

# PART III: EXHIBITS

State Timber Sale Contract  
No. 341-07-10  
Huff 'n Puff

EXHIBIT B

Page 1 of 3  
629-Form 341-203  
Revised 06/97

## OREGON DEPARTMENT OF FORESTRY

### TIMBER SALE OPERATIONS PLAN

(See Page 2 for instructions)



Date Received by STATE: \_\_\_\_\_

(5) State Brand Information (complete):

(1) Contract No.: 341-07-10

(2) Sale Name: Huff 'n Puff

(3) Contract Expiration Date: October 31, 2008

Project Completion Dates: October 31, 2007

(4) Purchaser: \_\_\_\_\_

(6) Purchaser Representatives:

Projects: _____	Phone: _____	Cell/Other Phone: _____	Home: _____
Projects: _____	Phone: _____	Cell/Other Phone: _____	Home: _____
Projects: _____	Phone: _____	Cell/Other Phone: _____	Home: _____
Projects: _____	Phone: _____	Cell/Other Phone: _____	Home: _____
Logging: _____	Phone: _____	Cell/Other Phone: _____	Home: _____
Logging: _____	Phone: _____	Cell/Other Phone: _____	Home: _____
Logging: _____	Phone: _____	Cell/Other Phone: _____	Home: _____
Logging: _____	Phone: _____	Cell/Other Phone: _____	Home: _____

(7) State Representatives:

Projects: _____	Phone: _____	Cell/Other Phone: _____	Home: _____
Logging: _____	Phone: _____	Cell/Other Phone: _____	Home: _____

(8) Name of Subcontractors & Starting Dates:

Projects: No(s) _____ - _____	Date: _____	Phone: _____
No(s) _____ - _____	Date: _____	Phone: _____
No(s) _____ - _____	Date: _____	Phone: _____
No(s) _____ - _____	Date: _____	Phone: _____
Logging: Felling _____	Date: _____	Phone: _____
Yarding: _____	Date: _____	Phone: _____

(9) Comments:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(10) Operations Map: Attach a copy of timber sale Exhibit A or other suitable map which plainly shows the items listed on the instruction sheet.

EXHIBIT B  
INSTRUCTION SHEET FOR OPERATIONS PLAN

**SUBMIT ONE COPY OF PLAN TO STATE**

Operations shall be limited to the work shown in the plan until a revised plan or supplemental plan is submitted covering additional work. Compliance with this plan is not in lieu of compliance with any federal requirements related to the federal Endangered Species Act. If STATE has prepared a required Forest Practices Act (FPA) "Written Plan" for operations, PURCHASER shall comply with all provisions of the Written Plan.

**Item No. (from Page 1)**

- (5) All sales require you to use a brand furnished by STATE. If the State brand has not been assigned when the plan is submitted, it will be furnished and assigned later. Complete drawing. If more than one brand is assigned to the sale, complete both drawings.
- (6) The contract requires you to have a designated representative available on the sale area or work location who is authorized to receive in your behalf any notice or instruction given by STATE and to take action in regard to performance under the contract. If logging and project work is widely separated, a representative is required for each.
- (7) The STATE representative will be designated when your plan is approved and is the person who will inspect and issue instructions regarding performance.
- (8) Show names of subcontractors to be used for any or all phases of the operations. If subcontractors are not known, or are changed later, give notification to the STATE representative prior to commencement of work by subcontractor.

Show projected dates for commencement of both projects and logging. If projected dates need to be changed at a later date, notification must be given to the STATE representative by supplemental plan or otherwise, prior to commencement of such operations.

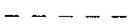
- (10) The STATE representative will furnish extra copies of Exhibit A of the contract for your use in preparing the operations map. The map shall use the following legend and show:
  1. Landing locations, approximate setting boundaries, and probable sequence of logging the settings. Number the settings in sequence.
  2. Locations of spur roads planned for construction, other than those required by the timber sale contract. Provide spur road specifications.
  3. Location of proposed tractor yarding roads. Show if and how marked on the ground.
  4. Location of temporary stream crossings.
  5. List the sequence of performing project work.
  6. Location of rock sources - attach pit development plans.



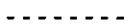
Cable landing, with numbers for sequence.



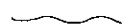
Tractor landing with alphabetical sequence.



Approximate setting boundary.



Spur truck roads.



Tractor yarding roads.



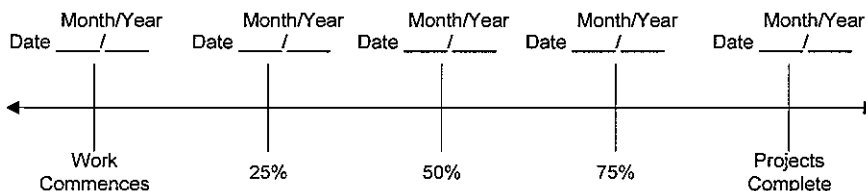
Temporary stream crossings.

EXHIBIT B  
OPERATIONS PLAN

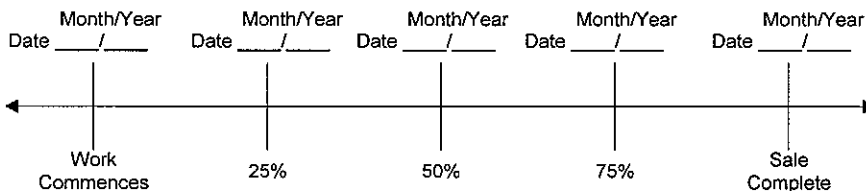
**Completion Timeline**

Indicate on the appropriate timeline below, the dates by which you plan to complete the work as required under this contract. The purpose of this section is to develop a plan that will ensure you complete the work as required, and meet the interim completion date(s) and contract expiration date. This plan is incorporated and made a part of the contract. When, in the opinion of STATE, operations are not commencing in a manner that meets the intent of this plan, you may be placed in violation of contract and your operations suspended until an amended plan is submitted and approved by STATE.

**Projects**



**Harvest & Other Requirements**



**The Federal Endangered Species Act (ESA) prohibits a person from taking any federally listed threatened or endangered species. Taking under the federal ESA may include alteration of habitat. STATE's approval of this plan does not certify that PURCHASER's operation under the plan is lawful under the federal ESA. As provided in the timber sale contract, PURCHASERS must comply with all applicable state, federal, and local laws.**

**PURCHASER's compliance with this plan is not in lieu of compliance with any federal requirements related to the federal Endangered Species Act.**

APPROVED: Date: \_\_\_\_\_

SUBMITTED BY:  
PURCHASER

STATE OF OREGON - DEPARTMENT OF FORESTRY

\_\_\_\_\_  
Title \_\_\_\_\_

\_\_\_\_\_  
Title \_\_\_\_\_

Original: Salem  
cc: District File  
Purchaser

EXHIBIT C

SCALING INSTRUCTIONS -- LOCATION APPROVAL -- BRAND INFORMATION

- (1) ORIGINAL REGISTRATION  Date \_\_\_\_\_  
 REVISION NUMBER \_\_\_\_\_  Date \_\_\_\_\_  
 CANCELLATION  Date \_\_\_\_\_

(2) TO: \_\_\_\_\_  
 (Third Party Scaling Organization)

(3) FROM: Astoria (04) Phone (503) 325-5451  
 (State Forestry District)  
 Address 92219 Hwy.202, Astoria, OR 97103

(4) PURCHASER: \_\_\_\_\_  
 Address \_\_\_\_\_

(12) SALE NAME Huff 'n Puff  
 COUNTY Clatsop

(13) STATE CONTRACT NUMBER 341-07-10

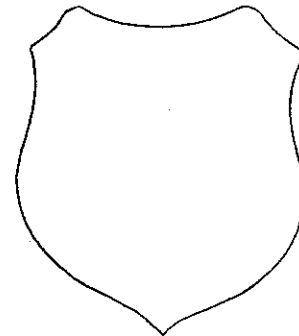
(14) SCALE: westside  eastside  cubic foot

(15) STATE BRAND REGISTRATION NUMBER \_\_\_\_\_

(16) BUREAU BRAND CODE NUMBER \_\_\_\_\_

(17) STATE BRAND INFORMATION:

(COMPLETE) ↓



(5) MINIMUM SCALING SPECIFICATIONS			CLASS		
SPECIES	SCALING DIAMETER INCHES	*NET SCALE VOLUME	PER MBF	** SUM	SUB
All Conifer	--	10	X		
All Hardwoods	--	10	X		

\* Apply minimum volume test to whole logs over 40' Westside; 20' Eastside.  
 \*\* Sum (if indicated): see instructions and explain in Item (20).

(6) WESTSIDE SCALE: YES  NO   
 Actual taper all logs over 40' scaling length

(7) EASTSIDE SCALE: YES  NO   
 \*Actual taper butt logs over 40' scaling length

(8) PENCIL BUCK YES  NO   
 back to Minimum Scaling Diameter \_\_\_\_\_

(9) ADD-BACK VOLUME -- YES  NO   
 Deductions due to delay

(18) PAINT REQUIRED: YES   
 COLOR Orange

(19) SPECIAL SCALES
PEELABLE CULL (all species)
UTILITY/PULP (all species)
<b>NO DEDUCTIONS ALLOWED FOR MECHANICAL DAMAGE</b>
OTHER: _____
OTHER: _____

(10) APPROVED SCALING LOCATIONS	Species	Yard	Truck

(20) REMARKS: All hardwood logs shall be scaled as sawlogs unless they meet either of the following requirements: (1) contain less than 30 net board feet, or (2) are smaller than 7 inches in gross scaling diameter. All hardwood logs that meet either requirement shall be scaled as "Utility."

(11) NOTICE OF CANCELLATION OF BRAND:  
 Effective Date: \_\_\_\_\_

Operator's Name (Optional inclusion by District): \_\_\_\_\_

(21) SIGNATURES:

\_\_\_\_\_  
 State Forester's Representative

\_\_\_\_\_  
 Purchaser or Authorized Representative Date

\_\_\_\_\_  
 State Forester Representative Date

**Notify the District within one hour when branding or painting is inadequate for quick identification, the receipts are missing, not correctly or completely filled out, and/or when logs presented for scaling are impossible to scale accurately.**

EXHIBIT C

INSTRUCTIONS FOR FORM 343-307 (rev. 5/01)

- (1) Check appropriate box. REVISION NUMBER requires comments. CANCELLATION requires Item (21). Complete date.
- (2) Designate Third Party Scaling Organization (TPSO). Send 4 copies to TPSO, 1 to purchaser, 1 to Salem, and keep such copies as to district needs.
- (3) State District office, address and phone.
- (4) Enter Purchaser's business name and address as it appears on the Contract.
- (5) Minimum Scaling Specifications. Review Section 2040 or 2045, "Log Removal," of the Contract. Species, or combined species can be separate entries. Information serves as a basis for scaling (see also Items (13) thru (17)), and is required to show existence on the sale. **PerM** (per MBF). **SUM** (lump sum material). **SUB** (submerchantable material. SUB, as used by the State, references that material containing at least 10 bf (net) but less than the lower merchantable net volume limit or grade requirements for other merchantable (PerM) entries. PerM, SUM, and Sub must be indicated by checking the appropriate column. Species with the same specifications and value are combined into one entry. PerM and Sub require scaling therefore complete specifications. SUM need not be scaled, hence no specifications. Loads containing only SUM are to be ticketed if so instructed in Item (19). Mixed loads of SUM, PERM and/or subspecies will always be scaled.
- (6) Westside -- actual taper segment scale. Check Yes or No. Special Service Rules on file with TPSO. See: Segment Scaling and Grading of Long Logs -- All Species -- State Forestry Department Scaling Practices (Westside).
- (7) Eastside -- actual taper/taper table segment scale. Special Service Rules on file with TPSO. See: Segment Scaling and Grading of Long Logs -- All Species -- State Forestry Department Scaling Practices (Eastside). Items with \* follow U.S. Forest Service Eastside rules.
- (8) Pencil Buck. Check NO if a westside sale, optional for eastside sales.
- (9) Add-Back Volume. Add-Back is normally checked YES. Scaler records deductions (sap rot, weather checks, etc.) caused by an abnormal delay in removal. Enter separately on scale ticket. TPSO provides State with summaries that include this as a net volume by species. Salvage sales and certain other circumstances may require that "NO" be checked.
- (10) Show scaling locations only applicable to TPSO. Not necessary to list markets. If all species are scaled at same location, enter "ALL."
- (11) When logging is complete, recall branding hammers, date and sign where indicated, check CANCELLATION box at top of form, and send to TPSO.
- (12) Enter sale name and county.
- (13) Enter sale Contract number.
- (14) Check Westside or Eastside log scale. Cubic foot refers to Northwest Log Rules Cubic Foot Scale.
- (15) Oregon Forest Products Brand Registry Number (optional).
- (16) DO NOT USE -- TPSO will fill in when applicable.
- (17) Show one brand only. Complete drawing. If more than one brand is assigned to the sale, (1) make separate form for each brand, and (2) on each form, explain and show other brand(s) under REMARKS, Item 19.
- (18) Check YES and designate orange.
- (19) Special Scales. These are the Special Scales that will be applied. If "Other" is indicated, please describe. Give comments in Item (19).
- (20) Use this space to designate weight conversion factors, or any other explanations to clarify scaling requirements. If additional scaling locations are approved, prepare another form showing all (old and new) locations. Check REVISION box at top of form and explain under remarks. Route as indicated.
- (21) Require purchaser to sign and date completed form.

EXHIBIT D  
 FOREST ROAD SPECIFICATIONS

SUBGRADE WIDTH	SURFACED WIDTH	POINT TO POINT	STATION TO STATION	DRAINAGE
16 feet	12 feet	1A to 1B	0+00 to 59+63	Ditch
16 feet	12 feet	1C to 1D	0+00 to 1+36	Ditch
16 feet	12 feet	1E to 1F	0+00 to 2+15	Ditch
16 feet	12 feet	1G to 1H	0+00 to 1+69	Ditch
16 feet	12 feet	1X to 1Y	0+00 to 8+83	Ditch
16 feet	12 feet	3A to 3B	0+00 to 5+90	Ditch
16 feet	12 feet	3C to 3D	0+00 to 5+35	Ditch
16 feet	12 feet	11 to 12	0+00 to 66+70	Ditch
16 feet	12 feet	13 to 14	0+00 to 134+05	Ditch
16 feet	12 feet	15 to 16	0+00 to 28+90	Ditch
16 feet	12 feet	17 to 18	0+00 to 39+75	Ditch
16 feet	12 feet	19 to 110	0+00 to 12+50	Ditch
16 feet	12 feet	111 to 112	0+00 to 7+90	Ditch
16 feet	12 feet	113 to 114	0+00 to 24+40	Ditch

**CLEARING.** This work shall consist of clearing, removing, and disposing of all trees, Snags, Down Timber, brush, surface objects, and protruding obstructions within the clearing limits.

Where clearing limits have not been marked, the clearing limits shall extend 5 feet back of the top of the cutslope and 5 feet out from the toe of the fill slope, or as directed by STATE. Clearing debris shall not be placed or permitted to remain in or under any road embankment sections. Clearing debris shall not be left lodged against standing trees.

All danger trees, leaners, and Snags outside the clearing limits which could fall and hit the road shall be felled.

**GRUBBING.** This work shall consist of the removal or digging out of stumps and protruding objects.

All stumps shall be completely removed within the limits of required grubbing. Stumps overhanging cutslopes shall be removed. Grubbing debris shall not be placed or permitted to remain in or under any road embankment sections. Grubbing debris shall not be left lodged against standing trees.

**GRUBBING CLASSIFICATION.**

New construction - From the top of the cutslope to the toe of the fill.

Improvements and reconstructions - 4 feet back from the shoulder of the subgrade or ditch, whichever is widest, or as marked in the field.

EXHIBIT D  
FOREST ROAD SPECIFICATIONS

CLEARING AND GRUBBING DISPOSAL. Scatter in stable locations through openings in the timber outside of the cleared right-of-way, except areas where end-haul is required. In areas where end-haul is required, clearing and grubbing debris shall be fully contained and hauled to a designated waste area. Do not place clearing and grubbing debris on side slopes exceeding 50 percent. Grubbing debris shall be left in a stable location, and not left lodged against standing trees.

EXCAVATION. Excavation and grading shall not be done when weather and/or ground conditions are such that damage will result to existing subgrade or cause excessive erosion.

Excavation shall conform to STATE-engineered lines, grades, dimensions, and plans when provided.

All suitable excavated material shall be used where possible for the formation of fills, shoulders, and drainage structure backfills. Embankment materials shall be free of woody debris, brush, muck, sod, frozen material, and other deleterious materials. All fills and drainage structure backfills shall be machine compacted according to the specifications in Exhibit D.

Unless road design plans show otherwise, all roads shall be on a balanced cross section, except when the slope is over 50 percent, the road shall be on full bench for the width specified.

Excess excavation shall not be sidecast where material will enter a stream course or where material will accumulate in areas deemed a high landslide hazard location by STATE.

ROAD WIDTH LIMITATIONS. PURCHASER shall obtain advance written approval from STATE to construct the road to a greater width than specified. Extra subgrade width shall be required for:

Fill Widening. Add to each fill shoulder 1 foot for fills 3 feet to 6 feet high; 2 feet for fills over 6 feet high.

Curve Widening. Widen the inside shoulder of all curves as follows: 400 divided by the radius of the curve equals the amount of extra width.

DRAINAGE

Subgrade. Subgrade shall be crowned at 4 to 6 percent ( $\frac{1}{2}$  inch per foot).

Ditch. Construct "V" ditch 3 feet wide and to a depth of 1 foot below subgrade.

Ditchouts. Construct ditchouts away from subgrade at locations marked in the field or as directed by STATE.

Outslope. Road subgrade shall be outsloped at 4 to 6 percent.

TURNOUTS. Increase roadbed width an additional 8 feet for both subgrade and surfacing. Length shall be at least 50 feet, or as staked on the ground, plus 25-foot approaches at each end.

Location: Intervisible but not greater than 750 feet apart and as marked in the field.

GRADING

	<u>Back Slopes</u>	<u>Fill Slopes</u>
Rock	Vertical to $\frac{1}{4}$ :1	Not steeper
Common - side slopes 50% and over	$\frac{3}{4}$ :1	than 1 $\frac{1}{2}$ :1
Common - side slopes less than 50%	1 :1	
Common - turnpike (level) section	2 :1	

Top of cutslope shall be rounded.

LANDINGS. Landings shall be constructed as posted in the field, no less than 50 feet wide and no more than 70 feet wide. Surface is to be crowned for drainage, with general grade no more than 3 percent. Surface as shown on Exhibit D.

TURNAROUNDS. Increase subgrade width an additional 20 feet for a length of 20 feet at locations marked in the field.

EXHIBIT D  
FOREST ROAD SPECIFICATIONS

SEASONAL WINTERIZATION. All unrocked roads or unfinished subgrades shall be waterbarred in accordance with specifications in Exhibit J, and blocked from vehicular traffic prior to October 1, annually and as directed by STATE.

GENERAL ROAD CONSTRUCTION INSTRUCTIONS

- (1) Excavated Materials. Excavated materials shall be utilized for road construction and hauled in where necessary. Surplus excavation materials shall be hauled to the waste areas as marked in the field and/or designated on Exhibit A. Surplus material from road segments 1C to 1D, 1E to 1F, and 1G to 1H, shall be utilized for road construction on segment 1A to 1B. Surplus excavated materials and waste materials shall be sloped and compacted for drainage. Fills shall be thoroughly compacted in accordance with Exhibit D.
- (2) Energy Dissipator Construction. Where rock is used for an energy dissipator, rock shall be placed below the culvert outlet and embedded for a minimum of 3 feet, in accordance with Exhibit I.
- (3) Equipment. All excavation and riprap placement shall be performed using a minimum 1½ cubic-yard, track-mounted excavator.
- (4) Engineered Road Structures. PURCHASER shall construct a professionally engineered Retaining Wall and a Geo-Grid Reinforced Fill that are sufficient to preserve slope stability on road segment 1A to 1B. These designs have been prepared by a Professional Engineer licensed in Oregon, and are on file at the Astoria District office. Prior to excavation, PURCHASER shall slope stake the construction areas to ensure proper location of the structures. STATE shall be notified a minimum of 48 hours prior to beginning the work. A Professional Engineer licensed in Oregon and approved by STATE shall supervise and inspect the construction work and issue STATE written certification upon completion of the project.
- (5) Subgrade Preparation and Application of Surfacing Rock.
  - (a) Complete culvert installations, drainage ditches, ditchouts, fill construction, and other specified work prior to the application of surfacing rock.
  - (b) Subgrade shall be crowned at 4 to 6 percent (½ inch per foot).
  - (c) Upon completion of above required work, apply, process, and compact surfacing rock in accordance with specifications in Exhibit D. Final road surface shall be crowned at 4 to 6 percent (½ inch per foot).

SPECIFIC ROAD CONSTRUCTION INSTRUCTIONS

<u>Segment</u>	<u>Station</u>	<u>Work Description</u>
1A to 1B	0+00	Point 1A
	1+30	Begin 80 foot radius curve.
	2+25	End curve.
	7+77	Begin full-bench and full containment.
	10+05	End full-bench and full containment.



EXHIBIT D  
FOREST ROAD SPECIFICATIONS

SPECIFIC ROAD CONSTRUCTION INSTRUCTIONS

<u>Segment</u>	<u>Station</u>	<u>Work Description</u>
1A to 1B (cont.)	13+08	Begin through fill.
	15+28	End through fill.
	15+65	Begin 60 foot radius curve. Begin full-bench and full containment.
	16+11	Begin landing construction left into bank.
	16+68	End curve.
	17+00	Transition out of landing.
	18+40	<u>Ultra Block Retaining Wall</u> . Begin construction of retaining wall.
	19+15	End construction of retaining wall.
	21+22	<u>Geo-Grid Reinforced Fill</u> . End full-bench and full containment. Start construction of geogrid reinforced through fill.
	24+80	End geogrid reinforced through fill.
	25+22	Point 1C. Begin full-bench and full containment.
	26+35	Begin 70 foot curve.
	26+88	End curve.
	29+17	End full-bench and full containment.
	34+04	Point 1E.
	36+03	Begin 100 foot radius curve. Begin full-bench and full containment.
	37+03	End curve. End full-bench and full containment.
	42+91	Construct landing. Daylight subgrade left and right.
	44+91	Point 1G. Begin full-bench and full containment.
	48+04	End full-bench and full containment.
	49+70	Begin full-bench and full containment.
	50+07	Begin 100 foot radius curve.
	52+50	End curve. End full-bench and full containment.
	56+90	Begin full-bench and full containment.

EXHIBIT D  
FOREST ROAD SPECIFICATIONS

SPECIFIC ROAD CONSTRUCTION INSTRUCTIONS

<u>Segment</u>	<u>Station</u>	<u>Work Description</u>
1A to 1B (cont.)	58+20	End full-bench and full containment. Transition into landing.
	58+60	Construct landing. Daylight subgrade left and right.
	59+63	Point 1B.

GENERAL ROAD IMPROVEMENT INSTRUCTIONS

- (1) Excavated Materials. Excavated materials shall be utilized for road and fill construction and hauled in where necessary. Surplus excavation materials shall be hauled to the waste areas as marked in the field and/or designated on Exhibit A. Waste materials shall be sloped and compacted for drainage. Fills shall be thoroughly compacted in accordance with Exhibit D.
- (2) Culvert Replacement, Culvert Installation, Fill Reconstruction, and Fill Removal. Existing culvert geometry shall be modified to provide for optimum drainage and culvert performance. Modifications may include, skewing the culvert and/or installing the culvert at gradients equal to or exceeding the drainage (or ditch) gradient. Where fill reconstruction or culvert replacement is specified, fills shall be excavated to natural stream course levels. All woody debris encountered during fill excavation shall be removed. All waste materials shall be hauled to nearby waste areas and shall be uniformly sloped and compacted for drainage. Waste materials shall be seeded and mulched in accordance with specifications in Exhibit K. Fill reconstruction backfill shall consist of select materials and may be obtained from borrow pits, as directed by STATE. Backfill materials shall be hauled in where necessary and thoroughly compacted in accordance with Exhibit D. Crushed rock shall be used for backfilling excavation trenches less than 3 feet deep. STATE may require the use of crushed rock for culvert bedding. Removed culverts shall be hauled to an approved refuse site off of STATE land.
- (3) Drainage Ditches. Restore or construct ditchlines, including ditchouts, as directed by STATE. Clean out all culvert inlets and outlets for a 10-foot radius. Re-establish or construct culvert sediment basins. Waste materials from drainage ditches and sediment basins shall not be pulled across existing surfacing rock, but shall be placed in nearby waste areas and uniformly sloped and compacted for drainage, as directed by STATE. Damaged culvert inlets and/or outlets shall be repaired by opening them with a hydraulic jack, or cutting off the culvert end to allow for free passage of water at peak flow levels. Install a culvert marker at each newly installed culvert and at each existing culvert that is missing a marker that could be reached by a grader blade.
- (6) Equipment. All excavation and riprap placement shall be performed using a minimum 1½ cubic yard, track-mounted excavator.
- (7) Subgrade Preparation and Application of Surfacing Rock.
  - (a) Complete culvert installations, drainage ditches, fill reconstruction, ditchouts, and other specified work prior to the application of new surfacing rock.
  - (b) Cut out all potholes and/or washboard sections from the existing surfacing.
  - (c) Apply required patching and leveling rock, as directed by STATE.

EXHIBIT D  
FOREST ROAD SPECIFICATIONS

GENERAL ROAD IMPROVEMENT INSTRUCTIONS

- (d) Process (grade and mix) the existing surfacing and added base rock. Provide for a crown of 4 to 6 percent, ( $\frac{1}{2}$  inch per foot), and compact in accordance with Exhibit D. Subgrade shall be crowned at 4 to 6 percent. Subgrade shall be crowned at 4 to 6 percent.
  - (e) Upon completion of above required work, apply, process, and compact surfacing rock in accordance with specifications in Exhibit D. Final road surface shall be crowned at 4 to 6 percent ( $\frac{1}{2}$  inch per foot).
- (8) Riprap Rock Use: When used for an energy dissipator, rock shall be placed below the culvert outlet and embedded for a minimum of 3 feet, in accordance with Exhibit I.

SPECIFIC ROAD IMPROVEMENT INSTRUCTIONS

<u>Segment</u>	<u>Station</u>	<u>Work Description</u>
I3 to I4	0+00	Point I3.
	124+15	Install culvert. Utilize 24 cubic yards of 1½ "-0" of crushed rock for culvert backfill. Construct energy dissipator utilizing 12 cubic yards of 24"-6" rip-rap rock.
	127+80	Construct energy dissipator utilizing 12 cubic yards of 24"-6" rip-rap rock.
	134+05	Point I4.
I7 to I8	0+00	Point I7.
	36+20	Repair culvert inlet.
	39+75	Point I8.
I11 to I12	0+00	Point I11.
	4+50	Construct turnout.
	6+65	Install culvert. Utilize 24 cubic yards of 1½ "-0" of crushed rock for culvert backfill.
	7+90	Point I12.
I13 to I14	0+00	Point I13.
	23+60	Install culvert. Utilize 24 cubic yards of 1½ "-0" of crushed rock for culvert backfill.
	24+40	Point I14.

EXHIBIT D  
 END-HAULING REQUIREMENTS

POINT TO POINT	STA. TO STA.	CONTAINMENT	WASTE AREA LOCATION	WASTE AREA TREATMENT
1A to 1B	7+77 to 10+05	1	1	1
1A to 1B	15+65 to 21+22	1	1	1
1A to 1B	25+22 to 29+17	1	1	1
1A to 1B	36+03 to 37+03	1	1	1
1A to 1B	44+91 to 48+04	1	1	1
1A to 1B	49+70 to 52+50	1	1	1
1A to 1B	56+90 to 58+20	1	1	1
1C to 1D	0+00 to 1+36	2	1	1
1E to 1F	0+00 to 2+15	2	1	1
1G to 1H	0+00 to 1+69	2	1	1
1X to 1Y	3+38 to 4+40	1	2	1

End-Haul Areas General Requirements

Material shall not be intentionally side cast.

Clearing and grubbing debris shall be end-hauled and burned.

When blasting is required, it shall be accomplished using timing devices, delayed charges, low intensity shots, or other suitable means to contain as much material as possible within the road prism.

Containment

- (1) Full containment: The amount of material lost over the outside edge of the road shall not exceed 6 inches in depth measured perpendicular to the natural ground slope. Pioneer excavation shall be removed by digging, loading, and hauling rather than by pushing or scraping methods.
- (2) Average containment: The amount of material lost over the outside edge of the road shall not exceed 12 inches in depth measured perpendicular to the natural ground slope.

Trees and stumps may have up to 12 inches of material directly above them. Any amount of material exceeding the containment requirements shall be removed by whatever means necessary and end-hauled to a designated waste area.

Waste Area Location

- (1) 1A to 1B – Utilize material for road construction on segment 1A to 1B.
- (2) 1X to 1Y - Utilize material for road construction on segment 1X to 1Y.

Waste Area Treatment

- (1) Utilize suitable material for fill construction and compact in accordance with specifications in Exhibit D.

EXHIBIT D  
 ROAD SURFACING

ROAD SEGMENT 1A to 1B				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	1A to 1B		0+00 to 59+63		
				Volume (CY) per		Number of		
Base Rock	4"-0" crushed		8	station	50	stations	59.63	2,982
Junctions	4"-0" crushed	1A	8	junction	40	junctions	1	40
Junctions	3/4"-0" crushed	1A	3	junction	20	junctions	1	20
Turnouts	4"-0" crushed	2+18, 27+17, 33+62	8	TO	22	TO's	3	66
Turnouts	4"-0" crushed	40+60, 48+85	8	TO	22	TO's	2	44
Turnouts	3/4"-0" crushed	2+18, 27+17, 33+62	3	TO	10	TO's	3	30
Turnouts	3/4"-0" crushed	40+60, 48+85	3	TO	10	TO's	2	20
Curve Widening	4"-0" crushed	1+30 to 2+25, 15+65 to 16+68	8	curve	36	curves	2	72
Curve Widening	4"-0" crushed	18+40 to 19+25, 26+35 to 26+88	8	curve	36	curves	2	72
Curve Widening	4"-0" crushed	36+03 to 37+03, 50+07 to 52+50	8	curve	36	curves	2	72
Curve Widening	3/4"-0" crushed	1+30 to 2+25, 15+65 to 16+68	3	curve	10	curves	2	20
Curve Widening	3/4"-0" crushed	18+40 to 19+25, 26+35 to 26+88	3	curve	10	curves	2	20
Curve Widening	3/4"-0" crushed	36+03 to 37+03, 50+07 to 52+50	3	curve	10	curves	2	20
Turnarounds	4"-0" crushed	44+20, 56+70	8	TA	24	TA's	2	48
Surface Rock	3/4"-0" crushed		3	station	19	stations	59.63	1,133
Energy Dissipators	24"-6" riprap	3+36, 9+65, 12+33	N/A	dissipator	12	dissipators	3	36
Energy Dissipators	24"-6" riprap	18+32, 20+71, 36+14	N/A	dissipator	12	dissipators	3	36
Retaining Wall Backfill	3/4"-0" crushed	18+40 to 19+15	N/A					858
Landings	4"-0" crushed	16+11	8	Landing	80	Landings	1	80
Landings	6"-0" pit-run	42+91, 1B	N/A	Landing	80	Landings	2	160
Total Rock for Road Segment:				1A to 1B				5,828
ROAD SEGMENT 1C to 1D				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	1C to 1D		0+00 to 1+36		
				Volume (CY) per		Number of		
Base Rock	4"-0" crushed		8	station	50	stations	1.36	68
Junctions	4"-0" crushed	1C	8	junction	24	junctions	1	24
Junctions	3/4"-0" crushed	1C	3	junction	10	junctions	1	10
Landings	6"-0" pit-run	1D	N/A	Landing	80	Landings	1	80
Total Rock for Road Segment:				1C to 1D				182

EXHIBIT D  
 ROAD SURFACING

ROAD SEGMENT 1E to 1F				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	1E to 1F		0+00 to 2+15		
				Volume (CY) per		Number of		
Base Rock	4"-0" crushed		8	station	50	stations	2.15	108
Junctions	4"-0" crushed	1E	8	junction	24	junctions	1	24
Junctions	3/4"-0" crushed	1E	3	junction	10	junctions	1	10
Landings	6"-0" pit-run	1F	N/A	Landing	80	Landings	1	80
Total Rock for Road Segment:				1E to 1F				222
ROAD SEGMENT 1G to 1H				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	1G to 1H		0+00 to 1+69		
				Volume (CY) per		Number of		
Base Rock	4"-0" crushed		8	station	50	stations	1.69	85
Junctions	4"-0" crushed	1G	8	junction	24	junctions	1	24
Junctions	3/4"-0" crushed	1G	3	junction	10	junctions	1	10
Landings	6"-0" pit-run	1H	N/A	Landing	80	Landings	1	80
Total Rock for Road Segment:				1G to 1H				199
ROAD SEGMENT 1X to 1Y				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	1X to 1Y		0+00 to 8+83		
				Volume (CY) per		Number of		
Base Rock	4"-0" crushed		8	station	50	stations	8.83	442
Junctions	4"-0" crushed	1X	8	junction	36	junctions	1	36
Turnouts	4"-0" crushed	4+50	8	TO	22	TO's	1	22
Curve Widening	4"-0" crushed	0+77 to 1+52	8	curve	24	curves	1	24
Energy Dissipators	24"-6" riprap	2+10, 7+70	N/A	dissipator	12	dissipators	2	24
Landings	6"-0" pit-run	4+50, 1Y	N/A	Landing	80	Landings	2	160
Total Rock for Road Segment:				1X to 1Y				708
ROAD SEGMENT 3A to 3B				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	1C to 1D		0+00 to 5+90		
				Volume (CY) per		Number of		
Base Rock	4"-0" crushed		8	station	50	stations	5.90	295
Junctions	4"-0" crushed	3A	8	junction	24	junctions	1	24
Landings	6"-0" pit-run	3B	N/A	Landing	80	Landings	1	80
Total Rock for Road Segment:				1C to 1D				399

EXHIBIT D  
 ROAD SURFACING

ROAD SEGMENT 3C to 3D				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	1E to 1F		0+00 to 5+35		
				Volume (CY) per		Number of		
Base Rock	4"-0" crushed		8	station	50	stations	5.35	268
Junctions	4"-0" crushed	3C	8	junction	24	junctions	1	24
Landings	6"-0" pit-run	1+86, 3D	N/A	Landing	80	Landings	2	160
Total Rock for Road Segment:				1E to 1F				452
ROAD SEGMENT 3E				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	1G to 1H		N/A		
				Volume (CY) per		Number of		
Landings	6"-0" pit-run	3E	N/A	Landing	80	Landings	1	80
Total Rock for Road Segment:				1G to 1H				80
ROAD SEGMENT I to I2				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	I1 to I2		0+00 to 66+70		
				Volume (CY) per		Number of		
Leveling Rock	3/4"-0" crushed		N/A					300
Surface Rock	3/4"-0" crushed		3	station	19	stations	66.70	1,267
Turnouts	3/4"-0" crushed		3	TO	10	TO's	8	80
Curve Widening	3/4"-0" crushed		3	curve	10	curves	2	20
Junctions	3/4"-0" crushed		N/A	junction	12	junctions	1	12
Total Rock for Road Segment:				I1 to I2				1,679
ROAD SEGMENT I3 to I4				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	I3 to I4		0+00 to 134+05		
				Volume (CY) per		Number of		
Leveling Rock	1 1/2"-0" crushed		N/A					600
Surface Rock	1 1/2"-0" crushed		3	station	19	stations	134.05	2,547
Turnouts	1 1/2"-0" crushed		3	TO	10	TO's	16	160
Curve Widening	1 1/2"-0" crushed		3	curve	10	curves	9	90
Junctions	1 1/2"-0" crushed		N/A	junction	12	junctions	7	84
Energy Dissipators	24"-6" riprap	124+15, 127+80	N/A	dissipator	12	dissipators	2	24
Culvert Backfill	1 1/2"-0" crushed	124+15	N/A	culvert	24	culverts	1	24
Total Rock for Road Segment:				I3 to I4				3,529

EXHIBIT D  
 ROAD SURFACING

ROAD SEGMENT I5 to I6				POINT TO POINT	Sta. to Sta.		TOTAL VOLUME (CY)	
Application	Rock Size and Type	Location	Depth of Rock (inches)	I5 to I6		0+00 to 28+90		
				Volume (CY) per		Number of		
Leveling Rock	4"-0" crushed		N/A				250	
Total Rock for Road Segment:			I5 to I6				250	
ROAD SEGMENT I7 to I8				POINT TO POINT	Sta. to Sta.		TOTAL VOLUME (CY)	
Application	Rock Size and Type	Location	Depth of Rock (inches)	I7 to I8		0+00 to 39+75		
				Volume (CY) per		Number of		
Leveling Rock	1 1/2"-0" crushed		N/A				200	
Surface Rock	1 1/2"-0" crushed		3	station	19	stations	39.75	755
Turnouts	1 1/2"-0" crushed		3	TO	12	TO's	4	48
Curve Widening	1 1/2"-0" crushed		3	curve	10	curves	4	40
Junctions	1 1/2"-0" crushed		3	junction	12	junctions	1	12
Total Rock for Road Segment:			I7 to I8				1,055	
ROAD SEGMENT I9 to I10				POINT TO POINT	Sta. to Sta.		TOTAL VOLUME (CY)	
Application	Rock Size and Type	Location	Depth of Rock (inches)	I9 to I10		0+00 to 12+50		
				Volume (CY) per		Number of		
Leveling Rock	4"-0" crushed		N/A				100	
Surface Rock	4"-0" crushed		6	station	38	stations	13	475
Total Rock for Road Segment:			I9 to I10				575	
ROAD SEGMENT I11 to I12				POINT TO POINT	Sta. to Sta.		TOTAL VOLUME (CY)	
Application	Rock Size and Type	Location	Depth of Rock (inches)	I11 to I12		0+00 to 7+90		
				Volume (CY) per		Number of		
Leveling Rock	1 1/2"-0" crushed		N/A				60	
Culvert Backfill	1 1/2"-0" crushed	6+65	N/A	culvert	24	culverts	1	24
Total Rock for Road Segment:			I11 to I12				84	
ROAD SEGMENT I13 to I14				POINT TO POINT	Sta. to Sta.		TOTAL VOLUME (CY)	
Application	Rock Size and Type	Location	Depth of Rock (inches)	I13 to I14		0+00 to 24+40		
				Volume (CY) per		Number of		
Leveling Rock	4"-0" crushed		N/A				120	
Surface Rock	4"-0" crushed		6	station	38	stations	24.40	927
Turnouts	4"-0" crushed		6	TO	17	TO's	2	34
Culvert Backfill	1 1/2"-0" crushed	26+60	N/A	culvert	24	culverts	1	24
Total Rock for Road Segment:			I13 to I14				1,105	



EXHIBIT D  
 ROAD SURFACING

ROAD SEGMENT: Flagpole Stockpile Site				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size And Type	Location	Depth of Rock (inches)	Stockpile Site		n/a		
				Volume (CY) per		Number of		
Stockpile Floor	6"-0" Pit run		12	Station	75	Stations	n/a	645
Total Rock for Road Segment:				Flagpole Stockpile Site				645
ROAD SEGMENT: Point 4(A) (FRY CREEK)				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size and Type	Location	Depth of Rock (inches)	4A		0+00 to 1+00		
				Volume (CY) per		Number of		
Base Rock & FW	4"-0" Crushed		8	Station	57	Stations	0.85	48
Surf. Rock & FW	1½"-0" Crushed		4	Station	28	Stations	0.85	24
Bridge Deck	1½"-0" Crushed					Stations	0.15	12
Bridge Footings	1½"-0" Crushed	4A	12	Footing	6	Footings	2	12
Fill Armor	24"-6" Riprap	4A						156
Str. Bank Armor	24"-6" Riprap	4A						60
Total Rock for Road Segment:				4A				312
ROAD SEGMENT: Point 4(B) (HOPPINHOME)				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size And Type	Location	Depth of Rock (inches)	4B		0+00 to 1+00		
				Volume (CY) per		Number of		
Base Rock & FW	4"-0" Crushed		8	Station	72	Stations	1	72
Surf. Rock & FW	1½"-0" Crushed		4	Station	36	Stations	1	36
Culvert Bedding	1½"-0" Crushed	4B	12					36
Culvert Backfill	1½"-0" Crushed	4B						408
Retent. Boulders	36"-12" Riprap	4B						24
Fill Armor	24"-6" Riprap	4B						96
Str. Bank Armor	24"-6" Riprap	4B						24
Total Rock for Road Segment:				4B				696
ROAD SEGMENT: Point 4(C) (Spur 27)				POINT TO POINT		Sta. to Sta.		TOTAL VOLUME (CY)
Application	Rock Size And Type	Location	Depth of Rock (inches)	4C		0+00 to 1+25		
				Volume (CY) per		Number of		
Base Rock	4"-0" Crushed		8	Station	52	Stations	1.15	60
Surface Rock	1½"-0" Crushed		4	Station	31	Stations	1.15	36
Bridge Deck	1½"-0" Crushed						0.10	24
Bridge Footings	1½"-0" Crushed		12	Footing	6	Footings	2	12
Fill Armor	24"-6" Riprap							228
Str. Bank Armor	24"-6" Riprap							72
Total Rock for Road Segment:				4C				432

ROCK TOTALS (CY)	36"-12"	24"-6"	6"-0"	4"-0"	1 1/2"-0"	3/4"-0"
18,431	24	756	1,525	7,028	5,268	3,830

Roads shall be uniformly graded and approved by STATE prior to rocking.

EXHIBIT D  
ROCK ACCOUNTABILITY

The rock shall meet the quality and size specifications in Exhibit G. A sample of the rock shall be supplied to STATE for testing and approval prior to rocking. PURCHASER shall obtain subgrade approval from STATE prior to rocking. Rocking shall be limited to periods when weather conditions are acceptable to STATE and when sediments will not enter streams.

Rock accountability shall be determined by the following methods, as directed by STATE. STATE shall be given 24 hours' notice prior to rocking.

Rock Checking. All rock spreading shall be done only when a STATE representative is present. STATE shall issue a receipt for each load delivered, and rock shall be measured without allowance for shrinkage or shakedown during hauling. Total truck measure volume for each road segment shall be as shown on Exhibit D. Deliver at least 600 cubic yards per 8-hour shift, unless otherwise approved by STATE. A penalty of \$10 for each 10 cubic yards which are not delivered during a single shift shall be billed, and payment shall be required prior to final acceptance of the project by STATE.

Depth Measurement. Rock shall be spread and compacted according to the depths specified in Exhibit D. Truck measure volumes are given, but shall not limit the amount of rock spread.

Depth shall be determined in the most compacted area of the surface cross section. If additional rock is required because of insufficient depth, it shall be added by truck measure to those areas that were slighted. The conversion from compacted yardage to truck yardage is 1.3 multiplied by the compacted yardage equals truck yardage.

The depth of compacted aggregates shall not vary more than 1 inch from the depth specified in Exhibit D. The average depth for each road segment shall be the specified depth or greater. Surfacing areas shall be staked by STATE.

Load Records. Notify STATE before spreading the rock and maintain a record of all rock delivered for spreading. Make the record available for STATE inspection. A report listing the amount of rock delivered the prior month must be submitted no later than the 15th of each month.

EXHIBIT D

COMPACTION AND PROCESSING REQUIREMENTS

Subgrade. Subgrade surfaces of the road segments listed below shall be graded and compacted prior to rocking. Compaction shall be accomplished by traveling all surfaces from shoulder to shoulder until visible deformation ceases, or in the case of a sheepsfoot roller, the roller "walks out." At least 3 passes shall be made over the entire width and length of the road. A pass is defined as traveling a road section in one direction and then back over that same section again. Compaction shall be accomplished by using one or more of the approved equipment options listed below:

Subgrade shall be crowned at 4 to 6 percent unless otherwise specified.

ROAD SEGMENT	COMPACTION EQUIPMENT OPTIONS
All road segments that require rock surfacing.	1

Fills. Embankments and fills shall be placed in (approximately) horizontal layers not more than 8 inches in depth. Each layer shall be separately, and thoroughly, compacted. Compaction equipment shall be operated over the entire width of each layer until visible deformation of the layers ceases or, in the case of a sheepsfoot roller, the roller "walks out." At least 3 passes shall be made over the entire width and length of each layer. A pass is defined as traveling a fill layer in one direction and then back over that same layer again.

Placing individual rocks or boulders with more depth than the allowed layer thickness shall be Permitted, provided the embankment will accommodate them. Such rocks and boulders shall be at least 6 inches below the subgrade. They shall be carefully distributed and the voids filled with finer material, forming a dense and compacted mass. Compaction shall be accomplished by using one or more of the approved equipment options listed below:

ROAD SEGMENT	COMPACTION EQUIPMENT OPTIONS
All road segments	1, 2, or 3; and 4

Crushed Rock. The rock shall be uniformly mixed and spread in layers on the approved roadbed. Each layer of crushed rock shall be moistened or dried to uniform moisture content suitable for maximum compaction and compacted in layers not to exceed 6 inches in depth. When more than 1 layer is required, each shall be shaped and compacted before the succeeding layer is placed. Any irregularities or depressions that develop during compaction of the top layer shall be corrected by loosening the material at these places and adding or removing material until the surface is smooth and uniform. Each layer shall be compacted with a minimum of 3 passes over the entire width and length of the road. A pass is defined as traveling a road section in one direction and then back over that same section again. Compaction shall be accomplished by using one or more of the approved equipment options listed below:

Rock shall be compacted and processed during the same project period it is spread, unless otherwise approved in writing by STATE.

Rock shall be crowned at 4 to 6 percent unless otherwise specified.

ROAD SEGMENT	COMPACTION EQUIPMENT OPTIONS
All road segments requiring crushed rock	1

EXHIBIT D

COMPACTION EQUIPMENT OPTIONS

- (1) Vibratory Rollers. The drum shall have a smooth surface, a diameter not less than 48 inches, a width not less than 58 inches, and a turning radius of 15 feet or less. Vibration frequency shall be regulated in steps to 1400, 1500, and 1600 VPM, corresponding to engine speeds of 1575, 1690, and 1800 RPM. The centrifugal force developed shall be 7 tons at 1600 VPM. It shall be activated by a power unit of not less than 25 horsepower. The vibratory roller shall be self-propelled and operated at speeds ranging from 0.9 miles to 1.8 miles per hour, as directed by STATE.
- (2) Rubber-Tired Skidders. A rubber-tired skidder weighing a minimum of 20,000 pounds shall be operated over the fill layers so that the entire layered surface comes in contact with the tires. Skidders with oversized tires (high flotation) are not acceptable for compaction.
- (3) Tampingfoot Compactors. Tampingfoot or sheepsfoot compactors shall exert a minimum pressure of 250 pounds per square inch on the ground area in contact with the tamping feet. The compactor shall cover a minimum width of 60 inches per pass and weigh a minimum of 16,000 pounds.
- (4) Vibratory Hand-Operated or Backhoe-Mounted Tamper. Vibratory hand-held or hydraulic tampers shall be used for compaction of backfill materials around culverts (and/or bridge approach embankment materials around abutments). The tamper shoe dimensions shall be a minimum of 10" X 13" and capable of a centrifugal force of 2,250 pounds.

EXHIBIT E  
CULVERT SPECIFICATIONS

All culvert materials shall be furnished and installed by PURCHASER, unless otherwise specified in the Contract. All culverts shall be constructed of corrugated double-walled polyethylene, or corrugated aluminized steel except for Culvert No. 14, which shall be constructed of 10 gauge, corrugated aluminized steel. Polyethylene culverts shall meet the requirements of AASHTO M-294-901, Type S. This specification applies to high density polyethylene corrugated pipe with an integrally formed smooth interior. Aluminized steel culverts shall be constructed of corrugated aluminized Type 2 steel. All culverts shall conform to the material and fabricating requirements of the "Standard Specifications for Highway Construction" prepared by the Highway Division of the Oregon State Department of Transportation. Corrugation types and shapes other than those meeting the above minimum Highway requirements, shall be approved in writing by STATE.

Culverts shall be located according to the alignment and grade as shown on the Plan and Profile, and/or as staked in the field, or as stipulated in special instructions.

The STATE Representative shall determine final culvert locations and stake the locations in the field prior to installation.

Culvert grade shall slope away from ditch grade at least 2 percent unless otherwise specified.

The foundation and trench walls for all culverts shall be free from logs, stumps, limbs, stones, and other objects which would dent or damage the pipe. The culvert trench shall be excavated 3 pipe diameters wide to Permit compaction and working on each side of the pipe. Tamping shall be done in 6-inch lifts, 1 pipe diameter each side of the pipe to 95 percent density or over. Bedrock shall be excavated as required to provide a uniform foundation for the full length of the culvert.

A bedding of granulated material or crushed rock as specified shall be placed to provide a wide band of support and to transmit the load from above evenly over the entire length of the pipe.

Backfill shall consist of granulated material, crushed rock, or job-excavated soil free of stumps, limbs, rocks, or other objects which would damage the pipe.

Transporting of the pipe shall be done carefully. Dragging or allowing free fall from trucks or into trenches shall not be Permitted.

Joining shall be done with bands of like material and corrugations. Manufacturers' instructions shall be followed for prefabricated pipe assembly.

Polyethylene joints shall be made with split couplings, corrugated to engage the pipe corrugations, and shall engage a minimum of 4 corrugations, 2 on each side of the pipe joint.

A manufacturer's certification that the product was manufactured, tested, and supplied in accordance with this specification shall be furnished to the Project Engineer upon request.

EXHIBIT E  
 CULVERT SPECIFICATIONS

Minimum height of cover over top of culvert to subgrade when road is to be rocked shall be as follows: 12" for culverts 18" to 36" and 18" for culverts 42" to 96" (add 6" for roads which will not be rocked). Minimum vertical cover for other designs shall be as specified by STATE.

Lengths of individual culvert sections shall be not less than 10 feet, unless otherwise provided for in special instructions.

The ends of each culvert shall be free of logs and debris which would restrict the free flow of water. The intake end of relief culverts shall be provided with a sediment catching basin 3 feet in diameter at the bottom. The outlet end of any culvert which would allow water to erode embankment soil shall be provided with an energy dissipator, half round, or other approved slope protection device. Construct lead-off ditches away from culvert outlets where the slope gradients restrict the free flow of water.

Following are the minimum standard gauges for pipe and coupling bands. Some culverts may require different gauges and may be found in the culvert listing.

Dia.	Steel Pipe Gauge	Band Gauges	Band Widths ("")			Hugger Band Widths ("")	
			Annular	Helical	Dimpled	Annular	Helical
12-15	16 (0.0598")	16	7	12	12	13 1/8	10 1/2
18-24	16 (0.0598")	16	12	12	12	13 1/8	10 1/2
30-36	16 (0.0598")	16	12	12	12	13 1/8	10 1/2
42	14 (0.0747")	16	12	12	NA	13 1/8	10 1/2
48	12 (0.1046")	16	24	24	NA	13 1/8	10 1/2
54	14 (0.0747")	16	24	24	NA	13 1/8	10 1/2
60	12 (0.1046")	16	24	24	NA	13 1/8	10 1/2
66-72	12 (0.1046")	16	24	24	NA	13 1/8	10 1/2
78	12 (0.1046")	16	24	24	NA	13 1/8	10 1/2
84	12 (0.1046")	16	24	24	NA	14 3/4	10 1/2
90-120	12 (0.1046")	16	26	26	NA	NA	NA

Culverts larger than 60" in diameter shall have 3" x 1" corrugations.

Culverts 36 inches in diameter or larger shall have 1:1 beveled inlets.

Tamping is required.

All removed culverts shall be hauled to an approved refuse site off of STATE land.

The intake ends of culverts in fills less than 3 feet shall be marked by driving white fiberglass posts within 6 inches of the downgrade side. Posts shall be a minimum of 6 feet long and 2 1/2 inches wide, with the spade driven 2 feet into the ground.

EXHIBIT E  
 CULVERT LIST

CULVERT NO.	DIAMETER (Inches)	LENGTH (Feet)	ROAD SEGMENT POINT TO POINT	STATION
1	18	60	1A to 1B	0+10
2	18	30	1A to 1B	3+36
3	18	30	1A to 1B	9+65
4	18	44	1A to 1B	12+33
5	18	30	1A to 1B	18+32
6	18	30	1A to 1B	20+71
7	18	44	1A to 1B	36+14
8	18	30	1X to 1Y	2+10
9*	24	70	1X to 1Y	5+60
10	18	30	1X to 1Y	7+70
11	18	40	I3 to I4	124+15
12	18	40	I11 to I12	6+65
13	18	40	I13 to I14	23+60
14*	120" CSP al. ctd.	72	Point 4B	

\*Indicates culverts that do not require markers.

EXHIBIT F

ROCK QUARRY DEVELOPMENT AND USE

- (1) PURCHASER shall prepare a written development plan for the quarry area. The plan shall be submitted to STATE for approval prior to conducting any operation in the quarry area. The plan shall include, but not be limited to:
  - (a) Location of benches and roads to benches.
  - (b) Disposal site for woody debris, overburden and reject material.
  - (c) Time lines for rock quarry use.
  - (d) Erosion Control measures.
- (2) PURCHASER shall schedule and coordinate quarry and stockpile usage with other existing or planned activity requiring quarry or stockpile usage. PURCHASER shall notify STATE 5 days prior to the start of quarry development activities.
- (2) The quarry site shall be left in a condition free from overburden and debris. Access roads to the quarry, and the quarry floor, shall be cleared at the termination of use. Overburden shall be removed for a distance of 20 feet beyond the developed rock source.
- (3) PURCHASER shall conduct the operation relative to the disposal of waste material in such manner that silt, rock, debris, dirt, or clay shall not be washed, conveyed, or otherwise deposited in any stream.
- (4) At the Flagpole Quarry and stockpile site, fall all timber within the posted right of way boundary and deck all merchantable timber, as directed by STATE. The timber is property of Longview Fibre Company. All woody debris, including stumps and slash shall be hauled to the designated waste area and piled, as directed by STATE.
- (5) All overburden and reject material from the rock source development shall be hauled to the designated waste area shown on Exhibit F and utilized as directed by STATE prior to constructing the stockpile site.
- (6) Controlled blasting techniques shall be utilized for any blasting operations, and shall be accomplished using timing devices, delayed charges, low intensity shots, or other suitable means to contain as much material as possible within the quarry development area. PURCHASER shall maintain a comprehensive blasting log that contains all pertinent data for all blasting operations. The blasting log shall be submitted to the STATE after the completion of all blasting activity. The blasting log is intended for STATE record keeping purposes only.
- (7) Existing benches shall be used, extended, and uniformly developed during quarry development. New benches shall be constructed at intervals of 40 feet or less in height and shall be a minimum of 20 feet in width. Any gravel or talus slopes shall be left with a working face at an angle of 60 degrees or less.
- (8) Quarry face shall be developed in a uniform manner. All quarry backslopes shall be left in a stable condition.
- (9) Oversized material that is produced or encountered during development shall be broken down and utilized for crushing as directed by STATE.
- (10) The quarry floor shall be developed to provide for drainage away from the quarry. All quarry and stockpile site drainage ditches shall be maintained. Quarry access roads shall be cleared and blocked upon completion of quarry use as directed by STATE.

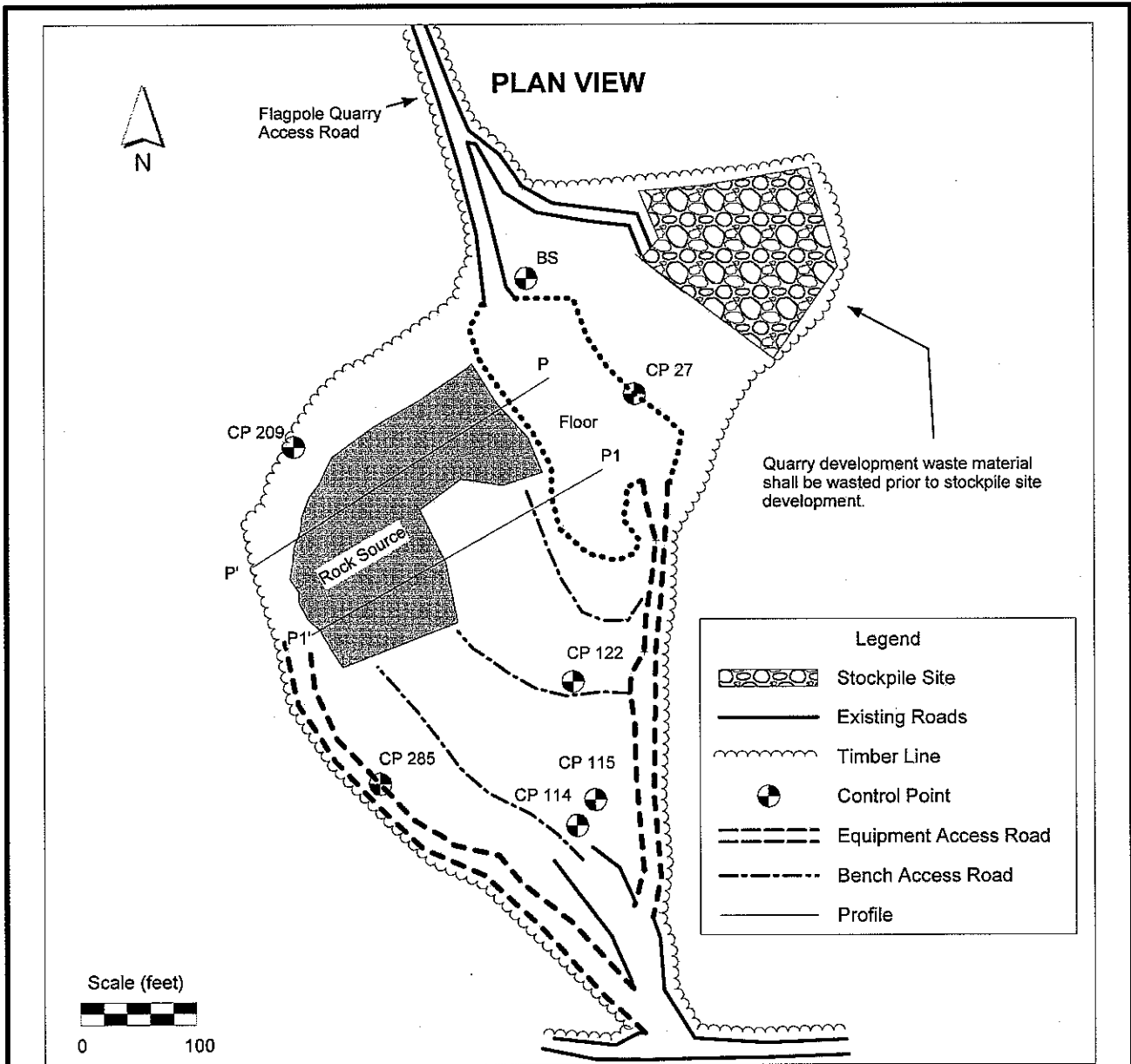


EXHIBIT F

ROCK QUARRY DEVELOPMENT AND USE

- (11) Proper winterization and storm-water control measures such as water barring, drainage, utilization of filter bales, mulching and/or blocking access shall be utilized and such measures maintained to protect the watershed and project work, as directed by STATE.
- (13) Construct the Flagpole Stockpile site, as shown on Exhibit F. Stockpile site shall be surfaced with 6"-0" pit-run rock a minimum of 8 inches deep and shall be sloped for drainage. Compaction of the Stockpile site shall be in accordance with Exhibit D. The finished area of the Stockpile site shall not exceed 0.4 acres and shall be constructed as directed by STATE.

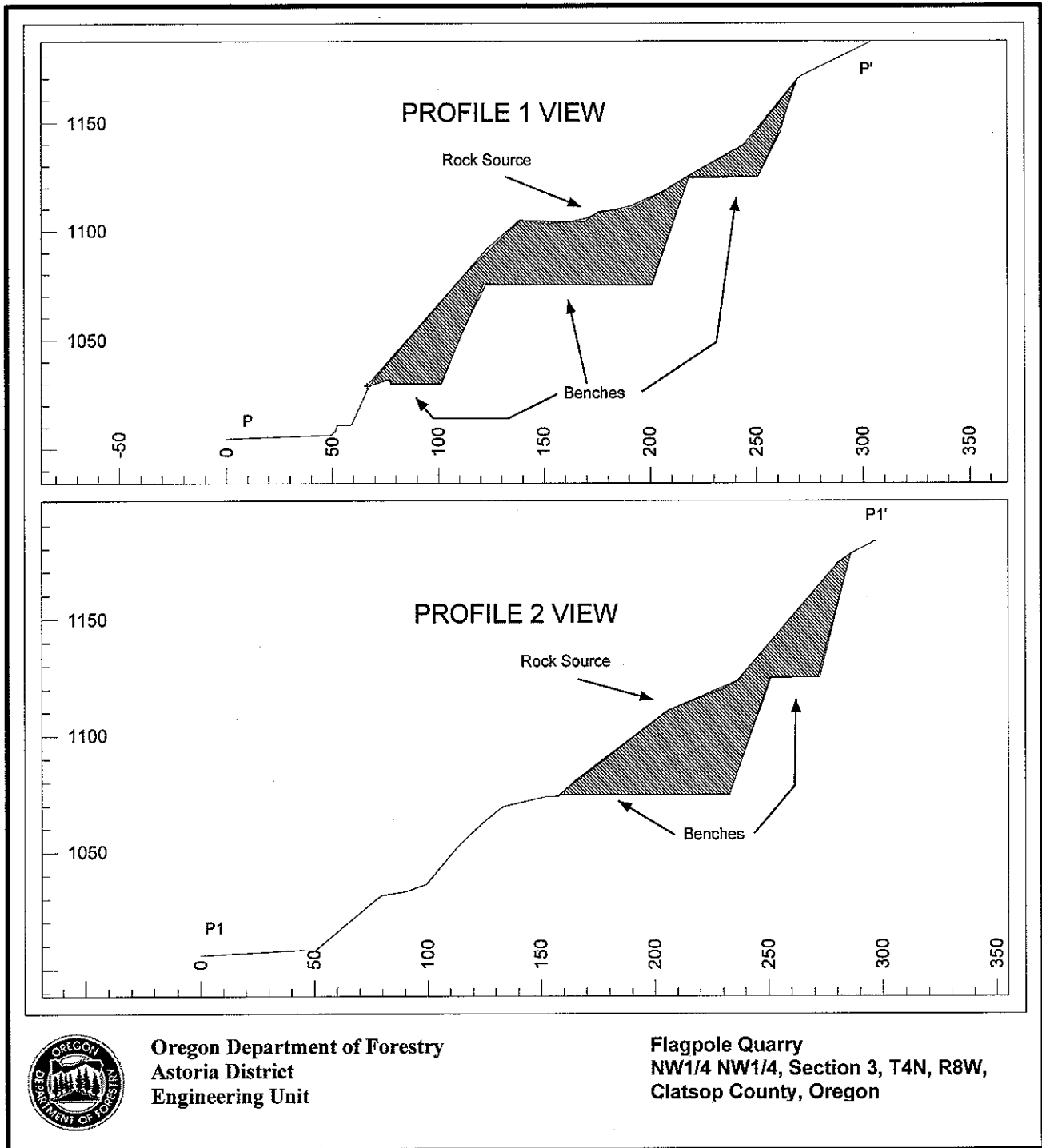
EXHIBIT F  
ROCK QUARRY DEVELOPMENT AND USE



Oregon Department of Forestry  
Astoria District  
Engineering Unit

Flagpole Quarry  
NW1/4 NW1/4, Section 3, T4N, R8W,  
Clatsop County, Oregon

EXHIBIT F  
ROCK QUARRY DEVELOPMENT AND USE



Oregon Department of Forestry  
Astoria District  
Engineering Unit

Flagpole Quarry  
NW1/4 NW1/4, Section 3, T4N, R8W,  
Clatsop County, Oregon

EXHIBIT G  
CRUSHED ROCK SPECIFICATIONS

Materials. The material shall be fragments of rock or other hard, durable particles crushed to the required size and a filler of finely crushed stone, sand, or other finely divided mineral matter. The material shall be free from vegetation and lumps of clay. STATE may require screening and/or rejecting of materials utilized for production of crushed rock for the purpose of removing excess fines or dirt.

Quality and Grading Requirements. The stone base materials shall be crushed rock, including sand. River gravel shall not be used.

The material from which base material is produced or manufactured shall conform to the general requirements of Section 2630 of the "Standard Specifications for Highway Construction" prepared by the Highway Division, Oregon Department of Transportation, and shall meet the following test requirements:

Hardness - Test Method AASHTO T 96 35% Maximum

Durability - Test Method OSHD Standard  
Passing No. 20 Sieve: 30% Maximum  
Sediment Height: 3" Maximum

<u>For 3/4"-0"</u>	Passing	1" sieve	100%
	Passing	3/4" sieve	90-100%
	Passing	3/8" sieve	55-75%
	Passing	1/4" sieve	40-60%

Of the fraction passing 1/4" sieve, 40% to 60% shall pass the No. 10 sieve.

<u>For 1½"-0"</u>	Passing	2" sieve	100%
	Passing	1½" sieve	95-100%
	Passing	3/4" sieve	60-85%
	Passing	1/4" sieve	35-50%

Of the fraction passing 1/4" sieve, 40% to 60% shall pass the No. 10 sieve.

<u>For 4"-0"</u>	Passing	5" sieve	100%
	Passing	4" sieve	90-100%
	Passing	2" sieve	55-75%
	Passing	1/4" sieve	15-35%

The referenced sieve shall have square openings as set forth in AASHTO M 92, Woven Cloth Series. The determinations of size and gradings shall be as set forth in AASHTO T 27.

EXHIBIT G

PIT-RUN AND RIPRAP ROCK SPECIFICATIONS

<u>For 6"-0" Pit-Run</u>	Passing	10" sieve	100%
	Passing	6" sieve	65%

Control of gradation shall be by visual inspection by STATE.

For 24"-6" Riprap. A minimum of 50 percent or more of the material shall measure at least 24 inches, measured in one dimension. Material shall be clean, well graded, and free of 2"-0" fines.

Control of gradation shall be by visual inspection by STATE.

For 36"-6" Riprap. A minimum of 50 percent or more of the material shall measure at least 24 inches, measured in one dimension. Material shall be clean, well graded, and free of 2"-0" fines.

Control of gradation shall be by visual inspection by STATE.

EXHIBIT H

STREAM CROSSING STRUCTURE SPECIFICATIONS  
Project No. 4, - Points 4A and 4C

PURCHASER shall design and construct two open bottom concrete slab culverts that are sufficient to preserve a natural stream channel width of 15 feet for Point 4A and 10 feet for Point 4C.

These specifications require a fully engineered prefabricated concrete slab deck culvert of pre-cast conventionally reinforced concrete construction. Structural members shall be designed in accordance with AASHTO LRFD Bridge Design Specifications, 1998 (Modified). Welding and weld procedure qualification tests shall conform to the provisions of ANSI/AWS D1.1 "Structural Welding Code", 1996 Edition and/or CWB – CSA W59.

The structures shall be designed for E80 vehicle loads. All designs shall be prepared by a Professional Engineer licensed in Oregon and approved by STATE.

The stream crossing structures shall maintain the existing alignment and width of the road. STATE has performed a site survey for the purposes of displaying the road and stream locations and is shown on pages 5, 6, 7, 10, 11, and 12.

Retaining curbs shall be designed to accommodate and retain roadway embankments. Footings shall extend a minimum of 2 feet below the predicted natural stream bottom elevations and prevent the scour of any substructure, footing or roadway embankment. Riprap rock shall be utilized to armor and protect road approach embankments.

PROJECT PLANS. PURCHASER shall submit plans to STATE for approval, prior to commencement of any work on the project. The plans shall include design calculations, scaled drawings, elevations and section drawings for the structure, including sizes and dimensions of components. The plans shall also include a description of special tools, equipment, the required lifting capacity and the general process to install and connect the components. Plans must contain erosion control measures, site de-watering measures and all information necessary for the administration and inspection of the project by STATE. The plans shall be stamped and signed by a professional engineer licensed in Oregon.

GENERAL CONSTRUCTION SPECIFICATIONS

- (a) Work shall be conducted only during periods of low water flows and between July 1 and September 15, annually. STATE shall be notified a minimum of 48 hours prior to beginning the work. STATE has prepared a FPA "Written Plan" for this work.
- (b) Remove the existing embankment and culverts to accommodate the work area for stream crossing construction. Existing embankment(s) shall be excavated to the natural stream course level. All woody debris encountered during excavation shall be removed. Excavated debris and materials unsuitable for embankment construction shall be end hauled to the designated waste area, as directed by STATE. The existing, removed culverts shall be hauled to an approved refuse site off of STATE land.
- (c) Waste materials shall be sloped for drainage and stability, as directed by STATE. Prior to hauling waste materials, the waste area shall be cleared of large woody debris. The debris shall be piled adjacent to the waste area. All exposed excavation areas and waste materials shall be mulched with straw. Applied mulch shall be a minimum of 2 inches deep and provide a uniform cover. Large woody debris shall be redistributed over the waste area after all waste materials have been hauled.
- (d) Construct the concrete open bottom slab culvert and the approach embankments in accordance with approved plans. The approach embankments shall consist of 4"-0" crushed rock and/or select materials, hauled in where necessary. Embankment materials shall be thoroughly compacted in accordance with Exhibit D.

EXHIBIT H

STREAM CROSSING STRUCTURE SPECIFICATIONS  
Project No. 4. - Point 4A and 4C

GENERAL CONSTRUCTION SPECIFICATIONS

- (e) Oil spill response materials shall be on site before the work begins.
- (f) A minimum 2 cubic-yard, track-mounted excavator shall be used for all excavation, stream channel development, and riprap placement.
- (g) All joints of the concrete members shall be sealed and filled with a construction sealant to prevent material from entering the stream.

SPECIFIC CONSTRUCTION INSTRUCTIONS 4A (FRY CREEK)

- (a) Construct stable foundation bases for footings and back walls by utilizing a minimum of 12 cubic yards of 1½"-0" crushed rock and enclosed in geotextile fabric and compacted.
- (b) Utilize a minimum of 156 cubic yards of 24"-6" riprap rock for embankment armor, and 60 cubic yards of 24"-6" riprap rock for stream bank armor. Riprap rock shall be placed and tamped at a 1½:1 slope, beginning at the fill toes.
- (c) Utilize a minimum of 5 cubic yards of 4"-0" crushed rock and on site cobble to construct new stream channel.
- (d) Upon completion of the above required work, apply, process, and compact surfacing rock in accordance with Exhibit D. Utilize a minimum of 48 cubic yards of 4"-0" crushed base course rock and 36 cubic yards of 1½"-0" crushed surface course rock to provide for a minimum road surface width of 14 feet and to provide for a smooth and uniform transition from the existing roadway across the structure.

The Engineer shall supervise and inspect the construction work and issue STATE written certification upon completion of the project.

SPECIFIC CONSTRUCTION INSTRUCTIONS 4C (SPUR 27)

- (a) Construct stable foundation bases for footings and back walls by utilizing a minimum of 12 cubic yards of 1½"-0" crushed rock and enclosed in geotextile fabric and compacted.
- (b) Utilize a minimum of 228 cubic yards of 24"-6" riprap rock for embankment armor, and 72 cubic yards of 24"-6" riprap rock for stream bank armor. Riprap rock shall be placed and tamped at a 1½:1 slope, beginning at the fill toes.
- (c) Utilize a minimum of 15 cubic yards of 4"-0" crushed rock and on site cobble to construct new stream channel.
- (d) Upon completion of the above required work, apply, process, and compact surfacing rock in accordance with Exhibit D. Utilize a minimum of 60 cubic yards of 4"-0" crushed base course rock and 60 cubic yards of 1½"-0" crushed surface course rock to provide for a minimum road surface width of 14 feet and to provide for a smooth and uniform transition from the existing roadway across the structure.

The Engineer shall supervise and inspect the construction work and issue STATE written certification upon completion of the project.

EXHIBIT H

TYPE "F" CULVERT INSTALLATION SPECIFICATIONS  
Project No. 4. - Point 4B

- (1) Type "F" stream fill reconstruction must allow free passage of fish as provided in the Oregon Forest Practice Rules. Modifications of the existing culvert geometry shall be required to allow free passage of fish.
- (2) Work shall be conducted only during periods of low water flows and between July 1 and September 15, annually. STATE shall be notified a minimum of 48 hours prior to beginning work. STATE has prepared the required FPA "Written Plan" for this work. Oil Spill response materials shall be on site before the work begins.
- (3) A minimum 2 cubic-yard, track-mounted large class excavator shall be used for all excavation, stream channel development, and riprap placement. Use of an on site hydraulic rock hammer may be required for the breaking of rock strata encountered during the development of the culvert bed.
- (4) Excavated debris and soil materials unsuitable for fill construction shall be hauled to the Waste Areas as shown on Exhibit A. All woody debris encountered during excavation shall be removed and hauled to the waste area. The existing culvert shall be hauled to an approved refuse site off of STATE land.
- (5) Waste materials shall be sloped for drainage and stability, as directed by STATE. Prior to hauling waste materials, the waste area shall be cleared of large woody debris. The debris shall be piled adjacent to the waste area. All exposed excavation areas and waste materials shall be mulched with straw. Applied mulch shall be a minimum of 2 inches deep and provide a uniform cover. Large woody debris shall be redistributed over the waste area after all waste materials have been hauled.
- (6) Grass seed and straw mulch shall be applied to all exposed areas, bare soils and waste materials as directed by STATE in accordance with Exhibit K.
- (7) De-watering of the work site shall be accomplished prior to the removal of any additional fill material for the development of the culvert bed and stream channel. The work site shall be de-watered by the use of cofferdams, pumps, temporary diversion ditches and/or drainage structures.
- (8) Remove existing fill, culvert, and any logs or woody debris.
- (9) Remove additional fill and logs or woody debris for the development of the new culvert bed. The new culvert bed will **NOT** be the same location as the existing culvert bed. The new culvert bed inlet and outlet coordinates are designated on Exhibit H.
- (10) Develop the stream channel for a distance of 25 feet upstream of the inlet of the culvert and 25 feet downstream of the outlet, as directed by STATE. The stream channel width will be 10 feet and stream channel banks shall be sloped at 1½:1.
- (11) Native (excavated) stream sediment material shall be placed in the culvert barrel to a minimum depth of 40 inches to simulate and form the stream bed as directed by STATE. Utilize 24 cubic yards of 36"-6" riprap rock (streambed retention material) placed and embedded at the outlet of the new culvert to establish the stream channel elevation and allow additional stream sediment materials to settle in the barrel of the pipe.

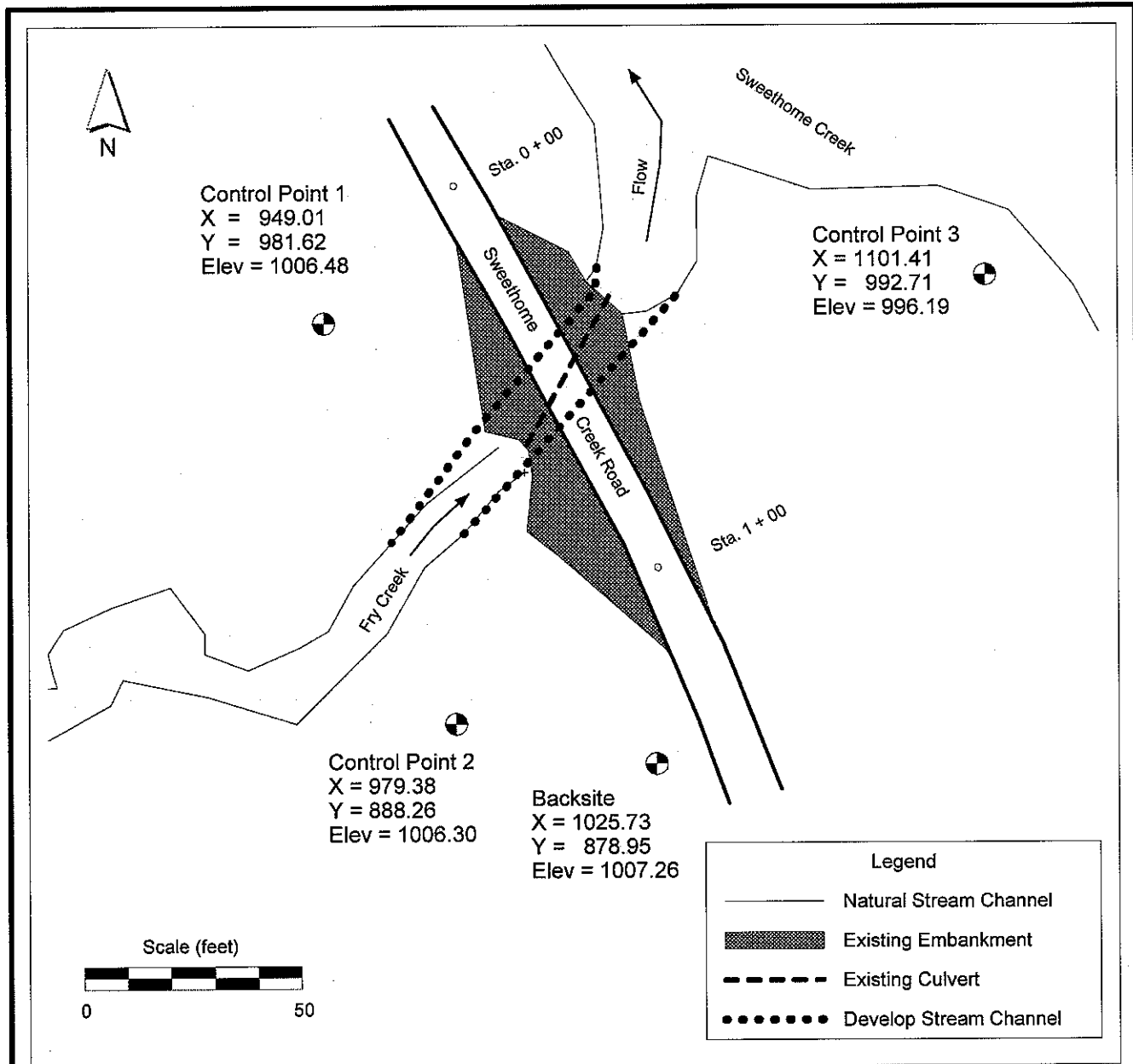


EXHIBIT H

ROUND CULVERT INSTALLATION SPECIFICATIONS  
Project No. 4. - Point 4B

- (12) Fill reconstruction backfill shall consist of select materials and 4"-0" crushed rock as directed by STATE. Backfill shall be compacted as specified in Exhibit D. Riprap rock shall be placed and tamped at a 1½:1 slope for a minimum thickness of 2 feet beginning at the toes.
- (13) Utilize 36 cubic yards 1½"-0" crushed rock bedding reinforcement material, and 408 cubic yards of 1½"-0" crushed rock backfill material.
- (14) Utilize 120 cubic yards of 24"-6" riprap rock for fill and stream bank armor material placed and tamped at a 1½:1 slope for a minimum thickness of 2 feet beginning at the toes.
- (15) Finished fill subgrade width is 20 feet. Finished fill surface width is 16 feet. Utilize 72 cubic yards of 4"-0" crushed base course rock and 36 cubic yards of 1½"-0" crushed surface course rock to provide for a smooth and uniform transition from the existing roadway across the fill. Applied crushed rock shall be processed and compacted as specified in Exhibit D.

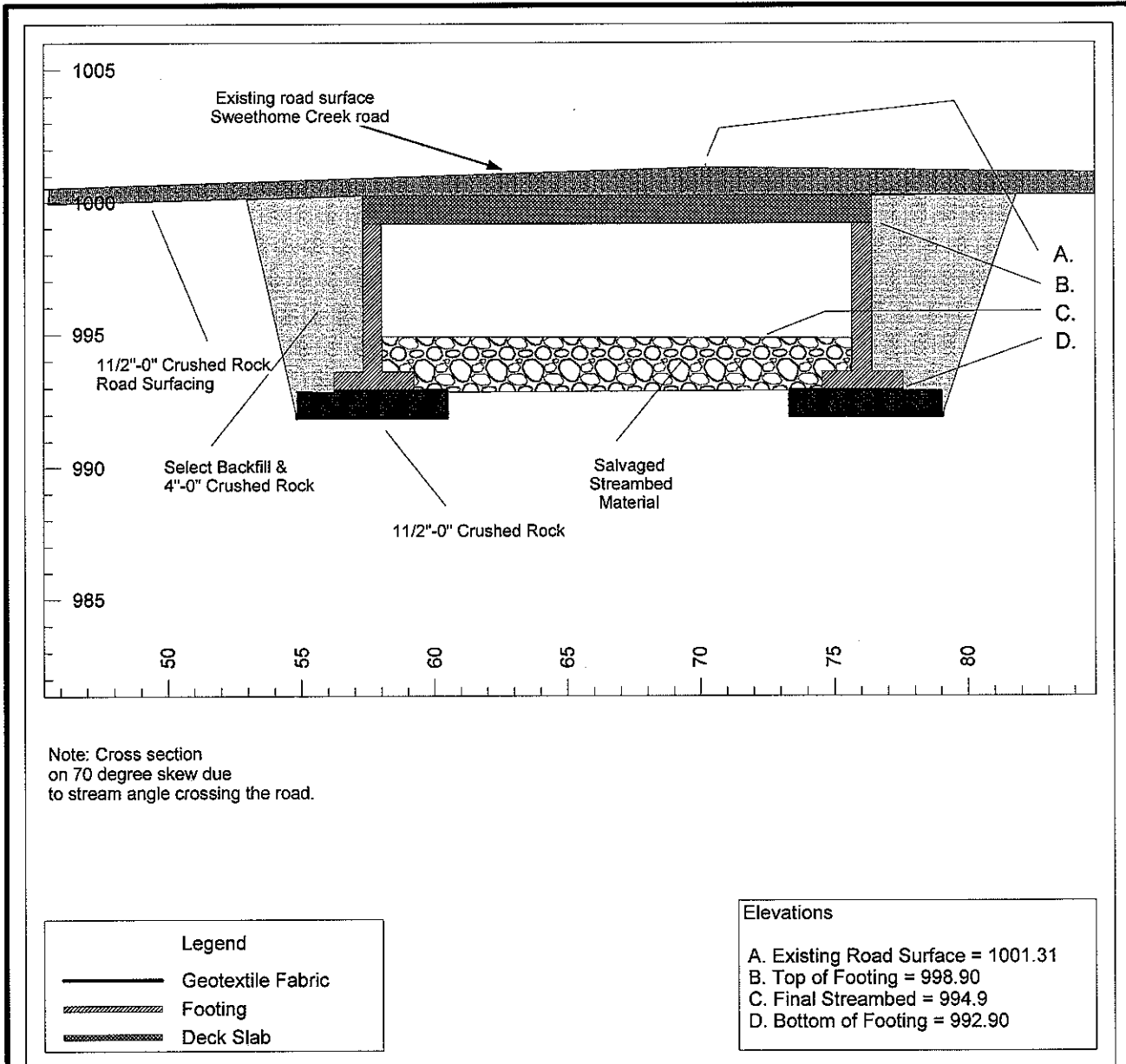
EXHIBIT H  
 4A SITE PLAN



Oregon Department of Forestry  
 Astoria District  
 Engineering Unit

Point 4A  
 Fry Creek Site  
 NE1/4, Section 29, T4N, R8W, W. M.  
 Clatsop County, Oregon

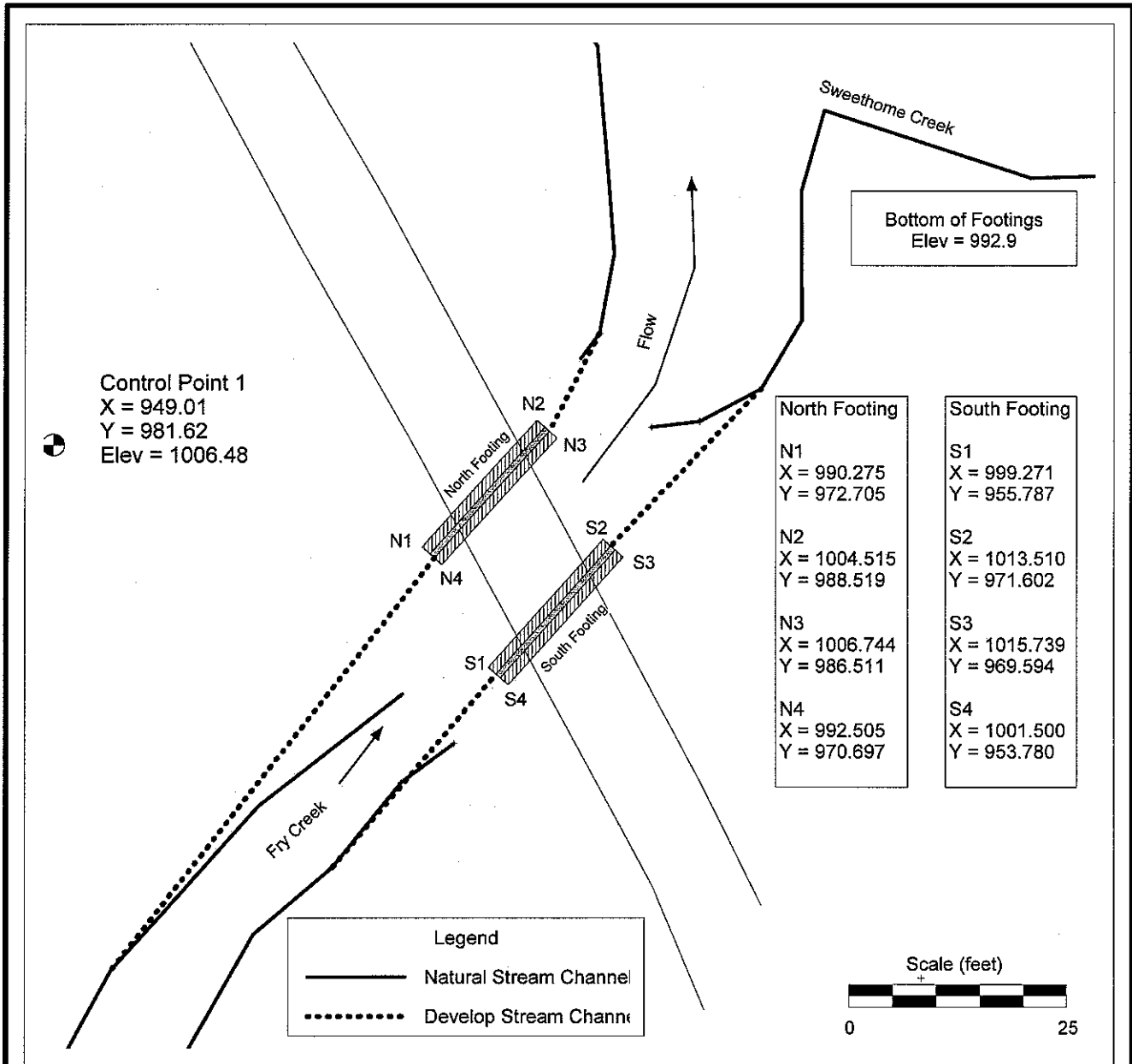
EXHIBIT H  
 4A FOOTING PROFILE



Oregon Department of Forestry  
 Astoria District  
 Engineering Unit

Point 4A  
 Fry Creek Site  
 NE1/4, Section 29, T4N, R8W, W. M.  
 Clatsop County, Oregon

EXHIBIT H  
 4A FOOTING PLAN



**Point 4A**  
**Fry Creek Site**  
 NE1/4, Section 29, T4N, R8W, W. M.  
 Clatsop County, Oregon

EXHIBIT H  
 4B SITE PLAN

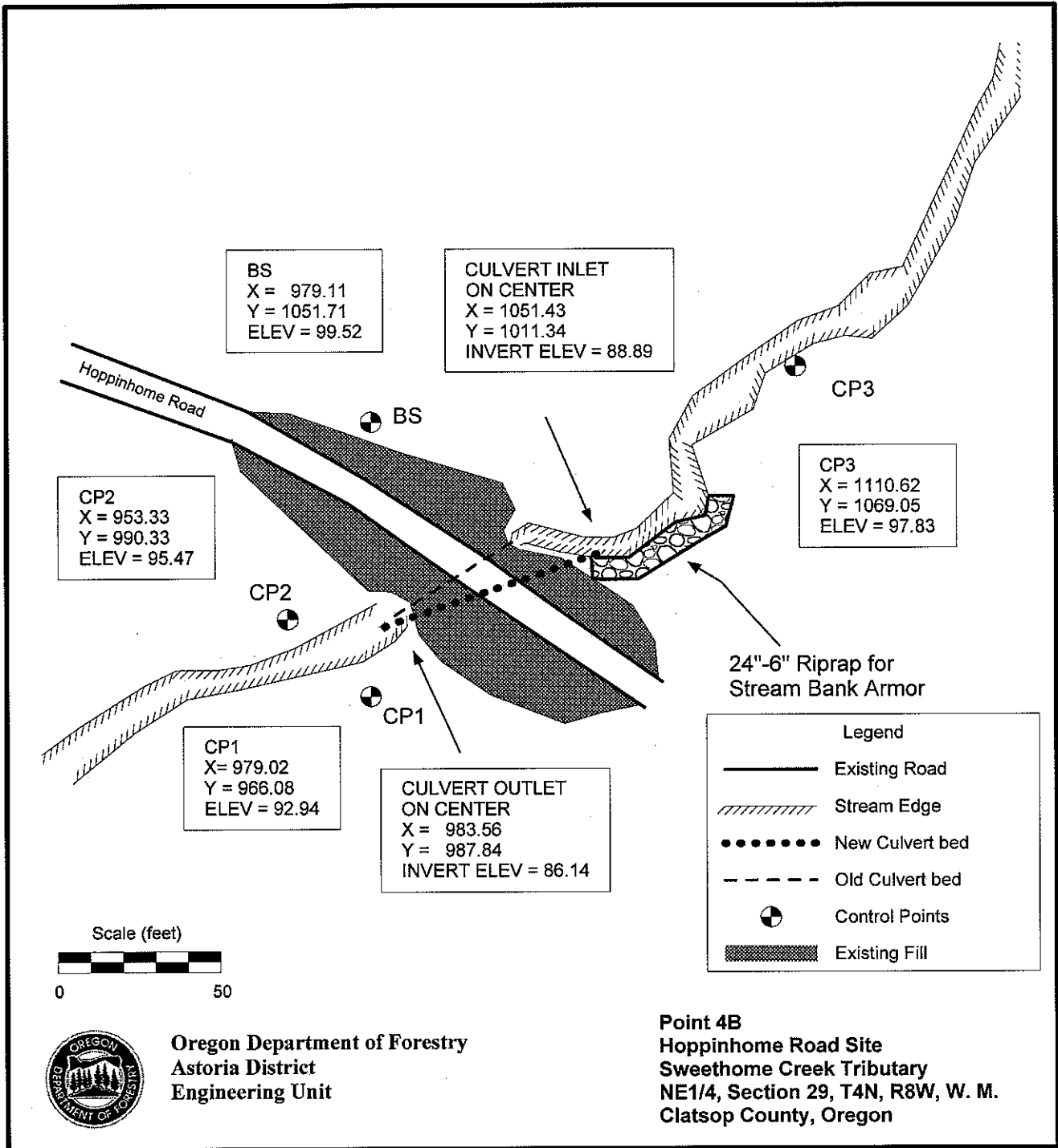
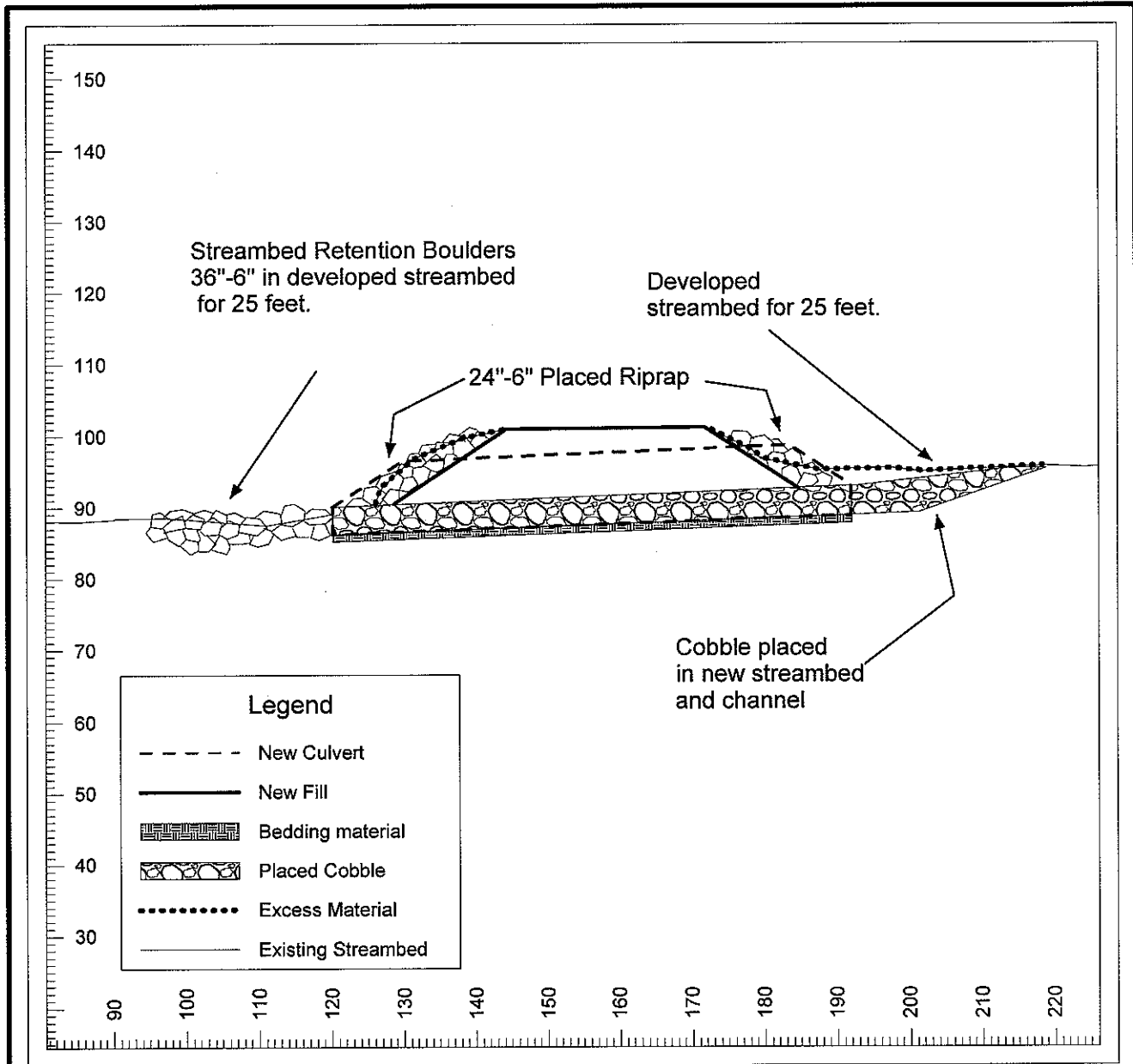


EXHIBIT H

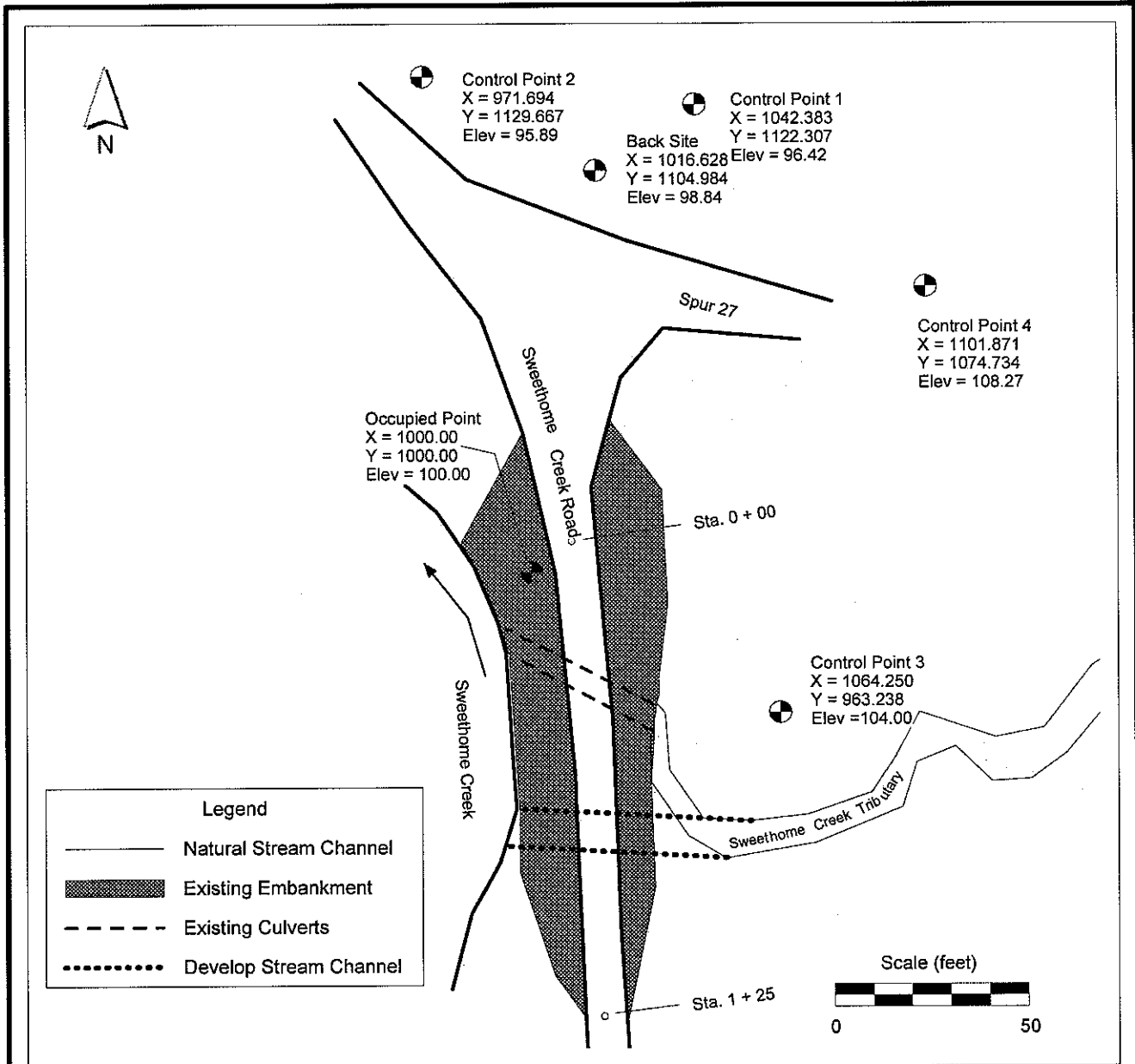
4B PROFILE VIEW



Oregon Department of Forestry  
Astoria District  
Engineering Unit

Point 4B  
Hoppinhome Road Site  
Sweethome Creek Tributary  
NE1/4, Section 29, T4N, R8W, W. M.  
Clatsop County, Oregon

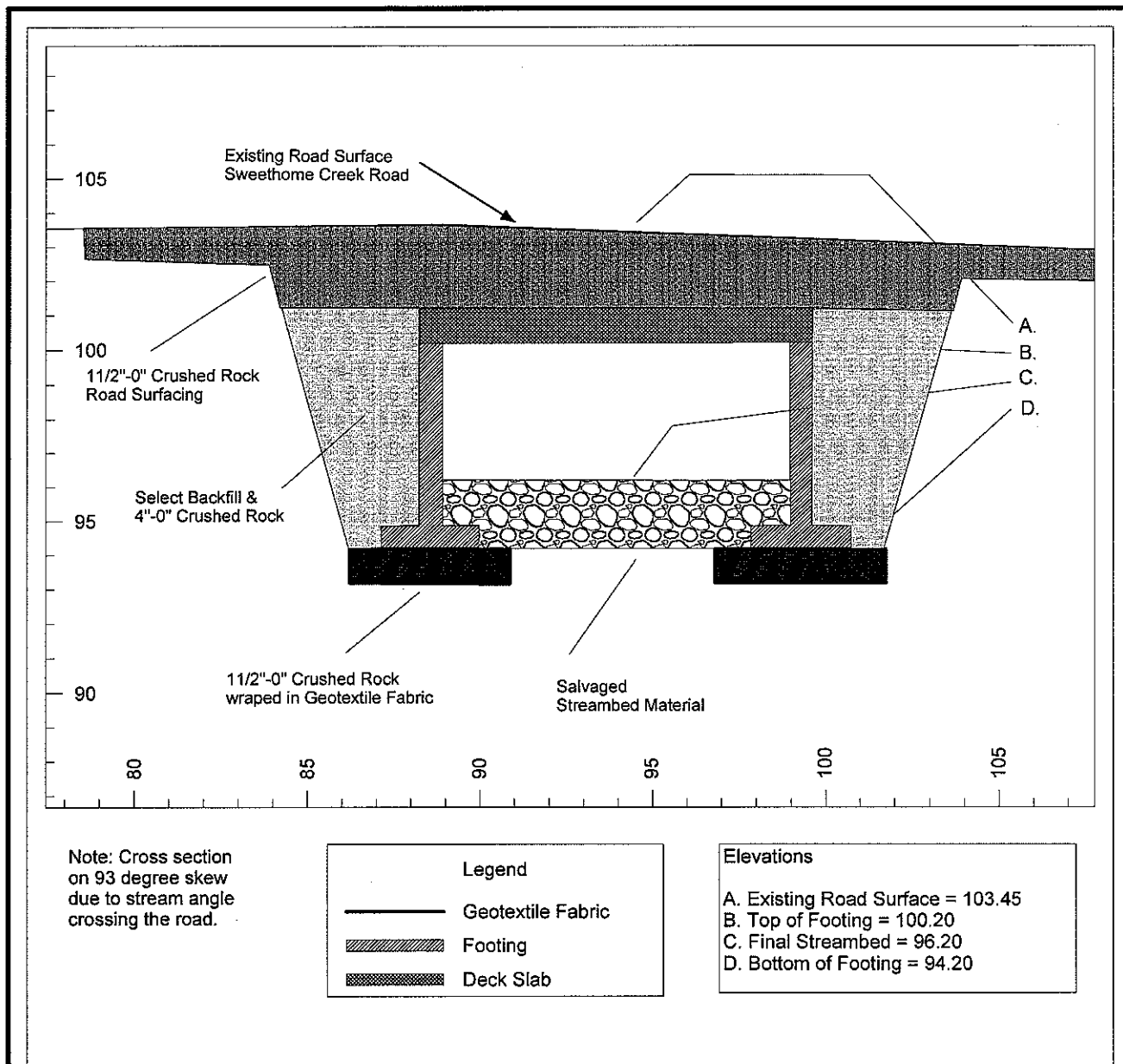
EXHIBIT H  
4C SITE PLAN



Oregon Department of Forestry  
Astoria District  
Engineering Unit

Point 4C  
Spur 27 Site  
SW1/4, Section 28, T4N, R8W, W.M.  
Clatsop County, Oregon

EXHIBIT H  
 4C FOOTING PROFILE

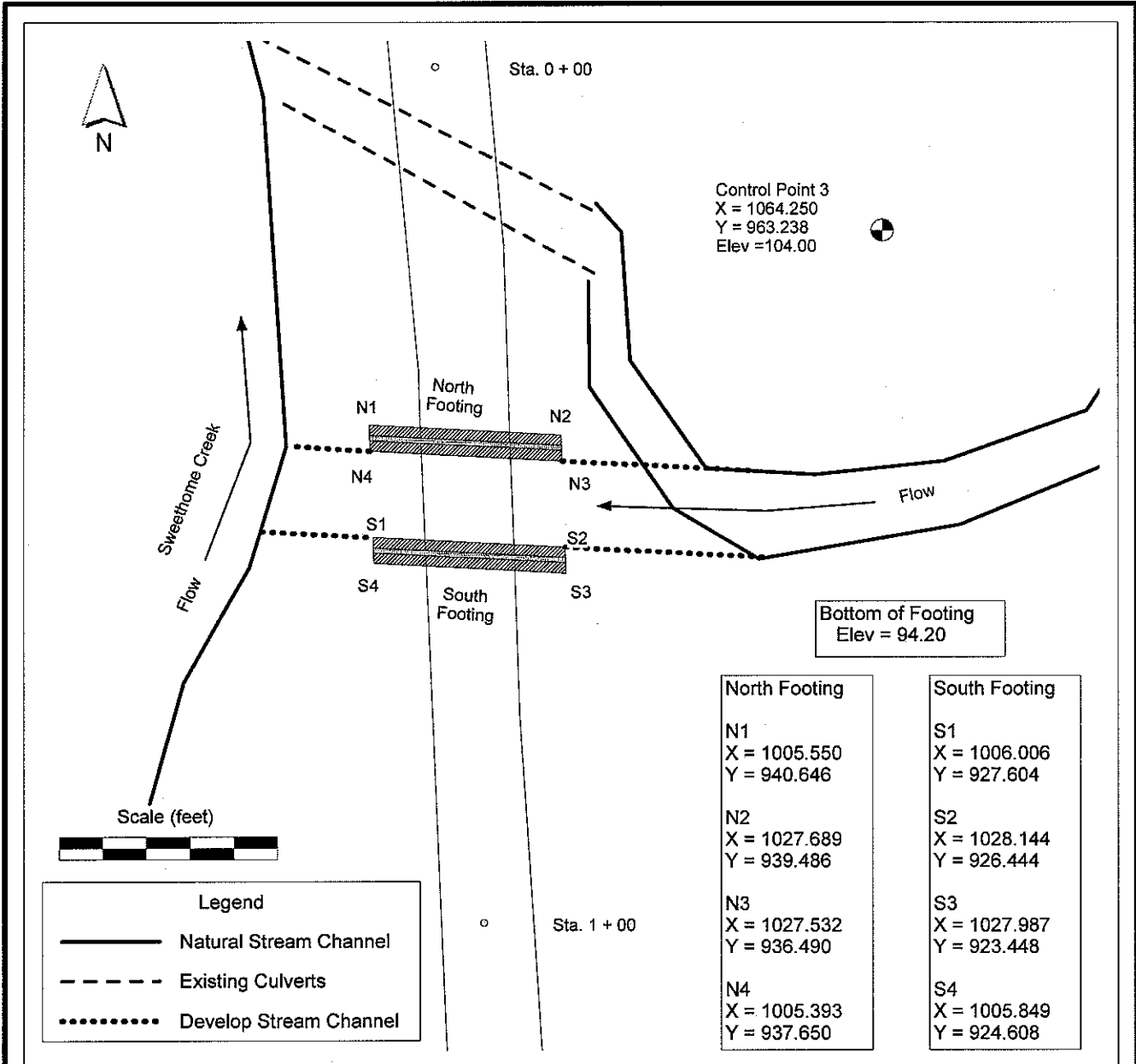


Oregon Department of Forestry  
 Astoria District  
 Engineering Unit

Point 4C  
 Spur 27 Site  
 SW1/4, Section 28, T4N, R8W, W. M.  
 Clatsop County, Oregon



EXHIBIT H  
 4C FOOTING PLAN



Oregon Department of Forestry  
 Astoria District  
 Engineering Unit

Point 4C  
 Spur 27 Site  
 SW1/4, Section 28, T4N, R8W, W.M.  
 Clatsop County, Oregon

EXHIBIT I

TYPICAL EMBEDDED ENERGY DISSIPATOR

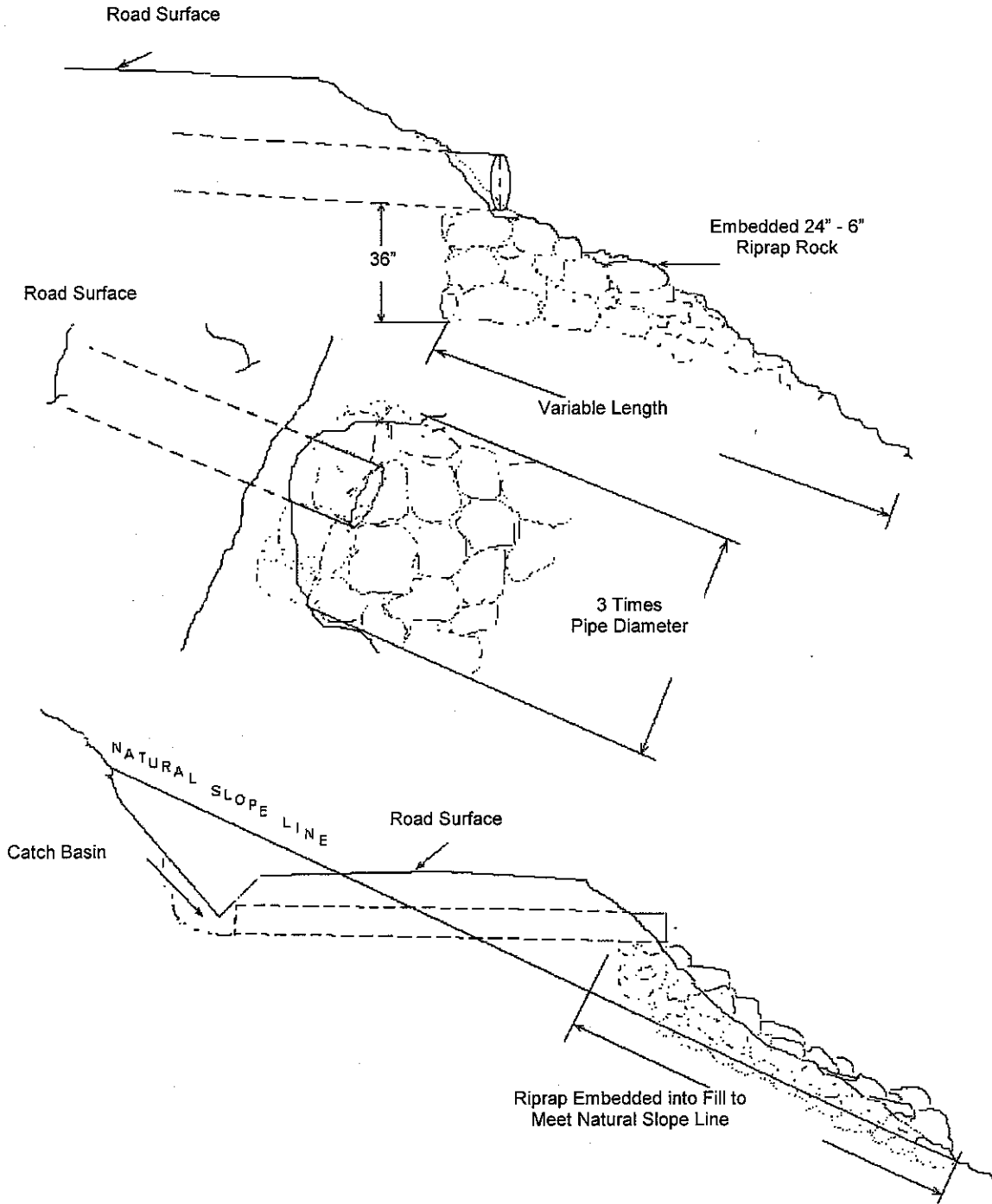
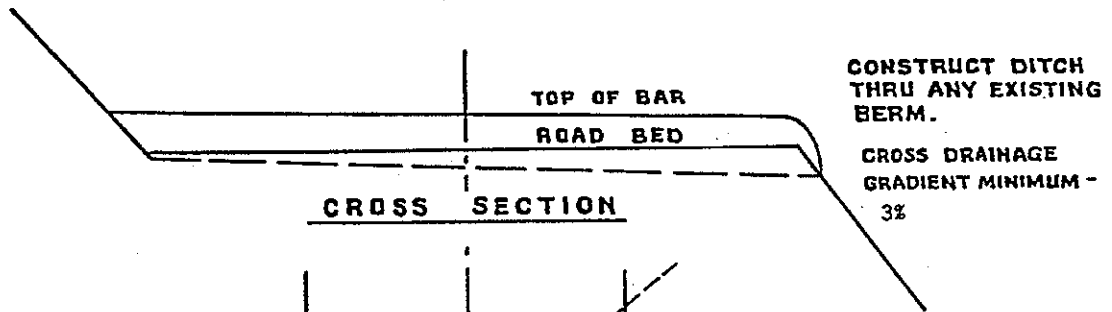
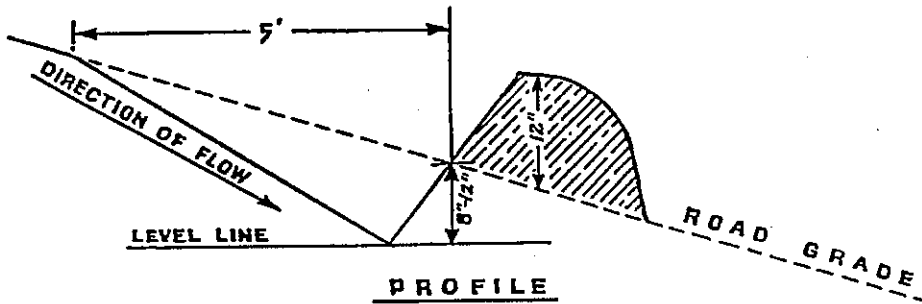
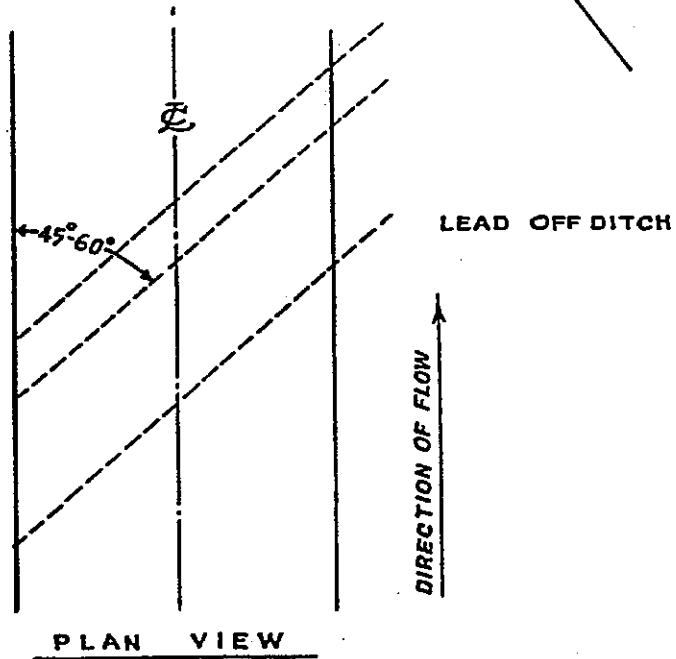


EXHIBIT J  
 WATERBAR SPECIFICATIONS



**SPACING OF WATERBARS**

ROAD GRADE	DISTANCE
≤ 5%	400'
6-10%	200'
11-15%	150'
16-20% or greater	100'



**WATERBAR SPECIFICATIONS  
 FOR CROSS DITCHING #298**

EXHIBIT K

SEEDING AND MULCHING

This work shall consist of preparing seedbeds and furnishing and placing required seed and straw mulch. Straw mulch shall consist of straw that is free of noxious weeds. Apply seed and straw mulch to all waste areas, and bare soils resulting from Project No. 4.

Seeding Seasons. Seeding shall be performed only from March 1 through June 15 and August 15 through October 31. Seeding materials shall not be applied during windy weather or when the ground is excessively wet or frozen. Areas of disturbed soil shall be seeded by the end of the project period in which work was started.

Application Methods for Seed

Dry Method. Mechanical seeders, seed drills, landscape seeders, cultipacker seeders, or other approved mechanical seeding equipment shall be used to apply the seed in the amounts and mixtures specified. Hand-operated seeding devices may be used when seed is applied in dry form.

Application Rates for Seed

The seed mixture listed below shall be applied at 100 lbs. per acre. The seed mixture shall be comprised of the following:

SPECIES	MIXTURE	PURE LIVE SEED	POISON AND/OR REPELLENT	GERMINATION
Annual Rye	26%	95%	0	>90%
Orchard Grass	25%	95%	0	>90%
New Zealand White Clover	17%	95%	0	>90%
Perennial Rye	15%	95%	0	>90%
Birdsfoot Trifol	07%	95%	0	>90%
Red Clover	06%	95%	0	>90%
Alsike Clover	04%	95%	0	>90%

Mulching Period. Straw mulch shall be applied within 24 hours of spreading grass seed.

Application Rates for Mulch

Place straw mulch to a reasonably uniform thickness of 1½ to 2½ inches. This rate requires between 2 and 3 tons of dry mulch per acre.

EXHIBIT L

SPECIFICATIONS FOR BRUSH AND SLASH SHOVEL PILING

Description of Work to be Done

Areas designated for work under the contract shall be treated according to the specifications given below:

Clearing - Brush, logging slash, and other debris shall be cleared from planting sites and piled in windrows or piled so that 80 percent or more of the soil organic layer is exposed. All woody vegetation (other than conifer trees) is defined as brush in this exhibit.

Piles - shall be located at least 75 feet apart and shall be no more than 75 feet long. Piles shall be located inside the project area designated for piling and shall be more than 75 feet from any edge or standing conifer tree. Piles shall be built to a height of 3 to 4 feet and then covered to prevent water from reaching the slash. STATE shall supply the materials used for covering the slash. Additional woody debris shall be piled on top of the covered piles to complete the piling, as directed by STATE. Logs and chunks which are suitable for firewood shall be piled separately from slash, near roads and landings and alongside the road in locations designated by STATE.

Conifer Trees - shall be saved, unless otherwise directed by STATE.

Skid Trails - shall be ripped to a depth of 12 inches.

Residual Logs - Within Conifer-stocked portions of Areas 1, 2, and 3, an average of 800 cubic feet of conifer logs per acre. Logs shall contain a minimum of 10 cubic feet of volume, and be no shorter than 6 feet in length, to be selected by PURCHASER. Two logs per acre shall be at least 24 inches in diameter, at the large end where available. Conifer logs must be in Decay class 1 or 2 condition, as indicated by intact bark and original wood color. Trees and/or logs shall be well distributed across conifer portions of the Timber Sale Areas.

Protective Measures - shall comply with Oregon Forest Practice Rules issued per ORS 527.610 to 527.992. Examples of protective measures are: (1) waterbarring tractor trails where necessary to prevent runoff toward streams; (2) not windrowing in streams or streamways; and (3) leaving stream buffers along designated streams.

Work specifications may be modified or waived only upon written notice from STATE.

EXHIBIT L

SPECIFICATIONS FOR BRUSH AND SLASH SHOVEL PILING

Equipment Type, Equipment Operation, and Conduct of Work

The specifications given below are requirements for equipment type, equipment operation, and conduct of work under the contract.

Shovel - shall be a track-mounted machine with a ground-pressure rating of not more than 6.8 PSI and a net horsepower of 85 or more. The machine shall be capable of a minimum horizontal reach of 26 feet and a minimum vertical reach of 16 feet.

- Excavator-shovel: Bucket shall be a hydraulically controlled, 4 to 5-foot wide, "clamshell-style bucket with rake arms," with a 360-degree continuous rotation, and tooth length on rake arm shall be greater than 14 inches long, unless otherwise approved in writing by STATE. "Clamshell-style bucket with rake arms" shall be hydraulically controlled to operate bucket in a horizontal position (**fixed position: positive control**) for piling slash.
- Log Loader – shovel: Bucket shall be a hydraulically controlled, 4 to 5 foot wide, "clamshell-style bucket with rake arms," with a 360-degree continuous rotation, and tooth length on rake arm shall be greater than 14 inches long, unless otherwise approved in writing by STATE. "Clamshell-style bucket with rake arms" shall be hydraulically controlled to operate bucket in a vertical position (**free swinging**) for piling slash.

Equipment	Rate	Hours	Appraised Value
Excavator	\$ 120.00 / hour	54.0	\$ 6,480.00
Log Loader	\$ 87.50 / hour	74.1	\$ 6,480.00

Operator - must be experienced in operating similar equipment on land clearing operations, be able to operate the equipment proficiently, and pile the debris on the area as directed by STATE.

Support - including transport, other equipment, replacements, supplies, maintenance, and repairs shall be furnished as required to complete work; and shall be furnished without cost to STATE, other than as agreed under the contract terms.

Work Scheduling - work shall be accomplished only during dry weather conditions, and started within 14 calendar days after completion of yarding activities on Areas 1, 2, and 3. Operations shall provide for continual operation until contract work is completed, unless interrupted by poor weather, fire closures, or other uncontrollable circumstances. Equipment breakdowns shall be repaired without undue delay, and provision shall be made for replacement of equipment to prevent prolonged delays. Piling operation shall not be allowed when operations might damage sites or affect stream flows. Any exception to these instructions must be authorized in writing by STATE.

STATE Representative - shall provide directions for the conduct of work according to specifications.

## **PART IV: OTHER INFORMATION**

State Timber Sale Contract  
No. 341-07-10  
Huff 'n Puff

### **FPA "Written Plan" for Operating within 100 Feet of Type F Streams**

Portions of Sections 11, 12, and 13, T4N, R8W, W.M., Clatsop County, Oregon

**Landowner:** Oregon Department of Forestry  
92219 Highway 202  
Astoria, Oregon 97103  
Phone: (503) 325-5451

#### **Protected Resources:**

1. Nehalem River.
2. Unnamed tributary to the Nehalem River

#### **Specific Site Characteristics:**

1. Nehalem River (Large, Type F) – This River flows along a portion of the eastern boundary of Area 2 for approximately 1,500 feet, and is 300 feet or more outside the boundary.
2. Unnamed tributary to the Nehalem (Small, Type F) - This stream flows through the northern portion of Area 2 for approximately 1,500 feet, and has a posted buffer of more than 100 feet.

#### **Tree and Vegetation Retention:**

Vegetation within the buffer consists of alder and some conifer, with a significant understory of salmonberry.

CLEARCUT HARVEST -- Area 2: During cable yarding operations, it is anticipated that cable skylines will cross all the above listed streams.

#### **Resource Protection Practices:**

Along all of the above-mentioned streams, as well as any live streams, the following practices are required, under the timber sale contract, to protect the streams and streamside areas:

- No trees will be felled within posted stream buffers (RMA's) except where needed for corridors.
- Trees that fall or slide into Type F RMA's shall not be removed without prior approval from STATE.
- Trees adjacent to the posted and non-posted stream buffers (RMA's) will be felled away from or parallel to the streams to prevent trees from entering the aquatic areas.
- When cable logging is conducted nearby the RMA's, logging lines may cross, but will not be lowered to the ground in the RMA's during yarding, except during rigging. During rigging the lines must be pulled out of the RMA's when changing corridors.
- Logs shall be fully suspended when yarding across all stream buffers (RMA's), posted or not.
- Cable corridors must be at least 100 feet apart where they cross the RMA's.

I, the undersigned, submit this written plan in compliance with the requirements in the Forest Practice Act regarding the operations conducted within 100 feet of streams I agree to the protection measures listed in this plan.

Submitted by: \_\_\_\_\_  
Operator/PURCHASER

Date: \_\_\_\_\_

**Attachments:** Logging Plan Map

Original: Salem  
CC: Operator, Purchaser, District File, Sunset Unit

**FPA "WRITTEN PLAN" For State Timber Sale Stream Crossing Structure Replacement Project**  
**Huff 'n Puff**  
**Point 4A and 4C**

**Landowner:** Oregon Department of Forestry  
92219 Hwy 202  
Astoria, OR 97103  
(503) 325-5451

**Protected Resources:**

**Point 4A:** Fry Creek, a medium Type F stream, located in the NE¼ of Section 29, T4N, R8W, W.M., Clatsop County, Oregon.

**Point 4C:** An unnamed tributary of Sweethome Creek, a small Type F stream, located in the SW ¼ of Section 28, T4N, R8W, W.M., Clatsop County, Oregon.

A written plan is required for any activity within 100 feet of any Type F stream.

**Situation:**

**Point 4A:** A galvanized-steel-culvert stream crossing located on Sweethome Creek Road is deteriorating and is a partial blockage to fish. Resource management objectives for this stream crossing project include providing cost effective long-term access, meeting or exceeding FPA requirements, enhancement of fisheries habitat, and protection of water quality and riparian areas.

**Point 4C:** Two galvanized-steel-culverts for one stream crossing located on Sweethome Creek Road are deteriorating and are a partial blockage to fish. Resource management objectives for this stream crossing project include providing cost effective long-term access, meeting or exceeding FPA requirements, enhancement of fisheries habitat, and protection of water quality and riparian areas.

**Drainage Area and Structure Design Point 4A:** The stream crossing structure will be an open-bottom concrete-slab culvert which will provide a 15 foot wide waterway under the structure.

Existing Stream Gradient:	4%
Size of Watershed:	617 acres
Average Stream Width:	13.03 feet for a 282 foot stream reach
Stream Bed Material:	Cobble, Sand, Gravel
50-Year Peak Flow/Mi. <sup>2</sup> :	350 cfs
50-Year Peak Flow:	337 cfs
Flow Capacity of Existing Structure:	113 cfs
Flow Capacity of New Structure:	450 cfs
	45 ft <sup>2</sup> wetted cross sectional area
	21 ft wetted perimeter (w/ 1 ft clearance)



**FPA "WRITTEN PLAN" For State Timber Sale Stream Crossing Structure Replacement Project**  
**Huff 'n Puff**  
**Point 4A and 4C**

**Drainage Area and Structure Design Point 4C:** The stream crossing structure will be an open-bottom concrete-slab culvert which will provide a 10 foot wide waterway under the structure.

Existing Stream Gradient:	3%
Size of Watershed:	216 acres
Average Stream Width:	8.61 feet for a 357 foot stream reach
Stream Bed Material:	Cobble, Sand, Gravel
50-Year Peak Flow/Mi. <sup>2</sup> :	350 cfs
50-Year Peak Flow	118 cfs
Flow Capacity of Existing Structures:	42 cfs
Flow Capacity of New Structure:	238 cfs
	30 ft <sup>2</sup> wetted cross sectional area
	16 ft wetted perimeter (w/ 1 ft clearance)

**Practices Points 4A and 4C:**

- Machine activity in stream channels will be minimized. All existing fill, existing culvert removal, and rip rap rock placement will be performed using a minimum 2 cubic-yard track-mounted excavator.
- In-stream work, including, excavation, culvert removal, pile driving, riprap rock placement, and construction of a wing wall and back walls will be conducted from July 1 to September 15.
- An erosion-control plan will be developed and followed to prevent sediment from entering the stream during construction work.
- Waste materials will be hauled to approved waste areas and left in a stable condition.
- A combination of pre-cast open-bottom concrete-slab culvert components and riprap rock will be used to construct back walls, and stream deflectors to protect the structure, road approaches/embankments, and stream banks from erosion.
- Use of pre-cast concrete components will prevent contamination of water from mixing and pouring concrete on site.
- Oil spill response materials shall be on site before the work begins.

I, the undersigned, submit this written plan in compliance with the requirements in the Forest Practices Act regarding the operations conducted within 100 feet of Type F streams. I agree to the protection measures listed on this plan.

Submitted

\_\_\_\_\_  
Purchaser/Operator/Contract Representative

\_\_\_\_\_  
Date

Attachments: Exhibit A and H.

Original: Salem

CC: Operator, Purchaser, District File, Sunset Unit, Engineering Unit

**FPA "WRITTEN PLAN" For State Timber Sale Stream Crossing Structure Replacement Project**  
**Huff 'n Puff**  
**Point 4B**

**Landowner:** Oregon Department of Forestry  
92219 Hwy 202  
Astoria, OR 97103  
(503) 325-5451

**Protected Resources:**

A large type F stream located in the NE1/4, Section 29, T4N, R8W, W.M., Clatsop County, Oregon. A "written plan" is required for any activities within 100 feet of any type F stream.

**Situation:**

An existing culvert stream crossing structure, located on Hoppinhome Road is undersized and in a deteriorating condition. The existing structure is a partial blockage to fish passage upstream.

**Drainage Area and Stream Crossing Design:** The existing culvert will be replaced with an 120" x 72', 10 gage aluminized steel round culvert pipe, embedded 40", with both ends step beveled. The stream crossing will utilize a streambed simulation strategy and preserve a natural stream channel (waterway), a minimum of 10 feet wide. The stream crossing meets and exceeds the requirements of the FPA for type F stream crossings. It will take sufficient time and flow conditions for the predicted stream bed to develop inside and above the stream crossing. The new fill height will be 13.8 feet.

Existing Stream Gradient:	3.81%
Size of Watershed:	214 acres
Average Stream Width:	9.12 feet for a 237 foot stream reach
Stream Bed Materials:	Silt, Gravel, Cobbles
50 - Year Peak Flow/Mile <sup>2</sup> :	350 cfs
50 - Year Peak Flow:	195 cfs
Flow Capacity of Existing Structure:	87 cfs
Flow Capacity of New Structure:	387 cfs

**Resource Protection Measures:**

- (1) Machine activity in stream channels will be minimized.
- (2) In stream work shall be conducted during periods of low water flows and between July 1 and September 15, annually.
- (3) Minimum 2 cubic yard track mounted excavator type equipment shall be used for embankment excavation, stream channel development, streambed retention boulder placement, stream bank armor, and riprap (fill armor) placement.
- (4) Excavated embankment materials will be hauled to approved waste areas, sloped for drainage and left in a stable condition.
- (5) Erosion control measures shall be applied to all exposed excavation areas, bare soils and waste materials.
- (6) Riprap rock will be used to armor embankments and stream banks.

**FPA "WRITTEN PLAN" For State Timber Sale Stream Crossing Structure Replacement Project**  
**Huff 'n Puff**  
**Point 4B**

- (7) Native (excavated) stream sediment materials (fines, cobble) shall be placed in the culvert barrel to facilitate the development of the stream channel inside the barrel of the culvert.
- (8) Excavated boulders or riprap rock shall be placed in the culvert barrel, and placed and embedded starting at the culvert outlet and thence downstream for 25 feet (retention boulders) of the new culvert to allow additional stream sediment materials to settle in the barrel of the culvert and to prevent the flushing of placed material.
- (9) The de-watering of the installation area during development of the pipe arch bed and stream channel will be accomplished by use of cofferdams, temporary diversion ditches, and/or drainage structures. De-watering once begun will be continual until such time that the stream has been released into the new culvert.
- (10) Oil spill response materials shall be on site before the work begins.

I, the undersigned, submit this written plan in compliance with the requirements in the Forest Practices Act regarding the operations conducted within 100 feet of Type F streams. I agree to the protection measures listed on this plan:

Submitted

\_\_\_\_\_

Purchaser/Operator/Contract Representative

\_\_\_\_\_

Date

Attachments: Exhibits A and H.

Original: Salem

CC: Operator, Purchaser, District File, Sunset Unit, Engineering Unit

OREGON DEPARTMENT of FISH and WILDLIFE

FISH SCREENING PROGRAM

**SMALL PUMP SCREEN SELF CERTIFICATION**

The Oregon Water Resources Department in coordination and cooperation with the Oregon Department of Fish and Wildlife includes screen requirements on pumps to protect fish as a condition of many surface water and/or reservoir water right permits. This is done in accordance with ORS 537.153.

The Oregon Department of Fish and Wildlife does not usually inspect small pump screens at pumped diversions less than 225 GPM (Gallons per Minute), but furnishes the following fish screening criteria information to the water right permit tee:

**Screen material open area** must be at least 27% of the total wetted screen area.

**Perforated plate:** Openings shall not exceed 3/32 or 0.0938 inches (2.38 mm).

**Mesh/Woven wire screen:** Square openings shall not exceed 3/32 or 0.0938 inches (2.38mm) in the narrow direction, e.g., 3/32 inch x 3/32 inch open mesh.

**Profile bar screen/Wedge wire:** Openings shall not exceed 0.0689 inches (1.75 mm) in the narrow direction.

**Screen area** must be large enough to cause fish impact. Wetted screen area depends on the water flow rate and the water approach velocity. **Approach velocity** is the water velocity perpendicular to and approximately three inches in front of any part of the screen face.

**An Active pump screen** is a self cleaning screen that has a proven cleaning system. The **screen approach velocity for active pump screens** shall not exceed 0.4 fps (feet per second) or 0.12 mps (meters per second). The wetted screen area in square feet is calculated by dividing the maximum water flow rate in cubic feet per second (1 cfs = 449 gpm) by 0.4 fps.

**A Passive pump screen** is a screen that has no cleaning system other than periodic manual cleaning. **Screen approach velocity for passive pump screens** shall not exceed 0.2 fps or 0.06 mps. The wetted screen area in square feet is calculated by dividing the maximum water flow rate by 0.2 fps.

*For further information on fish screening please contact:*

Bernie Kepshire, Oregon Department of Fish and Wildlife,  
7118 NE Vandenberg Avenue, Corvallis, OR 97330-9446 (541) 757-4186 x 255

As evidence of having met fish screen installation requirements, please sign the certification and send to: Oregon Water Resources Department, Water Rights Section, 725 Summer St. NE, Suite A, Salem, OR 97301-1271

**Certification:** I certify that my small pumped diversion of less than 225 gpm meets fish screening criteria, and that I will maintain it to comply with regulatory criteria. I also understand that should fish screening standards change, I may be required to modify my installation to meet applicable standards.

Applicant Signature: \_\_\_\_\_ Date: \_\_\_ / \_\_\_ / \_\_\_ WRD File #

Printed Name and Address:

Phone: (       )

Fax: (       )

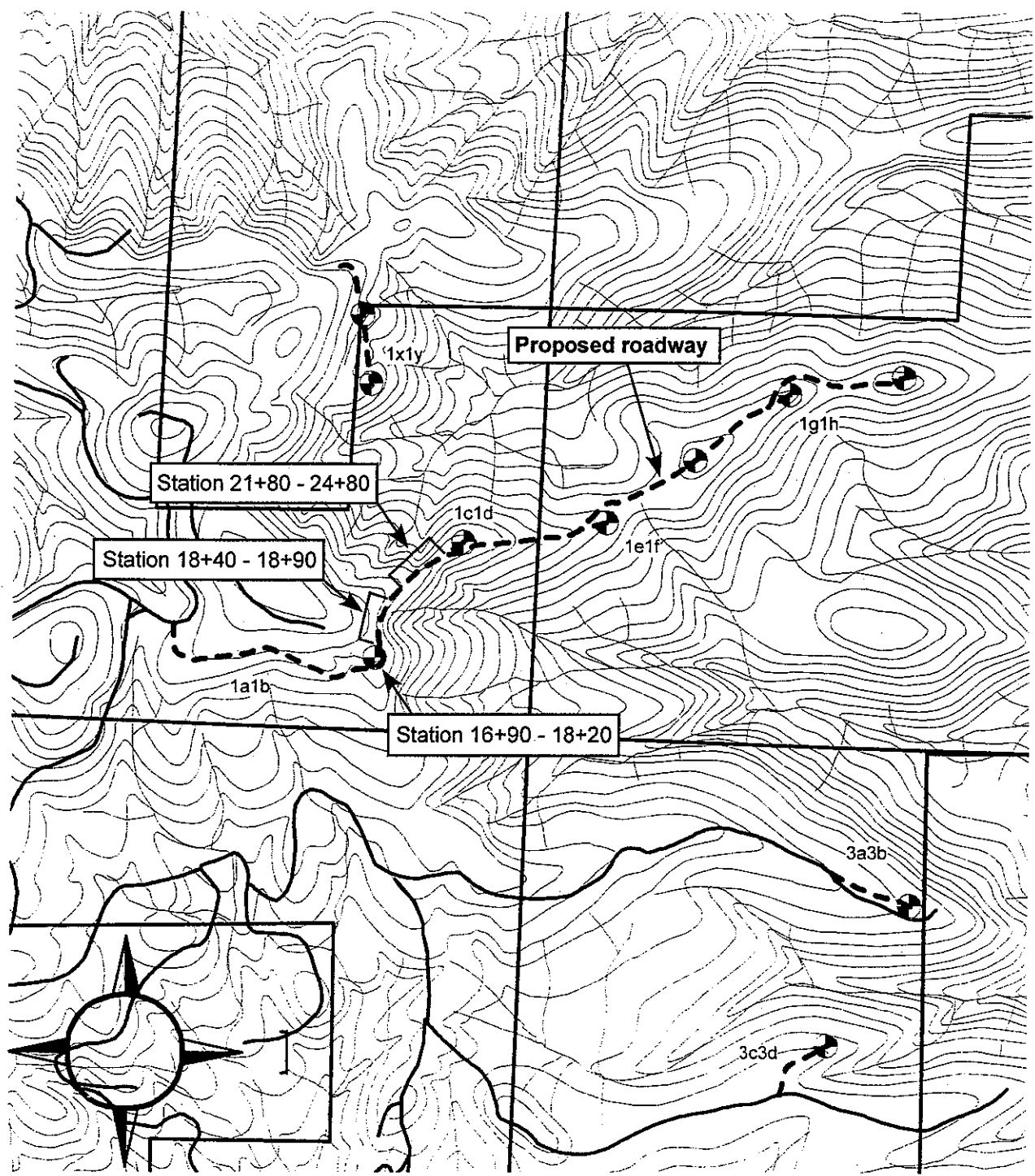
bm  
3/11/99  
PUMPCERT.doc

NB: ODFW logo is 129% of logo on HQ mail label



7312 SW Durham Road  
 Portland, Oregon 97224  
 Tel 503.598.8445 Fax 503.598.8705

# SITE PLAN



## Legend



Date: 09/12/05  
 Drawn by: EKR

APPROXIMATE SCALE 1"=1000'

Project: ODF Huff 'N Puff Road Project  
 Clatsop County, Oregon

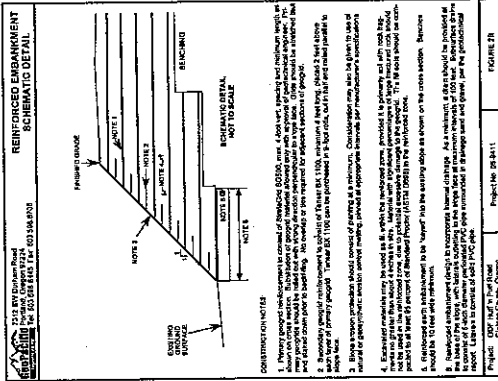
Job No: 05-9411

FIGURE 1

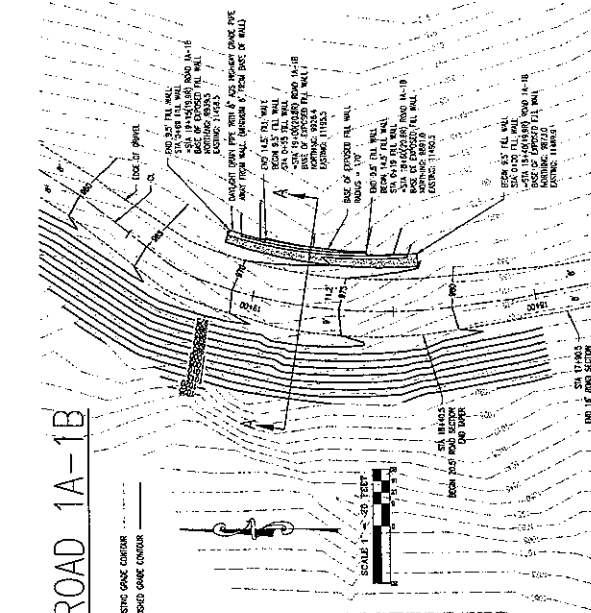
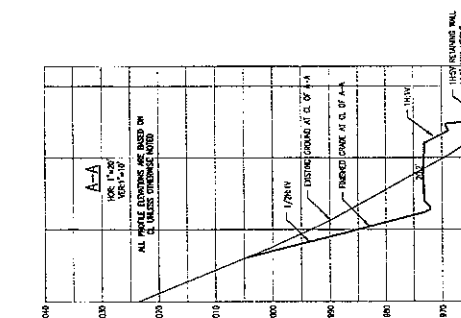
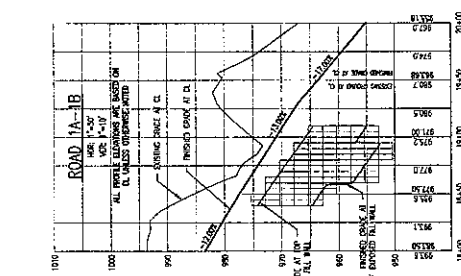
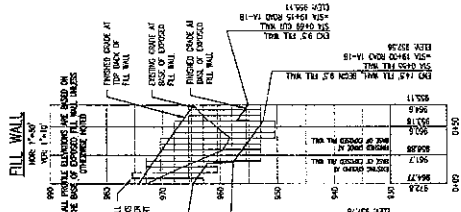
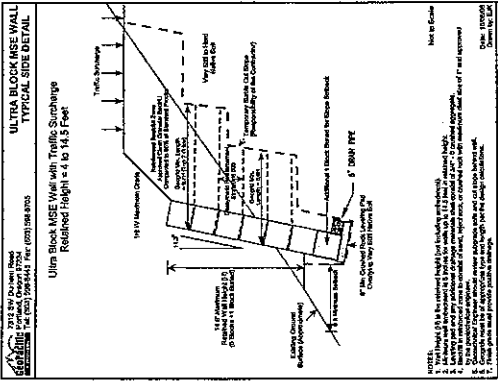
**ULTRA BLOCK MSE RETAINING WALL CONSTRUCTION NOTES:**

1. RETAINING WALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE GEOTECHNICAL REPORT BY GEOTECHNICAL ENGINEERING, INC. DATED 08/08/14 AT 102.
2. SLOTTED SOILS SHALL BE REMOVED AND REPLACED WITH GRANULAR FILL (AS PER GEOTECHNICAL REPORT) AND BUILT UP WITH APPROVED GRANULAR FILL WITH 1% BINDER.
3. ALL EXISTING BLOCKS SHALL BE REPAIRED OR REPLACED WITH A MINIMUM SPACING OF 10 FEET FROM THE FACE OF SLOPE. THE WALL SHALL BE CONSTRUCTED ON A COMPACTED ROCK (3) FILLING TO A MINIMUM OF 12 (1) FEET THICK.
4. 2X (2) INCH BARS (REINFORCED) SPACING 40 P.C. ON 40 AND HORIZONTAL CURVE P.C. SHALL BE EMBEDDED IN 7' MINIMUM FROM THE BOTTOM OF THE WALL FACE. DRINK PIPE AND DOWN PIPES SHALL BE INSTALLED IN GRANULAR FILL. BARS SHALL BE EMBEDDED IN GRANULAR FILL TO A MINIMUM OF 12" FROM THE FACE OF SLOPE. BARS SHALL BE EMBEDDED IN GRANULAR FILL TO A MINIMUM OF 12" FROM THE FACE OF SLOPE.
5. MINIMUM WALL THICKNESS SHALL BE THREE (3) FEET FROM THE EXPOSED EDGE (NOT THE EXPOSED BLOCK).
6. WALL BATTER SHALL BE 1:1.5 REVERSE (14:14) AND SHALL BE REINFORCED CLOSELY DURING THE PLACEMENT OF BLOCKS.
7. BLOCKS SHALL BE 9' X 1.5' X 1.5' WITHIN BLOCKS.
8. CURVE SHALL BE PLACED BETWEEN EXISTING BLOCK (EVERY 2.5 FEET) SPACING BETWEEN THE FRONT AND SECOND BLOCK SHALL BE 1.5 FEET. THE WALL SHALL BE REINFORCED WITH A MINIMUM SPACING OF 10 FEET FROM THE FACE OF SLOPE. THE WALL SHALL BE REINFORCED WITH A MINIMUM SPACING OF 10 FEET FROM THE FACE OF SLOPE. THE WALL SHALL BE REINFORCED WITH A MINIMUM SPACING OF 10 FEET FROM THE FACE OF SLOPE.
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**ENGINEERED FILL DETAIL  
STATION 21+85 TO 24+75 ROAD 1A-1B**



**RETAINING WALL DETAIL  
STATION 18+40 TO 19+15 ROAD 1A-1B**



**REVISIONS:**

NO.	DATE	DESCRIPTION	BY	CHKD.
1	08/08/14	ISSUED FOR PERMIT	AKS	AKS
2	08/08/14	REVISED PER COMMENTS	AKS	AKS
3	08/08/14	REVISED PER COMMENTS	AKS	AKS
4	08/08/14	REVISED PER COMMENTS	AKS	AKS
5	08/08/14	REVISED PER COMMENTS	AKS	AKS

**ENGINEERING PLANNING SURVEYING - FORESTRY**  
**AKS ENGINEERING & DESIGN**  
 1810 SW CAROLAN DRIVE, SUITE 100  
 SEASIDE, OR 97138  
 PHONE: (503) 925-8788 FAX: (503) 925-8888

**RETAINING WALL AND ENGINEERED FILL DESIGN**

**PREPARED FOR:**  
 OREGON DEPARTMENT OF FORESTRY  
 8251 HWY 202, ASTORIA, OR 97103  
 PHONE: 503-325-5400 FAX: 503-325-5725

**PROJECT NO. 1310**  
**SHEET 1 OF 1**

**DATE: 08-27-08**

**HUFF 'N PUFF**  
**CLATSOP COUNTY**  
 CLATSOP COUNTY, OREGON

### **Ultra Block MSE Walls**

The Ultra Block MSE wall should be single stacked as shown on the attached Figure 5C. The MSE reinforced walls will be located on the downslope side of the road and will retain slopes and a traffic surcharge. Wall design details and calculations are attached to this report. Seismic stability analysis was not included as part of this study, and the minimum allowable factor of safety against wall failure was taken as 1.25. Subgrade soils should consist of very stiff to hard native soil or rock. A minimum slope setback of 6 feet is required from existing very steep slopes. In order to accomplish the slope setback, we recommend burying a block as shown on the attached Figure 5C. The wall should be founded on a crushed rock or concrete leveling pad a minimum of 6 inches thick. GeoPacific should review the subgrade prior to placement of the base block.

The Lock Block MSE walls have been designed with a 11.3 degree batter. Wall batter should be checked frequently during wall construction, as a reduced batter will result in reduced factors of safety.

Geogrids should be placed every block (every 2.5 feet) starting between the first and second block (not including the buried block), and should consist of StrataGrid 600 geotextile with a minimum ultimate tensile strength of 7,800 lbs/ft. Proposed geogrid substitutions should be reviewed by the geotechnical engineer. The upper two geogrids should be a minimum length of 0.8H where H is the retained height (not including embedment) and grid lengths are measured from the front of the wall. Lower geogrids should be a minimum length of 0.6H as shown on the attached detail. Grids should be placed so that the primary strength direction is perpendicular to the wall face and should not be rolled out parallel to the wall.

The reinforced backfill zone should consist of crushed rock, or approved equivalent clean granular fill with a maximum clast size of 1 inch compacted to at least 95% of Standard Proctor (ASTM D698).

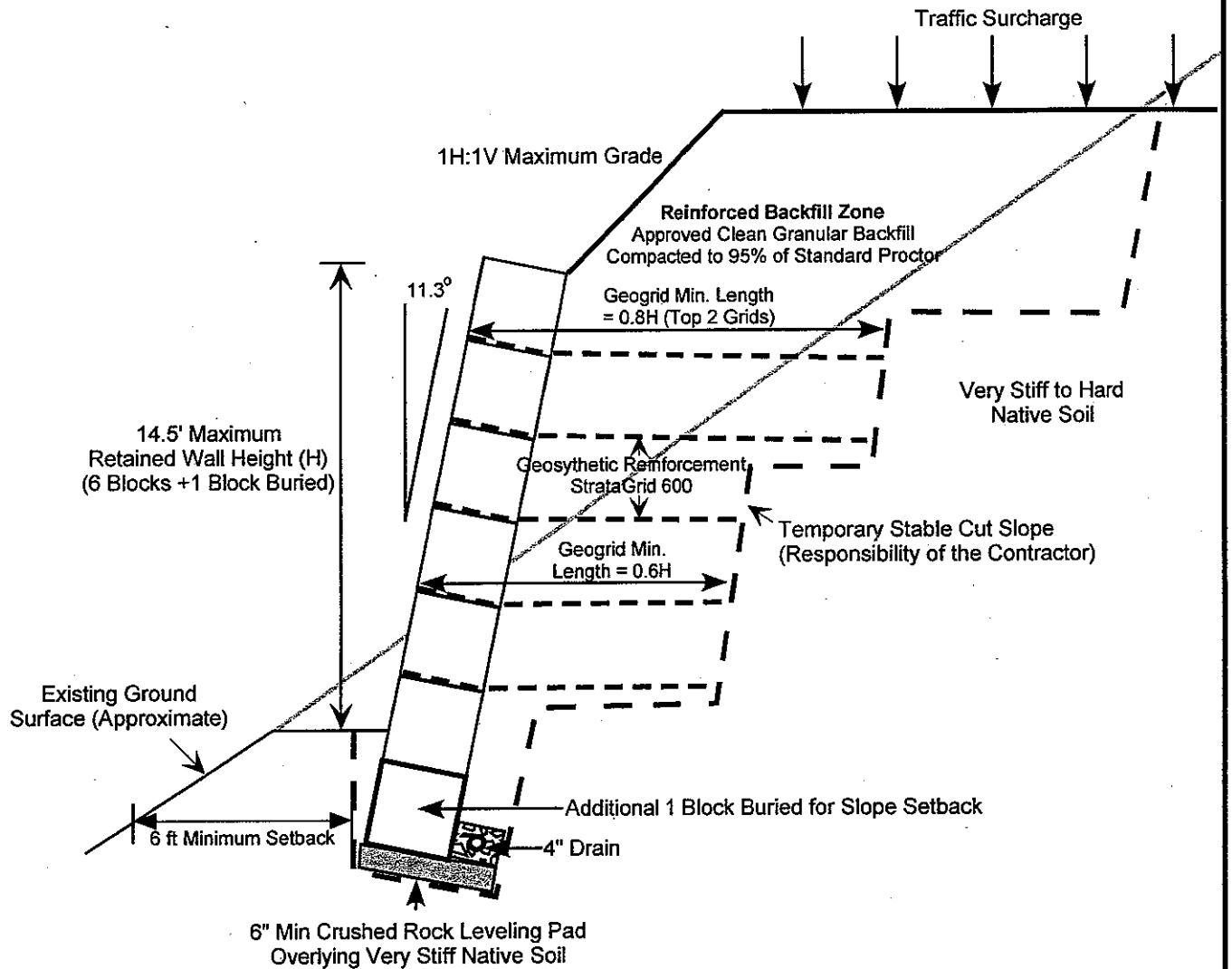
Adequate drainage behind and beneath the wall is critical to wall performance. A subsurface drain consisting of 4-inch diameter, perforated, Schedule 40 PVC or ADS Highway Grade pipe should be embedded in drain material behind the bottom of the wall face. The drainpipe and surrounding drain rock should be wrapped in non-woven geotextile (Mirafi 140N, or approved equivalent) to minimize the potential for clogging and/or ground loss due to piping. Water collected from the drains should be directed into the local storm drain system or other suitable outlet.

Based on the attached calculations, the proposed retaining walls will have a factor of safety of at least 1.25 against sliding, overturning, bearing capacity failure, internal failure, and facing failure provided that our recommendations for wall construction are followed. GeoPacific should verify geogrid products before placement, and observe construction of the designed retaining walls including subgrade inspection, overexcavation requirements, embedment, wall batter, geogrid placement, backfill compaction, and finished grades.



# ULTRA BLOCK MSE WALL TYPICAL SIDE DETAIL

## Ultra Block MSE Wall with Traffic Surcharge Retained Height = 4 to 14.5 Feet



**NOTES:**

1. Wall Height (H) is the retained height (not including embedment).
2. Minimum wall embedment is 6 inches for walls up to 14.5 feet in retained height.
3. Leveling pad and any additional drainage materials shall consist of 3/4" - 0 crushed aggregate.
4. Backfill in reinforced zone to consist of sand, reject rock, or crushed rock with maximum clast size of 1" and approved by the geotechnical engineer.
5. Geotechnical Engineer should review subgrade soils and cut slope behind wall.
6. Geogrids must be of appropriate type and length per the design calculations.
7. Finish grade must provide positive drainage.

Not to Scale

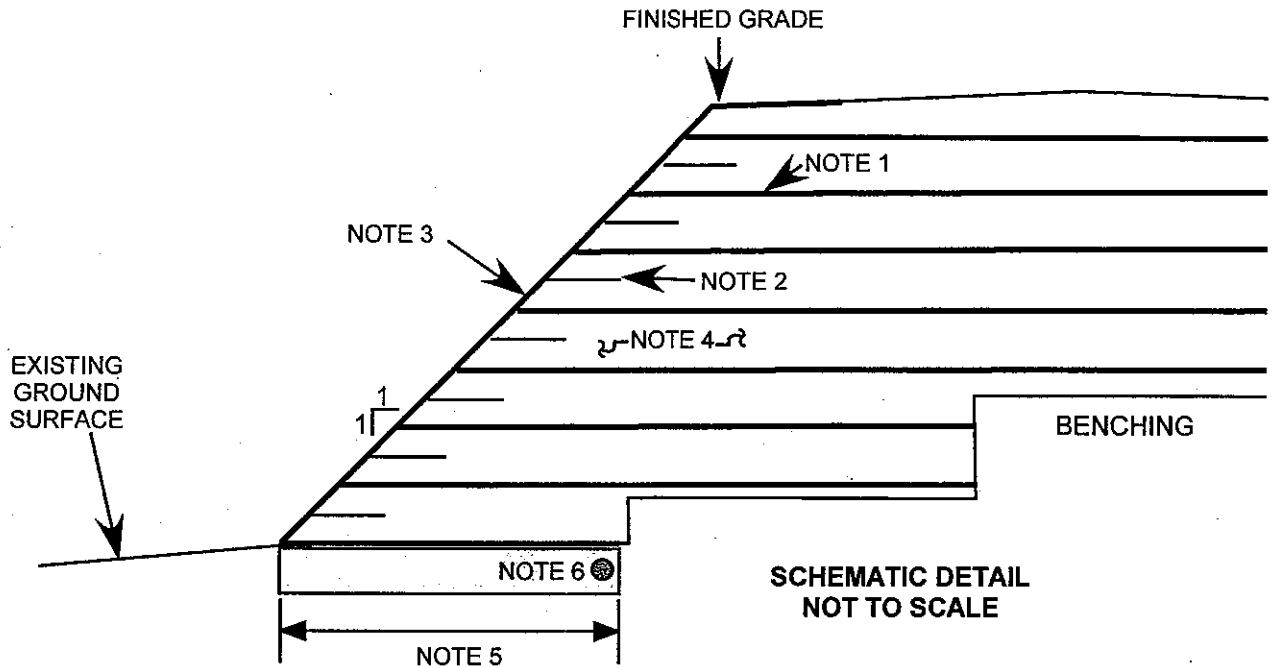
Date: 10/05/05  
 Drawn by: EJK





7312 SW Durham Road  
Portland, Oregon 97224  
Tel: 503.598.8445 Fax: 503.598.8705

## REINFORCED EMBANKMENT SCHEMATIC DETAIL



### CONSTRUCTION NOTES:

1. Primary geogrid reinforcement to consist of StrataGrid SG500, max. 4-foot vert. spacing and minimum length as shown on cross section. Substitution of geogrid material allowed only with approval of geotechnical engineer. Primary geogrids should be rolled out with strong direction perpendicular to slope face. Grids should be stretched taut and staked down prior to backfilling. No overlap or ties required for adjacent sections of geogrid.
2. Secondary geogrid reinforcement to consist of Tensar BX 1100, minimum 4 feet long, placed 2 feet above each layer of primary geogrid. Tensar BX 1100 can be purchased in 9-foot rolls, cut in half and rolled parallel to slope face.
3. Slope erosion protection should consist of planting at a minimum. Consideration may also be given to use of natural or geosynthetic erosion control matting, pinned at appropriate intervals per manufacturer's specifications. Vegetation as specified by project forester.
4. Excavated materials may be used as fill within the reinforced zone, provided it is primarily soil with rock fragments no greater than about 4 inches in size. Material with significant percentages of large fractured rock should not be used in the reinforced zone, due to potential excessive damage to the geogrid. The fill soils should be compacted to at least 95 percent of Standard Proctor (ASTM D698) in the reinforced zone.
5. Reinforced earth embankment to be "keyed" into the existing slope as shown on the cross section. Benches should be 10 feet wide minimum.
6. Reinforced embankment design to incorporate internal drainage. As a minimum, a drain should be provided at the base of the slope, with laterals outletting to the slope face at maximum intervals of 100 feet. Subsurface drains to consist of 4-inch diameter perforated PVC pipe surrounded in drainage sand and gravel, per the geotechnical report. Laterals to consist of solid PVC pipe.

Project: ODF Huff 'n Puff Road  
Clatsop County, Oregon

Project No. 05-9411

FIGURE 2B

Appendix A  
 1H:1V Geogrid-Reinforced Slope Calculations and Cross Section

ODF Huff 'n Puff Road  
 1H:1V Geogrid-Reinforced Slope

Material #: 1	Description: Weathered Basalt Bedrock	Wt: 135	Cohesion: 0	Phi: 44
Material #: 2	Description: Reinforced Engineered Fill	Wt: 125	Cohesion: 0	Phi: 34

Static Factor of Safety: 1.346  
 Minimum FS Required for Roadway Construction: 1.25

