

BRIDGE INSPECTION REPORT

1812246
Structure File Number

BRIDGE NUMBER CUY 00322 1534

YEAR BUILT 1939

DIST 12 Bridge Type 322 TYPE SERVICE 1 5 CHAGRIN RIV .25 MI W 174#

DECK out/out 65.1 Deck Area 9,763 sqft			0 OTHER	
1. FLOOR	1 REINF CONCRT (PRESTRSD, PRECAST) Left 2 SIDEWALK(>2') / Right 2 SIDEWALK(>2')	1	2. WEARING SURFACE	Thk 2 Wear Date 7/6/2009 1
3. CURBS, SIDEWALKS AND WALKWAYS		1	4. MEDIAN	Lanes on 4 1
5. RAILING	6 STEEL POST & STEEL PANEL (DECO)	1	6. DRAINAGE	0 OTHER-NATURAL(OFF THE BRIDGE ENDS)
7. EXPANSION JOINTS	N NONE		8. SUMMARY	8
SUPERSTRUCTURE			2 WELDED BUILT-UP STEEL	
9. ALIGNMENT	Max Spans 72	1	10. BEAMS/GIRDERS/SLAB	1
11. DIAPHRAGMS or CROSSFRAMES		1	12. JOISTS/STRINGERS	
13. FLOOR BEAMS			14. FLOOR BEAM CONNECTIONS	
15. VERTICALS			16. DIAGONALS	
17. END POSTS			18. TOP CHORD	
19. LOWER CHORD			20. LOWER LATERAL BRACING	
21. TOP LATERAL BRACING			22. SWAY BRACING	
23. PORTALS			24. BEARING DEVICES	3 SLIDING (BRONZE) 1
25. ARCH			26. ARCH COLUMNS or HANGERS	
27. SPANDREL WALLS			28. PROTECTIVE COATING SYSTEM	Paint Date 1/1/1939 1 RED LEAD 7
29. PINS/HANGERS/HINGES			30. FATIGUE PRONE CONNECTIONS	
31. LIVE LOAD RESPONSE		S	32. SUMMARY	7
SUBSTRUCTURE			1 GRAVITY	
33. ABUTMENTS	1 GRAVITY	1	34. ABUTMENT SEATS	Abutment: ON PILING 1
35. PIERS		1	36. PIER SEATS	1 GRAVITY Piers: ON PILING 1
37. BACKWALLS		1	38. WINGWALLS	1
39. FENDERS and DOLPHINS	Piers = 01 NN NN Spans = 2		40. SCOUR	3 1
41. SLOPE PROTECTION	N NONE-NATURAL PROTECTION(GRA)		42. SUMMARY	Dive Date 11/2/2010 6
CULVERTS				
43. GENERAL	N NONE/NOT APPLICABLE		44. ALIGNMENT	
45. SHAPE			46. SEAMS	
47. HEADWALLS or ENDWALLS	Culvert Length 0		48. SCOUR	Culvert Fill Depth 0
49.			50. SUMMARY	
CHANNEL				
51. ALIGNMENT	6 (SEE CODING GUIDE)	2	52. PROTECTION	2 STONE 2
53. WATERWAY ADEQUACY		1	54. SUMMARY	5
APPROACHES				
55. PAVEMENT	2 BITUMINOUS	1	56. APPROACH SLABS	1
57. GUARDRAIL	1 STEEL BEAM	1	58. RELIEF JOINTS	1
59. EMBANKMENT		1	60. SUMMARY	Percent Legal = 150 8
GENERAL				
61. NAVIGATION LIGHTS			62. WARNING SIGNS	Maint Resp 1 OHIO TRAN DEPT
63. SIGN SUPPORTS	Signs on = N MVC on = 9999.9 Under C = 0		64. UTILITIES	1
65. VERTICAL CLEARANCE	Under NC = 0	N	66. GENERAL APPRAISAL & OPERATIONAL STATUS	6 A
67. INSPECTED BY			68. REVIEWED BY	

SIGNED

PE Number

ACP
INITIALS

SIGNED

59487 YSS
PE Number INITIALS

DATE 11/2/2010

1 1 1 N 1 N N N
SURVEY

DATE 3/4/2011

DECK

ALL DECK ITEMS ARE NEW IN 2009.

SUPERSTRUCTURE

BEAMS: NEW FASCIA BEAMS IN 2009. BEAM ENDS ENCASED IN
CONCRETE IN 2009. STILL SOME MINOR SECTION LOSS.

XFRAMES: SOME NEW IN 2009.

BEARINGS: NEW IN 2009.

PCS: SOME AREAS HAVE NEW PAINT IN 2009. STILL SOME RUSTING.

PCS IS 1-5% DETERIORATED.

SUBSTRUCTURE

MOST SUBSTRUCTURE ITEMS REPAIRED IN 2009.

ABUTMENTS: MINOR SANDSTONE DETERIORATION.

PIERS: CRACKS. SCALING.

WINGWALLS: MINOR CRACKS.

SCOUR: LARGE DUMP ROCK WAS ADDED TO ABUTS AND PIER IN 2009.

UNDERWATER INSPECTION BY KCI ON 11/2/10, SEE ATTACHED
REPORT.

CHANNEL

ALIGNMENT: RIVER FLOWS TOWARDS REAR ABUTMENT AND INTO
EAST FACE OF PIER #1.

PROTECTION: UNEVEN SETTLEMENT OF STONE SLABS NEAR START
ABUTMENT.

APPROACHES

ALL NEW IN 2009.

GENERAL

UTILS: NEW CONNECTIONS AT ABUTS IN 2009.

LAST SNOOPER INSPECTION IN 2008.

LAST DIVE INSPECTION IN 2010.

DRYSUIT PIER ON 11/17/09.

Underwater Inspection Report for:

U.S. Route 322 (Mayfield Road) over the Chagrin River in Gates Mills, Cuyahoga County
(Two Span Steel Beam Bridge)

KCI Personnel on site during inspection:

1. Capt. Travis M. Clower, MBA, P.E. (Diver / Lead Inspector)
2. Mr. Christopher J. Luciani (Backup Diver / Inspector)
3. Mr. William Becka (Tender / Supervisor)

ODOT personnel on site during inspection:

1. Andrea Persanyi



General Elevation View



Location Map

Prepared for:

ODOT District 12
5500 Transportation Blvd
Garfield Heights, Ohio 44125



Prepared by:

KCI Associates of Ohio
388 S. Main Street, Suite 401
Akron, Ohio 44311
Phone: (330) 564-9100



DESCRIPTION

Bridge Number CUY-322-1534 (SFN 1812246) carries four lanes of U.S. Route 322 (Mayfield Road) over the Chagrin River in Gates Mills, Ohio. The bridge has an overall length of approximately 150 feet and was built in 1939. The structure consists of a steel beam bridge supported by two concrete abutments and a single wall pier. The substructure units are partially covered with sandstone masonry facing.

INSPECTION OPERATIONS

KCI's three-person dive team performed an underwater inspection on 11/02/06 using a dry suit for access. A visual inspection was performed from one foot above the waterline (splash zone) to the mudline. Soundings were taken along both abutments, both faces of the pier, and up to 30 feet upstream and downstream of the bridge using a survey rod. The previous underwater inspection report dated 10/24/06 and ODOT BR-86 top-side inspection report dated (03/02/10) were available for comparison. Original plans were available for review.

Hazards Encountered:	<i>Timber debris, riprap along the pier.</i>
Inspection Mode:	<i>Dry suit.</i>
Flow Direction / Velocity:	<i>North / ~1 fps</i>
Direction of Diver / Inspector:	<i>Inspector able to enter the water from either bank.</i>
Channel Bottom:	<i>Riprap and mud</i>
Scour Checked By:	<i>Soundings and probing</i>
Equipment Used:	<i>Dry suit, survey rod.</i>
Elements Cleaned:	<i>N/A</i>
Hydrographic Reference:	<i>Underside of steel beam on the southeast side of the pier</i>

OBSERVATIONS**Bridge**

- The bridge had been rehabilitated since the last inspection.
- The entire width of the pier and a section of the southeast wingwall were submerged and inspected (see Photos 5, 6, and 8). Because of the depth of the water and the recently placed riprap, only a dry suit was used during the inspection. The max depth along the pier was 4.8'.
- Large riprap had been placed along the pier since the last inspection (see Photo 11).



- The mortar of the sandstone masonry facing appeared to be in good condition.
- Both abutments were not inundated by the river and therefore were not considered part of this inspection.
- Large stones are in place along the west embankment serving as scour control (see Photo 9).
- No undermining of the pier footing was found along the entire pier perimeter.
- There is a submerged 10" diameter tree in the upstream channel, 10' from the pier (see Photos 8 and 10).

Channel

- The channel alignment is poor. It approaches from the southeast at approximately a 45-degree angle (see Photo 3).
- There was low flow at the time of inspection.
- The stream bed consisted of sand, silt and mud and there is large riprap along the entire length of the pier.

DEFECTS & DEFICIENCIES

- Minor scaling is present in the east and west faces of the pier along the waterline. No other deficiencies were noted during this inspection.

SCOUR RATINGS AND ASSESSMENT

- The BR86 rating for item #40 (Scour) is as follows:

Inspection Mode	Condition Rating
3	1

- The Item #74 - Scour Critical Susceptibility Rating is as follows:

Condition Rating
7

The underwater inspection found the pier to be completely surrounded and protected with large diameter riprap for approximately 15 feet in all directions. This riprap placement was part of a recent rehabilitation project. The riprap along with the cut stone shore protection on the west bank should be monitored after future large flood events.

COMPARISON TO PREVIOUS REPORTING

The bridge had been rehabilitated since the last inspection. The cracks in both abutments and the southeast wingwall were patched (see Photo 12). Large riprap was placed along the pier to repair the previously noted exposed footing and to prevent any further scour issues (see Photo 11). Sections of the large cut stone bank protection on the west bank are missing and need replaced. This is shown in Photo 7. There are no other recommendations at this time.



Photo by T. Clower, 11/2/10

Photo 1 - Facing Southwest. North Elevation.



Photo by T. Clower, 11/2/10

Photo 2 - Facing North. South Elevation..



Photo by T. Clower, 11/2/10

Photo 3 - Facing Southeast, Upstream.



Photo by T. Clower, 11/2/10

Photo 4 - Facing North, Downstream.



Photo by T. Clower, 11/2/10

Photo 5 - Facing West. East Elevation of the Pier.



Photo by T. Clower, 11/2/10

Photo 6 - Facing East. West Elevation of the Pier.



Photo by T. Clower, 11/2/10

Photo 7 - Facing Northwest. West Abutment and missing shore protection.



Photo by T. Clower, 11/2/10

Photo 8 - Facing East. East Abutment. Note timber debris in foreground.



Photo by T. Clower, 11/2/10

Photo 9 - Facing North. Large stones along the West Embankment for Scour Protection.



Photo by T. Clower, 11/2/10

Photo 10 - Facing Southeast. Tree Debris in the Upstream Channel.



Photo by T. Clower, 11/2/10

Photo 11 - Facing Downward. Riprap along the Pier (south end shown).



Photo by T. Clower, 11/2/10

Photo 12 - Facing Southeast. Repaired Crack in the Southeast Wingwall.

APPENDIX
SCOUR SUSCEPTIBILITY WORKSHEET

OFFICE ASSESSMENT																					
Structure Information																					
Bridge Number	CUY-322-0738																				
SFN	1812246																				
Feature Intersected	SR 322 over Chagrin River																				
Assessment Team Members	Bill Becka, Chris Luciani, Travis Clower, PE																				
Office Check - Step 1/6 - Performed by:																					
-																					
1) Condition Rating History																					
A) Channel - Year 51. Alignment 52. Protection - 53. Waterway Adequacy - 54. Channel Summary	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 15%;">2010</td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> <tr><td>1</td><td></td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> <tr><td>5</td><td></td><td></td><td></td></tr> </table>	2010				2				1				2				5			
2010																					
2																					
1																					
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B) Culvert/Approach - Year 59. Embankment 48. Scour	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 15%;">2010</td><td></td><td></td><td></td></tr> <tr><td>N/A</td><td></td><td></td><td></td></tr> <tr><td>N/A</td><td></td><td></td><td></td></tr> </table>	2010				N/A				N/A											
2010																					
N/A																					
N/A																					
C) Substructure - Year 39. Fenders and Dolphins 40. Scour 41. Slope Protection 42. Substructure Sum.	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 15%;">2010</td><td></td><td></td><td></td></tr> <tr><td>N/A</td><td></td><td></td><td></td></tr> <tr><td>3</td><td>1</td><td></td><td></td></tr> <tr><td>2</td><td></td><td></td><td></td></tr> </table>	2010				N/A				3	1			2							
2010																					
N/A																					
3	1																				
2																					
2) Overtopping																					
A) Inventory - Waterway Adequacy Rating - Item 88: B) History of Overtopping	Y N _____																				
- Remote - Greater than 100 years - Slight - Between 11 and 100 years - Occasional - Between 3 and 10 years Frequent - Within 3 years	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td style="width: 15%;">Y</td><td></td></tr> <tr><td></td><td>N</td></tr> <tr><td></td><td>N</td></tr> <tr><td></td><td>N</td></tr> </table>	Y			N		N		N												
Y																					
	N																				
	N																				
	N																				

Screening - Step 2/6 - Performed by:			Y	N
1) Low Risk				
- A) Is the structure a culvert (excluding 3 sided culverts)?			N	
- B) Are all abutment and pier footings keyed into rock?			N	
- C) Are all drilled shafts embedded into rock?			N	
2) Scour Susceptible			Y	
- A) Is there scour or a history of scour problems?		Y		
- B) Are the foundations spread footings or unknown foundations?		Y		
- C) Is the structure nonredundant, simple span or 3 sided culvert?			N	
- D) Does the structure have an inadequate waterway opening or design that collects ice and/or debris?			N	
- E) Is the streambed experiencing active degradation or aggradation?		Y		
- F) Is the streambed experiencing active lateral movement of bank erosion?			N	
- G) Do the banks have steep slopes or is there high stream velocity?		Y		
- H) Are there in-stream mining operations in the vicinity of the structure?			N	
- I) Does the structure have a history of flood damage to the structure?			N	
- J) Does the structure cross near stream confluences?		-	N	
- K) Does the structure cross sharp bends?		Y		
- L) Is the structure located in alluvial fans?			N	
FIELD ASSESSMENT				
Upstream Condition - Step 3/6 - Performed by:				
A) Banks			Y	N
1) Stable:			Y	
	Natural Vegetation, trees, bank stabilization measures such as riprap, paving, gabions, channel stabilization measures such as dikes and jetties			
2) Unstable				N
	Bank sloughing, undermining, evidence of lateral movement, damage to stream stabilization measures.			
B) Main Channel				
1) Clear and open with good approach flow conditions?				N
2) Does channel meander or is it braided with main channel at an angle to the orientation of the bridge?		Y		
3) Existence of island, bars, debris, cattle guards and fence that may affect flow?		Y		
4) Aggrading or degrading of streambed?		Y		
5) Evidence of movement of channel with respect to the bridge?				N
C) Flood Plain				
1) Evidence of significant flow on floodplain?		Y		
2) Floodplain flow patterns - does flow overtop road and/or return to main channel?				N
3) Is there hydraulic adequacy of the relief bridge (if relief bridges are obstructed, they will affect flow patterns at the main channel bridge)?				
4) Is the floodplain development and any obstruction to flows approaching the bridge and its approaches?				N
5) Evidence of overtopping approach roads (debris, erosion of embankments slopes, damage to riprap or pavement, etc.)?				N
D) Debris				
1) Large Amounts of debris obstructing or hung on substructure.				N
2) Small amounts of debris obstructing or hung on substructure.		Y		
3) No debris obstructing flow or hung up on substructure.				-

Condition at Bridge - Step 4/6 - Performed by:			Y	N
A) Substructure				
1) Are there evidence of scour and/or undermining of the abutments or pier footings?				N
2) Is the main current attacking piers or abutments at an angle (approx. angle 50 deg)?		Y		
3) Has riprap been removed and replaced by bed-load material?				N
4) Can displaced riprap be seen below the bridge?				N
5) Are guidebanks in place?	<i>Are guidebanks in place?</i>	Y		
	<i>Are guidebanks in good working order?</i>	Y		
	<i>Have scour or erosion damaged the guidebanks?</i>	Y		
6) Is there evidence of scour and erosion of streambeds and banks, especially adjacent to piers and abutments?		Y		
7) Has the stream cross section changed since the last measurement?	<i>In what way?</i>	Y		
<u>Bridge was renovated and East bank configuration changed. Riprap placed around center pier.</u>				
B) Superstructure				
1) Is there evidence of overtopping (debris in cross frames, railing anchors etc.)?				N
3) Is the superstructure tied down to the substructure to prevent displacement during floods?				N/A
5) Is the superstructure a simple span configuration and/or nonredundant load path?				N
Downstream Condition - Step 5/6 - Performed by:			Y	N
A) Banks				
1) Stable:	Natural Vegetation, trees, bank stabilization measures such as riprap, paving, gabions, channel stabilization measures such as dikes and jetties	Y		
2) Unstable	Bank sloughing, undermining, evidence of lateral movement, damage to stream stabilization measures, etc.			N
B) Main Channel				
1) Clear and open with good "getaway" conditions?		Y		
2) Does channel meander?		Y		
3) Is the channel braided with bends?				N
4) Does the channel have islands or bars?		Y		
5) Are there cattle guards or fences restricting flow?				N
6) Aggrading or degrading stream bed?		Y		
7) Evidence of movement of channel with respect to the bridge?				N
C) Flood Plain				
1) Clear and open so that contracted flow at the bridge will return smoothly to the floodplain?				Y
2) Is the floodplain restricted by dikes, developed trees, debris or other obstruction?		Y		
3) Evidence of scour and erosion due to downstream turbulence?				N

CONCLUSION - Step 6/6 - Performed by:		Y	N
1) Field Review Completed		Y	
2) SCOUR CRITICAL SUSCEPTIBILITY - ITEM #74 - Assessment with Field Review			
A) Recommend one of the following codes according to this Assessment			
6 - Not Yet Evaluated (the Purpose of this assessment is to remove this coding)			
T - Low Risk - Not yet evaluated, bridge over Tidal Waters			
9 - Low Risk - Stable; Bridge, including piles, are well above flood elevations			
8 - Low Risk - Stable; Scour is above top of footing and/or on rock that will resist scour throughout life			
7 - Low Risk - Stable; Scour POA countermeasures implemented	Y		
5 - Low Risk - Stable; scour within limits of known foundation			
4 - Low Risk - Stable; field review found exposed foundations where action is required			
U - High Risk - Unknown foundation - <i>develop POA</i>			
3 - High Risk - Unstable; field review found undermining - <i>develop POA</i>			
2 - High Risk - Unstable; extensive scour at bridge foundation - <i>develop POA, revise Scour Rating</i>			
1 - Higher Risk - Unstable; failure imminent, close bridge - <i>develop POA</i>			
0 - Highest Risk - Unstable; bridge has failed - <i>develop POA</i>			
Follow Up			
Update Item #74 in BMS			
Assessment placed in the Bridge Files			