

April 20th, 2023



# MALCOLM DRILLING CO., INC.

**Abernethy Bridge**

**Tait McCutchan**

**Malcolm Drilling Company**



# Abernethy Bridge



OVERVIEW

SCOPE

EQUIPMENT

OBSTACLES TO  
OVERCOME

PICTURES

## Project Overview

The I-205 Improvements in Oregon include the seismic retrofit and widening of the Abernethy Bridge to withstand major earthquakes. When complete it will be the first earthquake ready bridge that crosses the Willamette River in the Portland metropolitan area making it the regional north-south lifeline route after a disaster.

# Abernethy Bridge



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## Project Team Members:

Owner – Oregon Department of Transportation

General Contractor – Kiewit

Drilled Shaft Contractor – Malcolm Drilling Co., Inc.

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**MALCOLM'S SCOPE INCLUDED THE INSTALLATION OF PERMANENTLY & TEMPORARILY CASED OSCILLATOR DRILLED SHAFTS:**

## DRILLED SHAFT OVERVIEW

**13 Total Piers with 28 TOTAL DRILLED SHAFTS**

-Drilled shaft diameters and depths:

- Pier 1 – 2.2 meter (6.56' OD) x 250' long with full depth permanent casing
- Pier 2,3,4,5 – 3.73 meter (12.23' OD) x up to 240' long with full depth permanent casing
- Pier 6 – 3.73 (12.23' OD) x 170' long with full depth temporary casing
- Pier 7 – 3.3 meter (10.84' OD) x 150' long with full depth permanent casing

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**MALCOLM'S SCOPE INCLUDED THE INSTALLATION OF PERMANENTLY & TEMPORARILY CASED OSCILLATOR DRILLED SHAFTS:**

## DRILLED SHAFT OVERVIEW

**13 Total Piers with 28 TOTAL DRILLED SHAFTS**

-Drilled shaft diameters:

- Pier 8A – 2.5 meter (8.2' OD) x 140' long with full depth temporary casing
- Pier 8B – 2.5 meter (8.2' OD) x 140' long with full depth permanent casing
- Pier 9, C3 – 2.5 meter (8.2' OD) x up to 100' with full depth temporary casing
- Pier 10,11,12,13 – 2 meter (6.56' OD) up to 60' deep

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**MALCOLM'S SCOPE INCLUDED THE INSTALLATION OF PERMANENTLY & TEMPORARILY CASED OSCILLATOR DRILLED SHAFTS:**

## DRILLED SHAFT OVERVIEW

### ROCK SOCKETS

- All shafts have rock sockets that ranged in length from 5'-20' long
- Rock sockets were excavated, depending on shaft location with either a BG-40, BG-50 or drop chisel.
- Rock strengths were up to 25,000 psi.

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- Mobilized in August 2022
- Shafts will be complete in November 2023
- There will be a downtime between May and August of 2023
- To Date 70% of the shafts installed

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# Abernethy Bridge



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## SCOPE OF WORK

# Abernethy Bridge



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## Malcolm Scope of Work

- Dig/Drill & Install fully cased drilled shafts
- Place reinforcing steel cages. Majority of caged were spliced vertically over shaft in multiple sections
- Perform load testing at Piers 1B and 2B
- Furnish and place shaft concrete
- Furnish and place permanent casing
- CSL testing of all shafts

# Abernethy Bridge



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## Malcolm Scope of Work

- Thermal Integrity testing of all shafts
- Mini SID Testing off all shafts
- Clean Inside of Perm Structural Casing After Installation

# Abernethy Bridge



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## Material/Testing Requirements

- Drilled Shaft Concrete (4000P and 5000P)
- All 12' OD shafts had to have special low heat mix (50% cement / 50% slag mix)
- Low heat mix had a max placement temp of 85 degrees
- Permanent Casing 1.25", 1.5", 1.625", 1.875" thick
- Permanent Structural casing required on Piers 2,3,4,5,7,8
- All field spliced permanent casing had to be UT tested

# Abernethy Bridge



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## Material/Testing Requirements

- All Shafts Required CSL Testing
- All Shafts required Thermal Integrity Testing
- Sand Content Testing (Less than .25%)
- All Shafts required Mini SID testing.
- Pier 1A and 2B required soni-caliper testing

# Abernethy Bridge



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## Equipment Used

# Abernethy Bridge



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## Equipment Used

- Liebherr 895 Dig Crane
- 3.8 Meter Oscillator (Piers 2-6)
- 3.3 Meter oscillator (Pier 1 & 7)
- 2.5 Meter Oscillator (Pier 8-13)
- Bauer BG-50 and BG-40 Drill Rig
- Liebherr 8130 Support and Dig Crane
- Linkbelt 800 Support Crane
- Linkbelt 750 Support Crane

# Abernethy Bridge



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VRM 3800-T3100





# VRM 3800 & Liebherr 895



# VRM 3800 & Liebherr 895



# Abernethy Bridge





# Ring Chisel



# Core Barrel with Roller Bits



# Digging Buckets



# BG-50 Stem



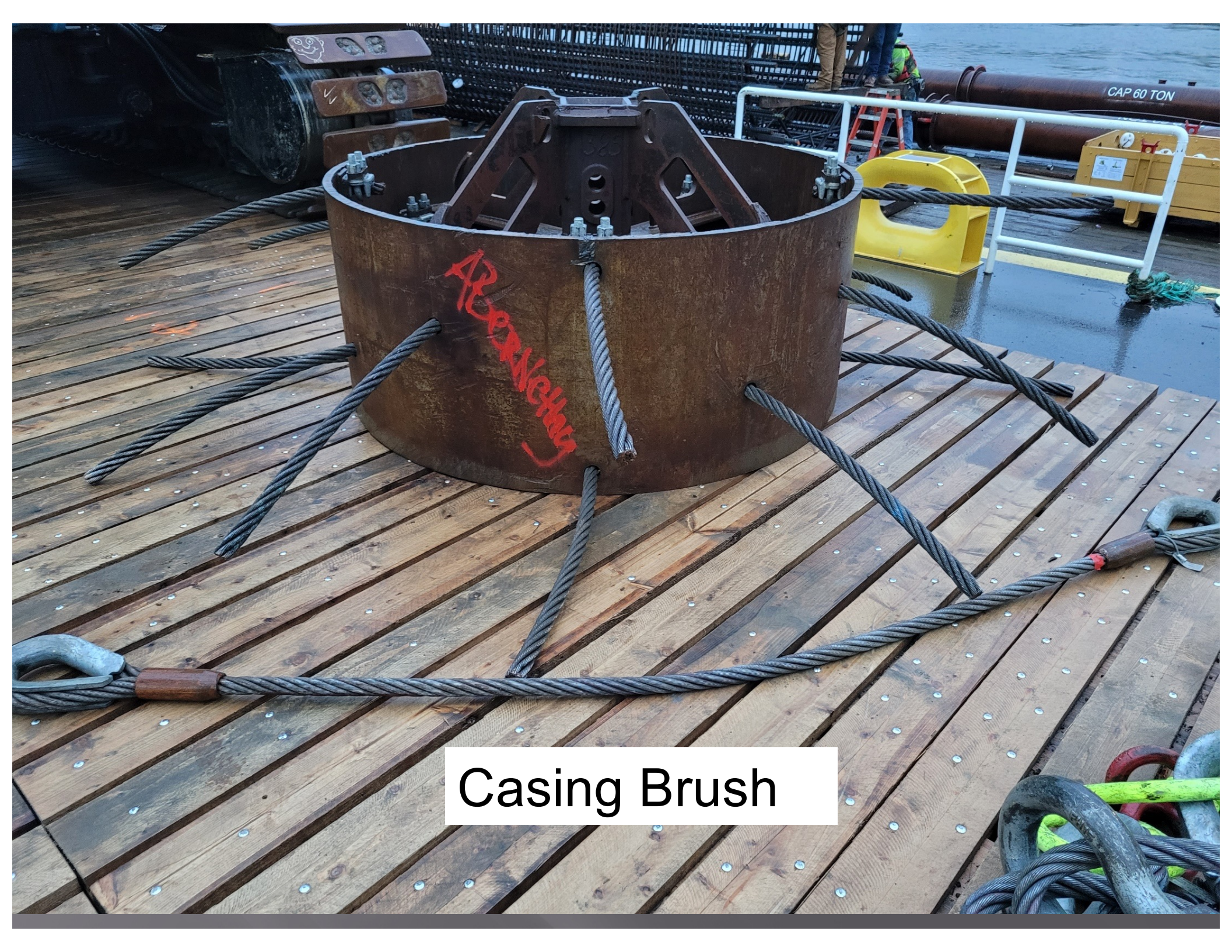


# BG-50 Stem



# Bauer BG-50





Casing Brush

# Abernethy Bridge



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Foundation Layouts & Shaft Details

# Abernethy Bridge



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# Abernethy Bridge



OVERVIEW

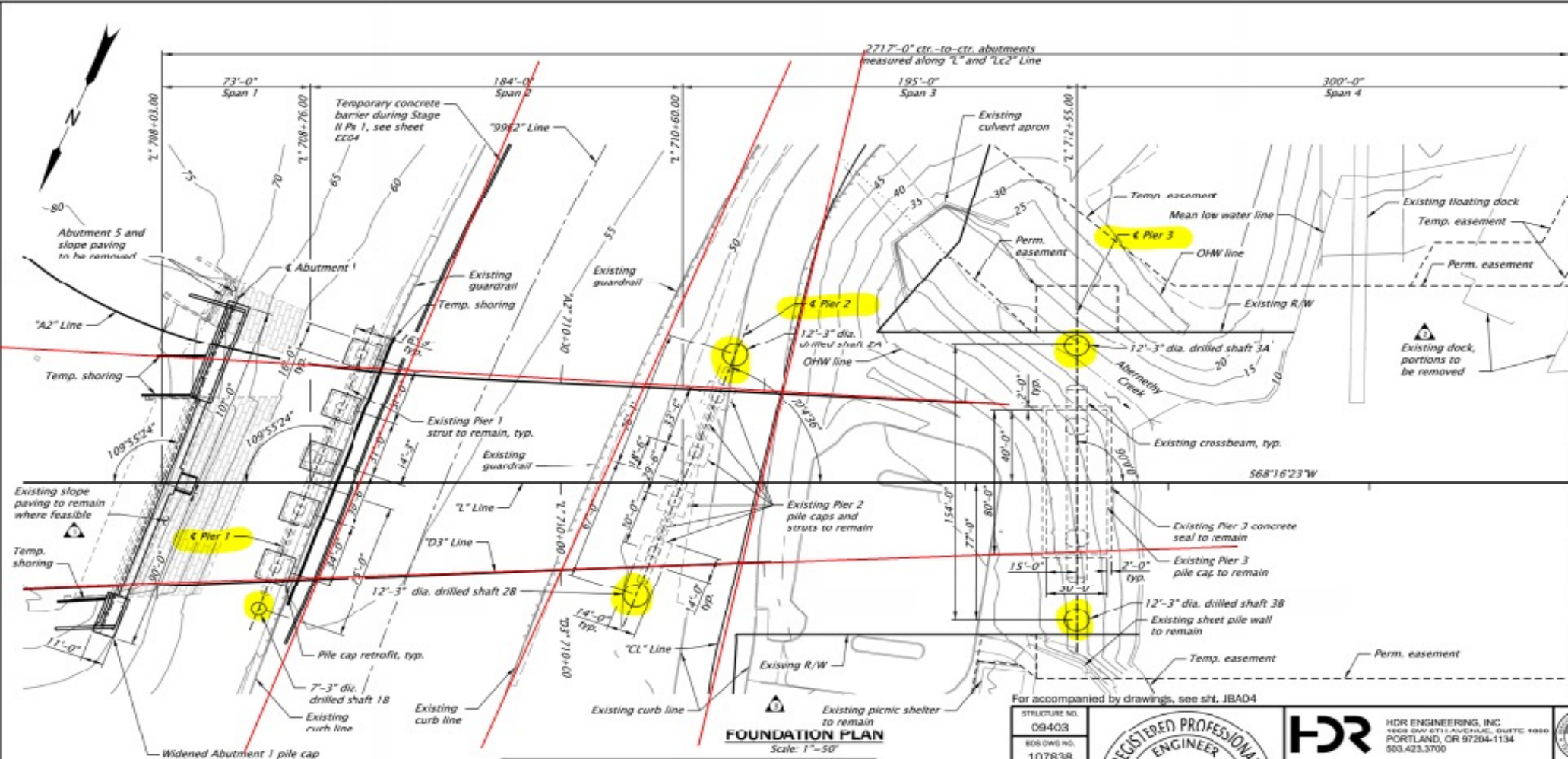
SCOPE

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## Foundation Layout



# Abernethy Bridge



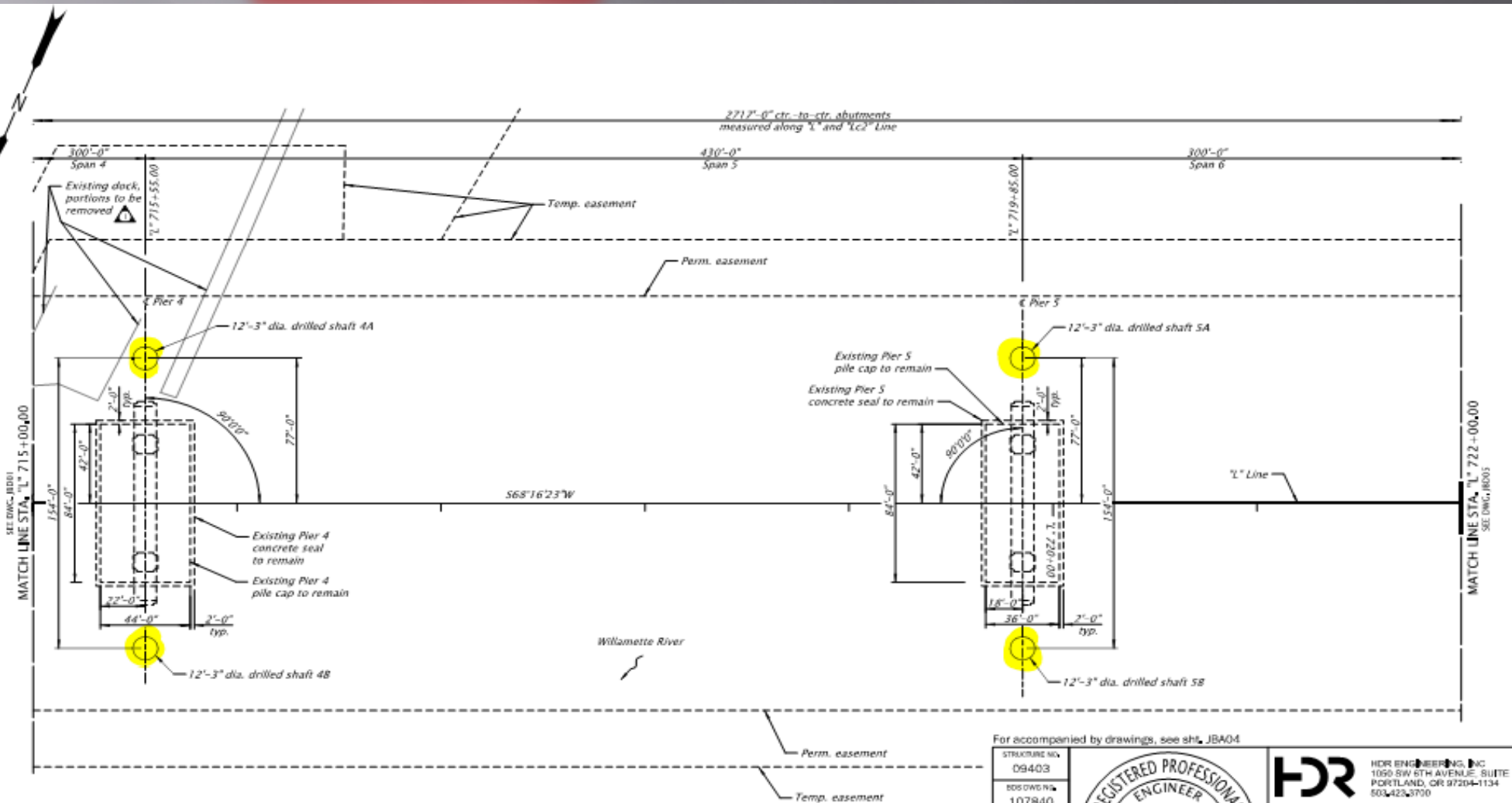
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FOUNDATION PLAN

For accompanied by drawings, see sht. JBA04

STRUCTURE NO.  
09403  
ECS DWG NO.  
107840  
DATE PLOTTED  
77.778



**HDR** HDR ENGINEERING, INC.  
1050 SW 6TH AVENUE, SUITE  
PORTLAND, OR 97204-1134  
503.423.3700

WILLAMETTE R & HWYS 1E & 3, HWY 64 (GEO)

# Abernethy Bridge



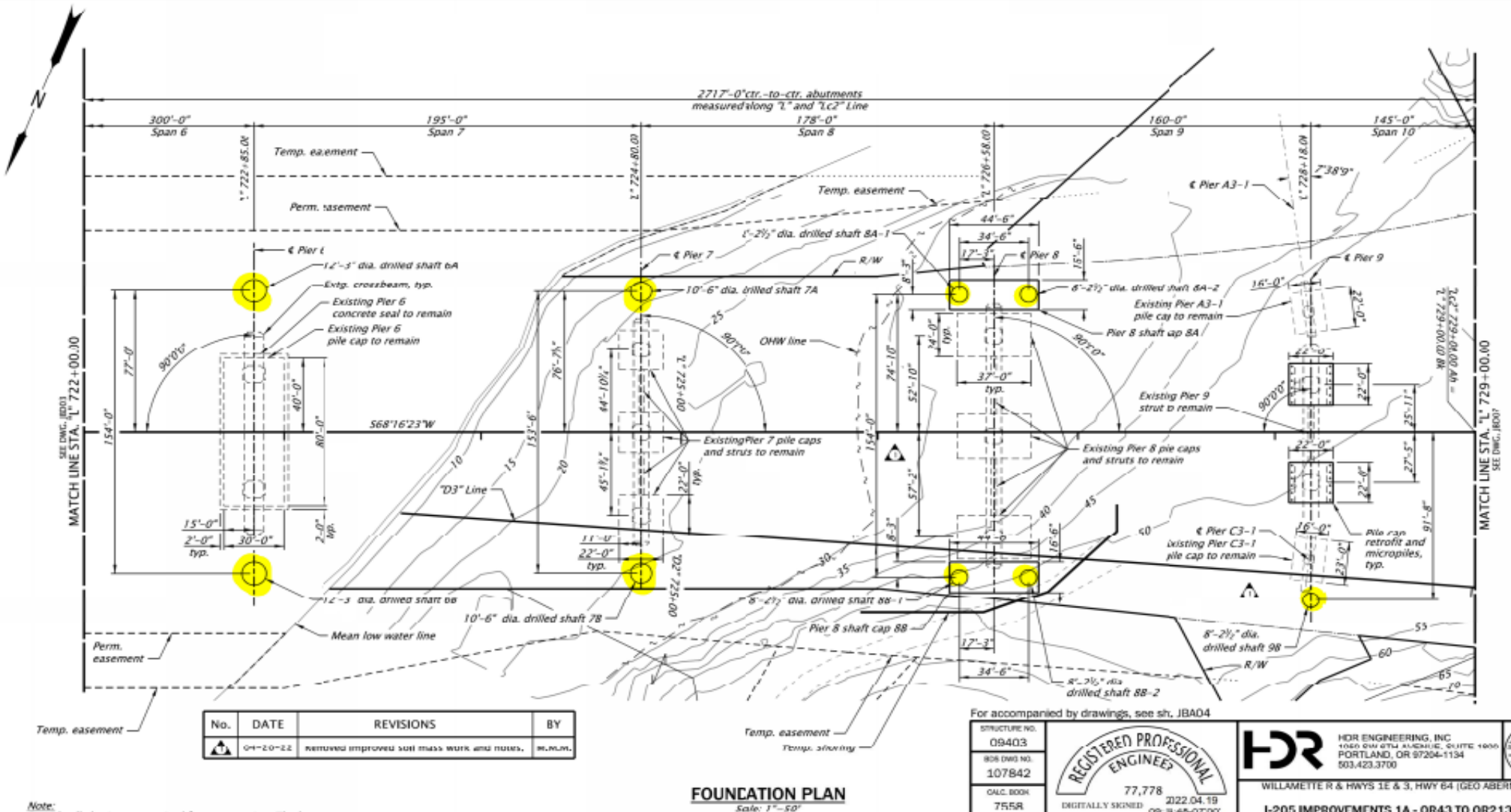
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No.	DATE	REVISIONS	BY
1	04-20-22	removed improved soil mass work and notes.	W.M.M.

**FOUNDATION PLAN**  
Scale: 1"=50'

For accompanied by drawings, see sh. JBA04

STRUCTURE NO.  
09403  
JOB DRAWING NO.  
107842  
CALC. BOOK  
755R



**HR** HDR ENGINEERING, INC.  
1000 SW 17TH AVENUE, SUITE 1000  
PORTLAND, OR 97204-1134  
503.423.3700  
WILLAMETTE R & HWYS 1E & 3, HWY 64 | GEO ABERNETHY  
I-205 IMPROVEMENTS 1A - 0943 TO 09213

Note:



# Abernethy Bridge



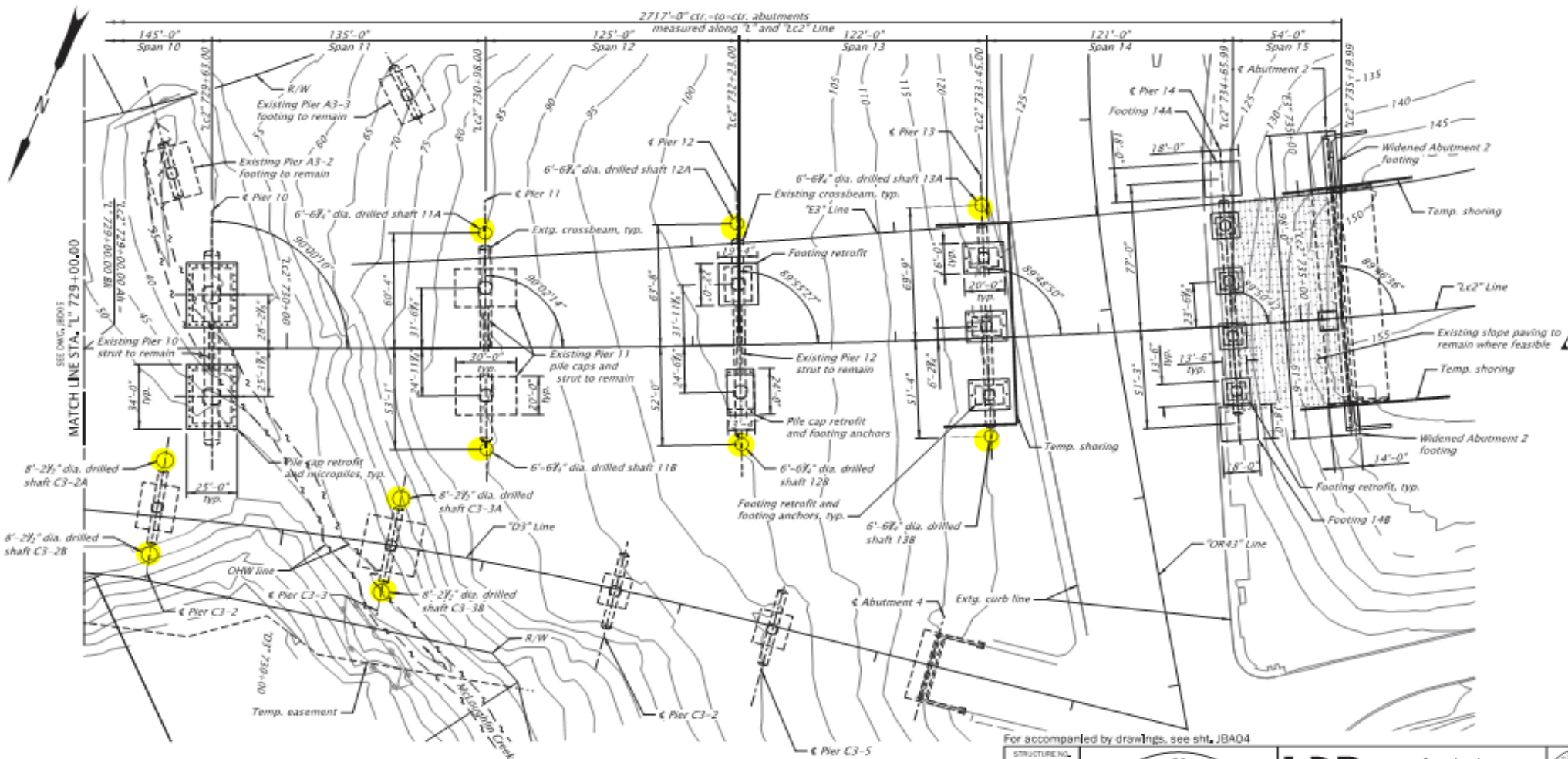
OVERVIEW

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For accompanied by drawings, see sht. JBA04

**FOUNDATION PLAN**  
Scale: 1"=50'

STRUCTURE NO.	09403
SEE DWG NO.	107844



**HDR** HDR ENGINEERING, INC.  
1050 SW 5TH AVENUE, SUITE 1600  
PORTLAND, OR 97204-1134  
503.423.3700

*Note:*  
Provide all chains as required for construction. The locations

# Abernethy Bridge



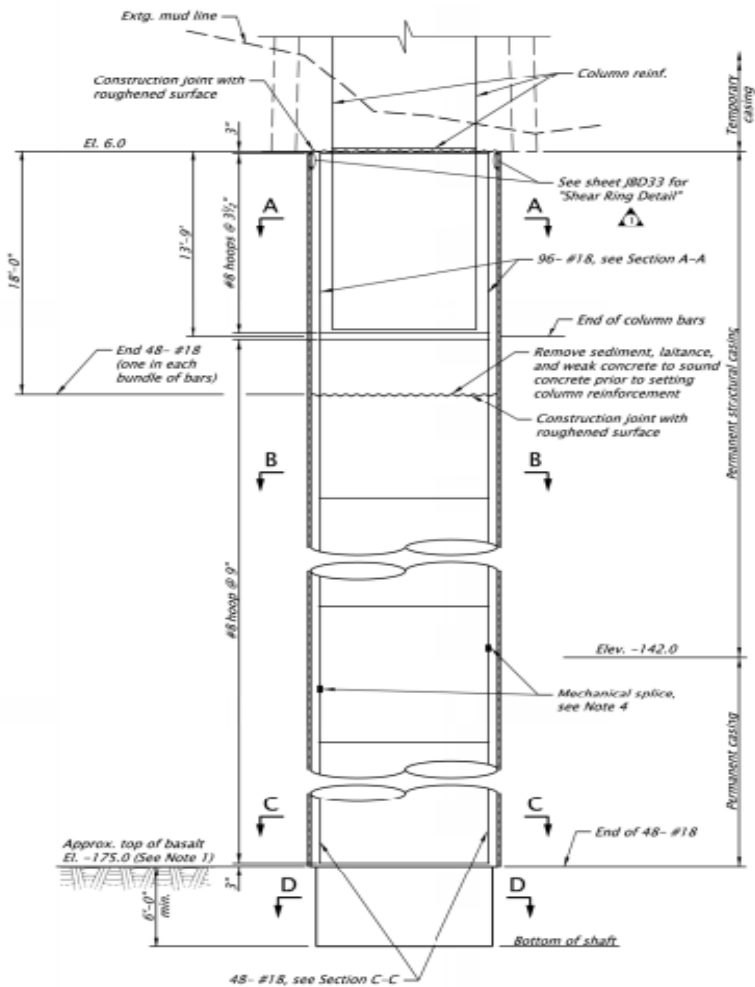
OVERVIEW

SCOPE

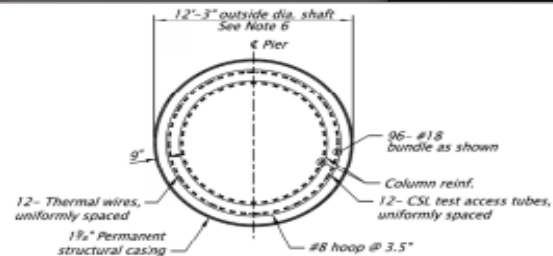
EQUIPMENT

OBSTACLES TO OVERCOME

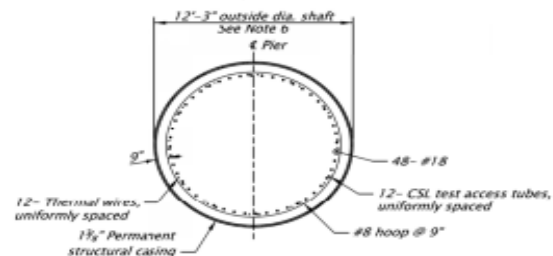
PICTURES



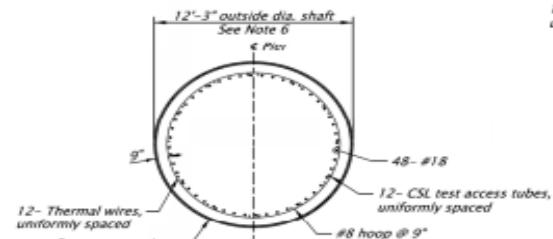
**ELEVATION**  
Scale: 1/8"=1'-0"



**SECTION A-A**  
Scale: 1/8"=1'-0"

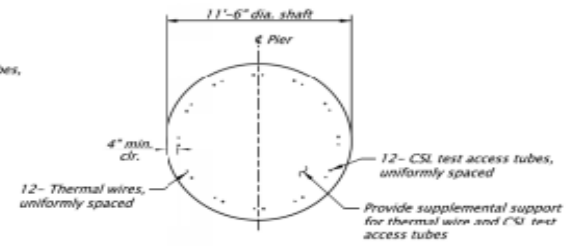


**SECTION B-B**  
Scale: 1/8"=1'-0"



**SECTION C-C**  
Scale: 1/8"=1'-0"

- Notes:**
1. Top of basalt elevation may vary. See Special Provisions to accommodate variation. Tip elevation may vary to construct required socket into basalt.
  2. See Special Provisions for permanent structural casing requirements.
  3. Where the min. thickness of permanent structural casing is shown, it is specified to satisfy structural design requirements only. The contractor shall increase the casing thickness to provide casing of sufficient strength to resist handling, transportation, and installation stresses and the external stresses of the subsurface materials.
  4. Do not splice more than 50% of reinf. bar at any one location. Stagger splices a minimum of 3'-0".
  5. For #8 hoops, see sheet JBD33 for "Welded Lap Splice Detail".
  6. The outside diameter of the casing shall not be less than the specified diameter of the shaft minus 3". The outside diameter of the casing shall not be greater than the specified diameter of the shaft plus 3".



**SECTION D-D**  
Scale: 1/8"=1'-0"

No.	DATE	REVISIONS	BY
1	04-20-22	Added shear ring.	J.B.

For accompanied by drawings, see sht. JBA04

STRUCTURE NO. 09403
DES. DWG. NO. 107851
CALC. BOOK 755R
REV: 054
M.P.: 9.03
COUNTY Clatsop
DATE 10/2021



**HDR** HDR ENGINEERING, INC  
1060 SW 8TH AVENUE, SUITE 1800  
PORTLAND, OR 97204-1134  
503.423.3700

WILLAMETTE R & HWYS 1E & 3, HWY 64 (GED ABERNETHY)  
**1-205 IMPROVEMENTS 1A - OR43 TO OR213 SEC.**  
EAST PORTLAND FREEWAY  
CLACKAMAS COUNTY

Designer: Jedediah Bingle  
Reviewer: Jeff Olson

**PIER 3 SHAFT 3A**

SHEET NO.  
JBD14

**SCALE WARNING**  
IF THIS SCALE LINE DOES NOT MEASURE ONE INCH, THEN DRAWING IS NOT TO SCALE

RENEWS: 12-31-2023

# Abernethy Bridge



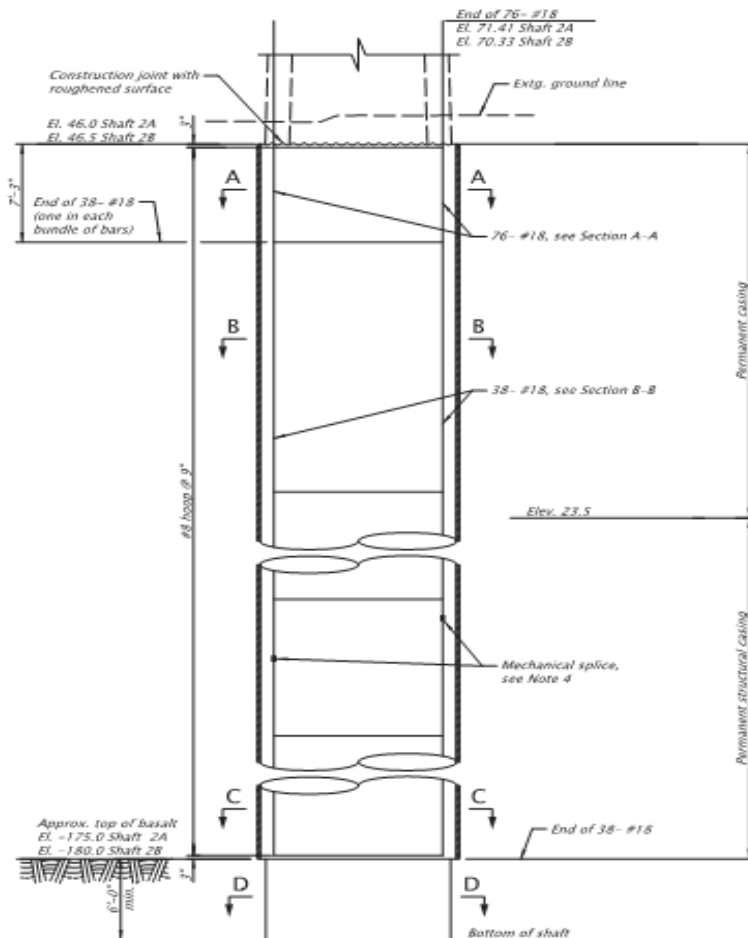
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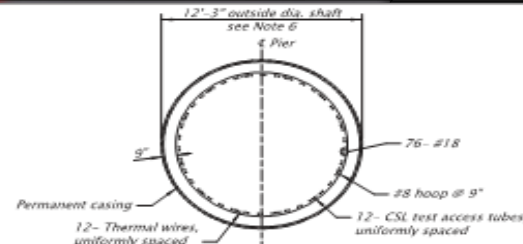
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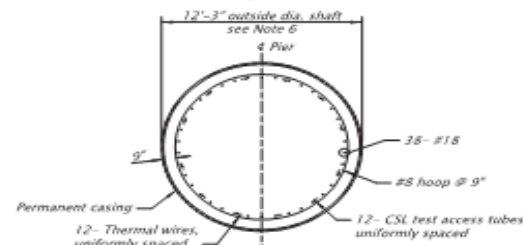


**ELEVATION**  
Scale: 1/8"=1'-0"



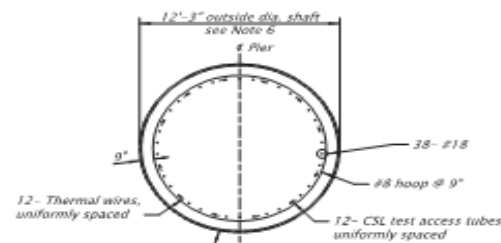
**SECTION A-A**

Scale: 1/8"=1'-0"



**SECTION B-B**

Scale: 1/8"=1'-0"

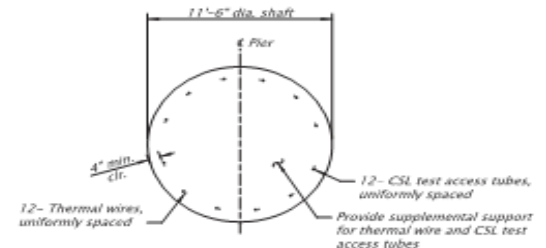


**SECTION C-C**

Scale: 1/8"=1'-0"

**Notes:**

1. Top of Basalt elevation may vary. See Special Provisions to accommodate variation. Tip elevation may vary to construct required socket into basalt.
2. See Special Provisions for permanent structural casing requirements.
3. Where the min. thickness of permanent structural casing is shown, it is specified to satisfy structural design requirements only. The contractor shall increase the casing thickness to provide casing of sufficient strength to resist handling, transportation, and installation stresses and the external stresses of the subsurface materials.
4. Do not splice more than 50% of reinf. bar at any one location. Stagger splices a minimum of 3'-0".
5. For #8 hoops, see sheet JBD33 for "Welded Lap Splice Detail".
6. The outside diameter of the casing shall not be less than the specified diameter of the shaft minus 3". The outside diameter of the casing shall not be greater than the specified diameter of the shaft plus 3".
7. See sheet JBD39 for bi-directional testing details at Shaft 2B.



**SECTION D-D**

Scale: 1/8"=1'-0"

For accompanied by drawings, see sht. JBA04

STRUCTURE NO.	09403
DOS DRG. NO.	107850
CALC. BOOK	7558
REV. 004	
DATE	10/2021
COUNTY	Clackamas
DRN.	
REVISIONS	



RENEWS: 12-31-2021

	HDR ENGINEERING, INC. 1050 SW 8TH AVENUE, SUITE 1800 PORTLAND, OR 97204-1134 503.423.3700	
	WILLAMETTE R & HWYS 1E & 3, HWY 64 (GED ABERNETHY) <b>I-205 IMPROVEMENTS 1A - OR43 TO OR213 SEC.</b> EAST PORTLAND FREEWAY CLACKAMAS COUNTY	
Designer: Jeediah Bingle Drafter: John Wang	Reviewer: Jeff Olson Checker: Dawn Morgan	SHEET NO. <b>JBD13</b>
<b>PIER 2 SHAFTS</b>		

**SCALE WARNING**  
IF THIS SCALE LINE DOES NOT MEASURE ONE INCH THEN DRAWING IS NOT TO SCALE



# Abernethy Bridge



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Pier 1 (Land)	OD	Wall Thickness	Structural Perm Or Perm Casing	Length (ft) Including Drive Ring	BTM Drive Ring W/ Teeth Attach On 7" Centers	Oscillator Ring Attached onTop	Top of Casing Detail	BTM Casing Detail	Casing Weight (lbs)	Drill Pad EL	Top of Casing EL	BTM Casing EL	Casing LF Including Drive Ring
Piece 1	7.2	1.25	Permanent	60	2" Thick x 36" tall (Grade 50)	NO	Square	Drive Ring w/ Teeth	68,269.01				
Piece 2	7.2	1.25	Permanent	60	NO	NO	Square	Beveled	68,269.01				
Piece 3	7.2	1.25	Permanent	60	NO	NO	Square	Beveled	68,269.01				
Piece 4	7.2	1.25	Permanent	53	NO	NO	Square	Beveled	60,304.29				
Piece 5 (Extra)	7.2	1.25	Permanent	10	NO	NO	Square	Beveled	11,378.17				
<b>Totals</b>				<b>243</b>					<b>276,489.50</b>	<b>53</b>	<b>61</b>	<b>-172</b>	<b>233</b>

Pier 2A (Land)	OD	Wall Thickness	Structural Perm Or Perm Casing	Length (ft) Including Drive Ring	BTM Drive Ring W/ Teeth Attach On 7" Centers	Oscillator Ring Attached onTop	Top of Casing Detail	BTM Casing Detail	Casing Weight (lbs)	Drill Pad EL	Top of Casing EL	BTM Casing EL	Casing LF Including Drive Ring
Piece 1	12.234	1.5	Perm Structural	47	2" Thick x 36" tall (Grade 50)	NO	Square	Drive Ring w/ Teeth	109,510.65				
Piece 2	12.234	1.5	Perm Structural	47	NO	NO	Square	Beveled	109,510.65				
Piece 3	12.234	1.5	Perm Structural	47	NO	NO	Square	Beveled	109,510.65				
Piece 4	12.234	1.5	Perm Structural	47	NO	NO	Square	Beveled	109,510.65				
Piece 5	12.234	1.5	Perm Structural	41	NO	NO	Square	Beveled	95,530.56				
Piece 6 (Extra)	12.234	1.5	Perm Structural	10	NO	NO	Square	Beveled	23,300.14				
<b>Totals</b>				<b>239</b>					<b>556,873.29</b>	<b>46</b>	<b>54</b>	<b>-175</b>	<b>229</b>

Pier 2B (Land)	OD	Wall Thickness	Structural Perm Or Perm Casing	Length (ft) Including Drive Ring	BTM Drive Ring W/ Teeth Attach On 7" Centers	Oscillator Ring Attached onTop	Top of Casing Detail	BTM Casing Detail	Casing Weight (lbs)	Drill Pad EL	Top of Casing EL	BTM Casing EL	Casing LF Including Drive Ring
Piece 1	12.234	1.5	Perm Structural	47	2" Thick x 36" tall (Grade 50)	NO	Square	Drive Ring w/ Teeth	109,510.65				
Piece 2	12.234	1.5	Perm Structural	47	NO	NO	Square	Beveled	109,510.65				
Piece 3	12.234	1.5	Perm Structural	47	NO	NO	Square	Beveled	109,510.65				
Piece 4	12.234	1.5	Perm Structural	47	NO	NO	Square	Beveled	109,510.65				
Piece 5	12.234	1.5	Perm Structural	46	NO	NO	Square	Beveled	107,180.63				
Piece 6 (Extra)	12.234	1.5	Perm Structural	10	NO	NO	Square	Beveled	23,300.14				
<b>Totals</b>				<b>244</b>					<b>568,523.36</b>	<b>46</b>	<b>54</b>	<b>-180</b>	<b>234</b>

Pier 3A (Trestle)	OD	Wall Thickness	Structural Perm Or Perm Casing	Length (ft) Including Drive Ring	BTM Drive Ring W/ Teeth Attach On 7" Centers	Oscillator Ring Attached onTop	Top of Casing Detail	BTM Casing Detail	Casing Weight (lbs)	Drill Pad EL	Top of Casing EL	BTM Casing EL	Casing LF Including Drive Ring
Piece 1	12.234	1.5	Perm Structural	44	2" Thick x 36" tall (Grade 50)	NO	Square	Drive Ring w/ Teeth	102,520.61				
Piece 2	12.234	1.5	Perm Structural	39	NO	NO	Square	Beveled	90,870.54				
Piece 3	12.234	1.5	Perm Structural	39	NO	NO	Square	Beveled	90,870.54				
Piece 4	12.234	1.5	Perm Structural	39	NO	NO	Square	Beveled	90,870.54				
Piece 5	12.234	1.5	Perm Structural	39	NO	YES	Osc Ring	Beveled	90,870.54				
Piece 6 (Extra)	12.234	1.5	Perm Structural	10	NO	NO	Square	Beveled	23,300.14				
<b>Totals</b>				<b>210</b>					<b>489,302.89</b>	<b>30</b>	<b>25</b>	<b>-175</b>	<b>200</b>

Pier 3B (Trestle)	OD	Wall Thickness	Structural Perm Or Perm Casing	Length (ft) Including Drive Ring	BTM Drive Ring W/ Teeth Attach On 7" Centers	Oscillator Ring Attached onTop	Top of Casing Detail	BTM Casing Detail	Casing Weight (lbs)	Drill Pad EL	Top of Casing EL	BTM Casing EL	Casing LF Including Drive Ring
Piece 1	12.234	1.625	Permanent	44	2" Thick x 36" tall (Grade 50)	NO	Square	Drive Ring w/ Teeth	110,968.45				
Piece 2	12.234	1.625	Perm Structural	40	NO	NO	Square	Beveled	100,880.41				
Piece 3	12.234	1.625	Perm Structural	39	NO	NO	Square	Beveled	98,358.40				
Piece 4	12.234	1.625	Perm Structural	39	NO	NO	Square	Beveled	98,358.40				
Piece 5	12.234	1.625	Perm Structural	39	NO	YES	Osc Ring	Beveled	98,358.40				
Piece 6 (Extra)	12.234	1.625	Perm Structural	10	NO	NO	Square	Beveled	25,220.10				
<b>Totals</b>				<b>211</b>					<b>532,144.15</b>	<b>30</b>	<b>25</b>	<b>-176</b>	<b>201</b>



# Abernethy Bridge



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Pier 4B (Trestle)	OD	Wall Thickness	Structural Perm Or		Length (ft) Including Drive Ring	BTM Drive Ring W/ Teeth Attach On 7" Centers		Oscillator Ring Attached onTop	Top of Casing Detail	BTM Casing Detail	Casing Weight (lbs)	Drill Pad EL	Top of Casing EL	BTM Casing EL	Casing LF Including Drive Ring
			Perm	Casing		W/ Teeth Attach On 7" Centers	Oscillator Ring Attached onTop								
Piece 1	12.234	1.5	Perm	Structural	50	2" Thick x 36" tall (Grade 50)		NO	Square	Drive Ring w/ Teeth	116,500.69				
Piece 2	12.234	1.5	Perm	Structural	50	NO		NO	Square	Beveled	116,500.69				
Piece 3	12.234	1.5	Perm	Structural	50	NO		NO	Square	Beveled	116,500.69				
Piece 4	12.234	1.5	Perm	Structural	48	NO		YES	Osc Ring	Beveled	111,840.66				
Piece 5 (Extra)	12.234	1.5	Perm	Structural	10	NO		NO	Square	Beveled	23,300.14				
<b>Totals</b>					<b>208</b>						<b>484,642.87</b>	<b>30</b>	<b>25</b>	<b>-173</b>	<b>198</b>

Pier 5A (Trestle)	OD	Wall Thickness	Structural Perm Or		Length (ft) Including Drive Ring	BTM Drive Ring W/ Teeth Attach On 7" Centers		Oscillator Ring Attached onTop	Top of Casing Detail	BTM Casing Detail	Casing Weight (lbs)	Drill Pad EL	Top of Casing EL	BTM Casing EL	Casing LF Including Drive Ring
			Perm	Casing		W/ Teeth Attach On 7" Centers	Oscillator Ring Attached onTop								
Piece 1	12.234	1.5	Permanent		50	2" Thick x 36" tall (Grade 50)		NO	Square	Drive Ring w/ Teeth	116,500.69				
Piece 2	12.234	1.5	Permanent		45	NO		NO	Square	Beveled	104,850.62				
Piece 3	12.234	1.5	Permanent		42	NO		NO	Square	Beveled	97,860.58				
Piece 4	12.234	1.5	Permanent		40	NO		YES	Osc Ring	Beveled	93,200.55				
<b>Totals</b>					<b>177</b>						<b>412,412.44</b>	<b>30</b>	<b>25</b>	<b>-152</b>	<b>177</b>

Pier 5B (Trestle)	OD	Wall Thickness	Structural Perm Or		Length (ft) Including Drive Ring	BTM Drive Ring W/ Teeth Attach On 7" Centers		Oscillator Ring Attached onTop	Top of Casing Detail	BTM Casing Detail	Casing Weight (lbs)	Drill Pad EL	Top of Casing EL	BTM Casing EL	Casing LF Including Drive Ring
			Perm	Casing		W/ Teeth Attach On 7" Centers	Oscillator Ring Attached onTop								
Piece 1	12.234	1.5	Permanent		50	2" Thick x 36" tall (Grade 50)		NO	Square	Drive Ring w/ Teeth	116,500.69				
Piece 2	12.234	1.5	Permanent		50	NO		NO	Square	Beveled	116,500.69				
Piece 3	12.234	1.5	Permanent		45	NO		NO	Square	Beveled	104,850.62				
Piece 4	12.234	1.5	Permanent		41	NO		YES	Osc Ring	Beveled	95,530.56				
<b>Totals</b>					<b>186</b>						<b>433,382.56</b>	<b>30</b>	<b>25</b>	<b>-161</b>	<b>186</b>

Pier 6A (Trestle)	OD	Wall Thickness	Structural Perm Or		Length (ft) Including Drive Ring	BTM Drive Ring W/ Teeth Attach On 7" Centers		Oscillator Ring Attached onTop	Top of Casing Detail	BTM Casing Detail	Casing Weight (lbs)	Drill Pad EL	Top of Casing EL	BTM Casing EL	Casing LF Including Drive Ring
			Perm	Casing		W/ Teeth Attach On 7" Centers	Oscillator Ring Attached onTop								
Piece 1	12.234	1.5	Permanent		38.5	2" Thick x 36" tall (Grade 50)		NO	Square	Drive Ring w/ Teeth	89,705.53				
<b>Totals</b>					<b>38.5</b>						<b>89,705.53</b>	<b>30</b>	<b>25</b>	<b>-13.5</b>	<b>38.5</b>

Pier 6B (Trestle)	OD	Wall Thickness	Structural Perm Or		Length (ft) Including Drive Ring	BTM Drive Ring W/ Teeth Attach On 7" Centers		Oscillator Ring Attached onTop	Top of Casing Detail	BTM Casing Detail	Casing Weight (lbs)	Drill Pad EL	Top of Casing EL	BTM Casing EL	Casing LF Including Drive Ring
			Perm	Casing		W/ Teeth Attach On 7" Centers	Oscillator Ring Attached onTop								
Piece 1	12.234	1.5	Permanent		38.5	2" Thick x 36" tall (Grade 50)		NO	Square	Drive Ring w/ Teeth	89,705.53				
<b>Totals</b>					<b>38.5</b>						<b>89,705.53</b>	<b>30</b>	<b>25</b>	<b>-13.5</b>	<b>38.5</b>



# Abernethy Bridge



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EQUIPMENT

OBSTACLES TO  
OVERCOME

PICTURES



# Abernethy Bridge



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## REBAR CAGES



Largest cage was 11' OD x 260'  
long and weighed almost 300K

Piers 10-13 were set in one piece

Piers 3-7 were set in two pieces  
and spliced vertically over the  
shaft

Piers 1-2 were set in three pieces  
and spliced vertically over the  
shaft

# Abernethy Bridge





# Abernethy Bridge



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## OBSTACLES TO OVERCOME

1. Working Over Water
2. Working Near Existing Structures
3. Getting Equip From Shaft to Shaft on Barges
4. Shaft Obstructions

# Abernethy Bridge

## Pier 5B Platform/Barges



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# Abernethy Bridge

## Pier 5B Platform/Barge Work



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# Abernethy Bridge

## Pier 5A Trestle Work



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# Abernethy Bridge

## Pier 5A Trestle Work



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# Abernethy Bridge

ADSC



# Abernethy Bridge

Moving Equip From Barge to Trestle & Platforms



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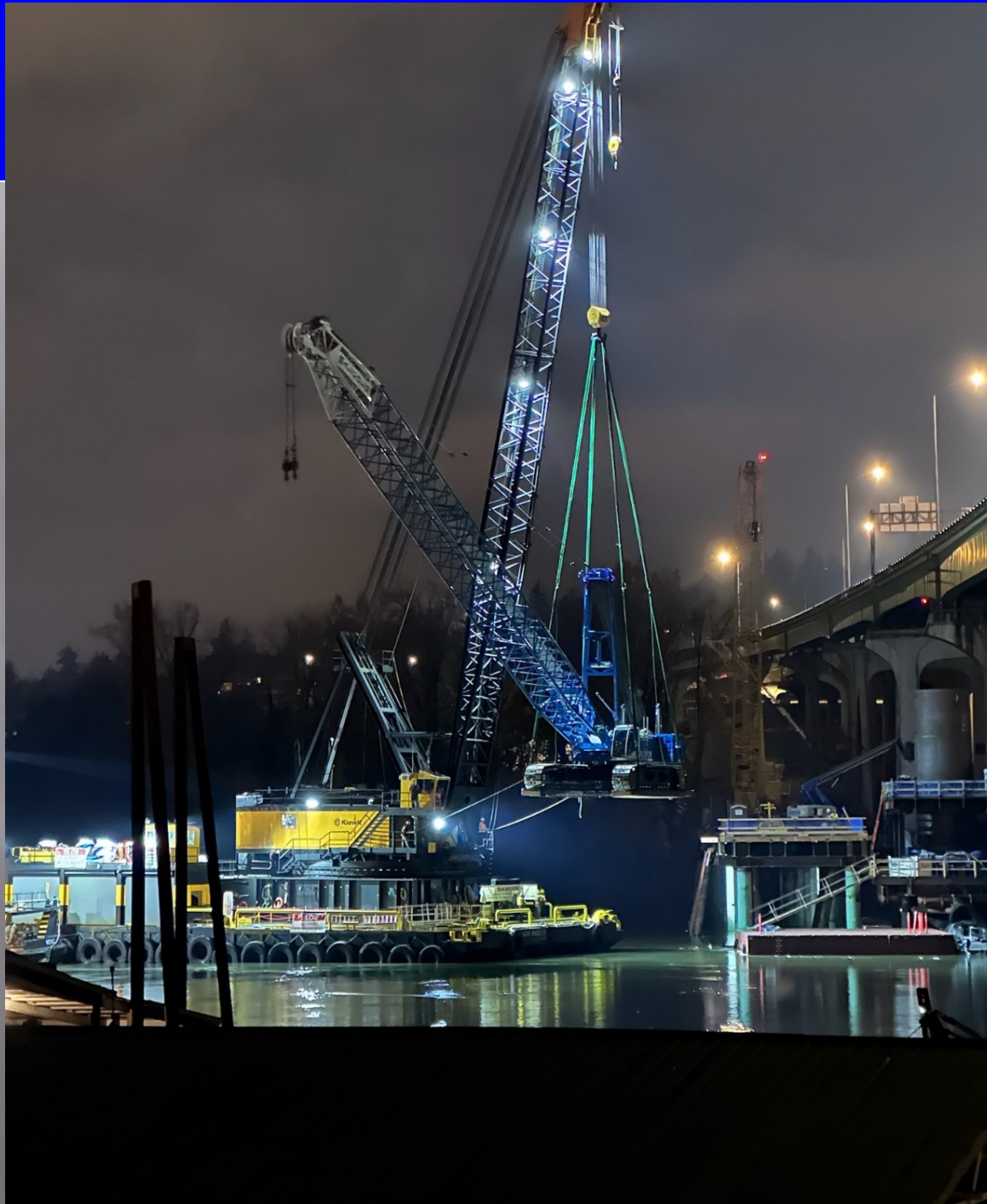
EQUIPMENT

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# Moving Equip From Barge to Trestle & Platforms



# Abernethy Bridge

## Moving Equip From Barge to Trestle & Platforms

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# Abernethy Bridge

## Moving Equip From Barge to Trestle & Platforms

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# Abernethy Bridge



Moving Equip From Barge to Trestle & Platforms



**Working Near Existing Structures**



# Abernethy Bridge

## Working Near Existing Structures



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**Working Near Existing Structures**

# Working Near Existing Structures





**Working Near Existing Structures**

# Abernethy Bridge

Working Inside Cofferdam at Pier 3A



# Abernethy Bridge

Working Inside Cofferdam at Pier 3A











**Steel Pile Obstruction Pier 1B  
Encountered at 180' BGS**

# Steel Pile Obstruction Pier 2A Encountered at 200' BGS



# Abernethy Bridge



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## VIDEOS

<https://www.youtube.com/watch?v=QH1wwLxGrls>

<https://www.youtube.com/watch?v=AXhXwE5CabI>

# Abernethy Bridge



**OVERVIEW**

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**QUESTIONS?**