



PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY
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August 30, 2017

Ms. Kimberly D. Bose, Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street, NE
Washington, DC 20426

Re: **Lake Chelan Hydroelectric Project No. 637-041**
Article 401 – Final USDA Forest Service Site-Specific Erosion Control Plan
USDA-FS Erosion Sites 5a, 5b, 8a, 8b, 10a, 10b, and 12 dated August 2017

Dear Secretary Bose:

Public Utility District No. 1 of Chelan County (Chelan PUD), licensee for the Lake Chelan Project No. 637 (Project), hereby submits for Federal Energy Regulatory Commission (Commission) approval the enclosed USDA Forest Service Site Specific Erosion Control Plan pursuant to license Article 401(a) and USDA Forest Service 4(e) condition no. 1.¹ The Commission has approved previous Forest Service site-specific erosion control plans, specifically: the first site-specific plan for sites 11, 55, 58 and 59 on December 14, 2007²; the second site-specific plan for sites 24, 25, 26, and 27 on March 29, 2010³; and the third site-specific plan for sites 1, 2, 14, 15, 16, and 17 on August 27, 2013⁴.

License Article 401(a), license Appendix A, Article 1(a)(2), and license Appendix B, condition no. 1 require Chelan PUD to submit site-specific erosion control plans for Commission approval at least one year before ground-disturbing activity occurs.

In accordance with the above license requirements, Chelan PUD, in collaboration with the USDA Forest Service (see attached letter), hereby files the fourth Final USDA Forest Service Site-Specific Erosion Control Plan dated August 2017, for habitat and ground-disturbing activities on USDA Forest Service Lands necessary to implement the erosion control implementation plan.

¹ *Public Util. Dist. No. 1 of Chelan County*, 117 FERC ¶ 62,129 (2006).

² *Public Util. Dist. No. 1 of Chelan County*, 121 FERC ¶ 62,196 (2007).

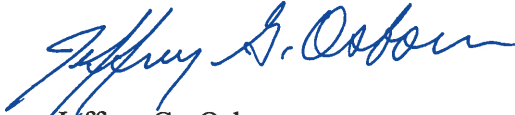
³ *Public Util. Dist. No. 1 of Chelan County*, 130 FERC ¶ 62,268 (2010).

⁴ *Public Util. Dist. No. 1 of Chelan County*, 144 FERC ¶ 62,172 (2013).

The plan describes the erosion control work anticipated to be conducted on sites 5a, 5b, 8a, 8b, 10a, 10b, and 12. Chelan PUD and the USDA Forest Service plan to begin implementation of the erosion control work in the fall of 2018 and to complete the work by the end of 2021. To help meet this schedule, Chelan PUD respectfully requests review and approval of this plan.

Please do not hesitate to contact me or Gene Yow (509-661-4305) with any questions or comments regarding this plan.

Sincerely,



Jeffrey G. Osborn
License Compliance Supervisor
jeff.osborn@chelanpud.org
(509) 661-4176

Enclosures: Final USDA Forest Service Site-Specific Erosion Control Plan, August 2017
USDA Forest Service letter dated August 16, 2017

cc: Division of Hydropower Administration and Compliance
Federal Energy Regulatory Commission
Mail Code DHAC, PJ-12
888 First Street NE
Washington, DC 20426

Erich Gaedeke, FERC-PRO

Final USDA Forest Service Site-Specific Erosion Control Plan,
August 2017

USDA FOREST SERVICE SITE SPECIFIC EROSION CONTROL PLAN

USDA-FS EROSION SITES 5a, 5b, 8a, 8b, 10a, 10b and 12

Final

**LAKE CHELAN HYDROELECTRIC PROJECT
FERC Project No. 637**

August 2017



**Public Utility District No. 1 of Chelan County
Wenatchee, Washington**

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EXECUTIVE SUMMARY

The Federal Energy Regulatory Commission (FERC) Order on Offer of Settlement and Issuing New License (License) for the Lake Chelan Hydroelectric Project No. 637 (Project) was issued November 6, 2006 to the Public Utility District No. 1 of Chelan County (Chelan PUD). License Article 401(a) and Appendix A, Article 1(a)(2) of the new Project License requires Chelan PUD to submit to FERC site-specific erosion control plans for habitat and ground-disturbing activities on National Forest Service Lands necessary to implement the erosion control implementation plan. The first site-specific erosion control plan was approved December 14, 2007, the second was approved March 29, 2010, and the third plan was approved on August 27, 2013. This fourth plan describes the USDA Forest Service (Forest Service or USDA-FS) site-specific erosion control work anticipated to be conducted between 2017 and 2021, including sites 5a, 5b, 8a, 8b, 10a, 10b and 12, as required by the new License, as specified in the License Articles and the Lake Chelan Comprehensive Settlement Agreement, October 8, 2003 (Settlement Agreement). Included in this plan is a map of proposed activities, a description of the land management area designation for the location of the proposed activity and the applicable standards and guidelines, a description of the designs by location, designs and mitigation measures considered, documentation of National Environmental Policy Act and permitting requirements.

SECTION 1: INTRODUCTION

The Federal Energy Regulatory Commission (FERC) Order on Offer of Settlement and Issuing New License (License) for the Lake Chelan Hydroelectric Project No. 637 (Project) was issued on November 6, 2006 to the Public Utility District No. 1 of Chelan County (Chelan PUD). The project license requires the treatment and monitoring of non-easement erosion sites located on USDA Forest Service (Forest Service or USDA-FS) Lands on the shores of Lake Chelan, as described in the Lake Chelan Comprehensive Settlement (Settlement Agreement), October 8, 2003, and its attachments, which is Appendix A of the Project License.

Project License Article 401(a) and Appendix A, Article 1(a)(2) requires Chelan PUD, at least one year before ground-disturbing activity occurs, to file with the FERC Site Specific Erosion Control Plans for the USDA Forest Service sites (site-specific plans). The components of the site-specific plan relate to the planning of erosion control work specified in the Appendix A of the License, and in Section 2.2.1 of Chapter 1 of the Lake Chelan Comprehensive Plan, which is Attachment B of the Settlement Agreement, as stated below.

2.2.1 Site-Specific Implementation Plans

Site-specific plans will be prepared by Chelan County PUD and approved by the USDA Forest Service for habitat and ground disturbing activities on National Forest System Lands required by the New License, including activities contained within resource management plans required by the New License that will be prepared subsequent to issuance of the New License. Site-specific plans for activities will be prepared two years in advance of required implementation dates.

Site-specific plans shall include:

1. Map depicting the location of the proposed activity.
2. A description of the USDA Forest Service land management area designation within the Forest Plan for the location of the proposed activity and the applicable standards and guidelines.
3. A description of locations, designs and mitigation measures considered, including implementation of effectiveness monitoring.
4. Data collected from surveys, biological evaluations or consultation as required by regulations applicable to ground or habitat disturbing activities on National Forest System lands in existence at the time the plan is prepared.
5. Noxious weed control measures included as part of mitigation.
6. An environmental analysis or other appropriate National Environmental Policy Act (NEPA) analysis of the proposed action that meets the USDA Forest Service requirements for implementing NEPA.

General concepts of large woody debris (LWD) are discussed in Chapter 3 of the Comprehensive Plan, which describes beneficial uses, LWD characteristics, and general standards and placement concepts.

The site-specific plan has been developed to provide the necessary information to conduct erosion control work at Sites 5a, 5b, 8a, 8b, 10a, 10b and 12. All of these sites are located in the middle portion of the lake (See Figure 1 and 2). It is anticipated that work on these sites will be conducted during the drawdown in the following order:

1. Site 5a and 5b
2. Site 8a, 8B, 10a, and 10b
3. Site 12

The first erosion contract will be to complete work at Sites 5a and 5b during the drawdown months in 2017 and early 2018. The contract(s) will include a contingency year for construction if needed due to delays in permitting, weather, or lake level issues.

The second erosion contract will be to complete work at Sites 8a, 8b, 10a, and 10b during the drawdown months in late 2018 and early 2019. The contract(s) will include a contingency year for construction if needed due to delays in permitting, weather, or lake level issues.

The third erosion contract will be to complete work at Site 12 during the drawdown months in late 2019 and early 2020. The contract(s) will include a contingency year for construction if needed due to delays in permitting, weather, or lake level issues.

The organization of the remainder of this plan is in sections that relate to specific clauses in Section 2.2.1 of chapter 1 of the Comprehensive Plan. Each section begins with the relevant requirements of the License, followed by the description of the methods that will be used to monitor and report compliance with the licensee.

SECTION 2: SITE LAND MANAGEMENT AREA DESIGNATION

The *land management area designation* in the *Wenatchee National Forest Land and Resource Management Plan* for all seven of the erosion sites proposed in this plan are classified as Riparian Zones (EW-2). Forest-wide standards and guidelines apply to the EW-2 sites which will allow the soil improvement actions proposed in this plan to occur. In addition to generic Forest Plan direction, all of the Lake Chelan watershed assessments including the Middle Chelan Watershed Assessment (USDA-FS, 1999); North Shore of Lake Chelan Watershed Assessment (USDA-FS, 1998); and Upper Chelan Watershed Assessment (USDA-FS, 2003) call for varying forms of treatment or remedial actions for shoreline erosion.

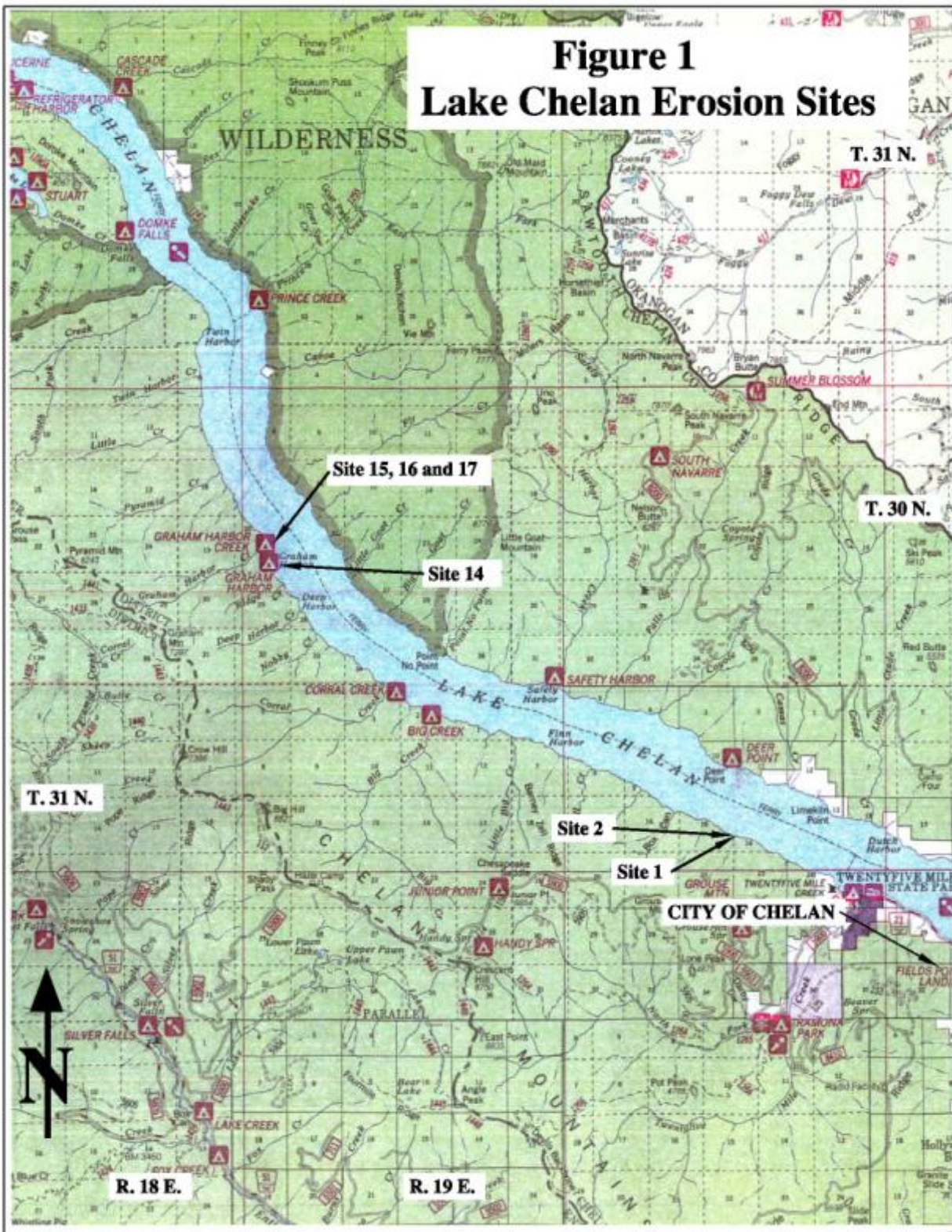


Figure 1: Location Map (1 of 2)



Figure 2: Location Map (2 of 2)

SECTION 3: LOCATION, DESIGN, MONITORING

3.1 Location of Sites

All sites are located on the south shore. All sites are located on the middle portion of the lake. They are approximately 28-32 miles from Chelan. Refer to Figure 1 and 2 for locations.

3.2 Design – Baseline Data and Treatments

Each site will be repaired with a variety of treatments. As work progresses in the implementation process and knowledge is gained, it is anticipated that new types or combinations of treatment will be developed. Please refer to Appendix A for current treatment designs.

Treatment designs will start with the basic site sketches and original survey soil information, site observations and slope profiles contained in the Inventory of Shoreline Erosion Lake Chelan and Bypass Reach Study Report, Final (Chelan PUD, 2000). These original sketches were further modified with proposed treatment areas identified on the sketches in the Erosion Control Treatments and Concepts for Lake Chelan, Okanogan and Wenatchee National Forests, Final (Chelan PUD, 2001). This body of information is the base from which each set of site-specific Forest Service erosion plans will be developed over the implementation time period.

The anticipated treatment for the sites covered in this plan (sites 5a, 5b, 8a, 8b, 10a, 10b and 12) are presented below.

3.2.1 Erosion Control Treatments

Site 5a

Total length of Treatment 5a is approximately 1063 lineal feet. Zones A and C are 183' lineal feet and will be treated with the T3S Modified Single Row Rock Placement treatment. Zones B, D, E and F are 848 lineal feet and will be treated with the T3 Double Row Rock Placement treatment.

Additional site data: General overall slope, P1 ~ 90+% max, P2~90% slightly less.

Soils: Stony surfaces, steep silty sands and rocky colluvial slopes >30%.

Maximum bluff height: 40 feet

Table 1: Treatments for Site 5a

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	53	T3S Modified	Single Row Rock Placement. No LWD
B	32	T3	Double Row Rock Placement. Include 2 pieces LWD
C	130	T3S Modified	Single Row Rock Placement. No LWD

D	194	T3	Double Row Rock Placement. Include 12 pieces LWD
E	129	T3	Double Row Rock Placement. Include 8 pieces LWD
F	493	T3	Double Row Rock Placement. Include 30 pieces LWD

Site 5a

1982 Site 5a, by MGY, 03/23/99

Site 5a, 03/23/99

Moderate U/S exposure, Bedrock limits both ends and some spots in middle face or near angle of repose

Toe, sl undercut

0'-110'

Till, silty sand (SM) matrix. 50% coarse gravel to 3' boulders, angular to sub round

More larger cobbles at toe

Downslope (1085'), angular to sub round gravel and cobbles, mostly 2" to 3'

Face with grass, moss, clean rocks, shrubs (+)

Toe, some sl. Undercutting at toe (-), rocky below 1100' (=)

Upslope burned off,

Some visual screening by vegetation, face blends with similar materials upslope

110'-200'

Rocky drainage area, mostly grass covered, with shrubs and small trees (+)

Few signs of erosion. Some spots sl. Undercut (=).

200'-480'

More exposed U/S (N60°W).

Face with grass, shrubs, ferns, moss, trees.

About 50% sl. Undercut (=).

480'-980'

Near vertical at top of face. Rockier at toe.

Grass, duff, moss, small trees, rock clean (+).

Less grass 500'+

About 600', face fresh, top of face more active, fewer shrubs, other veg.

980'-end at 1075' bedrock

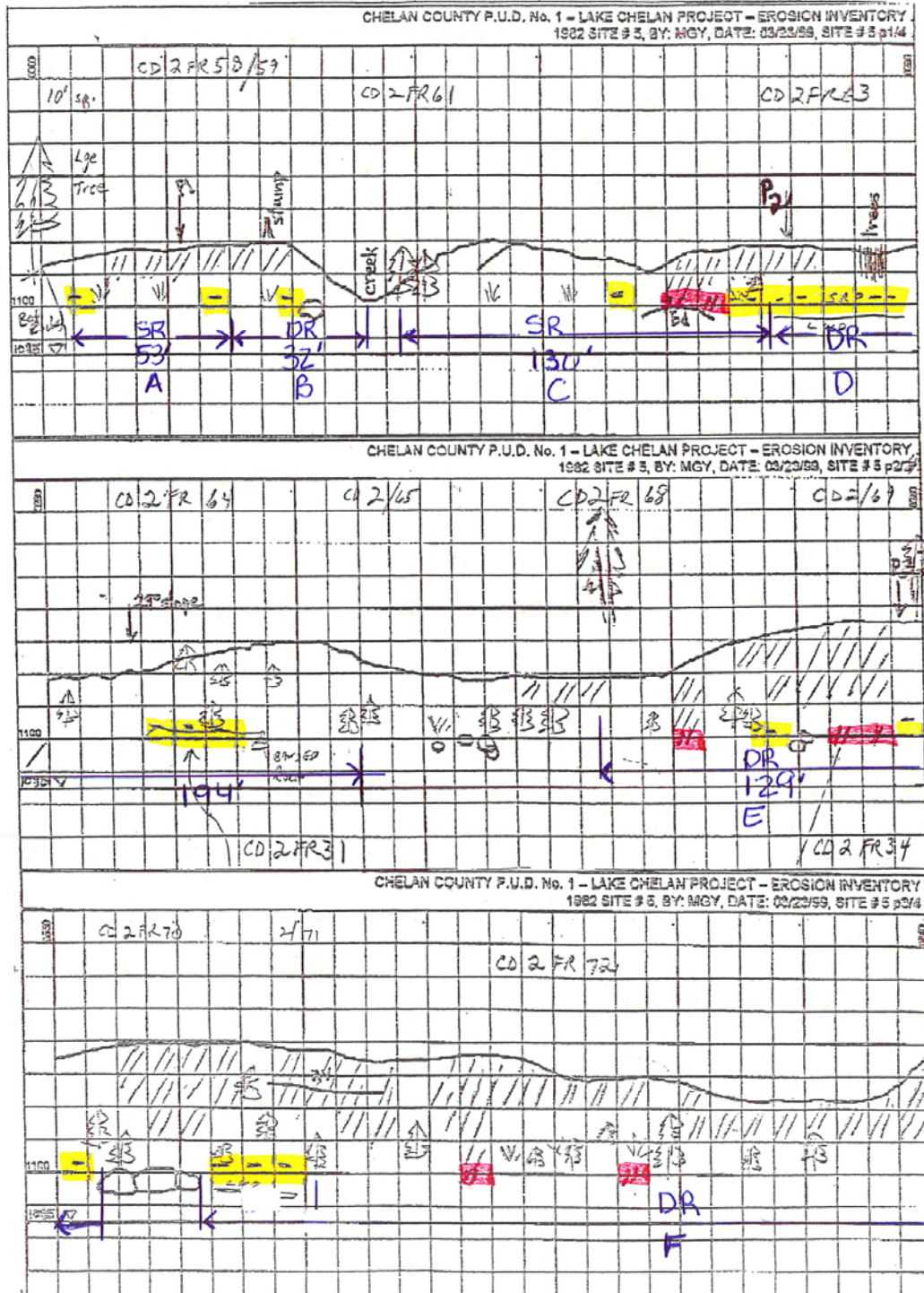
Very exposed U/S, long fetch. Downslope flatter.

Comparison with 1982 photos (Site 5, all/4): Shape of face unchanged.

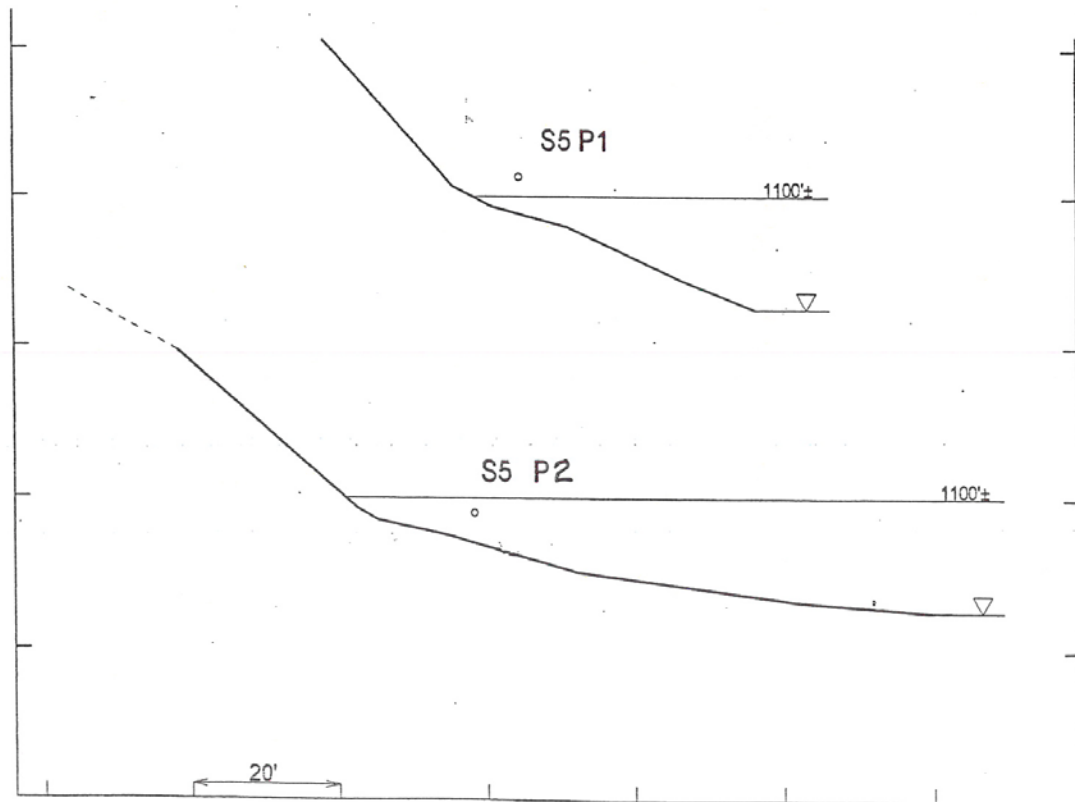
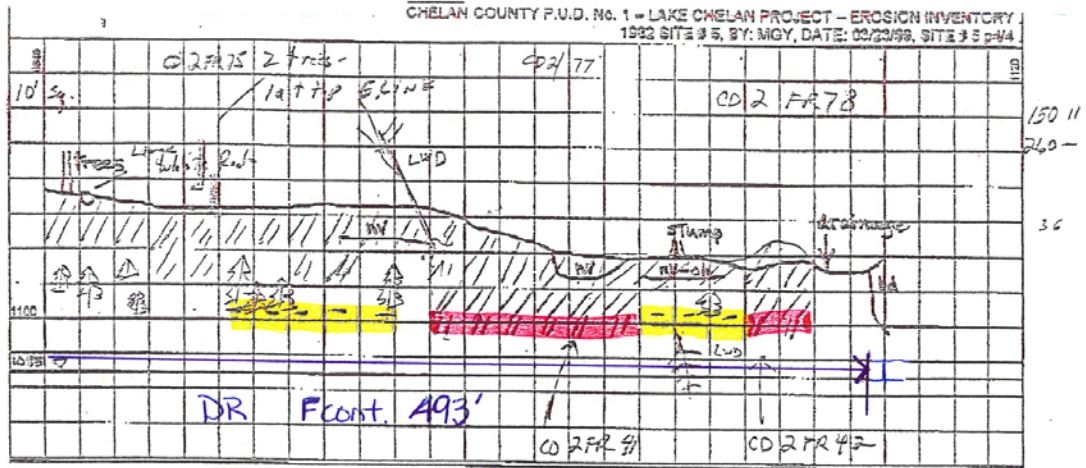
Face still shows a good deal of bare soil and some rocks as previously.

Most of lip less pronounced. Shrubs and trees more numerous and larger in most areas. (+)

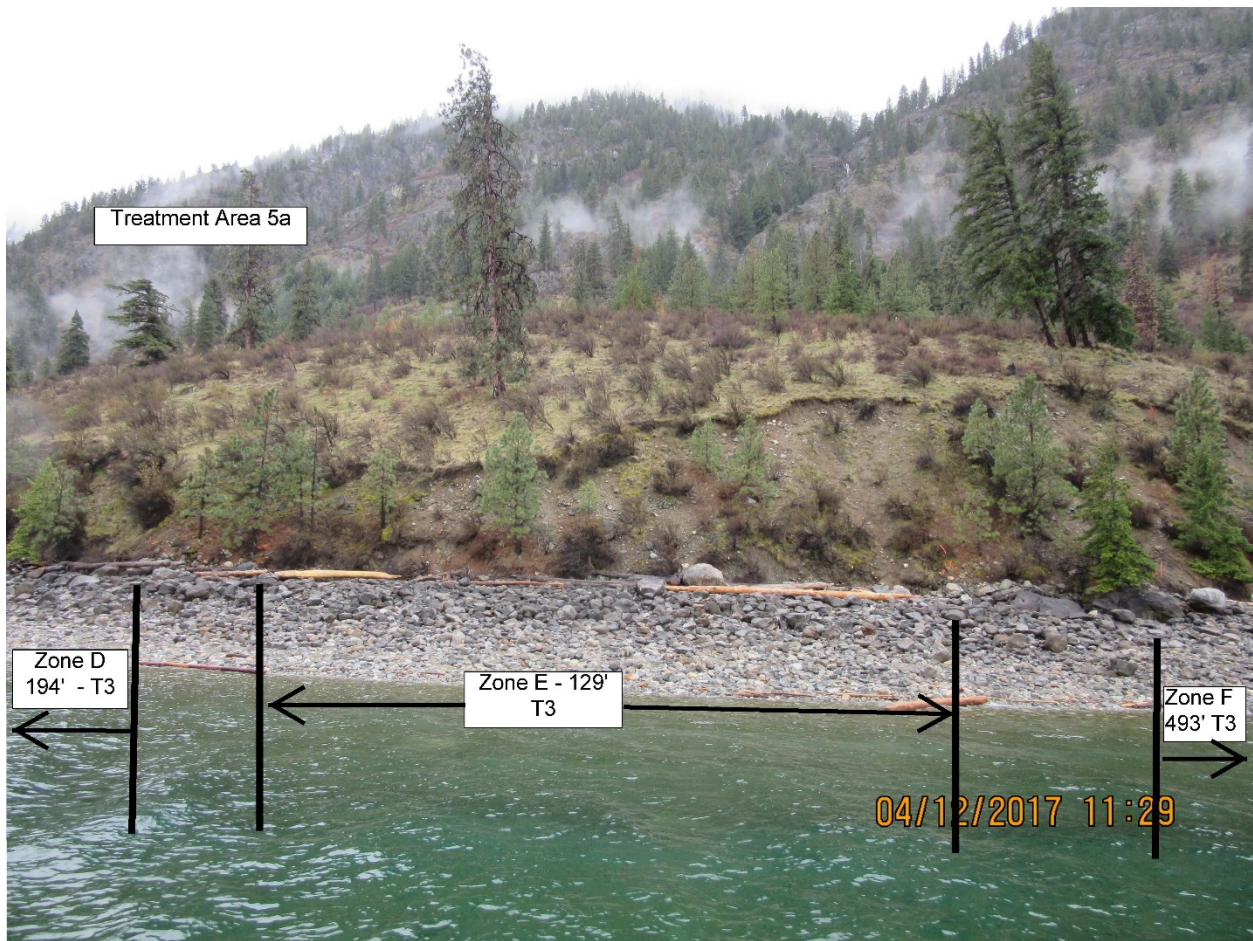
Site 5a

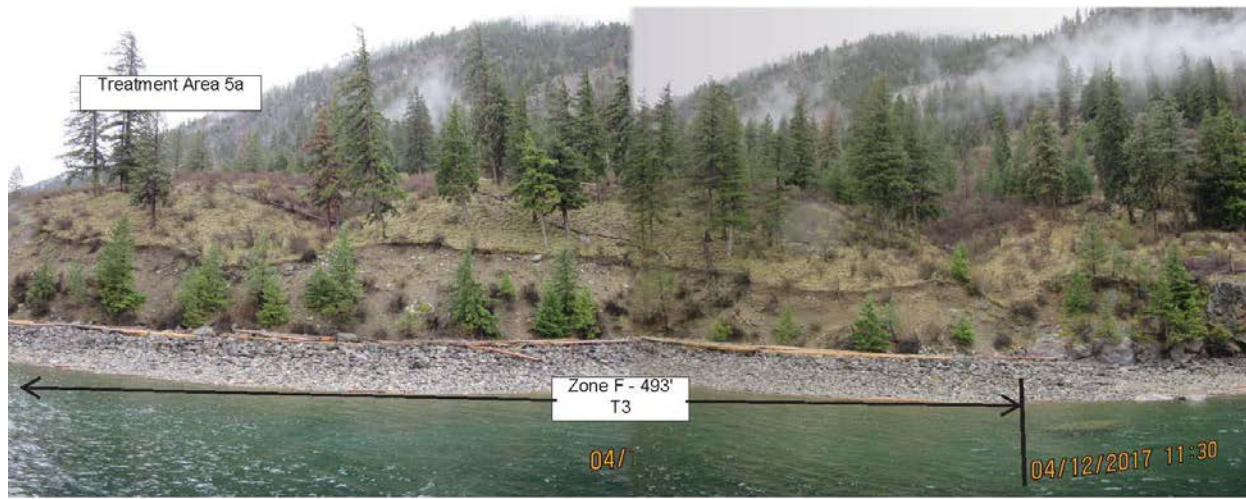


Site 5a









Site 5b

At Site 5b approximately 340 lineal feet will be treated with the T1 Modified – Enhanced Placed Rock treatment, all of Site 5b will be treated with LWD.

Additional Site data:

Soils: Stony surfaces, steep silty sands and rocky colluvial slopes >30%.

Maximum Bluff Height: 40 feet

Table 2: Treatments for Site 5b

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	340'	T1	Enhanced Placed Rock. Include 20 pieces LWD

Site 5b

0' – end at 330' bedrock

Moderately exposed U/S. Limited by bdrk both ends. Steep face with vegetation.

Till, silty sand (SM) matrix with 30%-40% coarse gravel to 3' boulders.

SI. Overhang to near vertical at top. Remainder of face near angle of repose.

Face with grass, duff, shrubs, sm. trees (+).

Toe about 20% sl. Undercut at toe, about 10% undercut and destabilizing up to mid-face (-).

225'-250' & 280'-330'

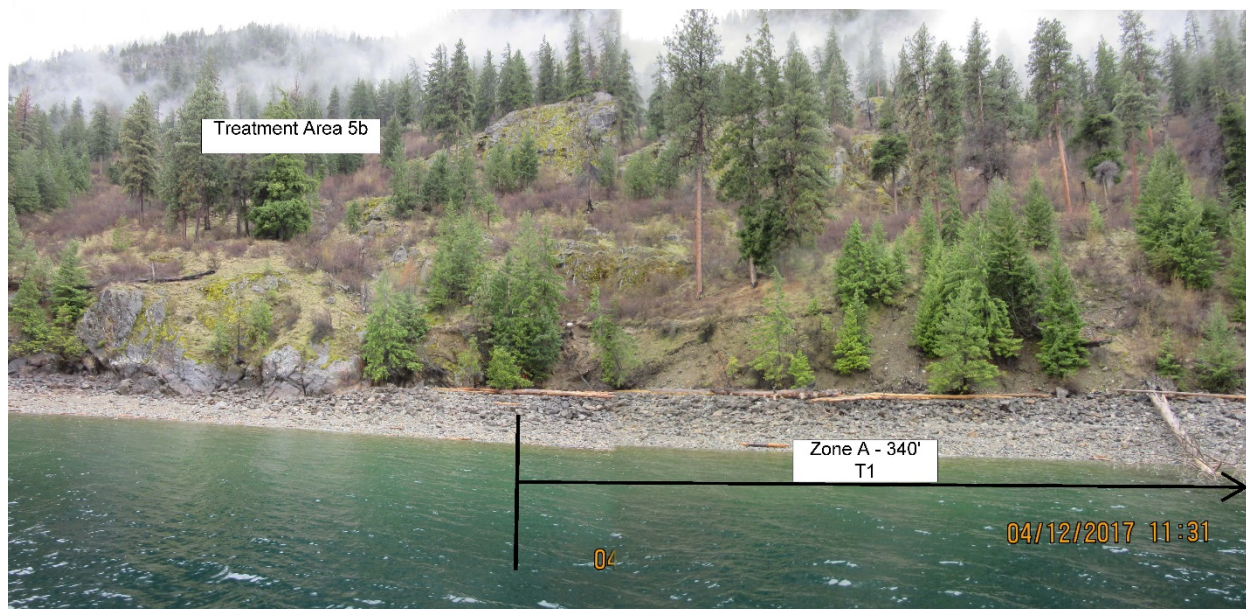
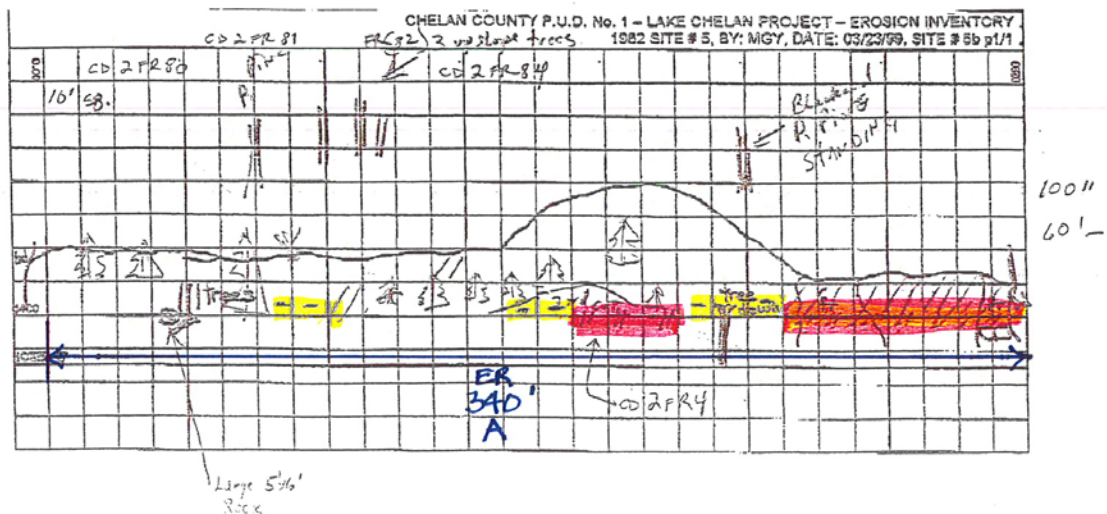
Fresher erosion face, little veg., near angle of repose.

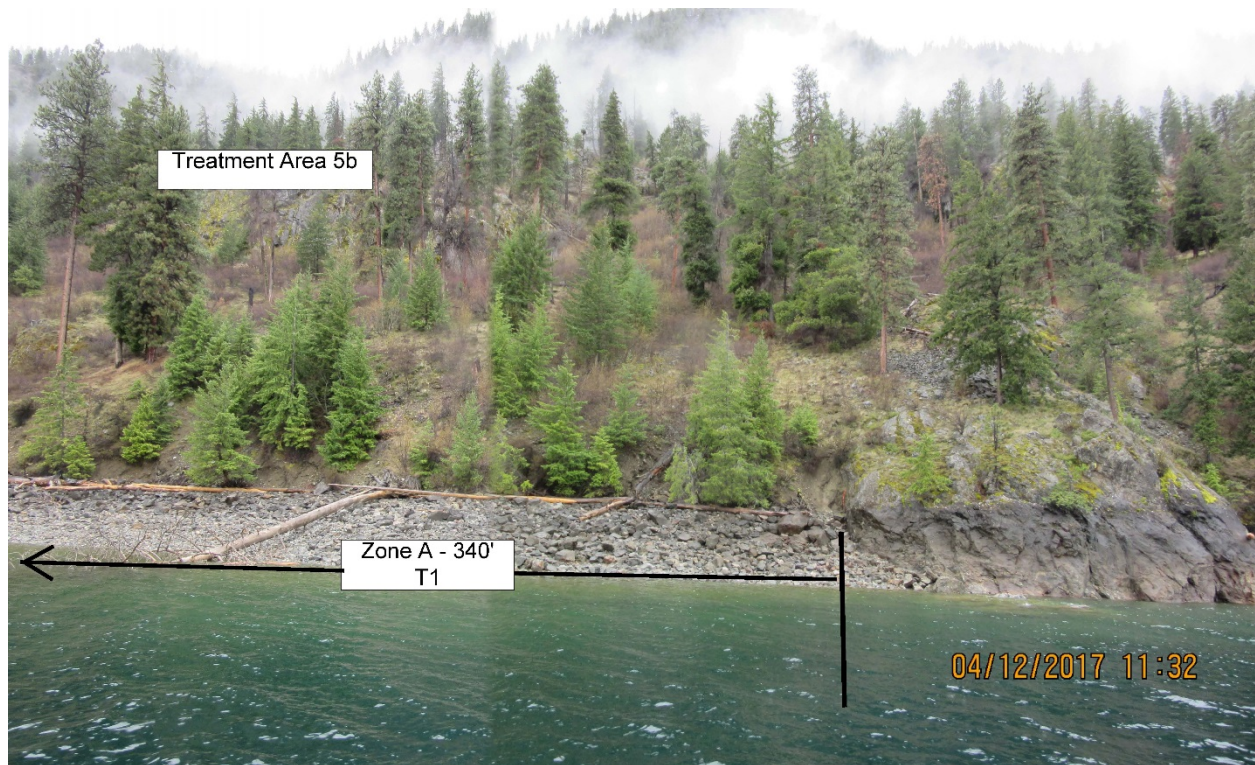
Comparison to 1982 photo ((Site 5, 4/4) difficult due to angle):

Site shows more and larger vegetation.

One tree, previously on the brink, lost to erosion.

Overall improved, but not undercut. (+/-)





Site 8a

Total length of treatments in Site 8a is approximately 72'. Zone A is 19' long and will be treated with T1 – Enhanced Placed Rock. Zone B is 32' and will be treated with T3 – Double row Rock Placement. Zone C will be treated with T3S Modified – Single Row Rock Placement. There will be no LWD.

Soils: Stony Surface, steep silty sands and rocky colluvial slopes > 90%. Maximum bluff height: 20 feet.

Table 3: Treatments for 8a

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	19	T1	Enhanced Placed Rock. 1 LWD.
B	32	T3	Double row Rock Placement. 2 LWD.
C	21	T3S Modified	Single Row Rock Placement. No LWD.

0'-end at 30' bedrock

Exposed U/S, long fetch, Limited by bedrock both ends and toe.

Rock chute at D/S end.

Face near angle of repose, small bench at toe.

Colluvium above bedrock toe, very rocky surface, 20-30% coarse gravel

Downslope, coarse gravel to 1.5', grades to fine-med gravel near water

Bare soil in spots, about 1/2 covered by duff, shrubs (=)

Bedrock limits expansion.

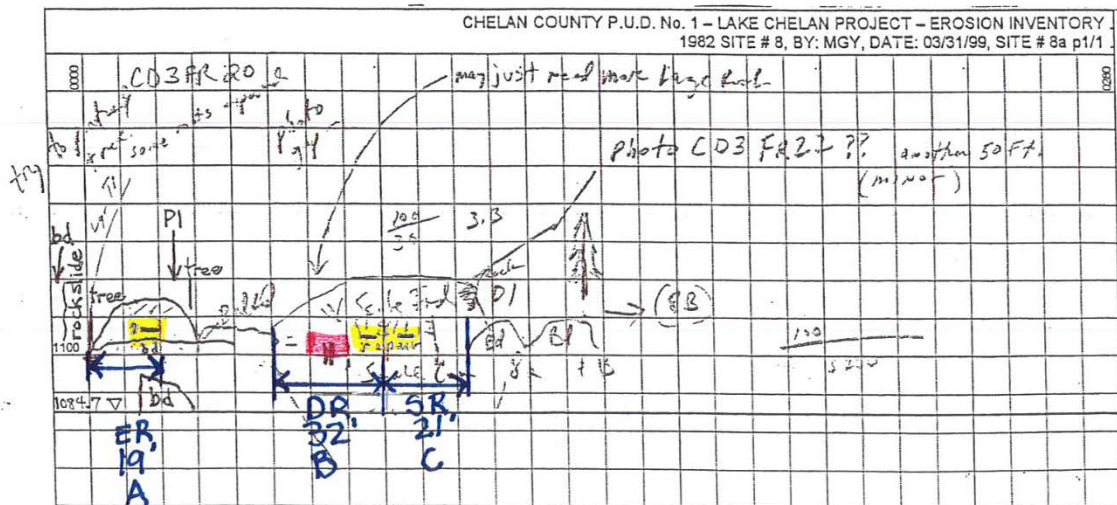
Visual screening, lower half of face. Upper half rocky, blends with upslope.

Compare to 1982 photos (Site 8, 1/3):

Lost one tree, on bedrock near U/S end of site, leaning 30° from vert in 1982; down in 1999.

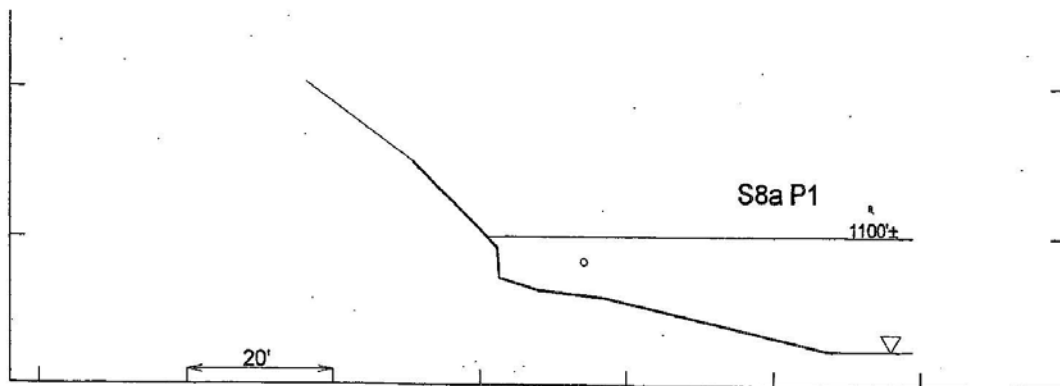
Otherwise little apparent change. Same shape of face, rocks in face, stumps on downslope.

More and larger shrubs and trees. (+)



Easement Free/ Group 3 Site

Site 8a





Site 8b

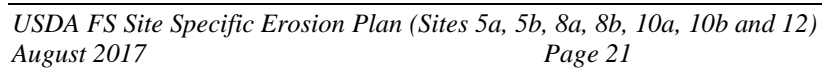
Total length of treatments in Site 8b is approximately 495'. Zone A is 41' long and will be treated with T3 – Double Row Rock Placement. Zone B is 18' and will be treated with T3 – Double Row Rock Placement. Zone C is 50' and will be treated with T3S Modified – Single Row Rock Placement. Zone D is 156 feet and will be treated with T1 - Enhanced Row Rock Placement. Zone E is 80' and will be treated with T1 - Enhanced Placed Rock. Zone F is 150' and will be treated with T3 - Double Row Rock Placement.

Soils: Stony Surface, steep silty sands and rocky colluvial slopes > 90%. Maximum bluff height: 20 feet.

Table 4: Treatments for 8b

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	41	T3	Double Row Rock Placement. 3 LWD.
B	18	T3	Double Row Rock Placement. 1 LWD.
C	50	T3S Modified	Single Row Rock Placement. No LWD.
D	156	T1	Enhanced Placed Rock. 9 LWD.
E	80	T1	Enhanced Placed Rock. 5 LWD.
F	150	T1	Enhanced Placed Rock. 9 LWD.

Easement Free/ Group 3 Site



0'-40'

Sl. Sheltered U/S

Face near angle of repose, bench near 1100', steep downslope, flatter near 1085'

Colluvium, SM matrix with cobbles to 1.5', subround, more cobbles at toe

Bench, fine gravel to 8" cobbles

Downslope, some bedrock, rock to 2', subround, fine-med gravel near 1085'

Face, sl. overhang with roots at top, some bedrock

Toe, sl. undercut

Mid-face, shrubs, moss, grass, small trees, logs at toe

40'-120'

Mostly bedrock

120'-335' as at 0'-40' but

Moderately exposed U/S

Soil mostly till

Bench, coarse gravel to 2' rock

Downslope, rock to 5', most <1.5'

Face with grass, moss, many shrubs

Repairs apparent 150'-166' and 182'-214'

335'-360'

Near vertical face, fresh soil surface

360'-end at 698'

Top of face, vegetated and stable

Mid-face and toe, bare soil, near vertical

Possible repair 382'-394'

Except 430'-460', Very rocky face, sl. undercut toe

Repair 526'-549'

600'-610', Downslope, boulders

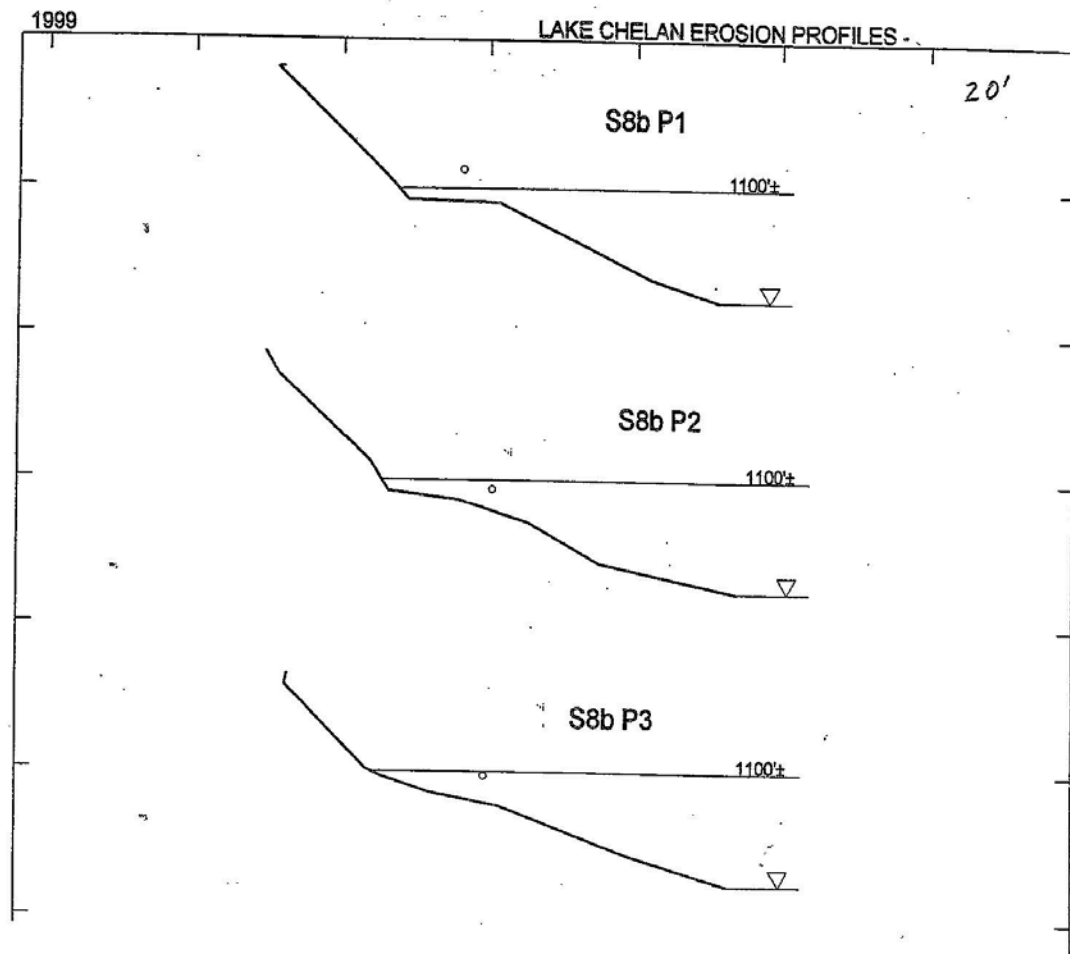
Compare to 1982 photos (Site 8, all/3):

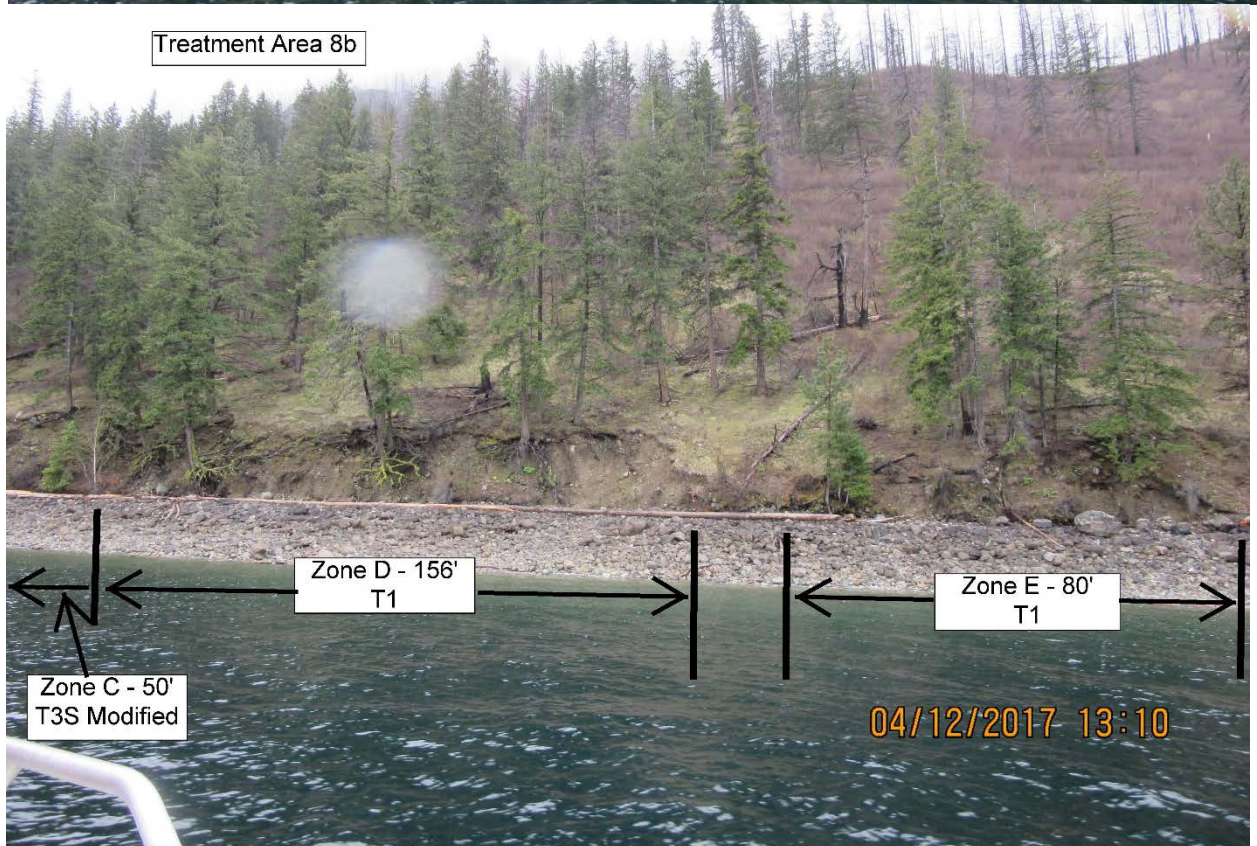
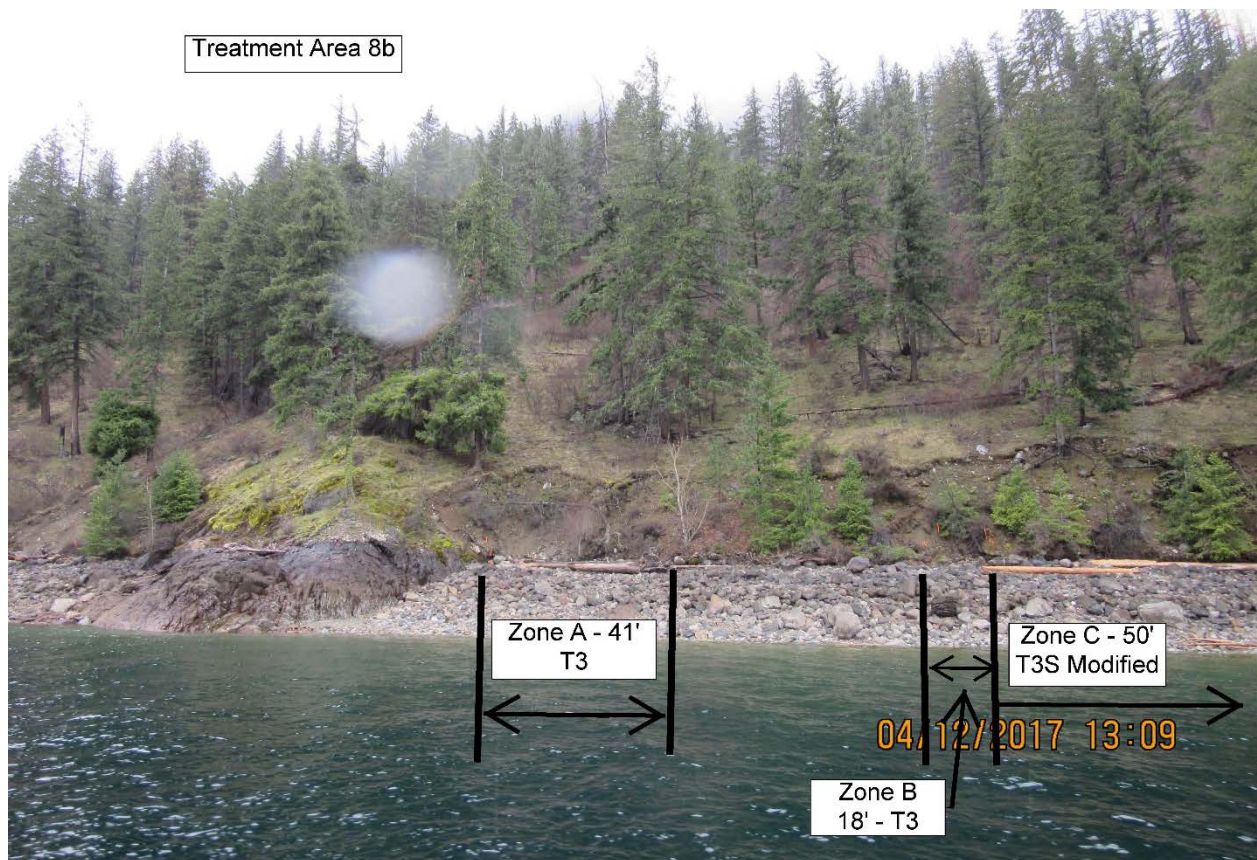
Possibly two trees lost, on verge in 1982, gone or leaning in 1999.

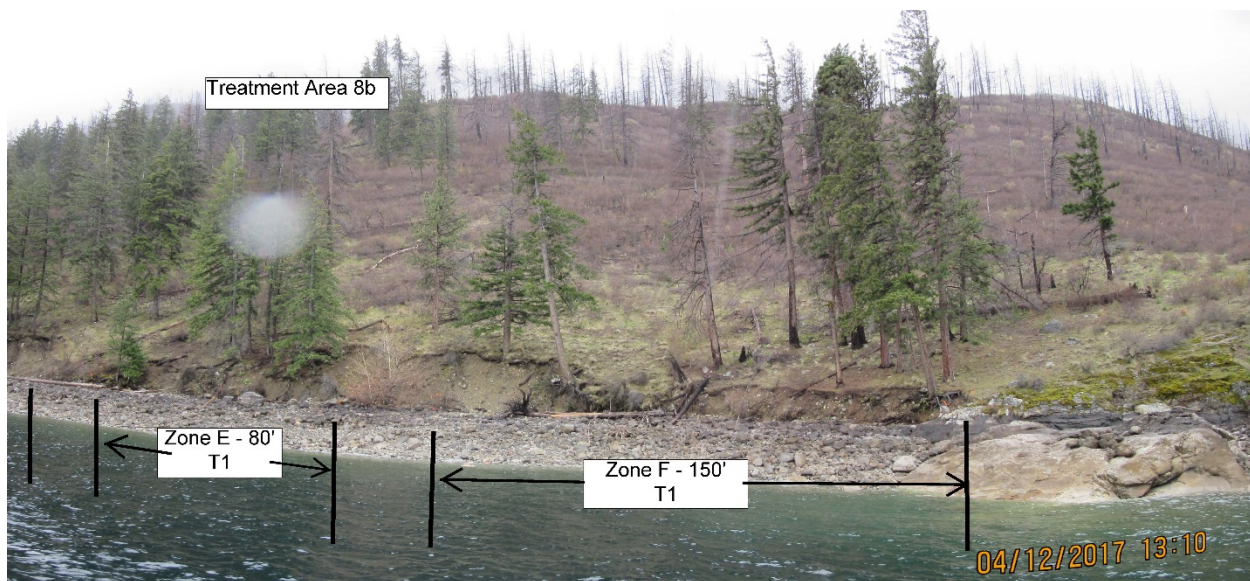
Other trees undercut in 1982 still present.

Face has more duff, shrubs. (+)

Site 8b







Site 10a

Total length of treatments in Site 10a is approximately 71'. Zone A is 21' long and will be treated with T1 - Enhanced Placed Rock. Zone B is 20' and will be treated with T3S Modified – Single Row Rock Placement. Zone C is 30' and will be treated with T3 – Double row Rock Placement.

Soils: Stony Surfaces, steep silty sands and rocky colluvial slopes > 90+%. Maximum bluff height: 40 feet.

Table 5: Treatments for 10a

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	21	T1	Enhanced Placed Rock. 1 LWD.
B	20	T3S Modified	Single Row Rock Placement. No LWD.
C	30	T3	Double Row Rock Placement. 2 LWD.

0'-end at 160'

Exposed U/S with long fetch

Bedrock limits both ends

Face near angle of repose

Mostly moss, grass, shrubs

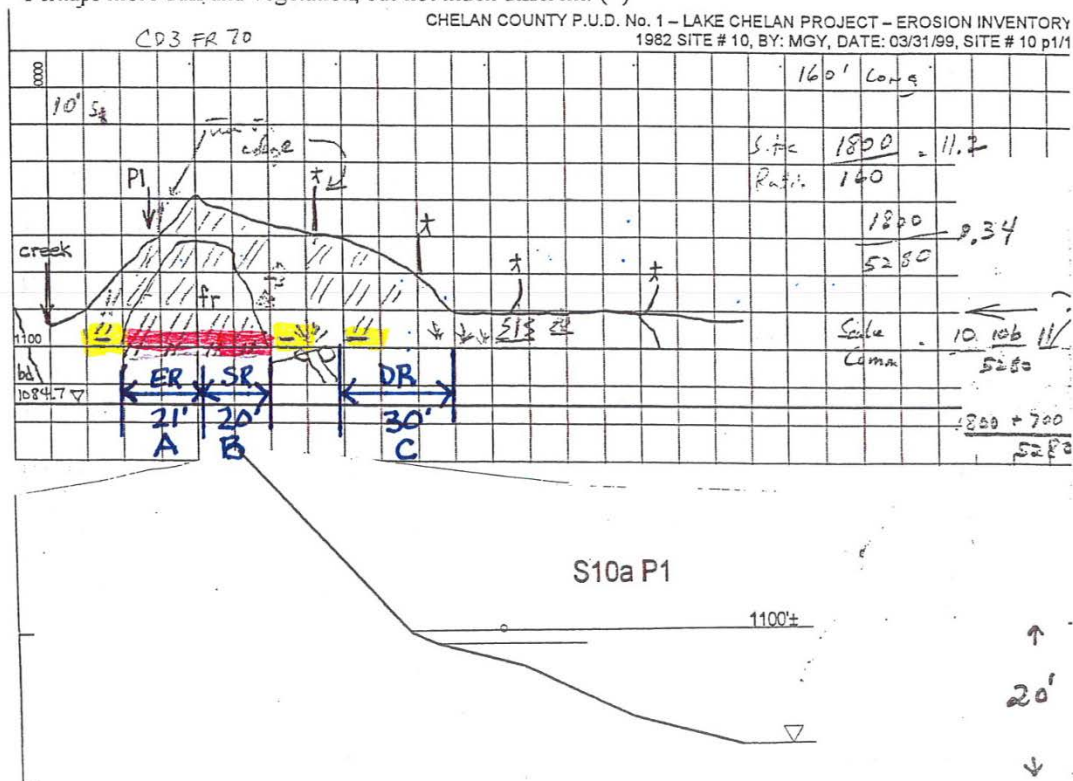
About 22'-58', mostly bare soil face

End at mossy bank - inactive

Visual impact small except for bare face 22'-58'.

Compare to 1982 photo, Site 10, 1/4: Appears approximately the same.

Perhaps more duff and vegetation, but not much different. (=)





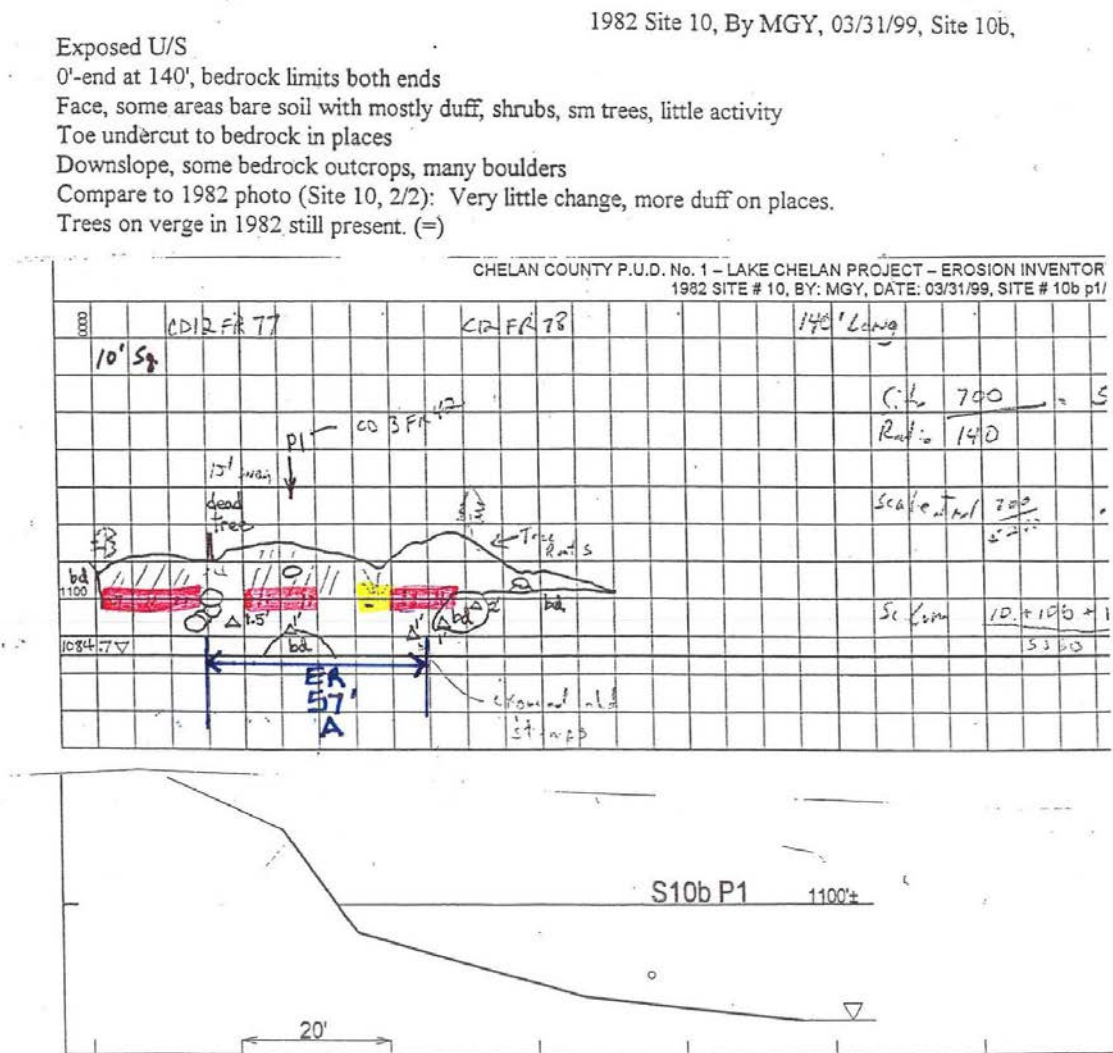
Site 10b

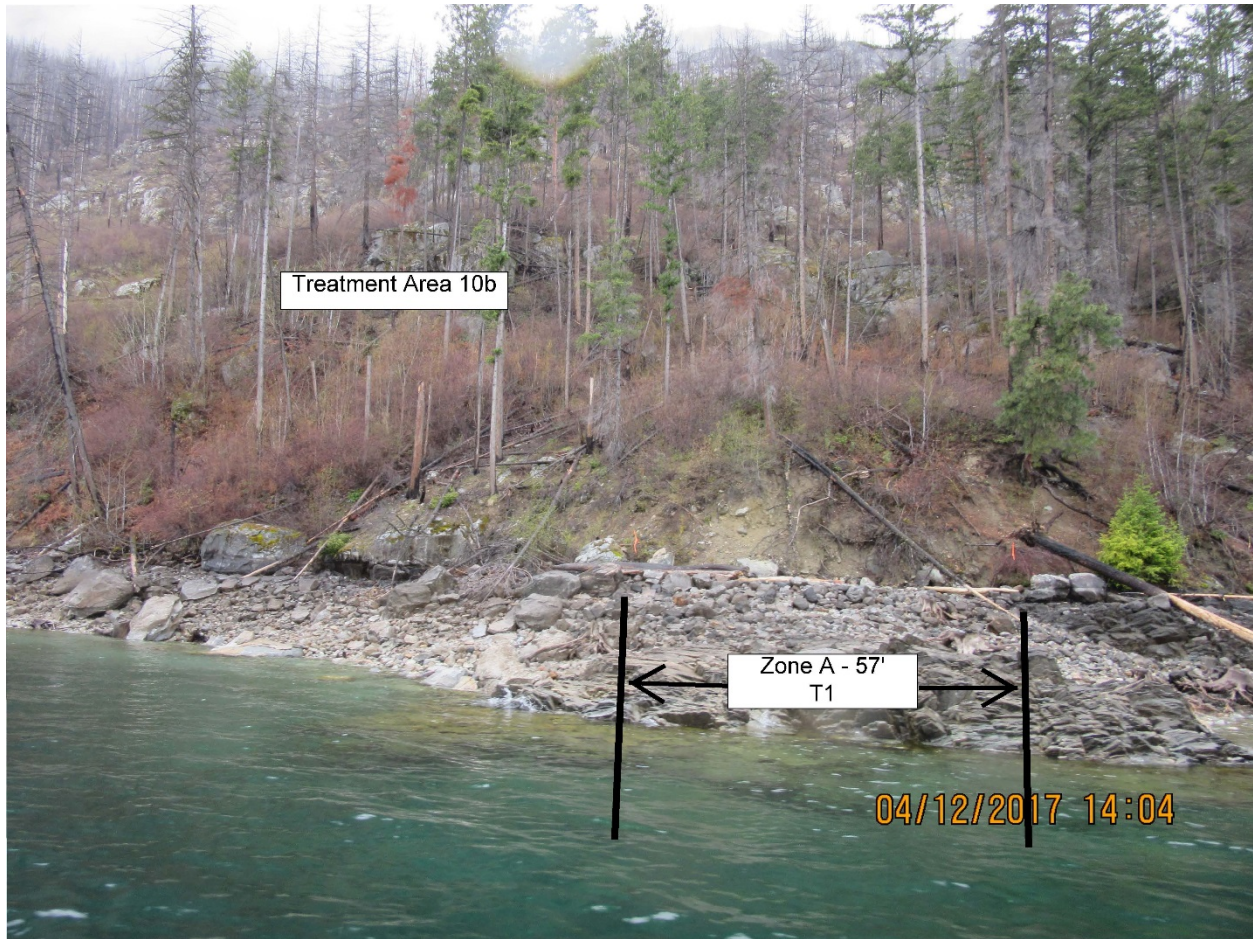
Total length of treatments in Site 10a is approximately 57'. Zone A is 57' long and will be treated with T1 - Enhanced Placed Rock.

Soils: Stony Surfaces, steep silty sands and rocky colluvial slopes > 90+%. Maximum bluff height: 17 feet.

Table 6: Treatments for 10b

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	57	T1	Enhanced Placed Rock. 4 LWD.





Site 12

Total length of treatments in Site 12 is approximately 810'. Zone A is 200' long and will be treated with T1 - Enhanced Placed Rock. Zone B is 75' and will be treated with T3S Modified – Single Row Rock Placement. Zone C is 100' and will be treated with T3 – Double row Rock Placement. Zone E is 410' and will be treated with T1 - Enhanced Placed Rock.

Soils: Stony Surfaces, silty sands and extremely steep near vertical rocky colluvial slopes.
Maximum bluff height: -24 feet.

Table 7: Treatments for 12

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	200	T1	Enhanced Placed Rock. 12 LWD.
B	75	T3S Modified	Single Row Rock Placement. No LWD.
C	100	T3	Double Row Rock Placement. 6 LWD.
D	25	T3S Modified	Single Row Rock Placement. No LWD.
D	410	T1	Enhanced Placed Rock. 25 LWD.

Maximum Bluff Height: ~24 feet.

1982 Site 12, By MGY, 04/13/99, Site 12

Moderately exposed U/S

0'-267'

Face at angle of repose, some sl. overhanging at top

Small bench, steep downslope

Colluvium, about 40% gravel and cobbles to 3', subangular

Bench and downslope, coarse gravel to boulders, mostly angular to subangular

Mostly active, few plants (-)

Relatively visible, stands out, little screening

Upslope, rocky, with trees

130'+ Some moss on face

160'+ Some bushes on face

200'+

Moss, grass, shrubs near toe,

Top half of face still oversteepened

Little bench

267' Sl undercut area, but otherwise little erosion activity

320' Sl undercut area, but otherwise little erosion activity

360'-400'

Sl sheltered

Oversteepened face

Till, 30%-40% rocks to 2'

Downslope, near water, fine-med gravel

Some moss, grass, shrubs, sm trees

Sl undercut at toe

400'-420'

Wider bench with med. gravel

Flatter downslope

Little activity, moss, grass

Sl undercut at toe

446'+ More exposed U/S

530'+ Face oversteepened, very active,

605'+ Less exposed U/S, some bushes near toe

700'+

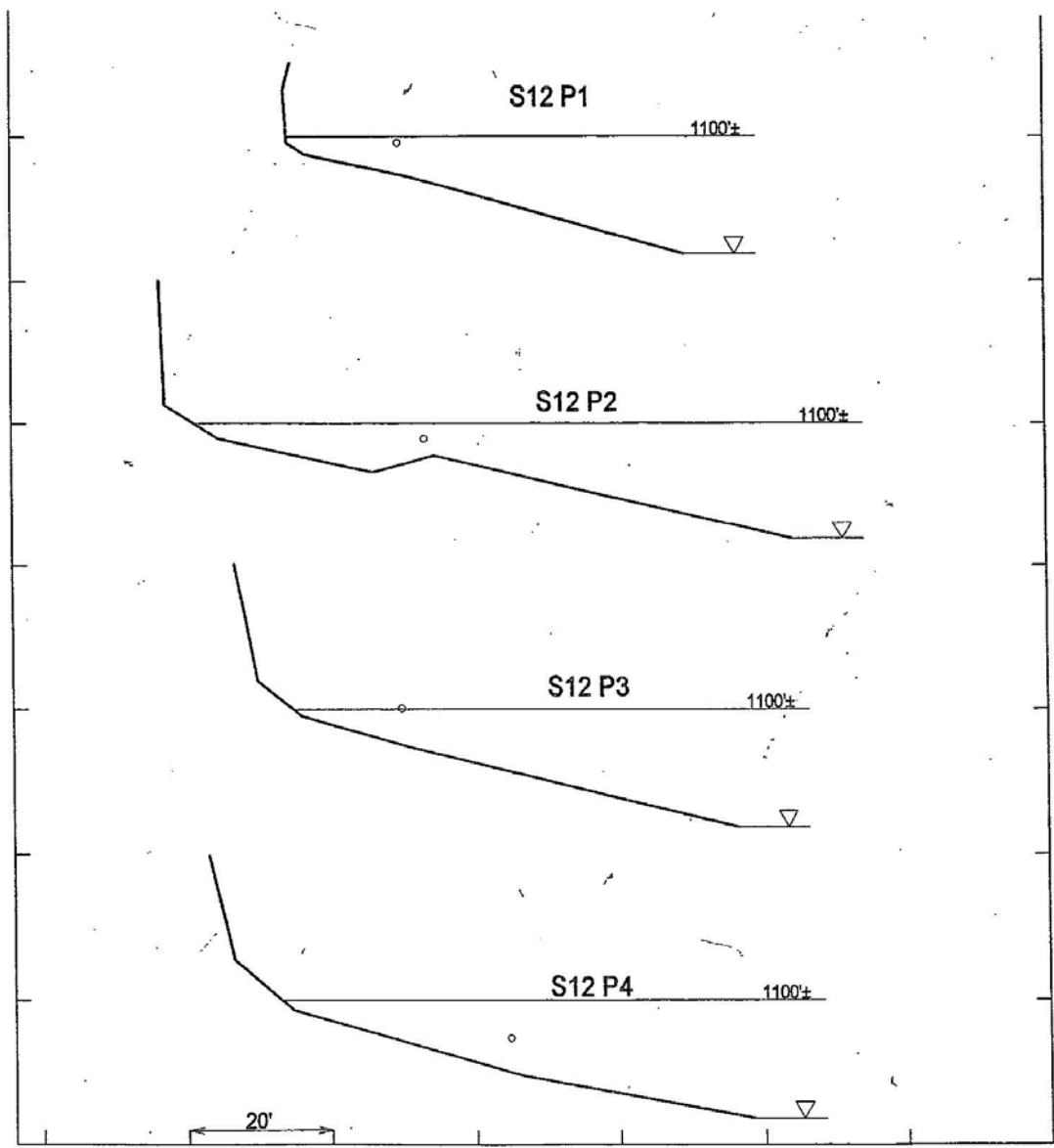
More sheltered by point U/S,

Downslope very rocky

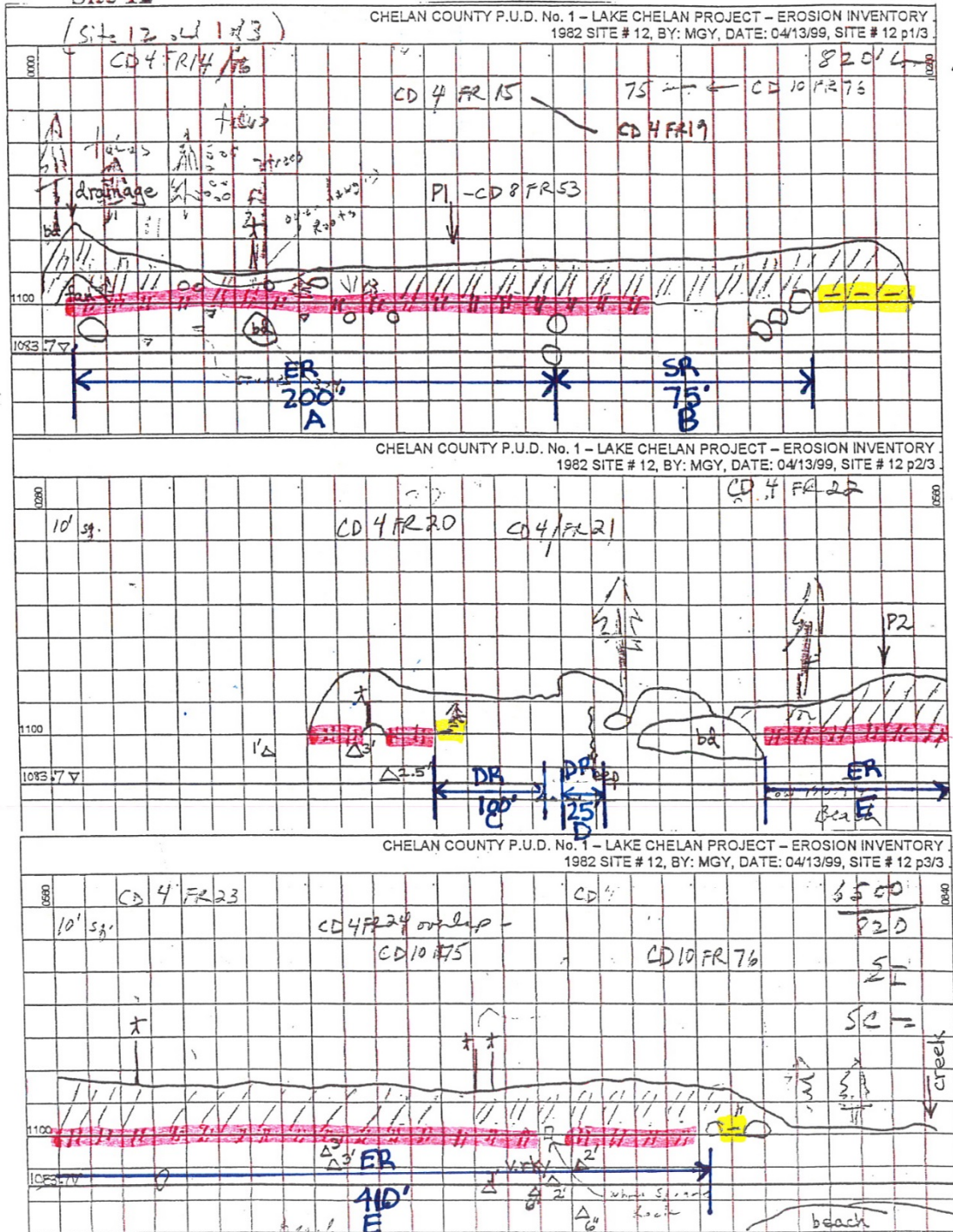
776'+ Only sl. undercut at toe

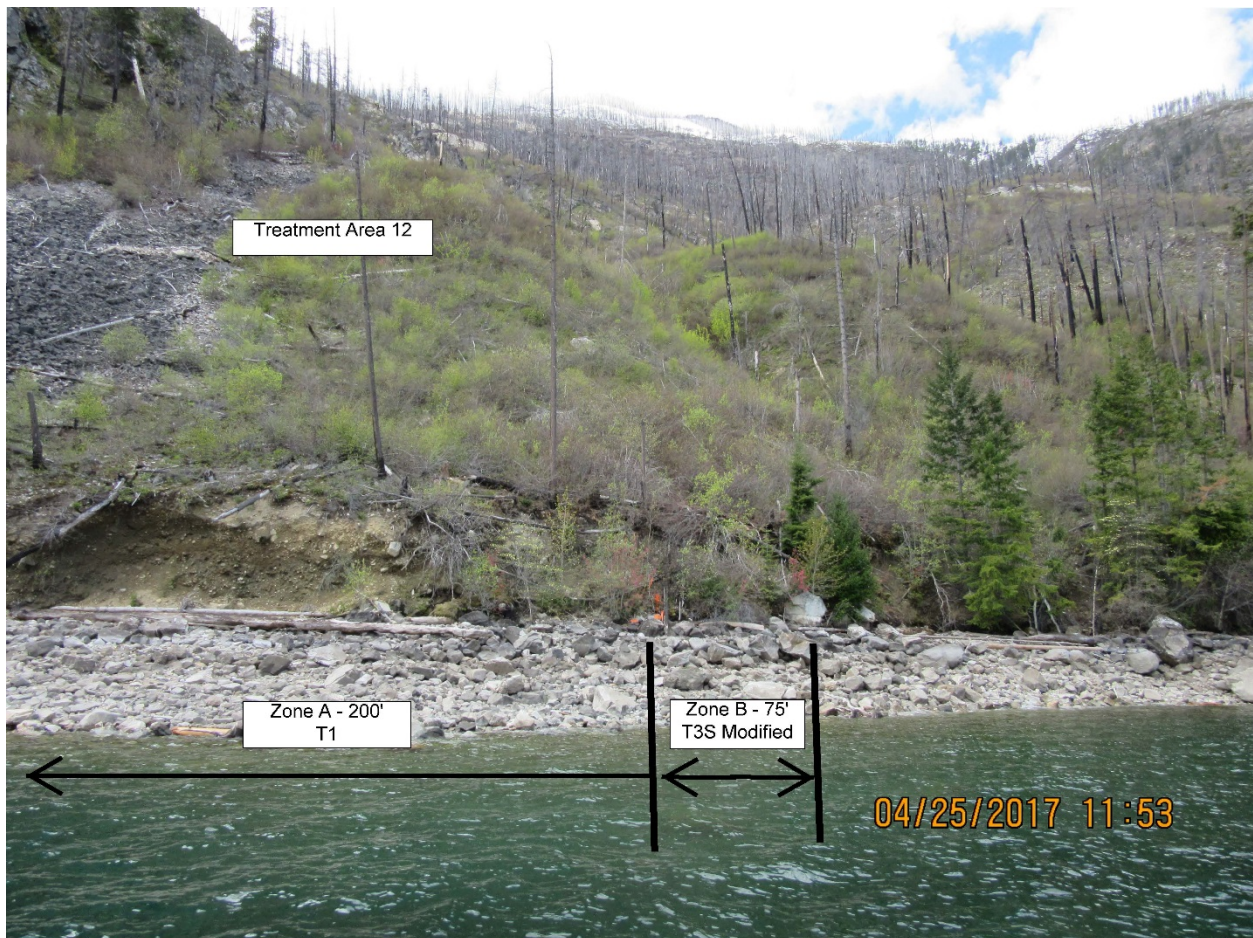
820' end

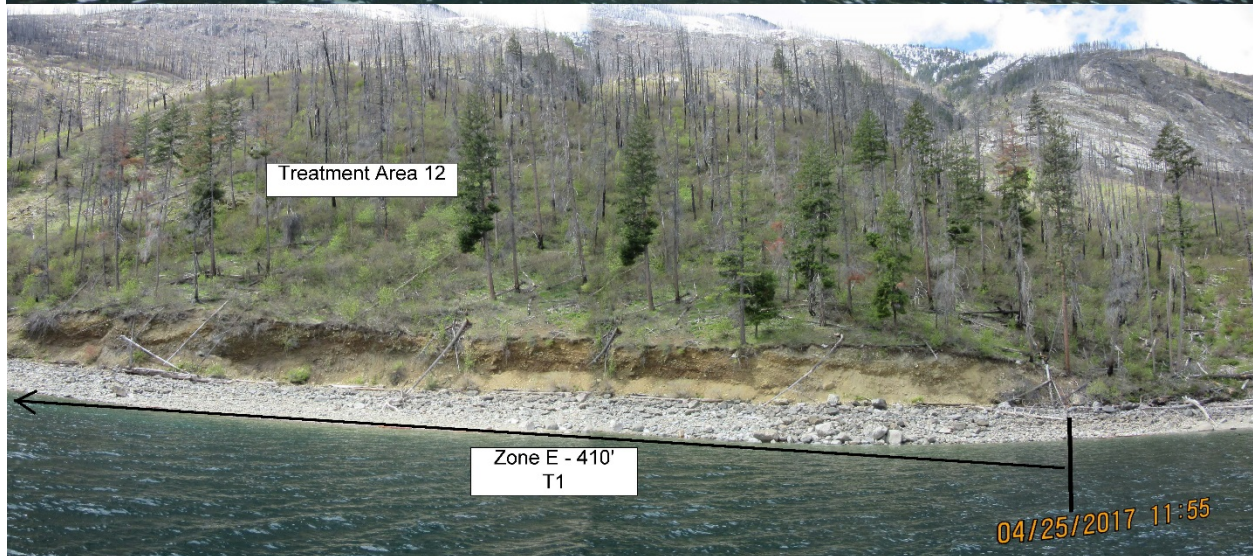
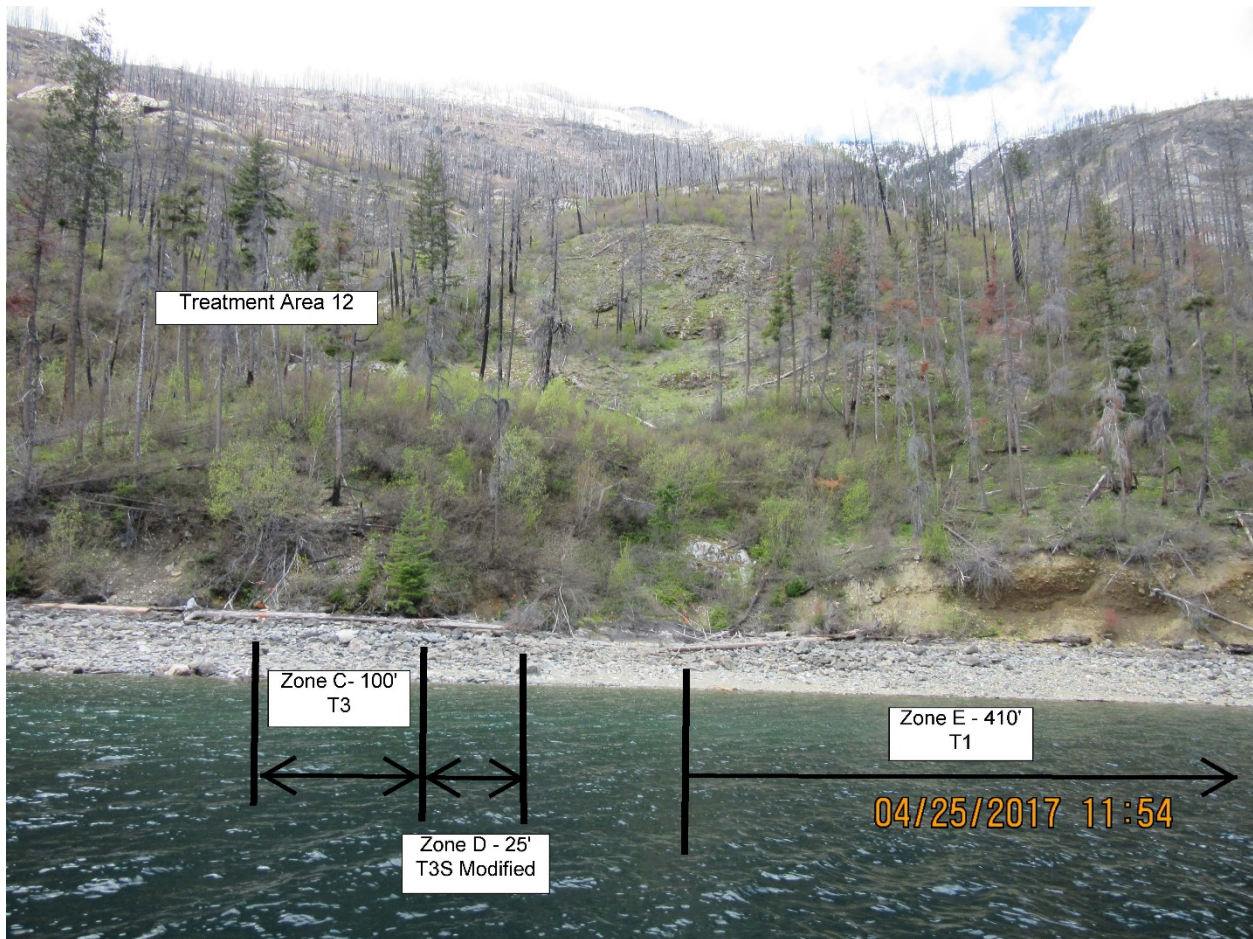
Site 12



Site 12







3.3 Mitigation Measures Included

Noxious weed control will be addressed by: 1) limiting foreign soils being brought into the sites. 2) noxious weed control will be incorporated into the design and level of actual ground disturbance in that only at or below the normal high water level should we have actual ground disturbance, and 3) large rock will be coming from a weed-free certified pit. Every effort will be made to keep existing slopes and vegetation as stable as possible during treatment.

Large Woody Debris (LWD) will be used to benefit fish and address wave actions where possible and to the agreed upon ratio (1/1) of disturbed shoreline. This set of treatment allows for LWD placement to be incorporated into approximately 2,527 linear feet of shoreline treatments. It will not be a continuous treatment but selected pieces anchored occasionally till we reach the appropriate amount. It will be done so that it does not interfere with dock access or other recreational shoreline to water access at the campgrounds. T1 and T3 treatments trigger excavation that is used in the LWD calculation. We have calculated 2,527 lineal feet of these treatments with excavation disturbances of approximately 1.5 feet; so we have a square footage of required LWD (approximately 3,790 square feet). With “average” pieces of LWD being a 20-foot log 14-16 inches in diameter; each log would represent about 25 square feet of mitigation. Thus we are planning to place approximately 152 “average” logs within the treatments that allow for them.

3.4 Implementation and Effectiveness Monitoring

The effectiveness monitoring schedule is based on when each site will be treated; the timelines for site treatment are outlined in chapter 1 of the Lake Chelan Comprehensive Management Plan. The monitoring will be focused on evaluation four distinct focus areas:

1. Slope stabilization with an objective of reaching a 90% success rate in the treated areas
2. Presence of native vegetation with an objective of reaching ratio of native to non-native vegetation similar to that found on nearby on undisturbed slopes on 90% of treated area. This will take into account the percentage of rock, and bare spots as this is a very dry hostile natural environment.
3. Presence of noxious weeds with an objective of not introducing any new noxious weeds through the course of treatment. Implementation methodologies are designed to exclude the introduction of noxious weeds. Treated areas will be monitored on an ongoing basis to determine if the methodologies employed are sufficient to meet the project objectives.
4. Stability of LWD with an objective of minimizing movement. Large loose objects could become hazardous to the site users.

All four focus areas will be monitored 1, 3 and 5 years following treatment at the sites. LWD inspections and slope stability inspections will be conducted during drawdown times to allow inspection of anchoring devices. Noxious weed and vegetation inspections will occur after leaf-out, typically in the May to June time period. These inspections will be coordinated with other erosion control implementation steps to provide travel and time efficiencies when possible.

SECTION 4: NATIONAL ENVIRONMENTAL POLICY ACT and PERMITTING

4.1 NEPA

The Forest Service accepted the Final Environmental Assessment (FEA) for Hydropower for Lake Chelan Hydroelectric Project, FERC Project No. 637, FERC, October 2003, for erosion control treatments. Materials included in the FEA detailed all previously conducted survey work, and proposed site-specific treatment areas that were measured and mapped at 10-foot increments. The proposed specific treatments have not materially changed since the date of issuance of the FEA and, as such, will be consistent with the intent of the original proposed treatments.

4.2 Permitting

Consultation with the Army Corps of Engineers will occur through the permitting process and Tribal entities will be consulted through Nation to Nation letters describing the project and soliciting input.

The U.S. Fish and Wildlife Service will review site specific program consistency analysis forms (PCF), which is required as part of a larger programmatic analysis completed for the entire project over the 25 years of erosion control treatment. The USFWS concurred with the Forest Service findings of “may affect not likely to adversely affect” the northern spotted owl (*Strix occidentalis caurina*), gray wolf (*Canis lupus*), and grizzly bear (*Ursus arctos*) in the Biological Evaluation for Lake Chelan Erosion Sites in letters dated August 15, 2007 and April 8, 2008. The proposed treatments at the sites covered in this site-specific plan are consistent with the BE and a programmatic consistency form will be completed to document meeting requirements in the BE.

A Joint Aquatic Resources Permit Application Form (JARPA) will be submitted to the Washington Department of Fish and Wildlife, Washington Department of Ecology, U. S. Fish and Wildlife Service, and the Army Corps. The JARPA is the formal request for Nationwide Permit 13 Bank Stabilization from the Army Corps of Engineers, addresses the Department of Ecology 401 Water Quality Certification permit, and the Washington Department of Fish and Wildlife’s Hydraulic Project Application (HPA) addressed under the 2005 HPA Memorandum of Understanding.

To ensure that site-specific permitting requirements are met, Project Files, including biological evaluation data, cultural resources, and consultation, will be created or updated, to provide additional site-specific information in a timely manner over the life of the License. Project Files include the Biological Evaluation (BE) data and U.S. Fish and Wildlife Service (USFWS) concurrence letters, the Cultural Resources information, and the Joint Aquatic Resources Permit Application (JARPA).

4.3 Cultural Resources

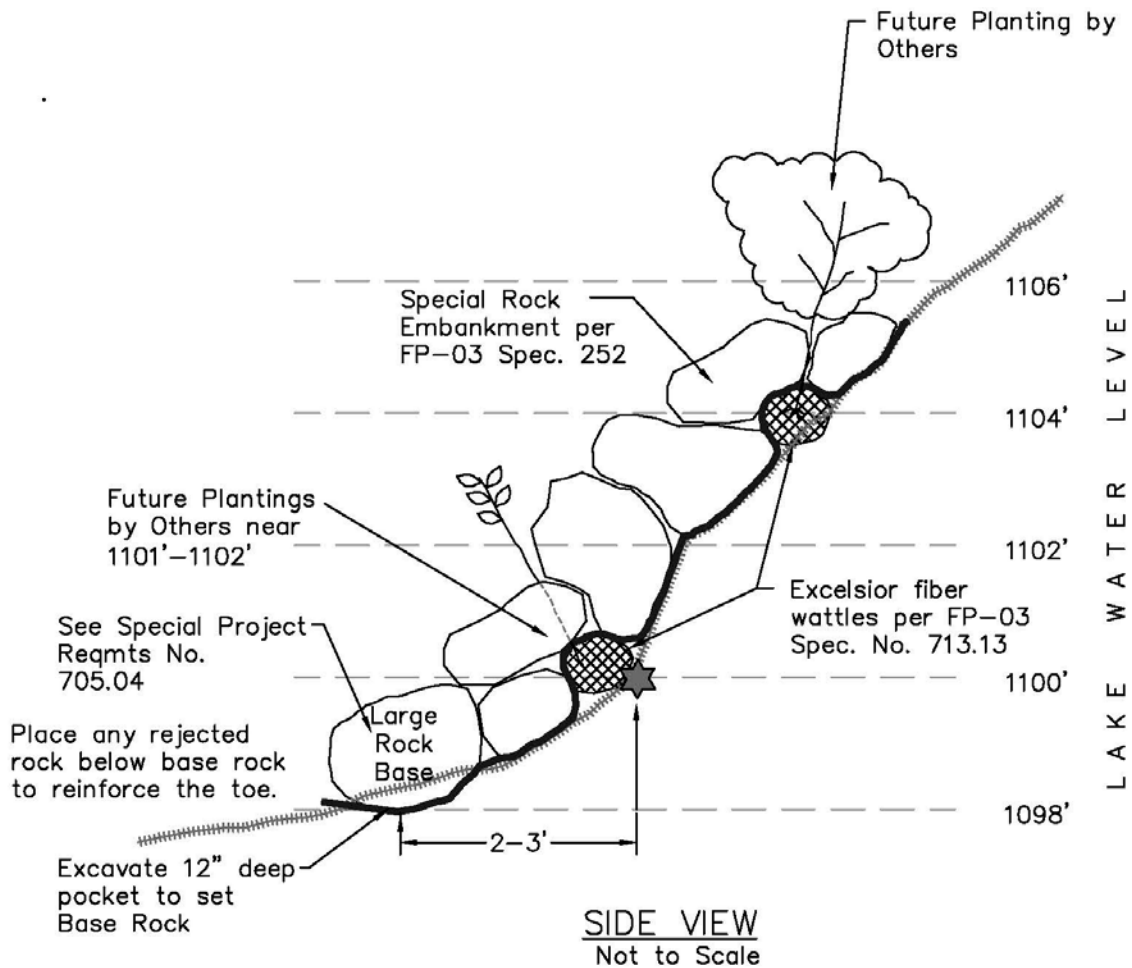
Prior to project implementation an Appendix B Project Documentation form will be completed for cultural resource compliance to meet requirements in the *Programmatic Agreement Among The United States Department of Agriculture, Forest Service, Pacific Northwest Region (Region 6), The Advisory Council on Historic Preservation, And the Washington State Historic*

Preservation Officer Regarding Cultural Resources Management on National Forests in the State Of Washington. The Appendix B Project Documentation will be completed by Okanogan - Wenatchee National Forest Archaeologists to meet Section 106 of the National Historic Preservation Act. Nation to Nation letters describing the project will be sent to the Confederated Tribes of the Colville and the Yakima Nation.

APPENDIX A: CONSTRUCTION DRAWINGS OF PROPOSED TREATMENTS

ENHANCED PLACED ROCK

T1

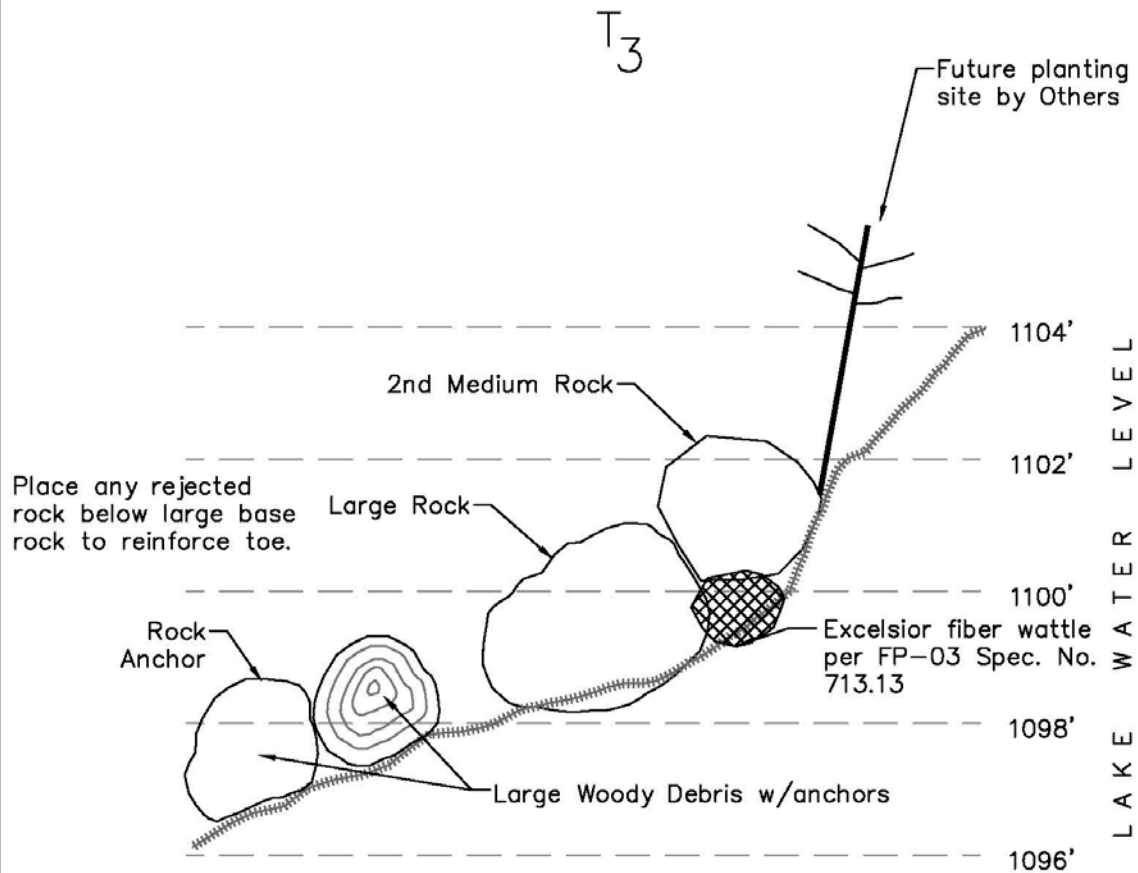


LEGEND

- ★ 1100' Waterline/Soil - Excavate for base rock 2-3' waterward
- Erosion Control Geotextile, FP-03 Spec. Table 714.4 Type IV.A
- ≈≈≈≈≈ Approximate Natural Profile

Sheet Title	Sheet
T1 ENHANCED PLACED ROCK	
Project LAKE CHELAN SHORELINE EROSION CONTROL	

DOUBLE ROW ROCK PLACEMENT WITH HORIZONTAL LARGE WOODY DEBRIS (LWD When Required)



LEGEND

SIDE VIEW

Not to Scale

Approximate Natural Profile

SHEET NOTES:

Turf Reinforcement Mat Not Required

LWD=Large Woody Debris - Sound Logs 14"-24"dia., 20'-30' long at Prince Creek (Government-Furnished Materials)

Large Rock = 700-900 lb. rock

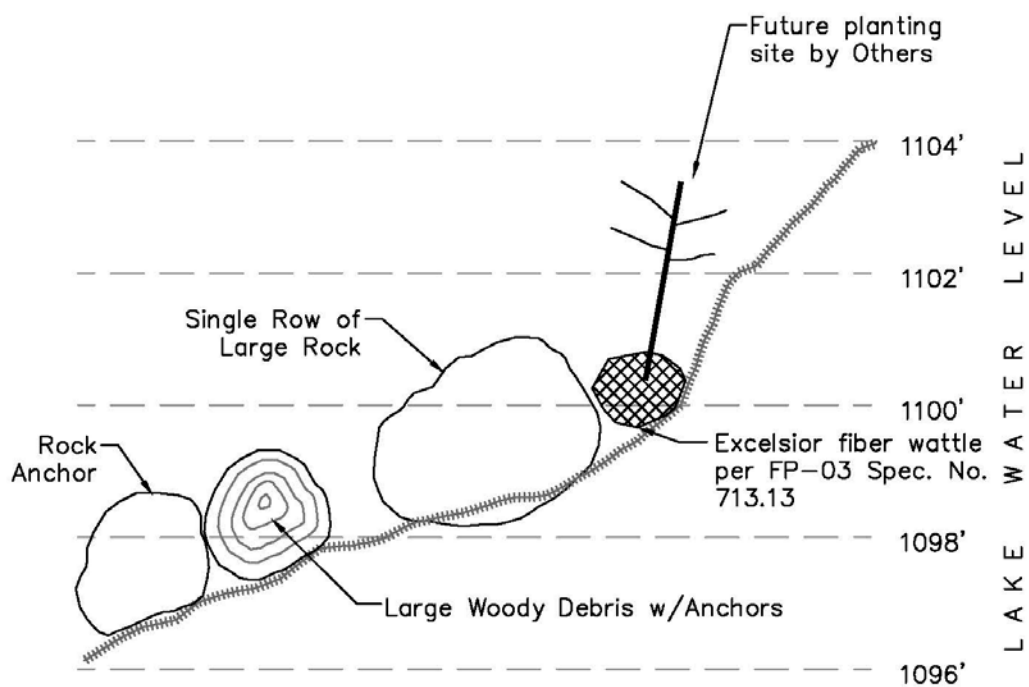
Medium Rock = 300-500 lb. rock

Rock Anchor = 700 - 1250 lb. rock

Sheet Title	T-3 DOUBLE ROW ROCK PLACEMENT	Sheet
Project	LAKE CHELAN SHORELINE EROSION CONTROL	

SINGLE ROW ROCK PLACEMENT WITH HORIZONTAL LARGE WOODY DEBRIS T3S Modified

T3S Modified Treatment:
LWD and wattles not required.



LEGEND

SIDE VIEW

Not to Scale

Approximate Natural Profile

SHEET NOTES:

LWD=Large Woody Debris - Sound Logs 14"-24" dia., 20'-30'
long at Prince Creek (Government-Furnished Materials)

Large Rock = 700-900 lb. rock

Medium Rock = 300-500 lb. rock

Rock Anchor = 700 - 1250 lb. rock

Sheet Title	Sheet
T3S MODIFIED - SINGLE ROW ROCK PLACEMENT	
Project	LAKE CHELAN SHORELINE EROSION CONTROL

Notes:

Drill 1 1/4" inch hole into anchor rock 8-9" deep. Blow hole clean before inserting Sitka AnchorFix2 anchoring adhesive or approved equal. Insert adhesive gun to the bottom of the hole and fill completely. Insert 1" GALVANIZED threaded rod into hole. Clean excess adhesive. Drill 1" hole through center of log. Thread other end of rod through log and secure with galvanized washer and nut.

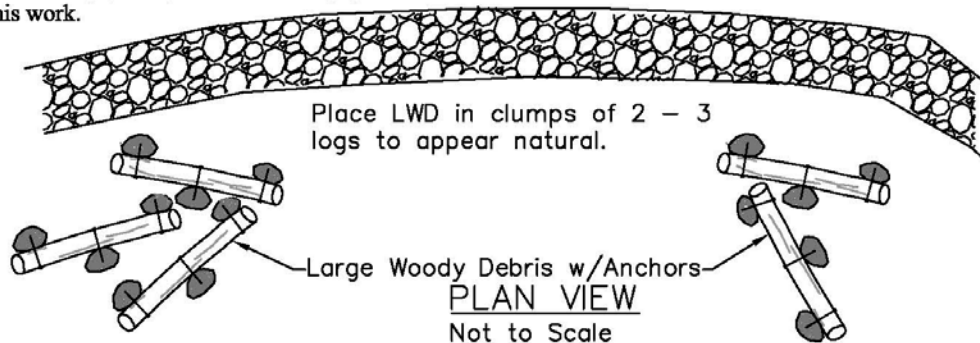
One complete sound log (14 - 20" diameter by 20 - 30' long) with 3 rock tiedowns is considered One LWD Treatment.

Anchor Rock will be 700-1250 lb. rock.

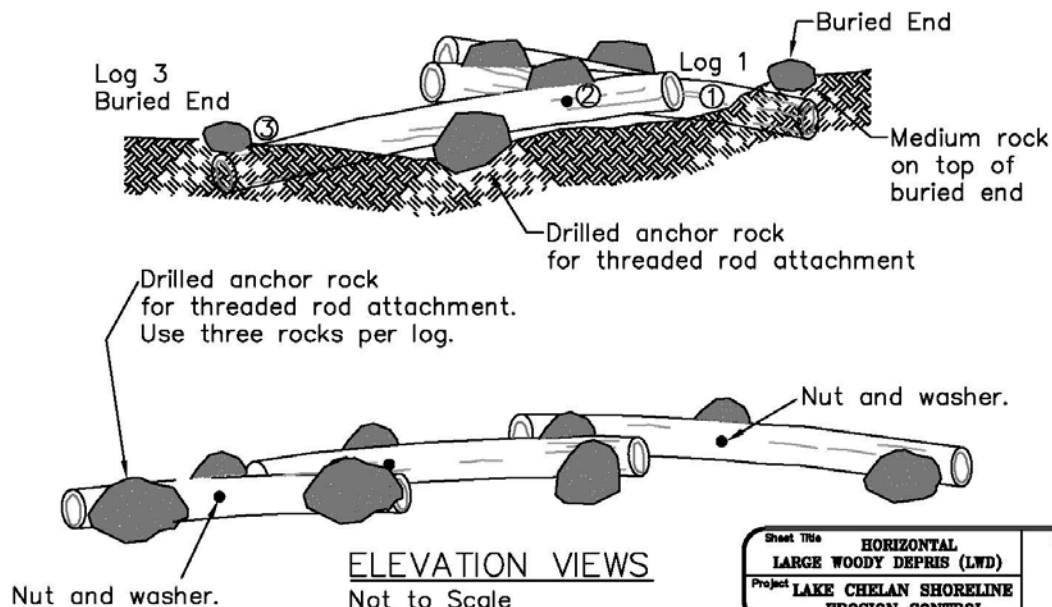
All material needed (Adhesive, threaded rods, washers and nuts, etc) are considered incidental to Pay Item 15756(d)

Erosion Control, Log (LWD). No additional payment will be made for this work.

HORIZONTAL LARGE WOODY DEBRIS (LWD)



HORIZONTAL LARGE WOODY DEBRIS



Sheet Title	HORIZONTAL LARGE WOODY DEBRIS (LWD)	Sheet
Project	LAKE CHELAN SHORELINE EROSION CONTROL	

USDA Forest Service letter dated August 16, 2017



United States
Department of
Agriculture

Forest
Service

Okanogan -Wenatchee
National Forest
Chelan Ranger District

428 West Woodin Avenue
Chelan, WA 98816
(509) 682-2576

File Code: 2770

Date: August 16, 2017

Public Utility District No 1 of Chelan County
Jeffrey G. Osborn
P.O. Box 1231
Wenatchee, WA 98807

RECEIVED

AUG 24 2017

Licensing & Compliance

Dear Jeffrey:

Enclosed is the USDA Forest Service Site-Specific Erosion Control Plan for Sites 5a, 5b, 8a, 8b, 10a, 10b, and 12 which we drafted at the PUD's request. It is ready for submission to FERC for approval.

Please submit the attached to satisfy License Article 401 (a). The work in these plans occurs entirely on National Forest System lands. We plan for construction to begin in the fall of 2018 and be completed by the end 2021.

Sincerely,

KARI GROVER WIER
District Ranger





PUBLIC UTILITY DISTRICT NO. 1 of CHELAN COUNTY
P.O. Box 1231, Wenatchee, WA 98807-1231 • 327 N. Wenatchee Ave., Wenatchee, WA 98801
(509) 663-8121 • Toll free 1-888-663-8121 • www.chelanpud.org

August __, 2017

Ms. Kimberly D. Bose, Secretary
FEDERAL ENERGY REGULATORY COMMISSION
888 First Street, NE
Washington, DC 20426

Re: **Lake Chelan Hydroelectric Project No. 637-041**
Article 401 – Final USDA Forest Service Site-Specific Erosion Control Plan
USDA-FS Erosion Sites 5a, 5b, 8a, 8b, 10a, 10b, and 12 dated August __, 2017

Dear Secretary Bose:

Public Utility District No. 1 of Chelan County (Chelan PUD), licensee for the Lake Chelan Project No. 637 (Project), hereby submits for Federal Energy Regulatory Commission (Commission) approval the enclosed USDA Forest Service Site Specific Erosion Control Plan pursuant to license Article 401(a) and USDA Forest Service 4(e) condition no. 1.¹ The Commission has approved previous Forest Service site-specific erosion control plans, specifically: the first site-specific plan for sites 11, 55, 58 and 59 on December 14, 2007²; the second site-specific plan for sites 24, 25, 26, and 27 on March 29, 2010³; and the third site-specific plan for sites 1, 2, 14, 15, 16, and 17 on August 27, 2013⁴.

License Article 401(a), license Appendix A, Article 1(a)(2), and license Appendix B, condition no. 1 require Chelan PUD to submit site-specific erosion control plans for Commission approval at least one year before ground-disturbing activity occurs.

In accordance with the above license requirements, Chelan PUD, in collaboration with the USDA Forest Service (see attached letter), hereby files the fourth Final USDA Forest Service Site-Specific Erosion Control Plan dated August __, 2017, for habitat and ground-disturbing activities on USDA Forest Service Lands necessary to implement the erosion control implementation plan.

¹ *Public Util. Dist. No. 1 of Chelan County*, 117 FERC ¶ 62,129 (2006).

² *Public Util. Dist. No. 1 of Chelan County*, 121 FERC ¶ 62,196 (2007).

³ *Public Util. Dist. No. 1 of Chelan County*, 130 FERC ¶ 62,268 (2010).

⁴ *Public Util. Dist. No. 1 of Chelan County*, 144 FERC ¶ 62,172 (2013).

The plan describes the erosion control work anticipated to be conducted on sites 5a, 5b, 8a, 8b, 10a, 10b, and 12. Chelan PUD and the USDA Forest Service plan to begin implementation of the erosion control work in the fall of 2018 and to complete the work by the end of 2021. To help meet this schedule, Chelan PUD respectfully requests review and approval of this plan.

Please do not hesitate to contact me or Gene Yow (509-661-4305) with any questions or comments regarding this plan.

Sincerely,

Jeffrey G. Osborn
License Compliance Supervisor
jeff.osborn@chelanpud.org
(509) 661-4176

Enclosures: USDA Forest Service letter dated (yet to be received)
USDA Forest Service Site-Specific Erosion Control Plan, August __, 2017

cc: Division of Hydropower Administration and Compliance
Federal Energy Regulatory Commission
Mail Code DHAC, PJ-12
888 First Street NE
Washington, DC 20426

Erich Gaedeke, FERC-PRO

USDA FOREST SERVICE SITE SPECIFIC EROSION CONTROL PLAN

USDA-FS EROSION SITES 5a, 5b, 8a, 8b, 10a, 10b and 12

Final

LAKE CHELAN HYDROELECTRIC PROJECT
FERC Project No. 637

August 2017



Public Utility District No. 1 of Chelan County
Wenatchee, Washington

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EXECUTIVE SUMMARY

The Federal Energy Regulatory Commission (FERC) Order on Offer of Settlement and Issuing New License (License) for the Lake Chelan Hydroelectric Project No. 637 (Project) was issued November 6, 2006 to the Public Utility District No. 1 of Chelan County (Chelan PUD). License Article 401(a) and Appendix A, Article 1(a)(2) of the new Project License requires Chelan PUD to submit to FERC site-specific erosion control plans for habitat and ground-disturbing activities on National Forest Service Lands necessary to implement the erosion control implementation plan. The first site-specific erosion control plan was approved December 14, 2007, the second was approved March 29, 2010, and the third plan was approved on August 27, 2013. This fourth plan describes the USDA Forest Service (Forest Service or USDA-FS) site-specific erosion control work anticipated to be conducted between 2017 and 2021, including sites 5a, 5b, 8a, 8b, 10a, 10b and 12, as required by the new License, as specified in the License Articles and the Lake Chelan Comprehensive Settlement Agreement, October 8, 2003 (Settlement Agreement). Included in this plan is a map of proposed activities, a description of the land management area designation for the location of the proposed activity and the applicable standards and guidelines, a description of the designs by location, designs and mitigation measures considered, documentation of National Environmental Policy Act and permitting requirements.

SECTION 1: INTRODUCTION

The Federal Energy Regulatory Commission (FERC) Order on Offer of Settlement and Issuing New License (License) for the Lake Chelan Hydroelectric Project No. 637 (Project) was issued on November 6, 2006 to the Public Utility District No. 1 of Chelan County (Chelan PUD). The project license requires the treatment and monitoring of non-easement erosion sites located on USDA Forest Service (Forest Service or USDA-FS) Lands on the shores of Lake Chelan, as described in the Lake Chelan Comprehensive Settlement (Settlement Agreement), October 8, 2003, and its attachments, which is Appendix A of the Project License.

Project License Article 401(a) and Appendix A, Article 1(a)(2) requires Chelan PUD, at least one year before ground-disturbing activity occurs, to file with the FERC Site Specific Erosion Control Plans for the USDA Forest Service sites (site-specific plans). The components of the site-specific plan relate to the planning of erosion control work specified in the Appendix A of the License, and in Section 2.2.1 of Chapter 1 of the Lake Chelan Comprehensive Plan, which is Attachment B of the Settlement Agreement, as stated below.

2.2.1 Site-Specific Implementation Plans

Site-specific plans will be prepared by Chelan County PUD and approved by the USDA Forest Service for habitat and ground disturbing activities on National Forest System Lands required by the New License, including activities contained within resource management plans required by the New License that will be prepared subsequent to issuance of the New License. Site-specific plans for activities will be prepared two years in advance of required implementation dates.

Site-specific plans shall include:

1. Map depicting the location of the proposed activity.
2. A description of the USDA Forest Service land management area designation within the Forest Plan for the location of the proposed activity and the applicable standards and guidelines.
3. A description of locations, designs and mitigation measures considered, including implementation of effectiveness monitoring.
4. Data collected from surveys, biological evaluations or consultation as required by regulations applicable to ground or habitat disturbing activities on National Forest System lands in existence at the time the plan is prepared.
5. Noxious weed control measures included as part of mitigation.
6. An environmental analysis or other appropriate National Environmental Policy Act (NEPA) analysis of the proposed action that meets the USDA Forest Service requirements for implementing NEPA.

General concepts of large woody debris (LWD) are discussed in Chapter 3 of the Comprehensive Plan, which describes beneficial uses, LWD characteristics, and general standards and placement concepts.

The site-specific plan has been developed to provide the necessary information to conduct erosion control work at Sites 5a, 5b, 8a, 8b, 10a, 10b and 12. All of these sites are located in the middle portion of the lake (See Figure 1 and 2). It is anticipated that work on these sites will be conducted during the drawdown in the following order:

1. Site 5a and 5b
2. Site 8a, 8B, 10a, and 10b
3. Site 12

The first erosion contract will be to complete work at Sites 5a and 5b during the drawdown months in 2017 and early 2018. The contract(s) will include a contingency year for construction if needed due to delays in permitting, weather, or lake level issues.

The second erosion contract will be to complete work at Sites 8a, 8b, 10a, and 10b during the drawdown months in late 2018 and early 2019. The contract(s) will include a contingency year for construction if needed due to delays in permitting, weather, or lake level issues.

The third erosion contract will be to complete work at Site 12 during the drawdown months in late 2019 and early 2020. The contract(s) will include a contingency year for construction if needed due to delays in permitting, weather, or lake level issues.

The organization of the remainder of this plan is in sections that relate to specific clauses in Section 2.2.1 of chapter 1 of the Comprehensive Plan. Each section begins with the relevant requirements of the License, followed by the description of the methods that will be used to monitor and report compliance with the licensee.

SECTION 2: SITE LAND MANAGEMENT AREA DESIGNATION

The *land management area designation* in the *Wenatchee National Forest Land and Resource Management Plan* for all seven of the erosion sites proposed in this plan are classified as Riparian Zones (EW-2). Forest-wide standards and guidelines apply to the EW-2 sites which will allow the soil improvement actions proposed in this plan to occur. In addition to generic Forest Plan direction, all of the Lake Chelan watershed assessments including the Middle Chelan Watershed Assessment (USDA-FS, 1999); North Shore of Lake Chelan Watershed Assessment (USDA-FS, 1998); and Upper Chelan Watershed Assessment (USDA-FS, 2003) call for varying forms of treatment or remedial actions for shoreline erosion.

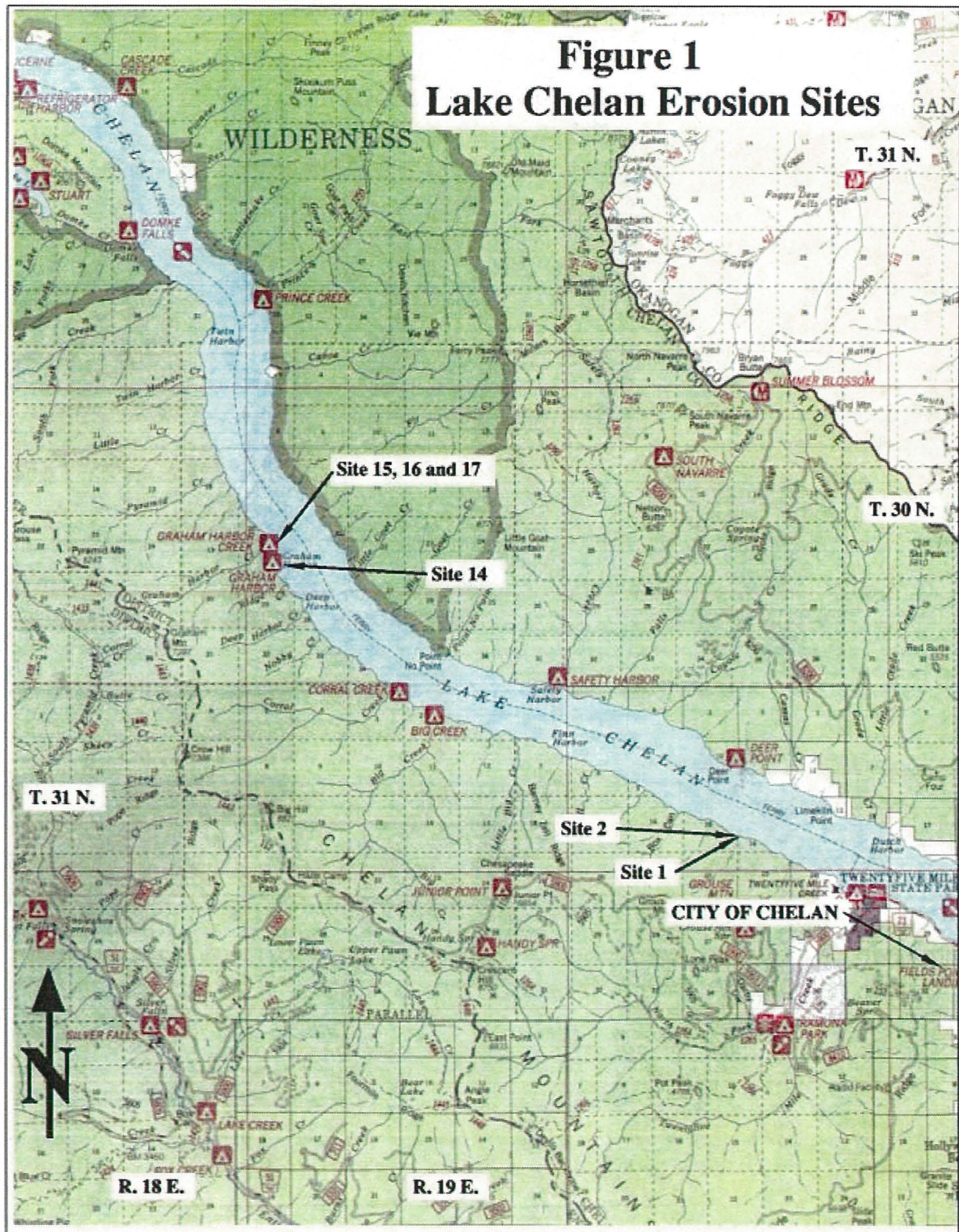


Figure 1: Location Map (1 of 2)

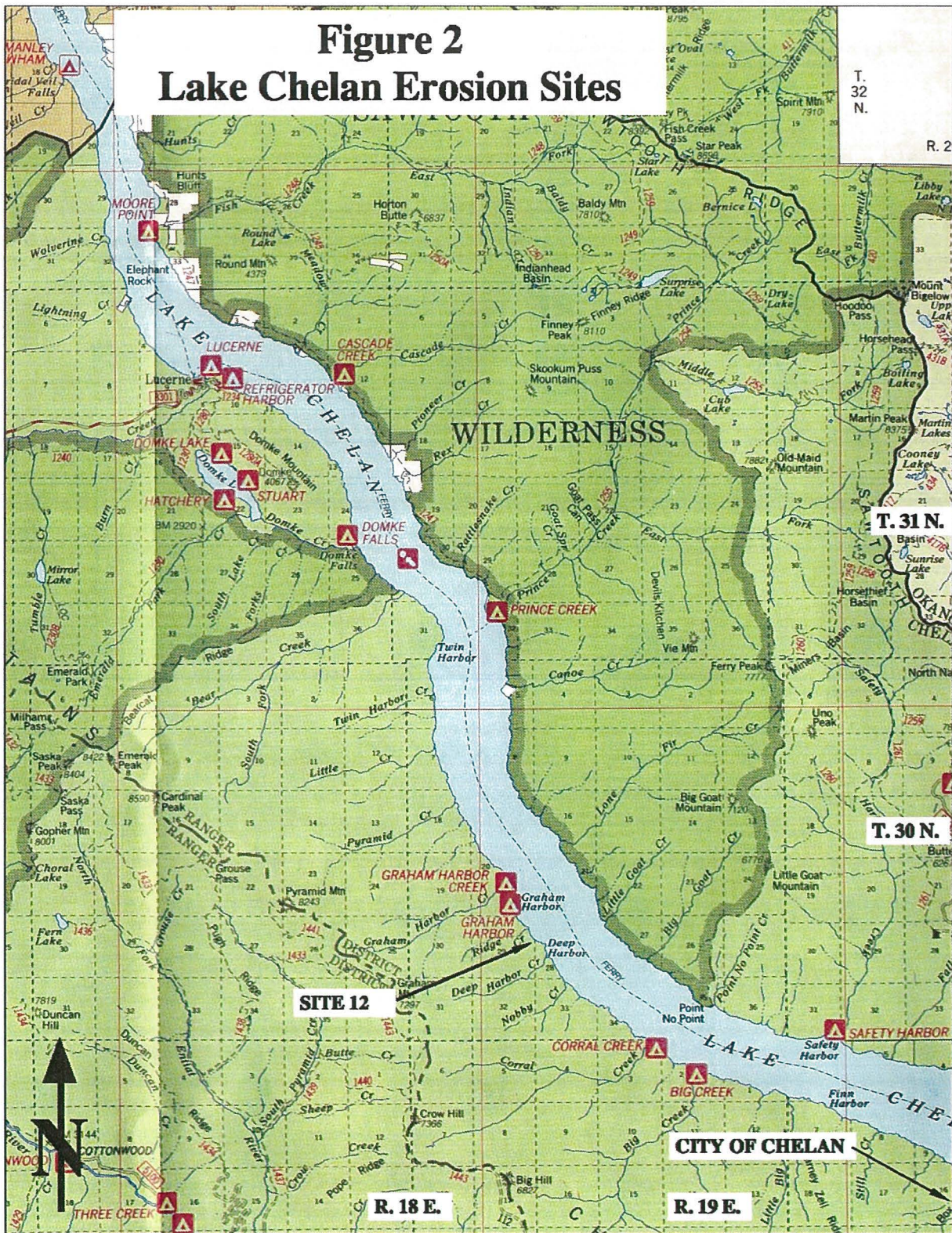


Figure 2: Location Map (2 of 2)

SECTION 3: LOCATION, DESIGN, MONITORING

3.1 Location of Sites

All sites are located on the south shore. All sites are located on the middle portion of the lake. They are approximately 28-32 miles from Chelan. Refer to Figure 1 and 2 for locations.

3.2 Design – Baseline Data and Treatments

Each site will be repaired with a variety of treatments. As work progresses in the implementation process and knowledge is gained, it is anticipated that new types or combinations of treatment will be developed. Please refer to Appendix A for current treatment designs.

Treatment designs will start with the basic site sketches and original survey soil information, site observations and slope profiles contained in the Inventory of Shoreline Erosion Lake Chelan and Bypass Reach Study Report, Final (Chelan PUD, 2000). These original sketches were further modified with proposed treatment areas identified on the sketches in the Erosion Control Treatments and Concepts for Lake Chelan, Okanogan and Wenatchee National Forests, Final (Chelan PUD, 2001). This body of information is the base from which each set of site-specific Forest Service erosion plans will be developed over the implementation time period.

The anticipated treatment for the sites covered in this plan (sites 5a, 5b, 8a, 8b, 10a, 10b and 12) are presented below.

3.2.1 Erosion Control Treatments

Site 5a

Total length of Treatment 5a is approximately 1063 lineal feet. Zones A and C are 183' lineal feet and will be treated with the T3S Modified Single Row Rock Placement treatment. Zones B, D, E and F are 848 lineal feet and will be treated with the T3 Double Row Rock Placement treatment.

Additional site data: General overall slope, P1 ~ 90+% max, P2~90% slightly less.

Soils: Stony surfaces, steep silty sands and rocky colluvial slopes >30%.

Maximum bluff height: 40 feet

Table 1: Treatments for Site 5a

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	53	T3S Modified	Single Row Rock Placement. No LWD
B	32	T3	Double Row Rock Placement. Include 2 pieces LWD
C	130	T3S Modified	Single Row Rock Placement. No LWD

D	194	T3	Double Row Rock Placement. Include 12 pieces LWD
E	129	T3	Double Row Rock Placement. Include 8 pieces LWD
F	493	T3	Double Row Rock Placement. Include 30 pieces LWD

Site 5a

1982 Site 5a, by MGY, 03/23/99

Site 5a, 03/23/99

Moderate U/S exposure, Bedrock limits both ends and some spots in middle face or near angle of repose

Toe, sl undercut

0'-110'

Till, silty sand (SM) matrix. 50% coarse gravel to 3' boulders, angular to sub round

More larger cobbles at toe

Downslope (1085'), angular to sub round gravel and cobbles, mostly 2" to 3'

Face with grass, moss, clean rocks, shrubs (+)

Toe, some sl. Undercutting at toe (-), rocky below 1100' (=)

Upslope burned off,

Some visual screening by vegetation, face blends with similar materials upslope

110'-200'

Rocky drainage area, mostly grass covered, with shrubs and small trees (+)

Few signs of erosion. Some spots sl. Undercut (=).

200'-480'

More exposed U/S (N60°W).

Face with grass, shrubs, ferns, moss, trees.

About 50% sl. Undercut (=).

480'-980'

Near vertical at top of face. Rockier at toe.

Grass, duff, moss, small trees, rock clean (+).

Less grass 500'+

About 600', face fresh, top of face more active, fewer shrubs, other veg.

980'-end at 1075' bedrock

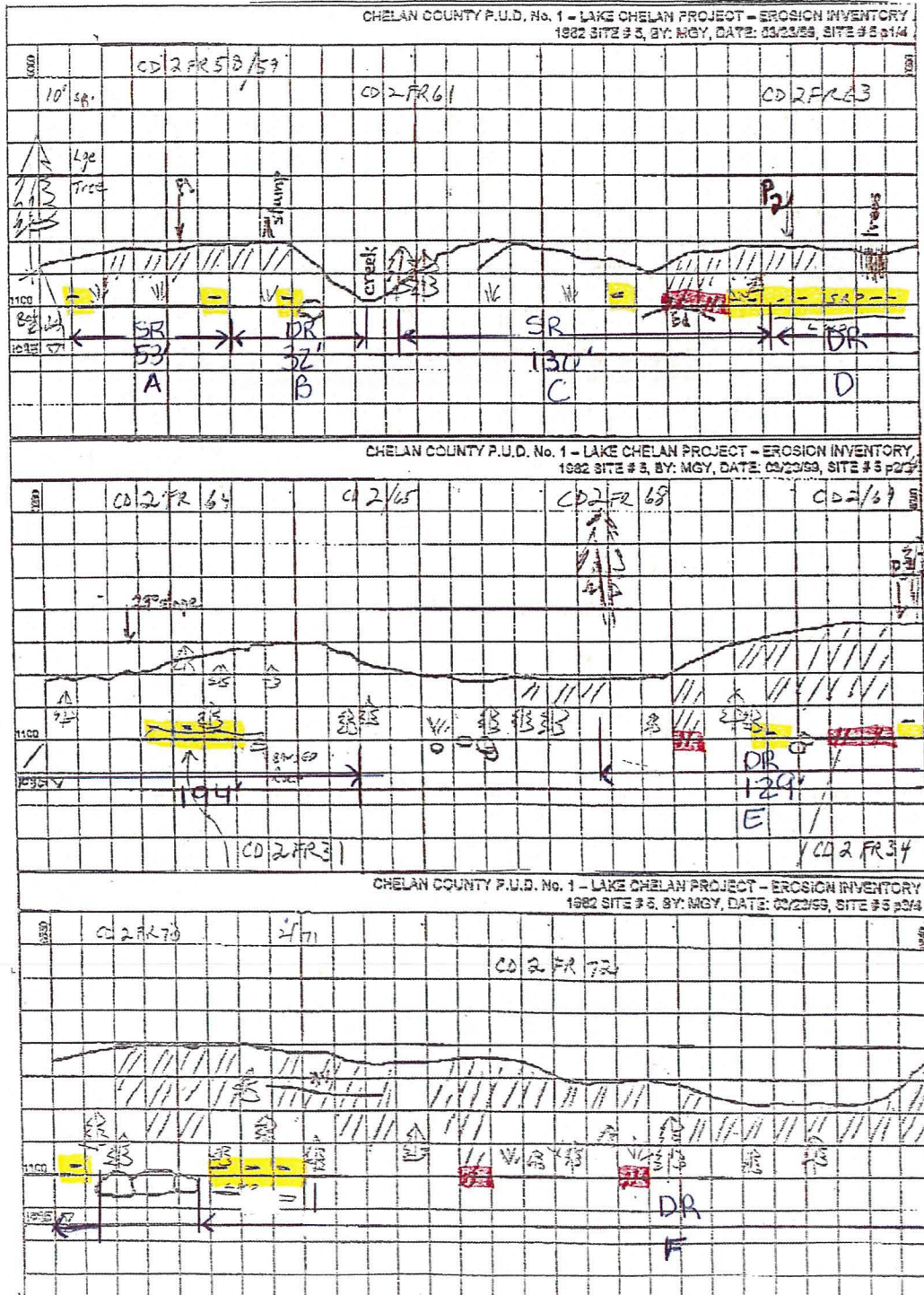
Very exposed U/S, long fetch. Downslope flatter.

Comparison with 1982 photos (Site 5, all/4): Shape of face unchanged.

Face still shows a good deal of bare soil and some rocks as previously.

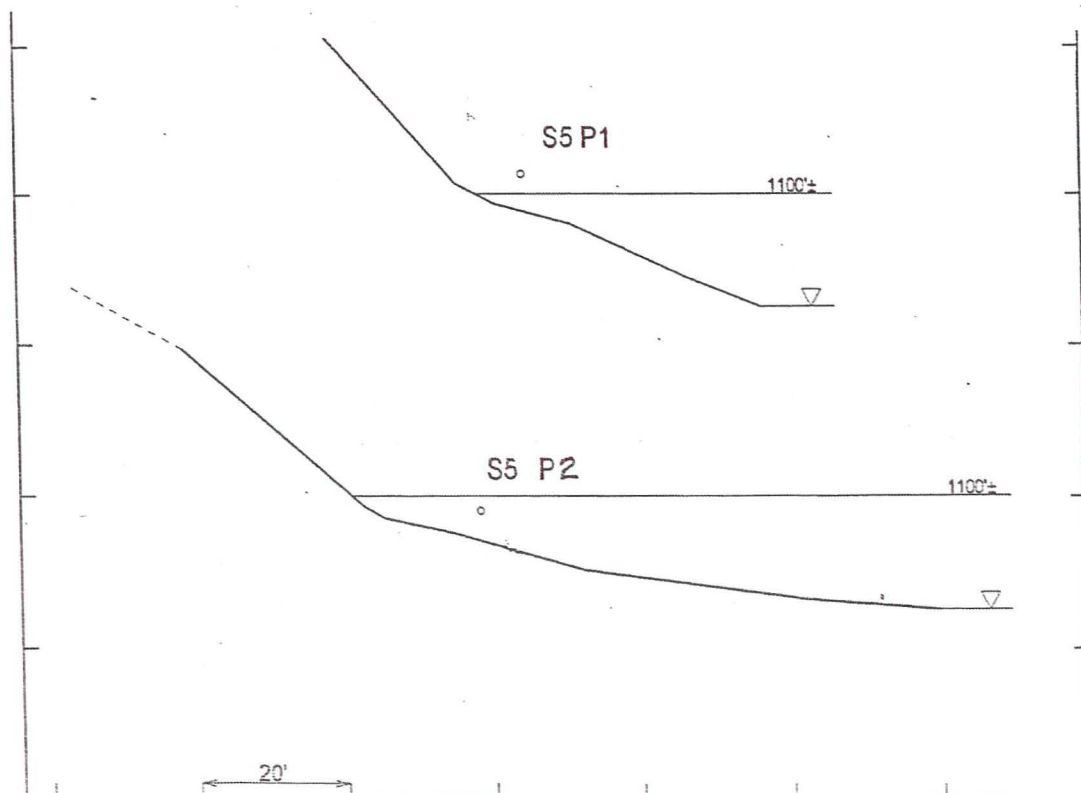
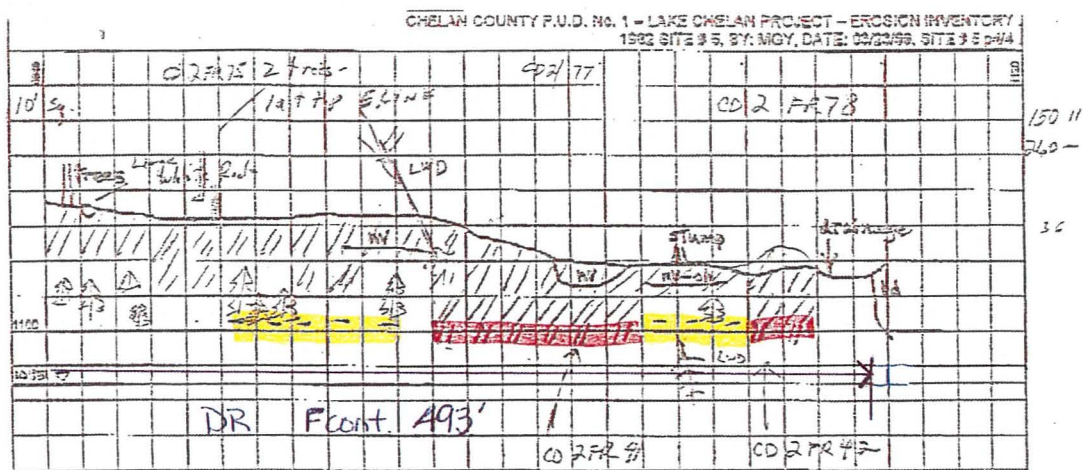
Most of lip less pronounced. Shrubs and trees more numerous and larger in most areas. (+)

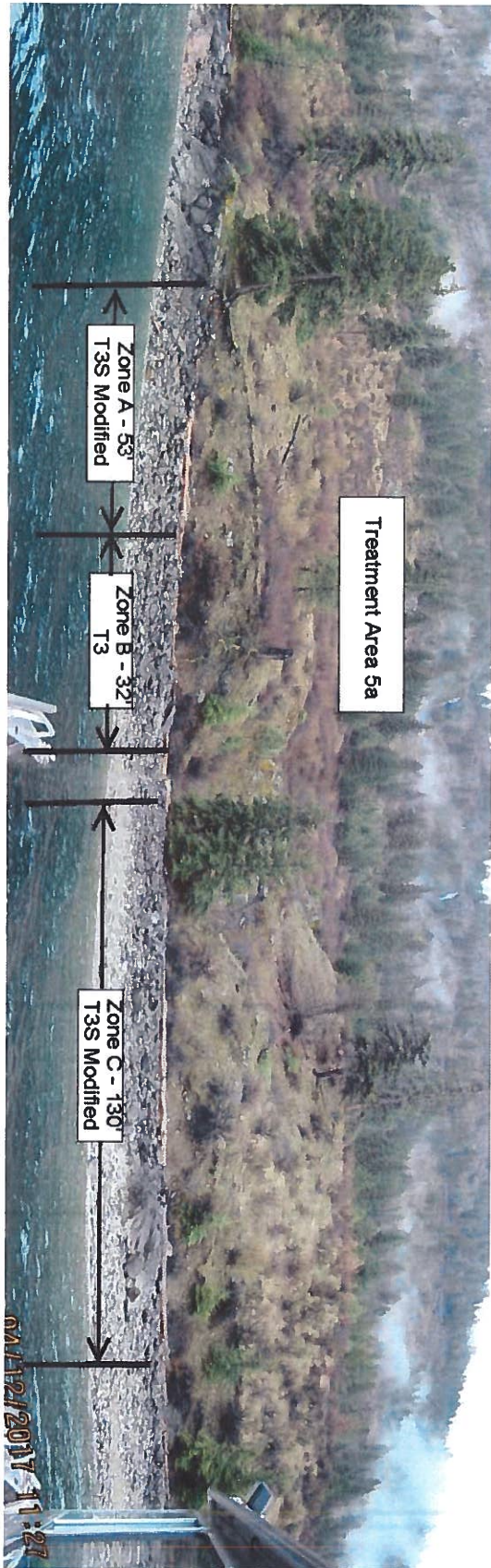
Site 5a

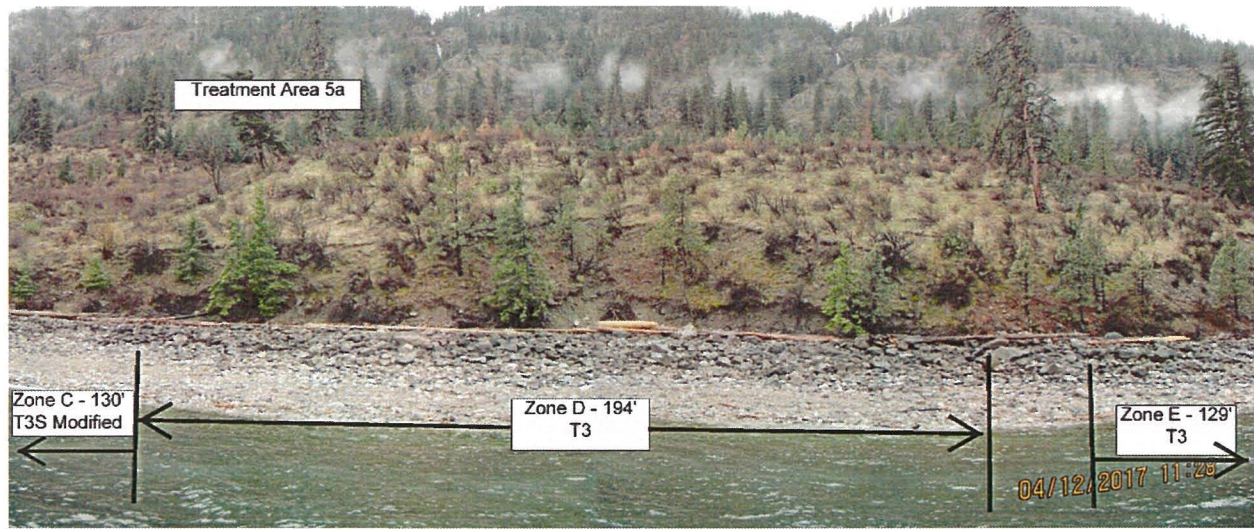


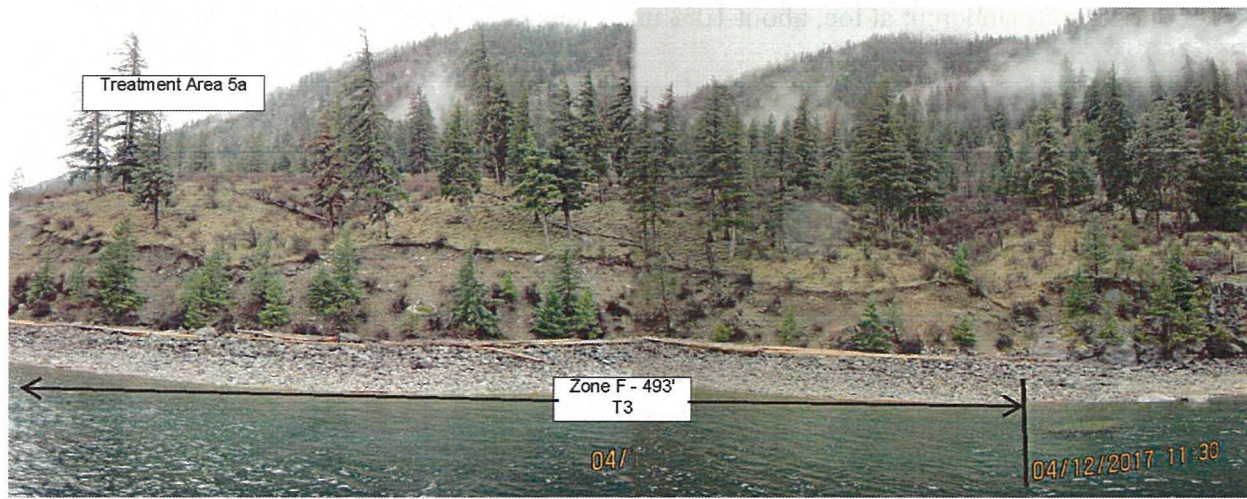
Easement Free/ Group 3 Site

Site 5a









Site 5b

At Site 5b approximately 340 lineal feet will be treated with the T1 Modified – Enhanced Placed Rock treatment, all of Site 5b will be treated with LWD.

Additional Site data:

Soils: Stony surfaces, steep silty sands and rocky colluvial slopes >30%.

Maximum Bluff Height: 40 feet

Table 2: Treatments for Site 5b

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	340'	T1	Enhanced Placed Rock. Include 20 pieces LWD

Site 5b

0' – end at 330' bedrock

Moderately exposed U/S. Limited by bdrk both ends. Steep face with vegetation.

Till, silty sand (SM) matrix with 30%-40% coarse gravel to 3' boulders.

SI. Overhang to near vertical at top. Remainder of face near angle of repose.

Face with grass, duff, shrubs, sm. trees (+).

Toe about 20% sl. Undercut at toe, about 10% undercut and destabilizing up to mid-face (-).

225'-250' & 280'-330'

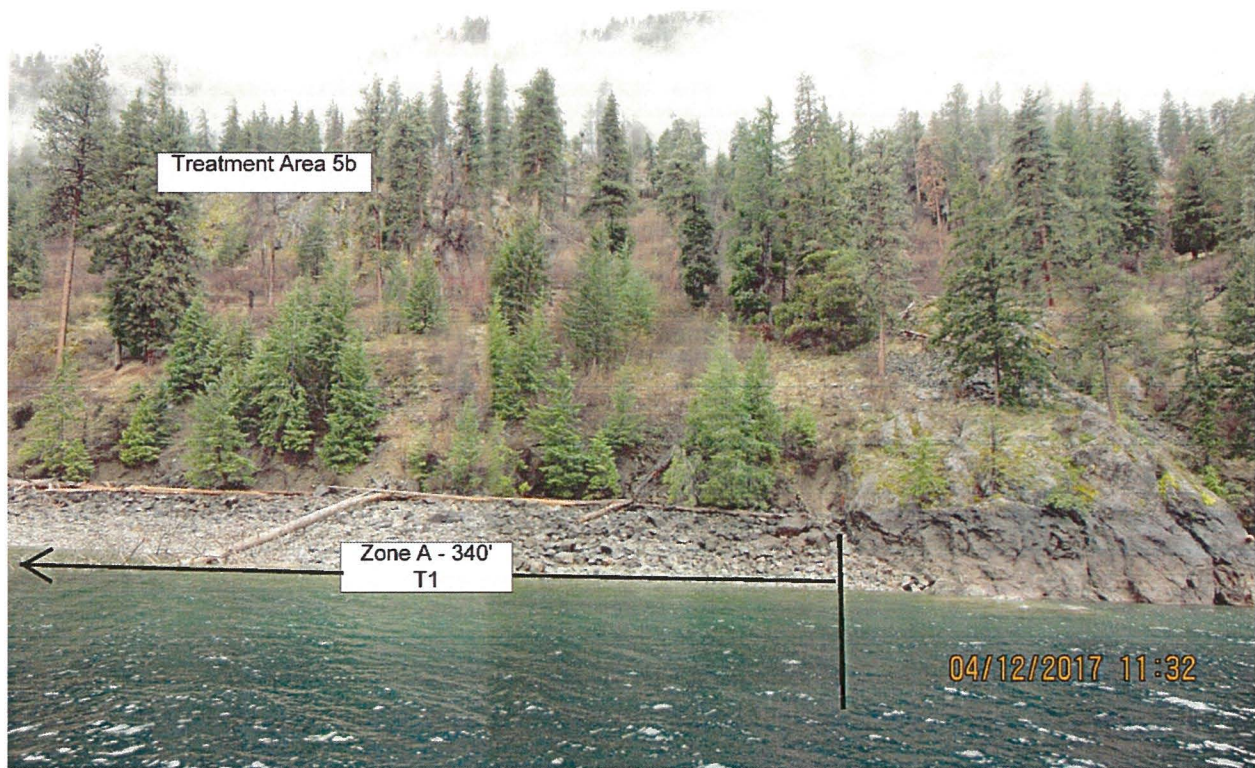
Fresher erosion face, little veg., near angle of repose.

Comparison to 1982 photo ((Site 5, 4/4) difficult due to angle):

Site shows more and larger vegetation.

One tree, previously on the brink, lost to erosion.

Overall improved, but not undercut. (+/-)



Site 8a

Total length of treatments in Site 8a is approximately 72'. Zone A is 19' long and will be treated with T1 – Enhanced Placed Rock. Zone B is 32' and will be treated with T3 – Double row Rock Placement. Zone C will be treated with T3S Modified – Single Row Rock Placement. There will be no LWD.

Soils: Stony Surface, steep silty sands and rocky colluvial slopes > 90%. Maximum bluff height: 20 feet.

Table 3: Treatments for 8a

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	19	T1	Enhanced Placed Rock. 1 LWD.
B	32	T3	Double row Rock Placement. 2 LWD.
C	21	T3S Modified	Single Row Rock Placement. No LWD.

More and larger shrubs and trees. (+)



Site 8b

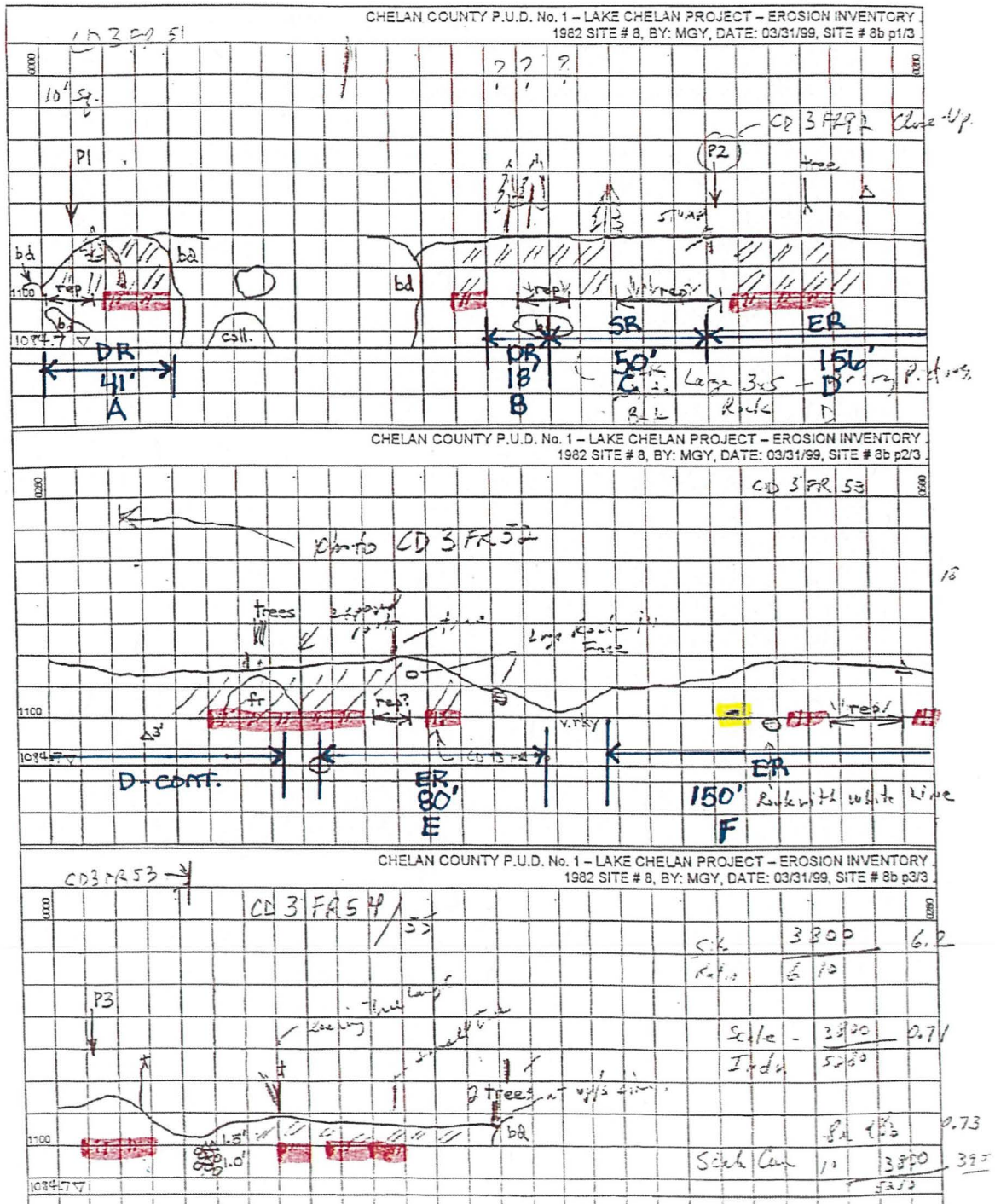
Total length of treatments in Site 8b is approximately 495'. Zone A is 41' long and will be treated with T3 – Double Row Rock Placement. Zone B is 18' and will be treated with T3 – Double Row Rock Placement. Zone C is 50' and will be treated with T3S Modified – Single Row Rock Placement. Zone D is 156 feet and will be treated with T1 - Enhanced Row Rock Placement. Zone E is 80' and will be treated with T1 - Enhanced Placed Rock. Zone F is 150' and will be treated with T3 - Double Row Rock Placement.

Soils: Stony Surface, steep silty sands and rocky colluvial slopes > 90%. Maximum bluff height: 20 feet.

Table 4: Treatments for 8b

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	41	T3	Double Row Rock Placement. 3 LWD.
B	18	T3	Double Row Rock Placement. 1 LWD.
C	50	T3S Modified	Single Row Rock Placement. No LWD.
D	156	T1	Enhanced Placed Rock. 9 LWD.
E	80	T1	Enhanced Placed Rock. 5 LWD.
F	150	T1	Enhanced Placed Rock. 9 LWD.

Site 8b



0'-40'

Sl. Sheltered U/S

Face near angle of repose, bench near 1100', steep downslope, flatter near 1085'

Colluvium, SM matrix with cobbles to 1.5', subround, more cobbles at toe

Bench, fine gravel to 8" cobbles

Downslope, some bedrock, rock to 2', subround, fine-med gravel near 1085'

Face, sl. overhang with roots at top, some bedrock

Toe, sl. undercut

Mid-face, shrubs, moss, grass, small trees, logs at toe

40'-120'

Mostly bedrock

120'-335' as at 0'-40' but

Moderately exposed U/S

Soil mostly till

Bench, coarse gravel to 2' rock

Downslope, rock to 5', most <1.5'

Face with grass, moss, many shrubs

Repairs apparent 150'-166' and 182'-214'

335'-360'

Near vertical face, fresh soil surface

360'-end at 698'

Top of face, vegetated and stable

Mid-face and toe, bare soil, near vertical

Possible repair 382'-394'

Except 430'-460', Very rocky face, sl. undercut toe

Repair 526'-549'

600'-610', Downslope, boulders

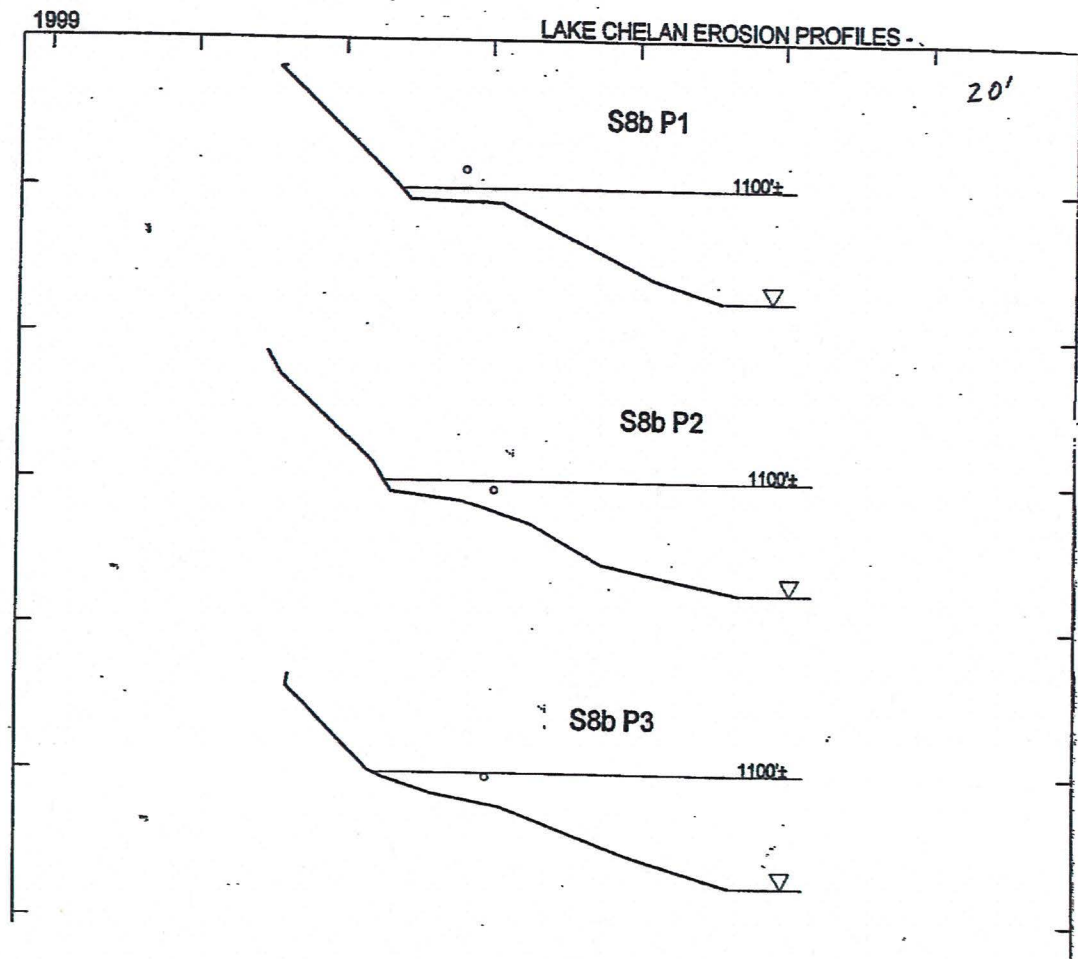
Compare to 1982 photos (Site 8, all/3):

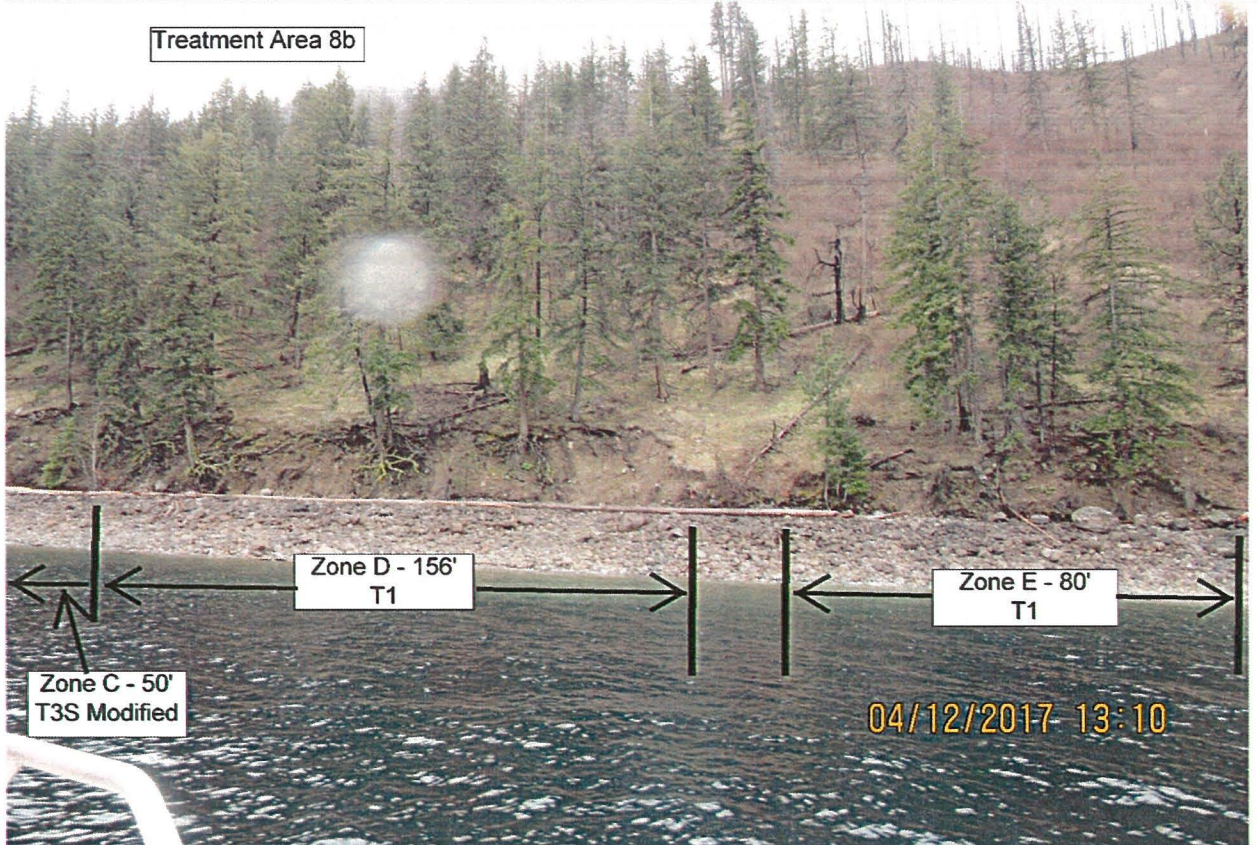
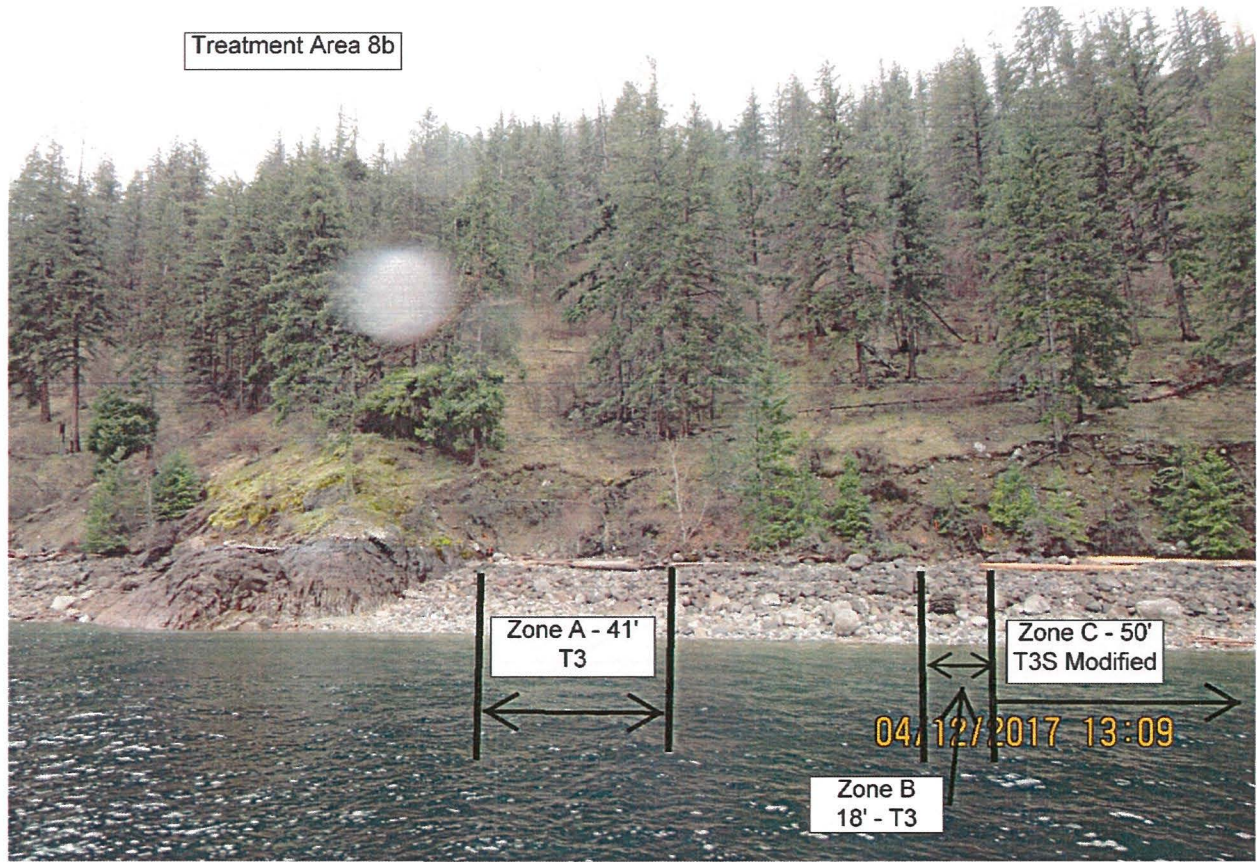
Possibly two trees lost, on verge in 1982, gone or leaning in 1999.

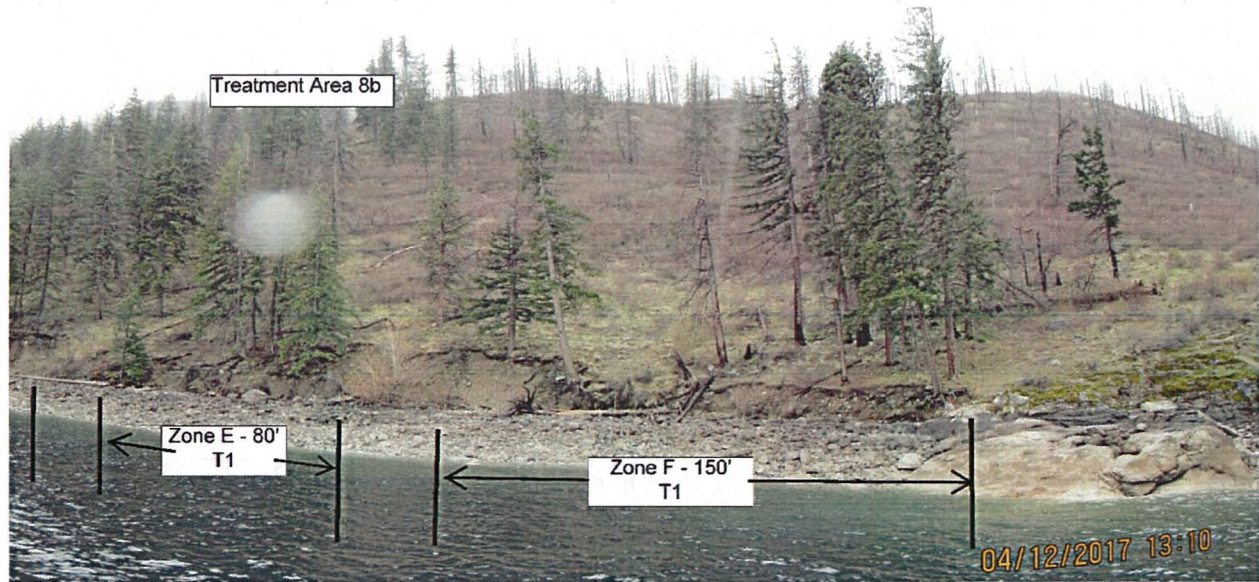
Other trees undercut in 1982 still present.

Face has more duff, shrubs. (+)

Site 8b







Site 10a

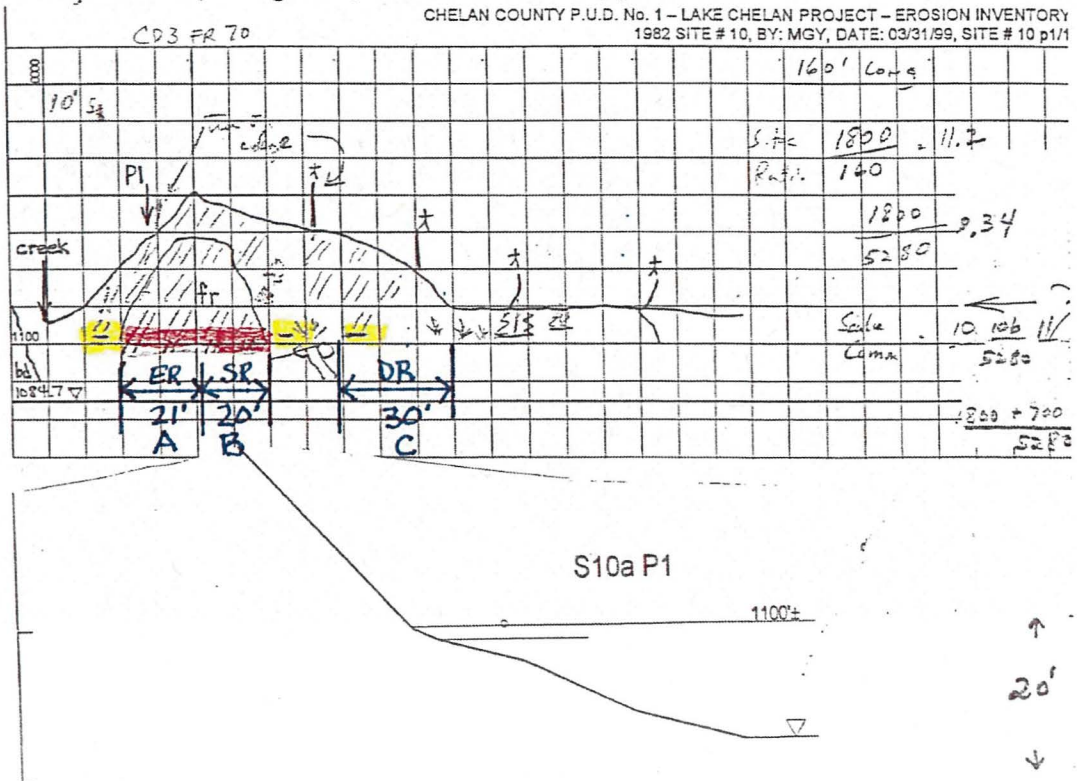
Total length of treatments in Site 10a is approximately 71'. Zone A is 21' long and will be treated with T1 - Enhanced Placed Rock. Zone B is 20' and will be treated with T3S Modified – Single Row Rock Placement. Zone C is 30' and will be treated with T3 – Double row Rock Placement.

Soils: Stony Surfaces, steep silty sands and rocky colluvial slopes > 90+%. Maximum bluff height: 40 feet.

Table 5: Treatments for 10a

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	21	T1	Enhanced Placed Rock. 1 LWD.
B	20	T3S Modified	Single Row Rock Placement. No LWD.
C	30	T3	Double Row Rock Placement. 2 LWD.

0'-end at 160'
 Exposed U/S with long fetch
 Bedrock limits both ends
 Face near angle of repose
 Mostly moss, grass, shrubs
 About 22'-58', mostly bare soil face
 End at mossy bank - inactive
 Visual impact small except for bare face 22'-58'.
 Compare to 1982 photo, Site 10, 1/2: Appears approximately the same.
 Perhaps more duff and vegetation, but not much different. (=)





Site 10b

Total length of treatments in Site 10a is approximately 57'. Zone A is 57' long and will be treated with T1 - Enhanced Placed Rock.

Soils: Stony Surfaces, steep silty sands and rocky colluvial slopes > 90+%. Maximum bluff height: 17 feet.

Table 6: Treatments for 10b

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	57	T1	Enhanced Placed Rock. 4 LWD.

1982 Site 10, By MGY, 03/31/99, Site 10b,

Exposed U/S

0'-end at 140', bedrock limits both ends

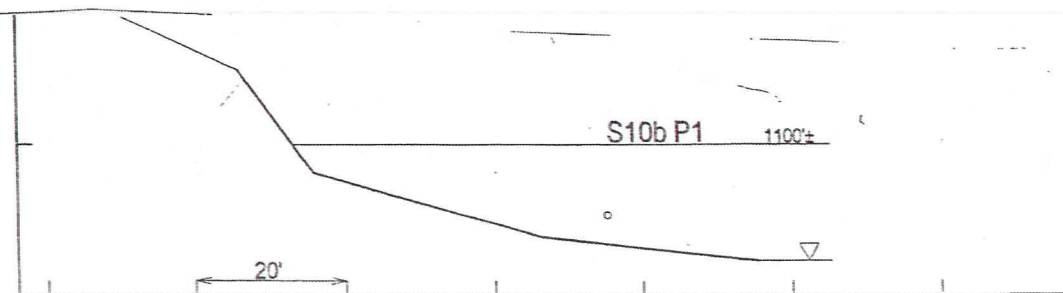
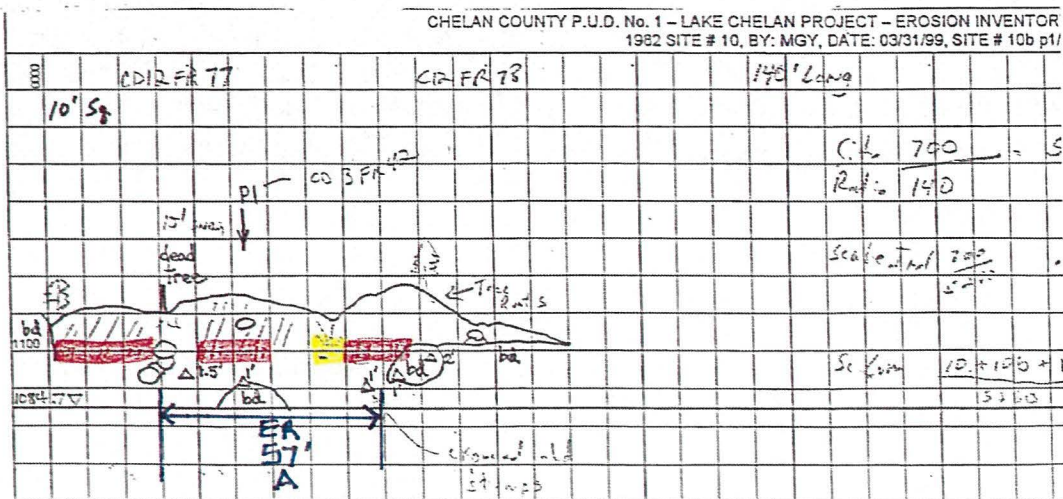
Face, some areas bare soil with mostly duff, shrubs, sm trees, little activity

Toe undercut to bedrock in places

Downslope, some bedrock outcrops, many boulders

Compare to 1982 photo (Site 10, 2/2): Very little change, more duff on places.

Trees on verge in 1982 still present. (=)





Site 12

Total length of treatments in Site 12 is approximately 810'. Zone A is 200' long and will be treated with T1 - Enhanced Placed Rock. Zone B is 75' and will be treated with T3S Modified – Single Row Rock Placement. Zone C is 100' and will be treated with T3 – Double row Rock Placement. Zone E is 410' and will be treated with T1 - Enhanced Placed Rock.

Soils: Stony Surfaces, silty sands and extremely steep near vertical rocky colluvial slopes.
Maximum bluff height: -24 feet.

Table 7: Treatments for 12

Treatment Zone	Length (Feet)	Treatment Type (See Drawings)	Treatment Description
A	200	T1	Enhanced Placed Rock. 12 LWD.
B	75	T3S Modified	Single Row Rock Placement. No LWD.
C	100	T3	Double Row Rock Placement. 6 LWD.
D	25	T3S Modified	Single Row Rock Placement. No LWD.
D	410	T1	Enhanced Placed Rock. 25 LWD.

Maximum Bluff Height: ~24 feet.

1982 Site 12, By MGY, 04/13/99, Site 12

Moderately exposed U/S

0'-267'

Face at angle of repose, some sl. overhanging at top

Small bench, steep downslope

Colluvium, about 40% gravel and cobbles to 3', subangular

Bench and downslope, coarse gravel to boulders, mostly angular to subangular

Mostly active, few plants (-)

Relatively visible, stands out, little screening

Upslope, rocky, with trees

130'+ Some moss on face

160'+ Some bushes on face

200'+

Moss, grass, shrubs near toe,

Top half of face still oversteepened

Little bench

267' Sl undercut area, but otherwise little erosion activity

320' Sl undercut area, but otherwise little erosion activity

360'-400'

Sl sheltered

Oversteepened face

Till, 30%-40% rocks to 2'

Downslope, near water, fine-med gravel

Some moss, grass, shrubs, sm trees

Sl undercut at toe

400'-420'

Wider bench with med. gravel

Flatter downslope

Little activity, moss, grass

Sl undercut at toe

446'+ More exposed U/S

530'+ Face oversteepened, very active,

605'+ Less exposed U/S, some bushes near toe

700'+

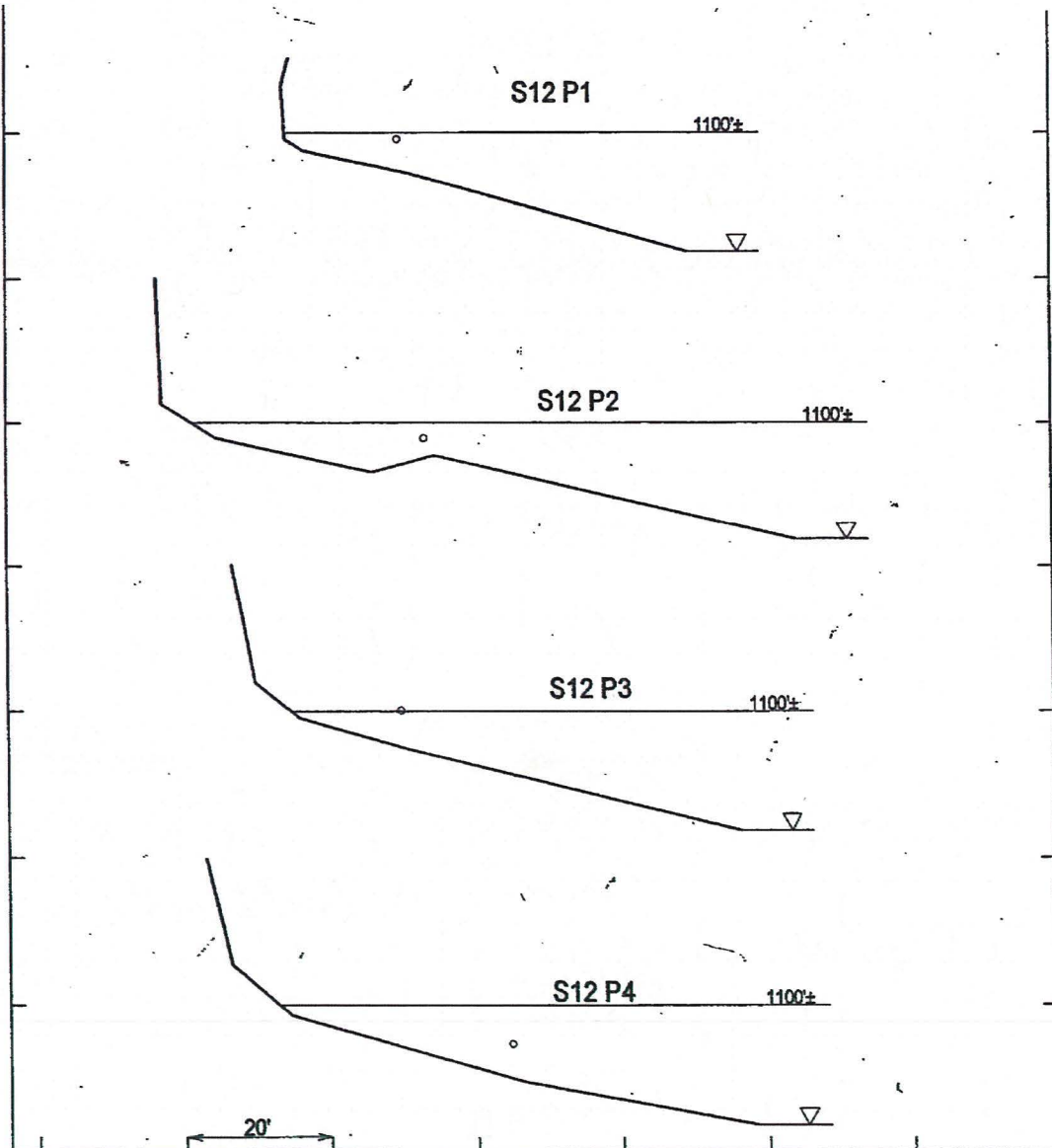
More sheltered by point U/S,

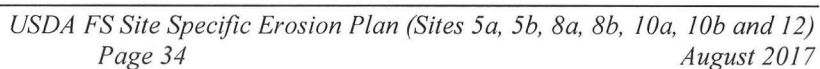
Downslope very rocky

776'+ Only sl. undercut at toe

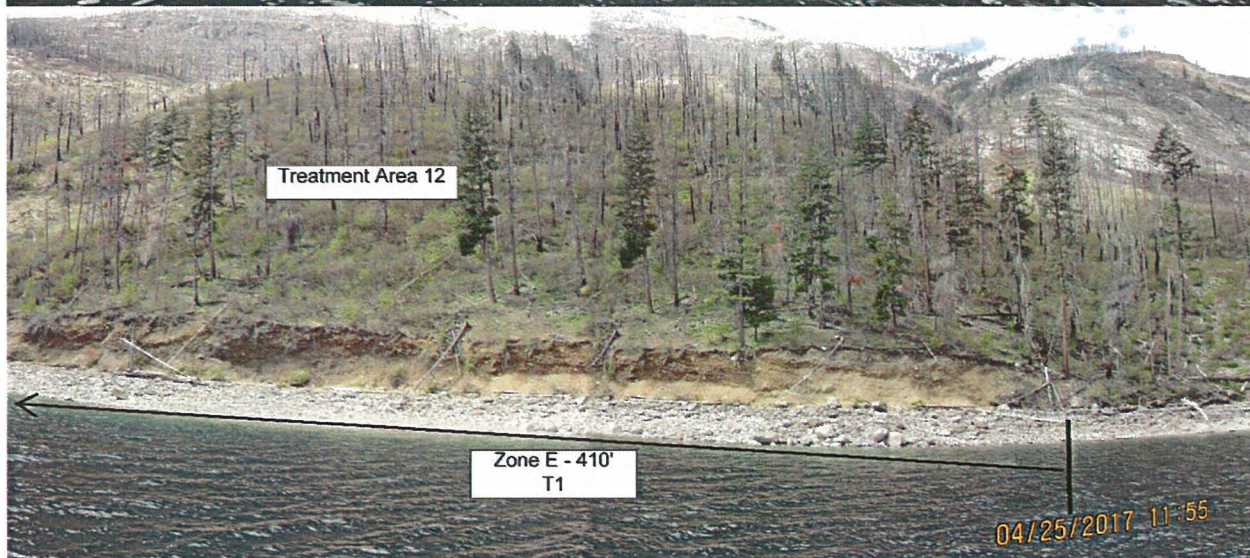
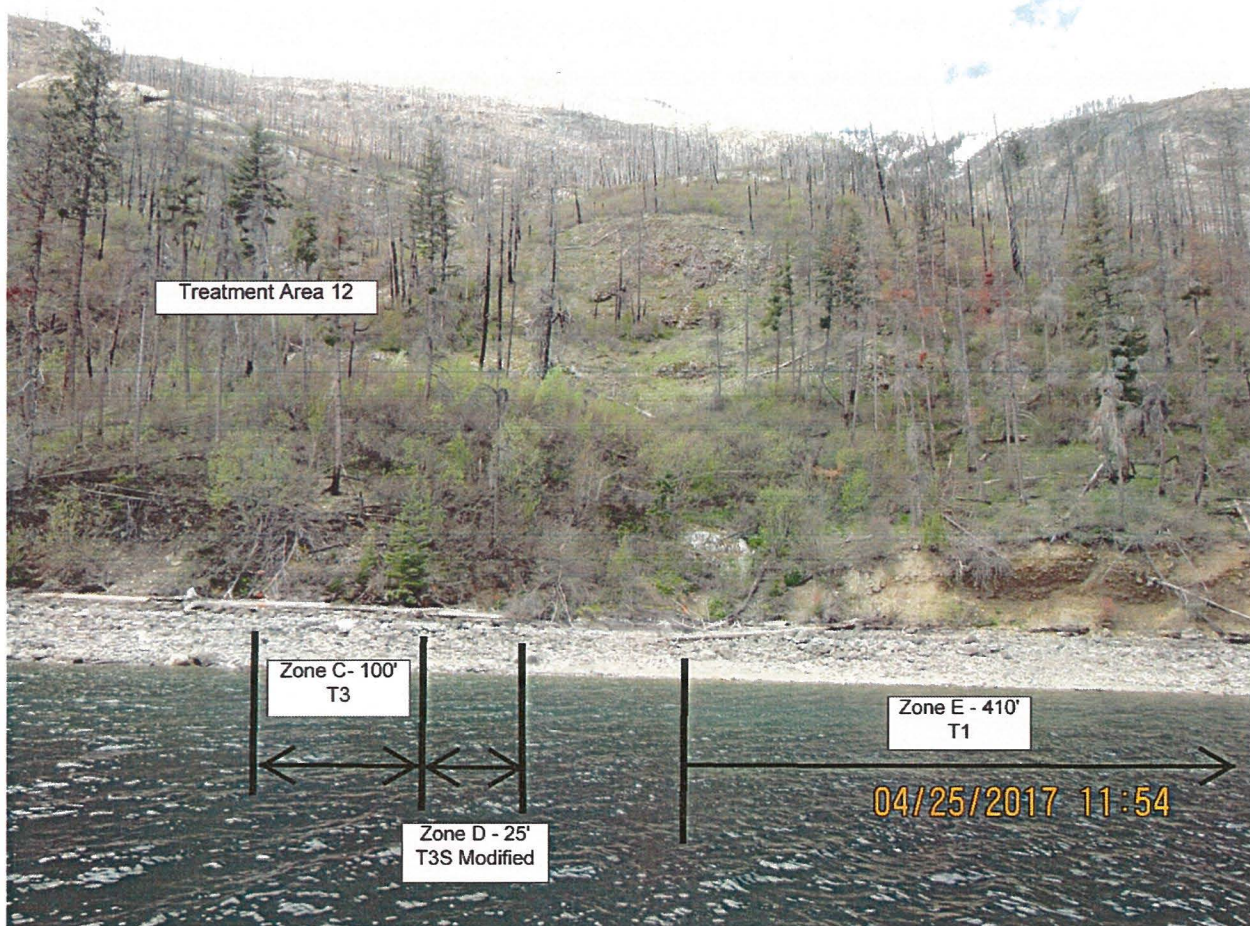
820' end

Site 12









3.3 Mitigation Measures Included

Noxious weed control will be addressed by: 1) limiting foreign soils being brought into the sites. 2) noxious weed control will be incorporated into the design and level of actual ground disturbance in that only at or below the normal high water level should we have actual ground disturbance, and 3) large rock will be coming from a weed-free certified pit. Every effort will be made to keep existing slopes and vegetation as stable as possible during treatment.

Large Woody Debris (LWD) will be used to benefit fish and address wave actions where possible and to the agreed upon ratio (1/1) of disturbed shoreline. This set of treatment allows for LWD placement to be incorporated into approximately 2,527 linear feet of shoreline treatments. It will not be a continuous treatment but selected pieces anchored occasionally till we reach the appropriate amount. It will be done so that it does not interfere with dock access or other recreational shoreline to water access at the campgrounds. T1 and T3 treatments trigger excavation that is used in the LWD calculation. We have calculated 2,527 lineal feet of these treatments with excavation disturbances of approximately 1.5 feet; so we have a square footage of required LWD (approximately 3,790 square feet). With “average” pieces of LWD being a 20-foot log 14-16 inches in diameter; each log would represent about 25 square feet of mitigation. Thus we are planning to place approximately 152 “average” logs within the treatments that allow for them.

3.4 Implementation and Effectiveness Monitoring

The effectiveness monitoring schedule is based on when each site will be treated; the timelines for site treatment are outlined in chapter 1 of the Lake Chelan Comprehensive Management Plan. The monitoring will be focused on evaluation four distinct focus areas:

1. Slope stabilization with an objective of reaching a 90% success rate in the treated areas
2. Presence of native vegetation with an objective of reaching ratio of native to non-native vegetation similar to that found on nearby on undisturbed slopes on 90% of treated area. This will take into account the percentage of rock, and bare spots as this is a very dry hostile natural environment.
3. Presence of noxious weeds with an objective of not introducing any new noxious weeds through the course of treatment. Implementation methodologies are designed to exclude the introduction of noxious weeds. Treated areas will be monitored on an ongoing basis to determine if the methodologies employed are sufficient to meet the project objectives.
4. Stability of LWD with an objective of minimizing movement. Large loose objects could become hazardous to the site users.

All four focus areas will be monitored 1, 3 and 5 years following treatment at the sites. LWD inspections and slope stability inspections will be conducted during drawdown times to allow inspection of anchoring devices. Noxious weed and vegetation inspections will occur after leaf-out, typically in the May to June time period. These inspections will be coordinated with other erosion control implementation steps to provide travel and time efficiencies when possible.

SECTION 4: NATIONAL ENVIRONMENTAL POLICY ACT and PERMITTING

4.1 NEPA

The Forest Service accepted the Final Environmental Assessment (FEA) for Hydropower for Lake Chelan Hydroelectric Project, FERC Project No. 637, FERC, October 2003, for erosion control treatments. Materials included in the FEA detailed all previously conducted survey work, and proposed site-specific treatment areas that were measured and mapped at 10-foot increments. The proposed specific treatments have not materially changed since the date of issuance of the FEA and, as such, will be consistent with the intent of the original proposed treatments.

4.2 Permitting

Consultation with the Army Corps of Engineers will occur through the permitting process and Tribal entities will be consulted through Nation to Nation letters describing the project and soliciting input.

The U.S. Fish and Wildlife Service will review site specific program consistency analysis forms (PCF), which is required as part of a larger programmatic analysis completed for the entire project over the 25 years of erosion control treatment. The USFWS concurred with the Forest Service findings of “may affect not likely to adversely affect” the northern spotted owl (*Strix occidentalis caurina*), gray wolf (*Canis lupus*), and grizzly bear (*Ursus arctos*) in the Biological Evaluation for Lake Chelan Erosion Sites in letters dated August 15, 2007 and April 8, 2008. The proposed treatments at the sites covered in this site-specific plan are consistent with the BE and a programmatic consistency form will be completed to document meeting requirements in the BE.

A Joint Aquatic Resources Permit Application Form (JARPA) will be submitted to the Washington Department of Fish and Wildlife, Washington Department of Ecology, U. S. Fish and Wildlife Service, and the Army Corps. The JARPA is the formal request for Nationwide Permit 13 Bank Stabilization from the Army Corps of Engineers, addresses the Department of Ecology 401 Water Quality Certification permit, and the Washington Department of Fish and Wildlife’s Hydraulic Project Application (HPA) addressed under the 2005 HPA Memorandum of Understanding.

To ensure that site-specific permitting requirements are met, Project Files, including biological evaluation data, cultural resources, and consultation, will be created or updated, to provide additional site-specific information in a timely manner over the life of the License. Project Files include the Biological Evaluation (BE) data and U.S. Fish and Wildlife Service (USFWS) concurrence letters, the Cultural Resources information, and the Joint Aquatic Resources Permit Application (JARPA).

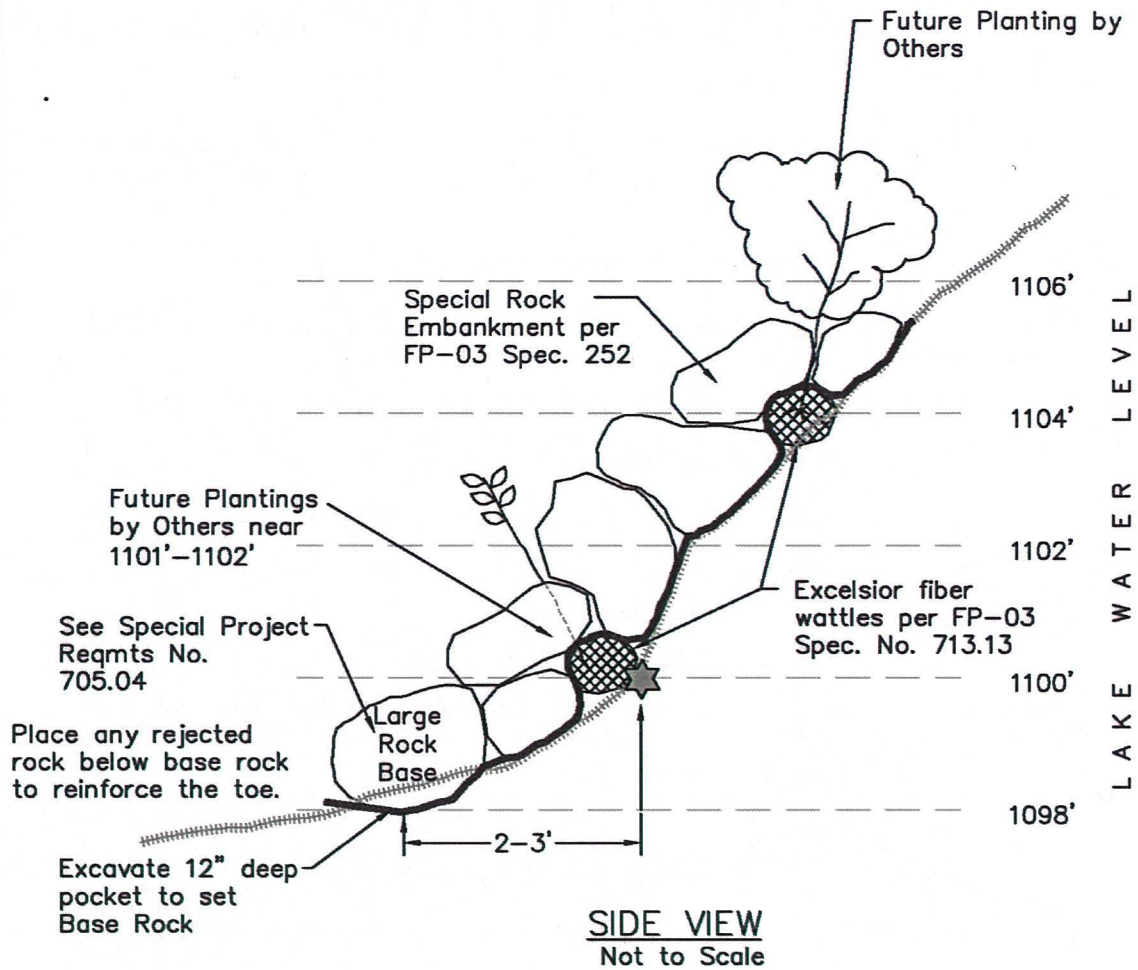
4.3 Cultural Resources

Prior to project implementation an Appendix B Project Documentation form will be completed for cultural resource compliance to meet requirements in the *Programmatic Agreement Among The United States Department of Agriculture, Forest Service, Pacific Northwest Region (Region 6), The Advisory Council on Historic Preservation, And the Washington State Historic*




Preservation Officer Regarding Cultural Resources Management on National Forests in the State Of Washington. The Appendix B Project Documentation will be completed by Okanogan - Wenatchee National Forest Archaeologists to meet Section 106 of the National Historic Preservation Act. Nation to Nation letters describing the project will be sent to the Confederated Tribes of the Colville and the Yakima Nation.

APPENDIX A: CONSTRUCTION DRAWINGS OF PROPOSED TREATMENTS

ENHANCED PLACED ROCK T1

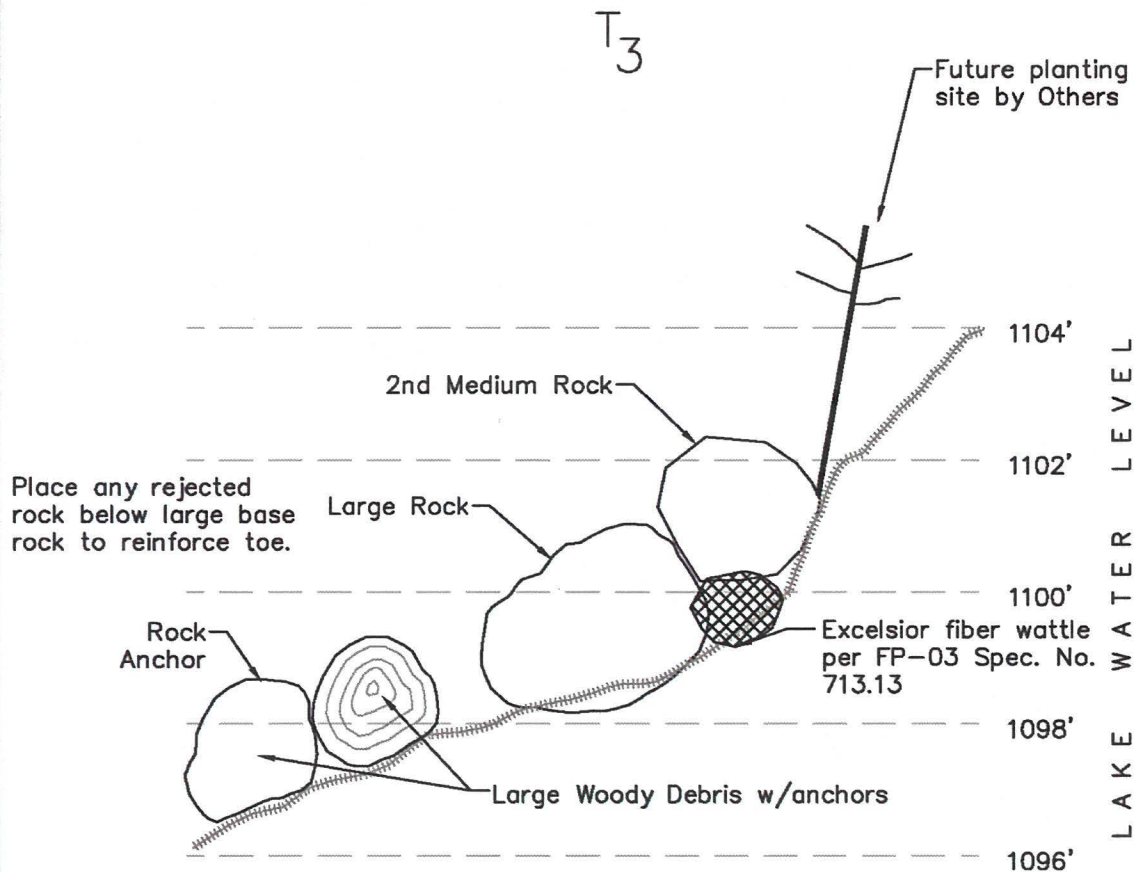


LEGEND

-  1100' Waterline/Soil - Excavate for base rock 2-3' waterward
-  Erosion Control Geotextile, FP-03 Spec. Table 714.4 Type IV.A
-  Approximate Natural Profile

Sheet Title	Sheet
T1 ENHANCED PLACED ROCK	
Project LAKE CHELAN SHORELINE EROSION CONTROL	

DOUBLE ROW ROCK PLACEMENT WITH HORIZONTAL LARGE WOODY DEBRIS (LWD When Required)



LEGEND

SIDE VIEW

Not to Scale

Approximate Natural Profile

SHEET NOTES:

Turf Reinforcement Mat Not Required

LWD=Large Woody Debris - Sound Logs 14"-24"dia., 20'-30' long at Prince Creek (Government-Furnished Materials)

Large Rock = 700-900 lb. rock

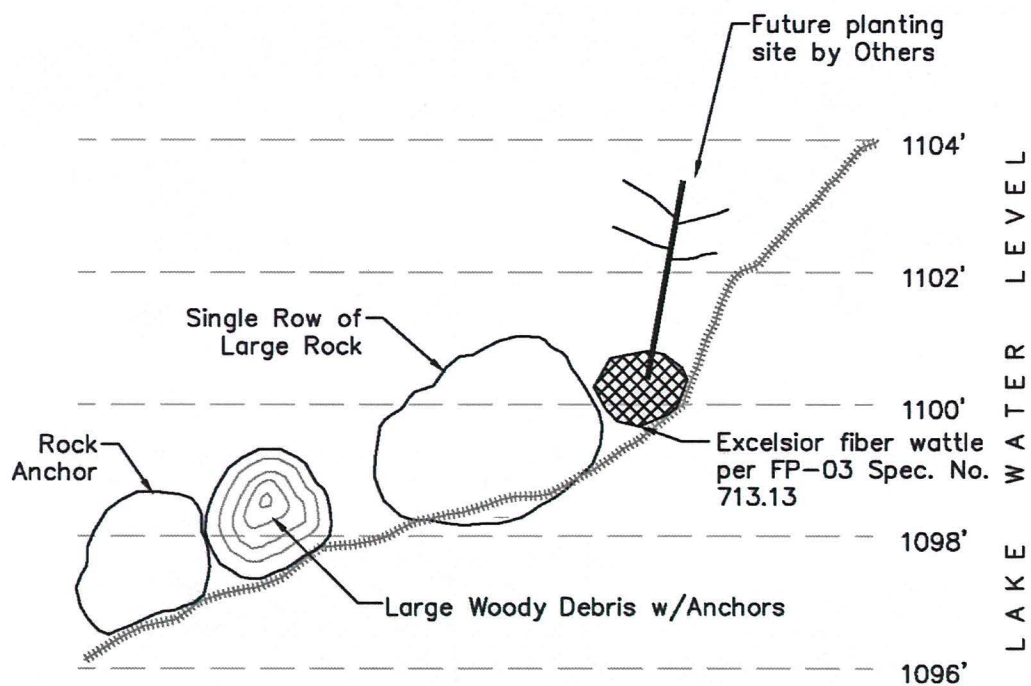
Medium Rock = 300-500 lb. rock

Rock Anchor = 700 - 1250 lb. rock

Sheet Title	T-3 DOUBLE ROW ROCK PLACEMENT	Sheet
Project	LAKE CHELAN SHORELINE EROSION CONTROL	

SINGLE ROW ROCK PLACEMENT WITH HORIZONTAL LARGE WOODY DEBRIS T3S Modified

T3S Modified Treatment:
LWD and wattles not required.



LEGEND

SIDE VIEW Not to Scale

----- Approximate Natural Profile

SHEET NOTES:

LWD=Large Woody Debris - Sound Logs 14"-24" dia., 20'-30'
long at Prince Creek (Government-Furnished Materials)
Large Rock = 700-900 lb. rock
Medium Rock = 300-500 lb. rock
Rock Anchor = 700 - 1250 lb. rock

Sheet Title	Sheet
T3S MODIFIED - SINGLE ROW ROCK PLACEMENT	
Project	
LAKE CHELAN SHORELINE EROSION CONTROL	

Notes:

Drill 1 1/4" inch hole into anchor rock 8-9" deep. Blow hole clean before inserting Sitka AnchorFix2 anchoring adhesive or approved equal. Insert adhesive gun to the bottom of the hole and fill completely. Insert 1" GALVANIZED threaded rod into hole. Clean excess adhesive. Drill 1" hole through center of log. Thread other end of rod through log and secure with galvanized washer and nut.

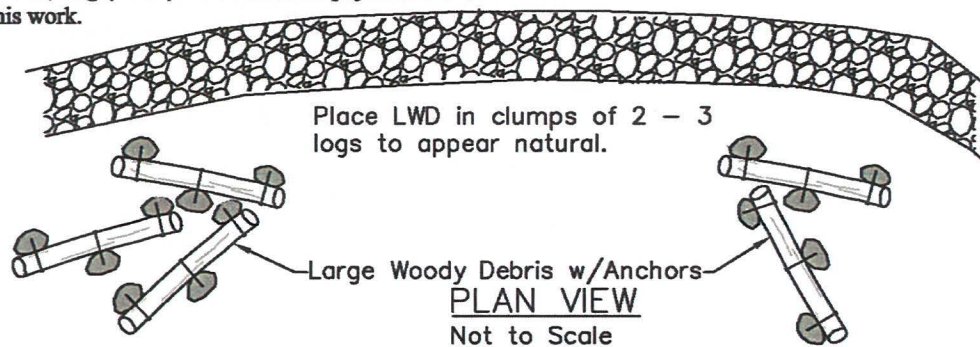
One complete sound log (14 - 20" diameter by 20 - 30' long) with 3 rock tiedowns is considered One LWD Treatment.

Anchor Rock will be 700-1250 lb. rock.

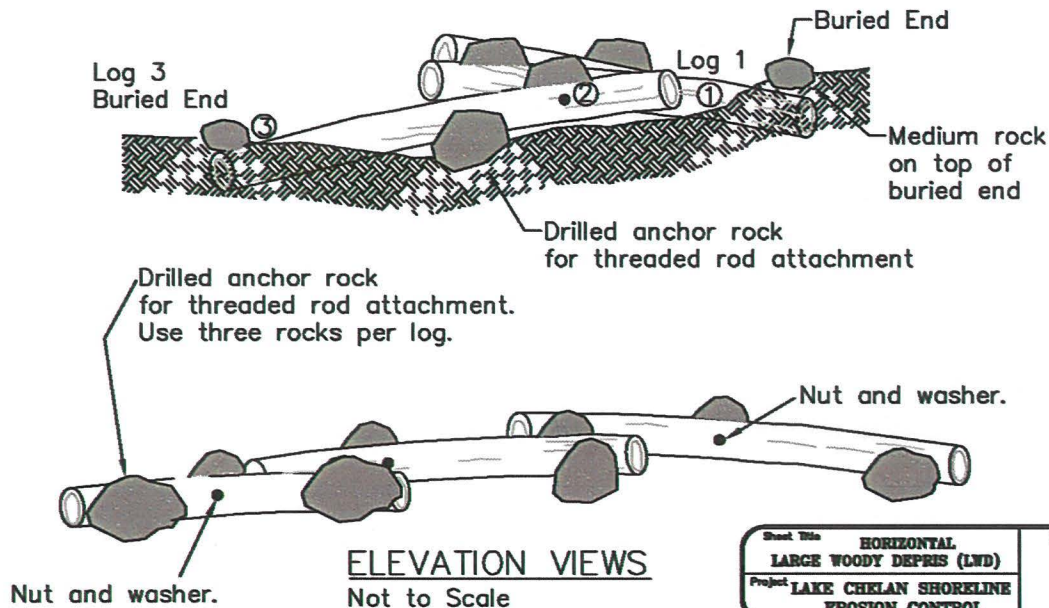
All material needed (Adhesive, threaded rods, washers and nuts, etc) are considered incidental to Pay Item 15756(d)

Erosion Control, Log (LWD). No additional payment will be made for this work.

HORIZONTAL LARGE WOODY DEBRIS (LWD)



HORIZONTAL LARGE WOODY DEBRIS



Sheet Title	HORIZONTAL LARGE WOODY DEBRIS (LWD)	Sheet
Project	LAKE CHELAN SHORELINE EROSION CONTROL	