LETTER OF NOTIFICATION FOR THE

DUKE ENERGY OHIO

3885 -138kV EAST PROVIDENT LOOP NEWBUILD

PUCO Case No. 17-2057-EL-BLN

Submitted to:

The Ohio Power Siting Board

Pursuant to OAC 4906-06

Submitted by:

Duke Energy Ohio, Inc.

October 27, 2017

Letter of Notification

This Letter of Notification has been prepared by Duke Energy Ohio, Inc. (hereafter "Duke Energy Ohio") in accordance with Ohio Administrative Code (OAC) Section **4906-6-05** for the review of Accelerated Certificate Applications. The following section corresponds to the administrative code sections for the requirements of a Letter of Notification.

4906-06-05 ACCELERATED APPLICATION REQUIREMENTS

4906-6-05(B): General Information

4906-6-05(B)(1) Name, Reference Number, Brief Description, and Letter of Notification Requirement

Name of Project:

Duke Energy Ohio 3885 -138kV East Provident Loop – New Build

2017 LTFR Reference:

The Project was not included in the Long-Term Forecast Report filed with the OPSB.

Brief Description of the Project:

Duke Energy Ohio proposes to construct approximately 0.27 miles of 138 kV transmission line between the planned East Provident Substation and the existing Duke 138kV transmission line located in West Chester Township, Butler County, Ohio. The proposed project area consists of approximately 0.27 miles of new and existing 100-foot wide Duke Energy Ohio transmission line corridor Right-Of-Way (ROW), and includes the replacement of ten (10) structures. The Project begins at the proposed East Provident Substation located north of Provident Drive (39.31430, -84.45795), and terminates south of Provident Drive (39.31245, -84.45778) as it enters the existing Duke Energy Ohio ROW.

Letter of Notification Requirement:

This project qualifies as a Letter of Notification filing because it meets the requirements outlined in OAC 4906-1-01, Attachment A (1)(b). The rule reads "New construction, extension, or relocation of single or multiple circuit electric power transmission line(s), or upgrading existing transmission or distribution line(s) for operation at a higher transmission voltage as follows: (b) Lines(s) greater than 0.2 miles in length but not greater than two miles in length."

4906-6-05(B)(2): Need for the Project

The 0.27 miles of new transmission line is an essential component of the East Provident Substation project, which has the primary objective of improving power quality and reliability due to load growth on the Duke Energy Ohio system in the Butler County service area. The proposed 3885 -138kV East Provident Loop will connect the new substation facility to the existing Duke ROW.

4906-6-05(B)(3): Location of the Project Relative to Existing or Proposed Lines

The location of the project is depicted in Attachment A: Figures 1-2. Figure 1 shows the general project vicinity depicted on a USGS quadrangle topographic map. Figure 2 depicts the planned transmission line location, ecological resources in the project vicinity, and additional details depicted on an aerial imagery map. Attachment B depicts the Project location relative to the existing transmission lines.

4906-6-05(B)(4): Alternatives Considered

Given the location of the proposed East Provident Substation and the need to connect this facility to the existing Duke transmission line located immediately south of the facility, the current alignment is the only reasonable alternative available and no others were considered.

4906-6-05(B)(5): Public Information Program

Due to the short length of the electric transmission line and small number of affected property owners Duke Energy Ohio has not developed a public information program for this project; however, Duke Energy Ohio has worked closely with each property owner during the development of the project and the ROW acquisition process. Further, Duke mailed a letter, via first class mail, to affected landowners, tenants, contiguous owners, and anyone else Duke Energy Ohio believes may be affected by the Project. The letter complies with all requirements of OAC Section 4906-6-08(B). Copies of the notification letter are available in Attachment C.

4906-6-05(B)(6): Construction Schedule

Construction is planned to begin December 2017, upon approval of this LON. The Project is anticipated to be completed and in-service by May 2018.

4906-6-05(B)(7): Area Map

Attachment A; Figures 1 and 2 depict the general location of the Project. Figure 1 shows the general project vicinity illustrated on a USGS quadrangle topographic map. Figure 2 illustrates the planned transmission line location, water resources in the project vicinity, and additional details depicted on an aerial imagery map.

4906-6-05(B)(8): Property Owner List

The proposed 3885 -138kV East Provident Loop project is located within new and existing ROW easements. Three (3) new structures will be located within the existing transmission line ROW and new seven (7) pole structures will be within the new easement associated with the East Provident substation.

4906-6-05(B)(9): TECHNICAL FEATURES OF THE PROJECT

The Project involves the installation of approximately 0.27 miles of 138 kV single circuit, electrical transmission line. The proposed transmission line will involve ten (10) galvanized steel self-supporting single circuit structures within new and existing Duke Energy Ohio ROW. Structure diagrams are provided in Attachment D.

4906-6-05(B)(9)(a): Operating Characteristics

Voltage:	138kV
Structure Type:	Six (6) Embed Light-Duty Poles and Four (4) Self-Supporting Engineered Poles
Conductors:	954 kcmil ACSR Rail
Static Wire:	7#8 Alumn Weld wire
Insulators:	Six (6) 138kV Polymer post insulators and Porcelain suspension insulators on LD Poles and Four (4) 138kV Polymer post insulators and Porcelain suspension insulators on LD Dead-end Poles
Right-of-Way/Land	Requirements: Duke Energy Ohio either owns the property or has obtained easements on which the transmission lines will be constructed

4906-6-05(B)(9)(b): Electric and Magnetic Fields

Information concerning the electric and magnetic fields is included in Attachment E.

4906-6-05(B)(9)(b)(i): Calculated Electric and Magnetic Fields Strength Levels

Three load conditions were examined: (a) normal maximum loading, (b) emergency line loading, and (c) winter normal conductor rating. Normal maximum loading represents the peak flow expected with all system facilities in service; daily/hourly flows fluctuate below this level. Emergency loading is the maximum current flow during unusual (contingency) conditions, which exist only for short periods of time. Winter normal (WN) conductor rating represents the maximum current flow that a line, including its terminal equipment, can carry during winter conditions.

Duke Energy Ohio designs its facilities according to the National Electric Safety Code (NESC), at a minimum. The structure height and configuration was chosen based on the NESC engineering parameters, and cost.

EMF CALCULATIONS	
Condition	Line Loading (Amperes)
(a) Normal Maximum Loading	175 (Port Union Side)
	128 (Hall Side)
(b) Emergency Line loading	1264
(c) Winter Normal Conductor Rating	1414

4906-6-05(B)(9)(b)(ii): Alternative Design Consideration for Electric and Magnetic Fields

The proposed project includes the construction of a new transmission line within the new and existing transmission ROW. Other alternative routes were not considered because the Project was able to take advantage of existing easements and avoid further impacts.

4906-6-05(B)(9)(c): Estimated Cost

The estimated cost for the proposed 3885 -138kV East Provident Loop 138 kV electric transmission rebuild project is approximately $1,460,000.00.

4906-6-05(B)(10): SOCIAL AND ECOLOGICAL IMPACTS

4906-6-05(B)(10)(a): Land Uses

The project is located in the West Chester Township, Butler County, Ohio, approximately 20 miles north of Cincinnati. West Chester Township, which covers 18 square miles, contained a population of 60,958 people based on the 2010 census data. The land use immediately surrounding the Project area is predominantly developed commercial and industrial property.

4906-6-05(B)(10)(b): Agricultural Land

Agricultural land vegetation assemblage is not located within the Project disturbance area. No properties within the Project area are registered as an agricultural district as defined by Chapter 929 of the Ohio Revised Code.

4906-6-05(B)(10)(c): Archaeological or Cultural Resources

The Ohio Historic Preservation Office's (OHPO) online mapping system was consulted to identify previously recorded cultural resources within 1.6 km (1 mi) of the study area (project location). The OHPO records check indicates that 13 archaeological sites, 5 historic structures, and 1 National Register of Historic Places (NRHP) listed historic district have been previously recorded in the one-mile buffer. No previously identified archaeological sites are located in or adjacent to the study area.

Table 1-1 Archaeological Sites and Historic Structures in or Adjacent to the Study Area

Archaeological Site/Structure Number	Site/Structure Type	NRHP Eligibility
33-BU-0207	Unidentified Prehistoric	Ineligible
33-BU-0532	Unidentified Prehistoric	Ineligible
33-BU-0533	Unidentified Prehistoric	Ineligible
33-BU-0534	Unidentified Prehistoric	Ineligible
33-BU-0536	Unidentified Prehistoric	Ineligible
33-BU-0563	Historic Non Aboriginal	Ineligible
33-BU-0623	Early Archaic, Middle Archaic, Late Archaic, Early Woodland, Middle Woodland, Historic Non Aboriginal	Potentially Eligible
33-BU-0624	Early Archaic	Potentially Eligible
33-BU-0625	Unidentified Prehistoric, Historic Non Aboriginal	Ineligible
33-BU-0626	Unidentified Prehistoric, Historic Non Aboriginal	Ineligible
33-BU-0627	Late Archaic, Early Woodland, Historic Non Aboriginal	Undetermined
33-BU-0628	Early Woodland, Middle Woodland	Potentially Eligible
33-BU-0996	Historic Non Aboriginal	Ineligible
BUT0035314	ca. 1840 Single Dwelling Home	Unknown
BUT0004414	ca. 1825 Miami-Erie Canal Lock 38	Unknown
BUT0162214	ca. 1910 Stewart House/Rialto Grocery/Retail Store Dwelling	Unknown
HAM0498349	Ca1910 Dwelling/Carriage House	Unknown
HAM0496649	Ca. 1840 GE Employees Park Admin. Bldg/Alexander Morris House/Dwelling/Summer Kitchen	Unknown

Records on file at OHPO indicate that 11 previous cultural resource investigations have been conducted within 1.6 km (1 mi) of the project area (Brown 2006; Gibbs et al. 1997; Gray and Pape 1996; Gullet 2014; Jackson 1996; Jackson et al. 1996; Keener 2012; Kreinbrink 1998a, 1998b and 1998c; Kreinbrink 1999). None of the previous cultural resources investigations were conducted in or adjacent to the current project area.

4906-6-05(B)(10)(d): Local, State, and Federal Requirements

No local, state or federal permit or other authorizations are required for the 3885 -138kV East Provident Loop project. All proposed impacts to 'Waters of the U.S.' (Wetland 1) illustrated on Attachment A, Figure 2, are associated with the construction of the East Provident Substation and will be permitted accordingly.

4906-6-05(B)(10)(e): Endangered, Threatened, and Rare Species .Investigation

Several sources of information were consulted to further define the potential habitat of listed species that occur within the County of the Project. Attachment A, Table 1, contains list a of the Rare, Threatened and Endangered (RTE) species known to occur within Butler County and their potential to occur within the Study Area based on their habitat requirements and observations during the field survey.

Coordination with the U.S. Fish and Wildlife Service (USFWS) and the Ohio Department of Natural Resources (ODNR) were initiated on July 14, 2017. Correspondence from the U.S. Fish and Wildlife Service Area was received on August 16, 2017 and ODNR Division of Wildlife regarding RTE located within a ½-mile of the Study Area was received September 5, 2017 (Attachment F). The correspondence from ODNR indicated that there are no verified records of federally listed endangered, threatened, or candidate species, or their habitats existing within the project site or vicinity.

The entire Project Area was field surveyed by Cardno, Inc. (Cardno) as part of contracted services to assess ecological impacts. This included habitat assessments to identify RTE species and their habitat, specifically Indiana Bat and Northern Long-eared Bat roost trees. Based on Cardno's field inspection, the Project Study Area consisted of actively maintained ROW, commercial development, secondary growth deciduous forest, emergent / scrub-shrub wetland, and emergent wetland vegetation assemblages. Secondary growth forest was identified outside the maintained ROW but will not be impacted as a result of the proposed project. Ornamental residential trees were located throughout the survey area and may be impacted as a result of the proposed project. No trees with characteristic habitat indicators of primary maternity roost trees will be removed as a component of the 3885 -138kV East Provident Loop project.

4906-6-05(B)(10)(f): Areas of Ecological Concern

As a part of the investigation, Duke Energy Ohio hired Cardno to conduct an investigation for areas of ecological concern. As a part of Cardno's investigation, a request was submitted to the ODNR Ohio Natural Heritage Program and the U.S. Fish and Wildlife Service on August 14, 2017, to research the presence of any unique ecological sites, geological features, animal assemblages, scenic rivers state wildlife area, nature preserves, parks or forest, national wildlife refuges, or other protected areas within one (1) mile of the Project area using the ODNR Natural Heritage Database. A copy of ODNR's Response and USFWS request letter are included in Attachment F.

The ODNR response on September 5, 2017 indicated that there are no unique ecological sites, geological features, animal assemblages, scenic rivers state wildlife area, nature preserves, parks or forests, national wildlife refuges, or other protected areas within one (1) mile of the Project area.

As a part of the field investigation and ecological assessment, Cardno conducted a wetland delineation and stream assessment of the Project area (Attachment G). Cardno's investigation included approximately 0.27 mile long by 100-foot wide ROW (6.07 acres) study area around the proposed centerline, access roads, and additional workspace areas. The Study Area was over-surveyed to account for potential reconfigurations compared to the final Project Area. During the investigation, Cardno identified three (3) potentially regulated waters within the Project's Study Area. This includes one emergent/scrub-shrub wetland complex (Wetland 1), one emergent wetland (Wetland 2), and one intermittent stream (Stream 1). See Attachment A, Figure 2.

The proposed construction access plan as shown in Attachment A, Figure 2, was developed by Cardno to avoid and/or minimize disturbance to all streams and wetlands. No impacts to regulated waters or RTE habitat are anticipated by the Project.

As a part of the investigation, Cardno identified 100 year floodplains using the FEMA National Flood Hazard Layer within the Project Area. Attachment A, Figure 2 depicts the location of the 100 year floodplains in relation to the Project Area. There are no designated 100-year floodplains identified within the Study Area. Activities completed as a component of the 3885 East Provident Loop will not require a Floodplain Construction Permit from Butler County.

4906-6-05(B)(10)(g): Other Information

To the best of Duke Energy Ohio's knowledge, no unusual conditions exist that would result in environmental, social, health, or safety impacts. Construction and operation of the proposed Project will meet all applicable safety standards established by the Occupational Safety and Health Administration, and will be in accordance with the requirements specified in the latest revision of the National Electric Safety Code as adopted by the Public Utilities Commission of Ohio. The Stormwater Pollution

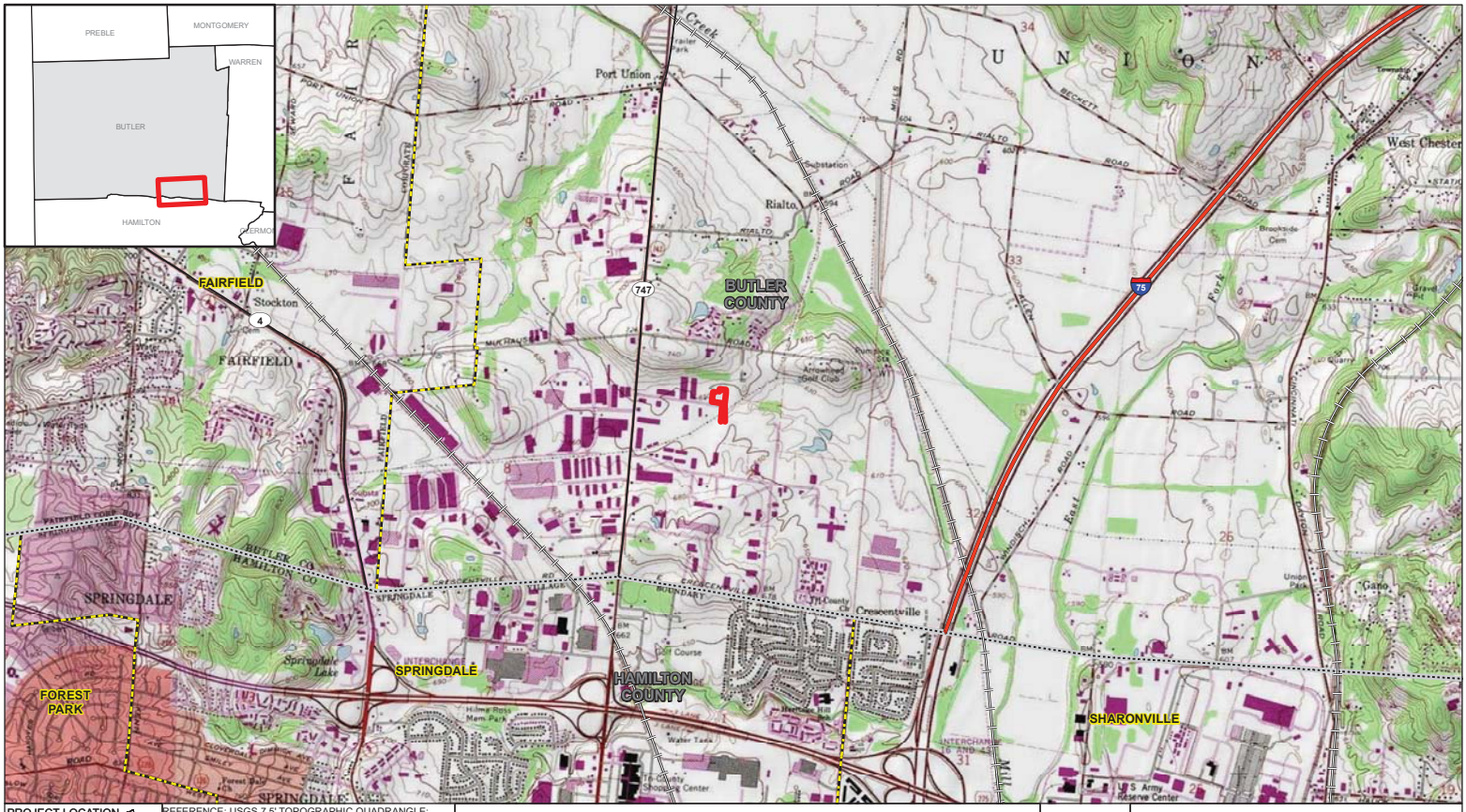
Prevention Plan (SWPPP), depicting the project's access plan is available in Attachment H.

4906-6-07: Document of Letter of Notification Transmittal and Availability for Public Review

Copies of this Letter of Notification have been sent to the offices of West Chester Township Board of Trustees, the Butler County Commissioners, the West Chester Land Use Planning Committee, and the Butler County Planning Department, as well as the MidPointe Library West Chester (Attachment I). A newspaper notice will be provided in the Cincinnati Enquirer within seven days of filing this application.

Attachment A

Figures and Tables



PROJECT LOCATION

BUTLER COUNTY, OH

REFERENCE: USGS 7.5' TOPOGRAPHIC QUADRANGLE: GLENDALE, OHIO. OBTAINED VIA ESRI USA TOPO, NATIONAL GEOGRAPHIC TOPO, AND USGS, ACCESSED 01/2017.

N

0 1,000 2,000 Feet

- Project Centerline
- Interstate
- State Highway
- US Highway
- Railroad
- County Boundary
- Municipal Boundary

DUKE ENERGY.

Cardno

FIGURE 1
OPSB LON FILING
3885 – 138kV EAST PROVIDENT LOOP
DUKE ENERGY
PROJECT VICINITY MAP

DRAWN BY: COD DATE: 9/14/2017
CHECKED: CJ APPROVED: JT

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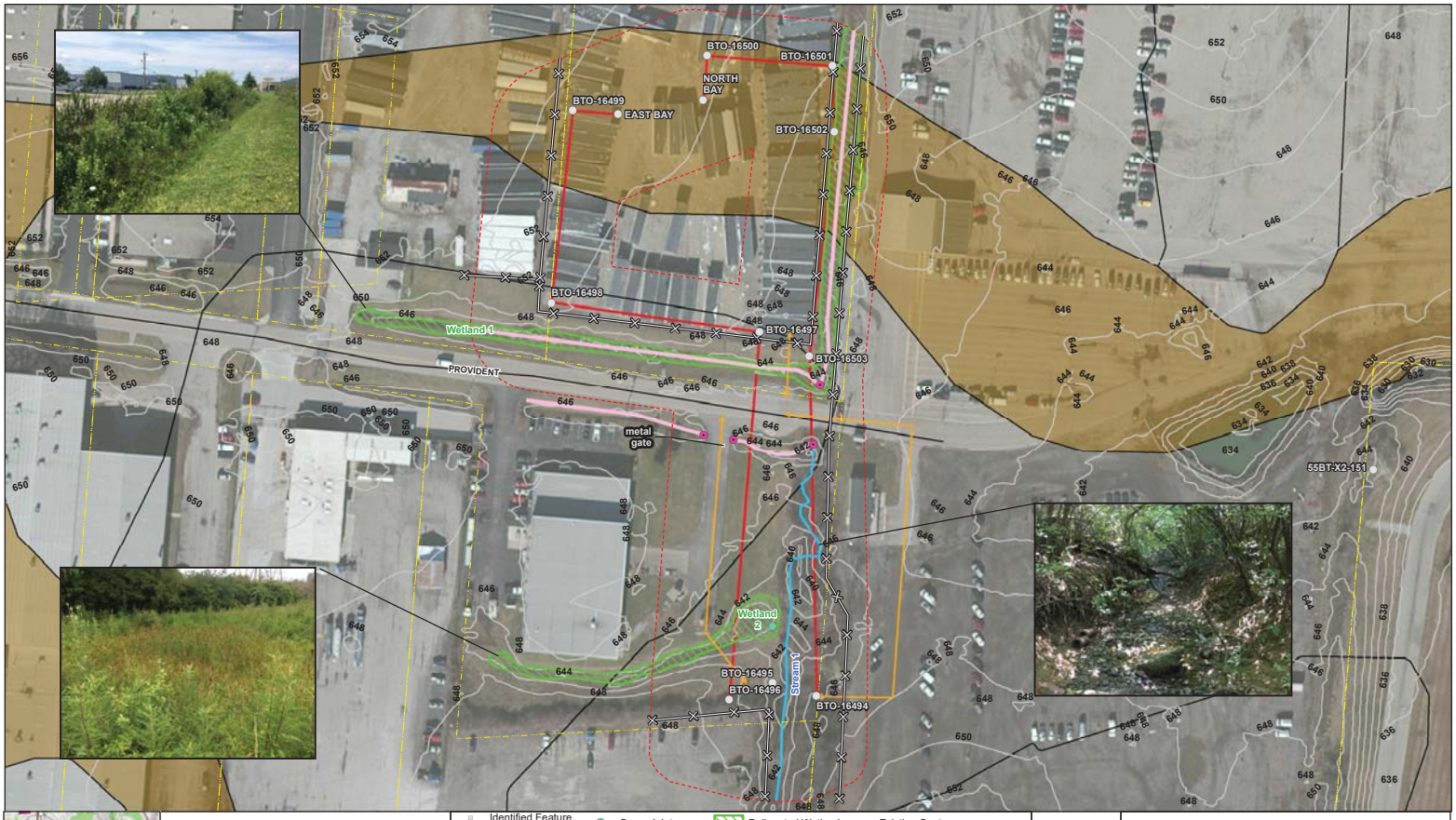

REFERENCE:
ESRI WORLD IMAGERY, OBTAINED THROUGH ESRI WORLD IMAGERY MICROSOFT CORPORATION, ACCESSED 01/2017

N

0 50 100 Feet

- Identified Feature
- Proposed Structure
- Existing Culvert
- Fence Line
- Parcels
- 150ft Corridor
- Tree in ROW
- Sewer Inlet
- Ditch
- Potential Access
- Delineated Stream
- Open Water
- Soil Unit
- Soil Unit - HYDRIC
- Delineated Wetland
- Interstate
- State Highway
- US Highway
- Railroad
- Local Road
- Existing Contour
- Project Centerline
- Municipal Boundary
- NWI Wetland
- NHD Flowline
- 100 yr and Floodway

DUKE ENERGY.

Cardno

FIGURE: 2

OPSB LON FILING
3885 – 138kV EAST PROVIDENT LOOP
DUKE ENERGY
ENVIRONMENTAL ACCESS PLAN

DRAWN BY: COD DATE: 9/14/2017
CHECKED: CJ APPROVED: JT

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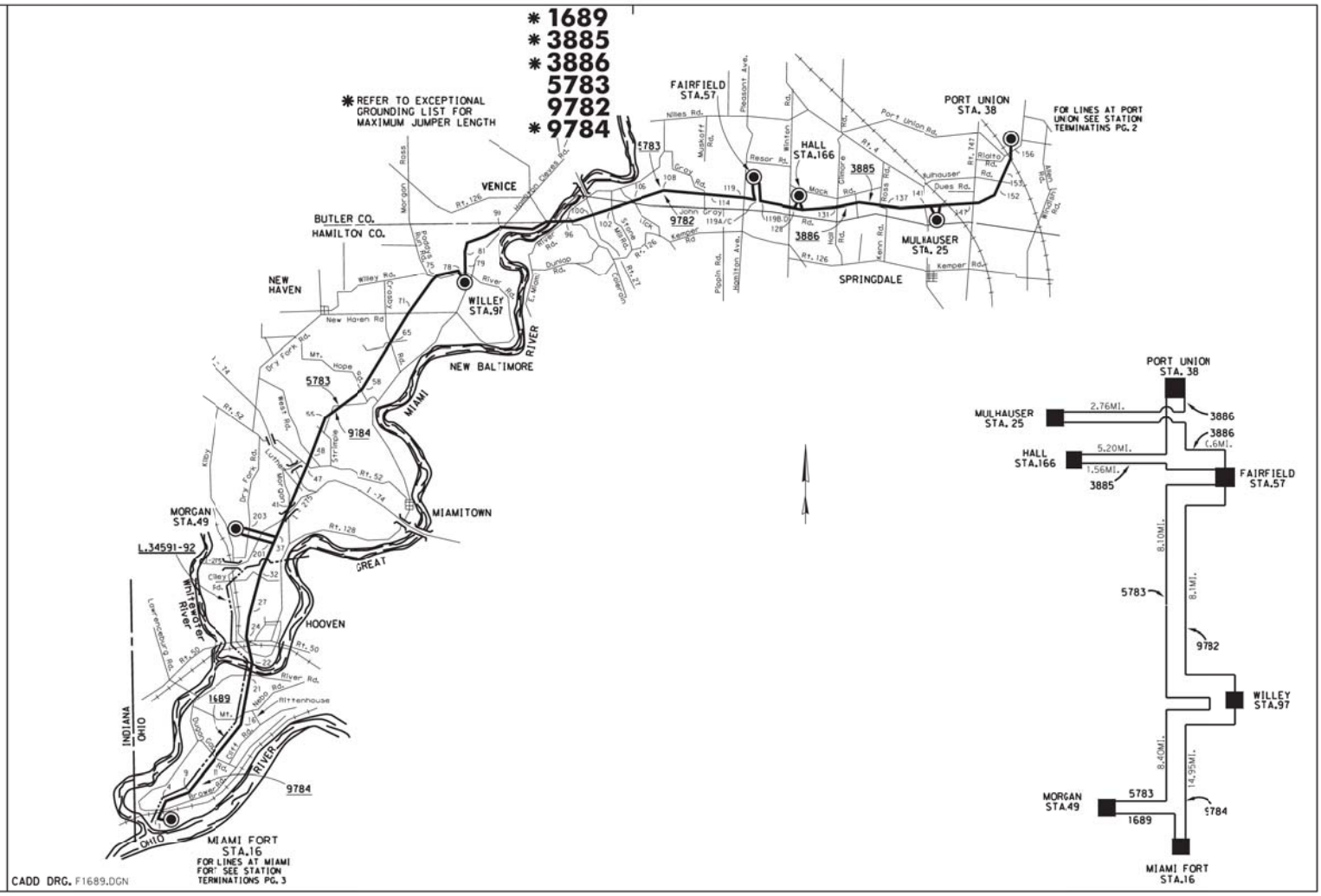
Attachment B

Project Area Location Relative to Existing Electric Lines

HL

3/25/2015 S.S.



CADD DRG. F1689.DGN

Attachment C

Property Owner Notification Letter

Transmission – Public Outreach
EX552 | 315 Main Street
Cincinnati, OH 45202

Sep. 15, 2017

«OWNER»
«MAILING_ADDRESS»
«CITY», «STATE» «ZIP»

Re: Important Information about a Duke Energy Reliability Enhancement Project in your area

New Substation for the Community of West Chester Township.

Dear Property Owner:

Reliability is a responsibility that Duke Energy takes very seriously. To keep that commitment, we're upgrading the electric transmission system in your community, a project critical to ensuring continued reliability of your area's electric service. As a neighbor to the project area, we're writing to provide you with details of plans to build a new substation, as well as how to reach us should you have any questions.

Duke Energy plans to build a new 138-kilovolt/13 kilovolt (kV) substation at the site of the former property of R&R Family Investments, LLC, located at 5020 Provident Drive in West Chester Township. This project will provide greater capacity and enhanced service reliability for this growing community in Butler County.

Construction of the new substation will begin in late August with completion planned for June, 2018. Area businesses may see occasional lane closures on Provident Drive as materials are delivered to the site. The initial phase of construction involves the clearing and grading of the substation site this summer. The right of way must be clear for construction crews to have safe and unobstructed entry to the site. There also may be lulls during various construction phases, which include:

Concrete Work – Concrete footings and foundations that are poured shortly after the site is cleared. Expect to see large trucks with a concrete mixer in the right of way.

Steel Erection and Civil Construction – Once the concrete pad has cured, the substation steel framework – typically towers or poles – is installed. The steel supports electric control equipment and the transmission lines that connect the substation to the regional electric grid.

Equipment Testing – The new equipment is extensively tested before the substation goes into service. This is to ensure that the facility is operating reliably and safely.

Energizing and Site Restoration – Once construction and testing is completed, the substation is energized. All disturbed or exposed areas outside the substation fence line are restored with vegetation and seeding to establish ground cover and to prevent soil erosion.

Post-Construction Operation – Most substations are not staffed once they're in operation, although technicians make regular visits to monitor operation and perform routine maintenance.

The substation will be inside a securely-fenced area with a gravel base. It will have the capacity for three transformers to change voltage levels from high transmission voltages to lower distribution voltages in order to provide power to homes and businesses. The substation will contain a small building inside the fence that houses substation controls. The substation will have directional lighting at night for safety and security.

Construction typically takes place during daylight hours. Once the substation is completed, all construction materials and debris will be removed, and the right of way will be restored as closely as possible to its original condition. No power outages are expected during construction.

Vegetation clearing for the high-powered transmission line that will loop through the substation is scheduled for October. This will allow our crews to have safe and unobstructed entrance to work on the transmission line. Installation of 8 galvanized steel poles is scheduled for March, 2018. You will be contacted directly if any encroachments or vegetation issues affect your property.

For additional questions, call 888.827.5116, or e-mail MWOhioTransmission@duke-energy.com. Thank you for your cooperation as Duke Energy progressively powers the lives of our customers and the vitality of our communities.

Sincerely,

Moses Muci
Project Manager

«PARCEL_ID»

Attachment D

Proposed Site Plans

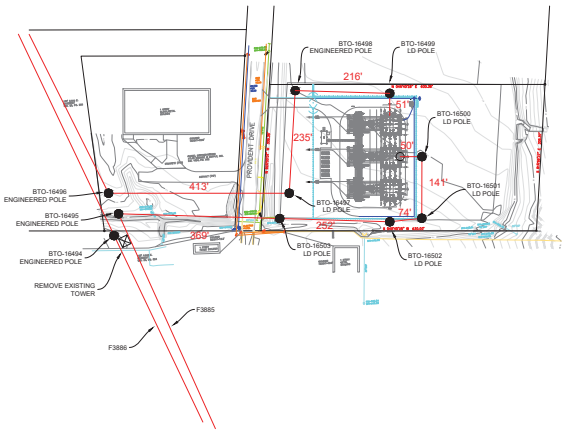
MAP GRID: N05E0150
COMMUNITY: RIALTO
TWP.: WEST CHESTER
STATE: OHIO
COUNTY: BUTLER
TAX: 9 0410
OPERATING UNIT: VSOH
FEEDER (138KV): F3885
FEEDER (138KV): F3886
DISTRICT: TODHUNTER

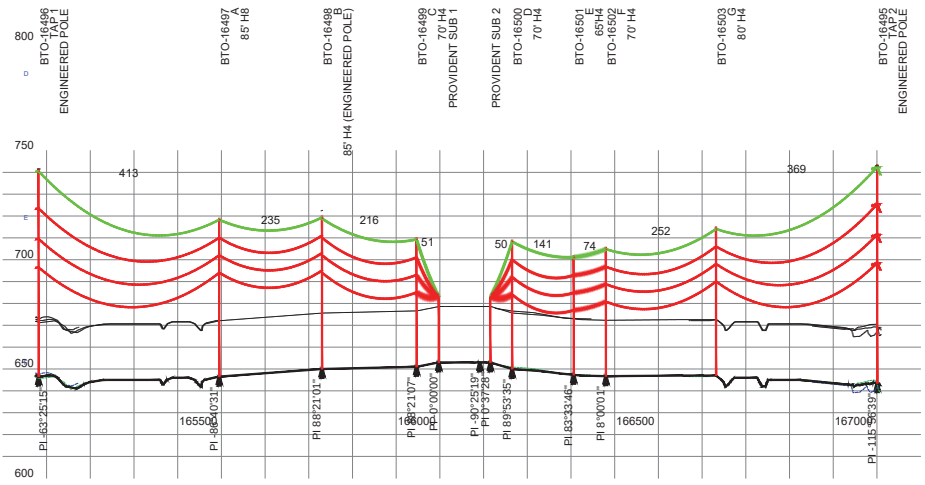
CONTACT/ ENGINEER:
JAKE DAWN
513-287-1371

TRANSMISSION:
WO# 7199800
PROJECT CODES:

PROJECT#	ACTIVITY	DESCRIP.
P7594	I	INSTALL
O4126	R	RETIRE
7594	X	MAINT.

WIRE STRINGING DATA					
POLES	COND.	SAG CHART	STATIC	SAG CHART	DISTANCE





NO.	DATE	REVISION	DRFT.	ENGR.

DUKE ENERGY.

INDEX: F3385
DESCRIPTION: EAST PROVIDENT DR SUBSTATION LOOP
PRELIMINARY PLAN & PROFILE
DATE: 6/19/17
LOCATION: BUTLER CO
DRAWN: JAKE DAWN
ENGINEER: JAKE DAWN
TRANSMISSION LINE ENGINEERING
CKD:
PAGE:
SCALE: NOTED
DWG NO:

Attachment E

Electric and Magnetic Fields Study

ELECTRIC AND MAGNETIC FIELDS

EAST PROVIDENT EMF STUDY
(F3885)

Prepared for:

DUKE ENERGY

Prepared by:

Commonwealth

ELECTRIC AND MAGNETIC FIELDS

EAST PROVIDENT SUBSTATION
(F3885)

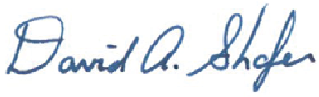
Prepared for:

DUKE ENERGY

Prepared by:

Richard D. Cook, P.E.
Katherine J. Klaus

Responsible Engineer:



David A. Shafer, P.E.
Manager
Electrical Systems

At the Offices of:
Commonwealth Associates, Inc.
P.O. Box 1124
Jackson, Michigan 49204-1124

August 15, 2017
0386.0696\300

TABLE OF CONTENTS

EXHIBITS

INTRODUCTION

Commonwealth Associates, Inc. was contracted by Duke Energy to perform calculations for Electric and Magnetic Fields for the proposed looping of the existing Port Union to Hall 138 kV transmission line, F3885, into the new East Provident Substation. The planned new East Provident Substation is to be built in Butler County Ohio. The transmission in the vicinity of the new East Provident Substation is shown in Exhibit 8.

The 0.3-mile loop-in of the existing Port Union to Hall 138 kV circuit F3885 into the new East Provident Substation is shown in Exhibit 9. The new interconnection takes place along the existing double circuit 138 kV tower line from a location 300 feet south of the east end of Provident Drive in Butler County Ohio. The existing Lattice Steel tower 129 is to be removed and the existing circuit F3886 will be transferred from the old tower to a new steel pole, 129A, located just west of tower 149. Circuit F3886 will continue to service the Port Union to Mulhauser 138 kV line. The current circuit F3885 will be reterminated at two new steel dead end poles, 149B and 149J, which will also be located just west of tower 149. The F3885 138 kV loop-in to the new substation will extend 400 feet north from the two new dead end towers, crossing Provident Drive near its eastern end. The segment from 149B will connect across the southern side and up the western side of the new substation. The segment from 149J will connect along the eastern side of the new substation. Both segments will be terminated into the new substation from its north side. The loop-into the new East Provident Substation will replace the existing Port Union to Hall 138 kV circuit with two new 138 kV circuits; East Provident to Port Union and East Provident to Hall.

The proposed loop of the 138 kV transmission line into the new East Provident Substation:

- Connects to existing Port Union 138 kV Sub 1.4 miles east and north of East Provident
- Connects to existing Hall 138 kV Substation 3.8 miles west of East Provident
- Existing 138 kV Double Circuit tower line utilizes Lattice Steel towers
- New Loop-in will utilize Single Circuit Steel Pole construction
- Phase Conductors on the new 138 kV Loop-in will be 954 kcmil ACSR Rail
- New line is topped with one 7#8 AW shield wire
- Existing 138 kV circuit from Port Union to Hall is on the north side of the tower line
- Right-of-way for the new circuits will extend to 50 feet from the steel pole centerlines, perpendicular to the new circuit paths
- Minimum for conductor height, Hmin = 25.5 feet

Ohio Power Siting Board (OPSB) Chapter 4906-6-05 (2) (a) requires that applicants for electric power facilities shall calculate the electric and magnetic fields for the transmission line at minimum conductor height measured at one meter above ground, both under the conductors and at the EROW. Three-Phase conductor currents used for calculating magnetic field strength levels include:

Table 1 Duke Energy – East Provident Loop-in Current Flows

	(Amps)
(i) Winter Normal Conductor Rating	1414
(ii) Emergency Line loading	1264
(iii) Normal Maximum loading	
Port Union Side	175
Hall Side	128

The applicant shall provide a typical calculated profile of the electric and magnetic field strengths.

SUMMARY OF RESULTS

Following tables describe Electric and Magnetic Fields; for both peak (maximum) values within the planned ROW and values at the edge of the ROW (EROW) for the new 138 kV Loop-in.

Peak Values for Profiles Inside the ROW

Table 2 Inside the ROW			**Profile 1**	**Profile 2A**	**Profile 2B**
		Based On	**Hmin = 25.5'**	**Hmin = 25.5'**	**Hmin = 25.5'**
Electric Field	(kV/m)	144.9 kV	1.59	1.59	1.59
Magnetic Field – Winter Normal	(mG)	1414 Amps	181.61	154.41	154.41
Magnetic Field - Emergency	(mG)	1264 Amps	162.34	138.03	138.03
Magnetic Field – Normal Maximum	(mG)	Table 1	21.33	19.11	13.98

Values for Profiles at the Edge of the ROW

Table 3 Edge of the ROW			**Profile 1**	**Profile 2A**	**Profile 2B**
		Based On	**Hmin = 25.5'**	**Hmin = 25.5'**	**Hmin = 25.5'**
Electric Field	(kV/m)	144.9 kV	0.04	0.05	0.05
Magnetic Field – Winter Normal	(mG)	1414 Amps	34.43	31.81	31.81
Magnetic Field - Emergency	(mG)	1264 Amps	30.78	28.44	28.44

Magnetic Field – Normal Maximum	(mG)	Table 1	3.07	3.94	2.88

Values for Profiles at the Edge of the ROW

Table 4 Near Buildings			**Building A Block/Metal**	**Building B Frame**	**Building C Metal**
		Based On	**Profile 1 140' West**	**Profile 1 63' East**	**Profile 2A 62' East**
Electric Field	(kV/m)	144.9 kV	0.03	0.05	0.06
Magnetic Field – Winter Normal	(mG)	1414 Amps	5.22	34.46	23.29
Magnetic Field - Emergency	(mG)	1264 Amps	4.67	30.81	20.82
Magnetic Field – Normal Maximum	(mG)	Table 1	0.31	4.61	2.88

CALCULATIONS

The calculations for Electric and Magnetic Fields profiles were made using the TRALIN module of the CDEGS program. While not an OPSB requirement, CDEGS includes the Radio Noise (RN) as part of the results. We show in Exhibit 7 that the RN at the EROW and beyond is less than 30 dB.

The voltage dependent Electric Field calculations were performed assuming that the line was operating at an ANSI maximum of 1.05% of nominal voltage (138*1.05 = 144.9 kV). The current dependent Magnetic Field calculations were performed assuming the phase conductor currents were loaded to either their winter normal rating, emergency rating or summer normal loading per OPSB requirements as shown in Table 1.

Coordinates used for calculations were based on the tangent structure and are shown below and in Exhibit 10. For all three profiles the second number in the tables is the lowest height above level ground for the new 138 kV loop-in. For Profile 1 (Table 5), the first number in each set is the horizontal distance in feet from the center line of the ROW (the two transmission line segments are 50 feet apart). The ROW for Profile 1 is 50 feet from each of the two transmission line segments; which is ±75 feet from the transmission centerline. For Profiles 2A and 2B (Tables 6 and 7), the first number in each set is the horizontal distance in feet from the center of the steel pole transmission tower; which is also the center of the ROW. The ROW for Profile 2A extends 50 feet east from the steel pole transmission towers (the substation lies to the west). The ROW for Profile 2B extends 50 feet west from the steel pole transmission towers (the substation lies to the east). We note that there are steel truck trailers parked within the western substation ROW (Profile 2B) and assume that these will be moved elsewhere.

138 kV East Provident – Profile 1

Table 5 ROW is ±75' from the Transmission Centerline			
Bottom Phase 3	**Middle Phase 2**	**Top Phase 1**	**Shield Wire**
Hmin = 25.5'	Line Segment 149B – 149C		
(-31', 25.5')	(-31', 33.5')	(-31', 41.5')	(-26.15', 51.9')
Hmin = 25.5'	Line Segment 149J – 149I		
(19', 25.5')	(19', 33.5')	(19', 41.5')	(-23.85', 51.9')

138 kV East Provident Substation (East Side) – Profile 2A

Table 6 ROW is +50' from the Transmission Centerline			
Phase C	**Phase B**	**Phase A**	**Shield Wire 1**
Hmin = 25.5'	Line Segment 149I – 149H		
(-6', 25.5')	(-6', 33.5')	(-6', 41.5')	(-1.15', 51.9'')

138 kV East Provident Substation (West Side) – Profile 2B

Table 7 ROW is -50' from the Transmission Centerline			
Phase C	**Phase B**	**Phase A**	**Shield Wire 1**
Hmin = 25.5'	Line Segment 149I – 149H		
(6', 25.5')	(6', 33.5')	(6', 41.5')	(1.15', 51.9'')

ELECTRIC FIELD RESULTS

The High Voltage (HV) lines of the 138 kV Transmission Circuit create an electric field (EField) in the vicinity of the 138 kV conductors. Measured at 3-feet above ground, the AC electric field for all three profiles (1, 2A and 2B) reaches a maximum level of almost 1.6 kV/m under the 138 kV conductors within the ROW. Because the insulators cause the conductors to hang up to 6-feet to either the east or west of the steel poles the profile is slightly offset from the pole centers. As shown in Exhibits 1, 2 and 3, at the edge-of-the-ROW (EROW) the three profiles (1, 2A and 2B) are each at or less than 0.05 kV/m. At the three buildings identified just outside of the EROW:

	Distance To Bldg.	EField
Building A – Single Story Block and Metal	140'	0.02 kV/m
Building B – Single Story Frame	63'	0.05 kV/m
Building C – Single Story Metal	62'	0.06 kV/m

Buildings A and B are both at or below the 0.05 kV/m found at the EROW. Building C shows a very slight rise to 0.06 kV/m due to the slight rise in the EField just outside the EROW observed in all three profiles.

MAGNETIC FIELD RESULTS

The Magnetic Field (MField) for the 138 kV Transmission Line was calculated with phase conductors carrying one of three loading conditions per OPSB requirements as shown in Table 1 (full winter normal of 1414 Amps, emergency current of 1264 Amps or normal maximum loading of 175 Amps from Port Union and 128 Amps to Hall).

The current in the phase conductors of the 138 kV Transmission Line creates a magnetic field in their vicinity. Measured at 3-feet above ground, the maximum MField under the 138 kV phase conductors occurs within the ROW for the three profiles prepared. Table 2 shows the maximum MFields for the three OPSB loading conditions. The maximum result of 182 mG was for Winter conditions for Profile 1. Profiles 2A and 2B showed maximum fields of 155 mG. For Emergency conditions the MFields dropped by less than 20 mG results. For normal loading conditions the results were less than 22 mG.

The MField at the EROW, shown in Table 3, ranged from less than 35 mG for Winter Normal in Profile 1 to slightly over 28 mG for Emergency Profiles 2A and 2B. The MField for Normal Maximum loading ranged from just under 3.1 mG to just over 2.8 mG.

Similar to the EField results, calculations, shown in Table 4, were prepared for the MField at three buildings identified near the EROW for the proposed new loop-in to E.Provident:

	Distance To Bldg.	MField
Building A – Single Story Block and Metal	140’	3.5 mG
Building B – Single Story Frame	63’	35 mG
Building C – Single Story Metal	62’	24 mG

EXHIBIT 1

138 kV Electric Field Profile 1

Exhibit 1
East Provident EMF Study
138 kV Transmission Line Rail Loop-In
Profile 1

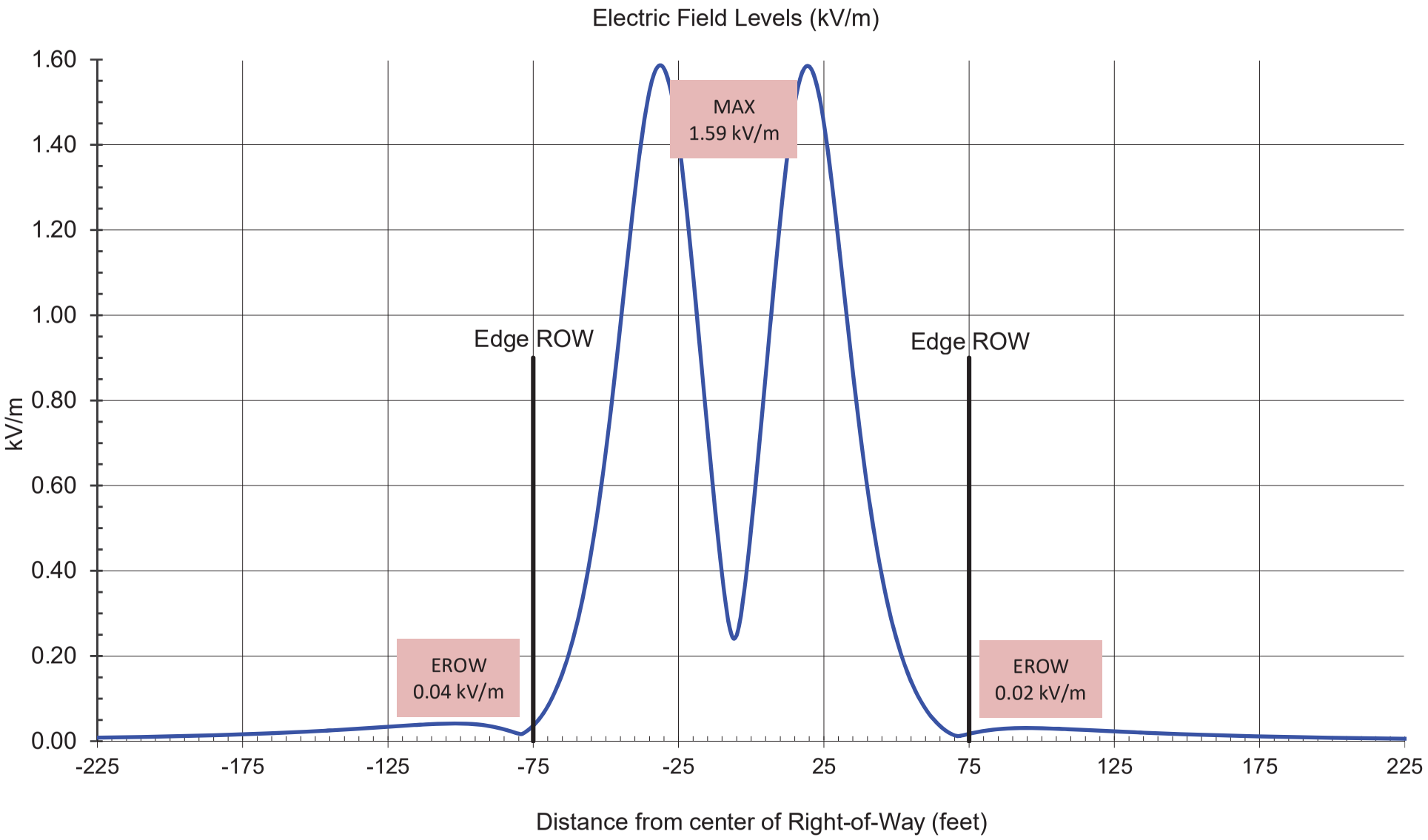
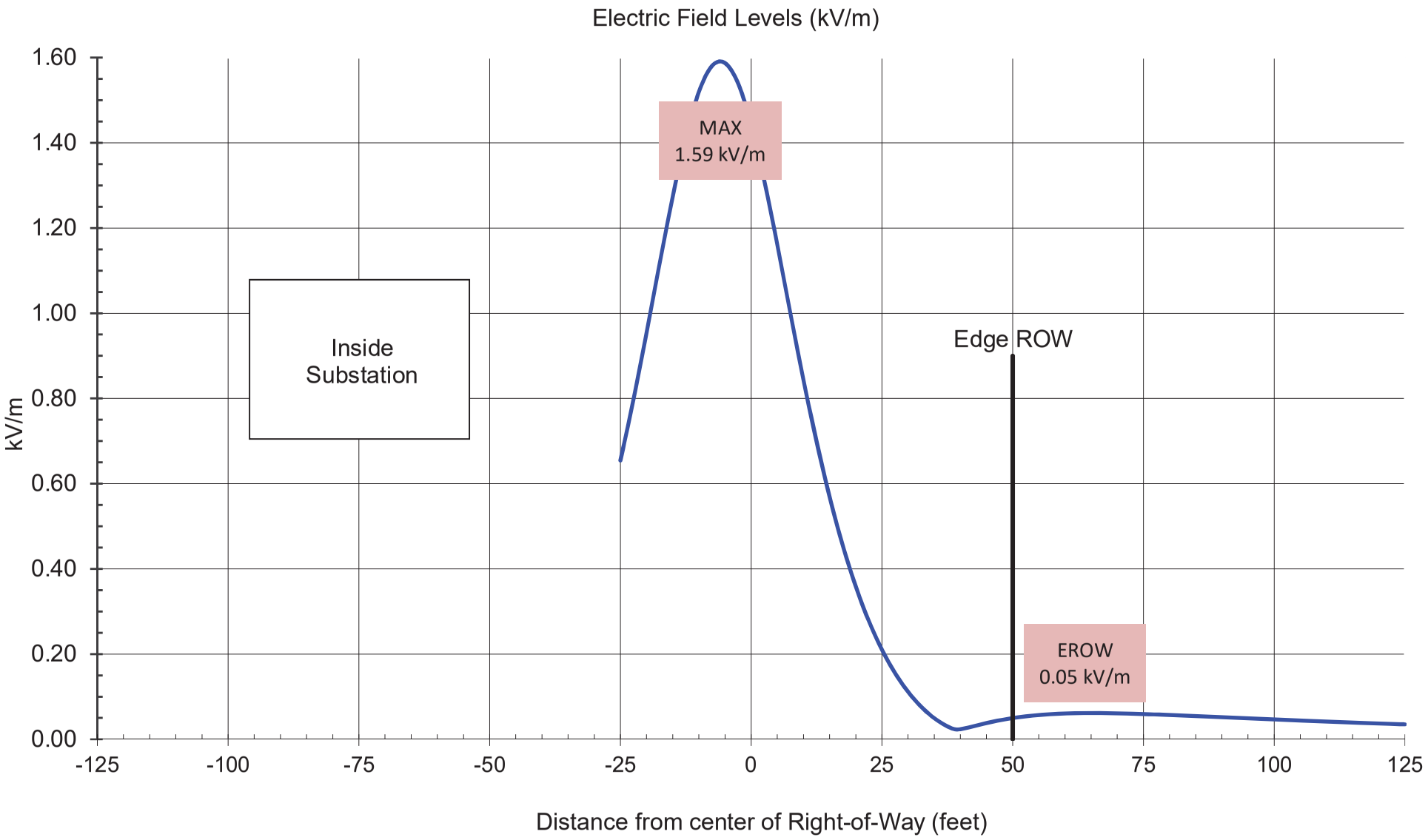


EXHIBIT 2

138 kV Electric Field Profile 2A

Exhibit 2
East Provident EMF Study
138 kV Transmission Line Rail Loop-In East of Substation
Profile 2A



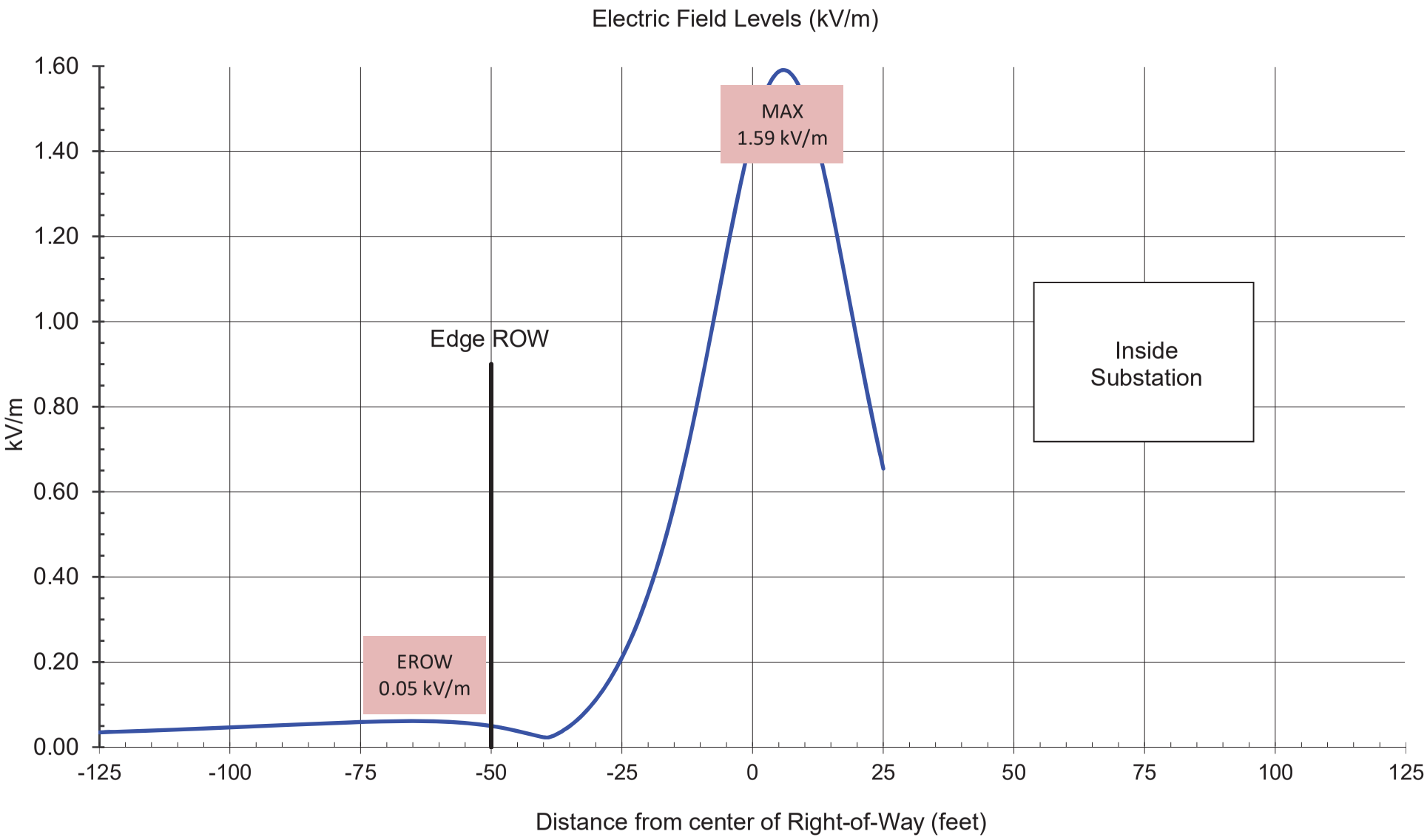
T:\TransMap\KKlaus Working Files\DUKE\EastProvident\Exhibit 1_7.xls

Commonwealth Associates, Inc.

EXHIBIT 3

138 kV Electric Field Profile 2B

Exhibit 3
East Provident EMF Study
138 kV Transmission Line Rail Loop-In West of Substation
Profile 2B



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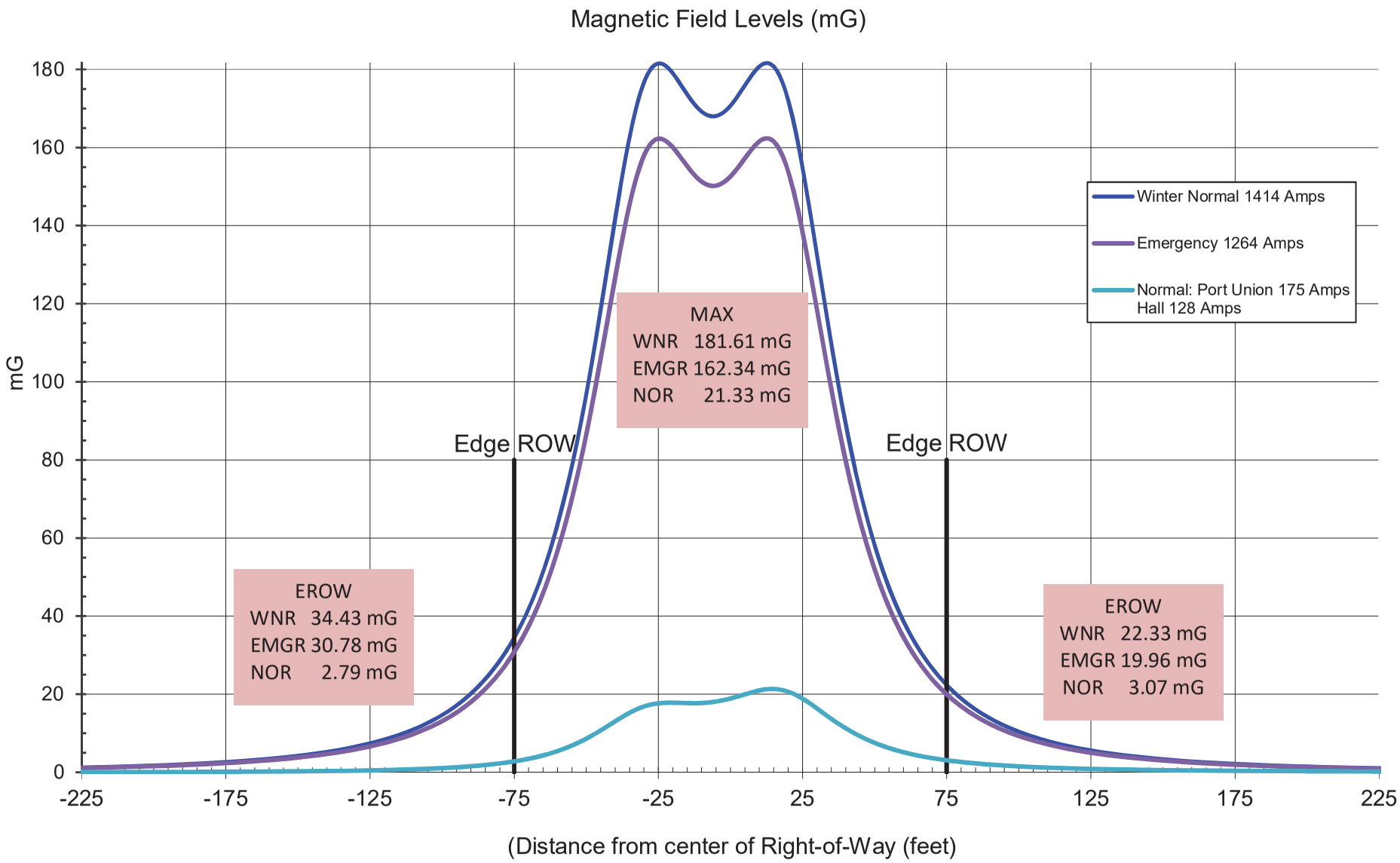
Commonwealth Associates, Inc.

EXHIBIT 4

138 kV Magnetic Field Profile 1

Exhibit 4
East Provident EMF Study
138 kV Transmission Line Rail Loop-In
Profile 1



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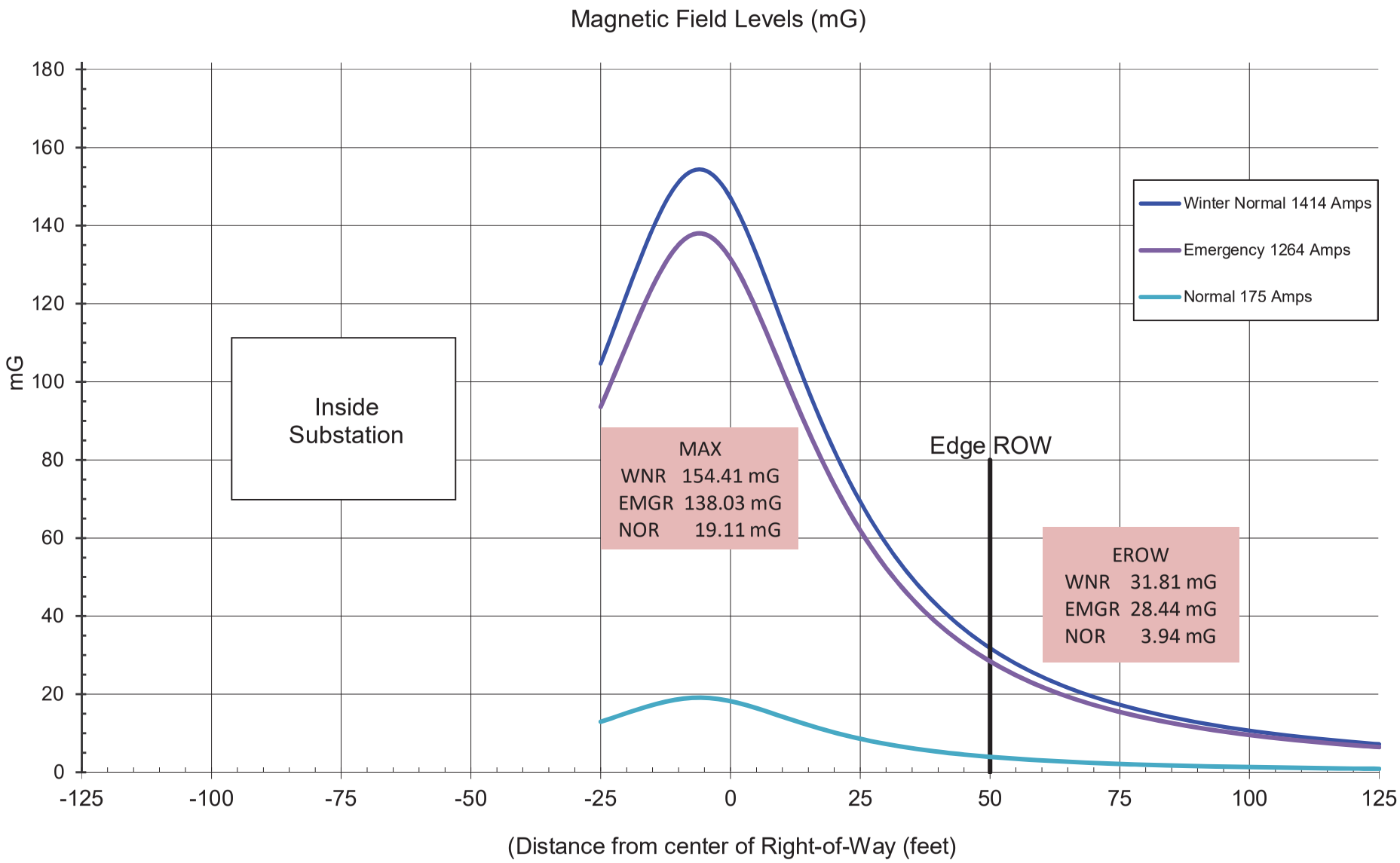
Commonwealth Associates, Inc.

EXHIBIT 5

138 kV Magnetic Field Profile 2A

Exhibit 5
East Provident EMF Study
138 kV Transmission Line Rail Loop-In East of Substation
Profile 2A



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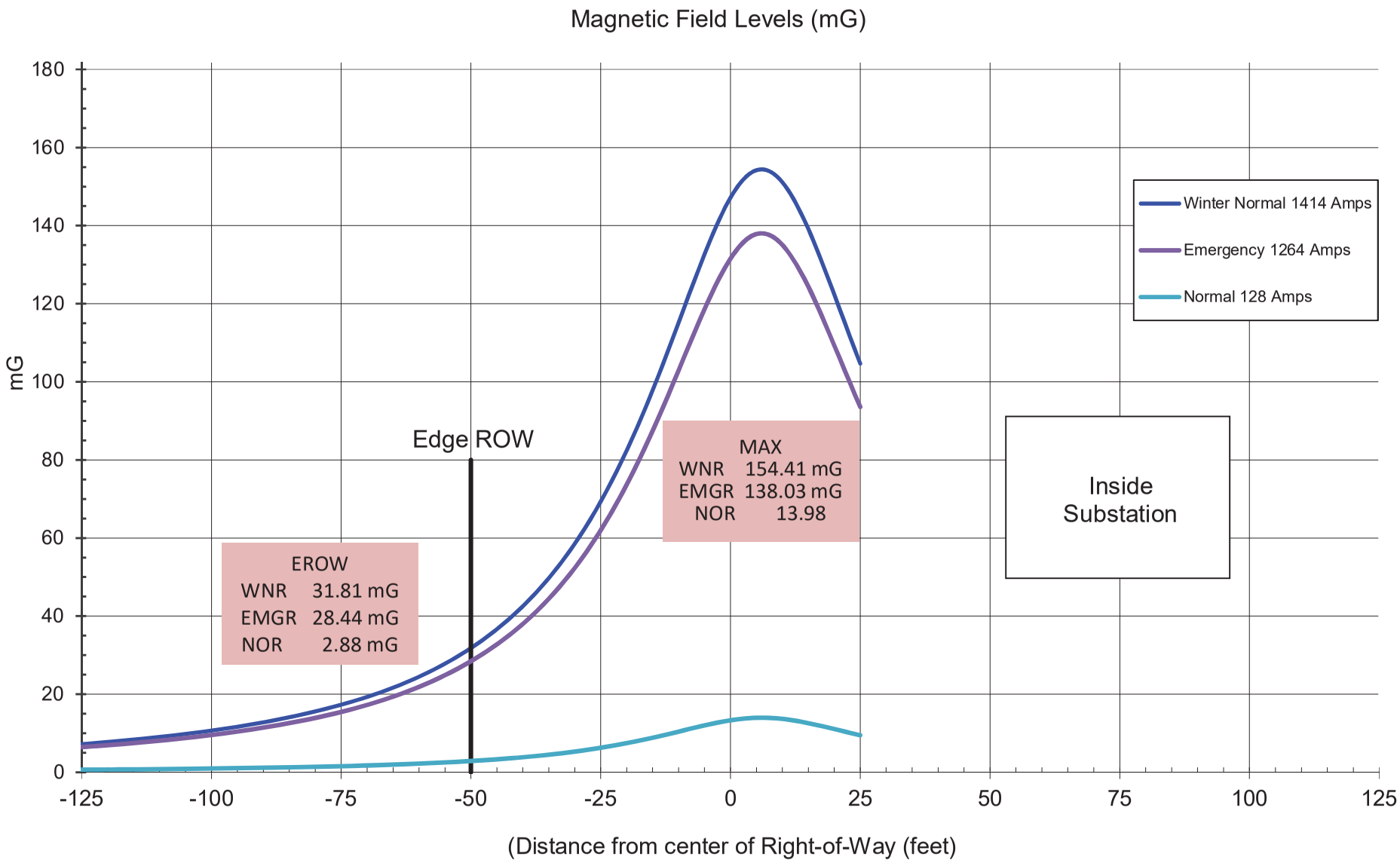
Commonwealth Associates, Inc.

EXHIBIT 6

138 kV Magnetic Field Profile 2B

Exhibit 6
East Provident EMF Study
138 kV Transmission Line Rail Loop-In West of Substation
Profile 2B



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Commonwealth Associates, Inc.

EXHIBIT 7

138 kV Radio Noise Profile

Exhibit 7
East Provident EMF Study
138 kV Transmission Line Rail Loop-In
Profile 2A

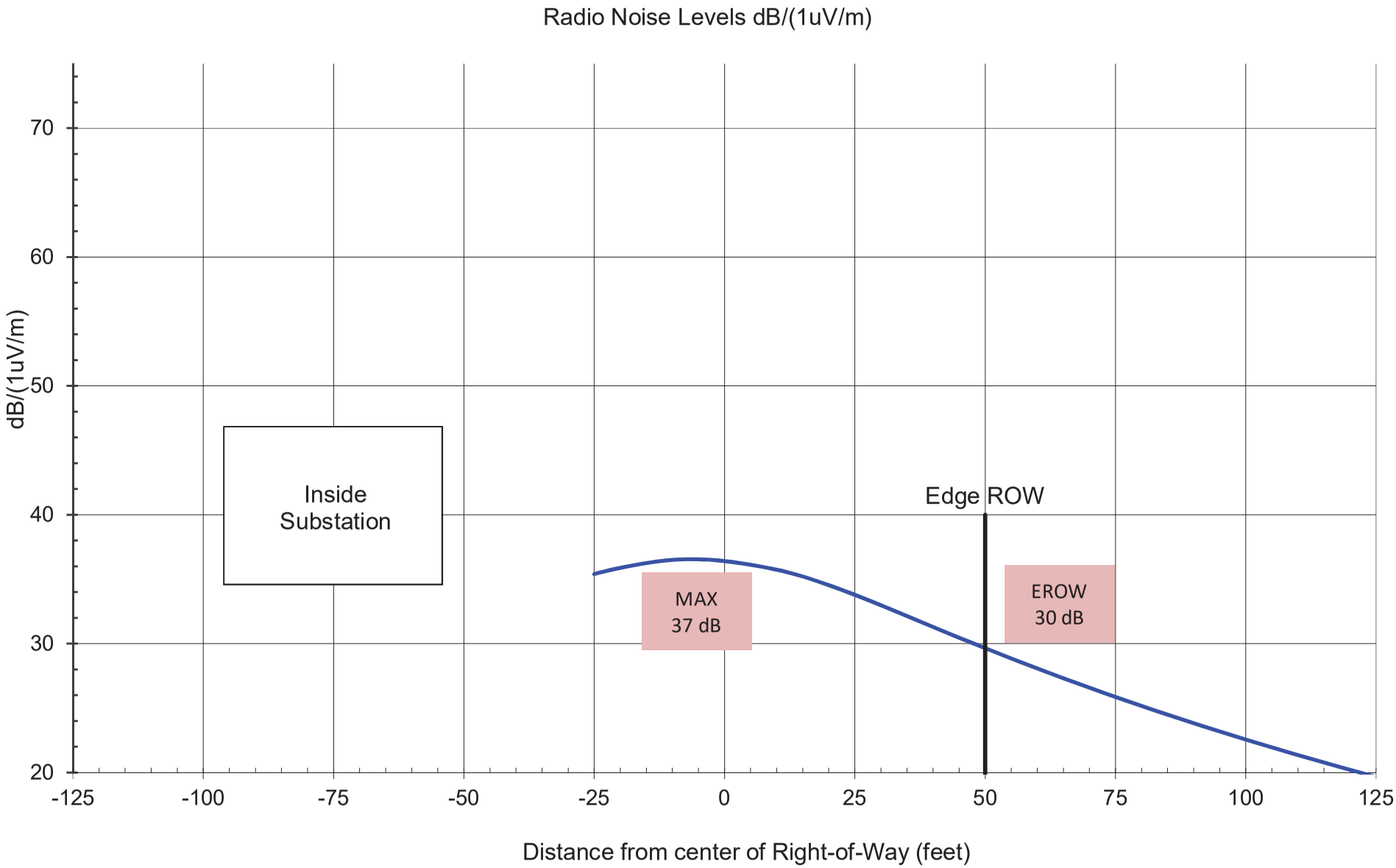


EXHIBIT 8

Transmission in the Vicinity of East Provident Substation

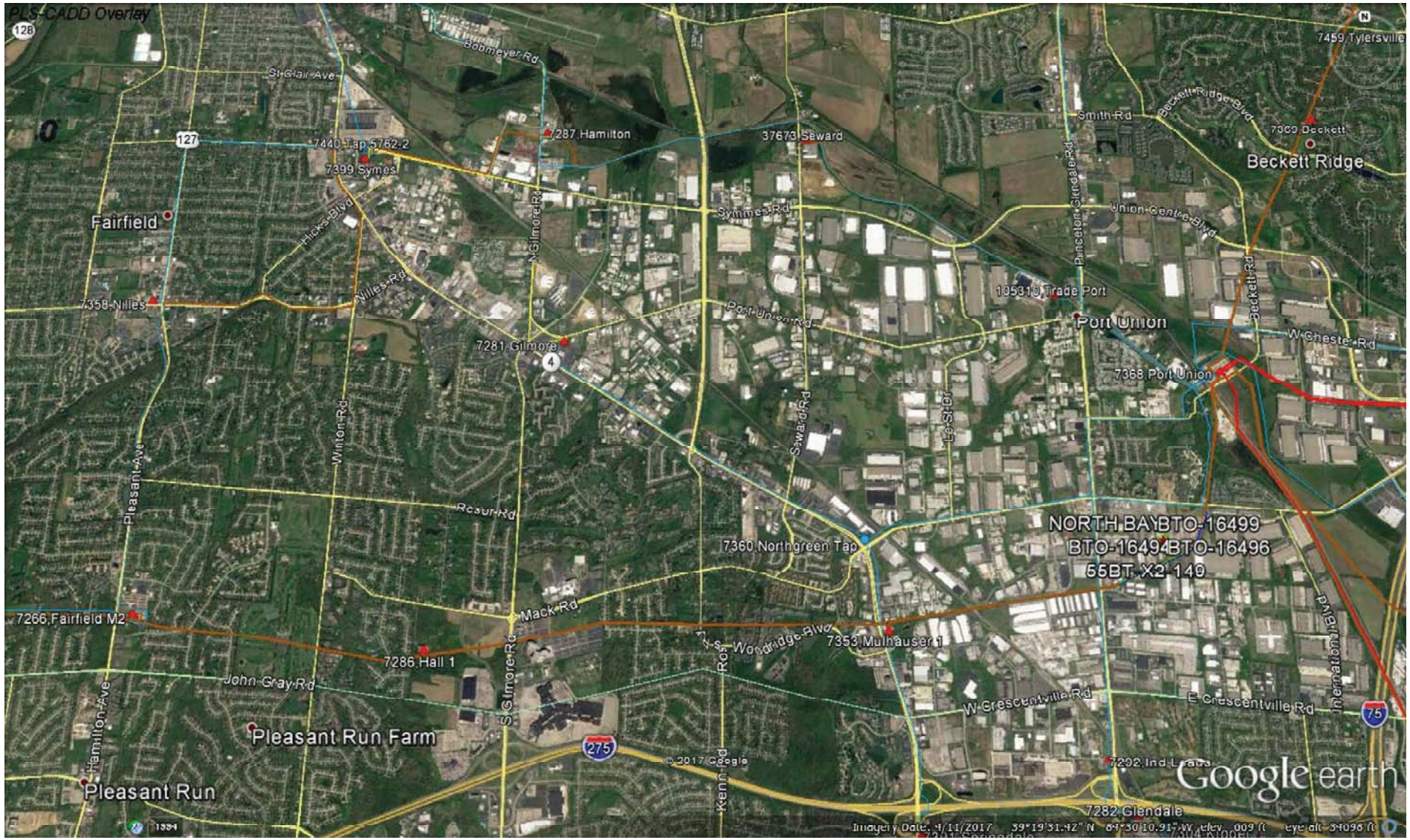

PLS-CADD Overlay
7459 Tylersville
Bobmeyer Rd
St Clair Ave
7287 Hamilton
37673 Seward
Smith Rd
Beckett Ridge Blvd
7369 Beckett
Beckett Ridge
127
7440 Tap 5762.2
7399 Symes
Fairfield
Hicks Blvd
N Gilmore Rd
Symmes Rd
Princeton Glendale Rd
Union Centre Blvd
Beckett Rd
105310 Trade Port
Port Union
7358 Nilles
Nilles Rd
Port Union Rd
W Chester Rd
7281 Gilmore
4
7368 Port Union
Winton Rd
Pleasant Ave
Seward Rd
Lesaor
Resor Rd
NORTH BAYBTO-16499
BTO-16494BTO-16496
55BT X2 140
7360 Northgreen Tap
7266 Fairfield M2
Mack Rd
Woodridge Blvd
7353 Mulhauser 1
7286 Hall 1
John Gray Rd
S Gilmore Rd
Kenn Rd
W Crescentville Rd
E Crescentville Rd
International Blvd
75
Hamilton Ave
Pleasant Run Farm
275
© 2017 Google
7292 Ind Leads
Google earth
Pleasant Run
7282 Glendale
Imagery Date: 4/11/2017 39°19'51.42" N 84°30'10.91" W elev 909 ft eye alt 5098 ft

EXHIBIT 9

East Provident Substation Loop Plan Overview

MAP GRID: N05E0150
COMMUNITY: RIALTO
TWP.: WEST CHESTER
STATE: OHIO
COUNTY: BUTLER
TAX: 9 0410
OPERATING UNIT: VSOH
FEEDER (138KV): F3885
FEEDER (138KV): F3886
DISTRICT: TODHUNTER

CONTACT/ ENGINEER:
JAKE DAWN
513-287-1371

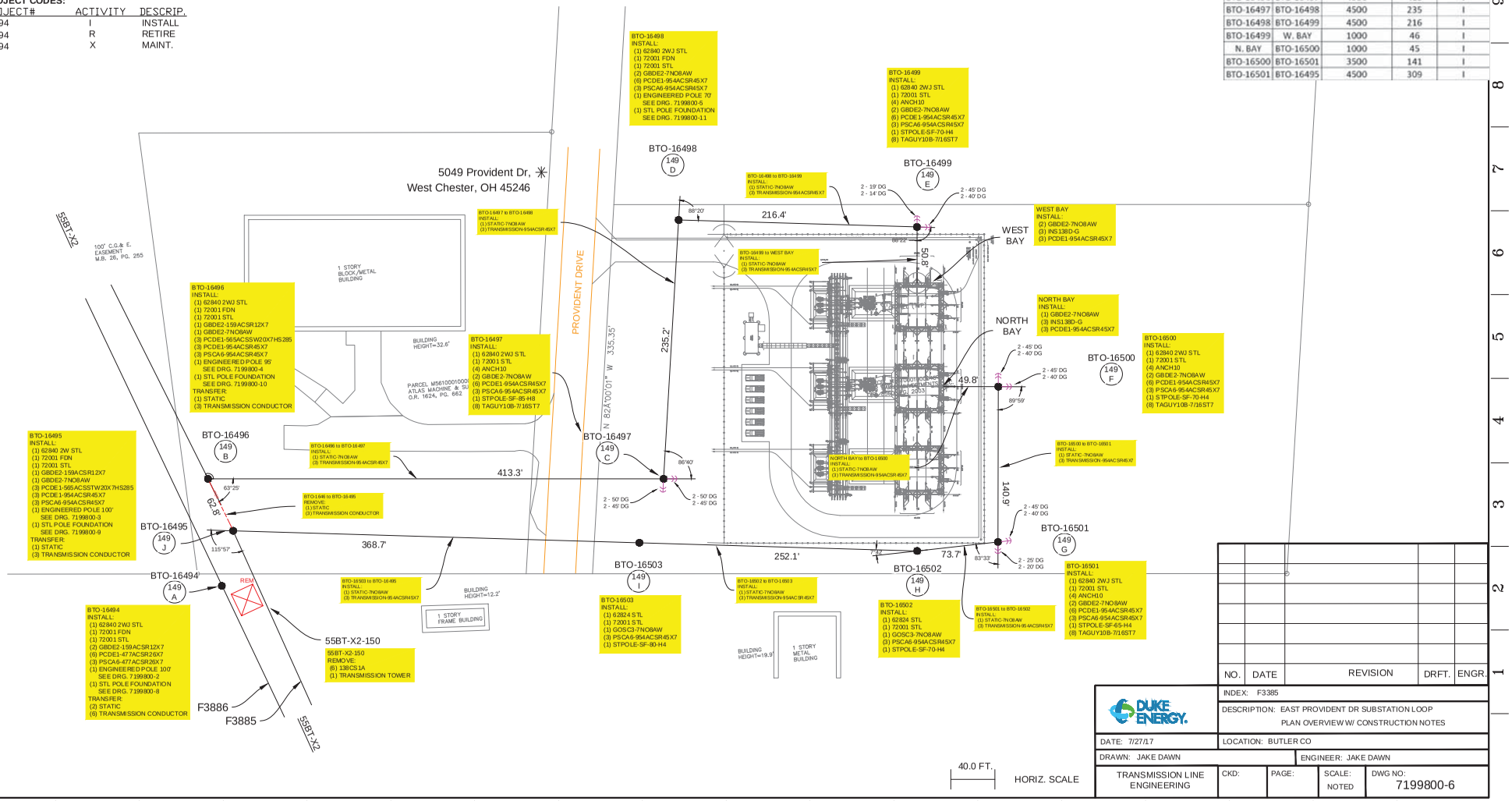
NOTE:
- FOR PHASING, SEE DRG. 7199800-1 & 7199800-7
- PLACE CONDUCTOR IN ROLLERS AND ADD WIRE AS NEEDED
- RE-SAG CONDUCTOR PER THE STRINGING AND SAGGING CHARTS

TRANSMISSION:
WO# 7199800
PROJECT CODES:

PROJECT#	ACTIVITY	DESCRIP.
P7594	I	INSTALL
P7594	R	RETIRE
P7594	X	MAINT.

WIRE STRINGING DATA

FROM	TO	MAX TENSION NESC HEAVY INITIAL (LBS)	RULING SPAN (FT)	INSTALL RETIRE TRANSFER
STATIC - 7NO8AW				
BTO-16496	BTO-16497	1700	413	I
BTO-16497	BTO-16498	1700	235	I
BTO-16498	BTO-16499	1700	216	I
BTO-16499	W. BAY	500	46	I
N. BAY	BTO-16500	500	45	I
BTO-16500	BTO-16501	1700	141	I
BTO-16501	BTO-16495	1700	309	I
CONDUCTOR - 954 ACSR 45X7				
BTO-16496	BTO-16497	4500	413	I
BTO-16497	BTO-16498	4500	235	I
BTO-16498	BTO-16499	4500	216	I
BTO-16499	W. BAY	1000	46	I
N. BAY	BTO-16500	1000	45	I
BTO-16500	BTO-16501	3500	141	I
BTO-16501	BTO-16495	4500	309	I



NO.	DATE	REVISION	DRFT.	ENGR.

DUKE ENERGY.

INDEX: F3385
DESCRIPTION: EAST PROVIDENT DR SUBSTATION LOOP PLAN OVERVIEW W/ CONSTRUCTION NOTES
DATE: 7/27/17
LOCATION: BUTLER CO
DRAWN: JAKE DAWN
ENGINEER: JAKE DAWN
TRANSMISSION LINE ENGINEERING
CKD:
PAGE:
SCALE: NOTED
DWG NO: 7199800-6

EXHIBIT 10

138 kV Single Circuit Steel Pole Transmission Configuration

Duke Energy
138kV Two Way Deadend With Jumper Support
DWG: 62840 2WJ STL

Duke Energy
138kV Two Way Deadend With Jumper Support
DWG: 62840 2W STL

Duke Energy
138kV Two Way Deadend
DWG: 62840 2W STL

Duke Energy
138KV Horizontal Post Type Vertical Insulator Framing
DWG: 62824 STL