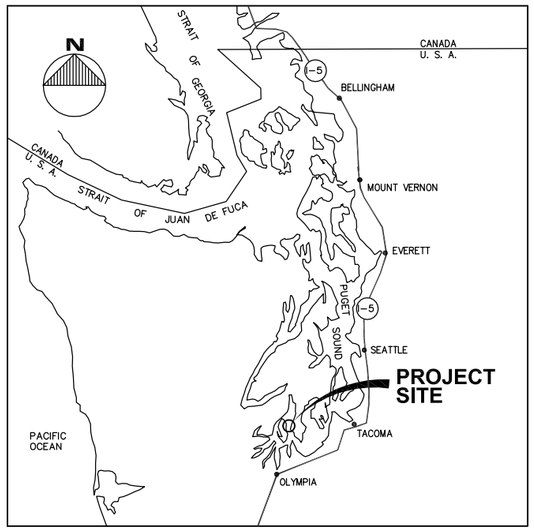
HERRON ISLAND FERRY
DOLPHIN REPLACEMENT



VICINITY MAP

SITE AERIAL

SHEET TITLE	No.
TITLE SHEET AND SHEET INDEX	1
SURVEY (ISLAND)	2
SURVEY (MAINLAND)	3
EXISTING AND DEMOLITION (ISLAND)	4
EXISTING AND DEMOLITION (MAINLAND)	5
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DIGITAL SIGNATURE:
Todd Belsick
Todd Belsick (Dec 13, 2016)

THIS DRAWING SET WAS CREATED AS AN ELECTRONIC DOCUMENT. IF THE ELECTRONIC DOCUMENT DOES NOT INCLUDE A VERIFIABLE DIGITAL SIGNATURE IN THE BOX ABOVE, PLEASE CONTACT THE ENGINEER OF RECORD FOR THE ORIGINAL CERTIFIED ELECTRONIC DOCUMENT.

P N D ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

TODD WILLIAM BELSICK — STATE OF WASHINGTON — 39312 — REGISTERED PROFESSIONAL ENGINEER
12/13/16

REVISIONS		
REV	DATE	DESCRIPTION

ISSUED FOR BID

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

TITLE: **TITLE SHEET AND SHEET INDEX**

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO: 1 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016	
CHECKED BY:	TWB	SCALE:	NOTED	

7/12/16
Drawings\2015\154034 - Herron Island Dolphin Replacement\Issued For Bid\154034-01.dwg

WITHIN GOVERNMENT LOT 3, SECTION 28, TOWNSHIP 21 NORTH, RANGE 01 WEST. WM, IN PIERCE COUNTY, WASHINGTON

DOLPHIN PILINGS TABLE
ON MAINLAND SURVEY

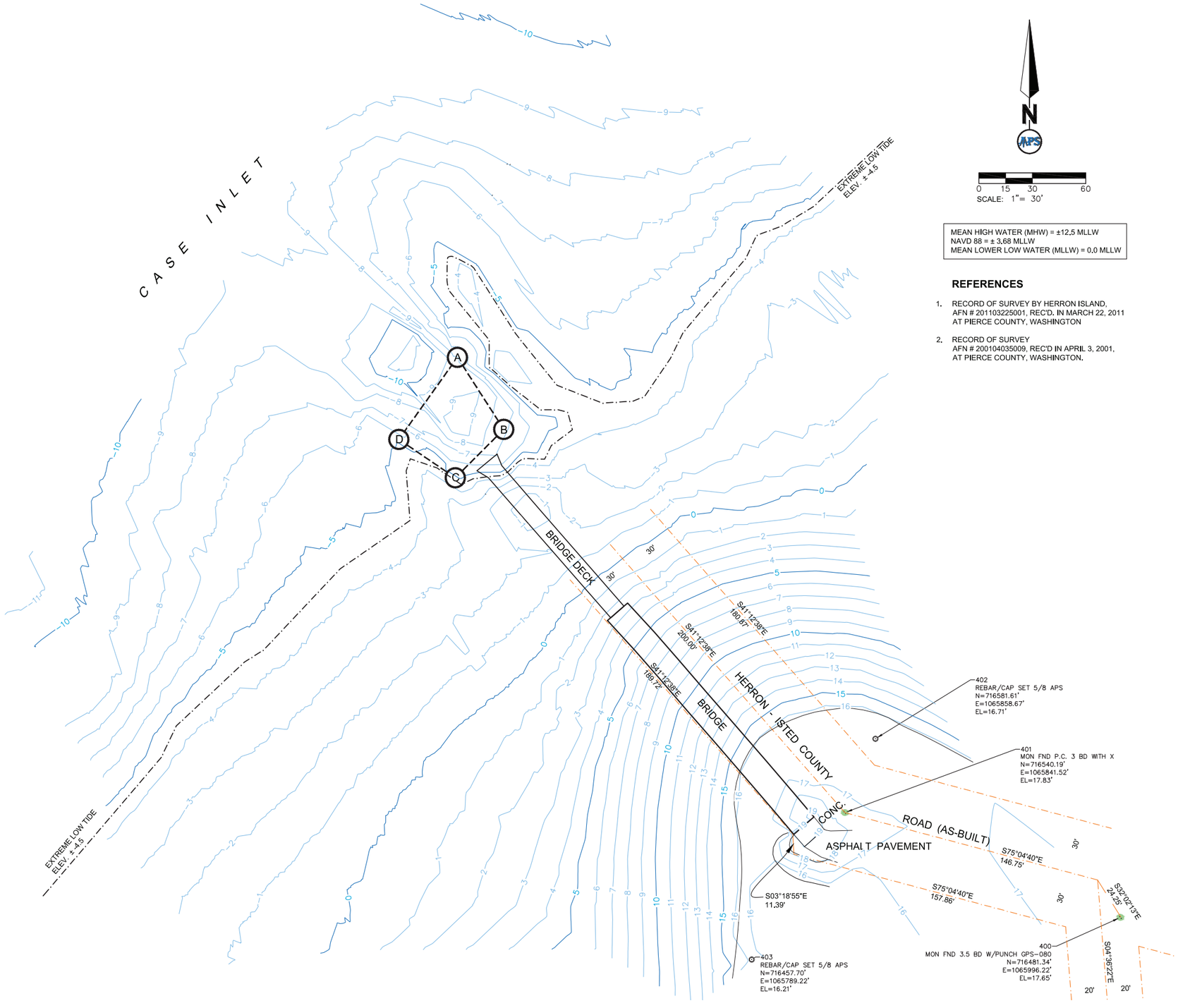
- (A) GROUND ELEV. = - 8.5'
  HIGHEST DOLPHIN EL. = 22.8'
- (B) GROUND ELEV. = - 7.5'
  HIGHEST DOLPHIN EL. = 23.6'
- (C) GROUND ELEV. = - 5.2'
  HIGHEST DOLPHIN EL. = 24.1'
- (D) GROUND ELEV. = - 6.1'
  HIGHEST DOLPHIN EL. = 22.8'

GENERAL NOTES

1. THE SOLE PURPOSE IS TO PRODUCE A HYDROGRAPHIC MAPPING OF THE HERRON ISLAND FERRY DOCKING AREA AT MAINLAND AND ISLAND LOCATION, AS ILLUSTRATED HEREON.
2. OUR CLIENT, PN & D ENGINEERS, HAS NOT FURNISHED APS SURVEY & MAPPING WITH A TITLE REPORT OF THE BOUNDARIES, A COMBINATION OF RECORD OF SURVEYS AND PLATS WERE USED IN CONCERT WITH FOUND MONUMENTATION TO DETERMINE THE BOUNDARIES SHOWN HEREON. ACTUAL OWNERSHIP STATUS MAY VARY.
3. THIS SURVEY WAS BASED ON A RTK VRS SURVEY (USING TRIMBLE R8 UNITS) IN COMBINATION WITH A CONVENTIONAL SURVEY (USING TRIMBLE 5600 TOTAL STATIONS, LEICA 1" TO 5" TOTAL STATION). THIS NETWORK MEETS OR EXCEEDS THE ACCURACY STANDARDS SET BY WAC 332-130-090.
4. ALL MONUMENTS WERE OCCUPIED OR OBSERVED DURING THE MONTH OF AUGUST IN 2015.
5. ALL MEASURING INSTRUMENTS AND EQUIPMENT USED FOR THIS SURVEY WERE MAINTAINED IN ADJUSTMENT ACCORDING TO MANUFACTURER'S SPECIFICATIONS.
6. THIS SURVEY DOES NOT CONSTITUTE A SUBDIVISION OF LAND.
7. ALL COORDINATES AND BEARINGS ARE BASED ON OBSERVATIONS USING THE WASHINGTON STATE PREFERENCE NETWORK, THE WASHINGTON STATE PLANE NAD 1983/2012A COORDINATE SYSTEM, SOUTH ZONE 4602, GEOID 03, EXPRESSED IN US SURVEY FEET.
8. ALL VERTICAL ELEVATIONS ARE BASED ON MEAN LOWER LOW WATER (MLLW) DATUM.
9. USING MULTIPLE TIDE OBSERVATIONS OVER A 3 DAY PERIOD AND COMPARING THEM TO THE MCMICKEN ISLAND TIDE ESTIMATE ON THE SAME DAYS; THE RESULTING DIFFERENCE IN MLLW AND NAD88/2012A = 3.68' [THIS IS WITHIN 0.3' OF THE PUBLISHED DIFFERENCES IN THE GENERAL AREA.]
10. ALL VERTICAL DATA IS EXPRESSED IN MLLW.
11. ALL HORIZONTAL DATA IS IN WASHINGTON STATE PLANE COORDINATES, SOUTH ZONE; EXPRESSED IN U.S.SURVEY FEET.

SPECIAL SURVEY NOTE

THIS SURVEY WAS PREPARED FOR THE EXCLUSIVE USE OF PN&D ENGINEERS, AND DOES NOT EXTEND TO ANY UNNAMED PARTY WITHOUT EXPRESS RECERTIFICATION BY APS SURVEY & MAPPING, LLC AND/OR THE PROFESSIONAL LAND SURVEYOR NAMED HEREON, NAMING SAID PARTY.



MEAN HIGH WATER (MHW) = ±12.5 MLLW
NAVD 88 = ± 3.68 MLLW
MEAN LOWER LOW WATER (MLLW) = 0.0 MLLW

REFERENCES

1. RECORD OF SURVEY BY HERRON ISLAND,
   AFN # 201103225001, REC'D. IN MARCH 22, 2011
   AT PIERCE COUNTY, WASHINGTON
2. RECORD OF SURVEY
   AFN # 200104035009, REC'D IN APRIL 3, 2001,
   AT PIERCE COUNTY, WASHINGTON.

APS SURVEY & MAPPING
1221 S.E. 26TH STREET, SUITE A
BELLEVUE, WASHINGTON 98005
TEL: (425) 746-3200
FAX: (425) 746-5242

STATE OF WASHINGTON
TIMOTHY J. SIMSEN
CERTIFICATE NUMBER
29293
REGISTERED
PROFESSIONAL LAND
SURVEYOR

TOPOGRAPHIC / HYDROGRAPHIC MAPPING

HERRON ISLAND FERRY - MAINLAND

FOR PN&D ENGINEERING, INC

HERRON ISLAND — WASHINGTON

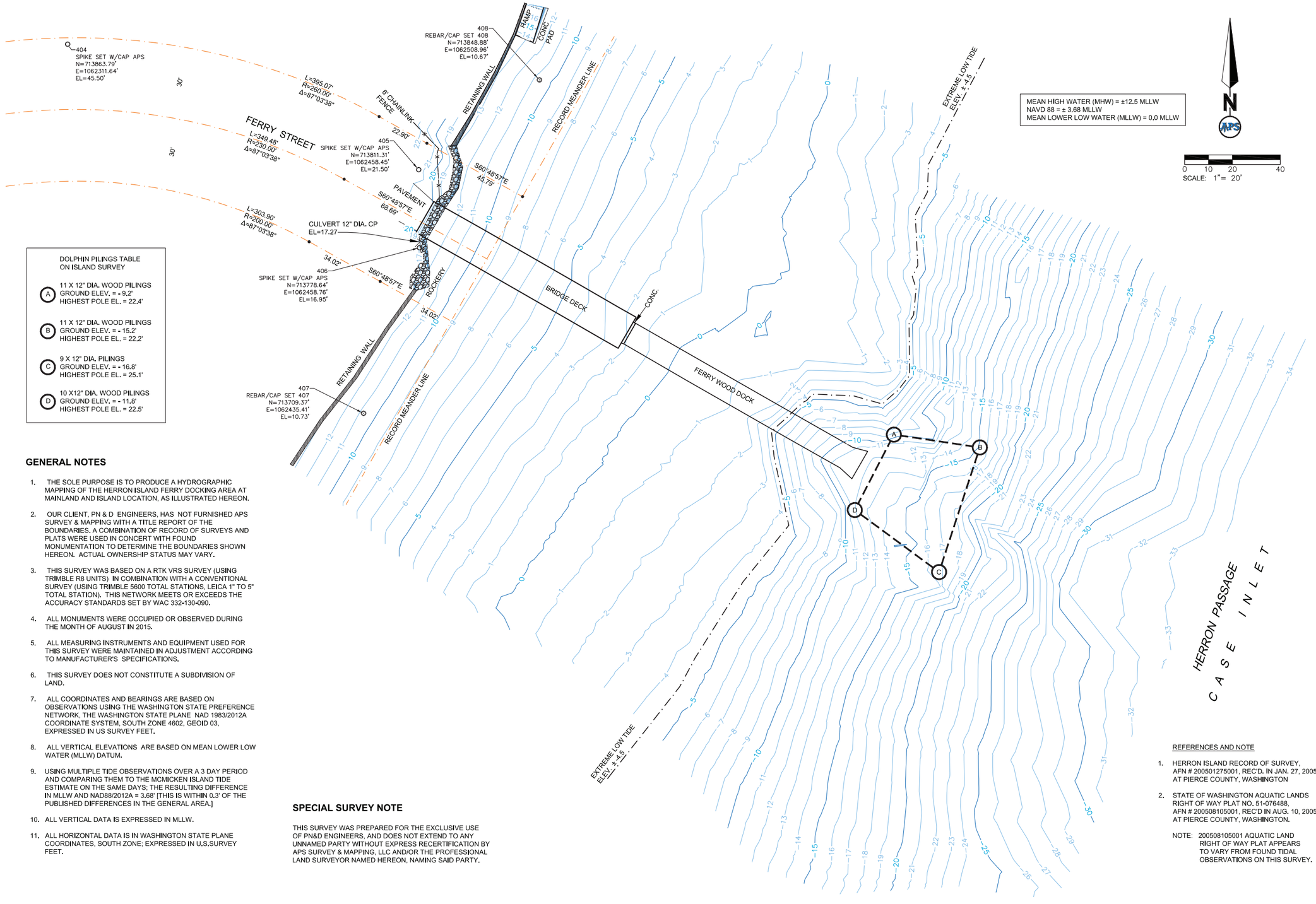
DATE: 9/01/15 — APSSM PROJECT NO.: — ACAD DWG NAME: 1081025MLLW.dwg

SURVEYED BY: TJS — CHECKED BY: _____
DRAWN BY: MAGG — APPROVED BY: TJS

DATE	BY	REVISION	CK'D	APPR.
9/1/15	MAGG	MEAN LOW LOW TO	TJS	TJS
		MEAN LOWER LOW		

SHEET 1 OF 1

WITHIN GOVERNMENT LOTS 1 AND 2 , SECTION 32, TOWNSHIP 21 NORTH, RANGE 01 WEST. WM, IN PIERCE COUNTY, WASHINGTON



MEAN HIGH WATER (MHW) = ±12.5 MLLW
NAVD 88 = ± 3.68 MLLW
MEAN LOWER LOW WATER (MLLW) = 0.0 MLLW

N

0 10 20 40
SCALE: 1"= 20'

DOLPHIN PILINGS TABLE
ON ISLAND SURVEY

- (A) 11 X 12" DIA. WOOD PILINGS
  GROUND ELEV. = - 9.2'
  HIGHEST POLE EL. = 22.4'
- (B) 11 X 12" DIA. WOOD PILINGS
  GROUND ELEV. = - 15.2'
  HIGHEST POLE EL. = 22.2'
- (C) 9 X 12" DIA. PILINGS
  GROUND ELEV. = - 16.8'
  HIGHEST POLE EL. = 25.1'
- (D) 10 X12" DIA. WOOD PILINGS
  GROUND ELEV. = - 11.8'
  HIGHEST POLE EL. = 22.5'

GENERAL NOTES

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SPECIAL SURVEY NOTE

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REFERENCES AND NOTE

1. HERRON ISLAND RECORD OF SURVEY, AFN # 200501275001, REC'D. IN JAN. 27, 2005 AT PIERCE COUNTY, WASHINGTON
2. STATE OF WASHINGTON AQUATIC LANDS RIGHT OF WAY PLAT NO. 51-076488, AFN # 200508105001, REC'D IN AUG. 10, 2005, AT PIERCE COUNTY, WASHINGTON.

   NOTE: 200508105001 AQUATIC LAND RIGHT OF WAY PLAT APPEARS TO VARY FROM FOUND TIDAL OBSERVATIONS ON THIS SURVEY.

APS SURVEY & MAPPING
1321 S.E. 26TH STREET, SUITE A
BELLEVUE, WASHINGTON 98005
TEL: (425) 746-3200
FAX: (425) 746-3242

VOSB Small Business

TYLER J. SIMSEN — STATE OF WASHINGTON — 22393 — REGISTERED PROFESSIONAL LAND SURVEYOR

TOPOGRAPHIC / HYDROGRAPHIC MAPPING

HERRON ISLAND FERRY - ISLAND

FOR PN&D ENGINEERING, INC

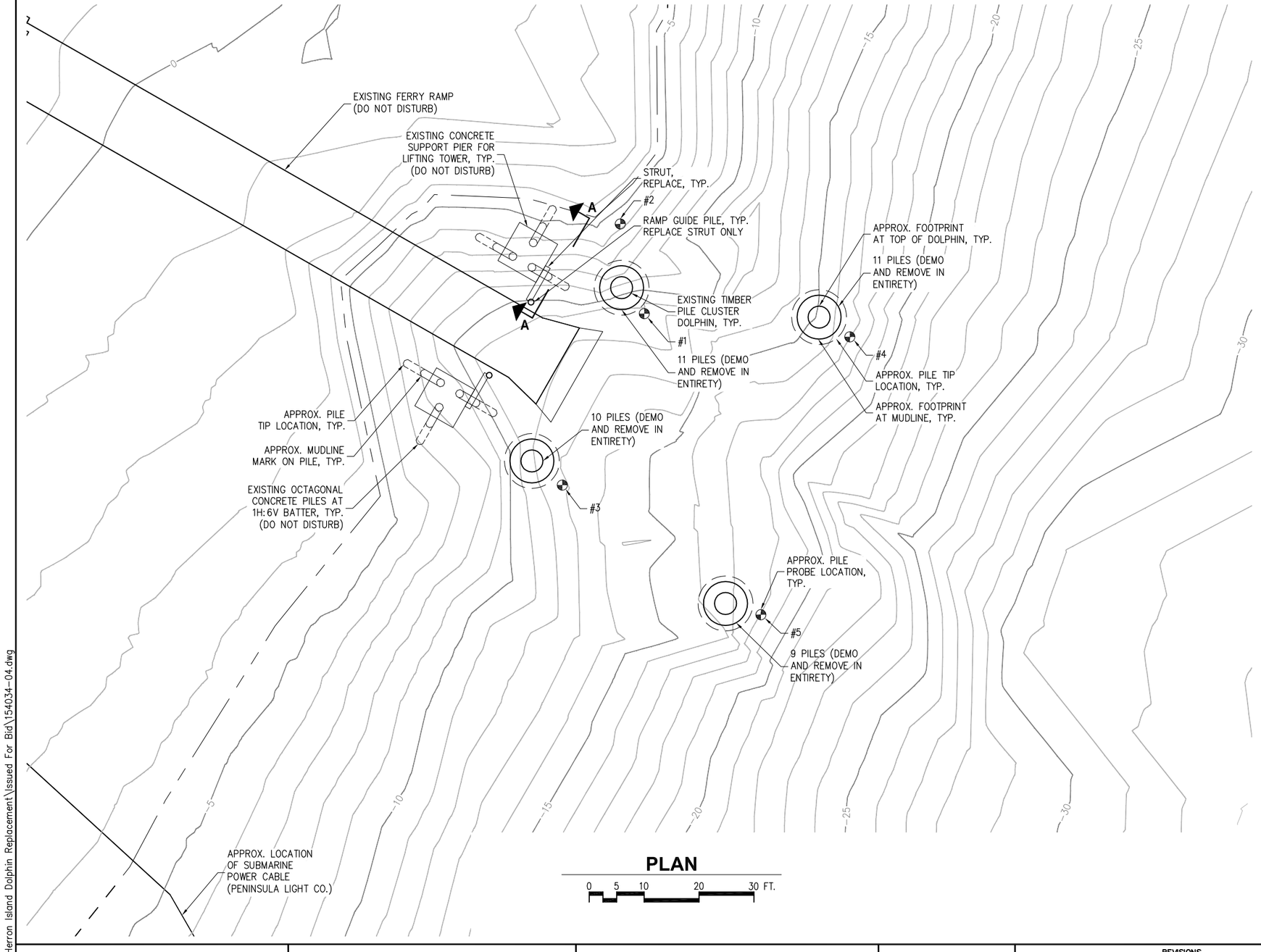
HERRON ISLAND WASHINGTON

DATE:	9/01/15
APSSM PROJECT NO.:	
ACAD DWG NAME:	1081025MLLW.dwg

SURVEYED BY: TJS
DRAWN BY: MAGG
CHECKED BY: TJS
APPROVED BY: TJS

DATE	BY	REVISION	CK'D	APPR.
9/1/15	MAGG	MEAN LOW LOW TO MEAN LOWER LOW	TJS	TJS

SHEET 1 OF 1



PLAN

0 5 10 20 30 FT.

DEMOLITION AND CONSTRUCTION NOTES:

Contractor shall verify character and composition of existing dolphins and guide pile struts to be demolished for purpose of confirming demolition quantities and existing structure layout, dimensions and components. Contractor shall conduct a dive inspection over work area to document any surface debris, pile stubs or other potential obstructions to pile installation. Submit photo, video and survey documentation of any potential conflicts found, to Engineer, prior to mobilization to site.

The Herron Island Ferry system operates on a published regular sailing schedule. The Contractor shall plan to conduct on site construction activities around the ferry schedule as required to execute the work. Demolition of the existing dolphins and installation of the new dolphins shall be sequenced such that impacts to ferry operations are minimized and a functional berthing system is maintained throughout demolition and construction. A detailed plan of work and schedule shall be submitted and approved at least two weeks in advance of any demolition work being performed.

The Contractor's staging area shall be limited to the overwater area outside the slip. Barge shall not be allowed to ground out on the seabed at any time.

Remove and dispose of all timber piles, steel wire rope, plastic wear sleeves and associated hardware components of existing timber pile cluster dolphins. All piles shall be fully extracted using a suitable vibratory hammer. Any piles that break during extraction shall be removed with help from divers, line pull, clam shell grab or other means as necessary to remove pile in order to allow installation of new dolphin piles. If broken off pile is not located within the driving path of a new pile, the existing pile may be cut off at mudline. All demolition and construction work shall comply with the permits issued for the project.

PROBE LOCATION	ESTIMATED ELEV. (FT, MLLW)		EMBEDDED DEPTH (FT)	NOTES
	MUDLINE ELEV.	PILE TIP ELEV.		
#1	−11.0	−57.5	46.5	VIBRATORY REFUSAL
#2	−7.0	−53.0	46.0	HARD DRIVING MOST OF LENGTH
#3	−13.0	−54.0	41.0	VIBRATORY REFUSAL
#4	−17.0	−62.0	45.0	VIBRATORY REFUSAL
#5	−19.0	−53.0	34.0	VIBRATORY REFUSAL

Pile probing utilized an 83−foot long 12−inch x−strong pipe with an APE 150T vibratory driver/extractor and an APE 375 power unit. Other details regarding probing and other geotechnical information are provided in the construction documents.

ISSUED FOR BID

P N D ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

TODD WILLIAM BELSTOCK — 39312 — REGISTERED PROFESSIONAL ENGINEER
12/13/16

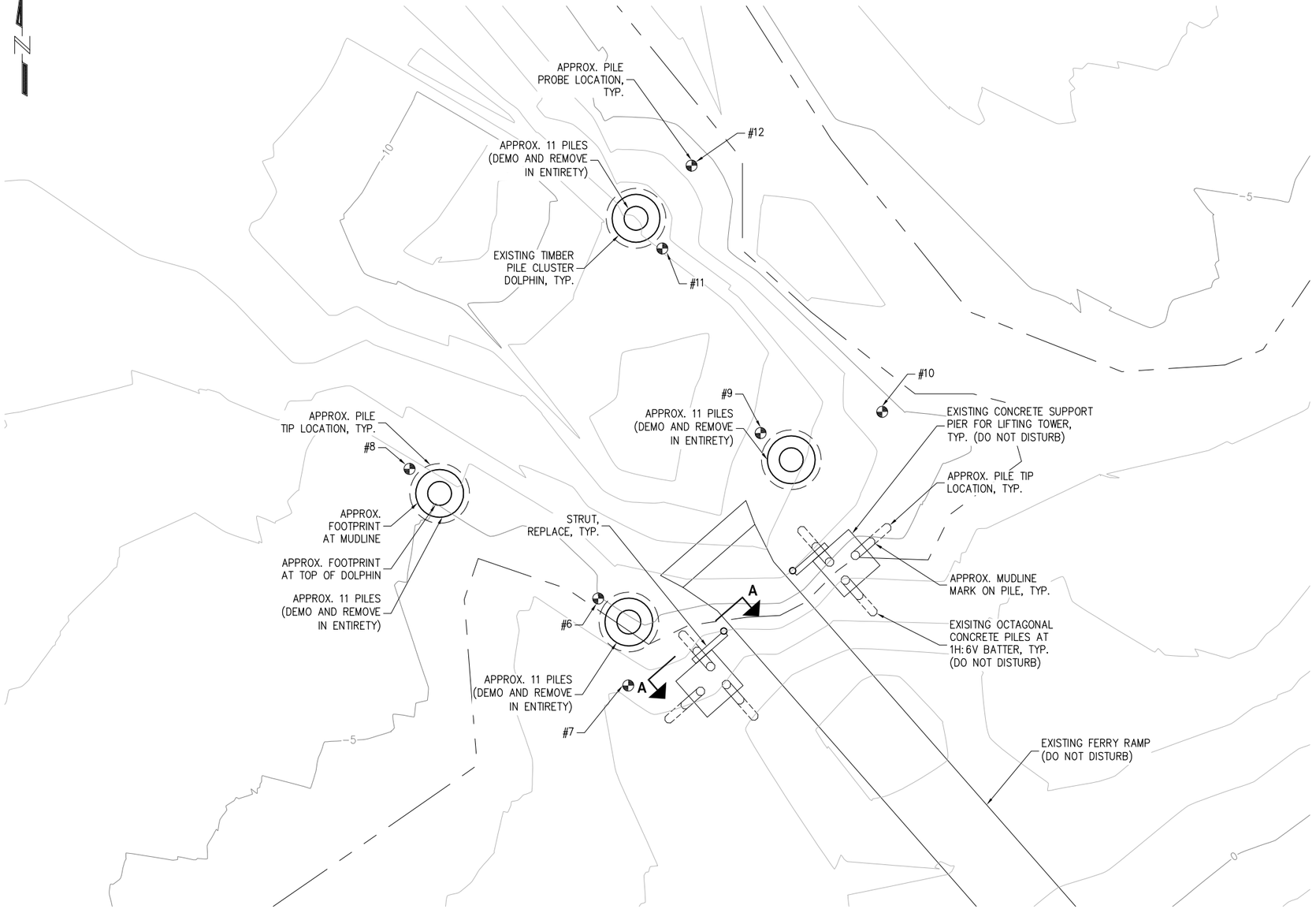
REVISIONS		
REV	DATE	DESCRIPTION

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

TITLE: **EXISTING AND DEMOLITION (ISLAND)**

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO:	4 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016		
CHECKED BY:	TWB	SCALE:	NOTED		

7/12/16
Drawings\2015\154034 − Herron Island Dolphin Replacement\Issued For Bid\154034−04.dwg



PLAN

0 5 10 20 30 FT.

PROBE LOCATION	ESTIMATED ELEV. (FT, MLLW)		EMBEDDED DEPTH (FT)	NOTES
	MUDLINE ELEV.	PILE TIP ELEV.		
#6	−5.0	−71.0	66.0	SOFT FULL DEPTH
#7	−3.0	−71.0	68.0	SOFT FULL DEPTH
#8	−6.0	−69.0	63.0	SOFT FULL DEPTH
#9	−8.0	−69.0	61.0	SOFT FULL DEPTH
#10	−5.0	−69.0	64.0	SOFT UNTIL FINAL INCHES
#11	−7.0	−69.0	62.0	SOFT FULL DEPTH
#12	−5.0	−66.5	61.5	SOFT UNTIL FINAL INCHES

Pile probing utilized an 83−foot long 12−inch x−strong pipe with an APE 150T vibratory driver/extractor and an APE 375 power unit. Other details regarding probing and other geotechnical information are provided in the construction documents.

ISSUED FOR BID

P N D ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

JOHN WILLIAM BELSTON — 39312 — REGISTERED PROFESSIONAL ENGINEER — STATE OF WASHINGTON

12/13/16

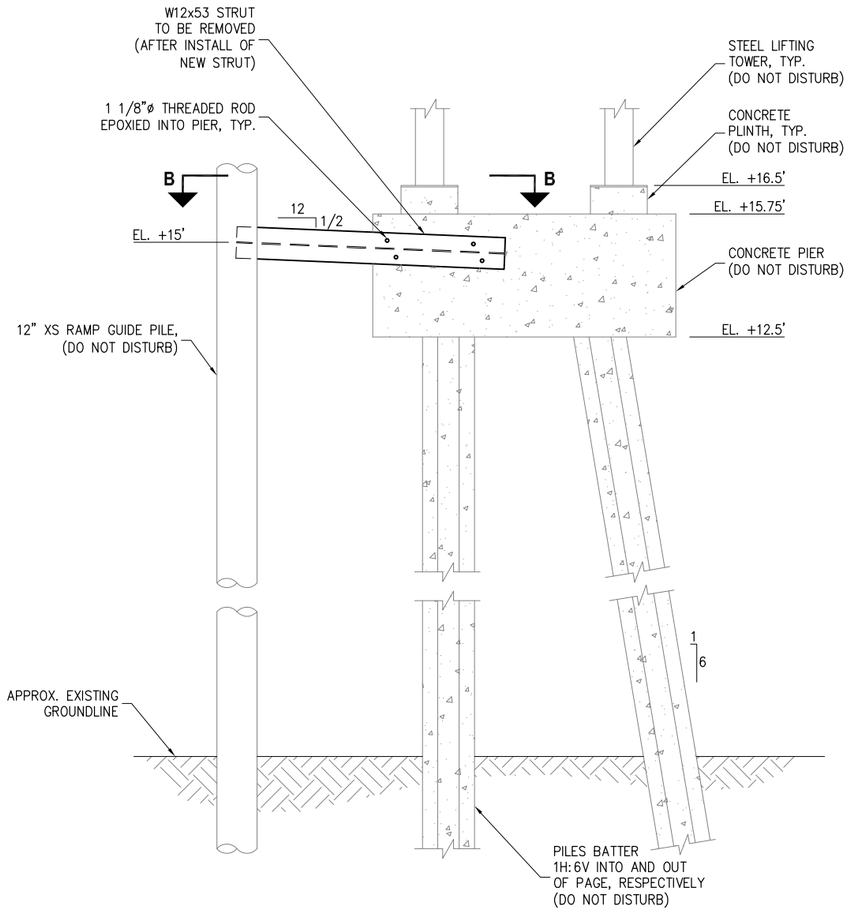
REVISIONS		
REV	DATE	DESCRIPTION

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

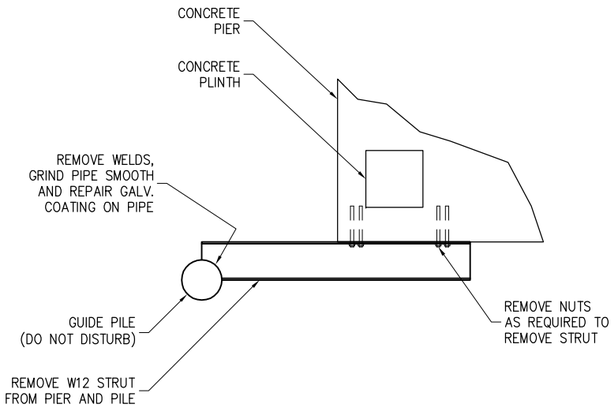
TITLE: **EXISTING AND DEMOLITION (MAINLAND)**

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO: 5 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016	
CHECKED BY:	TWB	SCALE:	NOTED	

7/14/16
Drawings\2015\154034 - Herron Island Dolphin Replacement\Issued For Bid\154034-05.dwg



SECTION A-A



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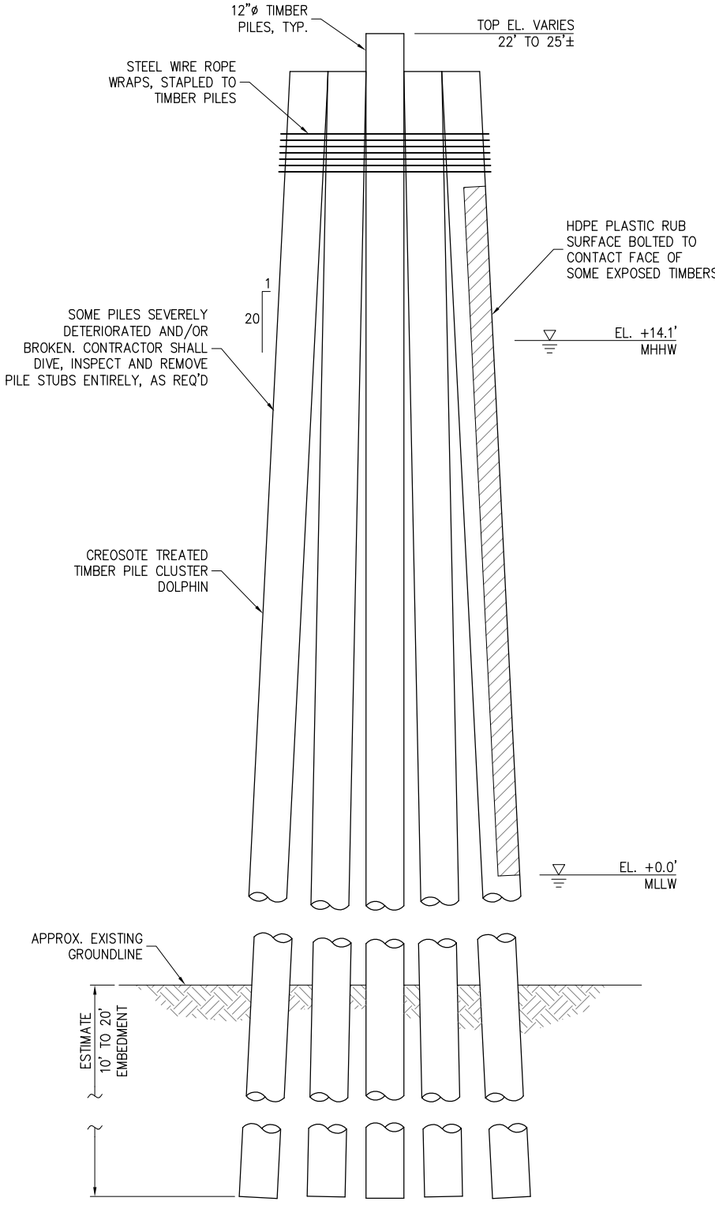


TYPICAL DOLPHIN ELEVATION

ISSUED FOR BID

P N D
ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

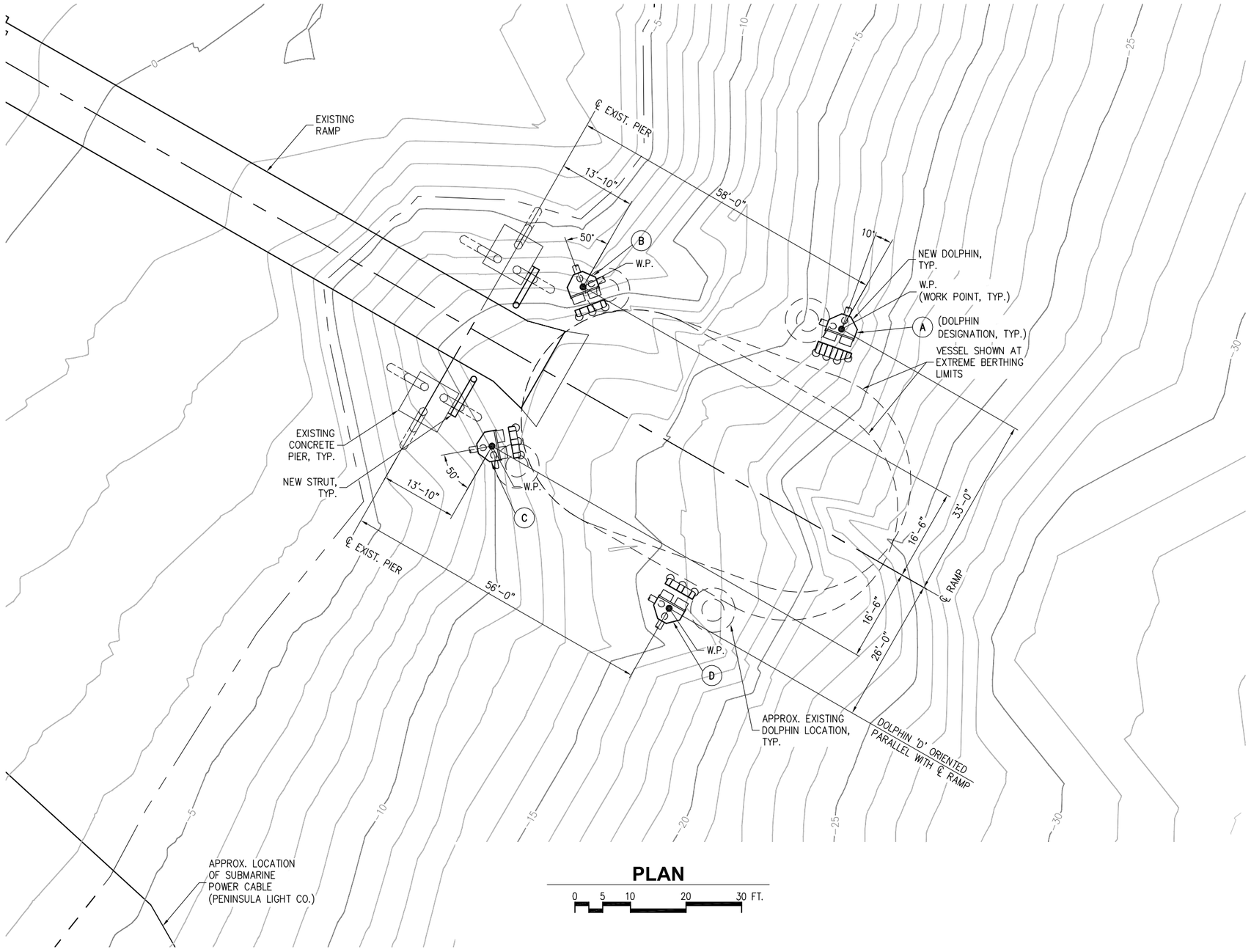
REVISIONS		
REV	DATE	DESCRIPTION

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

TITLE: **EXISTING AND DEMOLITION DETAILS**

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO:	
DRAWN BY:	GRD	DATE:	DECEMBER 2016	6	OF 17
CHECKED BY:	TWB	SCALE:	NOTED		

7/13/16
Drawings\2015\154034 - Herron Island Dolphin Replacement\Issued For Bid\154034-06.dwg



PLAN

0 5 10 20 30 FT.

ISSUED FOR BID

P N D ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

TODD WILLIAM BELSTON 39312 REGISTERED PROFESSIONAL ENGINEER
12/13/16

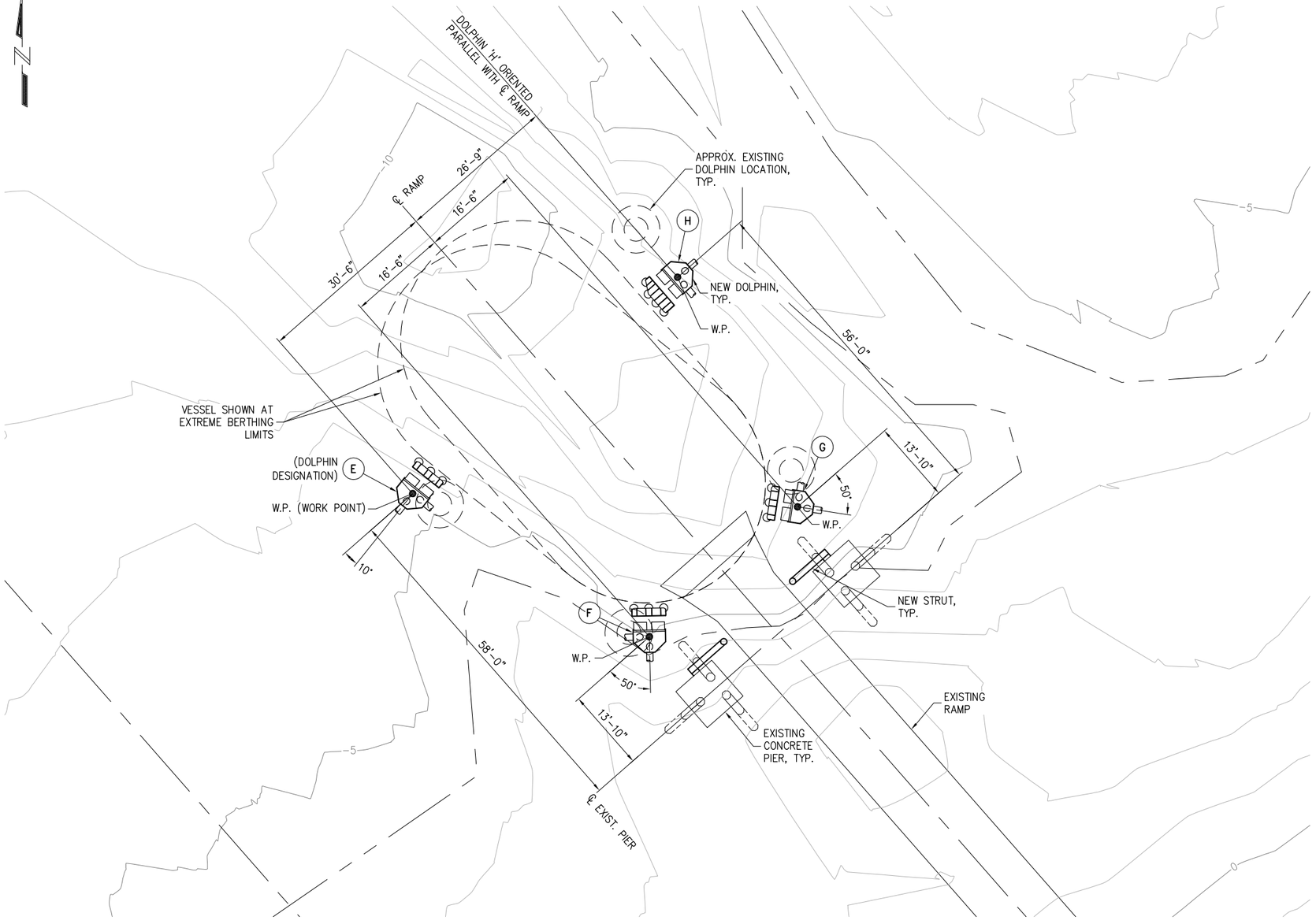
REVISIONS		
REV	DATE	DESCRIPTION

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

TITLE: **SITE PLAN (ISLAND)**

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO: 7 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016	
CHECKED BY:	TWB	SCALE:	NOTED	

7/12/16
Drawings\2015\154034 - Herron Island Dolphin Replacement\Issued For Bid\154034-07.dwg



PLAN

0 5 10 20 30 FT.

ISSUED FOR BID

P N D ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

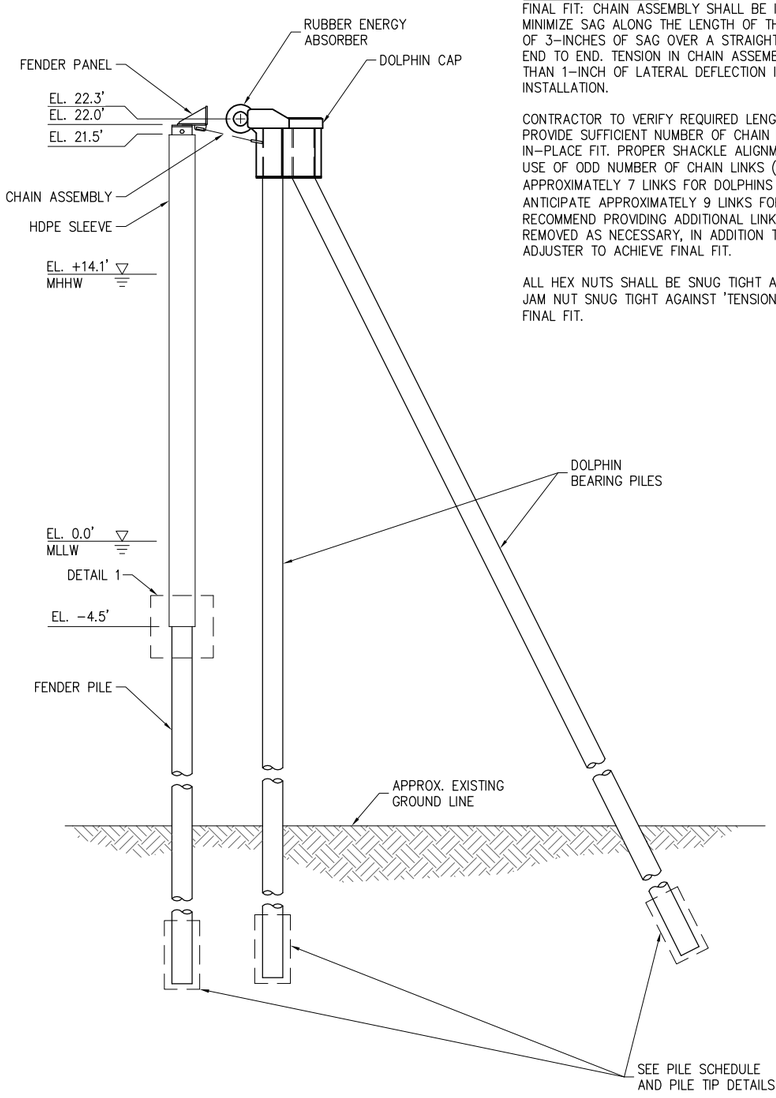
REVISIONS		
REV	DATE	DESCRIPTION

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

TITLE: **SITE PLAN (MAINLAND)**

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO: 8 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016	
CHECKED BY:	TWB	SCALE:	NOTED	

7/12/16
Drawings\2015\154034 - Herron Island Dolphin Replacement\Issued For Bid\154034-08.dwg



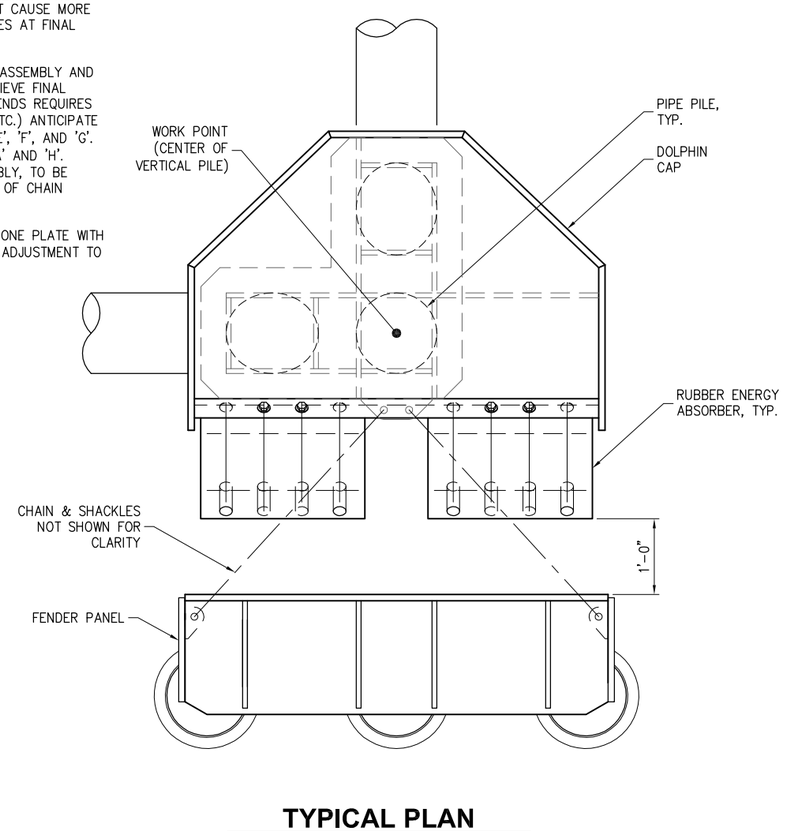
TYPICAL ELEVATION

INSTALLATION NOTES:

FINAL FIT: CHAIN ASSEMBLY SHALL BE INSTALLED AND ADJUSTED TO MINIMIZE SAG ALONG THE LENGTH OF THE ASSEMBLY TO A MAXIMUM OF 3-INCHES OF SAG OVER A STRAIGHT LINE MEASUREMENT FROM END TO END. TENSION IN CHAIN ASSEMBLY SHALL NOT CAUSE MORE THAN 1-INCH OF LATERAL DEFLECTION IN FENDER PILES AT FINAL INSTALLATION.

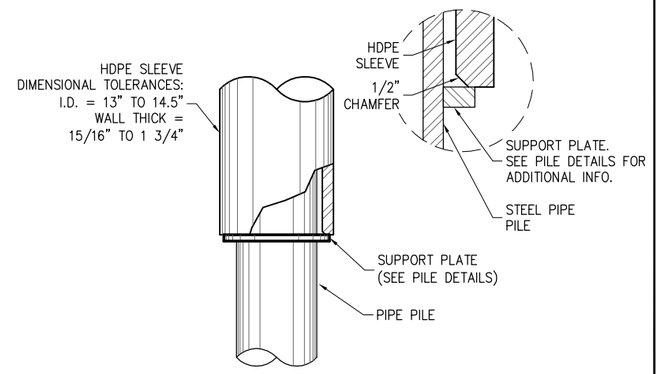
CONTRACTOR TO VERIFY REQUIRED LENGTH OF CHAIN ASSEMBLY AND PROVIDE SUFFICIENT NUMBER OF CHAIN LINKS TO ACHIEVE FINAL IN-PLACE FIT. PROPER SHACKLE ALIGNMENT AT LUG ENDS REQUIRES USE OF ODD NUMBER OF CHAIN LINKS (5, 7, 9, 11, ETC.) ANTICIPATE APPROXIMATELY 7 LINKS FOR DOLPHINS 'B', 'C', 'D', 'E', 'F', AND 'G'. ANTICIPATE APPROXIMATELY 9 LINKS FOR DOLPHINS 'A' AND 'H'. RECOMMEND PROVIDING ADDITIONAL LINKS PER ASSEMBLY, TO BE REMOVED AS NECESSARY, IN ADDITION TO TIGHTENING OF CHAIN ADJUSTER TO ACHIEVE FINAL FIT.

ALL HEX NUTS SHALL BE SNUG TIGHT AGAINST DOG BONE PLATE WITH JAM NUT SNUG TIGHT AGAINST 'TENSION' NUT, AFTER ADJUSTMENT TO FINAL FIT.

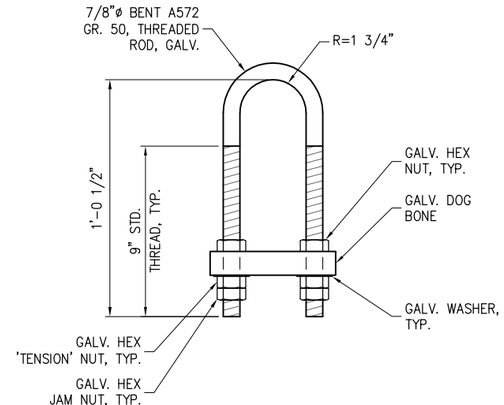


TYPICAL PLAN

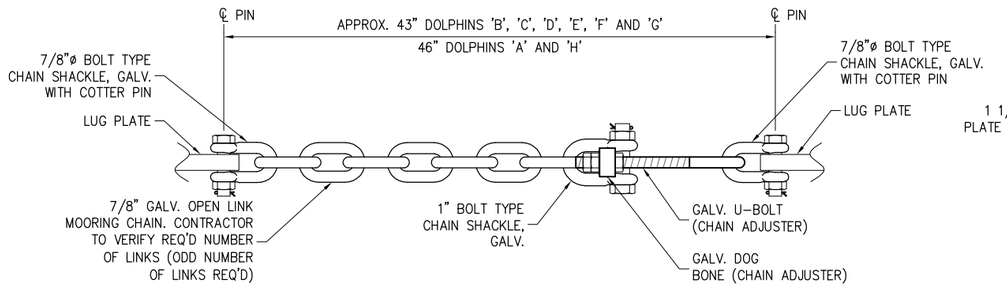
CAP STIFFENER, PILE CONFIGURATION, FENDER PANEL AND CHAIN ASSEMBLY LAYOUT VARIES BY DOLPHIN. SEE SITE PLANS AND DETAILS



DETAIL 1



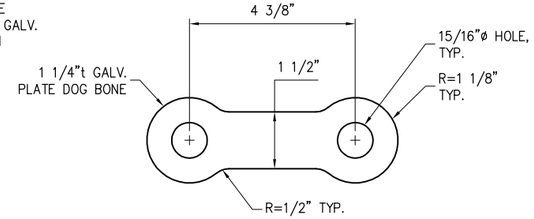
CHAIN ADJUSTER



CHAIN ASSEMBLY

(2) REQUIRED EACH DOLPHIN, (16) TOTAL

* ALL NUTS TO BE SNUG TIGHT AGAINST CHAIN ADJUSTER PLATE AFTER FINAL IN-PLACE FIT.



DOG BONE DETAIL

ISSUED FOR BID

P N D ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

TODD WILLIAM BELSON — 39312 — REGISTERED PROFESSIONAL ENGINEER — 12/13/16

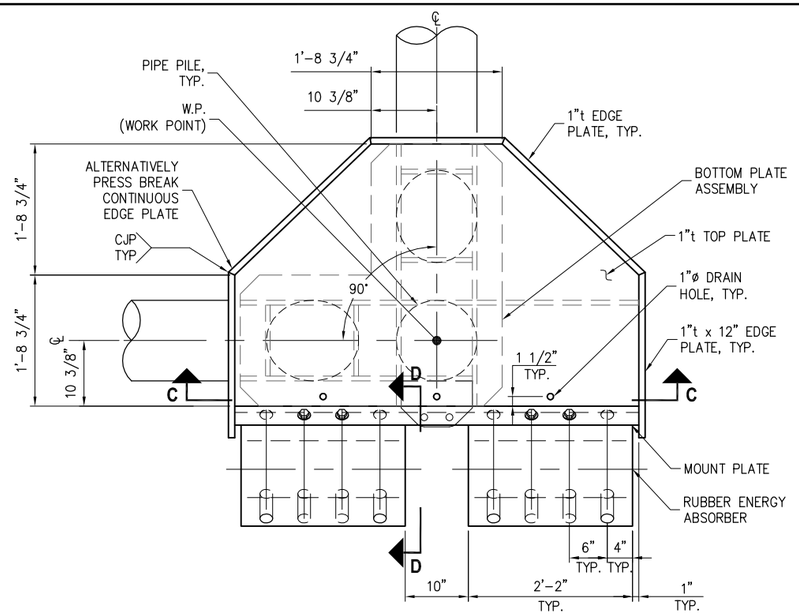
REVISIONS		
REV	DATE	DESCRIPTION

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

TITLE: **DOLPHIN PLAN AND DETAILS**

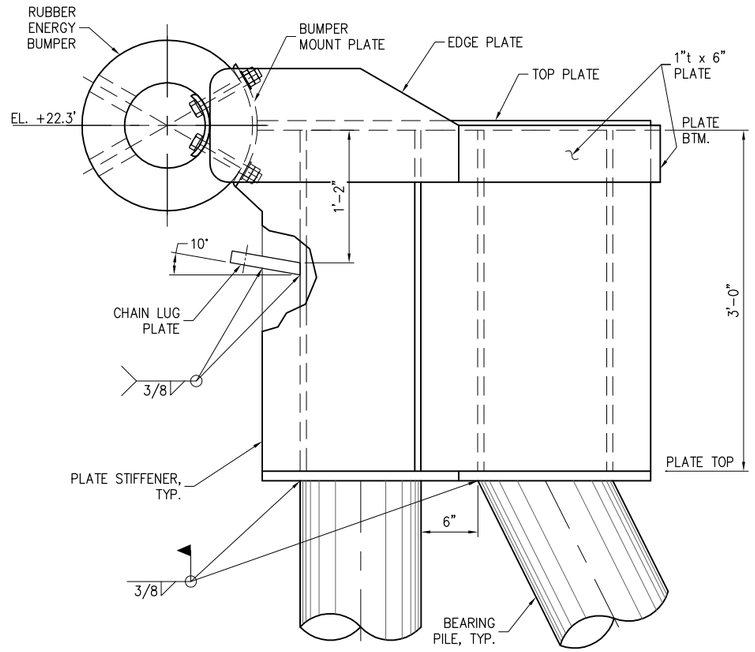
DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO: 9 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016	
CHECKED BY:	TWB	SCALE:	NOTED	

7/12/16
Drawings\2015\154034 - Herron Island Dolphin Replacement\Issued For Bid\154034-09.dwg

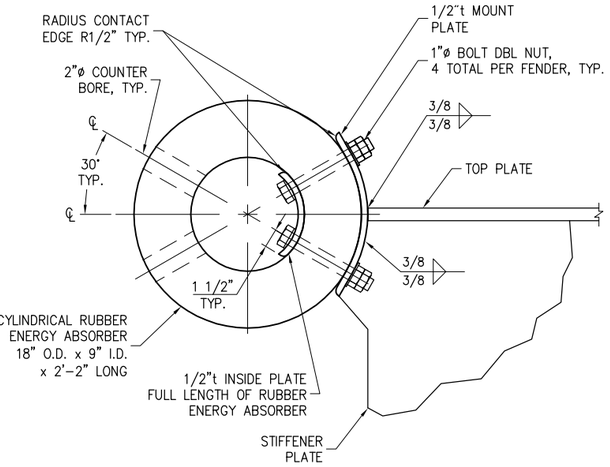


DOLPHIN CAP PLAN

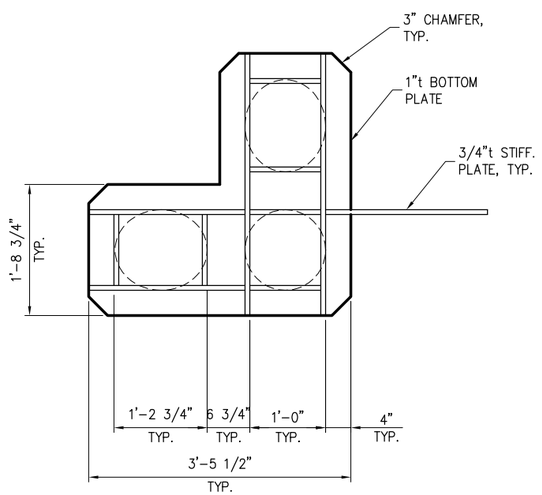
(DOLPHIN CAP 'A', 'C', 'E' AND 'G' SHOWN CAP 'B', 'D', 'F' AND 'H' OPPOSITE HAND)



TYPICAL ELEVATION

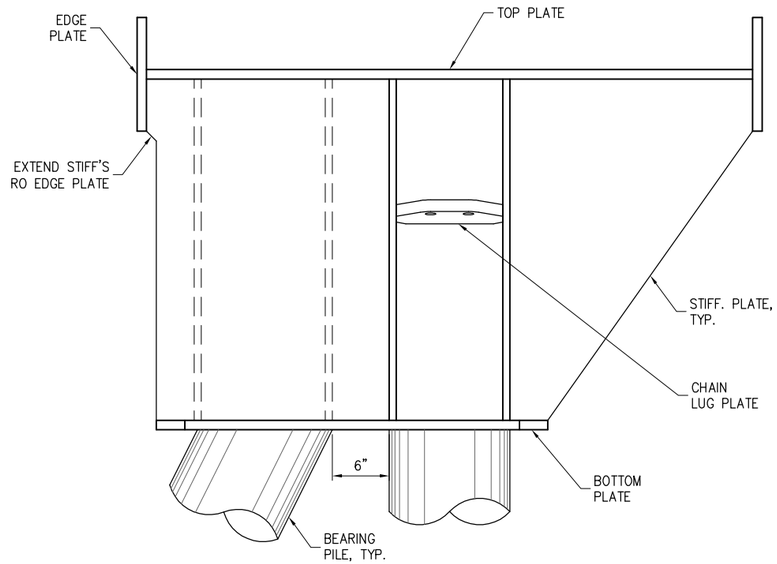


SECTION D-D

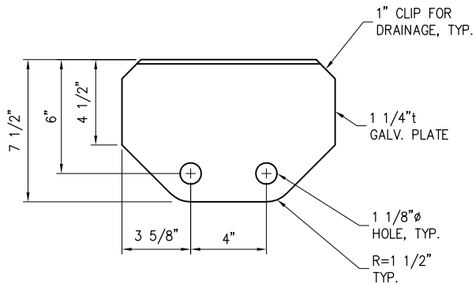


BOTTOM PLATE ASSEMBLY

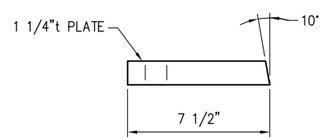
(DOLPHIN CAP 'A', 'C', 'E' AND 'G' SHOWN CAP 'B', 'D', 'F' AND 'H' OPPOSITE HAND)



SECTION C-C



CHAIN LUG PLATE PLAN



CHAIN LUG PLATE SECTION

ISSUED FOR BID

P N D ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

JOHN WILLIAM BELSICK — STATE OF WASHINGTON — 39312 — REGISTERED PROFESSIONAL ENGINEER
12/13/16

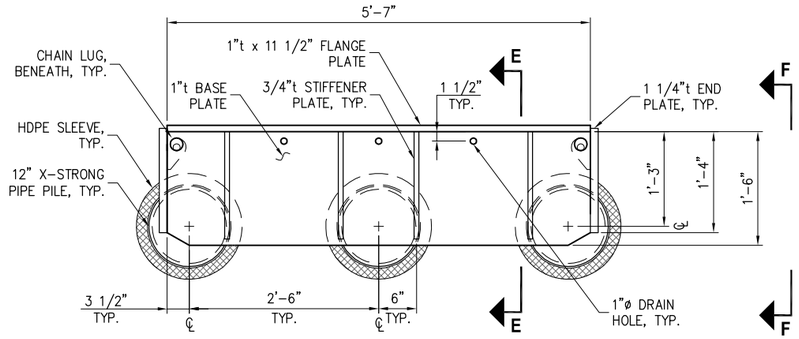
REVISIONS		
REV	DATE	DESCRIPTION

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

TITLE: **DOLPHIN CAP**

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO:	10 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016		
CHECKED BY:	TWB	SCALE:	NOTED		

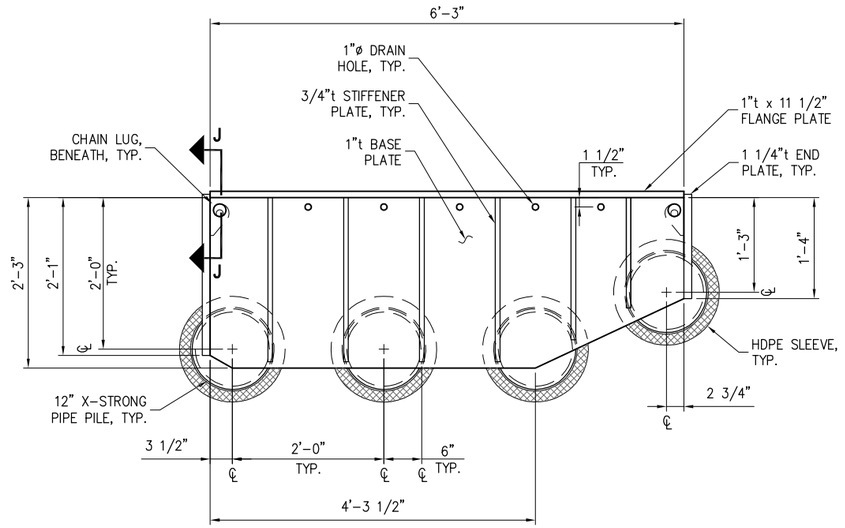
7/12/16
Drawings\2015\154034 - Herron Island Dolphin Replacement\Issued For Bid\154034-10.dwg



NOTE:
DOLPHINS 'B', 'C' AND 'D' WILL HAVE BOLLARD AND HAWSER RAIL. SEE SHEET 12 FOR THESE DETAILS.

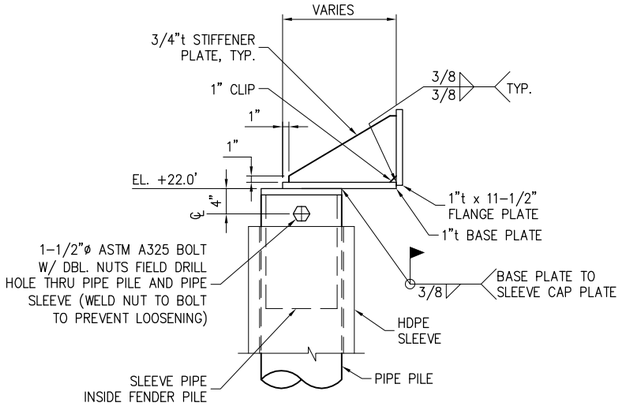
3 PILE FENDER PANEL PLAN

DOLPHINS 'B', 'C', 'D', 'E', 'F' AND 'G'

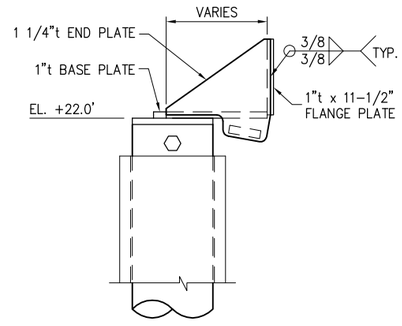


4 PILE FENDER PANEL PLAN

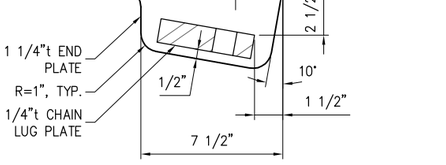
DOLPHIN 'A' SHOWN, DOLPHIN 'H' OPPOSITE HAND



SECTION E-E

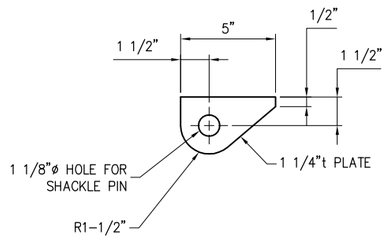


VIEW F-F

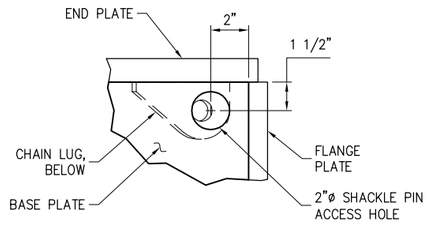


SECTION J-J

SLEEVE PIPE



CHAIN LUG



SECTION K-K

ISSUED FOR BID

P N D ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

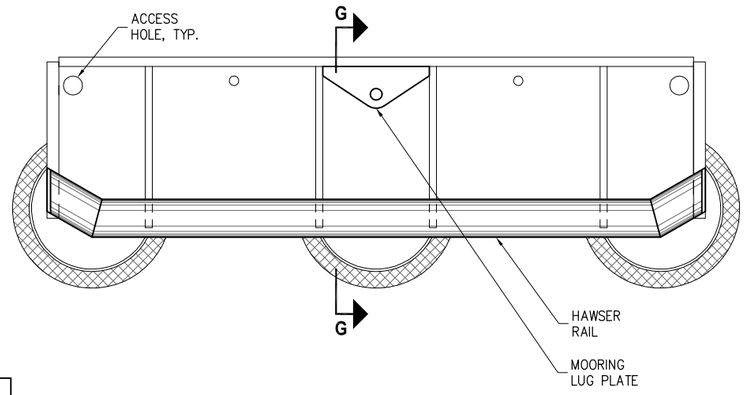
REVISIONS		
REV	DATE	DESCRIPTION

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

TITLE: **FENDER PANEL**

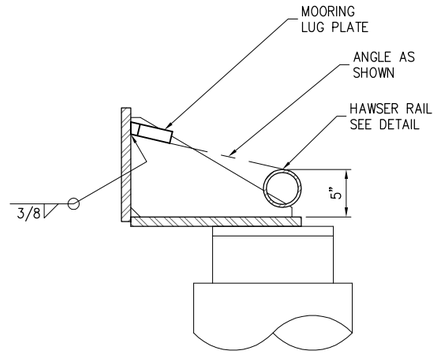
DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO: 11 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016	
CHECKED BY:	TWB	SCALE:	NOTED	

7/14/16
Drawings\2015\154034 - Herron Island Dolphin Replacement\Issued For Bid\154034-11.dwg

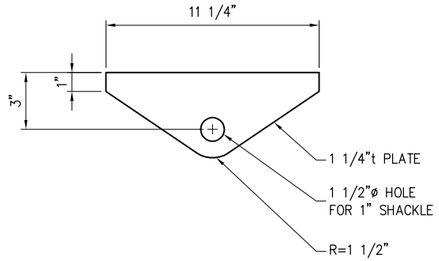


PLAN

NOTE:
DOLPHINS 'B', 'C' AND 'D' WILL HAVE MOORING LUG AND HAWSER RAIL AS DETAILED.

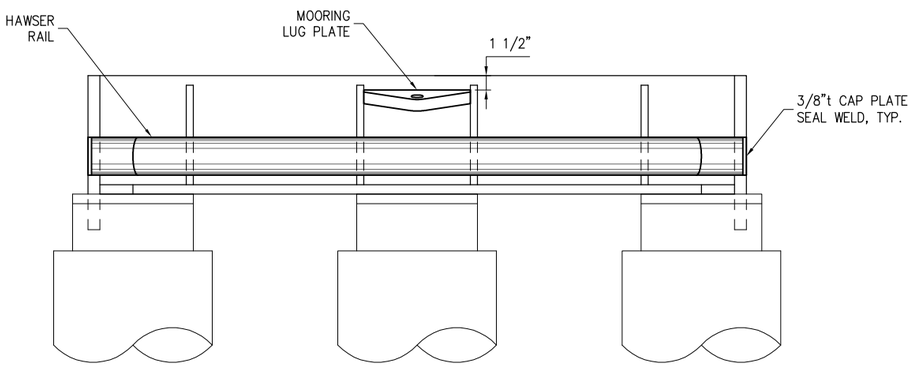


SECTION G-G

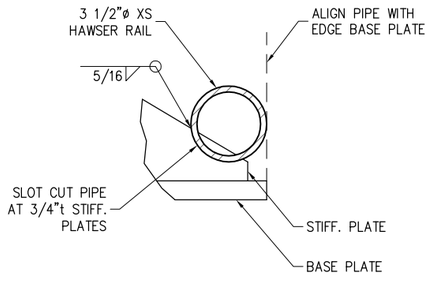


MOORING LUG PLATE

NOTES:
1) OWNER WILL FURNISH 1" SAMPSON MOORING LINE WITH THIMBLE EYE.
2) CONTRACTOR WILL FURNISH 1" GALV. ANCHOR SHACKLE WITH BOLT TYPE PIN AND S.S. COTTER PIN. CONTRACTOR WILL INSTALL MOORING LINES AND SHACKLES ON SPECIFIED DOLPHINS.
3) LINE WEAR IS EXPECTED FROM TYPICAL USE. OWNER SHALL PERFORM REGULAR INSPECTION, MAINTENANCE AND REPLACEMENT AS REQUIRED TO ENSURE SAFE, SECURE MOORAGE OF VESSEL.



ELEVATION



HAWSER RAIL DETAIL

ISSUED FOR BID

P N D ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

TODD WILLIAM BEASLEY — STATE OF WASHINGTON — 39312 — REGISTERED PROFESSIONAL ENGINEER
12/13/16

REVISIONS

REV	DATE	DESCRIPTION

PROJECT: HERRON ISLAND FERRY DOLPHIN REPLACEMENT

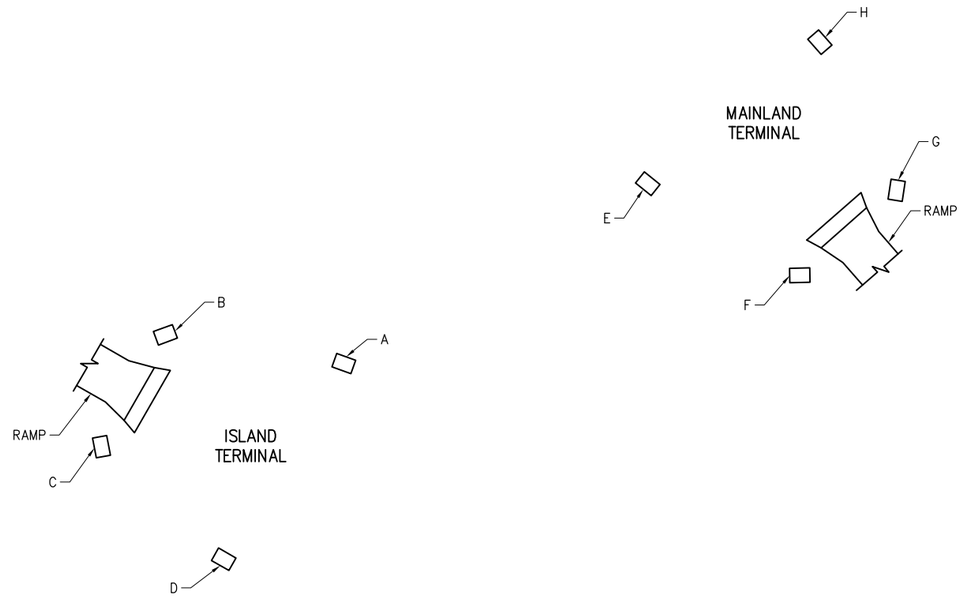
TITLE: MOORING LUG AND HAWSER RAIL

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO:	12 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016		
CHECKED BY:	TWB	SCALE:	NOTED		

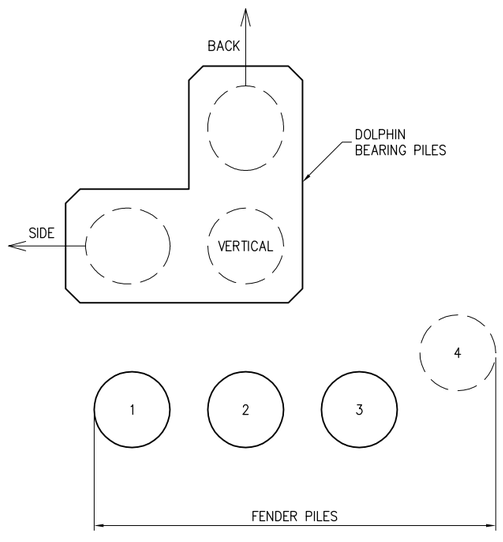
7/12/16
Drawings\2015\154034 - Herron Island Dolphin Replacement\Issued For Bid\154034-12.dwg

PILE SCHEDULE

DESIGNATION		PILE SIZE	BATTER	PILE TIP	SUPPLY LENGTH (FT)	LENGTH OF BARE (FT)	ESTIMATED TIP ELEV. (MLLW)	ULTIMATE LOAD (KIPS)	
								COMPRESSION	TENSION
DOLPHIN A BEARING PILES	VERTICAL	12.75"ø x 0.50"t	VERTICAL	SPIN FIN	90	30	−65	80	220
	BACK	12.75"ø x 0.50"t	2:1	SHOE	100	40	−65	240	80
	SIDE	12.75"ø x 0.50"t	2:1	SHOE	100	40	−65	80	80
DOLPHIN A FENDER PILES	1	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
	2	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
	3	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
	4	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
DOLPHIN B BEARING PILES	VERTICAL	12.75"ø x 0.50"t	VERTICAL	SPIN FIN	90	30	−60	80	220
	BACK	12.75"ø x 0.50"t	2:1	SHOE	100	40	−60	240	80
	SIDE	12.75"ø x 0.50"t	3:1	SHOE	100	40	−60	80	80
DOLPHIN B FENDER PILES	1	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
	2	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
	3	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
DOLPHIN C BEARING PILES	VERTICAL	12.75"ø x 0.50"t	VERTICAL	SPIN FIN	90	30	−65	80	220
	BACK	12.75"ø x 0.50"t	2:1	SHOE	100	40	−65	240	80
	SIDE	12.75"ø x 0.50"t	3:1	SHOE	100	40	−65	80	80
DOLPHIN C FENDER PILES	1	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
	2	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
	3	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
DOLPHIN D BEARING PILES	VERTICAL	12.75"ø x 0.50"t	VERTICAL	SPIN FIN	90	30	−65	80	220
	BACK	12.75"ø x 0.50"t	2:1	SHOE	100	40	−65	240	80
	SIDE	12.75"ø x 0.50"t	2:1	SHOE	100	40	−65	80	80
DOLPHIN D FENDER PILES	1	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
	2	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
	3	12.75"ø x 0.50"t	VERTICAL	SHOE	80	20	−55	20	–
DOLPHIN E BEARING PILES	VERTICAL	12.75"ø x 0.50"t	VERTICAL	SPIN FIN	100	40	−75	80	220
	BACK	12.75"ø x 0.50"t	2:1	SHOE	110	40	−75	240	80
	SIDE	12.75"ø x 0.50"t	2:1	SHOE	110	40	−75	80	80
DOLPHIN E FENDER PILES	1	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
	2	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
	3	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
DOLPHIN F BEARING PILES	VERTICAL	12.75"ø x 0.50"t	VERTICAL	SPIN FIN	100	40	−75	80	220
	BACK	12.75"ø x 0.50"t	2:1	SHOE	110	40	−75	240	80
	SIDE	12.75"ø x 0.50"t	3:1	SHOE	110	40	−75	80	80
DOLPHIN F FENDER PILES	1	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
	2	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
	3	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
DOLPHIN G BEARING PILES	VERTICAL	12.75"ø x 0.50"t	VERTICAL	SPIN FIN	100	40	−75	80	220
	BACK	12.75"ø x 0.50"t	2:1	SHOE	110	40	−75	240	80
	SIDE	12.75"ø x 0.50"t	3:1	SHOE	110	40	−75	80	80
DOLPHIN G FENDER PILES	1	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
	2	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
	3	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
DOLPHIN H BEARING PILES	VERTICAL	12.75"ø x 0.50"t	VERTICAL	SPIN FIN	100	40	−75	80	220
	BACK	12.75"ø x 0.50"t	2:1	SHOE	110	40	−75	240	80
	SIDE	12.75"ø x 0.50"t	2:1	SHOE	110	40	−75	80	80
DOLPHIN H FENDER PILES	1	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
	2	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
	3	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–
	4	12.75"ø x 0.50"t	VERTICAL	SHOE	100	40	−75	20	–



DOLPHIN DESIGNATION KEY



PILE DESIGNATION KEY

SPIN FIN™ PILE IS A REGISTERED TRADEMARK OF PND ENGINEERS, INC.

PND ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

REVISIONS		
REV	DATE	DESCRIPTION

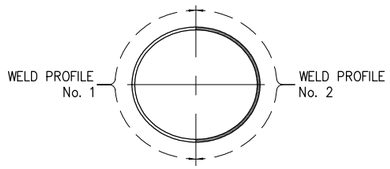
ISSUED FOR BID

PROJECT: HERRON ISLAND FERRY DOLPHIN REPLACEMENT

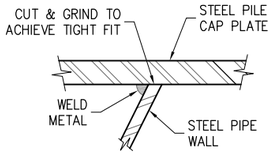
TITLE: PILE SCHEDULE AND KEY

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO:	13 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016		
CHECKED BY:	TWB	SCALE:	NOTED		

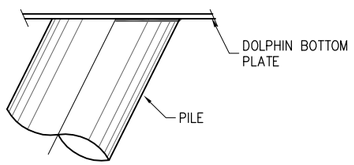
7/14/16
Drawings\2015\154034 – Herron Island Dolphin Replacement\Issued For Bid\154034-13.dwg



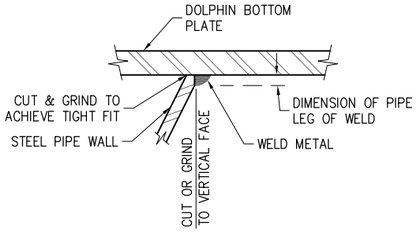
PLAN



WELD PROFILE No. 1

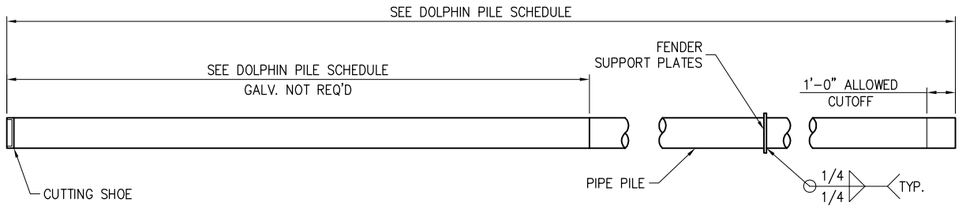


ELEVATION

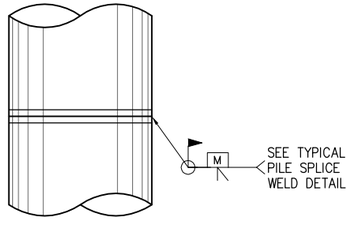


WELD PROFILE No. 2

DOLPHIN BATTER PILE WELD

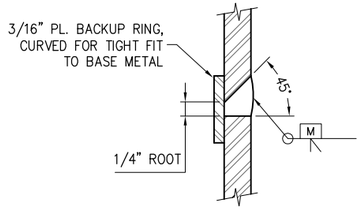


FENDER PILE

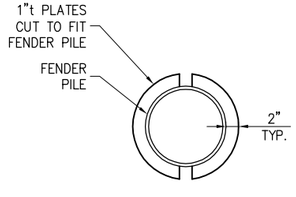


PILE SPLICE

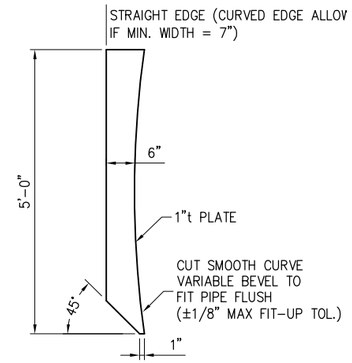
TYPICAL FOR ALL SHOP OR FIELD PIPE PILE SPLICES



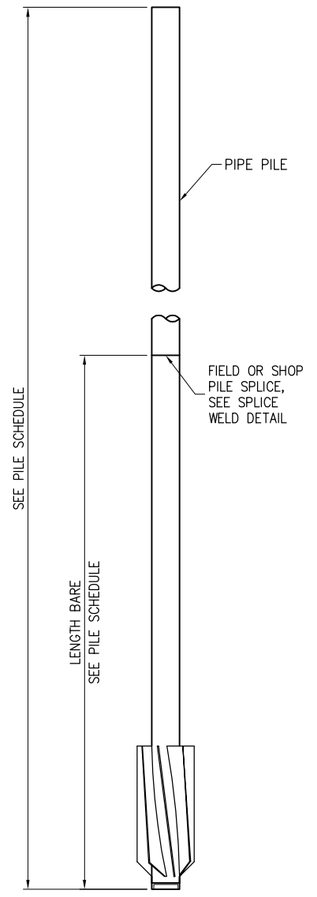
TYPICAL PILE SPLICE WELD



FENDER SUPPORT PLATES



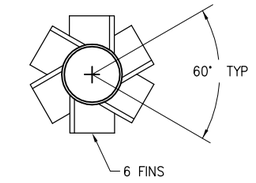
SPIN FIN



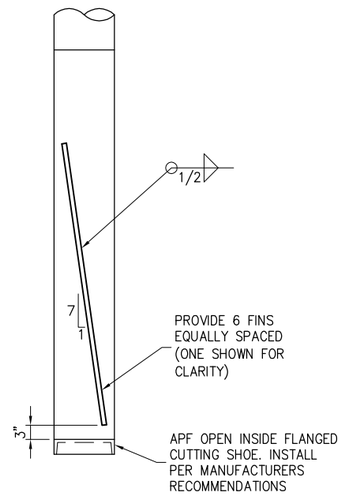
BEARING PILES

(SHOWN WITH SPIN FIN PILE TIP. REFER TO PILE SCHEDULE FOR REQUIREMENTS OF EACH PILE.)

PILE/FIN SECTION

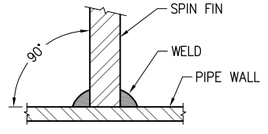


PLAN



ELEVATION

SPIN FIN PILE



PILE/FIN SECTION AT CENTERLINE OF PLATE

SPIN FIN WELD

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1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
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12/13/16

REVISIONS		
REV	DATE	DESCRIPTION

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

TITLE: **PILE DETAILS**

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO:
DRAWN BY:	GRD	DATE:	DECEMBER 2016	14 OF 17
CHECKED BY:	TWB	SCALE:	NOTED	

7/14/16
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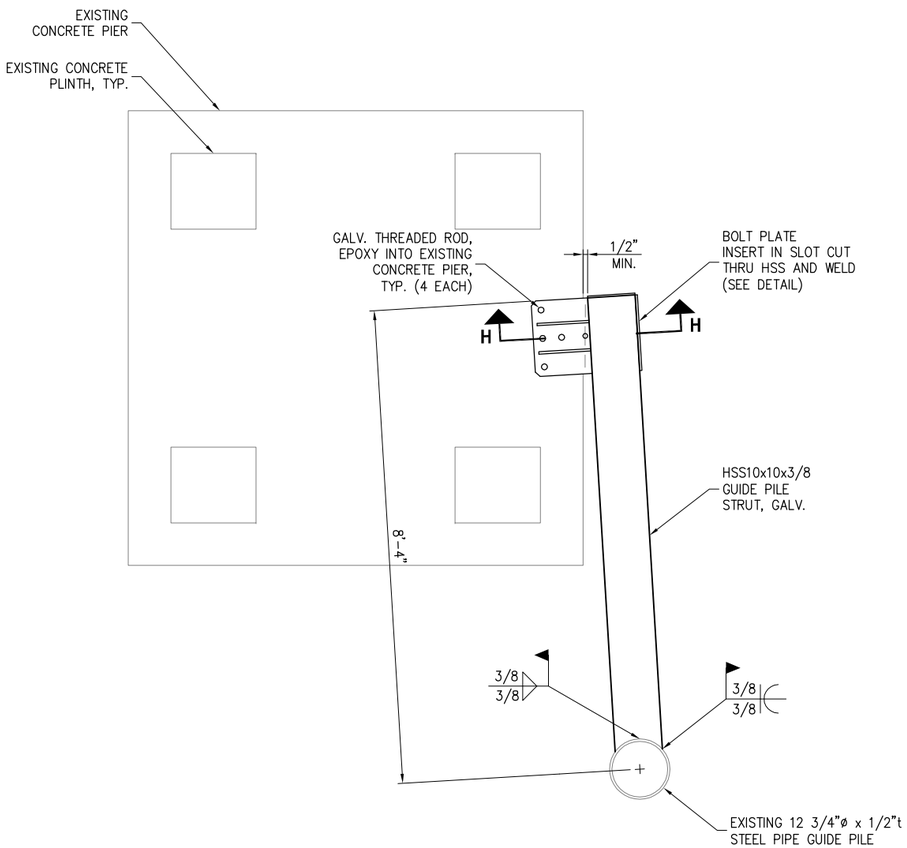
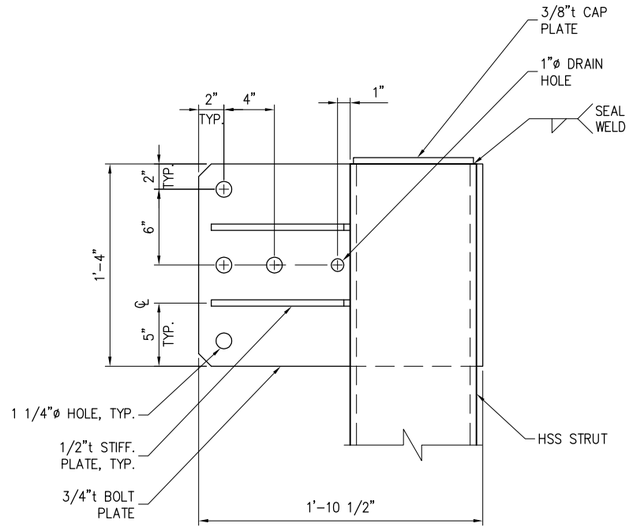
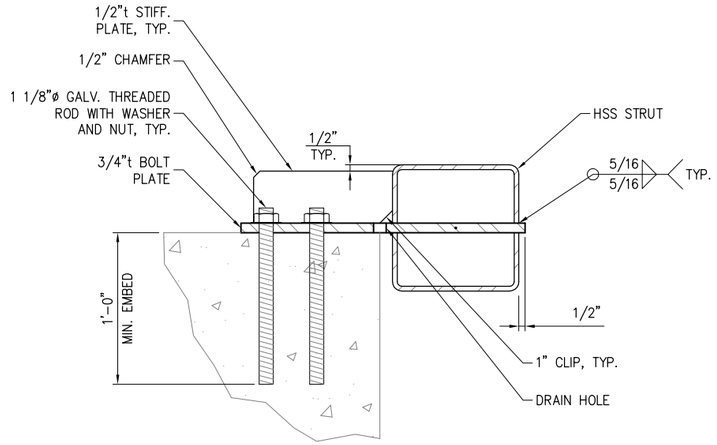


PLAN



DETAIL



SECTION H-H

ISSUED FOR BID

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1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

TODD WILLIAM BEASLEY — STATE OF WASHINGTON — 39312 — REGISTERED PROFESSIONAL ENGINEER
12/13/16

REVISIONS

REV	DATE	DESCRIPTION

PROJECT: **HERRON ISLAND FERRY DOLPHIN REPLACEMENT**

TITLE: **GUIDE PILE STRUTS**

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO: 15 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016	
CHECKED BY:	TWB	SCALE:	NOTED	

12/13/16
Drawings\2015\154034 - Herron Island Dolphin Replacement\Issued For Bid\154034-15.dwg

GENERAL NOTES

DESIGN CRITERIA

APPLICABLE CODES
All local codes plus the following are part of these General Notes.

–AISC – American Institute of Steel Construction. Specification for Structural Steel Building, 14th Edition (AISC 360–10).
–ASCE – American Society of Civil Engineers. Minimum Design Loads for Buildings and Other Structures (ASCE 7–10).
–ASTM – American Society of Testing and Materials. Annual Book of Standards.
–AWS – American Welding Society. Structural Welding Code – Steel (AWS D1.1).
–ICC – International Code Council. International Building Code 2012 (IBC–12).
–PIANC – Permanent International Association of Navigation Congresses. Guidelines for the Design of Fender Systems.
–SSPC – Steel Structures Painting Council. Steel Structures Painting Manual.

DESIGN VESSEL

Name:	MV Charlie Wells
Gross Tonnage:	99 long tons
Length (LOA):	72 feet
Beam:	40 feet
Operating Freeboard:	3 foot, min. to 5 foot, max.

Ferry service will continue to operate during construction. Contractor shall accommodate operations by staying clear of the ferry slip and shall demolish existing dolphins in a phased sequence to provide continuous ferry berthing at the slip. Only one dolphin at a time shall be removed and in a sequence as required to maintain service. Contractor shall develop a site specific safety plan for his crew and the ferry crew and passengers. This safety plan shall be submitted to the Owner for approval prior to mobilizing to the site.

Ferry boat operators shall take special care in berthing during construction. Operator shall coordinate with Contractor and use dolphins still intact while work on adjacent dolphins is underway. Ferry boat will be used as a pile driving template for the new fender piles. Operator will assist Contractor by positioning and holding position of vessel during installation of fender piles. Ferry operator and crew shall follow the Contractor's site specific safety plan.

ESTIMATED BERTHING ENERGIES AND APPROACH VELOCITIES

BERTHING TYPE	DAMAGE/WEAR ESTIMATE	ESTIMATED ENERGY	APPROACH VELOCITY
Typical	Normal Wear	5 foot–kips	0.9 knots
Moderate	Minor Fender Damage Possible	14 foot–kips	1.5 knots
Hard	Fender Damage Expected	27 foot–kips	2.1 knots
Very Hard	High Fender Damage Expected	~75 foot–kips+	3.6 knots

WIND LOAD
110 mph, 3 second gust, Exposure C, unless otherwise noted, Occupancy Category II Structure per IBC–12/ASCE 7–10.

TIDES
Elevation datum for this project is 0.00 ft, Mean Lower Low Water (MLLW). Tidal Data Plane – Allyn, Case Inlet, Mason County (from Washington Department of Ecology).

Highest Recorded Tide: Estimated (EHW):	17.50 ft
Mean Higher High Water (MHHW):	14.10 ft
Mean High Water (MHW):	13.20 ft
Mean Tide Level (MTL):	8.10 ft
Mean Sea Level (MSL, 1952):	7.58 ft
Mean Low Water (MLW):	3.00 ft
Mean Lower Low Water (MLLW):	0.00 ft
Lowest Recorded Tide: Estimated (ELW):	–4.50 ft

CATHODIC PROTECTION
Cathodic protection provided by galvanizing of the steel components. After 10 years, structures should be inspected for corrosion and anodes added, as necessary.

MATERIALS AND CONSTRUCTION

PILES
Pipe material for fender piles and backing piles shall be ASTM A252, Grade 3, with minimum yield strength of 60 ksi. Chemistry of steel shall have a C.E. less than 0.45 per AWS.

STRUCTURAL STEEL
All miscellaneous steel plates and other shapes shall conform to ASTM A572, Grade 50, unless otherwise noted. Rectangular and round HSS shapes shall conform to ASTM A500 Grade B.

HARDWARE
All carbon steel shackles shall be new, forged, quenched and tempered hardware, shall be hot dip galvanized and shall be provided in the sizes called out in the drawings. Verify fit–up and compatibility of components. The pins on all shackles shall be alloy steel and have nut and cotter pin. Open link mooring chain shall be carbon steel, galvanized chain, in the size called out in the drawings. All chain, shackles, and other connecting hardware shall be new and accompanied with proof load documentation, as applicable.

All connecting bolts for steel to steel shall be ASTM A325 or A449. All other bolts shall be ASTM A307 with heavy hex nuts or as otherwise noted. Cut washers shall be 3/16–inch plate minimum. All nuts, bolts, washers, etc. shall be galvanized.

Stainless steel components shall be type 316, marine grade.

HDPE SLEEVES
High density polyethylene (HDPE) pipe sleeves shall meet the requirements of ASTM F714 and have the following dimensions:
Inside Diameter: Min. = 13 inch, Max. = 14–1/2inches
Wall Thickness: Min. = 15/16 inch, Max. = 1–3/4 inches

Contractor shall verify that the sleeve meets the above criteria and that the sleeve fits freely over the fender pile prior to shipment to the project site. Sleeve shall not be forced onto the pile. Any sleeve that has to be forced shall be rejected and replaced with a suitable sleeve at no additional cost to the Owner.

CYLINDRICAL RUBBER ENERGY ABSORBERS
Cylindrical rubber energy absorbers shall be comprised of elastomeric cylindrical rubber fender units as detailed in the plans. The overall dimensions of the fender units shall be as detailed in the plans within the following tolerances:

–Outside diameter: +/– 1/4 inch
–Inside diameter: +/– 1/4 inch
–Length: + 0 inch, – 1/4 inch

All edges shall be cut and finished smooth and even, without rough edges. All holes shall be cleanly bored with appropriate equipment and methods to ensure no damage to the rubber, including tearing, delamination, burning or any other permanent deformation or scaring of the material.

The fender units shall be capable of absorbing the design energy with a reaction at the designed deflection stated below (per foot of length of each fender unit), within a tolerance of +/– 10 percent:

–Reaction: 12.5 kips per foot of length
–Energy Absorption: 4.0 kip–foot per foot of length
–Deflection: 50 percent (9 inches)

The rubber for the fenders shall be natural or synthetic rubber or a mixture. The fenders shall be reinforced with carbon black and resistant to aging, seawater, abrasion and ultraviolet rays. The rubber shall be homogenous in quality and free from foreign materials, bubbles, injury, cracks and other harmful defects. A certified test report, showing compliance with the rubber properties shown, must be provided to the Engineer before the fenders are delivered to the site.

The performance of the fender is to be expressed by the value of the energy absorbed at the maximum value of the reaction load generated when the fender is compressed to its rated or maximum deflection.

In the performance test of the fender, compression is to be applied toward the top face of the fender unit. The compression speed shall follow current PIANC Fender Performance Testing guidelines and shall be recorded during testing. The fender unit is to be cycled for three times up to the designed deflection. Let the fender stand at rest for at least one hour. Then, a fourth deflection cycle shall determine the fender performance. For the performance test of the fender, the room temperature at the time of the test shall be recorded. The fender units shall achieve a performance with +/– 10 percent of the stated nominal design performance.

Performance tests must be conducted on at least four of the fender units and witnessed by an accredited 3rd party testing agency. Certificates must be provided before the fenders arrive on the jobsite confirming that the tests were run according to PIANC, Procedure to Determine and Report the Performance of Marine Fenders. The certificates must also confirm that the results of the tests meet the energy and reaction requirements called out in these specifications.

The rubber fenders shall be packaged sufficiently to prevent damage during shipment. Packing and delivery procedure must be included in the submittal package.

Fender mounting plates and internal plate washers that will be in contact with the rubber fender unit shall have eased and rounded edges to avoid causing damage to the fender unit when in service.

WELDING
All field and shop welding shall conform to AWS D1.1 Structural Welding Code – Steel, current edition.

Deposited filler metal shall meet Charpy Impact requirements of 20 foot–pounds at –20 degrees F and have chemistry similar to the base metal as approved by the Owner. Filler metals shall only be used in welding positions recommended by the manufacturer. Welding consumables shall be stored and the condition maintained per AWS Section 5.

Welding personnel shall be qualified per WABO to weld procedures and weld positions necessary for the joint details specified. All onsite welding shall be completed by WABO certified welders. All steel fabrication shop drawings shall reference the weld procedure specifications for each weld detailed. Weld procedure specifications shall be submitted with the shop drawings. Submittals verifying welder qualifications must be transmitted to the Owner for approval prior to any welding.

No welding through coatings shall be performed. Coatings within 2 inches of the weld root shall be removed prior to welding and repaired as discussed in Coating Repair.

All welds shall be visually inspected to comply with the visual inspection criteria for statically loaded non–tubular and tubular connections per AWS Section 6. Welds are subject to non–destructive testing using VT, RT, MT and UT methods, per AWS Section 5, as appropriate. Welding inspection shall be provided by WABO certified third party inspector.

Acceptable criteria shall be for non–cyclic loading. Welds failing shall be repaired at the Contractor's expense, which will also include all costs for retesting, to achieve passing results.

Remove and repair all burrs and weld splatter after welding.

GALVANIZING
All structural steel, pile and hardware shall be galvanized per ASTM A123 or A153 after fabrication unless otherwise noted.

SPRAY METALIZING
Dolphin caps shall be spray metalized per the following specifications from the SSPC (Steel Structures Painting Council) – Steel Structures Painting Manual:

–SSPC CS–Guide No. 23 for Thermal Spray Metallic Coating
–SSPC–SP 12 for power washing, pre cleaning
–SSPC–SP 10/NACE No. 2 for blast cleaning, near white metal finish
–SSPA–PA 2 for coating thickness measurement
–SSPC–PA 1 for seal coating

Contractor shall submit a Quality Control Plan for preparation and application of metal coatings for all project components specified to be coated. Quality Control Plan shall address solvent cleaning, blasting, surface profile standards, stripe coat and primer coat application, finish coat applications, coating thickness measurement and documentation, adhesion pull test procedures, independent inspection and documentation, as well as handling and transport methods.

Prepare all surfaces to be spray metalized per SSPC CS–Guide 23, Current Edition. Surfaces to be spray metalized include dolphin caps. Prior to blast cleaning, surface imperfections such as sharp fins, sharp edges, weld spatter, etc. shall be removed from the surface. Blast clean the surfaces to be spray metalized to a near white metal finish in accordance with SSPC–SP 10/NACE No. 2. The steel substrate shall have a minimum angular profile depth of 2.5 mils.

Prior to application of the spray metalized coating, the steel substrate shall be heated to 250 degrees F to remove moisture from the steel. A minimum surface temperature shall be maintained during application of the spray metalized coating to prevent condensation of moisture on the substrate. Time between the completion of the final blasting and the completion of the thermal spraying should be no greater than six hours. If rust bloom, blistering or degraded coating appears at any time during the application of the coating system, repair the unsatisfactory portions per the specifications.

Following cleaning and preparation, spray metalize the dolphin caps with a pure zinc coating per the SSPC CS–Guide 23, Current Edition. The coating shall have a minimum dry film thickness of 12 mils. The coating thickness shall be measured per SSPC–PA 2 with the following modification: no single measurement, including those that create a spot measurement, shall be less than 70% of the minimum required dry film thickness. The specified coating thickness shall be applied in several crossing passes laying down approximately 3 to 4 mils for each pass. The deposited coating system shall be uniform without blisters, cracks, loose particles, or exposed steel as examined with 10x magnification. Thermal spraying in low temperature environments, less than 40 degrees F, shall comply with SSPC–CS 23 requirements

The Contractor shall perform a minimum of one portable tension–bond measurement on each dolphin cap. The Contractor shall also perform a bend test at the beginning of each work shift or crew change, consisting of:

–Use carbon steel coupons of approximate dimension 2 in. x 4 in. x 8 in. x 0.05 in. thick.
–Surface preparation according to the contract specifications.
–Bend coupons 180 degrees around a 0.5 in. diameter mandrel. Bend test passes if there is no cracking or only minor cracking with no spalling or lifting (by a knife blade) from the substrate. Bend test fails if the coating cracks with lifting (by a knife blade) from the substrate

Seal the spray metalized coating with Pro–Line 4800/4801 Prothane H.S. as manufactured by Sherwin Williams or approved equal. Sealant color shall be clear. The seal coat shall be applied to 2 to 3 mils dry film thickness per manufacturer's recommendations and in conformance with SSPC–PA 1. The sealer should be applied as soon as possible after thermal spraying and preferably within eight hours.

COATING REPAIR
Damaged galvanizing, including that removed for welding, shall be repaired by stick galvanizing with zinc sticks to a minimum thickness of 12 mils per ASTM A780, followed with a layer of zinc rich paint.

EPOXY ANCHORS
All epoxy anchors shall be Hilti HIT–HY 200 max adhesive and installed per manufacturer's recommendations, unless otherwise noted.

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1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

12/13/16

REVISIONS

REV	DATE	DESCRIPTION

PROJECT: HERRON ISLAND FERRY DOLPHIN REPLACEMENT

TITLE: GENERAL NOTES

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO: 16 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016	
CHECKED BY:	TWB	SCALE:	NOTED	

7/12/16
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GENERAL NOTES (cont.)

PILE INSTALLATION REQUIREMENTS

GENERAL
A vibratory hammer shall be used to install all piles to full length specified. Dolphin vertical and back batter bearing piles shall be proof driven with an impact hammer. The Contractor shall submit a plan for pile driving, including hammer type, driving method, proposed templates and support equipment, etc. All pile driving methods shall meet the requirements of the permits issued for this project.

TOLERANCES
The fender piles shall be driven within 1 percent of plumb vertical alignment (1/2 inch over 4 feet) and within 1 inch of final horizontal position at cutoff. The dolphin vertical bearing piles shall be driven within 2 percent of plumb vertical alignment (1 inch over 4 feet) and within the 2 inches of final horizontal position at cutoff. Dolphin batter piles shall be driven within 2 percent of specified batter angle alignment (23 to 25 inches over 4 feet for 2:1 batter piles and 15 to 17 inches over 4 feet for 3:1 batter piles) and within 2 inches of final horizontal position at cutoff.

Piles hitting obstacles and misaligned piles outside specified tolerances shall be pulled by the Contractor with a vibratory hammer and redriven at no additional cost to the Owner. Contractor is responsible for conducting a dive inspection in the work area to confirm area is clear for new pile driving. Document any potential conflicts to pile driving and contact Engineer immediately with report.

PILE DRIVING
All piles shall be driven with a vibratory and/or impact hammer adequately sized and configured as needed to obtain the required embedment to the estimated tip elevations shown in the plans, without damage to the pile. It is anticipated that at a minimum, an APE 200, APE 150T, or equivalent vibratory hammer, similar to that used for the test pile program, will be used. Production piles shall reach, at a minimum, the probe depths achieved in the Test Pile Probing program and achieve the specified bearing and tension capacities based on Engineer's evaluation of driving characteristics. If selected vibratory hammer is unable to reach the probe depths and capacities, substitution with more suitable equipment shall be made, at the Contractor's expense.

Dolphin vertical and back batter bearing piles shall be driven with both vibratory hammer and impact hammer as required to reach design embedment. Dolphin vertical piles include a SPIN FIN™ pile tip which is anticipated to increase driving resistance by approximately 50 percent, compared to smooth piles. Contractor shall account for this anticipated increase in driving resistance when selecting pile driving equipment. Additionally, piles equipped with a SPIN FIN pile tip will rotate counterclockwise (when viewed from above) while advancing. It is anticipated that pile may rotate up to one full rotation in 30 feet of driving.

It is anticipated that an impact hammer with a minimum ram weight of approximately 4,000 pounds and rated energy capable of delivering approximately 27,000 foot–pounds (DELMAG D19–32 or equal) will be required. However, Contractor shall evaluate if larger piece of equipment will be necessary to achieve embedment and capacities specified in the plans.

All pile driving shall be conducted in the presence of the Owner's Representative. The Contractor shall assist in monitoring the pile driving and shall mark each pile in one–foot increments with every 5th foot increment numbered. Pile marks shall be visible from all sides during driving. All pile cutoffs shall become property of the Contractor and shall be removed from the site. Minimum cutoff of one–foot required to allow for final grades and assembly, installation and welding of caps.

REQUIRED CAPACITIES
In addition to driving to the estimated tip elevations shown in the plans, all piles shall be driven to refusal with full weight of vibratory hammer applied and hammer running at full power. Refusal is considered when pile advancement slows to zero for a period of at least 30 seconds. Piles failing to reach referenced local probe depth elevation prior to refusal may require additional effort. Fender piles driving full length, but not reaching defined refusal shall be subjected to the following capacity criteria:

Fender piles shall have adequate bearing capacity to support the weight of the stationary vibratory hammer (approximately 10,000 pounds), held for one minute without visible settlement. Contractor shall demonstrate adequate bearing capacity of each fender pile, if refusal is not reached. If fender pile settles under stationary weight of vibratory hammer, pile will be allowed to set–up for 24 hours and retested. If settlement continues after set–up period, 20 foot section of pipe shall be spliced, per the plans and specifications, and driving continued.

Dolphin vertical and back batter bearing piles shall be driven with vibratory and impact hammer to required embedment and bearing capacity as described in the pile schedule in the plans. If specified bearing capacity is not achieved prior to driving full length of pile, an additional section of pipe (20 foot minimum) shall be spliced and driving continued until capacity is demonstrated.

Dolphin bearing piles shall be driven to refusal as defined in these notes. Dolphin bearing piles may require proofing with an impact hammer if refusal is not reached prior to driving full length of pile specified. Data collected from impact driving the specified bearing pile will be used to estimate the bearing capacity of the other dolphin piles, where impact hammer is not used. If required bearing capacity cannot be confirmed, or full length of pile is driven without reaching specified capacity, an additional section of pipe (20 foot minimum) shall be spliced and driving continued until capacity is demonstrated.

SPECIAL INSPECTION AND STRUCTURAL OBSERVATION REQUIREMENTS 2015 IBC

IBC SECTION	RDP	SO#	IBC SECTION TITLE
1705.2.1	SE	1	STRUCTURAL STEEL
1705.7	SE	1	DRIVEN DEEP FOUNDATIONS
SAI 1 TO BE DETERMINED BY CONTRACTOR.			

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PND ENGINEERS, INC.
1736 Fourth Avenue S., Suite A
Seattle, Washington 98134
P: 206.624.1387
www.pndengineers.com

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12/13/16

REVISIONS		
REV	DATE	DESCRIPTION

PROJECT: HERRON ISLAND FERRY DOLPHIN REPLACEMENT

TITLE: GENERAL NOTES

DESIGNED BY:	JDO	PROJECT NO:	154034.02	SHEET NO: 17 OF 17
DRAWN BY:	GRD	DATE:	DECEMBER 2016	
CHECKED BY:	TWB	SCALE:	NOTED	