PORT OF DILLINGHAM ADVISORY COMMITTEE MEETING

Friday, February 21, 2025 at 6:00 PM

AGENDA

In compliance with the Americans with Disabilities Act, individuals needing special accommodations / during this meeting should notify the City of Dillingham at 907-842-5212 at least three working days before the meeting.

CALL TO ORDER

ROLL CALL

1. Address Member Changes/Updates
2. Alice Ruby
   Kevin McCambly
   Steven Carrier
   Dan Dunaway
   Robert Heyano
   Robin Samuelsen
   Reed Tennyson
   Cole Schlagel

APPROVAL OF AGENDA

APPROVAL OF MINUTES

UNFINISHED BUSINESS

NEW BUSINESS

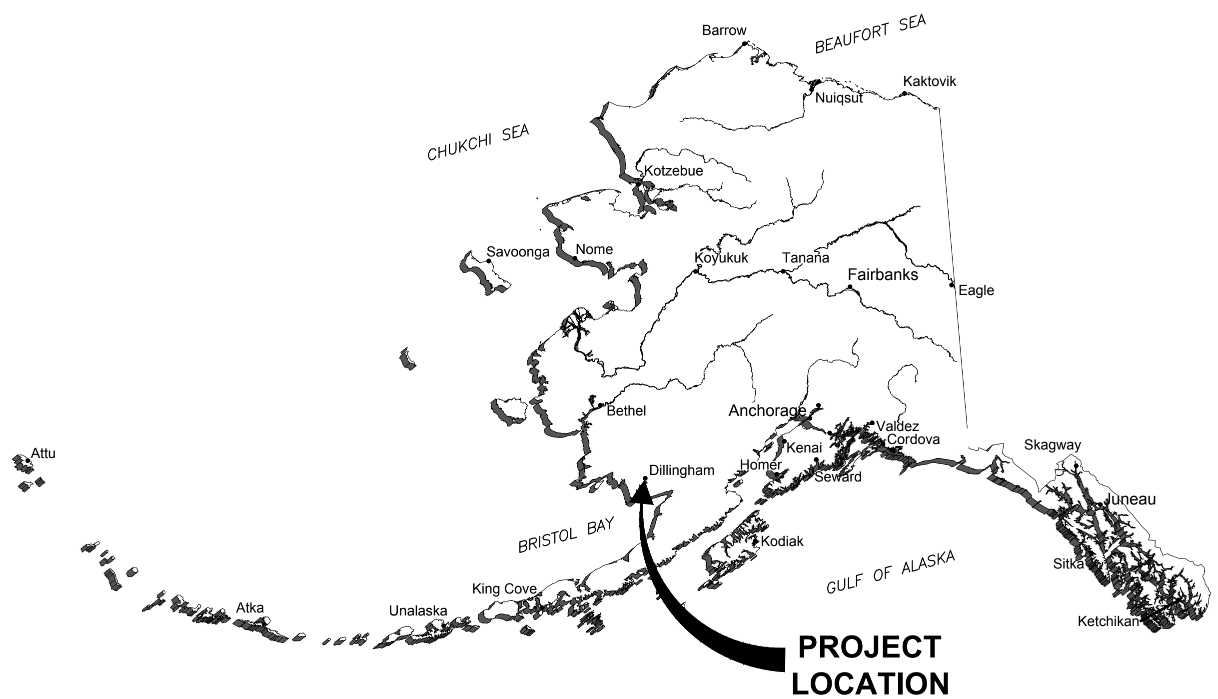
3.
   A. PIDP Grant Updates
   B. Tariff Updates
   C. Erosion
   D. Clean Harbors

PUBLIC COMMENT/COMMITTEE COMMENTS

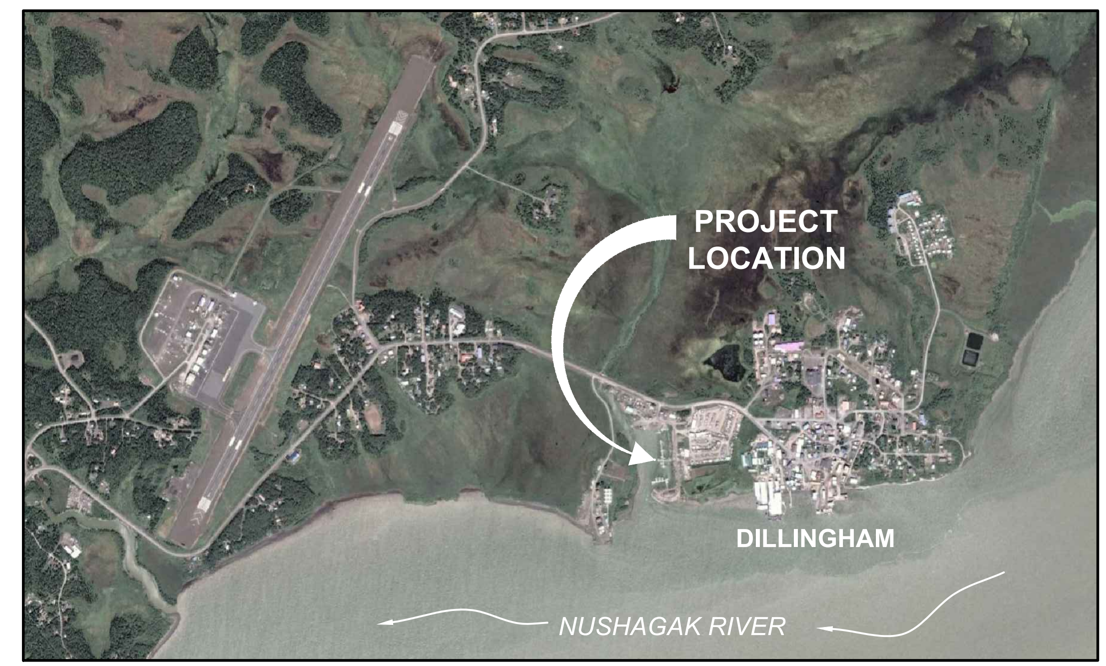
ADJOURNMENT

DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

MARCH 2019
DILLINGHAM, ALASKA



STATE OF ALASKA



DILLINGHAM VICINITY

J:\2017\171113 Dillingham Small Boat Harbor\Drawings\1.01_1.02 Cover Sheet and Index.dwg, 1.01, 4/9/2019 3:49:28 PM, james, 1:2

100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

PND Engineers, Inc. is not responsible for safety programs, methods or procedures of operation, or the construction of the design shown on these drawings. Where specifications are general or not called out, the specifications shall conform to standards of industry. Drawings are for use on this project only and are not intended for reuse without written approval from PND. Drawings are also not to be used in any manner that would constitute a detriment directly or indirectly to PND.

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER

DATE: 4/9/2019

1506 West 36th Avenue
Anchorage, Alaska 99503
Phone: 907.561.1011
Fax: 907.563.4220
www.pndengineers.com

PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: COVER SHEET AND VICINITY MAP

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 1.01	SHEET NO: 1 OF 27
CHECKED BY: CDC	PROJECT NO: 171113		

ABBREVIATIONS

A.B. – ANCHOR BOLT
AC – ASPHALT CONCRETE
AKDOT – ALASKA DEPARTMENT OF TRANSPORTATION
ALT – ALTERNATE
B.O. – BOTTOM OF
BTM – BOTTOM
BTR – BETTER
BP – BEGIN PROJECT
C – CHANNEL
CB – CORNER BAR
CIP – CAST IN PLACE
CL – CENTERLINE
℄ – CENTERLINE
CLR – CLEAR
CONC – CONCRETE
CONN – CONNECTION
CONT – CONTINUOUS
CY – CUBIC YARD
DIP – DUCTILE IRON PIPE
E – EASTING
EA – EACH
E.F. – EACH FACE
EL – ELEVATION
ELEV – ELEVATION
E.W. – EACH WAY
EOP – END OF PROJECT
EP – END PLATE
EQL – EQUAL
EW – END WALL
EXIST – EXISTING
F&I – FURNISH AND INSTALL
HDG – HOT-DIP GALVANIZED
HDPE – HIGH DENSITY POLYETHYLENE
HORZ – HORIZONTAL
HP – H-PILE SECTIONS
HTL – HIGH TIDE LINE
I.D. – INSIDE DIAMETER
INV – INVERT
L – LENGTH OF CURVE
L – STEEL ANGLE
LF – LINEAR FEET
LSH – LONG SIDE HORIZONTAL
LSV – LONG SIDE VERTICAL
MAX – MAXIMUM
MH – MAN HOLE
MHW – MEAN HIGH WATER
MIN – MINIMUM
MLLW – MEAN LOWER LOW WATER
MT – MAGNETIC PARTICLE TESTING
N – NORTHING
NIC – NOT IN CONTRACT
NFS – NON-FROST SUSCEPTIBLE
NTS – NOT TO SCALE
OC – ON CENTER
O.D. – OUTSIDE DIAMETER
PL – PLATE
ROW – RIGHT OF WAY
R/W – RIGHT OF WAY
S.S. – STAINLESS STEEL
SDR – STANDARD DIMENSION RATIO
SF – SQUARE FEET
SHT – SHEET
SIM – SIMILAR
SSMH – SANITARY SEWER MANHOLE
STA – STATION
t – THICKNESS
T&B – TOP AND BOTTOM
T.O. – TOP OF
TYP – TYPICAL
UNO – UNLESS NOTED OTHERWISE
USACE – UNITED STATES ARMY CORPS OF ENGINEERS
V – VALVE
VERT – VERTICAL
w/ – WITH
W – WIDE FLANGE BEAM
WWF – WELDED WIRE FABRIC

LEGEND

NEW WATERLINE —W—W—
EXISTING WATERLINE – – W – – W –
NEW FIRE LINE —F—F—
EXISTING UNDERGROUND ELECTRIC – – – UGE –
EXISTING FENCE
NEW FIRE HYDRANT
EXISTING FIRE HYDRANT

GENERAL NOTES

GENERAL

1. PROPERTY DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO ITS PRECONSTRUCTION CONDITION OR BETTER AT NO ADDITIONAL COST TO THE OWNER.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADHERING TO ALL APPLICABLE LOCAL, STATE AND FEDERAL CODES, PERMITS AND SAFETY REQUIREMENTS.
3. THE LOCATIONS OF EXISTING FEATURES AND UTILITIES SHOWN ON THE DRAWINGS ARE APPROXIMATE. ADDITIONAL UTILITIES NOT SHOWN IN THESE DRAWINGS MAY BE PRESENT. THE CONTRACTOR SHALL VERIFY ALL UTILITY LOCATIONS IN THE FIELD AS NECESSARY, PRIOR TO BEGINNING WORK. THE HORIZONTAL AND VERTICAL LOCATIONS OF ALL UTILITIES ENCOUNTERED IN THE FIELD SHALL BE RECORDED ON THE CONTRACTOR'S RECORD DRAWINGS. CONTACT LOCAL UTILITY COMPANIES PRIOR TO ANY/ALL EXCAVATIONS.
4. GRADING AND FINAL ALIGNMENT OF UTILITIES AND PIPING ARE SUBJECT TO MINOR REVISIONS BY THE ENGINEER TO FIT SITE CONDITIONS, AT NO ADDITIONAL COST.

APPLICABLE CODES AND STANDARDS

ALL LOCAL CODES PLUS THE FOLLOWING SPECIFICATIONS, STANDARDS AND CODES ARE APPLICABLE:

1. AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS, CURRENT EDITION
2. AMERICAN INSTITUTE OF STEEL CONSTRUCTION (AISC), "STEEL CONSTRUCTION MANUAL, THIRTEENTH EDITION"
3. AMERICAN CONCRETE INSTITUTE (ACI), BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE – ACI 301-11
4. AISC CODE OF STANDARD PRACTICE.
5. AMERICAN SOCIETY OF CIVIL ENGINEERS (ASCE) STANDARD – MINIMUM DESIGN LOADS FOR BUILDINGS AND OTHER STRUCTURES (ASCE 7-10)
6. INTERNATIONAL BUILDING CODE (IBC), 2006 EDITION
7. AMERICAN WOOD COUNCIL, NATIONAL DESIGN SPECIFICATIONS (NDS) FOR WOOD CONSTRUCTION, 2012 EDITION
8. AMERICAN WELDING SOCIETY (AWS) STRUCTURAL WELDING CODES FOR STEEL & ALUMINUM AWS D1.1 & D1.2, CURRENT EDITION
9. ALUMINUM ASSOCIATION, ALUMINUM DESIGN MANUAL 2015 EDITION

DESIGN PARAMETERS

FLOAT SYSTEM IS DESIGNED FOR SEASONAL SUMMER USE ONLY. THE OWNER SHALL REMOVE THE FLOATS PRIOR ICING CONDITIONS WITHIN THE HARBOR.

DESIGN LIFE	30 YEARS
WIND LOAD	127 MPH 3-SEC GUST (50 YEAR MRI PER ASCE 7-10), ADJUSTED TO 2-MINUTE DURATION WITH VESSEL SHAPE FACTORS
VESSEL SIZE	BRISTOL BAY GILLNETTER 32'x13', 9' AVERAGE BROAD SIDE EXPOSED HEIGHT, 11' AVERAGE BOW/STERN EXPOSED HEIGHT
DEAD LOAD	ALL
LIVE LOAD	40 POUNDS PER SQUARE FOOT UNIFORM LOAD OR 1,000 POUND CONCENTRATED LOAD OVER 1 SQUARE FOOT AREA
FREEBOARD	30-INCHES UNDER DEADLOAD ONLY, APPROX 30 POUNDS PER SQUARE FOOT SURPLUS FLOATATION
IMPACT	DESIGN VESSEL AT VELOCITY OF 1.5 FEET/SECOND, VESSEL IMPACT ANGLE OF 30°
ICE	APPLICABLE TO PILES ONLY. 4-FT THICKNESS, 8 KSF CRUSHING STRENGTH
GANGWAY	SEE CONTRACT REQUIREMENTS
GEOTECH	SEE CONTRACT DOCUMENTS FOR AVAILABLE GEOTECHNICAL INFORMATION

TIDAL LEVELS – ELEVATION DATUM FOR THIS PROJECT IS 0.0 MEAN LOWER LOW WATER (MLLW)

NOAA TIDAL DATUM FOR 1983-2001 EPOCH AT SNAG POINT, DILLINGHAM ALASKA (STATION ID #9465374)

EXTREME HIGH WATER (EHW)	+25.0 FT (ESTIMATED)
MEAN HIGHER HIGH WATER (MHHW)	+20.6 FT
MEAN HIGH WATER (MHW)	+18.9 FT
MEAN TIDE LEVEL (MTL)	+10.6 FT
MEAN LOW WATER (MLW)	+2.30 FT
MEAN LOWER LOW WATER (MLLW)	+0.00 FT
EXTREME LOW WATER LEVEL (ELW)	-5.00 FT (ESTIMATED)

DRAWING INDEX

100% DESIGN
4/9/2019

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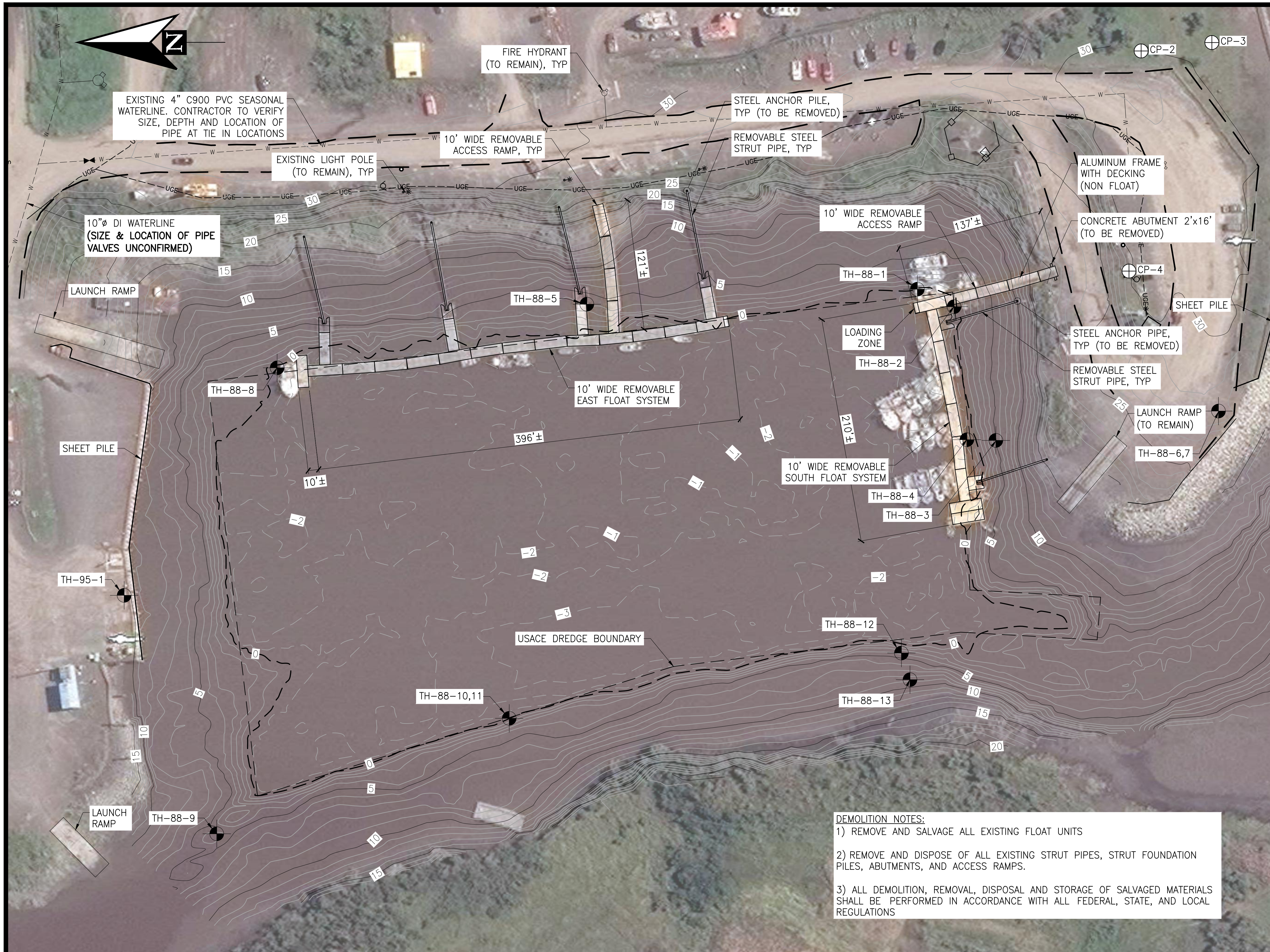
PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: DRAWING INDEX, ABBREVIATIONS, AND GENERAL NOTES

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 1.02	SHEET NO: 2 OF 27
CHECKED BY: CDC	PROJECT NO: 171113		



DEMOLITION NOTES:

1) REMOVE AND SALVAGE ALL EXISTING FLOAT UNITS

2) REMOVE AND DISPOSE OF ALL EXISTING STRUT PIPES, STRUT FOUNDATION PILES, ABUTMENTS, AND ACCESS RAMPS.

3) ALL DEMOLITION, REMOVAL, DISPOSAL AND STORAGE OF SALVAGED MATERIALS SHALL BE PERFORMED IN ACCORDANCE WITH ALL FEDERAL, STATE, AND LOCAL REGULATIONS

BATHYMETRIC SURVEY NOTES

1. PRIMARY PROJECT HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 6, NAD83 (2011), IN US SURVEY FEET BASED ON NGS PUBLISHED VALUES, HOLDING USC&GS STATION "DILLINGHAM 1947" (PID UV7691) AS N 1,849,383.08', E 1,551,809.45' AND USC&GS AZIMUTH MARK "DILLINGHAM AZ MK 1947" (PID UV7690) AS N 1,841,347.21', E 1,553,844.91'.

   LOCAL PROJECT HORIZONTAL CONTROL IS ALASKA STATE PLANE, ZONE 6, NAD83 (2011), IN US SURVEY FEET HOLDING USACE DOMED BC "1277-3 1984" AS N 1,840,427.98', E 1,550,887.60'.

2. VERTICAL CONTROL IS MEAN LOWER LOW WATER (MLLW=0.0'), BASED ON THE NOAA/NOS TIDAL BENCH MARK LIST: "946 5374, SNAG POINT, NUSHAGAK BAY, DILLINGHAM, ALASKA" PUBLISHED 04/29/2013. THIS TIDAL DATUM IS BASED ON THE 1983-2001 TIDAL EPOCH AND IS REFERENCED BY HOLDING NOAA/NOS TIDAL BENCH MARK "5374 D 2007" AS 60.45'.

3. VERTICAL TIES TO THE NATIONAL SPATIAL REFERENCE SYSTEM ARE BASED ON PUBLISHED NAVD88 (GEOID 12B) ELEVATIONS HOLDING NOAA BENCHMARK "946 5374 B 2007" (PID BBBF17) AS 18.46'.

4. BATHYMETRY OBTAINED FROM THE US ARMY CORPS OF ENGINEERS 2017 POST DREDGE SURVEY. BATHYMETRY WAS COLLECTED JUNE 1-2, 2017 BY HUGHES & ASSOCIATES, WASILLA, AK. SOUNDINGS WERE COLLECTED USING AN CEESCOPE ECHO SOUNDER OPERATING AT 200 KHZ. SOUND VELOCITY THROUGH THE WATER COLUMN WAS DETERMINED WITH AN DIGIBAR PRO SOUND VELOCITY PROBE. POSITION AND TIDES WERE PROVIDED IN REAL TIME USING A TRIMBLE R8 RTK GPS RECEIVER OPERATING ON KINEMATIC CORRECTIONS BROADCAST FROM A TRIMBLE R8 RTK BASE RECEIVER SET AT CONTROL STATION, "1277-3". DATA WAS COLLECTED AND PROCESSED USING HYPACK 2017 INTEGRATED SOFTWARE. HORIZONTAL CONTROL WAS SURVEYED USING RTK GNSS EQUIPMENT AND TECHNIQUES.

UPLANDS SURVEY NOTES

1. BASIS OF COORDINATES FOR THIS SURVEY ARE NAD 83, ALASKA STATE PLANE ZONE 6 IN U.S. SURVEY FEET, DERIVED BY GPS OBSERVATION CONSTRAINING COORDINATES PROVIDED ON THE US ARMY CORPS OF ENGINEERS, ALASKA DISTRICT, "DILLINGHAM HARBOR POST DREDGE SURVEY" DATED JUNE1-2, 2017. COORDINATES OF "1277-3 1984," (CP-3) HELD FOR THIS PROJECT ARE N=1840427.98, E=1550887.60.

2. THE VERTICAL DATUM FOR THIS SURVEY IS MEAN LOWER LOW WATER (MLLW=0.0'), BASIS OF VERTICAL CONTROL IS "1277-3 1984" (CP-3), PROVIDED ON THE US ARMY CORPS OF ENGINEERS, ALASKA DISTRICT, "DILLINGHAM HARBOR POST DREDGE SURVEY" DATED JUNE 1-2, ELEVATION OF "1277-3 1984" (CP-3) HELD FOR THIS SURVEY IS 30.21 U.S. FEET (MLLW).

3. THE FIELD SURVEY WAS PERFORMED DECEMBER 14, 2017 AND JANUARY 4, 2018 BY EDGE SURVEY AND DESIGN, LLC.

4. ALL DIMENSIONS AND COORDINATES ARE IN U.S. SURVEY FEET UNLESS OTHERWISE NOTED.

5. THIS SURVEY WAS COMPLETED USING GNSS SURVEY TECHNIQUES.

6. UTILITY LOCATES WERE SURVEYED WHERE MARKED BY LOCATE COMPANIES.

7. CONTOURS ARE IN FEET, WITH ONE FOOT INTERVALS.

8. NO TITLE SEARCH WAS PREPARED FOR THIS SURVEY. OTHER EASEMENTS AND ENCUMBRANCES MAY EXIST.

SURVEY CONTROL DATA

CONTROL POINT	STATION	NORTHING	EASTING	MLLW	DESCRIPTION
CP-1	1277-1 1984	1,841,622.39	1,550,745.71	32.11	3.25 INCH USACE SBC
CP-2	1277-2 1984	1,840,494.00	1,550,879.74	30.86	3.25 INCH USACE SBC
CP-3	1277-3 1984	1,840,427.98	1,550,887.60	30.21	3.25 INCH USACE SBC
	5374 A 2007			25.62	NOAA/NOS TIDAL BM
	5374 B 2007			24.87	NOAA/NOS TIDAL BM
CP-4	DILL 1998	1,840,505.33	1,550,674.26	29.80	3.25 INCH FLAT ALCAP
	DILLINGHAM 1947	1,849,383.08	1,551,809.45		3.5 INCH USCGS SBC
CP-5	DILLINGHAM AZ MK	1,841,347.21	1,553,844.91		2 INCH USCGS IRON PIPE
	PICKEL 1998	1,841,509.51	1,550,437.81	28.82	3.25 INCH FLAT ALCAP
CP-6	WDS-2 2001	1,841,419.33	1,549,910.66	22.77	3.25 INCH DOMED ALCAP

CP-# CONTROL POINT

TH-88-XX APPROXIMATE TEST HOLE LOCATION FROM 1988 PND GEOTECH REPORT

TH-95-1 APPROXIMATE TEST HOLE LOCATION FROM 1995 SHANNON & WILSON GEOTECH REPORT

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4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49 TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

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PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: EXISTING CONDITIONS & DEMOLITION PLAN

DESIGNED BY:	CR/BJ	DATE:	APRIL 2019	DWG NO: 1.03
CHECKED BY:	CDC	PROJECT NO:	171113	SHEET NO: 3 OF 27

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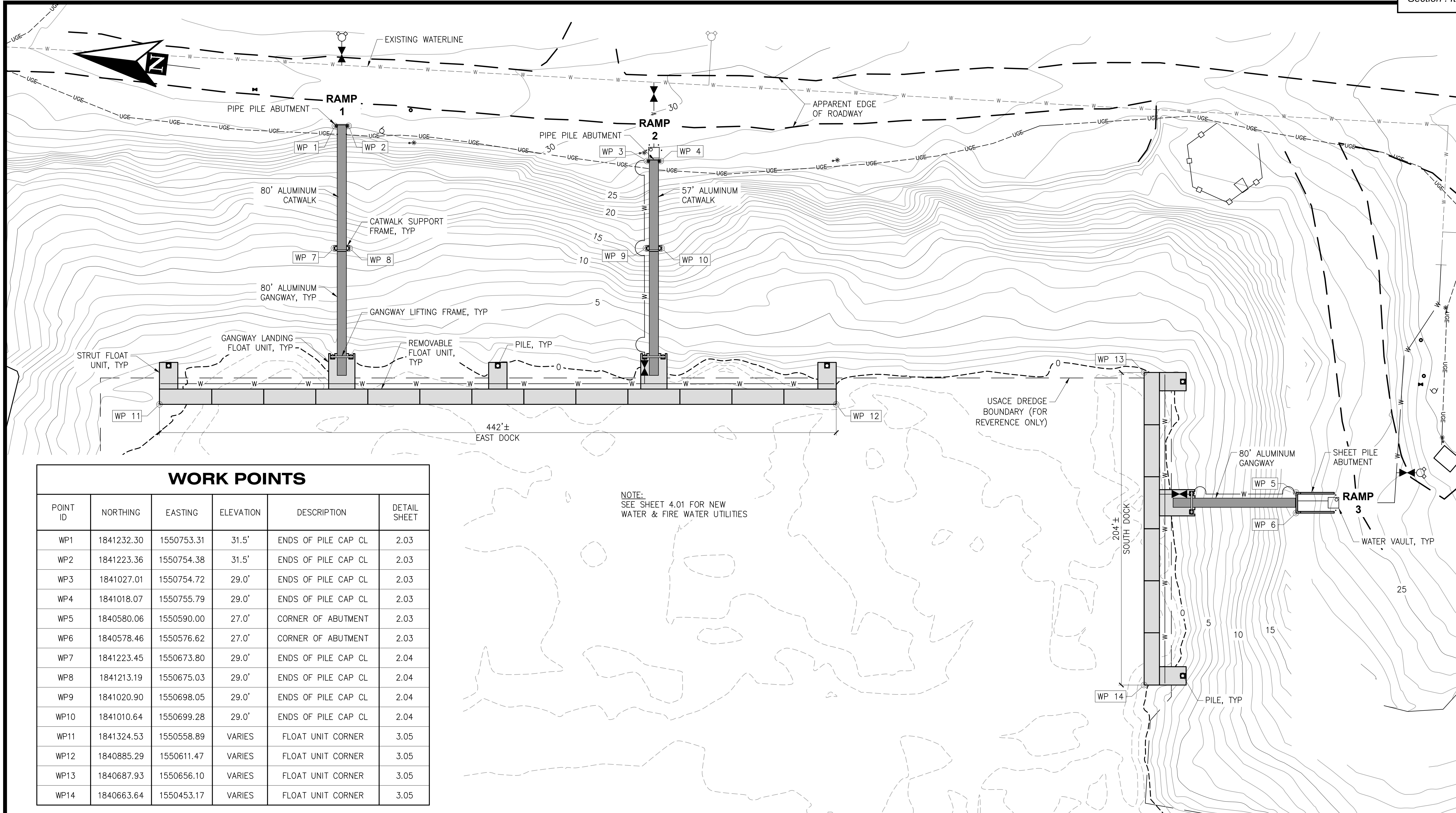

WORK POINTS

POINT ID	NORTHING	EASTING	ELEVATION	DESCRIPTION	DETAIL SHEET
WP1	1841232.30	1550753.31	31.5'	ENDS OF PILE CAP CL	2.03
WP2	1841223.36	1550754.38	31.5'	ENDS OF PILE CAP CL	2.03
WP3	1841027.01	1550754.72	29.0'	ENDS OF PILE CAP CL	2.03
WP4	1841018.07	1550755.79	29.0'	ENDS OF PILE CAP CL	2.03
WP5	1840580.06	1550590.00	27.0'	CORNER OF ABUTMENT	2.03
WP6	1840578.46	1550576.62	27.0'	CORNER OF ABUTMENT	2.03
WP7	1841223.45	1550673.80	29.0'	ENDS OF PILE CAP CL	2.04
WP8	1841213.19	1550675.03	29.0'	ENDS OF PILE CAP CL	2.04
WP9	1841020.90	1550698.05	29.0'	ENDS OF PILE CAP CL	2.04
WP10	1841010.64	1550699.28	29.0'	ENDS OF PILE CAP CL	2.04
WP11	1841324.53	1550558.89	VARIES	FLOAT UNIT CORNER	3.05
WP12	1840885.29	1550611.47	VARIES	FLOAT UNIT CORNER	3.05
WP13	1840687.93	1550656.10	VARIES	FLOAT UNIT CORNER	3.05
WP14	1840663.64	1550453.17	VARIES	FLOAT UNIT CORNER	3.05

0 30 60 90 120 FT

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4/9/2019

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PND ENGINEERS, INC.

PROJECT:
DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE:
NEW SITE PLAN

DESIGNED BY: CR/BJ | DATE: APRIL 2019 | DWG NO: 1.04
CHECKED BY: CDC | PROJECT NO: 171113 | SHEET NO: 4 OF 27

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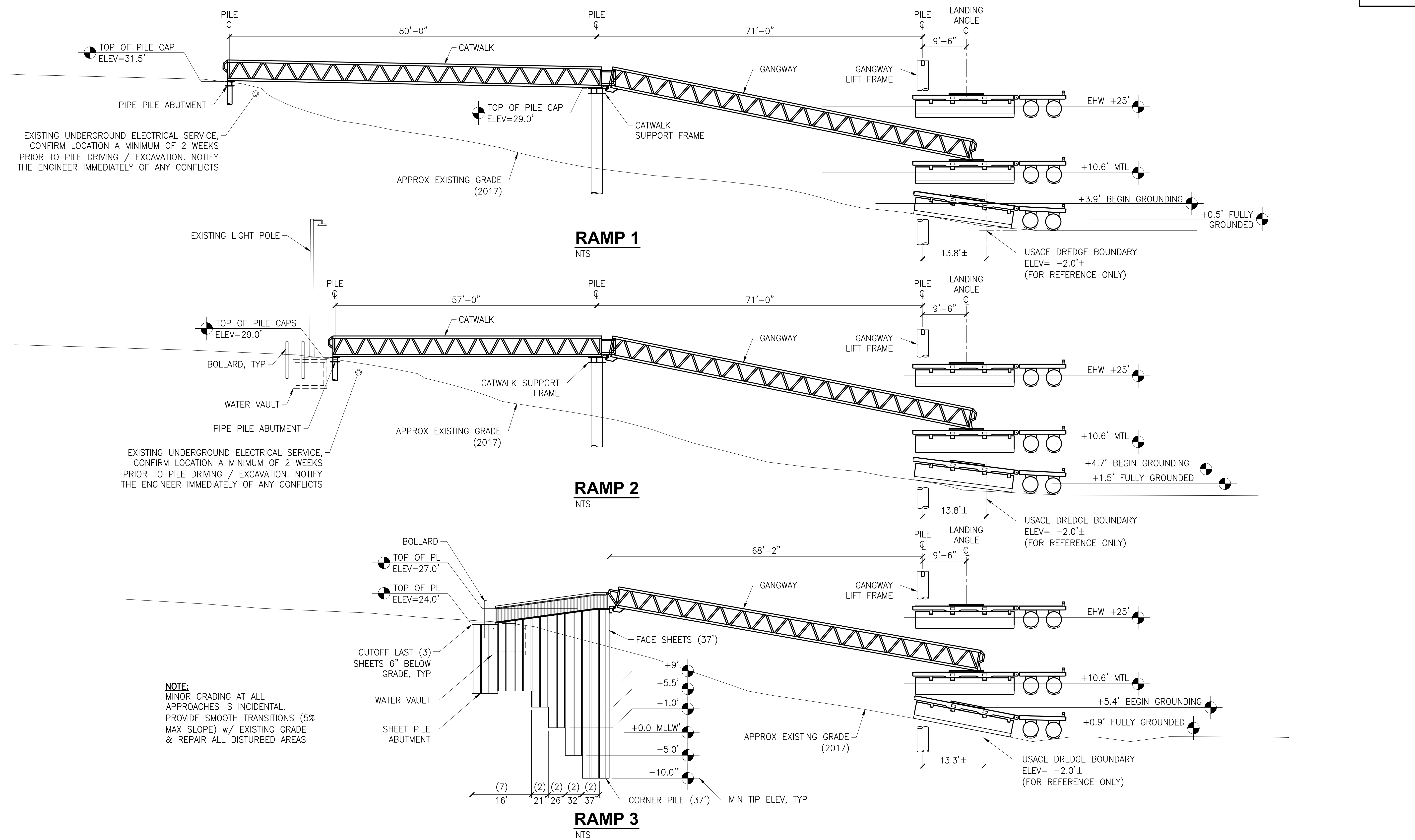

NOTE:
MINOR GRADING AT ALL APPROACHES IS INCIDENTAL. PROVIDE SMOOTH TRANSITIONS (5% MAX SLOPE) w/ EXISTING GRADE & REPAIR ALL DISTURBED AREAS

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STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER
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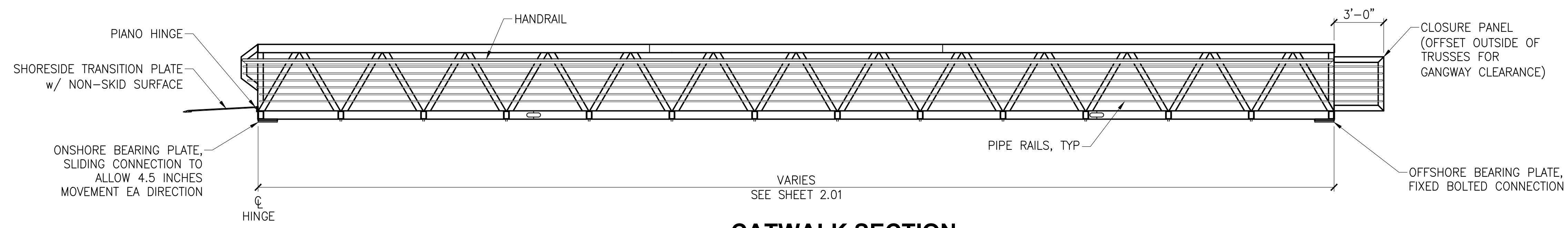
PND ENGINEERS, INC.

PROJECT:
DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

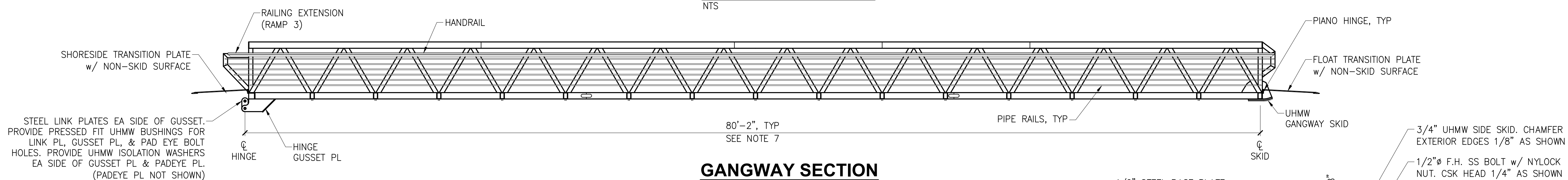
TITLE:
RAMP SECTIONS

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 2.01	SHEET NO: 5 OF 27
CHECKED BY: CDC	PROJECT NO: 171113		



CATWALK SECTION

NTS

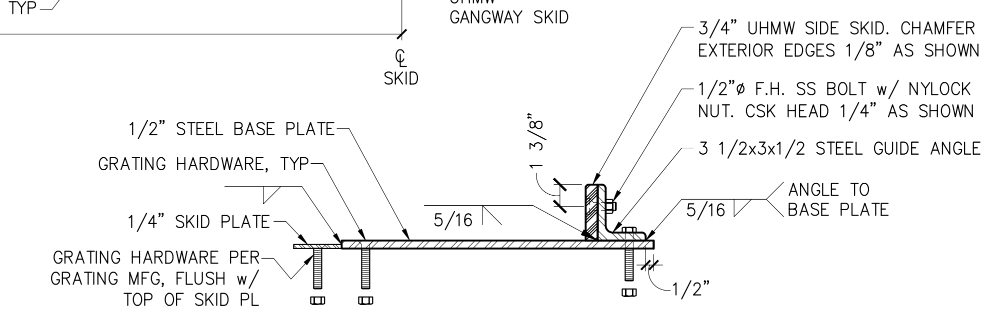


GANGWAY SECTION

NTS

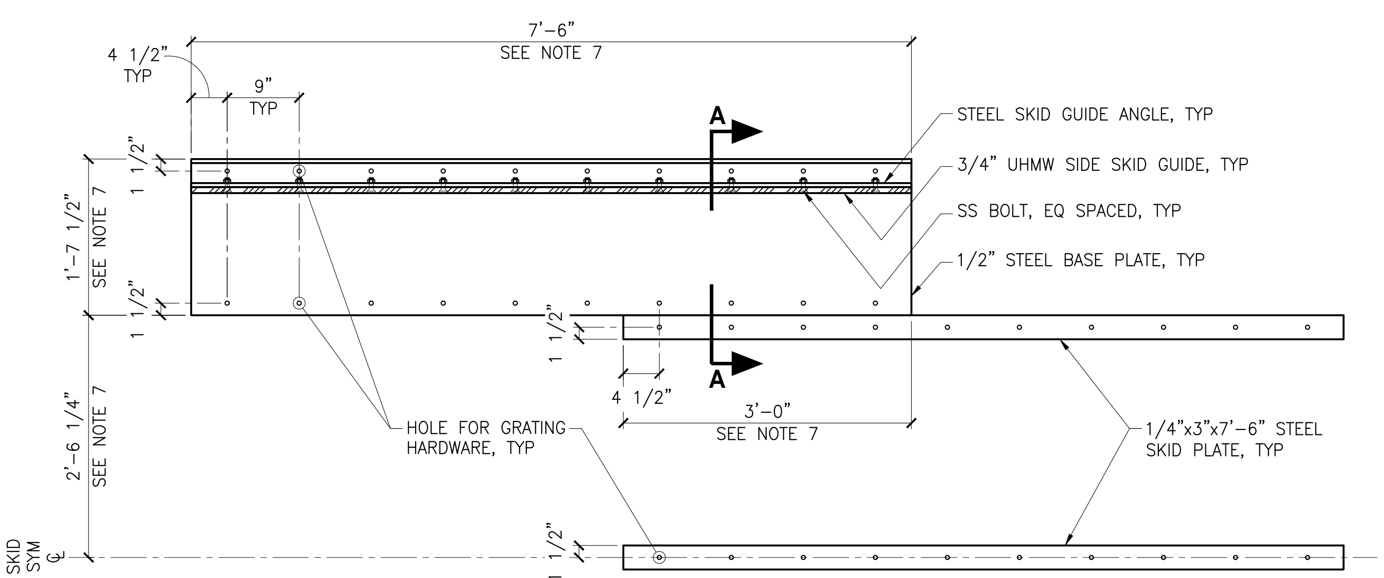
GENERAL NOTES:

1. NO TENSION SPLICES IN MIDDLE THIRD OF GANGWAY/CATWALK.
2. CHORD SPLICE LOCATIONS SHOWN FOR ILLUSTRATION ONLY. ACTUAL LOCATIONS SHALL BE SUBMITTED BY FABRICATOR FOR ENGINEER APPROVAL.
3. TOP AND BOTTOM CHORD SPLICES SHALL BE STAGGERED 5-FT MIN.
4. PROVIDE CAMBER OF 3" AT MID-SPAN.
5. ALL MATERIALS SHALL BE ALUMINUM UNLESS OTHERWISE NOTED.
6. PROVIDE WEEP HOLES AT DOWNHILL END OF ALL CHORD TUBES AND DECK BEAM TUBES. FABRICATOR SHALL SUBMIT HOLE LOCATIONS TO ENGINEER FOR APPROVAL.
7. ASSUMED DIMENSION FOR DESIGN. CONTRACTOR VERIFY BASED ON ACTUAL SKID/HINGE/BEARING DETAILS.
8. SUBMIT POTABLE WATER/FIREWATER MOUNTING DETAILS FOR ENGINEER APPROVAL.



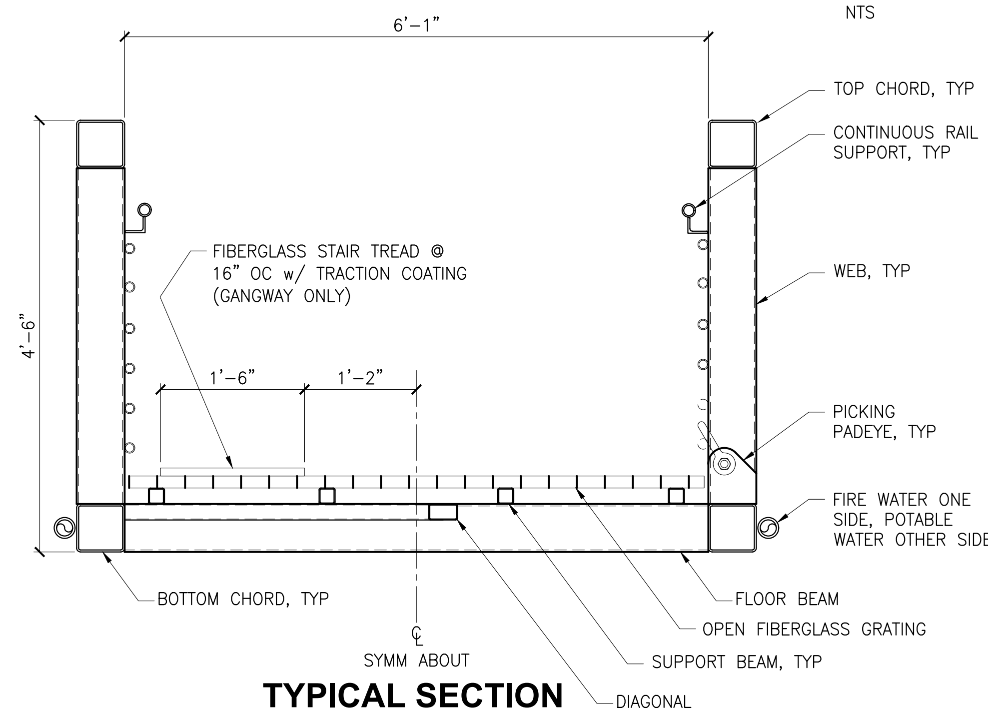
SKID ASSEMBLY SECTION A-A

NTS



SKID BASE PLATE/GUIDE ANGLE ASSEMBLY - PLAN

NTS



TYPICAL SECTION

NTS

NOTE:
THE GANGWAY & SKID ASSEMBLY SHOWN IN THESE PLANS IS PROVIDED FOR REFERENCE ONLY. IT IS THE CONTRACTOR'S RESPONSIBILITY TO PROVIDE AN ENGINEERED GANGWAY MEETING THE REQUIREMENTS OF THE SPECIFICATIONS AND REFERENCED CODES. THE GANGWAY SUPPLIED BY THE CONTRACTOR MAY DEVIATE FROM THE DETAILS SHOWN IN THE PLANS, HOWEVER DEVIATIONS MUST PROVIDE AN EQUAL LEVEL OF SERVICE AS DETERMINED BY THE ENGINEER. PROVIDE TOTAL WEIGHT OF GANGWAY PRIOR TO ORDERING GANGWAY OR FLOATS

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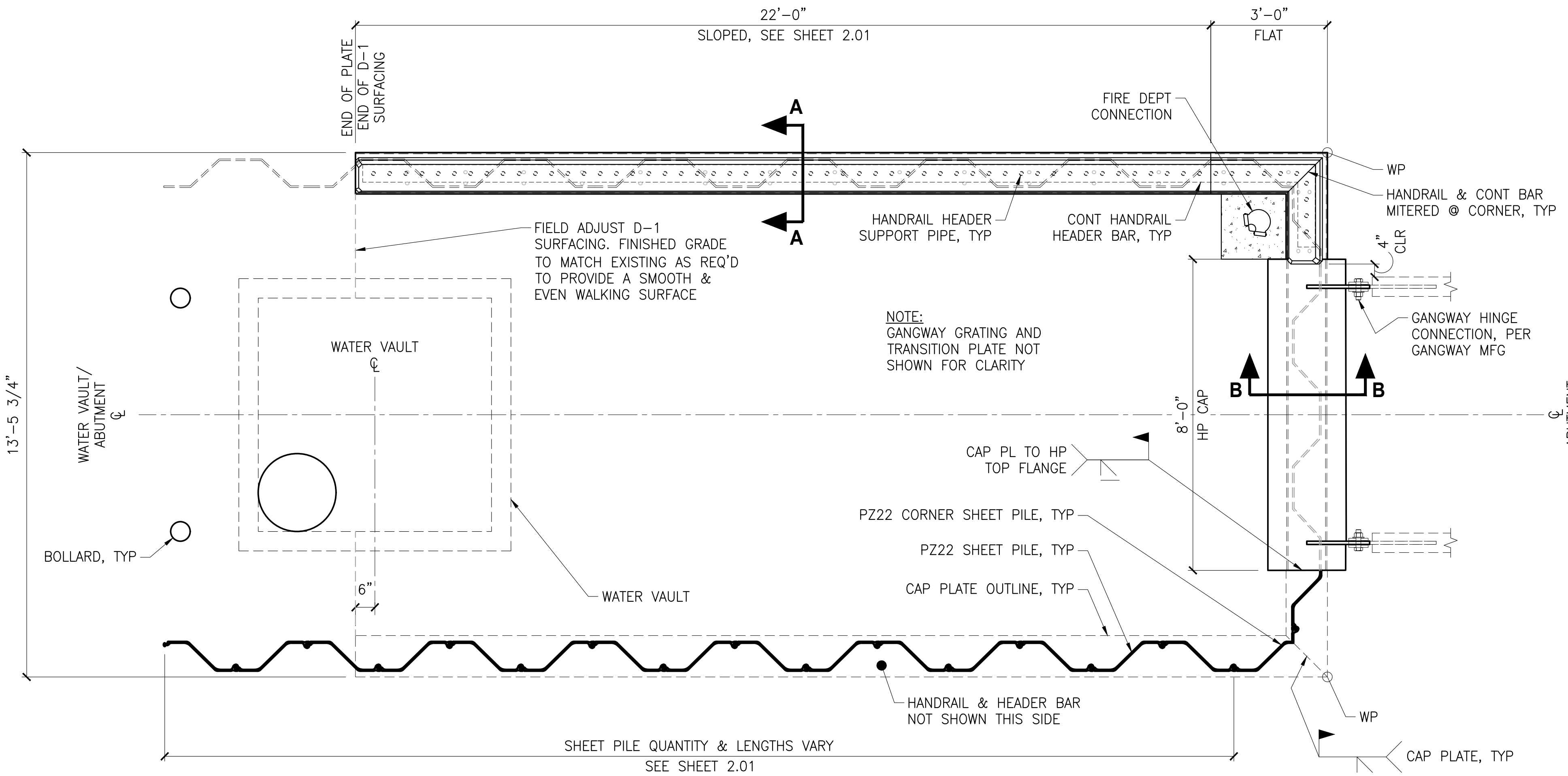
PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

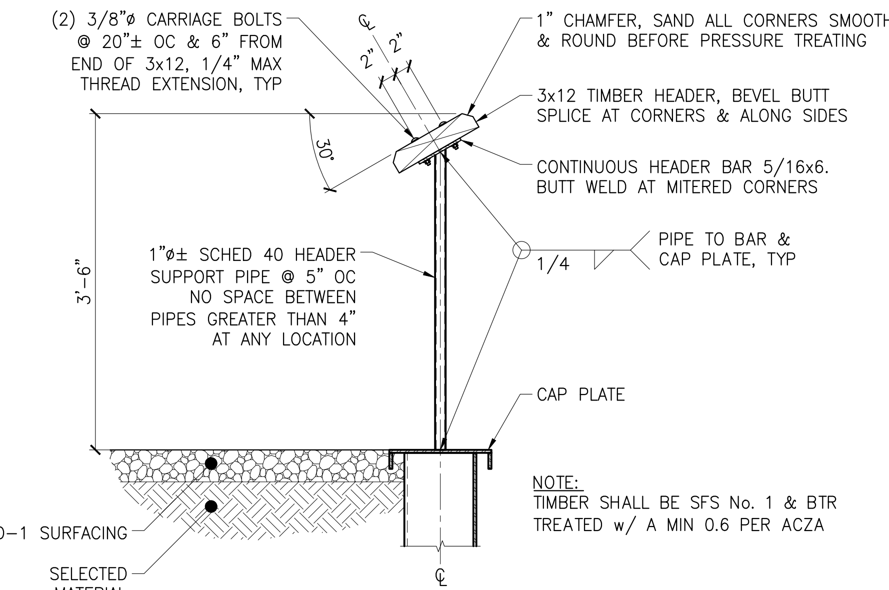
TITLE: GANGWAY & CATWALK DETAILS

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 2.02	SHEET NO: 6 OF 27
CHECKED BY: CDC	PROJECT NO: 171113		



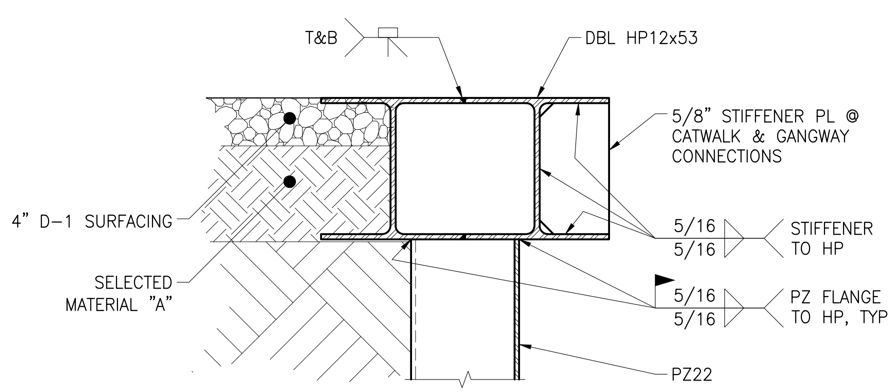
SHEET PILE ABUTMENT PLAN

NTS (RAMP 3)



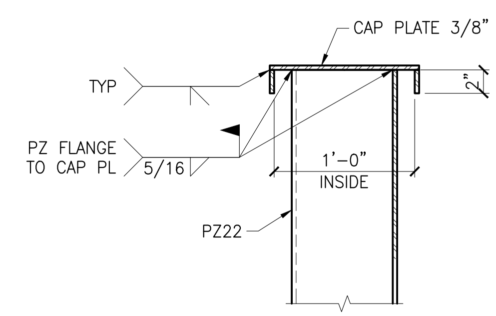
SECTION A-A

NTS



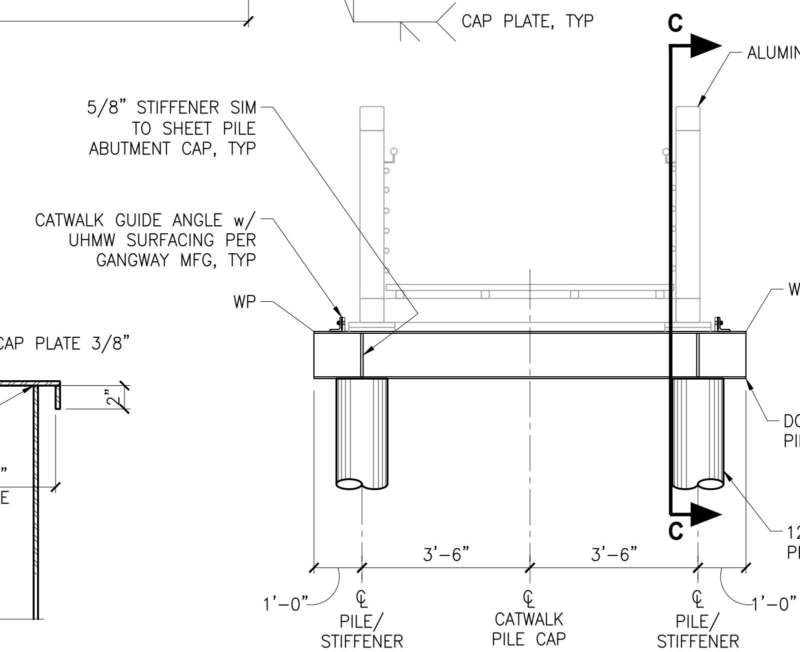
SECTION B-B

NTS



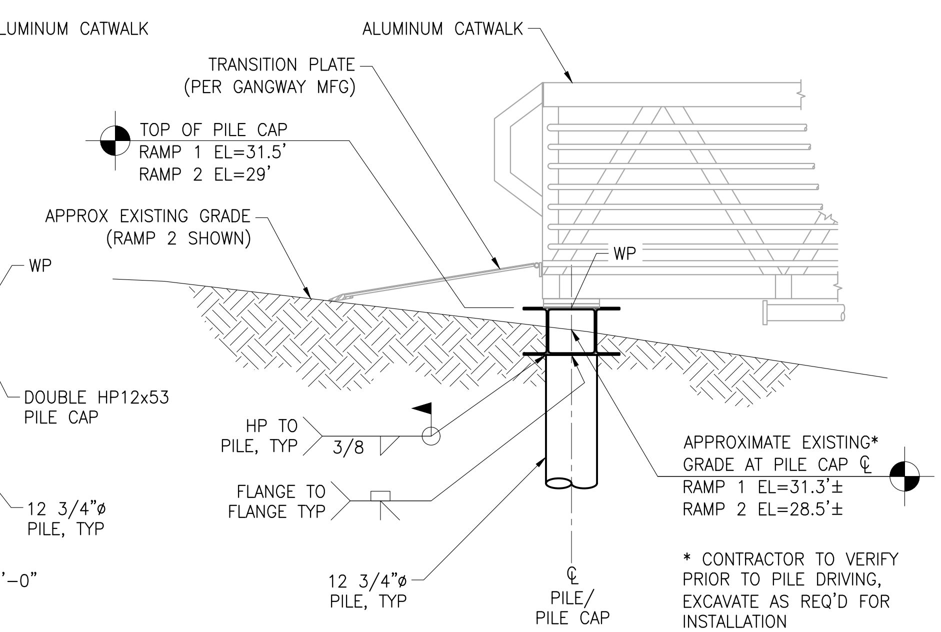
CAP DETAIL

NTS



PIPE PILE ABUTMENT

NTS (RAMPS 1 & 2)



SECTION C-C

NTS

100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

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REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

1506 West 36th Avenue
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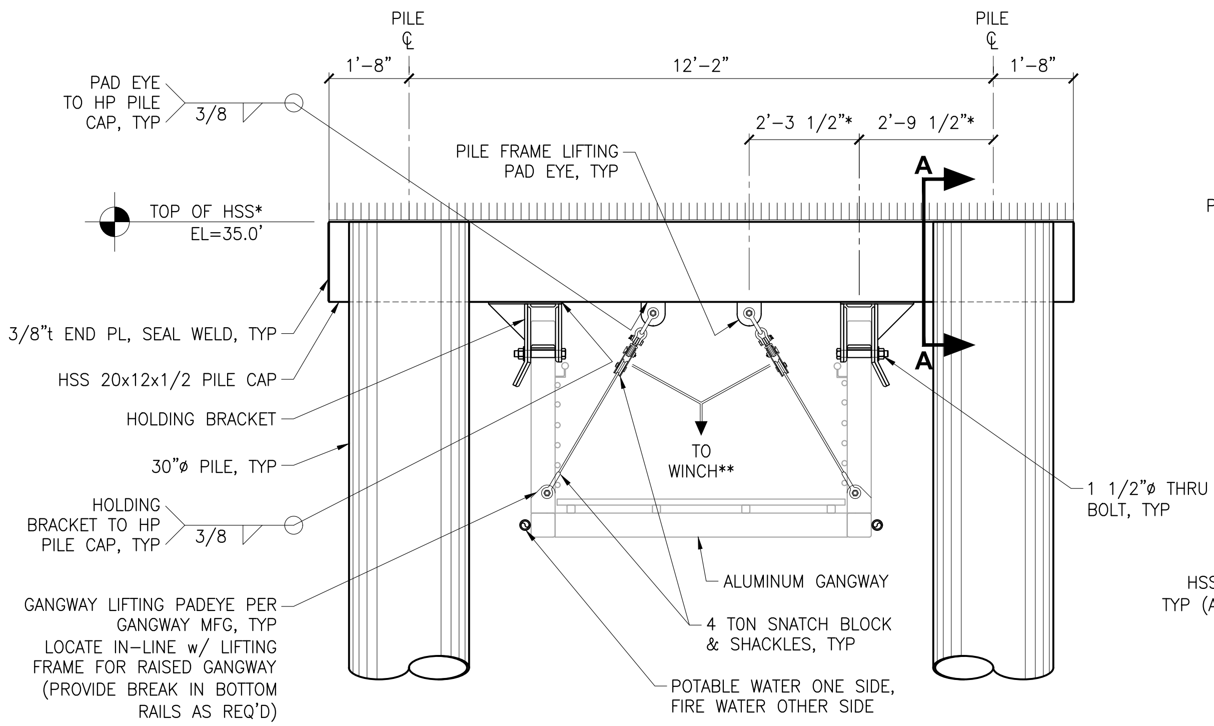
Phone: 907.561.1011
Fax: 907.563.4220
www.pndengineers.com
PND ENGINEERS, INC.

PROJECT:
DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE:
ABUTMENT DETAILS

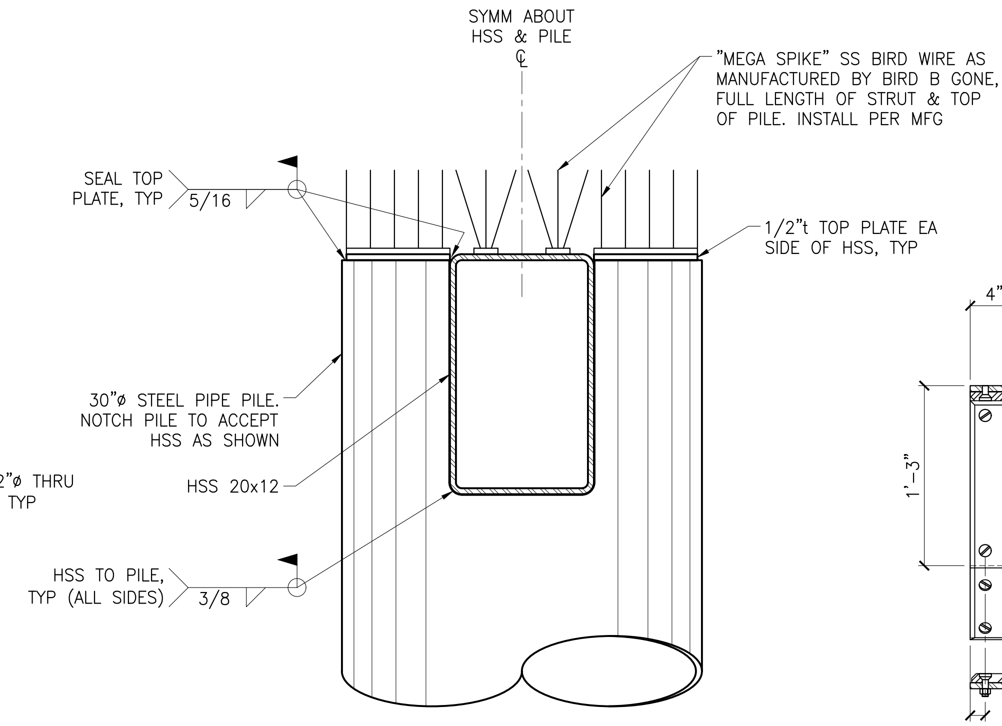
DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 2.03	SHEET NO: 7 OF 27
CHECKED BY: CDC	PROJECT NO: 171113		



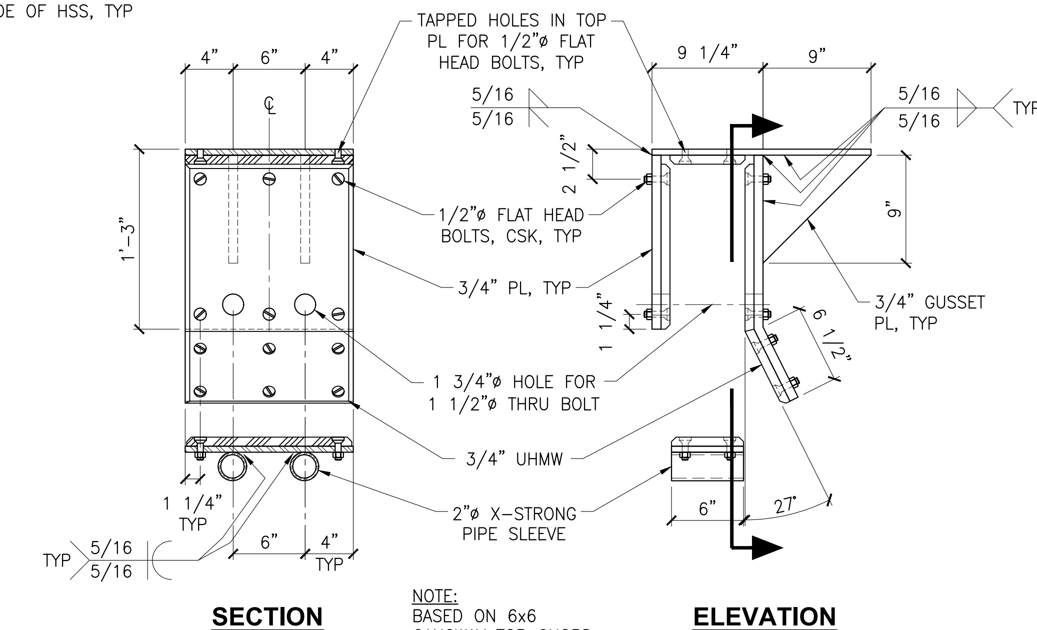
GANGWAY LIFTING FRAME
NTS

NOTES:
* DIMENSIONS SHOWN ARE BASED ON THE "REFERENCE GANGWAY" GEOMETRY PROVIDED ON SHEET 2.02. MODIFY THE GANGWAY LIFTING FRAME & HOLDING BRACKET AS REQ'D FOR FURNISHED GANGWAY.

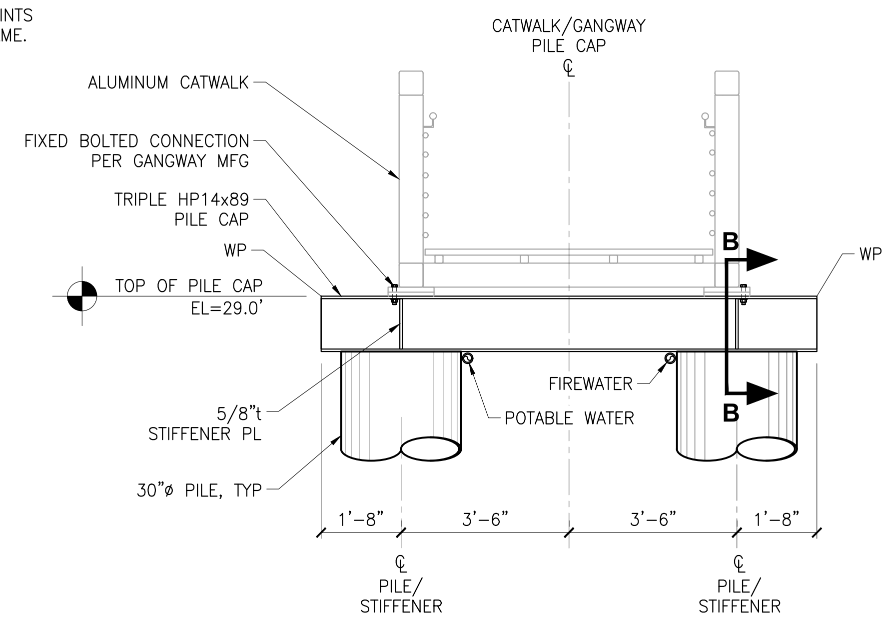
** PROVIDE (1) NEW WINCH & ASSOCIATED HARDWARE REQ'D FOR GANGWAY LIFTING OPERATIONS. PROVIDE WINCH ANCHOR POINTS ON CATWALK OR OFFSHORE CATWALK FRAME. SUBMIT WINCHING PLAN FOR APPROVAL.



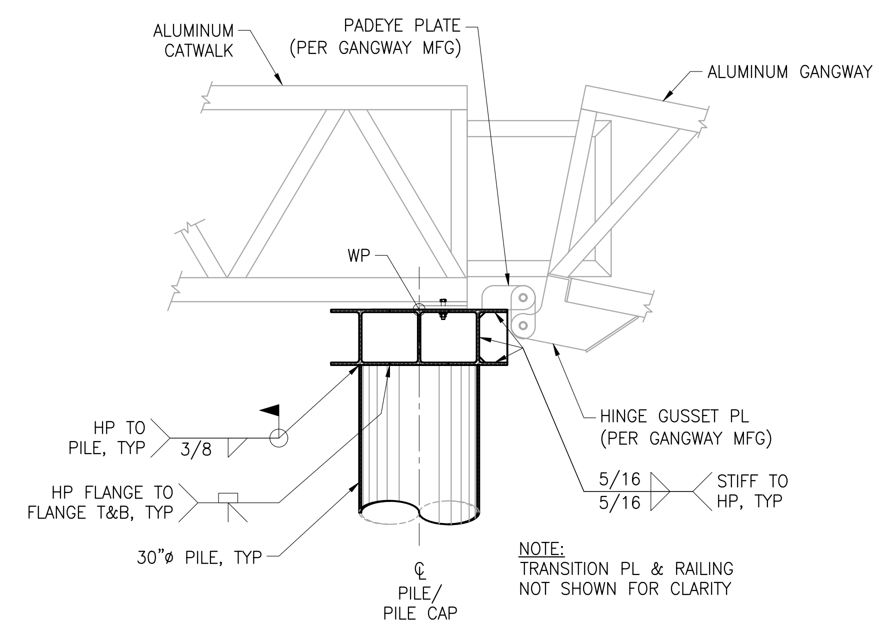
SECTION A-A
NTS



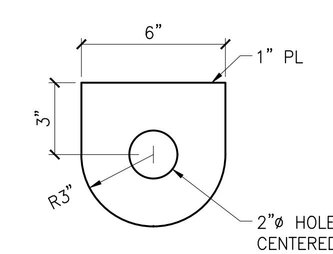
HOLDING BRACKET
NTS



OFFSHORE CATWALK FRAME
NTS



SECTION B-B
NTS



PAD EYE
NTS

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CITY OF DILLINGHAM ALASKA

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STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER
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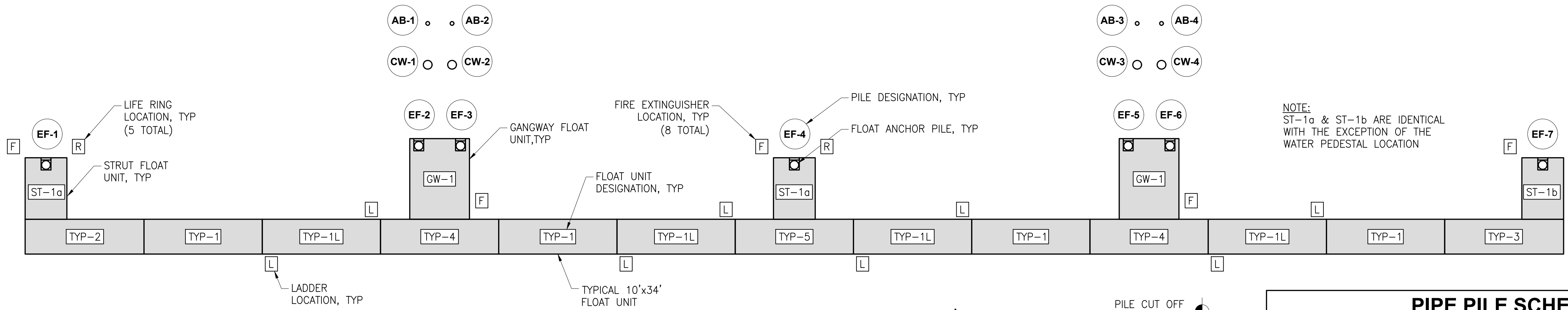
PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

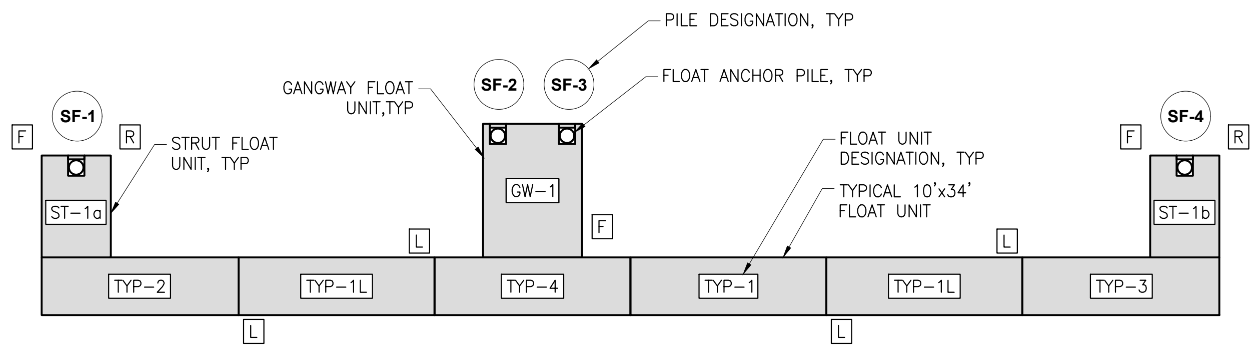
TITLE: PILE CAP DETAILS

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 2.04	SHEET NO: 8 OF 27
CHECKED BY: CDC	PROJECT NO: 171113		



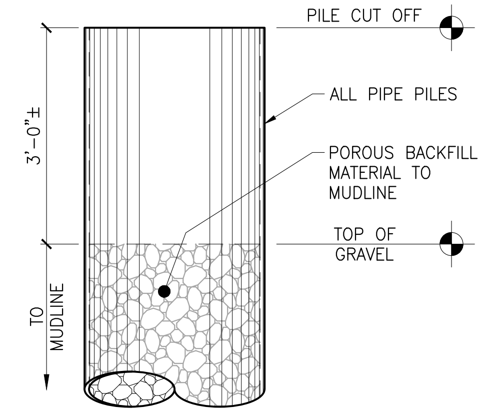
EAST FLOAT LAYOUT

NTS



SOUTH FLOAT LAYOUT

NTS



GRAVEL FILL

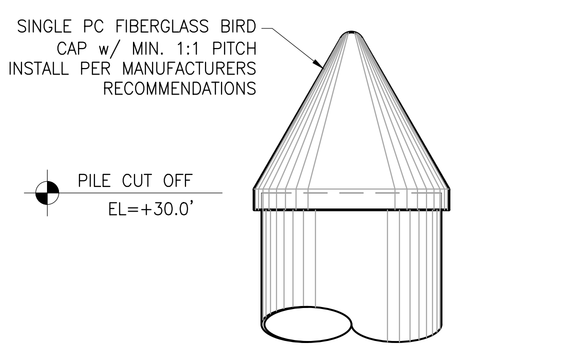
NTS

PIPE PILE SCHEDULE

PILE ID	SIZE	MIN TIP EL	SUPPLY LENGTH	NOMINAL BEARING CAPACITY	PILE TIP	NORTHING (NOTE 2)	EASTING (NOTE 2)
EF–1	30"x0.750"	–49.0'	85'	200 KIPS	SPIN FIN	1841321.57	1550584.68
EF–2	30"x0.750"	–49.0'	90'	200 KIPS	SPIN FIN	1841215.84	1550603.21
EF–3	30"x0.750"	–49.0'	90'	200 KIPS	SPIN FIN	1841203.92	1550604.63
EF–4	30"x0.750"	–49.0'	85'	200 KIPS	SPIN FIN	1841107.91	1550610.25
EF–5	30"x0.750"	–49.0'	90'	200 KIPS	SPIN FIN	1841013.28	1550627.45
EF–6	30"x0.750"	–49.0'	90'	200 KIPS	SPIN FIN	1841001.37	1550628.88
EF–7	30"x0.750"	–49.0'	85'	200 KIPS	SPIN FIN	1840894.25	1550635.82
SF–1	30"x0.750"	–49.0'	85'	200 KIPS	SPIN FIN	1840662.15	1550653.14
SF–2	30"x0.750"	–49.0'	90'	200 KIPS	SPIN FIN	1840647.66	1550581.17
SF–3	30"x0.750"	–49.0'	90'	200 KIPS	SPIN FIN	1840646.23	1550569.25
SF–4	30"x0.750"	–49.0'	85'	200 KIPS	SPIN FIN	1840639.28	1550462.13
CW–1	30"x0.750"	–40.0'	75'	200 KIPS	SPIN FIN	1841221.80	1550674.00
CW–2	30"x0.750"	–40.0'	75'	200 KIPS	SPIN FIN	1841214.85	1550674.83
CW–3	30"x0.750"	–40.0'	75'	200 KIPS	SPIN FIN	1841019.24	1550698.24
CW–4	30"x0.750"	–40.0'	75'	200 KIPS	SPIN FIN	1841012.29	1550699.08
AB–1	12.75"x0.500"	–8.0'	40'	20 KIPS	OPEN SHOE	1841231.30	1550753.43
AB–2	12.75"x0.500"	–8.0'	40'	20 KIPS	OPEN SHOE	1841224.35	1550754.27
AB–3	12.75"x0.500"	–10.0'	40'	20 KIPS	OPEN SHOE	1841026.01	1550754.84
AB–4	12.75"x0.500"	–10.0'	40'	20 KIPS	OPEN SHOE	1841019.06	1550755.67
EXTRA	30"x0.750"		40'				

NOTES:

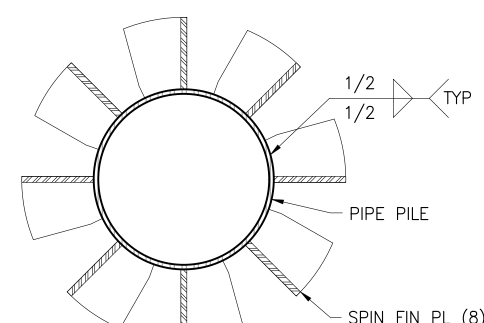
1) ALL PIPE PILES SHALL BE GRAVEL FILLED, SEE DETAIL.
2) CONFIRM NORTHINGS & EASTINGS FOR PILES BASED ON FINAL FABRICATED FLOAT UNIT DIMENSIONS PRIOR TO INSTALLATION.



(LOCATIONS EF–1, EF–4, EF–7, SF–1, & SF–4)

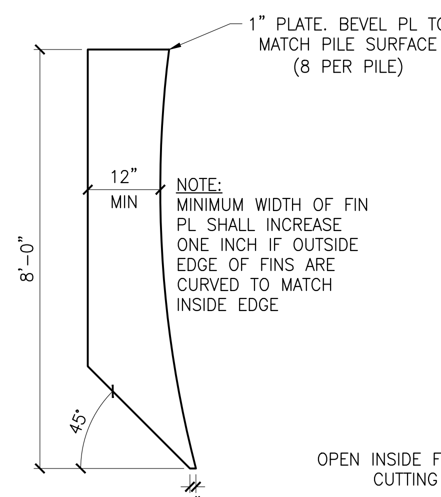
FLOAT PILE CAP

NTS

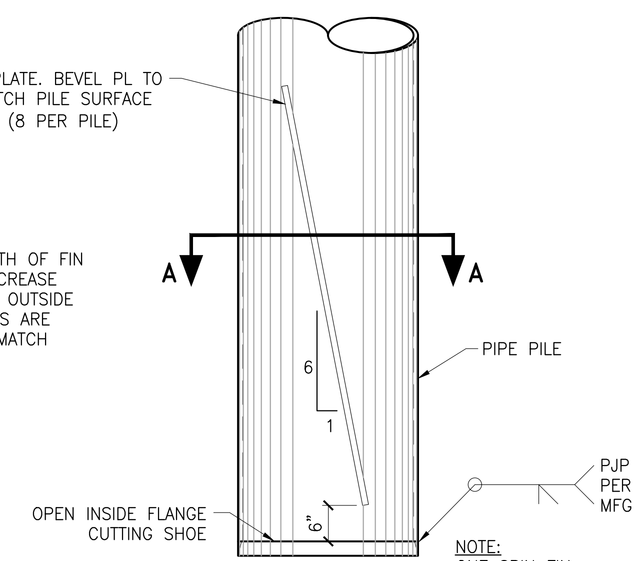


SECTION A-A

NTS



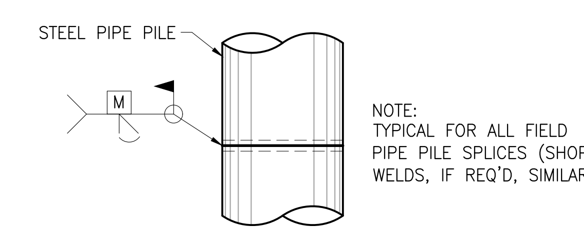
SPIN FIN ELEVATION



ELEVATION

SPIN FIN™ PILE TIP DETAILS

NTS



SPLICE DETAIL

NTS

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4/9/2019

CITY OF DILLINGHAM ALASKA

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STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER

DATE: 4/9/2019

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Fax: 907.563.4220
www.pndengineers.com

PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: FLOAT LAYOUT & PILE DETAILS

DESIGNED BY: CR/BJ | DATE: APRIL 2019 | DWG NO: 3.01
CHECKED BY: CDC | PROJECT NO: 171113 | SHEET NO: 9 OF 27

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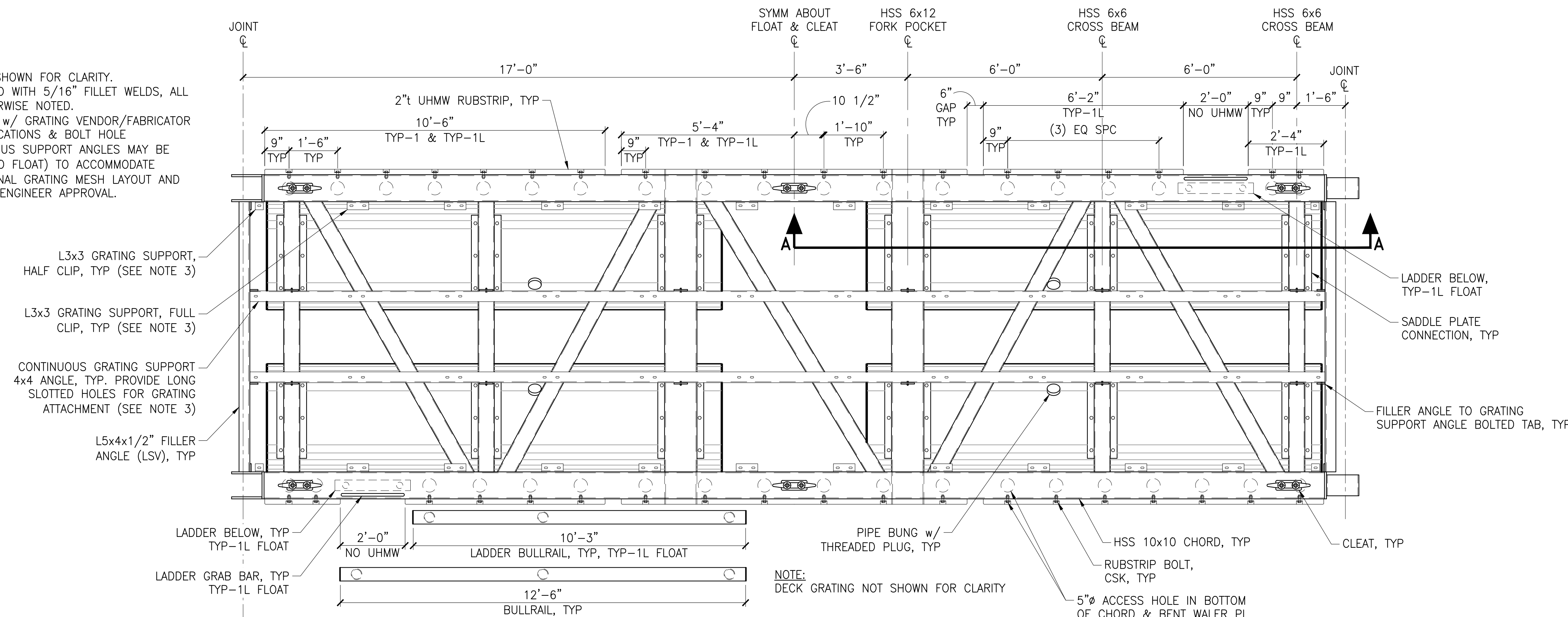
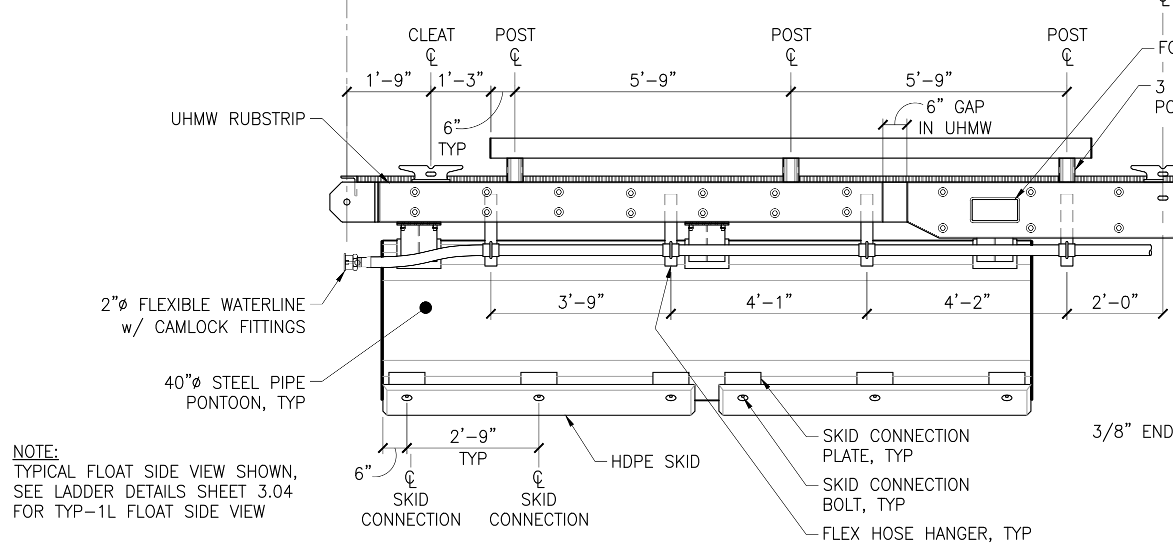
NOTES:
1. DECK GRATING & WATERLINE NOT SHOWN FOR CLARITY.
2. ALL JOINTS SHALL BE SEAL WELDED WITH 5/16" FILLET WELDS, ALL SIDES, ALL AROUND, UNLESS OTHERWISE NOTED.
3. FLOAT FABRICATOR TO COORDINATE w/ GRATING VENDOR/FABRICATOR TO DETERMINE GRATE SUPPORT LOCATIONS & BOLT HOLE LAYOUT/CONFIGURATIONS. CONTINUOUS SUPPORT ANGLES MAY BE ADJUSTED (+/- 1" TRANSVERSE TO FLOAT) TO ACCOMMODATE GRATING MESH LAYOUT). SUBMIT FINAL GRATING MESH LAYOUT AND BOLT ATTACHMENT LOCATIONS FOR ENGINEER APPROVAL.



TYPICAL FLOAT MODULE PLAN

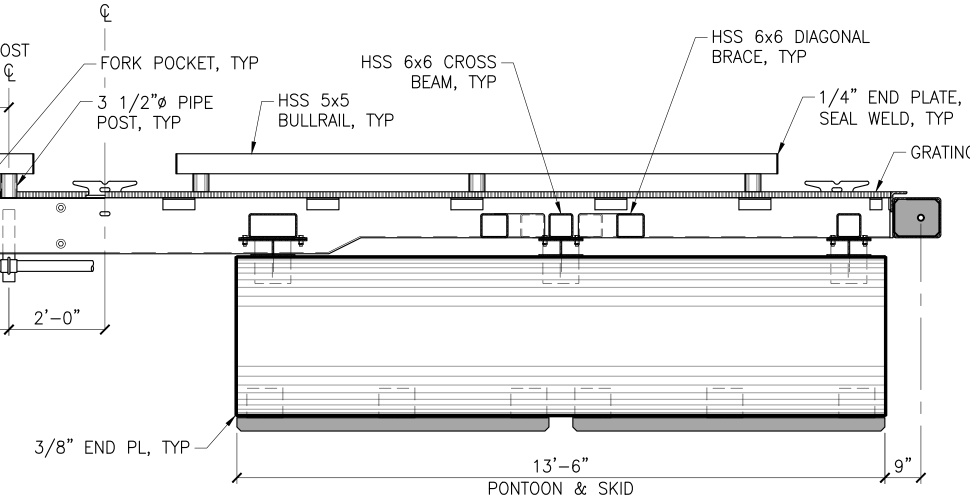
NTS ESTIMATED DRY WT = 19,700 LBS



NOTE:
TYPICAL FLOAT SIDE VIEW SHOWN, SEE LADDER DETAILS SHEET 3.04 FOR TYP-1L FLOAT SIDE VIEW

SIDE VIEW

NTS



SECTION A-A

NTS

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4/9/2019

CITY OF DILLINGHAM ALASKA

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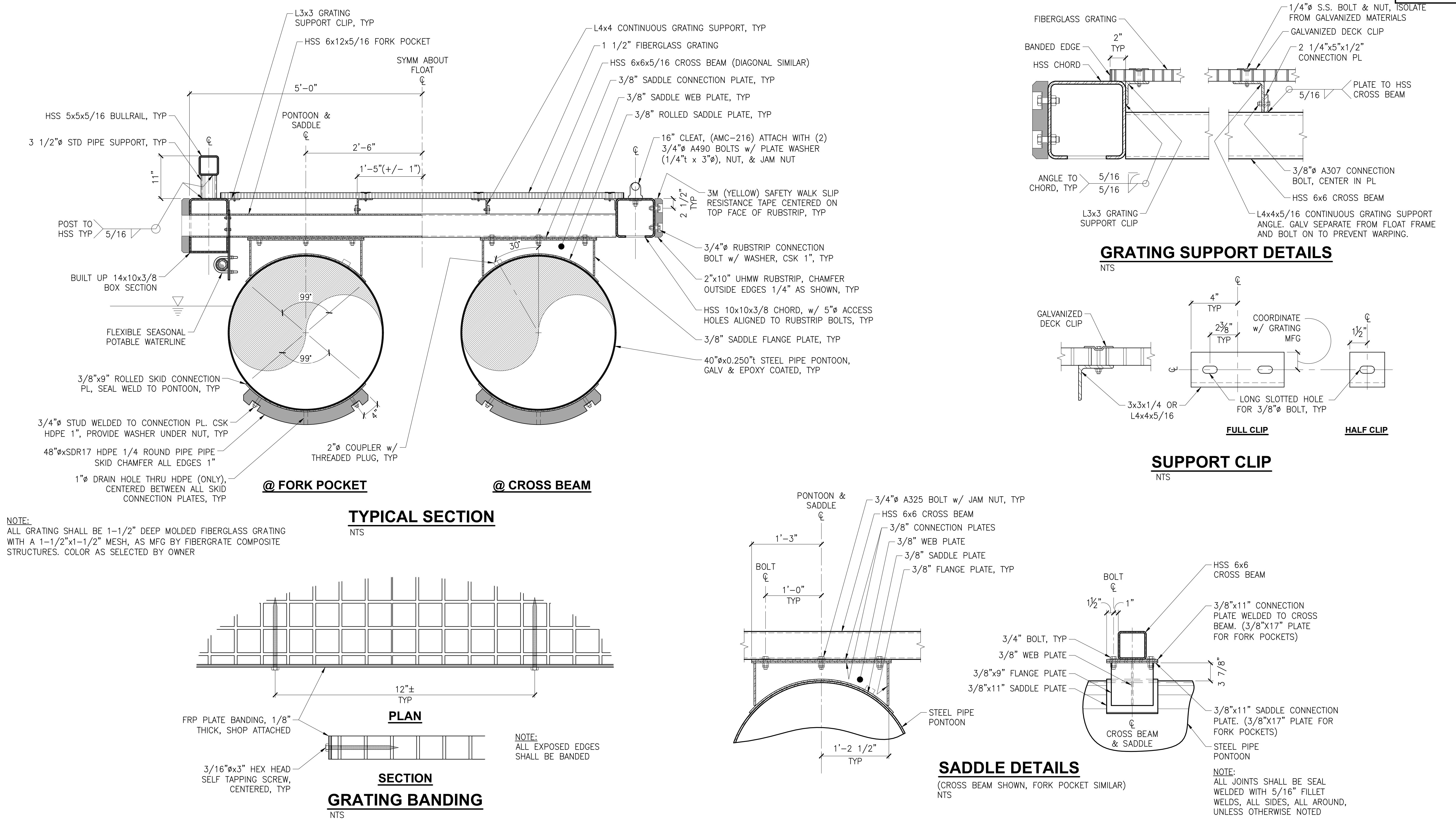
PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: TYPICAL FLOAT (TYP-1) PLAN

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 3.02
CHECKED BY: CDC	PROJECT NO: 171113	SHEET NO: 10 OF 27



NOTE:
ALL GRATING SHALL BE 1–1/2" DEEP MOLDED FIBERGLASS GRATING WITH A 1–1/2"x1–1/2" MESH, AS MFG BY FIBERGRATE COMPOSITE STRUCTURES. COLOR AS SELECTED BY OWNER

NOTE:
ALL JOINTS SHALL BE SEAL WELDED WITH 5/16" FILLET WELDS, ALL SIDES, ALL AROUND, UNLESS OTHERWISE NOTED

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4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA, 49TH, Dempsey S. Thieman, CE-9974, REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

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PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: TYPICAL FLOAT DETAILS (1 OF 2)

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 3.03
CHECKED BY: CDC	PROJECT NO: 171113	SHEET NO: 11 OF 27

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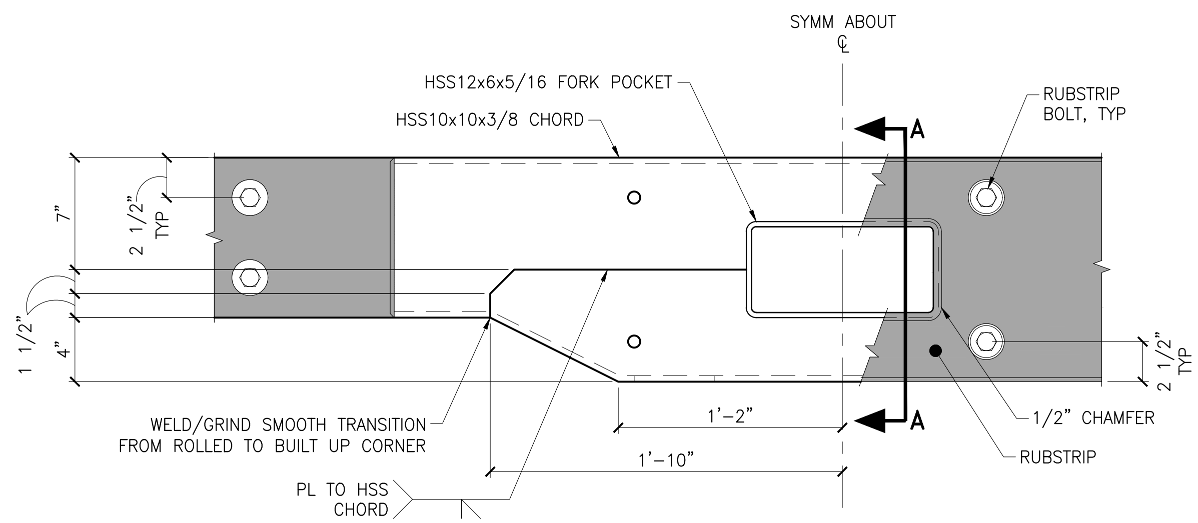
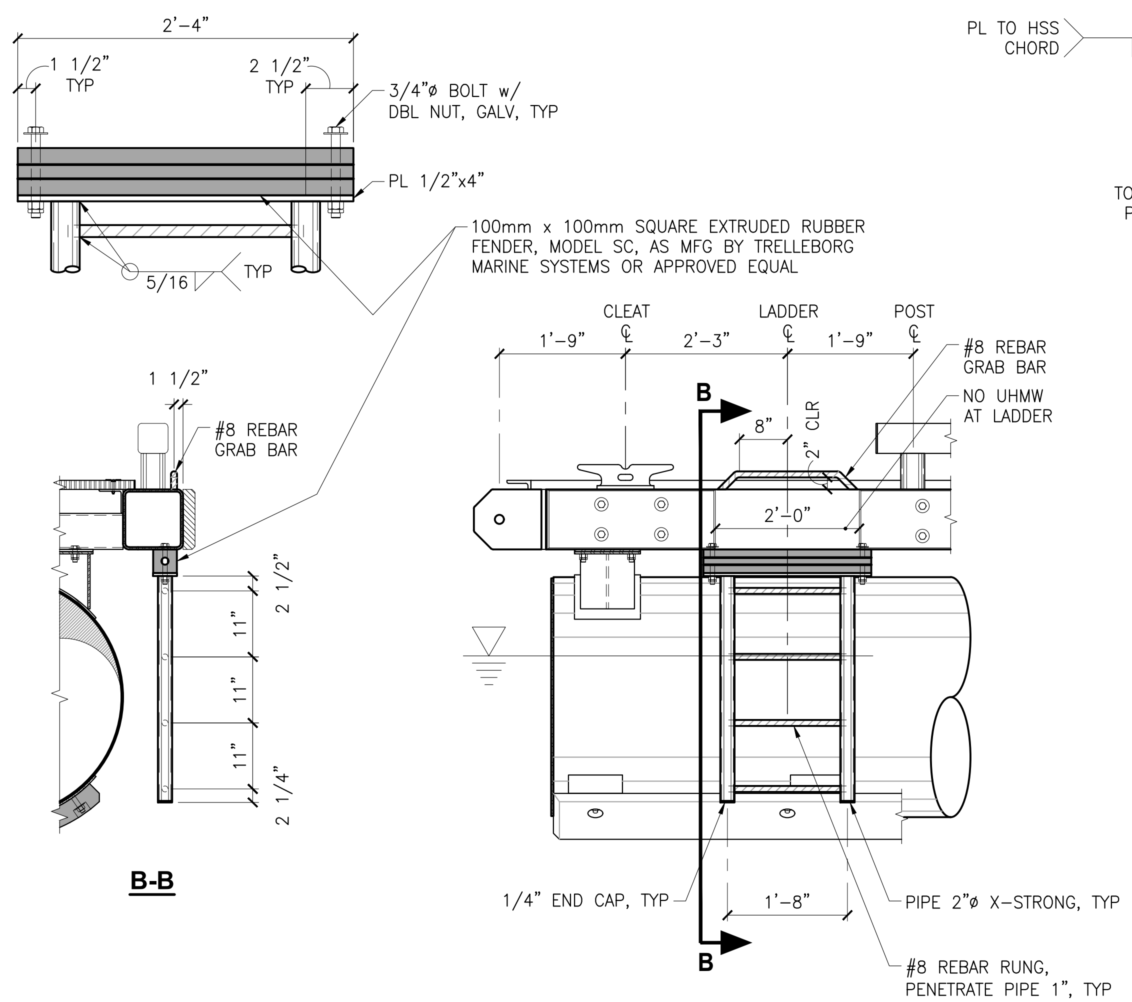
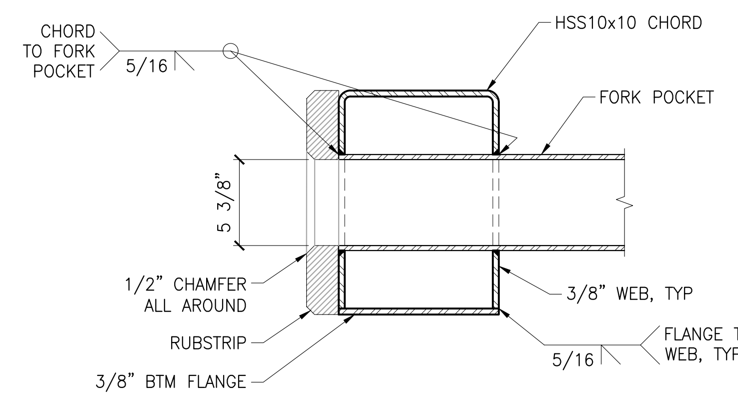


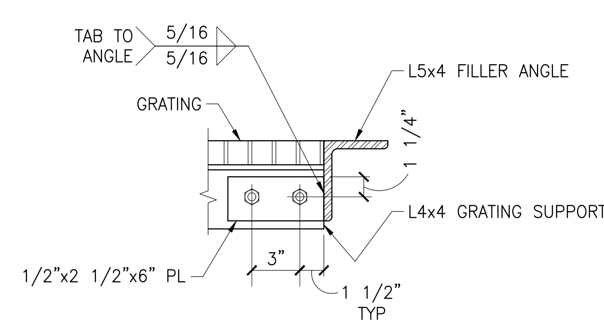
FORK POCKET
NTS



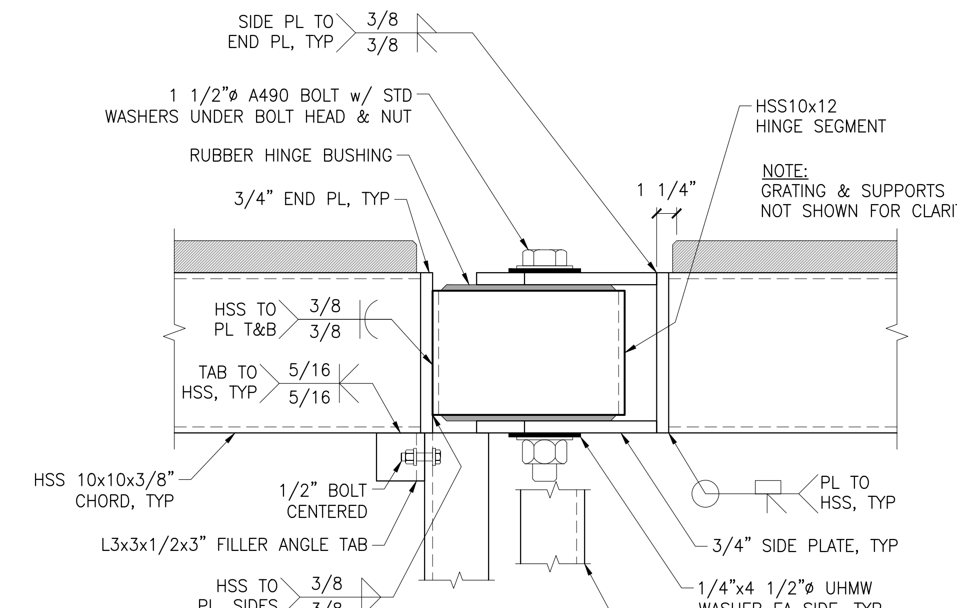
LADDER DETAILS (TYP-1L FLOATS)
NTS



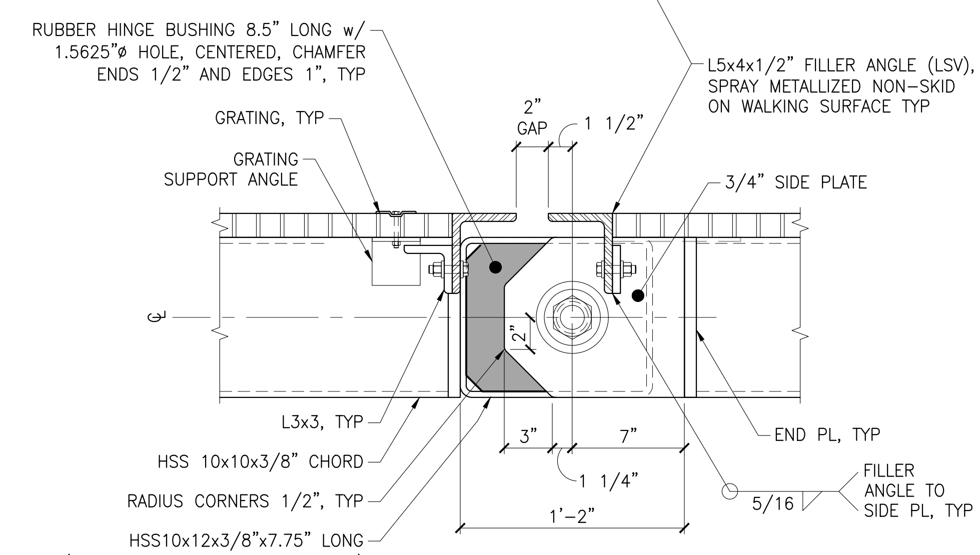
SECTION A-A
NTS



CONTINUOUS GRATING SUPPORT TO FILLER ANGLE TAB
NTS



PLAN



SECTION

FLOAT TO FLOAT CONNECTION
NTS

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4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH — Dempsey S. Thieman CE-9974 — REGISTERED PROFESSIONAL ENGINEER

DATE: 4/9/2019

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Anchorage, Alaska 99503
Phone: 907.561.1011
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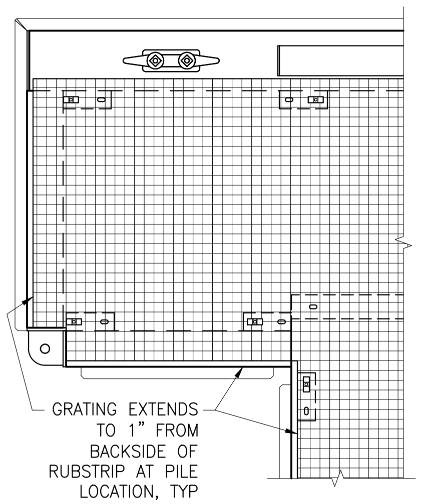
P N D ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

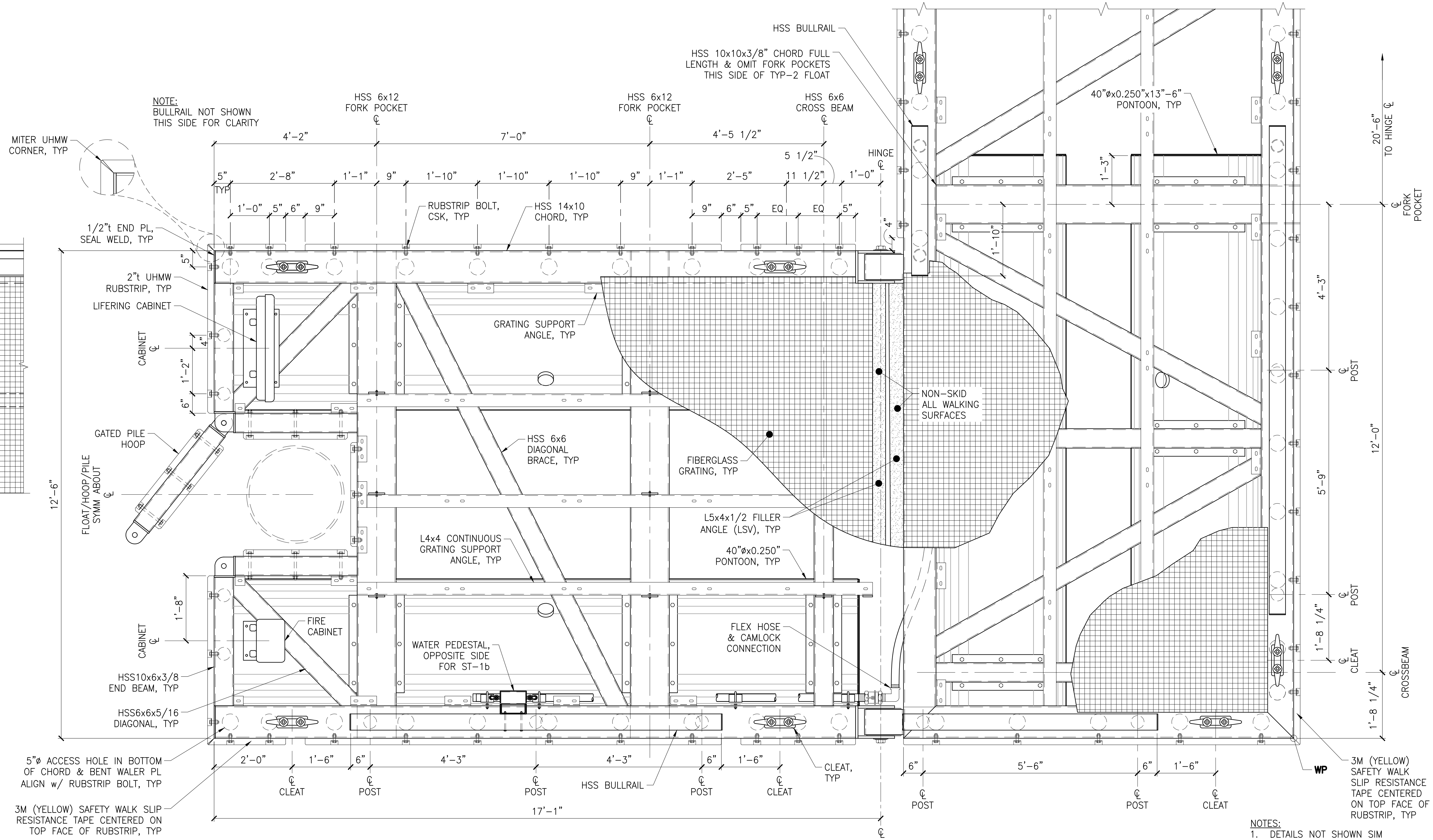
TITLE: TYPICAL FLOAT DETAILS (2 OF 2)

DESIGNED BY:	CR/BJ	DATE:	APRIL 2019	DWG NO: 3.04
CHECKED BY:	CDC	PROJECT NO:	171113	SHEET NO: 12 OF 27



GRATING DETAIL

NTS



STRUT FLOAT UNIT (ST-1a) PLAN

NTS ESTIMATED DRY WT = 12,500 LBS

END FLOAT (TYP-2) PLAN

NTS

NOTES:
1. DETAILS NOT SHOWN SIM TO TYP-1 FLOAT UNIT
2. TYP-3 FLOAT OPPOSITE HAND OF TYP-2

J:\2017\171113 Dillingham Small Boat Harbor\Drawings\3.01_3.10 Float System.dwg, 3.05, 4/9/2019 3:50:12 PM, james, 1:2

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CITY OF DILLINGHAM ALASKA

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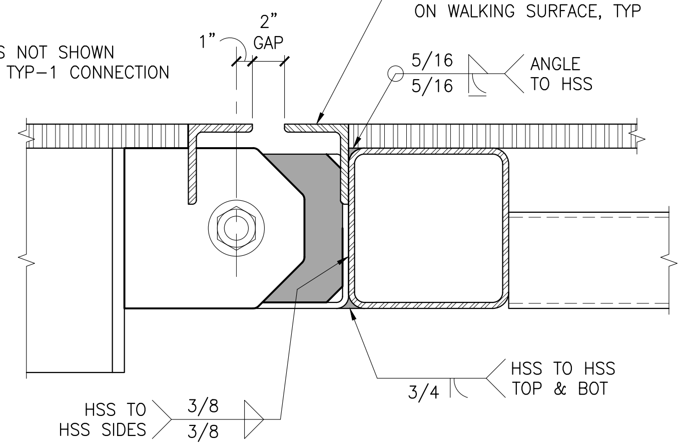
PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: STRUT FLOAT (ST-1) PLAN

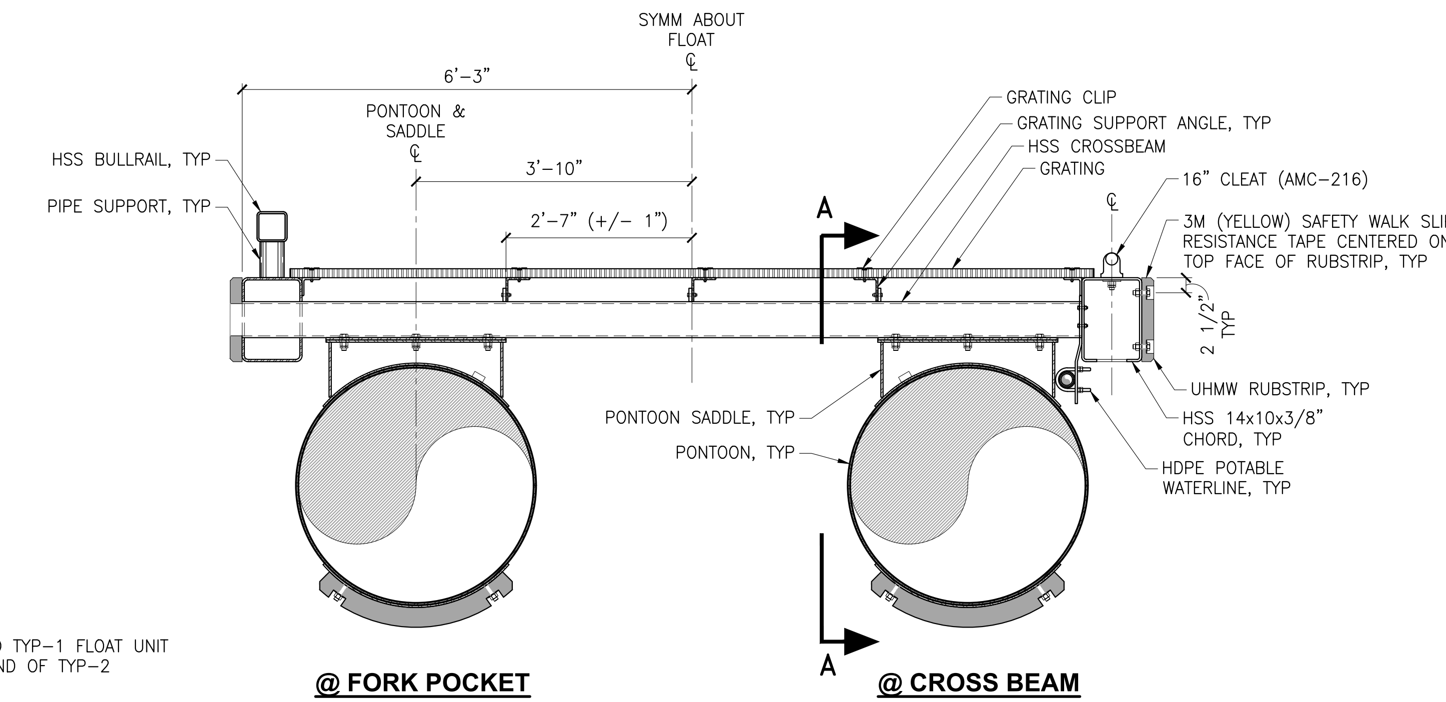
DESIGNED BY:	CR/BJ	DATE:	APRIL 2019	DWG NO: 3.05
CHECKED BY:	CDC	PROJECT NO:	171113	SHEET NO: 13 OF 27



FLOAT TO FLOAT CONNECTION

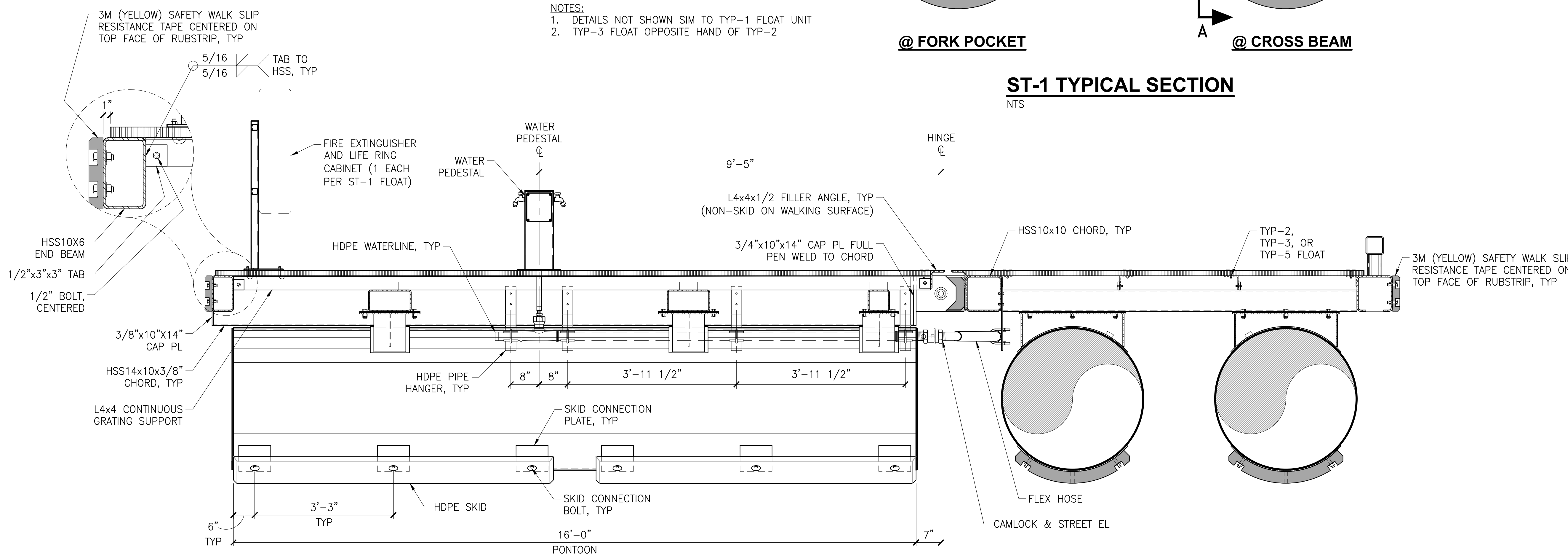
NTS

NOTES:
1. DETAILS NOT SHOWN SIM TO TYP-1 FLOAT UNIT
2. TYP-3 FLOAT OPPOSITE HAND OF TYP-2



ST-1 TYPICAL SECTION

NTS



SECTION A-A

NTS

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4/9/2019

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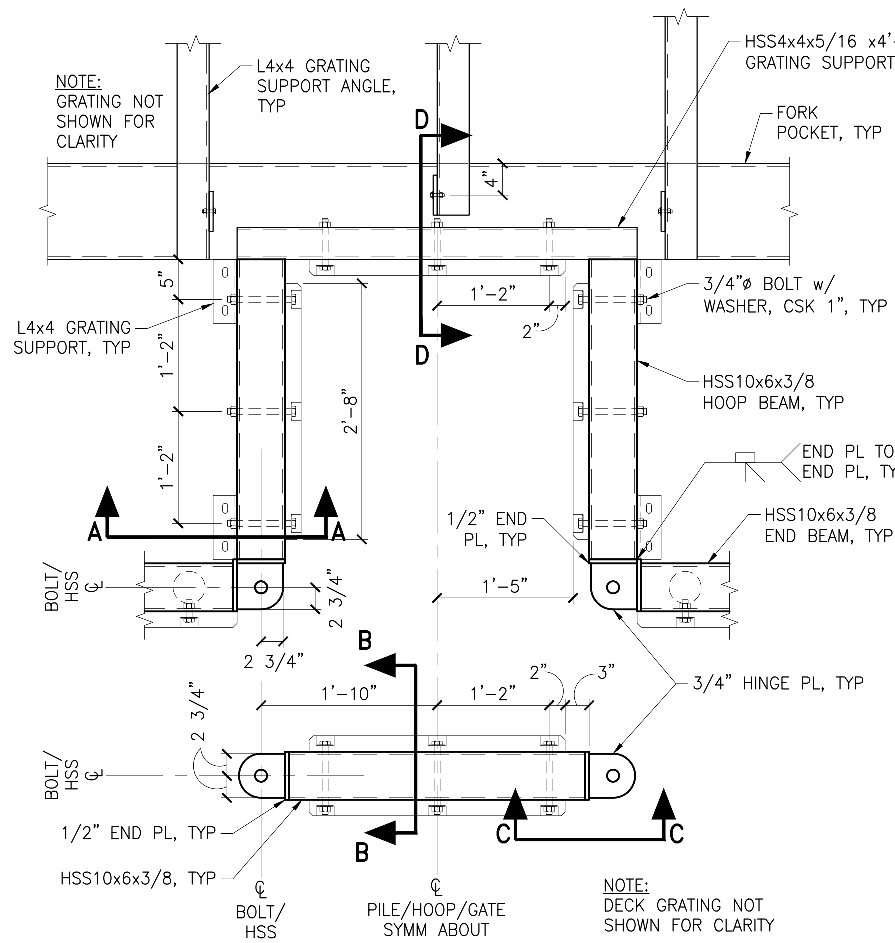
www.pndengineers.com
PND ENGINEERS, INC.

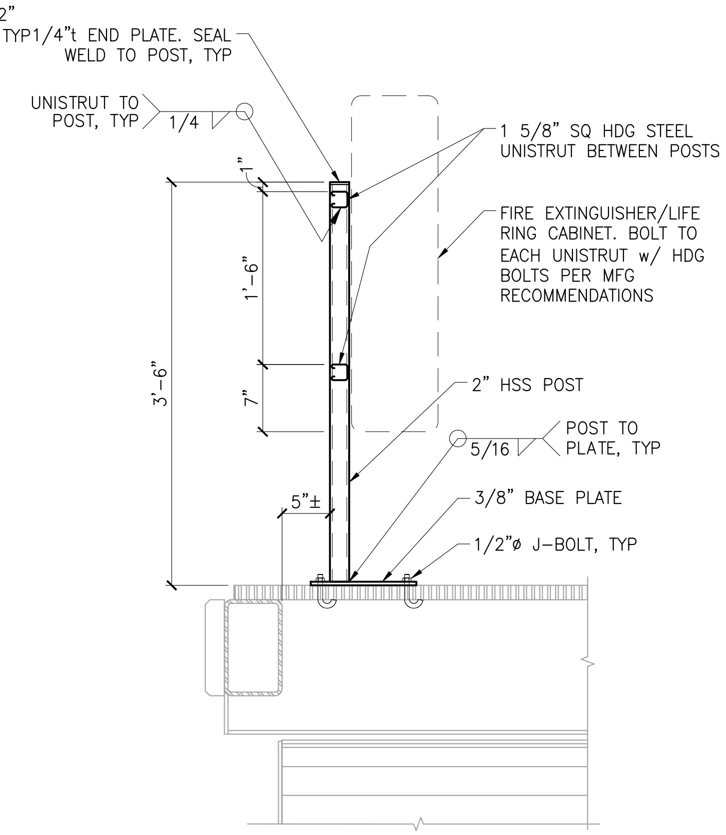
PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: STRUT FLOAT DETAILS (1 OF 2)

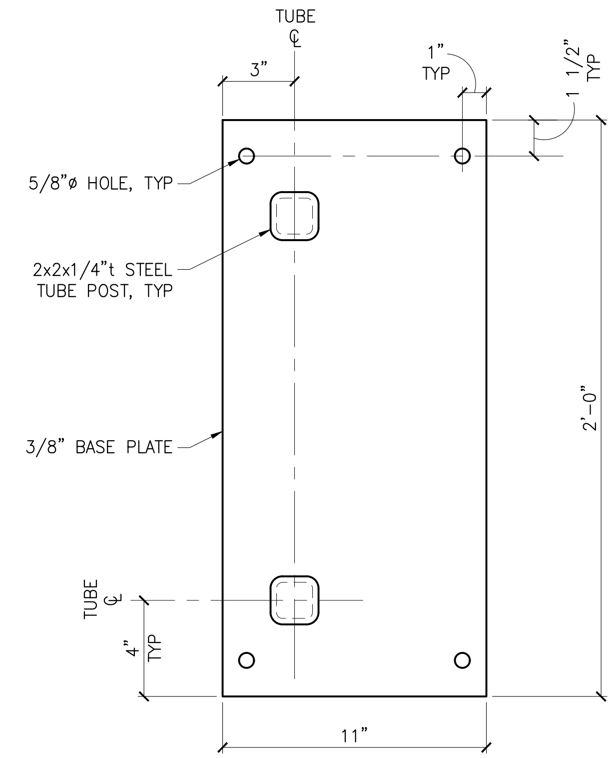
DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 3.06
CHECKED BY: CDC	PROJECT NO: 171113	SHEET NO: 14 OF 27



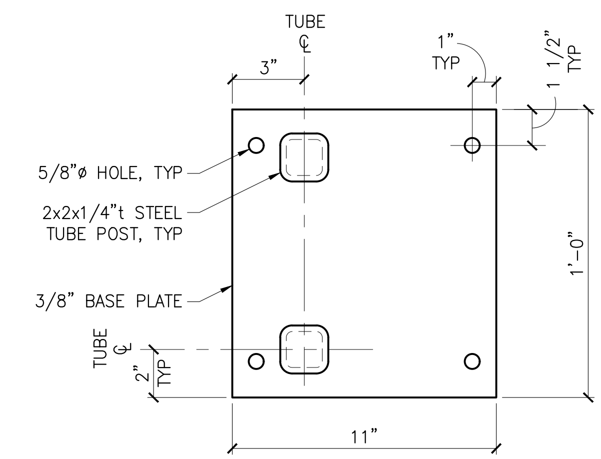
ST-1 PILE HOOP PLAN
NTS



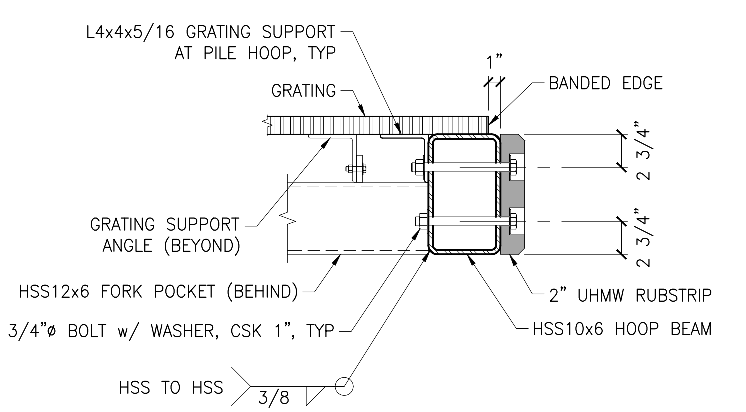
SAFETY EQUIPMENT BASE TYPICAL SECTION
NTS



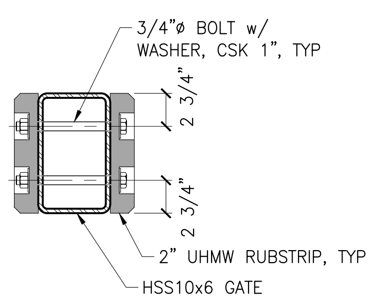
LIFE RING CABINET BASE PLAN
NTS



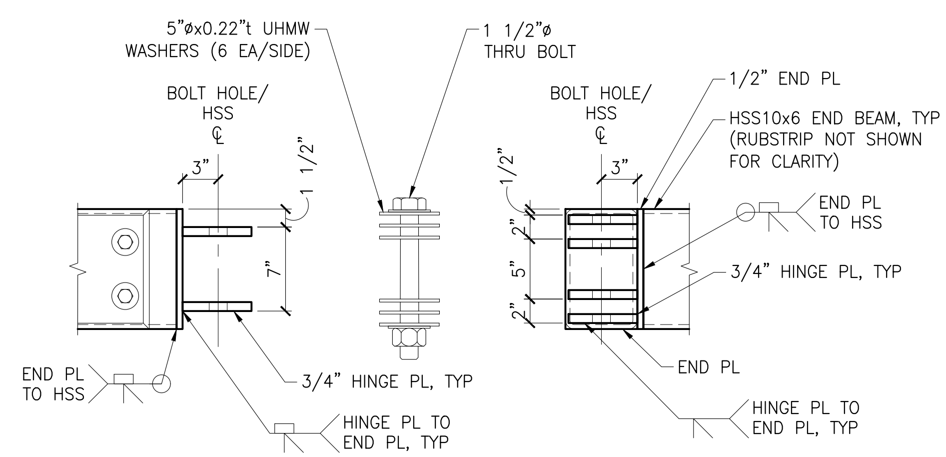
FIRE EXTINGUISHER BASE PLAN
NTS



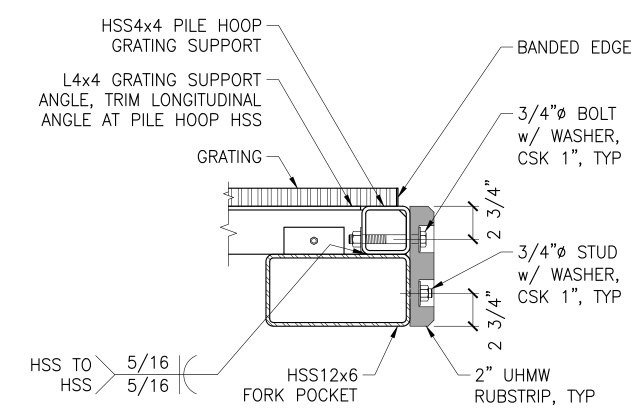
SECTION A-A
NTS



SECTION B-B
NTS



ELEVATION C-C
NTS



SECTION D-D
NTS

100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49 TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

1506 West 36th Avenue
Anchorage, Alaska 99503
Phone: 907.561.1011
Fax: 907.563.4220
www.pndengineers.com
PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: STRUT FLOAT DETAILS (2 OF 2)

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 3.07	SHEET NO: 15 OF 27
CHECKED BY: CDC	PROJECT NO: 171113		

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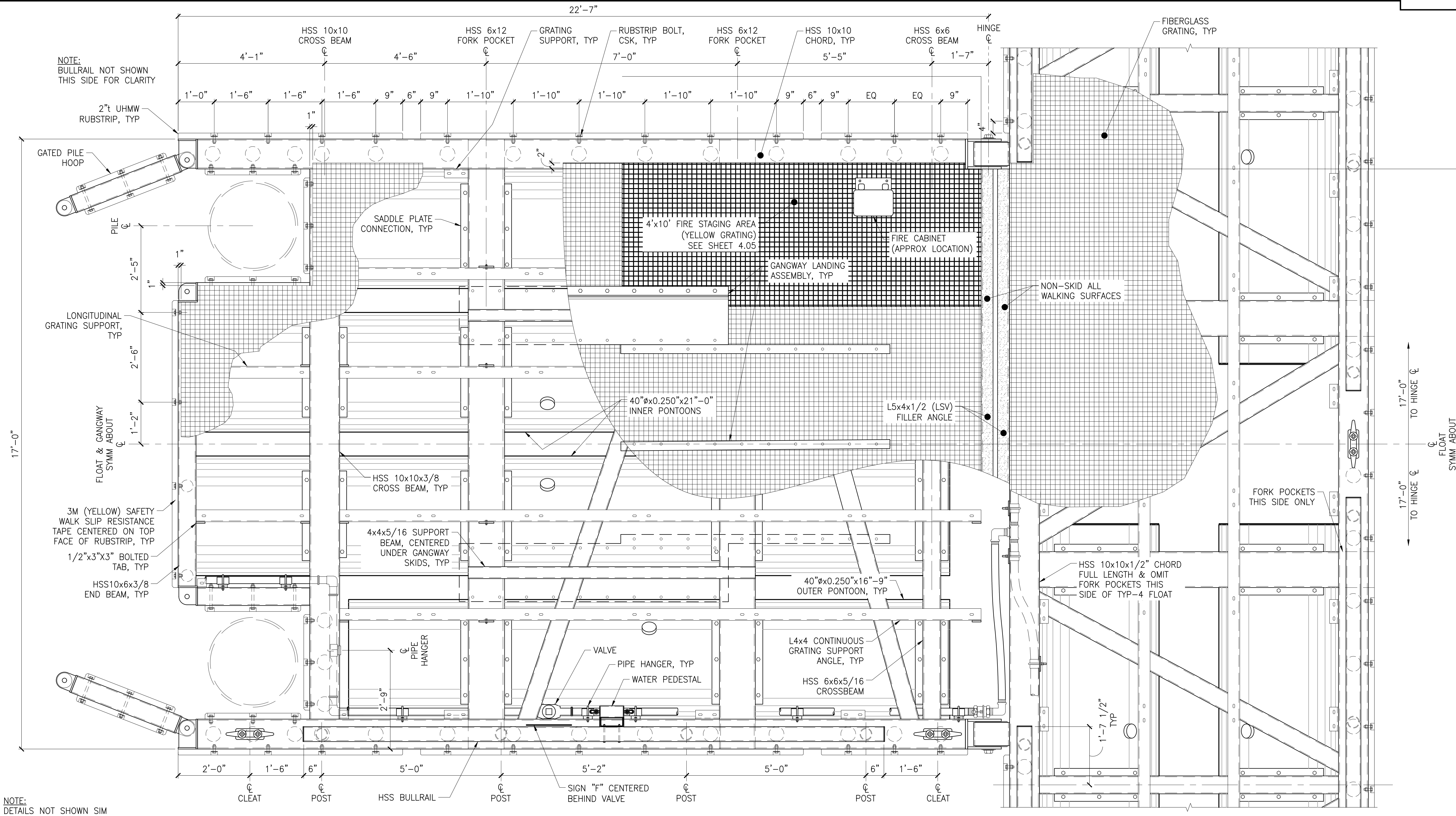

NOTE:
DETAILS NOT SHOWN SIM TO TYP-1 & ST-1 FLOATS

GANGWAY LANDING FLOAT (GW-1)

NTS ESTIMATED DRY WT = 27,000 LBS

GANGWAY CONNECTION FLOAT (TYPE-4)

NTS

100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER

DATE: 4/9/2019

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Anchorage, Alaska 99503
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www.pndengineers.com
PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: GANGWAY FLOAT (GW-1) PLAN

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 3.08
CHECKED BY: CDC	PROJECT NO: 171113	SHEET NO: 16 OF 27

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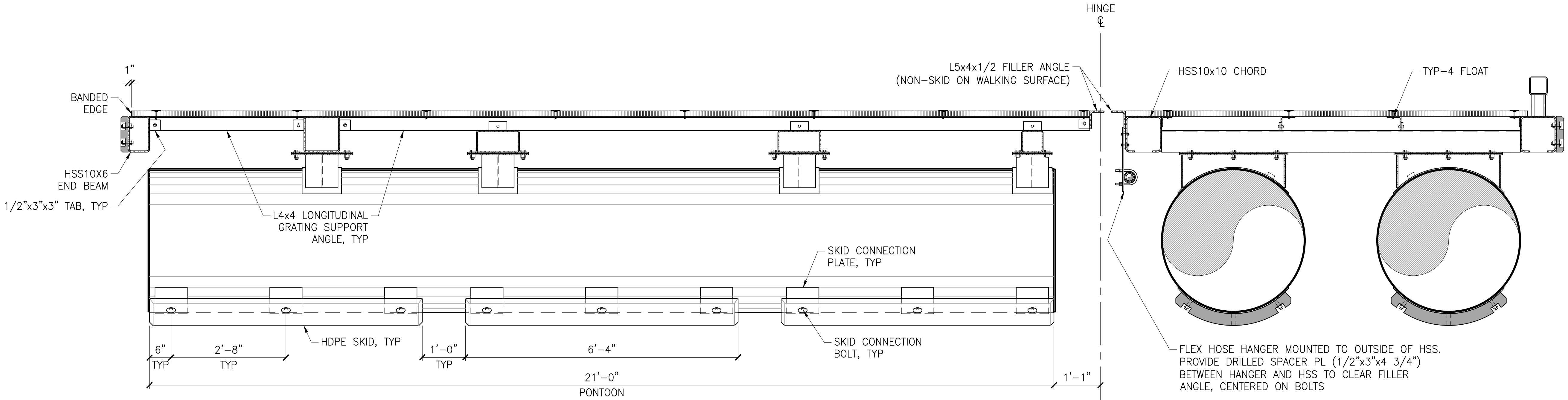
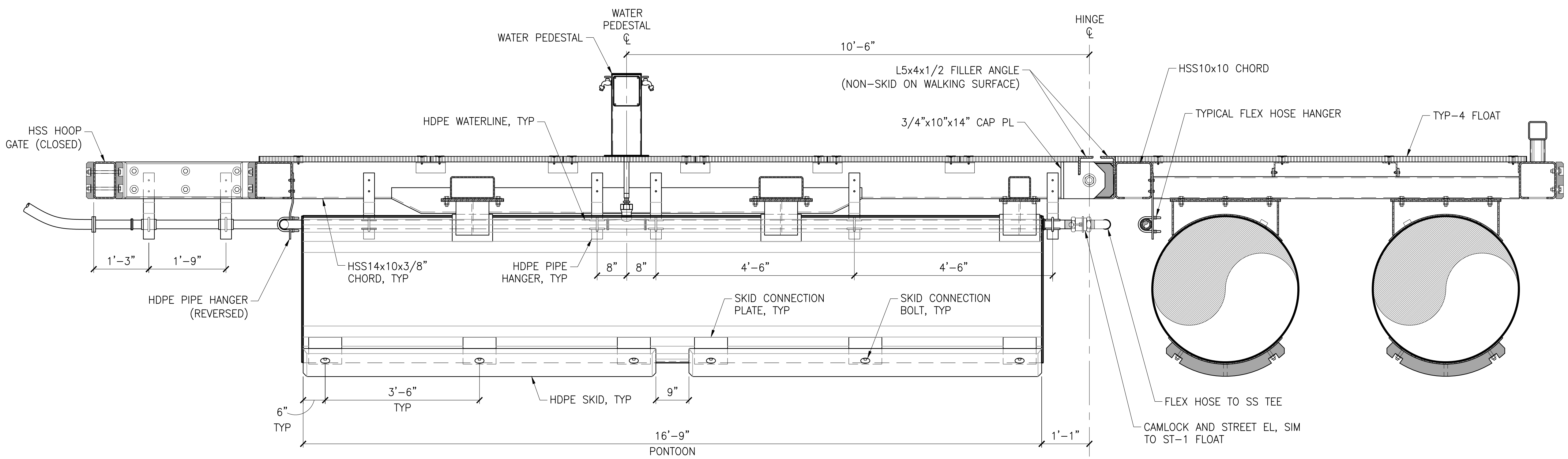


SECTION @ 21' PONTOONS

NTS



SECTION @ PILE HOOP

NTS

100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49 TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER

DATE: 4/9/2019

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Anchorage, Alaska 99503
Phone: 907.561.1011
Fax: 907.563.4220
www.pndengineers.com

PND ENGINEERS, INC.

PROJECT: **DILLINGHAM SMALL BOAT HARBOR REPLACEMENT**

TITLE: GANGWAY FLOAT SECTIONS

DESIGNED BY:	CR/BJ	DATE:	APRIL 2019	DWG NO:	3.09
CHECKED BY:	CDC	PROJECT NO:	171113	SHEET NO:	17 OF 27

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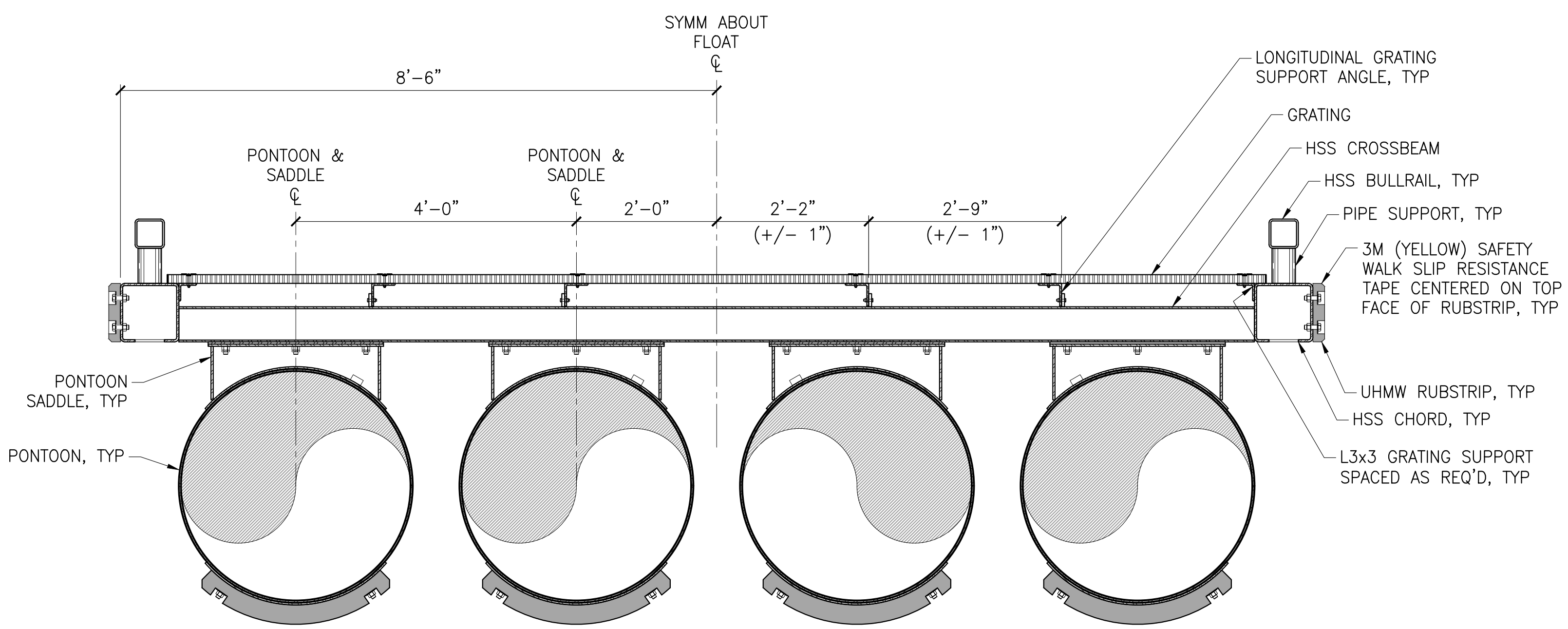
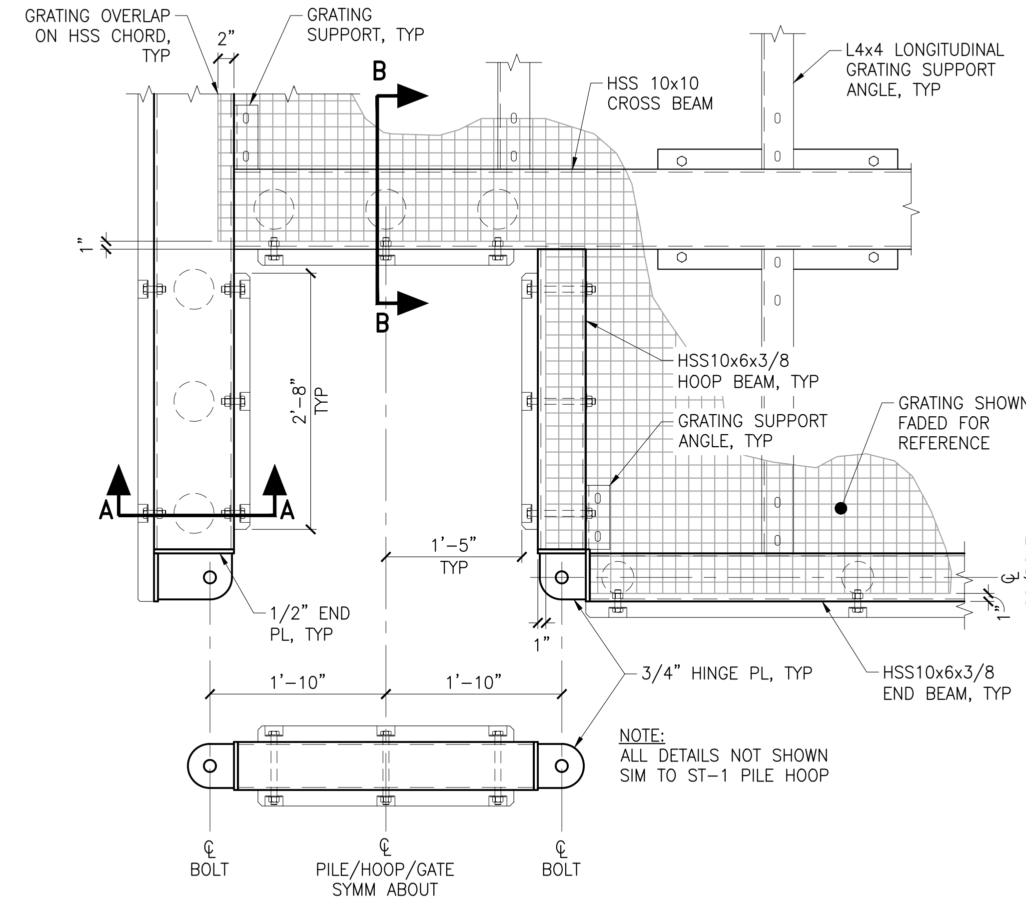
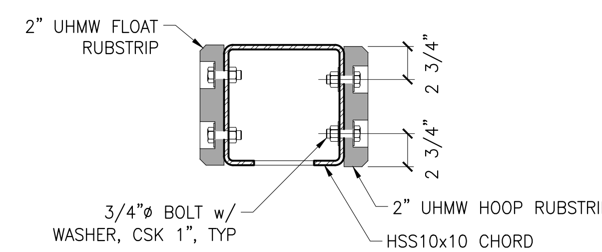


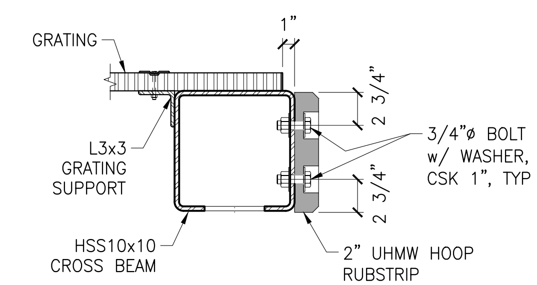
GW-1 TYPICAL SECTION
NTS



GW-1 PILE HOOP PLAN
NTS



SECTION A-A
NTS



SECTION B-B
NTS

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CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER

DATE: 4/9/2019

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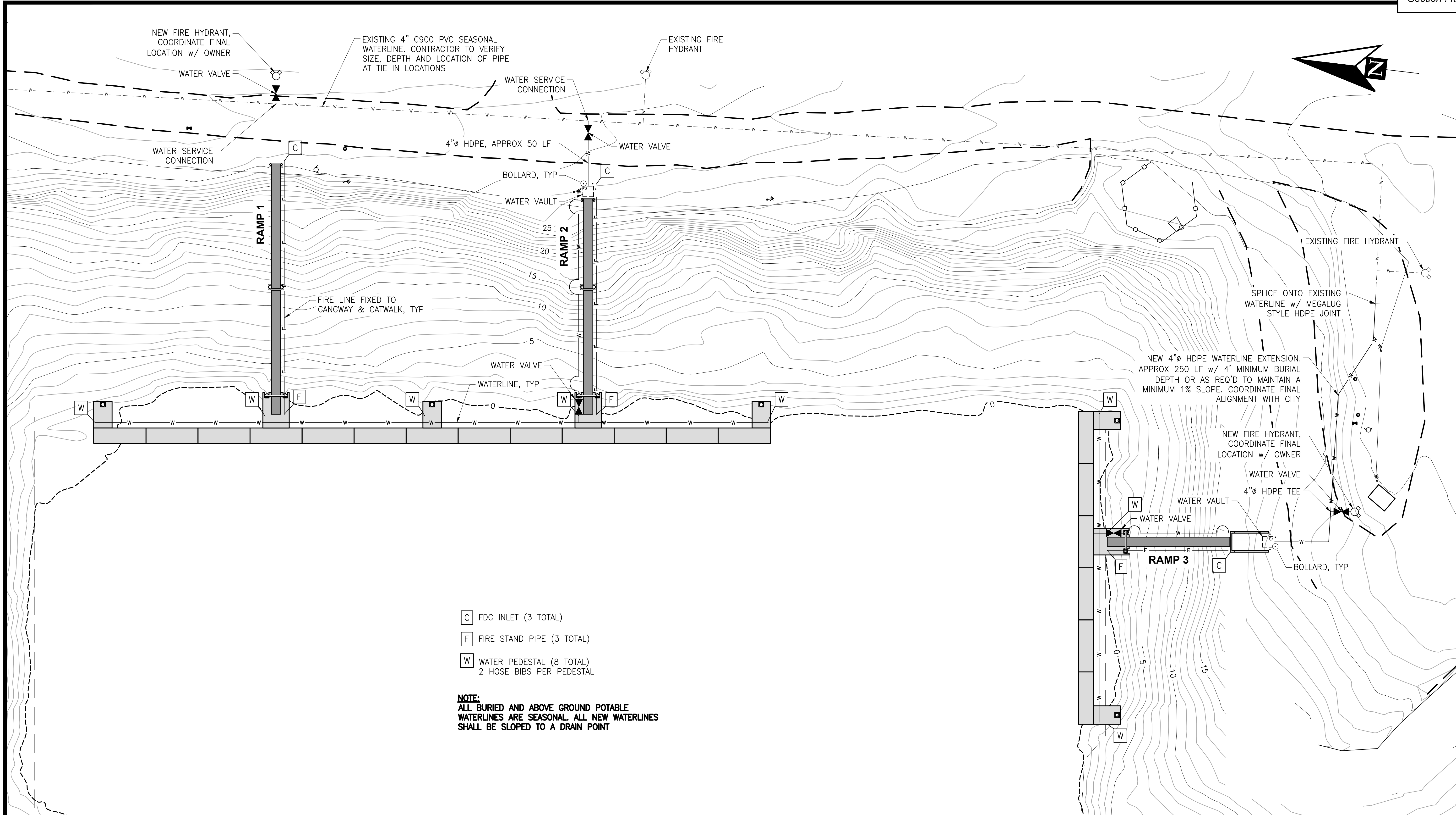
www.pndengineers.com
PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: GANGWAY FLOAT DETAILS

DESIGNED BY:	CR/BJ	DATE:	APRIL 2019	DWG NO: 3.10
CHECKED BY:	CDC	PROJECT NO:	171113	SHEET NO: 18 OF 27



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4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

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www.pndengineers.com
PND ENGINEERS, INC.

PROJECT:
DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE:
WATER SUPPLY PLAN

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 4.01
CHECKED BY: CDC	PROJECT NO: 171113	SHEET NO: 19 OF 27

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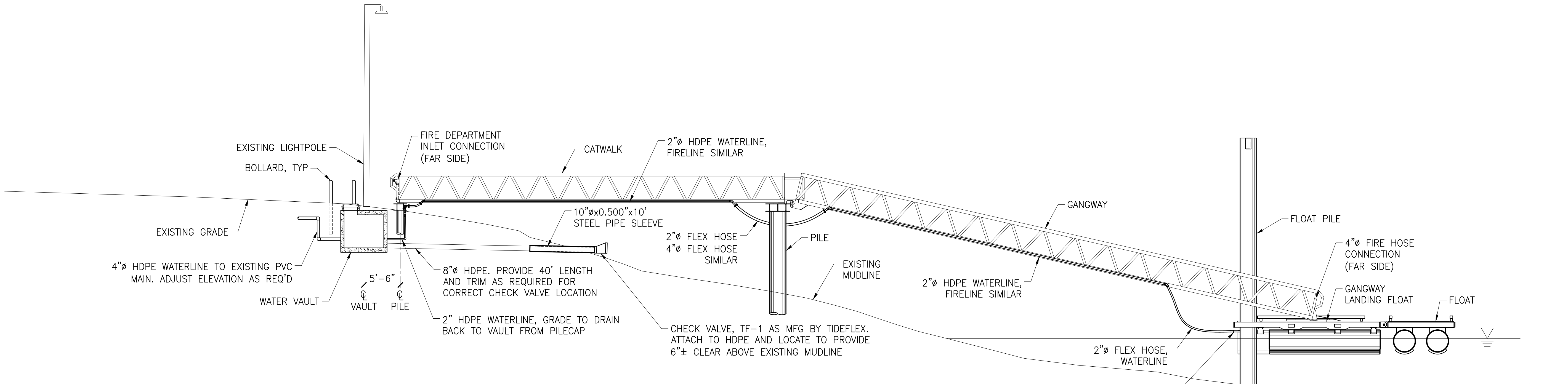
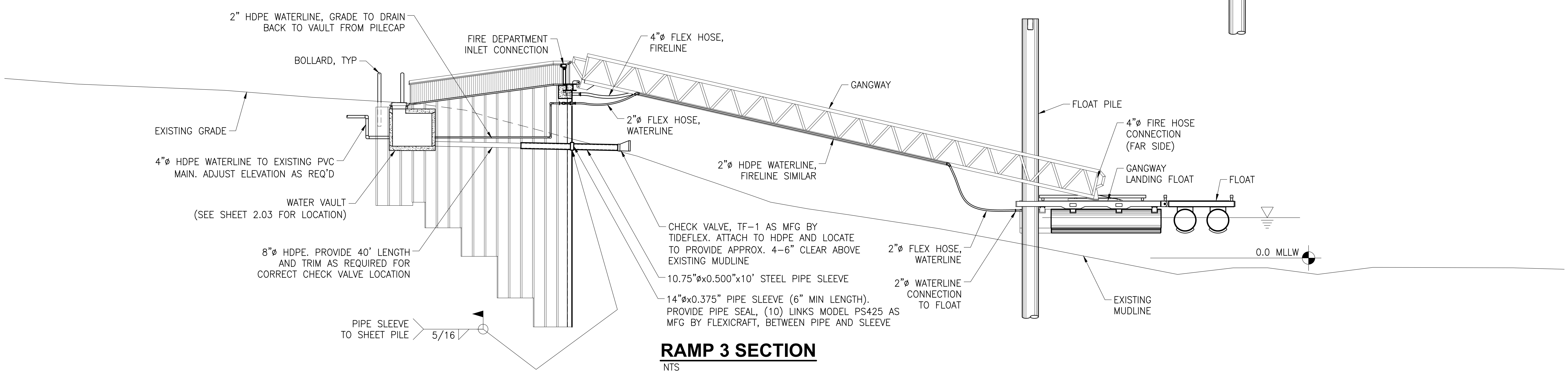


RAMP 2 SECTION
NTS

NOTE:
RAMP 1 SIMILAR



RAMP 3 SECTION
NTS

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100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

1506 West 36th Avenue
Anchorage, Alaska 99503
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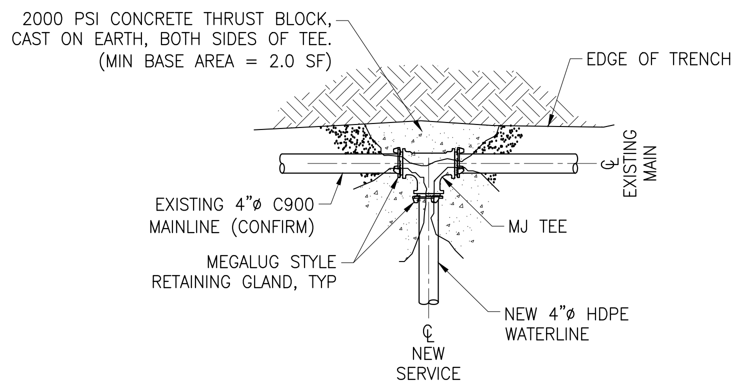
Fax: 907.563.4220
www.pndengineers.com
PND ENGINEERS, INC.

PROJECT:
DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE:
WATER SUPPLY SECTIONS

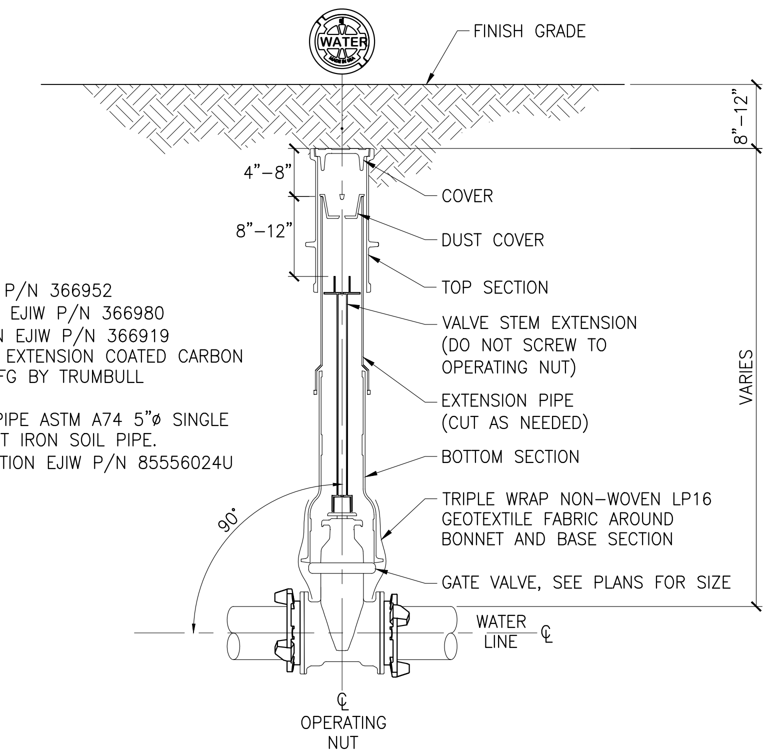
DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 4.02	SHEET NO: 20 OF 27
CHECKED BY: CDC	PROJECT NO: 171113		



WATER SERVICE CONNECTION (EXISTING MAIN)

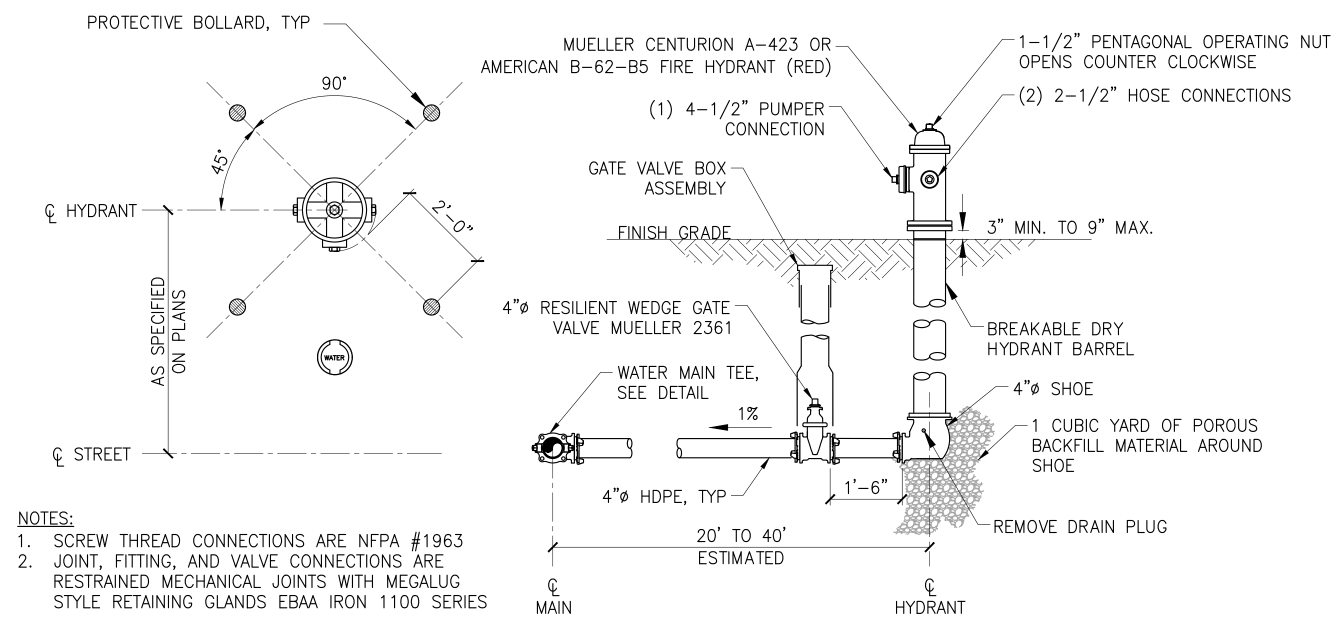
NTS

NOTES:
1. COVER EJIW P/N 366952
2. DUST COVER EJIW P/N 366980
3. TOP SECTION EJIW P/N 366919
4. VALVE STEM EXTENSION COATED CARBON STEEL AS MFG BY TRUMBULL INDUSTRIES
5. EXTENSION PIPE ASTM A74 5"ø SINGLE HUB SV CAST IRON SOIL PIPE.
6. BOTTOM SECTION EJIW P/N 85556024U



GATE VALVE BOX

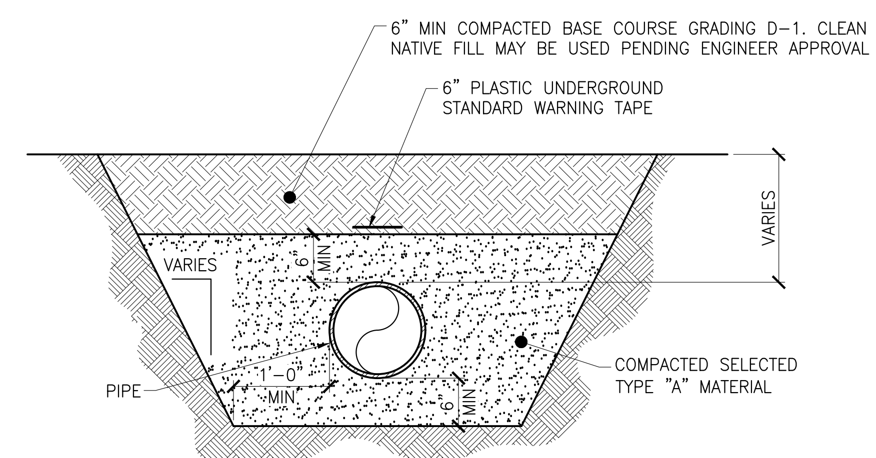
NTS



NOTES:
1. SCREW THREAD CONNECTIONS ARE NFPA #1963
2. JOINT, FITTING, AND VALVE CONNECTIONS ARE RESTRAINED MECHANICAL JOINTS WITH MEGALUG STYLE RETAINING GLANDS EBAA IRON 1100 SERIES

FIRE HYDRANT

NTS



TYPICAL TRENCH SECTION

NTS

NOTE:
1) TRENCH WALL SLOPES WILL VARY WITH SOIL STRENGTH AND CHARACTER PER OSHA
2) SLOPE PIPE TO DRAIN 1% MIN TO OUTLET

J:\2017\171113 Dillingham Small Boat Harbor\Drawings\4.02_4.07 Water Details.dwg, 4.03, 4/9/2019 3:50:34 PM, james, 1:2

100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER

DATE: 4/9/2019

1506 West 36th Avenue
Anchorage, Alaska 99503
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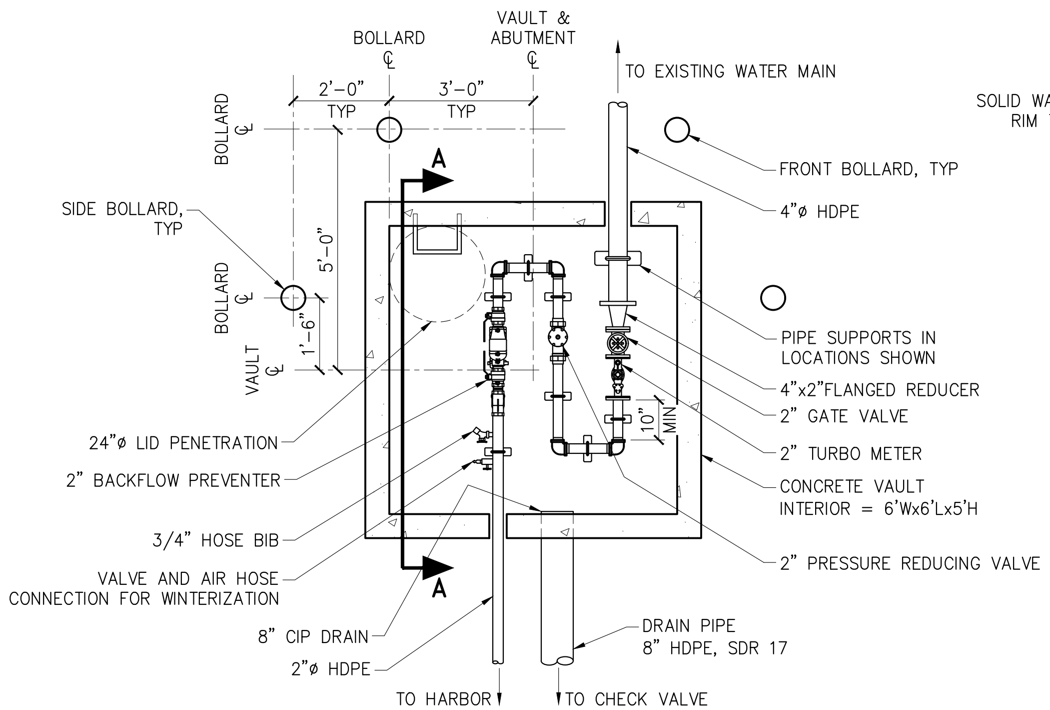
www.pndengineers.com

PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

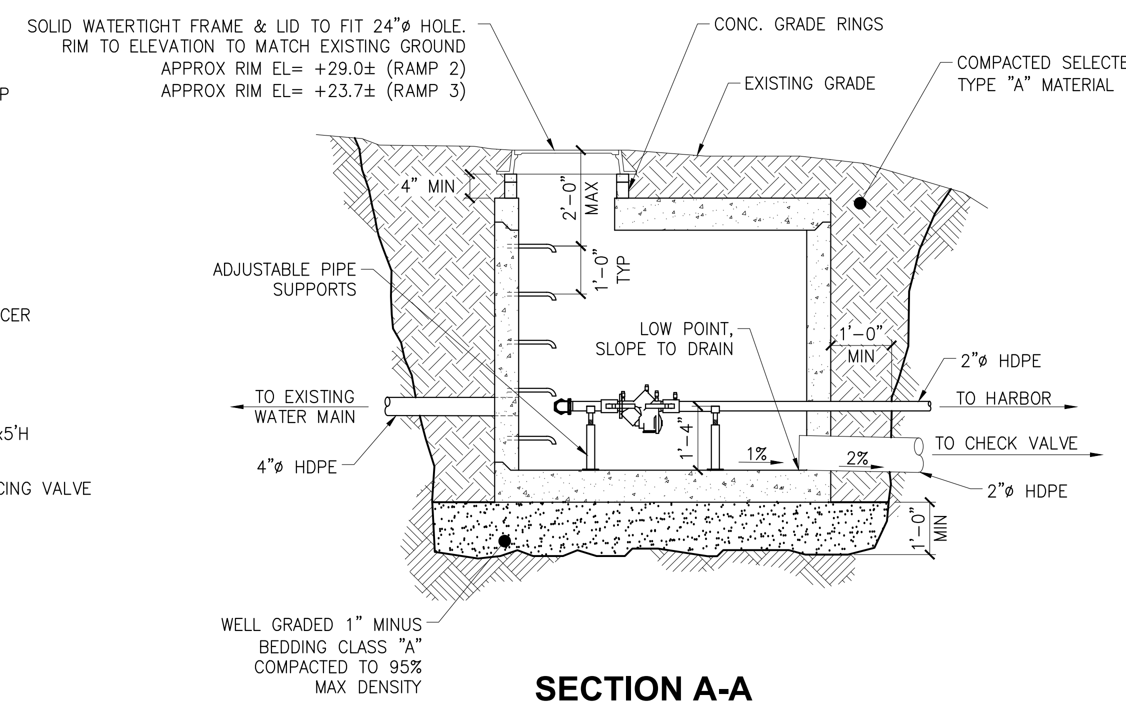
TITLE: UPLANDS WATER DETAILS (1 OF 2)

DESIGNED BY:	CR/BJ	DATE:	APRIL 2019	DWG NO: 4.03
CHECKED BY:	CDC	PROJECT NO:	171113	SHEET NO: 21 OF 27



WATER SERVICE VAULT PLAN

NTS

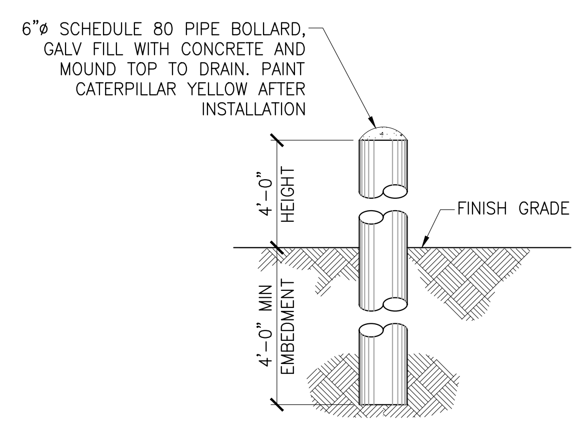


SECTION A-A

NTS

NOTES:

1. CONTRACTOR SHALL SUBMIT VAULT LAYOUT & PIPE SUPPORT PLAN FOR ENGINEER APPROVAL PRIOR TO VAULT CONSTRUCTION.
2. GROUT ALL WALL PENETRATIONS WITH NON-SHRINK GROUT.
3. ADJUSTABLE PIPE SUPPORTS SHALL BE STANDON MODEL S92 (HOT DIP GALV). ANCHOR BASE PLATES TO VAULT FLOOR
4. RESILIENT WEDGE GATE VALVE SHALL BE WATTS SERIES 405-NRS-RW
5. TURBO METER SHALL BE BADGER RECORDALL MODEL 200
6. PRESSURE REDUCING VALVE SHALL BE WATTS SERIES LF25AUB-Z3
7. BACKFLOW PREVENTER SHALL BE WATTS LF909 M1-QT-S
8. ALL PARTS SHALL BE AS SPECIFIED OR APPROVED EQUAL
9. VAULT DESIGN PER ASTM C-857. VAULT, FRAME, AND LID SHALL BE RATED FOR AASHTO HS-20 LOADING



TYPICAL PROTECTIVE BOLLARD

NTS

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4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49 TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

1506 West 36th Avenue
Anchorage, Alaska 99503
Phone: 907.561.1011
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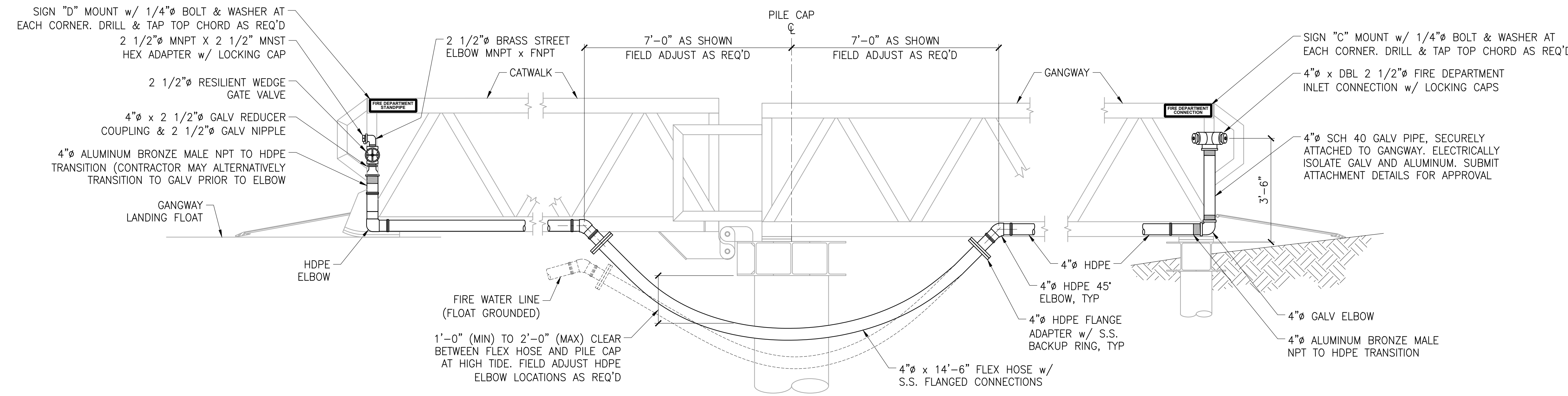
PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

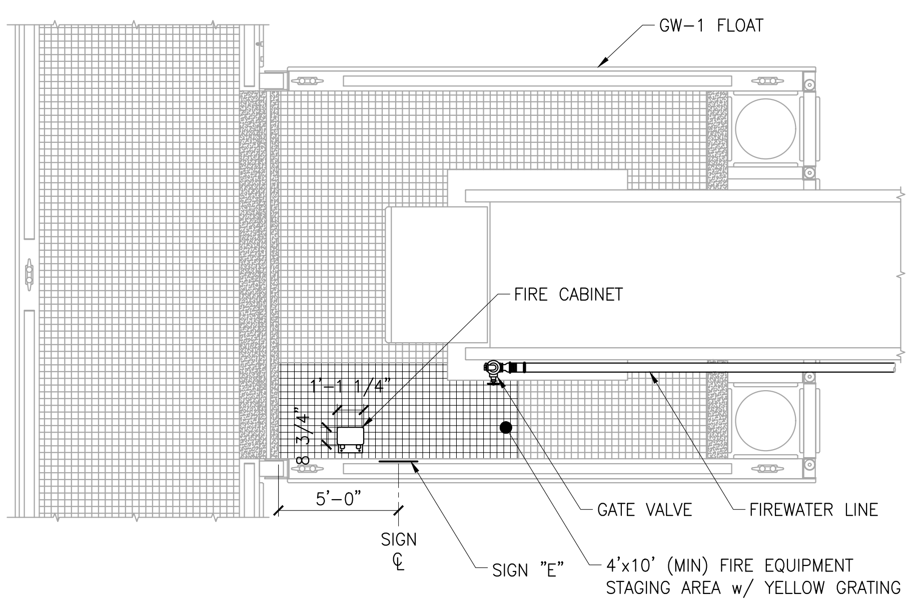
TITLE: UPLANDS WATER DETAILS (2 OF 2)

DESIGNED BY:	CR/BJ	DATE:	APRIL 2019	DWG NO: 4.04
CHECKED BY:	CDC	PROJECT NO:	171113	SHEET NO: 22 OF 27



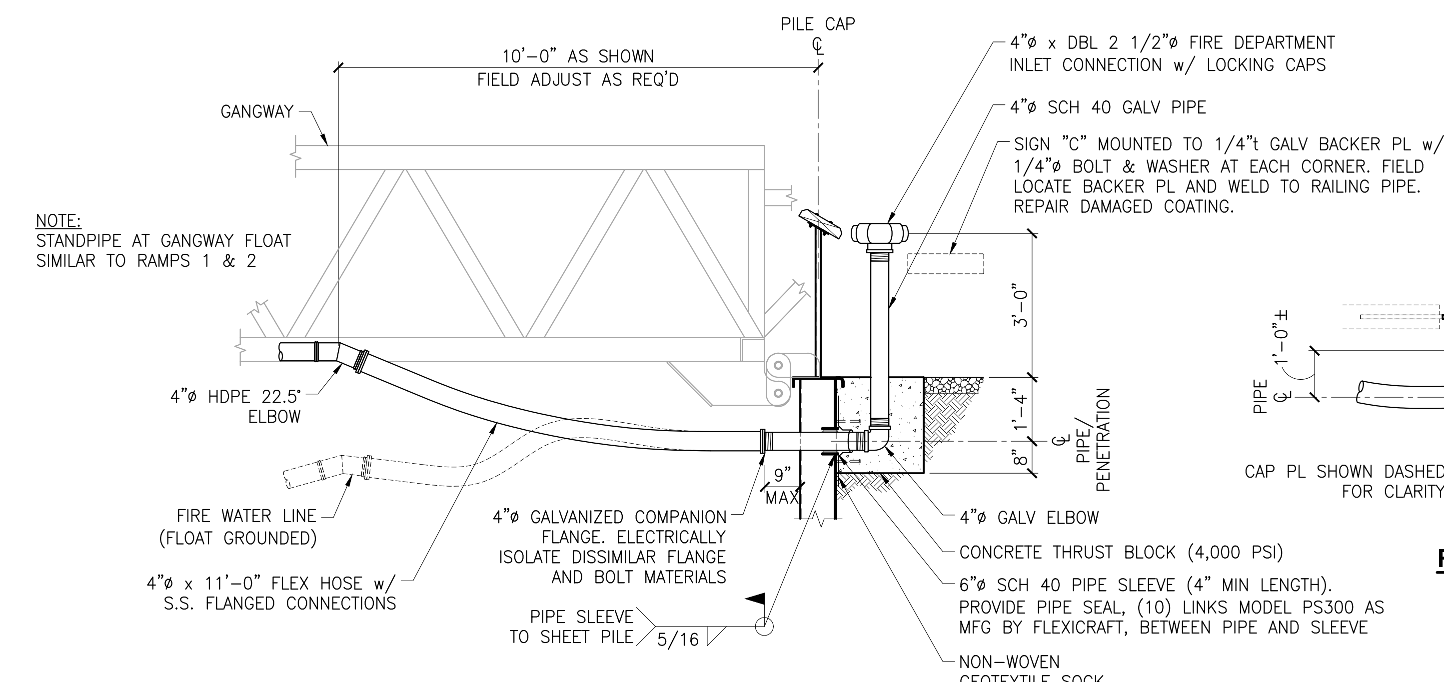
RAMPS 1 & 2

SHEET NOTE:
HANDRAILS, PIPE RAILS, AND OTHER DETAILS NOT SHOWN FOR CLARITY

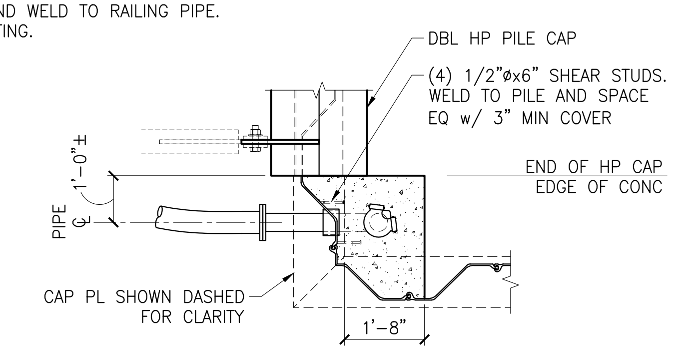


FIRE EQUIPMENT STAGING AREA
NTS

NOTE:
STANDPIPE AT GANGWAY FLOAT SIMILAR TO RAMPS 1 & 2



RAMP 3



RAMP 3 CORNER PLAN

FIREWATER ROUTING FROM SHORE
NTS

J:\2017\171113 Dillingham Small Boat Harbor\Drawings\4.02_4.07 Water Details.dwg, 4.05, 4/9/2019 3:50:36 PM, james, 1:2

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4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

1506 West 36th Avenue
Anchorage, Alaska 99503
Phone: 907.561.1011
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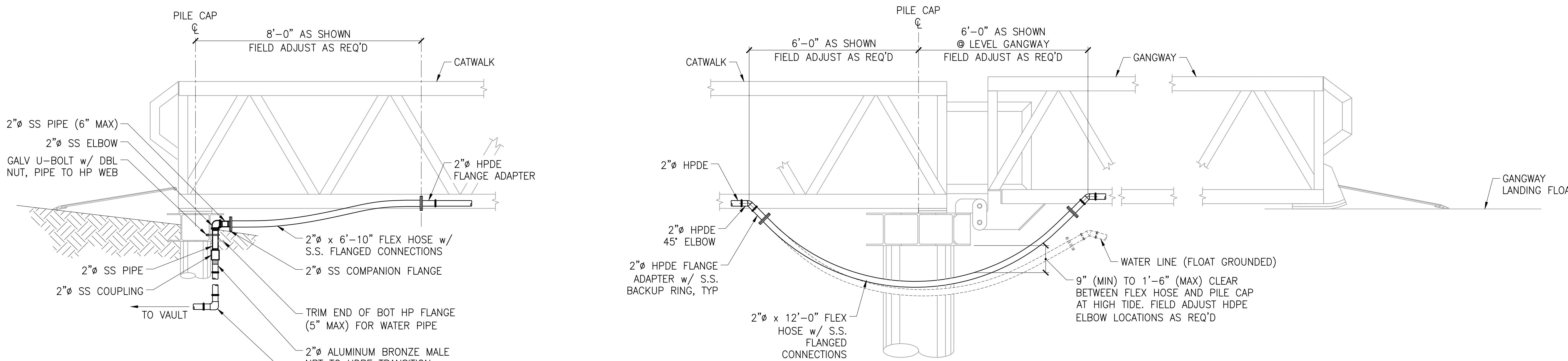
www.pndengineers.com
PND ENGINEERS, INC.

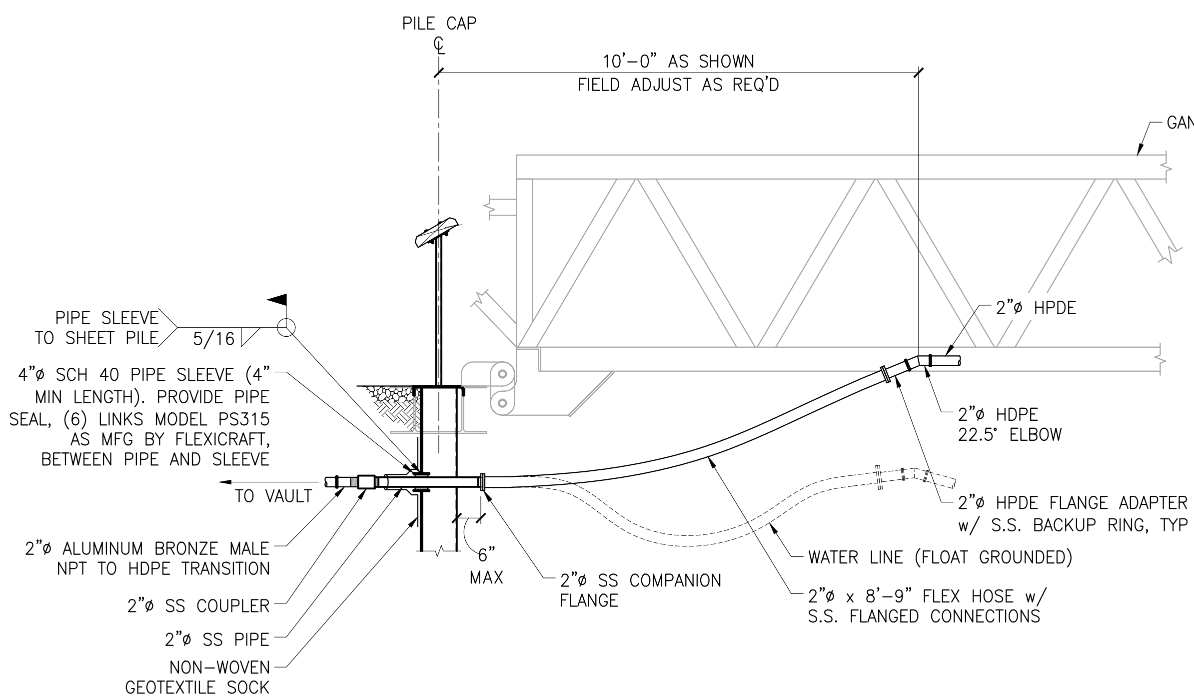
PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT
TITLE: FIREWATER ROUTING FROM SHORE

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 4.05
CHECKED BY: CDC	PROJECT NO: 171113	SHEET NO: 23 OF 27

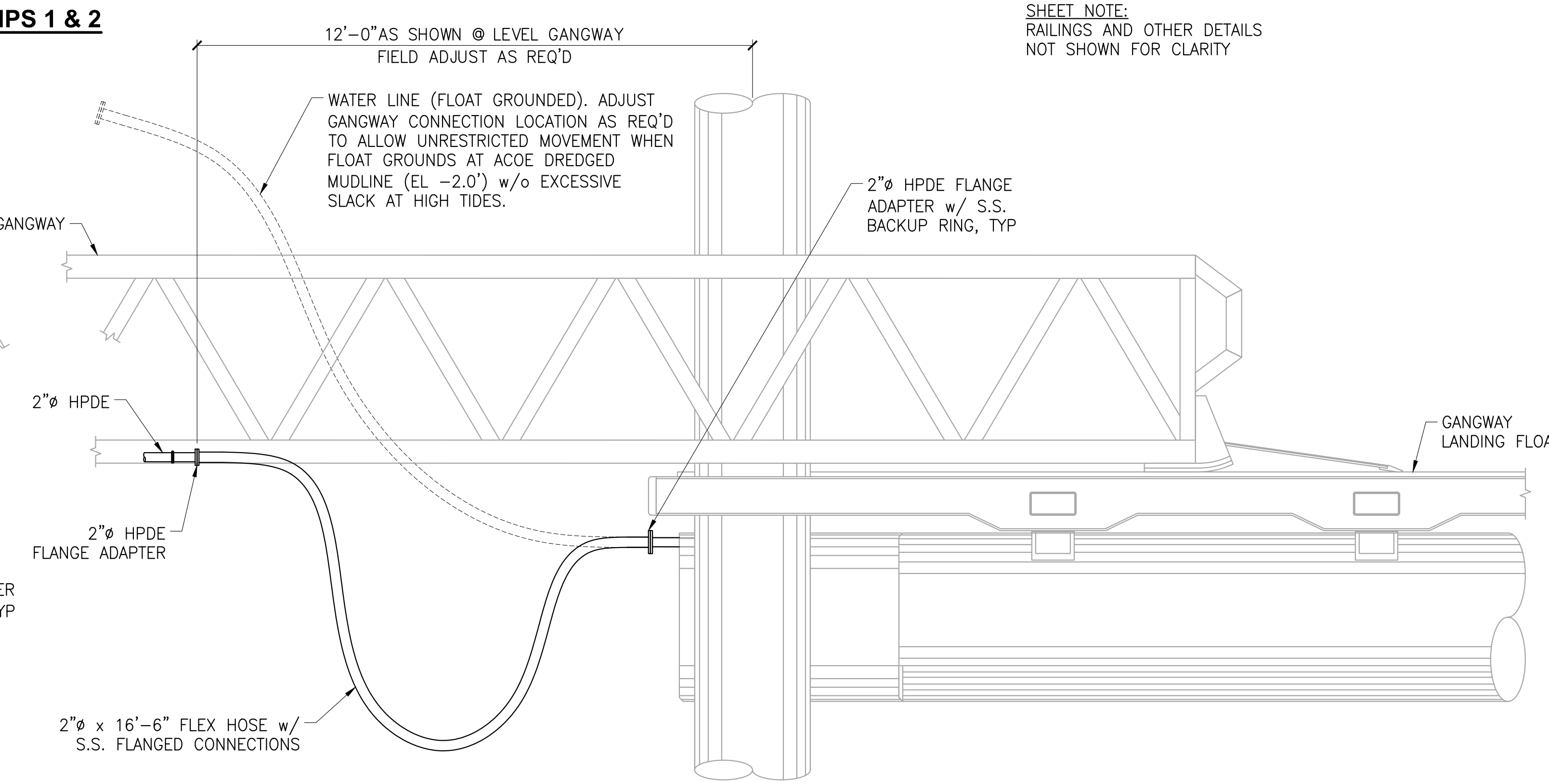


RAMPS 1 & 2

SHEET NOTE:
RAILINGS AND OTHER DETAILS NOT SHOWN FOR CLARITY



RAMP 3



TYPICAL FLOAT WATERLINE CONNECTION

WATERLINE ROUTING FROM SHORE

NTS

100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49 TH
Dempsey S. Thieman
CE-9974
REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

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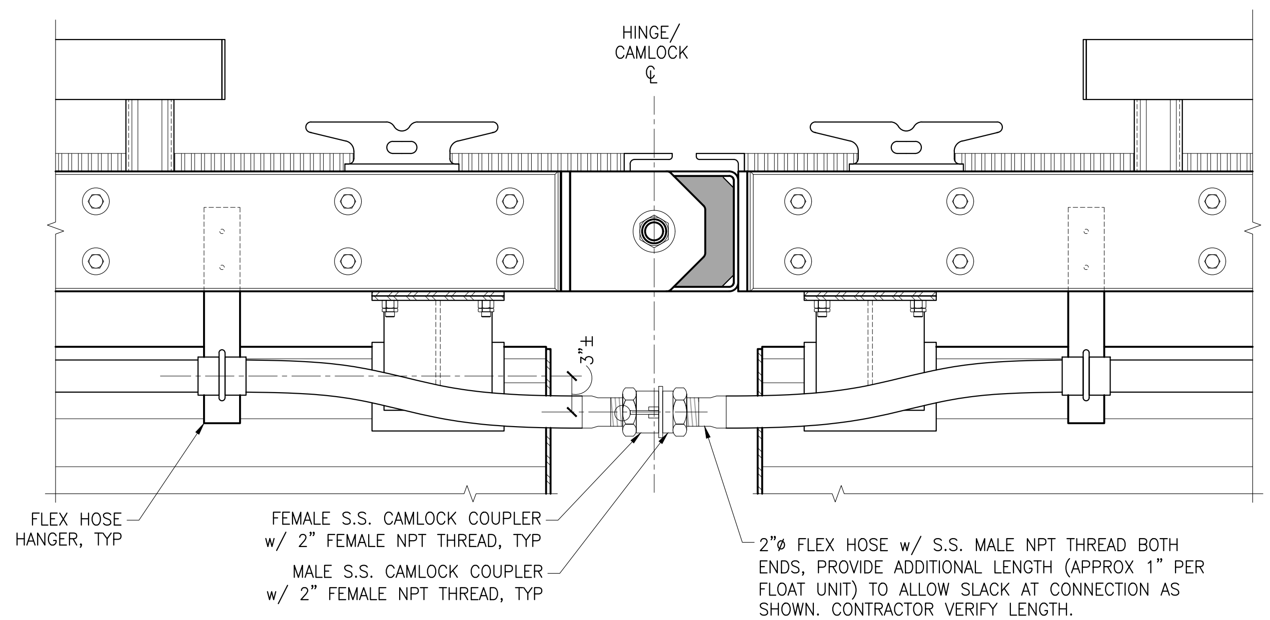
Phone: 907.561.1011
Fax: 907.563.4220
www.pndengineers.com
PND ENGINEERS, INC.

PROJECT: **DILLINGHAM SMALL BOAT HARBOR REPLACEMENT**

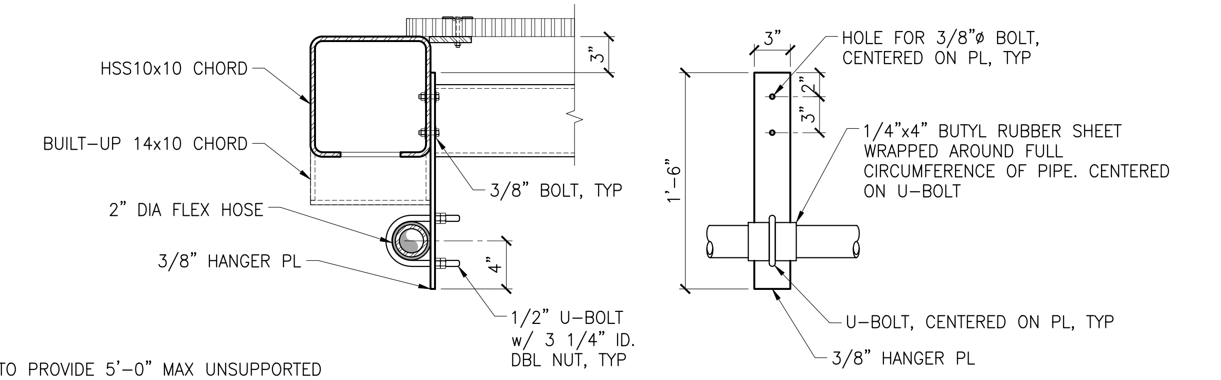
TITLE: POTABLE WATER ROUTING FROM SHORE

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 4.06	SHEET NO: 24 OF 27
CHECKED BY: CDC	PROJECT NO: 171113		



HOSE CONNECTION @ TYP FLOAT HINGE

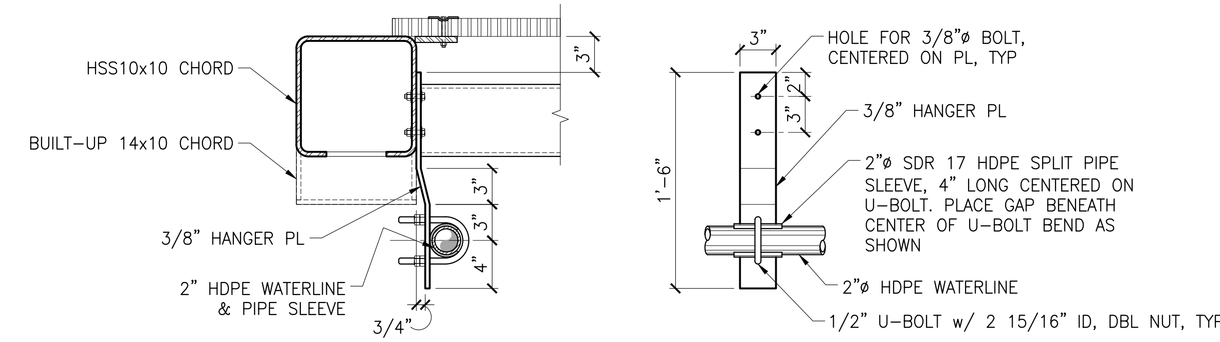
NTS



NOTE:
LOCATE HANGERS TO PROVIDE 5'-0" MAX UNSUPPORTED LENGTH OF FLEX HOSE/HDPE PIPE UNLESS OTHERWISE NOTED. SUBMIT PROPOSED HANGER LOCATIONS ON FLOAT SHOP DRAWINGS FOR APPROVAL

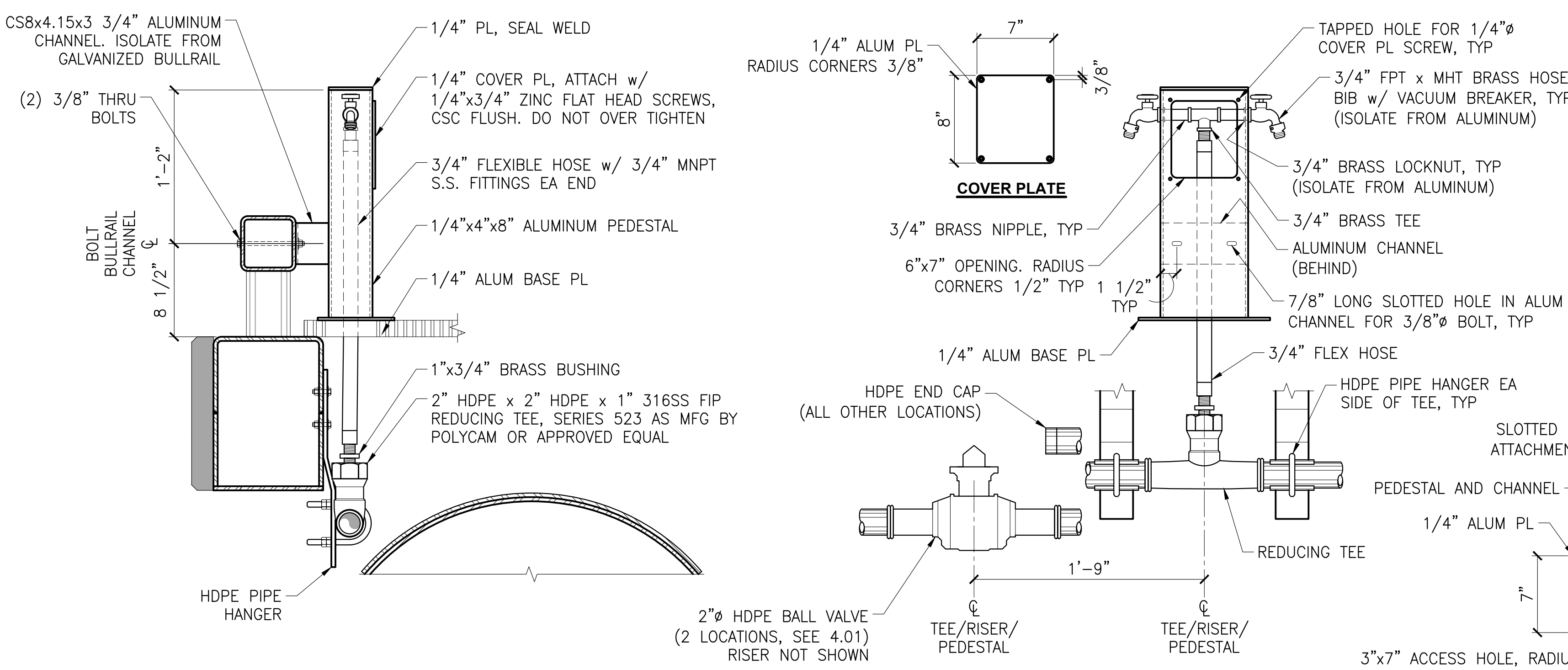
FLEX HOSE HANGER

NTS



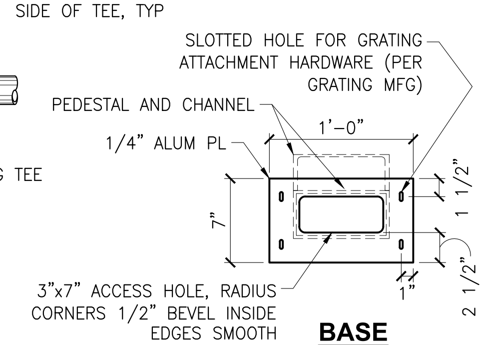
HDPE PIPE HANGER

NTS

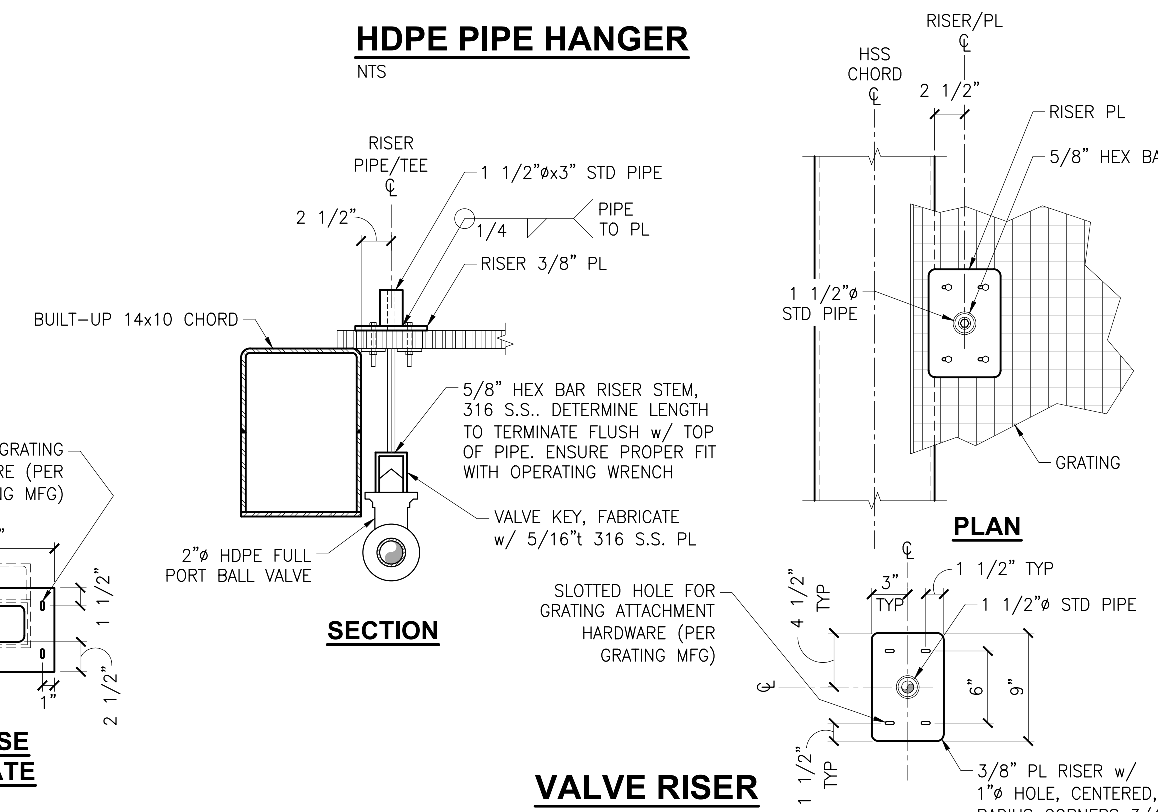


WATER PEDESTAL DETAILS

NTS



BASE PLATE



VALVE RISER

NTS

100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

1506 West 36th Avenue
Anchorage, Alaska 99503
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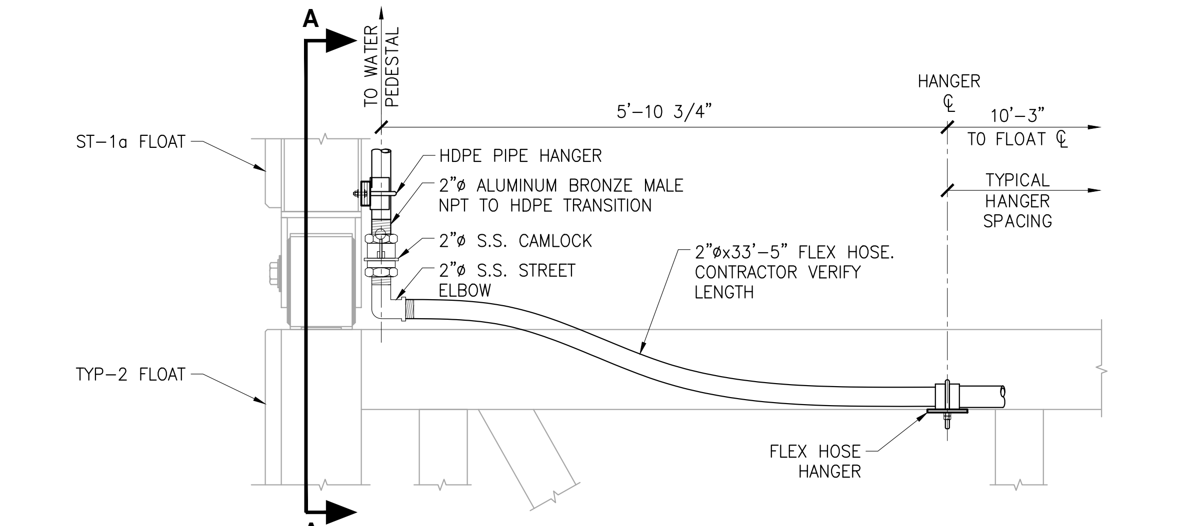
Fax: 907.563.4220
www.pndengineers.com
PND ENGINEERS, INC.

PROJECT: DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE: FLOAT WATER DETAILS (1 OF 2)

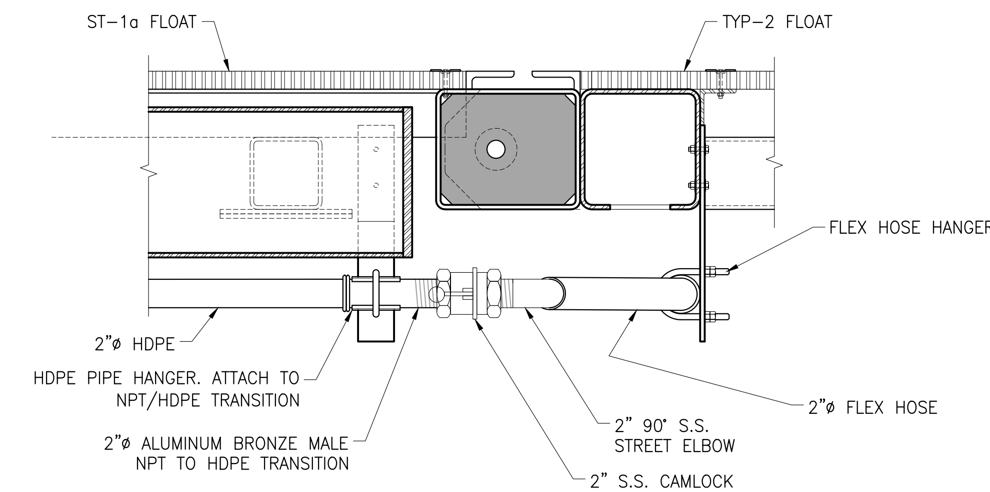
DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 4.07	SHEET NO: 25 OF 27
CHECKED BY: CDC	PROJECT NO: 171113		



ST-1a/TYP-2 WATER CONNECTION

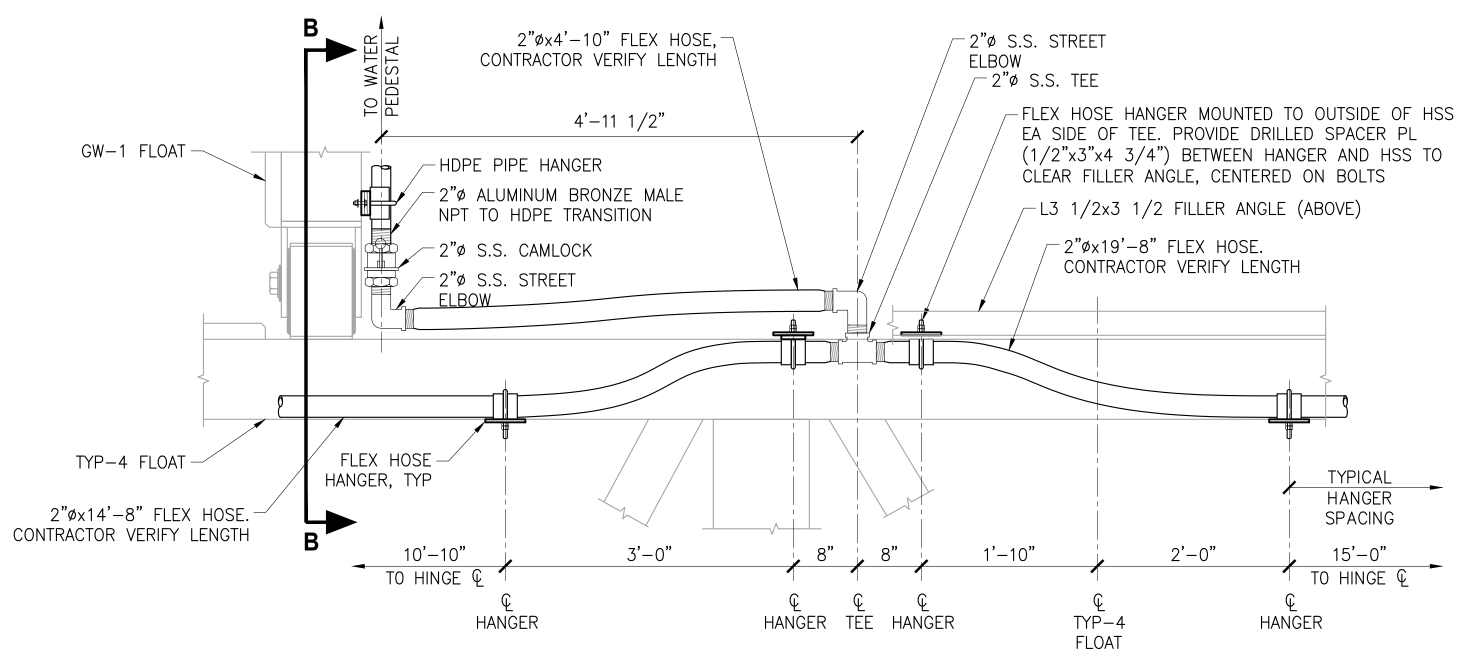
NTS

NOTE:
ST-1b/TYP-3 WATER CONNECTION OPPOSITE HAND



SECTION A-A

NTS



GW-1/TYP-4 WATER CONNECTION

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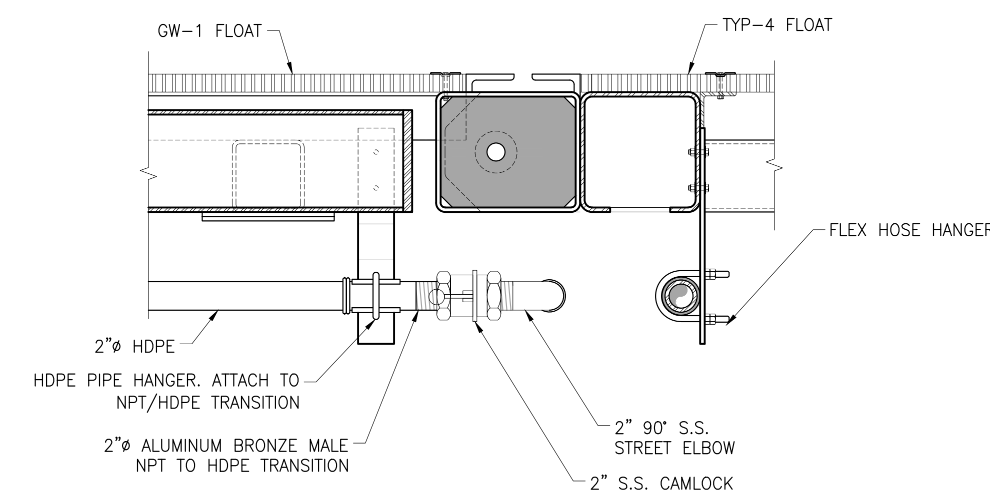


SECTION B-B

NTS

100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH Dempsey S. Thieman CE-9974 REGISTERED PROFESSIONAL ENGINEER

DATE: 4/9/2019

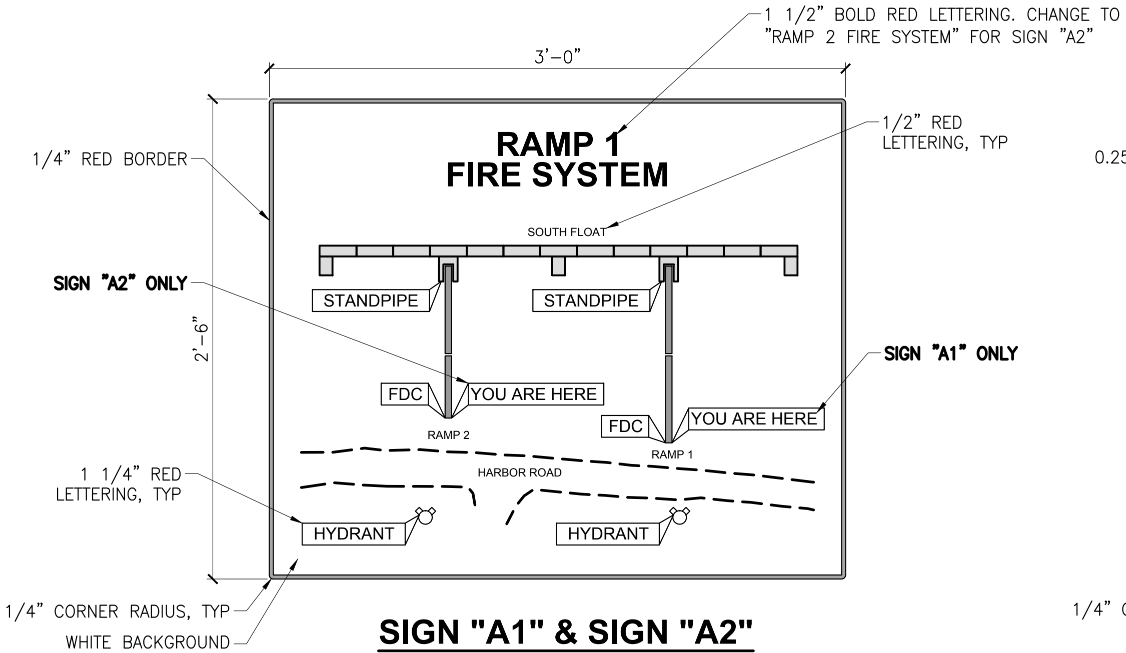
1506 West 36th Avenue
Anchorage, Alaska 99503
Phone: 907.561.1011
Fax: 907.563.4220
www.pndengineers.com

PND ENGINEERS, INC.

PROJECT:
DILLINGHAM SMALL BOAT HARBOR REPLACEMENT

TITLE:
FLOAT WATER DETAILS (2 OF 2)

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 4.08
CHECKED BY: CDC	PROJECT NO: 171113	SHEET NO: 26 OF 27



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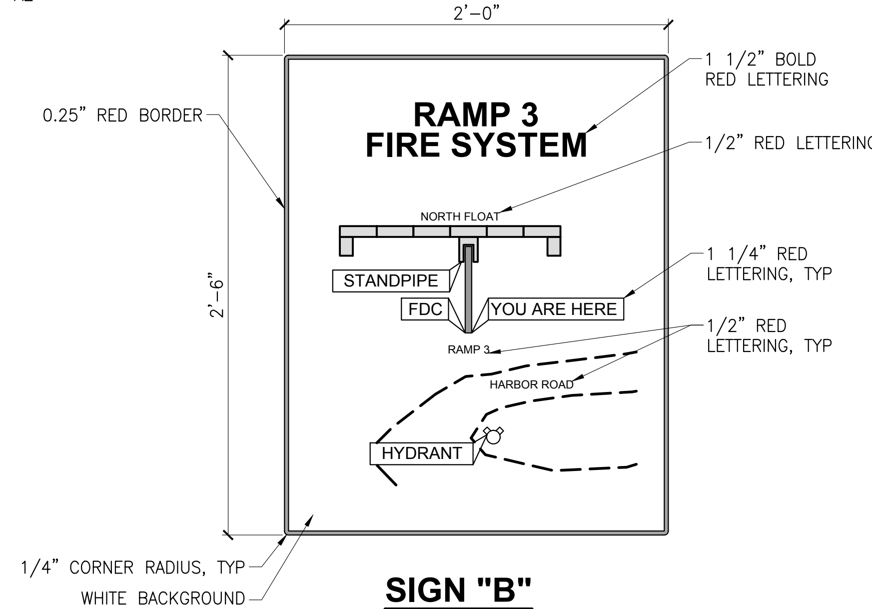
NTS (1 OF EACH)



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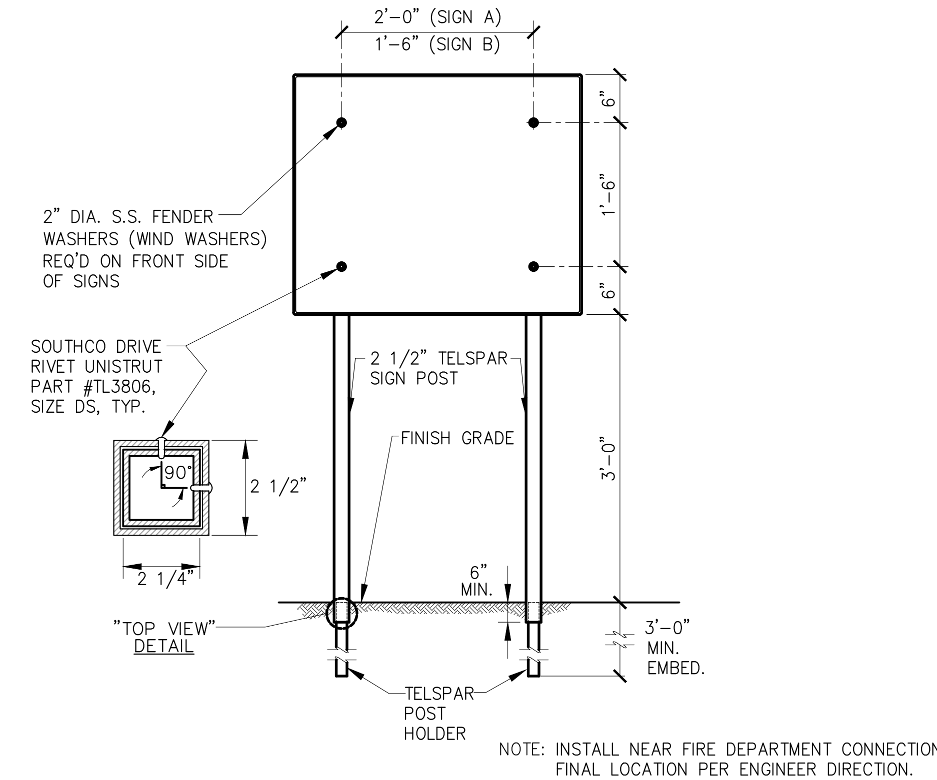
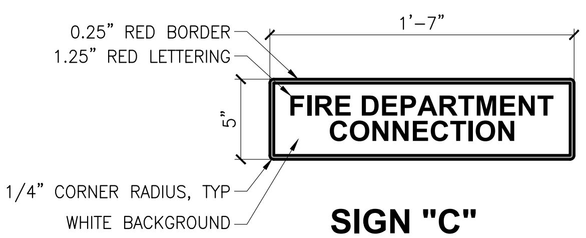


SIGN "A" & SIGN "B" MOUNT ELEVATION
NTS



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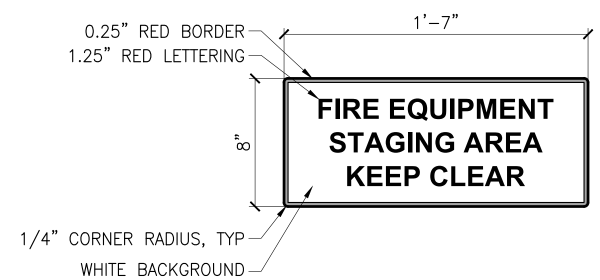

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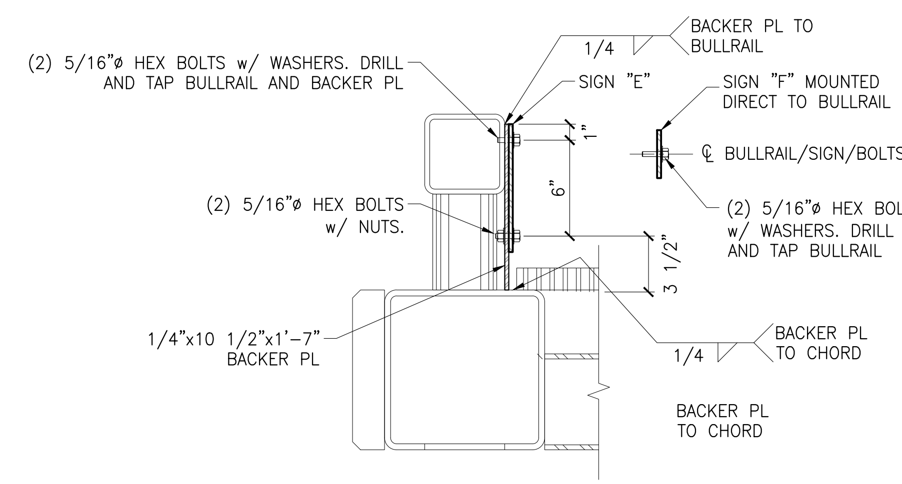

BULLRAIL MOUNTED SIGNS
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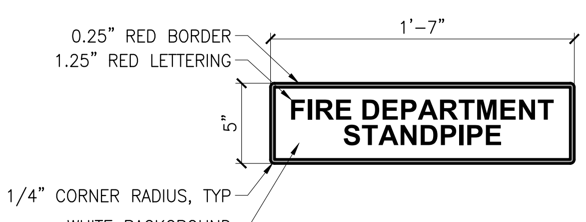

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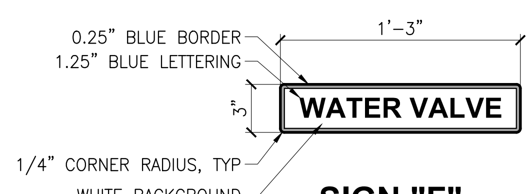

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J:\2017\171113 Dillingham Small Boat Harbor\Drawings\4.02_4.07 Water Details.dwg, 4.09, 4/9/2019 3:50:40 PM, james, 1:2

100% DESIGN
4/9/2019

CITY OF DILLINGHAM ALASKA

REV	DATE	DESCRIPTION

STATE OF ALASKA 49TH — Dempsey S. Thieman CE-9974 — REGISTERED PROFESSIONAL ENGINEER
DATE: 4/9/2019

1506 West 36th Avenue
Anchorage, Alaska 99503
Phone: 907.561.1011
Fax: 907.563.4220
www.pndengineers.com
PND ENGINEERS, INC.

PROJECT: **DILLINGHAM SMALL BOAT HARBOR REPLACEMENT**

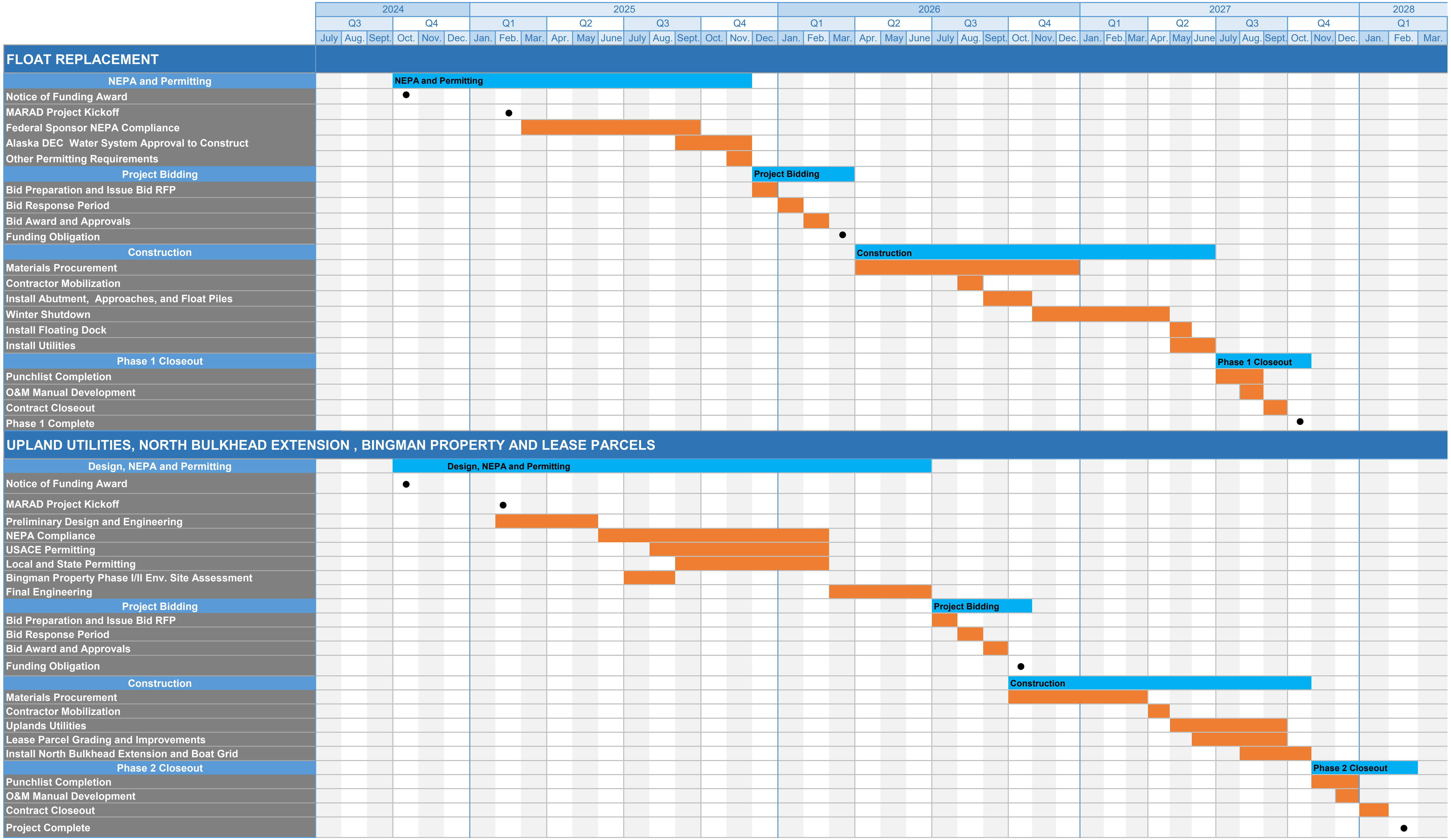
TITLE: WATER SIGNAGE

DESIGNED BY: CR/BJ	DATE: APRIL 2019	DWG NO: 4.09
CHECKED BY: CDC	PROJECT NO: 171113	SHEET NO: 27 OF 27

No.	Description	Quantity	Units	Unit Cost	Total Cost
1	**Small Boat Harbor Float Replacement**	**1**	**LS**	**$10,225,750.00**	**$10,225,750**
1.1	**Mobilization and Demoblization**	**1**	**LS**	**$1,024,000**	**$1,024,000**
1.2	**Demolition**	**1**	**LS**	**$40,000**	**$40,000**
1.2.1	*Remove Existing Piles and Pipe Struts*	*1*	*LS*	*$25,000*	*$25,000*
1.2.2	*Demo Abutments and Misc Clearing*	*1*	*LS*	*$15,000*	*$15,000*
1.3	**Float Approaches and Gangways**	**1**	**LS**	**$819,000**	**$819,000**
1.3.1	*Provide and Install Abutments*	*3*	*EA*	*$78,000*	*$234,000*
1.3.2	*Provide and Install Pile Supported Bents*	*1*	*LS*	*$230,000*	*$230,000*
1.3.3	*Provide and Install Gangways and Catwalks*	*355*	*LF*	*$1,000*	*$355,000*
1.4	**Float System**	**1**	**LS**	**$6,425,750**	**$6,425,750**
1.3.1	*Provide and Install Steel Floats*	*8,655*	*SF*	*$650*	*$5,625,750*
1.3.2	*Provide and Install Pile*	*1*	*LS*	*$800,000*	*$800,000*
1.5	**Utilities**	**1**	**LS**	**$223,000**	**$223,000**
1.5.1	*Provide and Install Water System*	*1*	*LS*	*$140,000*	*$140,000*
1.5.2	*Provide and Install Fire Water System*	*1*	*LS*	*$83,000*	*$83,000*
1.6	**Contingency (Assumed 15%)**	**1**	**LS**	**$1,279,000**	**$1,279,000**
1.7	**Engineering and Project Management**	**1**	**Each**	**$415,000**	**$415,000**
1.7.1	*NEPA Review Process - Assumes Abreviated EA*	*1*	*Each*	*$65,000*	*$65,000*
1.7.2	*Bid Support*	*1*	*Each*	*$25,000*	*$25,000*
1.7.3	*Construction Administration*	*1*	*Each*	*$55,000*	*$55,000*
1.7.4	*Submittal Review and Fabrication Inspection*	*1*	*Each*	*$90,000*	*$90,000*
1.7.5	*Onsite Construction Inspection*	*1*	*Each*	*$150,000*	*$150,000*
1.7.6	*Project Closeout*	*1*	*Each*	*$30,000*	*$30,000*
2	**Upland Water and Sewer Upgrades**	**1**	**LS**	**$1,764,000.00**	**$1,764,000**
2.1	**Mobilization and Demobilization**	**1**	**LS**	**$150,000**	**$150,000**
2.2	**Water System Upgrades**	**1**	**LS**	**$540,000**	**$540,000**
2.3	**Sewer System Upgrades**	**1**	**LS**	**$535,000**	**$535,000**
2.4	**Roadway Surface Repairs**	**1**	**LS**	**$50,000**	**$50,000**
2.5	**Contingency (Assumed 20%)**	**1**	**LS**	**$255,000**	**$255,000**
2.6	**Design, Engineering and Permitting**	**1**	**LS**	**$128,000**	**$128,000**
2.7	**Construction Management and Inspection**	**1**	**LS**	**$106,000**	**$106,000**
3	**North Bulkhead Extension and Boat Grid**	**1**	**LS**	**$2,954,450.00**	**$2,954,450**
3.1	**Mobilization and Demobilization**	**1**	**LS**	**$400,000**	**$400,000**
3.2	**Demolition**	**1**	**LS**	**$60,000**	**$60,000**
3.3	**Bulkhead Extension**	**1**	**LS**	**$1,128,450**	**$1,128,450**
3.3.1	*Provide Z-Sheet Pile*	*150*	*Ton*	*$3,500*	*$525,000*
3.3.2	*Install Sheet Pile*	*100*	*EA*	*$1,230*	*$123,000*
3.3.3	*Provide and Install Cap and Hand Railing*	*230*	*LF*	*$540*	*$124,200*
3.3.4	*Provide and Place Fill*	*4,500*	*CY*	*$75*	*$337,500*
3.3.5	*Provide and Place Surface Course*	*150*	*CY*	*$125*	*$18,750*
3.4	**Boat Grid**	**1**	**LS**	**$548,000**	**$548,000**
3.4.1	*Provide Pipe Piles*	*50*	*Ton*	*$3,500*	*$175,000*
3.4.2	*Install Pipe Piles*	*30*	*EA*	*$5,100*	*$153,000*
3.4.3	*Provide and Install Catwalk Caps*	*10*	*EA*	*$22,000*	*$220,000*
3.5	**Contingency (Assumed 20%)**	**1**	**LS**	**$428,000**	**$428,000**
3.6	**Design, Engineering and Permitting**	**1**	**LS**	**$215,000**	**$215,000**
3.7	**Construction Management and Inspection**	**1**	**LS**	**$175,000**	**$175,000**
4	**Bingman Property Phase I/II Environmental Assessment**	**1**	**LS**	**$160,000.00**	**$160,000**
5	**Lease Parcel Development**	**1**	**LS**	**$657,500.00**	**$657,500**
5.1	**Mobilization and Demobilization**	**1**	**LS**	**$70,000**	**$70,000**
5.2	**Clearing and Grubbing**	**1**	**LS**	**$45,000**	**$45,000**
5.3	**Provide and Place Fill**	**4,500**	**CY**	**$75**	**$337,500**
5.4	**Provide and Place Surface Course**	**200**	**CY**	**$125**	**$25,000**
5.5	**Contingency (Assumed 20%)**	**1**	**LS**	**$95,000**	**$95,000**
5.6	**Design, Engineering and Permitting**	**1**	**LS**	**$48,000**	**$48,000**
5.7	**Construction Management and Inspection**	**1**	**LS**	**$37,000**	**$37,000**
				Project Total Estimate (2024)	**$15,761,700**
				Escallation (1 year @ 3.1%)	**$488,600**
				TOTAL	**$16,250,300**

CITY OF
DILLINGHAM
ALASKA

Dillingham Waterfront Improvements
Project Schedule



INTERNATIONAL ASSOCIATION OF MARITIME AND PORT EXECUTIVES

PO Box 2729, South Portland, ME 04116

(207) 741-7000

20 November 2024

Daniel J. Miller
Port Director – City of Dillingham
235 Harbor Road
Dillingham, AK 99576 (907) 843-1379
harbor@dillinghamak.us

Dear Daniel,

The IAMPE provides advisory services and training to its membership, and we are pleased to send you the proposal for a tariff review and update recommendations. As a member of our industry partner, the Alaska Association of Harbormasters and Port Administrators, we can extend our member services to the Port of Dillingham. We will also provide a document outlining Terminal Rules and Regulations, which will incorporate required safety and security provisions based on federal requirements.

All work will be undertaken from our offices in South Portland, Maine. No travel is anticipated under this proposal. The IAMPE will undertake this effort with the Port through multiple phone calls to discuss various areas that need to be addressed and to provide progress reports. All documents will be provided in draft form for review and discussion. The final documents should be reviewed by your attorneys before publishing.

Scope: The IAMPE will undertake each of the following tasks:

1) Complete Tariff review with adjustments, additions and recommended modifications
2) Creation of a Terminal Rules & Regulations document
3) Cover memo for your governing board

Schedule: Preliminary work can begin as early as December 2024, after Notice to Proceed is issued. Timeline is 120 days from NTP to completion. Payment upon completion net 30 days. We request all documents from you in Microsoft Word (or a comparable) format for ease of editing.

Price: The IAMPE only provides services of this nature to its members. As a member of the IAMPE, the proposed fee shall not exceed $14,900.

We appreciate the opportunity to provide this service to our membership and thank you for your consideration of this proposal. If this is acceptable, please sign below and return a copy to us.

We look forward to working with you.

Sincerely,

David Arnold, Executive Director

Accepted: ___________________________________

By: ____ so authorized

Printed name and Title: ____

Cc: Capt. Jeff Monroe

Report of Investigation 2021-3 Dillingham

EROSION EXPOSURE ASSESSMENT—DILLINGHAM

Richard M. Buzard, Mark M. Turner, Katie Y. Miller, Donald C. Antrobus, and Jacquelyn R. Overbeck

Dillingham, Alaska in 2004. Photo: Alaska Division of Community and Regional Affairs, www.commerce.alaska.gov/dcra/dcrarepoext/Pages/PhotoLibrary.aspx.

Published by
STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
2021

EROSION EXPOSURE ASSESSMENT—DILLINGHAM

Richard M. Buzard, Mark M. Turner, Katie Y. Miller, Donald C. Antrobus, and Jacquelyn R. Overbeck

Report of Investigation 2021-3 Dillingham

State of Alaska
Department of Natural Resources
Division of Geological & Geophysical Surveys

STATE OF ALASKA
Mike Dunleavy, Governor

DEPARTMENT OF NATURAL RESOURCES
Corri A. Feige, Commissioner

DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS
Steve Masterman, State Geologist and Director

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Suggested citation:
Buzard, R.M., Turner, M.M., Miller, K.Y., Antrobus, D.C., and Overbeck, J.R., 2021, Erosion Exposure Assessment of Infrastructure in Alaska Coastal Communities: Alaska Division of Geological & Geophysical Surveys Report of Investigation 2021-3.https://doi.org/10.14509/30672

Contents

Figures

Tables

EROSION EXPOSURE ASSESSMENT—DILLINGHAM

Richard M. Buzard[1], Mark M. Turner[1], Katie Y. Miller[1], Donald C. Antrobus[2], and Jacquelyn R. Overbeck[1]

DILLINGHAM EROSION EXPOSURE ASSESSMENT

This is a summary of erosion forecast results near infrastructure at Dillingham, Alaska. We conduct a shoreline change analysis, forecast 60 years of erosion, and estimate the replacement cost of infrastructure in the forecast area. Buzard and others (2021) describe the method and guidance for interpreting tables and maps.

Source data for this summary include the following:

- Delineated vegetation lines and change assessment by Buzard and others (2021) following the methods of Overbeck and others (2020).
- Infrastructure GIS shapefiles and metadata from the City of Dillingham (2021) GIS Public Works open data site.
- Added infrastructure such as roads and buildings, delineated if visible in the most up-to-date high resolution (≤ 0.66 ft [20 cm] ground sample distance) aerial orthoimagery (Quantum Spatial, 2019).
- Computed infrastructure cost of replacement based on square or linear footage from Buzard and others (2021).

Dillingham is located in southwest Alaska at the head of Nushagak Bay at the confluence of the Wood and Nushagak Rivers. Erosion at Dillingham is caused by tidal fluctuations and severe storm events (City of Dillingham, 2016). Erosion ranges from 3 to 9.8 feet per year along most of the shoreline fronting the City of Dillingham but reaches up to 16.4 feet per year on the shoreline adjacent to the wastewater lagoon (Overbeck and others, 2020). Efforts to control riverbank erosion began in 1983 with the construction of a seawall east of the city dock to Snag Point (U.S. Army Corps of Engineers, 2009). Shoreline protections also exist along the east bank of the boat harbor and along the shoreline fronting the mooring facilities of Bristol Alliance Fuels.

We forecast erosion 60 years from the most recent shoreline (2018) at 20-year intervals to identify the exposure of infrastructure to erosion (tables 1–3). Erosion is not forecast where shoreline protection structures exist. Southwest of the boat harbor, erosion is forecast to reach 17 buildings between 2038 and 2078 (table 1). These are either identified as residences or unspecified (table 3). East of Snag Point, rapid and consistent erosion of a peat meadow is encroaching on the wastewater lagoon and nearby water and sewer lines. The City of Dillingham (2018) reports the sewage outfall pipe is currently experiencing erosion impacts. Erosion is forecast to undermine the entire pipe and reach the wastewater lagoon by 2058. However, the peat meadow fronting the lagoon infrastructure transitions into a vegetated hill covered with fill from the lagoon's construction (fig. 1). This topographic variation

[1] Alaska Division of Geological & Geophysical Surveys, 3354 College Rd., Fairbanks, Alaska 99709-3707
[2] Alaska Native Tribal Health Consortium, 4000 Ambassador Drive, Anchorage, Alaska 99508

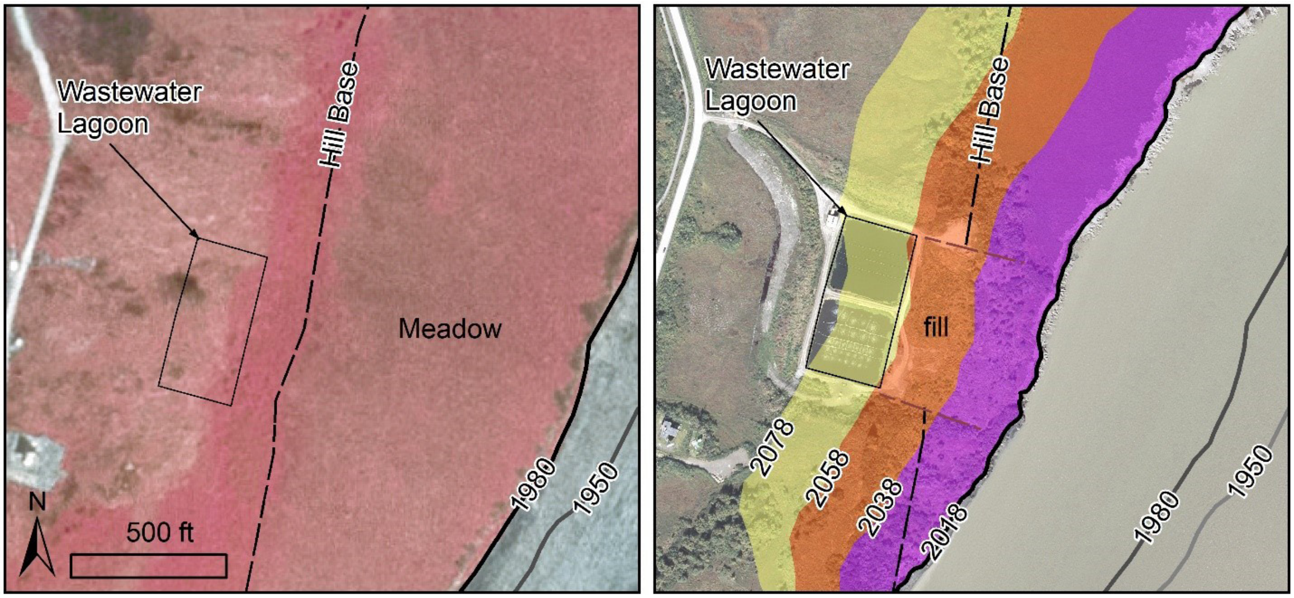

Figure 1. Predicted erosion changes at Dillingham wastewater lagoon. (Left) The color-infrared image of the 1980 Dillingham coast shows the base of the hill. (Right) 2018 image of the same area. The wastewater lagoon is built into the hill, and fill from the construction is deposited seaward. Erosion continues at a linear rate toward the hill's base and fill area, suggesting exposure by 2058. However, the fill area has different lithology and vegetation cover that can significantly change erosion rates.

Table 1. Quantity of infrastructure with estimated erosion exposure by linear footage (LF), square footage (SF), or count (n).

Quantity of Exposed Infrastructure				
Erosion Forecast Date Range	Buildings & Tank Facilities (n)	Water Lines (LF)	Roads (LF)	Wastewater Lagoon (SF)
2018 to 2038	0	610	0	0
2038 to 2058	9	981	0	2,006
2058 to 2078	8	1,258	856	97,854
Combined Total	17	2,849	856	99,860

Table 2. Replacement cost of infrastructure exposed to erosion per 20-year interval.

Cost to Replace Exposed Infrastructure					
Erosion Forecast Date Range	Buildings & Tank Facilities	Water Lines	Roads	Wastewater Lagoon	Sum
2018 to 2038	$0	$244,100	$0	$0	$244,100
2038 to 2058	$4,506,200	$392,500	$0	$6,000,000	$10,898,700
2058 to 2078	$2,480,100	$503,100	$342,300	$0	$3,325,500
Combined Total	$6,986,300	$1,139,700	$342,300	$6,000,000	$14,468,300

Table 3. Cost estimate of exposed buildings and tank facilities by 20-year interval. The count of exposed residential or unspecified buildings is denoted in parentheses.

Cost to Replace Exposed Buildings and Tank Facilities		
Erosion Forecast Date Range	**Building Type**	**Cost of Replacement**
2018 to 2038	none	0
2038 to 2058	Residential (4)	$ 2,808,500
	Unspecified (5)	$ 1,697,700
2058 to 2078	Residential (2)	$ 1,180,100
	Unspecified (6)	$ 1,300,000

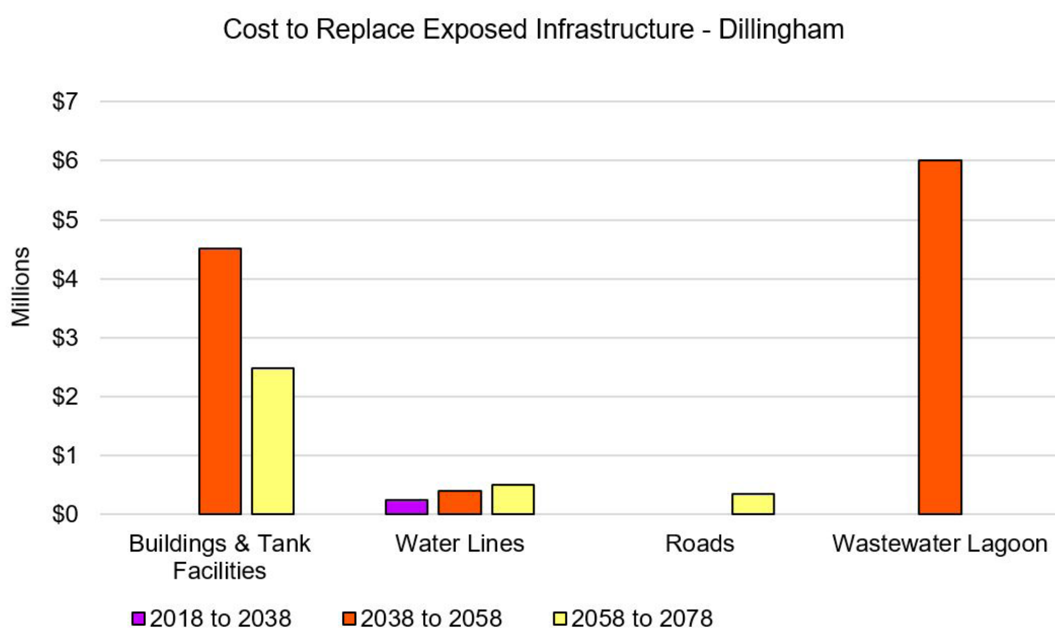

Figure 2. This figure shows the replacement cost of utilities, transportation infrastructure, and buildings in the erosion forecast area. Twenty-year intervals are symbolized by color: purple represents the time interval 2018 to 2038, orange represents 2038 to 2058, and yellow represents 2058 to 2078. The greatest single cost is the wastewater lagoon that is forecast to begin experiencing erosion by 2058. The total cost of buildings exceeds this, reaching over $7.0 million.

can significantly alter the rate of erosion, so a site investigation is appropriate to assess exposure of the lagoon and nearby infrastructure more accurately. The total estimated replacement cost of infrastructure exposed to erosion is $14.5 million (± $4.3 million) by 2078 (table 2; fig. 2). We do not estimate erosion exposure for power and fuel infrastructure because the data were not available.

ACKNOWLEDGMENTS

This work was funded by the Denali Commission Village Infrastructure Protection Program through the project "Systematic Approach to Assessing the Vulnerability of Alaska's Coastal Infrastructure to Erosion." The community of Dillingham was not consulted for this report.

REFERENCES

Buzard, R.M., Turner, M.M., Miller, K.Y., Antrobus, D.C., and Overbeck, J.R., 2021, Erosion exposure assessment of infrastructure in Alaska coastal communities: Alaska Division of Geological & Geophysical Surveys Report of Investigation 2021-3. https://doi.org/10.14509/30672

City of Dillingham, 2016, City of Dillingham 2016 hazard mitigation plan: Federal Emergency Management Agency, 190 p.

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———2021, City of Dillingham GIS public works open data site: City of Dillingham [website]: found at https://city-of-dillingham-dillingham.hub.arcgis.com/

Overbeck, J.R., Buzard, R.M., Turner, M.M., Miller, K.Y., and Glenn, R.J., 2020, Shoreline change at Alaska coastal communities: Alaska Division of Geological & Geophysical Surveys Report of Investigation 2020-10, 29 p., 45 sheets. https://doi.org/10.14509/30552

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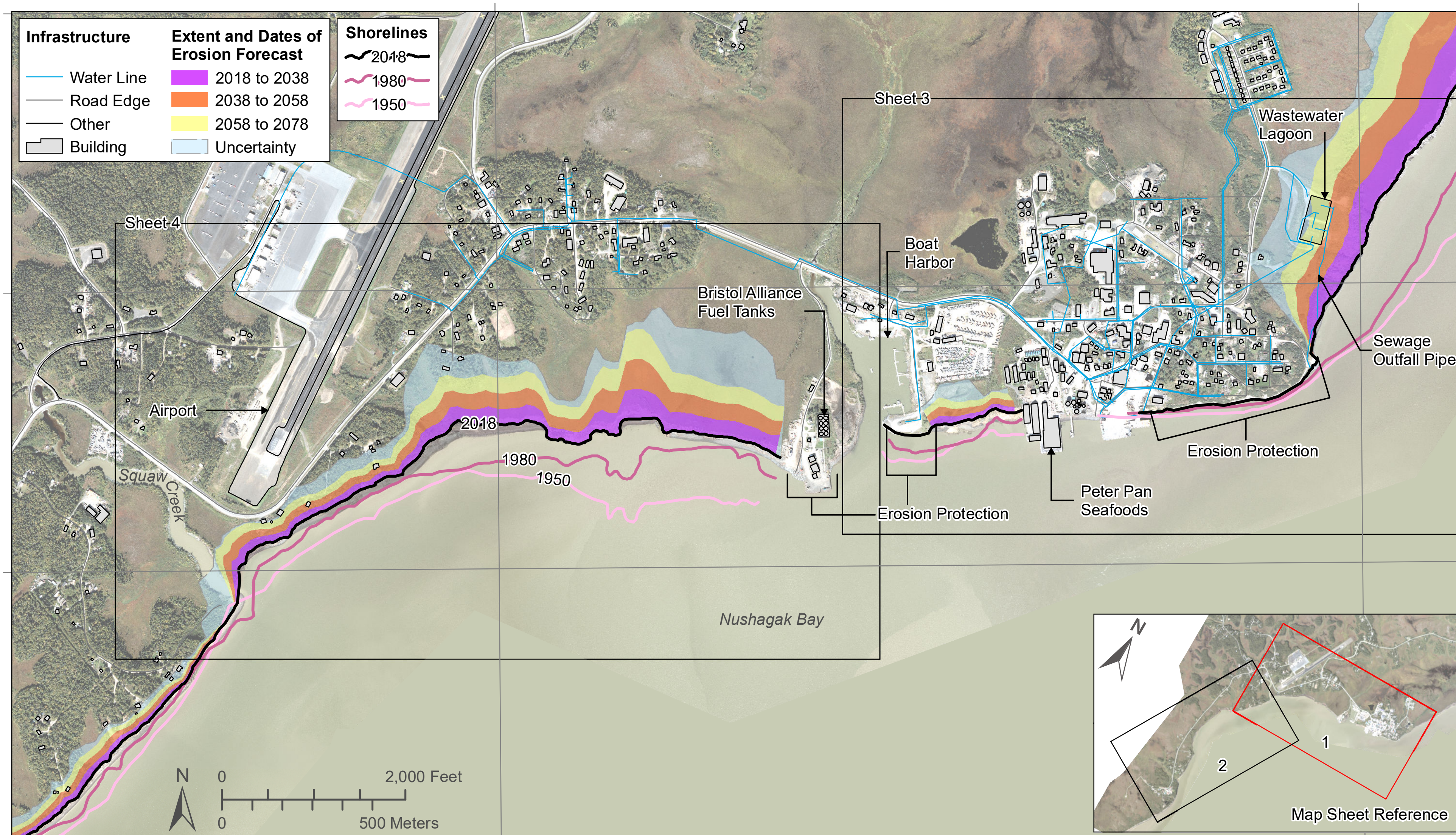
U.S. Army Corps of Engineers, 2009, City shoreline emergency bank stabilization, Dillingham, Alaska: U.S. Army Corps of Engineers Alaska District, 37 p.

Erosion Forecast
Dillingham, Alaska



Projection: NAD83 UTM Zone 4N. Orthoimagery year: 2018. Orthoimagery available from elevation.alaska.gov

Erosion and accretion of coasts and rivers result in shoreline change. These rates of shoreline change at Alaska communities are calculated from historical and modern shorelines (shorelines shown as lines in pinkscale and labeled by year). The long-term (1950 to 2018) shoreline change rate is used to forecast where erosion could impact community infrastructure. Erosion is forecast to reach the colored areas by specified time intervals: 2018 to 2038 (purple), 2038 to 2058 (orange), and 2058 to 2078 (yellow). The area of uncertainty of the 2078 shoreline at a 90 percent confidence interval is light blue. Areas that are not colored by time interval are not forecast to erode by 2078 based on the historical shoreline change rate. For more detailed information about the impacts to infrastructure from erosion at Dillingham, refer to the Dillingham erosion exposure assessment report.

This work is part of the Coastal Infrastructure Erosion Vulnerability Assessment project funded by the Denali Commission Environme Threatened Communities Grant Program. Components of this map were prepared by the Alaska Department of Commerce, Communi Economic Development (DCCED) using funding from multiple municipal, state, federal, and tribal partners. The original AutoCAD drawing infrastructure data layers was converted to ArcGIS.

STATE OF ALASKA
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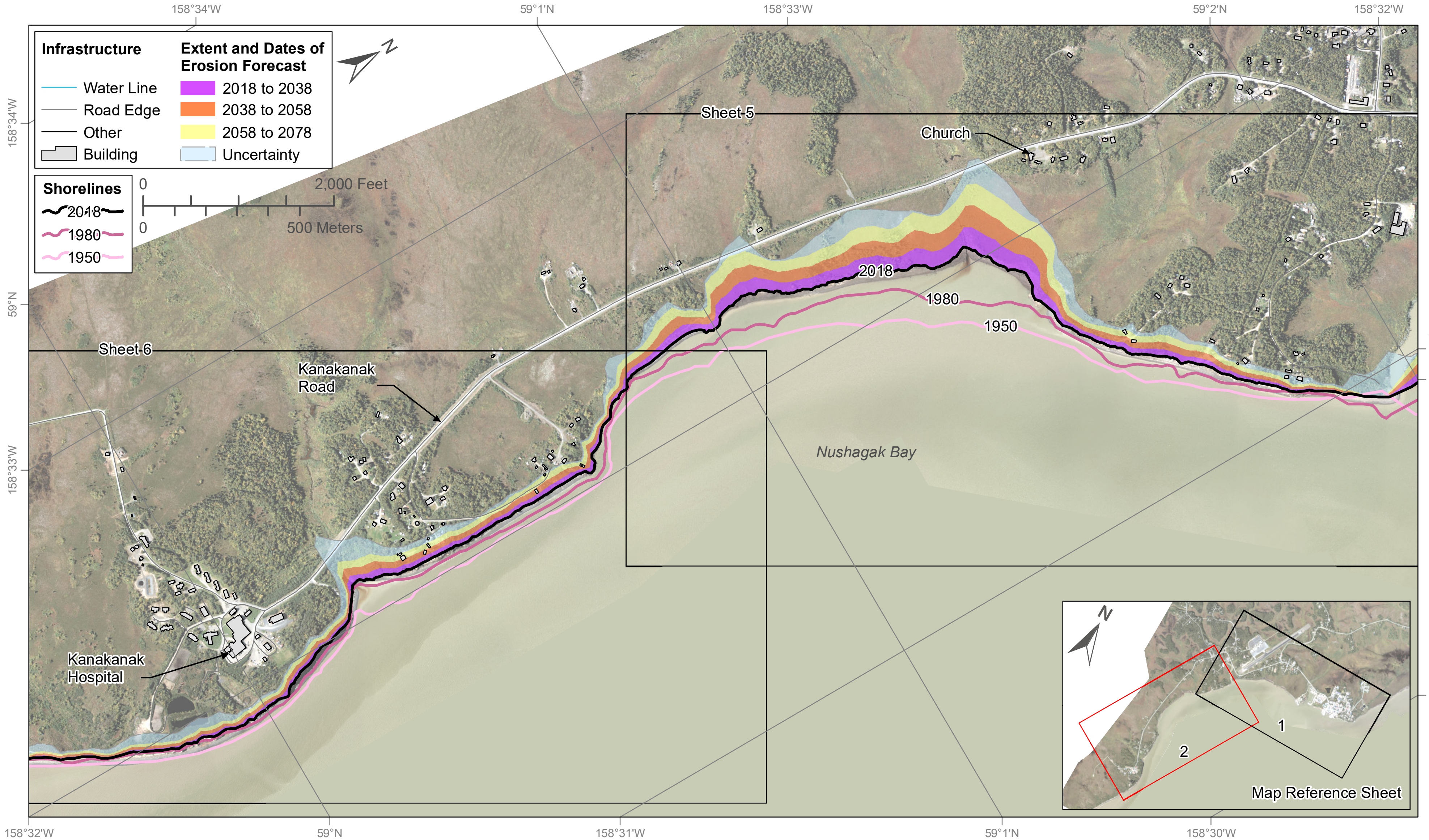
website: dggs.alaska.gov

Erosion Forecast
Dillingham, Alaska



Projection: NAD83 UTM Zone 4N. Orthoimagery year: 2018. Orthoimagery available from elevation.alaska.gov

STATE OF ALASKA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

website: dggs.alaska.gov

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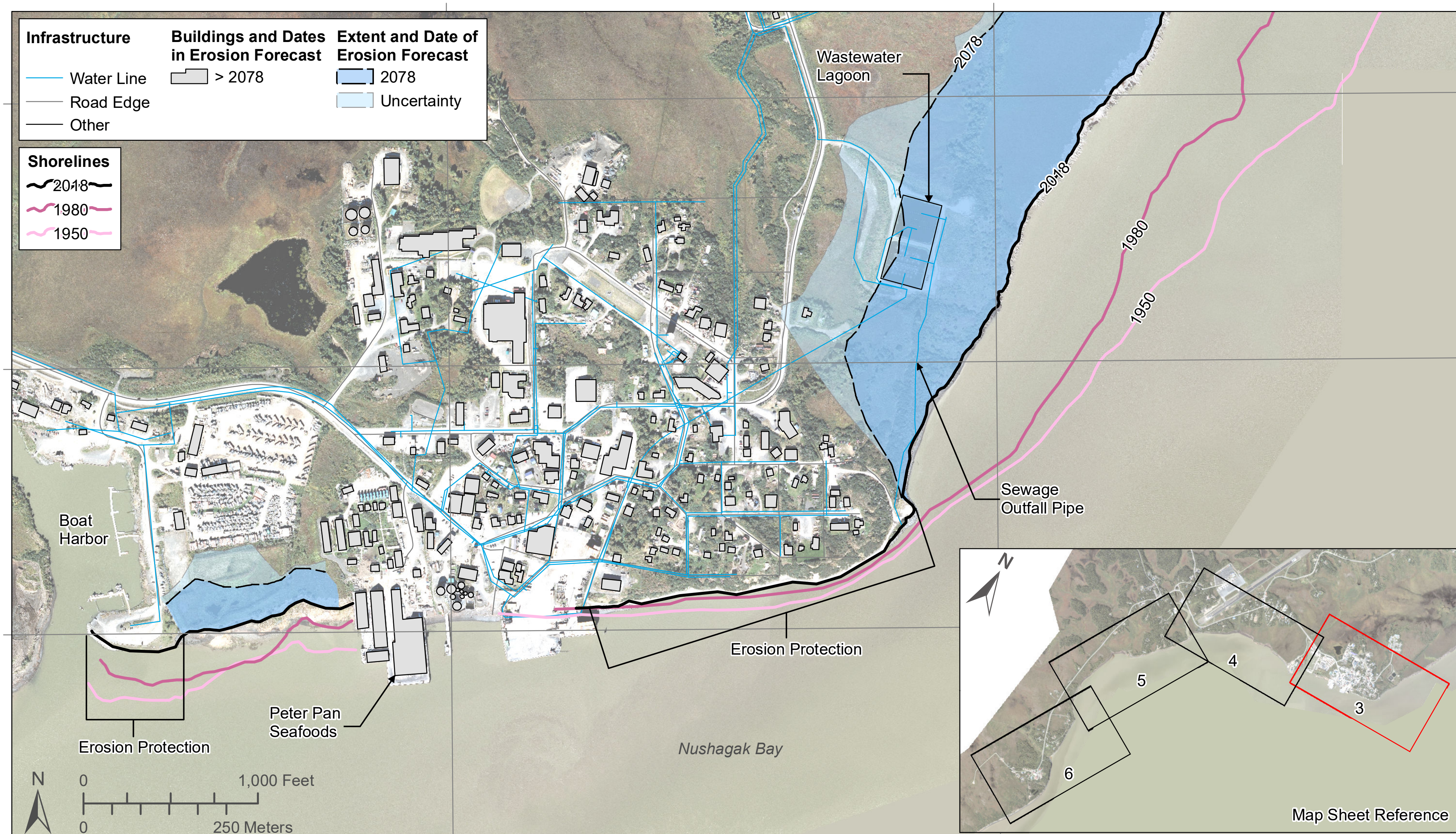
This work is part of the Coastal Infrastructure Erosion Vulnerability Assessment project funded by the Denali Commission Environme Threatened Communities Grant Program. Components of this map were prepared by the Alaska Department of Commerce, Communi Economic Development (DCCED) using funding from multiple municipal, state, federal, and tribal partners. The original AutoCAD drawing infrastructure data layers was converted to ArcGIS.

Erosion Exposure
Dillingham, Alaska



158°28'W 158°27'W

Projection: NAD83 UTM Zone 4N. Orthoimagery year: 2018. Orthoimagery available from elevation.alaska.gov

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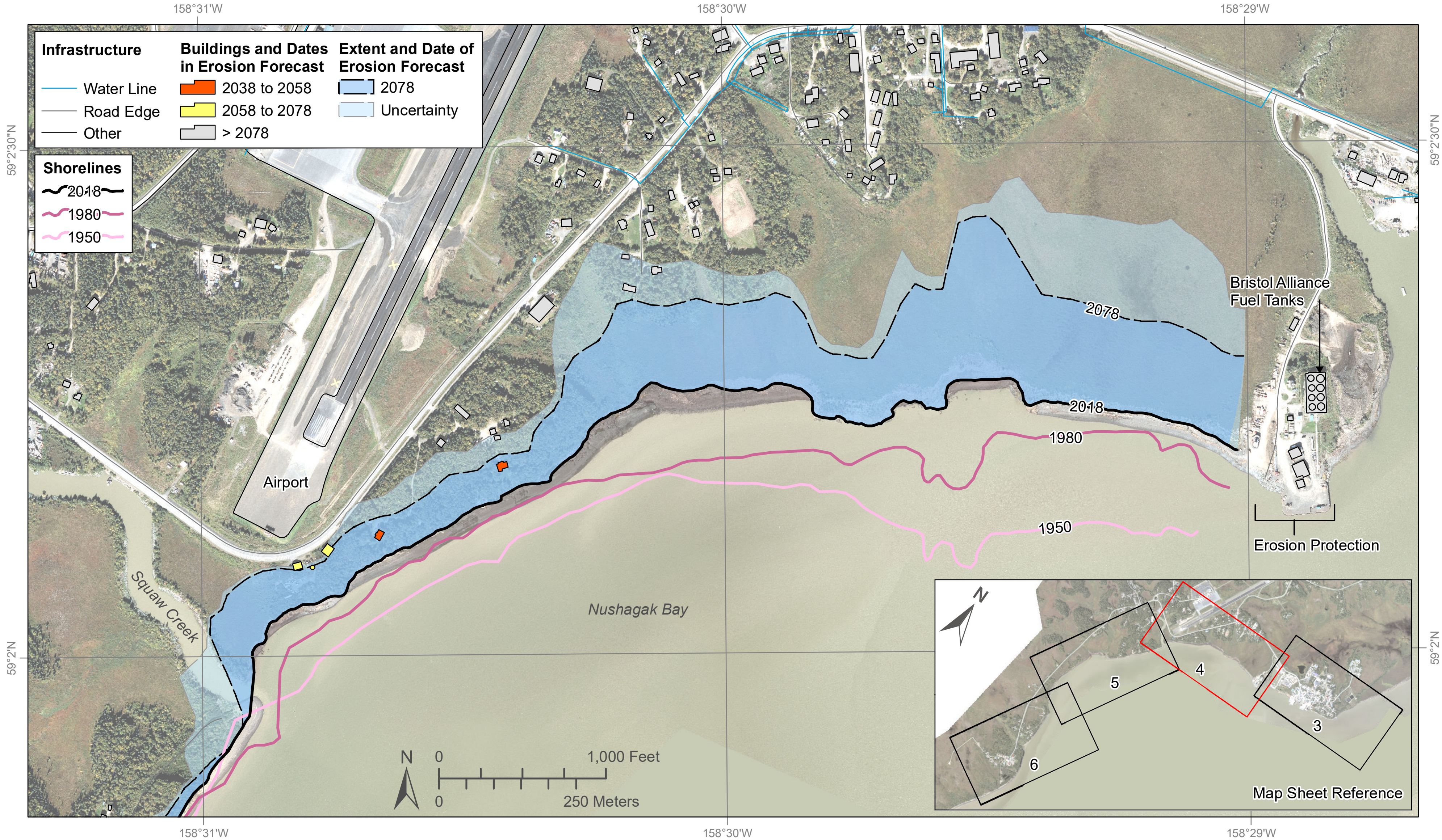

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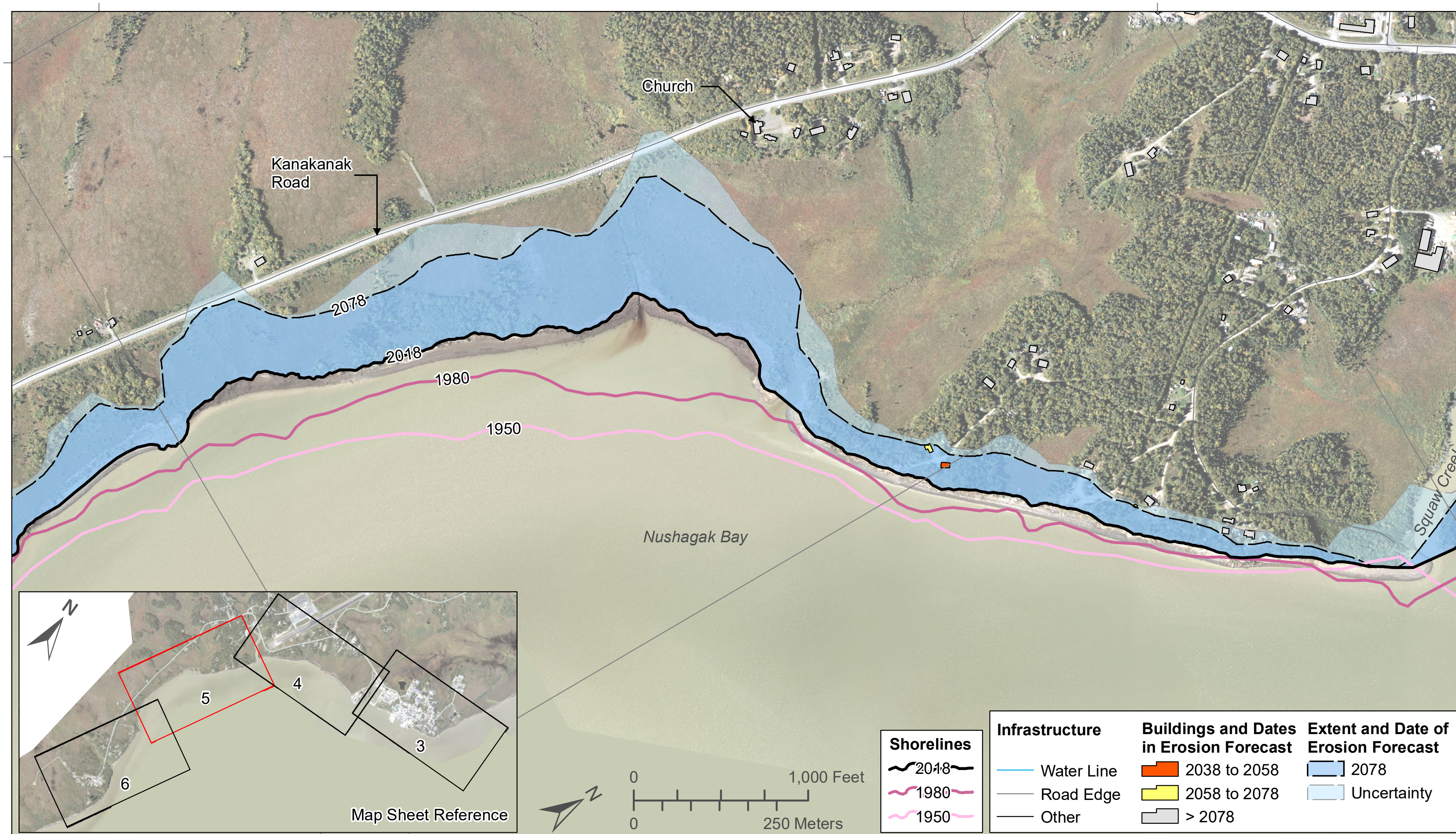
Erosion Exposure
Dillingham, Alaska



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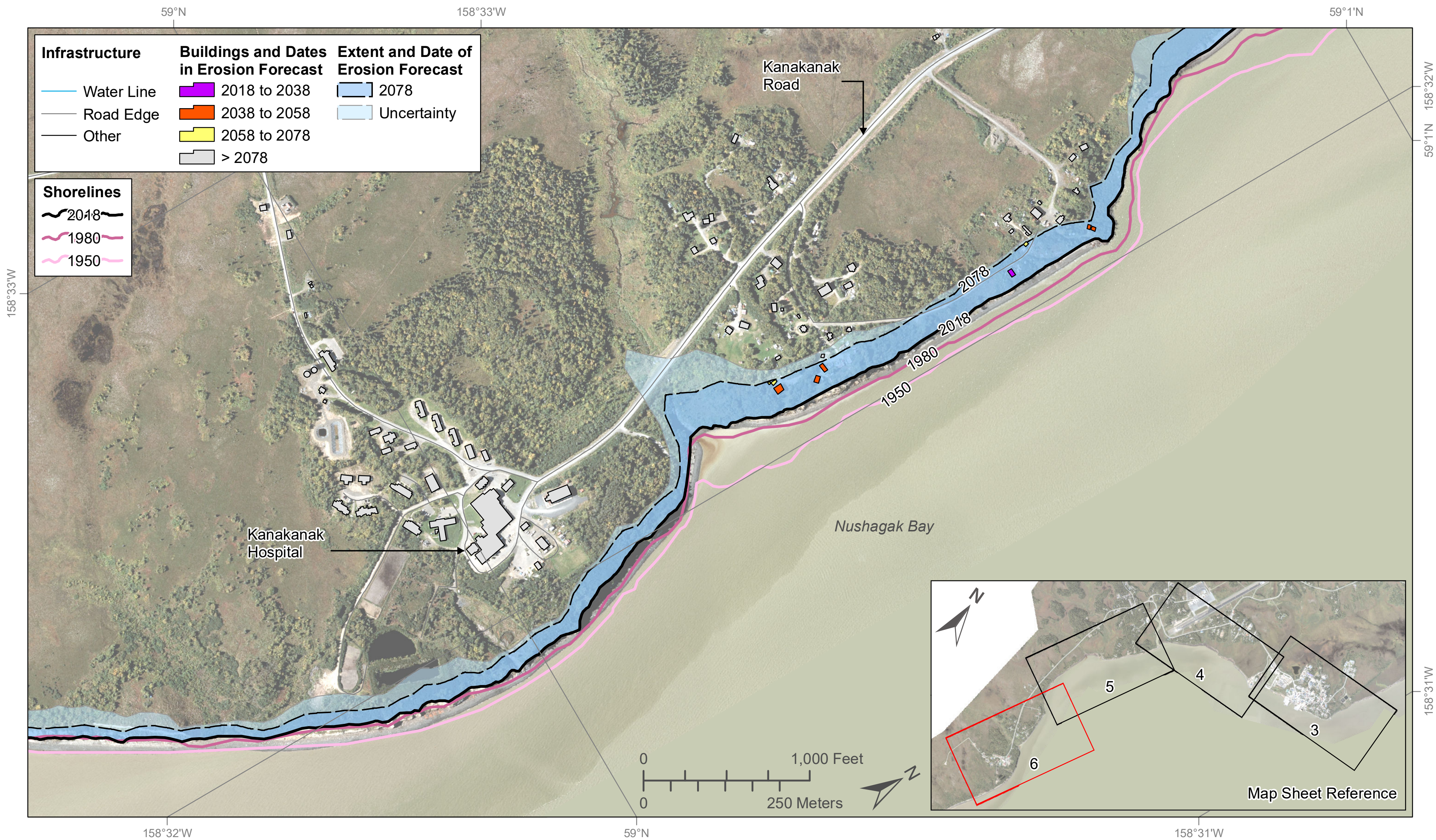
Erosion Exposure
Dillingham, Alaska

Section . Item 2.



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Bristol Alliance Fuels
Site Erosion Report

Dillingham, Alaska

Bristol Project No. 32170071

November 2016

Prepared for:

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ACRONYMS AND ABBREVIATIONS

&	and
@	at
°	degrees
$	dollars (US)
%	percent
ADF&G	Alaska Department of Fish & Game
BAF	Bristol Alliance Fuels
BESC	Bristol Engineering Services Corporation
CPI	consumer price index
ft	foot
h	horizontal
MHW	Mean High Water
MLLW	Mean Lower Low Water
O&M	operations and maintenance
USACE	US Army Corps of Engineers
v	vertical
yd^3	cubic yard
yr	year

1.0 INTRODUCTION

1.1 PROJECT SUMMARY

Bristol Alliance Fuels (BAF) has a retained Bristol Engineering Services Corporation to research and summarize the history of the shoreline protection at the BAF Site, to update previous construction cost estimates to current prices, and to estimate the cost and quantities of additional shoreline protection.

This report is intended to be used as a high level planning document for erosion protection measures for the BAF property adjacent to the Dillingham Small Boat Harbor.

1.2 BACKGROUND AND HISTORY

Dillingham is in southwestern Alaska, approximately 327 miles southwest of Anchorage. Dillingham serves as the economic, transportation, and public service center for western Bristol Bay. Commercial fishing, fish processing, cold storage, and fishing industry support services form the base of the local and regional economy. The Dillingham Small Boat Harbor accommodates about 350 fishing vessels and is vital for commercial salmon fishing interests. The Dillingham harbor was first constructed in 1960 by enlarging the channel of Scandinavia Creek where it enters the Nushagak River estuary, and has been labeled a "half-tide harbor" because it goes essentially dry at low tides. The harbor must be dredged annually to maintain functionality. The harbor is used seasonally as a commercial fishing base by residents of Alaska as well as by others from outside the state.

Erosion is a constant threat to Dillingham, which is on a bluff overlooking the Nushagak River estuary. Main infrastructure in the study area that will be affected in the near future includes both private and public property, the small boat harbor mooring and launching facilities, the BAF facility, and the city waterfront park.

Bristol Alliance Fuels owns the land to the west of the harbor and also owns the bulk fuel tanks that presently hold the fuel supply for the City of Dillingham and surrounding communities (shown in Figure 1). The Bristol Alliance Fuels operations site on the Nushagak River west the Dillingham harbor has been experiencing erosion issues and BAF is looking to protect their property and infrastructure. The BAF site is home to the largest fuel facility in the Bristol Bay area, a 2.95-million-gallon tank farm, marine fueling facility, docking, and barge haul-out services. BAF also supplies fuel to surrounding communities when the need arises (in recent years to Aleknagik, Manokotak, Clarks Point, and Koliganek) and to snowmachiners and boat operators in the region. BAF stores fuel for Crowley Marine barges (formerly Yukon Fuels) so that Crowley can avoid sending large barges upriver and bottoming out in shallow spots. The BAF dock is a good location for rolling on and off and supports the construction industry in the region with loading and off/loading capabilities.

BAF's goal is to protect and improve their existing facilities at the site with by expanding existing pad areas, improving the barge haul-out ramp, adding a separate public beach access road, high mast site lighting, adding a protected harbor side fueling station, and storage areas.

Figure 1: 2016 Aerial Photo of BAF Site

1.3 PREVIOUS STUDIES AND PROJECTS

There have been 15 previous studies by the U.S. Army Corps of Engineers (USACE) for the Dillingham area between 1960 and 2009. The two USACE studies done in 2009 were the Economic Analysis for City of Dillingham Shoreline Emergency Bank Stabilization and the City Shoreline Emergency Bank Stabilization, Dillingham, Alaska. These two reports are the foundation of this technical memorandum is the source of all technical and historical information unless stated otherwise.

Previous efforts to control riverbank erosion in Dillingham include:

- 1,600 feet of sheetpile bulkhead at Snag Point built between 1995 and 1998
- 600 feet of sheet-pile bulkhead built east of the harbor entrance
- 400 feet of riprap revetment on the east bank of the entrance channel in 1999
- The timber plank and pile bulkheads built in 1983
    - replaced by open cell sheet-pile bulkhead in 2004-2005

Buildings and a dock owned by the Bristol Bay Packing Company Cannery once stood where the BAF dock is currently located. The cannery was dismantled in the late 1960s and the Ball Brothers then used the site in the 1980s during which they constructed a wooden bulkhead. The bulkhead prevented further erosion of that area until a storm destroyed it sometime around 1997 or 1998. In the summer of 2004, BAF completed construction of a sheet-pile dock in same location as the old sheet-pile and timber bulkhead

1.4 CAUSES OF EROSION IN DILLINGHAM

Extreme tides, currents, storm surges, and wave and ice conditions are responsible for creating land erosion at the west bank of the Dillingham Harbor.

1.4.1 Tides

Tide levels at Dillingham range from 23.0 feet above mean lower low water (MLLW) at the extreme high water to -4.6 feet below MLLW at the lowest tide.

1.4.2 Currents

Nushagak Bay currents are affected by the marine influences of the Bering Sea and fresh water effects from Scandinavian Creek, Squaw Creek, the Nushagak River, and the Wood River. The predominant direction of the current is east to northeast. The maximum current recorded from all ship trackline data was an easterly velocity of 7.5 knots measured offshore in the vicinity of the city dock at flood tide. Current velocities within the project area ranged from 0.64 knot to 2.5 knots.

1.4.3 Storm Surges

Storm surges are increases in water elevation caused by a combination of relatively low atmospheric pressure and wind-driven transport of seawater over relatively shallow and large unobstructed waters. Storm induced surges can produce short-term increases in water level, which rises to an elevation considerably above tidal levels. Dillingham has low-pressure events that may cause an increase in the water levels at the shoreline. However, the many obstructions presented by bends and sandbars over the fetch are expected to prevent storm surges greater than 6 feet.

1.4.4 Wave Climate

The wave climate at Dillingham is generally moderate and is subject to short-period wind generated waves from the southwest to northeast. Waves coming from the southwest are predominant and are subject to diffraction, refraction, and shoaling as they pass through bends in the river. The longest fetch is from the southwest and is 25.7 miles. The 50-year design storm wave was determined to be a 6.22-foot breaking wave from the southwest with a period of 5.0 seconds.

1.4.5 Ice Conditions

Nushagak Bay generally begins to freeze up around the first of November. Break-up usually begins sometime in May. Ice ride-up on the shore is common and should be expected on any rubblemound structure. Controlling ice forces on the harbor side were listed at 13 kips/ft over the upper elevations.

1.5 SITE EROSION HISTORY

Erosion of the BAF-owned lands has been under constant threat of erosion as far back as 1899, as recorded on Plat 62-135 Bristol Bay Recording District when the land was transferred from the North Coast Packing Company to the New England Fish Company. See Figure 2 for historical erosion of the site.

The Dillingham Small Boat Harbor has historically been protected by the point of land near Scandinavian Beach. Surveys performed for the 1960 boat harbor project show Scandinavian Beach extending 700 feet from the top of the west bank, across the opening of Dillingham Harbor with a top elevation of 10 to 15 feet above MLLW. Topographic information collected in 2001 shows that this entire 700-foot section has eroded away, with the west top of bank receding by about 300 feet. It is hypothesized that this extreme rate of erosion as likely caused by a combination of factors. The most likely contributing factor is that the point forced a hard 90-degree bend in Scandinavian Creek. This bend was subject to the constant erosive forces of the creek. Very similar to any other meandering stream or creek in the region, banks erode away due to the loose sandy silt soils prevalent in the area, which are easily erodible. Figure 3 and Figure 4 are the historical photos of Scandinavian Beach, which depict the land lost from 1981 to 2001. In recent years, erosion along the west side of the un-stabilized bank area has progressed to an extent that it has washed away the point of land at Scandinavian Beach that protected the small boat harbor. In turn, exposure to open water has increased wave action within the harbor basin and subjected the fine soils along the inner harbor banks to erosion.

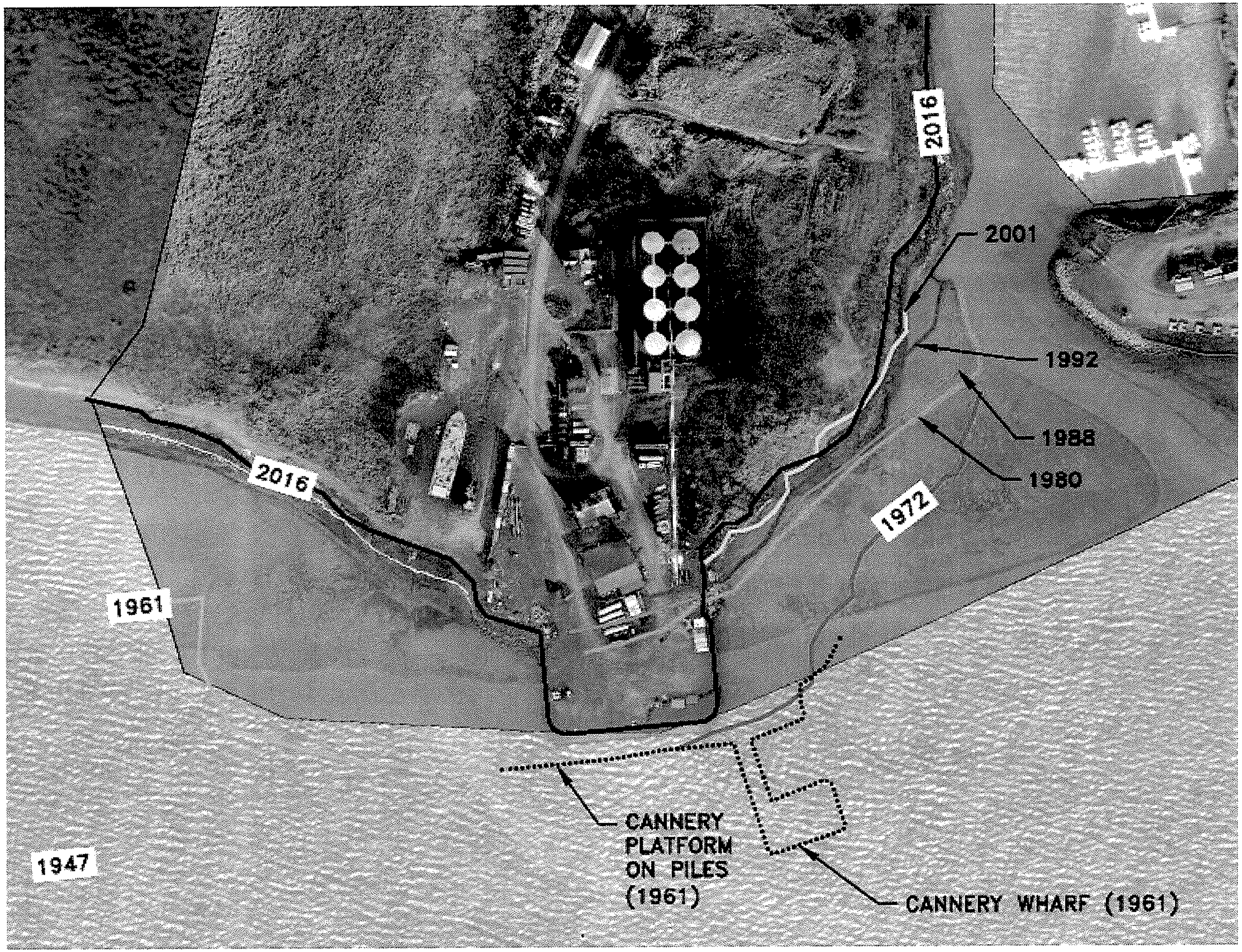

Figure 2: Shoreline Erosion History of BAF Site

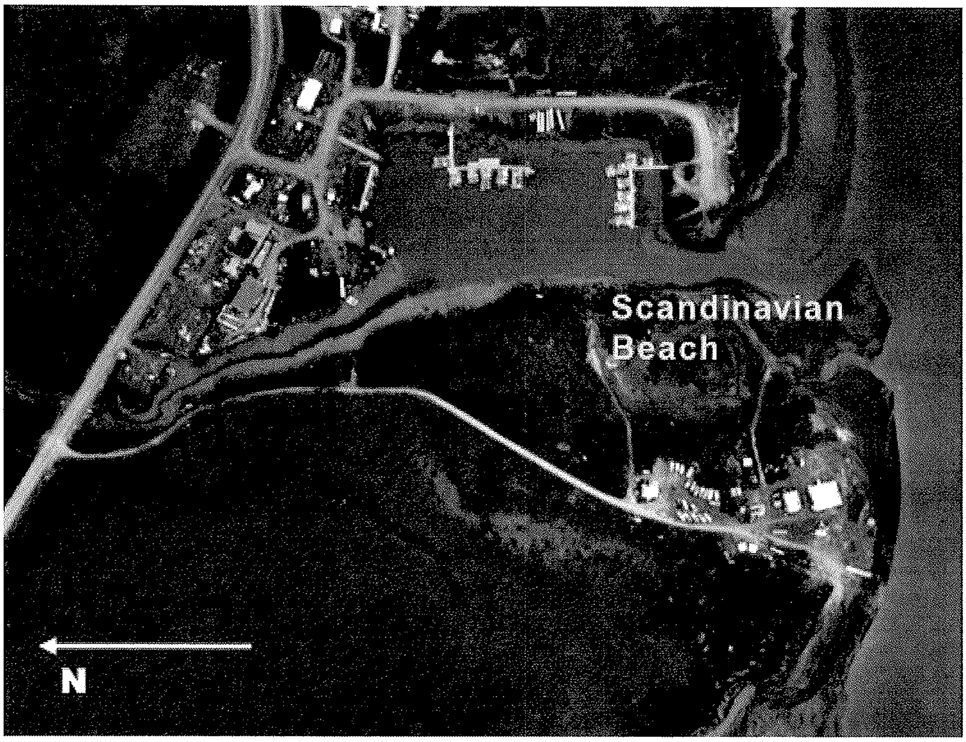

Figure 3: Scandinavian Beach in 1981

Figure 4: Scandinavian Beach in 2001

The USACE Reports outline different areas, and rates of erosion, for the land immediately adjacent to the small boat harbor. The erosion areas are broken into three zones. Zone 1 represents the western boundary of the BAF site, which lies outside of the small boat harbor. Zone 2 represents the western boundary of the BAF site, which lies within the small boat harbor. Zone 3 represents the western bank of the inner harbor. These zones are identified in Figure 5.

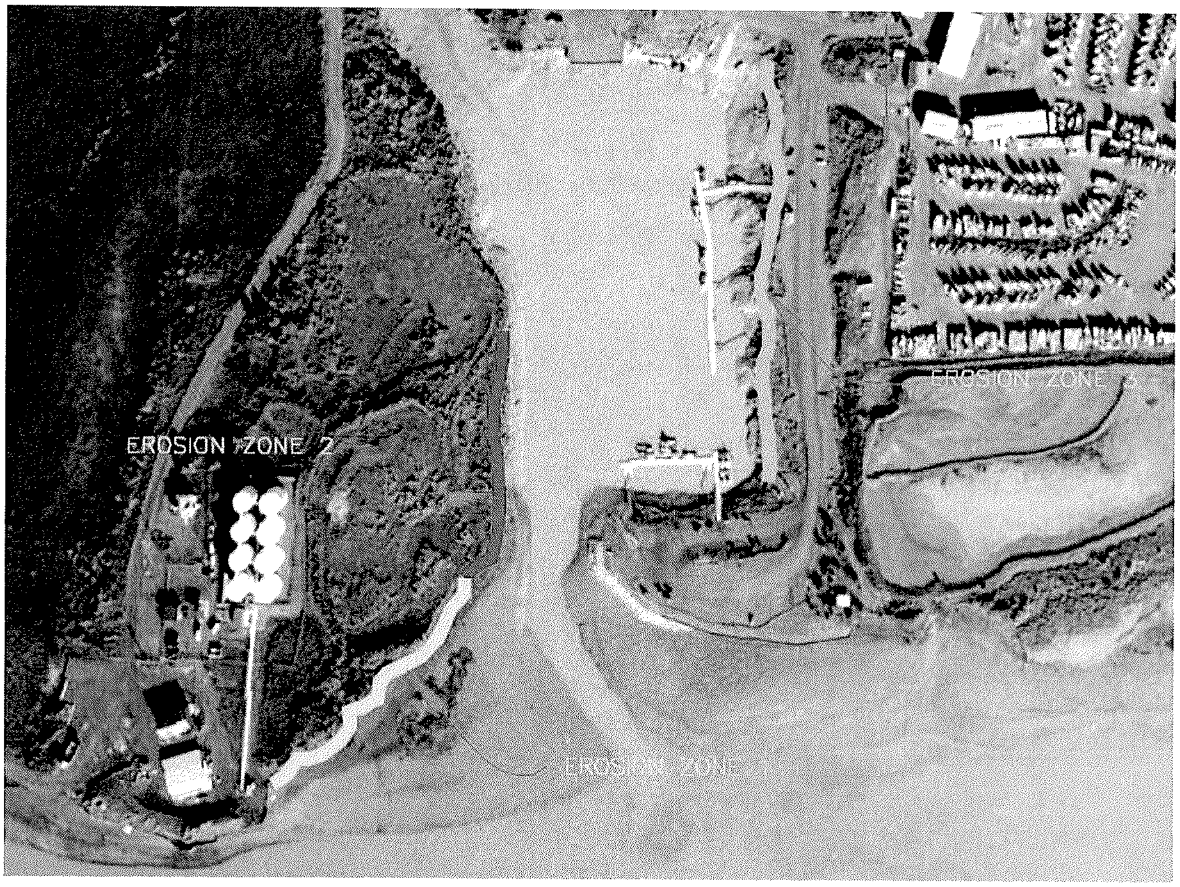

Figure 5: Erosion Zone Delineation

Table 1 shows the land lost from erosion for each zone and Table 2 shows the erosion rate for each zone. The USACE Reports indicated that the average erosion for the Western boundary of the BAF Site for the period of analysis from 1972 through 2001 was 10.8 linear feet per year, with an estimated 5.7 acres lost since 1972.

Table 1: Historic Land Loss (1972-2001)

ZONE 1	
Linear Feet of Landward Bank Erosion:	316
Lost Acreage:	4.5
Value of Lost Acreage:	$124,800
ZONE 2	
Linear Feet of Landward Bank Erosion:	40
Lost Acreage:	0.4
Value of Lost Acreage:	$11,600
ZONE 3	
Linear Feet of Landward Bank Erosion:	40
Lost Acreage:	0.8
Value of Lost Acreage:	$21,600
TOTAL ZONES 1-3	
Linear Feet of Landward Bank Erosion:	396
Lost Acreage:	5.7
Value of Lost Acreage:	$157,900

Table 2: Annual Erosion Rates

Erosion Zone 1	
Comparison Years	Erosion Per Year (ft/yr)
1972 to1980	17.14
1980 to 1988	3.11
1988 to 1992	15.54
1992 to 2001	7.75
Average Erosion Per Year – Zone 1	*10.89*
Erosion Zone 2	
Comparison Years	Erosion Per Year (ft/yr)
1972 to1980	2.06
1980 to 1988	2.24
1988 to 1992	0.042
1992 to 2001	1.22
Average Erosion Per Year – Zone 2	*1.39*
Erosion Zone 3	
Comparison Years	Erosion Per Year (ft/yr)
1972 to1980	1.06
1980 to 1988	0.28
1988 to 1992	3.45
1992 to 2001	0.71
Average Erosion Per Year – Zone 3	*1.38*

Historical documents do not mention erosion issues along the west bank of the interior of the harbor. This indicates that erosion problems likely developed over the last few decades. As previously mentioned, since 1972 the shoreline has eroded more than 200 feet, and lowered by at least 10 feet vertically, thus allowing waves to enter the harbor unimpeded. For example, the 1985 Dillingham, Alaska Final Detailed Project Report and Environmental Impact Statement does not mention waves entering the harbor. Since the late 1990's, waves from storms have been documented entering the harbor causing interior erosion, damage to vessels, and increasing the maintenance costs of existing harbor facilities.

In August 2005, a storm surge has inflicted major damage to the Dillingham shoreline. The August 2005 storm washed away up to 10 feet of the shoreline, overtopped the sheet-pile seawall at the parking lot by at least 2 feet, washed parked vehicles into the harbor, and washed boats that were moored in the harbor up onto dry land, see Figures 6 & 7. Water elevation at the time of overtopping included a tide elevation of about 20 feet MLLW. Based upon an estimated surge of 3 feet, the total height of water when the wave crest was at the wall was estimated at 23 feet MLLW.

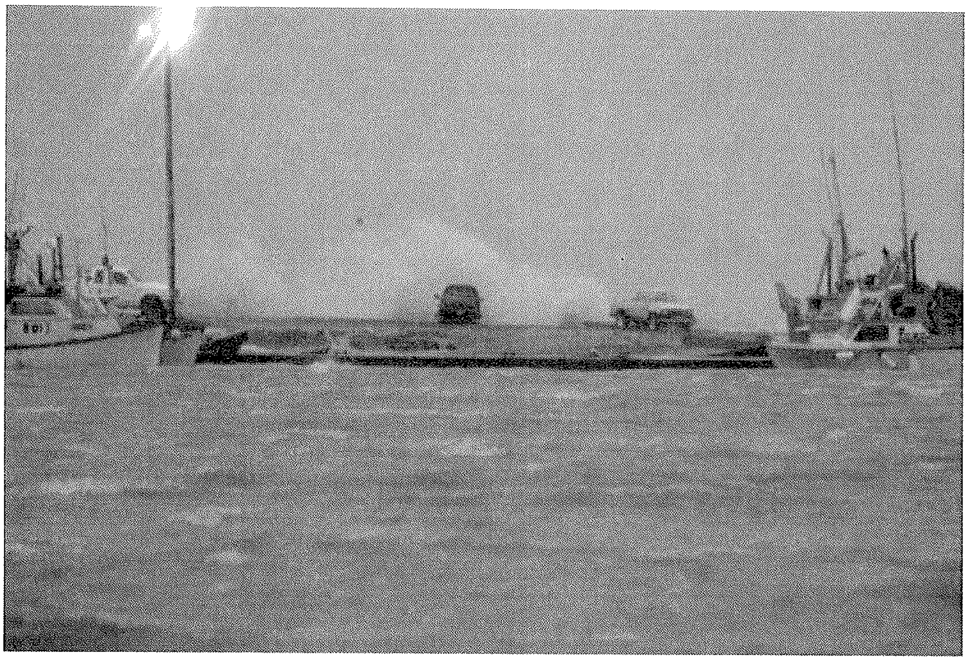

Figure 6: Waves breaking over outer bank

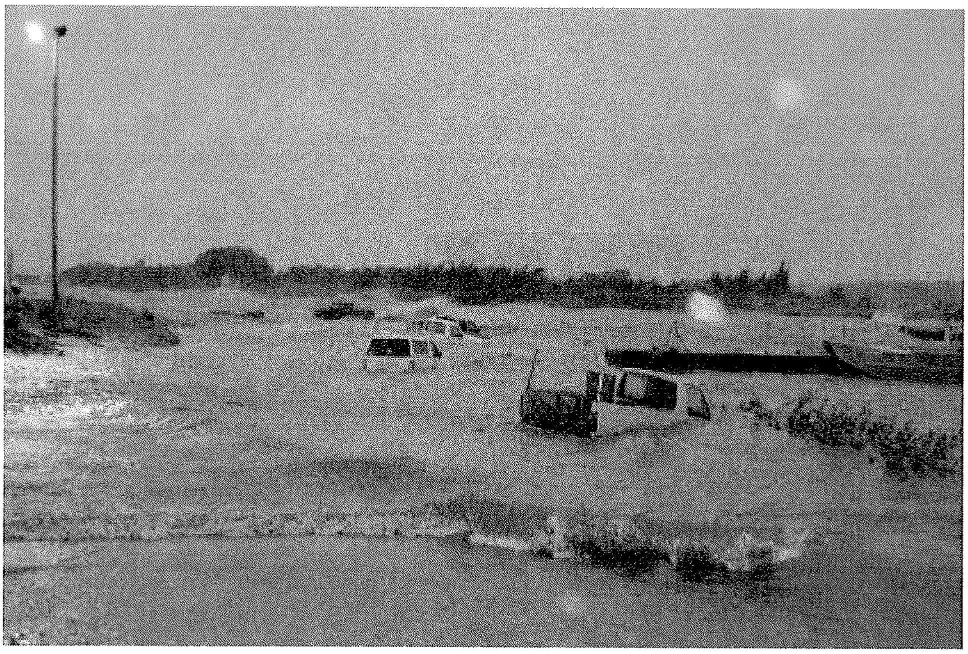

Figure 7: Storm surge in the harbor

In 2015, a large piece of the shoreline on the west side of Scandinavian Creek eroded away. This piece of land is adjacent to the BAF fuel tanks. Additional land on the west side of Scandinavian Creek north of the harbor has also recently eroded and is threatening the access road to the BAF facilities, see Figures 8 & 9.

Figure 8: Erosion that occurred in 2015 on west side of harbor

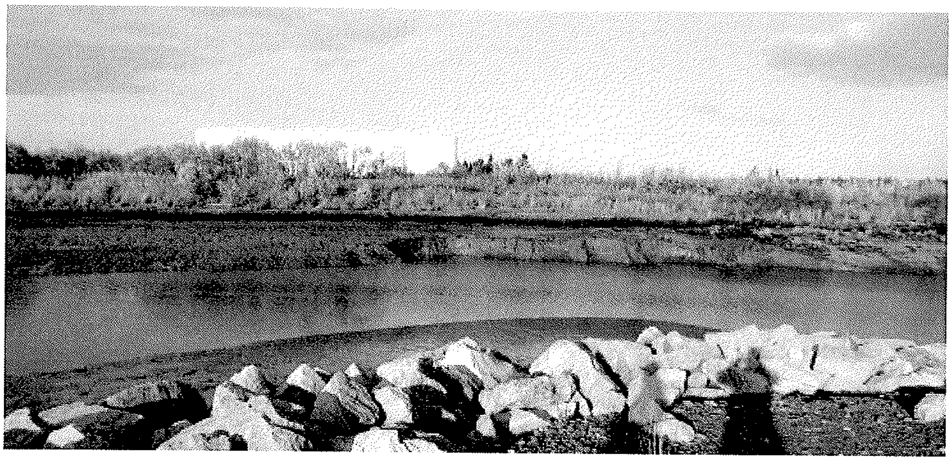

Figure 9: Looking west from harbor at the erosion adjacent to the fuel tanks

1.6 Ongoing Erosion Concerns

The continuous threat of erosion of the BAF-owned lands adjacent to the west entrance channel of Scandinavian Creek resulted in the need for BAF to construct shoreline protection measures approximately 650 feet southwest of the harbor entrance channel in 2003. This was only a stopgap measure as the threat of land and infrastructure loss due to erosion is still eminent. Earlier USACE reports (2009) stated that the tanks could be threatened as early as 2015. While this did not occur, BAF understands the importance of having a timeline of anticipated land loss in order properly plan for the protection of their assets. As a result of this need, Bristol Engineering Services Corporation (BESC) has developed updated erosion rates and figures depicting the bank location at mean high water (MHW) for the years 2020, 2030, and 2040.

To determine the rate of erosion each zone BESC used data developed by the USACE, displayed in Table 2 and a comparison of the 2001 bank location at MHW to the 2016 bank location, for Zone 1. There was not enough data to complete this exercise for Zones 2 and 3. The erosion rates for Zone 1 were determined to be 1.6 ft/yr. This combination of data was evaluated to determine the median value of the erosion rates from 1972 to 2016. The median value was used in lieu of the average due to the limited amount of data and lack of normalcy of the data sets. This data is presented as Table 3.

Table 3: Annual Erosion Rates - Updated 2016

Year	Zone 1	Zone 2	Zone 3
1972 to 1980	17.14	2.06	1.06
1980 to 1988	3.11	2.24	0.28
1988 to 1992	15.54	0.04	3.45
1992 to 2001	7.75	1.22	0.71
2001 to 2016	1.6	-	-
Median (ft/yr)	7.8	1.6	0.9

See Figure 10 for a visual representation of the predicted erosion limits, as a basis of time. Please note that this figure is for planning purposes only and is subject to the assumptions made as part of this analysis.

1.6.1 Zone 4 Erosion

The USACE reports only focused on erosion on the eastern boundaries of the BAF site. In order to have a comprehensive picture of erosion of the entire BAF site a new zone was added, Zone 4. Zone 4 represents the shoreline on the south and west of the BAF site. This area is shown on Figure 2, as the bank lines west of the all tide dock.

Based on a comparison of the shoreline locations from 1961 to 2016 it was determined that an annual loss of 5.9 feet occurred in Zone 4. This value was used in the visual representation of the predict erosions limits shown in Figure 10. The approximate area of area lost during this time period in Zone 4 is 7.2 acres.

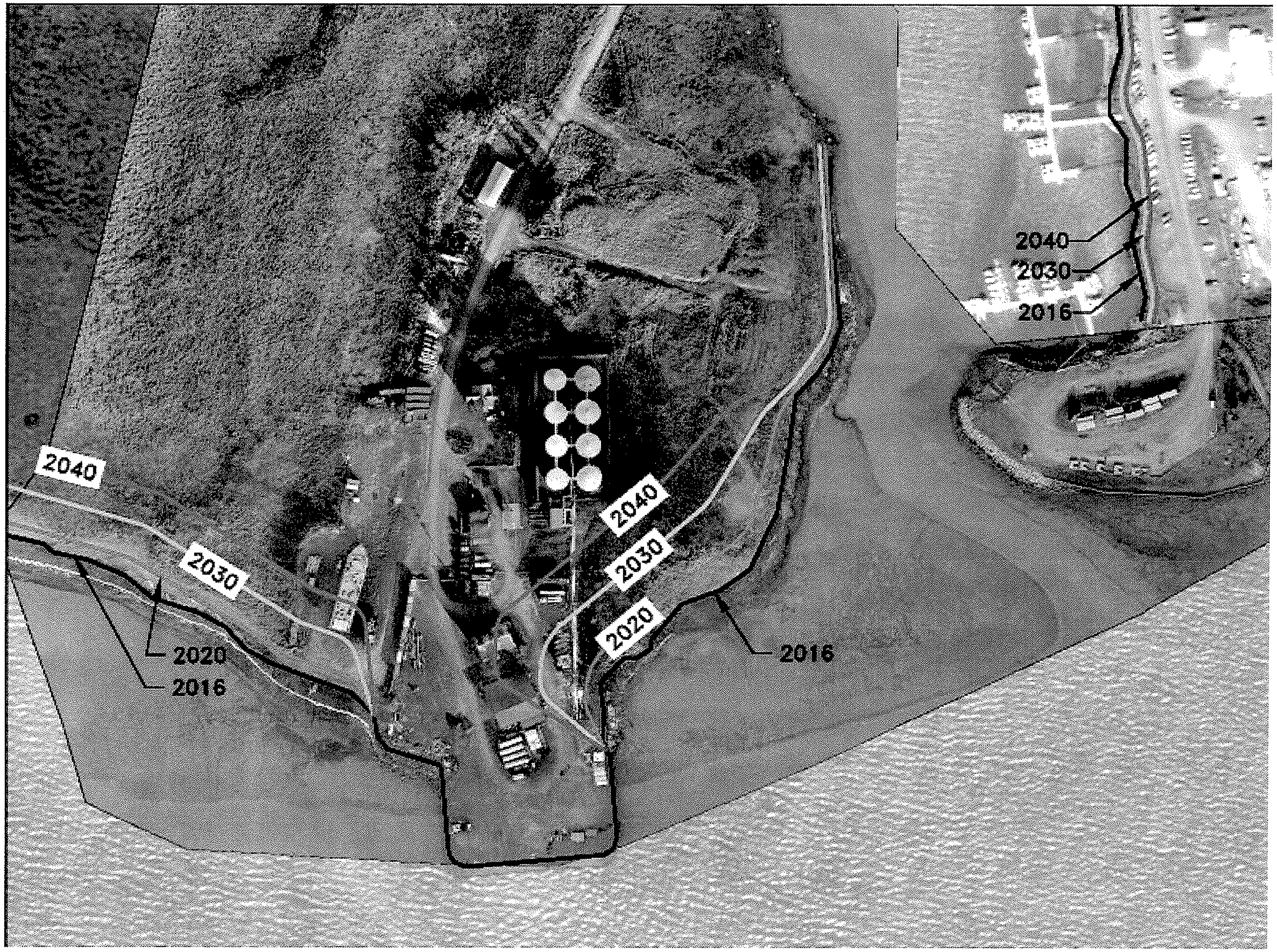

Figure 10: Predicted MHW Bank Locations over Time

1.7 Impact to the Local Economy

Damage to the BAF facility would be serious. There are other fuel providers in the area, but research has indicated that the loss of BAF would be a critical breakdown in fuel supply infrastructure, not only to Dillingham, but also to several outlying communities. The loss or severe damage of this facility would greatly impact the supply of fuel and other petrochemical supplies to the region. There would be significant life safety issues in that utilities and transportation in five communities would have their fuel supply opportunities greatly decreased. Any impacts to the fuel supply and storage could have a costly impact on fuel prices in the region. In addition to the economic impacts, there is the environmental concern that a spill of fuel oil or other petrochemical product would be extremely damaging to the environment, especially the highly valued salmon fishery.

The Bristol Bay commercial fishery is vital to the economy of the region. Dillingham is the primary operating center for fishermen and fish processing in the Nushagak District and has the only protected boat harbor in Bristol Bay. The Alaska Department of Fish and Game (ADF&G) reported that The Bristol Bay region had a salmon harvest with an ex-vessel value of $94,480,000 in 2015.

The salmon fishery is of great concern to the local population, and any project would need to have minimal impacts to the fishery, both during construction and for the project life. Residents use the tidal flats to the east and west of the boat harbor entrance as subsistence set net sites. It is important that any coastal stabilization construction project be designed to minimize interference with this activity that is of both economic and subsistence importance.

Damages associated with incremental maintenance and advanced replacement to harbor infrastructure are occurring as a result of erosion in the study area. Types of infrastructure damages include: repairs and advanced replacement of moorage floats, damage to moorage float swing arms, damage to concrete boat ramps, and damages to the harbor bulkhead.

The commercial fishing fleet utilizing Dillingham Harbor includes up to 750 vessels. The commercial fishing season out of Dillingham Harbor extends primarily from May through July. The peak number of commercial vessels that utilized the harbor at any one time was approximately 450 during a salmon fishing closure. The typical number of vessels utilizing the harbor at any one time during the fishing season is between 250 and 300 vessels. Harbor users typically incur vessel damages as a result of increased wave action during storms. Damaging storms were identified as those causing waves of 2' or higher within the harbor. Engineering analysis of wind and tide data for the study area confirmed local estimates of annual damaging storm frequency at 7 storms per year during the May-September fishing and boating season.

2.0 USACE ENGINEERING STUDY

The purpose of the 2009 USACE study was the reduction of current and future damages to existing structures and facilities as caused by wave action. The 2009 USACE study looked at six design alternatives including a "No-Action" plan. The Alternatives are described throughout this section and shown in Figures 11-16.

2.1 ALTERNATIVE W1

Alternative W1 consists of a rock revetment on both the west and east sides of the inner harbor, see Figure 11. This alternative is designed to eliminate the erosion problems along the west bank and inside the harbor itself, but would not replace the protection that had been provided by the Scandinavian Beach spit, before it eroded away. Although this project would be able to claim benefits from eliminating erosion, there would still be residual damages from waves entering the harbor.

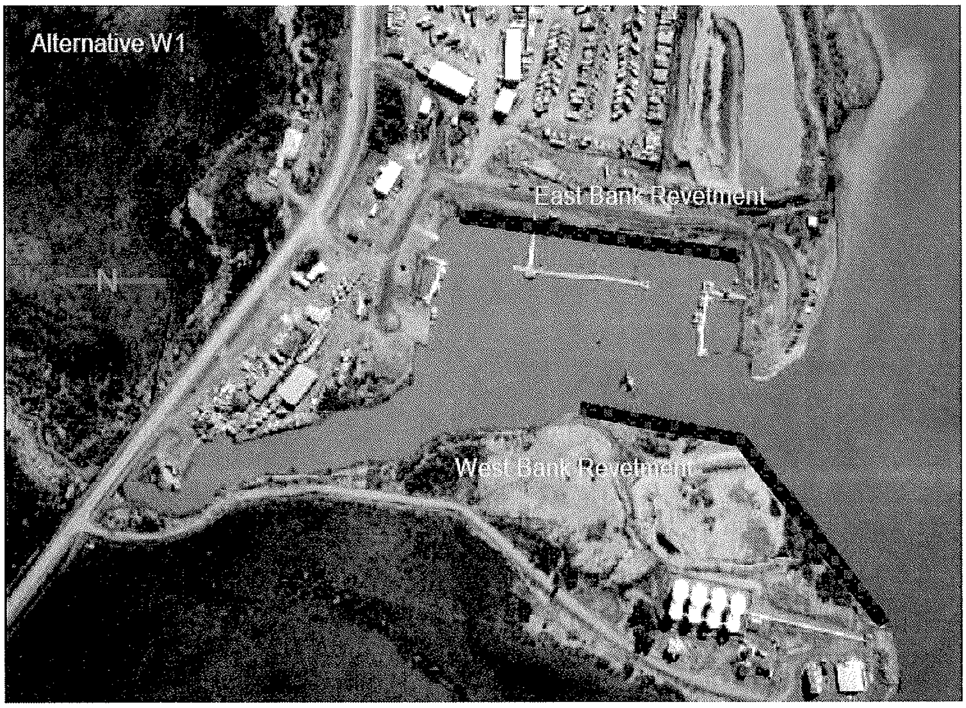

Figure 11: Alternative W1

2.2 ALTERNATIVE W1A

Alternative W1A consists of a combination of sheet-pile wall and rock revetment on the west side of the harbor and a rock revetment on the east side of the harbor, see Figure 12. This alternative was prepared in response to a request of BAF. BAF wanted the option for potential fueling and barge loading operations, for which the sheet pile option would be ideal.

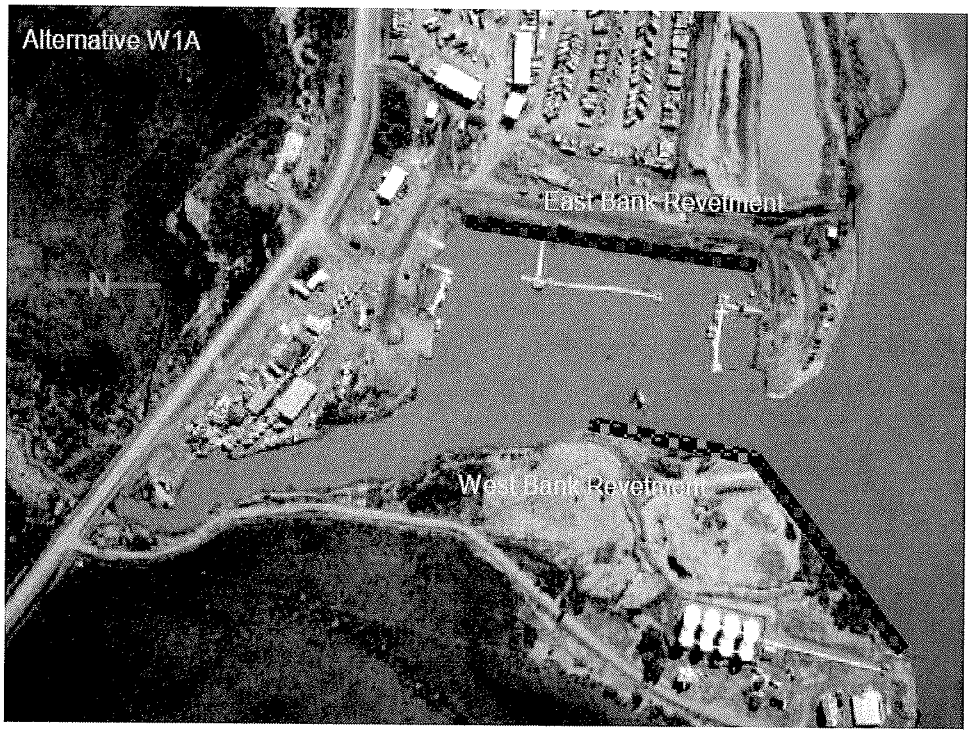

Figure 12: Alternative W1A

2.3 ALTERNATIVE W2

Alternative W2 consists of a rubble mound breakwater and a rock revetment on the west side of the harbor. see Figure 13. This alternative utilizes both a breakwater and revetment to prevent future erosion damages. The breakwater would prevent large waves from entering the harbor, thus eliminating much of the erosion problem within the harbor. The revetment along the west bank is necessary to prevent erosion in the areas of the west bank still exposed to the adverse wave climate. Because waves that would impact the interior west bank would be much smaller than those that are currently impacting the west bank, the revetment cross section for this interior section would not require material as large as that required in Alternatives W1 and W1A. The armor rock thickness for the revetment would be reduced from 5.0' to 3.0' thick and the size of the armor rock would be reduced from rocks in the 3,000 lb. range to rocks in the 300 lb. range.

While the erosion occurring on the east side of the harbor has no direct impact to BAF, the breakwater installed in this option would reduce waves entering the harbor from 6' to 1' and would significantly reduce damage to harbor facilities and vessels as well as eliminating the need for a revetment on the east side of the harbor. This breakwater would be also beneficial to BAF if an interior harbor fueling or barge loading location is added in the future.

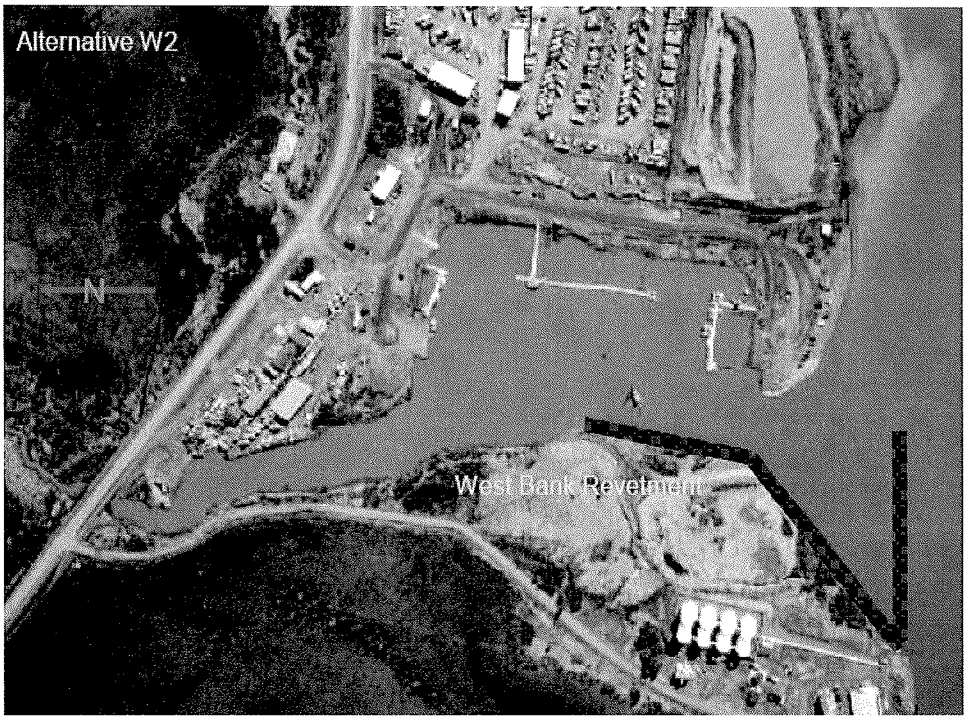

Figure 13: Alternative W2

2.4 Alternative W3

Alternative W3 is essentially the same as alternative W2, except for including the east revetment and a somewhat different alignment for the breakwater, see Figure 14. This alternative accomplishes the same as alternative W2 but includes added protection for the east bank to prevent further erosion from the residual 1-foot wave in the harbor. This additional increment of protection would be expected to provide very little in the way of additional damages prevented. This alternative also used a different size breakwater to see if a lesser cost breakwater could be found.

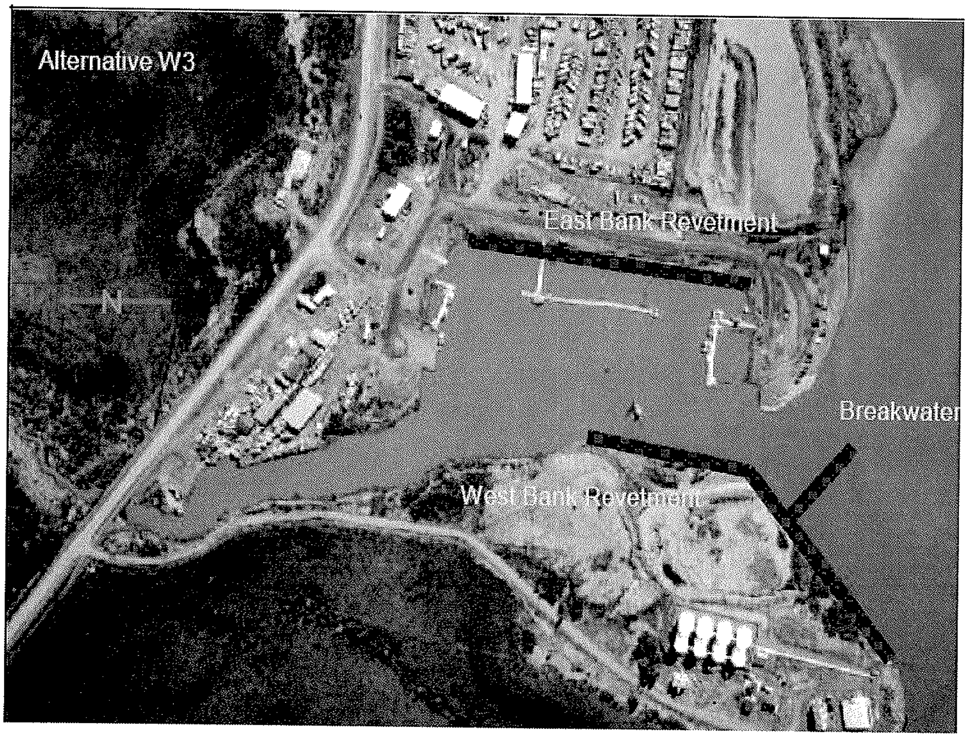

Figure 14: Alternative W3

2.5 ALTERNATIVE W4

Alternative W4 is essentially the same as alternative W2 and W3, except for including the east revetment and a somewhat different alignment for the breakwater, see Figure 15. The purpose of this alternative was again to discover if a different breakwater alignment would provide protection at a lesser cost.

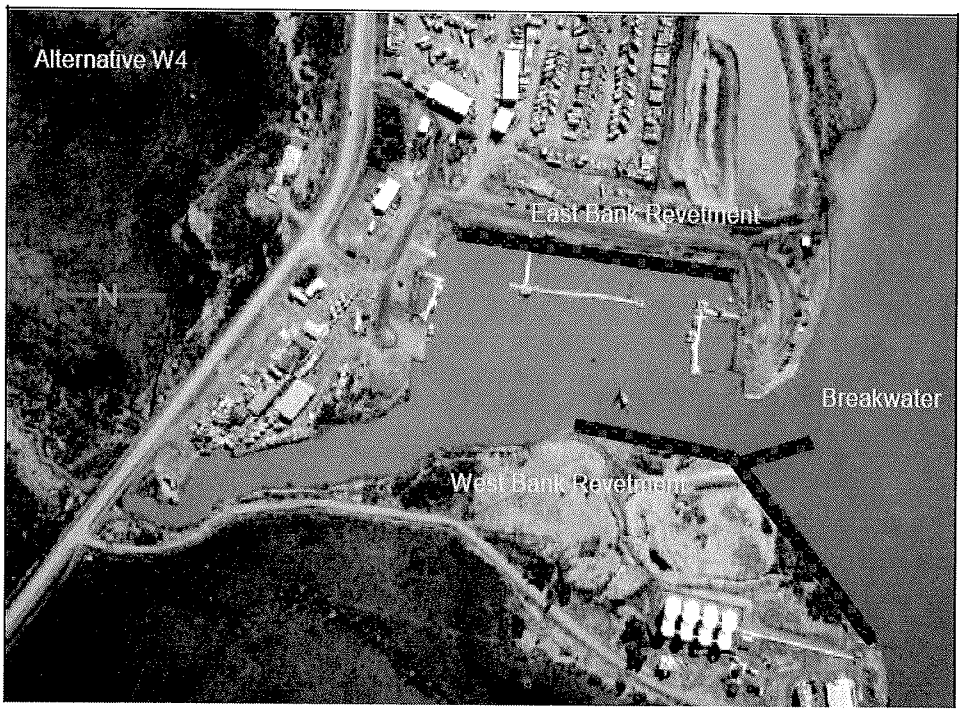

Figure 15: Alternative W4

2.6 ALTERNATIVE W5

Alternative W5 has the same breakwater and rock revetments on the west side of the harbor as Alternative W2 and the revetment on the east bank, see Figure 16. This alternative was added later in the analysis after Alternative W2 was found to be the most cost effective alternative. This alternative adds the east revetment to Alternative W2 to determine if the additional increment of the east revetment would be cost effective.

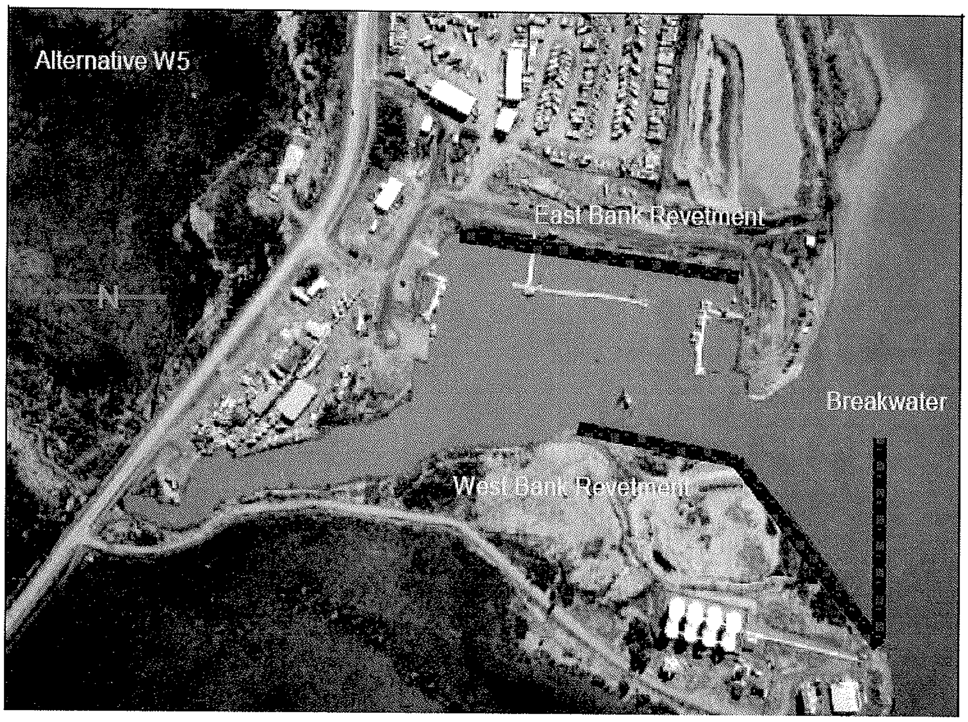

Figure 16: Alternative W5

2.7 ALTERNATIVE W6

Alternative W6 is the No-Action plan and only meets the objectives of minimizing impacts to fishing habitat and maintenance dredging of the harbor.

2.8 USACE Study Conclusions

The USACE analyzed the alternatives based on damages avoided, a benefit to cost ratio, an evaluation of the advantages and disadvantages of the materials and alignments, and comparison to determine the most cost effective alternative. Construction cost, total and average annual first cost, annual operation and maintenance, and total annual costs were developed for each alternative.

2.8.1 Eliminated Alternatives

After the initial analysis, Alternatives W1A, W3, W4 and W6 were eliminated from further consideration. W1A was eliminated because sheet-pile was deemed to be cost prohibitive when compared with the cost of riprap. Alternatives W3 and W4 were eliminated because, when the effectiveness of these alternatives was analyzed, they appeared to have identical benefits as W5. Furthermore, the costs of Alternatives W3 and W4 are much higher because they require a substantial amount of additional riprap along the revetment to prevent the same amount of damages. Alternative W5 requires less riprap armor than W3 and W4 because the breakwater is located farther out, which causes the wave energy to be dissipated sooner, resulting in less armor needed behind the breakwater. Due to the decreased riprap armor, initial cost estimates showed that Alternative W5 had the lowest cost when compared to W3 and W4 while it provided identical benefits, and thus was the most logical to keep. The no action plan, Alternative W6, was eliminated because it did not meet the primary objective of significantly reducing erosion damages and protecting the harbor.

2.8.2 Preferred Alternatives

For the remainder of this report, the focus will be Alternative W1, Alternative W2, and Alternative W5.

2.8.3 Alternative W1

It is estimated that alternative W1 would effectively stop land loss from erosion on the West Side; however, it does not replace the natural protection that had been provided by Scandinavian Beach, and does nothing to reduce the damages caused by wave energy within the harbor. Arresting erosion in the harbor would eliminate the need for future emergency actions to protect the BAF facility and future repairs to the sheet-pile swing arms. This alternative also does not address the identified damages to moorage floats, concrete boat ramps, the harbor bulkhead, and vessel damages. See Figure 17 for the estimate of wave heights entering the harbor using Alternative W1.

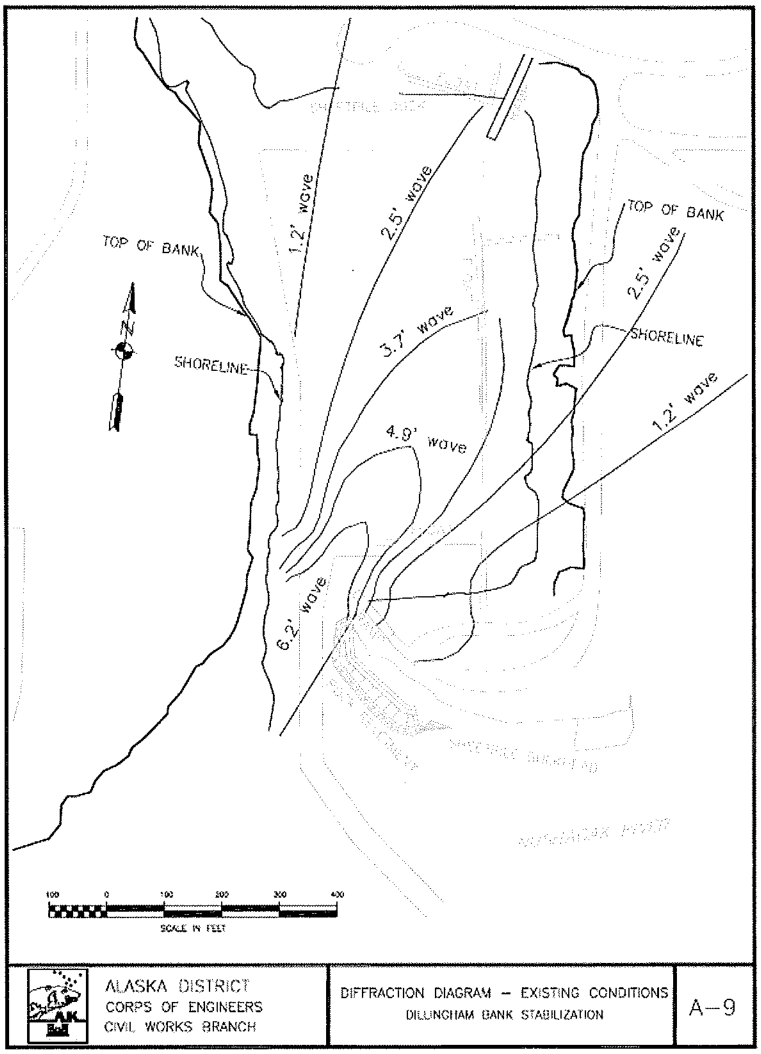

Figure 17: Wave heights using Alternative W1

2.8.4 Alternatives W2 & W5

It is estimated that alternatives W2 and W5 would effectively halt erosion in the study area and eliminate effects of land loss and damages to near-shore harbor infrastructure. Consistent with USACE shore stabilization design standards, alternatives W2 and W5 were formulated such that wave height in the harbor would be maintained at less than 1 foot, eliminating the incremental damages to floats and vessels in the harbor, see Figure 18. As such, each alternative as designed is expected to eliminate the identified incremental damages associated with erosion in the study area.

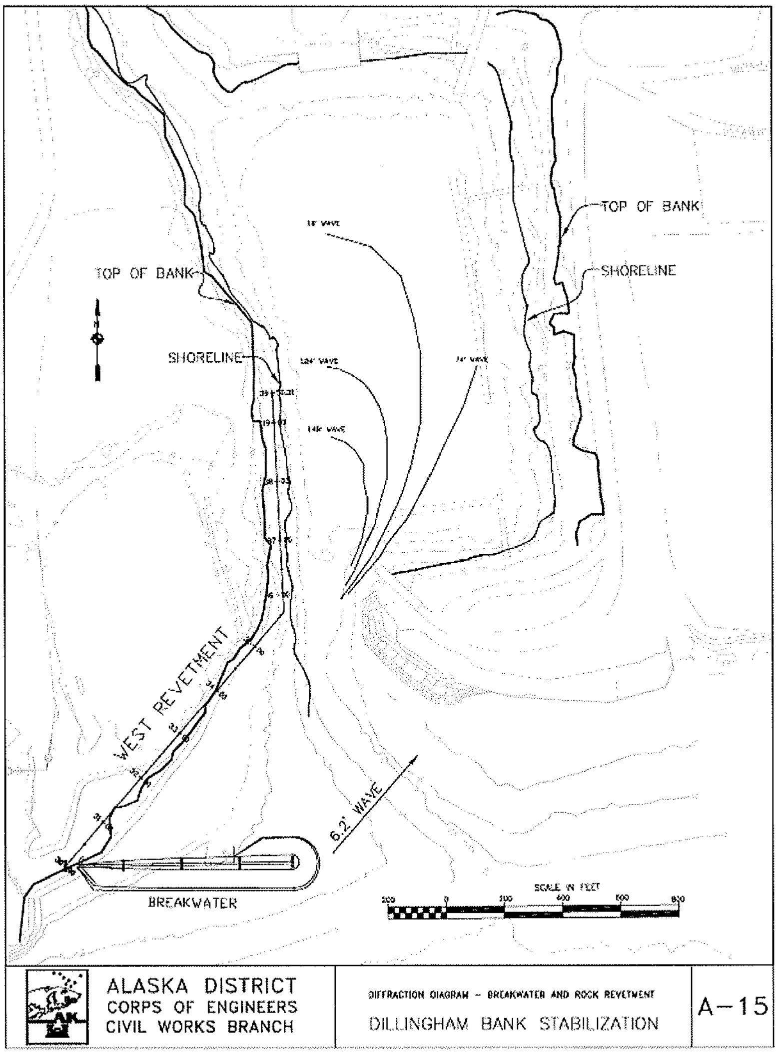

Figure 18: Wave heights using Alternative W2 & W5

2.9 Costs Comparison

Of the five construction alternatives, the USACE developed preliminary cost estimates for the three most viable alternatives, W1, W2, and W5. The preliminary cost estimates, in 2008 dollars, for these alternatives are shown in Table 4.

Table 4: Preliminary Project Alternatives Cost Comparison

	Alt W1	Alt W2	Alt W5
Project Costs	$12,924,000	$8,780,000	$10,238,000
Annual O&M Costs	$64,700	$43,900	$51,200

After developing these preliminary project costs, the USACE then did a comprehensive analysis of the least cost alternative W2. This analysis placed the estimated cost of the project at $12,245,000, a 39.5% increase from the preliminary estimate. Due to the similar nature of all three alternatives presented in Table 4, we anticipate the error in the initial project cost to be systemic therefore; we have updated the preliminary project cost to reflect the cost of W2. These updated project cost are shown in Table 5.

Table 5: Preliminary Project Alternatives Cost Comparison (Updated)

	Alt W1	Alt W2	Alt W5
Project Costs	$18,029,000	$12,245,000	$14,282,000

2.10 USACE Recommended Alternative

As can be seen in Table 4, the Alternative W1 was approximately 50% more expensive than Alternative W2. Both W1 and W2 provide the same amount of shoreline protection for the BAF site. Because of the protection offered by the breakwater in Alternative W2, the armor rock thickness for the revetment is reduced from 5.0' to 3.0' thick and the size of the armor rock would be reduced from rocks in the 3,000 lb. range to rocks in the 300 lb. range. Combined with the additional protection offered to the City side, alternative W2 was recommended over alternative W1. Alternative W5 is the same on the west side of the harbor as W2 but includes additional protection on the City side. The USACE found that the benefits from that additional protection did not outweigh the costs. Alternative W2 was chosen as the recommended alternative.

Alternative W2 consists of a 391-foot rubblemound breakwater and a 950-foot rock revetment on the West Side of the harbor with no bank stabilization on the east bank, see Figure 18. This alternative uses both a breakwater and revetment to prevent future erosion damages. The breakwater would prevent large waves from entering the harbor, thus eliminating much of the erosion problem and damages to the harbor facilities and vessels. The west bank revetment is required to prevent further erosion from residual waves or from rare storms that would bring a wave in from the east. Because waves impacting the interior west bank would be much smaller than those currently impacting it, the revetment cross section for this interior section would not require material as large as that required for Alternatives W1 and W1A. No adverse impact on the Bristol Fuel's dock or the existing harbor is expected to occur from construction of this Alternative. Erosion inside of the harbor would be reduced due to the decreased wave climate.

The revetments would be constructed as a three-layer system of core, secondary, and armor stone. The rock would extend up to an elevation of +32 feet MLLW with 1V:3H side slopes, see Figure 19. From elevation +29 MLLW to elevation +32 MLLW, the slope would be graded to transition to the existing top of bank. The top elevation of the revetment was determined from 6 feet of wave run-up with a design high water level of 26 feet. The design water level equates to mean higher high water (+20 MLLW) plus 6 feet of storm surge. This upper section of revetment would be planted with live willow stakes and sprigging of grasses of species common to the Dillingham area. This planting would replace vegetation lost either to erosion or during the construction of the project.

The west revetment would require approximately:

- 11,000 yd^3 of armor rock, ranging in size from 350 to 200 pounds
- 7,200 yd^3 of Secondary rock, ranging in size from 200 and 20 pounds
- 3,800 yd^3 of core rock, ranging in size from 20 pounds to 1 pound
- 3,600 yd^3 of porous fill to be placed behind the revetment

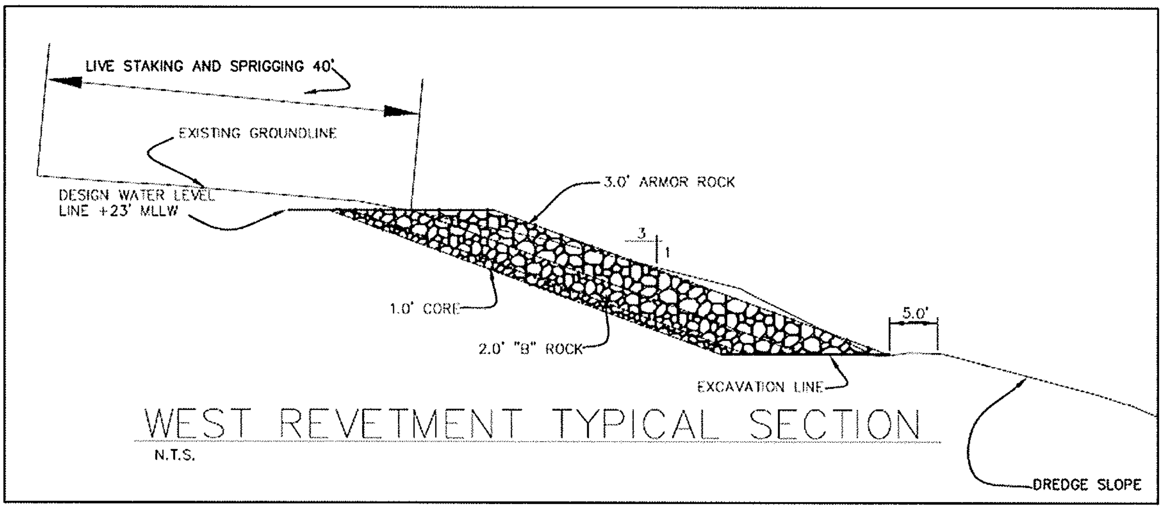

Figure 19: West revetment typical section

The breakwater would be constructed using a three-layer system of core, secondary, and armor stone. The breakwater would have a crest elevation of +32 feet MLLW and have 1V:1.5H side slopes, see Figure 20. The breakwater is designed to be an overtopping structure.

The breakwater would require approximately:

- 5,500 yd^3 of armor, ranging in size from 3,826 and 2,295 pounds.
- 3,250 yd^3 of secondary rock, ranging in size from 2,295 to 230 pounds
- 4,300 yd^3 of core rock, ranging in size from 230 to 21 pounds.

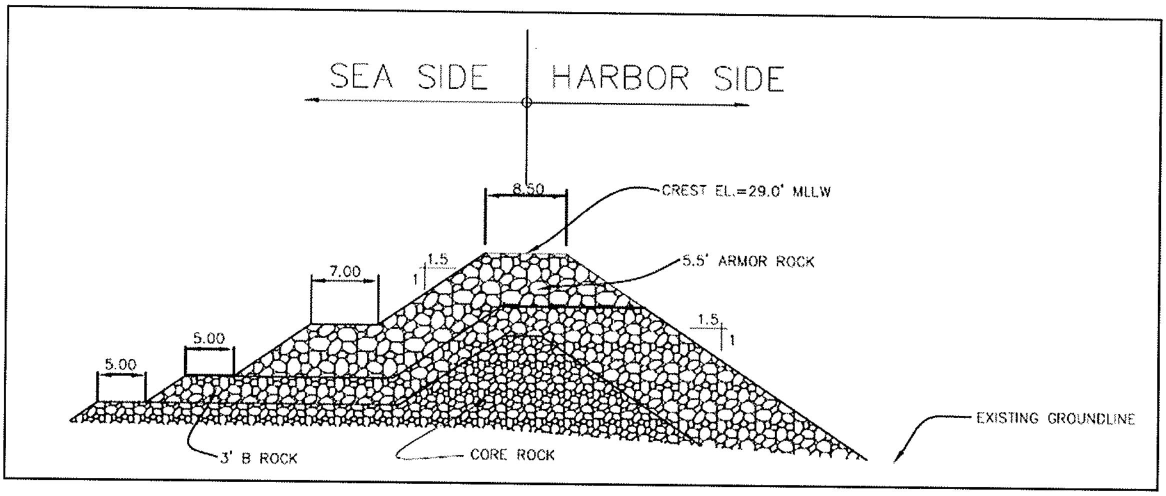

Figure 20: Breakwater typical section

The detailed construction and project costs for Alternative W2 are shown in Table 6. The costs are broken down by sections with the breakwater and revetment costs listed individually. Please note that this is in 2008 dollars.

Table 6: Detailed Project Cost, Alternative W2

Item	Cost	20% Contingency	Total Cost
Mob and Demob	$973,000	$194,600	$1,167,600
Revetment	$5,152,600	$1,030,52	$6,183,120
Breakwater	$3,044,100	$608,820	$3,652,920
Total Construction Costs	$9,169,700	$1,833,940	$11,003,640
Lands and Damages	$91,000		$91,000
Planning and Design	$225,000	$45,000	$270,000
Construction Management	$734,000	$146,800	$880,800
Total Project Costs	$10,219,700	$2,025,740	$12,245,440

2.11 Construction Considerations

Mitigation for this project consists of minimizing in-water work to protect juvenile salmon as much as possible along with vegetating and contouring disturbed areas behind the revetment to minimize surface erosion from rain and overtopping waves.

Much of the revetment construction below the mean high water line (+18 MLLW) would be done during lower tides when the tide flat is dewatered, but some construction on the breakwater might be necessary when the tide flats are flooded. Both the West Side and City Dock Side revetments would be built at the base of former disposal site berms. The riverbanks behind the west side revetment would be sloped to grade before construction.

2.12 Operations and Maintenance

Maintenance of the rock revetment and breakwater would be the responsibility of the City of Dillingham. The USACE, Alaska District would conduct periodic site inspections to verify whether maintenance is warranted on the revetment and breakwater. Both the revetment and breakwater were designed to be stable for the 50-year wave condition. Therefore, it is not anticipated that there will be significant loss of stone on the structures during the life of the project. Typically rock revetments and breakwaters have a 50-year design life, even though they may last much longer. Maintenance of a rock revetment and breakwater may require replacement of 2 percent of the armor stone every 25 years.

Whereas the expected operation and maintenance (O&M) requirements for these projects are expected to be minimal, there are tasks necessary to ensure long lasting protection for the areas of concern. Typical O&M requirements would include routine inspection of the structures and the occasional addition of armor stone to areas that are experiencing excessive wear. The West Side project has an estimated annual O&M requirement of $50,300. These amounts are based on having to replace a minimal percentage of rock every 10 to 15 years.

3.0 USACE COST CORRECTIONS FOR INFLATION

In order to discuss the USACE developed alternative costs outlined in this report it was necessary to adjust the values from 2008 to 2016 dollars. The method used for this transformation was a comparison of the 2008 and 2016 consumer price index (CPI). The 2008 and 2016 CPI was found to be 189.497 and 216.999, respectively, for Anchorage which was the closes major city were data was available.. This change in the CPI is quantified as an increase in the construction cost by 14.5%. The updated project costs are displayed in Table 7.

Table 7: Project Alternatives Cost Comparison in 2016 Dollars

	Alt W1	Alt W2	Alt W5
Project Costs	$20,643,000	$14,021,000	$16,353,000

4.0 ALTERNATIVE W1 MODIFIED

During a planning session with BAF management BESC was directed to determine what the cost of Alternative W1 would be with the absence of the East Bank Revetment. The logic being, if BAF was to construct some type of erosion protection structure independent of the City then there would be no need to construct the East Bank Revetment.

Based on our analysis of the USACE cost reports we estimate the cost of the East Bank Revetment to be approximately $4,339,000 in 2008 dollars. Adjusting this cost to 2016, as outlined in Section 3.0, yields an anticipated cost of the East Bank Revetment at $4,986,000. Therefore, the cost of Alternative W1 Modified is anticipated to be $15,657,000.

Based on a comparison of the alternative cost presented in Table 7 and Alternative W1 Modified is appears that Alternative W2 would still be the preferred solution for BAF if cost was the deciding factor.

5.0 OTHER EROSION PROTECTION AREAS FOR BAF SITE

Two other locations of erosion were identified that are not covered in the USACE 2009 reports. One area is along the BAF site access road due south of the culvert that Scandinavian Creek passes through at Kanakanak Road. The other site is along the shoreline of the BAF property west of the sheet pile dock, Figure 21.

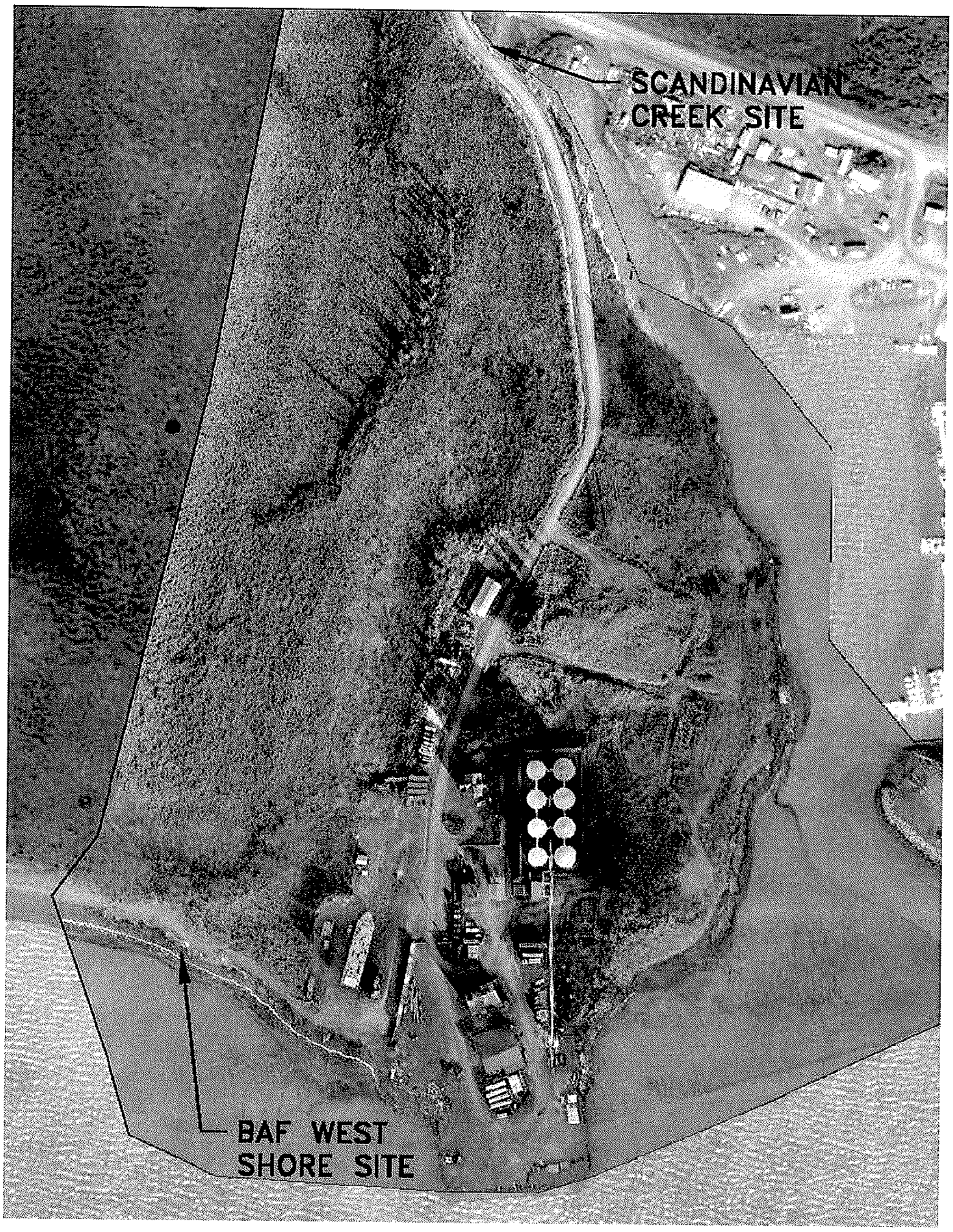

Figure 21: Other Erosion Protection Areas

5.1 Scandinavian Creek Site

For the purpose of the memo, it is assumed that a revetment similar to Alternative W2 as shown in Figure 19 will be used to prevent further erosion from occurring in this area. The length of this revetment will be approximately 220 feet long. The rock revetments would have a top of +22 feet MLLW to match the existing road elevation and a bottom elevation of +15 feet MLLW. The top elevation of the revetments was does not include wave run-up. The design water level equates to the mean higher high water level plus 6 feet of storm surge. approximately 540 yd^3 of armor rock would be used that range in size from 350 to 200 pounds. Secondary rock size would be from 200 to 20 pounds and would require 360 yd^3. 180 yd^3 of core rock would be placed behind the secondary layer and would range in size from 20 to 1 pounds. Using costs previously established in the USACE report and adjusted to 2016 values, the cost of this section of erosion control would be approximately $829,720. See Table 8 for a breakdown of costs.

Table 8: Scandinavian Creek project costs

Item	Cost	20% Contingency	Total Cost
Mob and Demob	$222,840	$44,570	$267,410
Erosion Control	$3,660	$730	$4,390
Clearing and Grubbing	$12,830	$2,570	$15,400
Excavation and Hauling	$109,020	$21,800	$130,820
Textile	$24,730	$4,950	$29,680
Backfill and Prep	$95,730	$19,150	$114,880
Construction Survey	$20,150	$4,030	$24,180
Armor Rock	$48,800	$9,760	$58,560
B Rock	$32,190	$6,440	$38,630
Core Rock	$15,980	$3,200	$19,180
Total Construction Cost	$585,930	$117,190	$703,120
Planning and Design	$58,600	$11,720	$70,320
Const. Management	$46,900	$9,380	$56,280
Total Project Costs	**$691,430**	**$138,290**	**$829,720**

5.2 BAF West Shore Site

BAF has plans to expand and upgrade their existing pad and barge haul-out ramp, see Figure 21. Armor stone has already been placed between the sheet pile dock and the barge ramp. The shoreline west of the barge ramp will need to be protected from wave erosion. For the purpose of the memo, it is assumed that a revetment similar to Alternative W1 as shown in Figure 23 will be used to prevent further erosion from occurring in this area. This revetment is thicker than the revetment used in Alternative W2 and assumes there is no breakwater to reduce the wave impact on the shore.

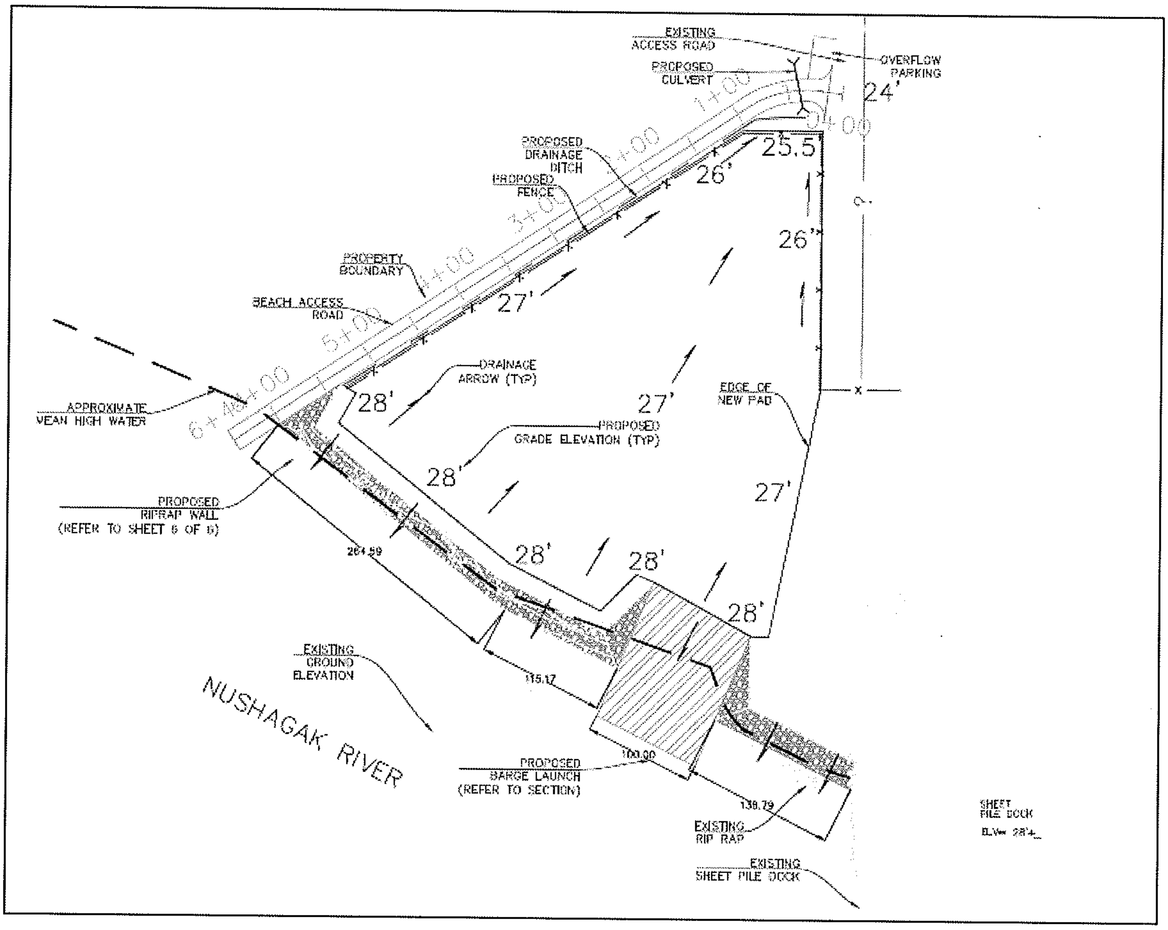

Figure 22: Planned BAF expansion.

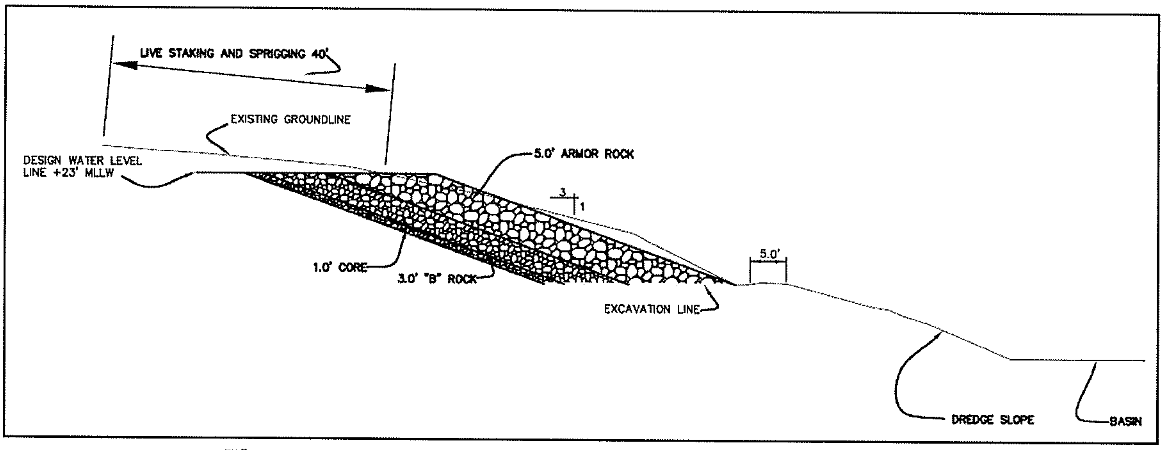

Figure 23: West shore revetment typical section.

The rock revetments would have a top of +32 feet MLLW. The top elevation of the revetments was determined from 6 feet of wave run-up with a design water level of 26 feet. The length of this revetment will be approximately 380 feet long. The design water level equates to the mean higher high water level plus 6 feet of storm surge. approximately 3,560 yd^3 of armor rock would be used that range in size from 1,914 to 1,148 pounds. Secondary rock size would be from 1,148 to 115 pounds and would require 2,140 yd^3, and 710 yd^3 of core rock would be placed behind the secondary layer and would range in size from 115 to 11 pounds. Using costs previously established in the USACE report and adjusted to 2016 values using a CPI increase of 14.5% from 2008, the cost of this section of erosion control is estimated to be approximately $2,122,900. See Table 9 for a breakdown of costs.

Table 9: BAF West Shore protection project costs

Item	Cost	20% Contingency	Total Cost
Mob and Demob	$384,910	$76,980	$461,890
Erosion Control	$6,330	$1,270	$7,600
Clearing and Grubbing	$22,150	$4,430	$26,580
Excavation and Hauling	$188,300	$37,660	$225,960
Textile	$42,720	$8,540	$51,260
Backfill and Prep	$165,360	$33,070	$198,430
Construction Survey	$34,810	$6,960	$41,770
Armor Rock	$379,660	$75,930	$455,590
B Rock	$211,560	$42,310	$253,870
Core Rock	$63,480	$12,700	$76,180
Total Construction Cost	$1,499,280	$299,860	$1,799,140
Planning and Design	$149,900	$29,980	$179,880
Const. Management	$119,900	$23,980	$143,880
Total Project Costs	**$1,769,080**	**$353,820**	**$2,122,900**

6.0 SUMMARY OF PROJECT COST

The purpose of this section is to provide a final summary of the project cost, in 2016 dollars, developed as part of this report.

Table 10: Summation of Project Cost

Work Item	Cost
Alternative W2	$14,021,000
Scandinavian Creek Site	$830,000
BAF West Shore	$2,123,000
Total Project Costs	**$16,974,000**

ALASKA CLEAN HARBORS

TIERED CERTIFICATION CHECKLIST

Facility Name ____

Manager ____

Address ____

____

Phone ________________ Email ___________________________________

Website ____

ACH Point Person ____

Number of Slips ____

Feet of Transient Moorage _______________________________________

Facility Types Present (CHECK ALL THAT APPLY)

☐ Wash-down Pad

☐ Boatyard

☐ Upland Boat Storage

☐ Pump Out Facility

☐ ____________________

Site Review Date

____

☐ Preliminary

☐ Certification

☐ Recertification

Operations & Site Features
(CHECK ALL THAT APPLY)

Number of employees: Full-time (year-round) _______ Part-time (year-round) _______ Seasonal _______

What type of docking system do you have? ☐ Floating docks ☐ Fixed docks ☐ Bulkheads

What are the docks made of? ____

☐ Use of shrink wrap covers

☐ Winterization

☐ Mechanical/engine shop

☐ Other

☐ Fiberglass Repairs

☐ Bottom sanding and painting

☐ Boat bottom washing

☐ Paved roadways

☐ Storm drains

☐ Oil changes

____

Does your community recycle? ____

Are there local regulations prohibiting littering? ____

This checklist is the backbone of your application to become a certified Alaska Clean Harbor. Use this form to conduct a self-assessment of your facility. We will help you devise an action plan to reach certification goals. This checklist should be used in conjunction with the Alaska Clean Harbors Guidebook and/or the ACH website: http://www.alaskacleanharbors.org.

Our goal is to be inclusive of all types of harbors in Alaska, so ACH staff and the Advisory Committee are available to help you figure out how to meet the goals of reducing waste and preventing pollution. In 2024 we implemented a tiered program with the objective of including more harbors. Harbors can apply for Silver, Gold, and Platinum based on the number of Best Management Practices (BMPs) achieved.

Place a checkmark in the appropriate box (yes, no, not applicable [N/A]) next to each question. If an item is in progress, mark yes and then explain at the bottom of the page. Check N/A if a particular BMP is not applicable to your facility, i.e. your community does not have recycling.

To become certified as an Alaska Clean Harbor, you must achieve 100% of the regulatory federal and state legal requirements which are on the third page. You must also mark "yes" to a certain number of the remaining goals. The number corresponding with the tier level achieved is at the top of each checklist.

Regulations and Permits

The following items are federal or state requirements:

Solid Waste Management	Yes	No	In Progress
a. Your facility provides adequate trash cans/dumpsters (18 AAC 64.005).			
b. The facility's trash cans are covered and labeled.			
Liquid Chemical & Hazardous Waste Management	Yes	No	In Progress
a. Your facility conducts hazardous waste determinations on all chemicals prior to disposal.			
b. There are established procedures for the storage, disposal, and recycling of all hazardous waste, in accordance with federal and state regulations.			
c. Safety Data Sheets for all hazardous substances used at your facility for vessel or engine maintenance are readily available for staff.			
Petroleum Product Management	Yes	No	In Progress
a. Your facility reports all fuel spills to ADEC and U.S. National Response Center (NRC).			
b. There is a Spill Prevention, Control and Countermeasure (SPCC) or other oil spill contingency plan in place and your employees are trained to execute it.			
Sewage & Pump Out Facility Operation	Yes	No	In Progress
a. Discharge of untreated human and pet waste is prohibited within the harbor basin and grounds.			
Stormwater Management	Yes	No	In Progress
a. Have an APDES (formerly a NPDES) Stormwater permit and Stormwater Pollution Prevention Plan? For more information: https://dec.alaska.gov/water/wastewater/stormwater/multisector/			

Harbor Operations

(Best practices for harbor facilities or operations)

Choose from the following criteria: Silver Certification = 3, Gold = 7, Platinum = 16

	Yes	Not Yet	N/A
a) Fuel storage and waste tanks are clearly labeled and stored in a manner that does not allow release to the environment.			
b) Facility provides used oil and oily rag collection and disposal.			
c) There is an ordinance or policy addressing abandoned and derelict vessels. They are removed when possible.			
d) Signs are posted informing boaters and staff of harbor environmental policies.			
e) Litter and pet waste is picked-up within harbor and along shoreline daily.			
f) Facility provides collection bins and bags for pet waste.			
g) Clean, functional restrooms are provided when harbor is open for business.			
h) Some of the following items are available to boaters for maintenance activity at the marina: tarps, trash bags, oil pads and/or bilge socks.			
i) Oil boom and spill response materials are available and easily accessible.			
j) The contents of hazardous waste containers are appropriately stored and labeled including accumulation start dates. *Note: the recommendation for storage of hazardous waste is on an impervious surface with containment able to retain 110% of the volume of the largest container.*			
k) Facility properly stores and disposes of batteries, antifreeze, and paint products.			
l) Facility retains disposal and recycling records and compares the amount of waste generated and shipped with past years to monitor progress.			
m) Local response officials, particularly the fire department, are familiar with the location and character of hazardous materials stored on site.			
n) There are disposal options for zincs at grid, boatyard, and/or other upland areas where boaters do maintenance.			
o) Disposal policies for dock or facility construction and replacement projects at your facility are in place and followed.			
p) If recycling is available in your community, it is provided for your boaters and staff.			
q) Facility sends used oil to an approved recycling facility or it is re-used on site.			
r) Harbor policy covers minimizing pollution and debris from tidal grid and boatyard use including abrasive blasting, painting, and sanding.			
s) Facility provides sewage pump out stations that are well signed and accessible.			

t) Provide example(s) of innovative best management practices not listed above that are unique to your marina.			
Future or in-progress items:			

Water Management and Coastal Resiliency

(Best practices to address water quality and to minimize damage from natural disasters)

Choose from the following criteria: Silver Certification = 1, Gold = 4, Platinum = 9

	Yes	Not Yet	N/A
a. Facility cleans storm drains, gutters and other water management structures on a systematic schedule.			
b. All storm drains are labeled (i.e. No Dumping, Drains to Ocean) and staff ensures impermeable surfaces remain free of waste from employees and boaters.			
c. New construction or renovation projects minimize impervious cover (such as asphalt and concrete) and runoff. Examples include utilizing gravel, grass, or permeable pavers.			
d. Facility incorporates techniques that reduce stormwater pollutants, such as planting native shrubs around maintenance areas, and/or replacing impervious areas with pervious areas.			
e. Boaters are encouraged to minimize gray-water discharges. Also, discharge from Type I and Type II MSDs is discouraged in the slip or mooring.			
f. Facility has prevention measures in place to protect against discharges from floor drains and sumps in buildings.			
g. A fish and bait management plan limits fish waste disposal to areas that do not impair water quality.			
h. Facility provides an oil/water separation service to filter bilge water.			
i. Facility promotes the use of aquatic safe herbicides and pesticides if applicable.			
j. A completed natural hazard emergency document is on file and reviewed with staff annually.			
k. Employ living shoreline techniques or no wake signs to protect shoreline from erosion.			
l. Provide example(s) of innovative best management practices not listed above that are unique to your marina.			

Future or in-progress items:

Boater Education

(Best practices to minimize pollution from boaters)

Choose from the following criteria: Silver Certification = 1, Gold = 3, Platinum = 7

	Yes	Not Yet	N/A
a) Facility provides educational materials about best boating practices that are readily accessible to boaters in the form of brochures, factsheets, pamphlets and/or other publications.			
b) Facility incorporates language or educational materials about environmental best management practices in boater slip agreements.			
c) Pollution prevention and waste management activities are regularly published by harbor (includes press release, social media, email).			
d) Publicly recognize boaters when they demonstrate environmental stewardship (newsletters, boater of the month, social media, etc.).			
e) Boaters are provided information on the proper handling of older refrigeration systems that may have CFCs as refrigerants.			
f) Options for fishing gear disposal are made available to boaters.			
g) Boaters are provided with information on the proper storage and disposal of wastes not accepted on-site.			
h) There is signage prohibiting the feeding of wild animals.			
i) Provide example(s) of innovative best management practices not listed above that are unique to your marina.			
Future or in-progress items:			

Employee Training and Community Outreach

(Best Management Practices for staff and communities)

Choose from the following criteria: Silver Certification = 1, Gold = 3, Platinum = 7

	Yes	Not Yet	N/A
a) All employees (including seasonal employees) are educated about pollution prevention in routine meetings and/or trainings.			
b) Facility trains employees on best practices for bilge maintenance and to watch for inappropriate discharges.			
c) Employees are trained in management of hazardous materials as well as other relevant safety requirements.			
d) Facility maintains staff training records.			
e) Employees are trained to talk to boaters about strategies to prevent littering and pollution.			
f) Encourage and assist employees to attend professional development trainings and certifications in relation to environmental issues.			
g) Publicly recognize employees when they demonstrate environmental stewardship (newsletters, employee of the month, social media, etc.).			
h) Partner with a local school, youth club or other organization to offer field trips, clean-up efforts or collaborative programs.			
i) Provide example(s) of innovative best management practices not listed above that are unique to your marina.			
Future or in-progress items:			

Certification Tier Achieved (Circle):	Silver Gold Platinum
Verified by Alaska Clean Harbors Program Representative: Name: Affiliation & Date:	