

PJM Generator Interconnection
Queue #Z1-079
Todhunter-Foster 345 kV
NTE Ohio, LLC 513 MW Capacity
Combined Cycle Natural Gas Project
Facilities Study Report

July, 2015
Duke Energy Corp.

A. Transmission Owner Facilities Study Summary

1. Description of Project

The Interconnection Customer (IC), NTE Ohio, LLC, is proposing the installation of a combined-cycle natural gas generating facility by December 2017 in Middletown, Ohio, near the intersection of Oxford State Road and Cincinnati Dayton Road. The location is approximately 1.5 miles northeast of the existing Duke Energy Ohio (DEO) Todhunter Substation facility. The IC requested the interconnection to be studied as a 513 MW capacity injection into the DEO system by tapping into the existing DEO Todhunter-Foster 345 kV circuit which is adjacent to the plant site.

The scope of this Facilities Study is to determine the facilities and estimated cost to:

- Interconnect the proposed NTE interconnection substation to the DEO Todhunter to Foster Circuit 4515. DEO proposed to provide this connection via the construction of a 345 kV interconnection substation which has been designated Garver Substation;
- Provide local and/or network upgrades necessary to maintain the reliability of the transmission system, including:
 - Replace (13) 138 kV circuit breakers at Todhunter with breakers rated 80 kA interrupting;
 - Install reactors on the low sides of the three Todhunter 345-138 kV autotransformers;
 - Reconductor the DEO 138 kV Circuit 5680 from Todhunter to Nickel substations to achieve 300 MVA capacity;
 - Upgrade Circuit 5680 terminal equipment at Todhunter and Nickel substations as required to accommodate the increased line capacity.

2. Amendments to the System Impact Study data or System Impact Study Results

The System Impact Study shows (14) 138 kV circuit breakers at Todhunter need to be replaced. The updated study indicates only (13) breakers need to be replaced instead.

Fault current limiting reactors need to be installed on the low side of all three Todhunter 345-138 kV autotransformers to allow synchronization of both units prior to the completion of the breaker replacement. Once all the thirteen breakers have been replaced, the temporary reactors will be removed from service.

PJM’s analysis of MISO, LGEE, and OVED revealed no upgrades in those territories; however there is a requirement for either resetting or replacing relays on the Mountaineer-Belmont circuit in Appalachian Power Company (AEP) territory.

3. Interconnection Customer’s Submitted Milestone Schedule

The Interconnections Customer’s milestone schedule is as follows:

Milestone	Date
Construction award/Commence construction	June 30, 2015
Grading substantially completed	October 2015
Step-up transformers delivered and installed	August 2016
Substation operational (backfeed from DEO to IC)	June 1, 2017
Full synchronization	December 31, 2017

4. Scope of Customer’s Work

The Interconnection Customer’s direct connection facilities, up to the point of interconnection to DEO’s facilities, include the following facilities:

- 345 kV line or bus from generator step-up connection bus to the substation bus at Garver
- 345 kV main air break disconnect and grounding switch
- Two 345 kV line circuit breakers with air break disconnect and grounding switches on the high side of the generator step-up transformers
- Two generator step up transformers with primary voltage of 345 kV
- Protection and control equipment for transformers, breakers and switches

5. Description of Facilities Included in the Facilities Study

The interconnection facilities to be constructed by DEO shall include a 345 kV switching substation and the necessary 345 kV line work required to redirect the Todhunter-Foster 345 kV line through the new Garver Substation. The existing Todhunter-Foster 345 kV circuit shall be looped through the Garver Substation. The 345 kV line work shall consist of the installation of six steel pole structures to intercept and redirect the Todhunter-Foster 345 kV circuit to the Garver Substation, and the necessary 345 kV conductors to connect the new structures to the termination structures in Garver Substation. Circuit breakers and their associated protection and control equipment shall be installed in Garver Substation to split the circuit into two separate circuits,

Todhunter to Garver and Garver to Foster. The Garver Substation bus and switching configuration shall consist of a 3-breaker ring bus which will have positions to terminate the two newly established circuits, and a position to connect to the IC's direct connection facilities. (System protection and control work required in the existing Todhunter and Foster substations to establish the two new 345 kV circuits will be handled on a separate DEO internal project which is not included in this facilities study.)

In addition to the above facilities that are needed to connect the NTE Ohio, LLC project to the DEO transmission system, it has been determined that the additional fault current contributed by the IC project will result in thirteen 138 kV circuit breakers at the DEO Todhunter Substation experiencing fault current in excess of their capabilities. Due to the magnitude of work required to replace these circuit breakers, it will not be possible to complete the replacement prior to the IC's desired commercial operation date. To allow synchronization of both units prior to the completion of the breaker replacement, DEO will install fault current limiting reactors on the low side of all three Todhunter 345-138 kV autotransformers such that the available fault current will be below the interrupting capability of the existing circuit breakers. Once all the thirteen breakers have been replaced, the temporary reactors will be removed from service.

The Todhunter Substation to Nickel Substation portion of 138 kV Circuit 5680 will also be overloaded for certain contingencies due to the Z1-079 project. Therefore, the cost to rebuild 3.3 miles of 138 kV line between Todhunter and Nickel substations is also included in this facilities study.

Appalachian Power Company (AEP) Upgrade: Per the System Impact Study report Appalachian Power Company (AEP) reports that the 4558/4791 MVA SN/SE ratings are no longer sufficient within the Z1 Queue. The Mountaineer Relay Compliance Trip Limit is the limiting element. An engineering study will need to be conducted to determine if the relay thermal limit settings can be adjusted to mitigate the overload. Cost estimate for relay setting adjustment is \$20K. A new relay package will be required if the relay thermal settings cannot be adjusted. Estimated Cost for the new relay package: \$300,000. The portion of this cost allocated to Z1-079 is \$55,742. (n4259).

6. Total Costs of Transmission Owner Facilities included in Facilities Study

The total cost to install the facilities summarized in item 5 above is estimated by DEO as follows:

Garver Substation work, n4474:	\$ 5,727,403
Circuit 4515 Loop - 345 kV Line work, n4473:	\$ 2,638,877
Todhunter 138 kV breaker replacement (13 CBs), n 4251:	\$ 8,115,876
Circuit 5680 Todhunter-Nickel Reconductor, n4254:	\$ 2,460,979
Todhunter 138 kV Reactors (3 sets), n4251.1-13	<u>\$ 1,091,074</u>
Total Estimated Cost of work to be performed by Duke Energy Ohio:	\$20,034,209
Additional cost for Appalachian Power Company (AEP) NUN: n4259:	\$ 55,742
Total:	\$20,089,951

7. Summary of Milestone Schedules for Completion of Work Included in Facilities Study
 DEO's milestone schedule for construction of the interconnection facilities is as follows:

Garver Substation work:

Milestone	Civil	Structural	Electrical
Engineering Complete	4/01/16	7/01/16	08/01/16
Material Delivery	6/01/16	08/01/16	10/01/16
Targeted Start of Construction	7/01/16	09/01/16	11/01/16
Targeted Completion of Construction	6/01/17	06/01/17	06/01/17
Testing and commission	3/01/17 – 06/01/17		
Project Complete	06/01/17		

Circuit 4515 Loop - 345 kV Line work:

Milestone	Date
Engineering Complete	10/01/16
Foundation Material Delivered	01/01/17
Overhead Line Material Delivered	02/01/17
Targeted Start of Construction (Foundations)	03/01/17
Targeted Start of Construction (Above Grade Work)	03/01/17
Project Complete	06/01/17

Todhunter 138 kV breaker replacement (13 CB):

Milestone	Civil	Structural	Electrical
Engineering Complete	08/01/18	8/01/18	09/01/18
Material Delivery	01/01/19	01/01/19	01/01/19
Targeted Start of Construction	03/01/19	03/01/19	03/01/19
Targeted Completion of Construction	12/31/20	12/31/20	12/31/20
Testing and commission	01/01/19 – 12/31/20		
Project Complete	12/31/20		

Circuit 5680 Todhunter – Nickel Reconductor:

Milestone	Date
Engineering Complete	05/01/16
Overhead Line Material Delivered	07/01/16
Targeted Start of Construction	09/01/16
Project Complete	12/31/16

Todhunter 138 kV Reactors (3 sets):

Milestone	Civil	Structural	Electrical
Engineering Complete	04/01/17	05/01/17	06/01/17
Material Delivery	05/01/17	08/01/17	08/01/17
Targeted Start of Construction	07/01/17	09/25/17	09/25/17
Targeted Completion of Construction	12/29/17	12/29/17	12/29/17
Testing and commission	09/25/17 – 12/31/17		
Project Complete	12/31/17		

The above described schedule calls for the 345 kV interconnection substation to be energized and fully operational by 6/1/2017. IC's schedule calls for their substation interconnection facilities to be operational by June 1, 2017. While IC may substantially complete construction and testing of their facilities by June 2017, it will not be possible to synchronize both generators until DEO completes the installation of the reactors at Todhunter which is scheduled to be completed by December 2017. It does not appear that this will impact IC's commercial operation date for the Z1-079 project.

B. Transmission Owner Facilities Study Results

1. Transmission Lines – New

The new transmission line construction required by this requested interconnection includes the interception and redirection of the existing Todhunter-Foster 345 kV transmission line through the new Garver Substation. The purpose and necessity of this work is to connect the output of the IC generation into the bulk electric system in a reliable manner. The new line construction shall consist of five spans of single-circuit 345 kV conductors, with a total circuit length of approximately 2700 feet. The termination points shall be two steel poles set in line with the Todhunter-Foster 345 kV circuit and two termination structures in the Garver Substation. It is anticipated that the construction of the above facilities shall be accomplished under a construction notice to the Public Utilities Commission of Ohio.

Specifications for the line extensions are as follows:

Nominal voltage rating: 345 kV

Construction type: overhead, single circuit, Alternating Current

Phase conductors: two 954 kcmil 45/7 ACSR conductors per phase

Static conductors: two 7#8 AW

Normal MVA ratings: 1529 MVA Summer and 1909 MVA Winter

Emergency MVA ratings: 1529 MVA Summer and 1909 MVA Winter

BIL: 1550 kV

Positive sequence impedance: approximately $0.0549 + j 0.6070$ ohms/mile

Zero sequence impedance: approximately $0.5595 + j 1.6967$ ohms/mile

A geographic map depicting the customer facility and proposed transmission line configuration is attached at the end of this report.

2. Transmission Lines – Upgrades

Todhunter to Nickel 138 kV Circuit 5680 will be upgraded to 300MVA capacity.

3. New Substation/Switchyard Facilities

This interconnection will require a new 345 kV switchyard to connect the IC facilities to the Todhunter-Foster 345 kV line. The purpose and necessity of the substation facilities is to enable the IC generator output to be injected into the bulk electric system in a reliable manner. The connection to the IC-owned Interconnection Facilities and the transmission system will be designed in a way to minimize any adverse reliability impacts to the transmission system. It will also allow DEO to operate the transmission system without degradation in the event of failure in the IC-owned facilities. The facilities shall be configured in a three-breaker ring bus arrangement which will have three termination positions, one each for the new Todhunter-Garver Substation 345 kV circuit, the new Garver Substation-Foster 345 kV circuit, and the connection to the IC generator step-up transformers.

The Garver Substation is anticipated to be located on the north side of the existing Todhunter-Foster 345 kV circuit, approximately 1.5 miles away from the Todhunter Substation in Butler County, Ohio.

It is anticipated that a Construction Notice will have to be filed with the Ohio Power Sting board for construction of the interconnection substation. All permitting, other than local building permits required for DEO's equipment and control building, will be obtained by NTE Ohio, LLC (i.e. Storm Water SWPPP, Zoning, OPSB.).

DEO's portion of the substation will consist of two structures supporting incoming transmissions lines and various structures supporting electric equipment. The approximate height of the structures will vary from twenty to seventy-five feet. All structures will be designed according to the National Electric Safety Code, American Society of Civil Engineers 113 (Substation Structure Design Guide), and American Institute of Steel Construction (Steel Construction Manual). The structures are

anticipated to be supported by drilled reinforced concrete piers, varying in length based on demand.

The site will include the following:

- Three (3) circuit breakers rated for 362 kV, 1300 kV BIL, 3000 A, 50 kAIC, 3 pole with the following current transformer arrangement: 2-2000:5 multi ratio bushing current transformers, C800, thermal rate factor 2.0, mounted on bushings #1, 3, 5 (6-total); 1-2000/1200/1000:5 metering current transformer, 0.3B2.0, thermal rate factor 2.0, mounted in the Z position on bushings #2, 4, 6 (3-total); 2-2000:5 multi ration current transformers, C800, thermal rate factor 2.0, mounted in the X & Y positions on bushings #2, 4, 6 (6-total).
- Six (6) 345 kV 3000 amp breaker disconnect switches with supporting structure, 2 - 345 kV 3000 amp motor operated line disconnect switches, and 1 - 345 kV 3000 amp motor operated transformer disconnect switch with support structure.
- Four (4) wave traps rated 345 kV, 1300 kV BIL, 3000 A.
- Ten (10) 345 kV coupling capacitor voltage transformers (CCVT) with support structures and 3 - 345 kV 500/5A extended range metering CTs with support structures.
- Nine (9) 345 kV line surge arrestors with support structures
- Two (2) 7200-120/240v 100 kva pad mount station power transformer
- Two (2) 13ft x 30ft prefab control buildings complete with battery system, ac & dc panel boards with auto transfer, lighting, and HVAC
- Bus support insulators rated for 345 kV, 1300kV BIL
- Bus rated for 3000 A.
- Circuits to Todhunter and Foster rated for a summer peaking rating of 2558A.

Protective Relaying, metering and communication will include the following:

- GE PVD protective relay will be used for the primary bus protection
- Schweitzer SEL-487B relay will be used for the backup bus protection
- Schweitzer SEL-421 relay and carrier will be used for primary line circuit protection
- Schweitzer SEL-421 relay and carrier will be used for backup line circuit protection
- Schweitzer SEL-451 relays will be used for circuit breaker control and breaker failure on all circuit breakers.
- Primary metering will be done with the 300:5 metering CT's and a set of CCVT's.
- Backup metering will be done with the circuit breaker metering CT's and a set of CCVT's.
- Primary communication with be done with our EMS/supervisory will be done with telephone company T1 leased line.

- Backup communication with our EMS/supervisory will be done via Verizon 3G wireless.

All structural and electrical design shall conform to applicable PJM technical requirements, philosophy and design standards.

A one-line diagram and a general arrangement drawing depicting the interconnection substation and connection to the NTE facilities are attached at the end of this report.

4. Upgrades to Substation/Switchyard Facilities

Thirteen 138 kV breakers (911, 915, 917, 921, 923, 927, 929, 933, 935, 937, 939, 941, and 945) at Todhunter Substation will be upgraded to circuit breakers rated 80 kA interrupting.

Three sets of 138 kV, 2500 Ampere fault current limiting reactors will be installed on the low sides of the TB 15, 16 and 17 transformers at Todhunter Substation. (These reactors will be removed upon completion of the installation of the 13 breakers).

5. Metering & Communications

DEO's metering standard calls for primary and backup meters, with separate current transformers and a dual-secondary winding potential transformer. Primary and back-up communication channels are also required. It is anticipated that primary communication will be done via telephone company T1 leased line, with backup communication via 3G wireless.

6. Environmental, Real Estate and Permitting Issues

NTE Ohio, LLC shall obtain all property required for the construction of the interconnection substation and convey rights to DEO for the installation of DEO-owned facilities. It is anticipated that a Construction Notice will have to be filed with the Ohio Power Sting board for construction of the interconnection substation. All permitting, other than local building permits required for DEO's equipment and control building, will be obtained by IC (i.e. Storm Water SWPPP, Zoning, OPSB.)

7. Summary of Results of Study

Cost Estimates

Note: Project Management, construction oversight, and other support services are included in "Indirect Cost".

Attachment Facilities:

Resource	Direct Costs			Indirect Costs			Total Cost (Direct & Indirect)
	Material	Labor	Total	Material	Labor	Total	
Transmission Line 4515 Detail Design		\$91,029	\$91,029		\$84,802	\$84,802	\$175,831
Transmission Line 4515 Material and Equipment	\$1,854,085		\$1,854,085	\$166,868		\$166,868	\$2,020,953
Transmission Line 4515 Construction and Testing		\$271,061	\$271,061		\$121,897	\$121,897	\$392,958
AFUDC - Transmission			\$0		\$49,135	\$49,135	\$49,135
N4473: Transmission Line 4515 Estimated Total Costs	\$1,854,085	\$362,090	\$2,216,175	\$166,868	\$255,834	\$422,702	\$2,638,877
Garver Substation Detail Design		\$528,732	\$528,732		\$664,432	\$664,432	\$1,193,164
Garver Substation Material and Equipment	\$2,441,793		\$2,441,793	\$221,847		\$221,847	\$2,663,640
Garver Substation Construction and Testing		\$1,118,887	\$1,118,887		\$632,582	\$632,582	\$1,751,469
AFUDC - Garver Substation			\$0		\$119,130	\$119,130	\$119,130
N4474: Garver Substation Estimated Total Costs	\$2,441,793	\$1,647,619	\$4,089,412	\$221,847	\$1,416,144	\$1,637,991	\$5,727,403
Attachment Facilities Estimated Grand Total	\$4,295,878	\$2,009,709	\$6,305,587	\$388,715	\$1,671,978	\$2,060,693	\$8,366,280

Network Facilities:

Resource	Direct Costs			Indirect Costs			Total Cost (Direct & Indirect)
	Material	Labor	Total	Material	Labor	Total	
Transmission Line 5680 Detail Design		\$179,500	\$179,500		\$157,844	\$157,844	\$337,344
Transmission Line 5680 Material and Equipment	\$766,013		\$766,013	\$68,941		\$68,941	\$834,954
Transmission Line 5680 Construction and Testing		\$744,190	\$744,190		\$510,193	\$510,193	\$1,254,383
AFUDC - Transmission			\$0		\$34,298	\$34,298	\$34,298
n4254: Transmission Line 5680 Estimated Total Costs	\$766,013	\$923,690	\$1,689,703	\$68,941	\$702,335	\$771,276	\$2,460,979
Todhunter Substation Detail Design		\$997,500	\$997,500		\$1,101,551	\$1,101,551	\$2,099,051
Todhunter Substation Material and Equipment	\$3,792,167		\$3,792,167	\$341,201		\$341,201	\$4,133,368
Todhunter Substation Construction and Testing		\$1,057,970	\$1,057,970		\$679,370	\$679,370	\$1,737,340
AFUDC - Todhunter Substation			\$0		\$146,117	\$146,117	\$146,117
n4251 1-13: Breakers Todhunter Substation) Estimated Total Costs	\$3,792,167	\$2,055,470	\$5,847,637	\$341,201	\$1,927,038	\$2,268,239	\$8,115,876
Todhunter Reactors Detail Design		\$63,395	\$63,395		\$70,114	\$70,114	\$133,509
Todhunter Reactors Material and Equipment	\$656,273		\$656,273	\$58,671		\$58,671	\$714,944
Todhunter Reactors Construction and Testing		\$137,646	\$137,646		\$99,251	\$99,251	\$236,897
AFUDC - Todhunter Reactors			\$0		\$5,724	\$5,724	\$5,724
N4251.14 Todhunter Reactors Estimated Total Costs	\$656,273	\$201,041	\$857,314	\$58,671	\$175,089	\$233,760	\$1,091,074
Network Facilities Estimated Grand Total	\$5,214,453	\$3,180,201	\$8,394,654	\$468,813	\$2,804,462	\$3,273,275	\$11,667,929

Grand Total of Facilities and Network Upgrades

\$20,034,209

Resource	Direct Costs			Indirect Costs			Total Cost (Direct & Indirect)
	Material	Labor	Total	Material	Labor	Total	
N4259: Appalachian Power Company (AEP) Relay Replacement contingency	\$25,084	\$15,050	\$40,134	\$2,230	\$13,378	\$15,608	\$55,742

Schedules

Garver Substation work (n4474):

Milestone	Civil	Structural	Electrical
Engineering Complete	4/01/16	7/01/16	08/01/16
Material Delivery	6/01/16	08/01/16	10/01/16
Targeted Start of Construction	7/01/16	09/01/16	11/01/16
Targeted Completion of Construction	6/01/17	06/01/17	06/01/17
Testing and commission	3/01/17 – 06/01/17		
Project Complete	06/01/17		

Circuit 4515 Loop - 345 kV Line work (n4473):

Milestone	Date
Engineering Complete	10/01/16
Foundation Material Delivered	01/01/17
Overhead Line Material Delivered	02/01/17
Targeted Start of Construction (Foundations)	03/01/17
Targeted Start of Construction (Above Grade Work)	03/01/17
Project Complete	06/01/17

Todhunter 138 kV breaker replacement (13 CBs, n4251.1-13):

Milestone	Civil	Structural	Electrical
Engineering Complete	08/01/18	8/01/18	09/01/18
Material Delivery	01/01/19	01/01/19	01/01/19
Targeted Start of Construction	03/01/19	03/01/19	03/01/19
Targeted Completion of Construction	12/31/20	12/31/20	12/31/20
Testing and commission	01/01/19 – 12/31/20		
Project Complete	12/31/20		

Circuit 5680 Todhunter – Nickel Reconductor (n4254):

Milestone	Date
Engineering Complete	05/01/16
Overhead Line Material Delivered	07/01/16
Targeted Start of Construction	09/01/16
Project Complete	12/31/16

Todhunter 138 kV Reactors (3 sets, n4251.14):

Milestone	Civil	Structural	Electrical
Engineering Complete	04/01/17	05/01/17	06/01/17
Material Delivery	05/01/17	08/01/17	08/01/17
Targeted Start of Construction	07/01/17	09/25/17	09/25/17
Targeted Completion of Construction	12/29/17	12/29/17	12/29/17
Testing and commission	09/25/17 – 12/31/17		
Project Complete	12/31/17		

The above described schedule calls for the 345 kV interconnection substation to be energized and fully operational by 6/1/2017. IC's schedule calls for their substation interconnection facilities to be operational by June 1, 2017. While NTE Ohio, LLC may substantially complete construction and testing of their facilities by June 2017, it will not be possible to synchronize both generators until DEO completes the installation of the reactors at Todhunter which is scheduled to be completed by December 2017. It does not appear that this will impact IC's commercial operation date for the Z1-079 project.

Assumptions

The following assumptions apply to the Duke Energy Ohio scope of work:

- Property acquisition to be performed by others with the assumed location as shown on drawing provided by NTE Ohio, LLC
- Site development to be performed by others with all DEO's equipment located in one fenced area
- DEO's relaying equipment to be located in its own control building.
- All permitting, other than building permits for DEO's equipment/buildings, to be performed by others. For example, Storm Water SWPPP, Zoning, OPSB, etc.
- Station power will be provided by two separated 13 kV sources from the DEO distribution system in the vicinity of the project.
- Acquisition of the right of way and permitting for the railroad crossing for the 345 kV loop can be obtained in a timely manner.

8. Information Required for Interconnection Service Agreement

Cost breakdown for the FERC filing of the Interconnection Service Agreement

Attachment Facilities:

Direct Charges Labor	\$2,009,709
Direct Charges Material	\$4,295,878
Indirect Charges Labor	\$1,503,713
Indirect Charges material	\$388,715
<u>Carrying Charges (@8.8%)</u>	<u>\$168,265</u>
Total	\$8,366,280

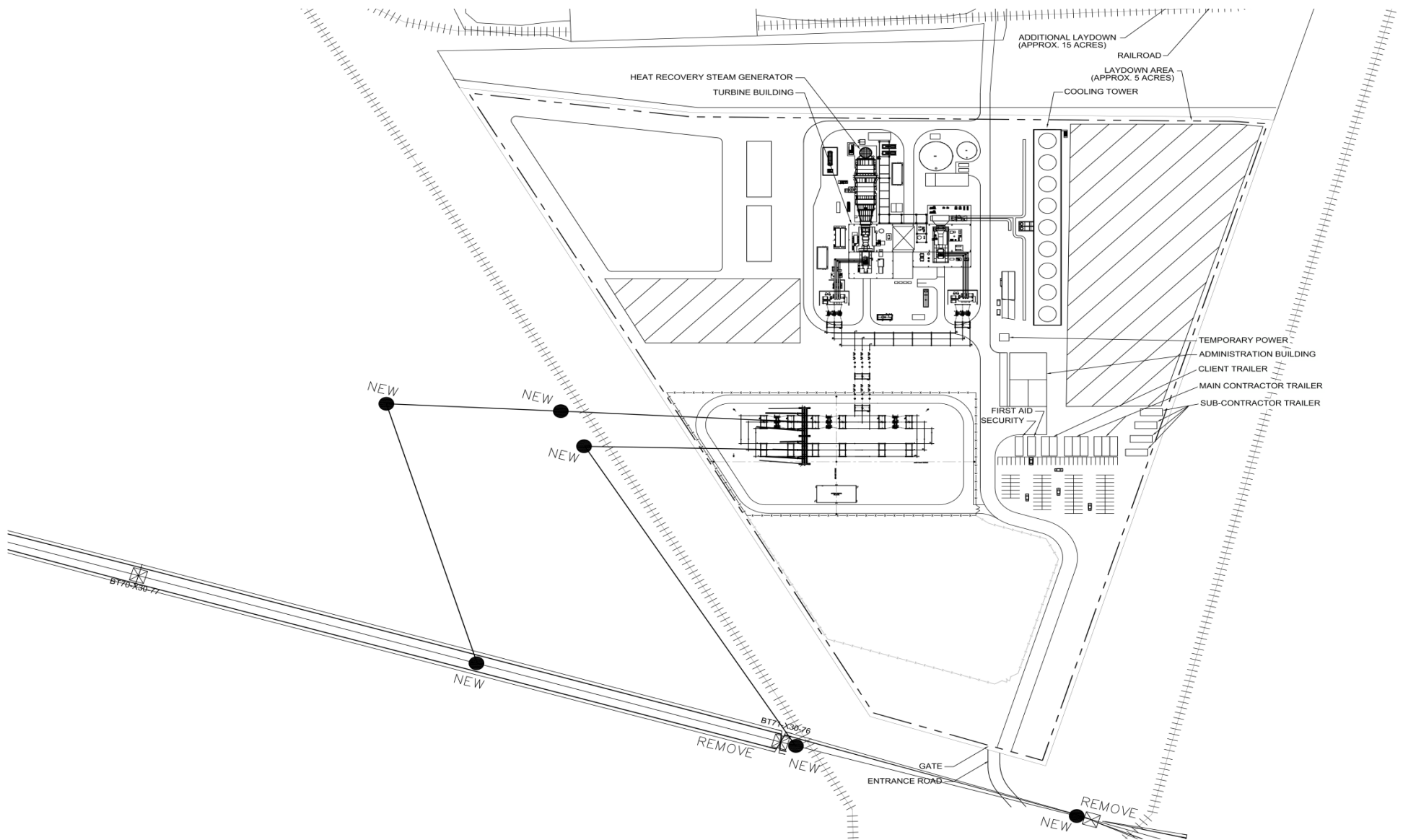
***Network Facilities:**

Direct Charges Labor	\$3,180,201
Direct Charges Material	\$5,214,453
Indirect Charges Labor	\$2,618,323
Indirect Charges material	\$468,813
<u>Carrying Charges (@8.8%)</u>	<u>\$186,139</u>
Total	\$11,667,929

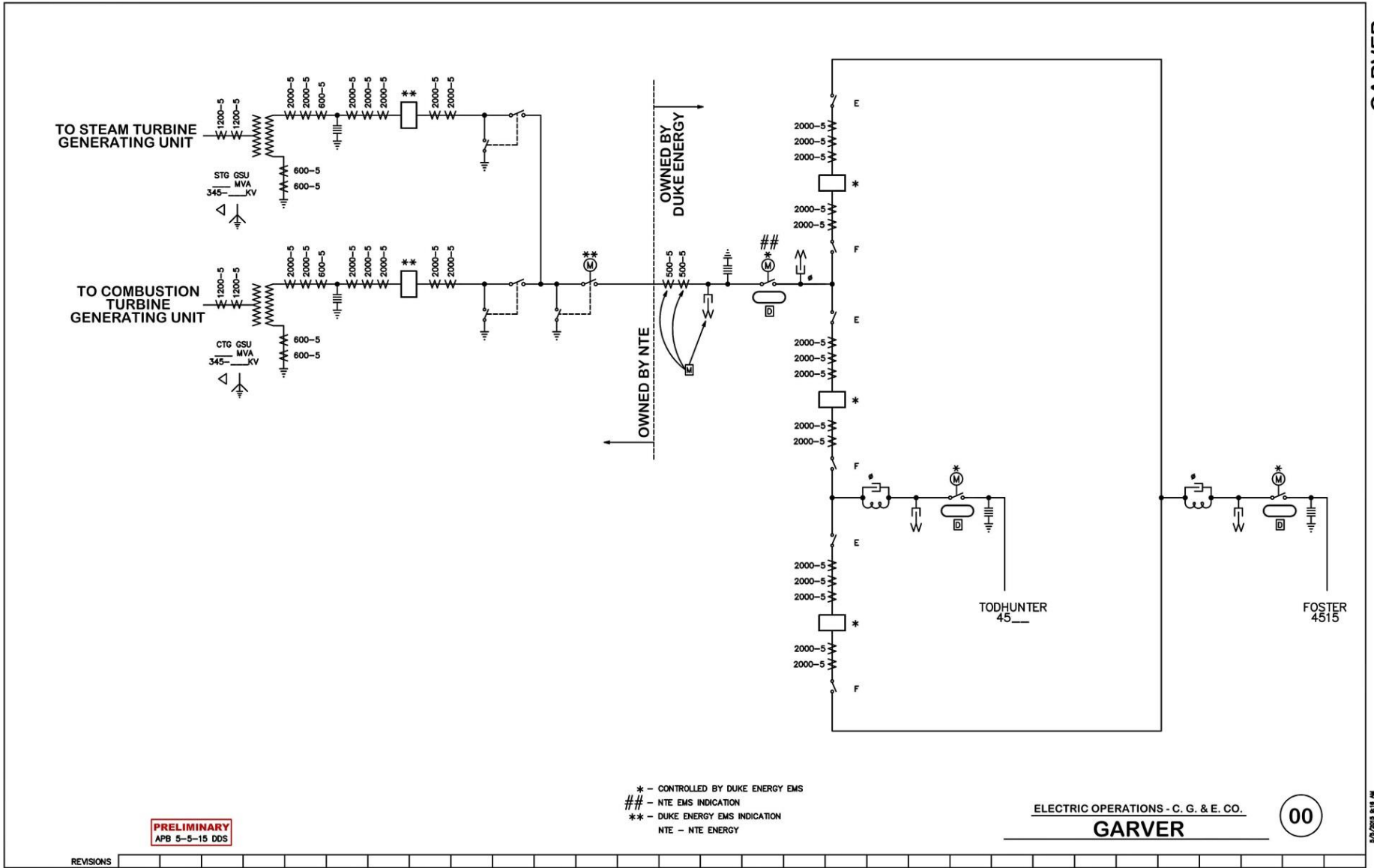
Appalachian Power Company (AEP) Charges

1. Mountaineer – Belmont 765 kV line overload:

The 4558/4791 MVA SN/SE ratings are no longer sufficient within the Z1 Queue. The Mountaineer Relay Compliance Trip Limit is the limiting element. An engineering study will need to be conducted to determine if the relay thermal limit settings can be adjusted to mitigate the overload. Cost estimate for relay setting adjustment is \$20K. A new relay package will be required if the relay thermal settings cannot be adjusted. Estimated Cost for the new relay package: \$300,000. **The allocation to this project is 18.58% or \$55,742. (N4259). *Note: This brings the Network Facilities charge up to \$11,723,671, and the total project cost to \$20,089,951**



Garver Substation & NTE Facility - Geographic map depicting customer facility and proposed transmission line configuration



REVISIONS

PRELIMINARY
APB 5-5-15 DDS

- * - CONTROLLED BY DUKE ENERGY EMS
- ## - NTE EMS INDICATION
- ** - DUKE ENERGY EMS INDICATION
- NTE - NTE ENERGY

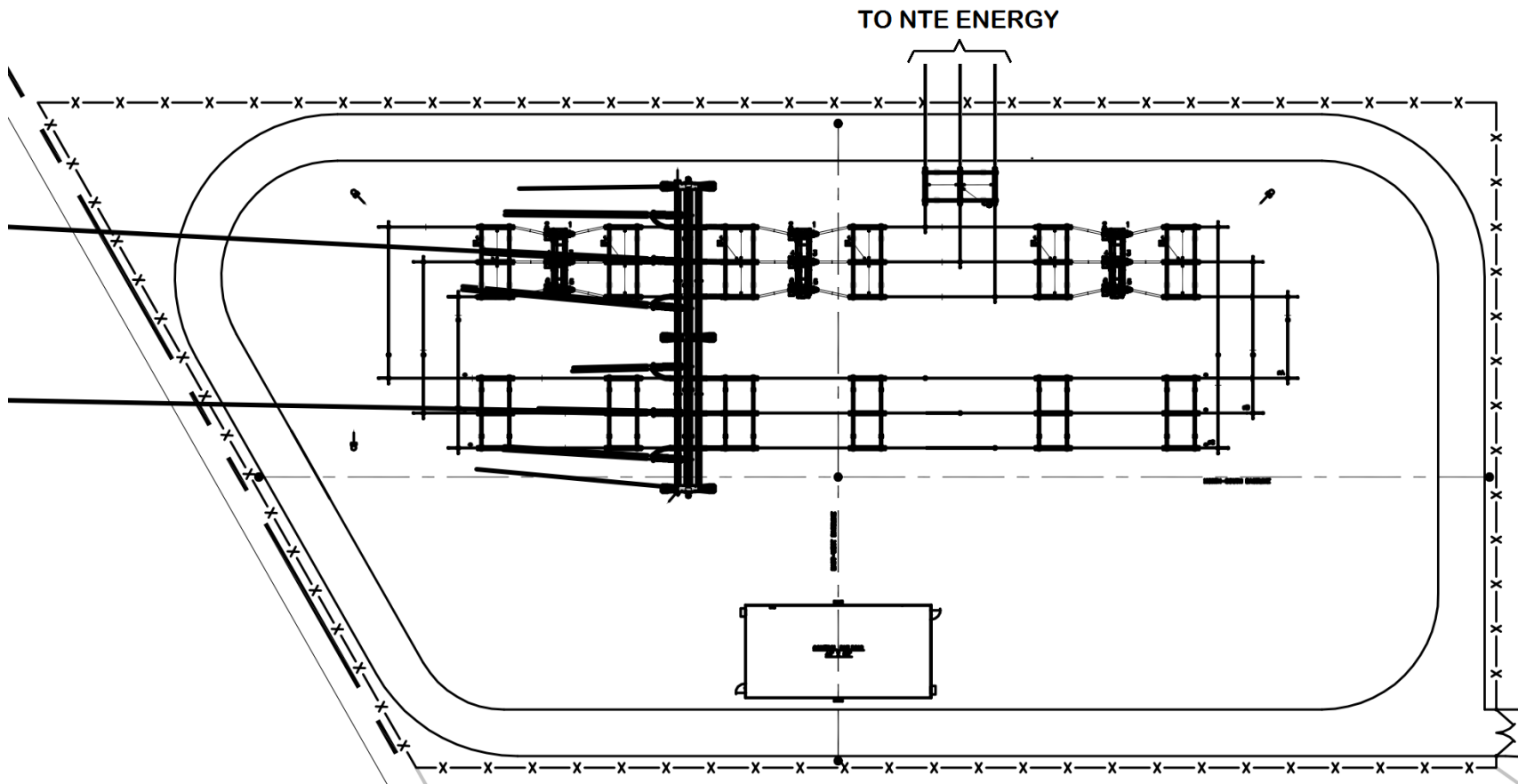
ELECTRIC OPERATIONS - C. G. & E. CO.
GARVER

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Garver Substation - Proposed One-line Diagram



Garver Substation - Proposed General Arrangement