Terracon
Consulting Engineers & Scientists

OHIO DEPARTMENT OF TRANSPORTATION

UNDERWATER BRIDGE INSPECTION REPORT

SFN:	**3102491**	**c36 Pier Walls:**	**2**	**Bridge Number:**	**HAM-50-02.080**
Substructure:	**3**	**c42 Scour:**	**3**	**Inspection Date:**	**07/17/2020**
Channel:	**3**	**c51 Alignment:**	**3**	**Division:**	**District 8**
		c53 Hydraulic Opening:	**2**	**River:**	**Whitewater River**

Program Manager:	**Steve Mary, P.E.**	Weather:	**Sunny**
Project Manager:	**Jason Sander, P.E.**	Air Temperature:	**93° (F)**
Team Leader:	**Adam Wolf**	Water Temperature:	**79° (F)**
Team Members:	**Cassandra Brendel, Zach Harrison (Diver)**		

Route:	**Route 50**
Inventory Direction:	**West to East**
County:	**Hamilton**
Location:	**N39°9'59.98", W84°47'16.12"**
Bridge Length:	**455'**
Superstructure Type:	**Steel Girder**
Substructure Type:	**CIP Concrete Piers**
Foundation Type:	**Steel Piling**
Total Substructure Units:	**4**
Substructure Units in Water:	**2**
Water Depth:	**17'**
Water Velocity:	**<.5 FPS**
Underwater Visibility:	**1.5'**

Summary of Scour and Channel Conditions:

The channel has shifted to the east since initial construction, and the main channel is directed at the east abutment. A scour pocket has developed toward the downstream end of the east abutment between the abutment face and ¼ span. The approximate dimensions are 30' long x 15' wide x 17' deep. Heavy buildup of tree debris has collected in the scour area and along the downstream face of the east abutment.

Summary of Substructure Conditions:

The east abutment at the abandoned traction bridge is undermined. The vertical height of the undermined area was up to 18" and penetration of approximately 7'. Deep foundation wood piles were exposed. Due to buildup of tree debris in the water around the exposure area, we could not determine the number of piles or the full extent of the undermined area below the east abutment of the traction bridge.

Repair Recommendation:

Remove tree debris on east abutment and determine the extent of the undermining. Implement scour countermeasures.

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Structure ID #: **HAM-50-02.080, Route 50 over the Whitewater River** Date: **07/17/2020**
County: **Hamilton** State: **Ohio**
Description: **West Abutment and Pier 1**

1. Not inspected; out of water

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Structure ID #: **HAM-50-02.080, Route 50 over the Whitewater River** Date: **07/17/2020**
County: **Hamilton** State: **Ohio**
Description: **Pier 2**

1. Only the upstream nose of the pier was in the water at the time of the inspection.
3. No foundation or footing exposure.
4. The bottom substrate around the base of pier consists of silty sand, gravel, cobbles and boulders.
5. Hammer soundings of the concrete were performed. No areas of unsound concrete (delamination's, voids, etc.) were noted.
6. No significant defects were observed to be present below the waterline.
7. Minor scaling in the typical splash zone area.
8. Isolated to the upstream nose; construction joint has spalling of the edges and a gap of up to 1".
9. The west face of the abandoned traction bridge pier has a vertical crack 7' from the rear nose. The crack is approximately 1/8" wide max and is from the mudline up 6.5' to the first construction joint (see photo log page 10). No evidence of the crack on the east face.
10. The west face of the abandoned traction bridge pier has several various spalls approximately 0' to 3' above the mudline line. The spalls are approximately 5" diameter and up to 1" deep.
11. The west face approximately 15' from the upstream nose and 1' above the mudline. One spall 5" diameter 1" diameter.
12. The east face approximately 4' from the upstream nose and 3' above the mudline. One spall 1.6' wide x 1' tall x ¼" deep.

See attached drawings, sketches and photographs of the areas to better visualize the conditions at the time of the assessment.

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Structure ID #: **HAM-50-02.080, Route 50 over the Whitewater River** Date: **07/17/2020**
County: **Hamilton** State: **Ohio**
Description: **East Abutment**

1. Light marine growth (algae). Approximately 10% of the substructure unit was cleaned below the water line.
2. Visibility approximately 1.5'.
3. No foundation or footing exposure of the newer portion of the abutment. Undermining of the abandoned traction bridge abutment was found with wood pile exposure. Due to heavy build-up of tree debris in the water, the diver could not determine the number of exposed piles or the full extent of the undermined area.
4. The bottom substrate around the base of the abutment consists of silty sand, gravel, cobbles and an occasional boulder.
5. Hammer soundings of the concrete were performed on the structure; no areas of unsound concrete (delamination's, voids, etc.) were noted.
6. No significant defects were observed to be present below the waterline.
7. Approximately 15' from the upstream corner of the abutment a full height vertical hairline crack (max 1/16" wide) was observed from the mudline to the top of the abutment (see photo log).
8. Approximately 20' from the upstream corner of the abutment a 4' wide x 3' tall spall was observed out of the water.
9. Heavy tree debris accumulation as well as old wood pile and a 4x12 timber wall found in front and along the abandoned traction bridge abutment.
10. The sheet pile wall found at the nose of the abandoned traction bridge abutment is heavily corroded within the splash zone.

See attached drawings, sketches and photographs of the areas to better visualize the conditions at the time of the assessment.

Structure ID #: **HAM-50-02.080, Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **Bridge Structure, Looking Upstream**

Photos
TERRACON

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Structure ID #: **HAM-50-02.08,0 Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **Bridge Structure, Looking Downstream**

Photos
TERRACON

Terracon
Consulting Engineers & Scientists

Structure ID #: **HAM-50-02.080, Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **East Face of Pier 2**

Photos
TERRACON

Terracon
Consulting Engineers & Scientists

Structure ID #: **HAM-50-02.080, Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **West Face of Pier 2**

Photos
TERRACON

Terracon
Consulting Engineers & Scientists

Structure ID #: **HAM-50-02.080, Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **East Face of Pier 2**

Photos
TERRACON

Terracon
Consulting Engineers & Scientists

Structure ID #: **HAM-50-02.080, Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **East Abutment**

Photos
TERRACON

Terracon
Consulting Engineers & Scientists

Structure ID #: **HAM-50-02.080, Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **East Abutment Spall**

Photos
TERRACON

Terracon
Consulting Engineers & Scientists

Structure ID #: **HAM-50-02.080, Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **Below Bridge, View Upstream**

Photos
TERRACON

Terracon
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Structure ID #: **HAM-50-02.080, Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **Below Bridge, View Downstream**

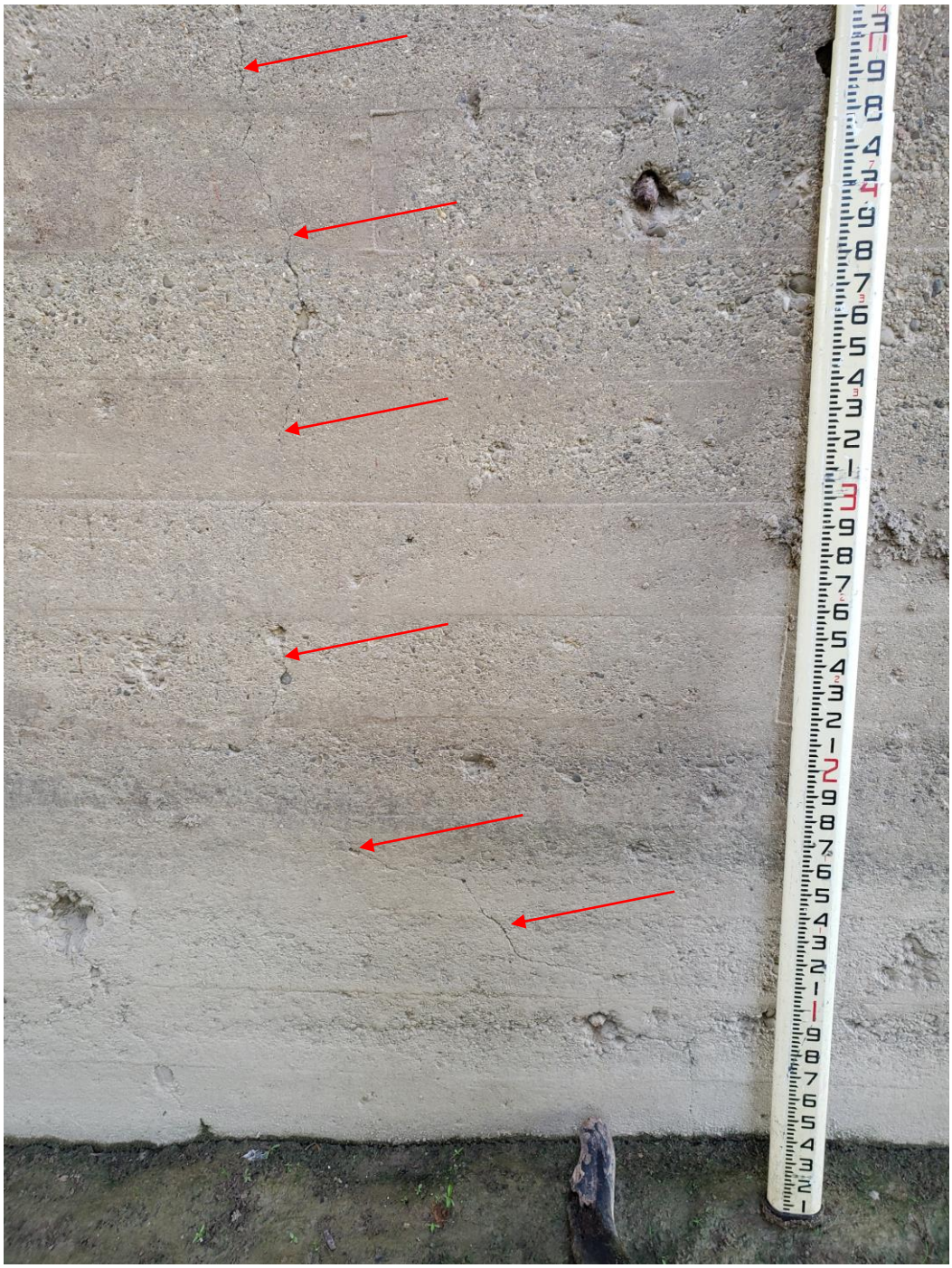
Photos
TERRACON

Terracon
Consulting Engineers & Scientists

Structure ID #: **HAM-50-02.080, Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **Crack, West Face of Pier 2 Traction Bridge (no sign of crack on east face)**



Photos
TERRACON

Terracon
Consulting Engineers & Scientists

Structure ID #: **HAM-50-02.080, Route 50 over Whitewater River** Date: **07/17/2020**

County: **Hamilton** State: **Ohio**

Description: **Full Height Hairline Crack, East Abutment (max 1/16” wide)**

Photos
TERRACON

N

℄ Proposed Channel Change

NOTE:- See Sheets 136 to 139 for channel excavation cross sections. Channel excavation included with Roadway Quantities for payment.

West Abutment

End Appr. Slab Sta. 53+87.96
End Appr. Pav't. Sta. 54+02.96
Face of Abut. Sta. 54+05.96

PIER 1

℄ Pier Sta. 55+55.22

℄ Bridge & Chord

150'-9" % Brgs. (on chord)

153'-6" % Brgs. (on chord)

℄ Br. Sta. 56+31.98

68°22' with Hangnail @ 56+31.98 ℄ Survey

℄ Gdr.

Curb to curb

Substructure for abandoned traction bridge - Superstructure has been removed.

Existing C.C.C. & ST. L. R.R. Bridge

℄ of Truss

+31.98 (Low Gutter)

Old Conc. Abutment & Wing Walls removed

FLOW WHITE WATER RIVER

℄ Proposed Channel

℄ 2.25% Grade Excavation Limit

New Channel

PIER 2

℄ Gdr.

End Appr. Pav't. Sta. 58+61.00
Face of Abut. Sta. 58+58.00

℄ Pier Sta. 57+08.73

150'-9" % Brgs. (on chord)

Water Edge

Jetty

WHITE WATER RIVER

Steel Sheet Piling

EAST ABUTMENT

Existing Wood Piles

End Appr.

HEAVY TREE DEBRIS ALONG ABUTMENT

17' DEEP SCOUR POCKET

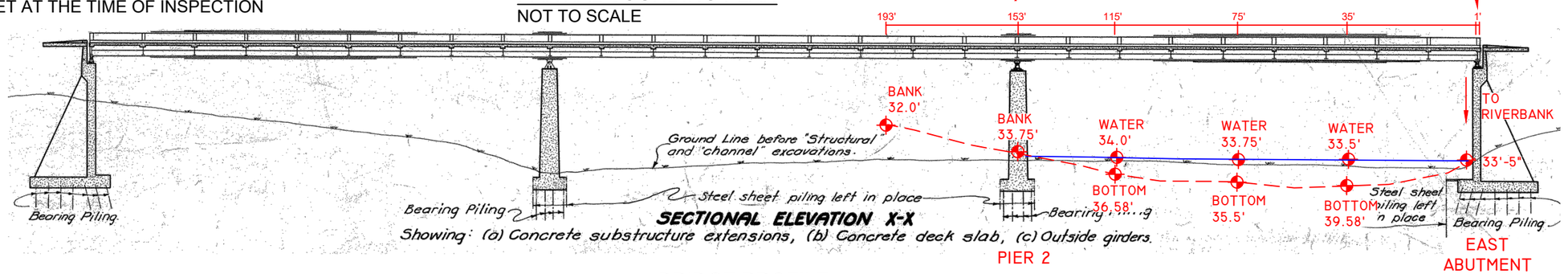
MEASUREMENTS TAKEN FROM TOP OF CRASH WALL: EAST ABUTMENT EXPANSION JOINT, UPSTREAM SIDE

PARTIAL SOUNDING PLAN
NOT TO SCALE

LEGEND:

6.3' INDICATES WATER DEPTH IN FEET AT THE TIME OF INSPECTION

* WATER ELEVATION REFERENCE POINT TAKEN FROM BOTTOM FLANGE OF STEEL GIRDER @ UPSTREAM CORNER OF EAST ABUTMENT 23.6' = EL 462.73'



SECTIONAL ELEVATION X-X
Showing: (a) Concrete substructure extensions, (b) Concrete deck slab, (c) Outside girders.

BRIDGE PROFILE
NOT TO SCALE

REV.	DATE	BY	DESCRIPTION

Terracon
Consulting Engineers and Scientists
611 LUNKEN PARK DRIVE CINCINNATI, OHIO 45226
PH. (513) 321-5816 FAX. (513) 321-4540

CROSS-SECTIONAL DEPTH PLAN (PARTIAL)

BRIDGE NO. HAM-50-02.80

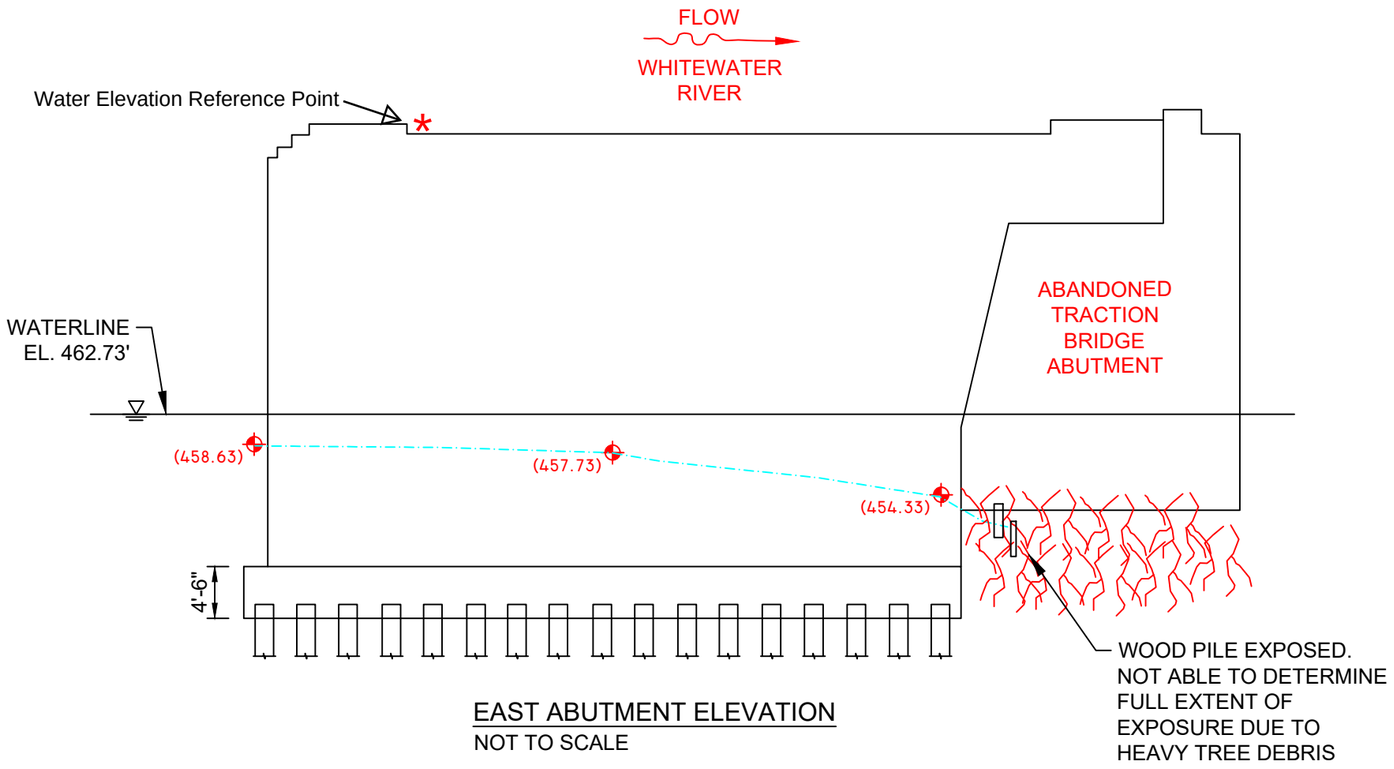
OHIO DEPARTMENT OF TRANSPORTATION-DISTRICT 8

EXISTING C.C.C. & ST. L. R.R. BRIDGE OVER WHITE WATER RIVER
HAMILTON COUNTY, OHIO

EXHIBIT 1

DESIGNED BY:	AAW
DRAWN BY:	KM
APPVD. BY:	JS
SCALE:	NOT TO SCALE
DATE:	08/13/2020
JOB NO.	N1191158
ACAD NO.	BR INS.DWG
SHEET NO.:	1

Date: 8/16/2020 7:10 AM File Path: C:\DRAWINGS\1191158\BR INS 2020.DWG



EAST ABUTMENT ELEVATION
NOT TO SCALE

LEGEND:

6.3' INDICATES WATER DEPTH IN FEET AT THE TIME OF INSPECTION

TREE DEBRIS

WATER ELEVATION REFERENCE POINT

GENERAL NOTES:
AT THE TIME OF INSPECTION THE WATERLINE WAS LOCATED APPROXIMATELY 23.6' FEET BELOW THE BOTTOM FLANGE OF THE STEEL GIRDER AT THE UPSTREAM CORNER OF THE EAST ABUTMENT. THIS CORRESPONDS TO A WATERLINE ELEVATION OF 462.73'

REV.	DATE	BY	DESCRIPTION

Terracon
Consulting Engineers and Scientists
611 LUNKEN PARK DRIVE CINCINNATI, OHIO 45226
PH. (513) 321-5816 FAX. (513) 321-4540

PIER ELEVATIONS

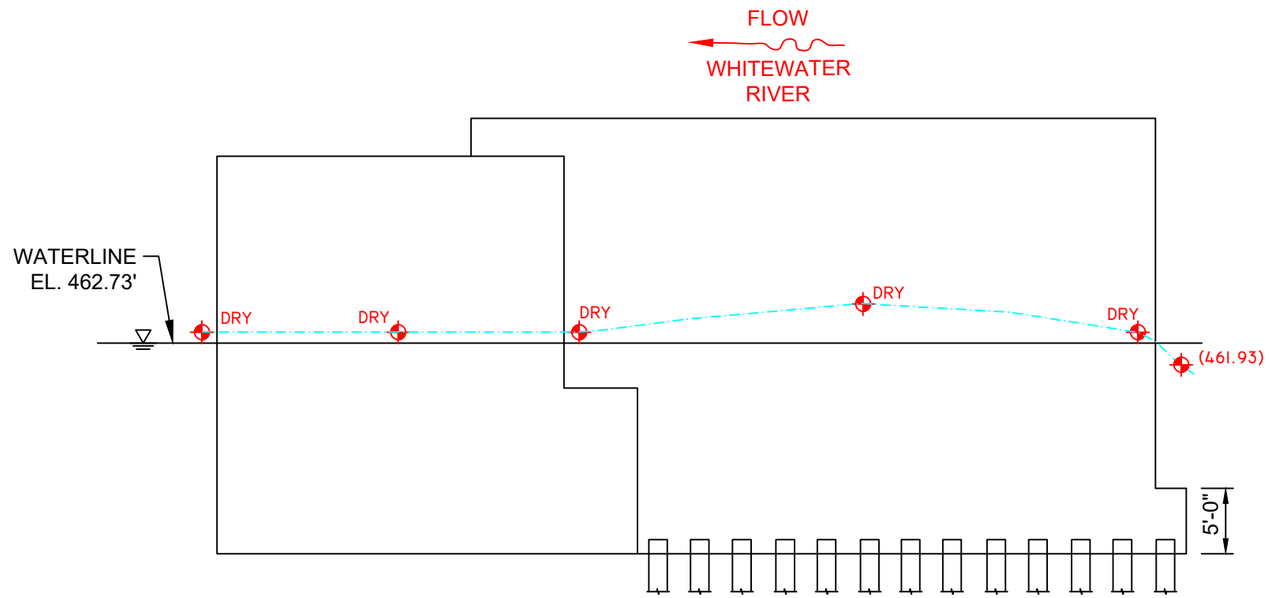
BRIDGE NO. HAM-50-02.80

OHIO DEPARTMENT OF TRANSPORTATION-DISTRICT 8

EXISTING C.C.C. & ST. L. R.R. BRIDGE OVER WHITE WATER RIVER
HAMILTON COUNTY, OHIO

EXHIBIT 2

DESIGNED BY:	AAW
DRAWN BY:	KM
APPVD. BY:	JS
SCALE:	NOT TO SCALE
DATE:	08/13/2020
JOB NO.	N1191158
ACAD NO.	BR INS.DWG
SHEET NO.:	1



PIER 2 ELEVATION
NOT TO SCALE

LEGEND:

6.3' INDICATES WATER DEPTH IN FEET AT THE TIME OF INSPECTION

TREE DEBRIS

GENERAL NOTES:
AT THE TIME OF INSPECTION THE WATERLINE WAS LOCATED APPROXIMATELY 23.6' FEET BELOW THE BOTTOM FLANGE OF THE STEEL GIRDER AT THE UPSTREAM CORNER OF THE EAST ABUTMENT. THIS CORRESPONDS TO A WATERLINE ELEVATION OF 462.73'

REV.	DATE	BY	DESCRIPTION

Terracon
Consulting Engineers and Scientists
611 LUNKEN PARK DRIVE CINCINNATI, OHIO 45226
PH. (513) 321-5816 FAX. (513) 321-4540

PIER ELEVATIONS

BRIDGE NO. HAM-50-02.08
OHIO DEPARTMENT OF TRANSPORTATION-DISTRICT 8
EXISTING C.C.C. & ST. L. R.R. BRIDGE OVER WHITE WATER RIVER
HAMILTON COUNTY, OHIO

EXHIBIT 2

DESIGNED BY:	AAW
DRAWN BY:	KM
APPVD. BY:	JS
SCALE:	NOT TO SCALE
DATE:	08/13/2020
JOB NO.	N1191158
ACAD NO.	BR INS.DWG
SHEET NO.:	2

Underwater Inspection Procedure Checklist

Acceptable written procedures communicate to the next field inspection team leader what is necessary to ensure a safe and successful inspection. Each bridge requiring underwater diving techniques must have written inspection procedures specific to each bridge which address items unique to that bridge. The prior inspection report condition ratings and inspection comments, by themselves, do not suffice for the required procedures. It is valuable to review these items but they do not serve the same purpose as the inspection procedures. The inspection report records what an inspector actually did, what was looked at, and what was found. Procedures lay out what should be done, looked at, etc. Often consultant underwater reports will include a paragraph or section in the written report that communicates the underwater inspection procedures. This will often suffice as adequate inspection procedures and fulfill the intent of the FHWA requirement. This checklist is a framework and should be completed for all underwater diving inspections when inspection procedures do not exist.

I. Bridge Identification

a. Agency with Inspection Responsibility: **Terracon Consultants, Inc.**

Dive Frequency: _____**60**_____ months

SFN: **3102491** Bridge Number (County-Route-SLM-SD): **HAM-50-02.080**

Superstructure Type Main Span Type: **STEEL GIRDER**

Approach Span: **NA**

Substructure Type Abutment Type: **REINFORCED CONCRETE**

Pier Type: **REINFORCED CONCRETE**

Total Pier Count: **2**

Total Pier Count in water: **1**

Foundations: **H-STEEL PILE**

Feature Intersected: **Whitewater River**

b. Photographs – Photographs are shown in the underwater inspection report for this structure.

End view

Elevation

Underside

II. Office and Field Assessment

Prior to the inspection, obtain and review copies of the previous underwater inspection reports, routine inspection reports and design plans in preparation of the inspection. Divers should pay particular attention given to any observed areas of deterioration, the channel conditions and factors that may accelerate material deterioration. Changes shall be noted in the inspection procedure. Site conditions should be reviewed prior to diving.

a. Channel Conditions

___	Waterway features
NO	Rapid stream flows,
NO	Significant debris accumulation
NO	Constricted waterway openings
YES	Soft or unstable streambeds
YES	Meandering channels
YES	Other (which may promote scour and undermining of substructure elements) -**DEBRIS**
NO	Navigable Waterway
NO	Flow Controls

b. Anticipated Water conditions which may affect the inspection

NO	Cold Water (Approx. Temp___)
NO	Black water - limited
YES	Rapid stream flows
NA	Near military facility
NA	Tribal fishing
OK	Water quality
NO	History of Log jams

c. Identify factors that may accelerate the deterioration of the bridge elements:

NO	Highly corrosive water
NO	Unprotected steel members
NO	Other

Risk Factor Narrative:

Refer to report.

III. **Contacts Prior to Work**

(TO BE COMPLETED BY THE BRIDGE OWNER)

Point of contact for immediate action such as closing the bridge due to findings)

Contact Bridge Owner ___ (number) days before the proposed underwater inspection.

Special contracting and scheduling procedures prior to inspection, include recommended lead time

Entity	Contact Name and Title	Contact Phone	Lead Time
Coast Guard	NA	NA	NA
Property Owner	NA	NA	NA
Access Equipment	BOAT	TERRACON OWNED	NA
Lake or River draw-down	NA	NA	NA
Canal dry time	NA	NA	NA
Tree removal	NA	NA	NA
Other:			
Other:			

IV. **Dive Team Shall Include the Following:**

Dive Team Narrative:

Refer to report.

Example: The Bridge shall be investigated using a three-member dive team: one supervisor to monitor rack box and take notes, one diver, and one tender/standby diver. There shall be one NBIS Team Leader onsite at all times.

V. Site Information

Navigable waterway:	**NO**	Anticipated current	**1 ft**
If Yes, (waterway river point)	**NA**	Scour Critical (item 113):	**NO**
Anticipated water visibility depth	**1.5 ft**	POA in place:	**NO**
Anticipated Dive depth	**>10 ft**	Scour Monitoring devices present:	**NO**

Verify the Scope of Services when work is contracted for the procedure for underwater elements that are not in water during an inspection. **NA**
Site Information Narrative: **NA**

Refer to report.

The underwater inspection consists of a visual and tactile examination of the accessible surfaces of the substructure items in water. Additional items should reference the scope of services in the contract. For reference the following items are in water: (FILL in number only if in water…IF NONE, put 0)

Item	Number of Units	Level of Inspection (1, 2 or 3) with Commentary
Piers and Number of Columns	1	Refer to report, as applicable
Abutment	1	Refer to report, as applicable
Culvert	0	Refer to report, as applicable
Scour Countermeasures	0	Refer to report, as applicable
Fenders or Dolphins	0	Refer to report, as applicable

Photographs should be taken, if water clarity permits, for typical conditions, conditions that have changed since last inspection and significant or noteworthy deficiencies. The type of channel bottom material, the presence or extent of scour, the presence or extent of riprap, the presence or extent of drift and debris, and the location of any foundation exposure or undermining shall be quantified. Include depth, length, height and location of deficiencies.

VI. **Equipment and Field Logistics**

a. The inspection should be conducted using:

NA Chest waders

NA Hip waders

YES Diving equipment

NA SCUBA (Note that ADCI Consensus Standards require communication systems be employed for both SCUBA and Surface-Supplied (whether air or mixed-gas) dive modes)

YES SCUBA with communication

NA Surface Supplied with communication

b. The channel bottom should be sounded utilizing

X Digital fathometer

_X___ Telescoping survey rod

_X___ acoustic imaging

c. During the inspection, the divers should work from

_X_ Boat

_X_ Shore

____ Either

The note taker should work alongside the dive team.

d. Access to the waterway should be obtained from the shore (north bank, southwest quadrant, driveway 30 yards north etc.)

No Boat

e. The maximum depth of the channel is typically measured_____ feet from

_____

_____

Reference Datum_____

Soundings should be dictated by the scope of work. When not detailed in the scope they should be repeated from the previous soundings. If neither exist, then they need to be taken in a grid pattern between substructure units 100' upstream and 100' downstream.

VII. Other Narrative Not Included In Previous Sections

Refer to report.

STATE OF OHIO
BRIDGE INSPECTION FIELD REPORT

SFN 1306146 | Bridge Number HAM-50-02.080 | Year Built 1941

DIST 08 | Feature Intersect WHITEWATER RIVER | Municipality

APPROACH ITEMS

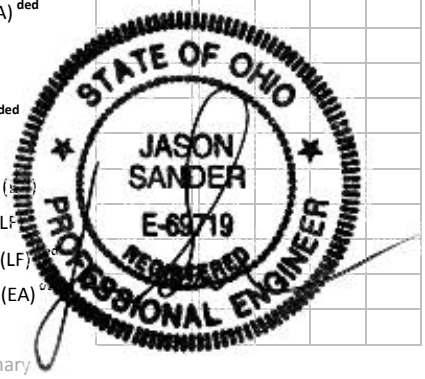
		Qty.	condition state 1	2	3	4	cr TR
c1.	Wearing Surface (EA)						
c2.	Slab (SF)						
c3.	Relief Joint (LF)						
c4.	Embankment (EA) ded						
c5.	Guardrail (EA)						
N36.	Safety Features: Tr, Gr, Tm						
c6.	Approach Summary						

DECK ITEMS

		Qty.	condition state 1	2	3	4	cr TR
c7.1	Floor/Slab (SF)						
c7.2	Edge of Floor/Slab (LF)						
c8.	Wearing Surface (SF)						
c9.	Curbs/Sidewalk (LF)						
c10.	Median (LF)						
c11.	Railing (LF)						
N36.	Safety Features: Rail						
c12.	Drainage (EA) ded						
c13.	Expansion Joint (LF) ded						
N58.	Deck Summary						

SUPERSTRUCTURE ITEMS

		Qty.	condition state 1	2	3	4	cr TR
c14.	Alignment (EA) ded						
c15.1	Beams/Girders (LF)						
c15.2	Slab (SF)						
c16.	Diaphragm/X-Frames (EA)						
c17.	Stringers (LF)						
c18.	Floorbeams (LF)						
c19.	Truss Verticals (EA)						
c20.	Truss Diagonals (EA)						
c21.	Truss Upper Chord (EA)						
c22.	Truss Lower Chord (EA)						
c23.	Truss Gusset Plate (EA) ded						
c24.	Lateral Bracing (EA)						
c25.	Sway Bracing (EA)						
c26.	Bearing Devices (EA) ded						
c27.	Arch (LF)						
c28.	Arch Column/Hanger (EA)						
c29.	Arch Spandrel Walls (LF)						
c30.	Prot. Coating System (LF)						
c31.	Pins/Hangers/Hinges (EA)						
c32.	Fatigue (LF) ded						
N59.	Superstructure Summary						



SUBSTRUCTURE ITEMS

		Qty.	condition state 1	2	3	4	cr TR
c33.	Abutment Walls (LF)	75	70	5			2
c34.	Abutment Caps (LF)						
c35.	Abut. Colmns/Bents (EA)						
c36.	Pier Walls (LF)	54	54				1
c37.	Pier Caps (LF)						
c38.	Pier Columns/Bents (EA)						
c39.	Backwalls (LF)						
c40.	Wingwalls (EA)	1	1				1
c42.	Scour (EA) ded	2	1		1		4
c43.	Slope Protection (EA) ded	1	1				1
N60.	Substructure Summary						3

CULVERT ITEMS

		Qty.	condition state 1	2	3	4	cr TR
c44.	General (LF)						
c45.	Alignment (LF) ded						
c46.	Shape (LF) ded						
c47.	Seams (EA) ded						
c48.	Headwall/Endwall (EA)						
c49.	Scour (EA) ded						
c50.	Abutments (LF)						
N62.	Culvert Summary						

CHANNEL ITEMS

		Qty.	condition state 1	2	3	4	cr TR
c51.	Alignment (LF) ded	200			200		3
c52.	Protection (LF) ded						
c53.	HydraulicOpening (EA) ded	3	3				1
c54.	Navigation Lights (EA) ded						
N61.	Channel Summary						3

SIGN/UTILITY ITEMS

		Qty.	condition state 1	2	3	4	cr TR
c55.	Signs (EA) ded						
c56.	Sign Supports (EA) ded						
c57.	Utilities (LF) ded						
N59, 60 or 62	General Appraisal						
N41.	Operating Status						

Inspector Name ZACH HARRISON

Inspection Date/Type 7/17/2020

Reviewer Name JASON SANDER P.E.

Review Date 7/11/2019

PE Number (Insp or Rev) E69719