

## **Specifications for the Secondary Installation of Communication Equipment on MLGW Transmission Structures**

### **1. Request and Approval Procedure**

- 1.1. The telecommunications provider “Carrier” will submit a written request to the MLGW Utility Coordinator for proposed communication equipment that will include a general description of the proposed communications equipment to be installed, the MLGW structure number on which the proposed equipment is to be mounted, the structure location with respect to nearest street intersection or landmark, and the structure’s relation to any other MLGW or TVA transmission structures in the immediate vicinity. GPS coordinates may be provided, but in addition to this information. Transmission Engineering shall confirm the tower number. This structure number shall be made a part of all correspondence and record drawings including site plans, site agreements, and all other supporting documents.
- 1.2. MLGW will conduct a preliminary review of structural, electrical, and utility conflicts. Structures will be inspected by MLGW Engineering. No authorization will be given to commence construction until all towers are made in suitable condition. MLGW will do its best to locate and identify utility conflicts; however, it is the telecommunications provider’s responsibility to locate existing facilities in the subject area and design its facilities to all of MLGW requirements as well as any applicable standards.
- 1.3. MLGW will supply the carrier with copies of the easement documents.
- 1.4. MLGW will grant preliminary authorization to proceed with the planning and design of the ground equipment. The carrier will supply MLGW with the detailed specifications of the proposed communications equipment to be mounted on the structure required to proceed with the engineering of the antenna mounts by MLGW Engineering or its consultant. MLGW reserves the right to allow the carrier to hire its own engineering consultant to engineer the antenna mounts under special circumstances.
- 1.5. MLGW will return a cost estimate and schedule for the engineering of the antenna mounts. The estimate will include, but not be limited to, the structural analysis of the tower with proposed antenna(s), detailed plans for the erection of the antenna, platforms, and the mounting of coax cables on the structure, and the design of any foundations required to support the antennas. The cost estimate will include only engineering and design but will not include the purchasing of any materials or labor and equipment required for the installation. The primary contact for MLGW’s consultant will be provided to the carrier at this time.
- 1.6. MLGW will provide plan & profile drawings, tower erection drawings, and this specification upon customer’s request to enable the carrier to develop its construction plans for ground equipment, access roads, and electrical site service. It will be the responsibility of the carrier’s engineering consultant to coordinate its work with MLGW Engineering or MLGW’s engineering consultant.
- 1.7. The Carrier will submit site plan for approval. Site plans shall conform to all applicable standards plus those described in Section 2 of these specifications.
- 1.8. Completion of Contract and/or Commencement Agreement and preconstruction meeting before any site work begins.

## 2. Design and Engineering

2.1. All tower analyses shall be performed using the PLS-CADD Tower analysis program, latest version. The structure and antenna shall be analyzed per the loads shown in Appendix A plus all other applicable standards for communication equipment. The analysis shall be representative of the detailed antenna mount plans and shall be re-run per changes to the design. All supporting materials including the determination of resultant loads from the antenna, platform, antenna mounts and coax cables shall be supplied along with the tower analysis and shall be clearly developed and easily interpretable. In the event that the tower does not meet structural strength requirements, the carrier will be given the option to modify the size and number of antennas to meet these requirements. No structural modifications to the arms, post angles, or foundations of the tower will be allowed. It is up to the discretion of MLGW to allow any other minor modifications to the structure. The electronic tower model and data file shall be provided to Transmission Engineering for review and incorporation into its plant records if performed by the Carrier's engineering consultant.

2.2. All tower modification and antenna bracing to the tower shall be detailed per ASCE Manual 52, Guide for Design of Steel Transmission Towers, latest version. All connections from the antenna support to the tower and any replacement members for the tower shall be detailed, complete with referenced dimensions from existing bolts or tower members. All interferences to the installation of additional bracing members and the drilling of additional holes with typical equipment shall be checked in the overall design. All plans will include a bill of material to include member sizes and weights, fabrication details, material specifications, and any special installation instructions required. No conceptual or illustrative documents or plans indicating the need for adjustments and/or modifications in the field will be approved as construction documents. In addition, the approval of construction documents developed by the Carrier's engineering consultant does not indicate that a detailed design check of the work has been performed by MLGW Engineering.

2.3. Site must have a sign on the gate with the carrier's company name, carrier's site name, the carrier's 24 hours a day contact telephone number, MLGW tower number, MLGW site name and the MLGW electric meter site address. The appropriate electromagnetic energy signs in accordance with Federal Communication Commission rules on radio frequency emissions 47 CFR 1.1307(b) must also be displayed. [The Carrier \*shall\* up dated signs to meet these requirement's when performing Antenna Site Upgrades or when any part of the signs are no longer legible.](#)

2.4. All utility services to the site shall be underground and identified on the plans. [All new site utility service shall be handled through MLGW Building Services Center located at 5791 Summer Trees Drive, Memphis TN 38134 and can be contacted at \(901\)729-8630 \(press option 2\).](#)

2.5. There shall be no welding allowed directly to the structure.

2.6. Galvanox paint should be applied to all holes drilled in existing tower members and any steel that is to be connected directly to the tower.

2.7. Coax must be located inside the tower body on the ahead or rear tower face (face to which no crossarms are attached) and away from the step-bolt leg of the tower. The coax should be run adjacent to the post angle to allow the post angle to partially shield the coax from additional wind loads. The waveguide ladder should be secured to the tower through the use of u-bolts or j-bolts.

2.8. The step bolt leg must be identified on the drawings submitted for approval. No structural modifications may be made to the step-bolt leg of the tower.

2.9. No permanent generation or fuel storage will be allowed within a transmission easement. Provisions will be allowed to connect temporary portable generation in the case of a prolonged outage.

2.10. Every effort shall be made such that the addition of the antenna and associated facilities shall not impede access in, around, and on the tower or sacrifice the structures existing level of safety.

2.11. Palnuts shall be used and properly installed on all new bolts.

2.12. The latest date of this specification must be made a part of the plans for each site.

2.13. All structural analyses and site and structural drawings must be stamped by a Licensed Professional Engineer of the state of Tennessee.

2.14. All grounds must maintain 10 ohms resistance or less. Ground resistivity shall be checked by appropriate methods.

2.15. All ground equipment shall be located ahead or behind the tower. No ground equipment will be allowed on the side of the tower under the crossarms.

### **3. Construction and Maintenance**

3.1. Upon MLGW Engineering's approval of any given site a Work Order will be issued to the Electric Matrix Planner Coordinator for the coordination and inspection of each site. The following information will accompany each Work Order:

- Work Order Number
- Inspection Checklist
- Site Plans
- Structural Drawings
- MLGW Updated List of Sites
- MLGW Plan and Profile Drawings
- MLGW Site Location Map
- MLGW Phasing Diagrams
- MLGW Tower Erection Diagrams

3.2. MLGW Engineering will coordinate a General Preconstruction meeting to include Representatives from MLGW Transmission Engineering, Electric Operations, Customer Engineering, Electric Matrix Contract Services, an employed representative from the Carrier, general contractor and the electrical line subcontractor. No preconstruction meeting shall be held prior to the approval of all construction documents for the site. No preconstruction meeting will be held without representation from the Carrier and its contractors.

3.3. All work performed by the contractor shall conform to MLGW Electric Distribution Safety Manual, latest revision and OSHA clearance requirements for crane operation around energized conductors that will apply. **(ALTERNATIVE TO 20-FOOT CLEARANCE (TABLE A) IN 1926.1407-1411 MAY BE USED:** If you know the line's voltage, you may use the minimum clearance distance in Table A in lieu of 20' feet as long as all **Steps That Are Required By the**

**Standard Are Followed.** The voltages on the MLGW system are 120/240 volts, 277/480 volts, 120/208 volts, 240 volts, 480 volts, 12KV, 23KV, 115KV and 161KV).

A copy of MLGW Electric Distribution Safety Manual will be supplied to the contractor upon the contractor's request. It shall be the responsibility of the contractor to contact the safety department at (901) 372-5650 with any questions regarding this policy.

3.3.1. A tailgate safety meeting must be performed at the beginning of each work day and MLGW Safety Stand-By Inspector must be notified and given the opportunity to attend this meeting.

3.4. All climbing on MLGW tower structures will be performed by qualified personnel familiar with transmission line voltages, approach distances, and hazards associated with working in close proximity to transmission lines and shall be certified in C.P.R. and tower top rescue. The crew performing any antenna work shall be comprised of a number of workers such that there is a minimum of two persons (one qualified as stated above) on the ground site in addition to those climbing.

3.5. All work performed on MLGW high voltage transmission structures must be done under a Clearance Order or Caution Order. To obtain a Clearance or Caution Order, the Contractor Shall Contact and verbally speak with MLGW supervision in the **Construction Service Area at (901) 320-1567 or (901) 734-4101. (It Shall be the Contractor responsibility to furnish the specific MLGW Tower Number and MLGW Site Name to identify the MLGW site location the contactor wants to perform the work on.)** A minimum of two (2) working days' notice shall be given prior to the start of work requiring a Caution Order and a minimum eight (8) calendar days' notice SHALL all be given prior to the start of work requiring a Clearance Order. A MLGW Safety Stand-By Inspector from Electric Support, Construction Services Area will be present while work is being performed under the Clearance or Caution Order. Any changes to the scheduled request must be made with the supervision of MLGW Construction Service Area.

3.5.1. Clearance Order

3.5.1.1. A Clearance Order requires a line outage (Switching to de-energize the line(s) and conductor grounding.)

3.5.1.2. Work being performed under a Clearance Order shall be done between visible Grounds installed on the conductors on the adjacent structures to the work location structure. Additional grounds may also be installed on the work location structure conductors.

3.5.1.3. Testing of the "de-energized" conductors shall be done with certified test Equipment before applying grounds. The grounds used shall meet all OSHA requirements, speciation and be approved by the MLGW Safety Stand-By Inspector.

3.5.1.4. The minimum crew size of qualified and certified personnel performing the installation and removal of grounds will consist of the following:

- a) One (1) Journeyman Level Experience Crewleader or Foreman
- b) One (1) Journeyman Lineman or 4<sup>th</sup> year Apprentice in his last 6 months
- c) One (1) Journeyman Lineman or 2<sup>nd</sup> year Apprentice in his last 6 months
- d) One (1) Employee qualified in C.P.R. and tower top rescue (on the ground)

3.5.1.5. The crew performing the installation and removal of grounds task shall remain on site for the duration of the work and shall be prepared to remove such grounds to re-energize the transmission line if conditions dictate.

3.5.1.6 The daily outage window will be from 6:00 AM to 6:00 PM or sun up to sun down whichever comes first. No climbers shall be on MLGW tower structures before or after this window. The outage window will be determined on a site-by-site basis by [Electric Support, Construction Services](#) Area Supervision.

3.5.1.7. Transmission lines will be restored at the end of each daily outage window. All grounds shall be removed from the transmission line conductors. Grounding cables may be left attached to the tower provided the grounding cables are properly stowed and secured to the tower only with the approval of the MLGW Safety Stand-By Inspector.

### 3.5.2. Caution Order

3.5.2.1. A Caution Order does not require a line outage. The automatic re-closing is disabled and a minimum of ten (10) feet of working clearance must be maintained to the energized line at all times. This distance applies to all personnel, materials, tools and equipment.

3.5.2.2. A Caution Order must be obtained each time a tower is climbed to do any inspection or maintenance.

3.5.2.3. The MLGW Safety Stand-By Inspector shall have the right to stop work at any time when he/she determines that an unsafe work conditions exist due to negligence of the contractor, weather, electrical system requirements or other reason.

3.5.2.4. The lineman or other qualified personnel who climb the MLGW tower structure under a Caution Order must climb on the inside of the tower when passing between the bottom conductor and the upper conductor cross-arm. This will reduce the possibility of shock to the personnel on the tower.

3.5.2.5. No hand lines, materials, or test leads will be allowed outside the transmission tower body when work is performed under a Caution Order. A hand line may be passed down the center of the tower to convey tools and materials to the personnel on the tower. This line must remain inside the lacing of the tower for the full length of the tower structure.

3.5.2.6. The daily Caution Order window will be from 6:00 AM to 6:00 PM or sun up to sun down whichever comes first. No climbers shall be on MLGW tower structures before or after this window. The Caution Order window will be determined on a site-by-site basis by [Electric Support, Construction Services](#) Area Supervision.

3.6. The Contractor shall supply new bolts, nuts, and palnuts that may be removed or added during installation or retrofits.

3.7. No structural members may be removed or added unless indicated so on approved structural drawings.

3.8. All gates must be properly secured.

3.9. Upon the completion of each tower installation, the [Electric Support, Construction Services Area Supervision](#) will schedule a full inspection of the new installation. [Construction Services Area Supervision](#) will notify [Transmission Engineering](#) by email the Work Order is complete and ready for their site inspection.

3.10. [Transmission Engineering](#) will complete a final inspection of each site.

3.11 All structural steel tower members removed shall be bundled and tagged with the MLGW structure number at each end of the bundled. The bundles shall be securely banded using a Type 201 Stainless Steel Band. The tags shall have MLGW structure number (Example: STR. No. 1234) stamped in to them with the lettering and numbering a minimum of ½” in size and shall be made using aluminum, stainless or brass a minimum of 1” wide X 0.30” thick. Before the new installation can be signed off as completed the contractor will transport and unload of the steel bundle at MLGW steel storage yard located at MLGW McLemore Substation #45 at 1191 Florida St. The steel storage yard is located on the west side of the substation and can be accessed off of McLemore Ave west of Florida St. To unload the steel the contractor shall be responsible for schedule the MLGW Construction Inspector to be on site to allow access to the storage yard.

#### **4. Retirement**

4.1. The Carrier (or its designated contractor) will send a written request to the Utility Coordinator in Telecommunications Engineering for the site retirement. This written request shall include the site name, site location, and MLGW Tower number. The Utility Coordinator shall verify the Carrier has sent appropriate notification to the Procurement and Contracts Department.

4.2. Engineering will issue the [Electric Support](#) Planner Coordinator a Work Order for the coordination and inspection of the retirement and will set up a preconstruction meeting. Troubleshooting and Maintenance and Customer Service Field Operations will be copied on the Work Order, which will include the service address for the site, a site map, and the site service sketch, if available.

#### 4.3. Site Service Demolition

4.3.1. The Carrier will be supplied with the contact information for the Commercial Resource Center and the Expeditor at the preconstruction meeting. The Carrier will be asked to first contact the Commercial Resource Center to stop the service and supply them with the meter number, meter address, and pertinent information regarding the location of the site, i.e. transmission tower located 400 feet west of nearest street address. The Commercial Resource Center will supply this information to Customer Service Field Operations who will disconnect the service.

4.3.2. Upon completion of the site disconnect, the Carrier will then contact the Expeditor and request the service demolition. The request should include all the information regarding the site as listed above. The Expeditor will request Trouble Shooting and Maintenance to perform the demolition.

4.3.3. The removal of the ground equipment may proceed with approval from the [Utility Coordinator in Telecommunications Engineering](#).

4.4. All Construction and Maintenance procedures must be followed as outlined in this Specification, to including final inspection.

4.5. The tower **structure and site area** shall be returned to “as good” or better condition than existed prior to installation.

4.5.1. No work **on the tower structure is** to commence until all material is on hand to completely restore the tower **structure condition than existed prior to installation.**

4.5.2. Any tower members removed or modified for installation must be replaced **unless other wises receiving written approval by MLGW Transmission Engineering.**

4.5.3. The site Carrier Company is responsible for the removal of all utility services identified on the original plans. This to include the removal of the transformer station requested and installed to supply service to antenna site. The transformer station removal request shall be handled through MLGW Building Services Center located at 5791 Summer Trees Drive, Memphis TN 38134 and can be contacted at (901)729-8630 (press option 2). The physical transformer station site removal must be completed before the tower structure and site area will be signed off as returned to “as good” or better condition than existed prior to installation.

## **5. Liability**

MLGW shall not be responsible for damage to the Lessee’s equipment as a result of its normal construction and maintenance practices.

## Appendix A

**DESIGN LOADS FOR MLGW TOWERS**

TOWER TYPE	MAX HEIGHT ft.	WIND SPAN ft.	WEIGHT SPAN ft.	LINE ANGLE deg.	OVERHEAD GROUND WIRE					CONDUCTOR				
					DESCRIPTION	DIA. in.	WT. lbs./ft.	DESIGN TENSION lbs.	BROKEN TENSION lbs.	DESCRIPTION	DIA. in.	WT. lbs./ft.	DESIGN TENSION lbs.	BROKEN TENSION lbs.
E2	92	1,300	1,300	0	7/16" H.S.S.	0.435	0.399	6,000	5,140	636 MCM 26/7 ACSR	0.990	0.875	9,000	12,270
E3	92	1,300	1,300	0	7/16" H.S.S.	0.435	0.399	6,000	5,140	636 MCM 26/7 ACSR	0.990	0.875	9,000	12,270
E20	108	1,300	1,800	0	7/16" H.S.S.	0.435	0.399	4,500	4,500	795 MCM 26/7 ACSR	1.108	1.094	9,000	14,320
E24	108	1,300	1,500	0	7/16" H.S.S.	0.435	0.399	3,600	3,600	<b>954 MCM 45/7 ACSR*</b>	1.165	1.075	<b>18,000*</b>	<b>11,900*</b>
E29	108	1,200	1,500	0	7/16" H.S.S.	0.435	0.399	3,700	3,700	1,590 MCM 45/7 ACSR	1.502	1.799	13,500	10,100
F20	124	1,300	1,800	6	7/16" H.S.S.	0.435	0.399	4,500	4,500	795 MCM 26/7 ACSR	1.108	1.094	9,000	14,320
F20A	124	1,200	1,800	0	7/16" H.S.S.	0.435	0.399	3,600	3,600	<b>954 MCM 45/7 ACSR*</b>	1.165	1.075	<b>18,000*</b>	<b>11,900*</b>
G20	124	1,100	1,500	18	7/16" H.S.S.	0.435	0.399	4,500	4,500	795 MCM 26/7 ACSR	1.108	1.094	9,000	14,320
G20A	124	1,100	1,500	9	7/16" H.S.S.	0.435	0.399	3,600	3,600	<b>954 MCM 45/7 ACSR*</b>	1.165	1.075	<b>18,000*</b>	<b>11,900*</b>
G24	124	1,100	3,000	18	7/16" H.S.S.	0.435	0.399	3,600	3,600	<b>954 MCM 45/7 ACSR*</b>	1.165	1.075	<b>18,000*</b>	<b>11,900*</b>
On one side of structure @ wind and wt. spans					OPGW	0.649	0.600	4,500	4,500					

\* **TWO CONDUCTORS PER PHASE (CROSSARM) (tensions given are total for both conductors)**

## LOAD CASE INFORMATION

- 1 - NESC Medium Intact Loading, 40 mph wind, 1/4" ice, 15 deg F, NESC overload factors
- 4 - NESC Extreme Wind, 90 mph wind, no ice, 15 deg F, NESC overload factor
- 2 - 1 broken static wire, 40 mph wind, 1/4" ice, 15 deg F, 1.75 tension overload factor
- 3 - 1 broken conductor, 40 mph wind, no ice, 15 deg F, 1.1 tension overload factor

Contact MLGW Engineering for Design Loads for structure types not listed or for those with special modifications.