

Ames Intermodal Project Cast in Place Concrete Stair Repair Proposal

July 27, 2012

Issue/ Background:

While walking punchlist Neumann Monson noticed cracks at the center span of the bottom of the elevated cast in place concrete stairs. Neumann Monson then proceeded to have Terracon conduct a scan of the stairs with ground penetrating radar in order to determine if the concrete reinforcing was installed correctly. The results are in the attached report entitled **Exhibit A**. In short it was determined that the reinforcing sizing was correct, however the bottom mat of steel consisting of #6 bars at 9" o.c. in the long direction and #4 bars in the short direction had moved up vertically, particularly at the middle of the span. It is assumed that the bars were installed in the correct position initially as they were inspected by Team Services prior and during the pour.

After notification by Neumann Monson, Weitz engineered a temporary shoring detail for the stairs and conducted destructive testing (removed a small area of concrete adjacent to one of the cracks) to confirm Terracon's findings. Weitz did this and confirmed Terracon's findings.

At that time Neumann Monson instructed Weitz to propose possible solutions to resolve the issue. A series of solutions has been discussed including removing the curtainwall and completely rebuilding the stair, adding supplemental structural steel members to support the stairs, and lastly, to utilize carbon fiber reinforcing.

Proposed Repair:

Structural Concerns

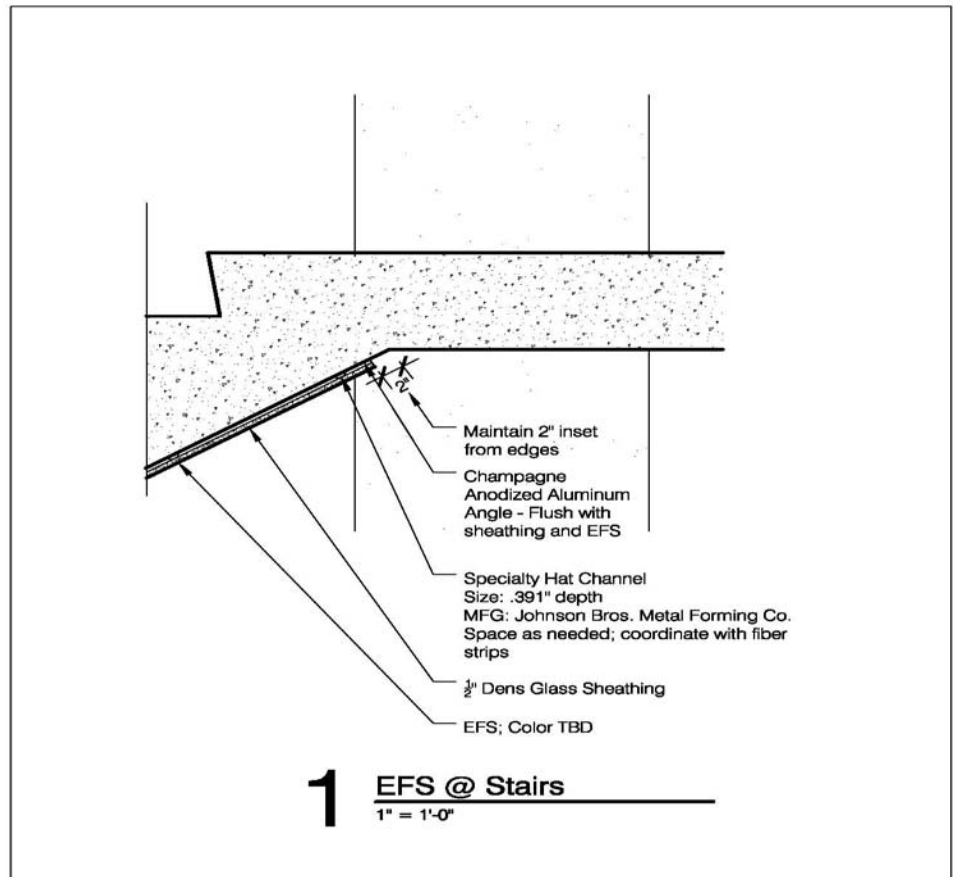
After meeting with representatives of ISU and Cy Ride, Weitz is proposing the use of fiber reinforced carbon at the bottom of the stairs. The fiber reinforcement is laminated with an epoxy coating to adhere it to the bottom of the stairs. This reinforcing is designed to provide the same structural design capacity as the bottom mat of reinforcing that moved up vertically in the concrete. A Sika or a BASF system would be used for this. Both systems have been used extensively for structural repairs of bridge beams, bridge columns, and other cast in place concrete structures. Weitz would assume design responsibility for this repair and will specify the quantity, arrangement, and layout of the carbon fiber.

The repair would include jacking the stairs back to their original position using our shoring system. Then underside surface of the stairs where the carbon fiber is applied is ground down as much as an 1/8" of an inch to provide a clean, fresh surface to adhere the carbon fiber to. The carbon fiber is then applied in a bed of epoxy resin that fully adheres it to the underside of the stairs. The carbon fiber would then be covered in flame/ smoke retardant fire rated coating, Topcoat FRL is the name of this product and both the Sika and BASF products are compatible

with this coating. See the attached **Exhibit B** for product data on the Sika and BASF fiber carbon solutions as well as product data on the Topcoat FRL coating.

Aesthetic Concerns:

ISU, Cy Ride, and Neumann Monson have indicated that aesthetic concerns are critical as well as the structural integrity of any proposed repair. The stairs on this project are key design feature of the building. Therefore, after several meetings and reviewing mock ups of the proposed repairs and possible coating material Weitz is proposing that the repair work be covered by a mechanically attached furring, Dense Glass, and an EIFS system which would produce a “sand” type finish matching the exterior bulkhead adjacent to the Terminal Building. The total thickness of the solution would be approximately 1 inch. A pre finished sheet metal trim piece would be utilized to provide a finished edge of the system.



Warranty

Weitz is prepared to offer a 15 year warranty for the aforementioned stair repair. Likewise, we would be willing to conduct a yearly inspection of the steps to confirm that the repair is functioning properly for the next 5 years. We would report our findings to Cy Ride immediately following the inspection.

Schedule

If released tomorrow, 7/27/2012, Weitz could have crews on site the week of August 6 and be complete with the structural portion of the work by end of day August 17, 2012. Weitz would begin work on the EIFS detail the week of 8/13/2012 and have a maximum of two weeks of installation of this system. Weitz will contact the City of Ames to confirm if they would be willing to grant us a CO for the ramp with only one stair open while the EIFS is installed. Again, Weitz will work diligently to improve this timetable but we do not want to underestimate the time it will take to complete these repairs.

Respectfully Submitted,



Mike L.T. Cooper, LEED AP
Project Manager

NON-DESTRUCTIVE TESTING SERVICES REPORT



Report Number: AB123501.0001
Service Date: 06/20/12
Report Date: 06/28/12

EXHIBIT A

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Ames, IA 50010
515-232-0950

Client

Neumann Monson Architects PC
Attn: Brian Warthen
1000 Walnut Street
Des Moines, IA 50309

Project

Intermodal Facility GPR Services
Construction Materials Testing
Ames, IA

Project Number: AB123501

On June 20, 2012, Terracon Consultants, Inc. (Terracon) performed geophysical exploration services at selected locations within the Ames Intermodal Facility in Ames, IA.

PROJECT DESCRIPTION

It is our understanding that cracks are appearing on various stair runs within the facility. The purpose of the geophysical exploration is to gather information to aid in identifying the presence and locations of rebar, and other metal anomalies within the stairs, if applicable.

EXPLORATION METHODS

In general, ground-penetrating radar (GPR) field collection follows the procedures referenced in ASTM D 6432, and more information on both the general method and collection procedures can be found in the standard. GPR utilizes radio waves to detect changes in the subsurface of the area being scanned. Changes or reflections in the signal generally indicate material property changes, such as, but not limited to electromagnetic conductivity and dielectric constant, which in some cases can be qualitatively linked to other material properties such as density. These changes can be effective in identifying the presence and location of items such as subsurface voids, buried concrete, tanks, underground utilities, and embedded reinforcing steel in concrete and masonry structures, among other things.

Terracon used a GPR system consisting of hand-cart-mounted 1600 MHz antenna made by Geophysical Survey Systems Inc. (GSSI) to perform an upper profile geophysical survey. GPR collection was performed using a free-scanning technique to investigate the designated areas.

CONCLUSIONS

Anomalies consistent with rebar and were marked and measured in the field using marking chalk.

Northeast stairwell, 1st run-Ground floor to 1st floor

Anomalies consistent with rebar were seen running the length of the floor run (vertically) at approximately 9 inches on center. Bar was seen running the width of the stair run (horizontally) at approximately 12 inches on center. Concrete cover of the anomalies was approximately 2-3 inches at the bottom of the run and increased to 5-6 inches near the top of the run.

There is a second layer of vertical bars extending approximately 5 feet at the top and the bottom of the run. This layer has around 6 inches of concrete cover.

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Northeast stairwell, 2nd run- 1st floor to 2nd floor

Anomalies consistent with rebar were seen running the length of the floor run (vertically) at approximately 9 inches on center. Bar was seen running the width of the stair run (horizontally) at approximately 12 inches on center. The concrete cover on this run again started at approximately 2-3 inches, but increased to nearly 7 inches by the top of the run.

There is a second layer of vertical bars extending approximately 5 feet at the top and the bottom of the run. This layer has around 6 inches of concrete cover.

Southwest stairwell, 1st run- Ground floor to 1st floor

Anomalies consistent with rebar were seen running the length of the floor run (vertically) at approximately 9 inches on center. Bar was seen running the width of the stair run (horizontally) at approximately 12 inches on center. The concrete cover on this run started near 2-3 inches. It was nearly 8 inches by the middle of the run, and ended at the top of the run back near 3-4 inches.

There is a second layer of vertical bars extending approximately 5 feet at the top and the bottom of the run. This layer has around 6 inches of concrete cover.

Southwest Stairwell, 2nd run- 1st floor to 2nd floor

Anomalies consistent with rebar were seen running the length of the floor run (vertically) at approximately 9 inches on center. Bar was seen running the width of the stair run (horizontally) at approximately 12 inches on center. The concrete cover on this run started near 2-3 inches. It was nearly 8 inches by the middle of the run, and ended at the top of the run back near 3-4 inches.

There is a second layer of vertical bars extending approximately 5 feet at the top and the bottom of the run. This layer has around 6 inches of concrete cover.

Terracon attempted to size the rebar in each run, but due to the depth of the rebar and difficulties calibrating the GPR and FerroScan unit, the rebar sizes were not able to be measured with high confidence. The measurements taken apparently indicate the vertical bars to be #6, while the horizontal bars were #4.

LIMITATIONS

It should be noted that, as with any geophysical testing method, the process relies on instrument signals to indicate physical conditions in the field. Signal information can be affected by on-site conditions beyond the control of the operator such as but not limited to, soil/concrete types, soil/concrete moisture, and/or reinforcing steel spacing. Interpretation of those signals is based on a combination of known factors combined with the experience of the operator and geophysical scientist evaluating

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the results. Utilizing conventional observation, sampling and testing ("truthing") of select areas is highly recommended to confirm the results from the GPR scans. As with all geophysical methods, the GPR results provide a level of confidence but should not be considered precise or absolute, and should not be used for construction purposes. We cannot be responsible for the misinterpretation of unverified GPR results by others.

Services:

Terracon Rep.: Robert Kramer

Reported To:

Contractor:

Report Distribution:

(1) Neumann Monson Architects PC,
Brian Warthen

(1) Terracon Consultants, Inc., Michael
Sampson

Reviewed By:

Michael L. Sampson

Construction Services Manager

The tests were performed in general accordance with applicable ASTM, AASHTO, or DOT test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.