ARSEE ENGINEERS, INC.

CLIENT ORIENTED — BY DESIGN

Johnson Creamery Smokestack
for
Joseph Patrick
Peerless Development
105 S. York Street, Suite 450
Elmhurst, IL 60126

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SINCE 1968

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March 1, 2022

Joseph Patrick
Director of Development
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105 S. York Street, Suite 450
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Re: Johnson Creamery Smokestack
Bloomington, Indiana

Mr. Patrick:

EXECUTIVE SUMMARY

We have completed our reassessment of the Johnson Creamery Smokestack in Bloomington, Indiana. This work has included a review of findings by others since our original assessment was performed in 2017. We have revisited the site and made comparisons to our earlier work to see how the deterioration is progressing. Using wall profiles determined by others in 2020, we have refined our structural analysis of the stability of the stack in design wind and seismic events as required by the current Building Code. Multiple options for repair have been considered.

Deterioration has progressed. New spalls are visible in at least 11 locations. One of the 38 steel straps observed in 2017 has either been removed or has fallen. Previous comments by ourselves in 2017 and others in 2020 regarding how much the stack leans were rough estimates based on visual observations. 3D point cloud analysis in 2022 reveals the stack is leaning 2'-3½" to the southeast.

Work by R & P in 2020 determined wall thicknesses and profiles throughout the height of the stack. This allowed us to refine our structural analysis and more accurately evaluate the stability of the stack with regard to the current Building Code. Our analysis has shown that even a new masonry stack built to the same height, configuration, wall thicknesses and profiles will fail in a design wind or seismic event. In its current configuration, the unreinforced brick masonry stack will have to be reduced in height to 60' to meet current Code requirements. Conceptually, the stack could be reduced to the height of 75' and meet the current Code by reinforcing the interior of the stack with concrete and enlarging and supplementing the existing foundation. Changes in the Building Code since the stack was constructed in 1949 simply make an unreinforced masonry stack of this height and wall construction impossible.

Our detailed observations and comments follow.

BACKGROUND OF THE STUDY

Arsee Engineers first assessed the smokestack in the fall of 2017 as part of a due diligence assessment for the City of Bloomington. Our report summarizing this work is attached as Appendix A and is hereby included into this report by reference.

The purpose of the current study has been to reassess the condition of the stack and offer recommendations on its stability and potential repair. In order to facilitate this effort, we have performed the following

- We have reviewed work performed by others since 2017.
    - Report prepared by R and P Industrial Chimney Company, Inc. (R & P) dated April 6, 2020.
    - Report prepared by Patriot Engineering dated January 7, 2021.
    - Proposals prepared by the Gerard Chimney Company for various repair options in 2021.
- We have revisited the site and performed the following:
    - Videotaped and took still photographs with a remote controlled aerial drone.
    - Created a 3D point cloud of the stack from videos taken by the drone.
    - Taken elevations of the exposed corners of the concrete foundation.
    - Developed montages of the stack for comparison with 2017 observations.
- We have updated our structural analysis of the stack using wall thicknesses and profiles reported by R & P in their 2020 report.

OBSERVATIONS

The Leaning of the Smokestack

The smokestack leans or tilts to the southeast. This is severe enough that it can be seen from ground level with the naked eye as shown in Photos 1 and 2. In 2017 we determined that the top of the stack was leaning 1 foot in every 10 and estimated that the overall tilt was in the order of several feet.

In their 2020 report, R & P estimated the chimney was leaning nearly 18 inches out of plumb. They further stated the curvature appeared to start at the 70 foot level but minor displacements were also observed below.

In the current study, we attempted to determine the lean or tilt of the stack in two ways. First we used a surveying transit to create a vertical “line” through the center of the stack in a direction approximately perpendicular to the lean. This is depicted photographically in Figure 1. This eliminates any potential parallax effect from the photograph. Comparing the proportions of the difference from the centerline to the width of the stack, we estimate the stack is 1’-9” out of plumb

from this vantage point. Figure 2 shows an image from our report in 2017 for comparison. This was created without the aide of a transit. A second method to determine the distortion used a remote controlled aerial drone to create a 3D point cloud of the stack. From this "measurements" can be made showing how far it is out of plumb. Figures 3 though 11A show pairs of aerial photographs and the 3D point cloud at various positions around the stack. The maximum distortion was found to be 2'-3½' where the stack leans to the southeast. The stack appears to start to curve or lean to the southeast just above the 25 foot level. If the stack were to fall in the direction of the lean, much like a tree being cut down, it would fall as shown in Figure 12. The overall radius of 140' from the center of the stack is also shown to get a sense of the danger zone.

Foundation of the Smokestack

The report prepared by Patriot Engineering investigated the foundation of the stack. Their report concluded that the concrete foundation is resting on bedrock and that bedrock is approximately 8.5 to 10.5 feet below grade level. They did not attempt to drill down into the rock to look for mud or clay seams.

Using a surveying level, elevations were taken at each of the eight corners of the octagonally shaped foundation. While one would not expect a foundation like this to be perfectly level there is a definite trend showing the foundation tilts to the southeast. See Figure 13. A 1 inch tilt in the 14 foot wide foundation corresponds to a 10 inch tilt out of vertical in the 140 foot tall stack. The apparent displacement of the concrete could be result of compression of a mud or clay seam in the bedrock in the southeast portion of the foundation causing it to "tilt" in that direction.

Visual Assessment Comparison

The drone was also utilized to create a series of vertical montages of the stack from different angles. The orientation of the montages attempted to copy a similar set of montages taken in 2017 so that the two sets could be compared. See Figures 14 through 16. In 2017 we observed 38 steel bands in the stack. The 2022 montages show band #35 down from the top is now missing. R & P reported only 37 steel bands when they performed their assessment in 2020 and noted there was evidence of one missing. Photos 3 and 4 show this location in 2017 and 2022. Rust stains and a bead of sealant are visible in the 2022 photo where the band was located.

Evidence of spalling was also compared between the 2017 and 2022 montages. There are 11 locations in 2022 where new spalling is visible. These generally occur in the south to southwest face of the stack between 60 and 100 foot levels. Examples are shown in Photos 5 and 6. Face shell spalling was also more evident at the foundation as shown in Photos 7 and 8.

STRUCTRUAL ANALYSIS

Using information reported by R & P from their investigation of the interior of the stack we were able to refine our previous structural analysis. In 2017 we assumed wall thicknesses based on previous experience with similar stacks. R & P cut a hole in the steel plate roof and lowered a camera to observe the condition of the masonry and determine a more accurate wall profile. Using the R & P wall profile we have re-evaluated the stability of the stack under current code

requirements for wind and seismic loads. Further assumptions used in the analysis are presented in Appendix B. Our findings can be summarized as follows

- The smokestack will go into tension at the base under the current Code required wind load.
- The smokestack will go into tension at the base under the current Code required seismic load.
- The stack would have to be shortened to the 100' level to eliminate tension at the base due to the current Code required wind load.
- The stack would have to be shortened to the 60' level to eliminate tension at the base due to the current Code required seismic load.

In other words, even in its original configuration (ie: undistorted) the stack does not meet the requirements of the current Building Code for either wind or seismic loads. A design wind (120 mph gust for a period of 3 seconds) or a design seismic event would theoretically cause severe damage up to and including potential collapse of the stack.

REPAIR OPTIONS

At the onset of this study three options were to be investigated as follows:

Option 1- Removal of the stack down to the 70 foot level and repair the remaining masonry down to grade.
Option 2- Same as Option 1, but also reconstructing the stack to a height of 100 feet.
Option 3- Same as Option 1 but reconstructing the stack to a height of 140 feet.

Given the results of the latest structural analysis – none of these options will meet current Code requirements and therefore are not feasible. Given the configuration of the masonry walls of the stack any option over 60 feet in height will not meet the requirements of the Building Code for seismic loads.

In light of all this, we believe there are two viable options at this point.

Option A

- Remove the entire structure down to the 60' above grade level. Salvage face shells from sound brick for spall repair below this level. Dispose of steel plate roof/beams and straps above 60' level.
- Remove the inner brick liner and all debris in the bottom of the stack.
- Inspect the remaining steel straps and repair as necessary.
- Remove spalled and/or cracked brick and patching material from previous spall repairs. Replace the entire face shell with brick salvaged from above. Assume a total of 250 of these will be repaired.
- Epoxy inject approximately 250 LF of cracks.
- Properly cut out and tuckpoint all of the remaining mortar joints.
- Install a new concrete roof system with venting.

Option A is the tallest configuration available to have the stack meet all current Building Code requirements without having to reinforce the base for seismic loads. By removing the upper 80 feet of the stack and reducing the load on the foundation we do not believe supplemental modifications to the foundation will be necessary.

Option B

- Remove the entire structure down to the 75' above grade level. Salvage face shells from sound brick for spall repair below this level. Dispose of steel plate roof/beams and straps above the 75' level.
- Inspect the remaining steel straps and repair as necessary.
- Remove spalled and/or cracked brick and patching material from previous spall repairs. Replace the entire face shell with brick salvaged from above. Assume a total of 300 of these will be repaired.
- Epoxy inject approximately 300LF of cracks.
- Properly cut out and tuckpoint all of the remaining mortar joints.
- Install a new concrete roof system with venting.
- Remove the inner brick liner and all debris in the bottom of the stack to expose the concrete foundation.
- Install a series of 1 inch diameter vertical reinforcing bars at 12 inches on center in a circle inside the stack. These will be epoxied into holes drilled into the top of the concrete foundation. Install a series of ½ inch diameter stainless steel all thread rods into the masonry walls on the inside face of the stack (approximately 300 rods) set in epoxy.
- Fill the bottom of the stack with concrete to a depth of approximately 20 feet. This would be performed in multiple pours so that the hydrostatic pressure of the wet concrete does not blow out or distort the walls of the stack.
- Excavate around the perimeter of the foundation down to bedrock. Install reinforcing bars into the sides of the foundation and pour a reinforced concrete "doughnut" to create a larger more stable foundation.

Option B is the tallest configuration available assuming the brick from the original stack can be kept in place and (**with significant unseen modifications**) the refurbished stack can meet current Building Code requirements for wind and seismic loads.

Working with Gerard Chimney and Glenroy Construction (a local General Contractor) the following budgetary cost estimates have been developed. These are anticipated construction costs and do not include A/E fees, contingencies or other soft costs.

Option A – Remove stack down to 60' level Budgetary cost estimate	$ 350,000
Option B— Remove stack to down 75' level/reinforce Interior and modify foundation Budgetary cost estimate	$ 525,000

A key element in either option is the length of time it would take to demo the upper part of the smokestack down to the 75' or 60' so that the Farmer's Market could open in the nearby parking lot. Gerard Chimney believes this could be accomplished in approximately 4 weeks from the receipt of a Notice to Proceed.

TEMPORARY STABILIZATION

During the course of this work, the question has been raised as to whether the smokestack could be temporarily stabilized in place until more permanent repairs are undertaken.

Theoretically – the answer is yes.

We have investigated two schemes to "hold" the smokestack in place with a supplemental steel frame of some type.

1. Construction of pipe scaffolding that would completely encircle the stack. The scaffold would have to tie into the walls of the tower near mid height to use the self weight of the masonry to keep windward side of the scaffold from lifting off the ground in a lateral wind or seismic event.
2. A steel frame made of wide flange beams and columns that would encircle the stack. This frame would be bolted to new concrete foundations to hold the steel frame down in a wind or seismic event.

Huge challenges for either of these schemes involve the proximity of the two buildings to the east and southeast of the stack. The pipe scaffolding or steel frame would have to extend onto/into both of these structures. No attempt has been made to determine how this would be performed. Nothing is insurmountable – but either of these temporary stabilization schemes seems very impractical.

With the aide of Specialty Contractors for scaffolding and steel erection very rough cost estimates have been developed for these two schemes.

Pipe scaffolding (2 month rental)	$ 350,000
Steel Framing	$ 550,000

These do not include A/E fees, contingencies or other soft costs. The pipe scaffolding would take approximately 7 weeks to design and install assuming Scaffold King could be contracted directly and assist us in the design to expedite the overall process. The steel frame would take on the order of 10 weeks to order, fabricate and install if the work did not have to be publicly bid.

CONCLUSION

In our opinion, this re-evaluation of the smokestack has helped us develop a better understanding of 1) how it is constructed, 2) how it has deteriorated and 3) what options are truly available to stabilize and repair it.

The concept of restoring it to its original height and appearance is understandable and obviously in the historical sense, desirable. The reality is the stack was constructed when the potential for

significant seismic forces was not considered in the Building Code used in Indiana. Masonry stacks typically do not fare well in seismic events and our scientific understanding of earthquakes has heightened concern enough that there are now Code provisions for them. In order for a 140 foot tall stack to meet the Building Code in this same location today it would have to be constructed from literally the ground up with different wall profiles and with a new foundation.

Lowering the stack to a level of 60 to 75 feet in height will preserve the original material to at least some degree.

This report will probably generate further questions and discussion. We are happy to try to answer them and help move this process along.

Your truly,

Frederick A. Herget P.E.
Professional Engineer

PHOTOGRAPHS

Photo 1 Looking up the wall of the stack on the southeast face.

Photo 2 Looking up the wall of the stack on the opposite side as Photo 1.

Photo 3 Photo taken in 2017.

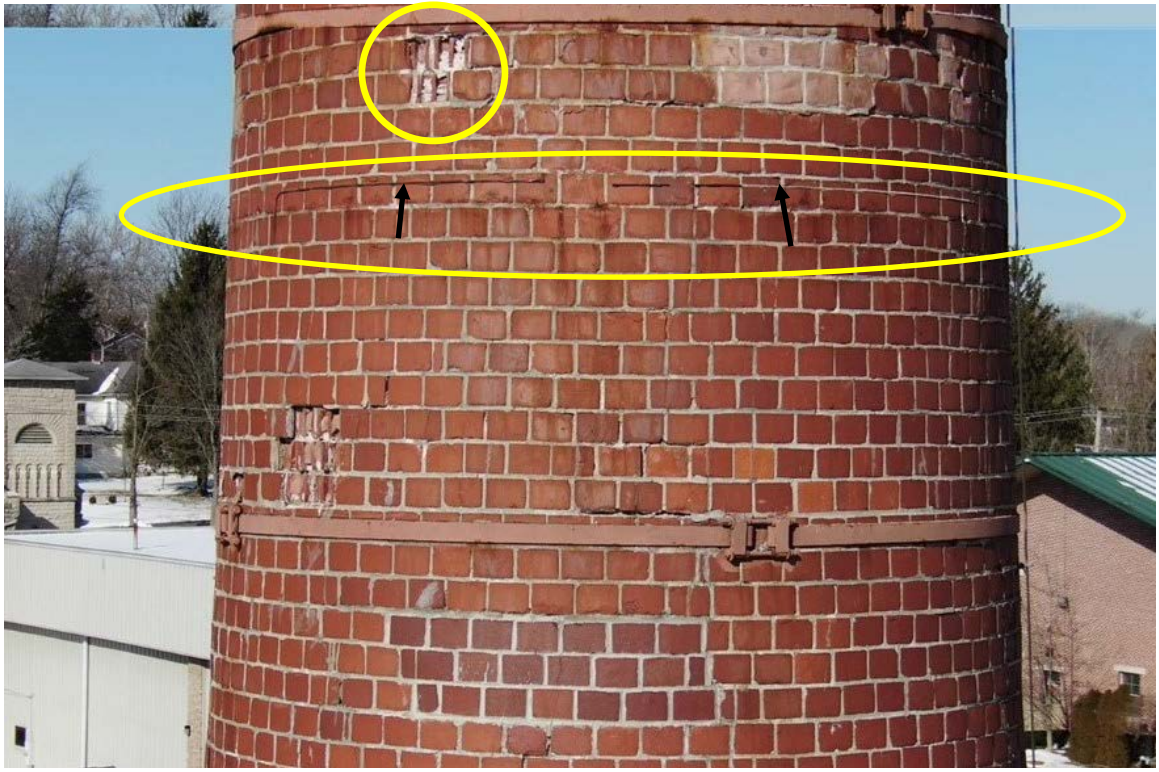

Photo 4 Photo taken in 2022. Band 35 is gone. Remnants of sealant at the top of the band are highlighted as is a new spall.

Photo 5 New spalls are highlighted in this 2022 photo.

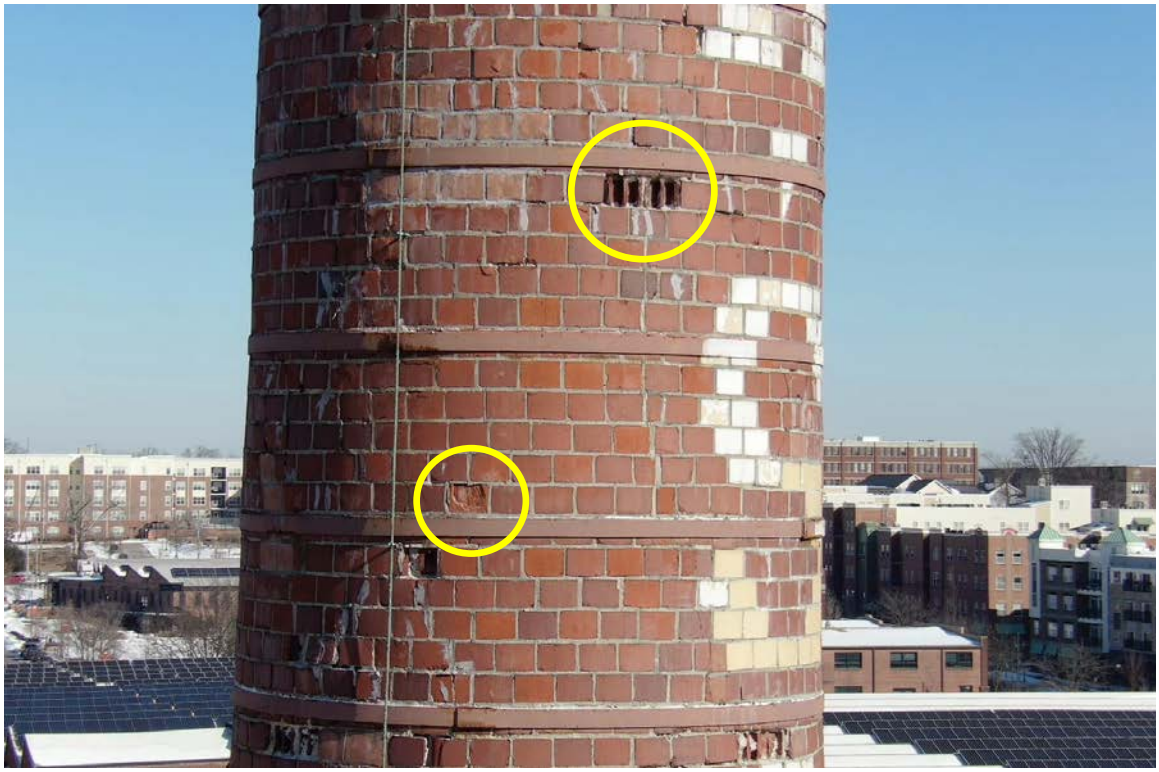

Photo 6 More new spalls are highlighted.

Photo 7
Spalling extends to the base of the stack.

Photo 8
The face shells are splitting off from the body of the brick.

FIGURES

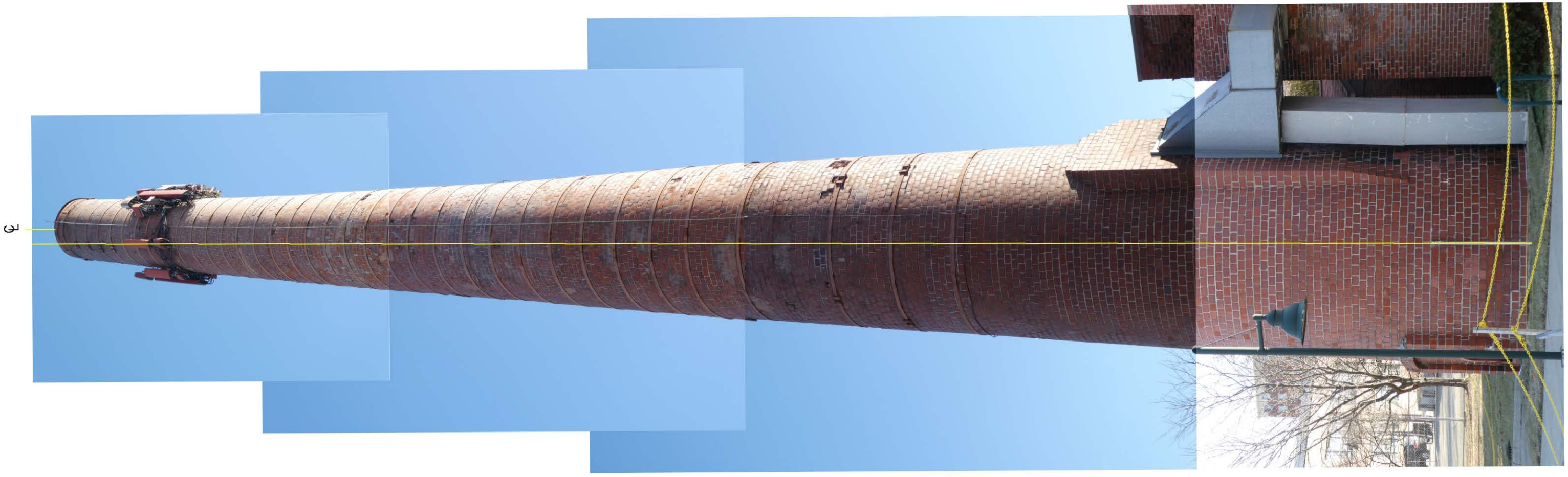

FIGURE 1

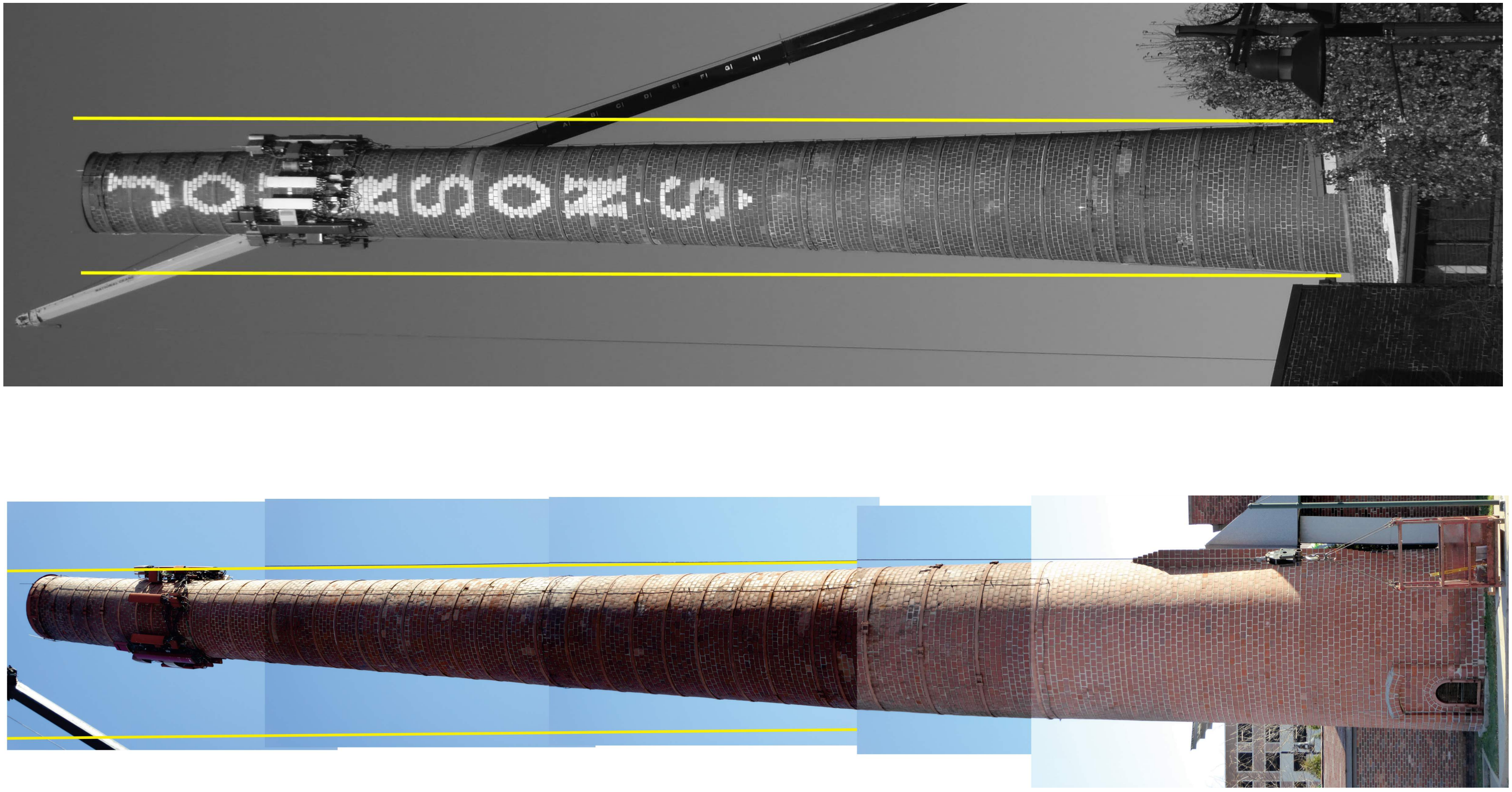

FIGURE 2

FIGURE 3

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JOHNSON'S CREAMERY
SMOKE STACK

PLAN VIEW PHOTO

Project number	Project Number	R1
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	Scale

2/28/2022 10:26:59 AM

R3.1

North Elevation

1
R2.1

1
R4.1

2' - 3 1/2"

R5.1

West Elevation

East Elevation

R9.1

1
R8.1

1
R6.1

South Elevation

R7.1

FIGURE 3a

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JOHNSON'S CREAMERY
SMOKE STACK

PLAN VIEW

Project number	Project Number	R1	
Date	Issue Date		
Drawn by	Author		
Checked by	Checker	Scale	1/8" = 1'-0"

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FIGURE 4

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JOHNSON'S CREAMERY
SMOKE STACK

NORTH EAST ELEVATION PHOTO

Project number	Project Number	R2
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	Scale

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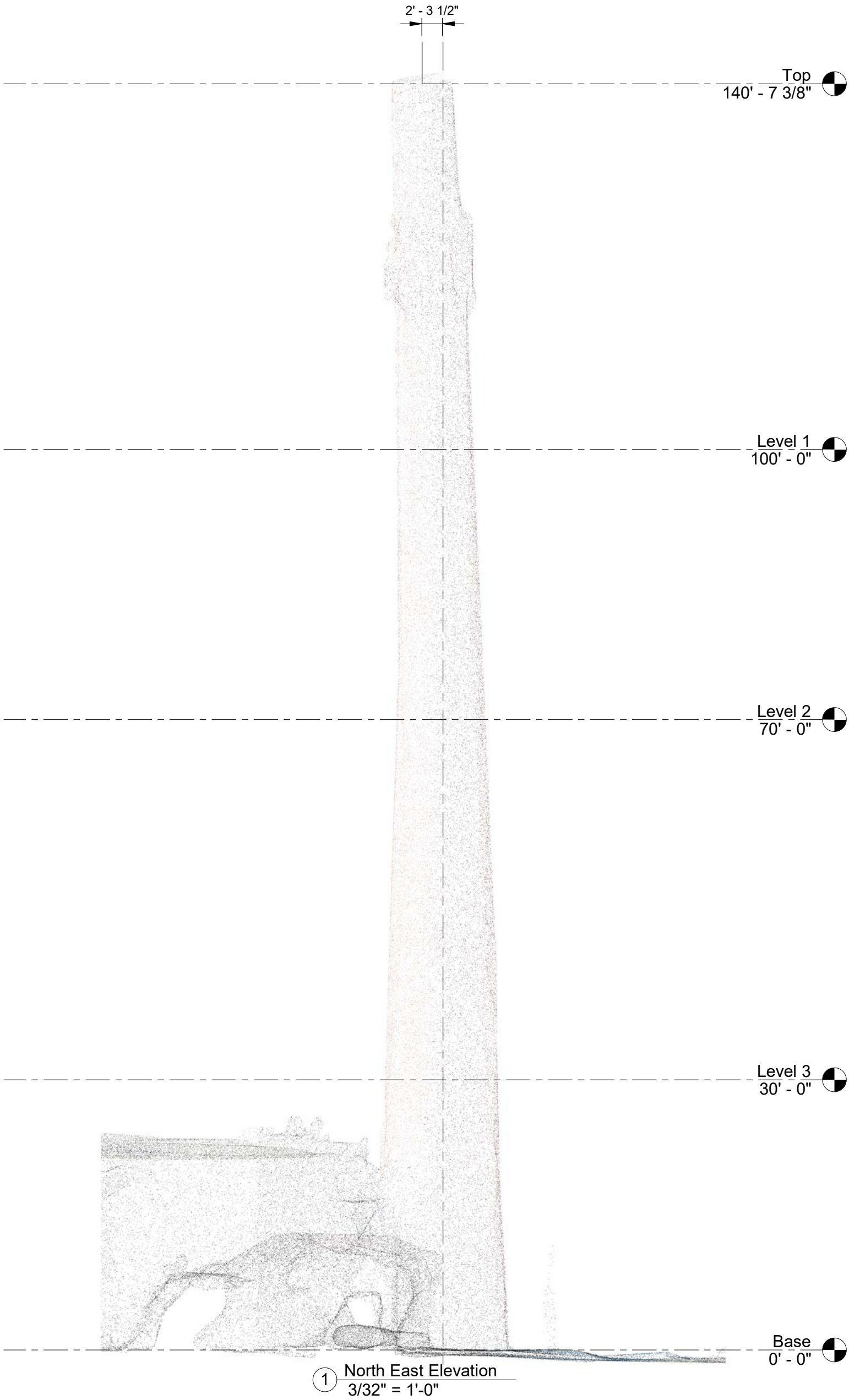

1 North East Elevation
3/32" = 1'-0"

FIGURE 4a

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JOHNSON'S CREAMERY
SMOKE STACK

NORTH EAST ELEVATION

Project number Project Number	R2.1
Date Issue Date	
Drawn by Author	
Checked by Checker	Scale 3/32" = 1'-0"

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FIGURE 5

ARSEE ENGINEERS | SINCE 1968
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JOHNSON'S CREAMERY
SMOKE STACK

NORTH ELEVATION PHOTO

Project number	Project Number	R3
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	Scale

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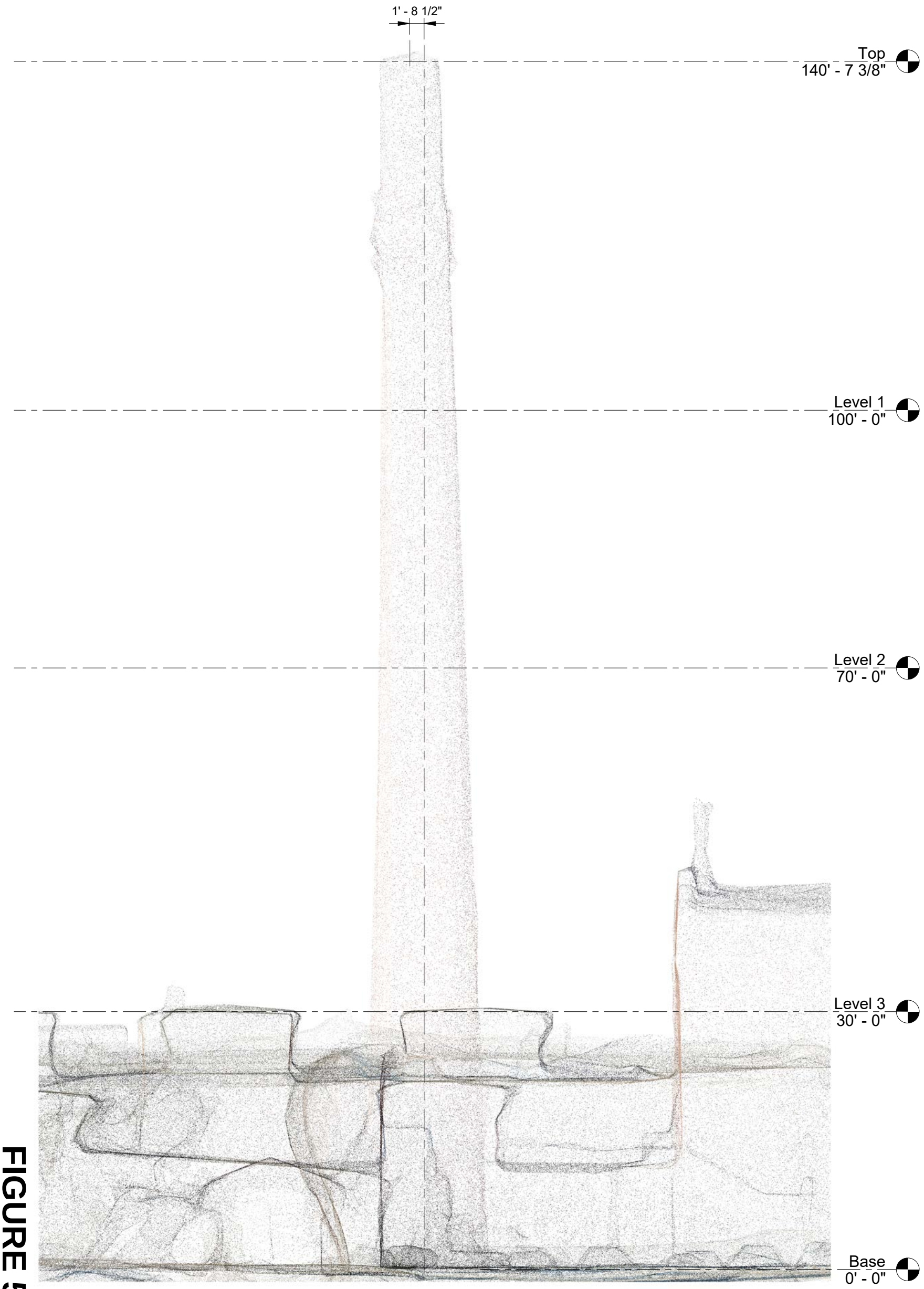

1 North Elevation
3/32" = 1'-0"

FIGURE 5a

ARSEE ENGINEERS | SINCE 1968
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JOHNSON'S CREAMERY
SMOKE STACK

NORTH ELEVATION

Project number	Project Number	R3.1
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	Scale 3/32" = 1'-0"

2/25/2022 12:00:28 PM

FIGURE 6

ARSEE ENGINEERS | SINCE 1968 CLIENT ORIENTED – BY DESIGN	JOHNSON'S CREAMERY SMOKE STACK	NORTH WEST ELEVATION PHOTO	
		Project number Project Number Date Issue Date Drawn by Author	R4
		Checked by Checker	Scale

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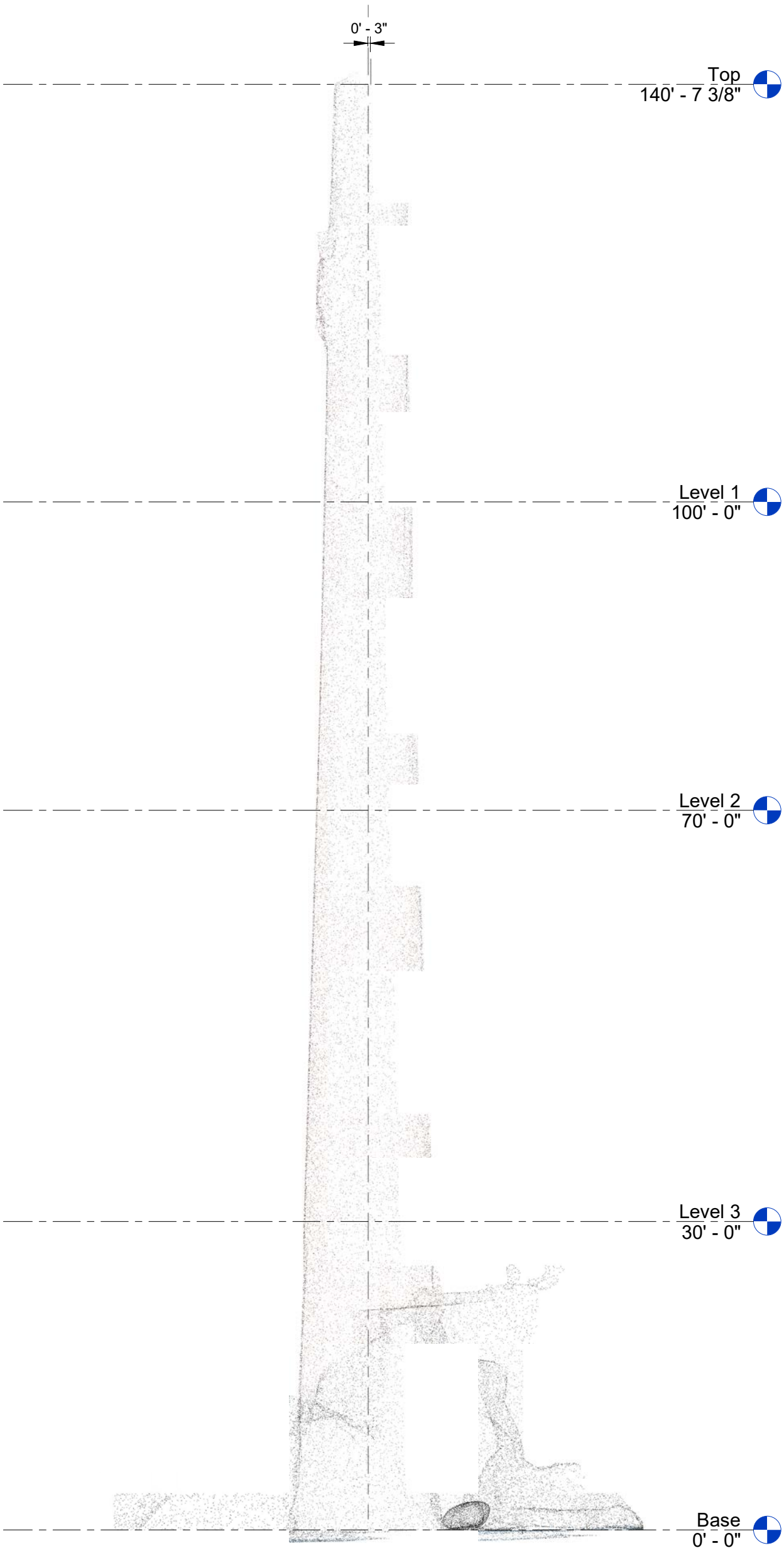

1 North West Elevation
3/32" = 1'-0"

FIGURE 6a

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JOHNSON'S CREAMERY
SMOKE STACK

NORTH WEST ELEVATION

Project number	Project Number	R4.1	
Date	Issue Date		
Drawn by	Author		
Checked by	Checker	Scale	3/32" = 1'-0"

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FIGURE 7

ARSEE ENGINEERS | SINCE 1968 CLIENT ORIENTED – BY DESIGN	JOHNSON'S CREAMERY SMOKE STACK	WEST ELEVATION PHOTO	
		Project number Project Number Date Issue Date Drawn by Author	R5
		Checked by Checker	Scale

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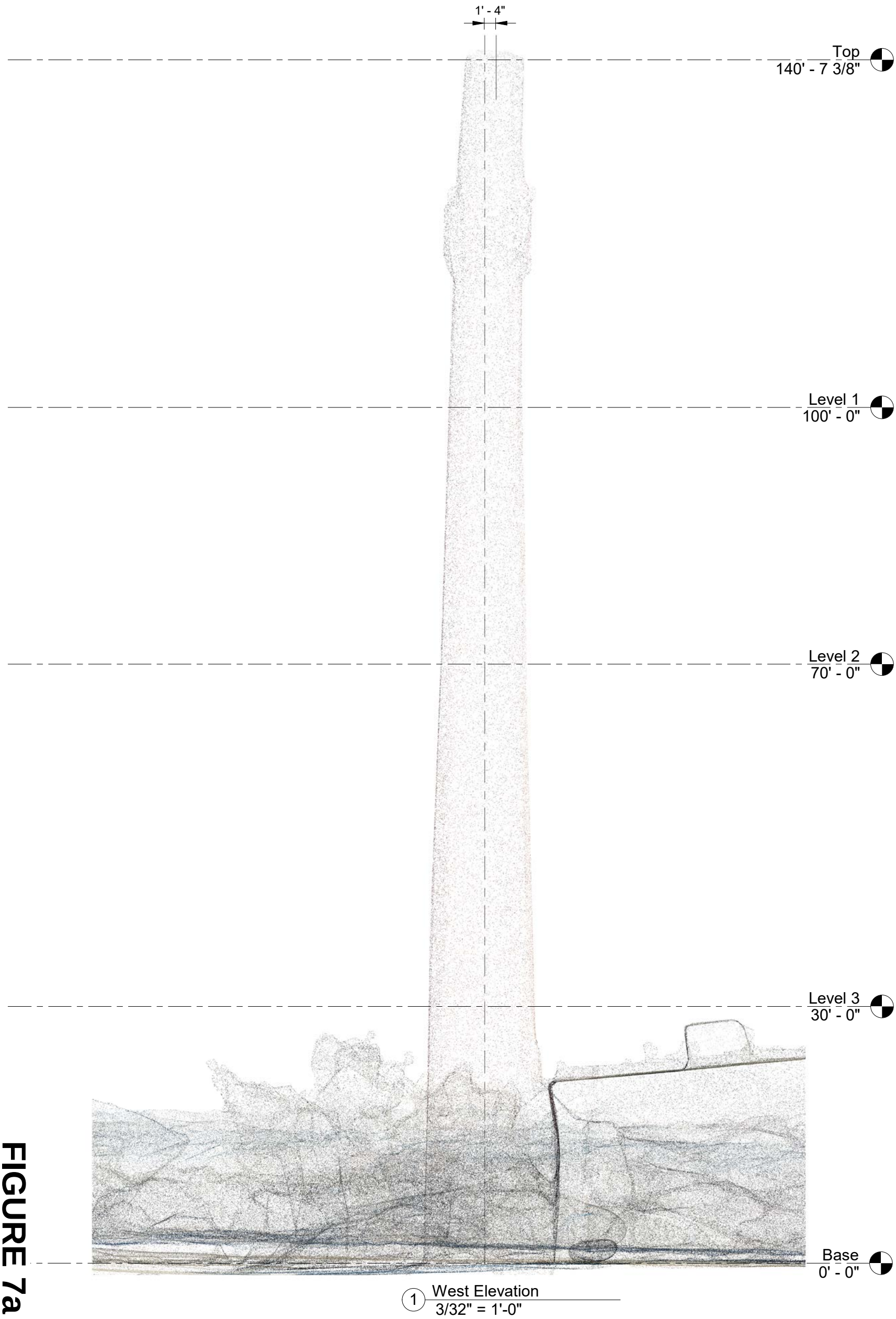

1 West Elevation
3/32" = 1'-0"

FIGURE 7a

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JOHNSON'S CREAMERY
SMOKE STACK

WEST ELEVATION

Project number	Project Number	R5.1
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	Scale 3/32" = 1'-0"

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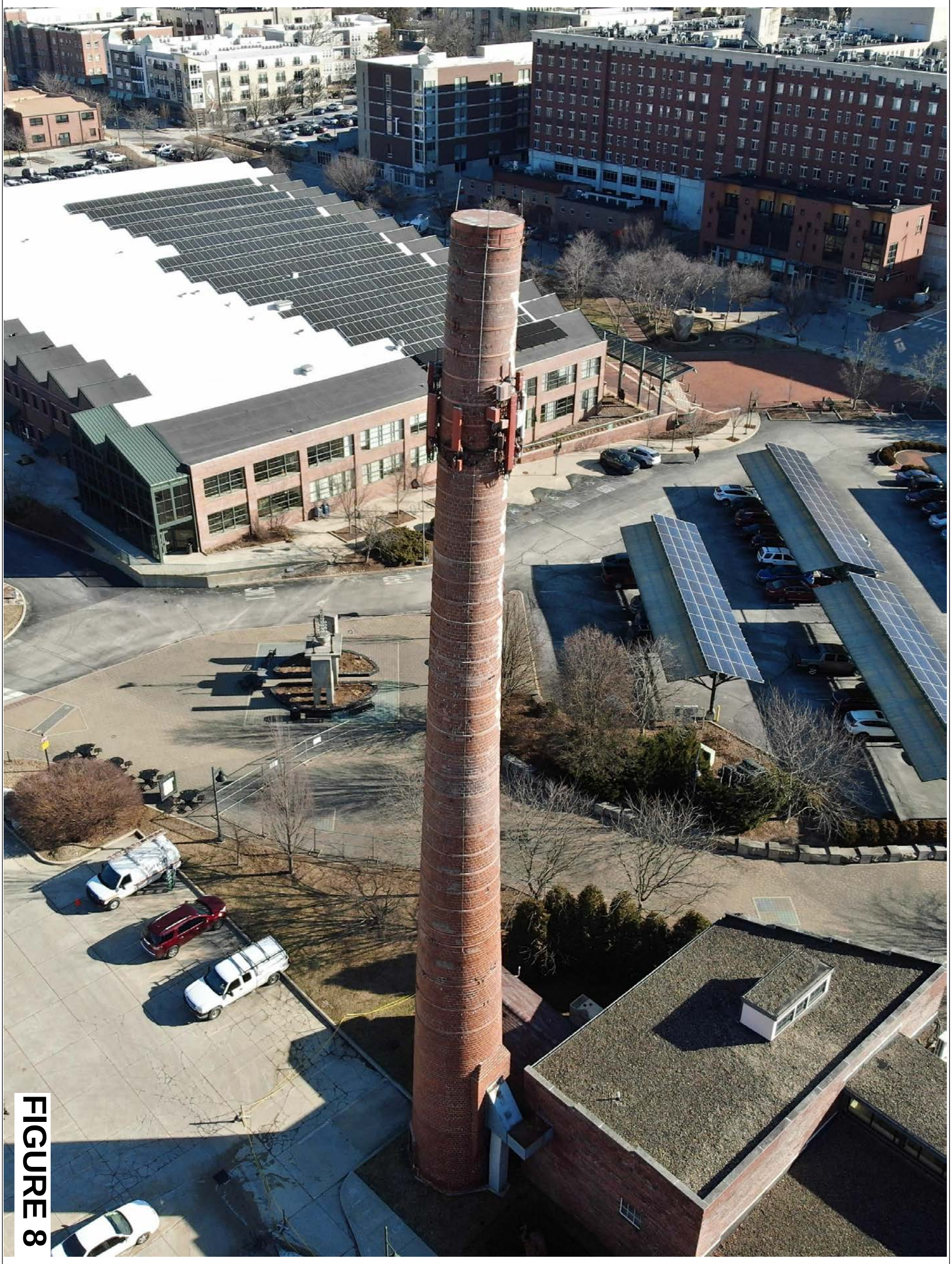

FIGURE 8

ARSEE ENGINEERS | SINCE 1968 CLIENT ORIENTED – BY DESIGN	JOHNSON'S CREAMERY SMOKE STACK	SOUTH WEST ELEVATION PHOTO	
		Project number Project Number Date Issue Date Drawn by Author Checked by Checker	R6 Scale

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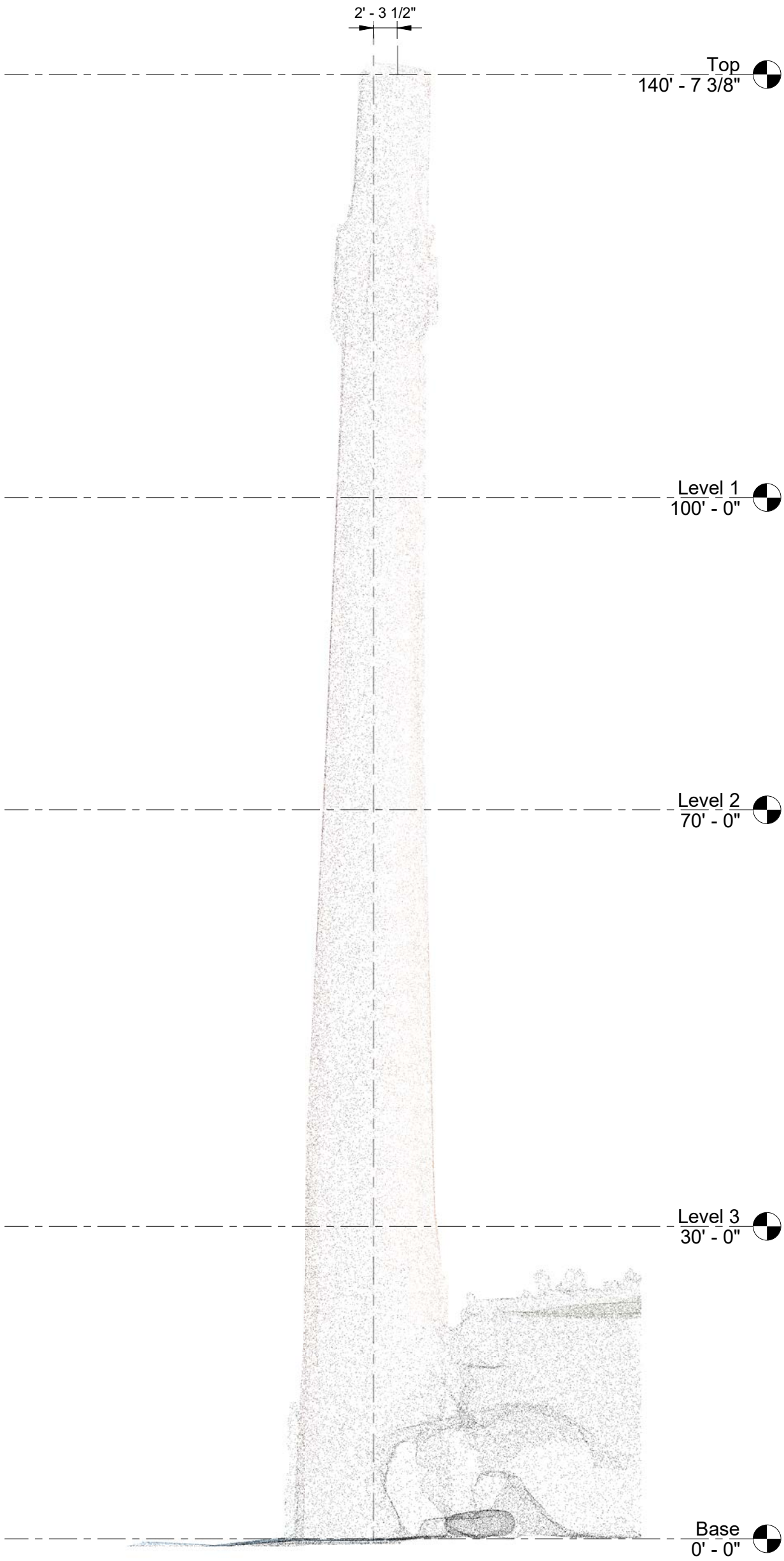

1 South West Elevation
3/32" = 1'-0"

FIGURE 8a

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JOHNSON'S CREAMERY
SMOKE STACK

SOUTH WEST ELEVATION

Project number	Project Number	R6.1	
Date	Issue Date		
Drawn by	Author		
Checked by	Checker	Scale	3/32" = 1'-0"

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FIGURE 9

ARSEE ENGINEERS | SINCE 1968 CLIENT ORIENTED – BY DESIGN	JOHNSON'S CREAMERY SMOKE STACK	SOUTH ELEVATION PHOTO	
		Project number Project Number	R7
		Date Issue Date	
		Drawn by Author	
		Checked by Checker	Scale

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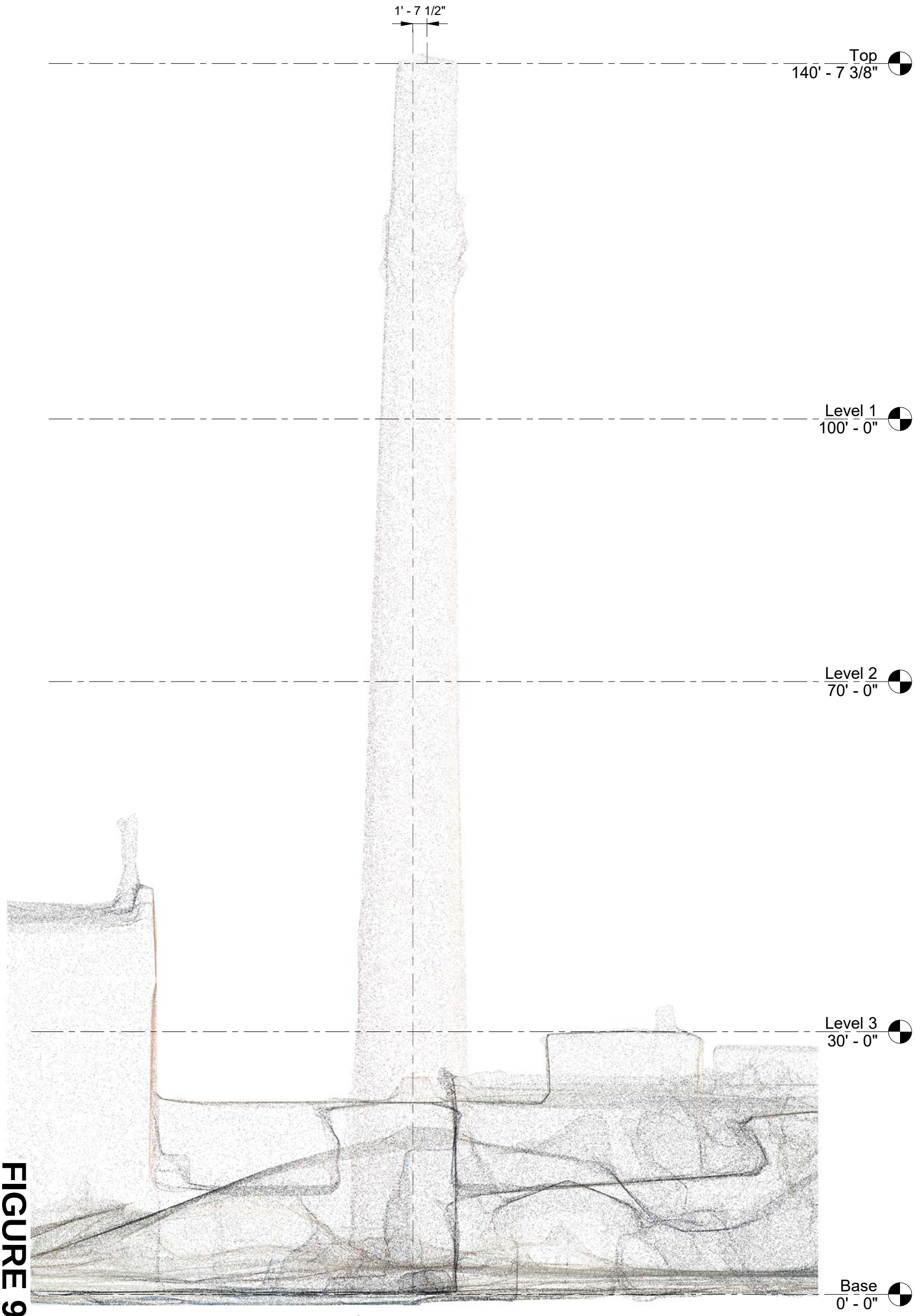

1 South Elevation
3/32" = 1'-0"

FIGURE 9a

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JOHNSON'S CREAMERY
SMOKE STACK

SOUTH ELEVATION

Project number	Project Number	R7.1
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	Scale 3/32" = 1'-0"

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FIGURE 10

ARSEE ENGINEERS | SINCE 1968 CLIENT ORIENTED – BY DESIGN	JOHNSON'S CREAMERY SMOKE STACK	SOUTH EAST ELEVATION PHOTO	
		Project number Project Number	R8
		Date Issue Date	
		Drawn by Author	
		Checked by Checker	Scale

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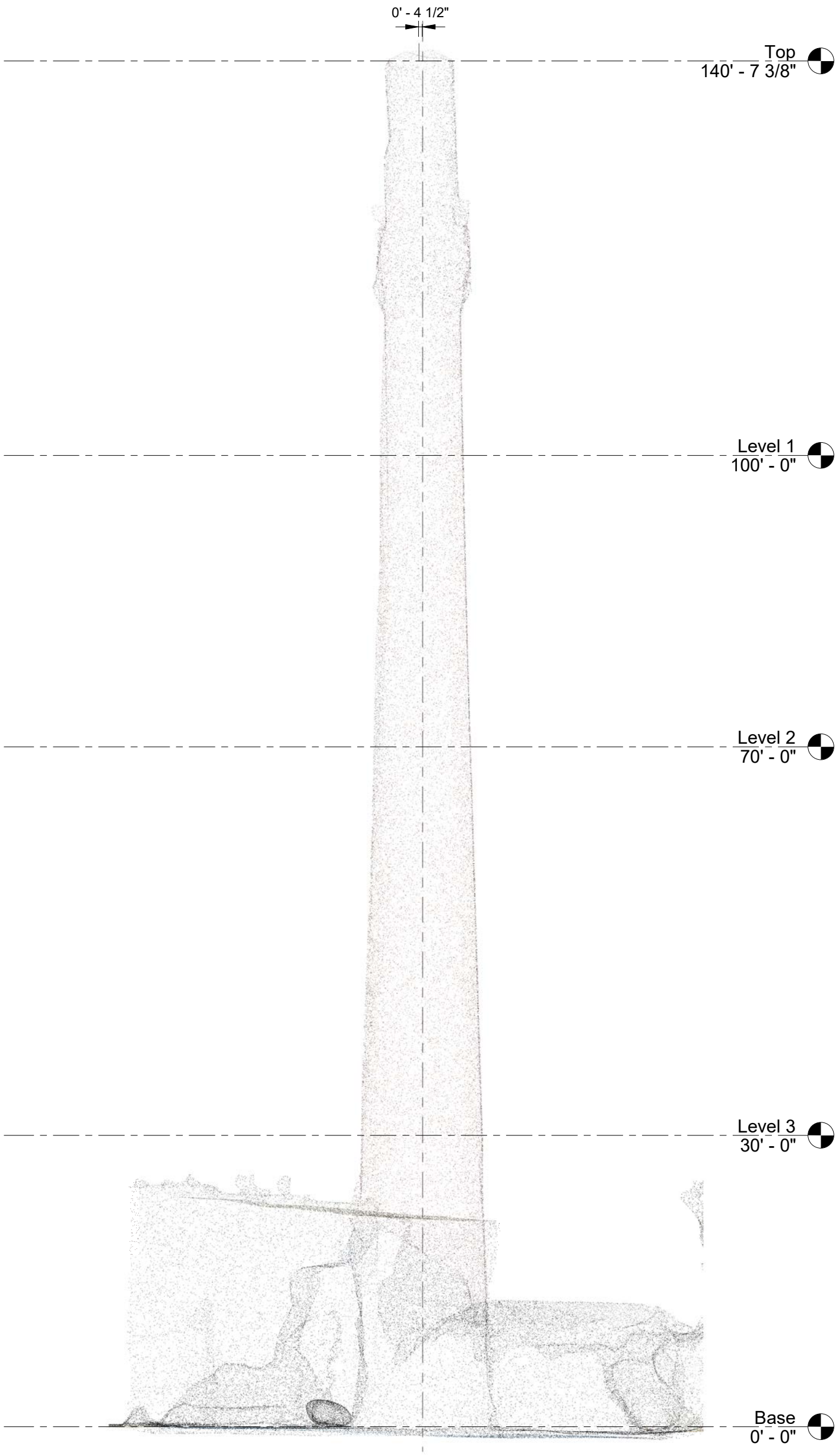

1 South East Elevation
3/32" = 1'-0"

FIGURE 10a

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JOHNSON'S CREAMERY
SMOKE STACK

SOUTH EAST ELEVATION

Project number	Project Number	R8.1
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	Scale 3/32" = 1'-0"

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FIGURE 11

ARSEE ENGINEERS | SINCE 1968 CLIENT ORIENTED – BY DESIGN	JOHNSON'S CREAMERY SMOKE STACK	EAST ELEVATION PHOTO	
		Project number Project Number Date Issue Date Drawn by Author Checked by Checker	R9 Scale

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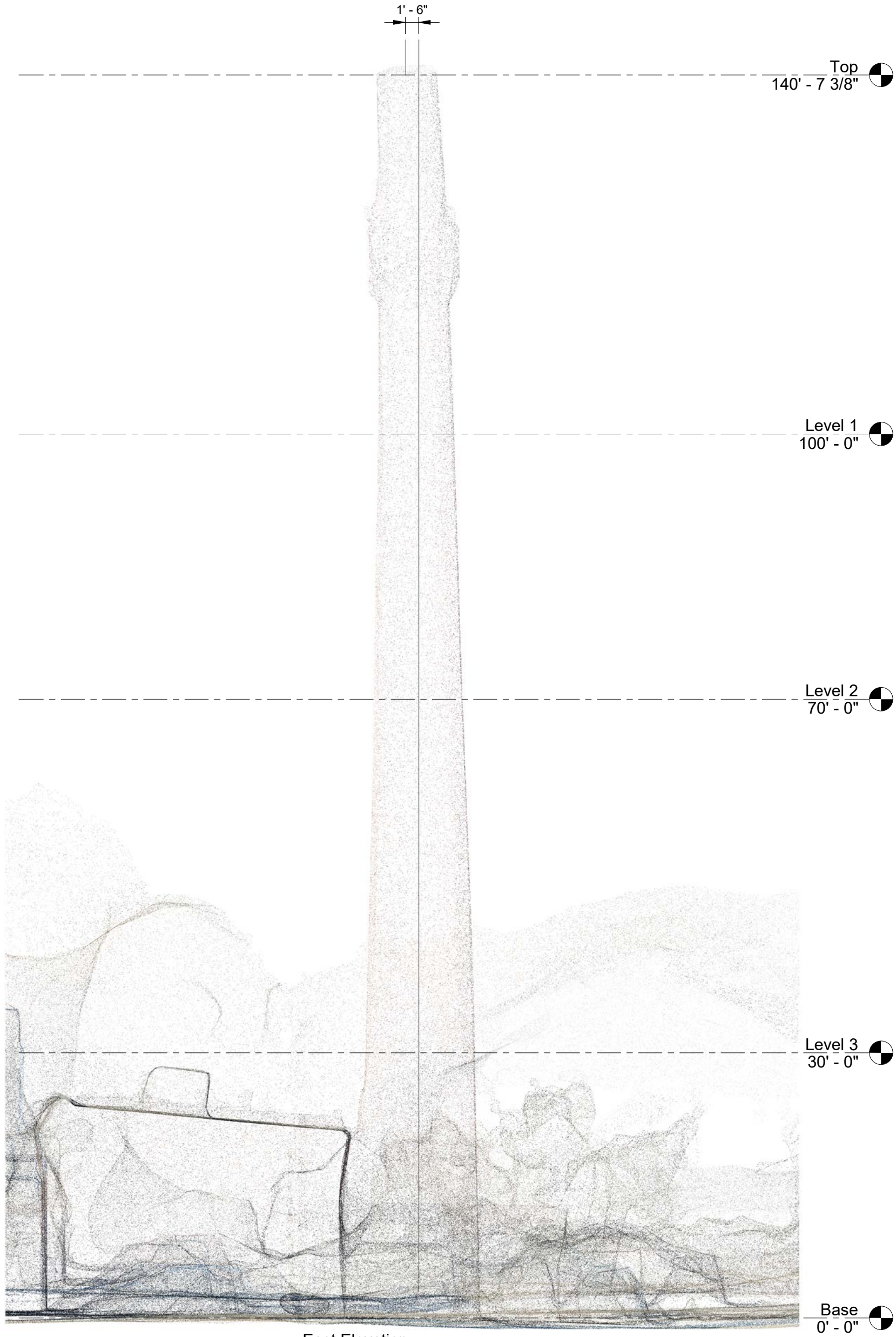

1 East Elevation
3/32" = 1'-0"

FIGURE 11a

ARSEE ENGINEERS | SINCE 1968
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JOHNSON'S CREAMERY
SMOKE STACK

EAST ELEVATION

Project number	Project Number	R9.1
Date	Issue Date	
Drawn by	Author	
Checked by	Checker	Scale 3/32" = 1'-0"

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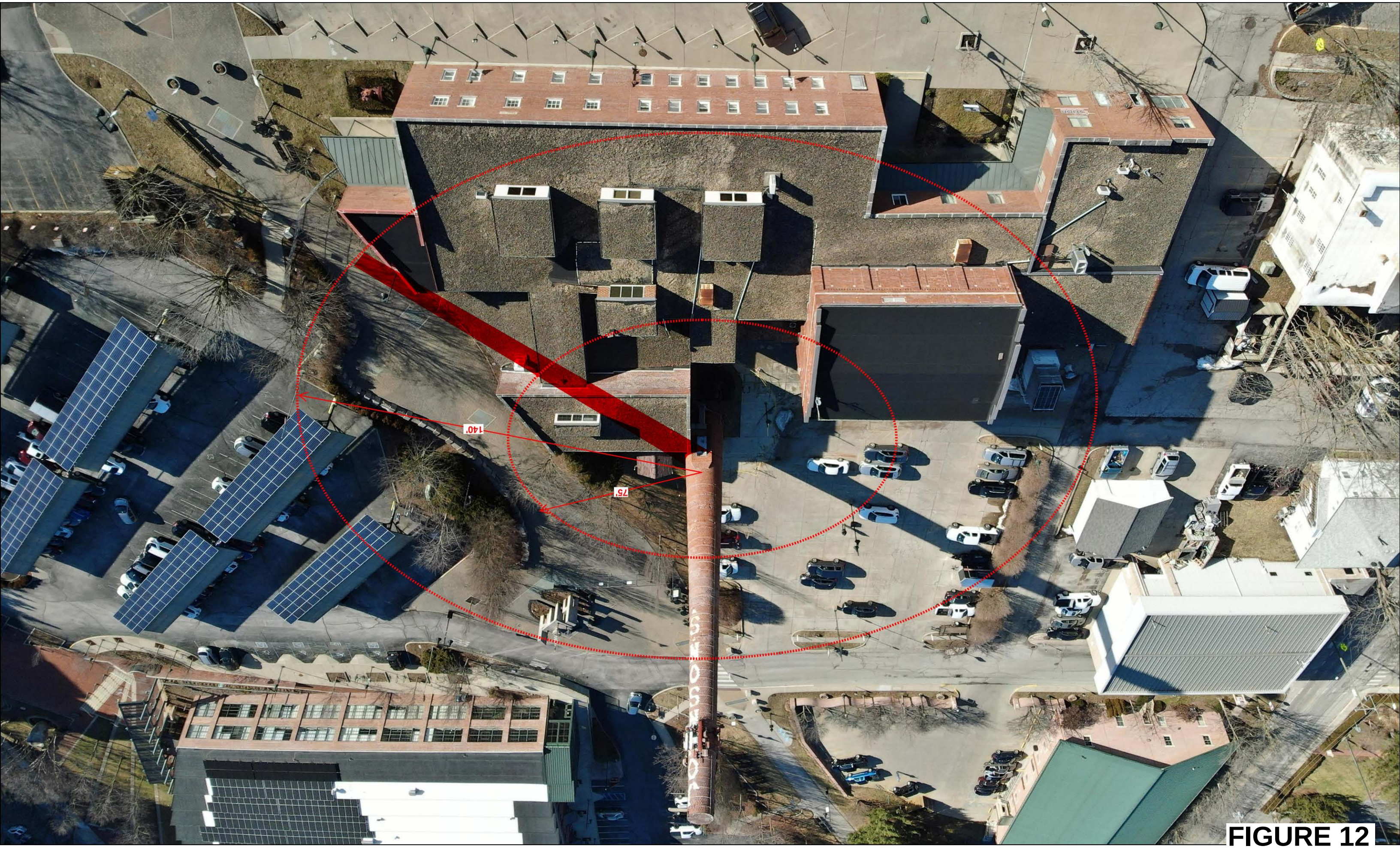

FIGURE 12

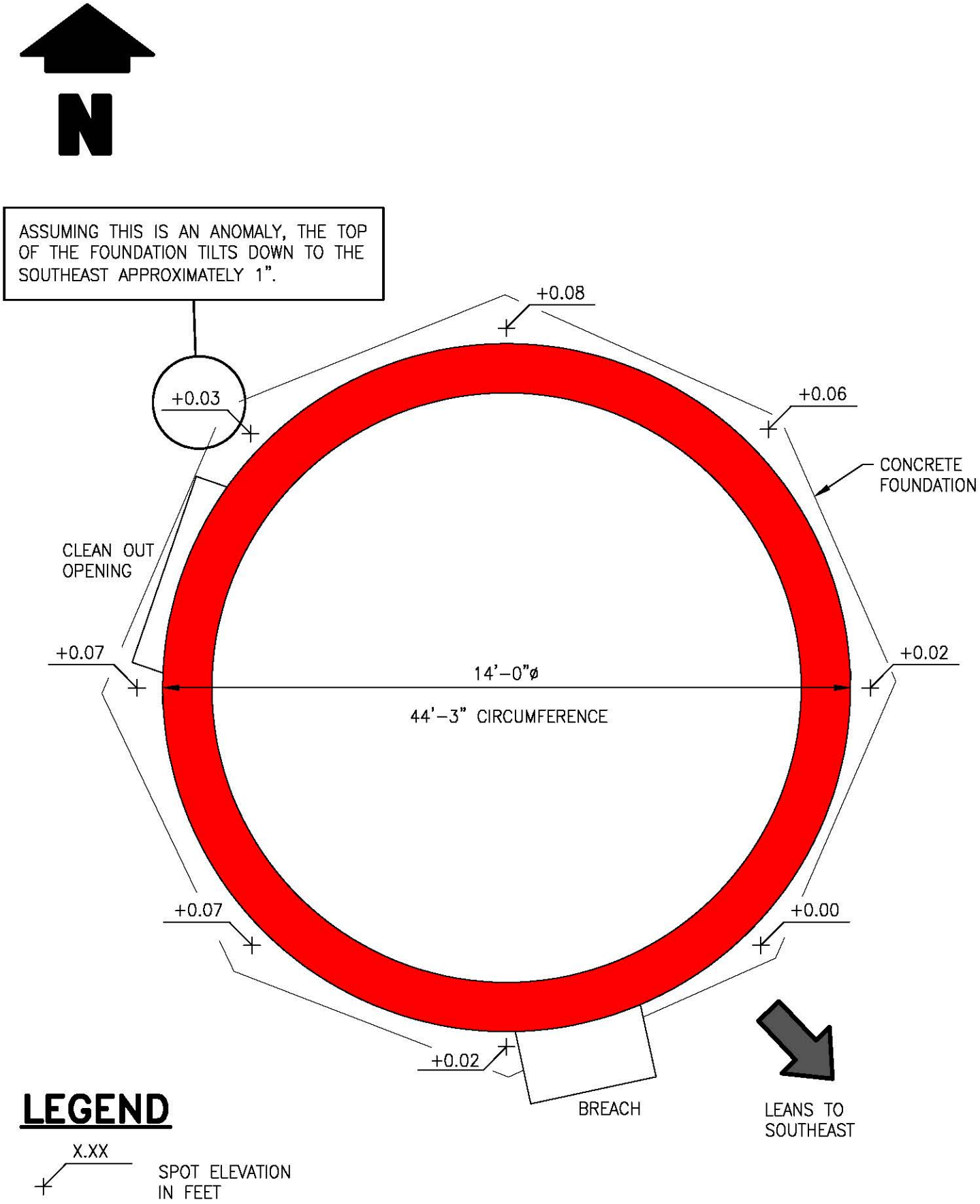
N
ASSUMING THIS IS AN ANOMALY, THE TOP OF THE FOUNDATION TILTS DOWN TO THE SOUTHEAST APPROXIMATELY 1".
+0.08
+0.03
+0.06
CONCRETE FOUNDATION
CLEAN OUT OPENING
+0.07
14'-0"ø
44'-3" CIRCUMFERENCE
+0.02
+0.07
+0.00
+0.02
BREACH
LEANS TO SOUTHEAST
LEGEND
X.XX
SPOT ELEVATION IN FEET

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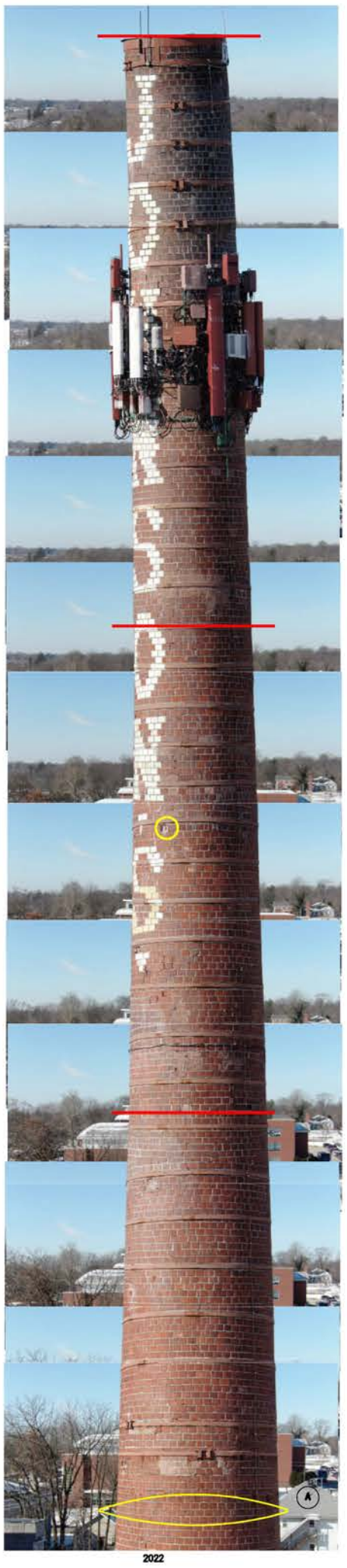
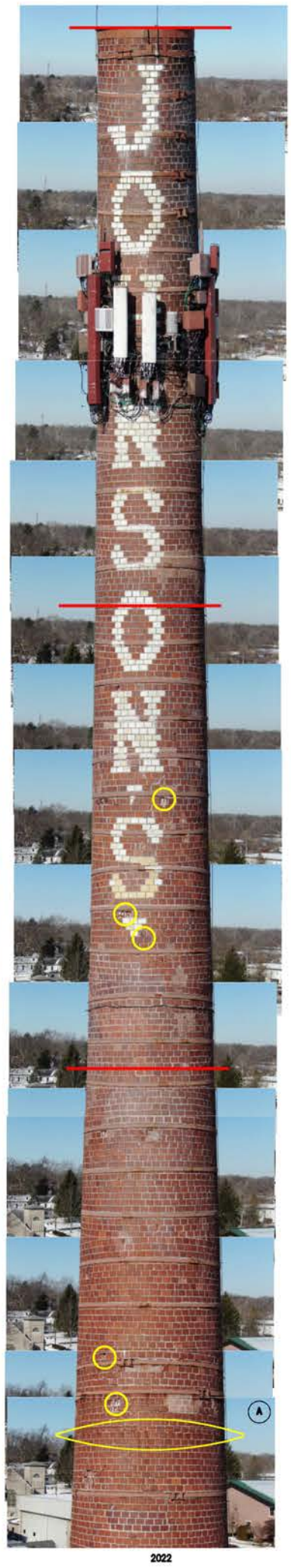
FIGURE 14



2022

1 NEW SPALL

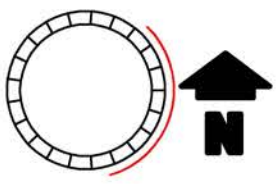
2017

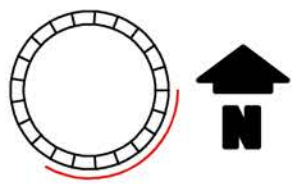


2022

5 NEW SPALLS

2017





SHEET NO. S1	DATE	SCALE	DRAWN BY	CHECKED BY	TITLE: EAST AND SSE ELEVATIONS			STAL	JOHNSON CREAMERY SMOKE STACK 2017 - 2022 COMPARISON		CERTIFIED BY
								REVISION			
								DATE			

ARSEE ENGINEERS, INC.

CLIENT ORIENTED — BY DESIGN

9715 KINCAID DRIVE, SUITE 100 317/594-5152 PHONE
FISHERS, INDIANA 46037-9459 317/594-9590 FAX

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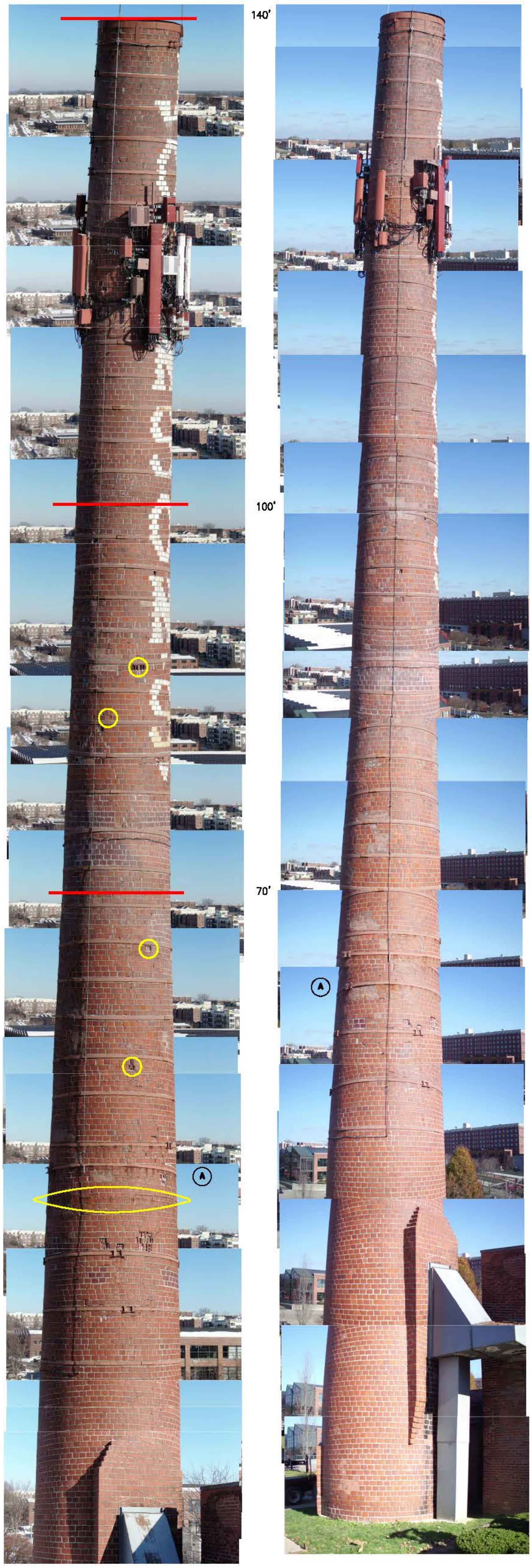
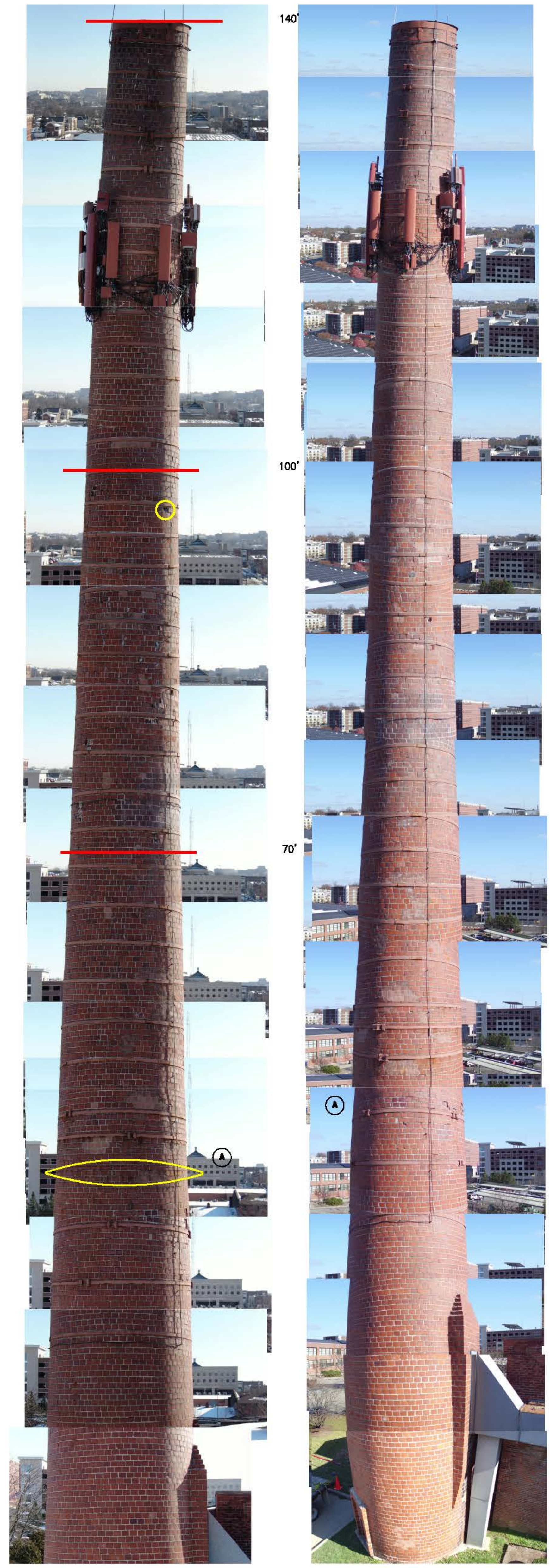
FIGURE 15



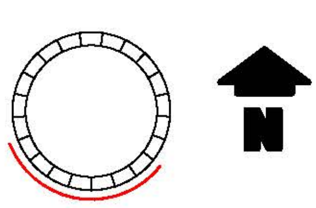
4 NEW SPALLS
2022

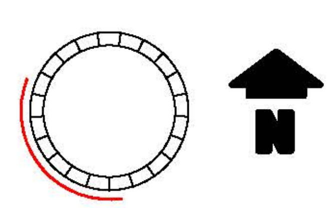
2017



1 NEW SPALLS
2022

2017



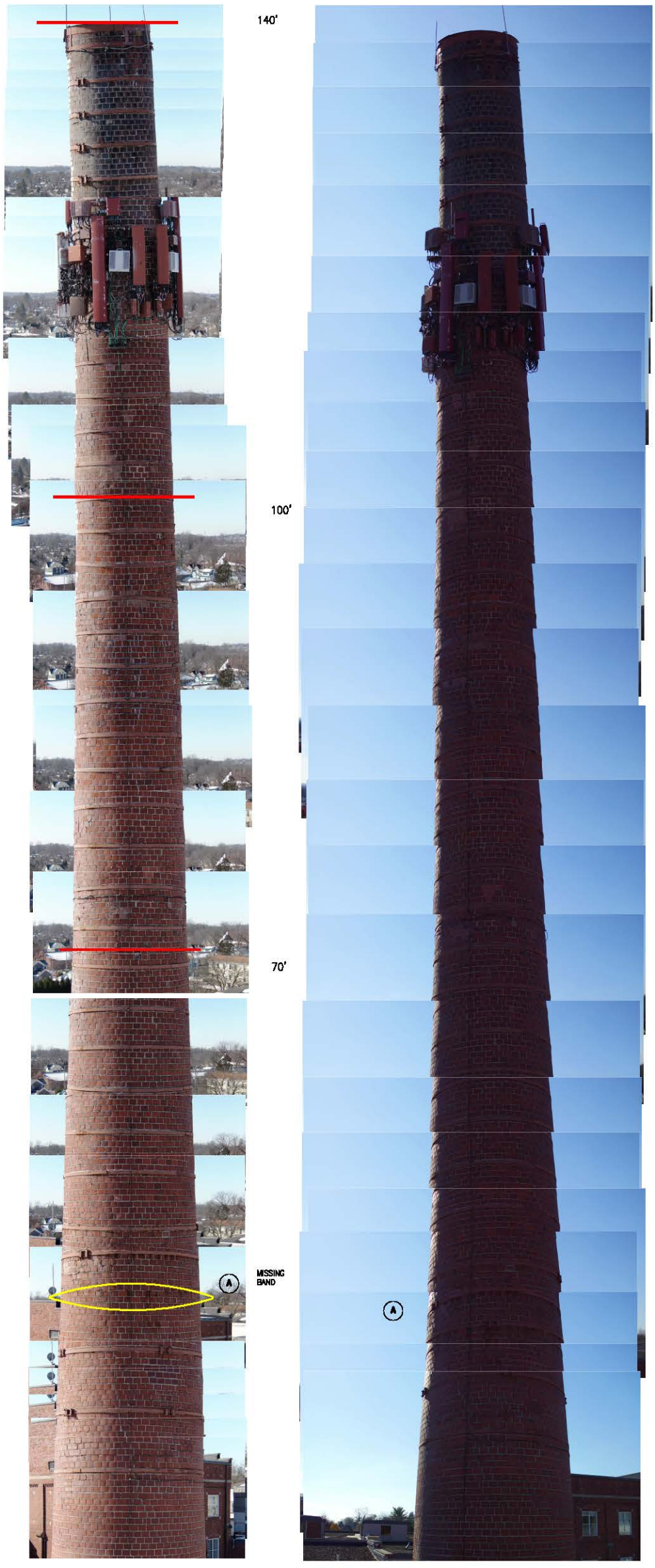


SHEET NO.	DATE	SCALE	DRAWN BY	CHECKED BY	TITLE			
S2					SOUTH AND SW ELEVATIONS	SYM. / REVISION / DATE	JOHNSON CREAMERY SMOKE STACK 2017 - 2022 COMPARISON	CERTIFIED BY

ARSEE ENGINEERS, INC.
CLIENT ORIENTED — BY DESIGN
9715 KINCAID DRIVE, SUITE 100 FISHERS, INDIANA 46037-9459
317/594-5162 PHONE 317/594-9590 FAX

P:\22050\Cad\S3.dwg 2/28/22 - 12:02 PM

FIGURE 16



SHEET NO. S3	TITLE NNW ELEVATION	JOHNSON CREAMERY SMOKE STACK 2017 - 2022 COMPARISON	CERTIFIED BY
DATE			
SCALE			
DRAWN BY			
CHECKED BY			

BY	REVISION	DATE

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APPENDIX A

ARSEE ENGINEERS, INC.

CLIENT ORIENTED — BY DESIGN

Johnson Creamery Smokestack Assessment

for

Alex Crowley
City of Bloomington
401 N. Morton, Suite 150
P. O. Box 100
Bloomington, IN 47404

APPENDIX A

50 | ARSEE ENGINEERS
1968 | CLIENT ORIENTED – BY DESIGN

Frederick A. Herget, PE
Scott A. Jones, PE
Allen R. Pulley
John A. Seest, PE
Daniel M. Calabrese, PE
Matthew D. Kilgour, PE
Albert C. Kovacs, PE
Bryan R. Wilson, PE
Andrew P. Langferman, PE
Gary D. Linard, PE
Laura E. Metzger, PE
Philip R. Savich, PE

November 30, 2017

Alex Crowley
City of Bloomington
401 N. Morton, Suite 150
P. O. Box 100
Bloomington, IN 47404

Re: Johnson Creamery Smokestack

Dear Alex:

EXECUTIVE SUMMARY

We have completed our assessment of the smokestack within the Johnson's Creamery facility. This work has included up close observation/documentation using both a crane and man basket as well as drone technology.

The current stack is approximately 140 feet tall and is reported to have been constructed in 1949. The upper portion of the stack leans several feet to the south/southeast. Crude measurements show it is out of plumb one foot in every ten at the top of the stack. In our opinion, this movement has occurred after construction – it was not built this way.

Deterioration is visible throughout the height of the stack to various degrees but is more prominent in the upper half. This takes the form of spalled brick, cracking (predominantly vertical) and deteriorated mortar. There is evidence of numerous different repairs being made over the years. Most of these have been of a more cosmetic nature and the deterioration continues to progress. The top of the chimney is capped with a steel plate – this promotes deterioration on the inside face of the masonry. The extent of such deterioration is unknown.

A preliminary structural analysis of the stack shows it can go into tension under design wind or seismic loads required by current Building Codes and theoretically overturn. This analysis has not attempted to take into account the distorted shape of the stack or the cracking/spalling of the masonry. These conditions increase concerns over the stability of the stack.

Extensive repairs must be implemented if the stack is to remain. A ballpark estimate of $350,000 has been developed with the aid of a contractor who has repaired similar stacks. Further analysis is required to finalize a repair program including assessment of the interior of the stack. Our detailed observations and comments follow.

BACKGROUND OF THE ASSESSMENT

This assessment has been limited to the masonry smokestack of the Johnson's Creamery facility in Bloomington, Indiana. The current stack is approximately 140 feet tall based upon measurements taken in the field and has a total of 38 steel bands encircling it as shown in Photo 1 and Figure 1. The "Johnson's" logo is prominently visible facing to the southeast. A review of the literature reveals the oldest portion of the Johnson's Creamery facility dates back to 1913 – 14. Photographs from the Monroe County Historical Society from the period of 1921 to 1943 show an earlier stack which has a slightly different configuration at the top and does not have the Johnson's logo. See Figures 2 through 4. A National Register nomination in 1995 reports "The current 178 foot smokestack replaced an earlier one in 1949." This nomination is included as Appendix A.

The discrepancy in the height of the current stack is interesting. The 1995 nomination citing a height of 178 feet may simply be wrong or approximately 38 feet of the stack has been removed.

The stack is constructed of multiple wythes of unreinforced brick masonry supported by a concrete foundation of unknown depth. There was no indication of abnormal or significant differential movement or settlement of the foundation. The stack is approximately 12'-6" in diameter at the base and 7'-0" at the top. Individual brick are nominally sized at 6 ¼"w x 4 ½" h x 2 ¾ t.

A visual assessment was performed on November 22nd. A 50 ton crane and man basket were used to observe and photograph the stack up close. Still and video images were recorded using a DJI Matrice 600 Pro drone. See Photos 2 through 4. Mortar samples were taken of both the original and repair mortars and are available for further analysis as the need may arise. A series of holes were drilled to a depth of two inches throughout the height of the stack to get a feel for the relative hardness of the mortar. No further testing or sampling was performed. A steel grate welded over the opening at the base of the stack prevented observation of the interior.

OBSERVATIONS

The following observations were made either while on site or during a review of the photographs and historic images. See Photos 5 through 47 and Figures 5 through 8.

- There is evidence of numerous significant repairs being made at multiple times since 1949.
- A total of 38 steel bands are in place throughout the upper 100 feet of the stack. All are tight and in good condition. These were installed to address vertical cracking which occurs throughout the majority of the stack.
- The steel bands appear to have been installed at different times. Extensive tuckpointing was performed prior to installation of most of the steel bands. See Figure 5. Many more repairs have been made after installation.

- Cell phone equipment is installed approximately 120 feet above grade level.

- The top of the stack is covered with a steel plate. This prevents rainwater from entering to the interior but also promotes freeze/thaw deterioration on the inside face of the stack. Warm, moist air rises and condenses on the colder masonry surface. Numerous brick shards were visible on the interior of the stack at grade level.

- The walls of the stack vary in thickness from 20 inches (5 wythes of brick) at the base to 7 inches (2 wythes of brick) at the top. Transition points from 5 to 2 wythes are unknown.

- Faces of the brick have spalled in numerous locations. This seems to be more prevalent on the south, west and east sides. This appears to have been an ongoing problem for many years as there is evidence of multiple different ways repairs have been attempted.

- New deterioration continues to occur in areas where previous repairs have been made - the deterioration is progressive and is continuing.

- Loose shards of brick and mortar have, and will continue to fall from the outside of the stack. This presents a real danger to the public and cars parked nearby. Shards falling from the side of the stack would be expected to "slide" down until they strike a steel band and "bounce" outward.

- Glazed brick used to create the Johnson's logo have deteriorated in a different manner. The glaze has spalled away from the body of the piece. Multiple units have been replaced in the lower "S". This occurred prior to installation of the steel band in this location.

- More recent repairs have been of a more cosmetic nature. Tuckpointing and brick replacement have been replaced with face caulking, cementitious patches and tuckpointing efforts where mortar is "buttered" over the eroded joint. The tuckpointing mortar is harder than the original mortar. It has debonded and fallen back out in numerous locations.

- We have performed similar assessment on six other smokestacks of similar or older vintage. The mortar in this stack is as soft as or softer than that in any of the other stacks we have investigated.

- New (unrepaired) cracks were observed. These occur throughout the height of the stack.

- The stack visibly leans to the south as shown in Figure 6 and Photos 44 through 47. Multiple reports indicate this condition has been present for a long period of time. Plumb bob measurements found the top of the stack is out of plumb at a slope of 1 to 10 or approximately 6.0°.

- Montage views of the upper portion of the stack are shown in Figure 7. A montage of the logo on the southeast face is shown in Figure 8.

STRUCTURAL ANALYSIS

We have performed structural analyses of the smokestack, modeling it in a finite element software program, RISA 3D, primarily to determine the structural natural frequency. This was necessary to evaluate its ability to withstand lateral loads under current Building Codes. Our analyses assumes a perfectly plumb smokestack and does not account for cracking/spalling of the masonry.

These analyses assume the hollow core clay brick masonry is unreinforced and un-grouted and that it varies in thickness from two wythes at the top to five wythes at the base. We assumed mortar in the bed joints of the brick is placed only on the face shells of each brick.

The lateral analyses assumes a Type II construction and a 1.0 importance factor. The total horizontal seismic shear load required by Code is equal to 10% of the total weight of the stack, or 21,000 pounds located at a height of 55 feet above grade level. The lateral wind pressure on the stack varies from 34 pounds per square foot (psf) at the top to 13 psf at the base.

Under normal gravity loads, the compressive stresses in the brick face shells appear to be within an acceptable range. However, when either wind or seismic loads are placed on the smokestack, there is some concern for tension in the mortar joints. The magnitude of these tension stresses warrants a more detailed analysis, but can likely be resolved with vertical reinforcement in the walls at the stack base.

We also reviewed the Structural Analysis Report dated November 20, 2017, prepared by GPD Group, Inc. In general, it appears they have used rational engineering judgment. However, their assumptions of brick configuration and wall thicknesses exaggerate unit dead load of the masonry walls resulting in a computed stack weight that is more than double what our analysis shows. This is unconservative when evaluating lateral loads in the stack. Their report did not include a seismic analysis.

CONCLUSIONS AND RECOMMENDATIONS

In light of the above and based upon our experience with several other smokestacks of similar construction, age and geographic location, we come to the following conclusions:

- The current smokestack was constructed in 1949 and is approximately 140 feet tall. The National Register nomination listing it at 178 feet in height was either grossly in error or some 38 feet have been removed. If the top of the stack was removed within the last 25 years it would have been a monumental event which many people would remember and one that should be recorded by newspapers, etc. We have not found any such documentation.

- The upper portion of the stack leans visibly to the south/southeast. Crude measurements find the masonry above the cell phone equipment to be out one foot horizontally for every ten feet vertically. The top of the stack is visibly displaced several feet from where it would be if it were constructed normally and plumb. Reports by people that it has been this way for many years may be true but it is incomprehensible that it was constructed in this distorted shape.

- There is evidence of numerous repair efforts being made over the years to address brick spalling, cracking and mortar deterioration. The majority of these repairs have been more cosmetic than permanent solutions. Deterioration continues to progress – new cracks develop, more brick faces fall, existing cracks re-open and repair mortar debonds and falls out.

- Covering the top of the stack with a steel cap promotes deterioration on the interior. The extent of this deterioration is unknown.

- The original mortar is as soft as or softer than any other stack we have assessed. Mortar samples were taken and can be tested to determine composition and anticipated strength if necessary.

- Still photographs and videos were taken in vertical "drops" around the circumference of the stack. Detailed repair drawings could be generated from these but are beyond the scope of this assessment.

- In our opinion, there is no question extensive repairs are necessary if the stack is to remain. To get a sense of the order of magnitude of what these might cost, we solicited the help of a local masonry contractor who has worked on similar stacks and asked him to price the following:

    - Install six vertical steel straps welding them to the 38 circumferential bands to provide resistance to lateral loads and further leaning of the masonry. These would extend from the top of the stack down to and be attached to the concrete foundation.
    - Properly cut out and tuckpoint all of the mortar joints.
    - Remove and replace approximately 200 brick which have spalled or have been patched.
    - Epoxy inject 1,000 LF of cracks.
    - A ballpark estimate of the cost of these repairs is $350,000. This does not include A/E or CM fees, contingencies or other indirect expenses. It would require the cell phone equipment be turned off while work is being performed in close proximity.

- Before such a repair program is finalized, we recommend these additional steps be undertaken:

    1. Analyze the composition of the original mortar.
    2. Remove and test prisms of brick and mortar to more accurately determine the physical characteristics of the brick and mortar assemblage.
    3. Perform some sort of assessment of the interior of the stack.
    4. Import the video taken from the drone and generate a 3-D computer model of the stack in its current condition. From this, accurate measurements of the distortion can be made and a more rigorous structural analysis can be performed.

We suspect this report will promote significant discussion regarding the condition and future of the smokestack. We will be happy to meet and discuss our observations in person if you like.

Yours truly,

Frederick A. Herget
Professional Engineer

Gary D. Linard
Professional Engineer

/kna

PHOTOGRAPHS

Photo 1

Overall view from the southeast.

Photo 2

Close up observations were made from a crane and basket.

Photo 3

Video and still images were recorded with a drone.

Photo 4

Close up of the drone.

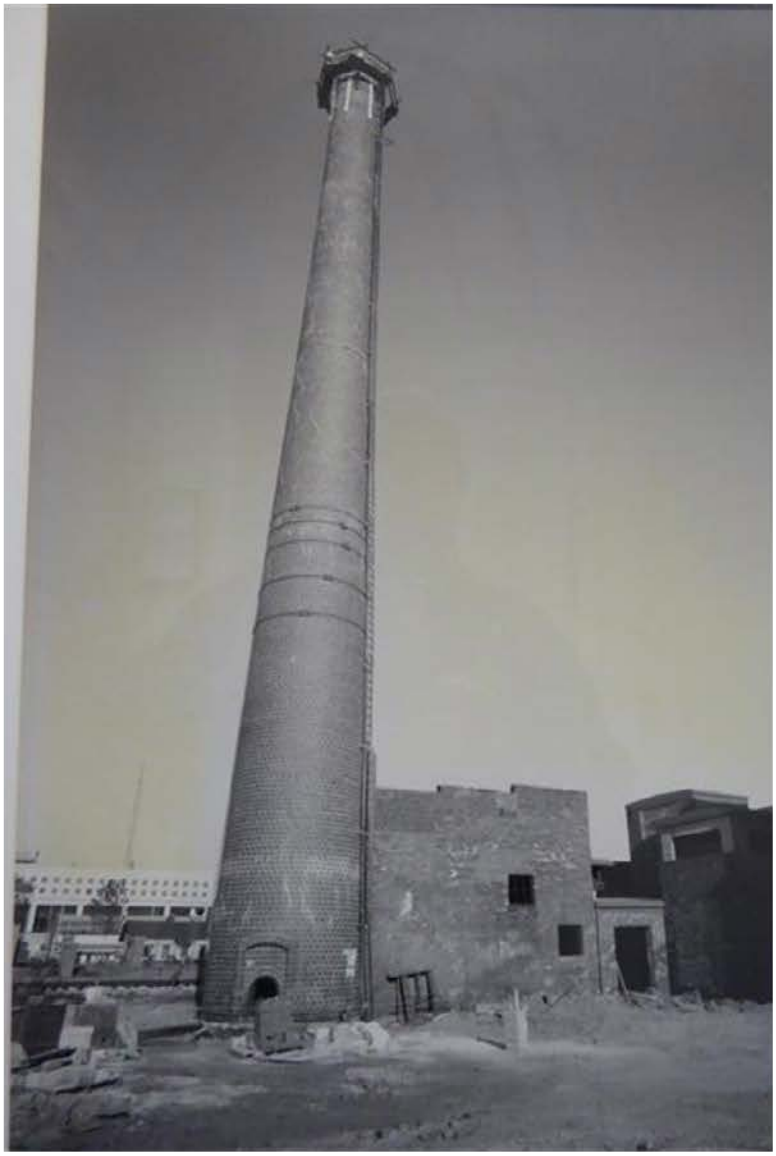


Photo 5

Historic photo (unknown year). It appears repairs are being made throughout the height of the stack. Bands 33 through 37 are visible...

Photo 6

...and several bands have been installed at the top. The "larger" white mortar joints have been tuckpointed.

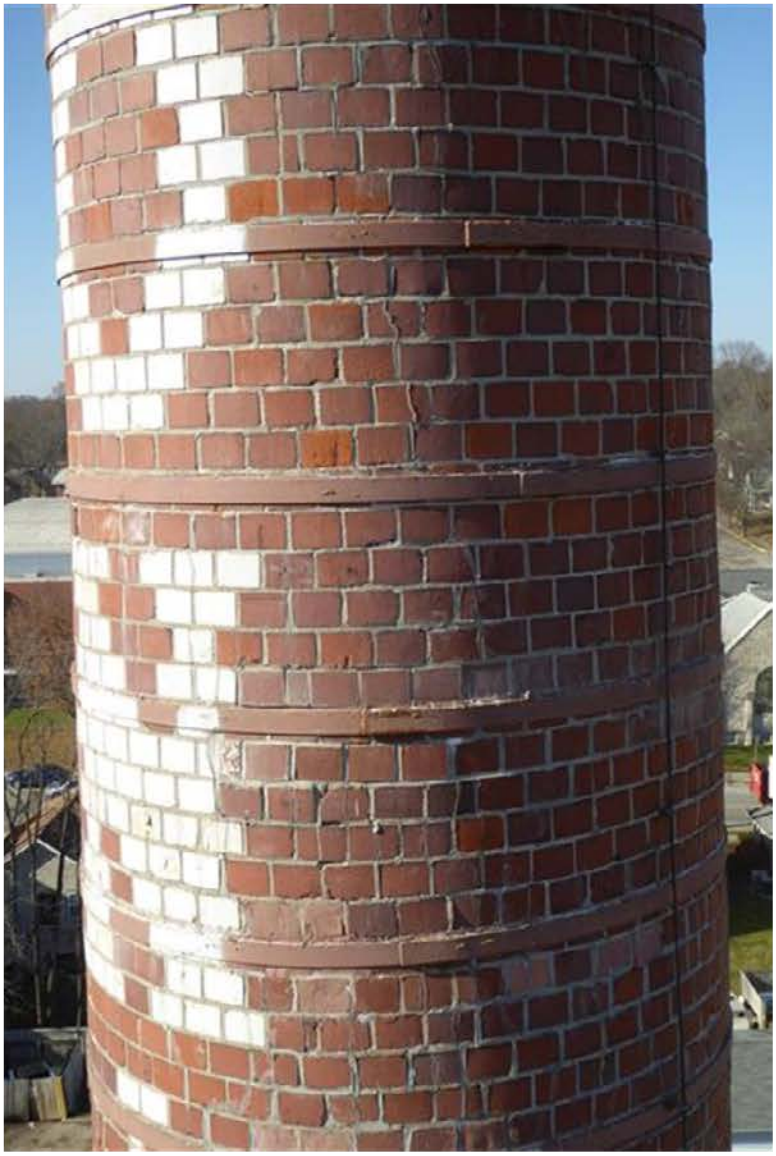


Photo 7

A total of 38 steel bands are currently in place on the stack.

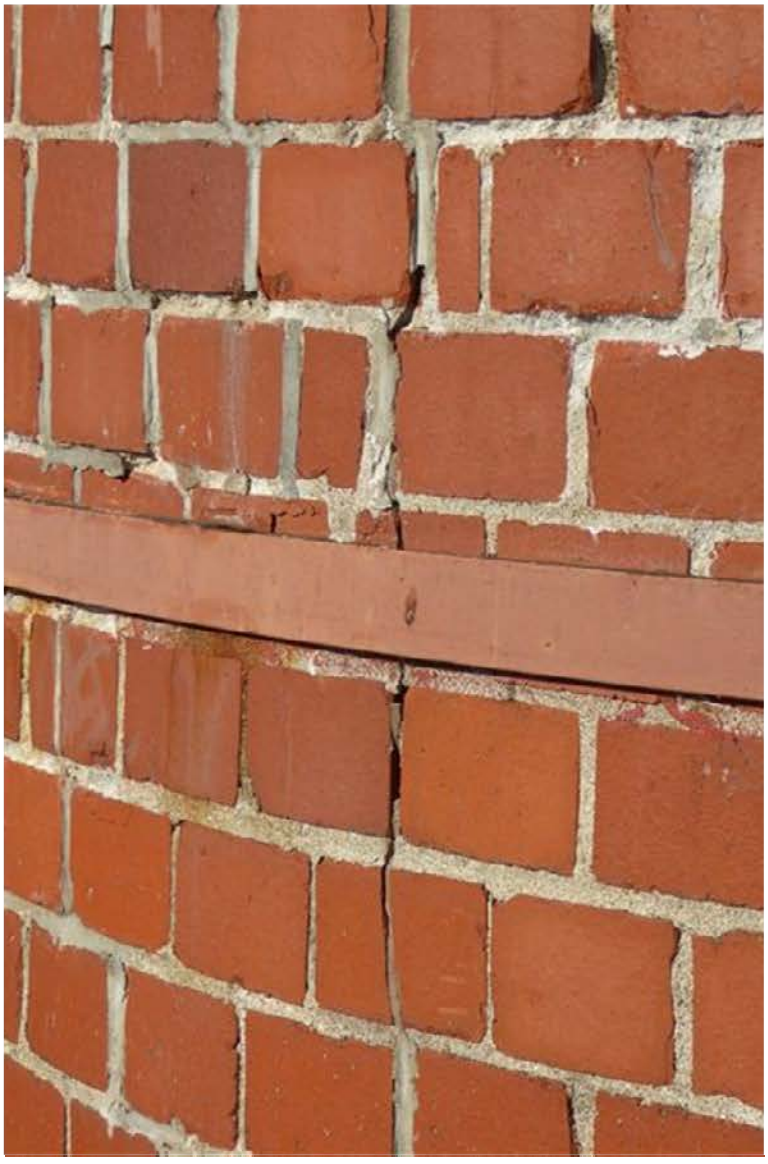


Photo 8

These were installed to address vertical cracking which occurs throughout the upper 100 feet of the stack.

Photo 9

Closer view of bands and cell phone equipment in the upper portion of the stack.

Photo 10

The 1/4 x 4 inch steel bands are secured with two, 3/4 inch diameter bolts.

Photo 11 The top of the stack has been capped with a steel plate.

Photo 12 This prevents rain from falling inside but promotes freeze/thaw deterioration due to the “chimney effect” where warm, moist air rises and condenses on the inside face of the masonry.

Photo 13 Opening at the base of the stack.

Photo 14 Wall thickness at the opening is 13 inches or 3 wythes of brick. This flares out to 5 wythes of brick or 20 inches in thickness on the sides of the opening.

Photo 15

Faces of the brick have spalled in multiple locations.

Photo 16

Splitting cracks running parallel to the face of the brick are visible adjacent to the “hole.”

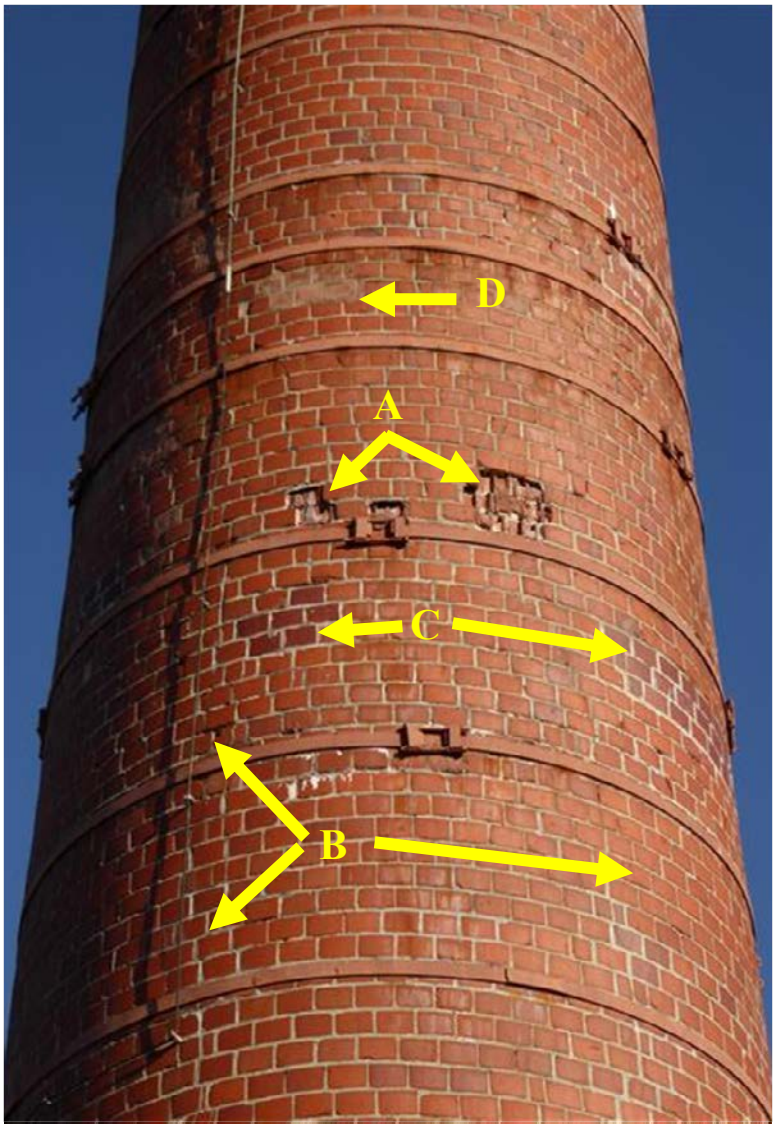
Photo 17 Interior face of a shard found on the ground.

Photo 18 The outer face shell is only 3/4 inches thick.

Photo 19

Multiple forms and vintages of deterioration are present:

A=Recent spalling
B=Vertical cracking
C=Spalled areas where brick were replaced with brick
D=Spalled areas where brick were replaced with patching compound



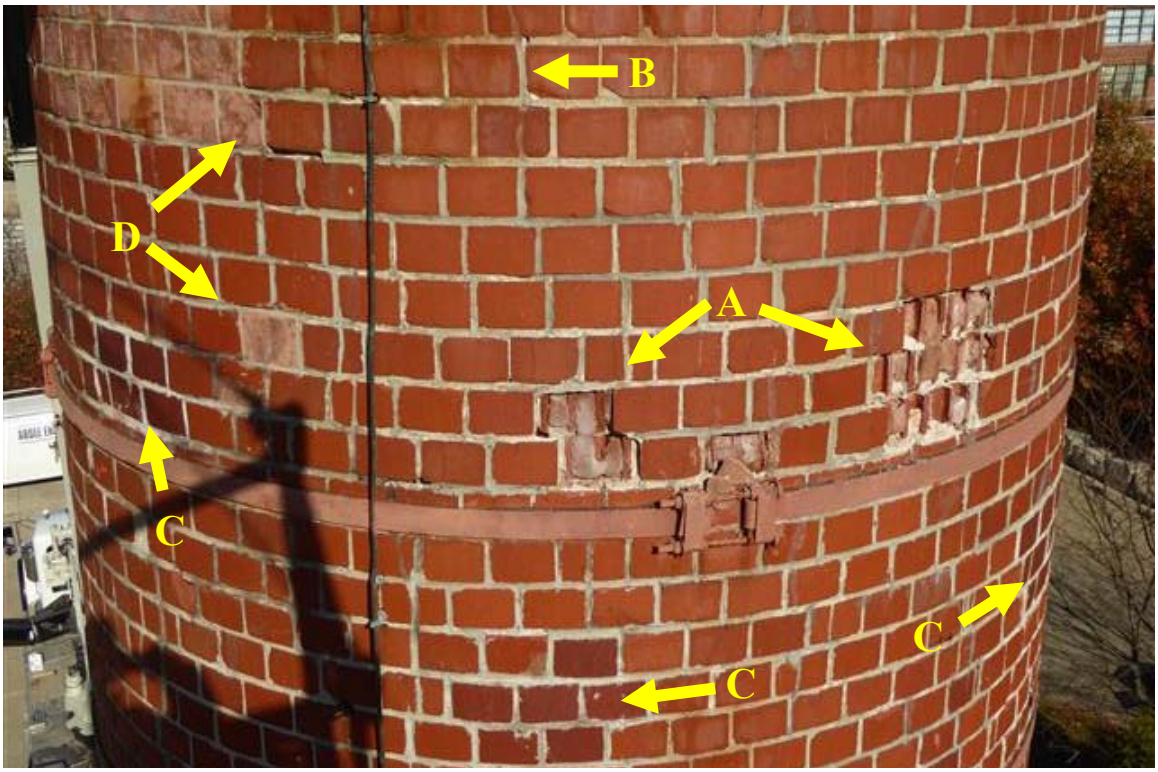


Photo 20

Closer view of these conditions.

Photo 21

Loose shards of brick up higher in the stack.

Photo 22

Such shards and spalls occur adjacent to longer vertical and/or stair step cracks.

Photo 23 Cementitious patches have been used to replace spalled brick in numerous locations.

Photo 24 The patching material cracks and falls away itself.

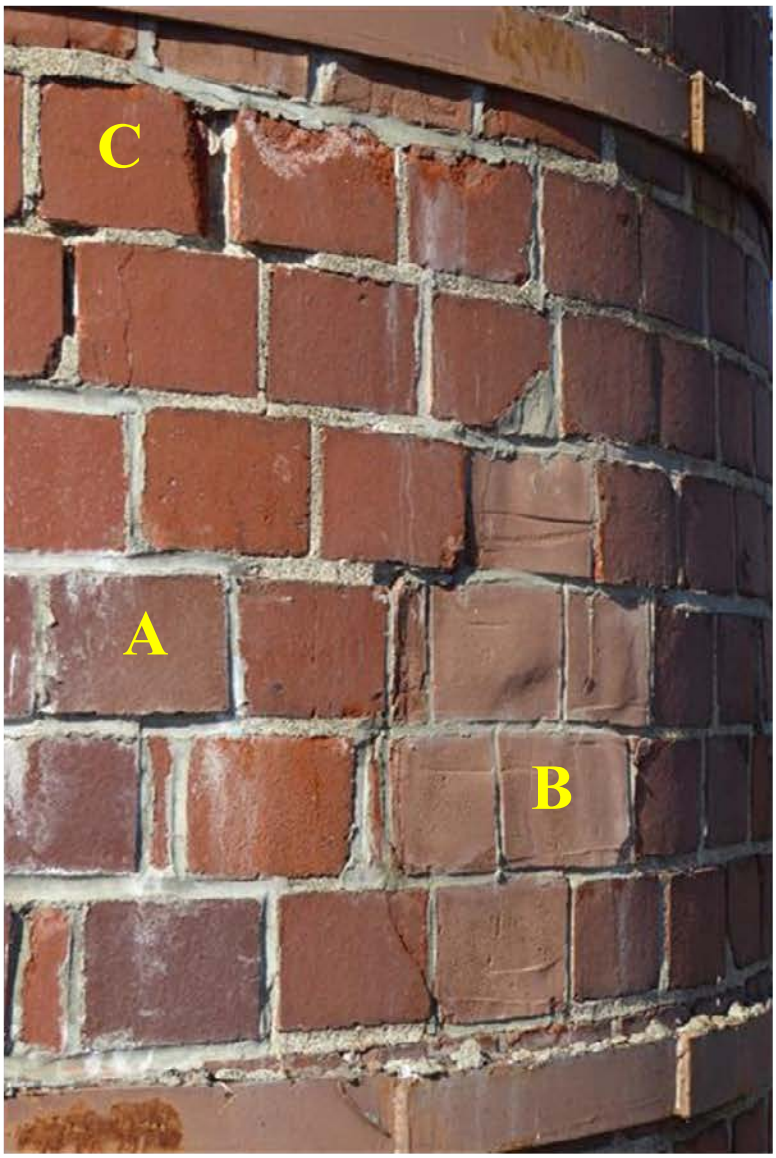


Photo 25

Area where multiple repairs have been made (probably at different times).

A=Brick were replaced with brick
B=Brick were patched
C=Eroded joints were tuckpointed

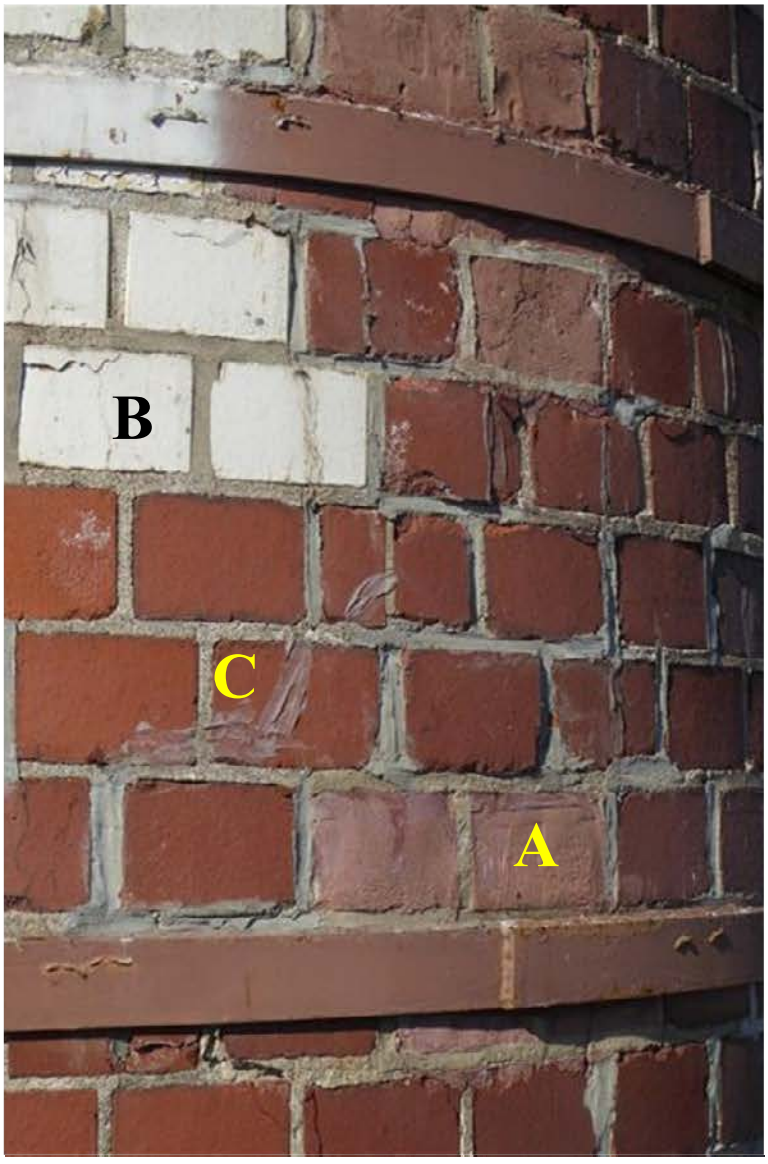


Photo 26

More multiple repair efforts.

A=Brick were patched
B=Tuckpointing
C=Face caulking

Photo 27

Several of the glazed tile in the “S” were replaced.

Photo 28

This occurred prior to the steel band being placed in this location.

Photo 29 Glaze spalls continue to occur.

Photo 30 Similar condition in another location.

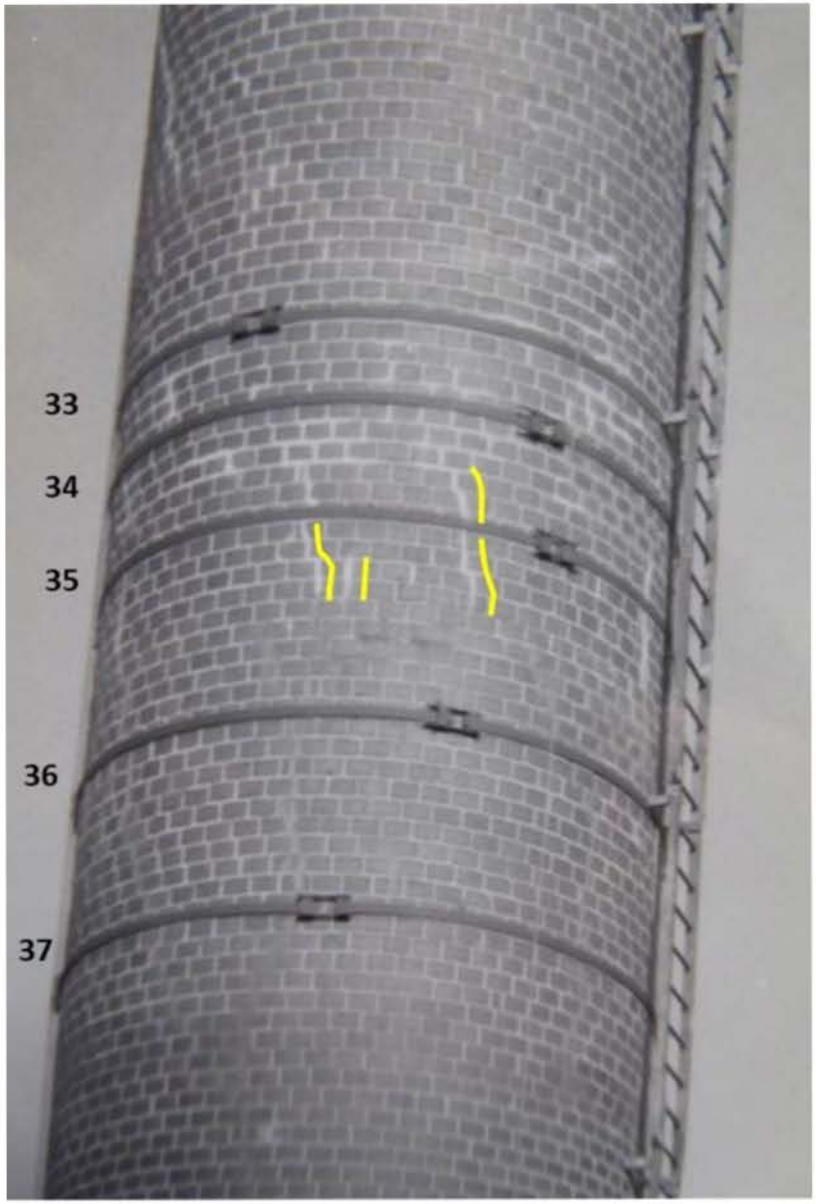


Photo 31

Historic photo showing bands 33 through 37 as seen from the southwest.

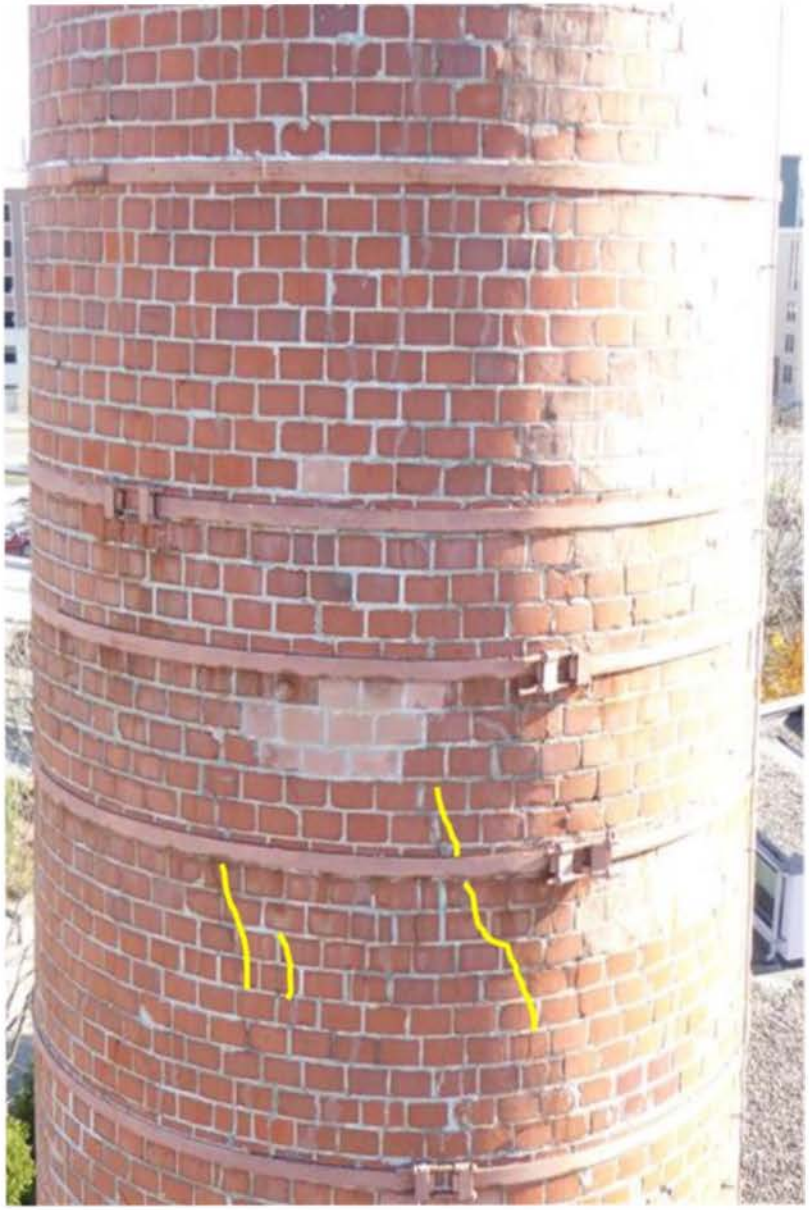


Photo 32

Tuckpointed cracks are still visible today AND many more cracks/spalls have occurred.

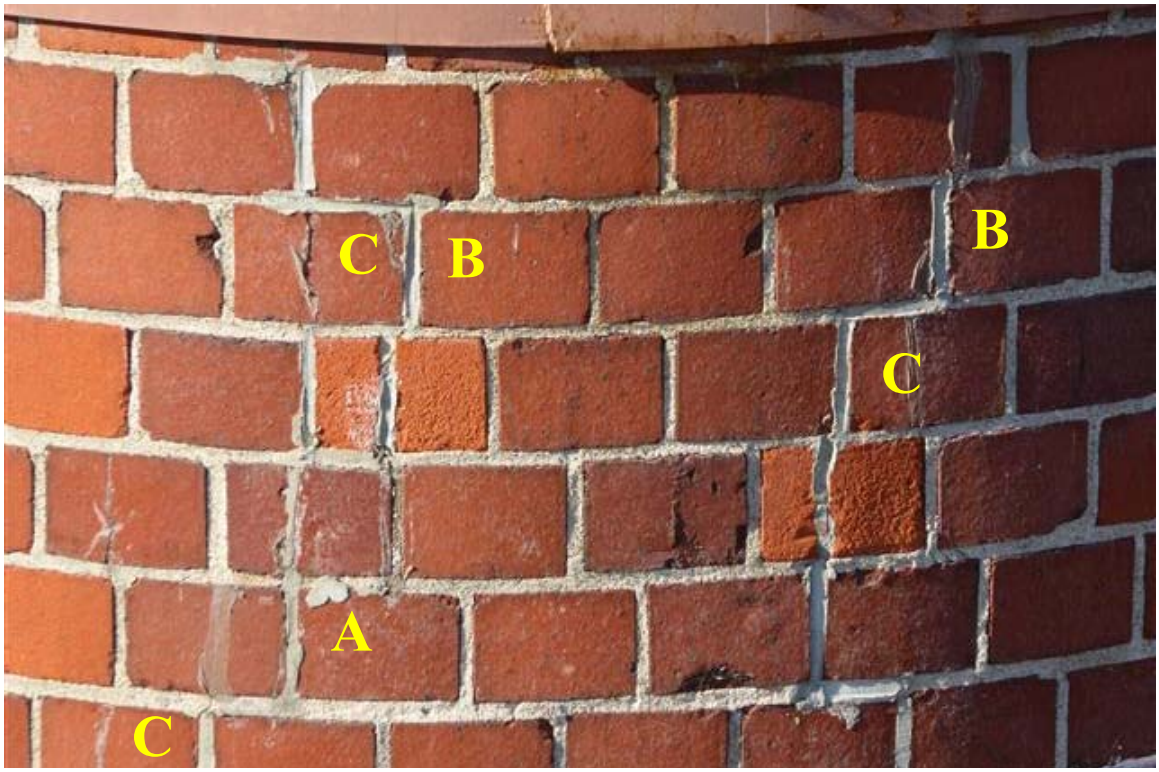


Photo 33

Three vintages of crack repair: A & B - different colors of tuckpointing mortar and C - face caulk.

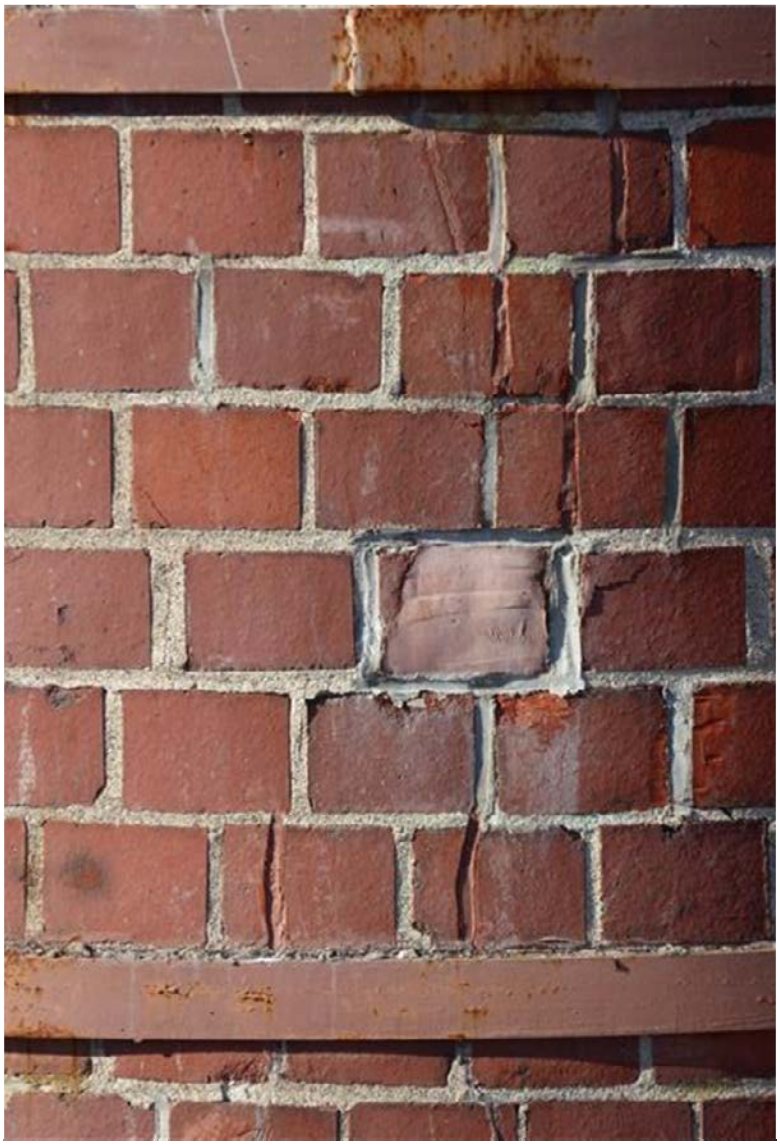


Photo 34

Yet another way of addressing cracks in the masonry.

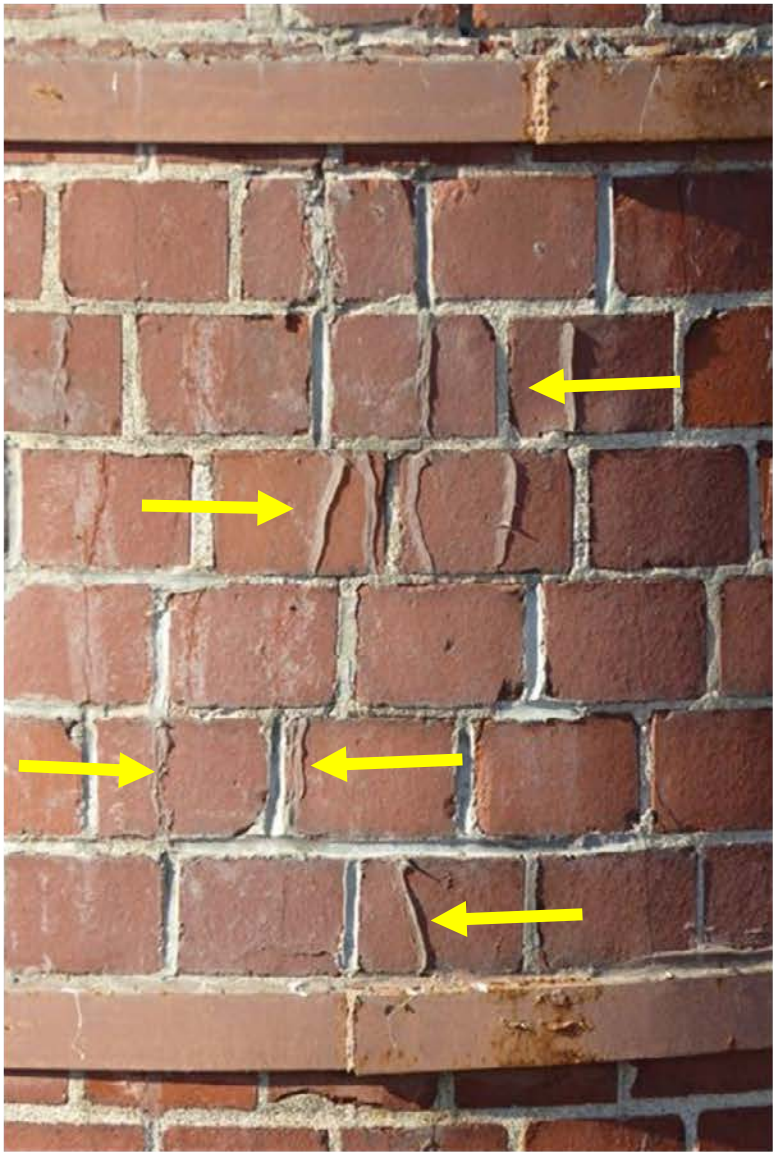


Photo 35

Face caulking over cracks.

Photo 36

Face caulk with a different color of material.

Photo 37

Unrepaired cracks lower in the stack...

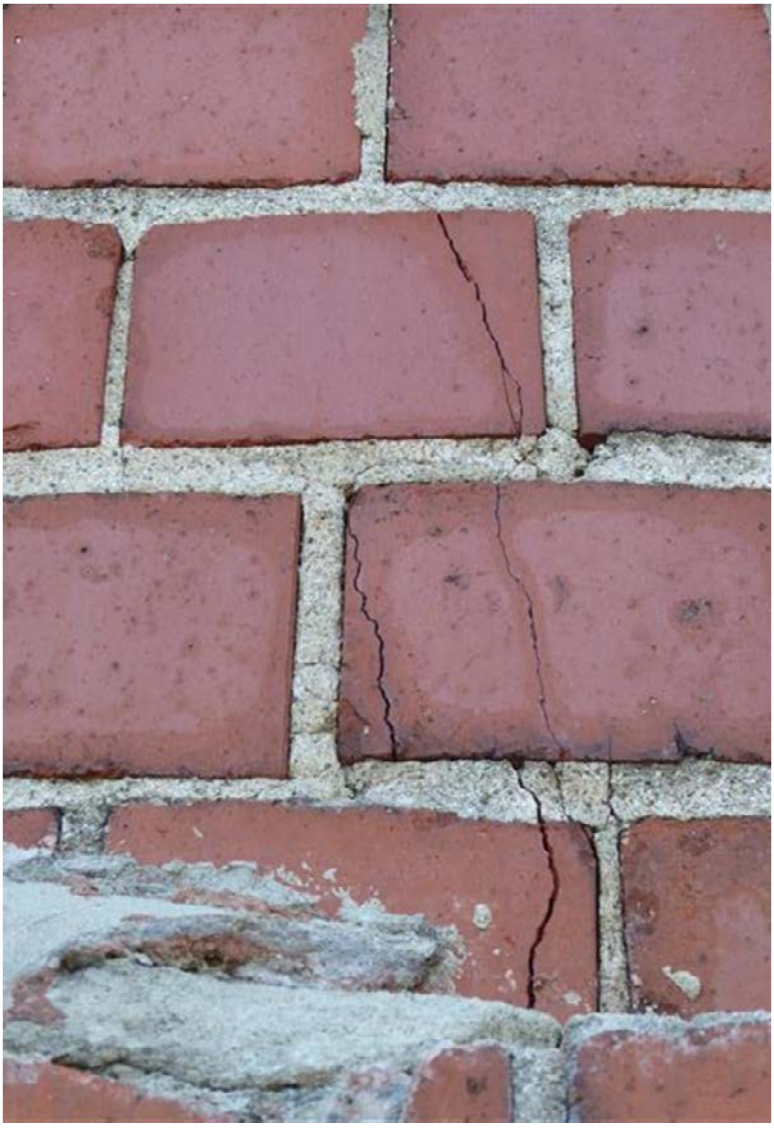


Photo 38

...and near the top of the stack.

Photo 39

Tuckpointing mortar falls back out of the joints in multiple locations.

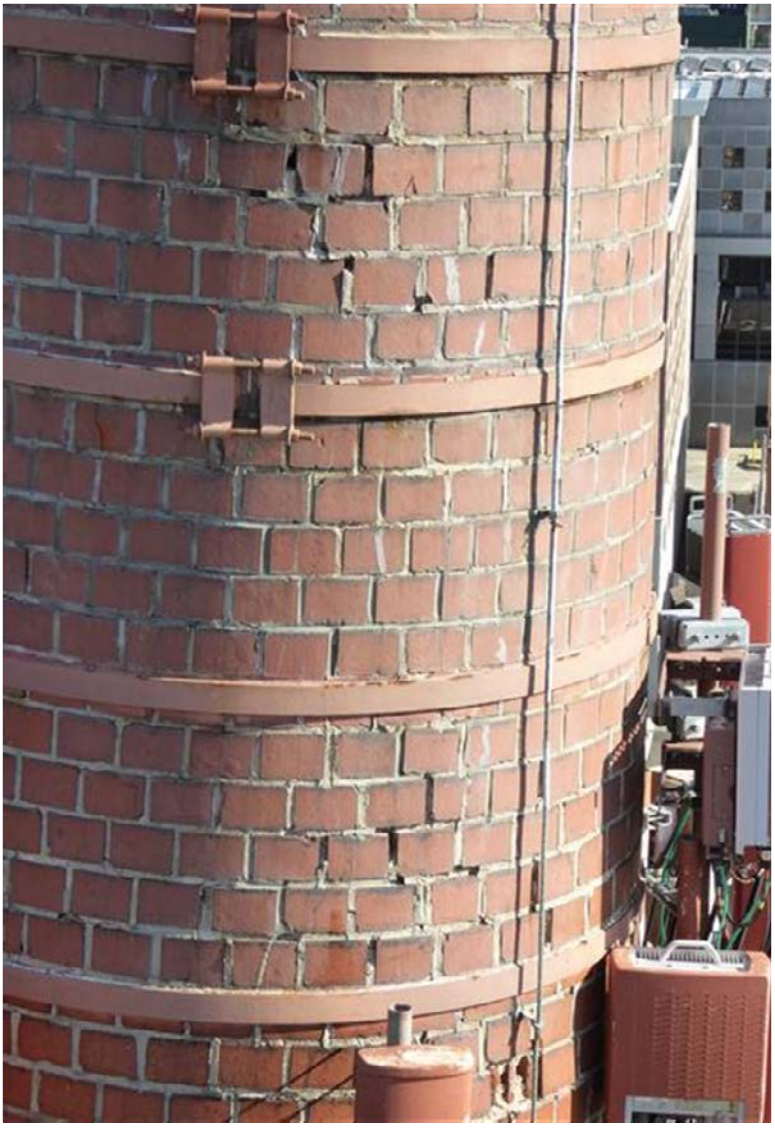


Photo 40

Closer view of one such area.

Photo 41

Similar condition in another location.

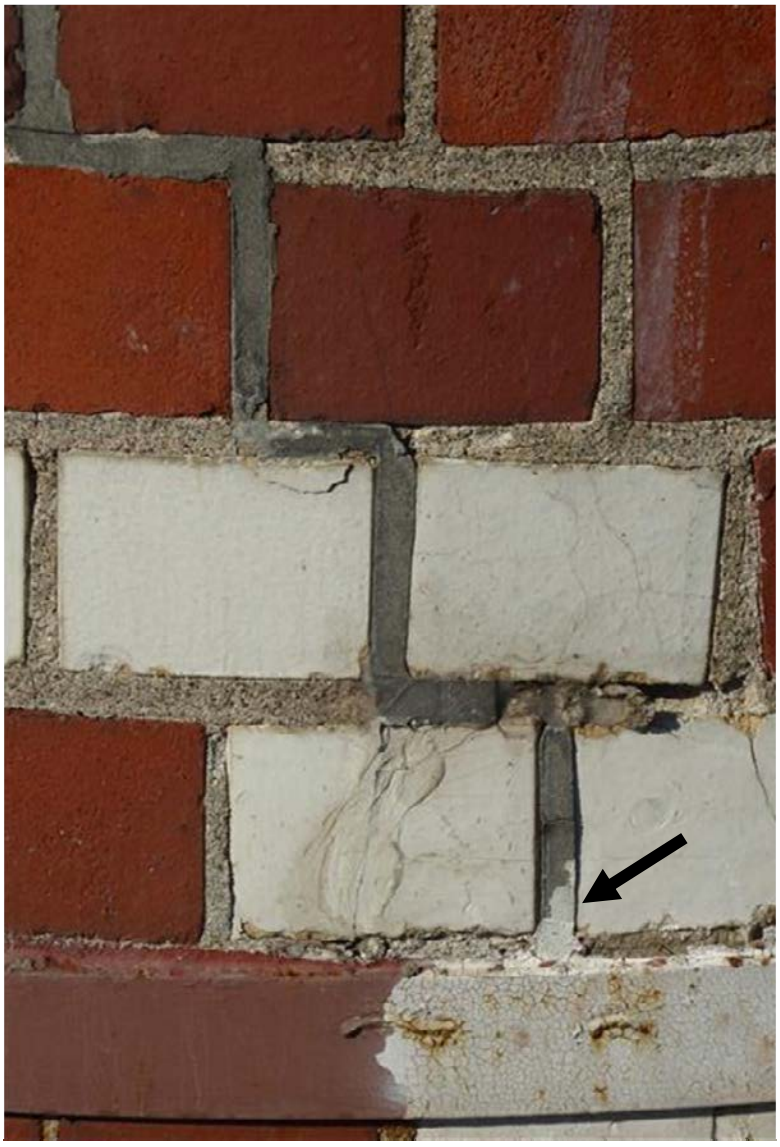


Photo 42

This repair mortar was painted over.

Photo 43A

Harder tuckpointing mortar is removed to reveal softer cracked/eroding original mortar.

Photo 43B

Similar condition in another location.

Photo 43C

The original mortar is much softer than the tuckpointing material when drilled.

Photo 44

The crane wire serves as a giant plumb bob...

Photo 45

...demonstrating how much the stack leans.

Photo 46

Measurements taken above the cell phone equipment revealed the top of the stack leans 10 inches in 90 inches.

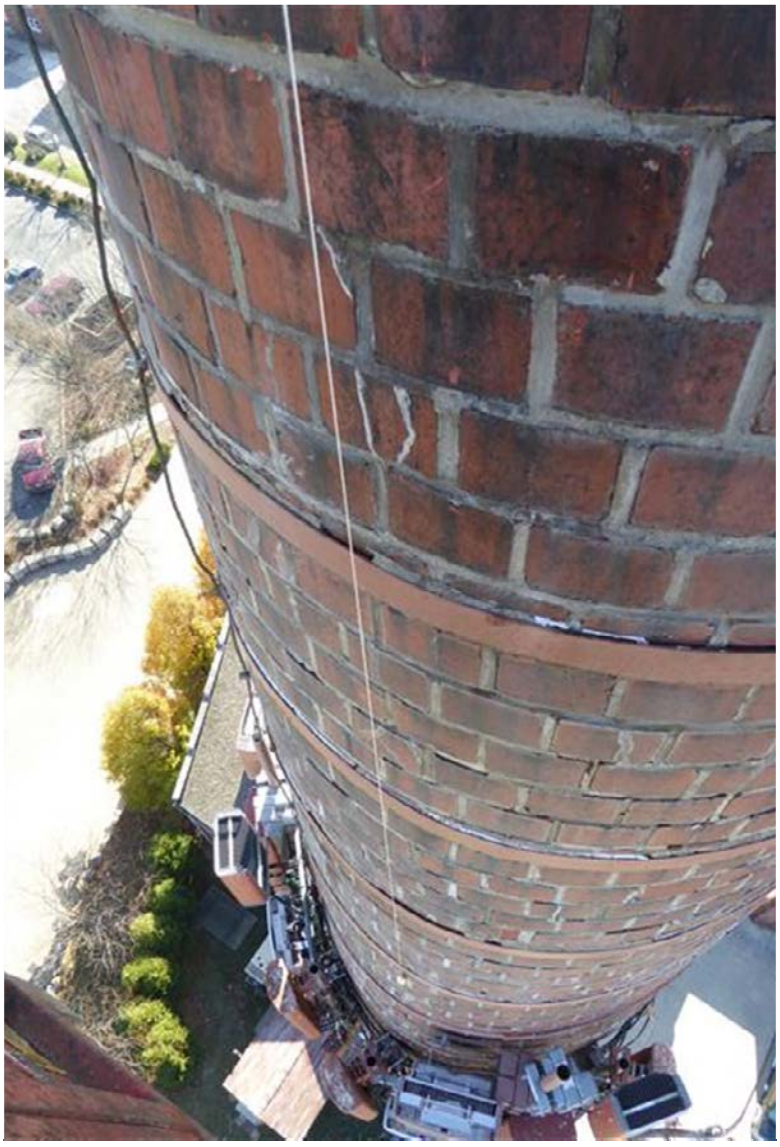
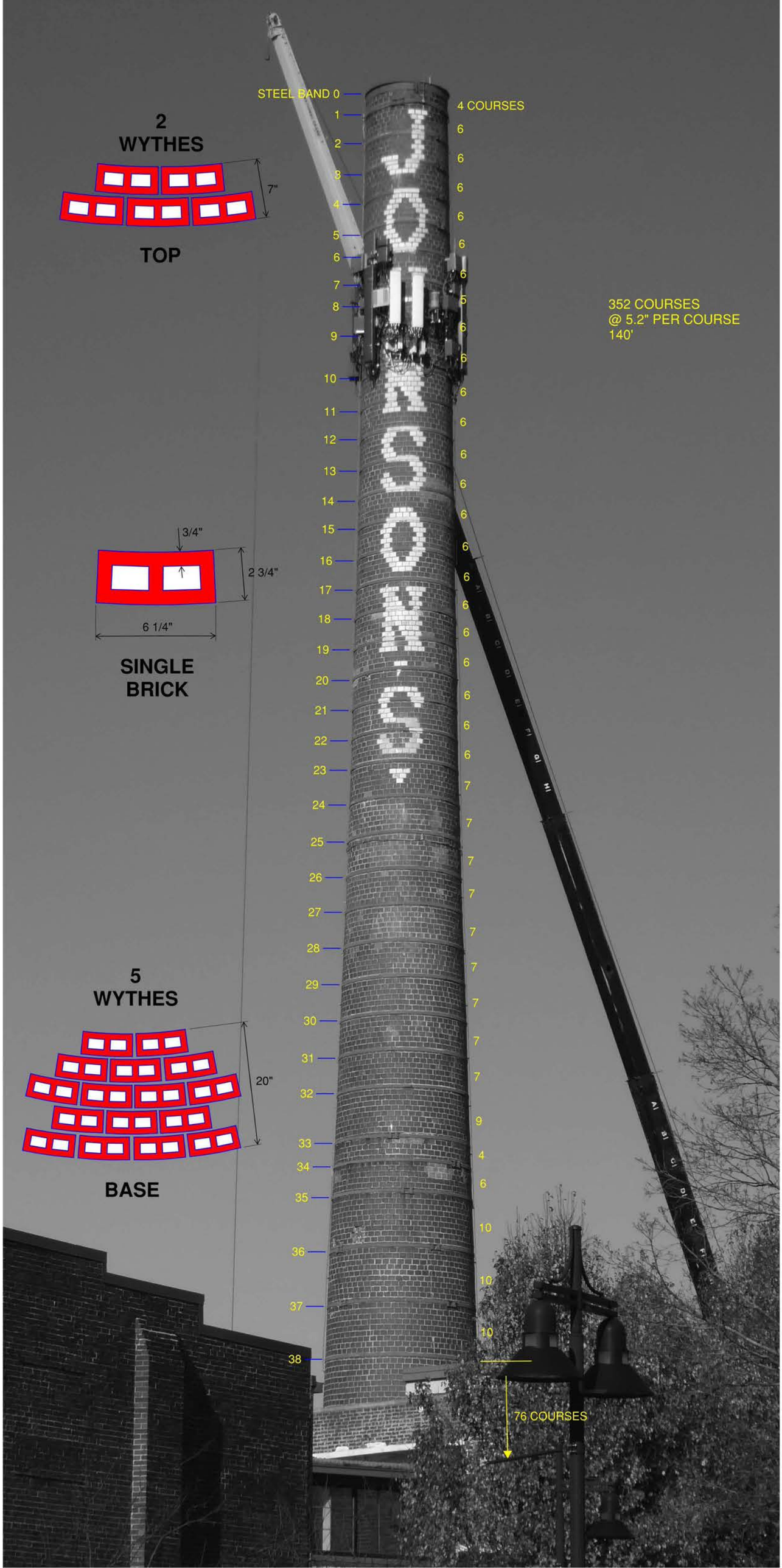


Photo 47

This was taken on the north side of the stack.


STEEL BAND 0
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27
28
29
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31
32
33
34
35
36
37
38
4 COURSES
6
6
6
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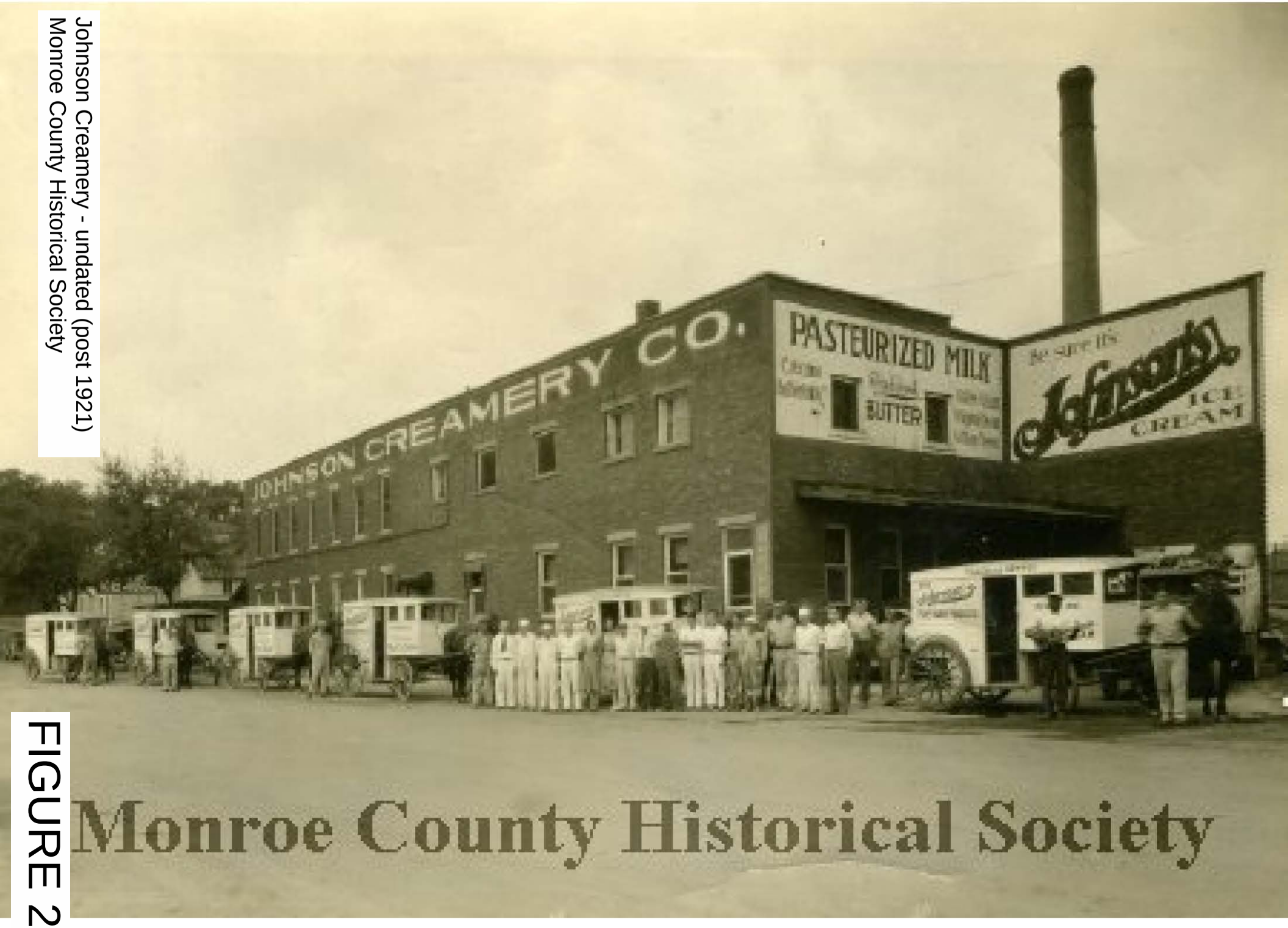
7
7
7
7
9
4
6
10
10
10
352 COURSES
@ 5.2" PER COURSE
140'
76 COURSES
2
WYTHES
7"
TOP
3/4"
2 3/4"
6 1/4"
SINGLE
BRICK
5
WYTHES
20"
BASE
JOHNSONVILLE

FIGURE 1



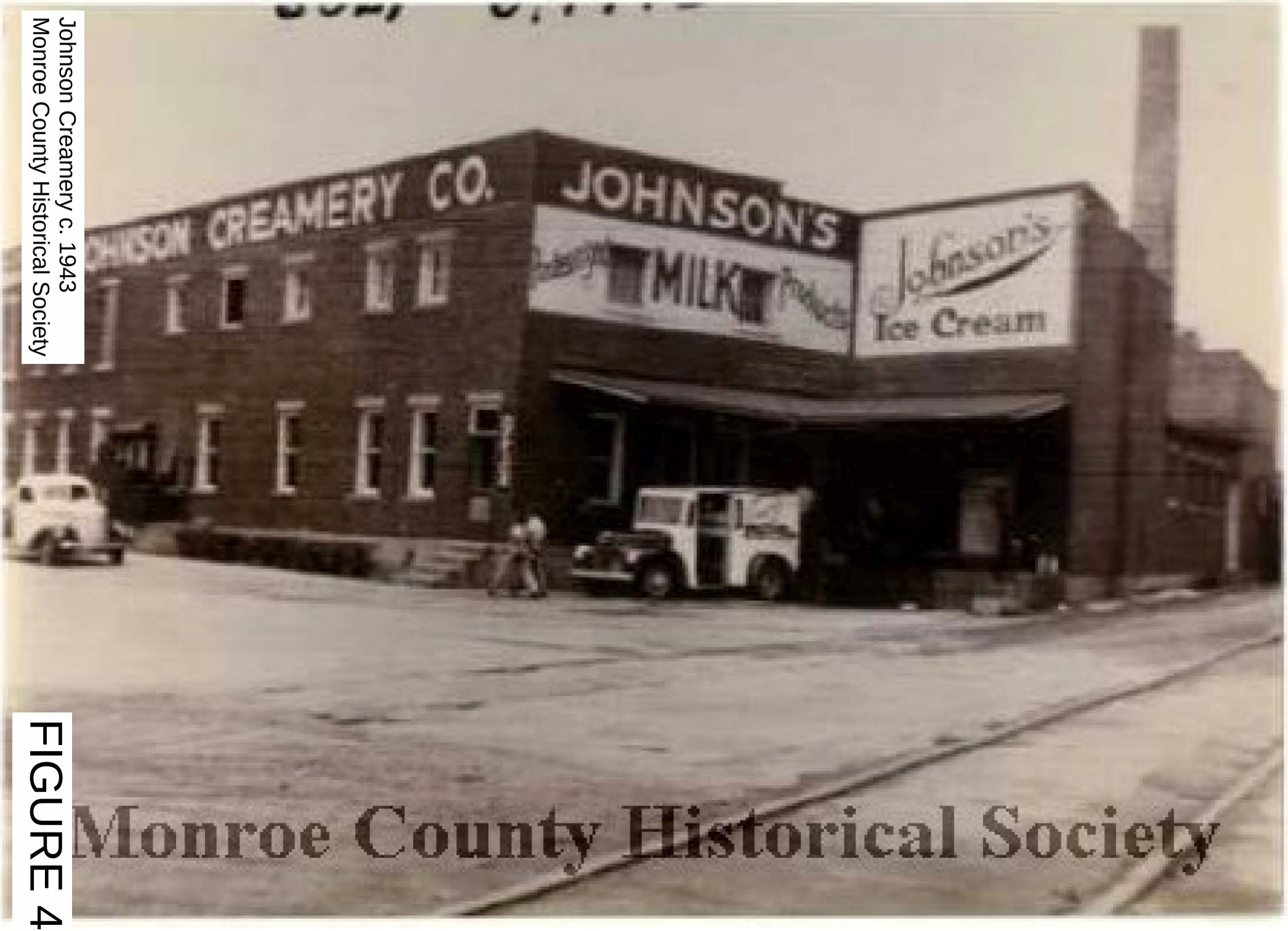
Johnson Creamery - undated (post 1921)
Monroe County Historical Society

FIGURE 2

Special to the H-T

Johnson Creamery c. 1936
Bloomington Herald-Tribune
February 20, 1994

FIGURE 3



Johnson Creamery c. 1943
Monroe County Historical Society

FIGURE 4

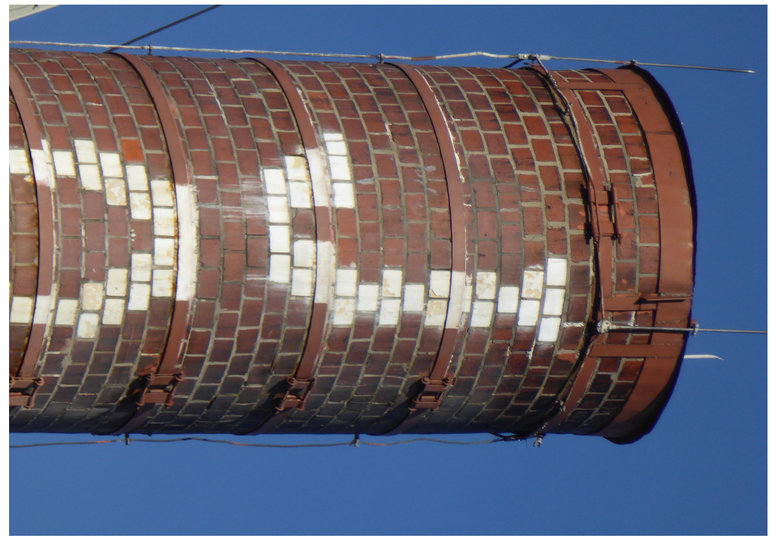
FIGURE 5

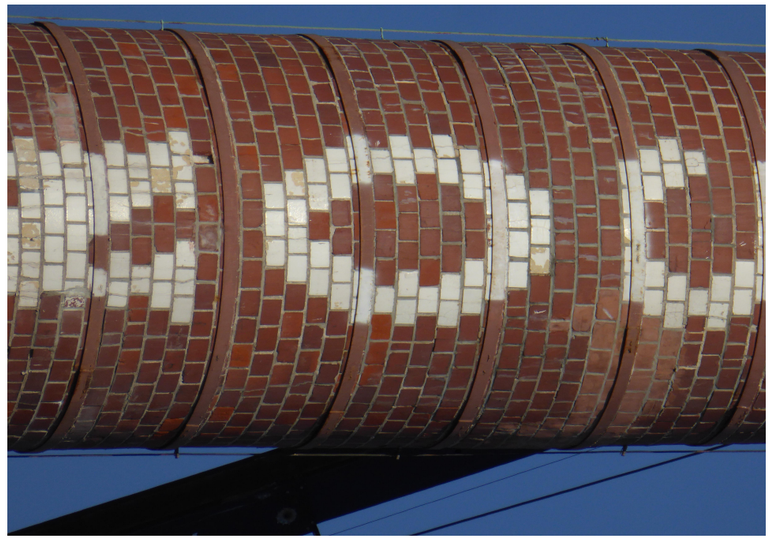
FIGURE 6

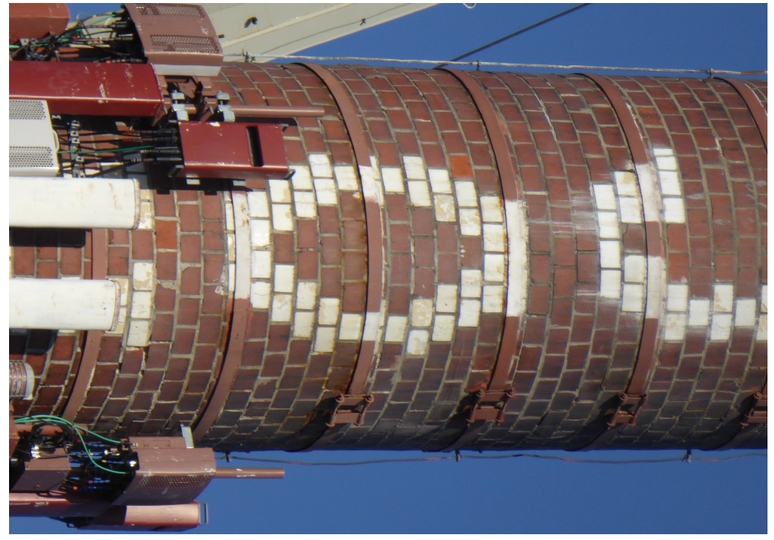
EAST

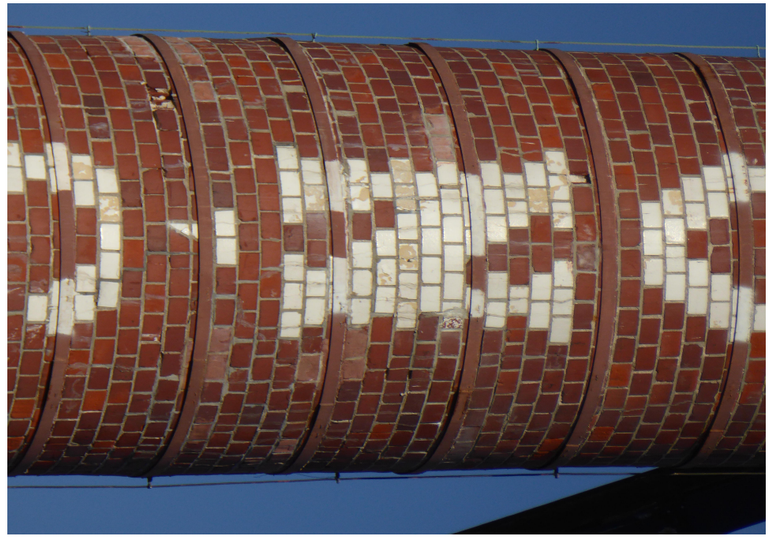
NORTHEAST

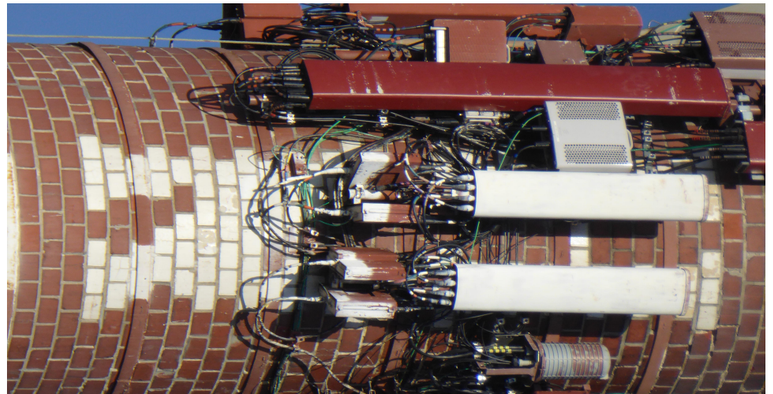
NORTHWEST

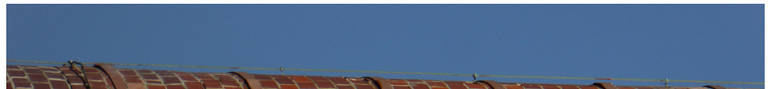












APPENDIX

NPS Form 10-900
(Oct. 1990)

OMB No. 10024-0018 FILE COPY

FINAL

United States Department of the Interior
National Park Service

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in How to Complete the National Register of Historic Places Registration Form (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If an item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Johnson's Creamery

other names/site number N/A

2. Location

street & number 400 West Seventh Street N/A ☐ not for publication

city or town Bloomington N/A ☐ vicinity

state Indiana code IN county Monroe code 105 zip code 47404

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act, as amended, I hereby certify that this ☒ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36CFR Part 60. In my opinion, the property ☒ meets ☐ does not meet the National Register criteria. I recommend that this property be considered significant ☐ nationally ☐ statewide ☒ locally. (☐ See continuation sheet for additional comments.)

Paul R. Risley 11-10-95

Signature of certifying official/Title Date

Indiana Department of Natural Resources

State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional comments.)

Signature of certifying official/Title Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that the property is: Signature of the Keeper Date of Action

☐ entered in the National Register.
☐ See continuation sheet.

☐ determined eligible for the National Register
☐ See continuation sheet.

☐ determined not eligible for the National Register

☐ removed from the National Register

☐ other, (explain:) _____

Name of Property | County and State

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☒ private
- ☐ public-local
- ☐ public-State
- ☐ public-Federal

Category of Property
(Check only one box)

- ☒ building
- ☐ district
- ☐ site
- ☐ structure
- ☐ object
- ☐ landscape

Number of Resources within Property
(Do not include previously listed resources in the count)

Contributing	Noncontributing	
1	0	buildings
0	0	sites
0	0	structures
0	0	objects
1	0	Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

N/A

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
(Enter categories from instructions)

Industry:	Manufacturing Facility

Current Functions
(Enter categories from instructions)

Commerce/Trade:	Business

7. Description

Architectural Classification
(Enter categories from instructions)

No Style

Materials
(Enter categories from instructions)

foundation	CONCRETE
walls	BRICK
	STONE: Limestone
roof	SYNTHETICS: Vinyl
other	

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

8: Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing.)

- ☒ A Property is associated with events that have made a significant contriibution to the broad patterns of our history.
- ☐ B Property is associated with the lives of persons significant in our past.
- ☒ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☐ D Property has yielded, or is likely to yield, information important in prehistory or history.

Criteria Considerations
(Mark "x" in all the boxes that apply.)

Property is:

- ☐ A owned by a religious institution or used for religious purposes.
- ☐ B removed from its original location.
- ☐ C a birthplace or grave.
- ☐ D a cemetery.
- ☐ E a reconstructed building, object, or structure.
- ☐ F a commemorative property.
- ☐ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

ARCHITECTURE
INDUSTRY

Period of Significance

1914 - 1951

Significant Dates

1914
1921
1927

Significant Person
(Complete if Criterion B is marked above)

N/A

Cultural Affiliation

N/A

Architect/Builder

Unknown

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographic References

Bibliography
(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- ☒ preliminary determination of individual listing (36 CFR 67) has been requested
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey # _____
- ☐ recorded by Historic American Engineering Record # _____

Primary location of additional data:

- ☐ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☐ University
- ☒ Other

Name of repository:

Monroe County Public Library Indiana Room

Johnson's Creamery
Name of Property

Monroe County, In
County and State

10. Geographical Data

Acreage of Property less than one acre

UTM References
(Place additional UTM references on a continuation sheet.)

	Zone	Easting	Northing
1	16	539980	4335400
2			
3			
4			

☐ See continuation sheet

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Cynthia Brubaker

organization Preservation Development, Inc. date 06/15/95

street & number 400 West 7th Street, Suite 110 telephone (812) 336 - 2065

city or town Bloomington state Indiana zip code 47404

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white** photographs of the property.

Additional items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of SHPO or FPO.)

name 8th St. Development Corp.

street & number 400 West 7th Street, P.O. Box 221 telephone (812) 335 - 2058

city or town Bloomington state Indiana zip code 47404

Johnson's Creamery is a rambling conglomeration of added components that form a unique complex with a functional architectural style. The 35,000 square foot complex is surrounded by other former industrial and commercial buildings, railroad tracks, surface parking lots and a church. Its larger context is the historic industrial corridor of Bloomington's near west side, which forms the eastern section of the proposed West Side National Register Historic District.

The original Johnson's Creamery building, built in late 1913 or 1914, was a two-story red brick building, rectangular in plan, at the southeast part of the current structure. The original building opens onto a loading dock at the southeast corner facing the railroad tracks and has a parapeted asphalt roof with a shallow slope towards the rear. The limestone capped parapet steps down as the roof slopes to the rear. Subsequent additions were added over the years up to 1951 that were all built of red brick masonry walls and parapeted, low-pitch asphalt roofs. No part of the Creamery was present on the August 1913 Sanborn insurance map. The 1927 Sanborn insurance map, a 1949 aerial photograph, former owners and employees and physical evidence provided guidance in dating the components.

A small two-story component, identified by its first floor interior vaulted ceiling and angled exterior that conforms to the railroad tracks, was probably added to the original building early. A painted sign and infilled window openings on interior masonry walls on the east and north sides of the building confirm that they were once exterior walls. A boiler and coal room, probably built as a separate structure at or near the time of the original building, was later linked to the original building with the construction of a mechanical, engine and tank storage room. The boiler room is two stories high with a single interior volume to accommodate large boilers. The boiler room roof is parapeted, slopes to the rear and supports a rectangular light monitor on top. The limestone capped parapet steps down towards the rear as does the original 1914 building in front. The connecting mechanical room is one story high with a continuous north-south clerestory that divides the roof with a shallow slope to the east and west. The boilers were vented to a tall red brick masonry smokestack. The current 178 foot smokestack replaced an earlier one in 1949.

A large two-story component was added in 1921 to the west of the original 1914 building. This addition is very similar to the original 1914 building with the same parapeted roof details and forms a continuous masonry front facade. According to a photograph printed in a 1938 25th anniversary bulletin, windows across the entire front facade were wood frame, one-over-one, double-hung windows with limestone lintels and sills. Windows on the second floor of the original 1914 building were smaller six-light, wood frame sash with limestone lintels and sills. "Johnson Creamery Co." was painted across the parapet of the front covering both the original 1914 building and the 1921 addition. Other signage was painted on the second floor at the southeast corner of the original 1914 building.

Sometime after 1914, a freestanding, one-story garage was constructed on the alley west of the complex. The garage was later linked to the complex with the 1927 construction of an ice house. The ice house is three stories high and was originally a single volume inside for stacking ice. Its low-pitched gable roof slopes to the north and south with stepped parapet end gables and limestone capstones. The pilastered brick facade is symmetrically adorned with simple brickwork, small limestone blocks and limestone banding.

In 1951, a two-story addition replaced a freestanding house on the alley in front of the freestanding garage described above. The 1951 addition connected to and provided a second story over the freestanding garage. The 1951 addition also included: a one-story enclosed loading bay on the west facade of the 1921 addition,

with a concrete block west wall; a second story connecting passage to the 1921 addition across the front of the ice house; and a covered loading area on the ground floor in front of the ice house. The loading area sloped to below the first floor grade so that trucks could back up and load from a dock at the rear. The loading area was covered with a steel bar joist roof structure with wood decking and asphalt roofing.

Two freestanding buildings were also found on the property at the beginning of the project. These included a large concrete block garage built in 1949 and a small concrete block storage building built around the time of the 1951 addition.

The following list chronologically specifies each of the components described above for reference throughout the remainder of the application:

1. original 1914 building
2. vaulted space (between 1914 and 1927)
3. boiler room (between 1914 and 1927)
4. mechanical room (between 1914 and 1927)
5. 1921 addition
6. freestanding garage (between 1914 and 1921)
7. ice house (1927)
8. smokestack (1949)
9. concrete block garage (1949)
10. 1951 addition
11. small concrete block building (1951).

The Creamery survived continuous upgrades in plant operations, a fact well reflected in the more advanced building technologies found in its later additions. The 1914 portion was framed within its brick walls with timber posts, beams, joist work, and floors. In the 1921 addition and the ice house the interior structural components were steel columns, web and bar joists, and concrete floors, and by 1951 the new office addition was a block structure with brick veneer and aluminum windows.

Due to the changing nature of the Johnson's Creamery business, many changes were made to the complex over the years, both inside and outside. Window and door openings were added, infilled or moved. Window sash and doors were replaced. Vents, tanks and other equipment were added, especially at the rear of the building. Loading docks were added at the front of the building. Innumerable changes were made to the inside of the complex as dairying and refrigeration processes changed and developed and as Johnson's management made decisions on the operation of the business. Large rooms were divided into smaller work or refrigeration areas, floor levels were altered to accommodate new equipment and the need to drain liquids and walls were tiled to provide an easily cleaned surface. Interior partition walls were built of a variety of materials including:

- plaster and tile over brick and plaster and tile over concrete block in the 1914 and 1921 sections of the building
- cork, adhered and coated with an asbestos adhesive, over concrete block or brick in the ice house and former freestanding garage area that was converted to refrigeration areas
- concrete parged concrete block or brick in the 1951 addition and former freestanding garage area
- sheet metal and asbestos board panels over cork or concrete parged block or brick in the former freestanding garage area
- drywall and plaster over wood frame and parged or painted concrete block in the 1951 addition.

After creamery operations ceased at the complex in 1987, large areas of interior and exterior walls and the roof were broken out to remove and salvage large steel tanks that were built into their locations. A temporary pyramidal roof structure was built at the southwest corner of the 1921 addition to cover a hole created for a crane to remove the large tanks. Finally, the building was subject to vandalism and graffiti during its six year period of standing empty without maintenance. The current owner is completing a historic rehabilitation that began in January 1994. The building is now known as the Johnson's Creamery Business Center and houses professional offices.

Summary
The Johnson's Creamery building is significant for its association with early twentieth century industry in Bloomington as the structure, from 1914 to 1987, in which dairy products and ice were produced and sold and from which they were distributed door to door. The Creamery is one of very few intact industrial buildings in Bloomington, Indiana, located one block north and two blocks west of the courthouse square within Bloomington's near west side industrial corridor. First constructed in 1914, the red brick building grew to the large complex of various additions that stands today through a series of major building stages up to 1951. The complex took shape according to the developing nature of the creamery business and the constraints of its site: railroad tracks to the east, and the city's street grid to the south, west and north. The current rehabilitation has restored a level of integrity augmenting its significance as one of very few intact examples in Bloomington of a functional, industrial architectural style. The most unique identifying features of this two and three-story unpainted red brick factory building are the three-story ice house and the 178 foot tall brick smokestack with white glazed bricks that vertically spell "Johnson's" and serves as a long-standing Bloomington landmark.

History and Context
Johnson's Creamery can be evaluated in the historic context of business and industry in Bloomington between 1914 and 1951. The limestone industry provided the major source of income for Monroe County from the 1890's until World War II. Bloomington's economy was further diversified with several small industries, the Showers Brothers Company Furniture Factory, numerous commercial establishments and Indiana University. The Showers Brothers Company reached its zenith of operation in the 1920's when it produced 60% of the furniture built in this country, greatly expanded its facilities and employed more than 2000 people.

Other Bloomington industries, including Johnson's Creamery, experienced similar prosperity. They were: the Nurre Mirror Plate Glass Company, which furnished all the mirrors used in the Showers Brothers Company's furniture; the Bloomington Basket Company, which produced fruit and vegetable baskets; the Cantol Wax Company, which produced wax cleaning and lubricating products (building listed on the National Register of Historic Places, April 24, 1990); the Field Glove Company, which produced mittens and gloves; and the Seward and Company foundry and machine works. Johnson's Creamery, which produced milk, cream, ice cream, butter, cottage cheese, chocolate milk, buttermilk, orange drink and ice, can be evaluated within the context of Bloomington's industries. The Creamery, the Cantol Wax building and the Showers complex are the only intact structures from among this list of industries. The Creamery can also be evaluated within the context of creameries in Indiana.

History of Johnson's Creamery
Ward W. and Ellis W. Johnson founded the Johnson Creamery Company in 1913. The two brothers first operated a dairy on South Washington Street in 1912, where the company continued to maintain stables for delivery wagons and horses after moving to the West 7th Street address and until at least 1938. The new plant was completed in 1914 and was ideally located in downtown Bloomington's industrial corridor next to the Illinois Central railroad tracks and other industrial and commercial establishments.

Rapidly outgrowing its original 1914 plant, the factory appended major additions in 1921, 1927, and again in 1951. Large boilers were necessary for the production of power to operate the plant and required tall

smokestacks for venting. These needs shaped the addition of mechanical spaces onto the original 1914 building. Subsequent additions and interior alterations also reflected the needs of the dairying process.

The Creamery processed dairy products from local milk suppliers and delivered its produce to the surrounding community in horse drawn wagons as late as 1939 before fully switching to motorized transport. Cutting and storing blocks of ice was a necessary sub-process to the creamery business before the advance of refrigeration technology in the late 1930's and 1940's. For this reason, the construction of the large three-story high ice house was important to the expansion of the business in the 1920's. "Today's Milk Today," the Johnson's slogan in the 1930's, told customers that the company knew the importance of moving the milk from the cow to the customer quickly. In 1938, Johnson's employed 70 people who produced and delivered properly pasteurized milk and dairy products including: coffee and whipping cream; "made-to-measure" ice cream; "Shady Brook" butter; cottage cheese; chocolate milk; "Creamo" (cultured creamed buttermilk); Johnson's Orange drink; and distilled water ice. The company also operated a retail department that sold the dairy products as well as, ice, in a small house north of the plant that was replaced with the 1951 addition. The 1951 addition retained a retail area with an ice cream counter. Most of Johnson's products were however, sold through home delivery with only 15% of its products sold to stores in the 1930's.

The number of licensed dairy plants in Indiana grew throughout the 1920's and 1930's from 234 in 1924 to over 400 throughout most of the 1940's. Most were family owned and operated with a limited geographical scope due to the constraints of refrigeration technology. As that technology advanced, the number of licensed dairy plants in Indiana declined to 224 in 1956 and has continued to decline with consolidation and competition from large supermarkets to a mere 48 in 1982. Chains such as Kroger in the Midwest and Safeway in the East, maintain their own dairies and use milk as a loss leader sales item. The increased shelf life of milk to three weeks has also contributed to the rise of large centralized dairies located closer to the milk supply, which is north of Indianapolis for the State of Indiana.

Johnson's Creamery fell victim to this trend when it vacated the building in 1987 and sold out to a larger dairy, Maplehurst, in Indianapolis a few years later. The complex remains however, as a clear example of this once important aspect of the Bloomington and Monroe County economy. The Creamery kept eighty area farmers in business from whom they bought the raw milk and employed as many as 100 people in the 1950's. It was noted as one of the larger dairies and the largest ice-manufacturer in southern Indiana. It was also known as one of the more desirable and steadfast employers in the area and as a reliable source of good quality products.

The Johnson's Creamery building is eligible for listing on the National Register under criterion A for its association with industry in Bloomington and the dairy business in Indiana. Among the historic Bloomington industries listed above, Johnson's Creamery was one of only a few, the limestone industry and Indiana University, to survive past the 1950's. A household name for 75 years, Johnson's, still holds significance for the Bloomington community in the symbol of the Creamery building and smokestack.

Architecture

Structures associated with historic industrial uses in Bloomington that were identified in the Indiana Historic Sites and Structures Inventory: City of Bloomington, Interim Report include: the Coca-Cola Bottling Company

Building (ca. 1930; 153-055-80113; rated "notable") at 318 South Washington Street; the Bloomington Wholesale Foods Warehouse (1920; 153-055-80068; rated "contributing") at 300 West 7th Street; the Cantol Wax Company Building (ca. 1905; 153-055-80043; rated "contributing;" listed on the National Register, April 24, 1990) at 211 North Washington Street; and the Showers Brothers Furniture Company Building [sic] (1909 - 1924; 153-055-80064; rated "outstanding").

In addition, several structures associated with historic industrial and commercial uses in Bloomington have been identified as contributing to the proposed West Side Historic District. These include the Johnson's Creamery building itself, the I. Fell Building, at 201 South Rogers Street, the Bloomington Garage building at 316 West 6th Street, the Curry Buick building at 218 West 7th Street and the Bloomington Frosted Foods building at 213 South Rogers Street. The current rehabilitation of the Johnson's Creamery building has restored sufficient integrity that it can be considered individually eligible for the National Register as well as, contributing to the proposed West Side Historic District.

The Johnson's Creamery building is eligible for listing on the National Register under criterion C for its characteristics that reflect an industrial architectural style. Brick masonry, stepped parapets, wood windows on older buildings and aluminum and steel sash on newer buildings and additions and functional unadorned facades with minimal architectural detail are characteristics of this industrial architectural style shared by the Creamery and the other buildings listed above. Among these buildings, only the Showers building was listed as "outstanding," and is considered eligible for listing on the National Register as part of a complex of Showers related buildings. Only the Cantol Wax building is listed individually on the National Register. The Creamery, in its newly rehabilitated state, now displays a comparable level of integrity with these two buildings and persuasively portrays the industrial heritage of Bloomington.

The Creamery building is also eligible for listing on the National Register under criterion C for its characteristics that reflect the creamery business and distinguish it as such. Built during the height of industrial success in the 1920's in Bloomington, the 1921 addition and the 1927 ice house both reflect a style that was practical, industrial and functional for the processing of milk and the storage of ice. The ice house also presented a more stylish facade with decorative architectural details built into the brick and limestone masonry. Although the simple rhythm of the street facade partially disguises the building's true purpose, other features reveal it, such as the ice house that rises from the middle of the complex and the landmark smokestack that rises from behind it. These exterior features and other interior features clearly indicate factory functions. Long, open rooms for processing operations, arch-vault ceilings for ice loads, tall mechanical spaces for compressors and boilers, and a continuous rhythm of large double hung windows, roof monitors and clerestories for natural light all speak the language of technological space. Similarly, interior wall finishes of painted plaster and glazed concrete block, and quarry tile over concrete floors reflect the sanitary surroundings necessary for dairy production.

Bibliography

Huffman, Dick. Former owner, Johnson's Creamery. Interviews.

Johnson Creamery Company brochure, "A Quarter Century —of Progress and Service," 1938.

Martin, Bob. Former plant manager, Johnson's Creamery. Interviews.

Orelup, Margaret. Johnson Creamery, Historic Preservation Certification Application, Part 1 - Evaluation of Significance. April 1987.

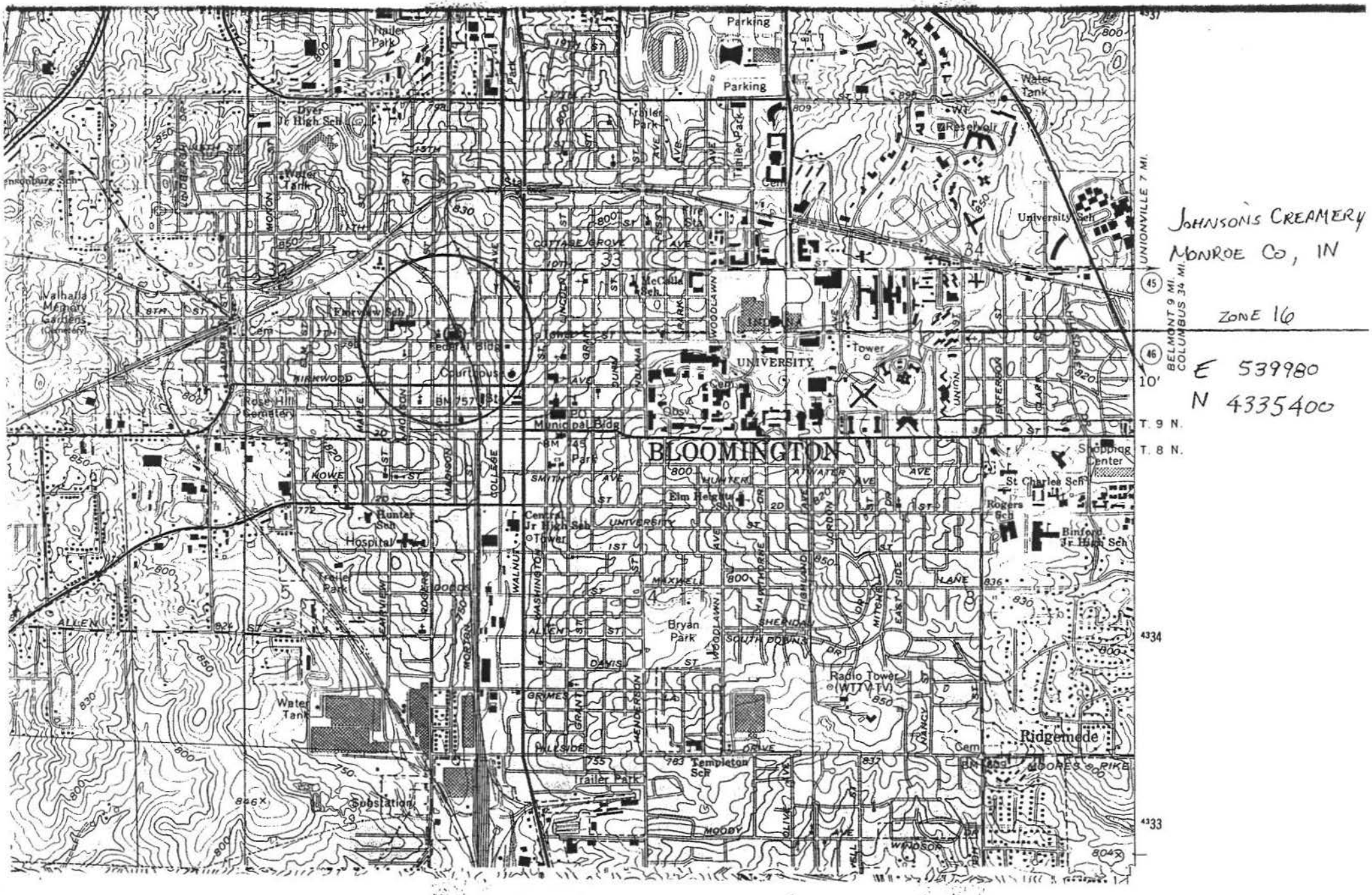
Sanborn Insurance Maps: 1913, 1927, 1947.

Verbal Boundary Description

Beginning at the intersection of the east curbline of the alley between North Rogers Street and the CSX railroad and the north curbline of West 7th Street, proceed east along the north curbline of West 7th Street to the CSX railroad right-of-way. Then proceed northwest along the west boundary of the CSX railroad right-of-way to the south curbline of West 8th Street. Then proceed west along the south curbline of West 8th Street to the east curbline of the alley between North Rogers Street and the CSX railroad. Then proceed south to the point of beginning.

Boundary Justification

The described boundary includes the property historically associated with and owned by the Johnson's Creamery. The boundaries are slightly larger than the private property boundary to compensate for an encroahment of the building into the public right-of-way.



JOHNSONS CREAMERY
MONROE CO, IN

ZONE 16

E 539980
N 4335400

APPENDIX B

Basis of Loading

Wind

- Based on ASCE 7-10, “Minimum Design Loads for Buildings and Other Structures”
    - Chapter 29: Wind Loads on Other Structures and Building Appurtenances – MWFRS
    - Chapter 1: General
    - Chapter 2: Combinations of Loads
    - Chapter 26: Wind Loads: General Requirements
- Building Risk/Occupancy Category III – Buildings and other structures, the failure of which could pose a substantial risk to human life
- Exposure Category B – Urban and suburban area prevails for a distance greater than 2,600 ft or 20 times the height of the building (2,800 ft), whichever is greater.
- Basic Wind Speed for Occupancy Category III – 120 mph (3 sec gust wind speed at 33 ft)
- Structure Type for Wind Directionality – Round Chimney
- No Hills or Escarpments to increase wind due to topographic factors.
- The stack has a Round cross-section and Rough (D’/D=0.02) surface type.
- Structure is assumed to be a Dynamically Sensitive Structure.

Seismic

- Based on ASCE 41-13, “Seismic Evaluation and Retrofit of Existing Buildings”
    - Chapter 13: Architectural, Mechanical, and Electrical Components
    - Chapter 2: Performance Objectives and Seismic Hazards
- Site Class B: Rock with 2,500ft/s < v_s < 5,000 ft/s
- Unbraced Cantilever Component – Stack
- Component Importance Factor, I_p = 1.5 – Operational Nonstructural Performance Level
- Fundamental Period, T_p = 3.1 sec

APPENDIX B