

Rochester Gas and Electric Corporation

Rochester Transmission Project Enhancement

Exhibit 5

Design Drawings

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EXHIBIT 5: DESIGN DRAWINGS

5.1 Introduction

Rochester Gas and Electric Corporation (RG&E or the Applicant) proposes to construct the Rochester Transmission Project Enhancement (RTP Enhancement or the Project), which includes a new 115-kilovolt (kV) transmission line (Proposed Line 949) between Station 418 (located in Town of Gates) and Station 48 (located in City of Rochester), a total distance of approximately 6.7 miles. Proposed Line 949 will be built in thirteen sections, as described in Table 5-1.

Table 5-1 Line Route Description

Section	Length (miles)	Description	Structure Configuration	Attached Circuits	ROW Width / Parallel Circuit Separation
1	1.01	Station 418 to Trabold Rd Crossing	Double Circuit 115kV Steel Single Pole	DC: 115kV RG&E LINE 910	Existing ROW
2	0.12	Trabold Rd Crossing to 2 Spans South of Trabold Rd	Double Circuit 115kV Steel Single Pole	DC: 115kV LINE 910 UB: 34.5kV LINE 730	Existing ROW
3	0.14	2 Spans South of Trabold Rd to Line 940 Riser	Single Circuit 115kV Steel Single Pole	N/A	50' Separation (Parallel 115kV SP) 75' Additional ROW
4	0.06	Line 940 Riser to CSX Railroad	Single Circuit 115kV Steel Single Pole	N/A	50' Separation (Parallel 115kV SP) 50' Additional ROW
5	1.62	CSX Railroad to Howard Rd Crossing	Single Circuit 115kV 34.5kV Underbuild Steel Single Pole	UB: 34.5kV LINE 730	Existing Center Line in railroad (RR) ROW (for Structures 23-34; structures are positioned further away from RR than existing centerline to either meet the 25' requirement they are placed as far away as possible due to real estate or engineering constraints)

Section	Length (miles)	Description	Structure Configuration	Attached Circuits	ROW Width / Parallel Circuit Separation
6	0.95	Howard Rd Crossing to Line 926 & 916 Corridor	Single Circuit 115kV 34.5kV Underbuild Steel Single Pole	UB: 34.5kV LINE 705	Existing center line in RR ROW
7	0.15	Line 926 & 916 Corridor to Buffalo Rd Crossing	Double Circuit 115kV 34.5kV & 4kV Underbuild Steel Single Pole	DC: 115kV LINE 926 UB: 34.5kV LINE 705 & 4kV LINE 359 & Pilot 44 Fiber	Existing ROW
8	0.39	Buffalo Rd Crossing to Line 916 Crossing (East of McKee Rd)	Double Circuit 115kV 34.5kV & 4kV Underbuild Steel Single Pole	DC: 115kV LINE 926 UB: 34.5kV LINE 705 & 4kV LINE 359 & Pilot 44 Fiber	Existing ROW
9	0.09	Line 916 Crossing (East of McKee Rd) to Rochester & Southern RR Crossing	Double Circuit 115kV Steel Single Pole (Structures on the east side of the RR crossing will be two single circuit 115 kV steel poles)	DC: 115kV LINE 926	Existing ROW
10	1.24	Rochester & Southern RR Crossing to Ferrano Street Crossing	Double Circuit 115kV	DC: 115kV LINE 926	Existing centerline of Line 926 Inside RR ROW
11	0.53	Ferrano Street Crossing to 2 Spans North of Emerson Street	Double Circuit 115kV	DC: 115kV LINE 926	Existing centerline of Line 926 Inside RR ROW
12	0.21	2 Spans North of Emerson Street to 2 Spans East of Mt. Read Blvd	Double Circuit 115kV	DC: 115kV LINE 916	Existing centerline of Line 916 Inside RR ROW
13	0.19	2 Spans East of Mt. Read Blvd to Station 48	Double Circuit 115kV	DC: 115 kV LINE 916	Existing centerline of Line 916 in RR ROW

5.2 Design Standards

5.2.1 *Transmission Line*

The Applicant will design the Project's transmission structures and components in accordance with applicable national and state codes and regulations and the Applicant's own standards. The most significant such regulation is the current National Electrical Safety Code (NESC), which specifies both the minimum structural loads for determining the required structural capacity and appropriate clearances to energized parts and wires. Typical clearance requirements, as defined by the current NESC, include clearances to the ground, adjacent transmission lines, railroad lines, buildings, and a host of other facilities.

The current NESC, as well as other more stringent criteria that may be implemented by the Applicant, will determine the structural loading of the Project's transmission lines. Four basic load conditions are considered by the Applicant:

1. **NESC Heavy Loading Grade B Construction, Rule 250B:** ½-inch radial ice at 0 degrees Fahrenheit (°F) with a 4 pounds per square foot (psf) wind pressure;
2. **NESC Extreme Wind Loading, Rule 250C:** 90 miles per hour (mph) wind at 60°F;
3. **NESC Extreme Ice with Concurrent Wind Loading, Rule 250D:** 1-inch radial ice at 15°F with a 4 psf wind pressure;
4. **Heavy Ice Loading:** 1½-inch radial ice at 32°F with no wind.

The wire in each load case is in the "initial" condition before the effects of creep or other loads influence the wire tension.

The electric line rating the Applicant will require for this Project will be to provide a minimum 200-mega volt ampere (MVA) capacity at a summer Long-Term Emergency (LTE) loading condition for Proposed Line 949. For Existing Lines 910, 926, and 916, a conductor of the same size as the existing will be used to maintain the same line rating.

Affected structures along the existing lines will be removed and replaced with new structures to allow for double-circuiting and/or under-building. The Applicant will use different types of structures and structure materials for the Project. In general, Proposed Line 949 will be primarily supported with steel pole structures containing steel davit arms and porcelain suspension insulators and in some cases braced polymer line post insulators. Proposed Line 949 will be built with a 795 Aluminum Conductor Steel Reinforced (ACSR) 26/7 “Drake” conductor, and the shield wires will be Optical Ground Wire (OPGW) and Alumoweld 7#7 (mostly in spans connecting substation A-frames, where two shieldwires are required). All existing lines will be carried onto the new structures of Proposed Line 949 to make use of the existing ROW and centerline.

A detailed description of the proposed new transmission structures is included in Exhibit E-1.

Figure 5-1 is a set of Plan and Profile drawings of Proposed Line 949. Figure 5-2 is a set of cross-section diagrams of the structures that will support Proposed Line 949 and the existing lines within the Project ROW. Preliminary engineering indicates that the most common height of the steel pole structures will be approximately 99.2 feet at the highest point (the tops of the vertical poles), and the most common width at the widest point (across the horizontal cross-arm sections) will be approximately 18.5 feet. However, several individual structures required to maintain clearances from existing transmission lines and other features will be significantly taller. Figure 5-3 shows typical structure types.

The material of the structures will be steel, their color will be gray, and their finish will be galvanized.

Figures 5-4 and 5-5 depict typical foundations and insulators, respectively.

5.2.2 *Station 48*

The design drawings for the Station 48 expansion include a system one-line diagram and a site plan.

5.2.2.1 *One-Line Diagram*

Figure 5-6, a one-line diagram, is a simplified diagram which symbolically depicts the electrical arrangement of the 115kV circuit breakers in Station 48. Black color indicates the existing arrangement; additions and modifications proposed as part of the Project are red in color.

5.2.2.2 *Site Plan*

Figure 5-7 is a site plan of the equipment arrangement and surrounding area features for the proposed 115kV lines bus addition in Station 48. Black color indicates the existing arrangement; additions and modifications proposed as part of the Project are red in color.

5.2.3 *Station 418*

The design drawings for Station 418 include a system one-line diagram and a site plan.

5.2.3.1 *One-Line Diagram*

Figure 5-8, a one-line diagram, is a simplified diagram that symbolically depicts the electrical arrangement of the 115kV circuit breakers in Station 418. Black color indicates the existing arrangement inclusive of modifications the Applicant is making as part of its Rochester Area Reliability Project (RARP), which will precede the Project. Removal modifications proposed as part of the Project are indicated by green color and additions proposed as part of the Project are red in color on Figure 5-8.

5.2.3.2 *Site Plan*

Figure 5-9 is a site plan of the equipment arrangement and surrounding area features for the proposed 115kV lines bus addition in Station 418. Black color indicates the existing arrangement inclusive of modifications ongoing as part of RARP, which will precede the Project. Removal modifications proposed as part of the Project are shown as green in color and additions proposed as part of the Project are shown as red in color on Figure 5-9.

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