Appendix B

Diving Inspection Report
February 5, 2007

Bergmann Associates
1 Computer Drive South
Albany, New York 12205

Attn: Mr. Peter Melewski
Re: Underwater Investigation of the Poughkeepsie Railroad Bridge
McLaren File No. 106158

Dear Mr. Melewski:

Introduction

McLaren Engineering Group was retained by Bergmann Associates to perform an underwater investigation of the submerged portions of the substructures for Pier 2 through Pier 5 for the Poughkeepsie Railroad Bridge. The investigation was performed from November 2 to November 7, 2006. Also please find attached Appendix – A, Photographs, and Appendix – B, Figures referenced during this report.

Scope of Work

All in-water pier substructures received a visual inspection from Mean High Water line (MHW) to the mudline. Water depth were measured and recorded at eight points around the perimeter of the piers along the mudline. Probes were taken into the timber cribbing and grillage. Mudline elevation and composition were recorded. Additional investigation was performed using a “DIDSON” Sonar Camera on November 21, 2006 at Pier 2 to determine the extent of the void area observed during the initial investigation.

Methodology

The dive team conducting the investigation was composed of a Professional engineer diver, a diver and a diver tender. Dive operations were conducted from either a thirty-foot aluminum boat or a twenty-two foot fiberglass dive boat. Diving was performed using surface supplied equipment with constant two-way radio communication and real-time video recording. Divers visibility during the investigation was limited to three inches or less, making visual observation very limited. Most of the inspection was performed using tactile investigation skills. Due to high current velocity, inspections time was limited to hours of slack current.
Bridge History

The Pennsylvania Railroad officially started the initial construction of the Poughkeepsie Railroad Bridge in 1873. However, actual bridge construction started in 1876 by the American Bridge Company who built Pier 2, installed the cribbing for Pier 3, and partially completed construction on the timber cribbing for Pier 4. Construction was suspended from 1876 to 1886 when construction was resumed by the Union Bridge Company, who modified the design and reworked Pier 2 and completed the remainder of the bridge with the first traffic across the bridge on January 1, 1889.

The overall length of the bridge is approximately 6,767 feet (see Figure 1). The main bridge (Pier 0 to Pier 7) consists of seven deck truss spans (Photo 1), three cantilever spans of 548 ft each, two connecting spans of 525 ft each and two shore spans of 201 ft each for a total river span of 3,094 ft (see Figure 2). The east and west bridge approaches are comprised of a combination of deck truss and girder spans that are supported by steel bents.

Additional work to strengthen the bridge to accommodate heavier rail loading was completed in 1907. General maintenance and several track changes were performed in subsequent years until a fire occurred on the east approach span of the bridge in 1974 causing damage that ended all rail services over the bridge.

Typical Substructure Construction

Typical substructure components of the piers consist of a heavy timber crib structure that was used as a deep dredging system. The cribbing is essentially a bottomless box and was constructed of several layers of 12 in. by 12 in. timbers positioned horizontally and fastened with steel pins, typically the exterior was then sheathed with vertical timber planking to complete the structure. The cribbing structures measures approximately 60 ft wide by 100 ft long at the bottom (see Figure 3), and tapers along the east and west faces to 50 ft wide by 100 ft long at the top. The timber cribbing was partially built on land then floated out in the river where it was positioned, sunk by filling the weighting pocket with stone and built up to the required elevation as dredges worked to remove material from the interior dredging wells until the bottom of the crib structure was founded on firm soil at approximately 130 ft below the surface of the river. The dredging wells were then filled and leveled with concrete to provide a stable foundation for the timber grillage layer.

When the concrete filled timber cribbing installation was complete the next step was constructing and placing a floating caisson over the cribbing. The caisson was designed with the bottom serving as a mat of timber grillage and was constructed of six layers of 12 in. by 12 in. timbers (see Figure 4). Once the caisson was floated into position over the previously placed cribbing, construction of the masonry faced concrete pier began within the floating caisson. As the pier construction progressed the weight of the pier gradually sunk the caisson until it rested on the cribbing. Once the masonry and concrete pier was completed the caisson was flooded and the sides were removed leaving the completed masonry and concrete portion of the pier resting on the timber grillage. The finished overall dimensions of the concrete filled masonry piers are approximately 25 ft wide by 90 ft long.
Observations

Pier 2

Pier 2 is located nearest to the western shoreline of the river (Photo 2 and Photo 3). Construction of Pier 2 varies slightly from the other piers (see Figure 5). Construction of the substructure was partially completed when the project was postponed, redesigned and work eventually started again by a different Contractor. A bottomless timber caisson was constructed around the existing pier and pumped dry, then partial demolition of the existing pier was performed, the new masonry and concrete pier constructed over the remains of the previously pier foundation and then the interior of the caisson was filled with concrete (see Figure 6).

The stone masonry portion of the pier is generally in fair condition. Typical deficiencies include intermittent areas of missing mortar from between the joints, with penetration from 4 in. to 12 in. deep, and moderately spalled and loose coping stones on the south face of the pier. Moderate efflorescence and rust staining were also evident on the face of the masonry.

The timber cribbing and grillage typically exhibit moderate rot and loss of cross sectional area with gaps between the timbers averaging 1 in. to 2 in. wide. Intermittent penetrations into the gaps of the cribbing were taken and typically varied from 12 in. to over 3 ft deep. The outer layer of vertical timber sheeting is missing from around the entire pier. Intermittent missing pieces of 12 in by 12 in. timber cribbing were also observed. A significant horizontal void area was observed behind the outermost layer of the timber crib wall, extending along the east, south and west faces of the pier. The voids are located approximately 29 ft below the water surface and extend approximately 16 ft along the south face and 56 ft along the west face. The void in the timber cribbing is 2 ft high at the south west corner and tapers down to 2 in. as it progresses along the south and west elevations. Penetrations in the void varied from 3 ft to more than 6 ft deep. The maximum height of the void on the inside of the timber cribbing at the southwest corner is unknown.

Additional investigation was performed to determine the depth of the void. A dive crew equipped with a “DIDSON” Sonar Camera performed a real time sonar survey of the void area. Interpretation of the sonar images revealed that only the outer layer of weighting pockets has been compromised revealing the stone fill (Photo 4). The inner timber wall and transverse ties appeared to be in place (Photo 5, and Photo 6). It was not possible to visually inspect or probe the timber on the interior pockets to determine their condition.

The mudline generally consists of silt and sand over scattered rip rap stone with concrete and steel debris. No signs of scour were observed in the vicinity of the pier. Water depth varied from 39 ft to 66 ft around the pier.

Pier 3

Pier 3 also has a slightly different construction. The timber grillage mat was built up of 14 layers of 12 in. by 12 in. timbers in order to bring the foundation up to the required elevation (see Figure 7).
The stone masonry portion of the pier is generally in fair condition (Photo 7 and Photo 8). Typical deficiencies include intermittent areas of missing mortar from between the joints, with penetration from 2 in. to 14 in. deep. Moderate efflorescence and rust staining were also evident on the face of the masonry.

The timber cribbing and grillage typically exhibit moderate rot and loss of cross sectional area with gaps between the timbers averaging 1 in. to 2 in. wide. Intermittent penetrations into the gaps of the cribbing were taken and typically varied from 12 in. to over 4 ft deep. The outer layer of vertical timber sheeting is missing from around the entire pier. Minor areas of intermittent missing pieces of 12 in by 12 in. timber cribbing from the outer layer, up to 4 ft long were also observed.

A significant void was discovered along the east elevation at approximately 22 feet below the water surface. The void was located at the interface between the timber grillage and the cribbing structure. The void measured approximately 4 ft high at the southeast corner and tapered down to 2 ft high at the north end of the pier. Penetrations into the void varied and were approximately 2 ft deep at the northwest corner and up to 6 ft deep at the southwest corner.

The mudline generally consists of silt and sand over scattered rip rap stone with concrete and steel debris. No signs of scour were observed in the vicinity of the pier. Water depth varied from 38 ft to 51 ft around the pier.

Pier 4

Constructions of the pier substructural elements are as described above under “Typical Substructure Construction”. The stone masonry portion of the pier is generally in fair condition (Photo 9 and Photo 10). Typical deficiencies include intermittent areas of missing mortar from between the joints, with penetration from 4 in. to 16 in. deep.

The timber cribbing and grillage typically exhibit moderate rot and loss of cross sectional area with gaps between the timbers averaging 1 in. to 2 in. wide. Intermittent penetrations into the gaps of the cribbing were taken and typically varied from 12 in. to 2 ft deep. The outer layer of vertical timber sheeting is missing from around the entire pier. Minor areas of intermittent missing pieces of 12 in by 12 in. timber cribbing from the outer layer were also observed.

The mudline generally consists of silt and sand over scattered rip rap stone with concrete and steel debris. No signs of scour were observed in the vicinity of the pier. Water depth varied from 39 ft to 58 ft around the pier.

Pier 5

Pier 5 is located nearest to the eastern shoreline of the river (Photo 11 and Photo 12). Constructions of the pier substructural elements are as described above under “Typical Substructure Construction”.

The stone masonry portion of the pier is generally in fair condition. Typical deficiencies include intermittent areas of missing mortar from between the joints, with penetration from 2 in. to 12 in. deep. Moderate efflorescence and rust staining were also evident on the face of the masonry.
The timber cribbing and grillage typically exhibit moderate rot and loss of cross sectional area with gaps between the timbers averaging 1 in. to 2 in. wide. Intermittent penetrations into the gaps of the cribbing were taken and typically varied from 12 in. to over 3 ft deep. The outer layer of vertical timber sheeting is missing from around the entire pier. Minor areas of intermittent missing pieces of 12 in by 12 in. timber cribbing from the outer layer, were also observed.

The mudline generally consists of silt and sand over scattered rip rap stone with concrete and steel debris. No signs of scour were observed in the vicinity of the pier. Water depth varied from 42 ft to 54 ft around the pier.

**Conclusions & Recommendations**

It is recommended to repair the void areas at Pier 2 and Pier 3 to stop the loss of fill from within the cribbing and restore structural integrity. These deficiencies are not an emergency or a structural stability issue at this time; however, the repairs are needed to provide long-term protection and insure stability. It is recommended that these repairs be completed within the next five years to prevent accelerated deterioration of the substructures. We strongly recommend that the deteriorated portions of Piers 2 and 3 be inspected on an annual basis until repairs are made, to arrest or respond to any sudden change of these conditions. It is our intent to avoid any dramatic increase in rehabilitation costs due to lack of attention. It is also recommended to perform an underwater inspection just prior to repair construction to confirm that the extent of deterioration has not changed.

Typically repairs to the voids involve sealing the outer surface of the void by installing formwork or grout bags. The void area is then pumped full with concrete. Estimated construction cost for these repairs is approximately $750,000 to $1,500,000. After repairs have been completed the piers should be regularly inspected at five-year intervals to monitor the deterioration of the substructure elements and recommend any additional repairs.

Permits for the repair construction will be required from various state and federal agencies. Since the permitting process approval may take an unusually long time (over 1 year), it is recommended that work on submitting the permits begin immediately so as to not delay the repairs.
Appendix A

Photographs
Photo 1 – Overall view of the river spans of the bridge, looking north.

Photo 2 – Pier 2 west and north elevation.
Photo 3 – Pier 2, south and east elevation.

Photo 4 – Pier 2, west face, south end, sonar image from interior of the void showing large stone fill.
Photo 5 – Sonar image from interior of void showing inner wall timbers in place.

Photo 6 – Sonar image showing transverse timber tie and inner wall in place.
Photo 7 – Pier 3, north and west elevation of the pier.

Photo 8 – Pier 3, south and east face of the pier.
Photo 9 – Pier 4, north and west elevation of the pier.

Photo 10 – Pier 4, south and east elevation of the pier.
Photo 11 – Pier 5, north and west elevation of the pier.

Photo 12 - Pier 5, south and east elevation of the pier.
Appendix B

Figures
General Plan of Floating Caissons for Poughkeepsie Bridge

[Diagram of floating caissons]

Scale, N=1/648

Union Bridge Co. Oct 11, 1883

FIG. 4
Used for estimating quantities of masonry for Special Franchise Work
Jan 1918

All holes were filled with concrete

The railroad is shown in
Fig. 2

This section assumed to have been used below Eire.

COFFER-DAM - PIER NO. 2

UNION BRIDGE - CT

FIG. 6
2006 DIVING INSPECTION

BEGIN ABUTMENT ☐ ☑ Pier (s) 002-PRR, 003-PRR
004-PRR, 005-PRR ☐ END ABUTMENT

FLAGS:
☐ RED ☐ YELLOW
☐ RED PIA ☐ SAFETY
X ☐ SAFETY PIA ☑ NONE
☐ REMOVAL ☐ INACTIVATION

Prime Consultant:
McLaren ENGINEERING GROUP
Phone (845) 353-6400 Fax (845) 353-6509

REVIEWED BY: ☑ George F. Assis
TITLE: Quality Control Engineer, PE# 073077
BD-4009/MD1
DIVE INSPECTION REPORT
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**QC ENGINEER**

P.E. #

DATE

10/22/07

**BRIDGE DIVING INSPECTION AND CONDITION REPORT**

**FEATURE CARRIED**

Poughkeepsie RR Bridge

**FEATURE CROSSED**

Hudson River

**ENGINEER**

James V. Green

**ON-SITE P.E.**

James V. Green

**P.E. No.**

078453

**STATE**

NY
COMMENTS

Swift current, dive during slack.

Repair void areas within the timber cribbing to prevent loss of fill.

Repoint stone masonry joints.
COMMENTS

Swift current, dive during slack.

Repair voids within the timber grillage to prevent loss of fill.
Repoint stone masonry joints.
**NEW YORK STATE DEPARTMENT OF TRANSPORTATION**

**BRIDGE DIVING INSPECTION AND CONDITION REPORT**

**FEATURE CARRIED**
Poughkeepsie RR Bridge

**FEATURE CROSSED**
Hudson River

**ON-SITE ENGINEER**
James V. Green

**DIVER**
James V. Green

**P.E. No.**
078453

**STATE**
NY

**R C**
8 6

**BRIDGE MILE POINT**
2908

**SIGNATURE**

**YEAR**
2006

**MONTH**
11

**DAY**
07

**SPAN #**
18 19 20

**UNIT CODE**
21 22 23

**P R R**

**COMMENTS**

- **Recommended Further Investigation**
  - N

- **Dive Comments**
  - Y

- **Work Recommendation**
  - Y

- **Safety Flag**

- **Structural Flag**

- **Structural Flag Condition**

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- **Safety Flag Date**

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- **Swift current, dive during slack.**

- **Repaint stone masonry joints.**
COMMENTS

Swift current, dive during slack.

Repoint stone masonry joints.
GENERAL BIN SUMMARY

SUPERSTRUCTURE DESCRIPTION  Total No. of Spans: 74  Load Path:  X Redundant  _ Non-Redundant  Dir/Orient: E/W

Primary Member Material:  X Steel  _ Iron  _ Concrete  _ Timber  _ Other:

Primary Member Type:  _ Rolled Girder  _ PL Girder  _ Box Girder  X Truss  _ Frame  _ Arch  _ Pipe  _ Slab

X Other: Built-up riveted steel girders

Plan Review: Plans agree with field conditions?  X Yes  _ No: Explain:

SITE CONDITIONS

Evidence of High Water?  _ No  X Yes: Approx. height above present water level?  1.5 ft

Underwater Visibility:  _ Good  _ Fair  X Poor

Tidal Waters?  _ No  X Yes

Low Freeboard?  X No  _ Yes

Protective Devices?  X No  _ Yes: Quantity ______ Type: ______ SSU#:

Current:  _ Negligible  Up to 1.0 fps  X Up to 2.0 fps  2.0 to 4.0 fps  Over 4.0 fps: Estimated Current:

Marine Growth:  X Negligible  _ Moderate  _ Heavy  _ Blast Cleaning Required: Total area cleaned:

Type:  X Algae  _ Aquatic Plants/Grasses  _ Zebra Mussel  _ Barnacles  _ Other:

Polluted Water?  X No  _ Yes: Explain:

ACTIVITY LOG

Inspection Access:  X Boat  _ Shore  Bridge Deck  Other:

Boat Launch Location:  ( N/A) Whites Marine, Hudson, NY

Unusual Conditions:  X No  _ Yes: Explain:

Special Contact(s) for Access or Coordination:  X No  _ Yes: Name(s), Organization, Address and Phone Number(s):

Insp. Consultant:  X M.G. McLaren, P.C.

Diving Subcontractor:  X None

Date  Arrival Time  Depart. Time  Dive Hours  Temp. Range  Weather  Remarks
11/02/06  7:30 AM  3:30 PM  5  42-55 F  Clear  U/W Inspection
11/03/06  7:30 AM  3:30 PM  5  42-55 F  Clear  U/W Inspection
11/04/06  7:30 AM  3:30 PM  5  42-55 F  Clear  U/W Inspection
11/05/06  7:30 AM  3:30 PM  5  42-55 F  Clear  U/W Inspection
11/06/06  7:30 AM  3:30 PM  5  42-55 F  Clear  U/W Inspection
11/07/06  8:00 AM  4:00 PM  4  42-55 F  Clear  U/W Inspection
11/21/06  7:30 AM  3:30 PM  5  42-55 F  Clear  DIDSON Sonar Imaging investigation
### GENERAL SSU SUMMARY

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**SSU Type:**
- Concrete Solid Stem
- Dry/Mortared Stone Masonry
- Steel Sheetpile Cell or Caisson
- Other

**SSU Foundation:**
- On Piles: (Timber, Steel H, Concrete, Steel Pipe)
- On Soil
- On Bedrock
- Unknown Type
- Other

**Channel Bottom:**
- Natural: Bedrock, Boulders, Cobble, Gravel, Organics, Coarse or Medium Sand
- Fine Sand or Silt
- Other

**Scour Protection:**
- Does any Scour Protection exist? Yes
- Is it shown on plans? Yes
- Is it functioning adequately? Yes

---

**Compare Soundings to Previous**

Up to 6 ft of scour on the east elevation and fill up to 5 ft on the west elevation has occurred since the 2002 underwater inspection. Previous inspection used an assumed waterline elevation of +1.00 which may be in error.

**Major Findings:**

Large void area behind outer timber cribwall. Void is located 29 ft below water, is up to 2 ft high and extends 56 ft along the west face, and 16 ft along the south face. Penetrations into the void over 6 ft deep.

**Limits to Performing Inspection:** Yes

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### GENERAL SSU SUMMARY

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**SSU Type:**
- Concrete Solid Stem
- Dry/Mortared Stone Masonry
- Steel Sheetpile Cell or Caisson
- Other

**SSU Foundation:**
- On Piles: (Timber, Steel H, Concrete, Steel Pipe)
- On Soil
- On Bedrock
- Unknown Type
- Other

**Channel Bottom:**
- Natural: Bedrock, Boulders, Cobble, Gravel, Organics, Coarse or Medium Sand
- Fine Sand or Silt
- Other

**Scour Protection:**
- Does any Scour Protection exist? Yes
- Is it shown on plans? Yes
- Is it functioning adequately? Yes

---

**Compare Soundings to Previous**

Fill up to 5 ft has occurred on the west elevation and fill up to 10 ft on the east elevation since the 2002 underwater inspection. Previous inspection used an assumed waterline elevation of +1.00 which may be in error.

**Major Findings:**

Large void area on the east face between the timber grillage and timber cribwall. Void area is located 22 ft below water and is approximately 2 ft to 4 ft high and 2 ft to 6 ft deep.

**Limits to Performing Inspection:** Yes
### GENERAL SSU SUMMARY

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<td>Is it functioning adequately?</td>
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<td>No: Explain:</td>
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**Compare Soundings to Previous**

No sounding data is available for comparison.

**Major Findings:**

Typical gaps between the timber cribbing members approximately 1 in. to 2 in. high with penetration into the gaps from 1 ft to 4 ft deep.

**Limits to Performing Inspection:** No

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<td>Is it functioning adequately?</td>
<td>No</td>
<td>Yes</td>
<td>No: Explain:</td>
</tr>
</tbody>
</table>

**Compare Soundings to Previous**

No sounding data is available for comparison.

**Major Findings:**

Typical gaps between the timber cribbing members approximately 1 in. to 2 in. high with penetration into the gaps from 1 ft to 4 ft deep.

**Limits to Performing Inspection:** No
### UNDERWATER BRIDGE INSPECTION AND CONDITION REPORT

**M.P.:** 29.08  **REGION:** 8  **COUNTY:** 6  **SHEET:** 9  **OF:** 35  
**FEATURE CARRIED:** Poughkeepsie RR Bridge  **FEATURE CROSSED:** Hudson River  
**INSPECTED BY:** James V. Green  **TITLE:** On-Site P.E./Team Leader  **DATE:** 11/07/06

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<tr>
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<tbody>
<tr>
<td>002P00</td>
<td>24</td>
<td>3</td>
<td>Voids - Voids created due to loss of ballast stone from outer timber cribwall. Void measures up to 2 ft high at the southwest corner, and extends 56 ft to the north along the west face, and 16 ft along the south face. Penetration into the void is greater than 6 ft.</td>
</tr>
<tr>
<td>25</td>
<td>4</td>
<td>Holes - Several intermittent holes through the outer timber cribwall. Holes measure up to 1 ft high by 1 ft wide with penetration up to 4 ft.</td>
<td></td>
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<td>Structural Damage - Missing and rotted outer cribwall timbers on the south and west faces of the pier.</td>
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<td>Non-structural damage - loss of ballast stone from outer cribwall.</td>
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<td>28</td>
<td>4</td>
<td>Displacement - Several horizontal timbers are displaced up to 1 ft vertically.</td>
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<td>4</td>
<td>Missing Elements - cribwall is missing original layer of vertical timber sheathing.</td>
<td></td>
</tr>
<tr>
<td>30</td>
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<td>Loss of fill - Loss of ballast stone fill in outer cribwall layer.</td>
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<td>9</td>
<td>Structural cracks - Concrete elements are covered by stone masonry veneer or timber cribwall.</td>
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<td>Erosion/Scaling - penetrations from 1 ft to 4 ft into the concrete fill behind the outer timber cribwall.</td>
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<td>Grout Loss - Approximately 25 percent loss of grout from the masonry joints.</td>
<td></td>
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<td>4</td>
<td>Splitting - Ends of most timber cribwall and grillage members split up to 2 in. wide and up to 1 ft long.</td>
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<td>Rot - Outer layer of timber cribwall and grillage exhibit approximately 1 in. to 2 in. loss of section due to rot, creating 1 in. to 3 in. gaps between the timbers.</td>
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<td>Fasteners - Most of the exposed steel pins fastening the timbers exhibit 50 percent to 100 percent loss of cross-sectional area.</td>
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<td>Voids - Voids created due to loss of concrete from under the timber grillage.</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Void measures up to 1 ft to 2 ft high, and extends along the entire east face of the pier, depth of the void is up to 6 ft.</td>
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### UNDERWATER BRIDGE INSPECTION AND CONDITION REPORT

**M.P.:** 29.08  
**REGION:** 8  
**COUNTY:** 6  
**SHEET:** 11 OF 35  

**FEATURE CARRIED:** Poughkeepsie RR Bridge  
**FEATURE CROSSED:** Hudson River  

**INSPECTED BY:** James V. Green  
**TITLE:** On-Site P.E./Team Leader  
**DATE:** 11/07/06  

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**RECOMMENDATIONS:**

<table>
<thead>
<tr>
<th>002PRR</th>
<th>Repair voids along the west and south faces of the timber cribwall. Fill void areas behind cribwall. Repoint stone masonry along the face of the pier.</th>
</tr>
</thead>
<tbody>
<tr>
<td>003PRR</td>
<td>Repair voids along the east face of the timber grillage. Fill void areas under the timber grillage. Repoint stone masonry along the face of the pier.</td>
</tr>
<tr>
<td>004PRR</td>
<td>Repoint stone masonry along the face of the pier.</td>
</tr>
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<td>005PRR</td>
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SKETCHES
UNDERWATER BRIDGE INSPECTION AND CONDITION REPORT

BIN 29.08 REGION 8 COUNTY 6 Sheet 15 of 35
FEATURE CARRIED: POUGHKEEPSIE RAILROAD BRIDGE FEATURE CROSSED: HUDSON RIVER

ELEVATION SKETCH

UNIT: PIER 2

DIVER'S CONFIRMATION:

PIER 2
WEST ELEVATION VIEW
N.T.S.

Depth (ft): 2006
61.0
64.0
0+00
0+50

Depth (ft): 2002
69.0
64.0
1+00

STATION: (ft)

VIDEO TIME: Not taken due to poor visibility

UNDERMINE HORIZ./VERT.
NONE

FOUNDATION TYPE:
STONE & GRAVEL WITH CONCRETE FILLED TIMBER CRIB

PILE TYPE:
N/A

PILE LENGTH:
N/A

REMARKS:
## ELEVATION SKETCH

**PIER 2**

**EAST ELEVATION VIEW**

| Depth (ft) 2006 | 63.0 |
| Depth (ft) 2002 | 63.0 |
| Station (ft)   | 0+00 |

**Remarks:**

- Foundation Type: Stone & Gravel with Concrete Filled Timber Crib
- Pile Type: N/A
- Pile Length: N/A
- Video Time: Not taken due to poor visibility
- Undermine Horiz./Vert.: None

---

**Loose Coping Stone**

**Broken Stone**

**25% Mortar Loss Throughout the Pier**

**10 LF Missing Coping Stone**

**NORTH FACE CRACKS**

**Gaps Between Timbers 1" to 2" With 1" to 3" Penetration Typical**

**2002 Mudline**

**2006 Mudline**

---

**FEATURE CARRIED:** Poughkeepsie Railroad Bridge

**FEATURE CROSSED:** Hudson River

**INSPECTED BY:** James V. Green

**TITLE:** P.E./DIVER

**DATE:** 11/07/2006

---

**DIVER'S CONFIRMATION:**
ELEVATION SKETCH

PIER 3
WEST ELEVATION VIEW

N.T.S.

Depth (ft) 2006  54.0  46.0  47.0
Depth (ft) 2002  52.0  41.0  49.0
Station (ft) 0+00  0+50  1+00

Video Time: Not taken due to poor visibility

Undermine Horiz./Vert.: None

Foundation Type: Stone & Gravel with Concrete Filled Timber Crib
Pile Type: N/A
Pile Length: N/A

Remarks:
ELEVATION SKETCH

LOOSE COPING STONE

±20% MORTAR LOSS THROUGHOUT THE PIER

VOID 2'x4'H x7'5" Lx2' TO 4' DEEP

TOP OF GRILAGE EL. -11'

TOP OF GRID EL. -22'

GAPS BETWEEN TIMBERS 1" TO 2" WITH 1" TO 3" PENETRATION TYPICAL

2006 MUDLINE

PIER 3

EAST ELEVATION VIEW

N.T.S.

Depth: (ft) 2006
50.0

Depth: (ft) 2002
49.0

STATION: (ft)
1+00

Videos: Not taken due to poor visibility

UNDERMINE HORIZ. VERT.
NONE

FOUNDATION TYPE:
STONE & GRAVEL WITH CONCRETE FILLED TIMBER CRIB

PILE TYPE:
N/A

PILE LENGTH:
N/A

REMARKS:
ELEVATION SKETCH

PIER 4
WEST ELEVATION VIEW

H.T.S.

Depth (ft) 2006: 58.0
Depth (ft) 2002: N/A
Station (ft): 0+00 0+50 1+00

Video Time: Not taken due to poor visibility
Undermine: None
Foundation Type: Stone & gravel with concrete filled timber crib
Pile Type: N/A
Pile Length: N/A

Remarks:
ELEVATION SKETCH

PIER 4

EAST ELEVATION VIEW

N.T.S.

Depth: (ft) 2006  55.0
Depth: (ft) 2002  N/A

STATION: (ft)  1+00  0+50  0+00

VIDEO TIME: Not taken due to poor visibility
UNDERMINE HORIZ./VERT.: NONE

FOUNDATION TYPE: STONE & GRAVEL WITH CONCRETE FILLED TIMBER CRIB
PILE TYPE: N/A
PILE LENGTH: N/A

REMARKS:
ELEVATION SKETCH

PIER 5
WEST ELEVATION VIEW

Depth (ft): 2006
Depth (ft): 2002 N/A

Station (ft): 0+00 0+50 1+00

Video Time: Not taken due to poor visibility

Undermine Horiz./Vert.: None

Foundation Type: Stone & Gravel with Concrete Filled Timber Crib

Pile Type: N/A

Pile Length: N/A

Remarks:
ELEVATION SKETCH

PIER 5
EAST ELEVATION VIEW

**SOUTH FACE BROKEN STONE**

- **+20% MORTAR LOSS THROUGHOUT THE PIER**

**TOP OF SILLAGE EL. -11'**
**TOP OF CRIIB EL. -17'**

- **GAPS BETWEEN TIMBERS 1" TO 2" WITH 1" TO 3" PENETRATION TYPICAL**

- **2006 WULLINE**

**N.T.S.**

**Depth (ft):**
- 2006: 54.0
- 2002: N/A

**Station (ft):**
- 1+00
- 0+50
- 0+00

**Video Time:** Not taken due to poor visibility

**Foundation Type:** STONE & GRAVEL WITH CONCRETE FILLED TIMBER CRIB

**Pile Type:** N/A

**Pile Length:** N/A

**Remarks:**
UNDERWATER BRIDGE INSPECTION AND CONDITION REPORT

BIN 29.08 REGION 8 COUNTY 6 Sheet 23 of 35
FEATURE CARRIED Poughkeepsie Railroad Bridge FEATURE CROSSED Hudson River
INSPECTED BY James V. Green TITLE P.E/DIVER DATE 11/07/2006

SOUNDING DATA

PLAN VIEW N.T.S.

DATUM: PIER 2
DATE 11-07-06 TIME 9:52AM

CHANNEL BOTTOM DESCRIPTION RIP-RAP, CONC. DEBRIS, SILT
SCOUR PROTECTION RIP-RAP.
UNDERWATER BRIDGE INSPECTION AND CONDITION REPORT

BIN 29.06 REGION 8 COUNTY 6 Sheet 24 of 35
FEATURE CARRIED POUGHKEEPSIE RAILROAD BRIDGE FEATURE CROSSED HUDSON RIVER
INSPECTED BY James V. Green TITLE P.E./DIVER DATE 11/07/2006

SOUNDED DATA

UNIT: PIER 3 DIVER'S CONFIRMATION:

PLAN VIEW

N.T.S.

CHANNEL BOTTOM DESCRIPTION RIP-RAP, CONC. & SILT DEBRIS, SILT
SCOUR PROTECTION RIP-RAP.
SOUNDING DATA

CHANNEL BOTTOM DESCRIPTION: RIP-RAP, CONC. & STEEL DEBRIS, SILT
SCOUR PROTECTION: RIP-RAP.
UNDERWATER BRIDGE INSPECTION AND CONDITION REPORT

BIN 29.08  REGION 8  COUNTY 6  Sheet 26 of 35
FEATURE CARRIED  Poughkeepsie Railroad Bridge
INSPECTED BY  James V. Green  TITLE  P.E./DIVER
FEATURE CROSSED  Hudson River  DATE 11/07/2006

SOUNDING DATA

UNIT: PIER 5  DIVER'S CONFIRMATION: [Signature]

PLAN VIEW

N.T.S.

CHANNEL BOTTOM DESCRIPTION  RIP-RAP, CONC. DEBRIS, SILT
SCOUR PROTECTION  RIP-RAP.

DATUM: PIER 5  DATE 11-02-06  TIME 10:41AM

[Diagram of underwater bridge with sounding data and plan view]
PHOTOGRAPHS
PHOTO NO.: 1
LOCATION: Upstream
DESCRIPTION: General View
Looking North
REFERENCES: N/A

PHOTO NO.: 2
LOCATION: Downstream
DESCRIPTION: General View
Looking South
REFERENCES: N/A
PHOTO NO.: 7
LOCATION: Pier 3
DESCRIPTION: General View
Looking Southeast

REFERENCES: N/A
PHOTO NO.: 9
LOCATION:
Pier 4

DESCRIPTION:
General View
Looking Southeast

REFERENCES: N/A

PHOTO NO.: 10
LOCATION:
Pier 4

DESCRIPTION:
General View
Looking Northwest

REFERENCES: N/A
PHOTO NO.: 11
LOCATION: Pier 5
DESCRIPTION: General View
Looking Southeast
REFERENCES: N/A

PHOTO NO.: 12
LOCATION: Pier 5
DESCRIPTION: General View
Looking Northwest
REFERENCES: N/A
DESCRIPTION:
Didson Sonar image of void area on west face of pier. Note large stone fill.

REFERENCES:
BR356c - Item 24
Rated - 3

DESCRIPTION:
Didson Sonar image of void area on west face of pier. Note inner timber cribwall still intact.

REFERENCES:
BR356c - Item 24
Rated - 3