Submission of Supplemental Projects for Inclusion in the Local Plan
**Need Number:** ATSI-2018-001

**Process Stage:** Submission of Supplemental Projects for Inclusion in Local Plan – 04/15/2019

**Previously Presented:**
Need - 9/28/2018  
Solution – 10/26/2018

**Supplemental Project Driver:**  
Equipment Material Condition, Performance and Risk

**Specific Assumption Reference**  
Substation Condition Rebuild / Replacement  
- Power Transformers and Load Tap Changers (LTC)

**Problem Statement**  
Avon 345 / 138 kV 448 MVA #91 Transformer  
- Transformer is gassing at an increasing rate  
- Oil condition is degraded  
- Leaks – Not cost effective to repair  
- Severe loading history  
- Cooler condition is degraded
Need Number: ATSI-2018-001

Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan—04/15/2019

Selected Solution:
Avon 345/138 kV #91 Transformer Replacement
  - Replace existing Avon #91 345/138 kV transformer (448 MVA) with a new 345/138 kV transformer (560 MVA)

Avon Substation – Terminal equipment to be replaced include:
  - Substation conductor

Estimated Project Cost: $5.8 M

Projected In-Service: 12/31/2019

Supplemental Project ID: s1754
Need Number: ATSI-2018-002
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan – 04/15/2019
Previously Presented:
Need - 9/28/2018
Solution – 10/26/2018

Supplemental Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption Reference
Substation Condition Rebuild / Replacement
- Power Transformers and Load Tap Changers (LTC)
- Circuit Breaker and Other Fault Interrupting Devices

Problem Statement
Fox 345 / 138 kV 224 MVA #5 Transformer
- Oil Pump/cooler maintenance
- Aging/deteriorating bushings
- Increased failure risk
Fox 138 kV Circuit Breaker Q5
- Mechanism issues
- Aging/deteriorating bushings
- Spare part availability/vendor support limitations
- Negative impact on equipment health (transformer)
Need Number: ATSI-2018-002
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan– 04/15/2019

Selected Solution:
Fox 345/138 kV #5 Transformer Replacement

- Replace existing Fox #5 345/138 kV transformer (224 MVA) with a new 345/138 kV transformer (280 MVA).

Fox Substation – Terminal equipment to be replaced includes:
- 138kV circuit breaker Q5, substation conductor, CCVT, and associated relaying.

Estimated Project Cost: $6.3 M
Projected In-Service: 12/31/2019
Supplemental Project ID: s1755
Need Number: ATSI-2018-003
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan– 04/15/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018

Supplemental Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption Reference
Substation Condition Rebuild / Replacement
- Power Transformers and Load Tap Changers (LTC)
- Circuit Breaker and Other Fault Interrupting Devices

Problem Statement
New Castle 138 / 69 kV 75 MVA #7 Transformer
- Oil Leaks/moisture ingress
- Aging/deteriorating bushings
- Increased failure risk

New Castle 69 kV Circuit Breaker B32
- Mechanism issues
- Aging/deteriorating bushings
- Spare part availability/vendor support limitations
- New breaker will offer improved transformer protection

SRRTEP – Western ATSI Local Plan

ATSI Transmission Zone M-3 Process
New Castle 138/69 kV #7 Transformer Replacement
Need Number: ATSI-2018-003
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan – 04/15/2019

Selected Solution:
New Castle #7 138/69 kV Transformer Replacement
- Replace existing New Castle #7 138/69/4.2 kV transformer (125 MVA) with new 138/69 kV transformer (134 MVA).
- Replace existing 69 kV breaker (B32).
- Install new 69/4.2 kV transformer (15 MVA) and a 69 kV circuit breaker in existing 69 kV transformer position for generation station service.

Estimated Project Cost: $3.9 M
Projected In-Service: 12/31/2020
Supplemental Project ID: s1756
Need Number: ATSI-2018-004
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan– 04/15/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018

Supplemental Project Driver:
Equipment Material Condition, Performance and Risk
Specific Assumption Reference
Substation Condition Rebuild / Replacement
  ▪ Power Transformers and Load Tap Changers (LTC)
Problem Statement
Beaver 345 / 138 / 13.2 kV 392 MVA #1 Transformer
  ▪ Oil Pump issues and maintenance
  ▪ Increased failure probability
  ▪ Aging/deteriorating bushings
Beaver 345 / 138 / 13.2 kV 392 MVA #2 Transformer
  ▪ Oil Pump issues and maintenance
  ▪ Increased failure probability
  ▪ Aging/deteriorating bushings
Need Number: ATSI-2018-004
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan – 04/15/2019

Selected Solution:
Beaver #1 and Beaver #2 345/138 kV Transformer Replacement
- Replace existing Beaver #1 345/138/13.2 kV transformer (350 MVA) with new 345/138 kV transformer (448 MVA)
- Replace existing Beaver #2 345/138/13.2 kV transformer (350 MVA) with new 345/138 kV transformer (448 MVA)
- Install new 138/13.2 kV transformer (14MVA) and breaker for power to station service at Beaver
- Install new 138/13.2 kV transformer (14MVA) and breaker for power to station service at West Lorain Generation

Beaver Substation – Terminal equipment to be replaced include:
- Replace disconnect switches, VT’s, CCVT’s, and associated relaying.

Estimated Project Cost: $12.7 M
Projected In-Service: 12/31/2021
Supplemental Project ID: s1757
Need Number: ATSI-2018-005
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan– 04/15/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018
Supplemental Project Driver: 

*Equipment Material Condition, Performance and Risk*

Specific Assumption Reference

- Substation Condition Rebuild / Replacement
- Circuit Breaker and Other Fault Interrupting Devices
- Disconnect Switches
- Electromechanical and Solid-state Protective Relaying
- Potential Transformers (PTs), Coupling Capacitor Voltage Transformers (CCVTs)
- Line Arresters

Problem Statement

Northfield 138 kV Bus 2 and Bus 4
- Deteriorated bushings and insulators, increased failure risks
- Reliability issues, EM relaying mis-operations

Juniper 138 kV Bus 1
- Deteriorated bushings and insulators, increased failure risks
- Reliability issues, EM relaying mis-operations

SRRTEP – Western ATSI Local Plan
Need Number: ATSI-2018-005
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan—04/15/2019

Selected Solution:
Northfield and Juniper 138 kV Bus Upgrades

NORTHFIELD 138 kV Substation – Terminal equipment to be replaced include:
- Replace bus relaying, disconnect switches, VT's, CCVT's, breakers (B18, B20, B21), and arresters, for Northfield 138 kV Bus 2 and Bus 4.

JUNIPER 138 kV Substation – Terminal equipment to be replaced include:
- Replace bus relaying, disconnect switches, CCVT's, breakers (B25 and B27), and arresters for Juniper Bus 1.

Estimated Project Cost: $2.1M
Projected In-Service: 3/15/2020
Supplemental Project ID: s1758

Bubble Chart
Not Applicable
Substation upgrades only.
Need Number: ATSI-2018-006
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan – 04/15/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018

Supplemental Project Driver:
Operational Flexibility and Efficiency
Specific Assumption Reference
Add / Expand Bus Configuration
- Substation buses that adversely impact system performance
- Reduce amount of exposed potential local load loss during contingency conditions.

Reconductor / Rebuild Transmission Lines
- Mitigation of PJM issued PCLLRWs or post contingency switching limitations.

Problem Statement
Frisco-Maple #1 and #2 69 kV line Terminal Equipment
- Mitigate PJM issued PCLLRWs / Pre-contingency switching orders, eight times, for thermal concerns on the 69 kV system under contingency conditions.
  - Loss of the New Castle-Hoytdale #1 and New Castle-Hoytdale #2 138 kV lines.
  - Results in potential thermal loading greater than 100% on the Frisco-Maple #1 69 kV line or potential thermal loading on the Frisco-Maple #2 69 kV line depending on system conditions.

SRRTEP – Western ATSI Local Plan
Need Number: ATSI-2018-006
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan—04/15/2019

Selected Solution:
Frisco-Maple #1 and #2 69 kV Line Upgrades
FRISCO Substation
- Install new relay panels on B4 breaker and line exit.
- Upgrade 336.4 ACSR substation conductor
- Replace disconnect switches

MAPLE Substation
- Install new relay panels on B118 breaker and line exit.
- Upgrade 336.4 ACSR substation conductor at Maple
- Replace disconnect switches
- Replace Breaker B118 (due to age and condition)
  - Existing Frisco-Maple #1 69 kV Line rating: 72 MVA SN / 72 MVA SE
  - New Frisco-Maple #1 69 kV Line rating: 80 MVA SN / 96 MVA SE
  - Existing Frisco-Maple #2 69 kV Line rating: 62 MVA SN / 62 MVA SE
  - New Frisco-Maple #1 69 kV Line rating: 80 MVA SN / 96 MVA SE

Estimated Project Cost: $1.3M
Projected In-Service: 12/31/2019
Supplemental Project ID: s1759
**Supplemental Project Driver:**
*Equipment Material Condition, Performance and Risk*

**Specific Assumption Reference**
*Line Condition Rebuild / Replacement*

Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.

- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

**Problem Statement**

Ironville-Citgo 69 kV Condition Assessment (Approximately 4 miles)

*Line Condition Rebuild / Replacement*

- Identified obsolete and deteriorated equipment.
  - 60-68 year old construction; poor inspection results, 89 % rejection rate.
  - Approximately 2 repair records over the past 5 years.
- Multiple transmission delivery points (3) impacted; back-up source to (4) transmission delivery points.
Need Number: ATSI-2018-010
Process Stage: Submission of Supplemental Projects for Inclusion in Local Plan–04/15/2019

Selected Solution:
Ironville – Citgo 69 kV Line Rebuild
- Rebuild/reconductor existing radial Ironville – Citgo 69 kV Line with 477 ACSR and replace line switches A6648, A6791, A6792, A6793, and A6647.
- Existing conductor is 336 ACSR.
- Existing line rating: 79 MVA SN / 95 MVA SE
- New line rating: 100 MVA SN / 120 MVA SE

Estimated Project Cost: $4.2M
Projected In-Service: 12/31/2020
Supplemental Project ID: s1760
Need Number: ATSI-2018-007
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan 06/12/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018

Project Driver:
Operational Flexibility and Efficiency

Specific Assumption Reference
Add / Expand Bus Configuration
  - Substation buses that adversely impact system performance
  - Reduce amount of exposed potential local load loss during contingency conditions.

Problem Statement
Zelienople 69 kV Area Load At Risk
  - Outage of the Zelienople circuit results in loss of 16.6 MW and 3,762 customers
  - Radial line exposure is 1.2 miles
  - Line has experienced 2 sustained outages in the past 5 years
Need Number: ATSI-2018-007
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

Proposed Solution:
Zelienople Normally Open Switch Addition
- Install one normally closed SCADA controlled switch on the Maple-Zelienople 69 kV Line
- Install one normally open SCADA controlled switch to connect the Zelienople 69 kV load to the Maple-Frisco 69 kV Line under emergency or maintenance conditions.

Alternatives Considered:
- Maintain existing configuration
- Build a second 69kV line (1.2 miles) from Maple substation to Zelienople substation

Estimated Project Cost: $0.6M
Projected IS Date: 12/31/2019
Status: Engineering
Supplemental Project ID: s1794
**Need Number:** ATSI-2018-008  
**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019  
**Previously Presented:**  
- Need - 9/28/2018  
- Solution – 10/26/2018  

**Project Driver:**  
*Equipment Material Condition, Performance and Risk*  
*Operational Flexibility and Efficiency*  

**Specific Assumption Reference**  
Add / Expand Bus Configuration  
- Substation buses that adversely impact system performance  
- Reduce amount of exposed potential local load loss during contingency conditions.  

Substation Condition Rebuild / Replacement  
- Power Transformers and Load Tap Changers (LTC)  
- Circuit Breaker and Other Fault Interrupting Devices  

Line Condition Rebuild / Replacement  
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.  

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Problem Statement

NLMK 69 kV Load At Risk

- Reduce the amount of local load loss under contingency conditions.
  - Loss of Crossland-NLMK 138 kV line
  - Results in loss of approximately 58 MWs of load.
  
  Or
  - Masury 69 kV bus fault
  - Results in potential local voltage collapse of the Masury 69 kV area

- Equipment Material Condition, Performance and Risk
  - NLMK 69 kV system cable trenches are deteriorated and in need of replacement
  - 69 kV breakers in need of replacement (bus-tie breaker has already failed)
  - NLMK 138/69 kV transformer #6 and #12 are aged (>50 years) and not standard design.
  - Transformer #6 has elevated gas levels.
  - Existing 69 kV transmission line conductor around NLMK is corroded and deteriorated with multiple splice locations.
  - Need to upgrade to current standards
Need Number: ATSI-2018-008
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

Proposed Solution:
NLMK 138/69 kV Substation Rebuild Project
- Retire existing NLMK 1M and 2M substations and network the existing NLMK 69 kV system with the Masury-Sharon 69 kV line
- Install a loop structure at the Masury tap and rebuild the segment of line from the tap to the 2M substation as double circuit 336 ACSR (0.8 miles)
- Replace existing NLMK 138/69 kV 1M substation with new a 138/69 kV substation
  - 3-138 kV breakers in a straight bus configuration (1-Line and 2-transformer breakers)
  - 2-138/69 kV transformers (134 MVA)
  - Six (6) breaker 69 kV ring bus
  - New control building
- Re-configure existing 69 kV lines around NLMK
  - Masury-NLMK 69 kV Line: 57 MVA SN / 73 MVA SE
  - Sharon-NLMK 69 kV Line: 57 MVA SN / 73 MVA SE
- Install revenue metering
- Add a 138 kV breaker at Crossland for the Crossland-NLMK 138 kV Line
- Upgrade 69 kV relays at Masury and Sharon substations

Legend

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<thead>
<tr>
<th>Voltage (kV)</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>500</td>
<td>Red</td>
</tr>
<tr>
<td>345</td>
<td>Blue</td>
</tr>
<tr>
<td>138</td>
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<td>Green</td>
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<td>34.5</td>
<td>Red</td>
</tr>
<tr>
<td>23</td>
<td>Red</td>
</tr>
<tr>
<td>New</td>
<td>Purple</td>
</tr>
</tbody>
</table>
Need Number: ATSI-2018-008
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

Alternatives Considered:
Convert Masury 69 kV into breaker-and-a-half configuration and replace two (2) 138/69 kV transformers, seven (7) 69 kV breakers at NLMK 1M substation, and all substation control cable at NLMK 1M substation

Estimated Project Cost: $30.0M
Projected IS Date: 12/31/2021
Status: Conceptual
Supplemental Project ID: s1795
Need Number: ATSI-2018-011
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018
Project Driver:
*Equipment Material Condition, Performance and Risk*

**Specific Assumption Reference**

**Line Condition Rebuild / Replacement**
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.
- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

**Problem Statement**
Abbe-Medina 69 kV Condition Assessment (Approx. 30 miles)
- Identified obsolete and deteriorated equipment.
  - 62 year old construction; poor inspection results.
  - Negative outage history over past 5 years.
  - Approximately 17 repair records over the past 5 years; increasing trend.
- Multiple transmission delivery points (8) impacted.
- Need to upgrade to current standards
Need Number: ATSI-2018-011
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

Proposed Solution:
Abbe-Medina 69 kV Line Rebuild
- Rebuild/reconductor the existing Abbe-Medina 69 kV line with 477 ACSR; existing conductor is mixed with 477 ACSR, 336 ACSR, 1/0 CU, and 3/0 ACSR conductors.

Abbe 69 kV Substation – Terminal equipment to be replaced includes:
- Substation conductor and disconnect switch

Columbia 69 kV Substation – Terminal equipment to be replaced includes:
- Substation conductor and disconnect switches

Medina 69 kV Substation – Terminal equipment to be replaced includes:
- Substation conductor and breaker B1 bypass and disconnect switch

- Existing line rating: 45 MVA SN / 46 MVA SE
- New line rating: 100 MVA SN / 121 MVA SE

- Rebuild/reconductor approximately 1 mile existing Medina Industries 69 kV line using 477 ACSR; shared structure with Abbe-Medina 69 kV Line for ~1 mile; existing conductor is mixed 1/0 CU and 3/0 ACSR.
- Line portion from Shawville-Columbia (~ 7.5 miles) was rebuilt in 2014 and will not be included in this rebuild.

Alternatives Considered:
- Maintain existing condition and elevated risk of failure

Estimated Project Cost: $20.9 M
Projected IS Date: 12/31/2019
Status: Engineering
Supplemental Project ID: s1796

SRRTEP – Western ATSI Local Plan
Need Number: ATSI-2018-012
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018

Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption Reference
Line Condition Rebuild / Replacement
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.
- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

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Note: Added general location (not to scale) of the Wellington-Hanville-Steuben Line to PJM map
Problem Statement

Wellington-Hanville-Steuben 69 kV Condition Assessment (Approx. 33 miles)

- Identified obsolete and deteriorated equipment.
  - 50 to 56 year old construction; poor inspection results.
  - Negative outage history over past 5 years;
  - Previous radial line (now networked) with 5 distribution delivery points.
  - Approximately 13 repair records over the past 5 years; increasing trend.

- Multiple transmission delivery points (5) impacted.
- Need to upgrade to current standards

Note: Added general location (not to scale) of the Wellington-Hanville-Steuben Line to PJM map
Need Number: ATSI-2018-012

Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

Proposed Solution:
Hanville-Wellington-Steuben 69 kV Line Rebuild
- Rebuild/reconductor ~26 miles of the existing Hanville-Wellington 69 kV Line with 477 ACSR (existing conductor 336 ACSR and 3/0 ACSR)

Wellington 69 kV Substation – Terminal equipment to be replaced includes:
- Substation conductor and disconnect switches
- Existing line rating: 33 MVA SN / 33 MVA SE
- New line rating: 100 MVA SN / 121 MVA SE

Alternatives Considered:
- Maintain existing condition and elevated risk of failure

Estimated Project Cost: $27.8 M
Projected IS Date: 12/31/2021
Status: Engineering
Supplemental Project ID: s1797
Need Number: ATSI-2018-013
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019
Previously Presented:
Need – 9/28/2018
Solution – 10/26/2018
Project Driver:
*Equipment Material Condition, Performance and Risk*

Specific Assumption Reference
*Line Condition Rebuild / Replacement*
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.
- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

Problem Statement
*Ravenna-West Ravenna #1 69 kV Condition Assessment (Approx. 4 miles)*
- Identified obsolete and deteriorated equipment.
  - 50 year old construction; poor inspection results, 94% rejection rate.
  - Negative outage history over past 5 years;
  - Approximately 21 repair records over the past 5 years; increasing trend.
- Need to upgrade to current standards

Note: Added general location of the Ravenna-West Ravenna line to PJM map

SRRTEP – Western ATSI Local Plan
Need Number: ATSI-2018-013
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

Proposed Solution:
Ravenna-West Ravenna #1 69 kV Line Rehab
- Rehab existing ~4.1 miles of the Ravenna-West Ravenna #1 69 kV Line (Existing 605 ACSR conductor not changing)

Ravenna 69 kV Substation – Terminal equipment to be replaced includes:
- Disconnect switches and transfer switches (due to condition)

- Existing line rating: 82 MVA SN / 103 MVA SE
- New line rating: 100 MVA SN / 121 MVA SE

Alternatives Considered:
- Maintain existing condition and elevated risk of failure

Estimated Project Cost: $3.4 M
Projected IS Date: 12/31/2020
Status: Conceptual
Supplemental Project ID: s1798
Need Number: ATSI-2018-014
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019
Previously Presented:
  - Need - 9/28/2018
  - Solution – 10/26/2018
Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption Reference
Line Condition Rebuild / Replacement
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.
- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

Problem Statement
Bingham-Cardington (Schaff) 69 kV Condition Assessment (Approx. 15 miles)
- Identified obsolete and deteriorated equipment.
  - 45-62 year old construction; poor inspection results, 92% rejection rate.
  - Negative outage history over past 5 years;
  - Approximately 10 repair records over the past 5 years; increasing trend.
- Need to upgrade to current standards
**Need Number:** ATSI-2018-014  
**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

**Proposed Solution:**  
Bingham-Cardington (Schaff) 69 kV Line Rebuild  
- Rebuild/reconductor ~15 miles of the existing Bingham-Cardington (Schaff) 69 kV Line with 477 ACSR (existing conductor 3/0 ACSR)

**Schaff 69 kV Substation – Terminal equipment to be replaced includes:**  
- Substation conductor and disconnect switch

- Existing line rating: 45 MVA SN / 54 MVA SE  
- New line rating: 100 MVA SN / 121 MVA SE

**Alternatives Considered:**  
- Maintain existing condition and elevated risk of failure

**Estimated Project Cost:** $13.3 M  
**Projected IS Date:** 6/1/2020  
**Status:** Engineering  
**Supplemental Project ID:** s1799

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**Legend**  
- **500 kV**  
- **345 kV**  
- **138 kV**  
- **69 kV**  
- **34.5 kV**  
- **23 kV**  
- **New**
Need Number: ATSI-2018-015
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018
Project Driver:
*Equipment Material Condition, Performance and Risk*

**Specific Assumption Reference**

**Line Condition Rebuild / Replacement**
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.
- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

**Problem Statement**

Bellevue-Carriage 69 kV Condition Assessment (Approximately 13 miles)
- Identified obsolete and deteriorated equipment.
  - 48 year old construction; poor inspection results, 62% rejection rate.
  - Negative outage history over past 5 years;
  - Approximately 9 repair records over the past 5 years; increasing trend.
  - Sections of older 3/0 CU conductor.
- Multiple transmission delivery points (7) impacted.
- Need to upgrade to current standards

SRRTEP – Western ATSI Local Plan
Need Number: ATSI-2018-015
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

Proposed Solution:
Bellevue-Carriage 69 kV Line Rebuild

- Rebuild/reconductor ~9.7 miles of the existing Bellevue-Carriage 69 kV Line with 336 ACSR (existing conductor 3/0 ACSR, 336 ACSR and 4/0 CU); replace existing line switches at Harkness (A50 & A51) and Lyme (A1 & A2) substations.

- Existing line rating: 45 MVA SN / 54 MVA SE
- New line rating: 76 MVA SN / 92 MVA SE

Alternatives Considered:
- Maintain existing condition and elevated risk of failure

Estimated Project Cost: $13.8 M
Projected IS Date: 6/1/2020
Status: Engineering
Supplemental Project ID: s1800

SRRTEP – Western ATSI Local Plan
Need Number: ATSI-2018-016
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018

Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption Reference
Line Condition Rebuild / Replacement
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.
- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

Problem Statement
Hanna-Newton Falls 138 kV Condition Assessment (Approximately 20 miles)
- Identified obsolete and deteriorated equipment.
  - 62 year old construction; poor inspection results, 87% rejection rate.
  - Negative outage history over past 5 years;
  - Approximately 45 repair records over the past 5 years; increasing trend.
- Need to upgrade to current standards
Need Number: ATSI-2018-016
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

Proposed Solution:

Hanna-Newton Falls 138 kV Line
- Rebuild/reconductor ~20 miles of the existing Hanna-Newton Falls 138 kV Line with 795 ACSR (existing conductor 477 ACSR and 605 ACSR)

Hanna 138 kV Substation – Terminal equipment to be replaced includes:
- Circuit breaker B4, CCVT’s, disconnect switches, line relaying, and line metering

Newton Falls 138 kV Substation – Terminal equipment to be replaced includes:
- Substation conductor, disconnect switches, and line relaying

- Existing line rating: 169 MVA SN / 208 MVA SE
- New line rating: 275 MVA SN / 333 MVA SE

Alternatives Considered:
- Maintain existing condition and elevated risk of failure

Estimated Project Cost: $29.2 M
Projected IS Date: 6/1/2021
Status: Engineering
Supplemental Project ID: s1801

SRRTEP – Western ATSI Local Plan
Need Number: ATSI-2018-017
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018
Project Driver:
Equipment Material Condition, Performance and Risk
Operational Flexibility and Efficiency

Specific Assumption Reference
Line Condition Rebuild / Replacement
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.
- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

Network Radial Transmission Line
- Radial lines that serve multiple delivery points.

CONTINUED NEXT SLIDE...

NOTE: Added general location of the Star-Seville (Rittman) 69kV to PJM Map

SRRTEP – Western ATSI Local Plan
Problem Statement

Star-Seville (Rittman) 69 kV Condition Assessment (Approximately 18 miles)

- Identified obsolete and deteriorated equipment.
  - 56 year old construction; poor inspection results, 82% rejection rate.
  - Negative outage history over past 5 years;
  - Approximately 30 repair records over the past 5 years; increasing trend.

- Multiple transmission delivery points (3) impacted.
- Radial 69 kV transmission line with approximately 30 MWs and approximately 7,700 customer at risk.
Need Number: ATSI-2018-017
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

Proposed Solution:

Star-Seville (Rittman) 69 kV Line Rebuild

- Rebuild/reconductor approximately 18 miles of the existing Star-Seville (Rittman) 69 kV Line with 336 ACSR (existing conductor 1/0 CU and 3/0 ACSR)

Rittman 69 kV Substation – Terminal equipment to be replaced includes:
- Spark gap arresters, substation conductor, and disconnect switch

Star 69 kV Substation – Terminal equipment to be replaced includes:
- Substation conductor

- Existing line rating: 44 MVA SN / 45 MVA SE
- New line rating: 76 MVA SN / 92 MVA SE

Alternatives Considered:
- Maintain existing condition and elevated risk of failure.

Estimated Project Cost: $18.6 M
Projected IS Date: 12/31/2021
Status: Conceptual
Supplemental Project ID: s1802
Need Number: ATSI-2018-018
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018

Project Driver:
Equipment Material Condition, Performance and Risk

Specific Assumption Reference
Line Condition Rebuild / Replacement
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.
- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

Problem Statement
Carlisle-Wellington 69 kV Condition Assessment (Approximately 29 miles)
- Identified obsolete and deteriorated equipment.
  - 50-75 year old construction; poor inspection results, 75% rejection rate.
  - Negative outage history over past 5 years;
  - Approximately 29 repair records over the past 5 years; increasing trend.
- Multiple transmission delivery points (9) impacted.
Need Number: ATSI-2018-018
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

Proposed Solution:

Carlisle-Wellington 69 kV Line
- Rebuild/reconductor ~29 miles of the existing Carlisle-Wellington 69 kV Line with 477 ACSR (existing conductor 605 ACSR and 336 ACSR)

Wellington 69 kV Substation – Terminal equipment to be replaced includes:
- Circuit breaker B34 and relays and controls

- Existing line rating: 76 MVA SN / 92 MVA SE
- New line rating: 100 MVA SN / 121 MVA SE

Alternatives Considered:
- Maintain existing condition and elevated risk of failure

Estimated Project Cost: $27.9 M
Projected IS Date: 3/1/2022
Status: Conceptual
Supplemental Project ID: s1803

Legend
- 500 kV
- 345 kV
- 138 kV
- 69 kV
- 34.5 kV
- 23 kV
- New
Need Number: ATSI-2018-019
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019
Previously Presented: Need - 9/28/2018
Solution – 10/26/2018

Project Driver:
*Equipment Material Condition, Performance and Risk*

Specific Assumption Reference
*Line Condition Rebuild / Replacement*
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.
- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

*Network Radial Transmission Line*
- Radial lines that serve multiple delivery points.

Problem Statement
*Maysville-Canal (Greenville) 69 kV Condition Assessment (Approximately 1.5 miles)*
- Identified obsolete and deteriorated equipment.
  - 61 year old construction; poor inspection results, 100% rejection rate.
  - Approximately 4 repair records over the past 5 years.
- Radial 69 kV transmission line with 16 MWs and approximately 6,800 customer at risk.

SRRTEP – Western ATSI Local Plan

NOTE: Added general location of the Maysville-Canal (Greenville) 69kV to PJM Map
**Need Number:** ATSI-2018-019  
**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

**Proposed Solution:**

**Canal-Maysville 69 kV Line Rebuild**

- Rebuild/reconductor ~1.5 miles of the existing Canal-Maysville 69 kV Line with 336 ACSR (existing conductor 336 ACSR and 3/0 ACSR)
- Replace line switches A-234 and A-235

** Greenville 69 kV Substation – Terminal equipment to be replaced includes:**
  - Substation conductor

- Existing line rating: 47 MVA SN / 56 MVA SE
- New line rating: 80 MVA SN / 96 MVA SE

**Alternatives Considered:**

- Maintain existing condition and elevated risk of failure

**Estimated Project Cost:** $1.7 M  
**Projected IS Date:** 12/31/2019
**Status:** Engineering
**Supplemental Project ID:** s1804

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**Legend**

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Code</th>
</tr>
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<tr>
<td>500 kV</td>
<td>Red</td>
</tr>
<tr>
<td>345 kV</td>
<td>Orange</td>
</tr>
<tr>
<td>138 kV</td>
<td>Yellow</td>
</tr>
<tr>
<td>69 kV</td>
<td>Green</td>
</tr>
<tr>
<td>34.5 kV</td>
<td>Red</td>
</tr>
<tr>
<td>23 kV</td>
<td>Orange</td>
</tr>
<tr>
<td>New</td>
<td>Pink</td>
</tr>
</tbody>
</table>

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SRRTEP – Western ATSI Local Plan
**Need Number:** ATSI-2018-020

**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

**Previously Presented:**
- Need - 9/28/2018
- Solution – 10/26/2018

**Project Driver:**
*Equipment Material Condition, Performance and Risk*

**Specific Assumption Reference**
**Line Condition Rebuild / Replacement**
Assessment of existing transmission lines for equipment characteristics that are at, or beyond their existing service life, or contain components that are obsolete.
- Aged or deteriorated wood pole transmission line structures.
- Negatively impact customer outage frequency and/or durations.
- Demonstrate an increasing trend in maintenance findings and/or costs

**Problem Statement**
**Midway-Napoleon 69 kV Condition Assessment (Approximately 11 miles)**
- Identified obsolete and deteriorated equipment.
  - 42-52 year old construction; poor inspection results, 60 % rejection rate.
  - Approximately 8 repair records over the past 5 years; increasing trend.
  - 4/0 ACSR conductor

SRRTEP – Western ATSI Local Plan
**Need Number:** ATSI-2018-020  
**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 06/12/2019

**Proposed Solution:**  
Midway – Napoleon 69 kV Line Rebuild  
- Rebuild/reconductor existing Midway – Napoleon 69 kV Line with 477 ACSR.  
- Existing conductor is 4/0 ACSR.

*Midway 69 kV Substation – Terminal equipment to be replaced includes:*  
- Replace 69kV breaker B6876, disconnect switches, line CVT, line trap, line tuner, and associated relaying.

*Napoleon 69 kV Substation – Terminal equipment to be replaced includes:*  
- Disconnect switches, line CVT, line trap, line tuner, and associated relaying.

- Existing line rating: 53 MVA SN / 64 MVA SE  
- New line rating: 100 MVA SN / 120 MVA SE

**Alternatives Considered:**  
- Maintain existing condition and elevated risk of failure

**Estimated Project Cost:** $19.6 M  
**Projected IS Date:** 12/31/2019  
**Status:** Engineering  
**Supplemental Project ID:** s1805

SRRTEP – Western ATSI Local Plan
**Need Number:** ATSI-2018-022  
**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019  
**Previously Presented:**  
Need - 11/29/2018  
Solution – 11/29/2018  

**Project Driver(s):**  
Customer Service - Emergent  

**Specific Assumption Reference(s)**  
New customer connection request will be evaluated per FirstEnergy’s “Requirements for Transmission Connected Facilities” document and “Transmission Planning Criteria” document.  

**Problem Statement**  
New Customer Connection - A customer requested 138 kV service for load of approximately 6 MVA near the Delta-Wauseon 138 kV line.
Need Number: ATSI-2018-022
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
  Need - 11/29/2018
  Solution – 11/29/2018

Proposed Solution:
- Tap the Delta-Wauseon 138 kV line and extend a 138 kV line (approximately 0.1 miles) to the proposed customer site (Match existing line conductor).

Alternatives Considered:
- None (obligation to serve)

Estimated Project Costs: $0.5M
Projected IS Date: 02/11/2019
Status: Complete
Supplemental Project ID: s1848
Need Number: ATSI-2019-001
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
- Need - 01/14/2019
- Solution – 03/25/2019

Project Driver(s):
Operational Flexibility and Efficiency
Infrastructure Resilience

Specific Assumption Reference(s)
Global Considerations
- System reliability and performance
- Substation / Line equipment limits
- Reliability of Non-Bulk Electric System (Non-BES) facilities
- Load and risk in planning and operational scenarios
- Load and/or customers at risk on single transmission lines

Problem Statement
Black River-Shinrock 69 kV Line
The Black River-Shinrock 69 kV line is approximately 24 miles long and serves five (5) transmission customers. The transmission line conductor is the limiting element.
- A Black River-Shinrock 69 kV line outage (N-1) results in approximately 47 MW and 14,200 customers being interrupted.
- Over the past five years, the Black River-Shinrock 69 kV line has experienced approximately 17 outages (9 sustained, 8 momentary).
Proposed Solution:

**Beaver Substation – New 138/69 kV Substation**

- Build a new 138/69 kV substation near the existing Beaver 138 kV substation.
- Extend 138 kV line (Approximately 0.1 miles) from the Beaver 138 kV substation to the new site.
- Install one (1) 138 / 69 kV 100/134 MVA transformer.
- Build a three (3) breaker 69 kV ring bus and control house.
- Loop in/out the existing Black River-Shinrock 69 kV line with double circuit line extension (approximately 0.3 miles) to the new 69 kV ring bus.
- At Shinrock replace the existing Electromechanically Relays.
- Add auto-sectionalizing scheme at Axtel substation.
- The project will add new 138/69 kV source to the area.
  - Provide operational flexibility and increased reliability
  - Provide additional capacity on the Beaver-Black River 138 kV line.
Need Number: ATSI-2019-001
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution – 03/25/2019

Transmission Line Ratings:
- Black River – Shinrock 69 kV Line
  - Before Proposed Solution: 80 MVA SN / 96 MVA SE
- Black River – Beaver 69 kV Line
  - After Proposed Solution: 80 MVA SN / 96 MVA SE
- Shinrock – Beaver 69 kV Line
  - After Proposed Solution: 80 MVA SN / 96 MVA SE

Alternatives Considered:
- Install 69 kV ring bus or auto-sectionalizing scheme at Axtel substation.

Estimated Project Cost: $7.4M
Projected IS Date: 12/31/2020
Status: Conceptual
Supplemental Project ID: s1945
Need Number: ATSI-2019-002
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
Solution – 03/25/2019

Project Driver(s):
- Operational Flexibility and Efficiency
- Infrastructure Resilience

Specific Assumption Reference(s)

Global Considerations
- System reliability and performance
- Substation / Line equipment limits
- Reliability of Non-Bulk Electric System (Non-BES) facilities
- Load and risk in planning and operational scenarios

Problem Statement

Brady 138 kV Area

PJM has issued PCLLRW to potentially drop 20 MW of load at Brady substation for the (N-1-1) outage of the Brady-Hanna 138 kV line and the Chamberlin-Hudson Muni 138kV line.
- Post-contingency voltage at Brady drops below 0.92 p.u. under this back-feed condition from Darrow 138 / 69 kV substation.
- The overall load at risk is approximately 61 MW, and the number of customers impacted is approximately 18,800.
Need Number: ATSI-2019-002
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution – 03/25/2019

Proposed Solution:
Brady 138 KV, 26.4 MVAR capacitor bank
- Install 138kV, 26.4 MVAR capacitor bank at Brady substation.
- Add one 138kV circuit breaker to convert Brady three (3) circuit breaker ring bus into four (4) circuit breaker ring bus.

Transmission Line Ratings:
- No Impact

Alternatives Considered:
- Bring another 138 kV source into Brady substation.

Estimated Project Cost: $1.4M
Projected IS Date: 12/31/2019
Status: Conceptual
Supplemental Project ID: s1946
Need Number: ATSI-2019-003
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
Solution – 03/25/2019

Project Driver(s):
Operational Flexibility and Efficiency
Infrastructure Resilience

Specific Assumption Reference(s)
Global Considerations
▪ System reliability and performance
▪ Substation / Line equipment limits
▪ Reliability of Non-Bulk Electric System (Non-BES) facilities
▪ Load and risk in planning and operational scenarios
▪ Load and/or customers at risk on single transmission lines

Problem Statement
Lincoln Park and Riverbend 138 kV Area
Lincoln Park 138 - 23 kV substation presently serves approximately 35 MW and 5,000 customers
▪ The loss of the Lincoln Park-Masury 138 kV line followed by the loss of the Lincoln Park-Lowellville 138 kV line (N-1-1) results in the loss of approximately 35 MW and 5,000 customers.

Continued on next slide...
Problem Statement - Continued
Riverbend 138 - 23 kV substation presently serves approximately 40 MW and 9,100 customers. Additionally the Wickliffe 138 kV substation serves approximately 22 MW and 10,000 customers.

- The loss of the Boardman-Wickliffe 138 kV line followed by the loss of the Riverbend-Salt Springs 138 kV line (N-1-1) results in the loss of roughly 62 MW and 19,100 customers.

System Performance
- Over the past 5 years, the Lincoln Park-Masury 138 kV line has experienced 1 outage (0 sustained, 1 momentary).
- Over the past 5 years, the Lincoln Park-Lowellville 138 kV line has experienced 4 outages (3 sustained, 1 momentary).
- Over the past 5 years, the Boardman-Wickliffe 138 kV line has experienced 2 outages (2 sustained, 0 momentary).
- Over the past 5 years, the Riverbend-Salt Springs 138 kV line has experienced 1 outage (1 sustained, 0 momentary).
Proposed Solution:  
Lincoln Park – Riverbend 138 kV Line  
- Build a new 138 kV line from Riverbend to Lincoln Park substation (roughly 5.7 miles)  
- Convert the Riverbend substation into a 4-breaker ring bus configuration by installing two 138 kV breakers  
- Expand the Lincoln Park 138 kV ring bus by installing one 138 kV breaker allowing for a new line terminal

Transmission Line Ratings:  
- Lincoln Park – Riverbend 138 kV Line  
  - After Proposed Solution: 275 MVA SN / 333 MVA SE

Alternatives Considered:  
- Build a new Salt Springs-Riverbend #2 138 kV Line and a new Lincoln Park-Shenango 138 kV Line.

Estimated Project Cost: $25.9M  
Projected IS Date: 12/31/2022  
Status: Conceptual  
Supplemental Project ID: s1947
Need Number: ATSI-2019-004
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
Solution - 03/25/2019

Project Driver(s):
Operational Flexibility and Efficiency
Infrastructure Resilience

Specific Assumption Reference(s)
Global Considerations
- System reliability and performance
- Substation / Line equipment limits
- Reliability of Non-Bulk Electric System (Non-BES) facilities
- Load and risk in planning and operational scenarios
- Load and/or customers at risk on single transmission lines

Problem Statement
Amherst 69 kV Area
The Amherst 69 kV substation is owned by Amherst Municipality with transmission service from a tapped 69 kV transmission line. The Henrietta-Johnson 69 kV line outage (N-1) results in approximately 39 MW & 9,195 customers at three transmission service points being interrupted.
- Over the past five years, the Henrietta-Johnson 69 kV line has experienced approximately 21 outages (13 sustained, 8 momentary).
Need Number: ATSI-2019-004
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution - 03/25/2019

Proposed Solution:
Amherst (New) 69 kV Ring Bus

- Build new 69 kV three (3) circuit breaker, future four(4), ring bus adjacent to Amherst Muni substation.
- Rebuild the Amherst Muni / Nordson tap (Approximately 1 mile) as double circuit 69 kV line, match the main line conductor, and loop the Henrietta-Johnson 69 kV line in/out of the new Amherst 69 kV ring bus.
- Terminate Amherst Muni into the new ring bus switch station.

Transmission Line Ratings:

- Henrietta – Johnson (existing) 69 kV Line
  - Before Proposed Solution: 45 MVA SN / 54 MVA SE

- Henrietta – Amherst (New) 69 kV Line
  - After Proposed Solution: 80 MVA SN / 96 MVA SE

- Johnson – Amherst (New) 69 kV Line
  - After Proposed Solution: 80 MVA SN / 96 MVA SE

Alternatives Considered:
- Maintain existing configuration.

Estimated Project Cost: $4.0M
Projected IS Date: 12/31/2020
Status: Conceptual
Supplemental Project ID: s1948
**Need Number:** ATSI-2019-005  
**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019  
**Previously Presented:**  
Need - 01/14/2019  
Solution - 03/25/2019

**Project Driver(s):**  
Equipment Material Condition  
Performance and Risk

**Specific Assumption Reference(s)**

Global Considerations  
- Level of criticality to system performance and operations  
- Expected service life (at or beyond) or obsolescence

**Problem Statement**

The Delaware – Tangy 138 kV Line is an ~1.0 mile tie line between FirstEnergy and AEP. The line is operated normally open and has not been closed since 2014. Failing pilot wire relays and phone line communications are near or beyond their expected service life or obsolete.
ATSI Transmission Zone M-3 Process
Remove the Tangy – Delaware 138 kV Line

Need Number: ATSI-2019-005
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution - 03/25/2019

Proposed Solution:
- Remove the Tangy – Delaware 138 kV Line and poles.
- Remove Tangy’s B50 relays associated with the Pilot wire scheme (CEY,NAA and CFPG).
- Keep all other relaying and equipment associated with Breaker B50.
- Breaker B50 will be used as the transfer breaker.

Alternatives Considered:
- Replace the obsolete relaying and phone line with fiber and 411L PR/L90 BU scheme with both using current differential over fiber.

Estimated Project Costs: $0.6M
Projected IS Date: 06/30/2020
Status: Conceptual
Supplemental Project ID: s1949
Need Number: ATSI-2019-006
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
Solution – 03/25/2019

Project Driver(s):
Operational Flexibility and Efficiency
Infrastructure Resilience

Specific Assumption Reference(s)
Global Considerations
- System reliability and performance
- Substation / Line equipment limits
- Reliability of Non-Bulk Electric System (Non-BES) facilities
- Load and risk in planning and operational scenarios
- Load and/or customers at risk on single transmission lines

Problem Statement
Elm 138 kV Area
The contingency loss of the Ivanhoe-Packard 138 kV line followed by the loss of the Niles-Niles Central Muni 138 kV line results in the loss of approximately 137 MW and 28,600 customers at six (6) transmission service points.
- Over the past five years, the Ivanhoe-Packard 138 kV line has experienced approximately 2 outages (1 sustained, 1 momentary).
- Over the past five years, the Niles-Niles Central Muni 138 kV line has experienced approximately 4 outages (1 sustained, 3 momentary).
Need Number: ATSI-2019-006
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution – 03/25/2019

Proposed Solution:
Elm 138 kV Ring Bus and Line Build
- Convert Ivanhoe 138 kV substation to a six (6) breaker ring bus configuration by installing two (2) 138 kV breakers
- Convert Elm 138 kV substation to a five (5) breaker ring bus configuration (future 6) by installing four (4) 138 kV breakers
- Build approximately 3 miles of 138 kV line from Ivanhoe to Elm.

Transmission Line Ratings:
- Ivanhoe – Elm 138 kV Line
  - After Proposed Solution: 274 MVA SN / 333 MVA SE

Alternatives Considered:
- Build new transmission line (approximately 3 miles) from Niles to Niles Central Muni and convert Niles Central Muni to a four (4) breaker ring bus configuration (space constraints at Niles)

Estimated Project Cost: $12.1M
Projected IS Date: 6/1/2023
Status: Conceptual
Supplemental Project ID: s1950
Need Number: ATSI-2019-007
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution - 03/25/2019

Project Driver(s):
Operational Flexibility and Efficiency
Infrastructure Resilience

Specific Assumption Reference(s)
Global Considerations
- System reliability and performance
- Substation / Line equipment limits
- Reliability of Non-Bulk Electric System (Non-BES) facilities
- Load and risk in planning and operational scenarios
- Load and/or customers at risk on single transmission lines

Problem Statement
Jackman 138 / 69 kV Area
The Jackman 69 kV substation is electrically isolated from the Jackman 138 kV substation; it is sourced from Dixie 69 kV substation. The contingency loss of the Dixie-Jackman 69 kV line or a stuck breaker at Dixie substation results in the loss of approximately 43 MW and 19,000 customers at three transmission service points.
- Over the past five years, the Dixie-Jackman 69 kV line has experienced approximately 1 outage (1 sustained, 0 momentary).
**Need Number:** ATSI-2019-007  
**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019  
**Previously Presented:** Need - 01/14/2019  
Solution - 03/25/2019

**Proposed Solution:**  
**Jackman 69 kV Ring Bus and Transformer**  
- Expand Jackman substation to a five (5) breaker 69 kV ring bus by adding 5 breakers.  
  - Create positions for two transformers, a capacitor bank, and two line exits.  
- Add a 138 kV high side breaker and install a 138 / 69 kV 134 MVA transformer.  
- Close the normally open circuit switcher at Hawley substation to network the Jackman 69 kV system with the Vulcan sourced 69 kV system by replacing both 69 kV circuit switchers at Hawley substation with 69 kV circuit breakers.

**Transmission Line Ratings:**  
- **Jackman-Vulcan 69 kV Line**  
  - Before Proposed Solution: 96 MVA SN / 96 MVA SE  
  - After Proposed Solution: 107 MVA SN / 132 MVA SE  
- **Jackman-Dixie 69 kV Line**  
  - Before Proposed Solution: 107 MVA SN / 138 MVA SE  
  - After Proposed Solution: 107 MVA SN / 138 MVA SE

**Alternatives Considered:**  
- Maintain existing condition and elevated risk of failure

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**Estimated Project Cost:** $8.1M  
**Projected IS Date:** 13/30/2023  
**Status:** Conceptual  
**Supplemental Project ID:** s1951
**ATSI Transmission Zone M-3 Process**

**Weldon 69 kV Ring Bus and Line Build**

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**Need Number:** ATSI-2019-008  
**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019  
**Previously Presented:**  
- Need - 01/14/2019  
- Solution - 03/25/2019  

**Project Driver(s):**  
- Operational Flexibility and Efficiency  
- Infrastructure Resilience

**Specific Assumption Reference(s)**

- System reliability and performance  
- Substation / Line equipment limits  
- Reliability of Non-Bulk Electric System (Non-BES) facilities  
- Load and risk in planning and operational scenarios  
- Load and/or customers at risk on single transmission lines

**Problem Statement**

**Kimberly 69 kV Area**

The Kimberly 69 kV substation is served from a 3.6 mile radial transmission line from Salt Springs 138 / 69 kV substation with 19 MW and 5,500 customers at risk.

Additionally, the contingency loss of the nearby Berlin Lake-Boardman 69 kV line results in the loss of approximately 46 MW and 12,500 customers at four (4) transmission service points.
Need Number: ATSI-2019-008
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution - 03/25/2019

Proposed Solution:
**Weldon 69 kV Ring Bus and Line Build**
- Construct a new four (4) breaker ring bus (Weldon Substation) outside the existing Canfield Steel substation.
- Network the new four (4) breaker ring bus by completing the following:
  - Loop the existing Canfield Steel radial 69 kV circuit into the new Weldon substation
  - Loop the existing Berlin Lake-Boardman 69 kV line into new Weldon substation by constructing roughly 0.6 miles 69 kV line adjacent to existing Canfield Steel 69 kV radial circuit
  - Build new Weldon-Kimberly 69 kV line (approximately 6.4 miles).
- Install new line exit switch and SCADA to the line exits at Kimberly.
- Install auto-sectionalizing scheme at Canfield substation.

**Transmission Line Ratings:**
**Berlin Lake-Weldon 69 kV Line**
- After Proposed Solution: 80 MVA SN / 96 MVA SE
**Weldon-Boardman 69 kV Line**
- After Proposed Solution: 80 MVA SN / 96 MVA SE
**Weldon-Kimberly 69 kV Line**
- After Proposed Solution: 111 MVA SN / 135 MVA SE

Alternatives Considered:
- Install ring bus at Canfield substation (Space constrained)
- Network Kimberly substation by building a new 69 kV line from Kimberly to Salt Springs substation

**Estimated Project Cost:** $17.4M
**Projected IS Date:** 6/1/2023
**Status:** Conceptual
**Supplemental Project ID:** s1952
Need Number: ATSI-2019-011
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution - 03/25/2019

Project Driver(s):
Equipment Material, Condition, Performance and Risk
Operational Flexibility and Efficiency
Infrastructure Resilience

Specific Assumption Reference(s)
Global Considerations
- System reliability and performance
- Substation / Line equipment limits
Upgrade Relay Schemes
- Bus protection schemes
- Relay schemes that have a history of mis-operation

Problem Statement
Evergreen Substation 138 kV Equipment and Protection
- BES bus protection is presently performed by a complex scheme that has a history of causing mis-operations at other substations. The scheme uses distributed electromechanical relays to exclude a bus fault rather than detecting the bus fault directly.
ATSI Transmission Zone M-3 Process

**Evergreen 138 kV Relay Upgrades**

**Proposed Solution:**

*Evergreen 138 kV Relay Upgrades*

- Replace bus protection scheme with dual differential protection.
- Replace bus PTs due to condition
- Replace 3 breakers (B23, B24, and B27 bus transfer) due to condition and insufficient lack of sufficient CTs for proper system to support standard, redundant bus protection.

**Transmission Line Ratings:**

- **Evergreen-Ivanhoe 138 kV Line**
  - Before Proposed Solution: 226 MVA WN / 249 MVA WE
  - After Proposed Solution: 226 MVA WN / 286 MVA WE
- **Evergreen-Niles 138 kV Line**
  - Before Proposed Solution: 224 MVA SN / 293 MVA SE
  - After Proposed Solution: 278 MVA SN / 339 MVA SE

**Alternatives Considered:**

- Maintain existing protection scheme with high risk for mis-operation.

**Estimated Project Cost:** $1.3M

**Projected IS Date:** 3/1/2021

**Status:** Conceptual

**Supplemental Project ID:** s1954

No diagram required.

All work is within the substation.
**Need Number:** ATSI-2019-012

**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019

**Previously Presented:**
- Need - 01/14/2019
- Solution - 03/25/2019

**Project Driver(s):**
- Equipment Material, Condition, Performance and Risk
- Operational Flexibility and Efficiency
- Infrastructure Resilience

**Specific Assumption Reference(s):**

- Global Considerations
  - System reliability and performance
  - Substation / Line equipment limits

**Problem Statement**

Frisco Substation 69 kV Protection

- Line protection at Frisco substation consists of a single relay protection scheme. A recent relay failure during a fault at a nearby substation led to delayed fault clearing and a larger number of customers affected than necessary. There is not backup relay schemes to reduce customer exposure to a similar single point of failure.
Proposed Solution:
Frisco 69 V Relay Upgrades
- Replace bus protection with dual differential scheme.
- Upgrade relays and substation conductors on the Frisco-Maple 69 kV line exit.

Transmission Line Ratings:
- Frisco-Maple #1 69 kV Line (Frisco-Knox T)
  - Before Proposed Solution: 72 MVA SN / 72 MVA SE
  - After Proposed Solution: 80 MVA SN / 96 MVA SE

Alternatives Considered:
- Maintain existing protection scheme with high risk for mis-operation and single point of failure.

Estimated Project Cost: $0.3M
Projected IS Date: 12/31/2020
Status: Conceptual
Supplemental Project ID: s1955

No diagram required.
All work is within the substation
Need Number: ATSI-2019-013
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
Solution - 03/25/2019

Project Driver(s):
- Equipment Material, Condition, Performance and Risk
- Operational Flexibility and Efficiency
- Infrastructure Resilience

Specific Assumption Reference(s)
Global Considerations
- System reliability and performance
- Substation / Line equipment limits

Upgrade Relay Schemes
- Protection system with single point of failure

Problem Statement
Maple Substation 69 kV Protection
- Line protection at Maple substation consists of a single relay protection scheme. A recent relay failure during a fault at a nearby substation led to delayed fault clearing and a larger number of customers affected than necessary. There is not backup relay schemes to reduce customer exposure to a similar single point of failure.
Need Number: ATSI-2019-013
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
Solution - 03/25/2019

Proposed Solution:
Maple 69 kV Relay Upgrades
- Replace bus protection scheme with dual differential protection.
- Replace two breakers (B118, and B134) due to condition and lack of sufficient CTs to support standard redundant bus protection.
- Upgrade the relays on the Maple-Frisco #2 69 kV line exit.

Transmission Line Ratings:
- Maple-Frisco #2 69 kV Line (Maple-Thompson T)
  - Before Proposed Solution: 62 MVA SN / 62 MVA SE
  - After Proposed Solution: 80 MVA SN / 96 MVA SE

Alternatives Considered:
- Maintain existing protection scheme with high risk for mis-operation and single point of failure.

Estimated Project Cost: $0.95M
Projected IS Date: 12/31/2021
Status: Conceptual
Supplemental Project ID: s1956
Need Number: ATSI-2019-017
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
Solution – 03/25/2019

Project Driver(s):
Equipment Material, Condition, Performance and Risk

Specific Assumption Reference(s)
Global Factors
- At or beyond expected service life or obsolete
- Failure risk, to the extent caused by asset design characteristics, or historical industry/company performance data, or application design error
- Show a high level of criticality to system performance and operations

Substation Condition Rebuild / Replacement
- Circuit breakers and other fault interrupting devices
- Switches
- Relays
- CCVTs

Problem Statement
Fowles – NASA Q16 138 kV Terminal Equipment
- One (1) 138 kV breaker at Fowles (Q16), associated switches, relays, and CCVTs are showing degrading performance, increasing maintenance, age (60 years), and obsolescence of equipment and spare parts.
ATSI Transmission Zone M-3 Process
Fowles 138 kV Breaker and Substation Upgrades

Proposed Solution:
Fowles 138 kV Breaker and Substation Upgrades
- Replace the 138 kV Q16 breaker at Fowles, associated switches, substation conductor, EM relays, and CCVTs.

Transmission Line Ratings:
- Fowles-NASA Q16 138 kV Line (Fowles-Dunkirk Tap)
  - Before Proposed Solution: 153 MVA SN / 199 MVA SE
  - After Proposed Solution: 237 MVA SN / 287 MVA SE

Alternatives Considered:
- Maintain existing condition and risk of failure.

Estimated Project Cost: $0.7M
Projected IS Date: 12/31/2019
Status: Conceptual
Supplemental Project ID: s1957

No diagram required.
All work is within the substation.
Need Number: ATSI-2019-019
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
                     Solution – 03/25/2019

Project Driver(s):
Equipment Material, Condition, Performance and Risk

Specific Assumption Reference(s)
Global Factors
- At or beyond expected service life or obsolete
- Failure risk, to the extent caused by asset design characteristics, or historical
- Industry/company performance data, or application design error
- Show a high level of criticality to system performance and operations

Substation Condition Rebuild / Replacement
- Circuit breakers and other fault interrupting devices
- Switches
- Current transformers (CTs), control cables, and cable trays
- Carrier sets and associated wave-traps
- Line Arresters, Risers and connections

Problem Statement
West Akron 138 kV Substation
One (1) 138 kV Oil Circuit Breaker (OCB) breaker (B1) at West Akron, lightning arresters and associated
switches, and CCVTs are showing degrading performance, increasing maintenance, age (30 years), and
obsolescence of equipment and spare parts.
ATSI Transmission Zone M-3 Process
West Akron 138 kV Breaker and Substation Upgrades

Need Number: ATSI-2019-019
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
  Need - 01/14/2019
  Solution – 03/25/2019

Proposed Solution:
West Akron 138 kV Breaker and Substation Upgrades
- Replace the 138 kV B1 Oil Circuit Breaker (OCB) breaker at West Akron, wave-trap, substation conductor, and associated switches, and CCVTs

Transmission Line Ratings:
- West Akron-Pleasant Valley 138 kV Line (West Akron-Bath Tap)
  - Before Proposed Solution: 196 MVA SN / 228 MVA SE
  - After Proposed Solution: 196 MVA SN / 242 MVA SE

Alternatives Considered:
- Maintain existing condition and risk of failure.

Estimated Project Cost: $0.6M
Projected IS Date: 12/01/2019
Status: Conceptual
Supplemental Project ID: s1958

No diagram required.
All work is within the substation.
Need Number: ATSI-2019-020
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
Solution – 03/25/2019

Project Driver(s):
*Equipment Material, Condition, Performance and Risk*

**Specific Assumption Reference(s)**

*Global Factors*
- At or beyond expected service life or obsolete
- Show a high level of criticality to system performance and operations
- Impact customer outage frequency and/or duration

**Upgrade Relay Schemes**
- Relay schemes that have a history of mis-operation
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades
- Bus protection schemes

**Problem Statement**

Cloverdale 69 kV Substation Assessment

The electromechanical relays and communication equipment at the 69 kV Cloverdale substation have been identified to be prone to mis-operation. The disconnect switches have operation difficulty and are greater than 40 years of age. The 69 kV Bus PTs are nearing end of life with increased risk of failure.
Need Number: ATSI-2019-020
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
Solution – 03/25/2019

Proposed Solution:
Cloverdale 69 kV Relay and Equipment Upgrades
- Replace the 69 kV line relays related to breakers B269 and B233, relays related to transfer bus breaker relays B275, 69 kV bus PTs, and associated CTs, disconnection switches, and communication equipment at the 69 kV Cloverdale substation.

Transmission Line Ratings:
- Cloverdale-Dale #2 69 kV Line (Cloverdale-Carmont Tap)
  - Before Proposed Solution: 139 MVA SN / 153 MVA SE
  - After Proposed Solution: 139 MVA SN / 169 MVA SE

Alternatives Considered:
- Maintain existing condition and risk of failure.

Estimated Project Cost: $0.5M
Projected IS Date: 6/1/2020
Status: Conceptual
Supplemental Project ID: s1959

ATSI Transmission Zone M-3 Process
Cloverdale 69 kV Relay and Equipment Upgrades

No diagram required.
All work is within the substation

SRRTEP Committee Western – FirstEnergy Local Plan
Longview 69 kV Substation Assessment

- The electromechanical relays and communication equipment at the 69 kV Longview substation have been identified to be prone to mis-operation. The disconnect switches have operation difficulty and the 69 kV Bus PTs are nearing end of life with increased risk of failure.
Need Number: ATSI-2019-021
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution – 03/25/2019

Proposed Solution:
Longview 69 kV Relay Upgrades
- Replace line relays and bus transfer switches associated with breakers B228, B232, B215, B70, B4 and bus tie breaker B94.
- Replace 69 kV bus PTs.
- Longview-Mohican 69 kV line being rebuilt under ATSI-2019-024

Transmission Line Ratings:
- Longview-Mohican 69 kV Line (Longview-Mifflin Muni Tap)
  - Before Proposed Solution: 36 MVA SN / 36 MVA SE
  - After Proposed Solution: 80 MVA SN / 96 MVA SE

Alternatives Considered:
- Maintain existing condition and risk of failure.

Estimated Project Cost: $1.3M
Projected IS Date: 09/23/2019
Status: Conceptual
Supplemental Project ID: s1960

No diagram required.
All work is within the substation
Need Number: ATSI-2019-022
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution – 03/25/2019

Project Driver(s):
Equipment Material, Condition, Performance and Risk

Specific Assumption Reference(s)
Global Factors
- Level of criticality to system performance and operations
- Equipment installation times (long lead and/or extended)
- Environmental considerations
- Expected service life (at or beyond) or obsolescence

Substation Condition Rebuild / Replacement
- Power transformers and load tap changers (LTCs)

Problem Statement
Hoytdale Substation Transformer Assessment
- The existing 345 / 138 kV Hoytdale transformer #1 is showing end of service life issues; including oil leaks, moisture ingress, problematic cooling controls, unreliable gauges / annunciators, failing pumps and relays that are prone to mis-operations.
Need Number: ATSI-2019-022
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution – 03/25/2019

Proposed Solution:
Hoytdale 345 / 138 kV Transformer #1
- Replace the 345 / 138 kV Transformer #1 400 MVA transformer with a standard 448 MVA transformer.
- Replace existing relays, MOABs A-108 and A-36, and CCVTs

Transmission Line Ratings:
- Hoytdale 345 / 138 kV Transformer #1
  - Before Proposed Solution: 514 MVA SN / 533 MVA SE
  - After Proposed Solution: 533 MVA SN / 601 MVA SE

Alternatives Considered:
- Rebuild and reseal transformer, replacing pumps, bushings, gauges and cooling controls. Replace identified relays, CCVTs, and MOABs. Add on-line monitoring to transformer.
- Maintain existing condition and risk of failure.

Estimated Project Cost: $4.8M
Projected IS Date: 6/1/2021
Status: Conceptual
Supplemental Project ID: s1961

No diagram required.
All work is within the substation
ATSI Transmission Zone M-3
Process

New Castle 138 kV and 69 kV Breakers

Substation Condition Rebuild / Replacement
- Circuit breakers and other fault interrupting devices
- Switches
- Risers and connections

Problem Statement
New Castle 138 kV and 69 kV Substation Assessment
- One (1) 138 kV OCB breaker (B166) and five (5) 69 kV OCB breakers (B32, B86, B90, B96 and B106) at New Castle are showing end of life characteristics; including deteriorated bushings, mechanism, oil leaks, and age (> 30 years) with increasing maintenance and obsolescence of equipment and spare parts. Associated disconnect switches are also deteriorating with failures and operating difficulties.
Need Number: ATSI-2019-023  
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019  
Previously Presented: Need - 01/14/2019  
Solution – 03/25/2019

Proposed Solution:
New Castle 138 kV and 69 kV Breakers
- Replace existing 138 kV oil circuit breaker B166, five (5) 69 kV oil circuit breakers (B32, B86, B90, B96, and B106), substation conductor, and associated disconnect switches at New Castle substation.
- Upgrade substation conductor at Lowellville substation on the New Castle-Lowellville 69 kV line.
- Upgrade disconnect switches at Frisco substation on the New Castle-Frisco 69 kV line.

Transmission Line Ratings:
- New Castle-Lowellville 69 kV Line (Lowellville-Bessemer Tap)
  - Before Proposed Solution: 88 MVA SN / 115 MVA SE
  - After Proposed Solution: 100 MVA SN / 121 MVA SE
- New Castle-Frisco 69 kV Line (Frisco-Kopple Tap)
  - Before Proposed Solution: 82 MVA SN / 103 MVA SE
  - After Proposed Solution: 100 MVA SN / 121 MVA SE

Alternatives Considered:
- Maintain existing condition and risk of failure.

Estimated Project Cost: $3.4M
Projected IS Date: 12/31/2020
Status: Conceptual
Supplemental Project ID: s1962

No diagram required.  
All work is within the substation
Need Number: ATSI-2019-024
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented: Need - 01/14/2019
Solution – 03/25/2019

Project Driver(s):
Equipment Material, Condition, Performance and Risk

Specific Assumption Reference(s)
Global Factors supporting Line Rebuild
- Negative impact on equipment health and/or system reliability
- Age/condition of wood pole structures and line hardware
- Increasing negative trend in maintenance findings and/or costs
- Limited availability of spare parts and/or vendor technical support
- Current design criteria, applicable codes, and industry best practices

Problem Statement
Coulter-Longview 69 kV Line Assessment
- The poles and associated hardware on this line have reached end of life with 90% of the poles greater than 60 years.
- Maintenance and repairs are trending upward in frequency and severity.
- Four Air Break switches are obsolete and no longer supported for parts.
- Conductor (1/0 and 2/0 Copper) dates to original construction

System Performance
- Over the past 5 years, the Coulter-Longview 69 kV line has experienced 10 outages (6 sustained, 4 momentary).
**ATSI Transmission Zone M-3 Process**

**Longview-Mohican 69 kV Line (Longview-Coulter 69 kV Line Segment)**

**Need Number:** ATSI-2019-024  
**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019  
**Previously Presented:** Need - 01/14/2019  
**Solution – 03/25/2019**

**Proposed Solution:**

Longview-Mohican 69 kV Line (Longview-Coulter 69 kV Line Segment)

- Rebuild the Longview-Coulter 69 kV line segment (approximately 15.8 miles of the 22.1 line miles), replace four (4) line switches (A-10, A-19, A-23 and A-27) and add SCADA control.
- Terminal equipment at Longview substation to be upgraded under ATSI-2019-021; including:
  - Line relaying, substation conductor, and disconnect switches

**Transmission Line Ratings:**

- Longview-Mohican 69 kV Line
  - Before Proposed Solution: 36 MVA SN / 36 MVA SE
  - After Proposed Solution: 80 MVA SN / 96 MVA SE

**Alternatives Considered:**

- Selective pole replacements and line rehab. This alternative was not selected due to 99% of the poles not meeting reliability evaluation for age and condition: Greater than 70 years old, top rot, woodpecker, failed hammer and sound tests, worn attachment hardware, rising maintenance costs.

**Estimated Project Cost:** $22.2M  
**Projected IS Date:** 12/31/2022  
**Status:** Conceptual  
**Supplemental Project ID:** s1963
Need Number: ATSI-2019-025
Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
- Need - 01/14/2019
- Solution – 03/25/2019

Project Driver(s):
*Equipment Material, Condition, Performance and Risk*

**Specific Assumption Reference(s)**
Global Factors supporting Line Rebuild
- Negative impact on equipment health and/or system reliability
- Age/condition of wood pole structures and line hardware
- Increasing negative trend in maintenance findings and/or costs
- Limited availability of spare parts and/or vendor technical support
- Current design criteria, applicable codes, and industry best practices

**Problem Statement**
**Brush Wellman-Ottawa 69 kV Line Assessment**
- The poles and associated hardware on this line have reached end of life with 92% of the poles greater than 60 years.
- Maintenance and repairs are trending upward in frequency and severity.
- Four Air Break switches are obsolete and no longer supported for parts.

**System Performance**
- Over the past 5 years, the Brush Wellman-Ottawa 69 line has experienced 4 outages (3 sustained, 1 momentary).
**Need Number:** ATSI-2019-025  
**Process Stage:** Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019  
**Previously Presented:** Need - 01/14/2019  
Solution – 03/25/2019

**Proposed Solution:**  
*Brush Wellman-Ottawa 69 kV Line*  
- Rebuild the Brush Wellman-Ottawa 69 kV line (approximately 7.3 miles)  
- Replace four line switches; A-7240, A-7228, A-7235 and A-7235 N.O  
- Upgrade the terminal equipment at Brush Wellman substation including:  
  - Substation conductors and relay communication equipment

**Transmission Line Ratings:**  
- *Brush Wellman-Ottawa 69 kV Line*  
  - Before Proposed Solution: 72 MVA SN / 72 MVA SE  
  - After Proposed Solution: 80 MVA SN / 96 MVA SE

**Alternatives Considered:**  
- Selective pole replacements (REHAB) and continue to maintain from present condition with risk of failure.

**Estimated Project Cost:** $10.0M  
**Projected IS Date:** 12/31/2022  
**Status:** Conceptual  
**Supplemental Project ID:** s1964
ATSI Transmission Zone M-3 Process
Relay Misoperation Upgrades (Multiple Locations)

Process Stage: Submission of Supplemental Project for Inclusion in the Local Plan – 10/11/2019
Previously Presented:
Need - 01/14/2019
Solution – 03/25/2019

Project Driver(s):
Operational Flexibility and Efficiency
Infrastructure Resilience

Specific Assumption Reference(s)
Global Factors
- System reliability and performance
- Substation / line equipment limits

Upgrade Relay Schemes
- Relay schemes that have a history of mis-operation
- Obsolete and difficult to repair communication equipment (DTT, Blocking, etc.)
- Communication technology upgrades
- Bus protection schemes

Map Not Shown
Multiple Locations

Continued on next slide...
Problem Statement

PJM Zone - ATSI

- FirstEnergy has identified protection schemes using a certain vintage of relays and communication equipment that have a history of misoperation.
- Proper operation of the protection scheme requires all the separate components perform adequately during a fault.
- In many cases the protection equipment cannot be repaired due to a lack of replacement parts and available expertise in the outdated technology.
- Transmission line ratings are limited by terminal equipment.

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<thead>
<tr>
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<tbody>
<tr>
<td>026</td>
<td>Allen Junction-Vulcan 138 kV Line</td>
<td>290 / 325</td>
<td>290 / 346</td>
<td>Line Relay, Substation Conductor / Drops</td>
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<tr>
<td>027</td>
<td>Avery 138 / 69 kV Substation</td>
<td>153 / 153</td>
<td>177 / 177</td>
<td>Relay, Substation Conductor / Drops, Disconnect Switches</td>
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<tr>
<td>028</td>
<td>Bayshore-GM Powertrain 138 kV Line</td>
<td>278 / 342</td>
<td>278 / 343</td>
<td>Line Relay</td>
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<tr>
<td>030</td>
<td>Blue Jacket-Kirby 138 kV Line</td>
<td>218 / 269</td>
<td>278 / 339</td>
<td>External Company Equipment</td>
</tr>
<tr>
<td>032</td>
<td>Cedar Street-New Castle 138 kV Line</td>
<td>294 / 350</td>
<td>370 / 452</td>
<td>Line Relay, CT, Circuit Breaker, Substation Conductor / Drops, Disconnect Switches</td>
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<tr>
<td>033</td>
<td>East Akron-West Ravenna 138 kV Line</td>
<td>176 / 229</td>
<td>200 / 242</td>
<td>Substation Conductor / Drops</td>
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<tr>
<td>034</td>
<td>GM Defiance-Richland #1 138 kV Line</td>
<td>216 / 229</td>
<td>216 / 264</td>
<td>Line Relay</td>
</tr>
<tr>
<td>035</td>
<td>GM Defiance-Richland #2 138 kV Line</td>
<td>216 / 229</td>
<td>216 / 264</td>
<td>Line Relay</td>
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</table>

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### Problem Statement – Continued from previous slide

<table>
<thead>
<tr>
<th></th>
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</tr>
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<tbody>
<tr>
<td>037</td>
<td>Hanna-West Ravenna #1 138 kV Line</td>
<td>295 / 369</td>
<td>324 / 395</td>
<td>Substation Conductor / Drops</td>
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<tr>
<td>038</td>
<td>Hoytdale-Maple 138 kV Line</td>
<td>278 / 332</td>
<td>278 / 339</td>
<td>Wave-trap</td>
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<tr>
<td>039</td>
<td>Hyatt-Tangy 345 kV Line</td>
<td>971 / 971</td>
<td>1560 / 1900</td>
<td>External Company Equipment</td>
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<tr>
<td>040</td>
<td>Ivanhoe-Mahoningside 138 kV Line</td>
<td>196 / 222</td>
<td>200 / 242</td>
<td>Wave-trap</td>
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<tr>
<td>041</td>
<td>Ivanhoe-Packard 138 kV Line</td>
<td>196 / 210</td>
<td>200 / 242</td>
<td>Line Relay, Wave-trap</td>
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<td>042</td>
<td>Jennings-LTV West Q-12 138 kV Line</td>
<td>43 / 43</td>
<td>256 / 262</td>
<td>Line Relay, CT, Circuit Breaker</td>
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<tr>
<td>043</td>
<td>Jennings-LTV West Q-14 138 kV Line</td>
<td>43 / 43</td>
<td>256 / 262</td>
<td>Line Relay, CT, Circuit Breaker</td>
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<td>045</td>
<td>Midway-Levis Park 138 kV Line</td>
<td>278 / 286</td>
<td>308 / 376</td>
<td>Line Relay, Substation Conductor / Drops</td>
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<tr>
<td>046</td>
<td>Midway-Napoleon 138 kV Line</td>
<td>161 / 179</td>
<td>161 / 194</td>
<td>Meter</td>
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<tr>
<td>047</td>
<td>Salt Springs-Riverbend 138 kV Line</td>
<td>223 / 223</td>
<td>278 / 339</td>
<td>Line Relay, CT, Substation Conductor / Drops</td>
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<tr>
<td>048</td>
<td>Star-Wadsworth Muni 138 kV Line</td>
<td>221 / 262</td>
<td>233 / 282</td>
<td>Substation Conductor / Drops</td>
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<tr>
<td>049</td>
<td>West Akron-Babb 138 kV Line</td>
<td>190 / 223</td>
<td>200 / 242</td>
<td>Line Relay, Wave-trap, Substation Conductor / Drops</td>
</tr>
</tbody>
</table>
## ATSI Transmission Zone M-3 Process

### Relay Misoperation Upgrades (Multiple Locations)

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>026</td>
<td>Allen Junction-Vulcan 138 kV Line</td>
<td>308 / 376 (Vulcan-Toledo U Tap)</td>
<td>Vulcan: replace 138 kV breaker B-13397, disconnect switches, relay panel, CCVTs, line tuner, and wave trap. Allen Junction: replace 138 kV breaker B-13377, disconnect switches, relay panel, CCVTs, line tuner, and wave trap.</td>
<td>$0.9 M</td>
<td>11/01/2019</td>
</tr>
<tr>
<td>027</td>
<td>Avery 138 / 69 kV Substation</td>
<td>177 / 177 (Transformer)</td>
<td>Avery: Replace Avery 138 / 69 kV transformer relaying, substation conductor and disconnect switches.</td>
<td>$0.3 M</td>
<td>12/16/2019</td>
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<tr>
<td>028</td>
<td>Bayshore-GM Powertrain 138 kV Line</td>
<td>278 / 343</td>
<td>Replace Bayshore 238 kV Breaker, disconnect switches, wave trap, line tuner, CCVTs.</td>
<td>$0.6 M</td>
<td>11/1/2019</td>
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<tr>
<td>029</td>
<td>Bayshore-Jeep 138 kV Line</td>
<td>279 / 365</td>
<td>Bayshore: Replace Jeep 138 kV Line relay, replace CCVT, Wave Trap and Line Tuner.</td>
<td>$0.6 M</td>
<td>12/31/2019</td>
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<tr>
<td>030</td>
<td>Blue Jacket-Kirby 138 kV Line</td>
<td>278 / 339 (Blue Jacket Upgrade)</td>
<td>Kirby: Replace Blue Jacket - Kirby 138kV Line relay, CCVT, Line Tuner</td>
<td>$0.4 M</td>
<td>12/1/2021</td>
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<tr>
<td>032</td>
<td>Cedar Street-New Castle 138 kV Line</td>
<td>370 / 452</td>
<td>Cedar Street: Replace 138 kV Cedar Street – New castle Line relay</td>
<td>$0.2 M</td>
<td>4/1/2020</td>
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<tr>
<td>034</td>
<td>GM Defiance-Richland #1 138 kV Line</td>
<td>216 / 264</td>
<td>GM Defiance: Replace GM Defiance-Richland #1 138 kV Line relay, line conductor, disconnect switch, Remove Wave Trap and coupling capacitor. Richland: Replace GM-Defiance-Richland #1 138 kV Line relay, line conductor, Breaker B-13242, disconnect switch</td>
<td>$0.6 M</td>
<td>2/15/2022</td>
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<td>035</td>
<td>GM Defiance-Richland #2 138 kV Line</td>
<td>216 / 264</td>
<td>GM Defiance: Replace GM Defiance-Richland #2 138 kV Line relay, GOAB switch 13277, Wave trap, Line Tuner. PT’s, CCVT, upgrade substation conductor. Richland: Replace GM Defiance-Richland #2 138 kV line relay, breaker B-13243, disconnect switch, CCVT, Wave trap, Line Tuner, upgrade substation conductor</td>
<td>$1.1 M</td>
<td>3/30/2022</td>
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<td>037</td>
<td>Hanna-West Ravenna #1 138 kV Line</td>
<td>324 / 395</td>
<td>Hanna: Replace Hanna-West Ravenna 138 kV Line Relaying, Breaker B-7, Disconnect switches West Ravenna: Replace Hanna-West Ravenna 138 kV Line Relaying, disconnect switches, tuner</td>
<td>$0.7 M</td>
<td>4/1/2020</td>
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<tr>
<td>039</td>
<td>Hyatt-Tangy 345 kV Line</td>
<td>1560 / 1900 (Hyatt Upgrade)</td>
<td>Tangy: Replace Hyatt-Tangy 345 kV Line relaying, upgrade substation conductor</td>
<td>$0.2 M</td>
<td>6/1/2020</td>
</tr>
<tr>
<td>040</td>
<td>Ivanhoe-Mahoningside 138 kV Line</td>
<td>200 / 242</td>
<td>Ivanhoe: Replace Ivanhoe-Mahoningside 138 kV line relaying, disconnect switches, Wave trap, line tuner, and CCVTs Mahoningside: Replace Ivanhoe-Mahoningside 138 kV line relaying, breaker B-63, disconnect switch, CCVTs, Wave trap, line tuner</td>
<td>$1.2 M</td>
<td>3/31/2021</td>
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<tr>
<td>041</td>
<td>Ivanhoe-Packard 138 kV Line</td>
<td>200 / 242</td>
<td>Ivanhoe: Replace Ivanhoe-Packard 138 kV line relaying, breaker B-9, disconnect switches, CCVTs, Wave trap, line tuner, upgrade substation conductor Packard: Replace Ivanhoe-Packard 138 kV line relaying, breaker B-10, Air break Switch, disconnect switches, CCVTs, Wave trap, line tuner, upgrade substation conductor</td>
<td>$1.5 M</td>
<td>12/1/2021</td>
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<tr>
<td>042</td>
<td>Jennings-LTV West Q-12 138 kV Line</td>
<td>256 / 262</td>
<td>Jennings: Replace Jennings-LTV West Q-12 138 kV line relaying, disconnect switch</td>
<td>$0.2 M</td>
<td>6/1/2020</td>
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<tr>
<td>043</td>
<td>Jennings-LTV West Q-14 138 kV Line</td>
<td>256 / 262</td>
<td>Jennings: Replace Jennings-LTV West Q-14 138 kV line relaying, breaker B-7, disconnect switches, CCVTs</td>
<td>$0.5 M</td>
<td>12/1/2020</td>
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<tr>
<td>044</td>
<td>Kirby-Tangy 138 kV Line</td>
<td>278 / 339</td>
<td>Kirby: Replace Kirby-Tangy 138 kV line relaying Tangy: Replace Kirby-Tangy 138 kV line relaying, disconnect switches, CCVTs</td>
<td>$0.8 M</td>
<td>3/31/2021</td>
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## Solution Statement – Continued from previous slide

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<tr>
<td>045</td>
<td>Midway-Levis Park 138 kV Line</td>
<td>308 / 376</td>
<td>Midway: Replace Midway-Levis Park 138 kV line relaying, breaker 13300, CCVTs, wavetrap, line tuner, disconnect switches&lt;br&gt;Levis Park: Replace Midway-Levis Park 138 kV line relaying, breaker 13336, CCVTs, wavetrap, line tuner, disconnect switches</td>
<td>$1.0 M</td>
<td>12/31/2019</td>
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<tr>
<td>046</td>
<td>Midway-Napoleon 138 kV Line</td>
<td>161 / 194</td>
<td>Midway: Replace Midway-Napoleon 138 kV line relaying, breaker 13304, disconnect switch, CCVT’s, wavetrap, line tuner&lt;br&gt;Napoleon: Replace Midway-Napoleon 138 kV line relaying</td>
<td>$0.8 M</td>
<td>6/1/2020</td>
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<td>047</td>
<td>Salt Springs-Riverbend 138 kV Line</td>
<td>N/A</td>
<td>Cancelled Project – To be completed under ATSI-2019-003</td>
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<td>048</td>
<td>Star-Wadsworth Muni 138 kV Line</td>
<td>N/A</td>
<td>Cancelled Project – To be completed under PJM Supplemental # s1695</td>
<td>N/A</td>
<td>N/A</td>
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<tr>
<td>049</td>
<td>West Akron-Babb 138 kV Line</td>
<td>200 / 242</td>
<td>West Akron: Replace West Akron-Babb 138 kV line relaying, breaker b-159, disconnect switches, AB switch, CCVTs, upgrade substation conductor&lt;br&gt;Babb: Replace West Akron-Babb 138 kV line relaying, breaker, b-95, disconnect switch, AB switch, CCVTs, upgrade substation conductor</td>
<td>$0.9 M</td>
<td>6/01/2021</td>
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### Alternatives Considered:
- Maintain existing condition and elevated risk of failure

### Estimated Project Cost:
See Summary Tables

### Project IS Date:
See Summary Tables

### Status:
All projects are Conceptual

### Supplemental Project ID:
s1965-s1986

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No Diagrams Required
All work is within the substation
Revision History

4/15/2019 – V1 – Local Plan posted to pjm.com for S1754 – S1760
6/12/2019 – V2 – Local Plan updated to include S1794-S1805
10/11/2019 – V3 – Local Plan updated to include S1848; S1945-S1952; S1954-S1986