Selection Report

Wisconsin Southeast
345 kV Competitive Transmission Project

January 6, 2026

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Executive Summary

MISO has chosen Viridon Midcontinent LLC to develop the Wisconsin Southeast Competitive Transmission Project (WISE).

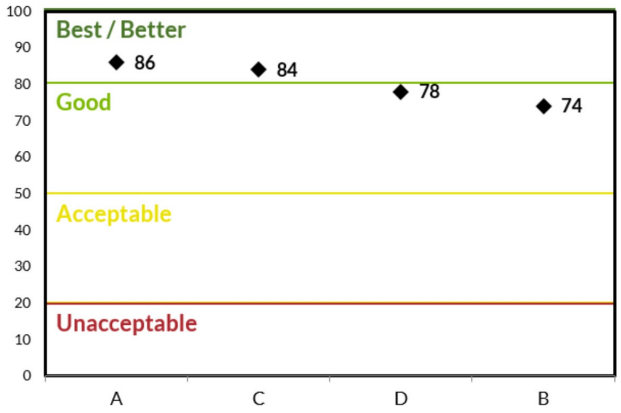
This report explains MISO's competitive developer selection process and the WISE project, summarizes the four proposals MISO received to build and operate WISE, and explains why MISO selected Viridon to develop WISE.

In 2024, MISO approved the Long-Range Transmission Planning (LRTP) Tranche 2.1 portfolio for inclusion in the 2024 MISO Transmission Expansion Plan. This tranche included Project 28, which consists of new and upgraded transmission facilities in Southeast Wisconsin.

MISO determined that four new 345 kV substations and four new 345 kV transmission lines within Project 28 were eligible for its Competitive Transmission Process. MISO grouped these facilities and titled them the Wisconsin Southeast 345 kV Competitive Transmission Project and refers to it as "WISE." WISE must be placed into service by June 1, 2033.

MISO issued a Request for Proposals (RFP) for WISE on February 13, 2025. On July 28, 2025, four developers submitted a total of four proposals. Figure 1 identifies the score and categorization MISO awarded to each WISE proposal – Viridon is Developer A in this report.

Figure 1. Proposal Scores



All proposals met the minimum requirements of the RFP. Each developer explained how it would procure materials and what contractors it would use to build the project. Each developer demonstrated it has the capital to build and operate the project and substantial experience operating and maintaining high-voltage transmission facilities.

Figure 2 shows the estimated capital costs exclusive of AFUDC and present value of the 40-year revenue requirements submitted for WISE.

Figure 2. Proposal Cost ($M) [1]

Viridon, which was Developer A, proposed installing Drake ACSS conductor on weathering steel monopoles over routes totaling 106 miles. Its estimated capital cost and present value revenue requirement (PVRR) were significantly lower than those of any other developer. Although MISO is concerned that some components of its estimated capital cost may be understated, Viridon offered cost containment strong enough to likely ensure the lowest cost to the ratepayer even if its estimated costs rose significantly. It has an executed agreement with a general contractor.

Developer B proposed installing Drake ACSS conductor on weathering steel monopoles over routes totaling 126 miles. It has not yet selected a general contractor.

Developer C proposed installing Suwannee ACSS/TW conductor on weathering steel monopoles over routes totaling 109 miles. Although it would be well positioned to implement and operate the project, ratepayers would most likely pay more for the project than if implemented by Viridon, due to a higher estimated capital cost, the absence of meaningful cost containment and the highest requested return on equity and weighted average cost of capital. It has an alliance agreement with a general contractor.

Developer D proposed installing Cardinal ACSS/TW conductor on concrete monopoles over routes totaling 122 miles. Although its estimated capital cost was lower than that of Developers B and C, its PVRR was significantly higher due predominantly to significantly higher O&M expense. It has not yet executed a contract with its planned contractor.

[1] The MISO capital cost estimate was escalated to the estimated in-service year dollars based on MISO's 2.50% annual inflation rate. The developers' estimates reflect the sum of capital costs in the years in which they were spent.

Figure 3 identifies the four evaluation criteria and respective weights identified in the tariff, and MISO's categorizations. The figure also identifies how each proposal ranked in each criterion.

Figure 3. Evaluation Scores

Proposal	Cost and Design 35%	Project Implementation 30%	Oper. & Maint. 30%	Planning Participation 5%	Score
A (Viridon)	Best	Good (3)	Good (3)	✓	86
C	Good (2)	Better (2)	Best	✓	84
D	Good (4)	Best	Good (3)	✓	78
B	Good (3)	Good (4)	Better (2)	✓	74

MISO determined Viridon and Developer C submitted the most competitive proposals, respectively.

Viridon submitted superior cost containment that will likely ensure the lowest cost to ratepayers. It has already executed an agreement with a general contractor, which has significant experience with 345 kV transmission line and substation construction. Although its O&M provider has less experience than some of the other proposed O&M providers, MISO is confident that provider will be able to execute this project.

Although Developer C had strong project implementation and O&M plans, ratepayers would likely pay more for the project due to its higher estimated costs and less effective cost containment. Developer C also planned to request the highest return on equity and weighted average cost of capital of any potential developer.

MISO and Viridon will execute the Selected Developer Agreement within 60 days of the public release of this report.

Wisconsin Southeast Competitive Transmission Project Selection Report

I. Competitive Project and Process

This report explains MISO's decision to select Viridon Midcontinent LLC to develop the Wisconsin Southeast Competitive Transmission Project (WISE) and the process MISO used to reach its decision.

Competitive Project

On December 12, 2024, MISO's Board of Directors approved the Tranche 2.1 Long-Range Transmission Planning portfolio for inclusion in the 2024 MISO Transmission Expansion Plan (MTEP24). Tranche 2.1 includes Project 28, which consists of 36 new or upgraded transmission facilities in Southeast Wisconsin.

MISO determined the following Project 28 facilities are eligible for its Competitive Transmission Process:

- Four substations (Big Bend, Cedar Creek Junction, Mullet River Junction, and Sheboygan River)
- Two 345 kV single-circuit transmission lines (South Fond du Lac – Jefferson and Sugar Creek – REC Bradford)
- One 345 kV double-circuit transmission line (Big Bend – Sugar Creek)
- One 345 kV single-circuit transmission line constructed with 345/138 kV double-circuit capable structures (Fort Atkinson – Whitewater)

MISO grouped these eight facilities together as the Wisconsin Southeast 345 kV Competitive Transmission Project and refers to the project as "WISE." WISE must be placed into service by June 1, 2033.

Request for Proposals

MISO issued a Request for Proposals (RFP) on February 13, 2025, to solicit proposals from Qualified Transmission Developers (QTDs) to build and operate WISE. MISO held a public meeting on March 17, 2025, to provide information and answer questions about the project and the RFP. Full details about the RFP and a register of questions asked, along with the answers provided by MISO, are available on MISO's Competitive Transmission Administration webpage.[2]

[2] https://www.misoenergy.org/planning/competitive-transmission-administration/

MISO's goal is to select a proposal that provides the greatest overall value while meeting all project requirements and ensuring the highest likelihood of project success. Cost is an important component of value and a comparative advantage, but it is not the sole consideration. MISO anticipates the following aspects of the project may be particularly important. MISO encouraged developers to consider:

1. **Multiple transmission facilities located over a wide geographic area:** The project contains four new substations and four new transmission line facilities that are not all directly electrically interconnected. An important aspect of the project will be the plans to construct multiple new substations and multiple new transmission line facilities located over a wide geographic area, and the plans to maintain those facilities once in-service.
2. **Coordination with Interconnecting Transmission Owner:** The project contains transmission line facilities that are only a segment of a longer transmission line and that interconnect near existing substations. An important aspect of the project will be the planned coordination and flexibility with the interconnecting Transmission Owner on various regulatory, permitting, design, construction, and operations and maintenance activities.
3. **Project Scale and Scope:** The project is relatively large, with a MISO-estimated cost exceeding $500 million. An important aspect of the project will be to demonstrate the ability to manage the complexities of a large project from the standpoint of financing, and overall project management.
4. **New substation locations:** The project contains four new substations that will tie into existing transmission lines. An important aspect of the project will be the strategic siting of the new substation locations in relation to the interconnections that must be made to existing transmission lines and any new lines (if applicable) and how the siting of the new substations affects the cost, design, and implementation plans for the project.

Proposal Receipt

On July 28, 2025, four developers submitted proposals for WISE. MISO validated each developer was certified as a Qualified Transmission Developer on the dates the proposals were submitted and reviewed each proposal for completeness. It gave every developer the opportunity to clarify or cure unclear or incomplete submissions. All developers responded to MISO requests for clarification or cure, and no developer subsequently withdrew a proposal.

On October 1, 2025, MISO announced it had received four valid and complete proposals from four development teams: American Transmission Company and Dairyland Power Cooperative (jointly) with WPPI Energy as a Proposal Participant, Longview Infrastructure Midwest LLC with Great River Energy as a Proposal Participant, LS Power Grid Wisconsin Inc, and Viridon Midcontinent LLC.

Proposal Quality

MISO appreciates the amount and complexity of information competitive developers must organize, summarize, and submit in response to MISO's competitive RFPs.

The WISE RFP was the second RFP for MISO's Tranche 2.1 competitive projects and the second RFP that used MISO's new approach for Part 2. Proposal Template. This approach consists of specific questions instead of broader requests for information and simplifies MISO's comparison of proposals.

The WISE proposals continued to validate this new approach. Most answers were concise and directly answered the questions asked. The developers correctly followed MISO's attachment naming format, which allowed MISO to easily identify and understand the additional documents attached to proposals. Some answers did include information already stated in previous answers, but MISO understands that competitive developers will typically error on the safe side when deciding how to answer questions.

MISO did identify aspects of the proposals that complicated its review or did not align with the RFP's directions. One or more developers submitted:

- Redacted attachments that required MISO to spend time requesting unredacted versions. Although MISO's tariff states it will protect confidential information and CEII submitted by developers through the competitive transmission process, MISO recognizes the project's RFP did not remind developers of this protection. MISO has revised its future RFPs to state this.
- Project cost workbooks with incorrect equation changes. MISO's review process identified one developer, although with good intentions, incorrectly changed an equation. MISO had to request a revised workbook from this developer.

Although these issues did not result in a change in any proposal's comparative ranking, MISO expects future competitive projects to have closer rankings, and a failure to scrutinize proposal documents or follow the RFP could jeopardize a proposal's success.

MISO recognizes it also has a role to play in facilitating well-written, competitive proposals. It will continue to look for opportunities in future RFPs to ask more specific questions and provide clearer direction.

Confidentiality

MISO recognizes the importance of transparency in the Competitive Transmission Process. However, MISO is obligated to treat the following information as confidential unless a developer consents to its disclosure:

- all detailed breakdowns of costs, including the itemized costs for labor and materials,
- all details of a developer's financing arrangements (as well as those for any project participants),
- all detailed design, routing, siting, or specialty construction techniques, and
- any other information or portions of documents that a developer has clearly designated as confidential (excluding items that are expressly categorized by the MISO Tariff as non-confidential or that MISO has an obligation to make publicly available).

Proposal information the tariff categorizes as not confidential includes:

- the identity of developers,
- the high-level design, estimated cost, and estimated 40-year annual transmission revenue requirement for the project,
- information relating to any cost-containment measures, cost-caps, and rate incentives,
- information about the proposed in-service dates of the project,
- the final evaluation score assigned to each proposal (with the names of the developers masked),

- all timetables and milestones agreed to between the Selected Developer and MISO in the Selected Developer Agreement,
- information that is publicly available, a developer has consented to release, or the tariff requires MISO to make publicly available.

Communication and Information Protocols

MISO adheres to the following self-imposed protocols throughout the competitive developer selection process:

- **Project Information Kept Confidential:** Information deemed confidential under the Tariff related to competitive projects will be treated as commercially and competitively sensitive.
- **Communications to Be Coordinated:** MISO aims to coordinate all communications with interested stakeholders regarding RFPs, the evaluation process, selection report, and variance analysis. Please refer all questions to MISO Client Relations at CTA@misoenergy.org and not to individual MISO personnel.
- **Questions Will Be Answered Transparently:** MISO will publicly post questions it receives and vetted answers on the Competitive Transmission Administration webpage.
- **Project-Specific Questions to Be Directed to MISO:** Once an RFP is issued for a Competitive Project and until the Selection Report is issued, all questions regarding that project must be directed to MISO and not to interconnecting incumbent transmission owners. MISO will process these questions in accordance with MISO's Business Practices Manual No. 027.

These communication protocols are posted on MISO's public website, were incorporated in part within the RFP and BPM-027, and were included in presentations during public stakeholder meetings.

MISO conducted training for employees and consultants involved with the Competitive Developer Selection Process. MISO emphasized the need for confidentiality and announced the communication protocols at every meeting of MISO staff and the Competitive Transmission Executive Committee where information about the RFP, developers, or their proposals was discussed.

MISO instructed the evaluation team, which was required to protect the confidentiality of all proposals and associated work products, to refrain from discussing any proposal with entities or individuals that were not part of the MISO evaluation team.

All MISO employees and consultants followed the confidentiality and communication protocols established by MISO throughout the competitive developer selection process, and restricted access and discussions about proposals not only to external parties, but also to other staff members within MISO who were not part of the MISO evaluation team. In addition, to protect the integrity of the evaluation process, MISO has kept the identities of its independent consultants confidential and required those consultants to attest they did not have a conflict of interest with any project developer.

MISO restricted access to all electronic versions of proposal-related documents. Only members of the MISO evaluation team were allowed access to proposal materials. In addition, before MISO evaluated the proposals, MISO randomly assigned a number to each proposal and a letter to each developer to enable team members to discuss proposals without referring to a developer's name.

Proposal Evaluation

MISO analyzed each proposal in compliance with Attachment FF of MISO's Tariff, Business Practices Manual No. 027 Competitive Transmission Process, and the WISE RFP.

MISO studied each of the four evaluation criteria identified in the tariff, as well as the enumerated subcriteria. Within each criterion and sub criterion, it considered the cost, risk, certainty, and specificity of the information in each proposal.

Part III of this report, *Comparative Analysis of Proposals*, explains how MISO selected the developer for this project. Each section begins with a summary of the requirements for that section and then discusses the areas in which all developers performed equally and the areas in which they performed differently. Similar performance by all developers is discussed summarily, while differences are explored in greater detail.

This report principally refers to proposals by developer. If a developer submits more than one proposal, the report will only distinguish that developer by proposal when the subject matter is different between that developer's proposals.

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II. Summary of Proposals

The following three figures represent principal components of the WISE proposals by developer. Part III of this report discusses the information in greater detail.

Figure 4. Design characteristics

	A (Viridon)	B	C	D
Conductor				
Trade name and type	Drake ACSS	Drake ACSS	Suwannee ACSS/TW	Cardinal ACSS/TW
Kcmil (Misch alloy core)	2-795 (MA2)	2-795 (MA2)	2-959 (MA3)	2-954 (MA3)
Emergency amps (summer)	3000A	3326A	3000A	3498A
Max. operating temp. (F°)	338°	414°	305°	392°
Max design temp. (F°)	394°	414°	305°	392°
Max audible noise (dBA)	48	53	47	52
Tangent structures				
Type	Monopole	Monopole	Monopole	Monopole
Material	Steel (weathering)	Steel (weathering)	Steel (weathering)	Concrete
Insulators	Braced post	Braced post	Braced post	Braced post
Foundation	Direct embed	Direct embed	Direct embed	Direct embed
Total tangents	470	572	559	696
Deadend and angled structures				
Type	Steel (weathering)	Steel (weathering)	Steel (weathering)	Concrete
Deadend modifications	Drilled pier	Drilled pier	Drilled pier	3-pole guyed
Angled modifications	Guyed	Drilled pier	Drilled pier	Drilled pier
Exceptions[3]			H-frame	H-frame, galvanized
Typical shielding angle (°)	25°	10°	0°	25°
Mean recurrence interval (yrs)	100	300	100	300
Struct–struct span (avg ft)	985	820	865	771
DE-DE section (avg mi)	2.8	1	2.0	1.4
Substation				
Main bus rating (Amps)	4397	4200	3000	5528
Breaker ratings (ring/BAAH)				
Load rating	3000A/3000A	3000A/3000A	3000A/3000A	3000A/4000A
Interrupting rating	63kA/63kA	>40kA/>50kA	63kA/63kA	63kA/63kA

[3] C and D would use H-frames when necessary to meet FAA clearance concerns or longer spans. D would use galvanized steel poles when structures must be taller than 130 feet or guying was not feasible.

Figure 5. Cost characteristics [4]

	A (Viridon)	B	C	D
Estimates				
Revenue requirement ($M, PV)	$256	$361	$370	$437
Capital cost ($M, without AFUDC)	$349	$477	$481	$471
Commitments				
Revenue				
Calendar year commitment	ISY + 40	20		40
Cap tier 1 (Avg over estimates)	5%	[5] -6%		7%
Reduction in Rev. Require.	100%	25%		60%
Cap tier 2 (Avg over estimates)		14%		
Reduction in Rev. Require.		100%		
Defer unused cap	[6] No	No		Yes
Defer revenue over cap	Yes	No		No
Financing				
Calendar year commitment	ISY + 40	40		40
Max equity			47.50% (40y)	
Max ROE			10.48% (20y)	
Max weighted ROE	3.92%	4.275%		
Max WACC				7.90%
Minimum ROE	8.20%	7.25%	8.49%	
Capital cost ($M)				
Calendar year commitment	ISY + 40		40	40
Cap amount	$349		$481	$525
Cap includes AFUDC	No		No	Yes
WACC over cap				5.50%
ROE over cap			8.50%	
Weighted ROE over cap	2.80%			
Other				
O&M (years)			10	
Schedule guarantee	✓	✓	✓	✓
Change orders		✓		
Waive return on CWIP	✓		✓	✓

4 Certain information is approximate to either help anonymize the developer or to simplify the table.

5 The revenue cap is approximately 6% lower than the proposed amount.

6 If FERC does not approve Viridon's proposal to defer excess revenue for possible recovery in a later period, it will request to defer unused cap space for possible future use.

III. Comparative Analysis of Proposals

This section explains the criteria MISO must evaluate in each proposal, the weights MISO must assign to the criteria identified in the tariff, the content of the proposals responsive to the WISE RFP, and the information that strengthened or weakened each developer's submission.

1. Cost & Design

MISO must evaluate each proposal's electrical design, structural design, estimated capital cost and revenue requirements, and cost containment offers. This evaluation constitutes 35% of MISO's decision in this project.

In this criterion, MISO categorized Viridon's proposal as Best, and Developer B, C, and D as Good.

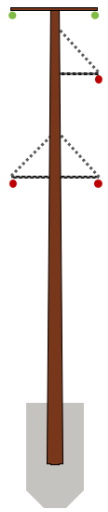
1A. Transmission Line Design

A competitive proposal must describe the characteristics of all proposed conductors, wires, transmission structures, and foundations. It must also explain all grounding, lightning, galloping, and vibration strategies.

All developers adequately described their proposed transmission line designs and evaluated the galloping and vibration performance of those designs.

Figure 6 illustrates the common characteristics of the proposed line designs. All developers proposed substantially similar transmission structures.

Figure 6. Typical monopole tangent structure



The proposed designs affect project cost, implementation, operation, and maintenance differently. Viridon designed the longest spans, which reduce the number of structures, lowering cost and potentially simplifying implementation. However it also proposed the most guyed structures, which may introduce complications during implementation. Developer B and Developer D designed their structures against a 300-year mean recurrence interval (MRI) weather event, which increases reliability but also increases capital cost. Generally, a higher MRI will lead to a more robust transmission line design.

Developer C and Developer D's designs will require a narrower right-of-way (ROW) which decreases cost. Developer D's design results in the most structures per mile which increases capital cost. MISO considered these tradeoffs when it ranked the proposals' Cost and Design plans.

Viridon, Developer B, and Developer C selected weathering steel structures, stating the Wisconsin Public Service Commission prefers weathering steel transmission structures in certain designs. Developer D selected galvanized steel and concrete poles, citing Wisconsin as a wet and potentially corrosive environment that may not be suited for weathering steel.

Although MISO's decision in this project does not significantly rest on this issue, it does positively view evidence in competitive transmission proposals that a developer believes stakeholders will not object to aesthetic aspects of its designs.

All developers performed lightning and vibration studies and considered galloping. All developers also considered the NESC 5mA rule in the design as well as calculating electric, magnetic fields as well as audible noise.

1B. Substation Design

A competitive proposal that includes a substation must include a detailed one-line diagram and describe the proposed protection schemes, remote monitoring capabilities, communication systems, power transformers, line terminal ratings, and characteristics of various other equipment. It must also describe how the structural design will meet local legal and regulatory requirements.

The project's RFP stated developers should select substation locations that simplify and optimize the line from the new substation to the nearby transmission lines. The WISE RFP specified that three substations will have a four-position ring bus configuration and one substation will have a six-position breaker and a half bus arrangement. The RFP specified a minimum circuit breaker interrupting rating of 40kA for the ring bus substations and 50kA for the breaker and a half substation. It also specified a minimum load rating for the circuit breakers of 3000 amps for both substation designs.

MISO reviewed the developers' civil designs, physical designs, structural designs, and protection and control designs. All developers submitted adequate substation designs.

Viridon proposed using 3000 Ampere(A) circuit breakers with a 63kA interrupting rating at all substations and proposed using a main bus with a 4397 A rating at the breaker and a half substation. Viridon's proposed location for the Cedar Creek substation could result in transmission cut-in lines being longer than one mile. Double circuit cut-in lines longer than one mile will either have to be designed as single circuit lines or be subject to additional transmission planning study work if they are built as double circuit lines.

Viridon proposed three sources of AC service. Viridon's proposed access roads to its substations could lead to challenges once the project is in-service such as one of the substation access roads being approximately three quarters of a mile long and another with a tight turning radius and steep slopes. Viridon provided layout drawings that included expansion plans for the substations. If needed in the future, the expansion of the ring bus design will require minor rework.

Developer B proposed using 3000 A circuit breakers and specified a minimum interrupting capability that met the minimum design requirements in the RFP. Developer B proposed using a main bus with a 4200 A rating at the breaker and a half substation. Its proposed substation locations result in cut-in lines that are less than one mile long.

Developer B proposed two sources of AC power along with provisions to connect a portable generator if both sources of station service were lost. Developer B described its expansion plans but did not include the expansion plans on the layout drawings. If needed in the future, expansion of the ring bus layout will not require re-work.

Developer C proposed using 3000 A circuit breakers with a 63kA interrupting rating at all substations and a main bus with a 3000 A rating at the breaker and a half substation. Its proposed substation locations result in cut-in lines that are less than one mile long. Developer C proposed two sources of AC power via local distribution and there is some risk that these sources will not be completely independent of each other.

Developer C will use a private fiber network to provide redundant communication paths between the substation and control centers. The other developers indicated that they would establish dual communication links between the substation and their control centers but did not provide details regarding these links. Developer C described the expansion plans but did not include the expansion plans on the layout drawings. If needed in the future, the expansion of the ring bus design will require the most rework.

Developer D proposed using 3000 A circuit breakers at the ring-bus substations and 4000 A breakers at the breaker and a half substation. All breakers will have a 63kA interrupting rating. It would use a main bus with a 5528 A rating at the breaker and a half substation. Its proposed substation locations result in cut-in lines that are less than one mile long. It included a possible future reactor on its initial Big Bend substation layout drawings.

Developer D proposed digital fault recorders (DFR) at all substations. It proposed the use of a Human-Machine-Interface (HMI) touchscreen and keyboard to perform local control of the substation equipment. It will use a geotextile fabric under the access roads. It proposed a single motorized drive gate and has no alternate access in the event the drive gate becomes inoperable. It provided layout drawings that included expansion plans for the substations. If needed in the future, the expansion of the ring bus layout will not require any re-work.

1C. Capital Cost

A competitive proposal must detail the capital cost it estimates for the project in its Project Cost Workbook (PCW). Although MISO must evaluate the rigor of each cost estimate and any financial assumptions, it recognizes those estimates are not binding without cost containment measures.

MISO does not include capitalized financing expenses when it compares capital cost because not all proposals may choose to capitalize those expenses. However, the present value of revenue requirement (PVRR) calculation includes all developers' financing expenses during construction.

Figure 7 illustrates the estimated capital costs and fully loaded cost per line mile of the proposals. MISO's estimates reflect 2033 dollars while the developers' estimates are the sum of capital spent during the proposed construction periods.

Figure 7. Estimated capital cost ($M) [7]

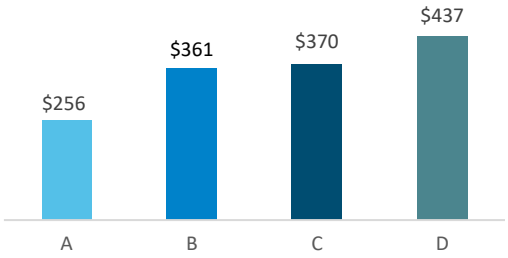
Although Viridon (Developer A) estimated a capital cost that was about 25% less than the next lowest estimate, that cost may not be achievable given the significant difference between its estimates for right-of-way, condemnation, and other costs and those of the other developers, a few of which demonstrated previous work in the project area. However, as this report will discuss, Viridon's cost containment was sufficient to ensure its proposal will likely result in the lowest cost to ratepayers in the scenarios MISO considered.

[7] The MISO capital cost estimate was escalated to the estimated in-service year dollars based on MISO's 2.50% annual inflation rate. The developers' estimates reflect the sum of capital costs in the years in which they were spent.

1D. Annual Transmission Revenue Requirement

A competitive proposal must show in detail the project's estimated annual transmission revenue requirements (ATRR) for the first partial year and the next forty years. MISO calculates the present value of a project's revenue requirements (PVRR) by discounting each ATRR by a 7.1% discount rate.

Figure 8. Estimated PVRR ($M)



Viridon (Developer A) estimated a PVRR that was almost 30% lower than that of the next lowest estimate. This was primarily due to its very low estimated capital cost and the lowest weighted average cost of capital. The following section explains that its choice to cap its annual revenue requirements, cap its weighted average cost of equity (WACE) for the project's life, and reduce that WACE by almost 30% on capital costs greater than its estimate significantly reduced the cost risk to the ratepayer of its proposal.

Developer B estimated the second lowest PVRR. This was primarily due to its use of a WACE superior to that used by Developer C and Developer D.

Developer C estimated a PVRR that was slightly higher than that of Developer B. This was primarily due to its comparably higher cost estimate, a slightly less leveraged capital structure and the highest return on equity requested by any developer.

Developer D estimated the highest PVRR. Although its estimated capital cost and weighted cost of capital were both lower than those of Developer C, it proposed the highest O&M expense and the least leveraged capital structure.

1E. Cost Containment

A developer, to make its proposal more competitive, may commit to limit the revenue it will request to recover on a project through the end of the 40th full calendar year of operation. MISO refers to this as the "project life" in this section. Developers often commit to limit the project's total revenue, the project's capital cost upon which revenue components are based, individual revenue components, or a combination of these. Unless stated otherwise below, each commitment offered would be enforceable for the project life.

Figure 5 on page 8 of this report presents the cost containment offers of each proposal.

Total Revenue Requirement

The most comprehensive single form of cost containment a transmission developer can offer is to cap the revenues it will request from FERC to recover annually. Developers may offer hard caps, which preclude all revenue recovery greater than each cap, or soft caps, which may or will preclude a portion of revenue greater than each cap. No developer offered hard revenue caps in this project.

Viridon would cap its annual revenues at approximately 5% greater than its estimates plus any revenue necessary to earn a minimum ROE of 8.2%. If MISO also selected it to develop BECI, a 765 kV competitive project in Wisconsin that MISO is concurrently administering, Viridon would remove the 5% increment on its caps, but it would retain discretion to allocate its recoverable expenses on one project to the other project to minimize revenue it would otherwise have to forfeit. MISO recognizes that this discretion would allow Viridon to hedge the increased cost risk it would accept if it removed the 5% increment.

Developer B would cap its annual revenues for the project's first 20 full calendar years at an average of 6% less than its estimates that would reduce additional revenue by 25%. Developer B offered a second set of caps for the same period at an average of 14% greater than its estimate that would reduce additional revenue by 100%. However, it would not cap revenue in the project's partial, first year of operation. These caps would also be subject to a minimum ROE of 7.25%.

Developer C did not offer to cap its total revenue.

Developer D would cap its annual revenue for the project's first 40 full calendar years at an average of 7% greater than its estimates. It would forfeit 60% of all revenue greater than those caps. It did not hedge these revenue caps with a minimum ROE.

Financing Expenses

The developers also offered cost containment that would only apply to certain financing expenses.

Viridon offered to cap its weighted cost of equity at 3.92%.

Developer B offered to cap its WACE at 4.275% for the project's first 40 full calendar years. It also offered to cap ROE at 8.95% for recovery during construction and for any costs caused by Force Majeure events under section 11.1 of MISO's Selected Developer Agreement.

Developer C offered to cap its equity structure at 47.5% for the project's life and its return on equity at 10.48% for 20 years.

Developer D offered to cap its weighted cost of capital at 7.90%.

Capital Cost

Developers may also propose to fully or partially cap a project's capital costs. The caps may either include or exclude AFUDC.

Viridon offered to reduce its maximum weighted cost of equity from 3.92% to 2.80% on capital costs greater than its estimate. The cap would exempt AFUDC. It would also reduce its cap by 7% if MISO selected it to develop both WISE and BECI.

Developer B did not offer to cap its capital cost.

Developer C offered to reduce its maximum ROE from 10.48% to 8.49% on capital costs greater than its estimate. This offer is somewhat dependent upon FERC's approved ROE and Developer C's cost of debt. This cap would exempt AFUDC.

Developer D offered to reduce its maximum WACC from 7.90% to 5.50% on capital costs greater than its estimate. This cap would include AFUDC.

Other Aspects

The developers each proposed additional provisions that would offer increased certainty to their revenue estimates.

Viridon proposed to not recover any additional cost related to a change in a project interconnection point up to 500 feet from the location identified in the RFP. It would also reduce its weighted average cost of equity by 0.01% for every month, up to 12 months, its actions result in a delay to the final energization of a project facility. Viridon estimated AFUDC during construction and committed to not apply for the CWIP incentive. Its revenue requirement cap amount would be adjusted by month based on the actual in-service date. Finally, it stipulated that it would defer unrecoverable expenses without a return and request to recover those expenses in any year in which there was room under its revenue caps. If FERC does not permit this treatment, it would increase all revenue caps by 0.5% and increase each cap by any unused cap space in the previous year.

Developer B's offer related to project delay was identical to that of Viridon's. It also stipulated that it would not increase its revenue caps for any change orders under section 9.2.1B of MISO Selected Developer Agreement, unless caused by defined excluded causes. Finally, it stipulated it would not seek to recover more than $1 million related to pre-selection development costs.

Developer C offered to reduce its MISO ROE adder by 0.05% for every month, up to ten months, its actions result in a delay to the final energization of a project facility. It estimated AFUDC and offered not to request CWIP recovery. It also offered to cap its recoverable O&M expense for the first ten calendar years at a fixed amount, adjusted for inflation pursuant to the Consumer Price Index. It would defer unrecoverable O&M and collect it either in years in which there was room under the cap or in project years 11-15, without interest. Developer C also offered an ROE reduction for the first $35M of capital costs above their capital cost cap caused by an uncontrollable force or Force Majure event. Finally, it maintained a right to earn a minimum ROE of 8.49%, that could change if MISO's base ROE rate changes or Developer C's cost of debt increases.

Developer D offered to reduce its ROE by 0.025% for every month, up to 12 months, its actions result in a delay to the final energization of a project facility. It also estimated AFUDC during construction and committed to not seek CWIP recovery.

Scenario Analysis

MISO also calculated proposal PVRRs in different scenarios to understand how those scenarios would affect the PVRRs. Common scenarios include changes in project cost, return on equity, cost of debt, O&M expense, route lengths, and equity in capital structure. The WISE project had no developer offer hard annual revenue caps for the projects' lives.

Viridon's PVRR remained the lowest in all scenarios despite its ROE floor of 8.20%. This was due to its revenue and WACE caps, and its WACE decrement on excess capital costs, all of which would be effective for the project life.

Developer B performed well in some scenarios but, due to its tier 2 ATRR cap being set approximately 14% above its estimates, its cost containment was not as strong as that of Developer A.

Developer C's ROE cap and its decremented ROE on excess capital costs were not strong enough to change its competitive positioning.

Developer D had the most effective cost containment relative to its own estimates in high cost increase scenarios due to the absence of an overriding minimum ROE stipulation. However, its high starting cost coupled with revenue caps that only reduced additional revenue by 60% limited its competitiveness.

2. Project Implementation

A competitive proposal must explain the experience and expertise of its management and construction team, its proposed project transmission routes and sites and how it will obtain the land and permits it will need, how it will build and finance the project facilities, and how it will ensure the safety of its teams. This evaluation constitutes 30% of MISO's decision in this project.

All development teams demonstrated relevant experience owning, building, or operating transmission assets. They also all established they will be partnering with other utilities and contractors to strengthen their plans.

For Project Implementation, MISO categorized Developer D as Best, Developer C as Better, and both Viridon and Developer B as Good.

2A. Management Ability

Schedule

A competitive developer must submit a project schedule that illustrates eight named activities and the project's critical path. For each activity, it must explain why the time it scheduled for that activity was appropriate and how it has accounted for float. It also must explain the project's critical path.

Viridon's schedule has float on the critical path and after completion prior to the required in-service date (ISD). It has demonstrated research to better understand regulatory permitting timelines. It provides significant and well-researched flexibility through early ISD preparations. It provided a summary schedule which effectively provides rationale for sequencing decisions and illustrates the critical path.

Developer B's schedule has no float on the critical path but the most float overall with 17 months between completion and required ISD. It demonstrated the most research into land acquisition timelines. It provided minimal supporting information for accelerating the three standalone substations to a June 1, 2028 ISD.

Developer C's schedule lacks details included in other developers' schedules (e.g., Environmental Impact Analysis/Agricultural Impact Statement and other intermediate CPCN activities, land acquisition, stakeholder/landowner engagement, etc.). It demonstrated extensive planning for accelerating ISDs.

Developer D used correspondence with Wisconsin regulatory counsel to inform its planned regulatory permitting timelines. Its schedule had the clearest breakdown of activities and exhibited a high level of planning. It provided the most overall flexibility with conservative durations, float along the critical path, and three months of float after project completion prior to the required ISD. It demonstrated the least planning to accelerate facilities' ISDs beyond the early ISDs already proposed.

Management

A competitive developer must describe how it will manage the project team to meet the proposed schedule. It should describe the qualifications and locations of the management team and the organizational structure of the project's contractors and subcontractors. It must discuss how it will mitigate project risks.

Viridon demonstrates certainty in its management plan by having an executed agreement with its general contractor (GC). Its approach to project risks is optimistic.

Developer B presents some risk to WISE in its approach to bid out GC duties after project award, though it has standing agreements with potential contractors. It demonstrates clear and logical relationships between mitigation measures and the impact of risks on the project.

Developer C demonstrates management certainty by having an alliance agreement with its planned contractor and established offices in Wisconsin. It lacks specificity regarding management responsibilities and project risk mitigation measures.

Developer D has the most risk-averse management approach with a planned GC that has similar experience with the developer and the most activities completed to mitigate project risks.

Experience

A competitive developer must identify the general locations, miles and number of transmission facilities its construction team has built and the developer currently operates and maintains. It must specifically discuss a few of the most relevant facilities and explain the extent to which the teams that built those facilities will be the same as its team on this project. Finally, if it lacks experience executing the types of facilities in this project, it must explain how it will obtain the experience and knowledge to execute this project.

Viridon's contractor has significant experience on similar projects. Viridon itself has no experience in Wisconsin and cites the experience of project team members while at previous employers, which provides less certainty compared to other developers.

Developer B demonstrated relevant experience including its team members' experience in Wisconsin. It cited some team members' experience from previous companies, which provides less certainty compared to other developers.

Developer C demonstrates the most relevant experience in Wisconsin of all developers and the strongest sampling of similar projects which were implemented by the same team planned to implement WISE. It provided examples of completing similar projects on time or under budget, adding certainty to its plan.

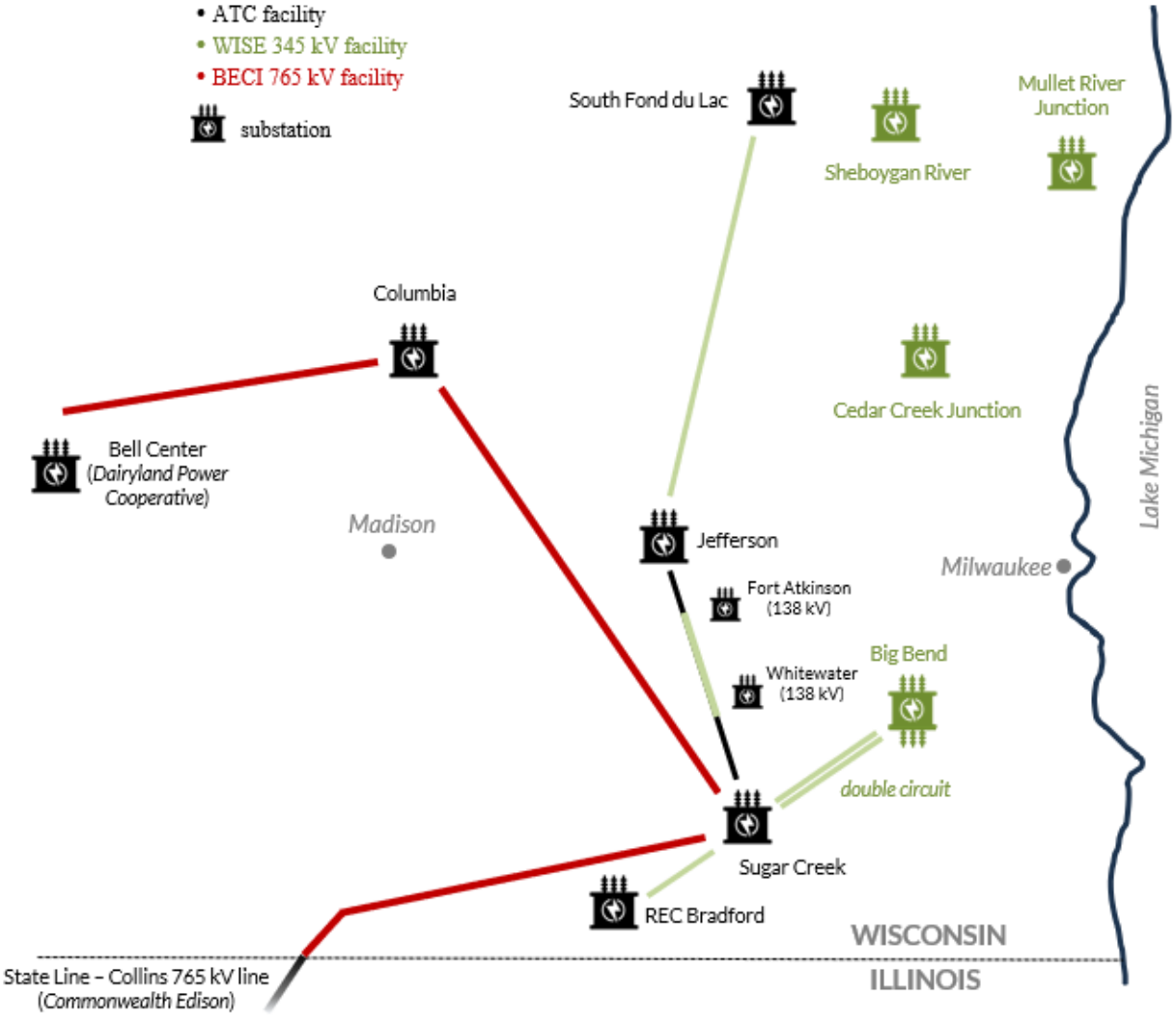
Developer D has implemented relevant 345 kV projects on time and under budget, but its team demonstrated the least experience in Wisconsin of all developers.

2B. Routing and Siting

A competitive developer must explain where and how it will site each transmission line and substation included in the project. It must discuss the constraints in the project areas, explain how each route and site is optimal given those constraints, and explain the remaining work the developer will perform to reduce the risk of the project. Finally, it must explain how it will obtain the necessary permits and acquire the necessary land to execute the project.

Figure 9 illustrates the existing and proposed transmission assets relevant to WISE. WISE will consist of four new 345 kV substations and four new 345 kV transmission lines. Big Bend-Sugar Creek will be a double circuit line, and Fort Atkinson-Whitewater will be a single circuit line on double circuit-capable structures, able to support a future 138 kV line. The Big Bend substation will be a six-position breaker-and-a-half, and the other new substations will be four-position ring buses. All facilities will interconnect with facilities owned by ATC.

Figure 9. WISE 345 kV facility map



Line Routing

Wisconsin Statute 1.12(6) establishes routing and siting guidelines for new electric transmission facilities, including high-voltage transmission lines. According to these guidelines, referred to as Wisconsin's siting priorities, the following corridors should be utilized in the following order of priority: existing utility corridors, highway and railroad corridors, recreational trails, and new corridors.

Viridon does not explicitly route in accordance with Wisconsin's siting priorities, which creates some risk, though some of its routing criteria aligned with Wisconsin's guidelines. It mitigated routing risks by demonstrating a thoughtful approach to constraints in the area, putting significant effort into site visits and agency outreach, and commissioned consultant studies to better understand the project area. However, its conclusions from mitigation efforts lacked specificity and did not always translate into decisions made in developing its proposed routes, which are the shortest total of all developers.

Developer B cited some Wisconsin policies as guidance for its routing decisions, though it creates some risk by not explicitly referencing Wisconsin's siting priorities or how they relate to the proposed routes. Its routing study had the least specific discussions of why its proposed routes (the longest total of all developers) were preferable over the alternatives, what conclusions were drawn from site visits, and how it will mitigate risks related to geotechnical characteristics of the project area. It proposes a riskier river crossing with more mitigation requirements than other developers. It did conduct significant agency outreach and provided specific examples of routing influence from that outreach.

Developer C mitigates routing risk by routing in accordance with Wisconsin's siting priorities, referencing historical geotechnical data from the project area, and demonstrating the most comprehensive understanding of uniquely local constraints. However, it impacts the most USGS Protected Areas of any developer (six), proposes riskier water crossings, and plans for some post-award coordination with local agencies that other developers have already initiated.

Developer D's routing study focused on Wisconsin's siting priorities and provided a thorough breakdown of its iterative process to select proposed routes from the most routing alternatives of all developers, resulting in the most risk-averse routes that impact the fewest USGS Protected Areas (two) and minimized impacts to routing constraints such as protected species. It did not spend as much time conducting field visits and local outreach as other developers, but the conclusions it reached from its efforts had specific impacts on its proposed routes.

Substation Siting

All developers have secured purchase option agreements for all sites (Developer B has County support for its Big Bend Substation site).

Viridon commissioned substation site assessments and desktop reviews of each substation site including some alternative sites. Its KMZ attachments included potential routes for cut-ins with existing transmission lines. These studies contain extensive site-specific information such as topographic features, zoning characteristics, and a full array of environmental constraints. It discusses each site's visual and audible impacts with a high level of specificity, describing the natural features of each site that mitigate impacts such as existing vegetation and neighboring land use.

Developer B demonstrated a high level of site development in its KMZ attachments which included parcel boundaries, wetlands, access roads, and potential routes for cut-ins with existing transmission lines. Its responses regarding how its proposed sites were chosen, each site's visual and audible impacts, and physical security features were brief and lacking specificity compared to the other developers'.

Developer C provided landowner correspondence logs and site maps for each proposed substation. The correspondence logs provide certainty in its process of selecting the proposed site from a set of alternatives. Its KMZ attachments included laydown yard locations and access roads. It discussed completed and planned visual and audible impacts mitigation measures, such as strategic incorporation of landscaping or fencing.

Developer D provided the most thorough substation site analysis of all developers. The analysis clearly demonstrates its process of selecting a proposed site from several alternatives and includes exhaustive discussion of constraints, opportunities, constructability features, and environmental consultations. It provided the most specificity regarding audible and visual features and planned mitigations for each site, including obtaining additional purchase option agreements around its Big Bend site to increase its buffer distance. Its discussion of physical security features is the most exhaustive of all developers and is clearly influenced by its substation analysis and planned mitigation methods. It demonstrated a high level of site development in its KMZ attachments which includes parcel boundaries, laydown yard locations, access roads, and site photos.

Permitting

A competitive proposal must describe how the developer will obtain regulatory permits necessary for the project. A developer must also discuss recent projects that demonstrate its capabilities to obtain the necessary permits.

All responses demonstrated significant research and experience which lead to certainty surrounding each developer's permitting plan.

Viridon conducted agency outreach to understand the PSCW CPCN process and demonstrated how that understanding impacted its permitting plan. It provided permitting tables with summaries, notes, status, and durations, as well as timelines of each permitting category. It highlighted team members' previous experience obtaining all permit types while at the developer or other companies.

Developer B conducted agency outreach to understand the PSCW CPCN process and demonstrated how that understanding impacted its permitting plan. It commissioned consultant permitting matrices which provide permit type, agency, consultation requirement, timeframe, comments related to WISE including conclusions from agency consultations, probability of need, and responsible part, adding certainty to its overall permitting plan. It provided extensive environmental permitting summaries with descriptions of project-specific features which necessitate each permit.

Developer C provided a table and attachments demonstrating its extensive experience preparing applications for and receiving CPCN approvals from the PSCW. It provided an environmental permitting matrix including agency, permit, regulated activity, applicable facilities, application requirements, anticipated timeframe, and WISE-specific comments, adding certainty to its environmental permitting plan. It demonstrated a thorough understanding of local and utility-related permits that will be required for the project.

Developer D consulted with a local law firm to gain understanding of the PSCW process and requirements for WISE. It prepared an environmental permitting study, describing each required permit, its agency, timeframe, application process, and notes specific to WISE, adding certainty to its environmental permitting plan. It demonstrated experience obtaining permits of each category and discussed conclusions obtained from significant agency outreach.

ROW and Land Acquisition

A competitive proposal must describe a developer's abilities to acquire right-of-way (ROW) and land for the project and the processes it will use to negotiate with landowners, prepare and execute contracts, complete land transactions, and when necessary, use eminent domain to condemn ROW.[8]

Viridon provided a landowner mailer, construction questionnaire, easement agreement, and its consultant's ROW and land acquisition plan, though they are templates or typical documents that will be used rather than ones developed for WISE. It assumed the most optimistic condemnation rate of all developers, and it states that condemnation will be treated as a last resort after exhausting all other efforts in accordance with Wisconsin Statute Ch. 32. It provided an agreement with a land surveying company which included details about its scope of work related to the WISE project. It listed local organizations it will conduct outreach to shortly after project award.

Developer B provided its land acquisition materials and procedures which included typical practices along with some WISE-specific details such as Wisconsin statutes that will apply, permitting needs, and project land acquisition team members. It assumed a similar condemnation rate as Developers C and D. It plans to hold public open houses and engage landowners and community leaders after project award. It plans to contract a team of agents to manage landowner negotiations, though its parcel coverage is lacking compared to the parcels within its ROW which creates some uncertainty in its plan.

Developer C demonstrated its extensive knowledge of the Wisconsin ROW and land acquisition processes and requirements by citing examples of acquisitions in Wisconsin for previous projects and providing several materials outlining typical practices which will be employed for WISE. These materials are primarily boilerplate or examples from previous projects with a few exceptions such as a map of state trail crossings and railroad properties in the project area. It assumed the most required parcels and unique owners for its proposed ROW. Its assumed condemnation is consistent with its historical rate. It will contact local stakeholders and landowners, including at virtual and in-person open houses, after project award. It clearly defines the steps it will take to contact and negotiate with landowners.

Developer D prepared the most project-specific ROW and land acquisition materials of any developer including a land valuation study, a public outreach plan, and ROW acquisition procedures. It also demonstrated its extensive knowledge of the Wisconsin ROW and land acquisition processes and requirements by citing examples of acquisitions in Wisconsin for previous projects and providing several materials outlining typical practices which will be employed for WISE. It assumed a similar condemnation rate as Developers B and C. It will engage community leaders shortly after project award and will implement direct contact and public open houses to involve landowners.

[8] MISO BPM-27 Section 7.3.5

2D. Construction

A competitive developer must describe its plans for engineering and surveying, material procurement, construction, and commissioning of the project. It must include a construction plan. Each developer sufficiently explained how it would construct the WISE facilities.

Engineering and Surveying

A competitive proposal must discuss a developer's engineering and surveying plans prior to project construction and the labor it will use.[9]

These plans typically include field wetland delineation, utility mapping, and geotechnical and light detection and ranging (LiDAR) surveys on all easements and acquired land. They also should include identification of all line crossings and coordination with line owners on necessary outages or clearances.

All developers will complete similar engineering and surveying activities if awarded the project including LiDAR survey and geotechnical investigations with borings. Engineering level definitions (i.e. 30%, 60%, 90%, IFC) are similar across all developers, though Developer C and Developer D provided the most details about tasks that are completed at each level and what design milestones will be.

Viridon has completed engineering activities and desktop studies including structure configuration design with spotting, a steel/concrete transmission line structure comparison study, and substation site civil designs with access roads and earthwork calculations. Its consultants have conducted desktop geotechnical and environmental studies for its proposed routes and substation sites.

Developer B has conducted soil borings at three of its four proposed substation sites and has conducted a desktop topographic survey. Its design decisions were supported by two site visits. It plans to further develop its engineering package after project award by completing additional geotechnical borings, LiDAR acquisition, and other targeted surveys.

Developer C has completed a preliminary staking report, a high-level bill of materials, and structure load and design drawings. It has commissioned a consultant FAA study and completed desktop geotechnical investigations at three of its four proposed substation sites, supplemented by a single soil boring at each, to add certainty to its plan. Its completed engineering activities have been informed by stakeholder engagement. Its planned engineering and surveying activities are described by discipline, including construction support activities.

Developer D has completed several engineering activities including structure loading and framing designs, substation physical security designs, and structure-specific foundation designs. It also conducted field studies including substation site wetland delineations, environmental reviews, and aerial reconnaissance. It provided a thorough breakdown of post-award activities including subsurface investigation which includes soil borings and cone penetration testing (CPT).

[9] MISO BPM-27 Section 7.3.6

Material Procurement

A competitive proposal must describe a developer's plans for purchasing, transporting, storing, and staging all materials for the project.

All developers have reasonable approaches to procurement management. They all have procurement teams which have cross-over with their previous experience cited. All developers provided lists of vendors approved for WISE key materials with at least two vendors per material. All developers acknowledge circuit breakers as long lead time materials, and they all demonstrate that planning and activities have been completed to mitigate procurement risk.

Viridon will manage and procure key, long-lead materials using an internal team supported by its construction partner which will manage the remaining materials. It did not provide approved vendors for some key materials. It has reached out to vendors to obtain pricing and current lead times. It plans to order materials as early as possible after award and alter its construction schedule as needed for long lead times. It provided the most letters of support (tied with Developer C) across the widest group of vendors and suppliers for WISE, adding certainty to its procurement plans.

Developer B, like Viridon, will manage and procure key, long-lead materials using an internal team supported by its construction partner which will manage the remaining materials. It does not provide specificity about its process for vendor approval. It will reserve breaker manufacturing slots in mid-2026, has production capacity reserved for other long-lead items such as transmission structures, and has access to spare materials through its construction partner. It provided the fewest vendor and supplier letters of support of all developers.

Developer C lacks a single point of responsibility at the management level like all other developers have and has three integrated teams sharing procurement responsibilities with some crossover. Its vendor approval process is the most rigorous of the developers. It has reserved vendor slots, has multiple approved vendor options as needed, and has access to in-house spare materials. It provided the most letters of support (tied with Viridon) across the widest group of vendors and suppliers for WISE, adding certainty to its procurement plans.

Developer D has internal procurement leadership with contractor management of major materials. It provides a thorough explanation of its vendor approval process, and it will perform manufacturing site inspections. It has reached out to vendors to obtain pricing and current lead times, will order materials as early as possible after award, and has provided float in the schedule for key materials (including six months for breakers).

Construction

A competitive proposal must describe a developer's construction abilities and plan for the project. The developer must discuss approved contractor lists in the relevant state, if they exist, requirements and standards for contractors, the anticipated staff and contractors it will use for the project, their base of operations during construction, their experience and expertise, and the safety programs to be used.[10]

[10] MISO BPM-27 Section 7.3.8

All developers provided descriptions of internal management oversight with the same or similar personnel mentioned previously in their proposals. All developers provided QA/QC form templates or examples from previous projects.

Viridon and its GC plan to utilize two substation construction crews and two transmission line construction crews to build the project's multiple facilities with some schedule overlap. It specified planned matting quantities and crew sizes.

Developer B's construction approach is more aggressive than the other developers' with short durations and concurrent construction of multiple facilities. It specified project-specific planning including matting quantities, crew sizes, guard structure locations, and substation construction methods. It describes methods it will implement to provide environmental protection such as temporary bridges.

Developer C indicated the most relevant experience overall. It plans to utilize a single core project team, rolling between facilities and gaining efficiency through experience. It includes the most details about its site preparation considerations including clearing, surveying, staking, access road development, stormwater pollution prevention plan (SWPPP), grading, matting, and material staging. It describes its step-by-step process for foundation construction. It highlights unique remediation techniques and invasive species management.

Developer D's construction approach is straightforward and certain. Its construction contractor, which worked on all its previous experience cited in the proposal, will be responsible for construction and QA/QC. It proposes a single crew rolling between facilities and will bring in additional crews as necessary. It specified planned matting quantities and crew sizes. Its construction execution plan, developed by its planned GC, is full of project-specific information regarding project quantities, crew and equipment makeup, construction methods, conductor pull plan, milestones, etc. It accounted for local constraints such as the Wisconsin frost laws and incorporated related hauling restrictions into its plan. It is the only developer which names a specialized subcontractor to perform remediation.

Commissioning

A developer must describe how it will commission and energize a competitive facility.[11] It must identify and explain the qualifications of the internal personnel or contractors that will perform the work. It must discuss equipment testing, coordination with ITOs, and final inspection procedures.

All developers adequately described their commissioning processes, identified personnel who will perform the work, and discussed procedures which will require coordination with interconnecting TOs.

2E. Financing

A developer must demonstrate it can finance construction of the project. This section does not anonymize the developers because all content is either publicly available or permitted to be included in this report. Additionally, in this section, the developers are organized alphabetically which does not correspond to their randomly assigned letters (i.e., Developer A, B, C, D) used elsewhere in this report.

[11] MISO BPM-27 Section 7.3.9

Each of the four development teams that submitted proposals for WISE demonstrated through financial statements, credit ratings, current liquidity, financial guarantees, unfunded capital commitments, and previous projects that they can finance WISE.

American Transmission Company is a transmission company owned by utilities, municipalities, municipal electric companies and electric cooperatives from Wisconsin, Michigan and Minnesota. Dairyland Power Cooperative is a generation and transmission cooperative that provides wholesale electricity to member cooperatives and municipal utilities in Wisconsin, Minnesota, Iowa, and Illinois. WPPI Energy supplies wholesale power and energy services to 51 electric utilities in Wisconsin, Michigan, and Iowa. ATC, Dairyland, and WPPI will own 50%, 25%, and 25% of WISE, respectively. ATC is rated A+ and WPPI is rated A by S&P. Dairyland is rated A3 by Moody's.

Longview Infrastructure Midwest, LLC is indirectly owned by Stonepeak Partners, LP., a privately-owned company. Longview will finance WISE with capital commitments from one of Stonepeak's global energy investment funds. Great River Energy is a wholesale electric cooperative that serves 26 member distribution cooperatives in Minnesota and Wisconsin. Great River Energy is rated A- by S&P. Great River Energy will own at least 1% of WISE and may purchase up to 49% of the project.

LS Power Grid Wisconsin, Inc. is indirectly owned by LS Power Associates, LP., a privately-owned company that owns and operates transmission assets in Indiana, California, Texas, and other states. LSPA does not hold a public credit rating, but it provided a private credit rating in its proposal.

Viridon Midcontinent LLC is indirectly owned by Blackstone, Inc., a privately-owned company. Viridon is directly owned by Blackstone Energy Transition Partners IV LP (BETP IV), one of Blackstone's private equity funds. Blackstone is rated A+ by S&P and BETP IV is rated AA+ from Fitch.

2F. Safety

A competitive proposal must describe the general and specific aspects of the project safety plan and include the safety record reports of the entities that will be constructing the project.[12]

All developers submitted the table of contents of their site-specific safety plans and at least five years of safety data of their planned construction contractors. MISO determined all proposals contained satisfactory safety information.

[12] MISO BPM-27 Section 7.3.17

3. Operations and Maintenance

MISO must evaluate each developer's plan for normal operations, non-normal operations, maintenance, financial strategy, and safety after the competitive project is in-service. This evaluation constitutes 30% of MISO's decision in this project.

All developers demonstrated they would be able to successfully operate and maintain this project.

For Operations and Maintenance, MISO categorized Developer C as Best, Developer B as Better, and Viridon and Developer D equally as Good.

3A. Normal Operations

A developer must explain how it will incorporate the competitive facilities into a Local Balancing Authority, monitor and control real-time operations, execute switching activities on project transmission lines or substations, and coordinate planned outages.

Local Balancing Authority Area

A competitive developer must describe how it will incorporate the project facilities into a MISO Local Balancing Authority Area (LBAA).[13] Unless there were existing arrangements among the developers or their affiliates and the Balancing Authority, any new LBAA agreements must be negotiated after this report is issued. All developers adequately explained how they would incorporate WISE into an LBAA. The developers provided detailed plans including the roles and responsibilities of the functions.

Viridon will use an O&M provider whose control center currently operates as a LBA in MISO. Viridon provided its plans to become signatory to MISO's Amended Balancing Authority Agreement and have its designated control center provide the operational LBA functions.

Developer B already operates as a MISO LBA and would include these new facilities in their existing processes.

Developer C plans that existing MISO LBAs would provide LBA services for the new facilities.

Developer D provided two LBA options, the first option being to develop agreements with existing MISO LBAs with the second option of becoming signatory to MISO's Amended Balancing Authority Agreement and having their designated control center provide the operational LBA functions.

Real-Time Operations Monitoring and Control

A competitive proposal must describe how the project facilities will be monitored and controlled in real time. It must identify the location and ownership of the control center that will be used as well as the staffing levels and training programs of the center. It must also state the control center complies with all applicable

[13] MISO BPM-027 Section 7.4.1

NERC standards, describe how the center will communicate with MISO, other entities, and project facilities, describe the Supervisory Control and Data Acquisition (SCADA) system that will be used, and describe how the developer will fulfill all the requirements of the NERC Transmission Operator (TOP) for WISE.

All developers adequately explained the control centers they would use to monitor the project and the resources they have in those control centers. Although the control centers were in different locations and some currently monitor more line miles and substations than others, all developers established they could adequately monitor and control the WISE facilities. The developers all plan to use existing control centers that already have a functioning SCADA system and are staffed with NERC certified transmission system operators.

Viridon's designated control center currently has NERC certified operators that perform TOP functional duties. The primary control center and backup control center are located approximately 30 minutes apart. MISO reviewed a subset of the developer's control center procedures and observed that Viridon's operating procedures submitted with its proposal were not as mature as those of Developer B and Developer C. Viridon performs real-time assessments for a limited number of facilities. Viridon described their operator training program and there was no mention of an in-house operator training simulator being used in the training program.

Developer B's designated control center currently has NERC certified operators that perform TOP functional duties. The primary control center and backup control center are located approximately 60 minutes apart. MISO reviewed a subset of the developer's control center procedures and observed that Developer B had mature operating procedures. Developer B performs real-time assessments for the second most facilities of all the developers. Developer B described their operator training program and they utilize an in-house operator training simulator in their training program.

Developer C's designated control center currently has NERC certified operators that perform TOP functional duties. The primary control center and backup control center are located approximately 60 minutes apart. MISO reviewed a subset of the developer's control center procedures and observed that Developer C had mature operating procedures. Developer C performs real-time assessments for the most facilities of all the developers. Developer C described their operator training program and they utilize an in-house operator training simulator in their training program.

Developer D's designated control center currently has NERC certified operators that perform the TOP functional duties. The primary control center and backup control center are located approximately 30 minutes apart. MISO reviewed a subset of the developer's control center procedures and observed that Developer D's operating procedures were not as mature as those of Developer B and Developer C. Developer D did not submit any procedures indicating that they perform real-time assessments. Developer D described their operator training program and they utilize an in-house operator training simulator in their training program.

Switching and Planned Outage Coordination

A competitive proposal, if the underlying project will require the developer to install either a transmission line switch or a substation on a project facility, must describe the switching activities as well as the labor and resources that will be necessary. A proposal must also identify and describe the labor, expertise, tools, and base of operations for coordinating planned outages for the competitive facilities.

All developers established they can reliably perform switching and coordinate planned outages. Developers provided samples of their switching procedures along with their lockout tagout procedures. All developers will have field switching personnel located within 30-90 minutes of the project facilities.

All developers have personnel that perform the outage coordination function. Developer B's and Developer C's outage coordination staff execute significantly more planned outages than those of Viridon and Developer D.

3B. Non-Normal Operations

A competitive proposal must explain how the developer will respond to forced outages, repair equipment during emergencies, and rebuild project facilities destroyed in a catastrophe.

Forced Outage Response

A proposal must describe how a developer will respond to a forced outage of each project facility.[14] If the project includes a substation, a developer must discuss how long it will be able to monitor and control each substation if that substation loses its off-site AC station power source, and it must explain its plans to control the substation using only DC battery power.[15]

All developers provided response times for their first responders to arrive at the project facilities. The developers indicated that first responders will typically perform initial substation assessments, line patrols, isolation switching, initial troubleshooting, and minor repairs of substation equipment.

Viridon plans to establish a local field office in the vicinity of the project facilities and will staff this office with four field employees. Its first responders can arrive within one hour and their emergency repair crews can arrive within five hours.

Developer B plans to establish a local field office in the vicinity of the project facilities and will staff with two field employees. Its first responders can arrive in one and a half hours, and their emergency repair crews can arrive within four hours.

Developer C has arrangements with local crews to provide the initial forced outage response. Its first responders and emergency repair crews are located under one hour away from the project facilities. Specialized repair crews are also located within one hour of the project facilities.

Developer D plans to establish a local field office in the vicinity of the project facilities and will staff this office with four field employees. Its first responders can arrive in one hour and their emergency repair crews are located within two and a half hours of the project facilities.

Upon loss of AC power to a substation, Developer C has the longest substation battery run time. Developer D plans to maintain a trailer-mounted mobile backup generator at its local field office to provide an option to restore power if a substation loses all sources of AC power. Developer B and Developer D provided

[14] MISO BPM-027 Section 7.4.4

[15] WISE RFP Part II, page 32

connection points to facilitate the installation of a mobile generator to provide station power upon loss of all sources of AC power.

Emergency Repair and Testing

A proposal must describe how a developer will address emergency repairs and testing on each project facility during a forced outage. It must explain from where and how soon personnel and equipment will respond, establish that the developer will have adequate equipment to repair the facility, and describe how it will minimize the duration of forced outages. All the developers provided the locations of their emergency repair crews for the project facilities.

Viridon's O&M team's emergency outage response will be coordinated through integrated efforts between an internal oversight committee, field operations, and control center support staff. Viridon's emergency repair crews are located approximately five hours away.

Developer B's response to an emergency outage of project facilities will proceed in accordance with its transmission system restoration plans. Developer B's emergency repair crews are located approximately four hours away.

Developer C's O&M team is responsible for coordinating the response to an emergency outage using their control center operations group which operates two fully staffed, 24/7 control centers. Their field maintenance and response teams include dedicated staff as well. Developer C's emergency repair crews are located approximately one hour away.

Developer D will coordinate all forced outage response activities through a combination of local field staff and centralized operations personnel at its control center. Developer D's emergency repair crews are located approximately two and a half hours away.

Major Replacement and Rebuilding

A competitive proposal must describe how the developer will complete any major asset replacement or rebuild because of catastrophic destruction or normal degradation.

All developers explained how they would rebuild a line segment of the WISE project should five miles of the line become damaged in a catastrophe. They adequately explained under what circumstances they would rebuild the WISE project's line segment to get the line in-service more quickly and they demonstrated it has the procedures, personnel, and materials in place to accomplish this.

Viridon's response to loss of five miles of transmission line includes an initial assessment followed by a determination if a temporary rebuild should be prioritized over a permanent rebuild. Viridon indicated that a temporary rebuild would take 2-3 weeks. A permanent rebuild is expected to take 5-7 weeks of construction time and would take longer if materials were not available. The fabrication of all new steel poles would add 13-15 weeks to the duration.

Developer B's initial response to loss of five miles of transmission line includes appointing a system restoration coordinator to manage the event, deciding on performing a temporary rebuild or permanent rebuild, and preparing drawings to be used by construction crews. Developer B indicated that they would elect a temporary rebuild if spare material was not available. A temporary rebuild is expected to take 3-5

weeks as they expect to temporarily rebuild at a rate of 1-2 miles per week. A permanent rebuild is expected to take 5-10 weeks.

Developer C's response to loss of five miles of transmission includes evaluating the need for a temporary rebuild based upon several factors. Developer C anticipates a temporary rebuild taking 4 weeks with structures being spotted to avoid interference with the future permanent rebuild. A permanent rebuild timeframe would depend on the lead time of steel structures with material lead times ranging from 2 weeks for emergency orders to 28 weeks for standard orders. Once permanent material is staged, it indicates that the permanent rebuild would take two weeks to complete.

Developer D indicates that they do not anticipate the need for a temporary rebuild, even under extreme damage scenarios. Developer D has spare material for the project along with access to affiliate material to accommodate the permanent rebuilding. Developer D described the timeframe for a permanent rebuild and expects the rebuild to take 5-15 weeks assuming a rebuild rate of 1-3 miles per week.

All developers described their response plans that address the failure of a major substation asset.

Viridon provided a contingency plan that addressed the response to specific transformer failures. Developer B provided a transmission system restoration plan that detailed roles, responsibilities, and restoration response to be used when responding to major incidents. Developer C provided their field response plan that contains their approach to managing major failures. Developer C also provided specific examples where they responded to emergency scenarios involving substation equipment. Developer D provided an Emergency Operating Procedure that outlines the oversight, coordination, and response plan to be used when responding to system damage.

3C. Maintenance

The proposal must explain how a developer will maintain the project facilities. This includes preventative and predictive maintenance, testing, and material storage and logistics.

Maintenance and Testing

A competitive developer must describe how it will maintain and test project assets to minimize costs while the asset is in-service. The developer must discuss when, how, and how often it will execute preventative maintenance (such as tree-trimming) versus predictive maintenance (such as equipment testing) and what data will be recorded or used to make maintenance decisions.[16]

It must also describe how it will ensure replacement material for project facilities is timely available if necessary. It must explain what spare parts are necessary, how many it will store in inventory or have available from vendors, the agreements it has with those vendors, where all spare parts will be located, and how quickly the spare parts will be available if needed.

MISO reviewed representative maintenance documents submitted by the developers. All developers provided high-level program documents that outlined maintenance strategies, inspection frequencies, and

[16] MISO BPM-27 Section 7.4.8

documentation requirements. Developer B, Developer C, and Developer D also provided procedures used by maintenance crews in the field. All developers adequately explained their maintenance strategies.

All the developers will inspect the project transmission lines at least yearly and will inspect the project substations at least monthly. All the developers adequately explained the resources that will perform the preventative maintenance on the project transmission lines and project substations. Developer C provided copies of the existing contracts for all contractors used in their preventative maintenance program.

Spare Project Material

A competitive developer must describe how it will ensure replacement equipment for project assets is timely available if necessary. It must explain what spare parts are necessary, how many it will store in inventory or have available from vendors, the agreements it has with those vendors, where all spare parts will be located, and how quickly the spare parts will be available if needed.

All the developers explained their spare equipment strategy.

Viridon provided a list of spare equipment it plans to procure for the project. Viridon will establish a warehouse/storage facility in the project area for spare transmission line and substation equipment. Viridon's O&M team is party to several mutual assistance groups.

Developer B provided a list of spare equipment it plans to procure for the project. It will establish a laydown yard near its planned local field office for spare transmission line parts. Spare substation parts will be stored near one of the project substations. It is a member of a mutual assistance group.

Developer C provided a list of spare transmission line equipment and substation equipment available in multiple storage areas in the project area. It is a member of several mutual assistance groups and it maintains a fully functional, modular control house designed to be rapidly deployed.

Developer D provided a list of spare equipment that it plans to store at a warehouse and material yard located near one of the project substations. Developer D is not a member of a mutual assistance group but has access to affiliate-owned spare equipment. Developer D also has access to affiliate-owned emergency restoration structures that can be used as temporary transmission line structures.

3D. Financial Strategy for Maintenance

A developer must describe how it will finance activities due to normal wear and tear of project assets or catastrophic destruction. All developers established their ability to either hold or raise capital to address project maintenance.

3E. Safety

A developer must describe the general and specific aspects of the project safety plan and include the OSHA/DART reports of the entities that will be maintaining the WISE facilities.[17] It must attach both a table of contents for detailed safety plans and programs and its safety record report.

[17] MISO BPM-27 Section 7.4.10

All developers identified the teams that will oversee and implement safe practices during project maintenance. They adequately explained the teams' experience and qualifications, the safety-related information a contractor must provide to work on project maintenance, and the safety statistics of its proposed maintenance teams.

4. Planning Participation

MISO must base 5% of its evaluation of a competitive proposal on the planning participation of the entities related to that proposal. If it determines any RFP Respondent, Proposal Participant, or any affiliate of either meets the requirements to earn planning participation for the competitive project, MISO must award that proposal the full 5%.

Qualifying participation activities include submitting the results of planning studies or a planning solution to MISO related to the transmission issues addressed by a competitive project. MISO posts a list on its website that identifies each entity that meets the requirement for planning participation related to the competitive projects within each MISO Transmission Expansion Plan.

All developers received planning participation credit for this project.

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Appendix A. Glossary

Any capitalized terms used in this report for which definitions are not provided in this glossary are as defined in the MISO Tariff or the applicable MISO business practices manuals.

For some terms defined in the MISO Tariff, definitions provided in this glossary have been adapted to make them easier to understand when separated from the Tariff, but the formal Tariff definitions are controlling for all purposes.

For readability, many of the terms defined below are not capitalized when used in the body of this report.

Allowance for Funds Used During Construction (AFUDC)

Allowance for funds used during construction refers to a request by the owner of a transmission facility to capitalize financing costs incurred before the owner places the facility into service. An owner will then request to earn a return on the net amount as it is depreciated along with the facility.

Annual Transmission Revenue Requirement (ATRR)

The annual revenue a transmission owner may recover from transmission customers through MISO's Attachment O, GG, and MM for providing transmission service.

Business Practices Manual (BPM)

Document that contains instructions, rules, policies, procedures, and guidelines established by MISO for the operation, planning, accounting, and settlement requirements of the MISO region.

For purposes of the RFP, BPM-027 provides further background information, business rules, processes, and guidelines for the Competitive Transmission Process (including the roles and responsibilities of MISO, Transmission Owners, Members, and any other non-MISO Members and other interested parties).

CPCN

Certificate of Public Convenience and Necessity

CEII

Critical Energy Infrastructure Information, as described in 18 C.F.R. § 388.113(c)(1).

Co-location

Occurs when a transmission line shares the same structures and right-of-way as another transmission line or shares a common right-of-way of another transmission line.

Competitive Developer Selection Process

The process utilized to solicit Proposals, evaluate Proposals, and designate a Selected Proposal and Selected Developer in accordance with the MISO Tariff.

Competitive Transmission Executive Committee (CTEC)

A team of three or more MISO executives, including at least one officer, charged with overseeing MISO staff and consultants involved in implementing the MISO Competitive Transmission Process.

Competitive Transmission Process

The process used to certify Qualified Transmission Developers, identify Competitive Transmission Projects, solicit proposals, evaluate proposals, and designate a Selected Developer and Selected Proposal.

CWIP (Construction Work-in-Progress)

In the context of transmission rate regulation, it refers to a request by the owner of a transmission facility to be allowed to include costs of facility construction in rate base before the corresponding transmission facility has been placed in service. Under FERC rules, CWIP funding is limited to amounts that would otherwise qualify for AFUDC.

DART

Days Away, Restricted, or Transferred is an OSHA safety metric.

EHV

Extra-High Voltage

Evaluation Criteria

The four FERC-approved criteria the Tariff requires MISO to use for the competitive developer selection process: (1) cost and design, (2) project implementation, (3) operations and maintenance, and (4) planning participation.

Evaluation Principles

The four evaluation principles specified in Section 8.1 of BPM-027, which MISO uses to guide and influence the collective application of the MISO evaluation criteria. The evaluation principles are certainty, risk mitigation, cost, and specificity.

Evaluation Team

Designated members of MISO management and staff responsible, together with independent consultants retained by MISO to assist management and staff, responsible for administration of MISO's competitive developer selection process, subject to oversight by the Competitive Transmission Executive Committee.

FERC

Federal Energy Regulatory Commission.

KMZ

KMZ is a file extension for a file type used by Google Earth. KMZ stands for "Keyhole Markup language Zipped," which is a compressed version of a KML (Keyhole Markup Language) file. KML is notation related to geographic display and visualization within Internet-based, two-dimensional maps and three-dimensional Earth browsers.

LiDAR

LiDAR (Light Detection And Ranging) is a surveying method that measures distance to a target by illuminating the target with pulsed laser light and measuring the reflected pulses with a sensor.

Local Balancing Authority

An operational entity or a "Joint Registration Organization" (as defined by NERC) that is: (a) responsible to NERC for compliance with the subset of NERC Balancing Authority Reliability Standards defined in the Balancing Authority Agreement for its local area within the MISO Balancing Authority Area, (b) a Party (other than MISO) to the MISO Balancing Authority Agreement, and (c) shown in Appendix A to the Balancing Authority Agreement.

Long Range Transmission Planning (LRTP)

A key initiative of the Reliability Imperative. The focus of LRTP is to improve the ability to reliably move electricity across the MISO region from where it is generated to where it is needed, at the lowest possible cost.

MISO

Midcontinent Independent System Operator, Inc.

MISO Tariff

MISO's Open Access Transmission, Energy and Operating Reserve Markets Tariff (including all its schedules and attachments), as amended from time to time.

MTEP (MISO Transmission Expansion Plan)

A long-range plan used to identify expansions or enhancements to the MISO transmission system to (a) support efficiency in bulk power markets, (b) facilitate compliance with documented federal and state energy laws, regulatory mandates, and regulatory obligations, and (c) maintain reliability.

The MTEP is developed biennially or more frequently, and subject to review and approval by MISO's Board of Directors.

MTEP24

MISO's 2024 Transmission Expansion Plan, the transmission plan in which the project was approved.

NESC

National Electrical Safety Code, which sets the ground rules and guidelines for practical safeguarding of utility workers and the public during the installation, operation, and maintenance of electric supply and communication lines and associated equipment.

Nominal Dollars

Nominal dollars reflect the costs to construct / operate the project at the time the cost is incurred. For example, if an RFP Respondent expects an item will cost $1,000 in 2028, then the cost estimate in nominal dollars in 2028 will be $1,000.

NRCS

The Natural Resources Conservation Service.

OSHA

The U.S. Occupational Safety and Health Administration.

Parallel Transmission line

A transmission line that is constructed on its own right-of-way but is adjacent to another transmission line.

Present Value of Revenue Requirements (PVRR)

The present value in 2024, using a discount rate of 7.1%, of the Annual Transmission Revenue Requirements estimated by a Developer And included in a competitive project's Project Cost Workbook.

Project Cost Workbook (PCW)

An Excel spreadsheet template, included as part of the RFP materials, for each RFP Respondent to use in submitting financial information for its proposal.

Proposal Participant

For purposes of this project, a Proposal Participant is an entity that is involved in a proposal and is not the RFP Respondent but will co-own the project and rely on the RFP Respondent to be responsible for constructing and implementing the project. A proposal may designate a Proposal Participant as responsible for one or more aspects of operations, maintenance, repair, or restoration, on terms comparable to those that would apply if the RFP Respondent intended to rely on a third-party contractor. Every proposal must specify whether the RFP Respondent plans to convey any interests in the project to one or more Proposal Participants.

Proposal Submission Deadline

The date and time by which proposals responding to an RFP must be delivered to MISO.

Qualified Transmission Developer

A MISO Transmission Owner, independent transmission company, or non-owner Member of MISO that submits a Transmission Developer Application and is subsequently determined by MISO to meet the minimum requirements for a Qualified Transmission Developer outlined in Attachment FF of the Tariff.

RFP

A request for proposals issued by MISO, which constitutes an invitation (including associated requirements) for Qualified Transmission Developers to submit proposals to construct, implement, own, operate, maintain, repair, and restore a Competitive Transmission Project.

RFP Respondent

A Qualified Transmission Developer involved in a competitive proposal submitted to MISO.

SCADA

Supervisory Control And Data Acquisition.

Selected Developer

The RFP Respondent designated by the Executive Committee as having submitted the Selected Proposal, and therefore selected to implement the project according to the Selected Developer Agreement.

Selected Developer Agreement

The agreement, as set forth in Appendix 1 to Attachment FF of the Tariff, to be executed between the Selected Developer and MISO. This agreement establishes the terms and conditions under which the Selected Developer will construct and implement the project as specified in its Selected Proposal.

Selected Proposal

The proposal selected by the Executive Committee (in accordance with the Competitive Developer Selection Process) as the highest-scoring proposal submitted in response to the RFP.

Switching Order

A switching order is a written set of instructions, using three-way communications during implementation, to ensure that an electrical facility is de-energized and put into an electrically safe condition before maintenance is performed. It would typically include (1) switching activities step by step, (2) estimated times, (3) responsibility assignments, (4) applicable safety measures, and (5) necessary personal protective equipment for each step.

Appendix B. Design-Related Terminology

ACSR

Aluminum conductor, steel reinforced. With ACSR conductor, both the primary conducting material (aluminum) and steel strands contribute to overall conductor strength. Because the aluminum is important as a supporting material, system operators must be careful not to allow the conductor to become so hot that the aluminum starts to soften (referred to as annealing). Extended operation at higher temperatures could cause ACSR to start losing its strength, increasing risk of low clearance or conductor failure.

ACSS

Aluminum conductor, steel supported. ACSS conductors use fully annealed aluminum supported on high-strength steel. Because the steel is the primary source of conductor strength, ACSS conductor usually can be operated at higher temperatures than ACSR.

BAAH

A breaker-and-a-half arrangement consists of two main buses, both of which are normally energized. Associated facilities interconnect with the main buses in sets of two positions, and these pairs of positions each have three associated breakers – a center circuit breaker common to the two positions. Each position is therefore associated with one-and-a-half breakers.

Bus

An electrical bus in a substation is a conductor or group of conductors that serves as a collection and transfer point for energy flowing into and out of substation feeders. A bus has an associated arrangement of circuit breakers that allow the bus to be disconnected from individual or sets of positions, so that, with all breakers open, the bus is electrically isolated from remaining power system elements. The number and positions of the circuit breakers vary with different substation designs, as further described in the glossary under the definitions for “DBDB,” “BAAH,” and “ring bus.”

Dead-end structures (also failure containment, containment, or storm structures)

Dead-end or failure containment transmission structures are designed to withstand more mechanical stress than standard “tangent” or “running angle” structures (explained below). They are used at heavy-angle turns along transmission routes (where the forces created by the high degree of the angle in conjunction with the conductor weight and tension make it harder for support structures to remain upright). They are also placed at specified intervals along a transmission line so that, if something seriously damages or destroys some of the supporting structures, the structure failure will not cascade through many miles of transmission line. Instead, the dead-end structures on either side of the damaged area will arrest the structure failures.

Direct embedded

Transmission structures that are direct embedded are generally anchored by extending the structure shaft below grade, relying on the surrounding earth and backfill material for support. To place direct-embedded structures, construction workers excavate a hole of sufficient depth, place the structure in it, and then refill the space around the structure. The fill material may be gravel, engineered material or replacement of the excavated backfill. A bearing plate may be engineered into the design of the foundation as needed.

Drilled pier

A concrete pier foundation with steel reinforcement and anchor bolts. Depending on soil conditions installation may be with or without casing. Either permanent or temporary casing may be used. Installation may require specialized techniques and drilling fluids.

Galloping

Galloping is a term for how overhead power lines will oscillate (generally, but not exclusively, in a vertical direction) in a low-frequency, high-amplitude motion due to wind and the formation of a thin layer of ice on the wire. Sustained or severe galloping can damage or cause failure of transmission line components and supporting structures.

Galvanized steel structure

Transmission structure made of steel coated in zinc to prevent corrosion. This gives it a shiny appearance.

Guying (or guyed)

Practice of attaching tensioned cables (typically steel) to transmission structures to increase their stability.

Kcmil

Abbreviation for thousands of circular mils, a measurement of wire gauge (a mil is 1/1000 inch).

MA2

Core standard-strength steel strands available in ACSS.

MA3

Core high-strength steel strands available in ACSS.

Monopole

A single primary structure (typically wood or steel) that supports an overhead transmission line—as distinguished, for example, from H-frame, three-pole, or lattice tower structures. Tangent monopole structures typically have davit arms or braced post to position conductor assemblies a minimum distance away from the structure.

Optical ground wire (OPGW)

A wire composed of optical fiber surrounded by conductive material (steel and aluminum) used in conjunction with overhead transmission lines to combine the functions of grounding (see the explanation of shield angle below) and communications.

Ring bus

In a ring bus arrangement, the positions associated with the bus form a closed loop or "ring," with each position separated by a circuit breaker. The numbers of circuit breakers and positions are equal.

Running angle structure

Structures used for portions of a transmission line route that have light- or medium-angle turns. Typically, the suspension assemblies for attaching the conductor to the structures will permit the insulators to swing away from the support structure.

Shield (or shielding) angle

Position of optical ground wire secured on a transmission structure in relation to the position of the conductor below for which it provides shielding.

Because the optical ground wire is positioned above the conductor, it will attract lightning strikes that might otherwise strike the conductor, and safely conduct the resulting electrical charge along grounding material on the structure to grounding rods or other devices below.

Specifically, shield angle describes the angle between (a) an imaginary vertical line drawn from the attachment point of the optical ground wire and (b) an imaginary line drawn between the attachment point for the optical ground wire and the attachment point (on the same structure) for the shielded conductor. A smaller shield angle more effectively protects the conductor beneath.

Tangent structure

Structures used for portions of a transmission line route that are mostly straight or have very minor turns.

TW (Trapezoidal Wire)

Trapezoidal Shaped Aluminum Strands in conductor construction.

Weathering steel

Weathering steel forms an adherent protective rust that limits further oxidation of the metal. Hot-dipped galvanized steel is produced by dipping bare steel in a bath of molten zinc metal. The resulting metallurgical reaction between iron and zinc provides both a barrier and cathodic protection that protects steel from corrosion.