CASCADE POINT

FERRY TERMINAL STAGE 1 DESIGN BUILD

Project No. HSHWY00015

REQUEST FOR PROPOSALS

PART IV – APPENDICES

May 23, 2025

Alaska Department of Transportation and Public Facilities
Southcoast Region
6860 Glacier Highway
Juneau, AK 99801

Table of Contents for Part IV – Appendices

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	HSHWY00015	2025	0001	23

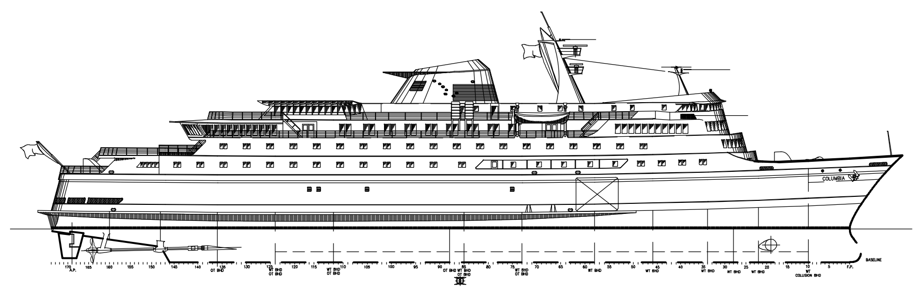
Appendix 2-1

STATE OF ALASKA

DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES

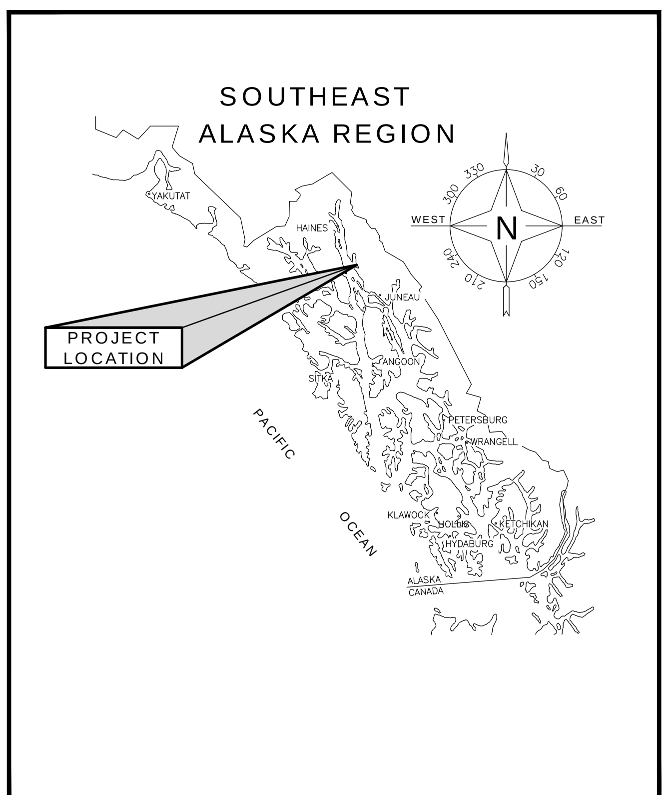
JUNEAU CASCADE POINT FERRY TERMINAL - STAGE 1 DESIGN BUILD

PROJECT NO: HSHWY 00015

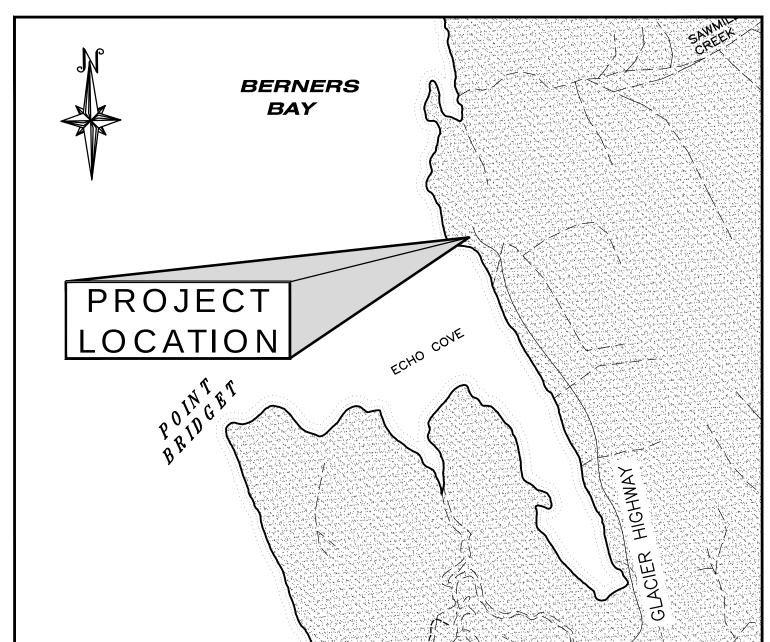


DRAWING INDEX

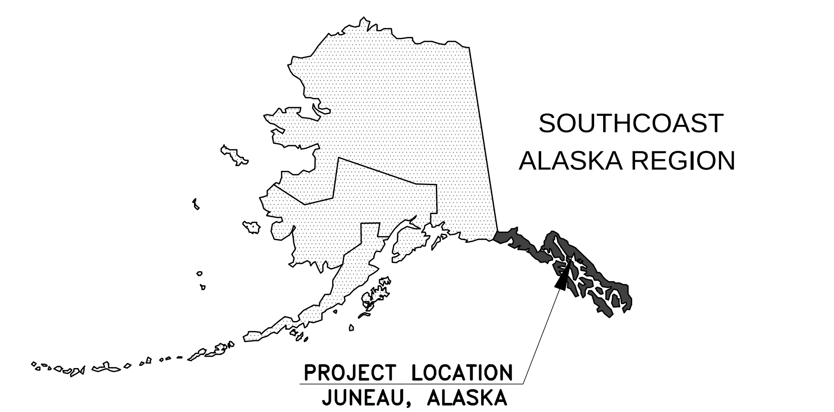
TIDAL DATA	
EHW	+24.5
HTL	+20.8'
MHW	+14.8'
MLLW	0.0'
ELW	-4.8'



VICINITY MAP



SITE MAP



USE THESE PLANS IN CONJUNCTION WITH THE STATE OF ALASKA STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION, 2020 EDITION AND THE PROJECT SPECIAL PROVISIONS.

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

APPROVED:

REGIONAL PRECONSTRUCTION ENGINEER DATE
KIRK MILLER, P.E.

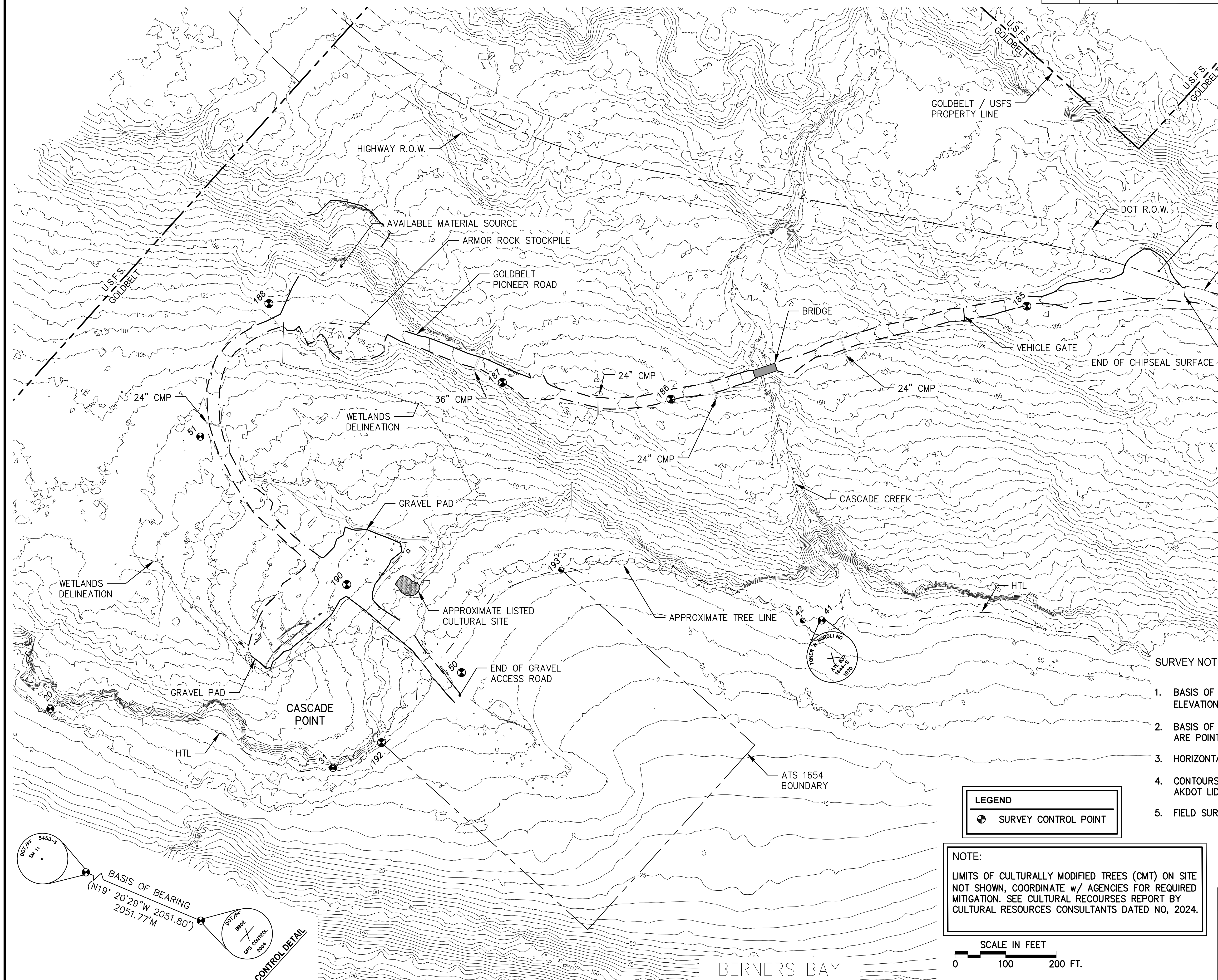
CONCUR:

REGIONAL DIRECTOR DATE
CHRISTOPHER GOINS, CM, P.E.

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_0001 Title Page.dwg | DATE 5/19/2025 10:42 | LAYOUT 0001 | DESIGNED MDS | CHECKED MG | DRAFTED KLL

NO.	DATE	REVISION

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	HSHWY00015	2025	0002	23



SURVEY CONTROL SUMMARY TABLE

PT#	NORTHING	EASTING	ELEV. (FT)	DESCRIPTION
10	257736.21	232376.44	29.85	FND 2" ALCAP
20	255800.21	233055.98	15.34	FND MON
31	255307.79	233344.90	23.64	FND MON 3" BC
41	254786.95	234209.66	23.13	FND MON
42	254814.70	234184.25	21.01	FND #5 REBAR W/YPC
50	255245.92	233655.02	18.30	FND #5 REBAR W/YPC
51	255941.71	233653.93	89.30	FND 2" ALCAP
185	254903.37	234942.60	208.05	DOT MON 2.5" BB
186	255301.85	234333.61	147.19	DOT MON 2.5" BB
187	255570.98	234134.43	137.54	DOT MON 2.5" BB
188	256017.87	233940.09	116.52	DOT MON 2.5" BB
190	255530.75	233631.66	52.91	DOT MON 2.5" BB
192	255270.25	233446.04	23.73	FND MON BC
193	255236.09	233938.20	22.26	ATS MON

SURVEY NOTES:

1. BASIS OF VERTICAL DATUM FOR THIS SURVEY IS CONTROL POINT 20, BRASS CAP 'BB02' ELEVATION=15.34' MLLW, AS PER CONTROL SHEET FOR THE JUNEAU ACCESS ROAD PROJECT.
2. BASIS OF BEARING IS N19° 20'29"W BETWEEN AKDOT CONTROL MONUMENTS 'BB02' AND 'SM11,' WHICH ARE POINTS 20 AND 10 RESPECTIVELY.
3. HORIZONTAL AND VERTICAL COORDINATES FOR POINTS 10 & 20 WERE SUPPLIED BY AKDOT.
4. CONTOURS ARE IN FEET, WITH 5' INTERVALS. CONTOURS OUTSIDE EXISTING ROADWAY PROVIDED BY AKDOT LIDAR.
5. FIELD SURVEYS, BATHYMETRY AND WETLANDS DELINEATION PERFORMED BETWEEN 1998-2023.

LEGEND

SURVEY CONTROL POINT

NOTE:

LIMITS OF CULTURALLY MODIFIED TREES (CMT) ON SITE NOT SHOWN, COORDINATE w/ AGENCIES FOR REQUIRED MITIGATION. SEE CULTURAL RECOURSES REPORT BY CULTURAL RESOURCES CONSULTANTS DATED NO, 2024.

SCALE IN FEET
0 100 200 FT.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

EXISTING CONDITIONS AND SURVEY CONTROL

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB-0002_00003 Existing Conditions.dwg
LAYOUT 0002
DESIGNED
CHECKED
DRAFTED

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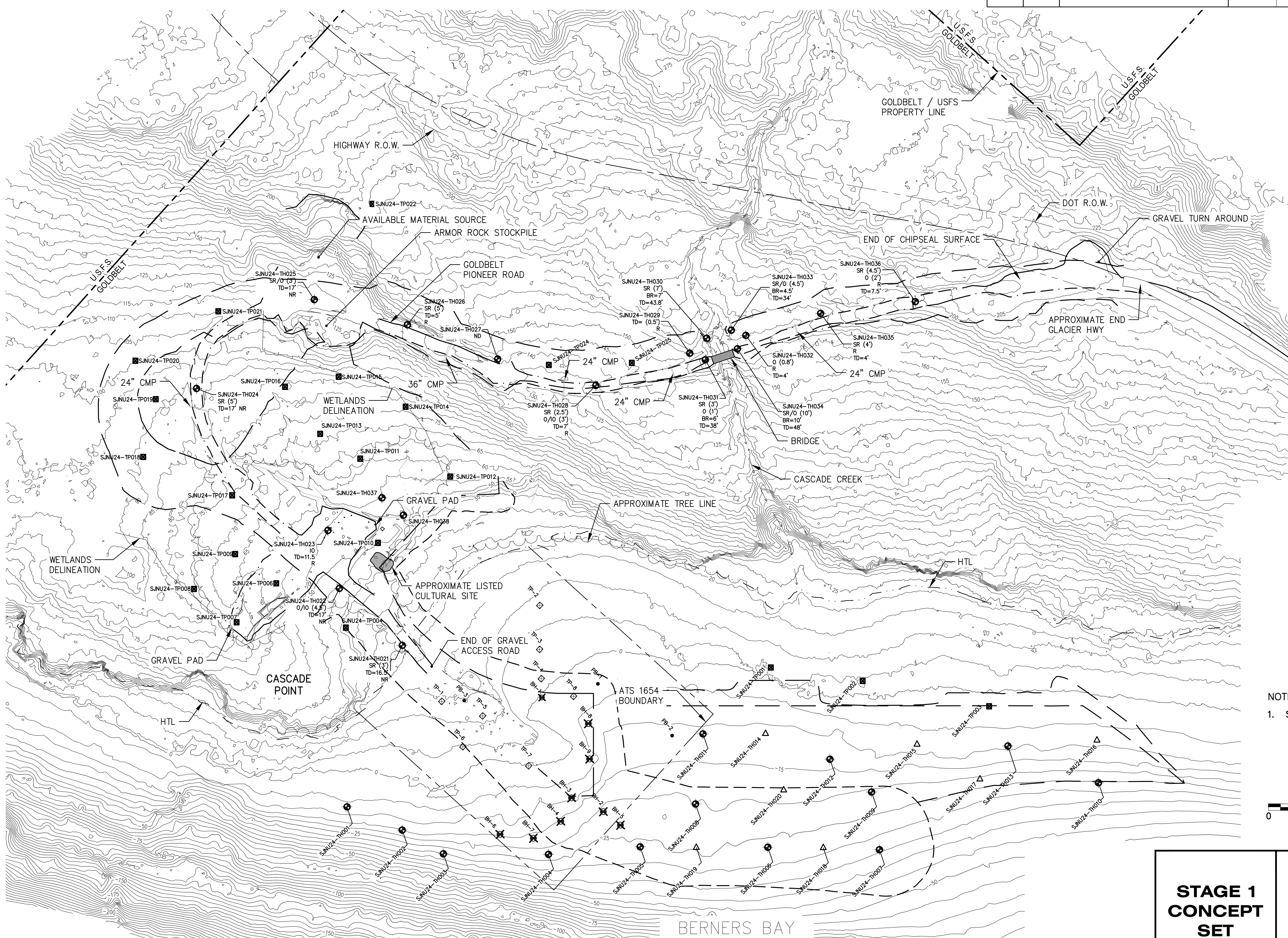

LEGEND OF PRIOR SITE GEOTECHNICAL INVESTIGATIONS

TP-1	EXCAVATED TEST PIT
PB-2	DRILLED PROBE
BH-5	BOREHOLE

NOTE:

1. SEE PND GEOTECHNICAL DATA REPORT FOR SOIL LOGS

SCALE IN FEET

0 100 200 FT.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

GEOTECHNICAL INVESTIGATION PLAN

DRAFTED | CHECKED | DESIGNED | LAYOUT 0003

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB-0002_00003 Existing Conditions 5/19/2025 10:39

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	HSHWY00015	2025	1000	23

ROADWAY

EXISTING / PROPOSED

- EDGE OF PAVEMENT
- LIMIT OF CUT SLOPE & FILL SLOPE (CUT / FILL)
- GRAVEL EDGE
- CONCRETE CURB & GUTTER
- CONCRETE CURB CUT
- BRIDGE
- GUARDRAIL
- END & PARALLEL END SECTIONS
- FENCE
- RETAINING WALL
- SPECIAL DITCH
- FLAT BOTTOM DITCH
- RIPRAP
- PROJECT LIMITS

PAVEMENT MARKINGS

PROPOSED

- TRAFFIC PROJECT CENTERLINE
- 8" & 4" WHITE SOLID STRIPE (8"W, 4"W)
- 4" WHITE STRIPE (4"W)
- 4" YELLOW STRIPE (4"Y)
- 2' CROSSWALK OR STOPBAR (24"W (TYP))
- LADDER CROSSWALK LAYOUT 2' WIDE RUNGS WITH 2' SPACES ALIGNED TO AVOID TIRE PATHS (10')

UTILITIES

EXISTING / PROPOSED

- STORM DRAIN (P-106-2, SI)
- STORM DRAIN MANHOLE, CLEANOUT (SD, CO)
- CURB INLET CATCH BASIN
- FIELD INLET CATCH BASIN (FI)
- PIPE CULVERT WITH END SECTION
- SANITARY SEWER (SS)
- SANITARY SEWER MANHOLE, CLEANOUT (SS, CO)
- WATER (W)
- RAW WATER (RW)
- FIRE HYDRANT, VALVE OR RISER
- GAS
- WELL, WATER SERVICE CONNECTION
- OIL OR PIPELINE
- TANKS (ABOVE GROUND, UNDERGROUND)
- ELECTRIC (UE) (UNDERGROUND)

TOPOGRAPHY

EXISTING / PROPOSED

- WETLANDS
- TREELINE (EDGE OF VEGETATION)
- BUILDING OR FOUNDATION
- CONTOUR, MAJOR OR MINOR (520)
- DRAINAGE FLOW
- CREEK (CENTERLINE)
- EDGE OF WATER

RIGHT-OF-WAY

RECOVERED / SET THIS PROJECT

- FEDERAL GOV'T SURVEY MONUMENT
- GOV'T CONTROL STATION
- PRIMARY MONUMENT (BRASS/AL CAP)
- MISC SECONDARY CORNER
- PRIMARY CENTERLINE MONUMENT
- SECONDARY CENTERLINE MONUMENT
- RANDOM CONTROL MONUMENT (RCM)
- PRIMARY GPS CONTROL POINT (GPS)
- HORIZONTAL CONTROL POINT (CP)
- SECONDARY CONTROL POINT (SCP)
- VERTICAL BENCHMARK (BM)
- TEMPORARY BENCHMARK (TBM)
- TOWNSHIP AND RANGE LINES (T13N, T12N, R3W, R2W)
- SECTION LINE
- 1/4 SECTION LINE
- 1/16 SECTION LINE
- CORPORATE or CITY LIMITS
- EXISTING RIGHT-OF-WAY (R/W)
- RIGHT-OF-WAY OR EASEMENT REQUIRED
- PROJECT RIGHT-OF-WAY LINE (R/W)
- EXISTING RIGHT-OF-WAY EASEMENT
- EXISTING PROPERTY LINE
- CONTROLLED ACCESS LINE
- EXISTING UTILITY EASEMENT
- PROPOSED UTILITY EASEMENT
- EXISTING CENTERLINE

ABBREVIATIONS

APPROX	APPROXIMATELY
BFS	BEGIN FULL SUPER
BNC	BEGIN NORMAL CROWN
℄	CENTERLINE
CY	CUBIC YARD
E	EAST, EASTING
ENC	END NORMAL CROWN
ELEV	ELEVATION
FT '	FOOT, FEET
H	HORIZONTAL
IE	INVERT ELEVATION
IN "	INCH, INCHES
L	LENGTH OF CURVE
LCL	LEFT OF CENTERLINE
LC	LEVEL CURVE
LT	LEFT
LVC	LENGTH OF VERTICAL CURVE
MAX	MAXIMUM
MIN	MINIMUM
N	NORTH, NORTHING
NO.	NUMBER
NTS	NOT TO SCALE
OC	ON CENTER
PC	POINT OF CURVATURE
POT	POINT ON TANGENT
PST	PERFORATED STEEL TUBE
PT	POINT OF TANGENCY
PVI	POINT OF VERTICAL INTERSECTION
R	RADIUS
R/W	RIGHT OF WAY
RCL	RIGHT OF CENTERLINE
RT	RIGHT
S	SOUTH
SQFT	SQUARE FOOT
STA	STATION
T	TANGENT
TYP	TYPICAL
V	VERTICAL
VPC	VERTICAL POINT OF CURVATURE
VPI	VERTICAL POINT OF INTERSECTION
VPT	VERTICAL POINT OF TANGENCY
W	WEST
Ø	DIAMETER

REFERENCE LEGEND

- VIEW TITLE — X * ** — **VIEW NAME**
- DRAWING TITLE/ SUBTITLE — **DRAWING TITLE**
- SECTION OR ELEVATION VIEW (X * **)
- DETAIL CALLOUT (X * **)
- DETAIL TAG (X * **)
- ADDITIONAL SHEET CALLOUT

IN VIEW TITLE:

* SHEET NUMBER WHERE THE CALLOUT CUT IS MADE OR DASH MARK WHEN ON THE SAME SHEET

** SHEET NUMBER WHERE DETAIL IS LOCATED WHEN ON A DIFFERENT SHEET OR DASH MARK WHEN ON THE SAME SHEET

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

CIVIL GENERAL NOTES AND ABBREVIATIONS

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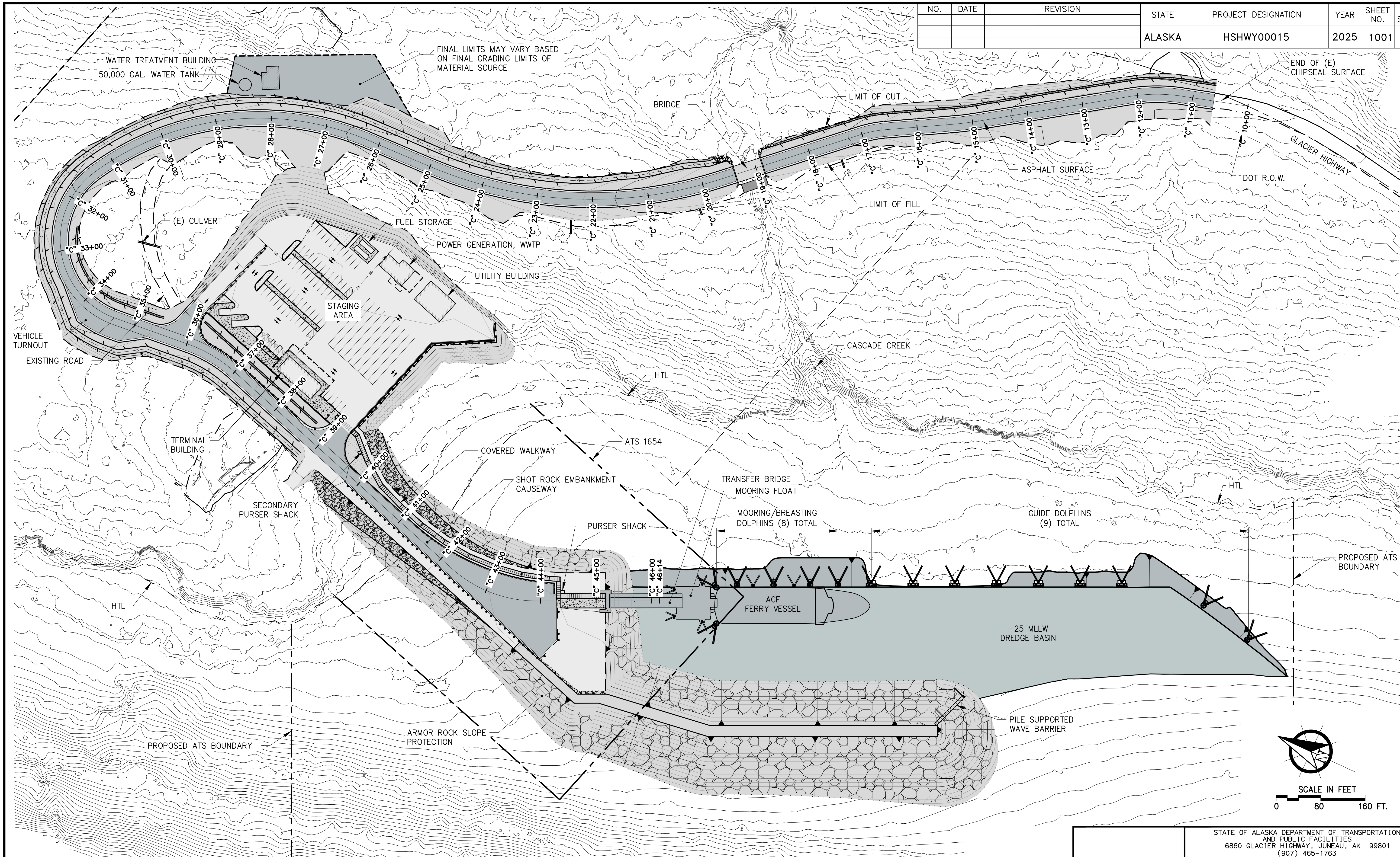

NOTE:

1. THIS DRAWING IS PROVIDED FOR GENERAL REFERENCE AND INFORMATIONAL PURPOSES ONLY
2. UTILITIES NOT SHOWN.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
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JNU CASCADE POINT FERRY TERMINAL

SITE MASTER PLAN

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_Master Plan.dwg | DATE 5/17/2025 13:41 | LAYOUT 1001 | DESIGNED | CHECKED | DRAFTED

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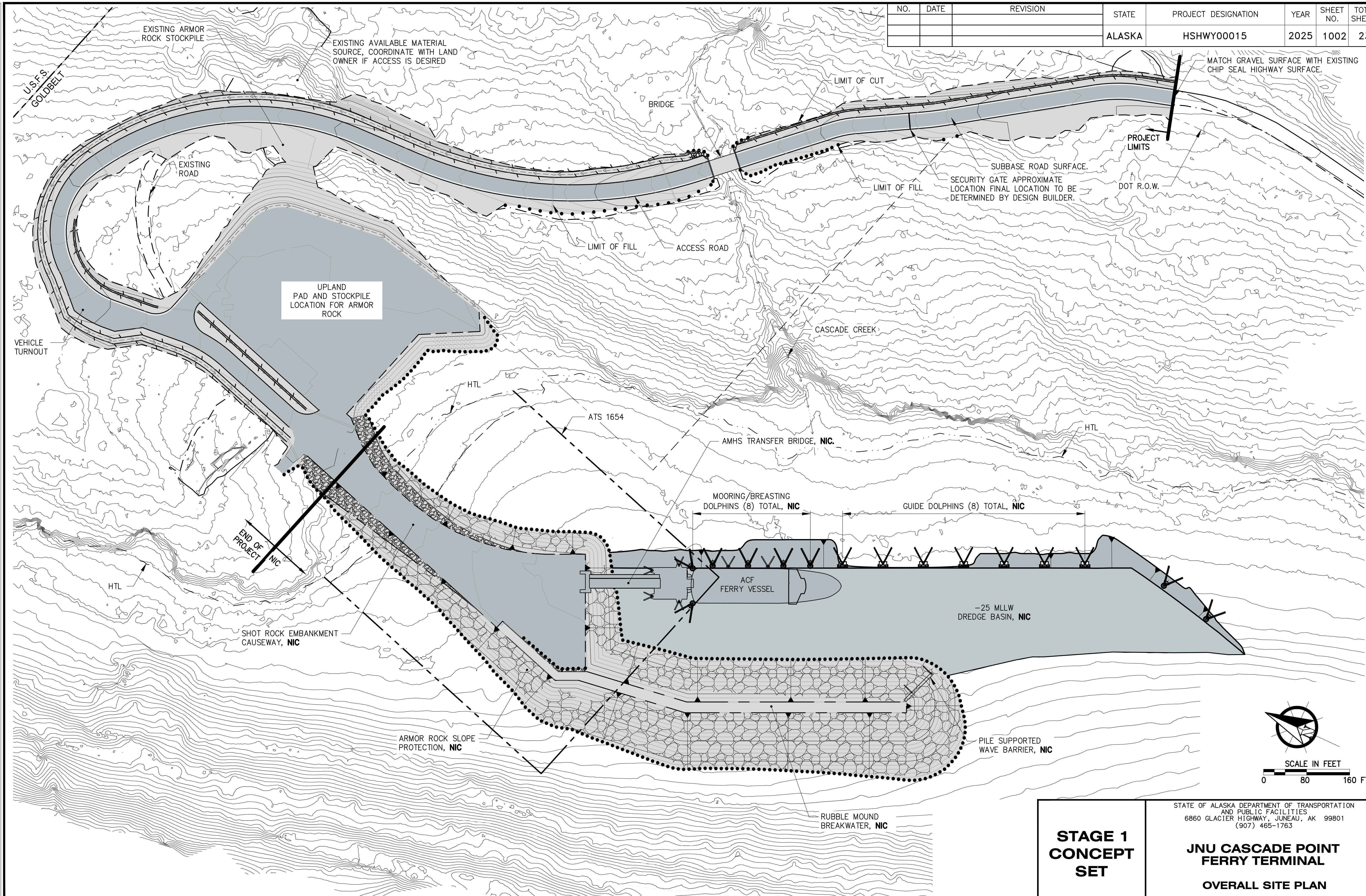

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
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JNU CASCADE POINT FERRY TERMINAL

OVERALL SITE PLAN

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_1002 Overall Site Plan.dwg
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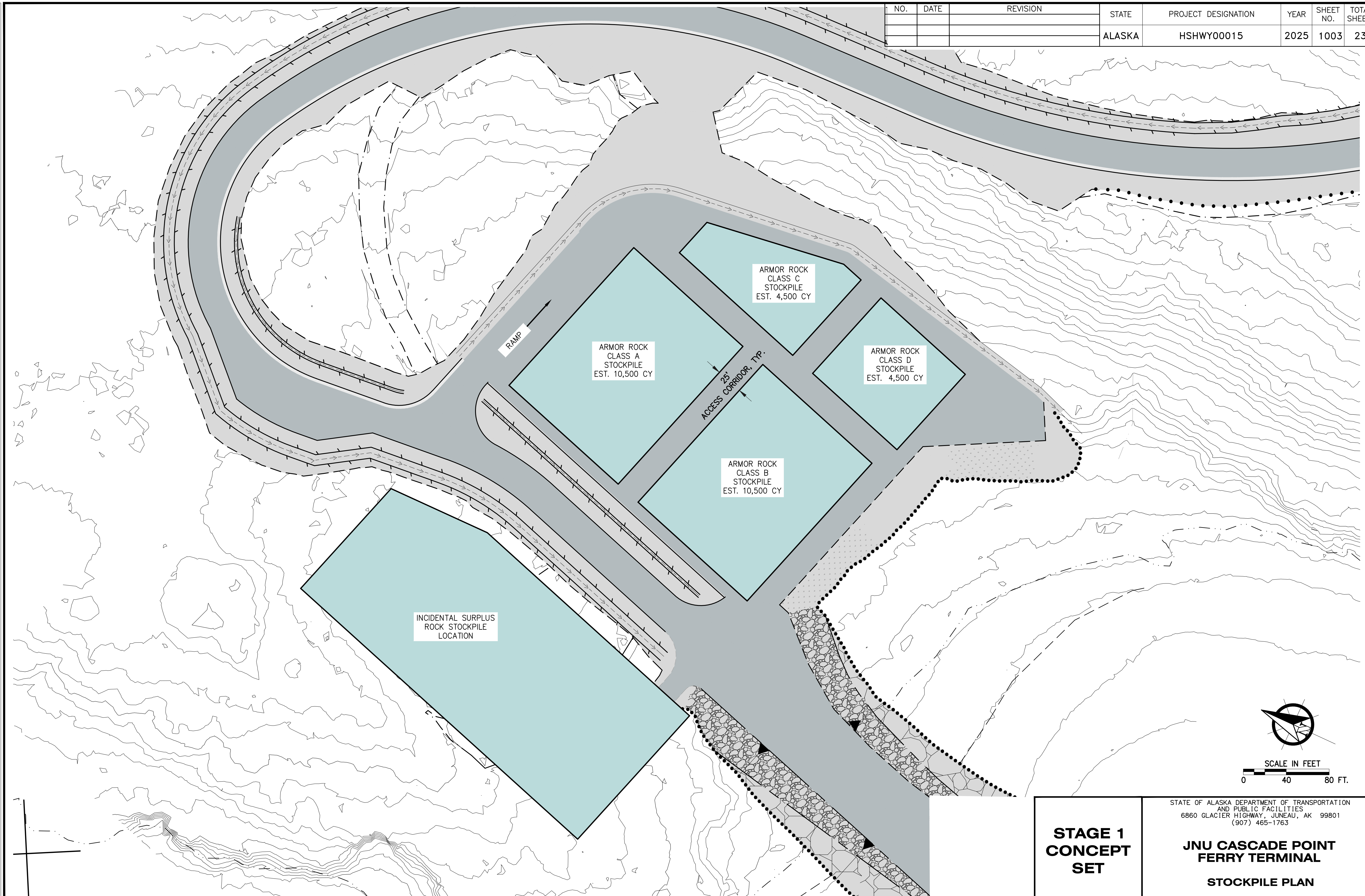
LAYOUT 1002
DESIGNED
CHECKED
DRAFTED



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STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
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STAGE 1 CONCEPT SET

JNU CASCADE POINT FERRY TERMINAL

STOCKPILE PLAN

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DESIGNED
CHECKED
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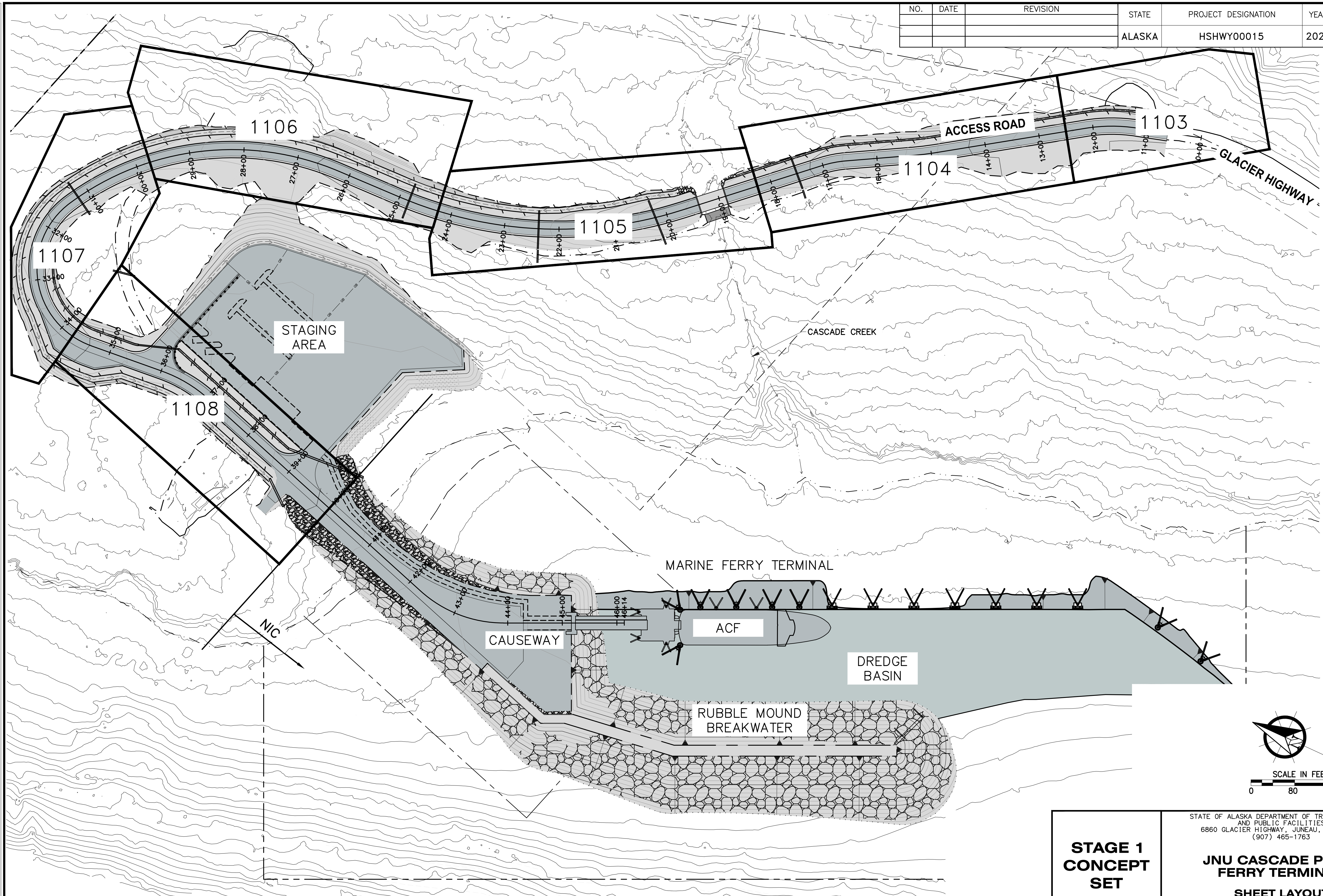

STAGE 1 CONCEPT SET

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6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

SHEET LAYOUT SCHEMATIC

DRAFTED | CHECKED | DESIGNED | LAYOUT 1004

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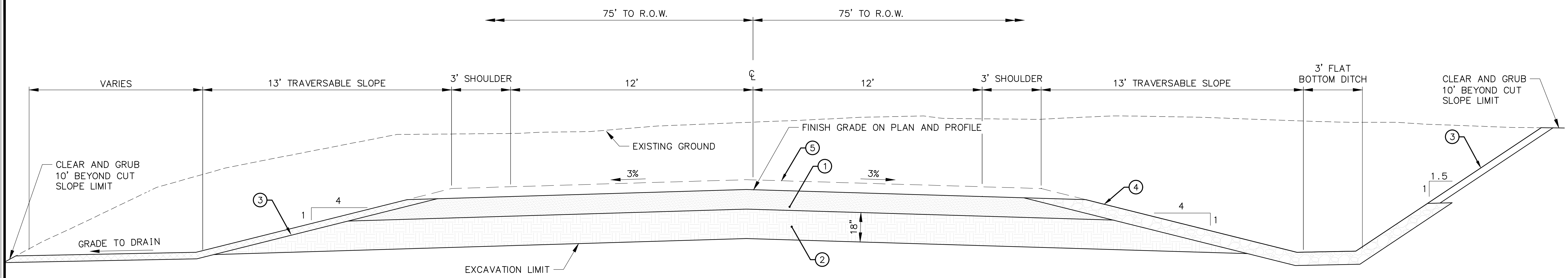
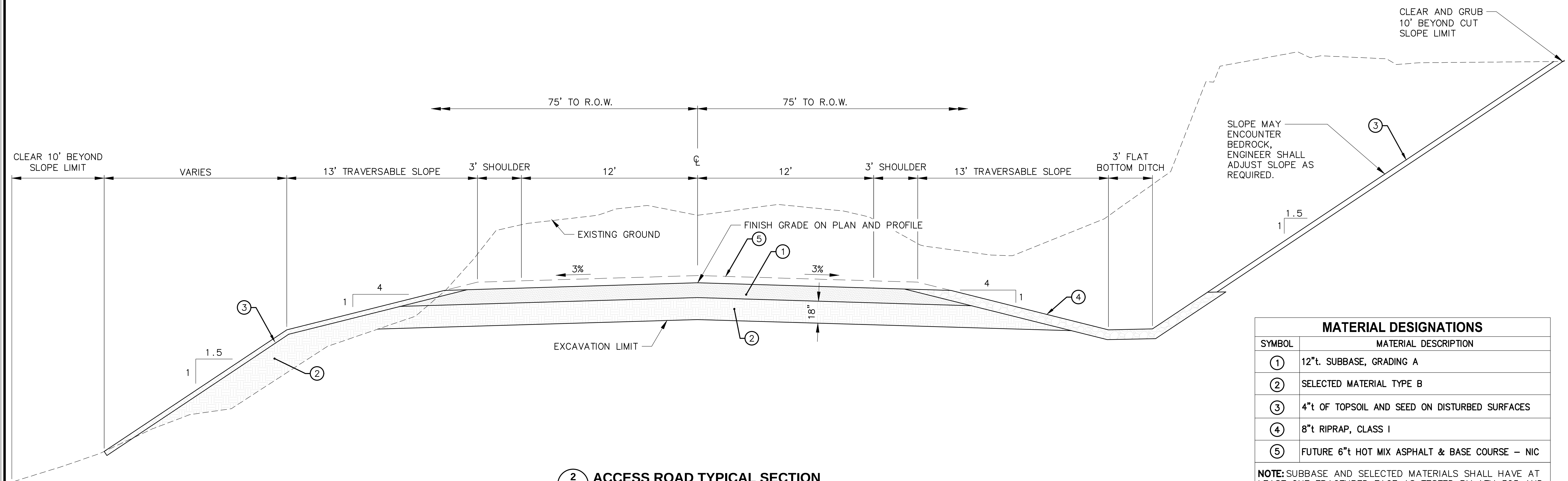


1 ACCESS ROAD TYPICAL SECTION
BOP TO STA 14+75 & STA 15+50 TO STA 16+50



2 ACCESS ROAD TYPICAL SECTION
STA 14+75 TO STA 15+50 & STA 16+50 TO 18+86 (BRIDGE)

MATERIAL DESIGNATIONS

SYMBOL	MATERIAL DESCRIPTION
1	12"t. SUBBASE, GRADING A
2	SELECTED MATERIAL TYPE B
3	4"t OF TOPSOIL AND SEED ON DISTURBED SURFACES
4	8"t RIPRAP, CLASS I
5	FUTURE 6"t HOT MIX ASPHALT & BASE COURSE – NIC

NOTE: SUBBASE AND SELECTED MATERIALS SHALL HAVE AT LEAST ONE FRACTURED FACE AS TESTED BY ATM 305 AND SHALL BE LIMITED TO 6% PASSING THE NO. 200 SIEVE.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

ROAD TYPICAL SECTIONS

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_110X Typical Sections.dwg 5/19/2025 15:02 LAYOUT 12 DESIGNED CHECKED DRAFTED

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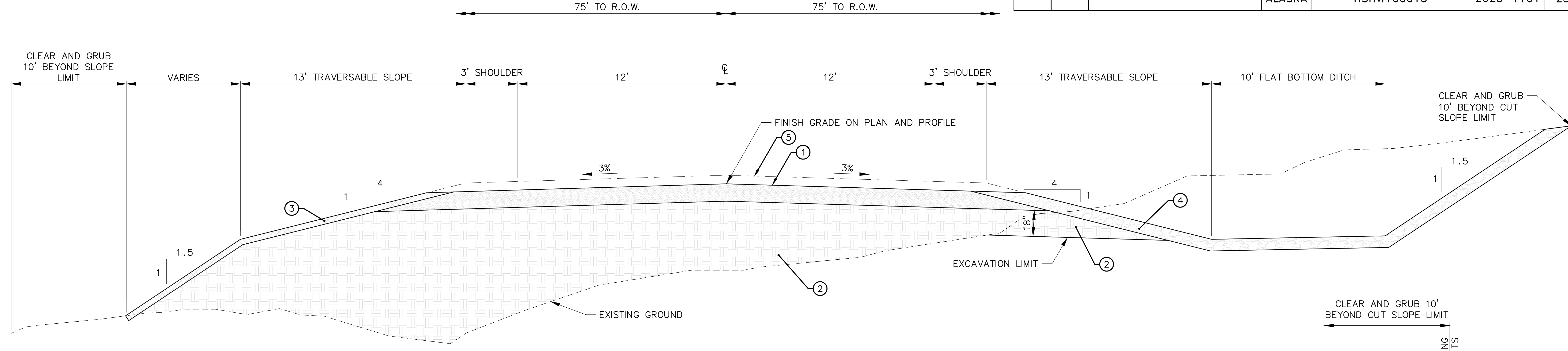
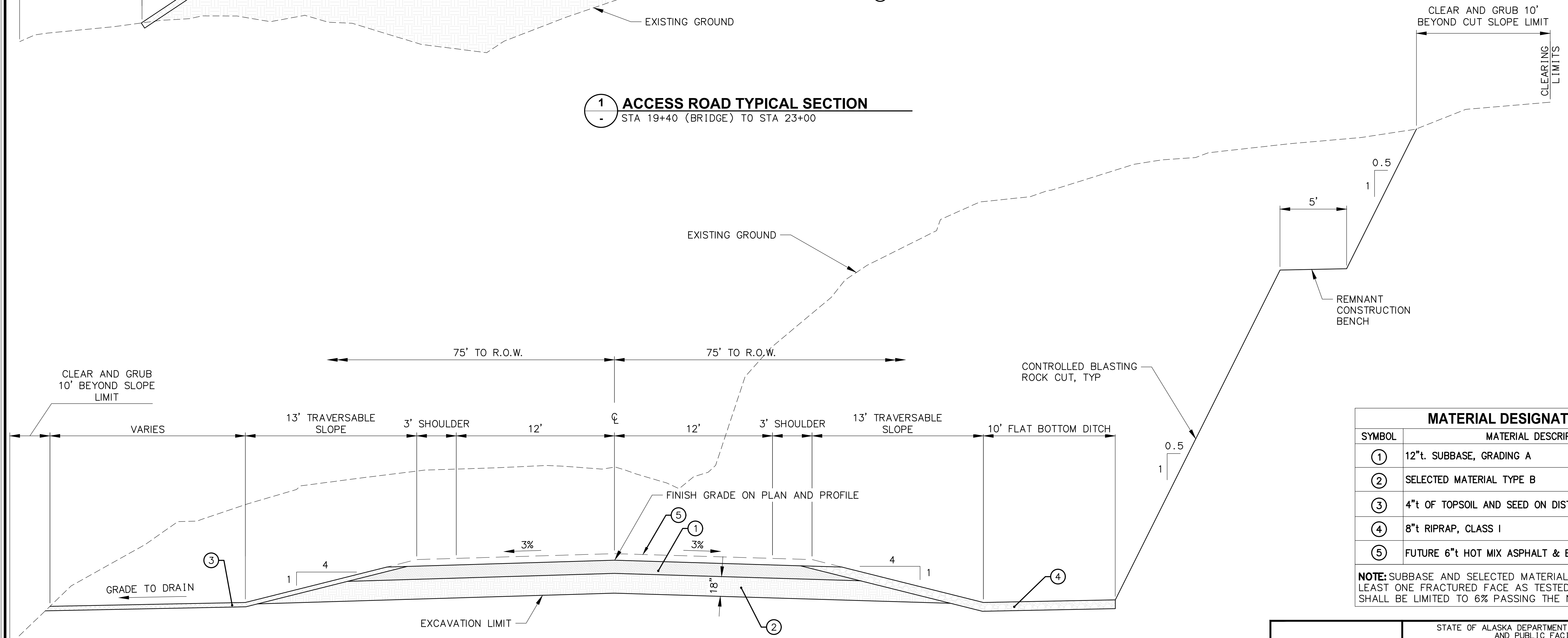


1 - ACCESS ROAD TYPICAL SECTION
STA 19+40 (BRIDGE) TO STA 23+00



2 - ACCESS ROAD TYPICAL SECTION
STA 23+00 TO STA 31+20

MATERIAL DESIGNATIONS

SYMBOL	MATERIAL DESCRIPTION
1	12"t. SUBBASE, GRADING A
2	SELECTED MATERIAL TYPE B
3	4"t OF TOPSOIL AND SEED ON DISTURBED SURFACES
4	8"t RIPRAP, CLASS I
5	FUTURE 6"t HOT MIX ASPHALT & BASE COURSE – NIC

NOTE: SUBBASE AND SELECTED MATERIALS SHALL HAVE AT LEAST ONE FRACTURED FACE AS TESTED BY ATM 305 AND SHALL BE LIMITED TO 6% PASSING THE NO. 200 SIEVE.

STAGE 1 CONCEPT SET

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JNU CASCADE POINT FERRY TERMINAL

ROAD TYPICAL SECTIONS

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_110X Typical Sections.dwg | 5/19/2025 12:51 | LAYOUT 12 (2) | DESIGNED | CHECKED | DRAFTED

NO.	DATE	REVISION

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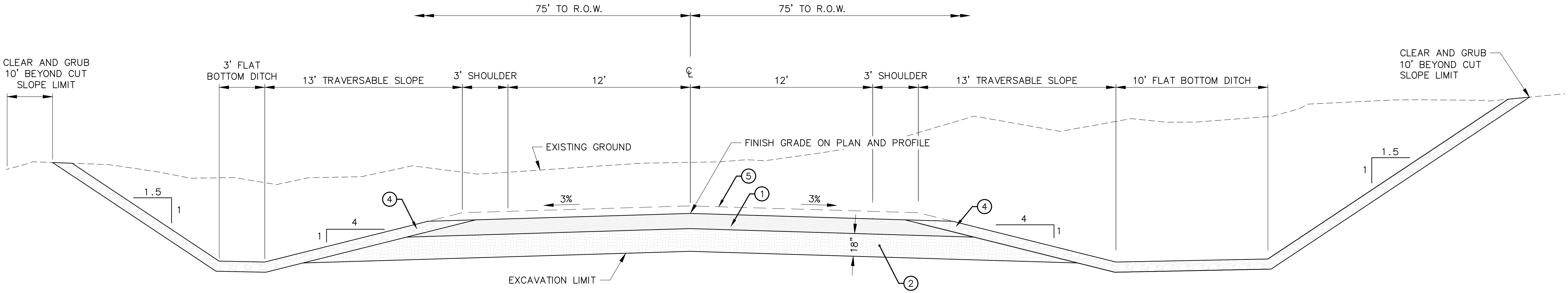
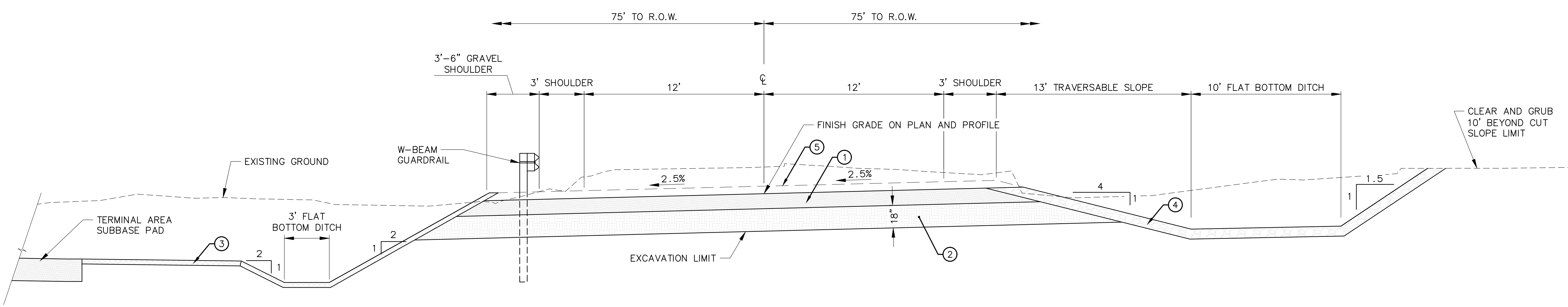


1 ACCESS ROAD TYPICAL SECTION
STA 31+20 TO STA 35+30



2 ACCESS ROAD TYPICAL SECTION
STA 35+30 TO STA 39+26 (CAUSEWAY)

MATERIAL DESIGNATIONS

SYMBOL	MATERIAL DESCRIPTION
1	12"t. SUBBASE, GRADING A
2	SELECTED MATERIAL TYPE B
3	4"t OF TOPSOIL AND SEED ON DISTURBED SURFACES
4	8"t RIPRAP, CLASS I
5	FUTURE 6"t HOT MIX ASPHALT & BASE COURSE – NIC

NOTE: SUBBASE AND SELECTED MATERIALS SHALL HAVE AT LEAST ONE FRACTURED FACE AS TESTED BY ATM 305 AND SHALL BE LIMITED TO 6% PASSING THE NO. 200 SIEVE.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

ROAD TYPICAL SECTIONS

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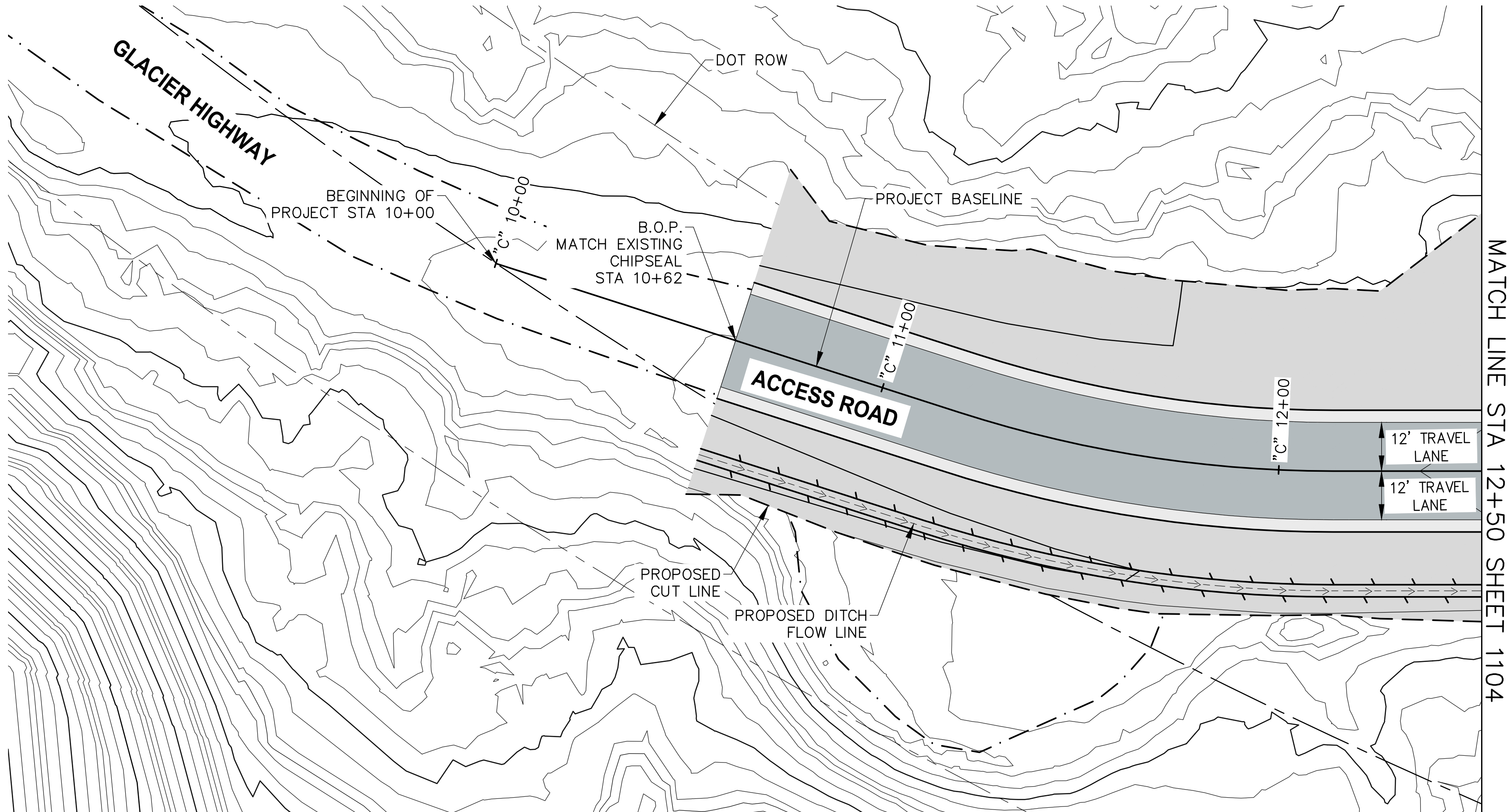
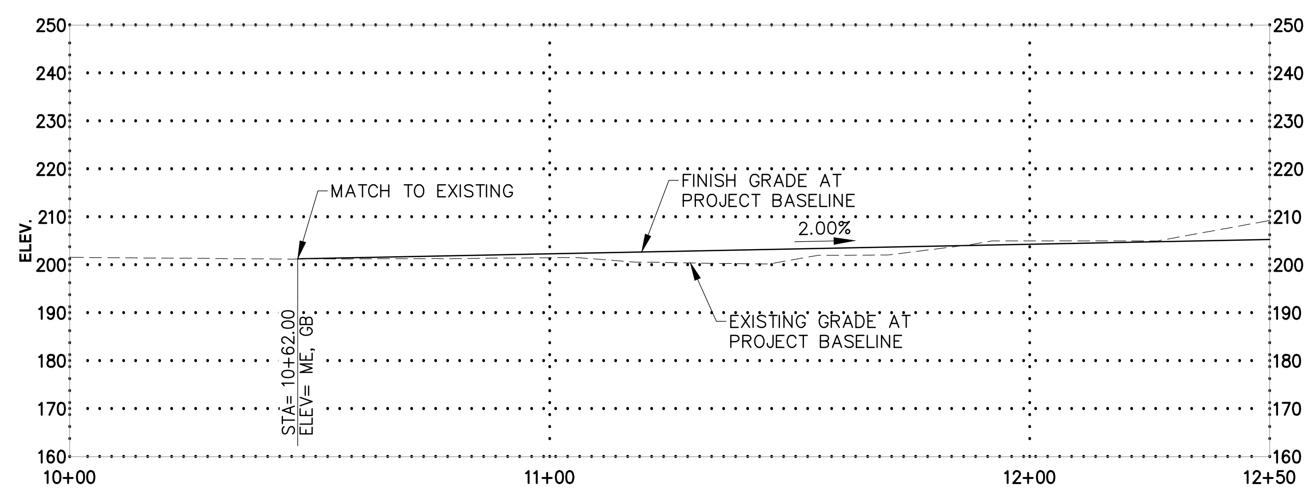
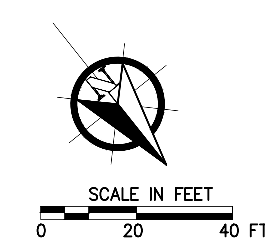


PARTIAL PLAN



PARTIAL PROFILE



STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

ROAD PLAN & PROFILE

DRAFTED | CHECKED | DESIGNED | LAYOUT PP 1 (2)

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_110X Road Plans and Profiles.dwg 6/4/2025 9:56

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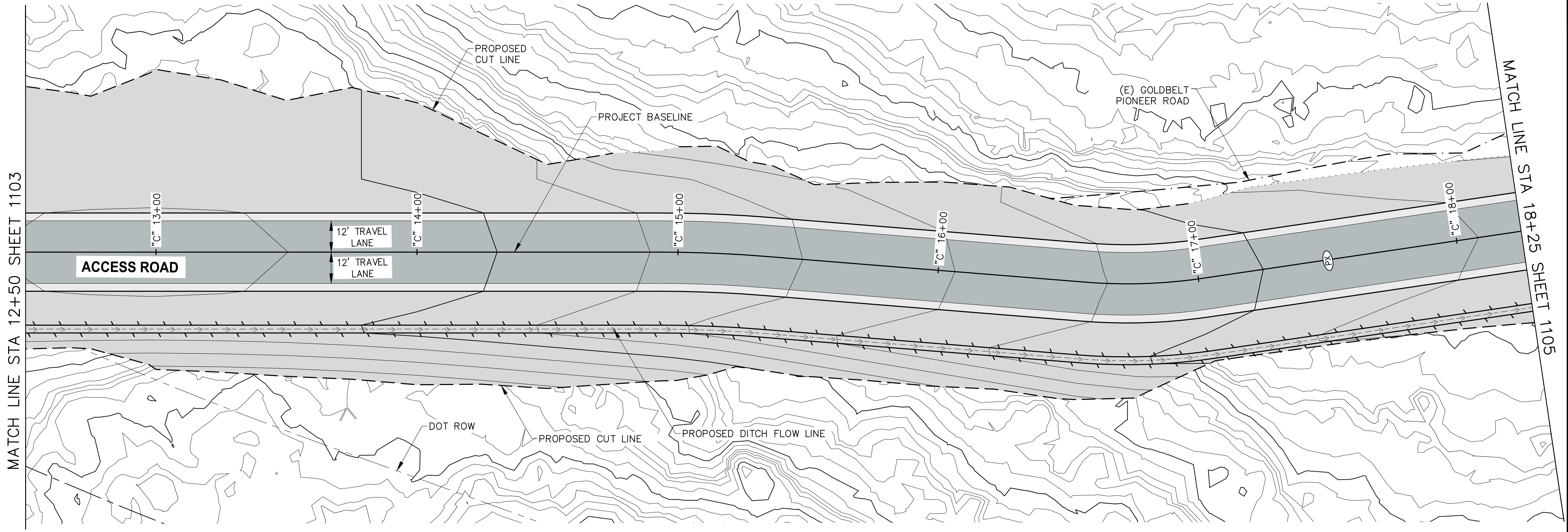
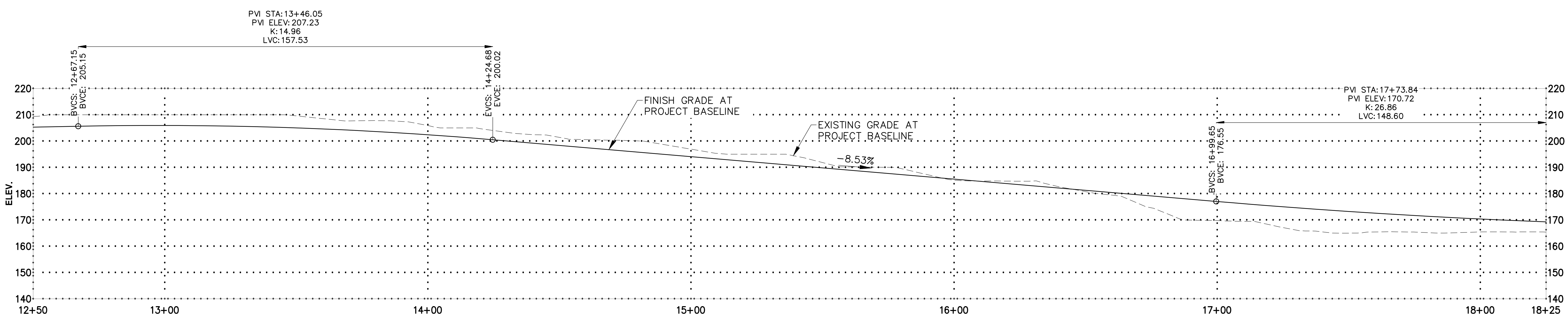
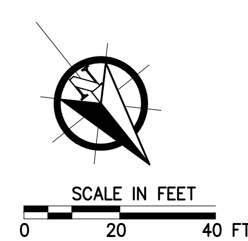


PARTIAL PLAN



PARTIAL PROFILE



STAGE 1 CONCEPT SET

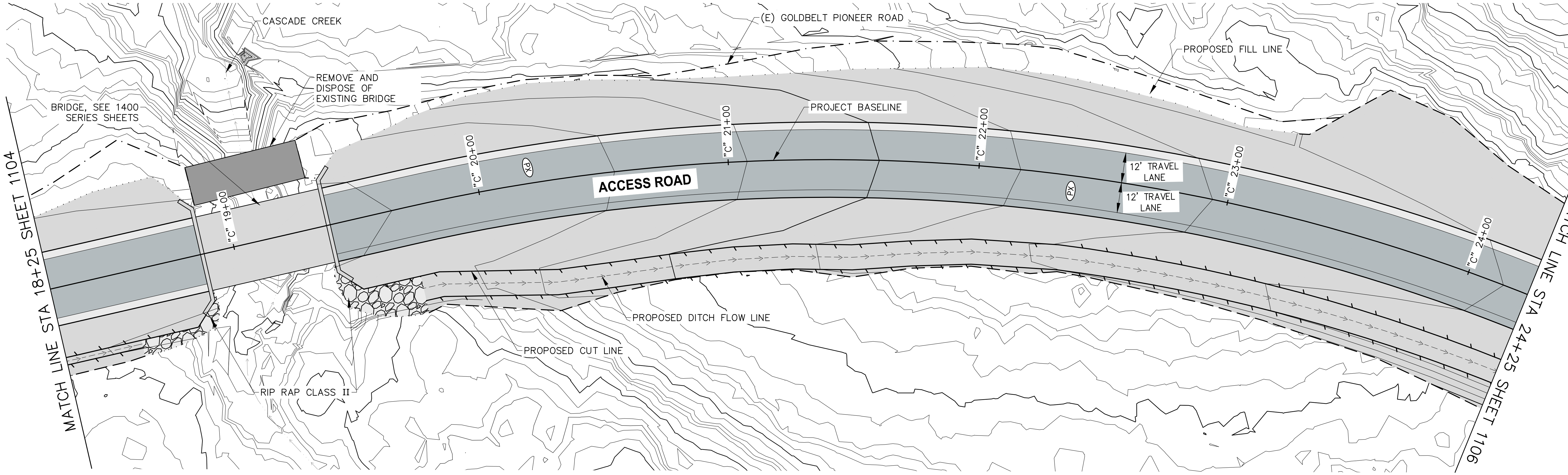
STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

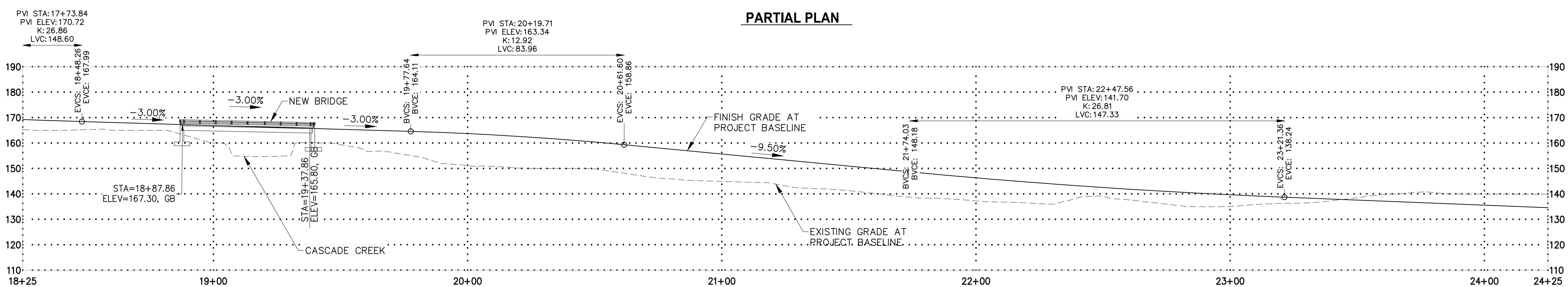
ROAD PLAN & PROFILE

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_110X Road Plans and Profiles.dwg 6/13/2025 9:56 | LAYOUT PP 1 | DESIGNED | CHECKED | DRAFTED

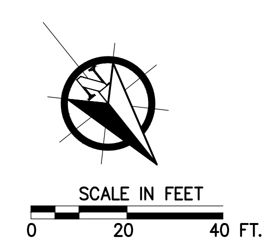
NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	HSHWY00015	2025	1105	23



PARTIAL PLAN



PARTIAL PROFILE



STAGE 1 CONCEPT SET	STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES 6860 GLACIER HIGHWAY, JUNEAU, AK 99801 (907) 465-1763 **JNU CASCADE POINT FERRY TERMINAL** **ROAD PLAN & PROFILE**	

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_110X Road Plans and Profiles.dwg | DATE 5/9/2025 9:56 | LAYOUT PP 2 | DESIGNED | CHECKED | DRAFTED

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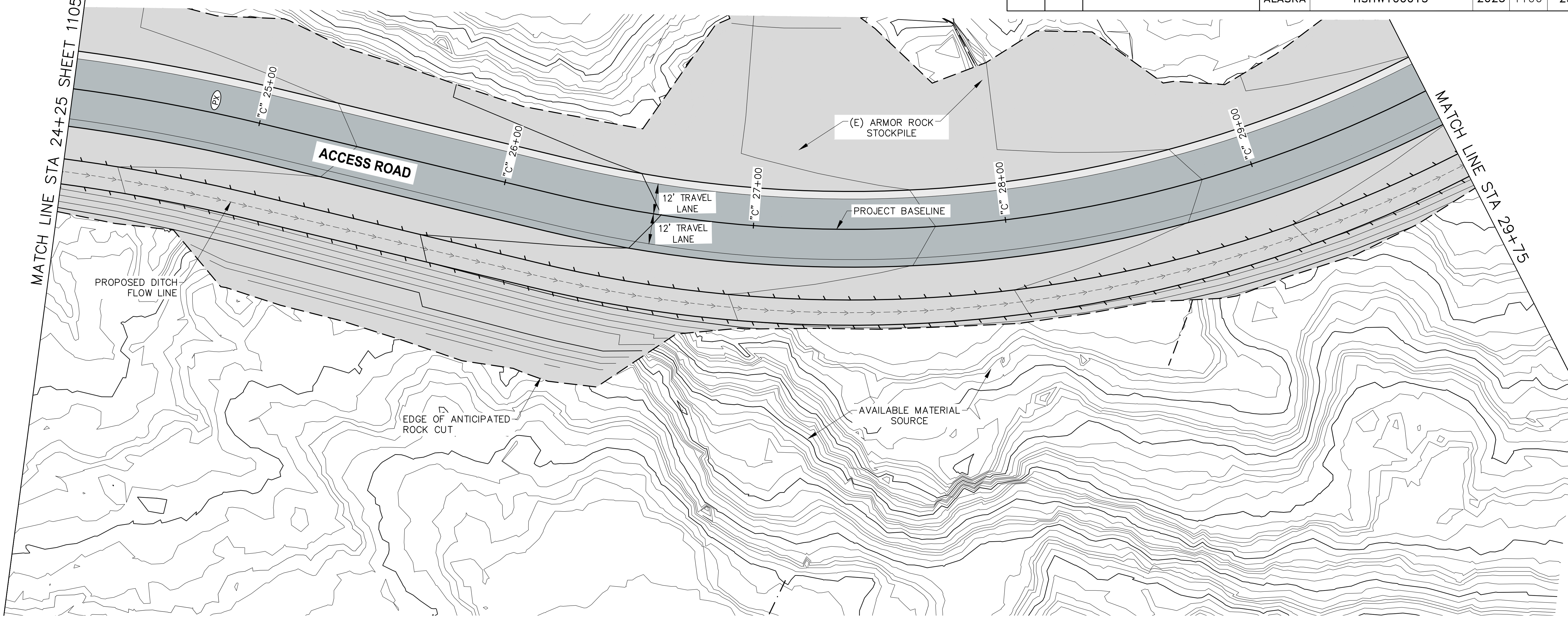

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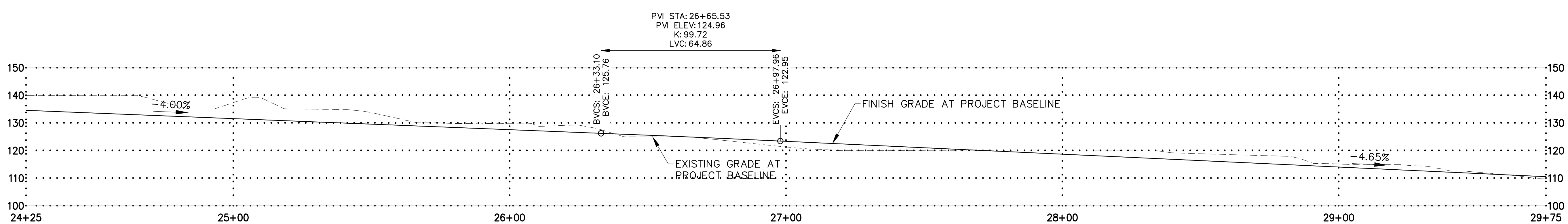

PARTIAL PROFILE

SCALE IN FEET

0 20 40 FT.

STAGE 1 CONCEPT SET	STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES 6860 GLACIER HIGHWAY, JUNEAU, AK 99801 (907) 465-1763 **JNU CASCADE POINT FERRY TERMINAL** **ROAD PLAN & PROFILE**

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_110X Road Plans and Profiles.dwg | DATE 5/09/2025 9:56 | LAYOUT PP 3 | DESIGNED | CHECKED | DRAFTED

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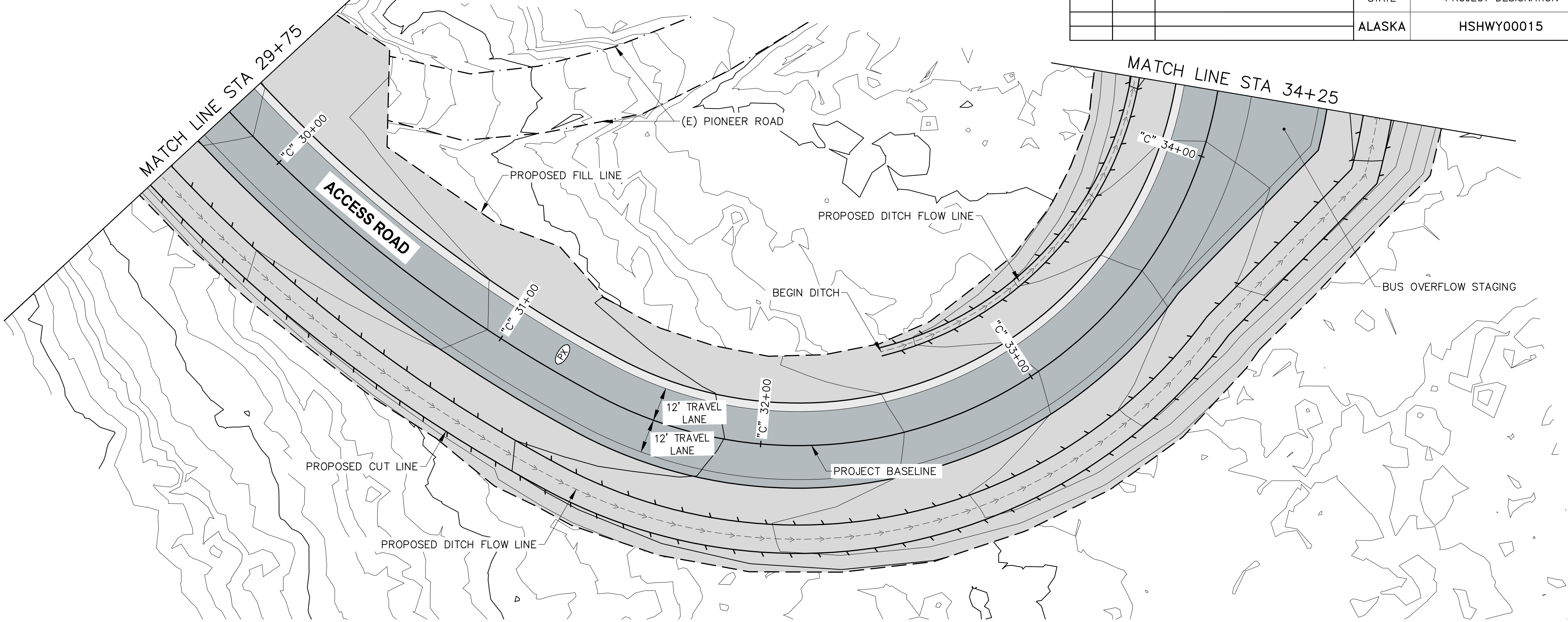
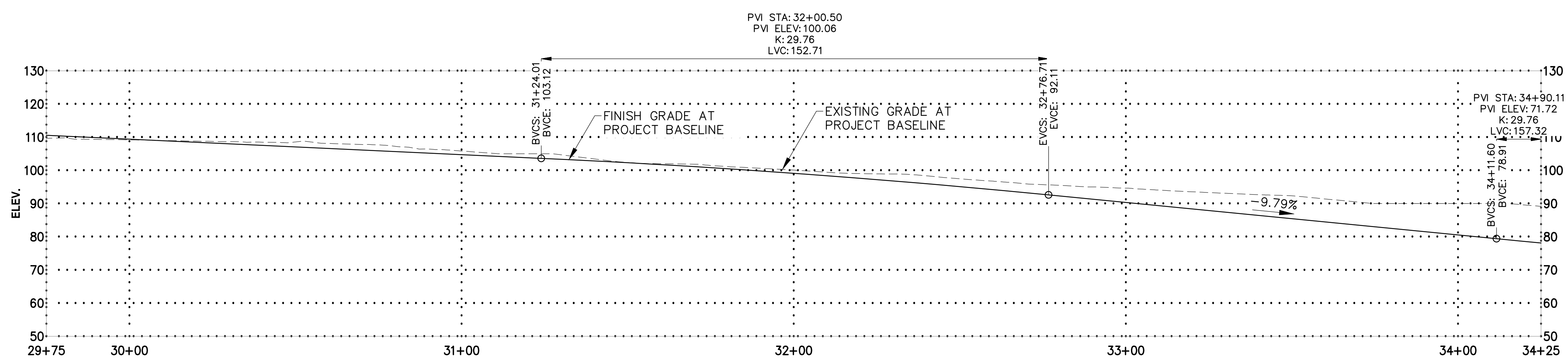


PARTIAL PLAN



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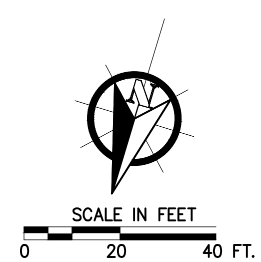

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

ROAD PLAN & PROFILE

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_110X Road Plans and Profiles.dwg
DATE 5/[illegible]/2025 9:56
LAYOUT PP 4
DESIGNED
CHECKED
DRAFTED

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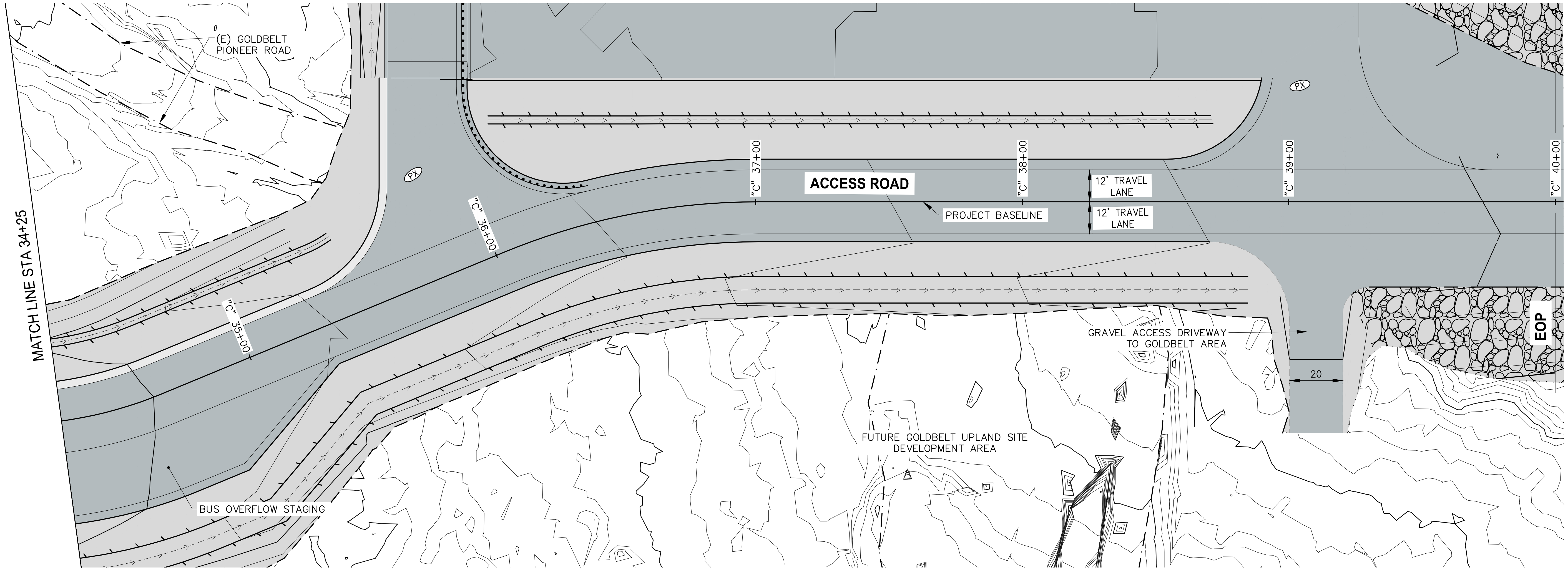
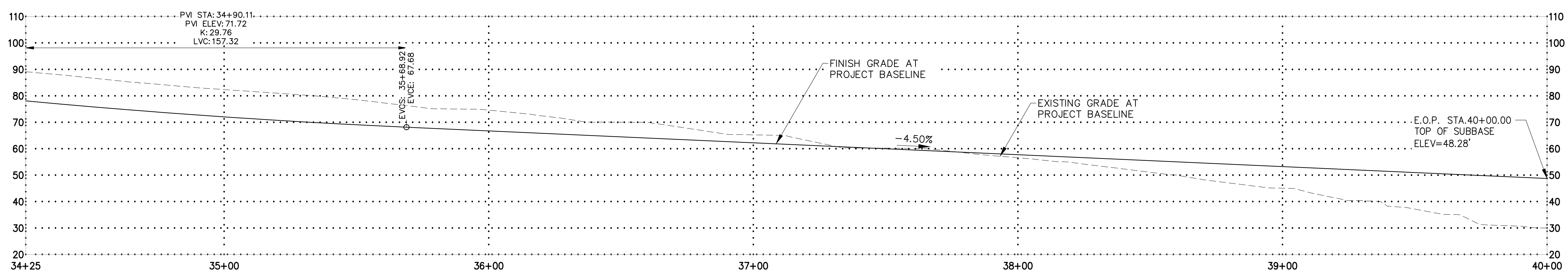


PARTIAL PLAN



PARTIAL PROFILE

SCALE IN FEET
0 20 40 FT.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

ROAD PLAN & PROFILE

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_110X Road Plans and Profiles.dwg
LAYOUT PP 5
DESIGNED
CHECKED
DRAFTED

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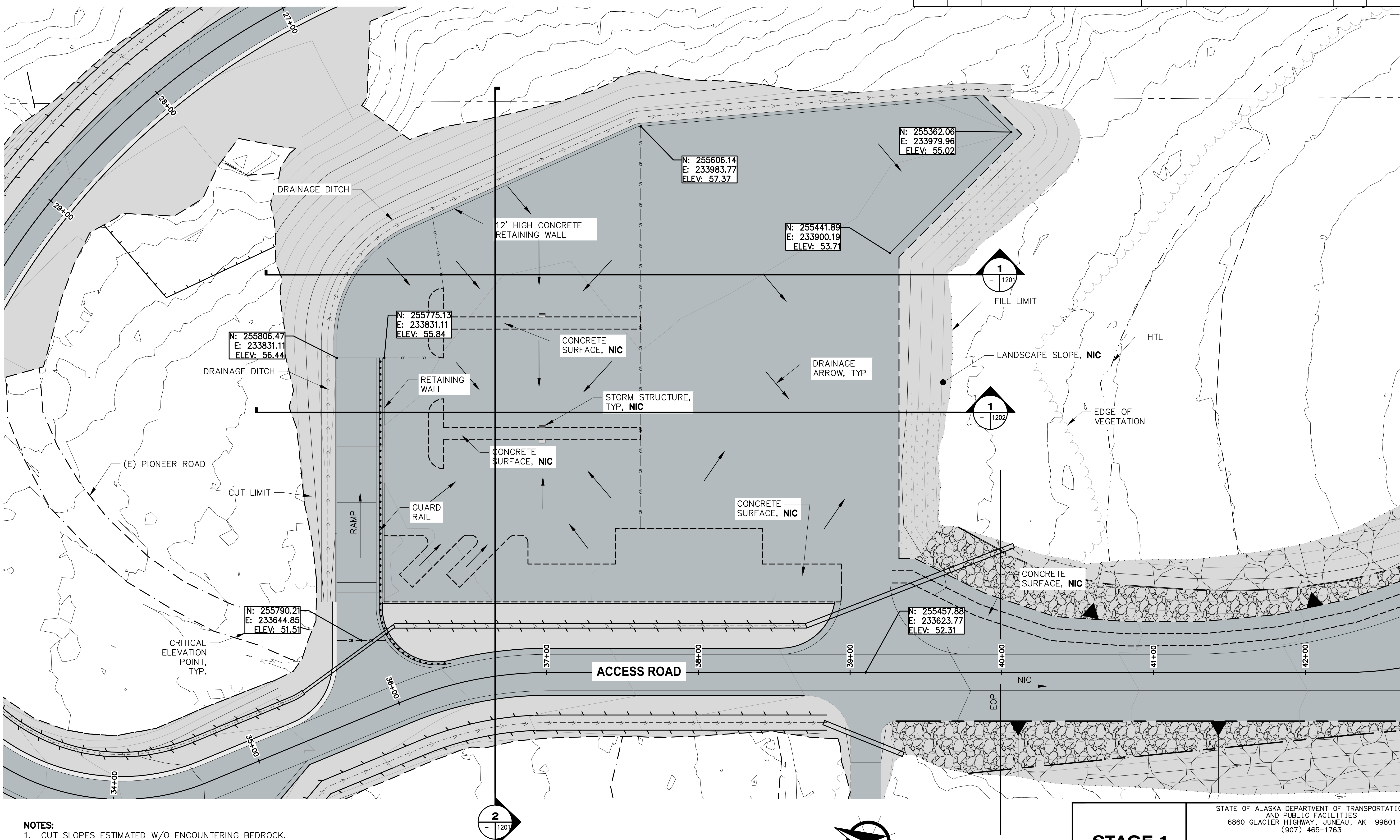

NOTES:

1. CUT SLOPES ESTIMATED W/O ENCOUNTERING BEDROCK.
2. STRUCTURES AND GRADE BREAKS SHOWN ARE APPROXIMATE AND ARE INTENDED TO SHOW THE APPROXIMATE DRAINAGE PATTERNS.
3. ELEVATION PROVIDED ARE REFERENCED FROM MLLW IN FEET.
4. CRITICAL ELEVATION POINTS SHOWN

SCALE IN FEET
0 30 60 FT.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

STAGING AREA GRADING AND DRAINAGE PLAN

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_120X Staging Area Grading Plan.dwg | LAYOUT 12 | DESIGNED | CHECKED | DRAFTED

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
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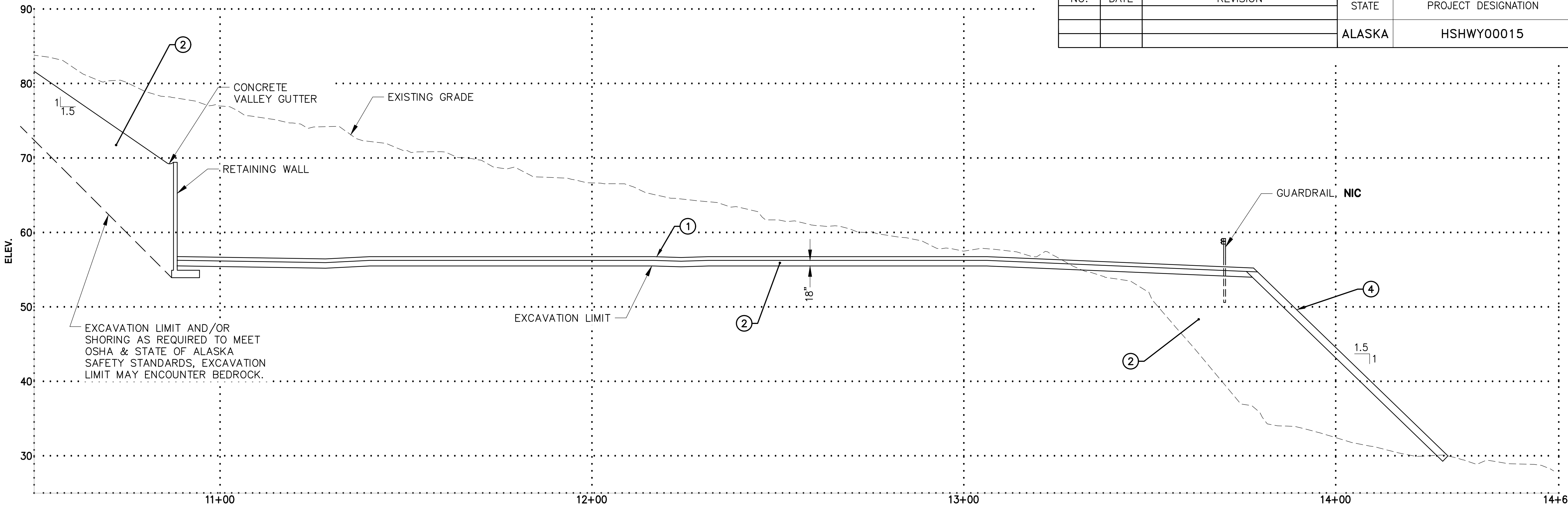
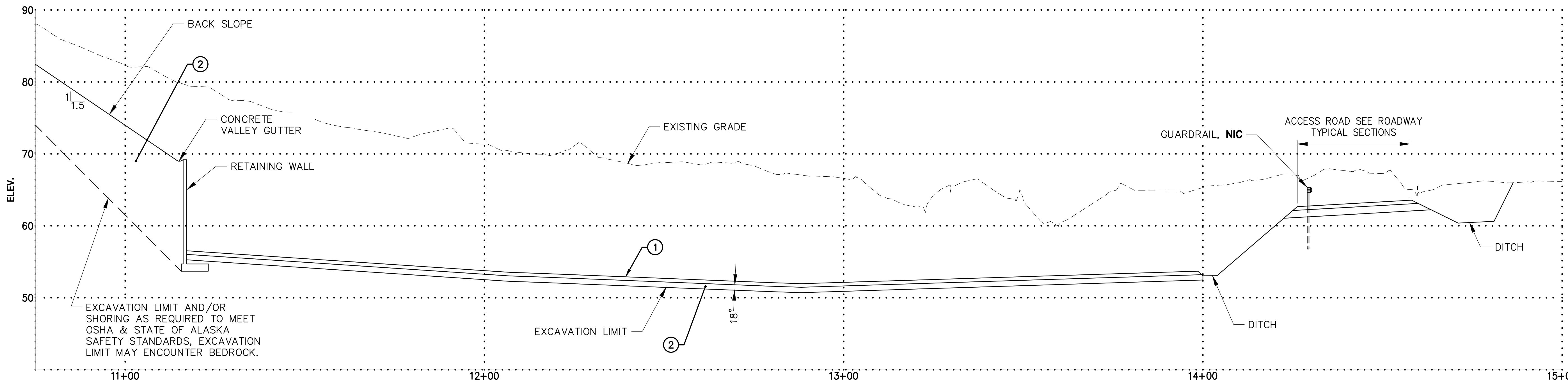


1 SITE SECTION
-



2 SITE SECTION
-

MATERIAL DESIGNATIONS

SYMBOL	MATERIAL DESCRIPTION
1	12"t. SUBBASE, GRADING A
2	SELECTED MATERIAL TYPE B
3	4"t OF TOPSOIL AND SEED ON DISTURBED SURFACES
4	8"t RIPRAP, CLASS I
5	FUTURE 6"t HOT MIX ASPHALT & BASE COURSE – NIC

NOTE: SUBBASE AND SELECTED MATERIALS SHALL HAVE AT LEAST ONE FRACTURED FACE AS TESTED BY ATM 305 AND SHALL BE LIMITED TO 6% PASSING THE NO. 200 SIEVE.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

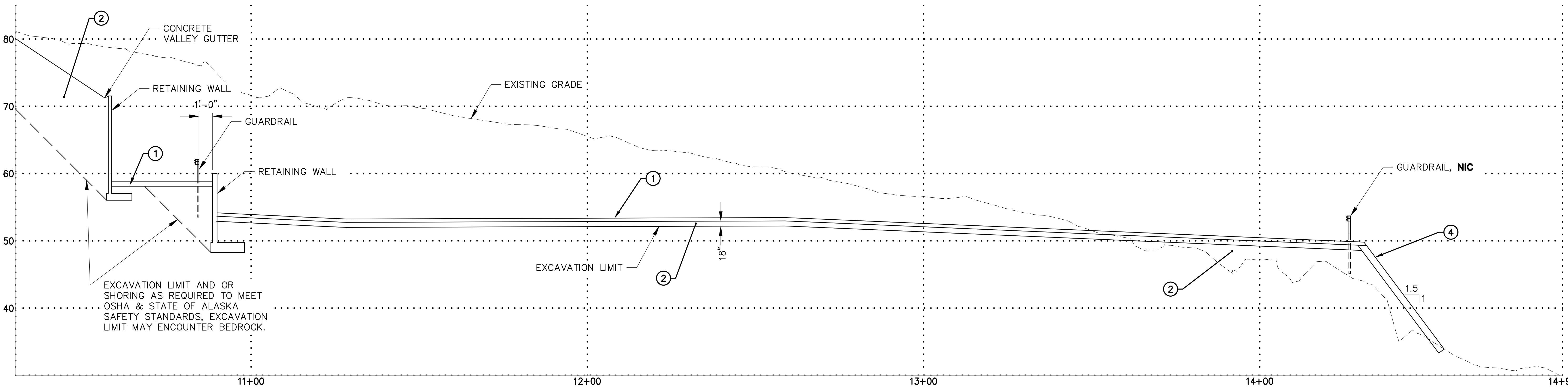
JNU CASCADE POINT FERRY TERMINAL

STAGING AREA SITE SECTIONS

DRAFTED | CHECKED | DESIGNED | LAYOUT 1201

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_120X Staging Area Site Sections

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
			ALASKA	HSHWY00015	2025	1202	23



1 - SITE SECTION

MATERIAL DESIGNATIONS	
SYMBOL	MATERIAL DESCRIPTION
1	12"t. SUBBASE, GRADING A
2	SELECTED MATERIAL TYPE B
3	4"t OF TOPSOIL AND SEED ON DISTURBED SURFACES
4	8"t RIPRAP, CLASS I
5	FUTURE 6"t HOT MIX ASPHALT & BASE COURSE – NIC

NOTE: SUBBASE AND SELECTED MATERIALS SHALL HAVE AT LEAST ONE FRACTURED FACE AS TESTED BY ATM 305 AND SHALL BE LIMITED TO 6% PASSING THE NO. 200 SIEVE.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

STAGING AREA SITE SECTIONS

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
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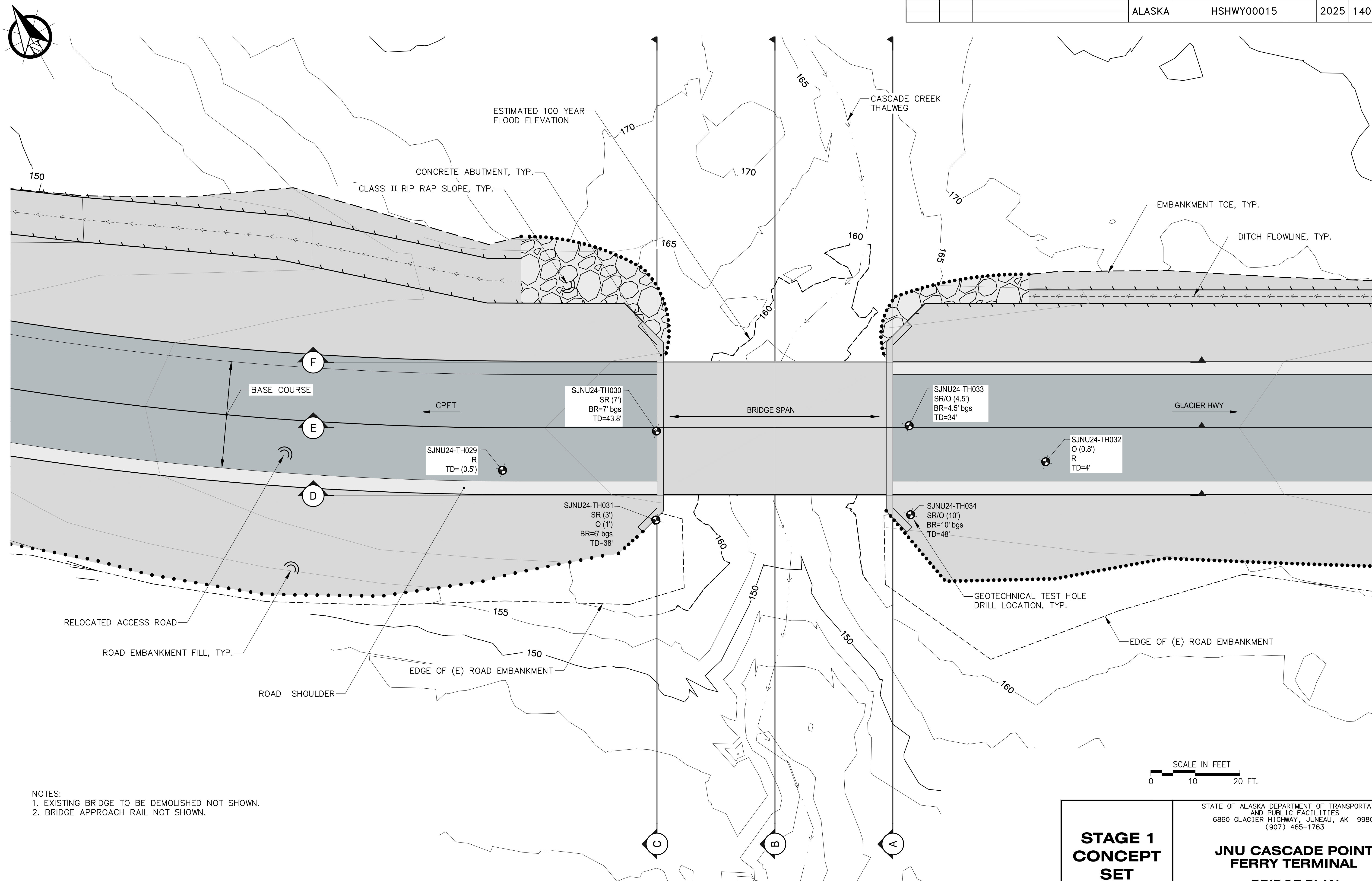

NOTES:
1. EXISTING BRIDGE TO BE DEMOLISHED NOT SHOWN.
2. BRIDGE APPROACH RAIL NOT SHOWN.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

BRIDGE PLAN

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_Bridge Plan & Sections.dwg 5/17/2025 13:04
LAYOUT 1
DESIGNED
CHECKED
DRAFTED

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
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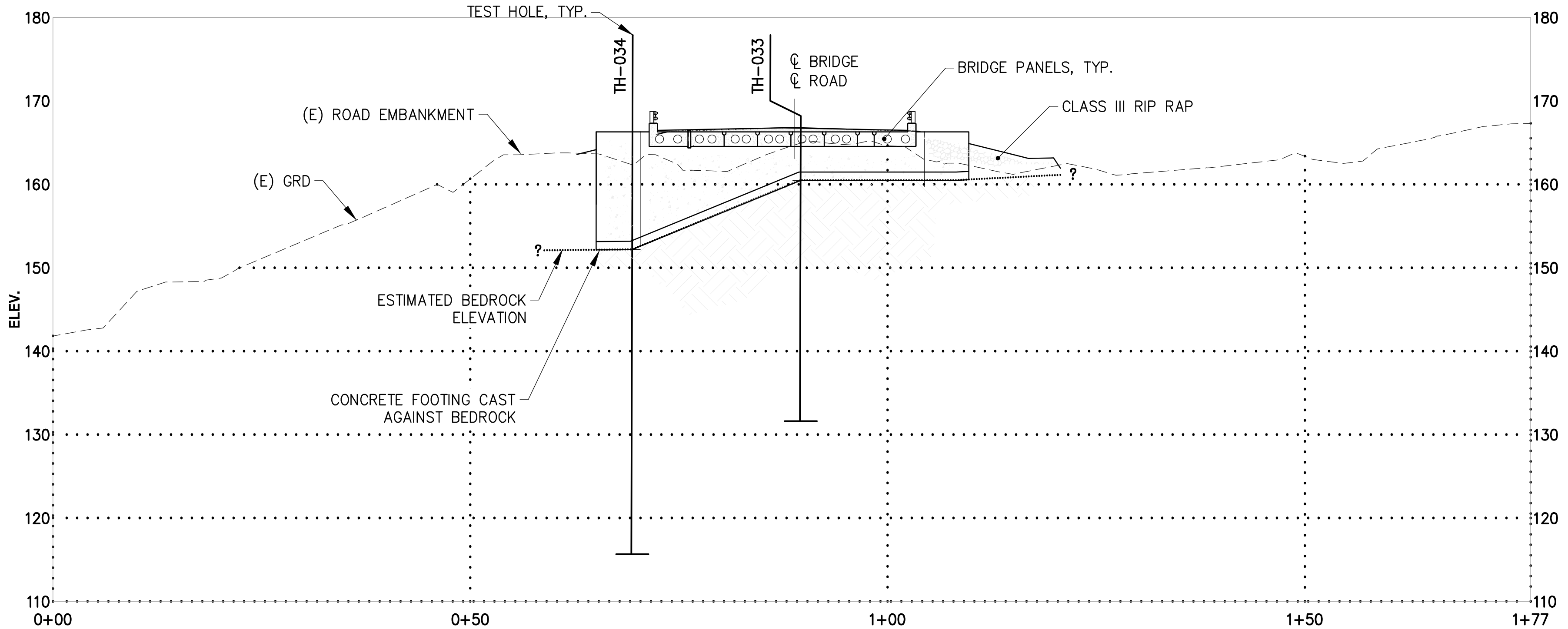
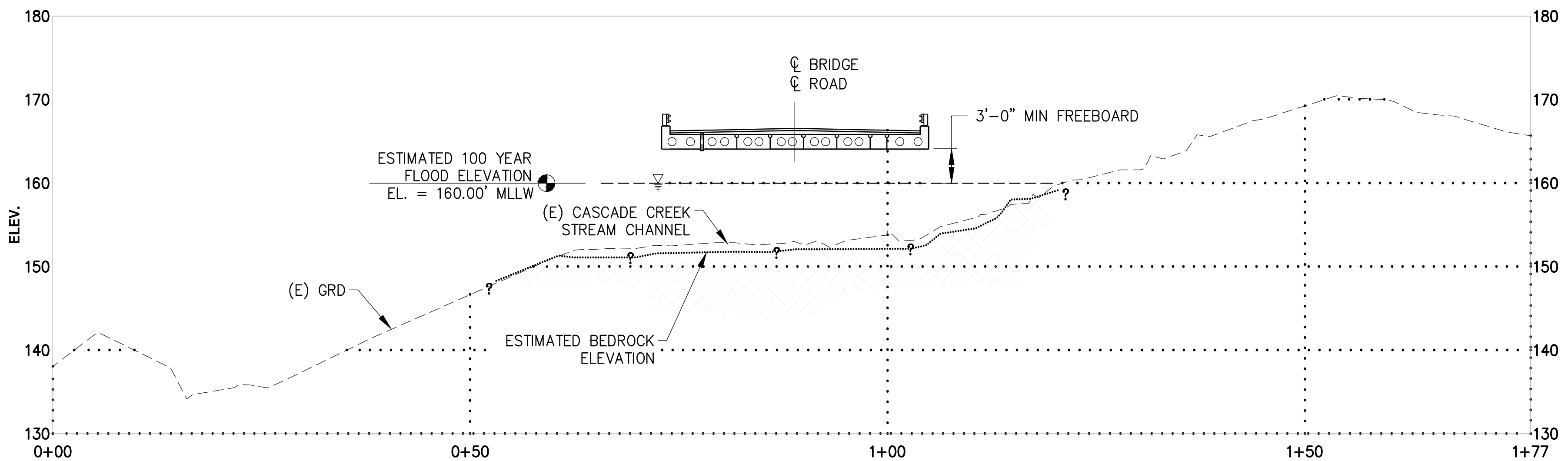


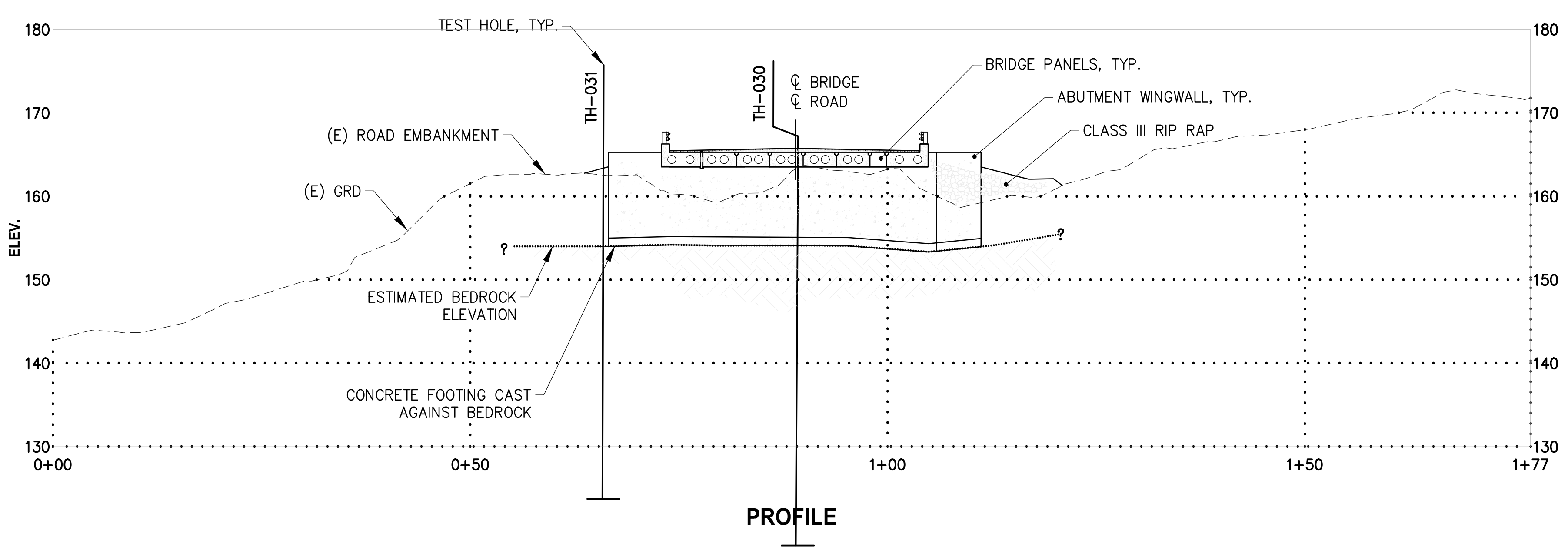
(A) BRIDGE SECTION @ EAST ABUTMENT

SCALE IN FEET
0 10 20 FT.



(B) BRIDGE SECTION @ MID SPAN

SCALE IN FEET
0 10 20 FT.



PROFILE

(C) BRIDGE SECTION @ WEST ABUTMENT

SCALE IN FEET
0 10 20 FT.

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

JNU CASCADE POINT FERRY TERMINAL

BRIDGE SECTIONS

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_Bridge Plan & Sections.dwg
DATE 5/17/2025 13:04
LAYOUT 2
DESIGNED
CHECKED
DRAFTED

NO.	DATE	REVISION	STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
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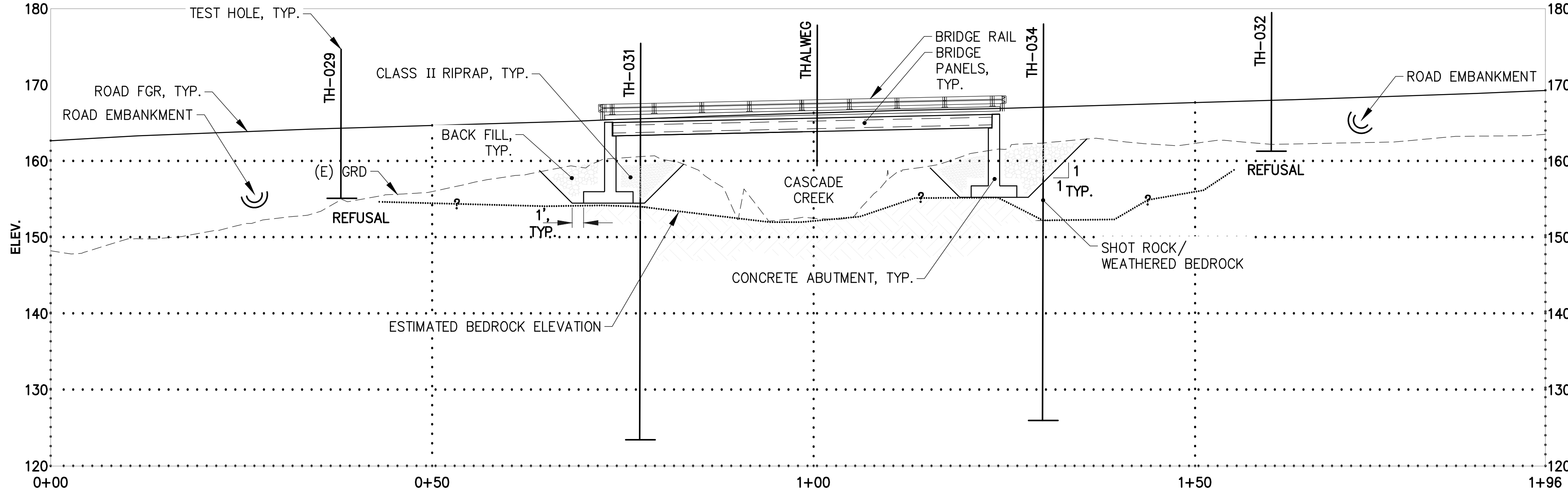
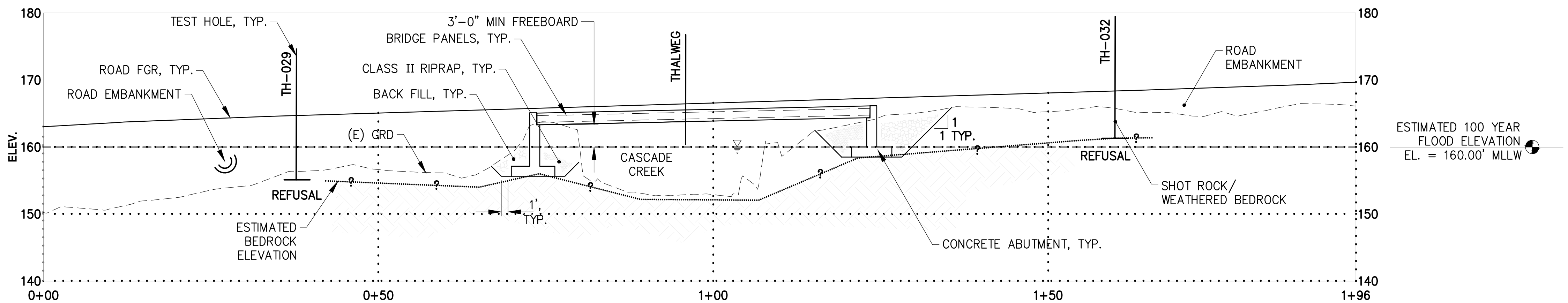


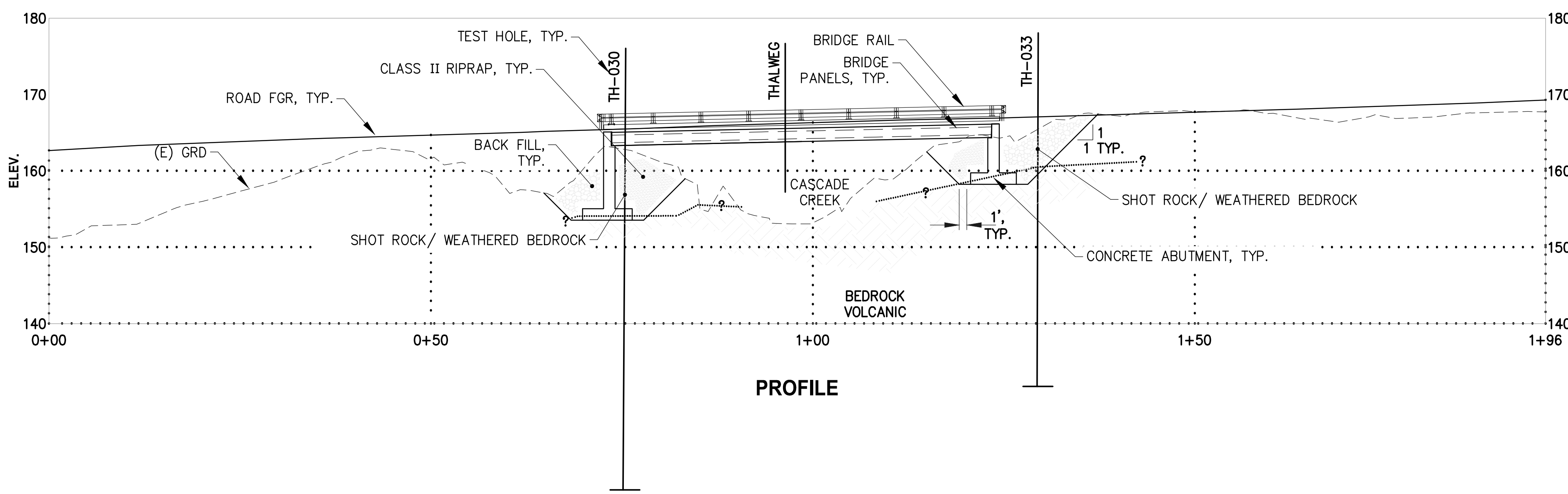
(D) BRIDGE ELEVATION @ DOWNSTREAM EDGE

SCALE IN FEET
0 10 20 FT.



(E) BRIDGE ELEVATION @ CL OF BRIDGE

SCALE IN FEET
0 10 20 FT.



(F) BRIDGE ELEVATION @ UPSTREAM EDGE

SCALE IN FEET
0 10 20 FT.

PROFILE

STAGE 1 CONCEPT SET

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
6860 GLACIER HIGHWAY, JUNEAU, AK 99801
(907) 465-1763

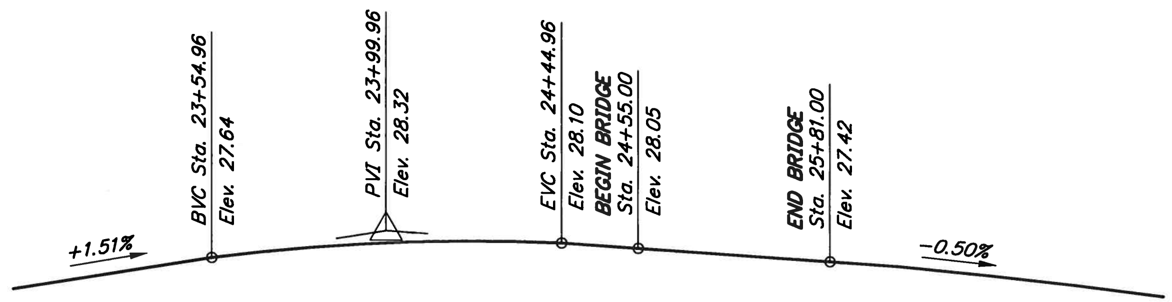
JNU CASCADE POINT FERRY TERMINAL

BRIDGE ELEVATION

FILE N:\23xxx\232045 Cascade Point Ferry Terminal\G. Drawings\Design Build\DB_Bridge Plan & Sections.dwg 5/17/2025 13:04 | LAYOUT 3 | DESIGNED | CHECKED | DRAFTED

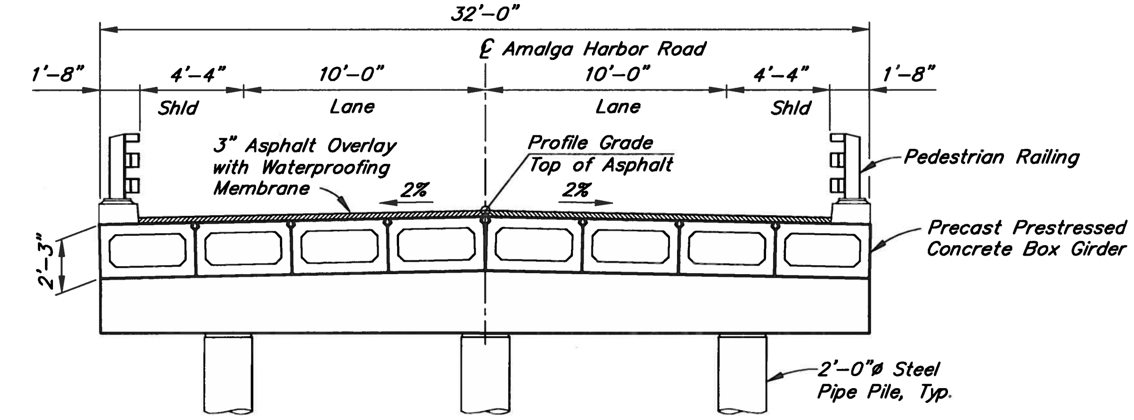
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N1	55

Appendix 4-1

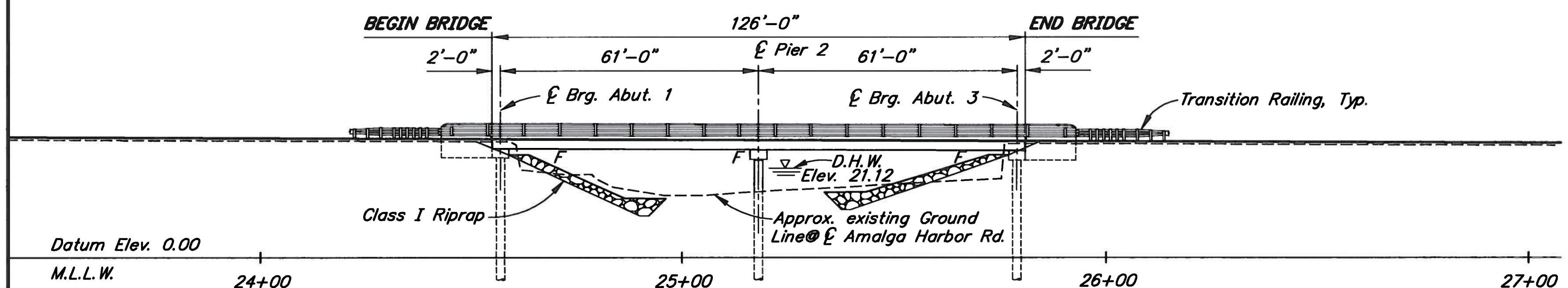


PROFILE GRADE DATA

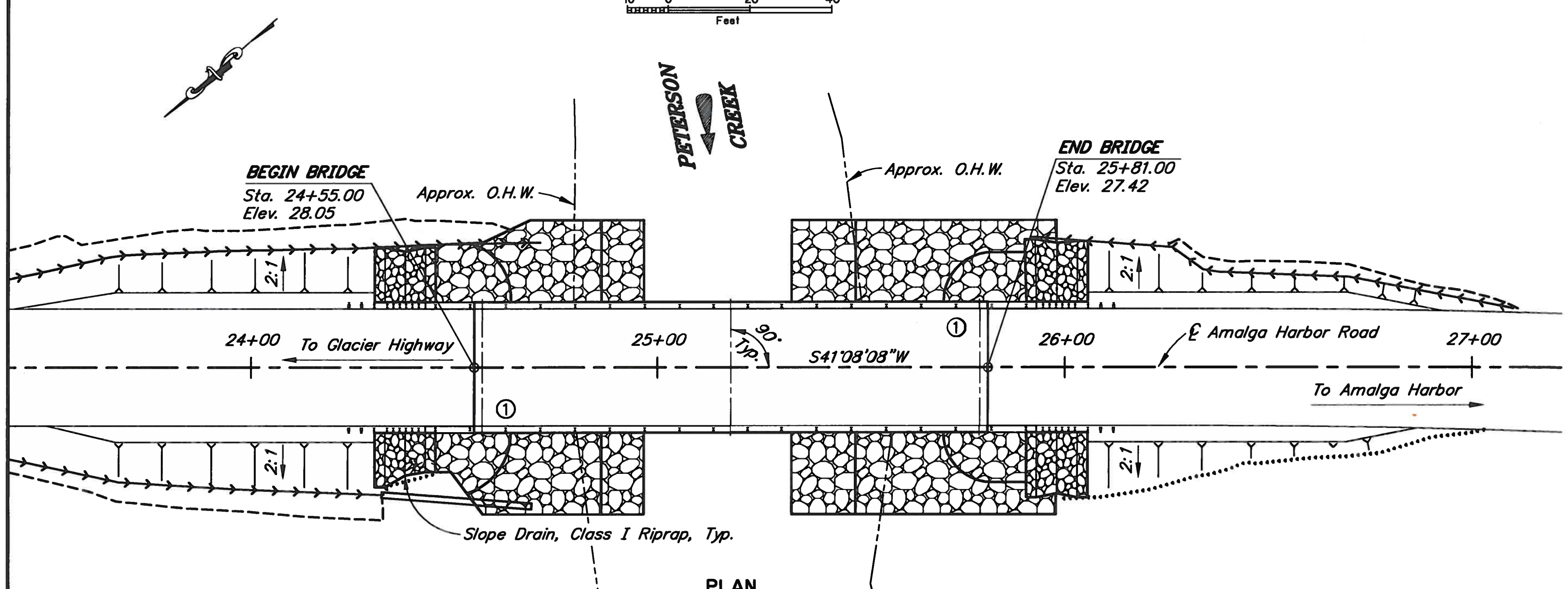
No Scale



TYPICAL SECTION



ELEVATION



PLAN

BRIDGE DRAWING INDEX

TITLE	DWG. NO.
GENERAL LAYOUT	1
SITE PLAN	2
RIPRAP LAYOUT	3
ABUTMENTS	4
WINGWALLS	5
PIER 2	6
FRAMING PLAN AND TYPICAL SECTION	7
GIRDERS	8
GIRDER DETAILS	9
PEDESTRIAN RAILING	10
BRIDGE RAIL TRANSITION	11
TEST HOLE LOGS AND LOCATIONS	12-17

NOTES:

① Denotes location of Bridge No. Plate.

LEGEND

- ··········· Daylight Fill
- →→→→→→ Bottom of Ditch
- - - - - - - Daylight Cut

DESIGNED BY: Steve Lee	CHECKED: Loren Gehring	LAYOUT BY: Steve Lee	CHECKED BY: Loren Gehring
DRAWN BY: Sam Sollie	CHECKED: Steve Lee	SPECIFICATIONS BY: Steve Lee	P S & E COMPARED: Loren Gehring
QUANTITIES BY: Steve Lee	CHECKED: Loren Gehring	APPROVAL RECOMMENDED BY: FOR Rich Pratt	MICHAEL W. KNAPP

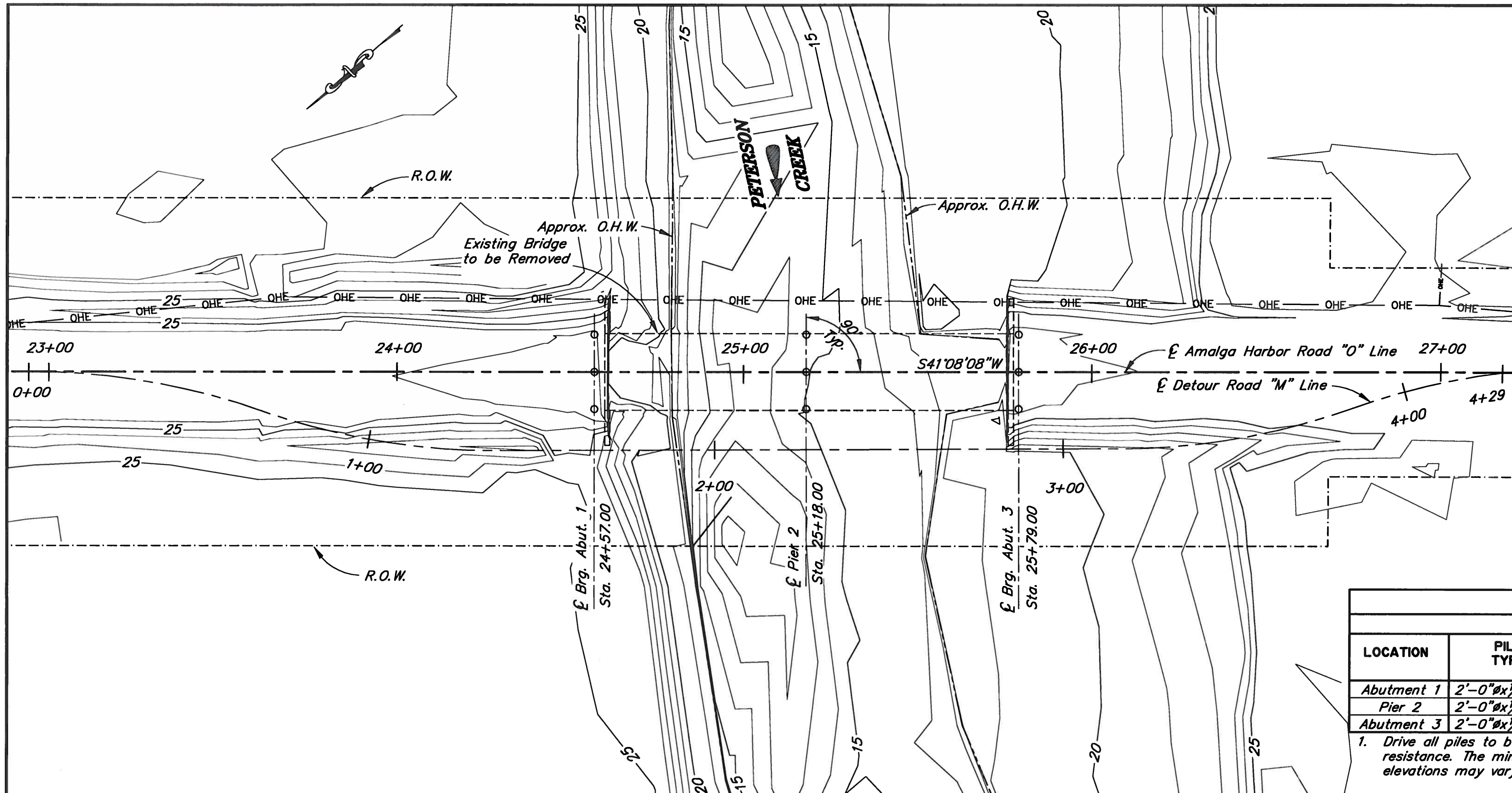
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

STATE OF ALASKA 49TH — Stephan H. Lee, No. SE 13696, REGISTERED PROFESSIONAL ENGINEER

PETERSON CREEK BRIDGE
AMALGA HARBOR ROAD
GENERAL LAYOUT

BRIDGE NO. 383
DWG. NO. 1

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N2	55



SITE PLAN

10 0 20 40 Feet

GENERAL NOTES

DESIGN: AASHTO LRFD Bridge Design Specifications, Sixth Edition 2012, with latest interim specifications. Seismic design per AASHTO Guide Specifications for LRFD Seismic Bridge Design, Second Edition 2011 with latest interim specifications.

LIVE LOAD: HL-93

DEAD LOAD: Includes 50 psf for all wearing surfaces.

SEISMIC PARAMETERS: PGA = 0.21
SS = 0.48
S1 = 0.23
Site Class = E
Liquefaction Potential = High
AASHTO 7% probability of exceedance in 75 years.

REINFORCEMENT: ASTM A706, Grade 60, Fy = 60,000 psi
Space reinforcement evenly unless otherwise noted.
ASTM A970, Class HA Headed bars.

PRESTRESSED CONCRETE: See Girder Dwgs.

CONCRETE: Class A Concrete unless otherwise noted, f'c = 4000 psi

STRUCTURAL STEEL PILING: Pipe Piles – API 5L X52 PSL2, Fy = 52,000 psi
Pile Tip reinforcing is required.

PILE DATA TABLE

LOCATION	PILE TYPE	DRIVING CRITERIA: MINIMUM PENETRATION (ft)	DRIVING CRITERIA: ESTIMATED PILE TIP ELEVATION (ft)	DRIVING CRITERIA: DRIVING RESISTANCE (K)	DESIGN DATA: STRENGTH I FACTORED LOAD (K)	DESIGN DATA: NOMINAL RESISTANCE (K)	DESIGN DATA: RESISTANCE FACTOR, φ
Abutment 1	2'-0"øx½" Pipe	66.0	-43.0	536	268	536	0.50
Pier 2	2'-0"øx½" Pipe	119.5	-97.0	862	431	862	0.50
Abutment 3	2'-0"øx½" Pipe	167.0	-145.0	558	279	558	0.50

1. Drive all piles to bedrock and to the required nominal resistance. The minimum penetration and estimated pile tip elevations may vary due to bedrock elevations.

ABBREVIATIONS:

- ℄ = Centerline
- ℘ = Plate
- & = and
- @ = at
- ø = diameter
- A/C = asphalt concrete
- Approx. = approximate
- Abut. = Abutment
- bot. = bottom
- Br. = bridge
- btwn. = between
- Brg. = Bearings
- cfs = cubic feet per second
- CJP = complete joint penetration
- Clr. = clear, clearance
- cms = cubic meter per second
- Dia. = diameter
- D.H.W. = Design High Water
- Dwg. = drawing
- Elev. = elevation
- e.f. = each face
- E = expansion bearing
- (E) = existing
- F = fixed bearing
- f.f. = far face
- H.T.L. = high tide line
- Hwy. = highway
- Jt. = joint
- k = thousand pound
- ksi = thousand psi
- Lt. = left
- max. = maximum
- M.H.W. = mean high water
- min. = minimum
- M.L.L.W. = mean low low water
- n.a. = not applicable
- n.f. = near face
- No. = number
- N/C = not calculated
- O.H.W. = ordinary high water
- —OHE— = overhead electrical
- psi = pounds per square inch
- R.O.W. = right of way
- Rt. = right
- spc. = space, spaces
- Sta. = station
- Symm. = symmetric
- Typ. = typical
- UT = ultrasonic testing
- Yr. = year

BRIDGE BASIS OF ESTIMATE

ITEM NO.	ITEM	PAY UNIT	ESTIMATING UNIT	SUBST.	SUPERST.	TOTAL
202(13)	Removal of Bridge (Bridge No. 383)	LS	SF		2545	2545
205(1)	Excavation for Structures	CY	CY	190		190
205(3)	Structural Fill	CY	CY	100		100
205(4)	Porous Backfill Material	CY	CY	20		20
501(1)	Class A Concrete	LS	CY	48		48
501(3)	Class A Concrete	CY	CY	57		57
501(5)	Precast Concrete Member (62'-11½" Prestressed Box Girder)	EA	EA		16	16
503(1)	Reinforcing Steel	LS	LBS	16,700		16,700
503(2)	Epoxy-Coated Reinforcing Steel	LS	LBS	830		830
503(3)	Drill and Bond Dowels	EA	EA	64		64
505(5)	Furnish Structural Steel Piles (2'-0"x½" Pipe)	LF	LF	1062		1062
505(6)	Drive Structural Steel Piles (2'-0"x½" Pipe)	EA	EA	9		9
507(2)	Pedestrian Railing	LF	LF		300	300
508(1)	Waterproofing Membrane	LS	SY		402	402
520(1)	Temporary Crossing	LS	LS			All Req'd
606(16)	Transition Rail	EA	EA		4	4
611(1)	Riprap, Class I	CY	CY	610		610
631(2)	Geotextile, Erosion Control, Class 1	SY	SY	780		780

Item numbers are for reference only. Quantities shown are not necessarily the pay quantities nor the total quantity of the particular item.

DESIGNED BY: Steve Lee	CHECKED: Loren Gehring	HYDRAULICS BY: Robert Trousil	CHECKED BY:
DRAWN BY: Sam Sollie	CHECKED: Steve Lee	FOUNDATIONS REVIEWED BY: Dave Hemstreet / CH2MHill	
QUANTITIES BY: Steve Lee	CHECKED: Loren Gehring		

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

STATE OF ALASKA 49TH Stephen H. Lee No. SE 13896 REGISTERED PROFESSIONAL ENGINEER

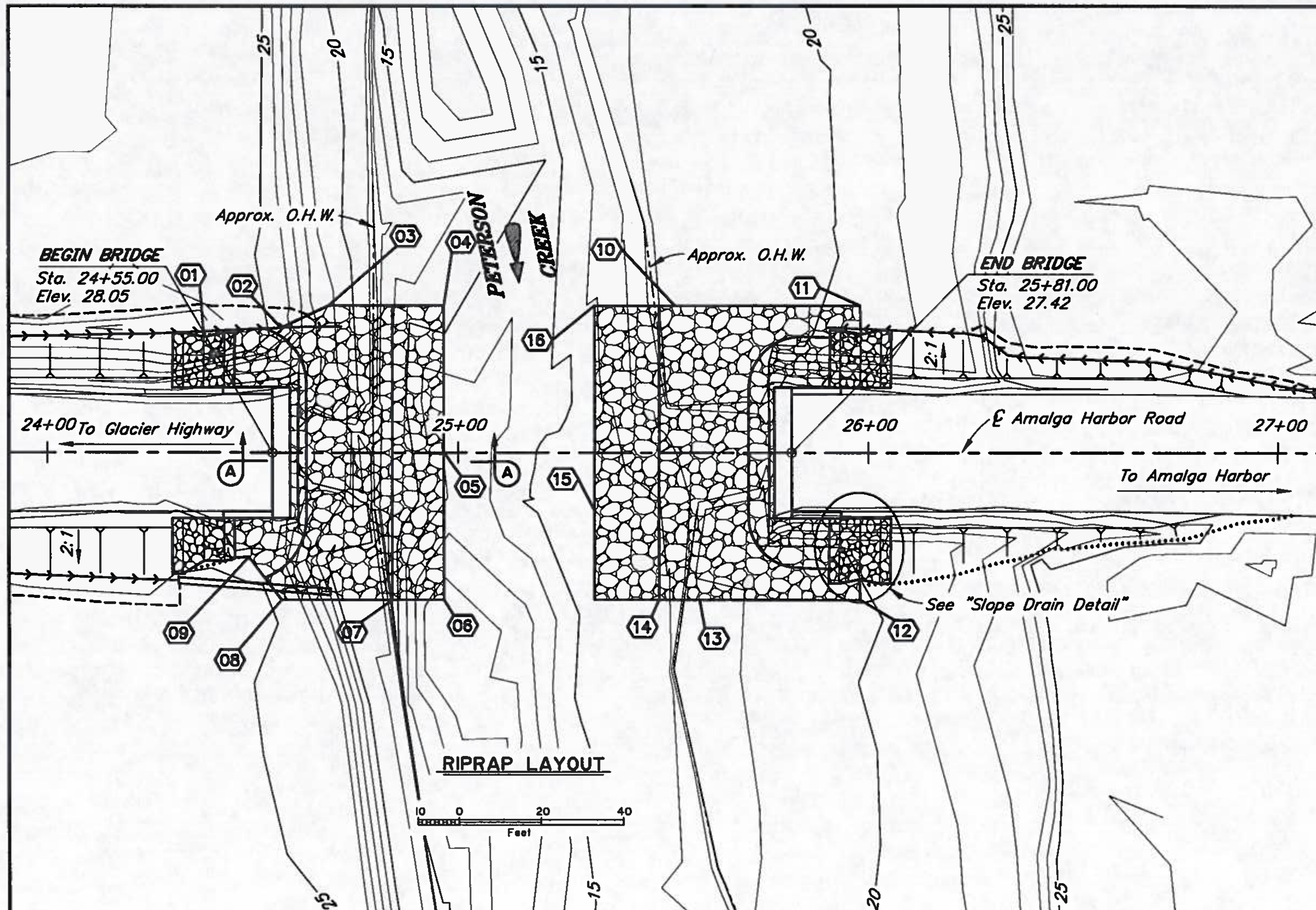
PETERSON CREEK BRIDGE

AMALGA HARBOR ROAD

SITE PLAN

BRIDGE NO. 383
DWG. NO. 2

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N3	55



RIPRAP LAYOUT

POINT	STATION	OFFSET	ELEVATION
1	24+38.00	29.7' LT	23.0
2	24+56.88	30.6' LT	23.0
3	24+68.47	36.0' LT	22.0
4	24+96.47	36.0' LT	14.0
5	24+96.46	00.0' RT	14.0
6	24+96.46	36.0' RT	14.0
7	24+83.96	36.0' RT	14.0
8	24+56.97	36.0' RT	20.0
9	24+49.00	25.6' RT	25.0
10	25+52.71	36.0' LT	17.0
11	25+98.00	36.0' LT	20.5
12	25+98.00	36.0' RT	20.5
13	25+58.71	36.0' RT	19.0
14	25+48.88	36.0' RT	15.5
15	25+33.21	14.3' RT	15.5
16	25+33.21	36.0' LT	15.5

RIPRAP TABLE

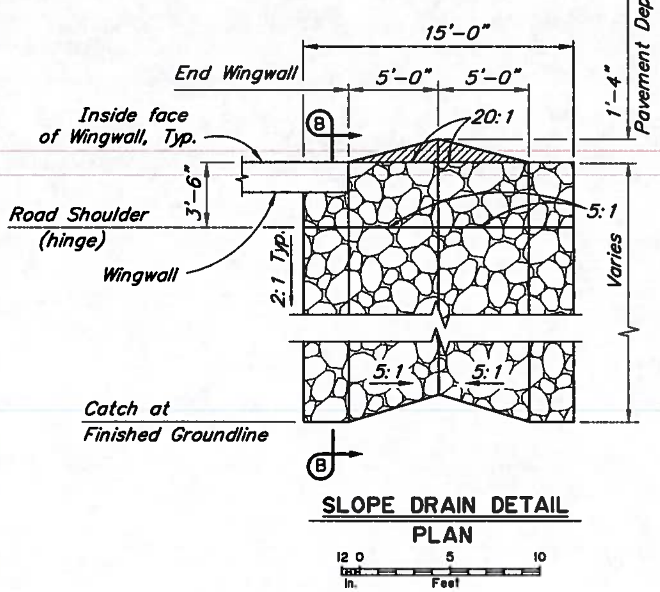
PROPOSED BRIDGE DATA	
AK DOT & PF BRIDGE NO.	383
DRAINAGE AREA, SQ MI	9.72
BRIDGE LENGTH, FT	126.50
BRIDGE WIDTH, FT	32
MINIMUM CHORD ELEV, FT	24.61
MINIMUM CAP BOTTOM ELEV, FT	21.28
OHW ELEV, FT	18.15
HW ELEV @ Q100, FT	21.12
PIER SCOUR	4.40
ABUTMENT / CONTRACTION SCOUR	2.00
ABUTMENT / END TREATMENT	CLASS I RIPRAP

HYDRAULIC & HYDROLOGIC SUMMARY, BRIDGE NO. 383

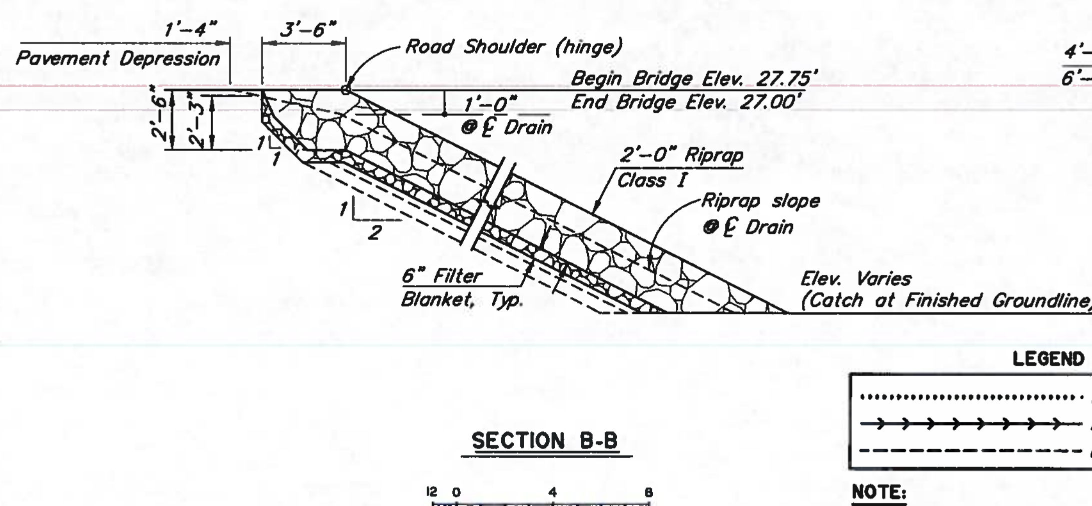
RETURN PERIOD	FLOW RATE, CFS	HEADWATER ELEV, (FT)	DISTANCE TO CHORD BOTTOM, (FT)
Q2	400	18.15	6.46
Q50	2310	20.97	3.64
Q100	2670	21.12	3.49
Q500	3220	22.31	2.30
Discharge Rqd. to overtop roadway, CFS	N/A		
Roadway overtopping reccurence probability	>Q500		

EXCEEDANCE/RECCURENCE PROBABILITIES:

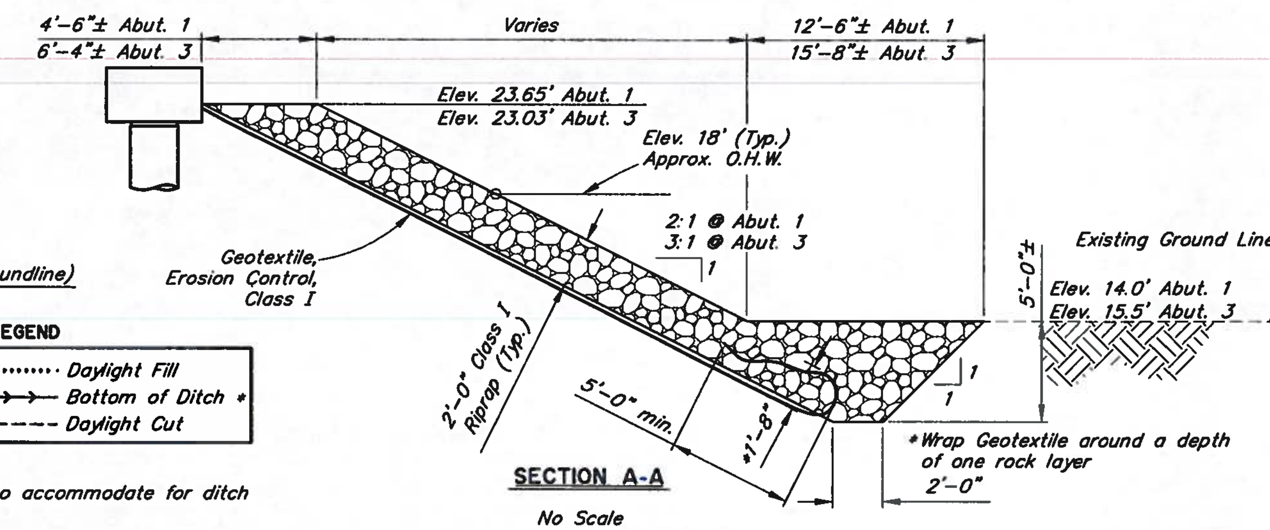
Q2 – TWO YR = 50% (OHW)
Q50 – FIFTY YR = 2%
Q100 – ONE HUNDRED YR = 1%
Q500 – FIVE HUNDRED YR = 0.5%



SLOPE DRAIN DETAIL
PLAN



SECTION B-B



SECTION A-A

No Scale

LEGEND

- Daylight Fill
- Bottom of Ditch *
- Daylight Cut

NOTE:
* Adjust Riprap to accommodate for ditch drainage flow.

DESIGNED BY: Sara Manning
CHECKED: Robert Trousil
DRAWN BY: Sam Sollie
CHECKED: Steve Lee
QUANTITIES BY: Steve Lee
CHECKED: Sara Manning

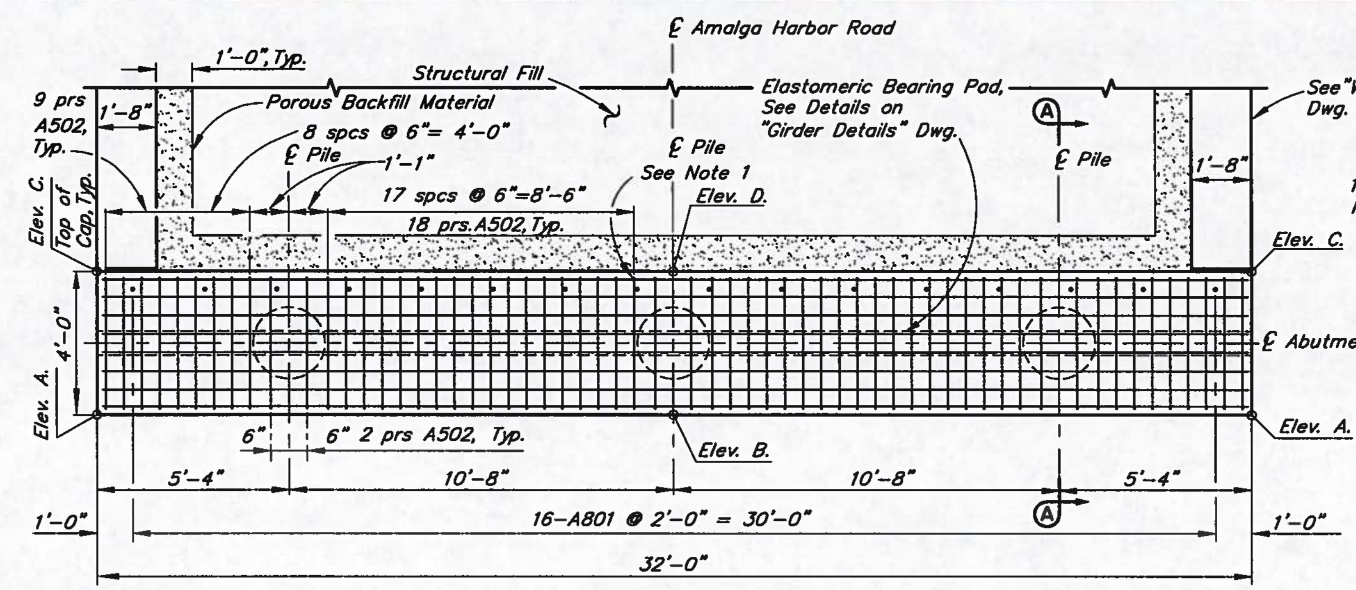
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

STATE OF ALASKA 49TH Robert E. Trousil No. CE 12504 REGISTERED PROFESSIONAL ENGINEER 10.4.13

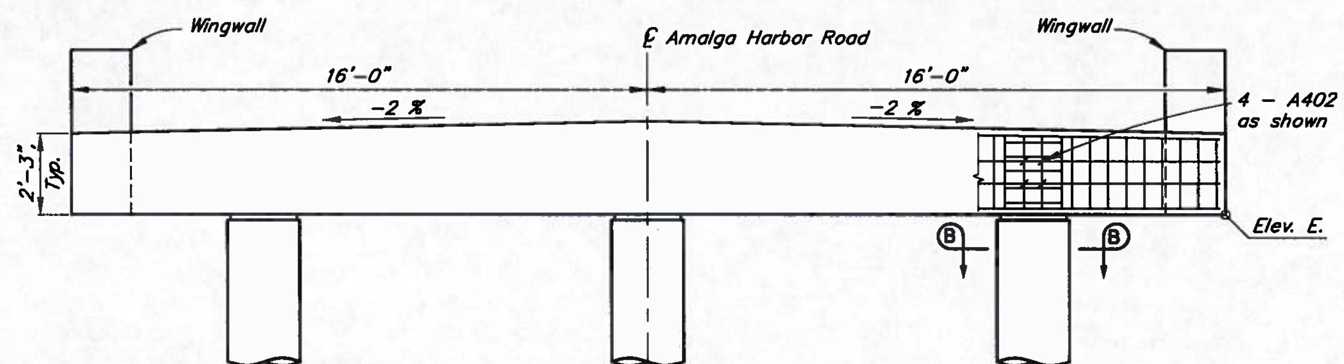
PETERSON CREEK BRIDGE
AMALGA HARBOR ROAD
RIPRAP LAYOUT

BRIDGE NO. 383
DWG. NO. 3

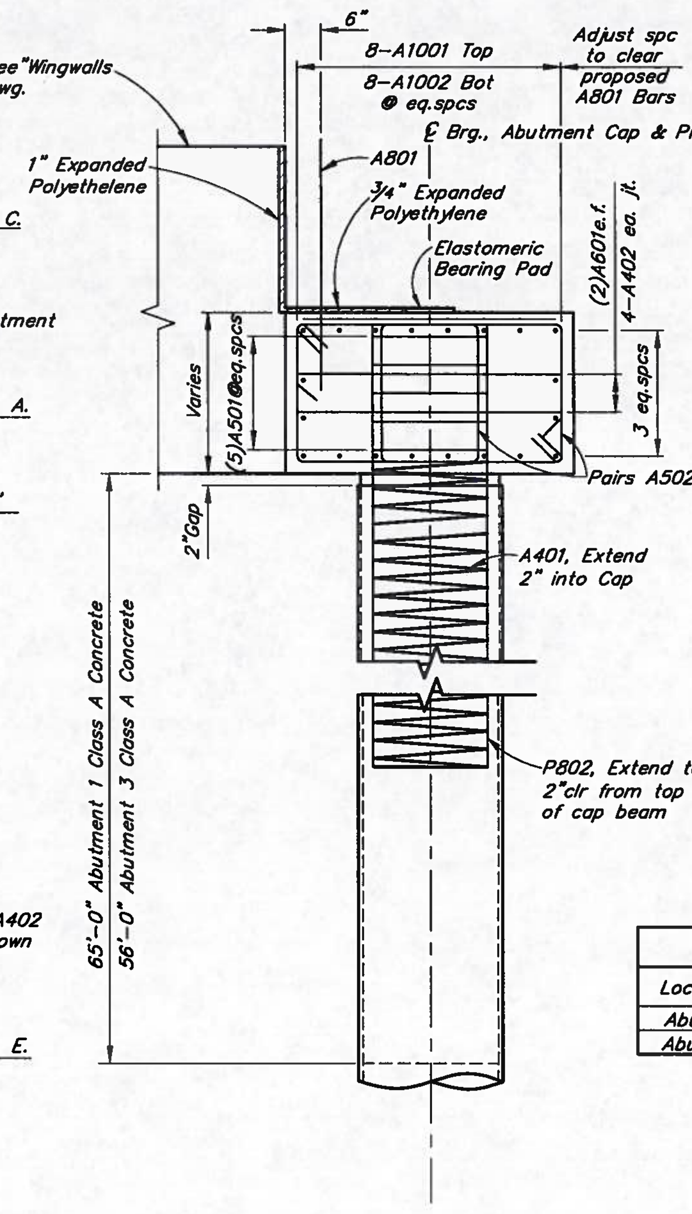
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N4	55



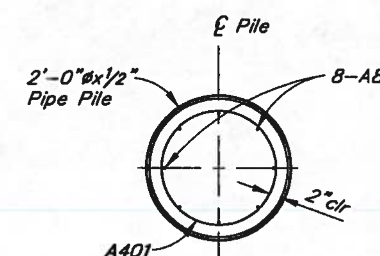
PLAN



ELEVATION



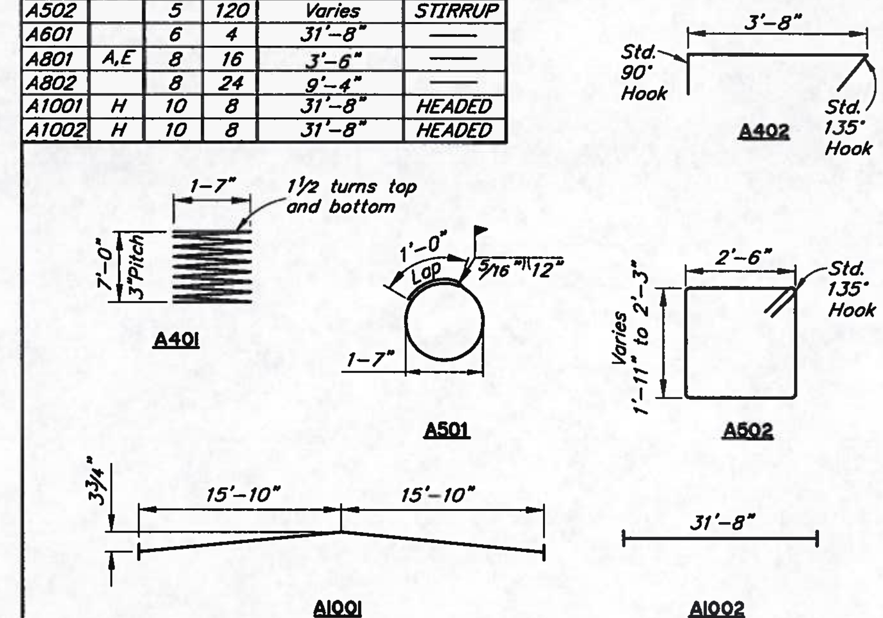
SECTION A-A



SECTION B-B

REINFORCING STEEL SCHEDULE - ONE ABUTMENT

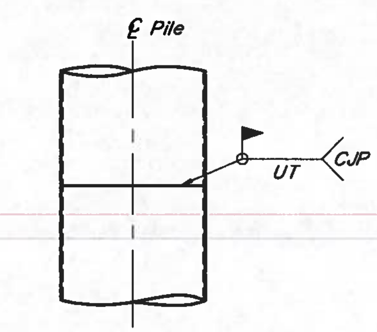
MARK	NOTE	SIZE	NO.	LENGTH	TYPE	BENDING DIAGRAM
A401	S	4	3	154'-6"	SPIRAL	
A402		4	12	4'-5"	STIRRUP	
A501		5	15	6'-0"	HOOP	
A502		5	120	Varies	STIRRUP	
A601		6	4	31'-8"	—	
A801	A,E	8	16	3'-6"	—	
A802		8	24	9'-4"	—	
A1001	H	10	8	31'-8"	HEADED	
A1002	H	10	8	31'-8"	HEADED	



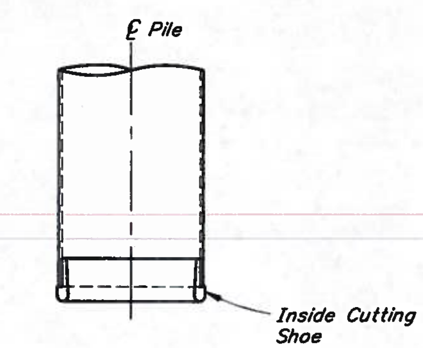
A – Drill and bond 1'-6" after girder erection
E – Epoxy coated reinforcing steel
H – Headed reinforcing steel
S – Splices permitted. Length does not include splices.

CAP ELEVATION TABLE

Location	Elevation A	Elevation B	Elevation C	Elevation D	Elevation E
Abut. 1	25.15	25.47	25.17	25.49	22.90
Abut. 3	24.56	24.88	24.54	24.86	22.28



PILE SPLICE DETAIL



PILE TIP DETAIL

NOTES:

1. Adjust A502 to clear A801 bars.
2. A801's, elastomeric pads and expanded polyethylene not shown in Elevation view.
3. Bond elastomeric bearing pads and expanded polyethylene to concrete with epoxy resin adhesive meeting AASHTO M235, Type IV, Grade 3, Class B.

DESIGNED BY: Steve Lee	CHECKED: Loren Gehring
DRAWN BY: Sam Sollie	CHECKED: Steve Lee
QUANTITIES BY: Steve Lee	CHECKED: Loren Gehring

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

STATE OF ALASKA 49TH Stephen H. Lee No. SE 13696 REGISTERED PROFESSIONAL ENGINEER

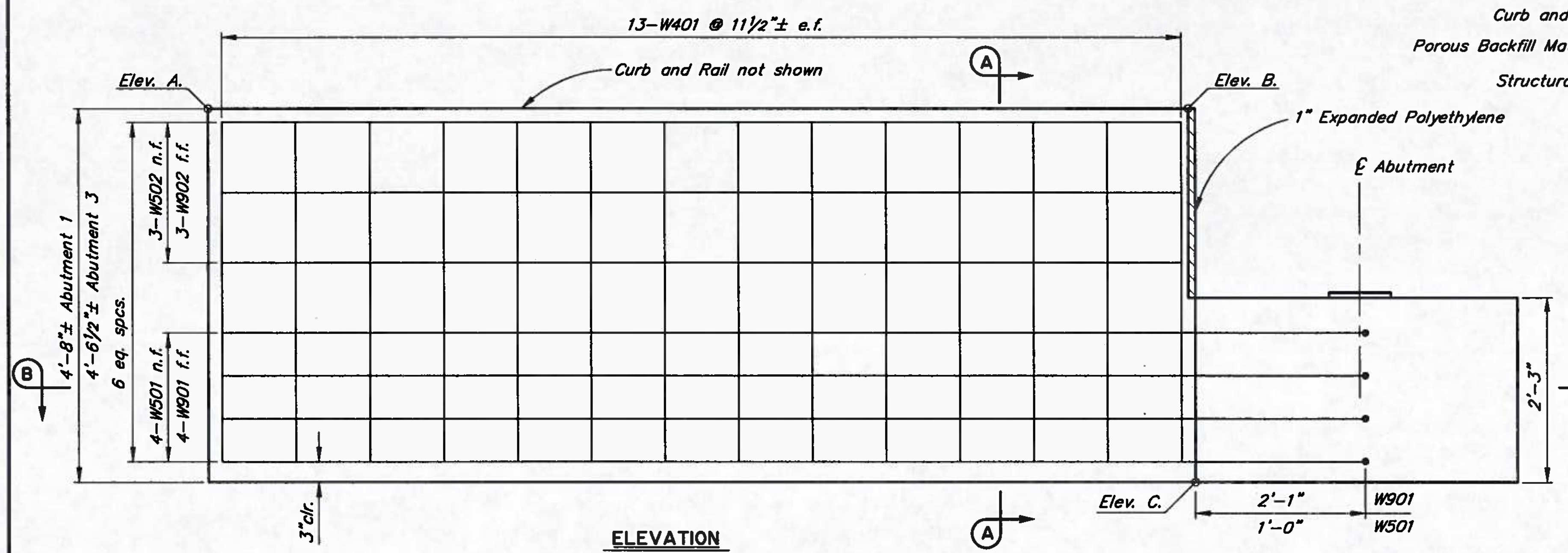
PETERSON CREEK BRIDGE

AMALGA HARBOR ROAD

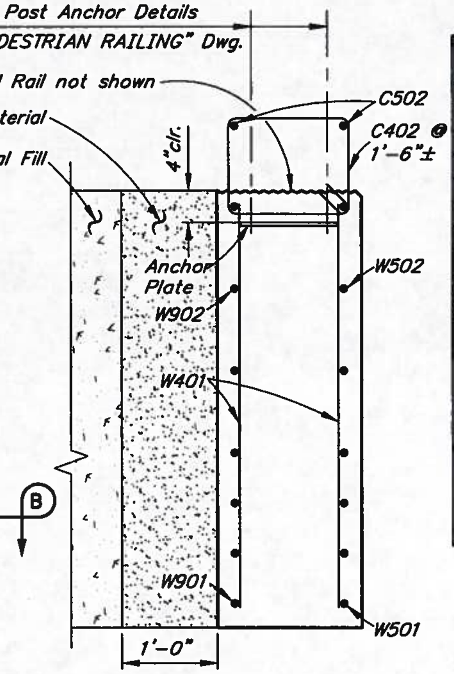
ABUTMENTS

BRIDGE NO. 383
DWG. NO. 4

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N5	55



ELEVATION

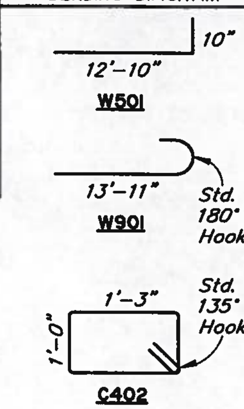


SECTION A-A

REINFORCING STEEL SCHEDULE - ONE ABUTMENT

MARK	NOTE	SIZE	NO.	LENGTH	TYPE
W401		4	52	4'-2"	---
W501		5	8	13'-8"	BENT
W502		5	6	11'-7"	---
W901		9	8	15'-2"	BENT
W902		9	6	11'-7"	---
C402	E	4	18	5'-3"	BENT
C502	E	5	4	11'-7"	---

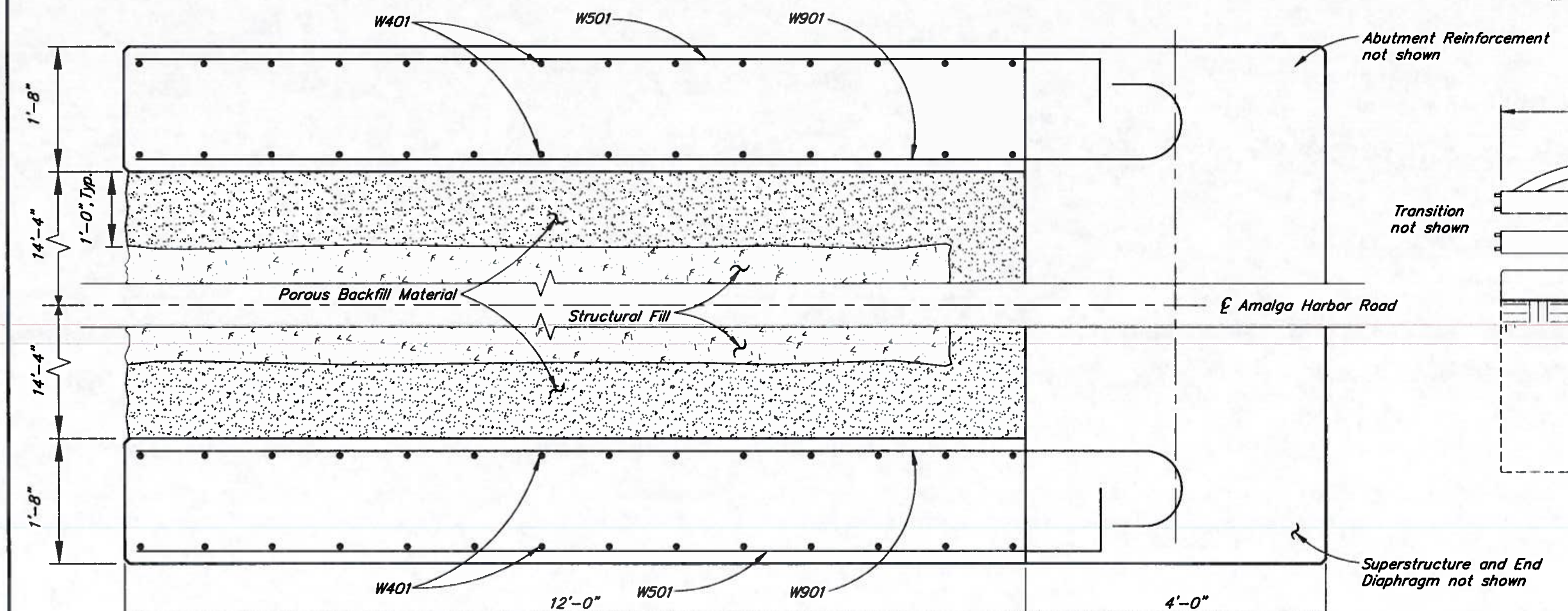
BENDING DIAGRAM



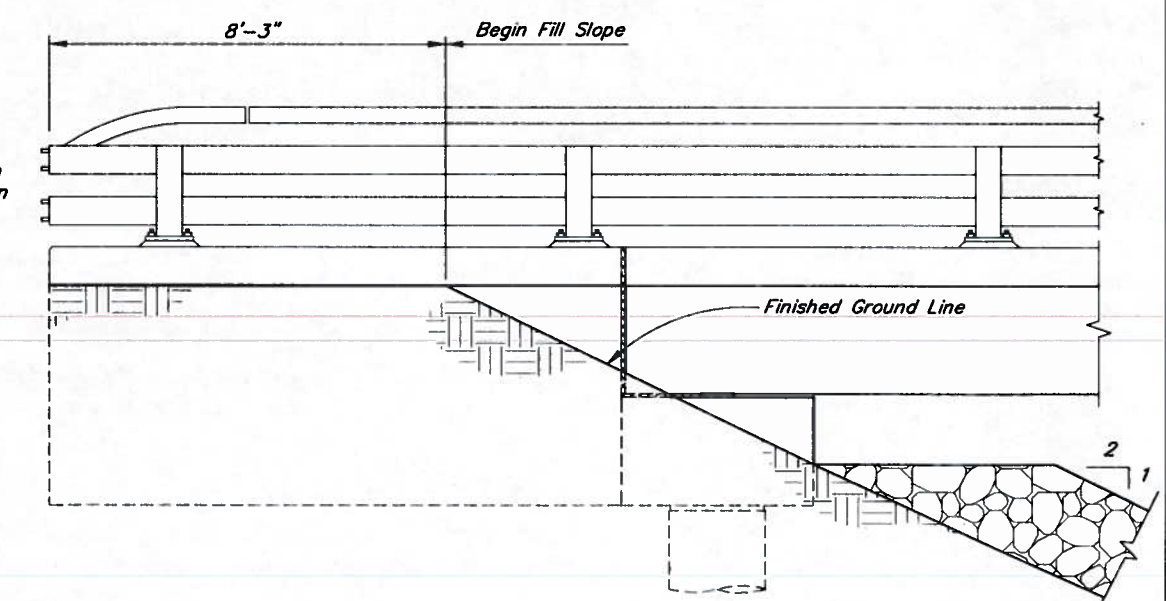
E - Epoxy coated reinforcing steel.

WINGWALL ELEVATION TABLE

Location	Elevation A	Elevation B	Elevation C
Abut. 1	27.57	27.51	22.92
Abut. 3	26.82	26.88	22.29



SECTION B-B



FINISHED ELEVATION

DESIGNED BY: Steve Lee	CHECKED: Loren Gehring
DRAWN BY: Sam Sollie	CHECKED: Steve Lee
QUANTITIES BY: Steve Lee	CHECKED: Loren Gehring

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

STATE OF ALASKA 49TH Stephen H. Lee No. SE 13698 REGISTERED PROFESSIONAL ENGINEER 10/1/13

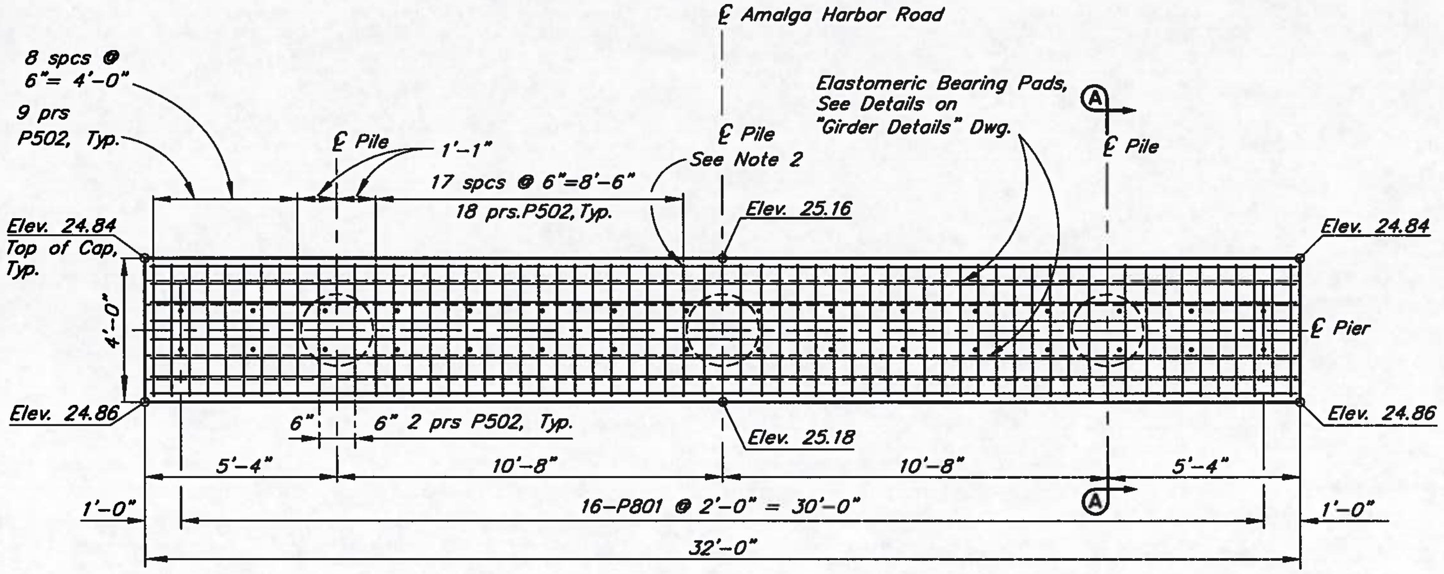
PETERSON CREEK BRIDGE

AMALGA HARBOR ROAD

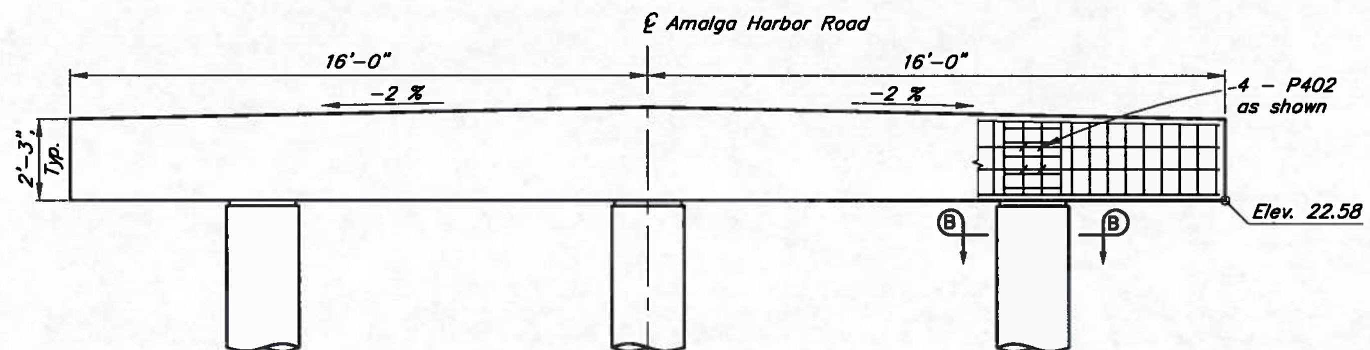
WINGWALLS

BRIDGE NO. 383
DWG. NO. 5

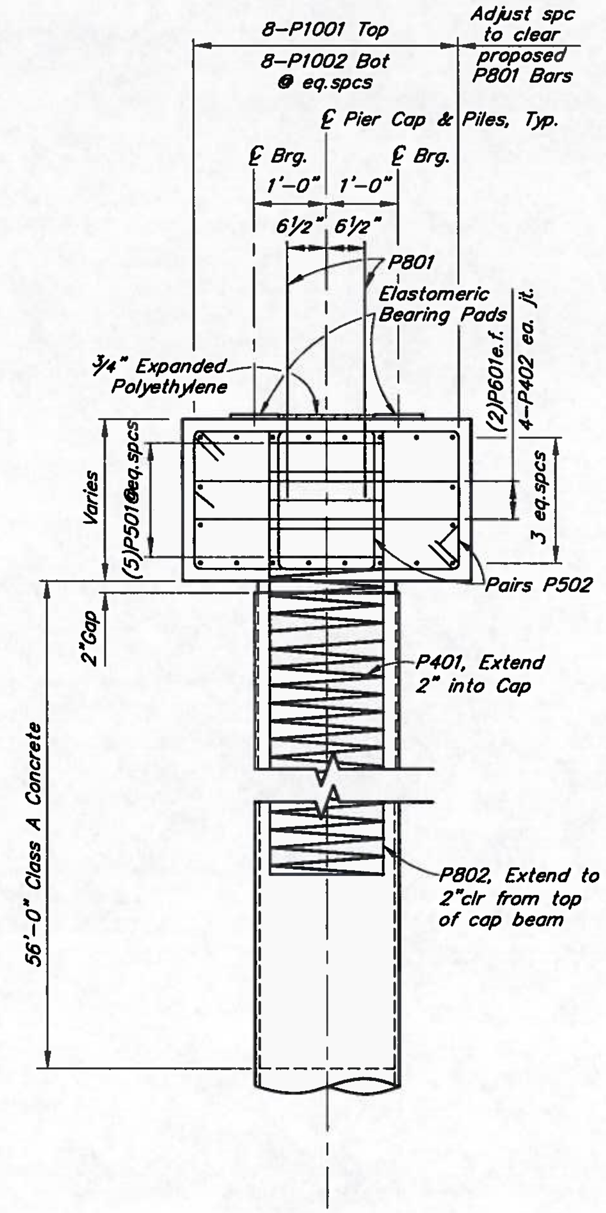
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N6	55



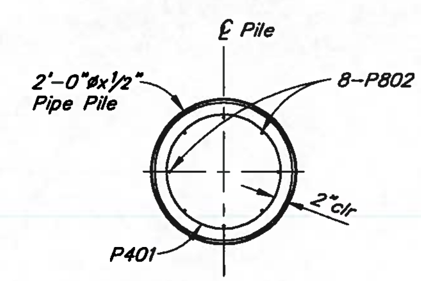
PLAN



ELEVATION



SECTION A-A

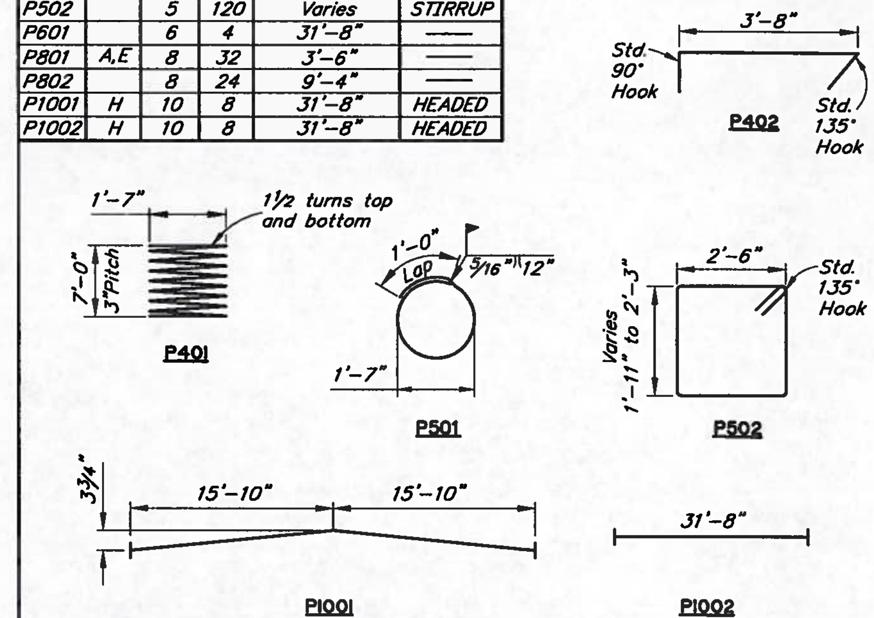


SECTION B-B

REINFORCING STEEL SCHEDULE - PIER 2

MARK	NOTE	SIZE	NO.	LENGTH	TYPE
P401	S	4	3	154'-6"	SPIRAL
P402		4	12	4'-5"	STIRRUP
P501		5	15	6'-0"	HOOP
P502		5	120	Varies	STIRRUP
P601		6	4	31'-8"	——
P801	A,E	8	32	3'-6"	——
P802		8	24	9'-4"	——
P1001	H	10	8	31'-8"	HEADED
P1002	H	10	8	31'-8"	HEADED

BENDING DIAGRAM



A – Drill and bond 1'-6" after girder erection
E – Epoxy coated reinforcing steel
H – Headed reinforcing steel
S – Splices permitted. Length does not include splices.

NOTES:

1. See "ABUTMENTS" Dwg for "Pile Splice Detail" and "Pile Tip Detail".
2. Adjust P502 to clear P801 bars.
3. P801's, elastomeric pads and expanded polyethylene not shown in Elevation view.
4. Adjust P1001 to clear P801 bars.
5. Bond elastomeric bearing pads and expanded polyethylene to concrete with epoxy resin adhesive meeting AASHTO M235, Type IV, Grade 3, Class B.

DESIGNED BY: Steve Lee	CHECKED: Loren Gehring
DRAWN BY: Sam Sollie	CHECKED: Steve Lee
QUANTITIES BY: Steve Lee	CHECKED: Loren Gehring

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

State of Alaska 49th — Stephen H. Lee No. SE 13698 Registered Professional Engineer

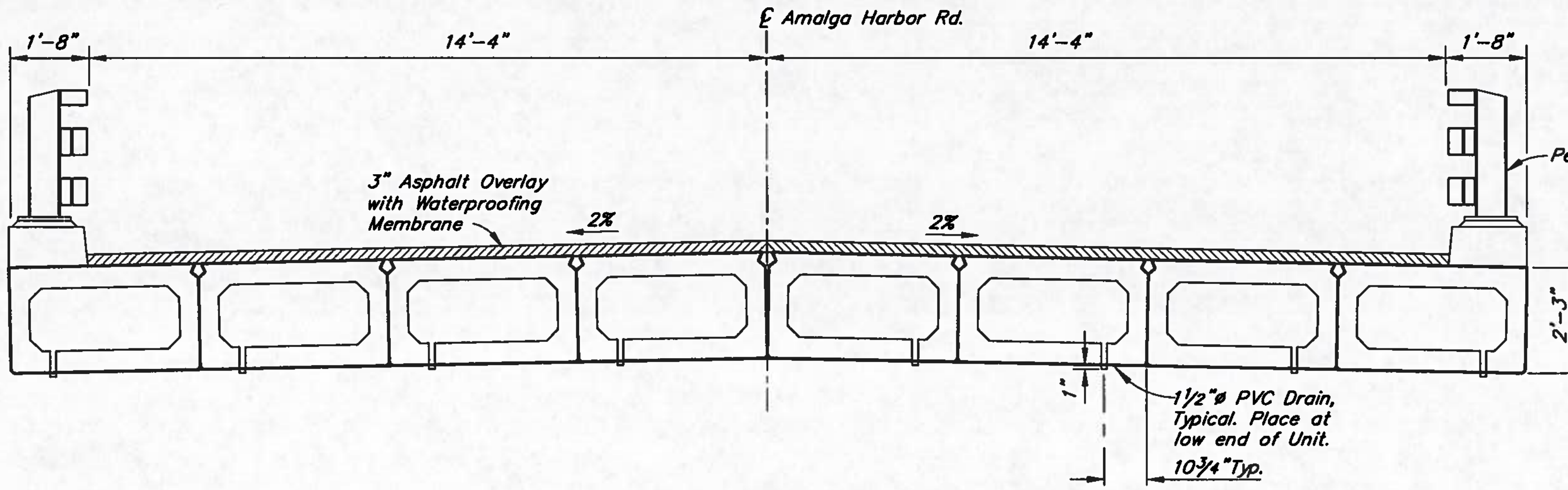
PETERSON CREEK BRIDGE

AMALGA HARBOR ROAD

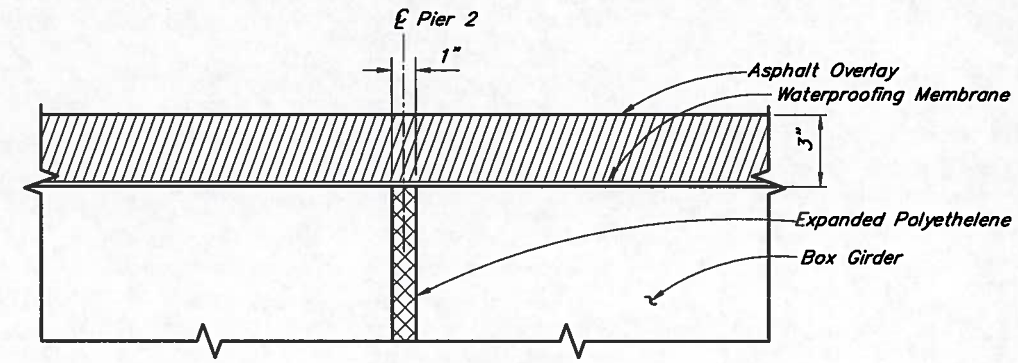
PIER 2

BRIDGE NO. 383
DWG. NO. 6

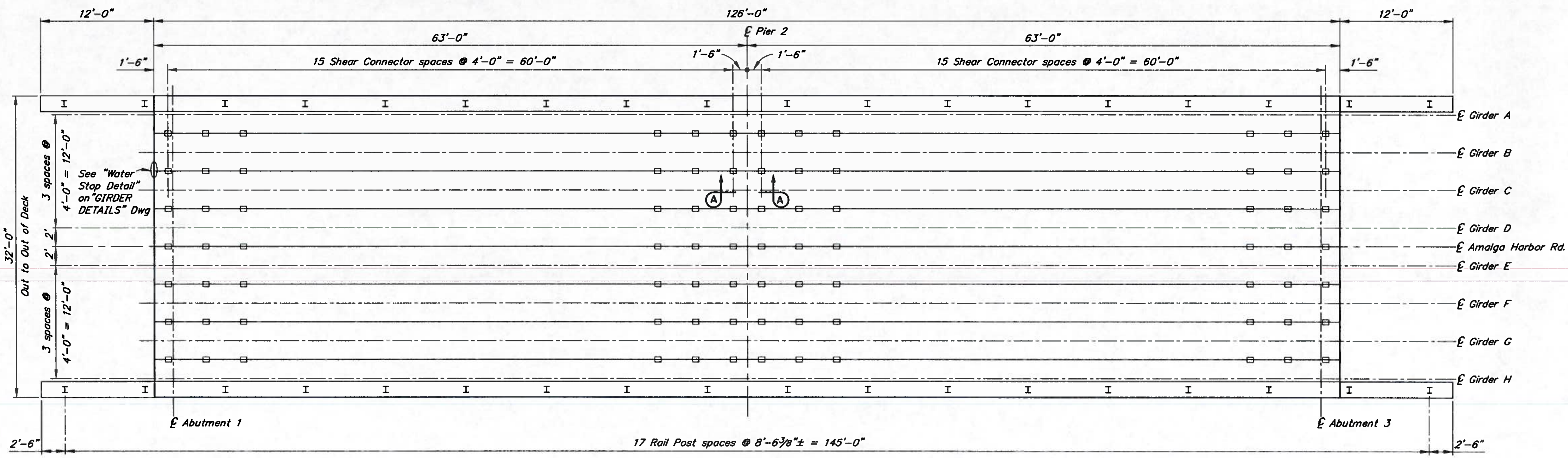
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N7	55



TYPICAL SECTION



SECTION A-A



FRAMING PLAN

DESIGNED BY: Steve Lee	CHECKED: Loren Gehring	
DRAWN BY: Sam Soltis	CHECKED: Steve Lee	
QUANTITIES BY: Steve Lee	CHECKED: Loren Gehring	

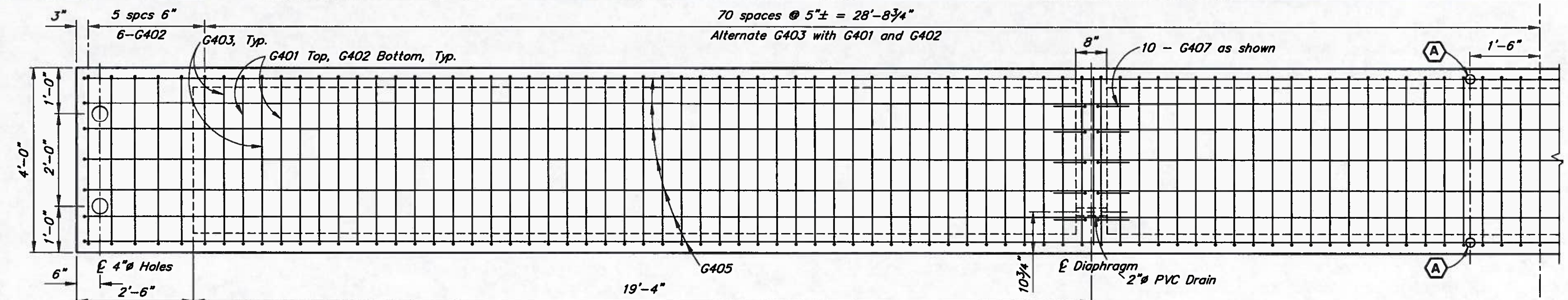
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

STATE OF ALASKA 49TH Stephan H. Lee No. SE 13698 REGISTERED PROFESSIONAL ENGINEER

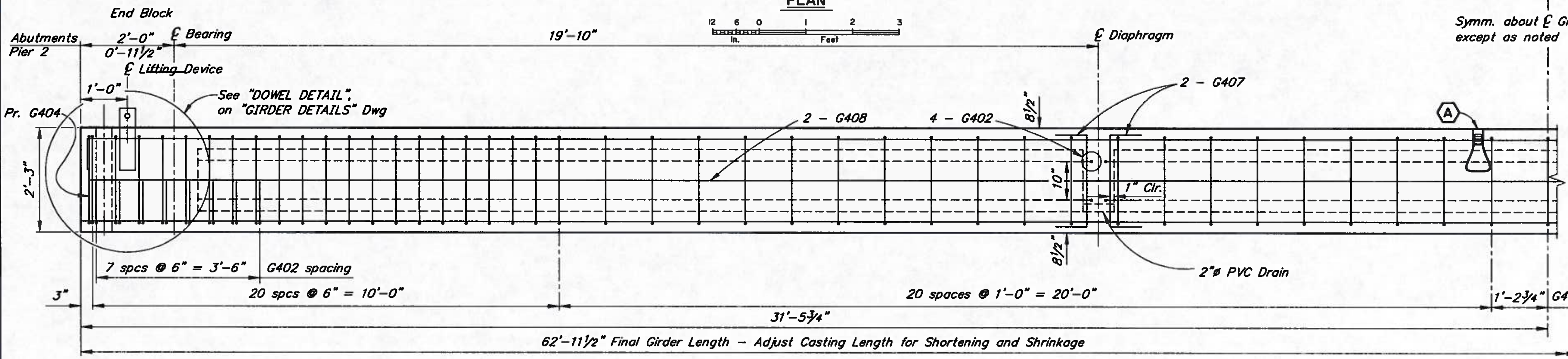
PETERSON CREEK BRIDGE
AMALGA HARBOR ROAD
FRAMING PLAN AND TYPICAL SECTION

BRIDGE NO. 383
DWG. NO. 7

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N8	55



PLAN

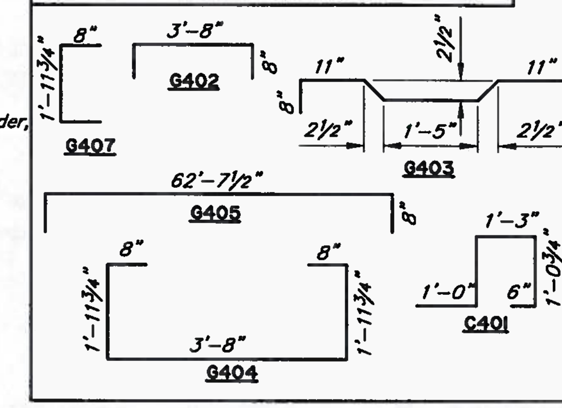


ELEVATION

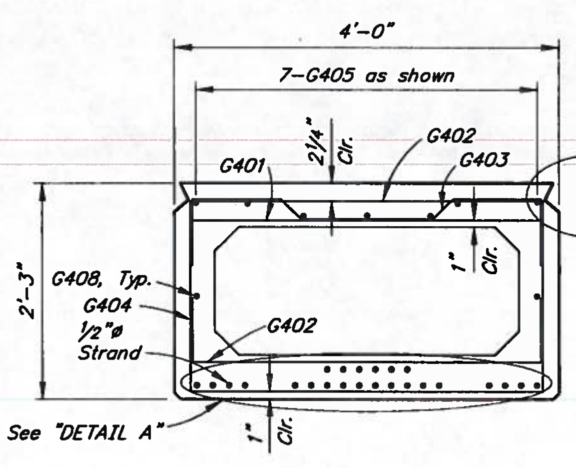
REINFORCING STEEL - ONE GIRDER

MARK	NOTE	SIZE	NO.	LENGTH	TYPE
G401	E	4	69	3'-8"	---
G402	E	4	97	5'-0"	BENT
G403	E	4	70	5'-2"	BENT
G404	E	4	83	8'-11½"	BENT
G405	E,S	4	7	63'-11½"	BENT
G406	E,N,Y	4	64	2'-0"	---
G407	E	4	20	3'-3¾"	BENT
G408	E,S	4	2	62'-7½"	---
C401	E,X	4	43	4'-10½"	BENT
C402	E,S,X	4	2	62'-7½"	---

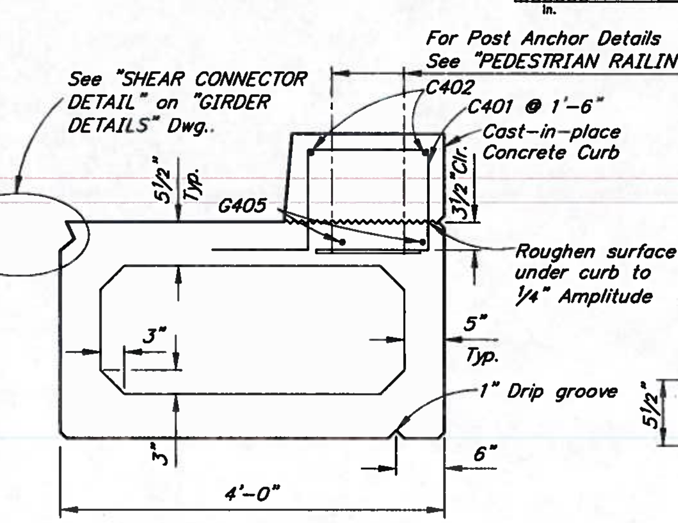
BENDING DIAGRAM



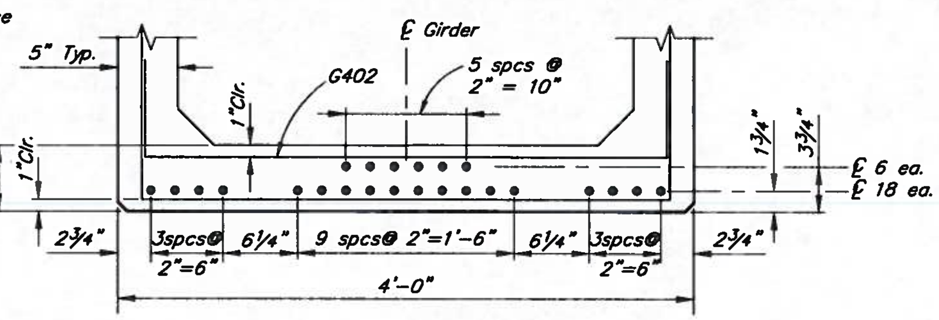
E – Epoxy-Coated reinforcing steel
N – See "Girder Details" Dwg.
S – Splices permitted. Length does not include splices.
X – Exterior girders only
Y – Provide 32 ea. at exterior girders



INTERIOR GIRDER
TYPICAL SECTION



EXTERIOR GIRDER
TYPICAL SECTION



DETAIL A

GIRDER NOTES:

Use Class P concrete with the following strengths:
at Stress Transfer.....f'ci = 5000 psi
at 28 Days................f'c = 6000 psi

Use 0.5"ø prestressing strands conforming to AASHTO M203, Grade 270, low-relaxation strand.

Design is based on the following steel stresses:
Pretensioning – Jacking Stress 189 ksi
after initial losses 178 ksi
after all losses 156 ksi

Two inch clear cover on reinforcing steel unless noted otherwise.

See "FRAMING PLAN AND TYPICAL SECTION" Dwg. for Shear Connector Spacing.

Form girders so the roadway surface conforms to the indicated grade line with an allowance for ½" of positive camber at midspan.

Galvanize all steel embedded in girders except for shear connectors.

(A) 1"X1'-0" Coil Anchor Insert for vertical adjustment of girders. Recess 2".

Omit Shear Key and Shear Key Connector in the exterior face of exterior girders.

Cast ends of girders plumb with respect to roadway grade.

DESIGNED BY: Steve Lee	CHECKED: Loren Gehring	
DRAWN BY: Sam Sollie	CHECKED: Steve Lee	
QUANTITIES BY: Steve Lee	CHECKED: Loren Gehring	

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

STATE OF ALASKA 49TH Stephan H. Lee No. SE 13698 REGISTERED PROFESSIONAL ENGINEER 10/4/13

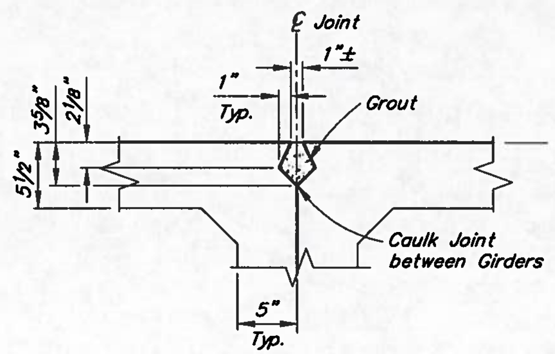
PETERSON CREEK BRIDGE

AMALGA HARBOR ROAD

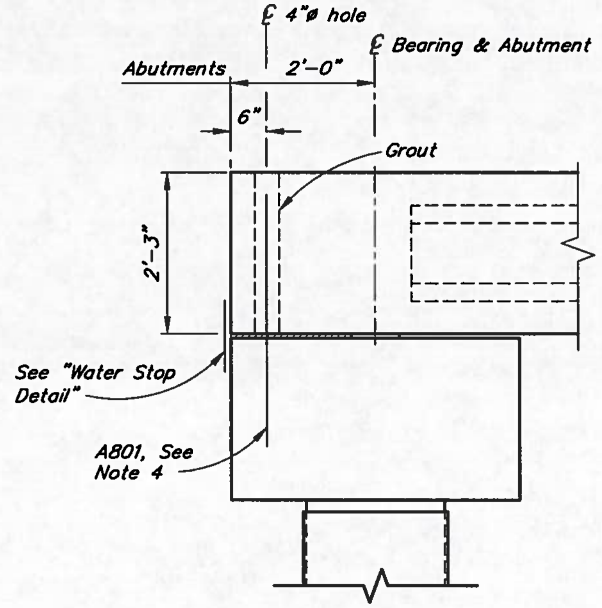
GIRDERS

BRIDGE NO. 383
DWG. NO. 8

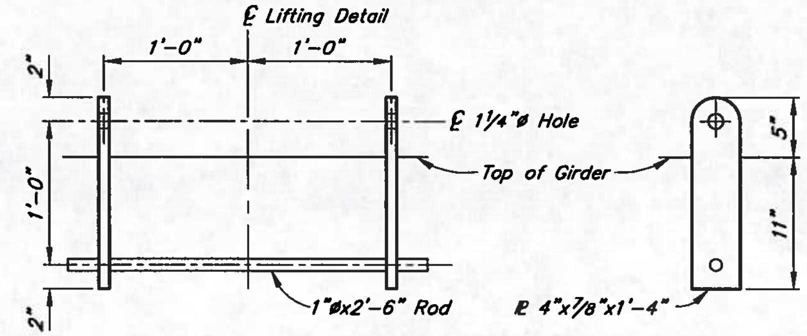
STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N9	55



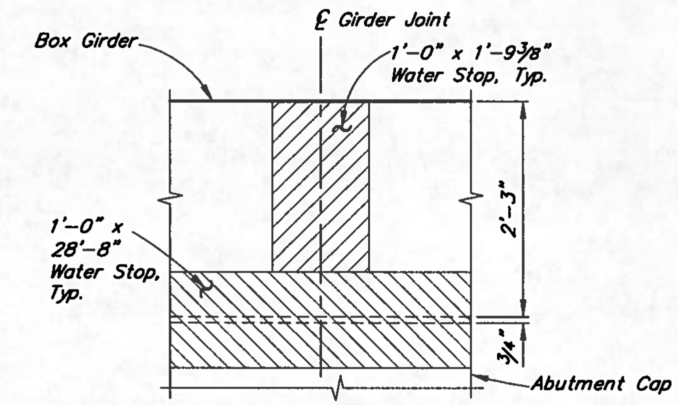
SHEAR KEY DETAIL



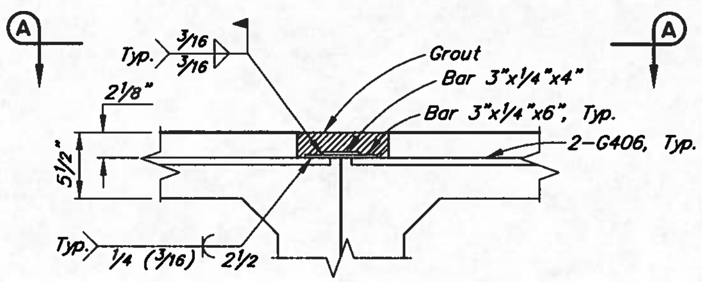
DOWEL DETAIL
ABUTMENTS



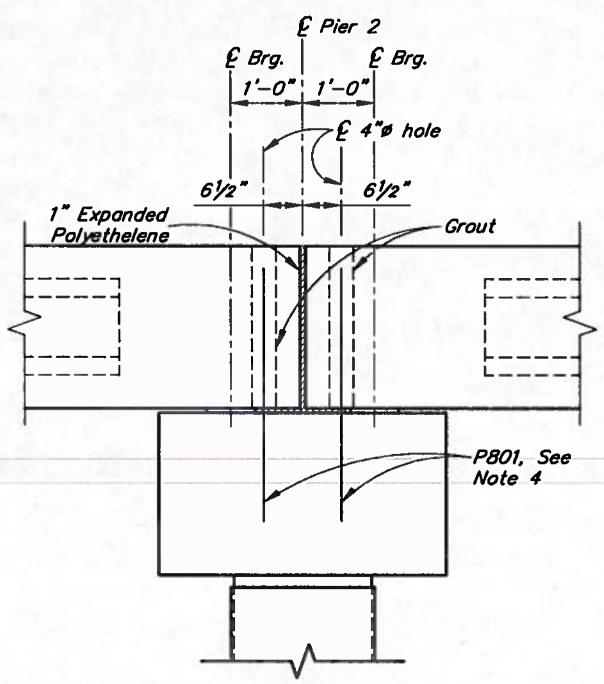
LIFTING DEVICE DETAIL



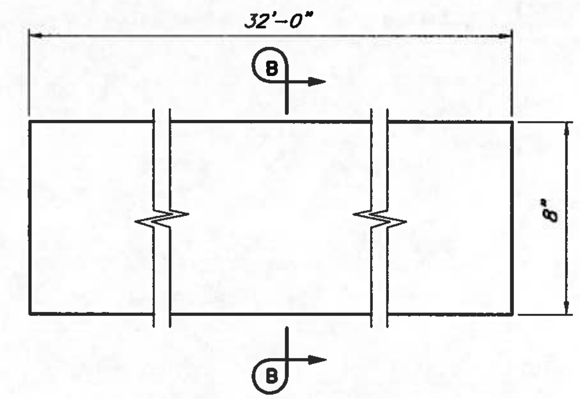
WATER STOP DETAIL
END ELEVATION



SHEAR CONNECTOR DETAIL

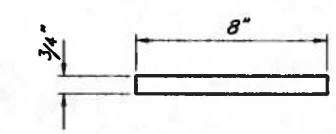


DOWEL DETAIL
PIER 2

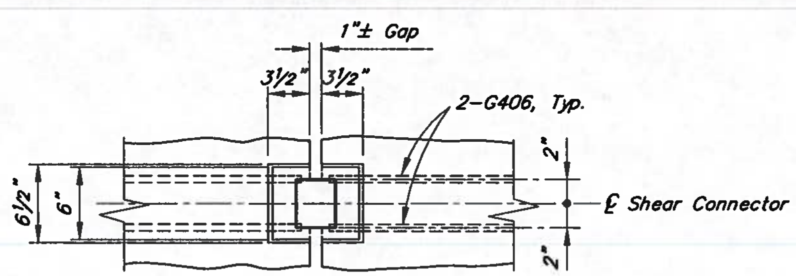


ELASTOMERIC BEARING PAD DETAIL

Grade 5, Shear Modulus = 115 psi



SECTION B-B



VIEW A-A

BEARING PAD REACTION / GIRDER		
SERVICE LOAD		
LOCATION	DEAD LOAD, kips	✱LIVE LOAD, kips
Abutments	36	37
Pier 2	36	37

✱ Does not include dynamic load allowance.

NOTES:

1. Remove epoxy coating from areas to be welded.
2. Cut lifting device flush with top of girder after erection.
3. Fill holes with grout at abutments and pier.
4. Drill and bond A801's and P801's, 1'-6" after girder erection.

DESIGNED BY: Steve Lee | CHECKED: Loren Gehring
DRAWN BY: Sam Sollie | CHECKED: Steve Lee
QUANTITIES BY: Steve Lee | CHECKED: Loren Gehring

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

STATE OF ALASKA 49TH Stephan H. Lee No. SE 13698 REGISTERED PROFESSIONAL ENGINEER

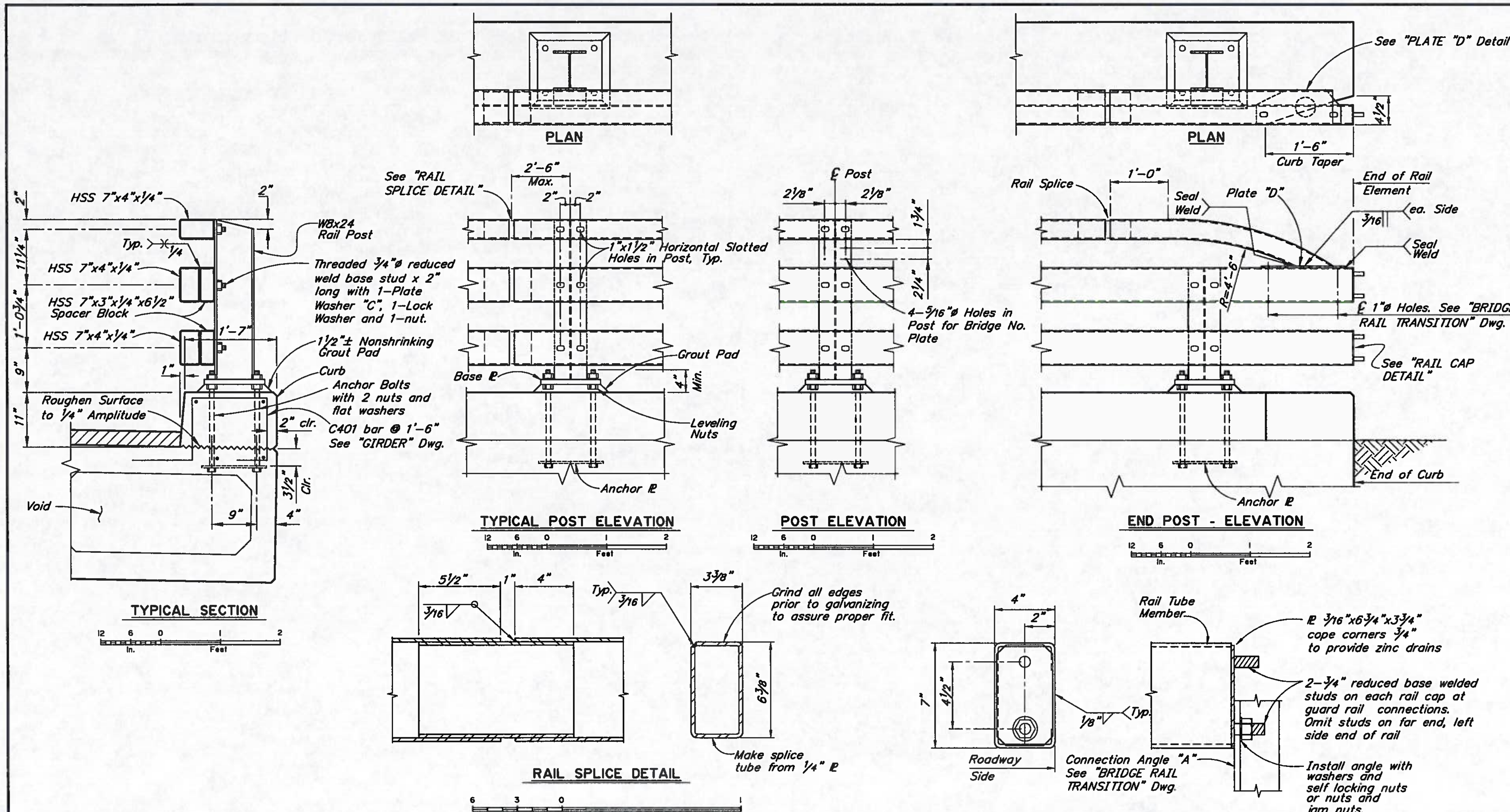
PETERSON CREEK BRIDGE

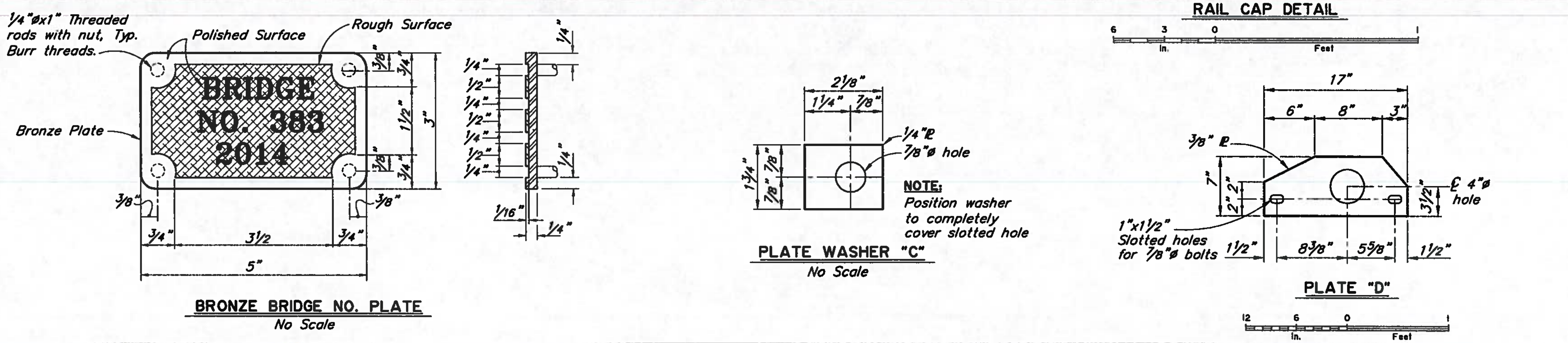
AMALGA HARBOR ROAD

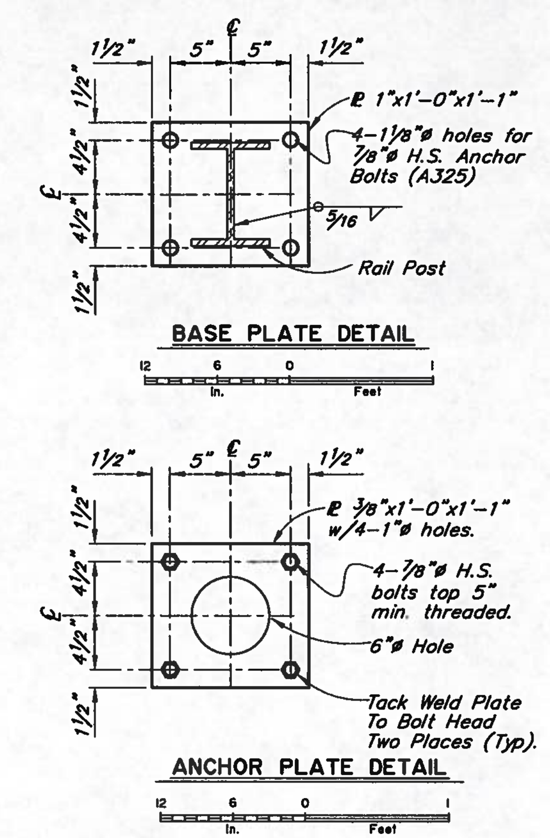
GIRDER DETAILS

BRIDGE NO. 383
DWG. NO. 9

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N10	55







NOTES:

1. Locate bridge number plates as shown (2 total) on "GENERAL LAYOUT" Dwg..
2. Furnish bridge number plates. Use bronze with "Century" type style lettering. Use studs and nuts that conform to UNS C65100 or C65500. Braze ¼"ø threaded rod to back of plate with nut – 4 required. Use locking nuts or lock washers on all machine bolts.
3. Provide railing expansion joints at 50'-0" max. intervals. Provide a minimum of 2 rail posts between railing expansion joints. Railing expansion joints are required in rail panels that span bridge expansion joints.
4. Install posts plumb.
5. Use grout that conforms to ASTM C1107, Grade C with a minimum 28 day f'c of 9000 psi and meets the requirements of ATM 520..
6. See "FRAMING PLAN AND TYPICAL SECTION" Dwg. for rail post spacing and overhang length.

DESIGNED BY: Steve Lee	CHECKED: Loren Gehring
DRAWN BY: Sam Sollie	CHECKED: Steve Lee
QUANTITIES BY: Steve Lee	CHECKED: Loren Gehring

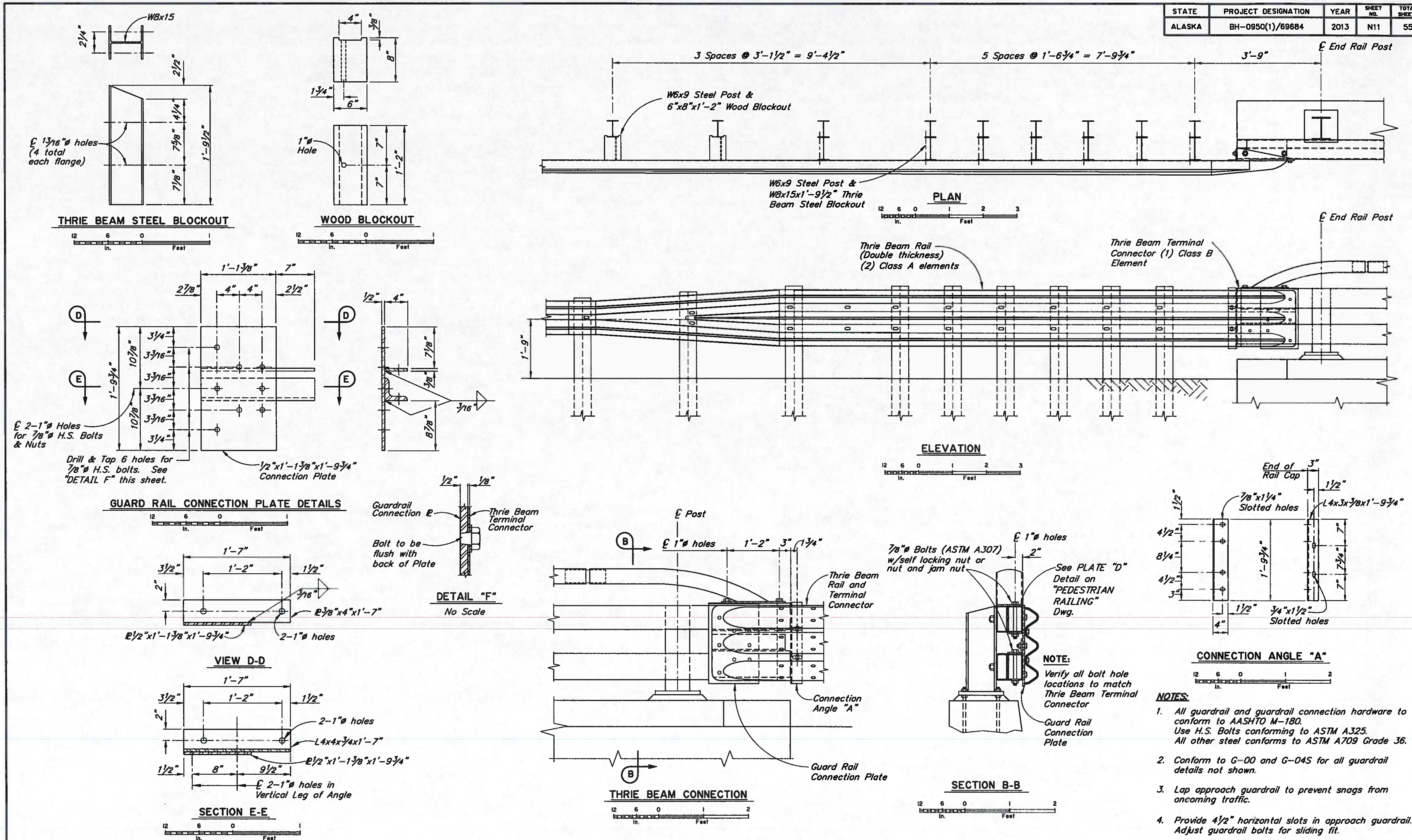
STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

STATE OF ALASKA 49TH Stephen H. Lee No. SE 13698 REGISTERED PROFESSIONAL ENGINEER

PETERSON CREEK BRIDGE
AMALGA HARBOR ROAD
PEDESTRIAN RAILING

BRIDGE NO. 383
DWG. NO. 10

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950(1)/69684	2013	N11	55



NOTES:

1. All guardrail and guardrail connection hardware to conform to AASHTO M-180. Use H.S. Bolts conforming to ASTM A325. All other steel conforms to ASTM A709 Grade 36.
2. Conform to G-00 and G-04S for all guardrail details not shown.
3. Lap approach guardrail to prevent snags from oncoming traffic.
4. Provide 4½" horizontal slots in approach guardrail. Adjust guardrail bolts for sliding fit.

DESIGNED BY: Steve Lee — CHECKED: Loren Gehring
DRAWN BY: Sam Sollie — CHECKED: Steve Lee
QUANTITIES BY: Steve Lee — CHECKED: Loren Gehring

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
BRIDGE SECTION

STATE OF ALASKA — 49TH — Stephan H. Lee — No. SE 13696 — REGISTERED PROFESSIONAL ENGINEER

PETERSON CREEK BRIDGE
AMALGA HARBOR ROAD
BRIDGE RAIL TRANSITION

BRIDGE NO. 383
DWG. NO. 11

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950-(1)/69684	2013	N12	

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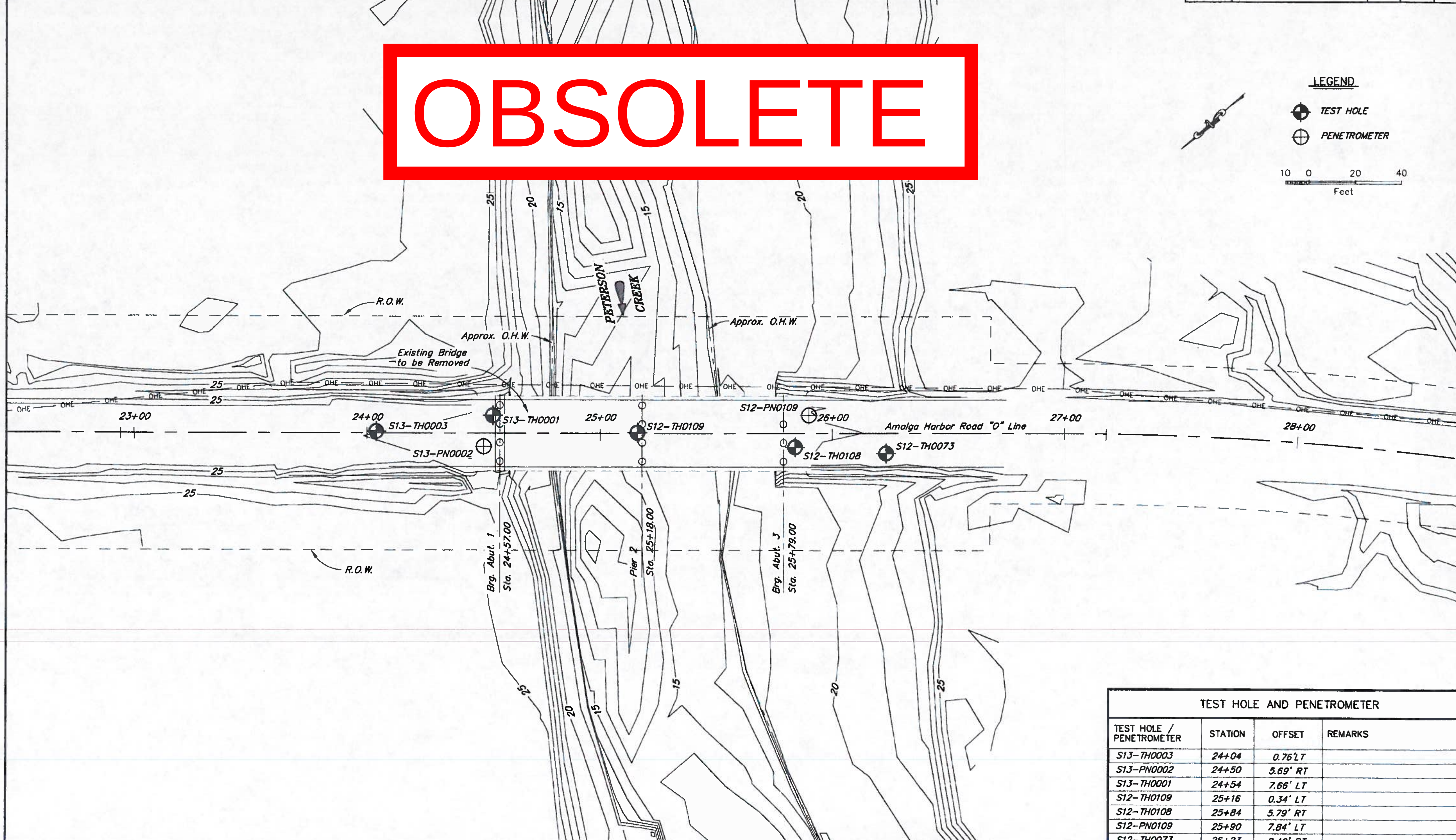


TEST HOLE AND PENETROMETER

TEST HOLE / PENETROMETER	STATION	OFFSET	REMARKS
S13-TH0003	24+04	0.76' LT	
S13-PN0002	24+50	5.69' RT	
S13-TH0001	24+54	7.66' LT	
S12-TH0109	25+16	0.34' LT	
S12-TH0108	25+84	5.79' RT	
S12-PN0109	25+90	7.84' LT	
S12-TH0073	26+23	8.40' RT	

DESIGNED BY:	D. HEMSTREET	CHECKED:	GEOLOGIST
DRAWN BY:	S. DONAHUE	CHECKED:	Engineer
QUANTITIES BY:	Engineer	CHECKED:	Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

STATE OF ALASKA — David A. Hemstreet — No. CE 9800 — REGISTERED PROFESSIONAL ENGINEER
10/2/13

PETERSON CREEK BRIDGE
AMALGA HARBOR ROAD
TEST HOLE & PENETROMETER LOCATION

BRIDGE NO. 0383
DWG. NO. 12

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950-(1)/69684	2013	N12	

TEST HOLE AND PENETROMETER

TEST HOLE / PENETROMETER	STATION	OFFSET	REMARKS
S13-TH0003	24+04	1' LT	
S13-PN0002	24+50	6' RT	
S13-TH0001	24+54	8' LT	
S12-TH0109	25+16	0.5' LT	
S12-TH0108	25+84	6' RT	
S12-PN0109	25+90	8' LT	
S12-TH0073	26+23	8' RT	

DESIGNED BY: D. HEMSTREET	CHECKED: GEOLOGIST		
DRAWN BY: S. DONAHUE	CHECKED: Engineer		
QUANTITIES BY: Engineer	CHECKED: Engineer		

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

STATE OF ALASKA 49TH David A. Hemstreet No. CE 9800 REGISTERED PROFESSIONAL ENGINEER
10/4/13

PETERSON CREEK BRIDGE
AMALGA HARBOR ROAD
TEST HOLE & PENETROMETER LOCATION

BRIDGE NO. 0383
DWG. NO. 12

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950-(1)/69684	2013	N13	

TYPICAL TEST HOLE LOG

DATE: Date begun – Date completed
STATION / OFFSET: XX+XX FEET RT or LT

Hole diameter 3.5 in

Elevation(ft): 100, 95, 90, 85, 80, 75, 70, 65, 60, 55, 50, 45, 40, 35, 30

Depth(ft)

Frozen

Drilling Method

Graphic materials description
Stratum contact
5.0ft
Estimated stratum contact

Observed Ground Water Date: xx/xx/xx

Transitional stratum change

Soil graphic and soil type explanation

GRAVEL (GP)
GRAVEL (GW)
SAND (SP)
SAND (SW)
SILT (ML)
SILT (MH)
CLAY (CL)
CLAY (CH)
ORGANICS OR PEAT (PT)
COBBLE OR BOULDER INDICATED BY DRILL REACTION OR CORE
ICE
WEATHERED BEDROCK (Strength Grade, Weathering Grade)
BEDROCK (Strength Grade, Weathering Grade)
COAL

SILTY GRAVEL (GM)
CLAYEY GRAVEL (GC)
SILTY SAND (SM)
CLAYEY SAND (SC)
ORGANIC SILTS (OL)
ORGANIC CLAYS (OH)

RQD % = Sum of lengths of core pieces > 4" / total length of run
UCS = Uniaxial Compressive Strength, PSI
L = Longest length of core in run
S = Shortest lkength of core in run

32.0ft

SAND with Silt — USCS soil name
p200 = 8% — % passing the #200 (0.075mm) sieve
Sa=42% — % sand, retained on #200 (0.075mm) sieve and passing #4 (4.75mm) sieve
Gr=50% — % gravel, retained on #4 (4.75mm) sieve
Moisture=5.0% — moisture content
Org=10% — organic content
PI=8 — plasticity index
LL=18 — liquid limit
SM — USCS classification
PP=2.0 — pocket penetrometer (ton / SF)
TV=2.0 — torvane (ton / SF)

GRAPHICS: (double symbols with split graphics may be used to indicate combinations of soil types)

48.0ft

07-3533 = soil sample number (year – sample number)

Interval sampled with recovery shaded

10

SPT = blow count / ft. (total blows for second and third 6" increment) with standard penetration test sampler w/ 1.4 ID, 2" O.D. using a CME autohammer with 140 lb. hammer and a 30" freefall latest edition AASHTO T 206 (ASTM D1586).

SPT_{60} = same as SPT except, instead of CME autohamer, the cathead/rope method was used.

SS = blow count with 2" I.D., 2.5" O.D. sampler driven by a 340 lb. CME autohammer with a 30" freefall.

MC = blow count with 2.5" I.D., 3" O.D. sampler driven by a 340 lb. CME autohammer with a 30" freefall.

Indicates no valid SPT

AU — Indicates sample from auger flight

CS — Continuous sampler

Indicates sampler refusal. Refusal defined as 50 or more blows per 6" increment, 100 total blows, or no movement observed with 10 successive blows.

VS — Vane shear test, undrained shear strength, PSF

ST — Thin walled sampler, pushed

70.0ft

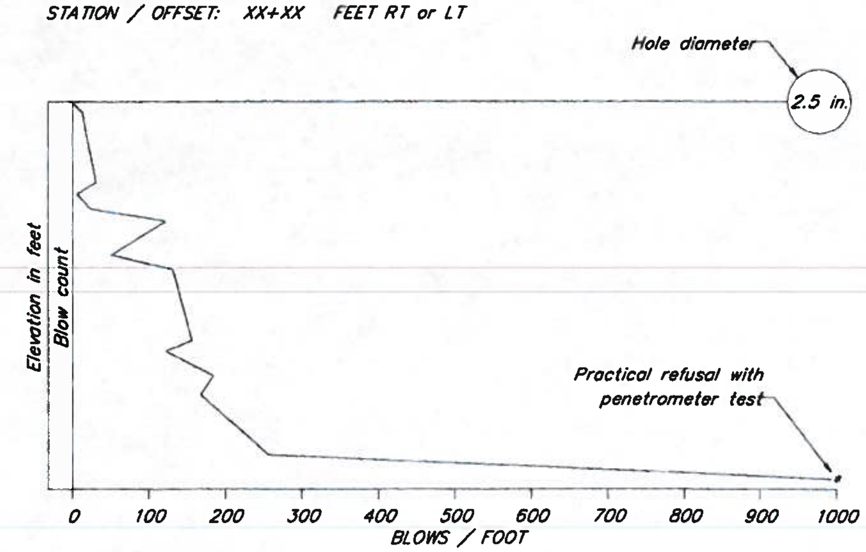
Bottom of hole (BOH)   Total depth

NOTES:

1) The test hole logs depicted graphically in these drawings are distillations of the original field logs, based on post-field investigation review and analysis. These drafted logs include changes made to field descriptions based upon laboratory test data, review and analysis. Detailed field observations of rock and soil sampled during the drilling program are not reproduced in the drafted logs.
2) Description of soils follows Alaska Geotechnical Procedures manual. Classification of soils follows Unified Soil Classification System (ASTM D2487).
3) The test hole logs from these sheets are an integral part of the Foundation Geology Report. See Construction Contract Bid Documents – invitation to bid/notice to bidders. Important information about the test hole logs and the foundation investigation is contained in the report. The test hole logs are not severable from and cannot be completely and correctly interpreted without reference to the Foundation Geology Report.

TYPICAL PENETROMETER TEST LOG

DATE: Date begun – Date completed
ELEVATION: Ground elevation at test hole
STATION / OFFSET: XX+XX FEET RT or LT



Bottom of hole (BOH)

NOTES:
Penetrometer W/2.5" O.D., with a CME AUTOMATIC Hammer using a 340 lb. weight and a 30" freefall

DESIGNED BY:	D. HEMSTREET	CHECKED:	B.Benko
DRAWN BY:	S. DONAHUE	CHECKED:	Engineer
QUANTITIES BY:	Engineer	CHECKED:	Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

STATE OF ALASKA 49TH David A. Hemstreet No. CE 9800 REGISTERED PROFESSIONAL ENGINEER
David Hemstreet 10/2/13

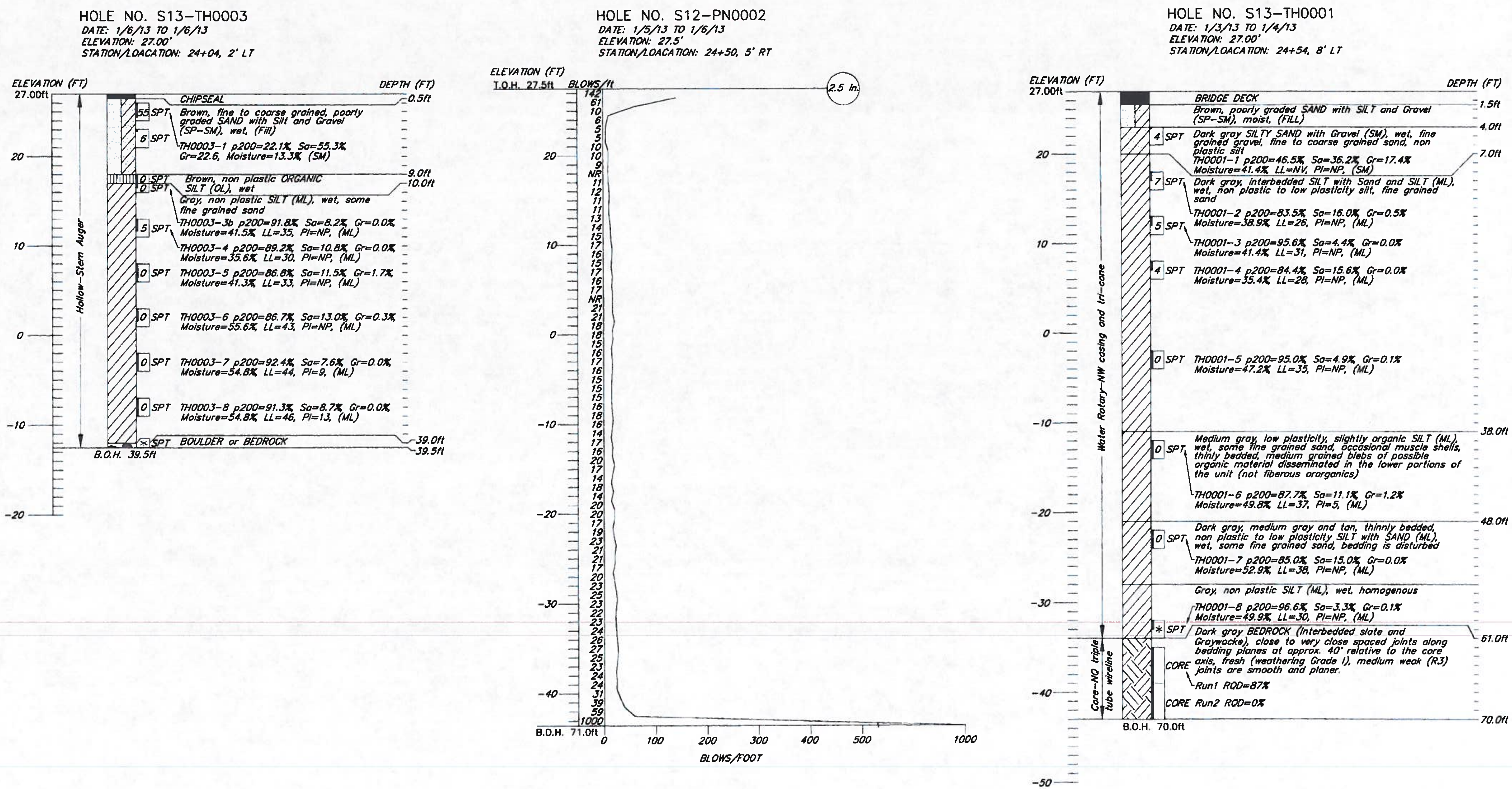
PETERSON CREEK BRIDGE

AMALGA HARBOR ROAD

TEST HOLE & PENETROMETER LEGEND

BRIDGE NO. 0383
DWG. NO. 13

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950-(1)/69684	2013	N14	



DESIGNED BY: D. HEMSTREET	CHECKED: GEOLOGIST
DRAWN BY: S. DONAHUE	CHECKED: Engineer
QUANTITIES BY: Engineer	CHECKED: Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

STATE OF ALASKA 49TH David A. Hemstreet No. CE 9800 REGISTERED PROFESSIONAL ENGINEER

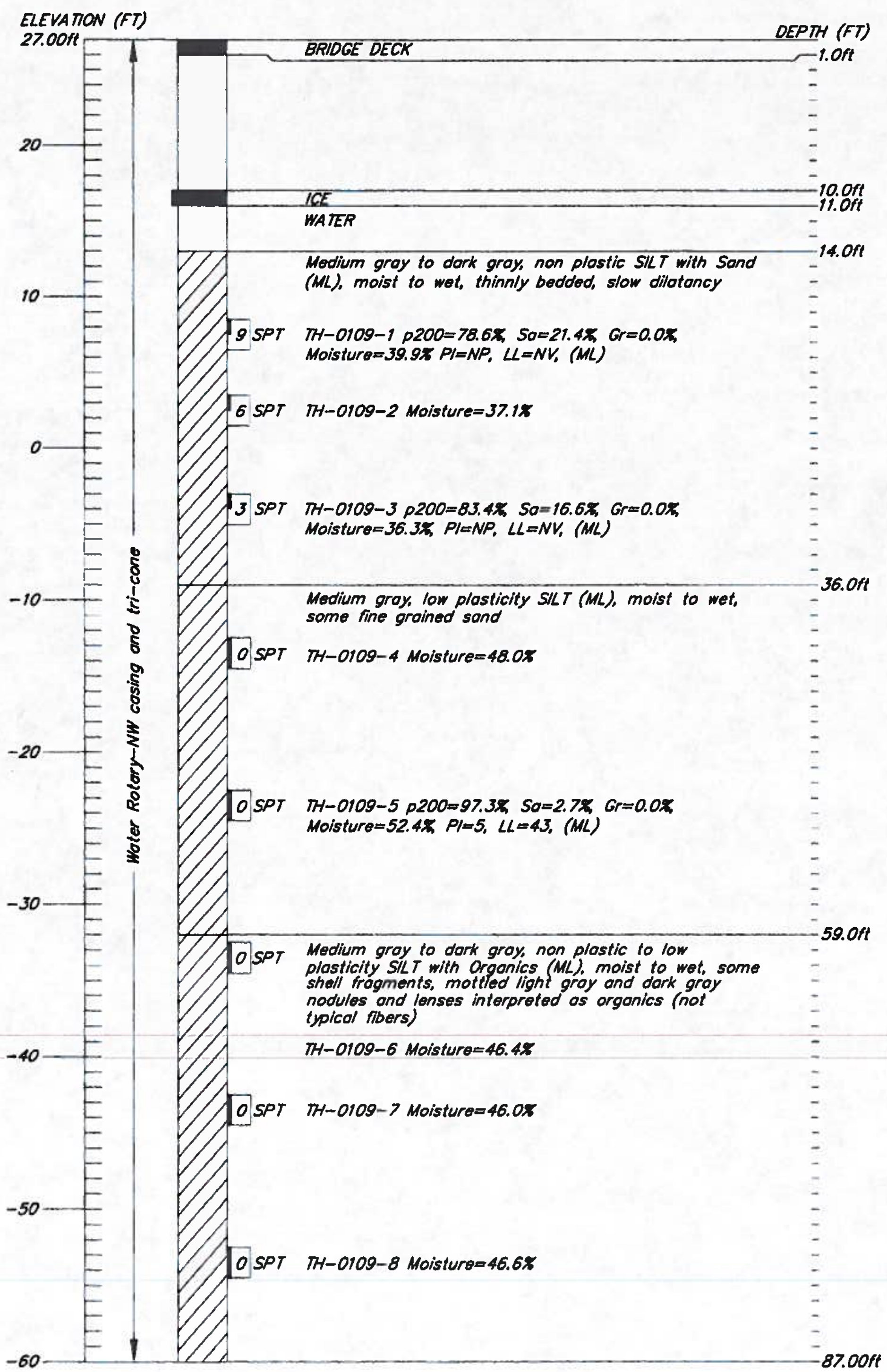
10/2/13

PETERSON CREEK BRIDGE
AMALGA HARBOR ROAD
TEST HOLE & PENETROMETER LOGS

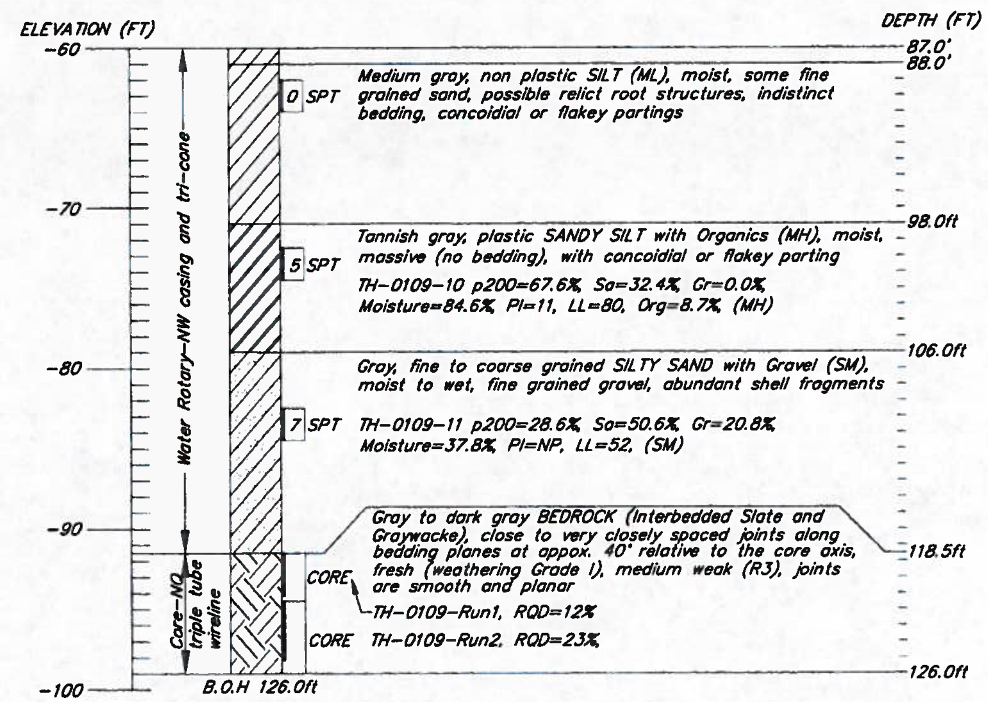
BRIDGE NO. 0383
DWG. NO. 14

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950-(1)/69684	2013	N15	

HOLE NO. S12-TH0109
DATE: 12/2/12 TO 12/2/12
ELEVATION: 27.00'
STATION/LOACATION: 25+16, 0.34' LT



HOLE NO. S12-TH0109 (CONTINUED)
DATE: 12/2/12 TO 12/2/12
ELEVATION: 27.00'
STATION/LOACATION: 25+16, 0.34' LT



DESIGNED BY: D. HEMSTREET	CHECKED: GEOLOGIST
DRAWN BY: S. DONAHUE	CHECKED: Engineer
QUANTITIES BY: Engineer	CHECKED: Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

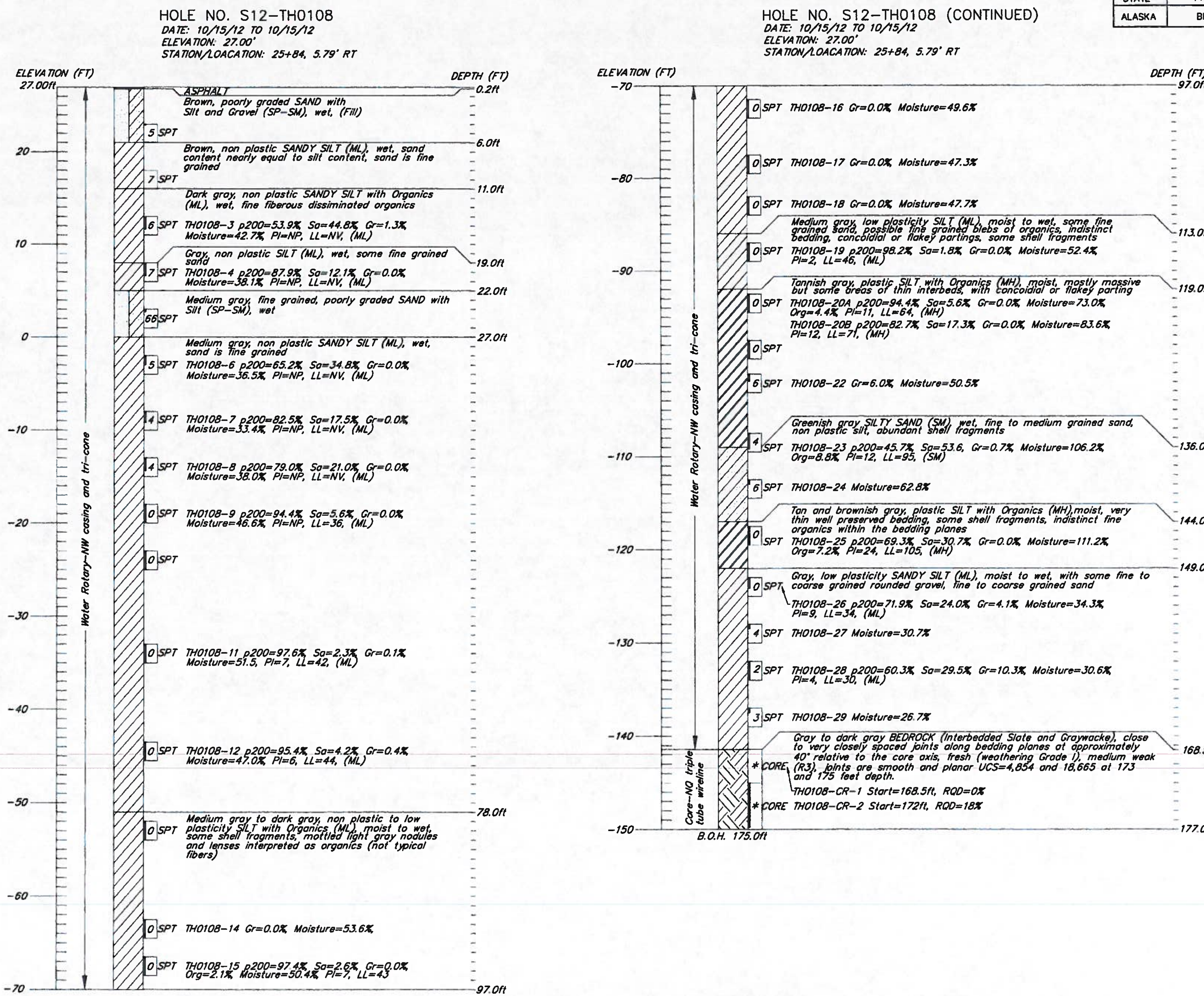
STATE OF ALASKA 49TH David A. Hemstreet No. CE 9800 REGISTERED PROFESSIONAL ENGINEER

David A. Hemstreet 1/9/13

PETERSON CREEK BRIDGE
AMALGA HARBOR ROAD
TEST HOLE & PENETROMETER LOGS

BRIDGE NO. 0383
DWG. NO. 15

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950-(1)/69684	2013	N16	



DESIGNED BY:	D. HEMSTREET	CHECKED:	GEOLOGIST
DRAWN BY:	S. DONAHUE	CHECKED:	Engineer
QUANTITIES BY:	Engineer	CHECKED:	Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

STATE OF ALASKA — David A. Hemstreet — No. CE 8800 — REGISTERED PROFESSIONAL ENGINEER
10/2/13

PETERSON CREEK BRIDGE

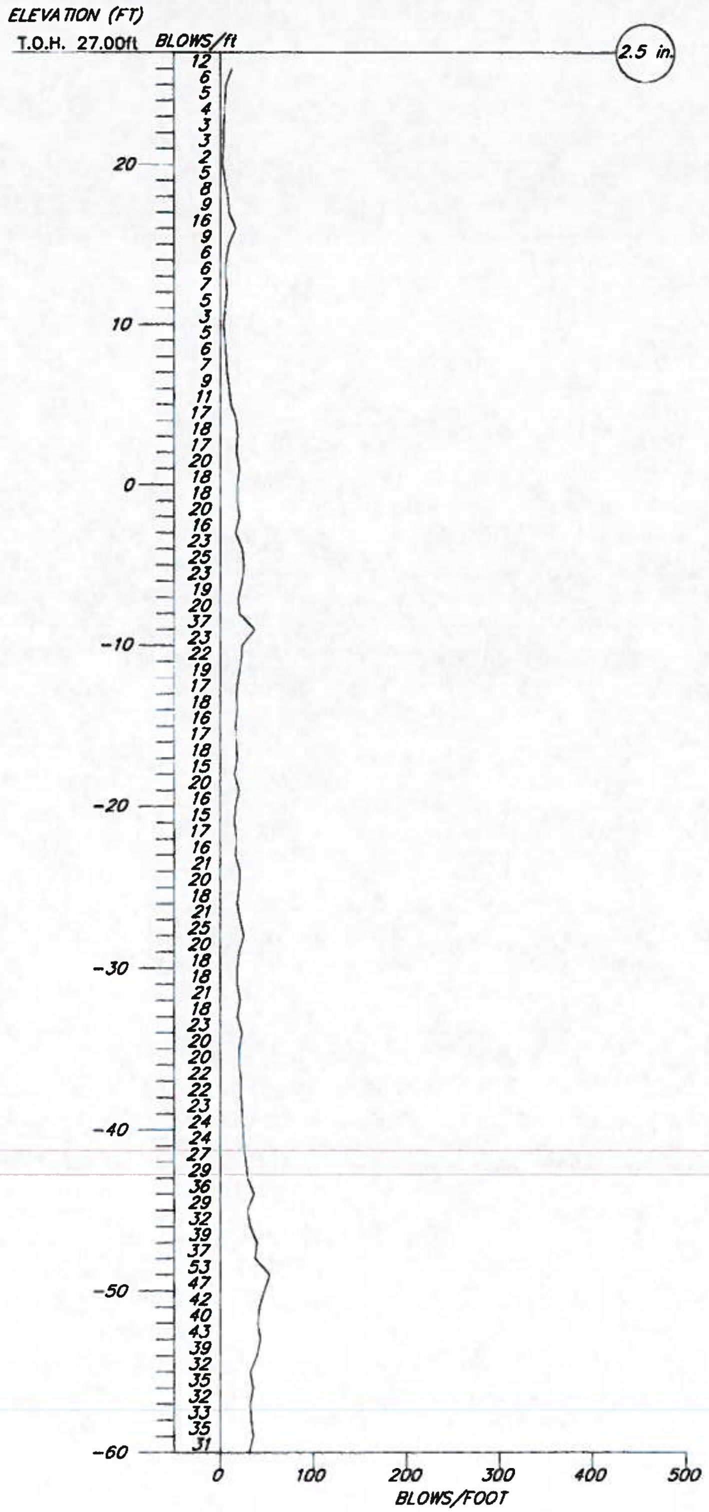
AMALGA HARBOR ROAD

TEST HOLE & PENETROMETER LOGS

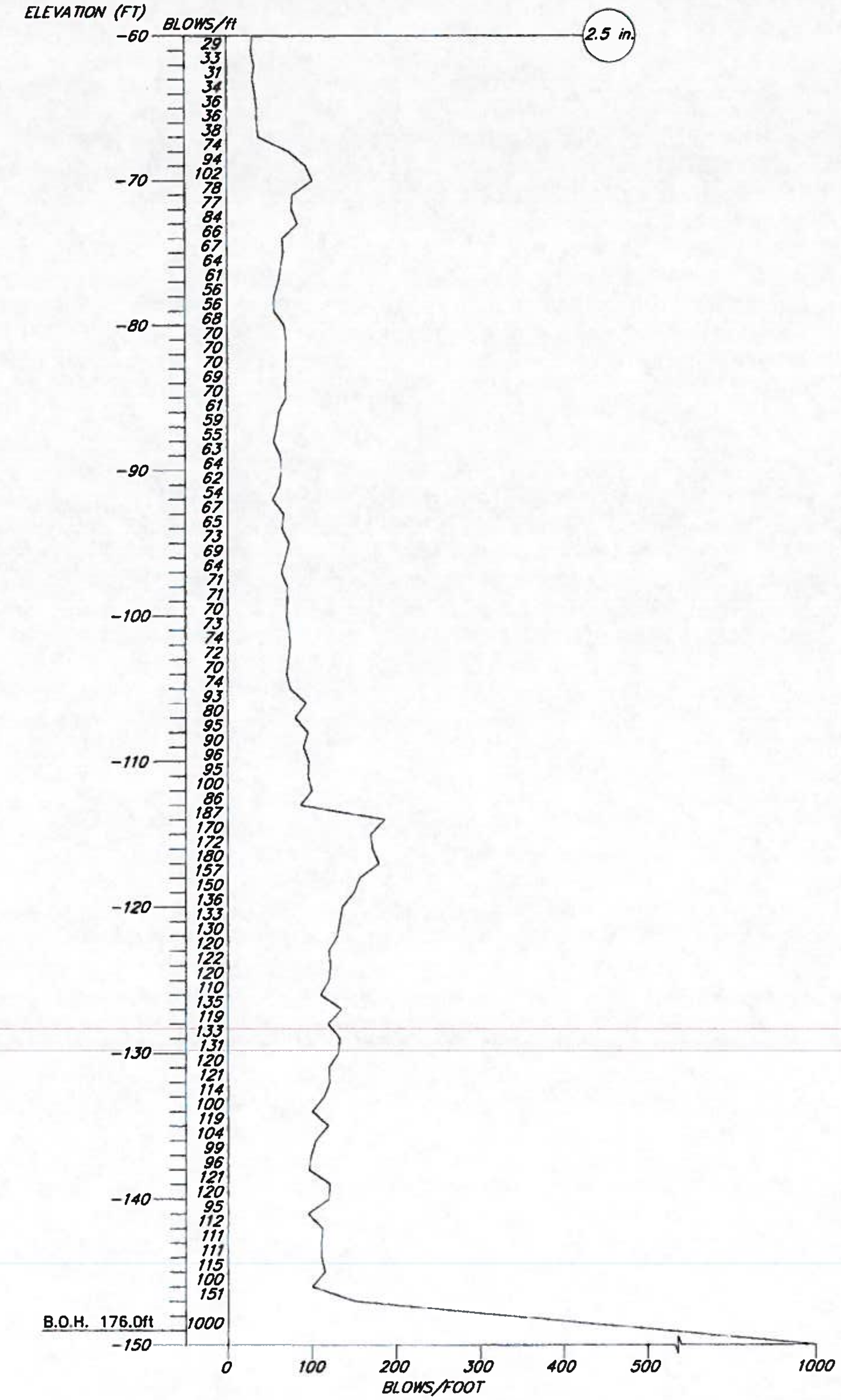
BRIDGE NO. 0383
DWG. NO. 16

STATE	PROJECT DESIGNATION	YEAR	SHEET NO.	TOTAL SHEETS
ALASKA	BH-0950-(1)/69684	2013	N17	

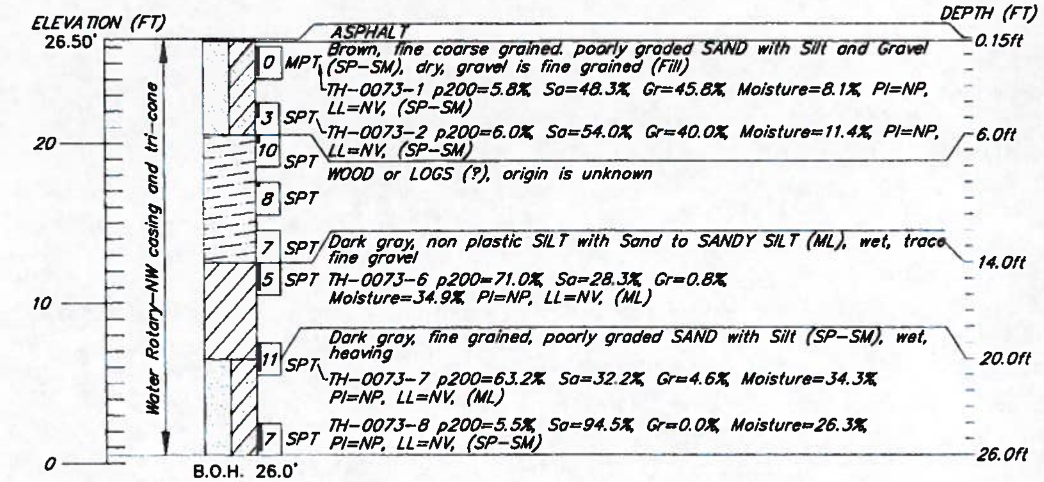
HOLE NO. S12-PN0109
DATE: 1/5/12 TO 1/5/12
ELEVATION: 27.00'
STATION/LOACATION: 25+90, 7.84' LT



HOLE NO. S12-PN0109 (CONTINUED)
DATE: 1/5/12 TO 1/5/12
ELEVATION: 27.00'
STATION/LOACATION: 25+90, 7.84' LT



HOLE NO. S13-TH0073
DATE: 10/10/12 TO 10/10/12
ELEVATION: 26.50'
STATION/LOACATION: 26+23, 8.40' RT



DESIGNED BY: D. HEMSTREET	CHECKED: GEOLOGIST
DRAWN BY: S. DONAHUE	CHECKED: Engineer
QUANTITIES BY: Engineer	CHECKED: Engineer

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
STATEWIDE MATERIALS

STATE OF ALASKA 49TH — David A. Hemstreet No. CE 9800 REGISTERED PROFESSIONAL ENGINEER — 10/2/13

PETERSON CREEK BRIDGE
AMALGA HARBOR ROAD
TEST HOLE & PENETROMETER LOGS

BRIDGE NO. 0383
DWG. NO. 17

Appendix 5-1

JNU CASCADE POINT FERRY TERMINAL

Task 4: Hydrology and Hydraulic Report

DRAFT

May 2025

Contract Number HSSWY00015

PREPARED FOR:

DEPARTMENT OF TRANSPORTATION & PUBLIC FACILITIES
6860 Glacier Highway
P.O. 112506
Juneau, Alaska 99811-2500

PREPARED BY:

PND ENGINEERS, INC.
9360 Glacier Highway Suite 100
Juneau, AK 99801
PND No. 232045

EXECUTIVE SUMMARY

CASCADE CREEK HYDROLOGY AND HYDRAULIC REPORT

A hydrology and hydraulics study was performed by PND Engineers, Inc. (PND) upon request from the Alaska Department of Transportation and Public Facilities (AKDOT&PF), to provide essential bridge design parameters and recommendations in regards to scour protection for the proposed bridge across Cascade Creek. The study includes an analysis of predicted design flows, and a detailed evaluation of hydraulic conditions at the proposed bridge.

The hydrology for the crossing was determined by utilizing regression equations established by the United States Geological Survey (USGS) to estimate flood magnitude and frequency. Inputs for the equations included the size of the watershed and mean annual precipitation. The analysis of hydraulics utilized the United States Army Corps's (USACE) Hydrologic Engineering Center-River Analysis System (HEC-RAS) to predict water surface elevations at the bridge and all river cross-sections, as well as predict conveyance and velocity distributions. Essential input parameters for the HEC-RAS model included: Surveyed cross-sectional data along the reach and estimated Manning's roughness values.

Based on the hydraulic analysis, the following parameters for the bridge design were determined:

- The predicted 100-year and 500-year flood elevations were 160.3 and 161.1 feet (MLLW).
- The minimum low chord elevation of the proposed bridge should be 163.3 feet (MLLW).
- Installation of Class II riprap is recommended along the upstream embankment in the vicinity of the stream, and along the bridge abutments. Two well-graded aggregate filter layers are recommended between the native subgrade and the riprap.
- There is no additional backwater expected for a 100-year and 500-year flood event.

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ACRONYMS & ABBREVIATIONS

AEP	ANNUAL EXCEEDANCE PROBABILITY
AKDOT&PF	ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES
AMHS	ALASKA MARINE HIGHWAY SYSTEM
CFS	CUBIC FEET PER SECONDS
FT/S	FEET PER SECONDS
HEC-RAS	HYDROLOGIC ENGINEERING CENTER-RIVER ANALYSIS SYSTEM
H&H	HYDROLOGIC AND HYDRAULIC
LIDAR	LIGHT DETECTION AND RANGING
MHHW	MEAN HIGHER HIGH WATER
MLLW	MEAN LOWER LOW WATER
MP	MILEPOST
PND	PND ENGINEERS, INC.
PRISM	PARAMETER-ELEVATION REGRESSIONS ON INDEPENDENT SLOPES MODEL
Q100	PEAK 100-YEAR FLOW
Q500	PEAK 500-YEAR FLOW
XS	CROSS-SECTION
RSA	REGIONAL SKEW AREA
USACE	UNITES STATES CORPS OF ENGINEERS
USGS	UNITES STATES GEOLOGICAL SURVEY

1. INTRODUCTION

Juneau, AK is the capital of the U.S. State of Alaska, and it is located along the Gastineau Channel and the Alaskan panhandle as shown in Figure 1. Downtown Juneau is located at the base of Mount Juneau and it is located across the channel from Douglas Island**Error! Reference source not found.**.

The proposed Cascade Point Ferry Terminal is located north of downtown Juneau approximately 42 miles along the Glacier Highway as shown in Figure 2. The creek flows through the Tongass National Forest, which is the largest U.S. National Forest at 16.7 million acres. Most of its area is temperate rain forest and is home to many species of endangered and rare flora and fauna. Cascade Creek runs through spruce and hemlock forests, and the terrain tends to be steep. The only improvement along the creek is the current and proposed bridge crossing.

The scope of the project includes an improved access road, uplands staging area, and marine facility improvements to provide a fully functioning ferry terminal facility for Alaska Marine Highway System (AMHS). The proposed terminal will be located on a privately owned parcel of land leased to the Alaska Department of Transportation and Public Facilities (AKDOT&PF), located approximately 30-road miles north of Auke Bay in Juneau, Alaska. This strategic location is expected to reduce AMHS vessel operating expenses by reducing travel time on the Northern Lynn Canal route (PND, 2024a).

The report summarizes the hydrologic and hydraulic (H&H) analysis and design for the Cascade Creek crossing.

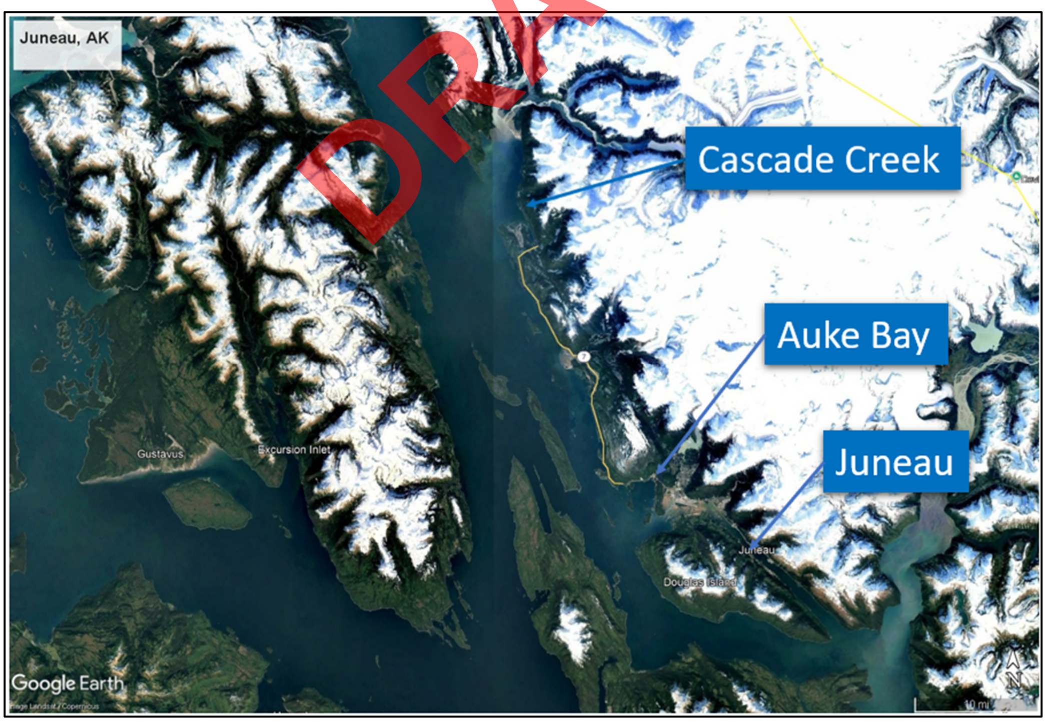

Figure 1: Location of Cascade Creek in relation to Juneau, AK.

Figure 2: The location of the Cascade Creek crossing near MP 42 of the Glacier Highway.

2. PROJECT DESCRIPTION AND ALTERNATIVES

The Juneau Cascade Point Ferry Terminal Project is a collaborated effort between the AKDOT&PF and Goldbelt, Inc. with the primary objective of constructing a new Alaska Class Ferry (ACF) seasonal homeport (PND, 2024a).

The existing bridge across Cascade Creek requires replacement to meet AKDOT&PF standards and the anticipated loading requirements. PND presented two bridge alternatives as part of the PND (2024a) Alternatives Analysis deliverable:

- Precast Concrete Alternative
- Pre-engineered Steel Bridge

Based on AKDOT&PF bridge design preferences, a precast concrete bridge is the most likely design alternative (PND, 2024a) which also provides the lowest profile structure. Therefore, the hydraulic analysis at Cascade Creek was performed based on a preliminary design of a precast concrete bridge.

Figure 3 shows a preliminary bridge site plan with testhole locations that were recently drilled as part of PND's uplands geotechnical investigation. Figure 4 shows bridge elevations and the locations of the concrete abutments at the centerline of the proposed bridge.

The proposed low chord elevation at the upstream edge of the proposed 50-foot-long precast bridge is at approximately 163.8 feet Mean Lower Low Water (MLLW). The proposed width of the bridge is 30 feet. The new bridge proposed location is roughly 30-feet upstream from an existing pioneer road bridge.

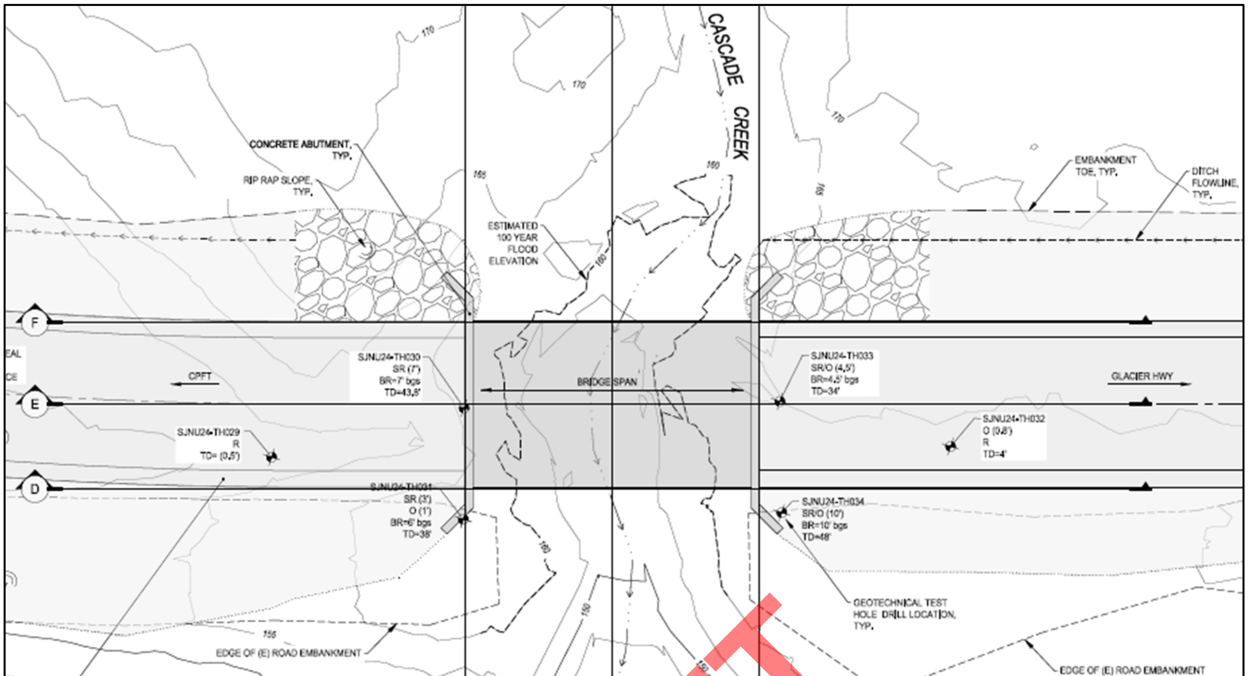

Figure 3: Plan view of the proposed bridge across Cascade Creek (PND, 2025).

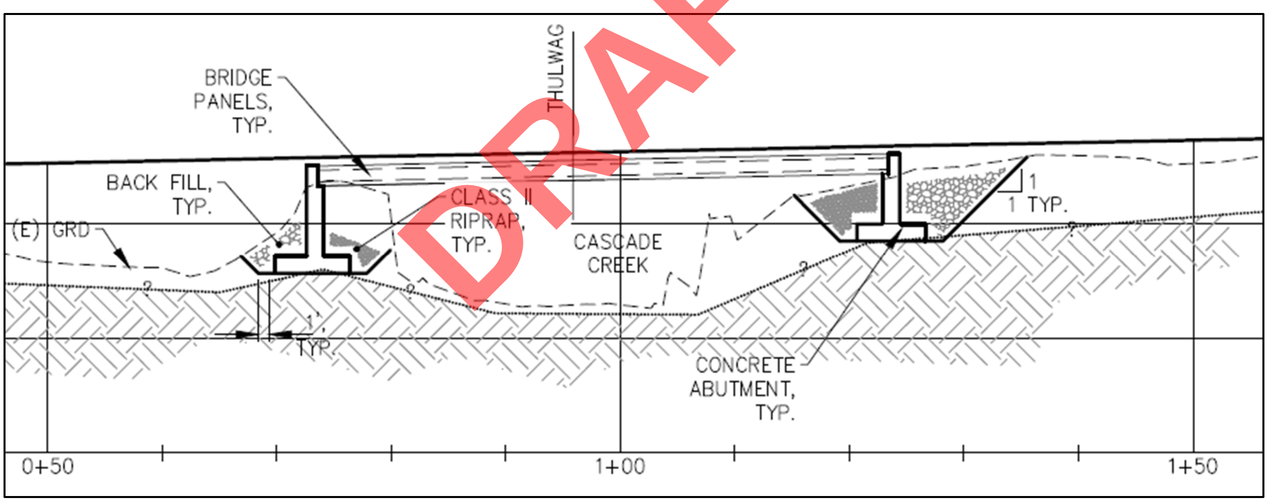

Figure 4: Proposed bridge elevations at centerline of bridge (PND, 2025).

3. EXISTING HYDROLOGIC AND HYDRAULIC CONDITIONS

3.1 SITE VISITS

PND engineers conducted a site visit on October 10th, 2024 to collect required field data and flag cross-sections for PND's surveying crew. Discharge and the water surface elevation were measured immediately upstream of the existing bridge crossing as shown in Figure 5. Discharge was measured with a Hach FH950 portable flow meter. Discharge and the water surface elevation were measured to be 7.6 cubic feet per seconds (cfs) and +153.48 feet (MLLW), respectively.

A surveying crew from PND conducted a field survey of flagged cross-sections on October 28th – 29th, 2024. Eleven cross-sections were surveyed, with three of the cross-sections located downstream of the crossing (Figure 6), and eight of the cross-sections located upstream of the crossing as shown in Figure 7. The vertical datum of the survey was mean lower low water (MLLW=0.0). Horizontal control was defined by the AKDOT Eldred Grid, which is a custom projection developed by the AKDOT&PF specifically for the Glacier Highway Extension Project NO. 69583.

The friction slope between cross-sections 0+00.00 and 1+48.58, 0+00.00 and 5+17.01, and1+96.52 and 5+17.01, were 0.1552, 0.1352 and 0.0917, respectively.

Figure 5: Measurement of streamflow conducted at the time of the site visit on October 10th, 2024.

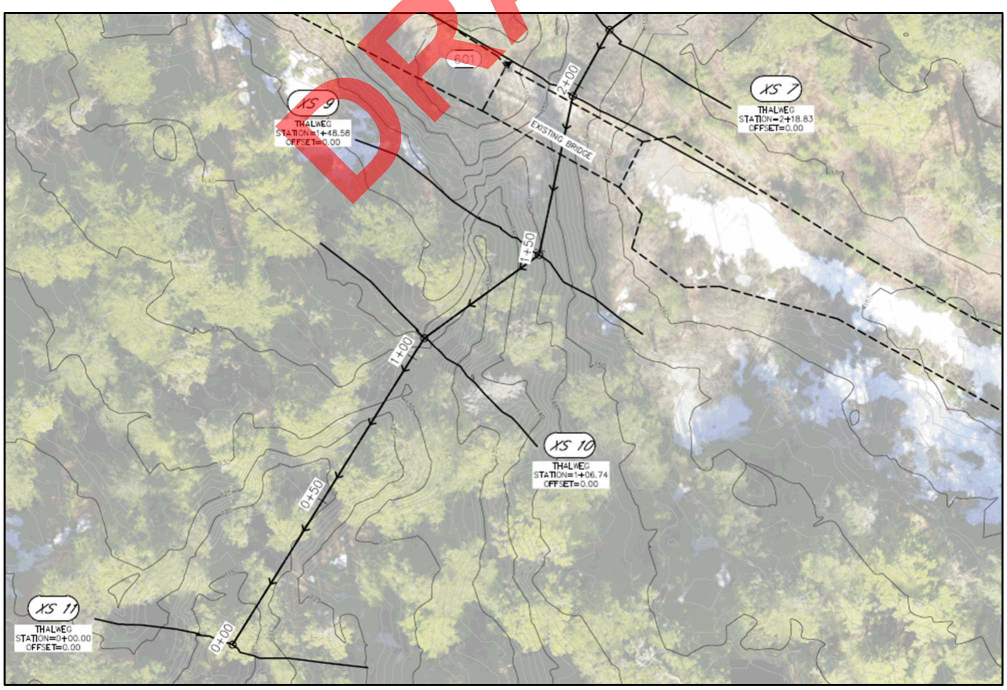

Figure 6: Surveyed cross-sections downstream of the existing bridge.

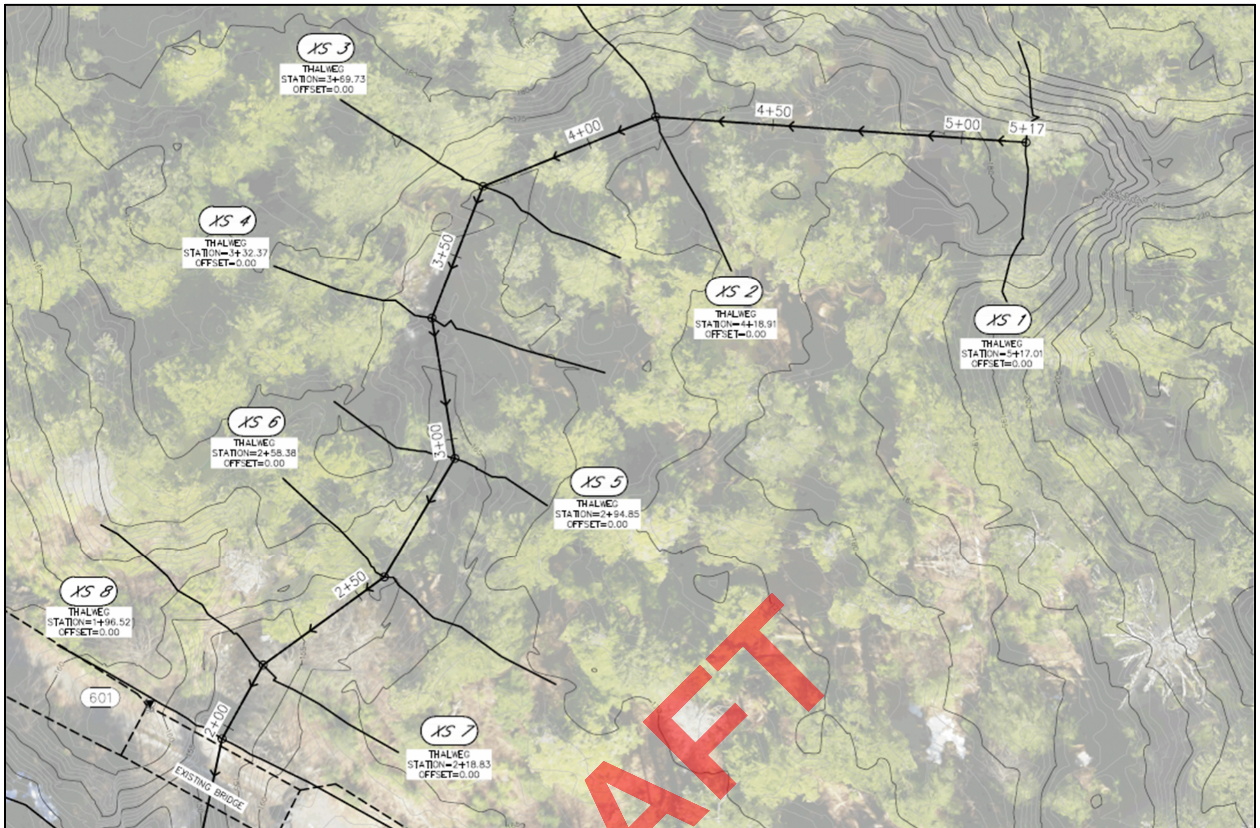

Figure 7: Surveyed cross-sections upstream of the existing bridge.

3.2 HYDRAULICS

Cascade Creek flows through steep terrain in the Tongass National Forest. The channel material in Cascade Creek is typically composed of large boulders and cobbles due to the high energy of the water flow, as is typical for most high-gradient streams. Larger rocks have been left behind that can resist erosion in such conditions. The steep conditions in the creek have developed features such as cascades, which further contributes to the rocky channel composition. The rocky banks give way to a floodplain that consists of dense vegetation. Thick brush, abundant debris, and fallen trees make the terrain difficult to traverse.

Cross-section 5+17.01 is located immediately downstream of a 30-foot-tall waterfall with a high vegetated right bank. Between cross-sections 5+17.01 and cross-section 3+69.73, the vegetated right bank remains steep and tall, while the left floodplain consists of dense brush with several tree logs. Further downstream, the right bank becomes gradually less steep. There are a series of cascades between cross-sections 2+58.38 and 2+18.83 as shown in

Figure 8 A scour hole has developed at cross-section 2+18.83 due to the plunging flow across the cascades as shown in Figure 9. The scour hole was estimated to be approximately 2 feet deep. There are tall banks on both sides of the existing bridge between cascades, which facilitates channelized flow even during high flow conditions.

There is an approximately 20-foot-tall waterfall immediately downstream of the existing bridge (Figure 10) which ensures no increase in backwater during high flows. Further downstream, there are a series of cascades, followed by a 40-foot-tall waterfall located approximately 20 feet downstream of cross-section 0+00.00.

Bankfull widths typically range between 25 and 30 feet immediately downstream of the waterfall at cross-section 5+17.01. The stream becomes gradually narrower further downstream, and bankfull widths are approximately 15 to 20 feet wide between cross-sections 369.73 and 258.38. At the existing bridge, bankfull widths range between 20 and 25 feet. Downstream of the existing bridge, bank full widths ranged between 15 and 20 feet. The friction slope between cross-sections 196.52 and 238.61 is significantly less steep compared to slopes further upstream of the crossing and also downstream of the crossing. Flow expansion and a reduction in the friction slope will likely cause a hydraulic jump near cross-section 2+18.83 during a flood event.

The existing channel bed upstream and downstream of the crossing is well armored. The presence of shallow bedrock will limit any potential scour of the creek bed as well. Due to these factors, scour of the channel bed is not expected to be a significant concern at the crossing. The channel banks are either well vegetated or armored by boulders or bedrock. No sign of bank erosion was observed during the site visit. The lateral migration potential for Cascade Creek is low. Bed load transport is expected to be the primary mode of transport, as larger particles could roll and bounce along the streambed due to the strong water flow. Suspended sediment transport is more prevalent in lower energy streams with finer particles. Overall, any potential for aggregation or degradation in Cascade Creek is expected to be low.

No discernable high-water marks were found at the time of the site visit.

Figure 8: Looking downstream of a series of cascades between cross-sections 2+58.38 and 2+18.83.

Figure 9: Looking upstream from the existing bridge across Cascade Creek. A scour hole has developed directly downstream of a series of cascades approximately 25 feet upstream of the existing bridge.

Figure 10: Looking downstream from the existing bridge across Cascade Creek.

3.3 ICE CONDITIONS

Streamflow is expected to decrease in Cascade Creek during the winter months as precipitation is tied up in snow and ice. Due to the limited streamflow before freezing temperatures, the formation of an ice cover in Cascade Creek will have limited thickness. Even during an unusually rapid spring breakup, any potential superelevation of the water surface as it flows over any existing ice cover/anchor ice will be limited. Furthermore, the high-energy stream should facilitate fairly rapid ice melt in the channel. Therefore, ice is expected to have a minimal, if not negligible impact, at the crossing.

3.4 GEOTECHNICAL INVESTIGATIONS

As part of the Juneau Cascade Point Ferry Terminal Upland Geotechnical Site Plan (PND, 2024b), six boreholes were drilled in the near vicinity of the existing bridge across Cascade Creek. The borehole samples indicate that the depth to bedrock ranged between 5 to 10 feet at the four borehole locations near the bridge crossing. Shallow bedrock below the channel bed is therefore likely.

4. HYDROLOGIC ANALYSIS

Hydrologic analysis was completed using regression equations developed by the United Stated Geological Survey (USGS) and released as part of Scientific Investigations Report 2016-5024 (Curran et al., 2016). The regression equations are based on annual peak-flow data through water year 2012 and they were compiled from 387 stream gages on unregulated streams with at least 10 years of record.

The watershed for the Cascade Creek crossing is part of Regional Skew Area (RSA) 2. The temperate, moist climate of RSA 2 reflects the maritime influence of the Gulf of Alaska. The mean annual precipitation is significantly higher than for RSA 1. For RSA2, the median value of the mean annual precipitation for the study basins is 145 inches. Floods are more commonly generated by rainfall, which generally occurs in the autumn and winter (Curran et al., 2016).

The drainage area was delineated using Light Detection and Ranging (LiDAR) data and digital imagery collected by WSI (Watershed Sciences) in 2013 for Juneau and surrounding areas. Mean annual precipitation data was available through the Parameter-elevation Regressions on Independent Slopes Model (PRISM) Climate Group which operate out of Oregon State University. The delineation of the watershed for the Cascade Creek crossing is available in Appendix A. The size of the basin area and the mean annual precipitation for the basin, were estimated to be as follows:

- Basin Area: 1.4 square miles (mi^2)
- Mean Annual Precipitation: 99 inches

Table 1 shows annual exceedance probability (AEP) flows for the Cascade Creek crossing using the regression equation available in Curran et al. (2016). The 100-year (0.01 AEP) and 500-year (0.002 AEP) stream flows were estimated to be 486 and 650 cfs, respectively.

Table 1: Cascade Creek design flows (cfs).

0.5 AEP	0.2 AEP	0.1 AEP	0.04 AEP	0.02 AEP	0.01 AEP	0.005 AEP	0.002 AEP
137	216	276	356	418	486	555	650

5. HYDRAULIC ANALYSIS

A Hydrologic Engineering Center – River Analysis System (HEC-RAS) numerical model was developed to analyze the hydraulics at the Cascade Creek crossing. HEC-RAS is designed to perform one-dimensional hydraulic calculations for a full network of natural and constructed channels, overbank/floodplain areas and levee protected areas. Furthermore, HEC-RAS calculates water surface profiles for gradually varied flow in natural or constructed channels for both steady and unsteady flow conditions, and can compute movable boundary sediment transport for quasi-unsteady and fully unsteady flow conditions.

For Cascade Creek, one-dimensional water surface profiles were computed using HEC-RAS for both existing and proposed conditions.

5.1 HEC-RAS MODEL #1 – EXISTING CONDITIONS

Before simulating proposed conditions, existing hydraulic conditions observed during the site visit on October 10th, 2024 were simulated using HEC-RAS. The HEC-RAS model was developed based on 11 surveyed cross-sections, and 11 interpolated cross-sections as shown in Figure 11. The existing bridge was added to the HEC-RAS model; however, it did not have any impacts on the hydraulics at the crossing. Based on surveyed conditions, the upstream and downstream boundary conditions were set as follows:

- Upstream: Normal Depth S=0.0917
- Downstream: Normal Depth S=0.1552

A steady flow simulation was performed using the measured discharge of 7.6 cfs. The Manning's roughness value for the floodplain was set to 0.21 to account for the dense terrain. An iterative approach of gradually increasing the Manning's roughness value was employed to determine the composite roughness for the channel bed and banks. A Manning's roughness of 0.14 yielded a simulated water surface elevation of 153.38 feet (MLLW) at cross-section 209, which closely correlated with the measured water elevation of 153.48 feet (MLLW). Furthermore, a comparison between the simulated and measured slopes between cross-sections 218.83 and 196.52 revealed close agreement as well. See Appendix B for the simulated water surface elevations based on the measured discharge of 7.6 cfs.

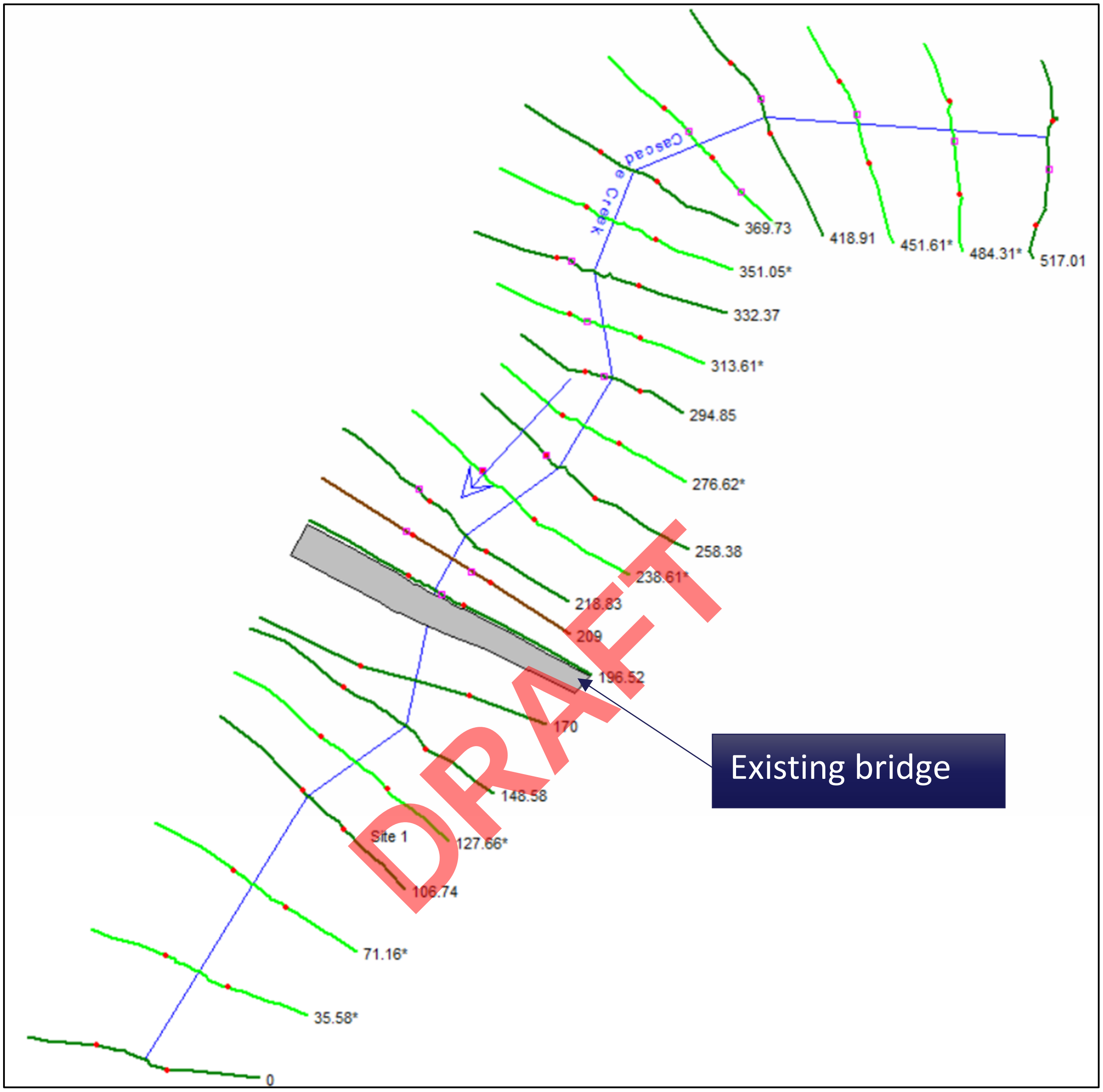

Figure 11: Geometric data for HEC-RAS Model #1 of Cascade Creek.

5.2 HEC-RAS MODEL #2 – PROPOSED CONDITIONS

The proposed precast concrete bridge alternative was incorporated into the HEC-RAS model for Cascade Creek. The proposed bridge was added at RS #212.0. The HEC-RAS model was developed based on the 11 surveyed cross-sections, and 15 interpolated cross-sections as shown in Figure 12. The distance between cross-sections was shorter directly upstream of the bridge to prevent large jumps in energy losses between the cross-sections.

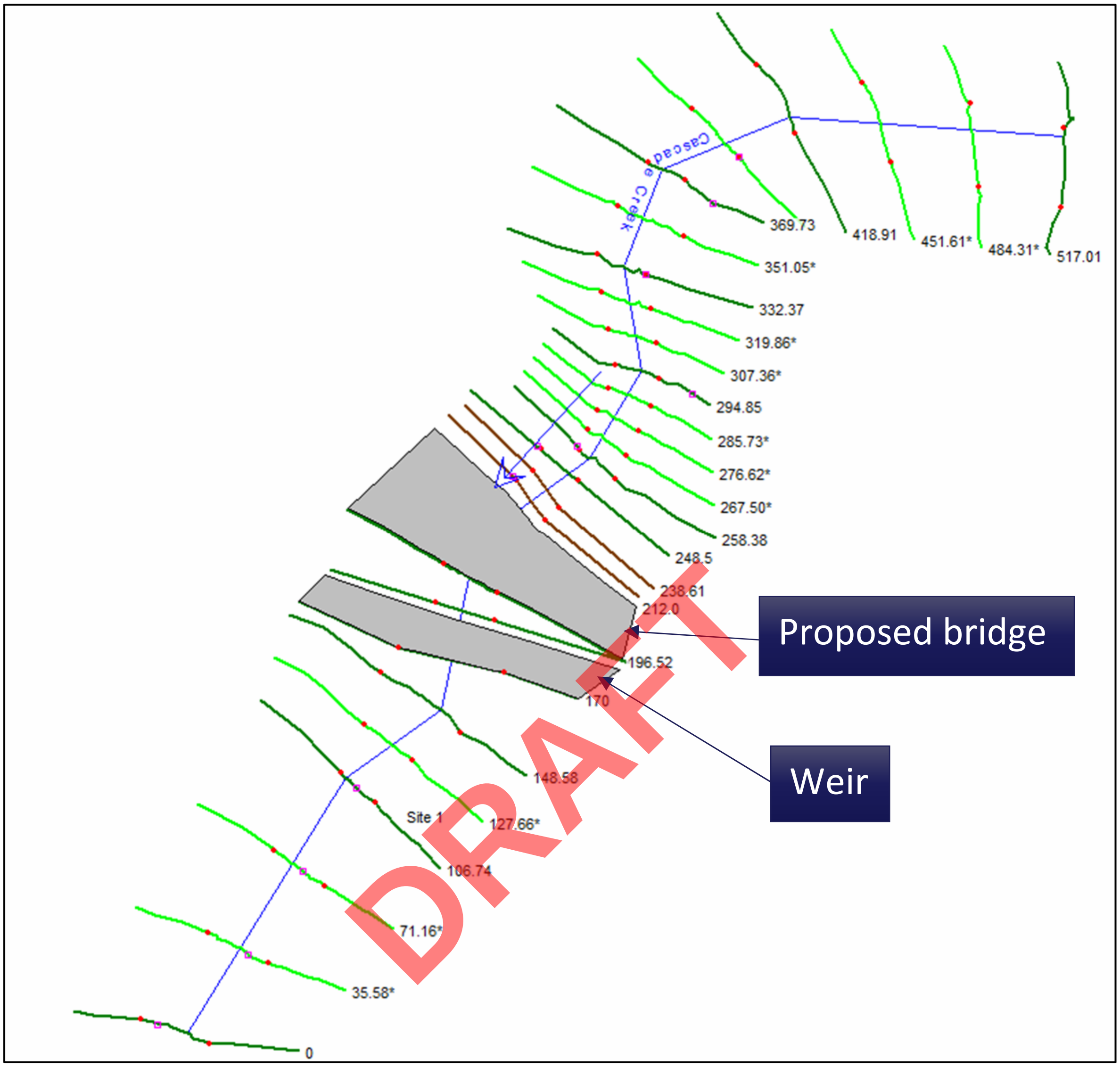

Figure 12: Geometric data for HEC-RAS Model #2 of Cascade Creek.

Based on the steep slope of the channel bed, rapidly varying flows were expected. Transitions between subcritical to supercritical flow, and supercritical to subcritical flow are likely to occur. As the energy equation is not considered to be applicable whenever the water surface passes through the critical depth, the momentum equation was selected for all design flows.

To realistically account for the presence of a waterfall directly downstream of the existing bridge, an inline structure, in the form of a weir, was added at Cross-section (XS) #178.95. The weir had a width of 9 feet and the weir coefficient was set to 2.6. The upstream and downstream embankment slopes were set to 2 (horizontal) to 1 (vertical) (2H:1V).

For high-gradient streams the water depth and friction slope are important factors to consider when estimating the Manning's roughness value. Robert D. Jarrett developed an equation to predict the

Manning's roughness coefficient by analyzing the results of a large selection of field studies and measurements of high-gradient natural streams in the Rocky Mountains of Colorado as outlined in Jarrett (1984). The data implied that the Manning's roughness coefficient noticeably decreased with depth and increased with friction slope. Based on a thorough review of the findings in Jarrett (1984), a composite Manning's roughness of 0.085 was deemed to be a representable roughness value for the channel bed and banks. For the floodplain, the Manning's roughness was set to 0.21 to account for the densely vegetated terrain.

The upstream and downstream boundary conditions were set as follows:

- Upstream: Critical Depth
- Downstream: Critical Depth

5.2.1 100-YEAR & 500-YEAR WATER SURFACE PROFILES

The 100-year flood elevations were simulated using HEC-RAS as shown in Figure 13.

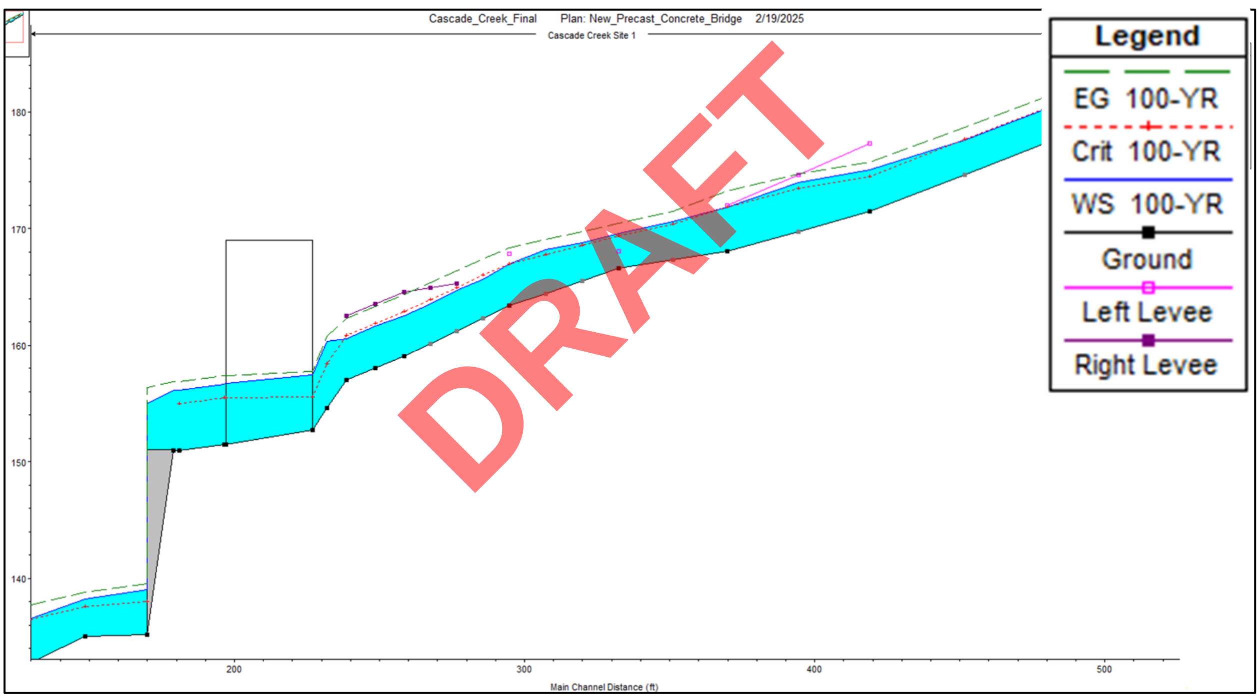

Figure 13: The 100-year predicted flood elevations for proposed conditions using HEC-RAS.

As shown in Figure 13, super critical flow is expected upstream of the proposed bridge. As the conveyance increased, and average velocities reduced significantly at the bridge crossing, HEC-RAS simulated a hydraulic jump, which caused a rise in the water surface elevation directly upstream of the bridge. Figure 14 shows a close-up view of the predicted 100-year and 500-year flood elevations at the proposed bridge crossing. The predicted flood elevations were 160.3 feet and 161.1 feet for a 100-year and 500-year flood event, respectively, at cross-section 232.

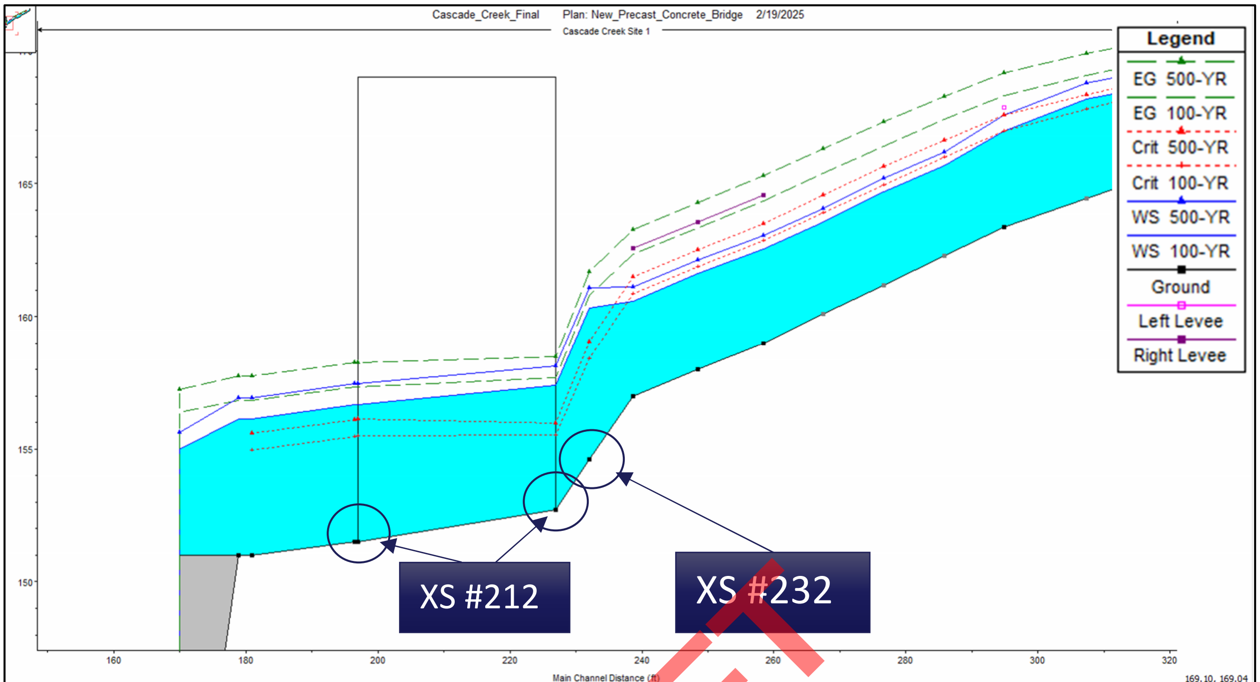

Figure 14: Close-up view of predicted flood elevations associated with a 100-year and 500-year flood event at the proposed bridge.

Predicted velocity distributions for a 100-year flood event at the upstream and downstream end inside the proposed bridge are shown in Figure 15 and Figure 16, respectively. The average velocities were approximately 4.2 and 6.5 feet per seconds (ft/s) at the upstream and downstream end, respectively, for a 100-year flood.

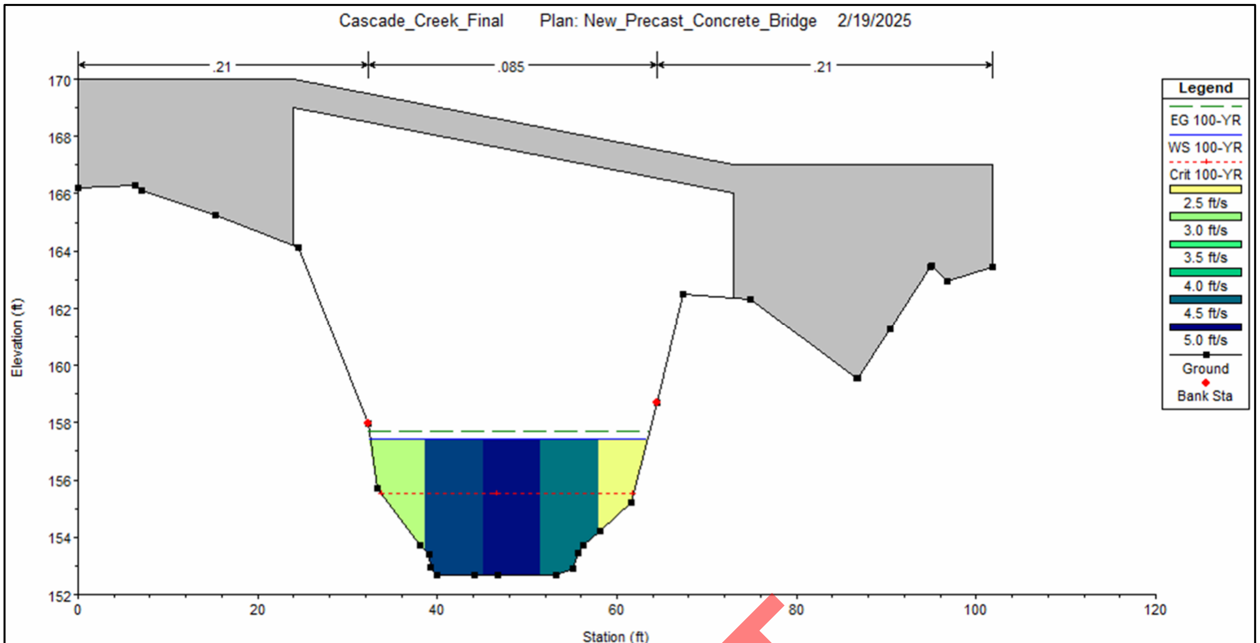

Figure 15: Predicted velocities at the upstream end of the proposed bridge.

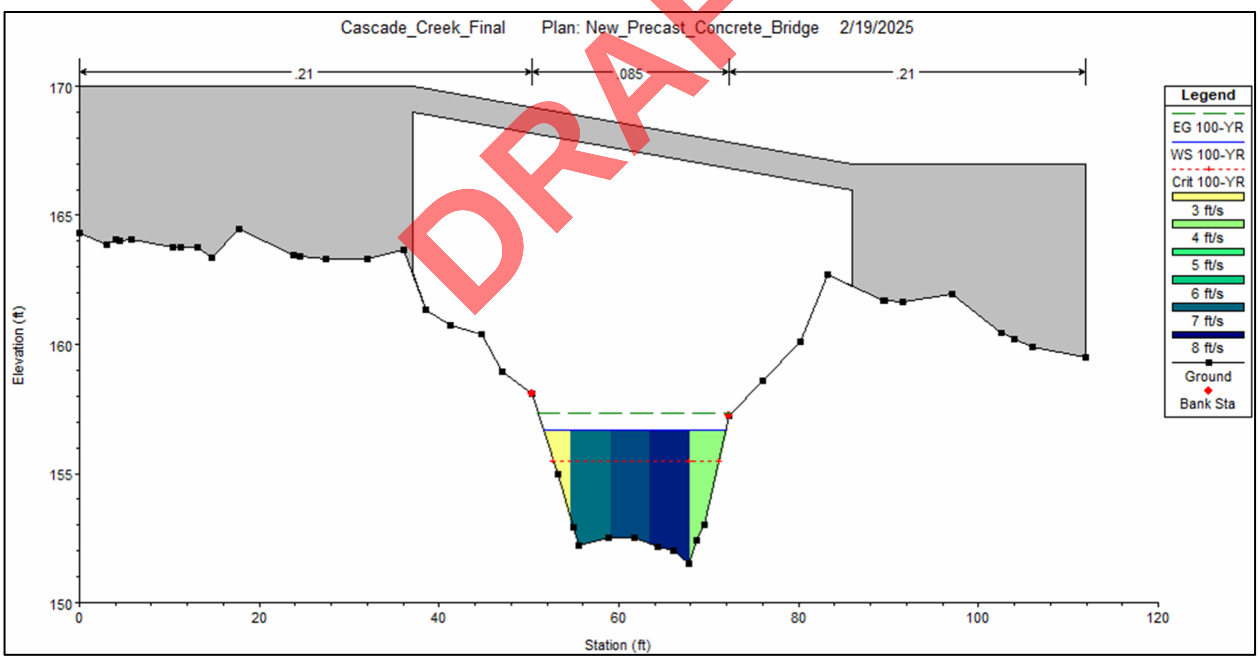

Figure 16: Predicted velocities at the downstream end of the proposed bridge.

Table 2 and Table 3 show predicted 100-year and 500-year flow parameters inside and directly upstream of the proposed bridge crossing, respectively. The ADOT&PF requires a 3-foot freeboard above the 100-year flood elevation. Therefore, the minimum low chord elevation of the bridge is recommended to be set no lower than 160.3 + 3.0 = 163.3 feet (MLLW). The current proposed low chord elevation shown in Figure 4 is sufficient to satisfy this requirement.

Simulated water surface elevations using HEC-Ras indicates that proposed conditions will maintain backwater from existing conditions. See Table B-2 and Table B-3 in Appendix B for a comparison of predicted water surface elevations for existing and proposed conditions.

Table 2: Predicted flow parameters at the bridge crossing for a 100-year flood event.

100-YR Flood	Cross-sections		
	212 (Downstream)	212 (Upstream)	232
W.S. Elev (ft)	156.7	157.4	160.3
Hydr. Depth (ft)	3.7	3.7	4.8
Ave. Velocity (ft/s)	6.5	4.2	5.7

Table 3: Predicted flow parameters at the bridge crossing for a 500-year flood event.

500-YR Flood	Cross-sections		
	212 (Downstream)	212 (Upstream)	232
W.S. Elev (ft)	157.5	158.1	161.1
Hydr. Depth (ft)	4.1	4.3	5.6
Ave. Velocity (ft/s)	7.1	4.7	6.5

5.2.2 SCOUR

The channel bed at the proposed bridge is well armored as it consists of large cobbles and boulders. Furthermore, the shallow bedrock at this site is expected to limit any potential scour that could occur during a large flood event. The only bed scour that was observed during the site visit was an approximately 2-foot-deep scour hole at cross-section 218, which was attributed to plunging flow.

The banks of the stream also consist of boulders and weathered bedrock, which will limit any potential bank erosion. While it was not evident from the modeling effort that a 100-year flood event could cause scour along the footings of the abutments, it is still advisable to install riprap along the abutments. Any areas that could be prone to long-term erosion should be protected.

5.3 RIPRAP DESIGN

Based on estimated embankment slopes, average flow velocities and hydraulic depths upstream and inside the bridge opening, equations available in ADOT&PF (2006) were applied to estimate the class of riprap needed. Reduced water depths and velocities were used to estimate the required size of riprap, as the bridge abutments are not expected to be influenced by the main channel flows. See Appendix C for detailed calculations of riprap sizing at abutments. Based on the expected hydraulic conditions during a 100-year flood, Class II riprap is recommended along the bridge abutments and along the embankment upstream of the proposed bridge as shown in Figure 17.

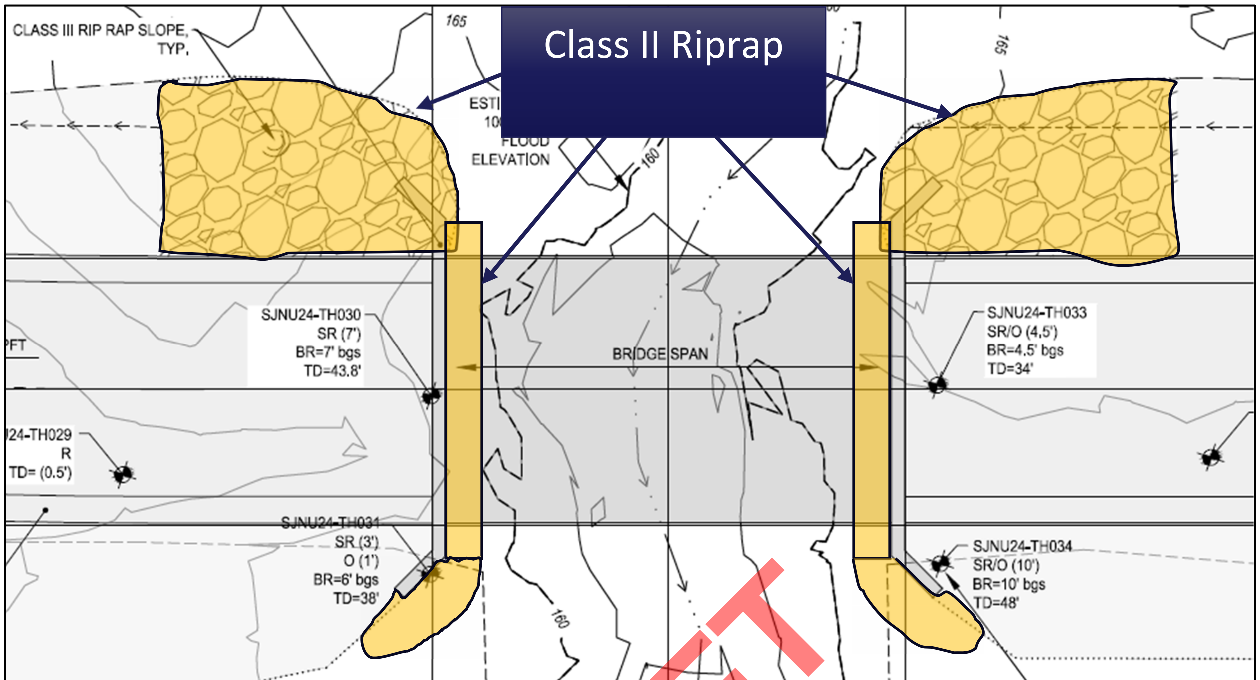

Figure 17: Areas recommended for scour protection (Class II riprap).

Figure 18 shows a typical profile view of recommended scour protection along the bridge abutments. The Class II riprap will be filled up to the grade with a cut slope of 1H:1V along the bridge abutments. All fill slopes will have a maximum slope of 1V:2H.

To ensure long-term stability and effective drainage beneath Class II riprap scour protection, two well-graded aggregate filter layers are recommended between the native subgrade and the riprap. The proposed layer configuration (from top to bottom) of the scour protection is shown below:

1. Class II riprap - minimum thickness of 2 feet
2. 4-inch minus crushed rock - minimum thickness of 6 inches
3. 1-inch minus crushed rock - minimum thickness of 6 inches
4. Native subgrade

Based on observations at the crossing, the soil consists of rocks, gravel, sand, and silt. To ensure adequate gradation of the aggregate filters, it was assumed that the mean grain size of the native subgrade corresponds to that of medium sand. The aggregate filters were sized in accordance with the guidelines provided in CIRIA et al. (2007) and USACE (1984). Detailed calculations for determining the appropriate gradation and size of the aggregate filters are presented in Appendix C.

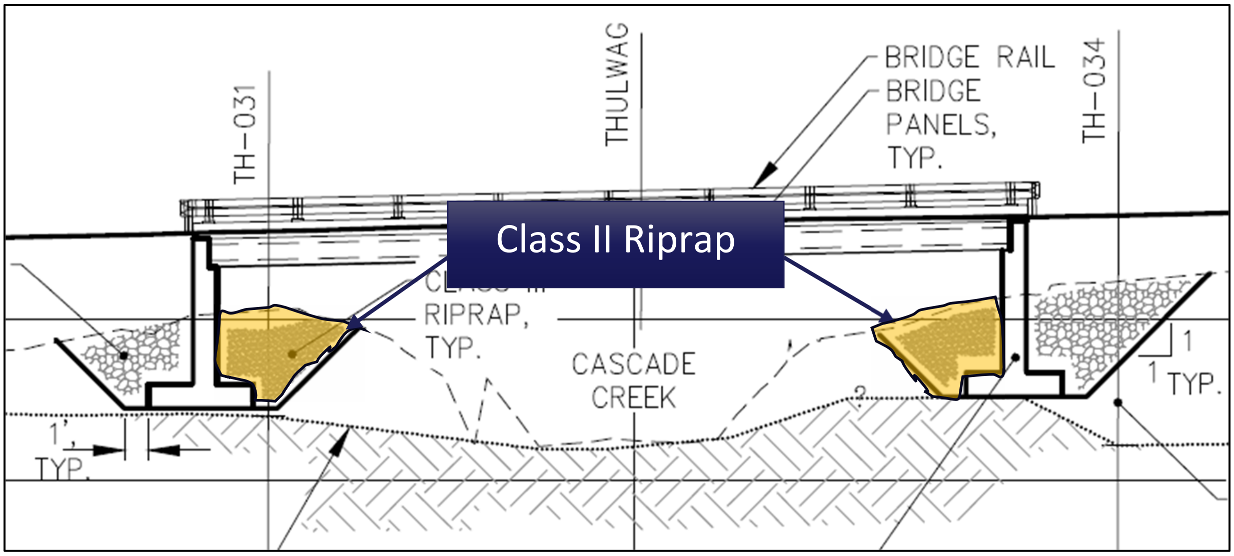

Figure 18: Profile view of recommended scour protection along the bridge abutments.

6. FLOODPLAIN MANAGEMENT

The project is outside of any Federal Emergency Management Agency (FEMA) mapped floodplain areas.

7. CONCLUSIONS

PND was tasked with performing a hydrologic and hydraulic analysis of the proposed bridge design at Cascade Creek. Cascade Creek is a high-energy stream that flows through steep terrain. The stream consists of a series of cascades and waterfalls in the vicinity of the proposed crossing. The channel bed and banks consist of large boulders, cobbles, and weathered bedrock.

Flood magnitudes associated with a 100-year and 500-year flood event were computed using regression equations developed by the USGS. The mean annual precipitation of 99 inches and a basin size of 1.4 square miles were required inputs for the regression equations. The magnitude of a 100-year and 500-year flood event were estimated to be 486 cfs and 650 cfs, respectively.

One-dimensional steady flow calculations were performed using HEC-RAS to simulate the hydraulic conditions at the proposed precast concrete bridge during a flood event. During a large flood event, there's potential for supercritical flow upstream of the crossing, while subcritical flow is expected inside the bridge. Flood elevations were predicted to be 160.3 feet and 161.1 feet (MLLW) for a 100-year and 500-year flood event, respectively, directly upstream of the proposed bridge. By accounting for a required freeboard of 3 feet, the minimum low chord elevation of the proposed bridge should be set at an elevation of 163.3 feet (MLLW). There is no additional backwater expected for a 100-year and 500-year flood event.

Riprap Class II is recommended as scour protection along the bridge abutments and along the upstream embankment in the vicinity of the stream. All temporary cut slopes will have a slope of 1H:1V, while all fill slopes will have a maximum slope of 2H:1V. Two well-graded aggregate filter layers are recommended between the native subgrade and the riprap.

8. HYDROLOGIC AND HYDRAULIC SUMMARY

Table 4 shows a summary of the hydrologic and hydraulic analysis results at the Cascade Creek crossing.

Table 4: Hydrologic and hydraulic analysis summary at the Cascade Creek crossing.

Drainage Area (mi^2)	1.4	
Exceedance Probability (%)	1	0.20
Return Period	100-year (Q100)	500-year (Q500)
Discharge (cfs)	486	650
Water Surface Elevation (ft)	160.3	161.1
Anticipated Backwater (ft)	0	0

9. REFERENCES

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Appendix A. Hydrology

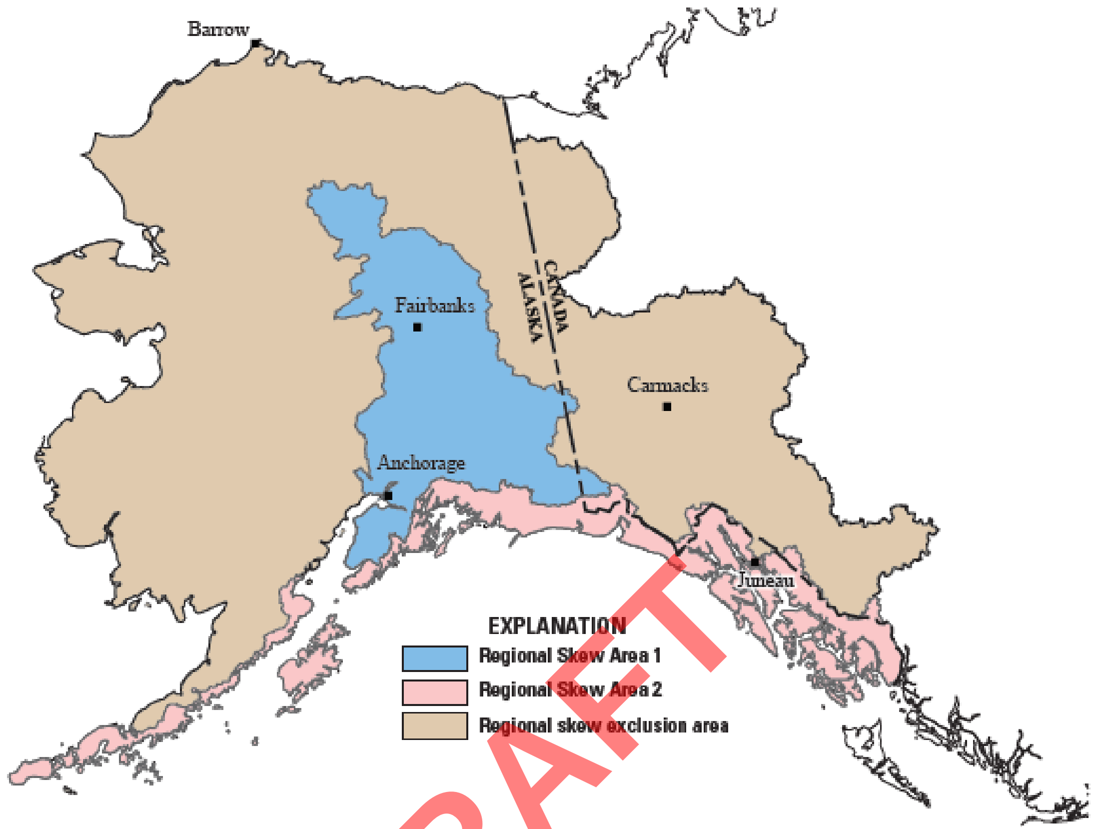

Figure 5. Regional skew areas for Alaska and conterminous basins in Canada.

Figure A-1: Regional skew areas for Alaska and conterminous basins in Canada (USGS, 2016).

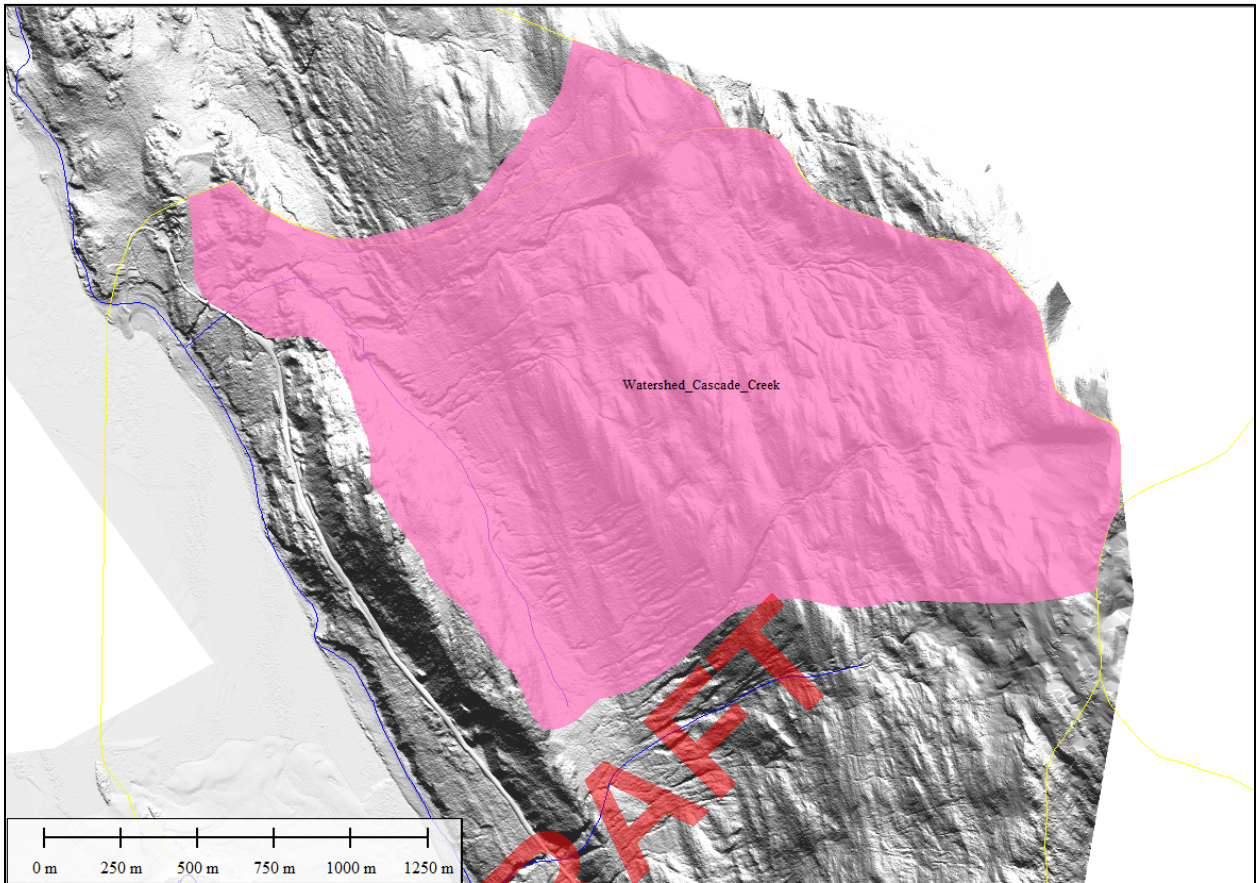

Figure A-2: Delineated watershed for the Cascade Creek crossing using Global Mapper v23.

Table A-1: Estimated annual exceedance probability discharge, in cubic feet per second.

AEP	Coefficient	Coefficient	Coefficient	Q (cfs)
0.5	0.944	0.836	1.023	137
0.2	2.47	0.795	0.916	216
0.1	4.01	0.775	0.865	276
0.04	6.53	0.755	0.816	356
0.02	8.79	0.743	0.787	418
0.01	11.4	0.732	0.764	486
0.005	14.3	0.723	0.744	555
0.002	18.7	0.712	0.721	650

Appendix B. Output from HEC-RAS

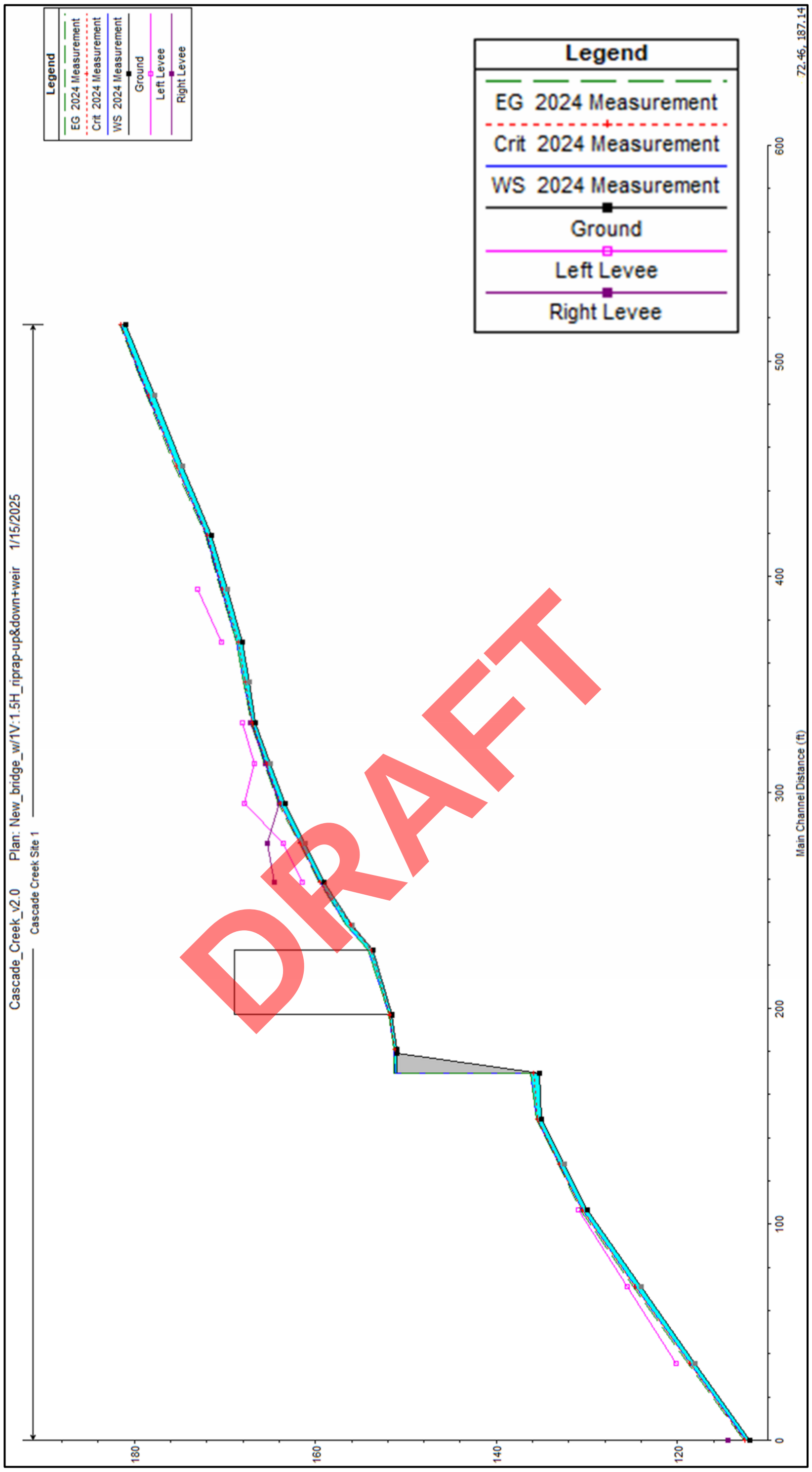

Figure B-1: Predicted water surface elevations for measured discharge using HEC-RAS.

Table B-1: HEC-RAS output based on the measured discharge of 7.6 cfs – existing conditions.

Profile Output Table - Standard Table 1

File Options Std. Tables Locations Help

HEC-RAS Plan: Ext wbridge River: Cascade Creek Reach: Site 1 Profile: 2024 Measurement

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Site 1	517.01	2024 Measurement	7.60	180.98	181.68	181.49	181.74	0.106166	2.01	3.77	8.24	0.52
Site 1	484.31*	2024 Measurement	7.60	177.80	178.72	178.43	178.76	0.075369	1.66	4.58	10.28	0.44
Site 1	451.61*	2024 Measurement	7.60	174.63	175.53	175.34	175.58	0.136834	1.84	4.12	12.51	0.57
Site 1	418.91	2024 Measurement	7.60	171.45	172.26	171.95	172.31	0.063999	1.77	4.30	7.67	0.42
Site 1	394.32*	2024 Measurement	7.60	169.74	170.49	170.30	170.54	0.082038	1.72	4.43	10.20	0.46
Site 1	369.73	2024 Measurement	7.60	168.03	168.86	168.56	168.89	0.050942	1.47	5.17	10.31	0.37
Site 1	351.05*	2024 Measurement	7.60	167.31	168.05	167.76	168.08	0.036421	1.22	6.22	13.01	0.31
Site 1	332.37	2024 Measurement	7.60	166.59	167.09	166.94	167.12	0.087441	1.48	5.13	15.75	0.46
Site 1	313.61*	2024 Measurement	7.60	164.98	165.65	165.44	165.68	0.066378	1.43	5.31	13.79	0.41
Site 1	294.85	2024 Measurement	7.60	163.37	164.06	163.93	164.11	0.111745	1.75	4.33	12.20	0.52
Site 1	276.62*	2024 Measurement	7.60	161.18	161.82	161.68	161.89	0.133871	2.04	3.72	9.62	0.58
Site 1	258.38	2024 Measurement	7.60	159.00	159.63	159.46	159.69	0.107775	1.99	3.82	8.63	0.53
Site 1	238.61*	2024 Measurement	7.60	155.90	156.40	156.36	156.52	0.309602	2.81	2.70	8.07	0.86
Site 1	218.83	2024 Measurement	7.60	150.21	153.41	150.74	153.41	0.000181	0.22	34.93	16.68	0.03
Site 1	209	2024 Measurement	7.60	152.48	153.38	153.12	153.41	0.050756	1.21	6.26	16.97	0.35
Site 1	196.52	2024 Measurement	7.60	151.49	152.66	152.53	152.69	0.063336	1.39	5.48	13.88	0.39
Site 1	186.85		Bridge									
Site 1	170	2024 Measurement	7.60	135.19	136.29	135.93	136.29	0.017727	0.75	10.17	25.42	0.21
Site 1	148.58	2024 Measurement	7.60	135.04	135.59	135.50	135.62	0.133763	1.44	5.27	22.91	0.53
Site 1	127.66*	2024 Measurement	7.60	132.51	133.24	133.03	133.29	0.089344	1.75	4.33	10.22	0.47
Site 1	106.74	2024 Measurement	7.60	129.99	130.64	130.54	130.72	0.195198	2.23	3.41	9.70	0.66
Site 1	71.16*	2024 Measurement	7.60	124.00	124.84	124.66	124.92	0.130525	2.28	3.33	6.98	0.58
Site 1	35.58*	2024 Measurement	7.60	118.01	118.71	118.64	118.83	0.248053	2.85	2.67	6.53	0.79
Site 1	0	2024 Measurement	7.60	112.02	112.72	112.50	112.78	0.091767	2.01	3.79	7.34	0.49

Table B-2: HEC-RAS output for a 100-year flood – existing conditions.

Profile Output Table - Standard Table 1

File Options Std. Tables Locations Help

HEC-RAS Plan: Removed River: Cascade Creek Reach: Site 1 Profile: 100-YR

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Site 1	517.01	100-YR	486.00	180.98	183.79	183.79	184.81	0.091281	8.13	60.41	31.09	1.01
Site 1	484.31*	100-YR	486.00	177.80	180.74	180.76	181.77	0.095070	8.13	59.75	30.06	1.02
Site 1	451.61*	100-YR	486.00	174.63	177.61	177.63	178.67	0.094499	8.25	58.91	29.21	1.02
Site 1	418.91	100-YR	486.00	171.45	175.05	174.43	175.69	0.040460	6.40	75.96	28.48	0.69
Site 1	394.32*	100-YR	486.00	169.74	173.92	173.44	174.65	0.043622	6.87	74.47	33.33	0.73
Site 1	369.73	100-YR	486.00	168.03	171.84	171.84	173.20	0.078627	9.55	60.67	30.92	0.96
Site 1	351.05*	100-YR	486.00	167.31	170.63	170.41	171.47	0.058738	7.41	70.22	35.46	0.85
Site 1	332.37	100-YR	486.00	166.59	169.60	169.36	170.42	0.052866	7.62	83.33	40.74	0.82
Site 1	319.86*	100-YR	486.00	165.52	168.79	168.58	169.73	0.055160	8.03	74.85	35.83	0.84
Site 1	307.36*	100-YR	486.00	164.44	168.17	167.79	169.08	0.046977	7.87	73.52	31.59	0.78
Site 1	294.85	100-YR	486.00	163.37	166.99	166.99	168.31	0.077343	9.36	57.68	24.89	0.97
Site 1	285.73*	100-YR	486.00	162.28	165.66	165.99	167.41	0.112345	10.67	48.80	22.95	1.16
Site 1	276.62*	100-YR	486.00	161.18	164.68	164.96	166.40	0.105544	10.59	49.27	22.03	1.13
Site 1	267.50*	100-YR	486.00	160.09	163.56	163.91	165.38	0.116460	10.89	47.53	21.30	1.17
Site 1	258.38	100-YR	486.00	159.00	162.54	162.86	164.35	0.106816	10.90	48.44	21.31	1.15
Site 1	248.5	100-YR	486.00	158.00	161.63	161.86	163.32	0.094016	10.51	50.52	21.52	1.09
Site 1	238.61	100-YR	486.00	157.00	160.58	160.86	162.34	0.101696	10.74	49.30	21.40	1.13
Site 1	209	100-YR	486.00	152.48	157.29	155.58	157.60	0.012667	4.43	113.91	37.37	0.41
Site 1	196.52	100-YR	486.00	151.49	156.66	155.47	157.33	0.032934	6.55	74.17	20.32	0.60
Site 1	181.0	100-YR	486.00	150.99	156.14	154.97	156.82	0.033542	6.60	73.69	20.28	0.61
Site 1	178.95		Inl Struct									
Site 1	170	100-YR	486.00	135.19	139.06	138.04	139.52	0.026579	5.39	90.10	30.23	0.55
Site 1	148.58	100-YR	486.00	135.04	138.24	137.57	138.83	0.038790	6.15	79.05	29.50	0.66
Site 1	127.66*	100-YR	486.00	132.51	136.34	136.34	137.63	0.088043	9.10	53.40	20.84	1.00
Site 1	106.74	100-YR	486.00	129.99	133.78	133.89	135.45	0.116996	10.38	46.81	15.46	1.05
Site 1	71.16*	100-YR	486.00	124.00	127.55	128.20	129.90	0.191453	12.30	39.52	16.59	1.40
Site 1	35.58*	100-YR	486.00	118.01	121.79	122.24	123.67	0.152642	10.99	44.21	19.46	1.29
Site 1	0	100-YR	486.00	112.02	115.48	116.02	117.46	0.195916	11.30	43.01	22.21	1.43

Table B-3: HEC-RAS output for a 100-year flood – proposed conditions.

Profile Output Table - Standard Table 1

File Options Std. Tables Locations Help

HEC-RAS Plan: Precast Concete Bridge River: Cascade Creek Reach: Site 1 Profile: 100-YR

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Site 1	517.01	100-YR	486.00	180.98	183.79	183.79	184.81	0.091281	8.13	60.41	31.09	1.01
Site 1	484.31*	100-YR	486.00	177.80	180.74	180.76	181.77	0.095070	8.13	59.75	30.06	1.02
Site 1	451.61*	100-YR	486.00	174.63	177.61	177.63	178.67	0.094499	8.25	58.91	29.21	1.02
Site 1	418.91	100-YR	486.00	171.45	175.05	174.43	175.69	0.040460	6.40	75.96	28.48	0.69
Site 1	394.32*	100-YR	486.00	169.74	173.92	173.44	174.65	0.043622	6.87	74.47	33.33	0.73
Site 1	369.73	100-YR	486.00	168.03	171.84	171.84	173.20	0.078627	9.55	60.67	30.92	0.96
Site 1	351.05*	100-YR	486.00	167.31	170.63	170.41	171.47	0.058738	7.41	70.22	35.46	0.85
Site 1	332.37	100-YR	486.00	166.59	169.60	169.36	170.42	0.052866	7.62	83.33	40.74	0.82
Site 1	319.86*	100-YR	486.00	165.52	168.79	168.58	169.73	0.055160	8.03	74.85	35.83	0.84
Site 1	307.36*	100-YR	486.00	164.44	168.17	167.79	169.08	0.046977	7.87	73.52	31.59	0.78
Site 1	294.85	100-YR	486.00	163.37	166.99	166.99	168.31	0.077343	9.36	57.68	24.89	0.97
Site 1	285.73*	100-YR	486.00	162.28	165.66	165.99	167.41	0.112345	10.67	48.80	22.95	1.16
Site 1	276.62*	100-YR	486.00	161.18	164.68	164.96	166.40	0.105544	10.59	49.27	22.03	1.13
Site 1	267.50*	100-YR	486.00	160.09	163.56	163.91	165.38	0.116460	10.89	47.53	21.30	1.17
Site 1	258.38	100-YR	486.00	159.00	162.54	162.86	164.35	0.106816	10.90	48.44	21.31	1.15
Site 1	248.5	100-YR	486.00	158.00	161.63	161.86	163.32	0.094916	10.51	50.52	21.52	1.09
Site 1	238.61	100-YR	486.00	157.00	160.58	160.86	162.34	0.101696	10.74	49.30	21.40	1.13
Site 1	232	100-YR	486.00	154.60	160.31	158.41	160.80	0.013807	5.68	98.12	24.69	0.46
Site 1	212.0		Bridge									
Site 1	196.52	100-YR	486.00	151.49	156.66	155.47	157.33	0.032934	6.55	74.17	20.32	0.60
Site 1	181.0	100-YR	486.00	150.99	156.14	154.97	156.82	0.033542	6.60	73.69	20.28	0.61
Site 1	178.95		Inl Struct									
Site 1	170	100-YR	486.00	135.19	139.06	138.04	139.52	0.026579	5.39	90.10	30.23	0.55
Site 1	148.58	100-YR	486.00	135.04	138.24	137.57	138.83	0.038790	6.15	79.05	29.50	0.66
Site 1	127.66*	100-YR	486.00	132.51	136.34	136.34	137.63	0.088043	9.10	53.40	20.84	1.00
Site 1	106.74	100-YR	486.00	129.99	133.78	133.89	135.45	0.116572	10.37	46.87	15.46	1.05
Site 1	71.16*	100-YR	486.00	124.00	127.55	128.20	129.90	0.191749	12.30	39.50	16.59	1.41
Site 1	35.58*	100-YR	486.00	118.01	121.79	122.24	123.67	0.152461	10.99	44.23	19.46	1.28
Site 1	0	100-YR	486.00	112.02	115.48	116.02	117.46	0.196023	11.30	43.01	22.21	1.43

Table B-4: HEC-RAS output inside the proposed bridge for a 100-year flood – proposed conditions.

Bridge Output

File Type Options Help

River: Cascade Creek Profile: 100-YR

Reach: Site 1 RS: 212.0 Plan: Precast Concete Bridge

Plan: Precast Concete Bridge Cascade Creek Site 1 RS: 212.0 Profile: 100-YR

E.G. US. (ft)	160.80
W.S. US. (ft)	160.31
Q Total (cfs)	486.00
Q Bridge (cfs)	486.00
Q Weir (cfs)	
Weir Sta Lft (ft)	
Weir Sta Rgt (ft)	
Weir Submerg	
Weir Max Depth (ft)	
Min El Weir Flow (ft)	167.01
Min El Prs (ft)	169.00
Delta EG (ft)	3.47
Delta WS (ft)	3.65
BR Open Area (sq ft)	510.98
BR Open Vel (ft/s)	6.51
BR Sluice Coef	
BR Sel Method	Momentum

Element	Inside BR US	Inside BR DS
E.G. Elev (ft)	157.69	157.34
W.S. Elev (ft)	157.42	156.69
Crit W.S. (ft)	155.53	155.49
Max Chl Dpth (ft)	4.72	5.20
Vel Total (ft/s)	4.22	6.51
Flow Area (sq ft)	115.07	74.61
Froude # Chl	0.39	0.60
Specif Force (cu ft)	301.33	252.61
Hydr Depth (ft)	3.73	3.67
W.P. Total (ft)	34.36	25.04
Conv. Total (cfs)	4503.3	2701.0
Top Width (ft)	30.87	20.35
Frctn Loss (ft)		
C & E Loss (ft)		
Shear Total (lb/sq ft)	2.44	6.02
Power Total (lb/ft s)	10.29	39.23

Table B-5: HEC-RAS output for a 500-year flood – proposed conditions.

Profile Output Table - Standard Table 1

File Options Std. Tables Locations Help

HEC-RAS Plan: Precast Concete Bridge River: Cascade Creek Reach: Site 1 Profile: 500-YR

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Site 1	517.01	500-YR	650.00	180.98	184.22	184.22	185.46	0.084607	8.92	74.24	31.90	1.00
Site 1	484.31*	500-YR	650.00	177.80	181.10	181.20	182.41	0.101735	9.18	70.80	31.05	1.07
Site 1	451.61*	500-YR	650.00	174.63	178.06	178.08	179.32	0.089688	8.99	72.33	29.96	1.02
Site 1	418.91	500-YR	650.00	171.45	175.62	174.90	176.39	0.039113	7.04	93.30	33.74	0.69
Site 1	394.32*	500-YR	650.00	169.74	174.26	173.89	175.27	0.052069	8.12	87.00	44.11	0.82
Site 1	369.73	500-YR	650.00	168.03	172.63	172.63	173.90	0.057719	9.53	97.43	47.47	0.86
Site 1	351.05*	500-YR	650.00	167.31	171.11	170.79	172.13	0.056160	8.19	90.02	49.05	0.85
Site 1	332.37	500-YR	650.00	166.59	170.16	169.81	171.13	0.049494	8.36	107.77	49.22	0.82
Site 1	319.86*	500-YR	650.00	165.52	169.39	169.08	170.49	0.050877	8.76	97.80	44.28	0.83
Site 1	307.36*	500-YR	650.00	164.44	168.80	168.35	169.89	0.044598	8.65	96.31	41.28	0.78
Site 1	294.85	500-YR	650.00	163.37	167.58	167.58	169.15	0.072232	10.24	73.17	26.93	0.96
Site 1	285.73*	500-YR	650.00	162.28	166.19	166.63	168.29	0.106624	11.75	61.76	25.88	1.17
Site 1	276.62*	500-YR	650.00	161.18	165.19	165.64	167.32	0.104895	11.83	61.01	24.80	1.16
Site 1	267.50*	500-YR	650.00	160.09	164.06	164.57	166.31	0.115268	12.15	58.94	25.76	1.20
Site 1	258.38	500-YR	650.00	159.00	163.06	163.50	165.30	0.105488	12.15	59.86	22.47	1.18
Site 1	248.5	500-YR	650.00	158.00	162.12	162.50	164.27	0.098953	11.92	61.25	22.61	1.15
Site 1	238.61	500-YR	650.00	157.00	161.10	161.50	163.28	0.100974	11.99	60.80	22.56	1.16
Site 1	232	500-YR	650.00	154.60	161.07	159.04	161.69	0.014925	6.51	120.59	34.49	0.49
Site 1	212.0		Bridge									
Site 1	196.52	500-YR	650.00	151.49	157.46	156.11	158.25	0.032904	7.16	90.86	22.04	0.61
Site 1	181.0	500-YR	650.00	150.99	156.94	155.61	157.74	0.033426	7.20	90.38	21.96	0.62
Site 1	178.95		Inl Struct									
Site 1	170	500-YR	650.00	135.19	139.67	138.49	140.23	0.026742	5.98	108.71	30.77	0.56
Site 1	148.58	500-YR	650.00	135.04	138.88	138.02	139.56	0.035625	6.62	98.18	30.07	0.65
Site 1	127.66*	500-YR	650.00	132.51	136.94	136.94	138.43	0.084458	9.82	66.25	22.40	1.00
Site 1	106.74	500-YR	650.00	129.99	134.58	134.59	136.43	0.105586	10.92	59.51	16.21	1.01
Site 1	71.16*	500-YR	650.00	124.00	128.03	128.86	130.92	0.198691	13.63	47.69	17.34	1.45
Site 1	35.58*	500-YR	650.00	118.01	122.29	122.83	124.53	0.151996	12.01	54.11	20.53	1.30
Site 1	0	500-YR	650.00	112.02	115.88	116.56	118.30	0.197317	12.48	52.08	23.05	1.46

Table B-6: HEC-RAS output inside the proposed bridge for a 500-year flood.

Bridge Output

File Type Options Help

River: Cascade Creek | Profile: 500-YR

Reach: Site 1 | RS: 212.0 | Plan: Precast Concete Bridge

Plan: Precast Concete Bridge Cascade Creek Site 1 RS: 212.0 Profile: 500-YR

E.G. US. (ft)	161.69	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	161.07	E.G. Elev (ft)	158.49	158.27
Q Total (cfs)	650.00	W.S. Elev (ft)	158.14	157.48
Q Bridge (cfs)	650.00	Crit W.S. (ft)	155.99	156.12
Q Weir (cfs)		Max Chl Dpth (ft)	5.44	5.99
Weir Sta Lft (ft)		Vel Total (ft/s)	4.72	7.12
Weir Sta Rgt (ft)		Flow Area (sq ft)	137.85	91.35
Weir Submerg		Froude # Chl	0.40	0.61
Weir Max Depth (ft)		Specif Force (cu ft)	424.65	363.92
Min El Weir Flow (ft)	167.01	Hydr Depth (ft)	4.32	4.13
Min El Prs (ft)	169.00	W.P. Total (ft)	36.18	27.49
Delta EG (ft)	3.44	Conv. Total (cfs)	5904.5	3612.1
Delta WS (ft)	3.61	Top Width (ft)	31.93	22.12
BR Open Area (sq ft)	510.98	Frctn Loss (ft)		
BR Open Vel (ft/s)	7.12	C & E Loss (ft)		
BR Sluice Coef		Shear Total (lb/sq ft)	2.88	6.72
BR Sel Method	Momentum	Power Total (lb/ft s)	13.59	47.80

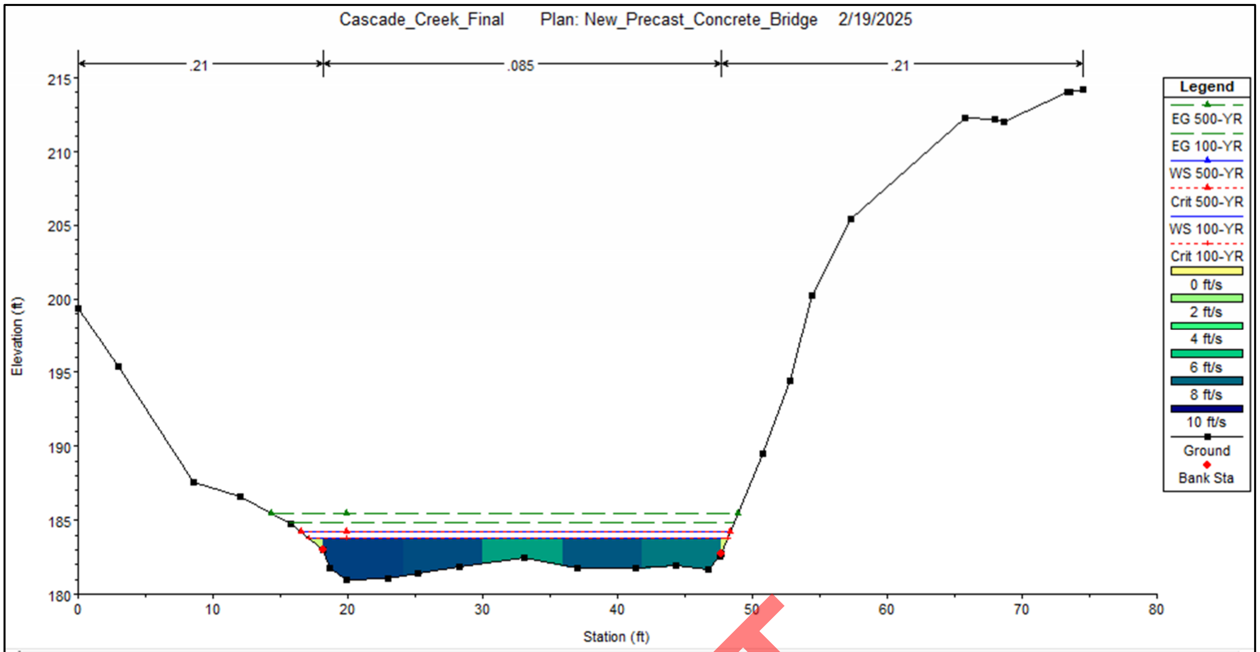

Figure B-2: Predicted velocity distribution at cross-section 517.01.

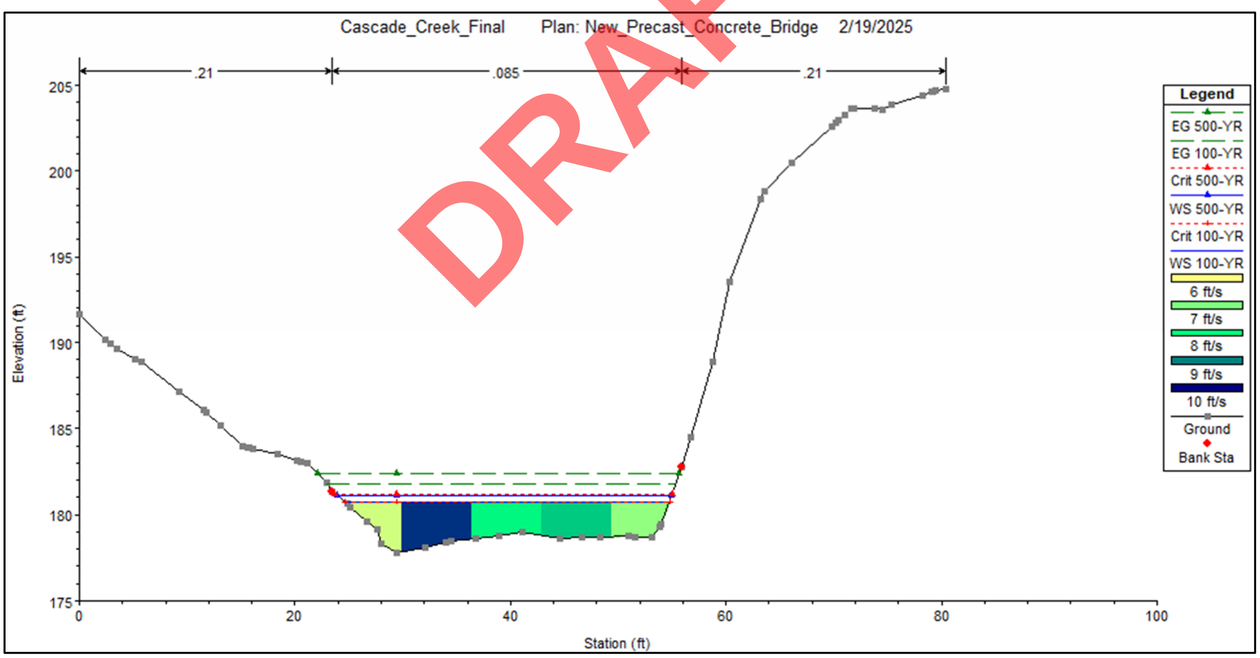

Figure B-3: Predicted velocity distribution at cross-section 484.31.

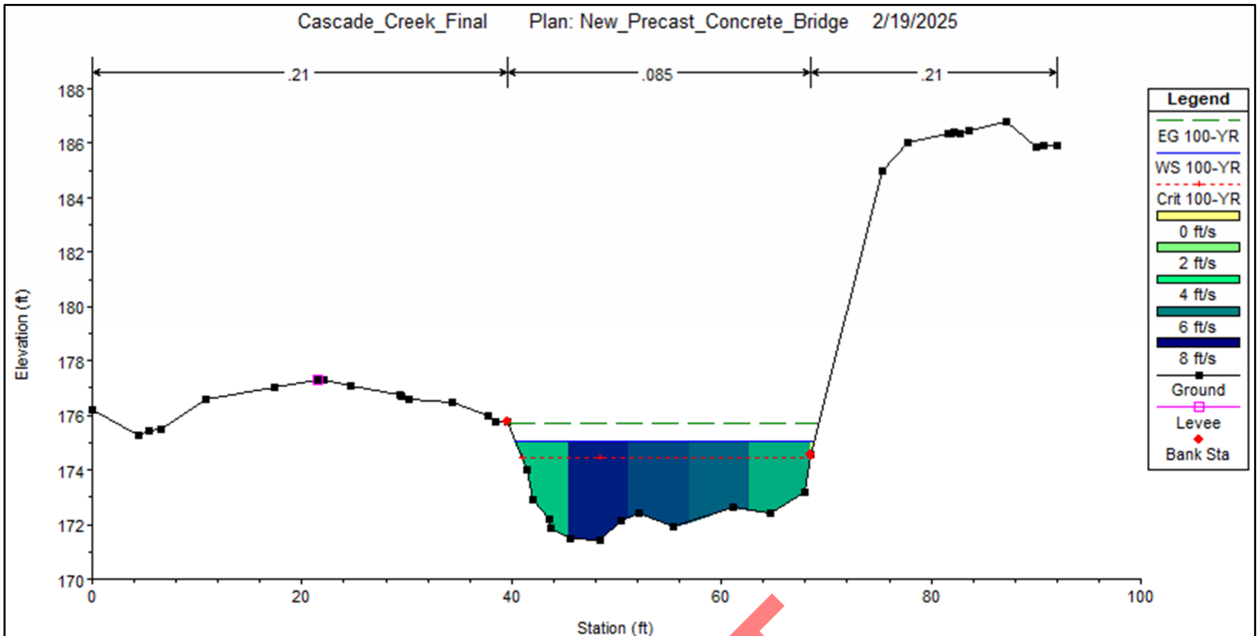

Figure B-4: Predicted velocity distribution at cross-section 418.91.

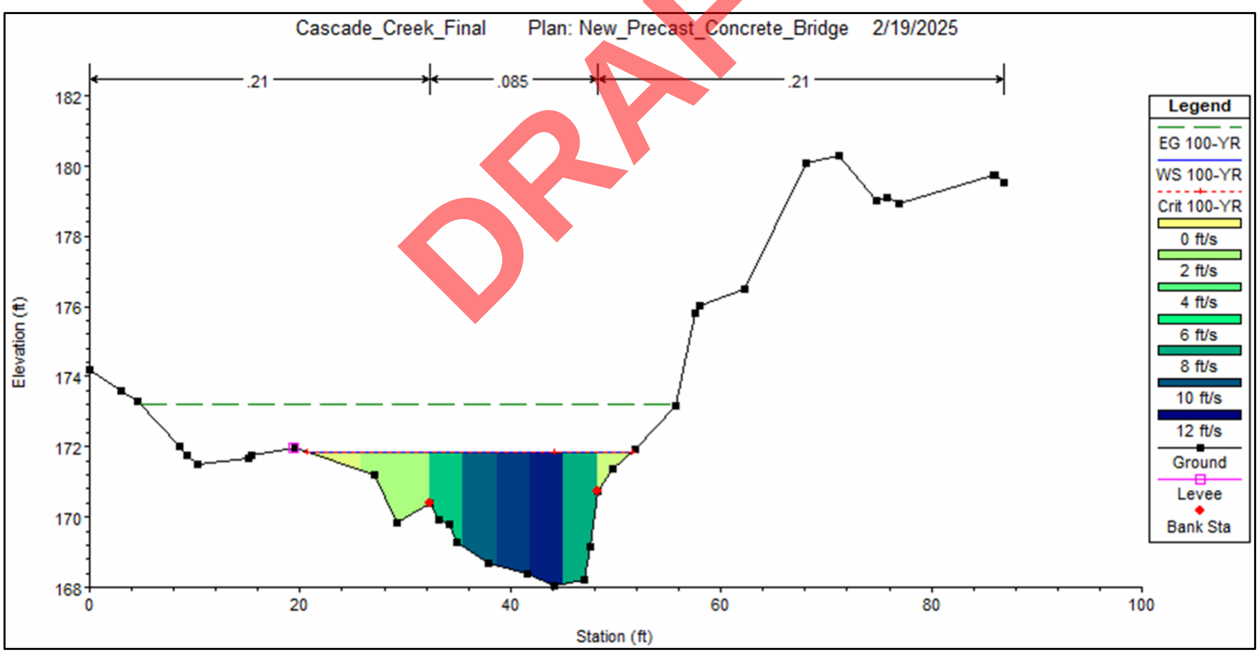

Figure B-5: Predicted velocity distribution at cross-section 369.73.

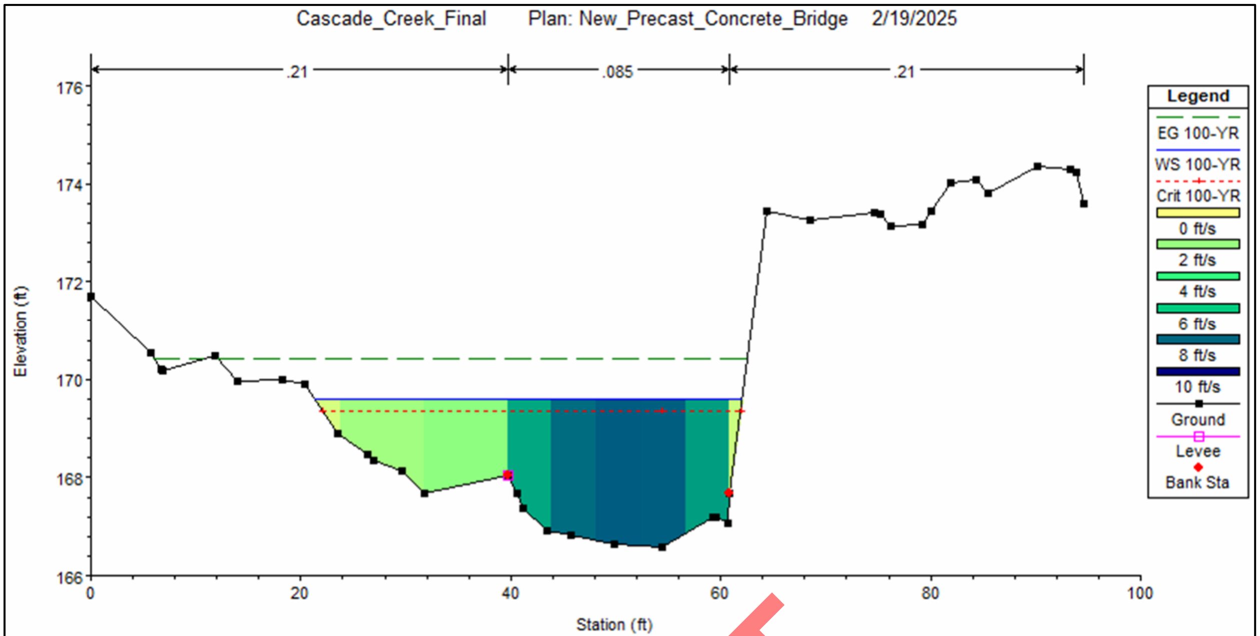

Figure B-6: Predicted velocity distribution at cross-section 332.37.

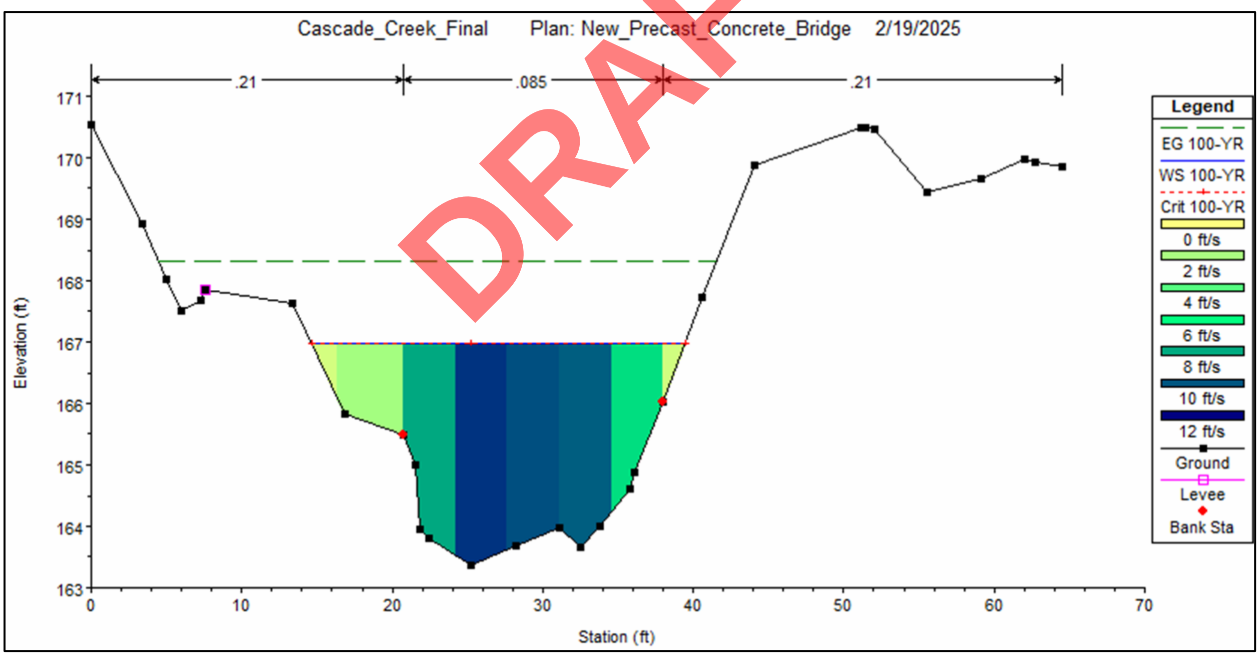

Figure B-7: Predicted velocity distribution at cross-section 294.85.

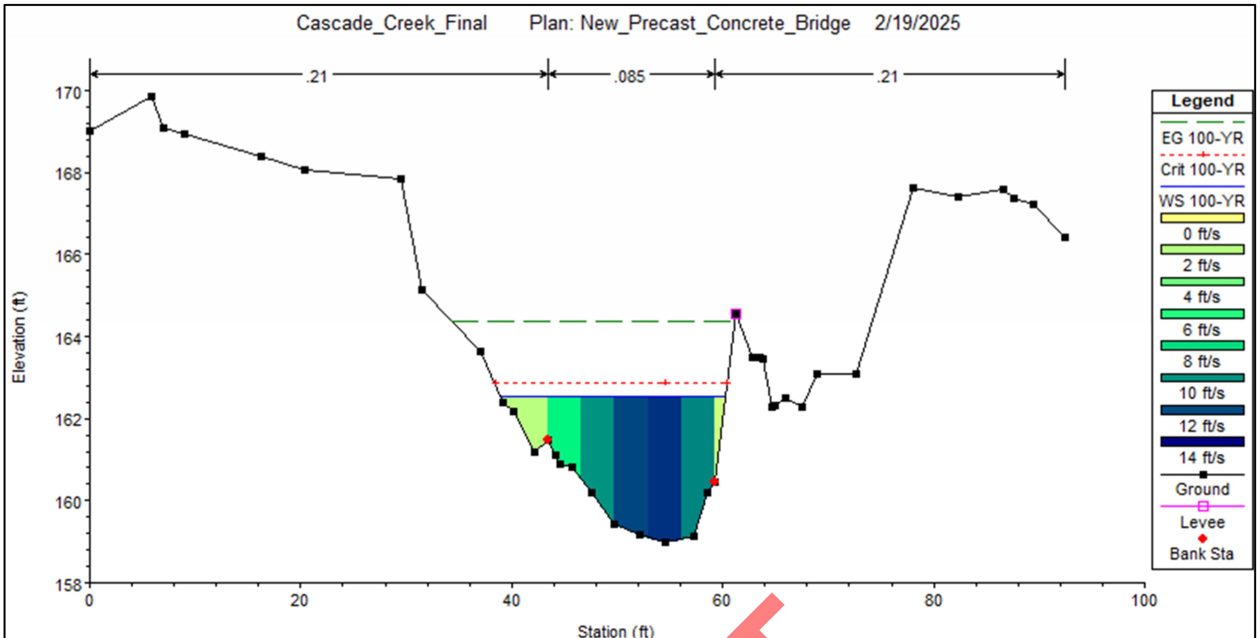

Figure B-8: Predicted velocity distribution at cross-section 258.38.

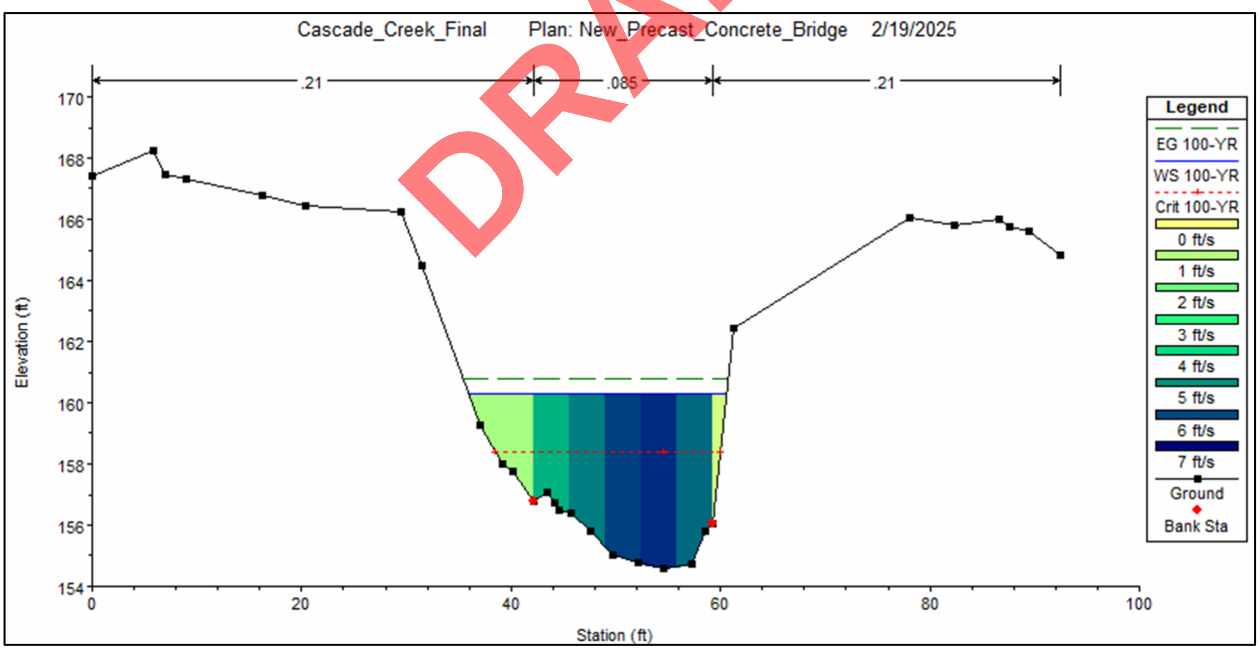

Figure B-9: Predicted velocity distribution at cross-section 232.

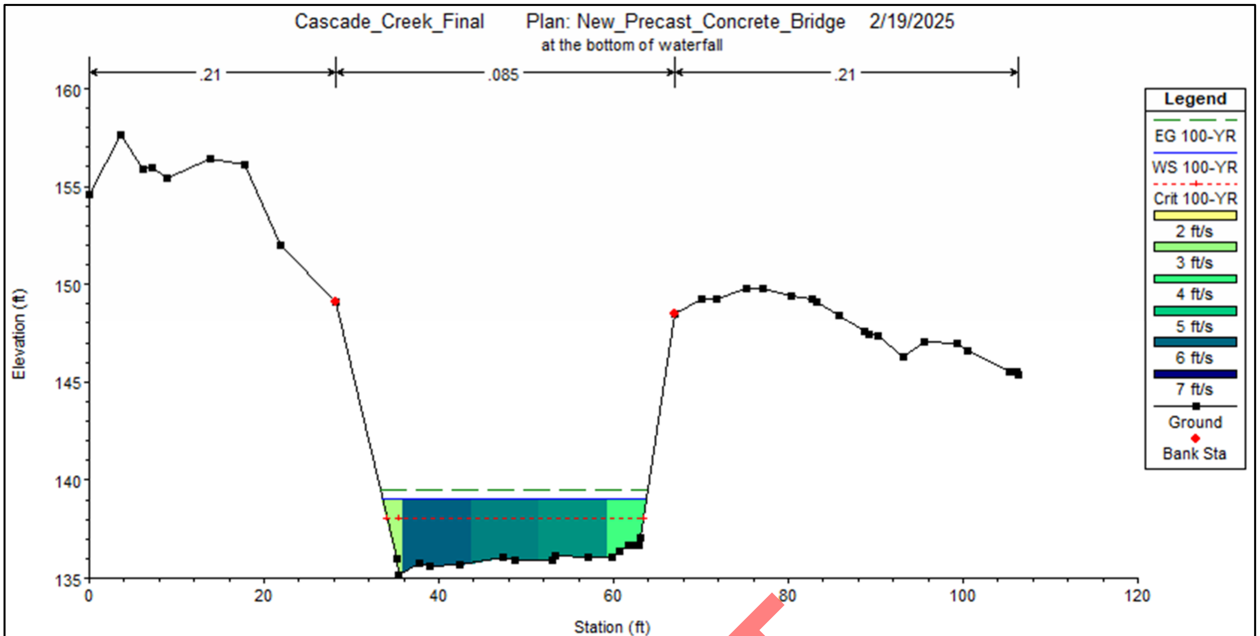

Figure B-10: Predicted velocity distribution at cross-section 170.

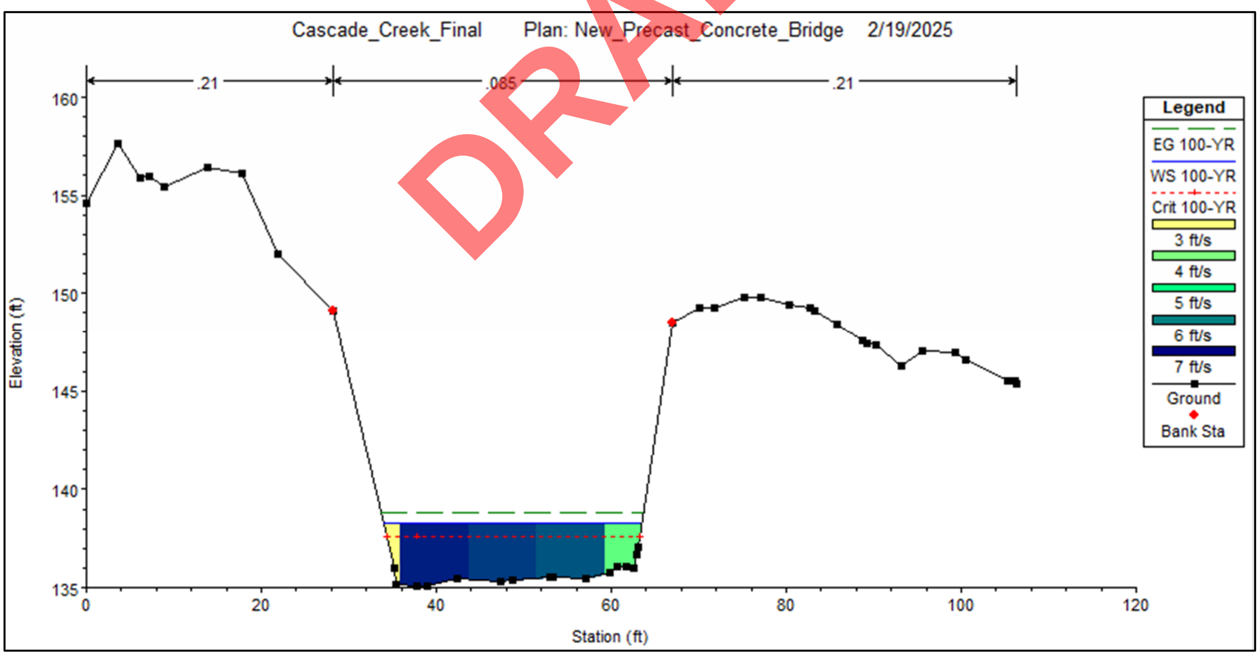

Figure B-11: Predicted velocity distribution at cross-section 148.58.

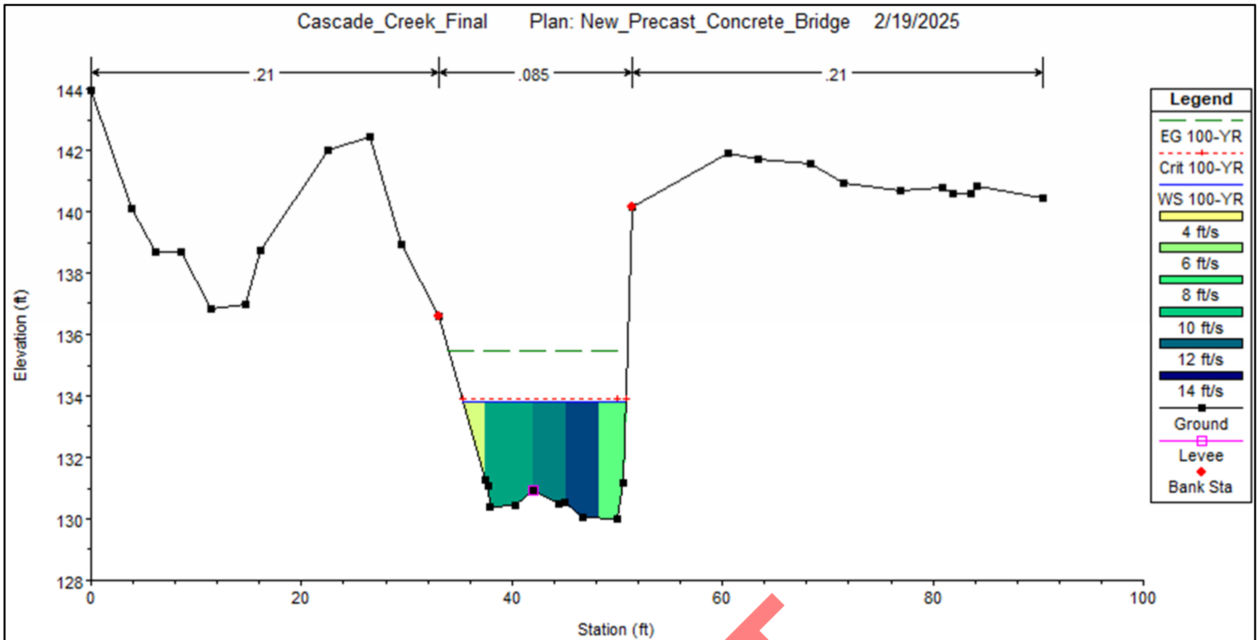

Figure B-12: Predicted velocity distribution at cross-section 106.74.

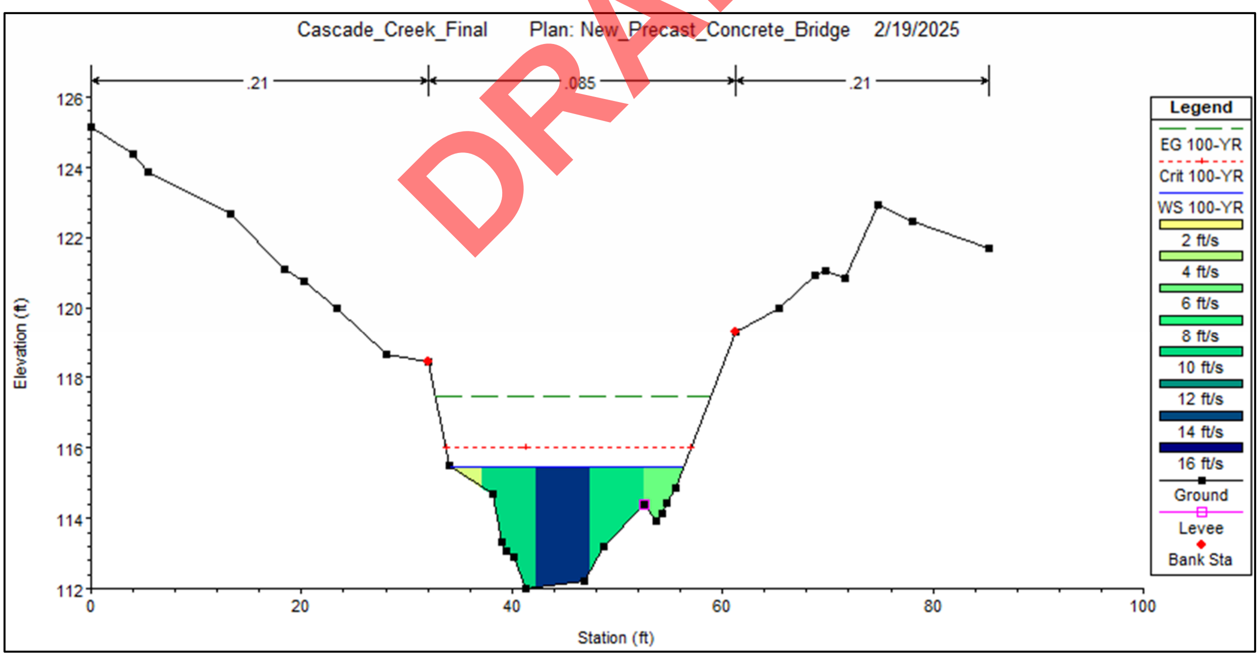

Figure B-13: Predicted velocity distribution at cross-section 0.0.

Appendix C. Sizing of Riprap and Recommended Gradations for Aggregate Filters

Table C-1: Riprap sizing calculations based on the Alaska Highway Drainage Manual (ADOT&PF, 2006).

Riprap Sizing based on Alaska Highway Drainage Manual (2006)

Abutments: Riprap Angle: 2

$$D_{50} = 0.001\ V_a^{3} / (d_{avg}^{0.5}\ K_1^{1.5})\ (Csg)\ (Csf)$$

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$$K_1 = 1-(\sin^2\theta/\sin^2\varphi)^{0.5}$$

$$C_{sg} = 2.12 / (S_s - 1)^{1.5}$$

$$C_{sf} = (SF / 1.2)^{1.5}$$

	(°)	(rad)
V_a (ft/s)	5.0	
d_{avg} (ft)	3	
K_1	0.257	
θ	26.6	0.464
β	37	0.646
C	1.54	
C_{sg}	1.00	
C_{sf}	1.54	
S_s	2.65	
SF	1.6	

D50 (ft)	**0.85**
Lbs	**53.8**

Use AKDOT&PF Riprap Class: 2

See AKDOT&PF (2020)

Meet the following gradation for the class specified. Percentages are by total weight, weights are for each stone:

1. Class I
   0-50% weighing up to 25 pounds
   0-10% weighing more than 50 pounds
2. Class II
   50-100% weighing 200 pounds or more
   0-15% weighing up to 25 pounds
   0-10% weighing more than 400 pounds
3. Class III
   50-100% weighing 700 pounds or more
   0-15% weighing up to 25 pounds
   0-10% weighing more than 1400 pounds
4. Class IV
   50-100% weighing 2000 pounds or more
   0-15% weighing up to 400 pounds
   0-10% weighing more than 5400 pounds

Table C-2: Recommended gradations for aggregate filters.

Interface #1	Class II Riprap	4" minus crushed rock
d85	21.3	3.5
d60	18.4	2.9
d50	16.0	2.5
d15	11.1	0.5

Interface #2	4" minus crushed rock	1" minus crushed rock
d85	3.5	0.75
d60	2.9	0.5
d50	2.5	0.4
d15	0.5	0.05 (#16 Sieve)

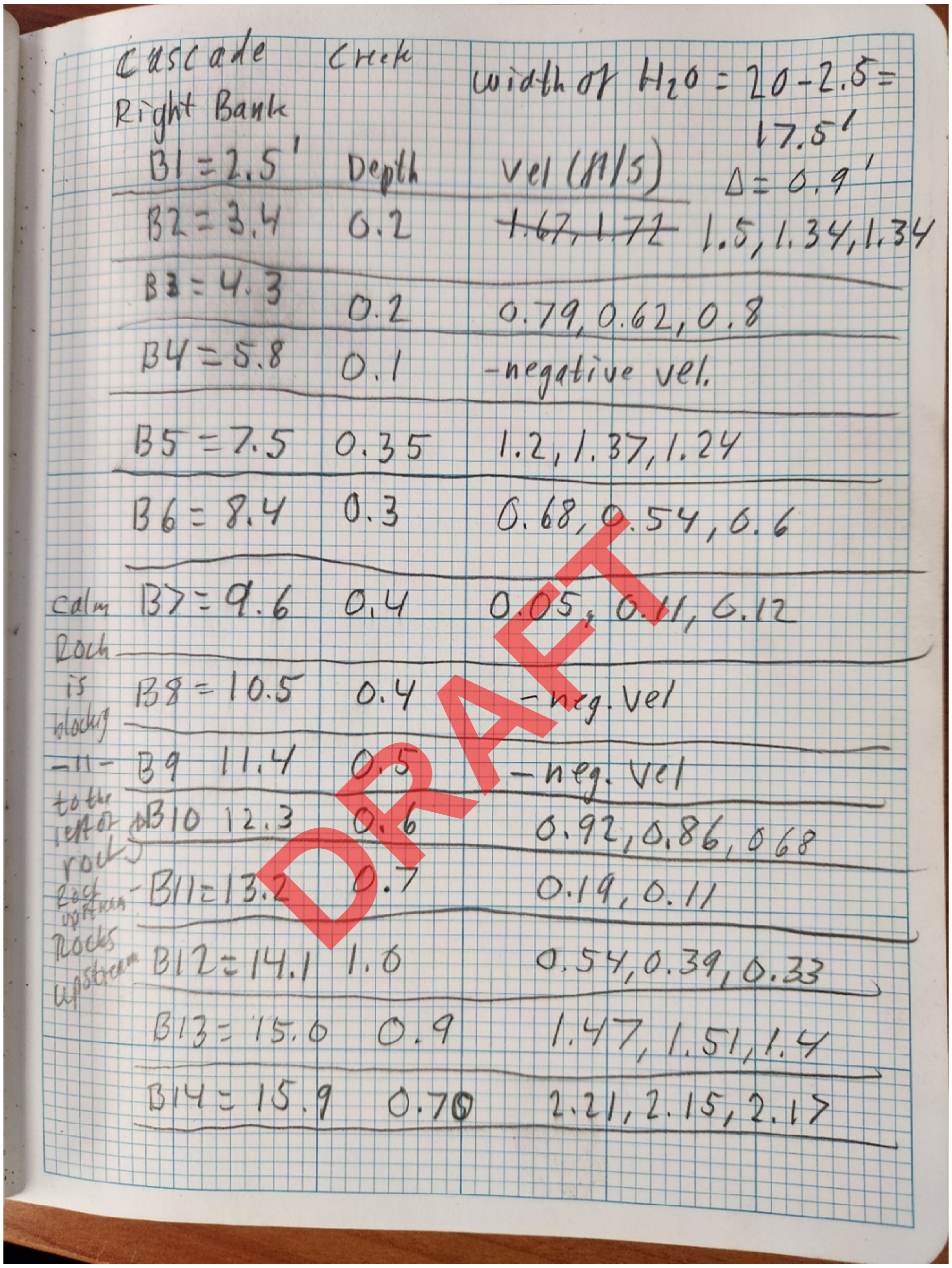
Interface #3	1" minus crushed rock	Native Subgrade
d85	0.75	0.020
d60	0.5	0.016
d50	0.4	0.014
d15	0.05 (#16 Sieve)	0.010

Interface #1			Comments
$d15_{upper}/d85_{under}$	3.2	Criteria met	Stability/Retention
$d50_{upper}/d50_{lower}$	6.4	Criteria met	Stability/Retention
$d15_{upper}/d15_{under}$	22.2	Criteria met	Permeability

Interface #2			
$d15_{upper}/d85_{under}$	0.7	Criteria met	Stability/Retention
$d50_{upper}/d50_{lower}$	6.3	Criteria met	Stability/Retention
$d15_{upper}/d15_{under}$	10.9	Criteria met	Permeability

Interface #3			
$d15_{upper}/d85_{under}$	2.3	Criteria met	Stability/Retention
$d15_{upper}/d15_{under}$	4.6	Criteria met	Permeability

Appendix D. Field Notes & USGS Discharge Midsection Method



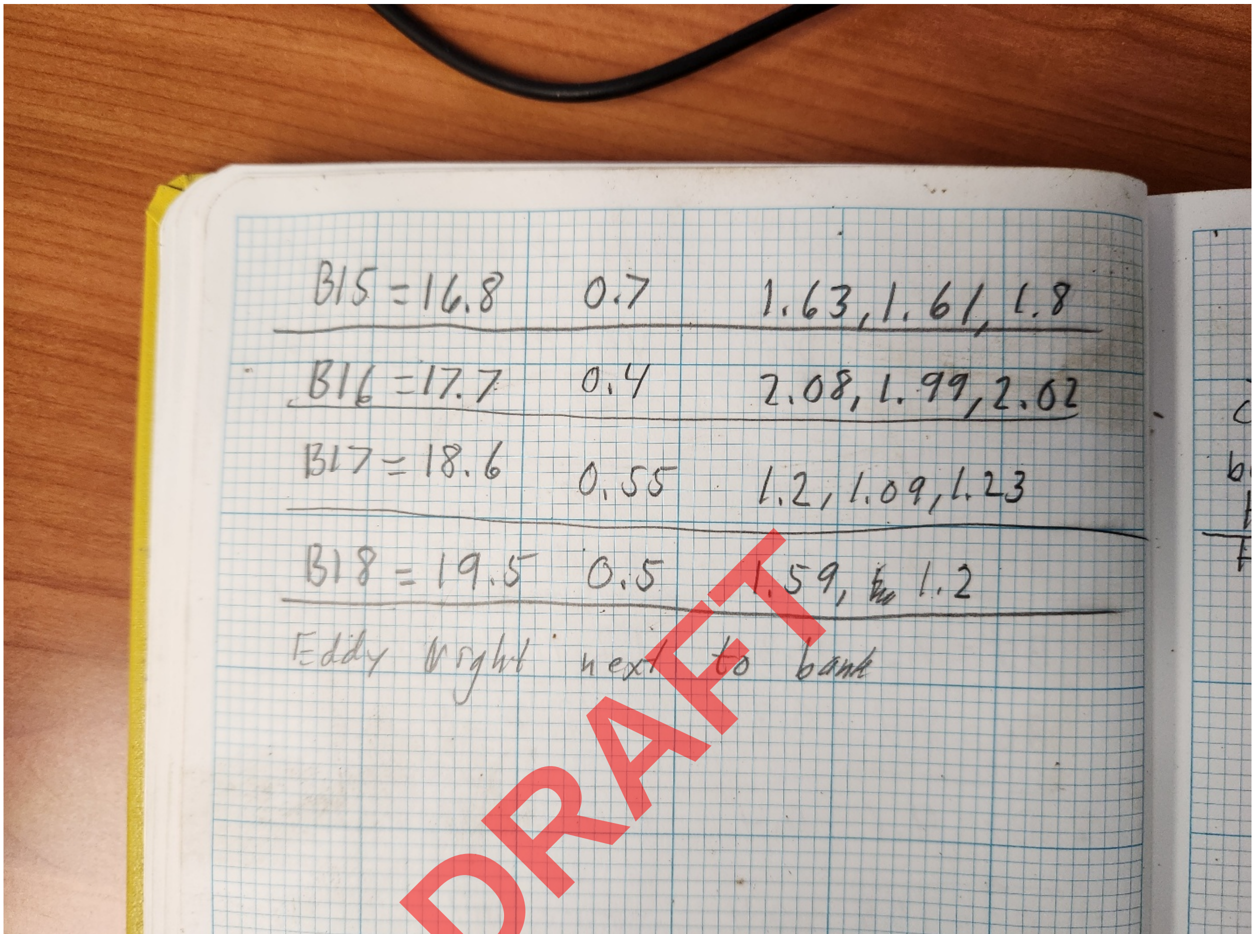
Cascade Creek
Right Bank

width of H_2O = 20-2.5= 17.5'

Δ = 0.9'

Note	Station	Depth	Vel (ft/s)
	B1 = 2.5'		
	B2 = 3.4	0.2	~~1.67, 1.72~~ 1.5, 1.34, 1.34
	B3 = 4.3	0.2	0.79, 0.62, 0.8
	B4 = 5.8	0.1	-negative vel.
	B5 = 7.5	0.35	1.2, 1.37, 1.24
	B6 = 8.4	0.3	0.68, 0.54, 0.6
calm	B7 = 9.6	0.4	0.05, 0.11, 0.12
Rock is blocking	B8 = 10.5	0.4	-neg. vel
-11-	B9 11.4	0.5	-neg. vel
to the left of rocks	B10 12.3	0.6	0.92, 0.86, 0.68
Rock upstream	B11 = 13.2	0.7	0.19, 0.11
Rocks upstream	B12 = 14.1	1.0	0.54, 0.39, 0.33
	B13 = 15.0	0.9	1.47, 1.51, 1.4
	B14 = 15.9	0.70	2.21, 2.15, 2.17

Figure D-1: Midsection method at cross-section 209 – Part 1.



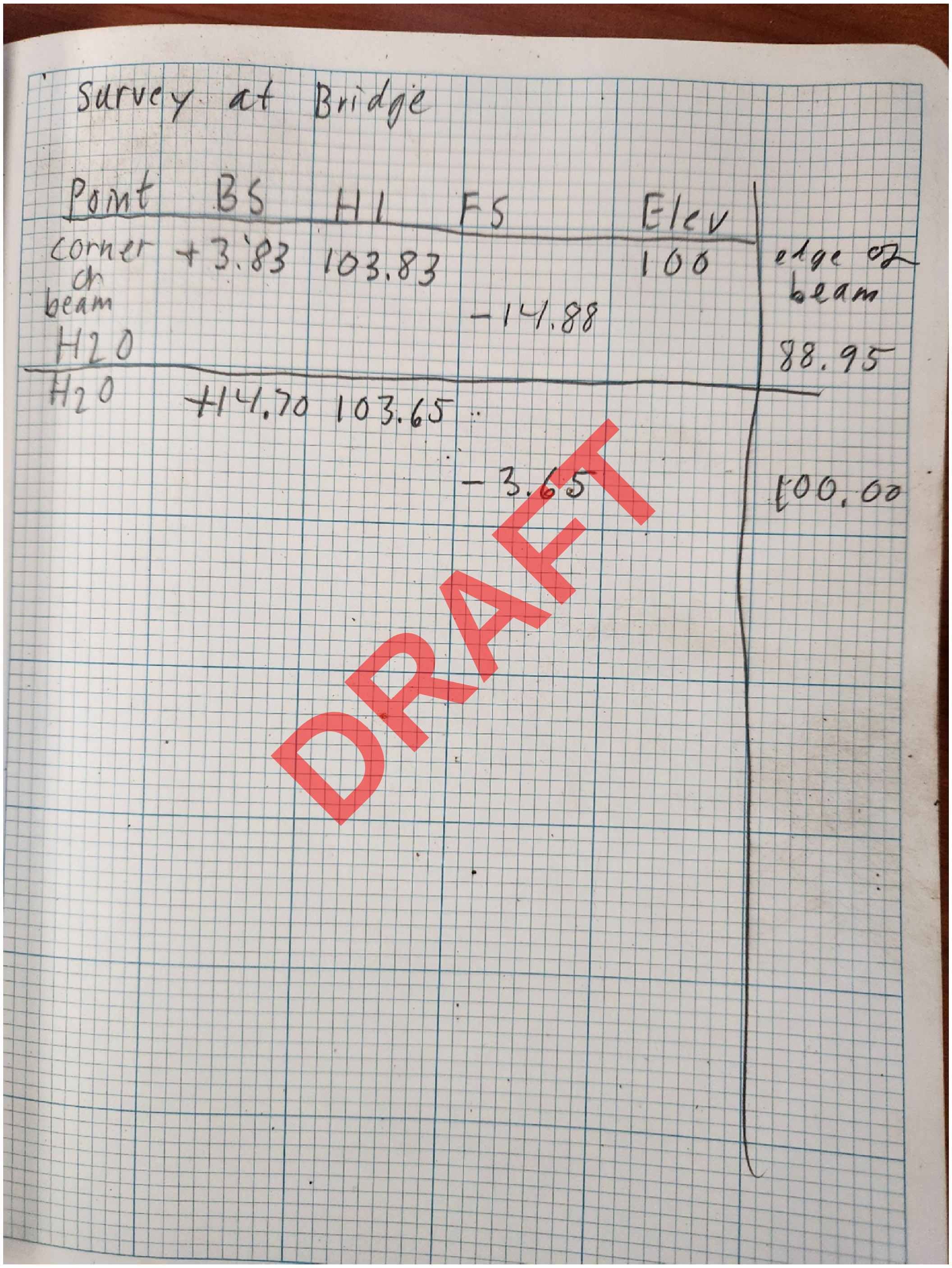
B15 = 16.8	0.7	1.63, 1.61, 1.8
B16 = 17.7	0.4	2.08, 1.99, 2.02
B17 = 18.6	0.55	1.2, 1.09, 1.23
B18 = 19.5	0.5	1.59, 1.2

Eddy right next to bank

Figure D-2: Midsection method at cross-section 209 – Part 2.

Table D-1: Computed discharge at cross-section 209 using the USGS Midsection Method.

Location	Distance From Bank (ft)	Stream Depth (ft)	Velocity (ft/s)	Velocity (ft/s)	Velocity (ft/s)	Average Velocity (ft/s)	Discharge (cfs)	Percentage (%)	Comments
B1	2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
B2	3.40	0.20	1.50	1.34	1.34	1.39	0.25	0.03	
B3	4.30	0.20	0.79	0.62	0.80	0.74	0.18	0.02	
B4	5.80	0.10	0.00	0.00	0.00	0.00	0.00	0.00	
B5	7.50	0.35	1.20	1.37	1.24	1.27	0.58	0.08	
B6	8.40	0.30	0.68	0.54	0.60	0.61	0.19	0.03	
B7	9.60	0.40	0.05	0.11	0.12	0.09	0.04	0.01	
B8	10.50	0.40	0.00	0.00	0.00	0.00	0.00	0.00	Boulder Blocks flow
B9	11.40	0.50	0.00	0.00	0.00	0.00	0.00	0.00	Boulder Blocks flow
B10	12.30	0.60	0.92	0.86	0.68	0.82	0.44	0.06	Boulder influences flow
B11	13.20	0.70	0.19	0.11	0.12	0.14	0.09	0.01	Boulder influences flow
B12	14.10	1.00	0.54	0.39	0.33	0.42	0.38	0.05	Boulder influences flow
B13	15.00	0.90	1.47	1.51	1.40	1.46	0.85	0.11	
B13-2	15.40	0.80	1.72	1.83	1.88	1.81	0.65	0.09	Add-on
B14	15.90	0.70	2.21	2.15	2.17	2.18	0.69	0.09	
B14-2	16.30	0.70	1.81	1.76	1.92	1.83	0.58	0.08	Add-on
B15	16.80	0.70	1.63	1.61	1.80	1.68	0.53	0.07	
B15-2	17.20	0.60	1.72	1.82	1.94	1.83	0.49	0.07	Add-on
B16	17.70	0.40	2.08	1.99	2.02	2.03	0.57	0.08	
B17	18.60	0.55	1.20	1.09	1.23	1.17	0.58	0.08	
B18	19.50	0.50	1.59	1.20	1.30	1.36	0.48	0.06	
B19	20	0				0.0	0.00		Eddy at bank



Survey at Bridge

Point	BS	HI	FS	Elev	
corner of beam	+3.83	103.83		100	edge of beam
H20			-14.88		88.95
H2O	+14.70	103.65			
			-3.65		100.00

Figure D-3: Survey of water surface elevation at cross-section 209.

Appendix 6-1

Preliminary Wetland Delineation Report & Functional Assessment

Cascade Point Ferry Terminal
Juneau, AK

Prepared For:

Alaska DOT&PF Southcoast
6860 Glacier Highway
Juneau, AK 99801

Prepared By:

PND Engineers, Inc.
1506 W 36th Ave.
Anchorage, AK 99503

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ACRONYMS AND ABBREVIATIONS

ACIS	Applied Climate Information System
APE	area of potential effect
CBJ	City and Borough of Juneau
Data Forms	Alaska Region Wetland Determination Data Forms
DOT&PF	Alaska Department of Transportation and Public Facilities
FAC	facultative plant
FACU	facultative upland plant
FACW	facultative wetland plant
FGDC	Federal Geographic Data Committee
FT	Feet
GPS	global positioning system
LiDAR	Light Detection and Ranging
NATAK-SE	Nearshore Assessment Tool for Alaska Southeast
NI	no indicator
NOAA	National Oceanic and Atmospheric Administration

NRCS	Natural Resources Conservation Service
NWI	National Wetland Inventory
NWPL	National Wetland Plant List
OBL	obligate wetland plant
PEM	palustrine emergent
PFO	palustrine forested
PND	PND Engineers, Inc.
PSS	palustrine scrub-shrub
Regional Supplement	Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Version 2)
UPL	upland plant
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
WESPAK-SE	Wetland Ecosystem Services Protocol for Alaska Southeast
WOTUS	waters of the U.S.

1 Introduction

PND Engineers, Inc. (PND) was contracted by the State of Alaska Department of Transportation and Public Facilities (DOT&PF) to provide engineering and environmental consulting services for the evaluation of a potential ferry terminal facility in Juneau, AK. The upland developments of the proposed project would include a paved access road, roadway bridge, vehicle parking, fuel storage, utilities, and a passenger terminal building. Proposed marine infrastructure includes a stern loading facility consisting of pile supported offshore structures, bridge support float, and a vehicle transfer bridge. Breakwater structures such as structural wave barriers and rubble mount structures may be necessary due to storm wave heights.

1.1 Project Location

The proposed project is located at Cascade Point near Berners Bay, at MP 41 of the Glacier Highway in Juneau, AK at approximately 58.69944°N Latitude, 134.93944°W Longitude, within Section 32, T36S, R63E, Copper River Principal Meridian. The proposed ferry terminal site is property of the Goldbelt Corporation and adjacent property is owned by the United States Forest Service (USFS).

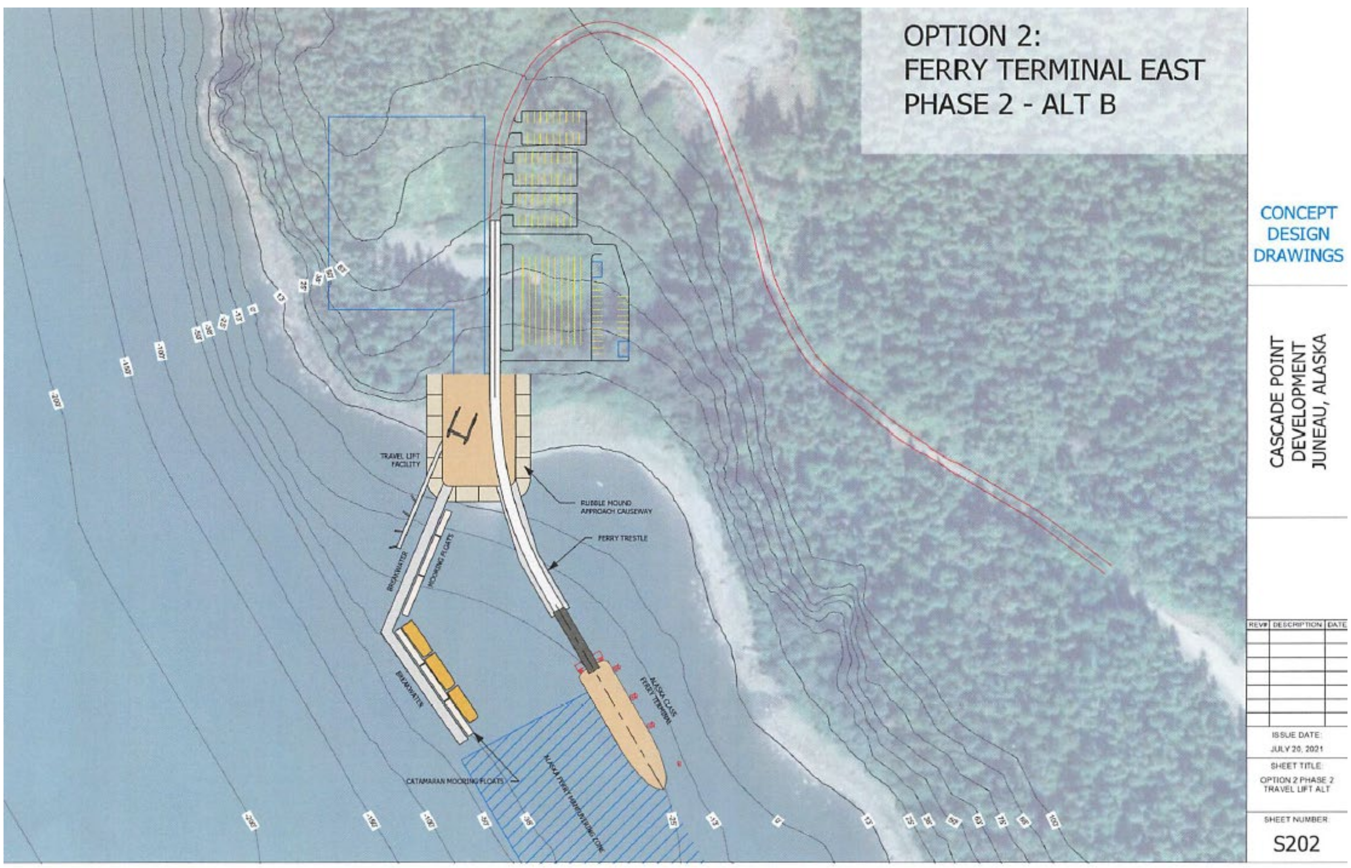

Figure 1. Project area (AK DOT RFP Attachment A, July 2021).

The property is crossed by a u-shaped access road (inaccessible to vehicle traffic) that begins at the terminus of the Glacier Highway and ends at the shoreline. A rock quarry and rock stockpiles abut the access road where the road cuts back to descend into a small valley before reaching the shore. Fill pads on either side of the access road occupy a bench within the valley at an intermediate elevation between the shore and the rock quarry. A narrow equipment access road to the top of the quarry takes off from the main access road east of the quarry.

Mapping focused on the suspected wetland areas as per the City and Borough of Juneau (CBJ) Wetland Management Plan (WMP) and areas identified where development may occur. All priority areas were investigated and directly visualized during the field study, although some outer edges of forested wetlands were inaccessible and boundaries were completed by referencing topographic mapping and aerial imagery. Where reasonably feasible, wetland areas were directly visited and mapped, but the area is complex and the wetlands identified may extend beyond the areas visited.

2 Methods

2.1 Background Information Review

Prior to conducting the field investigation, PND reviewed existing data sources for information related to wetlands in the project area and vicinity. Background data reviewed prior to the wetland delineation included high-resolution aerial imagery captured by drone (PND 2023), leaf-on and leaf-off aerial imagery from the City and Borough of Juneau (CBJ 2013), the National Oceanic and Atmospheric Administration (NOAA) Office of Coastal Management 2013 LiDAR elevations, a wetland delineation report from 2010 (Bosworth), the CBJ WMP (CBJ 2016), and the National Wetlands Inventory (NWI) maps and database (USFWS 2023).

Rainfall data, including year-to-date accumulated precipitation for Juneau, was accessed via AgACIS, a service from the Applied Climate Information System of the National Oceanic and Atmospheric Administration (NOAA) Regional Climate Centers (NOAA Regional Climate Centers 2023).

2.2 Wetland Determination

PND environmental scientists and certified wetland delineators Brenna Hughes and Schuyler Roskam conducted a wetland determination survey from September 19 through 21, 2023. Wetland determinations were made using the three-parameter approach in accordance with the 1987 Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Alaska Region (Ver. 2) (USACE 2007), referred to hereafter as the Regional Supplement.

The investigators walked the general vicinity on September 18 to examine project area topography and vegetation and prioritize proposed development sites. The target area was thoroughly investigated during the following three days. Most areas outside the target area were not directly evaluated for wetland potential. Detailed site information regarding hydrophytic vegetation, hydric soils, and wetland hydrology was catalogued for 8 data points. See Figure 2 for survey data point locations and target area boundaries. A soil probe was used at additional locations to quickly examine soil type and water table depth near wetland boundaries.

Findings were recorded on Alaska Region Wetland Determination Data Forms (Version 2) (referred to hereafter as Data Forms). Data recorded included site location, description, and wetland determination. Photos were taken of the general site conditions, as well as soil samples and pits. Data points and site features were recorded using handheld global positioning system (GPS). The Data Forms are included in Appendix A.

In order to meet the USACE definition of a wetland at least one primary or two secondary indicators are required for each of the three parameters: vegetation, soils, and hydrology.

Figure 2. Target area and sample point locations (imagery from Maxar Technologies, 2017).

2.2.1 Vegetation

Vegetation present in the sample areas was identified to species and noted on the Data Forms. Percent of absolute cover for each species by stratum (tree, sapling/shrub, or herb) was estimated per the Regional Supplement. The Alaska Regional Supplement recommends placing short woody perennial shrubs in the sapling/shrub stratum and limiting the herb stratum to herbaceous vascular species (USACE 2007).

Plot sizes were fit to local topography or plant community distribution (as noted in the Data Forms). Dominance of each species was evaluated according to the protocol in the Regional Supplement. Wetland indicator status for each species was determined from the National Wetland Plant List (USACE 2023). The indicator status categories are obligate wetland (OBL), facultative wetland (FACW), facultative (FAC), facultative upland (FACU), upland (UPL), or no indicator (NI). Plant species nomenclature used in this report is typically based on the Flora of Alaska (Ickert-Bond et al. 2019), which does not always agree with the USACE nomenclature. In such cases, ratings for synonyms were used. Determinations of hydrophytic vegetation were made based on the Dominance Test or the Prevalence Index, unless stated otherwise.

2.2.2 Soils

Soils were sampled by hand excavation to at least 18 to 24 inches in depth. Depth, color (by Munsell Color Chart, 2013), and texture of soil horizons were recorded on the Data Forms. Hydric soil indicators were evaluated based on the descriptions in the Regional Supplement. Determinations of hydric soil were made based on the presence of one or more hydric soil indicator(s).

2.2.3 Hydrology

Hydrology was evaluated based on the descriptions of indicator features contained in the Regional Supplement. The occurrence of surface water as well as the depth to water table or soil saturation (where present) was recorded for each site. Additional primary or secondary indicators were noted where found. Determinations of wetland hydrology were made based on the presence of at least one primary indicator or two or more secondary indicators.

2.3 Wetland Mapping

Test plot locations and wetland boundaries were surveyed using a handheld GPS. Positional accuracy of field measurements agreed generally with the PND's high-resolution aerial imagery and was sufficient for the intent of the survey and scope of this report. The wetland boundaries have not been verified by a surveyor. Wetland boundaries can vary annually, and precise positioning can be a subjective determination influenced by contemporary conditions.

2.4 Wetland Classification

Wetlands found within the project area were classified based on the U.S. Fish and Wildlife Service (USFWS) classification system as described by Cowardin et al. (1979, FGDC 2013) and used in the NWI (USFWS 2023). This system is based on an evaluation of attributes such as vegetation class and hydrologic regime.

2.5 Functional Assessment

The investigators assessed delineated wetlands for function and value using the Wetland Ecosystem Services Protocol for Alaska Southeast (WESPAK-SE, Adamus 2015), and the rapid protocol from the Nearshore Assessment Tool for Alaska Southeast (NATAK-SE, Adamus and Harris 2016). The delineated boundaries of each wetland type, or vegetation community within a wetland type, defined the assessment areas.

3 Results

3.1 Background Information Review

In order to maximize accuracy, previous information regarding wetlands for this area was compared to the information gathered during the field study. The NWI indicated that the shoreline of the study area is composed of estuarine and marine wetlands with alternating unconsolidated and rocky shores. This was confirmed during the field study. Additionally, the NWI indicates two patches of freshwater scrub-shrub wetlands north of the target area, and riverine wetlands at Cascade Creek (Figure 3). No other wetlands were shown by the NWI in the target area. Conversely, a wetland delineation report from 2010 suggested that approximately two thirds of that study's target area, which overlapped the target area of ths study, comprised a single large wetland interrupted by a fill pad and road (Figure 4, Bosworth 2010). CBJ wetland mapping data were accessed through the CBJ parcel viewer. The subject property contains CBJ-mapped emergent, shrub, and forested wetlands primarily along the shoreline, Cascade Creek, and within the target area of this study (Figure 5).

Figure 3. National Wetlands Inventory wetlands in the vicinity of the target area (FWS 2023).

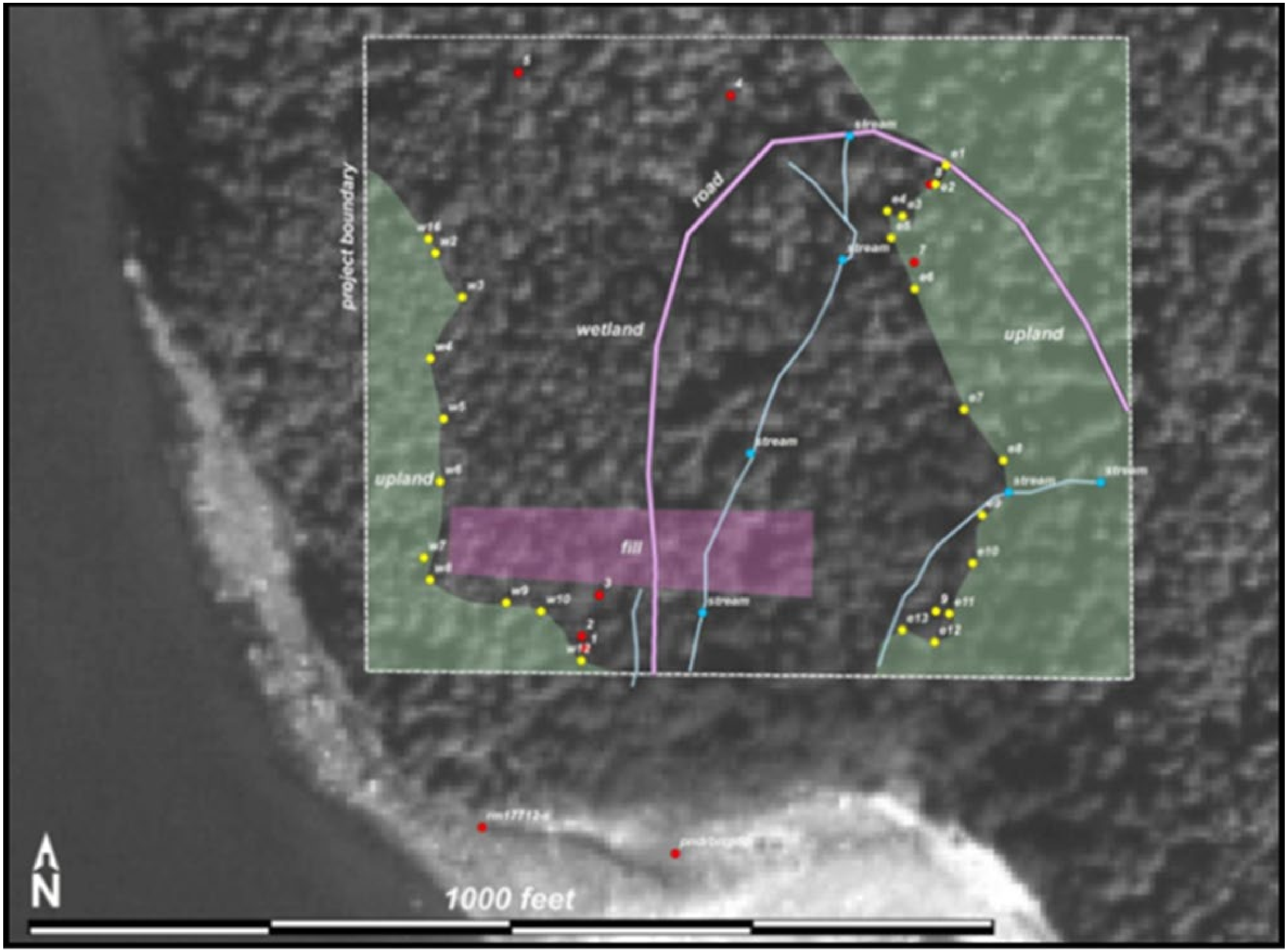

Figure 4. Wetland delineation boundaries and sample point locations from 2010 (Bosworth 2010).

Figure 5. CBJ WMP wetland boundaries (CBJ 2016) on aerial image (imagery from Maxar Technologies, 2017).

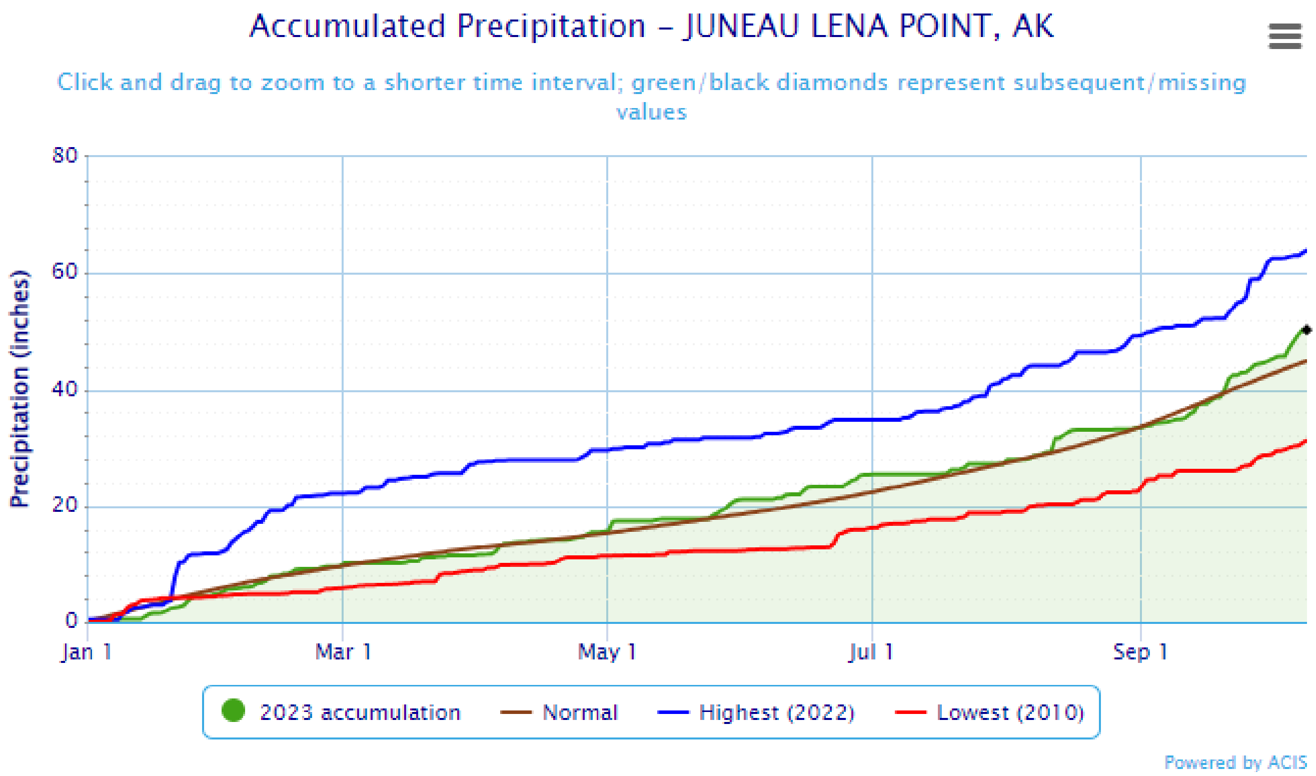

Figure 6. Precipitation year-to-date (NOAA Regional Climate Centers 2023).

Rainfall data for the project area was accessed via AgACIS as described in Section 2.1. Accumulated precipitation for Juneau was average for calendar year 2023 prior to the investigation. (Figure 6, NOAA Regional Climate Centers 2023).

3.2 Delineated Wetlands

The wetland determination identified and classified wetlands in the target area (Figure 7). Wetland boundaries generally agreed with wetland mapping by CBJ, although delineated wetlands were smaller in most cases and some areas mapped as wetlands by CBJ were determined to be uplands.

The semi-permanently flooded needle leaved evergreen scrub-shrub wetland (PSS4F) and the semi-permanently flooded broad leaved deciduous forested wetland (PFO1F) west of the existing access road (WET01 and WET02, respectively) were comparable to the shrub and forested wetland mapped by CBJ in that area; although it was clear during the investigation that the upslope (northern) sections were not as expansive as was mapped by CBJ. Similarly, several CBJ-mapped forested wetlands throughout the remainder of the target area did not satisfy all three criteria to meet the USACE definition of wetlands. Additional semi-permanently flooded broad leaved deciduous wetlands were delineated in a natural ditch near the toe of access road fill (WET03), and in a low-laying bench central to the target area (WET04). The delineated extents of the intertidal estuarine unconsolidated cobble-gravel shore wetland (E2US1) aligned well with an emergent wetland mapped by CBJ, although it covered more of the beach and did not extend as far inland. Intertidal marine unconsolidated cobble-gravel shore wetlands were also identified and delineated during low tide, and designated BEACH01. Classifications and areas for each delineated wetland are summarized in Table 1.

Table 1 – Details of delineated wetlands

Label	Type	Classification	Area (acres)	Figure(s)
WET01	PSS4F	Semi-permanently flooded needle leaved evergreen scrub-shrub	2.14	8
WET02	PFO1F	Semi-permanently flooded broad leaved deciduous forested	0.64	8, 9
WET03	PFO1F	Semi-permanently flooded broad leaved deciduous forested	0.10	8, 9
WET04	PFO1F	Semi-permanently flooded broad leaved deciduous forested	1.26	8, 9
WET05	E2US1	Intertidal estuarine unconsolidated cobble-gravel shore	0.43	9
BEACH01	M2US1	Intertidal marine unconsolidated cobble-gravel shore	1.10	9

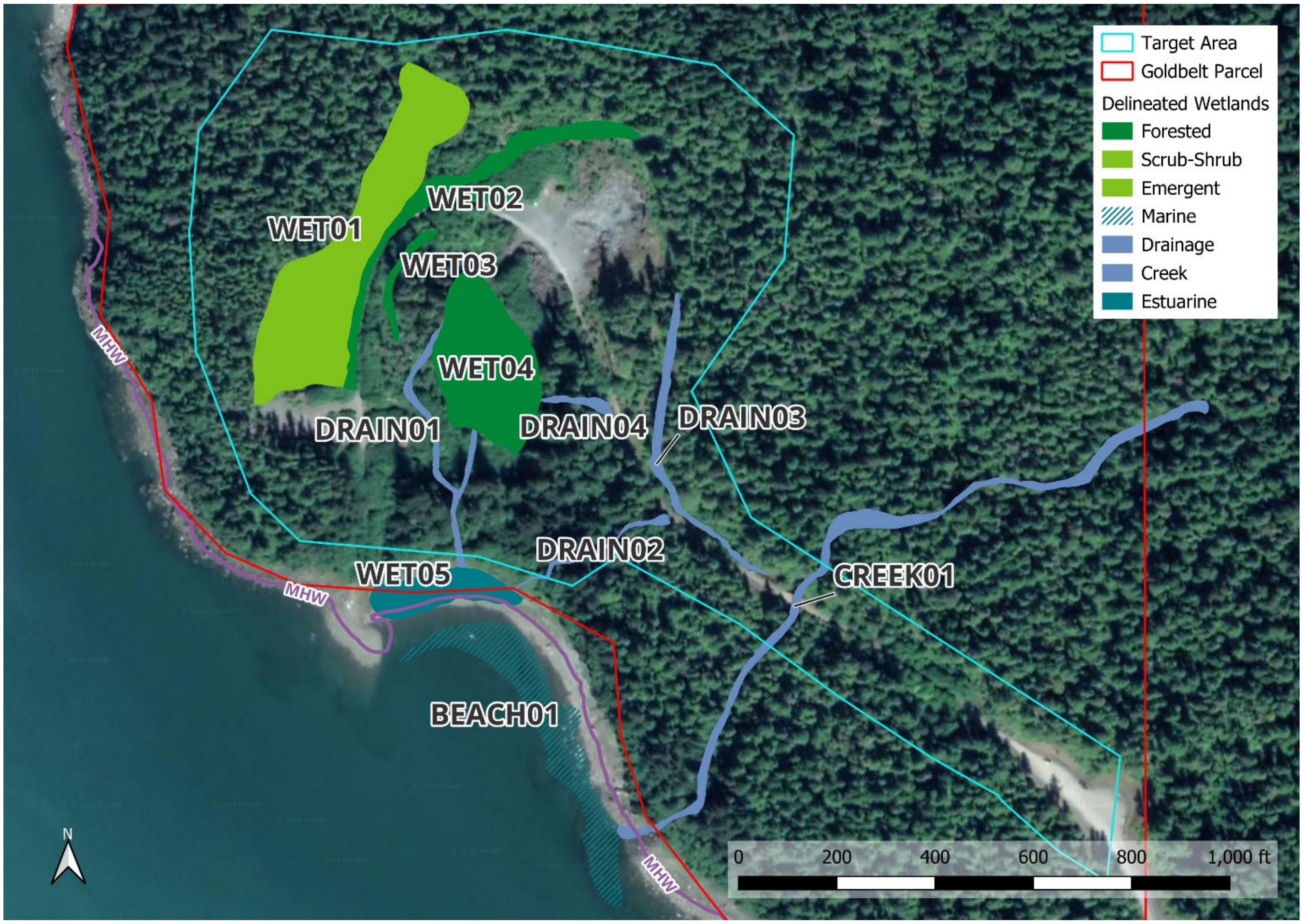

Figure 7. Overview of wetlands delineated features in the target area.

3.2.1 Vegetation

The PSS4F wetland (WET01) west of the access road was dominated by creeping dogwood (*Cornus canadensis*), false huckleberry (*Menziesia ferruginea*), juvenile western hemlock (*Tsuga heterophylla*), and skunk cabbage (*Lysichiton americanus*). The wetland was characterized by a mosaic of hummocks and potholes throughout, with skunk cabbage localized in the wettest areas and facultative upland species growing primarily on hummocks. The sample plot failed both the dominance test and prevalence index for hydrophytic vegetation, although the investigators determined the vegetation was problematic. Surface water was present in potholes throughout the wetland, and the water table was within eight inches of the surface at microtopographic highs. It is likely that relatively recent disturbance and the placement of fill downgradient had altered the natural hydrology and created wetter conditions at the site.

Two PFO1F wetlands (WET02 and WET03) occupied ditches where fill and debris had impounded water at the access road and the western fringe of the quarry. A sample plot near the lower terminus of WET02 was dominated by red alder (*Alnus rubra*) in both the tree and shrub strata, and by bluejoint (*Calamagrostis canadensis*) and skunk cabbage in the herb stratum. This vegetation community was present throughout most of WET02 and WET03, although in some areas western hemlock dominated the tree stratum rather than red alder. Dense forest and rough terrain made direct GPS location of the northern boundary of this vegetation community unfeasible, so topographic contours and aerial imagery were used to assist placement.

The central PFO4F wetland (WET04) was similarly dominated by red alder in both the tree and shrub strata at the sample plot, with western hemlock dominating the tree stratum in portions of the wetland. Skunk cabbage was prevalent throughout, and, along with threeleaf foamflower (*Tiarella trifoliata*), was dominant in the herb stratum at the sample plot.

The E2US1 wetland (WET05) was characterized as a coastal dunegrass (*Leymus mollis*) meadow that stretched approximately from mean high water to the upper reaches of the splash zone. Dunegrass was the sole dominant species; other species present were sea plantain (*Plantago maritima*) and marsh cinquefoil (*Comarum palustre*).

Vegetation at the M2US1 wetland (BEACH01) was primarily rockweed (*Fucus sp.*) with unidentified green algae in some areas. Marine invertebrates were also present throughout the wetland. A full wetland determination was not made for this wetland because it is below the mean high-water elevation of a navigable water, and clearly within USACE jurisdiction; however, it has been included in this discussion for consideration in project design and assessment of impacts.

The tree stratum in upland vegetation communities throughout the study area was dominated by some combination of Sitka spruce (*Picea sitchensis*), western hemlock, and red alder. Common shrubs found in upland plots were Devil's club (*Oplopanax horridus*), red elderberry (*Sambucus racemosa*), salmonberry (*Rubus spectabilis*), thimbleberry *(Rubus parviflorus*), oval-leaf blueberry (*Vaccinium ovalifolium*), and red huckleberry (*Vaccinium parviflorus*), creeping dogwood, and false huckleberry. False lily of the valley (*Maianthemum dilatatum*) and lady fern (*Athyrium filix-femina*) were common herbs in uplands. Skunk cabbage dominated the herb stratum at one upland sample plot and was present in small patches in uplands throughout the study area, which is indicative of the complex hydrology discussed further in Section 3.2.3.

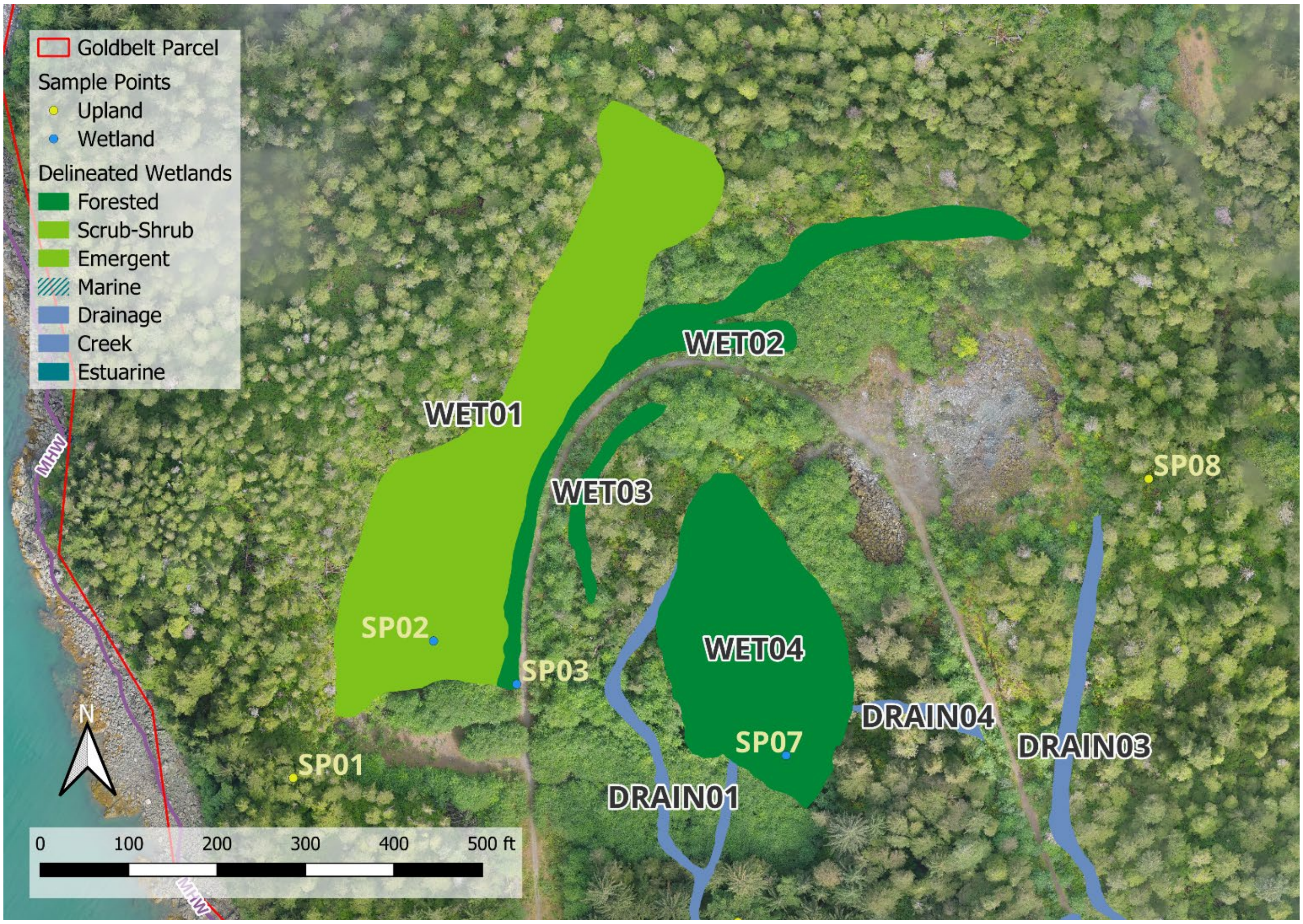

Figure 8. Wetlands delineated in the western portion of the target area

Figure 9. Wetlands delineated in the eastern portion of the target area

3.2.2 Soils

Soils in forested and scrub-shrub wetland plots were typically peat, or peat and muck, underlain by sands and gravels. The estuarine and marine wetland soils were unconsolidated cobbles and gravel of unknown depth.

Upland soils were also composed of peat, often very poorly decomposed. The thickness of the peat layer varied from a few inches to greater than 16 inches and underlying layers were silt loam, sandy loam, or bedrock. Mineral soil colors ranged from 7.5YR to 10YR with chroma 2.

3.2.3 Hydrology

Hydrology at forested and scrub-shrub wetland data points included universally saturated soils with high water table and surface waters. The estuarine wetland had very well-drained soils that remained saturated down to a depth of 10 inches where a freshwater water table was present. Lower on the beach, water seeped at the surface at approximately the lower boundary of the wetland. Seep water was also found to not be salty.

One upland data point also demonstrated saturated soils with a high water table and some surface water was visible in the plot; however, heavy rainfall over approximately 14 hours prior to sampling likely influenced the hydrology results, and the plot ultimately lacked hydrophytic vegetation. While assessing this plot for problematic vegetation, the investigators determined that the topography was generally too steep for soils to remain inundated or saturated for long periods, except for small, isolated areas within the plot with microtopographic relief that were too small to be mapped.

The remaining upland plots either lacked hydrology indicators entirely or, in one case, had only a single secondary indicator (microtopographic relief). Open water and drainages were common in both wetlands and some upland areas due to the steep topography and shallow bedrock constraining water flow. Some of these drainages supported small patches of skunk cabbage but generally lacked hydric soils, a hydrophytic vegetation community, or both. Disjointed patches may have the requisite soils but were too small to be mapped as wetland within the overall upland forest.

3.3 Functional Assessment

Four wetland types were assessed for wetland function using the methods described in Section 2.5: semi-permanently flooded needle leaved evergreen scrub-shrub (PSS4F; WET01), semi-permanently flooded broad leaved deciduous forested (PFO1F; WET02-WET04), intertidal estuarine unconsolidated cobble-gravel shore (E2US1; WET05), and intertidal marine unconsolidated cobble-gravel shore (M2US1; BEACH01). Additionally, two vegetation communities within the semi-permanently flooded broad leaved deciduous forested wetland type were assessed separately: WET02/WET03, and WET04. The grouped wetlands (WET02 and WET03) are bisected by road fill, and it is likely that they either formed as a result of the disturbance or were a single connected wetland at the time of fill placement.

Wetland assessment areas are referred to here by the labels of the delineated wetlands (e.g. WET02/03, BEACH01). Wetland function and value scores in the assessment area were generally lower or about the same (moderate) as the median and range calculated from other wetlands in the WESPAK-SE database. Function and value scores for each assessment area that were higher than the calculated median and range are shown in Table 2. Calculator spreadsheets for each assessment area are included in Appendix D.

Table 2—Wetland functions and values with ratings higher than mean by assessment area.

Assessment Area	Functions	Values and Attributes
WET01 – PSS4F	• Surface Water Storage • Sediment and Toxicant Retention and Stabilization • Phosphorous Retention • Nitrate Removal and Retention • Songbird, Raptor, and Mammal Habitat	• Aquatic Invertebrate Habitat • Waterbird Feeding Habitat • Waterbird Nesting Habitat • Songbird, Raptor, and Mammal Habitat • Wetland Sensitivity • Wetland Ecological Condition

WET02/03 – PFO1F	• Aquatic Invertebrate Habitat • Songbird, Raptor, and Mammal Habitat • Pollinator Habitat	• Aquatic Invertebrate Habitat • Songbird, Raptor, and Mammal Habitat • Wetland Sensitivity
WET04 – PFO1F	• Streamwater Cooling • Songbird, Raptor, and Mammal Habitat • Native Plant Habitat	• Organic Nutrient Export • Aquatic Invertebrate Habitat • Songbird, Raptor, and Mammal Habitat • Wetland Ecological Condition • Stress Potential
WET05 – E2US1	• Songbird, Raptor, and Mammal Habitat • Native Plant Habitat	• Waterbird Feeding Habitat • Songbird, Raptor, and Mammal Habitat
BEACH01 – M2US1	• N/A*	• Focal Fish • Sea and Shore Birds • Pinnipeds

*The NATAK-SE calculator produces ratings for two functions only. In this case, function ratings were moderate and lower.

3.3.1 Surface Water and Pollutant Retention

The WET01 assessment area scored the the highest possible for surface water storage function because it lacks an outlet; the same is true for retention of sediments and toxicants, phosphorous, and nitrate. However, the flood potential of the property is low, and the value of surface water storage at this location is near-zero.

WET02 similarly lacks an outlet and is hydrologically connected to WET01 but the WET02/03 assessment area as a whole did not meet the no-outlet criterion and was assigned a function rating of moderate.

3.3.2 Streamwater Cooling

The WET04 assessment area scored higher than the median and range of database wetlands for streamwater cooling function. Water moving through this wetland is heavily shaded and only at the surface during high-precipitation events. Both of these attributes allow water flowing into the wetland to cool before being discharged.

3.3.3 Organic Nutrient Export

The WET04 assessment area scored marginally higher than the median and range of database wetlands for organic nutrient export value. The assessment area is in close proximity (within 300 feet) of the high tide line and at a low elevation where it recieves greater input of water, which encourages nutrient export.

3.3.4 Aquatic Invertebrate Habitat

The WET02/03 assessment area scored marginally higher than the median and range of database wetlands for aquatic invertebrate habitat because it contained several small patches of ponded water and dense cover. Other non-tidal wetlands received moderate function ratings because they either had no standing water or had limited vegetative cover over standing water.

All non-tidal wetland assessment areas scored the maximum for aquatic invertebrate habitat value because the vegetation class of each was unique to the area within two miles. Land cover outside of the assessment areas is typically spruce/hemlock forest with little variation, while the assessed wetlands were characterized by early-successional alder thickets and scrub-shrub. This condition is likely the result of recent (within approximately 20 years) disturbance at the property and would be expected to develop into spruce-hemlock forest if left undisturbed longterm.

3.3.5 Waterbird Feeding Habitat

The WET01 and WET05 assessment areas scored the maximum for waterbird feeding habitat value. Non-tidal wetlands in important bird areas that also have ponded water accessible to waterbirds (i.e., with limited cover) receive a maximum score for this value under the WESPAK-SE model. The WET01 assessment area fits these criteria. As a tidal wetland, the WET05 assessment area received the maximum value score for waterbird feeding habitat because it is within an important bird area.

3.3.6 Waterbird Nesting Habitat

The WET01 assessment area scored the maximum for waterbird nesting habitat value because it has ponded water with limited cover, is not too steep, and it is within an important bird area. Tidal wetlands are subject to frequent flooding and the WESPAK-SE model does not score them for waterbird nesting habitat function or value.

3.3.7 Songbird, Raptor, and Mammal Habitat

All non-marine wetlands scored the maximum for songbird, raptor, and mammal habitat value because the subject property is adjacent to the Berners Bay Important Bird Area. Function scores for these assessment areas were variable but higher than the median and range of database wetlands because of the remoteness of the property, and the limited amount of surface water.

3.3.8 Pollinator Habitat

WET02/03 scored higher than the mean for pollinator habitat function. Piles of woody debris were extensive near the road margins, presumably remnants from when the road was originally cleared. These debris piles provide excellent nesting habitat for pollinators, differentiating this assessment area from the others and from the median and range of database wetlands.

3.3.9 Native Plant Habitat

The WET04 and WET05 assessment areas scored higher than the median and range for native plant habitat function. In both wetlands, groundwater was very near the surface and actively flowing through during the investigation, as evidenced by outflow in drainage channels and seeping at the shoreline. Both of these assessment areas have a relatively low potential for invasive species introduction and occupy landscape positions that are generally conducive to greater native plant diversity. They are also farther removed from disturbed areas on the property than other delineated wetlands, contributing to the higher ratings.

3.3.10 Wetland Sensitivity

Assessment areas WET01 and WET02/03 scored higher than the median and range of database wetlands for wetland sensitivity value. Factors that distinguished these assessment areas from the WET04 assessment area were the presence of ponded water of shallow depth and poor outflow. The WET05 assessment area scored lower than other tidal wetlands because of the abundance of natural cover and nitrogen fixers upland of the wetland, among other factors.

3.3.11 Ecological Condition

Wetland assessment areas WET01 and WET04 both scored higher than the median and range calculated from database wetlands for ecological condition. The factors that set them apart from WET02/03 were native shrub diversity in WET01, and the dense canopy and lack of bare ground in WET04. The WESPAK-SE tidal wetland calculator and the NATAK-SE calculator do not assess ecological condition, so WET05 and BEACH01 were not scored for this attribute.

3.3.12 Marine Wetland Attributes

The BEACH01 assessment area scored higher than the median and range calculated from database wetlands for conditions that support large numbers or high concentrations of focal fish (salmon, eulochon, herring), sea and shore birds (geese, gulls, cranes, some ducks, loons, grebes, cormorants, alcids, shorebirds, etc.), and pinnipeds. The assessment area is remote and mostly undisturbed. Boat traffic and other human disturbance is relatively infrequent and low-impact.

3.4 Additional Waters

Four intermittent drainages were identified during the surveys. Flowing surface water was present in each of these during the investigation and some locations had channelized. Water from WET04 discharged in two locations on its western and southern boundaries, eventually forming two channels through early-successional broad-leaved deciduous forest that then converged. The single channel continued through old-growth mixed forest before emptying into WET05. This drainage was designated DRAIN01. A second drainage, DRAIN02, began at a culvert under the access road where water continued at the surface or near-surface down a steep slope. At the toe of the slope, a channel had formed and continued to the shore where it drained into WET05. Drainage DRAIN03 comprised ditches formed on the upslope side of fill at the access road and an equipment road that accesses the top of the quarry. These ditches converge at a culvert under the access road, beginning DRAIN02. Drainage DRAIN04 begins at the downslope toe of fill under the access road, near the takeoff of the equipment road. Water in this drainage is surface or near-surface and flows down a steep slope into WET04.

Cascade Creek, designated CREEK01 in this study, flows through the target area and empties at the shore into the eastern portion of BEACH01. Within the subject property, the creek cuts through bedrock and passes under a wooden bridge at the access road. A series of falls convey the water down a steep slope before meeting the shore.

At the time of the investigation, the ordinary high-water line of Cascade Creek was indeterminable due to high flows following heavy rains, and the general inaccessibility of the creek. Project impacts to the creek are expected to be avoided where possible. In general, drainages lacked defined high-water marks and mapping utilized LiDAR elevation data (NOAA 2013) to supplement field observations where needed.

The marine intertidal wetland, BEACH01, is a special aquatic site because of the presence of submerged aquatic vegetation and is discussed in this report for planning purposes.

Concurrent with this investigation, PND land surveyors conducted a tideland survey seaward of the subject property. As part of the survey, detailed elevation data were collected that will aid in determining jurisdictional boundaries at the shoreline.

4 Conclusion

PND identified and delineated boundaries of five (5) potentially jurisdictional wetlands, one wetland entirely below mean high-water of a navigable water, and additional potential waters of the U.S. during field visits to the project study area in September of 2023. Total acreage of non-marine wetlands delineated was approximately 4.57 acres. Based on the study results, each of the areas preliminarily meet the wetland determination criteria established by the USACE 1987 Wetland Delineation Manual and the 2007 Regional Supplement. This report does not make any determination regarding USACE jurisdiction over these wetlands.

Impacts to these areas which cannot be avoided may require authorization by Department of the Army permit and mitigation according to USACE regional policies and practices.

5 References

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Appendix A – Data Forms

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Alaska Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	*OMB Control #: 0710-xxxx, Exp: Pending* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Cascade Point Borough/City: Juneau Sampling Date: 9/19/23
Applicant/Owner: Goldbelt, Inc. Sampling Point: 01
Investigator(s): B. Hughes, S. Roskam Landform (hillside, terrace, hummocks, etc.): ridge slope
Local relief (concave, convex, none): convex Slope (%): 5%
Subregion: Southeast Alaska Lat: 58.699158 Long: -134.941356 Datum: NAD83
Soil Map Unit Name: 36 JC - Typic humicryoid and typic haplocryoid NWI classification: UPL
Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No ___ (If no, explain in Remarks.)
Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes Y No ___
Are Vegetation N , Soil N , or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No N	Is the Sampled Area within a Wetland?	Yes ___ No N
Hydric Soil Present? Yes Y No ___		
Wetland Hydrology Present? Yes ___ No N		

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Tsuga heterophylla	75	Y	FAC
2.			
3.			
4.			
	75 =Total Cover		
50% of total cover: 37.5	20% of total cover: 15		

Sapling/Shrub Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Menziesia ferruginea	35	Y	FACU
2. Vaccinium ovalifolium	55	Y	FAC
3. Cornus canadensis	25	Y	FACU
4. Tsuga heterophylla	5	N	FAC
5. Rubus pedatus	<1	N	FAC
6.			
	120 =Total Cover		
50% of total cover: 60	20% of total cover: 24		

Herb Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	N/A =Total Cover		
50% of total cover: N/A	20% of total cover: N/A		

Plot Size (radius, or length x width) 30' % Bare Ground ∅
% Cover of Wetland Bryophytes N/A Total Cover of Bryophytes ___
(Where applicable)

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	–	x 1 = –
FACW species	–	x 2 = –
FAC species	135	x 3 = 405
FACU species	60	x 4 = 240
UPL species	–	x 5 = –
Column Totals:	195 (A)	645 (B)

Prevalence Index = B/A = 3.31

Hydrophytic Vegetation Indicators:

N Dominance Test is >50%
N Prevalence Index is ≤3.0[1]
– Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
– Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No N

Remarks:

SOIL

Sampling Point: 01

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0								
5							live	roots/moss
10							peat	large wood pieces
14	7.5YR 5/2						silt loam	
							rock layer below	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- Y Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Depleted Below Dark Surface (A11)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Remarks.

Restrictive Layer (if observed):
Type: bedrock/large rocks
Depth (inches): 14"

Hydric Soil Present? Yes Y No ___

Remarks:
Large fungus growing in peat layer

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- N Surface Water (A1)
- N High Water Table (A2)
- N Saturation (A3)
- N Water Marks (B1)
- N Sediment Deposits (B2)
- N Drift Deposits (B3)
- N Algal Mat or Crust (B4)
- N Iron Deposits (B5)
- N Surface Soil Cracks (B6)
- N Inundation Visible on Aerial Imagery (B7)
- N Sparsely Vegetated Concave Surface (B8)
- N Marl Deposits (B15)
- N Hydrogen Sulfide Odor (C1)
- N Dry-Season Water Table (C2)
- N Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- N Water-Stained Leaves (B9)
- N Drainage Patterns (B10)
- N Oxidized Rhizospheres along Living Roots (C3)
- N Presence of Reduced Iron (C4)
- N Salt Crust (B11)
- N Stunted or Stressed Plants (D1)
- N Geomorphic Position (D2)
- N Shallow Aquitard (D3)
- Y Microtopographic Relief (D4)
- N FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes ___	No N	Depth (inches): ___
Water Table Present?	Yes ___	No N	Depth (inches): ___
Saturation Present? (includes capillary fringe)	Yes ___	No N	Depth (inches): ___

Wetland Hydrology Present? Yes ___ No N

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Alaska Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	*OMB Control #: 0710-xxxx, Exp: Pending* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Cascade Point Borough/City: Juneau Sampling Date: 9/19/23
Applicant/Owner: Goldbelt, Inc Sampling Point: 02
Investigator(s): B. Hughes, S. Roskam Landform (hillside, terrace, hummocks, etc.): hummocky
Local relief (concave, convex, none): concave Slope (%): 15%
Subregion: Southeast Alaska Lat: 58.699571 Long: -134.940513 Datum: NAD83
Soil Map Unit Name: 3C0SP- typic humicryoid and typic haplocryoid NWI classification: UPL
Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No ___ (If no, explain in Remarks.)
Are Vegetation Y, Soil N, or Hydrology Y significantly disturbed? Are "Normal Circumstances" present? Yes ___ No N
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes Y	No ___	**Is the Sampled Area within a Wetland?** Yes Y No ___
Hydric Soil Present?	Yes Y	No ___	
Wetland Hydrology Present?	Yes Y	No ___	

Remarks: Area was previously cleared + pad constructed adjacent

VEGETATION – Use scientific names of plants.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3. Cornus canadensis	35	Y	FACU
4. Rubus pedatus	<5	N	FAC
=Total Cover	N/A		
50% of total cover: N/A	20% of total cover: N/A		

(Items 3–4 are bracketed with an arrow to Sapling/Shrub Stratum.)

Sapling/Shrub Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Vaccinium ovalifolium	15	N	FAC
2. Vaccinium parvifolium	5	N	FACU
3. Picea sitchensis	15	N	FACU
4. Tsuga heterophylla	55	Y	FAC
5. Alnus rubra	25	N	FAC
6. Menziesia ferruginea	30	Y	FACU
=Total Cover	185		
50% of total cover: 92.5	20% of total cover: 37		

Herb Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Lysichiton americanus	30	Y	OBL
2. Dryopteris expansa	<1	N	FACU
3. Blechnum spicant	2	N	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
=Total Cover	33		
50% of total cover: 16.5	20% of total cover: 6.6		

Plot Size (radius, or length x width) 20' % Bare Ground Ø
% Cover of Wetland Bryophytes N/A (Where applicable) Total Cover of Bryophytes ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	30	x 1 = 30
FACW species	Ø	x 2 =
FAC species	102	x 3 = 306
FACU species	85	x 4 = 344
UPL species		x 5 =
Column Totals:	218 (A)	680 (B)

Prevalence Index = B/A = 3.12

Hydrophytic Vegetation Indicators:

N Dominance Test is >50%
N Prevalence Index is ≤3.0[1]
___ Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
Y Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes Y No ___

Remarks: Direct evidence of wetland hydrology (3a). FACU plants on hummocks with skunk cabbage in open water between.

SOIL

Sampling Point: 02

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0								
16							peat	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

Y Histosol or Histel (A1)
___ Histic Epipedon (A2)
___ Black Histic (A3)
___ Hydrogen Sulfide (A4)
___ Thick Dark Surface (A12)
___ Alaska Gleyed (A13)
___ Alaska Redox (A14)
___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

___ Depleted Below Dark Surface (A11)
___ Depleted Matrix (F3)
___ Redox Dark Surface (F6)
___ Depleted Dark Surface (F7)
___ Redox Depressions (F8)
___ Red Parent Material (F21)
___ Very Shallow Dark Surface (F22)
___ Alaska Color Change (TA4)[4]
___ Alaska Alpine Swales (TA5)
___ Alaska Redox With 2.5Y Hue
___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Remarks.

Restrictive Layer (if observed):
Type: N/A
Depth (inches): ___

Hydric Soil Present? Yes Y No ___

Remarks:
Parent material color unknown

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

Y Surface Water (A1)
Y High Water Table (A2)
Y Saturation (A3)
N Water Marks (B1)
N Sediment Deposits (B2)
N Drift Deposits (B3)
N Algal Mat or Crust (B4)
N Iron Deposits (B5)
N Surface Soil Cracks (B6)
N Inundation Visible on Aerial Imagery (B7)
N Sparsely Vegetated Concave Surface (B8)
N Marl Deposits (B15)
N Hydrogen Sulfide Odor (C1)
N Dry-Season Water Table (C2)
N Other (Explain in Remarks)

Secondary Indicators (2 or more required)

N Water-Stained Leaves (B9)
N Drainage Patterns (B10)
N Oxidized Rhizospheres along Living Roots (C3)
– Presence of Reduced Iron (C4)
N Salt Crust (B11)
? Stunted or Stressed Plants (D1)
Y Geomorphic Position (D2)
N Shallow Aquitard (D3)
Y Microtopographic Relief (D4)
– FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes Y	No ___	Depth (inches): 4"
Water Table Present?	Yes Y	No ___	Depth (inches): 8"
Saturation Present? (includes capillary fringe)	Yes Y	No ___	Depth (inches): 0"

Wetland Hydrology Present? Yes Y No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:
N/A

Remarks: Area recently cleared, tree stratum absent.

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Alaska Region** See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	*OMB Control #: 0710-xxxx, Exp: Pending* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Cascade Point   Borough/City: Juneau   Sampling Date: 9/19/23

Applicant/Owner: Goldbelt, Inc.   Sampling Point: 03

Investigator(s): B. Hughes, S. Roskam   Landform (hillside, terrace, hummocks, etc.): ditch

Local relief (concave, convex, none): concave   Slope (%): 8

Subregion: Southeast Alaska   Lat: 58.6699436   Long: -134.940021   Datum: NAD83

Soil Map Unit Name: 36JC – typic humicryoid & typic haplocryoid   NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No ___ (If no, explain in Remarks.)

Are Vegetation Y, Soil Y, or Hydrology Y significantly disturbed? Are "Normal Circumstances" present? Yes Y No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes Y No ___		**Is the Sampled Area within a Wetland?** Yes Y No ___
Hydric Soil Present? Yes Y No ___		
Wetland Hydrology Present? Yes Y No ___		

Remarks: Ditch alongside road/Fill impounding water. Woody debris mounds. Young growth

VEGETATION – Use scientific names of plants.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	55	Y	FAC
2. Vaccinium ovalifolium	5	N	FAC
3. Blechnum spicant	8	N	FAC
4. Tsuga heterophylla	2	N	FAC
	55	=Total Cover	
50% of total cover: 27.5	20% of total cover: 11		
Sapling/Shrub Stratum			
1. Sambucus racemosa	4	N	FACU
2. Picea sitchensis	5	N	FACU
3. Alnus rubra	45	Y	FAC
4. Menziesia ferruginea	1	N	FACU
5. Rubus spectabilis	7	N	FACU
6. Oplopanax horridus	5	N	FACU
	82	=Total Cover	
50% of total cover: 41	20% of total cover: 16.4		
Herb Stratum			
1. Calamagrostis canadensis	55	Y	FAC
2. Lysichiton americanus	60	Y	OBL
3. Podagrostis aequivalvis	2	N	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	117	=Total Cover	
50% of total cover: 58.5	20% of total cover: 23.4		

Plot Size (radius, or length x width) 10' x 20'   % Bare Ground 0

% Cover of Wetland Bryophytes (Where applicable) N/A   Total Cover of Bryophytes ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)

Total Number of Dominant Species Across All Strata: 4 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	62	x 1 = 62
FACW species	–	x 2 =
FAC species	170	x 3 = 510
FACU species	22	x 4 = 88
UPL species	–	x 5 = –
Column Totals:	254 (A)	660 (B)

Prevalence Index = B/A = 2.59

Hydrophytic Vegetation Indicators:

- Y Dominance Test is >50%
- Y Prevalence Index is ≤3.0[1]
- – Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
- – Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes Y No ___

Remarks:

SOIL

Sampling Point: 03

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-2							peat	
12							muck	
20	10YR 3/2						sand	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- ___ Histosol or Histel (A1)
- Y Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Depleted Below Dark Surface (A11)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Remarks.

Restrictive Layer (if observed):
Type: N/A
Depth (inches): ______

Hydric Soil Present? Yes Y No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- Y Surface Water (A1)
- Y High Water Table (A2)
- Y Saturation (A3)
- ___ Water Marks (B1)
- ___ Sediment Deposits (B2)
- ___ Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- ___ Iron Deposits (B5)
- ___ Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- ___ Water-Stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- ___ Presence of Reduced Iron (C4)
- ___ Salt Crust (B11)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes Y No ___ Depth (inches): 4-8"
Water Table Present? Yes Y No ___ Depth (inches): 0"
Saturation Present? Yes Y No ___ Depth (inches): 0"
(includes capillary fringe)

Wetland Hydrology Present? Yes Y No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Alaska Region** See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	*OMB Control #: 0710-xxxx, Exp: Pending* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Cascade Point Borough/City: Juneau Sampling Date: 9/20/23

Applicant/Owner: Goldbelt, Inc. Sampling Point: 04

Investigator(s): B. Hughes, S. Roskam Landform (hillside, terrace, hummocks, etc.): beach

Local relief (concave, convex, none): none Slope (%): 5%

Subregion: Southeast Alaska Lat: 58.698288 Long: 134.939310 Datum: NAD83

Soil Map Unit Name: 36JC-Typic humicryoid + typic haplocryoid NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No ___ (If no, explain in Remarks.)

Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes ___ No ___

Are Vegetation N , Soil Y , or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes Y No ___	**Is the Sampled Area within a Wetland?** Yes Y No ___
Hydric Soil Present?	Yes Y No ___	
Wetland Hydrology Present?	Yes Y No ___	

Remarks: sand fleas.

VEGETATION – Use scientific names of plants.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
	N/A =Total Cover		
50% of total cover: ___	20% of total cover: ___		

Sapling/Shrub Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. N/A			
2.			
3.			
4.			
5.			
6.			
	N/A =Total Cover		
50% of total cover: ___	20% of total cover: ___		

Herb Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Leymus mollis	95%	Y	FAC
2. Plantago maritima	5	N	FACW
3. Comarum palustre	<1	N	OBL
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	100 =Total Cover		
50% of total cover: 50	20% of total cover: 20		

Plot Size (radius, or length x width) 20' % Bare Ground Ø

% Cover of Wetland Bryophytes N/A Total Cover of Bryophytes ___

(Where applicable)

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC:	1 (A)
Total Number of Dominant Species Across All Strata:	1 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC:	100% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	—	x 1 = —
FACW species	5	x 2 = 10
FAC species	95	x 3 = 285
FACU species	—	x 4 = —
UPL species	—	x 5 = —
Column Totals:	100 (A)	295 (B)
Prevalence Index = B/A =		2.95

Hydrophytic Vegetation Indicators:

Y Dominance Test is >50%

Y Prevalence Index is ≤3.0[1]

— Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

— Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes Y No ___

Remarks:

SOIL

Sampling Point: 04

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0 - ?							gravel & cobbles	w/sand

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:
- ___ Histosol or Histel (A1)
- ___ Histic Epipedon (A2)
- ___ Black Histic (A3)
- ___ Hydrogen Sulfide (A4)
- ___ Thick Dark Surface (A12)
- ___ Alaska Gleyed (A13)
- ___ Alaska Redox (A14)
- ___ Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:
- ___ Depleted Below Dark Surface (A11)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- Y Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Remarks.

Restrictive Layer (if observed):
Type: ___
Depth (inches): ___

Hydric Soil Present? Yes Y No ___

Remarks:
beach gravel and cobbles. Shallow beach area. Unable to fully excavate due to large cobbles. Area likely inundated at highest tides. Driftwood present. (Above MHW, though.). Problematic hydric soil type (1)

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)
- N Surface Water (A1)
- Y High Water Table (A2)
- Y Saturation (A3)
- N Water Marks (B1)
- N Sediment Deposits (B2)
- N Drift Deposits (B3)
- ___ Algal Mat or Crust (B4)
- N Iron Deposits (B5)
- N Surface Soil Cracks (B6)
- ___ Inundation Visible on Aerial Imagery (B7)
- ___ Sparsely Vegetated Concave Surface (B8)
- ___ Marl Deposits (B15)
- ___ Hydrogen Sulfide Odor (C1)
- ___ Dry-Season Water Table (C2)
- ___ Other (Explain in Remarks)

Secondary Indicators (2 or more required)
- ___ Water-Stained Leaves (B9)
- ___ Drainage Patterns (B10)
- ___ Oxidized Rhizospheres along Living Roots (C3)
- N Presence of Reduced Iron (C4)
- ___ Salt Crust (B11)
- ___ Stunted or Stressed Plants (D1)
- ___ Geomorphic Position (D2)
- ___ Shallow Aquitard (D3)
- ___ Microtopographic Relief (D4)
- ___ FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?			
Water Table Present?	Y		10"
Saturation Present? (includes capillary fringe)	Y		0"

Wetland Hydrology Present? Yes Y No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Water table approx level with grass line lower on beach. Not salty.

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Alaska Region** See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	*OMB Control #: 0710-xxxx, Exp: Pending* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Cascade Point Borough/City: Juneau Sampling Date: 09/20/23

Applicant/Owner: Goldbelt, Inc. Sampling Point: OS

Investigator(s): B. Hughes, S. Roskam Landform (hillside, terrace, hummocks, etc.): forest/flat

Local relief (concave, convex, none): none Slope (%): 3

Subregion: Southeast Alaska Lat: 58.697079 Long: -134.936651 Datum: NAD83

Soil Map Unit Name: 36 JC-Typic humicryoid + typic haplocryoid NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No ___ (If no, explain in Remarks.)

Are Vegetation N , Soil N , or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes Y No ___

Are Vegetation N , Soil N , or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present? Yes ___ No N Hydric Soil Present? Yes ___ No N Wetland Hydrology Present? Yes ___ No N	**Is the Sampled Area within a Wetland?**	**Yes** ___ **No** N

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Picea sitchensis	FACU	Y	55
2. Tsuga heterophylla	FAC	N	20
3. Alnus rubra	FAC	Y	55
4.			
	130	=Total Cover	
50% of total cover: 65		20% of total cover: 26	

Sapling/Shrub Stratum			
1. Oplopanax horridus	FACU	Y	15
2. Tsuga heterophylla	FAC	N	3
3. Rubus spectabilis	FACU	Y	8
4. Picea sitchensis	FACU	N	3
5.			
6.			
	29	=Total Cover	
50% of total cover: 14.5		20% of total cover: 5.8	

Herb Stratum			
1. Athyrium felix-femina	FAC	Y	10
2. Maianthemum dilatatum	FAC	Y	8
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	18	=Total Cover	
50% of total cover: 9		20% of total cover: 3.6	

Plot Size (radius, or length x width) 30' % Bare Ground Ø

% Cover of Wetland Bryophytes N/A Total Cover of Bryophytes ___
(Where applicable)

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 3 (A)

Total Number of Dominant Species Across All Strata: 6 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 50% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	–	x 1 = –
FACW species	–	x 2 = –
FAC species	96	x 3 = 288
FACU species	78	x 4 = 312
UPL species	–	x 5 = –
Column Totals:	174 (A)	600 (B)

Prevalence Index = B/A = 3.45

Hydrophytic Vegetation Indicators:

N Dominance Test is >50%

N Prevalence Index is ≤3.0[1]

– Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

– Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No N

Remarks:

SOIL

Sampling Point: 05

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox Features %	Type[1]	Loc[2]	Texture	Remarks
0-3							peat	
3-12	10YR 2/2						sandy loam	
							rock/bedrock	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

N Histosol or Histel (A1)
N Histic Epipedon (A2)
N Black Histic (A3)
N Hydrogen Sulfide (A4)
N Thick Dark Surface (A12)
N Alaska Gleyed (A13)
N Alaska Redox (A14)
N Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

N Depleted Below Dark Surface (A11)
N Depleted Matrix (F3)
N Redox Dark Surface (F6)
N Depleted Dark Surface (F7)
N Redox Depressions (F8)
N Red Parent Material (F21)
N Very Shallow Dark Surface (F22)

__ Alaska Color Change (TA4)[4]
__ Alaska Alpine Swales (TA5)
__ Alaska Redox With 2.5Y Hue
__ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
__ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Remarks.

Restrictive Layer (if observed):
Type: bedrock
Depth (inches): 12"

Hydric Soil Present? Yes __ No N

Remarks: Sampled w/ auger

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

N Surface Water (A1)
N High Water Table (A2)
N Saturation (A3)
N Water Marks (B1)
N Sediment Deposits (B2)
N Drift Deposits (B3)
N Algal Mat or Crust (B4)
N Iron Deposits (B5)
N Surface Soil Cracks (B6)
N Inundation Visible on Aerial Imagery (B7)
N Sparsely Vegetated Concave Surface (B8)
N Marl Deposits (B15)
N Hydrogen Sulfide Odor (C1)
N Dry-Season Water Table (C2)
N Other (Explain in Remarks)

Secondary Indicators (2 or more required)

N Water-Stained Leaves (B9)
N Drainage Patterns (B10)
N Oxidized Rhizospheres along Living Roots (C3)
– Presence of Reduced Iron (C4)
N Salt Crust (B11)
N Stunted or Stressed Plants (D1)
N Geomorphic Position (D2)
N Shallow Aquitard (D3)
N Microtopographic Relief (D4)
N FAC-Neutral Test (D5)

Field Observations:

Surface Water Present?	Yes __	No N	Depth (inches): __
Water Table Present?	Yes __	No N	Depth (inches): __
Saturation Present? (includes capillary fringe)	Yes __	No N	Depth (inches): __

Wetland Hydrology Present? Yes __ No N

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

U.S. Army Corps of Engineers **WETLAND DETERMINATION DATA SHEET – Alaska Region** See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	*OMB Control #: 0710-xxxx, Exp: Pending* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Cascade Point Borough/City: Juneau Sampling Date: 9/20/23
Applicant/Owner: Goldbelt, Inc. Sampling Point: 06
Investigator(s): B. Hughes, S. Roskam Landform (hillside, terrace, hummocks, etc.): forest/flat
Local relief (concave, convex, none): none Slope (%): 3%
Subregion: Southeast Alaska Lat: 58.688699 Long: -134.938716 Datum: NAD83
Soil Map Unit Name: 36.TC - Typic humicryoid + typic haplocryoid NWI classification: UPL
Are climatic / hydrologic conditions on the site typical for this time of year? Yes ___ No ___ (If no, explain in Remarks.)
Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes ___ No ___
Are Vegetation ___, Soil ___, or Hydrology ___ naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes Y	No ___	Is the Sampled Area within a Wetland? Yes ___ No N
Hydric Soil Present?	Yes ___	No N	
Wetland Hydrology Present?	Yes ___	No N	

Remarks: Near to stream.

VEGETATION – Use scientific names of plants.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Picea Sitchensis	65	Y	FACU
2. Alnus rubra	60	Y	FAC
3.			
4.			
	125	=Total Cover	
50% of total cover: 62.5	20% of total cover: 25		
Sapling/Shrub Stratum			
1. Oploplanax horridus	40	Y	FACU
2. Sambucus racemosa	3	N	FACU
3.			
4.			
5.			
6.			
	43	=Total Cover	
50% of total cover: 21.5	20% of total cover: 8.6		
Herb Stratum			
1. Maianthum dilatatum	15	Y	FAC
2. Circaea alpina	35	Y	FACW
3. Athyrium filix-femina	15	Y	FAC
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	65	=Total Cover	
50% of total cover: 32.5	20% of total cover: 13		

Plot Size (radius, or length x width) 30' % Bare Ground Ø
% Cover of Wetland Bryophytes N/A Total Cover of Bryophytes ___
(Where applicable)

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 6 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 66% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:	
OBL species	–	x 1 =	–
FACW species	35	x 2 =	70
FAC species	90	x 3 =	270
FACU species	108	x 4 =	432
UPL species	–	x 5 =	–
Column Totals:	233 (A)		772 (B)

Prevalence Index = B/A = 3.31

Hydrophytic Vegetation Indicators:

Y Dominance Test is >50%
N Prevalence Index is ≤3.0[1]
– Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
– Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes Y No ___

Remarks:

SOIL

Sampling Point: 06

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-4							organic	
4-12	7.5YR 2.5/2						peat	w/ gravel

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

N Histosol or Histel (A1)
N Histic Epipedon (A2)
N Black Histic (A3)
N Hydrogen Sulfide (A4)
N Thick Dark Surface (A12)
N Alaska Gleyed (A13)
N Alaska Redox (A14)
N Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

N Depleted Below Dark Surface (A11)
N Depleted Matrix (F3)
N Redox Dark Surface (F6)
N Depleted Dark Surface (F7)
N Redox Depressions (F8)
N Red Parent Material (F21)
N Very Shallow Dark Surface (F22)

N Alaska Color Change (TA4)[4]
N Alaska Alpine Swales (TA5)
N Alaska Redox With 2.5Y Hue
N Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
N Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Remarks.

Restrictive Layer (if observed):
Type: N/A
Depth (inches): ______

Hydric Soil Present? Yes ____ No N

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

N Surface Water (A1)
N High Water Table (A2)
N Saturation (A3)
N Water Marks (B1)
N Sediment Deposits (B2)
N Drift Deposits (B3)
N Algal Mat or Crust (B4)
N Iron Deposits (B5)
N Surface Soil Cracks (B6)
N Inundation Visible on Aerial Imagery (B7)
N Sparsely Vegetated Concave Surface (B8)
N Marl Deposits (B15)
N Hydrogen Sulfide Odor (C1)
N Dry-Season Water Table (C2)
N Other (Explain in Remarks)

Secondary Indicators (2 or more required)

N Water-Stained Leaves (B9)
N Drainage Patterns (B10)
N Oxidized Rhizospheres along Living Roots (C3)
N Presence of Reduced Iron (C4)
N Salt Crust (B11)
N Stunted or Stressed Plants (D1)
N Geomorphic Position (D2)
N Shallow Aquitard (D3)
N Microtopographic Relief (D4)
N FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes ____ No N Depth (inches): ____
Water Table Present? Yes ____ No N Depth (inches): ____
Saturation Present? Yes ____ No N Depth (inches): ____
(includes capillary fringe)

Wetland Hydrology Present? Yes ____ No N

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:

U.S. Army Corps of Engineers
WETLAND DETERMINATION DATA SHEET – Alaska Region
See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R

OMB Control #: 0710-xxxx, Exp: Pending
Requirement Control Symbol EXEMPT:
(Authority: AR 335-15, paragraph 5-2a)

Project/Site: Cascade Point   Borough/City: Juneau   Sampling Date: 09/21/23
Applicant/Owner: Goldbelt, Inc.   Sampling Point: 07
Investigator(s): B. Hughes, S. Roskam   Landform (hillside, terrace, hummocks, etc.): gentle slope
Local relief (concave, convex, none): none   Slope (%): 15%
Subregion: Southeast Alaska   Lat: 58.69921 Long: -134.93842   Datum: NAD83
Soil Map Unit Name: 36JC Typic humicryoid & typic haplocryod   NWI classification: UPL
Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No ___ (If no, explain in Remarks.)
Are Vegetation Y, Soil Y, or Hydrology Y significantly disturbed? Are "Normal Circumstances" present? Yes Y No ___
Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes Y	No ___
Hydric Soil Present?	Yes Y	No ___
Wetland Hydrology Present?	Yes Y	No ___

Is the Sampled Area within a Wetland? Yes Y No ___

Remarks: Area was previously cleared and road + pad constructed adjacent.

VEGETATION – Use scientific names of plants.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Alnus rubra	35	Y	FAC
2.			
3.			
4.			
=Total Cover	35		
50% of total cover: 17.5	20% of total cover: 7		
Sapling/Shrub Stratum			
1. Alnus rubra	75	Y	FAC
2. Vaccinium ovalifolium	5	N	FAC
3. Rubus spectabilis	10	N	FACU
4. Tsuga heterophylla	2	N	FAC
5. Oplopanax horridus	8	N	FACU
6.			
=Total Cover	100		
50% of total cover: 50	20% of total cover: 20		
Herb Stratum			
1. Athyrium filix-femina	2	N	FAC
2. Dryopteris expansa	5	N	FACU
3. Lysichiton americanus	12	Y	OBL
4. Tiarella trifoliata	20	Y	FAC
5.			
6.			
7.			
8.			
9.			
10.			
=Total Cover	39		
50% of total cover: 19.5	20% of total cover: 7.8		

Plot Size (radius, or length x width) 30'   % Bare Ground Ø
% Cover of Wetland Bryophytes (Where applicable) N/A   Total Cover of Bryophytes ___

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 4 (A)
Total Number of Dominant Species Across All Strata: 4 (B)
Percent of Dominant Species That Are OBL, FACW, or FAC: 100 (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	12	x 1 = 12
FACW species	–	x 2 = –
FAC species	139	x 3 = 417
FACU species	23	x 4 = 92
UPL species	–	x 5 = –
Column Totals:	174 (A)	521 (B)

Prevalence Index = B/A = 2.99

Hydrophytic Vegetation Indicators:

Y Dominance Test is >50%
Y Prevalence Index is ≤3.0[1]
– Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)
– Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes Y No ___

Remarks:

SOIL

Sampling Point: 07

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Features Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-10							peat	
10-16	5YR2.5/2						sand w/ gravel + organics	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- N Histosol or Histel (A1)
- Y Histic Epipedon (A2)
- N Black Histic (A3)
- N Hydrogen Sulfide (A4)
- N Thick Dark Surface (A12)
- N Alaska Gleyed (A13)
- N Alaska Redox (A14)
- N Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- ___ Depleted Below Dark Surface (A11)
- ___ Depleted Matrix (F3)
- ___ Redox Dark Surface (F6)
- ___ Depleted Dark Surface (F7)
- ___ Redox Depressions (F8)
- ___ Red Parent Material (F21)
- ___ Very Shallow Dark Surface (F22)
- ___ Alaska Color Change (TA4)[4]
- ___ Alaska Alpine Swales (TA5)
- ___ Alaska Redox With 2.5Y Hue
- ___ Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- ___ Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.

[4]Give details of color change in Remarks.

Restrictive Layer (if observed):
Type: N/A
Depth (inches): ___

Hydric Soil Present? Yes Y No ___

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- Y Surface Water (A1)
- Y High Water Table (A2)
- Y Saturation (A3)
- N Water Marks (B1)
- N Sediment Deposits (B2)
- N Drift Deposits (B3)
- N Algal Mat or Crust (B4)
- N Iron Deposits (B5)
- N Surface Soil Cracks (B6)
- N Inundation Visible on Aerial Imagery (B7)
- N Sparsely Vegetated Concave Surface (B8)
- N Marl Deposits (B15)
- N Hydrogen Sulfide Odor (C1)
- N Dry-Season Water Table (C2)
- N Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- N Water-Stained Leaves (B9)
- N Drainage Patterns (B10)
- N Oxidized Rhizospheres along Living Roots (C3)
- N Presence of Reduced Iron (C4)
- N Salt Crust (B11)
- N Stunted or Stressed Plants (D1)
- N Geomorphic Position (D2)
- N Shallow Aquitard (D3)
- N Microtopographic Relief (D4)
- N FAC-Neutral Test (D5)

Field Observations:

Surface Water Present? Yes Y No ___ Depth (inches): 2"
Water Table Present? Yes Y No ___ Depth (inches): 0"
Saturation Present? (includes capillary fringe) Yes Y No ___ Depth (inches): 0"

Wetland Hydrology Present? Yes Y No ___

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks: Heavy rainfall preceding ~12 hrs

U.S. Army Corps of Engineers WETLAND DETERMINATION DATA SHEET – Alaska Region See ERDC/EL TR-07-24; the proponent agency is CECW-CO-R	*OMB Control #: 0710-xxxx, Exp: Pending* *Requirement Control Symbol EXEMPT:* *(Authority: AR 335-15, paragraph 5-2a)*

Project/Site: Cascade Point Borough/City: Juneau Sampling Date: 9/21/23

Applicant/Owner: Goldbelt, Inc. Sampling Point: 08

Investigator(s): B. Hughes, S. Ruskam Landform (hillside, terrace, hummocks, etc.): valley

Local relief (concave, convex, none): convex Slope (%): 15%

Subregion: Southeast Alaska Lat: 58.70005 Long: -134.93625 Datum: NAD83

Soil Map Unit Name: 36JC – Typic humicryod and Typic haplocryod NWI classification: UPL

Are climatic / hydrologic conditions on the site typical for this time of year? Yes Y No ___ (If no, explain in Remarks.)

Are Vegetation N, Soil N, or Hydrology N significantly disturbed? Are "Normal Circumstances" present? Yes Y No ___

Are Vegetation N, Soil N, or Hydrology N naturally problematic? (If needed, explain any answers in Remarks.)

SUMMARY OF FINDINGS – Attach site map showing sampling point locations, transects, important features, etc.

Hydrophytic Vegetation Present?	Yes ___	No N	**Is the Sampled Area within a Wetland?** Yes ___ No N
Hydric Soil Present?	Yes Y	No ___	
Wetland Hydrology Present?	Yes Y	No ___	

Remarks:

VEGETATION – Use scientific names of plants.

Tree Stratum	Absolute % Cover	Dominant Species?	Indicator Status
1. Tsuga heterophylla	35	Y	FAC
2.			
3.			
4.			
	35 =Total Cover		
50% of total cover: 17.5	20% of total cover: 7		
Sapling/Shrub Stratum			
1. Tsuga heterophylla	25	N	FAC
2. Vaccinium ovalifolium	35	N	FAC
3. Menziesia ferruginea	45	Y	FACU
4. Cornus canadensis	65	Y	FACU
5. Oplopanax horridus	25	N	FACU
6. Rubus parviflorus	5	N	FACU
Vac parvifolium	10		FACU
	210 =Total Cover		
50% of total cover: 105	20% of total cover: 42		
Herb Stratum			
1. Lysichiton americanus	25	Y	OBL
2. Athyrium filix-femina	3	N	FAC
3. Dryopteris expansa	15	Y	FACU
4.			
5.			
6.			
7.			
8.			
9.			
10.			
	43 =Total Cover		
50% of total cover: 21.5	20% of total cover: 8.6		

Plot Size (radius, or length x width) 50' x 50' % Bare Ground 0

% Cover of Wetland Bryophytes N/A Total Cover of Bryophytes ___ (Where applicable)

Dominance Test worksheet:

Number of Dominant Species That Are OBL, FACW, or FAC: 2 (A)

Total Number of Dominant Species Across All Strata: 5 (B)

Percent of Dominant Species That Are OBL, FACW, or FAC: 40% (A/B)

Prevalence Index worksheet:

Total % Cover of:		Multiply by:
OBL species	25	x 1 = 25
FACW species	0	x 2 = 0
FAC species	98	x 3 = 294
FACU species	165	x 4 = 660
UPL species	0	x 5 = 0
Column Totals:	288 (A)	979 (B)

Prevalence Index = B/A = 3.40

Hydrophytic Vegetation Indicators:

N Dominance Test is >50%

N Prevalence Index is ≤3.0[1]

N Morphological Adaptations[1] (Provide supporting data in Remarks or on a separate sheet)

N Problematic Hydrophytic Vegetation[1] (Explain)

[1]Indicators of hydric soil and wetland hydrology must be present, unless disturbed or problematic.

Hydrophytic Vegetation Present? Yes ___ No N

Remarks:

SOIL

Sampling Point: 08

Profile Description: (Describe to the depth needed to document the indicator or confirm the absence of indicators.)

Depth (inches)	Matrix Color (moist)	Matrix %	Redox Color (moist)	Redox %	Type[1]	Loc[2]	Texture	Remarks
0-24							peat	

[1]Type: C=Concentration, D=Depletion, RM=Reduced Matrix, CS=Covered or Coated Sand Grains. [2]Location: PL=Pore Lining, M=Matrix.

Hydric Soil Indicators:

- Y Histosol or Histel (A1)
- N Histic Epipedon (A2)
- N Black Histic (A3)
- N Hydrogen Sulfide (A4)
- N Thick Dark Surface (A12)
- N Alaska Gleyed (A13)
- N Alaska Redox (A14)
- N Alaska Gleyed Pores (A15)

Indicators for Problematic Hydric Soils[3]:

- N Depleted Below Dark Surface (A11)
- N Depleted Matrix (F3)
- N Redox Dark Surface (F6)
- N Depleted Dark Surface (F7)
- N Redox Depressions (F8)
- N Red Parent Material (F21)
- N Very Shallow Dark Surface (F22)
- N Alaska Color Change (TA4)[4]
- N Alaska Alpine Swales (TA5)
- N Alaska Redox With 2.5Y Hue
- N Alaska Gleyed Without Hue 5Y or Redder Underlying Layer
- N Other (Explain in Remarks)

[3]One indicator of hydrophytic vegetation, one primary indicator of wetland hydrology, and an appropriate landscape position must be present unless disturbed or problematic.
[4]Give details of color change in Remarks.

Restrictive Layer (if observed):
Type: N/A
Depth (inches): ______

Hydric Soil Present? Yes Y No ____

Remarks:

HYDROLOGY

Wetland Hydrology Indicators:

Primary Indicators (any one indicator is sufficient)

- Y Surface Water (A1)
- Y High Water Table (A2)
- Y Saturation (A3)
- N Water Marks (B1)
- N Sediment Deposits (B2)
- N Drift Deposits (B3)
- N Algal Mat or Crust (B4)
- N Iron Deposits (B5)
- N Surface Soil Cracks (B6)
- N Inundation Visible on Aerial Imagery (B7)
- N Sparsely Vegetated Concave Surface (B8)
- N Marl Deposits (B15)
- N Hydrogen Sulfide Odor (C1)
- N Dry-Season Water Table (C2)
- N Other (Explain in Remarks)

Secondary Indicators (2 or more required)

- N Water-Stained Leaves (B9)
- N Drainage Patterns (B10)
- N Oxidized Rhizospheres along Living Roots (C3)
- N Presence of Reduced Iron (C4)
- N Salt Crust (B11)
- N Stunted or Stressed Plants (D1)
- Y Geomorphic Position (D2)
- N Shallow Aquitard (D3)
- Y Microtopographic Relief (D4)
- N FAC-Neutral Test (D5)

Field Observations:

	Yes	No	Depth (inches)
Surface Water Present?	Y		4
Water Table Present?	Y		
Saturation Present? (includes capillary fringe)	Y		2

Wetland Hydrology Present? Yes Y No ____

Describe Recorded Data (stream gauge, monitoring well, aerial photos, previous inspections), if available:

Remarks:
Heavy rainfall preceding ~ 14 hours

Appendix B – Soil Pit and Sample Location Photographs

	
Figure B-1. Soil Pit SP01	**Figure B-2. Sample Location SP03**
	
Figure B-3. Soil Pit SP03	**Figure B-4. Sample Location SP04**

Figure B-5. Soil Pit SP04

Figure B-6. Soil Pit SP05

Figure B-7. Soil Pit SP06

Figure B-8. Soil Pit SP07

Figure B-9. Sample Location SP07

Figure B-10. Sample Location SP08

Figure B-11. Drainage DRAIN01

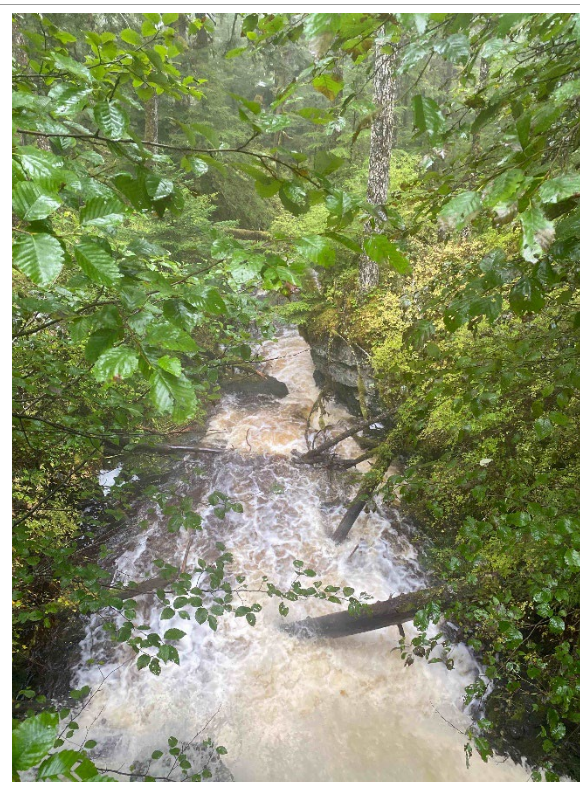

Figure B-12. Cascade Creek CREEK01

Appendix 6-2

Cultural Resources Survey and Monitoring for the Juneau Cascade Point Ferry Terminal Geotechnical Investigation (HSHWY00015)

Prepared By:

Aubrey L. Morrison, M.A.
Michael R. Yarborough, M.A.
Hollis A. Reddington, M.S.

Prepared For:

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CRC

Cultural Resource Consultants LLC
Anchorage, Alaska

Statement of Confidentiality

To protect fragile, vulnerable, or threatened cultural sites from disturbance, access to site-specific information from the Alaska Heritage Resources Survey is restricted or confidential. Distribution of portions of this report that identify the location of cultural sites is to be limited to those with a legitimate need to know, such as appropriate personnel from Cultural Resource Consultants LLC, Goldbelt, Inc., Solstice Alaska Consulting, PND Engineers, the Alaska Department of Transportation and Public Facilities, and the Office of History and Archaeology. Restricted or confidential information is withheld from public records disclosure under state law (AS 40.25.110) and under the federal Freedom of Information Act (PL 89-554). Information about site inventory may be restricted pursuant to AS 40.25.120(a)(4), Alaska State Parks Policy and Procedure No. 50200, the National Historic Preservation Act (PL 89-665, 16 U.S.C. 470), and the Archaeological Resources Protection Act (PL 96-95).

Executive Summary

The following report details the results of an archaeological survey and cultural resources monitoring at Cascade Point near Juneau, Alaska. Solstice Alaska Consulting, Inc. retained Cultural Resource Consultants to conduct survey and archaeological monitoring for the Juneau Cascade Point Ferry Terminal Geotechnical Testing project.

The project is located approximately 30 miles northwest of Juneau within Section 32 of Township 36S and Section 1 of Township 37S, Range 63E, Copper River Meridian.

The cultural resources survey at Cascade Point documented 71 culturally modified trees (CMTs) within JUN-00710, and no CMTs were affected by geotechnical testing within the site. The JUN-00710 site boundary was expanded slightly to the east and southeast. Despite the removal of roughly half of the previously documented CMTs and probable damage to the buried midden portion of the site around 2005, CRC recommends that the site should continue to remain eligible for the National Register.

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List of Figures

Project Description and Background

Cultural Resource Consultants LLC (CRC) was retained by Solstice Alaska Consulting Inc. to conduct an archaeological survey and cultural resources monitoring for geotechnical testing at Cascade Point, north of Juneau, Alaska (Figure 1). The Alaska Department of Transportation and Public Facilities (DOT&PF), in partnership with Goldbelt, Inc. (Goldbelt), is proposing to construct a new Alaska Marine Highway System (AMHS) ferry terminal and associated infrastructure at Cascade Point in Southeast Alaska. The project is located approximately 30 miles northwest of Juneau within Section 32 of Township 36S and Section 1 of Township 37S, Range 63E, Copper River Meridian.

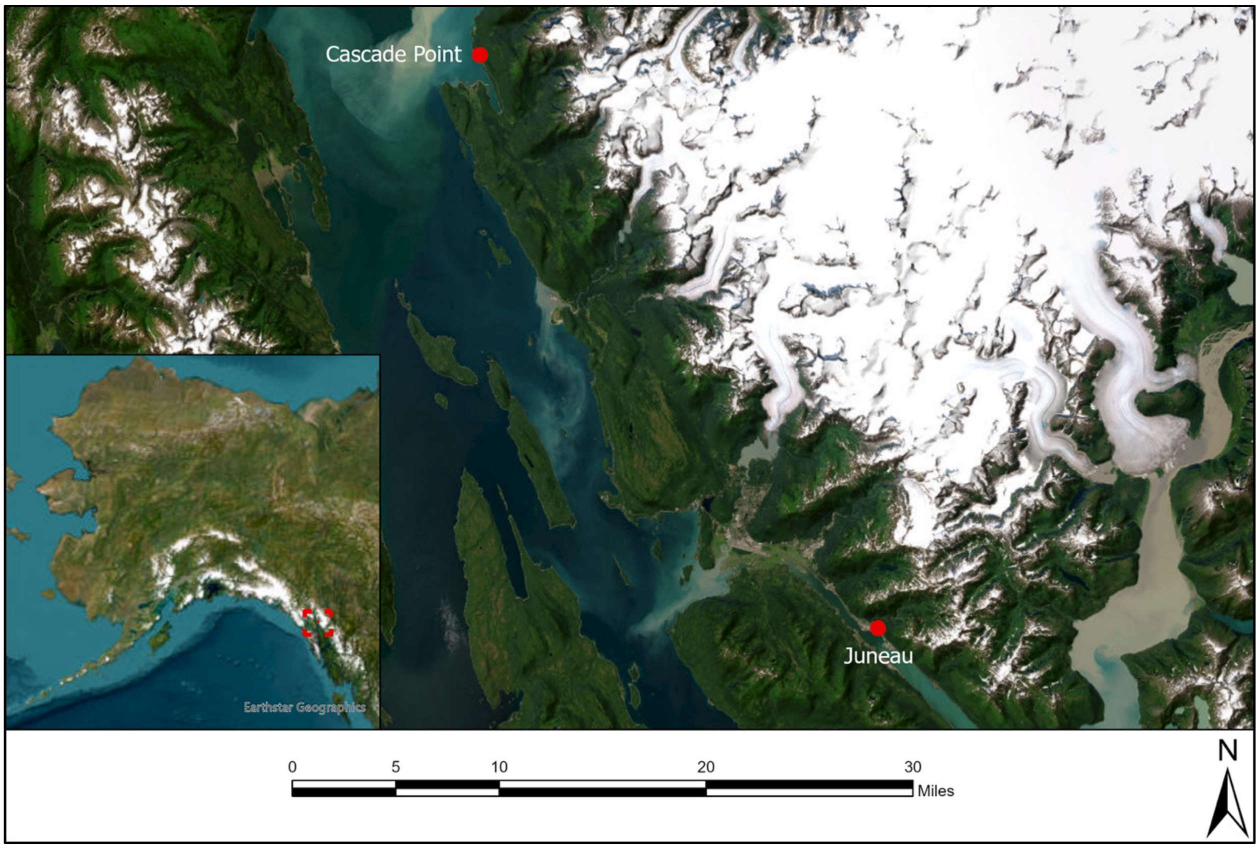

Figure 1. Project location.

As a part of the design effort for this project, DOT&PF proposed a geotechnical study to gather needed information from a proposed roadway alignment and parking lot site, and within the marine environment (Figure 2). Because of the previously reported archaeological midden site and grove of culturally modified trees (CMTs) within the project area (JUN-00710), the State Historic Preservation Officer (SHPO) stated in a letter to DOT&PF that "…a finding of 'no historic properties adversely affected with conditions' is appropriate for the proposed project." This was "contingent on the conditions that DOT&PF will implement avoidance of known deposits and culturally modified trees (CMTs) and conduct archaeological monitoring for project activities within JUN-00710 or 50 feet of the mapped site boundary" (Bittner 2024). The mapped site boundary is presented in Figure 3.

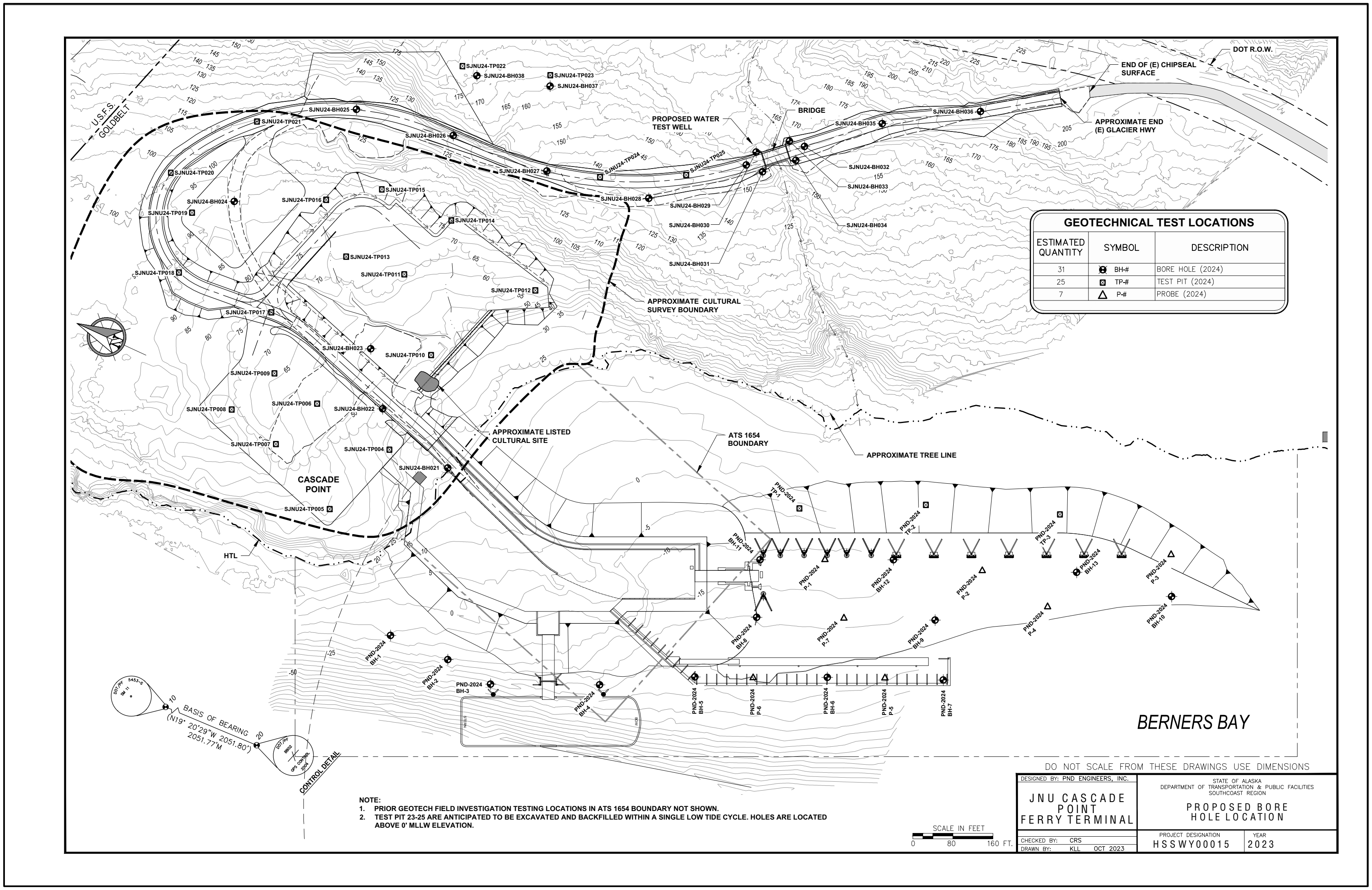

Figure 2. Geotechnical Test Locations.

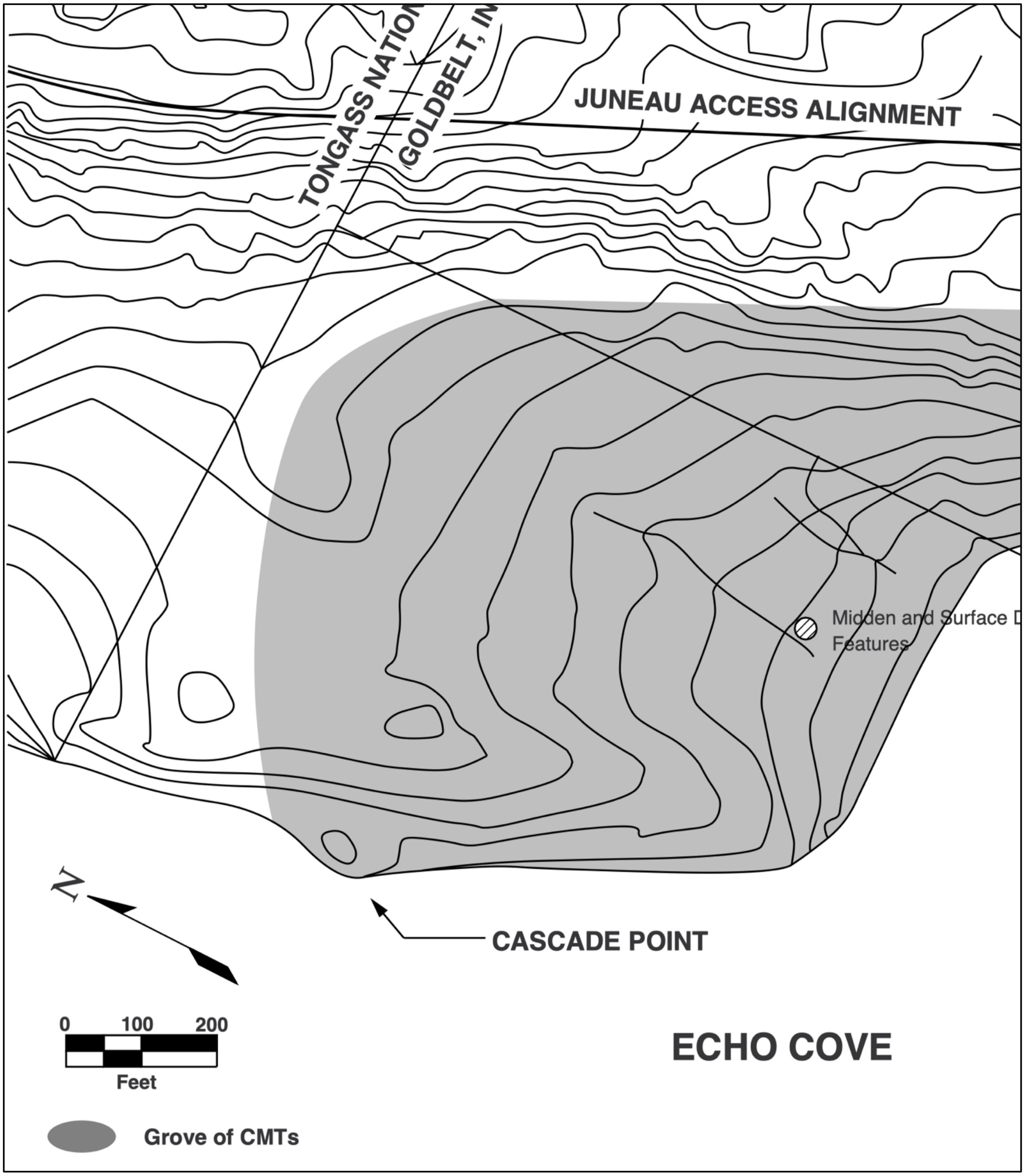

Figure 3. JUN-00710 site map from Yarborough (1997).

The purpose of the archaeological survey was to relocate the shell midden and surface depressions and to identify and mark CMTs to be avoided during the geotechnical investigation.

As per the stipulations from the SHPO, a cultural resources monitor was present for all ground disturbing activities within 50-feet of the mapped site boundary.

Environmental Context

Cascade Point protects a small cove in Berner's Bay, along Lynn Canal. An unnamed stream enters the bay just south of the project. Hills rise parallel to a creek valley and Berner's Bay. The site geology is primarily volcanic and is consistent with containing some slate (Brew and Ford 1985).

Sea levels in southeast Alaska rose rapidly by 17,000 cal B.P. as the Last Glacial Maximum came to an end (Baichtal et al. 2021). The highest elevation shell-bearing deposits in the Juneau area are over 200 meters (m) above sea level. Most of the rebound occurred between 14,000 and 12,900 cal. B.P. and was of some of the most extreme isostatic rebound in the region. A diagnostic tephra is the Mount Edgecumbe dacite tephra, which dates to 13,160 +/- 90 cal B.P. (Beget and Motyka 1998). Southeast Alaska's local Holocene Climatic Optimum from c. 10,780 to 9870 cal B.P. resulted in a warmer climate than modern and some of the first conclusive evidence of human occupation (Baichtal et al. 2021).

Following glacial melt during the Little Ice Age, the Juneau area again experienced extreme isostatic uplift around 1770 A.D., which continues to today (Larsen et al. 2005). The isostatic rebound is expected to outpace sea level rise as a result of climate change (Kelly et al. 2007). Baichtal et al. (2019) estimate that sea levels could have been as much as 20 m above modern sea level between c. 9000 B.P. and present. Over half of the survey area is within 20 m in elevation and may have resulted in deeper coves over time.

The Cascade Point survey area is within a mature spruce and hemlock forest. The understory consists primarily of young hemlock, rusty menziesia, blueberry, huckleberry, devil's club, and skunk cabbage. The eastern and western edges of the survey area are volcanic bedrock outcrops that create a natural bowl in the center of the study area. The bowl slopes to the south toward the beach. Two small streams drain the bowl, but large swaths of swampy areas dominated by skunk cabbage are present throughout the low-lying portions of the study area. A few areas within the study area were previously logged, and alder has regrown in these locations.

Cultural Chronology

To date, archaeological surveys in southeastern Alaska have documented thousands of sites. A large percentage of these sites are shell middens, although numerous other types of precontact and historic resources are known (Autrey 1992).

Madonna Moss (1998) refined the sequence for northern Northwest Coast history into an Early period (10,000 to 5000 B.P.), a Middle period (5000 to 1500 B.P.), and a Late period (1500 B.P. to Contact). Davis (1990) split the cultural sequence into a Paleomarine tradition (11,000-6500 B.P.), a Transitional stage (6500-5000 B.P.), and a Developmental Northwest Coast stage (5000 B.P. to European contact). The Developmental stage was further divided into the Early (c. 5000-2600 B.P.), Middle (c. 2600-1000 B.P.), and Late (c. 1000–contact) periods.

Early Period (c. 10,000 to 5000 B.P.)

Any Late Pleistocene sites would likely be under water (Carlson and Baichtal 2015). Moss' (1998) Early period, and Davis' (1990) Paleomarine tradition, are characterized by a well-developed microblade industry with wedge-shaped microblade cores, few or no bifacial tools, and an economy based on coastal marine subsistence. Davis (1990:198-199) argues that the time between 6500 and 5000 B.P. was a transitional stage as people adapted to a changing environment, seen in shifting economic and settlement strategies. By the end of the period, northwest coast people had shifted from highly mobile to sedentary (Brown 2016).

The vast majority of early Holocene sites in southeast Alaska have been identified in the vicinity of Prince of Wales Island as a result of paleoshoreline modeling (Carlson and Baichtal 2015). The sites include microblade, flake, bifacial, and burin technology. Early Northern northwest coast assemblages include core and blade technology, notched scrapers, burins, and unifacial technology, like at Ground Hog Bay 2 (JUN-00037), Hidden Falls (SIT-00119), and Yatuk Creek Terrace (CRG-00717; Ackerman et al. 1979; Davis et al. 1984; Mobley 2018).

Middle Period (5000 to 1500 B.P.)

Moss' (1998) Middle period, and Davis' Early and Middle Developmental stages, sites have extensive shell deposits, and are often associated with wood-stake fishing weirs. Middle period artifact assemblages include slate points and other ground stone materials, bone harpoons and points, and shell beads.

Davis (1990) differentiates the Early and Middle Developmental stages by the Middle period containing composite toggling harpoons and small flaked stone points, while these artifacts are absent from the Early period. Davis' (1990) Middle Developmental period also includes a greater focus on unilaterally barbed harpoons, ground stone knives, and heavy hand mauls. All of these artifact types increase in abundance during the Late period. That is to say, the shift in technology is gradual, and Moss lumps the change while Davis splits it.

Clark (1979:7) argues that, based on polished slate tools from the Coffman Cove site (PET-00067), from c. 4000 to 3000 B.P., southeast Alaska was part of "a long coastal sphere of communication stretching from southern British Columbia as far north as the Kodiak zone of southwestern Alaska." Cultural connections along the Pacific Coast continued late into the period, with a ground slate fishtail point recovered from Sarkar Cove Entrance (CRG-00164), dating to 1740 +/- 240 B.P. (Campbell 1984). The dating is consistent with the end of the florescence of chipped fishtail points to the west on the coast, between c. 2400 B.P. and as late as 1700 B.P. (Maschner 2008).

Late Period (1500 B.P. to Contact)

Moss' (1998) Late period, which is usually identified with the ethnographic cultures of the region, is similar to Davis' (1990) Late Developmental Northwest Coast stage, characterized by the presence of shell midden deposits, ground stone and bone technology, human burials, and the establishment of large settlements or winter villages, specialized camps, and fortifications. Late period artifacts include copper tools, stone bowls, ground stone knives, mauls, harpoons with lashing, and increased use of obsidian (Davis 1990).

After the Middle period, chipped stone technology continues to decline in abundance (Davis 1985; de Laguna 1964:183; Moss 1989a; Swanson and Davis 1982). Shouldered, chipped stone points have been recovered from SIT-00228, a probable Tlingit fort dating c. 1000 B.P. (Mobley 2003). Frederica de Laguna (1964:130) reported triangular/leaf-shaped chert blades from Old Town (YAK-00007).

Ethnography

Emmons (1991) provides a detailed account of Tlingit culture in the late nineteenth century. Tlingit society was split into tribes, clans, nobles, common people, and slaves. Tlingit occupied winter villages and seasonal subsistence camps. Usually, each tribe had only one winter village. Northern Tlingit constructed large plank homes of spruce, sometimes with subterranean platforms (Emmons 1991:60). Summer houses were smaller than winter houses, built on the ground without any excavation, and could double as a smokehouse. Temporary structures also included lean-tos.

Trade between coastal people was permitted for individuals, but trade rights with interior peoples were hereditary to chiefs (Emmons 1991:55). Tlingit traveled in canoes carved from tree trunks. Subsistence focused on salmon taken in traps, by spear, or by hook. Fur seal, halibut, eulachon, bear, wolf, fox, and other furbearers were taken primarily in spring.

Auk Tlingit have occupied Auk Bay, just north of Douglas Island, since c. 900 B.P. (X'unáxi National Register Nomination 2014). Auk elder Phillip Joseph (1967:8-9) describes the history of the Yaxteitann clan in the area: They started in the north, hunted seals at Young Bay, then settled in Indian Cove, and later discovered Auk Bay and moved their winter village there. Auk Bay became the center of the small clan, which controlled fewer resources than other clans and lacked interior trade routes (Thornton 2012:76).

Russian Period

The late precontact/early historic Tlingit toolkit includes abraders, chipped slate knives and adzes, and pebble/cobble spall tools, while chipped stone technology of other fine-grain materials is extremely rare to entirely absent (Ackerman 1965, 1970; Swanson and Davis 1982).

The historic period in Southeast Alaska began in 1741, when one of Vitus Bering's ships reached the outer coast of the Alexander Archipelago north of Dixon Entrance (Betts and Bowers 1994:18). In an effort to expand their territory into Southeast Alaska, the Russian American Company established a fort near Yakutat in 1796. It was later destroyed by the Tlingit in 1805 after relations quickly soured (de Laguna 1972:73; Khlebnikov 1994:1–6; Tikhmenev 1978:43, 61, 65, 99). In 1799, the Russians built a fort at Sitka, but it was destroyed by the Tlingit in 1802. A new fort, New Archangel, was built at Sitka in 1804. The Russian American Company established their headquarters there in 1808, where it remained until Alaska was sold to the United States in 1867 (de Laguna 1990:223).

American Period

The first major Alaskan gold discovery was in Silver Bow Basin in 1880, shortly after the sale of Alaska to the United States (Ferrell 1995). Juneau was established the following year as prospectors flooded the area. The Treadwell Mine, on Douglas Island, operated from 1882 to 1922 (Pollnow 2013). The Klondike Gold Rush began in 1897 and 1898, and more prospectors accessed the gold fields by starting at several Alaskan ports and traveling overland (de Laguna 1972). Mineral exploration restarted in southeast Alaska in the 1950s and intensified in the 1970s and 1980s (Pollow 2013:18).

Ancestral Hemlock Harvesting

Tlingit people have traditionally used *Yán*, or western hemlock wood, for smoking fish and carving spoons, spear shafts, and halibut hooks (National Park Service n.d). The outer bark makes a natural dye to color fishing nets and mountain goat wool. It was used to tan seal and deer hides (National Park Service n.d), and hemlock branches, called *haaw daa aa,* were placed in spawning areas to collect herring eggs (Newton and Moss 2004: 8, 45).

The bark stripped from hemlock was often collected for food. According to notes on Tlingit culture kept by U.S. Navy Lieutenant George Emmonds (1991:152) during the 1880s and 1890s:

> The inner bark of the hemlock, spruce, and pine was gathered in the spring and eaten with fresh oil, but that of the hemlock alone was prepared and preserved for winter…The tree trunk was debarked in slabs one or two feet wide and four or five feet long by means of wedges made of the limbs of hemlock, spruce, or cedar, pointed at one end and sharpened to a flat edge at the other. The wedge used by men was six feet long, the woman's but half that length. The bark [to be detached] was cut across at the bottom, with the pointed end, and pried off upwards with the wedge-shaped end of the stick. Then the woman scraped off the fine inner bark with her crescent-shaped knife, originally of mussel shell, later of metal. These shavings were dried or steamed in the earth oven between layers of skunk cabbage leaves, then mashed in wooden dishes with the woman's hand hammer, or rubbed soft with her hands. Then they were formed into cakes and pressed between pieces of hemlock bark, sun dried on the canoe cover, and stored in boxes or strung up on the wall. The preserved bark was softened in boiling water and then mixed with oil before being eaten.

A more recent description of the traditional method of preparing *sax'* is from Tlingit elder Jessie Dalton (Newton and Moss 1984:24):

> Take the bark back off from all the way around the hemlock tree. Shave off the bark from the sap side with what looks like an Eskimo ulu. Take the bark off in thin layers and after there is enough dig a pit and line it with coarse gravel all the way around and cover it with fern about one inch deep. On top of that, a layer of skunk cabbage, then you're ready to put in the *sax'*. Now you need to cover it again. Of course this is after the fire has been built and the rocks are quite hot so you have to work fast. Then cover with more fern, skunk cabbage and finally

> sand. The fire should last all night and the following day you will uncover it and find it very nice, tender and very sweet. Put it on clean canvas in the sunshine for a number of days to dry it.

Another description of hemlock use was provided by Martha James (Newton and Moss 2004:28):

> June was the time to get *sáx'* [sap of the outer cambium layer of inner young hemlock bark]. Special knives, *yees'*, were similar to ulus and kept very sharp to get the *sáx'* off from the inner bark.

Yarborough (1997:5) suggested that JUN-00710 was likely a temporary camp for processing *sáx'*. This conclusion was based on the small size of the shell midden, the two depressions, which may have been processing pits, and the types of scars left on the culturally modified hemlocks.

Previous Archaeological Research at Cascade Point

There is one previously reported site within the Cascade Point project area—JUN-00710. The site was first documented in 1996 by Michael Yarborough of CRC. Working under contract to Goldbelt, Inc on the Cascade Point Access Road project, he documented 159 CMTs and a shell midden with two surface depressions at the site (Yarborough 1997; see Figure 3). Following his recommendation, the SHPO determined the site eligible for the National Register.

In 1998, United States Forest Service (USFS) archaeologist Katherine Brown completed a Section 106 review for the proposed Cascade Point Access Road (Brown 1998). While the road corridor was primarily within land owned by Goldbelt, Inc., two sections of the proposed road crossed USFS land. This required a special use permit and prompted additional archaeological work. Brown (1998:4) recommended a "conditional no adverse effect" finding for the project with the understanding that mitigation would occur at JUN-00710. The stipulations of the finding were:

> The midden area of the site will be shovel tested to define site boundaries. Once these boundaries are defined the area will be flagged off and avoided by all construction activities.
>
> Chronological research on site 49 JUN 710 will be carried out. This will include dating of carbon-based materials from the midden area and dating of tree sections from the CMTs.
>
> CMTs would be mapped and documented before clearing activities take place.
>
> An interpretive display in the proposed lodge, or other appropriate area, will explain the significance of historic and prehistoric cultural resources in the area. Additionally, the importance of protecting these resources from vandalism and other destruction will also be emphasized.

Brown's recommendations were revisited in 2004, and both the SHPO and the USFS zone archaeologist agreed that they were still valid. The USFS conducted cultural resources monitoring for the road construction and archaeologist Jon Loring of Loring Research was hired by Goldbelt, Inc. to complete the mitigation at JUN-00710.

USFS archaeologist Rachel Myron monitored the road construction in May 2005, finding no new cultural resources. On May 6, 2005, Myron visited the southern end of the access road corridor and saw that road construction had begun, and trees had been cut within the 60-foot-wide right-of-way. Myron returned to JUN-00710 on May 9, 2005, with USFS archaeologist Nicole Lantz to determine the relationship between the midden site and the proposed road:

> Rachel and Nicole measured the distance between Station 179 +59.41 and the west edge of the northernmost archaeological feature. On an azimuth of 104 degrees (true) the west edge of the feature lies 49 feet from the centerline of the road. All three features, therefore, lie directly on the east edge of the road ROW.

Following Myron and Lantz's visit, Jon Loring conducted his fieldwork. According to Myron (2005:2), "Mr. Loring completed his fieldwork in June 2005 and a final project report is pending."

Unfortunately, if Loring completed a report on his work at JUN-00710, it is not on file at the Office of History and Archaeology or the Juneau Ranger District. A USFS Heritage Program FY2009 Annual Report noted that Loring's report was still not complete as of June 2010 (USFS Alaska Region 2010). CRC has been unable to contact Mr. Loring to obtain a copy of his report and the USFS district office in Juneau does not have a copy. At this point it is reasonable to conclude that a final report of the work was never completed. Myron's (2005:8) monitoring report references a letter written by Jon Loring to Goldbelt, Inc. stating:

> In early May 2005 Goldbelt, Inc. hired Cultural Resource Consultant Jon Loring, Loring Research to complete the mitigation measures required for JUN 710 at Cascade Point. Loring proposed to complete work on the project in two phases. Phase One was to include systematic testing to define the extent of the subsurface midden, documentation of the CMTs including GPS locations for each, and analysis of rounds extracted from all CMTs which lay within the clearing limits of the road. Loring completed this phase of work during the week of May 22, 2005.

Based on a thorough literature review, Loring's mitigation was the last archaeological fieldwork conducted at Cascade Point. However, without a copy of the mitigation report, we do not know the full extent of the shell midden within the site, the age of the site, or the ages and dates of modification of the CMTs.

Study Methods

Prior to the 2024 cultural resources survey, an extensive background review, including a search of the Alaska Heritage Resources Survey (AHRS), was conducted. The field effort was carried out by CRC Senior Project Archaeologist Aubrey Morrison, who meets the *Secretary of Interior's Professional Qualification Standards* (Federal Register Vol. 48, pp. 44738–44739).

Ms. Morrison has a demonstrated ability to conduct surveys and cultural resources monitoring in Alaska.

PND Engineers provided Ms. Morrison with GPS coordinates for their geotechnical testing locations, and each of the proposed test pits and boreholes was examined. CMTs in the vicinity of geotechnical tests were documented with photographs, measurements, and GPS points. CMTs were also flagged for avoidance.

Following the survey of the test locations, a pedestrian survey of the project area and the formerly mapped site boundary (see Figure 3) was conducted. Because the site, JUN-00710, had already been thoroughly surveyed and determined eligible for the National Register, the 2024 pedestrian survey focused on documenting the remaining CMTs, as many had been cut down since 2005. The survey was conducted in parallel transects spaced 10 to 20 m apart across the site. However, because the focus of the survey was CMTs, the transects eventually became more "meandering" as Ms. Morrison had to view all sides of each tree to look for modifications. CMTs that were missed during the survey were documented during the cultural resource monitoring. Unfortunately, due to the pace of monitoring, some trees were documented only with a photograph and a GPS point.

After the completion of the archaeological survey and documentation of the remaining CMTs, Ms. Morrison monitored the excavation of all backhoe test pits within the boundaries of JUN-00710 at Cascade Point. The purpose of the monitoring was to help the geotechnical testing crews avoid known CMTs and archaeological deposits and prevent inadvertent damage to as yet undiscovered archeological and historical materials.

Survey Results

The cultural resources survey was carried out between September 27 and 30, 2024, prior to monitoring of geotechnical tests. The survey area encompassed the entirety of the previously mapped site boundaries for JUN-00710 (see Figure 3) as well as a minimum of 50 feet on either side of the existing access road that extends from the end of Glacier Highway to the proposed ferry terminal. At the request of PND Engineers, Ms. Morrison also surveyed to the northeast and east of the existing material source, in the event that the material source is expanded in the future (Figure 4).

JUN-00710

As described above, JUN-00710 was initially recorded as a midden with two surface depressions and an associated grove of 159 hemlock CMTs. The site was documented prior to the construction of an access road from the Glacier Highway to Cascade Point. Following construction of the road, roughly half of the CMTs within the site were cut down. The exact date of this is unclear, but based on the alder regrowth within disturbed portions of the site, it likely occurred around the time the road was built in 2005 (Figure 5). A material source was developed near the northeastern edge of the property, and several gravel pads were added to the site, likely for staging construction equipment or for processing gravel from the material source (Figure 6). The cleared areas are visible on modern aerial photos of the site (see Figure 4).

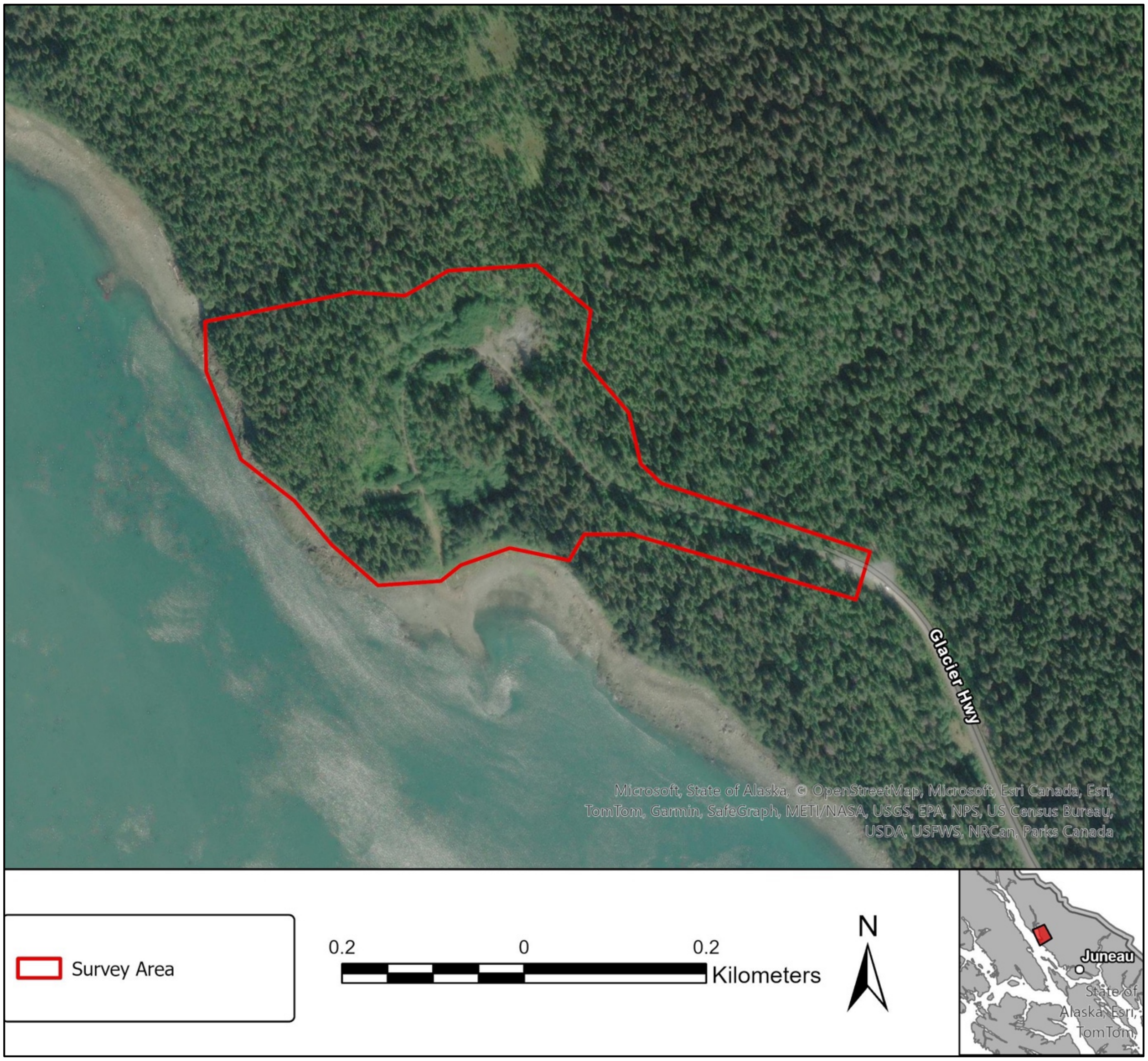

Figure 4. Survey area at Cascade Point.

Due to the dramatic changes at the site, finding the previously reported surface features and shell midden was challenging. Many of the trees that had been cut down were not removed and much of the ground surface was obscured by deadfall. The stream described in the AHRS card has been re-routed and no longer serves as a reference point for the subsurface midden and surface depressions. However, one surface depression and shell midden were relocated immediately south of a gravel pad and previously cleared area (Figure 7). The depression is roughly 15 m east of the road at the edge of a marine terrace. To minimize further damage to the site, a ¾-inch diameter soil probe was used to identify the presence of shell midden. Once the location was established, the site was then flagged for avoidance during geotechnical testing.

Figure 5. Disturbed area with gravel pad and alder regrowth.

Figure 6. Previously developed material source at Cascade Point. View to the west/southwest.

The single remaining surface depression measures 110 centimeters (cm) by 100 cm and is approximately 20 cm deep. Soil probes immediately north and northeast of the depression yielded a dark brown humus with dispersed mussel shell. The depression is at the edge of a terrace, the southern side of which has been partially excavated by heavy equipment. Charcoal and dispersed mussel shell were observed eroding out of the cutbank. Based on the previous descriptions and what was observed during the survey, roughly half of the midden portion of the site has been destroyed.

A total of 71 CMTs were documented at JUN-00710 (see Figure 7). Of these, 69 were hemlock and two were Sitka spruce. Most of the hemlocks showed evidence of bark stripping, while the two spruce trees had triangular shaped scars with ax or hatchet cut marks (Figure 8). The two spruce CMTs are likely more modern and may have marked survey locations. The southernmost spruce CMT is immediately adjacent to a survey monument.

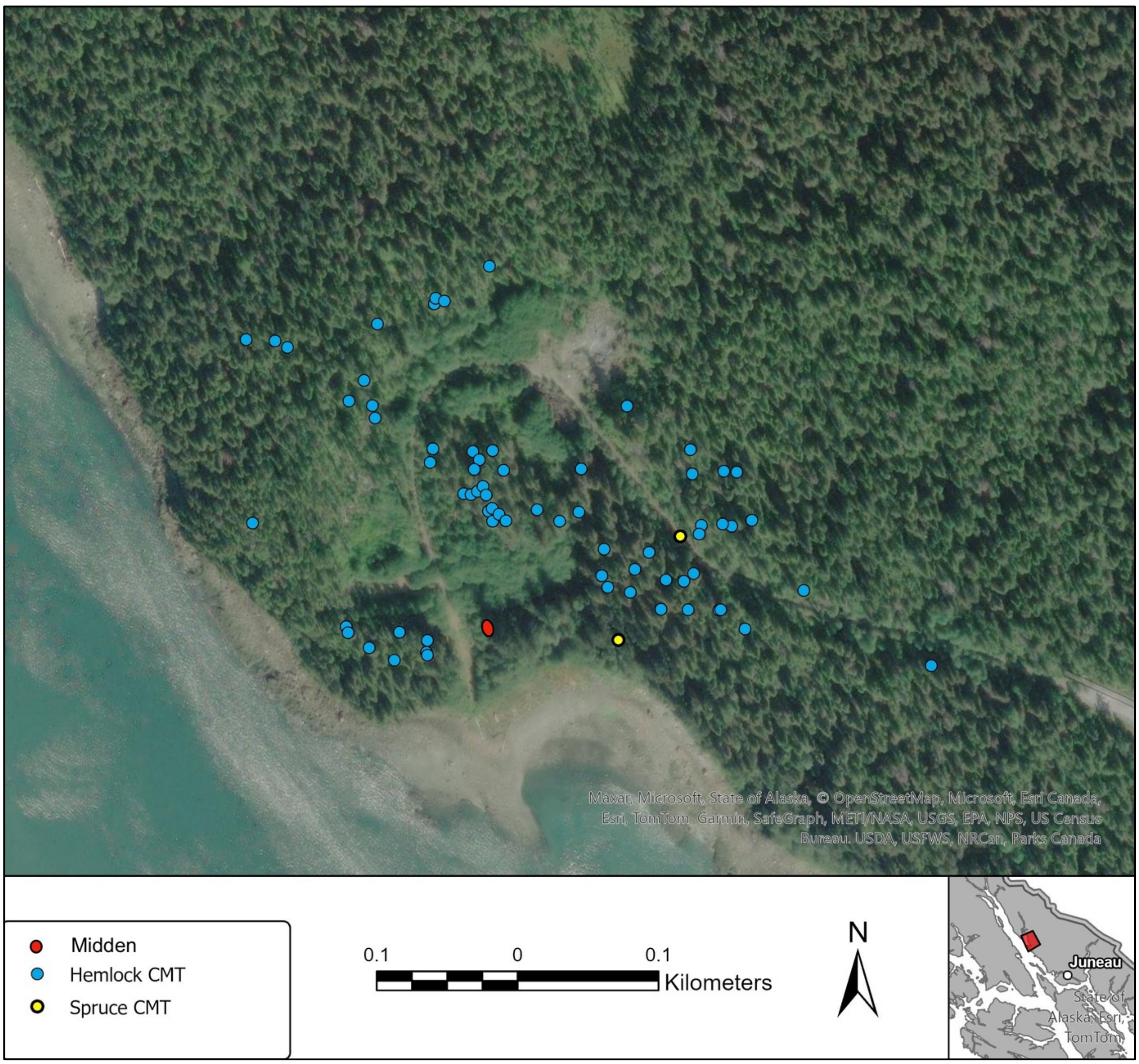

Figure 7. Survey results map showing CMTs and midden location.


Figure 8. Typical bark-stripped hemlock and a Sitka spruce with a triangular cut.

Measurements of the trees and modifications were recorded in cm, including scar length, width, and height above ground surface, and diameter at breast height (DBH). The culturally modified hemlocks had an average DBH of 73 cm. Interestingly, a relatively small, unmodified hemlock with a 30 cm DBH cut down during geotechnical testing had well over 200 growth rings. A more complete description of the CMTs documented, including a table containing all CMT data, is presented in Appendix A.

The site likely continues to the north, though the previous survey by Yarborough (1997) was constrained to the boundaries of Goldbelt's property. At that time, the USFS owned the parcel north of JUN-00710. That land is now owned by Goldbelt, but it was outside the survey area for this project.

CMTs were identified in most portions of the project area, with the exception of the places that had been previously cleared. The hemlocks along the rocky elevated beach terrace along the western side of the survey area were significantly smaller in diameter than hemlocks further inland. The smaller diameter trees suggested that this area had been previously logged. However, the small unmodified hemlock mentioned above was within this grove and based on the number of growth rings on that tree (over 200), this is an old growth forest, despite the size of the trees. Challenging growing conditions on the exposed volcanic bedrock along the western portion of the landform likely stunted the growth of trees and probably made them less desirable for bark harvesting, as there are few culturally modified hemlocks within this portion of the site (see Figure 7).

Monitoring Results

Cultural resource monitoring was conducted between October 1 and 9th, 2024. CRC archaeologist Aubrey Morrison monitored the excavation of 22 test pits and 5 boreholes within JUN-00710. Geotechnical testing in the site included test pits, excavated by a large excavator, and 5” diameter boreholes, excavated by a tracked drill rig.

The SHPO stated that archaeological monitoring must be conducted for “project activities within JUN-00710 or 50 feet of the mapped site boundary” (Bittner 2024). Archaeological survey prior to monitoring expanded the known site boundary. Once the survey had been completed, Ms. Morrison recognized that there would be no need to monitor the excavation of boreholes, as all of the boreholes would be excavated within cleared areas that had been previously disturbed. The test pits were excavated well off the existing roadway, which required some additional vegetation removal. The crew was able to use the previously logged areas and gravel pads to access most of their geotechnical tests, but a few unmodified trees had to be cut down to allow access. The test pits varied in size and depth. Because the goal was to go as deep as possible, the pits were often oblong in shape and were up to 15 feet long and wide. The maximum depth reached was 13 feet (Figure 9).

Figure 9. Typical test pit.

No cultural material was identified in the test pits. Sediments were largely glacial deposits overlain by a humus layer and most of the test pits encountered saturated ground or hit the water table. A few tests containing alluvial deposits likely indicate where the two creeks within the study area have meandered over time.

All CMTs were avoided during the excavation of test pits, and the test closest to the subsurface midden (TP 10) was within an area that had been previously disturbed. Therefore, all known cultural resources were successfully avoided.

Five of the proposed boreholes were monitored. The drill rig used for the boreholes was not able to travel off existing roads or gravel pads (Figure 10). Therefore, all drilling had to be conducted in previously disturbed areas where there was little, if any, potential for intact cultural resources.

CRC submitted a memo to the SHPO explaining the rationale for not requiring a monitor to observe boreholes but continued to monitor the excavation of boreholes until a decision was reached. After the memo was submitted, consultation continued between DOT&PF and Elyse Applegate at the state historic preservation office. At the direction of DOT&PF, Ms. Morrison contacted Elyse Applegate by telephone on October 9, 2024, and explained why monitoring of the boreholes was likely not necessary. Ms. Applegate concurred, and cultural resources monitoring at Cascade Point was considered complete.

Figure 10. Borehole 21, showing the tracked drill rig utilized for all boreholes.

Summary and Recommendations

The cultural resources survey at Cascade Point documented 71 CMTs within JUN-00710. The site boundary was expanded slightly to the east and southeast. Despite the removal of roughly half of the previously documented CMTs and probable damage to the buried midden portion of the site, CRC recommends that the site should continue to remain eligible for the National Register. While previous damage to the site was hypothetically mitigated by Jon Loring in 2005, the data from that study has remained unavailable. CRC's survey included only minimal soil probing to find the location of the midden, and a portion of the midden likely remains intact, indicating that the site still retains its significance under Criterion D of the National Register. Tree rings on the remaining CMTs at the site can be dated to reveal when the site was being used to harvest hemlock bark.

The cultural resources monitoring at Cascade Point did not identify any new cultural resources. No CMTs were disturbed during the excavation of test pits or the drilling of boreholes.

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Appendix A:

Culturally Modified Trees at JUN-00710

A total of 71 CMTs were documented at JUN-00710. CRC archaeologist Aubrey Morrison used the CMT typology developed by Charles Mobley (1989) and expanded by Mark McCallum (1991) to describe the types of modification observed. Due to time constraints while monitoring the excavation of geotechnical test pits, not all CMTs were fully measured. However, each individual CMT was, at a minimum, photographed and marked with a GPS point. Based on McCallum's (1991:17) typology, the majority of CMTs at Cascade Point (JUN-000710) most closely resemble Type H (Figure 1). According to Griffin et al. (1992:23) Type H trees were mostly the result of bark stripping for cambium. Despite variation in scar shape, the trees at JUN-00710 show evidence of bark stripping. Unfortunately, no definitive tool marks were noted on any of the modified hemlocks. The scar faces on most of the hemlocks have begun to rot, which has obscured any tool marks that may have been present.

The modification on several of the CMTs at JUN-00710 was described as a "slit" (Figure 2; Table 1). These trees were interpreted as Type H, or oval modification. In these instances, the tree was able to heal over the previously bark-stripped area. According to Mobley (1994:2), "the resulting scars, even when fairly large, don't usually damage the tree enough to kill it. So the tree continues to grow, with successive layers of new growth accumulating each year, gradually growing over the edges of the original scar." Because of the way trees grow, "new healing growth appears as two lobes of curved tree rings which curl over the old scar surface year after year" (Mobley 1994:2).

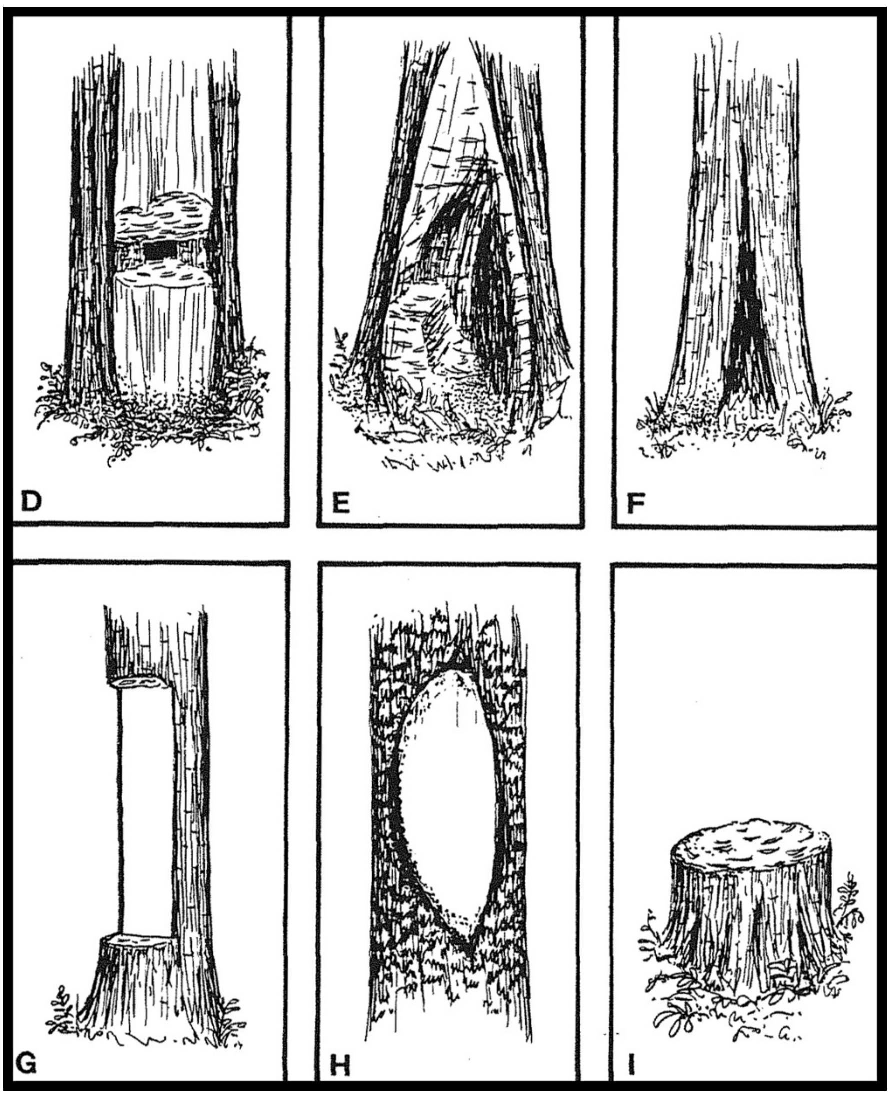


Figure 1. Types of CMTs from McCallum (1991).

Therefore, it is possible to count the number of rings laid down since the tree was modified, allowing for the date of modification to be determined. According to Mobley (1994:2), to date the modification, the tree must either be cut down or a pie-shaped wedge from the healing lobe must be removed with a chainsaw (Figure 3).

Based on the type of modification observed at JUN-00710, it is likely that Yarborough's (1997) suggestion that the site was likely a bark harvesting and processing site, holds true. The remaining CMTs in the site would be good candidates for future dating. In addition, charcoal from the shell midden portion of the site could be radiocarbon dated to see how well the two portions of the site align in terms of age. This work may have already been completed by Jon Loring, but without data from his study in 2005, the age of the site remains unknown.

Figure 2. Types of CMT scars found at JUN-00710. To the far left is an oval-shaped scar (Type H). In the center is a long slit, which is likely an oval scar that has almost fully healed. To the right is a tree with two small oval scars.

Table 1. JUN-00710 CMT data.

CMT #	Latitude	Longitude	Tree Species	Scar Shape	Scar Dimension (cm)	Height of Scar Base (cm)	DBH (cm)
1	58.69884	134.94030	Hemlock	Thin Oval	10x60	130	85
2	58.69877	134.94035	Hemlock	Oval	25x80	76	78
3	58.69875	134.94035	Hemlock	Oval			
4	58.69890	134.94101	Hemlock	Oval	10x30	40	54
5	58.70029	134.94014	Hemlock	Oval	15x70	60	68
6	58.70037	134.94013	Hemlock	Oval	20x60	75	60
7	58.70086	134.93979	Hemlock	Oval			
8	58.70000	134.93957	Hemlock	Rectangular	45x250	90	100
9	58.69992	134.93965	Hemlock	Oval			
10	58.69991	134.93911	Hemlock	Oval	25x95	70	55

CMT #	Latitude	Longitude	Tree Species	Scar Shape	Scar Dimension (cm)	Height of Scar Base (cm)	DBH (cm)
11	58.69988	134.93887	Hemlock	Triangular	20x45	50	75
12	58.69985	134.93906	Hemlock	Oval	18x36	136	58
13	58.69980	134.93915	Hemlock	Long oval	18x156	116	60
14	58.69967	134.93936	Hemlock	Oval	35x128	120	75
15	58.69965	134.93928	Hemlock	Oval	22x135	80	55
16	58.69966	134.93919	Hemlock	Oval	20x82	90	56
17	58.69968	134.93911	Hemlock	Alcove	30x48	150	85
18	58.69974	134.93881	Hemlock	Oval	23x47	90	70
19	58.69962	134.93910	Hemlock	Oval	26x130	40	85
20	58.69952	134.93913	Hemlock	Oval	25x144	95	88
21	58.69953	134.93908	Hemlock	Oval	20x64	60	80
22	58.69945	134.93912	Hemlock	Oval	25x90	120	110
23	58.69948	134.93902	Hemlock	Slit	25	40	65
24	58.69943	134.93896	Hemlock	Irregular	35x129	60	60
25	58.69944	134.93855	Hemlock	Irregular			
26	58.69933	134.93833	Hemlock	Oval			
27	58.69935	134.93807	Hemlock	Oval			
28	58.69884	134.93799	Hemlock	Long rectangular	20x160	80	115
29	58.69877	134.93693	Hemlock				
30	58.69847	134.93569	Hemlock	Oval	30x80	125	57
31	58.69894	134.94060	Hemlock	Oval	25x100	70	57
32	58.69878	134.94076	Hemlock	Long rectangular	26x120	86	70
33	58.69991	134.93713	Hemlock	Oval	12x49		61
34	58.69899	134.93632	Hemlock	Oval	25x145		76
35	58.69902	134.93642	Hemlock	Oval	20x73		92
36	58.69905	134.93667	Hemlock	Oval	16x110	90	84
37	58.69900	134.93673	Hemlock	Oval	30x127	75	86
38	58.69875	134.94035	Hemlock	Teardrop/Oval	18x26	76	78
39	58.69907	134.94121	Hemlock	Oval/slit	70 (mostly healed/closed)	150	60
40	58.69903	134.94121	Hemlock	Oval	19x68	130	68
41	58.70044	134.94039	Hemlock	Slit			
42	58.70054	134.94014	Hemlock	Oval			
43	58.69892	134.93802	Hemlock	Slit	10x63	130	85
44	58.69908	134.93790	Hemlock	Oval	20x65	80	67
45	58.69961	134.93789	Hemlock	Two small ovals			

CMT #	Latitude	Longitude	Tree Species	Scar Shape	Scar Dimension (cm)	Height of Scar Base (cm)	DBH (cm)
46	58.69987	134.94195	Hemlock	Oval	22x75	160	96
47	58.69953	134.93654	Hemlock	Oval	14x70	145	89
48	58.69938	134.93660	Hemlock	Oval	10x35	120	60
49	58.69899	134.93606	Hemlock	Oval	20x75	90	60
50	58.69931	134.93607	Hemlock	Oval	22x50	130	78
51	58.69934	134.93622	Hemlock	Oval	16x70	135	56
52	58.69874	134.93707	Hemlock	Slit	70	120	60
53	58.69878	134.93728	Hemlock	Oval	33x94	100	70
54	58.69877	134.93774	Hemlock	Oval	33x118	90	100
55	58.69890	134.93761	Hemlock	Slit	55	30	82
56	58.69898	134.93738	Hemlock	Slit			
57	58.70088	134.93905	Hemlock	Oval	25x150	80	75
58	58.70091	134.93901	Hemlock	Oval	20x70	85	65
59	58.70088	134.94093	Hemlock	Oval	10x56	100	70
60	58.70094	134.94105	Hemlock	Oval	10x87	50	71
61	58.70100	134.94139	Hemlock	Oval	30x80	80	75
62	58.70101	134.93827	Hemlock	2 slits	Slit 1: 35, Slit 2: 45	Slit 1:100, Slit 2: 80	85
63	58.70088	134.93892	Hemlock	Oval	25x130	60	70
64	58.69861	134.93744	Hemlock	Slit			
65	58.69856	134.93712	Hemlock	Oval	48x190	30	117
66	58.69850	134.93676	Hemlock	Oval			
67	58.69850	134.93674	Hemlock	Oval			
68	58.69834	134.93652	Hemlock	Oval			
69	58.69778	134.93445	Hemlock	Oval			
Spruce CMT	58.69850	134.93805	Spruce	Triangular	16x24	125	120
Spruce CMT	58.69902	134.93696	Spruce	Triangular	25x30	90	110

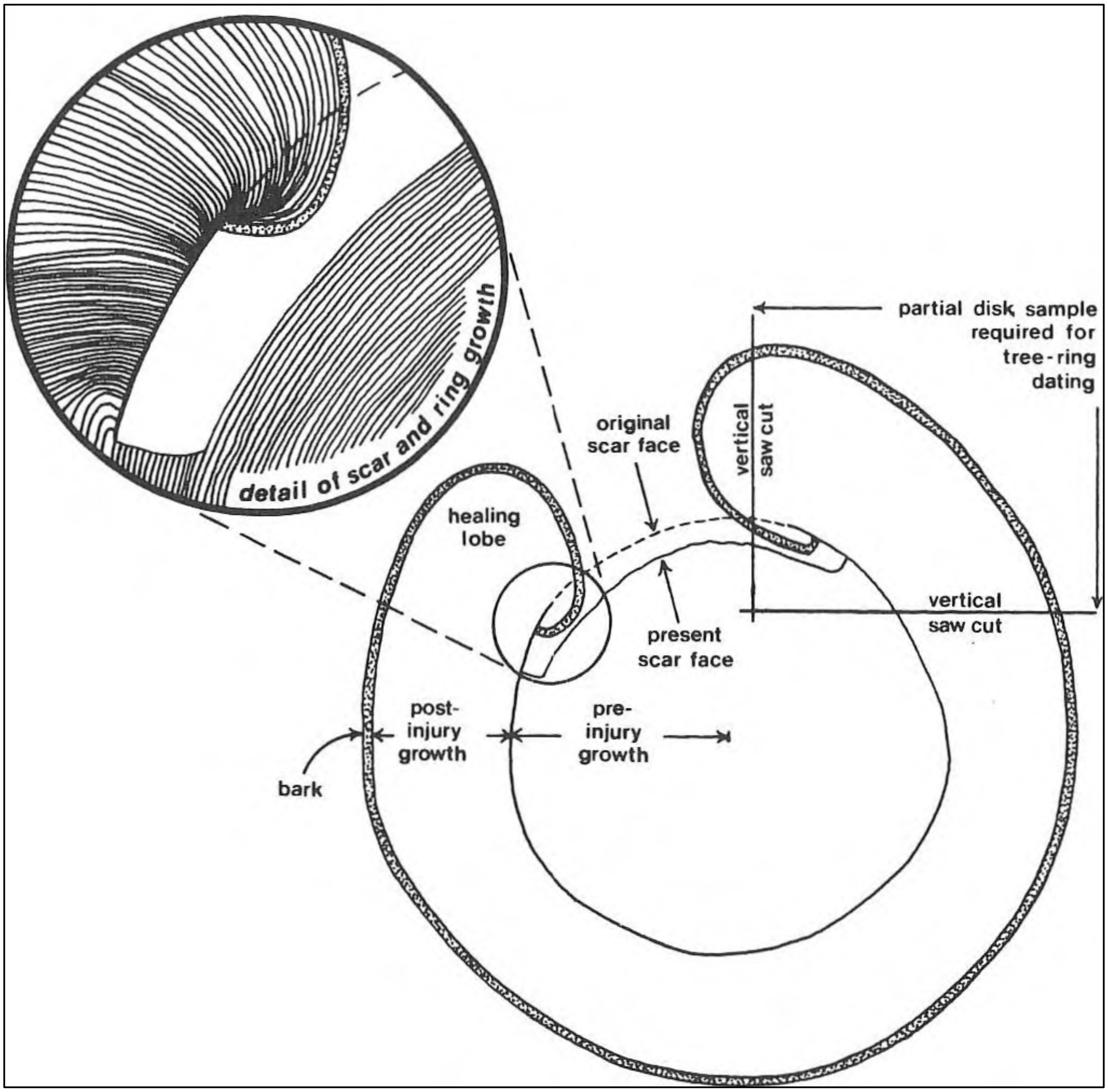


Figure 3. Mobley's (1992:100) Figure 2, showing the growth of the healing lobes over the scar face.

Appendix 8-1

STATE OF ALASKA DEPARTMENT OF TRANSPORTATION AND PUBLIC FACILITIES **RIGHT OF ENTRY** (Standard)	**PROJECT NAME:** JNU – CASCADE POINT FERRY TERMINAL **PROJECT #:** HSHWY00015 **FEDERAL-AID PROJECT #:** **PARCEL ID:**

Permission is hereby granted to the State of Alaska, Department of Transportation and Public Facilities, its contractors or agents, to enter upon the land owned by **GOLDBELT, INCORPORATED**, described as follows:

All that part of That portion of Government Lots 4 and 5, Section 32, Township 36 South, Range 63 East, C.R.M, and Government Lot 1, Section 1, Township 37 South, Range 63 East, C.R.M Juneau Recording District, First Judicial District, State of Alaska,

Which lies adjacent to Alaska Project HSHWY00015 right-of-way, for the purpose of Design Support Investigation by standard approved methods; and to do those reasonable acts necessary to accomplish the aforementioned task to establish a design contract and design, including but not limited to ingress and egress onto the property, pedestrian walk-over to scan the ground surface and surrounding terrain. The site will remain in its natural state, accomplishing all necessary incidentals thereto.

It is understood that this permission is not a waiver in any way of the right to compensation for such land or of any remedy authorized by law to secure payment, therefore. If it is determined that additional land interests are necessary, the State will negotiate with the undersigned to agree upon terms of compensation, and if an agreement cannot be reached, eminent domain proceedings will commence to establish just compensation.

This permission is granted to further transportation planning, engineering, design, construction and incidentals thereto, in consideration of a minimum payment of $1,000.00 and shall terminate upon completion of the work. No further promise of purchase of real property rights is made or implied. Nor does this agreement limit the State in potential negotiations for additional real property rights for the aforementioned project. Should the Owner require and request, every reasonable attempt shall be made to give no less than 24-hour notice to enter the said property, given adequate contact information as provided to the State. The State of Alaska shall leave said premises in as clean as feasibly possible and practical. The term of Right of Entry shall expire said work is complete.

IN WITNESS WHEREOF, this Right of Entry has been executed on this 21st day of May, 2025.

GOLDBELT, INCORPORATED

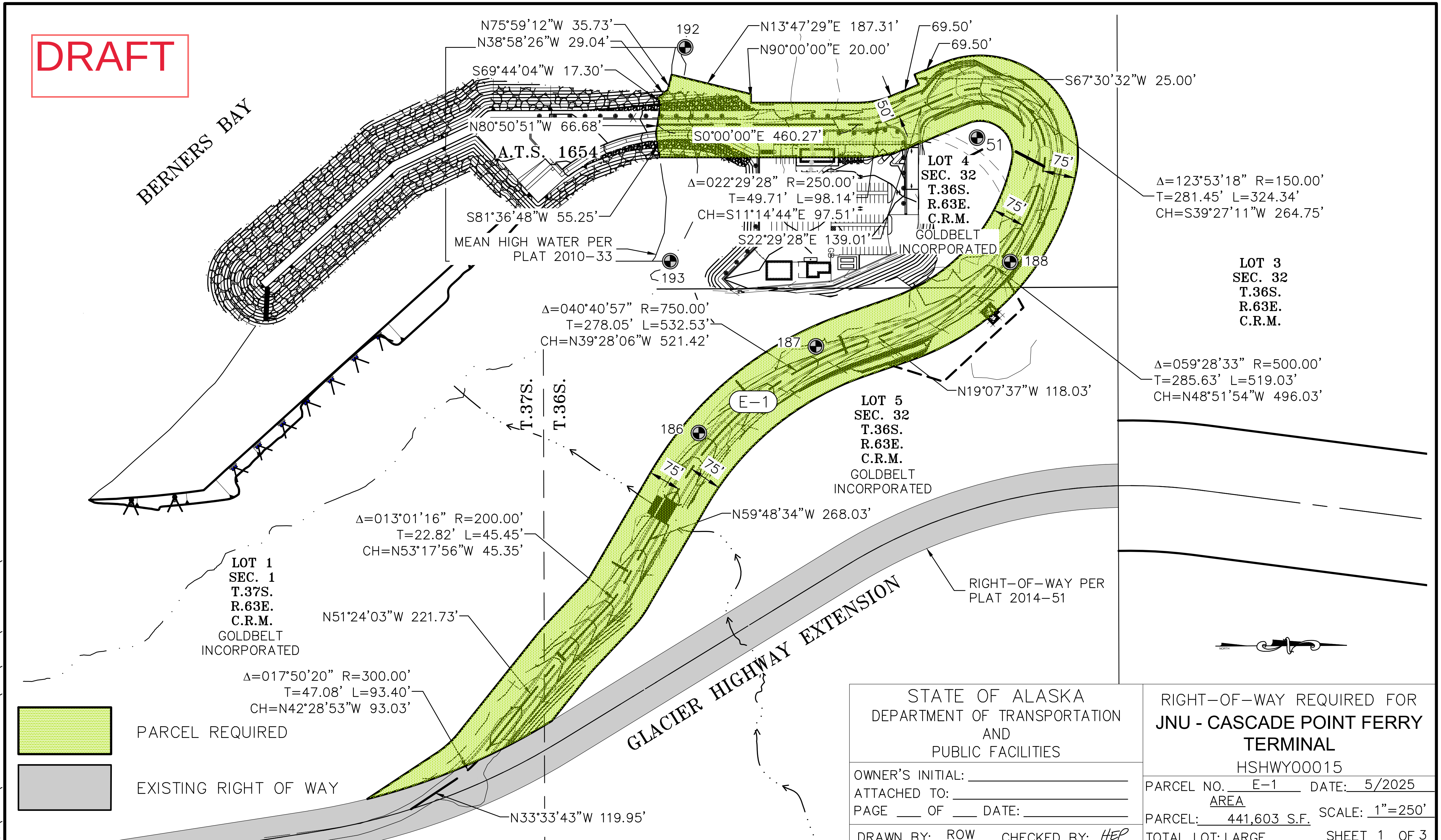
By: [signature]

Title: Project Manager

Print Name: Michael Williamson

Contact Number: 907-790-1455

Mailing Address: 3025 Clinton Drive, Ste. 100 Juneau, AK 99801



STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

OWNER'S INITIAL: ____
ATTACHED TO: ____
PAGE ___ OF ___ DATE: ____
DRAWN BY: ROW CHECKED BY: HEP

RIGHT-OF-WAY REQUIRED FOR
JNU - CASCADE POINT FERRY TERMINAL
HSHWY00015

PARCEL NO. E-1 DATE: 5/2025
AREA
PARCEL: 441,603 S.F. SCALE: 1"=250'
TOTAL LOT: LARGE SHEET 1 OF 3

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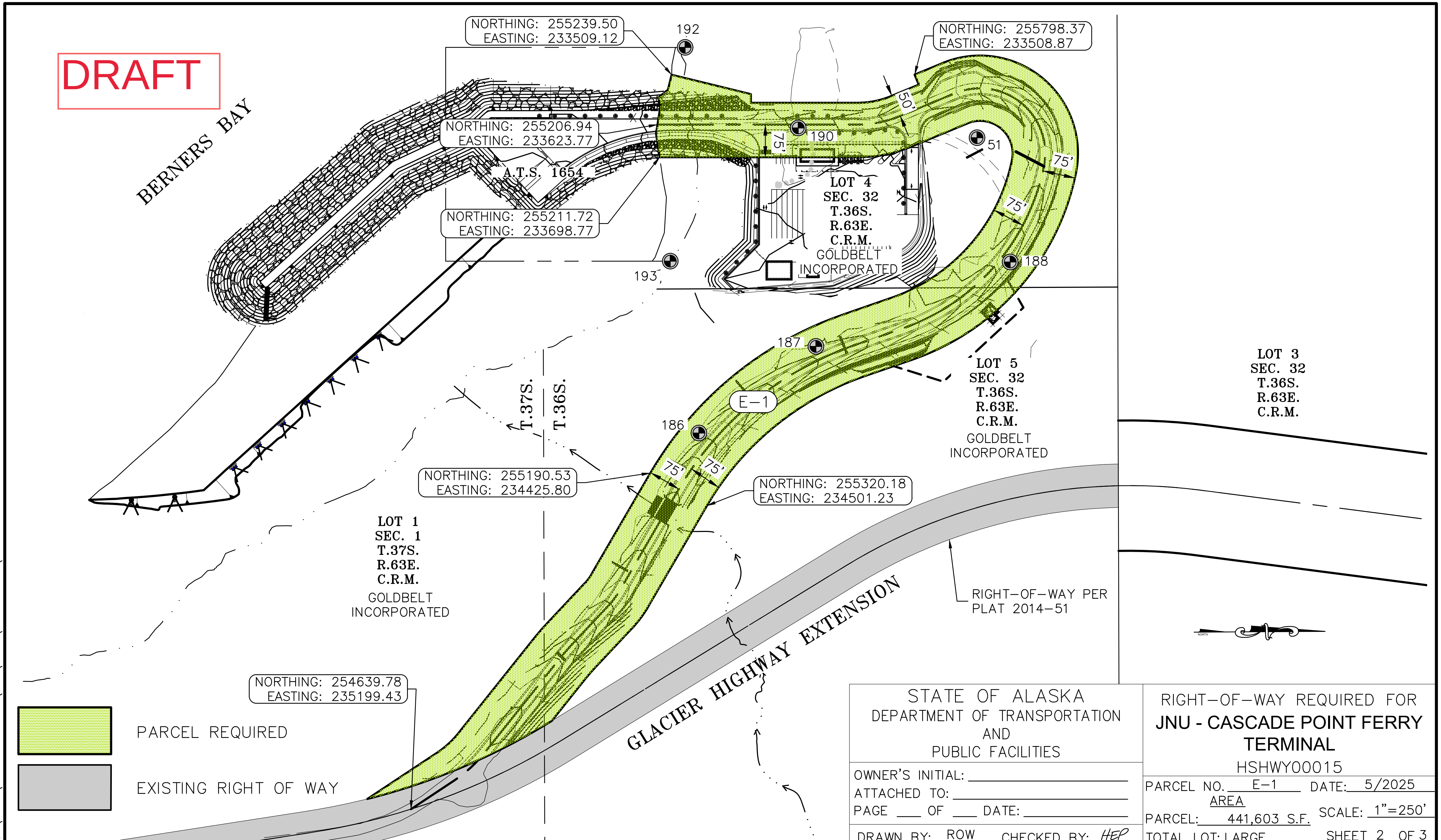

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

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DRAWN BY: ROW CHECKED BY: HEP

RIGHT-OF-WAY REQUIRED FOR
JNU - CASCADE POINT FERRY TERMINAL
HSHWY00015

PARCEL NO. E-1 DATE: 5/2025
AREA
PARCEL: 441,603 S.F. SCALE: 1"=250'
TOTAL LOT: LARGE SHEET 2 OF 3

Q:\JNU\HSHWY00015\RW\C3D\BASEMAP\HSHWY00015 ROW BASEMAP.DWG

Point Table			
Point #	Northing	Easting	Description
10	257736.21	232376.44	FND 2"ALCAP
20	255800.21	233055.98	FND MON
31	255307.79	233344.90	FND MON 3"BC
41	254786.95	234209.66	FND MON
42	254814.70	234184.25	FND
50	255245.92	233655.02	FND
51	255941.71	233653.93	FND 2"ALCAP
186	255301.85	234333.61	DOT MON 2.5"BB
187	255570.98	234134.43	DOT MON 2.5"BB
188	256017.87	233940.09	DOT MON 2.5"BB
190	255530.75	233631.66	DOT MON 2.5"BB
192	255270.25	233446.04	FND MON BC
193	255236.09	233938.20	ATS MON

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STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

OWNER'S INITIAL: ____________
ATTACHED TO: ____________
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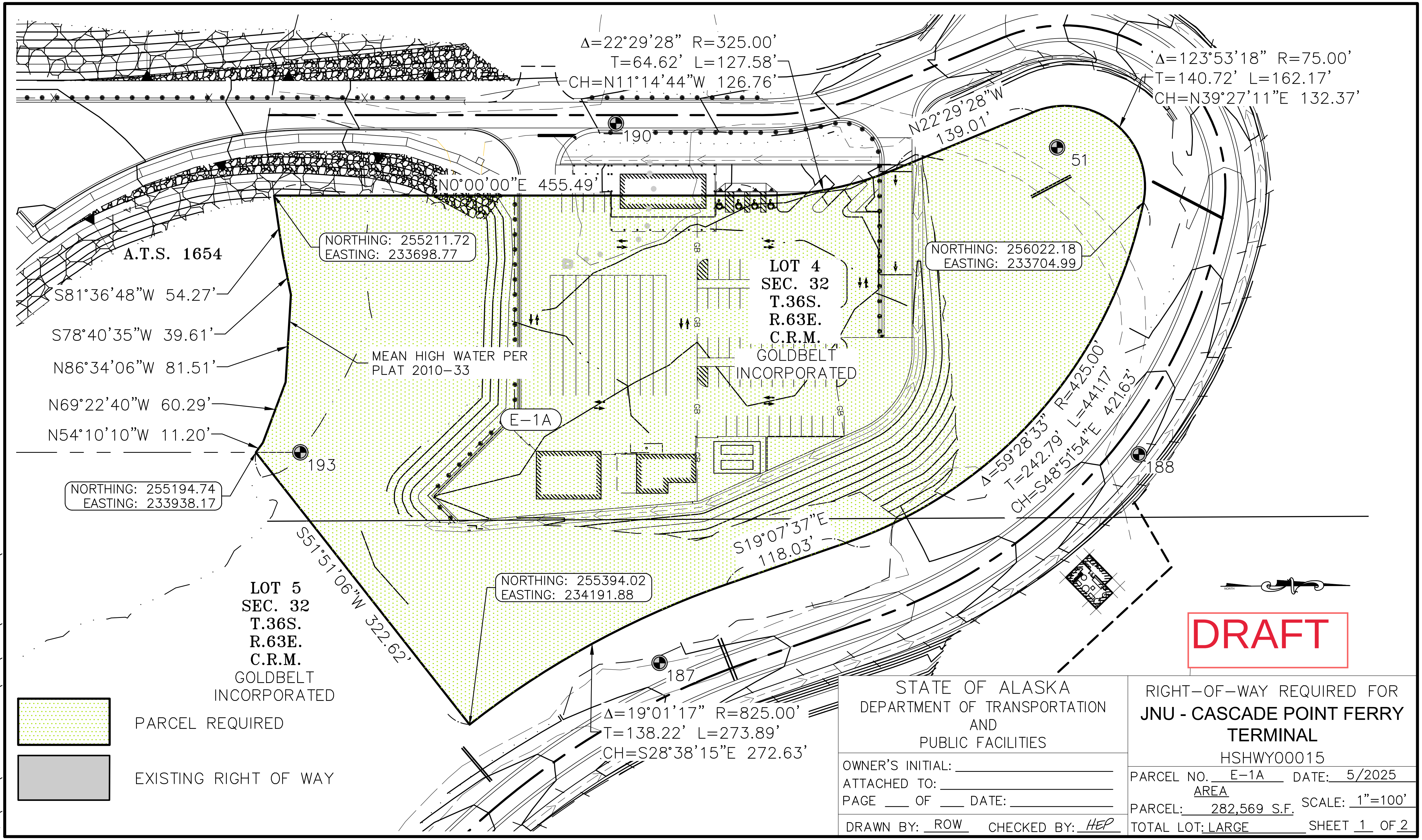
RIGHT-OF-WAY REQUIRED FOR
JNU - CASCADE POINT FERRY TERMINAL
HSHWY00015

PARCEL NO. E-1 DATE: 5/2025
AREA
PARCEL: 441,603 S.F. SCALE: 1"=250'
TOTAL LOT: LARGE SHEET 3 OF 3

Q:\JNU\HSHWY00015\RW\C3D\BASEMAP\HSHWY00015 ROW BASEMAP.DWG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T=64.62' L=127.58'
CH=N11°14'44"W 126.76'
Δ=123°53'18" R=75.00'
T=140.72' L=162.17'
CH=N39°27'11"E 132.37'
N22°29'28"W
139.01'
190
51
N0°00'00"E 455.49'
A.T.S. 1654
NORTHING: 255211.72
EASTING: 233698.77
NORTHING: 256022.18
EASTING: 233704.99
S81°36'48"W 54.27'
S78°40'35"W 39.61'
N86°34'06"W 81.51'
N69°22'40"W 60.29'
N54°10'10"W 11.20'
MEAN HIGH WATER PER
PLAT 2010-33
LOT 4
SEC. 32
T.36S.
R.63E.
C.R.M.
GOLDBELT
INCORPORATED
E-1A
193
NORTHING: 255194.74
EASTING: 233938.17
Δ=59°28'33" R=425.00'
T=242.79' L=441.17'
CH=S48°51'54"E 421.63'
188
S19°07'37"E
118.03'
S51°51'06"W 322.62'
NORTHING: 255394.02
EASTING: 234191.88
LOT 5
SEC. 32
T.36S.
R.63E.
C.R.M.
GOLDBELT
INCORPORATED
187
Δ=19°01'17" R=825.00'
T=138.22' L=273.89'
CH=S28°38'15"E 272.63'
PARCEL REQUIRED
EXISTING RIGHT OF WAY
DRAFT
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STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES
OWNER'S INITIAL:
ATTACHED TO:
PAGE ___ OF ___ DATE:
DRAWN BY: ROW CHECKED BY: HEP
RIGHT-OF-WAY REQUIRED FOR
JNU - CASCADE POINT FERRY
TERMINAL
HSHWY00015
PARCEL NO. E-1A DATE: 5/2025
AREA
PARCEL: 282,569 S.F. SCALE: 1"=100'
TOTAL LOT: LARGE SHEET 1 OF 2

Q:\JNU\HSHWY00015\RW\C3D\BASEMAP\HSHWY00015 ROW BASEMAP.DWG

Point Table

Point #	Northing	Easting	Description
10	257736.21	232376.44	FND 2"ALCAP
20	255800.21	233055.98	FND MON
31	255307.79	233344.90	FND MON 3"BC
41	254786.95	234209.66	FND MON
42	254814.70	234184.25	FND
50	255245.92	233655.02	FND
51	255941.71	233653.93	FND 2"ALCAP
186	255301.85	234333.61	DOT MON 2.5"BB
187	255570.98	234134.43	DOT MON 2.5"BB
188	256017.87	233940.09	DOT MON 2.5"BB
190	255530.75	233631.66	DOT MON 2.5"BB
192	255270.25	233446.04	FND MON BC
193	255236.09	233938.20	ATS MON

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STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
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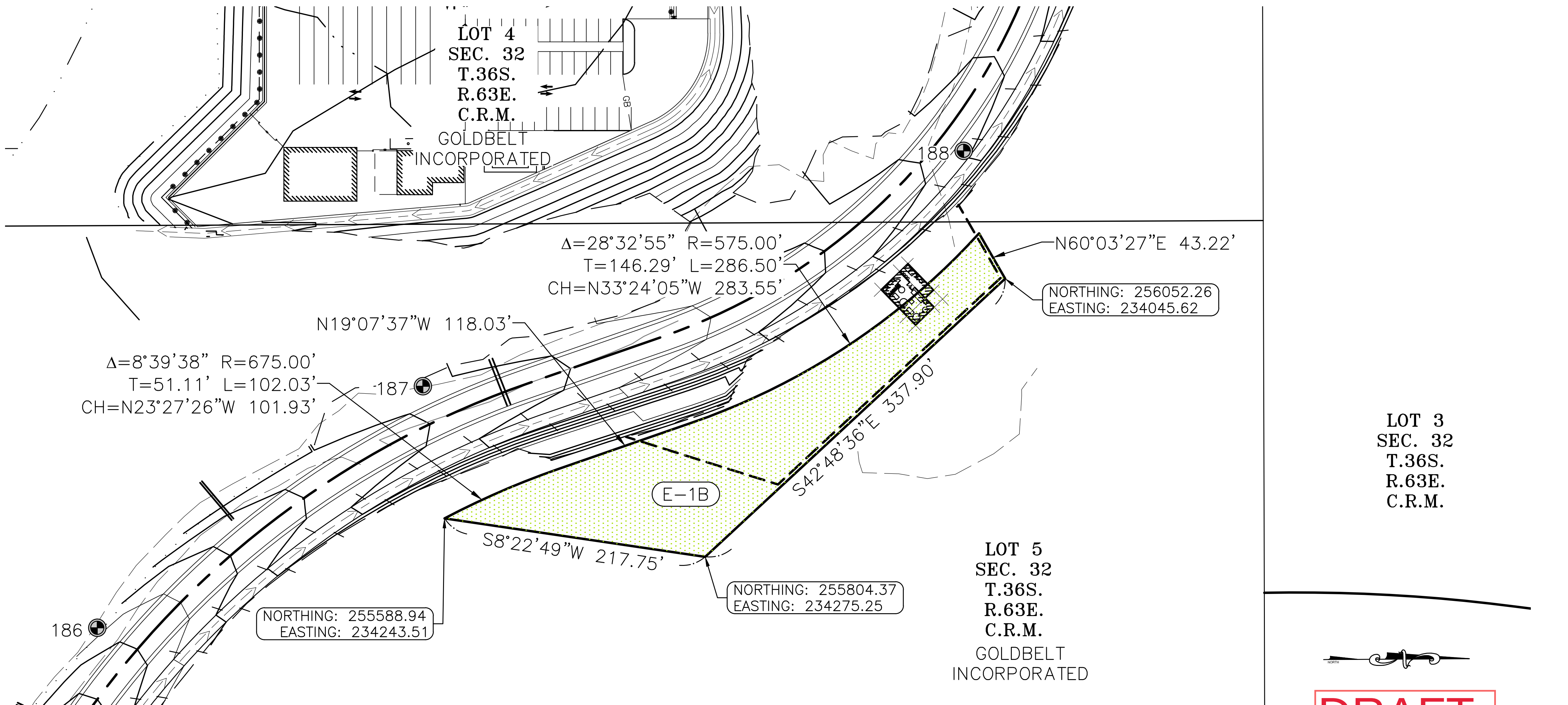
RIGHT-OF-WAY REQUIRED FOR
JNU - CASCADE POINT FERRY TERMINAL
HSHWY00015

PARCEL NO. E-1A DATE: 5/2025
AREA
PARCEL: 282,569 S.F. SCALE: 1"=100'
TOTAL LOT: LARGE SHEET 2 OF 2



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PARCEL REQUIRED

EXISTING RIGHT OF WAY

STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
AND
PUBLIC FACILITIES

OWNER'S INITIAL: ____
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RIGHT-OF-WAY REQUIRED FOR
JNU - CASCADE POINT FERRY TERMINAL
HSHWY00015

PARCEL NO. E-1B DATE: 5/2025
AREA
PARCEL: 30,075 S.F. SCALE: 1"=100'
TOTAL LOT: LARGE SHEET 1 OF 2

Point Table

Point #	Northing	Easting	Description
10	257736.21	232376.44	FND 2"ALCAP
20	255800.21	233055.98	FND MON
31	255307.79	233344.90	FND MON 3"BC
41	254786.95	234209.66	FND MON
42	254814.70	234184.25	FND
50	255245.92	233655.02	FND
51	255941.71	233653.93	FND 2"ALCAP
186	255301.85	234333.61	DOT MON 2.5"BB
187	255570.98	234134.43	DOT MON 2.5"BB
188	256017.87	233940.09	DOT MON 2.5"BB
190	255530.75	233631.66	DOT MON 2.5"BB
192	255270.25	233446.04	FND MON BC
193	255236.09	233938.20	ATS MON

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STATE OF ALASKA
DEPARTMENT OF TRANSPORTATION
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PUBLIC FACILITIES

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RIGHT-OF-WAY REQUIRED FOR
JNU - CASCADE POINT FERRY TERMINAL
HSHWY00015

PARCEL NO. E-1B DATE: 5/2025
AREA
PARCEL: 30,075 S.F. SCALE: 1"=100'
TOTAL LOT: LARGE SHEET 2 OF 2

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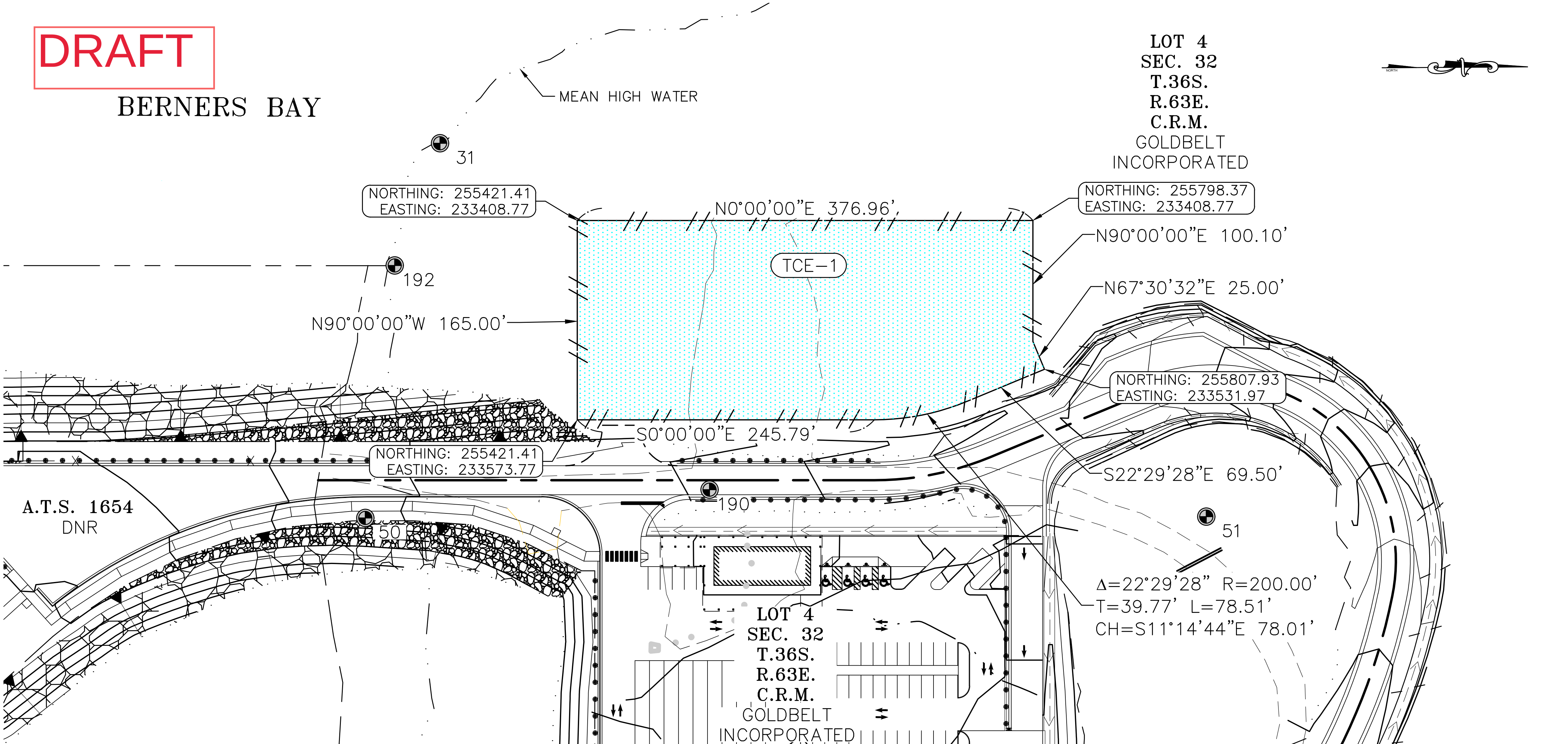

TEMPORARY PARCEL REQUIRED

EXISTING RIGHT OF WAY

STATE OF ALASKA
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PUBLIC FACILITIES

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RIGHT-OF-WAY REQUIRED FOR
JNU - CASCADE POINT FERRY TERMINAL
HSHWY00015

PARCEL NO. TCE-1 DATE: 5/2025
AREA
PARCEL: 60,495 S.F. SCALE: 1"=100'
TOTAL LOT: LARGE SHEET 1 OF 1