# Coal Creek
# Minkler Road Sediment Basin
# Performance Review
# &
# Recommended Refinements

**Prepared for:**
**Skagit County Public Works**

**Prepared by:**
**Northwest Hydraulic Consultants Inc.**

**January 31, 2008**

## ACKNOWLEDGEMENTS

The following staff of Northwest Hydraulic Consultants participated in this evaluation:

J.P. Johnson – Technical Analysis and Design

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## TABLE OF CONTENTS



## LIST OF TABLES



## LIST OF FIGURES



## LIST OF PHOTOGRAPHS

## LIST OF EXHIBITS

## Introduction

Skagit County Department of Public Works has asked Northwest Hydraulic Consultants (**nhc**) to review the performance of an existing sediment basin located downstream from Minkler Road (Figure 1). The basin was constructed in 1985 to capture and allow for the removal of sediment that was creating chronic flooding problems in the vicinity of Minkler Road. The County is actively working with the Washington State Department of Fish and Wildlife to improve the performance of the basin and has agreed to modify their sediment removal maintenance plans. However, no engineering analyses have been completed to determine if the new maintenance plans will prevent the chronic flood problems the basin was designed to solve. This report contains the results of **nhc**'s engineering performance review and recommends several modifications to improve the reliability of the system.

## Background Information

### Bridge and Basin Construction

The existing Minkler Road Bridge No 40159 and Sediment Basin were designed in April 1984 and constructed in the summer to fall of 1985. The original plans, which are attached as Exhibit A, show the original stream channel confined to a ditch that flowed west along the north edge of Minkler Road then turned south to pass under the road through a culvert along the extension of Sims Road. The project moved the crossing to its current location, raised Minkler Road up to 5 feet, and installed a 29-ft wide single span concrete slab bridge supported on vertical concrete wall abutments which rest on spread footings. Exhibit A shows the bottom of the footings eight feet below the low chord of the bridge and a concrete slab covering the entire floor of the bridge waterway four feet below the low chord. Immediately upstream and downstream from the bridge the plans show 350 $yd^3$ of light loose rock riprap lining the bed and banks of the stream channel. The plans are not identified as "As-Built" so features may not have been constructed as shown in Exhibit A; however, for this investigation we have assumed they were constructed as shown.

The sediment basin is approximately 900 feet long by 250 feet wide. It was constructed by excavating 13,000 $yd^3$ of material and surrounding the excavated area with an earthen dike that is 2 to 7 feet high. The dike ties into Minkler Road at the bridge and a concrete weir outlet structure at the downstream end. The weir has a four-foot wide low flow notch that joins the floor of the sediment basin to the bed of the existing downstream channel. The depth of the basin as shown on the original plans was 5 to 7 feet as measured from the top of the dike. The slopes of the basin floor were set to 1.4% for the first 300 feet downstream from the bridge, and then about 0.35% for the next 600 feet to the basin outlet.

### Basin Maintenance and Sediment Removal

Records provided by the County indicate that significant quantities of sediment have been removed from the basin four times since 1985. The first cleaning occurred in 1991 and as shown by the plan in Exhibit B, called for the removal of approximately 21,000 $yd^3$ of sediment (27,300 $yd^3$ assuming 30% swell). The intent was to restore the basin to the

original 1985 configuration. It is likely that between 1985 and 1991 sediment gradually filled the basin, but a large portion of the material was probably deposited by two large floods that occurred in November 1990.

The second cleaning took place in 1996, apparently as an emergency action. County records indicate that a contract was approved to remove 15,000 $yd^3$ of sediment. The emergency cleaning was likely initiated following a large November 1995 storm that impacted many local streams and most likely would have deposited significant quantities of sediment in the basin.

In 2005, the County developed a plan to remove material from the basin which is illustrated in Exhibit C. It is our understanding that the plan was approved by the Washington State Department of Fish and Wildlife (WDFW) but approval came just three days before the in-stream work window closed. The County only had time to remove a limited amount of vegetation and "small" amount of sediment. Exhibit C shows a profile and contour map of the basin which represents 2005 ground levels. These can be used to estimate the volume of material that accumulated between the previous cleaning in 1996 and 2005. Assuming that the 1996 excavation restored the original 1985 basin ground elevations (something that we cannot confirm), then approximately 30,000 $yd^3$ of sediment accumulated within the basin between 1996 and 2005. It is likely that a significant amount of this material was delivered to the basin during a major storm that occurred in October 2003.

In 2006, the County again applied for an HPA permit to clean the basin, but due to concerns by WDFW, the scope of the cleaning was scaled back significantly. Exhibit D illustrates the general concept that was approved. It called for removing approximately 3,500 cu yds of material from the upstream 1/3 of the basin, leaving the remaining two-thirds of the basin untouched. The permit approves sediment removals of approximately 3,500 cu yds each of the next five years, but requires the County to monitor conditions within the basin and modify the plan as necessary to avoid harming fish. The permit, a draft copy of which is attached as Exhibit E, also called for the removal of the downstream concrete outlet weir by October 1, 2008.

In 2007 the County removed approximately 3000 $yd^3$ of material from the basin as allowed by the HPA permit. The excavated area covers roughly the upstream one-half of the original basin, which extends slightly further downstream than is called for in the HPA. However, this modification was coordinated with WDFW personnel.

## Sediment Transport and Type

The average annual amount of sediment transported to and deposited within the basin can be estimated from the volume estimates above. Actual transport rates are slightly higher because some material currently passes through the basin outlet and deposits downstream. Table 1 lists the total volume of sediment deposited within the basin as calculated from the estimates above. Dividing these estimates by the number of years between cleanings provides an estimate of the average annual volume of sediment deposited within the basin. This is listed in the right column of Table 1.

**Table 1: Sediment Volume and Deposition Rate in the Existing Basin**

| Period (Years) | Estimate of Total Volume of Sediment Deposited within Basin ($yd^3$) | Estimate of Average Annual Volume of Sediment Deposited within the Basin ($yd^3$/year) |
|---|---|---|
| 1985 to 1991 | 21,000 | 3,500 |
| 1991 to 1996 | 15,000 | 3,000 |
| 1996 to 2005 | 30,000 | 3,300 |
| | Total = 66,000 | Average = 3,150 |

Table 1 indicates that in most years, approximately 3,000 $yd^3$ of sediment accumulates in the basin. During moderate and extreme floods, delivery may be several times the average or up to 6,000 to 9,000 $yd^3$. Allowing the County to remove up to 3,500 $yd^3$ annually is reasonable; however, if the basin is to continue to operate properly the HPA permit should be modified to allow the County to remove more material following a winter in which floods deliver above average volumes to the basin. If this flexibility is not allowed, the basin will eventually become filled with sediment and the chronic flooding problems will return.

The material that is depositing within the basin is a relatively uniform mixture of coarse sand and gravel. Figure 2 shows four sediment curves that were developed from samples collected by **nhc** within the basin in November 2007. Based on the average of four grain size distributions curves, the sediments are approximately 6% silt and clay (<0.08 mm), 47% sand (0.08 to 2 mm), and 47% gravel (>2 mm). Near the bridge the sediment includes a larger fraction of coarse gravel (50 to 75 mm) (see Photos 1 to 4). The orange grid shown in the photographs is two feet square with six-inch square interior grids. Velocities within the channel upstream from Minkler Road tend to be high enough to transport these larger particles to the bridge; however, they deposit under the bridge and at the head of the sediment basin because velocities slow as the channel expands into the bridge waterway and sediment basin.

## Functioning of the Current System

The sediment basin has two primary functions: 1) to keep the Minkler Road bridge waterway open to reduce flooding and improve public safety; and 2) to limit the supply of sediment delivered to the channel downstream from the basin. If the basin did not exist, an alluvial fan would form downstream from Minkler Road. The apex would be located at the bridge and the sediment would fan out across the neighboring fields. Numerous chronic flooding and erosion problems would develop on the downstream property and the bridge waterway would fill with sediment.

The sediment basin is a critical and essential feature of the existing system because Coal Creek is an efficient conveyor of sediment. As shown by the longitudinal profile in Figure 3, Coal Creek is steep upstream from State Highway 20, but the slope flattens as the stream approaches the highway and Minkler Road. As a result, sediment deposits downstream from the highway. As shown in the aerial photograph in Figure 4, a natural

alluvial fan once existed immediately downstream from the highway crossing. Remnants of the fan and numerous channel scars are visible in the photograph. Evidently, to stop the flooding and erosion problems created by this fan, land owners confined Coal Creek between earthen levees from the highway to Minkler Road. Confining the stream between levees has intensified the energy and now most of the sediment is transported downstream to Minkler Road. As mentioned in the previous paragraph, if the existing sediment basin did not exist or was not maintained, a large alluvial fan similar to the one visible in Figure 4 would form immediately downstream of Minkler Road.

**Existing Hydraulic Characteristics and Sediment Basin Performance**

To examine the hydraulic characteristics of the stream and sediment basin, **nhc** created an HEC-RAS water surface profile computer model. HEC-RAS is a popular computer code that was developed and is maintained by the U.S. Army Corps of Engineers (USCOE 2005). The model allows the user to estimate hydraulic characteristics for a range of discharges or flood events. The geometry of the stream channel and sediment basin is represented in the model by 17 cross sections which were surveyed by **nhc** in November 2007. The location of each cross section is illustrated in Figure 5. To ensure that a model is producing accurate results, the developer will typically attempt to calibrate the model. This involves refining Manning's "n" values, expansion and contraction coefficients, and adjusting ineffective flow areas until the model accurately reproduces an observed flood water surface profile. Unfortunately, no observed high water marks are available for Coal Creek; therefore, model parameters were selected based upon experience, engineering judgment and reference to classical publications (Barnes 1987, Chow 1959). This is typical when no calibration data are available.

The flood events that were examined using the HEC-RAS model are listed in Table 2. No stream gaging records are available for Coal Creek and no useful records exist for neighboring streams; therefore, flood frequency discharges were estimated using published regional regression equations (USGS 1997).

**Table 2. Annual Instantaneous Peak Discharges from USGS Regression Equations**

| Event | Annual Instantaneous Peak Discharge (cfs) |
|---|---|
| 2-year | 110 |
| 10-year | 200 |
| 25-year | 250 |
| 50-year | 300 |
| 100-year | 335 |

The HEC-RAS model was used first to examine the hydraulic characteristics of the existing basin, as represented by the surveys collected by **nhc** in November 2007. The resulting flood profiles are presented in Figure 6. The profiles suggest that the bridge can currently convey the 2- and 10-year floods, but not the larger events. It is likely, however, that sediment will clog the water way during both the 2-year and 10-year floods; thus even these events may create flooding problems. HEC-RAS assumes that the bed of the stream channel is fixed and thus it cannot account for changes in the bridge waterway due to sediment deposition during a flood. Even with this shortcoming, the

model does provide hydraulic data that is useful in evaluating the performance of the basin.

The model reveals that velocities begin to slow significantly at the bridge. As mentioned previously, between Highway 20 and Minkler Road the channel is narrow and is confined between levees. The floor of the channel is approximately 10 ft wide, the toes of the levees are about 18 feet apart and the interior slopes are covered with thick vegetation. Add to this a relatively steep slope of about 2% and you have a channel that is an efficient transporter of sediment. At Minkler Road, the channel widens, velocities slow, and the sediment deposits. The bridge waterway opening is 27 feet wide, but the effective width is about 24 feet because the bridge is skewed about 25 degrees to the channel. Immediately downstream from the bridge, the channel is about 30 ft wide for a short distance then it expands into the basin.

This hydraulic information reveals that sediment will continue to deposit within the bridge waterway and in the channel immediately downstream. Therefore, the current configuration as agreed to with WDFW will not meet the stated objectives and therefore, needs to be modified.

## Recommendations

### Basin Refinements

The recommendations below are to address a better functioning sediment basin so that the frequency of flooding at Minkler Road is reduced and the flood and habitat benefits to the downstream channel are preserved. The proposed modifications, which are described below, are illustrated in Figures 7 and 8.

The key to reducing flooding at Minkler Road is to keep sediment from depositing at or near the bridge. This requires maintaining velocities through the bridge and in the channel immediately downstream. Currently velocities slow significantly in the vicinity of the bridge which causes sediment to deposit. To maintain velocities a new channel needs to be constructed downstream from the bridge and minor modifications are needed at the bridge. As shown in Figure 7, the proposed new channel downstream from the bridge will be approximately 200 feet long. The bottom of the channel will be nominally 15 feet wide, but reduced to an effective width of 10 feet by placing clusters of large wood in key locations. The concept is to create a channel that is narrow enough to keep velocities sufficiently high to transport sediment downstream to the collection area. Using wood to narrow the channel is not ideal for sediment transport because the wood will create turbulence which will reduce energy and thus may slightly reduce sediment transport. However, if the wood is placed correctly, the impact to sediment transport should be relatively minor while the fish habitat benefits will be significant. Figures 9 and 10 illustrate the velocities within the modified channel and basin during the 2-year and 100-year floods. Velocities will remain relatively high within the constructed channel which should transport most sediment downstream to the sediment collection. These figures were created using a two-dimensional computer model that was created using a relatively new software code known as River2D. The code was developed by researchers at the University of Alberta, Canada (U of A 2002).

The bridge waterway needs to be modified slightly to keep sediment from depositing at the bridge. The effective width of the bridge is about 24 ft, or 14 ft wider than the effective width of both the existing upstream channel and the proposed downstream channel. To keep velocities high enough so that sediment moves through the bridge, the effective width of the floor of the waterway needs to be reduced. We propose to do this by placing manufactured cement ecology blocks at each of the four corners of the waterway as shown in Figure 7. Cement blocks were selected because they can be easily installed by setting them on top of the concrete slab that lines the floor of the waterway. They shouldn't require mechanical anchoring and can easily be adjusted if refinements are needed in the future. We suggest placing them to create a 15-ft wide opening which is slightly wider than the 10 foot wide channel upstream and downstream. We do not want to constrict the waterway too far, for it needs to be able to safely pass woody debris. If, over time, sediment transport performance can be improved by narrowing the waterway further, the ecology blocks can be adjusted. We considered using LWD to narrow the waterway, but it would be difficult to anchor and if it breaks loose it could jam under the bridge which could create significant problems.

As shown in Figure 8, the floor of the basin and the channel will need to be lowered 1 to 2 feet from the elevations that were surveyed in November 2007. This must be done to increase the depth of the opening under the bridge, to maintain a channel slope steep enough to keep the sediment moving past the bridge, and to provide adequate storage capacity in the sediment collection area. The existing peninsula access road that currently extends into the basin will need to be removed. Note also that a slope of 0.5% is called for across the floor of the sediment collection area to prevent fish stranding. This is less than the 2% called for in the existing HPA, but should be adequate to prevent fish stranding while providing ample space to store sediment within the collection area. A 2% slope will not.

The existing concrete weir at the downstream end of the basin is critical to the performance of the basin and should not be removed as called for in the existing HPA. As shown in Figure 12, the weir ponds the water upstream in the proposed sediment collection area, reducing velocities and causing sediments to deposit within the intended collection area. If the weir is removed, velocities within the basin will increase and significant sediment will pass through and deposit in the downstream channel. This will eventually create serious flooding problems downstream.

**Maintenance and Monitoring Requirements**

Although the proposed refinements should improve the performance and function of the sediment basin, additional refinements may be needed. We also expect that WDFW will be very interested in the performance of the basin for if it is successful, this application may be appropriate in other locations. Therefore, we recommend that the County closely monitor performance of the facility as follows.

During significant floods a County employee should travel to the site and collect a short video to document hydraulic conditions in the vicinity of the bridge and within the

sediment basin. After the flood recedes the employee should return to the site and video tape the floor of the stream channel and the sediment collection area to document sediment deposition patterns. Each summer, cross sections should be surveyed within the stream channel and basin at monumented locations. The survey information should be used to develop a tailored sediment removal plan to restore the system to the design condition.

The system will likely need minor refinements, thus we encourage the County to retain a river engineer to review the performance of the system for at least two to three years. The engineer would help develop the annual sediment removal plan and would identify refinements. The goal should be to have an efficient system within two or three years.

Immediately following construction we expect a head cut (< two feet) to propagate upstream from Minkler Road. The stream bed sediment in the upstream channel contains relatively high percentage of large gravel stones (2 inch to 3 inch). We expect some of these large particles to deposit within the bridge waterway and in the new channel downstream. Therefore, it may be necessary to remove these sediments during the annual cleaning until the upstream channel has achieved a new equilibrium and the supply of large stones is reduced.

Large floods will occur which will transport and deposit above average quantities of sediment within the basin. If the quantities are exceedingly large it is likely that sediment will deposit within every part of the system. Wherever the deposits are significantly thick, cleaning will be required to return the system to it design condition. Specific cleaning needs will be determined upon review of the monitoring surveys and would have to be coordinated with WDFW. To minimize the potential impact that sediment removal equipment will have on the stream, we suggest establishing a haul road on top of the right bank between the bridge and sediment collection area and on top of the existing embankment that runs along the right bank of the channel between the sediment collection area and the downstream weir. The haul road should be wide enough from which to operate an excavator and run a dump truck.

## Conclusion

Based upon this engineering investigation, it is our belief that with the modifications proposed above it is likely that the performance of the basin can be improved significantly. This will reduce flooding problems at Minkler Road and preserve the flood capacity and habitat quality of the downstream channel. Annual monitoring will be needed to determine if additional refinements are needed.

## References

Barnes, 1987. "Roughness Characteristics of Natural Channels", USGS Water-Supply Paper 1849, Reston, Virginia.

Chow, 1959. "Open-Channel Hydraulics", Chapter 5, McGraw Hill.

USCOE, May 2005, "HEC-RAS River Analysis System – Version 3.1.3", US Army Corps of Engineers Hydrologic Engineering Center, Davis, California.

USGS, 1997. "Magnitude and Frequency of Floods in Washington." U.S. Geological Survey, Water-Resources Investigations Report 97-4277. Tacoma, WA.

U of A, 2002. "River2D, Two-Dimensional Depth Averaged Model of River Hydrodynamics and Fish Habitat." Peter Steffler and Julia Blackburn, University of Alberta, Canada.

# FIGURES


WA Reference Map

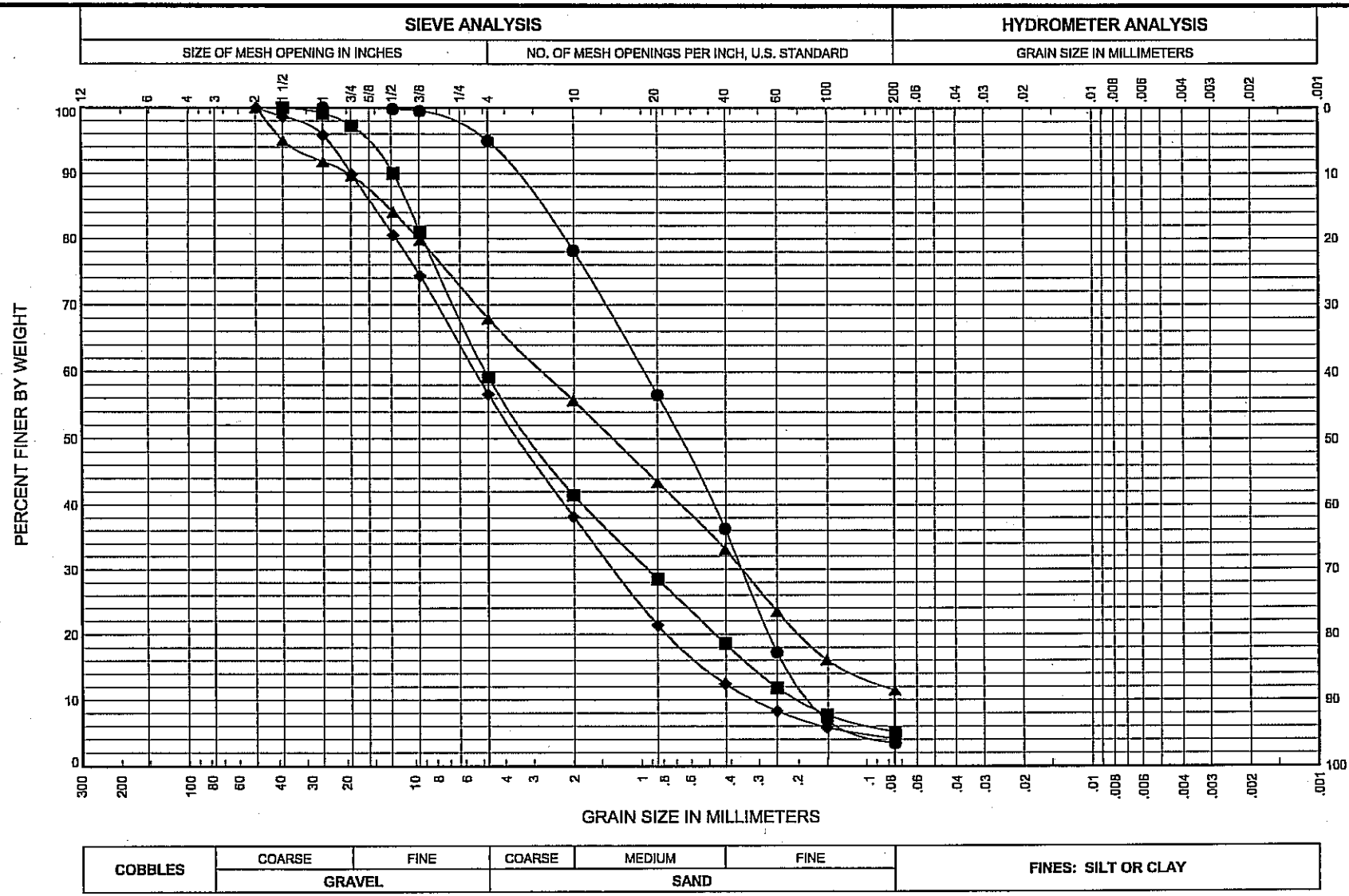


Coal Creek - Skagit County
Location Map

Scale - 1 inch equals 3,000 feet

0 1,500 3,000 6,000 Feet

FIGURE 1




| BORING AND SAMPLE NO. | DEPTH (feet) | U.S.C.S. SYMBOL | SAMPLE DESCRIPTION | FINES % | NAT. W.C. % | LL % | PL % | PI % |
|---|---|---|---|---|---|---|---|---|
| ● Grab 11-8-07, S-1 | 0.0 | SP | Gray, slightly gravelly SAND, trace of silt | 3.4 | 28.6 | | | |
| ■ Grab 11-8-07, S-2 | 0.0 | SP-SM | Gray, slightly silty, gravelly SAND | 5.1 | 11.2 | | | |
| ▲ Grab 11-8-07, S-3 | 0.0 | SP-SM | Gray, slightly silty, gravelly SAND | 11.5 | 8.3 | | | |
| ◆ Grab 11-8-07, S-4 | 0.0 | SW | Gray, gravelly SAND, trace of silt | 4.1 | 4.3 | | | |

All samples were collected within the existing Coal Creek sediment basin

Northwest Hydraulic Consultants
Coal Creek
Skagit County, Washington

**GRAIN SIZE DISTRIBUTION**

November 2007 21-1-08824-031

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. FINAL

Figure 2. Coal Creek Sediment Basin –Grain Size Distribution Curves

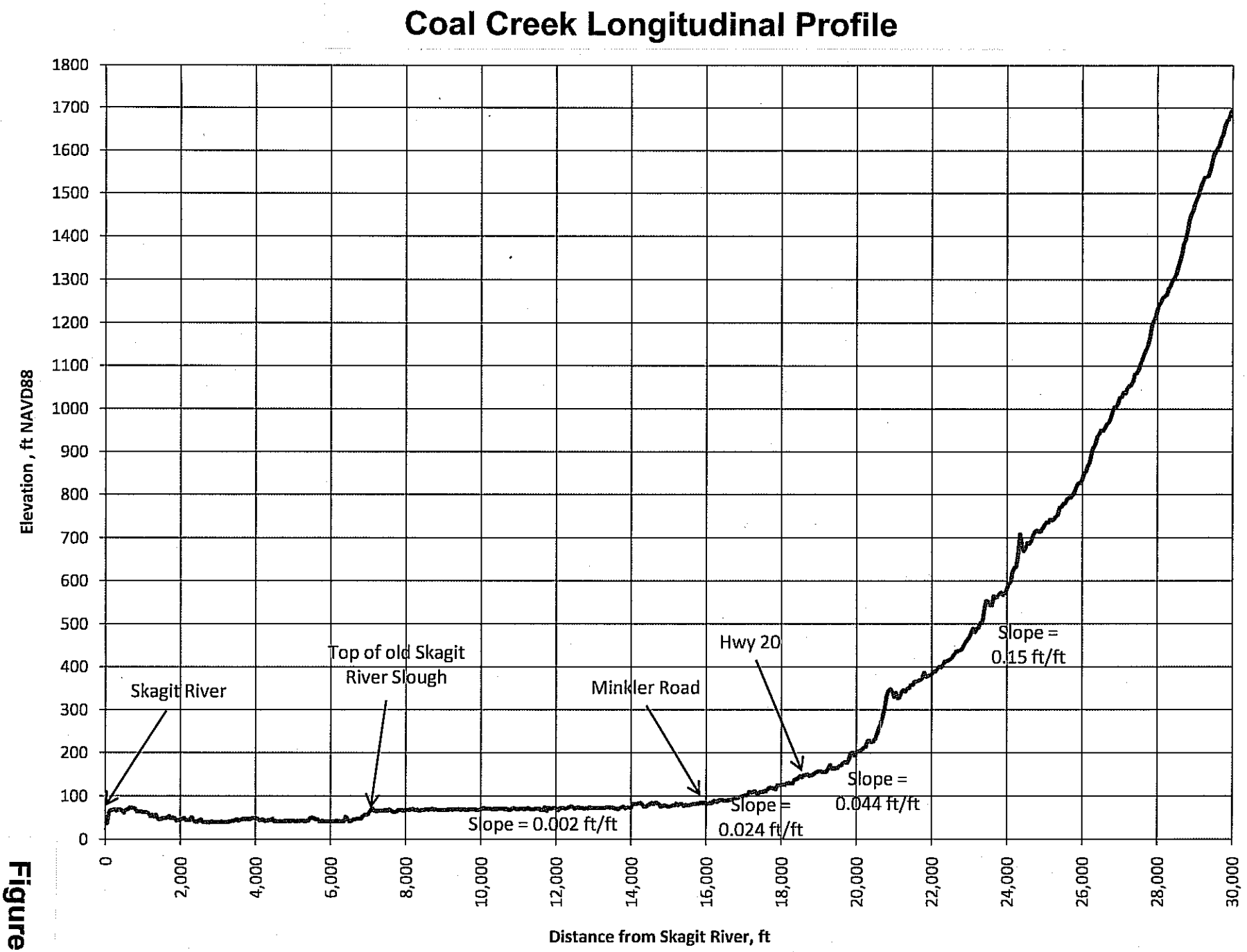

Coal Creek Longitudinal Profile
Elevation , ft NAVD88
1800
1700
1600
1500
1400
1300
1200
1100
1000
900
800
700
600
500
400
300
200
100
0
0
2,000
4,000
6,000
8,000
10,000
12,000
14,000
16,000
18,000
20,000
22,000
24,000
26,000
28,000
30,000
Distance from Skagit River, ft
Skagit River
Top of old Skagit River Slough
Minkler Road
Hwy 20
Slope = 0.002 ft/ft
Slope = 0.024 ft/ft
Slope = 0.044 ft/ft
Slope = 0.15 ft/ft

Figure 3

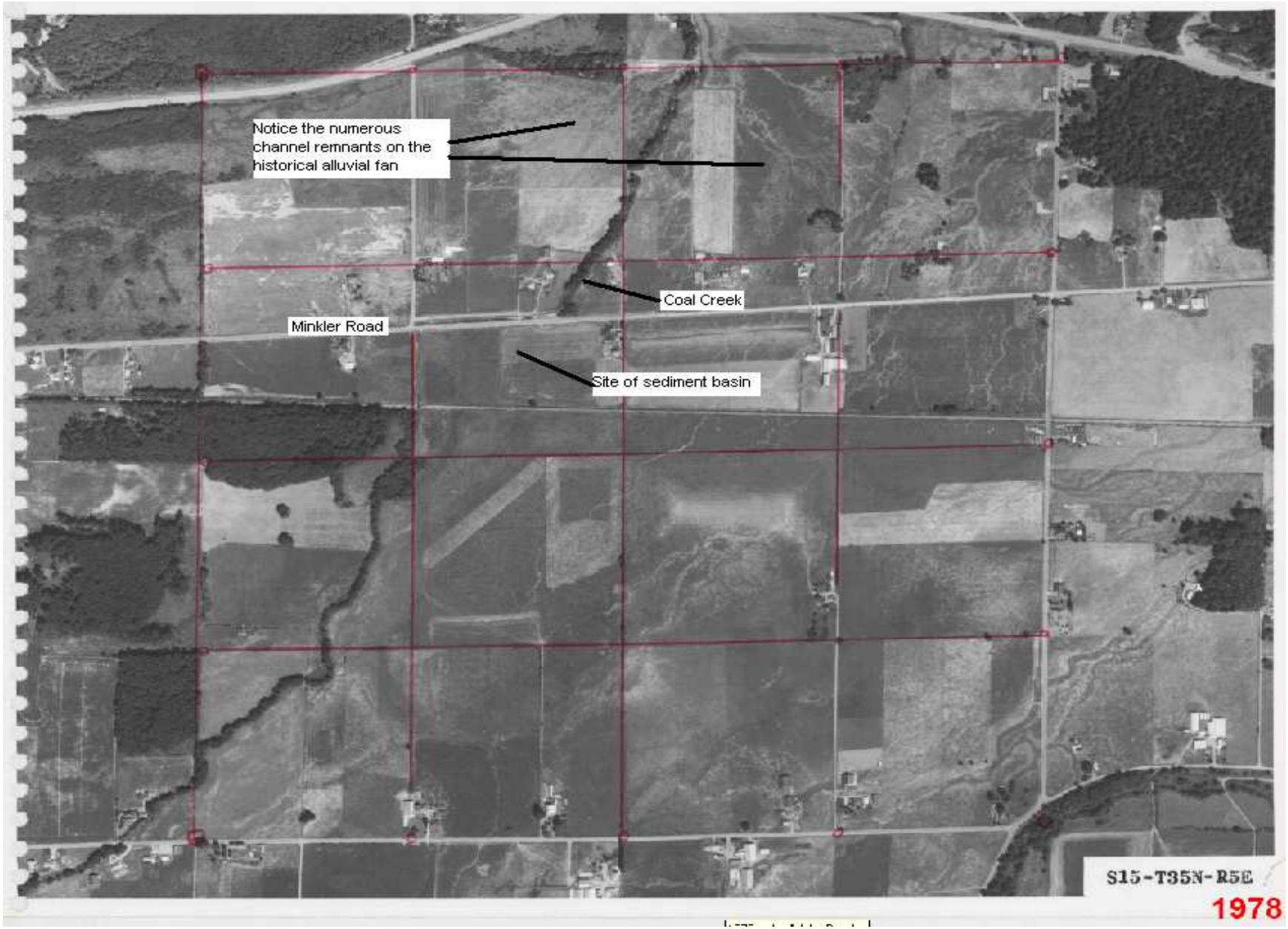
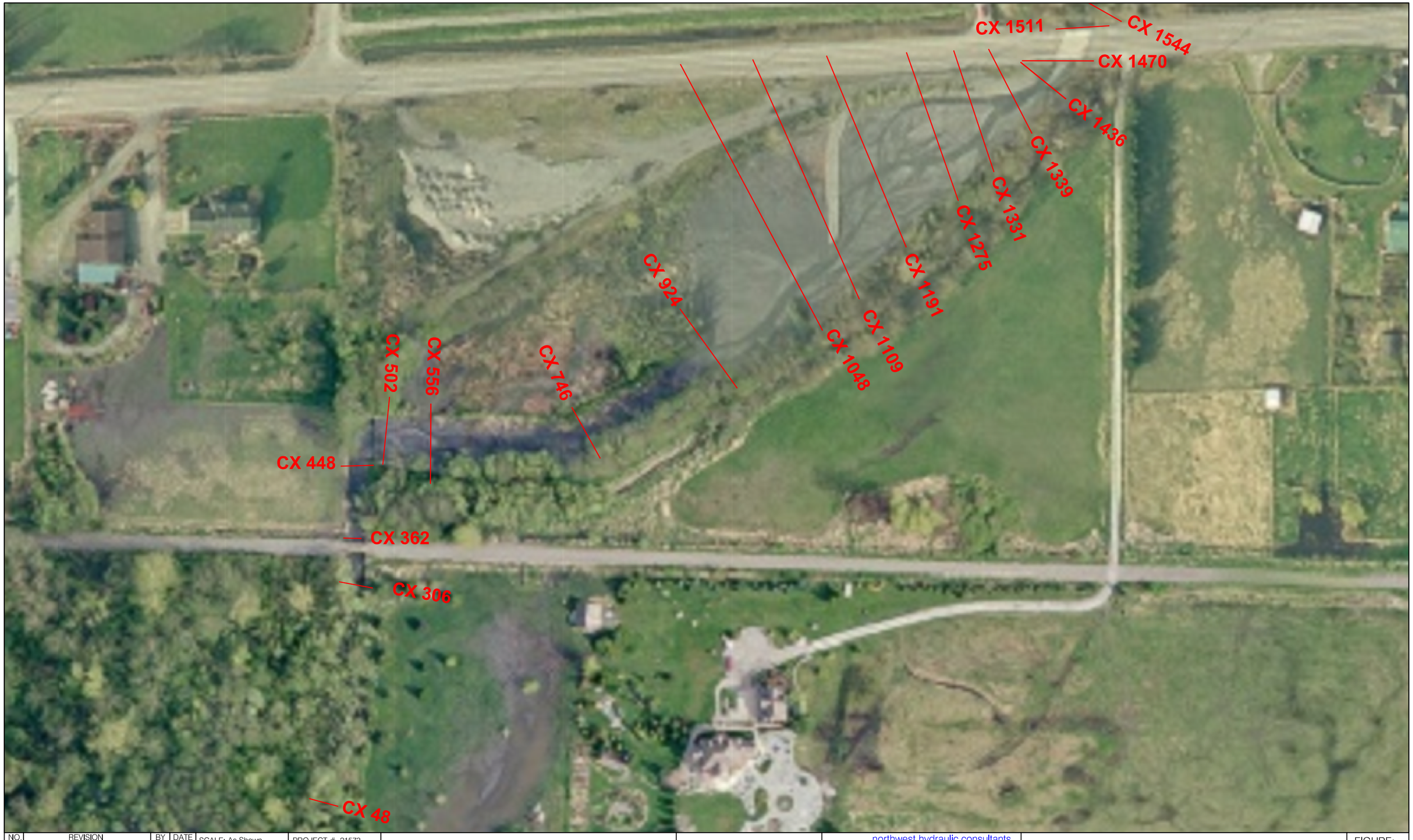



**Figure 4. Remnants of an Historical Alluvial Fan Upstream from Minkler Road. (1978 County Aerial Photograph).**

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Coal Creek - Skagit County
HEC-RAS Cross-Section Locations

FIGURE: 5

## HEC-RAS Flood Profiles, Existing Conditions

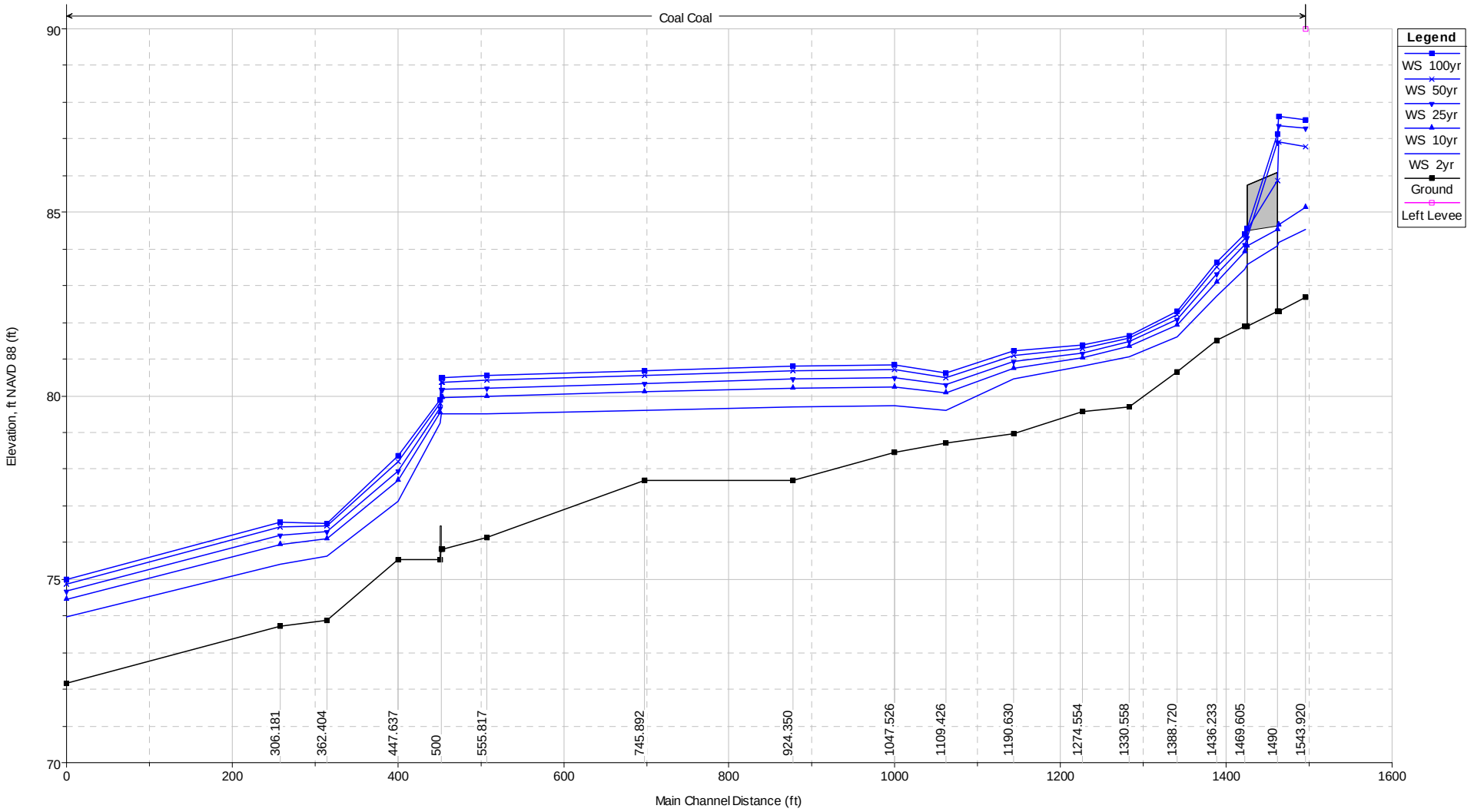
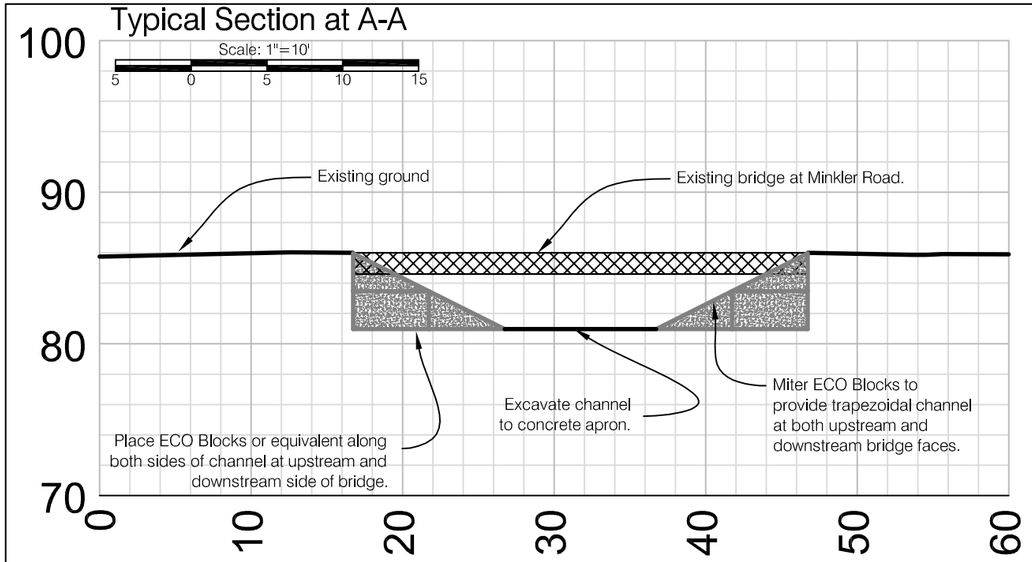
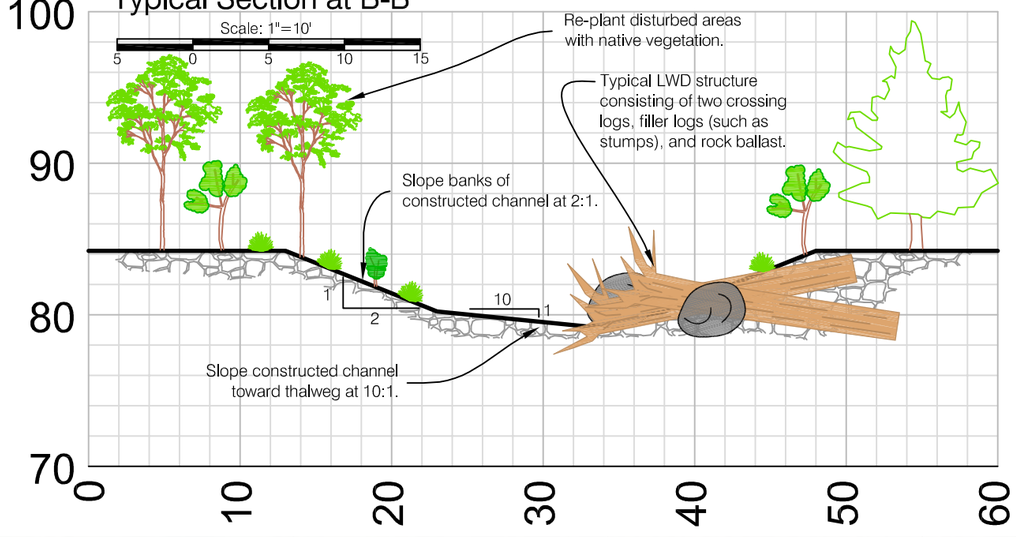


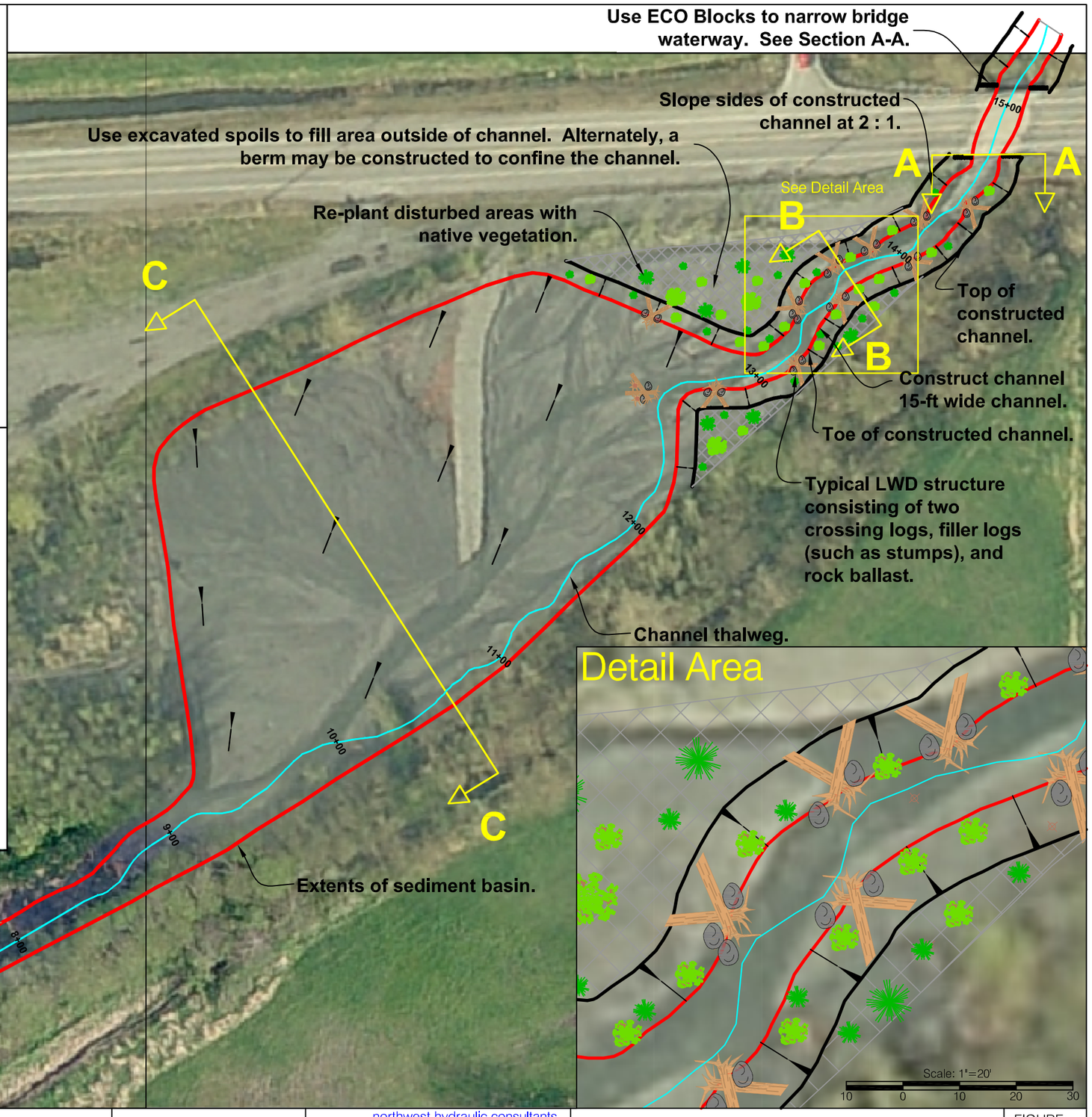

FIGURE 6

## Typical Section at A-A




## Typical Section at B-B







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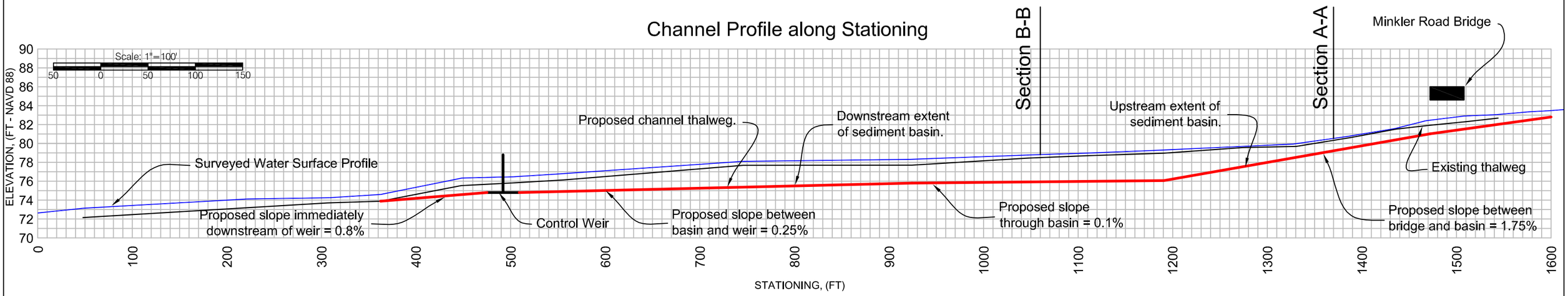
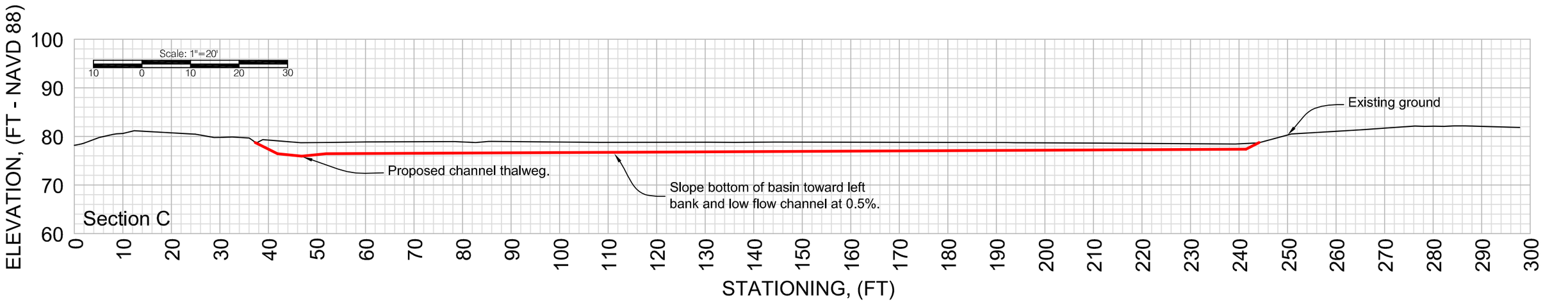
Coal Creek - Skagit County
Proposed Basin Modifications Plan

FIGURE: 7




# Section C-C

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Coal Creek - Skagit County
Proposed Basin Profile and Cross-Section

FIGURE: 8

**Proposed Coal Creek Sediment Basin – River2D Velocity Distribution for 2-Year Flood**

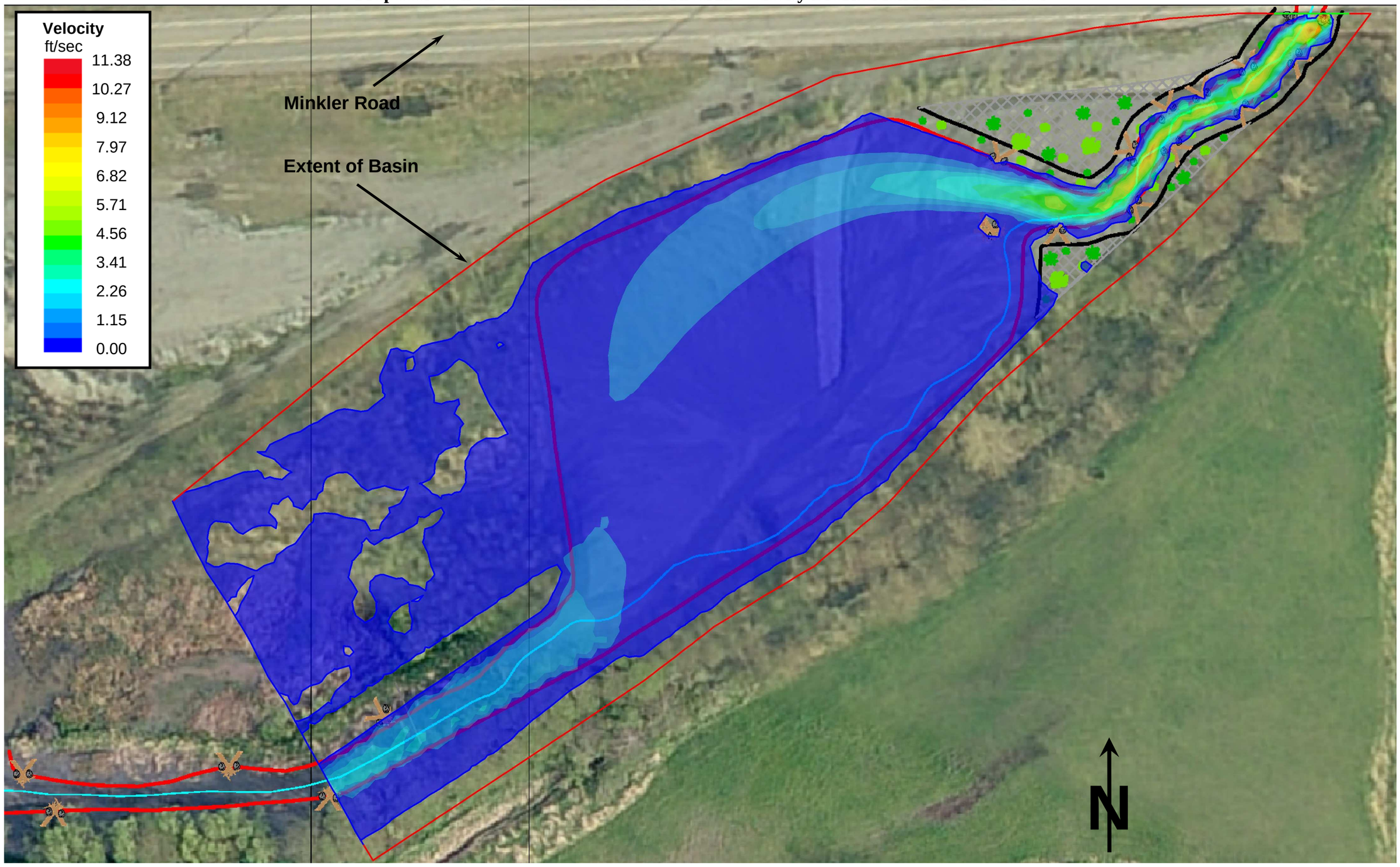



**FIGURE 9**

**Proposed Coal Creek Sediment Basin – River2D Velocity Distribution for 100-Year Flood**

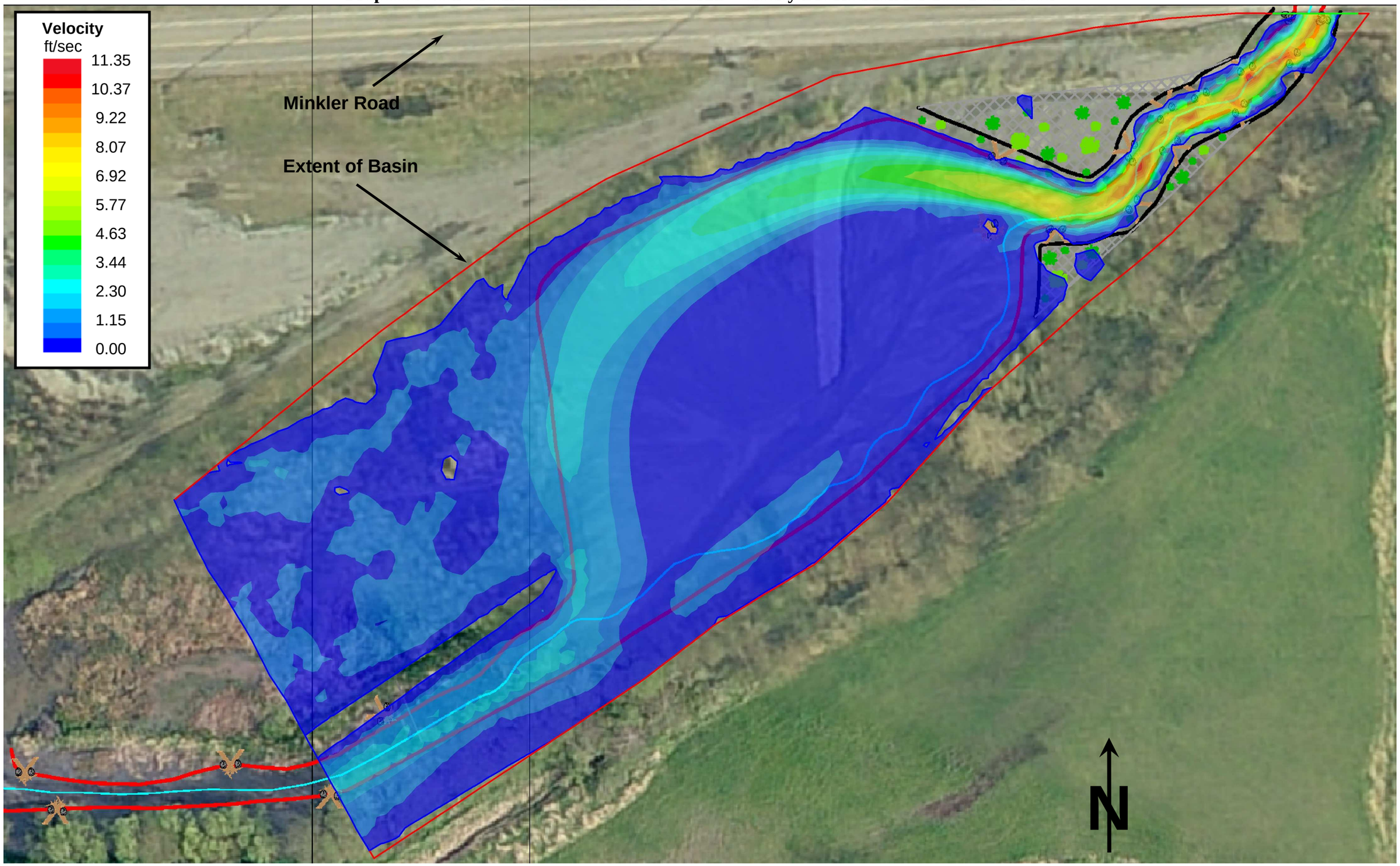



**FIGURE 10**

# HEC-RAS Flood Profiles, Proposed Conditions

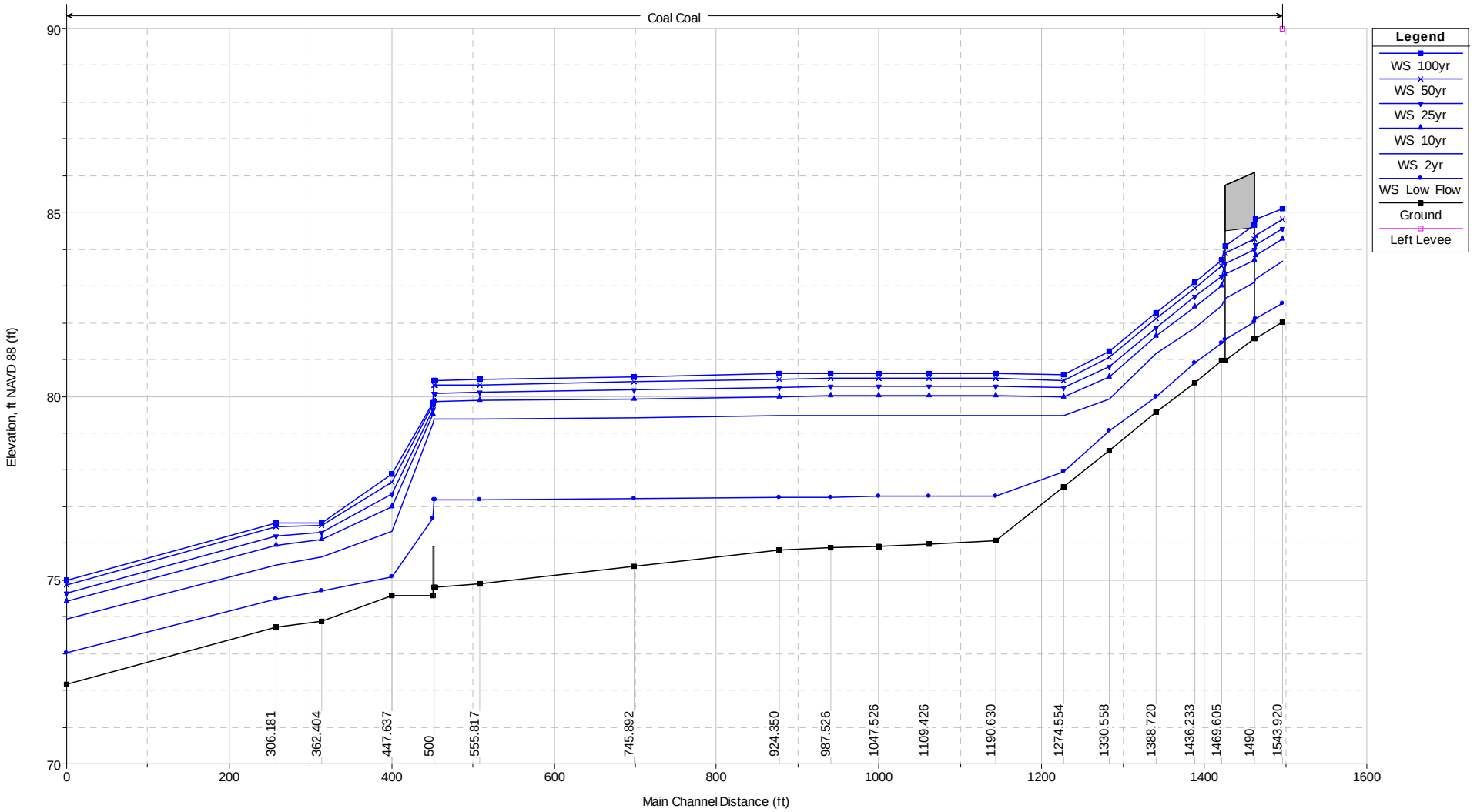



FIGURE 11

# PHOTOS

Photo 1. Viewing upstream to Minkler Road bridge from within the sediment basin (May 2007).

Photo 2. Viewing upstream within the sediment basin (May 2007).

Photo 3. Bed surface material in just downstream from the Minkler Road bridge. (The frame is 2 ft X 2 ft with 6 in X 6 in. grids) (November 2007)

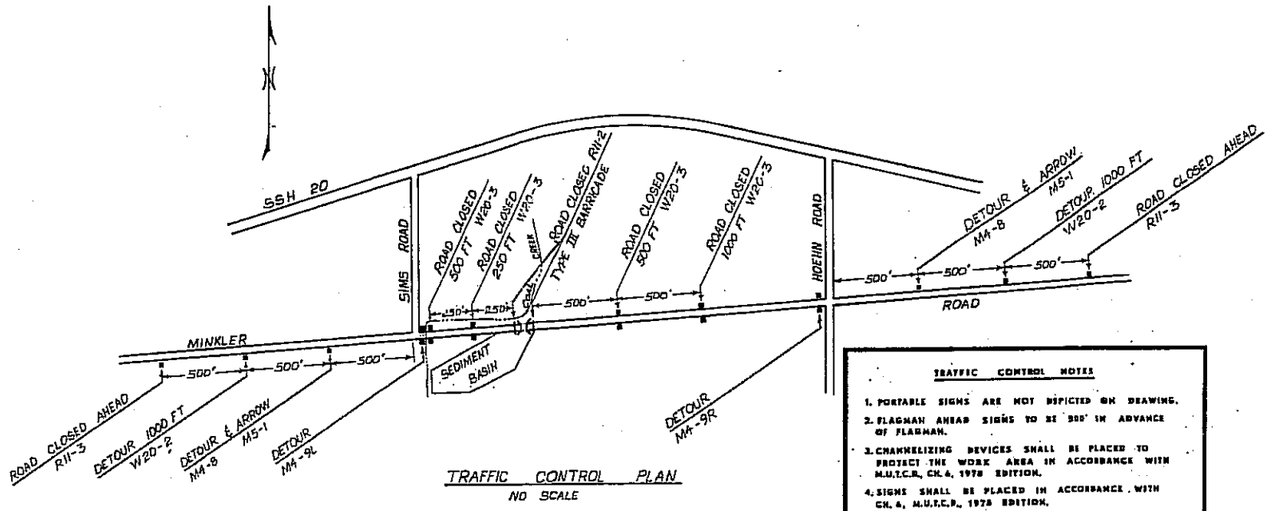
Photo 4. Typical material that covers the floor of the sediment basin. This is typical of the material represented by the grain size distribution curves shown in Figure 2 (November 2007).

# EXHIBITS

# MINKLER ROAD BRIDGE NO. 40159
# & SEDIMENT BASIN

STANDARD SYMBOLS

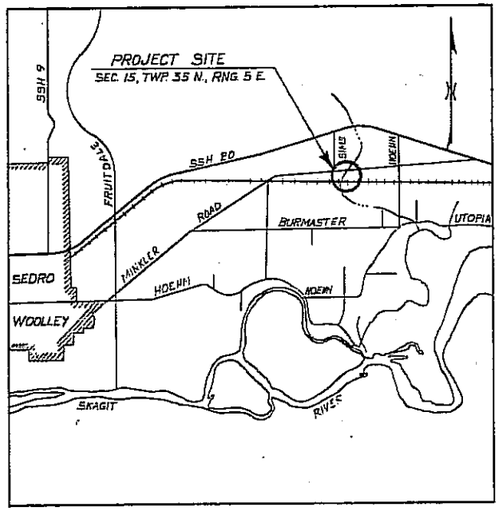
- SECTION LINE
- 1/4 SECTION LINE
- 1/16 SECTION LINE
- PROPERTY LINE
- EXISTING R/W LINE
- PROPOSED R/W LINE
- ROAD CENTERLINE
- EDGE OF TRAVELLED WAY
- MATCH LINE (MATCH TO SHEET Y)
- FENCE
- EXISTING GUARDRAIL
- PROPOSED GUARDRAIL
- CULVERT
- GAS LINE
- WATER LINE
- SANITARY SEWER
- STORM DRAINAGE
- BURIED TELEPHONE
- TELEPHONE PEDESTAL
- POWER POLE
- TELEPHONE POLE
- ANCHOR
- WATER METER
- VALVE (DESIGNATE TYPE)
- CATCH BASIN
- SHRUBBERY
- HEDGE



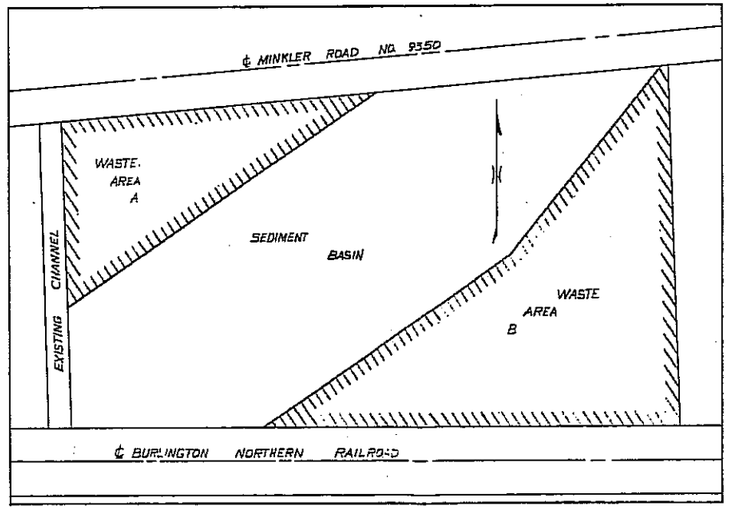

TRAFFIC CONTROL PLAN
NO SCALE

TRAFFIC CONTROL NOTES

1. PORTABLE SIGNS ARE NOT DEPICTED ON DRAWING.
2. FLAGMAN AHEAD SIGNS TO BE 500' IN ADVANCE OF FLAGMAN.
3. CHANNELIZING DEVICES SHALL BE PLACED TO PROTECT THE WORK AREA IN ACCORDANCE WITH M.U.T.C.D., CH. 6, 1978 EDITION.
4. SIGNS SHALL BE PLACED IN ACCORDANCE WITH CH. 6, M.U.T.C.D., 1978 EDITION.
5. FLAGMEN, BARRICADES, AND SIGNS SHALL CONFORM TO 1-07.23(2) OF THE STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, 1980 EDITION.


VICINITY MAP
SCALE: 1¼" = 1 MILE




WASTE SITE PLAN
SCALE: 1" = 100'

INDEX



8-28-84
CHAIRMAN, BOARD OF COMMISSIONERS DATE

W. EUGENE SAMPLES STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER

8/27/84
DIRECTOR OF PUBLIC WORKS DATE

MICROFILMED

| date | distribution | no. |
|---|---|---|
| | | |

SKAGIT COUNTY
PUBLIC WORKS
P.O. BOX 339, MT. VERNON, WA.

TRAFFIC SAFETY ENGINEER DATE 9/5/84

DESIGNED BY ____ date
DRAWN BY DTS 8-30-84 date
C.R.P. 9350-4
CHECKED BY ____ date
SCALE AS SHOWN
ROAD NO. 9350
BRIDGE NO. 40159

| no. | date | by | description of revisions |
|---|---|---|---|
| | | | |

SHEET DESCRIPTION TITLE SHEET, INDEX, VICINITY MAP, WASTE SITE PLAN, TRAFFIC CONTROL PLAN

PROJECT MINKLER ROAD BRIDGE NO. 40159 & SEDIMENT BASIN

SHT. 1 OF 6
1

#1984003

EXHIBIT A

## SUMMARY OF QUANTITIES

| ITEM NO. | TOTAL QUANTITIES | UNIT | ITEM | GROUP 1 ROADWAY | GROUP 2 BASIN |
|---|---|---|---|---|---|
| 1 | LUMP SUM | L.S. | MOBILIZATION | 0.50 | 0.50 |
| 2 | LUMP SUM | L.S. | CLEARING AND GRUBBING | 1.00 | |
| 3 | 13745 | C.Y. | EXCAVATION INCL. HAUL | 700 C.Y. | 13045 C.Y. |
| 4 | 200 | C.Y. | ARMOR ROCK RIPRAP (NORTH SIDE ROAD ONLY) | 200 C.Y. | |
| 5 | 580 | C.Y. | LIGHT LOOSE RIPRAP | | 580 C.Y. |
| 6 | 35 | L.F. | SCHEDULE A CULVERT PIPE, 18" DIA. | 35 L.F. | |
| 7 | 90 | L.F. | PLAIN STEEL CULVERT PIPE, 0.109" THICK (12 GA.), 48" DIA. | 90 L.F. | |
| 8 | 24 | L.F. | CLASS II REINFORCED CONCRETE CULVERT PIPE, 48" DIA. | 24 L.F. | |
| 9 | LUMP SUM | L.S. | DESIGN AND CONSTRUCT COAL CREEK BRIDGE NO. 40159 | 1.00 | |
| 10 | LUMP SUM | L.S. | OUTFALL STRUCTURE | | 1.00 |
| 11 | 1360 | C.Y. | GRAVEL BASE CLASS 'A' | 1360 C.Y. | |
| 12 | 235 | C.Y. | CRUSHED SURFACING TOP COURSE INCL. HAUL | 235 C.Y. | |
| 13 | 451 | TON | ASPHALT CONCRETE PAVEMENT, CLASS 'B', INCL. PAVING ASPHALT | 451 TONS | |
| 14 | 1.1 | ACRE | SEEDING (DIKE SLOPES ONLY) | | 1.1 AC. |
| 15 | 200 | L.F. | BEAM GUARD RAIL, TYPE I, INCL. END SECTIONS | 200 L.F. | |
| 16 | 4 | EACH | BEAM GUARD RAIL ANCHOR, TYPE I | 4 EACH | |
| 17 | LUMP SUM | L.S. | SIGNING AND TRAFFIC CONTROL | 1.00 | |
| 18 | LUMP SUM | L.S. | TRIMMING AND CLEAN UP | 0.50 | 0.50 |



| date | distribution | no. |
|---|---|---|
| | | |

**SKAGIT COUNTY**

PUBLIC WORKS
P.O. BOX 336, MT. VERNON, WA.

DIRECTOR OF PUBLIC WORKS — DATE 6/15/84

DESIGNED BY ____ date
DRAWN BY DJS 5-4-84 date
C.R.P. 9350-4
CHECKED BY RWL date
SCALE NO SCALE
ROAD NO. 9350
BRIDGE NO. 40159

| no | date | by | description of revisions |
|---|---|---|---|
| | | | |

SHEET DESCRIPTION
**SUMMARY OF QUANTITIES**

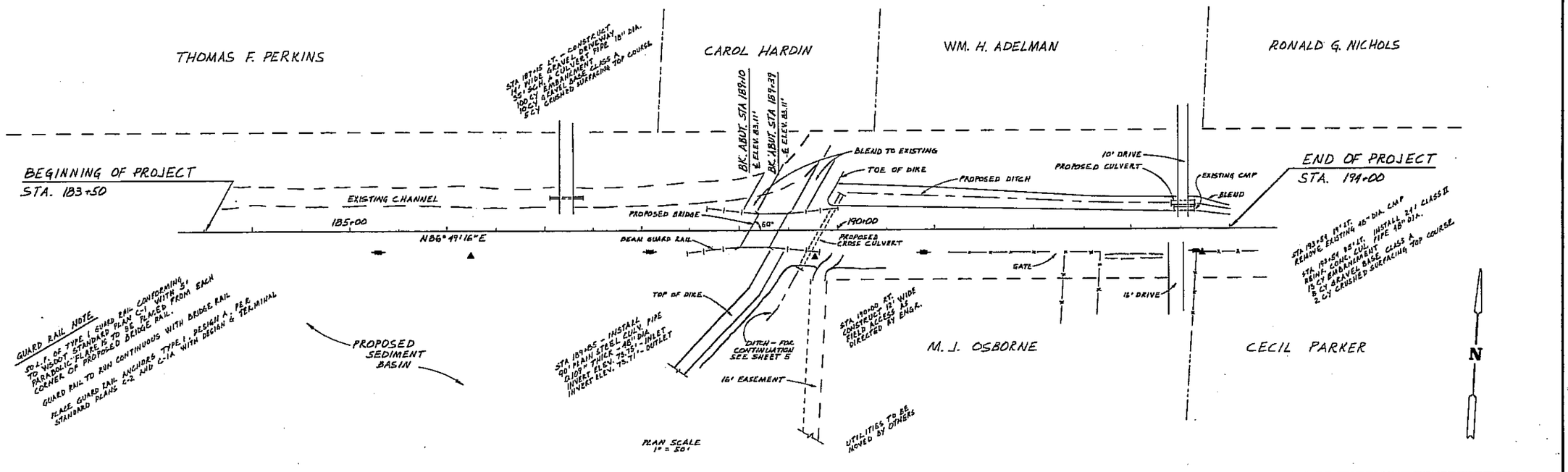
PROJECT **MINKLER ROAD BRIDGE NO. 40159 & SEDIMENT BASIN**

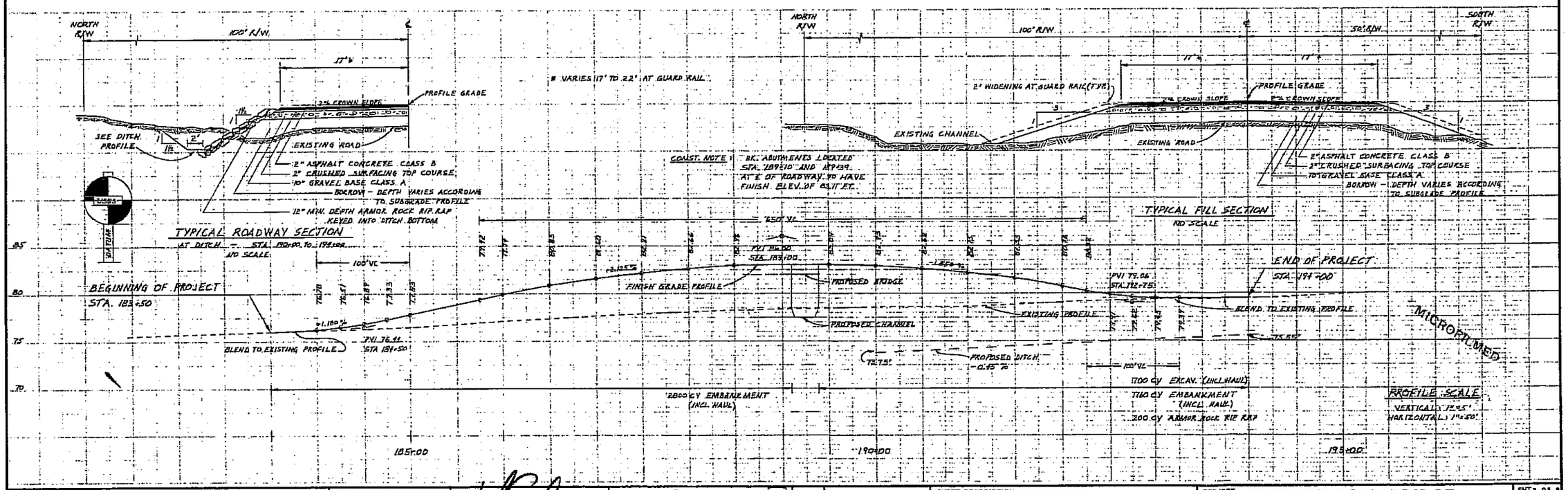
SHT 2 OF 8
**2**

#1984003/1-A

EXHIBIT A

# SEC. 15, T. 35N., R. 5E., W.M.



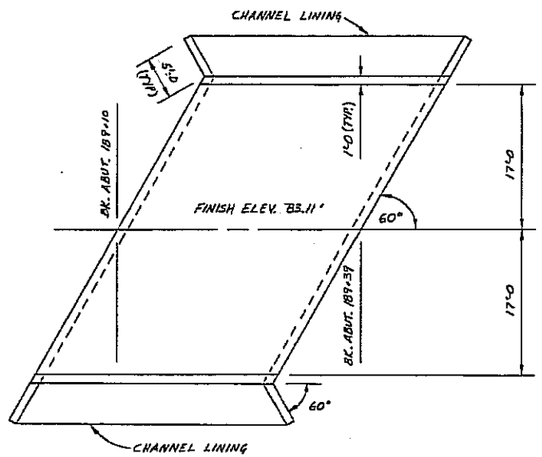




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| date / distribution / no. | SKAGIT COUNTY | PUBLIC WORKS P.O. BOX 396, MT. VERNON, WA. | DIRECTOR OF PUBLIC WORKS / DATE | DESIGNED BY MRK 6-84 / CHECKED BY KW<br>DRAWN BY MSW 6-84 / SCALE AS NOTED<br>C.R.P. 9250-4 ROAD NO. 9250 | no. date by description of revisions | SHEET DESCRIPTION: MINKLER RD. PLAN AND PROFILE | PROJECT: MINKLER ROAD BRIDGE NO. 40159 & SEDIMENT BASIN / SHT. 3 OF 9 — 3 |

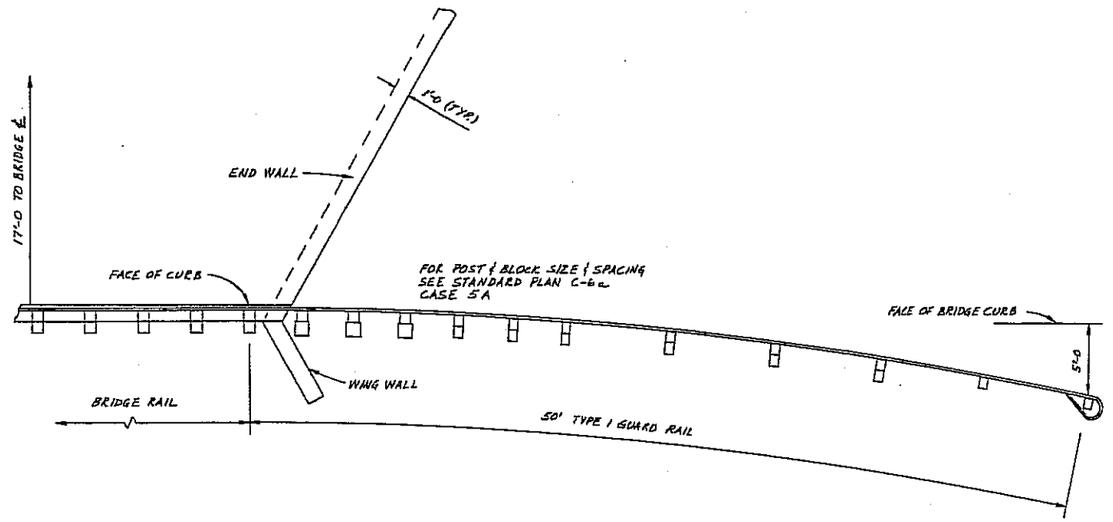
A1984003I-B



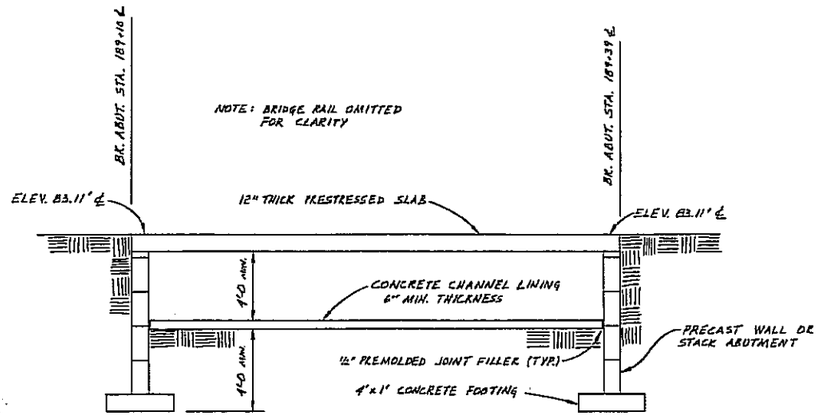
EXHIBIT A



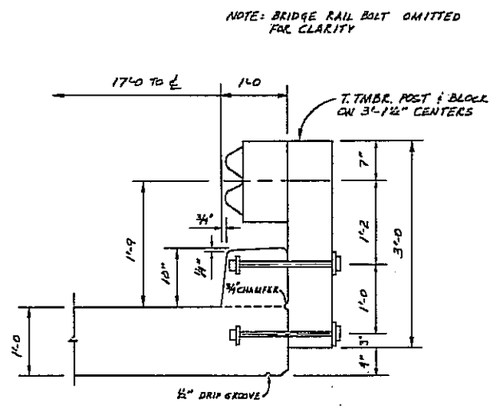

PLAN VIEW
SCALE: 3/8"=1'-0




TYPICAL RAIL LAYOUT
SCALE: 1/4"=1'-0




PROFILE VIEW
SCALE: 1/4"=1'-0




SECTION THRU CURB & RAILING
SCALE: 1"=1'-0

## GENERAL NOTES - BRIDGE

1. BRIDGE DESIGN SHALL CONFORM TO THE LATEST EDITION OF THE STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES AS ADOPTED BY THE AMERICAN ASSOC. OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS.
2. DESIGN LOADING : AASHTO HS-20-44
3. ALL MATERIALS SHALL CONFORM TO WSDOT STANDARD SPECS. FOR ROAD AND BRIDGE CONST. 1980 EDITION
4. REINFORCING STEEL :
   TOP REBAR MAT TO DECK SURFACE - 2" CLEAR
   TOP MAT REINF. SHALL BE EPOXY COATED
5. CONCRETE :
   CAST-IN-PLACE FOOTINGS, WING WALLS, CHANNEL LINING (CONCRETE AGAINST EARTH) : CLASS 'B'
   ALL OTHER CAST-IN-PLACE CONCRETE : CLASS AX



| date | distribution | no. |
|---|---|---|
| | | |

**SKAGIT COUNTY**

PUBLIC WORKS
RD. BOX 336, MT. VERNON, WA.

DIRECTOR OF PUBLIC WORKS — DATE 4/14/84

DESIGNED BY CGC 6-84 (date) | CHECKED BY (date)
DRAWN BY MSW 8-84 (date) | SCALE : AS NOTED
C.R.P. 9350-1 | BRIDGE NO. 40159

| no. | date by | description of revisions |
|---|---|---|
| | | |

SHEET DESCRIPTION
**MINKLER ROAD BRIDGE NO. 40159**
**PLAN AND PROFILE**

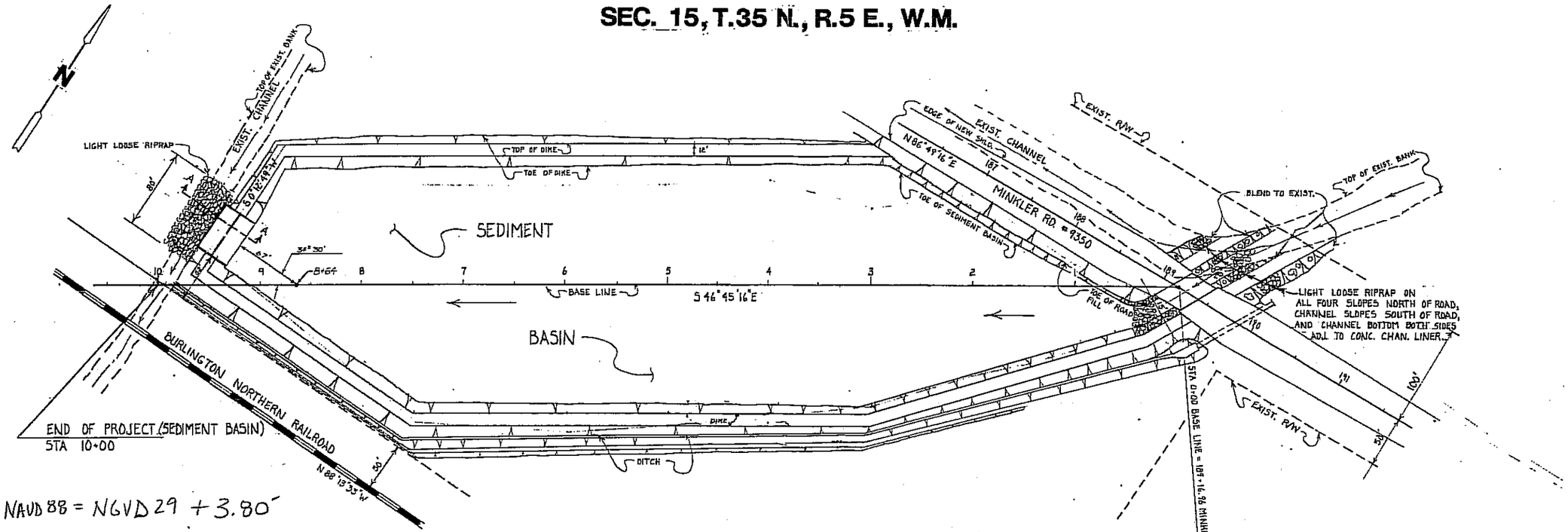
PROJECT
**MINKLER ROAD BRIDGE**
**NO. 40159 & SEDIMENT BASIN**

SHT. 4 OF 4
**4**

#9840031-C

EXHIBIT A

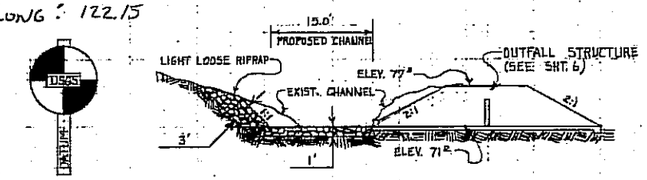
# SEC. 15, T.35 N., R.5 E., W.M.



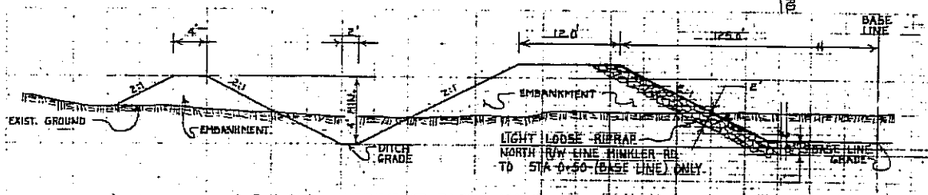

NAVD 88 = NGVD 29 + 3.80'

LAT : 48.52

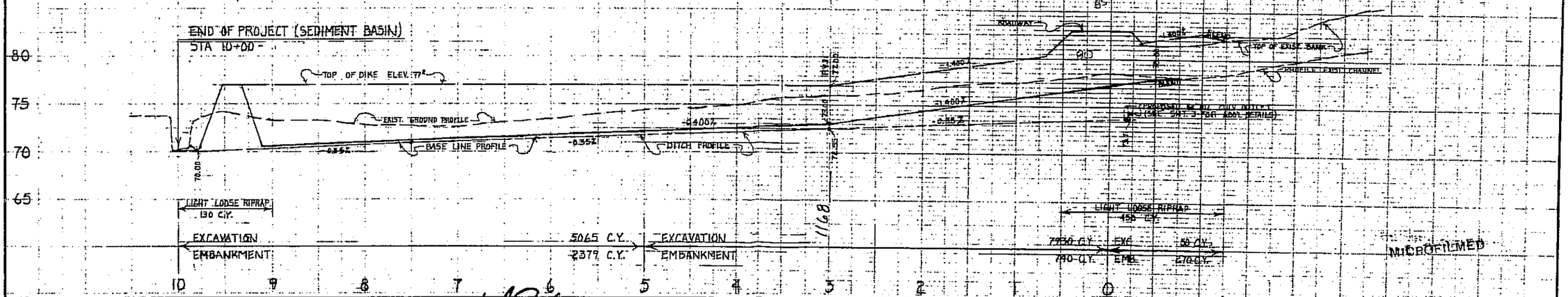
LONG : 122.15




SECTION A-A
NOT TO SCALE




TYPICAL SEDIMENT BASIN HALF SECTION
NOT TO SCALE




| | | | | | | | |
|---|---|---|---|---|---|---|---|
| date distribution no. | SKAGIT COUNTY | PUBLIC WORKS RD. BOX 336, MT. VERNON, WA. | DIRECTOR OF PUBLIC WORKS' DATE 6/15/84 | DESIGNED BY D.E.N. 3/84 CHECKED BY date<br>DRAWN BY M.R.K. 5/84 SCALE 1"=50'<br>C.R.R. 9350-4 ROAD BRIDGE NO. 9350 | no date by description of revisions | SHEET DESCRIPTION COAL CREEK SEDIMENT BASIN | PROJECT MINKLER ROAD BRIDGE NO. 40159 & SEDIMENT BASIN | SHT. 5 OF 6 5 |

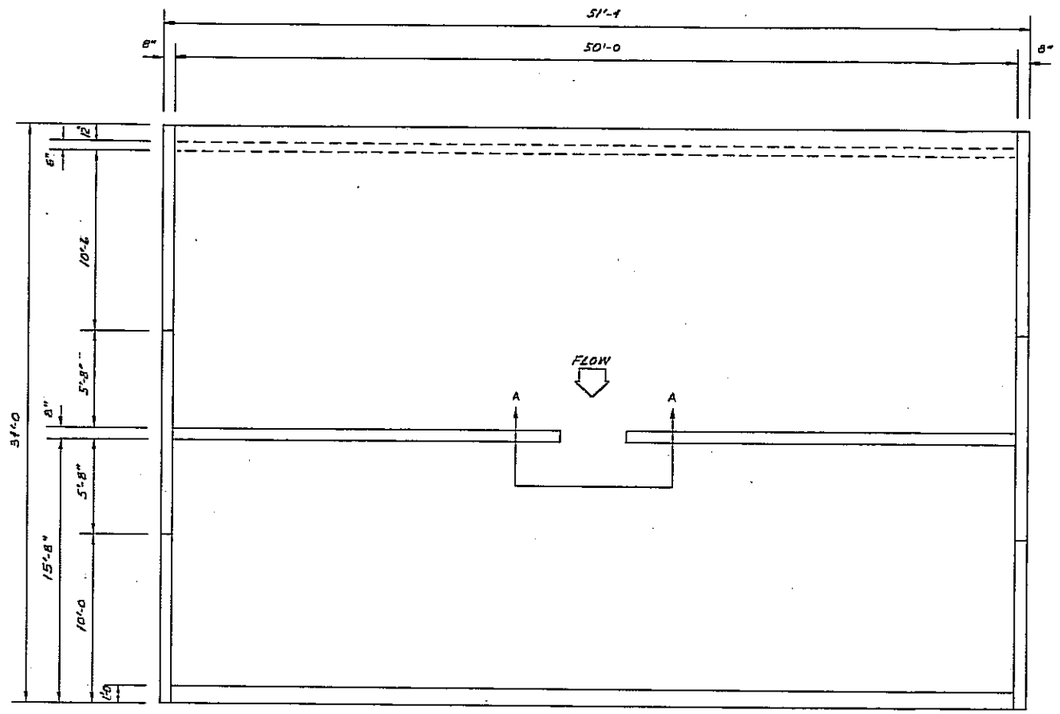
#)9847003,-0

MICROFILMED

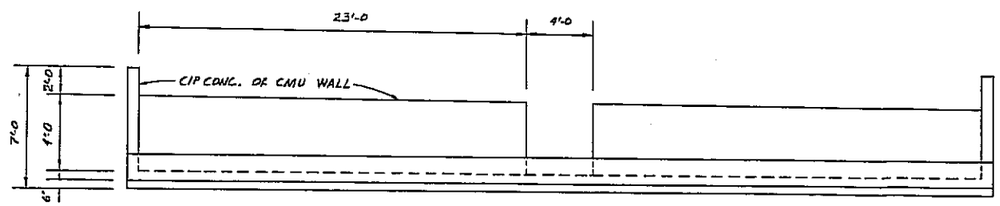
EXHIBIT A

## GENERAL NOTES - OUTFALL STRUCTURE

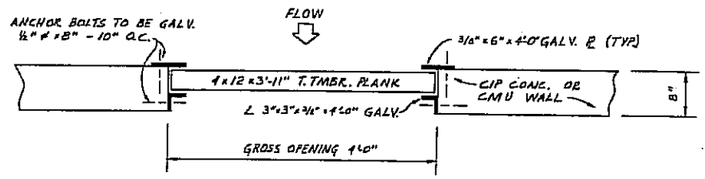
1. ALL C-I-P CONCRETE SHALL BE CLASS B
2. ALL REINFORCING BARS SHALL CONFORM TO ASTM SPEC. A-615-68, GRADE 40
3. WEIR AND END WALLS SHALL BE C-I-P CONCRETE OR CMU, FULL CONC. BLOCK, AT CONTRACTORS OPTION
4. CMU:
   ALL CONC. MASONRY UNITS TO BE FULL CONC. BLOCK
   ALL CELLS TO BE FILLED WITH PEA GRAVEL GROUT
5. REINFORCING BARS:
   SLAB - #4 BARS AT 24" EA. WAY
   WALLS - VERT.: #4 BARS AT 12"
   2 - #4 BARS AT END OF WALLS
   HORIZ.: 2 - #4 BARS AT TOP OF WALLS AND AT MID HEIGHT FOR WALL OVER 4'-0
   BOND BEAM FOR CMU
6. METALS - ALL ANGLES, PLATES AND ANCHOR BOLTS SHALL BE HOT-DIPPED GALVANIZED
7. CONTRACTOR SHALL PROVIDE 4 T. TMBR. PLANKS FOR LOW FLOW NOTCH



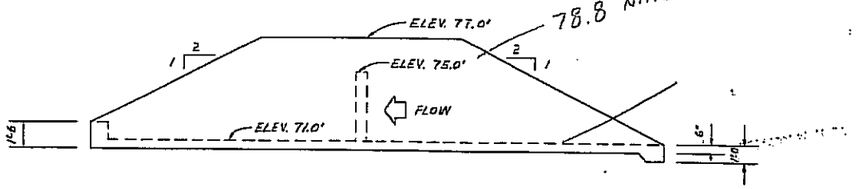

TOP VIEW
SCALE: 1/4"=1'-0




FRONT VIEW
SCALE: 1/4"=1'-0




A-A SECTION THROUGH LOW FLOW NOTCH
SCALE: 1"=1'-0"



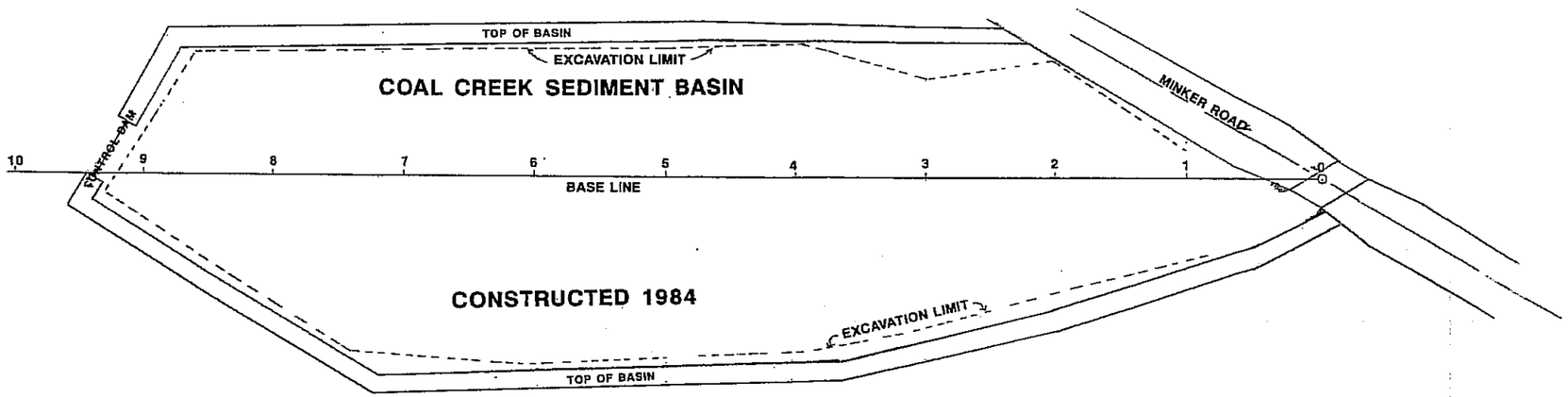

SIDE VIEW
SCALE: 1/4"=1'-0"

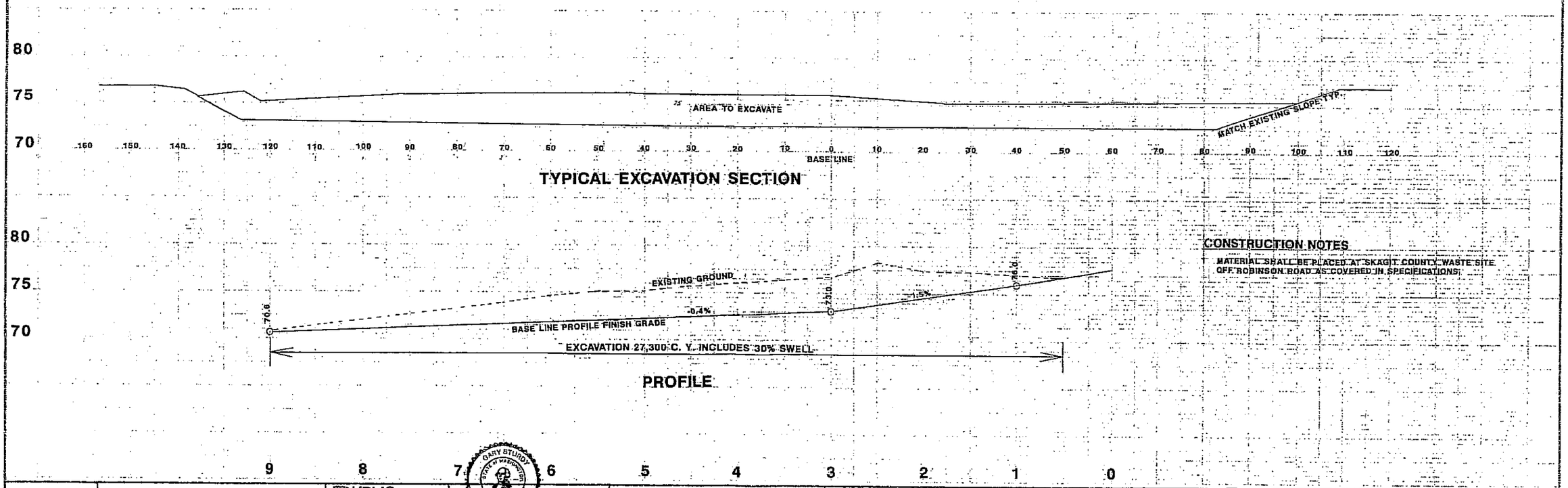
MICROFILMED

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| date distribution no. | SKAGIT COUNTY | PUBLIC WORKS P.O. BOX 366, MT. VERNON, WA. | DIRECTOR OF PUBLIC WORKS DATE 8/10/84 | DESIGNED BY FN 8-84 date<br>DRAWN BY MSW 8-84 date<br>C.R.P. 93572-4 | CHECKED BY RWB date<br>SCALE AS SHOWN<br>ROAD NO. 9250<br>BRIDGE NO. 40159 | no. date by description of revisions | SHEET DESCRIPTION: OUTFALL STRUCTURE DETAILS | PROJECT: MINKLER ROAD BRIDGE NO. 40159 & SEDIMENT BASIN | SHT. 6 OF 6 |

#19840031-6

EXHIBIT A



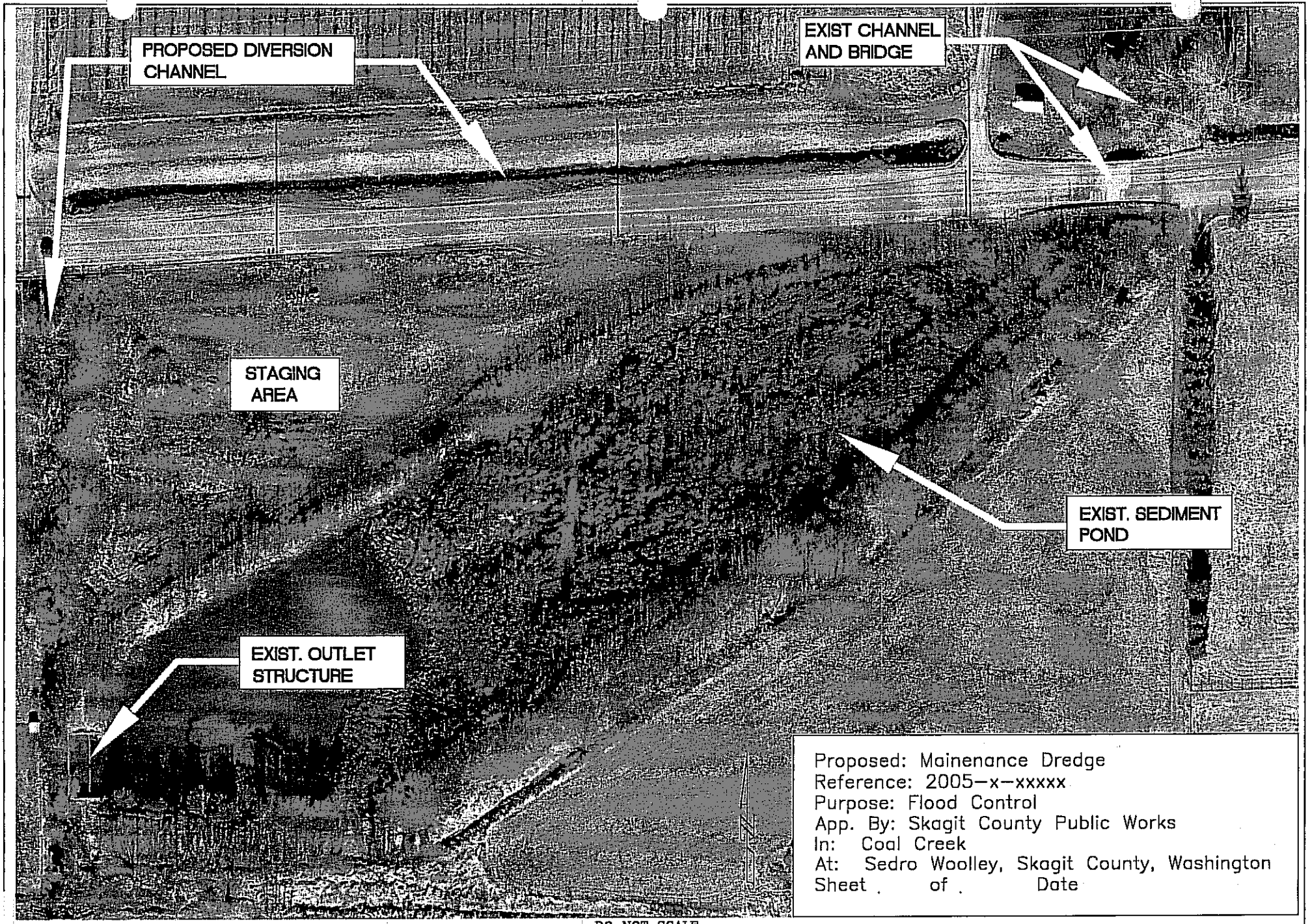

**CONSTRUCTION NOTES**

MATERIAL SHALL BE PLACED AT SKAGIT COUNTY WASTE SITE OFF ROBINSON ROAD AS COVERED IN SPECIFICATIONS.

| | | | | | | |
|---|---|---|---|---|---|---|
| date / distribution / no. | SKAGIT COUNTY PUBLIC WORKS P.O. BOX 339, MT. VERNON, WA. | GARY STUDY STATE OF WASHINGTON REGISTERED PROFESSIONAL ENGINEER — COUNTY ENGINEER DATE | DESIGNED BY [illegible] 4/3/91 CHECKED BY ____ date<br>DRAWN BY [illegible] 4/3/91 SCALE 1" = 50'<br>C.R.P. 117-2 ROAD BRIDGE NO. ____ | no. date by description of revisions | SHEET DESCRIPTION: PLAN AND PROFILE | PROJECT: COAL CREEK SEDIMENT BASIN CLEANING PROJECT | SHT. 1 OF 1 |

MINKLER ROAD NO. 9350

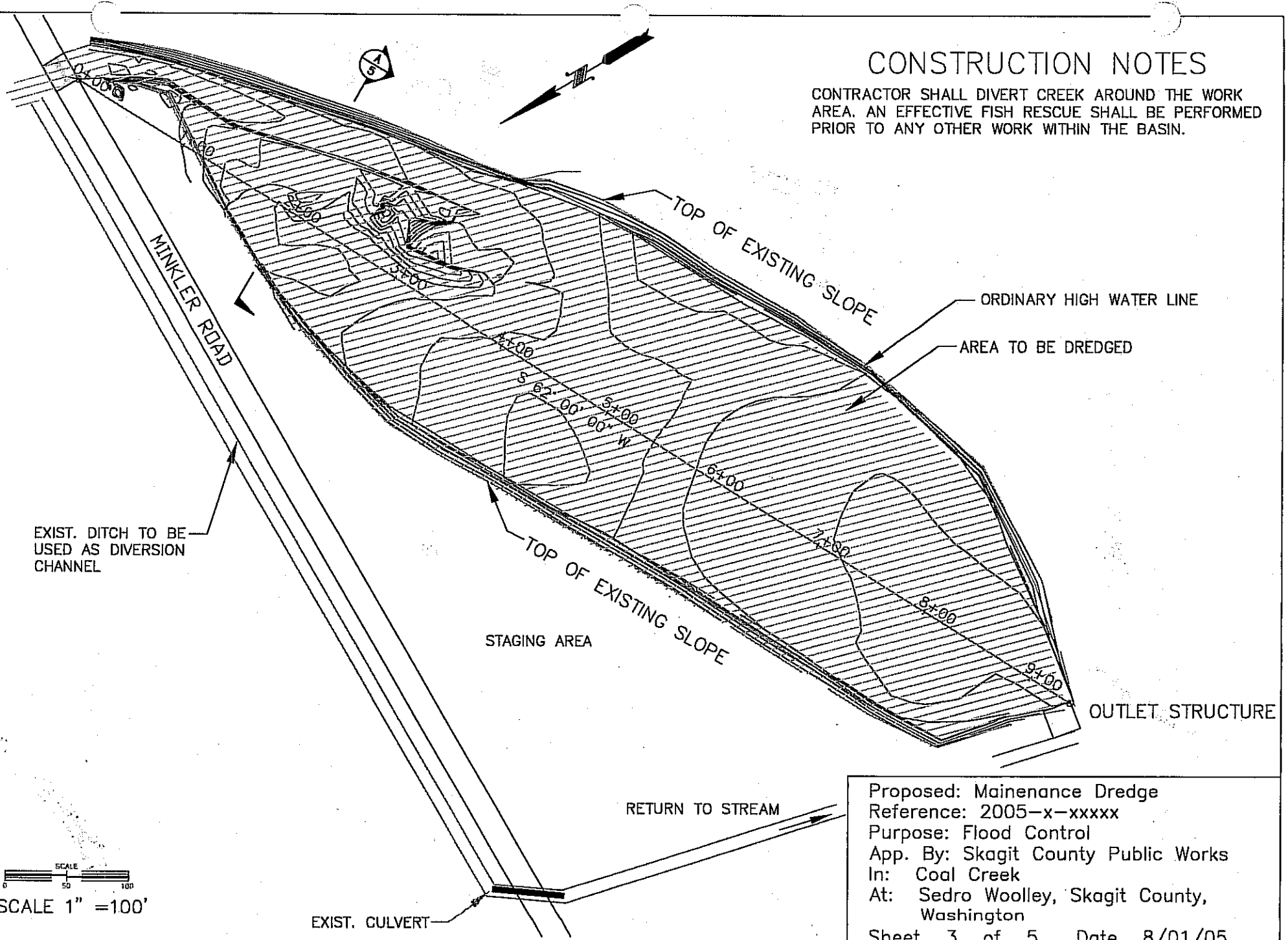
EXHIBIT B




Proposed: Mainenance Dredge
Reference: 2005–x–xxxxx
Purpose: Flood Control
App. By: Skagit County Public Works
In: Coal Creek
At: Sedro Woolley, Skagit County, Washington
Sheet . of . Date

DO NOT SCALE

| REVISIONS | SKAGIT COUNTY PUBLIC WORKS MOUNT VERNON, WASHINGTON | COAL CREEK SEDIMENT POND AERIAL PHOTOGRAPH | DRAWING NO. 2 |
|---|---|---|---|




Proposed: Mainenance Dredge
Reference: 2005–x–xxxxx
Purpose: Flood Control
App. By: Skagit County Public Works
In: Coal Creek
At: Sedro Woolley, Skagit County, Washington
Sheet 3 of 5 Date 8/01/05

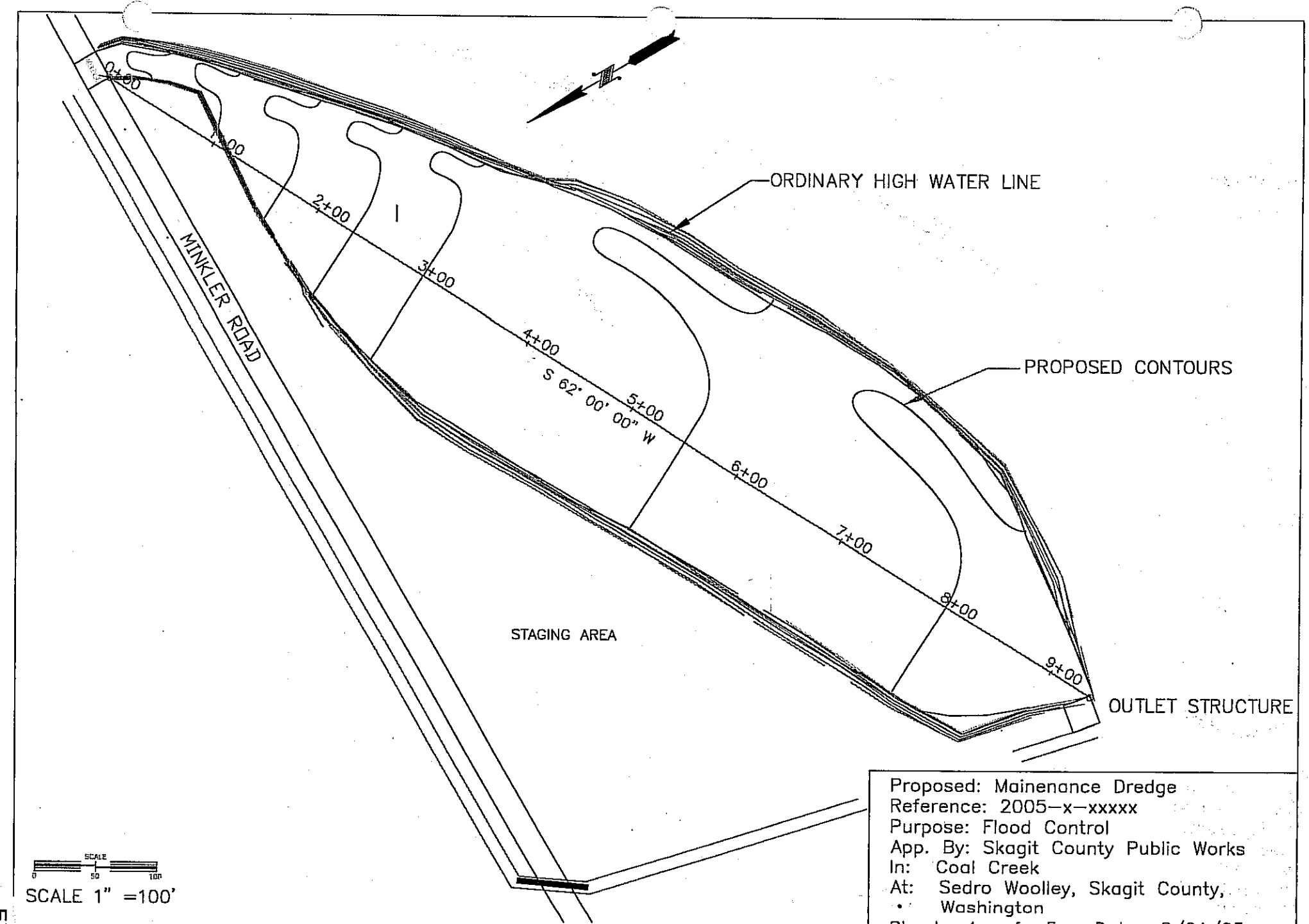
| REVISIONS | |
|---|---|
| 8/25/05 | MRK |

SKAGIT COUNTY PUBLIC WORKS
MOUNT VERNON, WASHINGTON

# COAL CREEK SEDIMENT POND
## PLAN VIEW - EXISTING

DRAWING NO. 3

EXHIBIT C




SCALE 1" =100'

Proposed: Mainenance Dredge
Reference: 2005–x–xxxxx
Purpose: Flood Control
App. By: Skagit County Public Works
In: Coal Creek
At: Sedro Woolley, Skagit County, Washington
Sheet 4 of 5 Date 8/01/05

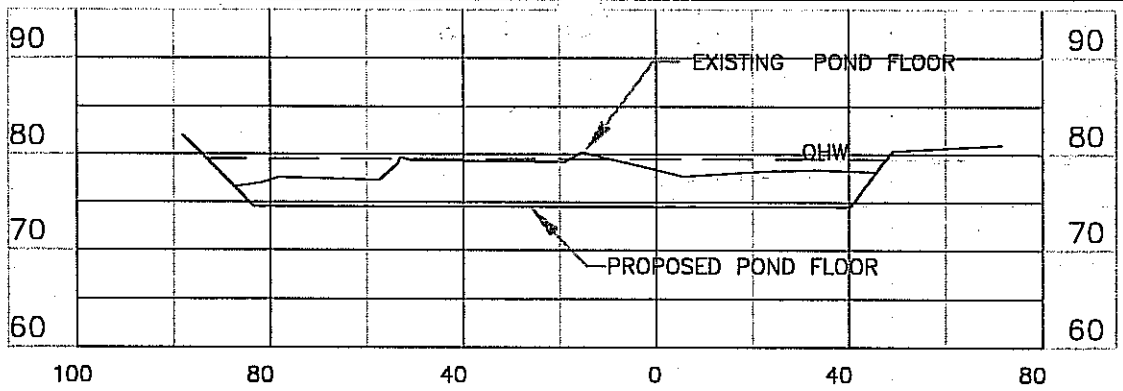
REVISIONS

SKAGIT COUNTY PUBLIC WORKS
MOUNT VERNON, WASHINGTON

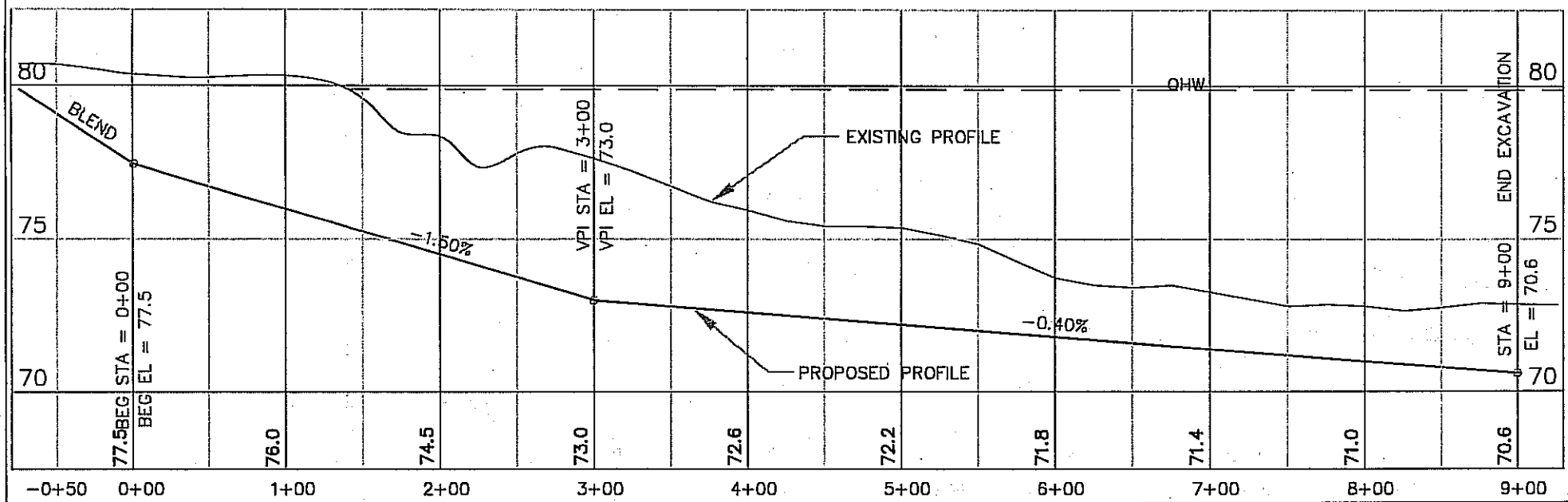
# COAL CREEK SEDIMENT POND
# PLAN VIEW - PROPOSED

DRAWING NO. 4

EXHIBIT C




**TYPICAL CROSS SECTION**
HORZ. SCALE: 1"=40'
VERT. SCALE: 1"=20'




**CENTERLINE PROFILE**
HORZ. SCALE: 1"=100'
VERT. SCALE: 1"=5'

Proposed: Mainenance Dredge
Reference: 2005-x-xxxxx
Purpose: Flood Control
App. By: Skagit County Public Works
In: Coal Creek
At: Sedro Woolley, Skagit County, Washington
Sheet 5 of 5 Date 8/01/05

| REVISIONS | SKAGIT COUNTY PUBLIC WORKS MOUNT VERNON, WASHINGTON | COAL CREEK SEDIMENT POND TYP. SECTION AND PROFILE | DRAWING NO. 5 |
|---|---|---|---|

EXHIBIT C

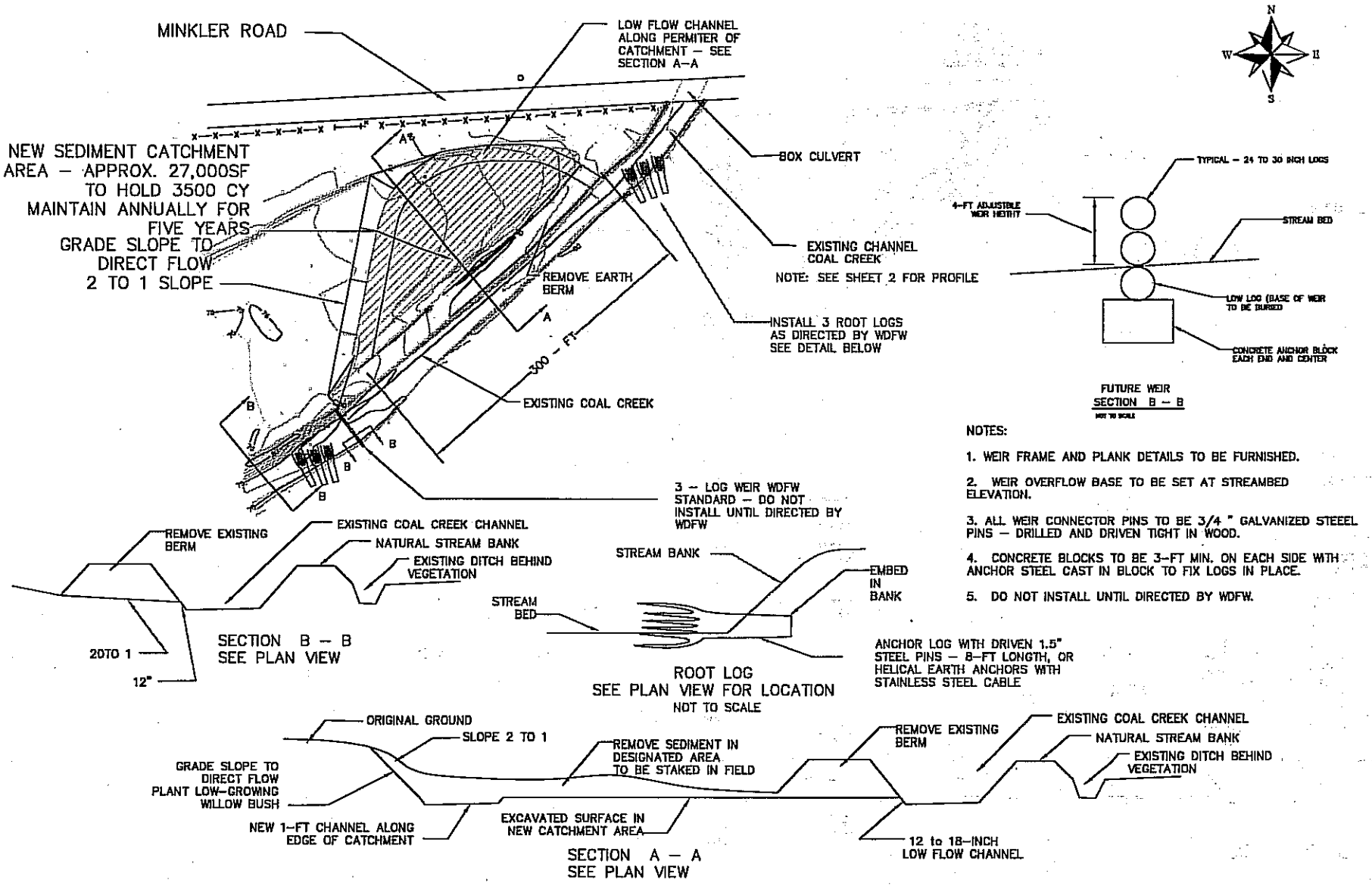

MINKLER ROAD
LOW FLOW CHANNEL ALONG PERMITER OF CATCHMENT – SEE SECTION A–A
NEW SEDIMENT CATCHMENT AREA – APPROX. 27,000SF TO HOLD 3500 CY MAINTAIN ANNUALLY FOR FIVE YEARS
GRADE SLOPE TO DIRECT FLOW 2 TO 1 SLOPE
BOX CULVERT
EXISTING CHANNEL COAL CREEK
NOTE: SEE SHEET 2 FOR PROFILE
REMOVE EARTH BERM
INSTALL 3 ROOT LOGS AS DIRECTED BY WDFW SEE DETAIL BELOW
300 – FT
EXISTING COAL CREEK
3 – LOG WEIR WDFW STANDARD – DO NOT INSTALL UNTIL DIRECTED BY WDFW
N
W
E
S
TYPICAL – 24 TO 30 INCH LOGS
4–FT ADJUSTABLE WEIR HEIGHT
STREAM BED
LOW LOG (BASE OF WEIR TO BE BURIED
CONCRETE ANCHOR BLOCK EACH END AND CENTER
FUTURE WEIR
SECTION B – B
NOT TO SCALE
NOTES:
1. WEIR FRAME AND PLANK DETAILS TO BE FURNISHED.
2. WEIR OVERFLOW BASE TO BE SET AT STREAMBED ELEVATION.
3. ALL WEIR CONNECTOR PINS TO BE 3/4 " GALVANIZED STEEEL PINS – DRILLED AND DRIVEN TIGHT IN WOOD.
4. CONCRETE BLOCKS TO BE 3–FT MIN. ON EACH SIDE WITH ANCHOR STEEL CAST IN BLOCK TO FIX LOGS IN PLACE.
5. DO NOT INSTALL UNTIL DIRECTED BY WDFW.
REMOVE EXISTING BERM
EXISTING COAL CREEK CHANNEL
NATURAL STREAM BANK
EXISTING DITCH BEHIND VEGETATION
20TO 1
12"
SECTION B – B
SEE PLAN VIEW
STREAM BANK
EMBED IN BANK
STREAM BED
ANCHOR LOG WITH DRIVEN 1.5" STEEL PINS – 8–FT LENGTH, OR HELICAL EARTH ANCHORS WITH STAINLESS STEEL CABLE
ROOT LOG
SEE PLAN VIEW FOR LOCATION
NOT TO SCALE
ORIGINAL GROUND
SLOPE 2 TO 1
GRADE SLOPE TO DIRECT FLOW PLANT LOW–GROWING WILLOW BUSH
REMOVE SEDIMENT IN DESIGNATED AREA TO BE STAKED IN FIELD
NEW 1–FT CHANNEL ALONG EDGE OF CATCHMENT
EXCAVATED SURFACE IN NEW CATCHMENT AREA
REMOVE EXISTING BERM
EXISTING COAL CREEK CHANNEL
NATURAL STREAM BANK
EXISTING DITCH BEHIND VEGETATION
12 to 18–INCH LOW FLOW CHANNEL
SECTION A – A
SEE PLAN VIEW
SKAGIT COUNTY PUBLIC WORKS
SKETCH – REVISED COAL CREEK SEDIMENT BASIN REDUCED SEDIMENT CATCHMENT
HPA NO. 2
2006 SEDIMENT CLEANING

EXHIBIT D

Jan 7.

Washington Department of FISH and WILDLIFE

# HYDRAULIC PROJECT APPROVAL

North Puget Sound
16018 Mill Creek Boulevard
Mill Creek, WA 98012-1296
(425) 775-1311

Issue Date:
Project Expiration Date: September 30, 2011

Control Number: 106724-1
FPA/Public Notice #: N/A

| PERMITTEE | AUTHORIZED AGENT OR CONTRACTOR |
|---|---|
| Skagit County Public Works Department<br>ATTENTION: Burt Reanier<br>1800 Continental Place<br>Mount Vernon, WA 98273-5625<br>360-336-9400<br>Fax: 360-336-9369 | |

Project Name: Coal Creek Experimental Catchment Reach

Project Description: Modification of an existing sediment detention pond with a length of 1000 feet to natural grade sediment catchment area with a length of 300 feet. The reach will be allowed to act more like an alluvial fan, depositing within the area where the stream naturally flows. Based on a monitoring and management plan, maintain the area on an annual basis under the supervision of WDFW. This is an experimental design, an attempt to eliminate the large scale sediment detention pond and associated impacts. Monitoring will indicate whether the design requires further modifications.

## PROVISIONS

1. TIMING LIMITATIONS: The project may begin immediately and shall be completed by September 30, 2011; Provided: Work shall only be conducted between June 15 and September 30 of each year, and shall be based on a management (maintenance) plan. Work required outside of this time period shall require a separate HPA.

2. NOTIFICATION REQUIREMENT: The Area Habitat Biologist (AHB) listed below shall receive written notification (FAX, email, or mail) from the person to whom this Hydraulic Project Approval (HPA) is issued (permittee) or the agent/contractor no less than three working days prior to the start of construction activities. The notification shall include the permittee's name, project location, starting date for work, and the control number for this HPA.

3. Work shall be accomplished per plans and specifications approved by the Washington Department of Fish and Wildlife entitled JARPA and dated September 07, 2006, except as modified by this Hydraulic Project Approval. A copy of these plans shall be available on site during construction.

BANK PROTECTION

4. Placement of bank protection material waterward of the ordinary high water line shall be restricted to the minimum amount necessary for installation of habitat features approved by the Washington Department of Fish and Wildlife.

5. Fish habitat components such as logs with/or root wads are required as part of the project. These fish habitat components shall be installed to withstand 100-year peak flows.

6. The fish habitat structures shall be fir or cedar, with a minimum of 18 inch diameter (dbh).

7. The fish habitat structures shall be placed so that they are within the low flow channel. The logs shall be embedded into the bank and anchored. The logs shall be staggered in their extension into the channel, with the furthermost structure extending no more than one half (1/2) across the channel. These logs shall be placed on a 30 degree angle to the channel, so that the root wad is facing upstream. The upstream log shall be placed so the root wad contacts the bank, and each subsequent root wad will be in contact with the adjoining upstream root wad.

Three other logs with root wads shall be spaced at approximately 15 foot increments downstream and installed at the same 30 degree angle, facing upstream, and extending no more than half way and not less than four feet into the channel.

8. The angle of the structure used to divert the stream into the high flow channel shall allow a smooth transition of stream flow.

DREDGING

9. An 'excavation line' shall be established. 'Excavation line' means a line on the dry bed at, or parallel to the water's edge. The distance from the water's edge (if wetted) shall be one foot, or shall be fifteen feet from the left bank if stream is dry. The excavation line may change with water level fluctuations and channel alterations.

10. An 'excavation zone' is the area between the 'excavation line' and the right bank or the center of the exposed bar. The 'excavation zone' shall be identified by boundary markers placed by the permittee and approved by the Area Habitat Biologist listed below prior to the commencement of gravel removal.

11. Dredging shall not be conducted upstream of the bridge, except as authorized by the AHB. Dredging shall not be conducted within the low flow channel if it is wetted.

12. Dredged streambed materials shall be disposed of at approved in-water disposal sites, or upland so it will not re-enter state waters.

13. Upon completion of the dredging, the streambed shall contain no pits, potholes, or large depressions to avoid stranding of fish.

14. Dredging shall be accomplished in the dry. Work shall be separated from the stream, if flowing, by maintaining a sediment barrier between the channel and work site. A bypass (pump or gravity flow) shall be used if the stream channel requires dredging, if flowing.

15. Dredging shall be accomplished by starting at the upstream end of the project boundary and working downstream.

16. Gravel removal from the stream shall not result in a lowering, over time, of the average channel cross-section profile through the project area or downstream.

17. Excavation shall begin at the existing earth berm, or the right bank of the stream, perpendicular to the alignment of the stream, and proceed toward the center of the catchment area on a minimum two percent gradient.

18. Streambed material shall not be removed from the water side of the earth berm or stream channel during the initial construction phase.

19. Post-project channel cross-sectional surveys are required and are the permittee's responsibility. The cross sections shall be referenced vertically to a permanent bench mark and horizontally to a permanent base line. They shall be taken perpendicularly to the high-flow channel every 50 feet throughout the project area and at cross sections through the upstream and downstream riffles immediately adjacent to the project area. Surveys shall be taken near the upstream control point (i.e. Minkler Bridge) and at the mid-point of each riffle. The post-project survey shall be submitted to the Washington Department of Fish and Wildlife within 90 days of completion of removal of gravel or prior to the expiration date of this Hydraulic Project Approval on September 30, 2011, whichever occurs first. (The pre-project survey information per WAC 220-110-140(8) was submitted to the Washington Department of Fish and Wildlife with the application for Hydraulic Project Approval on September 11, 2006.)

20. At the end of each work day, the excavation zone shall contain no pits, or potholes, or depressions that may trap fish as a result of fluctuation in water levels.

21. Stockpiling of material waterward of the ordinary high water line is not approved. If the water level rises and makes contact with stockpiles, further operation of equipment or removal of the stockpiles shall not proceed unless authorized under a separate Hydraulic Project Approval issued by the Washington Department of Fish and Wildlife.

22. The Area Habitat Biologist listed below shall be notified at least five working days before the start of actual gravel removal to allow approval of the 'excavation zone' boundary markers as required above, and upon project completion to allow for compliance inspection.

23. Gravel shall not be pushed across the wetted channel. Stream crossings are not authorized by this HPA.

24. Large woody material embedded in the bank or streambed shall be left undisturbed and intact.

25. Depressions created in gravel bars shall be filled, smoothed over, and sloped upwards toward the center of the gravel bar on a minimum two percent gradient.

26. A temporary bypass or coffer dam to divert flow around the work area shall be in place prior to initiation of other work in the wetted perimeter. This work includes installation of habitat features

and sediment removal in the box culvert (Minkler Road).

27. A sandbag revetment or similar device shall be installed at the bypass inlet to divert the entire flow through the bypass.

28. A sandbag revetment or similar device shall be installed at the downstream end of the bypass to prevent backwater from entering the work area.

29. The bypass shall be of sufficient size to pass all flows and debris for the duration of the project.

30. Prior to releasing the water flow to the project area, all habitat features shall be installed.

31. Upon completion of the project, all material used in the temporary bypass or coffer dam shall be removed from the site and the site returned to preproject or improved conditions.

32. The permittee shall capture and safely move food fish, game fish, and other fish life from the job site. The permittee shall have fish capture and transportation equipment ready and on the job site. Captured fish shall be immediately and safely transferred to free-flowing water downstream of the project site.

33. Any device used for diverting water from a fish-bearing stream shall be equipped with a fish guard to prevent passage of fish into the diversion device pursuant to RCW 77.57.010 and 77.57.070. The pump intake shall be screened with 1/8-inch mesh to prevent fish from entering the system. The screened intake shall consist of a facility with enough surface area to ensure that the velocity through the screen is less than 0.4 feet per second. Screen maintenance shall be adequate to prevent injury or entrapment to juvenile fish and the screen shall remain in place whenever water is withdrawn from the stream through the pump intake.

EQUIPMENT

34. Equipment used for this project shall be free of external petroleum-based products while working around the stream. Accumulation of soils or debris shall be removed from the drive mechanisms (wheels, tires, tracks, etc.) and undercarriage of equipment prior to its working below the ordinary high water line. Equipment shall be checked daily for leaks and any necessary repairs shall be completed prior to commencing work activities along the stream.

35. Alteration or disturbance of the bank and bank vegetation shall be limited to that necessary to construct the project. Within seven calendar days of project completion, all disturbed areas shall be protected from erosion using vegetation or other means. Within one year of project completion, the banks shall be revegetated with native or other approved woody species. Vegetative cuttings shall be planted at a maximum interval of three feet (on center) and maintained as necessary for three years to ensure 80 percent survival.

36. Existing shoreline vegetation shall not be removed or disturbed, except to install habitat features. Disturbance shall be minimized in these cases.

37. If at any time, as a result of project activities, fish are observed in distress, a fish kill occurs, or water quality problems develop (including equipment leaks or spills), immediate notification shall be made to the Washington Department of Ecology at 1-800-258-5990, and to the Area Habitat Biologist listed below.

38. Wastewater from project activities and water removed from within the work area shall be routed to an area landward of the ordinary high water line to allow removal of fine sediment and other contaminants prior to being discharged to the stream.

39. All waste material such as construction debris, silt, excess dirt or overburden resulting from this project shall be deposited above the limits of flood water in an approved upland disposal site.

40. If high flow conditions that may cause siltation are encountered during this project, work shall stop until the flow subsides.

41. The stream through the catchment area may be reconstructed in a left bank configuration. The reconstructed streambed shall smoothly align with the natural stream channel at the upstream and downstream ends. The high flow channel shall be reconstructed after each episode of gravel removal and shall be located along the right bank of the catchment area.

42. The high flow channel shall provide high flow relief and allow for sediment deposition. Minimum width shall be eight (8) feet. Depth shall be eight inches higher than the low flow channel at the upstream and downstream ends. The channel shall match the slope of the low flow channel as possible.

43. The left bank channel shall define and concentrate the low flow stream. Minimum width shall be eight (8) feet. Depth shall be one (1) foot lower than the adjacent edge. The stream channel shall be passable to migrating fish.

44. A log weir at the downstream end of the catchment area may be installed within the next five years if monitoring shows that it is required. The overall size of the catchment area may also be reduced based on the effectiveness of this project. Quantities of sediment removed shall be recorded and reported to the AHB each year.

45. The monitoring plan submitted September XX, 2006 shall be strictly adhered to except as modified by this Hydraulic Project Approval. Variance from this plan shall require written approval from WDFW. A copy of the monitoring plan shall be available on site during construction.

46. Downstream of the catchment area, the right bank is to be sloped at 20:1 for a distance of 30 feet from the channel to allow for natural stream bank processes to occur. Beyond the 30 foot setback, a maximum 2:1 sloped bank may be created. Revegetation of this area is required (see

Provision 36). Existing trees or other vegetation may be used (replanted/relocated) initially, with conifers (including fir and cedar on eight foot centers) to be planted within this area prior to December, 2008.

47. The concrete weir constructed as part of the original sediment trap shall be maintained to allow full flow through the weir at all times. The weir shall be completely removed by October 1, 2008, assuming satisfactory function of the catchment area prior to that date.

## PROJECT LOCATIONS

Location #1 Coal Creek

| WORK START: September 20, 2006 | | | | | WORK END: September 30, 2011 | |
|---|---|---|---|---|---|---|
| WRIA: | Waterbody: | | | | Tributary to: | |
| 03.0279 | Coal Creek (rb) | | | | Skiyou Slough | |
| 1/4 SEC: | Section: | Township: | Range: | Latitude: | Longitude: | County: |
| NW 1/4 | 15 | 35 N | 05 E | N 48.52389 | W 122.15306 | Skagit |
| Location #1 Driving Directions | | | | | | |

## NOTES

## APPLY TO ALL HYDRAULIC PROJECT APPROVALS

This Hydraulic Project Approval pertains only to those requirements of the Washington State Hydraulic Code, specifically Chapter 77.55 RCW (formerly RCW 77.20). Additional authorization from other public agencies may be necessary for this project. The person(s) to whom this Hydraulic Project Approval is issued is responsible for applying for and obtaining any additional authorization from other public agencies (local, state and/or federal) that may be necessary for this project.

This Hydraulic Project Approval shall be available on the job site at all times and all its provisions followed by the person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work.

This Hydraulic Project Approval does not authorize trespass.

The person(s) to whom this Hydraulic Project Approval is issued and operator(s) performing the work may be held liable for any loss or damage to fish life or fish habitat that results from failure to comply with the provisions of this Hydraulic Project Approval.

Failure to comply with the provisions of this Hydraulic Project Approval could result in a civil penalty of up to one hundred dollars per day and/or a gross misdemeanor charge, possibly punishable by fine and/or imprisonment.

All Hydraulic Project Approvals issued pursuant to RCW 77.55.021 (EXCEPT agricultural irrigation, stock watering or bank stabilization projects) or 77.55.141 are subject to additional restrictions, conditions or revocation if the Department of Fish and Wildlife determines that new biological or physical information indicates the need for such action. The person(s) to whom this Hydraulic Project Approval is issued has the right pursuant to Chapter 34.04 RCW to appeal

such decisions. All agricultural irrigation, stock watering or bank stabilization Hydraulic Project Approvals issued pursuant to RCW 77.55.021 may be modified by the Department of Fish and Wildlife due to changed conditions after consultation with the person(s) to whom this Hydraulic Project Approval is issued: PROVIDED HOWEVER, that such modifications shall be subject to appeal to the Hydraulic Appeals Board established in RCW 77.55.301.

## APPEALS INFORMATION

If you wish to appeal the issuance or denial of, or conditions provided in a Hydraulic Project Approval, there are informal and formal appeal processes available.

A. INFORMAL APPEALS (WAC 220-110-340) OF DEPARTMENT ACTIONS TAKEN PURSUANT TO RCW 77.55.021, 77.55.141, 77.55.181, and 77.55.291: A person who is aggrieved or adversely affected by the following Department actions may request an informal review of:

(A) The denial or issuance of a Hydraulic Project Approval, or the conditions or provisions made part of a Hydraulic Project Approval; or

(B) An order imposing civil penalties. A request for an INFORMAL REVIEW shall be in WRITING to the Department of Fish and Wildlife HPA Appeals Coordinator, 600 Capitol Way North, Olympia, Washington 98501-1091 and shall be RECEIVED by the Department within 30 days of the denial or issuance of a Hydraulic Project Approval or receipt of an order imposing civil penalties. If agreed to by the aggrieved party, and the aggrieved party is the Hydraulic Project Approval applicant, resolution of the concerns will be facilitated through discussions with the Area Habitat Biologist and his/her supervisor. If resolution is not reached, or the aggrieved party is not the Hydraulic Project Approval applicant, the Habitat Technical Services Division Manager or his/her designee shall conduct a review and recommend a decision to the Director or his/her designee. If you are not satisfied with the results of this informal appeal, a formal appeal may be filed.

B. FORMAL APPEALS (WAC 220-110-350) OF DEPARTMENT ACTIONS TAKEN PURSUANT TO RCW 77.55.021 (EXCEPT agricultural irrigation, stock watering or bank stabilization projects) or 77.55.291:

A person who is aggrieved or adversely affected by the following Department actions may request a formal review of:

(A) The denial or issuance of a Hydraulic Project Approval, or the conditions or provisions made part of a Hydraulic Project Approval;

(B) An order imposing civil penalties; or

(C) Any other 'agency action' for which an adjudicative proceeding is required under the Administrative Procedure Act, Chapter 34.05 RCW.

A request for a FORMAL APPEAL shall be in WRITING to the Department of Fish and Wildlife HPA Appeals Coordinator, shall be plainly labeled as 'REQUEST FOR FORMAL APPEAL' and shall be RECEIVED DURING OFFICE HOURS by the Department at 600 Capitol Way North, Olympia, Washington 98501-1091, within 30-days of the Department action that is being challenged. The time period for requesting a formal appeal is suspended during consideration of a timely informal appeal. If there has been an informal appeal, the deadline for requesting a formal appeal shall be within 30-days of the date of the Department's written decision in response to the informal appeal.

C. FORMAL APPEALS OF DEPARTMENT ACTIONS TAKEN PURSUANT TO RCW 77.55.021 (agricultural irrigation, stock watering or bank stabilization only), 77.55.141, 77.55.181, or 77.55.241: A person who is aggrieved or adversely affected by the denial or issuance of a Hydraulic Project Approval, or the conditions or provisions made part of a Hydraulic Project Approval may request a formal appeal. The request for FORMAL APPEAL shall be in WRITING to the Hydraulic Appeals Board per WAC 259-04 at Environmental Hearings Office, 4224 Sixth Avenue SE, Building Two - Rowe Six, Lacey, Washington 98504; telephone 360/459-6327.

D. FORMAL APPEALS OF DEPARTMENT ACTIONS TAKEN PURSUANT TO CHAPTER 43.21L RCW: A person who is aggrieved or adversely affected by the denial or issuance of a Hydraulic Project Approval, or the conditions or provisions made part of a Hydraulic Project Approval may request a formal appeal. The FORMAL APPEAL shall be in accordance with the provisions of Chapter 43.21L RCW and Chapter 199-08 WAC. The request for FORMAL APPEAL shall be in WRITING to the Environmental and Land Use Hearings Board at Environmental Hearings Office, Environmental and Land Use Hearings Board, 4224 Sixth Avenue SE, Building Two - Rowe Six, P.O. Box 40903, Lacey, Washington 98504; telephone 360/459-6327.

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E. FAILURE TO APPEAL WITHIN THE REQUIRED TIME PERIODS results in forfeiture of all appeal rights. If there is no timely request for an appeal, the department action shall be final and unappealable.

ENFORCEMENT: Sergeant Heinck (25) P2

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| Habitat Biologist<br>Jeffrey Kamps | kampsjwk@dfw.wa.gov<br>360-466-4345 | for Director<br>WDFW |

CC: