PRELIMINARY EVALUATION AND ASSESSMENT REPORT
MANSELL PUMPING STATION 5.0 MILLION GALLON GROUND STORAGE TANK
2600 RED SPRUCE
TOWN OF LITTLE ELM, TEXAS
KLEINFELDER PROJECT NO.: 20231796.001A

NOVEMBER 22, 2022

7805 Mesquite Bend Drive, Suite 100, Irving, TX. 75063 p| 972.868.5900 f| 972.409.0008

November 22, 2022
Project No.: 20231796.001A

Mr. Cody Collier
Assistant Director of Public Works
Town of Little Elm Public Works Department
1600 Mark Tree Lane
Town of Little El, Texas

Subject: **Preliminary Evaluation and Assessment Report**
Mansell Pumping Station 5.0 Million Gallon Ground Storage Tank

Dear Mr. Collier:

Kleinfelder has completed the authorized site visit and Preliminary Evaluation and Assessment Report for the Mansell Pumping Station 5.0 Million Gallon Ground Storage Tank, Town of Little Elm, Texas

The purpose of this report is to describe the procedures that were undertaken to complete the evaluations and assessments, to record the observations, and to present the resulting replacement and rehabilitation (R&R) recommendations for the Mansell Pumping Station 5.0 Million Gallon Ground Storage Tank (GST).

We appreciate the opportunity to provide our services for this project. If we can be of additional assistance, please do not hesitate to contact us at 972.868.5900.

Sincerely,

KLEINFELDER, INC.
Texas Registered Engineering Firm F-16438

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A Report Prepared for:

Mr. Cody Collier
Town of Little Elm - Department of Public Works
1600 Mark Tree Lane
Town of Little Elm, Texas

Preliminary Evaluation and Assessment Report
Mansell Pumping Station 5.0 Million Gallon Ground Storage Tank

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TABLE OF CONTENTS

APPENDICIES

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1 EXECUTIVE SUMMARY

The Town of Little Elm owns and operates the Mansell Pumping Station 5.0 million-gallon (MG) Ground Storage Tank (GST) that was constructed in 2004. The tank is located at 2600 Red Spruce Drive inside the Mansell Pump Station facility. This pre-stressed concrete tank is 30 feet high and 168.4 feet inside diameter built on a perimeter wall footing and a membrane slab.

This preliminary evaluation and assessment report (PEAR) provides the findings of the tank evaluation that was completed by Kleinfelder on August 29, 2022. The findings are provided in more detail in the next sections of this report. It provides the condition of each asset based on the observation during the assessment of the Mansell Pump Station 5.0 MG GST for the Coating System, Structural improvements, Safety & Security upgrades, Sanitary & Operational items. Based on the condition of the assets, the recommendations are provided along with the Opinion of Probable Construction Cost (OPCC). This OPCC is based on current (year 2022) labor and material costs using recent bid tabulations of similar tanks in the Dallas-Fort Worth Metropolitan area. Project costs are for planning purposes only and are based on the initial tank observations and recommendations made in the PEAR.

The entire list of the observations and recommendations for all the assets and various systems can be found in Section 5 of this report. Below is a brief summary:

Tank System/ Component	Description and Recommendation
Coating	No evidence of coating was observed in the concrete tank. However, some grout or sealant were used to cover the gaps of cracks seen on the exterior walls and foundation.
Structural	The tank is in good structural condition. The roof slab (exterior) has minor cracks but does not have any noticeable leaks. The interior has minor visible degradation and a pressure wash cleaning is recommended. There are areas of cracking and spalling on exterior walls. Repair affected areas with cementitious grout and recoat repaired areas. The foundation was mostly covered by soils and is recommended to install a mow strip around the base of the tank. The roof had 3-ATT towers installed in 2018. There are ATT conduits running from all three towers to a sub-station located at SW corner of the property.

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Tank System/ Component	Description and Recommendation
Safety & Security	The existing interior ladder has some staining, rust build up and corrosion. The ladder meets all the OSHA regulations in terms of the rail width except the conduit cable placement in the ladder. The conduits will be relocated to be in compliance with OSHA requirements. The interior ladder is equipped with a pipe slider for fall protection and is in poor condition. As a result, the interior ladder is recommended to be removed and replaced with a new fall protection system. The two roof access hatches are in good condition and need a Confined Space entry placard to comply with OSHA requirement. The tank has no roof railing installed. It is recommended to install a 42-inch-high railing with toe plate to meet OSHA regulations.
Operation	The concrete roof surface has some atmospheric staining and is in fair to good condition. The roof vent is a mushroom shaped vent, and the top vent screen needs to be replaced. The exterior piping condition was observed to be in moderate to good condition. The manual water level indicator was operable and in good condition.
Roof Drainage	No signs of water ponding were observed on the exterior of the roof. The overflow pipe and flapper were in good condition and installed per the Texas Commission on Environmental Quality (TCEQ) regulations. The existing roof vent screen is damaged and is recommended to be replaced.
Site	The existing site was observed to have vegetation around the ring foundation. It is recommended to have a concrete mow strip placed along the tank perimeter. Some landscaping needs repair and maintenance.

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2 BACKGROUND AND PURPOSE

On July 12, 2022, the Town of Little Elm retained Kleinfelder, Inc. (Kleinfelder) to conduct a tank inspection and provide preliminary engineering services for the Mansell Pumping Station 5.0 million gallon (MG) ground storage tank (GST). There is another 2 MG steel GST located at the same site. However, the assessment for 2 MG GST was not included as a part of this project.

As one of the services, Kleinfelder evaluated the ground storage tank in terms of the physical condition and operating performance along with providing recommendations for rehabilitation of the tank based on the evaluation. Additionally, Kleinfelder developed opinions of the probable construction cost (OPCC) to repair tank deficiencies observed during the site visit.

The scope of services to be provided by Kleinfelder for the purposes of this project includes:

- Develop a health and safety plan for tank site assessment.
- Review available record information
- Observation of tank systems – coating, structural, safety & security, sanitary, and operational;
- Assign condition and performance rankings;
- Preparation of recommendations and costs;

The purpose of this report is to describe the procedures that were undertaken to complete the evaluations and assessments, to record observations, and to present the resulting replacement and rehabilitation (R&R) for the Mansell Pumping Station 5.0 Million Gallon (MG) Ground Storage Tank (GST).

Comprehensive evaluations and assessments are critical to the Town of Little Elm's vision for implementing assessment and tank rehabilitation measures for its water storage tanks. The assessment includes data collection, review of the previous reports, design plans and specification for the existing facilities, interviews with the Town staff, and field assessments of the facility.

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3 PROJECT APPROACH

The evaluation and assessment included a field assessment of key components of various tank systems by a multi-discipline engineering team licensed and experienced in the areas of civil engineering, and structural engineering. The project team included personnel from Kleinfelder, and Ron Perrin Water Technology. The project team completed the field assessment for the Mansell Pumping Station 5.0 MG GST on August 29, 2022.

The assessment was performed in accordance with applicable sections of AWWA Manual M42 App. “C” and Section §§290.43 of the Texas Commission on Environmental Quality’s (TCEQ) Rules and Regulations for Public Water Systems.

Field assessment of the exterior systems was limited to the areas that could be directly observed from ground and included visual assessments. The tank was assessed while still in service to limit interruption of the public water supply. The interior of the tank was observed through the tank access hatch, the interior ladder, float observation, and an underwater dive inspection team. The assessment of all interior and exterior structural elements, coatings systems, and appurtenances, was performed from areas that were accessible without scaffolding or special rigging. In addition, no destructive or non-destructive test were completed on the existing concrete. No samples were collected for heavy metal testing.

The information gathered during the condition assessment provides a standardized record of the asset condition specific to each discipline. Data collected for each asset included: condition, performance, and regulatory compliance rating. In addition, other relevant information, such as recent performance history, and some previous design drawings were made available for our team review. The existing conditions of all assets were documented with digital photos. To standardize the process to determine an asset’s condition, specific discipline-related information was provided for each asset. The assessment also included assigning criticality to each major asset.

RATING SCALE

The rating scale used in the assessment and evaluation of each major component’s criticality

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factor is shown in Table (1). Each component was assigned a numerical rating based on their current conditions that is required to return the component to essentially new condition (i.e., restored to original physical condition, no performance issues, etc.).

This scale is industry-wide standard for designating condition and performance.

Table (1) – Rating Scale for Physical Condition, Performance and Regulatory

Rating	Physical Condition	Performance	Regulatory
1 - Excellent	No Visible Degradation	Component Functioning as Intended	No Code Issues
2 - Good	Slightly Visible Degradation	In-service, but Higher Than Expected O&M	Possible Code Issues
3 - Moderate	Visible Degradation	In-service, but Function is Impaired	Minor Code Issue
4 - Poor	Integrity of Component Moderately Compromised	In-service, but Function is Highly Impaired	Repairable Code Issue
5 - Critical	Integrity of Component Severely Compromised	Component not Functioning as Intended	Irreparable Code Issue (Asset Must Be Replaced)

Table (2) below provides an overview of the different tank assets that were observed during the assessment. In Section 7 - Conclusion and Recommendations, ratings are provided based on Table (1) for applicable components for each system.

Table (2) – Tank Systems & Components Inspected for Tank Assessments

Tank System	Method/Observation
Coating Systems	
Tank Exterior Coating System	The condition of the tank exterior coating systems for the piping and valves in vaults were evaluated by the following methods: • Observation of the coating, where access permitted • Depth and location of corrosion pitting or general corrosion
Tank Interior Coating System	The condition of the tank interior coating systems for the pipes were evaluated by the following methods: • Observation of the coating, where access permitted • Depth and location of corrosion pitting or general corrosion

Tank System	Method/Observation
Structural	
Tank Exterior Structural and Appurtenances	Performed an exterior observation to assess the condition of the following: • Tank concrete foundation where visible • Tank overflow valve • Tank concrete exterior surface • Tank roof access hatches
Tank Interior Structural and Appurtenances	The condition of the tank interior structural systems was completed by video captured by the professional divers and during the float inspection: • Roof, columns, and wall
Safety & Security	
Safety and Security Features	Performed an observation of safety and security features at the tank site to assess the condition of the following: • Fall protections systems • Ladders and railings constructed to OSHA requirements • Safety devices • Locking ladder guards • Fencing, gates, and access points
Operational	
Pipe and Valve Vaults	Performed an observation of pipe and valve vaults at each tank site to assess the condition of the following: • Access hatch, ladders, safety railing and platforms • Pipe and valve coating
Site Assessment	
Tank Site Evaluation	Performed an observation of the tank site to assess the condition of the following: • Site Assessment
Sanitary	
Pathways for Contamination Evaluation	Perform an observation of the tank system to assess potential pathways for contamination: • Roof and walls • Roof hatches • Venting • Screening • Overflows

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4 EXISTING FACILITY INFORMATION

The project site consists of one parcel of land located at 2600 Red Spruce Road, Town of Little Elm, TX 75068. This facility has two (2) ground storage tanks, along with pump station that are surrounded by residential properties. The Mansell Pump Station 5.0 MG GST's location along with pump stations and site is shown in the Photo 3.

The 5.0 MG GST is accessed via a concrete access road that leads from the South entrance off Red Spruce Drive through a security gate. The site is surrounded by 8-feet high brick wall. A pump station is located east of the ground storage tanks. The site is relatively flat, runoff drains away from the tank toward the east side of the property to a drain inlet.

Kleinfelder was provided with the 2004 construction design plans drawing titled "Mansell Pump Station Tank #2 plus one 1500 GPM Pump, Piping and Valves". The Rehabilitation drawing shows all the improvements made during the fall of 2004. The information and professional opinions contained herein are based on the provided as-built drawing in combination with the visual observation of the structure.

Table (3) shows the known facility information for Mansell Pump Station 5.0 MG GST.

Table (3) – Mansell Pump Station 5.0 MG Ground Storage Tank

Capacity (MG)	5.0	**Tank Builder**	Preload Inc.
Height of Tank (ft.)	30 (+/-)	**Exterior Coating**	Concrete
Diameter of Tank (ft.)	164.8 (+/-)	**Interior Coating**	Concrete
Inlet/Outlet Pipe Size (in)	20 / 36	**Tank Type**	Ground Storage Tank
Overflow Pipe Size (in)	24	**Tank Class**	Concrete
Sidewater Depth (ft.)	35 (+/-)	**Pressure Zone I.D.**	Not Available
Year Built	2004	**Tank I.D.**	5.0 MG GST

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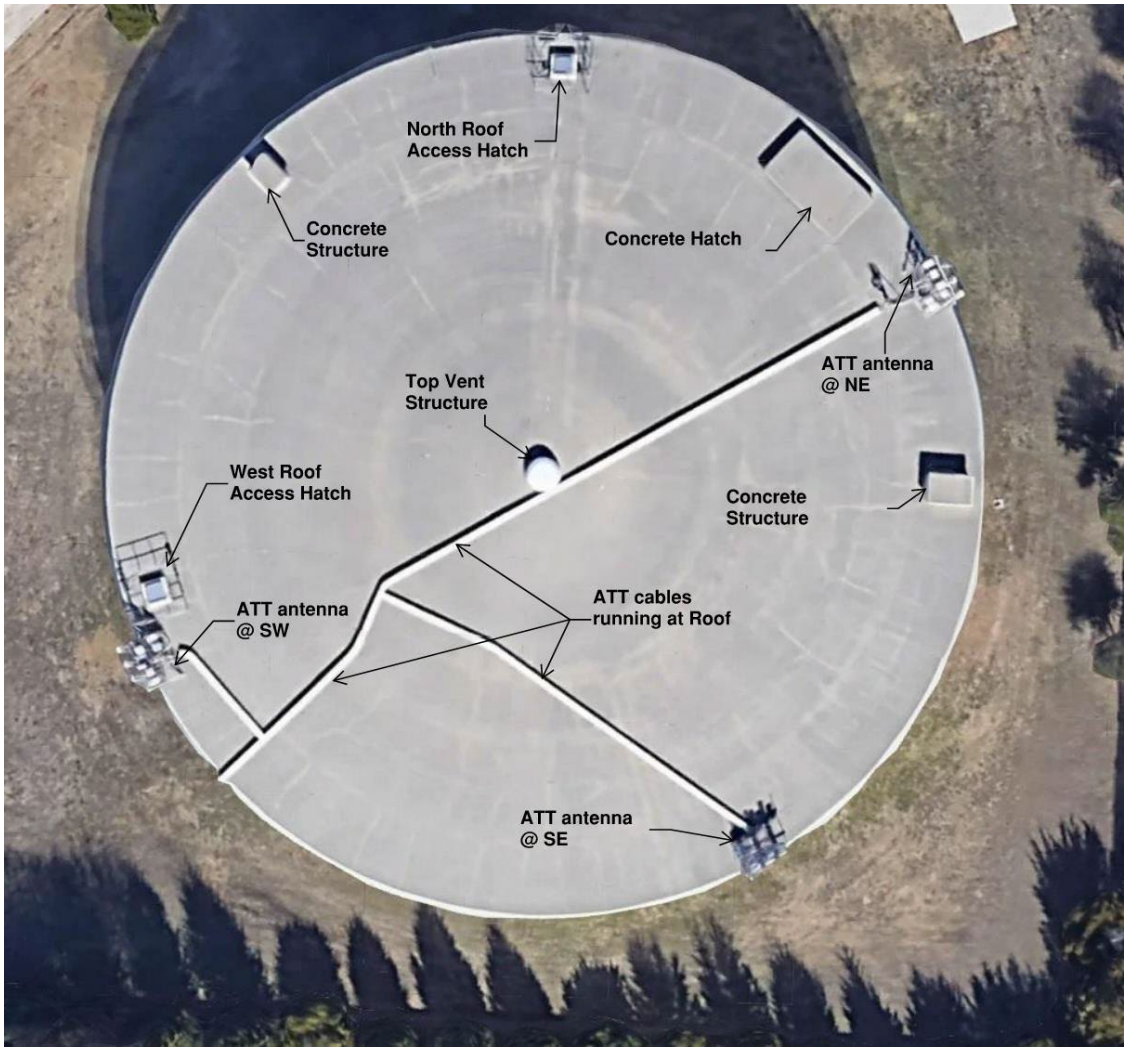

Photo No. 1 Overall Tank View – Top View

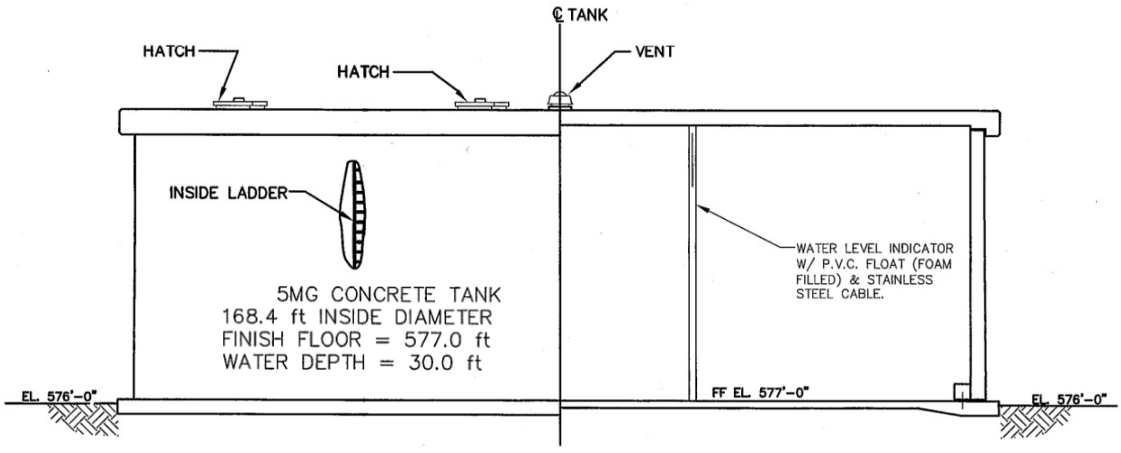

Photo No. 2 Tank Elevation & Section

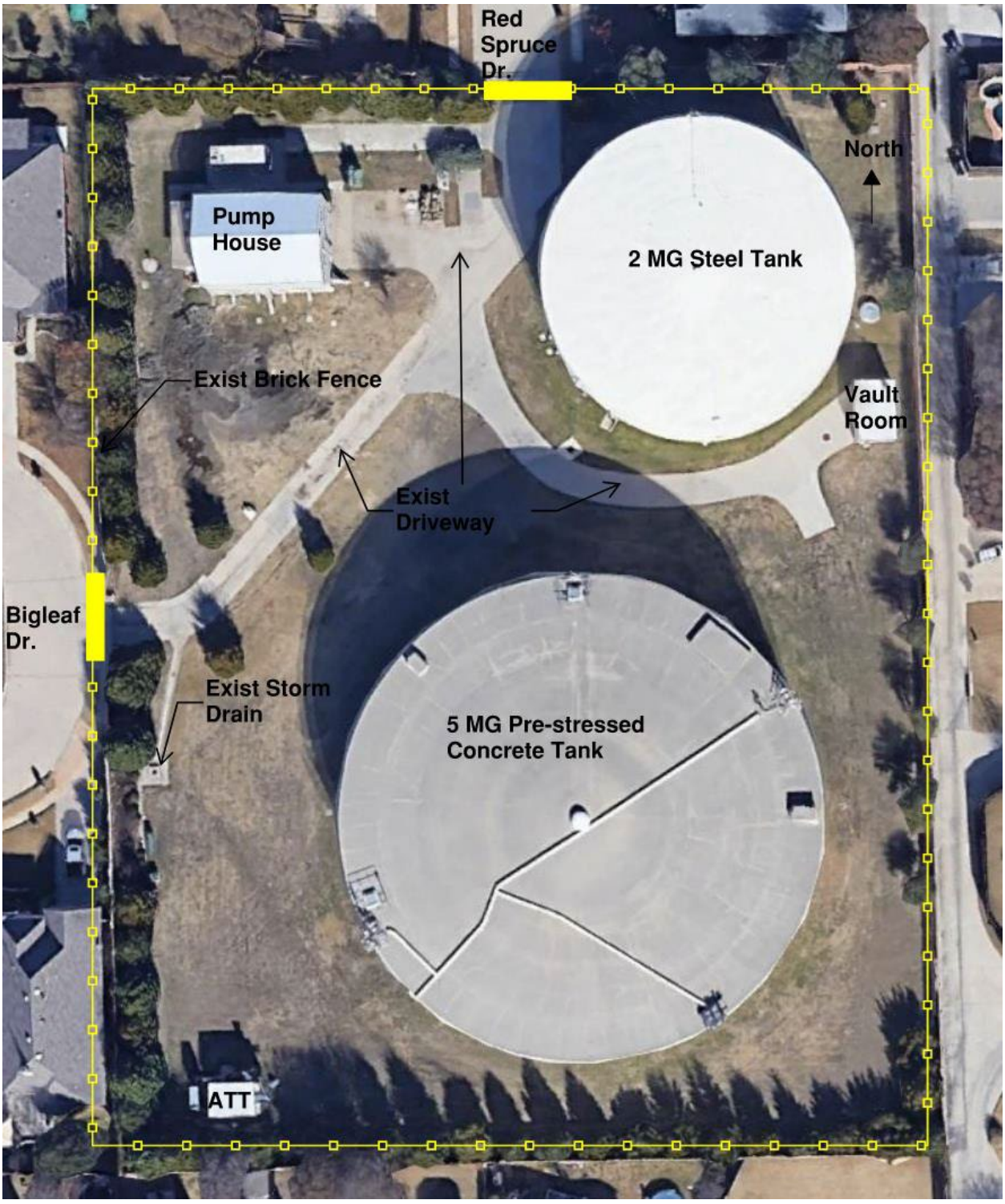

Photo No. 3 Overall Site View

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5 EVALUATION AND ASSESSMENT RESULTS

Access to Mansell Pump Station 5.0 MG Ground Storage Tank site was provided by Town of Little Elm staff on August 29th, 2022, for the project team to assess the tank site and the external and internal components of the tank. The assessment of all the tank exterior structural elements including coatings systems and appurtenances was performed from areas that were accessible without scaffolding or special rigging. The tank was in service during the assessment. Town of Little Elm staff filled the tank to its maximum allowable level to allow the dive inspection and float team's safe access to the water tank. During the dive inspection, the existing sediment level varied, with the maximum depth of 1/8-inch. No destructive testing was conducted on the tank.

In section 7, ratings were given based on the descriptions provided in Section 2 for the following systems:

- Coating
- Structural
- Safety & Security
- Operational
- Site Assessment

A summary of recommendations is provided in Section 7.

LIMITATIONS

No structural destructive testing of any kind nor analysis was performed to determine the structural adequacy of the concrete, only visual observation was performed. The concrete membrane floor was slightly observed in their entirety due to buildup of sediment at the base of the tank. The foundation was buried and therefore not observed in its entirety.

5.1 COATING

No destructive and non-destructive coating tests were completed on the exterior roof and shell.

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5.1.1 Tank Exterior Coating System

As referenced in Pic 18, 20 & 36, no traces of coatings were observed on exterior of tank.

5.1.2 Tank Interior Coating System

No interior coating was observed inside the concrete tank. However, traces of high-water mark were observed with a high metal like rust (iron) deposit on surface of interior tank and concrete columns. It is recommended to clean entire side surface of the tank and concrete column as a part of rehabilitation of tank.

Photo No. 4 High rust deposit on interior surface of tank

Photo No. 5 High rust deposit on interior column of the tank

5.1.3 Tank Piping Coating System

The exterior piping has corrosion and staining. The inlet and outlet pipe coating below the water level was spotted with severe corrosion and staining. It is recommended to blast and recoat both inlet and outlet pipes. The overflow pipe was surrounded by a concrete wall and was not visible.

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Photo No. 6 Inlet Pipe

Photo No. 7 Outlet Pipe

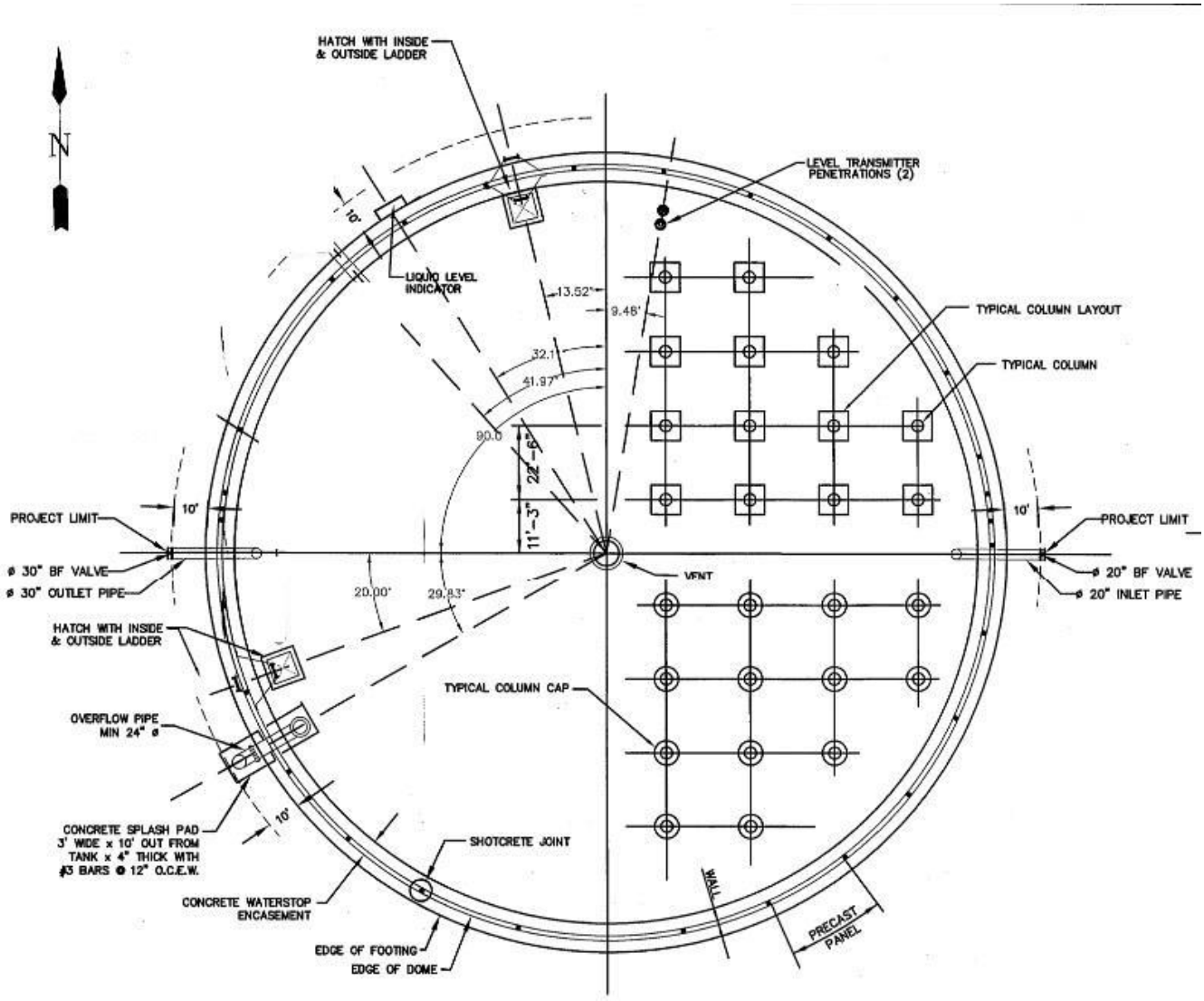

Photo No. 8 Overall View of Tank internal Components for inlet & outlet pipe locations.

5.2 STRUCTURAL

The structural evaluation was made of the observable elements of the exterior and from pictures of the interior. The overall tank was observed to be in good structural condition.

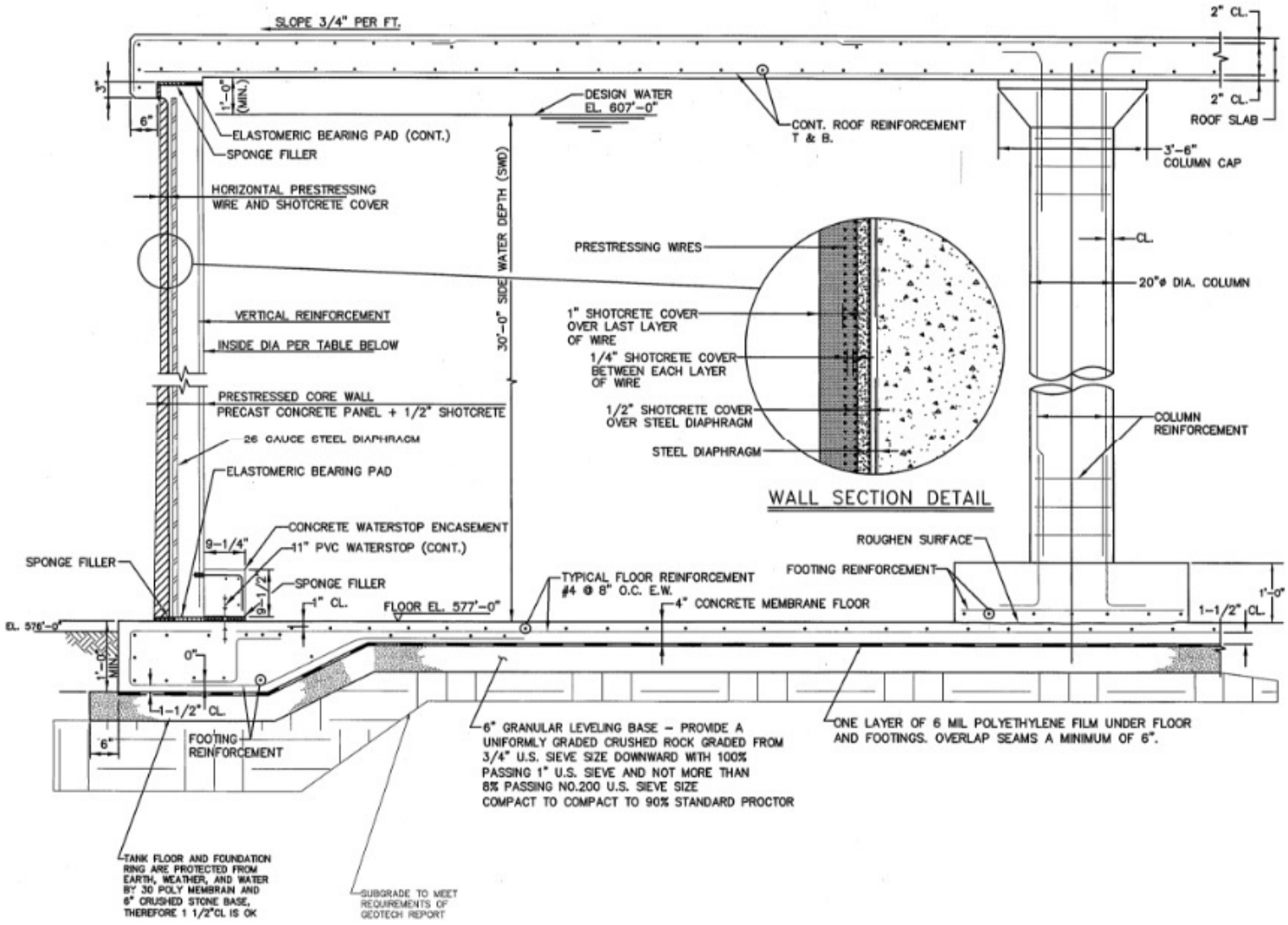

Photo No. 9 Structural details of wall, column, and foundation

5.2.1 Roof Slab

The exterior of the roof slab is in good condition aside from minor shrinkage cracks, some uniform linear cracks can be observed, however, no exposed rebar was observed on the roof. The construction joints were observed to be weathered and deteriorating. The roof of the tank had three ATT antenna installed in 2018 per LTE project ID DXL02847 with cables running from center to all three antennas. The plans are attached in Appendix A. As shown in photo 14 & 15, the underside of the roof was in good condition. Overall, the roof slab was observed to be in good condition. It is recommended to pressure wash cleaning.

Photo No. 10 Cracks at Roof Slab (Exterior)

Photo No. 11 Minor Spalling on Roof Slab (Exterior)

Photo No. 12 ATT antenna at Roof

Photo No. 13 Cables running at Roof

Photo No. 14 Interior Roof in good condition

Photo No. 15 Interior Roof beam in good condition

5.2.2 Float Cable & Liquid Level Indicator

The bottom of the float cable was found to be in good condition. There were some minor visible corrosion and rust. It is recommended to clean, paint and restore to its previous condition. The liquid level indicator was in operation and in good condition.

Photo No. 16 Bottom of Float Cable

Photo No. 17 Liquid Level Indicator for water depth

5.2.3 Exterior Walls

The exterior walls were observed to be in moderate condition overall. There are no active leaks on the exterior wall. The interior side of these walls were observed to be in good to moderate condition. No corrosion spots were observed. It is recommended that the external coating be reviewed by the manufacturer for upkeep of the external coatings.

There was an obvious gap observed between the exterior wall and roof slab. It is recommended to use a NSF 61 approved cementitious repair grout to seal the gap between tank wall and roof slab.

Photo No. 18 Possible Cracks Forming

Photo No. 19 Gap between roof slab and wall

Photo No. 20 Discoloration observed at bottom of the walls

5.2.4 Interior Column

The interior column was observed to be in good condition. Some discoloration and a mineral like iron was observed. No visible cracks, deterioration and reinforcement exposure was observed. It is recommended to pressure wash and clean the columns in its timely manner.

Photo No. 21 Interior Roof, Beam & Column

Photo No. 22 Interior Roof, Beam & Column

5.2.5 Membrane Slab

The membrane slab at the bottom of the tank had approximately one eighth to one fourth (.125 – 0.25) inches of sediment covering the entire floor surface. The amount of sediment does not warrant immediate attention or cleaning. Some debris was observed close to the inlet pipes.

Photo No. 23 Sediment deposit

Photo No. 24 Debris near inlet pipe

5.2.6 Wall Foundation

The ring wall foundation was buried and could not be observed in its entirety. The exterior bottom of the tank was observed to have staining, discoloration, and minor spalling around the perimeter. However, no foundation settling, exposed reinforced steel, deterioration at the tank base was observed.

Photo No. 25 Base of Tank Wall

Photo No. 26 Spalling of Concrete

5.3 SAFETY & SECURITY

5.3.1 Doors and Hatches

5.3.1.1 Patched Manway

The construction manway was observed to be permanently closed.

Photo No. 27 Patched Manway - Inside

Photo No. 28 Manway from outer wall - Closed

5.3.1.2 Roof Access Hatch

The Concrete tank has two 42-inch x 42-inch hatches. The hatches are double door swing with pull key lock. The hatches were installed with gaskets that appear to be in good working condition.

There was no confined space entry placard on the exterior as required by OSHA1910.146(c)(2). It is recommended to install a “Confined Space” entry placard. All the hatches had locks at the time of the site visit. Overall, the hatches are in good condition.

Hatch type: 42-inch square access hatches
General condition of coating: Moderate
Degree of corrosion: Moderate
Condition of metal: Good

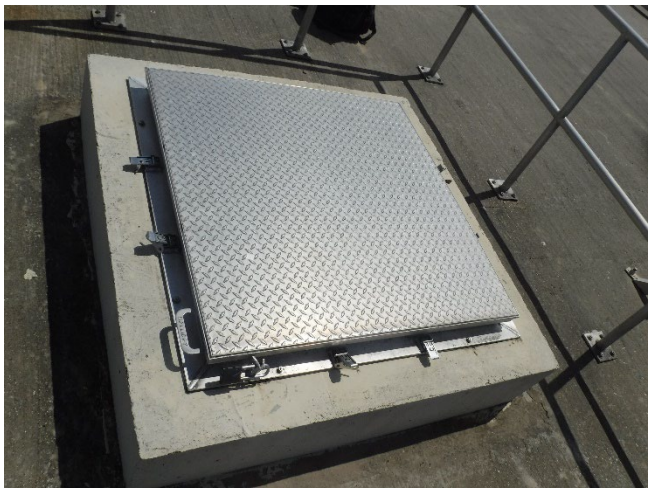

Photo No. 29 North Roof Access Hatch – Closed

Photo No. 30 North Roof Access Hatch - Open

Photo No. 31 West Roof Access Hatch – Closed

Photo No. 32 NE Concrete hatch

Photo No. 33 East Concrete Structure

Photo No. 34 NW Concrete Structure

5.3.2 Exterior Ladders

The 5.0 MG GST has two exterior ladders that lead from the base to the tank roof. The first ladder is located on the North side of the tank estimated to be 30 feet tall and the other is located along the West side of the tank and is also estimated to be 30 feet tall. Both ladders are surrounded by a steel safety cage from the end of the ladder guard to the landing. The ladder guard was locked at the time of the visit and was in good condition. The ladders are stainless steel and not coated and have minor corrosion and staining throughout. The ladder is equipped with round fall protection system on the center which was observed to be in good condition. The ladders length of the rung, spacing between rungs, diameter of rung and length of standoff was in accordance with the OSHA. There is one (1) conduit running along the left side of the ladder from the bottom of the ladder to the roof landing. The conduit does not allow for the 7-inch clearance behind the ladder as required by OSHA 1910.23. At the top of the ladder there is a transition directly to the ladder landing. The transition from ladder to landing is difficult due to the spacing between the extended safety round climb and ladder edges. Overall, the ladder is in good condition. The ladder should be blasted and recoated. The safety cage looks good, but the fall protection system should be replaced. The conduit should be relocated to meet the OSHA requirements.

Photo No. 35 Exterior to Roof Access

Photo No. 36 Exterior Ladder – Fall Protection

Photo No. 37 Exterior Ladder– Fall Protection and Ladder Guard

Photo No. 38 Exterior Ladder – Ladder Safety Cage

5.3.3 Interior Ladder

The interior ladder spans from the top of the roof access hatch (north) to floor of the tank. The first ladder located at the North side of the tank has moderate corrosion on the ladder rungs above the water line. The ladder below the water line has staining and spotted corrosion, including a biological growth that was unidentified. The ladder length of the rung was measured to be 16-inches and does meet the OSHA 1910.23(b)(4). Overall, the ladder is in poor condition. The round rail fall protection system was equipped with a pipe slider for fall protection which doesn't meet OSHA regulation and needs to be replaced. The interior ladder should be removed and replaced with new carbon-coated steel ladder with new fall protection system per OSHA

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requirements. The second ladder located close to outlet pipe at the west side of tank was in moderate condition.

Photo No. 39 Interior Ladder and Fall Protection System

Photo No. 40 Interior Ladder Corrosion

Photo No. 41 Biological Growth below water line

Photo No. 42 West ladder below water line

5.3.4 Roof Railing

The tank has roof railing for the north and west roof access hatches. The railing was measured to be 42-inches high with a toe plate and meets the OSHA standard 1926.502(b)(1) for above working level. The railing had minor corrosion on the bottom joint connection and staining throughout. Overall, the roof railing is in good condition. The railing should be blasted and recoated.

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Photo No. 43 West Access Hatch Roof Railing

Photo No. 44 North Access Hatch Roof Railing

5.4 OPERATIONAL

5.4.1 Inlet / Outlet Pipe #1

The 5.0 MG GST has two inlet/outlet pipe connected to the interior of the tank. The 20-inch inlet/outlet pipe #1 is located along the east wall. The interior of the pipe had corrosion around the fittings and minor sedimentation buildup. The pipe did not have any obstructions blocking the opening. Overall, the outlet pipe was in moderate condition.

Size: 20-inch inlet pipe
General condition of coating: Poor
Degree of corrosion: Moderate
Condition of metal: Moderate

Photo No. 45 Inlet Pipe Inside tank

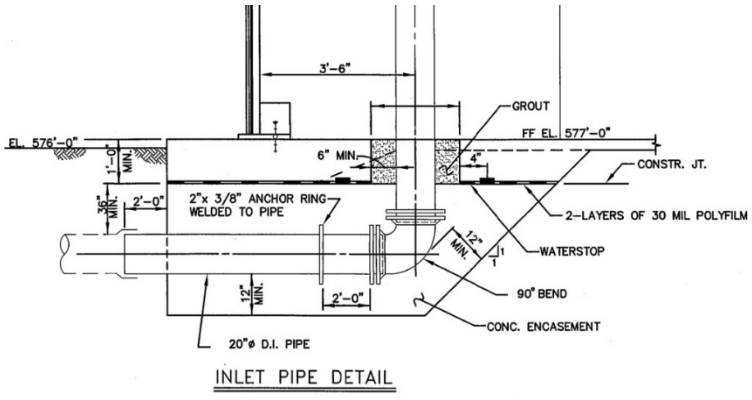

Photo No. 46 Inlet Pipe Detail

5.4.2 Inlet / Outlet Pipe #2

The 5.0 MG GST has two inlet/outlet pipe connected to the interior of the tank. The 30-inch inlet/outlet pipe #2 exits along the west wall. The pipe penetrates the tank floor and connects to the pump station located on northwest of the property. The interior of the pipe had significant corrosion around the fittings and minor sedimentation buildup. The pipe did not have any obstruction blocking the opening. Overall, the outlet pipe needs replacement.

Size: 30-inch Outlet pipe
General condition of coating: Poor
Degree of corrosion: Critical
Condition of metal: Moderate

Photo No. 47 Outlet Pipe Inside tank

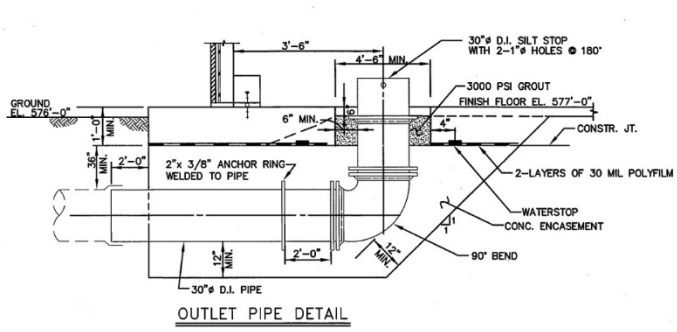

Photo No. 48 Outlet Pipe Detail

5.4.3 Overflow Pipe, Flap Valve, Weir Box and Catchment Box

The 24-inch overflow pipe runs along interior of the concrete wall 1-ft above the base to maximum design water elevation and penetrates through the wall approximately 10 inches above the ground on the southwest side of the tank. The overflow pipe is protected by a reinforced concrete box and the interior pipe was not visible inside tank. The flap valve is above a concrete swale that leads away from the site. The concrete swale is in good condition with no cracks or water ponding issues. The overflow pipe flap valve did have a sufficient air gap required by TCEQ and maintains a good seal. Overall, the overflow pipe and the flap gate were in good condition.

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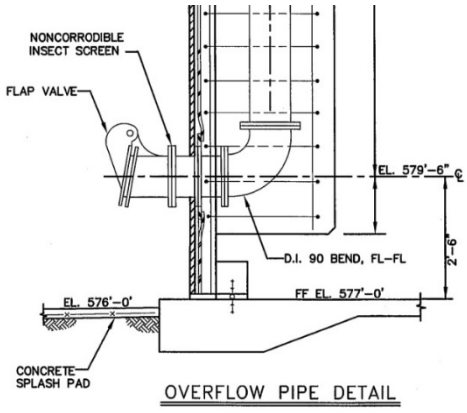

Photo No. 49 Overflow Pipe Detail

Photo No. 50 Overflow flapper and splashpad

Photo No. 51 Overflow flapper side view

Photo No. 52 Overflow flapper

5.4.4 Roof Vent

There is one 50-inch mushroom style roof vent in the center of the tank roof. The vent exterior had no noted corrosion. The fiberglass mesh, 24-inch x 24-inch screen is in compliance with TCEQ but was slightly damaged as it was not securely clamped in place with galvanized bands. Overall, the roof vent is in moderate condition. The roof vent mesh should be removed and replaced with new stainless or galvanized wire mesh to secure it firmly and comply with TCEQ to withstand winds of not less than tank design criteria.

Photo No. 53 Mushroom Roof Vent

Photo No. 54 Damaged Roof Vent Screen

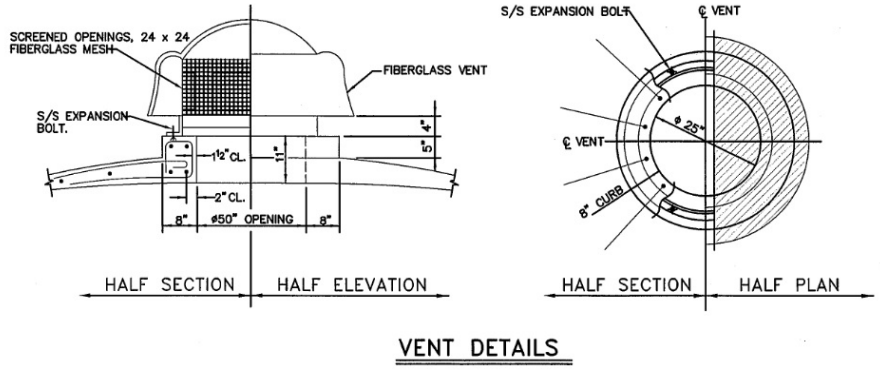

Photo No. 55 Vent Details

5.5 SITE ASSESSMENT

The site around Mansell Pump station 5.0 MG GST is relatively flat on all sides with the drainage flowing away from the tank to the west. No water ponding or erosion was observed during the site visit. Some minor landscape damage was observed close to storm drain inlet. The site perimeter is surrounded by 8-foot-high brick wall located at the front of the site and along the residential properties. The site fence was in good condition. There are two entrance gates that are in working condition. The pump station facility exterior appears to be in good condition. On the interior of the station, all the piping, grating and appurtenances were observed to have some staining and corrosion. The site has an additional 2MG Steel tank to the north with piping and valves that lead into the pump station. The existing driveway was observed in good condition with no pothole or spalling was noted. It is recommended to repair damaged landscape and install mow strip around the perimeter of the tank for ease of maintenance.

Photo No. 56 Entrance Gate at North end

Photo No. 57 Entrance Gate & Driveway at West end

Photo No. 58 Storm Drain inlet on West W/ damaged landscape

Photo No. 59 ATT building for antenna on SW corner

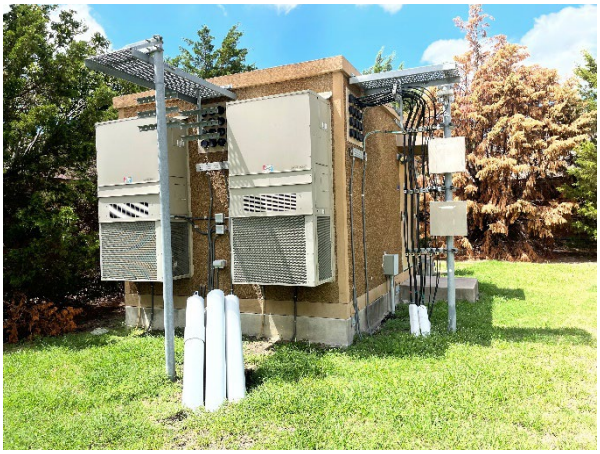

Photo No.60 Incoming wires to ATT building

Photo No. 61 West Side Site Grading

Photo No. 62 South Side Site Grading

Photo No. 63 East Side Site Grading

Photo No. 64 North Side Site Grading

Photo No. 65 2 MG Steel Tank on North Side

Photo No. 66 Vault adjacent to steel tank

Photo No. 67 Pump House Sign Board

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Photo No. 68 Pump House & driveway

Photo No. 69 Water Meter

Photo No. 70 Outlet pipe from tank to Pump House

Photo No. 71 Outlet pipe

Photo No. 72 Back view of Pump House

Photo No. 73 Generator adjacent to pump house

Photo No. 74 Pump inside Pump House

Photo No. 75 Electrical configuration in Pump House

5.6 ROOF DRAINAGE

An overall site structures and components were inspected to observe if there were any traces of sanitary contamination. Each observed structure is described below to elaborate on it.

5.6.1 Roof

The existing roof was observed to be in good condition. The walls had minor cracking, but no traces of leakage were observed. The roof drainage had no ponding issue.

5.6.2 Roof Hatch

The hatch was in good condition with no water ponding in the vicinity with moderate corrosion on the interior. However, no opening was observed that could lead to any contamination.

5.6.3 Venting

The roof vent had no noted corrosion and contamination issue.

5.6.4 Screening

The purpose of screen is to prevent entry of animals, birds, insects, and heavy air contaminants. The existing roof vent screen was observed to be damaged and recommended to be replaced to prevent air contaminants.

5.6.5 Overflows

The existing overflow flap valve was sealed completely. Thus, no leak was observed and was in good condition.

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6 LIMITATION

No structural destructive testing of any kind nor analysis was performed to verify the adequacy of structural members. Only visual observation was performed. The perimeter wall foundation was buried and therefore not observed in its entirety. The exterior surface of the wall had limited observation due to having been observed from the ground.

This report reflects the observations and recommendations for Mansell Pump Station 5.0 MG Ground Storage Tank based on the condition assessment conducted on August 29, 2022. The current conditions may differ.

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7 CONCLUSIONS AND RECOMMENDATIONS

Based on the assessment performed by the project team on August 29, 2022, the following table provides the summary of recommended improvements.

Table (4) – Rehabilitation of Mansell Pump Station 5.0 MG Ground Storage Tank

Asset	Physical Rating	Performance Rating	Code Compliance	Description	Recommendation
Coating - Piping	3 - Moderate. Worn. Treatable surface corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	Piping has spotted corrosion.	Monitor corrosion to determine if area affected increases
Operational - 20-inch Inlet pipe	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	Spotted corrosion and staining on interior.	Blast and Recoat
Operational - 36-inch Outlet pipe	4 - Poor. In need of repair. Corrosion may weaken structural capacity	4 - Poor. Functions less than required or requires significant resources to function as required	1 - No Code issues	Severe corrosion and staining.	Blast and Recoat
Operational - 24-inch Overflow pipe	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	Minor staining and spotted corrosion. Straight with no deflection.	Monitor corrosion to determine if area affected increases.
Operational - Overflow Flap Valve	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	Moderate corrosion on the lid and hinges.	No Action

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Asset	Physical Rating	Performance Rating	Code Compliance	Description	Recommendation
Operational - Overflow Pipe Catchment Concrete	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	No spalling or crack. Staining on the existing grating.	No Action
Operational - Roof Vents	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	The screen has been damaged.	Remove and replace screening with new stainless or galvanized mesh.
Safety and Security - Exterior Ladder	3 - Moderate. Worn. Treatable surface corrosion	3 - Moderate. Higher O&M required to keep component functioning as required	3 - Minor Code issue	Spotted minor corrosion and staining. Existing conduit on standoff is in violation of OSHA.	Relocate the conduit of the standoff to meet the OSHA requirement. No action required for coating.
Safety and Security - Exterior Ladder Fall Protection System	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	The safety rail was in good working condition. Minor staining.	No Action
Safety and Security - Ladder Guard	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	Locked at time of visit and in good working condition.	No Action
Safety and Security - Interior Ladder	4 - Poor. In need of repair. Corrosion may weaken structural capacity	3 - Moderate. Higher O&M required to keep component functioning as required	1 - No Code issues	Spotted corrosion and staining. The ladder standoff has corrosion with delamination and biological growth observed below water level.	Remove and replace ladder and treat for biological growth.
Safety and Security - Interior Ladder Fall Protection System	4 - Poor. In need of repair. Corrosion may weaken structural capacity	4 - Poor. Functions less than required or requires significant resources to function as required	5 - IRREPAIRABLE Code issue (asset must be replaced)	The ladder was equipped with a pipe for safety protection and doesn't comply with OSHA regulations.	Remove and replace Fall Protection System.

Asset	Physical Rating	Performance Rating	Code Compliance	Description	Recommendation
Safety and Security - Roof Access Hatch North	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	2 - Possible Code issue	Overall, in good condition. No confined space entry placard was installed	Install Confined space entry placard.
Safety and Security - Roof Access Hatch West	3 - Moderate. Worn. Treatable surface corrosion	2 - Good. Component functioning as required with normal maintenance	2 - Possible Code issue	Overall, in good condition. No confined space entry placard was installed	Install Confined space entry placard.
Safety and Security - Roof Railing	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	2 - Possible Code issue	Roof railing was limited to access hatch only.	Install roof railing all the way to center for added safety and security.
Safety and Security - Site Assessment	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	Relatively flat on all site. No water ponding observed. Small portion of landscape was worn and torn.	Repair worn and torn landscape.
Safety and Security - Brick Fence	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	7-feet brick wire.	No Action
Safety and Security - Entrance Gate	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	Both the gate was in working condition.	No Action
Safety and Security - Driveway	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	The concrete observed to have no cracks and in good condition	No Action

Asset	Physical Rating	Performance Rating	Code Compliance	Description	Recommendation
Structural - Roof Slab (Exterior)	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	The observed minor cracks do not have any noticeable leaks, the roof is in good condition.	No Action
Structural - Roof Slab (Interior)	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	The roof is in good condition.	Pressure wash cleaning
Structural - Walls (Exterior)	2 - Good. Minor wear. Minor Corrosion	3 - Moderate. Higher O&M required to keep component functioning as required	1 - No Code issues	There are areas of cracking and spalling.	Repair effected areas with cementitious grout and recoat repaired areas.
Structural - Walls (Interior)	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	The walls are in good condition.	The walls are in good condition.
Structural - Columns	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	The columns are in good condition.	Pressure wash cleaning
Structural - Membrane Slab	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	The membrane slab is in good condition.	Pressure wash cleaning
Structural - Wall Foundation	2 - Good. Minor wear. Minor Corrosion	2 - Good. Component functioning as required with normal maintenance	1 - No Code issues	The foundation is mostly covered by soil.	Regrading of the areas around the tank to allow for a mow strip to be installed.

8 OPINION OF PROBABLE CONSTRUCTION COST (OPCC)

8.1 MANSELL PUMPING STATION 5.0 MG GROUND STORAGE TANK

Tank System/ Component	Description	Estimated Cost
PART A		
Structural	• Repair of exterior wall	$ 30,000
Safety & Security – Hatches	• Install Roof railing to center • Install confined space signage (4)	$ 20,000
Safety & Security – Roof Ladders	• Remove and replace interior fall protection system • Remove and replace interior ladder and fall protection system	$ 20,000
Operation	• Remove and replace roof vent mesh • Remove and replace 30-inch outlet pipe • Blast and recoat inlet pipe	$ 15,000
Site	• Repair worn and torn landscaping	$ 10,000
Alternative (Miscellaneous)	• Mow Strip around tank	$ 40,000
	Sub Total	**$ 135,000**
	Contingency (~30%)	$ 40,500
	Total OPCC (approximate)	**$ 175,500**

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Appendix A

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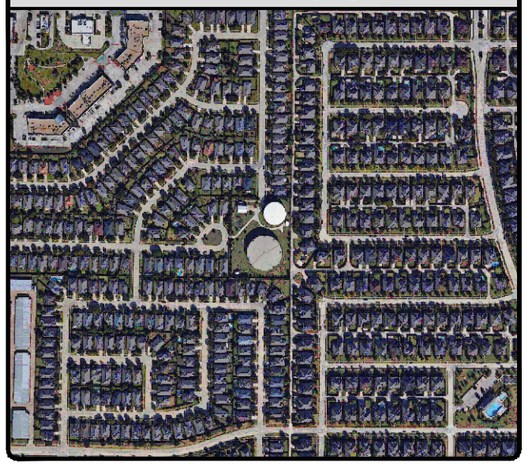
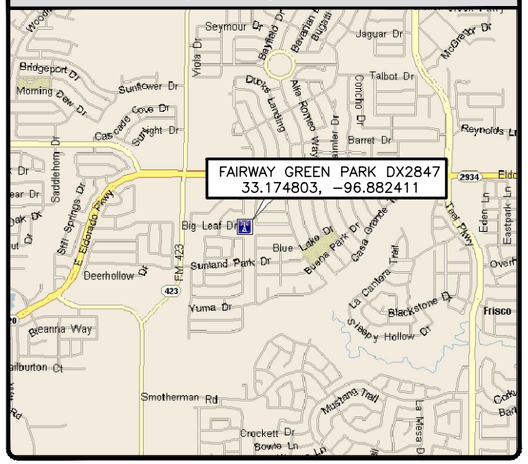
1801 VALLEY VIEW LANE
FARMERS BRANCH, TX 75234

SITE NAME:	**FAIRWAY GREEN PARK**
FA # / SITE ID:	**12677370 / DX2847**
PROJECT TYPE:	**LTE 5C / LTE 6C / RTXRX ANTENNA RETROFIT**
LTE PROJECT ID:	**DXL02847**
STRUCTURE TYPE:	**COLLOCATION 35'-6" WATER TANK**

AERIAL PHOTO



LOCATION MAP



TOWER ELEVATION

DRIVING DIRECTIONS

DEPARTING DALLAS/FORT WORTH INTERNATIONAL AIRPORT, HEAD NORTH ON INTERNATIONAL PKWY. IN 4.0 MILES, MERGE ONTO TX-121 N. IN 4.2 MILES CONTINUE ONTO SAM RAYBURN TOLLWAY. IN 3.5 MILES, CONTINUE ONTO TX-121/SAM RAYBURN TOLLWAY. IN 1.4 MILES, CONTINUE ONTO SAM RAYBURN TOLLWAY. IN 0.5 MILES, KEEP LEFT AT THE FORK, FOLLOW SIGNS FOR DALLAS NORTH TOLLWAY N AND MERGE ONTO DALLAS NORTH TOLLWAY N. IN 6.0 MILES, TAKE EXIT ELDORADO PKWY TO MERGE ONTO DALLAS PKWY. IN 0.2 MILES, MERGE ONTO DALLAS PKWY. IN 0.2 MILES, USE THE LEFT 2 LANES TO TURN LEFT ONTO ELDORADO PKWY. IN 2.4 MILES, TURN LEFT ONTO RED SPRUCE DR. CONTINUE STRAIGHT FOR 0.3 MILES TO ARRIVE AT YOUR DESTINATION STRAIGHT AHEAD.

ONE CALL

Texas811

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1-800-344-8377

PROJECT INFORMATION

LATITUDE: (NAD 83)	33.174803°
LONGITUDE: (NAD 83)	-96.882411°
SITE ADDRESS:	DX2847-FAIRWAY GREEN PARK 3096 BIG LEAF DRIVE LITTLE ELM, TX 75068
GROUND ELEVATION:	581' AMSL
MARKET:	NORTH TEXAS
JURISDICTION:	CITY OF LITTLE ELM
COUNTY:	DENTON
OCCUPANCY TYPE:	UNMANNED
A.D.A. COMPLIANCE:	FACILITY IS UNMANNED AND NOT FOR HUMAN HABITATION.

PROJECT TEAM

ENGINEER/ARCHITECT:
CLS GROUP
609 S. KELLY AVENUE, STE. D
EDMOND, OK 73003
PM: DAVID ROGERS
405-348-5460

CUSTOMER:
AT&T MOBILITY
1801 VALLEY VIEW LANE
FARMERS BRANCH, TX 75234
CONTACT: DANIEL NUTT
PHONE: 281-405-6747

TOWER OWNER:
TOWN OF LITTLE ELM
100 W ELDORADO PKWY
LITTLE ELM, TX 75068
CONTACT: JASON LAUMER
PHONE: 214-975-0473

SITE NAME:
FAIRWAY GREEN PARK

SITE NUMBER: DX2847

CODE COMPLIANCE

ALL WORK SHALL BE PERFORMED AND MATERIALS INSTALLED IN ACCORDANCE WITH THE CURRENT EDITIONS OF THE FOLLOWING APPLICABLE CODES AS ADOPTED BY THE LOCAL GOVERNING AUTHORITIES.

BUILDING/DWELLING CODE:	IBC 2012
STRUCTURAL CODE:	IBC 2012
PLUMBING CODE:	IPC 2012
MECHANICAL CODE:	IMC 2012
ELECTRICAL CODE:	NEC 2017
FIRE & LIFE SAFETY CODE:	IFC 2012

DO NOT SCALE DRAWINGS

CONTRACTOR SHALL VERIFY ALL PLANS, EXISTING DIMENSIONS, CONDITIONS ON THE JOB SITE AND SHALL IMMEDIATELY NOTIFY THE ARCHITECT OR ENGINEER IN WRITING OF ANY DISCREPANCIES BEFORE PROCEEDING WITH THE WORK OR BE RESPONSIBLE FOR THE SAME.

DRAWING INDEX

SHEET #	SHEET DESCRIPTION	REV. #
T1	TITLE SHEET	0
GN1	GENERAL NOTES	0
A1	SITE PLAN	0
A2	EXISTING EQUIPMENT PLAN	0
A2.1	PROPOSED EQUIPMENT PLAN	0
A3	TOWER ELEVATION	0
A4	ANTENNA PLAN	0
A5	EQUIPMENT DETAILS	0
A6	EQUIPMENT DETAILS	0

SCOPE OF WORK

TOWER SOW:

1. REMOVE (1) EXISTING SBNH-1D6565B ANTENNA IN POSITION 3 EACH SECTOR.
2. RELOCATE (1) EXISTING SBNHH-1D65B ANTENNA IN POSITION 2 TO POSITION 3 EACH SECTOR.
3. RELOCATE (1) EXISTING SBNHH-1D65B ANTENNA IN POSITION 4 TO POSITION 5 EACH SECTOR.
4. REMOVE AND REPLACE (1) EXISTING RRUS-12 FOR 850 LTE IN POSITION 4 WITH (1) PROPOSED RRUS-4478 B5 AND INSTALL IN POSITION 1 EACH SECTOR.
5. REMOVE (1) EXISTING RRUS-01 FOR 850 UMTS IN POSITION 3 EACH SECTOR.
6. RELOCATE (1) EXISTING RRUS-11 FOR 700 LTE IN POSITION 2 TO POSITION 5 EACH SECTOR.
7. RELOCATE (1) EXISTING RRUS-32 FOR 1900 LTE IN POSITION 2 TO POSITION 5 EACH SECTOR.
8. RELOCATE (1) EXISTING RRUS-32 FOR 2300 LTE IN POSITION 4 TO POSITION 3 EACH SECTOR.
9. INSTALL (2) PROPOSED JAHH-65B-R3B ANTENNAS IN POSITION 1 TO BE MOUNTED ON A BSAMNT-SBS-2-2 DUAL ANTENNA MOUNTING BRACKET EACH SECTOR.
10. INSTALL (1) PROPOSED RRUS-4478 B14 FOR 700 LTE AND (1) RRUS-32 B66 FOR 2100 LTE IN POSITION 1 EACH SECTOR.
11. INSTALL (1) PROPOSED DC6-48-60-18-8C SQUID.
12. INSTALL (1) DC POWER TRUNK.

GROUND SOW:

1. INSTALL (4) PROPOSED NEQ.15930 RECTIFIERS IN EXISTING POWER PLANT.
2. INSTALL (3) 30 AMP BREAKERS FOR 2100 LTE IN EXISTING POWER PLANT.
3. INSTALL (3) 25 AMP BREAKERS FOR 700 LTE IN EXISTING POWER PLANT.

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FARMERS BRANCH, TX 75234

ERICSSON
6300 LEGACY DRIVE
PLANO, TX 75024

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EDMOND, OK 73003
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COA# F-13220 EXP. 01/31/2019

REVISIONS

REV.	DATE	DESCRIPTION	INITIALS
A	02/28/18	PRELIMINARY ISSUE	JRL
0	03/26/18	FOR CONSTRUCTION	JRL

NOT FOR CONSTRUCTION UNLESS LABELED AS CONSTRUCTION SET

STATE OF TEXAS
TYLER M. BARKER
124473
LICENSED
PROFESSIONAL ENGINEER

Tyler M. Barker
CLS - Director of Engineering
PE # 124473 Exp. 9/30/2018
COA # F - 13220 Exp. 1/31/2019

3/28/2018

PE# 124473 EXP: 09/30/2018

DX2847
FAIRWAY GREEN PARK
FA#: 12677370
3096 BIG LEAF DRIVE
LITTLE ELM, TX 75068

SHEET TITLE
TITLE SHEET

SHEET NUMBER
T1

GENERAL NOTES

1. FOR THE PURPOSE OF CONSTRUCTION DRAWING, THE FOLLOWING DEFINITIONS SHALL APPLY:
   CONTRACTOR – GENERAL CONTRACTOR
   SUBCONTRACTOR – GENERAL CONTRACTOR (CONSTRUCTION)
   OWNER – AT&T MOBILITY
   OEM – ORIGINAL EQUIPMENT MANUFACTURER
2. PRIOR TO THE SUBMISSIONS OF BIDS, THE BIDDING SUBCONTRACTOR SHALL VISIT THE CELL SITE TO FAMILIARIZE THEMSELVES WITH THE EXISTING CONDITIONS AND TO CONFIRM THAT THE WORK CAN BE ACCOMPLISHED AS SHOWN ON THE CONSTRUCTION DRAWINGS. THE CONTRACTOR SHALL VERIFY ALL EXISTING CONDITIONS, QUANTITIES AND DIMENSIONS BEFORE STARTING ANY WORK. NOTIFY THE CONSTRUCTION MANAGER OF ANY DISCREPANCIES OR INSONSISTENCIES BEFORE PROCEEDING WITH THE WORK.
3. ALL MATERIALS FURNISHED AND INSTALLED SHALL BE IN STRICT ACCORDANCE WITH ALL APPLICABLE CODES, REGULATIONS, AND ORDINANCES. SUBCONTRACTOR SHALL ISSUE ALL APPROPRIATE NOTICES AND COMPLY WITH ALL LAWS, ORDINANCES, RULES, REGULATIONS, AND LAWFUL ORDERS OF ANY PUBLIC AUTHORITY REGARDING THE PERFORMANCE OF THE WORK. ALL WORK CARRIED OUT SHALL COMPLY WITH ALL APPLICABLE MUNICIPAL AND UTILITY COMPANY SPECIFICATIONS AND LOCAL JURISDICTIONAL CODES, ORDINANCES AND APPLICABLE REGULATIONS.
4. DRAWINGS PROVIDED HERE ARE NOT TO BE SCALED AND ARE INTENDED TO SHOW OUTLINE ONLY.
5. UNLESS NOTED OTHERWISE, THE WORK SHALL INCLUDE FURNISHING MATERIALS, EQUIPMENT, APPURTENANCES, AND LABOR NECESSARY TO COMPLETE ALL INSTALLATIONS AS INDICATED ON THE DRAWINGS.
6. THE SUBCONTRACTOR SHALL INSTALL ALL EQUIPMENT AND MATERIALS IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS UNLESS SPECIFICALLY STATED OTHERWISE.
7. IF THE SPECIFIED EQUIPMENT CANNOT BE INSTALLED AS SHOWN ON THESE DRAWINGS, THE SUBCONTRACTOR SHALL PROPOSE AN ALTERNATIVE INSTALLATION FOR APPROVAL BY THE CONTRACTOR.
8. SUBCONTRACTOR SHALL DETERMINE ACTUAL ROUTING OF CONDUIT, POWER AND TI CABLES, GROUNDING CABLES AS SHOWN ON THE POWER, GROUNDING AND TELCO PLAN DRAWING. SUBCONTRACTOR SHALL UTILIZE EXISTING TRAYS AND/OR SHALL ADD NEW TRAYS AS NECESSARY. SUBCONTRACTOR SHALL CONFIRM THE ACTUAL ROUTING WITH THE CONTRACTOR. ROUTING OF TRENCHING SHALL BE APPROVED BY CONTRACTOR.
9. THE SUBCONTRACTOR SHALL PROTECT EXISTING IMPROVEMENTS, PAVEMENTS, CURBS, LANDSCAPING AND STRUCTURES. ANY DAMAGED PART SHALL BE REPAIRED AT SUBCONTRACTOR'S EXPENSE TO THE SATISFACTION OF THE OWNER.
10. SUBCONTRACTOR SHALL LEGALLY AND PROPERLY DISPOSE OF ALL SCRAP MATERIALS SUCH AS COAXIAL CABLES AND OTHER ITEMS REMOVED FOR THE EXISTING FACILITY. ANTENNAS REMOVED SHALL BE RETURNED TO THE OWNER'S DESIGNATED LOCATION.
11. SUBCONTRACTOR SHALL LEAVE PREMISES IN CLEAN CONDITION.
12. ALL CONCRETE REPAIR WORK SHALL BE DONE IN ACCORDANCE WITH AMERICAN CONCRETE INSTITUTE (ACI) 301.
13. ANY NEW CONCRETE NEEDED FOR THE CONSTRUCTION SHALL HAVE 4000 PSI STRENGTH AT 28 DAYS UNLESS OTHERWISE SPECIFIED. ALL CONCRETING WORK SHALL BE DONE IN ACCORDANCE WITH ACI 318 CODE REQUIREMENTS.
14. ALL STRUCTURAL STEEL WORK SHALL BE DONE IN ACCORDANCE WITH AISC 13 EDITION SPECIFICATIONS.
15. CONSTRUCTION SHALL COMPLY WITH SPECIFICATION 25741-000-3APS-A00Z-00002, "GENERAL CONSTRUCTION SERVICES".
16. SUBCONTRACTOR SHALL VERIFY ALL EXISTING DIMENSIONS AND CONDITIONS PRIOR TO COMMENCING ANY WORK. ALL DIMENSIONS OF EXISTING CONSTRUCTION SHOWN ON THE DRAWINGS MUST BE VERIFIED. SUBCONTRACTOR SHALL NOTIFY THE CONTRACTOR OF ANY DISCREPANCIES PRIOR TO ORDERING MATERIAL OR PROCEEDING WITH CONSTRUCTION.
17. THE EXISTING CELL SITE IS IN FULL COMMERCIAL OPERATION. ANY CONSTRUCTION WORK BY SUBCONTRACTOR SHALL NOT DISRUPT THE EXISTING NORMAL OPERATION. ANY WORK ON EXISTING EQUIPMENT MUST BE COORDINATED WITH CONTRACTOR. ALSO, WORK MAY NEED TO BE SCHEDULED FOR AN APPROPRIATE MAINTENANCE WINDOW USUALLY IN LOW TRAFFIC PERIODS AFTER MIDNIGHT.
18. SINCE THE CELL SITE MAY BE ACTIVE, ALL SAFETY PRECAUTIONS MUST BE TAKEN WHEN WORKING AROUND HIGH LEVELS OF ELECTROMAGNETIC RADIATION. EQUIPMENT SHOULD BE SHUT DOWN PRIOR TO PERFORMING ANY WORK THAT COULD EXPOSE THE WORKERS TO DANGER. PERSONAL RF EXPOSURE MONITORS ARE REQUIRED TO BE WORN TO ALERT OF ANY DANGEROUS EXPOSURE LEVELS.
19. ALL ANTENNA PIPES SHALL BE SCHEDULE 80.
20. LIMITS OF LIABILITY – ITEMS REFERENCED ARE OWNER/CLIENT DICTATED ITEMS, OR SUPPLIED ITEMS WHICH ARE REPRODUCED WITHOUT ALTERATION AS DIRECTED BY OWNER/CLIENT, AND OWNER/CLIENT ASSUMES ANY AND ALL LIABILITY FOR USE OF, CONSEQUENCES OF, OR INTERPRETATION OF SAID ITEM, SPECIFICATION, OR DIRECTIVE; AND AGREES TO INDEMNIFY AND HOLD ENGINEER COMPLETELY HARMLESS.
21. PROFESSIONAL SEAL – DETAILS, SPECIFICATION(S), OR ITEMS REFERENCED, ARE NOT PART OF THE PROFESSIONAL DESIGN PERFORMED BY LICENSEE AND THE PROFESSIONAL SEAL DOES NOT APPLY.
22. LIMITS OF LIABILITY – ITEMS REFERENCED ARE OWER/CLIENT DICTATED ITEMS, OR SUPPLIED ITEMS WHICH ARE REPRODUCED WITHOUT ALTERATION AS DIRECTED BY OWNER/CLIENT, AND OWNER/CLIENT ASSUMES ANY AND ALL LIABILITY FOR USE OF, CONSEQUENCES OF, OR INTERPRETATION OF SAID ITEM, SPECIFICATION, OR DIRECTIVE; AND AGREES TO INDEMNIFY AND HOLD ENGINEER COMPLETELY HARMLESS.

ELECTRICIAL INSTALLATION NOTES

1. WIRING, RACEWAY AND SUPPORT METHODS AND MATERIALS SHALL COMPLY WITH THE REQUIREMENTS OF THE NEC AND TELCORDIA.
2. SUBCONTRACTORS SHALL MODIFY EXISTING CABLE TRAY SYSTEM AS REQUIRED TO SUPPORT RF AND TRANSPORT CABLING TO THE NEW BTS EQUIPMENT. SUBCONTRACTOR SHALL SUBMIT MODIFICATIONS TO CONTRACTOR FOR APPROVAL.

ELECTRICAL INSTALLATION NOTES CONT.

3. ALL CIRCUITS SHALL BE SEGREGATED AND MAINTAIN MINIMUM CABLE SEPARATION AS REQUIRED BY THE NEC AND TELCORDIA.
4. CABLES SHALL NOT BE ROUTED THROUGH LADDER-STYLE CABLE TRAY RUNGS.
5. EACH END OF EVERY POWER, GROUNDING, AND T1 CONDUCTOR AND CABLE SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). THE IDENTIFICATION METHOD SHALL CONFORM WITH NEC & OSHA, AND MATCH EXISTING INSTALLATION REQUIREMENTS.
6. POWER PHASE CONDUCTORS (I.E., HOTS) SHALL BE LABELED WITH COLOR-CODED INSULATION OR ELECTRICAL TAPE (3M BRAND, 1/2 INCH PLASTIC ELECTRICAL TAPE WITH UV PROTECTION, OR EQUAL). PHASE CONDUCTOR COLOR CODES SHALL CONFORM WITH THE NEC & OSHA, AND MATCH EXISTING INSTALLATION REQUIREMENTS
7. ALL ELECTRICAL COMPONENTS SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS. ALL EQUIPMENT SHALL BE LABELED WITH THEIR VOLTAGE RATING, PHASE CONFIGURATION, WIRE CONFIGURATION, POWER OR AMPACITY RATING, AND BRANCH CIRCUIT ID NUMBERS (I.E., PANELBOARD AND CIRCUIT ID'S).
8. PANELBOARDS (ID NUMBERS) AND INTERNAL CIRCUIT BREAKERS (CIRCUIT ID NUMBERS) SHALL BE CLEARLY LABELED WITH ENGRAVED LAMACOID PLASTIC LABELS.
9. ALL TIE WRAPS WHERE PERMITTED SHALL BE CUT FLUSH WITH APPROVED CUTTING TOOL TO REMOVE SHARP EDGES. USE LOW PROFILES TIE WRAPS.
10. POWER, CONTROL, AND EQUIPMENT GROUND WIRING IN TUBING OR CONDUIT SHALL BE SINGLE CONDUCTOR (12 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.
11. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED INDOORS SHALL BE SINGLE CONDUCTOR (6 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION AND RACEWAY SYSTEM USED, UNLESS OTHERWISE SPECIFIED.
12. SUPPLEMENTAL EQUIPMENT GROUND WIRING LOCATED OUTDOORS, OR BELOW GRADE, SHALL BE SINGLE CONDUCTOR 2 AWG SOLID TINNED COPPED CABLE, UNLESS OTHERWISE SPECIFIED.
13. POWER WIRING, NOT IN TUBING OR CONDUIT, SHALL BE MULTI-CONDUCTOR, TYPE TC CABLE (12 AWG OR LARGER), 600V, OIL RESISTANT THHN OR THWN-2, CLASS B STRANDED COPPER CABLE RATED FOR 90°C (WET AND DRY) OPERATION; LISTED OR LABELED FOR THE LOCATION USED, UNLESS OTHERWISE SPECIFIED.
14. ALL POWER AND GROUNDING CONNECTIONS SHALL BE CRIMP-STYLE, COMPRESSION WIRE LUGS AND WIRENUTS BY THOMAS AND BETTS (OR EQUAL). LUGS AND WIRENUTS SHALL BE RATED FOR OPERATION AT ON LESS THAN 75°C (90°C IF AVAILABLE).
15. RACEWAY AND CABLE TRAY SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE, AND NEC.
16. NEW RACEWAY OR CABLE TRAY WILL MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
17. ELECTRICAL METALLIC TUBING (EMT) OR RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40, OR RIGID PVC SCHEDULE 80 FOR LOCATIONS SUBJECT TO PHYSICAL DAMAGE) SHALL BE USED FOR EXPOSED INDOOR LOCATIONS.
18. ELECTRICAL METALLIC TUBING (EMT) OR ELECTRICAL NONMETALLIC TUBING (ENT), OR RIGID NONMETALLIC CONDUIT (RIGID PVC SCHEDULE 40) SHALL BE USED FOR CONCEALED INDOOR LOCATIONS.
19. GALVANIZED STEEL INTERMEDIATE METALLIC CONDUIT (IMC) SHALL BE USED FOR OUTDOOR LOCATIONS ABOVE GRADE.
20. RIGID NONMETALLIC CONDUIT (I.E., RIGID PVC SCHEDULE 40, OR RIGID PVC SCHEDULE 80) SHALL BE USED UNDERGROUND; DIRECT BURIED, IN AREAS OF OCCASIONAL LIGHT VEHICLE TRAFFIC OR ENCASED IN REINFORCED CONCRETE IN AREAS OF HEAVY VEHICLE TRAFFIC.
21. LIQUID-TIGHT FLEXIBLE METALLIC CONDUIT (LIQUID-TITE FLEX) SHALL BE USED INDOORS AND OUTDOORS, WHERE VIBRATION OCCURS OR FLEXIBILITY IS NEEDED.
22. CONDUIT AND TUBING FITTINGS SHALL BE THREADED OR COMPRESSION-TYPE AND APPROVED FOR THE LOCATION USED. SETSCREW FITTINGS ARE NOT ACCEPTABLE.
23. CABINETS, BOXES, AND WIREWAYS SHALL BE LISTED OR LABELED FOR ELECTRICAL USE IN ACCORDANCE WITH NEMA, UL, ANSI/IEEE AND NEC.
24. CABINETS, BOXES AND WIREWAYS TO MATCH THE EXISTING INSTALLATION WHERE POSSIBLE.
25. WIREWAYS SHALL BE EPOXY-COATED (GRAY) AND INCLUDE A HINGED COVER, DESIGNED TO SWING OPEN DOWNWARD; SHALL BE PANDUIT TYPE E (OR EQUAL); AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 34 (OR BETTER) OUTDOORS.
26. EQUIPMENT CABINETS, TERMINAL BOXES, JUNCTION BOXES, AND PULL BOXES SHALL BE GALVANIZED OR EPOXY-COATED SHEET STEEL, SHALL MEET OR EXCEED UL 50, AND RATED NEMA 1 (OR BETTER) INDOORS, OR NEMA 34 (OR BETTER) OUTDOORS.
27. METAL RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL BE GALVANIZED, EPOXY-COATED, OR NON-CORRODING; SHALL MEET OR EXCEED UL 514A AND NEMA OS 1; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
28. NONMETALLIC RECEPTACLE, SWITCH, AND DEVICE BOXES SHALL MEET OR EXCEED NEMA OS 2; AND RATED NEMA 1 (OR BETTER) INDOORS, OR WEATHER PROTECTED (WP OR BETTER) OUTDOORS.
29. THE SUBCONTRACTOR SHALL NOTIFY AND OBTAIN NECESSARY AUTHORIZATION FROM THE CONTRACTOR BEFORE COMMENCING WORK ON THE AC POWER DISTRIBUTION PANELS.
30. THE SUBCONTRACTOR SHALL PROVIDE NECESSARY TAGGING ON THE BREAKERS, CABLES AND DISTRIBUTION PANELS IN ACCORDANCE WITH THE APPLICABLE CODES AND STANDARDS TO SAFEGUARD AGAINST LIFE AND PROPERTY.

GROUNDING NOTES

1. THE SUBCONTRACTOR SHALL REVIEW AND INSPECT THE EXISTING FACILITY GROUNDING SYSTEM AND LIGHTNING PROTECTION SYSTEM (AS DESIGNED AND INSTALLED) FOR STRICT COMPLIANCE WITH THE NEC (AS ADOPTED BY THE AHJ). THE SITE-SPECIFIC (UL, LPI, OR NFPA) LIGHTING PROTECTION CODE, AND GENERAL COMPLIANCE WITH TELCORDIA AND TIA GROUNDING STANDARDS. THE SUBCONTRACTOR SHALL REPORT ANY VIOLATIONS OR ADVERSE FINDINGS TO THE CONTRACTOR FOR RESOLUTION.
2. ALL GROUND ELECTRODE SYSTEMS (INCLUDING TELECOMMUNICATION, RADIO, LIGHTNING PROTECTION, AND AC POWER GES'S) SHALL BE BONDED TOGETHER, AT OR BELOW GRADE, BY TWO OR MORE COPPER BONDING CONDUCTORS IN ACCORDANCE WITH THE NEC.
3. THE SUBCONTRACTOR SHALL PERFORM IEEE FALL-OF-POTENTIAL RESISTANCE TO EARTH TESTING (PER IEEE 1100 AND 91) FOR NEW GROUND ELECTRODE SYSTEMS. THE SUBCONTRACTOR SHALL FURNISH AND INSTALL SUPPLEMENTAL GROUND ELECTRODES AS NEEDED TO ACHIEVE A TEST RESULT OF 5 OHMS OR LESS. TESTS SHALL BE PERFORMED IN ACCORDANCE WITH 25471-000-3PS-EG00-0001, DESIGN & TESTING OF FACILITY GROUNDING FOR CELL SITES.
4. METAL RACEWAY SHALL NOT BE USED AS THE NEC REQUIRED EQUIPMENT GROUND CONDUCTOR. STRANDED COPPER CONDUCTORS WITH GREEN INSULATION, SIZED IN ACCORDANCE WITH THE NEC, SHALL BE FURNISHED AND INSTALLED WITH THE POWER CIRCUITS TO BTS EQUIPMENT.
5. EACH BTS CABINET FRAME SHALL BE DIRECTLY CONNECTED TO THE MASTER GROUND BAR WITH GREEN INSULATED SUPPLEMENTAL EQUIPMENT GROUND WIRES, 6 AWG STRANDED COPPER OR LARGER INDOORS BTS; 2 AWG STRANDED COPPER FOR OUTDOORS BTS.
6. EXOTHERMIC WELDS SHALL BE USED FOR ALL GROUNDING CONNECTIONS BELOW GRADE.
7. APPROVED ANTIOXIDANT COATINGS (I.E., CONDUCTIVE GEL OR PASTE) SHALL BE USED ON ALL COMPRESSION AND BOLTED GROUND CONNECTIONS.
8. ICE BRIDGE BONDING CONDUCTORS SHALL BE EXOTHERMICALLY BONDED OR BOLTED WITH STAINLESS STEEL HARDWARE TO THE BRIDGE AND THE TOWER GROUND BAR.
9. ALUMINUM CONDUCTOR OR COPPER CLAD STEEL CONDUCTOR SHALL NOT BE USED FOR GROUNDING CONNECTIONS.
10. MISCELLANEOUS ELECTRICAL AND NON-ELECTRICAL METAL BOXES, FRAMES AND SUPPORTS SHALL BE BONDED TO THE GROUND RING, IN ACCORDANCE WITH THE NEC.
11. METAL CONDUIT AND TRAY SHALL BE GROUNDED AND MADE ELECTRICALLY CONTINUOUS WITH LISTED BONDING FITTINGS OR BY BONDING ACROSS THE DISCONTINUITY WITH 6 AWG COPPER WIRE UL APPROVED GROUNDING TYPE CONDUIT CLAMPS.
12. GROUND CONDUCTORS USED IN THE FACILITY GROUND AND LIGHTNING PROTECTION SYSTEMS SHALL NOT BE ROUTED THROUGH METALLIC OBJECTS THAT FORM A RING AROUND THE CONDUCTOR, SUCH AS METALLIC CONDUITS, METAL SUPPORT CLIPS OR SLEEVES THROUGH WALLS OR FLOORS. WHEN IT IS REQUIRED TO BE HOUSED IN CONDUIT TO MEET CODE REQUIREMENTS OR LOCAL CONDITIONS, NON-METALLIC MATERIAL, SUCH AS PVC PLASTIC CONDUIT SHALL BE USED. WHERE USE OF METAL CONDUIT IS UNAVOIDABLE (E.G., NON-METALLIC CONDUIT PROHIBITED BY LOCAL CODE) THE GROUND CONDUCTOR SHALL BE BONDED TO EACH END OF THE METAL CONDUIT.
13. ALL TOWER GROUND SYSTEMS SHALL COMPLY WITH THE REQUIREMENTS OF ANSI/TIA 222. FOR TOWERS BEING BUILT TO REV G OF THE STANDARD, THE WIRE SIZE OF THE BURIED GROUND RING AND CONNECTIONS BETWEEN THE TOWER AND THE BURIED GROUND RING SHALL BE CHANGED FROM 2 AWG TO 2/0 AWG. IN ADDITION, THE MINIMUM LENGTH OF THE GROUND RODS SHALL BE INCREASED FOR 8 FEET TO 10 FEET.
14. ALL GROUND WIRE TO RRUS SHALL BE #2 GREEN STRANDED.
15. ALL OUTDOOR LUGS SHALL USE BLACK HEAT SHRINK AND INDOOR LUGS SHALL USE CLEAR HEAT SHRINK.
16. ALL OUTDOOR LUGS TO BE LONG BARREL 2 HOLE WITHOUT INSPECTION HOLES AND INDOOR LUGS TO HAVE INSPECTION HOLES.

ABBREVIATIONS

AGL	ABOVE GRADE LEVEL	MFR	MANUFACTURER
AMSL	ABOVE MEAN SEA LEVEL	MGB	MASTER GROUND BAR
AWG	AMERICAN WIRE GAUGE	MIN	MINIMUM
BLDG	BUILDING	N.T.S.	NOT TO SCALE
DWG	DRAWING	(P)	PROPOSED
FT	FOOT	PPC	POWER PROTECTION CABINET
EMT	ELECTRICAL METALLIC TUBING	RBS	RADIO BASE STATION
ELEV	ELEVATION	IN	INCH(ES)
EQUIP	EQUIPMENT	INT	INTERIOR
(E)	EXISTING	LB(S) OR #	POUND(S)
EXT	EXTERIOR	SF	SQUARE FOOT
FND	FOUNDATION	TYP	TYPICAL
F	FIBER	W/	WITH
GALV	GALVANIZED	XFMR	TRANSFORMER
GPS	GLOBAL POSITIONING SYSTEM		
GND	GROUND		
LTE	LONG TERM EVOLUTION		
MAX	MAXIMUM		

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COA# F-13220 EXP. 01/31/2019

REVISIONS

REV.	DATE	DESCRIPTION	INITIALS
A	02/28/18	PRELIMINARY ISSUE	JRL
0	03/26/18	FOR CONSTRUCTION	JRL

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Tyler M. Barker
CLS - Director of Engineering
PE # 124473 Exp. 9/30/2018
COA # F - 13220 Exp. 1/31/2019

3/28/2018

PE# 124473 EXP: 09/30/2018

DX2847

FAIRWAY GREEN PARK

FA#: 12677370

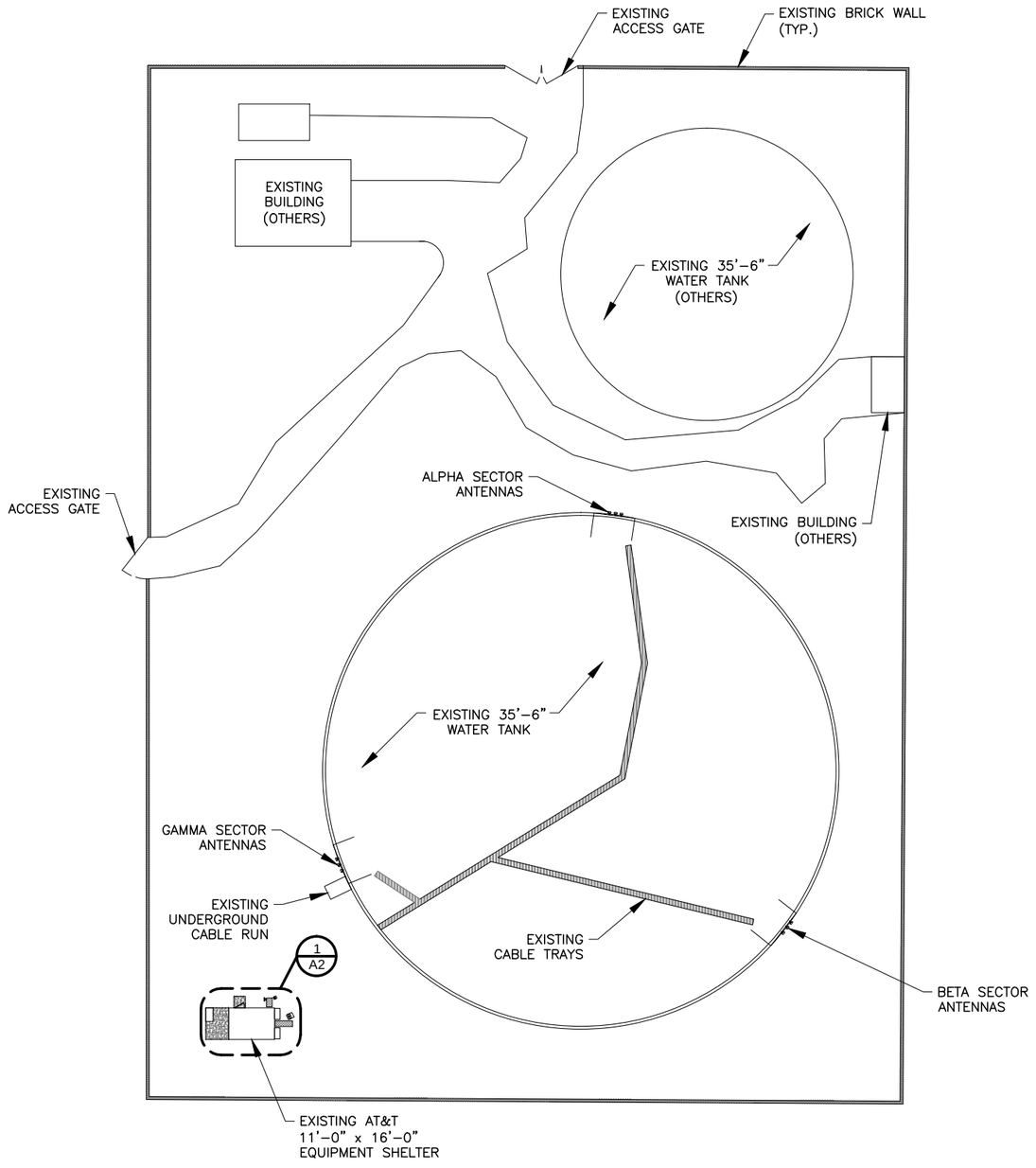
3096 BIG LEAF DRIVE
LITTLE ELM, TX 75068

SHEET TITLE

GENERAL NOTES

SHEET NUMBER

GN1



1 SITE PLAN

SCALE: 0' 25' 50' 100' 1"=50'

TRUE NORTH

at&t
1801 VALLEY VIEW LANE
FARMERS BRANCH, TX 75234

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STATE OF TEXAS
TYLER M. BARKER
124473
PROFESSIONAL ENGINEER
LICENSED

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FAIRWAY GREEN PARK

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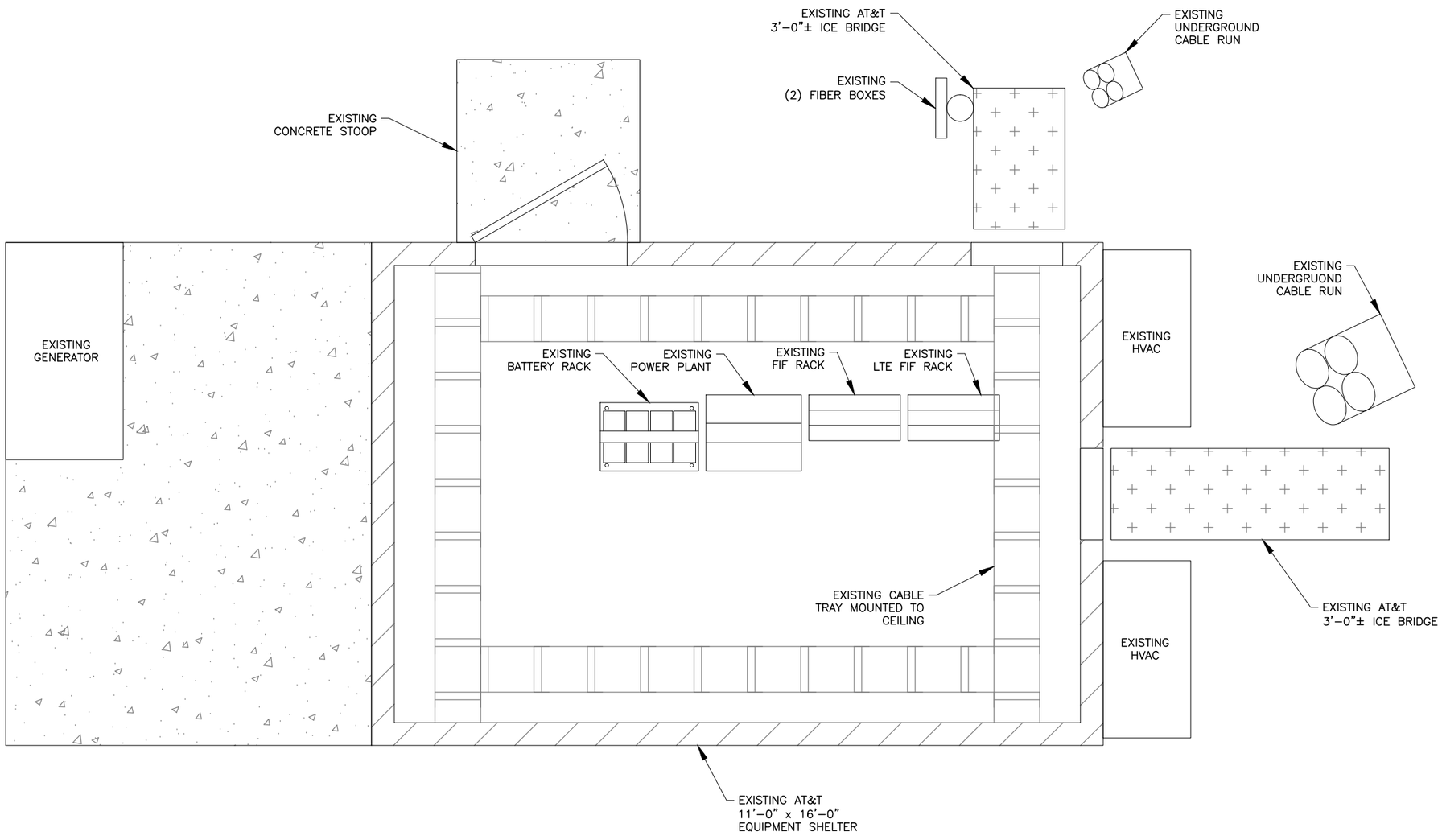
SHEET TITLE

SITE PLAN

SHEET NUMBER

A1



1 EXISTING EQUIPMENT PLAN

SCALE: 3/8"=1'-0"

0' 6" 1' 3' 6'

TRUE NORTH

at&t
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FAIRWAY GREEN PARK

FA#: 12677370

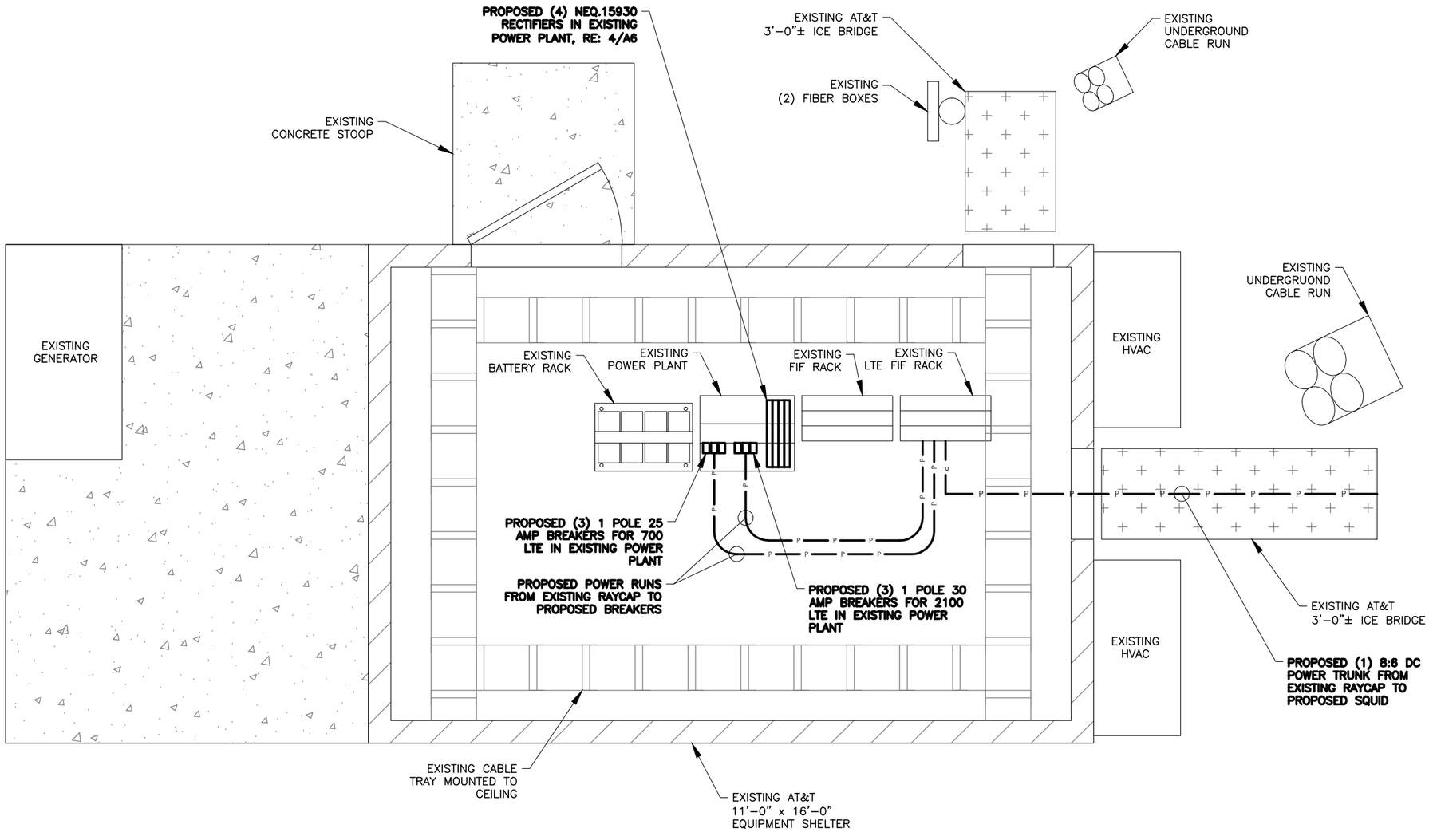
3096 BIG LEAF DRIVE
LITTLE ELM, TX 75068

SHEET TITLE

EXISTING
EQUIPMENT PLAN

SHEET NUMBER

A2



1 PROPOSED EQUIPMENT PLAN

SCALE: 0' 6" 1' 3' 6' 3/8"=1'-0"

TRUE NORTH

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SHEET TITLE

PROPOSED EQUIPMENT PLAN

SHEET NUMBER

A2.1

LOADING NOTE:

OTHER CARRIERS EQUIPMENT MAY BE OMITTED FOR CLARITY.

TOWER NOTES

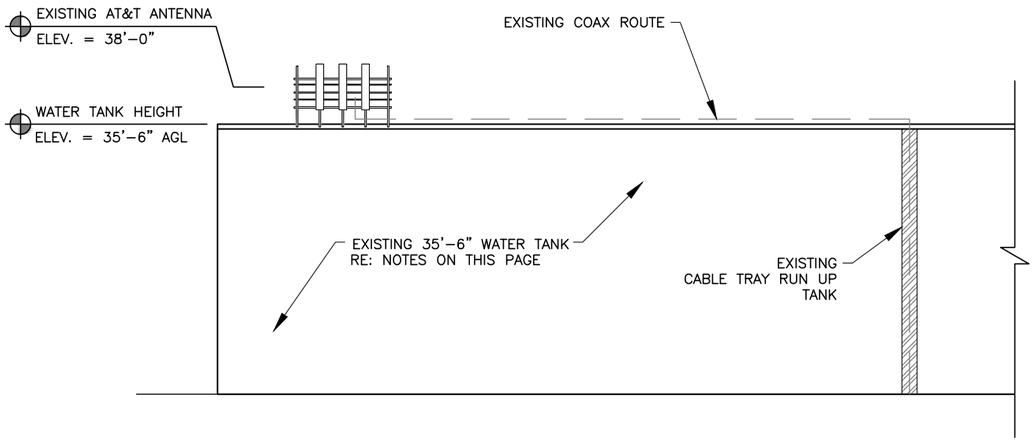
WATER TANK IS SHOWN FOR ILLUSTRATION ONLY AND FOR LOCATION OF APPURTENANCE(S).

REFER TO WATER TANK SURVEY FOR ALL EXISTING WATER TANK COMPONENTS TO INCLUDE ANTENNAS, LIGHTS, LIGHTNING ROD & WATER TANK HEIGHT.

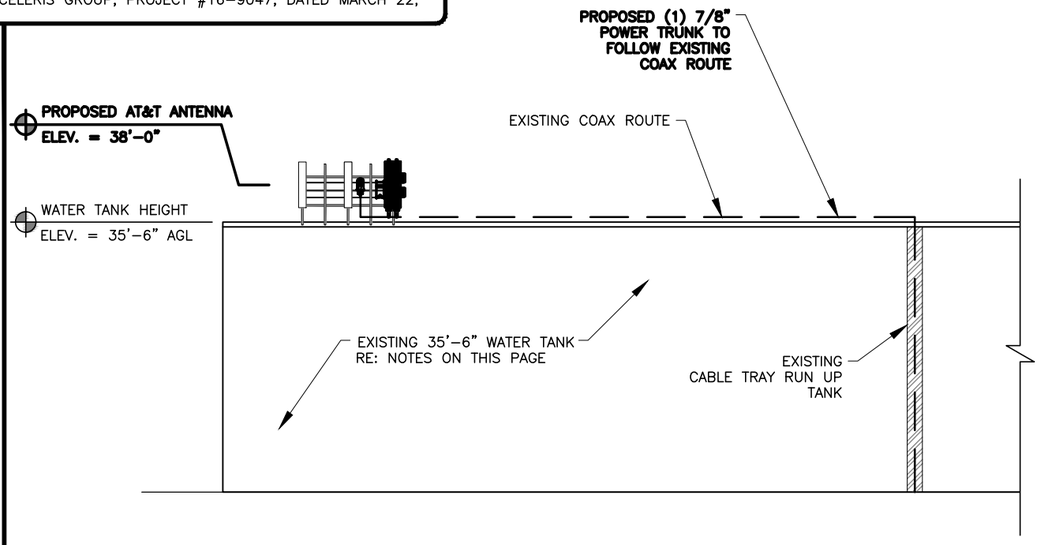
CONTRACTOR(S) TO COMPLY WITH ALL FCC AND FAA REGULATIONS ON THIS PROJECT.
COAX ROUTING MUST BE PER STRUCTURAL ANALYSIS.

PRIOR TO CONSTRUCTION:
CONTRACTOR SHALL VERIFY THAT A WATER TANK AND MOUNT STRUCTURAL ANALYSIS, DEPICTING THE LOADING SHOWN, HAS BEEN PERFORMED AND SHOWS A "PASS" OR AN "ACCEPTABLE" RATING. UNDER NO CIRCUMSTANCE WHAT SO EVER SHALL THE PROPOSED EQUIPMENT BE INSTALLED WITHOUT SAID STRUCTURAL ANALYSIS. IF SAID STRUCTURAL ANALYSIS REQUIRES THAT THE WATER TANK AND/OR MOUNT BE MODIFIED, SUCH MODIFICATIONS SHALL BE COMPLETED PRIOR TO INSTALLATION OF THE PROPOSED EQUIPMENT.

MOUNT ANALYSIS AND STRUCTURAL ANALYSIS DONE BY CELERIS GROUP, PROJECT #16-9047, DATED MARCH 22, 2018.



1 EXISTING ELEVATION
SCALE: N.T.S.



2 PROPOSED ELEVATION
SCALE: N.T.S.

EXISTING EQUIPMENT
REMOVING EQUIPMENT IS ITALICIZED

	TOTAL
EQUIPMENT RAD	38
AZIMUTH	8/128/248
MOUNT TYPE	Wall Mount
ANTENNAS	*(E) (3) SBNH-1D6565B* (E) (6) SBNHH-1D65B
TMAs	
DIPLEXERS	
RRUs	(E) (3) RRUS-11 (700 LTE) (E) (3) RRUS-32 (1900 LTE) *(E) (3) RRUS-01 (850 UMTS)* (E) (3) RRUS-11 (850 UMTS) (E) (3) RRUS-32 (2300 LTE) *(E) (3) RRUS-12 (850 LTE)*
RRU LOCATION	BEHIND ANTENNA
ADD'L EQUIPMENT	(E) (3) DC6-48-60-18-8F
COAX	
CABLES	(E) (1) RET (E) (3) 1/2" FIBER (E) (6) 7/8" POWER

FINAL EQUIPMENT
PROPOSED EQUIPMENT IS BOLDED

	TOTAL
EQUIPMENT RAD	38
AZIMUTH	8/128/248
MOUNT TYPE	Wall Mount
ANTENNAS	**(P) (6) JAHH-65B-R3B-V3** (E) (6) SBNHH-1D65B
TMAs	
DIPLEXERS	
RRUs	(E) (3) RRUS-11 (700 LTE) (E) (3) RRUS-32 (1900 LTE) (E) (3) RRUS-11 (850 UMTS) (E) (3) RRUS-32 (2300 LTE) **(P) (3) RRUS-4478 B14 (700 LTE)** **(P) (3) RRUS-4478 B5 (850 LTE)** **(P) (3) RRUS-32 B66 (2100 LTE)**
RRU LOCATION	BEHIND ANTENNA
ADD'L EQUIPMENT	(E) (3) DC6-48-60-18-8F **(P) (1) DC6-48-60-18-8C**
COAX	
CABLES	(E) (1) RET (E) (3) 1/2" FIBER (E) (6) 7/8" POWER **(P) (1) 7/8" POWER**

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3/28/2018

PE# 124473 EXP: 09/30/2018

DX2847

FAIRWAY GREEN PARK

FA#: 12677370

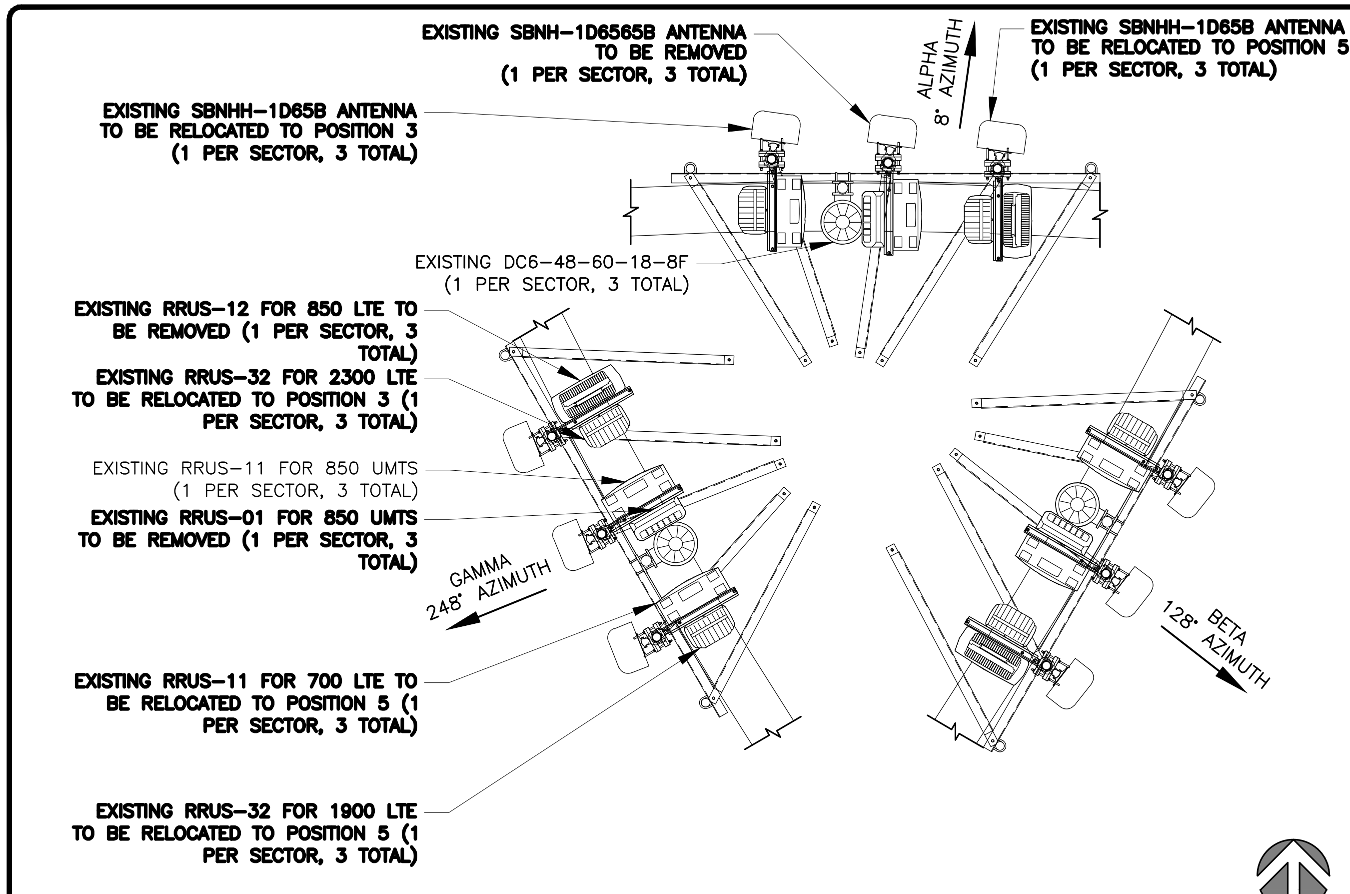
3096 BIG LEAF DRIVE
LITTLE ELM, TX 75068

SHEET TITLE

TOWER ELEVATION

SHEET NUMBER

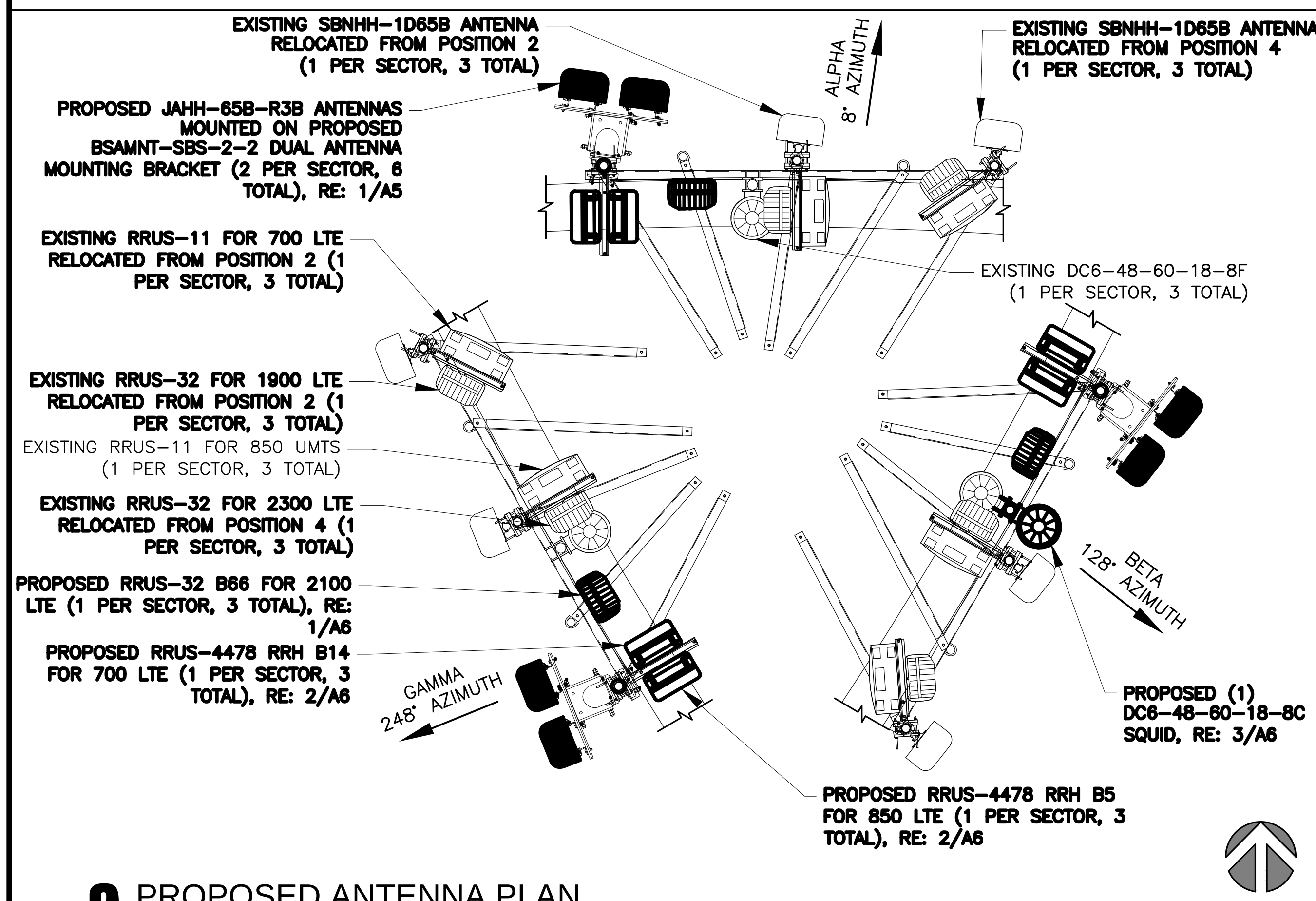
A3



1 EXISTING ANTENNA PLAN
SCALE: N.T.S.

EXISTING EQUIPMENT
REMOVING EQUIPMENT IS ITALICIZED

	ALPHA	BETA	GAMMA	TOTAL
EQUIPMENT RAD	38	38	38	38
AZIMUTH	128	128	248	8/128/248
MOUNT TYPE	Wall Mount	Wall Mount	Wall Mount	Wall Mount
ANTENNAS	*(E) (1) SBNH-1D6565B* (E) (2) SBNHH-1D65B	*(E) (1) SBNH-1D6565B* (E) (2) SBNHH-1D65B	*(E) (1) SBNH-1D6565B* (E) (2) SBNHH-1D65B	*(E) (3) SBNH-1D6565B* (E) (6) SBNHH-1D65B
TMAs				
DIPLEXERS				
RRUs	(E) (1) RRUS-11 (700 LTE) (E) (1) RRUS-32 (1900 LTE) *(E) (1) RRUS-01 (850 UMTS)* (E) (1) RRUS-11 (850 UMTS) (E) (1) RRUS-32 (2300 LTE) *(E) (1) RRUS-12 (850 LTE)*	(E) (1) RRUS-11 (700 LTE) (E) (1) RRUS-32 (1900 LTE) *(E) (1) RRUS-01 (850 UMTS)* (E) (1) RRUS-11 (850 UMTS) (E) (1) RRUS-32 (2300 LTE) *(E) (1) RRUS-12 (850 LTE)*	(E) (1) RRUS-11 (700 LTE) (E) (1) RRUS-32 (1900 LTE) *(E) (1) RRUS-01 (850 UMTS)* (E) (1) RRUS-11 (850 UMTS) (E) (1) RRUS-32 (2300 LTE) *(E) (1) RRUS-12 (850 LTE)*	(E) (3) RRUS-11 (700 LTE) (E) (3) RRUS-32 (1900 LTE) *(E) (3) RRUS-01 (850 UMTS)* (E) (3) RRUS-11 (850 UMTS) (E) (3) RRUS-32 (2300 LTE) *(E) (3) RRUS-12 (850 LTE)*
RRU LOCATION	BEHIND ANTENNA	BEHIND ANTENNA	BEHIND ANTENNA	BEHIND ANTENNA
ADD'L EQUIPMENT	(E) (1) DC6-48-60-18-8F	(E) (1) DC6-48-60-18-8F	(E) (1) DC6-48-60-18-8F	(E) (3) DC6-48-60-18-8F
COAX				
CABLES	(E) (1) RET (E) (1) 1/2" FIBER (E) (2) 7/8" POWER	(E) (1) 1/2" FIBER (E) (2) 7/8" POWER	(E) (1) 1/2" FIBER (E) (2) 7/8" POWER	(E) (1) RET (E) (3) 1/2" FIBER (E) (6) 7/8" POWER



2 PROPOSED ANTENNA PLAN
SCALE: N.T.S.

FINAL EQUIPMENT
PROPOSED EQUIPMENT IS BOLDED

	ALPHA	BETA	GAMMA	TOTAL
EQUIPMENT RAD	38	38	38	38
AZIMUTH	128	128	248	8/128/248
MOUNT TYPE	Wall Mount	Wall Mount	Wall Mount	Wall Mount
ANTENNAS	**(P) (2) JAHH-65B-R3B-V3** (E) (2) SBNHH-1D65B	**(P) (2) JAHH-65B-R3B-V3** (E) (2) SBNHH-1D65B	**(P) (2) JAHH-65B-R3B-V3** (E) (2) SBNHH-1D65B	**(P) (6) JAHH-65B-R3B-V3** (E) (6) SBNHH-1D65B
TMAs				
DIPLEXERS				
RRUs	(E) (1) RRUS-11 (700 LTE) (E) (1) RRUS-32 (1900 LTE) (E) (1) RRUS-11 (850 UMTS) (E) (1) RRUS-32 (2300 LTE) **(P) (1) RRUS-4478 B14 (700 LTE)** **(P) (1) RRUS-4478 B5 (850 LTE)** **(P) (1) RRUS-32 B66 (2100 LTE)**	(E) (1) RRUS-11 (700 LTE) (E) (1) RRUS-32 (1900 LTE) (E) (1) RRUS-11 (850 UMTS) (E) (1) RRUS-32 (2300 LTE) **(P) (1) RRUS-4478 B14 (700 LTE)** **(P) (1) RRUS-4478 B5 (850 LTE)** **(P) (1) RRUS-32 B66 (2100 LTE)**	(E) (1) RRUS-11 (700 LTE) (E) (1) RRUS-32 (1900 LTE) (E) (1) RRUS-11 (850 UMTS) (E) (1) RRUS-32 (2300 LTE) **(P) (1) RRUS-4478 B14 (700 LTE)** **(P) (1) RRUS-4478 B5 (850 LTE)** **(P) (1) RRUS-32 B66 (2100 LTE)**	(E) (3) RRUS-11 (700 LTE) (E) (3) RRUS-32 (1900 LTE) (E) (3) RRUS-11 (850 UMTS) (E) (3) RRUS-32 (2300 LTE) **(P) (3) RRUS-4478 B14 (700 LTE)** **(P) (3) RRUS-4478 B5 (850 LTE)** **(P) (3) RRUS-32 B66 (2100 LTE)**
RRU LOCATION	BEHIND ANTENNA	BEHIND ANTENNA	BEHIND ANTENNA	BEHIND ANTENNA
ADD'L EQUIPMENT	(E) (1) DC6-48-60-18-8F	(E) (1) DC6-48-60-18-8F **(P) (1) DC6-48-60-18-8C**	(E) (1) DC6-48-60-18-8F	(E) (3) DC6-48-60-18-8F **(P) (1) DC6-48-60-18-8C**
COAX				
CABLES	(E) (1) RET (E) (1) 1/2" FIBER (E) (2) 7/8" POWER	(E) (1) 1/2" FIBER (E) (2) 7/8" POWER **(P) (1) 7/8" POWER**	(E) (1) 1/2" FIBER (E) (2) 7/8" POWER	(E) (1) RET (E) (3) 1/2" FIBER (E) (6) 7/8" POWER **(P) (1) 7/8" POWER**

at&t
1801 VALLEY VIEW LANE
FARMERS BRANCH, TX 75234

ERICSSON
6300 LEGACY DRIVE
PLANO, TX 75024

CLSGroup
609 S. KELLY AVENUE, STE. D
EDMOND, OK 73003
PH: (405) 348-5460 FAX:(405) 341-4625
COA# F-13220 EXP. 01/31/2019

REVISIONS

REV.	DATE	DESCRIPTION	INITIALS
A	02/28/18	PRELIMINARY ISSUE	JRL
0	03/26/18	FOR CONSTRUCTION	JRL

NOT FOR CONSTRUCTION UNLESS LABELED AS CONSTRUCTION SET

STATE OF TEXAS
TYLER M. BARKER
124473
LICENSED PROFESSIONAL ENGINEER
Tyler M. Barker
CLS - Director of Engineering
PE # 124473 Exp. 9/30/2018
COA # F - 13220 Exp. 1/31/2019
3/28/2018
PE# 124473 EXP: 09/30/2018

DX2847
FAIRWAY GREEN PARK
FA#: 12677370
3096 BIG LEAF DRIVE
LITTLE ELM, TX 75068

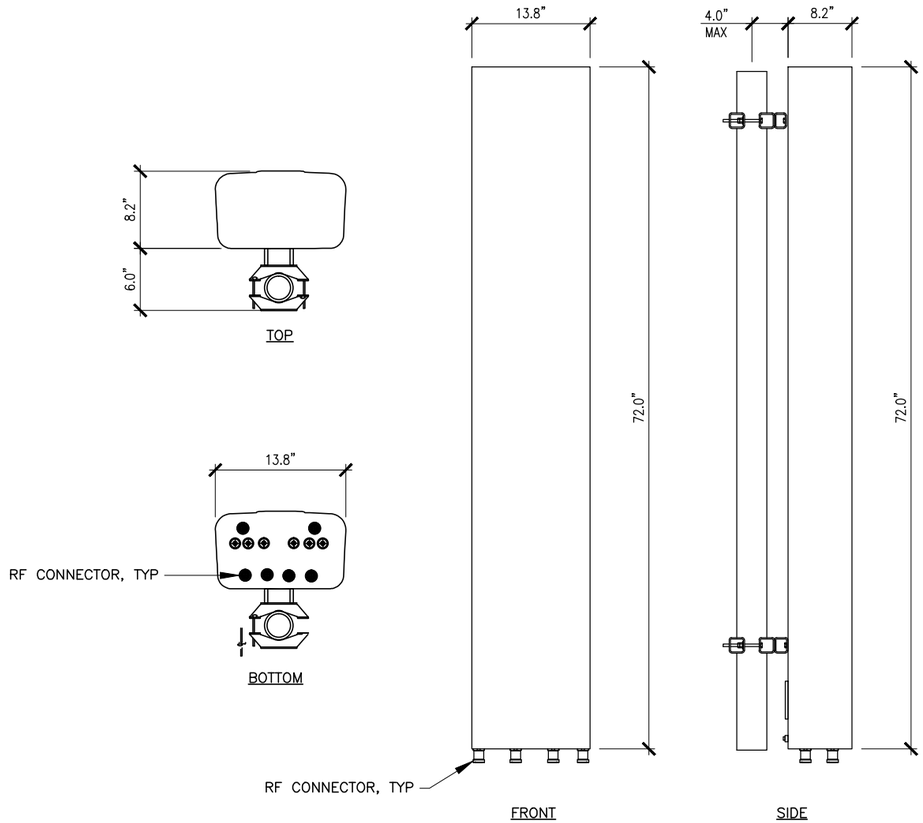
SHEET TITLE
ANTENNA PLAN

SHEET NUMBER
A4

ANTENNA INFORMATION
PULLED FROM PRELIMINARY
PRODUCT DATA SHEET

COMMSCOPE JAHH-65B-R3B

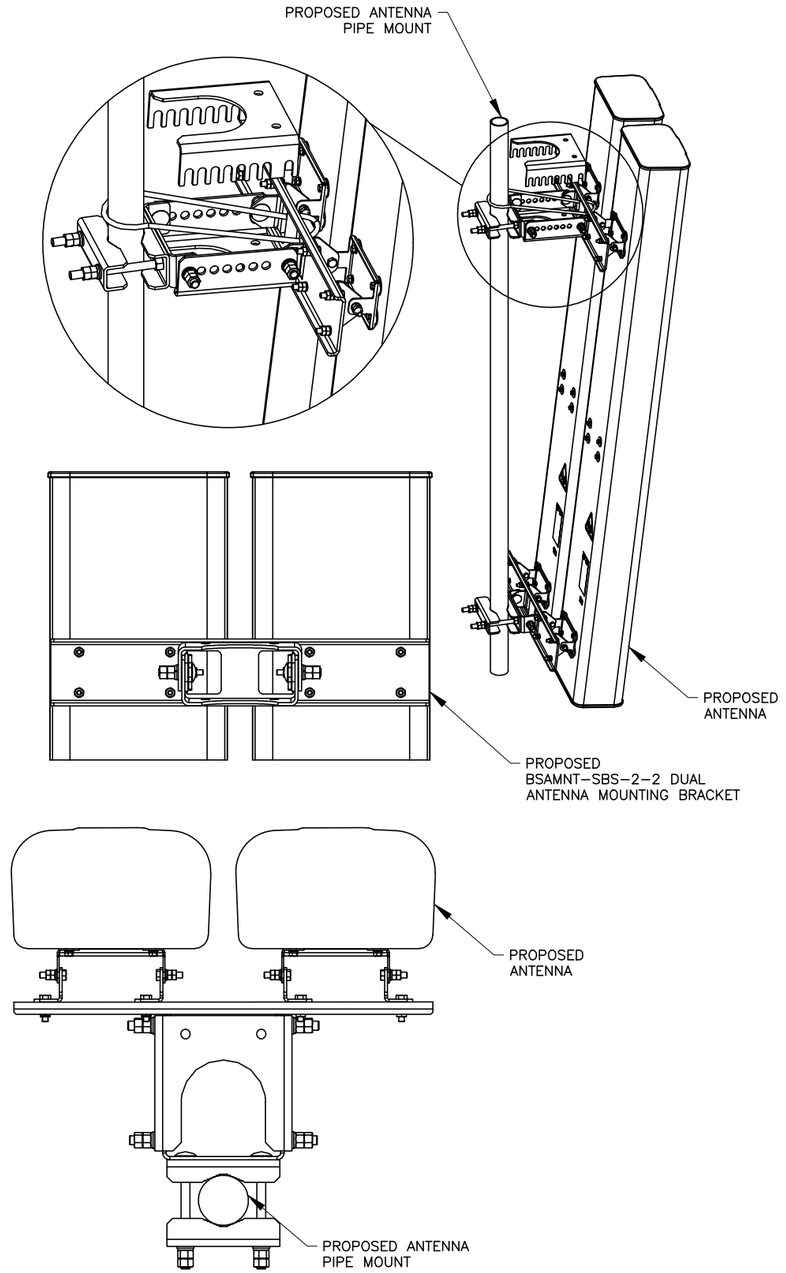
MANUFACTURE:	COMMSCOPE
MODEL:	JAHH-65B-R3B
DIMENSIONS:	72.0" X 13.8" X 8.2"
H X W X D	
WEIGHT:	63.3 LBS
FREQUENCY:	REFER TO RF DATA SHEET



1 ANTENNA SPECIFICATIONS

SCALE: N.T.S.

RE: GN22/GN1



2 BSAMNT-SBS-2-2 ANTENNA MOUNT SPECIFICATIONS

SCALE: N.T.S.

RE: GN22/GN1

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FARMERS BRANCH, TX 75234

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DX2847

FAIRWAY GREEN PARK

FA#: 12677370

3096 BIG LEAF DRIVE
LITTLE ELM, TX 75068

SHEET TITLE

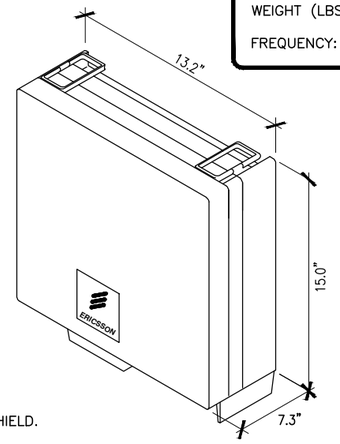
EQUIPMENT
DETAILS

SHEET NUMBER

A5

ERICSSON 4478 RRH B5 & B14

MANUFACTURE:	ERICSSON
MODEL:	RADIO 4478 B5 & B14
DIMENSIONS: H X W X D	15.0" X 13.2" X 7.3"
WEIGHT (LBS):	59.4 LBS
FREQUENCY:	REFER TO RF DATA SHEET



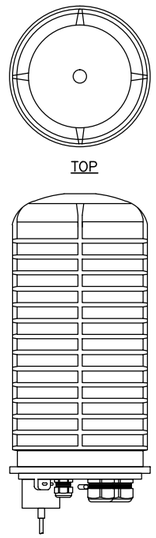
NOTE:
RRUS CAN ONLY BE
PAINTED ON SOLAR SHIELD.

2 4478 RRH SPECIFICATIONS
SCALE: N.T.S.

RE: GN22/GN1

RAYCAP DC6-48-60-18-8C

MANUFACTURE:	RAYCAP
MODEL:	DC6-48-60-18-8C
DIMENSIONS: H X W X D	23.5" X 9.7" X 9.7"
WEIGHT:	26 LB W/ BRACKET
NOMINAL OPERATION: VOLTAGE	48 VDC
VOLTAGE PROTECTION: RATING	400 VOLTS



TOP

FRONT

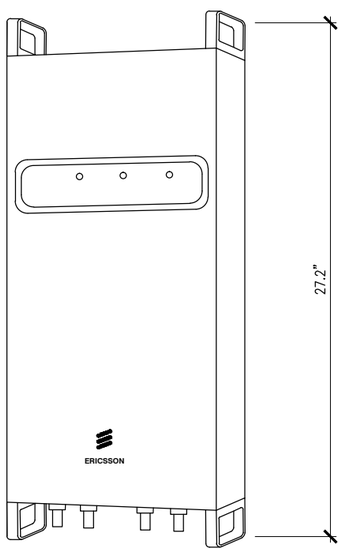
EQUIPMENT INFORMATION
PULLED FROM PRELIMINARY
PRODUCT DATA SHEET

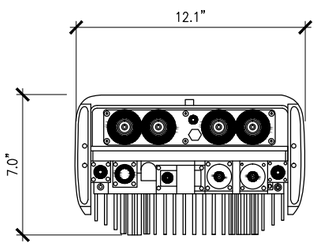
3 SURGE PROTECTOR SPECIFICATIONS
SCALE: N.T.S.

RE: GN22/GN1

ERICSSON RRUS-32 B2 & B66

MANUFACTURE:	ERICSSON
MODEL:	RRUS-32 B2 & B66
DIMENSIONS: H X W X D	27.2" X 12.1" X 7.0"
WEIGHT:	53 LBS
FREQUENCY:	REFER TO RF DATA SHEET





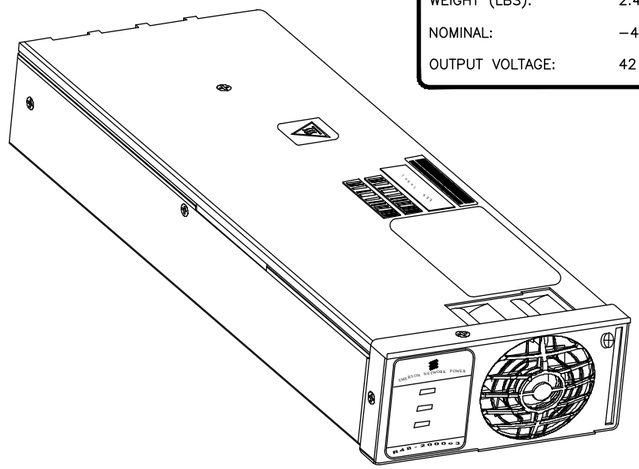
BOTTOM

1 REMOTE RADIO UNIT SPECIFICATIONS
SCALE: N.T.S.

RE: GN22/GN1

NEQ. 15930 RECTIFIER

MANUFACTURE:	EMERSON
MODEL:	UM1R482000e3
DIMENSIONS: H X W X D (IN)	1.7" X 3.3" X 9.9"
WEIGHT (LBS):	2.49 LBS
NOMINAL:	-48 VOLTS DC
OUTPUT VOLTAGE:	42 TO 58 VOLTS DC



4 NEQ. 15930 RECTIFIER (UM1R482000e3)
SCALE: N.T.S.

RE: GN22/GN1

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FARMERS BRANCH, TX 75234

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FAIRWAY GREEN PARK

FA#: 12677370

3096 BIG LEAF DRIVE
LITTLE ELM, TX 75068

SHEET TITLE

EQUIPMENT
DETAILS

SHEET NUMBER

A6

KLEINFELDER

Bright People. Right Solutions.

Appendix B

Ron Perrin
Water Technologies

PO Box 101614
Fort Worth, Texas 76185

Phone 1-888-481-1ROV

Inspection Report

Date of Inspection: 8/29/2022

Location: Town of Little Elm, Mansell pump station, Kleinfelder

Inspector: Joshua Jones

Type: Ground

Size: 5,000,000 Gallons

TCEQ Title 30. CHAPTER 290.46 (m)(1). (1) Each of the system's ground, elevated, and pressure tanks shall be inspected annually by water system personnel or a contracted inspection service.

(A) Ground and elevated storage tank inspections must determine that the vents are in place and properly screened, the roof hatches closed and locked, flap valves and gasketing provide adequate protection against insects, rodents, and other vermin, the interior and exterior coating systems are continuing to provide adequate protection to all metal surfaces, and the tank remains in a watertight condition.

Tank Overview

Vents in place and properly screened? **No.** Vent screen needs to be replaced.

STATE RULE: TCEQ Title 30. CHAPTER 290.43 (c) (1) Roof vents shall be gooseneck or roof ventilator and be designed by the engineer based on the maximum outflow from the tank. Vents shall be installed in strict accordance with current AWWA standards and shall be equipped with approved screens to prevent entry of animals, birds, insects and heavy air contaminants. Screens shall be fabricated of corrosion-resistant material and shall be 16-mesh or finer. Screens shall be securely clamped in place with stainless or galvanized bands or wires and shall designed to withstand winds of not less than tank design criteria (unless specified otherwise by the engineer).

Top vent structure

Top vent screen needs to be replaced

Roof Hatch closed and properly locked? **Yes**
Roof: Hatch proper size and design? **Yes**

STATE RULE: TCEQ Title 30. CHAPTER 290.43 (c) (2) All roof openings shall be designed in accordance with current AWWA standards. If an alternate 30 inch diameter access opening is not provided in a storage tank, the primary roof access opening shall not be less than 30 inches in diameter. Other roof openings required only for ventilating purposes during cleaning, repairing or painting operations shall be not less than 24 inches in diameter or as specified by the licensed professional engineer. An existing tank without a 30-inch in diameter access opening must be modified to meet this requirement when major repair or maintenance is performed on the tank. Each access opening shall have a raised curbing at least four inches in height with a lockable cover that overlaps the curbing at least two inches in a downward direction. Where necessary, a gasket shall be used to make a positive seal when the hatch is closed. All hatches shall remain locked except during inspections and maintenance.

Roof Hatch closed

Roof hatch opened

Is there a 30” Hatch, manway or bolted panel at any location on the tank? **No, only roof hatches. Lower manway was removed at one point.**

STATE RULE: TCEQ Title 30. CHAPTER 290.43 (c) (10) Access manways in the riser pipe, shell area, access tube, bowl area or any other location opening directly into the water compartment shall be located in strict accordance with current AWWA standards. These openings shall not be less than 24 inches in diameter. However, in the case of a riser pipe or access tube of 36 inches in diameter or smaller, the access manway may be 18 inches times 24 inches with the vertical dimension not less than 24 inches. The primary access manway in the lower ring or section of a ground storage tank shall be not less than 30 inches in diameter. Where necessary, for any access manway which allows direct access to the water compartment, a gasket shall be used to make a positive seal when the access manway is closed.

Inside of manway that was filled in

Overflow flapper valves and gaskets provide adequate protection against insects, rodents and other vermin? **Yes**. Flapper was in **good** condition.

STATE RULE: TCEQ Title 30. CHAPTER 290.43 (c) (3) Overflows shall be designed in strict accordance with current AWWA standards and shall terminate with a gravity-hinged and weighted cover. The cover shall fit tightly with no gap over 1/16 inch. If the overflow terminates at any point other than the ground level, it shall be located near enough and at a position accessible from a ladder or the balcony for inspection purposes. The overflow(s) shall be sized to handle the maximum possible fill rate without exceeding the capacity of the overflow(s). The discharge opening of the overflow(s) shall be above the surface of the ground and shall not be subject to submergence.


Overflow flapper and splashpad

Overflow flapper

Interior was found in **good** condition.

Inside wall

Inside roof and pillars

Inside roof and pillars

Inside wall behind the ladder

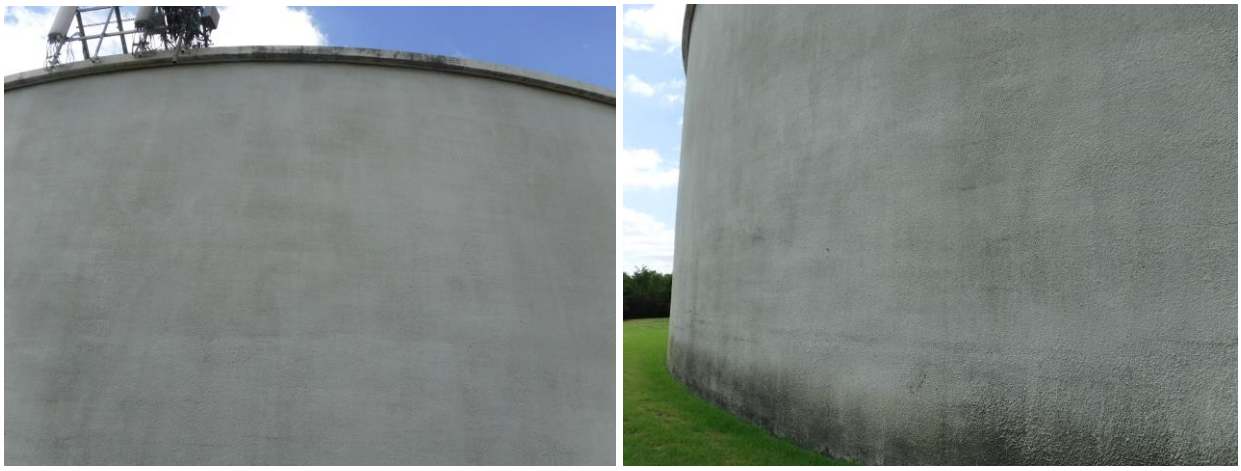
Outlet pipe Inlet pipe

One piece of concrete found on the floor from an edge somewhere in the tank

Exterior was in **good** condition.

STATE RULE: TCEQ Title 30. CHAPTER 290.43 (c) (8) All clearwells, ground storage tanks, standpipes, and elevated tanks shall be painted, disinfected, and maintained in strict accordance with current AWWA standards. However, no temporary coatings, wax grease coatings, or coating materials containing lead will be allowed. No other coatings will be allowed which are not approved for use (as a contact surface with potable water) by the EPA, National Sanitation Foundation (NSF), or United States Food and Drug Administration (FDA). All newly installed coatings must conform to American National Standards Institute/National Sanitation Foundation (ANSI/NSF) Standard 61 and must be certified by an organization accredited by ANSI.

Side of tank



Side of tank

Side of tank with cracking in the texture

Side of tank with some chipped texture

Side of tank and lip


Roof of tank with antennas and cables


Roof of tank


Roof of tank and concrete hatch

The tank is in watertight condition? **Yes**

Potable water leaking out? **No** Rain water leaking in? **No**

STATE RULE: TCEQ Title 30. CHAPTER 290.43 (c) (6) Clearwells and potable water storage tanks shall be thoroughly tight against leakage, shall be located above the groundwater table, and shall have no walls in common with any other plant units containing water in the process of treatment. All associated appurtenances including valves, pipes, and fittings shall be tight against leakage.

Outside access ladder corroded rungs? **No**
Loose rungs or bolts? **No**
The outside ladder was found in **good** condition.

Outside ladder

Inside ladder above waterline corroded? **No** Below waterline? **No**
Loose rungs or bolts above waterline? **No** Below waterline? **No**

Inside Ladder growth on lower ladder

Foundation: Settling, cracking, anchor bolt problems, deterioration, foundation settling , Spalling, exposed reinforcing steel, vegetation at tank base? **No**

Foundation was found in **good** condition

Foundation

Cathodic Protection: **No**. Anode Plates sealed and secured. **N/A**

Low spots on roof **No** Holes along seams on roof. **No**

Water Quality: Insects or birds in tank? **No**

Debris on the floor of the tank? **Yes, two unidentified objects**

Object 1 and 2 where on other ends of the tanks but both near inlet pipes

Sediment on bottom? **Yes.** Estimated Depth of sediment (if any)? ¼”

Sediment

Oil on the surface of stored water? **No**

Floating debris on the surface of the water? **No**

Is the water level indicator working? **Yes**

STATE RULE: TCEQ Title 30. CHAPTER 290.43 (c)(4) All clearwells and water storage tanks shall have a liquid level indicator located at the tank site. The indicator can be a float with a moving target, an ultrasonic level indicator, or a pressure gauge calibrated in feet of water. If an elevated tank or standpipe has a float with moving target indicator, it must also have a pressure indicator located at ground level. Pressure gauges must not be less than three inches in diameter and calibrated at not more than two-foot intervals. Remote reading gauges at the owner's treatment plant or pumping station will not eliminate the requirement for a gauge at the tank site unless the tank is located at the plant or station.

Bottom of float cable

Basic Security Evaluation: 1). Intruder resistant fence in place? **Yes.**

2). Condition of fence. **Good** 3). Security Lighting? **Yes**

4). Ladder guards in place, or the ladder is 8 or more feet from the ground? **Yes**

5). Illegal entry points noted? None

STATE RULE: TCEQ Title 30. CHAPTER 290.43 (e) Facility security. All potable water storage tanks and pressure maintenance facilities must be installed in a lockable building that is designed to prevent intruder access or enclosed by an intruder-resistant fence with lockable gates. Pedestal-type elevated storage tanks with lockable doors and without external ladders are exempt from this requirement. The gates and doors must be kept locked whenever the facility is unattended.

Other Notes: None

Fence

Fence since