



collaborāte / formulāte / innovāte

June 30, 2015

Ms. Sue Olson, P.E.  
City of Appleton  
100 North Appleton Street  
Appleton, WI 54911

SUBJECT: Appleton East High School StormTrap Structural Inspection

Dear Sue:

GRAEF was hired by the City to enter both Phase 1 and Phase 2 of the Appleton East High StormTrap storage system and provide the structural observation of the StormTrap units. The units were inspected for new structural defects, status of previous defects, and status of previous repairs. The repair letter provided by StormTrap for crack repair during Phase 1 was used as the basis of inspection for cracks observed in the units. The Phase 1 system was inspected on June 22 and Phase 2 was inspected on June 23.

**Phase 1 StormTrap System** – The general condition of the StormTrap units has not appeared to change since the last inspection last year. There were minimal new cracks observed and the new cracks observed were hairline cracks with a width less than .013", thus not requiring repair. The existing repairs appear to be unchanged from a year ago (Photos 1 & 2), except for the following existing repairs:

**J2** – Previous crack repair does not appear to have sealed the crack or the crack has opened wider-failing the repair. Crack width is approximately .06", recommend Type 3 Crack Repair. Photo 3

**G2** – Previous crack repair does not appear to have sealed the crack or the crack has opened wider-failing the repair. Crack width is approximately .04", recommend Type 3 Crack Repair. Photo 4

**G3** – Previous crack repair does not appear to have sealed the crack or the crack has opened wider-failing the repair. Crack width is approximately .05", recommend Type 3 Crack Repair.

**E31** – Rust is coming through the existing repair. The corrosion appears to be minor, recommend cleaning and recoating. Photo 5

**C16** – One side of crack is not sealed - opposite side was previously sealed. Crack width is approximately .04", recommend Type 2 Crack Repair (similar to opposite side repair) Photo 6

**Phase 2 StormTrap System** – The general condition of the StormTrap units appeared to be very good. Minimal additional hairline cracks (width less than .013”) were observed as well as some extended lengths of existing hairline cracks. Existing repairs appeared to be in sound condition. Photos 7-10. The following deficiencies were noted:

**D21** – Corrosion has started in exposed reinforcing that was previously coated. Recommend cleaning and recoating. Photo 11

**J15** - .02” wide crack in West vertical leg. Recommend Type 2 Crack Repair. Photo 12

**M20** - .02” wide crack in West vertical leg. Recommend Type 2 Crack Repair. Photo 13

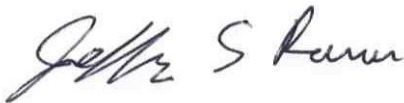
**Conclusion:**

Overall, the general condition of the StormTrap units appears to be very good. There does not appear to be many new defects that have occurred over the past year. The defects that have occurred are minimal in number and minor in defect. Based upon the recent inspection and minimal defects over the past year, it appears the StormTrap units have settled into place, and minimal future movement (potentially creating cracks) is expected.

Going forward we recommend another structural inspection in four years to coincide with the end of the current MIC contract. At that point a schedule can be discussed to review the StormTrap system and identify any areas of structural concern.

Please contact with any questions.

Sincerely,



Jeffrey S. Rosner, P.E.  
Principal

En: StormTrap Crack Repair Procedure

cc: Jim Hansen



**Photo 1 – Existing Repair**



**Photo 2 – Existing Epoxy Repair**



Photo 3 – J2, Open Crack at Repair



Photo 4 – G2, Open Crack Repair.





Photo 5 – E31, Minor corrosion at rebar coating.



Photo 6 – C16, Side of crack shown not previously repaired.



Photo 7 – Shim Protection

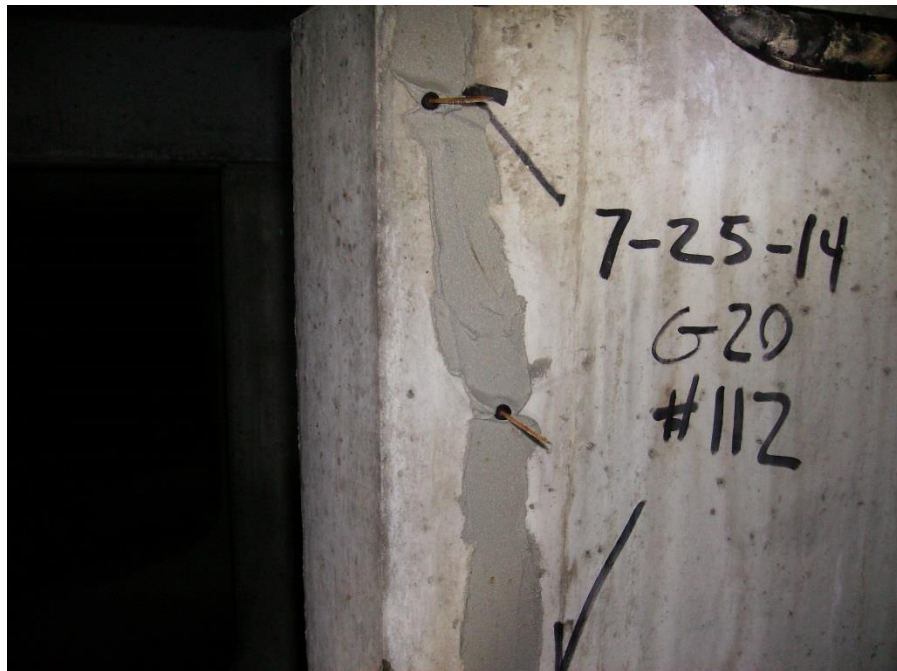


Photo 8 – Previous Repair





Photo 9 – Previous Repair



Photo 10 – Previous Repair



Photo 11 – D21, Minor corrosion at repair.

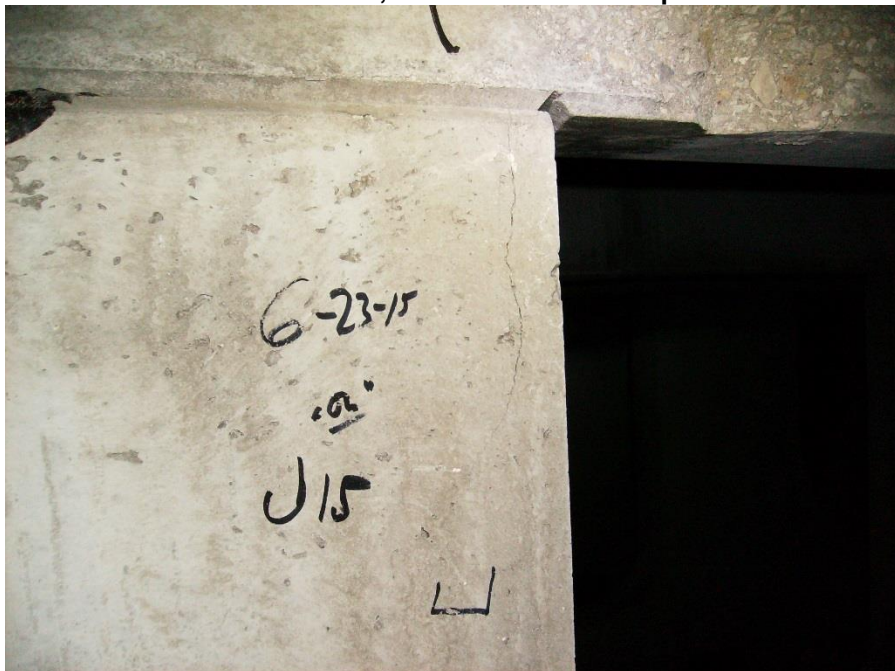


Photo 12 – J15, Vertical Crack



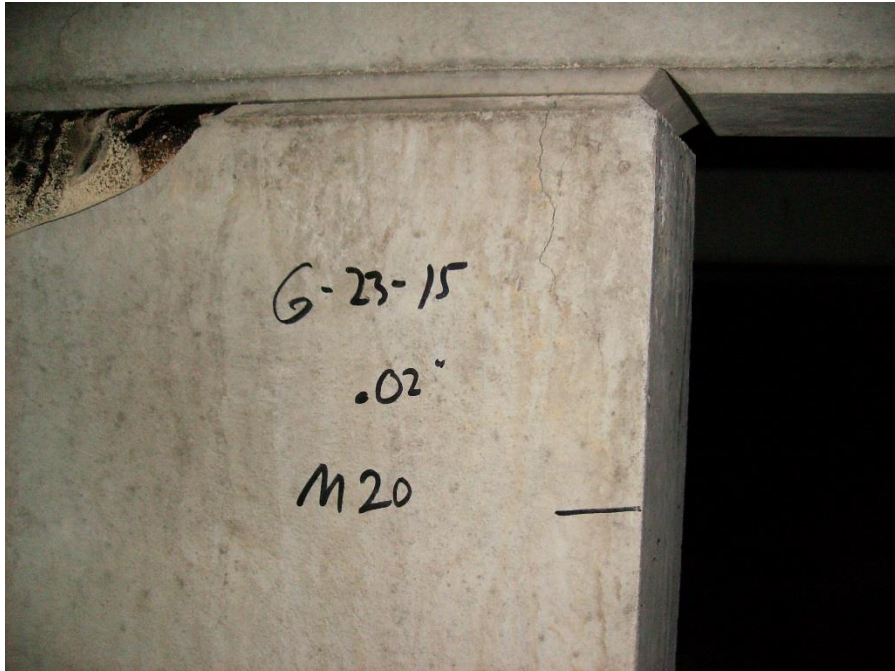


Photo 13 – M20, Vertical Crack



2495 W. Bungalow Rd. Morris, IL 60450  
P. 877.867.6872  
F. 815.416.1100  
www.STORMTRAP.com

City of Appleton  
100 North Appleton Street  
Appleton, WI 54911

Re: Crack Repair Identification Procedure – Appleton East HS Emmers Drive

StormTrap designs, manufactures and sells precast concrete storm water management systems throughout the United States and internationally for many uses including, but not limited to, storm water detention, retention, harvesting and water quality.

StormTrap is manufactured by NPCA certified manufacturing facilities. Through the NPCA certification, these facilities are required to adhere to strict quality control/quality assurance standards. These standards are one of the key components which allows StormTrap to provide the superior product that it does.

StormTrap modules are produced using 6,000 psi concrete and are structurally designed to accommodate HS-20 loading. Due to the inherent properties of reinforced precast concrete, cracking can occur during the shipment and installation process. This is an anticipated occurrence, which in most cases requires no attention. This document was prepared in attempt to help more clearly define 'extents' of cracking observed, what procedures/repairs need to be implemented, and ultimately, facilitate a smooth installation at the Appleton East High School on Emmers Drive.

Throughout the duration of delivery to the jobsite, a StormTrap representative will be available to inspect the StormTrap pieces prior to offloading. If any damage to a piece is observed prior to offloading, the StormTrap representative will inspect the piece for the purpose of documenting the location & description of the damage. As directed by the StormTrap representative, and unless the piece has been damaged beyond repair, the piece shall be offloaded & installed. The alpha-numeric location of the piece, as it pertains to the StormTrap shipping layout, shall be included on the documentation for all pieces with damage. Repairs required for pieces arriving directly from a StormTrap manufacturing facility which have experienced cracking/damage prior to off-loading shall be the responsibility of StormTrap. Pieces arriving from Midwest Industrial Coatings facility which have experienced cracking/damage prior to off-loading and require repair, shall be the responsibility of MIC. Once the pieces have been removed from the transporting truck, Radtke Contracting shall take responsibility of and therefore be responsible for any damage to pieces unrelated to any cracking/damage identified prior to offloading.

The following document identifies 3 different types of cracking occurrences that can be remedied on site. The document applies to cracking that may be observed during inspection of the pieces at the time of delivery, during installation, or after backfill. Cracking occurrences outside of these 3 specific categories are to be reviewed by StormTrap on a case-by-case basis. Chipping and spalling shall be addressed in the field on a case by case basis by the StormTrap representative. As a rule of thumb, if concrete has chipped or spalled off large enough to expose rebar, high strength, non-shrink grout shall be used to patch chip/spall.



Figure 1

### Type 1

The first type of crack which may be observed is a crack which would be 0.013" or smaller in width. These are cracks which are typically observed as a result of the shipment process and are identified as 'aesthetic' cracking. These cracks do not pose any structural concern and require no attention. An example of this can be seen in Figure 1.

### Type 2

The second type of crack which can occur is identified as being greater than 0.013" and equal to or less than 0.040" in width. Structurally, the only concern with this crack is potential migration of water into the crack which in long term applications could promote corrosion of the internal structural steel. Therefore, simply a sealant over the crack is suggested to deter water from permeating further into the precast section. Sikadur Crackfix is suggested for use in these applications to 'cover' the crack. Manufacturer's specifications should be followed in applying the material correctly and a Sika representative should be contacted for any clarification or questions regarding application (Product Detail Sheet attached). See Figure 2 for an example.



Figure 2

### Type 3

The third type of crack which could be encountered is identified as being greater than 0.040" and equal to or less than 0.080" in width. Cracks at this width require a 'structural material' to impregnate the gap and provide a structural transference of load through the crack. These cracks, as identified in Figure 3, should be repaired using a structural epoxy injection. Sikadur 35, Hi-Mod LV LPL is recommended for this application. Manufacturer's specifications should be followed in applying the material correctly and a Sika representative should be contacted for any clarification or questions regarding application (Product Detail Sheet attached).

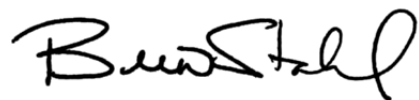


Figure 3



If you have any questions or concerns, please do not hesitate contact me at your convenience.

Regards,

A handwritten signature in black ink, reading "Brian Stahl". The signature is fluid and cursive, with the first name "Brian" and last name "Stahl" clearly distinguishable.

Brian Stahl, P.E.  
StormTrap, LLC  
Vice President - Operations

**Brian Stahl, P.E.**

2495 W. Bungalow Rd. Morris, IL 60450  
Phone: 815-416-0900 ext. 165 Fax: 815-416-1100 E-Mail: bstahl@stormtrap.com