Arc Flash Risk Assessment
With
Short-Circuit Analysis and Overcurrent Protective Device Coordination Analysis
For
Jurupa Community Services District
Parks
Jurupa, CA

Update April 2, 2019

Accomplished By

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7674 SOAR RWP PNL and HARR/CHAN RVRWLK PNL were added to the Riverwalk Park analysis. Recommendations for added equipment with an incident energy rating above 4 cal/cm2 can be found at the end of section 3.A.

Executive Summary

This report presents the results of short circuit calculations, protective device coordination, and arc flash incident energy calculations at the major electrical buses in the Jurupa Community Services District – Parks – Jurupa, CA facility. The scope of this report is to determine incident energy exposures at the equipment within the system, to verify that the interrupting ratings of the equipment in the distribution system are adequate for the available short circuit current, and to determine the settings for the protective devices to achieve optimum coordination. All calculations were done using the PTW software package supplied by SKM Systems Analysis, Inc. Version 8.0.3.4.

The following sites were analyzed in this report:

i. American Heroes Park (AHP)
ii. Cedar Creek Park (CCP)
iii. Dairyland Park (DP)
iv. Deer Creek Park (DCP)
v. Eastvale Community Center (ECC)
vi. Eastvale Community Park (ECP)
vii. Half Moon Park (HMP)
viii. Harada Heritage Park (HHP)
ix. James Huber Park (JHP)
x. McKune Family Park (MFP)
xi. Mountain View Park (MVP)
xii. Orchard Park (OP)
xiii. Providence Ranch Park (PRP)
xiv. Irrigation Well #41 (IW #41)
xv. River Walk Park (RWP)
xvi. Symphony Park (SP)

SEAM Group used abbreviations to help identify each Park in the report.

The study was conducted considering two operating scenarios:

- S0 – designates an incident energy that is higher when the system is operated at infinite bus
- S1 – designates an incident energy that is higher when the system is operated at 80% infinite bus

For more information about the infinite bus calculation and how this may affect the results of this study, please refer to Section 2.A of this report.

The hazards found in this facility with an incident energy greater than 40 cal/cm2 were found at the first panel or disconnect downstream from the utility transformer. Recommendations to reduce the arc flash incident energy exposure at these panels were not researched, due to the fact that this part of the system is being protected by utility owned equipment.

The majority of the circuit breakers installed in this facility have fixed instantaneous settings or have settings set to their maximum setting. Due to this fact, many of the recommendations in Section 3.A to reduce arc flash incident energy exposure involves resetting the existing breakers' instantaneous setting or by replacing the existing breakers with electronic trip circuit breakers. Although some of these recommendations may not be very cost effective, this is the only option SEAM Group had available to reduce the arc flash incident energy exposure.

The following incident energy table provides a breakdown of the different incident energy exposure levels that are to be used when an incident energy analysis has been completed for the selection of appropriate PPE as outlined in the 2018 Edition of NFPA 70E Table 130.5(G). SEAM Group will review all hazards with an incident energy exposure greater than 4 cal/cm2 and attempt to provide a recommendation to reduce these incident energies as shown in Section 3. The complete list of all the equipment calculated incident energies can be found in Section 7.

Summary of Incident Energy Exposure Levels

Incident Energy	Number of Busses	% of System
< 1.2 cal/cm2	102	74%
1.2 to 12 cal/cm2	9	7%
12 to 40 cal/cm2	23	16%
> 40 cal/cm2	4	3$
Total:	**138**	**100%**

All known protective devices in the facility appear to have adequate interrupting capacity as required in the National Electrical Code (NEC) Article 110.9. Any unknown devices will be outlined in Section 2 with a brief description outlining the reason. Section 3.C will list all of the unknown devices with the calculated fault current for the given device.

Table Equipment Evaluation Summary

Device Failure Type	Bus / Panel List
Unknown	CCP PNL

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Section **Page**

1. Introduction

This report presents the results of short circuit calculations, protective device coordination, and arc flash incident energy exposure calculations at the major electrical buses in the Jurupa Community Services District – Parks – Jurupa, CA facility. The scope of this report is to determine incident energy exposures at the equipment within the system, to verify that the interrupting ratings of the equipment in the distribution system are adequate for the available short circuit current, and to determine the settings for the protective devices to achieve optimum coordination. All calculations were done using the PTW software package supplied by SKM Systems Analysis, Inc. Version 8.0.3.4.

Section 2 of this report outlines the information used to generate the results of this report. This section will outline any assumptions that had to be made about the utility data provided or of any of the devices used within the incident energy analysis. Sometimes the specific settings for the devices cannot be determined in the field due to location, worn labels, or because of a digital interface. In these instances, SEAM Group will assume settings for the purposes of the report and then direct the customer to verify the settings for these particular devices. This section will also outline any equipment which we were unable to collect data along with a brief description explaining the reason the data was not collected.

Section 3 of this report presents findings describing dangerous or disruptive conditions within the facility. Arc flash incident energy levels are calculated using the algorithms specified by IEEE Standard 1584. The calculated arc flash incident energies above 4 cal/cm2 are reported. Recommendations for correcting the findings reported are then presented for each hazard found within the system. The largest overcurrent protective devices are analyzed for system coordination, and any undesirable conditions are reported along with recommendations for correcting the situation. Each overcurrent protective device included in the facility model is evaluated for adequate short circuit interrupting capability. Devices having insufficient interrupting capability are a safety hazard and are reported. All recommendations presume the protective devices have been well and properly maintained to operate in accordance with the manufacturer's specifications.

Section 4 contains tabulated input data for the utility, generators, transformers, motors, and conductors. This information represents the data collected and utilized for the calculated results found within this report.

Section 5 presents a summary of the calculated fault currents at every major bus modeled in the computer program. The three-phase to ground and single-phase to ground currents are reported. These two currents typically bracket the other possible fault currents and represent the worst-case scenario, and thus are sufficient for the analyses done for this report.

Section 6 presents the time-current coordination curves for the largest overcurrent protective devices, and the tabulated settings for those devices. The curves present a graphical representation of the device characteristics. The relative positions between and/or

among the protective devices indicate the coordination. Coordination implies the protective device closest to the fault reacts first to isolate the faulted part of the system from the remainder of the system. Following the time-current coordination curves will be the protective device types and settings as found during the on-site data collection process.

Section 7 presents the calculated incident energy exposure levels and appropriate PPE protection to wear. Calculated NFPA 70E 2018 protection levels are also described in this section. Labels indicating the incident energy exposure and arc flash approach boundary are provided with this report in Section 7.

Section 8 presents the single-line drawings of the plant electrical distribution system. These drawings provide the graphical user interface to the computer program as well as a record of the system topology. The calculated available fault currents for major buses, cable data, transformer data, and overcurrent protective device data are shown on the drawings included in this report. The same data is also shown on larger drawings that are included on the accompanying USB drive.

The Appendix presents the supplementary information provided by the owner. This information will include the utility data as provided by the utility for the facility and any supplementary information provided by the Customer for information requested by SEAM Group at the time of data collection or during the preparation of the report.

The report is also provided with a USB drive that will include PDF versions of the report and single line drawings of the system. In addition, the USB drive will include .dxf version of the drawings shown in the PDF and an Excel file containing an arc flash PPE table for the Customer's use.

2. Utility, Assumptions & Comments

A. The utility data for this report was provided by the utility Southern California Edison. A copy of this information can be seen in the Appendix.

The utility company did not provide information for American Heroes Park, Deer Creek Park, Eastvale Community Center, Eastvale Community Park, Harada Park, James Park, Orchard Park. However, SEAM Group had adequate information for these sites to be analyzed based on the infinite bus like the other Parks. This information is the maximum amount of fault current that would be available at the facility. While this will provide worst case results for the equipment interrupting ratings, it is not the ideal value needed for the incident energy analysis. The infinite bus model produces higher fault currents within the system in comparison to fault currents that may be experienced during an actual faulting event. This higher fault current can result in a lower incident energy rating than what may have been calculated with the actual values. To provide a more accurate representation of the actual arc fault levels within the system SEAM Group will analyze the system at the infinite bus 100% fault current level as well as at a fault current level of 80% of the infinite bus and take the worst-case situation for the purposes of this report. In the PPE table and in Section 3, (S0) designates an incident energy that is higher during 100% infinite bus calculation and (S1) designates an incident energy that is higher during 80% infinite bus calculation. The worst-case scenario is used in the tables and for recommendations.

This utility data is current as of the writing of this report. Any future changes within the utility system could affect the incident energy exposure results presented herein. These changes can be done by the utility at any time and often are done without any knowledge to the owner unless the change directly affects the customer's facility. Since these types of changes cannot be foreseen or predicted SEAM Group is not responsible for any incident energy exposure ratings affected by utility system changes. This utility information along with the data collected onsite has been used to construct a model of the facility for the incident energy analysis. In addition, the 2018 Edition of NFPA70E, 130.5(G) states that:

> "The incident energy analysis shall be updated when changes occur in the electrical distribution system that could affect the results of the analysis. The incident energy analysis shall also be reviewed for accuracy at intervals not to exceed 5 years."

B. The information (make, model, or settings) for the following protective devices could not be determined during the field investigation. This is most likely due to the equipment being inaccessible, worn labels, no labels, or simply because there is no longer information available due to the age of the equipment:

   i. CCP PNL MN CB (Drawing #2) – Unable to model a Milbank MQP circuit breaker due to limitations within the SKM software. As a result, an "unknown" device was used to provide conservative results.
   ii. CCP PNL CB 5 (Drawing #2) – Unable to model a Milbank MQP circuit breaker due to limitations within the SKM software. As a result, an "unknown" device was used to provide conservative results.

C. In some cases, a portion of the information may not have been available for the following equipment. In these instances, estimates were made based on engineering judgment and a knowledge of "typical" values:

   i. CCP UTIL XFMR to CCP PNL (Drawing #2) – Assumed a cable length of 99ft to provide conservative results for CCP PNL.
   ii. DP UTIL XFMR to DAIRY LAND PARK METER (Drawing #3) – Assumed a cable length of 99ft to provide conservative results for DP MN DSC.
   iii. HMP UTIL XFMR to HALF MOON PARK METER (Drawing #10) – Assumed a cable size of 350MCM (310 amperes) to match the full load ampacity of upstream transformer HMP UTIL XFMR. Also assumed a cable length of 99ft to provide conservative results for HMP PNL.
   iv. HHP PNL BC XFMR to HHP PNL BC (Drawing #11) – Assumed a cable size of 250MCM (255 amperes) to match the full load ampacity of upstream transformer HHP PNL BC XFMR.
   v. MVP UTIL XFMR to MOUNTAIN VIEW PARK METER (Drawing #17) – Assumed a cable length of 99ft to provide conservative results for MVP MN DSC.
   vi. OP UTIL XFMR to OP MSB (Drawing #18) – Assumed a cable size of 3/0AWG (200 amperes) to match the full load ampacity of upstream transformer OP UTIL XMFR to provide conservative results for OP MSB.
   vii. RW UTIL XFMR to RIVER WALK PARK METER (Drawing #22) – Assumed a cable size of 350MCM (310 amperes) to match the full load ampacity of upstream transformer RW UTIL XFMR. Also assumed a cable length of 99ft to provide conservative results for RWP PNL.
   viii. SP UTIL XFMR to SYMPHONY PARK METER (Drawing #23) – Assumed a cable size of 350MCM (310 amperes) to match the full load ampacity of upstream transformer SP UTIL XFMR. Also assumed a cable length of 99ft to provide conservative results for SP MDP.

D. An engineering technique was implemented to evaluate single-phase items as three-phase for the purpose of the report - as only three-phase equations exist. Due to this implementation, the component values in the one-line drawings are different from the actual values. The changes made are as follows: Multiply the transformer kVA rating by 1.732 and multiply any downstream single-phase cable length by a 1.15 (15% increase). The following items were analyzed in this manner:

- CCP PNL (Drawing #2)
- CCP WTR PLAY CP (Drawing #2)
- CCP PNL A (Drawing #2)
- CCP PNL R (Drawing #2)
- DP MN DSC (Drawing #3)
- DP PNL P (Drawing #3)
- DP WTR D PMP PIT CP (Drawing #3)
- DP PNL A (Drawing #3)
- DP LTG CNTCTR CP (Drawing #3)
- HMP PNL (Drawing #10)
- HMP LTG CNTCTR CP (Drawing #10)
- MVP MN DSC (Drawing #17)
- MVP PNL P (Drawing #17)
- MVP LTG CNTCTR CP (Drawing #17)
- MVP PNL B (Drawing #17)
- MVP HVAC DSC (Drawing #17)
- MVP PNL A (Drawing #17)
- RWP PNL (Drawing #22)
- SP MDP (Drawing #23)
- SP PNL A (Drawing #23)

E. The following table outlines loads that have cables that may not be properly protected by the upstream protective device.

Protective Device (PD)	PD Size	Cable (THWN)	Cable Ampacity	Load Description
ECC PNL L3 CB 21	40A	#10	30A	ECC WH-3 DSC

3. Findings & Recommendations

WARNING

The PPE requirements when working on the line side of main disconnects, bus work and cabling between main transformers and main disconnects, and the connections within main transformers are not affected by the recommendations made in this report unless specifically indicated otherwise. That part of the system is protected by devices on the primary side of the transformers that are normally owned and set by the utility. The primary or line side of these devices will often be considered "Dangerous", unless otherwise noted. In the arc flash table, the primary side of main circuit breakers, if present, will have "(LineSide)" designated in the bus name. Note that this exact name with the "(LineSide)" designation will not appear in the single line drawings; only the bus name will be displayed.

This section outlines the equipment within the system that has an incident energy exposure of greater than 4 cal/cm2. Immediately following is a recommendation to lower the incident energy exposure of the equipment if one exists. These recommendations will not negatively affect the coordination unless otherwise noted. SEAM Group will attempt to lower the incident energy values by adjusting breaker settings whenever possible; however, adjusting the breaker settings is not always an option. In some cases, SEAM Group will recommend a faster acting fuse to replace the current model of fuse being used. The customer should verify with the equipment manufacturer that the particular fuse recommendation is compatible with the equipment within which it is to be installed. It is also important to use the exact manufacturer and model of fuse as a similar fuse from another manufacturer may not have the same curve characteristics as the one indicated in the recommendation and could result in different incident energy values than those outlined in this report.

In other cases, only a different characteristic curve type (different circuit breaker model) will change the incident energy value. This may require a breaker with a faster acting instantaneous trip or replacing the breaker with discrete LI or LSI functions. In these instances, SEAM Group will try to select a breaker from the same manufacturer as the other breakers in the equipment to illustrate that the incident energy value can be reduced with a breaker that has similar characteristics and settings to the one shown. Due to the vast number of equipment types, manufacturers, and model numbers SEAM Group cannot guarantee that the particular breaker chosen will be compatible with the equipment. The customer should note that the actual level that can be achieved in the customer's equipment will be dependent on what manufacturer and model of breaker(s) are compatible with that equipment and may not necessarily achieve a level as low as what was shown in the report example. ***It is the customer's responsibility to consult their local equipment representative to determine what breakers are compatible with each piece of equipment.***

LSI, LS, and LI refers to electronic trip circuit breakers with the following functions:
L-Functions {Long Time Pickup – LTPU (Ir), Long Time Delay - LTD (tr)}
S-Functions {Short Time Pick Up – STPU (Isd), Short Time Delay – STD (tsd)}
I-Functions {Instantaneous – INST (Ii)}

A. **Arc Flash Recommendations**

1. **Bus ECP MSB (ECP MSB MN CB LineSide), fed from ECP UTIL XFMR on Drawing #8, has an incident energy exposure of 76.96 cal/cm2. (S0)**

   SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus ECP MSB (ECP MSB MN CB LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. SEAM Group does not recommend energized work to be performed on equipment with an incident energy exposure greater than or equal to 40 cal/cm2.

2. **Bus HHP MSA, fed from HHP UTIL XFMR on Drawing #11, has an incident energy exposure of 63.08 cal/cm2. (S0)**

   SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus HHP MSA. It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. SEAM Group does not recommend energized work to be performed on equipment with an incident energy exposure greater than or equal to 40 cal/cm2.

3. **Bus ECC MSB (ECC MSB MN CB LineSide), fed from ECC UTIL XMFR on Drawing #5, has an incident energy exposure of 59.19 cal/cm2. (S0)**

   SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus ECC MSB (ECC MSB MN CB LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. SEAM Group does not recommend energized work to be performed on equipment with an incident energy exposure greater than or equal to 40 cal/cm2.

4. **Bus PRP MSB (PRP MSB MN CB LineSide), fed from PRP UTIL XFMR on Drawing #20, has an incident energy exposure of 44.75 cal/cm2. (S0)**

   SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus PRP MSB (PRP MSB MN CB LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. SEAM Group does not recommend energized work to be performed on equipment with an incident energy exposure greater than or equal to 40 cal/cm2.

5. **Bus JHP MSB (JHP MSB MN CB LineSide), fed from JHP UTIL XFMR on Drawing #14, has an incident energy exposure of 39.73 cal/cm2. (S0)**

   SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus JHP MSB (JHP MSB MN CB LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. It has an incident energy exposure of 39.73 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

6. **Bus RWP PNL (RWP PNL MN CB LineSide), fed from RWP UTIL XFMR on Drawing #22, has an incident energy exposure of 25.63 cal/cm2. (S0)**

   SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus RWP PNL (RWP PNL MN CB LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. It has an incident energy exposure of 25.63 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

7. **Bus SP MDP (SP MDP MN CB LineSide), fed from SP UTIL XFMR on Drawing #23, has an incident energy exposure of 25.63 cal/cm2. (S0)**

   SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus SP MDP (SP MDP MN CB LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. It has an incident energy exposure of 25.63 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

8. **Bus MFP MSB (MFP MSB MN CB LineSide), fed from MFP UTIL XFMR on Drawing #16, has an incident energy exposure of 24.38 cal/cm2. (S0)**

   SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus MFP MSB (MFP MSB MN CB LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. It has an incident energy exposure of 24.38 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

9. **Bus HHP PNL DPBF (HHP PNL DPBF MN CB LineSide), fed from HHP MSA on Drawing #11, has an incident energy exposure of 23.35 cal/cm2. (S0)**

   Replace circuit breaker HHP MSA CB 6 with an electronic trip breaker having an LI tripping unit. SEAM Group tried an 800A, SIEMENS, HMG ETU 555 electronic trip breaker with the following settings: LTPU "800A", LTD "30", and an instantaneous trip of "2.4kA" (2,400 amperes). This change will reduce the incident energy exposure at bus HHP PNL DPBF (HHP PNL DPBF MN CB LineSide) from 23.35 cal/cm2 to less than 1.2 cal/cm2. Please note, this change will worsen the undesirable coordination with downstream protective devices. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

10. **Bus HMP PNL (HMP PNL MN CB LineSide), fed from HMP UTIL XFMR on Drawing #10, has an incident energy exposure of 22.47 cal/cm2. (S0)**

    SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus HMP PNL (HMP PNL MN CB LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. It has an incident energy exposure of 22.47 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

11. **Bus MVP MN DSC, fed from MVP UTIL XFMR on Drawing #17, has an incident energy exposure of 21.97 cal/cm2. (S0)**

    SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus MVP MN DSC. It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. It has an incident energy exposure of 21.97 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

12. **Bus MVP PNL P (MVP PNL P MN CB LineSide), fed from MVP MN DSC on Drawing #17, has an incident energy exposure of 21.51 cal/cm2. (S0)**

Install a stand-alone main circuit breaker in MVP MN DSC. SEAM Group tried a 200A, GE, SFHA SPECTRA RMS breaker with the instantaneous set to "MAX". Please note however, this change will cause undesirable coordination with downstream protective devices. This change will reduce the incident energy exposure at bus MVP PNL P (MVP PNL P MN CB LineSide) from 21.51 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

13. **Bus OP MSB (OP MSB MN FS LineSide), fed from OP UTIL XFMR on Drawing #18, has an incident energy exposure of 21.39 cal/cm2. (S0)**

SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus OP MSB (OP MSB MN FS LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. It has an incident energy exposure of 21.39 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

14. **Bus ECC PNL DPL1 (ECC PNL DPL1 MN CB LineSide), fed from ECC PNL DPL1 XFMR on Drawing #5, has an incident energy exposure of 20.85 cal/cm2. (S0)**

Replace circuit breaker ECC MSB CB 6 with an electronic trip breaker having an LSI tripping unit. SEAM Group tried a 200A, CUTLER-HAMMER, HKD OPTIM 550 electronic trip breaker with the following settings: LTPU "1", LTD "8", STPU "5", STD "0.2", i^2t "Out", and an instantaneous trip of "FIXED" (3,000 amperes). This change will reduce the incident energy exposure at bus ECC PNL DPL1 (ECC PNL DPL1 MN CB LineSide) from 20.85 cal/cm2 to 3 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

15. **Bus ECC PNL DPL2 (ECC PNL DPL2 MN CB LineSide), fed from ECC MSB on Drawing #5, has an incident energy exposure of 19.2 cal/cm2. (S0)**

Replace circuit breaker ECC MSB CB 4 with an electronic trip breaker having an LSI tripping unit. SEAM Group tried a 400A, CUTLER-HAMMER, HKD OPTIM 550 electronic trip breaker with the following settings: LTPU "1", LTD "8", STPU "3", STD "0.2", i^2t "Out", and an instantaneous trip of "FIXED" (4,800 amperes). This change will reduce the incident energy exposure at bus ECC PNL DPL2 (ECC PNL DPL2 MN CB LineSide) from 19.2 cal/cm2 to 3 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

16. **Bus ECP PNL HA (ECP PNL HA MN CB LineSide), fed from ECP MSB on Drawing #8, has an incident energy exposure of 18.85 cal/cm2. (S0)**

Reset the instantaneous setting of circuit breaker ECP MSB CB 46 to "5" (2,000 amperes). To maintain proper coordination with downstream protective device, ECP PNL HA MN CB, reset the instantaneous setting of protective device ECP PNL HA MN CB to "5" (2,000 amperes). This change will reduce the incident energy exposure at bus ECP PNL HA (ECP PNL HA MN CB LineSide) from 18.85 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment.

17. **Bus ECP PNL HB (ECP PNL HB MN CB LineSide), fed from ECP MSB on Drawing #8, has an incident energy exposure of 18.85 cal/cm2. (S0)**

Reset the instantaneous setting of circuit breaker ECP MSB CB 45 to "5" (2,000 amperes). This change will reduce the incident energy exposure at bus ECP PNL HB (ECP PNL HB MN CB LineSide) from 18.85 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment.

18. **Bus ECP PNL DP (ECP PNL DP MN CB LineSide), fed from ECP MSB on Drawing #8, has an incident energy exposure of 15.9 cal/cm2. (S0)**

Replace circuit breaker ECP MSB CB 40 with an electronic trip breaker having an LSI tripping unit. SEAM Group tried a 300A, CUTLER-HAMMER, CHKD OPTIM 550 electronic trip breaker with the following settings: LTPU "1", LTD "8", STPU "3", STD "0.2", i^2t "Out", and an instantaneous trip of "FIXED" (4,800 amperes). This change will reduce the incident energy exposure at bus ECP PNL DP (ECP PNL DP MN CB LineSide) from 15.9 cal/cm2 to 2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

19. **Bus ECC PNL K1 (ECC PNL K1 MN CB LineSide), fed from ECC PNL DPL2 on Drawing #6, has an incident energy exposure of 15.67 cal/cm2. (S0)**

Replace circuit breaker ECC PNL DPL2 CB 39 with a breaker having an adjustable instantaneous tripping unit. SEAM Group tried a 225A, CUTLER-HAMMER, HJD breaker with the instantaneous set to "10" (2,250 amperes). This change will reduce the incident energy exposure at bus ECC PNL K1 (ECC PNL K1 MN CB LineSide) from 15.67 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

20. **Bus HHP PNL BC (HHP PNL BC MN CB LineSide), fed from HHP PNL BC XFMR on Drawing #11, has an incident energy exposure of 15.1 cal/cm2. (S0)**

Replace circuit breaker HHP BATTNG CG DSC CB with an electronic trip breaker having an LSI tripping unit. SEAM Group tried a 250A, SIEMENS, HFG ETU 586 electronic trip breaker with the following settings: LTPU "200", LTD "6", STPU "3", STD "0.2", i^2t "Out", and an instantaneous trip of "2750" (2,750 amperes). This change will reduce the incident energy exposure at bus HHP PNL BC (HHP PNL BC MN CB LineSide) from 15.1 cal/cm2 to 2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

21. **Bus OP PNL BBL, fed from OP MSB on Drawing #18, has an incident energy exposure of 15.01 cal/cm2. (S1)**

Replace circuit breaker OP MSB CB 46 with a breaker having an adjustable instantaneous tripping unit. SEAM Group tried a 200A, CUTLER-HAMMER, HJD breaker with the instantaneous set to "10" (2,000 amperes). This change will reduce the incident energy exposure at bus OP PNL BBL from 15.01 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

22. **Bus HHP PNL A (HHP PNL A MN CB LineSide), fed from HHP PNL A XFMR on Drawing #11, has an incident energy exposure of 15 cal/cm2. (S0)**

SEAM Group could not find a faster acting fuse to reduce the PPE requirement at bus HHP PNL A (HHP PNL A MN CB LineSide). However, it is possible to reduce the PPE requirement by replacing the fused switch HHP NBRHD CTR DSC FS with an electronic trip breaker having an LSI tripping unit. For example, SEAM Group tried a 250A, SIEMENS, HFG ETU 576 electronic trip breaker with the following settings: LTPU "200", LTD "6", STPU "3", STD "0.2", i^2t "Out", and an instantaneous trip of "11" (2,750 amperes). This change will reduce the incident energy exposure at bus HHP PNL A (HHP PNL A MN CB LineSide) from 15 cal/cm2 to 2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

23. **Bus CCP PNL (CCP PNL MN CB LineSide), fed from CCP UTIL XFMR on Drawing #2, has an incident energy exposure of 14.14 cal/cm2. (S0)**

SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus CCP PNL (CCP PNL MN CB LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. It has an incident energy exposure of 14.14 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

24. **Bus HHP PNL BCA (HHP PNL BCA MN CB LineSide), fed from HHP PNL BC on Drawing #12, has an incident energy exposure of 13.1 cal/cm2. (S0)**

Replace circuit breaker HHP PNL BC CB 25 with a breaker having an adjustable instantaneous tripping unit. SEAM Group tried a 200A, CUTLER-HAMMER, HJD breaker with the instantaneous set to "7" (1,225 amperes). This change will reduce the incident energy exposure at bus HHP PNL BCA (HHP PNL BCA MN CB LineSide) from 13.1 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

25. **Bus HHP PNL BCB (HHP PNL BCB MN CB LineSide), fed from HHP PNL BC on Drawing #12, has an incident energy exposure of 13.1 cal/cm2. (S0)**

Replace circuit breaker HHP PNL BC CB 29 with a breaker having an adjustable instantaneous tripping unit. SEAM Group tried a 175A, CUTLER-HAMMER, HJD breaker with the instantaneous set to "7" (1,225 amperes). This change will reduce the incident energy exposure at bus HHP PNL BCB (HHP PNL BCB MN CB LineSide) from 13.1 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

26. **Bus DCP MSB (DCP MSB MN CB LineSide), fed from DCP UTIL XFMR on Drawing #4, has an incident energy exposure of 10.83 cal/cm2. (S0)**

SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus DCP MSB (DCP MSB MN CB LineSide). It is the first bus downstream from the utility transformer, and it is assumed there is no upstream protective device to reduce the hazard. It has an incident energy exposure of 10.83 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

27. **Bus DCP PNL PH (DCP PNL PH MN CB LineSide), fed from DCP MSB on Drawing #4, has an incident energy exposure of 10.73 cal/cm2. (S0)**

Replace circuit breaker DCP MSB CB 45 with a breaker having an adjustable instantaneous tripping unit. SEAM Group tried a 225A, CUTLER-HAMMER, HJD breaker with the instantaneous set to "5" (1,125 amperes). This change will reduce the incident energy exposure at bus DCP PNL PH (DCP PNL PH MN CB LineSide) from 10.73 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

28. **Bus DCP PNL PL (DCP PNL PL MN CB LineSide), fed from DCP PNL PH on Drawing #4, has an incident energy exposure of 8.29 cal/cm2. (S0)**

Replace circuit breaker DCP PNL PH CB 32 with an electronic trip breaker having an LSI tripping unit. SEAM Group tried a 100A, CUTLER-HAMMER, CHKD OPTIM 550 electronic trip breaker with the following settings: LTPU "1", LTD "4", STPU "4", STD "0.2", i^2t "Out", and an instantaneous trip of "8" (800 amperes). This change will reduce the incident energy exposure at bus DCP PNL PL (DCP PNL PL MN CB LineSide) from 8.29 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

29. **Bus OP BLDG #1 PNL (OP BLDG #1 PNL MN CB LineSide), fed from OP BLDG #1 PNL XFMR on Drawing #18, has an incident energy exposure of 6.23 cal/cm2. (S0)**

Replace circuit breaker OP MSB CB 45 with an electronic trip breaker having an LSI tripping unit. SEAM Group tried a 70A, CUTLER-HAMMER, CHKD OPTIM 550 electronic trip breaker with the following settings: LTPU "0.43", LTD "22", STPU "8", STD "0.2", i^2t "Out", and an instantaneous trip of "8" (560 amperes). This change will reduce the incident energy exposure at bus OP BLDG #1 PNL (OP BLDG #1 PNL MN CB LineSide) from 6.23 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

30. **Bus PRP PNL LB (PRP PNL LB MN CB LineSide), fed from PRP PNL LB XFMR on Drawing #20, has an incident energy exposure of 6.14 cal/cm2. (S0)**

Replace circuit breaker PRP MSB CB 16 with an electronic trip breaker having an LSI tripping unit. SEAM Group tried a 60A, GE, SGHB MVT PLUS/PM electronic trip breaker with the following settings: LTPU "1", LTD "1", STPU "5", STD "2", i^2t "Out", and an instantaneous trip of "10" (600 amperes). This change will reduce the incident energy exposure at bus PRP PNL LB (PRP PNL LB MN CB LineSide) from 6.14 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

31. **Bus OP BLDG #2 PNL (OP BLDG #2 PNL MN CB LineSide), fed from OP BLDG #2 PNL XFMR on Drawing #18, has an incident energy exposure of 6.02 cal/cm2. (S0)**

Replace circuit breaker OP MSB CB 51 with an electronic trip breaker having an LSI tripping unit. SEAM Group tried a 70A, CUTLER-HAMMER, CHKD OPTIM 550 electronic trip breaker with the following settings: LTPU "0.43", LTD "22", STPU "8", STD "0.2", i^2t "Out", and an instantaneous trip of "8" (560 amperes). This change will reduce the incident energy exposure at bus OP BLDG #2 PNL (OP BLDG #2 PNL MN CB LineSide) from 6.02 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

32. **Bus IW #41 PNL A (IW #41 PNL A MN CB LineSide), fed from IW #41 PNL A XFMR on Drawing #21, has an incident energy exposure of 4.49 cal/cm2. (S0)**

Replace circuit breaker IW #41 MSB CB 2 with an electronic trip breaker having an LSI tripping unit. SEAM Group tried a 60A, SIEMENS, HDG ETU 576 electronic trip breaker with the following settings: LTPU "30A", LTD "2.5", STPU "9", STD "0.2", i^2t "Out", and an instantaneous trip of "11" (660 amperes). This change will reduce the incident energy exposure at bus IW #41 PNL A (IW #41 PNL A MN CB LineSide) from 4.49 cal/cm2 to less than 1.2 cal/cm2. Appropriate PPE must be worn when working on energized equipment. ***It is the customer's responsibility to consult their local equipment representative to determine what protective devices are compatible with each piece of equipment; see paragraph 3.A above.***

Arc flash recommendations from April 2, 2019 update

1. **Bus 7674 SOAR RWP PNL (7674 SOAR RWP PNL MN FS LineSide), fed from RWP UTIL XFMR on Drawing #22, has an incident energy exposure of 23.82 cal/cm2.**

   SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus 7674 SOAR RWP PNL (7674 SOAR RWP PNL MN FS LineSide). It is the first bus downstream from the utility transformer, and the upstream protective device is owned by the utility. It has an incident energy exposure of 23.82 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

2. **Bus HARR/CHAN RVRWLK PNL (HARR/CHAN RVRWLK PNL MN CB LineSide), fed from RWP UTIL XFMR on Drawing #22, has an incident energy exposure of 14.59 cal/cm2.**

   SEAM Group is unable to provide a recommendation to reduce the incident energy exposure at bus HARR/CHAN RVRWLK PNL (HARR/CHAN RVRWLK PNL MN CB LineSide). It is the first bus downstream from the utility transformer, and the upstream protective device is owned by the utility. It has an incident energy exposure of 14.59 cal/cm2, and appropriate PPE must be worn when working on energized equipment.

B. **Coordination Recommendations**

There are overcurrent protective devices (fuses, relays, and circuit breakers) that do not coordinate adequately with other protective devices in the same circuit. Inadequate coordination can be defined as one protective device's time current curve (TCC) overlapping a TCC of another protective device. The curves represent graphically when a protective device will trip based on a given fault current versus time. Refer to Section 6 for further details. The TCC name with the undesirable coordination is indicated followed by a recommendation for correcting each situation.

Recommendations in this section are based on existing protective devices only and do not reflect any replacement recommendations made in section 3.A. This might apply for situations where an arc flash replacement recommendation in section 3.A is not feasible but coordination of the existing equipment is still desirable. Please note that for some of the TCC's listed below SEAM Group may not make a recommendation. This may occur at points in the system where devices do not have adjustable settings to correct the undesirable coordination, and often times these devices are near the end point of the system where it is not economical to replace a circuit breaker for what may be small or marginal improvements in coordination. SEAM Group will only indicate increases in incident energy exposures, from the implementation of the coordination recommendations presented below, if the resulting value is above 1.2 cal/cm^2.

1. **TCC ECC MSB To ECC PNL HM2**

   SEAM Group recommends accepting any miscoordination between protective devices ECC MSB CB 2 and ECC PNL HM2 MN CB due to these protective devices being in series. Therefore, if either protective device operates the same downstream equipment will be affected.

   However, to improve coordination between protective devices ECC MSB CB 2 and ECC PNL HM2 MN CB, reset the instantaneous setting of protective device ECC MSB CB 2 to “6” (3,600 amperes).

2. **TCC ECC PNL DPL2 To ECC PNL K1**

   Reset the instantaneous setting of upstream protective device ECC PNL DPL2 MN CB to “8” (4,800 amperes) to provide coordination with downstream protective devices.

   SEAM Group recommends accepting any miscoordination between protective devices ECC PNL DPL2 CB 39 and ECC PNL K1 MN CB due to these protective devices being in series. Therefore, if either protective device operates the same downstream equipment will be affected.

3. **TCC ECP MSB To ECP PNL HB**

   SEAM Group recommends accepting any miscoordination between protective devices ECP MSB CB 45 and ECP PNL HB MN CB due to these protective devices being in series. Therefore, if either protective device operates the same downstream equipment will be affected.

   However, to improve coordination between protective devices ECP MSB CB 45 and ECP PNL HB MN CB, reset the instantaneous setting of protective device ECP PNL HB MN CB to "5" (2,000 amperes).

4. **TCC ECP PNL DP XFMR To ECP PNL DP**

   Reset the instantaneous setting of upstream protective device ECP PNL DP MN CB to "7" (4,200 amperes) to provide coordination with downstream protective devices.

5. **TCC ECP UTIL To ECP MSB**

   Reset the STPU setting for upstream protective device ECP MSB MN CB to "3" (4,800 amperes) to provide coordination with downstream protective devices.

6. **TCC HHP MSA To HHP BATTING CAGE DSC**

   Reset the instantaneous setting of upstream protective device HHP MSA CB 5R to "3" (1,500 amperes) to improve coordination with downstream protective devices.

7. **TCC HHP MSA To HHP NGHBRHD CTR DSC**

   Reset the instantaneous setting of upstream protective device HHP MSA CB 5L to "HI" (2,000 amperes) to improve coordination with downstream protective devices.

8. **TCC HHP MSA To HHP PNL DPBF**

   SEAM Group recommends accepting any miscoordination between protective device HHP MSA CB 6 and HHP PNL DPBF MN CB due to these protective devices being in series. Therefore, if either protective device operates the same downstream equipment will be affected.

   Reset the instantaneous setting of protective device HHP PNL DPBF MN CB to "5" (3,500 amperes) to provide coordination with downstream protective devices.

   SEAM Group recommends accepting the miscoordination between protective devices HHP MSA CB 6 and HHP PNL DPBF CB 11 due to downstream protective device HHP PNL DPBF CB 11 having its' instantaneous setting set to its' minimum setting while any increase in the instantaneous setting of upstream protective device HHP MSA CB 6 will cause an increase in incident energy exposure levels in downstream equipment.

9. **TCC HHP MSB To HHP PNL HA**

   Reset the instantaneous setting of upstream protective device HHP MSB CB 5 to "7" (1,930 amperes) to provide coordination with downstream protective devices.

10. **TCC HHP PNL DPBF To HHP PNL HB**

    Reset the instantaneous setting of upstream protective device HHP PNL DPBF CB 22 to "HI" (2,500 amperes) to improve coordination with downstream protective devices.

11. **TCC JHP MSB To JHP PNL 1BB**

    Reset the instantaneous setting of protective device JHP MSB CB 3 to "HI" (1,500 amperes) to improve coordination with downstream protective devices.

12. **TCC MFP MSB To MFP PNL HA**

    Reset the instantaneous setting of upstream protective device MFP MSB MN CB to "3" (3,800 amperes) to improve coordination with downstream protective devices.

    SEAM Group recommends accepting the miscoordination between protective devices MFP MSB CB 2 and MFP PNL HA CB 4 due to downstream protective device MFP PNL HA CB 4 has a fixed instantaneous setting while any increase in the instantaneous setting of protective device MFP MSB CB 2 will cause an increase in incident energy exposure levels in downstream equipment.

13. **TCC PRP MSB To IW #41 MSB**

    Reset the instantaneous setting of upstream protective device IW #41 MN CB to "7" (1,930 amperes) to improve coordination with downstream protective devices.

    SEAM Group recommends accepting the miscoordination between protective devices PRP MSB CB 10 and IW #41 MSB CB 1 due to downstream protective device IW #41 MSB CB 1 having a fixed instantaneous setting while any increase in the instantaneous setting of protective device PRP MSB CB 10 will cause an increase in incident energy exposure levels in downstream equipment.

14. **TCC [Multiple]**

The TCCs in the following table all show coordination at low levels of the system. In each of these TCCs, the coordination between the protective device in column "Protective Device A" and the protective device in column "Protective Device B" cannot be improved, since both are fixed nonadjustable protective devices. However, these devices (respective to each listed TCC) are in series, so the operation of either affects the same equipment.

TCC Name	Protective Device A	Protective Device B
AHP MSB To AHP PNL L2 **	AHP MSB CB 3	AHP PNL L2 MN CB
AHP MSB To AHP PNL L2	AHP PNL L2 MN CB	AHP PNL L2 CB 2
CCP PNL To CCP PNL A	CCP PNL CB 22	CCP PNL A CB 13
CCP PNL A To CCP PNL R **	CCP PNL A CB 13	CCP PNL R MN CB
DCP MSB To DCP PNL PH **	DCP MSB CB 45	DCP PNL PH MN CB
DP PNL P To DP PNL A **	DP PNL P CB 40	DP PNL A MN CB
ECC MSB To ECC PNL HL1 **	ECC MSB CB 8	ECC PNL HL1 MN CB
ECC MSB To ECC PNL HM1 **	ECC MSB CB 7	ECC PNL HM1 MN CB
ECC MSB To ECC PNL HM1	ECC MSB CB 7	ECC PNL HM1 CB 44
ECC MSB To ECC PNL HM1	ECC PNL HM1 MN CB	ECC PNL HM1 CB 44
ECC PNL DPL1 To ECC PNL L3 **	ECC PNL DPL1 CB 34	ECC PNL L3 MN CB
ECC PNL DPL1 To ECC PNL L3	ECC PNL DPL1 CB 34	ECC PNL L3 CB 21
ECC PNL DPL1 To ECC PNL L3	ECC PNL L3 MN CB	ECC PNL L3 CB 21
ECP PNL DP To ECP CONCESSION PNL *+	ECP PNL DP CB 1	ECP CNC MN DSC FS
ECP PNL DP To CONCESSION PNL	ECP PNL DP CB 1	ECP CNCSSN PNL MN CB
ECP PNL DP To CONCESSION PNL	ECP PNL DP CB 1	ECP CNCSSN PNL CB 5
ECP PNL DP To CONCESSION PNL **	ECP CNC MN DSC FS	ECP CNCSSN PNL MN CB
ECP PNL DP To CONCESSION PNL	ECP CNCSSN PNL MN CB	ECP CNCSSN PNL CB 5

TCC Name	Protective Device A	Protective Device B
ECP PNL DP To ECP RSTRM B #1 PNL *+	ECP PNL DP CB 2	ECP RR B #1 DSC FS
ECP PNL DP To ECP RSTRM B #1 PNL	ECP PNL DP CB 2	ECP RR B 1 P MN CB
ECP PNL DP To ECP RSTRM B #1 PNL	ECP PNL DP CB 2	ECP RR B 1 P CB 5
ECP PNL DP To ECP RSTRM B #1 PNL **	ECP RR B #1 DSC FS	ECP RR B 1 P MN CB
ECP PNL DP To ECP RSTRM B #1 PNL	ECP RR B #1 DSC FS	ECP RR B 1 P CB 5
ECP PNL DP To ECP RSRRM B #1 PNL	ECP RR B 1 P MN CB	ECP RR B 1 P CB 5
HHP PNL BC To HHP PNL BCA **	HHP PNL BC CB 25	HHP PNL BCA MN CB
HHP PNL BC To HHP PNL BCC **	HHP PNL BC CB 1	HHP PNL BCC MN CB
HMP PNL To HMP LTG CNTCTR	HMP PNL MN CB	HMP PNL CB 10
JHP MSB To JHP PNL HP	JHP MSB CB 9	JHP PNL HP CB 21
MFP MSB To MFP PNL HB	MFP MSB CB 3	MFP PNL HB CB 4
MVP PNL P To MVP PNL A **	MVP PNL P CB 40	MCP PNL A MN CB
MVP PNL P To MVP PNL B	MVP PNL P CB 36	MVP PNL B CB 2
OP MSB To OP PNL SL	OP MSB CB 52	OP PNL SL CB 1
SP MDP To SP PNL A	SP MDP MN CB	SP MDP CB 2
SP MDP To SP PNL A	SP MDP MN CB	SP PNL A MN CB
SP MDP To SP PNL A **	SP MDP CB 2	SP PNL A MN CB

C. **Short Circuit Device Evaluation**

There are protective devices in the facility that appear to have inadequate interrupting capacity as required in the National Electrical Code (NEC) Article 110.9 based on the base operating scenario, Scenario (S0). If these protective devices are required to interrupt a fault that is larger than what the specific device is rated to handle, then they can fail to operate or even have the potential of causing a fire and/or injury to personnel. Please note however, since the utility was only able to provide secondary fault information based on the infinite bus model (refer to Section 2.A for explanation of infinite bus calculation), the values calculated for the interrupt ratings at each enclosure may cause the protective devices to show up as failing. Also, please note that every effort was made to collect the actual interrupting rating of motor control centers (MCC's) found in the system. MCC's will often carry a rating for the entire gear that is higher than the individual components found in use within the MCC itself. If we were unable to find an overall MCC rating at the time of the collection, then the individual device ratings found in the software library will be used for the purposes of this report. It is urged that the customer refer to the manufacturer or the original device submittal data to determine if a higher rating applies before replacing MCC protective devices. SEAM Group tried to account for any series ratings combinations that may apply, based on information publicly available from the manufacturers. However, SEAM Group recommends verifying the interrupting ratings, and if any series ratings are applicable, of the existing equipment before replacing any equipment that is listed below on the basis that they are failing or marginal.

The following tables indicate the protective devices that have an unknown interrupting capacity; the protective device type listed in each table represents all protective devices of that type within the referenced bus/equipment. Table 3C.1 indicates the devices that were "Unknown" due to lack of protective device model information and thus the interrupting rating of the device was unknown. This table may also include protective devices where the model number was known, but the device interrupting rating was still unknown. The customer should verify the rating of these devices or replace them with devices that have an interrupting rating greater than that shown.

Table 3C.1 Protective Devices (PD) with Unknown Interrupt Rating

Bus Name	PD Type	Drawing Number	Calc Fault
CCP PNL*+	UNKNOWN	Drawing #2	4,080

*+ SEAM Group is not aware of any UL rated protective device available with a rating of less than 10 kA. If the breakers in this bus have been maintained to operate in accordance with the manufacturer's specifications, there should be no interrupting rating concerns. However, because the ratings are unknown SEAM Group recommends verifying that the breaker ratings are at or above 10 kA.

Table 3C.2 indicates the devices that met the requirements under National Electric Code (NEC) Articles 110.9 and 240.86 for series-connected interrupt rating. These devices may still appear in the failed or marginal interrupting capacity tables based upon the calculated fault current at that bus and the device's series interrupting rating. The series rated interrupting capacity for these circuit breakers are based on either the upstream circuit breaker of the same manufacturer or the upstream fuse. Series rating look-up tables from the manufacturer are then used to determine if the combination of fuse/circuit breaker or circuit breaker/circuit breaker are series rated.

Table 3C.2 Protective Devices (PD) with Series Interrupt Rating

Bus Name	Downstream PD Type	Drawing Number	Interrupt Rating	Calc Fault	Upstream PD Type	Series Rating
ECC PNL HL1	GHB	Drawing #7	14,000	13,760	HFD	65,000
ECC PNL HM1	GHB	Drawing #7	14,000	14,070	HFD	65,000

4. Input Data

The conductor and transformer schedules on the following pages indicate the data that was entered and used by the computer program when calculating the fault currents. Data for the main feeders and transformers was documented by SEAM Group during the data collection visit. In some cases, information may not have been available. In these instances, estimates were made based on engineering judgment and a knowledge of "typical" values. In most cases, these estimates were selected to yield conservative results. Some of these instances may have a more detailed description in the assumptions in Section 2.

The customer was asked to secure data about fault current availability, utility protective devices, and utility transformers from the utility. If the proper data was secured from the servicing utility it has been incorporated into the computer model. If the proper data could not be secured, SEAM Group conservatively applied engineering judgment to arrive at reasonable source data as outlined in the assumptions in Section 2. The utility fault current information provided can be found in Appendix A.

Fault Analysis Input Report (English)

Utilities

Contribution From Name	Bus Name	In/Out Service	Nominal Voltage	Contribution Data	Duty	Units	X/R	PU (100 MVA Base)	R PU	X PU
AHP UTIL	BUS-0001	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
CCP UTIL	BUS-0013	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
DCP UTIL	BUS-0017	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
DP UTIL	BUS-0016	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
ECC UTIL	BUS-0018	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
ECP UTIL	BUS-0019	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
HHP UTIL	BUS-0023	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
HMP UTIL	BUS-0020	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
JHP UTIL	BUS-0024	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
MFP UTIL	BUS-0342	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
MVP UTIL	BUS-0026	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
OP UTIL	BUS-0027	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
PRP UTIL	BUS-0347	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
RWP UTIL	BUS-0029	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038
SP UTIL	BUS-0030	In	12,000	3P:	500,000	Amps	8.00	Pos:	0.001	0.010
				SLG:	250,000	Amps	8.00	Zero:	0.005	0.038

Motors

Contribution From Name	# of Motors	Bus Name	In/Out Service	Nominal Voltage	--------- Contribution Data -------- Base kVA	Xd"	X/R	PU (100 MVA Base) R PU	X PU
IW #41 PMP	1	BUS-0323	In	480	60.16	0.1692	10.00	28.116	281.169

Cables

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul		Per Unit (100 MVA Base) R pu	jX pu
CBL-0001	BUS-0002	In	1	150	350	Aluminum	Magnetic	PVC	Pos:	22.3280	12.7935
	AHP MSB								Zero:	70.3680	31.5089
CBL-0002	AHP MSB	In	1	15	1	Copper	Magnetic	PVC	Pos:	5.5473	1.9762
	AHP PNL L2								Zero:	17.4810	4.8643
CBL-0003	AHP MSB	In	1	5	10	Copper	Magnetic	PVC	Pos:	13.6372	0.9870
	AHP PRK LT LTG CP								Zero:	42.9780	2.4304
CBL-0004	AHP MSB	In	1	5	10	Copper	Magnetic	PVC	Pos:	13.6372	0.9870
	AM PRKNG LOT LTG CP0								Zero:	42.9780	2.4304
CBL-0005	AHP MSB	In	1	5	10	Copper	Magnetic	PVC	Pos:	13.6372	0.9870
	AM PRKNG LOT LTG CP1								Zero:	42.9780	2.4304
CBL-0006	AHP MSB	In	1	5	10	Copper	Magnetic	PVC	Pos:	13.6372	0.9870
	AM PRKNG LOT LTG CP2								Zero:	42.9780	2.4304
CBL-0007	AHP MSB	In	1	5	10	Copper	Magnetic	PVC	Pos:	13.6372	0.9870
	AM PRKNG LOT LTG CP3								Zero:	42.9780	2.4304
CBL-0008	AHP MSB	In	1	5	10	Copper	Magnetic	PVC	Pos:	13.6372	0.9870
	AM PRKNG LOT LTG CP4								Zero:	42.9780	2.4304
CBL-0009	AHP MSB	In	1	5	10	Copper	Magnetic	PVC	Pos:	13.6372	0.9870
	AM PRKNG LOT LTG CP5								Zero:	42.9780	2.4304
CBL-0010	AHP MSB	In	1	5	10	Copper	Magnetic	PVC	Pos:	13.6372	0.9870
	AM PRKNG LOT LTG CP6								Zero:	42.9780	2.4304
CBL-0011	BUS-0014	In	1	99	4/0	Aluminum	Magnetic	PVC	Pos:	18.2188	6.7031
	BUS-0015								Zero:	57.4166	16.5086
CBL-0012	BUS-0015	In	1	6	2	Copper	Magnetic	PVC	Pos:	2.0340	0.5891
	CCP PNL								Zero:	6.4102	1.4500
CBL-0013	CCP PNL	In	1	12	2	Copper	Magnetic	PVC	Pos:	4.0330	1.1680
	CCP PNL A								Zero:	12.7099	2.8750
CBL-0014	CCP PNL	In	1	29	6	Copper	Magnetic	PVC	Pos:	25.5000	3.4250
	CCP WTR PLAY CP								Zero:	80.3600	8.4350
CBL-0015	CCP PNL A	In	1	6	6	Copper	Magnetic	PVC	Pos:	5.1354	0.6898
	CCP PNL R								Zero:	16.1836	1.6987
CBL-0016	BUS-0021	In	1	99	250	Aluminum	Magnetic	PVC	Pos:	20.5030	8.7870
	BUS-0022								Zero:	64.6164	21.6402
CBL-0017	BUS-0022	In	1	2	250	Aluminum	Magnetic	PVC	Pos:	0.4763	0.2041
	DP MN DSC								Zero:	1.5012	0.5028
CBL-0018	DP MN DSC	In	1	6	3/0	Copper	Magnetic	PVC	Pos:	1.0792	0.6958
	DP PNL P								Zero:	3.4011	1.7133

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul	Per Unit (100 MVA Base)	R pu	jX pu
CBL-0019	DP PNL P	In	1	230	6	Copper	Magnetic	PVC	Pos:	271.1261	36.4160
	DP WTR D PMP PIT CP								Zero:	854.4194	89.6843
CBL-0020	DP PNL P	In	1	17	1	Copper	Magnetic	PVC	Pos:	6.3979	2.2793
	DP PNL A								Zero:	20.1615	5.6102
CBL-0021	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP								Zero:	49.8545	2.8193
CBL-0022	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP0								Zero:	49.8545	2.8193
CBL-0023	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP1								Zero:	49.8545	2.8193
CBL-0024	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP2								Zero:	49.8545	2.8193
CBL-0025	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP3								Zero:	49.8545	2.8193
CBL-0026	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP4								Zero:	49.8545	2.8193
CBL-0027	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP5								Zero:	49.8545	2.8193
CBL-0028	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP6								Zero:	49.8545	2.8193
CBL-0029	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP7								Zero:	49.8545	2.8193
CBL-0030	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP8								Zero:	49.8545	2.8193
CBL-0031	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP9								Zero:	49.8545	2.8193
CBL-0032	DP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	15.8192	1.1449
	DP LTG CNTCTR CP10								Zero:	49.8545	2.8193
CBL-0033	BUS-0041	In	1	350	4/0	Aluminum	Magnetic	PVC	Pos:	16.1024	5.9245
	DCP MSB								Zero:	50.7470	14.5909
CBL-0034	DCP MSB	In	1	15	4/0	Copper	Magnetic	PVC	Pos:	0.4167	0.3236
	DCP PNL PH								Zero:	1.3132	0.7969
CBL-0035	DCP PNL PH	In	1	20	8	Copper	Magnetic	PVC	Pos:	7.0399	0.6545
	DCP MUSCO LTG CP								Zero:	22.1866	1.6111
CBL-0036	DCP PNL PH	In	1	20	8	Copper	Magnetic	PVC	Pos:	7.0399	0.6545
	DCP MUSCO LTG CP0								Zero:	22.1866	1.6111
CBL-0037	DCP PNL PH	In	1	20	8	Copper	Magnetic	PVC	Pos:	7.0399	0.6545
	DCP MUSCO LTG CP1								Zero:	22.1866	1.6111
CBL-0038	DCP PNL PH	In	1	20	8	Copper	Magnetic	PVC	Pos:	7.0399	0.6545
	DCP MUSCO LTG CP2								Zero:	22.1866	1.6111
CBL-0039	DCP PNL PH	In	1	20	8	Copper	Magnetic	PVC	Pos:	7.0399	0.6545
	DCP MUSCO LTG CP3								Zero:	22.1866	1.6111

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul	Per Unit (100 MVA Base)	R pu	jX pu
CBL-0040	DCP PNL PH	In	1	20	8	Copper	Magnetic	PVC	Pos:	7.0399	0.6545
	DCP MUSCO LTG CP4								Zero:	22.1866	1.6111
CBL-0041	DCP PNL PH	In	1	20	8	Copper	Magnetic	PVC	Pos:	7.0399	0.6545
	DCP MUSCO LTG CP5								Zero:	22.1866	1.6111
CBL-0042	DCP PNL PH	In	1	20	8	Copper	Magnetic	PVC	Pos:	7.0399	0.6545
	DCP MUSCO LTG CP6								Zero:	22.1866	1.6111
CBL-0043	DCP PNL PH	In	1	30	2	Copper	Magnetic	PVC	Pos:	2.6302	0.7617
	BUS-0053								Zero:	8.2891	1.8750
CBL-0044	BUS-0054	In	1	5	3/0	Copper	Magnetic	PVC	Pos:	0.6988	0.4505
	DCP PNL PL								Zero:	2.2023	1.1094
CBL-0045	BUS-0056	In	2	45	350	Aluminum	Magnetic	PVC	Pos:	0.6289	0.3604
	ECC MSB								Zero:	1.9820	0.8875
CBL-0046	ECC MSB	In	2	400	350	Copper	Magnetic	PVC	Pos:	3.2813	4.2622
	ECC PNL HM2								Zero:	10.3385	10.4948
CBL-0047	ECC MSB	In	1	400	350	Copper	Magnetic	PVC	Pos:	6.5625	8.5243
	BUS-0073								Zero:	20.6771	20.9896
CBL-0048	ECC MSB	In	1	400	4/0	Copper	Magnetic	PVC	Pos:	11.1111	8.6285
	ECC PNL HL2								Zero:	35.0174	21.2500
CBL-0049	ECC MSB	In	1	10	4/0	Copper	Magnetic	PVC	Pos:	0.2778	0.2157
	ECC PNL HM1								Zero:	0.8754	0.5313
CBL-0050	ECC MSB	In	1	5	4/0	Copper	Magnetic	PVC	Pos:	0.1389	0.1079
	BUS-0092								Zero:	0.4377	0.2656
CBL-0051	ECC MSB	In	1	15	4/0	Copper	Magnetic	PVC	Pos:	0.4167	0.3236
	ECC PNL HL1								Zero:	1.3132	0.7969
CBL-0052	ECC PNL HM2	In	1	40	6	Copper	Magnetic	PVC	Pos:	8.8542	1.1892
	ECC AC-10 CP								Zero:	27.9028	2.9288
CBL-0053	ECC PNL HM2	In	1	40	6	Copper	Magnetic	PVC	Pos:	8.8542	1.1892
	ECC AC-12 CP								Zero:	27.9028	2.9288
CBL-0054	ECC PNL HM2	In	1	50	6	Copper	Magnetic	PVC	Pos:	11.0677	1.4865
	ECC AC-11 CP								Zero:	34.8785	3.6610
CBL-0055	ECC PNL HM2	In	1	75	6	Copper	Magnetic	PVC	Pos:	16.6016	2.2298
	ECC AC-9 CP								Zero:	52.3177	5.4915
CBL-0056	ECC PNL HM2	In	1	75	2	Copper	Magnetic	PVC	Pos:	6.5755	1.9043
	ECC AC-13 CP								Zero:	20.7227	4.6875
CBL-0057	ECC PNL HM2 Ext	In	1	140	1/0	Copper	Magnetic	PVC	Pos:	7.7778	3.2813
	ECC AC-4 CP								Zero:	24.5122	8.0755
CBL-0058	ECC PNL HM2 Ext	In	1	145	6	Copper	Magnetic	PVC	Pos:	32.0964	4.3110
	ECC AC-5 CP								Zero:	101.1476	10.6170
CBL-0059	ECC PNL HM2 Ext	In	1	120	6	Copper	Magnetic	PVC	Pos:	26.5625	3.5677
	ECC AC-7 CP								Zero:	83.7083	8.7865
CBL-0060	ECC PNL HM2 Ext	In	1	135	2	Copper	Magnetic	PVC	Pos:	11.8359	3.4277

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	Size	Cond. Type	Duct Type	Insul		Per Unit (100 MVA Base) R pu	jX pu
	ECC AC-8 CP								Zero:	37.3008	8.4375
CBL-0061	ECC PNL HM2 Ext	In	1	125	6	Copper	Magnetic	PVC	Pos:	27.6693	3.7164
	ECC AC-6 CP								Zero:	87.1962	9.1526
CBL-0062	BUS-0074	In	2	10	350	Copper	Magnetic	PVC	Pos:	0.4369	0.5674
	ECC PNL DPL2								Zero:	1.3764	1.3972
CBL-0063	ECC PNL DPL2	In	1	115	1/0	Copper	Magnetic	PVC	Pos:	34.0237	14.3537
	ECC PNL L7								Zero:	107.2277	35.3261
CBL-0064	ECC PNL DPL2	In	1	10	1/0	Copper	Magnetic	PVC	Pos:	2.9586	1.2482
	ECC PNL L6								Zero:	9.3242	3.0718
CBL-0065	ECC PNL DPL2	In	1	10	4/0	Copper	Magnetic	PVC	Pos:	1.4793	1.1488
	ECC PNL K1								Zero:	4.6621	2.8291
CBL-0066	ECC PNL DPL2	In	1	50	12	Copper	Magnetic	PVC	Pos:	216.1150	10.5168
	ECC CU-1 DSC (DPL2)								Zero:	681.0975	25.8991
CBL-0067	ECC PNL DPL2	In	1	10	1/0	Copper	Magnetic	PVC	Pos:	2.9586	1.2482
	ECC PNL L5								Zero:	9.3242	3.0718
CBL-0068	ECC PNL L6	In	1	40	12	Copper	Magnetic	PVC	Pos:	172.8920	8.4135
	ECC CU-2 DSC								Zero:	544.8780	20.7193
CBL-0069	ECC PNL L6	In	1	50	12	Copper	Magnetic	PVC	Pos:	216.1150	10.5168
	ECC KEF-1 CP								Zero:	681.0975	25.8991
CBL-0070	ECC PNL L6	In	1	10	12	Copper	Magnetic	PVC	Pos:	43.2230	2.1034
	ECC LCPB CP1 208V								Zero:	136.2195	5.1798
CBL-0071	ECC KEF-1 CP	In	1	50	12	Copper	Magnetic	PVC	Pos:	216.1150	10.5168
	ECC KEF-1 DSC								Zero:	681.0975	25.8991
CBL-0072	ECC PNL K1	In	1	50	12	Copper	Magnetic	PVC	Pos:	216.1150	10.5168
	ECC CU-3 DSC								Zero:	681.0975	25.8991
CBL-0073	ECC PNL HL2	In	1	10	12	Copper	Magnetic	PVC	Pos:	8.1163	0.3950
	ECC LCPB CP1 480V								Zero:	25.5790	0.9727
CBL-0074	ECC PNL HM1	In	1	65	6	Copper	Magnetic	PVC	Pos:	14.3880	1.9325
	ECC AC-1 DSC								Zero:	45.3420	4.7593
CBL-0075	ECC PNL HM1	In	1	50	6	Copper	Magnetic	PVC	Pos:	11.0677	1.4865
	ECC AC-2 CP								Zero:	34.8785	3.6610
CBL-0076	ECC PNL HM1	In	1	50	1/0	Copper	Magnetic	PVC	Pos:	2.7778	1.1719
	ECC AC-3 CP								Zero:	8.7543	2.8841
CBL-0077	BUS-0093	In	1	10	500	Copper	Magnetic	PVC	Pos:	0.6795	1.0771
	ECC PNL DPL1								Zero:	2.1403	2.6512
CBL-0078	ECC PNL DPL1	In	1	10	1	Copper	Magnetic	PVC	Pos:	3.6982	1.3175
	ECC PNL L2								Zero:	11.6540	3.2429
CBL-0079	ECC PNL DPL1	In	1	5	1	Copper	Magnetic	PVC	Pos:	1.8491	0.6587
	ECC PNL L3								Zero:	5.8270	1.6214
CBL-0080	ECC PNL L3	In	1	50	10	Copper	Magnetic	PVC	Pos:	136.3720	9.8696
	ECC CU-1 DSC (L3)								Zero:	429.7800	24.3043

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul	Per Unit (100 MVA Base)	R pu	jX pu
CBL-0081	ECC PNL L3	In	1	55	10	Copper	Magnetic	PVC	Pos:	150.0092	10.8566
	ECC WH-3 DSC								Zero:	472.7580	26.7347
CBL-0082	ECC PNL HL1	In	1	15	10	Copper	Magnetic	PVC	Pos:	7.6823	0.5560
	ECC PRK LT LTG CP								Zero:	24.2109	1.3691
CBL-0083	ECC PNL HL1	In	1	15	10	Copper	Magnetic	PVC	Pos:	7.6823	0.5560
	ECC PRK LT LTG CP0								Zero:	24.2109	1.3691
CBL-0084	ECC PNL HL1	In	1	15	12	Copper	Magnetic	PVC	Pos:	12.1745	0.5924
	ECC PRK LT LTG CP1								Zero:	38.3685	1.4590
CBL-0085	ECC PNL HL1	In	1	15	12	Copper	Magnetic	PVC	Pos:	12.1745	0.5924
	ECC PRK LT LTG CP2								Zero:	38.3685	1.4590
CBL-0086	ECC PNL HL1	In	1	15	12	Copper	Magnetic	PVC	Pos:	12.1745	0.5924
	ECC PRK LT LTG CP3								Zero:	38.3685	1.4590
CBL-0088	BUS-0105	In	2	50	700	Aluminum	Magnetic	PVC	Pos:	0.3668	0.3798
	ECP MSB								Zero:	1.1558	0.9353
CBL-0089	ECP MSB	In	1	30	12	Copper	Magnetic	PVC	Pos:	24.3490	1.1849
	ECP PNL A 480V								Zero:	76.7370	2.9180
CBL-0090	ECP MSB	In	1	950	500	Copper	Magnetic	PVC	Pos:	12.1224	19.2144
	ECP PNL HB								Zero:	38.1814	47.2938
CBL-0091	DP PNL P	In	25	1	5000	Copper	Busway	Epoxy	Pos:	0.0001	0.0001
	DP PNL P Ext								Zero:	0.0007	0.0003
CBL-0092	ECC PNL HM2	In	25	1	5000	Copper	Busway	Epoxy	Pos:	0.0000	0.0000
	ECC PNL HM2 Ext								Zero:	0.0001	0.0001
CBL-0093	ECP MSB	In	1	950	350	Copper	Magnetic	PVC	Pos:	15.5859	20.2452
	BUS-0122								Zero:	49.1081	49.8503
CBL-0094	ECP MSB	In	1	950	500	Copper	Magnetic	PVC	Pos:	12.1224	19.2144
	ECP PNL HA								Zero:	38.1814	47.2938
CBL-0095	ECP PNL A 480V	In	1	1	12	Copper	Magnetic	PVC	Pos:	0.8116	0.0395
	BUS-0111								Zero:	2.5579	0.0973
CBL-0096	BUS-0112	In	1	5	10	Copper	Magnetic	PVC	Pos:	10.2431	0.7413
	ECP PNL A 240V								Zero:	32.2813	1.8255
CBL-0097	ECP PNL HB	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP								Zero:	3.4878	0.3661
CBL-0098	ECP PNL HB	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP0								Zero:	3.4878	0.3661
CBL-0099	ECP PNL HB	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP1								Zero:	3.4878	0.3661
CBL-0100	ECP PNL HB	In	1	5	8	Copper	Magnetic	PVC	Pos:	1.7600	0.1636
	ECP EXT LTG CP								Zero:	5.5467	0.4028
CBL-0101	ECP PNL HB	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP2								Zero:	3.4878	0.3661
CBL-0102	ECP PNL HB	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP3								Zero:	3.4878	0.3661

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul		Per Unit (100 MVA Base) R pu	jX pu
CBL-0103	ECP PNL HB	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	ECP EXT LTG CP0								Zero:	8.0703	0.4564
CBL-0104	BUS-0123	In	2	5	350	Copper	Magnetic	PVC	Pos:	0.2184	0.2837
	ECP PNL DP								Zero:	0.6882	0.6986
CBL-0105	ECP PNL DP	In	1	40	2	Copper	Magnetic	PVC	Pos:	18.6760	5.4087
	BUS-0124								Zero:	58.8573	13.3136
CBL-0106	ECP PNL DP	In	1	25	4	Copper	Magnetic	PVC	Pos:	18.5489	3.6520
	BUS-0129								Zero:	58.4551	8.9913
CBL-0107	ECP PNL DP	In	1	75	4	Copper	Magnetic	PVC	Pos:	55.6467	10.9560
	BUS-0133								Zero:	175.3652	26.9739
CBL-0108	ECP PNL DP	In	1	85	4	Copper	Magnetic	PVC	Pos:	63.0663	12.4168
	BUS-0137								Zero:	198.7472	30.5705
CBL-0109	BUS-0124	In	1	5	2	Copper	Magnetic	PVC	Pos:	2.3345	0.6761
	ECP CNCSSN MN DSC								Zero:	7.3572	1.6642
CBL-0110	ECP CNCSSN MN DSC	In	1	5	2	Copper	Magnetic	PVC	Pos:	2.3345	0.6761
	ECP CONCESSION PNL								Zero:	7.3572	1.6642
CBL-0111	ECP CONCESSION PNL	In	1	10	8	Copper	Magnetic	PVC	Pos:	18.7454	1.7428
	ECP CNCSSN AC CP								Zero:	59.0768	4.2899
CBL-0112	BUS-0129	In	1	5	4	Copper	Magnetic	PVC	Pos:	3.7098	0.7304
	ECP STRG BLDG MN DSC								Zero:	11.6910	1.7983
CBL-0113	ECP STRG BLDG MN DSC	In	1	10	4	Copper	Magnetic	PVC	Pos:	7.4196	1.4608
	ECP STRG BLDG PNL								Zero:	23.3820	3.5965
CBL-0114	ECP STRG BLDG PNL	In	1	10	8	Copper	Magnetic	PVC	Pos:	18.7454	1.7428
	ECP STRG BLDG AC CP								Zero:	59.0768	4.2899
CBL-0115	BUS-0133	In	1	5	4	Copper	Magnetic	PVC	Pos:	3.7098	0.7304
	ECP RR B #1 MN DSC								Zero:	11.6910	1.7983
CBL-0116	ECP RR B #1 MN DSC	In	1	5	4	Copper	Magnetic	PVC	Pos:	3.7098	0.7304
	ECP RSTRM B #1 PNL								Zero:	11.6910	1.7983
CBL-0117	BUS-0137	In	1	5	4	Copper	Magnetic	PVC	Pos:	3.7098	0.7304
	ECP RR B #2 MN DSC								Zero:	11.6910	1.7983
CBL-0118	ECP RR B #2 MN DSC	In	1	10	4	Copper	Magnetic	PVC	Pos:	7.4196	1.4608
	ECP RSTRM B #2 PNL								Zero:	23.3820	3.5965
CBL-0119	ECP RSTRM B #1 PNL	In	1	10	8	Copper	Magnetic	PVC	Pos:	18.7454	1.7428
	ECP RR B #1 AC CP								Zero:	59.0768	4.2899
CBL-0120	ECP RSTRM B #2 PNL	In	1	10	8	Copper	Magnetic	PVC	Pos:	18.7454	1.7428
	ECP RR B #2 AC CP								Zero:	59.0768	4.2899
CBL-0121	ECP PNL HA	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP4								Zero:	3.4878	0.3661
CBL-0122	ECP PNL HA	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP5								Zero:	3.4878	0.3661
CBL-0123	ECP PNL HA	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP6								Zero:	3.4878	0.3661

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul		Per Unit (100 MVA Base) R pu	jX pu
CBL-0124	ECP PNL HA	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP7								Zero:	3.4878	0.3661
CBL-0125	ECP PNL HA	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP8								Zero:	3.4878	0.3661
CBL-0126	ECP PNL HA	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	ECP MUSCO CP9								Zero:	3.4878	0.3661
CBL-0127	BUS-0147	In	1	99	350	Copper	Magnetic	PVC	Pos:	6.4969	8.4391
	BUS-0148								Zero:	20.4703	20.7797
CBL-0128	BUS-0148	In	1	29	1	Copper	Magnetic	PVC	Pos:	8.0000	2.8500
	HMP PNL								Zero:	25.2100	7.0150
CBL-0129	HMP PNL	In	1	6	12	Copper	Magnetic	PVC	Pos:	18.8299	0.9163
	HMP LTG CNTCTR CP								Zero:	59.3433	2.2566
CBL-0130	HMP PNL	In	1	6	12	Copper	Magnetic	PVC	Pos:	18.8299	0.9163
	HMP LTG CNTCTR CP0								Zero:	59.3433	2.2566
CBL-0131	HMP PNL	In	1	6	12	Copper	Magnetic	PVC	Pos:	18.8299	0.9163
	HMP LTG CNTCTR CP1								Zero:	59.3433	2.2566
CBL-0132	HMP PNL	In	1	6	12	Copper	Magnetic	PVC	Pos:	18.8299	0.9163
	HMP LTG CNTCTR CP2								Zero:	59.3433	2.2566
CBL-0133	BUS-0155	In	3	25	700	Aluminum	Magnetic	PVC	Pos:	0.1223	0.1266
	HHP MSA								Zero:	0.3853	0.3118
CBL-0134	HHP MSA	In	2	30	3/0	Copper	Magnetic	PVC	Pos:	0.5241	0.3379
	HHP MSB								Zero:	1.6517	0.8320
CBL-0135	HHP MSA	In	1	125	4/0	Copper	Magnetic	PVC	Pos:	3.4722	2.6964
	HHP NGHBRHD CTR DSC								Zero:	10.9429	6.6406
CBL-0136	HHP MSA	In	1	500	300	Copper	Magnetic	PVC	Pos:	10.0694	10.6988
	HHP BATTING CAGE DSC								Zero:	31.7274	26.3455
CBL-0137	HHP MSA	In	2	950	500	Copper	Magnetic	PVC	Pos:	6.0612	9.6072
	HHP PNL DPBF								Zero:	19.0907	23.6469
CBL-0138	HHP MSB	In	1	10	3/0	Copper	Magnetic	PVC	Pos:	0.3494	0.2253
	HHP PNL HA								Zero:	1.1011	0.5547
CBL-0139	HHP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP LTG CONT CP								Zero:	8.0703	0.4564
CBL-0140	HHP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP LTG CONT CP0								Zero:	8.0703	0.4564
CBL-0141	HHP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP LTG CONT CP1								Zero:	8.0703	0.4564
CBL-0142	HHP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP LTG CONT CP2								Zero:	8.0703	0.4564
CBL-0143	HHP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP LTG CONT CP3								Zero:	8.0703	0.4564
CBL-0144	HHP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP LTG CONT CP4								Zero:	8.0703	0.4564

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul		Per Unit (100 MVA Base) R pu	jX pu
CBL-0145	HHP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP LTG CONT CP5								Zero:	8.0703	0.4564
CBL-0146	HHP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP LTG CONT CP6								Zero:	8.0703	0.4564
CBL-0147	HHP NGHBRHD CTR DSC	In	1	5	4/0	Copper	Magnetic	PVC	Pos:	0.1389	0.1079
	BUS-0171								Zero:	0.4377	0.2656
CBL-0148	BUS-0172	In	2	25	4/0	Copper	Magnetic	PVC	Pos:	1.3889	1.0786
	HHP PNL A								Zero:	4.3772	2.6563
CBL-0149	HHP PNL A	In	1	99	10	Copper	Magnetic	PVC	Pos:	202.8125	14.6781
	HHP 2 TON A/C DSC								Zero:	639.1688	36.1453
CBL-0150	HHP PNL A	In	1	99	8	Copper	Magnetic	PVC	Pos:	139.3906	12.9594
	HHP 3 TON A/C DSC 1								Zero:	439.2953	31.9000
CBL-0151	HHP PNL A	In	1	99	6	Copper	Magnetic	PVC	Pos:	87.6563	11.7734
	HHP 4 TON A/C DSC 1								Zero:	276.2375	28.9953
CBL-0152	HHP PNL A	In	1	99	8	Copper	Magnetic	PVC	Pos:	139.3906	12.9594
	HHP 3 TON A/C DSC 2								Zero:	439.2953	31.9000
CBL-0153	HHP PNL A	In	1	99	6	Copper	Magnetic	PVC	Pos:	87.6563	11.7734
	HHP 4 TON A/C DSC 2								Zero:	276.2375	28.9953
CBL-0154	HHP BATTING CAGE DSC	In	1	5	300	Copper	Magnetic	PVC	Pos:	0.1007	0.1070
	BUS-0180								Zero:	0.3173	0.2635
CBL-0155	BUS-0182	In	1	5	250	Copper	Magnetic	PVC	Pos:	0.4792	0.4297
	HHP PNL BC								Zero:	1.5095	1.0582
CBL-0156	HHP PNL BC	In	1	95	2/0	Copper	Magnetic	PVC	Pos:	16.8229	8.7908
	HHP PNL BCA								Zero:	53.0087	21.6389
CBL-0157	HHP PNL BC	In	1	95	2/0	Copper	Magnetic	PVC	Pos:	16.8229	8.7908
	HHP PNL BCB								Zero:	53.0087	21.6389
CBL-0158	HHP PNL BC	In	1	5	2	Copper	Magnetic	PVC	Pos:	1.7535	0.5078
	HHP PNL BCC								Zero:	5.5260	1.2500
CBL-0159	HHP PNL BCC	In	1	5	10	Copper	Magnetic	PVC	Pos:	10.2431	0.7413
	HHP SUMP PMP CP								Zero:	32.2813	1.8255
CBL-0160	HHP PNL DPBF	In	1	5	500	Copper	Magnetic	PVC	Pos:	0.0638	0.1011
	HHP PNL BFA								Zero:	0.2010	0.2489
CBL-0161	HHP PNL DPBF	In	1	5	500	Copper	Magnetic	PVC	Pos:	0.0638	0.1011
	HHP PNL BFE								Zero:	0.2010	0.2489
CBL-0162	HHP PNL DPBF	In	1	15	4/0	Copper	Magnetic	PVC	Pos:	0.4167	0.3236
	HHP PNL HB								Zero:	1.3132	0.7969
CBL-0163	HHP PNL BFA	In	1	15	6	Copper	Magnetic	PVC	Pos:	3.3203	0.4460
	HHP BFA LTG CONT CP								Zero:	10.4635	1.0983
CBL-0164	HHP PNL BFA	In	1	15	10	Copper	Magnetic	PVC	Pos:	7.6823	0.5560
	HHP BFA LTG CONT CP0								Zero:	24.2109	1.3691
CBL-0165	HHP PNL BFA	In	1	15	10	Copper	Magnetic	PVC	Pos:	7.6823	0.5560

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	Size	Cond. Type	Duct Type	Insul		R pu	jX pu
	HHP BFA LTG CONT CP1								Zero:	24.2109	1.3691
CBL-0166	HHP PNL BFA	In	1	15	6	Copper	Magnetic	PVC	Pos:	3.3203	0.4460
	HHP BFA LTG CONT CP2								Zero:	10.4635	1.0983
CBL-0167	HHP PNL BFA	In	1	15	6	Copper	Magnetic	PVC	Pos:	3.3203	0.4460
	HHP BFA LTG CONT CP3								Zero:	10.4635	1.0983
CBL-0168	HHP PNL BFA	In	1	15	10	Copper	Magnetic	PVC	Pos:	7.6823	0.5560
	HHP BFA LTG CONT CP4								Zero:	24.2109	1.3691
CBL-0169	HHP PNL BFA	In	1	15	6	Copper	Magnetic	PVC	Pos:	3.3203	0.4460
	HHP BFA LTG CONT CP5								Zero:	10.4635	1.0983
CBL-0170	HHP PNL BFA	In	1	15	6	Copper	Magnetic	PVC	Pos:	3.3203	0.4460
	HHP BFA LTG CONT CP6								Zero:	10.4635	1.0983
CBL-0171	HHP PNL BFE	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	HHP BFE LTG CONT CP								Zero:	3.4878	0.3661
CBL-0172	HHP PNL BFE	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP BFE LTG CONT CP0								Zero:	8.0703	0.4564
CBL-0173	HHP PNL BFE	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP BFE LTG CONT CP1								Zero:	8.0703	0.4564
CBL-0174	HHP PNL BFE	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	HHP BFE LTG CONT CP2								Zero:	3.4878	0.3661
CBL-0175	HHP PNL BFE	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	HHP BFE LTG CONT CP3								Zero:	3.4878	0.3661
CBL-0176	HHP PNL BFE	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP BFE LTG CONT CP4								Zero:	8.0703	0.4564
CBL-0177	HHP PNL BFE	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	HHP BFE LTG CONT CP5								Zero:	3.4878	0.3661
CBL-0178	HHP PNL BFE	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	HHP BFE LTG CONT CP6								Zero:	8.0703	0.4564
CBL-0179	HHP PNL BFE	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	HHP BFE LTG CONT CP7								Zero:	3.4878	0.3661
CBL-0180	HHP PNL HB	In	1	15	10	Copper	Magnetic	PVC	Pos:	7.6823	0.5560
	BUS-0207								Zero:	24.2109	1.3691
CBL-0181	HHP PNL HB	In	1	15	10	Copper	Magnetic	PVC	Pos:	7.6823	0.5560
	BUS-0208								Zero:	24.2109	1.3691
CBL-0182	HHP PNL HB	In	1	15	10	Copper	Magnetic	PVC	Pos:	7.6823	0.5560
	BUS-0209								Zero:	24.2109	1.3691
CBL-0183	BUS-0211	In	1	130	4/0	Aluminum	Magnetic	PVC	Pos:	5.9809	2.2005
	JHP MSB								Zero:	18.8489	5.4195
CBL-0184	JHP MSB	In	1	5	1/0	Copper	Magnetic	PVC	Pos:	0.2778	0.1172
	JHP LTG CNTCTR CP								Zero:	0.8754	0.2884
CBL-0185	JHP MSB	In	1	5	2	Copper	Magnetic	PVC	Pos:	0.4384	0.1270
	JHP PNL HP								Zero:	1.3815	0.3125

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul		Per Unit (100 MVA Base) R pu	jX pu
CBL-0186	JHP MSB	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	JHP LTG CNTCTR CP1								Zero:	3.4878	0.3661
CBL-0187	JHP MSB	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	JHP LTG CNTCTR CP2								Zero:	3.4878	0.3661
CBL-0188	JHP LTG CNTCTR CP	In	1	5	1/0	Copper	Magnetic	PVC	Pos:	0.2778	0.1172
	JHP PNL 1BB								Zero:	0.8754	0.2884
CBL-0189	MFP PNL HA	In	25	1	5000	Copper	Busway	Epoxy	Pos:	0.0000	0.0000
	MFP PNL HA Ext								Zero:	0.0001	0.0001
CBL-0190	JHP LTG CNTCTR CP1	In	1	10	6	Copper	Magnetic	PVC	Pos:	2.2135	0.2973
	JHP PNL SK								Zero:	6.9757	0.7322
CBL-0191	JHP LTG CNTCTR CP2	In	1	5	6	Copper	Magnetic	PVC	Pos:	1.1068	0.1487
	JHP PNL SF								Zero:	3.4878	0.3661
CBL-0192	JHP PNL HP	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	JHP LTG CNTCTR CP3								Zero:	8.0703	0.4564
CBL-0193	JHP PNL HP	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	JHP LTG CNTCTR CP4								Zero:	8.0703	0.4564
CBL-0194	JHP PNL HP	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	JHP LTG CNTCTR CP5								Zero:	8.0703	0.4564
CBL-0195	JHP PNL HP	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	JHP LTG CNTCTR CP6								Zero:	8.0703	0.4564
CBL-0196	JHP PNL HP	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	JHP LTG CNTCTR CP7								Zero:	8.0703	0.4564
CBL-0197	JHP PNL HP	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	JHP LTG CNTCTR CP8								Zero:	8.0703	0.4564
CBL-0198	JHP PNL HP	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	JHP LTG CNTCTR CP9								Zero:	8.0703	0.4564
CBL-0199	BUS-0346	In	1	150	350	Aluminum	Magnetic	PVC	Pos:	4.1927	2.4023
	MFP MSB								Zero:	13.2135	5.9167
CBL-0200	MFP MSB	In	1	10	1	Copper	Magnetic	PVC	Pos:	0.6944	0.2474
	MFP PNL HB								Zero:	2.1884	0.6089
CBL-0201	MFP MSB	In	1	15	500	Copper	Magnetic	PVC	Pos:	0.1914	0.3034
	MFP PNL HA								Zero:	0.6029	0.7467
CBL-0202	MFP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP0								Zero:	8.0703	0.4564
CBL-0203	MFP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP								Zero:	8.0703	0.4564
CBL-0204	MFP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP1								Zero:	8.0703	0.4564
CBL-0205	MFP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP2								Zero:	8.0703	0.4564
CBL-0206	MFP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP3								Zero:	8.0703	0.4564

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul		Per Unit (100 MVA Base) R pu	jX pu
CBL-0207	MFP PNL HA	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP4								Zero:	8.0703	0.4564
CBL-0208	MFP PNL HA Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP5								Zero:	8.0703	0.4564
CBL-0209	MFP PNL HA Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP6								Zero:	8.0703	0.4564
CBL-0210	MFP PNL HA Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP7								Zero:	8.0703	0.4564
CBL-0211	MFP PNL HA Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP8								Zero:	8.0703	0.4564
CBL-0212	MFP PNL HA Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP9								Zero:	8.0703	0.4564
CBL-0213	MFP PNL HA Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	MFP LTG CNTCTR CP Ext								Zero:	8.0703	0.4564
CBL-0214	BUS-0247	In	1	99	250	Aluminum	Magnetic	PVC	Pos:	15.4000	6.6000
	BUS-0248								Zero:	48.5341	16.2542
CBL-0215	BUS-0248	In	1	2	250	Aluminum	Magnetic	PVC	Pos:	0.3578	0.1533
	MVP MN DSC								Zero:	1.1276	0.3776
CBL-0216	MVP MN DSC	In	1	6	3/0	Copper	Magnetic	PVC	Pos:	0.8106	0.5226
	MVP PNL P								Zero:	2.5546	1.2869
CBL-0217	MVP PNL P	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP								Zero:	37.4463	2.1176
CBL-0218	MVP PNL P	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP0								Zero:	37.4463	2.1176
CBL-0219	MVP PNL P	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP1								Zero:	37.4463	2.1176
CBL-0220	MVP PNL P	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP2								Zero:	37.4463	2.1176
CBL-0221	MVP PNL P	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP3								Zero:	37.4463	2.1176
CBL-0222	MVP PNL P	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP4								Zero:	37.4463	2.1176
CBL-0223	MVP PNL P	In	25	1	5000	Copper	Busway	Epox	Pos:	0.0001	0.0000
	MVP PNL P Ext								Zero:	0.0005	0.0003
CBL-0224	MVP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP Ext								Zero:	37.4463	2.1176
CBL-0225	MVP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP5								Zero:	37.4463	2.1176
CBL-0226	MVP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP6								Zero:	37.4463	2.1176
CBL-0227	MVP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP7								Zero:	37.4463	2.1176

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul		Per Unit (100 MVA Base) R pu	jX pu
CBL-0228	MVP PNL P Ext	In	1	6	10	Copper	Magnetic	PVC	Pos:	11.8819	0.8599
	MVP LTG CNTCTR CP8								Zero:	37.4463	2.1176
CBL-0229	MVP PNL P Ext	In	1	109	2	Copper	Magnetic	PVC	Pos:	38.3309	11.1008
	MVP PNL B								Zero:	120.7993	27.3250
CBL-0230	MVP PNL P Ext	In	1	35	2	Copper	Magnetic	PVC	Pos:	12.0990	3.5039
	MVP PNL A								Zero:	38.1297	8.6250
CBL-0231	MVP PNL B	In	1	23	6	Copper	Magnetic	PVC	Pos:	20.3646	2.7352
	MVP HVAC DSC								Zero:	64.1764	6.7363
CBL-0232	BUS-0267	In	1	150	3/0	Copper	Magnetic	PVC	Pos:	5.2409	3.3789
	OP MSB								Zero:	16.5169	8.3203
CBL-0233	OP MSB	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	BUS-0271								Zero:	8.0703	0.4564
CBL-0234	OP MSB	In	1	70	10	Copper	Magnetic	PVC	Pos:	35.8507	2.5946
	BUS-0276								Zero:	112.9844	6.3893
CBL-0235	OP MSB	In	1	15	3/0	Copper	Magnetic	PVC	Pos:	0.5241	0.3379
	OP PNL BBL								Zero:	1.6517	0.8320
CBL-0236	OP MSB	In	1	15	2	Copper	Magnetic	PVC	Pos:	1.3151	0.3809
	OP PNL SL								Zero:	4.1445	0.9375
CBL-0237	BUS-0272	In	1	15	2	Copper	Magnetic	PVC	Pos:	5.2604	1.5234
	OP BLDG #1 PNL								Zero:	16.5781	3.7500
CBL-0238	BUS-0273	In	1	5	2	Copper	Magnetic	PVC	Pos:	1.7535	0.5078
	OP BLDG #2 PNL								Zero:	5.5260	1.2500
CBL-0239	OP PNL BBL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP								Zero:	8.0703	0.4564
CBL-0240	OP PNL BBL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP0								Zero:	8.0703	0.4564
CBL-0241	OP PNL BBL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP1								Zero:	8.0703	0.4564
CBL-0242	OP PNL BBL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP2								Zero:	8.0703	0.4564
CBL-0243	OP PNL BBL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP3								Zero:	8.0703	0.4564
CBL-0244	OP PNL BBL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP4								Zero:	8.0703	0.4564
CBL-0245	OP PNL BBL	In	25	1	5000	Copper	Busway	Epox	Pos:	0.0000	0.0000
	OP PNL BBL Ext								Zero:	0.0001	0.0001
CBL-0246	OP PNL BBL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP Ext1								Zero:	8.0703	0.4564
CBL-0247	OP PNL BBL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP5								Zero:	8.0703	0.4564
CBL-0248	OP PNL BBL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP6								Zero:	8.0703	0.4564

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul		Per Unit (100 MVA Base) R pu	jX pu
CBL-0249	OP PNL BBL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP7								Zero:	8.0703	0.4564
CBL-0250	OP PNL BBL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP8								Zero:	8.0703	0.4564
CBL-0251	OP PNL BBL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP9								Zero:	8.0703	0.4564
CBL-0252	OP PNL SL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP Ext2								Zero:	8.0703	0.4564
CBL-0253	OP PNL SL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP11								Zero:	8.0703	0.4564
CBL-0254	OP PNL SL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP12								Zero:	8.0703	0.4564
CBL-0255	OP PNL SL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP13								Zero:	8.0703	0.4564
CBL-0256	OP PNL SL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP14								Zero:	8.0703	0.4564
CBL-0257	OP PNL SL	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP15								Zero:	8.0703	0.4564
CBL-0258	OP PNL SL	In	25	1	5000	Copper	Busway	Epoxy	Pos:	0.0000	0.0000
	OP PNL SL Ext								Zero:	0.0001	0.0001
CBL-0259	OP PNL SL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP Ext3								Zero:	8.0703	0.4564
CBL-0260	OP PNL SL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP17								Zero:	8.0703	0.4564
CBL-0261	OP PNL SL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP18								Zero:	8.0703	0.4564
CBL-0262	OP PNL SL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP19								Zero:	8.0703	0.4564
CBL-0263	OP PNL SL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP20								Zero:	8.0703	0.4564
CBL-0264	OP PNL SL Ext	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	OP LTG CONT CP21								Zero:	8.0703	0.4564
CBL-0265	BUS-0348	In	1	120	700	Aluminum	Magnetic	PVC	Pos:	1.7604	1.8229
	PRP MSB								Zero:	5.5479	4.4896
CBL-0266	PRP MSB	In	2	5	3/0	Copper	Magnetic	PVC	Pos:	0.0873	0.0563
	PRP PNL HA								Zero:	0.2753	0.1387
CBL-0267	PRP MSB	In	1	10	10	Copper	Magnetic	PVC	Pos:	5.1215	0.3707
	BUS-0316								Zero:	16.1406	0.9128
CBL-0268	PRP MSB	In	1	600	1	Copper	Magnetic	PVC	Pos:	41.6667	14.8438
	IW #41 MSB								Zero:	131.3021	36.5365
CBL-0269	PRP MSB	In	1	10	6	Copper	Magnetic	PVC	Pos:	2.2135	0.2973

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	Size	Cond. Type	Duct Type	Insul		R pu	jX pu
	BUS-0327								Zero:	6.9757	0.7322
CBL-0270	PRP PNL HA	In	1	1	8	Copper	Magnetic	PVC	Pos:	0.3520	0.0327
	PRP LTG CNTCTR CP0								Zero:	1.1093	0.0806
CBL-0271	PRP PNL HA	In	1	1	8	Copper	Magnetic	PVC	Pos:	0.3520	0.0327
	PRP LTG CNTCTR CP1								Zero:	1.1093	0.0806
CBL-0272	PRP PNL HA	In	1	1	8	Copper	Magnetic	PVC	Pos:	0.3520	0.0327
	PRP LTG CNTCTR CP2								Zero:	1.1093	0.0806
CBL-0273	PRP PNL HA	In	1	1	8	Copper	Magnetic	PVC	Pos:	0.3520	0.0327
	PRP LTG CNTCTR CP3								Zero:	1.1093	0.0806
CBL-0274	PRP PNL HA	In	1	1	8	Copper	Magnetic	PVC	Pos:	0.3520	0.0327
	PRP LTG CNTCTR CP4								Zero:	1.1093	0.0806
CBL-0275	PRP PNL HA	In	1	1	6	Copper	Magnetic	PVC	Pos:	0.2214	0.0297
	PRP LTG CNTCTR CP5								Zero:	0.6976	0.0732
CBL-0276	PRP PNL HA	In	1	1	8	Copper	Magnetic	PVC	Pos:	0.3520	0.0327
	PRP LTG CNTCTR CP6								Zero:	1.1093	0.0806
CBL-0277	PRP PNL HA	In	1	1	6	Copper	Magnetic	PVC	Pos:	0.2214	0.0297
	PRP LTG CNTCTR CP								Zero:	0.6976	0.0732
CBL-0278	BUS-0317	In	1	5	8	Copper	Magnetic	PVC	Pos:	7.0399	0.6545
	PRP PNL LA								Zero:	22.1866	1.6111
CBL-0279	IW #41 MSB	In	1	5	12	Copper	Magnetic	PVC	Pos:	4.0582	0.1975
	BUS-0321								Zero:	12.7895	0.4863
CBL-0280	BUS-0321	In	1	5	12	Copper	Magnetic	PVC	Pos:	4.0582	0.1975
	IW #41 EMON CP								Zero:	12.7895	0.4863
CBL-0281	IW #41 MSB	In	1	15	2	Copper	Magnetic	PVC	Pos:	1.3151	0.3809
	IW #41 SFT STRT								Zero:	4.1445	0.9375
CBL-0282	IW #41 SFT STRT	In	1	99	2	Copper	Magnetic	PVC	Pos:	8.6797	2.5137
	BUS-0323								Zero:	27.3539	6.1875
CBL-0283	IW #41 MSB	In	1	5	10	Copper	Magnetic	PVC	Pos:	2.5608	0.1853
	BUS-0324								Zero:	8.0703	0.4564
CBL-0284	BUS-0325	In	1	5	6	Copper	Magnetic	PVC	Pos:	4.4271	0.5946
	IW #41 PNL A								Zero:	13.9514	1.4644
CBL-0285	BUS-0328	In	1	5	2	Copper	Magnetic	PVC	Pos:	1.7535	0.5078
	PRP PNL LB								Zero:	5.5260	1.2500
CBL-0286	PRP PNL LB	In	1	5	12	Copper	Magnetic	PVC	Pos:	16.2326	0.7899
	PRP SECURITY LTG CP								Zero:	51.1580	1.9453
CBL-0287	BUS-0332	In	1	99	350	Copper	Magnetic	PVC	Pos:	6.4969	8.4391
	BUS-0333								Zero:	20.4703	20.7797
CBL-0288	BUS-0333	In	1	6	2	Copper	Magnetic	PVC	Pos:	2.0340	0.5891
	RWP PNL								Zero:	6.4102	1.4500
CBL-0289	BUS-0336	In	1	99	350	Copper	Magnetic	PVC	Pos:	6.4969	8.4391
	BUS-0337								Zero:	20.4703	20.7797

Cable Name	From Bus To Bus	In/Out Service	Qty /Ph	Length Feet	------ Cable Description ------ Size	Cond. Type	Duct Type	Insul	Per Unit (100 MVA Base)	R pu	jX pu
CBL-0290	BUS-0337 SP MDP	In	1	6	2	Copper	Magnetic	PVC	Pos: Zero:	2.0340 6.4102	0.5891 1.4500
CBL-0291	SP MDP SP PNL A	In	1	29	2	Copper	Magnetic	PVC	Pos: Zero:	10.1000 31.8300	2.9250 7.2000
CBL-0292	BUS-0333 7674 SOAR RWP PNL	In	2	58	3/0	Copper	Magnetic	PVC	Pos: Zero:	4.0180 12.6630	2.5905 6.3789
CBL-0293	7674 SOAR RWP PNL RVR WLK RESTRM PNL	In	1	259	1/0	Copper	Magnetic	PVC	Pos: Zero:	57.4889 181.1798	24.2531 59.6896
CBL-0294	RVR WLK RESTRM PNL DUAL INSTA HOT CP	In	1	23	10	Copper	Magnetic	PVC	Pos: Zero:	47.1181 148.4938	3.4101 8.3974
CBL-0295	RVR WLK RESTRM PNL SUMP PUMP CP	In	1	17	10	Copper	Magnetic	PVC	Pos: Zero:	35.4410 111.6931	2.5650 6.3163
CBL-0296	RVR WLK RESTRM PNL HVAC CP	In	1	12	10	Copper	Magnetic	PVC	Pos: Zero:	23.5590 74.2469	1.7050 4.1987
CBL-0297	BUS-0333 HARR/CHAN RVRWLK PN	In	1	99	2	Copper	Magnetic	PVC	Pos: Zero:	34.7188 109.4156	10.0547 24.7500

2-Winding Transformers

Xformer Name	In/Out Service	----------Primary & Secondary---------- Bus	Conn.	Volts	FLA	Nominal kVA	Z PU (100 MVA Base)	R pu	jX pu
AHP UTIL XFMR	In	BUS-0001 BUS-0002	D WG	12,000 208	4 208	75.0	Pos: Zero:	11.6787 11.6787	36.8613 36.8613
CCP UTIL XFMR	In	BUS-0013 BUS-0014	D WG	12,000 240	2 104	43.3	Pos: Zero:	15.0693 15.0693	39.9792 39.9792
DCP PNL PL XFMR	In	BUS-0053 BUS-0054	D D	480 240	45 90	37.5	Pos: Zero:	36.5547 ,640.0000	103.0400 ,640.0000
DCP UTIL XFMR	In	BUS-0017 BUS-0041	D WG	12,000 480	4 90	75.0	Pos: Zero:	12.0813 12.0813	38.1320 38.1320
DP UTIL XFMR	In	BUS-0016 BUS-0021	D WG	12,000 208	2 120	43.3	Pos: Zero:	9.9146 9.9146	28.5820 28.5820
ECC PNL DPL1 XFMR	In	BUS-0092 BUS-0093	D WG	480 208	180 416	150.0	Pos: Zero:	7.8807 7.8807	28.2547 28.2547
ECC PNL DPL2 XFMR	In	BUS-0073 BUS-0074	D WG	480 208	271 625	225.0	Pos: Zero:	6.0560 6.0560	23.5907 23.5907
ECC UTIL XFMR	In	BUS-0018 BUS-0056	D WG	12,000 480	24 601	500.0	Pos: Zero:	1.6250 1.6250	7.6288 7.6288
ECP PNL A XFMR	In	BUS-0111 BUS-0112	D D	480 240	6 12	5.0	Pos: Zero:	217.5800 ,800.0000	467.8800 ,800.0000
ECP PNL DP XFMR	In	BUS-0122 BUS-0123	D WG	480 208	271 625	225.0	Pos: Zero:	6.1556 6.1556	23.9782 23.9782

Xformer Name	In/Out Service	Primary & Secondary				Nominal kVA	Z PU (100 MVA Base)		
		Bus	Conn.	Volts	FLA			R pu	jX pu
ECP UTIL XFMR	In	BUS-0019	D	12,000	48	1,000.0	Pos:	1.0003	5.7131
		BUS-0105	WG	480	1,203		Zero:	1.0003	5.7131
HHP PNL A XFMR	In	BUS-0171	D	480	120	100.0	Pos:	11.0210	62.9420
		BUS-0172	D	240	241		Zero:	,990.0000	,990.0000
HHP PNL BC XFMR	In	BUS-0180	D	480	120	100.0	Pos:	15.5680	51.7070
		BUS-0182	D	240	241		Zero:	,990.0000	,990.0000
HHP UTIL XFMR	In	BUS-0023	D	12,000	36	750.0	Pos:	1.4247	7.4653
		BUS-0155	WG	480	902		Zero:	1.4247	7.4653
HMP UTIL XFMR	In	BUS-0020	D	12,000	6	129.9	Pos:	4.3718	15.2440
		BUS-0147	WG	240	312		Zero:	4.3718	15.2440
IW #41 PNL A XFMR	In	BUS-0324	D	480	12	10.0	Pos:	94.2700	220.7100
		BUS-0325	D	240	24		Zero:	,900.0000	,900.0000
JHP UTIL XFMR	In	BUS-0024	D	12,000	24	500.0	Pos:	1.7084	8.0200
		BUS-0211	WG	480	601		Zero:	1.7084	8.0200
MFP UTIL XFMR	In	BUS-0342	D	12,000	7	150.0	Pos:	4.8360	17.3380
		BUS-0346	WG	480	180		Zero:	4.8360	17.3380
MVP UTIL XFMR	In	BUS-0026	D	12,000	4	86.6	Pos:	5.8291	18.8661
		BUS-0247	WG	240	208		Zero:	5.8291	18.8661
OP BLDG #1 PNL XFMR	In	BUS-0271	D	480	30	25.0	Pos:	71.6720	190.1400
		BUS-0272	D	240	60		Zero:	,960.0000	,960.0000
OP BLDG #2 PNL XFMR	In	BUS-0276	D	480	30	25.0	Pos:	71.6720	190.1400
		BUS-0273	D	240	60		Zero:	,960.0000	,960.0000
OP UTIL XFMR	In	BUS-0027	D	12,000	7	150.0	Pos:	5.3727	19.2647
		BUS-0267	WG	480	180		Zero:	5.3727	19.2647
PRP PNL LA XFMR	In	BUS-0316	D	480	6	5.0	Pos:	261.4400	562.1800
		BUS-0317	D	240	12		Zero:	,800.0000	,800.0000
PRP PNL LB XFMR	In	BUS-0327	D	480	30	25.0	Pos:	80.2800	212.9720
		BUS-0328	D	240	60		Zero:	,960.0000	,960.0000
PRP UTIL XFMR	In	BUS-0347	D	12,000	14	300.0	Pos:	2.1083	8.7497
		BUS-0348	WG	480	361		Zero:	2.1083	8.7497
RWP UTIL XFMR	In	BUS-0029	D	12,000	6	129.9	Pos:	4.3718	15.2440
		BUS-0332	WG	240	312		Zero:	4.3718	15.2440
SP UTIL XFMR	In	BUS-0030	D	12,000	6	129.9	Pos:	4.3718	15.2440
		BUS-0336	WG	240	312		Zero:	4.3718	15.2440

5. Summary of Calculated Fault Currents

The summary on the following pages indicates the calculated sustained fault currents at each bus of interest within the system. The three-phase fault currents shown were used to predict the incident energy exposure levels. The data will represent the "normal" operating mode values and will not indicate values when in any other modes.

The potential fault currents have been calculated by the PTW computer program using the method of symmetrical components, and the procedures of IEEE Standard 399-1986. The method of symmetrical components has been the accepted method for calculating unbalanced fault currents since the mid 1920's. Data required for the calculations is derived from the physical construction of the power system. Although it is not required to have exact numbers, it is wise to be within roughly 5%. The one exception is the electrical impedance associated with the grounding system since the ground paths are nearly impossible to ascertain. Ground path numbers are derived from historical test results, and normally applied through the judicious use of experience.

Jurupa Community Services Dist. - Parks

Unbalanced Fault Report

Comprehensive Short Circuit Study Settings

Three Phase Fault	Yes	**Faulted Bus**	All Buses
Single Line to Ground	Yes	**Bus Voltages**	First Bus From Fault
Line to Line Fault	No	**Branch Currents**	First Branch From Fault
Line to Line to Ground	No	**Phase or Sequence**	Report phase quantities
Motor Contribution	Yes	**Fault Current Calculation**	Asymmetrical RMS (with DC offset and Decay)
Transformer Tap	Yes	**Asym Fault Current at Time**	0.50 **Cycles**
Xformer Phase Shift	Yes		

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	5 Cycles	8 Cycles
7674 SOAR RWP PNL	240	7,964	3.31	1.77	6,201	0.86	1.41	8,187	7,964	7,964	7,964
AHP MSB	208	4,611	1.66	1.46	3,700	0.44	1.12	4,673	4,611	4,611	4,611
AHP PNL L2	208	4,267	1.54	1.31	3,316	0.40	0.99	4,302	4,267	4,267	4,267
AHP PRK LT LTG CP	208	3,992	1.44	1.06	2,979	0.36	0.78	4,002	3,992	3,992	3,992
AM PRKNG LOT LTG CP0	208	3,992	1.44	1.06	2,979	0.36	0.78	4,002	3,992	3,992	3,992
AM PRKNG LOT LTG CP1	208	3,992	1.44	1.06	2,979	0.36	0.78	4,002	3,992	3,992	3,992
AM PRKNG LOT LTG CP2	208	3,992	1.44	1.06	2,979	0.36	0.78	4,002	3,992	3,992	3,992
AM PRKNG LOT LTG CP3	208	3,992	1.44	1.06	2,979	0.36	0.78	4,002	3,992	3,992	3,992
AM PRKNG LOT LTG CP4	208	3,992	1.44	1.06	2,979	0.36	0.78	4,002	3,992	3,992	3,992
AM PRKNG LOT LTG CP5	208	3,992	1.44	1.06	2,979	0.36	0.78	4,002	3,992	3,992	3,992
AM PRKNG LOT LTG CP6	208	3,992	1.44	1.06	2,979	0.36	0.78	4,002	3,992	3,992	3,992

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps--------		
									3 Cycles	5 Cycles	8 Cycles
BUS-0001	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0002	208	7,177	2.59	3.16	7,177	0.86	3.16	8,098	7,177	7,177	7,177
BUS-0013	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0014	240	5,629	2.34	2.65	5,630	0.78	2.65	6,134	5,629	5,629	5,629
BUS-0015	240	4,195	1.74	1.40	3,530	0.49	1.08	4,242	4,195	4,195	4,195
BUS-0016	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0017	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0018	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0019	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0020	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0021	208	9,172	3.30	2.88	9,173	1.10	2.88	10,157	9,172	9,172	9,172
BUS-0022	208	5,760	2.08	1.23	4,520	0.54	0.92	5,794	5,760	5,760	5,760
BUS-0023	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0024	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0026	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0027	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0029	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0030	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0041	480	3,006	2.50	3.16	3,007	0.83	3.16	3,392	3,006	3,006	3,006
BUS-0053	480	2,191	1.82	1.45	1,817	0.50	1.08	2,219	2,191	2,191	2,191
BUS-0054	240	1,476	0.61	2.19	0	0.00	Infinite	1,557	1,476	1,476	1,476
BUS-0056	480	15,402	12.80	4.70	15,408	4.27	4.70	19,019	15,407	15,402	15,402
BUS-0073	480	6,422	5.34	1.87	4,792	1.33	1.49	6,643	6,422	6,422	6,422
BUS-0074	208	6,488	2.34	2.70	7,583	0.91	2.90	7,091	6,488	6,488	6,488
BUS-0092	480	14,230	11.83	3.39	13,612	3.77	2.83	16,304	14,230	14,230	14,230
BUS-0093	208	7,346	2.65	3.54	7,938	0.95	3.55	8,500	7,346	7,346	7,346
BUS-0105	480	20,704	17.21	5.71	20,715	5.74	5.71	26,723	20,732	20,704	20,704

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps--------		
									3 Cycles	5 Cycles	8 Cycles
BUS-0111	480	4,370	3.63	0.28	2,640	0.73	0.18	4,370	4,370	4,370	4,370
BUS-0112	240	450	0.19	1.95	0	0.00	Infinite	468	450	450	450
BUS-0122	480	3,839	3.19	1.55	2,606	0.72	1.28	3,906	3,839	3,839	3,839
BUS-0123	208	5,012	1.81	2.18	6,160	0.74	2.38	5,285	5,012	5,012	5,012
BUS-0124	208	3,964	1.43	1.33	3,929	0.47	1.00	4,000	3,964	3,964	3,964
BUS-0129	208	4,050	1.46	1.30	4,042	0.49	0.95	4,081	4,050	4,050	4,050
BUS-0133	208	2,772	1.00	0.78	2,177	0.26	0.51	2,773	2,772	2,772	2,772
BUS-0137	208	2,596	0.94	0.73	1,985	0.24	0.48	2,596	2,596	2,596	2,596
BUS-0147	240	15,160	6.30	3.49	15,163	2.10	3.49	17,485	15,160	15,160	15,160
BUS-0148	240	9,229	3.84	2.18	7,554	1.05	1.79	9,732	9,229	9,229	9,229
BUS-0155	480	15,806	13.14	5.24	15,813	4.38	5.24	20,014	15,818	15,806	15,806
BUS-0171	480	10,356	8.61	2.02	8,476	2.35	1.51	10,806	10,356	10,356	10,356
BUS-0172	240	3,203	1.33	4.53	0	0.00	Infinite	3,923	3,204	3,203	3,203
BUS-0180	480	5,512	4.58	1.57	3,948	1.09	1.24	5,612	5,512	5,512	5,512
BUS-0182	240	3,197	1.33	2.57	0	0.00	Infinite	3,464	3,197	3,197	3,197
BUS-0207	480	5,021	4.17	1.15	3,452	0.96	0.90	5,042	5,021	5,021	5,021
BUS-0208	480	5,021	4.17	1.15	3,452	0.96	0.90	5,042	5,021	5,021	5,021
BUS-0209	480	5,021	4.17	1.15	3,452	0.96	0.90	5,042	5,021	5,021	5,021
BUS-0211	480	14,651	12.18	4.70	14,657	4.06	4.70	18,092	14,656	14,651	14,651
BUS-0247	240	12,177	5.06	3.24	12,179	1.69	3.24	13,815	12,177	12,177	12,177
BUS-0248	240	7,254	3.02	1.20	5,571	0.77	0.89	7,293	7,254	7,254	7,254
BUS-0267	480	6,011	5.00	3.59	6,012	1.67	3.59	6,976	6,011	6,011	6,011
BUS-0271	480	4,562	3.79	1.73	3,890	1.08	1.31	4,682	4,562	4,562	4,562
BUS-0272	240	1,049	0.44	2.51	0	0.00	Infinite	1,132	1,049	1,049	1,049
BUS-0273	240	979	0.41	1.82	0	0.00	Infinite	1,010	979	979	979
BUS-0276	480	2,275	1.89	0.54	1,485	0.41	0.37	2,275	2,275	2,275	2,275
BUS-0316	480	8,724	7.25	1.20	6,625	1.84	0.85	8,770	8,724	8,724	8,724

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	 5 Cycles	 8 Cycles
BUS-0317	240	380	0.16	2.12	0	0.00	Infinite	399	380	380	380
BUS-0321	480	2,403	2.00	0.68	1,401	0.39	0.45	2,403	2,403	2,403	2,403
BUS-0323	480	2,189	1.82	0.74	1,261	0.35	0.47	2,190	2,189	2,189	2,189
BUS-0324	480	2,464	2.05	0.70	1,440	0.40	0.47	2,465	2,464	2,464	2,464
BUS-0325	240	851	0.35	1.85	0	0.00	Infinite	879	851	851	851
BUS-0327	480	9,965	8.29	1.78	8,222	2.28	1.32	10,252	9,965	9,965	9,965
BUS-0328	240	1,004	0.42	2.59	0	0.00	Infinite	1,090	1,004	1,004	1,004
BUS-0332	240	15,160	6.30	3.49	15,163	2.10	3.49	17,485	15,160	15,160	15,160
BUS-0333	240	9,229	3.84	2.18	7,554	1.05	1.79	9,732	9,229	9,229	9,229
BUS-0336	240	15,160	6.30	3.49	15,163	2.10	3.49	17,485	15,160	15,160	15,160
BUS-0337	240	9,229	3.84	2.18	7,554	1.05	1.79	9,732	9,229	9,229	9,229
BUS-0342	12,000	500,000	10,392.31	8.00	250,000	1,732.05	8.00	691,353	504,472	500,194	500,002
BUS-0346	480	6,679	5.55	3.59	6,680	1.85	3.59	7,751	6,679	6,679	6,679
BUS-0347	12,000	500,015	10,392.61	8.00	250,002	1,732.07	8.00	691,369	504,486	500,209	500,017
BUS-0348	480	13,736	11.42	4.14	13,610	3.77	4.14	16,472	13,738	13,736	13,736
CCP PNL	240	4,076	1.69	1.34	3,379	0.47	1.02	4,113	4,076	4,076	4,076
CCP PNL A	240	3,854	1.60	1.23	3,109	0.43	0.93	3,877	3,854	3,854	3,854
CCP PNL R	240	3,629	1.51	1.10	2,840	0.39	0.82	3,641	3,629	3,629	3,629
CCP WTR PLAY CP	240	3,038	1.26	0.83	2,206	0.31	0.60	3,040	3,038	3,038	3,038
DCP MSB	480	2,299	1.91	1.56	1,956	0.54	1.18	2,340	2,299	2,299	2,299
DCP MUSCO LTG CP	480	2,094	1.74	1.26	1,684	0.47	0.92	2,109	2,094	2,094	2,094
DCP MUSCO LTG CP0	480	2,094	1.74	1.26	1,684	0.47	0.92	2,109	2,094	2,094	2,094
DCP MUSCO LTG CP1	480	2,094	1.74	1.26	1,684	0.47	0.92	2,109	2,094	2,094	2,094
DCP MUSCO LTG CP2	480	2,094	1.74	1.26	1,684	0.47	0.92	2,109	2,094	2,094	2,094
DCP MUSCO LTG CP3	480	2,094	1.74	1.26	1,684	0.47	0.92	2,109	2,094	2,094	2,094
DCP MUSCO LTG CP4	480	2,094	1.74	1.26	1,684	0.47	0.92	2,109	2,094	2,094	2,094
DCP MUSCO LTG CP5	480	2,094	1.74	1.26	1,684	0.47	0.92	2,109	2,094	2,094	2,094

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	 5 Cycles	 8 Cycles
DCP MUSCO LTG CP6	480	2,094	1.74	1.26	1,684	0.47	0.92	2,109	2,094	2,094	2,094
DCP PNL PH	480	2,278	1.89	1.55	1,930	0.53	1.17	2,317	2,278	2,278	2,278
DCP PNL PL	240	1,470	0.61	2.17	0	0.00	Infinite	1,549	1,470	1,470	1,470
DP LTG CNTCTR CP	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP0	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP1	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP10	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP2	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP3	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP4	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP5	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP6	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP7	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP8	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP LTG CNTCTR CP9	208	4,480	1.61	0.82	3,180	0.38	0.60	4,482	4,480	4,480	4,480
DP MN DSC	208	5,705	2.06	1.22	4,461	0.54	0.91	5,738	5,705	5,705	5,705
DP PNL A	208	4,971	1.79	1.06	3,707	0.45	0.79	4,984	4,971	4,971	4,971
DP PNL P	208	5,565	2.00	1.20	4,318	0.52	0.90	5,594	5,565	5,565	5,565
DP PNL P Ext	208	5,565	2.00	1.20	4,318	0.52	0.90	5,594	5,565	5,565	5,565
DP WTR D PMP PIT CP	208	889	0.32	0.25	531	0.06	0.19	889	889	889	889
DUAL INSTA HOT CP	240	1,835	0.76	0.45	1,120	0.16	0.36	1,835	1,835	1,835	1,835
ECC AC-1 DSC	480	6,096	5.07	0.60	3,994	1.11	0.41	6,097	6,096	6,096	6,096
ECC AC-10 CP	480	6,106	5.08	0.93	4,202	1.16	0.69	6,114	6,106	6,106	6,106
ECC AC-11 CP	480	5,580	4.64	0.83	3,753	1.04	0.61	5,583	5,580	5,580	5,580
ECC AC-12 CP	480	6,106	5.08	0.93	4,202	1.16	0.69	6,114	6,106	6,106	6,106
ECC AC-13 CP	480	6,454	5.37	1.17	4,592	1.27	0.88	6,484	6,454	6,454	6,454
ECC AC-2 CP	480	7,200	5.99	0.71	4,883	1.35	0.48	7,201	7,200	7,200	7,200

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	 5 Cycles	 8 Cycles
ECC AC-3 CP	480	11,153	9.27	1.77	9,280	2.57	1.29	11,468	11,153	11,153	11,153
ECC AC-4 CP	480	5,877	4.89	1.17	4,134	1.15	0.89	5,904	5,877	5,877	5,877
ECC AC-5 CP	480	2,925	2.43	0.44	1,800	0.50	0.33	2,925	2,925	2,925	2,925
ECC AC-6 CP	480	3,264	2.71	0.48	2,027	0.56	0.36	3,264	3,264	3,264	3,264
ECC AC-7 CP	480	3,361	2.79	0.49	2,093	0.58	0.37	3,361	3,361	3,361	3,361
ECC AC-8 CP	480	5,138	4.27	0.90	3,463	0.96	0.68	5,143	5,138	5,138	5,138
ECC AC-9 CP	480	4,546	3.78	0.65	2,939	0.81	0.48	4,546	4,546	4,546	4,546
ECC CU-1 DSC (DPL2)	208	1,171	0.42	0.22	717	0.09	0.13	1,171	1,171	1,171	1,171
ECC CU-1 DSC (L3)	208	1,771	0.64	0.32	1,096	0.13	0.21	1,771	1,771	1,771	1,771
ECC CU-2 DSC	208	1,404	0.51	0.26	871	0.10	0.16	1,404	1,404	1,404	1,404
ECC CU-3 DSC	208	1,163	0.42	0.22	712	0.09	0.14	1,163	1,163	1,163	1,163
ECC KEF-1 CP	208	1,156	0.42	0.22	707	0.08	0.14	1,156	1,156	1,156	1,156
ECC KEF-1 DSC	208	610	0.22	0.14	364	0.04	Infinite	610	610	610	610
ECC LCPB CP1 208V	208	3,670	1.32	0.72	2,762	0.33	0.44	3,671	3,670	3,670	3,670
ECC LCPB CP1 480V	480	4,388	3.65	0.79	2,882	0.80	0.60	4,390	4,388	4,388	4,388
ECC MSB	480	14,473	12.03	3.55	13,974	3.87	3.02	16,755	14,474	14,473	14,473
ECC PNL DPL1	208	7,116	2.56	3.42	7,536	0.91	3.31	8,170	7,116	7,116	7,116
ECC PNL DPL2	208	6,386	2.30	2.66	7,372	0.89	2.79	6,960	6,386	6,386	6,386
ECC PNL HL1	480	13,761	11.44	3.11	12,927	3.58	2.53	15,484	13,761	13,761	13,761
ECC PNL HL2	480	5,638	4.69	1.24	3,974	1.10	0.96	5,674	5,638	5,638	5,638
ECC PNL HM1	480	13,993	11.63	3.24	13,263	3.68	2.67	15,881	13,993	13,993	13,993
ECC PNL HM2	480	8,941	7.43	2.21	7,187	1.99	1.74	9,450	8,941	8,941	8,941
ECC PNL HM2 Ext	480	8,941	7.43	2.21	7,187	1.99	1.74	9,450	8,941	8,941	8,941
ECC PNL K1	208	6,158	2.22	2.49	6,912	0.83	2.44	6,634	6,158	6,158	6,158
ECC PNL L2	208	6,699	2.41	2.65	6,784	0.81	2.19	7,296	6,699	6,699	6,699
ECC PNL L3	208	6,906	2.49	2.98	7,157	0.86	2.62	7,697	6,906	6,906	6,906
ECC PNL L5	208	6,069	2.19	2.30	6,718	0.81	2.10	6,450	6,069	6,069	6,069

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	 5 Cycles	 8 Cycles
ECC PNL L6	208	6,069	2.19	2.30	6,718	0.81	2.10	6,450	6,069	6,069	6,069
ECC PNL L7	208	3,756	1.35	1.12	3,050	0.37	0.80	3,769	3,756	3,756	3,756
ECC PRK LT LTG CP	480	8,819	7.33	0.86	6,288	1.74	0.57	8,825	8,819	8,819	8,819
ECC PRK LT LTG CP0	480	8,819	7.33	0.86	6,288	1.74	0.57	8,825	8,819	8,819	8,819
ECC PRK LT LTG CP1	480	6,946	5.77	0.60	4,603	1.28	0.39	6,946	6,946	6,946	6,946
ECC PRK LT LTG CP2	480	6,946	5.77	0.60	4,603	1.28	0.39	6,946	6,946	6,946	6,946
ECC PRK LT LTG CP3	480	6,946	5.77	0.60	4,603	1.28	0.39	6,946	6,946	6,946	6,946
ECC WH-3 DSC	208	1,633	0.59	0.30	1,004	0.12	0.19	1,633	1,633	1,633	1,633
ECP CNCSSN AC CP	208	3,148	1.13	0.90	2,634	0.32	0.61	3,151	3,148	3,148	3,148
ECP CNCSSN MN DSC	208	3,857	1.39	1.28	3,740	0.45	0.95	3,885	3,857	3,857	3,857
ECP CONCESSION PNL	208	3,753	1.35	1.23	3,565	0.43	0.90	3,776	3,753	3,753	3,753
ECP EXT LTG CP	480	4,050	3.37	1.67	2,774	0.77	1.38	4,144	4,050	4,050	4,050
ECP EXT LTG CP0	480	3,992	3.32	1.59	2,721	0.75	1.31	4,067	3,992	3,992	3,992
ECP MSB	480	19,233	15.99	4.46	18,526	5.13	3.85	23,468	19,237	19,233	19,233
ECP MUSCO CP	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP MUSCO CP0	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP MUSCO CP1	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP MUSCO CP2	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP MUSCO CP3	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP MUSCO CP4	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP MUSCO CP5	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP MUSCO CP6	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP MUSCO CP7	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP MUSCO CP8	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP MUSCO CP9	480	4,098	3.41	1.74	2,817	0.78	1.44	4,208	4,098	4,098	4,098
ECP PNL A 240V	240	446	0.19	1.87	0	0.00	Infinite	461	446	446	446
ECP PNL A 480V	480	4,500	3.74	0.28	2,722	0.75	0.19	4,500	4,500	4,500	4,500

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	 5 Cycles	 8 Cycles
ECP PNL DP	208	4,981	1.79	2.17	6,087	0.73	2.35	5,249	4,981	4,981	4,981
ECP PNL HA	480	4,193	3.49	1.88	2,901	0.80	1.55	4,338	4,193	4,193	4,193
ECP PNL HB	480	4,193	3.49	1.88	2,901	0.80	1.55	4,338	4,193	4,193	4,193
ECP RR B #1 AC CP	208	2,248	0.81	0.62	1,629	0.20	0.40	2,248	2,248	2,248	2,248
ECP RR B #1 MN DSC	208	2,681	0.97	0.75	2,077	0.25	0.50	2,682	2,681	2,681	2,681
ECP RR B #2 AC CP	208	2,069	0.75	0.58	1,466	0.18	0.37	2,069	2,069	2,069	2,069
ECP RR B #2 MN DSC	208	2,515	0.91	0.71	1,900	0.23	0.46	2,515	2,515	2,515	2,515
ECP RSTRM B #1 PNL	208	2,596	0.94	0.73	1,985	0.24	0.48	2,596	2,596	2,596	2,596
ECP RSTRM B #2 PNL	208	2,366	0.85	0.67	1,750	0.21	0.44	2,366	2,366	2,366	2,366
ECP STRG BLDG AC CP	208	3,005	1.08	0.81	2,431	0.29	0.53	3,006	3,005	3,005	3,005
ECP STRG BLDG MN DSC	208	3,886	1.40	1.21	3,745	0.45	0.86	3,907	3,886	3,886	3,886
ECP STRG BLDG PNL	208	3,584	1.29	1.07	3,249	0.39	0.74	3,594	3,584	3,584	3,584
HARR/CHAN RVRWLK PNL	240	4,241	1.76	0.74	2,782	0.39	0.57	4,242	4,241	4,241	4,241
HHP 2 TON A/C DSC	240	1,012	0.42	0.40	0	0.00	Infinite	1,012	1,012	1,012	1,012
HHP 3 TON A/C DSC 1	240	1,339	0.56	0.56	0	0.00	Infinite	1,339	1,339	1,339	1,339
HHP 3 TON A/C DSC 2	240	1,339	0.56	0.56	0	0.00	Infinite	1,339	1,339	1,339	1,339
HHP 4 TON A/C DSC 1	240	1,769	0.74	0.82	0	0.00	Infinite	1,769	1,769	1,769	1,769
HHP 4 TON A/C DSC 2	240	1,769	0.74	0.82	0	0.00	Infinite	1,769	1,769	1,769	1,769
HHP BATTING CAGE DSC	480	5,549	4.61	1.58	3,979	1.10	1.25	5,651	5,549	5,549	5,549
HHP BFA LTG CONT CP	480	5,760	4.79	1.62	4,158	1.15	1.28	5,876	5,760	5,760	5,760
HHP BFA LTG CONT CP0	480	5,106	4.24	1.16	3,520	0.98	0.90	5,129	5,106	5,106	5,106
HHP BFA LTG CONT CP1	480	5,106	4.24	1.16	3,520	0.98	0.90	5,129	5,106	5,106	5,106
HHP BFA LTG CONT CP2	480	5,760	4.79	1.62	4,158	1.15	1.28	5,876	5,760	5,760	5,760
HHP BFA LTG CONT CP3	480	5,760	4.79	1.62	4,158	1.15	1.28	5,876	5,760	5,760	5,760

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	 5 Cycles	 8 Cycles
HHP BFA LTG CONT CP4	480	5,106	4.24	1.16	3,520	0.98	0.90	5,129	5,106	5,106	5,106
HHP BFA LTG CONT CP5	480	5,760	4.79	1.62	4,158	1.15	1.28	5,876	5,760	5,760	5,760
HHP BFA LTG CONT CP6	480	5,760	4.79	1.62	4,158	1.15	1.28	5,876	5,760	5,760	5,760
HHP BFE LTG CONT CP	480	6,155	5.12	1.99	4,561	1.26	1.59	6,411	6,155	6,155	6,155
HHP BFE LTG CONT CP0	480	5,934	4.93	1.71	4,322	1.20	1.35	6,083	5,934	5,934	5,934
HHP BFE LTG CONT CP1	480	5,934	4.93	1.71	4,322	1.20	1.35	6,083	5,934	5,934	5,934
HHP BFE LTG CONT CP2	480	6,155	5.12	1.99	4,561	1.26	1.59	6,411	6,155	6,155	6,155
HHP BFE LTG CONT CP3	480	6,155	5.12	1.99	4,561	1.26	1.59	6,411	6,155	6,155	6,155
HHP BFE LTG CONT CP4	480	5,934	4.93	1.71	4,322	1.20	1.35	6,083	5,934	5,934	5,934
HHP BFE LTG CONT CP5	480	6,155	5.12	1.99	4,561	1.26	1.59	6,411	6,155	6,155	6,155
HHP BFE LTG CONT CP6	480	5,934	4.93	1.71	4,322	1.20	1.35	6,083	5,934	5,934	5,934
HHP BFE LTG CONT CP7	480	6,155	5.12	1.99	4,561	1.26	1.59	6,411	6,155	6,155	6,155
HHP LTG CONT CP	480	12,370	10.28	1.68	10,402	2.88	1.16	12,658	12,370	12,370	12,370
HHP LTG CONT CP0	480	12,370	10.28	1.68	10,402	2.88	1.16	12,658	12,370	12,370	12,370
HHP LTG CONT CP1	480	12,370	10.28	1.68	10,402	2.88	1.16	12,658	12,370	12,370	12,370
HHP LTG CONT CP2	480	12,370	10.28	1.68	10,402	2.88	1.16	12,658	12,370	12,370	12,370
HHP LTG CONT CP3	480	12,370	10.28	1.68	10,402	2.88	1.16	12,658	12,370	12,370	12,370
HHP LTG CONT CP4	480	12,370	10.28	1.68	10,402	2.88	1.16	12,658	12,370	12,370	12,370
HHP LTG CONT CP5	480	12,370	10.28	1.68	10,402	2.88	1.16	12,658	12,370	12,370	12,370
HHP LTG CONT CP6	480	12,370	10.28	1.68	10,402	2.88	1.16	12,658	12,370	12,370	12,370
HHP MSA	480	15,505	12.89	4.91	15,356	4.26	4.68	19,343	15,512	15,505	15,505
HHP MSB	480	14,659	12.19	3.83	14,072	3.90	3.22	17,270	14,660	14,659	14,659
HHP NGHBRHD CTR DSC	480	10,499	8.73	2.05	8,637	2.39	1.54	10,979	10,499	10,499	10,499
HHP PNL A	240	3,146	1.31	4.24	0	0.00	Infinite	3,793	3,146	3,146	3,146

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	 5 Cycles	 8 Cycles
HHP PNL BC	240	3,173	1.32	2.54	0	0.00	Infinite	3,430	3,173	3,173	3,173
HHP PNL BCA	240	2,643	1.10	1.78	0	0.00	Infinite	2,720	2,643	2,643	2,643
HHP PNL BCB	240	2,643	1.10	1.78	0	0.00	Infinite	2,720	2,643	2,643	2,643
HHP PNL BCC	240	3,127	1.30	2.41	0	0.00	Infinite	3,349	3,127	3,127	3,127
HHP PNL BFA	480	6,353	5.28	2.26	4,770	1.32	1.82	6,733	6,353	6,353	6,353
HHP PNL BFE	480	6,353	5.28	2.26	4,770	1.32	1.82	6,733	6,353	6,353	6,353
HHP PNL DPBF	480	6,393	5.31	2.26	4,805	1.33	1.82	6,778	6,393	6,393	6,393
HHP PNL HA	480	14,124	11.74	3.37	13,280	3.68	2.71	16,167	14,124	14,124	14,124
HHP PNL HB	480	6,238	5.19	2.18	4,662	1.29	1.76	6,580	6,238	6,238	6,238
HHP SUMP PMP CP	240	2,931	1.22	1.81	0	0.00	Infinite	3,020	2,931	2,931	2,931
HMP LTG CNTCTR CP	240	5,158	2.14	0.73	3,433	0.48	0.54	5,159	5,158	5,158	5,158
HMP LTG CNTCTR CP0	240	5,158	2.14	0.73	3,433	0.48	0.54	5,159	5,158	5,158	5,158
HMP LTG CNTCTR CP1	240	5,158	2.14	0.73	3,433	0.48	0.54	5,159	5,158	5,158	5,158
HMP LTG CNTCTR CP2	240	5,158	2.14	0.73	3,433	0.48	0.54	5,159	5,158	5,158	5,158
HMP PNL	240	7,387	3.07	1.41	5,544	0.77	1.09	7,471	7,387	7,387	7,387
HVAC CP	240	2,202	0.92	0.54	1,365	0.19	0.43	2,202	2,202	2,202	2,202
IW #41 EMON CP	480	2,246	1.87	0.62	1,302	0.36	0.42	2,246	2,246	2,246	2,246
IW #41 MSB	480	2,580	2.14	0.74	1,514	0.42	0.49	2,580	2,580	2,580	2,580
IW #41 PNL A	240	843	0.35	1.80	0	0.00	Infinite	868	843	843	843
IW #41 SFT STRT	480	2,520	2.10	0.74	1,475	0.41	0.49	2,521	2,520	2,520	2,520
JHP LTG CNTCTR CP	480	9,210	7.66	1.30	7,102	1.97	0.92	9,283	9,210	9,210	9,210
JHP LTG CNTCTR CP1	480	8,841	7.35	1.18	6,668	1.85	0.83	8,884	8,841	8,841	8,841
JHP LTG CNTCTR CP2	480	8,841	7.35	1.18	6,668	1.85	0.83	8,884	8,841	8,841	8,841
JHP LTG CNTCTR CP3	480	8,011	6.66	0.99	5,788	1.60	0.69	8,025	8,011	8,011	8,011
JHP LTG CNTCTR CP4	480	8,011	6.66	0.99	5,788	1.60	0.69	8,025	8,011	8,011	8,011
JHP LTG CNTCTR CP5	480	8,011	6.66	0.99	5,788	1.60	0.69	8,025	8,011	8,011	8,011
JHP LTG CNTCTR CP6	480	8,011	6.66	0.99	5,788	1.60	0.69	8,025	8,011	8,011	8,011

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	 5 Cycles	 8 Cycles
JHP LTG CNTCTR CP7	480	8,011	6.66	0.99	5,788	1.60	0.69	8,025	8,011	8,011	8,011
JHP LTG CNTCTR CP8	480	8,011	6.66	0.99	5,788	1.60	0.69	8,025	8,011	8,011	8,011
JHP LTG CNTCTR CP9	480	8,011	6.66	0.99	5,788	1.60	0.69	8,025	8,011	8,011	8,011
JHP MSB	480	9,398	7.81	1.33	7,304	2.02	0.94	9,481	9,398	9,398	9,398
JHP PNL 1BB	480	9,028	7.51	1.27	6,910	1.92	0.90	9,092	9,028	9,028	9,028
JHP PNL HP	480	9,136	7.60	1.27	7,014	1.94	0.90	9,201	9,136	9,136	9,136
JHP PNL SF	480	8,322	6.92	1.06	6,115	1.69	0.74	8,344	8,322	8,322	8,322
JHP PNL SK	480	7,843	6.52	0.97	5,634	1.56	0.68	7,855	7,843	7,843	7,843
MFP LTG CNTCTR CP	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP Ext	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP0	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP1	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP2	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP3	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP4	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP5	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP6	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP7	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP8	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP LTG CNTCTR CP9	480	5,136	4.27	1.72	4,394	1.22	1.29	5,267	5,136	5,136	5,136
MFP MSB	480	5,539	4.60	2.19	4,984	1.38	1.74	5,844	5,539	5,539	5,539
MFP PNL HA	480	5,450	4.53	2.17	4,872	1.35	1.73	5,745	5,450	5,450	5,450
MFP PNL HA Ext	480	5,450	4.53	2.17	4,872	1.35	1.73	5,745	5,450	5,450	5,450
MFP PNL HB	480	5,409	4.50	2.06	4,799	1.33	1.61	5,658	5,409	5,409	5,409
MVP HVAC DSC	240	2,661	1.11	0.49	1,669	0.23	0.37	2,661	2,661	2,661	2,661
MVP LTG CNTCTR CP	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	 5 Cycles	 8 Cycles
MVP LTG CNTCTR CP Ext	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512
MVP LTG CNTCTR CP0	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512
MVP LTG CNTCTR CP1	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512
MVP LTG CNTCTR CP2	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512
MVP LTG CNTCTR CP3	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512
MVP LTG CNTCTR CP4	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512
MVP LTG CNTCTR CP5	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512
MVP LTG CNTCTR CP6	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512
MVP LTG CNTCTR CP7	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512
MVP LTG CNTCTR CP8	240	5,512	2.29	0.79	3,828	0.53	0.57	5,514	5,512	5,512	5,512
MVP MN DSC	240	7,179	2.98	1.19	5,493	0.76	0.88	7,215	7,179	7,179	7,179
MVP PNL A	240	5,288	2.20	0.86	3,690	0.51	0.63	5,292	5,288	5,288	5,288
MVP PNL B	240	3,377	1.40	0.61	2,182	0.30	0.46	3,377	3,377	3,377	3,377
MVP PNL P	240	6,986	2.90	1.17	5,304	0.73	0.87	7,019	6,986	6,986	6,986
MVP PNL P Ext	240	6,986	2.90	1.17	5,304	0.73	0.87	7,019	6,986	6,986	6,986
OP BLDG #1 PNL	240	1,034	0.43	2.38	0	0.00	Infinite	1,105	1,034	1,034	1,034
OP BLDG #2 PNL	240	974	0.40	1.80	0	0.00	Infinite	1,003	974	974	974
OP LTG CONT CP	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP Ext1	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP Ext2	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP Ext3	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP0	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP1	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP11	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP12	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP13	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP14	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps--------		
									3 Cycles	5 Cycles	8 Cycles
OP LTG CONT CP15	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP17	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP18	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP19	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP2	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP20	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP21	480	4,395	3.65	1.60	3,670	1.02	1.20	4,481	4,395	4,395	4,395
OP LTG CONT CP3	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP4	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP5	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP6	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP7	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP8	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP LTG CONT CP9	480	4,468	3.71	1.69	3,774	1.05	1.27	4,575	4,468	4,468	4,468
OP MSB	480	4,808	4.00	2.13	4,261	1.18	1.69	5,055	4,808	4,808	4,808
OP PNL BBL	480	4,708	3.91	2.06	4,130	1.14	1.62	4,927	4,708	4,708	4,708
OP PNL BBL Ext	480	4,708	3.91	2.06	4,130	1.14	1.62	4,927	4,708	4,708	4,708
OP PNL SL	480	4,637	3.86	1.93	4,021	1.11	1.49	4,813	4,637	4,637	4,637
OP PNL SL Ext	480	4,637	3.86	1.93	4,021	1.11	1.49	4,813	4,637	4,637	4,637
PRP LTG CNTCTR CP	480	10,873	9.04	2.57	9,516	2.64	2.05	11,779	10,873	10,873	10,873
PRP LTG CNTCTR CP0	480	10,823	9.00	2.49	9,438	2.62	1.97	11,659	10,823	10,823	10,823
PRP LTG CNTCTR CP1	480	10,823	9.00	2.49	9,438	2.62	1.97	11,659	10,823	10,823	10,823
PRP LTG CNTCTR CP2	480	10,823	9.00	2.49	9,438	2.62	1.97	11,659	10,823	10,823	10,823
PRP LTG CNTCTR CP3	480	10,823	9.00	2.49	9,438	2.62	1.97	11,659	10,823	10,823	10,823
PRP LTG CNTCTR CP4	480	10,823	9.00	2.49	9,438	2.62	1.97	11,659	10,823	10,823	10,823
PRP LTG CNTCTR CP5	480	10,873	9.04	2.57	9,516	2.64	2.05	11,779	10,873	10,873	10,873
PRP LTG CNTCTR CP6	480	10,823	9.00	2.49	9,438	2.62	1.97	11,659	10,823	10,823	10,823

Fault Location Bus Name	Bus Voltage	3-Phase Amps	3-Phase MVA	3P X/R	SLG Amps	SLG MVA	SLG X/R	Mom Amps	---------3P Asym Amps-------- 3 Cycles	 5 Cycles	 8 Cycles
PRP MSB	480	11,062	9.20	2.76	9,779	2.71	2.24	12,146	11,062	11,062	11,062
PRP PNL HA	480	10,979	9.13	2.71	9,671	2.68	2.19	12,013	10,979	10,979	10,979
PRP PNL LA	240	378	0.16	2.07	0	0.00	Infinite	395	378	378	378
PRP PNL LB	240	1,000	0.42	2.55	0	0.00	Infinite	1,081	1,000	1,000	1,000
PRP SECURITY LTG CP	240	971	0.40	2.16	0	0.00	Infinite	1,022	971	971	971
RVR WLK RESTRM PNL	240	2,725	1.13	0.70	1,733	0.24	0.56	2,726	2,725	2,725	2,725
RWP PNL	240	8,749	3.64	1.88	6,990	0.97	1.51	9,054	8,749	8,749	8,749
SP MDP	240	8,749	3.64	1.88	6,990	0.97	1.51	9,054	8,749	8,749	8,749
SP PNL A	240	6,752	2.81	1.18	4,897	0.68	0.91	6,785	6,752	6,752	6,752
SUMP PUMP CP	240	2,002	0.83	0.49	1,230	0.17	0.39	2,002	2,002	2,002	2,002

6. Coordination Curves and Device Listings

An ideally coordinated system would have the overcurrent protective device closest to a short circuit, or fault, condition detect the fault and open the circuit. In the event the closest device fails to operate, the next device between the fault and the power source would detect the fault and open the circuit. Realistically, complete coordination is often not achievable, but an attempt is made to come as close as practical.

There are two main types of circuit breakers used within an electrical distribution system thermal magnetic and solid state with electronic tripping units. The solid-state breakers have electronic tripping units that allow for up to 5 points of adjustability along the curve. This can be seen in Figure 1 in the following pages. This figure outlines the name of each curve section that is referred to in the recommendations for both the arc flash and TCC sections. The solid-state breakers are often fully adjustable across the range making them very flexible for attaining coordination as well as reducing the incident energy exposure.

Figure 2 illustrates a thermal magnetic circuit breaker. The overload (Long-Time) characteristic of thermal-magnetic circuit breakers is not adjustable and has a wide tolerance compared to electronic trip units. This results in overlapping curves in the long-time region, and miscoordination for overload conditions; this is a typical scenario when trying to coordinate these types of breakers. The only region that has an option for adjustability is the instantaneous region. Small frame Circuit Breakers (less than ~100A) will often have fixed (non-adjustable) Instantaneous trip as well as fixed Long-Time trip. Because of the lack of adjustment on many thermal-magnetic Circuit Breakers SEAM Group may recommend acceptance of less than ideal coordination, unless replacement with an electronic Circuit Breaker allows a significant reduction in Arc Flash incident energy.

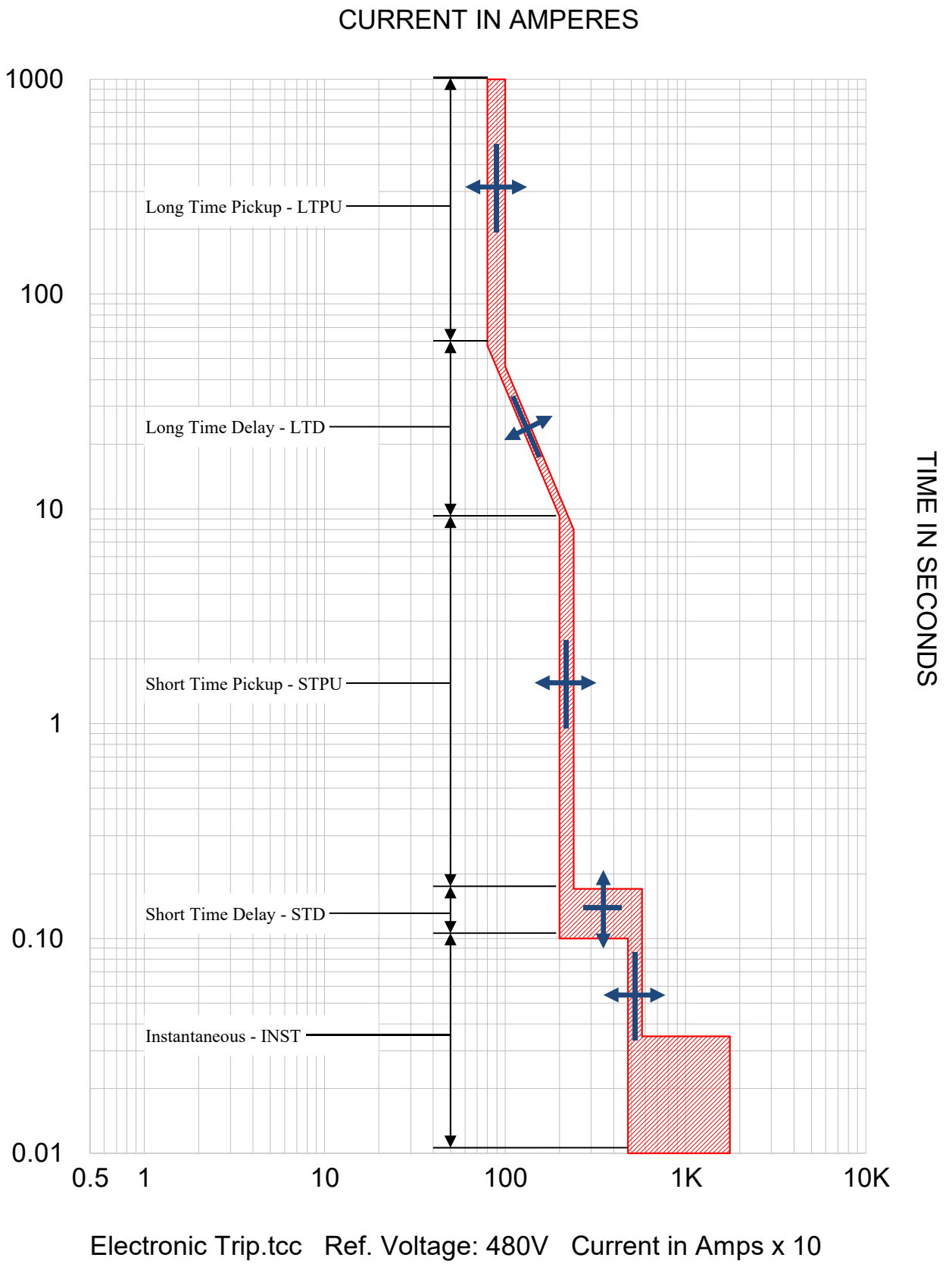


Figure 1: Typical circuit breaker with configurable setting electronic trip

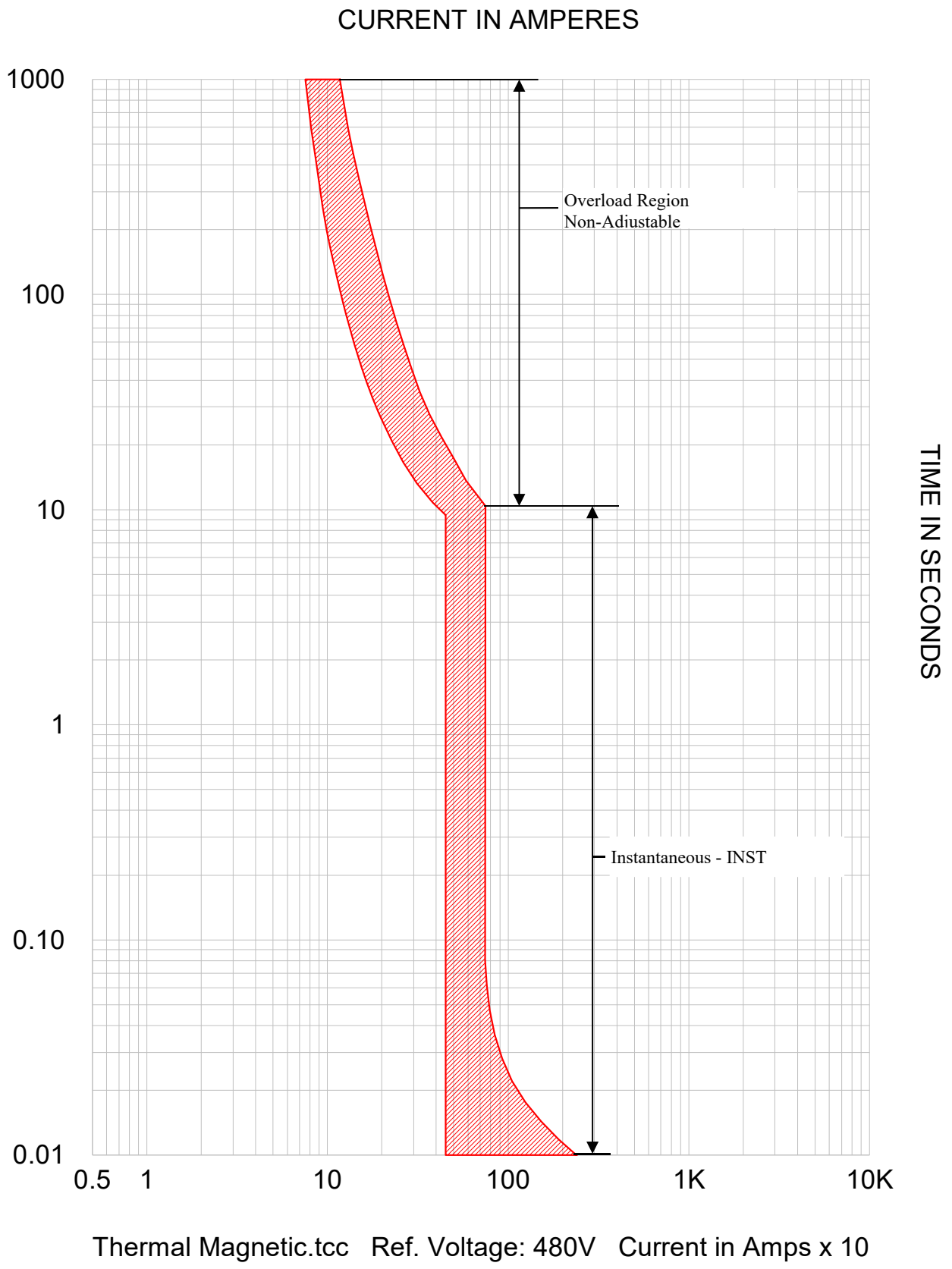


Figure 2: Typical thermal magnetic circuit breaker

Figure 3 below illustrates a typical situation where there are devices that do not properly coordinate. The red ovals called out as #1 and #2 illustrate areas where circuit breakers SWGR 1 CB and SWGR 2 CB do not coordinate. The area in #1 calls out where SWGR 2 CB overlaps and is set higher (to the right) of SWGR 1 CB in the long-time pickup and long-time delay regions. Since SWGR 2 CB is downstream from SWGR 1 CB the curve for SWGR 2 CB should be to the left of circuit breaker SWGR 1 CB. The area in #2 also illustrates where the instantaneous settings of SWGR 2 CB are set higher than SWGR 1 CB. Areas #1 and #2 illustrate how there can be coordination problems even between breakers that have solid state electronic tripping units that have multiple zones of adjustment. The red ovals called out as #3 and #4 illustrate areas where circuit breakers PNL 1 MAIN and PNL 1 CB do not coordinate. The area in #3 illustrates where there is some overlap in the instantaneous region between the two devices. PNL 1 CB overlaps and in some areas, is set higher than the upstream main circuit breaker PNL 1 MAIN. Area #4 illustrates the overlap that is typical in the overload region for thermal magnetic breakers, this region is not adjustable and overlap between similarly sized circuit breakers is typical.

Figure 4 below illustrates a corrected version of the breaker settings that would improve coordination between the devices. The coordination between circuit breakers SWGR 1 CB and SWGR 2 CB in areas #1 and #2 have been corrected. There is no overlap in these regions and SWGR 2 CB curve now sits to the left of SWGR 1 CB. There will remain some overlap in the instantaneous region as is shown by area #3, the only way to achieve full coordination in this region would be to have a system impedance that would limit the fault current at SWGR 2 CB below the instantaneous setting of SWGR 1 CB (i.e. <14,400A). The coordination between PNL 1 MAIN and PNL 1 CB has been improved; the instantaneous of circuit breaker PNL 1 MAIN has been increased to reduce the amount of overlap in this region. Although it does not fully coordinate it does represent an increase in selectivity and is a typical situation. Area #4 again illustrates the overlap in the overload region of the circuit breakers that is typical for similarly sized thermal magnetic circuit breakers.

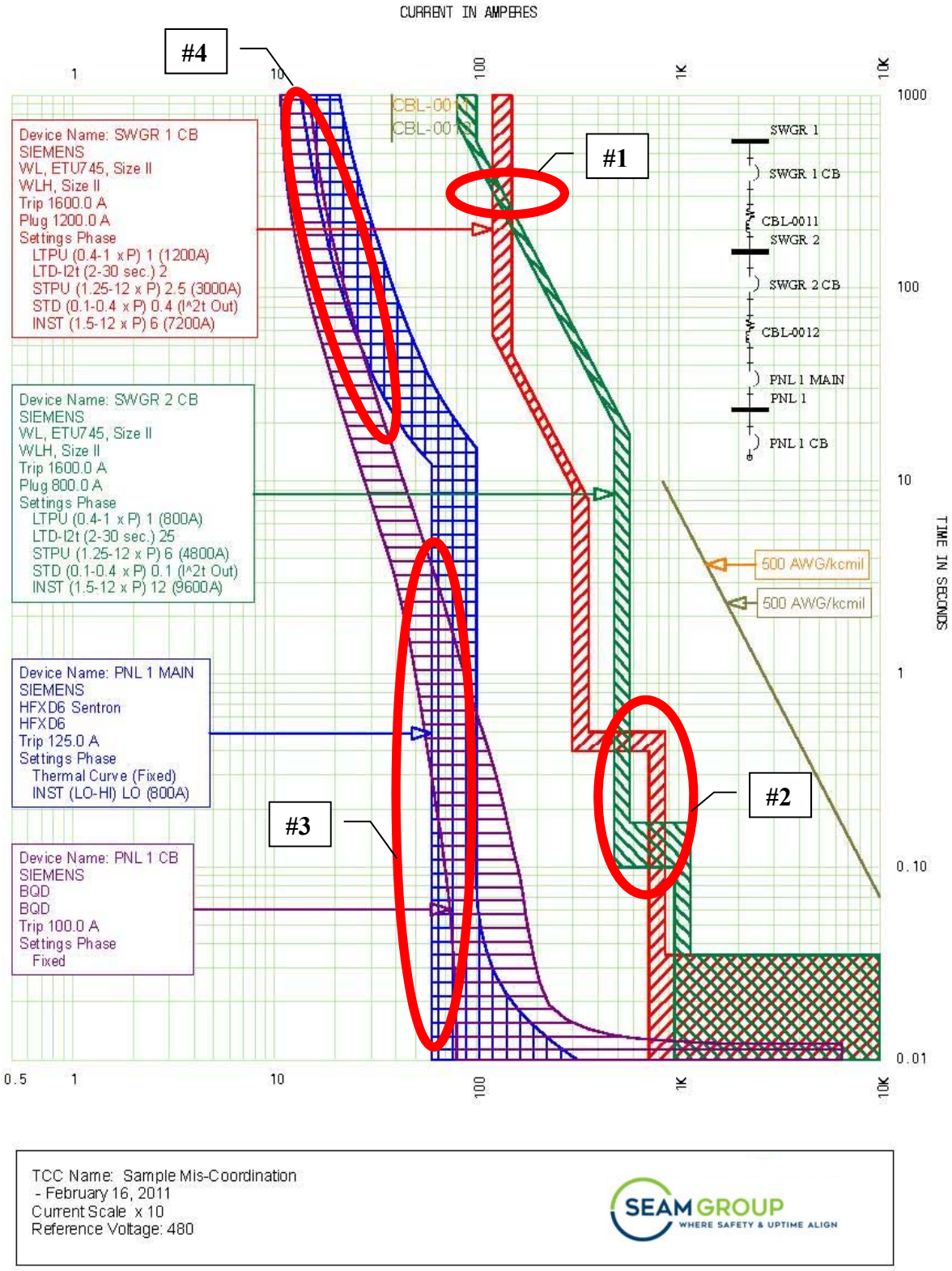


Figure 3: Sample TCC illustrating undesirable coordination

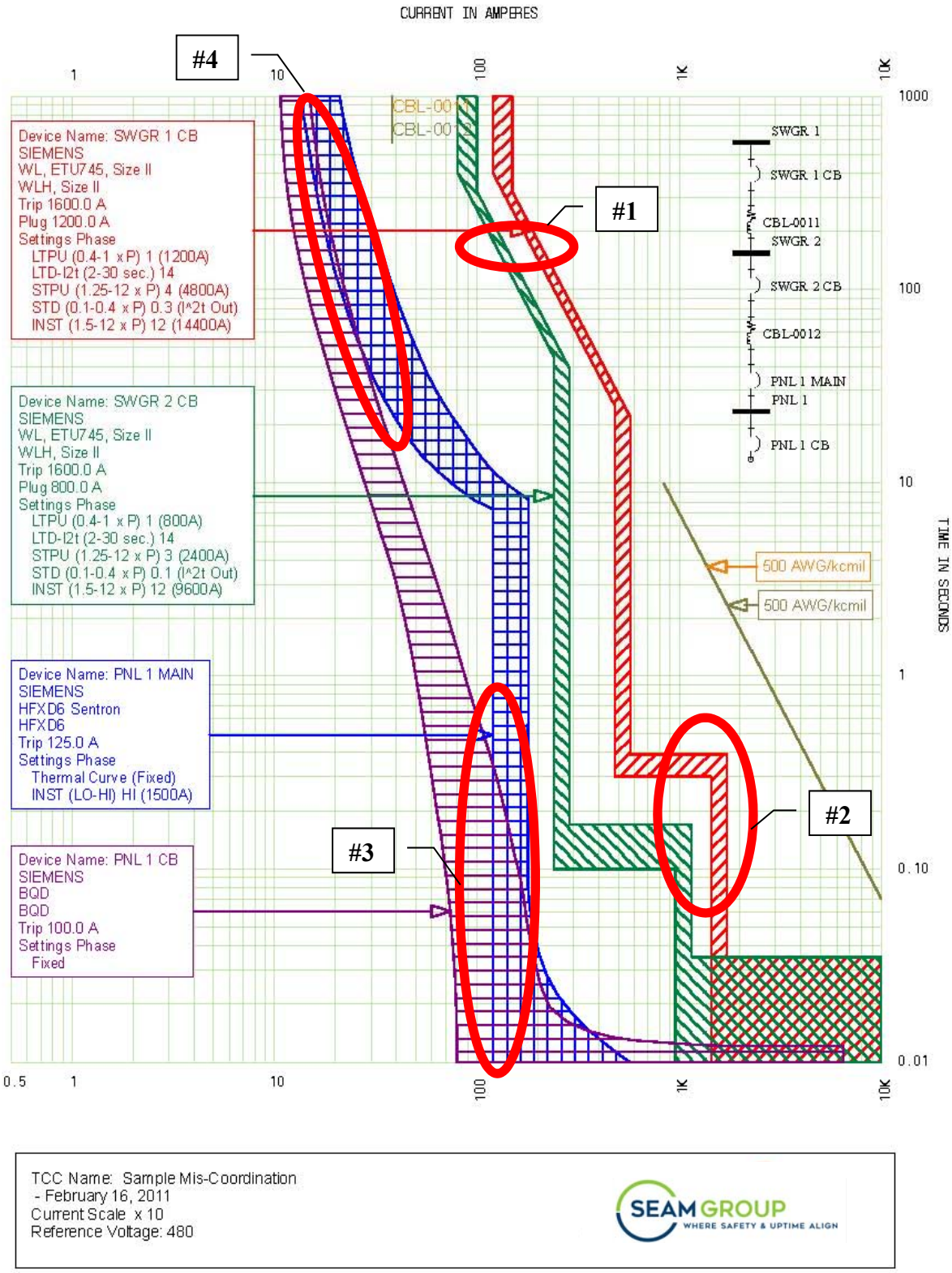


Figure 4: Sample TCC illustrating corrected coordination

Figure 5 illustrates a typical relay time current curve. These devices are often used at higher voltage levels or in the incoming primary distribution equipment for added control. Unlike a breaker a relay does not physically open the circuit - the relay acts as the trip unit/controller for an associated breaker that receives a signal from the relay to open. These relays sense the current flow in the circuit via current transformers (CT's) connected around the incoming or outgoing cables for the circuit to be monitored. The CT produces a reduced current proportional to the main circuit current flow via a magnetic field. This allows the relay to monitor/control high current circuits without having to be attached directly to the circuit. The curve in Figure 5 illustrates the basic curve style; however, with the newer programmable electronic relays the curve shape can become highly custom and the relays can also have additional protective features built into them that go beyond the basic overcurrent protection and coordination shown in this report. There are also older electro mechanical relays that will have the same basic curve shown in Figure 5, however these devices do not have the additional programming features of an electronic relay.

Figure 6 illustrates a typical fuse time current curve. A fuse contains a metal filament within a canister/cartridge that is then placed in line with the circuit. The fuse will then react to the current flow based on heat. If the current flow exceeds the value for which it was designed the fuse will "blow", i.e. the metal filament heats up and melts causing an opening in the circuit resulting in no current flow. A fuse has no adjustable settings similar to the fixed thermal magnetic breakers. The fuse curve is represented by an angled line that is shifted left or right based on the amperage rating of the device. One advantage of fuses that is that coordination is very easily achieved as long as the fuse models are the same and current ratings are different (i.e. 100A fuse would coordinate with 90A).

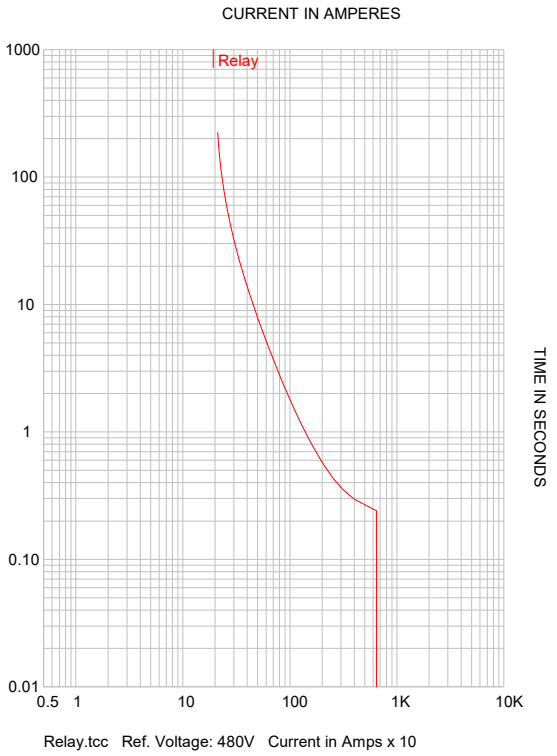


Figure 5: Typical Relay Curve

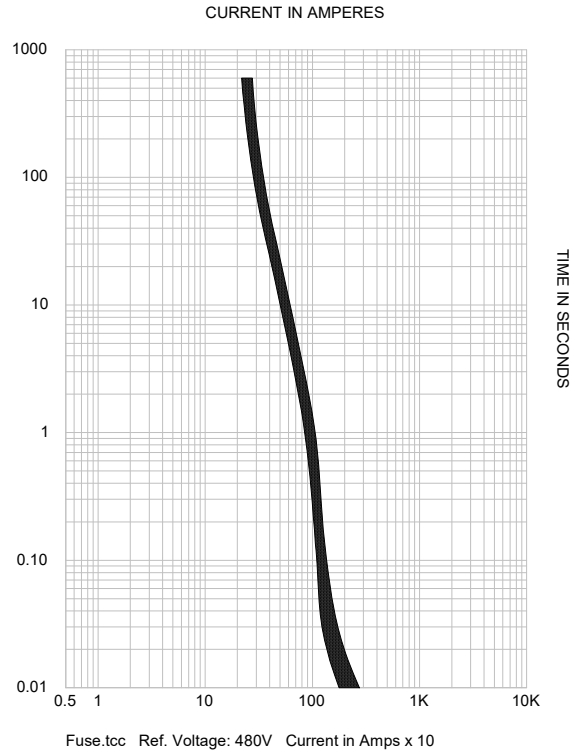
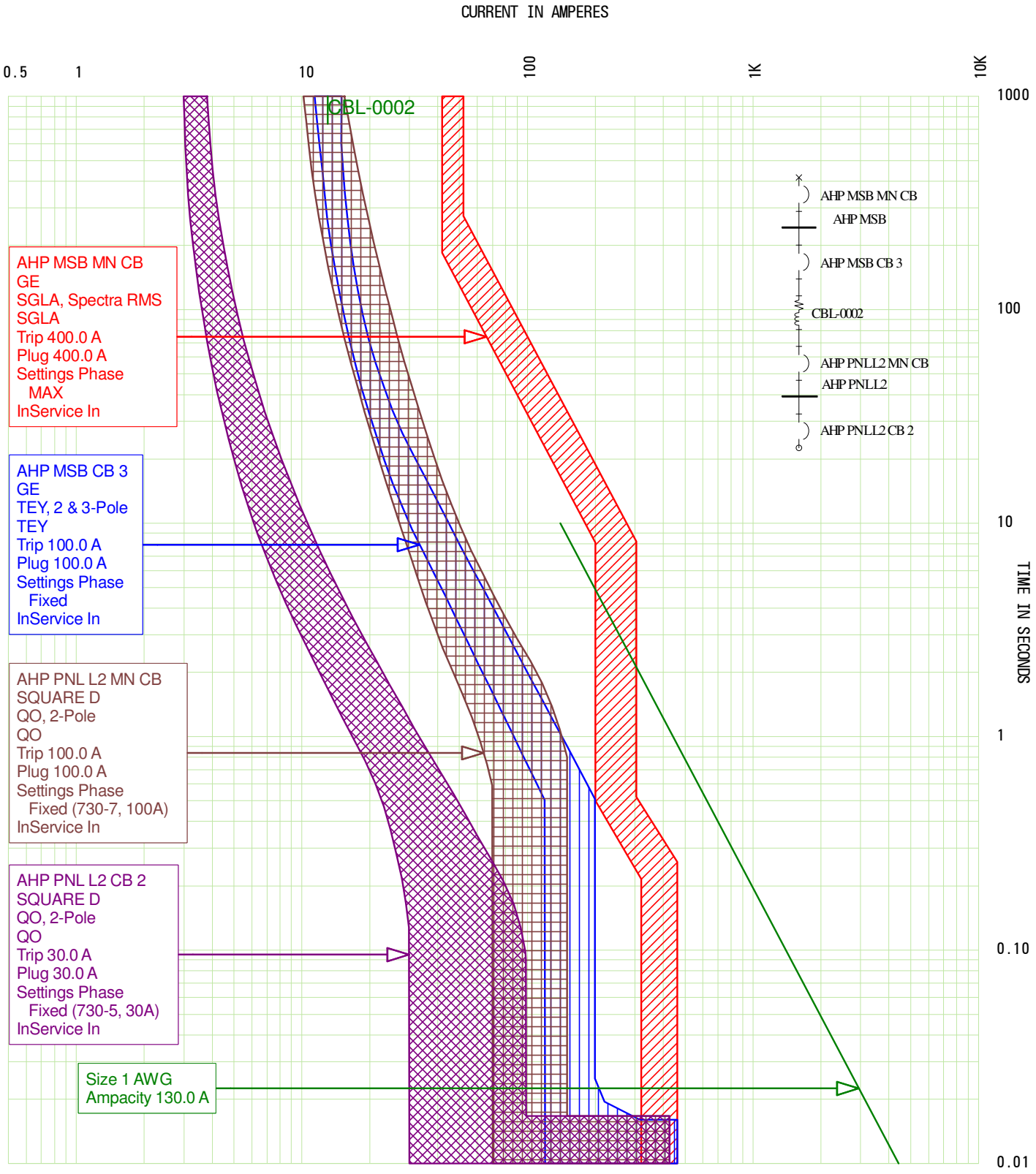


Figure 6: Typical Fuse Curve

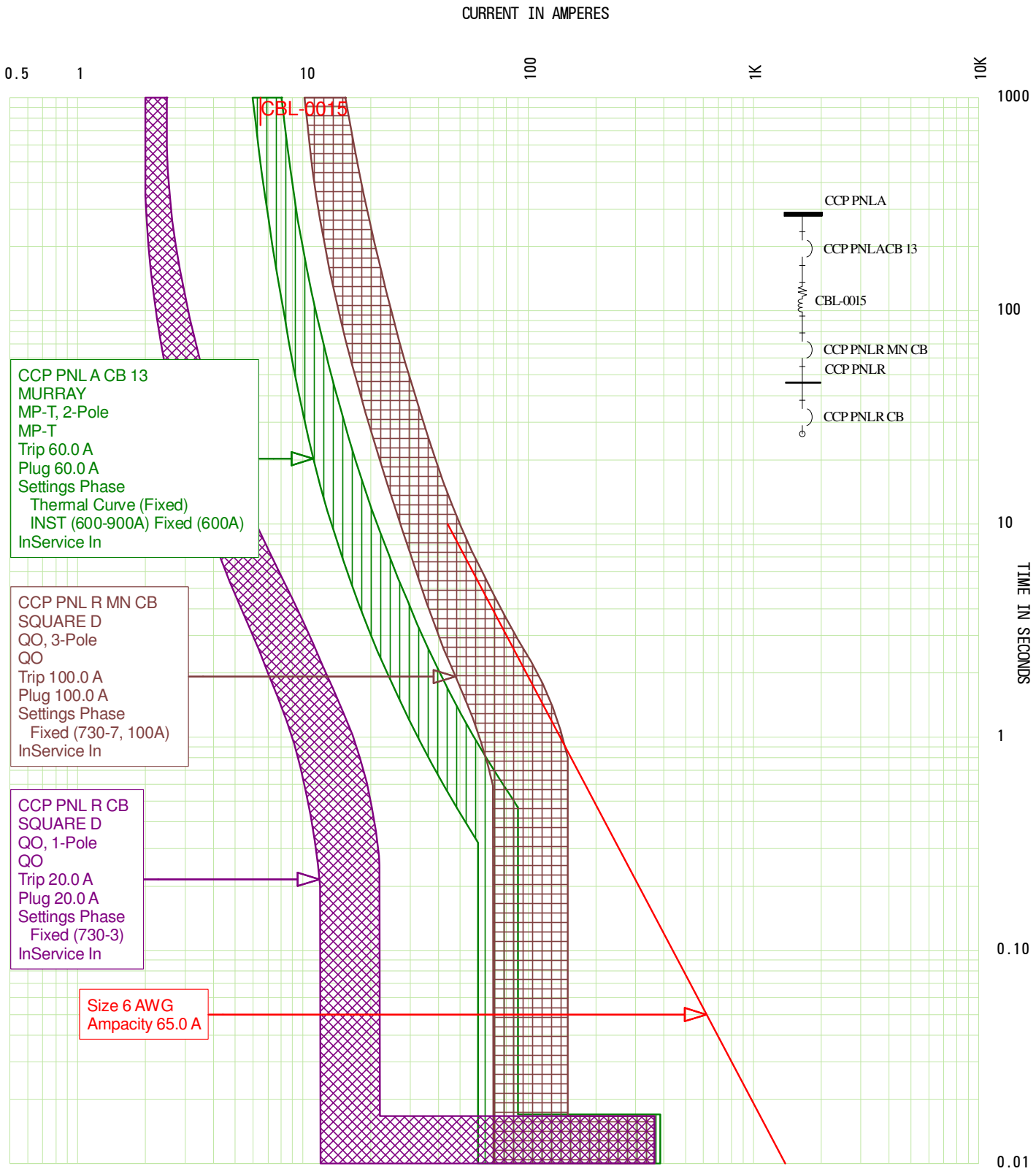
The following time-current curves (TCCs) graphically depict the time vs. current characteristics for each overcurrent protective device shown, and the relationship of each device to the other devices that are in electrical series. Fuse and circuit breaker information was documented by SEAM Group during the data collection phase of this project. A TCC will be created to illustrate the largest device for each panel to consider worst case coordination situations for the system.

Each set of plotted curves shows at least two protective devices. Also shown are the fusing characteristics for any conductors being protected by the plotted devices. The plotted characteristics reflect the conditions that existed at the time data collection was completed. All recommendations presume the protective devices have been well and properly maintained to operate in accordance with the manufacturer's specifications. A single line diagram of the portion of the system being coordinated has been included on each curve as well as data blocks that illustrate the protective device manufacturer and model, along with the associated settings and ratings for the device.



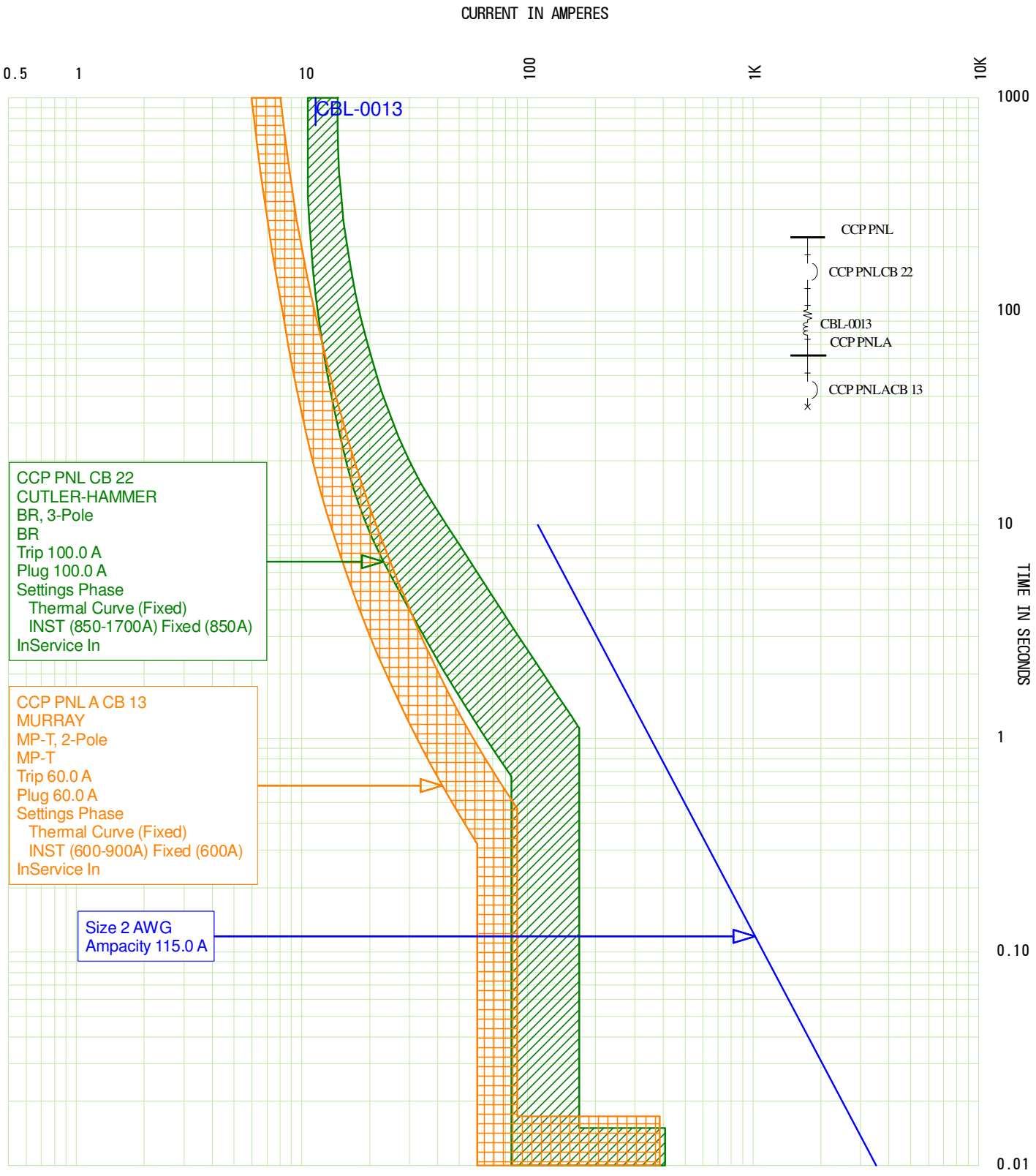
TCC Name: AHP MSB To AHP PNL L2
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 208

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



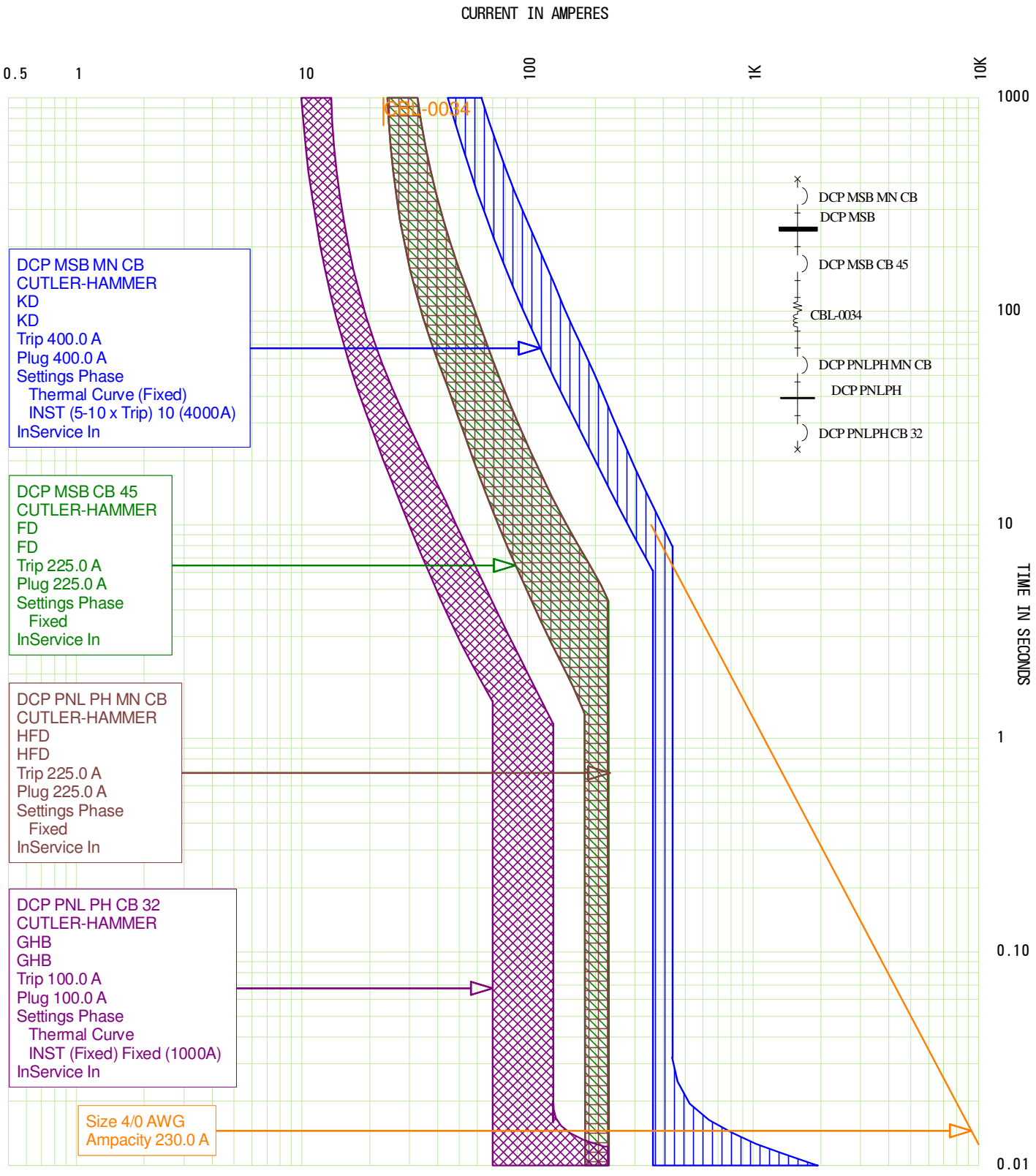
TCC Name: CCP PNL A To CCP PNL R
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 240

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



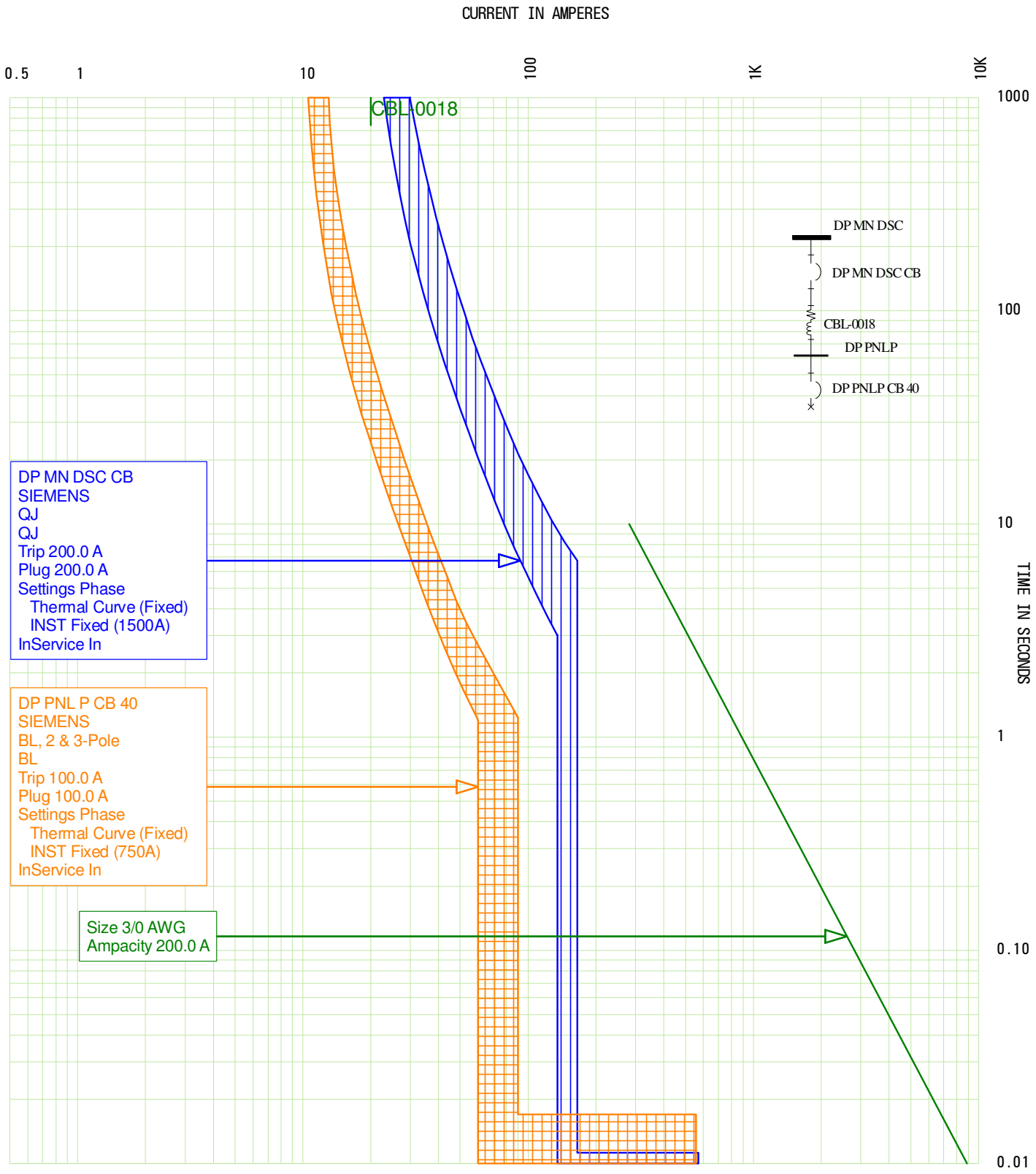
TCC Name: CCP PNL To CCP PNL A
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 240

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



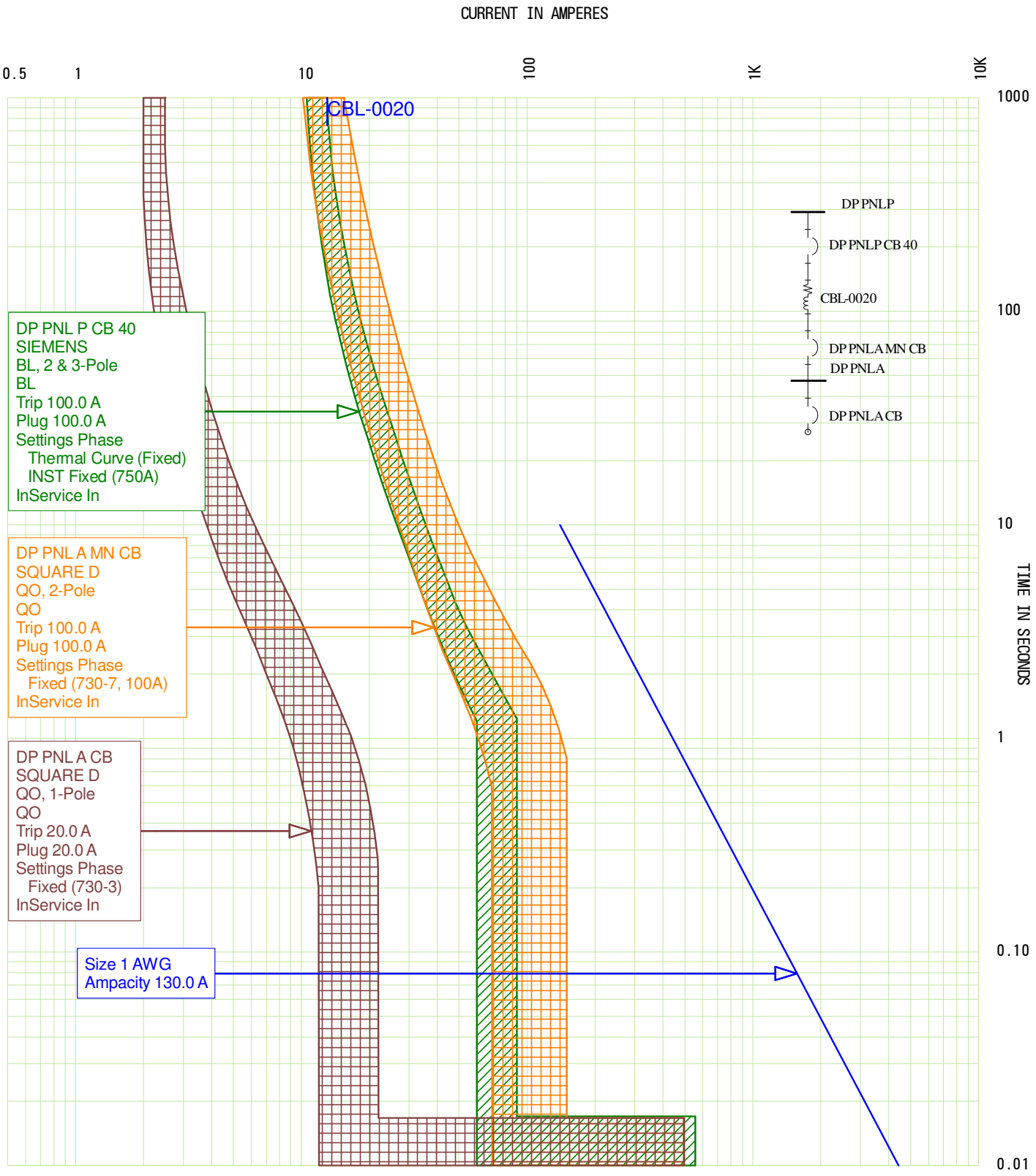
TCC Name: DCP MSB To DCP PNL PH
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



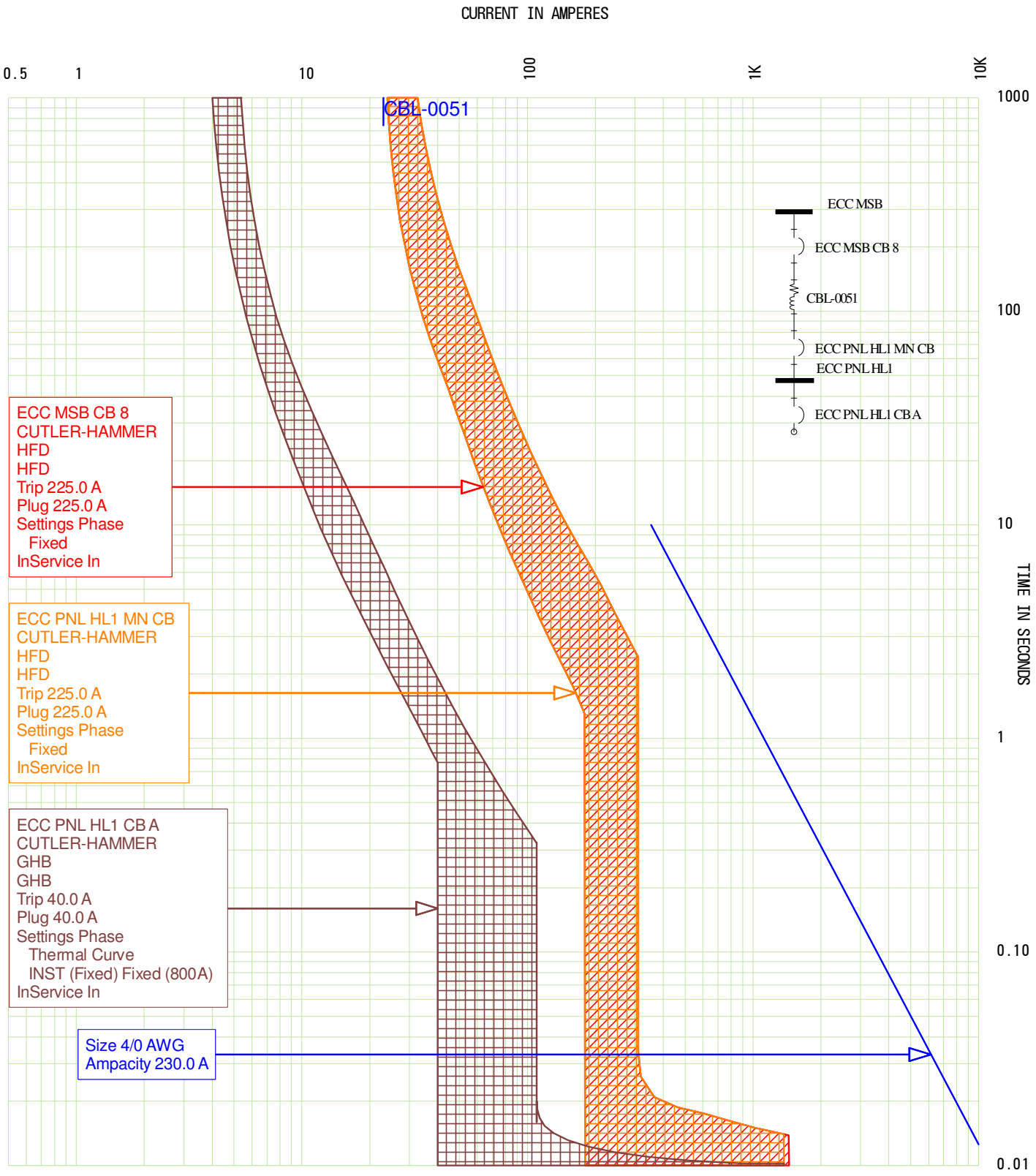
TCC Name: DP MN DSC To DP PNL P
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 208

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



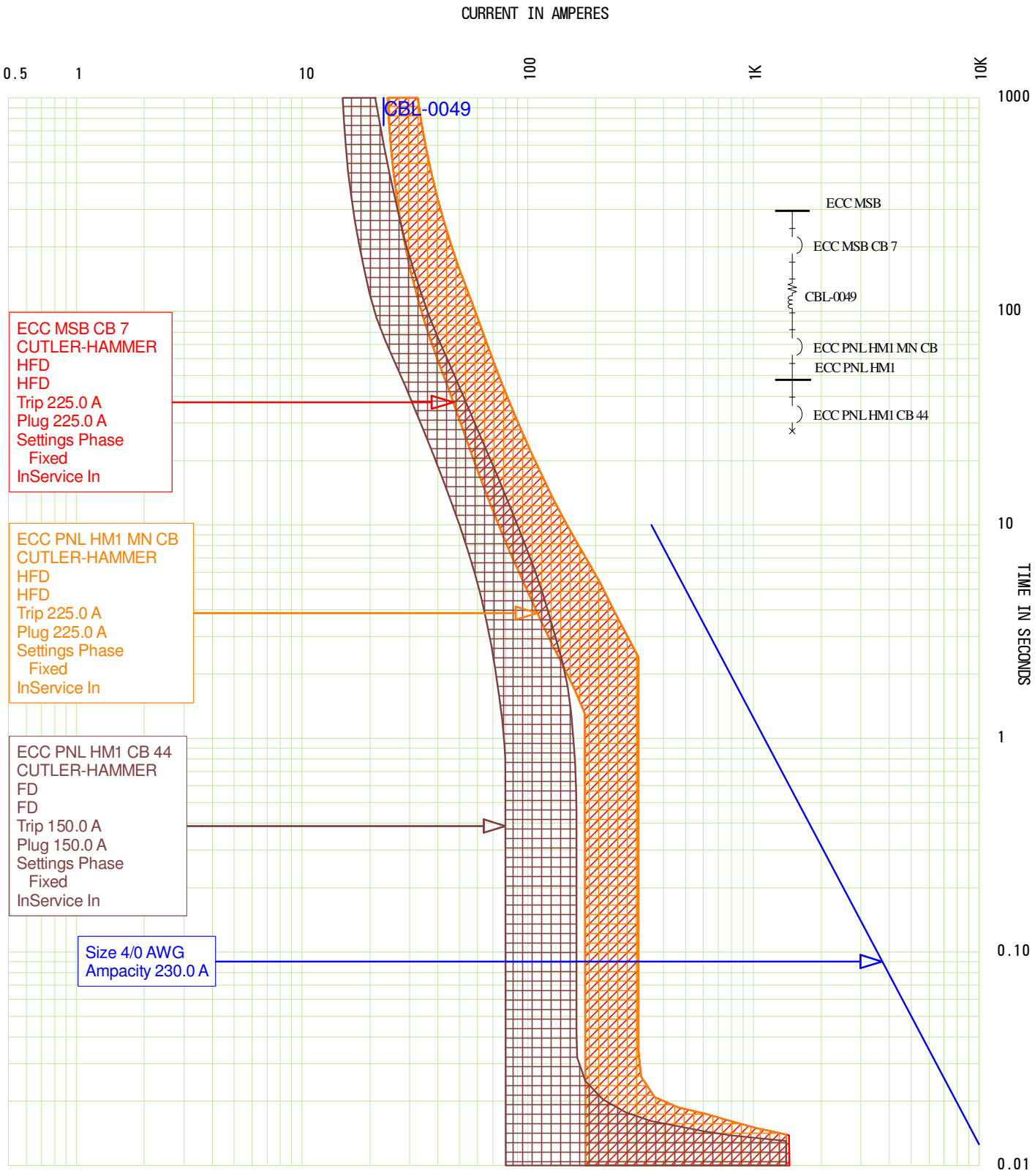
TCC Name: DP PNL P To DP PNL A
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 208

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



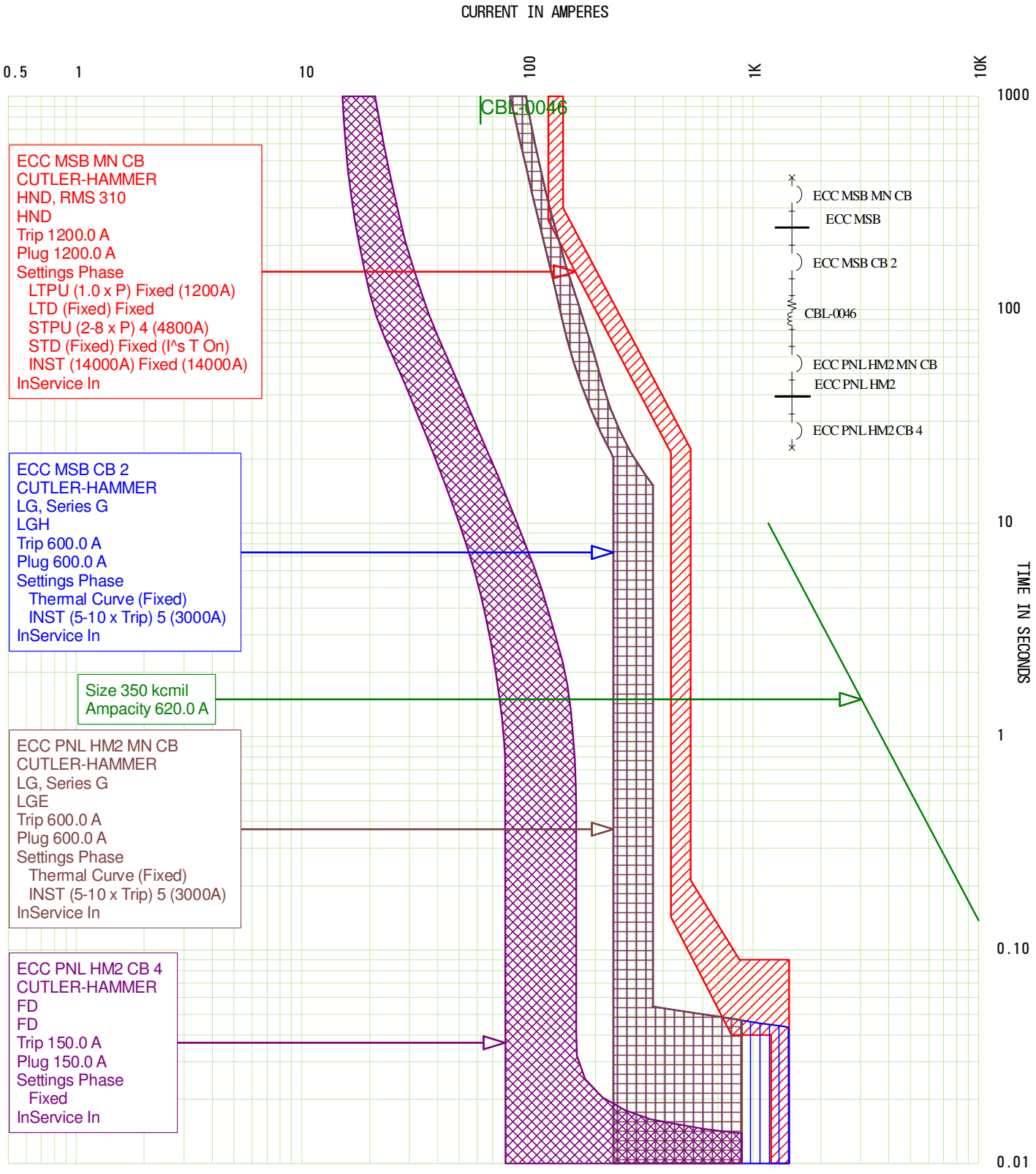
TCC Name: ECC MSB To ECC PNL HL1
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



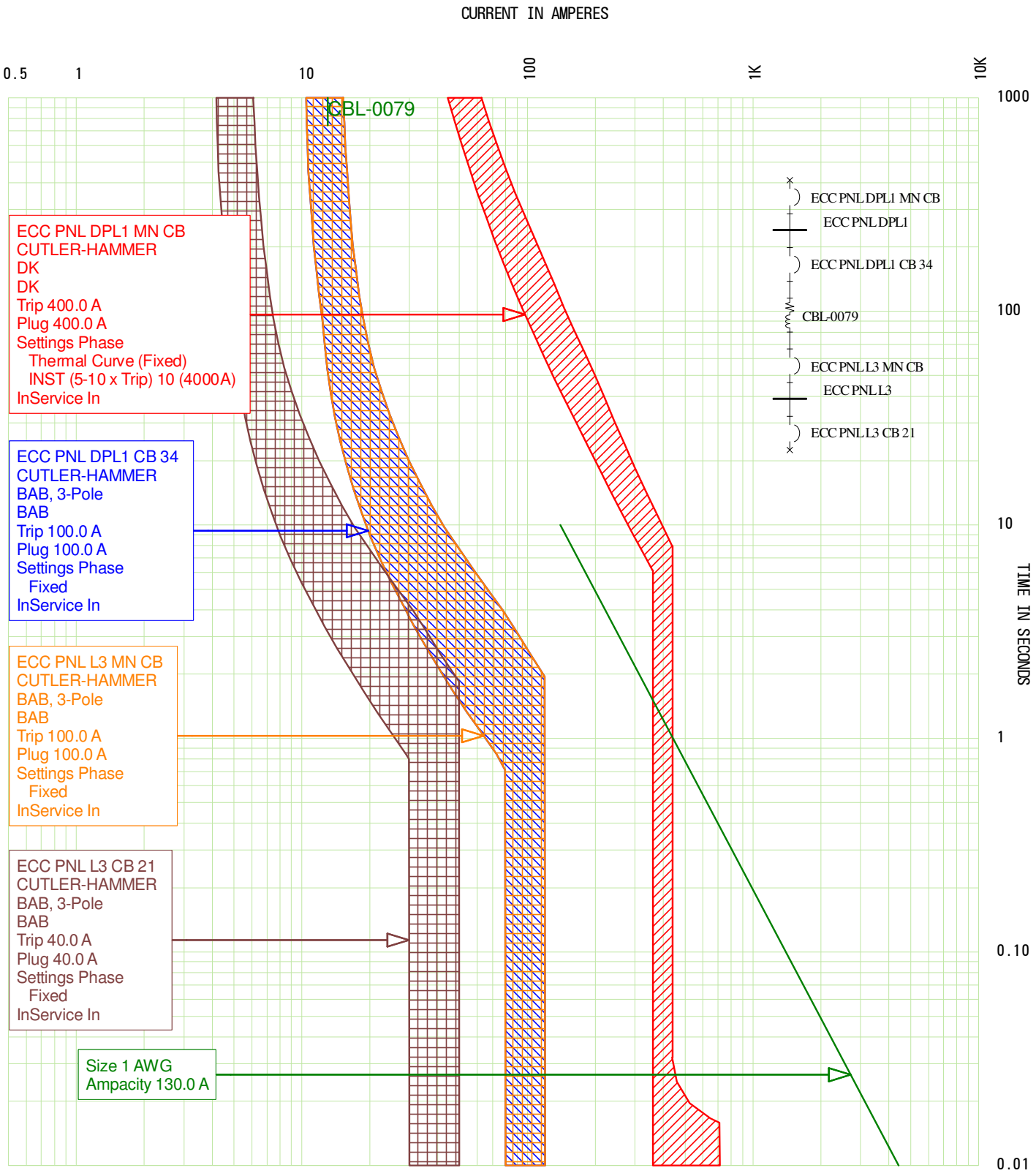
TCC Name: ECC MSB To ECC PNL HM1
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



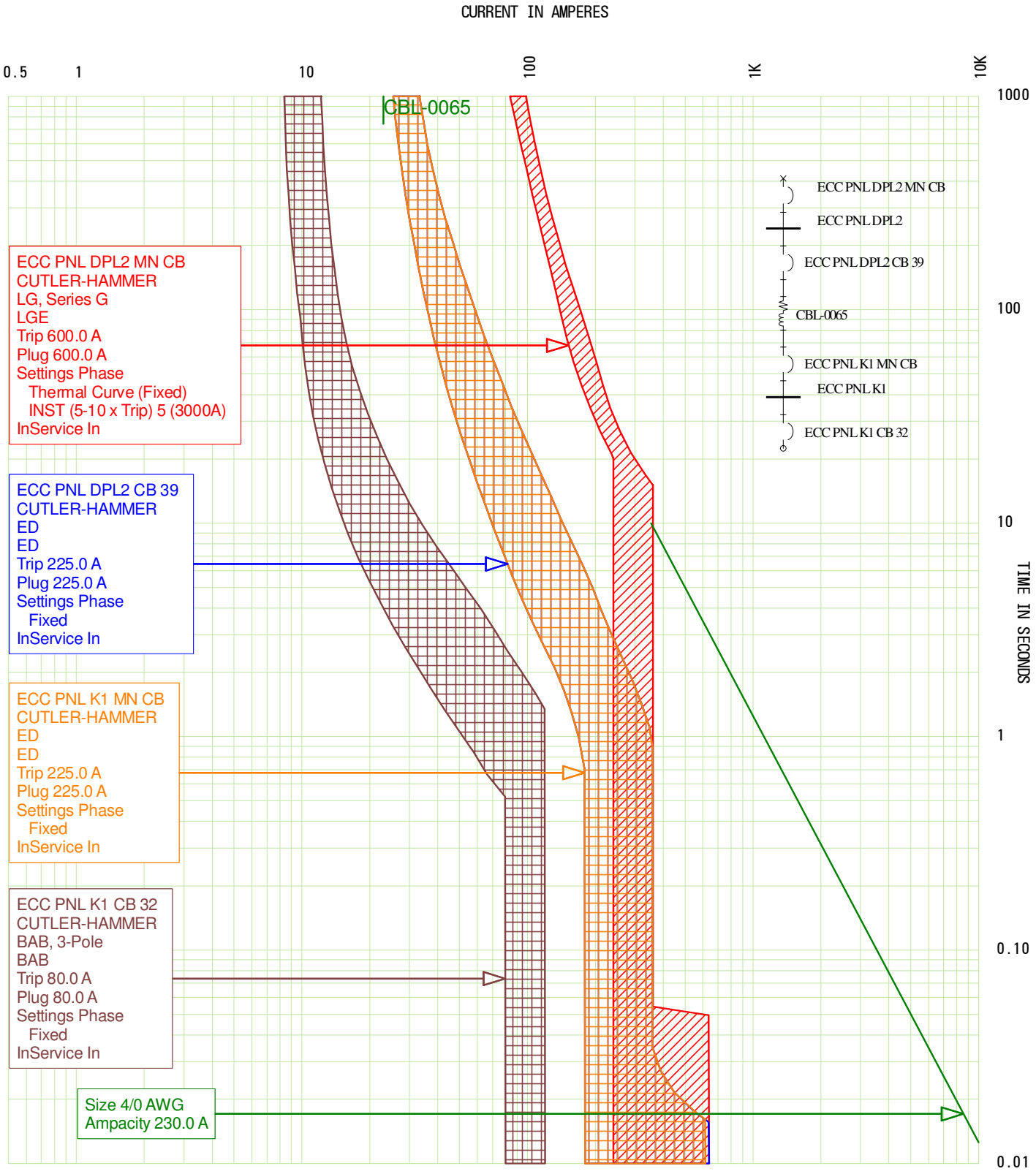
TCC Name: ECC MSB To ECC PNL HM2
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



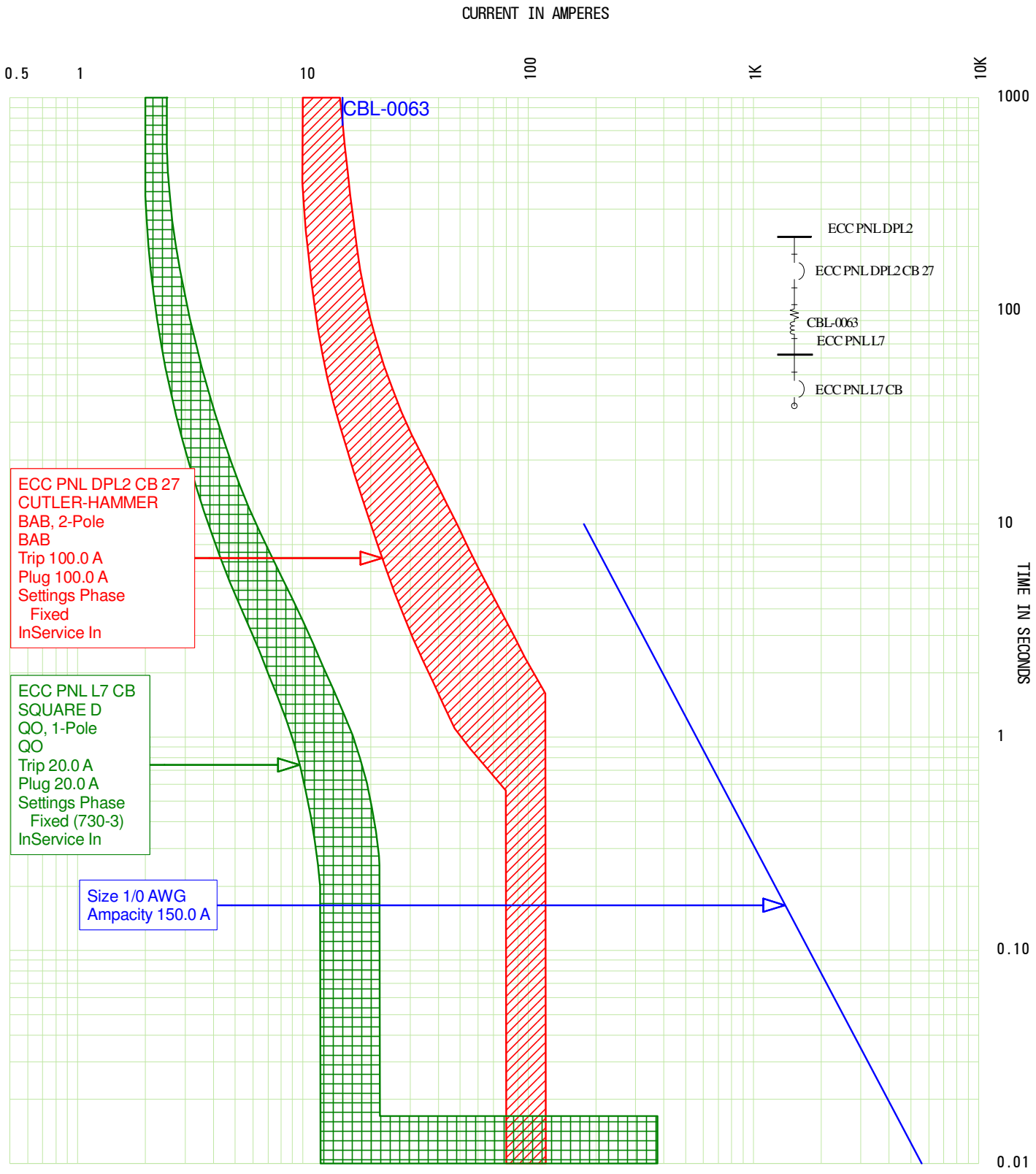
TCC Name: ECC PNL DPL1 To ECC PNL L3
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 208

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



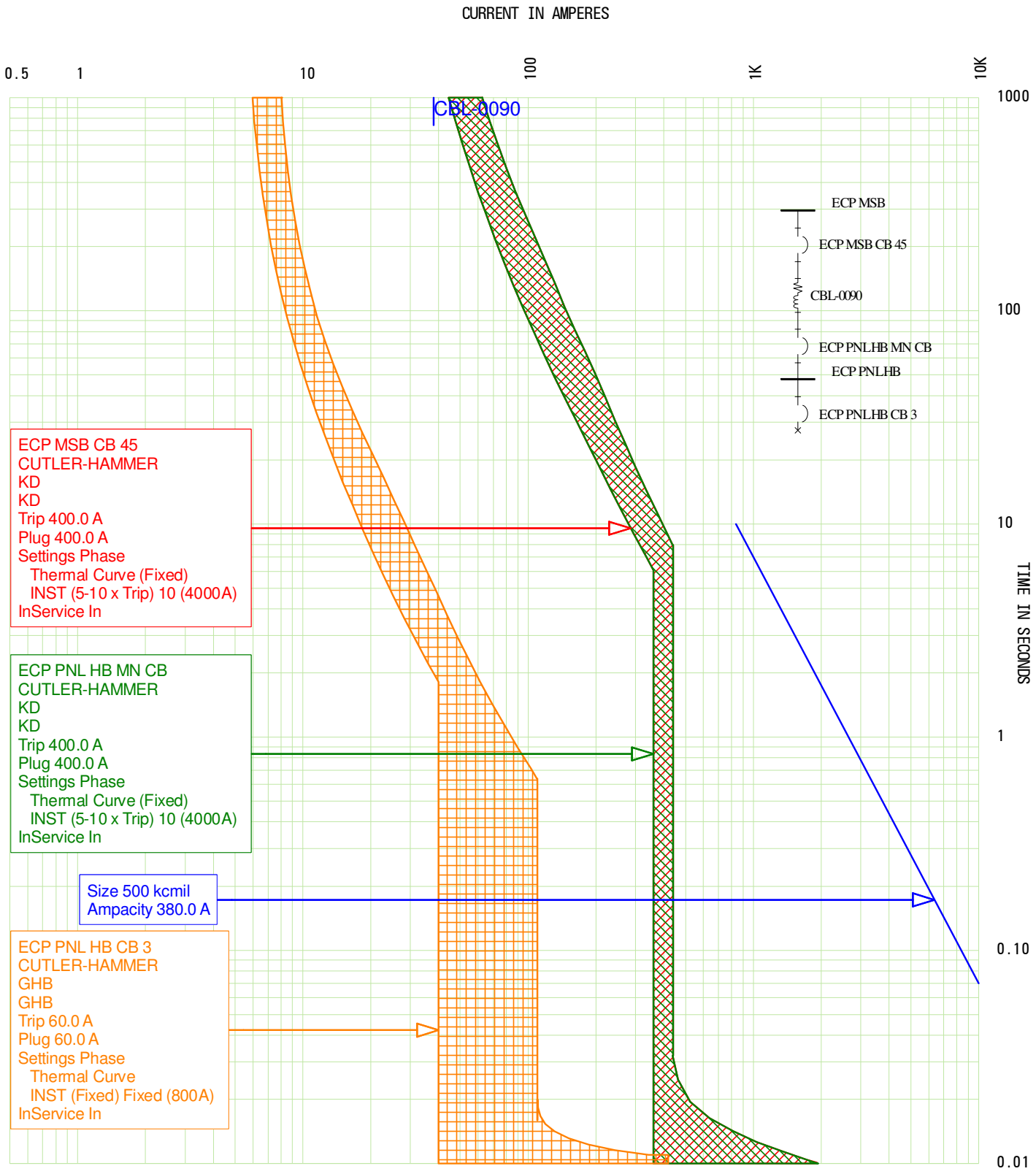
TCC Name: ECC PNL DPL2 To ECC PNL K1
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 208

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



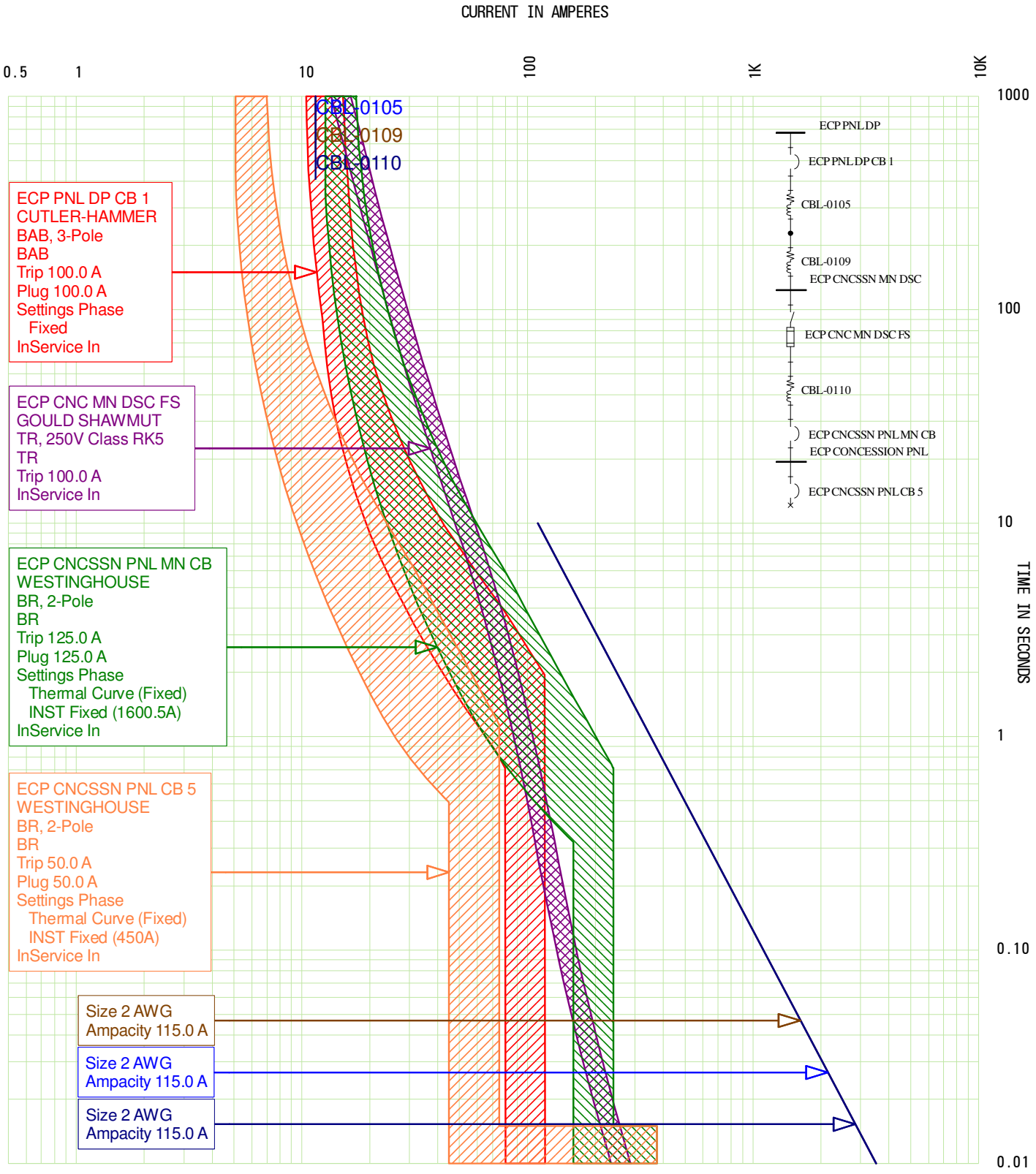
TCC Name: ECC PNL DPL2 To ECC PNL L7
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 208

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



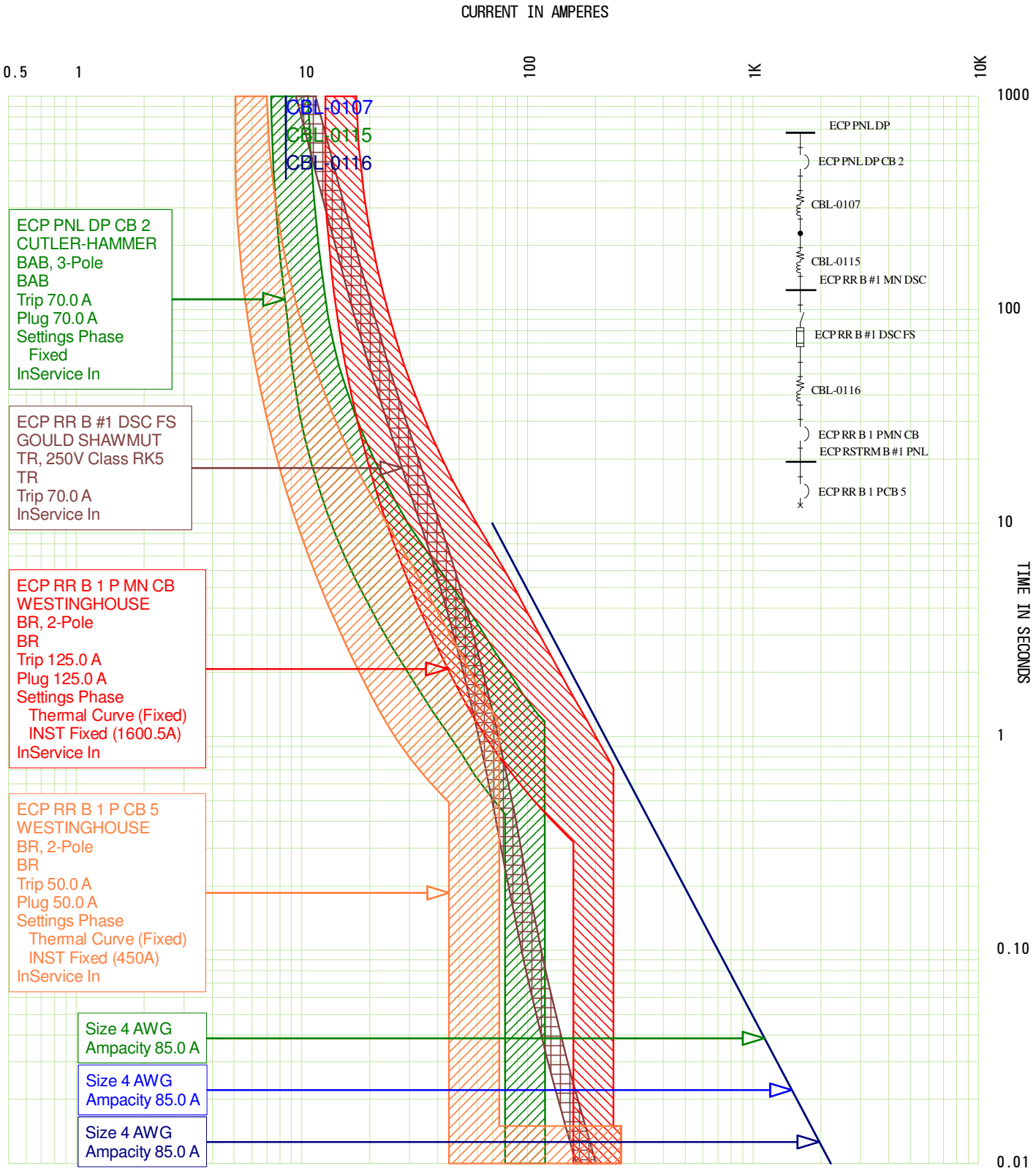
TCC Name: ECP MSB To ECP PNL HB
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



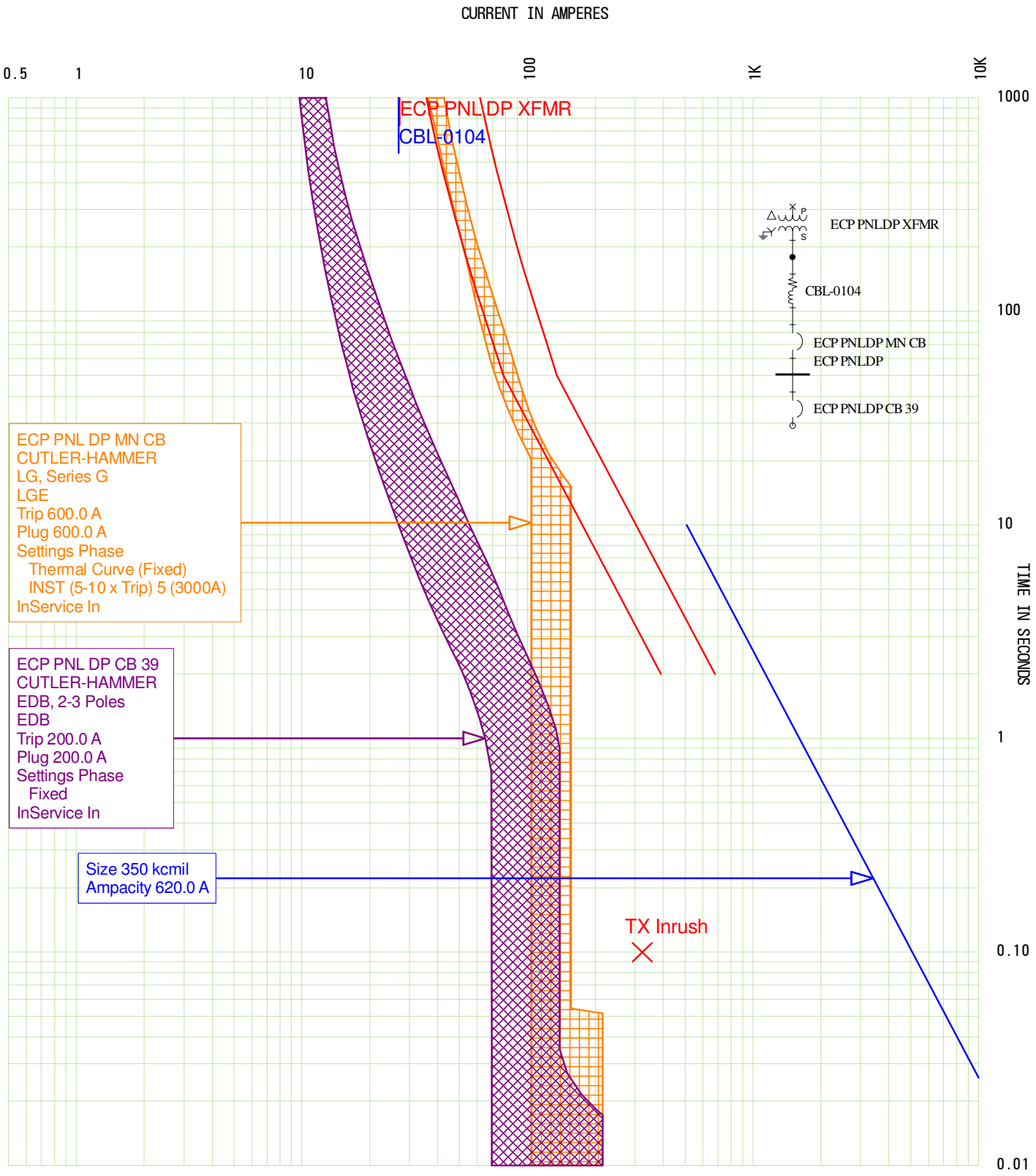
TCC Name: ECP PNL DP To ECP CONCESSION PNL
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 208

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



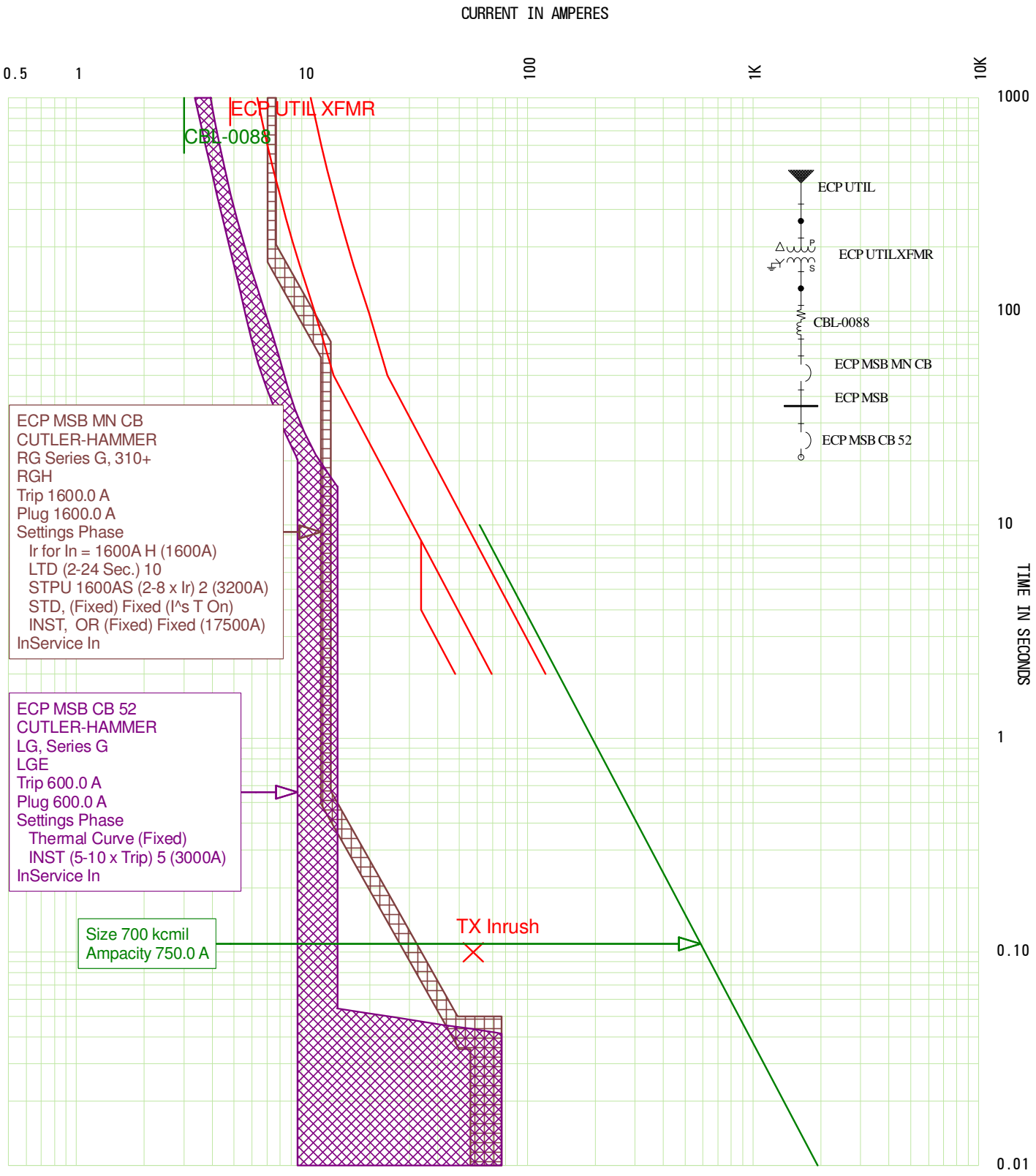
TCC Name: ECP PNL DP To ECP RSTRM B #1 PNL
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 208

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



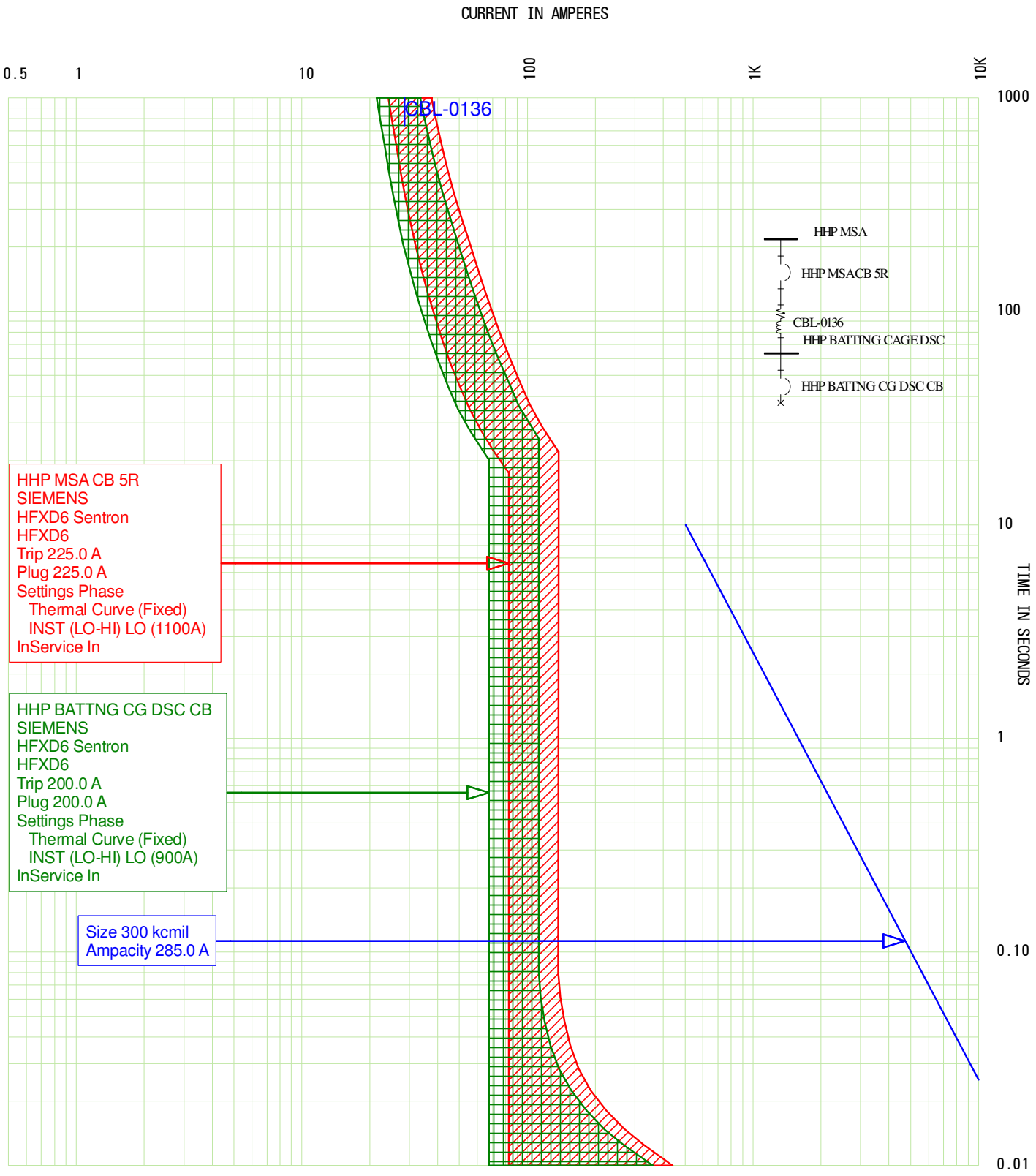
TCC Name: ECP PNL DP XFMR To ECP PNL DP
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



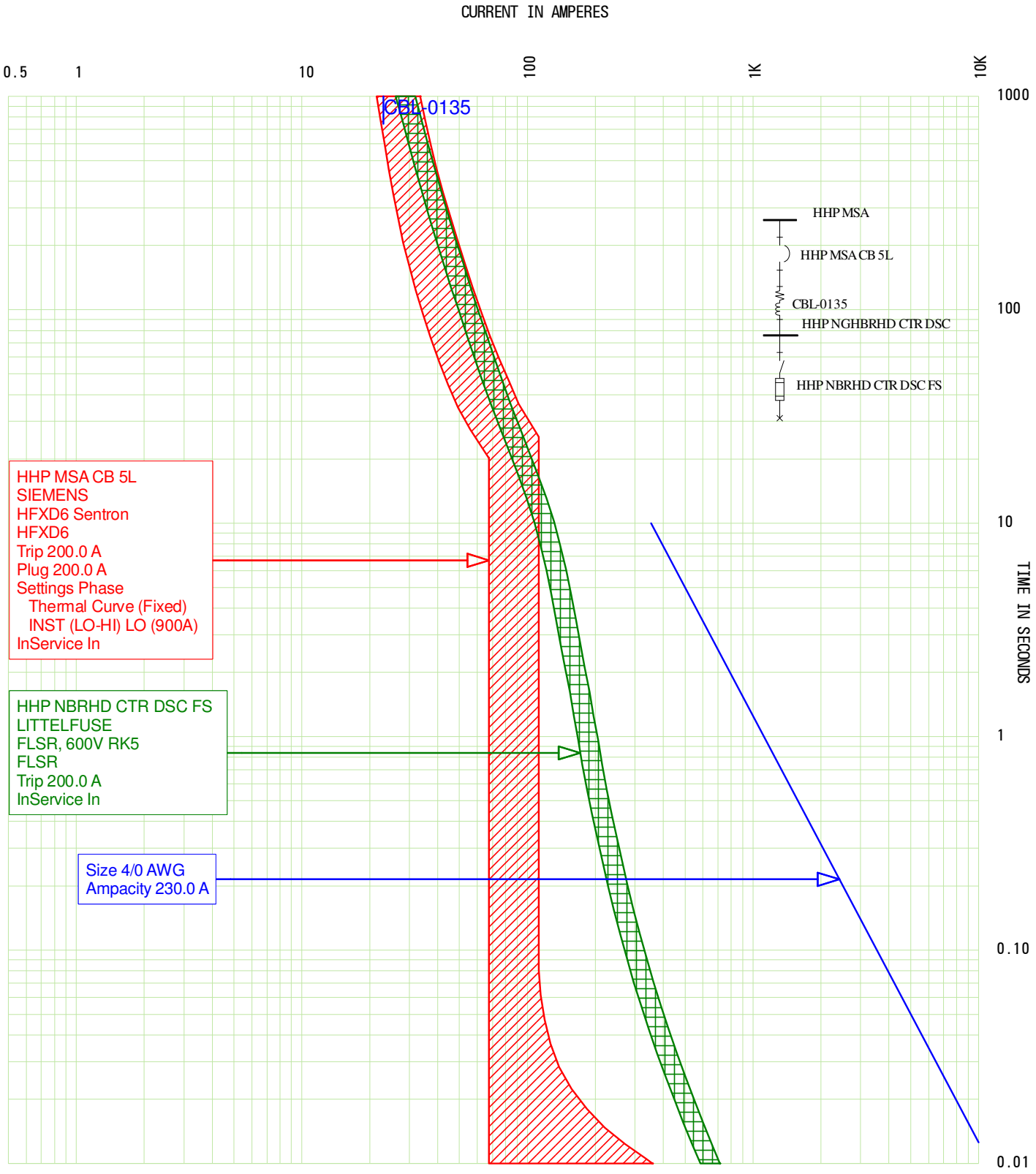
TCC Name: ECP UTIL To ECP MSB
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 12000

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



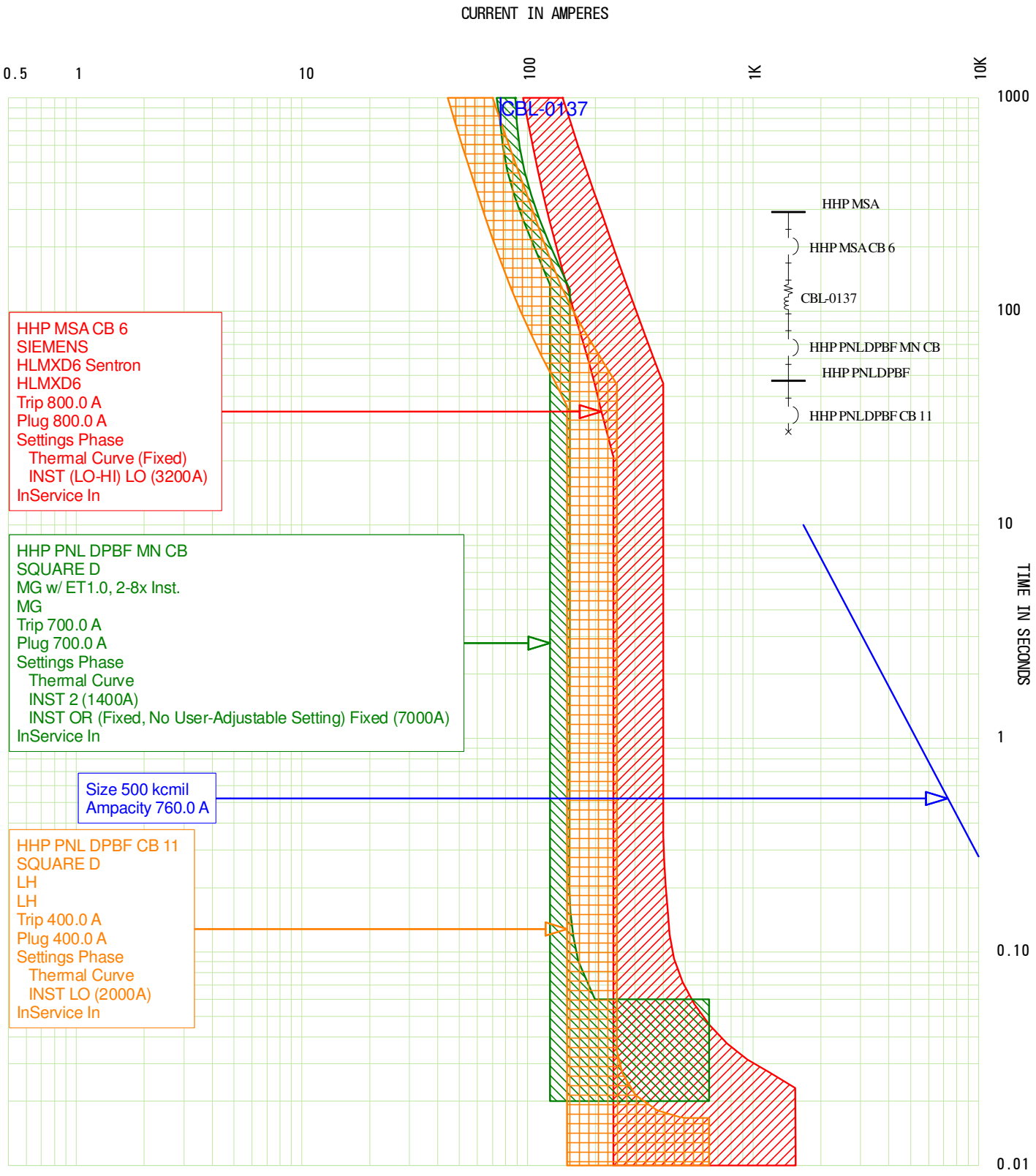
TCC Name: HHP MSA To HHP BATTING CAGE DSC
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



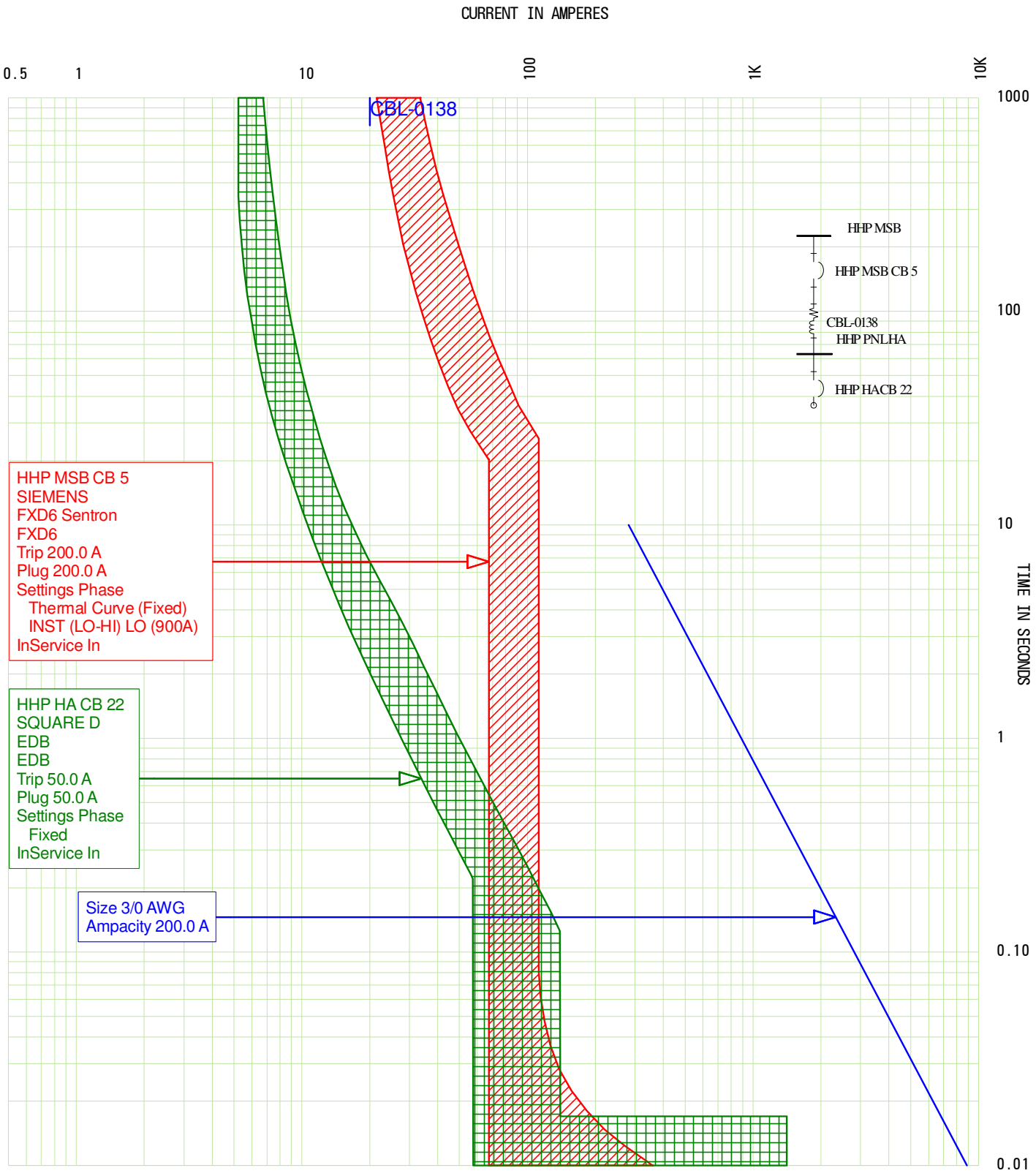
TCC Name: HHP MSA To HHP NGHBRHD CTR DSC
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



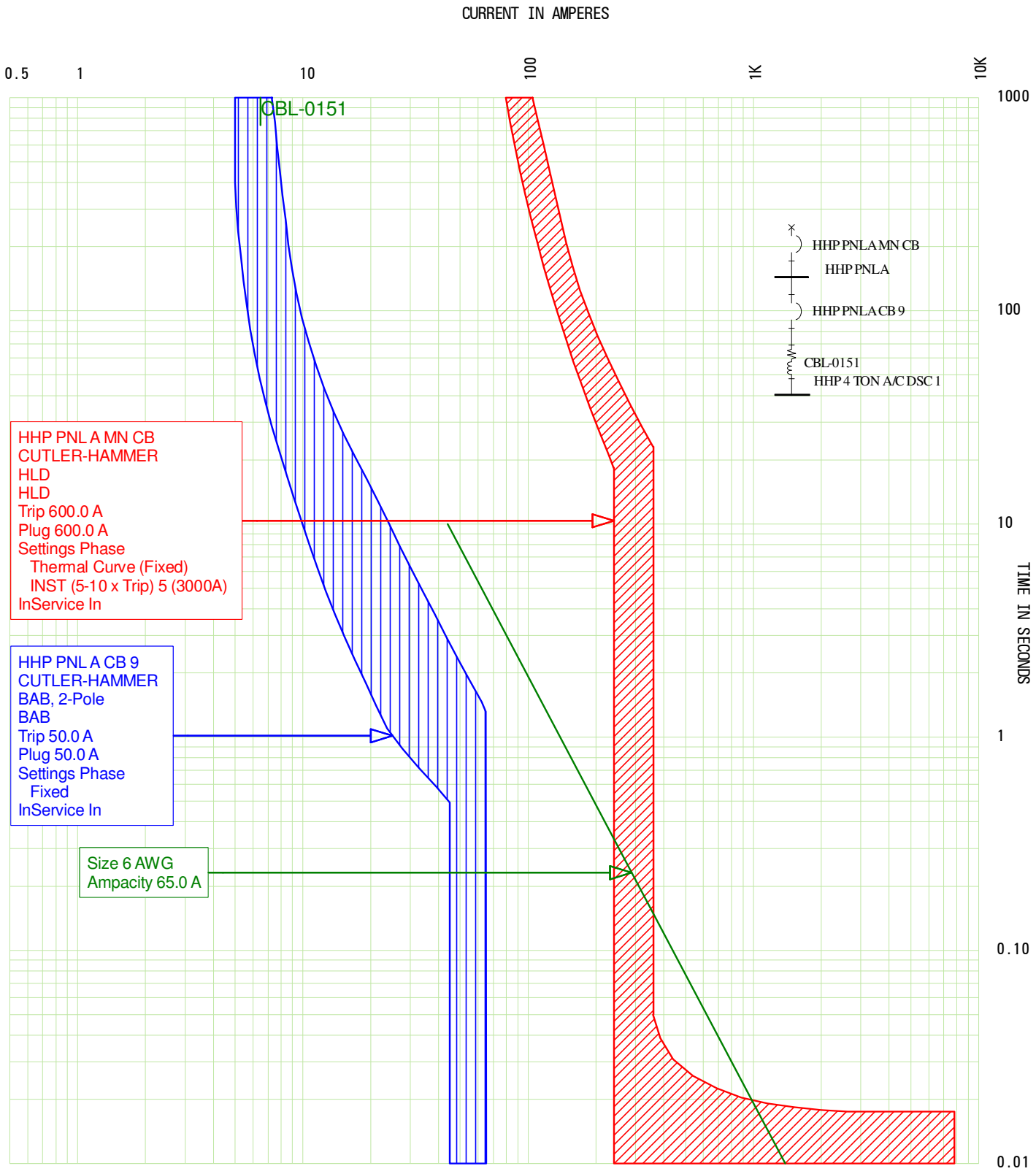
TCC Name: HHP MSA To HHP PNL DPBF
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



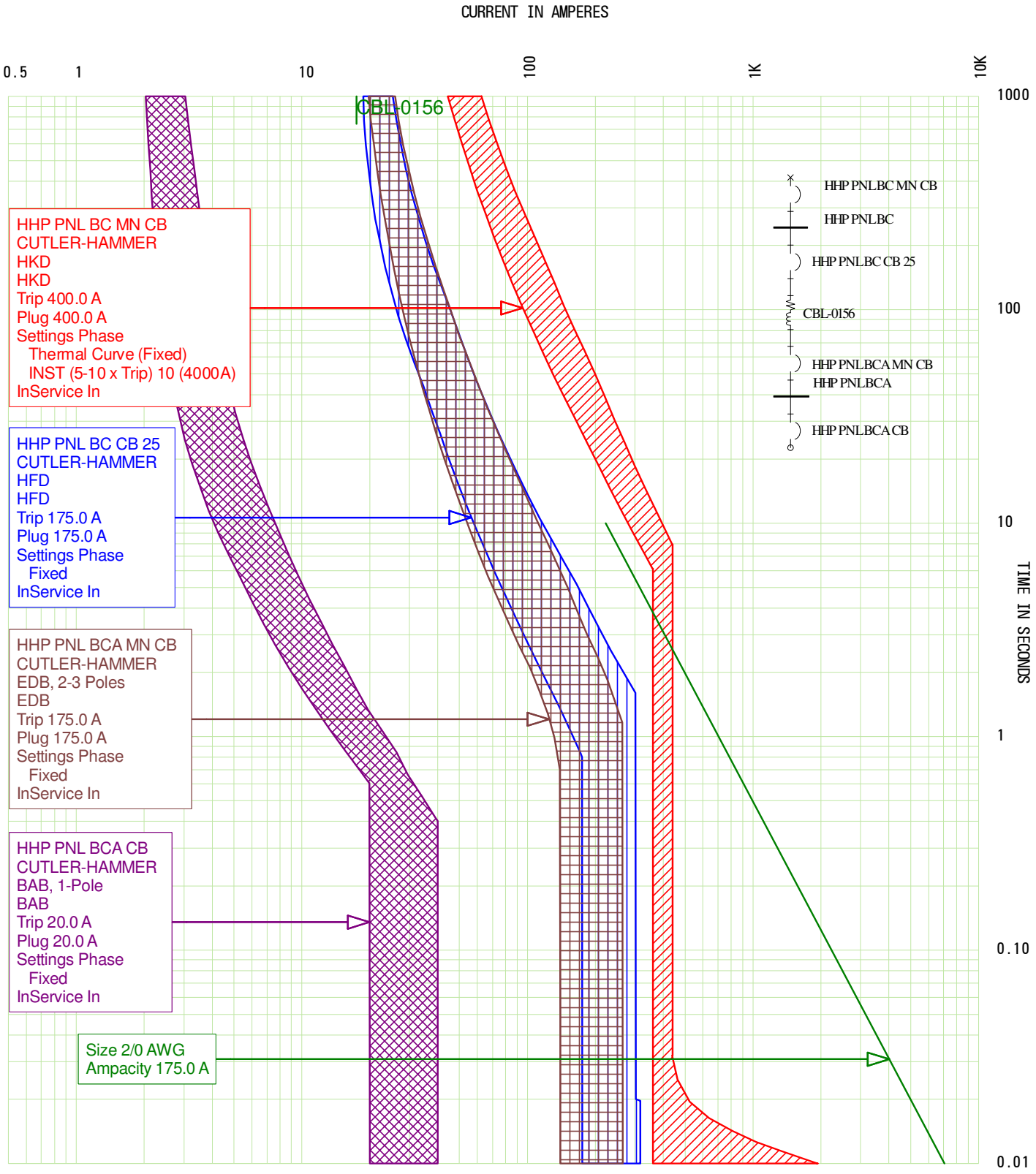
TCC Name: HHP MSB To HHP PNL HA
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



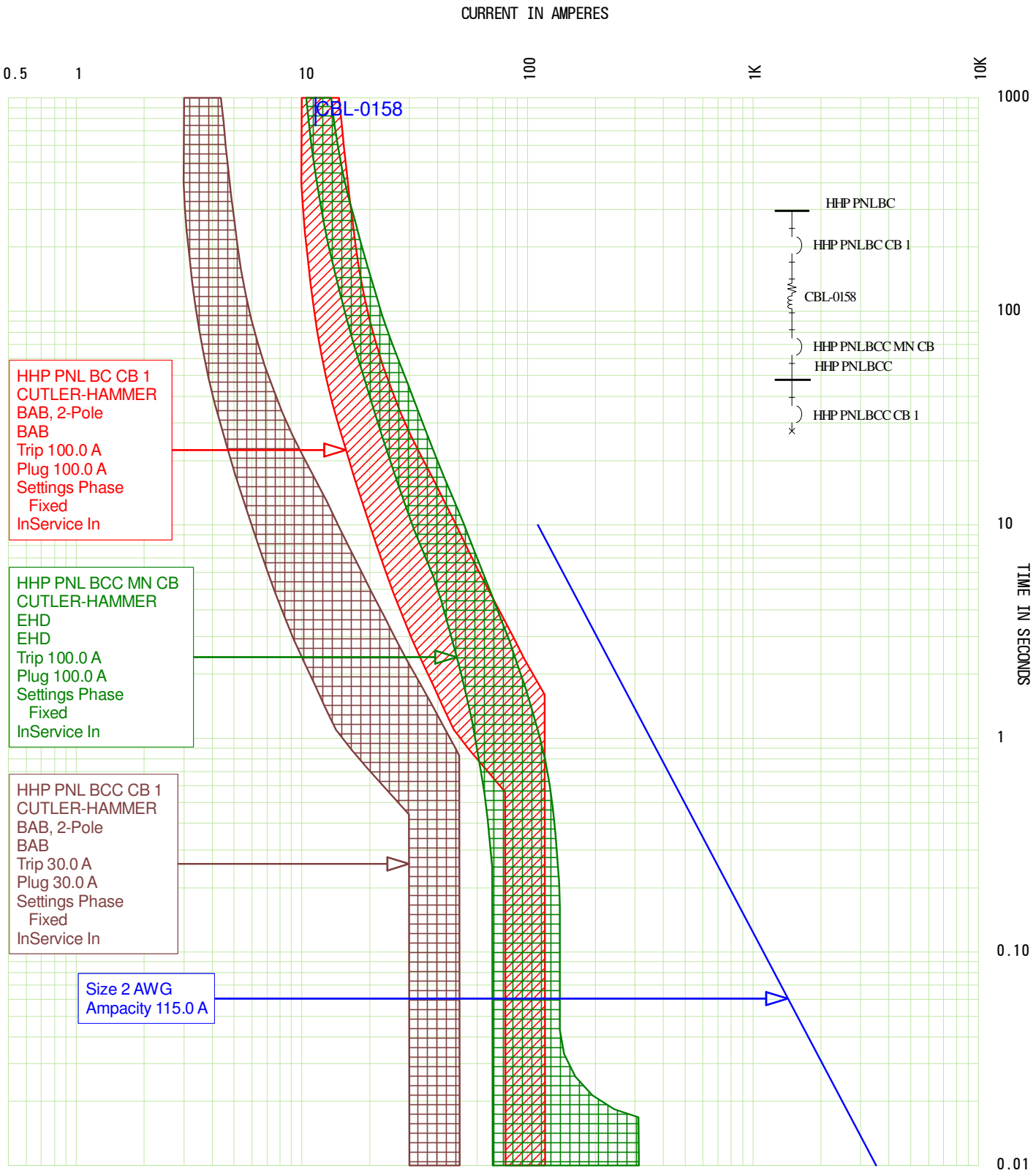
TCC Name: HHP PNL A To HHP 4 TON A/C DSC 1
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 240

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



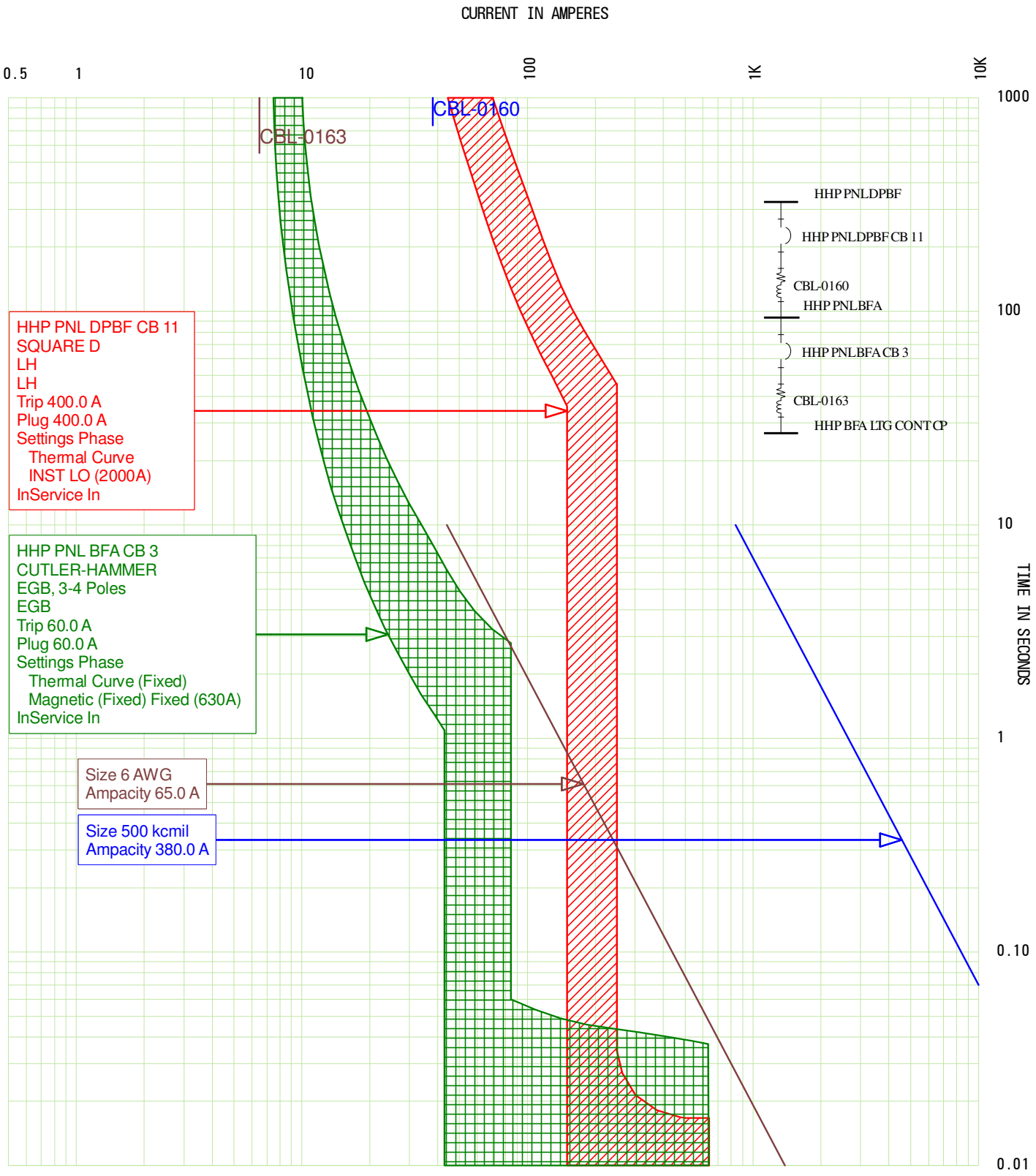
TCC Name: HHP PNL BC To HHP PNL BCA
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 240

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



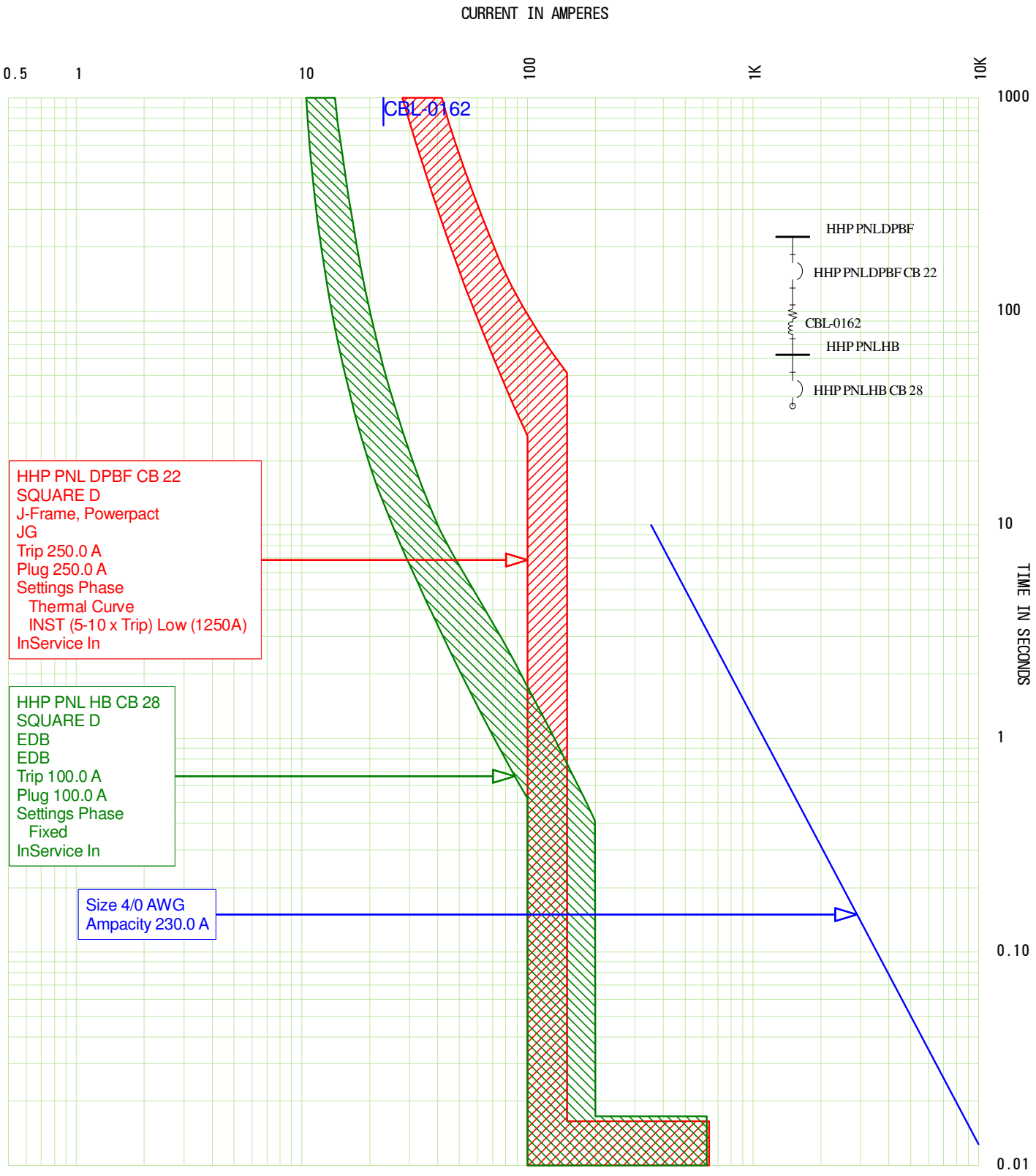
TCC Name: HHP PNL BC To HHP PNL BCC
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 240

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



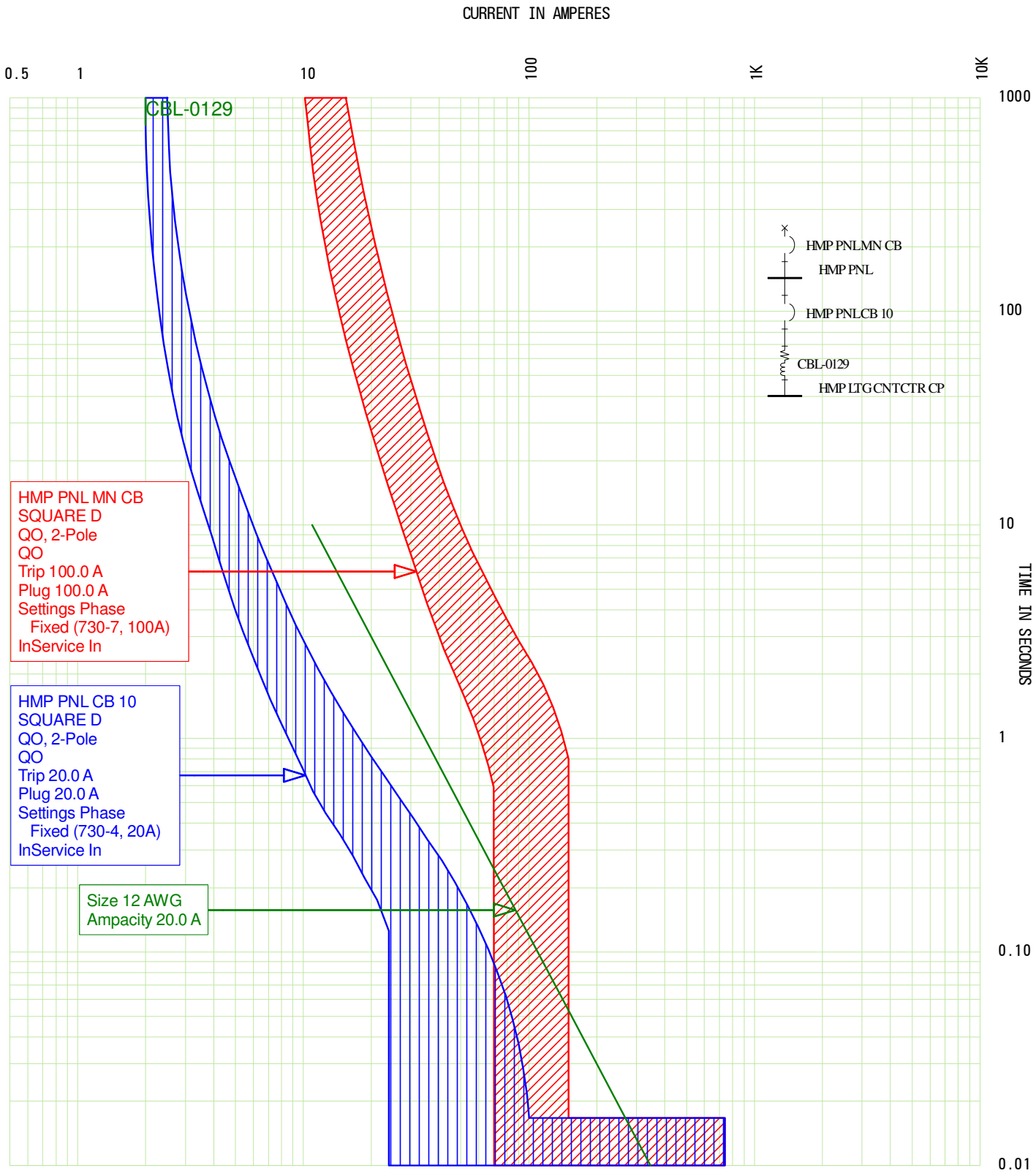
TCC Name: HHP PNL DPBF To HHP PNL BFA
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



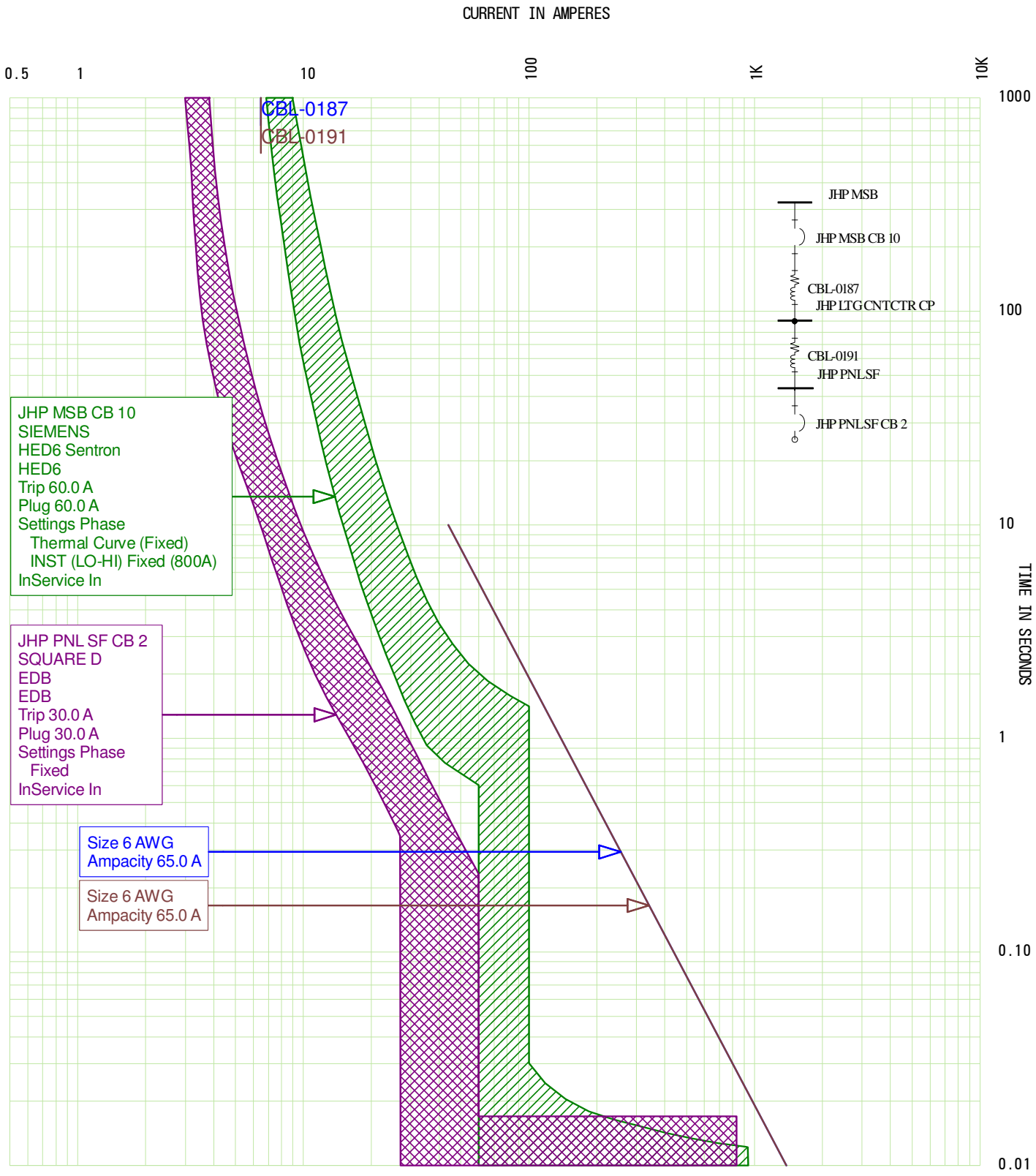
TCC Name: HHP PNL DPBF To HHP PNL HB
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



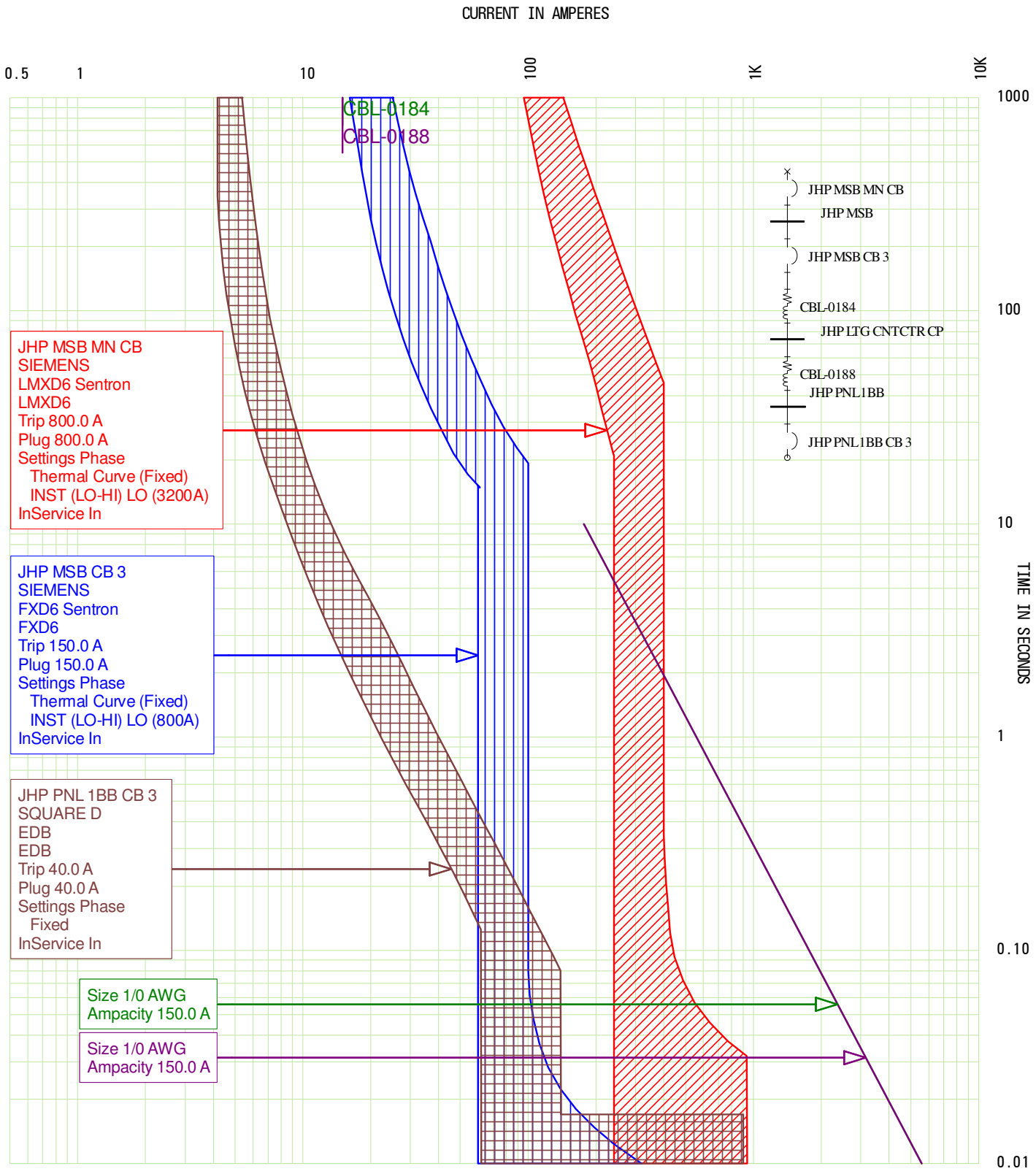
TCC Name: HMP PNL To HMP LTG CNTCTR CP
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 240

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



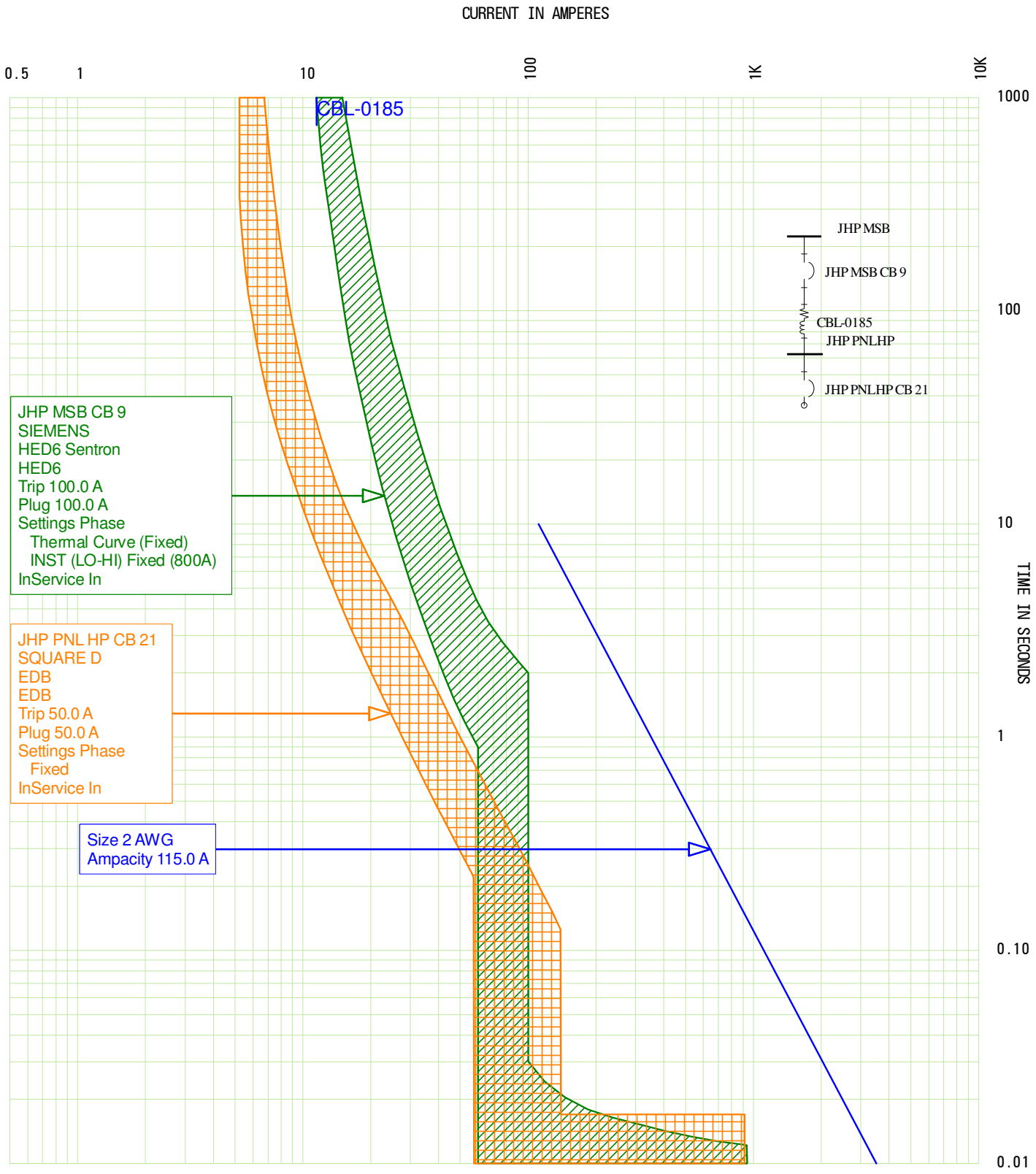
TCC Name: JHP MSB To JHP LTG CNTCTR CP
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



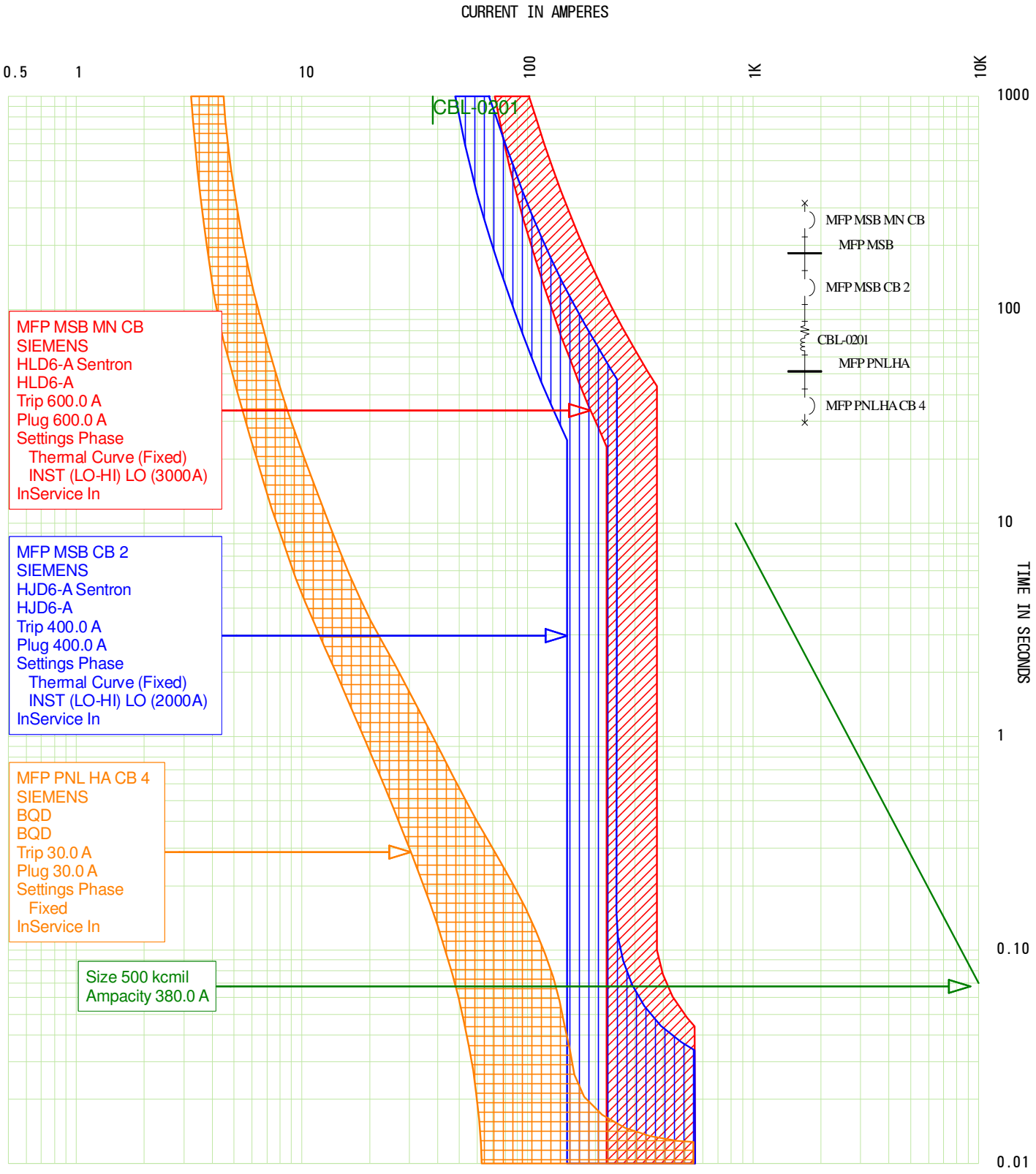
TCC Name: JHP MSB To JHP PNL 1BB
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



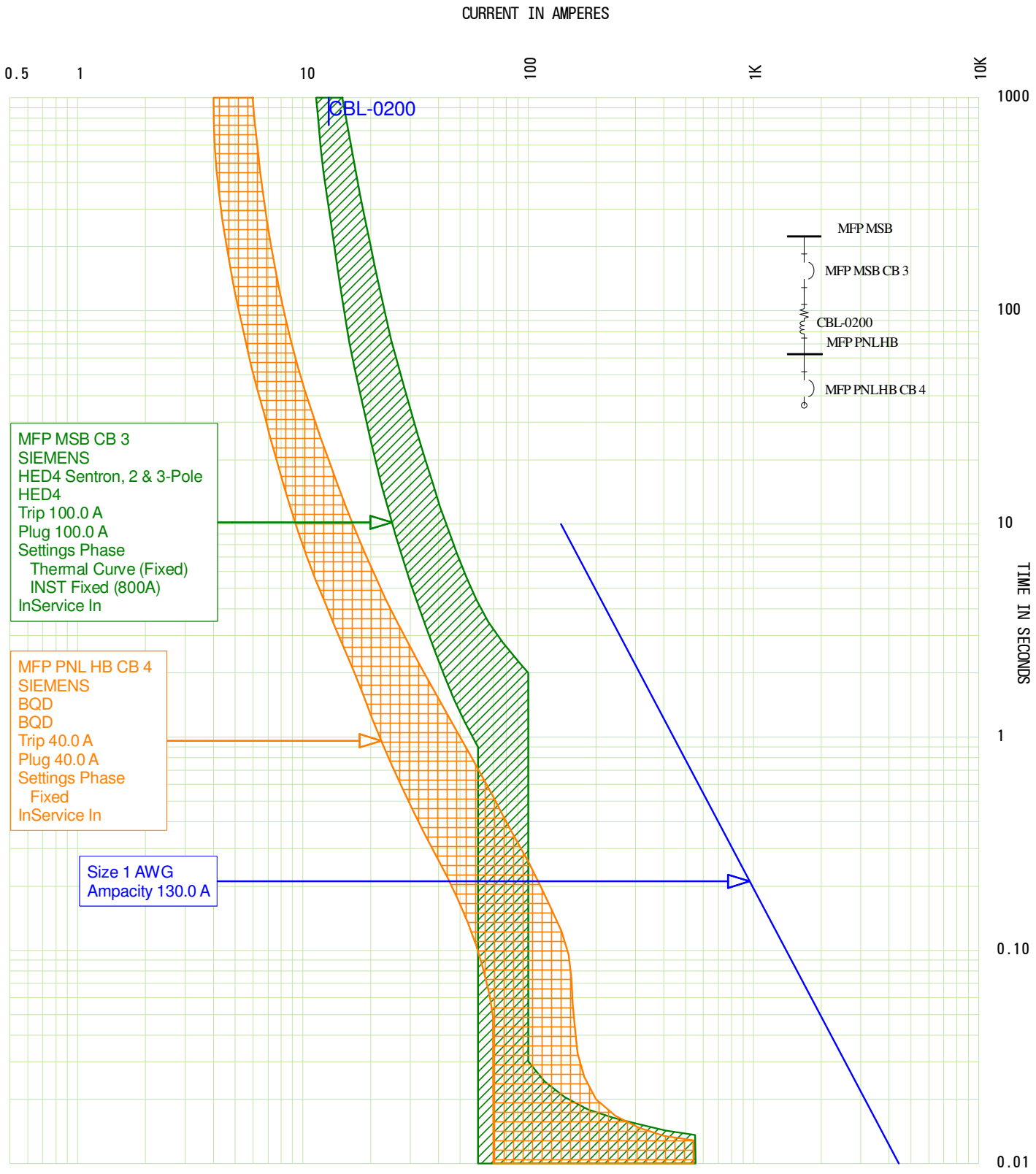
TCC Name: JHP MSB To JHP PNL HP
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



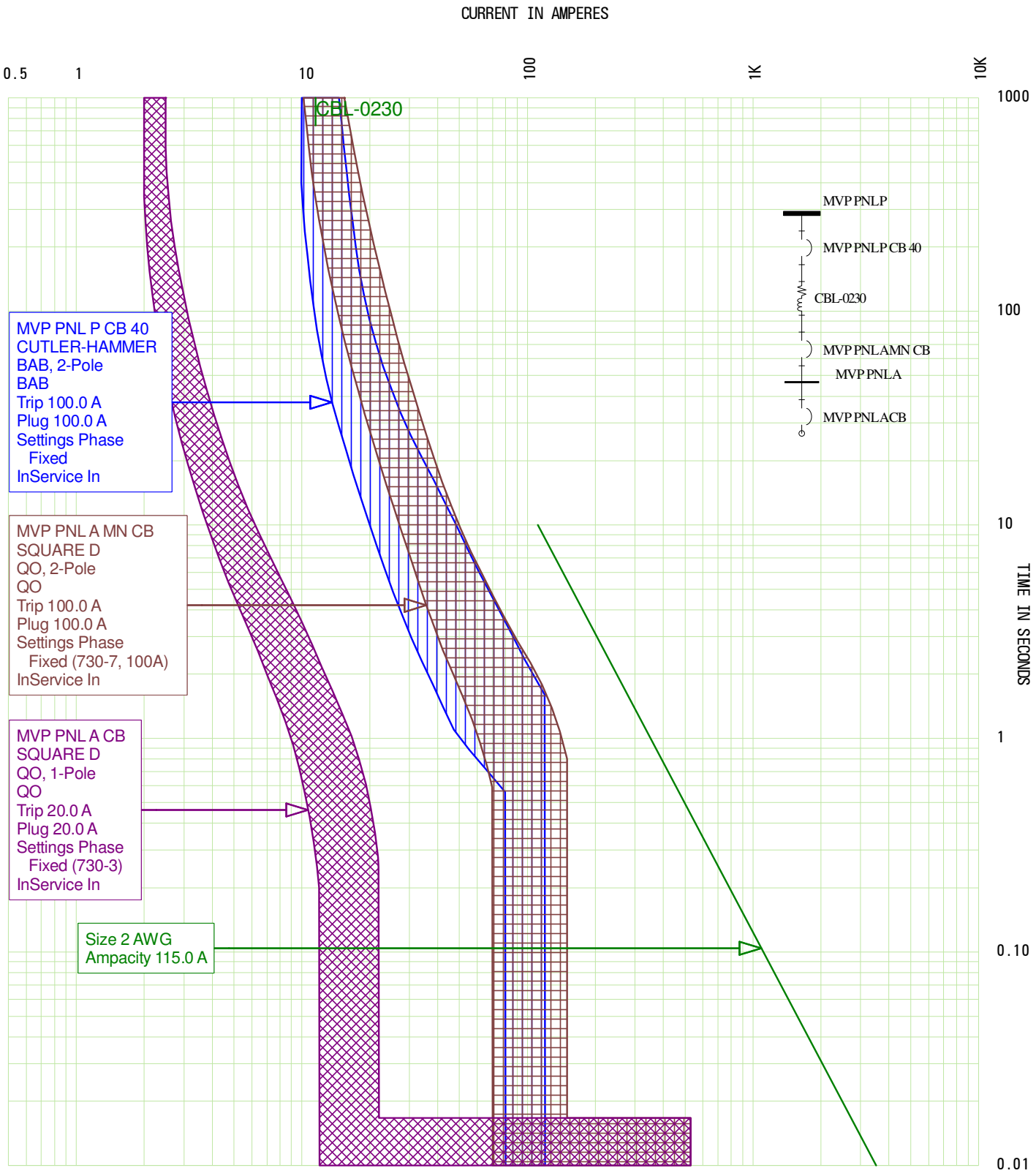
TCC Name: MFP MSB To MFP PNL HA
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



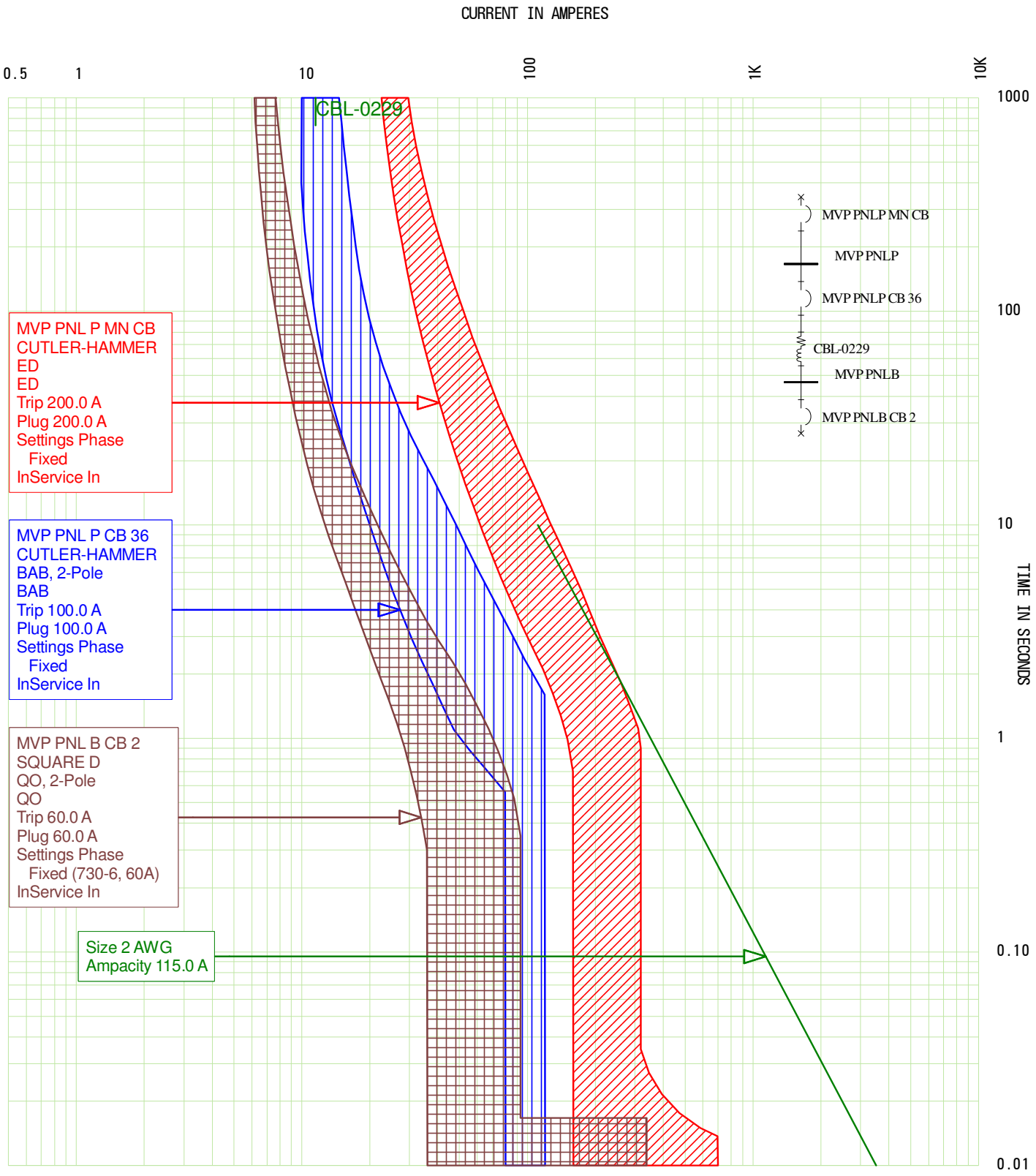
TCC Name: MFP MSB To MFP PNL HB
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



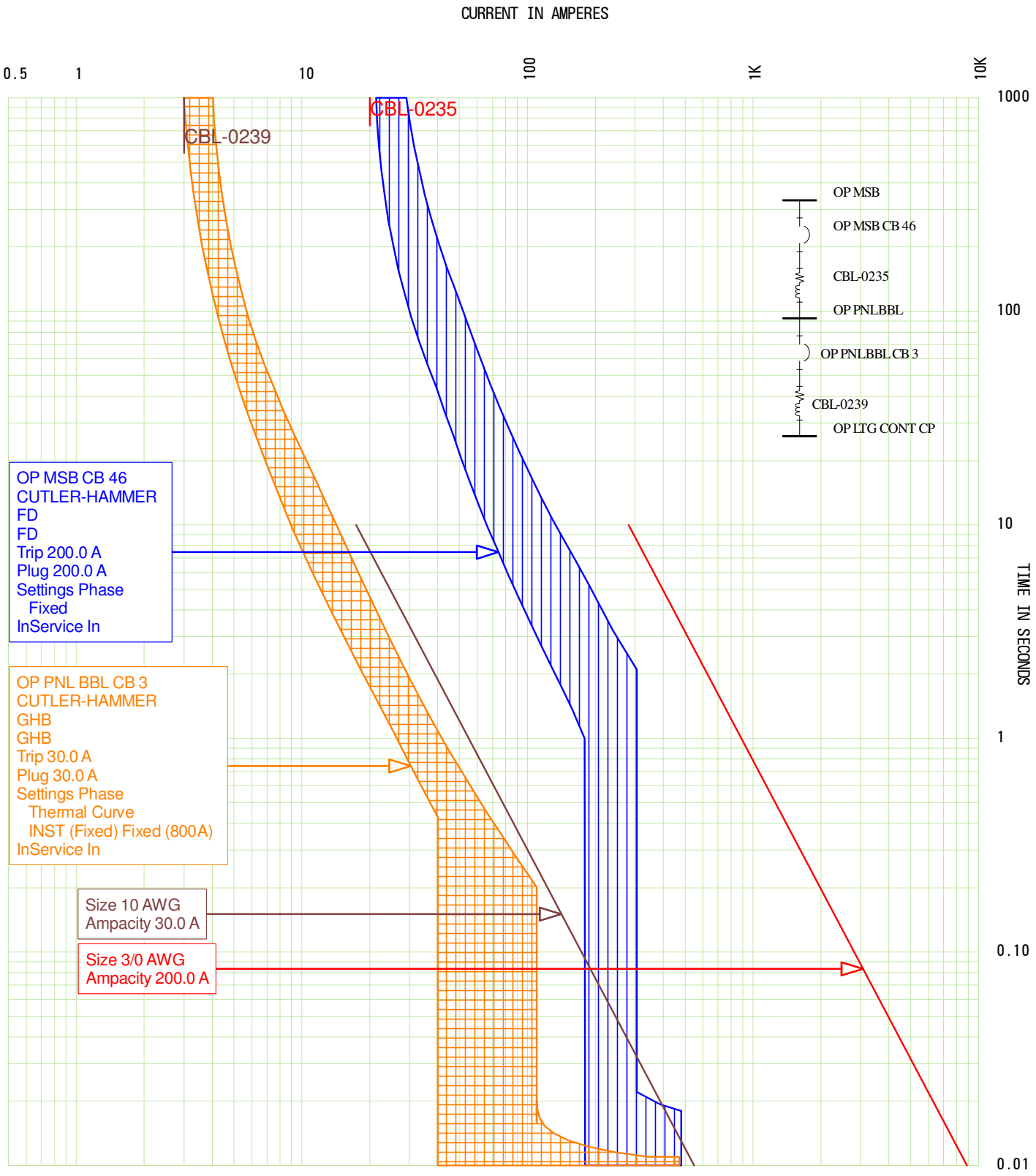
TCC Name: MVP PNL P To MVP PNL A
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 240

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



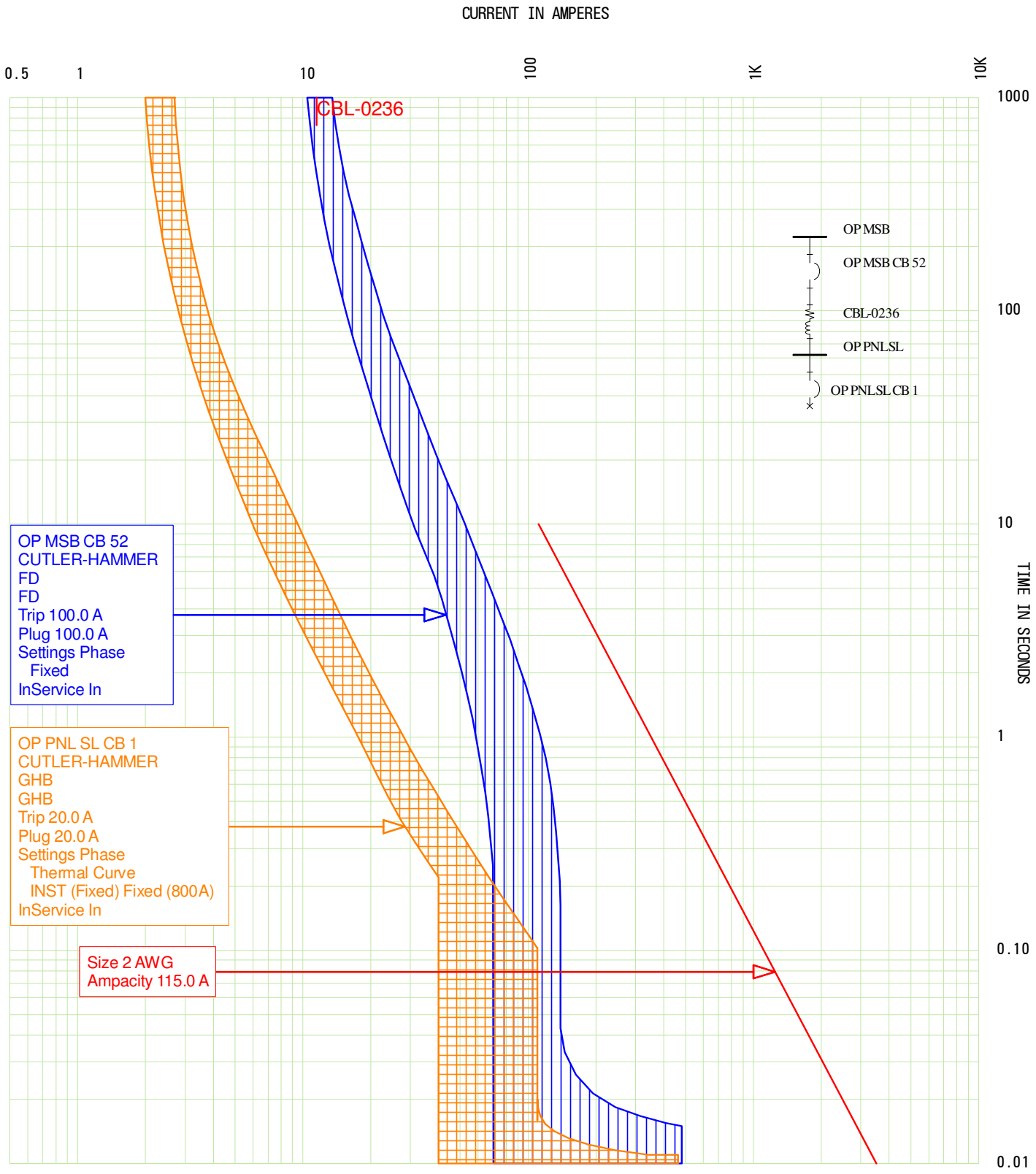
TCC Name: MVP PNL P To MVP PNL B
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 240

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



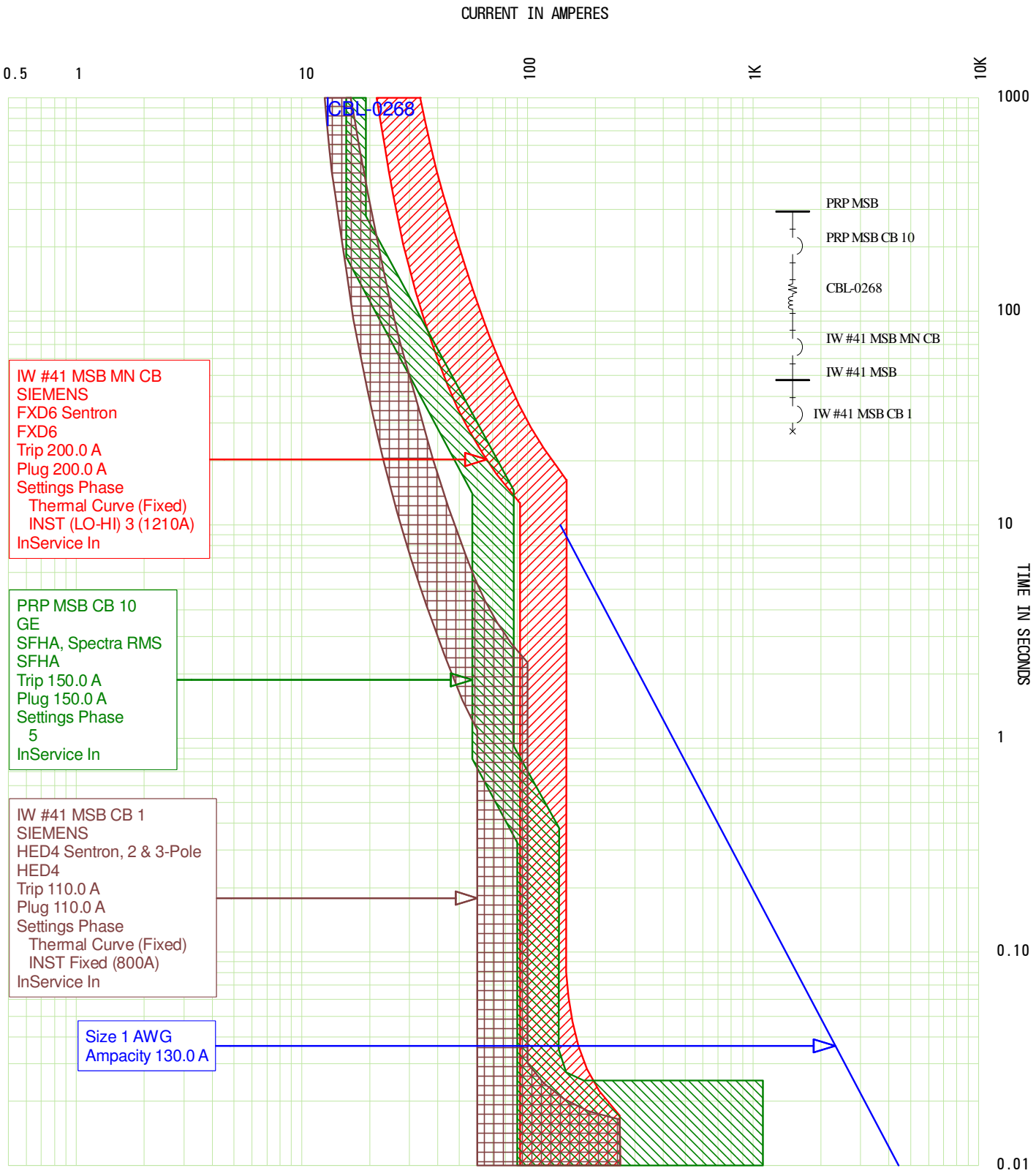
TCC Name: OP MSB To OP PNL BBL
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



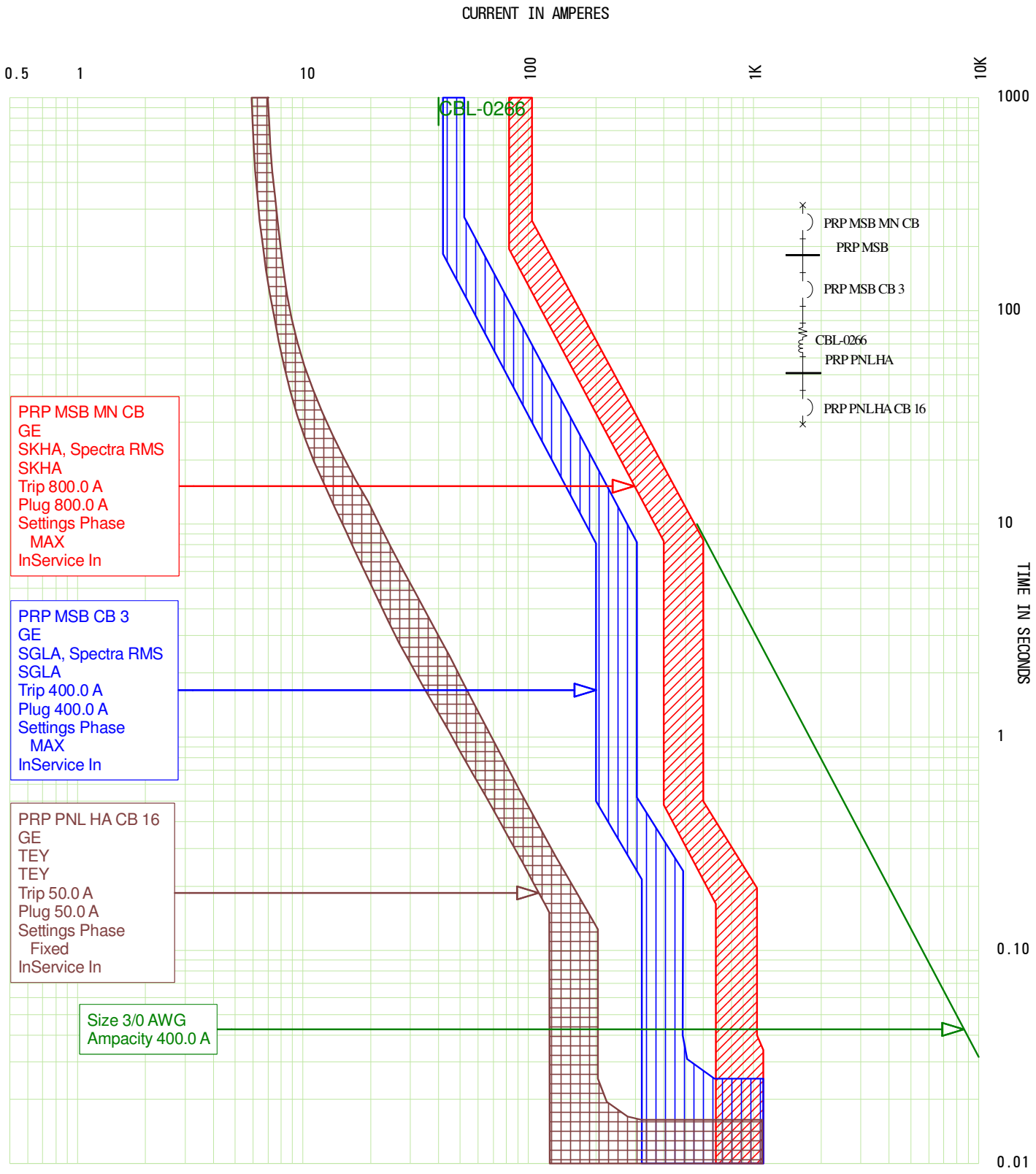
TCC Name: OP MSB To OP PNL SL
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



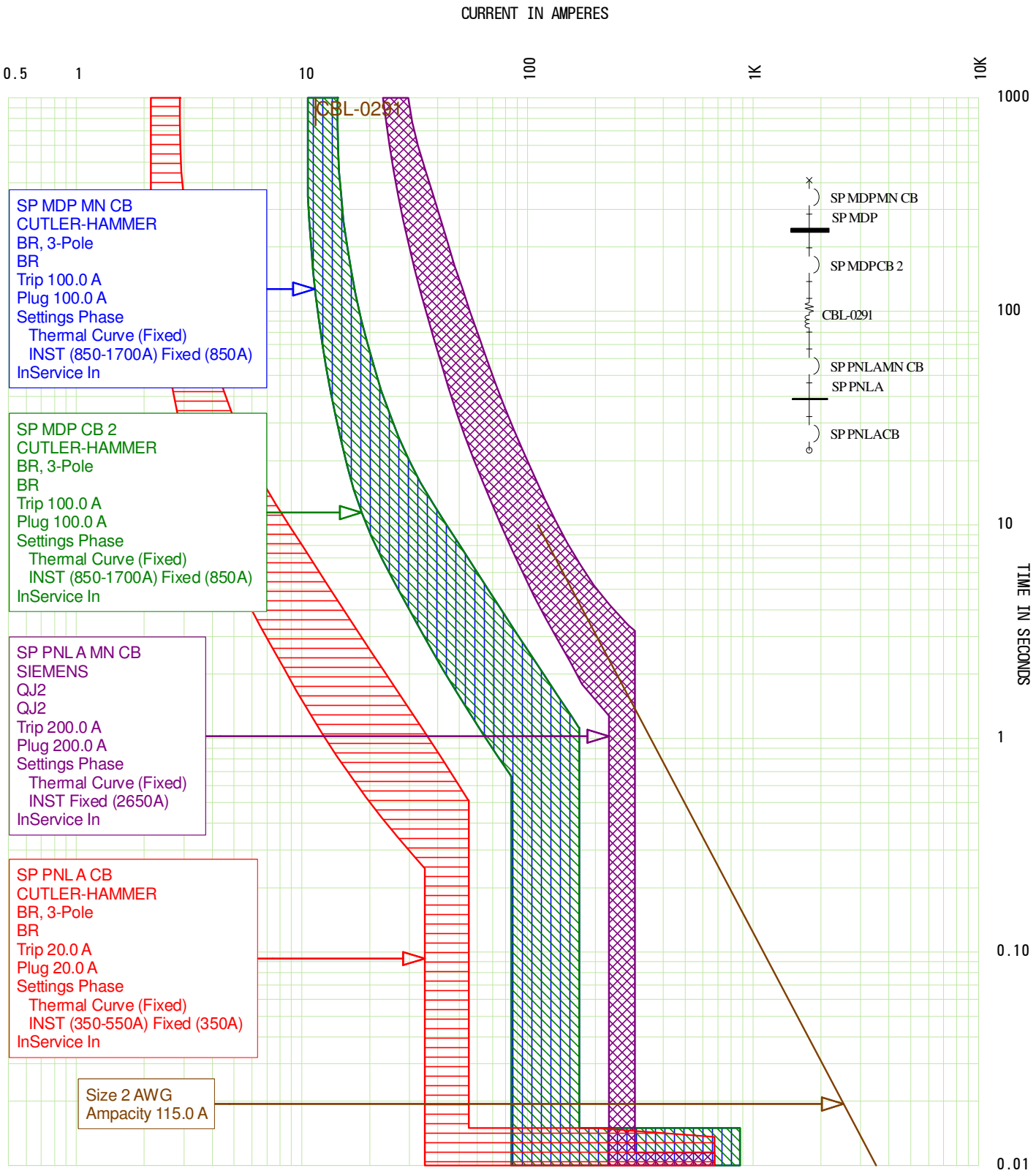
TCC Name: PRP MSB To IW #41 MSB
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



TCC Name: PRP MSB To PRP PNL HA
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 480

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN



TCC Name: SP MDP To SP PNL A
Jurupa Community Services Dist. - Parks - April 2, 2019
Current Scale x 10
Reference Voltage: 240

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Protective Device Settings

The following pages will outline the protective device type and settings for the devices as found during the on-site data collection process. The settings presented will not reflect any recommendations made for the protective devices in Section 3 Findings & Recommendations.

Ground Fault

Prot Dev	Function	Connected Bus	Voltage	Manufacturer	Description	Frame Desc.	Frame	Sensor	Segments	
ECC MSB MN CB	Ground	ECC MSB	480	CUTLER-HAMMER	GF, 400-1200A	HND	1,200	1,200	GFPU (2-6 x Ig) 3 x Ig	GFD (Inst-500 ms) 300 ms I2T
ECP MSB MN CB	Ground	ECP MSB	480	CUTLER-HAMMER	GF, 800-2500A	RGH	1,600	1,600	GFPU, (0.2-1 x In) 1.0X	GFD, (Inst-300ms) 120ms

Jurupa Community Services Dist. - Parks

Low Voltage Fuses

04/02/19

Prot Dev	Connected Bus	Voltage	Manufacturer	Type	Description	Cartridge	Cartridge Size	Trip
7674 SOAR RWP PNL MN FS	7674 SOAR RWP PNL	240	LITTELFUSE	JLLN, 300V Class T	35-1200A	JLLN	200	200
ECP CNC MN DSC FS	ECP CNCSSN MN DSC	208	GOULD SHAWMUT	TR, 250V Class RK5	15-600A	TR	100	100
ECP RR B #1 DSC FS	ECP RR B #1 MN DSC	208	GOULD SHAWMUT	TR, 250V Class RK5	15-600A	TR	100	70
ECP RR B #2 DSC FS	ECP RR B #2 MN DSC	208	GOULD SHAWMUT	TR, 250V Class RK5	15-600A	TR	100	70
ECP STRG B MN DSC FS	ECP STRG BLDG MN DSC	208	GOULD SHAWMUT	TR, 250V Class RK5	15-600A	TR	100	70
HHP MSA FS 3	HHP MSA	480	GOULD SHAWMUT	TRS, 600V Class RK5	15-600A	TRS	400	400
HHP NBRHD CTR DSC FS	HHP NGHBRHD CTR DSC	480	LITTELFUSE	FLSR, 600V RK5	15-600A	FLSR	200	200
OP MSB MN FS	OP MSB	480	BUSSMANN	JJS, 600V Class T	1-800A	JJS	400	400

Static Trip

Dev Name	Function	Bus	Voltage	Manufacturer	Frame Desc.	Frame Size	Sensor	Plug	LTPU	LTD	STPU	STD	I2T	INST
ECC MSB MN CB	Phase	ECC MSB	480	CUTLER-HAMMER	HND	1,200	1,200	1,200	Fixed	Fixed	4	Fixed	In	Fixed
ECP MSB MN CB	Phase	ECP MSB	480	CUTLER-HAMMER	RGH	1,600	1,600	1,600		10	2	Fixed	In	Fixed

Jurupa Community Services Dist. - Parks

LOW VOLTAGE THERMAL MAGNETIC MOLDED CASE BREAKER SETTINGS

04/02/19

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
AHP MSB CB 15	Phase	30	GE	TEY	30 30	15-100A	TEY, 2 & 3-Pole	Fixed
AHP MSB CB 16	Phase	30	GE	TEY	30 30	15-100A	TEY, 2 & 3-Pole	Fixed
AHP MSB CB 19	Phase	30	GE	TEY	30 30	15-100A	TEY, 2 & 3-Pole	Fixed
AHP MSB CB 20	Phase	30	GE	TEY	30 30	15-100A	TEY, 2 & 3-Pole	Fixed
AHP MSB CB 25	Phase	30	GE	TEY	30 30	15-100A	TEY, 2 & 3-Pole	Fixed
AHP MSB CB 26	Phase	30	GE	TEY	30 30	15-100A	TEY, 2 & 3-Pole	Fixed
AHP MSB CB 3	Phase	100	GE	TEY	100 100	15-100A	TEY, 2 & 3-Pole	Fixed
AHP MSB CB 7	Phase	30	GE	TEY	30 30	15-100A	TEY, 2 & 3-Pole	Fixed
AHP MSB CB 8	Phase	30	GE	TEY	30 30	15-100A	TEY, 2 & 3-Pole	Fixed
AHP MSB MN CB	Phase	400	GE	SGLA	400 400	125-600A	SGLA, Spectra RMS	MAX
AHP PNL L2 CB 2	Phase	30	SQUARE D	QO	30 30	15-125A	QO, 2-Pole	Fixed (730-5, 30A)
AHP PNL L2 MN CB	Phase	100	SQUARE D	QO	100 100	15-125A	QO, 2-Pole	Fixed (730-7, 100A)
CCP PNL A CB 13	Phase	125	MURRAY	MP-T	60 60	15-125A	MP-T, 2-Pole	Thermal Curve (Fixed INST (600-900A) Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
CCP PNL CB 18	Phase	60	CUTLER-HAMMER	BR	50 50	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (550-850A) Fixed
CCP PNL CB 22	Phase	100	CUTLER-HAMMER	BR	100 100	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (850-1700A) Fixed
CCP PNL CB 5	Phase	4,000	UNKNOWN	UNKNOWN	20 20	UNKNOWN	UNKNOWN	INST I
CCP PNL MN CB	Phase	4,000	UNKNOWN	UNKNOWN	100 100	UNKNOWN	UNKNOWN	INST I
CCP PNL R CB	Phase	20	SQUARE D	QO	20 20	15-70A	QO, 1-Pole	Fixed (730-3)
CCP PNL R MN CB	Phase	100	SQUARE D	QO	100 100	15-100A	QO, 3-Pole	Fixed (730-7, 100A)
DCP MSB CB 45	Phase	225	CUTLER-HAMMER	FD	225 225	15-225A	FD	Fixed
DCP MSB MN CB	Phase	400	CUTLER-HAMMER	KD	400 400	100-400A	KD	Thermal Curve (Fixed INST (5-10 x Trip) 10
DCP PNL PH CB 10	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
DCP PNL PH CB 16	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
DCP PNL PH CB 19	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
DCP PNL PH CB 22	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
DCP PNL PH CB 25	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
DCP PNL PH CB 31	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
DCP PNL PH CB 32	Phase	100	CUTLER-HAMMER	GHB	100 100	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
DCP PNL PH CB 37	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
DCP PNL PH CB 4	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
DCP PNL PH MN CB	Phase	225	CUTLER-HAMMER	HFD	225 225	15-225A	HFD	Fixed
DCP PNL PL CB 2	Phase	60	SQUARE D	QO	60 60	15-125A	QO, 2-Pole	Fixed (730-6, 60A)
DCP PNL PL MN CB	Phase	200	SQUARE D	QOM2-VH	200 200	100-225A	QOM2-VH	Fixed
DP MN DSC CB	Phase	225	SIEMENS	QJ	200 200	125-225A	QJ	Thermal Curve (Fixed INST Fixed
DP PNL A CB	Phase	20	SQUARE D	QO	20 20	15-70A	QO, 1-Pole	Fixed (730-3)
DP PNL A MN CB	Phase	100	SQUARE D	QO	100 100	15-125A	QO, 2-Pole	Fixed (730-7, 100A)
DP PNL P CB 1	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 13	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 17	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 2	Phase	50	SIEMENS	BL	50 50	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 21	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 22	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 25	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 26	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 29	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
DP PNL P CB 30	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 34	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 40	Phase	100	SIEMENS	BL	100 100	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 5	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
DP PNL P CB 9	Phase	20	SIEMENS	BL	20 20	15-125A	BL, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
ECC MSB CB 2	Phase	600	CUTLER-HAMMER	LGH	600 600	250-600A, Fixed, UL	LG, Series G	Thermal Curve (Fixed INST (5-10 x Trip) 5
ECC MSB CB 4	Phase	300	CUTLER-HAMMER	HKD	300 300	100-400A	HKD	Thermal Curve (Fixed INST (5-10 x Trip) 10
ECC MSB CB 5	Phase	225	CUTLER-HAMMER	HFD	225 225	15-225A	HFD	Fixed
ECC MSB CB 6	Phase	200	CUTLER-HAMMER	HFD	200 200	15-225A	HFD	Fixed
ECC MSB CB 7	Phase	225	CUTLER-HAMMER	HFD	225 225	15-225A	HFD	Fixed
ECC MSB CB 8	Phase	225	CUTLER-HAMMER	HFD	225 225	15-225A	HFD	Fixed
ECC PNL DPL1 CB 34	Phase	100	CUTLER-HAMMER	BAB	100 100	15-100A	BAB, 3-Pole	Fixed
ECC PNL DPL1 CB 39	Phase	100	CUTLER-HAMMER	BAB	100 100	15-100A	BAB, 3-Pole	Fixed
ECC PNL DPL1 MN CB	Phase	400	CUTLER-HAMMER	DK	400 400	250-400A	DK	Thermal Curve (Fixed INST (5-10 x Trip) 10
ECC PNL DPL2 CB 27	Phase	100	CUTLER-HAMMER	BAB	100 100	10-125A	BAB, 2-Pole	Fixed
ECC PNL DPL2 CB 33	Phase	100	CUTLER-HAMMER	BAB	100 100	10-125A	BAB, 2-Pole	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
ECC PNL DPL2 CB 34	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
ECC PNL DPL2 CB 39	Phase	225	CUTLER-HAMMER	ED	225 225	100-225A	ED	Fixed
ECC PNL DPL2 CB 40	Phase	100	CUTLER-HAMMER	BAB	100 100	10-125A	BAB, 2-Pole	Fixed
ECC PNL DPL2 MN CB	Phase	600	CUTLER-HAMMER	LGE	600 600	250-600A, Fixed, UL	LG, Series G	Thermal Curve (Fixed INST (5-10 x Trip) 5
ECC PNL HL1 CB 12	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECC PNL HL1 CB 2	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECC PNL HL1 CB 22	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECC PNL HL1 CB 32	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECC PNL HL1 CB 36	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECC PNL HL1 CB A	Phase	40	CUTLER-HAMMER	GHB	40 40	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECC PNL HL1 MN CB	Phase	225	CUTLER-HAMMER	HFD	225 225	15-225A	HFD	Fixed
ECC PNL HL2 CB	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECC PNL HL2 MN CB	Phase	225	CUTLER-HAMMER	FD	225 225	15-225A	FD	Fixed
ECC PNL HM1 CB 22	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECC PNL HM1 CB 3	Phase	40	CUTLER-HAMMER	GHB	40 40	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECC PNL HM1 CB 44	Phase	150	CUTLER-HAMMER	FD	150 150	15-225A	FD	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
ECC PNL HM1 MN CB	Phase	225	CUTLER-HAMMER	HFD	225 225	15-225A	HFD	Fixed
ECC PNL HM2 CB	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Fixed
ECC PNL HM2 CB 10	Phase	60	CUTLER-HAMMER	FD	60 60	15-225A	FD	Fixed
ECC PNL HM2 CB 15	Phase	60	CUTLER-HAMMER	FD	60 60	15-225A	FD	Fixed
ECC PNL HM2 CB 16	Phase	60	CUTLER-HAMMER	FD	60 60	15-225A	FD	Fixed
ECC PNL HM2 CB 21	Phase	60	CUTLER-HAMMER	FD	60 60	15-225A	FD	Fixed
ECC PNL HM2 CB 22	Phase	90	CUTLER-HAMMER	FD	90 90	15-225A	FD	Fixed
ECC PNL HM2 CB 27	Phase	100	CUTLER-HAMMER	FD	100 100	15-225A	FD	Fixed
ECC PNL HM2 CB 28	Phase	40	CUTLER-HAMMER	FD	40 40	15-225A	FD	Fixed
ECC PNL HM2 CB 3	Phase	50	CUTLER-HAMMER	FD	50 50	15-225A	FD	Fixed
ECC PNL HM2 CB 4	Phase	150	CUTLER-HAMMER	FD	150 150	15-225A	FD	Fixed
ECC PNL HM2 CB 9	Phase	40	CUTLER-HAMMER	FD	40 40	15-225A	FD	Fixed
ECC PNL HM2 MN CB	Phase	600	CUTLER-HAMMER	LGE	600 600	250-600A, Fixed, UL	LG, Series G	Thermal Curve (Fixed INST (5-10 x Trip) 5
ECC PNL K1 CB 32	Phase	80	CUTLER-HAMMER	BAB	80 80	15-100A	BAB, 3-Pole	Fixed
ECC PNL K1 CB 37	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
ECC PNL K1 MN CB	Phase	225	CUTLER-HAMMER	ED	225 225	100-225A	ED	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
ECC PNL L2 CB	Phase	20	CUTLER-HAMMER	BAB	20 20	10-70A	BAB, 1-Pole	Fixed
ECC PNL L2 MN CB	Phase	100	CUTLER-HAMMER	BAB	100 100	15-100A	BAB, 3-Pole	Fixed
ECC PNL L3 CB 1	Phase	30	CUTLER-HAMMER	BAB	30 30	10-125A	BAB, 2-Pole	Fixed
ECC PNL L3 CB 21	Phase	40	CUTLER-HAMMER	BAB	40 40	15-100A	BAB, 3-Pole	Fixed
ECC PNL L3 MN CB	Phase	100	CUTLER-HAMMER	BAB	100 100	15-100A	BAB, 3-Pole	Fixed
ECC PNL L5 CB 11	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
ECC PNL L5 MN CB	Phase	100	CUTLER-HAMMER	BAB	100 100	10-125A	BAB, 2-Pole	Fixed
ECC PNL L6 CB	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
ECC PNL L6 CB 11	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
ECC PNL L6 CB 27	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
ECC PNL L6 MN CB	Phase	100	CUTLER-HAMMER	BAB	100 100	10-125A	BAB, 2-Pole	Fixed
ECC PNL L7 CB	Phase	20	SQUARE D	QO	20 20	15-70A	QO, 1-Pole	Fixed (730-3)
ECP CNCSSN PNL CB 5	Phase	60	WESTINGHOUSE	BR	50 50	10-150A	BR, 2-Pole	Thermal Curve (Fixed INST Fixed
ECP CNCSSN PNL MN CB	Phase	150	WESTINGHOUSE	BR	125 125	10-150A	BR, 2-Pole	Thermal Curve (Fixed INST Fixed
ECP DP CB 6	Phase	70	CUTLER-HAMMER	BAB	70 70	15-100A	BAB, 3-Pole	Fixed
ECP MSB CB 3	Phase	20	CUTLER-HAMMER	FD	20 20	15-225A	FD	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
ECP MSB CB 33	Phase	150	CUTLER-HAMMER	FD	150 150	15-225A	FD	Fixed
ECP MSB CB 40	Phase	300	CUTLER-HAMMER	KD	300 300	100-400A	KD	Thermal Curve (Fixed INST (5-10 x Trip) 10
ECP MSB CB 45	Phase	400	CUTLER-HAMMER	KD	400 400	100-400A	KD	Thermal Curve (Fixed INST (5-10 x Trip) 10
ECP MSB CB 46	Phase	400	CUTLER-HAMMER	KD	400 400	100-400A	KD	Thermal Curve (Fixed INST (5-10 x Trip) 10
ECP MSB CB 52	Phase	600	CUTLER-HAMMER	LGE	600 600	250-600A, Fixed, UL	LG, Series G	Thermal Curve (Fixed INST (5-10 x Trip) 5
ECP PNL A 480V CB	Phase	20	CUTLER-HAMMER	EHD	20 20	15-100A	EHD	Fixed
ECP PNL A CB	Phase	20	CUTLER-HAMMER	BR	20 20	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (350-550A) Fixed
ECP PNL A MN CB	Phase	40	CUTLER-HAMMER	BR	25 25	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (400-650A) Fixed
ECP PNL DP CB 1	Phase	100	CUTLER-HAMMER	BAB	100 100	15-100A	BAB, 3-Pole	Fixed
ECP PNL DP CB 2	Phase	70	CUTLER-HAMMER	BAB	70 70	15-100A	BAB, 3-Pole	Fixed
ECP PNL DP CB 39	Phase	225	CUTLER-HAMMER	EDB	200 200	100-225A, UL	EDB, 2-3 Poles	Fixed
ECP PNL DP CB 5	Phase	70	CUTLER-HAMMER	BAB	70 70	15-100A	BAB, 3-Pole	Fixed
ECP PNL DP MN CB	Phase	600	CUTLER-HAMMER	LGE	600 600	250-600A, Fixed, UL	LG, Series G	Thermal Curve (Fixed INST (5-10 x Trip) 5
ECP PNL HA CB 10	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HA CB 15	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HA CB 16	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
ECP PNL HA CB 3	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HA CB 4	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HA CB 9	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HA MN CB	Phase	400	CUTLER-HAMMER	KD	400 400	100-400A	KD	Thermal Curve (Fixed INST (5-10 x Trip) 10
ECP PNL HB CB 10	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HB CB 15	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HB CB 20	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HB CB 21	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HB CB 3	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HB CB 4	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HB CB 9	Phase	60	CUTLER-HAMMER	GHB	60 60	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
ECP PNL HB MN CB	Phase	400	CUTLER-HAMMER	KD	400 400	100-400A	KD	Thermal Curve (Fixed INST (5-10 x Trip) 10
ECP RR B 1 P CB 5	Phase	60	WESTINGHOUSE	BR	50 50	10-150A	BR, 2-Pole	Thermal Curve (Fixed INST Fixed
ECP RR B 1 P MN CB	Phase	150	WESTINGHOUSE	BR	125 125	10-150A	BR, 2-Pole	Thermal Curve (Fixed INST Fixed
ECP RR B 2 P CB 5	Phase	60	WESTINGHOUSE	BR	50 50	10-150A	BR, 2-Pole	Thermal Curve (Fixed INST Fixed
ECP RR B 2 P MN CB	Phase	150	WESTINGHOUSE	BR	125 125	10-150A	BR, 2-Pole	Thermal Curve (Fixed INST Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
ECP STRG B PNL CB 5	Phase	60	WESTINGHOUSE	BR	50 50	10-150A	BR, 2-Pole	Thermal Curve (Fixed INST Fixed
ECP STRG B PNL MN CB	Phase	150	WESTINGHOUSE	BR	125 125	10-150A	BR, 2-Pole	Thermal Curve (Fixed INST Fixed
HARR/CHAN RVRWLK PNL CB 2	Phase	20	CUTLER-HAMMER	BR	20 20	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (350-550A) Fixed
HARR/CHAN RVRWLK PNL MN C	Phase	60	CUTLER-HAMMER	QC	60 60	15-100A	QC, 3-Pole	Fixed
HHP BATTNG CG DSC CB	Phase	200	SIEMENS	HFXD6	200 200	70-250A	HFXD6 Sentron	Thermal Curve (Fixed INST (LO-HI) LO
HHP HA CB 10	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HHP HA CB 14	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HHP HA CB 15	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HHP HA CB 2	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HHP HA CB 21	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HHP HA CB 22	Phase	50	SQUARE D	EDB	50 50	15-125A	EDB	Fixed
HHP HA CB 3	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HHP HA CB 6	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HHP HA CB 9	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HHP MSA CB 4R	Phase	125	SIEMENS	HHED6	100 100	15-125A	HHED6 Sentron	Thermal Curve (Fixed INST Fixed
HHP MSA CB 5L	Phase	200	SIEMENS	HFXD6	200 200	70-250A	HFXD6 Sentron	Thermal Curve (Fixed INST (LO-HI) LO

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
HHP MSA CB 5R	Phase	250	SIEMENS	HFXD6	225 225	70-250A	HFXD6 Sentron	Thermal Curve (Fixed INST (LO-HI) LO
HHP MSA CB 6	Phase	800	SIEMENS	HLMXD6	800 800	500-800A	HLMXD6 Sentron	Thermal Curve (Fixed INST (LO-HI) LO
HHP MSB CB 4	Phase	800	SIEMENS	LMXD6	700 700	500-800A	LMXD6 Sentron	Thermal Curve (Fixed INST (LO-HI) LO
HHP MSB CB 5	Phase	200	SIEMENS	FXD6	200 200	70-250A	FXD6 Sentron	Thermal Curve (Fixed INST (LO-HI) LO
HHP MSB MN CB	Phase	800	SIEMENS	LMXD6	800 800	500-800A	LMXD6 Sentron	Thermal Curve (Fixed INST (LO-HI) LO
HHP PNL A CB 1	Phase	30	CUTLER-HAMMER	BAB	30 30	10-125A	BAB, 2-Pole	Fixed
HHP PNL A CB 35	Phase	40	CUTLER-HAMMER	BAB	40 40	10-125A	BAB, 2-Pole	Fixed
HHP PNL A CB 39	Phase	50	CUTLER-HAMMER	BAB	50 50	10-125A	BAB, 2-Pole	Fixed
HHP PNL A CB 5	Phase	40	CUTLER-HAMMER	BAB	40 40	10-125A	BAB, 2-Pole	Fixed
HHP PNL A CB 9	Phase	50	CUTLER-HAMMER	BAB	50 50	10-125A	BAB, 2-Pole	Fixed
HHP PNL A MN CB	Phase	600	CUTLER-HAMMER	HLD	600 600	300-600A	HLD	Thermal Curve (Fixed INST (5-10 x Trip) 5
HHP PNL BC CB 1	Phase	100	CUTLER-HAMMER	BAB	100 100	10-125A	BAB, 2-Pole	Fixed
HHP PNL BC CB 25	Phase	175	CUTLER-HAMMER	HFD	175 175	15-225A	HFD	Fixed
HHP PNL BC CB 29	Phase	175	CUTLER-HAMMER	HFD	175 175	15-225A	HFD	Fixed
HHP PNL BC MN CB	Phase	400	CUTLER-HAMMER	HKD	400 400	100-400A	HKD	Thermal Curve (Fixed INST (5-10 x Trip) 10
HHP PNL BCA CB	Phase	20	CUTLER-HAMMER	BAB	20 20	10-70A	BAB, 1-Pole	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
HHP PNL BCA MN CB	Phase	225	CUTLER-HAMMER	EDB	175 175	100-225A, UL	EDB, 2-3 Poles	Fixed
HHP PNL BCB CB	Phase	20	CUTLER-HAMMER	BAB	20 20	10-70A	BAB, 1-Pole	Fixed
HHP PNL BCB MN CB	Phase	225	CUTLER-HAMMER	EDB	175 175	100-225A, UL	EDB, 2-3 Poles	Fixed
HHP PNL BCC CB 1	Phase	30	CUTLER-HAMMER	BAB	30 30	10-125A	BAB, 2-Pole	Fixed
HHP PNL BCC MN CB	Phase	100	CUTLER-HAMMER	EHD	100 100	15-100A	EHD	Fixed
HHP PNL BFA CB 10	Phase	60	CUTLER-HAMMER	EGB	60 60	15-125A, Fixed, UL	EGB, 3-4 Poles	Thermal Curve (Fixed Magnetic (Fixed) Fixed
HHP PNL BFA CB 15	Phase	30	CUTLER-HAMMER	EGB	30 30	15-125A, Fixed, UL	EGB, 3-4 Poles	Thermal Curve (Fixed Magnetic (Fixed) Fixed
HHP PNL BFA CB 21	Phase	60	CUTLER-HAMMER	EGB	60 60	15-125A, Fixed, UL	EGB, 3-4 Poles	Thermal Curve (Fixed Magnetic (Fixed) Fixed
HHP PNL BFA CB 27	Phase	60	CUTLER-HAMMER	EGB	60 60	15-125A, Fixed, UL	EGB, 3-4 Poles	Thermal Curve (Fixed Magnetic (Fixed) Fixed
HHP PNL BFA CB 3	Phase	60	CUTLER-HAMMER	EGB	60 60	15-125A, Fixed, UL	EGB, 3-4 Poles	Thermal Curve (Fixed Magnetic (Fixed) Fixed
HHP PNL BFA CB 33	Phase	30	CUTLER-HAMMER	EGB	30 30	15-125A, Fixed, UL	EGB, 3-4 Poles	Thermal Curve (Fixed Magnetic (Fixed) Fixed
HHP PNL BFA CB 4	Phase	60	CUTLER-HAMMER	EGB	60 60	15-125A, Fixed, UL	EGB, 3-4 Poles	Thermal Curve (Fixed Magnetic (Fixed) Fixed
HHP PNL BFA CB 9	Phase	20	CUTLER-HAMMER	EGB	20 20	15-125A, Fixed, UL	EGB, 3-4 Poles	Thermal Curve (Fixed Magnetic (Fixed) Fixed
HHP PNL BFE CB 10	Phase	30	SQUARE D	EDB	30 30	15-125A	EDB	Fixed
HHP PNL BFE CB 15	Phase	30	SQUARE D	EDB	30 30	15-125A	EDB	Fixed
HHP PNL BFE CB 16	Phase	60	SQUARE D	EDB	60 60	15-125A	EDB	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
HHP PNL BFE CB 21	Phase	60	SQUARE D	EDB	60 60	15-125A	EDB	Fixed
HHP PNL BFE CB 22	Phase	30	SQUARE D	EDB	30 30	15-125A	EDB	Fixed
HHP PNL BFE CB 28	Phase	60	SQUARE D	EDB	60 60	15-125A	EDB	Fixed
HHP PNL BFE CB 3	Phase	60	SQUARE D	EDB	60 60	15-125A	EDB	Fixed
HHP PNL BFE CB 4	Phase	60	SQUARE D	EDB	60 60	15-125A	EDB	Fixed
HHP PNL BFE CB 9	Phase	30	SQUARE D	EDB	30 30	15-125A	EDB	Fixed
HHP PNL DPBF CB 11	Phase	400	SQUARE D	LH	400 400	125-400A	LH	Thermal Curve INST LO
HHP PNL DPBF CB 17	Phase	400	SQUARE D	LH	400 400	125-400A	LH	Thermal Curve INST LO
HHP PNL DPBF CB 22	Phase	250	SQUARE D	JG	250 250	150-250A, UL	J-Frame, Powerpact	Thermal Curve INST (5-10 x Trip) Low
HHP PNL DPBF MN CB	Phase	800	SQUARE D	MG	700 700	300-800A	MG w/ ET1.0, 2-8x Inst.	Thermal Curve INST 2
HHP PNL HB CB 10	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HHP PNL HB CB 11	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HHP PNL HB CB 28	Phase	100	SQUARE D	EDB	100 100	15-125A	EDB	Fixed
HHP PNL HB CB 5	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
HMP PNL CB 1	Phase	20	SQUARE D	QO	20 20	15-125A	QO, 2-Pole	Fixed (730-4, 20A)
HMP PNL CB 10	Phase	20	SQUARE D	QO	20 20	15-125A	QO, 2-Pole	Fixed (730-4, 20A)

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
HMP PNL CB 14	Phase	20	SQUARE D	QO	20 20	15-125A	QO, 2-Pole	Fixed (730-4, 20A)
HMP PNL CB 5	Phase	20	SQUARE D	QO	20 20	15-125A	QO, 2-Pole	Fixed (730-4, 20A)
HMP PNL MN CB	Phase	100	SQUARE D	QO	100 100	15-125A	QO, 2-Pole	Fixed (730-7, 100A)
IW #41 MSB CB 1	Phase	125	SIEMENS	HED4	110 110	15-125A	HED4 Sentron, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
IW #41 MSB CB 2	Phase	30	SIEMENS	HED4	30 30	15-125A	HED4 Sentron, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
IW #41 MSB MN CB	Phase	200	SIEMENS	FXD6	200 200	70-250A	FXD6 Sentron	Thermal Curve (Fixed INST (LO-HI) 3
IW #41 PNL A CB 2	Phase	35	SIEMENS	QP	30 30	15-125A	QP, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
IW #41 PNL A MN CB	Phase	70	SIEMENS	QP	60 60	15-125A	QP, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
JHP MSB CB 10	Phase	125	SIEMENS	HED6	60 60	15-125A	HED6 Sentron	Thermal Curve (Fixed INST (LO-HI) Fixed
JHP MSB CB 15	Phase	125	SIEMENS	HED6	60 60	15-125A	HED6 Sentron	Thermal Curve (Fixed INST (LO-HI) Fixed
JHP MSB CB 3	Phase	150	SIEMENS	FXD6	150 150	70-250A	FXD6 Sentron	Thermal Curve (Fixed INST (LO-HI) LO
JHP MSB CB 9	Phase	125	SIEMENS	HED6	100 100	15-125A	HED6 Sentron	Thermal Curve (Fixed INST (LO-HI) Fixed
JHP MSB MN CB	Phase	800	SIEMENS	LMXD6	800 800	500-800A	LMXD6 Sentron	Thermal Curve (Fixed INST (LO-HI) LO
JHP PNL 1BB CB 3	Phase	40	SQUARE D	EDB	40 40	15-125A	EDB	Fixed
JHP PNL HP CB 1	Phase	30	SQUARE D	EDB	30 30	15-125A	EDB	Fixed
JHP PNL HP CB 10	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
JHP PNL HP CB 13	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
JHP PNL HP CB 2	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
JHP PNL HP CB 21	Phase	50	SQUARE D	EDB	50 50	15-125A	EDB	Fixed
JHP PNL HP CB 5	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
JHP PNL HP CB 6	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
JHP PNL HP CB 9	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
JHP PNL SF CB 2	Phase	30	SQUARE D	EDB	30 30	15-125A	EDB	Fixed
JHP PNL SK CB 3	Phase	20	SQUARE D	EDB	20 20	15-125A	EDB	Fixed
MFP MSB CB 2	Phase	400	SIEMENS	HJD6-A	400 400	200-400A	HJD6-A Sentron	Thermal Curve (Fixed INST (LO-HI) LO
MFP MSB CB 3	Phase	125	SIEMENS	HED4	100 100	15-125A	HED4 Sentron, 2 & 3-Pole	Thermal Curve (Fixed INST Fixed
MFP MSB MN CB	Phase	600	SIEMENS	HLD6-A	600 600	250-600A	HLD6-A Sentron	Thermal Curve (Fixed INST (LO-HI) LO
MFP PNL HA CB 10	Phase	20	SIEMENS	BQD	20 20	15-100A	BQD	Fixed
MFP PNL HA CB 15	Phase	30	SIEMENS	BQD	30 30	15-100A	BQD	Fixed
MFP PNL HA CB 16	Phase	20	SIEMENS	BQD	20 20	15-100A	BQD	Fixed
MFP PNL HA CB 21	Phase	20	SIEMENS	BQD	20 20	15-100A	BQD	Fixed
MFP PNL HA CB 22	Phase	20	SIEMENS	BQD	20 20	15-100A	BQD	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
MFP PNL HA CB 27	Phase	20	SIEMENS	BQD	20 20	15-100A	BQD	Fixed
MFP PNL HA CB 28	Phase	20	SIEMENS	BQD	20 20	15-100A	BQD	Fixed
MFP PNL HA CB 3	Phase	20	SIEMENS	BQD	20 20	15-100A	BQD	Fixed
MFP PNL HA CB 34	Phase	30	SIEMENS	BQD	30 30	15-100A	BQD	Fixed
MFP PNL HA CB 37	Phase	20	SIEMENS	BQD	20 20	15-100A	BQD	Fixed
MFP PNL HA CB 4	Phase	30	SIEMENS	BQD	30 30	15-100A	BQD	Fixed
MFP PNL HA CB 9	Phase	30	SIEMENS	BQD	30 30	15-100A	BQD	Fixed
MFP PNL HB CB 4	Phase	40	SIEMENS	BQD	40 40	15-100A	BQD	Fixed
MVP PNL A CB	Phase	20	SQUARE D	QO	20 20	15-70A	QO, 1-Pole	Fixed (730-3)
MVP PNL A MN CB	Phase	100	SQUARE D	QO	100 100	15-125A	QO, 2-Pole	Fixed (730-7, 100A)
MVP PNL B CB 2	Phase	60	SQUARE D	QO	60 60	15-125A	QO, 2-Pole	Fixed (730-6, 60A)
MVP PNL P CB 1	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 13	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 17	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 2	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 21	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
MVP PNL P CB 25	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 29	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 33	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 36	Phase	100	CUTLER-HAMMER	BAB	100 100	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 40	Phase	100	CUTLER-HAMMER	BAB	100 100	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 5	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 6	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
MVP PNL P CB 9	Phase	20	CUTLER-HAMMER	BAB	20 20	10-125A	BAB, 2-Pole	Fixed
MVP PNL P MN CB	Phase	200	CUTLER-HAMMER	ED	200 200	100-225A	ED	Fixed
OP BLDG #1 PNL CB	Phase	20	SQUARE D	QO	20 20	15-70A	QO, 1-Pole	Fixed (730-3)
OP BLDG #1 PNL MN CB	Phase	100	SQUARE D	QO	100 100	15-125A	QO, 2-Pole	Fixed (730-7, 100A)
OP BLDG #2 PNL CB	Phase	20	SQUARE D	QO	20 20	15-70A	QO, 1-Pole	Fixed (730-3)
OP BLDG #2 PNL MN CB	Phase	100	SQUARE D	QO	100 100	15-125A	QO, 2-Pole	Fixed (730-7, 100A)
OP MSB CB 45	Phase	30	CUTLER-HAMMER	FD	30 30	15-225A	FD	Fixed
OP MSB CB 46	Phase	200	CUTLER-HAMMER	FD	200 200	15-225A	FD	Fixed
OP MSB CB 51	Phase	30	CUTLER-HAMMER	FD	30 30	15-225A	FD	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
OP MSB CB 52	Phase	100	CUTLER-HAMMER	FD	100 100	15-225A	FD	Fixed
OP PNL BBL CB 10	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 15	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 16	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 21	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 22	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 27	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 28	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 3	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 33	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 34	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 4	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL BBL CB 9	Phase	30	CUTLER-HAMMER	GHB	30 30	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 1	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 13	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 14	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
OP PNL SL CB 17	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 18	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 2	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 21	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 22	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 29	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 5	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 6	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
OP PNL SL CB 9	Phase	20	CUTLER-HAMMER	GHB	20 20	15-100A, 2-3 Pole	GHB	Thermal Curve INST (Fixed) Fixed
PRP MSB CB 10	Phase	250	GE	SFHA	150 150	70-250A	SFHA, Spectra RMS	5
PRP MSB CB 15	Phase	20	GE	SEHA	20 20	15-150A	SEHA, Spectra RMS	MIN
PRP MSB CB 16	Phase	60	GE	SELA	60 60	15-150A	SELA, Spectra RMS	6
PRP MSB CB 3	Phase	400	GE	SGLA	400 400	125-600A	SGLA, Spectra RMS	MAX
PRP MSB MN CB	Phase	800	GE	SKHA	800 800	300-1200A	SKHA, Spectra RMS	MAX
PRP PNL HA CB 10	Phase	40	GE	TEY	40 40	15-100A, 2 & 3-Pole	TEY	Fixed
PRP PNL HA CB 16	Phase	50	GE	TEY	50 50	15-100A, 2 & 3-Pole	TEY	Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
PRP PNL HA CB 19	Phase	40	GE	TEY	40 40	15-100A, 2 & 3-Pole	TEY	Fixed
PRP PNL HA CB 22	Phase	40	GE	TEY	40 40	15-100A, 2 & 3-Pole	TEY	Fixed
PRP PNL HA CB 25	Phase	40	GE	TEY	40 40	15-100A, 2 & 3-Pole	TEY	Fixed
PRP PNL HA CB 30	Phase	50	GE	TEY	50 50	15-100A, 2 & 3-Pole	TEY	Fixed
PRP PNL HA CB 37	Phase	40	GE	TEY	40 40	15-100A, 2 & 3-Pole	TEY	Fixed
PRP PNL HA CB 4	Phase	40	GE	TEY	40 40	15-100A, 2 & 3-Pole	TEY	Fixed
PRP PNL LA CB	Phase	20	GE	THQB	20 20	15-100A	THQB	Fixed
PRP PNL LA MN CB	Phase	50	GE	TEB	40 40	15-100A	TEB	Fixed
PRP PNL LB CB	Phase	20	SQUARE D	QO	20 20	15-70A	QO, 1-Pole	Fixed (730-3)
PRP PNL LB CB 17	Phase	100	SQUARE D	QO	100 100	15-100A	QO, 3-Pole	Fixed (730-7, 100A)
PRP PNL LB MN CB	Phase	100	SQUARE D	QO	100 100	15-100A	QO, 3-Pole	Fixed (730-7, 100A)
RVR WLK RESTRM PNL CB 1	Phase	30	SQUARE D	QO	30 30	15-125A	QO, 2-Pole	Fixed (730-5, 30A)
RVR WLK RESTRM PNL CB 2	Phase	60	SQUARE D	QO	60 60	15-125A	QO, 2-Pole	Fixed (730-6, 60A)
RVR WLK RESTRM PNL CB 7	Phase	30	SQUARE D	QO	30 30	15-125A	QO, 2-Pole	Fixed (730-5, 30A)
RVR WLK RESTRM PNL MN CB	Phase	100	SQUARE D	QOM1-VH	100 100	50-125A	QOM1-VH	Fixed
RWP PNL CB 5	Phase	20	CUTLER-HAMMER	BR	20 20	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (350-550A) Fixed

DESIGNATION			FRAME		TRIP UNIT			
Location/Name	Function	Amps Frame	MFR	TYPE MODEL	Amps Sensor Plug	Description	TYPE/MODEL	INST SETTING
RWP PNL CB 6	Phase	100	CUTLER-HAMMER	BR	100 100	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (850-1700A) Fixed
RWP PNL MN CB	Phase	100	CUTLER-HAMMER	BR	100 100	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (850-1700A) Fixed
SP MDP CB 2	Phase	100	CUTLER-HAMMER	BR	100 100	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (850-1700A) Fixed
SP MDP MN CB	Phase	100	CUTLER-HAMMER	BR	100 100	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (850-1700A) Fixed
SP PNL A CB	Phase	20	CUTLER-HAMMER	BR	20 20	15-100A	BR, 3-Pole	Thermal Curve (Fixed INST (350-550A) Fixed
SP PNL A MN CB	Phase	225	SIEMENS	QJ2	200 200	60-225A	QJ2	Thermal Curve (Fixed INST Fixed

7. Incident Energy Summary and Calculations Methods

The arc flash risk assessment is done to conform to OSHA recommendations described in 29CFR 1910.333. Procedures for arc flash risk assessments are described in both NFPA Standard 70E-2018 and IEEE Standard 1584-2002-2004a. IEEE Standard 1584-2002-2004a describes a method for calculating the potential incident energy exposure is based on the anticipated "bolted" fault current. The results reported herein have been calculated using the more conservative, interpreted as more rigid, IEEE Standard 1584-2002-2004a.

IEEE Standard 1584-2002-2004a states that equipment rated below 240V need not be considered unless it involves a transformer larger than 125 KVA in its immediate supply. The reason for this exclusion is the inability of such small capacity systems to initiate and support arcing conditions. NFPA Standard 70E-2018 references the IEEE 1584 standard for use in the incident energy calculations. Since NFPA Standard 70E is recognized as the guiding document, SEAM Group has applied the limits from IEEE 1584.

The PTW arc flash incident energy analysis follows the NFPA 70E 2018 and IEEE 1584 2002 methods for determining the arc flash boundary distance and the incident energy that workers may be exposed to when working on or near electrical equipment. The incident energy analysis combines short circuit calculations, empirical equations and protective device operating times to estimate incident energy and protective clothing requirements at typical working distances.

The incident energy analysis report assumes the following criteria:

- Trip time is determined from the first upstream device to clear the fault as determined by the TCC curve
- Worker is stationary during the entire arc flash incident (constant working distance)
- Induction motors continuous sub-transient current for 5 cycles and motors less than 50HP ignored
- Interrupting device is rated for the available short circuit current (no equipment damage is considered)
- Ground fault and motor over load devices are not included
- For multi-function protective devices, only the first function is used to determine the trip time
- Reports only the larger incident energy based on 85% and 100% tolerances applied to the calculating arcing fault current
- A maximum trip time of 2 seconds is used assuming that a worker would be removing himself from the area within that time frame.
- The IEEE 1584 – 2002/2004a Edition standard equations were used as the basis for the calculations

The default values for equipment categories and gap, along with working distances used by PTW are indicated in Tables 7.1 and 7.2 below:

Table 7.1 Bus Gap Distances

Gap (mm)	Class of Equipment	Voltage
32	Switchgear	≤ 1kV
25	MCCs & Panelboards	≤ 1kV
102	Switchgear	1 – 5kV
153	Switchgear	>5kV
13	All Cable	Any
104	Open Air	1 – 5kV
153	Open Air	>5kV

Table 7.2 Working Distances

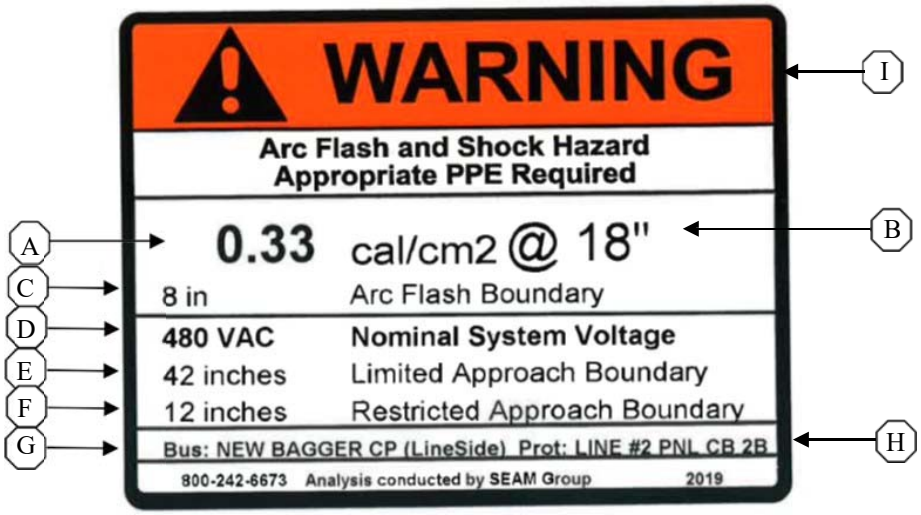
Working Distance	Equipment Type	Voltage
24 inches (610mm)	Switchgear	<=1kV
18 inches (455mm)	Panel	<=1kV
36 inches (910mm)	Switchgear	>1 & <35 kV
72 inches (1829mm)	Switchgear	>35kV
18 inches (455mm)	All others	-

The arc flash report in the following pages outlines the following:

- Arc flash Boundary - the distance from exposed live parts within which a person could receive 2nd degree burns
- Working Distance – the distance between the arc source and the worker's face or chest
- Incident Energy – the amount of energy on a surface at a specific distance from the flash

Along with determining the incident energy exposure levels and arc flash boundaries in a facility through an incident energy analysis, the customer must also determine the appropriate PPE that should be worn by their "Qualified Electrical Workers." When energized work must be performed, SEAM Group recommends using the NFPA 70E 2018, PPE selection Table 130.5(G) for guidance. The customer simply needs to reference the equipment label provided to determine the incident energy exposure level and wear the PPE with an incident energy rating greater than the value indicated on the label, along with the additional safety equipment as outlined in the PPE table included with this report.

Equipment found to have an incident energy rating at or above 40 cal/cm^2 is considered "Dangerous". PPE is available to protect against the thermal portion of the available incident energy; however, this PPE may not be sufficient to protect a worker from the shock wave produced by the incident. SEAM Group recommends de-energizing the equipment whenever possible to reduce the risk. Operation of electrical equipment found to be above 40 cal/cm2 is possible assuming the equipment is in normal operating conditions as outlined in 2018 NFPA 70E 130.2(A)(4). SEAM Group also recommends that PPE be worn when the normal operation of any device is conducted to provide protection to the worker in the case of an arc flash incident.



A **PPE – Incident Energy** – The incident energy value that determines the required PPE as outlined in NFPA 70E 130.5(C)(1) and as referenced in the arc flash table in Section 7.

B **Working Distance** – The distance from the arc source and the worker's face or chest

C **Arc Flash Protection Boundary** – When an arc flash hazard exists, an approach limit at a distance from a prospective arc source within which a person could receive a second degree burn if an electrical arc flash were to occur. The Boundary distance overrides the Approach distances

D **Bus Voltage Rating** – Voltage rating at the equipment being analyzed.

E **Limited Approach** – An approach limit at a distance from an exposed live part within which a shock hazard exists. This is the closest approach distance for an unqualified worker unless additional protective measures are used; an unqualified worker may only enter this area if accompanied by a qualified worker at all times.

F **Restricted Approach** – An approach limit at a distance from an exposed live part within which there is an increased risk of shock, due to electrical arc over combined with inadvertent movement, for personnel working in close proximity to the live part. This is the closest approach distance for a qualified worker unless additional protective measures are used.

G **Bus** – "Bus" represents the actual equipment being analyzed (i.e. Switchgear, MCC, Panel, Disconnect, etc)

H **Protective Device** – Protective device that is clearing the fault for the associated equipment, this may not always be the next upstream device due to coordination

I **Warning** – Label alert statement, "WARNING" for incident energy exposure between 0 and 40 cal/cm2 and "DANGEROUS" for anything above an incident energy of 40 cal/cm2

SEAM Group will apply all labels with an incident energy exposure of 1.2 cal/cm2 and above at the time of the report delivery. At this time, SEAM Group will also deliver all of the labels with an incident energy below 1.2 cal/cm2 required for the specific project. The labels with an incident energy below 1.2 cal/cm2 should be applied by the owner at their convenience, within the first 3 months. These labels will be identical to the labels with an incident energy above 1.2 cal/cm2 that SEAM Group will have already applied. The Bus Name (Item A) is the name of the equipment to which the label should be affixed to in the field. For example, if the bus name designates DSC AHU-1 then the label should be affixed to the disconnect supplying Air Handling Unit #1.

Please note that the protective device name (Item H referenced in the label example on the previous page) designates the device that is responsible for clearing the fault condition and may not logically be the first upstream device supplying the bus name indicated on the label. This can be because the immediate upstream device does not coordinate with the device that is downstream of it, resulting in the upstream device clearing the fault faster. For instance, you have circuit breaker SWB-1 CB5A in SWB-1 that supplies PNL-1 that contains a circuit breaker PNL-1 CB2 that supplies a downstream load RTU-1. If circuit breaker SWB-1 CB5A in SWB-1 operates faster than PNL-1 CB2 in PNL-1, then these two devices are not properly coordinated and the arc flash label will indicate that circuit breaker SWB-1 CB5A in SWB-1 is the protective device for RTU-1 and not PNL-1 CB2 in PNL-1. This can also be a result of an alternate system configuration being supplied via transfer switch. SEAM Group reviews all possible system configurations when doing the arc flash analysis and reports the worst-case scenario, thus the protective device shown on the label may be the result of an alternate scenario where the particular bus is fed from an alternate feed in the system (i.e. main-tie-main configuration, ATS's, etc).

The labels provided are for panels, disconnects, MCC's, etc, with an internal bus that would require service by onsite personnel. SEAM Group does not provide labels for motors, transformers, or individual MCC buckets or individual breakers in a given piece of equipment. The label provided for the stated "Bus" applies to the entire piece of equipment (i.e. all sections of a given MCC, switchgear, or switchboard), unless otherwise noted.

Buss ducts and their associated buss duct plugs will be labeled based on the plug with the highest incident energy value (worst case). The buss duct(s) will receive placard style labels approximately every 20 feet.

The table beginning on the next page shows arc flash incident energy exposure levels calculated for the existing system. Included in the table are the critical distances, the fault currents, and the incident energies for the indicated working distance for each bus analyzed. Arc flash hazard warning labels for the equipment have been created from this table. Label colors are: safety orange for incident energies between 0 and 40 cal/cm2 and Red for incident energies above 40 cal/cm2. Labels were provided for all devices analyzed for this report. Labels with an incident energy greater than 1.2 cal/cm2 will be applied at the time of the report delivery. Labels with an incident energy less than 1.2 cal/cm2 will be provided to the owner to label all remaining equipment as outlined in the report. Labels should be applied to disconnects, panels, switchgear, motor control centers, etc. In addition to labels with an incident energy less than 1.2 cal/cm2 outlined in the report, labels indicating an incident energy below 1.2 cal/cm2 should also be placed on the first disconnect or panel downstream from any transformer that is rated less than 125 kVA with a 240 V or less secondary. These labels with an incident energy less than 1.2 cal/cm2 at 240 V were applied by SEAM Group during the data collection process.

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Equip Type	Gap (mm)	Arc Flash Boundary (in)	Working Distance (in)	Incident Energy (cal/cm2)
7674 SOAR RWP PNL (7674 SOAR RWP PNL MN FS LineSide)	MaxTripTime @2.0s	0.24	7.96	7.96	3.87	2	PNL	25	111	18	23.82 (*S0)
AHP MSB (AHP MSB MN CB LineSide)	MaxTripTime @2.0s	0.208	4.61	4.61	2.53	2	PNL	25	18	18	#VALUE!
AHP PNL L2 (AHP PNL L2 MN CB LineSide)	AHP MSB CB 3	0.208	3.77	3.77	1.86	0.5866	PNL	25	18	18	#VALUE!
AHP PRK LT LTG CP	AHP MSB CB 7	0.208	3.99	3.99	2.28	0.016	PNL	25	4	18	0.11 (*S0)
CCP PNL (CCP PNL MN CB LineSide)	MaxTripTime @2.0s	0.24	4.08	4.08	2.39	2	PNL	25	81	18	14.14 (*S0)
CCP PNL A	CCP PNL CB 22	0.24	3.85	3.85	2.30	0.015	PNL	25	4	18	0.1 (*S0)
CCP PNL R (CCP PNL R MN CB LineSide)	CCP PNL CB 22	0.24	3.63	3.63	2.20	0.015	PNL	25	4	18	0.1 (*S0)
CCP WTR PLAY CP	CCP PNL CB 18	0.24	3.04	3.04	1.94	0.015	PNL	25	4	18	0.08 (*S0)
DCP MSB (DCP MSB MN CB LineSide)	MaxTripTime @2.0s	0.48	2.30	2.30	1.87	2	PNL	25	69	18	10.83 (*S0)
DCP MUSCO LTG CP	DCP PNL PH CB 19	0.48	2.09	2.09	1.72	0.01	PNL	25	3	18	0.05 (*S0)
DCP PNL PH (DCP PNL PH MN CB LineSide)	DCP MSB CB 45	0.48	2.28	2.28	1.85	2	PNL	25	69	18	10.73 (*S0)
DCP PNL PL (DCP PNL PL MN CB LineSide)	DCP PNL PH CB 32	0.24	1.47	1.47	1.15	2	PNL	25	59	18	8.29 (*S0)
DP LTG CNTCTR CP	DP MN DSC CB	0.208	4.48	4.48	2.48	0.0112	PNL	25	4	18	0.08 (*S0)
DP MN DSC	MaxTripTime @2.0s	0.208	5.71	5.71	2.93	2	PNL	25	18	18	#VALUE!
DP PNL A (DP PNL A MN CB LineSide)	DP MN DSC CB	0.208	4.97	4.97	2.66	0.0112	PNL	25	4	18	0.09 (*S0)
DP PNL P	DP MN DSC CB	0.208	5.57	5.57	2.88	0.0112	PNL	25	4	18	0.1 (*S0)
DP WTR D PMP PIT CP	DP PNL P CB 2	0.208	0.89	0.89	0.80	0.017	PNL	25	2	18	0.04 (*S0)
DUAL INSTA HOT CP	RVR WLK RESTRM PNL CB 1	0.24	1.83	1.83	1.14	0.0167	PNL	25	3	18	0.05 (*S0)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Equip Type	Gap (mm)	Arc Flash Boundary (in)	Working Distance (in)	Incident Energy (cal/cm2)
ECC AC-1 DSC	ECC PNL HM1 CB 3	0.48	6.10	6.10	4.30	0.0086	PNL	25	4	18	0.11 (*S0)
ECC AC-10 CP	ECC PNL HM2 CB 3	0.48	6.11	6.11	4.30	0.0159	PNL	25	6	18	0.21 (*S0)
ECC AC-11 CP	ECC PNL HM2 CB 15	0.48	5.58	5.58	3.98	0.0155	PNL	25	6	18	0.19 (*S0)
ECC AC-12 CP	ECC PNL HM2 CB 9	0.48	6.11	6.11	4.30	0.0159	PNL	25	6	18	0.21 (*S0)
ECC AC-13 CP	ECC PNL HM2 CB 27	0.48	6.45	6.45	4.51	0.0153	PNL	25	6	18	0.21 (*S0)
ECC AC-2 CP	ECC PNL HM1 CB 22	0.48	7.20	7.20	4.95	0.0085	PNL	25	5	18	0.13 (*S0)
ECC AC-3 CP	ECC PNL HM1 CB 44	0.48	11.15	11.15	7.20	0.0143	PNL	25	8	18	0.33 (*S0)
ECC AC-4 CP	ECC PNL HM2 CB 4	0.48	5.88	5.88	4.16	0.0157	PNL	25	6	18	0.2 (*S0)
ECC AC-5 CP	ECC PNL HM2 CB 10	0.48	2.93	2.93	2.29	0.0181	PNL	25	4	18	0.12 (*S0)
ECC AC-6 CP	ECC PNL HM2 CB 28	0.48	3.26	3.26	2.52	0.0178	PNL	25	5	18	0.13 (*S0)
ECC AC-7 CP	ECC PNL HM2 CB 16	0.48	3.36	3.36	2.58	0.0174	PNL	25	5	18	0.13 (*S0)
ECC AC-8 CP	ECC PNL HM2 CB 22	0.48	5.14	5.14	3.71	0.0163	PNL	25	6	18	0.19 (*S0)
ECC AC-9 CP	ECC PNL HM2 CB 21	0.48	4.55	4.55	3.34	0.0161	PNL	25	5	18	0.16 (*S0)
ECC CU-1 DSC (DPL2)	ECC PNL DPL2 CB 34	0.208	1.17	1.17	0.96	0.01	PNL	25	2	18	0.03 (*S0)
ECC CU-1 DSC (L3)	ECC PNL L3 CB 1	0.208	1.77	1.77	1.29	0.01	PNL	25	2	18	0.04 (*S0)
ECC CU-2 DSC	ECC PNL L6 CB 11	0.208	1.40	1.40	1.10	0.01	PNL	25	2	18	0.03 (*S0)
ECC CU-3 DSC	ECC PNL K1 CB 37	0.208	1.16	1.16	0.96	0.01	PNL	25	2	18	0.03 (*S0)
ECC KEF-1 CP	ECC PNL L6 CB 27	0.208	1.16	1.16	0.96	0.01	PNL	25	2	18	0.03 (*S0)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Equip Type	Gap (mm)	Arc Flash Boundary (in)	Working Distance (in)	Incident Energy (cal/cm2)
ECC KEF-1 DSC	ECC PNL L6 CB 27	0.208	0.61	0.61	0.61	0.01	PNL	25	1	18	0.01 (*S0)
ECC LCPB CP1 208V	ECC PNL L6 CB	0.208	3.67	3.67	2.15	0.01	PNL	25	3	18	0.06 (*S0)
ECC LCPB CP1 480V	ECC PNL HL2 CB	0.48	4.39	4.39	3.24	0.0088	PNL	25	4	18	0.09 (*S0)
ECC MSB (ECC MSB MN CB LineSide)	MaxTripTime @2.0s	0.48	14.47	14.47	8.99	2	PNL	25	194	18	59.19 (*S0)
ECC PNL DPL1 (ECC PNL DPL1 MN CB LineSide)	ECC MSB CB 6	0.208	7.12	7.12	3.43	2	PNL	25	103	18	20.85 (*S0)
ECC PNL DPL2 (ECC PNL DPL2 MN CB LineSide)	ECC MSB CB 4	0.208	6.39	6.39	3.17	2	PNL	25	98	18	19.2 (*S0)
ECC PNL HL1 (ECC PNL HL1 MN CB LineSide)	ECC MSB CB 8	0.48	13.76	13.76	8.61	0.0158	PNL	25	10	18	0.45 (*S0)
ECC PNL HL2 (ECC PNL HL2 MN CB LineSide)	ECC MSB CB 5	0.48	5.23	5.23	3.20	0.0316	PNL	25	8	18	0.31 (*S1)
ECC PNL HM1 (ECC PNL HM1 MN CB LineSide)	ECC MSB CB 7	0.48	13.99	13.99	8.74	0.0157	PNL	25	10	18	0.45 (*S0)
ECC PNL HM2 (ECC PNL HM2 MN CB LineSide)	ECC MSB CB 2	0.48	8.94	8.94	5.96	0.0501	PNL	25	16	18	0.95 (*S0)
ECC PNL K1 (ECC PNL K1 MN CB LineSide)	ECC PNL DPL2 CB 39	0.208	6.16	6.16	2.63	2	PNL	25	86	18	15.67 (*S0)
ECC PNL L2 (ECC PNL L2 MN CB LineSide)	ECC PNL DPL1 CB 39	0.208	6.70	6.70	3.28	0.01	PNL	25	4	18	0.1 (*S0)
ECC PNL L3 (ECC PNL L3 MN CB LineSide)	ECC PNL DPL1 CB 34	0.208	6.91	6.91	3.35	0.01	PNL	25	4	18	0.1 (*S0)
ECC PNL L5 (ECC PNL L5 MN CB LineSide)	ECC PNL DPL2 CB 40	0.208	6.07	6.07	3.06	0.01	PNL	25	4	18	0.09 (*S0)
ECC PNL L6 (ECC PNL L6 MN CB LineSide)	ECC PNL DPL2 CB 33	0.208	6.07	6.07	3.06	0.01	PNL	25	4	18	0.09 (*S0)
ECC PNL L7	ECC PNL DPL2 CB 27	0.208	3.76	3.76	2.19	0.01	PNL	25	3	18	0.06 (*S0)
ECC PRK LT LTG CP	ECC PNL HL1 CB 32	0.48	8.82	8.82	5.89	0.0084	PNL	25	5	18	0.16 (*S0)
ECC WH-3 DSC	ECC PNL L3 CB 21	0.208	1.63	1.63	1.22	0.01	PNL	25	2	18	0.03 (*S0)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Equip Type	Gap (mm)	Arc Flash Boundary (in)	Working Distance (in)	Incident Energy (cal/cm2)
ECP CNCSSN AC CP	ECP PNL DP CB 1	0.208	3.15	3.15	1.93	0.01	PNL	25	3	18	0.06 (*S0)
ECP CNCSSN MN DSC	ECP PNL DP CB 1	0.208	3.86	3.86	2.23	0.01	PNL	25	3	18	0.07 (*S0)
ECP CONCESSION PNL (ECP CNCSSN PNL MN CB LineSide)	ECP PNL DP CB 1	0.208	3.75	3.75	2.19	0.01	PNL	25	3	18	0.06 (*S0)
ECP EXT LTG CP	ECP PNL HB CB 21	0.48	4.05	4.05	3.03	0.0089	PNL	25	4	18	0.08 (*S0)
ECP MSB (ECP MSB MN CB LineSide)	MaxTripTime @2.0s	0.48	19.23	19.23	11.47	2	PNL	25	228	18	76.96 (*S0)
ECP MUSCO CP	ECP PNL HB CB 3	0.48	4.10	4.10	3.06	0.0089	PNL	25	4	18	0.08 (*S0)
ECP PNL A 240V (ECP PNL A MN CB LineSide)	ECP PNL A 480V CB	0.24	0.45	0.45	0.45	2	PNL	25	12	18	0.52 (*S0)
ECP PNL A 480V	ECP MSB CB 3	0.48	4.50	4.50	3.32	0.0158	PNL	25	5	18	0.16 (*S0)
ECP PNL DP (ECP PNL DP MN CB LineSide)	ECP MSB CB 40	0.208	4.98	4.98	2.67	2	PNL	25	87	18	15.9 (*S0)
ECP PNL HA (ECP PNL HA MN CB LineSide)	ECP MSB CB 46	0.48	4.19	4.19	3.12	2	PNL	25	97	18	18.85 (*S0)
ECP PNL HB (ECP PNL HB MN CB LineSide)	ECP MSB CB 45	0.48	4.19	4.19	3.12	2	PNL	25	97	18	18.85 (*S0)
ECP RR B #1 AC CP	ECP PNL DP CB 2	0.208	2.25	2.25	1.52	0.01	PNL	25	2	18	0.04 (*S0)
ECP RR B #1 MN DSC	ECP PNL DP CB 2	0.208	2.68	2.68	1.73	0.01	PNL	25	3	18	0.05 (*S0)
ECP RR B #2 AC CP	ECP DP CB 6	0.208	2.07	2.07	1.44	0.01	PNL	25	2	18	0.04 (*S0)
ECP RR B #2 MN DSC	ECP DP CB 6	0.208	2.51	2.51	1.65	0.01	PNL	25	3	18	0.05 (*S0)
ECP RSTRM B #1 PNL (ECP RR B 1 P MN CB LineSide)	ECP PNL DP CB 2	0.208	2.60	2.60	1.69	0.01	PNL	25	3	18	0.05 (*S0)
ECP RSTRM B #2 PNL (ECP RR B 2 P MN CB LineSide)	ECP DP CB 6	0.208	2.37	2.37	1.58	0.01	PNL	25	2	18	0.05 (*S0)
ECP STRG BLDG AC CP	ECP PNL DP CB 5	0.208	3.00	3.00	1.87	0.01	PNL	25	3	18	0.05 (*S0)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Equip Type	Gap (mm)	Arc Flash Boundary (in)	Working Distance (in)	Incident Energy (cal/cm2)
ECP STRG BLDG MN DSC	ECP PNL DP CB 5	0.208	3.89	3.89	2.24	0.01	PNL	25	3	18	0.07 (*S0)
ECP STRG BLDG PNL (ECP STRG B PNL MN CB LineSide)	ECP PNL DP CB 5	0.208	3.58	3.58	1.80	0.01	PNL	25	3	18	0.05 (*S0)
HARR/CHAN RVRWLK PNL (HARR/CHAN RVRWLK PNL MN CB LineSide)	MaxTripTime @2.0s	0.24	4.24	4.24	2.46	2	PNL	25	83	18	14.59 (*S0)
HHP 2 TON A/C DSC	HHP PNL A CB 1	0.24	1.01	1.01	0.88	0.01	PNL	25	2	18	0.03 (*S0)
HHP 3 TON A/C DSC 1	HHP PNL A CB 5	0.24	1.34	1.34	1.07	0.01	PNL	25	2	18	0.04 (*S0)
HHP 3 TON A/C DSC 2	HHP PNL A CB 35	0.24	1.34	1.34	1.07	0.01	PNL	25	2	18	0.04 (*S0)
HHP 4 TON A/C DSC 1	HHP PNL A CB 9	0.24	1.77	1.77	1.31	0.01	PNL	25	3	18	0.05 (*S0)
HHP 4 TON A/C DSC 2	HHP PNL A CB 39	0.24	1.77	1.77	1.31	0.01	PNL	25	3	18	0.05 (*S0)
HHP BATTING CAGE DSC	HHP MSA CB 5R	0.48	5.55	5.55	3.96	0.0108	PNL	25	5	18	0.13 (*S0)
HHP BFA LTG CONT CP	HHP PNL DPBF CB 11	0.48	5.76	5.76	4.09	0.0173	PNL	25	6	18	0.22 (*S0)
HHP BFE LTG CONT CP	HHP PNL BFE CB 3	0.48	6.16	6.16	4.33	0.017	PNL	25	7	18	0.23 (*S0)
HHP LTG CONT CP	HHP MSB CB 5	0.48	12.37	12.37	7.86	0.01	PNL	25	7	18	0.26 (*S0)
HHP MSA	MaxTripTime @2.0s	0.48	15.51	15.51	9.54	2	PNL	25	202	18	63.08 (*S0)
HHP MSB (HHP MSB MN CB LineSide)	HHP MSA FS 3	0.48	11.93	11.93	6.48	0.1415	PNL	25	31	18	2.94 (*S1)
HHP NGHBRHD CTR DSC	HHP MSA CB 5L	0.48	10.50	10.50	6.84	0.01	PNL	25	6	18	0.22 (*S0)
HHP PNL A (HHP PNL A MN CB LineSide)	HHP NBRHD CTR DSC FS	0.24	3.15	3.15	1.98	2	PNL	25	84	18	15 (*S0)
HHP PNL BC (HHP PNL BC MN CB LineSide)	HHP BATTNG CG DSC CB	0.24	3.17	3.17	2.00	2	PNL	25	84	18	15.1 (*S0)
HHP PNL BCA (HHP PNL BCA MN CB LineSide)	HHP PNL BC CB 25	0.24	2.64	2.64	1.75	2	PNL	25	77	18	13.1 (*S0)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Equip Type	Gap (mm)	Arc Flash Boundary (in)	Working Distance (in)	Incident Energy (cal/cm2)
HHP PNL BCB (HHP PNL BCB MN CB LineSide)	HHP PNL BC CB 29	0.24	2.64	2.64	1.75	2	PNL	25	77	18	13.1 (*S0)
HHP PNL BCC (HHP PNL BCC MN CB LineSide)	HHP PNL BC CB 1	0.24	3.13	3.13	1.98	0.01	PNL	25	3	18	0.07 (*S0)
HHP PNL BFA	HHP PNL DPBF CB 11	0.48	6.35	6.35	4.45	0.017	PNL	25	7	18	0.24 (*S0)
HHP PNL BFE	HHP PNL DPBF CB 17	0.48	6.35	6.35	4.45	0.017	PNL	25	7	18	0.24 (*S0)
HHP PNL DPBF (HHP PNL DPBF MN CB LineSide)	HHP MSA CB 6	0.48	6.39	6.39	3.80	2	PNL	25	110	18	23.35 (*S0)
HHP PNL HA	HHP MSB CB 5	0.48	14.12	14.12	8.81	0.01	PNL	25	8	18	0.29 (*S0)
HHP PNL HB	HHP PNL DPBF CB 22	0.48	6.24	6.24	4.38	0.0161	PNL	25	6	18	0.22 (*S0)
HHP SUMP PMP CP	HHP PNL BCC CB 1	0.24	2.93	2.93	1.89	0.01	PNL	25	3	18	0.07 (*S0)
HMP LTG CNTCTR CP	HMP PNL CB 10	0.24	5.16	5.16	2.83	0.0167	PNL	25	5	18	0.14 (*S0)
HMP PNL (HMP PNL MN CB LineSide)	MaxTripTime @2.0s	0.24	7.39	7.39	3.67	2	PNL	25	108	18	22.47 (*S0)
HVAC CP	7674 SOAR RWP PNL MN FS	0.24	2.16	2.16	1.29	0.0138	PNL	25	3	18	0.05 (*S1)
IW #41 EMON CP	PRP MSB CB 10	0.48	2.21	1.97	1.37	0.3879	PNL	25	21	18	1.57 (*S1)
IW #41 MSB (IW #41 MSB MN CB LineSide)	PRP MSB CB 10	0.48	2.58	2.31	1.84	0.025	PNL	25	5	18	0.15 (*S0)
IW #41 PNL A (IW #41 PNL A MN CB LineSide)	IW #41 MSB CB 2	0.24	0.84	0.84	0.77	1.677	PNL	25	40	18	4.49 (*S0)
IW #41 SFT STRT	IW #41 MSB CB 1	0.48	2.52	2.25	1.80	0.0187	PNL	25	4	18	0.11 (*S0)
JHP LTG CNTCTR CP	JHP MSB CB 3	0.48	9.21	9.21	6.11	0.01	PNL	25	6	18	0.19 (*S0)
JHP MSB (JHP MSB MN CB LineSide)	MaxTripTime @2.0s	0.48	9.40	9.40	6.22	2	PNL	25	152	18	39.73 (*S0)
JHP PNL 1BB	JHP MSB CB 3	0.48	9.03	9.03	6.01	0.01	PNL	25	6	18	0.19 (*S0)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Equip Type	Gap (mm)	Arc Flash Boundary (in)	Working Distance (in)	Incident Energy (cal/cm2)
JHP PNL HP	JHP MSB CB 9	0.48	9.14	9.14	6.07	0.0133	PNL	25	7	18	0.26 (*S0)
JHP PNL SF	JHP MSB CB 10	0.48	8.32	8.32	5.61	0.0135	PNL	25	7	18	0.24 (*S0)
JHP PNL SK	JHP MSB CB 15	0.48	7.84	7.84	5.33	0.0136	PNL	25	7	18	0.23 (*S0)
MFP LTG CNTCTR CP	MFP PNL HA CB 9	0.48	5.14	5.14	3.71	0.0133	PNL	25	5	18	0.15 (*S0)
MFP MSB (MFP MSB MN CB LineSide)	MaxTripTime @2.0s	0.48	5.54	5.54	3.96	2	PNL	25	113	18	24.38 (*S0)
MFP PNL HA	MFP MSB CB 2	0.48	4.55	4.55	2.85	0.0828	PNL	25	13	18	0.71 (*S1)
MFP PNL HB	MFP MSB CB 3	0.48	5.41	5.41	3.88	0.0145	PNL	25	6	18	0.17 (*S0)
MVP HVAC DSC	MVP PNL P CB 36	0.24	2.66	2.66	1.76	0.01	PNL	25	3	18	0.05 (*S0)
MVP LTG CNTCTR CP	MVP PNL P CB 1	0.24	5.51	5.51	2.97	0.01	PNL	25	4	18	0.09 (*S0)
MVP MN DSC	MaxTripTime @2.0s	0.24	7.18	7.18	3.60	2	PNL	25	106	18	21.97 (*S0)
MVP PNL A (MVP PNL A MN CB LineSide)	MVP PNL P CB 40	0.24	5.29	5.29	2.89	0.01	PNL	25	4	18	0.09 (*S0)
MVP PNL B	MVP PNL P CB 36	0.24	3.38	3.38	2.09	0.01	PNL	25	3	18	0.06 (*S0)
MVP PNL P (MVP PNL P MN CB LineSide)	MaxTripTime @2.0s	0.24	6.99	6.99	3.53	2	PNL	25	105	18	21.51 (*S0)
OP BLDG #1 PNL (OP BLDG #1 PNL MN CB LineSide)	OP MSB CB 45	0.24	1.03	1.03	0.89	1.975	PNL	25	49	18	6.23 (*S0)
OP BLDG #2 PNL (OP BLDG #2 PNL MN CB LineSide)	OP MSB CB 51	0.24	0.97	0.97	0.85	2	PNL	25	48	18	6.02 (*S0)
OP LTG CONT CP	OP PNL BBL CB 3	0.48	4.47	4.47	3.29	0.0088	PNL	25	4	18	0.09 (*S0)
OP MSB (OP MSB MN FS LineSide)	MaxTripTime @2.0s	0.48	4.81	4.81	3.51	2	PNL	25	104	18	21.39 (*S0)
OP PNL BBL	OP MSB MN FS	0.48	3.96	3.96	2.53	2	PNL	25	84	18	15.01 (*S1)

Bus Name	Protective Device Name	Bus kV	Bus Bolted Fault (kA)	Prot Dev Bolted Fault (kA)	Prot Dev Arcing Fault (kA)	Trip/ Delay Time (sec.)	Equip Type	Gap (mm)	Arc Flash Boundary (in)	Working Distance (in)	Incident Energy (cal/cm2)
OP PNL SL	OP MSB CB 52	0.48	4.64	4.64	3.40	0.0164	PNL	25	5	18	0.17 (*S0)
PRP LTG CNTCTR CP	PRP PNL HA CB 30	0.48	10.87	10.87	7.04	0.016	PNL	25	9	18	0.36 (*S0)
PRP MSB (PRP MSB MN CB LineSide)	MaxTripTime @2.0s	0.48	11.06	10.68	6.93	2	PNL	25	164	18	44.75 (*S0)
PRP PNL HA	PRP MSB CB 3	0.48	10.98	10.98	7.10	0.025	PNL	25	12	18	0.57 (*S0)
PRP PNL LA (PRP PNL LA MN CB LineSide)	PRP MSB CB 15	0.24	0.38	0.38	0.38	0.025	PNL	25	1	18	0.02 (*S0)
PRP PNL LB (PRP PNL LB MN CB LineSide)	PRP MSB CB 16	0.24	1.00	1.00	0.87	2	PNL	25	49	18	6.14 (*S0)
PRP SECURITY LTG CP	PRP PNL LB CB	0.24	0.97	0.97	0.85	0.0167	PNL	25	3	18	0.05 (*S0)
RVR WLK RESTRM PNL (RVR WLK RESTRM PNL MN CB LineSide)	7674 SOAR RWP PNL MN FS	0.24	2.73	2.73	1.79	0.0083	PNL	25	2	18	0.04 (*S0)
RWP PNL (RWP PNL MN CB LineSide)	MaxTripTime @2.0s	0.24	8.75	8.75	4.15	2	PNL	25	117	18	25.63 (*S0)
SP MDP (SP MDP MN CB LineSide)	MaxTripTime @2.0s	0.24	8.75	8.75	4.15	2	PNL	25	117	18	25.63 (*S0)
SP PNL A (SP PNL A MN CB LineSide)	SP MDP CB 2	0.24	6.75	6.75	3.44	0.015	PNL	25	5	18	0.16 (*S0)
SUMP PUMP CP	RVR WLK RESTRM PNL CB 7	0.24	2.00	2.00	1.22	0.0167	PNL	25	3	18	0.06 (*S0)

ARC FLASH PPE

Information Gathered from NFPA 70E-2018 Edition

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

INCIDENT ENERGY ANALYSIS METHOD*

PROTECTIVE CLOTHING AND PPE	INCIDENT ENERGY EXPOSURE		
	<1.2 cal/cm²	≥1.2 to 12 cal/cm²	>12 cal/cm²
Protective Clothing, non-melting (in accordance with ASTM F 1506) or untreated natural fiber, long sleeve shirt and pants or coveralls	✓		
Safety glasses	✓	✓	✓
Hard hat	✓	✓	✓
Hearing protection	✓	✓	✓
Leather footwear	✓	✓	✓
Rubber insulating gloves with leather protectors for arc and shock protection	✓	✓	✓
Arc rated long sleeve shirt and arc rated pants or arc rated coverall		✓	
Arc rated face shield and arc rated balaclava		✓	
Arc rated arc flash suit hood, jacket and pants			✓
Undergarments shall be made of a non-melting material in accordance with ASTM F 1506	✓	✓	✓

*This table is for use only when an incident energy analysis has been completed. If incident energy exposure has not been determined, refer to NFPA 70E-2018 Edition for PPE Category Method

<1.2 cal/cm²

≥ 1.2 to 12 cal/cm²

> 12 cal/cm²

EXAMPLE LABEL
(Not actual size)

WARNING

Arc Flash and Shock Hazard
Appropriate PPE Required

25.1 cal/cm² @ 18”

9 ft 7 in	Arc Flash Boundary
480 VAC	Nominal System Voltage
42 inches	Limited Approach Boundary
12 inches	Restricted Approach Boundary

Bus: MSB Prot: MaxTrip Time@2.0s

800-242-6673 Analysis conducted by SEAM Group 12/31/19

DISCLAIMER: This PPE guide and any information contained within is for reference purposes only and not meant to replace any regulation, code or standard. For detailed information regarding appropriate PPE selection, please refer to NFPA 70E–2018 Edition.

FOR MORE DETAILED INFORMATION REGARDING PROPER PPE SELECTION, VISIT **LEWELLYN.COM/PPE**

8. Single-Line Drawings

The single-line drawings that follow show the system topology and the calculated sustained fault currents for the plant.

The three-phase and line-to-ground fault currents are shown at each bus on the included drawings. These fault current values will represent the normal operating mode only and will not reflect emergency or alternate configuration fault currents. These represent the pertinent data used for the short circuit interrupting evaluation as well as the values used for the incident energy analysis (Please note that in some instances the worst-case values may actually be based on the alternate scenario fault current). Protective device information indicating the manufacturer and device size are also shown for customer reference.

Single-line drawings have been provided on a USB drive in .dxf format that is compatible with AUTOCAD and also in PDF format. The annotated drawings show circuit breaker and fuse data, cable data, transformer data, and fault currents.

Table 8 Drawing Schedule

Drawing Name	Major Buses
Drawing #1	AHP MSB
Drawing #2	CCP PNL
Drawing #3	DP PNL P
Drawing #4	DCP MSB * DCP PNL PH
Drawing #5	ECC MSB * ECC PNL DPL1 * ECC PNL L3
Drawing #6	ECC PNL HM2 * ECC PNL DPL2 * ECC PNL K1
Drawing #7	ECC PNL L6 * ECC PNL HM1 * ECC PNL HL1
Drawing #8	ECP MSB * ECP PNL HB
Drawing #9	ECP PNL DP * ECP PNL HA
Drawing #10	HMP PNL
Drawing #11	HHP MSA * HHP MSB * HHP PNL A * HHP PNL DPBF HHP PNL HB
Drawing #12	HHP PNL HA * HHP PNL BC
Drawing #13	HHP PNL BFA * HHP PNL BFE
Drawing #14	JHP MSB
Drawing #15	JHP PNL HP
Drawing #16	MFP MSB * MFP PNL HA
Drawing #17	MVP PNL P
Drawing #18	OP MSB * OP BLDG #1 PNL * OP BLDG #2 PNL
Drawing #19	OP PNL BBL * OP PNL SL
Drawing #20	PRP MSB * PRP PNL LB
Drawing #21	PRP PNL HA * IW #41 MSB
Drawing #22	RWP PNL
Drawing #23	SP MDP * SP PNL A

SEAM GROUP
FORMERLY PREDICTIVE SERVICE & LEWELLYN TECHNOLOGY

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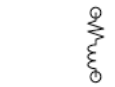
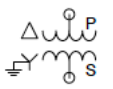
LEGEND

PANEL / MCC / SWITCHGEAR



CONDUCTOR



TRANSFORMER

TRANSMISSION LINE

UTILITY FEED

GENERATOR

MOTOR

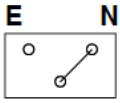
LOW VOLTAGE CIRCUIT BREAKER

FUSED SWITCH

NON-FUSED SWITCH

RELAY

HIGH-VOLTAGE CIRCUIT BREAKER



TRANSFER SWITCH

VARIBLE FREQUENCY DRIVE

UNINTERRUPTIBLE POWER SUPPLY

BUSWAY

AHP UTIL
SC Contribution 3P 500000.0 Amps
SC Contribution SLG 250000.0 Amps
System Nominal Voltage 12000.0 V

AHP UTIL XFMR
Nominal kVA 75 kVA
Z% 2.9000 %

CBL-0001
Size 350 (250.0 A)
QtyPerPhase 1
Length 150.0 ft

AHP MSB MN CB
Type SGLA, Spectra RMS
Sensor/Trip 400.0 A

AHP MSB
208.0 Volts RMS
4611.44 Amps 3P
3700.35 Amps SLG

AHP MSB CB 3
Type TEY, 2 & 3-Pole
Sensor/Trip 100.0 A

CBL-0002
Size 1 (130.0 A)
QtyPerPhase 1
Length 15.0 ft

AHP PNL L2 MN CB
Type QO, 2-Pole
Sensor/Trip 100.0 A

AHP PNL L2
208.0 Volts RMS
4267.12 Amps 3P
3315.80 Amps SLG

AHP PNL L2 CB 2
Type QO, 2-Pole
Sensor/Trip 30.0 A

AHP MSB CB 7
Type TEY, 2 & 3-Pole
Sensor/Trip 30.0 A

CBL-0003
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

AHP MSB CB 15
Type TEY, 2 & 3-Pole
Sensor/Trip 30.0 A

CBL-0004
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

AHP MSB CB 19
Type TEY, 2 & 3-Pole
Sensor/Trip 30.0 A

CBL-0005
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

AHP MSB CB 25
Type TEY, 2 & 3-Pole
Sensor/Trip 30.0 A

CBL-0006
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

AHP MSB CB 8
Type TEY, 2 & 3-Pole
Sensor/Trip 30.0 A

CBL-0007
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

AHP MSB CB 16
Type TEY, 2 & 3-Pole
Sensor/Trip 30.0 A

CBL-0008
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

AHP MSB CB 20
Type TEY, 2 & 3-Pole
Sensor/Trip 30.0 A

CBL-0009
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

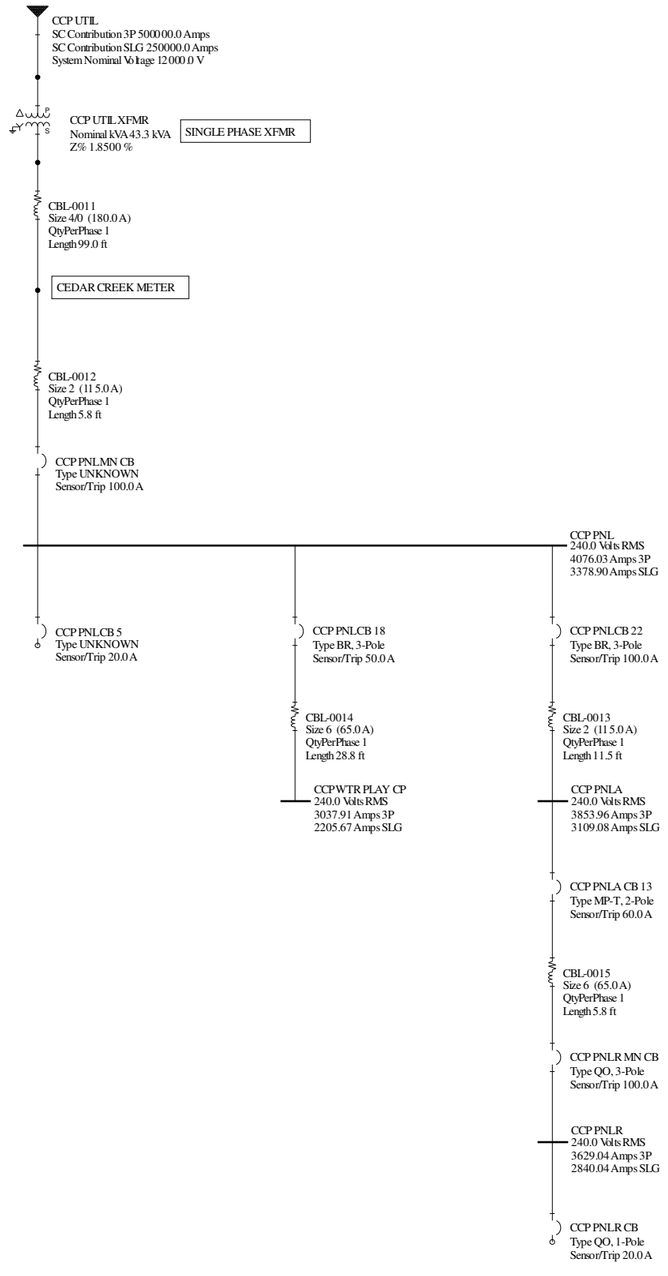
AHP MSB CB 26
Type TEY, 2 & 3-Pole
Sensor/Trip 30.0 A

CBL-0010
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

AHP PRK LT L TG CP
208.0 Volts RMS
3991.63 Amps 3P
2978.58 Amps SLG

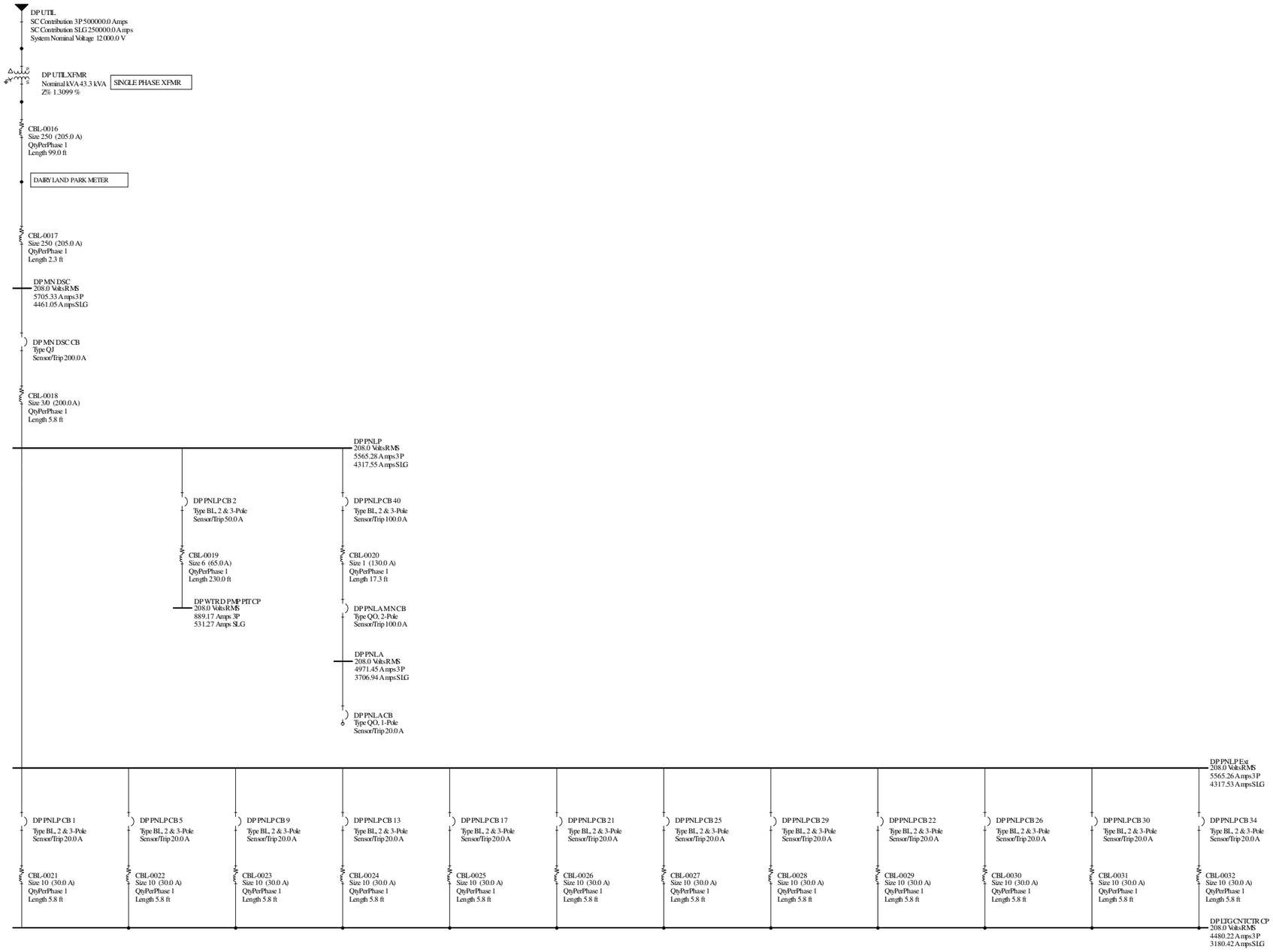
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #1
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



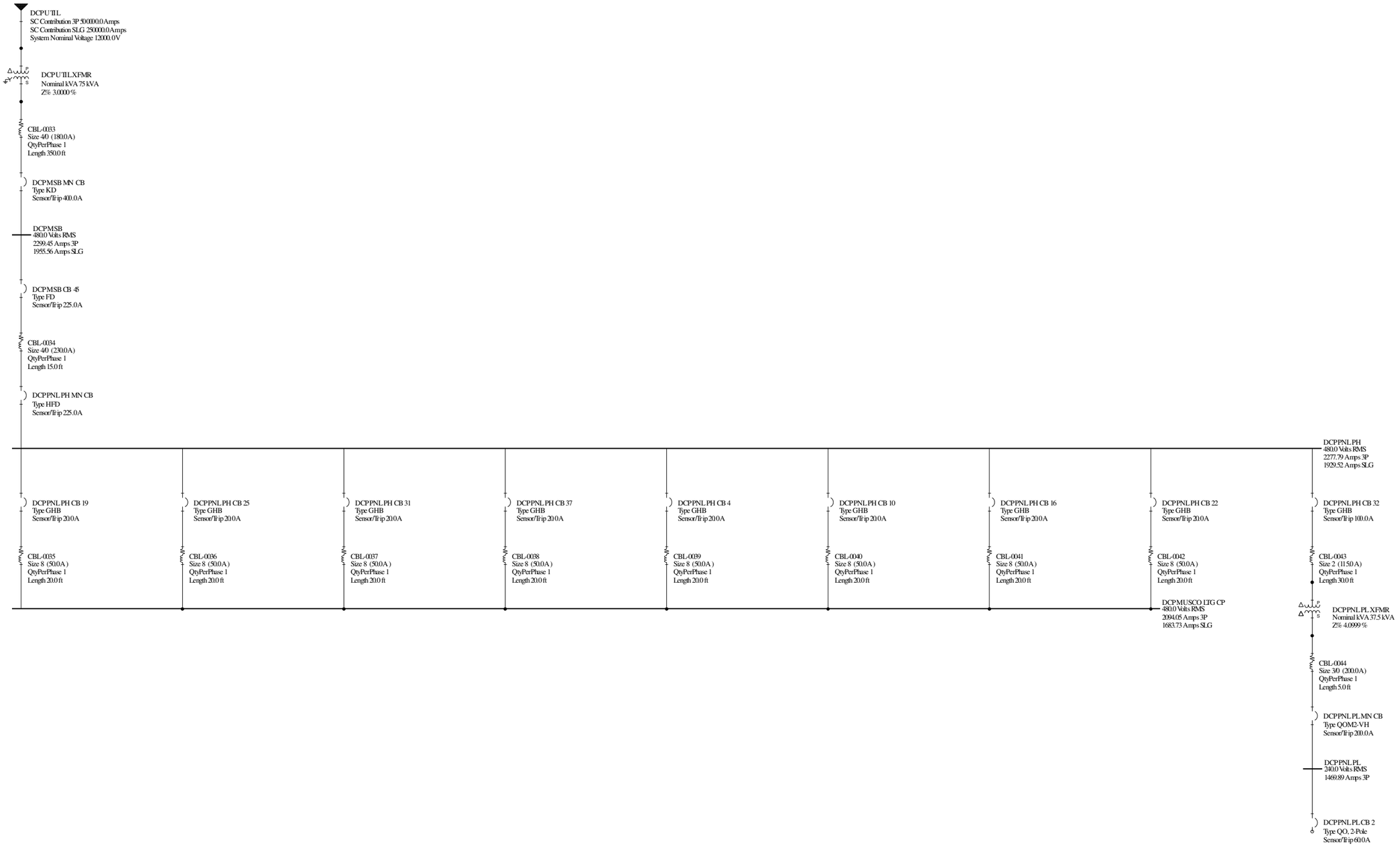
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #2
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



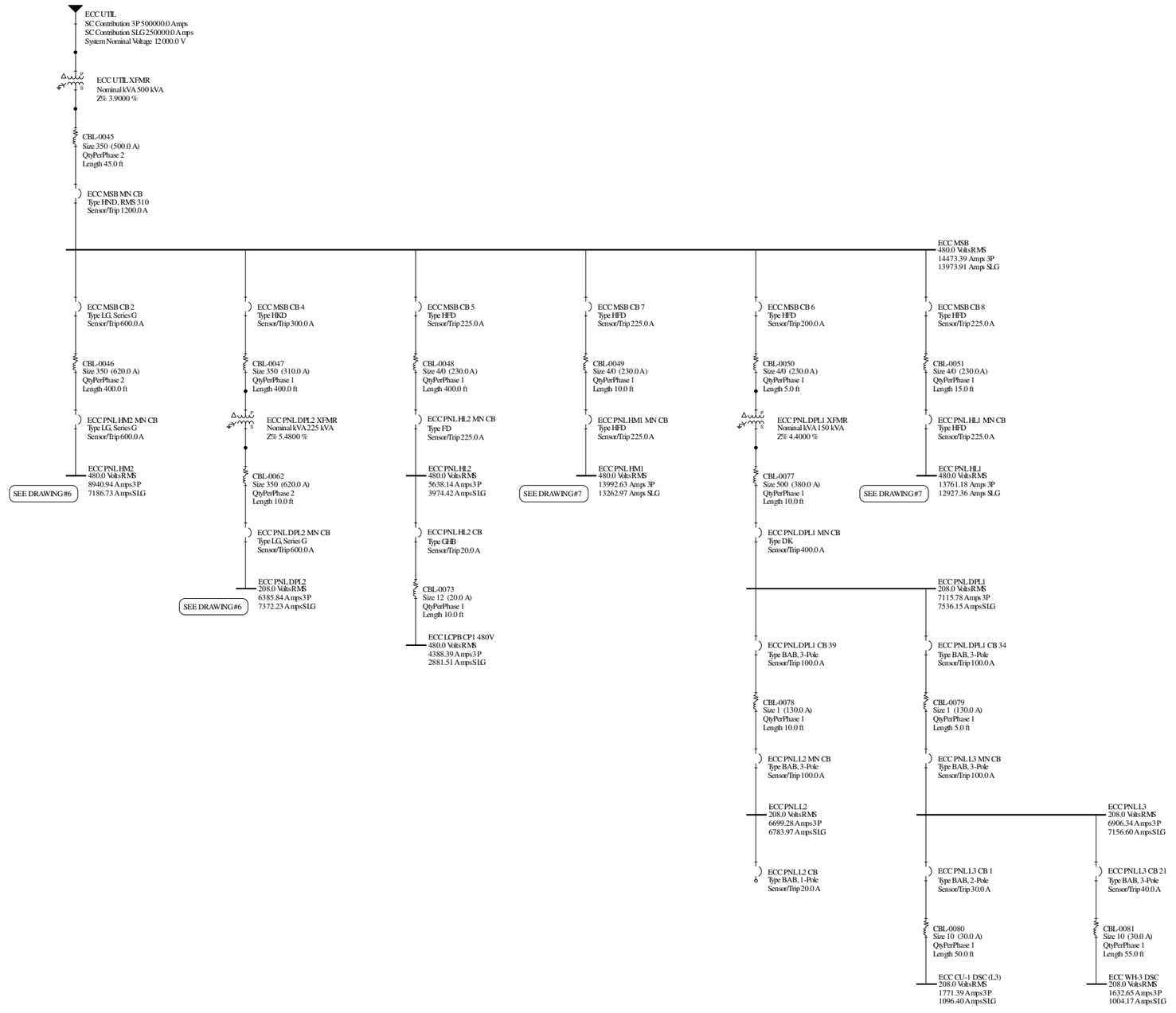
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #3
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



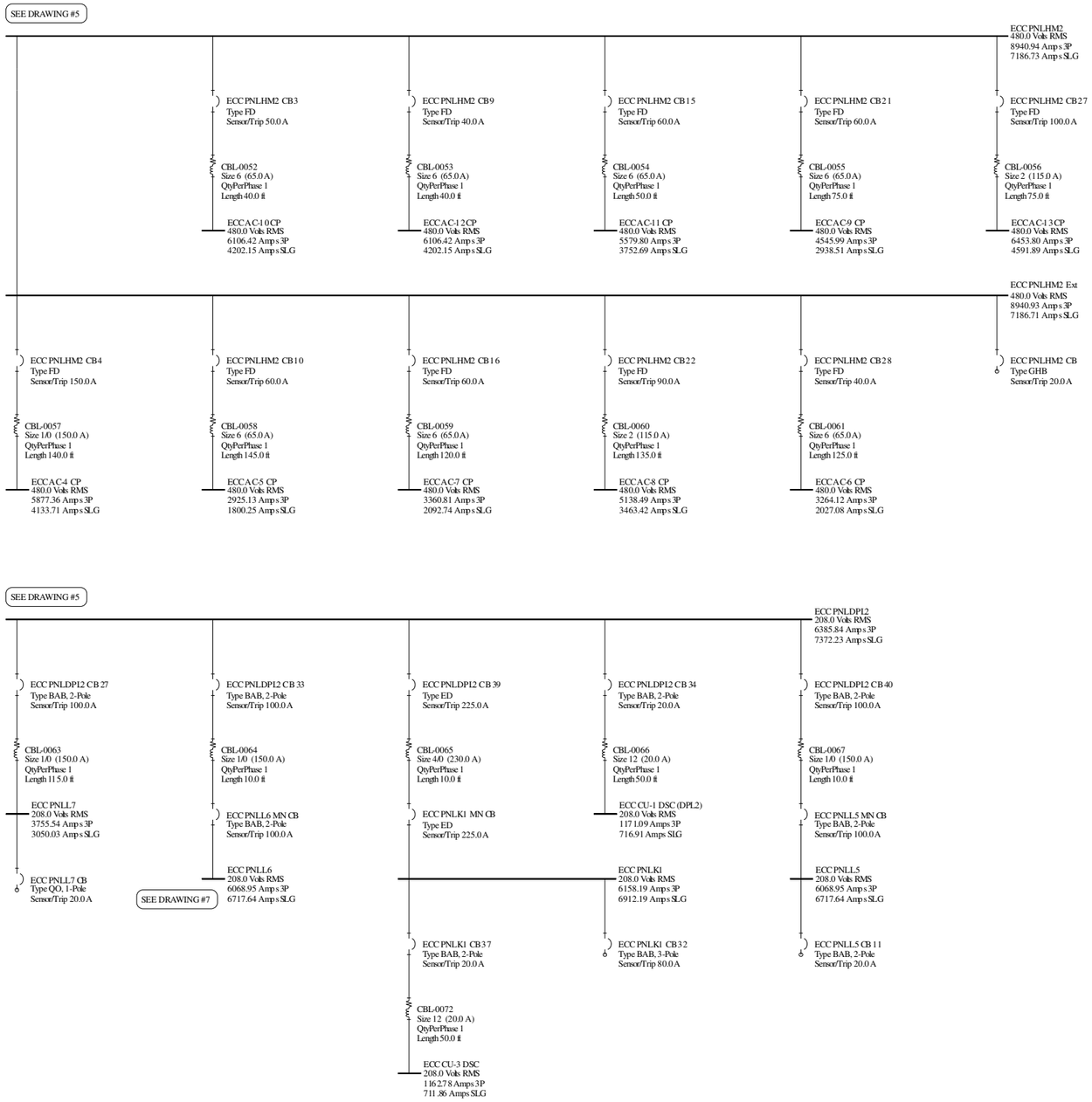
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #4
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



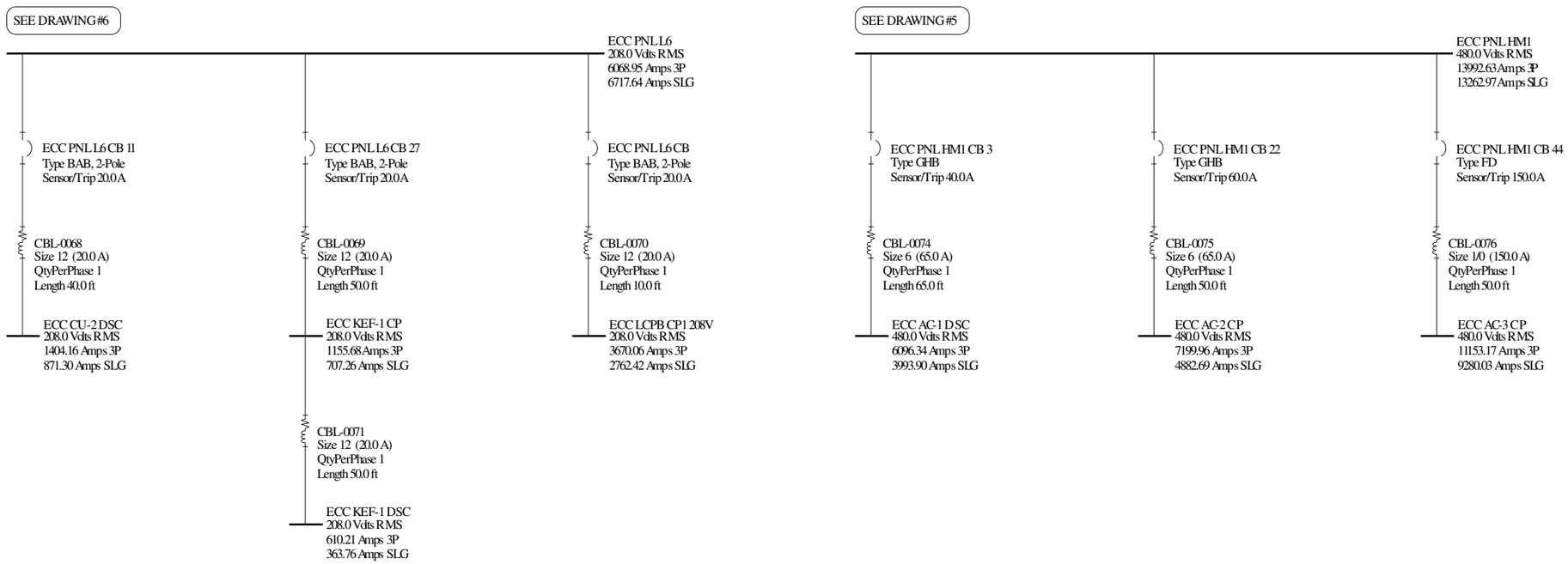
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #5
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #6
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #7
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)

ECP UTIL
SC Contribution 3P 500000.0 Amps
SC Contribution SLG 250000.0 Amps
System Nominal Voltage 12000.0 V

ECP UTIL XFMR
Nominal kVA 1000 kVA
Z% 5.8000 %

CBL-0088
Size 700 (750.0 A)
QtyPerPhase 2
Length 50.0 ft

ECP MSB MN CB
Type RG Series G, 310+
Sensor/Trip 1600.0 A

Tech requested 2 labels

ECP MSB
480.0 Volts RMS
19232.91 Amps 3P
18525.93 Amps SLG

ECP MSB CB 3
Type FD
Sensor/Trip 20.0 A

CBL-0089
Size 12 (20.0 A)
QtyPerPhase 1
Length 30.0 ft

ECP PNLA 480V
480.0 Volts RMS
4499.90 Amps 3P
2722.44 Amps SLG

ECP PNLA 480V CB
Type EHD
Sensor/Trip 20.0 A

CBL-0095
Size 12 (20.0 A)
QtyPerPhase 1
Length 1.0 ft

ECP PNLA XFMR
Nominal kVA 5 kVA
Z% 2.5800 %

CBL-0096
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

ECP PNLA MN CB
Type BR, 3-Pole
Sensor/Trip 25.0 A

ECP PNLA 240V
240.0 Volts RMS
445.78 Amps 3P

ECP PNLA CB
Type BR, 3-Pole
Sensor/Trip 20.0 A

ECP MSB CB 33
Type FD
Sensor/Trip 150.0 A

ECP MSB CB 45
Type KD
Sensor/Trip 400.0 A

CBL-0090
Size 500 (380.0 A)
QtyPerPhase 1
Length 950.0 ft

ECP PNLHB MN CB
Type KD
Sensor/Trip 400.0 A

SEE DRAWING #9

ECP MSB CB 40
Type KD
Sensor/Trip 300.0 A

CBL-0093
Size 350 (310.0 A)
QtyPerPhase 1
Length 950.0 ft

ECP PNLDP XFMR
Nominal kVA 225 kVA
Z% 5.5700 %

CBL-0104
Size 350 (620.0 A)
QtyPerPhase 2
Length 5.0 ft

ECP PNLDP MN CB
Type LG, Series G
Sensor/Trip 600.0 A

ECP PNLDP
208.0 Volts RMS
4980.90 Amps 3P
6087.46 Amps SLG

SEE DRAWING #9

ECP MSB CB 46
Type KD
Sensor/Trip 400.0 A

CBL-0094
Size 500 (380.0 A)
QtyPerPhase 1
Length 950.0 ft

ECP PNLHA MN CB
Type KD
Sensor/Trip 400.0 A

ECP PNLHA
480.0 Volts RMS
4192.90 Amps 3P
2901.37 Amps SLG

SEE DRAWING #9

ECP MSB CB 52
Type LG, Series G
Sensor/Trip 600.0 A

ECP PNLHB
480.0 Volts RMS
4192.90 Amps 3P
2901.37 Amps SLG

ECP PNLHB CB 3
Type GHB
Sensor/Trip 60.0 A

CBL-0097
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

ECP PNLHB CB 9
Type GHB
Sensor/Trip 60.0 A

CBL-0098
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

ECP PNLHB CB 15
Type GHB
Sensor/Trip 60.0 A

CBL-0099
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

ECP PNLHB CB 4
Type GHB
Sensor/Trip 60.0 A

CBL-0101
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

ECP PNLHB CB 10
Type GHB
Sensor/Trip 60.0 A

CBL-0102
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

ECP MUSCO CP
480.0 Volts RMS
4097.81 Amps 3P
2817.09 Amps SLG

ECP PNLHB CB 21
Type GHB
Sensor/Trip 20.0 A

CBL-0100
Size 8 (50.0 A)
QtyPerPhase 1
Length 5.0 ft

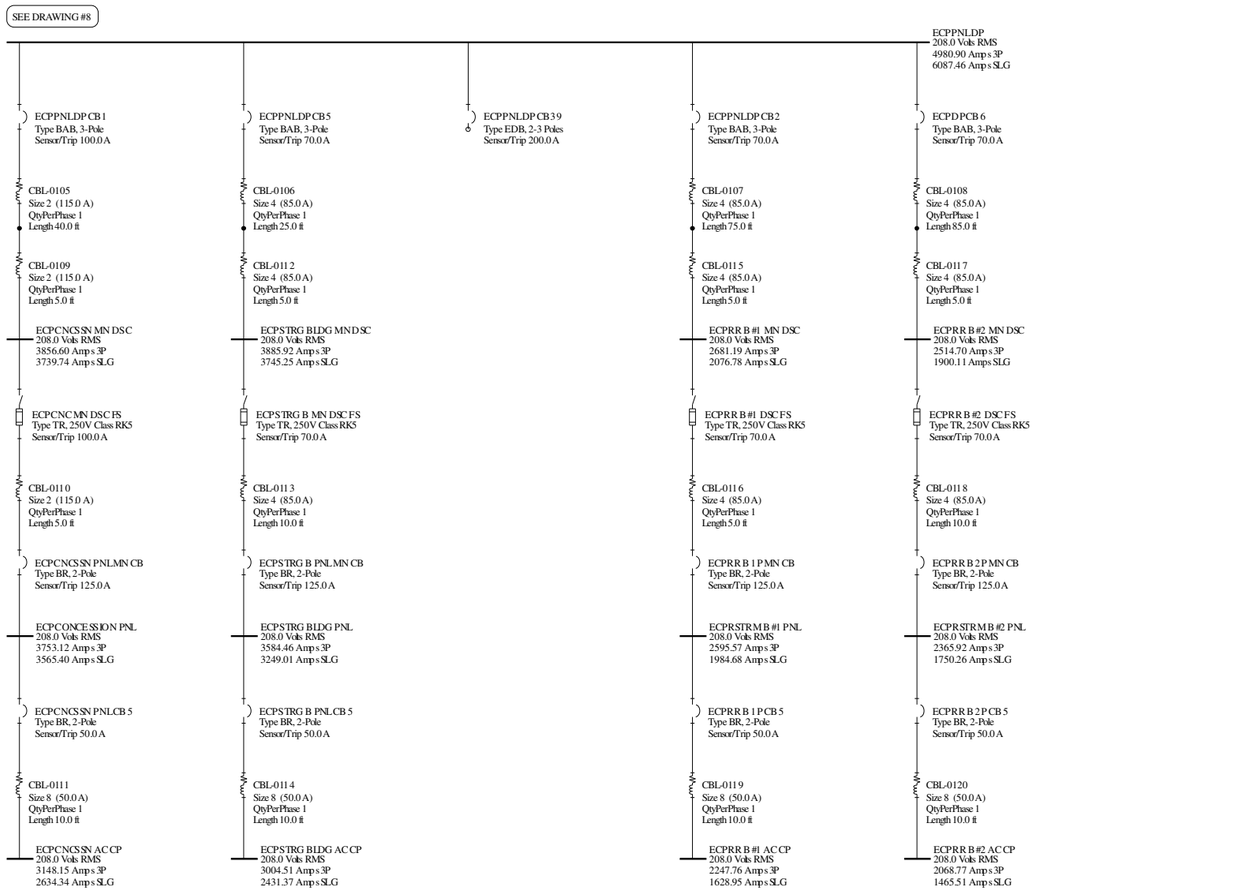
ECP PNLHB CB 20
Type GHB
Sensor/Trip 20.0 A

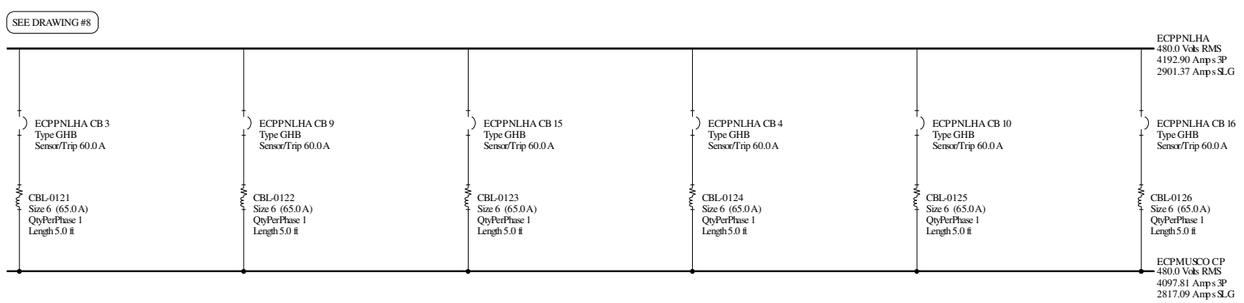
CBL-0103
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

ECP EXT LTG CP
480.0 Volts RMS
4050.46 Amps 3P
2773.75 Amps SLG

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

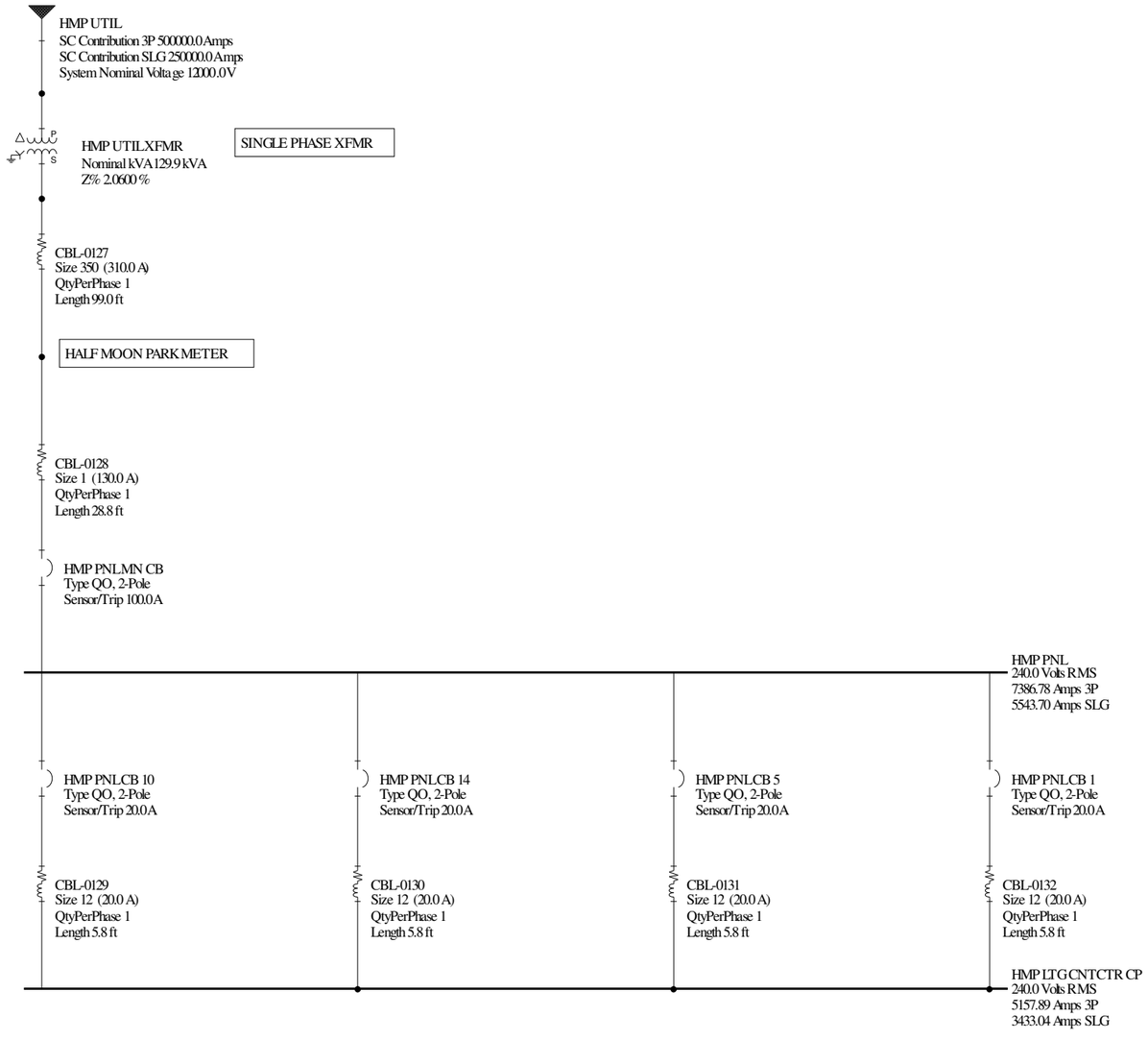
Jurupa Community Services Dist. - Parks
Drawing #8
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)





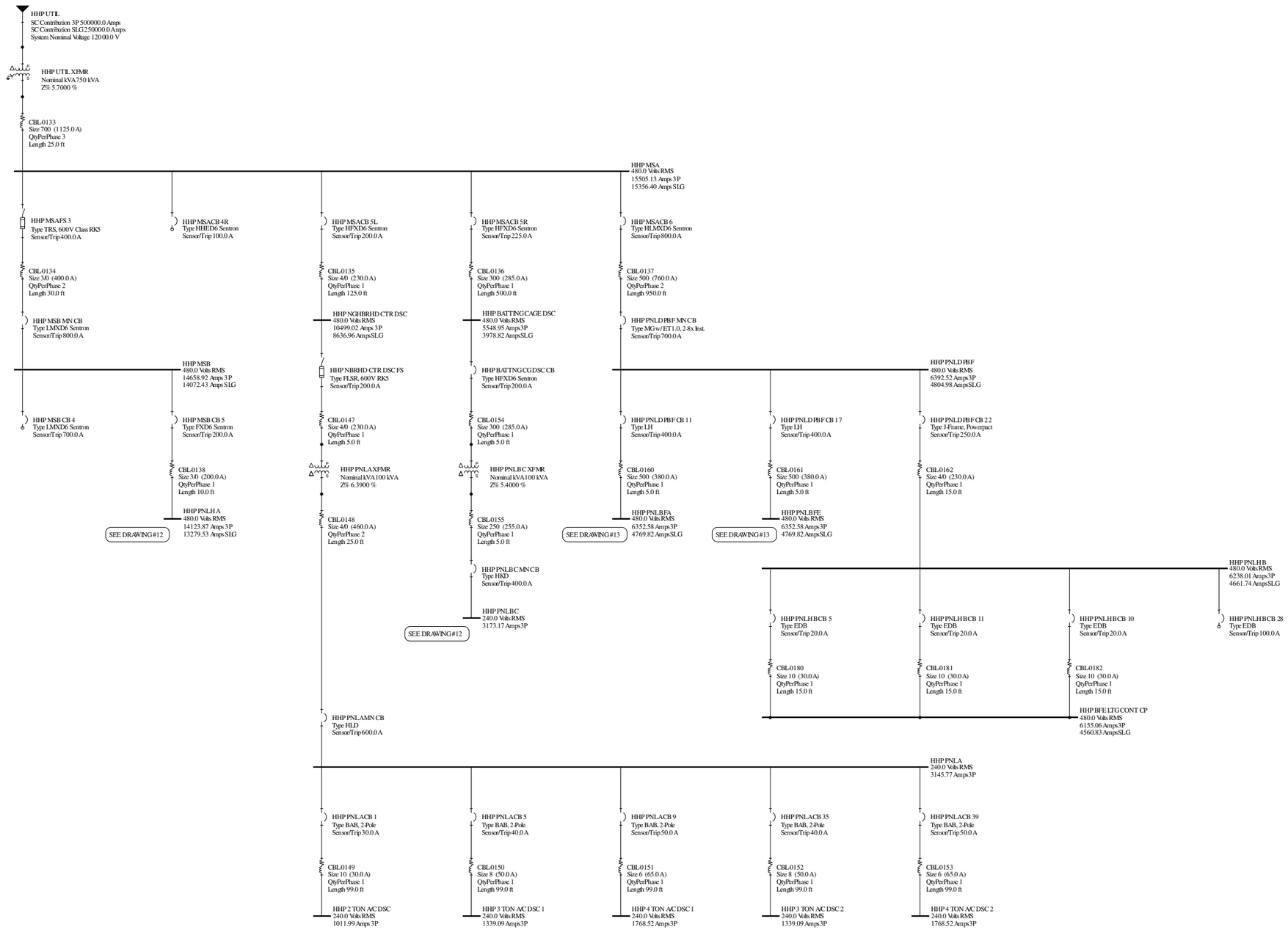
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #9
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #10
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #11
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)

SEE DRAWING #11

HHP PNL HA
480.0 VoltsRMS
14123.87 Amps 3P
13279.53 Amps SLG

HHP HA CB 3
Type EDB
Sensor/Trip 20.0 A

CBL-0139
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP HA CB 9
Type EDB
Sensor/Trip 20.0 A

CBL-0140
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP HA CB 15
Type EDB
Sensor/Trip 20.0 A

CBL-0141
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP HA CB 21
Type EDB
Sensor/Trip 20.0 A

CBL-0142
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP HA CB 2
Type EDB
Sensor/Trip 20.0 A

CBL-0143
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP HA CB 6
Type EDB
Sensor/Trip 20.0 A

CBL-0144
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP HA CB 10
Type EDB
Sensor/Trip 20.0 A

CBL-0145
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP HA CB 14
Type EDB
Sensor/Trip 20.0 A

CBL-0146
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP LTG CONT CP
480.0 VoltsRMS
12370.22 Amps 3P
10401.90 Amps SLG

HHP HA CB 22
Type EDB
Sensor/Trip 50.0 A

SEE DRAWING #11

HHP PNL BC
240.0 VoltsRMS
3173.17 Amps 3P

HHP PNL BC CB 25
Type HFD
Sensor/Trip 175.0 A

CBL-0156
Size 2/0 (175.0 A)
QtyPerPhase 1
Length 95.0 ft

HHP PNL BCA MN CB
Type EDB, 2-3 Poles
Sensor/Trip 175.0 A

HHP PNL BCA
240.0 VoltsRMS
2643.37 Amps 3P

HHP PNL BCA CB
Type BAB, 1-Pole
Sensor/Trip 20.0 A

HHP PNL BC CB 29
Type HFD
Sensor/Trip 175.0 A

CBL-0157
Size 2/0 (175.0 A)
QtyPerPhase 1
Length 95.0 ft

HHP PNL BCB MN CB
Type EDB, 2-3 Poles
Sensor/Trip 175.0 A

HHP PNL BCB
240.0 VoltsRMS
2643.37 Amps 3P

HHP PNL BCB CB
Type BAB, 1-Pole
Sensor/Trip 20.0 A

HHP PNL BC CB 1
Type BAB, 2-Pole
Sensor/Trip 100.0 A

CBL-0158
Size 2 (115.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP PNL BCC MN CB
Type EHD
Sensor/Trip 100.0 A

HHP PNL BCC
240.0 VoltsRMS
3126.64 Amps 3P

HHP PNL BCC CB 1
Type BAB, 2-Pole
Sensor/Trip 30.0 A

CBL-0159
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP SUMPPMP CP
240.0 VoltsRMS
2931.24 Amps 3P

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #12
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)

SEE DRAWING #11

HHP PNL BFA
480.0 Volts RMS
6352.58 Amps 3P
4769.82 Amps SLG

HHP PNL BFA CB 3
Type EGB, 3-4 Poles
Sensor/Trip 60.0 A

CBL-0163
Size 6 (65.0 A)
QtyPerPhase 1
Length 15.0 ft

HHP PNL BFA CB 9
Type EGB, 3-4 Poles
Sensor/Trip 20.0 A

CBL-0164
Size 10 (30.0 A)
QtyPerPhase 1
Length 15.0 ft

HHP PNL BFA CB 15
Type EGB, 3-4 Poles
Sensor/Trip 30.0 A

CBL-0165
Size 10 (30.0 A)
QtyPerPhase 1
Length 15.0 ft

HHP PNL BFA CB 21
Type EGB, 3-4 Poles
Sensor/Trip 60.0 A

CBL-0166
Size 6 (65.0 A)
QtyPerPhase 1
Length 15.0 ft

HHP PNL BFA CB 27
Type EGB, 3-4 Poles
Sensor/Trip 60.0 A

CBL-0167
Size 6 (65.0 A)
QtyPerPhase 1
Length 15.0 ft

HHP PNL BFA CB 33
Type EGB, 3-4 Poles
Sensor/Trip 30.0 A

CBL-0168
Size 10 (30.0 A)
QtyPerPhase 1
Length 15.0 ft

HHP PNL BFA CB 4
Type EGB, 3-4 Poles
Sensor/Trip 60.0 A

CBL-0169
Size 6 (65.0 A)
QtyPerPhase 1
Length 15.0 ft

HHP PNL BFA CB 10
Type EGB, 3-4 Poles
Sensor/Trip 60.0 A

CBL-0170
Size 6 (65.0 A)
QtyPerPhase 1
Length 15.0 ft

HHP BFA LTG CONT CP
480.0 Volts RMS
5759.62 Amps 3P
4158.26 Amps SLG

SEE DRAWING #11

HHP PNL BFE
480.0 Volts RMS
6352.58 Amps 3P
4769.82 Amps SLG

HHP PNL BFE CB 3
Type EDB
Sensor/Trip 60.0 A

CBL-0171
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP PNL BFE CB 9
Type EDB
Sensor/Trip 30.0 A

CBL-0172
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP PNL BFE CB 15
Type EDB
Sensor/Trip 30.0 A

CBL-0173
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP PNL BFE CB 21
Type EDB
Sensor/Trip 60.0 A

CBL-0174
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP PNL BFE CB 4
Type EDB
Sensor/Trip 60.0 A

CBL-0175
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP PNL BFE CB 10
Type EDB
Sensor/Trip 30.0 A

CBL-0176
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP PNL BFE CB 16
Type EDB
Sensor/Trip 60.0 A

CBL-0177
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP PNL BFE CB 22
Type EDB
Sensor/Trip 30.0 A

CBL-0178
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

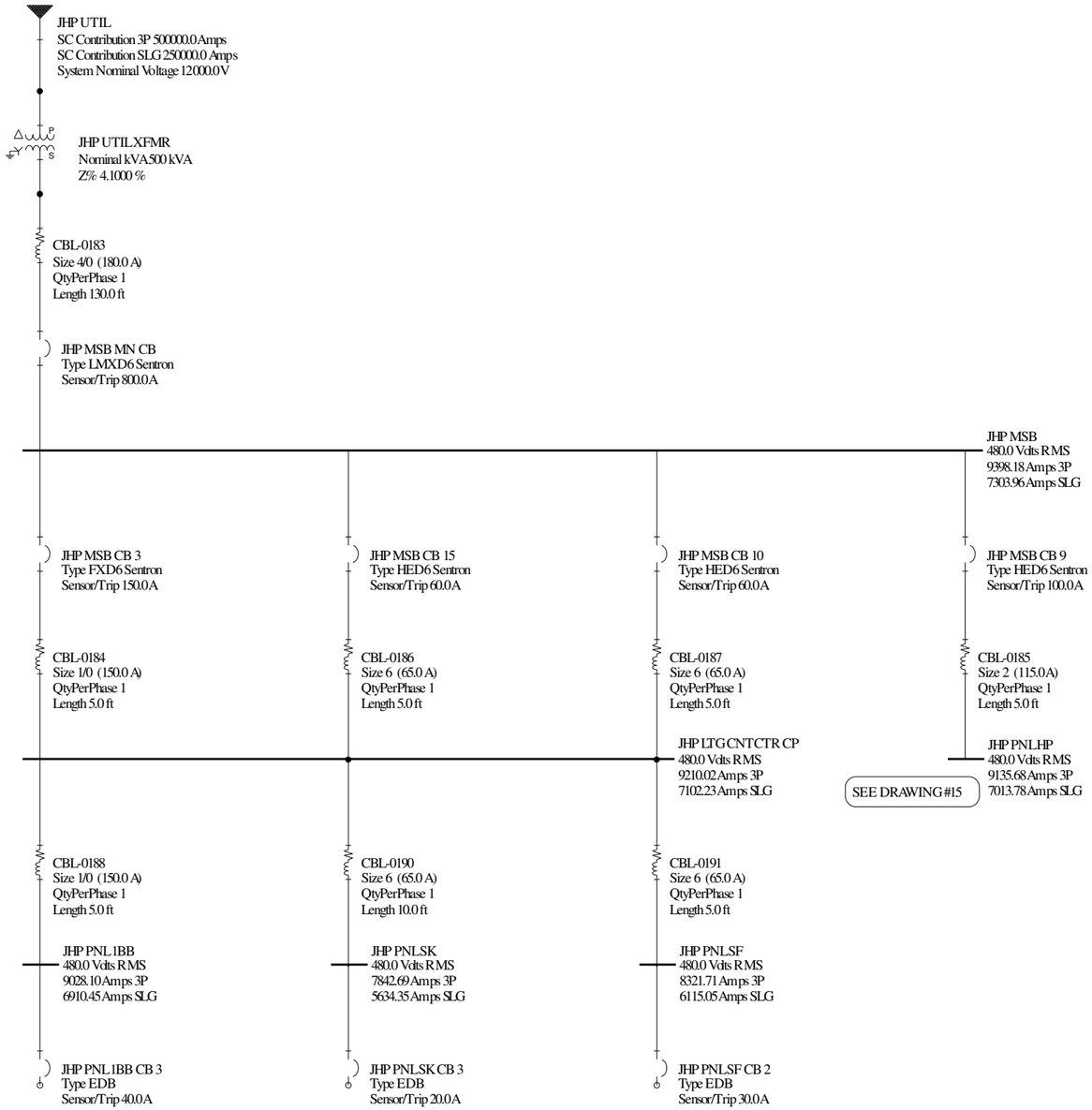
HHP PNL BFE CB 28
Type EDB
Sensor/Trip 60.0 A

CBL-0179
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

HHP BFE LTG CONT CP
480.0 Volts RMS
6155.06 Amps 3P
4560.83 Amps SLG

SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #13
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #14
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)

SEE DRAWING#14

JHP PNLHP
480.0 Volts RMS
9135.68 Amps 3P
7013.78 Amps SLG

JHP PNLHP CB 1
Type EDB
Sensor/Trip 30.0 A

CBL-0192
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

JHP PNLHP CB 5
Type EDB
Sensor/Trip 20.0 A

CBL-0193
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

JHP PNLHP CB 9
Type EDB
Sensor/Trip 20.0 A

CBL-0194
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

JHP PNLHP CB 13
Type EDB
Sensor/Trip 20.0 A

CBL-0195
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

JHP PNLHP CB 21
Type EDB
Sensor/Trip 50.0 A

JHP PNLHP CB 2
Type EDB
Sensor/Trip 20.0 A

CBL-0196
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

JHP PNLHP CB 6
Type EDB
Sensor/Trip 20.0 A

CBL-0197
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

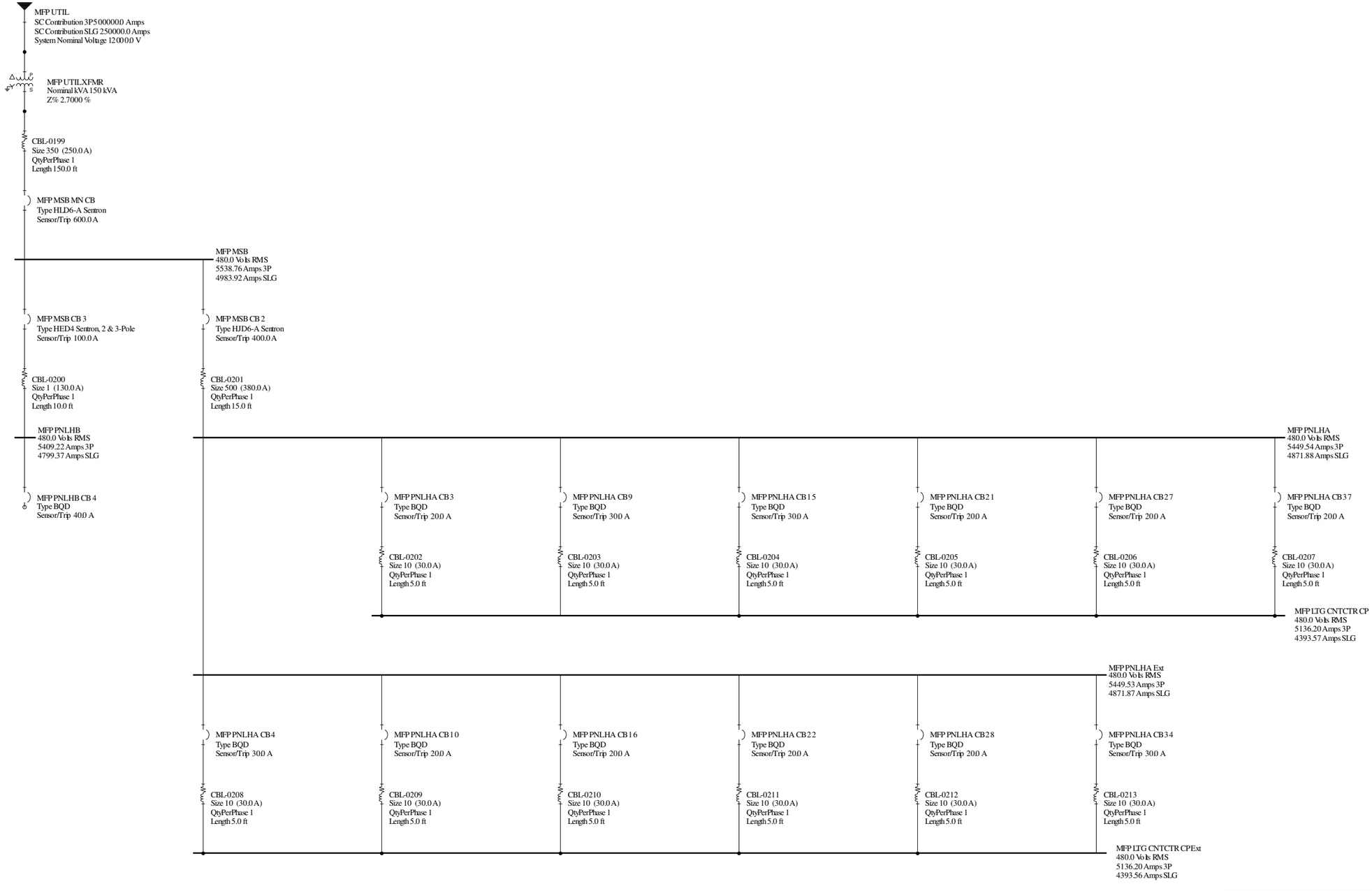
JHP PNLHP CB 10
Type EDB
Sensor/Trip 20.0 A

CBL-0198
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

JHP LTG CNTCTR CP
480.0 Volts RMS
9210.02 Amps 3P
7102.23 Amps SLG

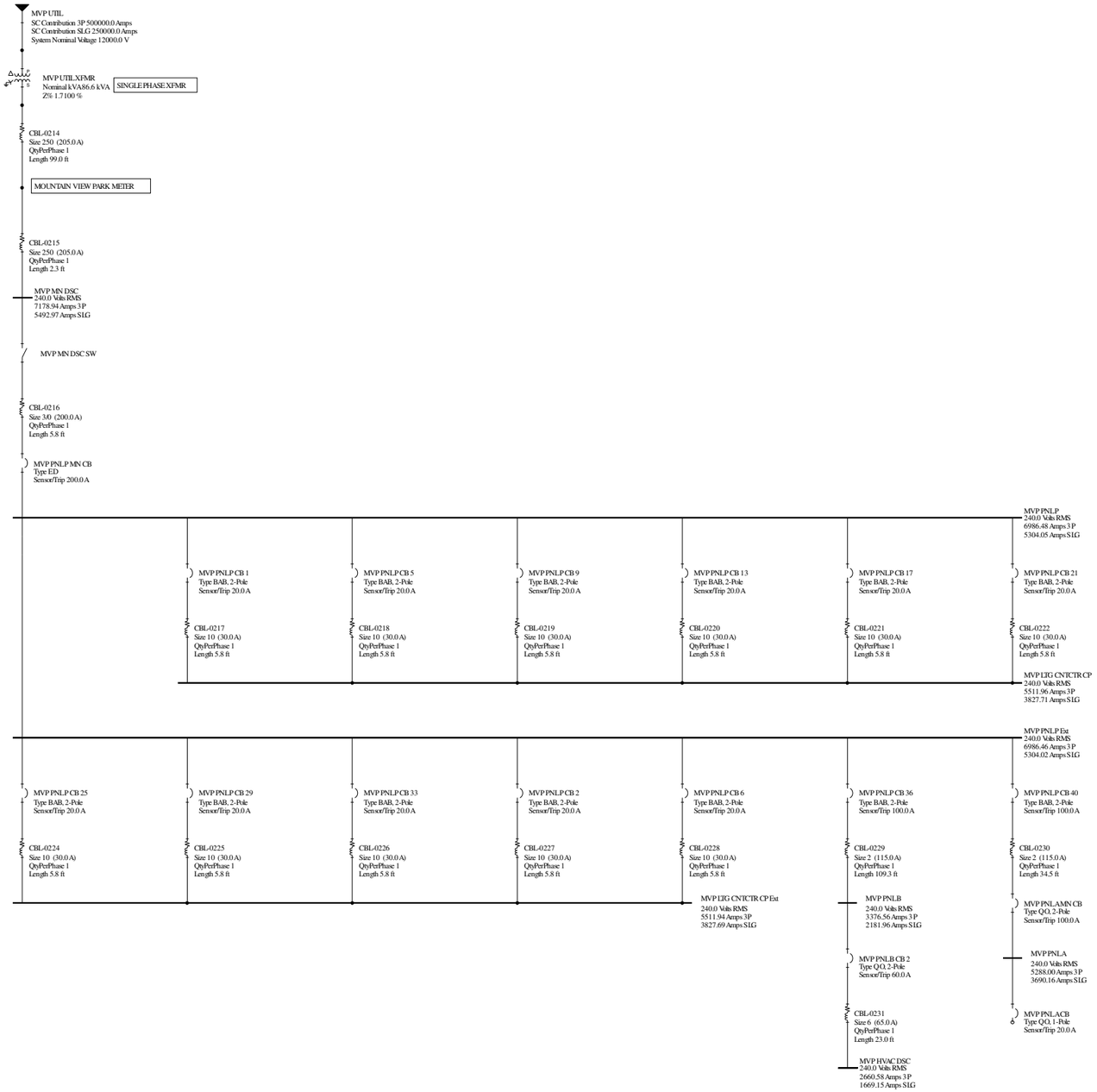
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #15
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



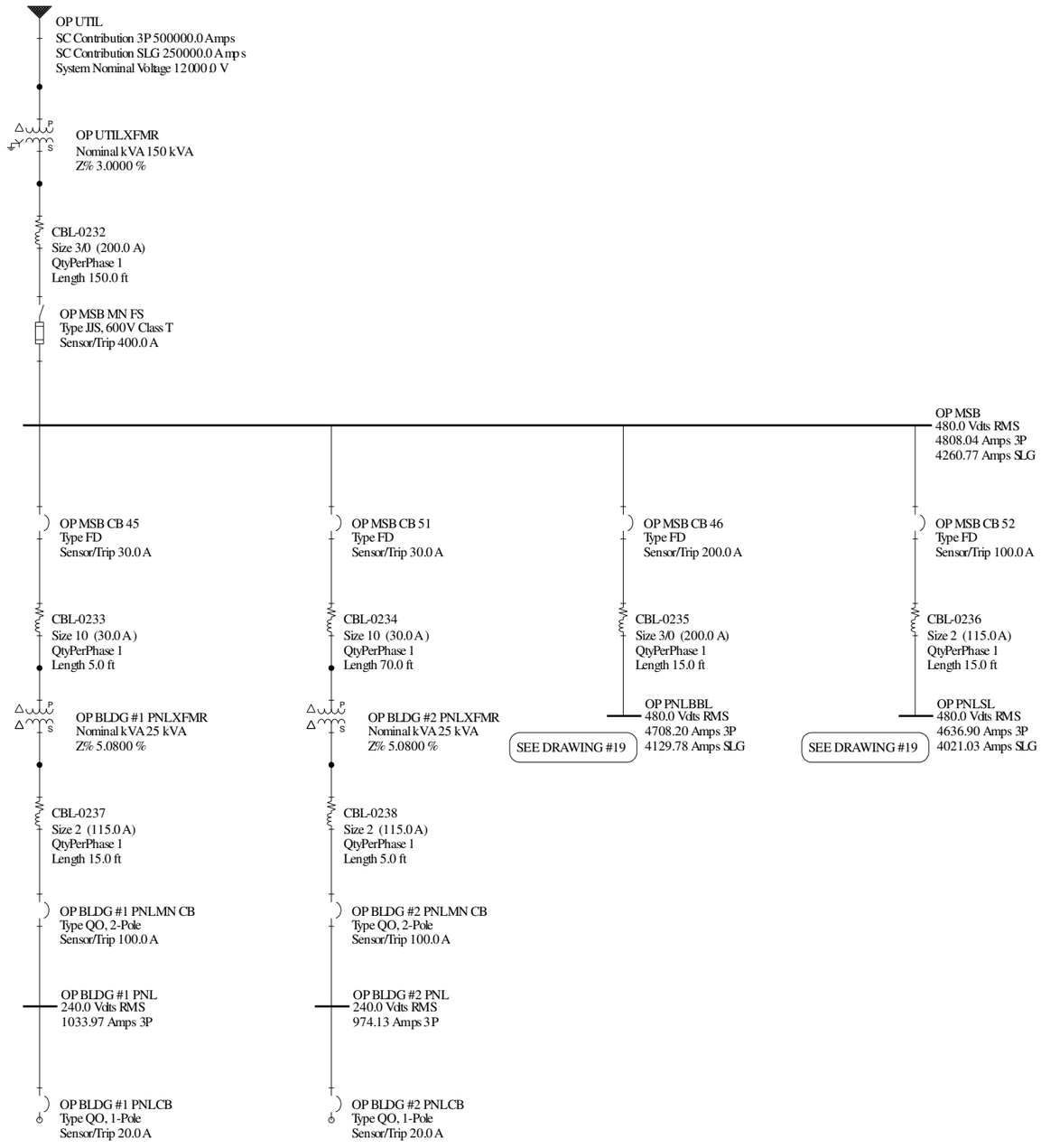
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #16
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

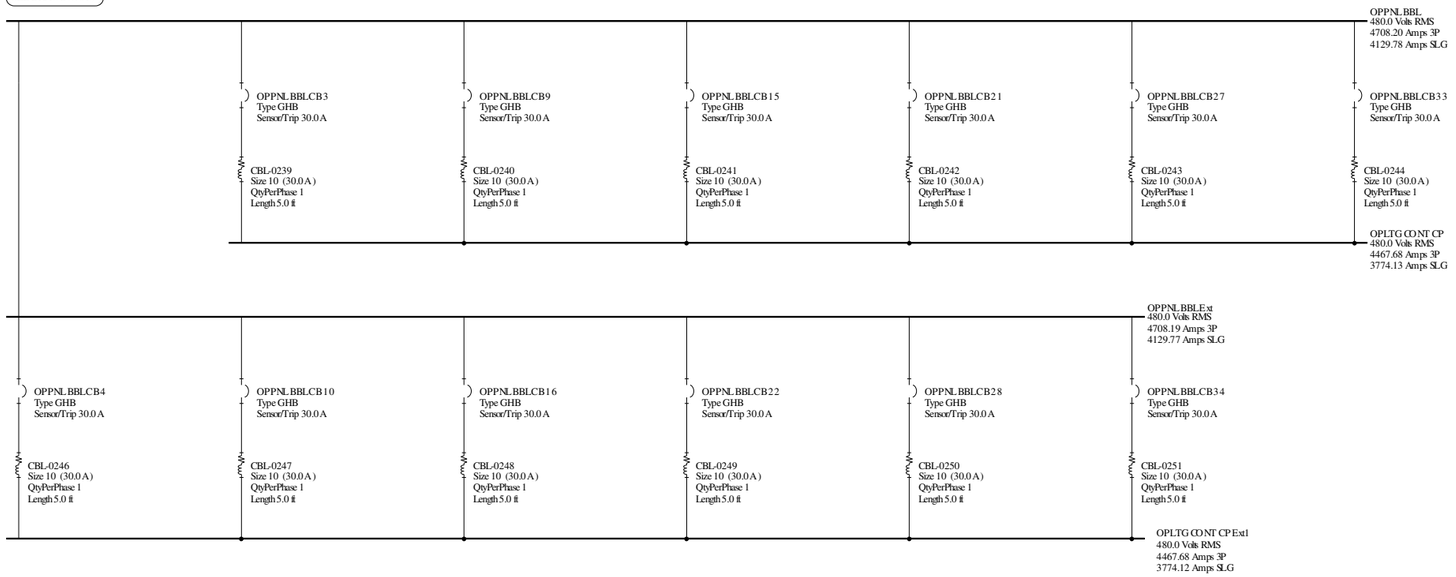
Jurupa Community Services Dist. - Parks
Drawing #17
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



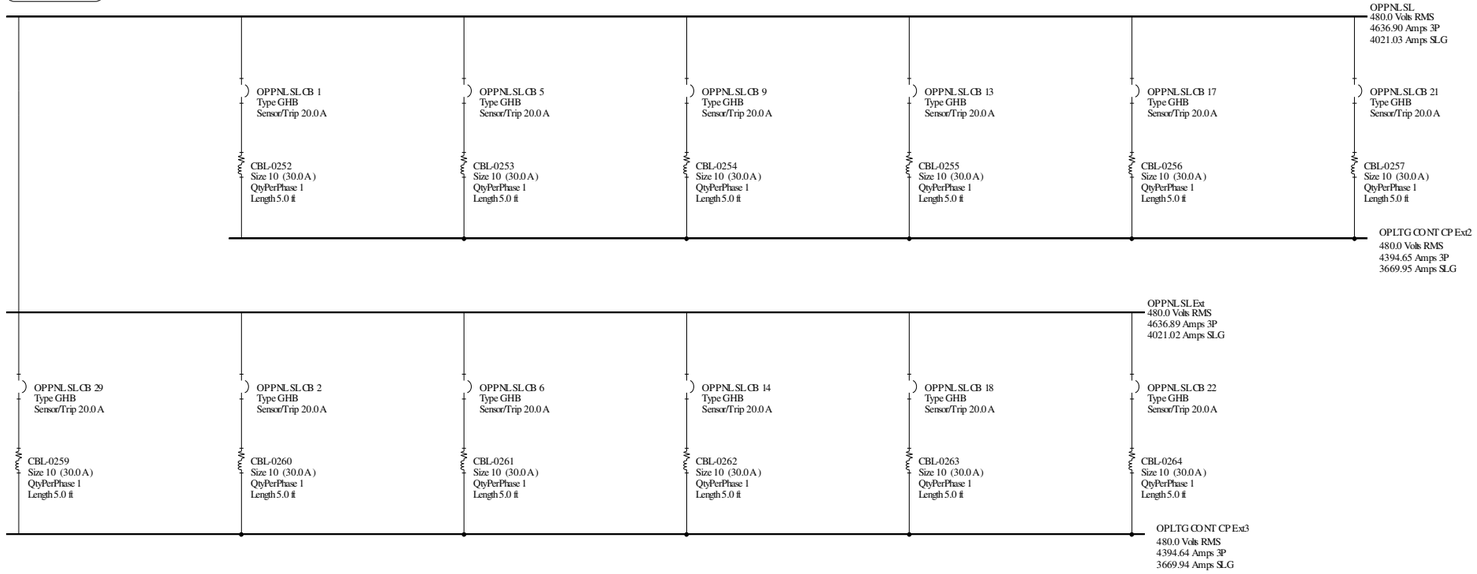
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #18
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)

SEE DRAWING #18

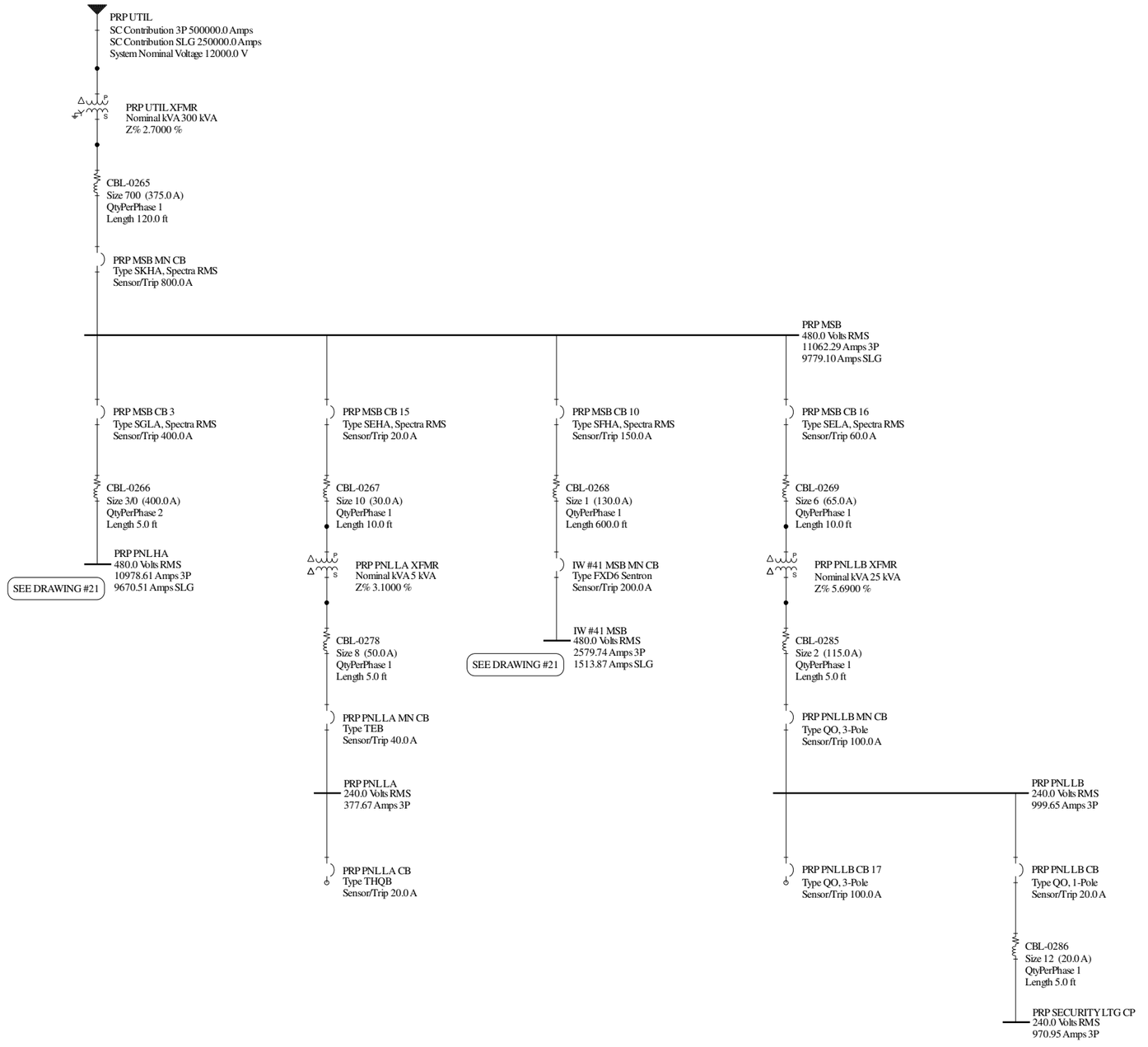


SEE DRAWING #18



SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #19
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #20
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)

SEE DRAWING #20

PRP PNL HA
480.0 Volts RMS
10978.61 Amps 3P
9670.51 Amps SLG

PRP PNL HA CB 19
Type TEY
Sensor/Trip 40.0 A

CBL-0270
Size 8 (50.0 A)
QtyPerPhase 1
Length 1.0 ft

PRP PNL HA CB 25
Type TEY
Sensor/Trip 40.0 A

CBL-0271
Size 8 (50.0 A)
QtyPerPhase 1
Length 1.0 ft

PRP PNL HA CB 37
Type TEY
Sensor/Trip 40.0 A

CBL-0272
Size 8 (50.0 A)
QtyPerPhase 1
Length 1.0 ft

PRP PNL HA CB 4
Type TEY
Sensor/Trip 40.0 A

CBL-0273
Size 8 (50.0 A)
QtyPerPhase 1
Length 1.0 ft

PRP PNL HA CB 10
Type TEY
Sensor/Trip 40.0 A

CBL-0274
Size 8 (50.0 A)
QtyPerPhase 1
Length 1.0 ft

PRP PNL HA CB 16
Type TEY
Sensor/Trip 50.0 A

CBL-0275
Size 6 (65.0 A)
QtyPerPhase 1
Length 1.0 ft

PRP PNL HA CB 22
Type TEY
Sensor/Trip 40.0 A

CBL-0276
Size 8 (50.0 A)
QtyPerPhase 1
Length 1.0 ft

PRP PNL HA CB 30
Type TEY
Sensor/Trip 50.0 A

CBL-0277
Size 6 (65.0 A)
QtyPerPhase 1
Length 1.0 ft

PRP LTG CNTCTR CP
480.0 Volts RMS
10873.19 Amps 3P
9515.61 Amps SLG

SEE DRAWING #20

IW #41 MSB
480.0 Volts RMS
2579.74 Amps 3P
1513.87 Amps SLG

CBL-0279
Size 12 (20.0 A)
QtyPerPhase 1
Length 5.0 ft

CBL-0280
Size 12 (20.0 A)
QtyPerPhase 1
Length 5.0 ft

IW #41 EMON CP
480.0 Volts RMS
2245.57 Amps 3P
1301.97 Amps SLG

IW #41 MSB CB 1
Type HED4 Sentron, 2 & 3-Pole
Sensor/Trip 110.0 A

CBL-0281
Size 2 (115.0 A)
QtyPerPhase 1
Length 15.0 ft

IW #41 SFT STRT
480.0 Volts RMS
2520.19 Amps 3P
1474.74 Amps SLG

CBL-0282
Size 2 (115.0 A)
QtyPerPhase 1
Length 99.0 ft

IW #41 PMP
Rated HP 60 hp

IW #41 MSB CB 2
Type HED4 Sentron, 2 & 3-Pole
Sensor/Trip 30.0 A

CBL-0283
Size 10 (30.0 A)
QtyPerPhase 1
Length 5.0 ft

IW #41 PNL A XFMR
Nominal kVA 10 kVA
Z% 2.4000 %

CBL-0284
Size 6 (65.0 A)
QtyPerPhase 1
Length 5.0 ft

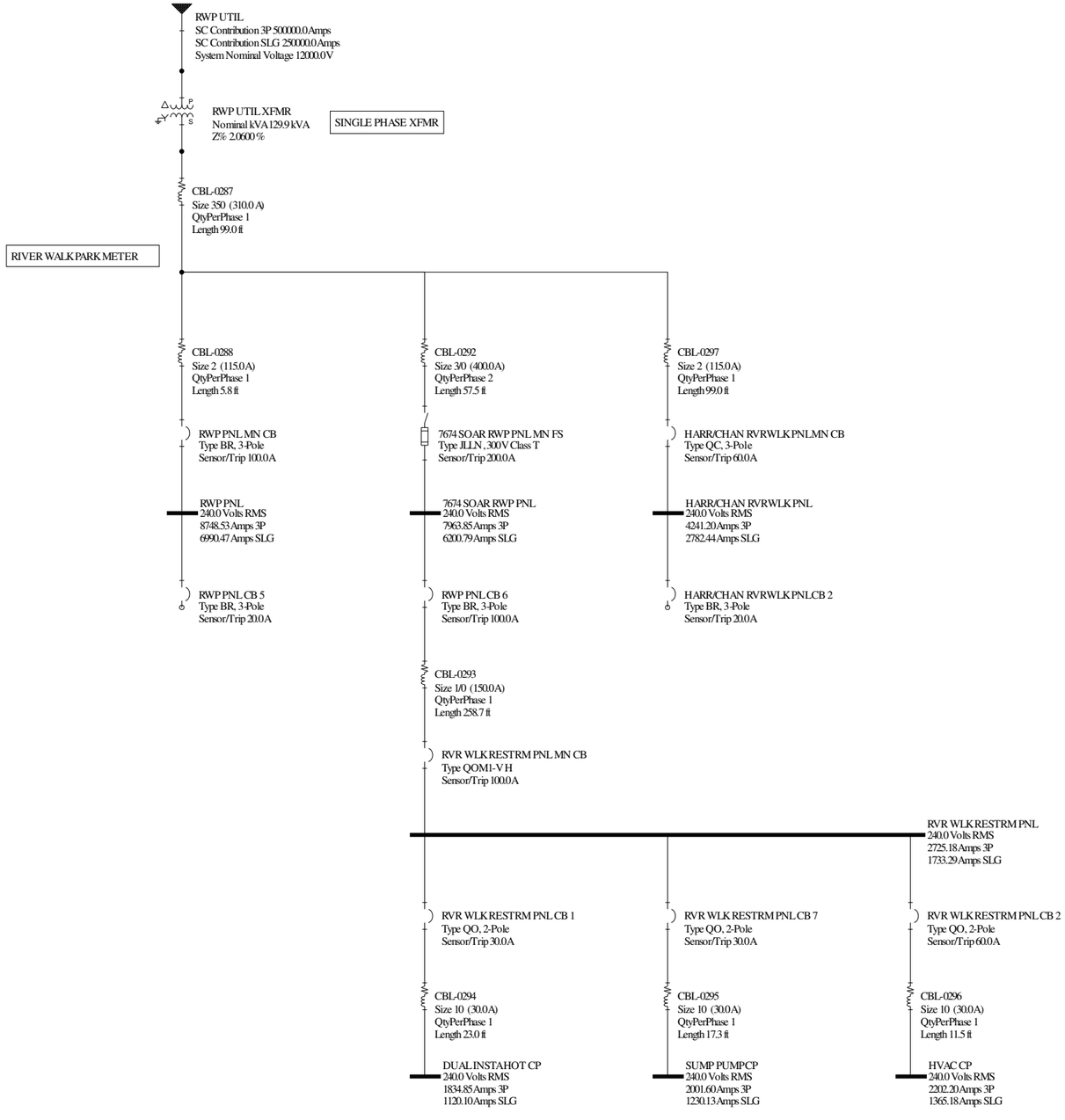
IW #41 PNL A MN CB
Type QP, 2 & 3-Pole
Sensor/Trip 60.0 A

IW #41 PNL A
240.0 Volts RMS
843.22 Amps 3P

IW #41 PNL A CB 2
Type QP, 2 & 3-Pole
Sensor/Trip 30.0 A

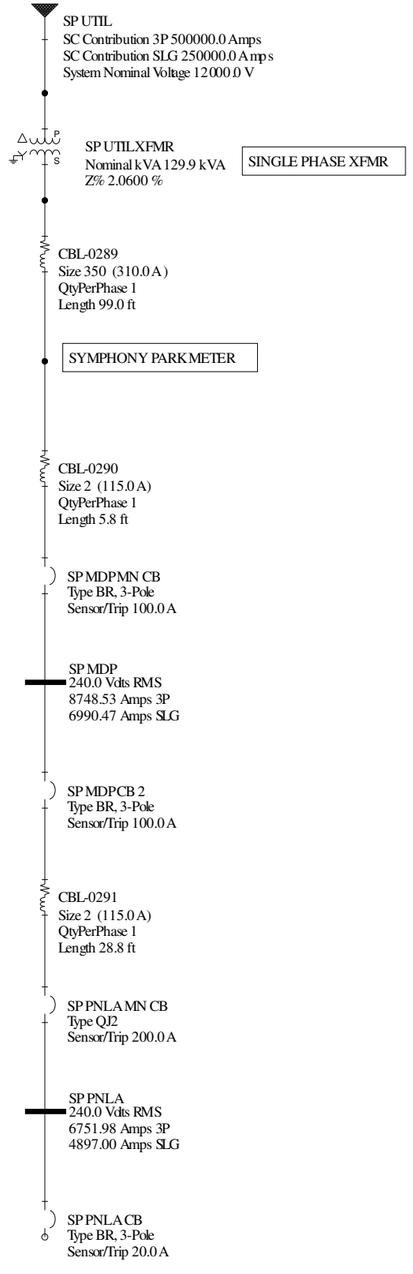
SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #21
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #22
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)



SEAM GROUP
WHERE SAFETY & UPTIME ALIGN

Jurupa Community Services Dist. - Parks
Drawing #23
April 2, 2019
Calculated Fault Currents Shown at Busses are Derived from Base Scenario (S0)

9. Appendix

Appendix – November 14, 2017

APPENDIX – FIELD TECHNICIAN FORM

Project: Jurupa Community Services District
Location: Jurupa Valley, CA

Assumptions & Collection Notes:

- Checked in with David and Jamie.

- Collected a total of 65 locations / sites...see attached list.

- All sites were collected per panel schedule.

- Checked out with David/ Jamie.

Additional data provided while on-site (drawings, test reports, etc.) - YES NO

In most cases data collection can be accomplished without interruption of facility operations. In the rare case where the data cannot be gathered due to our inability to access panels due to operational needs, panels located in areas requiring special security clearance, panels located in clean rooms, panels located in hazardous areas requiring specialized training, or other situations beyond our control, it would be necessary for the facility to gather that data and forward it to us.

Your facility's panelboards, bus ducts, motor control centers, disconnects, switchgear, etc, should be properly labeled per the National Electrical Code prior to our arrival. These labels should indicate, among other things, the name of the enclosure and what each of the fuses or circuit breakers are feeding. If there are unlabeled or mislabeled over-current protective devices it is the responsibility of the facility to rectify these if they are to be included in the analysis.

It is understood and accepted that the information on panel schedules and equipment labels was correct. It is understood and accepted that the assigned escort was knowledgeable of the facility electrical system and information received regarding the termination of loads was correct.

Lewellyn Technology must receive customer provided feedback outlining any outstanding information or questions as listed on this form within 3 weeks of the completion of the data collection in order to ensure timely project completion. We understand this may not always be possible and request that you contact our office within this timeframe to accommodate new scheduling if required. Delays in required information could result in delayed final project delivery.

Field Technician: MICKY SAMI **Date:** 11 / 09 / 2016

Facility contact: **Date:** 11 / 09 / 2016

Printed name: Jaime Godoy

Sheet1

	FACILITY
1	BLDG A, B, MODULAR and Well # 23
	PARKS
2	AMERICAN HEROES PARK
3	CEDAR CREEK PARK
4	DAIRYLAND PARK
5	DEER CREEK PARK
6	EASTVALE COMMUNITY PARK
7	EASTVALE COMMUNITY CENTER
8	HALF MOON PARK
9	HARADA HERIAGE PARK
10	JAMES HUBER PARK
11	McKUNE FAMILY PARK
12	MOUNTAIN VIEW PARK
13	ORCHARD PARK
14	PROVIDENCE RANCH PARK
15	RIVER WALK PARK
16	SYMPHONY PARK
	SEWER
17	CHANDLER LIFT STATION
18	HAMNER LIFT STATION
19	RIVER ROAD LIFT STATION

Sheet1

20	44TH ST LIFT STATION
21	FLORINE LIFT STATION
22	LAKESIDE LIFT STATION
23	LINARES LIFT STATION
24	REGIONAL LIFT STATION
25	SKY COUNTRY 1 LIFT STATION
26	SKY COUNTRY 2 LIFT STATION
27	SKY COUNTRY 3 LIFT STATION
28	CLAY LIFT STATION
29	CLIFF VALLEY LIFT STATION
	WATER
30	AGATE BOOSTER STATION
31	ARMSTRONG BOOSTER STATION
32	CFD BOOSTER STATION
33	CLAY BOOSTER STATION
34	56TH ST BOOSTER STATION
35	INDIAN HILLS I BOOSTER STATION
36	JEWEL ST BOOSTER STATION
37	LIVE OAK BOOSTER STATION
38	BENEDICT RESERVOIRS
39	INDIAN HILLS II BOOSTER STATION
40	PEDLEY RESERVOIRS
41	SUNNYSLOPE RESERVOIRS
42	HIGH SCHOOL IRRIGATION WELL
43	IRRIGATION WELL 3,5 & 21
44	IRRIGATION WELL 40

Sheet1

45	IRRIGATION WELL 41
46	IRRIGATION WELL 42
47	VAN LEEUWEN IRRIGATION WELL
48	WELL 6
49	WELL 8
50	WELL 11
51	WELL 12
52	WELL 14
53	WELL 15
54	WELL 16
55	WELL 17
56	WELL 18
57	WELL 19
58	WELL 20
59	WELL 22
60	WELL 24
61	WELL 25
62	ROGER TEAGARDEN ION EXCHANGE PLANT
63	BAIN
64	WELL 27
65	WELL 28

APPENDIX – UTILITY DATA PROVIDED

Date of Response: 7/11/2017

SOUTHERN CALIFORNIA EDISON
An *EDISON INTERNATIONAL* Company

Response to Letter of Request for Short Circuit Current Value for Panel Sizing and Protection Coordination

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SCE provides the information contained in this letter on an "as is" basis without warranty of any kind, either express or implied. This disclaimer of liability applies to any claim or cause of action for damages or injuries occurring as a result of any error, omission, deletion or defect in the content of the information provided, including, but not limited to, negligence, breach of contract, or tort. Under no circumstances shall SCE or any of its parent or affiliate companies, employees, directors or shareholders be liable to any party for (i) any direct, indirect, special, punitive, incidental, exemplary, consequential, or any other damages arising in any way out of the availability, use or reliance on the information provided; or (ii) any claim attributable to errors, omissions or other inaccuracies in the information provided herein.

The values provided above are maximum Short Circuit values, based on current distribution system conditions. Utility distribution systems are dynamic, and the electrical characteristics of the system can vary significantly due to abnormal conditions, upgrades, modifications, and temporary or permanent reconfigurations. Therefore, the Short Circuit values provided above are subject to change frequently and without notice. SCE does not guarantee to hold the system parameters represented in this information constant. Consequently, SCE recommends that all electrical work on the service panel main breaker should be done in a de-energized condition to eliminate arc flash hazard at this location.

To:	Customer:	Jurupa Community Services District	Phone:	
	Address:	11201 Harrel St	Fax:	
	City, Zip:	Jurupa Valley, CA 91752	Email:	

From: Southern California Edison (SCE) - Engineering &Technical Services - Field Engineering

Engineer:	Rebeca Sandoval	Phone:	
Address:	3 Innovation Way	Fax:	
City, Zip:	Pomona, CA 91768	Email:	rebeca.sandoval@sce.com

Subject: Southern California Edison's Contribution to Short Circuit Current at the Point-of-Connection of the SCE's Service Conductors to the Customer's Service Entrance Facilities (see disclaimer above)

Project:	Name:	Cedar Creek Park
	Address:	6709 Cedar Creek Rd
	City, Zip:	Eastvale, CA
	Structure #:	5457859

Date of Response: 7/11/2017

SOUTHERN CALIFORNIA EDISON
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Response to Letter of Request for Short Circuit Current Value for Panel Sizing and Protection Coordination

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To:	Customer:	Jurupa Community Services District	Phone:	
	Address:	11201 Harrel St	Fax:	
	City, Zip:	Jurupa Valley, CA 91752	Email:	

From: Southern California Edison (SCE) - Engineering &Technical Services - Field Engineering

Engineer:	Rebeca Sandoval	Phone:	
Address:	3 Innovation Way	Fax:	
City, Zip:	Pomona, CA 91768	Email:	rebeca.sandoval@sce.com

Subject: Southern California Edison's Contribution to Short Circuit Current at the Point-of-Connection of the SCE's Service Conductors to the Customer's Service Entrance Facilities (see disclaimer above)

Project:	Name:	Dairyland Park
	Address:	14520 Sam Remo Drive
	City, Zip:	Eastvale, CA 92880
	Structure #:	5457859

Date of Response: 7/11/2017

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Response to Letter of Request for Short Circuit Current Value for Panel Sizing and Protection Coordination

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To:	Customer:	Jurupa Community Services District	Phone:	
	Address:	11201 Harrel St	Fax:	
	City, Zip:	Jurupa Valley, CA 91752	Email:	

From: Southern California Edison (SCE) - Engineering &Technical Services - Field Engineering

Engineer:	Rebeca Sandoval	Phone:	
Address:	3 Innovation Way	Fax:	
City, Zip:	Pomona, CA 91768	Email:	rebeca.sandoval@sce.com

Subject: Southern California Edison's Contribution to Short Circuit Current at the Point-of-Connection of the SCE's Service Conductors to the Customer's Service Entrance Facilities (see disclaimer above)

Project:	Name:	Half Moon Park
	Address:	14383 Cherry Creek Circle
	City, Zip:	Eastvale, CA 92880
	Structure #:	5602719

Date of Response: 7/11/2017

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Response to Letter of Request for Short Circuit Current Value for Panel Sizing and Protection Coordination

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To:	Customer:	Jurupa Community Services District	Phone:	n/a
	Address:	11201 Harrel St	Fax:	n/a
	City, Zip:	Jurupa Valley, CA 91752	Email:	n/a

From: Southern California Edison (SCE) - Engineering &Technical Services - Field Engineering

Engineer:	Rebeca Sandoval	Phone:	0
Address:	3 Innovation Way	Fax:	0
City, Zip:	Pomona, CA 91768	Email:	rebeca.sandoval@sce.com

Subject: Southern California Edison's Contribution to Short Circuit Current at the Point-of-Connection of the SCE's Service Conductors to the Customer's Service Entrance Facilities (see disclaimer above)

Project:	Name:	McCune Family Park
	Address:	7450 Eastvale Parkway
	City, Zip:	Jurupa Valley, CA 91752
	Structure #:	5493195

Date of Response: 7/11/2017

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Response to Letter of Request for Short Circuit Current Value for Panel Sizing and Protection Coordination

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To:	Customer:	Jurupa Community Services District	Phone:	
	Address:	11201 Harrel St	Fax:	
	City, Zip:	Jurupa Valley, CA 91752	Email:	

From: Southern California Edison (SCE) - Engineering &Technical Services - Field Engineering

Engineer:	Rebeca Sandoval	Phone:	
Address:	3 Innovation Way	Fax:	
City, Zip:	Pomona, CA 91768	Email:	rebeca.sandoval@sce.com

Subject: Southern California Edison's Contribution to Short Circuit Current at the Point-of-Connection of the SCE's Service Conductors to the Customer's Service Entrance Facilities (see disclaimer above)

Project:	Name:	Mountain View Park
	Address:	14444 Healy Lake Cir
	City, Zip:	Eastvale, CA 92880
	Structure #:	5600853

Date of Response: 7/11/2017

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Response to Letter of Request for Short Circuit Current Value for Panel Sizing and Protection Coordination

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To:	Customer:	Jurupa Community Services District	Phone:	
	Address:	11201 Harrel St.	Fax:	
	City, Zip:	Jurupa Valley, CA 91752	Email:	

From: Southern California Edison (SCE) - Engineering &Technical Services - Field Engineering

Engineer:	Rebeca Sandoval	Phone:	
Address:	3 Innovation Way	Fax:	
City, Zip:	Pomona, CA 91768	Email:	rebeca.sandoval@sce.com

Subject: Southern California Edison's Contribution to Short Circuit Current at the Point-of-Connection of the SCE's Service Conductors to the Customer's Service Entrance Facilities (see disclaimer above)

Project:	Name:	Providence Ranch Park
	Address:	7210 Cedar Creek Dr.
	City, Zip:	Eastvale, CA 92880
	Structure #:	5492935

Date of Response: 7/11/2017

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To:	Customer:	Jurupa Community Services District	Phone:	
	Address:	11201 Harrel St	Fax:	
	City, Zip:	Jurupa Valley, CA 91752	Email:	

From: Southern California Edison (SCE) - Engineering &Technical Services - Field Engineering

Engineer:	Rebeca Sandoval	Phone:	
Address:	3 Innovation Way	Fax:	
City, Zip:	Pomona, CA 91768	Email:	rebeca.sandoval@sce.com

Subject: Southern California Edison's Contribution to Short Circuit Current at the Point-of-Connection of the SCE's Service Conductors to the Customer's Service Entrance Facilities (see disclaimer above)

Project:	Name:	Riverwalk Park
	Address:	7674 Soaring Bird Court
	City, Zip:	Eastvale, CA 92880
	Structure #:	5578008

Date of Response: 7/11/2017

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To:	Customer:	Jurupa Community Services District	Phone:	
	Address:	11201 Harrel St	Fax:	
	City, Zip:	Jurupa Valley, CA 91752	Email:	

From: Southern California Edison (SCE) - Engineering &Technical Services - Field Engineering

Engineer:	Rebeca Sandoval	Phone:	
Address:	3 Innovation Way	Fax:	
City, Zip:	Pomona, CA 91768	Email:	rebeca.sandoval@sce.com

Subject: Southern California Edison's Contribution to Short Circuit Current at the Point-of-Connection of the SCE's Service Conductors to the Customer's Service Entrance Facilities (see disclaimer above)

Project:	Name:	Symphony Park
	Address:	13365 Cadenza Dr.
	City, Zip:	Eastvale, CA 92880
	Structure #:	5655671

APPENDIX – REPORT REFERENCE MATERIAL

Table 3. 277 Volts AC—Breaker/Breaker Series Ratings

Main devices are shown centered at top, in shaded area. Respective branch devices shown directly below.
All ratings in this table apply to single-pole branch breakers only. For 2- and 3-pole branch breakers, see other tables.

Main Breaker Maximum Amperes	Series Equipment Rating—kA Symmetrical						
	22	25	35	65	100		150
100							**FCL** GHB GHQ, GHQRSP EHD FD HFD
125			**EGS** GHQ GHB	**EGH** GHQ GHB			
225			**FD, FDE** GHB GHQ GHQRSP GHBGFEP ①	**HFD, HFDE** GHB, GHQRSP GHQ EHD FD, GHBGFEP ②	**FDC** GHB EHD FD HFD		
250	**JD, JDB** GHB		**JD, JDB** GHB (15–50A) GHBGFEP	**HJD** GHB (15–50A) EHD FD GHBGFEP	**LCL** GHBS	**JDC** GHB EHD FD HFD	
400	**KD, KDB CKD** GHB	**HKD CHKD** GHB	**KD, KDB CKD** GHB (15–50A) EHD FD	**HKD, CHKD** GHB EHD FD	**KDC** GHB EHD FD HFD		**LCL** GHB EHD FD HFD

① Not valid with FDE.
② Not valid with HFDE.

Table 4. 480Y/277 Volts AC—Breaker/Breaker Series Ratings

Main devices are shown centered at top, in shaded area. Respective branch devices shown directly below.
All ratings in this table apply to 2- and 3-pole branch breakers only. For single-pole branch breakers, see **Table 3**.

Main Breaker Maximum Amperes	Series Equipment Rating—kA Symmetrical					
	22	25	35	65	100	150
100						**FCL** GHB, GHQRSP
125			**EGS** GHB	**EGH** GHB		
225			**FD, FDE** GHB, GHQRSP	**HFD, HFDE** GHB, GHQRSP	**FDC** GHB	
250	**JD, JDB** GHB		**JD, JDB** GHB (15–50A)	**HJD** GHB	**JDC** GHB	
400	**KD, KDB CKD** GHB	**HKD, CHKD** GHB	**KD, KDB CKD** GHB (15–50A)	**HKD, CHKD** GHB (15–50A)	**KDC** GHB	**LCL** GHB

SEAM GROUP
FORMERLY PREDICTIVE SERVICE & LEWELLYN TECHNOLOGY

6210 Technology Center Drive, Suite 200
Indianapolis, IN 46278

Update Guidelines

SEAM Group can provide consulting services to modify, add, and maintain the integrity of your Arc Flash Risk Assessment.

ARC FLASH SERVICES:

- Engineering and/or consulting services
- On-site work (as required)
- Label re-prints are $3.00/label
- One complete report hard copy reprint included (additional copies $100/each)

FEE SCHEDULE:

- Please contact us for accurate service rates at 800.242.6673 or seamgroup.com
- All invoices require payment Net 30 days.
- You may purchase consulting time in 5-hour blocks

ADDITIONAL SERVICES:

- Electrical Safety Program Development
- Safety Training
- Infrared Thermography (IR)
- LOTO Procedure Writing
- LVPM-Low Voltage Preventative Maintenance
- Arc Flash Hazard Mitigation

SEAM GROUP ARC FLASH UPDATE GUIDELINES

The following document will outline the information required to maintain and keep your arc flash study up to date.

Rev. 1:1 01-2019

6210 Technology Center Drive, Suite 200
Indianapolis, IN 46278

What information would cause a change in my arc flash?
There are multiple items that can affect the results of your arc flash evaluation. Obviously if there is any new equipment added that will require an arc flash label then these items will have to be added to the existing arc flash study. Another instance is that if any circuit is moved from one location to another, then the new component information (wire, protective device) would need to be verified to make sure nothing has changed. Any time a cable size (including going from single to parallel cables) or cable distance is modified then the model would need to be updated to reflect the difference. Also any replacement of a protective device or any change in a protective devices settings needs to be noted as this can also change the arc flash rating of the associated device. Replacement of any transformer can also affect the arc flash study results.

What's required to be included in a Study?
An arc flash study should include any equipment that service personnel would enter/open to perform maintenance operations. This would include panelboards, switchboards, switchgear, MCC's, disconnects, and control panels.

Where do I indicate/illustrate the changes?
We often advise a customer to utilize the one-line drawings included in the original study to markup where equipment has been added or to mark out equipment that has been deleted. If the above required information for the devices can be clearly indicated on the one lines that is fine, otherwise the pertinent component data can be provided as a supplement to the marked up one lines. This allows for quick and easy reference for SEAM Group to know where the changes were made in the system so there isn't a misinterpretation of customer provided information without a one line.

What if I just implemented a recommendation in the study?
If the system change was an implementation of a particular recommendation in the report, then this recommendation can be referenced by the customer and SEAM Group can ask any additional clarification questions required.

Any other particular information needed?
When indicating new equipment that has been added please provide the proper equipment name as you would want it to appear in the report, indicate if it is a panel, disconnect, control panel, etc., and also indicate the circuit number for the protective device that is supplying the device.

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SEAM GROUP ARC FLASH UPDATE GUIDELINES

I'm still confused, or my situation doesn't match anything here?
If you still have a question or your particular situation does not match a particular situation outlined here just contact SEAM Group and talk to one of our engineers for guidance!

Required Individual Component Information

Cables—Required information for cables includes the cable distance, the cable size, and if there are multiple cables in parallel for the particular circuit.

Protective Devices

Thermal Magnetic Circuit Breakers—Required information for thermal magnetic circuit breakers includes the manufacturer, model, size (amperage), and the instantaneous setting of the circuit breaker. (Please note that not all thermal magnetic circuit breakers will have adjustable instantaneous settings, often times if the breaker is <100A it will not have adjustable settings).

Electronic Trip Circuit Breakers—Similar to the thermal magnetic circuit breakers above, electronic trip circuit breakers are typically your larger frame circuit breakers used in switchboards and switchgear. The same manufacturer, model, and size (please note these breakers can have a frame amperage rating and then a separate plug amperage rating) information is required but the settings can be a bit more detailed as seen below:

- Trip Function: LSIG, LS, or LI
- Please note that there could be a separate trip unit model number which can be different than the circuit breaker model number
- L - Long Time Pickup
  - Long Time Delay
- S - Short Time Pickup
  - Short Time Delay
- I - Instantaneous Pickup
- G - Ground Pickup
  - Ground Delay

Fuses—Required information for fuses include Manufacturer, Model, and amperage rating.