

Harvest and Access Proposal for the Closer and Schwing Ding Timber Sales

**Prepared for the Washington State Department of
Natural Resources**

By

**Winter 2003 FEE 444 Design Class
University of Washington, Seattle, Washington**

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Technical Summary:

The senior class of Forest and Ecological Engineering at the University of Washington has contracted with the Washington State Department of Natural Resources to develop harvest and transportation plan for a parcel of land located near Ashford, Washington. The project endeavors to devise a set of plans to create a timber management, harvest and transportation plan that accounts for both monetary and ecological needs. We will take into account both timber harvesting and alternative sources of income such as selling carbon credits to accomplish our monetary goals. Our immediate goal is to devise a harvest plan for the next five years, and ultimately to create a plan that will yield a sustainable flow of timber. Minimizing the potential impacts of our activities is among our top priorities, which will ultimately lead to a sustainable forest management plan.

Executive Summary:

Reese Creek Transportation and Harvest Plan Design Proposal

**Winter 2003 FEE 444 Design Class
University of Washington, Seattle, Washington**

The Senior Class in Forest Engineering at the University of Washington will be designing a harvest and access plan for the Department of Natural Resources for the Reese Creek Watershed located near the town of Eatonville. The formal design project will start April 1, 2003 and a proposal will be presented to the DNR on approximately June 10, 2003.

As a Land Trust holder, the DNR is looking to get maximum revenue from their lands. However, in this case, we are also looking into non-traditional methods of generating revenue such as selling carbon credits. Our goals include conserving and enhancing the natural resources of state forest land while attaining the highest long term net income from these lands. At the same time we will attempt to minimize the potential impacts to the productivity of the forest, habitats, and wildlife, as the central theme to a long term sustainable forest management plan. Wildlife management, water quality, public use, and timber management are thus integral parts of the plan.

The Forest Engineering program has been closely linked with the DNR for many years. The DNR has entered into an agreement with the University of Washington that the senior Forest Engineering class will produce a harvest and transportation plan for the Closer and Schwing Ding timber sales during the spring quarter of 2003. The harvest plan will provide for at least 2 MMBF per year to be cut through fiscal year 2008.

We will have no more than ten weeks to complete the project. The project will be divided into three phases: preliminary planning, fieldwork, and final design.

Our final product will include a transportation plan detailing landing and road locations, culvert spacing, abandonment strategies, and ballast source. In addition, there will be a

harvest plan detailing thinning locations, harvesting methods, spacing, machinery to be used, and a monitoring procedure.

Our estimated project budget contains the cost to the UW and DNR. These costs include Pack Forest Charges, University Charges, and Contractual Services.

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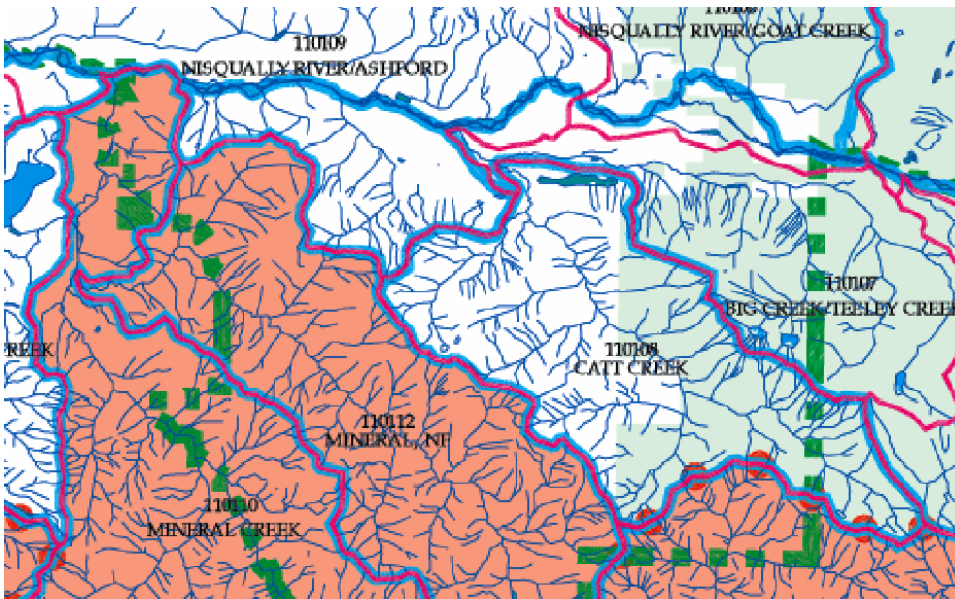
Design Project Introduction:

Problem:

To develop and implement a harvest and transportation plan in the following watersheds: Reese Creek, North Fork of Mineral Creek, and Catt Creek. In doing so, the access plan should enhance the natural resources of the state forest, while attaining the highest net income from the land.

Problem Background:

The University of Washington (UW) and the Washington State Department of Natural Resources (DNR) have a long standing tradition of working together for the Forest Engineers spring capstone design sequence. This year's project is a timber harvest project that will take place within the Reese Creek, North Fork of Mineral Creek and Catt Creek Drainages.



The Department of Natural Resources' primary goals for this project include devising a harvest and transportation plan in order to provide a sustainable even flow harvest of timber. In addition, the Hancock Timber Resources Group riparian ecosystems in the Reese Creek, North Fork of Mineral Creek, and the Catt Creek Drainages must be protected. To do so, areas of unique or important habitat need to be identified so that necessary protection of these species may be provided and improved upon. Potential species habitats of concern include the Northern Spotted Owl Dispersal Habitat and the Elk Winter Range. Visual impacts must also be considered and minimized to areas that can be seen from State Highway 706, as well as, from the town of Ashford. Finally, forest management activities must be considered in regards to other forest activities such as public use.

The project will require the design and implementation of a comprehensive road and harvest plan that minimizes cost, as well as, the amount of permanent roads. The design should consider each area with possible alternatives that account for environmental impacts from harvest and road construction. Economic considerations must be taken into account when choosing the most appropriate solution. The harvest plan should account for a lifespan of 10 years minimum, with a field plan covering the first five years of the harvest plan, or as time allows. In addition, it should identify possible sediment delivery caused by the roads, perform risk analysis for possible unstable slopes, and perform cost analysis for construction including road abandonment, fish passage issues, and maintenance. The transportation plan must also include a Road Maintenance and Abandonment Plan (RMAP), as well as, a possible source of ballast that will be used for road construction.

Expected Deliverables:

- A harvest plan detailing landing sites
- Road locations
- Extracted volume of merchantable timber
- The harvesting method, spacing between sites, and machinery used
- A monitoring procedure for examination of resulting habitat and structure

Key Stakeholders:

DNR - Ted Keeley (Problem Owner)

DNR - State Trust (Who the money from the timber sales go to)

Environmental Groups - (Minimal Environmental Disturbance)

Safety Groups – (Ensure that Labor and Industries manual is followed)

Peter Scheiss (Forest Engineering Advisor)

Jim Fridley (Design Professor)

Scott Bergen (Ecological Engineering Activist and Author)

Wood Processing Mills (Timber sale purchasers)

Logging and Forestry Services Contractors

Phil Hurvitz: expert in GIS and GPS

Finn Krogstand expert in GIS and Maps (rural)

Matt W. expert in Visual Impact Assessment

Jeff Comnick expert in LMS

Technical Specifications:

- Contribute 2 MMBF per year to the annual region harvest, through FY 08
- Harvest Plan Area
 - Lifespan 10year minimum.
 - Field truth the first 5years of the harvest plan, or as time allows.
 - Layout and design the Closer timber sale, 2 units, target acreage: 184 regeneration acres total.
 - Layout and design the Schwing Ding timber sale, target acreage: 99 regeneration acres.
 - Cannot exceed 200 acres of regeneration harvest over the next ten years, excluding Schwing Ding and Closer acreages.
 - Apply current Variable Density Thinning guidelines to the Harvest Planning Area, on a landscape basis. (Procedure #PR14-005-030)
 - Rotation age of 70 to 90 years for regeneration harvests.

Functional Requirements and Constraints that we plan to address:

(A further breakdown of functional requirements and constraints can be found in following sections and the appendix; House of Quality)

Functional Requirements

- Road Network
 - Minimize increases to the permanent road network.
 - Design new proposed roads, as time allows.
 - Identify potential sediment delivery areas and give recommendations for mitigation.
 - Perform risk assessment for unstable slopes and give recommendations for mitigation.
 - Conduct economic analysis
 - Road Abandonment
 - Fish structure upgrades and stream-adjacent parallel roads to Forest Practice standards
 - New road construction
 - Road Maintenance
 - Incorporate RMAP information in road network planning
 - Identify potential rock sources

Constraints

- **Public Use**
 - Visual Corridor
 - Aesthetics
 - Social / Political
 - Access
 - Recreation
 - Criminal Activity
 - Meth Labs
 - Vandalism

- **Resource Sensitivity**
 - Riparian Areas
 - Water Quality
 - Fisheries
 - Wetlands

- **Topography**
 - Yarding Distances (up hill & down hill)
 - Road Locations

- **Soils**
 - Surface Failures
 - Mass Wasting Potential
 - Erosion Potential

- **Unique and Important Habitat**
 - Northern Spotted Owl Dispersal Habitat
 - Murrelet Habitat

Potential Pitfalls:

The major potential pitfalls that we foresee are time constraints, inadequate data, and learning new software as we go. Our time scale is limited to 10 weeks and cannot be extended by any amount. Developing and maintaining a schedule will be an important part of the project. Inadequate data should not be a serious issue, however we are completely dependant on the DNR to provide us with accurate data. Many software programs will be required to complete this project. Some of these programs we are not proficient in and will need to learn this software as we complete the assignment.

Engineering Rationale:

Data Collection

Current State of the Art

The current state of the art in Forest management, Harvest and Transportation System design relies fully on Geographic Information System based data management, engineering analysis and design parameter specification.

The first step in the engineering process is to collect the required data that is needed to solve the problem. The data comes in various forms such as GIS coverage, reference materials, harvest and road building equipment cost and production estimates, and silviculture data.

Frequently used GIS coverages include: DEM (Created from LIDAR data), Hydro (stream network and polygons), Trans (Road network), POCAL (Public Land Survey Boundary Info), RIU (stand data), Soils (soil inventory), RMUALL (current and pending timber sales), Boundary (Built by UW for clipping state-wide layers), Ortho's (digital ortho photos -- topographically corrected aerial photos), PLS-PT (Public Land Survey Point Layer -- statewide surveyed corner positions), POCA (Political Boundary Lines -- Section Lines), Precipitation (statewide precipitation cover), ROS (statewide rain on snow), Storm (Coverage of precipitation during a storm), WAU (Watershed units), Mastertic (Tics for calibrating digitizers), Landsat (Digital satellite images), Unstable Slopes (DNR cover of unstable slopes), Towns (township boundaries)

Other reference materials are useful in the design of an access network to determine what the regulations are and what will be allowed to do within those regulations. These include the Habitat Conservation Plan (HCP), Landscape Management Plan (LMP), Forest Practices Act (FPA), Watershed Analysis Information (including wildlife issues, erosion issues, and unstable slopes analysis), text books, technical documents, maps, the UW FE Handbook.

Harvest and road building equipment cost and production estimates are acquired from programs such as SL-Pro, previous FE design proposals, USFS Region 2 costing spreadsheets and from the FE field trip to the Oregon Logging Conference in Eugene. All of these information sources are very useful in determining the costs involved in the production of an access network and the cost involved in implementing a silvicultural prescription.

When determining the different silvicultural processes there is a lot of information that will be pertinent to over all plan. This information includes average tree size, average log size, reasonable tail tree size, and total volume of stands.

The current State of the Art for the design roads systems and silvicultural prescriptions within a watershed has many different aspects. The first aspect that needs to be looked at is the timber models.

The timber models will show you the different heights, age class, site class, cut volume and so forth. The current state of the art in this area consists of many different programs. Those programs are Forest Vegetation Simulator (FVS), Suppose, LMS, Logger PC, and Plans. These programs will allow you to analyze the site conditions within your watershed and determine where boundaries will go, landing will need to be, what needs to be harvested first, and what units need to be thinned or actively managed. This information is crucial in the construction of a silvicultural prescription.

The next step is to analyze the watershed to determine stream generation and sediment delivery. This is very important when laying out roads and harvest units because both road construction and harvesting has a direct impact on how the streams flow and how much sediment those streams carry. The current states of the art in these areas are two different computer programs ArcGrid and ArcView. Each one of these programs uses GIS information from your watershed and from that you can determine direction of flow, accumulation, stream class, and much more to list. These programs allow you to log within a watershed and have very minimal impact on the watershed.

Once you have analyzed the watershed through ArcGrid or ArcView the location of landings, boundaries, and roads can be established. Along with the information on the watershed you must also determine what type of harvest system you will use (i.e. cable yarder, feller buncher, feller processor, etc.). This is usually determined by topography, but some factors such as soil type and cost may also affect your decision. When setting the boundaries for the harvest units the PLANS program will be used. The information or inputs needed to run PLANS are: max slope rigging distance, desired payloads (determined from timber modeling), minimum required ground clearance, carriage height when logs fly clear, carriage weight, tower height, tailhold height, allowable skyline tension, skyline weight, and mainline weight. From the inputs the program will produce setting boundaries, cable profiles, and payloads.

Logger PC is another program that can be utilized when determining landings and boundary locations. This program does not require as many inputs. The inputs include terrain information, yarder types, and carriage models. This program is very useful when analyzing cable yarding units and determining which cable system to use.

After determining the setting boundaries and deciding the best locations for landings the next step is to determine where the roads will be located and which existing roads are still usable. For the initial layout of the roads use GIS coverage of the area that is acquired through LIDAR. Then use Pegger in GIS to peg out new roads to connect landings to the roads already existing or the new mainlines that have designed. With all of the new information and computer programs the old method of designing roads with a contour map and a pegger is outdated, but will probably still be used to determine grades between landings and mainlines.

The next step is to produce a map that shows the side slopes, road grade and alignment. This map will be used on the preliminary road design process. All of the road designs will follow the HCP rules for road construction and will limit the number of stream crossings and the amount of road construction on unstable slopes. Most of these sensitive areas will be determined from the watershed analysis.

Once the designs of the roads have been completed next is laying them out in the field. This will consist of setting the grade line, setting the p-line, running corridor profiles, and traversing all designed roads. There are many different methods of traversing within the engineering field. Here are three methods and the equipment needed to do these; staff, compass, and chain, Criterion impulse laser, and a Lasertech impulse laser, MapStar digital compass, and a Hewlett Packard data recorder. Once this is completed take the recovered data to the office and create the final road network design. If you would like more in -depth instructions on how to use these instruments refer to the FE handbook.

Once the road design is completed go back and look at how our ditch system will affect the way the water flows within the watershed. Determine how the ditches will route water and if any harmful sediments will be transferred to dangerous areas within the watershed. The best way to analyze this is to create a modified flow direction map; this will allow a visual on how the roads and ditches intercept the downward flow and determine ways to counteract this process.

The DNR has most of the GIS and coverage data we need to analyze the watersheds within our unit. We will use most of the methods explained above with exceptions in a few cases. We will be working with most of the up to date equipment and computer programs to create a harvest and transportation plan for the Reese Creek, Cat Creek, and N. Fork of Mineral Creek watersheds. We will use all information needed, but not all of the above data will be used in our project.

Last we will construct an alternative harvest method plan. Right now there are three different methods used to harvest timber: ground-based systems, cable yarding systems, and helicopter systems. We will need to compare helicopter systems to cable systems for slopes greater than 30% and Helispace and Simyard are two programs that can help in this analysis. These programs will help greatly with the cost analysis. In general on slopes less than 30% ground based systems will be applied. Once the logging prescriptions have been determined we will analyze things like tailholds using equations such as Nakamura's to determine the holding strength of stumps.

Preliminary Analysis

The potential solution being considered must obtain a sustainable ecosystem while providing the DNR with an economical return. All of this must be done within the rules provided by the HCP that the DNR has created in conjunction with the Federal Government. Thinning cuts may be made within a unit, but must not border each other

and separate age classes should be maintained in the area to create an environment that can maintain the lively hood of indigenous plants and animals.

Conclusion

Following these steps will provide a potential solution for the DNR to design an access network, harvesting plan, and management activities within the newly purchased land of Reese Watershed. These designs must be applied with the functional requirements, constraints, and stakeholders expectations in mind. We also need to meet the DNR's economical needs while also considering environmental, ethical and safety issues

Project Management

OFFICE SETUP

Our first task at Pack Forest will be to set up a field office that will be dedicated to the project Hancock Timber Resources Group .computer equipment will be set up and the working space and related supplies and materials will be organized. We will complete this task within the first three days. Supplies that we will need for this task are computers, printers, digitizers, general office supplies, DNR literature and maps. Timely completion of this task is dependent on the ability of the University of Washington and the DNR to provide the needed equipment, materials and supplies.

DATA COLLECTION

We will need to collect data of GIS coverage's, harvest and transportation types and costs, and reference materials that will be needed. The DNR will provide us with GIS coverage's. Using ArcView and ArcInfo we will analyze the coverages. The following coverages were used in past projects and will most likely be necessary for this project (FE handbook):

- DEM (Created from LIDAR data)
- Hydro (stream network and polygons)
- Trans (Road network)
- POCAL (Public Land Survey Boundary Info)
- RIU (stand data)
- Soils (soil inventory)
- RMUALL (current and pending timber sales)
- Boundary (Built by UW for clipping state-wide layers)
- Orthos (digital ortho photos -- topographically corrected aerial photos)
- PLS-PT (Public Land Survey Point Layer – statewide surveyed corner positions)
- POCA (Political Boundary Lines – Section Lines)
- Precip (statewide precipitation cover)
- ROS (statewide rain on snow)
- Storm (Coverage of precipitation during a storm)
- WAU (Watershed units)
- Mastertic (Tics for calibrating digitizers)
- Landsat (Digital satellite images)
- Unstable Slopes (DNR cover of unstable slopes)
- Towns (township boundaries)
- LIDAR (1-2 m DEM's)

We will obtain harvest and transportation types and costs through information found on the FE website, information previously collected by the FE senior class, and inquiries made to contractors and financial institutions. This task should take approximately ten working days to complete. The majority of data will be collected within the first ten working days of the project, but we may need additional data as the project progresses. Initially all students will work on this task. The second week of this task we will assign some of the students to other duties.

BASEMAPS

The DNR will provide us with some base maps. Any maps not provided by the DNR that are required for the project, we will create using the digital information received from the DNR, or we will plot them by hand. The FE handbook lists recommended maps to be created such as hazardous soils and slope, timber age and type, existing roads, streams, and timber boundaries. This task should last approximately three to four days. We will start it during the second week and we will need data that has been collected during the first week. Two people will work on this task.

PRODUCTION EQUATIONS

Any harvesting methods that offer a possible solution we will analyze for comparison by costing, productivity, and feasibility. This will require data and maps that are to be created in the first two weeks. The duration of this task will be approximately eight days and will require two persons. Resources that we will use include the FE handbook and information gathered from past projects.

PRELIMINARY TIMBER MODELING

We will analyze stand data from the data collected during the first two weeks. Computer programs such as FVS, LMS, and Logger PC will aid us in this task. This task will take place over approximately an eight day period. One student will work on this task. The software that is listed here will be necessary.

WATERSHED ANALYSIS

To determine slope stability and sedimentation from proposed roads we will perform a watershed analysis. We will do this using ArcView and other software. This task will take place over approximately twelve days and will require one student to complete. The GIS data gathered during the first two weeks will be required to complete this task. Inaccurate or incomplete data may hinder us in performing this task.

PRELIMINARY SETTING DESIGN

We will distinguish between ground based harvesting areas and cable harvesting areas. The software programs PLANS and Logger PC will be used for this task. For cable systems, we will identify landing sites and calculate turn weights. We will also propose and analyze alternate harvesting systems. The FE handbook lists the following information about harvesting equipment, timber, and topography that will be necessary for this task:

Yarder information:

- Maximum slope rigging distance
- Carriage weight
- Tower height
- Allowable Skyline tension
- Skyline weight
- Mainline weight
- Carriage height when logs fly clear

Timber information:

- Desired Payload
- Tailhold Height

Ground information:

- Minimum required ground clearance
Approximately twelve days will be required for this task and two students will be assigned to it.

PRELIMINARY ROAD DESIGN

According to the locations of the proposed landing sites, we will create multiple road plans. We will use the software program ArcView with Pegger. The road specifications that will be followed are detailed in the Forest Practice Manual.

- Resources: Two Engineers, full time
- Duration: Twelve Days

PRELIMINARY ALTERNATE HARVEST SYSTEMS ANALYSIS

We will analyze alternate harvest systems. Different cable and ground based systems will be compared against each other. The HCP and LMS software will be used.

- Resources: Two Engineers, full time
- Duration: Ten Days

PRELIMINARY REPORT WORK

An outline using various software programs will be created to show what the final report will look like. This will be used upon completion of the fieldwork to help expedite the report writing process.

- Resources: One Engineer, full time
- Duration: Ten Days

FIELD PREPARATION

In preparation for our fieldwork we will prepare equipment and a plan of action. All students will be responsible for preparing their personal gear for the fieldwork.

- Resources: Two Engineers, full time
- Duration: Five days

FIELD MAPS

We will create durable maps that can survive in the field. These maps will display all pertinent information that has been gathered during the office work.

- Resources: Two Engineers, full time
- Duration: Four Days

FIELD WORK

To verify the initial plans made in the office during the first part of the course, we will conduct intensive fieldwork. We will survey and adjust our proposed roads according to actually conditions discovered in the field. This task is dependant on the completion of all previous tasks. Necessary supplies will include measurement devices such as a Criterion and GPS unit and field equipment such as flagging and stakes. A UW vehicle will be furnished to transport the team to the site.

- Resources: Seven Engineers, full time
- Duration: Fifteen Days

FINAL SETTING DESIGN

Once the fieldwork is completed and field data has been collected, we will review and adjust the setting designs. For this task we will use the software program PLANS to analyze the different settings. We will also consider requirements made by the DNR. These requirements are outlined in the HCP..

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- Resources: Two engineers, full time
- Duration: Seven days

The start of this project is dependent on the completion of the fieldwork.

FINAL ROAD DESIGN

We will compare the data that was used for the preliminary road design to the traverse and grade line data collected in the field will. This data is most likely to differ in many areas and several adjustments will need to be made. We will produce a final road design using the software program ROADENG. The start of this task is dependent on the completion of the fieldwork.

- Resources: Two Engineers, full time
- Duration: Five Days

FINAL ALTERNATE HARVEST SYSTEMS ANALYSIS

Considering the field data that has been collected, we will analyze alternate harvest systems. We will create a comparison between costs and feasibility of harvest systems. Here we will consider the HCP. At the completion of this task, we will provide a final recommendation for a harvest system. The use of LMS software will be used to project possible regeneration and appearances.

- Resources: Two Engineers, full time
- Duration: Seven Days

FINAL TIMBER MODELING

We will produce a visual model of the final landscape. This will show what the land will look like after it has been harvested. For this task we will use software programs such as LMS with FVS, Suppose, and Envision.

- Resources: One Engineers, full time
- Duration: Three Days

COST ANALYSIS

We will produce a detailed analysis of harvest and transportation costs. The start of this task will depend on the completion of the final road, setting, and harvest system designs. Using an Excel spreadsheet we will create the computed the costs. We will obtain the necessary information from literature we previously collected information on the FE website, and inquiries made to financial institutions that specialize in forest equipment.

- Resources: Two Engineers, full time
- Duration: Eight Days

REPORT

We will create a final report including our harvest and transportation. The completion of this task is dependent on the completion of all the previous tasks.

- Resources: Seven Engineers, full time
- Duration: Nineteen Days

FINAL MAPS

We will create final maps that show landing sites, harvest settings, road locations, ballast sources, and boundaries. This task will require the completion of the final road, setting, and harvest system designs.

- Resources: Two Engineers, full time
- Duration: Six Days

PRESENTATION

At the completion of this project we will prepare and give a report to the DNR staff. This presentation will be given using Microsoft Power Point. This task will be completed once the presentation is given. All students will be present at the presentation to the DNR.

- Resources: Two Engineers, full time
- Duration: Seven Days

References:

UW FE Handbook

<http://courses.washington.edu/fe450/>

Washington Forest Practices Board. 2001. Forest Practices Rules.

<http://www.wa.gov/dnr/htdocs/fp/div/div.html>

Watershed Analysis Manual

<http://www.wa.gov/dnr/htdocs/forestpractices/watershedanalysis/manual/>

Past FE Design Projects:

Tyee South Design Project 2002

http://courses.washington.edu/fe451/projects/02_tyee/proposal/Design_Proposal_2002.htm

Capstone Design Project 2001 Clallam River "Big Country" Timber Sale.

http://courses.washington.edu/fe450/projects/01_clallam/report/index.htm

A Thinning and Access Strategy for Accelerated Stand Habitat Creation in the Burnt Mountain Planning Area.

http://courses.washington.edu/fe450/projects/00_solduc/report/report2000.pdf

A Watershed and Transportation Plan for the North Hoodsport Block.

http://courses.washington.edu/fe450/projects/99_hoodcanal/cover/index.html

Appendix A: Technical

- a) Introduction
- b) Engineering Rationale
- c) Project Management Team

Appendix B: Facilities and Equipment

The facilities will be provided by the University of Washington in the form of Pack Forest. The entire UW design team will be housed, fed, and provided with office space at Pack.

The UW will also provide all equipment that is required to complete the job. This includes computers, software, and field equipment. See table for a complete list of computer software and field supplies to be used. The UW will also provide transportation to and from the job site.

Computer Software:

LoggerPC, GPS Download Software, Culvertloc., Sedmodl, Hydraulic programs, OTTO, RoadEng, Offtrack, NETWORK2000, Mapstar Data transfer, costing spreadsheets, Pegger, LMS, PLANS, SymYard2000, SkidderPC, WFCosting, Envision, SVS, Grid, ArcView, Dreamworks, MS Project, Power Point, Excel, Word, and an internet browser.

Field Equipment:

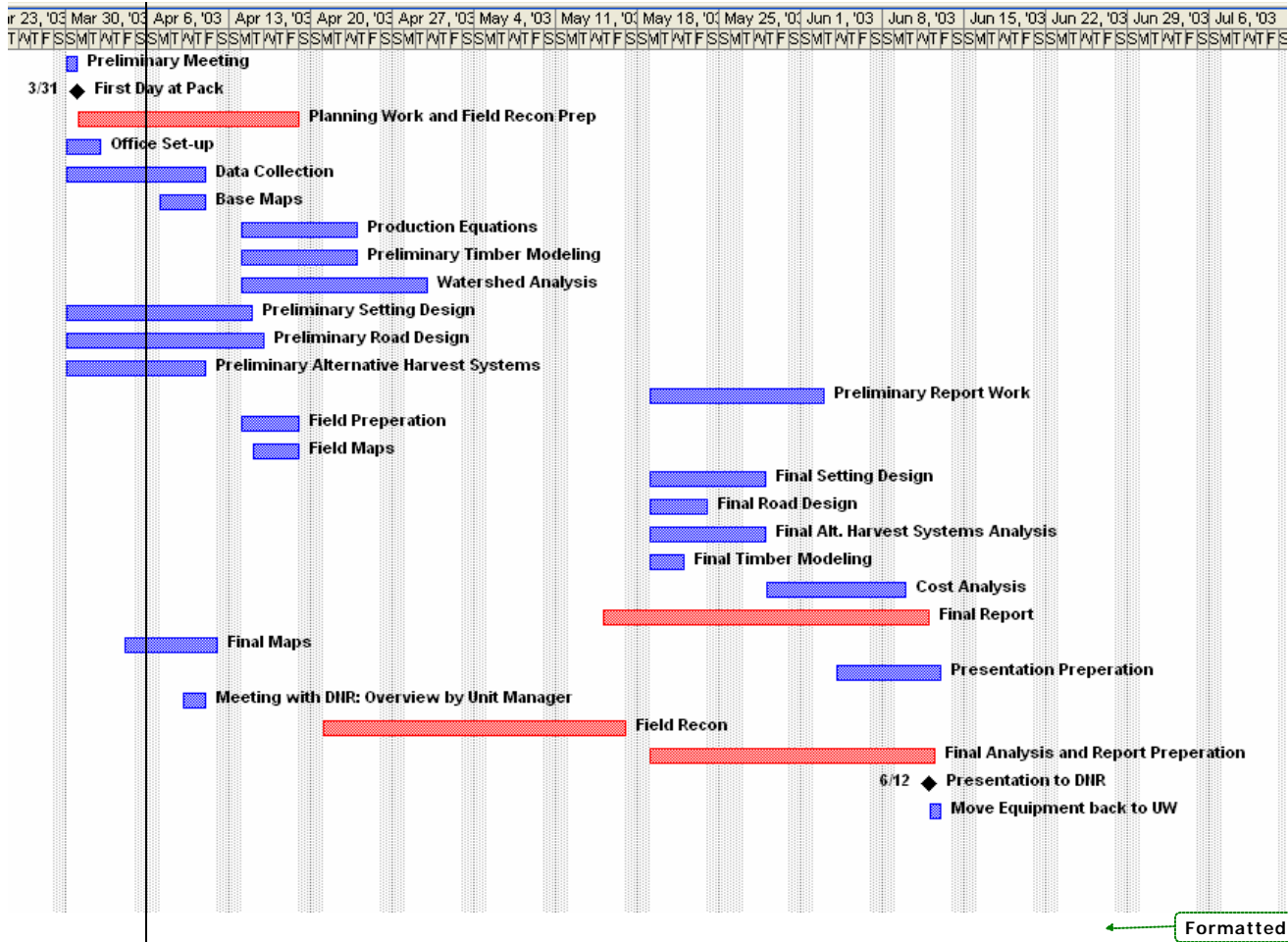
Compass, Mapstar-laser, Criterion, prisms, Relaskop, GPS, clinometers, hard hats, d-tape, cruiser's vests, calculators, total station instruments, flagging.

All equipment is already owned and costs for their use are indirect.

Appendix C: Collaborative Arrangements

This project is the result of a collaborative arrangement between the University of Washington and the Washington State Department of Natural Resources. This arrangement has been on-going for nearly **twenty years**. The UW is contracted to design a harvest and transportation plan. This collaboration is a win situation in which the students at the UW gain valuable experience while the DNR gets a technologically cutting edge plan at a low cost.

Appendix E: Gantt Chart



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Appendix F: Budget

Budget For 2003 Pack Forest Reese Watershed

Salaries/Wages

Title	Unit (days)	Unit Cost (\$/day)	Total (\$)
Project Manager			
Peter Schiess	50.00	320.00	16000.00
Lead Engineer			
Jeremy Tryall	50.00	200.00	10000.00
Field Engineer			
Kevin Pilemalm	50.00	160.00	8000.00
Colin Forsyth	50.00	160.00	8000.00
Erin Muldoon	50.00	160.00	8000.00
Pablo Reed	50.00	160.00	8000.00
Joshua Mattson	50.00	160.00	8000.00
Brent Horschman	50.00	160.00	8000.00
Mark Severson	50.00	160.00	8000.00
Total Salaries/Wages			56000.00
Benefits @ 25%			14000.00
Total Employee Cost			70000.00

Consultants

Title	Unit (days)	Unit Cost (\$/day)	Total (\$)
GIS Consultant	10.00	220.00	2200.00
GPS Consultant	5.00	200.00	1000.00
Total Cost of Consultants			3200.00

Supplies

Office supplies			1500.00
Misc. computer			1200.00

supplies/memory	
Computer maint./repairs	1200.00
ERSI Maintenance Contract	500.00
Misc. Supplies	1300.00
Total Cost of Supplies	5700.00

Transportation

Type of Vehicle	Rate (\$/mile)	Miles	Total (\$)
12 Person Van	0.36	1400.00	504.00
4X4 Suburban	0.36	1400.00	504.00
Total Cost of Transportation			1008.00
Total Direct Cost			79908.00
Overhead/Indirect Cost @ 35%			27967.80
Total Cost			107875.80
Profit/Risk @15%			16181.37
Total Project Cost			124057.17

Appendix F: Supplementary Data

Policies Procedures Guidelines and Law

- Habitat Conservation Plan
- Forest Practice Board Manuel
- Forest Resource Plan
- Forestry Handbook (HCP policies and procedures)
- Eatonville Landscape Assessment
- Nisqually River Management Plan

Appendix G: Resume and Project List(s)

Colin Forsyth

Forest and Ecological Engineering
Senior
University of Washington

(206) 383-7713
4557 8th Ave NE
Seattle, WA 98115
cforsyth@u.washington.edu

RESUME

Position:

Forest Engineer

Education:

University of Washington, Seattle, WA
Credits Complete: 96
GPA: 3.0

Pierce Community College, Lakewood, WA
Credits Completed: 58
GPA 3.1

Washington State University, Pullman, WA
Credits Completed: 19.5
GPA: 2.8

Relevant Experience:

For the past 3 quarters I have been an Undergraduate Research Assistant in the Urban Design and Planning Department working on a “Best Practices” guide for urban development. I am finishing my research this quarter. My responsibilities include: writing sections of the guide; researching relevant “tools” and articles; and keeping a database of bibliographies and associated notes in Endnotes (a bibliographical reference computer program).

Awards:

I attained the rank of Eagle Scout in the Boy Scouts of America

Activities:

Climbing Club at the University of Washington
Rugby Club at the University of Washington

Interests:

The Outdoors, Photography, Boy Scouts, Team Sports

SUMMARY

College senior with current Firefighter II Red Card certification and experience in wildland firefighting and structure protection. Worked closely with Department of Natural Resources, Forest Service, and Bureau of Land Management while firefighting. Organized team player and individual contributor with oral and written communication skills. Proficient in using Microsoft Word and Excel and extensive knowledge of LoggerPC and RoadEng.

EXPERIENCE

Portland Firemog

2002

Crew Member and Engine Boss in training

- Contributed to controlling fire perimeters through use of burnouts and both direct and indirect attack methods.
- Operated under two Type I management teams and one Type II management team on fires ranging from 1,000 to 180,000 acres.
- Employed radio communications and map reading skills to notify strike team leader of potential air drop locations.
- Organized and directed extensive hose lays for hard-to-reach areas.

Pacific Wildfire

2001

Crew Member

- Fought fires under one Type I management team and two Type II management teams on fires ranging from 1,000 to 120,000 acres.
- Gained widespread experience in initial attack firefighting.
- Prepared structures for potential fire damage by clearing loose brush, ladder fuels, and flammable materials away from the main structure, and shutting off all possible fuel sources.
- Communicated with an air -to-ground team when acting as a crash rescue unit on-site at a helicopter air field.

EDUCATION

Bachelor of Science in Forest and Ecological Engineering, University of Washington, Seattle, Washington

Expected Graduation December 2003

Environmental and Operational Analysis and Design

Senior Capstone Design Course for Forest and Ecological Engineering

Expected Date Spring Quarter 2003

Quarter-long, full-time course encompassing office and field work to implement a natural resource development plan for a client - Department of Natural Resources. Project combines application of previous studies with a focus on timber harvesting, low-volume road design, and forest engineering principles.

- Work as a team to gather objectives, identify guidelines and constraints, and propose design plan and schedule.
- Perform economic analysis to evaluate design alternatives.
- Explain final design using written, oral, and graphical communication tools.
- Utilize non-textbook information pertinent to final plan including codes/standards, government regulations, handbooks, and computer-oriented resources.

Central Kitsap High School, 1999

Distinguished Scholar, Graduate with Honors

Eagle Scout

KEVIN PILEMALM

18120 SE 394th street

Auburn, WA 98092

(206) 729-8548 (home)

(253) 951-6341 (cellular)

E-mail: pilemalm@u.washington.edu

Objective: Secure a permanent position in forest engineering.

SUMMARY

- Three summers successful experience as independent contractor of exterior house painting.
- Significant experience in calculating cost and labor time and preparing a resulting competitive bid.
- Self-confident, get the job done, and do it well.
- Highly reliable and dependable.
- Competent in use of personal computers.
- One summer working as a forest engineering intern for Weyerhaeuser.

SKILLS AND EXPERIENCE

PARTNERSHIP AS INDEPENDENT CONTRACTOR OF EXTERIOR HOUSE PAINTING

- Prepared and posted advertising displays.
- Performed site visits, calculated material and labor cost, submitted competitive bid.
- Performed surface preparation and actual painting (several coats).

BARN AND FENCE CONSTRUCTION

- Performed wall and door construction
- Set fence posts and strung wire

SURVEYING SKILLS

- Practical field work dealing with Traverses, Leveling, and Earthwork

COMPUTER SKILLS

- Familiar with use of personal computers and printers
- Skilled with use of: Word, Excel, Auto Cad, and Wolfpack

ENGINEERING SKILLS

- Familiar with road layout procedures
- Skilled in harvest unit layout
- Skilled in dealing with and designing riparian buffers
- Experienced with the use of GPS equipment
- Familiar with designing stream crossings

EMPLOYMENT HISTORY

2002 (summer) Forest Engineering Intern: Weyerhaeuser; Coos Bay, Oregon

1998-2001 (summers) Painting contractor: Federal Way, Kent, Des Moines,
Auburn, and Tacoma Washington

1995-1997 (summers)

Construction Laborer: Enumclaw Washington

EDUCATION AND TRAINING

Fall of 1998 – Spring of 2001

Prerequisite classes and Biology, Oceanography, etc.
at University of Washington. Seattle Washington

Fall of 2001 – Present

Forest Engineering program at University of
Washington. Seattle Washington