UNDERWATER BRIDGE INSPECTION REPORT

STRUCTURE NO. 57501

CSAH NO. 22

OVER THE

RED LAKE RIVER

DISTRICT 2 - PENNINGTON COUNTY

AUGUST 27, 2012

PREPARED FOR THE

MINNESOTA DEPARTMENT OF TRANSPORTATION

BY

AYRES ASSOCIATES & COLLINS ENGINEERS, INC.

JOB NO. 7423

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

REPORT SUMMARY:

The substructure units inspected at Bridge No. 57501, Piers 1 and 2, were found to be in satisfactory to fair condition with undermining of the footing and steel pile exposure at both piers. The concrete at the base of the piers below water was relatively soft with various spalls, cracks, and failed sections. The footing (lower pier shaft step) was exposed and often undermined at both piers with exposed steel H-piles present.

INSPECTION FINDINGS:

(A) No design drawings were provided and it is assumed that the piers consist of a steel H-pile bent encased in concrete. The bottom of the footing has undermining exposing the easternmost steel H-piles at the upstream end of Pier 2 and all piles of Pier 1. The piles had light surface corrosion.

(B) A light to moderate accumulation of timber debris was observed from 1 foot above the waterline to the channel bottom at the upstream end of Piers 1 and 2.

(C) The concrete at the footing has widespread irregularities due to section loss, with three corroded horizontal reinforcing bars exposed at the downstream end of Pier 1, as well as with cracks and areas of soft concrete and section loss at Piers 1 and 2.

RECOMMENDATIONS:

(A) Monitor the undermining and pile exposure during future inspections and if it continues to increase, scour countermeasures may be warranted at that time.

(B) Reinspect the submerged substructure units at the normal maximum recommended (NBIS) interval of sixty (60) months.

Respectfully submitted,

Inspection Team Leader

Ayres Associates, Inc.

Brian K. Schroeder
Registered Professional Engineer
State of Minnesota

PROFESSIONAL ENGINEER
I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.
Daniel G. Stromberg
Date 6/30/14 License # 21491

COLLINS ENGINEERS, INC.

Daniel G. Stromberg
Registered Professional
Engineer, State of Minnesota

MINNESOTA DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

1. BRIDGE DATA

Bridge Number: 57501

Feature Crossed: Red Lake River

Feature Carried: CSAH No. 22

Location: District 2 - Pennington County

Bridge Description: The bridge superstructure consists of three spans of multiple concrete box beams, which are supported by two concrete abutments and two concrete encased H-pile bent piers (assumed from field observations). The piers are numbered 1 and 2 starting from the south end of the bridge.

2. INSPECTION DATA

Professional Engineer Diver: Brian K. Schroeder, P.E.

Dive Team: Jason A. Cook, Anthony J. Coffaro

Date: August 27, 2012

Weather Conditions: Partly Cloudy, 69° F

Underwater Visibility: 4.0 feet

Waterway Velocity: 1.0 ft/sec

3. SUBSTRUCTURE INSPECTION DATA

Substructure Inspected: Piers 1 and 2.

General Shape: Field observations suggest that the piers are steel H-pile bent piers encased in a concrete shaft that steps out in a rectangular fashion (like a footing) at its base.

Maximum Water Depth at Substructure Inspected: Approximately 2.8 feet.

4. WATERLINE DATUM

Water Level Reference: The top of the pier bridge seat on the west side of Pier 1.

Water Surface: The waterline was approximately 12.2 feet below reference.
Assumed Waterline Elevation = 87.8 feet.

5. NBIS CODING INFORMATION (Minnesota specific codes are used for 92B and 113)

Item 60: Substructure: Code 5

Item 61: Channel and Channel Protection: Code 5

Item 92B: Underwater Inspection: Code B/08/12

Item 113: Scour Critical Bridges: Code I/94

Bridge is scour critical because abutment or pier foundation is rated as unstable due to observed scour at bridge site.

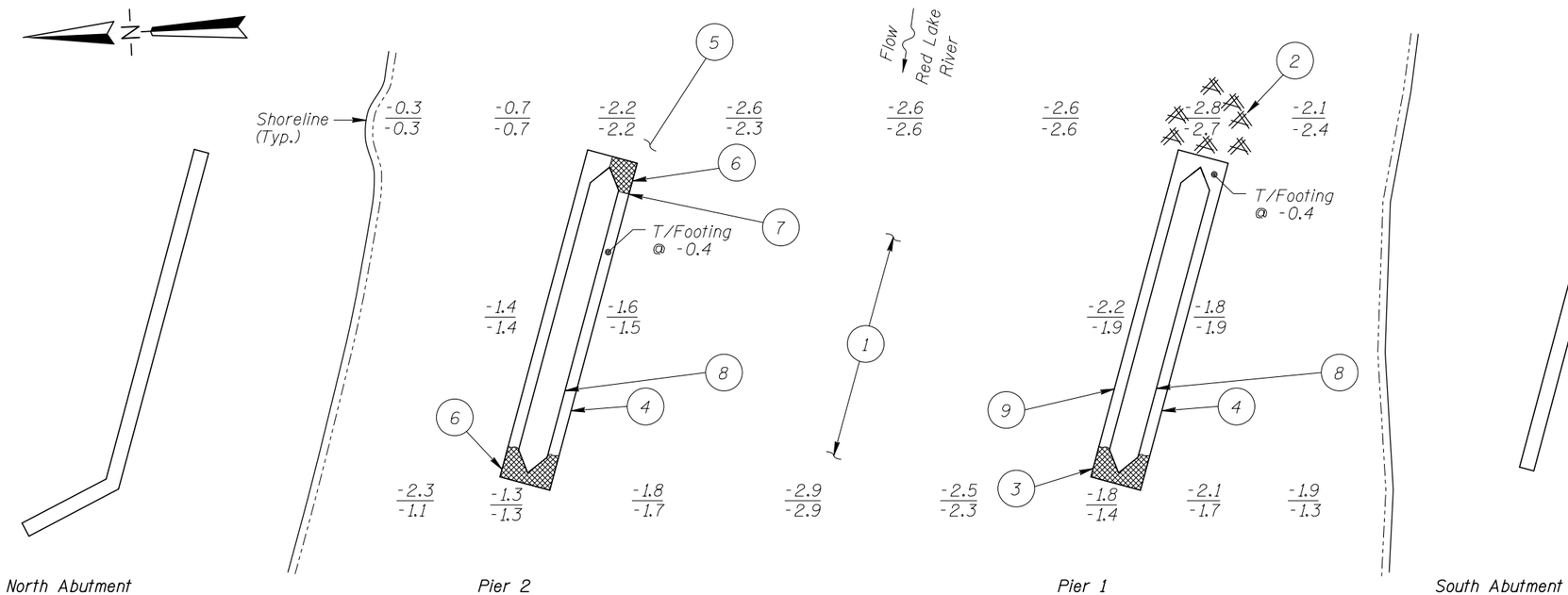
_____ Yes X No

6. STRUCTURAL ELEMENT CONDITION RATING

Item #	Element Description	Quantity	Unit	Conditions				
				1	2	3	4	5
205	Reinforced Concrete Column	2	EA		2			
220	Reinforced Concrete Footing	2	EA			2		
361	Scour	1	EA	1				
985	Slopes and Slope Protection	1	EA	1				

Photograph 1. View of Pier 1, Looking North.

Photograph 2. View of Pier 2, Looking South.



GENERAL NOTES:

1. Piers 1 and 2 were inspected at this bridge.
2. At the time of inspection on August 27, 2012, the waterline was located approximately 12.2 feet below the top of the pile cap at the downstream end of Pier 1. Since insufficient bridge elevation information was available a reference elevation of 100.0 was assumed. Based on the assumed reference, the waterline elevation was 87.8.
3. Soundings indicate the water depth at the time of inspection and are measured in feet.
4. Soundings were taken parallel to the bridge at 1/4 point intervals between the substructure units.

SOUNDING PLAN

INSPECTION NOTES:

(1) The channel bottom material consisted of silty sand and gravel with scattered 6 to 8 inch diameter cobbles and up to 3 inches of probe rod penetration.

(2) A light to moderate accumulation of 6 inch diameter timber debris was observed from 1 foot above the waterline to the channel bottom and 5 feet from the upstream nose of Pier 1.

(3) The bottom portion of the shaft/footing was broken off at the downstream end of Pier 1 exposing three corroded horizontal steel reinforcing bars. The broken piece of the footing was lying on the channel bottom and was approximately 3 feet long (E/W).

(4) The concrete of the bottom portion of the shaft/footing at Piers 1 and 2 was frequently soft on the surface with random irregularities and section losses having up to 5 inches of penetration.

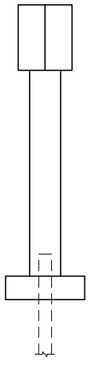
(5) Riprap was observed on the channel bottom measuring 1 to 2 feet in diameter at the upstream nose of Pier 2.

(6) The shaft bottom step of Pier 2 was cracked and detached at the south eastern corner of Pier 2 with an approximate length of 2.5 feet (E/W) and an approximate width of 8 inches (N/S) and also at the downstream end for a length of 3 feet.

(7) The bottom portion (stepout) of the concrete shaft was exposed around the entire shaft of Pier 2 with up to full height (1 foot) vertical exposure from the upstream 1/4 point of the south face, around upstream nose to the upstream 1/4 point on the north face. Undermining was observed in the location of full height vertical exposure with a maximum of 0.4 foot height at the upstream nose. The eastern most steel H-Pile was exposed in the area of undermining with light surface corrosion.

(8) The concrete of the pier cap and shaft for Pier 1 and 2 was typically smooth and sound with random minor areas of poor consolidation with 1/4 inch maximum penetration and with minor vertical hairline to 1/16 inch wide cracks extending the full height of the pier.

(9) The bottom portion (stepout) of concrete shaft was exposed around the entire shaft of Pier 1 with up to full height (1 foot) vertical exposure around the entire pier. Undermining was observed in the location of full height vertical exposure with a maximum of 0.8 feet height at the upstream nose. All of the H-Piles were exposed in the area of undermining with light surface corrosion.



TYPICAL END VIEW OF PIER

Legend

-2.0	Sounding Depth (8/27/12)
-5.2	Sounding Depth (8/18/07)
	Timber Debris

Note:

All soundings based on 2012 waterline location.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
UNDERWATER BRIDGE INSPECTION

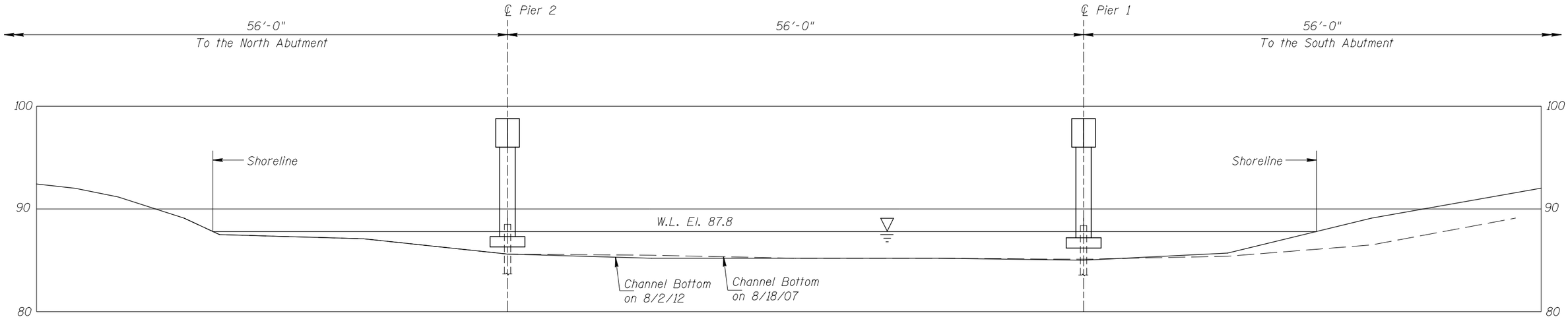
STRUCTURE NO. 57501
OVER THE RED LAKE RIVER
DISTRICT 2, PENNINGTON COUNTY

INSPECTION AND SOUNDING PLAN

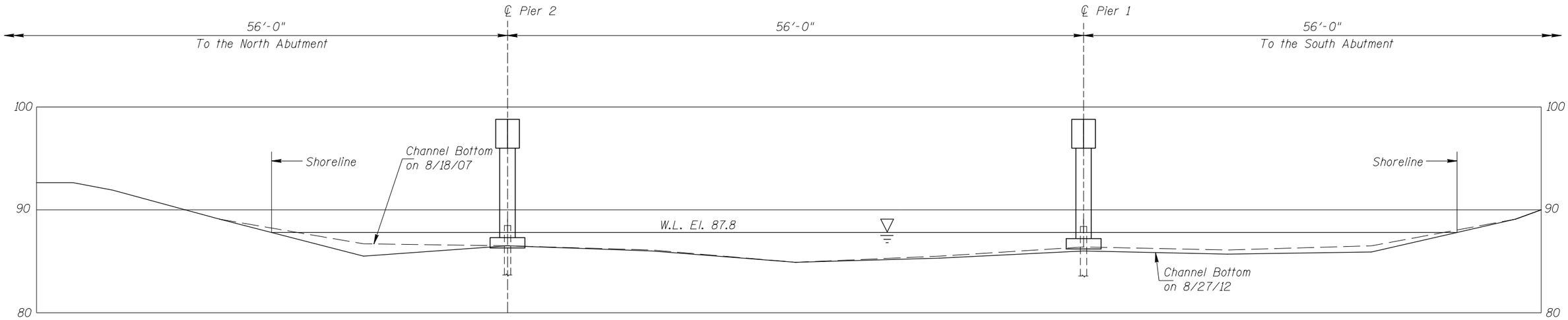
COLLINS ENGINEERS INC 123 North Wacker Drive Suite 300 Chicago, IL 60606 (312) 704-9300 www.collinsengr.com

AYRES ASSOCIATES 3433 Oakwood Hills Parkway Eau Claire, WI 54701 www.AyresAssociates.com

Drawn By: JAC		Date: SEPT. 2012
Checked By: BKS		Scale: NTS
Code: 52210162		Figure No.: 1



UPSTREAM FASCIA PROFILE



DOWNSTREAM FASCIA PROFILE

Note:

Refer to Figure 1 for General Notes.

MINNESOTA
DEPARTMENT OF TRANSPORTATION
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UPSTREAM AND DOWNSTREAM FASCIA PROFILES

COLLINS ENGINEERS INC
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Suite 300
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Eau Claire, WI 54701
www.AyresAssociates.com

Drawn By: JAC		Date: SEPT, 2012
Checked By: BKS		Scale: 1"=10'
Code: 52210162		Figure No.: 2

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES
DAILY DIVING REPORT

INSPECTORS: Ayres Associates DATE: August 27, 2012

ON-SITE TEAM LEADER: Brian K. Schroeder, P.E.

BRIDGE NO: 57501 WEATHER: Partly Cloudy, 69° F

WATERWAY CROSSED: Red Lake River

DIVING OPERATION: X SCUBA _____ SURFACE SUPPLIED AIR

_____ OTHER

PERSONNEL: Jason A. Cook, Anthony J. Coffaro

EQUIPMENT: Commercial Scuba, Probe Rod, Camera, Underwater Light, Hammer, Sounding Pole

TIME IN WATER: 8:45 A.M.

TIME OUT OF WATER: 9:00 A.M.

WATERWAY DATA: VELOCITY 1.0 ft/sec

VISIBILITY 4.0 feet

DEPTH 2.8 feet maximum at Pier 1

ELEMENTS INSPECTED: Piers 1 and 2

REMARKS: The concrete of the pier cap and shaft for Piers 1 and 2 was typically smooth and sound, with random minor areas of poor consolidation with ¼ inch maximum penetration, and with minor vertical hairline to 1/16 inch wide cracks extending from the top of the pier cap to bottom of lower pier shaft step. The bottom portion of the shaft was broken off at the downstream end of Pier 1 exposing three corroded horizontal steel reinforcing bars. The shaft bottom step of Pier 2 was cracked and detached at the southeastern corner and downstream end. The bottom of shaft step out was exposed around the entire shaft of both piers with up to full height (1 foot) vertical exposure. Undermining was observed in the location of full height vertical exposure. The easternmost steel H-pile of Pier 2 and all the piles of Pier 1 were exposed with light surface corrosion. There was a light to moderate accumulation of debris and timber drift at the upstream end of Piers 1 and 2.

FURTHER ACTION NEEDED: _____ YES ____X___ NO

Monitor the undermining and pile exposure during future inspections and if it continues to increase, scour countermeasures may be warranted at that time.

Reinspect the submerged substructure units at the normal maximum recommended (NIBIS) interval of sixty (60) months.

MINNESOTA DEPARTMENT OF TRANSPORTATION
OFFICE OF BRIDGES AND STRUCTURES

UNDERWATER INSPECTION CONDITION RATING FORM

BRIDGE NO. 57501
INSPECTORS Ayres Associates
ON-SITE TEAM LEADER Brian K. Schroeder, P.E.
WATERWAY CROSSED Red Lake River

INSPECTION DATE August 27, 2012

NOTE: USE ALL APPLICABLE CONDITION DEFINITIONS AS DEFINED IN THE MINNESOTA RECORDING AND CODING GUIDE INCLUDING GENERAL, SUBSTRUCTURE, CHANNEL AND PROTECTION, AND CULVERTS AND WALL DEFINITIONS TO COMPLETE THIS FORM.

CONDITION RATING

			SUBSTRUCTURE						CHANNEL					GENERAL					
UNIT REFERENCE NO.	UNIT DESCRIPTION	MAXIMUM DEPTH OF WATER	PILING	COLUMNS, SHAFTS, OR FACES*	FOOTINGS	DISPLACEMENT	OTHER	OVERALL SUBSTRUCTURE CONDITION CODE*	SCOUR	EMBANKMENT EROSION	EMBANKMENT PROTECTION	OTHER (DRIFT/DEBRIS)	OVERALL CHANNEL & PROTECTION CONDITION	CONCRETE	STEEL	TIMBER	LOSS OF SECTION	PREVIOUS REPAIR OR MAINTENANCE	OTHER
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	Pier 1	2.8’	6	6	4	7	N	5	5	7	8	6	5	5	6	N	5	N	N
	Pier 2	1.8’	6	6	4	7	N	5	5	7	8	N	5	5	6	N	5	N	N

*UNDERWATER PORTION ONLY

REMARKS: The concrete of the pier cap and shaft for Piers 1 and 2 was typically smooth and sound, with random minor areas of poor consolidation with ¼ inch maximum penetration, and with minor vertical hairline to 1/16 inch wide cracks extending from the top of the pier cap to bottom of lower pier shaft step. The bottom portion of the shaft was broken off at the downstream end of Pier 1 exposing three corroded horizontal steel reinforcing bars. The shaft bottom step of Pier 2 was cracked and detached at the southeastern corner and downstream end. The bottom of shaft step out was exposed around the entire shaft of both piers with up to full height (1 foot) vertical exposure. Undermining was observed in the location of full height vertical exposure. The easternmost steel H-pile of Pier 2 and all the piles of Pier 1 were exposed with light surface corrosion. There was a light to moderate accumulation of debris and timber drift at the upstream end of Piers 1 and 2.

NOTES: ATTACH SKETCHES AS NEEDED, IDENTIFY REMARK BY REFERRING TO UNIT REFERENCE NO. AND REMARK NO.
USE GENERAL SECTION TO IDENTIFY OVERALL PRESENCE OF SPALLS, CRACKS, CORROSION, ETC.