

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

RECEIVED

JUN 05 2015

PUBLIC SERVICE
COMMISSION

In the Matter of:

APPLICATION OF BULLITT UTILITIES, INC.)
FOR A CERTIFICATE OF CONVENIENCE AND) CASE NO 2014-00255
NECESSITY AND SURCHARGE FOR SAME)

PRE-FILED TESTIMONY OF CHRIS CRUMPTON

1. What is your name and business address?

Answer: My name is Chris Crumpton, and my business address is Bluestone Engineers, PLLC, 3703 Taylorsville Road, Louisville, Kentucky 40220-1354.

2. Are you an engineer, and, if so, please state your engineering qualifications.

Answer: Yes. I obtained my degree as a Civil Engineer from the University of Kentucky in 1995. Since that time, I have become licensed as a Professional Engineer, and am licensed to practice as an engineer in Kentucky, Indiana, Illinois, Ohio, and Georgia. I have provided engineering design services for wastewater treatment systems and wastewater treatment plants for entities located in Kentucky, including the Louisville and Jefferson County Metropolitan Sewer District, the Oldham County Environmental Authority and others.

3. Are you familiar with the Hunters Hollow Wastewater Treatment Plant site and how did you become familiar with it?

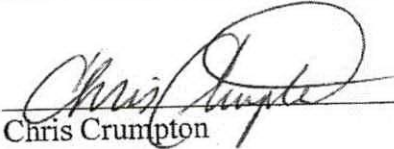
Answer: Yes. Bullitt Utilities retained me to conduct an investigation of the Hunters Hollow collection system and I have prepared a Sanitary Sewer Evaluation Study of that collection system. Additionally, I was contacted to conduct an investigation of the Hunters Hollow WWTP after it failed on or about March 29, 2015.

4. Did you in fact conduct an investigation of the Hunters Hollow WWTP, and did you issue a report containing the details of your investigation?

Answer: Yes. As stated in Attachment A to my Pre-Filed Testimony, I inspected the Hunters Hollow WWTP site on several occasions and my conclusions after conducting this investigation are set forth in Attachment A.

5. In your opinion, was the failure of the Hunters Hollow WWTP due to a design flaw or due to lack of maintenance?

Answer: Based on my inspection of the concrete foundation of the Hunters Hollow WWTP, and the determination that there was no reinforcing steel in the outer foundation area, the failure of the WWTP appears to be the result of this design flaw. In my opinion, lack of maintenance was not a cause or contributing factor of the failure of the Hunters Hollow WWTP.

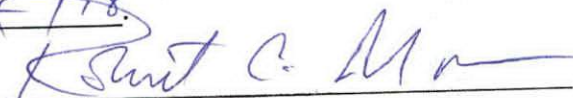

Chris Crumpton

STATE OF KENTUCKY


COUNTY OF FRANKLIN

SUBSCRIBED AND SWORN to before me by Chris Crumpton, this the 5th day of June, 2015.

My Commission expires: 2/27/18.


NOTARY PUBLIC

Respectfully submitted,

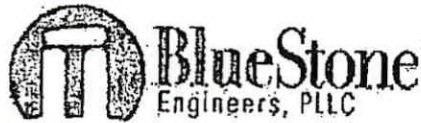

Robert C. Moore
HAZELRIGG & COX, LLP

CERTIFICATE OF SERVICE

I hereby certify that a true and correct copy of the foregoing was served by hand delivery on Jeff Derouen, Executive Director, Public Service Commission, 211 Sower Blvd., P.O. Box 615, Frankfort, Kentucky 40602 and United States Mail and electronic mail to Gregory T. Dutton and Jennifer Black Hans, Assistant Attorney General, 1024 Capital Center Drive, Suite 200, Frankfort, Kentucky 40601-8204, on this the 5th day of June, 2015.



Robert C. Moore



Mr. Robert C. Moore
Hazelrigg & Cox, LLP
415 West Main Street
P. O. Box 676
Frankfort, KY 40602-0676

April 30, 2014

SUBJECT: Hunters Hollow Treatment Plant
Field Inspection for Steel Tank
Bullitt County, Kentucky

Dear Mr. Moore:

This letter serves as a summary of a structural field inspection and review of site conditions for the recent tank failure at the Hunters Hollow Treatment Plant in Bullitt County, Kentucky:

The field review noted that multiple sections of the steel aeration tank separated from both the concrete foundation and clarifier tankage spilling contents of the treatment facility across the site and parking area. A temporary treatment system has been installed on-site to currently handle treatment of as much flow as possible. Sections of the steel aeration tank were observed laying at different locations just outside the tank's original perimeter with some sections intact while others had been cut to allow sections to be stacked near each other.

Inspection of the existing welds did not identify that structural tank failure occurred at these weld joints, as can be seen in the attached photographs. The steel tank pieces were welded to a piece of 8" channel to join the tank that was originally set in a concrete foundation about 4" deep (on the channel). These steel tank pieces and channel were observed to have been ripped out of the concrete foundation of the tank. Additionally, large chunks of concrete foundation were scattered about the site and around the steel tank pieces that had been stacked.

Since the lower portion of the tank receives a higher structural load and based on review of the channel pulled from the concrete foundation, we have estimated that separation must have occurred at the bottom of the tank and from a possible rupture or failure directly at the concrete foundation level. This could have been caused from concrete cracking, or insufficient sub-surface conditions that allows differential settlement. It was noted from talking with the treatment plant operator that this site has typically been identified as a wet "swampy" area adjacent to this existing stream.

We were unable to inspect the tank concrete foundation in detail due to the great amount of sludge that was covering the entire foundation section. Once this material has been cleared from the site additional inspection of the concrete foundation slab is recommended. Additionally, testing by a geotechnical engineer to determine concrete foundation thickness, soil testing beneath the slab, and depth to rock is also

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ATTACHMENT A



recommended. This could also determine if any groundwater is present underneath the slab. Additionally, once the sludge has been removed specific areas of the concrete foundation can be further inspected to identify if the exact location of the failure can be determined.

As can be expected, the portion of the exterior wall of the main aeration tank still standing was more heavily reinforced in the area connected to the digester tank and interior clarifier tank, as well as being supported by the stairs and connecting catwalks at this location. This section is still standing and pieces of the steel tank separated from this section at the welds due to the force of the wall being pulled out of the concrete foundation.

Again, we recommend that additional inspection and testing be performed in order to identify more details of the failure.

If you have questions please do not hesitate to give me a call at (502) 292-9288.

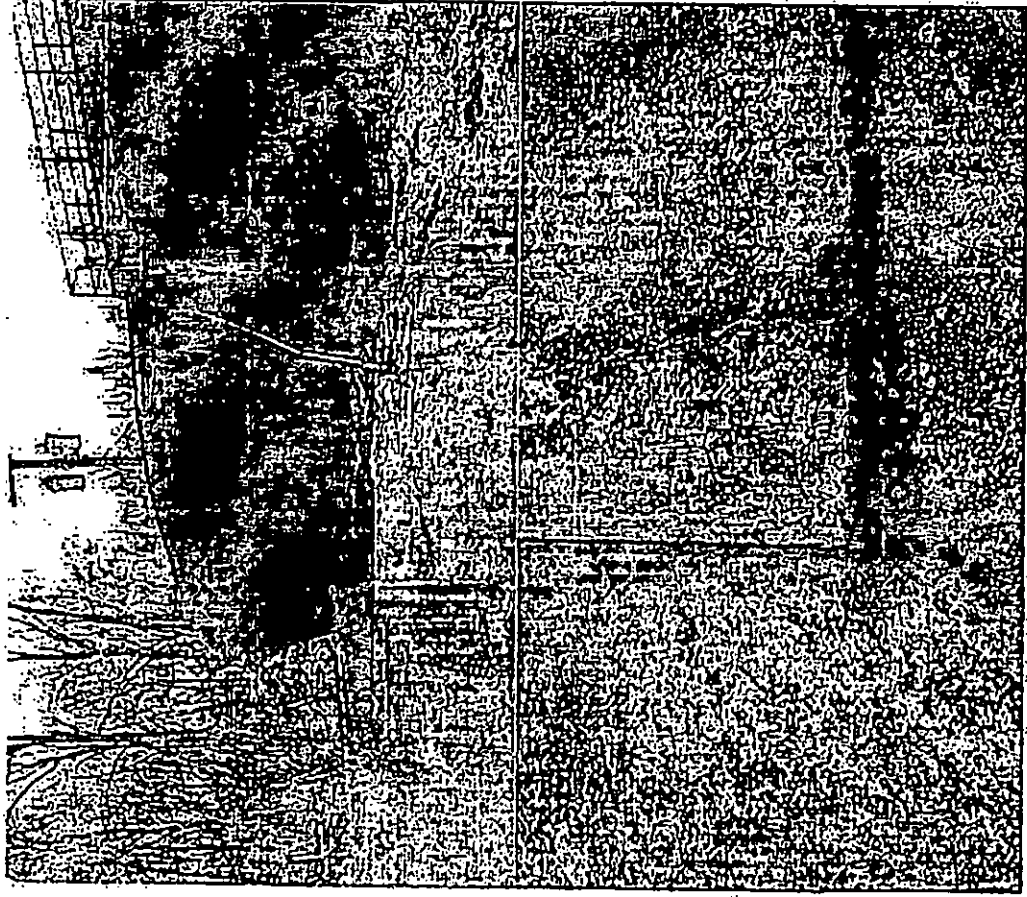
Sincerely,

A handwritten signature in cursive script, appearing to read 'Chris Crumpton'.

Christopher T. Crumpton/Civil Engineer

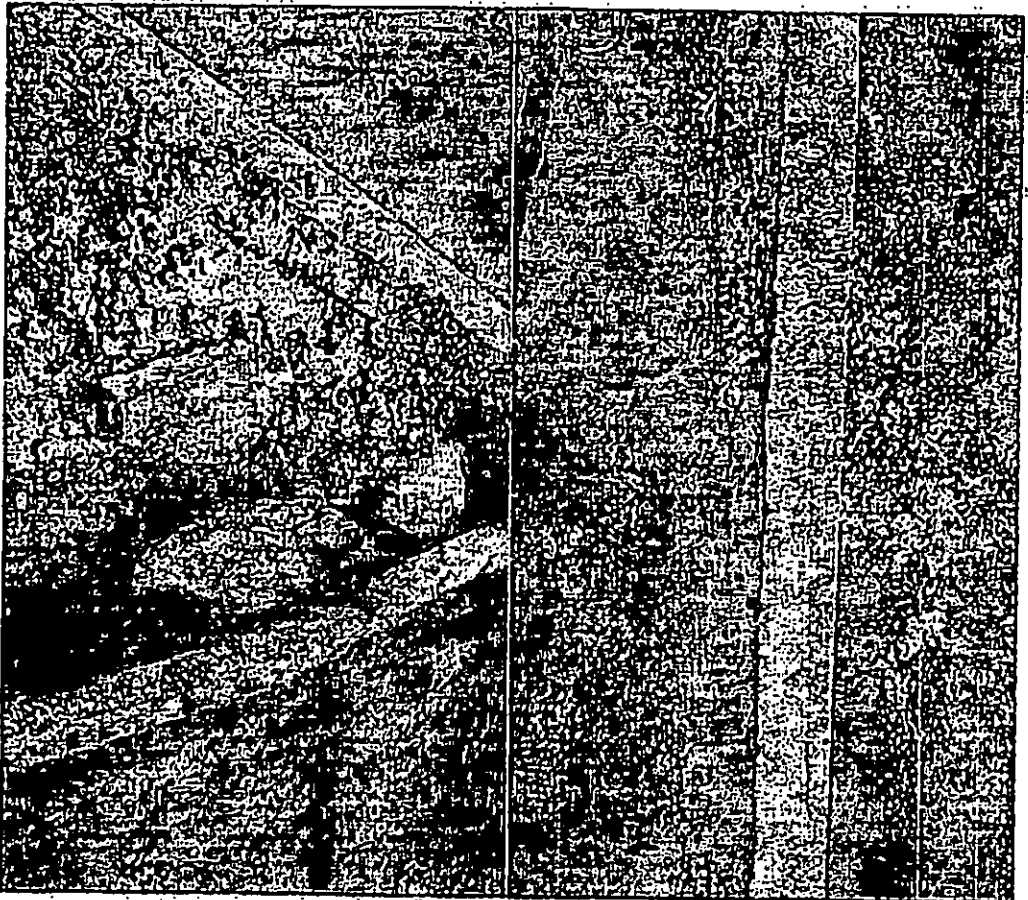
A handwritten signature in cursive script, appearing to read 'Robert T. Trautwein'.

Robert T. Trautwein/Structural Engineer



BlueStone
Engineers P.L.L.C.

TRAUTWEIN
ENGINEERING





TRAUTWEIN
ENGINEERING

BlueStone
Engineers, PLC





Mr. Robert C. Moore
Hazelrigg & Cox, LLP
415 West Main Street
P. O. Box 676
Frankfort, KY 40602-0676

July 22, 2014

SUBJECT: Hunters Hollow Treatment Plant
Field Inspection & Analysis for Structural Slab/Foundation
Bullitt County, Kentucky

Dear Mr. Moore:

Background:

This letter serves as a summary of an additional structural field inspection to review the concrete foundation and slab for the subject treatment plant, after the sludge was vacuumed out to clean the area. The purpose of the inspection was to check the remaining concrete slab under the original tank, and to inspect the foundation area where the steel tank sides (and channel) were pulled away from the foundation during the failure. Reference Exhibit "A" to identify location of pictures taken during the review process (Exhibit "A" is an aerial view of the site prior to the failure looking east towards Blue Lick Road).

The field review noted that the "interior" concrete slab was actually in very good condition and did not show signs cracking or settlement (Exhibit "B"). A concrete scan was not performed, but the interior slab should have steel reinforcement that held the slab in place during the failure of the tank. While not all of the slab was visible due to some portions still remaining covered with sludge material and/or the remaining section of reinforced mixing tank/stairs and clarifier, Exhibit "C" shows the areas that were cleared and visible, mostly on the west side to the south and southeast (a majority of the slab that existed under the area of the aeration tank that failed).

Interior Slab Review:

The concrete slab "edge" where the concrete abutted the steel tank channel on the interior side is in good condition as shown in Exhibit "D". Only a couple damaged locations are shown along this interior edge, from where the temporary welded steel reinforcement bars were installed in the foundation at the time of the initial concrete pour to provide a connection for the tankage while the steel channel was installed and the second concrete pour for the foundation was completed. Exhibit "D" additionally shows various locations along the exterior foundation slab indicating the variable width of concrete slab on the "exterior" portion of the foundation. These widths range from only 4 or 5 inches, all the way up to 2 feet.



The most notable area of damage is shown in the southeast quadrant of the tankage – this area looks to have received the most damage along the exterior foundation as compared to rest of the perimeter foundation – this can be seen in Exhibit "E".

Most important to note is that none of the exterior portion of the concrete foundation that held the steel channel in place includes structural steel reinforcement. Upon failure of the tank and foundation, when the steel channel was pulled from the foundation, these exterior pieces of concrete slab separated into typical 3' and smaller sections that are scattered around the site. Examples of some of these exterior foundation slab pieces are shown in Exhibit "F". These exterior slab pieces were found as far as 100 feet away from the tank foundation site.

Note from our initial inspection letter dated April 30, 2014:

"Inspection of the existing welds did not identify that structural tank failure occurred at these weld joints, as can be seen in the attached photographs. The steel tank pieces were welded to a piece of 8" channel to join the tank that was originally set in a concrete foundation about 4" deep (on the channel). These steel tank pieces and channel were observed to have been ripped out of the concrete foundation of the tank. Additionally, large chunks of concrete foundation were scattered about the site and around the steel tank pieces that had been stacked."

Conclusion:

From inspection of the interior slab condition (very good), as well as inspection of the exterior of the foundation section (pieces that have broken off from the foundation and are scattered about the site) this is indicative of a shear failure of the concrete foundation between the interior and exterior sections of the foundation where the steel channel was installed, see Exhibit "G" for typical detail. Since the exterior portion of the concrete foundation did not include any additional steel reinforcement, the section of foundation from the steel channel outward separated along the shear plane and pulled free from the interior foundation and slab during the failure of the plant. Most likely this occurred at the exterior foundation's weakest point along the perimeter, which from the review of the perimeter damage seems to be at location "X" as seen in Exhibit "A" and "B", and as shown on Exhibit "E". Pictures of the exterior foundation pieces showing the shear plane are shown on Exhibit "F".

As discussed previously, additional testing may be performed by a geotechnical engineer to excavate the existing slab at specified locations to compare depth and thicknesses of the concrete slab and foundation, however this may not be needed since it is apparent that:

1. Along the exterior of the concrete foundation that the slab and foundation thickness varies.



2. The exterior portion of the concrete foundation did not include steel reinforcement to account for "tension" force created by the channel pulling out of the foundation. Thus, the many pieces of concrete foundation that separated from the tank foundation demonstrate this smooth "shear plane" on their interior side.
3. The interior slab looks to be in excellent condition

If you have questions please do not hesitate to give me a call at (502) 292-9288

Sincerely,

A handwritten signature in cursive script, appearing to read 'Chris Crumpton'.

Christopher T. Crumpton/Civil Engineer

A handwritten signature in cursive script, appearing to read 'Robert T. Trautwein'.

Robert T. Trautwein/Structural Engineer



Exhibit "A" – Hunters Hollow WWTP
(looking East)



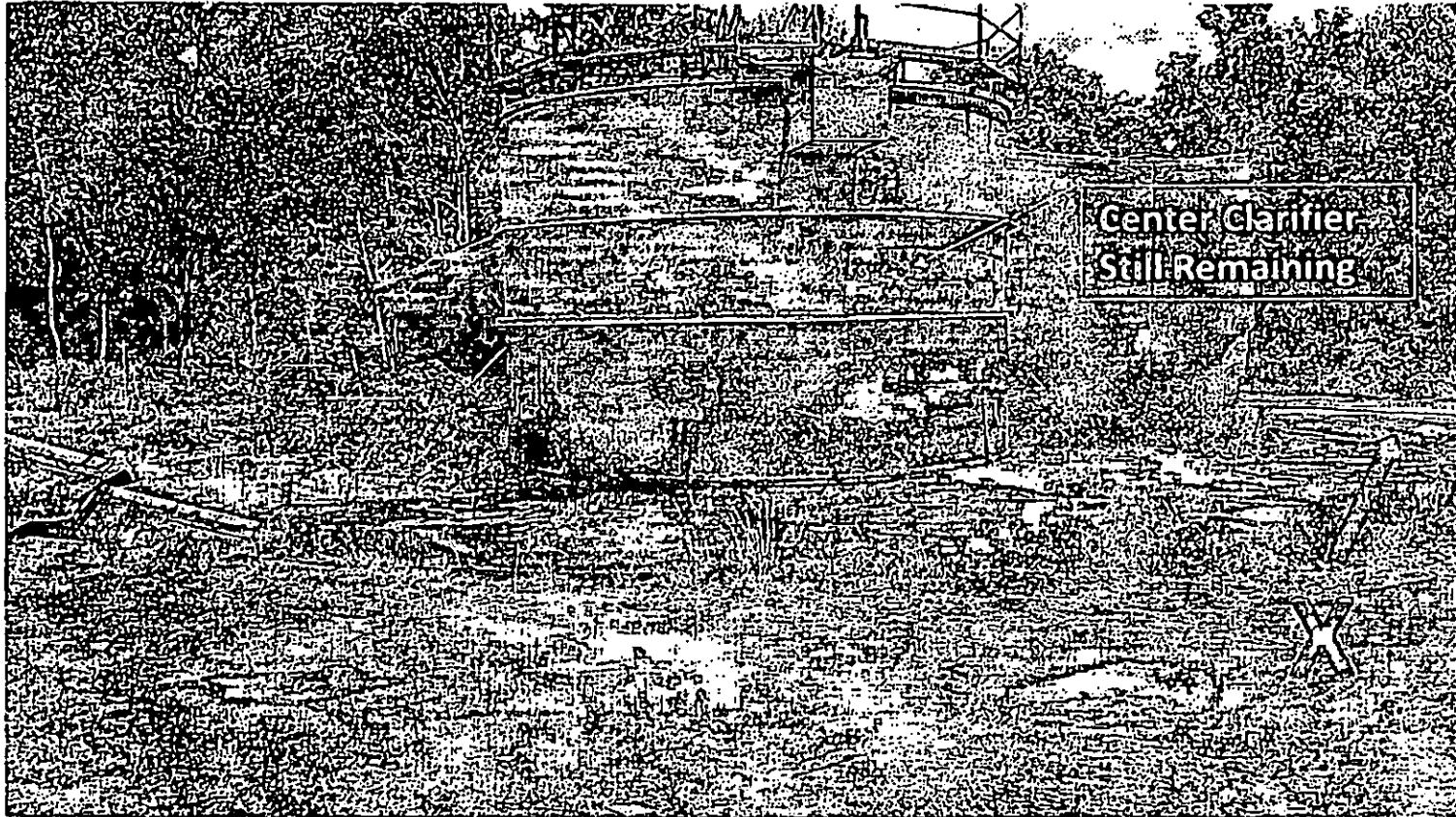


Exhibit "B" – Interior Concrete Slab
(looking East)



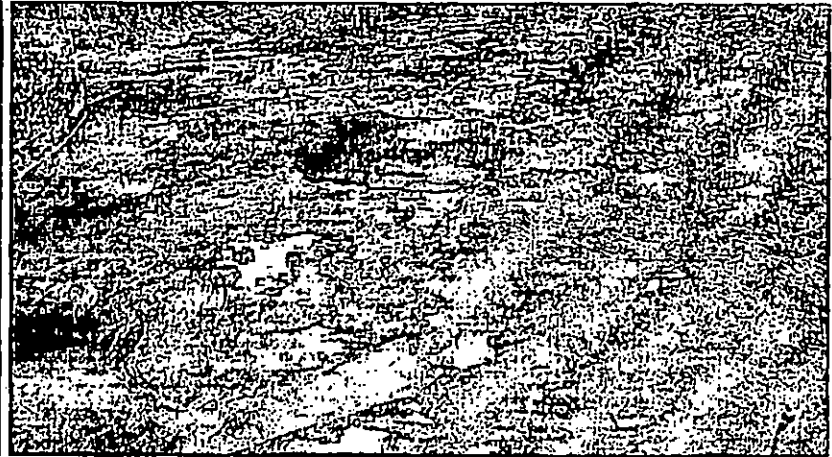


Exhibit "C" – Interior Concrete Slab



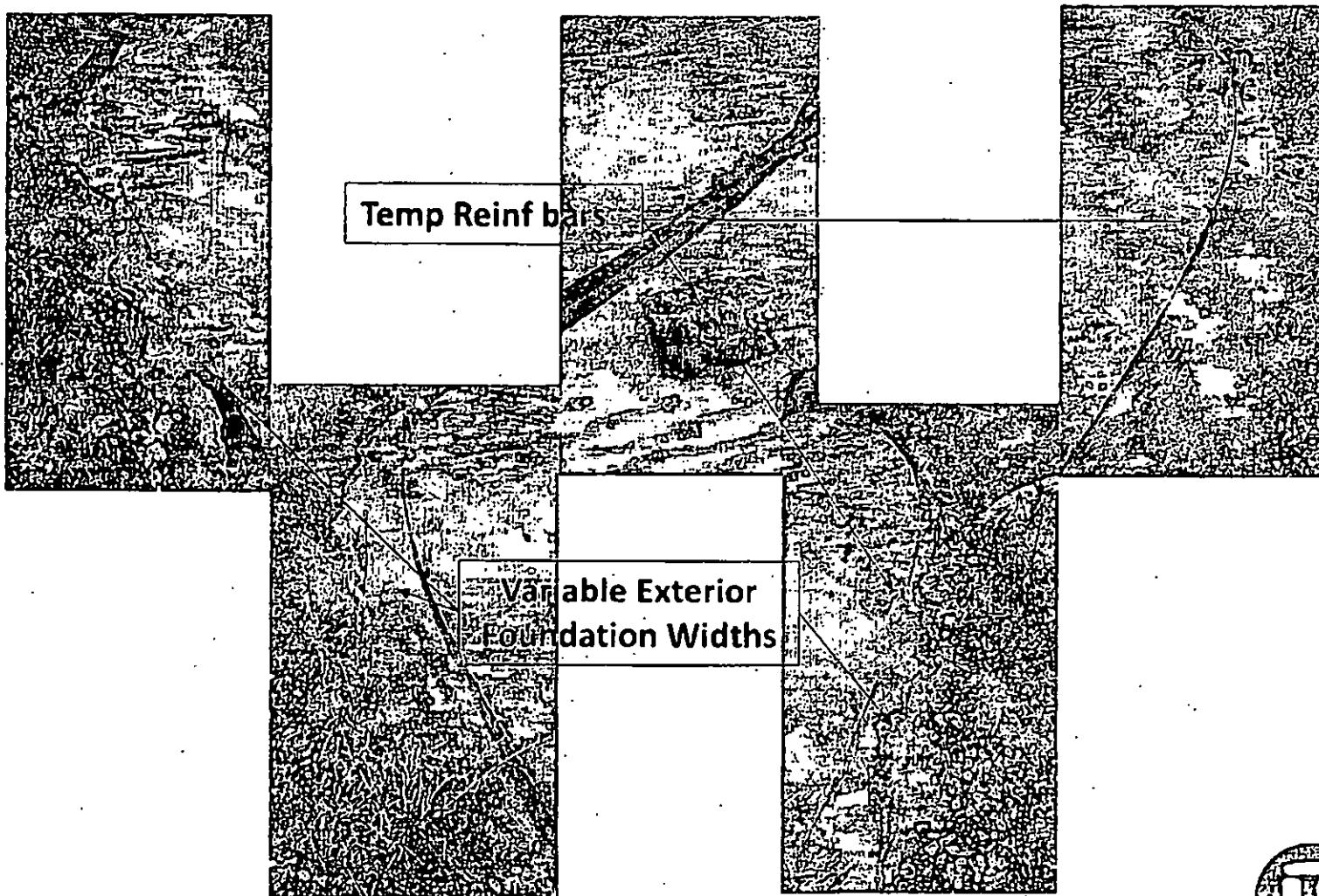
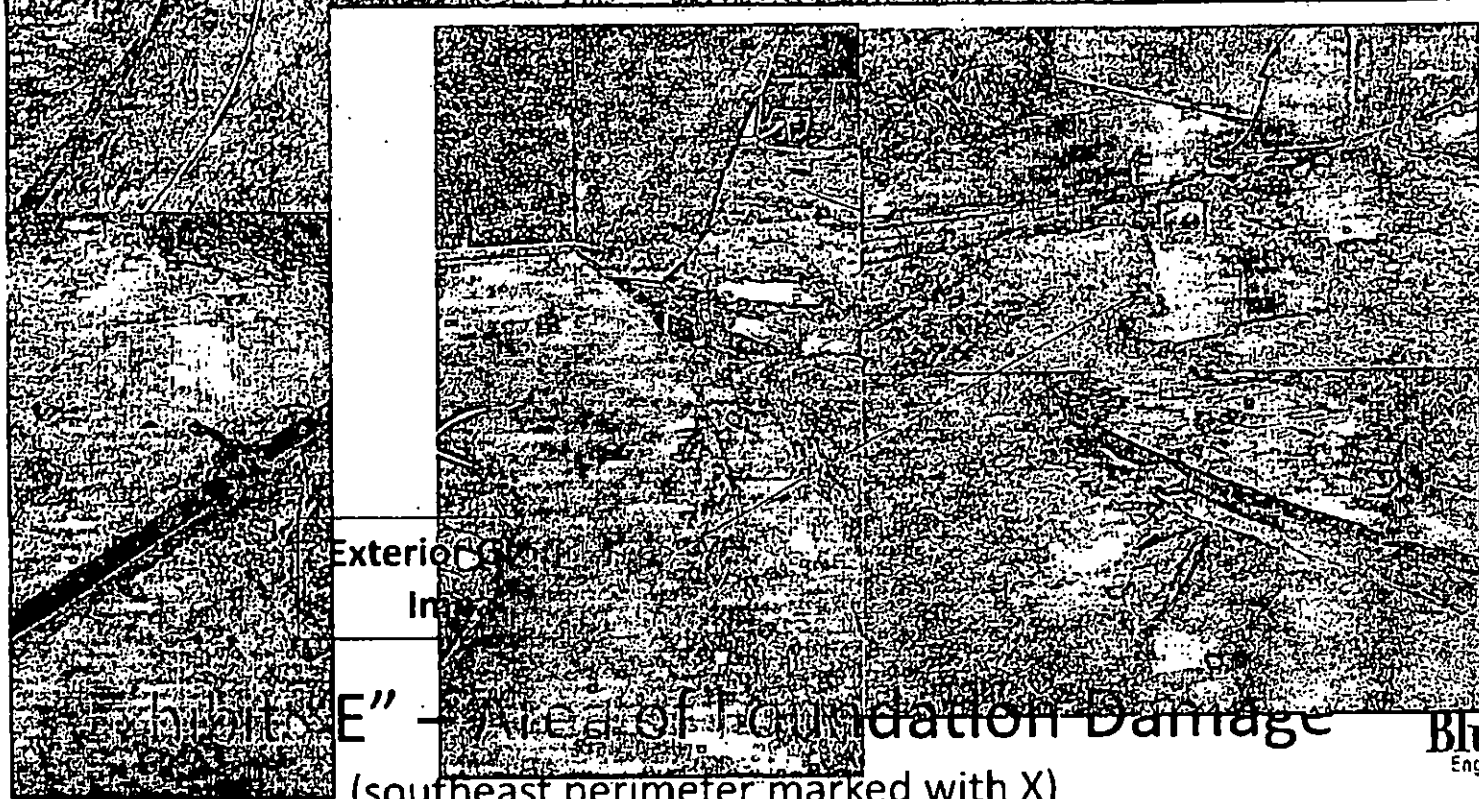
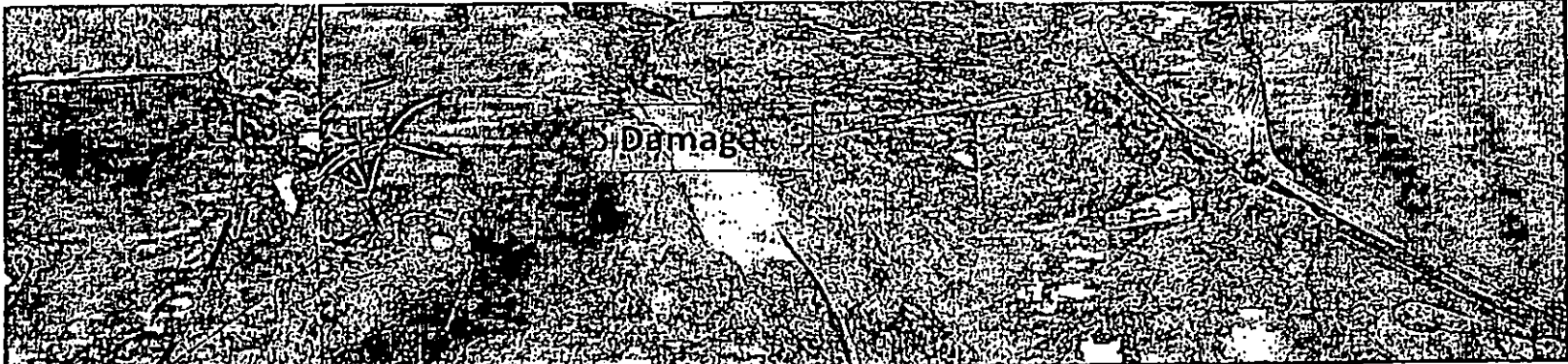


Exhibit "D" – Concrete Slab Edge &
Variable Exterior Foundation Widths





Exterior Foundation
Impairment

Exhibit "E" - Area of Foundation Damage
(southeast perimeter marked with X)



BlueStone
Engineers, PLLC

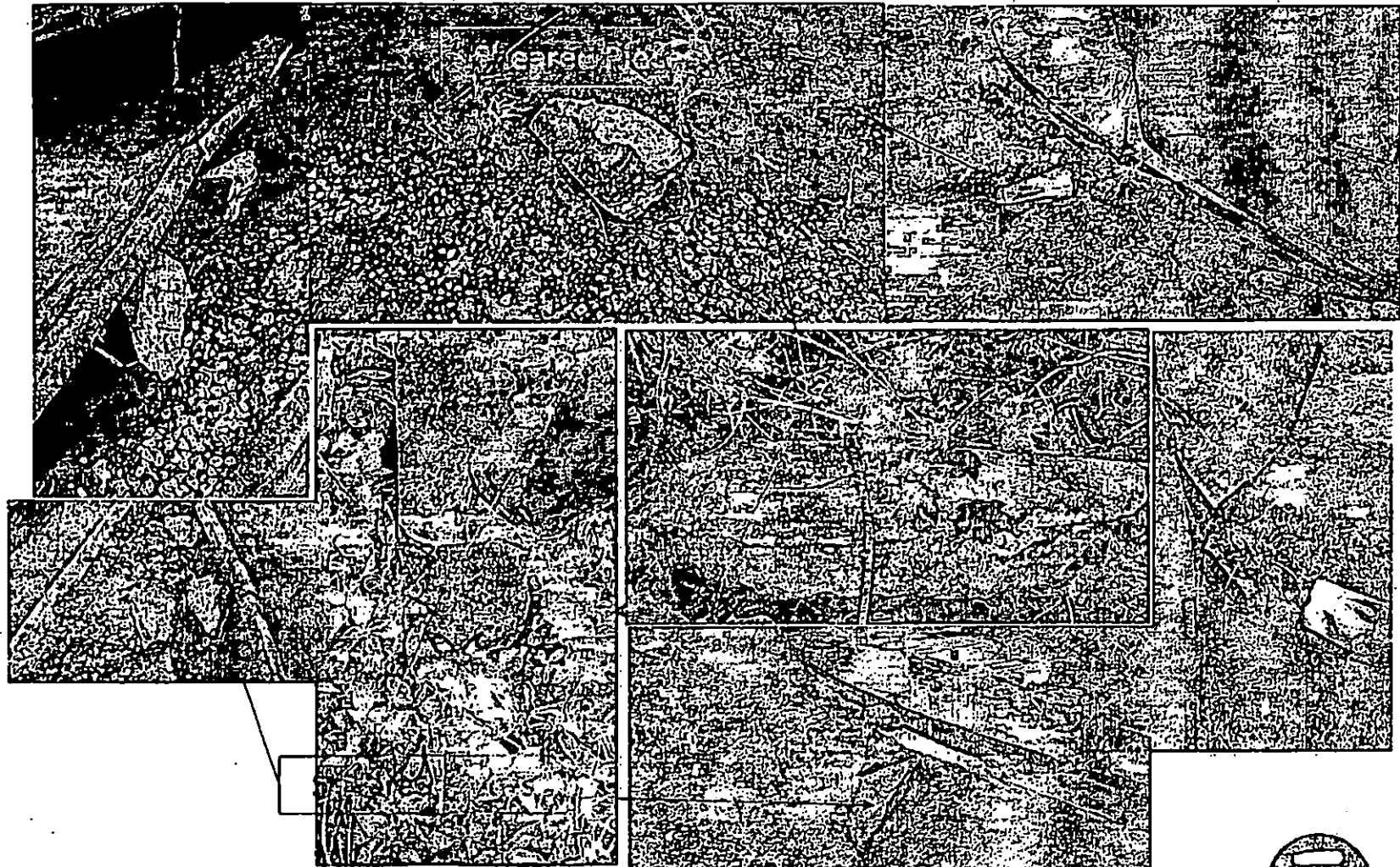
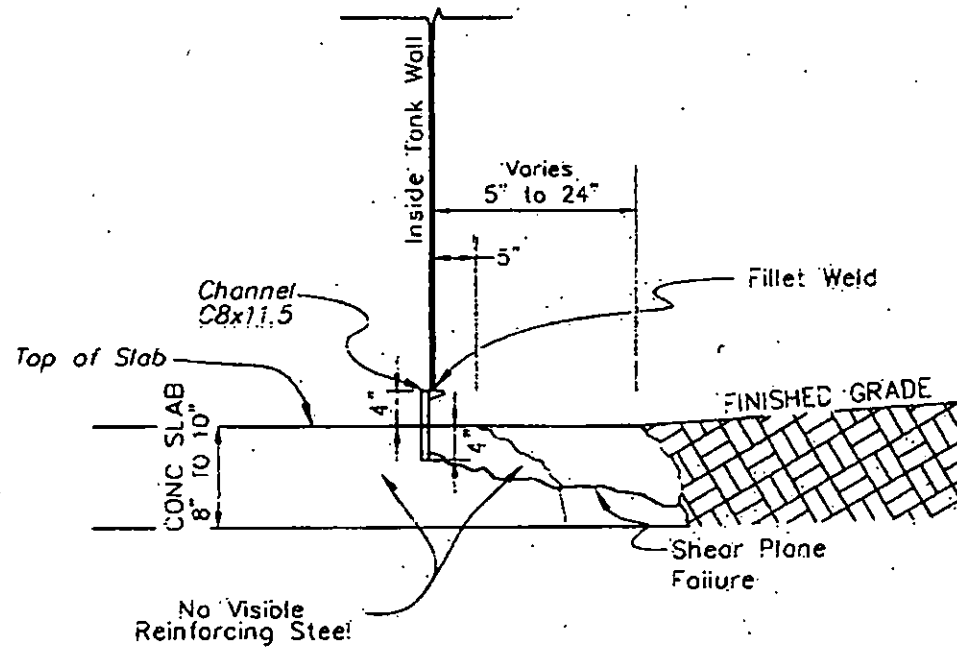


Exhibit "F" – Foundation Pieces Sheared off
(no steel reinforcement)





FOUNDATION DETAIL

Not to Scale

Exhibit "G" – Foundation Section

(shear plane failure)





Mr. Robert C. Moore
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415 West Main Street
P. O. Box 676
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May 20, 2015

**SUBJECT: Hunters Hollow Treatment Plant
Addendum for Field Inspection & Analysis for
Structural Slab/Foundation
Bullitt County, Kentucky**

Dear Mr. Moore:

As discussed in our follow-up summary letter dated June 22, 2014 for structural inspections of the Hunters Hollow Wastewater Treatment Facility, and based on the review of the concrete foundation, the lack of reinforcing steel in the outer foundation section would not have been identified from normal inspection or maintenance activities. Therefore, lack of maintenance of the facility does not appear to be a cause or contributing factor of the failure of the Hunters Hollow WWTP.

If you have questions please do not hesitate to give me a call at (502) 292-9288.

Sincerely,

A handwritten signature in cursive script, appearing to read 'Chris Crumpton'.

Christopher T. Crumpton
Project Engineer