Dominion Energy®

Application, Appendix, DEQ Supplement, Direct Testimony and Exhibits of Virginia Electric and Power Company

Before the State Corporation Commission of Virginia

Chesterfield-Tyler 230 kV Transmission Lines #205 and #2003 Partial Rebuild Project

Application No. 297

Case No. PUR-2020-00014

Filed: January 28, 2020

Volume 1 of 2

Application

COMMONWEALTH OF VIRGINIA
BEFORE THE
STATE CORPORATION COMMISSION

APPLICATION OF

VIRGINIA ELECTRIC AND POWER COMPANY

FOR APPROVAL AND CERTIFICATION
OF ELECTRIC FACILITIES

Chesterfield-Tyler 230 kV Transmission Lines #205 and #2003 Partial Rebuild Project

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COMMONWEALTH OF VIRGINIA

STATE CORPORATION COMMISSION

APPLICATION OF VIRGINIA ELECTRIC AND POWER COMPANY For approval and certification of electric transmission facilities: Chesterfield-Tyler 230 kV Transmission Lines # 205 and #2003 Partial Rebuild Project	))))))))	Case No. PUR-2020-00014

APPLICATION OF VIRGINIA ELECTRIC AND POWER COMPANY FOR APPROVAL AND CERTIFICATION OF ELECTRIC TRANSMISSION FACILITIES: CHESTERFIELD-TYLER 230 kV TRANSMISSION LINES #205 AND #2003 PARTIAL REBUILD PROJECT

Pursuant to § 56-46.1 of the Code of Virginia ("Va. Code") and the Utility Facilities Act, Va. Code § 56-265.1 *et seq.*, Virginia Electric and Power Company ("Dominion Energy Virginia" or the "Company"), by counsel, files with the State Corporation Commission of Virginia (the "Commission") this application for approval and certification of electric facilities (the "Application"). In support of its Application, Dominion Energy Virginia respectfully shows as follows:

1. Dominion Energy Virginia is a public service corporation organized under the laws of the Commonwealth of Virginia furnishing electric service to the public within its Virginia service territory. The Company also furnishes electric service to the public in portions of North Carolina. Dominion Energy Virginia's electric system—consisting of facilities for the generation, transmission, and distribution of electric energy—is interconnected with the electric systems of neighboring utilities and is a part of the interconnected network of electric systems serving the continental United States. By reason of its operation in two states and its interconnections with other utilities, the Company is engaged in interstate commerce.

2. In order to perform its legal duty to furnish adequate and reliable electric service, Dominion Energy Virginia must, from time to time, replace existing transmission facilities or construct new transmission facilities in its system.

3. In this Application, in order to maintain the structural integrity and reliability of its transmission system in compliance with mandatory North American Electric Reliability Corporation ("NERC") Reliability Standards, the Company proposes to rebuild within an existing right-of-way or on Company-owned property, an approximately 3.2 mile section of existing 230 kV Chesterfield-Locks Line #205 and Chesterfield-Poe Line #2003 between the Company's existing Chesterfield Substation, which is located on the Company's Chesterfield Power Station site, to Structure #205/19A, #2003/25, which is located approximately 0.6 mile south of the Company's existing Tyler Substation, all within Chesterfield County, Virginia. The Company also proposes to perform minor work at both the Chesterfield Substation and Tyler Substation (collectively, the "Chesterfield-Tyler Rebuild Project" or "Rebuild Project").

4. As of April 2019, the Company has approximately 3,115 miles of overhead transmission lines built prior to 1980 (approximately 47% of the overall overhead transmission system mileage). The Company has developed a proactive plan to rebuild transmission lines that are comprised of weathering steel towers (COR-TEN®[1] towers). The 230 kV system accounts for approximately 2,861 miles of the Company's total overhead transmission line system, of which approximately 1,502 miles were built primarily before 1980.

5. The lines identified above for rebuild run a total length of approximately 3.2 miles of existing Line #205 and Line #2003, which predominantly share double circuit COR-TEN® steel lattice towers that were constructed in 1962. These COR-TEN® towers have been identified for

[1] Registered trademark of United States Steel Corporation.

rebuild based on the Company's assessment in accordance with its Planning Criteria. The Company retained a third-party company, Quanta Technology ("Quanta"), to evaluate the condition of its COR-TEN® towers. After completing its evaluation, Quanta provided the Company with the 2016 Quanta Report, which confirmed the need to rebuild the COR-TEN® section of Lines #205 and #2003, among other 230 kV COR-TEN® transmission lines on the Company's system.

6. The desired in-service date for the Rebuild Project is December 31, 2022, subject to Commission approval and outage scheduling. The Company estimates that it will take approximately 21 months for detailed engineering, materials procurement, permitting, and construction after a final order from the Commission. Accordingly, to support this estimated construction timeline and construction plan, the Company respectfully requests a final order by March 1, 2021. Should the Commission issue a final order by March 1, 2021, the Company estimates that construction should begin on January 1, 2022, and be completed by December 31, 2022.

7. The estimated conceptual cost of the Rebuild Project is approximately $11.1 million, which includes approximately $10.8 million for transmission-related work and approximately $0.3 million for substation-related work (2019 dollars). The description of the proposed Rebuild Project is described in detail in Sections I and II of the Appendix attached to this Application.

8. Given the availability of existing right-of-way and the statutory preference given to the use of existing rights-of-way, and because additional costs and environmental impacts would be associated with the acquisition and construction of new right-of-way, the Company did not consider any alternate routes requiring new right-of-way for the Rebuild Project. Section II of the

Appendix addresses routing issues. The impact of the proposed Rebuild Project on scenic, environmental, and historical features is described in detail in Section III of the Appendix.

9. Based on consultations with the Virginia Department of Environmental Quality ("DEQ"), the Company has developed a supplement ("DEQ Supplement") containing information designed to facilitate review and analysis of the proposed facilities by the DEQ and other relevant agencies. The DEQ Supplement is attached to this Application.

10. Based on the Company's experience, the advice of consultants, and a review of published studies by experts in the field, the Company believes that there is no causal link to harmful health or safety effects from electric and magnetic fields generated by the Company's existing or proposed facilities. Section IV of the Appendix provides further details on Dominion Energy Virginia's consideration of the health aspects of electric and magnetic fields.

11. Section V of the Appendix provides a proposed route description for public notice purposes and a list of federal, state, and local agencies and officials that the Company has or will notify about the Application.

12. In addition to the information provided in the Appendix and the DEQ Supplement, this Application is supported by the prefiled direct testimony of Company Witnesses David C. Witt, Elizabeth K. Gatlin, Mohammad M. Othman, and Lane E. Carr filed with this Application.

WHEREFORE, Dominion Energy Virginia respectfully requests that the Commission:

(a) direct that notice of this Application be given as required by § 56-46.1 of the Code of Virginia;

(b) approve pursuant to § 56-46.1 of the Code of Virginia the construction of the Rebuild Project; and,

(c) grant a certificate of public convenience and necessity for the Rebuild Project under the Utility Facilities Act, § 56-265.1 *et seq.* of the Code of Virginia.

VIRGINIA ELECTRIC AND POWER COMPANY

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January 28, 2020

Appendix

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APPLICATION OF

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FOR APPROVAL AND CERTIFICATION
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Chesterfield-Tyler 230 kV Transmission Lines #205 and #2003 Partial Rebuild Project

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Appendix

Containing Information in Response to
"Guidelines for Transmission Line Applications Filed Under Title 56 of the Code of Virginia"

Case No. PUR-2020-00014

Filed: January 28, 2020

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Executive Summary

In order to maintain the structural integrity and reliability of its transmission system in compliance with mandatory North American Electric Reliability Corporation ("NERC") Reliability Standards, Virginia Electric and Power Company ("Dominion Energy Virginia" or the "Company") proposes:

(i) to rebuild within an existing right-of-way or on Company-owned property, an approximately 3.2 mile section of existing 230 kV Chesterfield-Locks Line #205 and Chesterfield-Poe Line #2003 between the Company's existing Chesterfield Substation, which is located on the Company's Chesterfield Power Station site, to Structure #205/19A, #2003/25, which is located approximately 0.6 mile south of the Company's existing Tyler Substation, all within Chesterfield County, Virginia; and

(ii) to perform minor work at both the Chesterfield Substation and Tyler Substation

(collectively, the "Rebuild Project"). Although the Rebuild Project extends past Tyler Substation for approximately 0.6 mile to Structure #205/19/A, #2003/25 in Chesterfield County, for simplicity in this Appendix and elsewhere, the Company will refer to the end points of this rebuild as Chesterfield Substation and Tyler Substation.

As of April 2019, the Company has approximately 3,115 miles of overhead transmission lines built prior to 1980 (approximately 47% of the overall overhead transmission system mileage). The Company has developed a proactive plan to rebuild transmission lines that are comprised of weathering steel towers (COR-TEN® towers). The 230 kV system accounts for approximately 2,861 miles of the Company's total overhead transmission line system, of which approximately 1,502 miles were built primarily before 1980.

The proposed Rebuild Project will replace aging infrastructure that is at the end of its service life in order to comply with the Company's mandatory transmission planning criteria (the "Planning Criteria"), thereby enabling the Company to maintain the overall long-term reliability of its transmission system, as well as to provide important system reliability benefits to the Company's entire network. Specifically, the Company proposes to rebuild approximately 3.2 miles of existing Line #205 and Line #2003, which predominantly share double circuit COR-TEN® steel lattice towers that were constructed in 1962. These COR-TEN® towers have been identified for rebuild based on the Company's assessment in accordance with its Planning Criteria. The Company retained a third-party company, Quanta Technology ("Quanta"), to evaluate the condition of its COR-TEN® towers. After completing its evaluation, Quanta Technology provided the Company with the 2016 Quanta Report, which confirmed the need to rebuild the COR-TEN® section of Lines #205 and #2003, among other 230 kV COR-TEN® transmission lines on the Company's system.

The Company proposes to rebuild Lines #205 and #2003 primarily in two construction phases: the first in the 0.6-mile section of those lines between Tyler Substation and Structure #205/19A, #2003/25; and the second in the 2.6-mile section of those lines between Chesterfield Substation and Tyler Substation. This construction will include rebuild line preparation work associated with

230 kV Lines #211 and #228 described in Section I.F of this Appendix,[1] as well as construction of a temporary line described in Section II.A.10.[2]

The length of the existing right-of-way and Company-owned property to be used for the Rebuild Project is approximately 3.2 miles. Because the existing right-of-way and Company-owned property is adequate to construct the proposed Rebuild Project, no new right-of-way is required. See also Section II.A.6. Given the availability of existing right-of-way and the statutory preference given to use existing rights-of-way, and because additional costs and environmental impacts would be associated with the acquisition and construction of new right-of-way, the Company did not consider any alternate routes requiring new right-of-way for this Rebuild Project.

The estimated conceptual cost of the Rebuild Project is approximately $11.1 million (in 2019 dollars), which includes approximately $10.8 million in transmission-related work, and approximately $0.3 million in substation-related work.

The desired in-service date for the Rebuild Project is December 31, 2022. The Company estimates it will take approximately 21 months for detailed engineering, materials procurement, permitting, and construction after a final order from the Commission. Accordingly, to support this estimated pre-construction activity timeline and construction plan, the Company respectfully requests a final order by March 1, 2021. Should the Commission issue a final order by March 1, 2021, the Company estimates that construction should begin on January 1, 2022 and be completed by December 31, 2022. This construction timeline will enable the Company to meet the targeted in-service date for the Rebuild Project.

[1] *See also*, *infra*, n. 8.
[2] *See also*, *infra*, n. 10.

I. NECESSITY FOR THE PROPOSED PROJECT

A. State the primary justification for the proposed project (for example, the most critical contingency violation including the first year and season in which the violation occurs). In addition, identify each transmission planning standard(s) (of the Applicant, regional transmission organization ("RTO"), or North American Electric Reliability Corporation) projected to be violated absent construction of the facility.

Response: The project is necessary to rebuild an approximately 3.2-mile section of the Chesterfield-Locks Line #205 and Chesterfield-Poe Line #2003 nearing its end of life.

Dominion Energy Virginia's transmission system is responsible for providing transmission service (i) for redelivery to the Company's retail customers; (ii) to Appalachian Power Company, Old Dominion Electric Cooperative, Northern Virginia Electric Cooperative, Central Virginia Electric Cooperative, and Virginia Municipal Electric Association for redelivery to their retail customers in Virginia; and (iii) to North Carolina Electric Membership Corporation and North Carolina Eastern Municipal Power Agency for redelivery to their customers in North Carolina (collectively, the "Dominion Energy Zone" or "DOM Zone").

Dominion Energy Virginia is part of the PJM Interconnection, L.L.C. ("PJM") regional transmission organization, which provides service to a large portion of the eastern United States. PJM is currently responsible for ensuring the reliability of and coordinating the movement of electricity through all or parts of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia, and the District of Columbia. This service area has a population of approximately 65 million and on August 2, 2006, set a record high of 166,929 megawatts ("MW") for summer peak demand, of which Dominion Energy Virginia's load portion was approximately 19,256 MW serving 2.4 million customers. On July 22, 2011, the Company set a record high of 20,061 MW for summer peak demand. On February 20, 2015, the Company set a winter peak and all-time record demand of 21,651 MW. Based on the 2020 PJM Load Forecast, the DOM Zone is expected to be one of the fastest growing zone in PJM, with average growth rates of 1.2% summer and 1.4% winter over the next 10 years compared to the PJM average of 0.6% and 0.6% over the same period for both summer and winter, respectively.

Dominion Energy Virginia is also part of the Eastern Interconnection transmission grid, meaning its transmission system is interconnected, directly or indirectly, with all of the other transmission systems in the United States and Canada between the Rocky Mountains and the Atlantic Coast, except for Quebec and most of Texas. All of the transmission systems in the Eastern Interconnection are dependent on each other for moving bulk power through the transmission system and for reliability support. Dominion Energy Virginia's service to its customers is extremely reliant on a robust and reliable regional transmission system.

PJM's Regional Transmission Expansion Plan ("RTEP") is the culmination of an annual transmission planning process, approved by the Federal Energy Regulatory Commission ("FERC"), which includes extensive analysis of the electric transmission system to determine any needed improvements.[3] PJM's annual RTEP is based on the effective criteria in place at the time of the analyses, including applicable standards and criteria of NERC, PJM, and local reliability planning criteria, among others.[4] The PJM Board of Managers (the "PJM Board") approves projects prior to inclusion in the RTEP.

Mandatory NERC Reliability Standards constitute minimum criteria with which all public utilities must comply as components of the interstate electric transmission system. Moreover, the Energy Policy Act of 2005 mandates that electric utilities follow these NERC Reliability Standards, and imposes fines for noncompliance up to $1 million per day per violation.

NERC has been designated by FERC as the electric reliability organization for the United States. Accordingly, NERC requires that the planning authority and transmission planner develop planning criteria to ensure compliance with NERC Reliability Standards. Mandatory NERC Reliability Standards require that a transmission owner ("TO") develop facility interconnection requirements that identify load and generation interconnection minimum requirements for a TO's transmission system, as well as the TO's reliability criteria.[5]

As of April 2019, the Company has approximately 3,115 miles of overhead transmission lines built prior to 1980 (approximately 47% of the overall overhead transmission system mileage). The Company has developed a proactive plan to rebuild transmission lines that are comprised of weathering steel towers (COR-TEN® towers). The 230 kV system accounts for approximately 2,861 miles of the Company's total overhead transmission line system, of which approximately 1,502 miles were built primarily before 1980.

As part of the Rebuild Project, the Company proposes to rebuild approximately 3.2 miles of existing Line #205 along with existing Line #2003, which share double circuit structures in existing right-of-way or on Company-owned property between the Company's existing Chesterfield and Tyler Substations. The approximately 3.2 mile sections of these lines were predominantly constructed in 1962 on double circuit COR-TEN® steel lattice towers, which have been identified for rebuild based on the Company's assessment in accordance with the Company's Planning Criteria.

[3] PJM Manual 14B focuses on the RTEP process and can be found at http://www.pjm.com/documents/manuals.aspx.
[4] See PJM Manual 14B, Attachment D: PJM Reliability Planning Criteria.
[5] See FAC-001-2, effective January 1, 2016 at http://www.nerc.com/pa/Stand/Reliability%20Standards/FAC-001-2.pdf.

Section C.2.9 of the Planning Criteria addresses electric transmission infrastructure approaching its end of life:[6]

> Electric transmission infrastructure reaches its end of life as a result of many factors. Some factors such as extreme weather and environmental conditions can *shorten* infrastructure life, while others such as maintenance activities can *lengthen* its life. Once end of life is recognized, in order to ensure continued reliability of the transmission grid, a decision must be made regarding the best way to address this end-of-life asset.
>
> For this criterion, "end of life" is defined as the point at which infrastructure is at risk of failure, and continued maintenance and/or refurbishment of the infrastructure is no longer a valid option to extend the life of the facilities consistent with Good Utility Practice and Dominion Energy Virginia Transmission Planning Criteria. The infrastructure to be evaluated under this end-of-life criteria are all transmission lines at 69 kV and above.
>
> The decision point of this criterion is based on satisfying two metrics:
>
> *1) Facility is nearing, or has already passed, its end of life, and*
> *2) Continued operation risks negatively impacting reliability of the transmission system.*
>
> For facilities that satisfy both of these metrics, this criterion mandates either replacing these facilities with in-kind infrastructure that meets current Dominion standards or employing an alternative solution to ensure the Dominion transmission system satisfies all applicable reliability criteria.

The Company submitted the Rebuild Project proposal, which would rebuild Line #205 and Line #2003 consistent with current 230 kV standards, in accordance with the PJM RTEP process to address the end-of-life criteria. The Rebuild Project initially was reviewed at the October 12, 2017 Transmission Expansion Advisory Committee ("TEAC") meeting and it was approved by the PJM Board on December 5, 2017. See Attachment I.A.1 for the relevant slides from the October 12, 2017 TEAC Meeting. No additional reliability studies were required by PJM in support of the need for the proposed project because Tyler Substation supports direct delivery of electric service to 9,640 of the Company's customers.

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[6] The Company's Transmission Planning Criteria can be found in Exhibit A of the Company's Facility Interconnection Requirements document, available online at https://www.dominionenergy.com/library/domcom/media/large-business/selling-power-to-dominion-energy/parallel-generation-and-interconnection/facility-connection-requirements.pdf.

1) Facility is nearing, or has already passed, its end of life

In regards to the first metric of the Company's Planning Criteria addressing end of life, the structures being rebuilt on Line #205 and Line #2003 are predominantly COR-TEN® steel lattice towers that were erected in 1962. COR-TEN® steel is now known to be problematic when used for lattice-type structures. These COR-TEN® towers have been identified for rebuild based on the Company's assessment in accordance with the Planning Criteria. The Company retained a third-party company, Quanta, to evaluate the condition of its COR-TEN® towers. After completing its evaluation, Quanta Technology provided the Company with the 2016 Quanta Report, which confirmed the need to rebuild the COR-TEN® section of Lines #205 and #2003, among other 230 kV COR-TEN® transmission lines on the Company's system.

2) Continued operation risks negatively impacting reliability of the transmission system

With regard to the second metric of the Company's Planning Criteria addressing end of life, both Line #205 and Line #2003 provide service to Dominion Energy Virginia's Tyler Substation, which in turn serves approximately 9,640 customers located in the Chesterfield County. The Company is unable to continue to provide reliable transmission service to these customers unless it addresses the aging infrastructure at the end of its service life.

The Company also relied on one of the four reliability tests identified in the Company's Planning Criteria. The relevant section of the Planning Criteria states in part:

> *2. Reliability and System Impact*
>
> The reliability impact of continued operation of a facility will be determined based on a planning power flow assessment and operational performance considerations. The end-of-life determination for a facility to be tested for reliability impact will be assessed by evaluating the impact on short and long term reliability with and without the facility in service in the power flow model. The existing system with the facility removed will become the base case system for which all reliability tests will be performed.
>
> The primary four (4) reliability tests to be considered are:
>
> 1. NERC Reliability Standards
> 2. PJM Planning Criteria – As documented in PJM Manual 14B – PJM Region Transmission Planning Process
> 3. Dominion Transmission Planning Criteria contained in this document

4. Operational Performance – This test will be based on input from PJM and/or Dominion System Operations as to the impact on reliably operating the system without the facility

Additional factors to be evaluated under system impact may include but not be limited to:

1. Market efficiency
2. Stage 1A [Auction Revenue Rights] sufficiency
3. Public policy
4. [SERC Reliability Corporation] reliability criteria

Failure of any of these reliability tests, along with the end-of-life assessment discussed herein, will indicate a violation of the End-of-Life Criteria and necessitate replacement as mandated earlier in this document.

The Company relied on Dominion Transmission Planning Criteria. The Company performed a contingency analysis to model the scenario with Lines #205 and #2003 out of service. This study identified violations of mandatory NERC Reliability Standards. Thermal overloads and low voltage violations were produced for several contingencies and are detailed in Section I.D.

***

In summary, the proposed Rebuild Project will replace aging infrastructure at the end of its service life in order to comply with the Company's mandatory Planning Criteria, thereby enabling the Company to maintain the overall long-term reliability of its transmission system, as well as to provide important system reliability benefits to the Company's entire network.

Attachment I.A.1

Reliability Analysis Update

Transmission Expansion Advisory Committee

October 12, 2017

Dominion Transmission Zone Baseline Project

Baseline Reliability - TO Criteria Violation

Line #205 and #2003 Partial Rebuild

Problem Statement: Dominion "End of Life Criteria"

- 230kV line #205 and #2003 run from Chesterfield to Locks and Poe respectively. An approximate 3 mile section of these lines from Chesterfield to Tyler was built on double circuit weathering steel (Corten) towers in 1962. The corten structures are in poor condition.
- Permanent MW load loss for removal of these lines is 140MW.
- These line sections need to be rebuilt to current standards based on Dominion's "End of Life" criteria.

Potential Solution:

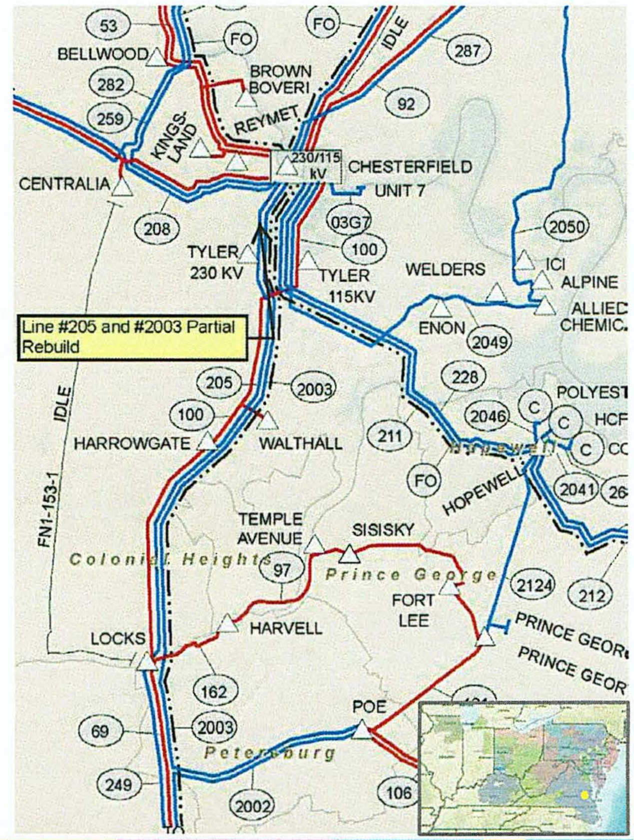
- Approximately 3 miles of line #205 and line #2003 will be rebuilt to current standard using with a summer emergency rating of 1047 MVA at 230kV. Proposed conductor is 2-636 ACSR. Considered structures include double circuit steel pole and double circuit galvanized steel tower. The Chesterfield - - Tyler segments of line #205 and #2003 have an existing summer emergency rating of 478MVA.

Alternatives: No feasible alternatives

Estimated Project Cost: $9.5 M

Possible IS Date: 12/31/2022

Project Status: Conceptual



COLOR	VOLTAGE	TRANSMISSION LINE NUMBER
	500 KV.	500 thru 599
	230 KV.	200 thru 299 & 2000 thru 2099
	115 KV.	1 thru 199
	138 KV.	AS NOTED
	69 KV.	AS NOTED

I. NECESSITY FOR THE PROPOSED PROJECT

B. Detail the engineering justifications for the proposed project (for example, provide narrative to support whether the proposed project is necessary to upgrade or replace an existing facility, to significantly increase system reliability, to connect a new generating station to the Applicant's system, etc.). Describe any known future project(s), including but not limited to generation, transmission, delivery point or retail customer projects, that require the proposed project to be constructed. Verify that the planning studies used to justify the need for the proposed project considered all other generation and transmission facilities impacting the affected load area, including generation and transmission facilities that have not yet been placed into service. Provide a list of those facilities that are not yet in service.

Response: [1] **Engineering Justification for Project**

For a detailed description of the engineering justification for the Rebuild Project, see Section I.A.

[2] **Known Future Projects**

There are no known future projects that require the Rebuild Project to be constructed. The Rebuild Project is required by the Company's end-of-life criteria as described in Section I.A.

[3] **Planning Studies**

The retirements of Chesterfield Power Station Units 3 and 4 that were announced on March 25, 2019, were taken into account in planning studies for this Application.

[4] **Facilities List**

Not applicable.

I. NECESSITY FOR THE PROPOSED PROJECT

C. Describe the present system and detail how the proposed project will effectively satisfy present and projected future electrical load demand requirements. Provide pertinent load growth data (at least five years of historical summer and winter peak demands and ten years of projected summer and winter peak loads where applicable). Provide all assumptions inherent within the projected data and describe why the existing system cannot adequately serve the needs of the Applicant (if that is the case). Indicate the date by which the existing system is projected to be inadequate.

Response: Attachment I.G.1 shows the portion of the Company's existing transmission system in the area of the proposed Rebuild Project. The existing Line #205 and Line #2003 are part of the Company's 230 kV network, which supports the delivery of generation to retail and wholesale customers. These lines support the network in the Chesterfield load area and provide direct delivery to approximately 9,640 customers served out of Tyler Substation.

The table in Attachment I.C.1 provides historical system peak loads for the Company's Chesterfield load area, which includes Line #205 and Line #2003. The table in Attachment I.C.1 also provides the anticipated summer and winter peak loads from 2020 to 2029 for this area. The projected loads in Attachment I.C.1 represent the Company's forecasted peaks based on actual load and the PJM 2020 Load Forecast, and demonstrate stable load demand in the area. Over the period from 2020 to 2029, the summer peak electrical demand for this area is projected to grow from 1,762 MW to 1,862 MW, and the winter peak electrical demand for this area is projected to change from 2,112 MW to 2,329 MW.

On March 25, 2019, Dominion Energy Virginia announced the retirement of Chesterfield Power Station Units 3 and 4. These retirements were taken into account in the planning studies for this Application and the Rebuild Project is required by the Company's end-of-life criteria as described in Section I.A.

The existing Line #205 and Line #2003 cannot adequately serve the needs of the Company and its customers because of the aging infrastructure, as discussed in Section I.A. The distribution network connected to Tyler Substation cannot serve station load on a continuous basis in the absence of these lines. The need for the Rebuild Project is based on the Company's end-of-life criteria, but currently, there is no specific date at which the existing system is projected to be inadequate. That said, the infrastructure will only continue to deteriorate. As such, the Company has created a plan to address its end-of-life facilities, estimating general timeframes for completion for end-of-life projects based on the condition of the facilities, the Company's resources, and the need to schedule outages. The Company has set December 31, 2022, as the target in-service date for the Rebuild Project to reflect the need confirmed by the 2016 Quanta Report balanced against the timeline for permitting and construction.

	Historical Summer Peak Loads (MW)				
	2015	2016	2017	2018	2019
Chesterfield Area	1688	1744	1687	1650	1465

	Projected Summer Peak Loads (MW)*									
	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Chesterfield Area	1762	1774	1788	1799	1811	1824	1830	1841	1849	1862

*Forecasted values are based on the PJM 2020 Load Forecast

	Historical Winter Peak Loads (MW)				
	2014/15	2015/16	2016/17	2017/18	2018/19
Chesterfield Area	2231	1809	2129	2269	1863

	Projected Winter Peak Loads (MW)*									
	2019/20	2020/21	2021/22	2022/23	2023/24	2024/25	2025/26	2026/27	2027/28	2028/29
Chesterfield Area	2112	2127	2153	2177	2200	2242	2265	2287	2308	2329

*Forecasted values are based on the PJM 2020 Load Forecast

I. NECESSITY FOR THE PROPOSED PROJECT

D. If power flow modeling indicates that the existing system is, or will at some future time be, inadequate under certain contingency situations, provide a list of all these contingencies and the associated violations. Describe the critical contingencies including the affected elements and the year and season when the violation(s) is first noted in the planning studies. Provide the applicable computer screenshots of single-line diagrams from power flow simulations depicting the circuits and substations experiencing thermal overloads and voltage violations during the critical contingencies described above.

Response: Analysis of PJM's 2024 Summer case (based on the 2019 Load Forecast) without Lines #205 and #2003 between Chesterfield and Tyler Substations in service shows a total of seventeen contingency scenarios that produce voltage violations. These scenarios are:

Scenario 1 – The N-1-1 contingency of the loss of Line #249 between 6CHRL249 (Chaparral) and Locks along with Contingency DVP_P1-2: LN 100.

Scenario 2 – The N-1-1 contingency of the loss of Line #2002 between Carson and Poe along with Contingency DVP_P1-2: LN 121.

Scenario 3 – The N-1-1 contingency of the loss of Line #121 between Prince George and Poe along with Contingency DVP_P1-2: LN 2002.

Scenario 4 – The N-1-1 contingency of the loss of Line #2124 between Prince George and Hopewell along with Contingency DVP_P1-2: LN 2002.

Scenario 5 – The N-1-1 contingency of the loss of Transformer #1 at Prince George Substation along with Contingency DVP_P1-2: LN 2002.

Scenario 6 – The N-1-1 contingency of the loss of Line #249 between Carson and 6CHRL249 (Chaparral) along with Contingency DVP_P1-2: LN 2002.

Scenario 7 – The N-1-1 contingency of the loss of Line #162 between Harvell and Locks along with Contingency DVP_P1-2: LN 2002.

Scenario 8 – The N-1-1 contingency of the loss of Line #2002 between Carson and Poe along with Contingency DVP_P1-2: LN 2124.

Scenario 9 – The N-1-1 contingency of the loss of Line #97 between Prince George and Fort Lee along with Contingency DVP_P1-2: LN 249.

Scenario 10 – The N-1-1 contingency of the loss of Line #100 between Chesterfield and Walthall along with Contingency DVP_P1-2: LN 249.

Scenario 11 – The N-1-1 contingency of the loss of Line #100 between Harrogate and Walthall along with Contingency DVP_P1-2: LN 249.

Scenario 12 – The N-1-1 contingency of the loss of Line #100 between Fort Lee and Sisisky along with Contingency DVP_P1-2: LN 249.

Scenario 13 – The N-1-1 contingency of the loss of Line #100 between Harrogate and Locks along with Contingency DVP_P1-2: LN 249.

Scenario 14 – The N-1-1 contingency of the loss of Line #97 between Sisisky and Temple along with Contingency DVP_P1-2: LN 249.

Scenario 15 – The N-1-1 contingency of the loss of Line #97 between Harvell and Temple along with Contingency DVP_P1-2: LN 249.

Scenario 16 – The N-1-1 contingency of the loss of Line #2002 between 6CHRL249 (Chaparral) and Locks along with Contingency DVP_P1-2: LN 249.

Scenario 17 – The N-1-1 contingency of the loss of Line #249 between Carson and Poe along with Contingency DVP_P1-2: LN 97.

These voltage violations are detailed in Table 1:

Table 1

Scenario	First Contingency	Bus #	Bus Name	Second Contingency	Cont Volt	%Vdrop
1	314285 6CHRL249 230 314316 6LOCKS 230 1	314346	6TYLER	DVP_P1-2: LN 100	0.8565	2.424
1	314285 6CHRL249 230 314316 6LOCKS 230 1	314301	6HARR205	DVP_P1-2: LN 100	0.8568	2.423
1	314285 6CHRL249 230 314316 6LOCKS 230 1	314316	6LOCKS	DVP_P1-2: LN 100	0.8577	2.419
2	314282 6CARSON 230 314331 6POE 230 1	314263	6TYLER1	DVP_P1-2: LN 121	0.8326	19.9
2	314282 6CARSON 230 314331 6POE 230 1	314299	6HARROWG	DVP_P1-2: LN 121	0.8334	19.881
2	314282 6CARSON 230 314331 6POE 230 1	314331	6POE	DVP_P1-2: LN 121	0.8342	19.851
2	314282 6CARSON 230 314331 6POE 230 1	935211	AD1-156 C	DVP_P1-2: LN 121	0.8343	19.834
2	314282 6CARSON 230 314331 6POE 230 1	935212	AD1-156 E	DVP_P1-2: LN 121	0.8343	19.834
3	314291 3PRGEORG 115 314329 3POE 115 1	314263	6TYLER1	DVP_P1-2: LN 2002	0.823	20.442
3	314291 3PRGEORG 115 314329 3POE 115 1	314299	6HARROWG	DVP_P1-2: LN 2002	0.8238	20.422
3	314291 3PRGEORG 115 314329 3POE 115 1	314331	6POE	DVP_P1-2: LN 2002	0.8246	20.391
3	314291 3PRGEORG 115 314329 3POE 115 1	935211	AD1-156 C	DVP_P1-2: LN 2002	0.8247	20.389
3	314291 3PRGEORG 115 314329 3POE 115 1	935212	AD1-156 E	DVP_P1-2: LN 2002	0.8247	20.389
4	314269 6PRGEORG 230 314303 6HOPEWLL 230 1	314269	6PRGEORG	DVP_P1-2: LN 2002	0.885	12.283
4	314269 6PRGEORG 230 314303 6HOPEWLL 230 1	314263	6TYLER1	DVP_P1-2: LN 2002	0.8907	13.579
4	314269 6PRGEORG 230 314303 6HOPEWLL 230 1	314299	6HARROWG	DVP_P1-2: LN 2002	0.8915	13.567
4	314269 6PRGEORG 230 314303 6HOPEWLL 230 1	314331	6POE	DVP_P1-2: LN 2002	0.8921	13.548
4	314269 6PRGEORG 230 314303 6HOPEWLL 230 1	935211	AD1-156 C	DVP_P1-2: LN 2002	0.8922	13.547
4	314269 6PRGEORG 230 314303 6HOPEWLL 230 1	935212	AD1-156 E	DVP_P1-2: LN 2002	0.8922	13.547
5	314269 6PRGEORG 230 314291 3PRGEORG 115 1	314263	6TYLER1	DVP_P1-2: LN 2002	0.8942	13.306
5	314269 6PRGEORG 230 314291 3PRGEORG 115 1	314299	6HARROWG	DVP_P1-2: LN 2002	0.895	13.293
5	314269 6PRGEORG 230 314291 3PRGEORG 115 1	314331	6POE	DVP_P1-2: LN 2002	0.8956	13.273
5	314269 6PRGEORG 230 314291 3PRGEORG 115 1	935211	AD1-156 C	DVP_P1-2: LN 2002	0.8957	13.272
5	314269 6PRGEORG 230 314291 3PRGEORG 115 1	935212	AD1-156 E	DVP_P1-2: LN 2002	0.8957	13.272
6	314282 6CARSON 230 314285 6CHRL249 230 1	314263	6TYLER1	DVP_P1-2: LN 2002	0.8961	12.885
6	314282 6CARSON 230 314285 6CHRL249 230 1	314299	6HARROWG	DVP_P1-2: LN 2002	0.8968	12.873
6	314282 6CARSON 230 314285 6CHRL249 230 1	314331	6POE	DVP_P1-2: LN 2002	0.8974	12.854
6	314282 6CARSON 230 314285 6CHRL249 230 1	935211	AD1-156 C	DVP_P1-2: LN 2002	0.8975	12.853
6	314282 6CARSON 230 314285 6CHRL249 230 1	935212	AD1-156 E	DVP_P1-2: LN 2002	0.8975	12.853
7	314302 3HARVELL 115 314314 3LOCKS 115 1	314263	6TYLER1	DVP_P1-2: LN 2002	0.8975	13.169
7	314302 3HARVELL 115 314314 3LOCKS 115 1	314299	6HARROWG	DVP_P1-2: LN 2002	0.8982	13.157
7	314302 3HARVELL 115 314314 3LOCKS 115 1	314331	6POE	DVP_P1-2: LN 2002	0.8988	13.138
7	314302 3HARVELL 115 314314 3LOCKS 115 1	935211	AD1-156 C	DVP_P1-2: LN 2002	0.8989	13.137
7	314302 3HARVELL 115 314314 3LOCKS 115 1	935212	AD1-156 E	DVP_P1-2: LN 2002	0.8989	13.137
8	314282 6CARSON 230 314331 6POE 230 1	314263	6TYLER1	DVP_P1-2: LN 2124	0.8968	13.48
8	314282 6CARSON 230 314331 6POE 230 1	314299	6HARROWG	DVP_P1-2: LN 2124	0.8975	13.468
8	314282 6CARSON 230 314331 6POE 230 1	314331	6POE	DVP_P1-2: LN 2124	0.8982	13.448
8	314282 6CARSON 230 314331 6POE 230 1	935211	AD1-156 C	DVP_P1-2: LN 2124	0.8983	13.432
8	314282 6CARSON 230 314331 6POE 230 1	935212	AD1-156 E	DVP_P1-2: LN 2124	0.8983	13.432
9	314291 3PRGEORG 115 314297 3F LEE97 115 1	314346	6TYLER	DVP_P1-2: LN 249	0.8305	18.648
9	314291 3PRGEORG 115 314297 3F LEE97 115 1	314301	6HARR205	DVP_P1-2: LN 249	0.8308	18.64
9	314291 3PRGEORG 115 314297 3F LEE97 115 1	314316	6LOCKS	DVP_P1-2: LN 249	0.8317	18.617
10	314284 3CHESTFLD 115 314349 3WALTHAL 115 1	314346	6TYLER	DVP_P1-2: LN 249	0.8401	18.206
10	314284 3CHESTFLD 115 314349 3WALTHAL 115 1	314301	6HARR205	DVP_P1-2: LN 249	0.8404	18.199
10	314284 3CHESTFLD 115 314349 3WALTHAL 115 1	314316	6LOCKS	DVP_P1-2: LN 249	0.8413	18.178
11	314298 3HARROWG 115 314349 3WALTHAL 115 1	314346	6TYLER	DVP_P1-2: LN 249	0.8447	17.794
11	314298 3HARROWG 115 314349 3WALTHAL 115 1	314301	6HARR205	DVP_P1-2: LN 249	0.8451	17.787
11	314298 3HARROWG 115 314349 3WALTHAL 115 1	314316	6LOCKS	DVP_P1-2: LN 249	0.8459	17.767
12	314297 3F LEE97 115 314340 3SISISKY 115 1	314346	6TYLER	DVP_P1-2: LN 249	0.8464	17.487
12	314297 3F LEE97 115 314340 3SISISKY 115 1	314301	6HARR205	DVP_P1-2: LN 249	0.8467	17.481
12	314297 3F LEE97 115 314340 3SISISKY 115 1	314316	6LOCKS	DVP_P1-2: LN 249	0.8476	17.462
13	314298 3HARROWG 115 314314 3LOCKS 115 1	314346	6TYLER	DVP_P1-2: LN 249	0.8501	17.466
13	314298 3HARROWG 115 314314 3LOCKS 115 1	314301	6HARR205	DVP_P1-2: LN 249	0.8504	17.46
14	314340 3SISISKY 115 314342 3TEMPLE 115 1	314346	6TYLER	DVP_P1-2: LN 249	0.8504	17.29
14	314340 3SISISKY 115 314342 3TEMPLE 115 1	314301	6HARR205	DVP_P1-2: LN 249	0.8508	17.283
13	314298 3HARROWG 115 314314 3LOCKS 115 1	314316	6LOCKS	DVP_P1-2: LN 249	0.8513	17.44
14	314340 3SISISKY 115 314342 3TEMPLE 115 1	314316	6LOCKS	DVP_P1-2: LN 249	0.8517	17.263
15	314302 3HARVELL 115 314342 3TEMPLE 115 1	314346	6TYLER	DVP_P1-2: LN 249	0.8589	16.548
15	314302 3HARVELL 115 314342 3TEMPLE 115 1	314301	6HARR205	DVP_P1-2: LN 249	0.8592	16.542
15	314302 3HARVELL 115 314342 3TEMPLE 115 1	314316	6LOCKS	DVP_P1-2: LN 249	0.8601	16.523
16	314282 6CARSON 230 314331 6POE 230 1	314263	6TYLER1	DVP_P1-2: LN 249	0.898	13.358
16	314282 6CARSON 230 314331 6POE 230 1	314299	6HARROWG	DVP_P1-2: LN 249	0.8988	13.346
16	314282 6CARSON 230 314331 6POE 230 1	314331	6POE	DVP_P1-2: LN 249	0.8994	13.326
16	314282 6CARSON 230 314331 6POE 230 1	935211	AD1-156 C	DVP_P1-2: LN 249	0.8995	13.31
16	314282 6CARSON 230 314331 6POE 230 1	935212	AD1-156 E	DVP_P1-2: LN 249	0.8995	13.31
17	314285 6CHRL249 230 314316 6LOCKS 230 1	314346	6TYLER	DVP_P1-2: LN 97	0.8624	1.832
17	314285 6CHRL249 230 314316 6LOCKS 230 1	314301	6HARR205	DVP_P1-2: LN 97	0.8627	1.832
17	314285 6CHRL249 230 314316 6LOCKS 230 1	314316	6LOCKS	DVP_P1-2: LN 97	0.8636	1.829

Similarly, analysis of PJM's 2024 Summer case (based on the 2019 Load Forecast) without Lines #205 and #2003 between Chesterfield and Tyler Substations in service shows at total of nine contingency scenarios that produce thermal violations. These scenarios are:

Scenario 9 – The N-1-1 contingency of the loss of Line #97 between Prince George and Fort Lee along with Contingency DVP_P1-2: LN 249.

Scenario 10 – The N-1-1 contingency of the loss of Line #100 between Chesterfield and Walthall along with Contingency DVP_P1-2: LN 249.

Scenario 11 – The N-1-1 contingency of the loss of Line #100 between Harrogate and Walthall along with Contingency DVP_P1-2: LN 249.

Scenario 12 – The N-1-1 contingency of the loss of Line #97 between Fort Lee and Sisisky along with Contingency DVP_P1-2: LN 249.

Scenario 14 – The N-1-1 contingency of the loss of Line #100 between Harrogate and Locks along with Contingency DVP_P1-2: LN 249.

Scenario 15 – The N-1-1 contingency of the loss of Line #97 between Harvell and Temple along with Contingency DVP_P1-2: LN 249.

Scenario 17 – The N-1-1 contingency of the loss of Line #249 between 6CHRL249 (Chaparral) and Locks along with Contingency DVP_P1-2: LN 97.

Scenario 18 – The N-1-1 contingency of the loss of Line #249 between Carson and 6CHRL249 (Chaparral) along with Contingency DVP_P1-2: LN 97.

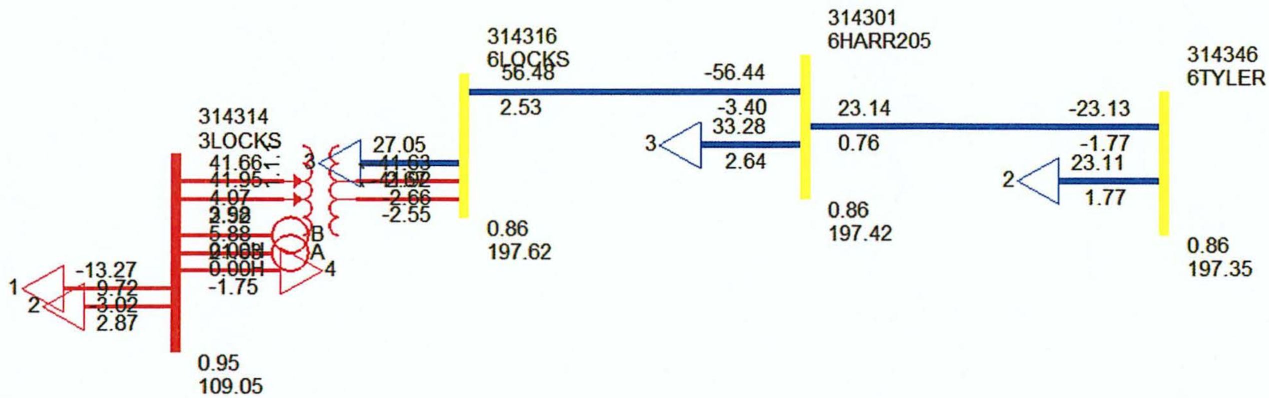
Scenario 19 – The N-1-1 contingency of the loss of Line #249 between Carson and 6CHRL249 (Chaparral) along with Contingency DVP_P1-2: LN 162.

These thermal violations are detailed in Table 2:

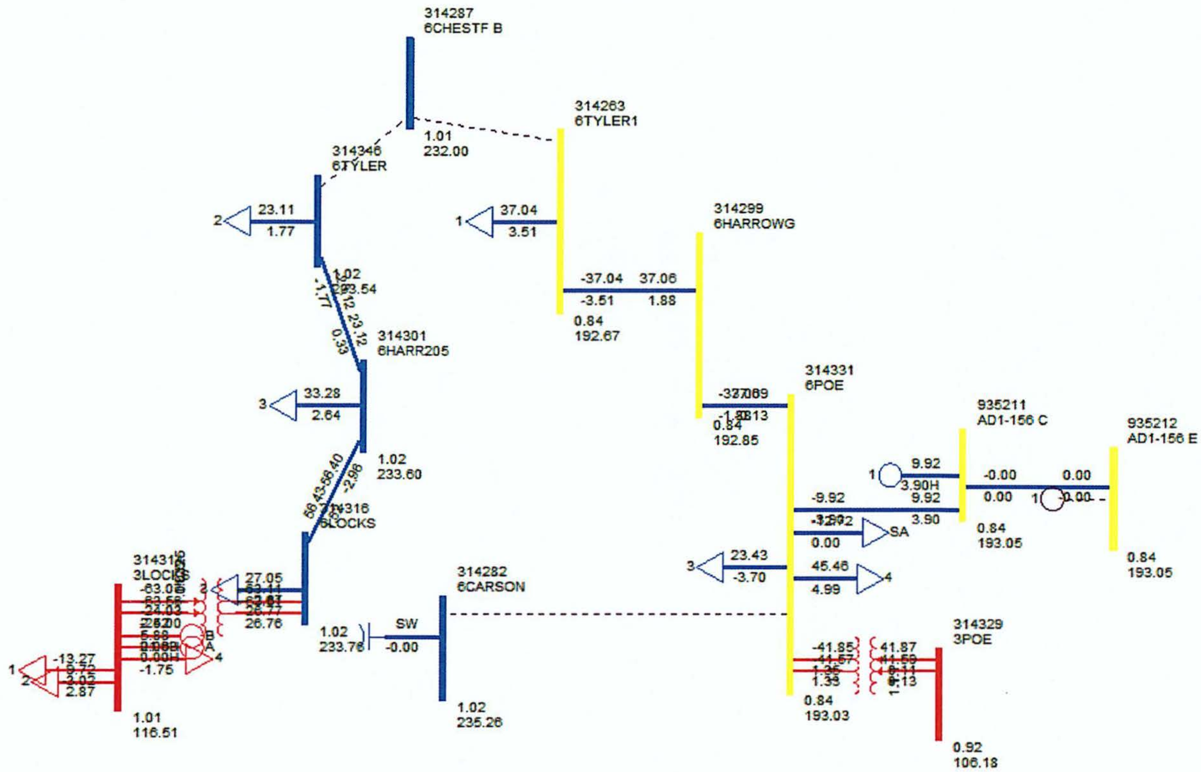
Table 2

Scenario	First Contingency							Monitored Facility							Second Contingency	SCD AC %Loading
9	314291	3PRGEORG	115	314297	3F LEE97	115	1	314298	3HARROWG	115	314314	3LOCKS	115	1	DVP_P1-2: LN 249	166.97
9	314291	3PRGEORG	115	314297	3F LEE97	115	1	314286	6CHESTF A	230	314284	3CHESTFLD	115	1	DVP_P1-2: LN 249	100.88
10	314284	3CHESTFLD	115	314349	3WALTHAL	115	1	314291	3PRGEORG	115	314297	3F LEE97	115	1	DVP_P1-2: LN 249	114.08
10	314284	3CHESTFLD	115	314349	3WALTHAL	115	1	314297	3F LEE97	115	314340	3SISISKY	115	1	DVP_P1-2: LN 249	108.07
10	314284	3CHESTFLD	115	314349	3WALTHAL	115	1	314340	3SISISKY	115	314342	3TEMPLE	115	1	DVP_P1-2: LN 249	104.09
11	314298	3HARROWG	115	314349	3WALTHAL	115	1	314291	3PRGEORG	115	314297	3F LEE97	115	1	DVP_P1-2: LN 249	101.96
12	314297	3F LEE97	115	314340	3SISISKY	115	1	314298	3HARROWG	115	314314	3LOCKS	115	1	DVP_P1-2: LN 249	135.22
14	314340	3SISISKY	115	314342	3TEMPLE	115	1	314298	3HARROWG	115	314314	3LOCKS	115	1	DVP_P1-2: LN 249	128
15	314302	3HARVELL	115	314342	3TEMPLE	115	1	314298	3HARROWG	115	314314	3LOCKS	115	1	DVP_P1-2: LN 249	117.57
17	314285	6CHRL249	230	314316	6LOCKS	230	1	314298	3HARROWG	115	314314	3LOCKS	115	1	DVP_P1-2: LN 97	117.2
18	314282	6CARSON	230	314285	6CHRL249	230	1	314298	3HARROWG	115	314314	3LOCKS	115	1	DVP_P1-2: LN 97	129.92
19	314282	6CARSON	230	314285	6CHRL249	230	1	314298	3HARROWG	115	314314	3LOCKS	115	1	DVP_P1-2: LN 162	102.67

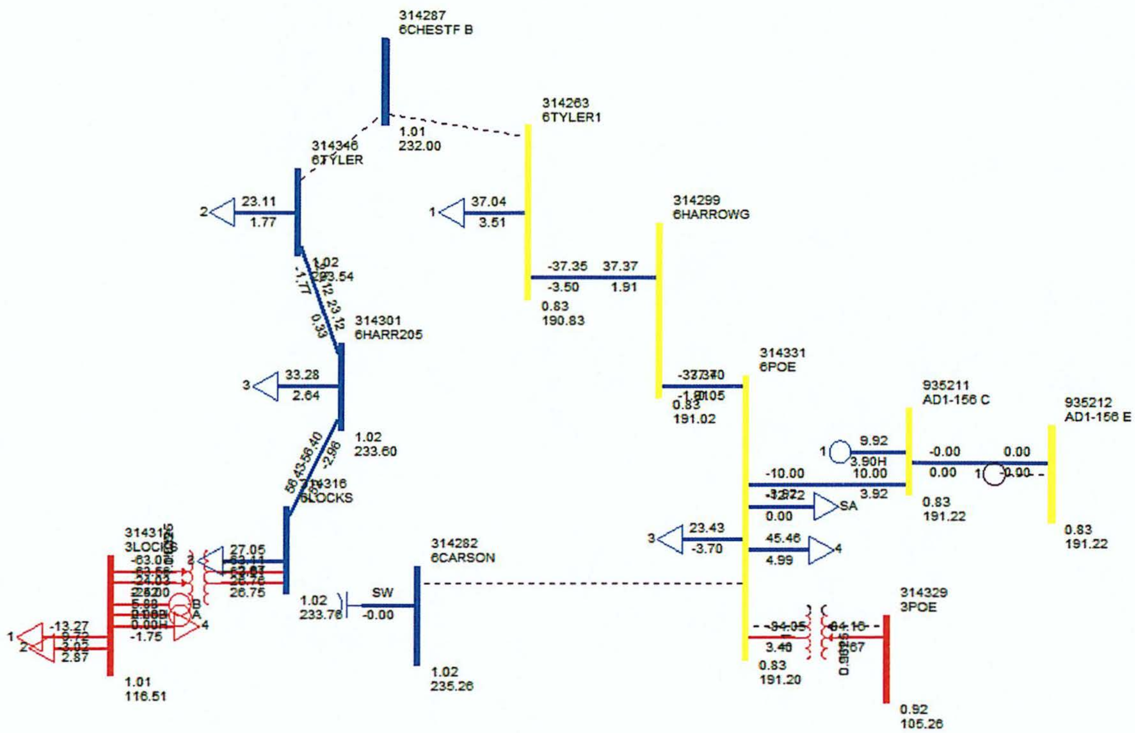
See Attachment I.D.1 for single-line diagram screenshots for the 19 contingency scenarios that comprise the voltage and thermal violations.



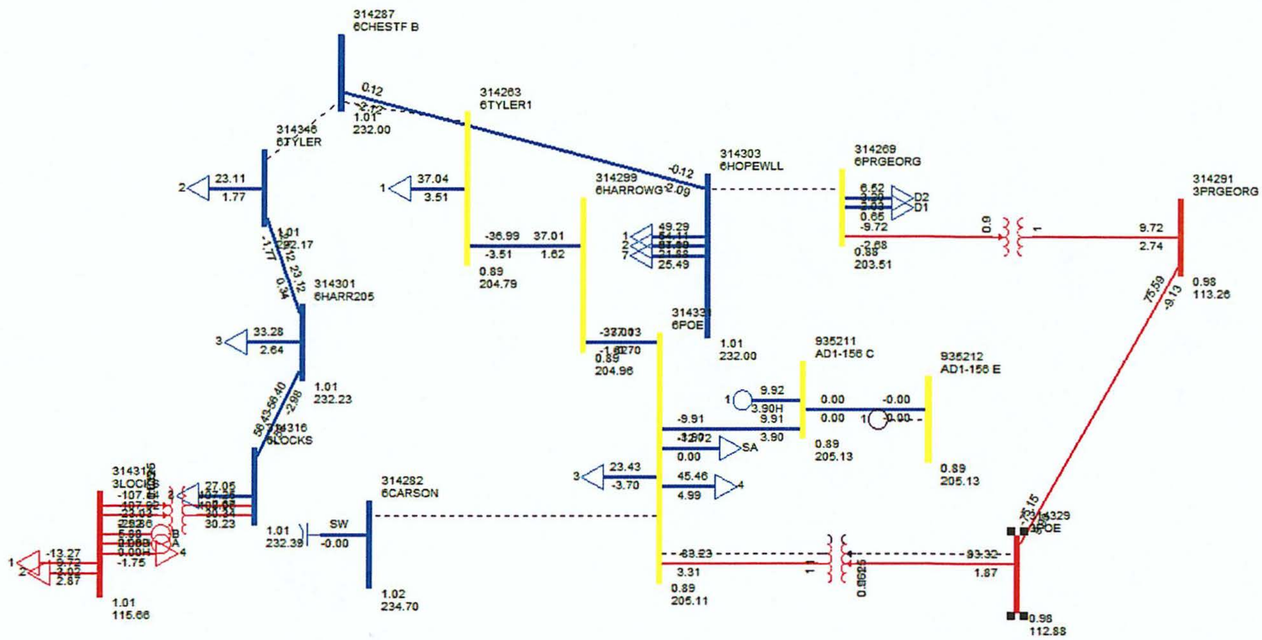
Scenario 1: N-1-1 contingency of the loss of Line #249 between Chaparelle and Locks along with Contingency DVP_P1-2: LN 100.



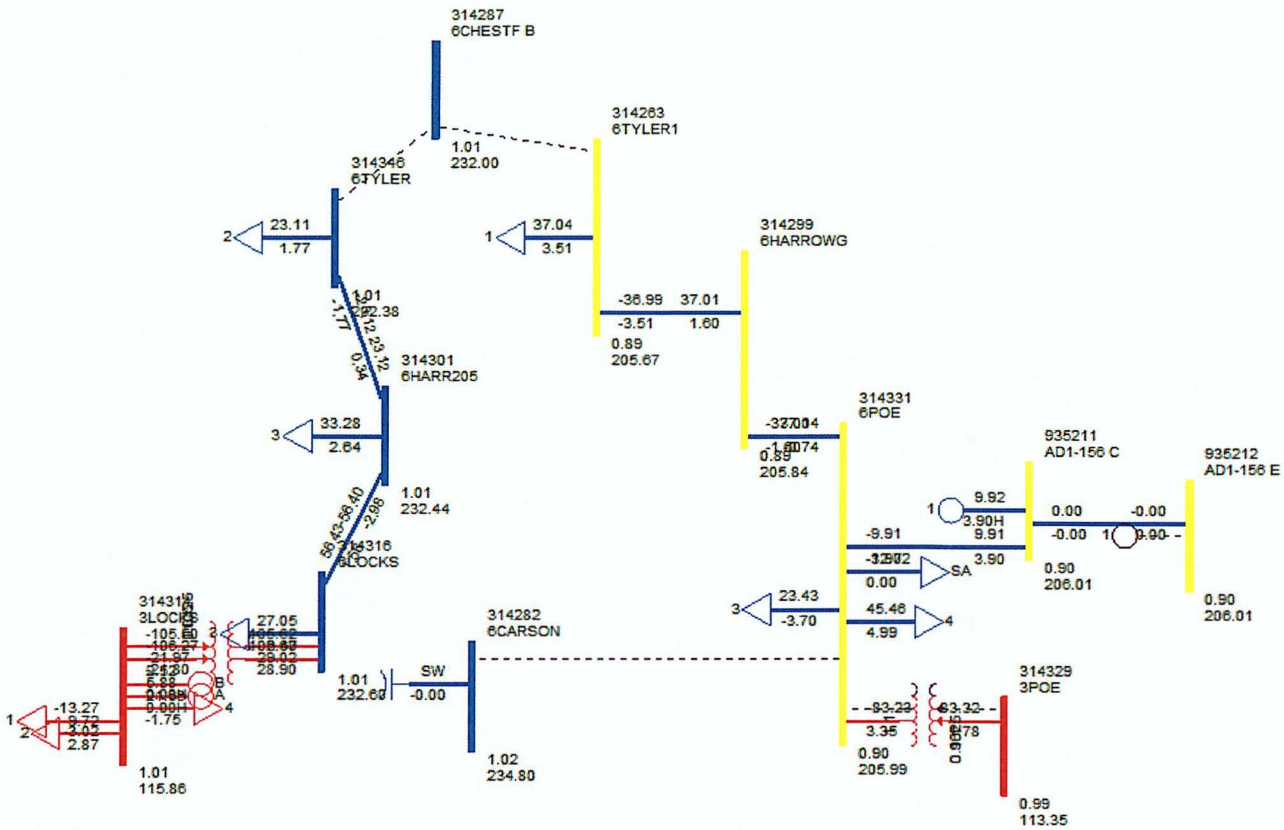
Scenario 2: N-1-1 contingency of the loss of Line #2002 between Carson and Poe along with Contingency DVP_P1-2: LN 121.



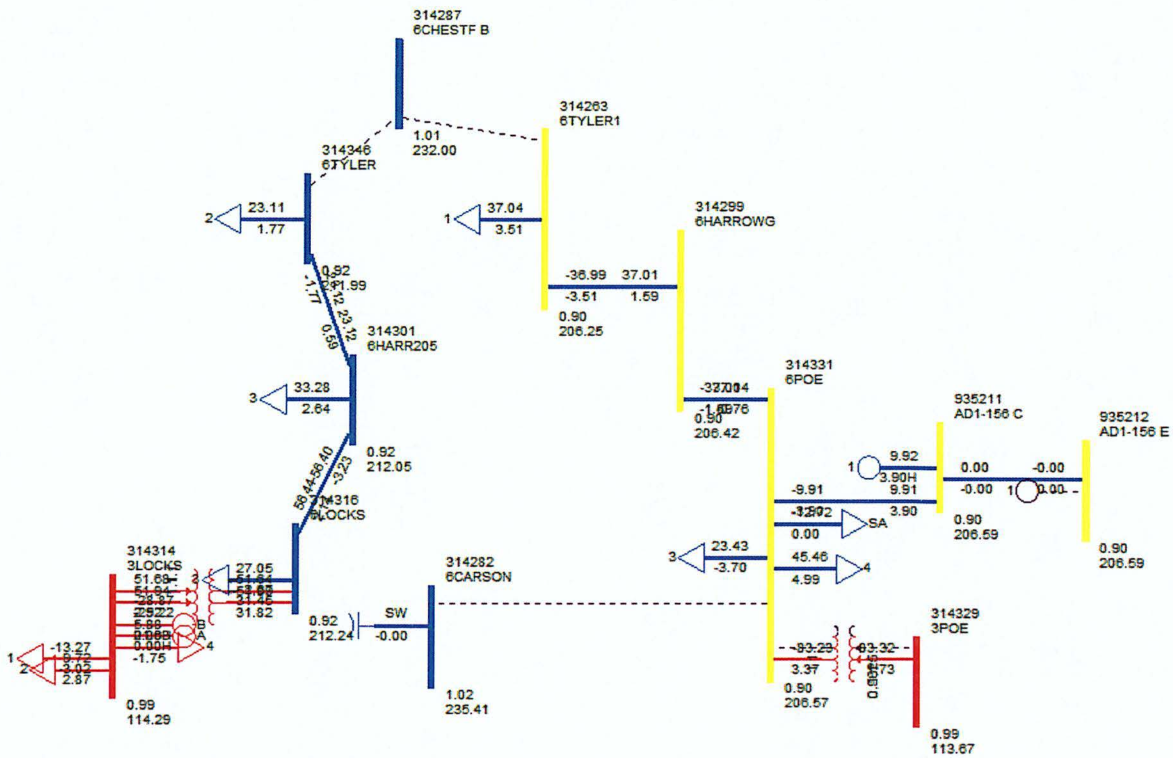
Scenario 3: N-1-1 contingency of the loss of Line #121 between Prince George and Poe along with Contingency DVP_P1-2: LN 2002.



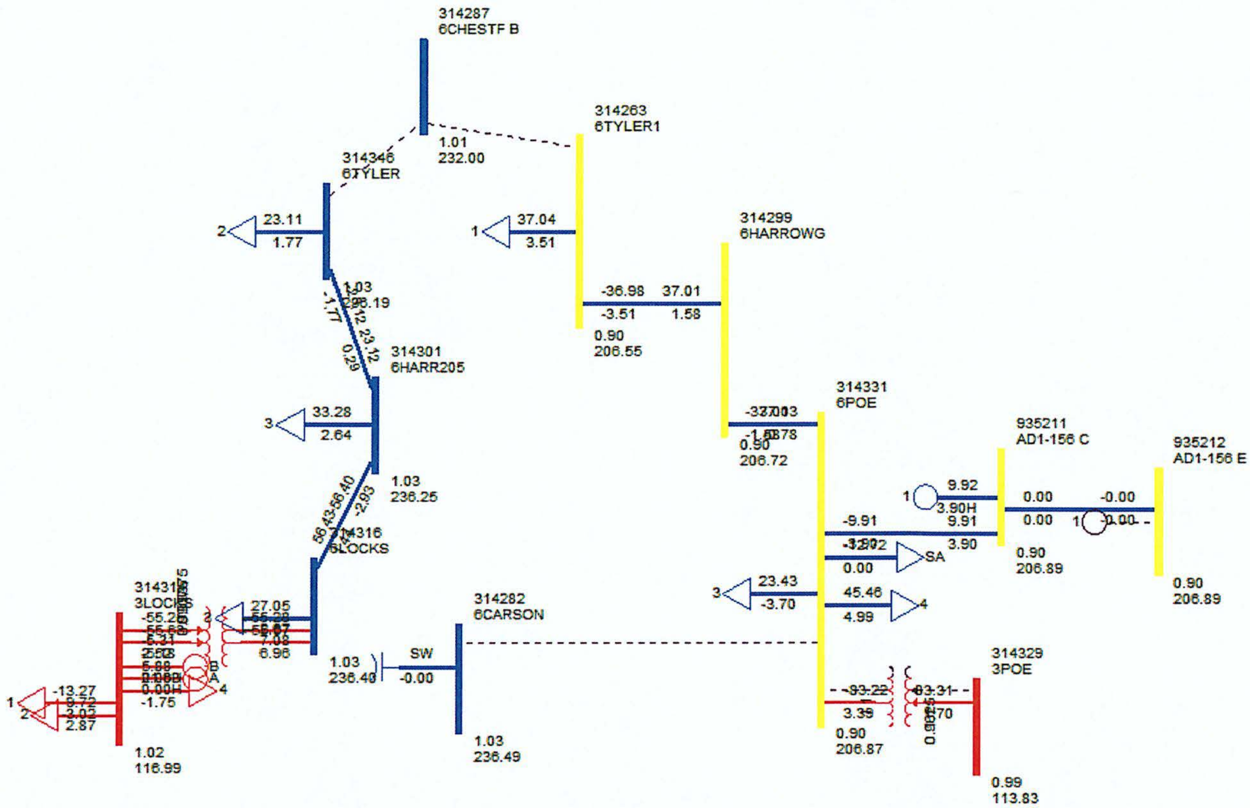
Scenario 4: N-1-1 contingency of the loss of Line #2124 between Prince George and Hopewell along with Contingency DVP_P1-2: LN 2002.



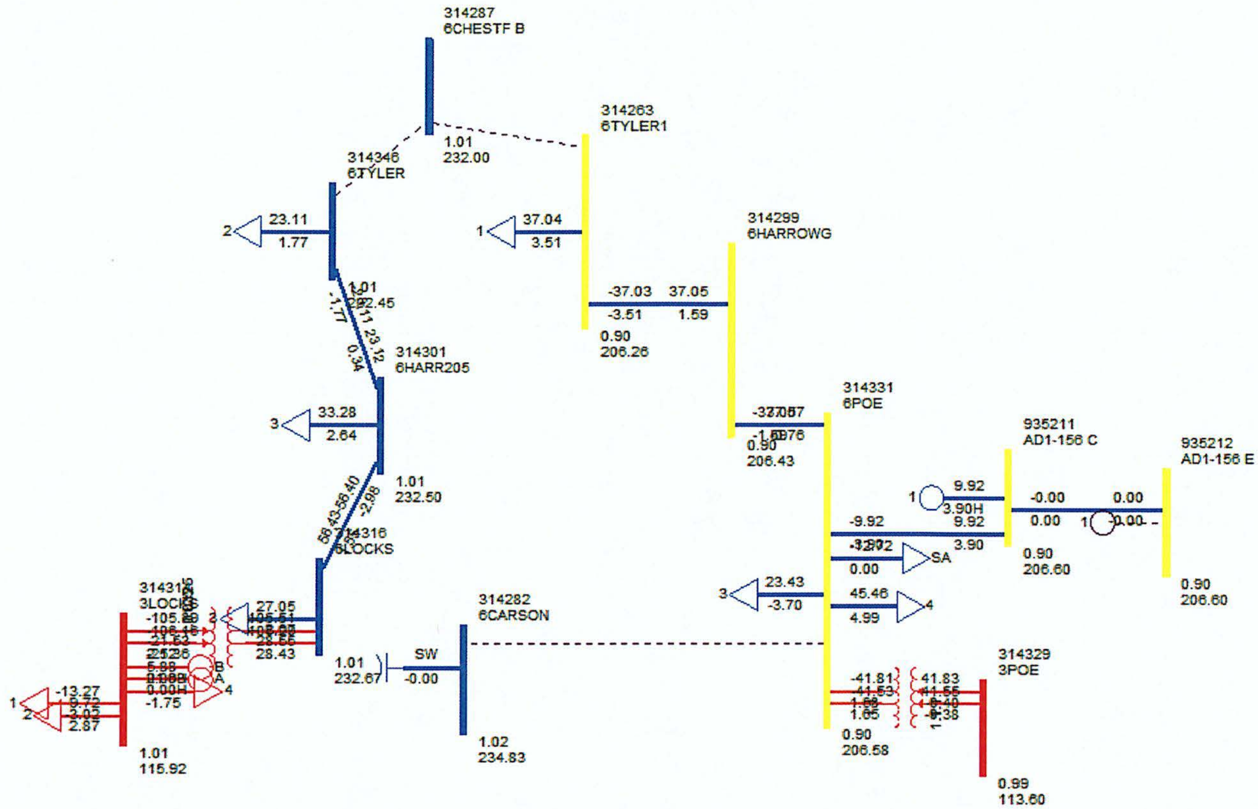
Scenario 5: N-1-1 contingency of the loss of Transformer #1 at Prince George Substation along with Contingency DVP_P1-2: LN 2002.



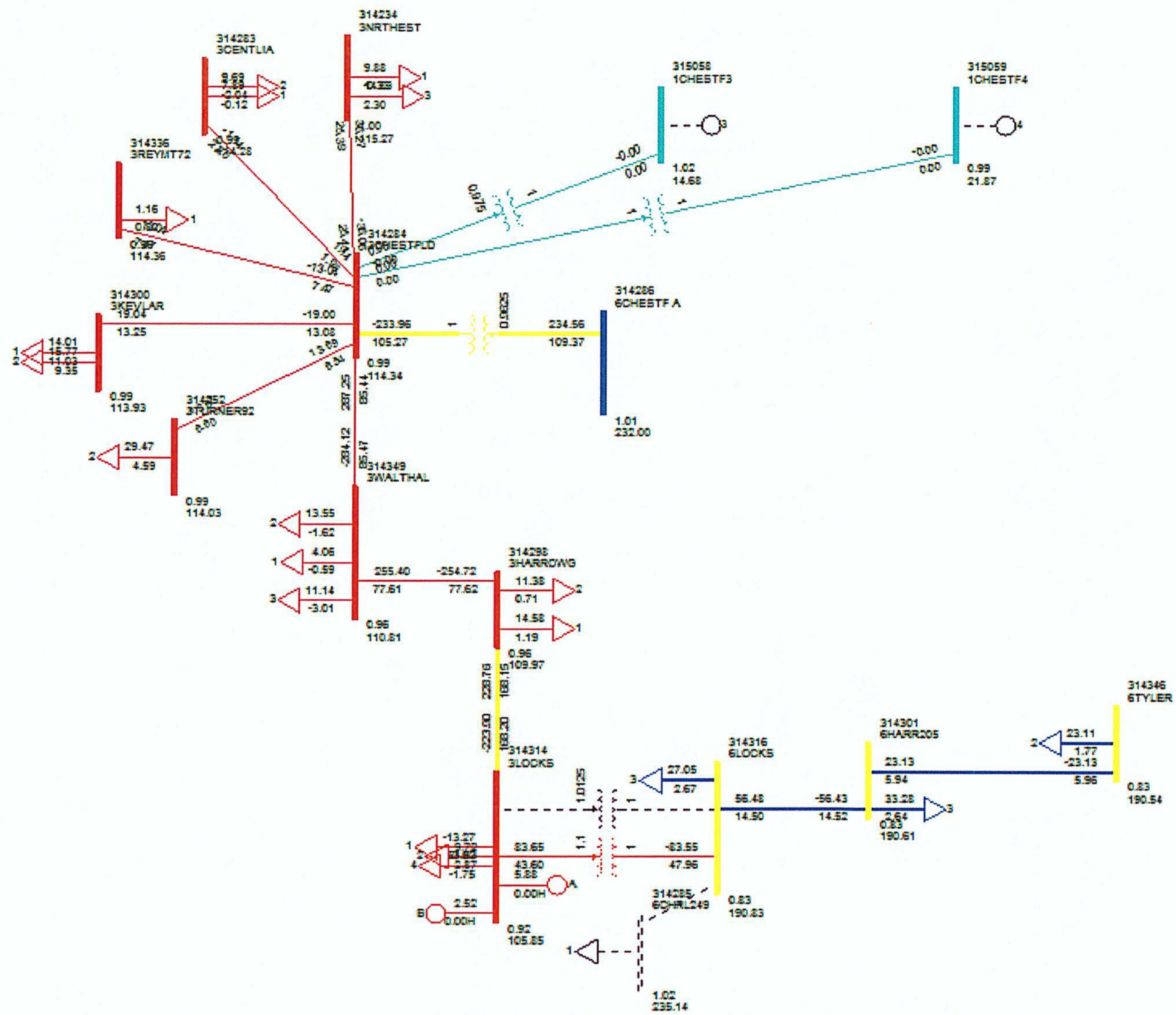
Scenario 6: N-1-1 contingency of the loss of Line #249 between Carson and Chaparall along with Contingency DVP_P1-2: LN 2002.



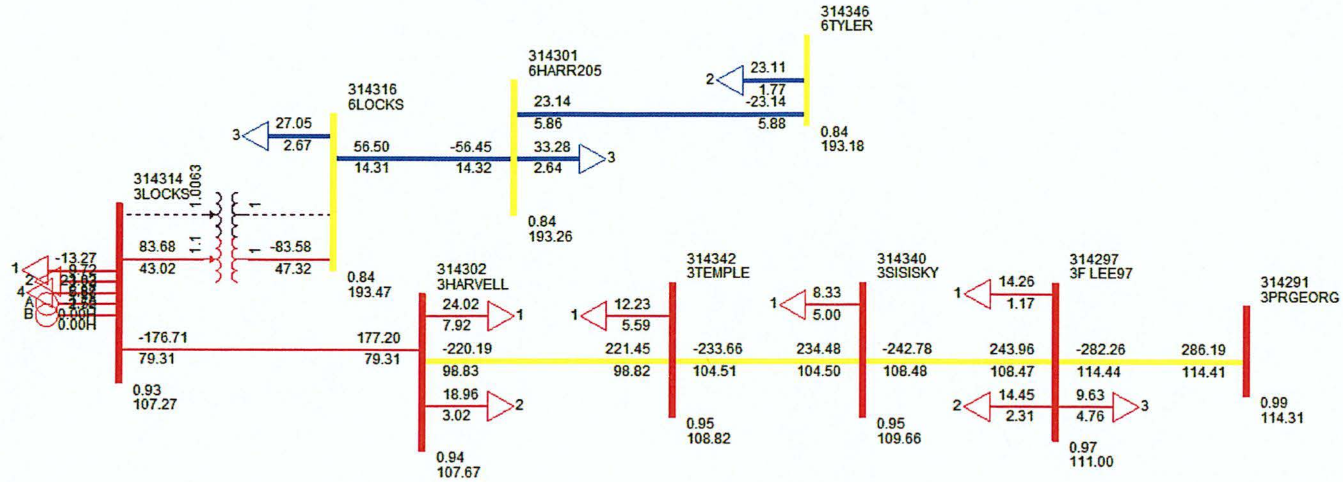
Scenario 7: N-1-1 contingency of the loss of Line #162 between Harvell and Locks along with Contingency DVP_P1-2: LN 2002.



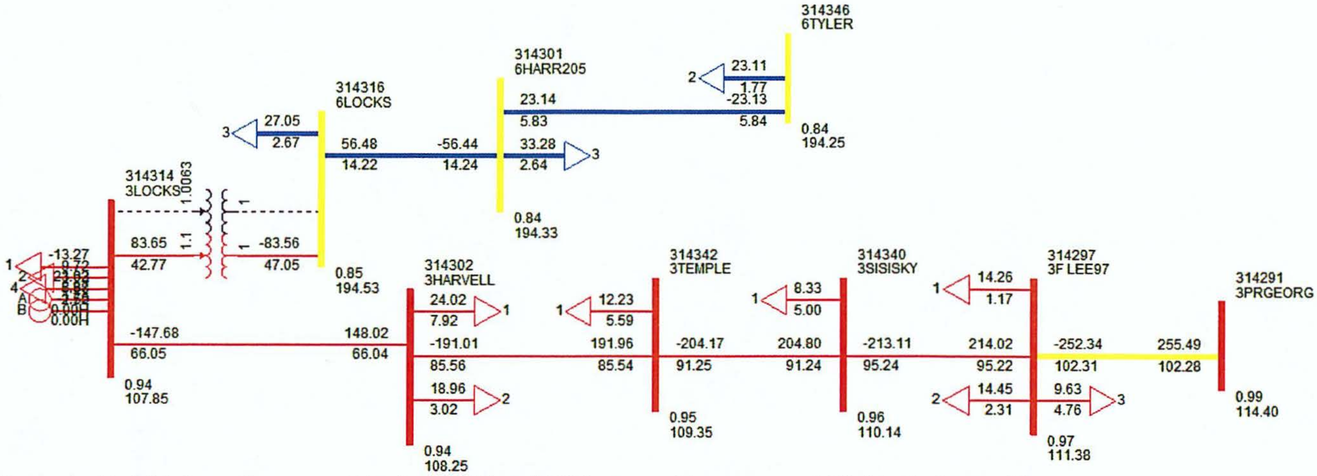
Scenario 8: N-1-1 contingency of the loss of Line #2002 between Carson and Poe along with Contingency DVP_P1-2: LN 2124.



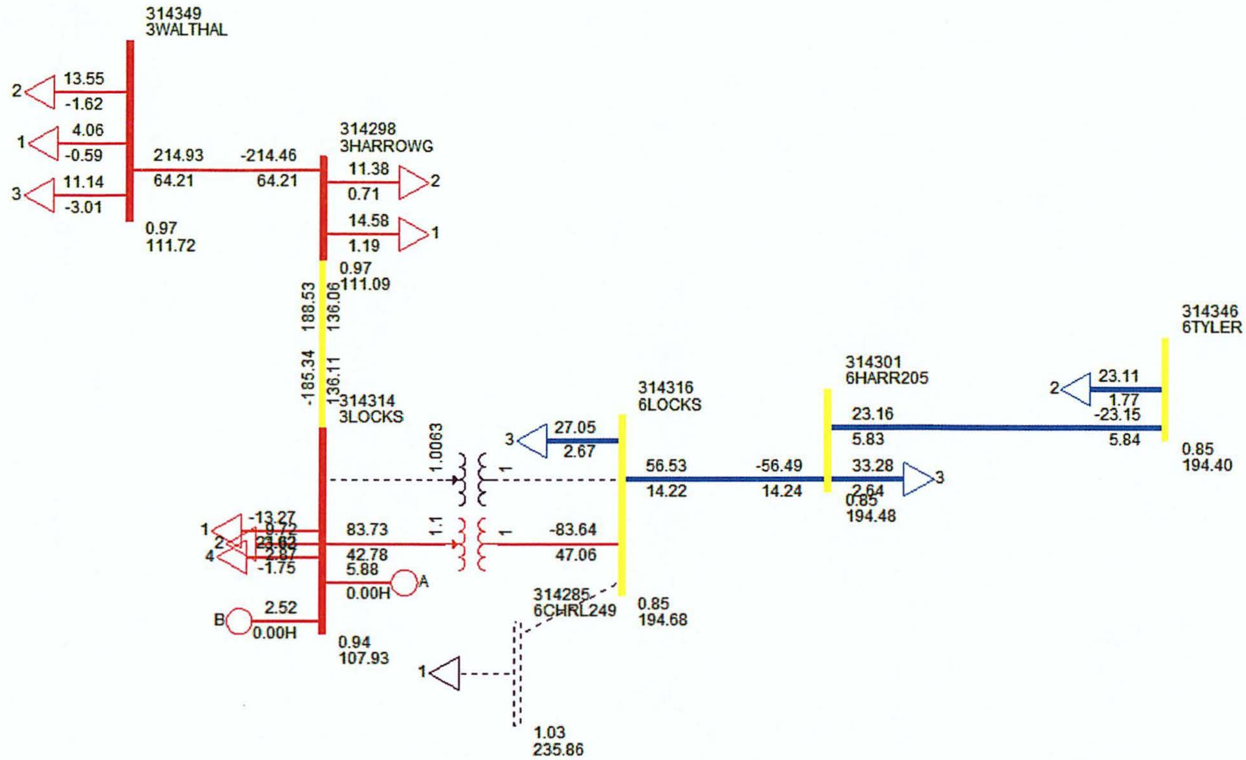
Scenario 9: N-1-1 contingency of the loss of Line #97 between Prince George and Fort Lee along with Contingency DVP_P1-2: LN 249.



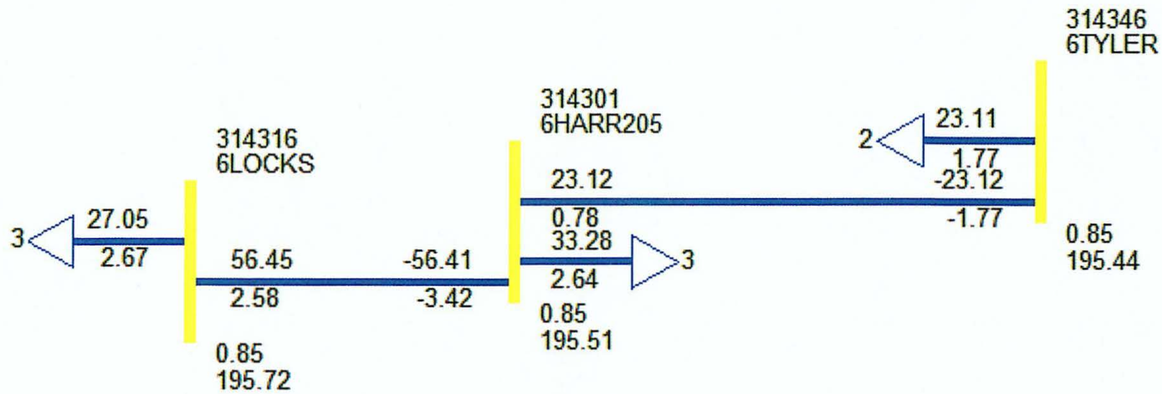
Scenario 10: N-1-1 contingency of the loss of Line #100 between Chesterfield and Walthall along with Contingency DVP_P1-2: LN 249.



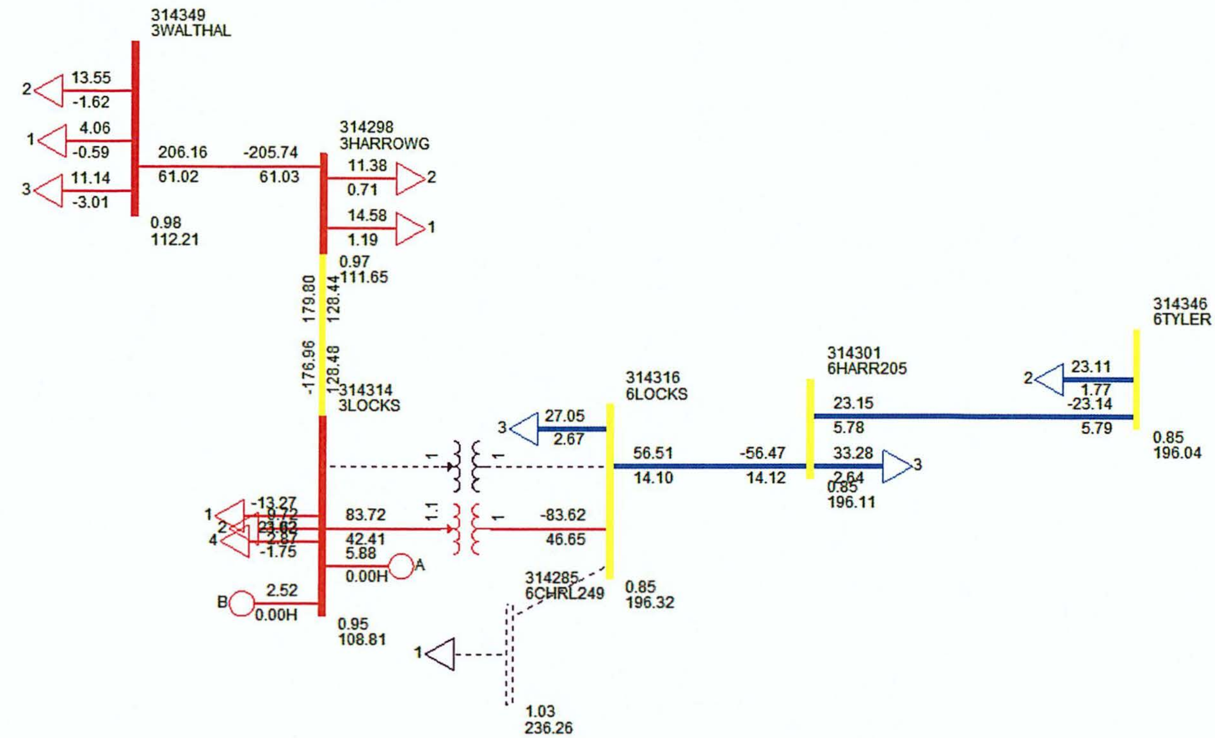
Scenario 11: N-1-1 contingency of the loss of Line #100 between Harrogate and Walthall along with Contingency DVP_P1-2: LN 249.



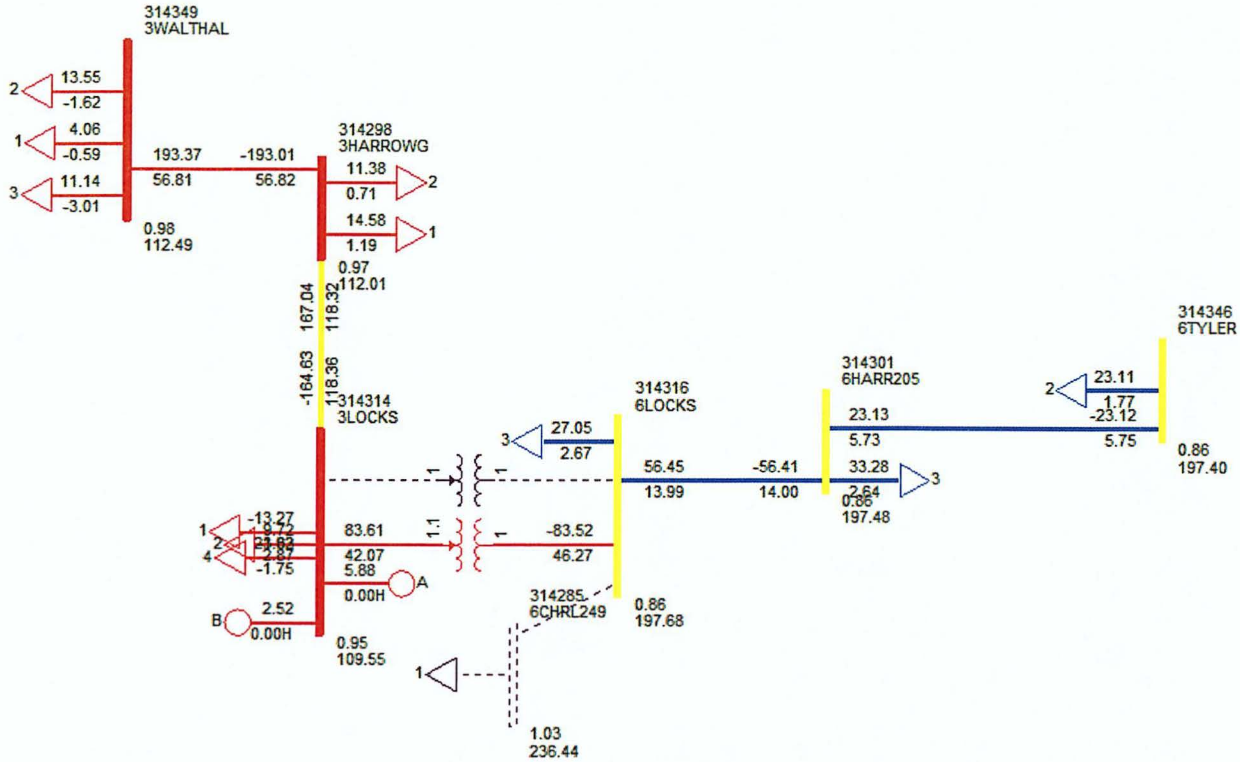
Scenario 12: N-1-1 contingency of the loss of Line #100 between Fort Lee and Sisisky along with Contingency DVP_P1-2: LN 249.



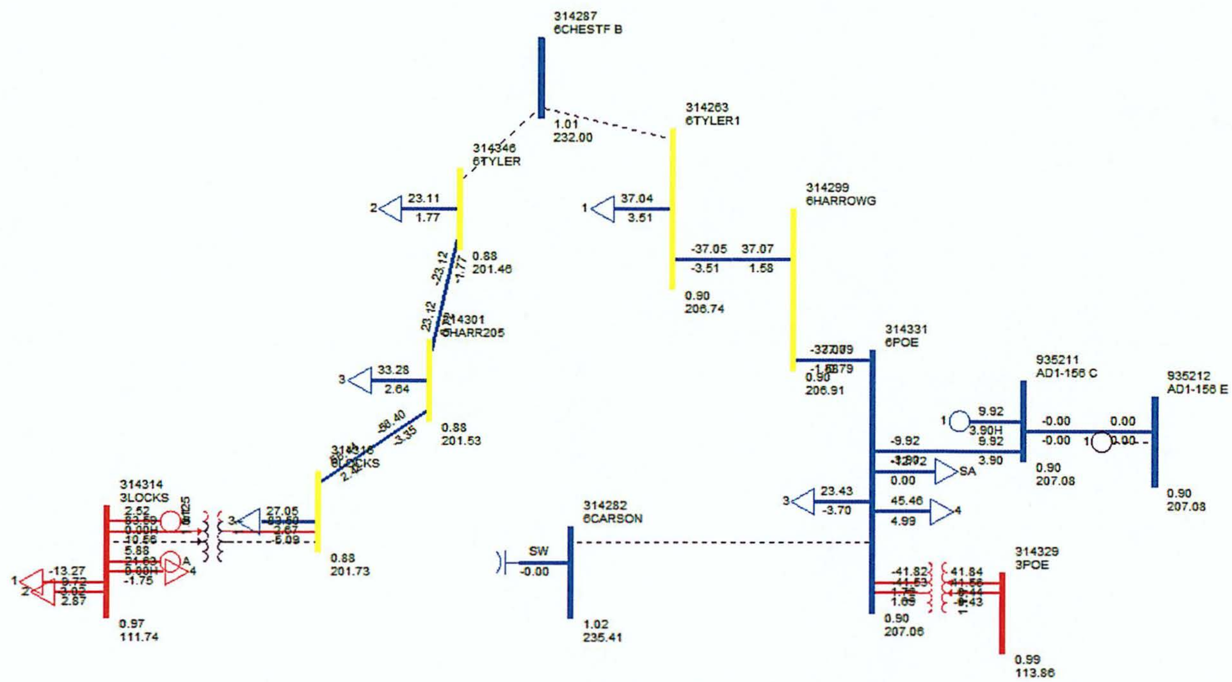
Scenario 13: N-1-1 contingency of the loss of Line #100 between Harrogate and Locks along with Contingency DVP_P1-2: LN 249.



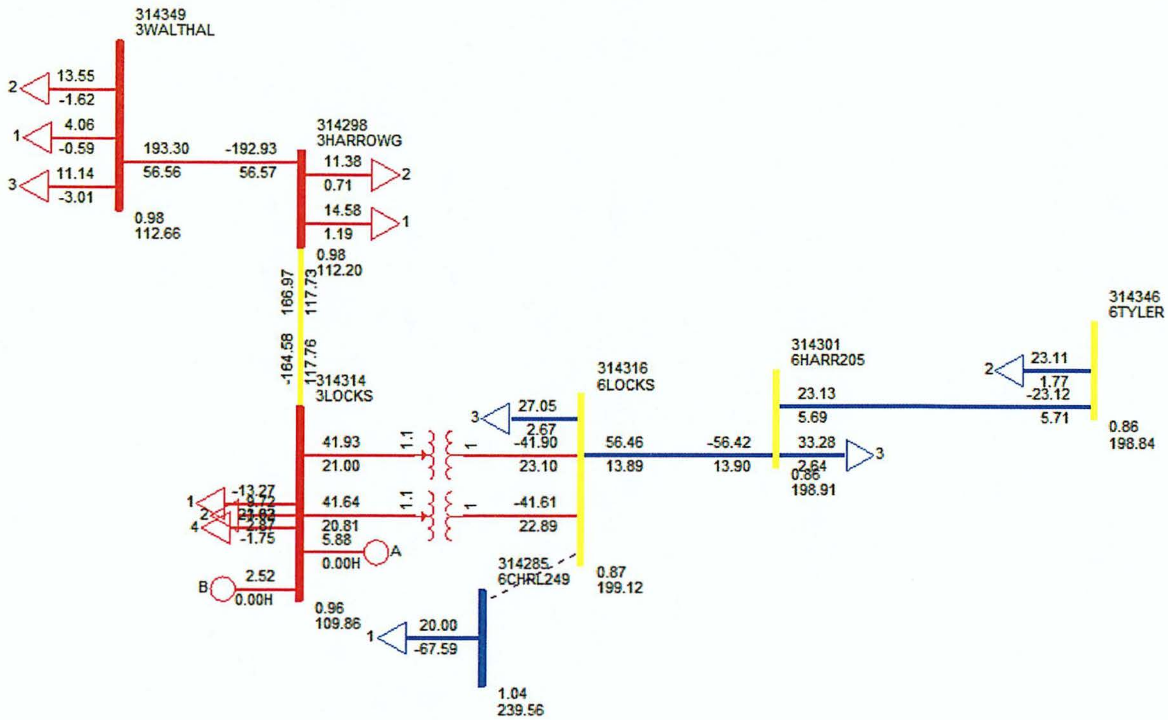
Scenario 14: N-1-1 contingency of the loss of Line #100 between Harrogate and Locks along with Contingency DVP_P1-2: LN 249.



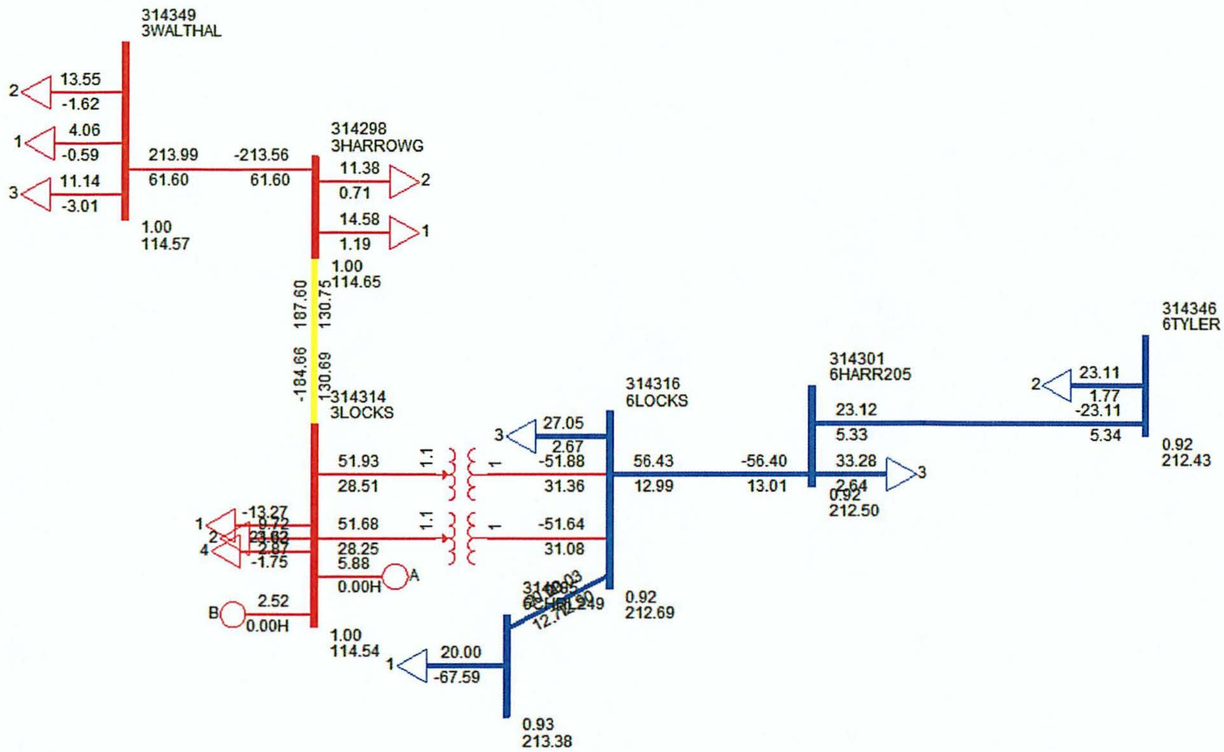
Scenario 15: N-1-1 contingency of the loss of Line #97 between Harvell and Temple along with Contingency DVP_P1-2: LN 249.



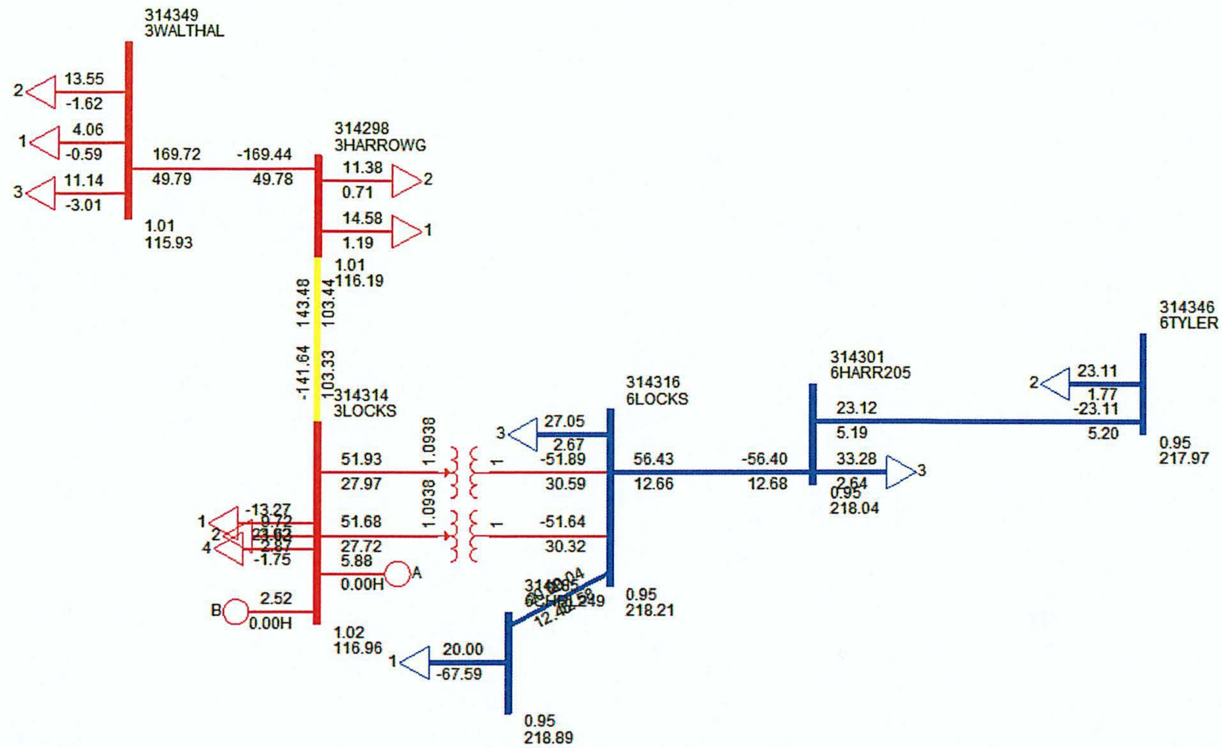
Scenario 16: N-1-1 contingency of the loss of Line #2002 between Carson and Poe along with Contingency DVP_P1-2: LN 249.



Scenario 17: N-1-1 contingency of the loss of Line #249 between Carson and Poe along with Contingency DVP_P1-2: LN 97.



Scenario 18: N-1-1 contingency of the loss of Line #249 between Carson and 6CHRL249 (Chaparral) along with Contingency DVP_P1-2: LN 97.



Scenario 19: N-1-1 contingency of the loss of Line #249 between Carson and 6CHRL249 (Chaparral) along with Contingency DVP_P1-2: LN 162.

I. NECESSITY FOR THE PROPOSED PROJECT

E. Describe the feasible project alternatives, if any, considered for meeting the identified need including any associated studies conducted by the Applicant or analysis provided to the RTO. Explain why each alternative was rejected.

Response: No feasible alternatives have been submitted to PJM. The distribution network cannot reliably serve the customers fed by Tyler Substation and a transmission source is needed. As stated in Sections I.A and I.D, not rebuilding the listed sections of Line #205 and Line #2003 results in contingency thermal overloads and low voltage violations.

Pursuant to the Commission's November 26, 2013, Order entered in Case No. PUE-2012-00029, and its November 1, 2018, Final Order entered in Case No. PUR-2018-00075 ("2018 Final Order"), the Company is required to provide analysis of demand-side resources ("DSM") incorporated into the Company's planning studies. DSM is the broad term that includes both energy efficiency ("EE") and demand response ("DR"). In this case, PJM and the Company have identified a need for the Project based on the need to replace aging infrastructure at the end of its service life in order to comply with the Company's mandatory Planning Criteria, thereby enabling the Company to maintain the overall long-term reliability of its transmission system.[7] Notwithstanding, when performing an analysis based on PJM's 50/50 load forecast, there is no adjustment in load for DR programs that are bid into the PJM reliability pricing model ("RPM") auction because PJM only dispatches DR when the system is under stress (i.e., a system emergency). Accordingly, while existing DSM is considered to the extent the load forecast accounts for it, DR that has been bid into PJM's RPM market is not a factor in this particular Application because the identified need is based on the condition of the infrastructure. Based on these considerations, the evaluation of the Rebuild Project demonstrated that despite accounting for DSM consistent with PJM's methods, the Rebuild Project is necessary. As noted in the 2018 Final Order, pursuant to the Grid Transformation and Modernization Act of 2018, the Company must propose $870 million of EE programs by 2028. On May 2, 2019, in Case No. PUR-2018-00168, the Commission approved a package of 11 new EE and DR programs ("Phase VII") to run for a five-year period beginning July 1, 2019. On December 3, 2019, the Company proposed "Phase VIII" of its DSM programs, accounting for approximately $186 million of proposed spending on EE programs. This case is currently pending before the Commission in Case No. PUR-2019-00201. In total, the Company has proposed approximately $344 million for the design, implementation, and operation of EE programs since July 1, 2018. These programs have not been accounted for in PJM's load forecast, and thus, were not part of the Company's planning studies.

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[7] While the PJM load forecast does not directly incorporate DR, its load forecast incorporates variables derived from Itron that reflect EE by modeling the stock of end-use equipment and its usages. Further, because PJM's load forecast considers the historical non-coincident peak ("NCP") for each load serving entity ("LSE") within PJM, it reflects the actual load reductions achieved by DSM programs to the extent an LSE has used DSM to reduce its NCPs.

I. NECESSITY FOR THE PROPOSED PROJECT

F. Describe any lines or facilities that will be removed, replaced, or taken out of service upon completion of the proposed project, including the number of circuits and normal and emergency ratings of the facilities.

Response: The Rebuild Project includes the removal or replacement of existing facilities on existing Lines #205 and #2003 as described below. Minor work will also occur on Lines #211 and #228. There will be no lines permanently taken out of service as part of the proposed Rebuild Project.

The existing normal/emergency ratings of Line #205 between Chesterfield and Tyler Substations are 478/478 MVA summer and 606/606 MVA winter. The existing normal/emergency ratings of Line #2003 between Chesterfield and Tyler Substations are 478/478 MVA summer and 606/606 MVA winter.

The 2.6-mile section of Lines #205 and #2003 between Chesterfield and Tyler Substations being rebuilt will have summer normal/emergency ratings of 1047/1047 MVA and winter normal/emergency ratings of 1160/1160 MVA. The 0.6-mile section of Lines #205 and #2003 between Tyler Substation and Structure #205/19A, #2003/25 being rebuilt will retain their current summer normal/emergency ratings of 470/470 MVA and winter normal/emergency ratings of 596/596 MVA after the rebuild.

Chesterfield Power Station (Structures #205/1B and #2003/1A to Structure #205/4, #2003/9)

One 230 kV double circuit COR-TEN® weathering steel lattice tower, three 230 kV double circuit galvanized steel lattice towers supporting Lines #205 and #2003, four 230 kV single circuit wood 3-pole structures and one 230 kV single circuit COR-TEN® weathering steel 3-pole structure supporting Line #2003 will be replaced with four 230 kV double circuit COR-TEN® weathering steel two-pole double dead end angle structures supporting Lines #205 and #2003, and five single circuit COR-TEN® weathering steel three-pole structures supporting Line #2003.

Chesterfield Power Station (Structure #205/4, #2003/9) to Tyler Substation (Structures #205/16A and #2003/21A, #211/21A)

Twelve 230 kV double circuit COR-TEN® weathering steel lattice towers will be replaced with nine 230 kV double circuit COR-TEN® weathering steel pole suspension structures, two 230 kV double circuit COR-TEN® weathering steel two-pole double dead end angle structures, and one 230 kV double circuit COR-TEN® weathering steel pole double dead end tangent structure supporting Lines #205 and #2003.

One new 230 kV double circuit COR-TEN® weathering steel H-frame double dead end switch structure supporting Lines #205 and #2003 will be installed between existing Structure #205/16, #2003/21 and existing Tyler Substation backbone

Structures #205/16A and #2003/21A, #211/21A. This structure will facilitate the replacement of Line Switch #20596 onto new switch Structure #205/16, #2003/21 located within the existing right-of-way approximately 180 feet north of existing backbone Structure #205/16A.

Tyler Substation (Structures# 2003/21A, #211/16A and 228/16A)[8]

In order to prepare for construction of the Rebuild Project, the Company proposes to remove one 230 kV single circuit galvanized steel pole double dead end structure supporting Line #228 within Tyler Substation (Structure #228/16A), which will be replaced with one 230 kV double circuit galvanized steel pole double dead end structure supporting Lines #211 and #228 within Tyler Substation (Structure #228/16A, #211/16A).

The installation of Structure #228/16A, #211/16A will allow the existing fiber optic shield wire and 1109 ACAR conductor for Line #228 to be transferred from existing single circuit Structure #228/16A to the new double circuit structure (Structure #228/16A, #211/16A).

Additionally, it will allow the 1109 ACAR conductor for Line #211 to be transferred from existing double circuit backbone Structure #2003/21A, #211/16A to the new double circuit Structure #228/16A, #211/16A.

This work will ensure safe working clearances from Line #211 facilities for the duration of the Rebuild Project. See Section II.A.10 of this Appendix.

Tyler Substation (Structures #205/16A and #2003/21A, #211/21A) to Structure #205/19A, #2003/25

Four 230 kV double circuit COR-TEN® weathering steel lattice towers will be replaced with one 230 kV double circuit COR-TEN® weathering steel two-pole double dead end angle structures, two 230 kV double circuit COR-TEN® weathering steel pole double dead end structures and one 230 kV double circuit COR-TEN® weathering steel H-frame Switch structure supporting Lines #205 and #2003 and replacement Line Switch #20599.

In addition to the structure replacements, the existing three-phase, 1109 and 2500 ACAR conductors for Lines #205 and #2003 between Chesterfield Substation and Structure #205/19A, #2003/25 will be replaced with three-phase bundled 636

[8] While the work associated with Lines #211 and #228 is necessary for construction of the Rebuild Project, it is not considered a component of the Rebuild Project. Rather, the work associated with Lines #211 and #228 (including removal of Structure #228/16A; construction of Structure #228/16A, #211/16A; and transfer of existing conductor and fiber optic shield wire for Line #211 to a new shared structure with Line #228) is considered by the Company to qualify as "ordinary extensions or improvements in the usual course of business" pursuant to § 56-265.2 A 1 of the Code of Virginia ("Va. Code") and, therefore, do not require approval pursuant to Va. Code § 56-46.1 B or a certificate of public convenience and necessity ("CPCN") from the State Corporation Commission ("Commission"). Should the Commission determine that an amended CPCN is required for the work associated with Lines #211 and #228 as described herein, the Company requests that the Commission grant such amended CPCN as part of its final order in this proceeding.

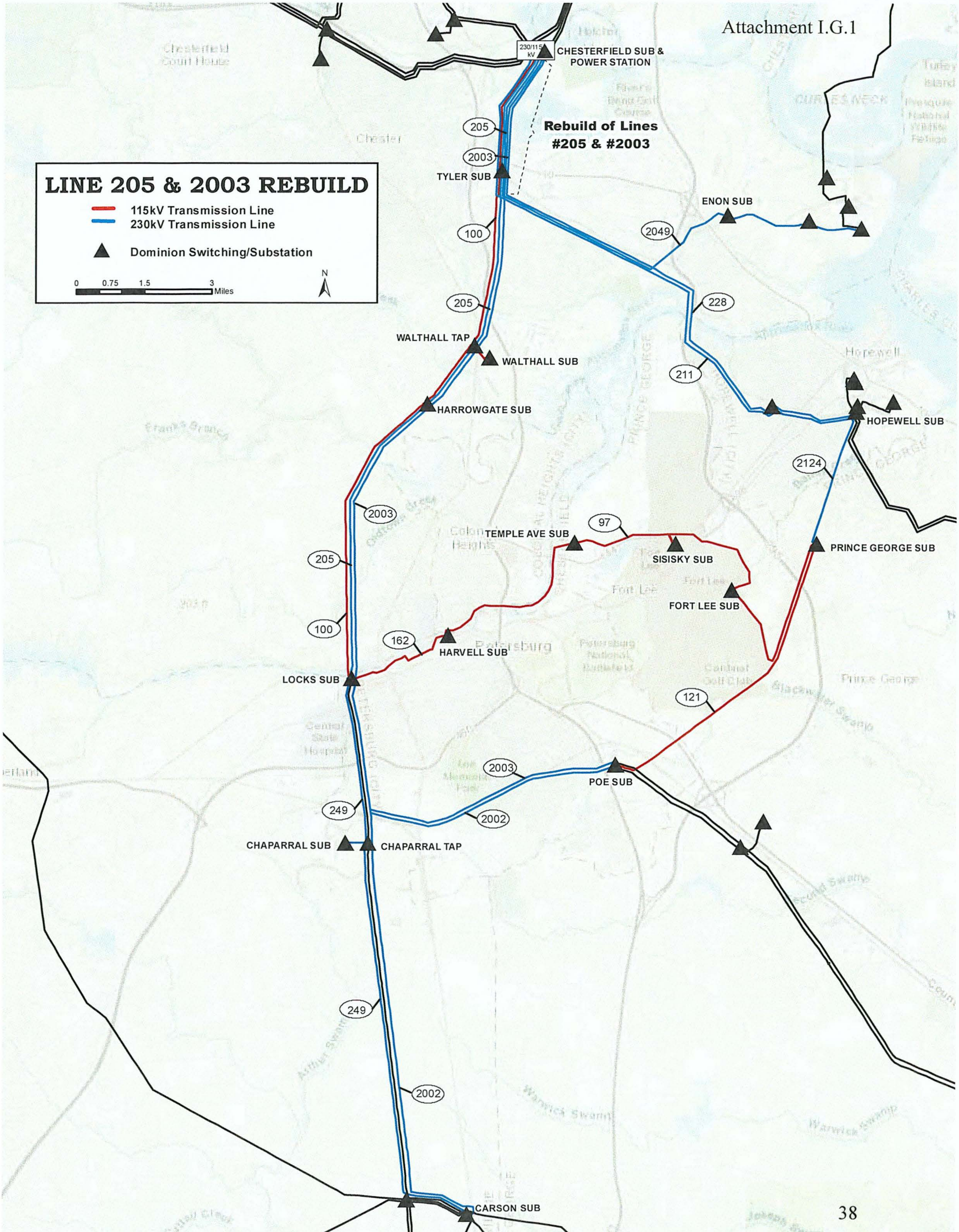
ACSR conductors. The existing alumoweld shield wire will be replaced with new fiber optic shield wire. With the exception of the 0.6 mile section from Tyler Substation to Structure #205/19A, #2003/25, the existing fiber optic shield wire installed in 1997 will be replaced.

I. NECESSITY FOR THE PROPOSED PROJECT

G. Provide a system map, in color and of suitable scale, showing the location and voltage of the Applicant's transmission lines, substations, generating facilities, etc., that would affect or be affected by the new transmission line and are relevant to the necessity for the proposed line. Clearly label on this map all points referenced in the necessity statement.

Response: See Attachment I.G.1.

Attachment I.G.1



I. NECESSITY FOR THE PROPOSED PROJECT

H. Provide the desired in-service date of the proposed project and the estimated construction time.

Response: The desired in-service date for the Rebuild Project is December 31, 2022.

The Company estimates it will take approximately 21 months for detailed engineering, materials procurement, permitting, and construction after a final order from the Commission. Accordingly, to support this estimated pre-construction activity timeline and construction plan, the Company respectfully requests a final order by March 1, 2021. Should the Commission issue a final order by March 1, 2021, the Company estimates that construction should begin on January 1, 2022 and be completed by December 31, 2022. This construction timeline will enable the Company to meet the targeted in-service date for the Rebuild Project.

I. NECESSITY FOR THE PROPOSED PROJECT

I. Provide the estimated total cost of the project as well as total transmission-related costs and total substation-related costs. Provide the total estimated cost for each feasible alternative considered. Identify and describe the cost classification (e.g. "conceptual cost," "detailed cost," etc.) for each cost provided.

Response: The estimated conceptual cost of the Rebuild Project is approximately $11.1 million (in 2019 dollars), which includes approximately $10.8 million in transmission-related work, and approximately $0.3 million in substation-related work.

I. NECESSITY FOR THE PROPOSED PROJECT

J. If the proposed project has been approved by the RTO, provide the line number, regional transmission expansion plan number, cost responsibility assignments, and cost allocation methodology. State whether the proposed project is considered to be a baseline or supplemental project.

Response: The proposed Rebuild Project was approved by the PJM Board on December 5, 2017, as baseline project b2961.

The Rebuild Project is presently 100% cost allocated to the DOM Zone.

I. NECESSITY FOR THE PROPOSED PROJECT

K. If the need for the proposed project is due in part to reliability issues and the proposed project is a rebuild of an existing transmission line(s), provide five years of outage history for the line(s), including for each outage the cause, duration and number of customers affected. Include a summary of the average annual number and duration of outages. Provide the average annual number and duration of outages on all Applicant circuits of the same voltage, as well as the total number of such circuits. In addition to outage history, provide five years of maintenance history on the line(s) to be rebuilt including a description of the work performed as well as the cost to complete the maintenance. Describe any system work already undertaken to address this outage history.

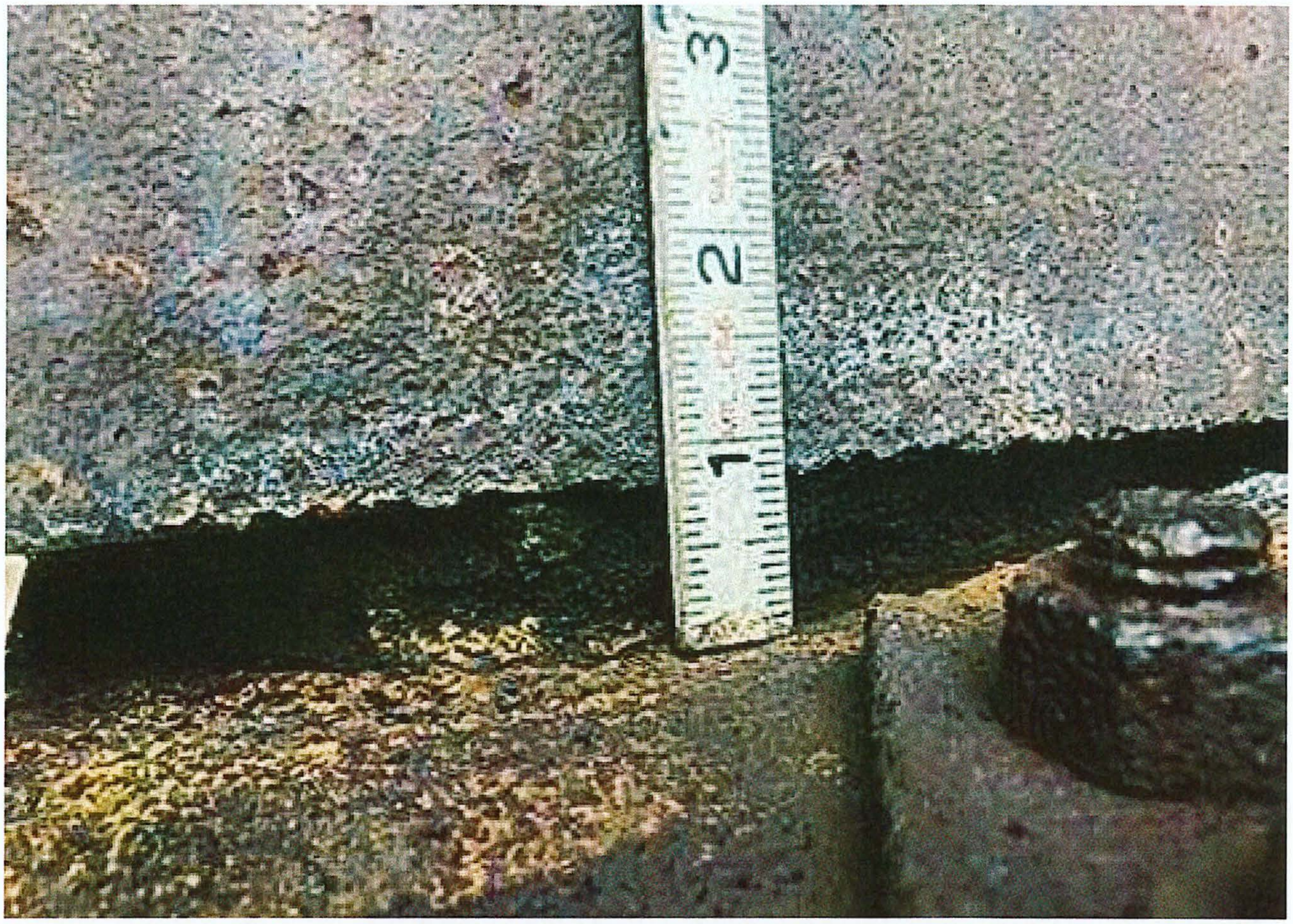
Response: The need for the Rebuild Project is not driven by outage history, but rather by the need to replace transmission infrastructure approaching its end of life. See Section I.A of this Appendix.

I. NECESSITY FOR THE PROPOSED PROJECT

L. If the need for the proposed project is due in part to deterioration of structures and associated equipment, provide representative photographs and inspection records detailing their condition.

Response: See Attachment I.L.1 for open notifications on Lines #205 and #2003, as well as representative photographs of the deterioration of the structures on Lines #205 and #2003. The 2016 Quanta Report, discussed in Section I.A, details the condition of these deteriorating structures.

Open Notifications-Lines 205 & 2003					
Equipment	**Cause Group**	**Cause Code Text**	**Cause Text**	**Notification Date**	**Reported By**
205/1A, 208/97	Conductor	Damper(s)-L=Loose, M=Missing	concrete	5/4/2015	KEVI097
2003/21A, 211/16A	Conductor	Cotter Key-BO=Backed Out, M=Mi	BO mid phase on sub side top circuit sub side @yolk plate & socket hot end	1/25/2018	STEPH41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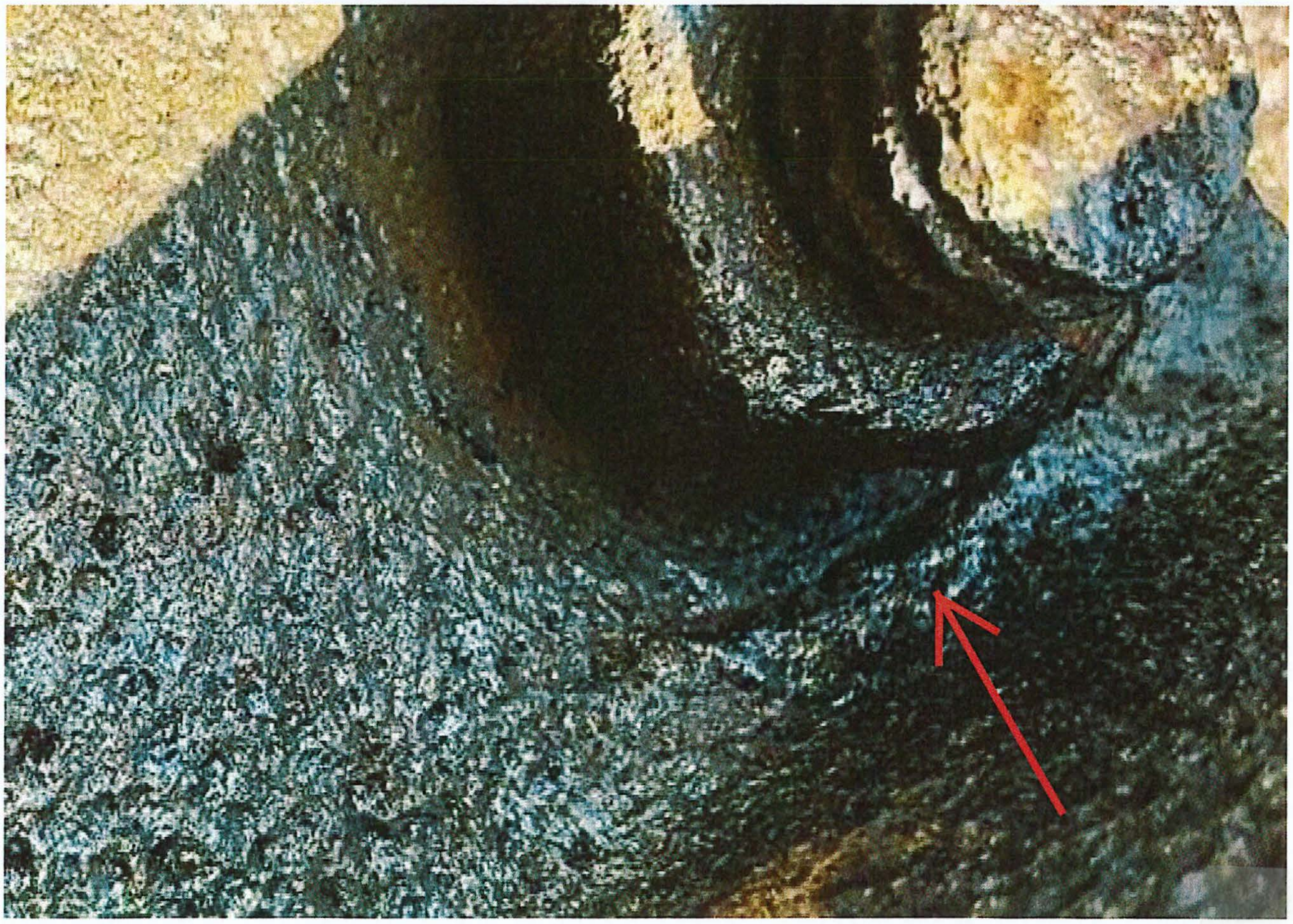
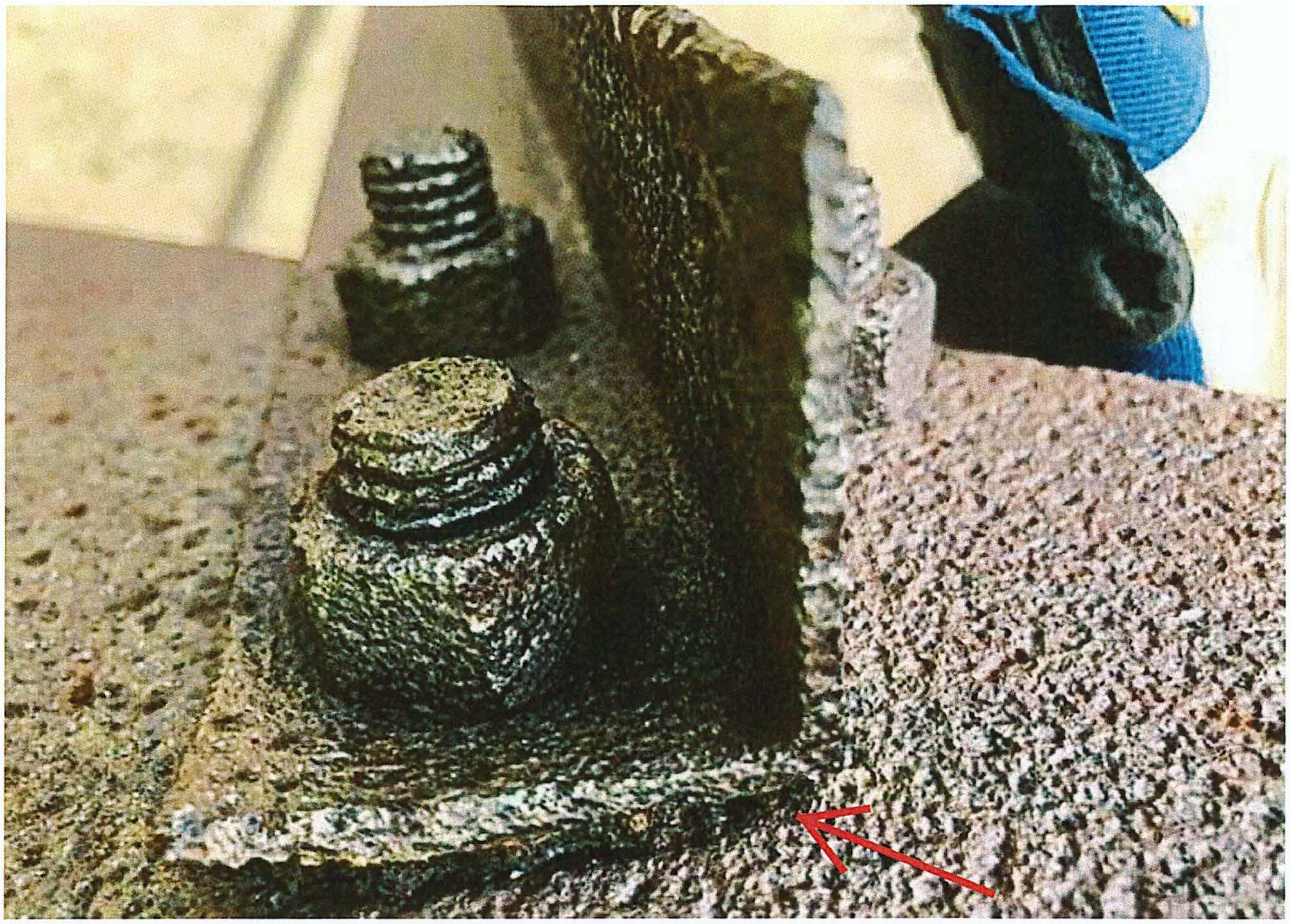
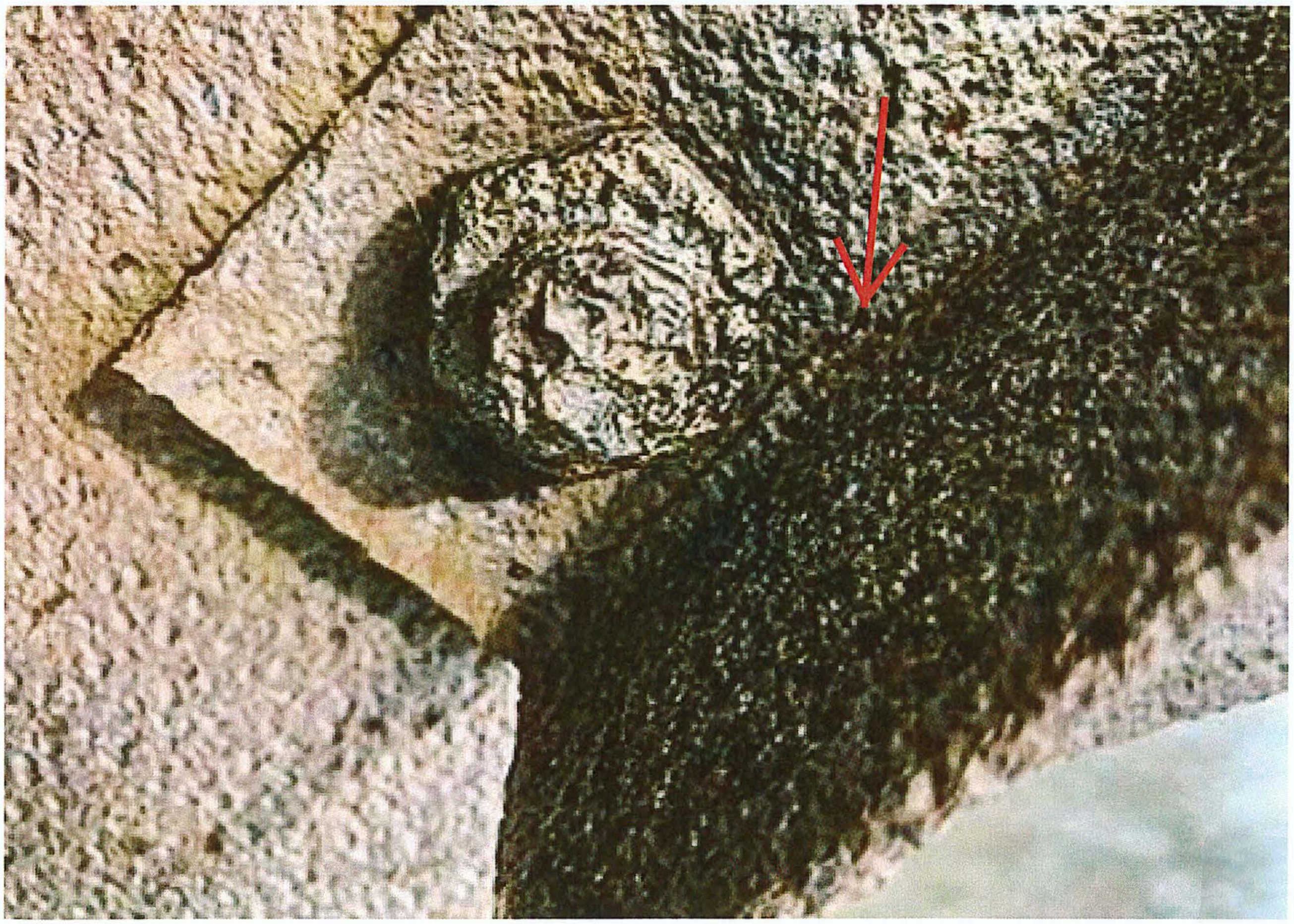
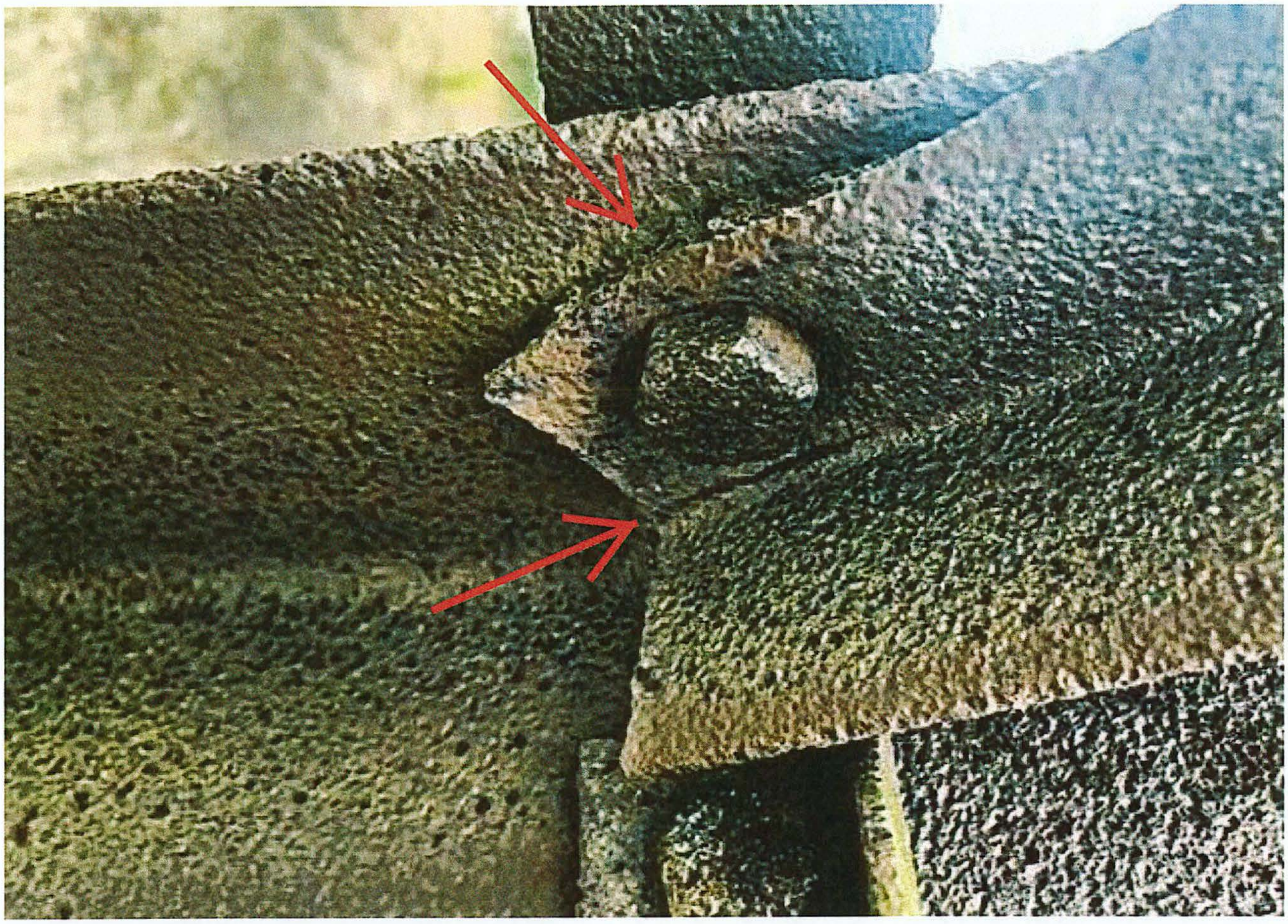
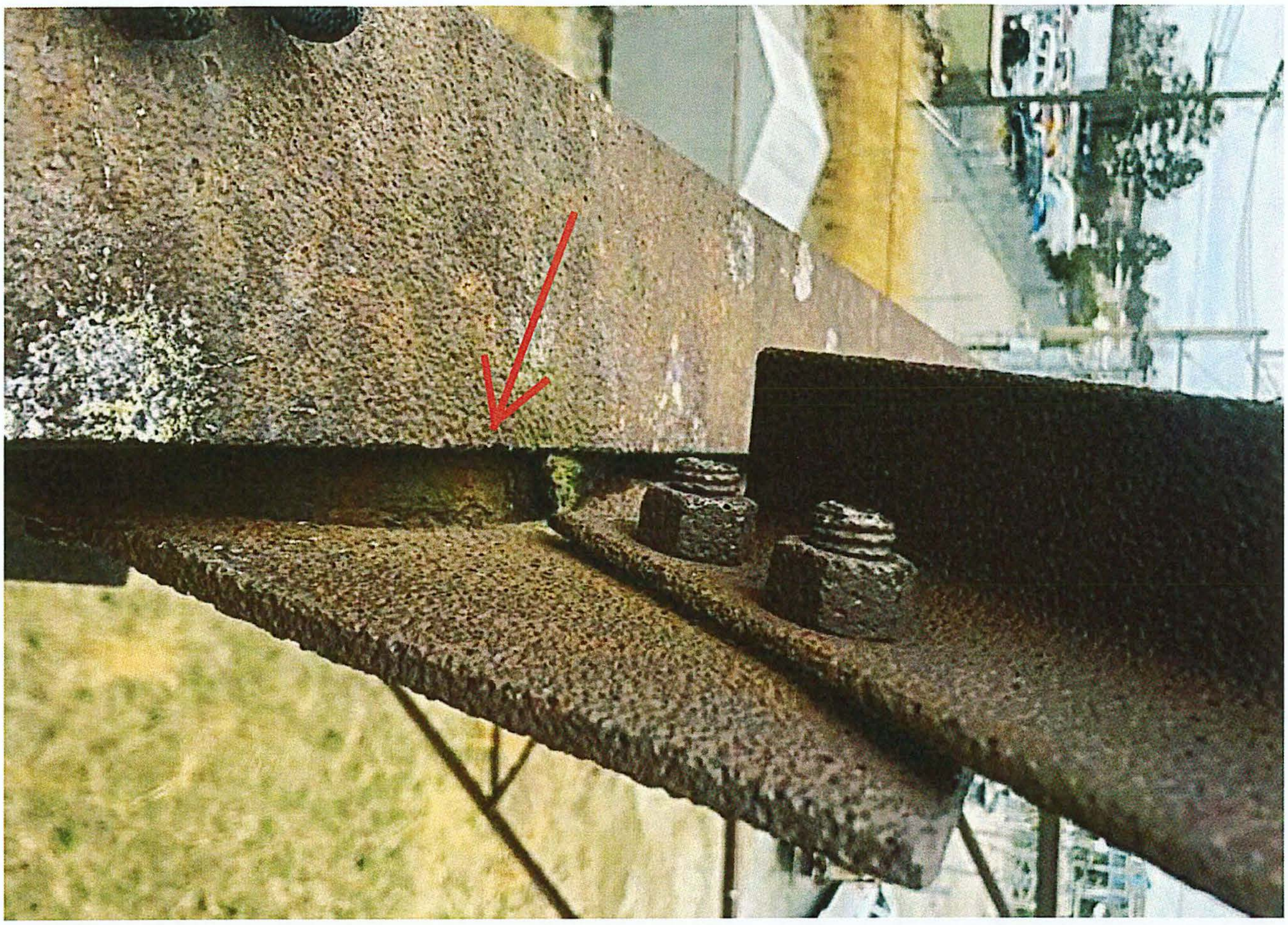
2
1

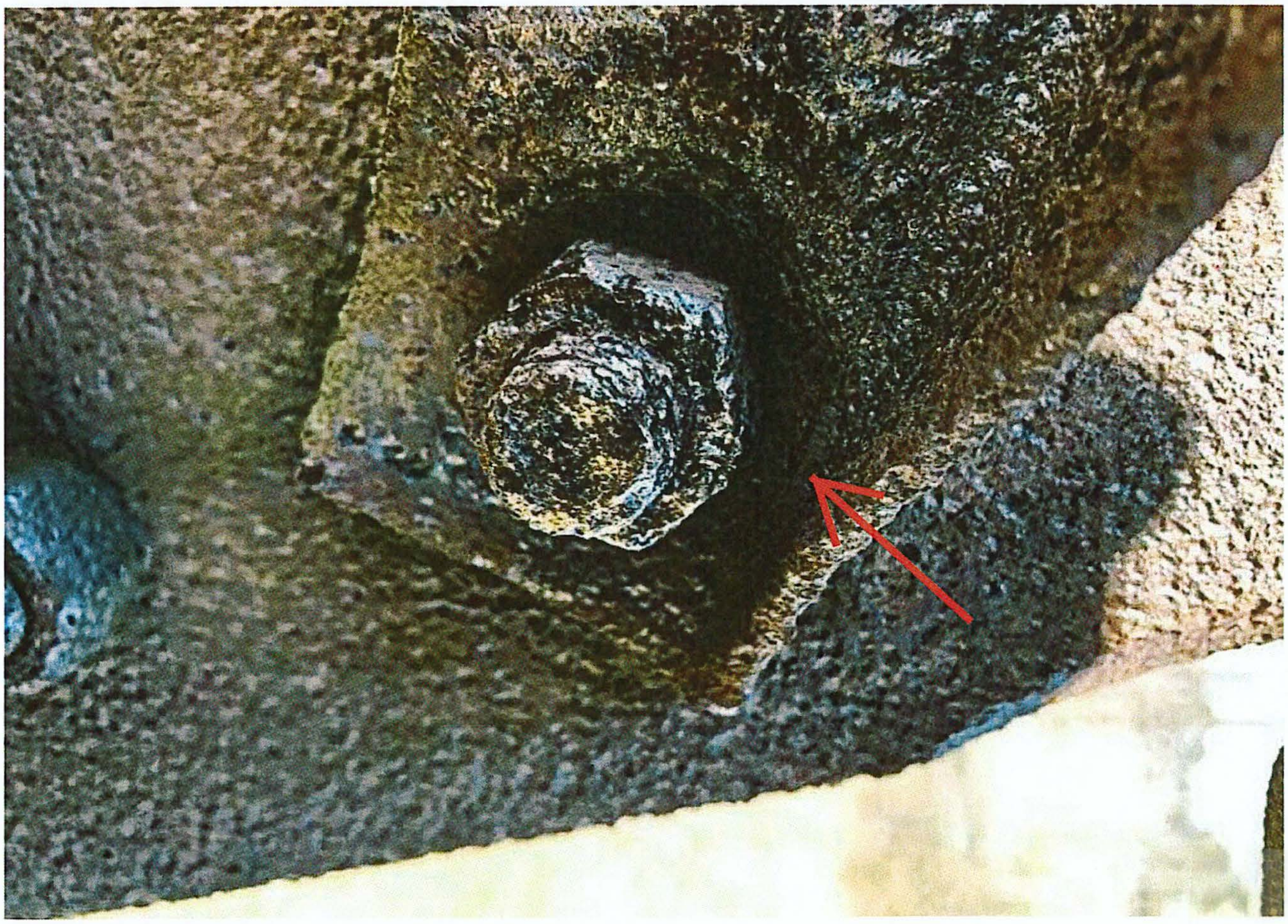


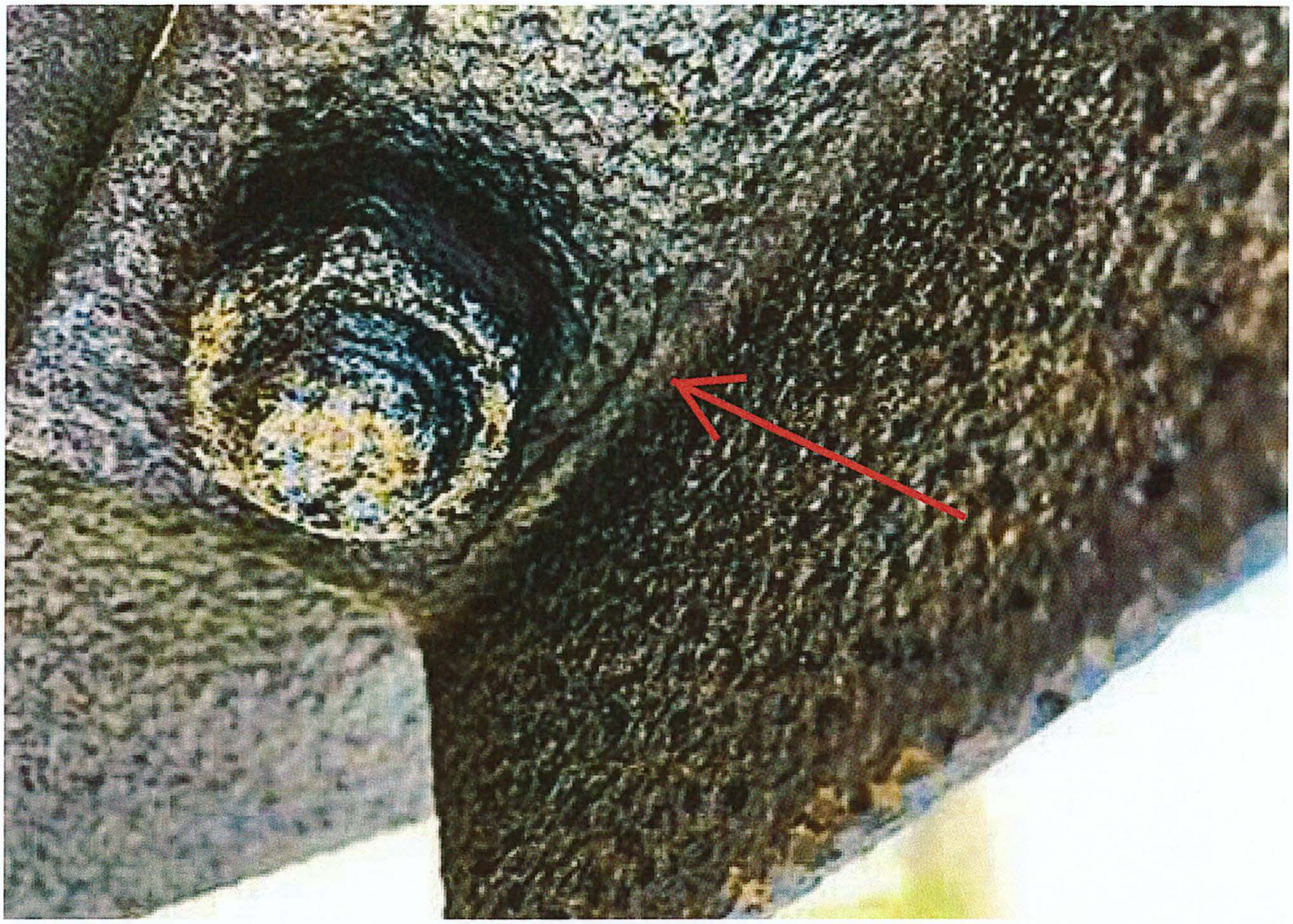


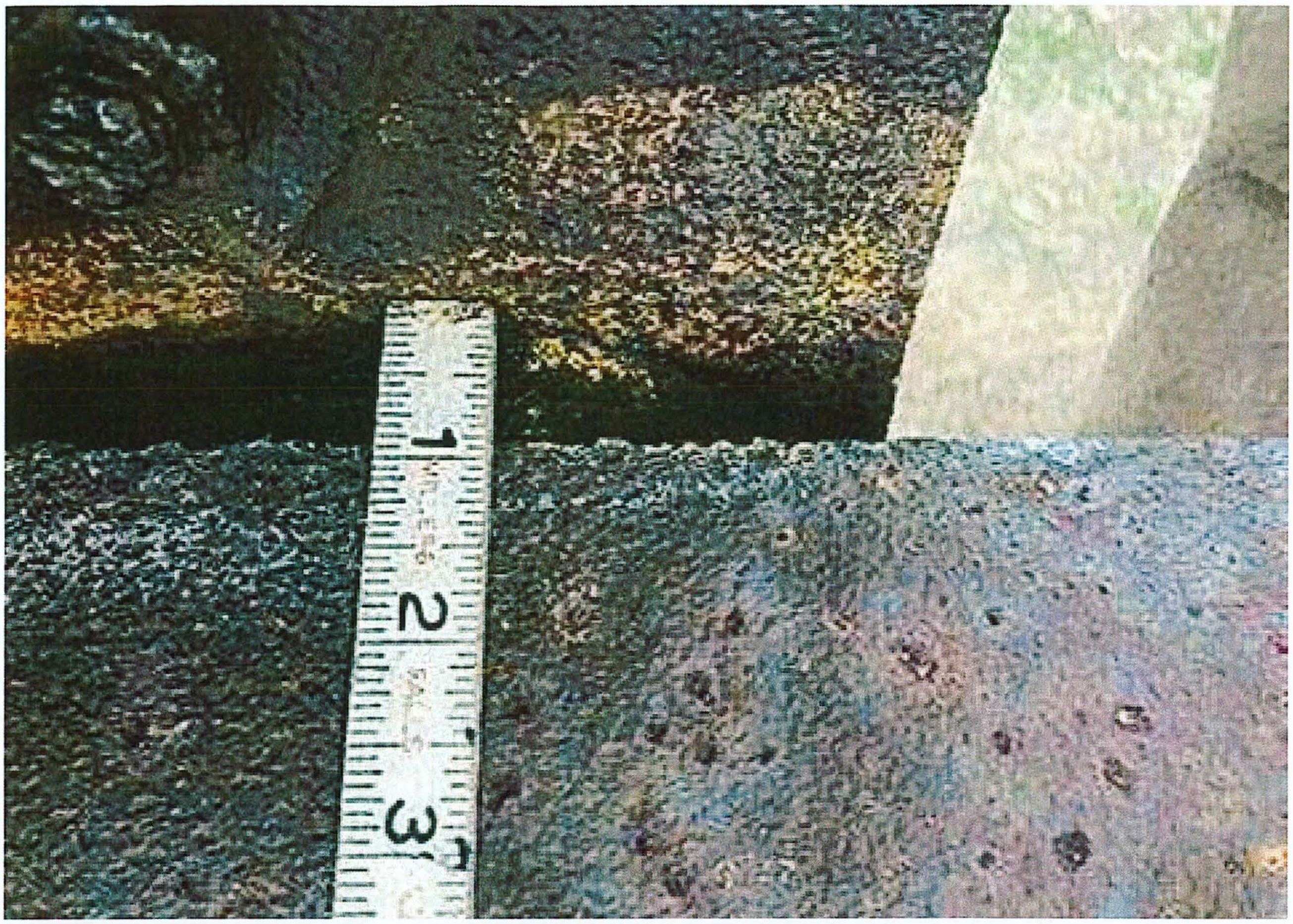


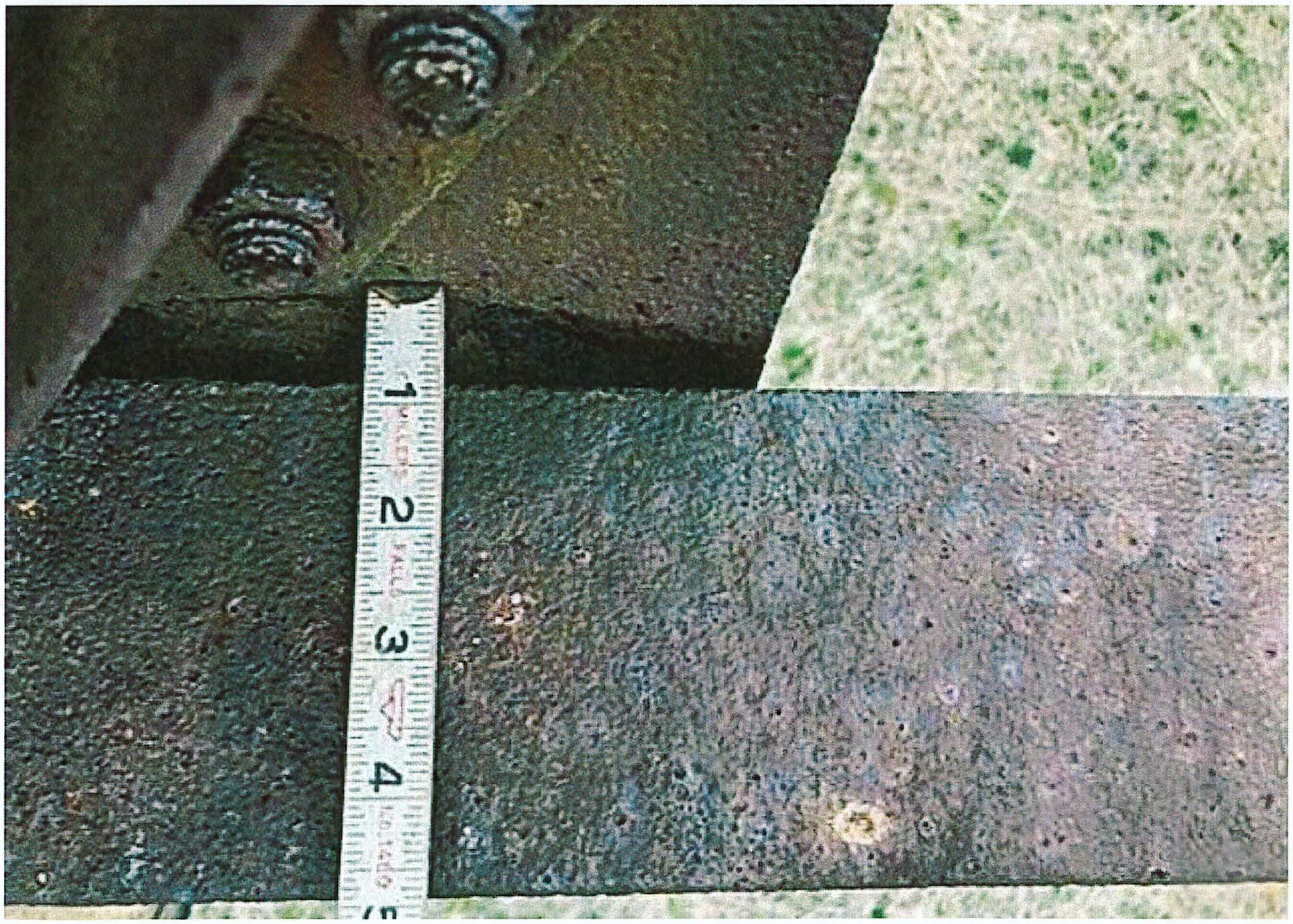


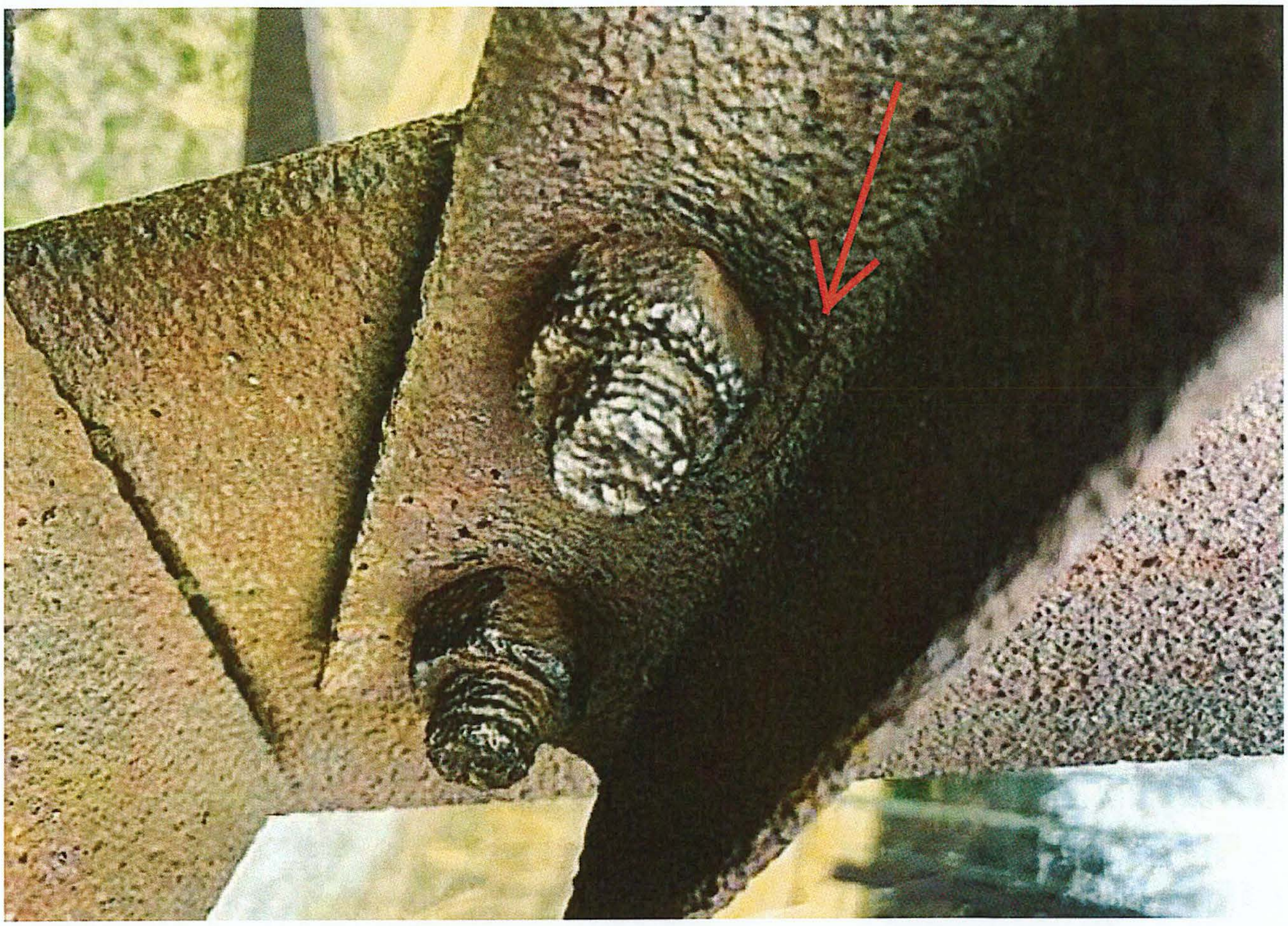












I. NECESSITY FOR THE PROPOSED PROJECT

M. In addition to the other information required by these guidelines, applications for approval to construct facilities and transmission lines interconnecting a Non-Utility Generator ("NUG") and a utility shall include the following information:

1. The full name of the NUG as it appears in its contract with the utility and the dates of initial contract and any amendments;

2. A description of the arrangements for financing the facilities, including information on the allocation of costs between the utility and the NUG;

3. a. For Qualifying Facilities ("QFs") certificated by Federal Energy Regulatory Commission ("FERC") order, provide the QF or docket number, the dates of all certification or recertification orders, and the citation to FERC Reports, if available;

b. For self-certificated QFs, provide a copy of the notice filed with FERC;

4. Provide the project number and project name used by FERC in licensing hydroelectric projects; also provide the dates of all orders and citations to FERC Reports, if available; and

5. If the name provided in 1 above differs from the name provided in 3 above, give a full explanation.

Response: Not applicable.

I. NECESSITY FOR THE PROPOSED PROJECT

N. Describe the proposed and existing generating sources, distribution circuits or load centers planned to be served by all new substations, switching stations and other ground facilities associated with the proposed project.

Response: Not applicable.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

1. Provide the length of the proposed corridor and viable alternatives.

Response: The length of the existing right-of-way for the Rebuild Project is approximately 3.2 miles from the Chesterfield Substation to Structure #205/19A, #2003/25, which is approximately 0.6 mile south of the Tyler Substation, located in Chesterfield County, Virginia. No alternative routes are proposed for the Rebuild Project. See Section II.A.9 for an explanation of the Company's route selection process.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

2. Provide color maps of suitable scale (including both general location mapping and more detailed GIS-based constraints mapping) showing the route of the proposed line and its relation to: the facilities of other public utilities that could influence the route selection, highways, streets, parks and recreational areas, scenic and historic areas, open space and conservation easements, schools, convalescent centers, churches, hospitals, burial grounds/cemeteries, airports and other notable structures close to the proposed project. Indicate the existing linear utility facilities that the line is proposed to parallel, such as electric transmission lines, natural gas transmission lines, pipelines, highways, and railroads. Indicate any existing transmission ROW sections that are to be quitclaimed or otherwise relinquished. Additionally, identify the manner in which the Applicant will make available to interested persons, including state and local governmental entities, the digital GIS shape file for the route of the proposed line.

Response: See Attachment II.A.2. The existing transmission line right-of-way parallels two sets of structures carrying a total of four circuits. No portion of the right-of-way is proposed to be quitclaimed or relinquished.

The Company will make the digital Geographic Information Systems ("GIS") shape file available to interested persons upon request to counsel for the Company as listed in the Rebuild Project Application.

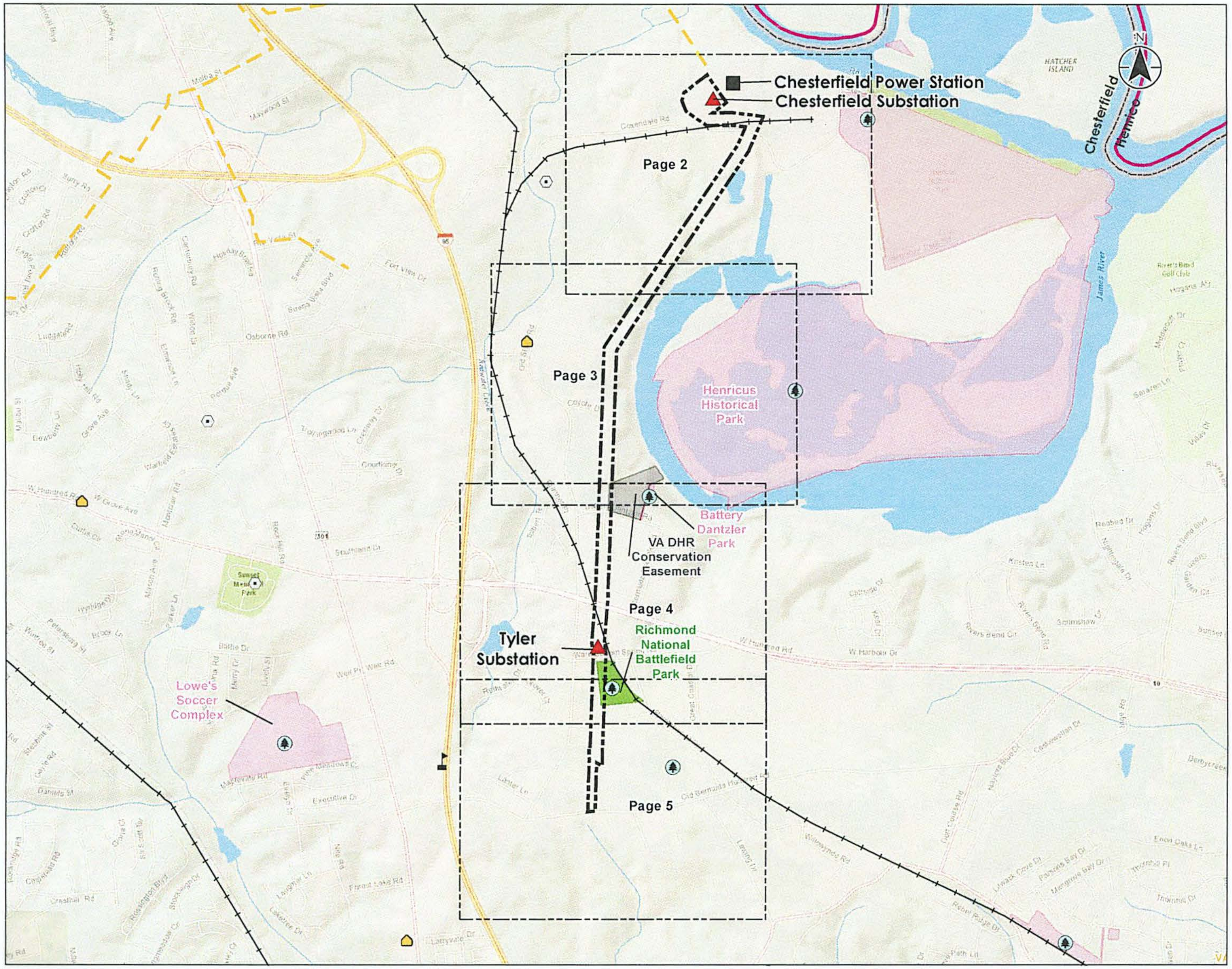


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Figure No.
II.A.2

Title
Environmental Constraints Map

Client/Project
Dominion Energy Virginia
Chesterfield - Tyler 230 kV Partial Rebuild

Project Location
Chesterfield County, Virginia

203401247
Prepared by LJB on 2019-01-07
Technical Review by MGS on 2019-04-02
Independent Review by CPG on 2019-03-24

0 2,000 4,000 Feet
1:24,000 (At original document size of 11x17)

- Existing Substation
- Existing Power Station
- Cemetery
- Park
- Place of Worship
- School
- Project Limits
- Page Index
- Federal Conservation Land/Easement
- Local Conservation Land/Easement
- Private Conservation Land/Easement
- Captian John Smith Chesapeake National Historic Trail
- Pipeline
- Railroad

Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Base features provided by Dominion Energy Virginia
3. Substation locations digitized from orthoimagery
4. Data Sources: ESRI, Google Earth, USGS, VA DCR Natural Heritage Program, PADUS, DCR, NPMS
5. Historic resource data provided by Virginia Department of Historic Resources, Virginia Cultural Resources Information System (VCRIS)
6. For clarity, only the sections of the Bermuda Hundred Archaeological Resource crossing the right-of-way are shown
7. Base Map © National Geographic and ESRI

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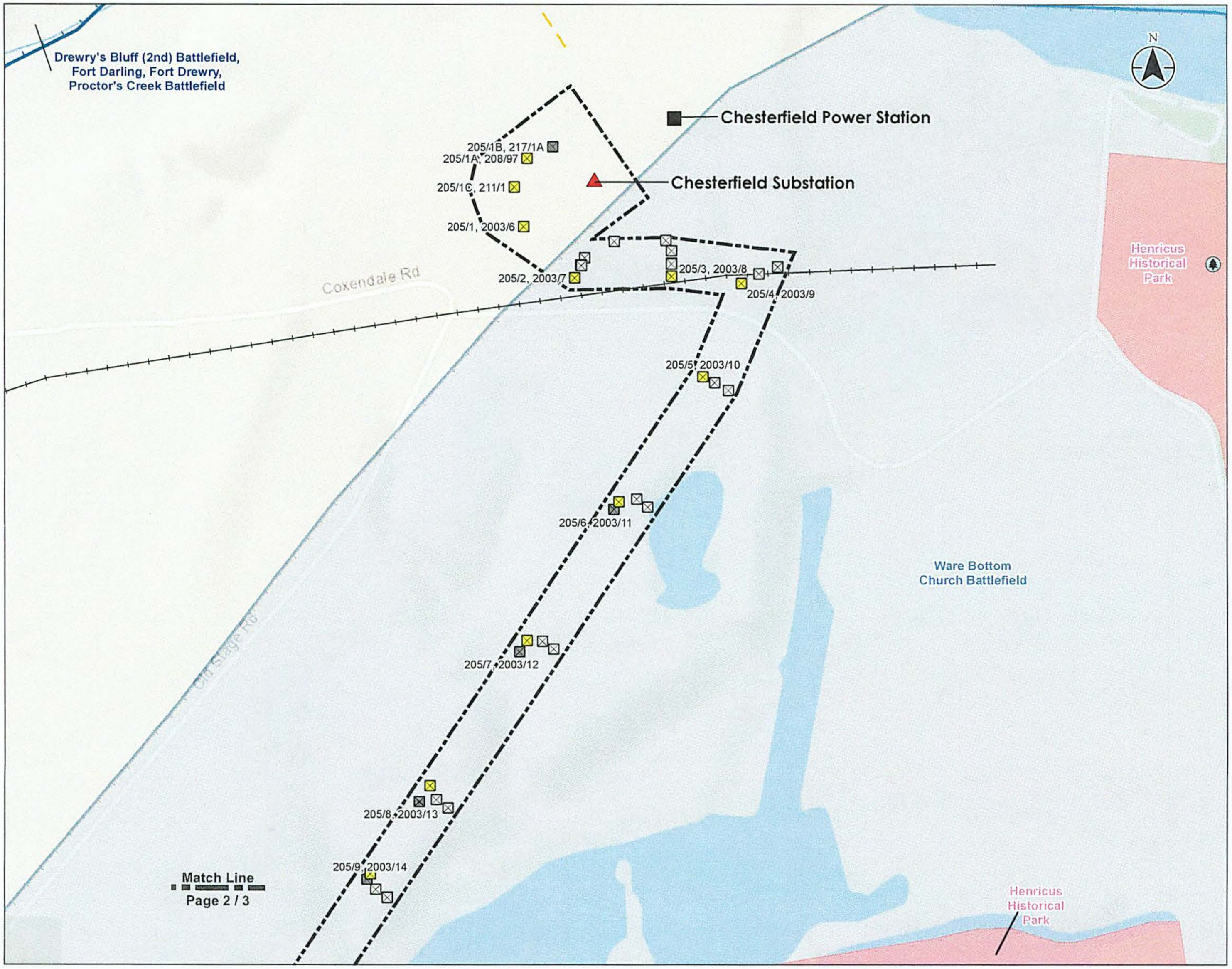

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0 500 1,000 Feet
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- Existing Rebuild Project Structure
- Other Existing Structures
- Proposed Structure
- Existing Substation
- Existing Power Station
- Park
- Project Limits
- Local Conservation Land/Easement
- Drewry's Bluff (2nd) Battlefield, Fort Darling, Fort Drewry, Proctor's Creek Battlefield (020-5320)
- Richmond National Battlefield Park (043-0033)
- Ware Bottom Church Battlefield (020-5319)
- Pipeline
- Railroad

Notes
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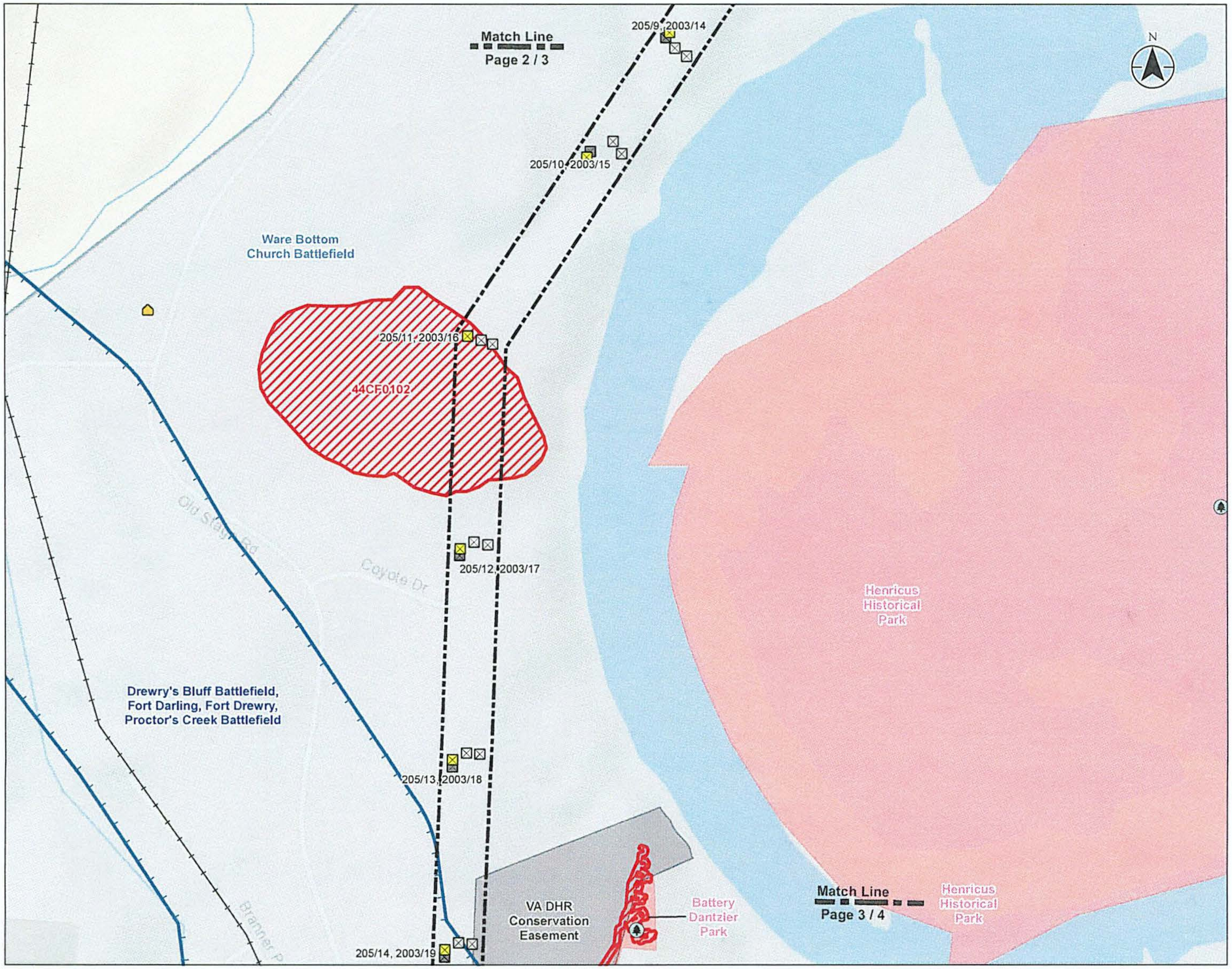

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- Proposed Structure
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- Park
- Place of Worship
- Project Limits
- Local Conservation Land/Easement
- Private Conservation Land/Easement
- Archaeological Resource
- Drewry's Bluff (2nd) Battlefield, Fort Darling, Fort Drewry, Proctor's Creek Battlefield (020-5320)
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- Ware Bottom Church Battlefield (020-5319)
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7. Base Map © National Geographic and ESRI

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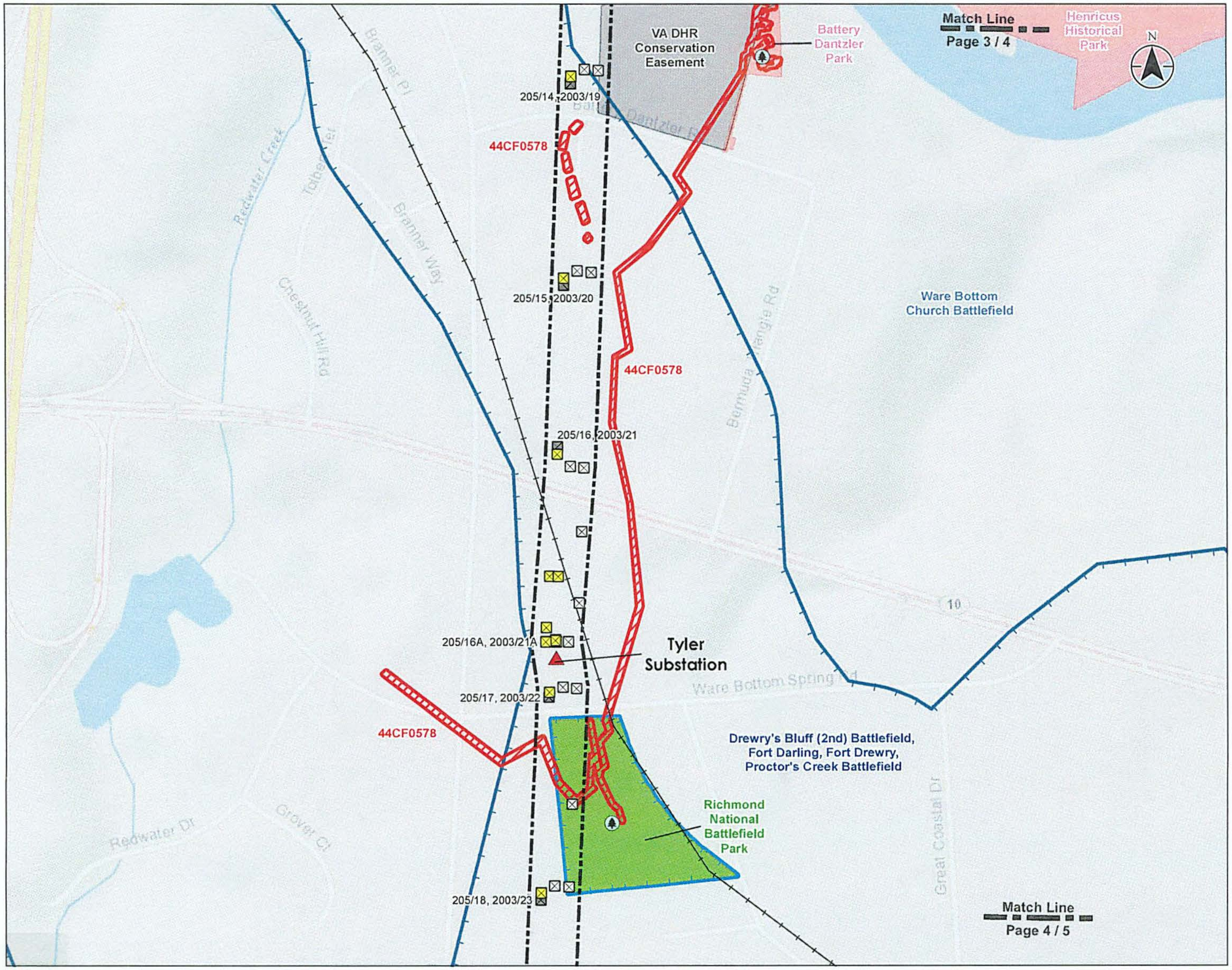

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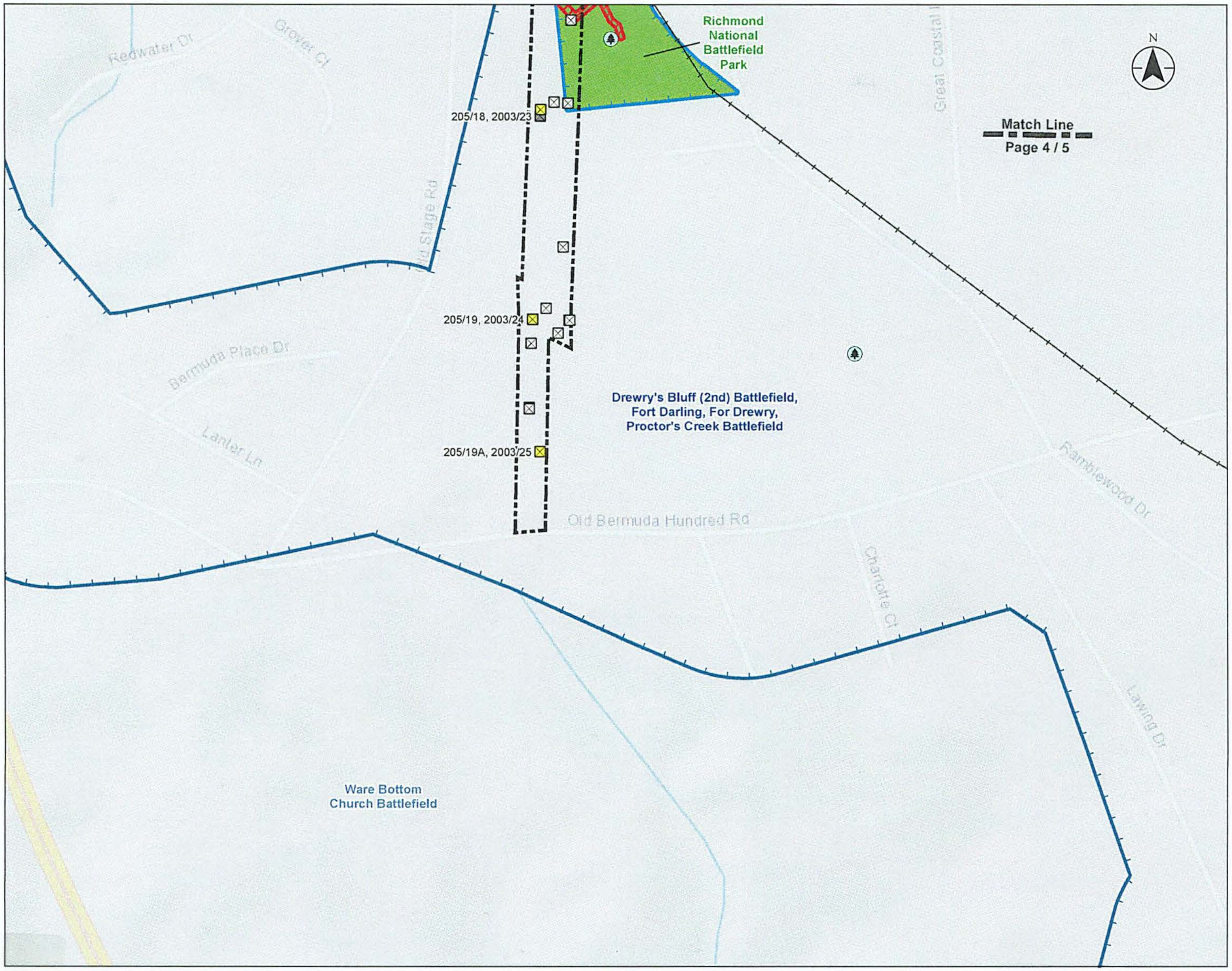

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Stantec
Dominion Energy

Page 05 of 05

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

3. Provide a separate color map of a suitable scale showing all the Applicant's transmission line ROWs, either existing or proposed, in the vicinity of the proposed project.

Response: See Attachment I.G.1.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

4. To the extent the proposed route is not entirely within existing ROW, explain why existing ROW cannot adequately service the needs of the Applicant.

Response: This section is not applicable because the Rebuild Project will be constructed entirely within existing right-of-way or Company-owned property. See also Section II.A.6.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

5. Provide drawings of the ROW cross section showing typical transmission line structure placements referenced to the edge of the ROW. These drawings should include:

a. ROW width for each cross section drawing;

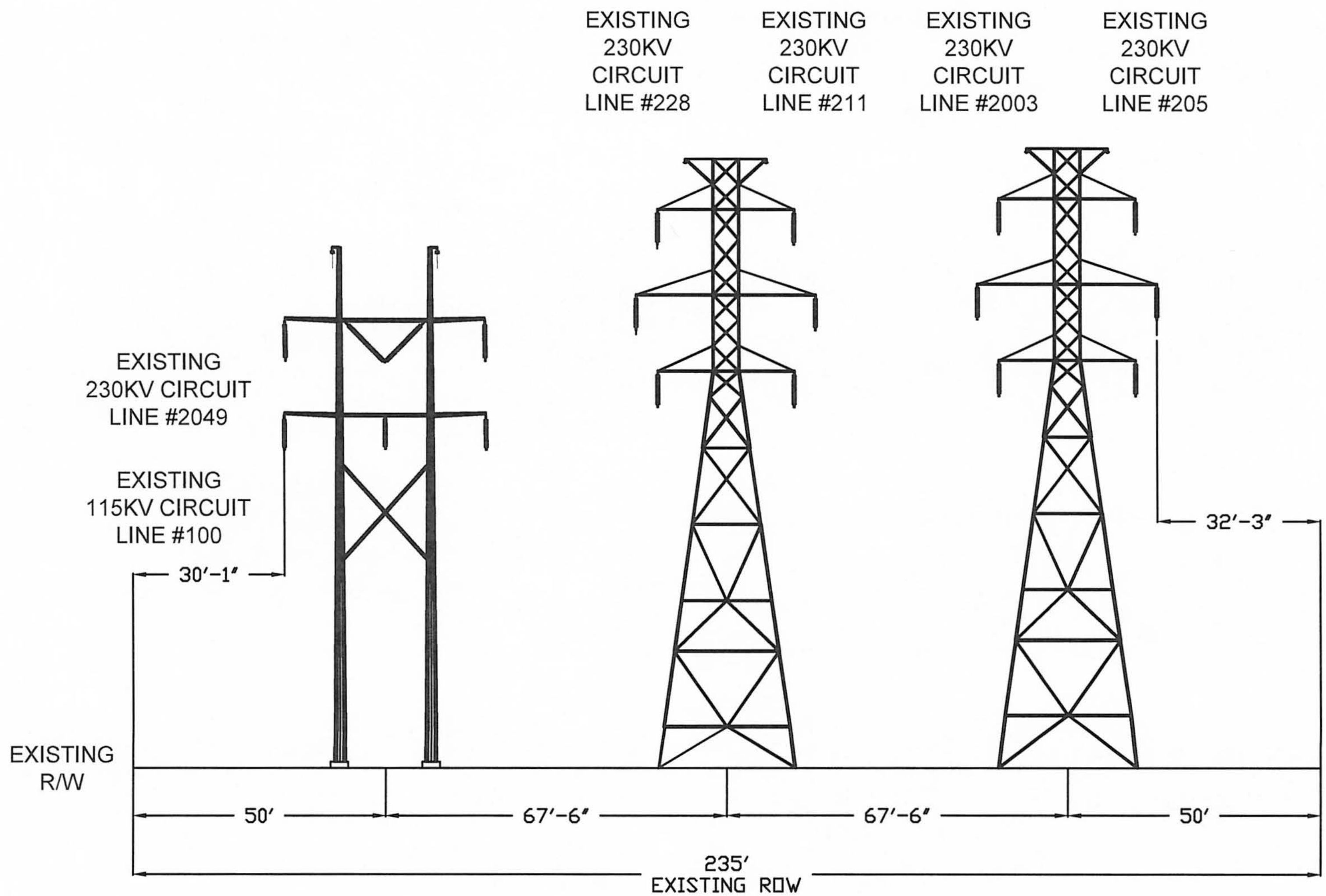
b. Lateral distance between the conductors and edge of ROW;

c. Existing utility facilities on the ROW; and

d. For lines being rebuilt in existing ROW, provide all of the above (i) as it currently exists, and (ii) as it will exist at the conclusion of the proposed project.

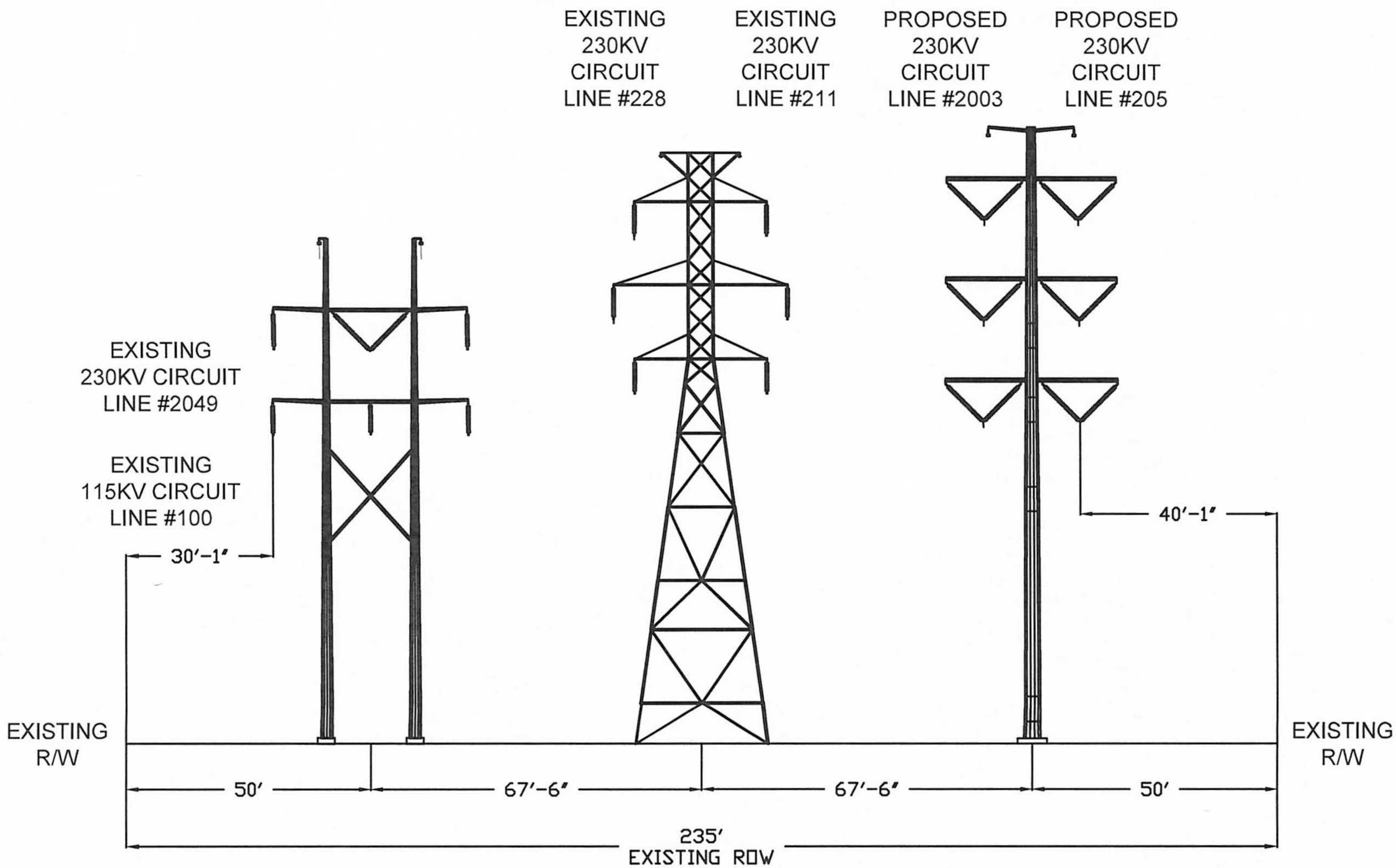
Response: See Attachments II.A.5.a-h.

EXISTING STRUCTURES 205/5, 2003/10 - 205/16, 2003/21



TYPICAL RIGHT OF WAY LOOKING TOWARD STRUCTURE 205/19A, 2003/25.
(AS VIEWED FROM THE NORTH)

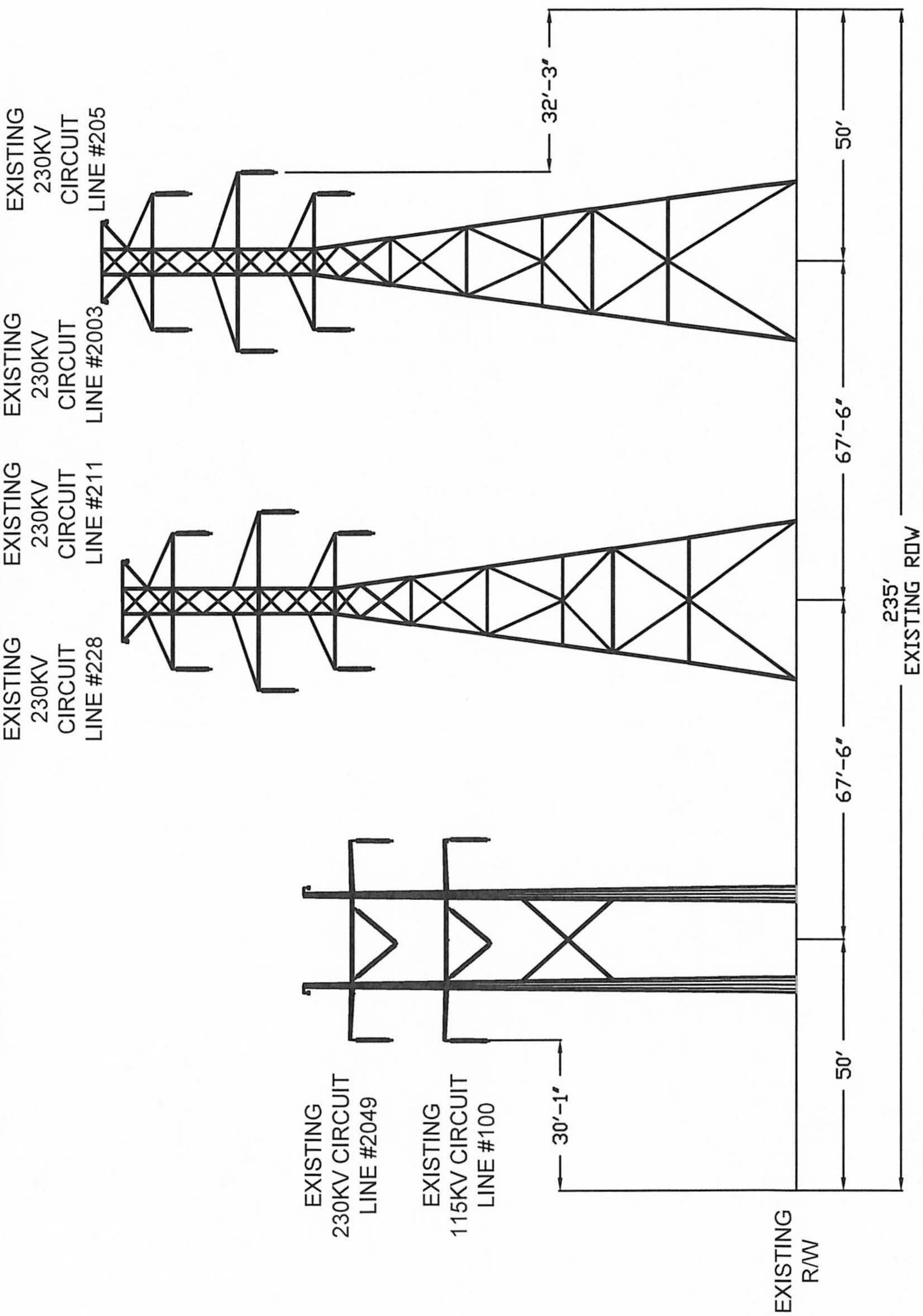
PROPOSED STRUCTURES 205/5, 2003/10 - 205/15A, 2003/20A



TYPICAL RIGHT OF WAY LOOKING TOWARD STRUCTURE 205/19A, 2003/25.
(AS VIEWED FROM THE NORTH)

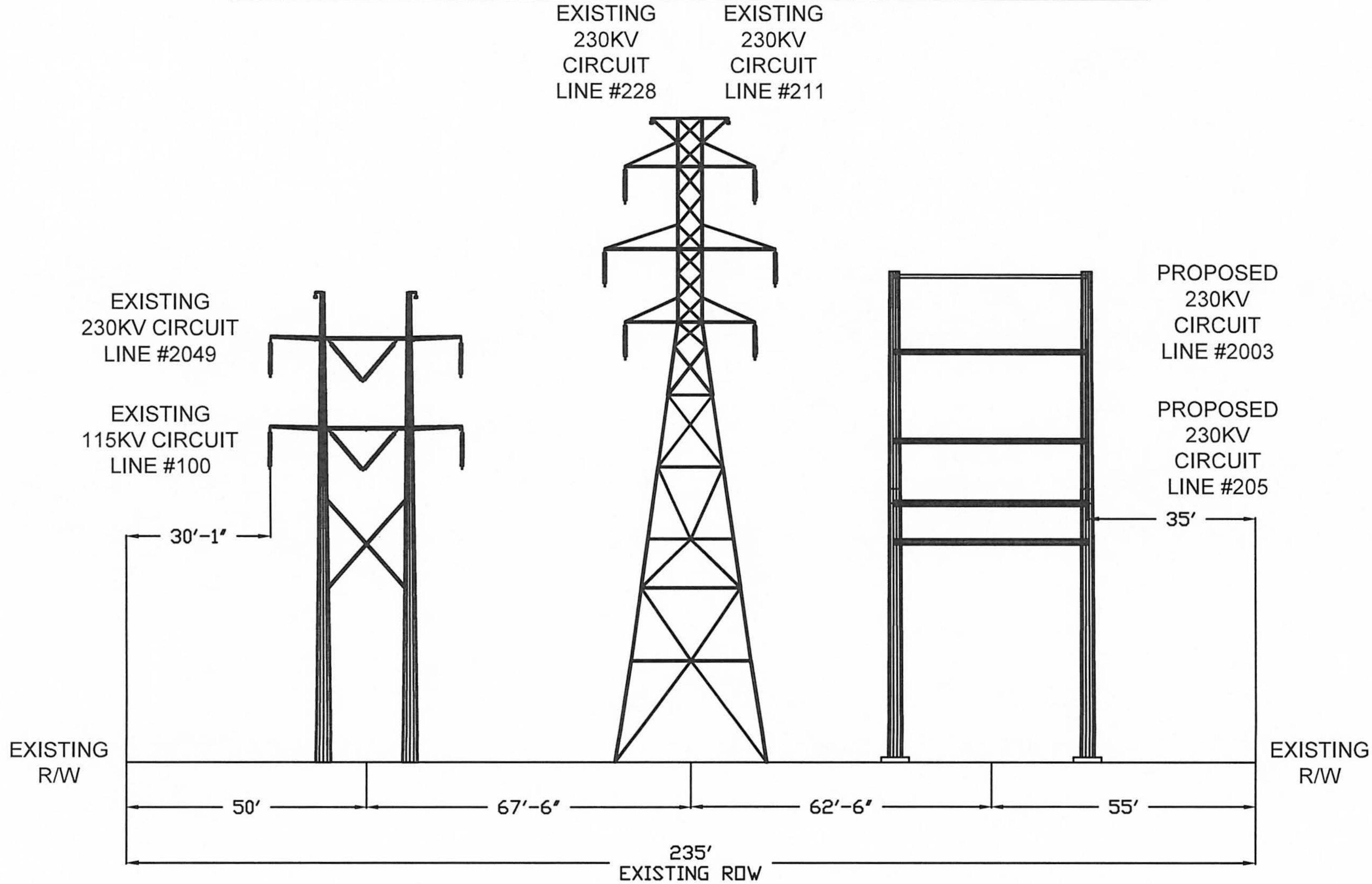
NOTE: INFORMATION CONTAINED ON DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND SUBJECT TO CHANGE BASED ON FINAL DESIGN.

EXISTING STRUCTURES 205/17, 2003/22 - 205/19, 2003/24



TYPICAL RIGHT OF WAY LOOKING TOWARD STRUCTURE 205/19A, 2003/25.
(AS VIEWED FROM THE NORTH)

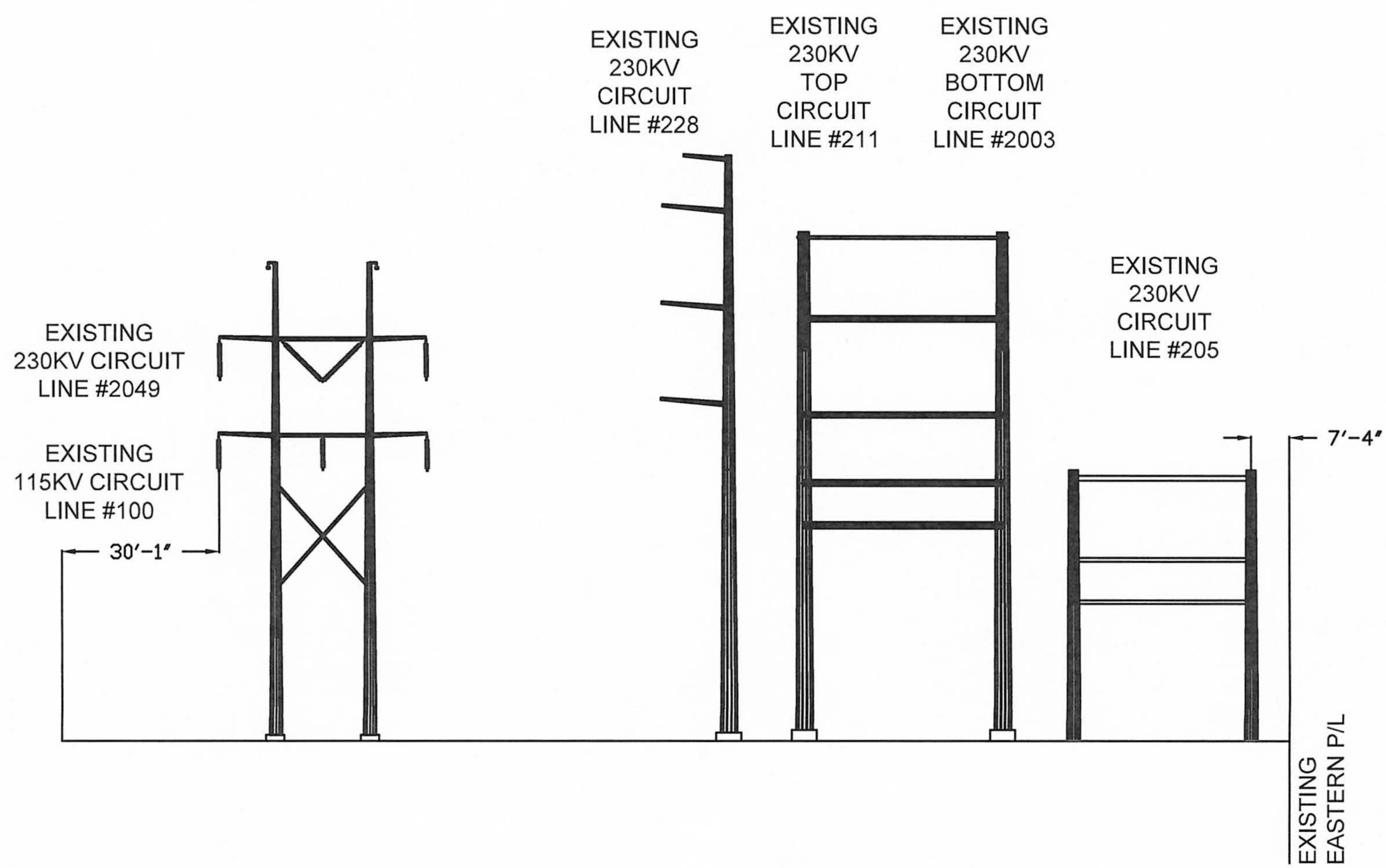
PROPOSED STRUCTURES 205/16, 2003/21 - 205/19, 2003/24



TYPICAL RIGHT OF WAY LOOKING TOWARD STRUCTURE 205/19A, 2003/25.
(AS VIEWED FROM THE NORTH)

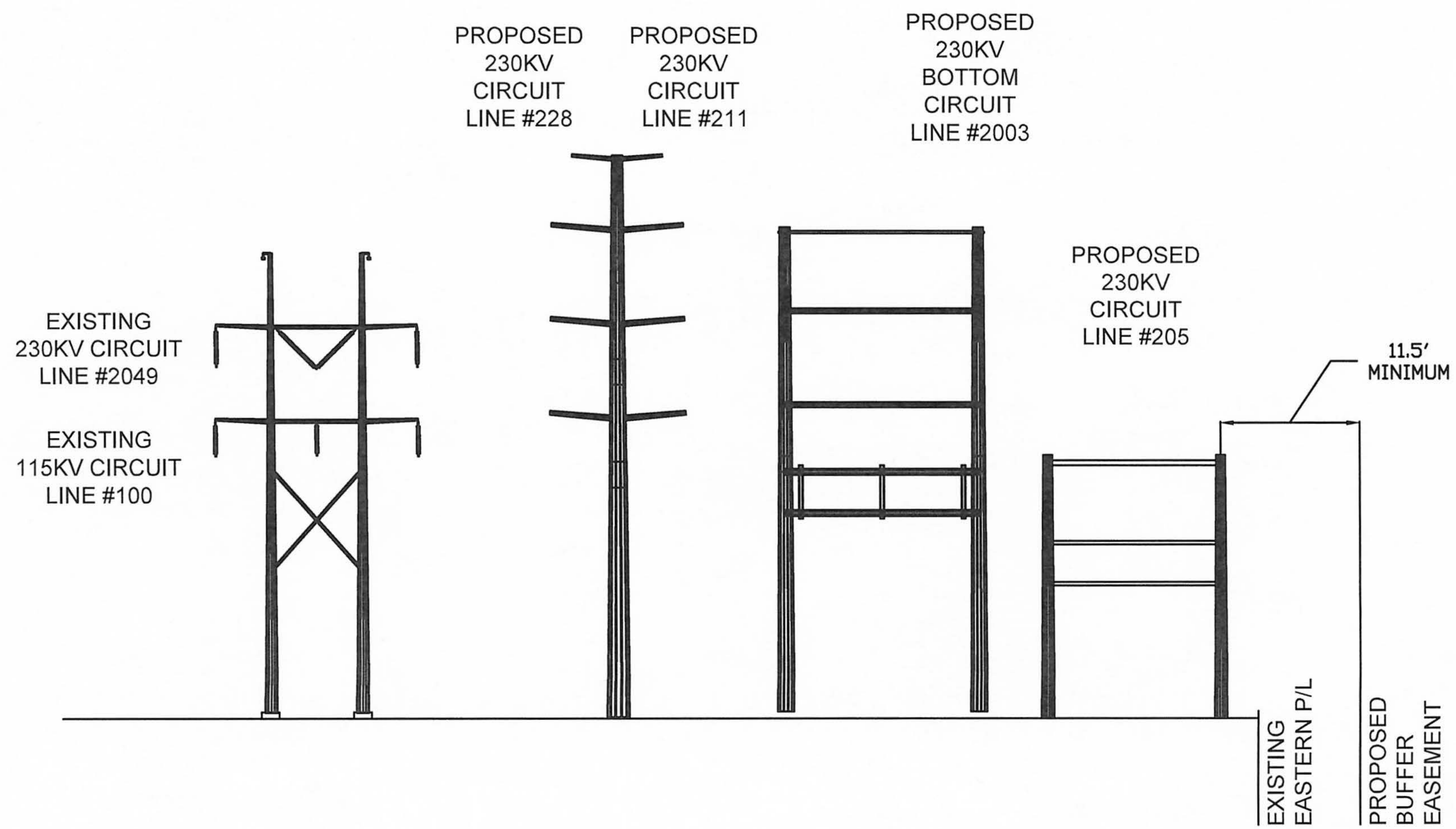
NOTE: INFORMATION CONTAINED ON DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND SUBJECT TO CHANGE BASED ON FINAL DESIGN.

TYLER SUBSTATION
STRUCTURE 228/16A & 211/16A, 2003/21A
EXISTING CONDITION



TYLER SUBSTATION LOOKING TOWARD STRUCTURE 205/19A, 2003/25
(AS VIEWED FROM THE NORTH)

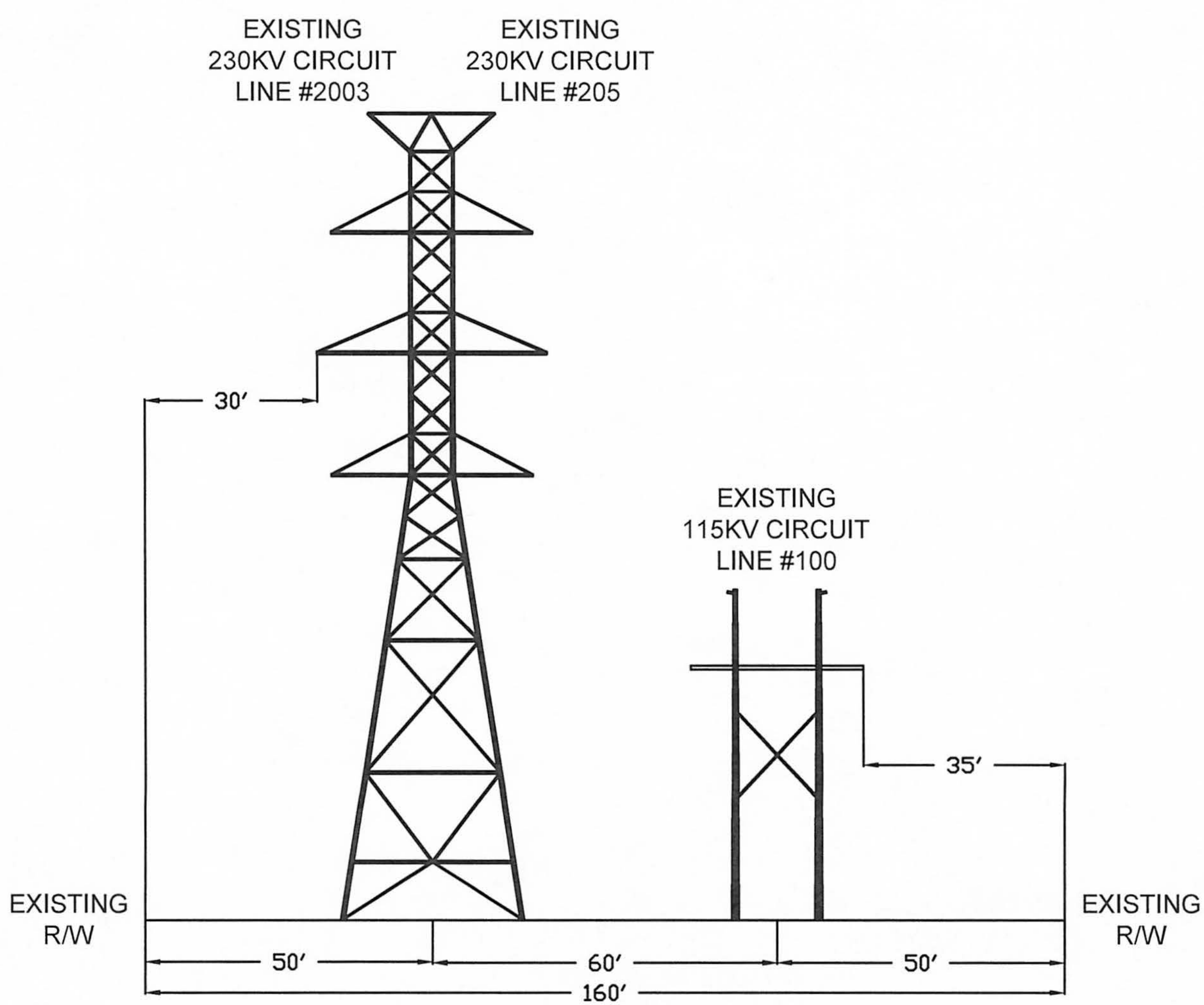
TYLER SUBSTATION
STRUCTURE 228/16A, 211/16A & 2003/21A
PROPOSED CONDITION



TYPICAL RIGHT OF WAY LOOKING TOWARD 205/19A, 2003/25
(AS VIEWED FROM THE NORTH)

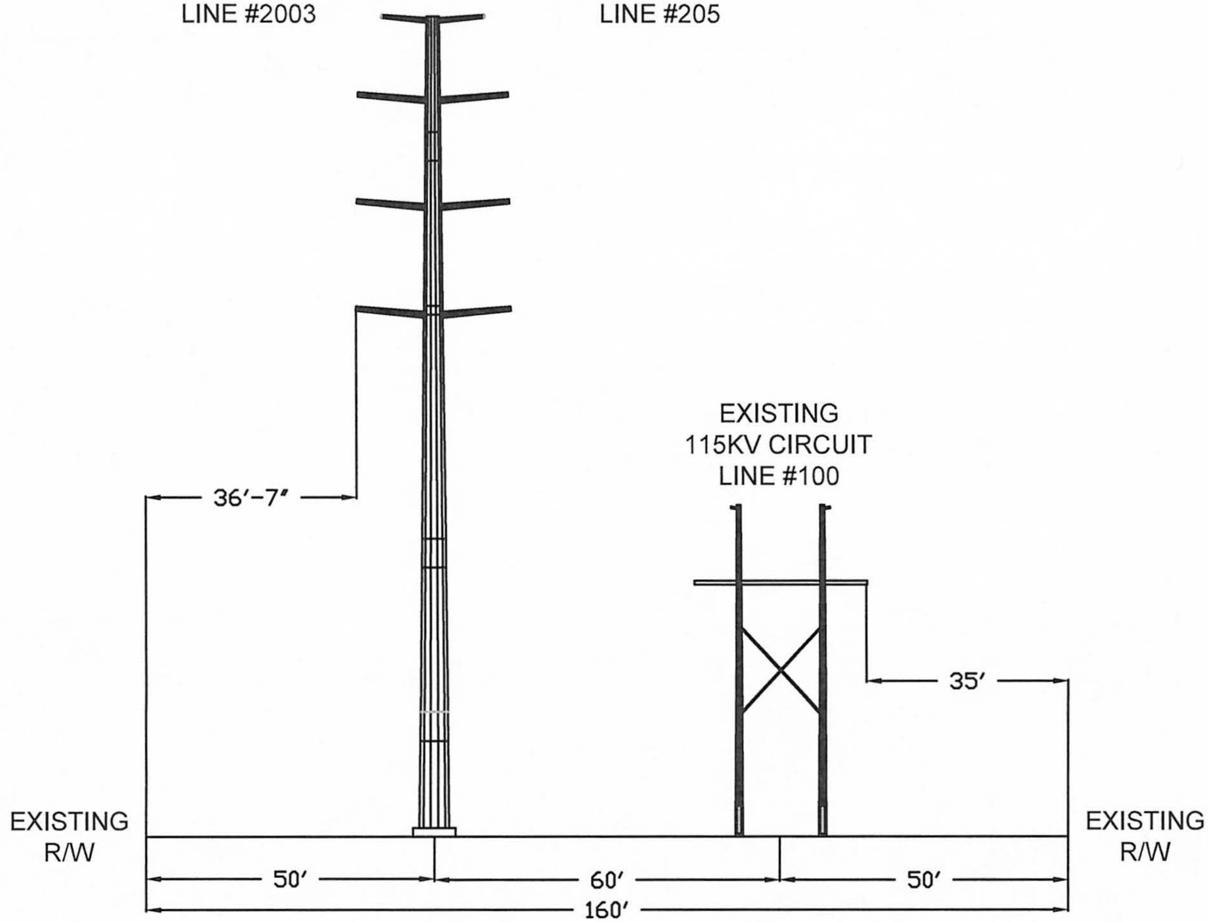
NOTE: INFORMATION CONTAINED ON DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND SUBJECT TO CHANGE BASED ON FINAL DESIGN.

EXISTING STRUCTURE 205/19A, 2003/25



TYPICAL RIGHT OF WAY LOOKING TOWARD STRUCTURE 205/19A, 2003/25
(AS VIEWED FROM THE NORTH)

PROPOSED STRUCTURE 205/19A, 2003/25



TYPICAL RIGHT OF WAY LOOKING TOWARD 205/19A, 2003/25
(AS VIEWED FROM THE NORTH)

NOTE: INFORMATION CONTAINED ON DRAWING IS CONSIDERED PRELIMINARY IN NATURE AND SUBJECT TO CHANGE BASED ON FINAL DESIGN.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

6. Detail what portions of the ROW are subject to existing easements and over what portions new easements will be needed.

Response: The entire 3.2-mile long transmission line corridor is in Chesterfield County, Virginia, within an existing transmission line right-of-way corridor currently containing 115 kV Line #100 and 230 kV Lines #205, #211, #228, #2003, and #2049. The Company obtained easements along this right-of-way prior to the 1950s.

Between Chesterfield Power Station and Structure #205/19, #2003/24, the existing right-of-way is 235 feet wide. Beyond Structure #205/19, #2003/24, the right-of-way narrows to 160 feet wide and contains Lines #100, #205, and #2003. Lines #205 and #2003 will be rebuilt within the existing right-of-way or on Company-owned property between the Company's Chesterfield Power Station and existing lattice tower Structure #205/19A, #2003/25 located approximately 0.6 mile south of the Company's Tyler Substation.

See Attachment II.A.6.a for a conservation easement map of the Rebuild Project.

While not a component of or required by the Rebuild Project, the Company determined it would be prudent to obtain a new easement for additional right-of-way adjacent to Tyler Substation for a total of approximately 0.2 acre. The National Electric Safety Code ("NESC") requires horizontal clearance to be maintained between a 230 kV conductor and other installations (such as signs, buildings, tanks, and other installations) in excess of 8 feet. The existing concrete backbone for Line #205 inside of Tyler Substation was constructed in the late 1970s, approximately 26 feet west of the centerline of the structures adjacent to the substation. This placed one leg of the backbone structure, and consequently the conductor at the backbone, less than 8 feet from the Company property line and right-of-way at Tyler Substation. While there are no other installations within 8 feet of the existing 230 kV conductor, relocation of the backbone structure is not feasible due to the constrained nature of the substation if an installation was constructed in the future. Therefore, to ensure that horizontal clearances continue to be met, the Company will pursue a buffer easement extending across up to four properties adjacent to Tyler Substation and the existing right-of-way north of Tyler Substation.

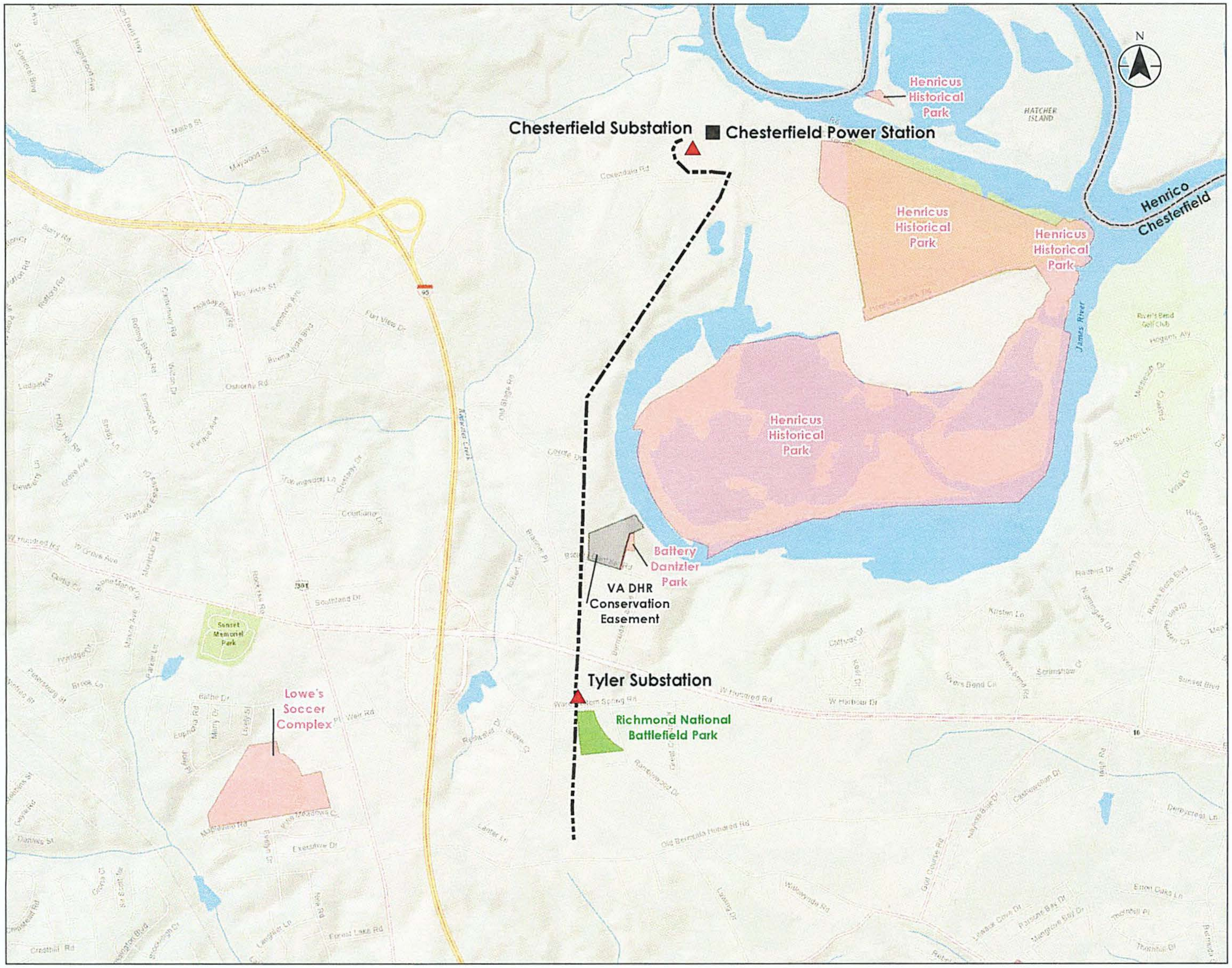


Figure No.
II.A.6.a

Title
Conservation Easement Map

Client/Project
Dominion Energy Virginia
Chesterfield - Tyler 230 kV Partial Rebuild

Project Location
Chesterfield County, Virginia

203401247
Prepared by LJB on 2019-01-08
Technical Review by MGS on 2019-04-02
Independent Review by CPG on 2019-03-24

0 2,000 4,000 Feet
1:24,000 (At original document size of 11x17)

- Existing Substation
- Existing Power Station
- Project Centerline
- Federal Conservation Land/Easement
- Local Conservation Land/Easement
- Private Conservation Land/Easement

Notes
1. Coordinate System: NAD 1983 StatePlane Virginia South FIPS 4502 Feet
2. Base features provided by Dominion Energy Virginia
3. Substation locations digitized from orthoimagery
4. Data Sources: VA DCR Natural Heritage Program, PADUS, and DCR
5. Base Map © National Geographic

Stantec Dominion Energy

Page 01 of 01

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

7. Detail the proposed ROW clearing methods to be used and the ROW restoration and maintenance practices planned for the proposed project.

Response: The entire 235-foot and the 160-foot widths of the existing transmission line right-of-way (as discussed in Section II.A.6 and shown in Attachments II.A.5.a-h) are currently maintained for operation of the existing transmission facilities. Trimming of tree limbs along the edge of the right-of-way may be conducted to support construction activities for the Rebuild Project. For any such minimal clearing within the right-of-way, trees will be cut to no more than three inches above ground level. Trees located outside of the right-of-way that are tall enough to potentially impact the transmission facilities, commonly referred to as "danger trees," may also need to be cut. Danger trees will be cut to be no more than three inches above ground level, limbed, and will remain where felled. Debris that is adjacent to homes will be disposed of by chipping or removal. In other areas, debris may be mulched or chipped as practicable. Danger tree removal will be accomplished by hand in wetland areas and within 100 feet of streams, if applicable. Care will be taken not to leave debris in streams or wetland areas. Matting will be used for heavy equipment in these areas. Erosion control devices will be used on an ongoing basis during all clearing and construction activities accompanied by weekly Virginia Stormwater Management Program inspections.

Erosion control will be maintained and temporary stabilization for all soil disturbing activities will be used until the right-of-way has been restored. Upon completion of the Rebuild Project, the Company will restore the right-of-way utilizing site rehabilitation procedures outlined in the Company's *Standards & Specifications for Erosion & Sediment Control and Stormwater Management for Construction and Maintenance of Linear Electric Transmission Facilities* that was approved by the Virginia Department of Environmental Quality ("DEQ"). Time of year and weather conditions may affect when permanent stabilization takes place.

This right-of-way will continue to be maintained on a regular cycle to prevent interruptions to electric service and provide ready access to the right-of-way in order to patrol and make emergency repairs. Periodic maintenance to control woody growth will consist of hand cutting, machine mowing and herbicide application.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

8. Indicate the permitted uses of the proposed ROW by the easement landowner and the Applicant.

Response: Any non-transmission use will be permitted that:

- Is in accordance with the terms of the easement agreement for the right-of-way;
- Is consistent with the safe maintenance and operation of the transmission lines;
- Will not restrict future line design flexibility; and
- Will not permanently interfere with future construction.

Subject to the terms of the easement, examples of typical permitted uses include but are not limited to:

- Agriculture
- Hiking Trails
- Fences
- Perpendicular Road Crossings
- Perpendicular Utility Crossings
- Residential Driveways
- Wildlife / Pollinator Habitat

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

9. Describe the Applicant's route selection procedures. Detail the feasible alternative routes considered. For each such route, provide the estimated cost and identify and describe the cost classification (e.g. "conceptual cost," "detailed cost," etc.). Describe the Applicant's efforts in considering these feasible alternatives. Detail why the proposed route was selected, and other feasible alternatives were rejected. In the event that the proposed route crosses, or one of the feasible routes was rejected in part due to the need to cross, land managed by federal, state, or local agencies or conservation easements or open space easements qualifying under §§ 10.1-1009 – 1016 or §§ 10.1-1700 – 1705 of the Code (or a comparable prior or subsequent provision of the Code), describe the Applicant's efforts to secure the necessary ROW.

Response: The Company's route selection for transmission line rebuild projects begins with a review of existing rights-of-way. This approach generally minimizes impacts on the natural and human environments. This approach is also consistent with Attachment 1 to these Guidelines, which states that existing rights-of-way should be given priority when adding new transmission facilities, and Va. Code §§ 56-46.1 and 56-259, which promote the use of existing rights-of-way for new transmission facilities. For the proposed Rebuild Project, the existing right-of-way and the Company-owned property that currently contains Lines #203 and #2005 is adequate.

Because the existing right-of-way and Company-owned property is adequate to construct the proposed Rebuild Project, no new right-of-way is necessary. Given the availability of existing right-of-way and the statutory preference given to the use of existing rights-of-way, and because additional costs and environmental impacts would be associated with the acquisition of and construction on new right-of-way, the Company did not consider any alternate routes requiring new right-of-way for this Rebuild Project. See also Section II.A.6.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

10. Describe the Applicant's construction plans for the project, including how the Applicant will minimize service disruption to the affected load area. Include requested and approved line outage schedules for affected lines as appropriate.

Response: To limit potential service disruption to the affected load area resulting from the proposed Rebuild Project, the Company plans to rebuild Lines #205 and #2003 with some planned line rebuild preparation followed by two construction phases ("Phase I" and "Phase II"). Specifically, the Company's previous operational experience has shown that when Locks Substation is placed in a radial configuration by removing the 230 kV source from Chesterfield Substation (i.e., Line #205), voltage fluctuations can occur on the transmission and distribution systems. These fluctuations impact power quality to customers in the surrounding area. To mitigate this, a temporary line will be required for the duration of the Rebuild Project, as described below. Assuming a final order from the Commission by March 1, 2021, as requested in Section I.H of this Appendix, the Company estimates that construction should begin on January 1, 2022, and be completed by December 31, 2022.

Line rebuild preparation will begin at Tyler Substation with work associated with Lines #211 and #228, as described in Section I.F.[9] This work will ensure safe working clearances from Line #211 facilities for the duration of the Rebuild Project.

Around the same time, temporary line work will begin connecting existing, isolated segments of Line #211 and modified segments of Line #100[10] to Line #205 approximately 1200 feet south of the Rebuild Project. This temporary configuration will be in place for approximately one-and-a-half months while the structures, conductor and shield wire are rebuilt from Tyler Substation to Structure #205/19A, #2003/25 (i.e., the Phase I section of the Rebuild Project).

Phase I of construction of the Rebuild Project will commence in the 0.6-mile section of Lines #205 and #2003 between Tyler Substation and Structure #205/19A, #2003/25, preceded by non-outage line structure foundation installation in this section and throughout the Rebuild Project in 2022 that will last about three months.

---

[9] *See*, *also*, n. 8.

[10] Temporary modifications will be made to six existing structures supporting 115 kV Line #100. These modifications are necessary to ensure safe operating clearances are maintained when the modified segment is operating as a part of the temporary 230 kV configuration with Lines #211 and #205. While the work associated with 115 kV Line #100 is necessary for construction of the Rebuild Project, it is not considered a component of the Rebuild Project. Rather, the work associated with Line #100 is temporary in nature, and Line #100 will be returned to its current state upon completion of the Rebuild Project.

Upon completion of Phase I, the temporary facilities associated with the use of Line #100 will be removed, and Line #100 will be normalized.

Phase II of construction of the Rebuild Project, which will take place in the 2.6-mile section of Lines #205 and #2003 between Tyler and Chesterfield Substations, will begin upon completion of Phase I. As a prerequisite for this work, the temporary line will be simplified with the removal of the modified segments of Line #100, thereby connecting Line #211 to Line #205 at Structure #205/19, #2003/24. This abbreviated temporary line configuration will remain in service for the remainder of construction of the Rebuild Project from Chesterfield Substation to Tyler Substation (i.e., the Phase II section of the Rebuild Project) through the projected in-service date of December 31, 2022.

The Company plans to take the following sequential outages for the Rebuild Project:

Line Rebuild Preparation

- Early Work Advanced Foundation Installation – No outages
- Line Rebuild Preparation (Tyler Substation) – Outages on Lines #228, #211, and #2003

Phase I

- Temporary Line (Line #211-Line #100-Line #205) – Outages on Lines #100, #211, and #205
- Tyler Substation to Structure #205/19A, #2003/25 – Outages on Lines #100, #211, #205, #2003, and on Tyler Substation TX#1 and TX#2

Phase II

- Temporary Line (Line #211-Line #205) – Outages on Lines #100, #211, #205, and #2003
- Tyler Substation to Chesterfield Substation – Outages on Lines #211, #205, #2003, and #208, and Headway on #259. Additionally, outages on Tyler Substation TX#1 and TX#2, and Headway on Chesterfield Substation Bus #7 and Bus #8 will be required.

Upon completion of Phase II, the Rebuild Project will be complete and placed into service. At this time, all remaining temporary facilities will be removed, and all lines will be normalized.

The Company will request line outages from PJM prior to the date of such outages. It is customary for PJM to not grant approval of the outages until shortly before the outages are expected to occur and, therefore, they may be subject to change.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

11. Indicate how the construction of this transmission line follows the provisions discussed in Attachment 1 of these Guidelines.

Response: Attachment 1 to these Guidelines contains a tool routinely used by the Company in routing its transmission line projects.

The Company utilized Guideline #1 (existing rights-of-way should be given priority when adding additional facilities) by siting the proposed Rebuild Project within the existing transmission corridor, as discussed in Section II.A.9.

By utilizing the existing transmission corridor, the proposed Rebuild Project will minimize impact to any site listed on the National Register of Historic Places ("NRHP"). Thus, it is consistent with Guideline #2 (where practical, rights-of-way should avoid sites listed on the NRHP). See Section III.A for a description of the resources identified in the Stage I Pre-Application Analysis prepared by Stantec Consulting Services, Inc. ("Stantec") on behalf of the Company, which is included with the DEQ Supplement as Attachment 2.H.1. Consistent with its customary practice, the Company will coordinate with the Virginia Department of Historic Resources ("VDHR") regarding the findings of the Stage I Pre-Application Analysis.

The Company has communicated with a number of local, state, and federal agencies prior to filing this Application consistent with FERC Guideline #4 (where government land is involved the Company should contact the agencies early in the planning process). See Sections III.B, III.J, V.D and the DEQ Supplement.

The Company follows recommended construction methods on a site-specific basis for typical construction projects (Guidelines #8, 10, 11, 15, 16, 18 and 22).

The Company also utilizes recommended guidelines in the clearing of right-of-way, constructing facilities, and maintaining rights-of-way after construction. Moreover, secondary uses of right-of-way that are consistent with the safe maintenance and operation of facilities are permitted.

II. DESCRIPTION OF THE PROPOSED PROJECT

A. Right-of-way ("ROW")

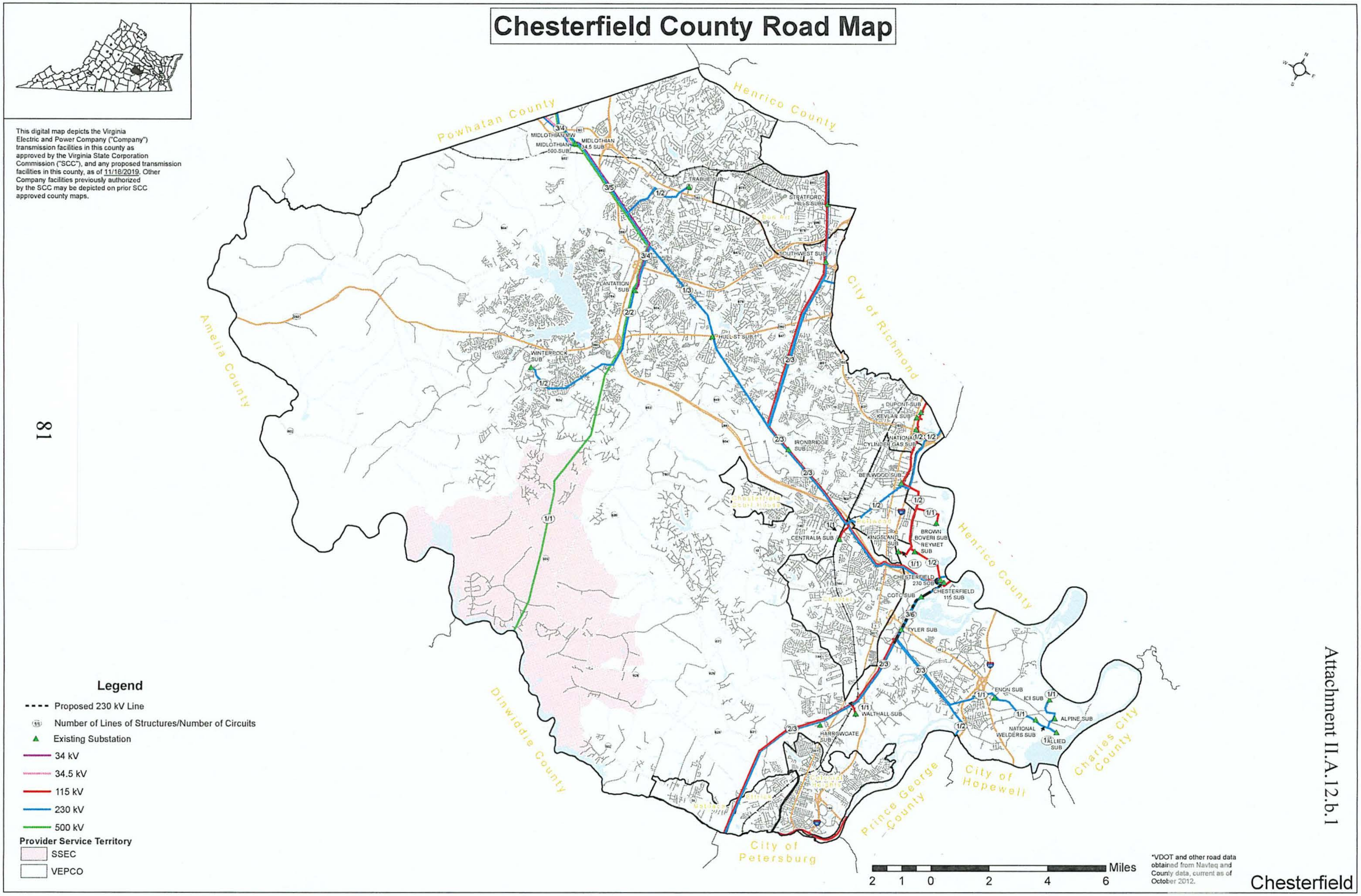
12. a. Detail counties and localities through which the line will pass. If any portion of the line will be located outside of the Applicant's certificated service area: (1) identify each electric utility affected; (2) state whether any affected electric utility objects to such construction; and (3) identify the length of line(s) proposed to be located in the service area of an electric utility other than the Applicant; and

b. Provide three (3) color copies of the Virginia Department of Transportation "General Highway Map" for each county and city through which the line will pass. On the maps show the proposed line and all previously approved and certificated facilities of the Applicant. Also, where the line will be located outside of the Applicant's certificated service area, show the boundaries between the Applicant and each affected electric utility. On each map where the proposed line would be outside of the Applicant's certificated service area, the map must include a signature of an appropriate representative of the affected electric utility indicating that the affected utility is not opposed to the proposed construction within its service area.

Response: a. The Rebuild Project traverses Chesterfield County, Virginia, for 3.2 miles and is located entirely within Dominion Energy Virginia's service territory.

b. Three copies of the map of the Virginia Department of Transportation "General Highway Map" for Chesterfield County are marked as required and filed with the Application. A reduced copy of the Chesterfield County map is provided as Attachment II.A.12.b.1.

Attachment II.A.12.b.1



This digital map depicts the Virginia Electric and Power Company ("Company") transmission facilities in this county as approved by the Virginia State Corporation Commission ("SCC"), and any proposed transmission facilities in this county, as of 11/18/2019. Other Company facilities previously authorized by the SCC may be depicted on prior SCC approved county maps.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

1. Detail the number of circuits and their design voltage, initial operational voltage, any anticipated voltage upgrade, and transfer capabilities.

Response: The Rebuild Project will affect two existing circuits, Line #205 and Line #2003. Both were designed for 230 kV operation and have been and will be operated at this voltage. There is no anticipated voltage upgrade for these lines.

The 2.6-mile section of Lines #205 and #2003 between Chesterfield and Tyler Substations being rebuilt will each have a summer transfer capability of 1047 MVA.

The 0.6-mile section of Lines #205 and #2003 between Tyler Substation and Structure #205/19A, #2003/25 being rebuilt will retain their summer transfer capability of 470 MVA.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

2. Detail the number, size(s), type(s), coating and typical configurations of conductors. Provide the rationale for the type(s) of conductor(s) to be used.

Response: The proposed conductor for both Lines #205 and #2003 will have three-phase twin-bundled 636 ACSR conductors arranged with two fiber optic shield wires as shown in Attachments II.B.3.a-g.

Twin-bundled 636 ACSR conductors are the Company's standard for new 230 kV construction.

II. DESCRIPTION OF THE PROPOSED PROJECT

B. Line Design and Operational Features

3. With regard to the proposed supporting structures over each portion of the ROW for the preferred route, provide diagrams (including foundation reveal) and descriptions of all the structure types, to include:

a. mapping that identifies each portion of the preferred route;

b. the rationale for the selection of the structure type;

c. the number of each type of structure and the length of each portion of the ROW;

d. the structure material and rationale for the selection of such material;

e. the foundation material;

f. the average width at cross arms;

g. the average width at the base;

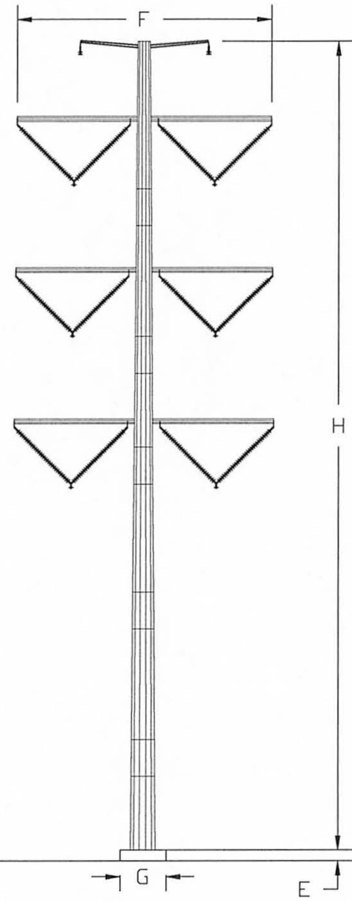
h. the maximum, minimum and average structure heights;

i. the average span length; and

j. the minimum conductor-to-ground clearances under maximum operating conditions.

Response: See Attachments II.B.3.a-g.

CHESTERFIELD - STRUCTURE 205/19A, 2003/25
STRUCTURES #205/5, 2003/10 - #205/15A, 2003/20A

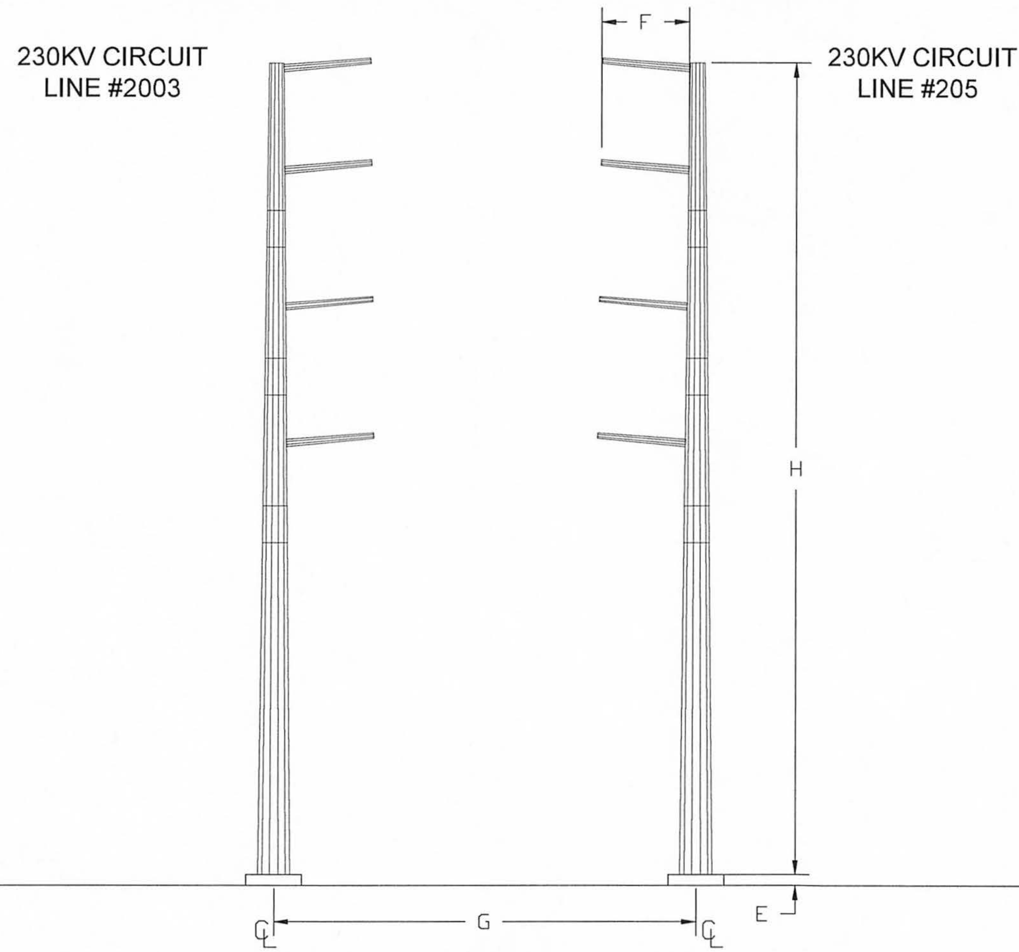


DOUBLE CIRCUIT 1-POLE STRUCTURE

A.	MAPPING OF THE ROUTE:	SEE ATTACHMENT II.B.5
B.	RATIONALE FOR STRUCTURE TYPE:	MAINTAINS THE EXISTING CIRCUITS VERTICAL CONFIGURATION.
C.	LENGTH OF R/W (STRUCTURE QTY):	1.3 MILES (9)
D.	STRUCTURE MATERIAL:	WEATHERING STEEL
	RATIONALE FOR MATERIAL:	WEATHERING STEEL WAS SELECTED TO MATCH THE STEEL POLE STRUCTURES CARRYING LINES #100 & #2049
E.	FOUNDATION MATERIAL:	CONCRETE
	AVERAGE FOUNDATION REVEAL:	SEE NOTE 2
F.	AVERAGE WIDTH AT CROSS ARM:	34.5'
G.	AVERAGE WIDTH AT BASE:	6' DIAMETER FOUNDATION (SEE NOTE 3)
H.	MINIMUM STRUCTURE HEIGHT:	110'
	MAXIMUM STRUCTURE HEIGHT:	135'
	AVERAGE STRUCTURE HEIGHT:	123'
I.	AVERAGE SPAN LENGTH (RANGE):	965' (747' - 1068')
J.	MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTE:
1. INFORMATION CONTAINED ON DRAWING IS PRELIMINARY IN NATURE AND SUBJECT TO CHANGE DURING FINAL DESIGN.
2. MINIMUM FOUNDATION REVEAL SHALL BE 1.5'.
3. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING.
4. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE.

CHESTERFIELD - STRUCTURE 205/19A, 2003/25
STRUCTURES #205/5, 2003/10 - #205/15A, 2003/20A

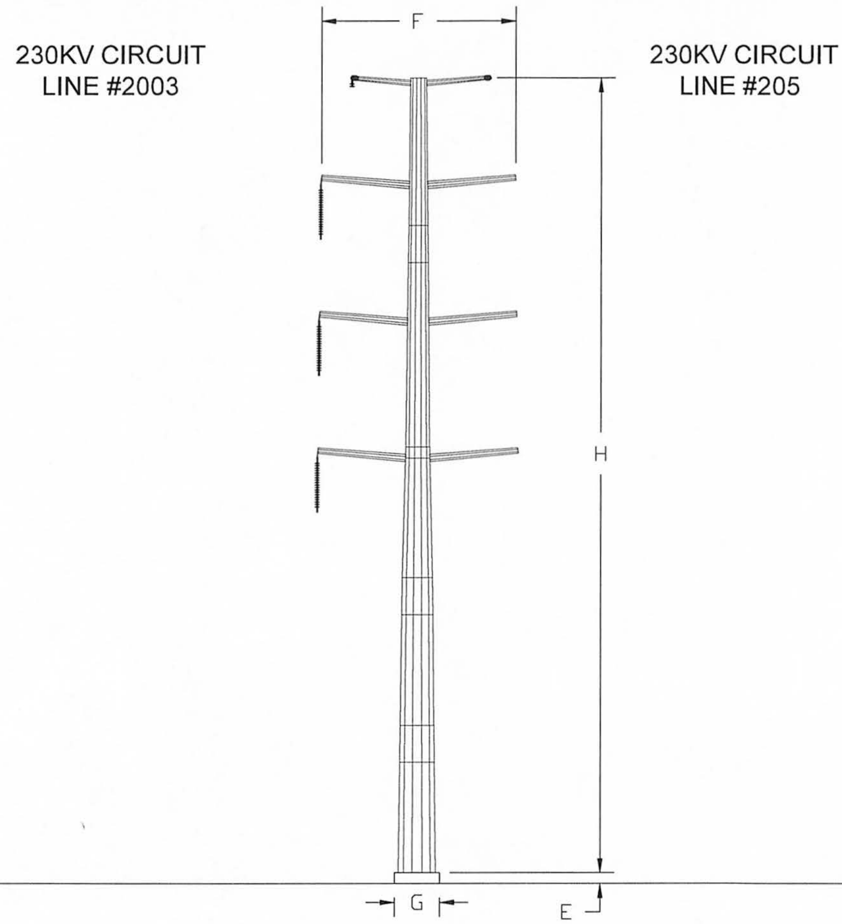


DOUBLE CIRCUIT 2-POLE STRUCTURE

A. MAPPING OF THE ROUTE:	SEE ATTACHMENT II.B.5
B. RATIONALE FOR STRUCTURE TYPE:	MAINTAINS THE EXISTING CIRCUITS VERTICAL CONFIGURATION.
C. LENGTH OF R/W (STRUCTURE QTY):	1.3 MILES (2)
D. STRUCTURE MATERIAL:	WEATHERING STEEL
RATIONALE FOR MATERIAL:	WEATHERING STEEL WAS SELECTED TO MATCH THE STEEL POLE STRUCTURES CARRYING LINES #100 & #2049
E. FOUNDATION MATERIAL:	CONCRETE
AVERAGE FOUNDATION REVEAL:	SEE NOTE 2
F. AVERAGE WIDTH AT CROSS ARM:	12'
G. AVERAGE WIDTH AT BASE:	57' BETWEEN POLES, 7.5' DIAMETER FOUNDATION (SEE NOTE 3)
H. MINIMUM STRUCTURE HEIGHT:	111'
MAXIMUM STRUCTURE HEIGHT:	135'
AVERAGE STRUCTURE HEIGHT:	123'
I. AVERAGE SPAN LENGTH (RANGE):	965' (747' - 1068')
J. MINIMUM CONDUCTOR-TO-GROUND:	22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTE:
1. INFORMATION CONTAINED ON DRAWING IS PRELIMINARY IN NATURE AND SUBJECT TO CHANGE DURING FINAL DESIGN.
2. MINIMUM FOUNDATION REVEAL SHALL BE 1.5'.
3. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING.
4. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE.

CHESTERFIELD - STRUCTURE 205/19A, 2003/25
STRUCTURES #205/5, 2003/10 - #205/15A, 2003/20A



DOUBLE CIRCUIT 1-POLE STRUCTURE

A. MAPPING OF THE ROUTE: SEE ATTACHMENT II.B.5

B. RATIONALE FOR STRUCTURE TYPE: MAINTAINS THE EXISTING CIRCUITS VERTICAL CONFIGURATION.

C. LENGTH OF R/W (STRUCTURE QTY): 1.3 MILES (1)

D. STRUCTURE MATERIAL: WEATHERING STEEL

RATIONALE FOR MATERIAL: WEATHERING STEEL WAS SELECTED TO MATCH THE STEEL POLE STRUCTURES CARRYING LINES #100 & #2049

E. FOUNDATION MATERIAL: CONCRETE

AVERAGE FOUNDATION REVEAL: SEE NOTE 2

F. AVERAGE WIDTH AT CROSS ARM: 26'

G. AVERAGE WIDTH AT BASE: 6' DIAMETER FOUNDATION (SEE NOTE 3)

H. MINIMUM STRUCTURE HEIGHT: 130'

MAXIMUM STRUCTURE HEIGHT: 130'

AVERAGE STRUCTURE HEIGHT: 130'

I. AVERAGE SPAN LENGTH (RANGE): 965' (747' - 1068')

J. MINIMUM CONDUCTOR-TO-GROUND: 22.5' (AT MAXIMUM OPERATING TEMPERATURE)

NOTE: 1. INFORMATION CONTAINED ON DRAWING IS PRELIMINARY IN NATURE AND SUBJECT TO CHANGE DURING FINAL DESIGN.
2. MINIMUM FOUNDATION REVEAL SHALL BE 1.5'.
3. FINAL FOUNDATION DIAMETER SHALL BE BASED UPON FINAL ENGINEERING.
4. STRUCTURE HEIGHTS ARE MEASURED FROM STRUCTURE CENTERLINE.