March 17, 2017

Mr. Sahar Chapuk
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Subject: Maintenance and Condition Assessment Report

AT&T/Black & Veatch Designation:	**Site Name:**	Green
	Site Number:	KS4130
Engineering Firm Designation:	**TEP Project Number:**	75971-66325
Site Data:	**202 E. Third St.** **Lee's Summit, Jackson County, MO 64063** **Latitude N *38° 54' 49.97"*, Longitude W *94° 22' 26.77"*** **145± Foot – Monopole Tower**	

Dear Mr. Chapuk,

Tower Engineering Professionals (TEP) completed a periodic inspection for the above referenced site. The onsite investigation was performed by Kyle Johnson and Alex Ponamarchuk of TEP during the March 8, 2017 site visit. The inspection was in accordance with the ANSI/TIA-222-G-2005, Annex J: Maintenance and Condition Assessment (Normative), including all addendums (addendums TIA-222-G-1 2007 and TIA 222-G-2 2009); the checklist is pages 2 thru 7 of this report.

Observations and recommendations are listed herein. The inspection included observation of tower members, bolted connections, and foundations above grade. For the purpose of this inspection, the tower flats were named by number according to the safety climb cable. The flat with the safety climb cable is labeled "flat 1", followed clockwise by "flat 2" through "flat 12."

Thank you for the opportunity to provide this service for you. If you have any questions or comments, please contact our office.

Sincerely,

Nicholas M. Constantine
Rocky Mountain Regional Director

ANSI/TIA-222-G MAINTENANCE AND CONDITION ASSESSMENT

A. STRUCTURE CONDITION

A.1. Damaged members (legs and bracing)			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
A.2. Loose members			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
A.3. Missing members			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
A.4. Climbing facilities, platforms, catwalks – all secure			
☐ Okay	☐ Possible Improvement	☒ Needs Repair	☐ Not Applicable
Notes: The safety climb cable and bottom connection are loose. One step peg was bent. The tail at the top of the safety climb cable was not projecting the minimum 1" above the sleeve per the manufacturer specifications. See the executive summary for further details.			
A.5. Loose and/or missing bolts and/or nut locking devices			
☐ Okay	☐ Possible Improvement	☒ Needs Repair	☐ Not Applicable
Notes: Loose bolts were observed on the platform mount. See the executive summary for further details.			
A.6. Visible cracks in welded connections			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			

B. FINISH

B.1. Paint and/or galvanizing condition			
☐ Okay	☐ Possible Improvement	☒ Needs Repair	☐ Not Applicable
Notes: See B.2.			
B.2. Rust and/or corrosion condition including mounts and accessories			
☐ Okay	☐ Possible Improvement	☒ Needs Repair	☐ Not Applicable
Notes: The tower paint is chipping throughout and there is moderate surface corrosion on tower, step peg brackets and mounting hardware. See the executive summary for further details.			
B.3. FAA or ICAO color marking conditions			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
B.4. Water collection in members (to be remedied, e.g., unplug drain holes, etc.)			
☐ Okay	☐ Possible Improvement	☒ Needs Repair	☐ Not Applicable
Notes: Trash/debris was observed inside the monopole base. See the executive summary for further details.			

C. LIGHTING

C.1. Conduit, junction boxes, and fasteners (weather tight and secure)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
C.2. Drains and vents openings (unobstructed)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
C.3. Wiring Condition			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
C.4. Light lenses			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
C.5. Bulb condition			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
C.6.a. Controllers functioning (Flasher)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes: TEP did not verify.			
C.6.b. Controllers functioning (Photo control)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes: TEP did not verify			
C.6.c. Controllers functioning (Alarms)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			

D. GROUNDING

D.1. Connections			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
D.2. Corrosion			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
D.3. Lightning protection (secured to structure)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			

E. ANTENNAS AND LINES

E.1. Antenna condition			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
E.2. Mount and/or ice shield condition (bent, loose, and/or missing members)			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
E.3. Feed line condition (flanges, seals, dents, jacket damage, grounding, etc.)			
☐ Okay	☒ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes: Multiple coax were observed to have been cut. See the executive summary for further details.			
E.4. Hanger condition (snap-ins, bolt on, kellum grips, etc.)			
☐ Okay	☒ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes: Corrosion was observed on the coax hangers installed on the inside of the porthole at elevation 120'. See the executive summary for further details.			
E.5. Secured to structure			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			

F. OTHER APPURTENANCES (WALKWAYS, PLATFORMS, SENSORS, FLOODLIGHTS, ETC.)

F.1. Condition			
☐ Okay	☐ Possible Improvement	☒ Needs Repair	☐ Not Applicable
Notes: The lightning rod does not project 3' above the top of the top appurtenance. See the executive summary for further details.			
F.2. Secured to structure			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			

G. INSULATOR CONDITION

G.1. Cracking and chipping			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
G.2. Cleanliness of insulators			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
G.3. Spark gaps set properly			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
G.4. Isolation transformer condition			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
G.5. Bolts and connection secure			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			

H. GUYS

H.1. Strand condition (corrosion, breaks, nicks, kinks, etc.)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.2.a. Guy Hardware Conditions (Turnbuckles or equivalent (secure and safety properly applied)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.2.b. Guy Hardware Conditions (Cable thimbles properly in place (if required))			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.2.c. Guy Hardware Conditions (Service sleeves properly in place (if required))			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.2.d.i. Guy Hardware Conditions (Cable connectors (*end fittings*) (Cable clamps applied properly and bolts tight)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.2.d.ii. Guy Hardware Conditions (Cable connectors (*end fittings*) (Wire serving properly applied))			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.2.d.iii. Guy Hardware Conditions (Cable connectors (*end fittings*) (No signs of slippage or damaged strands))			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.2.d.iv. Guy Hardware Conditions (Cable connectors (Preformed wraps – properly applied, fully wrapped, & sleeve in place))			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.2.d.v. Guy Hardware Conditions (Cable connectors (*end fittings*) (Poured sockets secure and showing no separation))			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.2.d.vi. Guy Hardware Conditions (Cable connectors (Shackles, bolts, pins, and cotter pins secure and in good condition))			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.3. Guy tensions			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.4. Measure guy tensions			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
H.5. Record temperature, wind speed and wind direction			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			

I. CONCRETE FOUNDATIONS

I.1.a. Ground condition (Settlement, movement or earth cracks)			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
I.1.b. Ground condition (Erosion)			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
I.1.c. Ground condition (Site condition (standing water, drainage, trees, etc.))			
☐ Okay	☐ Possible Improvement	☒ Needs Repair	☐ Not Applicable
Notes: Vegetation and trash/debris is present in the compound and inside the base of the tower. See the executive summary for further details.			
I.2.a. Anchorage condition (Nuts and/or nut locking device (tightened))			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
I.2.b. Anchorage condition (Grout condition)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes: No grout installed.			
I.2.c. Anchorage condition (Anchorages and/or anchor rod condition)			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
I.3.a. Concrete condition (Cracking, spalling, or splitting)			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
I.3.b. Concrete condition (Chipped or broken concrete)			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
I.3.c. Concrete condition (Honeycombing)			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			
I.3.d. Concrete condition (Low spots to collect moisture)			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			

J. GUYED MAST ANCHORS

J.1. Settlement, movement or earth cracks			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
J.2. Backfill heaped over concrete for water shedding			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
J.3. Anchor rod condition below earth (Maintain required structural capacity of anchor during exploration.)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			
J.4. Corrosion control measures (galvanizing, coating, concrete encasement, cathodic protection systems, etc.)			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes: Surface corrosion was present on fan plates at B and C anchors. See executive summary for further details.			
J.5. Anchor heads clear of earth			
☐ Okay	☐ Possible Improvement	☐ Needs Repair	☒ Not Applicable
Notes:			

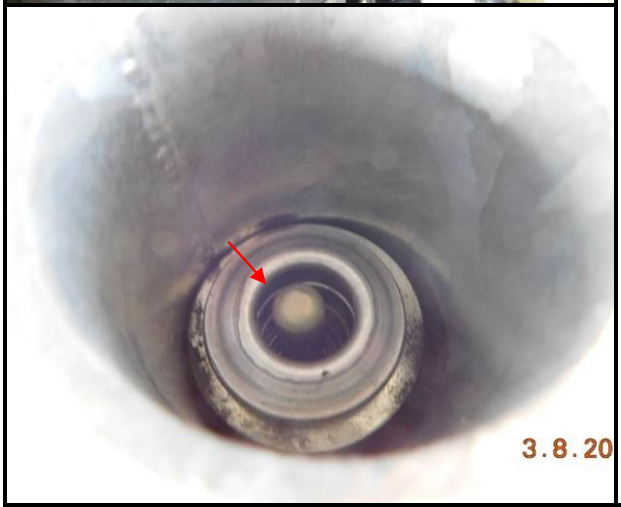
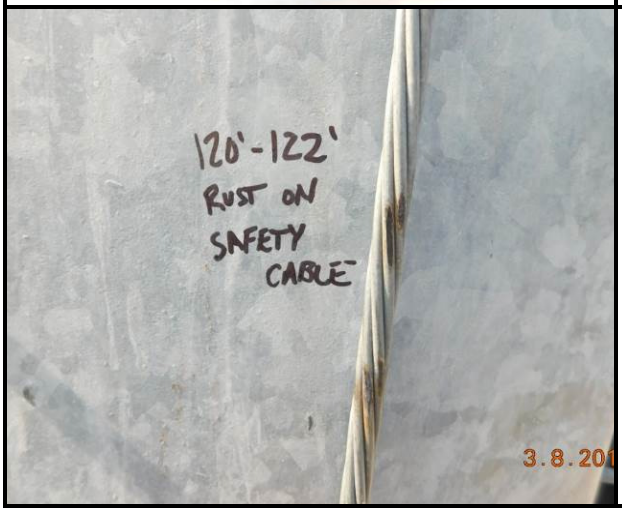
K. TOWER ALIGNMENT

K.1. Tower Plumb and Twist			
☒ Okay	☐ Possible Improvement	☐ Needs Repair	☐ Not Applicable
Notes:			

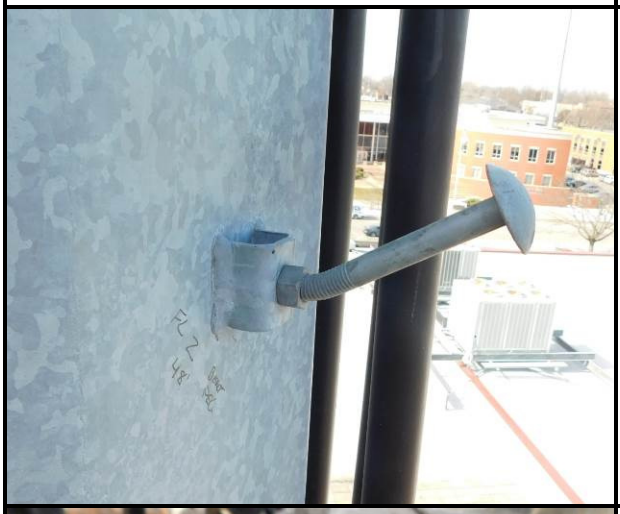
EXECUTIVE SUMMARY

Photograph	Observations and Recommendations
 	**A.4. Climbing facilities, platforms, catwalks – all secure** **Observation:** The mounting hardware at the base of the safety climb cable was observed to be loose and had corrosion. **Recommendation:** The mounting hardware should be replaced with new material of the same size and strength, and tightened to a "snug-tight" condition.
	**A.4. Climbing facilities, platforms, catwalks – all secure** **Observation:** The safety climb cable was observed to be slightly loose. **Recommendation:** The safety cable should be tightened so that there is no slack in the cable throughout the tower elevation.

EXECUTIVE SUMMARY

Photograph	Observations and Recommendations
 	**A.4. Climbing facilities, platforms, catwalks – all secure** **Observation:** The tail of the top of the safety climb cable was observed to be projecting from the sleeve assembly less than the 1" minimum recommended by the manufacturer. **Recommendation:** Consult the safety cable manufacturer for corrective actions. Reduced projection may indicate a fall or force may have occurred to the safety cable system. The safety cable manufacturer appears to be 3M / DBI Sala.
	**A.4. Climbing facilities, platforms, catwalks – all secure** **Observation:** Chipped galvanizing and corrosion was observed on the safety climb cable from elevations 120'± to 122'±. **Recommendation:** All corrosion should be cleaned with a wire brush and coated with two coats of approved galvanizing compound. Ensure a safety climb device runs smooth along the safety climb cable after galvanizing. Monitor the safety cable in future maintenance cycles for any additional deterioration at this location.

EXECUTIVE SUMMARY

Photograph	Observations and Recommendations
	**A.4. Climbing facilities, platforms, catwalks – all secure** **Observation:** A bent step peg was observed on flat 2 at elevation 48'±. **Recommendation:** The step peg should be replaced with a new step peg of the same size and strength.
	**A.5. Loose and/or missing bolts and/or nut locking devices** **Observation:** One 1/2"ø bolt located on the platform mount near the Alpha/Gamma corner was observed to be loose. Proper fit-up between the bolt and the plate was not achieved. **Recommendation:** The bolt should be replaced with a new bolt of the same size and strength and tightened per the "Turn-of-the-Nut" method.
	**A.5. Loose and/or missing bolts and/or nut locking devices** **Observation:** Improper fit-up was observed on the connection from the existing lightning rod to the tower platform. **Recommendation:** The position of the connection should be adjusted so that proper fit-up between all members is achieved. The connection should be tightened to a "snug-tight" condition.

EXECUTIVE SUMMARY

Photograph	Observations and Recommendations
  	**B.1. Paint and/or galvanizing condition** **Observation:** Chipped galvanizing was observed on the monopole shaft on flat 11 at elevations 57'±, 61'± and 66'±. **Recommendation:** The chipped galvanizing should be cleaned with a wire brush and painted with two coats of approved galvanizing compound.

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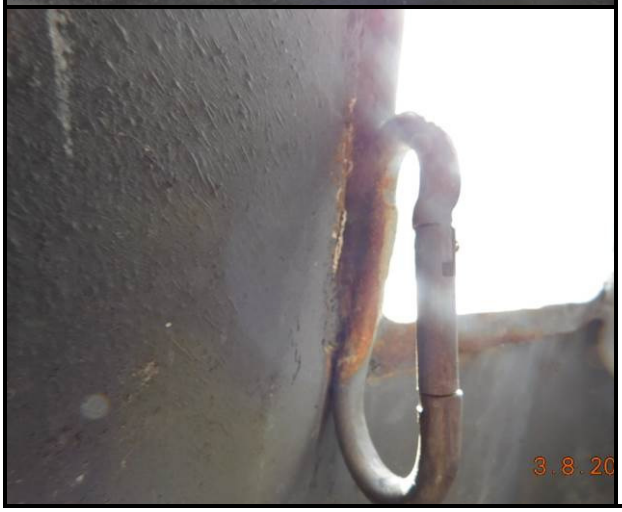
Photograph	Observations and Recommendations
	**B.2. Rust and/or corrosion condition including mounts and accessories** **Observation:** Corrosion was observed on the outside of the porthole installed on flat 12 at elevation 6'-6". **Recommendation:** All corrosion should be cleaned with a wire brush and painted with two coats of approved galvanizing compound.
	**B.2. Rust and/or corrosion condition including mounts and accessories** **Observation:** Corrosion and chipped galvanization was observed at the following locations: • The step peg on flat 2 at elevation 30'±. • The step peg on flat 2 at elevation 98'±. **Recommendation:** All corrosion should be cleaned with a wire brush and painted with two coats of approved galvanizing compound.
	

EXECUTIVE SUMMARY

Photograph	Observations and Recommendations
 	**B.2. Rust and/or corrosion condition including mounts and accessories** **Observation:** Corrosion was observed on the monopole shaft in the following locations: • Flat 11 at elevation 48'. • Flat 11 at elevation 121'-6"±. **Recommendation:** All corrosion should be cleaned with a wire brush and painted with two coats of approved galvanizing compound.
	**B.2. Rust and/or corrosion condition including mounts and accessories** **Observation:** Corrosion was observed on the nuts installed on the RRH mounting hardware in position 2 of the Alpha sector, position 3 of the Beta sector, and position 3 of the Gamma sector. **Recommendation:** The mounting hardware should be replaced with new members of the same size and strength.

EXECUTIVE SUMMARY

Photograph	Observations and Recommendations
  	**B.2. Rust and/or corrosion condition including mounts and accessories** **Observation:** Corrosion was observed on both sides of the porthole and on the coax hangers located on flat 2 at elevation 120'±. **Recommendation:** All corrosion should be cleaned with a wire brush and painted with two coats of approved galvanizing compound. Additional measures may be required by the Engineer of Record to verify the structural integrity of the pole at these entry ports.

EXECUTIVE SUMMARY

Photograph	Observations and Recommendations
	**B.4. Water collection in members (to be remedied, e.g., unplug drain holes, etc.)** **Observation:** The base of the monopole is clogged with trash/debris. **Recommendation:** Ensure that the monopole base is clear and free flowing to prevent corrosion from occurring inside the monopole shaft.
 	**E.3. Feed line condition (flanges, seals, dents, jacket damage, grounding, etc.)** **Observation:** A coax exiting out of the porthole on flat 9 at elevation 2'-0" was observed to have been cut. **Recommendation:** The carrier or tower owner should remove the abandoned coax.

EXECUTIVE SUMMARY

Photograph	Observations and Recommendations
 	**E.3. Feed line condition (flanges, seals, dents, jacket damage, grounding, etc.)** **Observation:** Multiple coax were observed to have been cut at the platform located at the top of the monopole. **Recommendation:** The carrier or tower owner should remove the abandoned coax.
	**F. OTHER APPURTENANCES (WALKWAYS, PLATFORMS, SENSORS, FLOODLIGHTS, ETC.)** **Observation:** The lightning rod was not observed to project the minimum 3'-0" above the top of the top appurtenance per AT&T standards. **Recommendation:** A longer lightning rod should be installed at the top of tower to ensure the minimum projection above the top of the top appurtenance is 3'-0".

EXECUTIVE SUMMARY

Photograph	Observations and Recommendations
 	**I.1.c. Ground condition (Site condition (standing water, drainage, trees, etc.))** **Observation:** Vegetation and trash/debris was observed throughout the compound and inside the monopole base. **Recommendation:** All vegetation and trash/debris should be removed from the site.

PHOTO LOG

Photo #	Description of Photograph
1-3	Site Signage
4-21	Tower Elevation and Compound
22-40	Coax Lines
41-109	Tower Discrepancies