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Witness:	Adam Molitor
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Sponsoring Party:	Ameren Transmission Company of Illinois
File No.:	EA-2025-0087
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MISSOURI PUBLIC SERVICE COMMISSION

FILE NO. EA-2025-0087

DIRECT TESTIMONY

OF

ADAM MOLITOR, P.E.

ON

BEHALF OF

AMEREN TRANSMISSION COMPANY OF ILLINOIS

St. Louis, Missouri
December, 2024

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DIRECT TESTIMONY

OF

ADAM J. MOLITOR, P.E.

FILE NO. EA-2025-0087

I. INTRODUCTION AND BACKGROUND

Q. Please state your name and business address.

A. My name is Adam J. Molitor. My business address is 1901 Chouteau Avenue, St. Louis, Missouri 63103.

Q. By whom are you employed and in what capacity?

A. I am currently a Principal Engineer in the Transmission Line Design and Standards group for Ameren Services Company (Ameren Services).

Q. What are your responsibilities as Transmission Line Design and Standards Engineer?

A. My duties include designing transmission lines and developing standard drawings and documents for transmission line design, materials and construction, for Ameren Corporation's transmission-owning utilities—Ameren Transmission Company of Illinois (ATXI), Ameren Illinois Company d/b/a Ameren Illinois (Ameren Illinois), and Union Electric Company d/b/a Ameren Missouri (Ameren Missouri). These duties include designing transmission lines, designing structures, and selecting hardware in accordance with National Electrical Safety Code (NESC) requirements; developing technical drawings; writing specifications and guidelines; preparing cost estimates; assisting with the management of project costs; and acting as the

technical lead to assist the project team throughout the selection of line routes, procurement, and construction of transmission expansion projects.

Q. Please describe your educational and professional background.

A. I graduated with a Bachelor of Science degree in Mechanical Engineering from the University of Missouri, Columbia in 2005. I have been an Engineer in Ameren Services Company's Transmission Line Design group since 2007. In the Transmission Line Design group, I have managed and designed projects on 138 kV, 161kV and 345 kV transmission lines. As of 2016, I develop standard documents, drawings, and processes for transmission line projects. In 2022, I was promoted to my current position as Principal Engineer within the Transmission Line Design and Standards group. I am a registered Professional Engineer in Illinois and Missouri.

Q. Have you previously testified before the Missouri Public Service Commission?

A. Yes. I have provided testimony on behalf of ATXI in Commission Docket EA-2024-0302. I have also testified before the Illinois Commerce Commission on behalf of Ameren Illinois.

II. PURPOSE OF TESTIMONY AND SCHEDULES

Q. What is the purpose of your direct testimony?

A. My direct testimony will support ATXI's request for a Certificate of Convenience and Necessity (CCN) and related Commission approvals authorizing ATXI to construct, acquire, and operate certain transmission assets as part of its Northern Missouri Grid Transformation Program (the Program) described in the direct testimony of ATXI witness Mr. Shawn Schukar. The Program represents ATXI's Missouri jurisdictional portion of the Long Range Transmission Planning (LRTP) Tranche 1 Portfolio approved by the Midcontinent Independent System Operator,

Inc. (MISO), as discussed in the direct testimony of MISO witness Mr. Jeremiah Doner.[1] The facilities included in this proceeding address the second phase of the overall Program in Missouri (Phase 2), which consists of one project: the Denny-Zachary-Thomas Hill-Maywood (DZTM) Project.

The DZTM Project includes the construction of slightly over 200 miles of new 345 kV transmission lines with three transmission line segments across ten Missouri Counties: DeKalb, Daviess, Grundy, Sullivan, Adair, Knox, Lewis, Marion, Macon, and Randolph. The first line segment will run approximately 102 miles or 107 miles (depending on the configuration option approved) from ATXI's new Denny Substation in DeKalb County to ATXI's existing Zachary Substation near Kirksville, Missouri (the DZ Segment). The DZ Segment consists of two configuration options: a single circuit option (the DZ Single Circuit Option), which will mostly be routed along existing or planned Associated Electric Cooperative, Inc. (AECI) transmission line corridors; or a double circuit option (the DZ Double Circuit Option), which will rebuild a section of an existing AECI 161 kV transmission line in a double circuit configuration and build a greenfield section in a double circuit configuration with a planned AECI 161 kV transmission line, in order to collocate the new 345 kV circuit on a single set of structures for the vast majority of the DZ Segment. The second line segment will be approximately 60 miles in length and will connect the existing Zachary Substation to ATXI's existing Maywood Substation near Palmyra, Missouri (the ZM Segment), routed along existing ATXI transmission line corridors. The third line segment consists of a new approximately 44-mile 345 kV transmission circuit from the Zachary

[1] It is ATXI's understanding that MISO intends to move to intervene and file the direct testimony of Mr. Jeremiah Doner in support of the Application shortly after ATXI's filing of its Application and direct testimony. All references to the direct testimony of MISO witness Mr. Jeremiah Doner reflect ATXI's understanding of his forthcoming testimony.

Substation running south to AECI's existing Thomas Hill Substation in Randolph County (the ZT Segment), rebuilding an existing Ameren Missouri 161 kV transmission line to accommodate the new 345 kV circuit which will almost entirely be collocated on the same structures with Ameren Missouri facilities.

My testimony focuses on describing the 345 kV transmission line-related elements of the Phase 2 DZTM Project. Specifically, I cover three topics. First, I explain the specific line work that will be undertaken to construct each of the line segments that collectively comprise the Phase 2 DZTM Project. Second, I explain the design specifications for the Project's new transmission lines and support structures. Finally, I explain the right-of-way width that will be needed to accommodate the Project's transmission lines.

Q. Are you sponsoring any schedules with your direct testimony?

A. Yes. I am sponsoring the following schedule:

- Schedule AM-D1 – Typical Structure Drawings.

Q. Are you providing any legal opinions in your direct testimony?

A. No. Although I refer to several regulatory requirements, as I understand them, related to construction of the Project, I am not an attorney and none of my testimony is intended to offer any legal opinions.

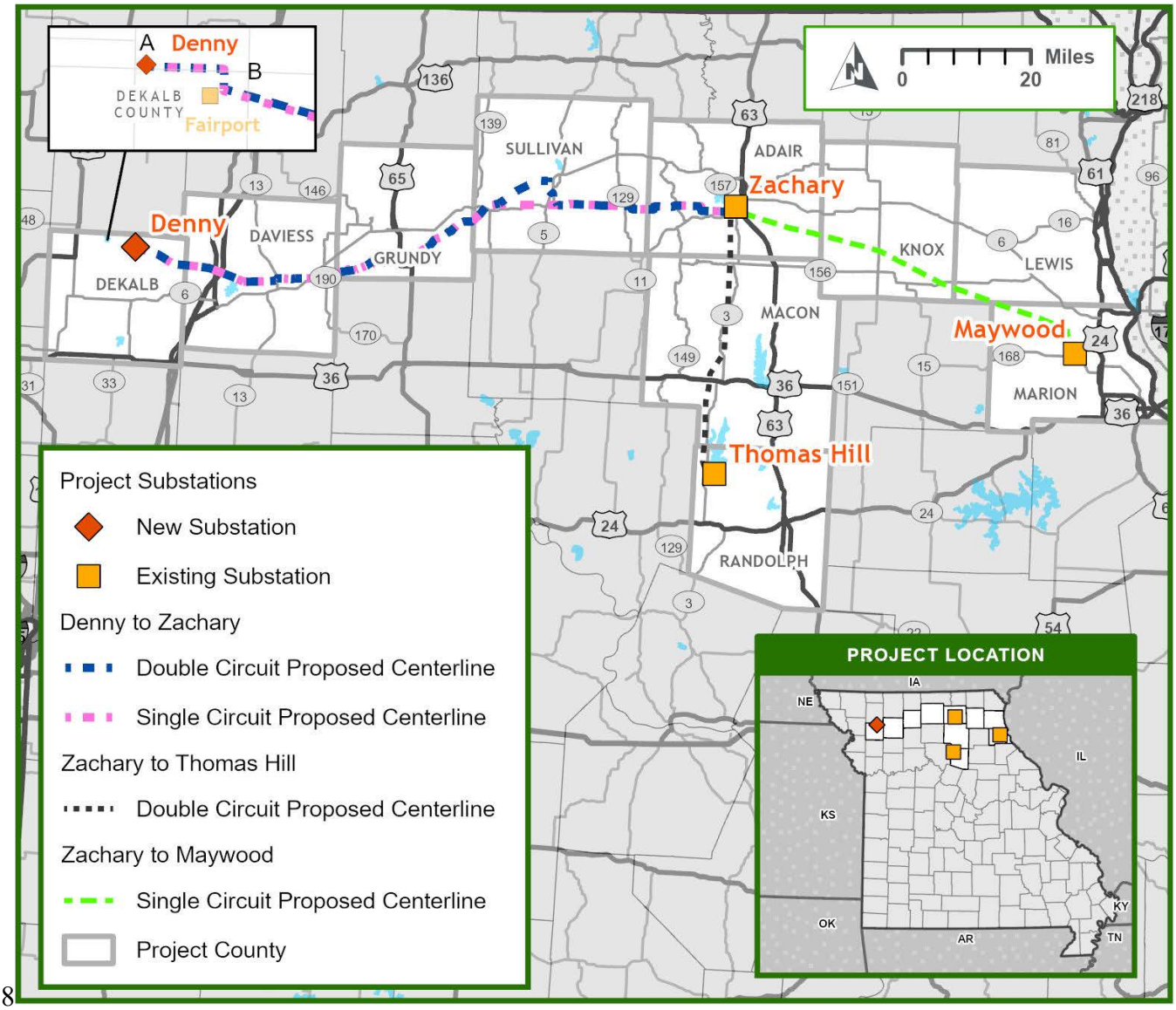
III. PHASE 2 DZTM PROJECT TRANSMISSION LINE WORK

A. Generally

Q. Can you provide a map depicting the three line segments of the Phase 2 DZTM Project?

A. Yes. The Phase 2 DZTM Project is depicted in the overview map contained in **Figure 1** below:

Figure 1 – DZTM Project Overview

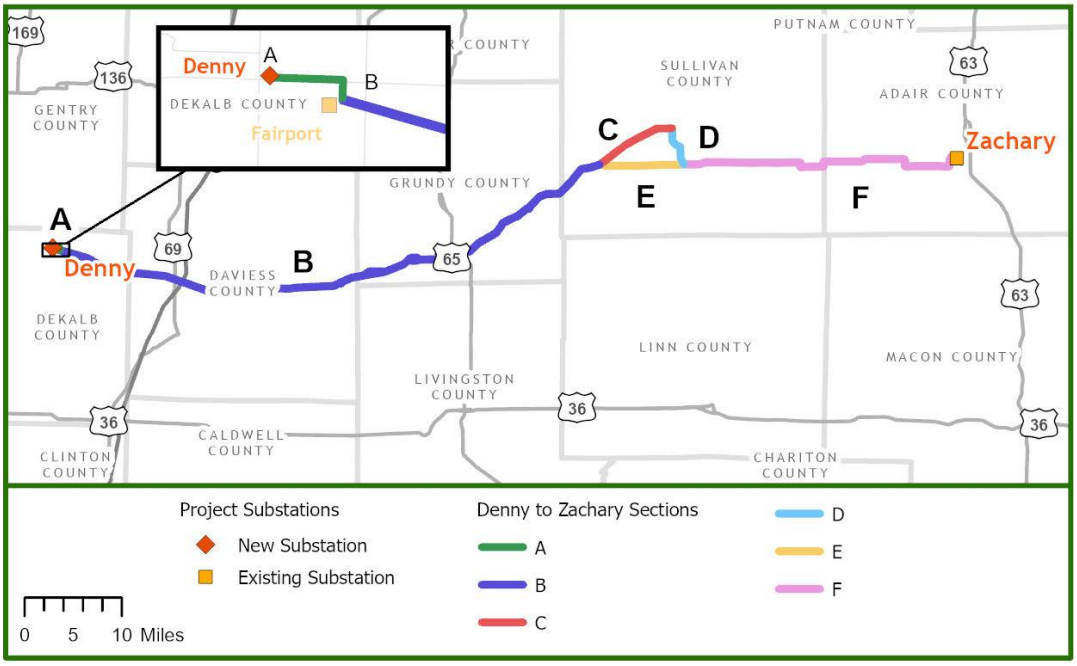


B. Denny-Zachary Segment

Q. Can you further describe the single circuit and double circuit configuration options for the DZ Segment?

A. Although the entire Program must be approved and constructed for its benefits to be realized, the Phase 2 DZTM Project, as discussed above, consists of three (3) line segments, with the DZ Segment having single and double circuit configuration/routing options that are identified, respectively, as the DZ Single Circuit Option and the DZ Double Circuit Option.[2] The DZ Segment is depicted in the overview map contained in Figure 1 above, and shows the DZ Single Circuit Option in pink and the DZ Double Circuit Option in blue. The DZ Segment is further broken out into Sections labeled A through F to more precisely identify the differences in scope of work for each option (double circuit versus single circuit) in Figure 2 below.

Figure 2 – Denny-Zachary Line Sections



[2] MISO selected the DZ Single Circuit Option. If the Commission were to condition its issuance of a CCN on use of the DZ Double Circuit Option, ATXI would seek a change order from MISO to approve use of that option.

The DZ Single Circuit Option consists of Sections A, B, E, and F in Figure 2, while the DZ Double Circuit Option consists of Sections A, B, C, D, and F in Figure 2.

The DZ Single Circuit Option would mostly be routed on single circuit structures adjacent to existing AECI transmission corridors (Section B) or planned new AECI transmission corridors (Section F). Sections B and F are connected by a new greenfield single circuit route (Section E) that does not follow an existing transmission corridor.

The DZ Double Circuit Option would co-locate the new 345 kV circuit on a single set of structures for the vast majority of the entire DZ Segment. Sections B and C of the DZ Double Circuit Option would rebuild an existing AECI 161 kV transmission line in a double circuit configuration and be co-located with AECI's line. Sections D and F of the DZ Double Circuit Option would construct a new greenfield double circuit line for co-location with a planned new AECI 161 kV transmission line. A more detailed description of each Section for the two options is contained in the table below:

Table 1
Denny to Zachary Line Segment – Section/Option Descriptions

Section-Option	Length (miles)	Description
A-SC A-DC	0.90	New 345 kV circuit will be co-located in a double circuit configuration with the new ATXI Denny-Fairport 345 kV circuit (part of the FDIM Project) on ATXI owned structures from the new ATXI Denny Substation to a point east of the AECI Fairport Substation where it meets the existing or rebuilt AECI 161 kV line.
B-SC	61.36	New single circuit 345 kV line that follows adjacent to the existing AECI 161 kV line from just east of Fairport Substation to a point in Bowman Township in Sullivan County. The centerline of ATXI's new single circuit 345 kV line will be placed approximately 125 feet from the centerline of the existing AECI line. Most of this section is south of AECI's existing line; however, there is approximately 2 miles where it deviates from the existing line and approximately 7.7 miles where the route will be located on the north side of the existing AECI 161 kV line.

Table 1 Denny to Zachary Line Segment – Section/Option Descriptions		
Section-Option	Length (miles)	Description
B-DC	62.42	Rebuild existing single circuit AECI 161 kV transmission line from just east of Fairport Substation to a point in Bowman Township in Sullivan County in a double circuit configuration and co-locate ATXI's new 345 kV circuit with AECI's 161 kV circuit. The centerline of the new double circuit line would be placed approximately 25 feet south of the centerline of the existing line for most of the length of Section B-DC.
C-DC	8.55	Rebuild existing single circuit AECI 161 kV line in double circuit configuration and co-locate ATXI's new 345 kV circuit with AECI's line, heading northeast from the end of Section B-DC up to just south of AECI's Locust Creek Substation.
D-DC	4.26	New double circuit 345 kV/161 kV line co-located with AECI's planned 161 kV Locust Creek-Zachary circuit from just south of AECI's Locust Creek Substation to a point in Duncan Township in Sullivan County.
E-SC	8.68	New single circuit 345 kV line that cuts to the east away from AECI's existing 161 kV line at the end of Section B, to a point in Duncan Township in Sullivan County where it meets AECI's planned new 161 kV line. Section E eliminates going up to AECI's Locust Creek Substation (replaces Sections C and D of the DZ Double Circuit Options), but does not follow an existing transmission corridor.
F-SC	30.8	New single circuit 345 kV line continues from the end of Section E-SC and will be constructed adjacent to AECI's planned new 161 kV line, adjacent to the north side of the line, heading east to ATXI's Zachary Substation.
F-DC	30.7	New double circuit 345 kV/161 kV line co-located with AECI's planned 161 kV line from the end of Section D east to Zachary Substation.

Q. Please explain the scope of line work for the DZ Segment.

A. The Denny to Zachary line segment will be comprised of the scope of one of the two design and route options, DZ Single Circuit Option or DZ Double Circuit Option.

The DZ Single Circuit Option, the single circuit design and route option, consists of approximately 102 miles of greenfield construction for the new single circuit 345kV transmission line going from the new ATXI Denny Substation to the existing ATXI Zachary Substation. This segment is located in DeKalb, Daviess, Grundy, and Sullivan Counties. With the exception of the approximately 0.9 miles outside the Denny Substation and 0.5 miles outside the Zachary Substation where the new circuit will be on double circuit structures, this greenfield corridor will utilize single shaft steel poles for the structure type, as depicted on Schedule AM-D1. A majority of the route will parallel existing AECI transmission lines. However, the structures for the new 345kV transmission line will not structure match AECI's facilities for its existing and planned 161kV line. This segment will require new 150-foot wide right-of-way.

The DZ Double Circuit Option, the double circuit design and route option, consists of approximately 107 miles of construction (with approximately 71 miles of brownfield construction and 36 miles of greenfield construction) for the new double circuit 345kV transmission line going from the new ATXI Denny Substation to the existing ATXI Zachary Substation. This segment is located in DeKalb, Daviess, Grundy, and Sullivan Counties. This segment will utilize double circuit steel poles for the structure type, as depicted on Schedule AM-D1. Approximately 70 miles of the line segment will rebuild existing AECI transmission line and utilize the existing corridor between the existing AECI Fairport Substation and a point just south of the existing AECI Locust Creek Substation. Approximately 35 miles of the line segment will be collated in a new transmission corridor with the planned AECI 161kV transmission line between a point just south of the existing AECI Locust Creek Substation and the existing ATXI Zachary Substation. This segment will require new 150-foot wide right-of-way.

C. Zachary-Maywood Segment

Q. Please explain the scope of line work for the ZM Segment.

A. The ZM Segment of DZTM consists of approximately 60 miles of new 345 kV single-circuit transmission line from the existing ATXI Zachary Substation to the existing ATXI Maywood Substation. This line segment is located in Adair, Knox, Lewis, and Marion Counties. This greenfield corridor will utilize single shaft steel poles for the structure type, as depicted on Schedule AM-D1. A majority of the route will parallel existing ATXI and Ameren transmission lines. This segment will require new 150-foot wide right-of-way to accommodate the new 345 kV circuit, however for a majority of the line the new right-of-way will overlap 98 feet of the existing right-of-way of the parallel transmission lines.

D. Zachary-Thomas Hill Segment

Q. Please explain the scope of line work for the ZT Segment.

A. The ZT Segment of the DZTM Project consists of rebuilding approximately 44 miles of the existing Ameren Thomas Hill-Adair 161kV transmission line as a 345/161 kV double circuit transmission line from the adjacent existing ATXI Zachary and Ameren Missouri Adair Substations to the existing AECI Thomas Hill Substation. This line segment is located in Adair, Macon and Randolph counties. This circuit will utilize double circuit, single shaft steel poles for the structure type, as depicted on Schedule AM-D1. This segment will require a new 150-foot wide right-of-way that will overlap the existing transmission right-of-way by 100-feet to accommodate the new 345/161 kV double circuit line.

IV. PHASE 2 DZTM PROJECT TRANSMISSION LINE DESIGN

Q. What are the design and operating voltages and frequency for the Phase 2 DZTM Project's transmission lines?

A. The new circuits for the Phase 2 DZTM Project will be operated and designed at a voltage of 345 kV with 60 Hertz (Hz) frequency. The following design ratings, including the normal and emergency peak operating current ratings, for the 345 kV conductor are shown in the table below.

"Bundled" 2x954 Cardinal ACSS 54/7 Ratings

	Max Design Temp (°F)	Summer Rating (A)	Winter Rating (A)
Normal:	320 °F	3070 A	3398 A
Emergency:	392 °F	3500 A	3764 A

Q. Please describe the conductor size, type, and spacing.

A. All new 345 kV circuits for the Phase 2 DZTM Project will consist of bundled (two sub-conductors per phase, three phases total) 954 Cardinal ACSS 54/7, 18" horizontal bundle spacing.

Q. Please describe the shield wires.

A. The DZ Segment with the DZ Double Circuit Option and ZT Segment will have two fiber optic ground wires (OPGW) for the shield wires (which are generally used for substation relaying purposes). The DZ Segment with the DZ Single Circuit Option and ZM Segment will have two shield wires: one OPGW and one non-fiber 7 strand aluminum clad steel wire (7#7 Alumoweld).[3]

[3] If a double circuit configuration is ultimately used for the DZ Segment, the design will consist of two OPGW shield wires, instead of one OPGW shield wire and one 7#7 Alumoweld shield wire.

Q. Please describe the support structures for the Phase 2 DZTM Project's transmission lines and conductors.

A. The new transmission lines for the Phase 2 DZTM Project will be 345 kV, three phase, multi-grounded, 60 Hz, overhead transmission lines. The transmission lines will mostly use single-shaft steel poles, or monopoles, for the support structures. For the double circuit configurations, dead end structures and angles greater than 15 degrees will utilize a two-pole design with concrete foundations. To determine the optimal foundation design, a soil boring will be taken at the location of each new structure. Generally, it is expected that most tangent structures will be installed with direct embed foundations and that support angle and dead end structures will be installed on concrete foundations. The concrete foundations will typically be six to twelve feet in diameter and project out of the ground approximately two to three feet. Each embedment or foundation will be designed specific to that location per the geotechnical report for that location. Single circuit tangent structures for the DZ Segment with DZ Single Circuit Option and ZM Segment will utilize polymer braced post insulators, and the ZT Segment double circuit tangents and all single and double circuit angles and dead end structures will utilize steel arms and glass bell insulators. Double circuit tangents for the DZ Segment with the DZ Double Circuit Option will utilize polymer braced post insulators for the 345kV circuit and steel arms and glass bell insulators for the 161kV circuit.

Q. What will be the height of and span between typical structures?

A. The typical pole height will range from 90 feet to 130 feet above the top of the foundation for single circuit structures and 115 feet to 150 feet for double circuit structures. The typical distance between poles will vary between 750 feet and 1,000 feet. Schedule AM-D1

contains drawings of typical supporting structures that will be used for the Phase 2 DZTM Project, including the heights and span ranges.

Q. What are the loading design parameters for the lines?

A. The lines will be designed in accordance with NESC requirements. Sections 250B, 250C and 250D of the NESC define the minimum loading conditions and thus the strength requirements applicable to the line and structures. The AECI 161kV circuit will additionally be designed in accordance with the Rural Utility Service (RUS) Bulletin 1724E-200.

Q. What are the designed line-to-ground and conductor-side clearances?

A. A minimum vertical ground line clearance of 25 feet will be maintained for the new 345 kV circuits, per the NESC.

Q. What about angle structures?

A. Single circuit angle structures will be similar to the tangent structures but will be installed on a concrete foundation as opposed to being direct embed.

Double circuit lines with line angles greater than 15 degrees will consist of two separate steel poles, with each pole supporting an individual circuit. All angle structures will also be self-supporting steel poles with concrete foundations, without the need for guy wires. See Schedule AM-D1 for typical drawings of these structures.

Q. Why were these structures selected?

A. ATXI selected weathering steel monopole structures for Phase 2 DZTM Project for several reasons. These structures have a more compact footprint compared to some other types of structures, such as H-frames or lattice towers, and are generally less impactful as a result.

Monopole structures can typically be constructed more easily and more quickly than other structure types, and design is fully customizable to the specific needs of a given structure at a particular location (soil borings will be retrieved to design the embedment or drilled pier foundations specific to that location to ensure adequate and efficient embedment and foundation designs). They can also be designed to support multiple circuits and still be self-supporting, eliminating the need for multiple guy wires.

Q. What is meant by "weathering" support structures?

A. Generally, weathering steel, sometimes referred to as "corten steel," is composed of several steel alloys, which forms a rust patina over the steel after several years of exposure to the weather. Weathering refers to a chemical composition, which allows increased resistance to corrosion compared to other steels. The protective or controlled rust surface patina eliminates the need for painting or galvanizing.

Q. What type of coating will the structures have?

A. Above grade, weathering steel does not require the use of a protective coating. The protective rust surface repairs itself. The direct embed poles will have a ground sleeve (a thicker steel cross section) at the groundline to mitigate against corrosion. The ground line sleeve will extend 2 feet above grade and will extend 4 feet below grade. A two-part epoxy protective coating will be utilized on the bottom section to include the embedded part of the pole. The coating will be utilized 2 feet above the groundline and will extend at least 7 feet below groundline.

Q. How will maintenance and repair of the structures be handled?

A. Ameren Services on behalf of the ATXI will maintain a maintenance schedule for each structure, and while inspection frequency will be identical to that of galvanized poles, galvanized poles are expected to require painting between 20 to 40 years of service life, while weathering steel poles do not require painting.

Q. Will the support structures also support any other lines or facilities, either initially or in the foreseeable future?

A. Other than as previously described, the structures will not be utilized for other lines or facilities in the foreseeable future.

Q. Will ATXI design the Phase 2 DZTM Project in accordance with all applicable regulatory standards?

A. Yes. Ameren Services, on behalf of the Applicant, will design the DZTM Project in accordance with and to comply with all applicable regulatory requirements and standards, including, as I mentioned, the NESC requirements.

V. PHASE 2 DZTM PROJECT TRANSMISSION LINES RIGHT-OF-WAY

Q. Generally, what right-of-way is needed for the Phase 2 DZTM Project's transmission lines?

A. A 150-foot-wide right-of-way is needed for the Phase 2 DZTM Project for operation and maintenance purposes. However, the ZM Segment will, for a majority of the line, overlap 98 feet of the existing right-of-way of the parallel transmission lines, and the ZT Segment will overlap the existing transmission right-of-way (of the 161kV transmission line being rebuilt)

by 100-feet, resulting in only 52 feet and 50 feet, respectively, of new right-of-way. A 150-foot-wide right-of-way provides adequate clearance from the conductor to any building or obstructions on the edge of the right-of-way, and is the industry standard for 345 kV transmission lines, in accordance with NESC Rule 234C.1. This width will also enable ATXI to comply with its vegetation clearance requirements, as described in the Transmission Vegetation Management Project document FAC-003-1 that it has on file with the Federal Energy Regulatory Commission in response to North American Electric Reliability Corporation mandates.

VI. CONCLUSION

Q. Does this conclude your direct testimony?

A. Yes.

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of Ameren Transmission Company of Illinois for a Certificate of Convenience and Necessity under Section 393.170.1, RSMo. relating to Transmission Investments in North Central Missouri.	))))))	File No. EA-2025-0087

AFFIDAVIT

1. My name is Adam J. Molitor. I am a Principal Engineer in the Transmission Line Design and Standards group for Ameren Services Company, which is a subsidiary of Ameren Corporation and an affiliate of Ameren Transmission Company of Illinois, the Applicant in the above-captioned proceeding.

2. I have read the above and foregoing Direct Testimony and the statements contained therein are true and correct to the best of my information, knowledge, and belief.

3. I am authorized to make this statement on behalf of Ameren Transmission Company of Illinois.

4. Under penalty of perjury, I declare that the foregoing is true and correct to the best of my knowledge and belief.

/s/ Adam J. Molitor
Adam J. Molitor, P.E.
Principal Engineer in the Transmission Line Design and Standards group for Ameren Services Company

On behalf of Ameren Transmission Company of Illinois

Date: December 11, 2024