741 MEETING STREET
SUITE 202
CHARLESTON, SC 29403



Structural Assessment of McClellanville Lookout Tower

McClellanville, South Carolina

August 2026

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Introduction

As part of a planning project funded with a Federal Historic Preservation Grant administered by the State Historic Preservation Office, the Town of McClellanville asked EM Structural to lead a team to assess the steel frame lookout tower located on Pinckney Street. The assessment team included John Moore of EM Structural, Greg Burbage of Elevated Structural Consultants, Justin Schwebler of Terracon, and architectural conservator Hillary King. Pricing estimates were provided by Huss Construction and John Hanna of Tower & Communications Services. This report is an overview of our findings, and includes this summary, a structural analysis, a condition assessment, testing results, annotated drawings, and pricing estimates. A National Register nomination was also completed as a part of this grant project and may be referred to for additional information about the history of the structure and its broader significance.

Brief History

The McClellanville Lookout Tower was erected in 1935 by the US Biological Survey (now the US Fish and Wildlife Service), in conjunction with the nearby building that currently houses The Village Museum. The tower was used by the Bureau of Biological Survey to observe and audit migratory bird numbers. It was also used by the US Forest Service to monitor the surrounding forests for fires. Similar towers were constructed throughout the region and the country, though many have been lost to neglect or intentionally demolished.

The design of the McClellanville Lookout Tower was a partnership between the International Derrick Company (IDECO), the Aermotor Company, and the US Forest Service. Both IDECO and Aermotor specialized in galvanized steel towers with a variety of purposes and designs. The Lookout Tower retains a large amount of original historic material, providing a tangible record of the types of structures used for scientific study and monitoring used by federal agencies around the country in the 1930s. Although the tower ceased to be used for official observational purposes in the 1980s, it is a well-known landmark and navigational aide to boaters. Similar towers across the country have been repaired for recreational uses.

Tower Structural Description

The tower is a relatively short self-supporting (no guy lines required) structure, square in plan with a leg in each corner of the square. The face width of each side of the square varies from approximately 22 feet at the base to 7 feet at the cab, which is the enclosed portion on top of the tower. The tower is approximately 100 feet tall to the bottom of the cab, which is 7 foot square in plan, and approximately 7' tall, with a low slope hip roof. See sheet S1 in the tower drawings attached to the report.

The structure is based on standard designs used by the US Forest Service in the 1930s and 1940s, with components from both IDECO and Aermotor. Standard design drawings can be found in 'United States Department of Agriculture, Forest Service, Standard Lookout Structure Plans, 1938'. This tower has some slight variations from those published in that document, but used the same design approach and materials.

Each tower face can be said to be made up of bays going up to the top of the tower. Each bay is defined by the large X configuration with a horizontal connecting the top of the X. This is called an X-braced bay. Each face of the tower is configured in the same way with a total of eight bays, each getting smaller as they go up the tower. Intermediate horizontal members within each bay brace the legs of the tower. The bottom two bays contain two of these intermediate horizontal braces, while the upper bays contain a single brace that intersects the X bracing. Stairs provide access to the cab at the top of the tower.

All of the structural members consist of structural steel angles. The legs vary in size from 5 x 5 x 3/8 inch angles at the bottom to 3 x 3 x 3/16 inch angles at the top, and are bolted together at each change in leg size. The bracing uses smaller angles, with the diagonals sized at 2 ½ x 2 ½ x 1/8 inch and smaller, main horizontals at 4 x 4 x 1/4 inch and smaller, and intermediate horizontals at 3 x 3 x 3/16 inch and smaller.

The structural steel used to construct the tower and the stair framing was hot-dip galvanized prior to erection at the site. It was not, and has never been, painted. Based on the standard design drawings, the structural steel for all parts conformed to ASTM A7 type steel with a yield strength of 33 ksi. The connection bolts conformed to ASTM A307. Both of these steel grades were commonly used in the 1930s and 1940s. Laboratory testing conducted as part of this assessment revealed the structural steel to be at least equivalent to ASTM A36 with a minimum yield strength of 36 ksi, which is slightly stronger than the standard design A7 steel called for in the Forest Service designs. The bolts were found to be at least as strong as the A307 material called for in the 1938 drawings.

All the bracing angles, diagonal and horizontal, are bolted to the legs. Because the steel is relatively thin, the ends of these angles were folded over into a flat shape, which effectively doubles the thickness of the structural member and greatly improves the bolted connection capacity.

Each of the four tower legs are bolted down to a concrete pier, the top of which is at grade level. There are two 1 1/8 inch diameter anchor rods attached to the leg and embedded in the concrete. This detail matches that shown on the standard design drawings for 100 foot towers. Based on the standard design drawings, these anchor rods have a yield strength of 50ksi and an ultimate strength of 65 ksi. However, the existing pier size is 2 foot square, which is much larger than the standard design of 1'-6" square, so we are not sure if the depth of the foundation matches that of the standard design or whether it was also modified for this particular tower. Both the width and depth are important factors in determining the capacity of the tower foundation for wind loads. For this assessment, we assumed that the footing below the pier matches that shown on the standard design: a 7 foot square footing the top of which is 7 feet below grade. Generally, footings for self-supporting towers are large and buried deep below grade to prevent overturning of the tower due to wind (the tower leg(s) try to pull the footing out of the ground under these conditions), so this assumption would make sense, though it has not been confirmed.

Please see the tower drawings in the appendix.

Stair Structure Description

The stairs provide access to the cab, with platform landings up the height of the tower. There are three landings between the ground and the top of the second bay. Above the second bay, there is a landing at the top of each bay at the main horizontal bracing. The platforms are framed with steel angles that span across the tower diagonally from the horizontal angle on one face to the angle on the adjacent face. This sets up a system where the stairs span across a diagonal of the square tower plan from the southwest corner to northeast corner. The stair stringers are made of small trusses consisting of structural steel angles, there are steel angle handrails connected to rail verticals which are in turn attached to the top and bottom of the stringer trusses. Most runs of stairs between platforms have a rail vertical at the top, bottom, and mid-length. Higher up in the tower there are verticals only at the top and bottom. The stairs consist of the same angle sizes and configurations. The treads and platforms are made up of 5/4 board, 9 ¼ inches deep and 2 feet long. The clear space between handrails is 2'-4".

Please see the drawing of the standard stairs in the appendix.

Cab Description

The structure of the cab at the top of the tower is in large part hidden from view behind architectural finishes. However, the floor framing can be seen from below standing on the top landing. Based on the standard design drawings and our field measurements, we believe that the perimeter structural members are 3 x 3 x 3/16 angles which also serve as the top horizontal of the top tower section. They are connected to the legs with bolted steel gusset plates. In the same plane as this perimeter angle there are two intermediate 3 x 3 x 3/16 angles serving as floor joists. They appeared to be bolted to the perimeter angles. A wooden floor was laid over these angles, currently in such poor condition it was difficult to determine its makeup. In the standard design the wood

floor was connected to the angles with carriage bolts. The corners of the cab consist of the top tower section legs, bent at the floor level into a vertical configuration.

Above the floor level there were two levels of horizontal girts, one at the sill level of the windows, and the other at the top of the cab wall, which also serves as the head of the windows. In the standard Forest Service design, these angles are L3 x 3 x ¼, but more likely these are actually 3/16 thick in keeping with the other angle framing of this cab. The horizontal girts are connected to the legs with bolted steel gusset plates. The roof is shaped as a shallow pyramidal hipped roof, the hips being formed of 2L 2 x 2 x 1/8 which are bolted to gusset plates which in turn bolt to the top horizontal girts at each corner, and to a 12 inch square by 3/16 cap plate at the peak. The standard design calls for a sheet metal roof. The extent of any wood ceiling or rafter framing could not be determined. Forming the exterior skin of the cab below the windows is sheet metal attached at the bottom to the perimeter angle, at the top to the window sill level girt, and at the corner angles of the cab.

Please see the drawing of the cab in the appendix.

Summary of Conditions

The tower structure is generally in fair condition. The extent of deterioration of structural members increases higher on the tower, no doubt because of the prevailing salt laden air flow at higher elevations. The legs are in good condition overall. The bracing angles showed extensive localized corrosion where they were folded at their ends for the connections to the legs, a place where water is likely to be trapped. Cold bending of the angles at the fold may have also contributed to its vulnerability to corrosion. Five diagonal braces in the tower had significant section loss at one or both ends, and 10 horizontal braces had significant section loss, in one or more cases having suffered complete section loss, making the structural member inoperative. One diagonal and one horizontal were bent enough to render them inoperative in the structure.

The stair structure was generally in good condition except at the longer runs of stairs where mid-length handrail verticals were fastened to the truss stringers. The clip angles used to connect the vertical angle to the top and bottom chord of the truss stringer apparently trap water (see attached typical stair detail), which has led to rusting at those connections. The expanding rust has caused deformation of the steel, leading to bending at the top or bottom angle chords (most often the bottom chord), with some section loss of that chord noted in some places. This affects the capacity of the stairs. The last short run of stairs from the top platform up into the cab is in very deteriorated condition throughout and is not structurally connected to the cab platform. Additionally, all the wooden stair treads and platforms are extremely weathered and deteriorated, some are missing or loose, and some are partially broken.

The cab itself has been exposed to significant weathering and is showing signs of deterioration beyond that of most of the rest of the tower. The angle floor framing is severely deteriorated. The wood flooring has also suffered significant material loss. The window frames appear to be in fair

condition, though the sashes will need to be reglazed as many glass panes are missing and the glazing putty has failed throughout. Though the roof was not accessible during the course of this assessment, we can see from provided aerial photographs that the metal roofing is in poor condition, which may mean the roof framing has been exposed to water and salts, causing deterioration there which could be similar to the floor framing below. The wooden alidade table, used to triangulate both bird and fire sightings, is also in poor condition.

For a more complete discussion of the tower structure, cab, and stair conditions see Terracon's Report in the appendix.

Structural Analysis of Tower

The tower was analyzed for current building code (as it applies to tower structures) wind loads, which in the International Building Code, ASCE-7 "Minimum Design Loads and Associated Criteria for Buildings and Other Structures', and the tower industry's own design code 'TIA-222-H' is defined for McClellanville as a 148 MPH **3 second wind gust 33 feet above grade.** Our analysis using 148 MPH also considered the extreme exposure the tower site has to maximum velocity winds over open water and marsh (Exposure D per ASCE). Hurricane Categories, as are often used by the news media, are determined according to the Saffir-Simpson scale which is **a sustained wind velocity, not a 3 second gust, 33 feet over open water**, and so differs slightly from design code wind speeds. You cannot compare the wind speeds from the Saffir-Simpson scale to the ASCE wind speeds as they are based on completely different criteria. A 148 MPH ASCE wind velocity corresponds to the lower end of a Category 4 hurricane. We can say the tower structure itself, if repaired, is good for a lower end Category 4 hurricane.

The analysis revealed that the only portions of the tower structure that do not meet current code loading are the diagonals in the lowest bay, and they are so slightly overstressed that it can be neglected. However, the laboratory tests on the steel taken from the tower indicate a stronger grade of steel than was used in the standard design, which renders the bottom diagonals structurally adequate. Which means this is a relatively robust tower, assuming that all of the tower members that suffer from severe deterioration (fewer than 15 members) are repaired.

However, the anchor rods for the leg connection to the foundation are approximately 80% overstressed, which is substantial. This limits the overall ASCE wind speed capacity to 127 MPH, which corresponds to a lower end Category 3 hurricane.

The foundation, assumed to be the standard design for a 100 foot tall standard design lookout tower, is also inadequate for current code winds. There is not enough weight of foundation and soil above the foundation to keep the tower from overturning (pulling the foundation(s) out of the ground). This limits the overall tower structure to an ASCE wind speed of 113 MPH, which is a Category 2 hurricane.

While additional anchor rods from the legs to added foundation concrete can be added, and additional weight at grade level can be provided to increase uplift resistance in the foundation, we

are not sure what the foundation consists of at this site. Several deviations from the standard designs have already been noted, and the foundation may be larger or deeper than assumed. The tower and its foundation has been load tested at least once, by Hurricane Hugo in 1989, and perhaps by other previous storms. An investigation and strengthening of the foundation would be very expensive, and would likely in some part damage historic fabric at the base of the tower and at least alter the historic aesthetic of the tower.

Please see Elevated Structural Consultants's tower analysis report and repair drawings.

Recommendations

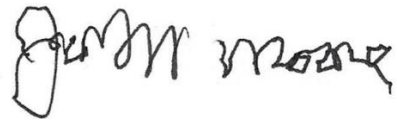
We have prioritized our recommendations as follows:

1) Repair the tower structural members as shown on the tower repair drawings. This will ensure stability and an adequate load path for wind loads to travel down the tower to the ground.
2) Repair stairs. Repair stair stringers at mid-length handrail verticals, replace all wood stair treads and platforms in-kind, and replace in-kind the severely deteriorated short run of stairs into the cab. See tower repair drawings and typical stair drawings.
3) Repair cab. This will likely have to be done by unbolting and lifting the cab and the topmost section of tower with a crane and placing it on the ground. At that point the work on the cab could be done on site or could be taken to the general contractor's shop for repair and restoration. Due to the extreme amount of deterioration present in the cab, we anticipate that this repair work will require a significant amount of new material, which should match the original as closely as possible. Salvageable historic materials should be reinstalled wherever possible. Following repair work, the cab and top section can be lifted and bolted back to the tower. See cab drawings.
4) Paint the tower and stairs. Although the tower has never been painted, the galvanizing that protects the steel from rust, and ultimately structural failure, has deteriorated and left the steel extremely vulnerable to additional material loss. This protection needs to be replaced to arrest further loss. This requires a new coating (an appropriate paint product) be applied in place. The paint should be color matched to the current patina of the galvanized coating where still intact. This coating, while requiring periodic maintenance, will protect the steel for years to come, avoiding the need to continually replace rusting braces and other elements as they fail due to material loss.

These four items will take the tower back to a condition where it can safely support people on the staircase and in the cab. Even though our calculations have determined that the anchor rods and foundations are likely overstressed for the code wind speed, those rods and foundations do not appear to have deteriorated since Hurricane Hugo, and at that time they were sufficient to keep the tower from overturning. Per the International Existing Building Code, this is a historic structure and is not required to meet current code loadings.

Please do not hesitate to contact me to let us know what you think or ask questions. I would be happy to come and talk to you about the report.

Sincerely,
EM Structural



John Moore, PE



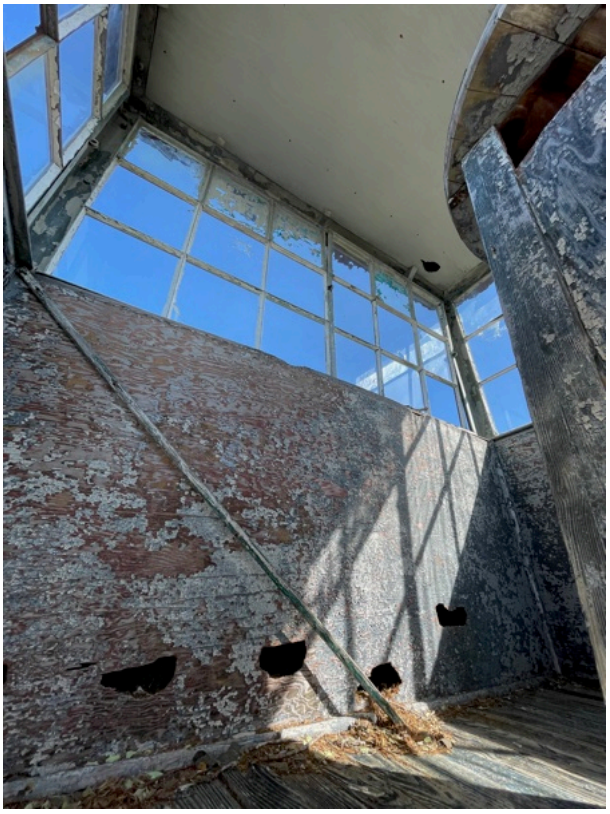
Hillary King
Architectural Conservator



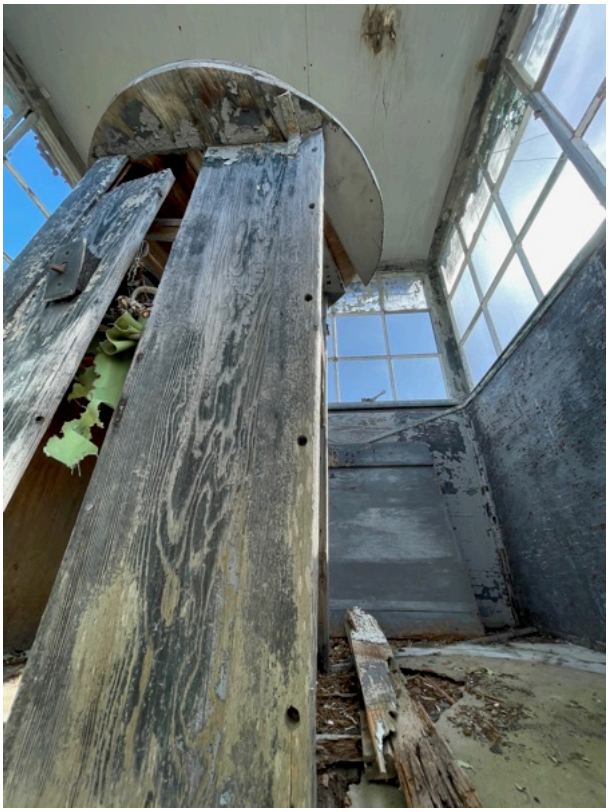
1. View of the tower



2. Typical damage: surface rust, missing and damaged treads and landings.



3. Interior of cab



4. Interior of cab



5. Cab flooring condition



6. At each landing, the handrails of the stairs have a curved detail.



7. Stair truss detail



8. Tread attachment detail



9. Typical damage at handrail attachment where water is trapped.



10. Deformation caused by rust expansion.



11. Bracing and leg attachment.



12. Bracing is bent at bolts to improve strength at connections.



13. Connection at foundation



14. Aermotor company plaque

August 28, 2026

Mrs. Michelle McClellan
Town of McClellanville

Re: McClellanville Lookout Tower
Height (steel) = 99.6'
Lat: 33.0813
Long: -79.459

Mrs. McClellan,

I have completed my analysis of the referenced Self-Supporting tower (See Figure 1). The tower was fabricated by Aermotor Company and provided to the Forest Service. Typical details of the tower and cab are provided on U.S. Department of Agriculture Forest Service drawings. The actual member sizes and geometry of this tower were obtained during a site visit on January 28, 2026. The main structural components are shown on the profile attached to this report. The wind loading, weight, and structural significance of members not shown on the profile are included in the analysis.

The parameters of the analysis are those of the ANSI/TIA-222-H code with the following site-specific parameters:

3 Second Ultimate Gust Wind Speed (No Ice)	-	148 mph
Risk Category	-	II
Exposure	-	D
Topographic Category	-	1
Crest Height	-	0 ft
3 Second Gust Wind Speed (w/ Ice)	-	30 mph
Design Ice Thickness	-	0.50

The study was performed using tnxTower version 8.4.0.2, a commercially available tower analysis program that idealizes the tower as a three-dimensional truss subject to simultaneous transverse (wind) and axial (dead and ice) loads. The analysis performed, and the conclusions contained herein are based on the assumption that the tower has been properly installed and maintained, including, but not limited to the following:

1. Proper alignment and plumbness.
2. Correct bolt tightness.
3. No significant deterioration or damage to any component. Several components of the tower are compromised and will require repairs that are identified in this report.

The following material grades were used when computing member capacities:

Angle legs, diagonals and struts:	ASTM A36 (Fy = 36ksi) (Tested Member)
Connection Bolts:	ASTM A307A (Fu=58ksi – 60ksi) (Tested)
Anchor Bolts:	QQ-B-71, Grade I, Class A (Fy=50ksi, Fu=65ksi)

The analysis results show a small overstress of less than 1% in the diagonals at elevation 0'-19.8'. All remaining tower members are adequate with no overstress. Since the overstress is less than 5%, the amount deemed acceptable withing the industry, the tower meets ANSI/TIA-222-H code requirements.

Computer printout included with this report shows the member stress levels for all structural components.

Standard foundation designs were contained in the U.S. Department of Agriculture Forest Service drawings. Only the top of pier could be accessed for size verification. Note that the measured pier was 2'-0" x 2'-0" while the standard detail calls out a 1'-6" x 1'-6" pier. Geotechnical information was not available, therefore presumptive soil parameters listed in the ANSI/TIA-222 H code, as listed below, were used.

Sandy Soil
Phi = 30 degrees
Unit Weight = 110 pounds / ft^3
Water Table = Assumed 3' below grade
Ultimate Bearing Capacity = 4000 psf

The maximum tension reaction at the tower base exceeds the anchor bolt capacity by 83%. The maximum tension reaction exceeds the uplift capacity of the soil above the foundation by 78%.

By incrementally decreasing the wind speed until the overstressing is eliminated, the following limiting wind speeds were determined for each component.

Limiting Wind Speed

Component	Wind Speed (mph)
Anchor Bolts	127
Foundation	113

The uplift resistance can be increased by adding concrete above the existing foundations to increase the dead weight. Additional bolts, or straps, connected to the existing legs and embedded in the new concrete would be required to supplement the capacity of the existing anchor bolts.

If foundation upgrades are desired, it would be advisable to obtain a current geotechnical report. Verifying the size of the existing foundation is beyond the scope of this project. Before upgrades are implemented, the size of the existing footing should be verified by exposing one footing or using a non-destructive testing procedure like ground penetrating radar.

Tower Deterioration

Several components of the tower and stairs are severely rusted. The exact locations and repairs for these areas are shown on drawings S1 – S6. The tower has a significant amount of surface rust. (See Figures 2 & 3) There are a few locations with heavier rust that will require cleaning of loose debris with hand tools. At the heavily rusted areas, a metal primer, such as Kem Bond HS, should be applied. The entire tower can then be prepared and painted with a zinc coating such as Tower-Guard HS. Specifications for these products are included in the appendix of this report.

The existing cab, steel floor framing and stairs immediately below the cab are significantly deteriorated. To facilitate restoration of the cab, it along with two tower bays (85.9 – 99.6') will be brought to the ground. (See Figure 4) After the restoration has been completed, the cab and tower section will be lifted and reattached to the top of the structure. The estimated weight of the cab and tower section to be removed is 7000 lbs.

If you have any questions about this analysis or need further assistance, please do not hesitate to call.

Sincerely,

ESC, llc.

Greg Burbage, PE



Appendix



Figure 1 – Tower Profile



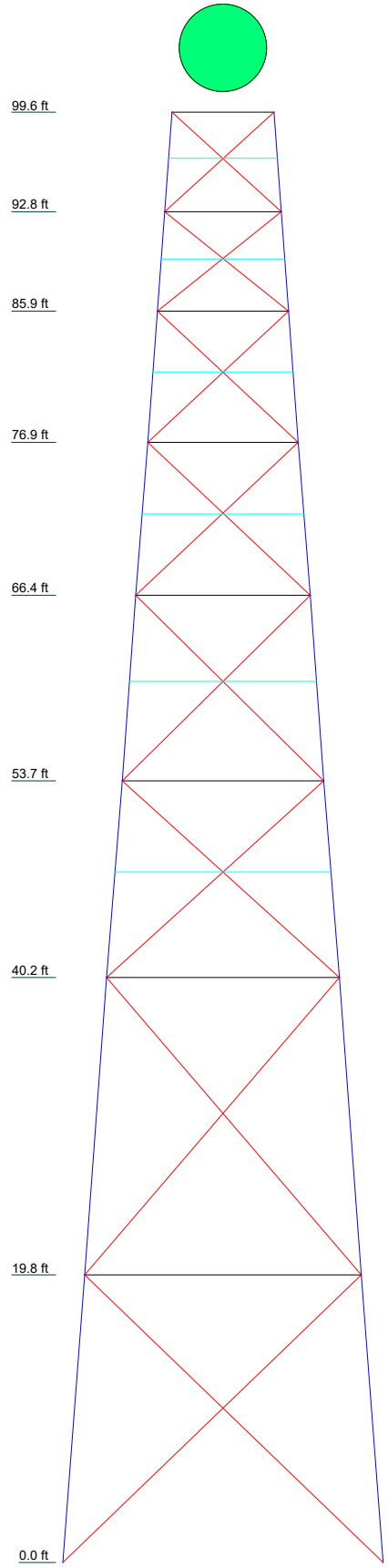
Figure 2 – Surface Rust – Paint Tower



Figure 3 – Surface Rust – Paint Tower



Figure 4 – Cab to be Removed for Repair



Section	T8	T7	T6	T5	T4	T3	T2	T1		
Legs	L5x5x3/8	L4x4x7/16	L4x4x5/16	L4x4x1/4	L3 1/2x3 1/2x1/4	L2x2x1/8	L3x3x3/16			
Leg Grade	A36									
Diagonals	L2 1/2x2 1/2x1/8				L2x2x1/8					
Diagonal Grade	A36									
Top Girts	L4x4x1/4	L3 1/2x3 1/2x1/4	L3x3x3/16		L2 1/2x2 1/2x3/16	L2x2x1/8	A	L3x3x3/16		
Sec. Horizontals	N.A.		L2 1/2x2 1/2x1/8		L2x2x1/8					
Inner Bracing	L4x4x1/4	L3 1/2x3 1/2x1/4	L3x3x3/16		L2 1/2x2 1/2x1/8	L2x2x1/8		L3x3x3/16		
Face Width (ft)	22.0625	19.02	15.93	13.9	11.97	10.39	9.03	8	7	
# Panels @ (ft)	1 @ 19.75	1 @ 20.42	1 @ 13.5	1 @ 12.75	1 @ 10.5	1 @ 9	2 @ 6.83			
Weight (K)	9.1	2.4	2.1	1.3	1.0	0.8	0.6	0.5	0.5	

DESIGNED APPURTENANCE LOADING

TYPE	ELEVATION	TYPE	ELEVATION
Shelter Building	104	Interior (Landing 4)	66.4
Framing (99.6')	99.6	Redundant (Not Modeled)	60 - 53.7
Redundant (Not Modeled)	96.2 - 92.8	Interior (Landing 5)	53.7
Interior (Landing 1)	92.8	Redundant (Not Modeled)	47 - 40.2
Redundant (Not Modeled)	89.4 - 85.9	Redundant (Not Modeled)	40.2 - 19.8
Interior (Landing 2)	85.9	Interior (Landing 6)	40.2
Redundant (Not Modeled)	81.4 - 76.9	Interior (Landing 7)	26.6
Interior (Landing 3)	76.9	Redundant (Not Modeled)	19.8 - 0
Redundant (Not Modeled)	71.7 - 66.4	Interior (Landing 8)	13.2

SYMBOL LIST

MARK	SIZE	MARK	SIZE
A	L2 1/2x2 1/2x3/16		

MATERIAL STRENGTH

GRADE	Fy	Fu	GRADE	Fy	Fu
A36	36 ksi	58 ksi			

TOWER DESIGN NOTES

1. Tower designed for Exposure D to the TIA-222-H Standard.
2. Tower designed for a 148 mph basic wind in accordance with the TIA-222-H Standard.
3. Tower is also designed for a 30 mph basic wind with 0.50 in ice. Ice is considered to increase in thickness with height.
4. Deflections are based upon a 60 mph wind.
5. Tower Risk Category II.
6. Topographic Category 1 with Crest Height of 0.00 ft

☐ *ALL REACTIONS ARE FACTORED*

MAX. CORNER REACTIONS AT BASE:
DOWN: 88 K
SHEAR: 10 K

UPLIFT: -91 K
SHEAR: 28 K

AXIAL 26 K
SHEAR 4 K *MOMENT 345 kip-ft*
TORQUE 4 kip-ft
SEISMIC

AXIAL 38 K
SHEAR 2 K *MOMENT 134 kip-ft*
TORQUE 0 kip-ft
30 mph WIND - 0.5000 in ICE

AXIAL 24 K
SHEAR 51 K *MOMENT 2770 kip-ft*
TORQUE 0 kip-ft
REACTIONS - 148 mph WIND

Elevated Structural Consultants, LLC
154 Tiger Lane
Summerville, SC 29483
Phone: (843) 697-6179
FAX:

Job:	***Lookout Tower - Existing Members***		
Project:	***Measured during site visit 1-28-2026***		
Client: City of McClellanville	Drawn by: Greg Burbage, PE	App'd:	
Code: TIA-222-H	Date: 07/01/26	Scale: NTS	
Path:		Dwg No. E-1	

tnxTower	Job	Page
	Lookout Tower - Existing Members	1 of 1
Elevated Structural Consultants, LLC 154 Tiger Lane Summerville, SC 29483 Phone: (843) 697-6179 FAX:	**Project** Measured during site visit 1-28-2026	**Date** 06:56:12 07/01/26
	Client City of McClellanville	**Designed by** Greg Burbage, PE

Section Capacity Table

Section No.	Elevation ft	Component Type	Size	Critical Element	P K	ϕP_{allow} K	% Capacity	Pass Fail
T1	99.58 - 92.75	Leg	L3x3x3/16	1	-8.40	31.65	26.5	Pass
T2	92.75 - 85.92	Leg	L3x3x3/16	26	-12.09	31.72	38.1	Pass
T3	85.92 - 76.92	Leg	L3 1/2x3 1/2x1/4	49	-19.00	47.43	40.1	Pass
T4	76.92 - 66.42	Leg	L3 1/2x3 1/2x1/4	74	-27.68	42.56	65.0	Pass
T5	66.42 - 53.67	Leg	L4x4x1/4	99	-38.97	45.31	86.0	Pass
T6	53.67 - 40.17	Leg	L4x4x5/16	123	-51.61	53.53	96.4	Pass
T7	40.17 - 19.75	Leg	L4x4x7/16	145	-70.25	78.14	89.9	Pass
T8	19.75 - 0	Leg	L5x5x3/8	166	-88.60	103.68	85.5	Pass
T1	99.58 - 92.75	Diagonal	L2x2x1/8	15	4.10	15.69	26.1	Pass
T2	92.75 - 85.92	Diagonal	L2x2x1/8	42	4.44	15.69	28.3	Pass
T3	85.92 - 76.92	Diagonal	L2x2x1/8	63	6.33	15.69	40.3	Pass
T4	76.92 - 66.42	Diagonal	L2x2x1/8	85	8.30	15.69	52.9	Pass
T5	66.42 - 53.67	Diagonal	L2x2x1/8	111	10.82	15.69	69.0	Pass
T6	53.67 - 40.17	Diagonal	L2x2x1/8	137	12.72	15.69	81.1	Pass
T7	40.17 - 19.75	Diagonal	L2 1/2x2 1/2x1/8	158	17.85	19.74	90.4	Pass
T8	19.75 - 0	Diagonal	L2 1/2x2 1/2x1/8	180	19.92	19.74	100.9	Acceptable
T1	99.58 - 92.75	Secondary Horizontal	L2x2x1/8	21	-0.13	2.92	4.3	Pass
T2	92.75 - 85.92	Secondary Horizontal	L2x2x1/8	47	-0.18	2.24	8.1	Pass
T3	85.92 - 76.92	Secondary Horizontal	L2x2x1/8	69	-0.29	1.73	16.5	Pass
T4	76.92 - 66.42	Secondary Horizontal	L2x2x1/8	93	-0.43	1.30	32.9	Pass
T5	66.42 - 53.67	Secondary Horizontal	L2x2x1/8	119	-0.63	0.97	64.6	Pass
T6	53.67 - 40.17	Secondary Horizontal	L2 1/2x2 1/2x1/8	142	-0.86	1.43	60.3	Pass
T1	99.58 - 92.75	Top Girt	L3x3x3/16	5	-2.47	32.59	7.6	Pass
T2	92.75 - 85.92	Top Girt	L2 1/2x2 1/2x3/16	29	-3.85	23.46	16.4	Pass
T3	85.92 - 76.92	Top Girt	L2x2x1/8	53	-4.05	7.97	50.8	Pass
T4	76.92 - 66.42	Top Girt	L2 1/2x2 1/2x3/16	77	-5.34	17.17	31.1	Pass
T5	66.42 - 53.67	Top Girt	L3x3x3/16	101	-6.92	22.11	31.3	Pass
T6	53.67 - 40.17	Top Girt	L3x3x3/16	125	-8.54	16.73	51.1	Pass
T7	40.17 - 19.75	Top Girt	L3 1/2x3 1/2x1/4	149	-10.71	26.60	40.3	Pass
T8	19.75 - 0	Top Girt	L4x4x1/4	169	-13.08	28.17	46.4	Pass
T1	99.58 - 92.75	Inner Bracing	L3x3x3/16	11	-0.40	26.47	1.5	Pass
T2	92.75 - 85.92	Inner Bracing	L2x2x1/8	33	-0.23	4.75	4.7	Pass
T3	85.92 - 76.92	Inner Bracing	L2x2x1/8	57	-0.15	3.73	4.0	Pass
T4	76.92 - 66.42	Inner Bracing	L2 1/2x2 1/2x1/8	83	-0.14	5.59	2.6	Pass
T5	66.42 - 53.67	Inner Bracing	L3x3x3/16	107	-0.20	10.74	1.9	Pass
T6	53.67 - 40.17	Inner Bracing	L3x3x3/16	131	-0.13	7.97	1.7	Pass
T7	40.17 - 19.75	Inner Bracing	L3 1/2x3 1/2x1/4	153	-0.56	12.75	4.4	Pass
T8	19.75 - 0	Inner Bracing	L4x4x1/4	173	-0.64	13.47	4.7	Pass
							Summary	
						Leg (T6)	96.4	Pass
						Diagonal (T8)	100.9	Acceptable
						Secondary Horizontal (T5)	64.6	Pass
						Top Girt (T6)	51.1	Pass
						Inner Bracing (T8)	4.7	Pass
						RATING =	**100.9**	**Acceptable**

125.21

Kem Bond® HS

Universal Metal Primer

B50NZ0003 Red Oxide, B50WZ0004 Off White, B50AZ0008 Gray

CHARACTERISTICS

KEM BOND HS is a fast drying, higher solids, rust inhibitive, universal, phenolic alkyd metal primer. Kem Bond HS can be topcoated with alkyd, acrylic, and high performance coatings. Also suitable as a "barrier" coat over conventional coatings which would normally be attacked by strong solvents in high performance coatings.

For use on properly prepared: Steel

Features:
- High film build to protect sand blasted steel
- Good corrosion and rust protection
- Universal, can be topcoated with epoxies and urethanes
- Exterior-interior metal primer
- Suitable for use in USDA inspected facilities

Recommended for use in:
- Marine application
- Maintenance primer
- Structural steel
- Machinery
- Steel pipe
- Hand rail
- Tanks
- Bar joists

Color: Red Oxide, Off White, Gray

Recommended Spreading Rate per coat:
(B50NZ0003 varies by base) as mixed

Wet mils:	3.0-8.0
Dry mils:	1.8-4.8
Coverage sq. ft. per gallon:	200-534
Theoretical coverage: sq. ft. per gallon @ 1 mil dry	962

Approximate spreading rates are calculated on volume solids and do not include any application loss. Note: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 4.0 mils wet, @ 50% RH:

	@40°F	@77°F	@120°F
To touch :	1 hour	30 min.	10 min.
Tack handle:	3 hours	1 hour	15 min.
To recoat: with itself and alkyds	6 hours	2 hours	1 hour
To recoat:*	24 hours	24 hours	6 hours
To recoat: with acrylic latex paints	48 hours	24 hours	6 hours
Cure time	5 days	2 days	1 day

* Recoat with hot solvent urethane or epoxies or high performance coatings.

Drying, and recoat times are temperature, humidity, and film thickness dependent.

Tinting: **Do Not Tint**

Finish: **Flat**

Red Oxide B50NZ0003
(may vary by color)

V.O.C. (less exempt solvents): As mixed
336 grams per litre; 2.81 lbs. per gallon
As per 40 CFR 59.406

Volume Solids:	60 ± 2%
Weight Solids:	79 ± 2%
Weight per Gallon:	13.17 lb
Flash Point:	71°F TCC
Shelf Life:	36 months, unopened

COMPLIANCE

As of 07/12/2021, Complies with:

OTC	Yes
OTC Phase II	No
S.C.A.Q.M.D.	No
CARB	No
CARB SCM 2007	No
CARB SCM 2020	No
Canada	Yes
LEED® v4 & v4.1 Emissions	No
LEED® v4 & v4.1 V.O.C.	No
EPD-NSF® Certified	No
MIR-Manufacturer Inventory	No
MPI®	Yes

APPLICATION

Temperature:

minimum	40°F / 4.4°C
maximum	120°F / 49°C
	air, surface, and material
	At least 5°F above dew point
Relative humidity:	85% maximum

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compatible with the existing environmental and application conditions.

Reducer:	No reduction in restricted areas Xylene,R2K4
Airless Spray:	
Pressure	1800 p.s.i.
Hose	1/4-3/8 inch I.D.
Tip	.017-.019 inch
Reduction	As needed up to 3% by volume
Conventional Spray:	Not recommended
Brush	Natural Bristle
Roller Cover	1/4-3/8 inch woven with solvent resistant core

If specific application equipment is listed above, equivalent equipment may be substituted.

Apply paint at the recommended film thickness and spreading rate as indicated on front page. Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance. Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness, or porosity of the surface, skill, and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, over thinning, climatic conditions, and excessive film build.

Mix paint thoroughly to a uniform consistency with slow speed power agitation prior to use. Stripe coat crevices, welds, and sharp angles to prevent early failure in these areas. When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Not recommended for immersion service or exposure to acids, alkalis, or strong solvents. Intimate contact with the steel surface and primer is necessary for adequate rust inhibition and adhesion.

According to American Institute of Steel Construction (AISC), shop coat primers are intended for protection for only a short period of exposure in ordinary atmospheric conditions, and is considered a temporary and provisional coating.

SPECIFICATIONS

Steel:
1 coat Kem Bond HS
2 coats Topcoat

Acceptable Topcoats:
Acrolon 218 HS Polyurethane
Hi-Solids Polyurethane
Industrial Enamel
Macropoxy 646 Epoxy
Macropoxy HS Epoxy
Metalatex Semi-Gloss Enamel
Pro Industrial Acrylic
Pro Industrial Waterbased Epoxy
Pro Industrial Waterbased Alkyd-Urethane
Pro Industrial Multi-Surface Acrylic
Pro Industrial Pre-Catalyzed Epoxy & Urethane
Pro Industrial Urethane Alkyd Enamel
Pro Industrial Waterbased Acrolon 100
Sher-Cryl
Silver-Brite Aluminum
Steel Master 9500
Tile-Clad HS Epoxy

The systems listed above are representative of the product's use, other systems may be appropriate. Other primers may be appropriate.

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Kem Bond® HS
Universal Metal Primer

SURFACE PREPARATION

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (**NIOSH** approved) and proper containment and cleanup. For more information, call the National Lead Information Center at **1-800-424-LEAD** (in US) or contact your local health authority.

Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Glossy surfaces should be sanded dull. Stains from water, smoke, ink, pencil, grease, etc. should be sealed with the appropriate primer-sealer. Recognize that any surface preparation short of total removal of the old coating may compromise the service length of the system.

Iron & Steel- Minimum surface preparation is Hand Tool Clean per SSPC-SP2. Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. For better performance, use Commercial Blast Cleaning per SSPC-SP6/ NACE 3, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils). Prime any bare steel within 8 hours or before flash rusting occurs.

Previously Painted Surfaces - If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, additional abrasion of the surface and/ or removal of the previous coating may be necessary. Retest surface for adhesion. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above. Recognize that any surface preparation short of total removal of the old coating may compromise the service length of the system.

Other substrates may or may not be appropriate. If a specific substrate is not listed above, consult your Sherwin-Williams representative for more information.

SURFACE PREPARATION

Mildew - Prior to attempting to remove mildew, it is always recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions may be advised. Mildew may be removed before painting by washing with a solution of 1 part liquid bleach and 3 parts water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with water and allow the surface to dry before painting. Wear protective eyewear, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach-water solution.

PERFORMANCE

Off White B50WZ0004

System Tested: (unless otherwise indicated)
Substrate: Steel
Surface Preparation: SSPC-SP6-NACE 3
Primer: 1 coat Kem Bond HS @ 4.5-5 Mils W.F.T.

Adhesion:
Method: ASTM D3359
Result: 4B

Corrosion Resistance:
Method: ASTM D5894, 1008
Result: Pass

Dry Heat Resistance
Method: ASTM D2485
Result: 200°F

Flexibility:
Method: ASTM D522, 1/4 inch mandrel
Result: Pass

Fineness of grind[1]:
Method: Hegman
Result: 4 Hegman minimum

Sag Test[1]**:**
Method: ASTM D4400
Result: 12 mils minimum

Viscosity[1]**:**
Method: Krebs Units
Result: 95-105 KU

Water Resistance:
Result: Pass

[1] Standard test based on Certificate of Analysis

SAFETY PRECAUTIONS

Before using, carefully read **CAUTIONS** on label. Refer to the Safety Data Sheets (SDSs) before use.

FOR PROFESSIONAL USE ONLY.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

CLEANUP INFORMATION

Clean spills, spatters & tools with compliant cleanup solvent. After cleaning, flush spray equipment with compliant cleanup solvent to prevent rusting of the equipment. Follow manufacturer's safety recommendations when using solvents.

DANGER: Rags, steel wool, other waste soaked with this product, and sanding residue may spontaneously catch fire if improperly discarded. Immediately place rags, steel wool, other waste soaked with this product, and sanding residue in a sealed, water-filled, metal container. Dispose of in accordance with local fire regulations.

HOTW	07/12/2021	B50NZ0003	36 321
HOTW	07/12/2021	B50WZ0004	32 310
HOTW	07/12/2021	B50AZ0008	20 314
FRC			

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative or visit www.paintdocs.com to obtain the most current version of the PDS and/or an SDS.

Protective & Marine Coatings

TOWER-GUARD™ HS

ZINC FILLED TRANSMISSION TOWER COATING

B54AZ600 **GALVANIZED GRAY**

Revised: March 17, 2022

PRODUCT INFORMATION

2.30

PRODUCT DESCRIPTION

TOWER-GUARD HS is a heavy duty, VOC compliant, high build, long oil/alkyd coating developed specifically for coating transmission towers. Designed for a single coat application that prevents corrosion through the use of metallic zinc dust, excellent wetting properties, and high build properties.

- Corrosion resistant
- Excellent exterior durability
- Brush, roll, or mitt application

PRODUCT CHARACTERISTICS

Finish:	Low Lustre
Color:	Galvanized Gray
Volume Solids:	89% ± 2%
Weight Solids:	95% ± 2%
VOC (SCAQMD):	<100 g/L; 0.8 lb/gal

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils:	**6.75**	**11.25**
Dry mils:	**6.0**	**10.0**
~Coverage sq ft/gal:	**145**	**240**

Drying Schedule @ 8.0 mils wet @ 50% RH:

	@ 50°F	@ 77°F	@ 100°F
To touch:	24 hours	12-24 hours	8 hours
To handle:	3 days	48-72 hours	24 hours
To recoat:	30 days	30 days	7 days

Drying time is temperature, humidity, and film thickness dependent.

Shelf Life:	12 months, unopened Store indoors at 40°F to 100°F.
Flast Point:	154°F, Seta Flash
Reducer/Clean up:	Mineral Spirits (R1K4) up to 3%

RECOMMENDED USES

For use on weathered galvanized surfaces such as:

- Electrical towers
- Substation towers
- Poles
- Fences
- Duct work
- Grain bin exteriors

PERFORMANCE CHARACTERISTICS

Substrate*: Steel

Surface Preparation*: SSPC-SP6

System Tested*:

1 ct. Tower-Guard HS @ 8.0 mils dft

*unless otherwise noted below

Test Name	Test Method	Results
Adhesion	ASTM D3359, Method A	5A, 100% retention
Dry Heat Resistance	ASTM D2485	200°F, 250°F intermittent
Flexibility	ASTM D1737, 180° bend, 1/8" mandrel	Passes
Salt Fog Resistance	ASTM B117, 700 hours	Passes, rating 9, per ASTM D610

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Protective & Marine Coatings

TOWER-GUARD™ HS

ZINC FILLED TRANSMISSION TOWER COATING

B54AZ600 **GALVANIZED GRAY**

Revised: March 17, 2022

PRODUCT INFORMATION

2.30

RECOMMENDED SYSTEMS

		Dry Film Thickness / ct. Mils	(Microns)
Steel:			
1 ct.	Tower-Guard HS	6.0-10.0	(150-250)
Galvanizing:			
1 ct.	Tower-Guard HS	6.0-10.0	(150-250)
Weathered galvanized structures:			
Transmission towers & poles			
Rust grade 2			
1 ct.	Kem Bond HS (Spot Prime)	2.0-5.0	(50-125)
1 ct.	Tower-Guard HS	6.0-10.0	(150-250)
Transmission towers & poles:			
Rust grade 3			
2 cts.	Kem Bond HS	2.0-5.0	(50-125)
1 ct.	Tower-Guard HS	6.0-10.0	(150-250)
Above grade transmission tower legs:			
1 ct.	Kem Bond HS (Spot Prime)	2.0-5.0	(50-125)
1 ct.	Tower-Guard HS	6.0-10.0	(150-250)

The systems listed above are representative of the product's use, other systems may be appropriate.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:
Iron & Steel: SSPC-SP2 or SP3
Galvanizing: SSPC-SP1

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

TINTING

Do not tint.

APPLICATION CONDITIONS

Temperature: 45°F minimum, 100°F maximum (air, surface, and material)
At least 5°F above dew point

Relative humidity: 85% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging: 5 gallon containers

Weight per gallon: 16.1 ± 0.2 lb

SAFETY PRECAUTIONS

Refer to the SDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Protective & Marine Coatings

TOWER-GUARD™ HS

ZINC FILLED TRANSMISSION TOWER COATING

B54AZ600 **GALVANIZED GRAY**

Revised: March 17, 2022

APPLICATION BULLETIN

2.30

SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel

Minimum surface preparation is Hand Tool Clean per SSPC-SP2. Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. For better performance, use Commercial Blast Cleaning per SSPC-SP6, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils). Prime any bare steel within 8 hours or before flash rusting occurs.

Galvanized Steel

Allow to weather a minimum of six months prior to coating. Solvent Clean per SSPC-SP1 (recommended solvent is VM&P Naphtha). When weathering is not possible, or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP7 is necessary to remove these treatments. Rusty galvanizing requires a minimum of Hand Tool Cleaning per SSPC-SP2, prime the area the same day as cleaned.

Surface Preparation Standards

	Condition of Surface	ISO 8501-1 BS7079:A1	Swedish Std. SIS055900	SSPC	NACE
White Metal		Sa 3	Sa 3	SP 5	1
Near White Metal		Sa 2.5	Sa 2.5	SP 10	2
Commercial Blast		Sa 2	Sa 2	SP 6	3
Brush-Off Blast		Sa 1	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	C St 2	C St 2	SP 2	-
	Pitted & Rusted	D St 2	D St 2	SP 2	-
Power Tool Cleaning	Rusted	C St 3	C St 3	SP 3	-
	Pitted & Rusted	D St 3	D St 3	SP 3	-

APPLICATION CONDITIONS

Temperature:	45°F minimum, 100°F maximum (air, surface, and material) At least 5°F above dew point
Relative humidity:	85% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer/Clean Up .....Mineral Spirits (R1K4)

Spray Application .....Not recommended

Brush

Brush.....Natural Bristle
Reduction.....As needed up to 3% by volume

Roller

Cover .....3/8" woven with phenolic core
Reduction.....As needed up to 3% by volume

Paint Mitt

Reduction.....As needed up to 3% by volume

If specific application equipment is not listed above, equivalent equipment may be substituted.

continued on back

Protective & Marine Coatings

TOWER-GUARD™ HS

ZINC FILLED TRANSMISSION TOWER COATING

B54AZ600 **GALVANIZED GRAY**

Revised: March 17, 2022

APPLICATION BULLETIN

2.30

APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mixing Instructions: Mix paint thoroughly by boxing and stirring before use. Make certain no pigment remains on bottom of can.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils:	**6.75**	**11.25**
Dry mils:	**6.0**	**10.0**
~Coverage sq ft/gal:	**145**	**240**

Drying Schedule @ 8.0 mils wet @ 50% RH:

	@ 50°F	@ 77°F	@ 100°F
To touch:	24 hours	12-24 hours	8 hours
To handle:	3 days	48-72 hours	24 hours
To recoat:	30 days	30 days	7 days

Drying time is temperature, humidity, and film thickness dependent.

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with Mineral Spirits, R1K4. Clean tools immediately after use with Mineral Spirits, R1K4. Follow manufacturer's safety recommendations when using any solvent.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

PERFORMANCE TIPS

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

Do not apply over moisture or at temperatures below 45°F.

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

Refer to the SDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

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1800 Reynolds Ave
North Charleston, South Carolina 29405
P 843-884-1234
F 843-884-9234
Terracon.com

August 25, 2026

Attn: Mr. John Moore
E: jmoore@emstructural.com

Re: Conditions Assessment and Material Sampling
McClellanville Lookout Tower
McClellanville, Charleston County, South Carolina 29458
Terracon Project No. EN257414

Dear Mr. Moore:

Terracon Consultants, Inc. (Terracon) is pleased to submit this report to EM Structural, LLC (Client) for a limited Conditions Assessment and Material Sampling at the above-referenced site. The purpose of this project was to conduct a limited conditions assessment, and material sampling to document current conditions and provide recommendations for future rehabilitation of the historic structures. As no federal funding or permitting is anticipated at this time, the following scope of services is not intended for compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (NHPA) (54 U.S.C. § 300101 et seq.).

We appreciate the opportunity to present this report. If you have any questions or comments regarding this report or require additional services, please contact us at your earliest convenience.

Sincerely,
Terracon Consultants, Inc.

Justin Schwebler, MSHP
Senior Scientist

Patricia Davenport-Jacobs, MFA, HP
Historic Preservation
Authorized Project Reviewer

Attachments: *NSL Analytical Material Sampling Test Results*

Conditions Assessment

General Context and Architectural Description

The McClellanville / Cape Romain National Wildlife Refuge Lookout Tower is an approximately 107 foot tall, Aermotor Company design, steel lookout tower with observation cab. The tower was erected by the United States Fish and Wildlife Service c. 1940, in the Town of McClellanville, Charleston County, South Carolina.

The tower is comprised of eight vertically stacked open lattice steel framed bays. Each bay is proportionally smaller in dimensions the higher on the tower at which it is mounted, such that the base of the tower is approximately 25’ wide x 20’ tall, and the tenth bay just below the observation cab of the tower is approximately 7’ wide and 6’9” tall. Each bay is constructed of galvanized “L-shaped” 90-degree, angled steel framing members with near vertical columns and hangars, horizontal main struts, stiffeners, and diagonal cross-bracing.

A steel-framed stairway with 1 ¼” x 9 ¼” wooden treads and angled steel handrails ascend the interior of each bay. Each level is oriented diagonally in plan to the exterior frame of the tower, such that each flight of the stairs rises from the southwest corner of the tower to the northeast corner alternatively within each bay. A small landing is mounted in each alternating corner of the tower at the connection point between each bay for the stairway directional turn. The first three stair landings are rectangular in plan near the base, with the five upper landings triangular in plan, framed with angled steel, and finished with 1 ¼” x 9 ¼” wooden decking. There are eight landings in total. The final run of stairs at the top of the tower to access the observation cab is mounted parallel with the exterior framing of the bay on the western side of the tower, rising from south to north.

The observation cab is approximately 7’Hx7’Wx7’L. The cab is accessed by the stairs mentioned above through a wooden trap door mounted to the cab floor. The exterior walls of the cab are clad with galvanized sheet metal while the interior wall coverings consist of painted plywood on the bottom 4’ of wall space and multi-light steel windows above. The metal panel walls are approximately half of the wall height, with the rest of the wall system comprised of the steel window assembly. The metal wall panels are approximately 2’7”Hx7’W. On each elevation of the cab the window assemblies are made up of two steel-framed windows with 9 steel muntin dividers. The operating system of the windows and exact measurements of the structural and finish material assemblies could not be determined by the team due to accessibility limitations of the cab due to safety concerns.

At the center of the observation cab, a square wood framed table pedestal is mounted to the floor. The top of the table is a circular wooden tabletop approximately 32” in diameter. Although the original equipment is no longer extant, the purpose of the base is for mounting an azimuth finding device. These were often the “Osborne Fire Finder” devices. An electric light switch is mounted to the west side of the table pedestal, indicating that there was electric lighting available in the observation cab.

The ceiling of the cab is painted plywood. The hipped roof of the cab is clad with corroded sheet metal overlapping at the ridge with metal fasteners. A small hatch for accessing the

roof is located on the south hip of the roof with a metal tiedown cleat. There is a hole in the pinnacle of the roof where the original ventilator would have been installed.



Figure 1: The Cape Romain National Wildlife Refuge Lookout Tower. View looking Northwest.

Conditions Assessment

This condition assessment rates architectural materials and finishes based on a Good-Fair-Poor grading system. This is a visual analysis of materials and components only; chemical or mechanical testing data can be found in Appendix A

The lookout tower is generally in fair condition. From the ground with distant visual analysis active corrosion is notable on steel framing members and connections. The corrosion is much more prevalent on the top half of the tower, likely from increased exposure to atmospheric salts driven by the coastal winds. In the areas with significant corrosion, the gray galvanized coating is almost entirely non-extent.

There is some material loss and significant active corrosion at most of the connections and through-bolts between the steel framing members and between the vertical bays of the tower. On the third bay from the ground, the north horizontal stiffener strut had corroded to the point of connection failure, completely separating at the northwest corner. A portion of this strut was cut away for material testing and analysis, (See Materials Testing and Analysis in **Appendix A**). A steel bolt and nut were also removed from this strut for chemical analysis.



Figure 2: Typical surface corrosion of primary steel framing members and galvanized coating failure.

The stairways of the tower have a more complicated set of conditions due to the relative complexity of the material assembly as compared to the tower framing. Each stair stringer is made of angled steel web trusses. Vertical support posts are attached to the stringers with 2" L-Clips to provide support for the angled steel handrails. The stair treads are 1 ¼" x 9 ¼" wood boards approximately 2 feet wide.



Figure 3: The stair stringer assembly and typical conditions.

The most common significant conditions on the stairways are the corrosion and deformation of the L-Clip attachments for the vertical handrail support posts and the degradation of the wooden stair treads and landing floors.

Many of the L-Clips attaching the vertical posts are significantly corroded and show signs of deformation and rust jacking between the L-Clip and steel angle framing members. The cause of the deformed L-Clips is potentially a result of moisture being trapped between the clip and framing members produced by the geometry of the constructed assembly. Due to the curious observation of a significantly higher percentage of corrosion, material loss, and physical

distortion compared to the rest of the tower, further investigative measures could be warranted.

As noted above, many of the wooden stair treads and landing floorboards are significantly degraded. The through bolts that connect the stair treads to the stringers are a common point of failure. Water infiltration at these connection points has caused the wood treads to degrade. Many of the treads and floorboards at the landings are loose, and some are missing entirely. The wooden treads do not appear to be original to the structure and were likely replaced sometime in the last few decades.

The observation cab is in poor condition. The steel framing and metal panel walls are in fair condition, but the interior material finishes are heavily degraded due to environmental exposure. The access stair connections to the cab framing have failed at the top of the stairs, making accessing the cab unsafe. The wood floors, plywood walls, and ceiling of the cab are in poor condition, showing signs of water infiltration, rot, and advanced material loss. The central observation table is also in poor condition with similar levels of material loss.



Figure 4: Connection failure (outlined in red) of the observation cab stairway connection and typical wood material conditions.

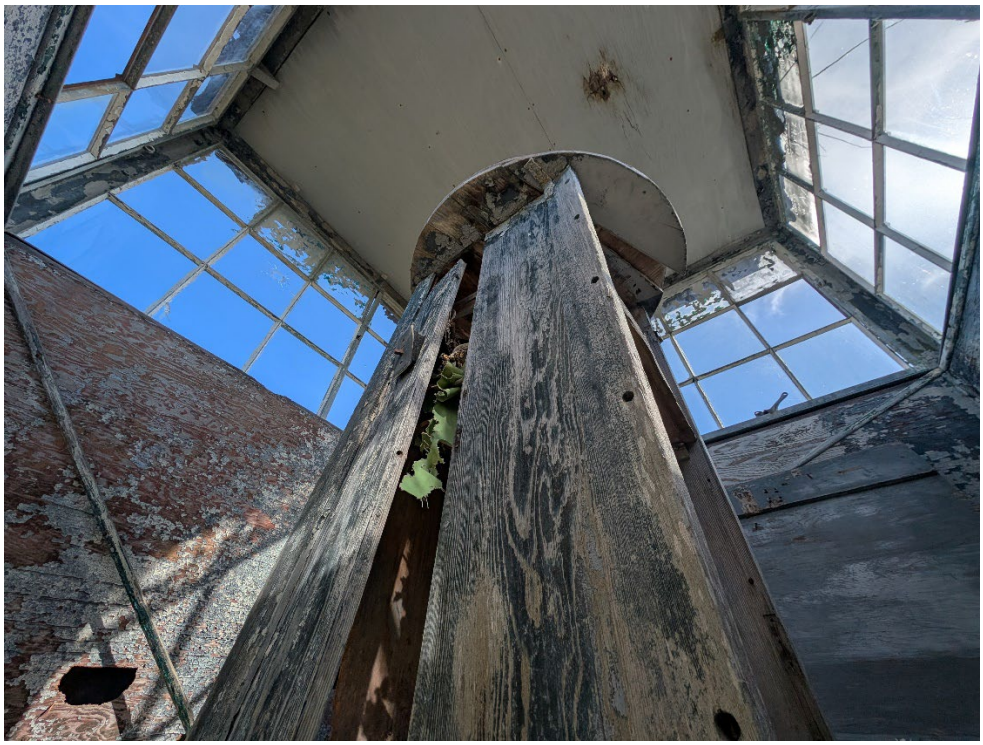


Figure 5: A view of the interior of the observation cab from the access stairway.



Figure 6: Exterior view of the observation cab showing general conditions of the sheet metal panels, windows, and floor.

The windows of the observation cab are in fair condition. While there are windowpanes missing due to glazing failure, the steel window frames and muntins appear to be in fair condition. The tower has been subjected to many extreme tropical weather events, including Hurricane Hugo, which has likely caused many windowpane failures.

The roof of the tower is not visible from the ground or from the interior of the observation cab. The edges of the roof that are visible appear to be in poor condition with significant surface corrosion and material loss. Drone imagery of the tower roof from the Town of McClellanville website shows the sheet metal roof panels, roof hatch, metal cleat, and ventilator access hole. The sheet metal appears to be in better condition on top of the roof, where the edges have more significant damage from environmental corrosion and wind damage. The ventilator hole appears to have been open to the elements at the time the photograph was taken (**Figure 7**).



Figure 7: The lookout tower roof, image courtesy of the Town of McClellanville.

Overall, the tower is in fair condition. Localized material loss and areas of active corrosion will continue to degrade the tower over time, leading to potentially dangerous conditions for the tower if maintenance interventions are not undertaken. The observation cab, the wooden stair treads, and the L-Clips for the handrail posts are the most concerning conditions on the tower. The failure of the wooden floor of the observation cab could lead to a catastrophic failure of the interior finishes of the cab, leading to an irretrievable loss of important original fabric.

Material Sampling Summary

General Information

Terracon received two (2) steel samples from an existing Lookout Tower in McClellanville, SC on 04/30/2026.

Summary of Services

Terracon performed Tensile/Yield/Elongation testing of the steel plate sample and Hardness testing of a steel bolt, both samples were tested for chemical composition.

Summary of Results

- **Rivet Sample**
  - Carbon Equivalent (CE) – 0.24
  - HRBW - 58

  The rivet sample is a standard low carbon steel sample very similar in chemistry to the steel bar. The carbon equivalent based on eight element analysis indicates a CE of 0.24. A CE below 0.40 is considered to be standard low carbon steel. The rivet sample was subjected to microhardness testing utilizing Rockwell B test method. The hardness was an HRBW of 58 which equates to an average tensile of 58,000 PSI to 60,000 PSI.

- **Steel Bar**
  - Carbon Equivalent – 0.30
  - Tensile Strength – 61,235 psi
  - Yield Strength – 46,218 psi

  The steel bar was subjected to eight element analysis and has a Carbon Equivalent of 0.30 CE. A CE below 0.40 is considered standard low carbon steel. Tensile and yield results are Tensile Strength 61,325 PSI and yield was 46,218 PSI.

These results indicate that both the rivet and the steel bar are most likely approximately 50-grade steel which can be welded with typical prequalified weld procedures for type 1 steels utilizing 70XX SMAW electrodes and ER71XX MIG and Flux Core welding processes.

Based on the chemical and physical characteristics of the steel, it meets the criteria for A7, A36, and 50 grade steels. The original tower specifications called for A7 steel. The sampled steel appears to match the original design specifications. There may be areas of past repair or modification on the tower where material characteristics deviate from the collected samples. Areas of the tower with higher concentrations of active corrosion or exposure to environmental stressors could impact the material characteristics of the steel, that were not observed in the testing samples. Our limited sample size is not a guarantee for the universal performance or material characteristics of the materials represented on the entire structure.

The laboratory sample analysis and report are attached in **Appendix A.**

Appendix A

NSL Analytical Material Sampling Test Results

TEST REPORT

THE REPORTED TEST RESULTS RELATE ONLY TO THE ITEM(S) TESTED

Terracon Consultants, Inc. (Cincinnati, OH)
611 Lunken Park Dr
Cincinnati, OH, 45226-1813
Peter Lytle

Request ID: R-20260514-018
Issue Date: 5/21/26 1:10:55 PM
PO Number: Dumford 102

Sample ID	C	Cr	Cu	Mn	Mo	Ni	Si	V
S-260514-056	0.16 %	<0.024 %	0.025 %	0.37 %	<0.011 %	<0.021 %	0.038 %	<0.01 %
S-260514-057	0.20 %	0.035 %	0.079 %	0.47 %	<0.011 %	0.038 %	0.033 %	<0.01 %

Reporting Officer :

NSL Analytical Services
4450 Cranwood Parkway
Cleveland, Ohio 44128

Roxanne Skinner, Technical Manager

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THE REPORTED TEST RESULTS RELATE ONLY TO THE ITEM(S) TESTED

Terracon Consultants, Inc. (Cincinnati, OH)
611 Lunken Park Dr
Cincinnati, OH, 45226-1813
Peter Lytle

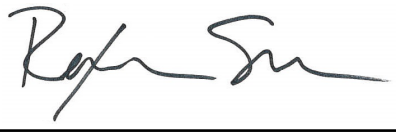
Request ID: R-20260514-018
Issue Date: 5/21/26 1:10:55 PM
PO Number: Dumford 102

Client Description:	Two Sample form an old fire watch Tower (One rivet and One Steel Coupon), Project Number EN257414
Sample No.:	S-260514-056
Customer ID:	Rivet - Chem

Test	Results	Specification Limit	Methods	Specification Description	Instrument Used	Analyst ID
C	0.16 %	N/A	LECO Furnace	N/A	I0172	A0103
Cr	<0.024 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
Cu	0.025 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
Mn	0.37 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
Mo	<0.011 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
Ni	<0.021 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
Si	0.038 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
V	<0.01 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015

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4450 Cranwood Parkway
Cleveland, Ohio 44128



Roxanne Skinner, Technical Manager

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611 Lunken Park Dr
Cincinnati, OH, 45226-1813
Peter Lytle

Request ID: R-20260514-018
Issue Date: 5/21/26 1:10:55 PM
PO Number: Dumford 102

Client Description:	Two Sample form an old fire watch Tower (One rivet and One Steel Coupon), Project Number EN257414
Sample No.:	S-260514-057
Customer ID:	Steel Sample - Chem

Test	Results	Specification Limit	Methods	Specification Description	Instrument Used	Analyst ID
C	0.20 %	N/A	LECO Furnace	N/A	I0172	A0103
Cr	0.035 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
Cu	0.079 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
Mn	0.47 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
Mo	<0.011 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
Ni	0.038 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
Si	0.033 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015
V	<0.01 %	N/A	Optical Emission Spectroscopy	N/A	I0114	A0015

Reporting Officer :

NSL Analytical Services
4450 Cranwood Parkway
Cleveland, Ohio 44128

Roxanne Skinner, Technical Manager

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611 Lunken Park Dr
Cincinnati, OH, 45226-1813
Peter Lytle

Request ID: R-20260514-018
Issue Date: 5/21/26 1:10:55 PM
PO Number: Dumford 102

Client Description:	Two Sample form an old fire watch Tower (One rivet and One Steel Coupon), Project Number EN257414
Test/Analysis Performed:	Rockwell Hardness per ASTM E18

Sample ID	Description
S-260514-054	Rivet - Rockwell Hardness

Specification	Hardness	Hardness Scale	Instrument Used	Analyst
S-260514-054-01-1	58	HRBW	I0041	A0046

Reporting Officer :

NSL Metallurgical
4564 Johnston Parkway
Cleveland, Ohio 44128

David Scannapieco, Technical Manager

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611 Lunken Park Dr
Cincinnati, OH, 45226-1813
Peter Lytle

Request ID: R-20260514-018
Issue Date: 5/21/26 1:10:55 PM
PO Number: Dumford 102

Client Description:	Two Sample form an old fire watch Tower (One rivet and One Steel Coupon), Project Number EN257414
Test/Analysis Performed:	Tensile Test

Sample ID	Description
S-260514-055	Steel Sample - Tensile

Specification	Tensile Strength	Yield Strength 0.2% Offset	Elongation in 4D	Reduction of Area	Fracture Location	Test Direction
S-260514-055-01-1	61,325 PSI	46,218 PSI	39 %	68 %	Middle Half of Gauge	Longitudinal

Specification	Test Method	Original Gauge Length	Width	Thickness	Instrument Used	Analyst
S-260514-055-01-1	ASTM E8	2.0000 in	0.5000 in	0.1360 in	I0054	A0024

Reporting Officer :

NSL Metallurgical
4564 Johnston Parkway
Cleveland, Ohio 44128

David Scannapieco, Technical Manager

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Instrument ID	Instrument Type	Model	Serial Number
I0114	Atomic Emission Spec	SpectroM12 AES Spark	19004747-149426
I0172	Combustion Furnace	Leco CS844	64248
I0041	Hardness	LECO LCR-500	LCR0056
I0054	Tensile Machine	Instron EM	5985B18910

Reporting Officer :

NSL Metallurgical
4564 Johnston Parkway



David Scannapieco, Technical Manager

Reporting Officer :

NSL Analytical Services
4450 Cranwood Parkway
Cleveland, Ohio 44128



Roxanne Skinner, Technical Manager

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HUSS, INC.
Preservation ❖ Residential ❖ Commercial

). Box 12339■ Charleston, SC■ 29422
(843) 937-0023■ Fax: (843) 937-0095

May 28, 2026

John Moore
EM Structural

RE: Budge for McClellanville Lookout Tower

$70,000.00 General Requirements: Based on 60-day project:

Item #1: $48,000.00

1) Replace all the wood stair treads and platforms on the stairs leading to the cab. The stair tread angle supports (part of the stringer truss) already have holes for replacement carriage bolts, but the platforms may require drilling new holes in the supporting angles for new bolts.

Item #2: $4,000.00

2) Replace in-kind the last, topmost run of stairs from the top platform to the cab. It would require fabrication of structural steel stairs and installation.

Item #3: $90,000.00

3) Restoration of the cab. In order to do that we think it would be best if the cab was on the ground. However, the four corners of the cab also form the four legs of the tower for the two topmost sections of tower. So, the tower erector would have to unbolt those leg splices and lift the cab and two sections off the tower. The face width of the tower at that splice is approximately 9 feet, so it might be advantageous for you to put the tower top on a flatbed and take it to your shop. The cab is not exactly built like the standard cab, which we have included in the attached. In order to view, clean, repair/replace, and paint the structural members of the cab you may have to remove the finishes and take the cab apart. On the cab drawing we have marked up what is involved.

Exclusions:

- Any crane work or removing cab to the ground.
- Any permits/work involving the osprey nest/bird control.

Thanks for reaching out to our company and contact us know if you have any questions.

Richard Huss
President
Huss Inc.
License # CLG13773

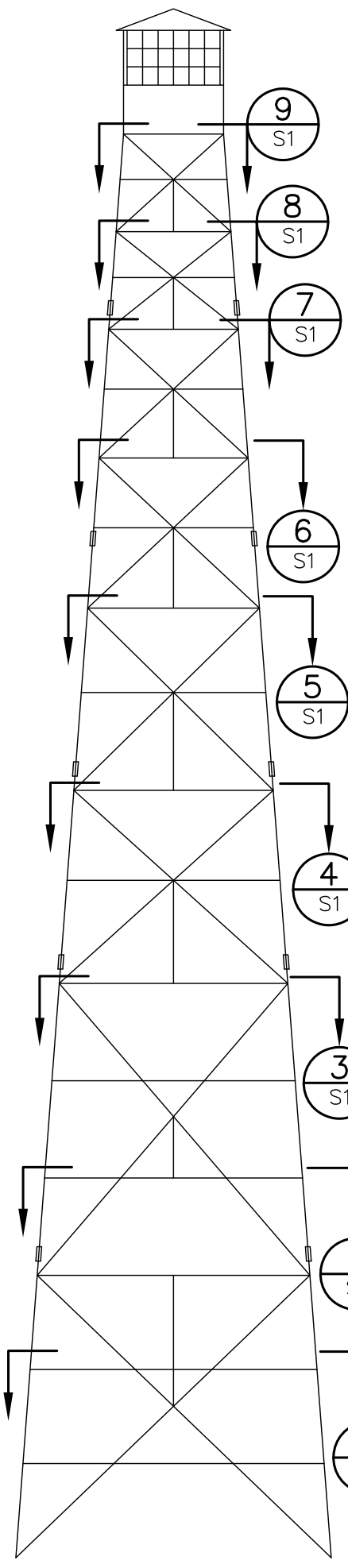
Budget Pricing – Lookout Tower – McClellanville, SC

Tower and Communications Services

- Repair tower members as shown on drawings - $20,000.00
- Repair Stringers - $20,000.00
- Bringing Cab & Top Section (above 86') to ground for renovation. - $15,000.00
- Reinstalling Cab and Top section after renovations - $15,000.00
- Prepare and paint tower / stringers - $60,000.00

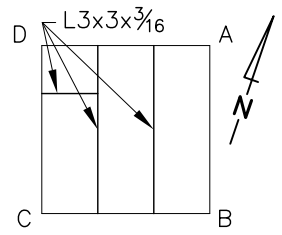
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L3x3x3/16	N/A		N/A	7.0'	1@7.25'	99.58'
		L3x3x3/16				92.75'
		A		8.0'	2@6.83'	
						85.92'
L4x4x7/16	L3½x3½x¼	L3½x3½x¼	L2x2x⅛	9.03'	1@9.00'	
L2x2x⅛						76.92'
	L2½x2½x3/16	L2x2x⅛		10.39'	1@10.50'	
		L2½x2½x3/16				66.42'
L4x4x¼	L4x4x¼	L4x4x¼	L2x2x⅛	11.97'	1@12.75'	
						53.67'
L4x4x5/16	L4x4x5/16	L3x3x3/16		13.90'	1@13.50'	46.92'
			L2½x2½x⅛			40.17'
L4x4x7/16	L3½x3½x¼	L3½x3½x¼		15.93'	1@20.42'	33.37'
						26.56'
	L2½x2½x⅛					19.75'
L5x5x3/8		L4x4x¼	L3x3x3/16	19.02'	1@19.75'	13.17'
						6.58'
LEGS	DIAGONALS	TOP GIRTS	SECONDARY HORIZONTALS	FACE WIDTH 22.0625'	PANELS	0.00'

A = L2½x2½x3/16

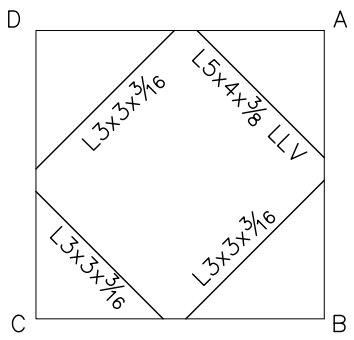


TOWER ELEVATION

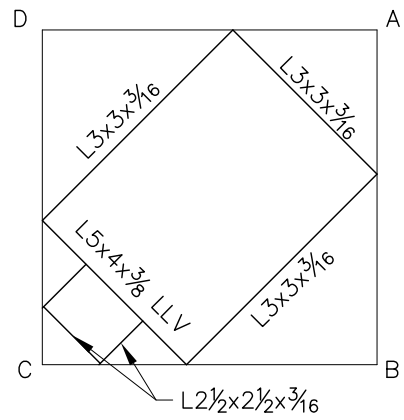
3/32"=1'-0"



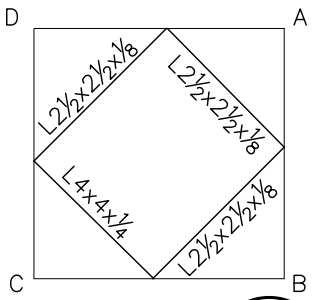
SECTION 9
1/8" = 1'-0" S1 | S1



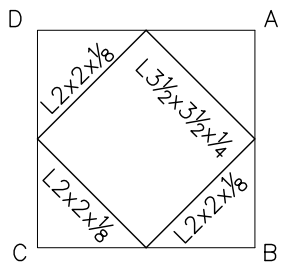
SECTION 5
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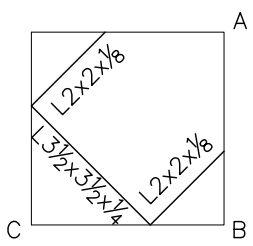
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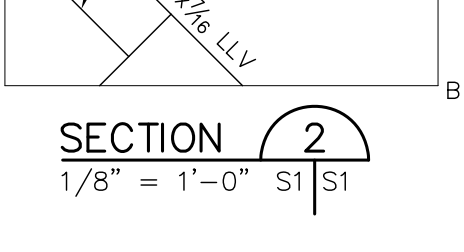
SECTION 6
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SECTION 7
1/8" = 1'-0" S1 | S1

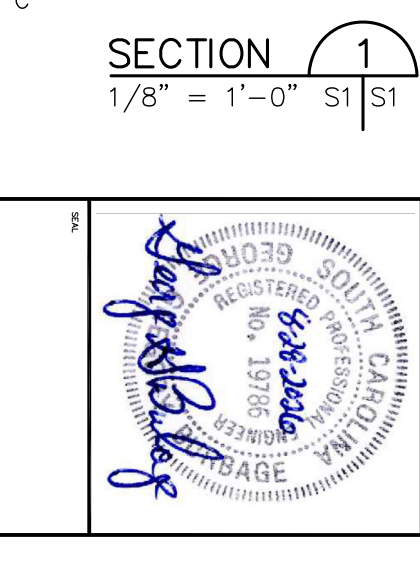


SECTION 8
1/8" = 1'-0" S1 | S1



SECTION 3
1/8" = 1'-0" S1 | S1

SECTION 2
1/8" = 1'-0" S1 | S1



SECTION 1
1/8" = 1'-0" S1 | S1

PROJECT

LOOKOUT TOWER
McCLELLANVILLE, SC
REPAIR DETERIORATED MEMBERS

SHEET TITLE

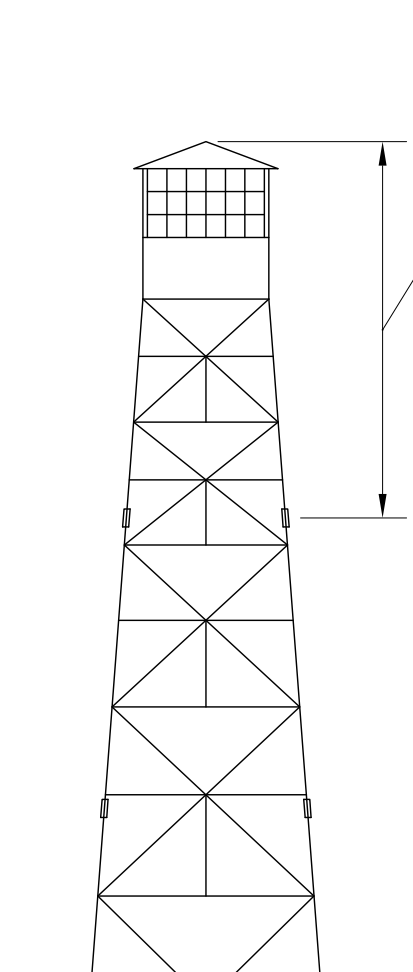
TOWER PROFILE

SEAL

ESC
ELEVATED STRUCTURAL CONSULTANTS, LLC
154 TIGER LANE
SUMMERVILLE, SC 29483
843-697-6179
www.esclic.us

PROJECT MGR.:	GGB
DESIGNED BY:	GGB
DRAWN BY:	GGB
CHECKED BY:	GGB
ISSUE DATE:	8-28-2026
PROJECT NO.:	25-122

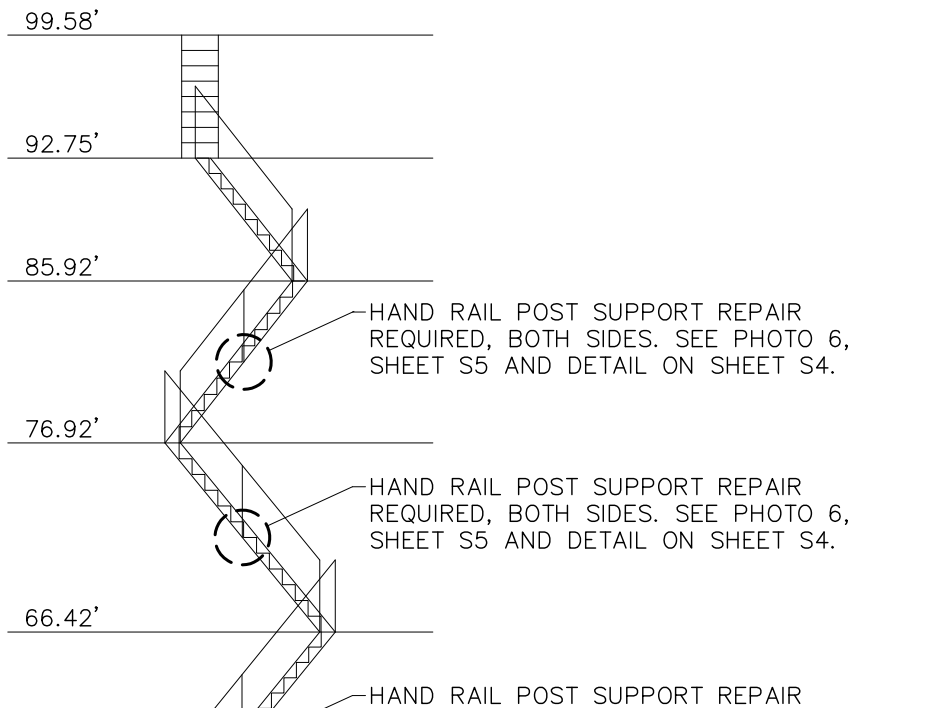
SHEET S1
OF 1 OF TOTAL 6



PROPOSED TO BE REMOVED FOR RESTORATION OF CAB. REPLACE WHEN RESTORATION COMPLETE.

TOWER ELEVATION

3/32"=1'-0"



STAIR / HANDRAIL

3/32"=1'-0"

PROJECT MGR: GGB
DESIGNED BY: GGB
DRAWN BY: GGB
CHECKED BY: GGB
ISSUE DATE: 8-28-2026
PROJECT NO.: 25-122

PROJECT

LOOKOUT TOWER
McCLELLANVILLE, SC
REPAIR DETERIORATED MEMBERS

SHEET TITLE

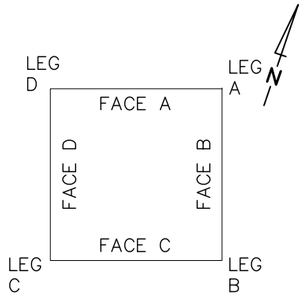
TOWER STAIRS

SEAL

SOUTH CAROLINA REGISTERED PROFESSIONAL ENGINEER GEORGE G. BABAGE No. 19786
6-28-2026

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SUMMERVILLE, SC 29483
843-697-6179
www.esclic.us

SHEET S2 OF 2 OF TOTAL 6



REQUIRED REPAIRS

ELEVATION (FT)	FACE	LEG	DAMAGE TO BE REPAIRED	REFERENCED PHOTO (SEE SHEET S5 & S6)	EXISTING MEMBER SIZE	DETAIL / REQUIRED ACTION
5.0	D	C	RUST AT WELDED HANDRAIL	PHOTO 1	L 2½ x 2½ x ⅛	ISOLATED RUST MEMBER REPAIR ON SHT. S4
9.88	A	D	RUSTED DIAGONAL MEMBER END	PHOTO 2	L 2½ x 2½ x ⅛	DIAGONAL BRACE REPAIR ON SHT. S4
13.17	A	D	ISOLATED RUST ON HORIZ. MEMBER	PHOTO 5	L 3 x 3 x 3/16	ISOLATED RUST MEMBER REPAIR ON SHT. S4
19.75	A	D	RUSTED DIAGONAL MEMBER END	PHOTO 2	L 2½ x 2½ x ⅛	DIAGONAL BRACE REPAIR ON SHT. S4
19.75	B	B	RUSTED DIAGONAL MEMBER END	PHOTO 2	L 2½ x 2½ x ⅛	DIAGONAL BRACE REPAIR ON SHT. S4
30.0	A	–	RUSTED CENTER VERTICAL MEMBER	PHOTO 8 & 9	L 2½ x 2½ x ⅛	REMOVE LOOSE DEBRIS AND TREAT RUST.
30.0	B	–	RUSTED CENTER VERTICAL MEMBER	PHOTO 8 & 9	L 2½ x 2½ x ⅛	REMOVE LOOSE DEBRIS AND TREAT RUST.
30.0	C	–	RUSTED CENTER VERTICAL MEMBER	PHOTO 8 & 9	L 2½ x 2½ x ⅛	REMOVE LOOSE DEBRIS AND TREAT RUST.
30.0	D	–	RUSTED CENTER VERTICAL MEMBER	PHOTO 8 & 9	L 2½ x 2½ x ⅛	REMOVE LOOSE DEBRIS AND TREAT RUST.
33.37	A	A	RUSTED HORIZONTAL MEMBER END	PHOTO 3	L 2½ x 2½ x ⅛	HORIZ. BRACE REPAIR ON SHT. S4
33.37	A	D	RUSTED HORIZONTAL MEMBER END	PHOTO 3	L 2½ x 2½ x ⅛	HORIZ. BRACE REPAIR ON SHT. S4
33.37	D	C	RUSTED HORIZONTAL MEMBER END	PHOTO 3	L 2½ x 2½ x ⅛	HORIZ. BRACE REPAIR ON SHT. S4
33.37	D	D	RUSTED HORIZONTAL MEMBER END	PHOTO 3	L 2½ x 2½ x ⅛	HORIZ. BRACE REPAIR ON SHT. S4
40.17	B	B	RUSTED AND BENT DIAGONAL	PHOTO 7	L 2½ x 2½ x ⅛	REPLACE BENT MEMBER
40.17	B	B	RUSTED AND BENT HORIZONTAL	PHOTO 7	L 2½ x 2½ x ⅛	REPLACE BENT MEMBER
40.17	C	C	RUSTED DIAGONAL MEMBER END	PHOTO 2	L 2½ x 2½ x ⅛	DIAGONAL BRACE REPAIR ON SHT. S4
40.17	D	A	RUSTED DIAGONAL MEMBER END	PHOTO 2	L 2½ x 2½ x ⅛	DIAGONAL BRACE REPAIR ON SHT. S4
46.92	A	D	HORIZONTAL MEMBER REMOVED	PHOTO 4	L 2½ x 2½ x ⅛	PROVIDE NEW L 2 x 2 x ⅛ MEMBER
46.92	A	A	RUSTED HORIZONTAL MEMBER END	PHOTO 3	L 2½ x 2½ x ⅛	HORIZ. BRACE REPAIR ON SHT. S4
46.92	B	A	RUSTED HORIZONTAL MEMBER END	PHOTO 3	L 2½ x 2½ x ⅛	HORIZ. BRACE REPAIR ON SHT. S4
46.92	B	B	RUSTED HORIZONTAL MEMBER END	PHOTO 3	L 2½ x 2½ x ⅛	HORIZ. BRACE REPAIR ON SHT. S4
46.92	D	D	RUSTED HORIZONTAL MEMBER END	PHOTO 3	L 2½ x 2½ x ⅛	HORIZ. BRACE REPAIR ON SHT. S4
57.0	D	–	RUSTED CENTER VERTICAL MEMBER	PHOTO 8 & 9	L 2 x 2 x ⅛	REMOVE LOOSE DEBRIS AND TREAT RUST.

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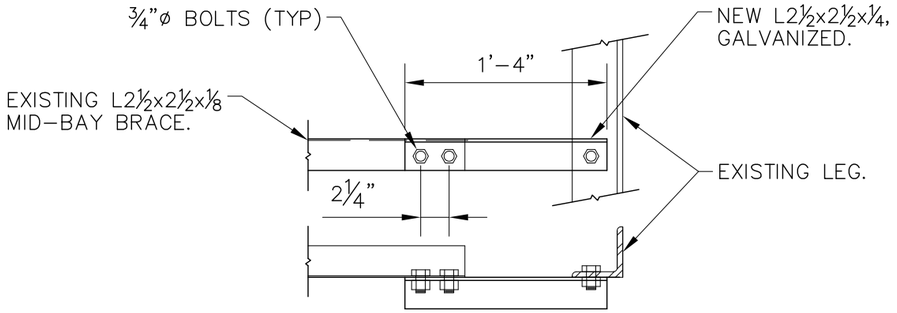
SEAL

PROJECT
LOOKOUT TOWER
McCLELLANVILLE, SC
REPAIR DETERIORATED MEMBERS

SHEET TITLE
DETAILS

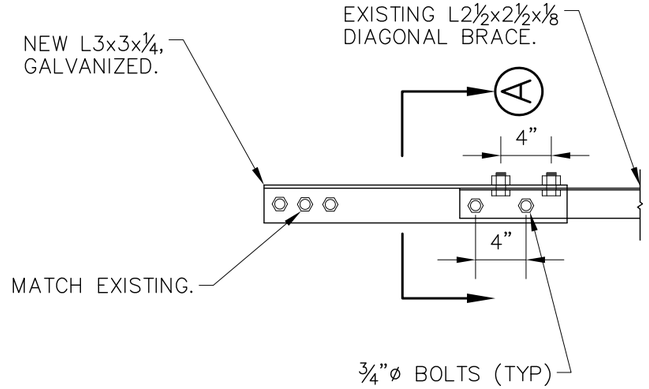
PROJECT MGR.:	GGB
DESIGNED BY:	GGB
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CHECKED BY:	GGB
ISSUE DATE:	8-28-2026
PROJECT NO.:	25-122

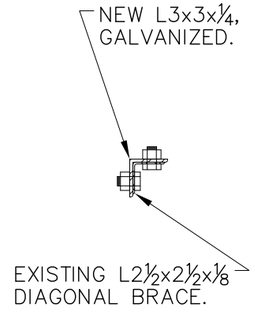
SHEET
S3
OF 3 OF TOTAL 6



HORIZ. BRACE REPAIR

1"=1'-0"

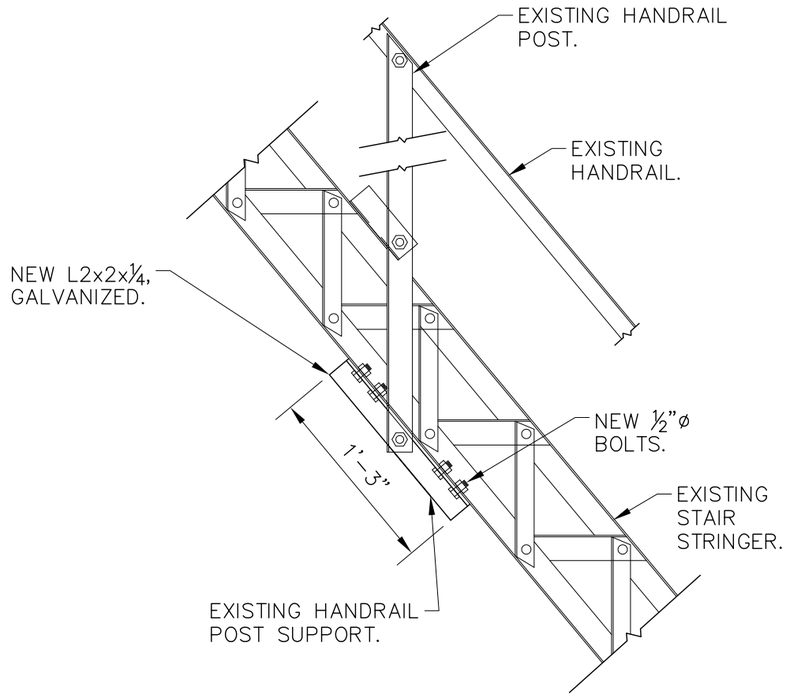




"A"

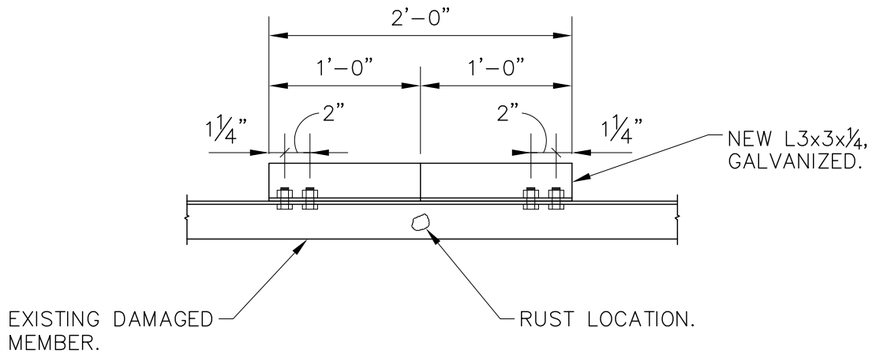
DIAGONAL BRACE REPAIR

1"=1'-0"



HANDRAIL POST SUPPORT REPAIR

1"=1'-0"



ISOLATED RUST MEMBER REPAIR

1"=1'-0"

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REGISTERED PROFESSIONAL ENGINEER GEORGE GRAY BULAGE SOUTH CAROLINA 8-28-2026 No. 19786

SEAL

PROJECT
LOOKOUT TOWER
McCLELLANVILLE, SC
REPAIR DETERIORATED MEMBERS

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SHEET
S4
OF 4 OF TOTAL 6



PHOTO 1 – WELDING DAMAGE TO DIAGONAL



PHOTO 2 – RUSTED DIAGONAL MEMBER



PHOTO 3 – RUSTED HORIZONTAL MEMBER



PHOTO 4 – HORIZONTAL MEMBER REMOVED



PHOTO 5 – RUST ON HORIZ. MEMBER



PHOTO 6 – STRING HANDRAIL POST SUPPORT

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REGISTERED PROFESSIONAL ENGINEER
GEORGE W. BUKAGE
SOUTH CAROLINA
No. 19786
8-28-2026

SEAL

PROJECT
LOOKOUT TOWER
McCLELLANVILLE, SC
REPAIR DETERIORATED MEMBERS

SHEET TITLE
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PROJECT MGR.:	GGB
DESIGNED BY:	GGB
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ISSUE DATE:	8-28-2026
PROJECT NO.:	25-122

SHEET
S5
OF 5 OF TOTAL 6



PHOTO 7 – BENT HORIZONTAL AND DIAGONAL MEMBER



PHOTO 8 – RUSTED VERTICAL MEMBER



PHOTO 9 – RUSTED VERTICAL MEMBER

NOTES:

1. CONTRACTOR SHALL COMPLY WITH THE REQUIREMENTS OF ANSI/ASSE A.10.48–2016.
2. VERIFY ALL DIMENSIONS BEFORE FABRICATION.
3. ANGLES SHALL COMPLY WITH A.S.T.M. SPECIFICATION A36 (Fy=36 KSI) AND SHALL BE HOT–DIP GALVANIZED IN ACCORDANCE WITH A.S.T.M. SPECIFICATION A123 AFTER FABRICATION.
4. FIELD DRILLING OF HOLES WILL BE REQUIRED. PAINT EXPOSED STEEL WITH TWO COATS OF ZRC COLD GALVANIZING (OR APPROVED EQUAL) BEFORE INSERTING BOLTS.

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GEORGE G. BUKAGE
REGISTERED PROFESSIONAL ENGINEER
SOUTH CAROLINA
No. 19786
8-28-2026

SEAL

PROJECT
LOOKOUT TOWER
McCLELLANVILLE, SC
REPAIR DETERIORATED MEMBERS

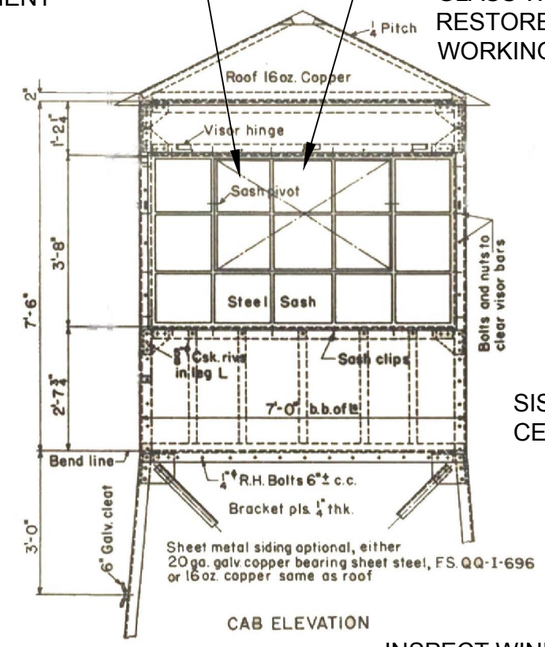
SHEET TITLE
DETAILS

PROJECT MGR.:	GGB
DESIGNED BY:	GGB
DRAWN BY:	GGB
CHECKED BY:	GGB
ISSUE DATE:	8–28–2026
PROJECT NO.:	25–122

SHEET
S6
OF 6 OF TOTAL 6

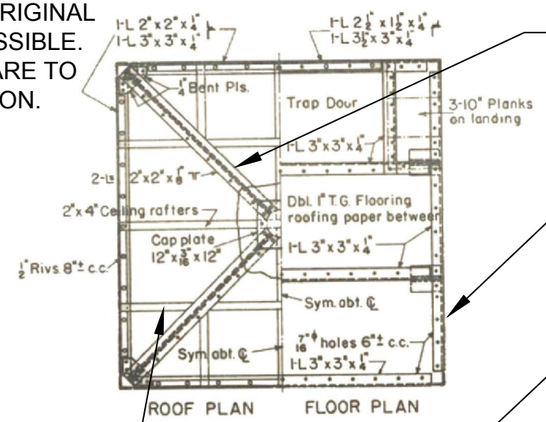
EXISTING SASHES ARE SIDE BY SIDE FIXED AND CASEMENT SASHES.

CLEAN AND REGLAZE STEEL SASHES. RETAIN ORIGINAL GLASS WHERE POSSIBLE. RESTORE HARDWARE TO WORKING CONDITION.



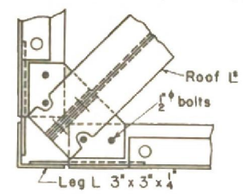
CAB ELEVATION

REPAIR OR REPLACE HIP BEAM ANGLES.



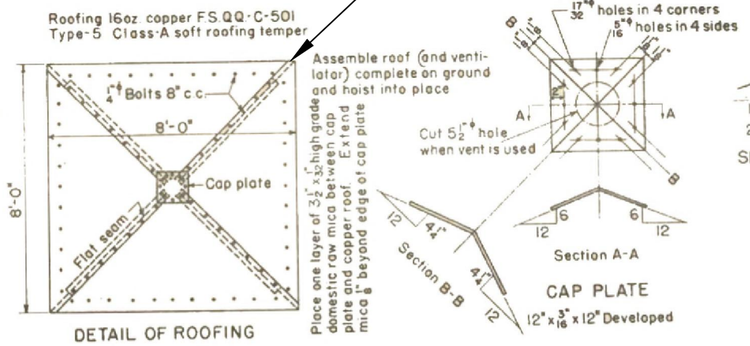
ROOF PLAN FLOOR PLAN

REPAIR OR REPLACE PERIMETER ANGLES AS NECESSARY.

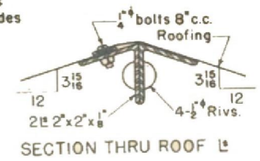


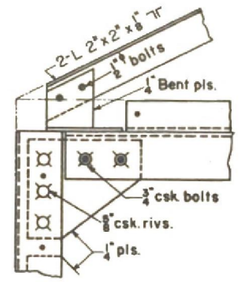
SISTER ALL 2X4 CEILING RAFTERS.

REPLACE ROOFING IN KIND (STEEL, NOT COPPER).



DETAIL OF ROOFING



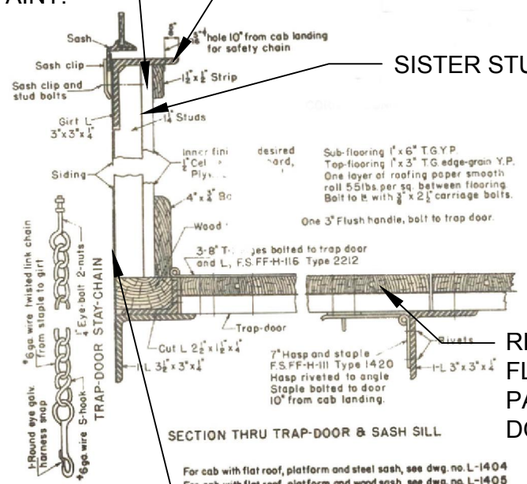


CORNER CONNECTIONS AT ROOF

RETAIN PLYWOOD ON WALLS. PATCH 4 SMALL HOLES. CLEAN AND REPAINT.

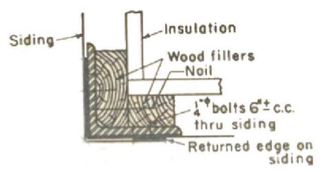
INSPECT WINDOW SILL AND CORNER ANGLES AND REPAIR AS NECESSARY.

SISTER STUDS WHERE NEEDED.



SECTION THRU TRAP-DOOR & SASH SILL

For cab with flat roof, platform and steel sash, see dwg. no. L-1404
For cab with flat roof, platform and wood sash, see dwg. no. L-1405



CORNER SECTION BELOW SASH

REPLACE CAB FLOOR FRAMING ANGLES, FLOORING, SUBFLOOR, AND ROOFING PAPER IN KIND. REPAIR AND REUSE TRAP DOOR IF POSSIBLE, OR REPLACE IN KIND.

CLEAN AND REPAINT METAL SIDING PANELS.

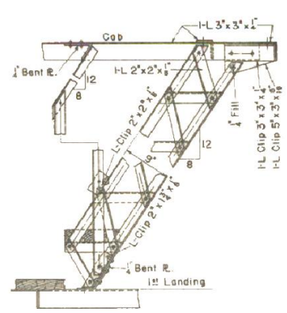
GENERAL NOTES

1. There are some small differences between this drawing and existing. Some differences, but not all, are noted on this sheet. Preserving existing details supersedes this drawing.
2. Cab may be unbolted and removed from the tower by crane (legs are bolted to tower approx. 8' below the floor of the cab) to be repaired on the ground.
3. There appears to be an osprey nest on the roof of the cab. Repairs and permits will need to be coordinated to comply with environmental laws and avoid injury to birds.
4. All steel elements to be cleaned and painted, matching the current color and sheen of the tower. If structurally unsound, replace in kind. See tower repair drawings for work below cab, and match those materials and specifications.

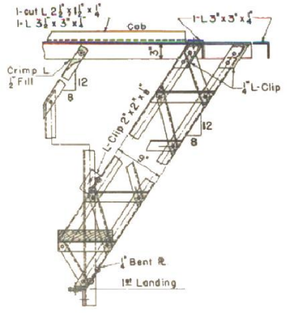
SOUTH CAROLINA PROFESSIONAL ENGINEER No. 9400 JAMES M. MOORE, JR.
8/31/26

SHEET TITLE: CAB REPAIRS		ENGINEER: JM DATE: 8/31/26	ADDRESS: 741 MEETING STREET SUITE 202 CHARLESTON, SC 29403 PHONE: (843) 722-1992 www.emstructural.com
PROJECT NAME: LOOKOUT TOWER	PROJECT NO:	REFERENCE DRAWING:	SHEET NUMBER: S1

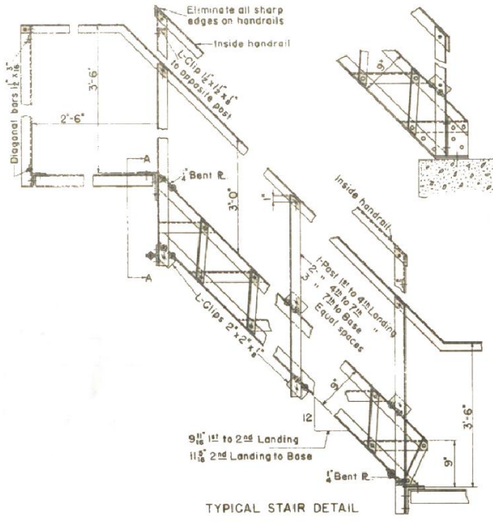
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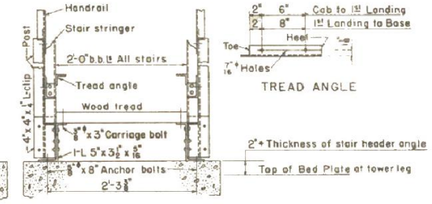
INSIDE STAIR STRINGER



OUTSIDE STAIR STRINGER



TYPICAL STAIR DETAIL



STAIR DETAIL AT BASE

Stair Stringers I-L 2"x2"x⅛"
Tread Angles do.
Handrail Posts do.
Lattice Angles I-L 1½"x1½"x⅛"
Handrails do.
⅝"x9"x2'-0" Wood treads

TREAD ANGLE

SHEET TITLE: STAIR REFERENCE DRAWINGS		ENGINEER: JM	ADDRESS: 741 MEETING STREET SUITE 202 CHARLESTON, SC 29403 PHONE: (843) 722-1992 www.emstructural.com	EM STRUCTURAL CONSULTING ENGINEERS www.emstructural.com
		DATE: 8/31/26		
PROJECT NAME: LOOKOUT TOWER	PROJECT NO:	REFERENCE DRAWING:	SHEET NUMBER: S2	