

2-DIST  
05

B.I.N.  
45K

**UNDERWATER OPERATIONS TEAM**  
**ROUTINE UNDERWATER INSPECTION REPORT**

BR. DEPT. NO.  
W-06-016

CITY/TOWN <b>WAREHAM</b>		8-STRUCTURE NO. <b>W06016-45K-DOT-NBI</b>		LEVEL OF INSPECTION <b>II</b>	93B-DATE INSPECTED <b>MAY 16, 2023</b>
07-FACILITY CARRIED <b>US 6 MARION RD</b>		ACCESS TO BRIDGE <b>EMBANKMENT</b>		UNDERWATER OPERATIONS ENGINEER <b>WILLIAM J. COLLERAN</b>	
06-FEATURES INTERSECTED <b>WATER WEWEANTIC RIVER</b>		DEPTH <b>10 m</b>	VISIBILITY <b>0.3 m</b>	TEAM LEADER (DIVE MASTER) <b>WILLIAM FERRY</b>	Report submitted by:
BOTTOM CONDITION <b>GRAVEL &amp; BOULDERS</b>		CURRENT <b>TIDAL/SWIFT</b>	TEAM MEMBERS <b>W. J. COLLERAN, J. A. MANKOWSKY, Z. GIKAS</b>		

<b>ITEM 60</b>		<b>4</b>	<b>DEF</b>
<b>SUBSTRUCTURE</b>			
<b>1. Abutments</b>	<b>N</b>		
a. Pedestals	N	-	
b. Bridge Seats	N	-	
c. Backwalls	N	-	
d. Breastwalls	N	-	
e. Wingwalls	N	-	
f. Slope Paving/Rip-Rap	N	-	
g. Pointing	N	-	
h. Footings	N	-	
i. Piles	N	-	
j. Scour	N	-	
k. Settlement	N	-	
l.	N	-	
<b>2. Piers or Bents</b>	<b>4</b>		
a. Pedestals	N	-	
b. Caps	N	-	
c. Columns	N	-	
d. Stems/Webs/Pierwalls	5	M-P	
e. Pointing	5	M-P	
f. Footing	5	M-P	
g. Piles	H	-	
h. Scour	4	S-P	
i. Settlement	5	M-P	
j.	N	-	
k.	N	-	
<b>3. Pile Bents</b>	<b>N</b>		
a. Pile Caps	N	-	
b. Piles	N	-	
c. Diagonal Bracing	N	-	
d. Horizontal Bracing	N	-	
e. Fasteners	N	-	
<b>UNDERMINING (Y/N)</b>		<b>Y</b>	

<b>ITEM 61</b>		<b>4</b>	<b>DEF</b>
<b>CHANNEL &amp; CHANNEL PROTECTION</b>			
1. Channel Scour	4	S-P	
2. Embankment Erosion	7	-	
3. Debris	7	-	
4. Vegetation	7	-	
5. Utilities	N	-	
6. Rip-Rap/Slope Protection	6	-	
7. Aggradation	7	-	
8. Fender System	N	-	
a. Piles	N	-	
b. Diagonal Bracing	N	-	
c. Horizontal Bracing	N	-	
d. Wales	N	-	
e. Fasteners	N	-	
f. Ladders	N	-	
9.	N	-	

<b>ITEM 59</b>		<b>DEF</b>
<b>SUPERSTRUCTURE</b>		
	N	-
	N	-
	N	-

<b>ITEM 62</b>		<b>N</b>	<b>DEF</b>
<b>CULVERTS</b>			
1. Roof	N	-	
2. Floor	N	-	
3. Walls	N	-	
4. Headwall	N	-	
5. Wingwall	N	-	
6. Pipe	N	-	
7. Protective Coating	N	-	
8. Embankment	N	-	
9. Wearing Surface	N	-	
10. Railing	N	-	
11. Sidewalks	N	-	
12. Utilities	N	-	
13. Member Alignment	N	-	
14. Deformation	N	-	
15. Scour	N	-	
16. Settlement	N	-	
17.	N	-	
18.	N	-	
<b>UNDERMINING (Y/N)</b>		<b>N</b>	

**DEFICIENCY REPORTING GUIDE**

**DEFICIENCY:** A defect in a structure that requires corrective action.

**CATEGORIES OF DEFICIENCIES:**

**M= Minor** Deficiencies which are minor in nature, generally do not impact the structural integrity of the bridge and could easily be repaired. Examples include but are not limited to: Spalled concrete, Minor scouring, etc.

**S= Severe/ Major Deficiency-** Deficiencies which are more extensive in nature and need more planning and effort to repair. Examples include but are not limited to: Moderate to major deterioration in concrete, Exposed and corroding rebars, Deteriorated timber piles, Considerable settlement, Considerable scouring or undermining, etc.

**C-S= Critical Structural Deficiency-** A deficiency in a structural element of a bridge that poses an extreme unsafe condition due to the failure or imminent failure of the element which will affect the structural integrity of the bridge.

**C-H= Critical Hazard Deficiency-** A deficiency in a component or element of a bridge that poses an extreme hazard or unsafe condition to the public, but does not impair the structural integrity of the bridge. Examples include but are not limited to: Any part of piles or fender system which are projecting outward and may become a safety hazard for the navigational traffic, etc.

**URGENCY OF REPAIR:**

**I=Immediate-** [Inspector(s) immediately contact District Bridge Inspection Engineer (DBIE) to report the Deficiency and to receive further instruction from him/her.]

**A=ASAP-** [Action/Repair should be initiated by District Maintenance Engineer or the responsible party (if not a State owned bridge) upon receipt of the Inspection Report.]

**P=Prioritize-** [Shall be prioritized by District Maintenance Engineer or the Responsible Party (if not a State owned bridge) and repairs made when funds and/or manpower is available.]

**Y=UNKNOWN N=NOT APPLICABLE H=HIDDEN/INACCESSIBLE R=REMOVED**

CITY/TOWN <b>WAREHAM</b>	B.I.N. <b>45K</b>	BR. DEPT. NO. <b>W-06-016</b>	8.-STRUCTURE NO. <b>W06016-45K-DOT-NBI</b>	INSPECTION DATE <b>MAY 16, 2023</b>
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## REMARKS

### GENERAL REMARKS

This structure is a three span bridge dated 1956. When the bridge was widened new piers were added at the downstream ends of the existing piers. The two sections of pier have a common concrete pier cap. See attached sketch on Page 7.

Both abutments are in the dry at low tide and were not inspected for this report.

- 1) Orientation - Abutments and piers are labeled left and right when facing downstream.
- 2) Sta 10+00 is at the upstream face of the new section of the pier. See sketch on Page 6.

**Note:** Tides are approximately 1/2 hour after tides at Marion, Sippican Harbor. Bridge is best inspected at slack tide.

### ITEM 60 - SUBSTRUCTURE

#### Item 60.2 - Piers or Bents

##### Item 60.2.d - Stems/Webs/Pierwalls

Pierwalls are concrete with granite blocks in the tidal zone.

The length of the piers from the nose to the angle points is approximately 4'.

##### Left Pier:

There are random cracked blocks in the upper tidal zone.

##### **Right Side**

The old pier has minor concrete deterioration just above the footing. The maximum height of deterioration is 0.7' and the maximum penetration is 1.5'. The deterioration is into concrete laitance.

##### Right Pier:

There are random cracked blocks in the upper tidal zone.

The old pier has minor concrete deterioration with laitance at the bottom of the concrete pierwall, just above the tremie.

At the upstream nose on the left side a block in the second course has settled down 0.1' and displaced out 0.4'. The block below this block in the third course has settled down 0.1' and displaced out 0.3'. There is a void in the deteriorated concrete behind these blocks measuring 3.0' long, 1.5' high and 3.0' penetration.

##### **Right Side**

There is deterioration at the mudline from the upstream nose to the angle point and continuing downstream an additional 5' from the angle point. The maximum height is 1.0' and the maximum penetration is 0.4'.

There are remnants of timber formwork against the right face of the old section of the pier.

##### **Left Side**

There is deterioration just above the footing 13' downstream of the upstream angle point measuring 3.0' long, 0.6' high and 0.6' penetration.

There is deterioration at the mudline from the upstream nose to the angle point and continuing downstream an additional 1' from the angle point. The maximum height is 1.1' and the maximum penetration is 0.7'.

#### Item 60.2.e - Pointing

##### Left Pier:

There is minor pointing loss in the tidal zone but the joints are generally tight. Maximum joint penetration in the right side is 1.5', the left side is 2.9', and a full-width penetration at the upstream nose.

##### Right Pier:

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## REMARKS

There is minor pointing loss in the tidal zone but the joints are generally tight. Maximum joint penetration in the right side is 2.6', the left side is 2.0' and there is 3.0' joint penetration at the upstream and downstream noses in the old pier.

### **Item 60.2.f - Footing**

#### **Left Pier:**

#### **Right Side - Undermining**

There is undermining at the downstream end of the right face of the old section of the pier and continuing into the new section. For measuring purposes Sta 10+00 is at the upstream face of the new section of the pier (See Sketch). The undermining extends 3' downstream of Sta 10+00 where it meets steel sheeting. The undermining extends 12' upstream of Sta 10+00 where it is covered by boulders. The penetration from Sta 10+10 to 10+12 is behind boulders. The maximum height of the undermining is 1.4' and the maximum penetration is 8.0'. The total width of the footing is approximately 9' (penetration extends beyond the footing approximately 1.2'). Penetration into soil had been up to 13.6' during previous inspections. See Undermining Monitoring Chart on Page 8. This undermining may have been caused by a washout of concrete laitance in addition to a scouring out of bottom materials.

#### **Left Side**

The left face of the old section of the pier has steel sheeting intermittently exposed 2.0' to 2.6' off the pier with a maximum height of exposure of 4.0'.

There is steel sheeting which is cut off at the top of the footing at the new section of pier. The maximum exposed height along the downstream nose is 16.0'. Plans show sheeting height of approximately 20' in this area.

#### **Right Pier:**

The sheeting at the new section of the pier is cut off at the top of the footing. The exposed height of sheeting along the downstream nose is 15.5'. Plans show sheeting height of approximately 16' in this area.

#### **Right Side**

At the bottom of pierwall and in top of footing there is deterioration at the mudline in the old pier from the downstream nose to 10' upstream of the downstream angle point measuring 14.0' long, 1.2' high and 1.5' penetration.

#### **Left Side**

There is deterioration at the mudline from the downstream angle point to the downstream nose of the old pier measuring 4.0' long, 0.6' high and 0.7' penetration. This deterioration does not penetrate under the pierwall.

### **Item 60.2.g - Piles**

According to 1929 plans piers (Old section of piers) are pile supported.

According to 1956 plans pier extensions (New section of piers) are pile supported.

### **Item 60.2.h - Scour**

#### **Left Pier:**

#### **Right Side - Undermining**

There is undermining at the downstream end of the right face of the old section of the pier and continuing into the new section. For measuring purposes Sta 10+00 is at the upstream face of the new section of the pier (See Sketch). The undermining extends 3' downstream of Sta 10+00 where it meets steel sheeting. The undermining extends 12' upstream of Sta 10+00 where it is covered by boulders. The penetration from Sta 10+10 to 10+12 is behind boulders. The maximum height of the undermining is 1.4' and the maximum penetration is 8.0'. The total width of the footing is approximately 9' (penetration extends beyond the footing approximately 1.2'). Penetration into soil had been up to 13.6' during previous inspections. See

CITY/TOWN <b>WAREHAM</b>	B.I.N. <b>45K</b>	BR. DEPT. NO. <b>W-06-016</b>	8.-STRUCTURE NO. <b>W06016-45K-DOT-NBI</b>	INSPECTION DATE <b>MAY 16, 2023</b>
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## REMARKS

Undermining Monitoring Chart on Page 8. This undermining may have been caused by a washout of concrete laitance in addition to a scouring out of bottom materials.

### **Left Side**

The left face of the old section of the pier has steel sheeting intermittently exposed 2.0' to 2.6' off the pier with a maximum height of exposure of 4.0'.

There is steel sheeting which is cut off at the top of the footing at the new section of pier. The maximum exposed height along the downstream nose is 16.0'. Plans show sheeting height of approximately 20' in this area.

### **Right Pier:**

The sheeting at the new section of the pier is cut off at the top of the footing. The exposed height of sheeting along the downstream nose is 15.5'. Plans show sheeting height of approximately 16' in this area.

### **Right Side**

At the bottom of pierwall and in top of footing there is deterioration at the mudline in the old pier from the downstream nose to 10' upstream of the downstream angle point measuring 14.0' long, 1.2' high and 1.5' penetration.

### **Left Side**

There is deterioration at the mudline from the downstream angle point to the downstream nose of the old pier measuring 4.0' long, 0.6' high and 0.7' penetration. This deterioration does not penetrate under the pierwall.

### **Item 60.2.i - Settlement**

#### **Left Pier:**

There are random cracked blocks in the upper tidal zone.

#### **Right Pier:**

There are random cracked blocks in the upper tidal zone.

At the upstream nose on the left side a block in the second course has settled down 0.1' and displaced out 0.4'. The block below this block in the third course has settled down 0.1' and displaced out 0.3'. There is a void in the deteriorated concrete behind these blocks measuring 3.0' long, 1.5' high and 3.0' penetration.

### **ITEM 61 - CHANNEL AND CHANNEL PROTECTION**

#### **Item 61.1 - Channel Scour**

##### **Left Pier:**

##### **Right Side - Undermining**

There is undermining at the downstream end of the right face of the old section of the pier and continuing into the new section. For measuring purposes Sta 10+00 is at the upstream face of the new section of the pier (See Sketch). The undermining extends 3' downstream of Sta 10+00 where it meets steel sheeting. The undermining extends 12' upstream of Sta 10+00 where it is covered by boulders. The penetration from Sta 10+10 to 10+12 is behind boulders. The maximum height of the undermining is 1.4' and the maximum penetration is 8.0'. The total width of the footing is approximately 9' (penetration extends beyond the footing approximately 1.2'). Penetration into soil had been up to 13.6' during previous inspections. See Undermining Monitoring Chart on Page 8. This undermining may have been caused by a washout of concrete laitance in addition to a scouring out of bottom materials.

##### **Left Side**

The left face of the old section of the pier has steel sheeting intermittently exposed 2.0' to 2.6' off the pier with a maximum height of exposure of 4.0'.

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## REMARKS

There is steel sheeting which is cut off at the top of the footing at the new section of pier. The maximum exposed height along the downstream nose is 16.0'. Plans show sheeting height of approximately 20' in this area.

### **Right Pier:**

The sheeting at the new section of the pier is cut off at the top of the footing. The exposed height of sheeting along the downstream nose is 15.5'. Plans show sheeting height of approximately 16' in this area.

### **Right Side**

At the bottom of pierwall and in top of footing there is deterioration at the mudline in the old pier from the downstream nose to 10' upstream of the downstream angle point measuring 14.0' long, 1.2' high and 1.5' penetration.

### **Left Side**

There is deterioration at the mudline from the downstream angle point to the downstream nose of the old pier measuring 4.0' long, 0.6' high and 0.7' penetration. This deterioration does not penetrate under the pierwall.

### **Item 61.6 - Rip-Rap/Slope Protection**

#### **Right Abutment:**

Riprap at the right abutment is slumped at the downstream end.

#### **Left Pier:**

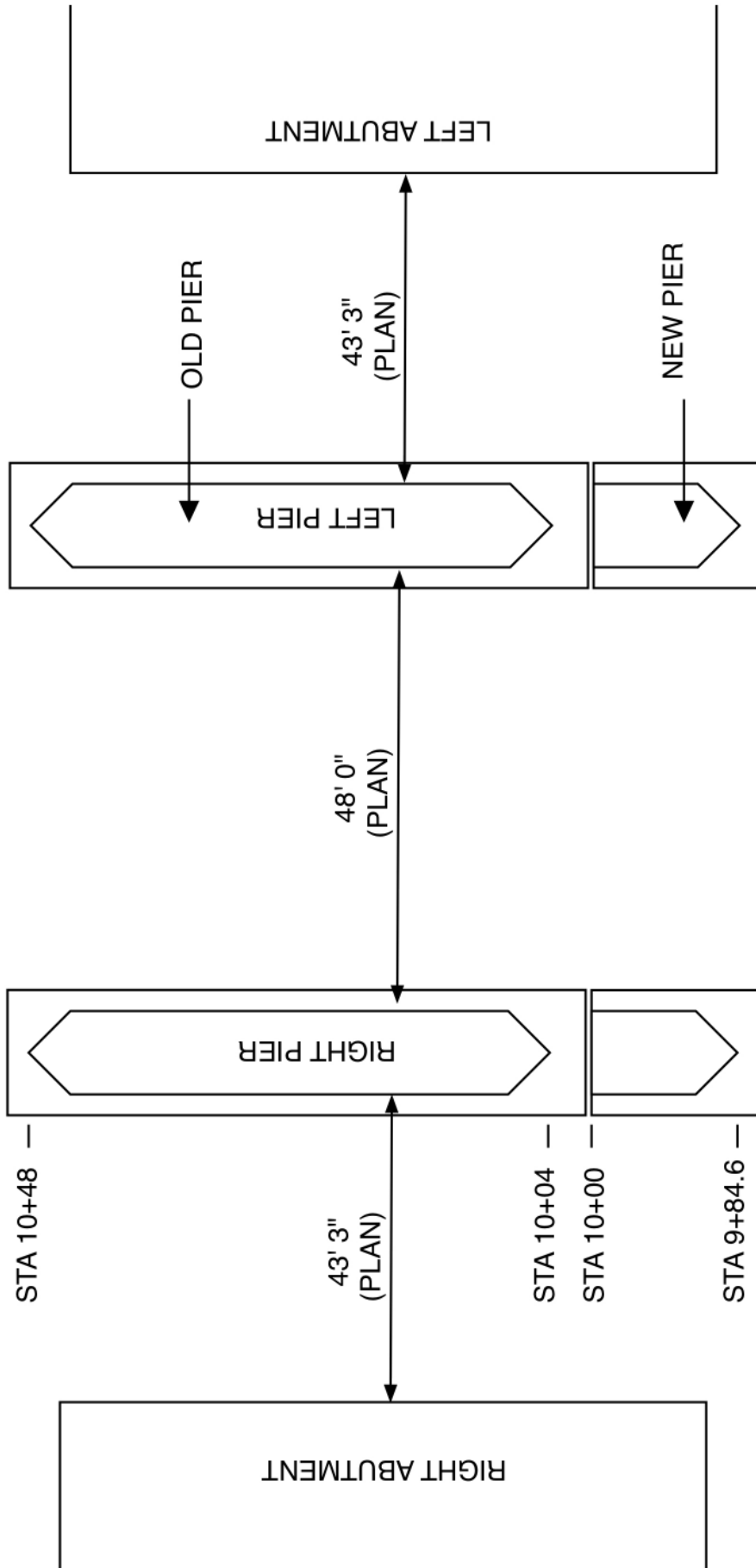
There are boulders across the upstream nose extending down along the right side to the undermining at the mudline.

### **Sketch / Chart Log**

Sketch 1 : PLAN VIEW - NOT TO SCALE  
 Sketch 2 : LEFT PIER PLAN VIEW & RIGHT SIDE ELEVATION VIEW - NOT TO SCALE  
 Chart 1 : UNDERMINING CHART - RIGHT SIDE OF LEFT PIER  
 Chart 2 : ELEMENT LEVEL CHART

TY/TOWN	B.I.N.	BR. DEPT. NO.	8-STRUCTURE NO.	INSPECTION DATE
AREHAM	45K	W-06-016	W06016-45K-DOT-NBI	MAY 16, 2023

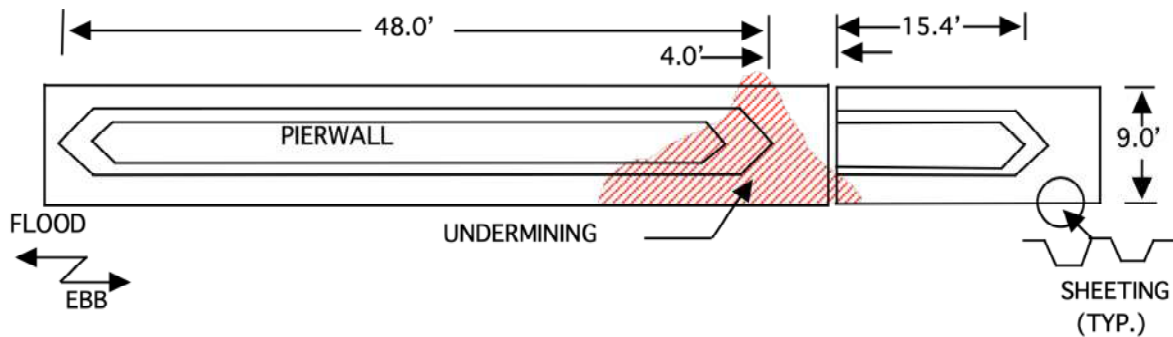
**SKETCHES**



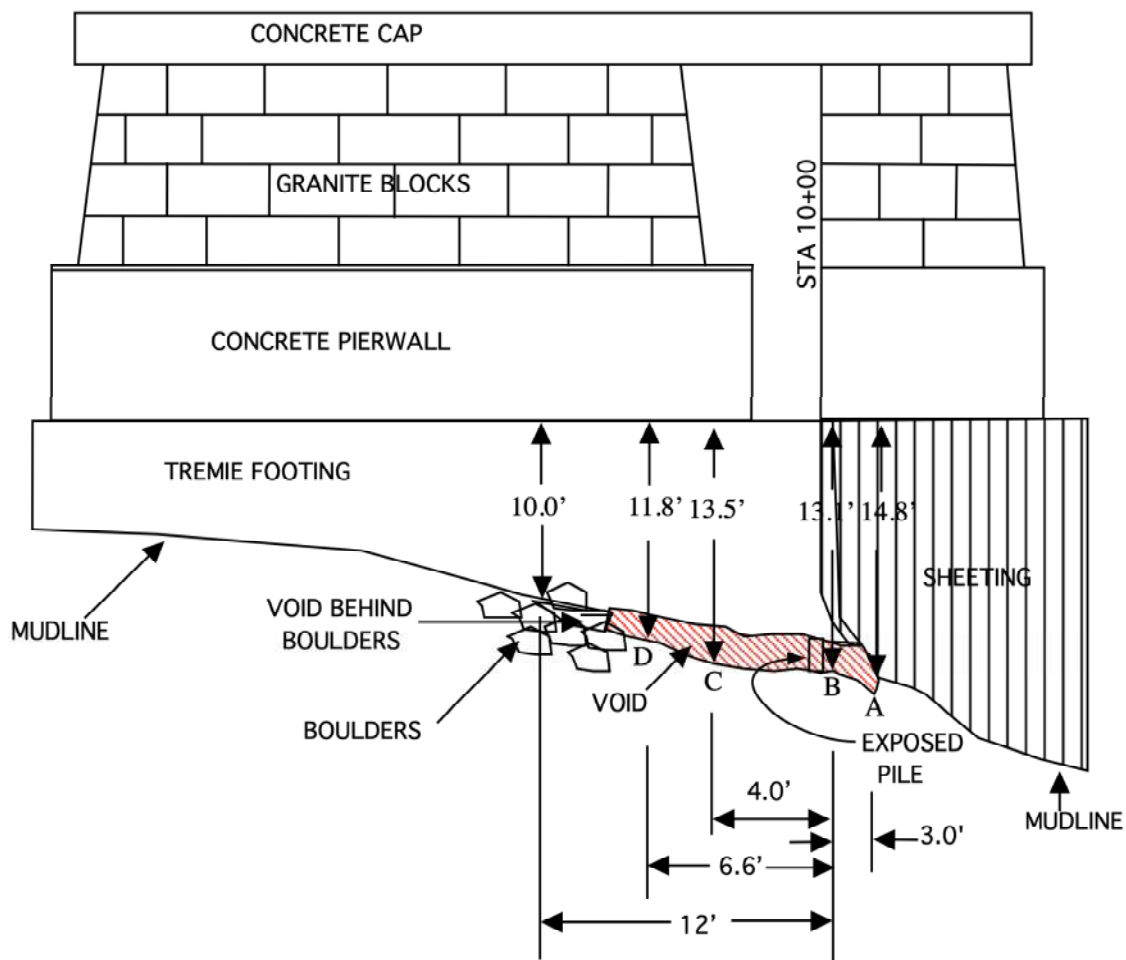
Sketch 1: PLAN VIEW - NOT TO SCALE

CITY/TOWN <b>WAREHAM</b>	B.I.N. <b>45K</b>	BR. DEPT. NO. <b>W-06-016</b>	8.-STRUCTURE NO. <b>W06016-45K-DOT-NBI</b>	INSPECTION DATE <b>MAY 16, 2023</b>
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**SKETCHES**



**LEFT PIER - PLAN VIEW**



**LEFT PIER - RIGHT ELEVATION**

**NOTES:**

1. HEIGHTS TO MUDLINE FROM TOP OF TREMIE AND STARTING POINT OF UNDERMINING SHOWN ON ELEVATION VIEW ARE FROM INSPECTION DATED 11/12/99.
2. SEE UNDERMINING CHART FOR CURRENT UNDERMINING MEASUREMENTS.

**Sketch 2: LEFT PIER PLAN VIEW & RIGHT SIDE ELEVATION VIEW - NOT TO SCALE**

TY/TOWN	B.I.N.	BR. DEPT. NO.	8-STRUCTURE NO.	INSPECTION DATE
AREHAM	45K	W-06-016	W06016-45K-DOT-NBI	MAY 16, 2023

**CHARTS**

	11/12/99	11/31/02	10/22/03	11/2/04	12/8/05	11/9/06	11/29/07	12/16/08	12/11/09	1/10/11	12/6/11	12/11/12
<b>HEIGHT</b>												
'A' - 3.0' DS OF STA 10+00	0.7'	0.7'	0.7'	0.7'	1.0'	1.0'	0.7'	0.7'	0.8'	0.8'	0.8'	1.2'
'B' - STA 10+00	1.3'	1.3'	1.5'	1.5'	1.5'	1.0'	1.2'	1.2'	1.1'	1.1'	1.1'	1.1'
'C' - 4.0' US OF STA 10+00	0.7'	1.0'	1.3'	1.3'	0.8'	0.8'	0.7'	0.7'	0.8'	0.6'	0.6'	0.9'
'D' - 6.6' US OF STA 10+00	0.7'	0.7'	0.7'	0.7'	0.7'	0.7'	1.0'	1.0'	0.4'	0.5'	0.5'	0.4'
<b>PENETRATION</b>												
'A' - 3.0' DS OF STA 10+00	2.3'	2.8'	8.0*	1.8'	2.0'	2.0'	2.2'	2.2'	2.3'	2.9'	3.8'	3.9'
'B' - STA 10+00	2.0'	2.0'	4.1*	1.6'	2.0'	11.0'	11.8'	11.8'	11.1'	10.9'	13.6'	12.7'
'C' - 4.0' US OF STA 10+00	6.6'	7.0'	7.8*	12.3'	6.5'	6.5'	7.0'	7.6'	9.3'	6.7'	7.0'	6.2'
'D' - 6.6' US OF STA 10+00	3.3'	4.7'	5.9*	2.6*	1.6'	5.0'	8.2'	5.2'	4.9'	5.0'	5.3'	7.0'
<b>HEIGHT</b>												
'A' - 3.0' DS OF STA 10+00	1.2'	1.2'	1.2'	0.9'	0.9'	0.9'	0.9'	0.9'	0.9'	1.2'	1.2'	1.2'
'B' - STA 10+00	1.1'	1.1'	1.3'	1.3'	1.3'	1.3'	1.3'	1.3'	1.2'	1.2'	1.2'	1.2'
'C' - 4.0' US OF STA 10+00	0.9'	0.9'	0.9'	1.6'	1.3'	1.4'	1.4'	1.4'	1.4'	1.4'	1.4'	1.4'
'D' - 6.6' US OF STA 10+00	0.4'	0.4'	0.4'	0.5'	0.7'	0.7'	0.5'	0.5'	0.9'	1.0'	1.0'	1.0'
<b>PENETRATION</b>												
'A' - 3.0' DS OF STA 10+00	2.9'	4'+	5.8'	6.0'	5.8'	6.0'	3.6'	7.3'	7.3'	7.0'	7.0'	7.0'
'B' - STA 10+00	9.0'	6.5**	9.0**	7.1'	8.4'	8.1'	5.1'	5.4'	7.8'	7.0'	7.0'	7.0'
'C' - 4.0' US OF STA 10+00	5.3'	6.2'	6.6'	12.0*	8.3'	7.9'	8.7'	8.7'	10.2'	8.0'	8.0'	8.0'
'D' - 6.6' US OF STA 10+00	6.1'	6.0'	6.2'	7.8'	10.2'	9.5'	7.8'	9.0'	6.0'	6.0'	6.0'	6.0'

\* PENETRATION TAKEN THROUGH SOFT MATERIAL.  
 SEE LEFT PIER RIGHT SIDE ELEVATION VIEW ON PAGE 7 FOR LOCATIONS OF A, B, C & D.

Chart 1: UNDERMINING CHART - RIGHT SIDE OF LEFT PIER

CITY/TOWN <b>WAREHAM</b>	B.I.N. <b>45K</b>	BR. DEPT. NO. <b>W-06-016</b>	8.-STRUCTURE NO. <b>W06016-45K-DOT-NBI</b>	INSPECTION DATE <b>MAY 16, 2023</b>
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**CHARTS**

**National Bridge Element Inspection**  
**UNDERWATER OPERATIONS MASSDOT**

<u>Bridge Number</u>	W-06-016	<u>Month</u>	<u>Day</u>	<u>Year</u>
		MAY	16	2023
<u>BIN</u>	45K	<u>Town</u> WAREHAM		
<u>Structure Number</u>	W06016 45K DOT NBI	<u>District</u> 5		
<u>Inspectors</u>	FERRY	COLLERAN, MANKOWSKY, GIKAS		
	<i>Leader</i>	<i>Member(s)</i>		

Element #	Element Name	Units	Env-iron.	Total Quantity	Q or %	Condition States (Quantity or Percent) *			
						1	2	3	4
211	OTHER PIERWALLS	LF	3	127	Q		57	70	
1080	DELAMINATION/SPALL	LF	3	124	Q		57	67	
4000	SETTLEMENT	LF	3	3	Q			3	
220	CONCRETE FOOTING	LF	3	150	Q		100	35	15
1080	DELAMINATION/SPALL	LF	3	14	Q		14		
6000	SCOUR	LF	3	136	Q		86	35	15

\* It is okay to switch between Quantity and Percent for different Elements.

**Chart 2: ELEMENT LEVEL CHART**