BUILDING CONDITION ASSESSMENT
BERLIN FALLS PARK
BERLIN, MARYLAND

Prepared For:
The Town of Berlin
10 William Street
Berlin, Maryland 21811

Prepared By:
Davis, Bowen & Friedel, Inc.
601 East Main Street, Suite 100
Salisbury, Maryland 21804

DBF #0050A105.A01

June 16, 2017

EXECUTIVE SUMMARY

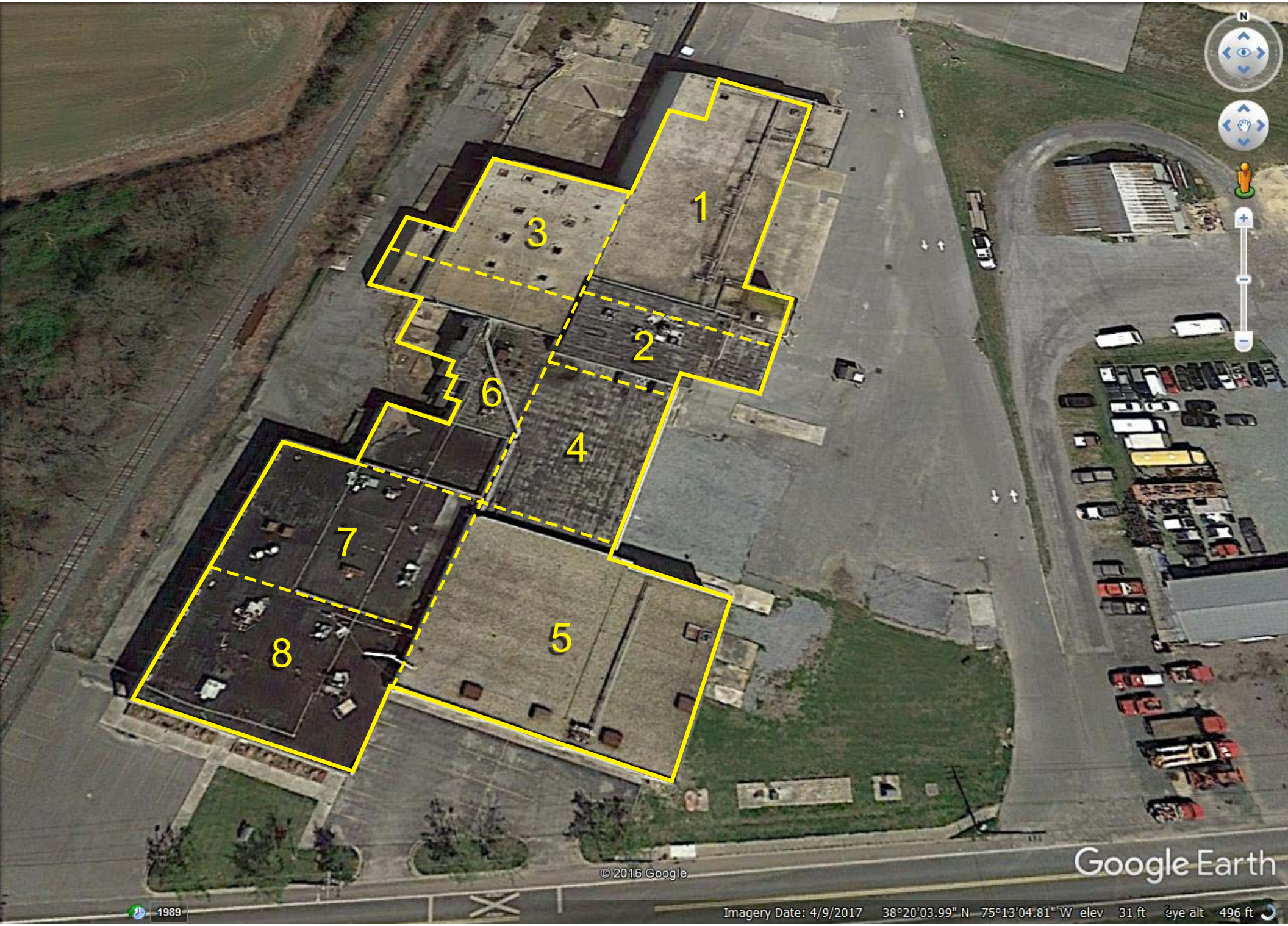
On May 19, 2017, Davis, Bowen & Friedel, Inc. observed the condition of the Berlin Falls Park Building, formerly Tyson Foods Plant, located on Route 346 in Berlin, Maryland. The purpose of our observations and this report is to provide a general visual assessment of the condition of the building and to provide recommendations for repair and replacement. Observations included, where accessible, the roofing, roof framing, floor framing, masonry walls, floor slabs and foundation walls. Refer to the attached Photos 1 through 8 and the Google Earth image for general exterior views of the building.

The gross floor area of the facility is over 65,000 square feet. The original building is over 40 years old. The majority of the superstructure of the building is comprised of precast concrete tees, beams, columns and hollow core slabs. The precast concrete components are in fair to good condition. The remaining components are structural steel beams, columns, open web joists and steel decking. Structural steel components subject to high humidity in an unconditioned space have deteriorated significantly. The structural steel components vary from poor to fair condition with some areas of local failure. The majority of the facility is one level with relatively high roofs. A second level exists in two areas: one supported on precast concrete plank and the other on timber floor joists. The second floor supported on timber floor joists has elevator access. The concrete slabs and trench drains vary from poor to good condition. Concrete exposed to the former animal processing areas are in poor condition.

For the purposes of this report, refer to the attached key plan for the different areas into which the building has been divided: Area 1 through Area 8. Divisions are based on construction type and the different phases of construction. Original occupancy of the facility varied from general office space, processing areas, mechanical spaces, shipping, and dry storage. Removal of ventilation and mechanical equipment from the roof and walls, as well as dislodged doors, have led to water infiltration and significant local deterioration. The poor condition of the roof has also led to water infiltration and significant local deterioration.

Recommendations presented in the report reflect the minimum effort to repair, reinforce and stabilize the building structurally. Other recommendations reflect the minimum effort to re-establish the building envelop preventing water infiltration, as well as upgrading insulation of the roof and walls to meet the intent of the International Energy Conservation Code. No mechanical, electrical or plumbing systems are salvageable.

In summary the facility is generally structurally sound and therefore suitable for adaptive reuse. Despite numerous areas of damage, neglect, deterioration, improper alterations and local failure, the building can be repaired and reconstructed to suit the desired reuse and occupancy. Architectural and engineering design services, including mechanical, electrical and plumbing would be required to advance this rehabilitation project to the next phase. The next phase is anticipated to be schematic design for the desired reuse in conjunction with the structural stabilization and re-establishment of the building envelope. See the attached “Opinion of Probable Construction Cost” at the end of the report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© 2016 Google
Google Earth
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Imagery Date: 4/9/2017 38°20'03.99" N 75°13'04.81" W elev 31 ft eye alt 496 ft

Photo 1

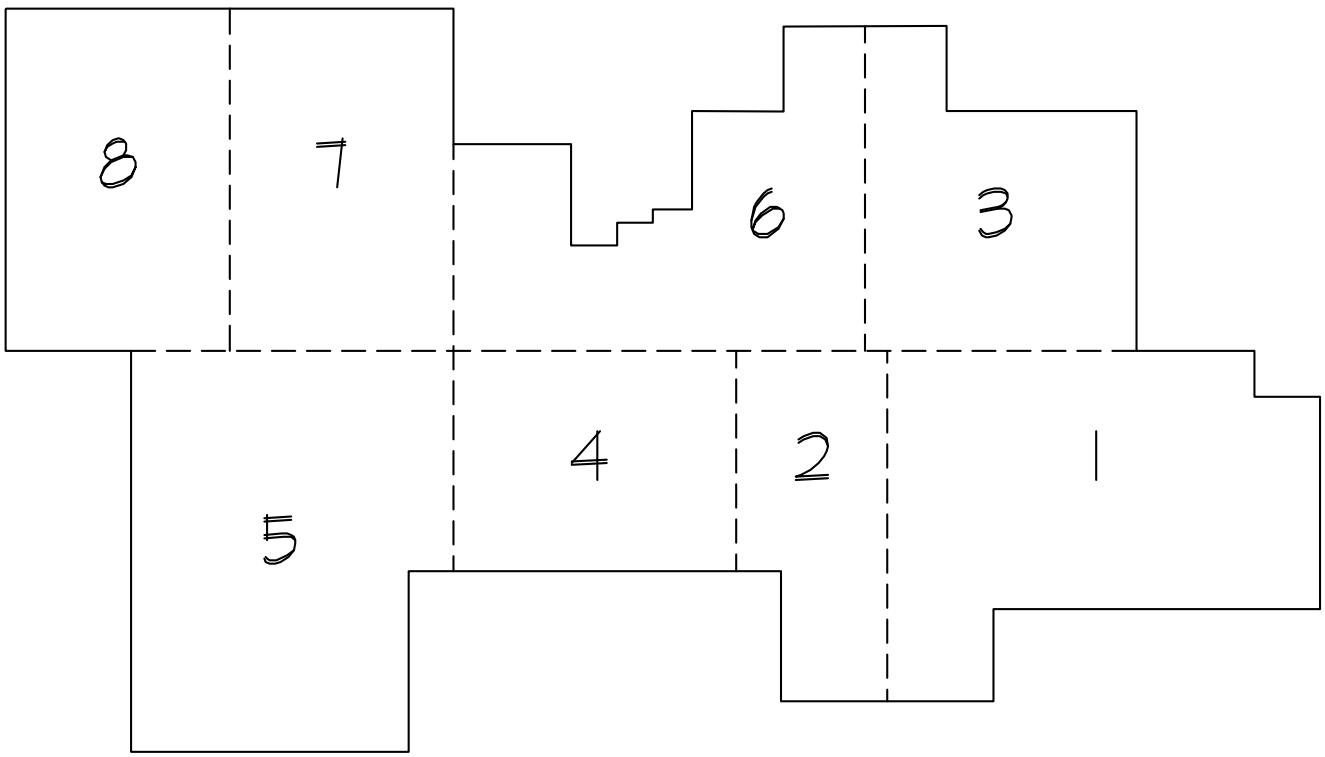
Photo 2

Photo 3

Photo 4

Photo 5

Photo 6



BUILDING KEY PLAN

N.T.S.

DAVIS
BOWEN &
FRIEDEL, INC.

ARCHITECTS, ENGINEERS & SURVEYORS

SALISBURY,MARYLAND ■ MILFORD, DELAWARE
410.543.9091 302.424.1441

BERLIN FALLS PARK

Berlin, MD

Dwg.No.: **sk-1**

Date:	Scale:	Proj.No.:
5/26/2017	AS NOTED	0050A105.A01

AREA 1

Observations and Conclusions:

1. The primary structural framing consists of precast prestressed concrete roof tees, beams and columns. The building is enclosed with concrete block masonry curtain walls Building Area 1 is in fair to good condition.
2. Minor deterioration and corrosion of reinforcing steel in the precast concrete building components were observed. Refer to Photo 1.
3. Open roof mounted HVAC equipment allow water infiltration into the building. Refer to Photo 2.
4. Roof leaks have resulted in staining, minor efflorescence and deterioration of the concrete roof framing. Refer to Photos 3 through 6.
5. Large spalls exist in the concrete floor slab. Overall the floor slab is in fair condition. Refer to Phot 7.
6. There are floor drains in the concrete slab. Refer to Photo 8.

Recommendations:

1. The roofing should be replaced and all openings roofed over. The roof deck should be insulated with an R-38 minimum, continuous, PolyIso foam.
2. Minor repairs to precast concrete should be performed.
3. Repairs to the concrete slab should be performed.
4. Exterior masonry walls should be repaired.
5. Exterior walls should be insulated.
6. Exterior doors should be replaced or infilled.

AREA 2

Observations and Conclusions:

1. Area 2 is comprised of two levels. The second floor previous occupancy was office and light storage. The second floor office area is supported by precast prestressed concrete plank. The light storage floor is comprised of timber floor joists, steel beams and steel columns.
2. The precast concrete planks supporting the office appear to be in good condition.
3. The timber floor joists and timber decking supporting storage are in fair to poor condition. Poor areas are the result of water damage due to roof leaks. Refer to Photos 1 through 2.
4. The steel columns are in fair to poor condition. Portions of the columns exhibit significant corrosion, severe pitting and delamination. Refer to Photos 3 through 8.
5. The roof is supported on open web steel joists and steel roof decking. The joists and decking are in fair to good condition. Refer to Photos and 9 and 10.

6. The elevator roof is open and allowing water infiltration. Refer to Photo 11.

Recommendations:

1. Minor repairs to the steel roof decking may be required, especially at roof leaks. Openings in the decking shall be filled in.
2. The roofing should be replaced and all openings roofed over. The roof deck should be insulated with an R-38 minimum, continuous, PolyIso foam.
3. The timber floor decking should be replaced.
4. Extensive repair and replacement of the timber floor joists may be required.
5. The steel columns and beams should be uncovered, inspected and sand-blasted cleaned, repaired and or reinforced. The steel columns and beams should be painted.

AREA 3

Observations and Conclusions:

1. The primary structural framing consists of precast prestressed concrete roof tees, beams and columns. The building is enclosed with concrete block masonry curtain walls Building Area 3 is in fair to poor condition.
2. Minor deterioration and corrosion of reinforcing steel in the precast concrete building components were observed. Refer to Photos 1 and 2.
3. Open roof mounted HVAC equipment allows water infiltration into the building. Refer to Photos 3 and 4.
4. Roof leaks have resulted in staining, minor efflorescence and deterioration of the precast concrete roof framing. Refer to Photo 5.
5. Exterior concrete masonry walls are in poor condition. Foundation settlement is apparent. Headers are not properly supported. At least one exterior pilaster is disconnected and displaced from the exterior wall. Refer to Photos 6 through 8.
6. There is significant deterioration of the concrete floor slab and trench drains. Refer to Photos 9 & 10.

Recommendations:

1. The roofing should be replaced and all openings roofed over. The roof deck should be insulated with an R-38 minimum, continuous, PolyIso foam.
2. Minor repairs to precast concrete should be performed.
3. Repairs to the concrete slab should be performed.
4. Significant repairs or complete replacement of the exterior wall should be performed.
5. Exterior walls should be insulated.
6. Exterior doors should be replaced or infilled.

AREA 4

Observations and Conclusions:

1. The roof system is comprised of steel roof decking, open web steel roof joists, steel beams and steel columns. Some beams and columns are encased. Refer to Photos 1 and 2.
2. Exterior walls are concrete block masonry with some interior glazed block. Refer to Photo 3.
3. Roof drains are leaking. Refer to Photo 4.
4. The roof decking is in fair to poor condition with some areas of significant deterioration especially around roof drains. Refer to Photos 5 and 6.
5. The open web steel joists are short span and therefore light duty. Member thicknesses are as little as 1/8 inch. Corrosion has caused a significant reduction in member capacity. Refer to Photos 7 and 8.
6. Some open web joist diagonals have been damaged. Refer to Photo 9.
7. The bottom chord of at least one joist broken. Refer to Photo 10.
8. The bottom chords of many joists have been altered by drilling and welding. Refer to Photo 11.
9. The joists are therefore in generally poor to failed condition.
10. Holes have been cut into the webs of some steel beams. Refer to Photo 12.
11. The steel columns are in fair to poor condition. Portions of the columns exhibit significant corrosion, severe pitting, impact damage and delamination. Refer to Photos 13 through 16.
12. Openings have been cut in the exterior concrete masonry wall without headers. Refer to Photos 17 through 20.
13. Steel headers in the exterior wall have been affected by corrosion, swelled and cause some vertical displacement in the wall. Refer to Photos 21 and 22.
14. One interior wall opening header has been affected by corrosion and is distorted. Refer to Photo 23.
15. One interior wall opening header does not appear to adequate. Refer to Photo 24.
16. The roofing should be replaced and all openings roofed over. The roof deck should be insulated with an R-38 minimum foam insulation.
17. The concrete floor slab is in fair condition.

Recommendations:

1. Numerous areas of the steel roof decking should be replaced or completely replaced.
2. All open web steel roof joists should be replaced and or reinforced.
3. Numerous steel beams will need to be reinforced.
4. The steel columns should be sand-blasted cleaned and repaired/reinforced.
5. Headers should be installed in exterior wall openings. Corroded exterior wall headers should be cleaned painted and sealed.
6. Interior wall opening header should be repaired and one replaced.

7. Minor repairs to the concrete floor slab should be performed.
8. The roofing should be replaced and all openings roofed over. The roof deck should be insulated with an R-38 minimum, continuous, PolyIso foam.

AREA 5

Observations and Conclusions:

1. The primary structural framing consists of precast prestressed concrete roof tees, beams and columns. The building is enclosed with insulated metal panel curtain walls Building Area 1 is in fair to good condition.
2. Minor deterioration of the precast concrete building components were observed. Refer to Photo 1.
3. The insulated metal panel walls appear to be in good condition.
4. Roof leaks have resulted in staining and minor efflorescence of the concrete roof framing. Refer to Photo 3.
5. Spalls and heavy scaling exist in the concrete floor slab, especially around trench drains. Overall the floor slab is in fair condition. Refer to Photo 2.

Recommendations:

1. Minor repairs to Area 5 should be anticipated.
2. Minor repairs to precast concrete should be performed.
3. Minor repairs to the concrete floor slab should be performed.
4. The roofing should be replaced and all openings roofed over. The roof deck should be insulated with an R-38 minimum, continuous, PolyIso foam.

AREA 6

Observations and Conclusions:

1. Area 6 former use was Boiler Room and Mechanical Shop.
2. The roof system is comprised of steel roof decking, open web steel roof joists, steel beams and steel columns.
3. Exterior walls are concrete block masonry.
4. The steel roof deck over the old Mechanical Shop is in poor condition. Refer to Photos 1 & 2.
5. The open web steel joists supporting the roof of the old Mechanical Shop are in fair condition. Refer to Photo 3.
6. The roof decking and steel joists over the old Boiler Room are in a severely deteriorated condition. Refer to Photo 4.

Recommendations:

1. Significant roof deck replacement will be required over the Mechanical Shop. The roofing should be replaced and all openings roofed over. The roof deck should be insulated with an R-38 minimum, continuous, PolyIso foam.
2. The roof system over the Boiler Room should not be put back into service and should be completely demolished.
3. Exterior walls of Boiler Room should be reconstructed.

AREA 7

Observations and Conclusions:

1. The roof system is comprised of long span open web steel roof joists and steel roof decking. The roof system appears to be in fair to good condition. Refer to Photos 1 through 3.
2. Masonry walls appear to be in good condition.

Recommendations:

1. The roofing should be replaced and all openings roofed over. The roof deck should be insulated with an R-30 minimum, continuous, PolyIso foam.

AREA 8

Observations:

1. The roof system is comprised of open web steel roof joists, steel beams, steel columns and steel roof decking. The roof system appears to be in fair to good condition. Refer to Photos 1 & 2.
2. Open roof mounted HVAC equipment allows water infiltration into the building. Refer to Photo 3.
3. Interior walls appear to be non-load bearing, however interior shear walls will likely be required to remain in service. Masonry walls appear to be in good condition. Refer to Photo 4.

Recommendations:

1. The roofing should be replaced and all openings roofed over. The roof deck should be insulated with an R-30 minimum, continuous, PolyIso foam.

ROOFING

Observations and Conclusions:

1. The condition of the roofing varies significantly throughout the facility. Due to lack of regular maintenance and repair, numerous roof leaks have developed. Insulation is likely saturated with water. The overall condition of the roofing is therefore rated as poor.
2. Standing water is common throughout the facility. Refer to Photos 1 through 5.
3. Mature vegetation exists in numerous areas. Refer to Photos 6 through 12.
4. There are some areas of roofing failure. Refer to Photos 13 & 14.
5. Parapet copings and flashing are in poor condition. Refer to Photos 15 & 16.

Recommendations:

1. Area 1 through Area 8 should be re-roofed. This will required removal of abandoned HVAC equipment, other mechanical systems, debris and vegetation. Some areas will require removal of stone ballast.
2. Insulation shall be removed to the roof deck and the roof deck repaired or replaced as required.
3. Roof drains, piping, downspouts and gutters shall be replaced.
4. New insulation shall be installed, R-30 minimum, continuous, PolyIso foam.
5. New roofing should be EPDM membrane or TPO, thermoplastic polyothefin.
6. Parapet wall flashings, scuppers and copings should also be replaced.

EXTERIOR

Observations and Conclusions:

1. The building exterior curtain wall cladding varies from concrete block, metal panel, insulated metal panel, brick masonry and EIFS.
2. Numerous areas of concrete block masonry has deteriorated due to settlement, impact damage and water erosion. Refer to Photos 1 through 5.
3. Large sections of concrete block masonry wall are in a severely deteriorated condition. Refer to Photo 6.
4. Metal panel wall siding has been installed as a temporary measure to cover demolished sections of the building. Refer to Photo 7.
5. Insulated metal wall panels are in fair condition with some areas of deterioration. Photos 8 through 10.
6. Brick veneer and EIFS are in fair to good condition with some area of water infiltration, deterioration and organic growth. Photos 11 through 16.

Recommendations:

1. The entire building exterior will require varying levels of repair and replacement.
2. Masonry wall openings will require infill and numerous lintels installed.
3. Significant repairs to damaged and deteriorated masonry walls should be made.
4. Cracked units and open mortar joints should be repointed. All control joint sealants should be replaced.
5. All doors in concrete block portions shall be replaced.
6. Newly installed metal panel wall siding attachment should be evaluated and properly connected.
7. Insulated metal wall panels should be repaired and recoated.
8. Minor brick repairs should be made as well as EIFS repairs and EIFS joints replaced.
9. Window and storefront sealants should be replaced.
10. All exterior curtain wall insulation should be upgraded to R-20 minimum.

DISCLAIMER

Our evaluation does not include structural analyses of any building components or their connections. Our evaluation is limited to a condition assessment of building elements that were easily accessible on the day of the inspection. Davis, Bowen & Friedel, Inc. takes no responsibility for any damage or deterioration not detectable by visual inspection. Neither our evaluation nor this report should be construed as a warrantee of the building either in part or in whole.

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 7

Photo 6

Photo 8

Photo 9

Photo 11

Photo 10

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 7

Photo 6

Photo 8

Photo 9

Photo 10

Photo 1

Photo 2

Photo 3

Photo 4

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Photo 7

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Photo 11

Photo 12

Photo 13

Photo 14

Photo 15

Photo 16

Photo 17

Photo 18

Photo 19

Photo 20

Photo 21

Photo 22

Photo 23

Photo 24

Photo 1

Photo 2

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Photo 3

Photo 4

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Photo 10

Photo 11

Photo 12

Photo 13

Photo 15

Photo 14

Photo 16

Photo 1

Photo 2

Photo 3

Photo 4

Photo 5

Photo 6

Photo 7

Photo 8

Photo 9

Photo 10

Photo 11

Photo 12

Photo 13

Photo 14

Photo 15

Photo 16

OPINION OF PROBABLE CONSTRUCTION COSTS

BERLIN FALLS PARK BUILDING STABILIZATION

FOR

TOWN OF BERLIN, MARYLAND

PRE-DESIGN SERVICES

PREPARED BY:
DAVIS, BOWEN & FRIEDEL, Inc.
DBF #0050A105.A01 DATE: JUNE 16, 2017

ITEM	UNIT	QUANTITY	PRICE	PRICE
1. MOBILIZATION / GENERAL CONDITION	LS	1	$98,760	**$98,760**
2. DEMOLITION				
A. REMOVE MISC. HVAC EQUIP. & DEBRIS	LS	1	$10,000	$10,000
B. REMOVE BATT INSUL FROM WALLS	LS	1	$2,000	$2,000
C. REMOVE ROOFING & STONE	SF	65,000	$4	$260,000
D. REMOVE CONCRETE MASONRY WALLS	SF	3,000	$2	$6,000
E. CLEANING & ENVIRONMENTAL	LS	1	$20,000	$20,000
F. WASTE DISPOSAL	TON	350	$80	$28,000
			SUB-TOTAL	**$272,000**
3. STRUCTURAL REPAIRS				
A. PRECAST CONCRETE	LS	1	$5,000	$5,000
B. AREA 4 ROOF FRAMING	SF	6500	$10.00	$65,000
C. AREA 6 ROOF FRAMING	SF	2400	$10.00	$24,000
D. STEEL COLUMNS & BEAMS	LS	1	$25,000	$25,000
E. CLEAN & PAINT STEEL	LS	1	$50,000	$50,000
			SUB-TOTAL	**$169,000**
4. EXTERIOR WALLS & INTERIOR FLOORS				
A. REPAIR CONCRETE BLOCK WALLS	LS	1	$20,000	$20,000
B. REPLACE CONCRETE BLOCK WALLS	SF	3,000	$25	$75,000
C. REPAIR INSULATED WALL PANEL	SF	1,500	$2	$3,000
D. REPLACE INSULATED WALL PANEL	SF	1,400	$25	$35,000
E. REPAIR EIFS	LS	1	$2,000	$2,000
F. INSULATE EXTERIOR WALLS	SF	20000	$3.00	$60,000
G. GUTTERS & DOWNSPOUTS	LS	1	$10,000	$10,000
H. INSTALL NEW ENTRY DOORS	EA	4	$2,000	$8,000
I. REPAIR STOREFRONT	LS	1	$5,000	$5,000
J. REPAIR INTERIOR CONCRETE SLABS	LS	1	$10,000	$10,000
K. REPAIR WOOD FLOOR	SF	3,300	$10	$33,000
			SUB-TOTAL	**$261,000**
5. ROOFING				
A. CLOSE IN OPENINGS	EA	20	$500.00	$10,000
B. REPLACE COPING / PARAPET CAP	LF	1,800	$40.00	$72,000
C. NEW ROOFING				
-INSULATION	SF	65,000	$8	$520,000
-ROOFING	SF	65,000	$5	$325,000
-WALK PADS & MISC.	LS	1	$10,000	$10,000
D. LADDERS	EA	4	$500	$2,000
E. ROOF DRAINS & PIPING	LS	1	$5,000	$5,000
			SUB-TOTAL	**$944,000**
			STABILIZATION SUB-TOTAL	**$1,744,760**
			15% CONSTR. CONTINGENCY	**$261,714**
			TOTAL	**$2,006,474**
DESIGN CONTINGENCIES			**15% DESIGN CONTINGENCY**	**$300,971**
			GRAND TOTAL	**$2,307,445**

BERLIN Tyson plant
Technical Report Prepared by Ellen Silbergeld, Jim Hulbert, Jane Kreiter, and Jennifer Nyland

This project was undertaken to assist the Town of Berlin in assuring the safety of repurposing the former Tyson Poultry slaughter and processing plant. The site is now owned by the town of Berlin Maryland, which plans to redevelop the site for community recreational purposes. The issue under investigation by us related to the potential presence of pathogenic bacteria at this site related to its former use.

BACKGROUND INFORMATION (FROM JANE KREITER)

The site was formerly occupied by a Tyson poultry slaughter and processing plant. There is extensive information of the presence of bacteria in these operations, including pathogenic organisms capable of causing diseases in humans. There is no indication that steps were taken by Tyson during plant activity [such steps are not required by state or federal regulation]. Since the plant closing, no remediation or cleanup was conducted inside the buildings or at the site.

Reason for concern: Of greatest concern, the site includes several ponds into which slaughter house wastes were disposed over the course of operation. Because the ponds have remained filled, they are likely to contain bacteria representing past uses. We focused on those pathogens carried by poultry that are capable of causing disease in humans. Moreover, because of the use of antibiotics in poultry feed, many studies, including research conducted in MD by the University of MD and our group have reported that antibiotic resistant pathogens are present on poultry at farms and on broiler chickens transported from farms to slaughter, The organisms of greatest concern, all of which have been reported with a high prevalence in poultry production are listed below. For cost reasons, as well as knowledge of the likelihood of persistence, we focused on *E coli.*

Campylobacter jejeuni
Enterococcus species
Staphylococci aureus
E. coli
Klebsiella

The flow from the chicken processing plant went through a pretreatment facility that was located inside the existing building. The flow then went to the round clarifier that is located South of the South Lagoon. From there it entered the South Lagoon on the East side where it was aerated. Then it flowed to the other side of south Lagoon where the floating vegetated barges are. From the Southern lagoon the flow went to the middle lagoon and then to the North lagoon. Prior to discharge into Kitts Branch the effluent went through a filter which was located in the building on the land located

between the middle and north lagoons. Chlorination and dechlorination occurred in the small cells adjacent to the building

These ponds are shown below (map from EA). Reading from top to bottom of this figure, the slaughter house waste was first discharged into the round holding reservoir shown at the bottom. From there, liquids were pumped into the small pond with plant flotation devices. This pond drained into the larger pond at the top of the figure and eventually runoff was discharged into a natural stream on the right on the ponds.

STUDY DESIGN (ELLEN SILBERGELD)
We proposed a limited study of sediments in the ponds currently on.the site since no analysis for pathogenic strains have been conducted. Owing to funding constraints, we focused on *E coli* a famiy of microorganisms that includes highly pathogenic strains.

Using information provided by EA and the Town of Berlin, we proposed to take sediment samples at three points within the first discharge pond on the map below. We did not sample from the holding reservoir.

These samples were collected by EA as described below, using standard methods prior to any drainage of water, removal of sediments or plants, or other disturbance of the bottom sediments. The cores were handled by scientists at Salisbury University, following protocols developed in the Brush laboratory at JHU and utilized by us in sampling river sediments in the Pocomoke River watershed. The cores were prepared for sectioning and storage using the same protocols.

SEDIMENT PROBE SAMPLING INVESTIGATION (conducted by Jim Hulbert, EA)
EA conducted a series of sediment probes at 25 pre-determined locations within the three wastewater management lagoons between 30 March and 31 March 2017. The probe data were used to identify the elevation of the water and sediment surfaces, as well as the elevation of the firm subgrade material at each location.

The Trimble R8S GNSS unit was mounted to the top of a fiberglass probe to provide horizontal and vertical positioning in the Maryland State Plane coordinate system (Figure 3-3). At each location, the probe was pushed into the sediment until refusal was met, or until the probe reached its full extent of 13.1ft. Three positional fixes were logged at each location: (1) water surface, (2) top of sediment, and (3) bottom of sediment. By obtaining three positional fixes, the water depth and overall thickness of the fine-grained sediment overburden was calculated for each location based on the difference of the various elevation values.

SEDIMENT CORE SAMPLING INVESTIGATION (EA)
The objective of the sediment coring effort was the collection of intact, cross-sectional samples in order to examine the sediment strata within the wastewater management lagoons. Twelve (12) locations established in a previous phase of the Site characterization were re-occupied for the collection of sediment core samples in order to sample the fine-grained material of concern (Figure 3-4). On 30 March and 31 March 2017, a 2.75-inch diameter piston corer was utilized by EA to collect 12 core samples and two duplicate core samples throughout the lagoons to a maximum depth of 5 ft below the sediment surface (Figure 3-5). Sediment core samples included:

- Four samples located within the north lagoon (SC-1N; SC-3N; SC-5N; SC-9N)
- Four samples located within the middle lagoon (SC-2S; SC-5S; SC-8S; SC-9S)

- Two samples located within the western half of the south lagoon (WWP-1; WWP-2)
- Two samples located within the eastern half of the south lagoon (WWP-3; WWP-4)

Additionally, two duplicate core samples were collected from the western half of the south wastewater lagoon (WWP-1.1; WWP-2.1) for the purpose of microbiological analyses. Sampling locations were located via GNSS by EA prior to sampling and are presented in Figure 2 above.

CORE PROCESSING (Salisbury University)

Dr Nyland received two core samples collected at the locations designated (Samples #WWP1 and WWP2) between 10:15 and 10:50am on 03/31/2017. The core samples were stored on ice and transported immediately to Salisbury University for subsampling and DNA isolation. The cores were opened under sterile conditions and subsamples (50ml volume) collected from the top (within the first 5 inches of the top) and bottom (within the first 3 inches of the bottom) of each core. DNA was isolated from these subsamples using Qiagen DNeasy PowerSoil isolation kits according to the manufacturer's instructions. Isolated DNA was stored at -80ºC until transport to Johns Hopkins for microbial genetic analyses. DNA samples were sent to Johns Hopkins on dry ice via FedEx.

DNA ANALYSIS (Johns Hopkins Bloomberg School of Public Health)

The frozen DNA samples were thawed using standard methods at Johns Hopkins. The identification of E coli was performed by polymerase chain reaction analysis of the DNA samples. The reactions were carried out on a StepOne Real-Time PCR system. The primers and probe were published in "Development of two real-time multiplex PCR assays for the detection and quantification of eight key bacterial pathogens in lower respiratory tract infections," detailing two real-time multiplex PCR assays for detection of bacterial pathogens (hyperlink here). The total volume of each reaction was 20 µl -- 10 µl 2X Veriquest USB Probe Master Mix; 1 µl of each primer (10 µM); 0.5 µl probe (10 µM); 2.5 µl ultrapure water; 5 µl DNA template. The DNA samples were tested neat (5 µl of bacterial DNA) and dilute (5 µl of 1:10 dilution of bacterial DNA). The published protocol we use to test for E. coli DNA in samples is actually a real time PCR assay and the results are expressed as cycle thresholds (CTs) for each of the samples. The CT is deinged as the number of cycles (or amplifications) required to detect a fluorescent signal about background. Positive controls were run for each assay.

RESULTS

The two positive control samples had CTs of 18.3 and 21.7. "Unknown" means that after 40 cycles there was no fluorescent signal indicating a negative result. Only Sample 2 (neat, that is, no dilution) was positive with a CT of 37.5. The maximum

number of cycles in this real-time assay is 40. While the CT is high (as expected for a nondiluted sample), it is not outside the range of the assay.

Block Type: 96well
Chemistry: TAQMAN
Experimen: F:\2017-06-13 Silbergeld samples EC.eds
Experimen: 2017-06-13 12:20:50 PM EDT
Instrument: steponeplus
Passive R: ROX

Well	Sample Name	Target Nar	Task	Reporter	Quencher	Ct	Ct Mean	Ct SD	Quantity	Quantity M	Quantity S	Automatic	Ct Threshc	Automatic Baseline	Baseline Start	Baseline End	Comments	HIGHSD	NOAMP	EXPFAIL
A2		ecoli	NTC	FAM	NFQ-MGB	Undetermined						FALSE	0.05	TRUE	3	39		N	N	N
B2		ecoli	NTC	FAM	NFQ-MGB	Undetermined						FALSE	0.05	TRUE	3	39		N	N	N
A1	Sample 1 (neat)	ecoli	UNKNOWI	FAM	NFQ-MGB	Undetermined						FALSE	0.05	TRUE	3	39		N	N	Y
B1	Sample 1 (1:10)	ecoli	UNKNOWI	FAM	NFQ-MGB	Undetermined						FALSE	0.05	TRUE	3	39		N	N	Y
F1	Sample 2 (neat)	ecoli	UNKNOWI	FAM	NFQ-MGB	37.5	37.5					FALSE	0.05	TRUE	3	34		N	N	N
G1	Sample 2 (1:10)	ecoli	UNKNOWI	FAM	NFQ-MGB	Undetermined	37.5					FALSE	0.05	TRUE	3	39		N	Y	Y
A3	Positive Ctrl 1:100	ecoli	UNKNOWI	FAM	NFQ-MGB	18.3	20.0					FALSE	0.05	TRUE	3	14		Y	N	N
B3	Positive Ctrl 1:1000	ecoli	UNKNOWI	FAM	NFQ-MGB	21.7	20.0					FALSE	0.05	TRUE	3	19		Y	N	N

CONCLUSIONS

Based on this analysis, we conclude that there is no evidence for the presence of bacteria of health concern at the site sampled.