Northeast Infrastructure, LLC

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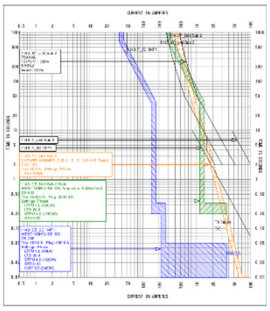
Replace Main Electrical Distribution Equipment
Project Number: 596A4-24-101
Bid Documents
Coordination Study

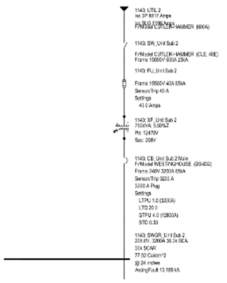
Lexington VAHCS
Troy Bowling Campus
1101 Veterans Dr.
Lexington, KY 40502

Northeast Infrastructure, LLC
34 Brown Street
Honesdale, PA 18431
October 29, 2025

LEXINGTON KY, VA MEDICAL CENTER

MEDIUM VOLTAGE FAULT CURRENT AND COORDINATION STUDY NEW SWITCHGEAR





100% SUBMITTAL

PROJECT NUMBER: 240121

31 OCTOBER 2025

Prepared By:
Elizabeth Tuomey, PE

Checked By:
Daniel Morton, PE

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1 EXECUTIVE SUMMARY

1.1 INTRODUCTION

Wiley|Wilson is providing the medium voltage design for the Lexington VA Medical Center to replace the Tower Building Switchgear, Chiller Switchgear 1, and associated distribution equipment. The purpose of this calculation package is to present the Short Circuit and Coordination Studies included with the design.

The new Tower switchgear consists of a 1200A 12.47kV double-ended four-section metal-clad switchgear, in a main-tie-main configuration. Each half of this switchgear consists of one main and two feeder breakers, with a tie breaker between them. The switchgear mains are fed from two separate feeder breakers in the VA-owned Main Building Switchgear that is immediately upstream. Also included in this design is the replacement of the 480V network protectors with high pressure safety switches on the secondary side of each of four Tower Building service transformers.

The Chiller Switchgear consists of a unit-substation-like lineup, with a 480V double-ended switchgear in a main-tie-main configuration, each side fed by a 2500kVA dry-type 12470-480V transformer and its associated 600A freestanding metal-clad circuit breaker.

The short circuit study is intended to show minimum required equipment ratings with the designed feeder lengths. Another analysis will be required during construction to reflect actual conditions based on purchased equipment and installed feeder types and lengths.

A coordination study has been performed for the medium voltage system using basis of design equipment to prove that proper coordination can be achieved. The Contractor will be required to provide their own coordination study based on actual equipment purchased to ensure that the equipment can meet code and project requirements.

1.2 CALCULATIONS

This study includes short circuit calculations and overcurrent protective device coordination.

All calculations have been performed using Power*Tools for Windows, a modular assembly of software developed by SKM Systems Analysis, Inc. The following modules have been used for this study:

- System Model Development DAPPER
- Short Circuit Calculations A_Fault
- Protective Device Coordination CAPTOR

Version 10.0.0.1 of the Power*Tools software has been used for all of the calculations presented throughout this report. Additional information related to this software package can be found at www.skm.com.

For this study, the purpose of the short circuit calculations is to determine available short circuit current levels throughout the electrical distribution system. The results of these calculations are used to confirm the short circuit interrupting and withstand ratings of designed equipment. These results can be found in Section 2 – "Short Circuit Analysis."

During the protective device coordination study, the ratings and settings of the proposed overcurrent protective devices are examined. In a selectively coordinated system, the protective device closest to the fault will interrupt the circuit thereby minimizing the disruption of electrical service. We have developed and plotted time current characteristic (TCC) coordination sheets showing the relationships between the relays in the Tower switchgear and the relays in the chiller switchgear transformer primary disconnects, the relays for the Main Switchgear breakers that feed them, the trip units in the contact switches and chiller switchgear main breakers, and the conductor damage curves. These sheets are included in Section 3 – "Protective Device Coordination Study."

2 SHORT CIRCUIT ANALYSIS

2.1 INTRODUCTION

The short circuit analysis is developed based on a modeled electrical system matching the design drawings, and on limited data collected in the field of the existing system as well as data presented in the Arc Flash Study provided by the VA. The available fault current at the utility substation has been provided by KU for each incoming circuit. Using the DAPPER module of SKM Power*Tools, a model of the system has been constructed from this data, and calculations have been run using this model.

2.2 SHORT CIRCUIT CALCULATION RESULTS

The short circuit analysis calculates available fault current levels throughout the electrical distribution system, from the incoming utility service feeds down through the secondary disconnects for each service transformer in the Tower Building. The results of the calculations are then used to determine the required ratings of the equipment buses to ensure their adequacy.

Using the A_Fault module of SKM Power*Tools, the short circuit fault currents for the model have been calculated. The A_Fault module is based on the Institute of Electrical and Electronics Engineers (IEEE) Standard 141 and American National Standards Institute (ANSI) Standards C37.010, C37.5, and C37.13.

Only one scenario was set up to conduct the short circuit current calculation, as the two incoming utility circuits are intended to be used in a preferred/alternate scheme and not paralleled. This scenario uses the future fault current contribution from the utility circuit with the highest fault current as the input to the system. Appendix A contains the short circuit current calculation for this scenario.

2.3 EQUIPMENT EVALUATION RESULTS

The tables on the following page compare proposed equipment ratings against calculated values of short circuit current. Table 2.1 shows an evaluation of all new equipment on the system under the worst-case single source configuration. The equipment evaluation only includes the new switchgear lineups and the disconnects for each service transformer, as this is the only equipment being replaced by this project and the rest of the system will remain unaffected; an evaluation of the entire medium-voltage system is outside the scope of this study.

TABLE 2.1 - EQUIPMENT EVALUATION

(Worst Case)

EQUIPMENT NAME	VOLTAGE L-L	MOMENTARY RATING (kA)			INTERRUPTING RATING (kA)			STATUS
		DEVICE	DUTY	PERCENT	DEVICE	DUTY	PERCENT	
TOWER SWGR A&B	12470	37	15.55	42.03	18	10.37	57.61	**Adequate**
DISC T-7	12470	37	15.04	40.65	18	10.789	59.93	**Adequate**
DISC T-8	12470	37	14.29	38.62	18	10.515	58.42	**Adequate**
DISC-NP T1	480	N/A	N/A	N/A	200	53.04	26.52	**Adequate**
DISC-NP T2	480	N/A	N/A	N/A	200	37.57	18.79	**Adequate**
DISC-NP T3	480	N/A	N/A	N/A	200	37.57	18.79	**Adequate**
DISC-NP T4	480	N/A	N/A	N/A	200	53.04	26.52	**Adequate**
SWGR CH-1 A&B	480	N/A	N/A	N/A	65	49.47	76.11	**Adequate**

3 PROTECTIVE DEVICE COORDINATION

3.1 INTRODUCTION

The protective device coordination study examines the settings of the basis of design overcurrent protective devices. In this section of the report, analysis of the device settings and time current characteristics is provided along with determination of whether proper coordination can be achieved. A re-evaluation of final purchased protective devices during the construction phase is required to achieve proper coordination on this system.

In a system lacking coordination, an overcurrent device may not adequately protect equipment from overload or short circuit currents, or a device further upstream of the device closest to a fault may interrupt the circuit. In either case, there may be a disruption that could have been avoided with proper coordination. Associated with this type of event are costs related to damaged equipment and/or downtime that may also have been avoided.

TCC curves for the medium voltage system are included in Appendix C. Protective device settings are found in Appendix D.

3.2 TIME-CURRENT CHARACTERISTIC COORDINATION SHEETS

TCC coordination sheets illustrating selected devices on the medium voltage system can be found in Appendix C. Where a redundant situation exists, a separate TCC curve was not generated.

For ease of use and navigation through the coordination sheets that follow, below is a key to aid in understanding the meaning of the various segments of the "TCC Name" field on each sheet. The various segments are separated by an underscore and should help to identify the portion of the electrical system being described.

TCC Name:	01_CB 56-2_TOWER FEEDERS
01	Indicates the first sequential TCC sheet for this system
CB 56-2	Indicates the most upstream equipment shown on this sheet
TOWER FEEDERS	Indicates the most downstream equipment shown on this sheet

The scope of the coordination study is depicted on the single line diagram in Appendix B. The coordination study encompasses the Tower Building's 12.47kV and the Chiller Building's Switchgear 1 distribution system, extending from the VAMC service entrance in the Main Building MV Switchgear above to the secondary protection of the Tower Building and Chiller Switchgear 1 service transformers.

Wiley|Wilson surveyed relay settings for the Main Building MV Switchgear feeder relays in the field where possible, and acquired data from the previous Arc Flash study as provided by the VA where settings could not be verified.

For the purposes of this study, the largest transformer in the Tower Building was analyzed in order to coordinate the new switchgear relays, as the system topology dictates that all other relays match one that would be analyzed therein. The main incoming relays for the Tower Switchgear must have identical settings to the other along with the ties, while the feeder breakers in the Tower Switchgear have different settings depending on size, and thus the Tower feeder relays are analyzed by size and not independently. Similarly, the two feeds to the Chiller Building Switchgear 1 through transformers T-7 and T-8 have not been independently analyzed, as they contain identical devices and serve identical loads and thus all associated devices must be set identically.

Settings have been developed using SEL-751 type relays and ABB EGTU trip units in the Tower Building, and Square D micrologic 5.0 trip units in the Chiller Building. This study will need revision if final product selections cannot match the characteristics of these devices.

Coordination between the feeder relays in the Main Building Switchgear and the main relays of the Tower Building Switchgear, as well as between Tower Building main and feeder relays, has been prioritized over that between the Tower Building main and tie relays. There are not sufficient time or pickup gaps between all devices in the system to achieve full coordination with the tie relay, and the only fault event that would ever test this miscoordination is a fault directly on the bus of the switchgear. Additionally, the tie breaker operation is largely intended to be manual only, not automatically controlled. As coordination can be achieved otherwise, it is recommended that the tie relay be set to match the incoming relays to minimize the chance of a miscoordinated trip.

TCC 01 in Appendix D represents both the phase and ground coordination for the Main Building Switchgear feeder relays and the Tower Building main relays. The long-time pickup value that the previous study has indicated for the Main Building Switchgear feeder devices (320A) is well within the protection limits of the #1/0 AWG incoming feeders to the Tower Building, and is even within the protection limits of all MV conductors further downstream. We recommend that the settings of the feeder relays in the main building switchgear be made to match. Settings for relay PD T-5 & TOWER MV2 are given within Table 4.1 in Appendix D. Settings of the Tower Building relays have been developed such that they can coordinate with each other and with the relays upstream. As the potential fault current is quite high and the instantaneous settings of the relays in the Main Building Switchgear are quite low, coordination cannot be achieved for faults of high magnitude, however for faults of lower magnitude coordination can be achieved while allowing for 0.2s of separation between curves.

The ground fault pickup for all feeder relays was determined based on conservative feeder protection and coordination with upstream devices as applicable, as coordination blow these devices is largely irrelevant – the only fault event that would test any miscoordination downstream would be a fault within a transformer itself, as all transformers on this system are primary-delta secondary-wye connected which limits the ability of any devices upstream

to detect ground faults that originate downstream. The ground fault protection at the upstream Main Building Switchgear relays is set quite low, thus resulting in a situation in which coordination for higher magnitude faults is difficult, while coordination for lower magnitude faults can easily be achieved.

TCC 02 shows coordination between the Tower Building main and feeder relay for downstream transformer T-4. Settings of the Tower Building relays have been developed such that they can coordinate with each other and with the relays upstream. The relays coordinate with the requisite 0.2s separation between the curves for both the phase and ground functions.

TCC 03 shows coordination between the Tower Building main and feeder relay for downstream transformer T-2. Settings of the Tower Building relays have been developed such that they can coordinate with each other and with the relays upstream. The relays coordinate with the requisite 0.2s separation between the curves for both the phase and ground functions.

TCC 04 shows coordination between the Tower Building feeder relay for downstream transformer T-4 and the high pressure safety switch on the secondary of the transformer. The feeder relay coordinates both with the downstream trip unit and the transformer inrush current. The long time pick up of the safety switch trip unit (1600A) is within the protection limits of the transformer and existing busway.

TCC 05 shows coordination between the Tower Building feeder relay for downstream transformer T-2 and the high pressure safety switch on the secondary of the transformer. The feeder relay coordinates both with the downstream trip unit and the transformer inrush current. The long time pick up of the safety switch trip unit (1200A) is within the protection limits of the design conductors.

TCC 06 shows coordination between the Main Building feeder relay for transformer T-7, the new primary protective relay for T-7, and the main breaker for the new Chiller Switchgear 1 A-side. This curve also represents the coordination for the B-side feed through transformer T-8, as the equipment and connections involved are identical. The feeder relay in the main building is fully able to coordinate with appropriate primary protective settings for transformer T-7. Coordination between both relays and the downstream main breakers of Chiller Switchgear 1 is very difficult, assuming that the settings of the new main breakers must be similar to those of the existing main breakers to prevent coordination issues further downstream. This is acceptable, as the only faults that would test this miscoordination would be faults on the bus of the new switchgear itself, and all of these devices are in series.

All settings as determined for coordination are sufficient for equipment protection as well without any compromise; all medium-voltage equipment and feeders will be adequately protected by settings recommended in this report.

Coordination with low-voltage devices downstream of the equipment being replaced is outside of the scope of this study. Coordination with these devices will need to be analyzed and settings developed after final equipment selections have been determined.

Appendix A

Short Circuit Current Calculation – Worst Case Single Source Scenario

SKM SHORT CIRCUIT CALCULATIONS

Oct 15, 2025 08:05:56

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ALL INFORMATION PRESENTED IS FOR REVIEW, APPROVAL
INTERPRETATION AND APPLICATION BY A REGISTERED ENGINEER ONLY
SKM DISCLAIMS ANY RESPONSIBILITY AND LIABILITY RESULTING
FROM THE USE AND INTERPRETATION OF THIS SOFTWARE.
-------------------------------------------------------------------------------
SKM POWER*TOOLS FOR WINDOWS
A_FAULT SHORT CIRCUIT ANALYSIS REPORT
COPYRIGHT SKM SYSTEMS ANALYSIS, INC. 1996-2020
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SKM SHORT CIRCUIT CALCULATIONS

F A U L T S T U D Y S U M M A R Y
(FOR APPLICATION OF LOW VOLTAGE BREAKERS)
PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO

BUS RECORD NO NAME	VOLTAGE L-L	A V A I L A B L E 3 PHASE	X/R	F A U L T LINE/GRND	D U T I E S (KA) X/R
DISC-NP-T1	480.	49.940	6.31	53.037	6.21
DISC-NP-T2	480.	36.013	5.68	37.570	5.57
DISC-NP-T3	480.	36.013	5.68	37.570	5.57
DISC-NP-T4	480.	49.939	6.31	53.034	6.20
DISC: T-7	12470.	10.789	8.34	10.647	7.72
DISC: T-8	12470.	10.515	7.15	10.378	6.70
MAIN BLDG SWITCHGEAR A	12470.	10.909	9.49	10.820	8.86
MAIN BLDG SWITCHGEAR B	12470.	10.632	7.95	10.546	7.51
SWGR: CH-1A	480.	49.468	9.86	52.499	9.80
SWGR: CH-1B	480.	49.255	9.57	52.339	9.59
TOWER BLDG SWITCHGEAR A	12470.	10.371	5.00	10.074	4.45
TOWER BLDG SWITCHGEAR B	12470.	10.122	4.71	9.844	4.23
TOWER SERVICE BUSWAY #1	480.	49.940	6.31	53.036	6.19
TOWER SERVICE BUSWAY #2	480.	36.013	5.68	37.571	5.57

30 FAULTED BUSES, 32 BRANCHES, 1 CONTRIBUTIONS
UNBALANCED FAULTS REQUESTED

*** SHORT CIRCUIT STUDY COMPLETE ***

SKM SHORT CIRCUIT CALCULATIONS

M O M E N T A R Y D U T Y S U M M A R Y R E P O R T

PRE FAULT VOLTAGE: 1.0000
MODEL TRANSFORMER TAPS: NO
SOLUTION METHOD : E/Z

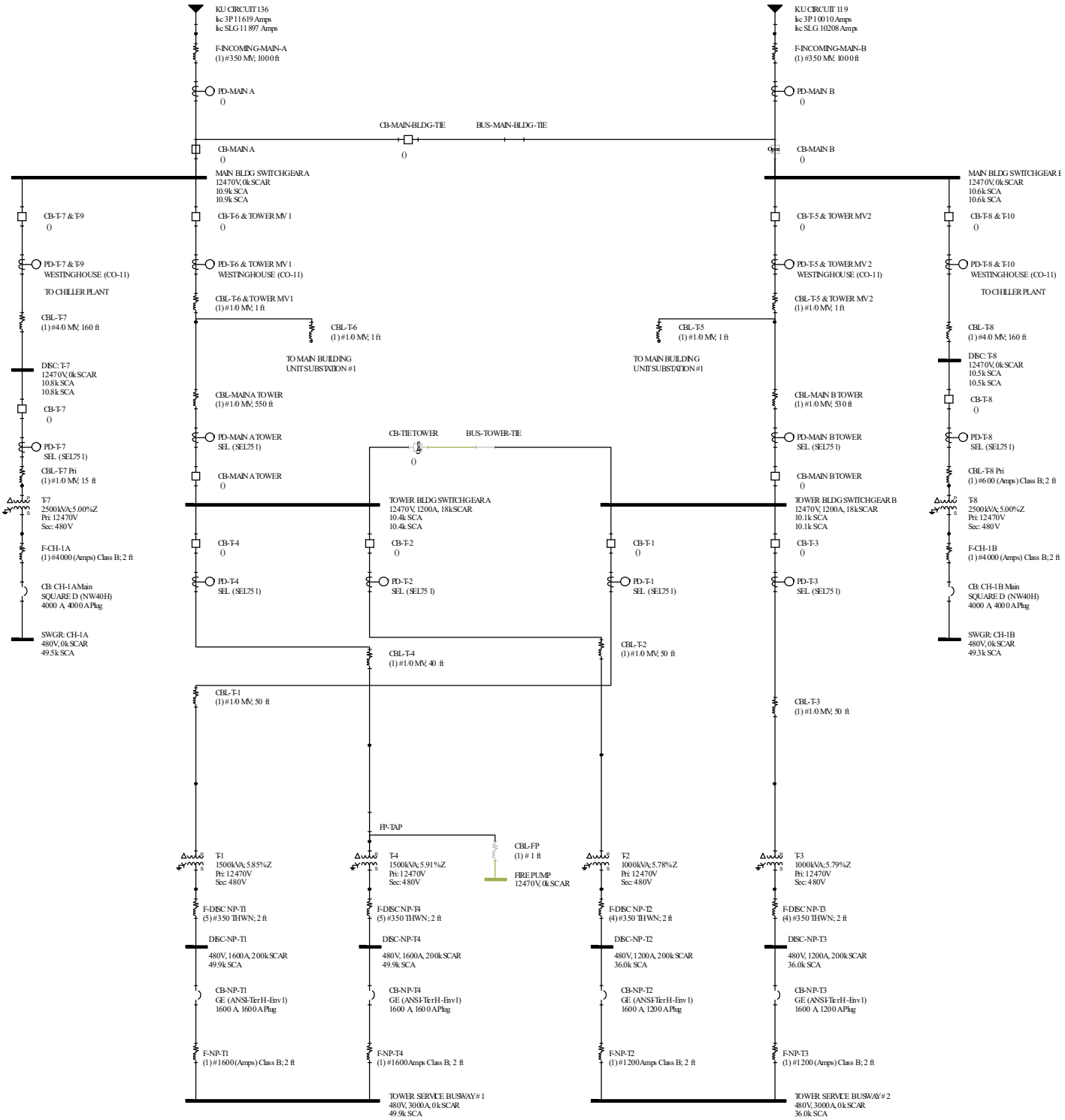
BUS RECORD NO	NAME	VOLTAGE L-L	* 3 PHASE * KA	X/R	* * * SLG * * * KA	X/R
DISC: T-7		12470.	15.035	8.34	14.621	7.72
DISC: T-8		12470.	14.229	7.15	13.859	6.70
MAIN BLDG SWITCHGEAR A		12470.	15.549	9.49	15.240	8.86
MAIN BLDG SWITCHGEAR B		12470.	14.683	7.95	14.407	7.51
TOWER BLDG SWITCHGEAR A		12470.	12.989	5.00	12.284	4.45
TOWER BLDG SWITCHGEAR B		12470.	12.505	4.71	11.863	4.23

16 FAULTED BUSES, 32 BRANCHES, 1 CONTRIBUTIONS
UNBALANCED FAULTS REQUESTED

*** SHORT CIRCUIT STUDY COMPLETE ***

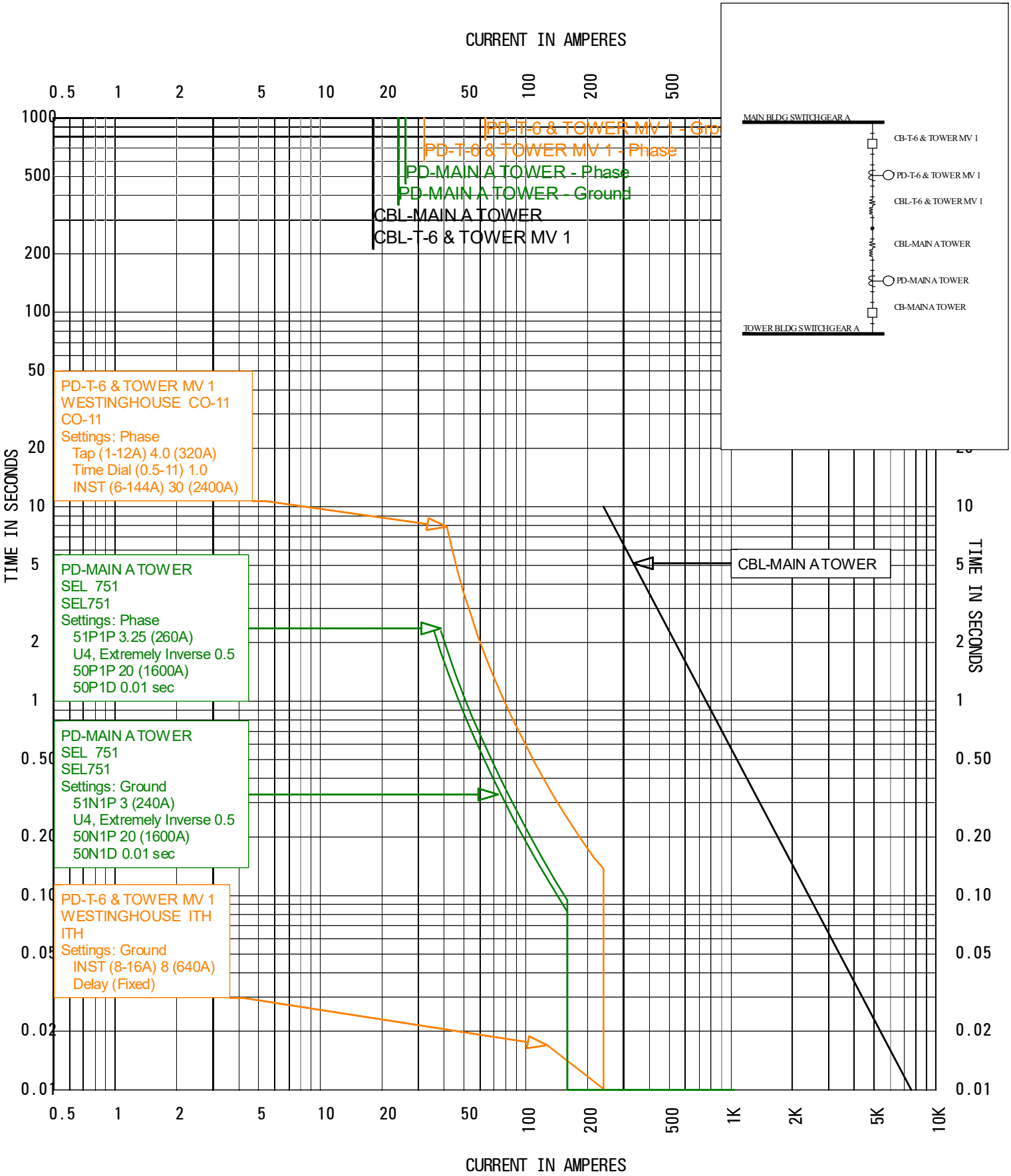
Appendix B

Scope of TCC Coordination


KU CIRCUIT 136
Isc 3P 11619 Amps
Isc SLG 11897 Amps
F-INCOMING-MAIN-A
(1) #350 MV; 1000 ft
PD-MAIN A
()
KU CIRCUIT 119
Isc 3P 10010 Amps
Isc SLG 10208 Amps
F-INCOMING-MAIN-B
(1) #350 MV; 1000 ft
PD-MAIN B
()
CB-MAIN-BLDG-TIE
BUS-MAIN-BLDG-TIE
()
CB-MAIN A
()
Open
CB-MAIN B
()
MAIN BLDG SWITCHGEAR A
12470V, 0k SCAR
10.9k SCA
10.9k SCA
MAIN BLDG SWITCHGEAR B
12470V, 0k SCAR
10.6k SCA
10.6k SCA
CB-T-7 & T-9
()
CB-T-6 & TOWER MV 1
()
CB-T-5 & TOWER MV2
()
CB-T-8 & T-10
()
PD-T-7 & T-9
WESTINGHOUSE (CO-11)
PD-T-6 & TOWER MV 1
WESTINGHOUSE (CO-11)
PD-T-5 & TOWER MV 2
WESTINGHOUSE (CO-11)
PD-T-8 & T-10
WESTINGHOUSE (CO-11)
TO CHILLER PLANT
CBL-T-6 & TOWER MV1
(1) #1/0 MV; 1 ft
CBL-T-5 & TOWER MV2
(1) #1/0 MV; 1 ft
TO CHILLER PLANT
CBL-T-7
(1) #4/0 MV; 160 ft
CBL-T-6
(1) #1/0 MV; 1 ft
CBL-T-5
(1) #1/0 MV; 1 ft
CBL-T-8
(1) #4/0 MV; 160 ft
TO MAIN BUILDING
UNIT SUBSTATION #1
TO MAIN BUILDING
UNIT SUBSTATION #1
DISC: T-7
12470V, 0k SCAR
10.8k SCA
10.8k SCA
DISC: T-8
12470V, 0k SCAR
10.5k SCA
10.5k SCA
CBL-MAIN A TOWER
(1) #1/0 MV; 550 ft
CBL-MAIN B TOWER
(1) #1/0 MV; 530 ft
CB-T-7
()
CB-T-8
()
PD-MAIN A TOWER
SEL (SEL751)
CB-TIE TOWER
BUS-TOWER-TIE
Open
()
PD-MAIN B TOWER
SEL (SEL751)
PD-T-7
SEL (SEL751)
PD-T-8
SEL (SEL751)
CBL-T-7 Pri
(1) #1/0 MV; 15 ft
CBL-T-8 Pri
(1) #600 (Amps) Class B; 2 ft
CB-MAIN A TOWER
()
CB-MAIN B TOWER
()
T-7
2500kVA; 5.00%Z
Pri: 12470V
Sec: 480V
TOWER BLDG SWITCHGEAR A
12470V, 1200A, 18kSCAR
10.4k SCA
10.4k SCA
TOWER BLDG SWITCHGEAR B
12470V, 1200A, 18kSCAR
10.1k SCA
10.1k SCA
T-8
2500kVA; 5.00%Z
Pri: 12470V
Sec: 480V
F-CH-1A
(1) #4000 (Amps) Class B; 2 ft
CB-T-4
()
CB-T-2
()
CB-T-1
()
CB-T-3
()
F-CH-1B
(1) #4000 (Amps) Class B; 2 ft
PD-T-4
SEL (SEL751)
PD-T-2
SEL (SEL751)
PD-T-1
SEL (SEL751)
PD-T-3
SEL (SEL751)
CB: CH-1A Main
SQUARE D (NW40H)
4000 A; 4000 A Plug
CB: CH-1B Main
SQUARE D (NW40H)
4000 A; 4000 A Plug
SWGR: CH-1A
480V, 0k SCAR
49.5k SCA
SWGR: CH-1B
480V, 0k SCAR
49.3k SCA
CBL-T-4
(1) #1/0 MV; 40 ft
CBL-T-2
(1) #1/0 MV; 50 ft
CBL-T-1
(1) #1/0 MV; 50 ft
CBL-T-3
(1) #1/0 MV; 50 ft
FP-TAP
CBL-FP
(1) # 1 ft
FIRE PUMP
12470V, 0k SCAR
T-1
1500kVA; 5.85%Z
Pri: 12470V
Sec: 480V
T-4
1500kVA; 5.91%Z
Pri: 12470V
Sec: 480V
T-2
1000kVA; 5.78%Z
Pri: 12470V
Sec: 480V
T-3
1000kVA; 5.79%Z
Pri: 12470V
Sec: 480V
F-DISC NP-T1
(5) #350 THWN; 2 ft
F-DISC NP-T4
(5) #350 THWN; 2 ft
F-DISC NP-T2
(4) #350 THWN; 2 ft
F-DISC NP-T3
(4) #350 THWN; 2 ft
DISC-NP-T1
480V, 1600A, 200k SCAR
49.9k SCA
DISC-NP-T4
480V, 1600A, 200k SCAR
49.9k SCA
DISC-NP-T2
480V, 1200A, 200k SCAR
36.0k SCA
DISC-NP-T3
480V, 1200A, 200k SCAR
36.0k SCA
CB-NP-T1
GE (ANSI-Ter H-Inv 1)
1600 A; 1600 A Plug
CB-NP-T4
GE (ANSI-Ter H-Inv 1)
1600 A; 1600 A Plug
CB-NP-T2
GE (ANSI-Ter H-Inv 1)
1600 A; 1200 A Plug
CB-NP-T3
GE (ANSI-Ter H-Inv 1)
1600 A; 1200 A Plug
F-NP-T1
(1) #1600 (Amps) Class B; 2 ft
F-NP-T4
(1) #1600 Amps Class B; 2 ft
F-NP-T2
(1) #1200 Amps Class B; 2 ft
F-NP-T3
(1) #1200 (Amps) Class B; 2 ft
TOWER SERVICE BUSWAY # 1
480V, 3000A, 0k SCAR
49.9k SCA
TOWER SERVICE BUSWAY # 2
480V, 3000A, 0k SCAR
36.0k SCA

Appendix C

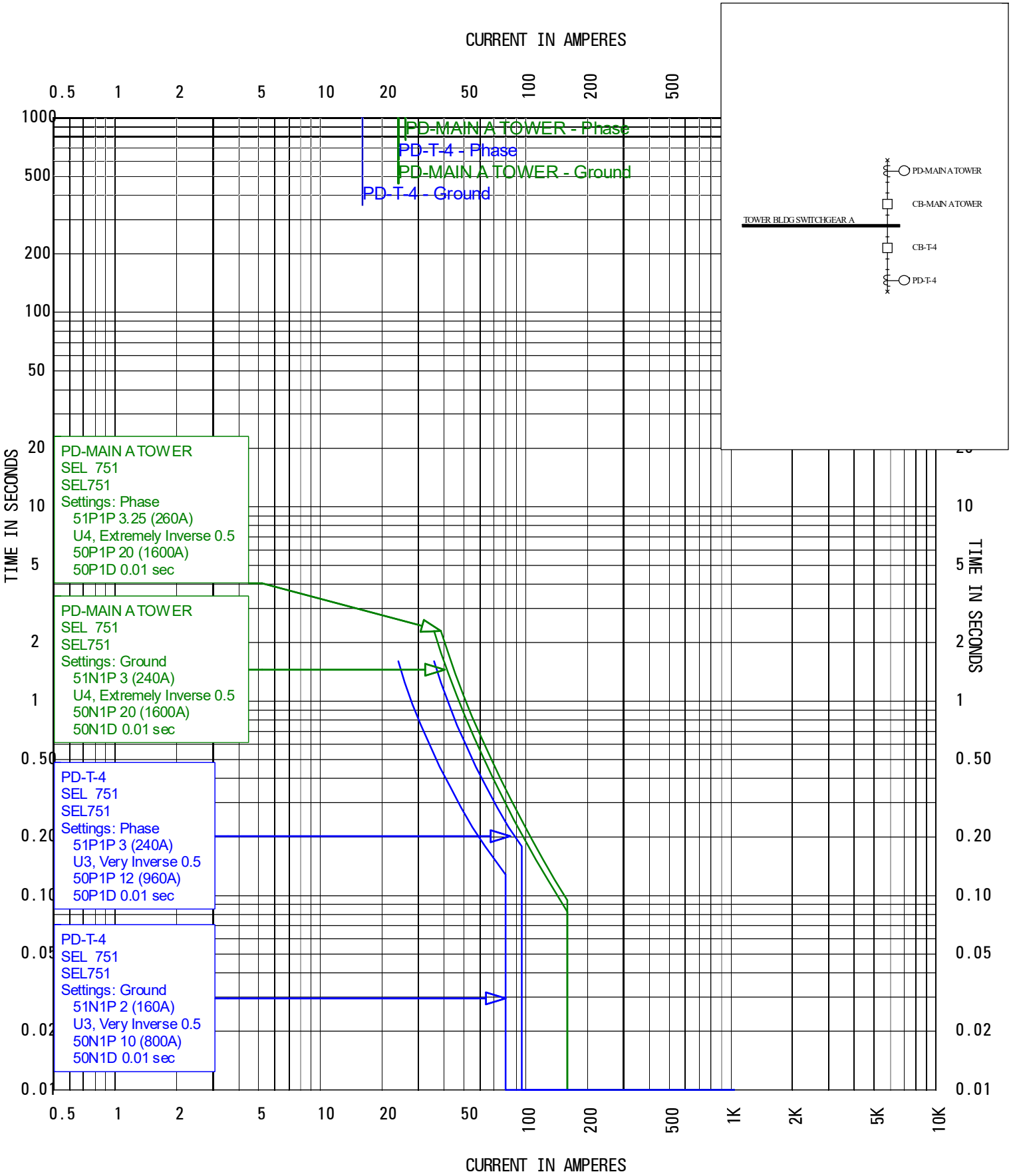
Time Current Coordination Curves



TCC Name: 01_CB T6 & TOWER MV1_CB MAIN A TOWER
Current Scale x 10

Reference Voltage: 12470
SKM Systems Analysis, Inc.
October 15, 2025 8:14 AM

Wiley|Wilson
Constant Progress

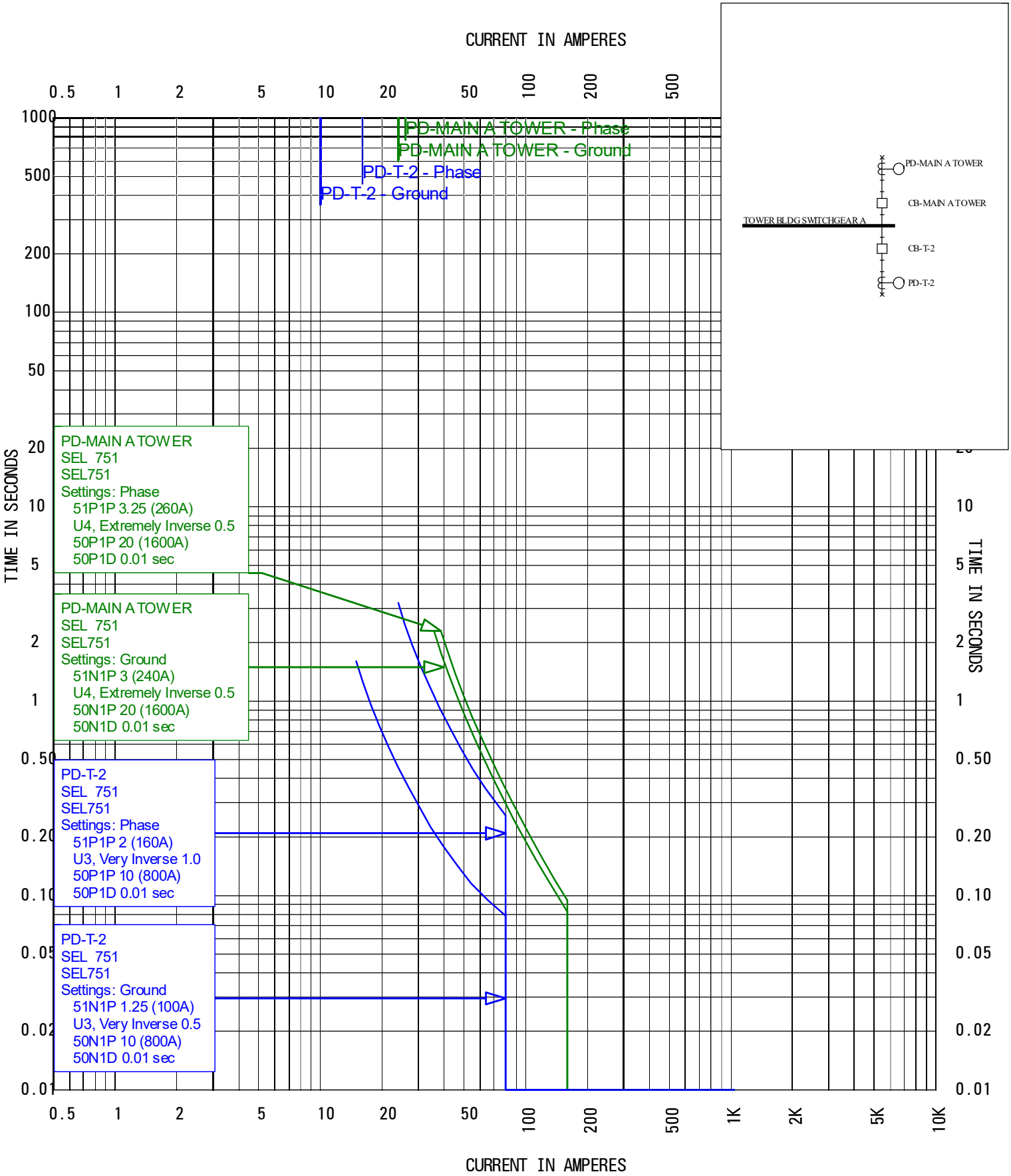


TCC Name: 02_CB MAIN A TOWER_CB T4

Current Scale x 10

Reference Voltage: 12470
SKM Systems Analysis, Inc.
October 15, 2025 8:14 AM

Wiley|Wilson
Constant Progress

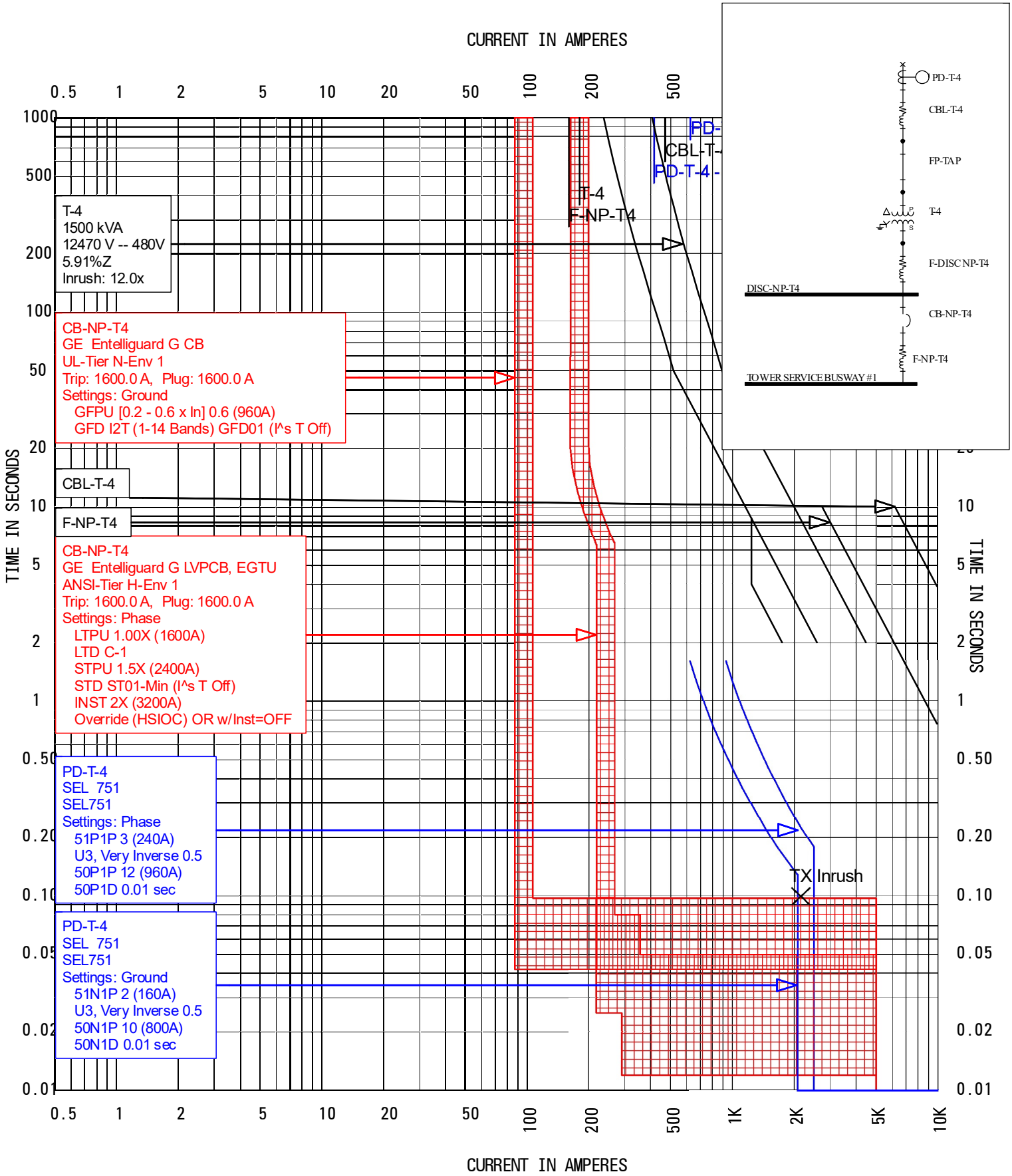


TCC Name: 03_CB MAIN A TOWER_CB T2

Current Scale x 10

Reference Voltage: 12470
SKM Systems Analysis, Inc.
October 15, 2025 8:15 AM

Wiley|Wilson
Constant Progress

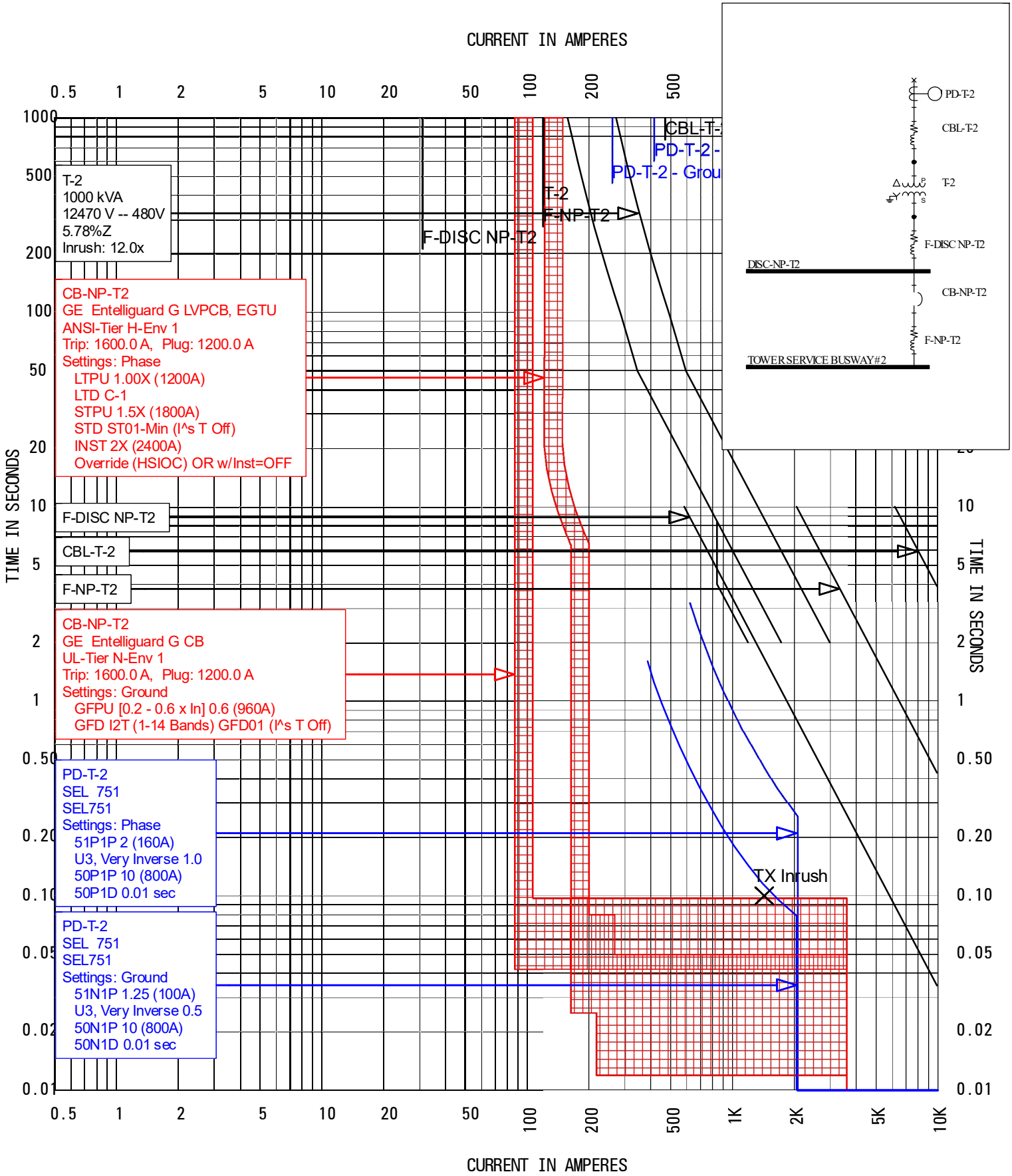


TCC Name: 04_CB T4_CB NP-T4

Current Scale x 10

Reference Voltage: 480
SKM Systems Analysis, Inc.
October 15, 2025 8:15 AM

Wiley|Wilson Constant Progress

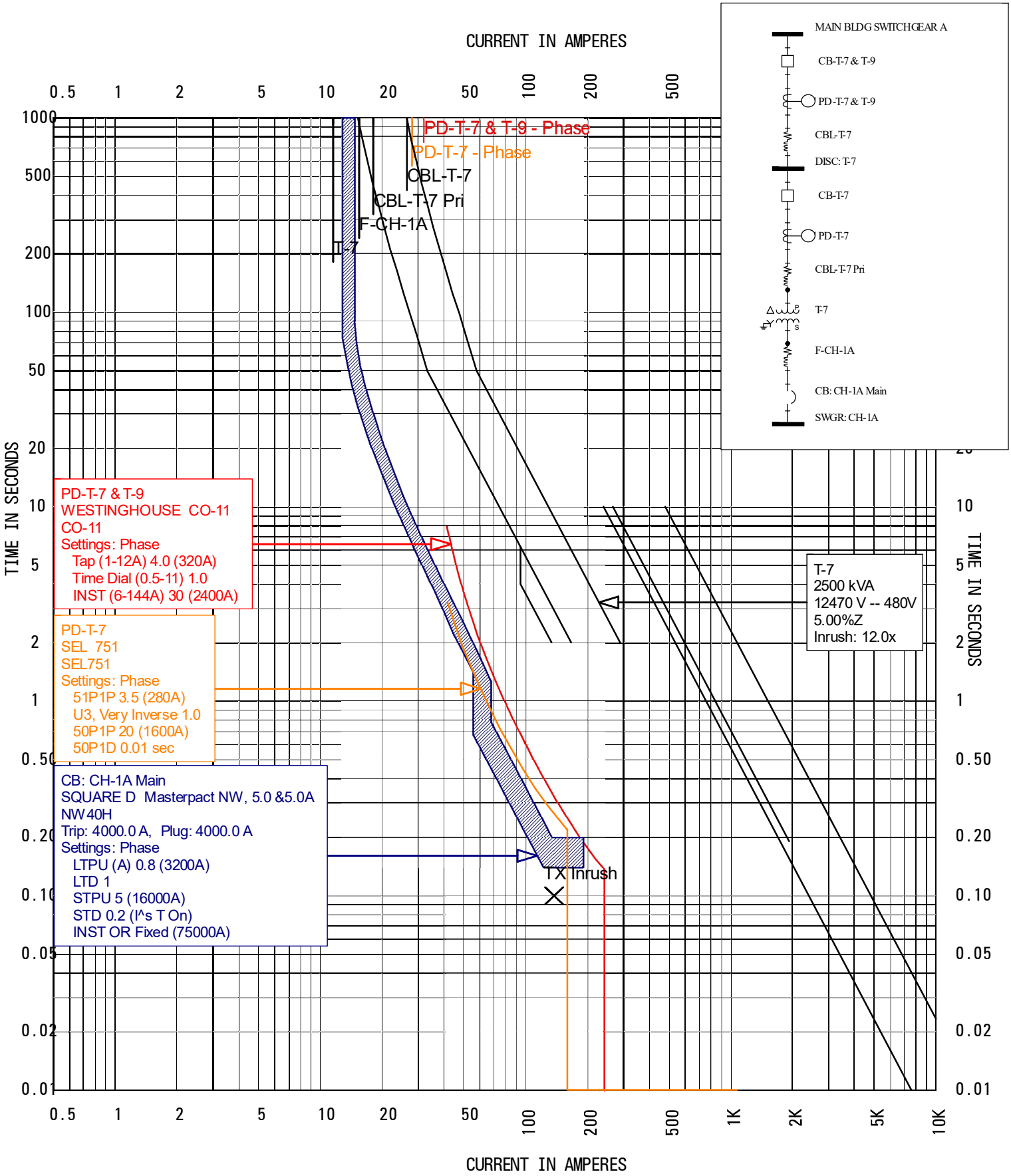


TCC Name: 05_CB T2_CB NP-T2

Current Scale x 10

Reference Voltage: 480
SKM Systems Analysis, Inc.
October 15, 2025 8:15 AM

Wiley|Wilson Constant Progress



TCC Name: 06_CB-T7&T9_CB CH-1A Main

Current Scale x 10

Reference Voltage: 12470

SKM Systems Analysis, Inc.

October 29, 2025 4:20 PM

Wiley|Wilson Constant Progress

Appendix D

Protective Device Settings

TABLE 4.1 MEDIUM VOLTAGE PROTECTIVE DEVICE SETTINGS

EQUIPMENT DESIGNATION	PROTECTIVE DEVICE DESIGNATION	DEVICE DESCRIPTION - BASIS OF DESIGN	CT RATIO	FUNCTION	SETTINGS
TOWER BLDG SWGR	PD-MAIN A TOWER	SEL 751	400/5	51P	51PP = 3.25 (260A) 51PC = U3 51PTD = 1.0
				50P	50P1P = 15 (1200A)
			400/5	51N	51NP = 3.0 (240A) 51NC = U3 51NTD = 0.50
				50N	50N1P = 12 (960A)
TOWER BLDG SWGR	PD-MAIN B TOWER	SEL 751	400/5	51P	51PP = 3.25 (260A) 51PC = U3 51PTD = 1.0
				50P	50P1P = 15 (1200A)
			400/5	51N	51NP = 3.0 (240A) 51NC = U3 51NTD = 0.50
				50N	50N1P = 12 (960A)
TOWER BLDG SWGR	PD-T-1	SEL 751	400/5	51P	51PP = 3 (240A) 51PC = U3 51PTD = 0.01
				50P	50P1P = 12 (960A)
			400/5	51N	51NP = 1.25 (100A) 51NC = U3 51NTD = 0.50
				50N	50N1P = 10 (800A)
TOWER BLDG SWGR	PD-T-2	SEL 751	400/5	51P	51PP = 2 (160A) 51PC = U3 51PTD = 0.01
				50P	50P1P = 10 (800A)
			400/5	51N	51NP = 1.25 (100A) 51NC = U3 51NTD = 0.50
				50N	50N1P = 10 (800A)
TOWER BLDG SWGR	PD-T-3	SEL 751	400/5	51P	51PP = 2 (160A) 51PC = U3 51PTD = 0.01
				50P	50P1P = 10 (800A)
			400/5	51N	51NP = 1.25 (100A) 51NC = U3 51NTD = 0.50
				50N	50N1P = 10 (800A)

TABLE 4.1 MEDIUM VOLTAGE PROTECTIVE DEVICE SETTINGS

EQUIPMENT DESIGNATION	PROTECTIVE DEVICE DESIGNATION	DEVICE DESCRIPTION - BASIS OF DESIGN	CT RATIO	FUNCTION	SETTINGS
TOWER BLDG SWGR	PD-T-4	SEL 751	400/5	51P	51PP = 3 (240A) 51PC = U3 51PTD = 0.01
				50P	50P1P = 12 (960A)
			400/5	51N	51NP = 1.25 (100A) 51NC = U3 51NTD = 0.50
				50N	50N1P = 10 (800A)
T7 DISC	PD-T-7	SEL 751	400/5	51P	51PP = 3.5 (280A) 51PC = U3 51PTD = 0.01
				50P	50P1P = 120 (16000A)
			400/5	51N	51NP = 1.25 (100A) 51NC = U3 51NTD = 0.50
				50N	50N1P = 10 (800A)
T7 DISC	PD-T-8	SEL 751	400/5	51P	51PP = 3.5 (280A) 51PC = U3 51PTD = 0.01
				50P	50P1P = 120 (16000A)
			400/5	51N	51NP = 1.25 (100A) 51NC = U3 51NTD = 0.50
				50N	50N1P = 10 (800A)

TABLE 4.2 LOW VOLTAGE PROTECTIVE DEVICE SETTINGS

EQUIPMENT DESIGNATION	PROTECTIVE DEVICE DESIGNATION	DEVICE DESCRIPTION - BASIS OF DESIGN	SETTINGS
DISC-NP-T1	CB-NP-T1	GE Entelliguard G LVPCB, EGTU	PHASE LTPU 1.00X (1600A) LTD C-1 STPU 1.5X (2400A) STD ST01-Min (I^s T Off) INST 2X (3200A) Override (HSIOC) OR w/Inst=OFF GROUND GFPU 0.2 (320A) GFD GFD01 (I^T OFF)
DISC-NP-T2	CB-NP-T2	GE Entelliguard G LVPCB, EGTU	PHASE LTPU 1.00X (1200A) LTD C-1 STPU 1.5X (1800A) STD ST01-Min (I^s T Off) INST 2X (2400A) Override (HSIOC) OR w/Inst=OFF GROUND GFPU 0.2 (320A) GFD GFD01 (I^T OFF)
DISC-NP-T3	CB-NP-T3	GE Entelliguard G LVPCB, EGTU	PHASE LTPU 1.00X (1200A) LTD C-1 STPU 1.5X (1800A) STD ST01-Min (I^s T Off) INST 2X (2400A) Override (HSIOC) OR w/Inst=OFF GROUND GFPU 0.2 (320A) GFD GFD01 (I^T OFF)
DISC-NP-T4	CB-NP-T4	GE Entelliguard G LVPCB, EGTU	PHASE LTPU 1.00X (1600A) LTD C-1 STPU 1.5X (2400A) STD ST01-Min (I^s T Off) INST 2X (3200A) Override (HSIOC) OR w/Inst=OFF GROUND GFPU 0.2 (320A) GFD GFD01 (I^T OFF)
SWGR: CH-1A	CB: CH-1A Main	Square D NW40H w/ Micrologic 5.0	PHASE LTPU = 0.8 (3200A) LTD = 1 STPU = 10 STD = 0.2 IsT ON INST = Fixed GROUND GFPU = D (800A) GFD = 0.3

TABLE 4.2 LOW VOLTAGE PROTECTIVE DEVICE SETTINGS			
EQUIPMENT DESIGNATION	PROTECTIVE DEVICE DESIGNATION	DEVICE DESCRIPTION - BASIS OF DESIGN	SETTINGS
SWGR: CH-1B	CB: CH-1B Main	Square D NW40H w/ Micrologic 5.0	PHASE LTPU = 0.8 (3200A) LTD = 1 STPU = 10 STD = 0.2 IsT ON INST = Fixed GROUND GFPU = D (800A) GFD = 0.3

Appendix E

KU Short Circuit and Protective Device Data

Lexington Operations Center 500 Stone Road Lexington, KY 40503

Kentucky Utilities Co.

A PPL company

December 12, 2024

R. D. Brock
Consulting Engineer
Ofc (859) 367-4304
Fax (859) 367-4236

Ms. Elizabeth Tuomey, PE
Wiley Wilson
127 Nationwide Drive
Lynchburg, VA 24502

Re: Available Fault Current Request

Customer: **Lexington VA Medical Center**
Location: **1101 Veterans Drive, Lexington, KY**
Circuit: **UK Med Center substation– Ckt 119 – delivering 12470 Volts nominal**

Dear Ms. Tuomey,

The fault current values and any other information provided below for the designated location were obtained from an analysis of the Kentucky Utilities Company (KU) electric distribution system. The values below represent the available fault current as of the date of this letter with circuits in their normal configuration and all other system conditions considered normal. These values do not include any contribution to available fault current from motors or any other non-utility equipment. Due to the dynamic nature of our electric distribution system, the actual fault current available may vary from the values provided below due to abnormal system conditions, temporary circuit reconfiguration or other factors. The customer should assume that such variance can occur at any time.

These values may also permanently increase over time due to changes in transformer impedances, voltage conversion, changes in circuit parameters or the configuration of the circuit. Because of this, the customer may wish to consider the values below as conservative and allow for possible future increases in available fault current for sizing electrical equipment and arc flash analysis. KU does not automatically provide updates of this information to customers but will gladly respond to requests for updated information. It is the responsibility of the customer to request updated information from KU if necessary to ensure that the customer's electrical equipment and personal protective requirements are adequate.

This letter is for informational purposes only and its preparation and delivery do not constitute the provision of engineering services to the customer by KU or any employee of KU.

Maximum Fault Currents

Description: **Fault Values are at the Primary Meter inside the substation at 12.47kV**

Type	Symmetrical Amps	Asymmetrical Amps	X/R Ratio
Three Phase	**10010**	**16530**	**21.4298**
Phase to Ground	**10208**	**16884**	**22.1439**

1. Primary Upstream Protection:

Breaker utilizing an SEL 351A Multifunction Relay .

Phase -- CT Ratio = 600:5, Tap 5.00, TL 4.00, Curve U4, Instantaneous = 40.00

Ground -- CT Ratio = 600:5, Tap 4.00, TL 2.00, Curve U4, Instantaneous = 40.00

Lexington Operations Center 500 Stone Road Lexington, KY 40503

Kentucky Utilities Co.

A PPL company

December 12, 2024

R. D. Brock
Consulting Engineer
Ofc (859) 367-4304
Fax (859) 367-4236

Ms. Elizabeth Tuomey, PE
Wiley Wilson
127 Nationwide Drive
Lynchburg, VA 24502

Re: Available Fault Current Request

Customer: **Lexington VA Medical Center**
Location: **1101 Veterans Drive, Lexington, KY**
Circuit: **UK Med Center substation– Ckt 136 – delivering 12470 Volts nominal**

Dear Ms. Tuomey,

The fault current values and any other information provided below for the designated location were obtained from an analysis of the Kentucky Utilities Company (KU) electric distribution system. The values below represent the available fault current as of the date of this letter with circuits in their normal configuration and all other system conditions considered normal. These values do not include any contribution to available fault current from motors or any other non-utility equipment. Due to the dynamic nature of our electric distribution system, the actual fault current available may vary from the values provided below due to abnormal system conditions, temporary circuit reconfiguration or other factors. The customer should assume that such variance can occur at any time.

These values may also permanently increase over time due to changes in transformer impedances, voltage conversion, changes in circuit parameters or the configuration of the circuit. Because of this, the customer may wish to consider the values below as conservative and allow for possible future increases in available fault current for sizing electrical equipment and arc flash analysis. KU does not automatically provide updates of this information to customers but will gladly respond to requests for updated information. It is the responsibility of the customer to request updated information from KU if necessary to ensure that the customer's electrical equipment and personal protective requirements are adequate.

This letter is for informational purposes only and its preparation and delivery do not constitute the provision of engineering services to the customer by KU or any employee of KU.

Maximum Fault Currents

Description: **Fault Values are at the Primary Meter inside the substation at 12.47kV**

Type	Symmetrical Amps	Asymmetrical Amps	X/R Ratio
Three Phase	**11619**	**19103**	**19.5470**
Phase to Ground	**11897**	**19597**	**20.2903**

1. Primary Upstream Protection:

Breaker utilizing an SEL 351A Multifunction Relay .

Phase -- CT Ratio = 600:5, Tap 5.00, TL 4.00, Curve U4, Instantaneous = 40.00

Ground -- CT Ratio = 600:5, Tap 4.00, TL 2.00, Curve U4, Instantaneous = 40.00