Power System Study
for the
Clark County School District – Career and Technical Center
Las Vegas, Nevada

Coordination Analysis

Power Quality Technical Services, Inc.
683 Scenic Tierra Lane
Henderson, NV 89015

Engineering Services (702) 204-5211

Prepared by:
Joe Dietrich, Jr., P.E.
Electrical Engineer

July 27, 2006

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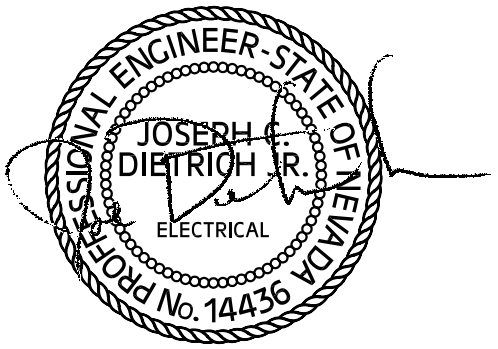

EXP. 12/31/06

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RECOMMENDATIONS

EXECUTIVE SUMMARY

Each aspect of the study, its pertinent results, and recommendations are summarized below. Detailed discussions appear later in each respective section of this report.

The **Coordination Study** found that the majority of the adjustable protective devices could be set to provide the greatest selectivity and minimize overall system impact in the event of a fault. As a result, it is recommended that all adjustable low voltage (277/480V through 120/208V) breakers be set and tested at the recommended settings.

- In some cases (typically in 120V/208V applications), Thermal Magnetic Breakers have significant overlap in the Instantaneous Trip Region. This is normal with these style breakers since most do not have an adjustable instantaneous setting.

- A complete listing of all breaker settings can be found in the *Appendix / Coordination Study - Analysis/Tables* section of this report.

COORDINATION STUDY INTRODUCTION

Introduction

The purpose of a coordination study is to properly select the circuit protective devices and to provide coordinated settings for adjustable protection devices in the facility that are within the scope of the study. The scope of this study includes the two electrical distribution systems starting at 12.47kV Nevada Power transformers and progressing through various 277/480V switchboards, transformers, and 120/208V panel boards. This study includes a tabulation of all appropriate feeder breaker settings.

The protective device ratings and settings were chosen to provide a reasonable compromise, based on a thorough engineering evaluation, between the often-conflicting goals of maximum protection and greatest service continuity. Judgments were made as to the best balance between these factors. When a balance is attained, the protective system is described as being "coordinated". It is not always possible to obtain the desired degree of system and equipment protection in a selective fashion. Selectivity means that for a fault at a given location, only the protective device nearest the fault will operate to isolate the fault from the circuit. Other "upstream" devices see the fault but allow the "downstream" device to operate first.

The Coordination Study's methods and recommendations are in conformance with the National Electrical Code (NEC), ANSI/IEEE Standard 242-1986 (IEEE Buff Book), and accepted industry practice. A general explanation of the methods used for this study is found in this section entitled *Procedures.*

The Coordination Study section of the report is organized as follows, *Compliance with Codes and Standards*, *Procedures*, and *General Discussion of Protective Devices.* The next section is titled *Coordination Study - Analysis* and includes the specific discussion and recommendations for the *Clark County School District – Career and Technical Center* project. Time Current Curves used during the evaluation of this particular electrical distribution system are included in the *Appendix*.

Compliance with Codes and Standards

The following discussion addresses the study's compliance with the National Electric Code and ANSI/IEEE Standards.

Lack of selectivity normally occurs with the **use of molded-case circuit breakers and fuses** for both feeder protection and branch circuit protection. Underwriter's Laboratory standard (UL489) requires that the molded-case circuit breakers incorporate an instantaneous trip. This provides self-protection for the molded-case breaker. At high levels of fault current, the instantaneous trip sensor of both the upstream substation feeder breaker and the downstream molded-case breaker or fuse will sense the fault current. Either or both may trip. This lack of selectivity occurs under severe fault

conditions when molded-case breakers or fuses are applied as feeder protective devices. It should also be noted that utilizing series rated combinations of circuit breakers would also compromise selectivity.

The electrical system is examined to find areas that do not conform to the current (2002) version of the **National Electric Code (NEC)**. The NEC is not necessarily enforced retroactively and it is not possible to determine the provisions of the NEC that were in force at the time that a particular installation was made. However, since the NEC provisions cited pertain to basic electrical system protection concepts, facility management should be cognizant of them and initiate corrective action when necessary.

Cable Ampacity - The ratings of all protective devices within the scope of this study were examined to see if they conformed to the requirements of NEC Article 240.4 which states that *"Conductors, . . ., shall be protected against overcurrent in accordance with their ampacities . . . "*

Ampacity values for wires with either a 60^{O}C or 75^{O}C thermal rating were used for this evaluation because these wire thermal ratings are stipulated in the UL listing instructions for the terminations of distribution equipment. The termination provisions are based on the use of 60^{O}C rated wire for wire sizes #14 to #1 AWG and 75^{O}C rated wire for wire sizes Nos. 1/0 and greater. Wire with a higher thermal rating may be used but this wire must have a cross-sectional area not less than that of the 60^{O}C or 75^{O}C rated wire in order to comply with the listing instructions. These listing instructions must be followed as required by NEC Article 110.3(B).

The next higher device rating is allowed in the code if the standard ampere rating of the fuse or circuit breaker doesn't correspond to the cable ampacity and if this rating does not exceed 800 amperes. The NEC contains tables of ampacities, which provide standard values for various cable types and voltage ranges. Adjustable trip circuit breaker settings can be considered acceptable if the minimum setting is within the limit imposed by the next largest standard device ampacity. The National Electric Code defines standard ampere ratings for fuses and inverse time circuit breakers in section 240-6 as ". . . 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100, 110, 125, 150, 175, 200, 225, 250, 300, 350, 400, 450, 500, 600, 700, 800, 1000, 1200, 1600, 2000, 2500, 3000, 4000, 5000, and 6000 amperes".

The protective device that protects each of the non conforming circuits should be replaced with one having a rating not greater than that indicated as the maximum device rating or the wire should be replaced with a quantity and size which will provide an ampacity not less than that indicated for the minimum wire size.

The National Electric Code Table 310-16 provides the ampacity of the system's 480V cables.

SIZE	AMPACITY
1/0	150
2/0	175
3/0	200
4/0	230
250	255
300	285
350	310
400	335
500	380
600	420
700	460
750	475
800	490
900	520
1000	545
1250	590
1500	625
1750	650
2000	665

Cable Ampacity for Capacitors is addressed in NEC article 460.8, which states, *"The ampacity of capacitor circuit conductors shall not be less than 135 percent of the rated current of the capacitor."*

Ground fault protection is examined on the 480V system pursuant to NEC articles 230.95 and 215.10. Equipment ground fault protection is required on service and feeder disconnecting means rated 1,000A or more in solidly grounded wye systems with greater than 150V to ground, but not exceeding 600 volts phase-to-phase. Feeder ground fault protection is not required if ground fault protection is installed on the supply side of the feeder, for example, at a main circuit breaker.

The inability of phase overcurrent devices to protect equipment from the damage caused by arcing ground faults is well documented. The arc is resistive and can limit the fault current to levels below the pickup settings of short-time and instantaneous devices. The ground fault may only be isolated through the action of an overload device, which allows the fault to continue for an extended period of time before tripping occurs. This extended time will result in greater damage to equipment than had the ground fault been isolated rapidly. Many instances have been recorded where equipment was literally consumed by an arcing ground fault.

While ground fault protection will greatly reduce the extent of damage that a ground fault arc can cause, the ground fault device may not necessarily operate selectively with phase overcurrent devices downstream. For this reason, ground fault protection

on both main and feeder circuit breakers should be contemplated in order to improve selectivity for feeder ground faults. The decision to install ground fault protection on feeder circuit breakers as well as main circuit breakers should consider the following issues:

1. Presence of critical loads on the feeders. Will critical loads experience an outage due to ground faults on other feeders?

2. Rating and type of downstream overcurrent devices. Are downstream phase overcurrent devices capable of sensing ground fault currents within their zone of protection? Is the degree of protection provided by these devices adequate to limit the extent of potential damage to a tolerable level?

3. Main ground fault protection sensitivity. Can the main ground fault device pickup and/or delay be set high enough to allow downstream overcurrent devices to isolate ground fault currents within their protective zone?

The analysis outlined above is beyond the scope of this study. A minimum recommendation would be to have ground fault protection at the main circuit breakers.

Transformer overcurrent protective devices applied at the primary and secondary of transformers were evaluated for compliance with NEC section 450.3. NEC Article 450-3(b)(2) permits the secondary protective device to be set no greater than 125 percent of the transformer rated secondary current when the primary device is not greater than 250 percent of the transformer rated primary current. Note that this article of the NEC *does not* permit the next highest rated device to be applied for the secondary protection when 125% of the rated current does not correspond to a standard rating.

Maximum Continuous Ratings of Fuses and Circuit Breakers Permitted For Various Transformer Voltage Levels and Impedances

NEC Table 450.3(A)

Transformers with Primaries Over 600V

Location Limitations	Transformer Rated Impedance	Primary Protection		Secondary Side Protection *N2		
				Over 600V		600V or Below
		Maximum Breaker Rating	Maximum Fuse Rating	Maximum Breaker Rating *N4	Maximum Fuse Rating	Maximum Circuit Breaker or Fuse Rating
Any Location	6% & Below	600% *N1	300% *N1	300% *N1	250% *N1	125% *N1
	More than 6% & not more than 10%	400% *N1	300% *N1	250% *N1	225% *N1	125% *N1
Supervised Locations Only *N3	Any	300% *N1	250% *N1	Not Req'd	Not Req'd	Not Req'd
	6% & Below	600%	300%	300% *N5	250% *N5	250% *N5
	More than 6% & not more than 10%	400%	300%	250% *N5	225% *N5	250% *N5

*N = Notes for Table 450.3(A)

1. Where the required fuse rating or circuit breaker setting does not correspond to a standard rating or setting, a higher rating or setting that does not exceed the next higher standard rating or setting shall be permitted.
2. Where secondary overcurrent protection is required, the secondary overcurrent device shall be permitted to consist of not more than six circuit breakers or six sets of fuses grouped in one location. Where multiple overcurrent devices are utilized, the total of all the device ratings shall not exceed the allowed value of a single overcurrent device. If both circuit breakers and fuses are used as the overcurrent device, the total of the device ratings shall not exceed that allowed for fuses.
3. A supervised location is a location where conditions of maintenance and supervision ensure that only qualified persons will monitor and service the transformer installation.
4. Electronically actuated fuses that may be set to open at a specific current shall be set in accordance with settings for circuit breakers.
5. A transformer equipped with a coordinated thermal overload protection by the manufacturer shall be permitted to have separate secondary protection omitted.

NEC Table 450.3(B)

Transformers with Primaries 600V and Below

Protection Method	Primary Protection			Secondary Protection *N2	
	Currents of 9 Amperes or More	Currents Less than 9 Amperes	Currents Less than 2 Amperes	Currents of 9 Amperes or More	Currents Less than 9 Amperes
Primary Only	125% *N1	167%	300%	Not Req'd	Not Req'd
Primary & Secondary	250% *N3	250% *N3	250% *N3	125% *N3	167%

*N = Notes for Table 450.3(B)

1. Where 125 percent of this current does not correspond to a standard rating of a fuse or nonadjustable circuit breaker, a higher rating that does not exceed the next higher standard rating shall be permitted.
2. Where secondary overcurrent protection is required, the secondary overcurrent device shall be permitted to consist of not more than six circuit breakers or six sets of fuses grouped in one location. Where multiple overcurrent devices are utilized, the total of all the device ratings shall not exceed the allowed value of a single overcurrent device. If both breakers and fuses are utilized as the overcurrent device, the total of the device ratings shall not exceed that allowed for fuses.
3. A transformer equipped with coordinated thermal overload protection by the manufacturer and arranged to interrupt the primary current, shall be permitted to have primary overcurrent protection rated or set at a current value that is not more than six times the rated current of the transformer for transformers having not more than 6 percent and not more than four times the rated current of the transformer for transformers having more than 6 percent but not more than 10 percent impedance.

Conductors that supply motor loads are subject to special requirements found in Article 430 of the NEC. First, it should be noted that NEC Table 430.150 shall be utilized for the full load current values applied to cable ampacity calculations for three-phase motors as specified in Article 430.6. The table supplies full load current values for motors rated up to 200HP. Current values for motors rated greater than 200HP can be interpolated from the table data.

References to motor full load current ratings in this report, when related to conductor ampacity, pertain to the values found in the NEC tables. Motor branch conductors supplying a single motor must have an ampacity greater or equal to 125 percent of the motor full load current rating (Article 430.24). The ampacity of both branch and feeder conductors which supply several motors must have a minimum ampacity greater or equal to the sum of the full load currents of the connected motors plus 25 percent of the full load current rating of the highest rated motor. These requirements must be applied when motors are operated simultaneously and continuously. However, special consideration can be granted from the authority having jurisdiction to these requirements when it can be shown that on-duty cycle, demand factor is less than 100 percent, operational procedures, production demands or nature of the work is such that not all motors are running at the same time and reduce the conductor heating sufficiently to allow use of a smaller conductor size (Article 430.26). In this report, motors are assumed to be run on a continuous basis unless stated otherwise.

Procedures

The coordination study generally begins at the Main Service Breaker. Settings were chosen with the goal of providing the best coordination that was possible with the largest downstream fixed-setting protective device (such as a transformer breaker). The study then proceeds by coordinating each of the feeder and sub-panel breakers. Time-current curves were used to determine the settings that provided optimum coordination. This report contains those time-current curves that were deemed to contain essential information.

The following is a tested, generally accepted philosophy for selecting and setting protective devices:

1. A feeder "first-line" or "primary" protective device will remove fault current as quickly as possible.
2. If the feeder primary protection fails, a "back-up" protective device will remove the fault. An upstream device that acts as the primary device in its zone usually provides the back-up function. Therefore, time-current coordination is required between the feeder primary and back-up protective devices.

The protective device settings are individually chosen to accommodate circuit parameters. The criteria used in determining the recommended feeder protective device settings are:

1. System or feeder circuit full-load current.
2. Allowance for coordination with the largest downstream protective device set to the highest pickup and time delay including substation secondary circuit protective devices.
3. Transformer protection in compliance with American National Standards Institute (ANSI) and National Electrical Code (NEC) requirements.
4. Avoidance of nuisance tripping due to transformer magnetizing inrush currents or motor inrush currents.
5. Short circuit for faults occurring in the protected zone of the system, including faults on transformer secondaries.
6. Protection of cables per NEC requirements and published heating limits.

Included in the report are protective device one-line diagrams which functionally depict connections of protective devices to instrument transformers (current transformers, potential transformers).

Calibration and Testing of Protective Devices

The time-current relationships between protective devices as established in this report require that the individual relay operating characteristics do not depart appreciably from those shown on the published time-current curves from the manufacturer. The specified settings will provide operation of the devices essentially as shown. However, device tolerance and the difficulty in obtaining exact field settings may result in deviations from the specified

operating times. Therefore, it is recommended that the device settings be calibrated by field tests to insure the desired response.

Satisfactory device coordination depends on operation of the protective devices when required, even though they may be inactive for long periods of time. To assure continued proper device action, it is essential the devices be calibrated and checked at regular intervals.

Low Voltage Cable Protection
Article 240.3 of the National Electric Code states that *"Conductors, . . . , shall be protected against overcurrent in accordance with their ampacities . . . "* The next higher standard overcurrent device rating (above the ampacity of the conductors being protected) is allowed in the code with some conditions if the standard rating of the fuse or circuit breaker doesn't correspond to the cable ampacity (below 800 amperes). NEC section 220.10(B) precludes setting an overcurrent protective device above its ampere rating in most situations.

System Medium Voltage Relay Settings
The medium voltage system relay settings are given in the *Relay Settings Table*.

One protection philosophy followed in this study in most cases is the avoidance of 0.5 relay time dial settings with standard non-static overcurrent relays. This is because experience has shown that nuisance tripping can be caused in this situation due to simple vibration. As much as possible, 0.75 is the lowest time dial setting used.

Low Voltage Circuit Breaker Settings
The low voltage circuit breaker device settings are provided in the *Adjustable Breaker Settings Table*. The protection and coordination for many of these circuit breakers becomes highly redundant, and many settings can be derived from a single curve.

As the table may indicate, some of the long time band settings may be set higher than minimum to allow coordination with downstream circuit breakers or fuses. In most cases the long time pickup is set for cable protection. Short time trip settings are chosen for close coordination with downstream devices, while the instantaneous trip settings are set at their highest value to allow maximum selectivity with upstream coordination. Also taken into account is the fault current available at the end of a feeder. This is to assure that a breaker operates when subjected to fault current levels.

ANSI STANDARD DEVICE FUNCTION NUMBERS

Dev. No.	Function
1.	Master Element
2.	Time-delay Starting or Closing Relay
3.	Checking or Interlocking Relay
4.	Master Contactor
5.	Stopping Device
6.	Starting Circuit Breaker
7.	Anode Circuit Breaker
8.	Control-Power Disconnecting Device
9.	Reversing Device
10.	Unit Sequence Switch
11.	Reserved for Future Application
12.	Over-speed Device
13.	Synchronous-speed Device
14.	Under-speed Device
15.	Speed or Frequency-Matching Device
16.	Reserved for Future Application
17.	Shunting or Discharge Switch
18.	Accelerating or Decelerating Device
19.	Starting-to-Running Transition Contactor
20.	Electrically Operated Valve
21.	Distance Relay
22.	Equalizer Circuit Breaker
23.	Temperature Control Device
24.	Reserved for Future Application
25.	Synchronizing or Synchronism-Check Device
26.	Apparatus Thermal Device
27.	Undervoltage Relay
28.	Flame Detector
29.	Isolating Contactor
30.	Annunciator Relay
31.	Separate Excitation Device
32.	Directional Power Relay
33.	Position Switch
34.	Master Sequence Device
35.	Brush-Operating or Slip-Ring Short-Circuiting Device
36.	Polarity or Polarizing Voltage Device
37.	Undercurrent or Underpower Relay
38.	Bearing Protective Device
39.	Mechanical-Condition Monitor
40.	Field Relay
41.	Field Circuit Breaker
42.	Running Circuit Breaker
43.	Manual Transfer or Selector Device
44.	Unit Sequence Starting Relay
45.	Atmospheric Condition Monitor
46.	Reverse-Phase or Phase-Balance Current Relay
47.	Phase-Sequence Voltage Relay
48.	Incomplete Sequence Relay
49.	Machine or Transformer Thermal Relay
50.	Instantaneous Overcurrent or Rate-of-Rise Relay
51.	AC Time Overcurrent Relay
52.	AC Circuit Breaker
53.	Exciter of DC Generator Relay
54.	Reserved for Future Application
55.	Power Factor Relay
56.	Field-Application Relay
57.	Short-Circuiting or Grounding Device
58.	Rectification Failure Relay
59.	Overvoltage Relay
60.	Voltage or Current Balance Relay
61.	Reserved for Future Application
62.	Time-Delay Stopping or Opening Relay
63.	Pressure Switch
64.	Ground Protective Relay
65.	Governor
66.	Notching or Jogging Device
67.	AC Directional Overcurrent Relay
68.	Blocking Relay
69.	Permissive Control Device
70.	Rheostat
71.	Level Switch
72.	DC Circuit Breaker
73.	Load-Resistor Contactor
74.	Alarm Relay
75.	Position Changing Mechanism
76.	DC Overcurrent Relay
77.	Pulse Transmitter
78.	Phase Angle Measuring or Out-of-Step Protective Relay
79.	AC Reclosing Relay
80.	Flow Switch
81.	Frequency Relay
82.	DC Reclosing Relay
83.	Automatic Selective Control or Transfer Relay
84.	Operating Mechanism
85.	Carrier or Pilot-Wire Receiver Relay
86.	Locking-Out Relay
87.	Differential Protective Relay
88.	Auxiliary Motor or Motor Generator
89.	Line Switch
90.	Regulating Device
91.	Voltage Directional Relay
92.	Voltage and Power Directional Relay
93.	Field-Changing Contactor
94.	Tripping or Trip-Free Relay
95.)	
96.)	Used only for specific applications on individual
97.)	installations where none of the assigned numbered
98.)	functions from 1 to 94 are suitable.
99.)	

General Discussion of Protective Devices

The elements that make up a protected system include relays, direct-acting trip devices, and fuses. Low-voltage power circuit breakers and insulated-case circuit breakers can be adjusted within certain limits to meet protection and coordination requirements. In medium and high-voltage systems, relays are used almost exclusively in the design of a flexible and coordinated protective system.

A brief description of some common relay types used in power distribution systems follows. Appropriate instruction books should be consulted to obtain further information concerning equipment details and their application.

Time-Overcurrent Relays (Device 51) - These relays operate on the electromagnetic induction principle and are available with several time-current operating characteristics. This flexibility makes it possible to select operating characteristics in close harmony with the protective requirements of a particular system component. These relays are non-directional in their operation and are used for both phase and ground fault overcurrent protection of transformers and distribution circuits. Special types are available for motor and generator protection.

The theoretical minimum current at which the relay will operate is called the *pickup current*, which is adjustable within a specified range by changing the *ampere tap* plug. Because of extremely low torques at low-current magnitude, electromechanical relays cannot generally be expected to operate predictably for currents less than 1.5 times the ampere tap setting. This accounts for the termination of the published time operating characteristics at this current level.

Generally, the time delay can be changed by means of a continuously adjustable time dial marked 0 to 10 or 0 to 11. Time-dial markings are arbitrary reference points and are not related to the actual time delay in seconds.

On time-current plots, relay operating characteristics are extended to the maximum short-circuit current value to which a relay is expected to respond. If the overcurrent relay is equipped with an instantaneous attachment (Device 50), then the curve will be terminated at the intersection with the instantaneous relay characteristic.

Overcurrent relays intended for phase fault protection are denoted as 51. Residually connected ground fault relays carry the designation 51N while ground fault relays connected to current transformers in the neutral of a transformer or generator are designated as 51G.

Time overcurrent relays employing electronic circuitry are also available. While these relays have different operating principles from their electromechanical counterparts, the general application procedures described still apply.

Instantaneous Overcurrent Relays (Device 50) - Instantaneous relays have extremely fast operating times (about one cycle). They are essential for fast clearing of extremely high fault currents to reduce burning damage and the possibility of unstable operation of rotating machinery.

However, instantaneous relays cannot always be used when selectivity is desired. Since they cannot be made selective with other instantaneous relays, they are generally only used as the last downstream relay of a series of protective devices which respond to essentially the same magnitude of short-circuit current. This may be a branch-circuit protector, such as a motor starter, or a transformer primary protector.

Whenever there is a large impedance in the circuit (such as a current-limiting reactor or a transformer) the fault current level on the load side may differ significantly from that on the source side. In such cases, the instantaneous relay on the source side of the impedance may be able to be set above the current that would flow to a fault on the load side.

Selectivity between instantaneous relays and fuses for fault clearing times of less than 0.1 second cannot be evaluated on a time-current basis. Since sufficient data are not available to verify selectivity, extreme caution should be exercised in predicting coordination on the basis of the time current characteristics of these devices.

Instantaneous relays may be either self-contained or provided as an attachment to a time-overcurrent relay. Many instantaneous relays operate on the electromagnetic attraction principle. These relays will operate equally well on dc and ac currents and the settings determined for them must recognize the possibility of asymmetry in the fault current. Induction cup type instantaneous relays are available for special applications.

Ground instantaneous relays are given designation suffixes in the same manner as ground time overcurrent relays.

Ground Relays (Devices 50GS and 51GS) - A sensitive ground-fault relay is used to take full advantage of a resistance-grounded system. This ground-fault relay is connected to a low-ratio, window-type current transformer encompassing the three-phase conductors. A matched combination is commonly referred to as a ground sensor. Both time-overcurrent and instantaneous ground sensors can be used (Devices 51GS and 50GS, respectively) to obtain selectivity.

The low-burden capability of window-type transformers introduces a ratio error which is taken into account by the use of operating curves applicable to the ground

sensor package being used; that is, the relay-CT combination. These curves may be obtained only by test and are available from the manufacturer. Note that directional ground overcurrent relays should never be connected to low ratio window-type current transformers.

The ground sensor is not responsive to positive and negative sequence load currents but is sensitive to zero sequence (ground fault) currents. Hence, the current transformer ratio is not governed by the anticipated load currents. A 50/5 current transformer ratio is generally used.

Differential Relays (Devices 87G, 87T, 87B and 87L) - Differential relays are employed to permit fast and sensitive protection for phase and ground faults in a bus (87B), a generator (87G), a transformer (87T), or a line (87L). Their use will not only reduce fault point burning damage, but will also improve the ability of rotating machines in the system to return to a stable, steady state mode of operation following a disturbance in the differential zone.

Differential relays are connected to two or more sets of current transformers located at the perimeters of the zone to be protected. Current transformers ideally should have identical characteristics so that through currents will not result in false operation of the differential relays. To allow for normal current transformer tolerances, differential relays are designed to be insensitive to small error currents.

Transformer differential relays are normally designed to provide restraint for harmonic currents predominant in transformer magnetizing inrush currents that are sensed by the transformer source-side current transformers. An adjustable percentage slope adjustment permits de-sensitizing the relay to prevent misoperation for a through fault due to current transformer ratio errors. Ratio tap adjustments are provided to match as nearly as possible the secondary currents in the primary and secondary current transformers.

COORDINATION STUDY ANALYSIS

Discussion and Recommendations

The coordination study analysis is provided below.

- All Feeder Breakers should be set and tested at the recommended settings.
- All low-voltage breakers should be set and tested at their recommended settings for proper coordination with upstream breakers and for proper protection of equipment.
- Several 120V / 208V thermal magnetic breakers had overlapping instantaneous regions upstream and downstream at several panels. This is not uncommon since these breakers typically do not employ adjustable instantaneous pickup capabilities.

Clark County School District - Career Technical Center
Adjustable Breaker Settings - E Sheet 501
7/27/2006

Adjustable Breaker Name	Manufacturer	Type	Style	Sensor/ Frame	Plug/ Tap	LTPU				LT Delay		STPU					Inst			Ground Trip			
						Name	Setting	Mult	Trip (A)	Name	Band	Name	Setting	Trip (A)	Band	I2t	Setting	Override	Trip (A)	Pickup	Trip (A)	Delay	I2t
B MDA	GE	Power+	ICCB	4000	4000	LT Pickup	1		4000	LT Delay (s)	1	ST Pickup				Out	9	Pickup	36000	0.2	800	Min	Out
B 3HA1A	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 3HAIB	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	4	1200	Fixed	In	4	Pickup	2400				Out
B 3HAIB-FDR	GE	Spectra RMS	MCCB SE	30A (15AT)	15	LT Pickup	1	1	15	LT Delay	Fixed	ST Pickup	Max	90	Fixed	In	Max	Pickup	187.5				Out
B 3HAIC	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	4	675	Fixed	In	4	Pickup	1350				Out
B 3HAIC-FDR	GE	Spectra RMS	MCCB SE	30A (15AT)	15	LT Pickup	1	1	15	LT Delay	Fixed	ST Pickup	Max	90	Fixed	In	Max	Pickup	187.5				Out
B 3HAID	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	4	675	Fixed	In	4	Pickup	1350				Out
B 3HAID-FDR	GE	Spectra RMS	MCCB SE	30A (15AT)	15	LT Pickup	1	1	15	LT Delay	Fixed	ST Pickup	Max	90	Fixed	In	Max	Pickup	187.5				Out
B 3HDPA	GE	Power+	ICCB	1600	1600	LT Pickup	1		1600	LT Delay (s)	2	ST Pickup				Out	9	Pickup	14400				Out
B 3HDPA-MAIN	GE	Power+	ICCB	1600	1600	LT Pickup	1		1600	LT Delay (s)	1	ST Pickup				Out	5	Pickup	8000				Out
B 3LB1A	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	3	562.5	Fixed	In	3	Pickup	1080				Out
B 3LBC1A	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	3	562.5	Fixed	In	3	Pickup	1080				Out
B 3LBC1B	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	3	562.5	Fixed	In	3	Pickup	1080				Out
B 3LBC1C	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	3	562.5	Fixed	In	3	Pickup	1080				Out
B 3LDPA-MAIN	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	2	760	Fixed	In	2	Pickup	1540				Out
B 3LDPB-MAIN	GE	Spectra RMS	MCCB SK	800	800	LT Pickup	1		800	LT Delay	Fixed	ST Pickup	2	1440	Fixed	In	2	Pickup	3080				Out
B 4HAIA	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	Max	2000	Fixed	In	Max	Pickup	4048				Out
B 4HAIB	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	Max	2000	Fixed	In	Max	Pickup	4048				Out
B 4HAIB-FDR	GE	Spectra RMS	MCCB SE	30A (20AT)	20	LT Pickup	1	1	20	LT Delay	Fixed	ST Pickup	Max	137	Fixed	In	Max	Pickup	250				Out
B 4HAIC	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 4HAIC-FDR	GE	Spectra RMS	MCCB SE	30A (15AT)	15	LT Pickup	1	1	15	LT Delay	Fixed	ST Pickup	Max	90	Fixed	In	Max	Pickup	187.5				Out
B 4HAID	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 4HAID-FDR	GE	Spectra RMS	MCCB SE	30A (15AT)	15	LT Pickup	1	1	15	LT Delay	Fixed	ST Pickup	Max	90	Fixed	In	Max	Pickup	187.5				Out
B 4LAIKA	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	4	675	Fixed	In	4	Pickup	1350				Out
B 4LAIKB	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	4	675	Fixed	In	4	Pickup	1350				Out
B 4LAIKC	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	4	675	Fixed	In	4	Pickup	1350				Out
B 4LAIKD	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	4	675	Fixed	In	4	Pickup	1350				Out
B 4LDPA-MAIN	GE	Power+	ICCB	1600	1600	LT Pickup	1		1600	LT Delay (s)	1	ST Pickup				Out	5	Pickup	8000				Out
B 4LDPB-MAIN	GE	Spectra RMS	MCCB SK	800	800	LT Pickup	1		800	LT Delay	Fixed	ST Pickup	2	1440	Fixed	In	2	Pickup	3080				Out
B 8HA2A	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	4	1200	Fixed	In	4	Pickup	2400				Out
B 8HA2A-FDR	GE	Spectra RMS	MCCB SE	30A (20AT)	20	LT Pickup	1	1	20	LT Delay	Fixed	ST Pickup	Max	137	Fixed	In	Max	Pickup	250				Out
B 8HA2B	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	4	675	Fixed	In	4	Pickup	1350				Out
B 8HA2B-FDR	GE	Spectra RMS	MCCB SE	30A (15AT)	15	LT Pickup	1	1	15	LT Delay	Fixed	ST Pickup	Max	90	Fixed	In	Max	Pickup	187.5				Out
B 8LDPA-MAIN	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	2	760	Fixed	In	2	Pickup	1540				Out
B 8LDPB-MAIN	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	2	760	Fixed	In	2	Pickup	1540				Out
B BH	GE	Spectra RMS	MCCB SF	250	125	LT Pickup	1		125	LT Delay	Fixed	ST Pickup	Max	625	Fixed	In	Max	Pickup	1250				Out
B CA	GE	Spectra RMS	MCCB SE	100A (70AT)	70	LT Pickup	1	1	70	LT Delay	Fixed	ST Pickup	6	350	Fixed	In	6	Pickup	693				Out
B ELEV	GE	Spectra RMS	MCCB SE	60A (60AT)	60	LT Pickup	1	1	60	LT Delay	Fixed	ST Pickup	5	228	Fixed	In	5	Pickup	462				Out
B T3DP1	GE	Spectra RMS	MCCB SE	150A (125AT)	125	LT Pickup	1	1	125	LT Delay	Fixed	ST Pickup	6	637.5	Fixed	In	6	Pickup	1237.5				Out
B T3DP2	GE	Spectra RMS	MCCB SE	150A (125AT)	125	LT Pickup	1	1	125	LT Delay	Fixed	ST Pickup	6	637.5	Fixed	In	6	Pickup	1237.5				Out
B T3LDPA	GE	Spectra RMS	MCCB SF	250	175	LT Pickup	1		175	LT Delay	Fixed	ST Pickup	Max	875	Fixed	In	Max	Pickup	1750				Out
B T3LDPB	GE	Spectra RMS	MCCB SG	400	350	LT Pickup	1	1	350	LT Delay	Fixed	ST Pickup	Max	1750	Fixed	In	Max	Pickup	3542				Out
B T4DP1	GE	Spectra RMS	MCCB SE	100A (100AT)	100	LT Pickup	1	1	100	LT Delay	Fixed	ST Pickup	Max	660	Fixed	In	Max	Pickup	1250				Out
B T4LDPA	GE	Spectra RMS	MCCB SK	800	800	LT Pickup	1		800	LT Delay	Fixed	ST Pickup	Max	4000	Fixed	In	Max	Pickup	8144				Out
B T4LDPB	GE	Spectra RMS	MCCB SG	400	350	LT Pickup	1	1	350	LT Delay	Fixed	ST Pickup	Max	1750	Fixed	In	Max	Pickup	3542				Out
B T8LDPA	GE	Spectra RMS	MCCB SF	250	175	LT Pickup	1		175	LT Delay	Fixed	ST Pickup	Max	875	Fixed	In	Max	Pickup	1750				Out
B T8LDPB	GE	Spectra RMS	MCCB SF	250	175	LT Pickup	1		175	LT Delay	Fixed	ST Pickup	Max	875	Fixed	In	Max	Pickup	1750				Out

Clark County School District - Career Technical Center
Thermal Magnetic Breakers - E Sheet 501
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Thermal Magnetic Breaker	Manufacturer	Type	Style	Frame	Trip	Instantaneous	
						Setting	Trip (A)
B 3HA1A-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 3LA1A	GE	Q Line	THQD	225A(100-225AT)	225		
B 3LA1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 3LAC1A	GE	Q Line	THQD	225A(100-225AT)	225		
B 3LAC1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 3LAC1B	GE	Q Line	THQD	225A(100-225AT)	225		
B 3LAC1B-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 3LB1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 3LBC1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 3LBC1B-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 3LBC1C-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 3LDPA-FDR	GE	E150	TEY	100A (100A)	100		
B 3LDPB-FDR	GE	E150	TEY	100A (100A)	100		
B 4HAIA-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 4LAIKA-FDR	GE	Q Line	THHQB	100A (15-50AT)	15		
B 4LAIKB-FDR	GE	Q Line	THHQB	100A (15-50AT)	15		
B 4LAIKC-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 4LAIKD-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 4LAIKE	GE	E150	TEY	100A (100A)	100		
B 4LAIKE-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 4LAIKF	GE	E150	TEY	100A (100A)	100		
B 4LAIKF-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 4LBCIA	GE	Q Line	THQD	225A(100-225AT)	225		
B 4LBCIA-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 4LBIA	GE	Q Line	THQD	225A(100-225AT)	225		
B 4LBIA-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 4LBIB	GE	Q Line	THQD	225A(100-225AT)	225		
B 4LBIB-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 4LBIB-MAIN	GE	Q Line	THQD	225A(100-225AT)	225		
B 4LBIC	GE	Q Line	THQD	225A(100-225AT)	225		
B 4LBIC-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 8LA2A	GE	Q Line	THQD	225A(100-225AT)	225		
B 8LA2A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 8LAC2A	GE	Q Line	THQD	225A(100-225AT)	225		
B 8LAC2A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 8LAC2B	GE	Q Line	THQD	225A(100-225AT)	225		
B 8LAC2B-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 8LB2A	GE	Q Line	THQD	225A(100-225AT)	225		
B 8LB2A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 8LBC2A	GE	Q Line	THQD	225A(100-225AT)	225		
B 8LBC2A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 8LBC2B	GE	Q Line	THQD	225A(100-225AT)	225		
B 8LBC2B-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 8LDPB-FDR	GE	E150	TEY	100A (100A)	100		

Clark County School District - Career Technical Center
Adjustable Breaker Settings - E Sheet 502
7/27/2006

Adjustable Breaker Name	Manufacturer	Type	Style	Sensor/ Frame	Plug/ Tap	LTPU				LT Delay		STPU					Inst			Ground Trip			
						Name	Setting	Mult	Trip (A)	Name	Band	Name	Setting	Trip (A)	Band	I2t	Setting	Override	Trip (A)	Pickup	Trip (A)	Delay	I2t
B MDB	GE	Power+	ICCB	4000	4000	LT Pickup	1		4000	LT Delay (s)	1	ST Pickup				Out	7	Pickup	28000	0.2	800	Min	Out
B 1EH1	GE	Spectra RMS	MCCB SE	60A (60AT)	60	LT Pickup	1	1	60	LT Delay	Fixed	ST Pickup	Max	456	Fixed	In	Max	Pickup	750				Out
B 1HAIA	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 1HAIB	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 1HAIB-FDR	GE	Spectra RMS	MCCB SE	30A (15AT)	15	LT Pickup	1	1	15	LT Delay	Fixed	ST Pickup	Max	90	Fixed	In	Max	Pickup	187.5				Out
B 1HAIC	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 1HDPA	GE	Spectra RMS	MCCB SK	800	800	LT Pickup	1		800	LT Delay	Fixed	ST Pickup	Max	4000	Fixed	In	Max	Pickup	8144				Out
B 1HDPA-MAIN	GE	Spectra RMS	MCCB SK	800	800	LT Pickup	1		800	LT Delay	Fixed	ST Pickup	4	2400	Fixed	In	4	Pickup	4912				Out
B 1LDPA-MAIN	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	Max	2000	Fixed	In	Max	Pickup	4048				Out
B 2EH1	GE	Spectra RMS	MCCB SE	60A (60AT)	60	LT Pickup	1	1	60	LT Delay	Fixed	ST Pickup	Max	456	Fixed	In	Max	Pickup	750				Out
B 2EH1-MAIN	GE	Spectra RMS	MCCB SE	100A (100AT)	100	LT Pickup	1	1	100	LT Delay	Fixed	ST Pickup	Max	660	Fixed	In	Max	Pickup	1250				Out
B 2EHDP-MAIN	GE	Spectra RMS	MCCB SF	250	200	LT Pickup	1		200	LT Delay	Fixed	ST Pickup	4	600	Fixed	In	4	Pickup	1200				Out
B 2EL1	GE	Spectra RMS	MCCB SE	30A (30AT)	30	LT Pickup	1	1	30	LT Delay	Fixed	ST Pickup	Max	243	Fixed	In	Max	Pickup	375				Out
B 2HAIA	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 2HAIB	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	5	1520	Fixed	In	5	Pickup	3136				Out
B 2HAIB-FDR	GE	Spectra RMS	MCCB SE	30A (15AT)	15	LT Pickup	1	1	15	LT Delay	Fixed	ST Pickup	Max	90	Fixed	In	Max	Pickup	187.5				Out
B 2HAIC	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 2HAIC-FDR	GE	Spectra RMS	MCCB SE	30A (15AT)	15	LT Pickup	1	1	15	LT Delay	Fixed	ST Pickup	Max	90	Fixed	In	Max	Pickup	187.5				Out
B 2HDPA	GE	Spectra RMS	MCCB SK	1200	1000	LT Pickup	1		1000	LT Delay	Fixed	ST Pickup	Max	5000	Fixed	In	Max	Pickup	10180				Out
B 2HDPA-MAIN	GE	Spectra RMS	MCCB SK	1200	1000	LT Pickup	1		1000	LT Delay	Fixed	ST Pickup	3	2450	Fixed	In	3	Pickup	4840				Out
B 2HS1	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 2HS2	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 2LDPA-MAIN	GE	Spectra RMS	MCCB SK	800	800	LT Pickup	1		800	LT Delay	Fixed	ST Pickup	Max	4000	Fixed	In	Max	Pickup	8144				Out
B 3EH1	GE	Spectra RMS	MCCB SE	100A (100AT)	100	LT Pickup	1	1	100	LT Delay	Fixed	ST Pickup	Max	660	Fixed	In	Max	Pickup	1250				Out
B 4EH1	GE	Spectra RMS	MCCB SE	60A (60AT)	60	LT Pickup	1	1	60	LT Delay	Fixed	ST Pickup	Max	456	Fixed	In	Max	Pickup	750				Out
B 5EH1	GE	Spectra RMS	MCCB SE	60A (60AT)	60	LT Pickup	1	1	60	LT Delay	Fixed	ST Pickup	Max	456	Fixed	In	Max	Pickup	750				Out
B 5HA1A	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 5HA1B	GE	Spectra RMS	MCCB SG	400	300	LT Pickup	1	1	300	LT Delay	Fixed	ST Pickup	Max	1500	Fixed	In	Max	Pickup	3036				Out
B 5HA1C	GE	Spectra RMS	MCCB SG	400	300	LT Pickup	1	1	300	LT Delay	Fixed	ST Pickup	Max	1500	Fixed	In	Max	Pickup	3036				Out
B 5HA1D	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 5HA1E	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 5HDPA	GE	Power+	ICCB	2000	2000	LT Pickup	1		2000	LT Delay (s)	2	ST Pickup				Out	9	Pickup	18000				Out
B 5HDPA-MAIN	GE	Power+	ICCB	2000	2000	LT Pickup	1		2000	LT Delay (s)	1	ST Pickup				Out	7	Pickup	14000				Out
B 5LDPA-MAIN	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	4	1200	Fixed	In	4	Pickup	2400				Out
B 5LDPB-MAIN	GE	Spectra RMS	MCCB SK	800	800	LT Pickup	1		800	LT Delay	Fixed	ST Pickup	4	2400	Fixed	In	4	Pickup	4912				Out
B 6EH1	GE	Spectra RMS	MCCB SE	60A (60AT)	60	LT Pickup	1	1	60	LT Delay	Fixed	ST Pickup	Max	456	Fixed	In	Max	Pickup	750				Out
B 6HAIA	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 6HAIB	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 6HAIC	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 6HDPA	GE	Spectra RMS	MCCB SK	1200	1000	LT Pickup	1		1000	LT Delay	Fixed	ST Pickup	Max	5000	Fixed	In	Max	Pickup	10180				Out
B 6HDPA-MAIN	GE	Spectra RMS	MCCB SK	1200	1000	LT Pickup	1		1000	LT Delay	Fixed	ST Pickup	4	3000	Fixed	In	4	Pickup	6140				Out
B 9HA2A	GE	Spectra RMS	MCCB SG	400	300	LT Pickup	1	1	300	LT Delay	Fixed	ST Pickup	Max	1500	Fixed	In	Max	Pickup	3036				Out
B 9HA2B	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out
B 9LDPA-MAIN	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	4	1200	Fixed	In	4	Pickup	2400				Out
B 9LDPB-MAIN	GE	Spectra RMS	MCCB SG	600	500	LT Pickup	1	1	500	LT Delay	Fixed	ST Pickup	3	1225	Fixed	In	3	Pickup	2425				Out
B CA	GE	Spectra RMS	MCCB SE	100A (70AT)	70	LT Pickup	1	1	70	LT Delay	Fixed	ST Pickup	Max	441	Fixed	In	Max	Pickup	875				Out
B ELEV 160	GE	Spectra RMS	MCCB SE	100A (70AT)	70	LT Pickup	1	1	70	LT Delay	Fixed	ST Pickup	Max	441	Fixed	In	Max	Pickup	875				Out
B ELEV 560	GE	Spectra RMS	MCCB SE	60A (60AT)	60	LT Pickup	1	1	60	LT Delay	Fixed	ST Pickup	Max	456	Fixed	In	Max	Pickup	750				Out
B MCCA	GE	Spectra RMS	MCCB SG	400	400	LT Pickup	1	1	400	LT Delay	Fixed	ST Pickup	Max	2000	Fixed	In	Max	Pickup	4048				Out
B MSB-ATS EH2A	GE	Spectra RMS	MCCB SF	250	200	LT Pickup	1		200	LT Delay	Fixed	ST Pickup	Max	1000	Fixed	In	Max	Pickup	2000				Out
B SPARE	GE	Spectra RMS	MCCB SE	100A (100AT)	100	LT Pickup	1	1	100	LT Delay	Fixed	ST Pickup	Max	660	Fixed	In	Max	Pickup	1250				Out
B TX T1LDPA	GE	Spectra RMS	MCCB SF	250	175	LT Pickup	1		175	LT Delay	Fixed	ST Pickup	3	437.5	Fixed	In	3	Pickup	840				Out
B TX T2LDPA	GE	Spectra RMS	MCCB SG	400	350	LT Pickup	1	1	350	LT Delay	Fixed	ST Pickup	4	1050	Fixed	In	4	Pickup	2100				Out
B TX T5LDPA	GE	Spectra RMS	MCCB SF	250	175	LT Pickup	1		175	LT Delay	Fixed	ST Pickup	Max	875	Fixed	In	Max	Pickup	1750				Out
B TX T5LDPB	GE	Spectra RMS	MCCB SG	400	350	LT Pickup	1	1	350	LT Delay	Fixed	ST Pickup	Max	1750	Fixed	In	Max	Pickup	3542				Out
B TX T6LAC1A	GE	Spectra RMS	MCCB SE	150A (125AT)	125	LT Pickup	1	1	125	LT Delay	Fixed	ST Pickup	Max	875	Fixed	In	Max	Pickup	1562.5				Out
B TX T6LAIA	GE	Spectra RMS	MCCB SE	150A (125AT)	125	LT Pickup	1	1	125	LT Delay	Fixed	ST Pickup	Max	875	Fixed	In	Max	Pickup	1562.5				Out
B TX T9LDPA	GE	Spectra RMS	MCCB SF	250	175	LT Pickup	1		175	LT Delay	Fixed	ST Pickup	Max	875	Fixed	In	Max	Pickup	1750				Out
B TX T9LDPB	GE	Spectra RMS	MCCB SF	250	225	LT Pickup	1		225	LT Delay	Fixed	ST Pickup	Max	1125	Fixed	In	Max	Pickup	2250				Out

Clark County School District - Career Technical Center
Thermal Magnetic Breakers - E Sheet 502
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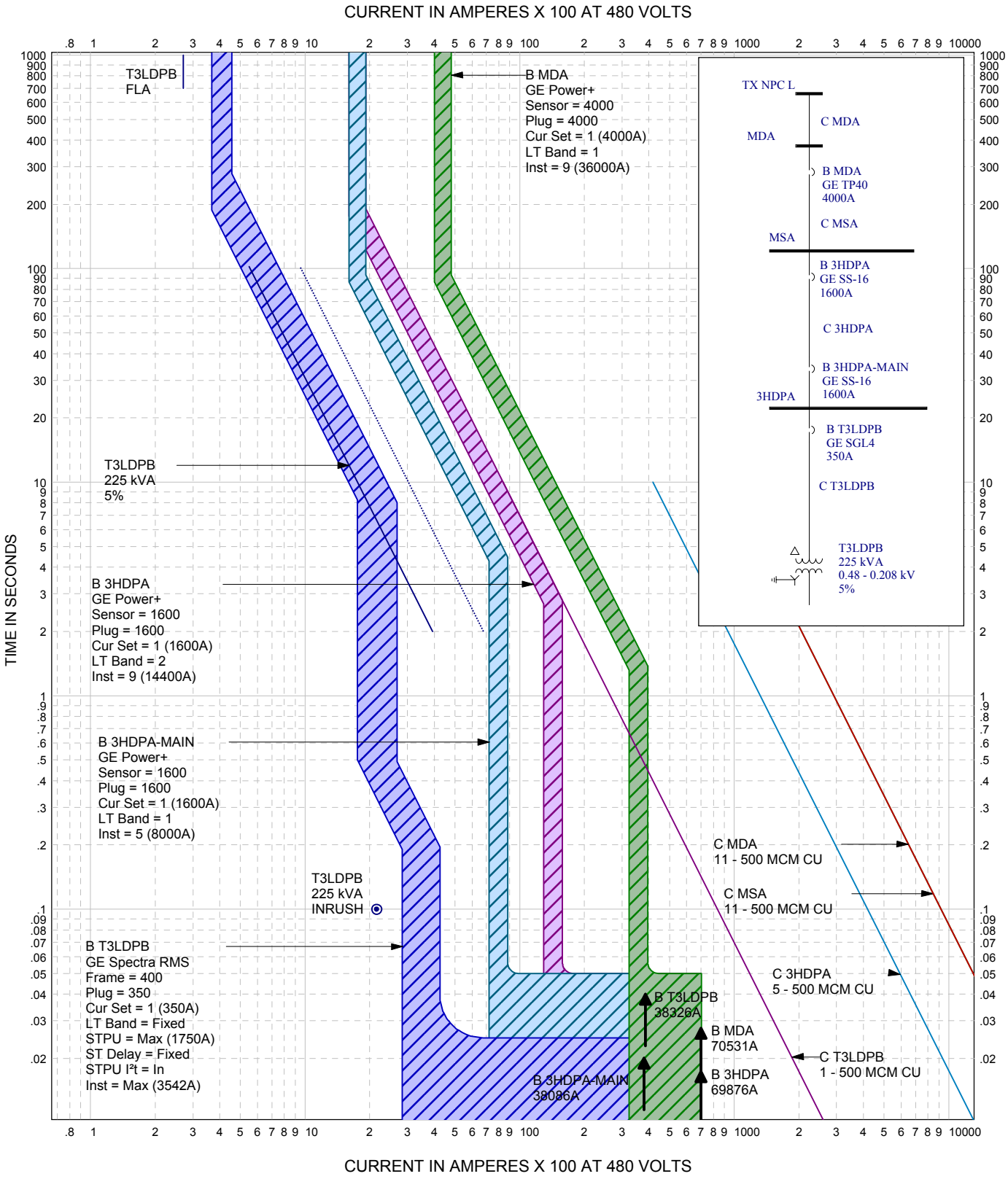
Thermal Magnetic Breaker	Manufacturer	Type	Style	Frame	Trip	Instantaneous	
						Setting	Trip (A)
B 1EH1-FDR	GE	E150	TEY	100A (20A)	20		
B 1EL1	GE	E150	TEY	100A (30A)	30		
B 1EL1- HI MAIN	GE	E150	TED (600V)	150A(15-50AT)	40		
B 1EL1-FDR	GE	Q Line	THQL	100A (15-50AT)	20		
B 1EL1-MAIN	GE	Q Line	THQL	100A (15-50AT)	50		
B 1HAIA-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 1HAIC-FDR	GE	E150	THED (277V)	150A(15-30AT)	15		
B 1LA1A	GE	Q Line	TQD	225A(100-225AT)	225		
B 1LA1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 1LA2A	GE	Q Line	TQD	225A(100-225AT)	225		
B 1LA2A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 1LAC1A	GE	Q Line	TQD	225A(100-225AT)	225		
B 1LAC1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 1LAC2A	GE	Q Line	TQD	225A(100-225AT)	225		
B 1LDPA-FDR	GE	E150	TEB	150A(90-100AT)	100		
B 2EH1-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 2EL1- HI MAIN	GE	E150	TED (600V)	150A(15-50AT)	40		
B 2EL1-FDR	GE	Q Line	THQL	100A (15-50AT)	20		
B 2EL1-MAIN	GE	Q Line	THQL	100A (15-50AT)	50		
B 2HAIA-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 2HS1-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 2HS2-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 2LA1A	GE	Q Line	THQD	225A(100-225AT)	225		
B 2LA1A-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 2LA1B	GE	Q Line	THQD	225A(100-225AT)	225		
B 2LA1B-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 2LA1KA	GE	Q Line	THQD	225A(100-225AT)	225		
B 2LA1KA-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 2LA1KB	GE	Q Line	THQD	225A(100-225AT)	225		
B 2LA1KB-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 2LA1KC	GE	Q Line	THQD	225A(100-225AT)	225		
B 2LAC1A	GE	Q Line	THQD	225A(100-225AT)	225		
B 2LAC1A-FDR	GE	Q Line	THHQB	100A (15-50AT)	20		
B 2LDPA-FDR	GE	Q Line	THQD	225A(100-225AT)	150		
B 3EH1-FDR	GE	E150	TEY	100A (20A)	20		
B 3EH1-MAIN	GE	E150	TEY	100A (100A)	100		
B 3EL1	GE	E150	TEY	100A (60A)	60		
B 3EL1- HI MAIN	GE	E150	TED (600V)	150A(15-50AT)	40		
B 3EL1-FDR	GE	Q Line	THQL	100A (15-50AT)	20		
B 3EL1-MAIN	GE	Q Line	THQL	100A (15-50AT)	50		
B 4EH1-FDR	GE	E150	TEY	100A (20A)	20		
B 4EL1	GE	E150	TEY	100A (60A)	60		
B 4EL1- HI MAIN	GE	E150	TED (600V)	150A(60-80AT)	70		
B 4EL1-FDR	GE	Q Line	THQL	100A (15-50AT)	20		
B 4EL1-MAIN	GE	Q Line	THQL	100A(60-100AT)	70		
B 5EH1-FDR	GE	E150	TEY	100A (20A)	20		
B 5EH1-MAIN	GE	E150	TEY	100A (100A)	100		
B 5EL1	GE	E150	TEY	100A (60A)	60		
B 5EL1- HI MAIN	GE	E150	TED (600V)	150A(15-50AT)	40		
B 5EL1-FDR	GE	Q Line	THQL	100A (15-50AT)	20		
B 5EL1-MAIN	GE	Q Line	THQL	100A(60-100AT)	70		
B 5HA1A-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 5HA1B-FDR	GE	E150	THED (277V)	150A(15-30AT)	15		
B 5HA1C-FDR	GE	E150	THED (277V)	150A(15-30AT)	15		
B 5HA1D-FDR	GE	E150	THED (277V)	150A(15-30AT)	15		
B 5HA1E-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 5LA1A	GE	Q Line	THQD	225A(100-225AT)	225		
B 5LA1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 5LAC1A	GE	Q Line	THQD	225A(100-225AT)	225		
B 5LAC1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 5LAC1B	GE	Q Line	THQD	225A(100-225AT)	225		

Clark County School District - Career Technical Center
Thermal Magnetic Breakers - E Sheet 502
7/27/2006

Thermal Magnetic Breaker	Manufacturer	Type	Style	Frame	Trip	Instantaneous	
						Setting	Trip (A)
B 5LAC1B-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 5LB1A	GE	Q Line	THQD	225A(100-225AT)	225		
B 5LB1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 5LB1B	GE	Q Line	THQD	225A(100-225AT)	225		
B 5LB1B-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 5LB1C	GE	Q Line	THQD	225A(100-225AT)	225		
B 5LB1C-FDR	GE	Q Line	THQB	100A (15-50AT)	15		
B 5LBC1A	GE	Q Line	THQD	225A(100-225AT)	225		
B 5LBC1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 5LBC1B	GE	Q Line	THQD	225A(100-225AT)	225		
B 5LBC1B-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 5LDPA-FDR	GE	E150	TEY	100A (100A)	100		
B 6EH1-FDR	GE	E150	TEY	100A (20A)	20		
B 6EL1	GE	E150	TEY	100A (30A)	30		
B 6EL1- HI MAIN	GE	E150	TED (600V)	150A(15-50AT)	40		
B 6EL1-FDR	GE	Q Line	THQL	100A (15-50AT)	20		
B 6EL1-MAIN	GE	Q Line	THQL	100A(60-100AT)	70		
B 6HAIA-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 6HAIB-FDR	GE	E150	THED (277V)	150A(15-30AT)	15		
B 6HAIC-FDR	GE	E150	THED (277V)	150A(15-30AT)	20		
B 6LA1A -MAIN	GE	Q Line	TQD	225A(100-225AT)	225		
B 6LA1A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 6LAC1A-MAIN	GE	Q Line	TQD	225A(100-225AT)	225		
B 9HA2A-FDR	GE	E150	THED (277V)	150A(15-30AT)	15		
B 9HA2B-FDR	GE	E150	THED (277V)	150A(15-30AT)	15		
B 9LA2A	GE	Q Line	THQD	225A(100-225AT)	225		
B 9LA2A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 9LAC2A	GE	Q Line	THQD	225A(100-225AT)	225		
B 9LAC2A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 9LAC2B	GE	Q Line	THQD	225A(100-225AT)	225		
B 9LAC2B-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 9LB2A	GE	Q Line	THQD	225A(100-225AT)	225		
B 9LB2A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 9LBC2A	GE	Q Line	THQD	225A(100-225AT)	225		
B 9LBC2A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B 9LBC2B	GE	Q Line	THQD	225A(100-225AT)	225		
B 9LDPB	GE	Q Line	THQD	225A(100-225AT)	150		
B LBIC MAIN	GE	Q Line	TQD	225A(100-225AT)	225		
B UPS 3A-MAIN	GE	Q Line	THQB	100A(60-100AT)	100		
B UPS 5	GE	Q Line	THQL	100A(60-100AT)	100		
B UPS 5A-MAIN	GE	Q Line	THQB	100A(60-100AT)	100		
B UPS 8	GE	Q Line	THQL	100A(60-100AT)	100		
B UPS 8A-MAIN	GE	Q Line	THQB	100A(60-100AT)	100		
B UPS 9A-MAIN	GE	Q Line	THQB	100A(60-100AT)	100		
B UPS3A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B UPS5A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B UPS8A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
B UPS9A-FDR	GE	Q Line	THQB	100A (15-50AT)	20		
KC 2LA1KC-FDR	GE	Q Line	THQB	100A (15-50AT)	20		

APPENDIX

E Sheet 5.01 TCCs



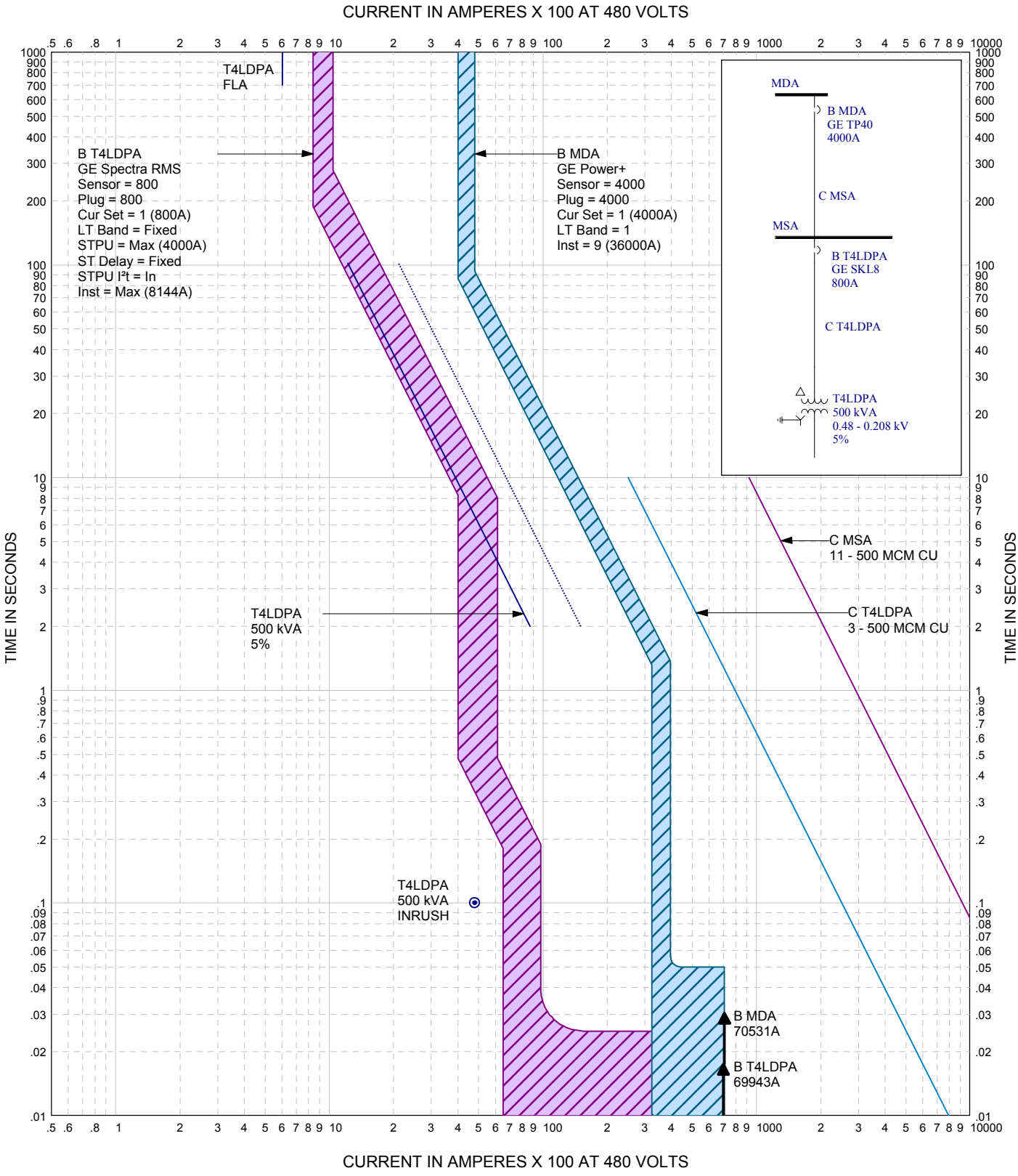
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MDA to T3LDPB

Clark County School District - Career and Technical Center E501

Breaker Settings: Service Main MDA, Feeder 3HDPA, 3HDPA-Main, and Feeder T3LDPB

FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 501

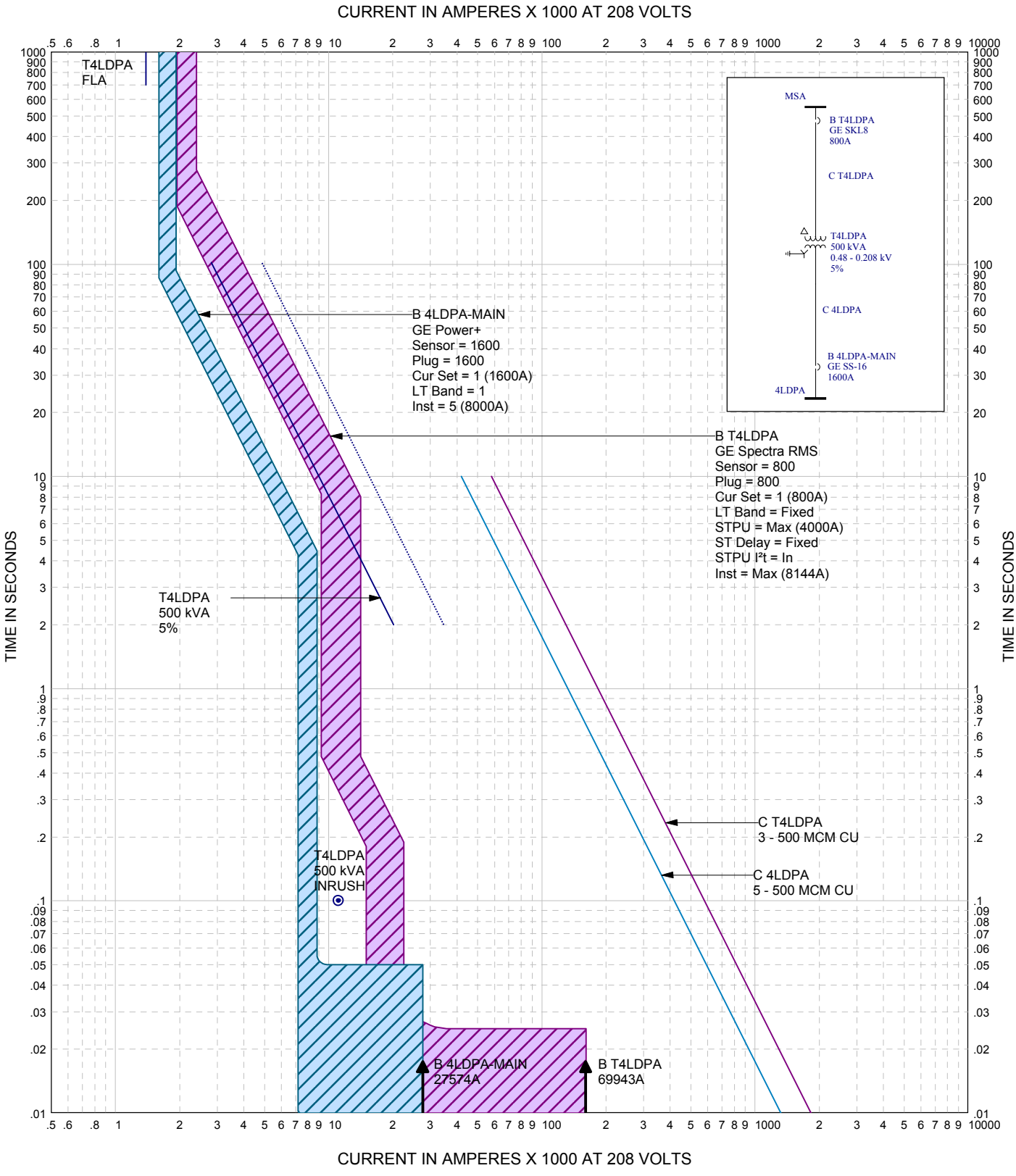


PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MDA to T4LDPA

Clark County School District - Career and Technical Center E501

Breaker Settings: Service Main MDA, Feeder T4LDPA

FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0



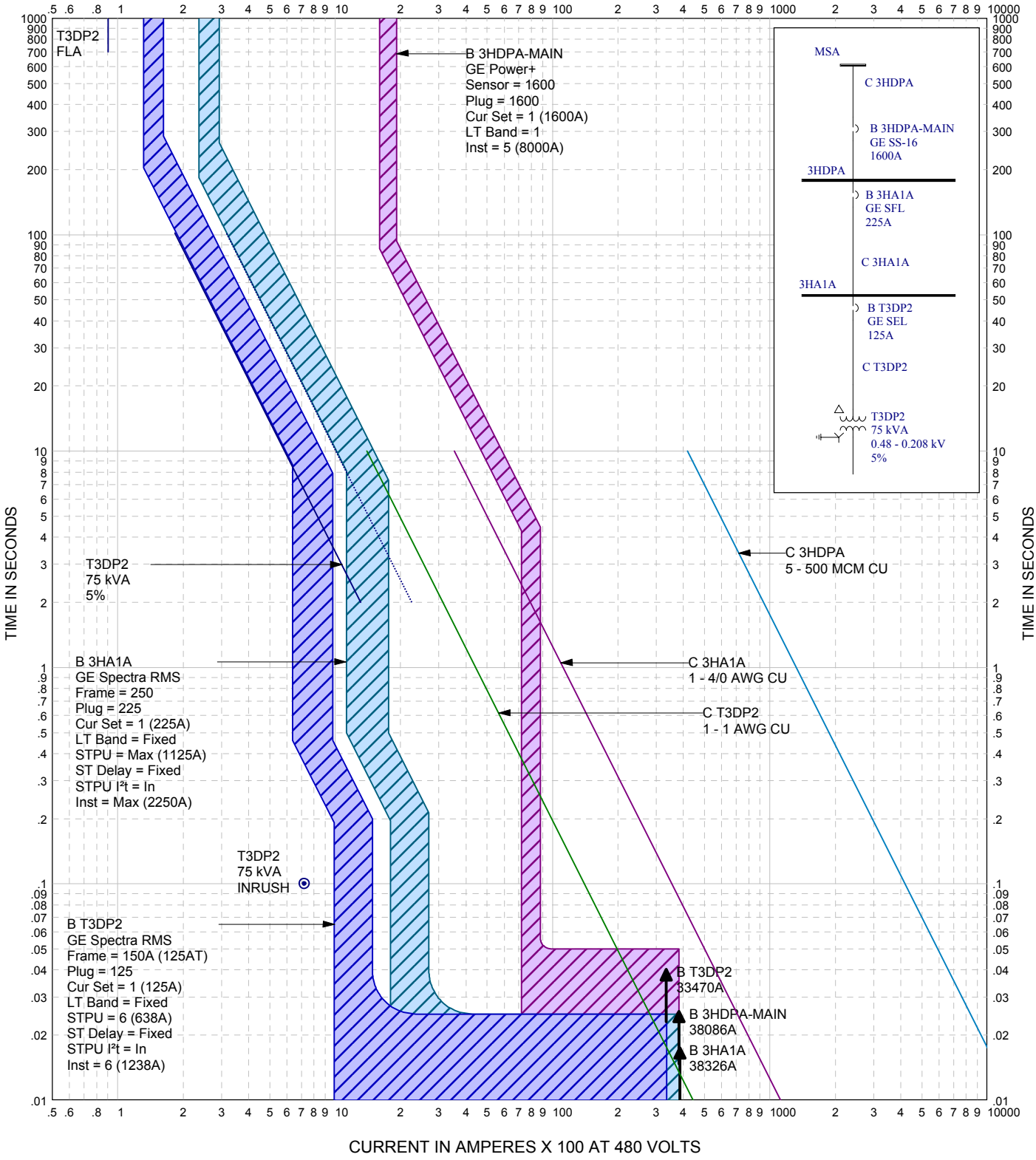
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Tx T4LDPA

Clark County School District - Career and Technical Center E501

Breaker Settings: Feeder T4LDPA / 4LDPA-Main

FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 501



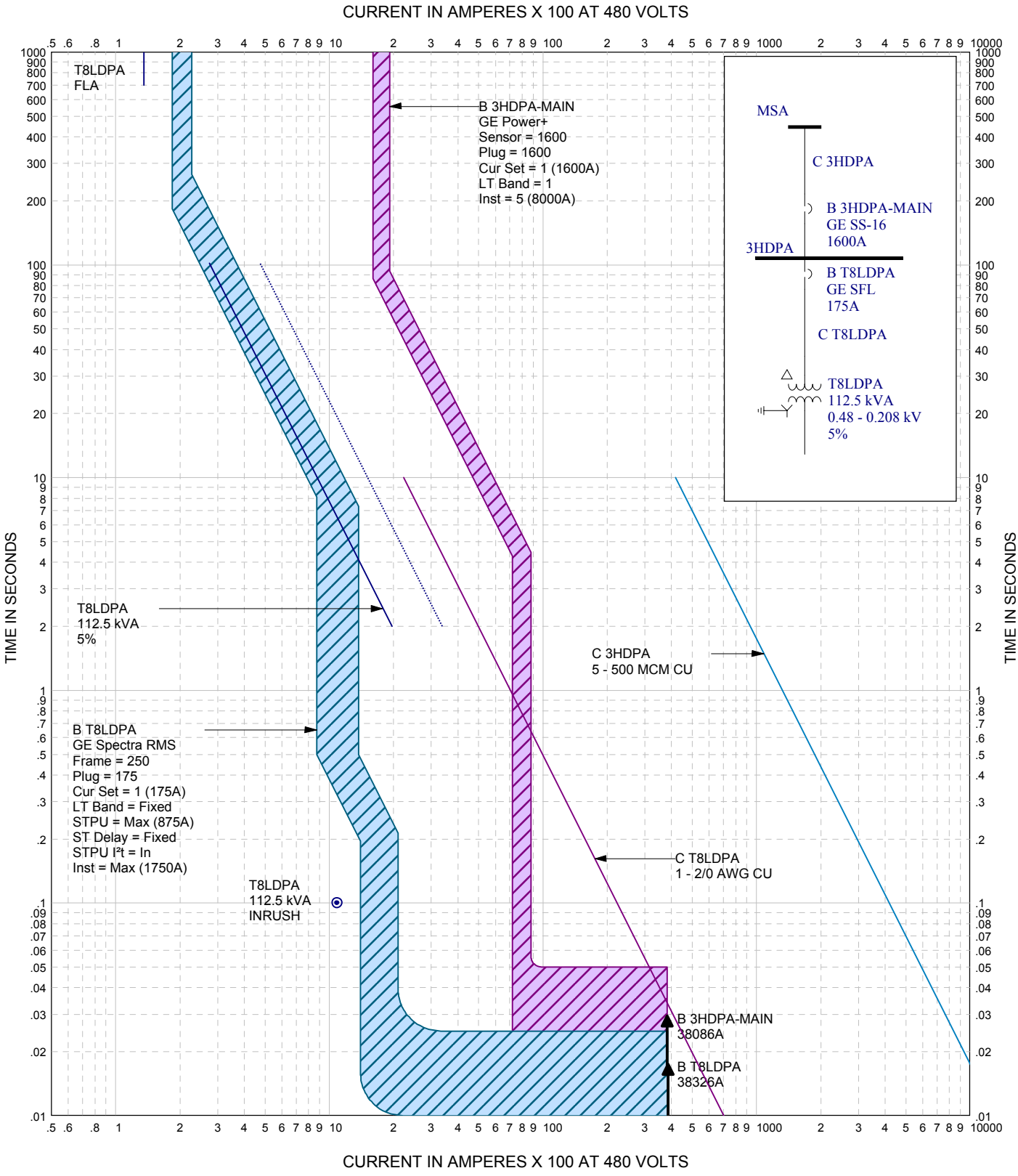
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MSA to T3DP2

Clark County School District - Career and Technical Center E501

Breaker Settings: 3HDPA-Main, Feeder 3HA1A, Feeder T3DP2
(T3DP1 Typical)

FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 501



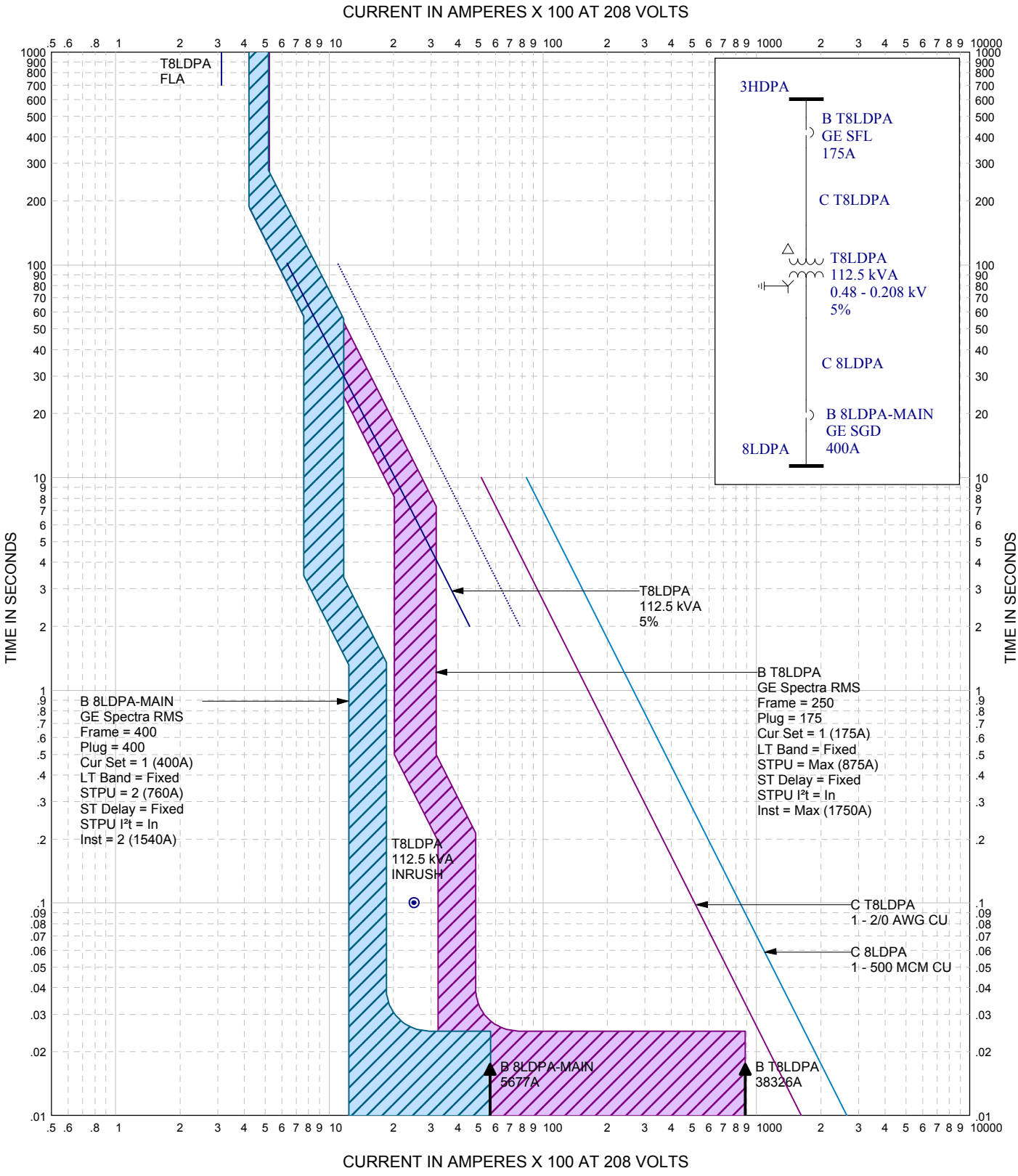
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MSA to T8LDPA

Clark County School District - Career and Technical Center E501

Breaker Settings: 3HDPA-Main, Feeder T8LDPA
(T8LDPB & T3LDPA Typical)

FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 501



PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Tx T8LDPA

Clark County School District - Career and Technical Center E501

Breaker Settings: Feeder T8LDPA / 8LDPA-Main

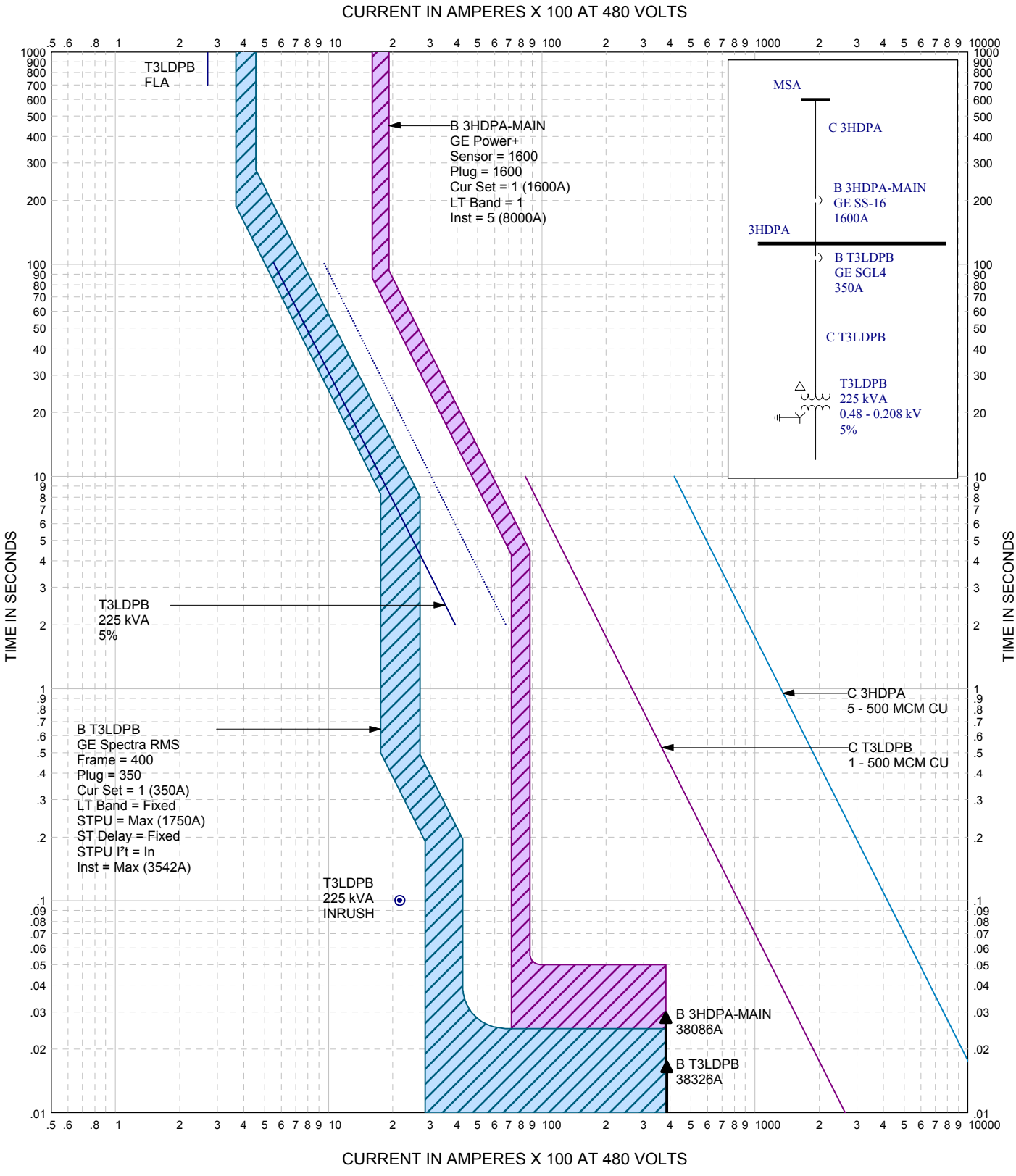
(Inrush applies to primary breaker only) Tx T8LDPB & T3LDPA Typical

FAULT: Phase

DATE: Jul 26, 2006

BY: Joe Dietrich

REVISION: 0



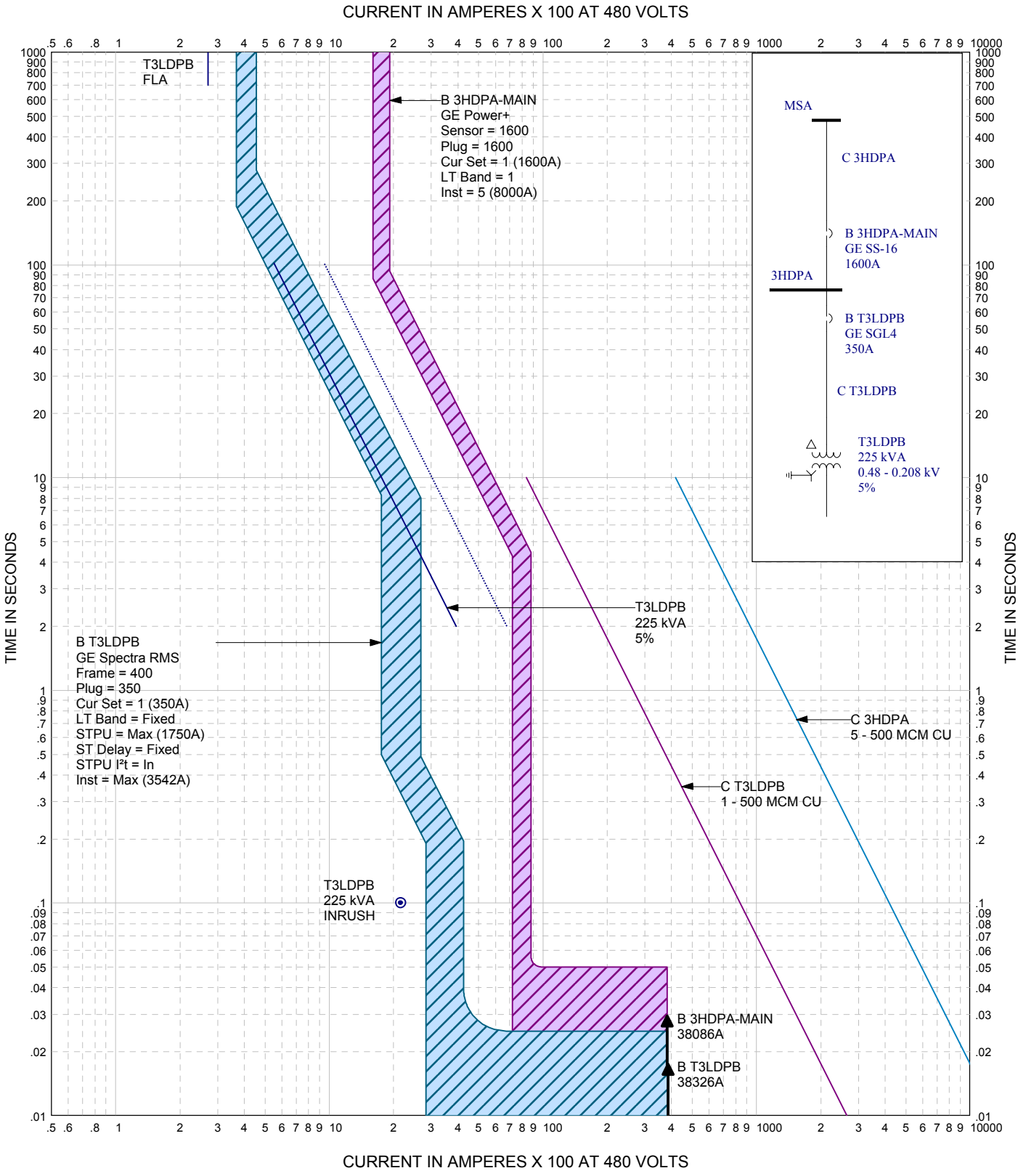
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MSA to 3HDPA

Clark County School District - Career and Technical Center E501

Breaker Settings: 3HDPA-Main, Feeder T3LDPB

FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 501



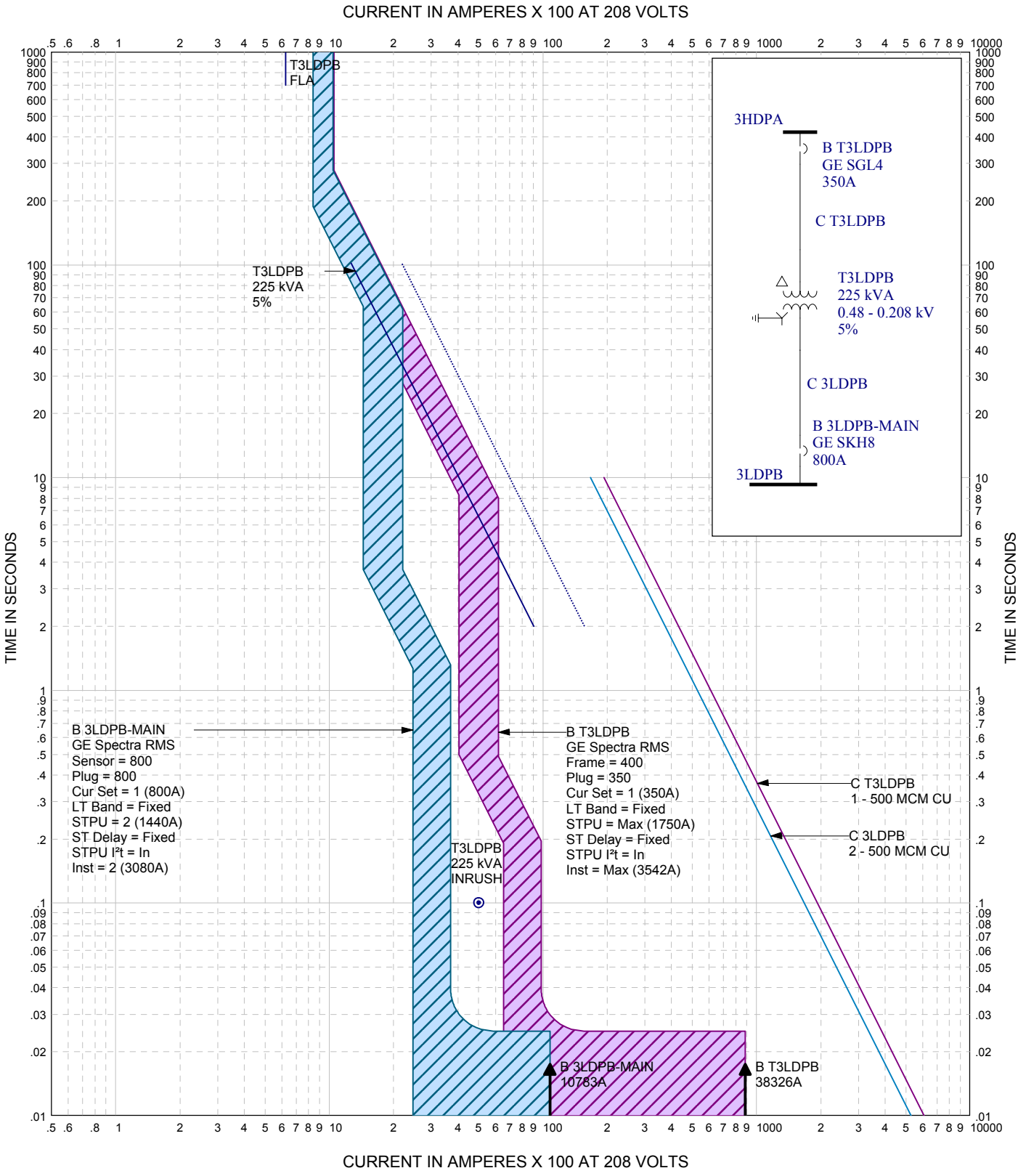
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MSA to T3LDPB

Clark County School District - Career and Technical Center E501

Breaker Settings: 3HDPA-Main, Feeder T3LDPB
(typical T4LDPB)

FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 501



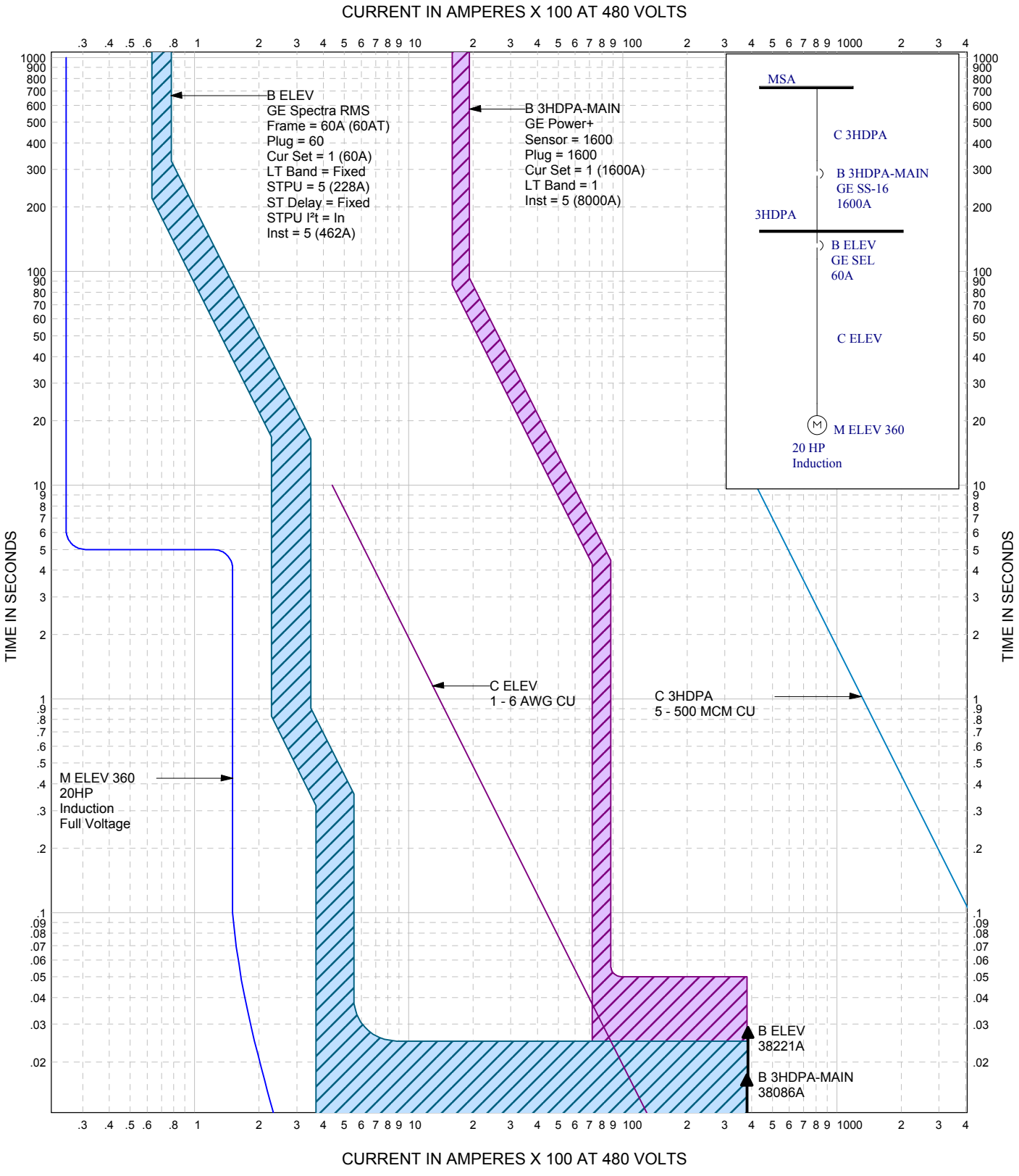
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Tx T3LDPB

Clark County School District - Career and Technical Center E501

Breaker Settings: T3LDPB Feeder / 3LDPB-Main
(typical Tx T4LDPB)

FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 501



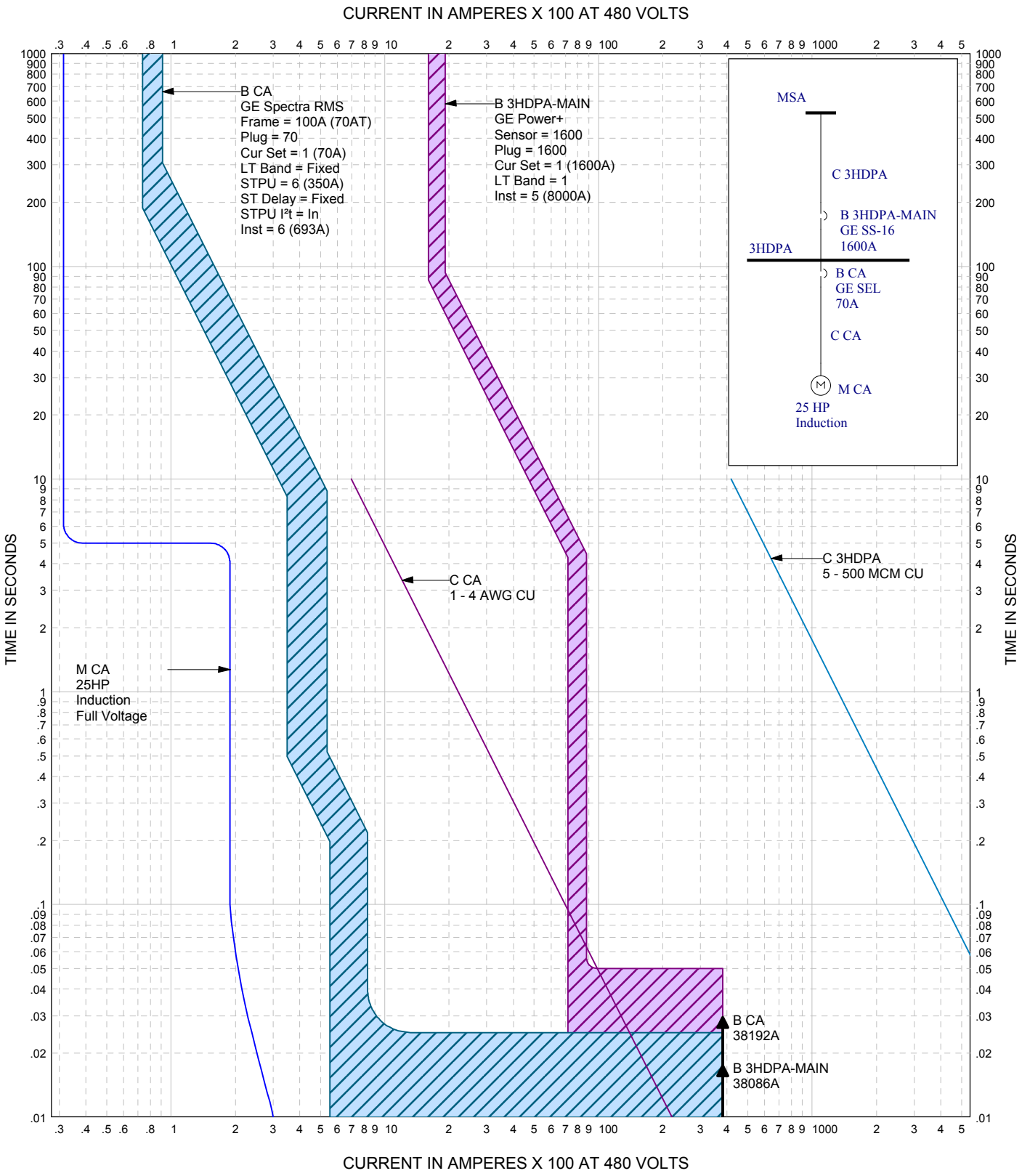
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	ELEV 360

Clark County School District - Career and Technical Center E501

Breaker Settings: 3HDPA-Main, Feeder ELEV

FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 501



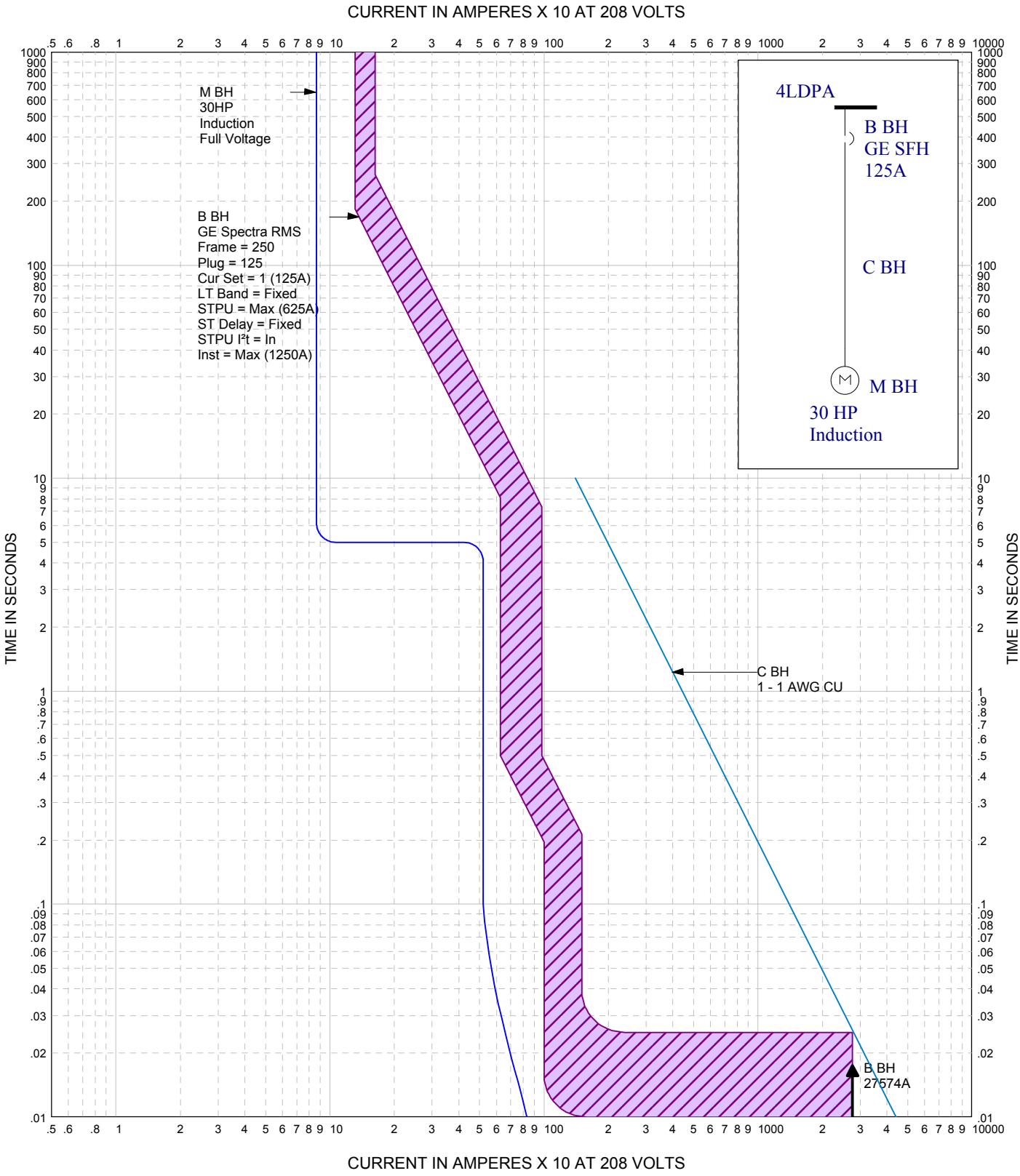
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Unit CA

Clark County School District - Career and Technical Center E501

Breaker Settings: 3HDPA-Main, CA Feeder

FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 501

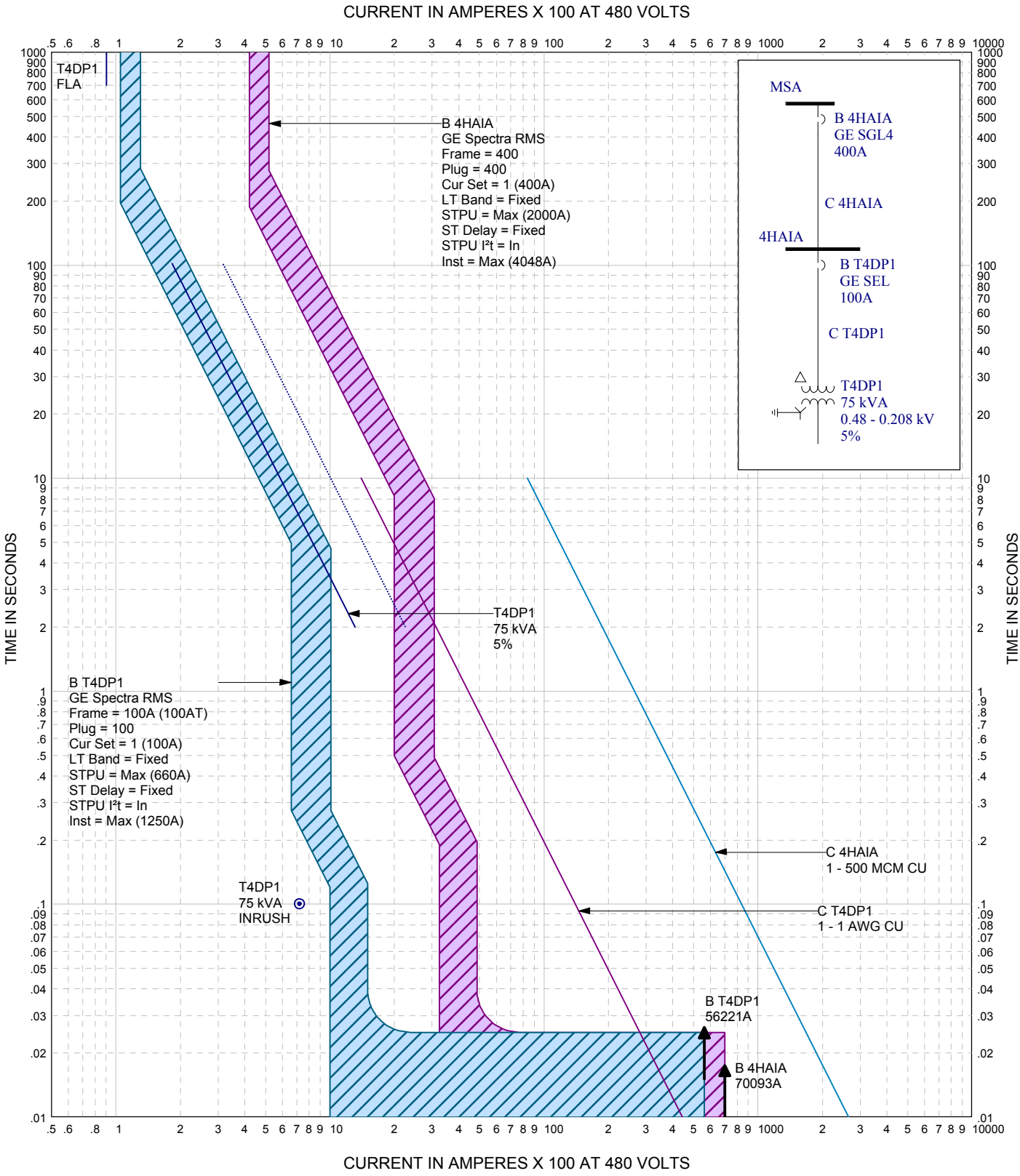


PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Motor BH

Clark County School District - Career and Technical Center E501

Breaker Settings: Feeder BH

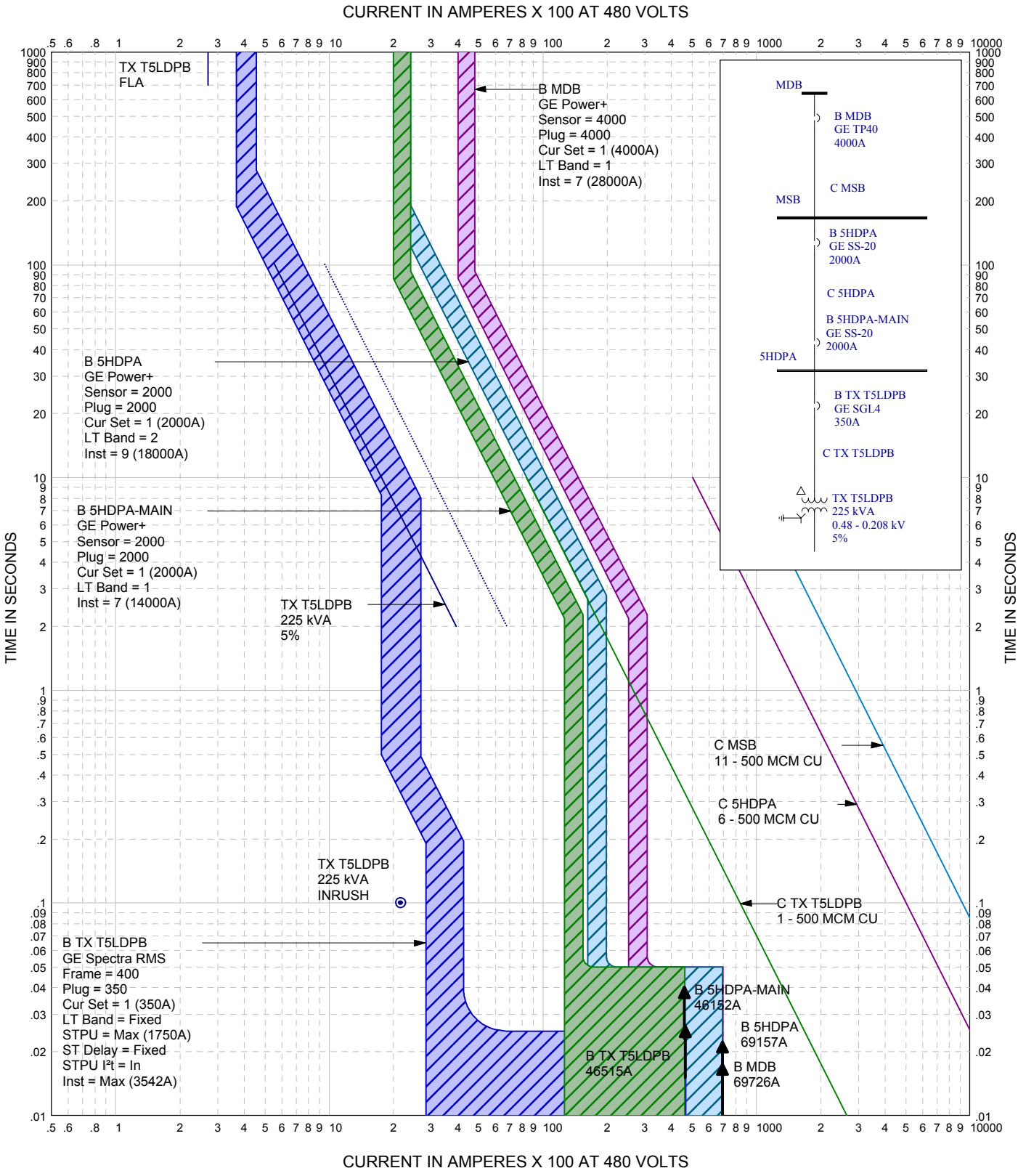
FAULT: Phase
DATE: Jul 26, 2006
BY: Joe Dietrich
REVISION: 0



PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	T4DP1
Clark County School District - Career and Technical Center E501		FAULT: Phase
		DATE: Jul 27, 2006
Breaker Settings: Feeder 4HAIA, Feeder T4DP1		BY: Joe Dietrich
		REVISION: 0

CCSD CTC 501

E Sheet 5.02 TCCs

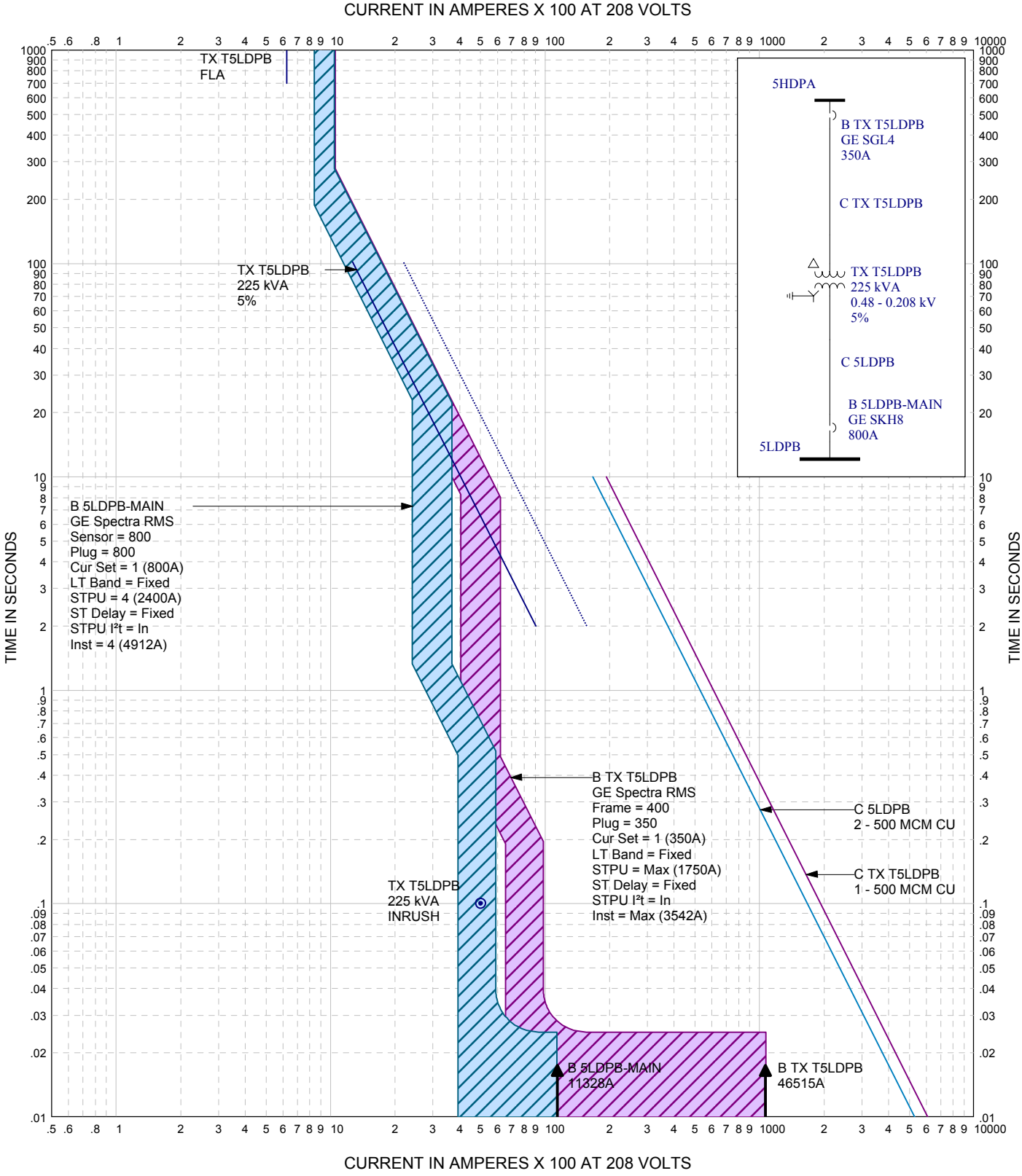


PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MDB to Tx T5LDPB

Clark County School District - Career and Technical Center E502

Breaker Settings: Service Main MDB, Feeder 5HDPA, 5HDPA-Main, Feeder Tx T5LDPB

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

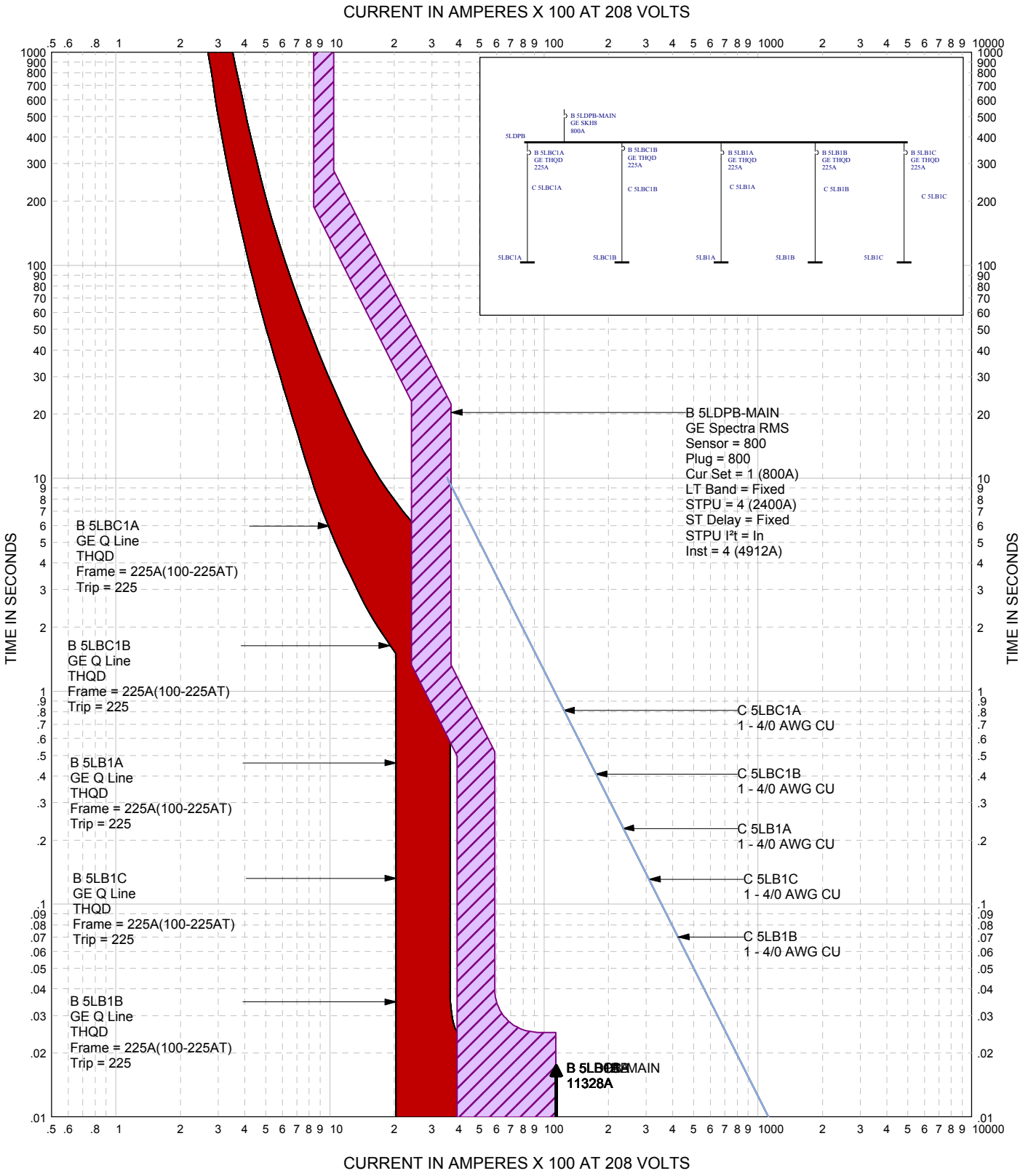


PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Tx T5LDPB

Clark County School District - Career and Technical Center E502

Breaker Settings: Feeder Tx T5LDPB / 5LDPB-Main

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

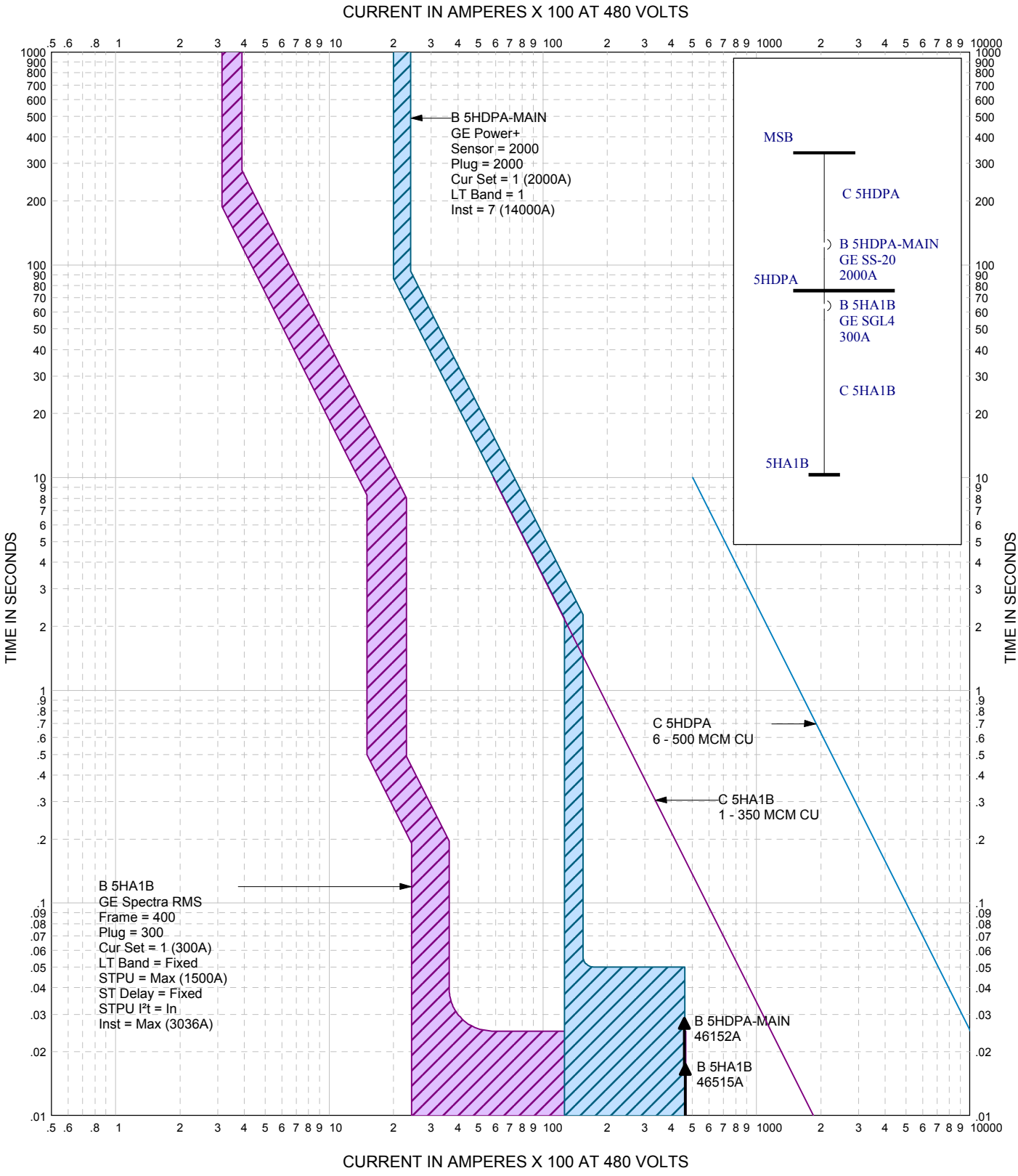


PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	5LDPB Feeders

Clark County School District - Career and Technical Center E502

Breaker Settings: 5LDPB Breakers

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

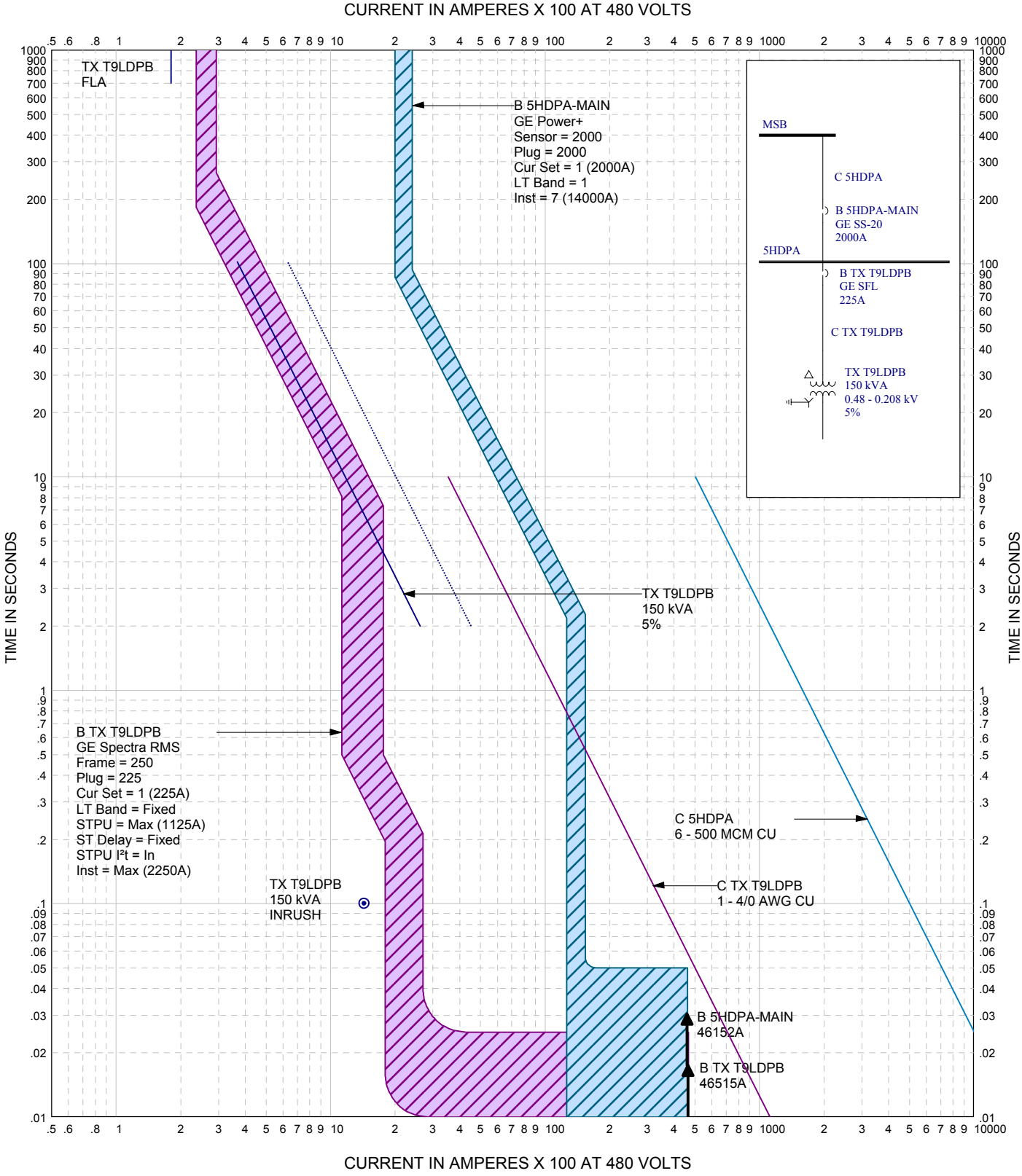


PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MSB to 5HA1B

Clark County School District - Career and Technical Center E502

Breaker Settings: 5HDPA-Main, Feeder 5HA1B
(9HA2A and 5HA1C Typical)

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

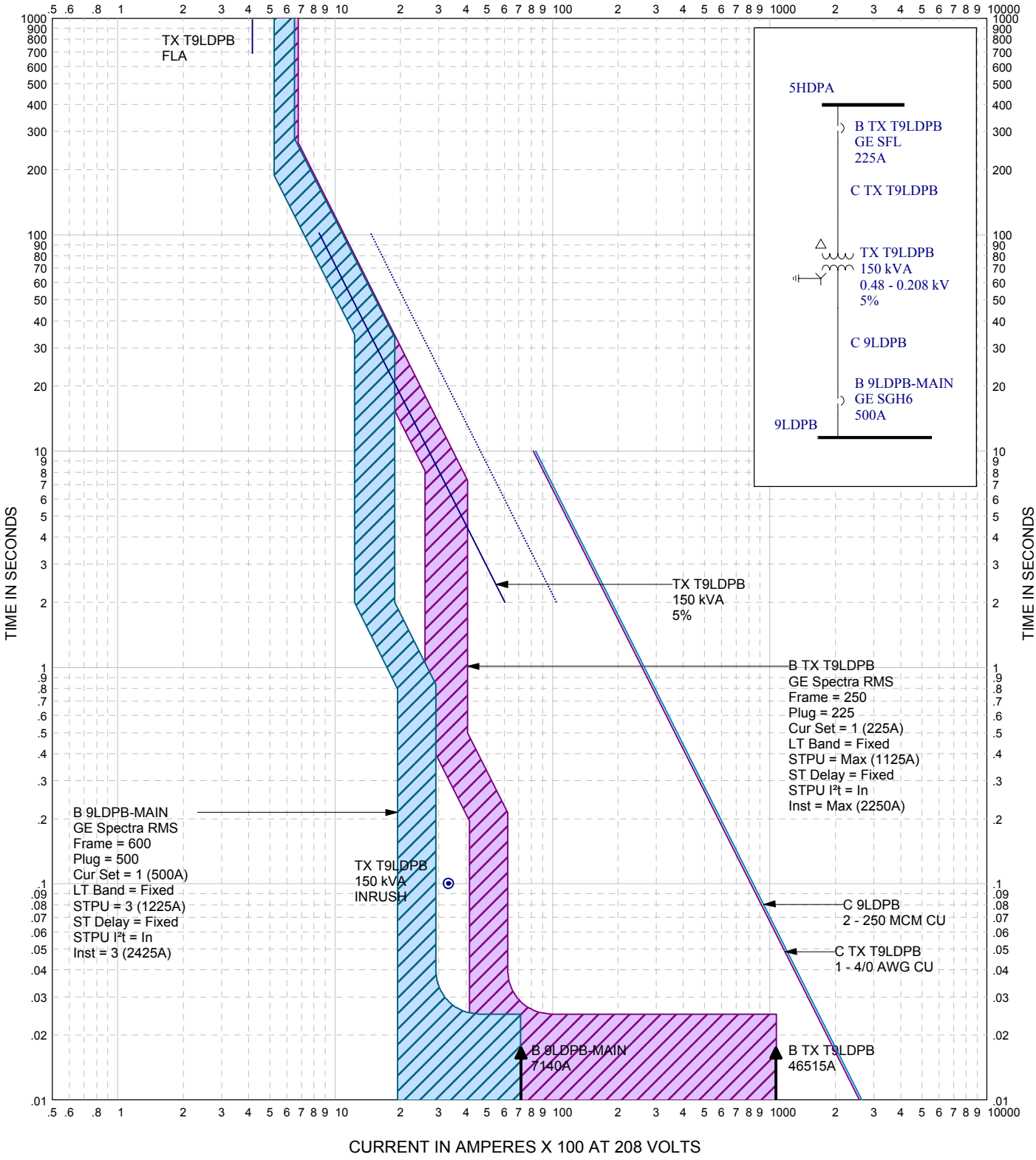


PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MSB to Tx T9LDPB

Clark County School District - Career and Technical Center E502

Breaker Settings: 5HDPA-Main, Feeder Tx T9LDPB
(Typical for 225A breakers in this SWBD)

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0



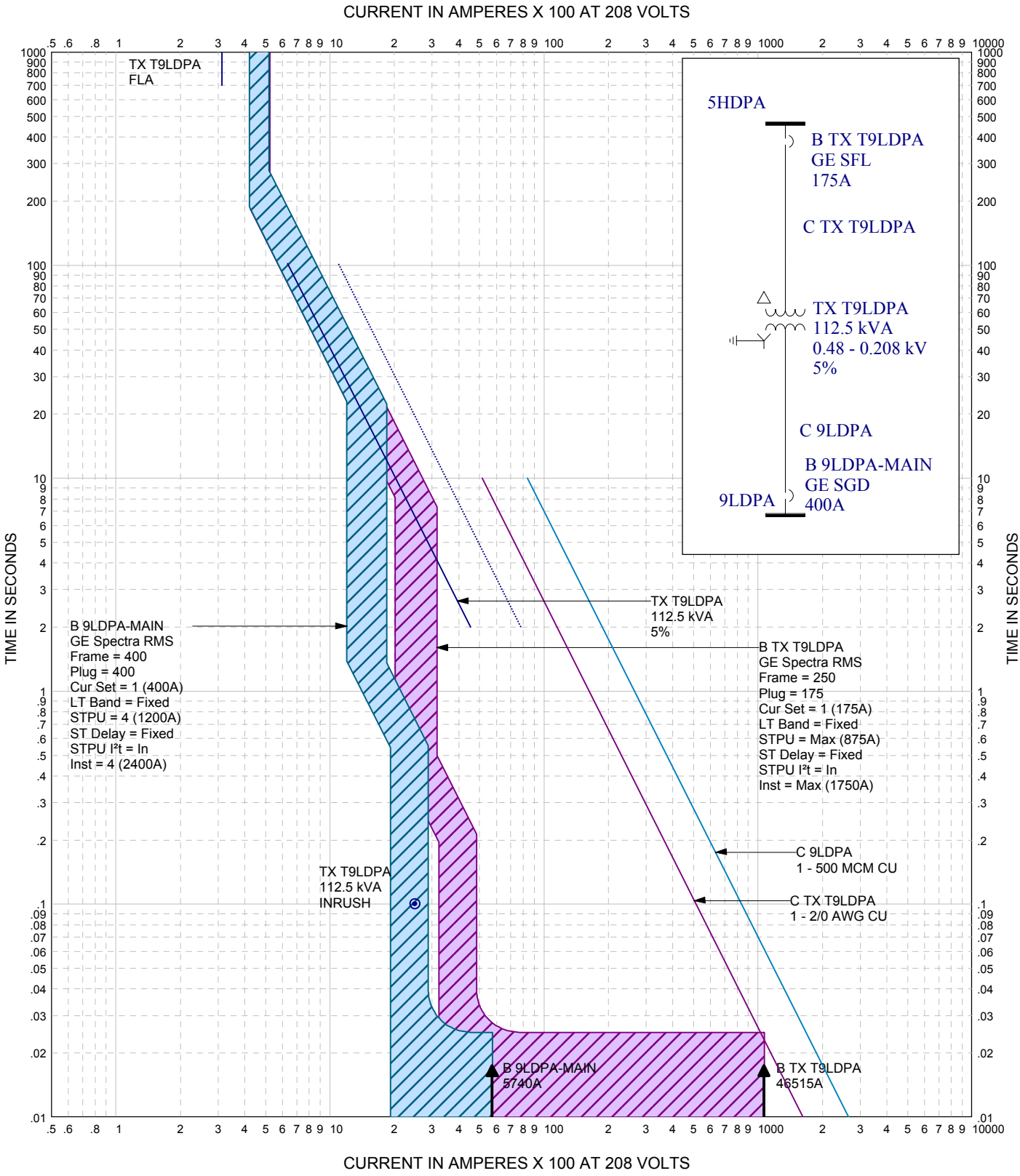
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Tx T9LDPB

Clark County School District - Career and Technical Center E502

Breaker Settings: Feeder Tx T9LDPB / 9LDPB-Main

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 502



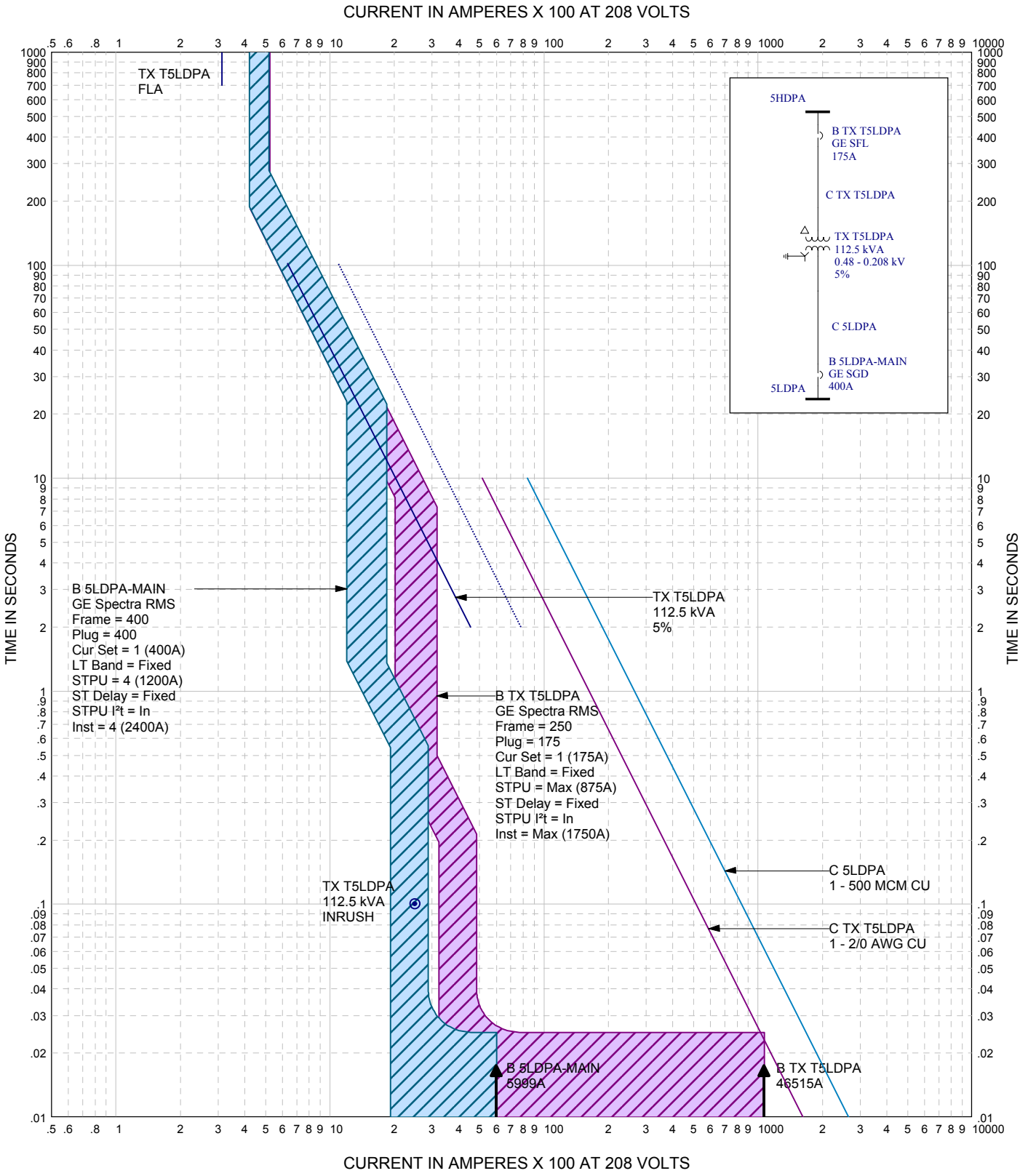
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Tx T9LDPA

Clark County School District - Career and Technical Center E502

Breaker Settings: Feeder Tx T9LDPA / 9LDPA-Main

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 502



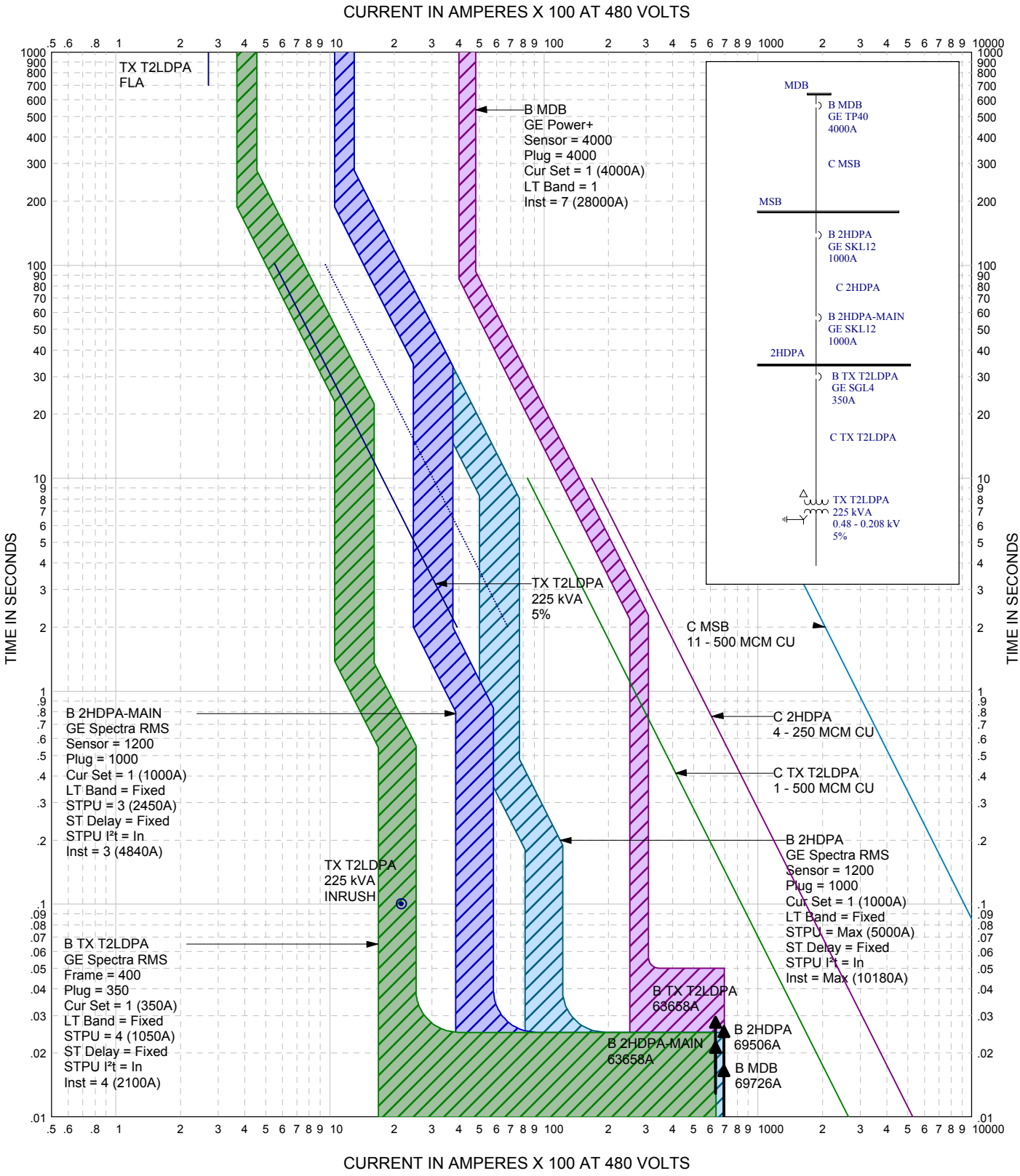
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Tx T5LDPA

Clark County School District - Career and Technical Center E502

Breaker Settings: Feeder Tx T5LDPA / 5LDPA-Main

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 502



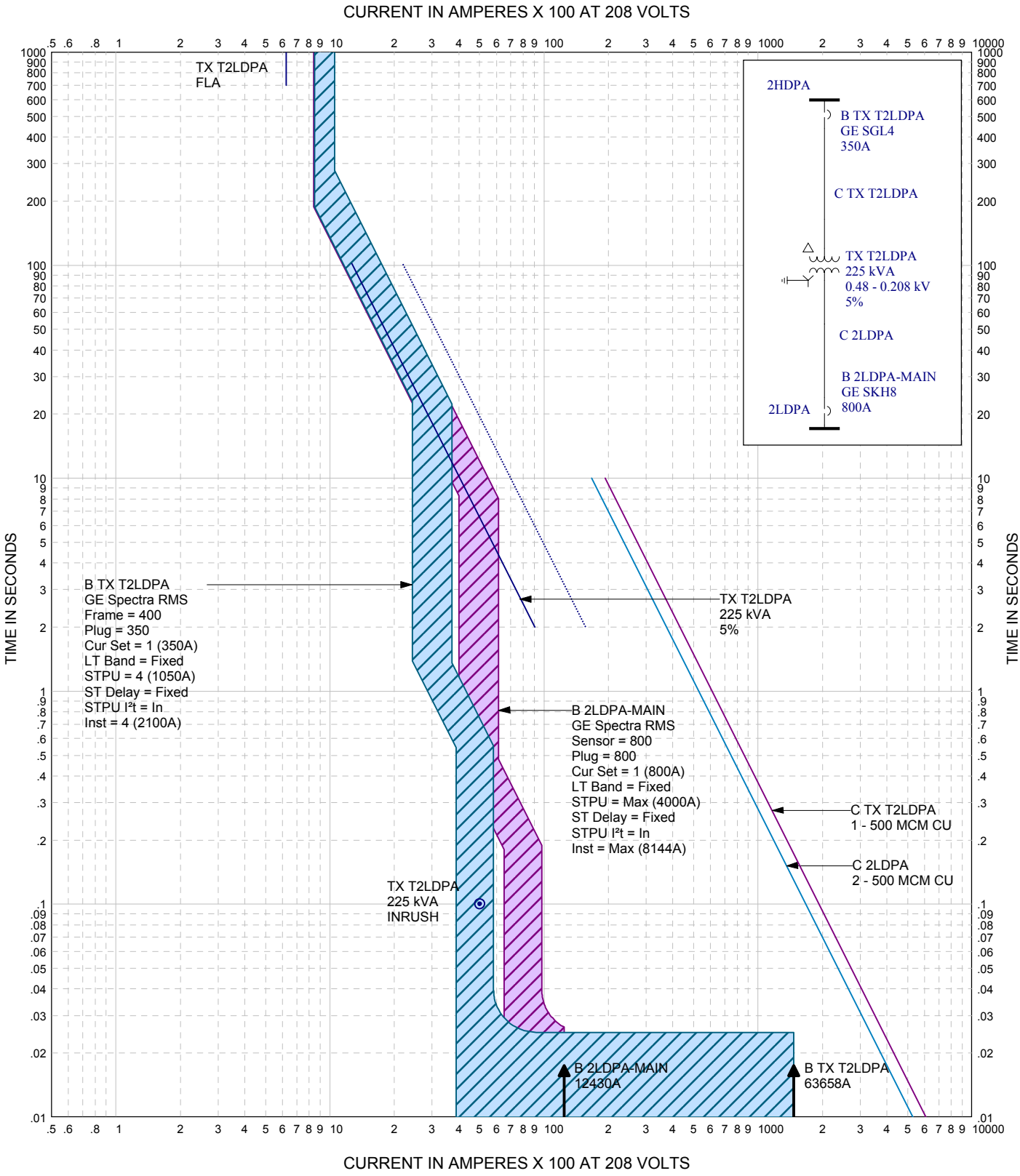
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MDB to Tx T2LDPA

Clark County School District - Career and Technical Center E502

Breaker Settings: Service Main MDB, Feeder 2HDPA, 2HDPA-Main, Feeder Tx T2LDPA

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 502



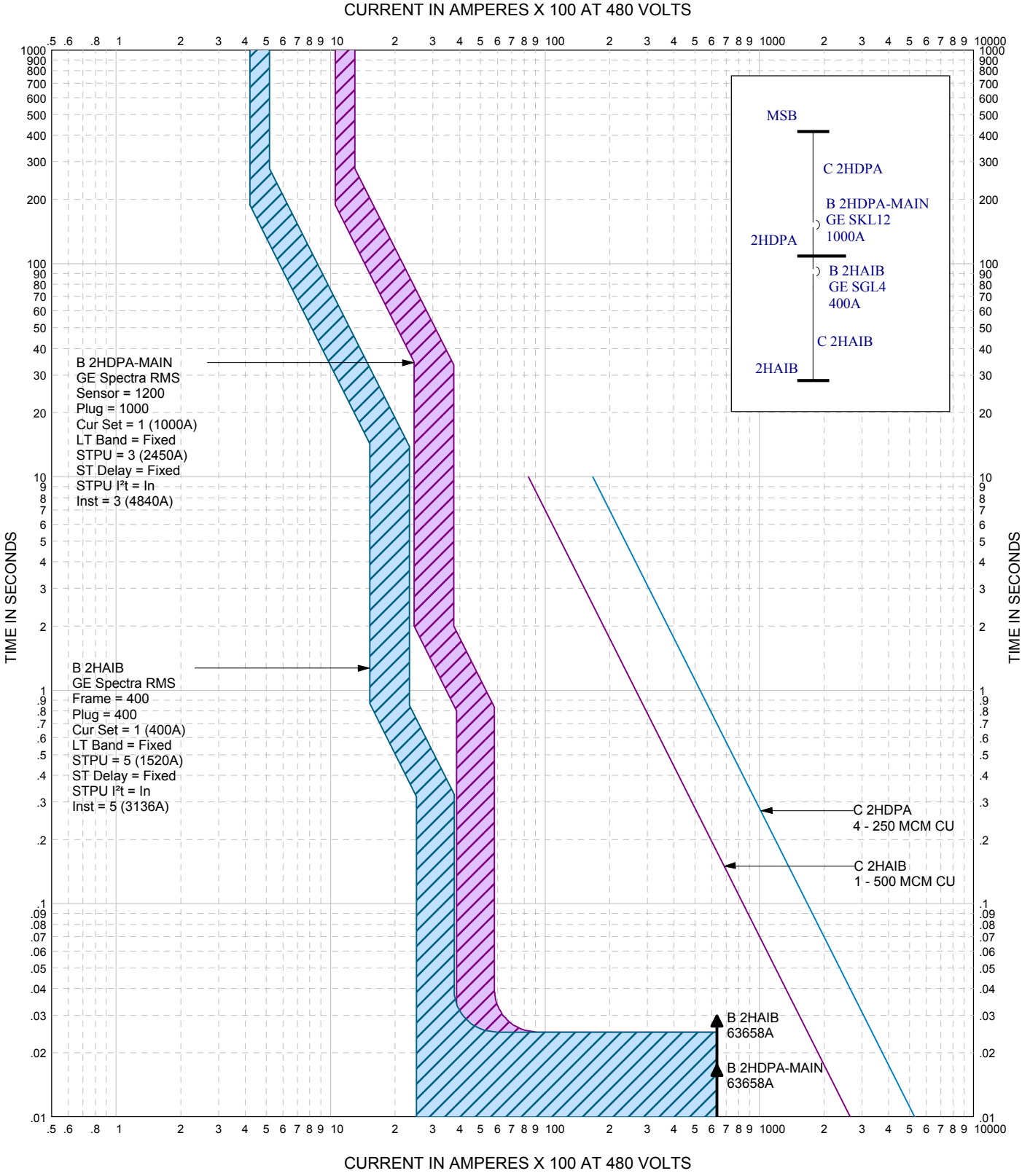
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Tx T2LDPA

Clark County School District - Career and Technical Center E502

Breaker Settings: Feeder Tx T2LDPA / 2LDPA-Main

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 502



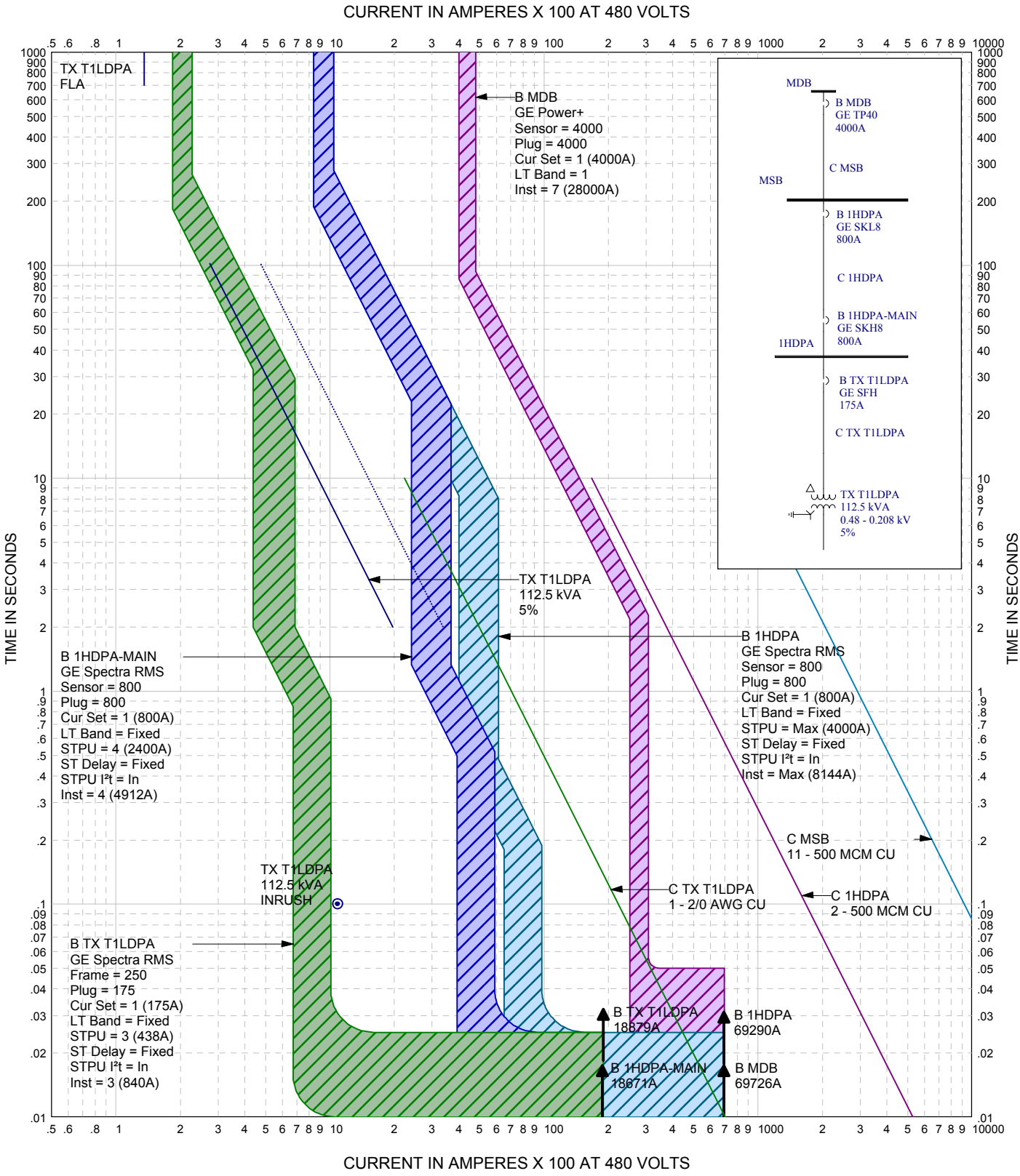
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MSB to 2HAIB

Clark County School District - Career and Technical Center E502

Breaker Settings: 2HDPA-Main, Feeder 2HAIB

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 502

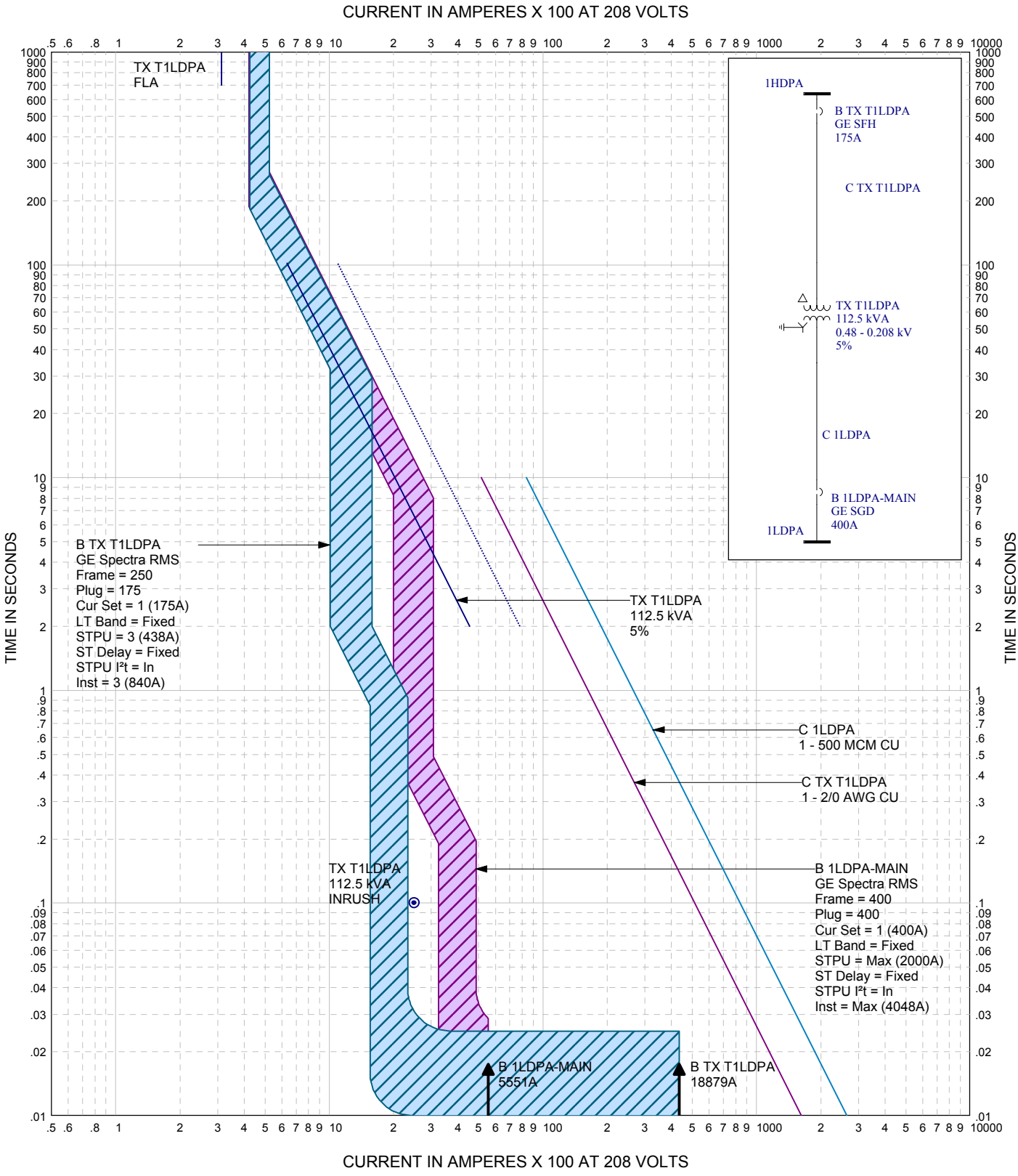


PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MDB to Tx T1LDPA

Clark County School District - Career and Technical Center E502

Breaker Settings: Service Main MDB, Feeder 1HDPA, 1HDPA-Main, Feeder Tx T1LDPA

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0



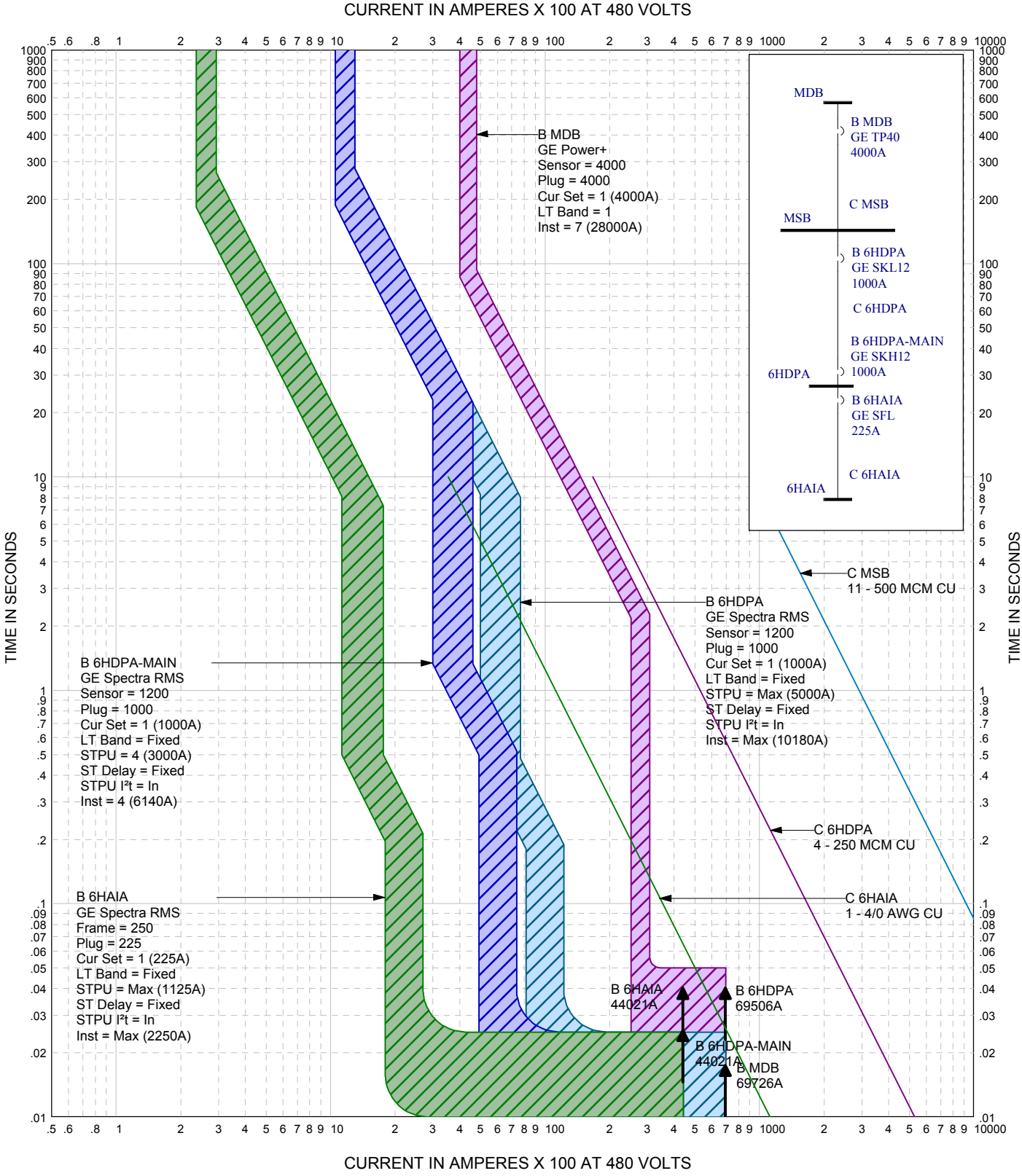
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Tx T1LDPA

Clark County School District - Career and Technical Center E502

Breaker Settings: Feeder Tx T1LDPA / 1LDPA-Main

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 502

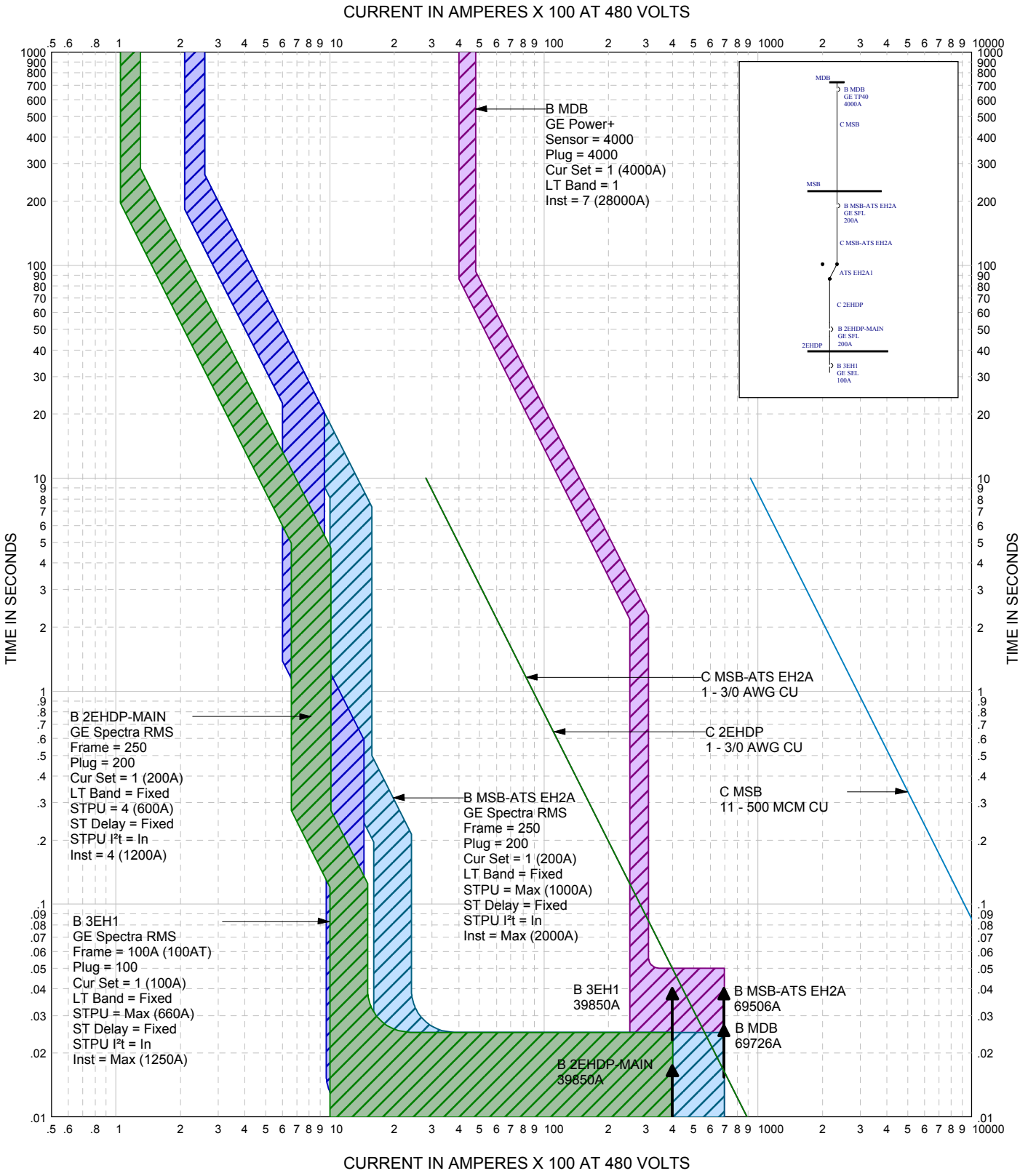


PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MDB to 6HAIA

Clark County School District - Career and Technical Center E502

Breaker Settings: Service Main MDB, Feeder 6HDPA, 6HDPA-Main, Feeder 6HAIA

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

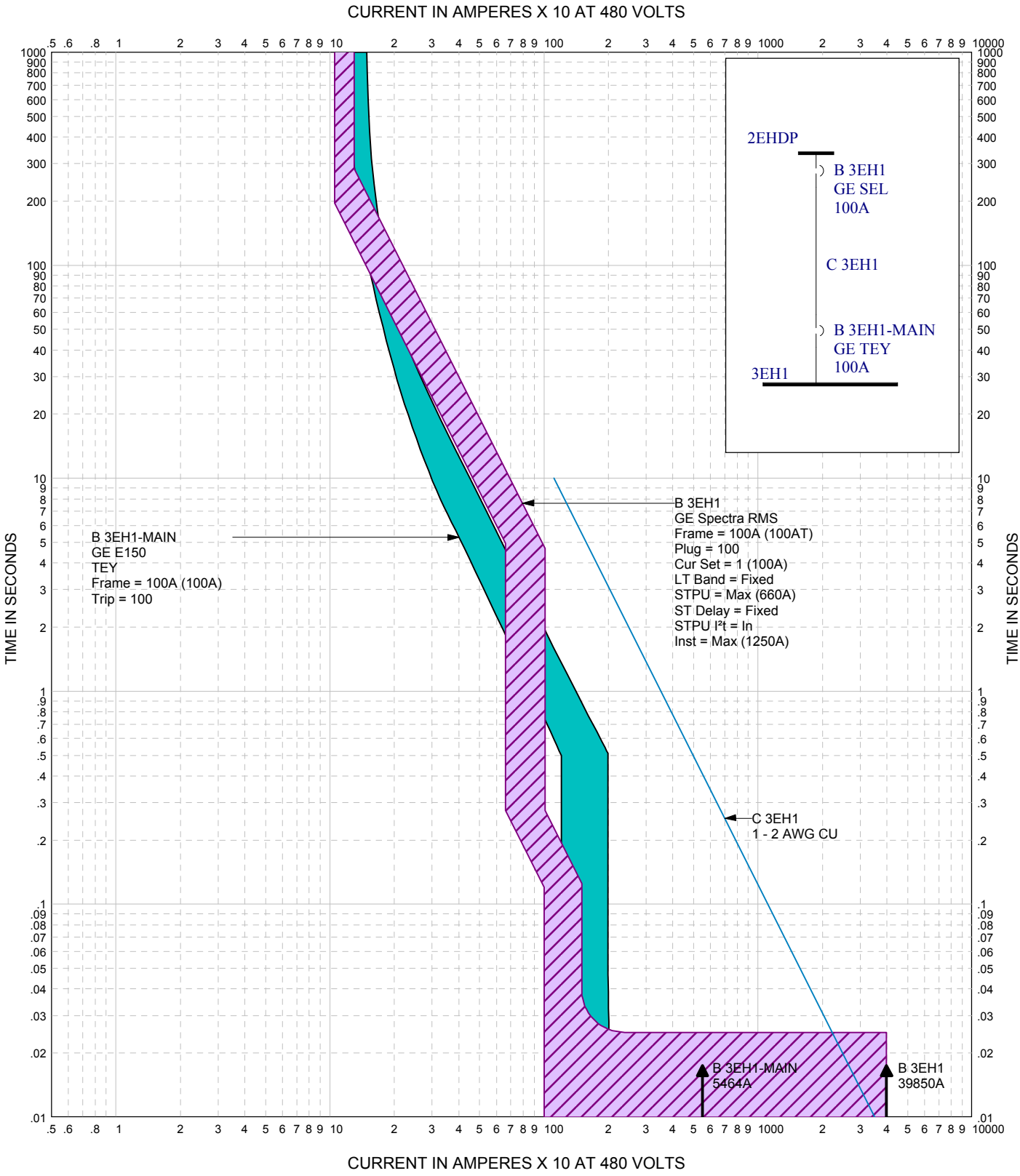


PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	MDB to 2EHDP

Clark County School District - Career and Technical Center E502

Breaker Settings: Service Main MDB, Feeder MSB-ATS EH2A, 2EHDP-Main, Feeder 3EH1

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0



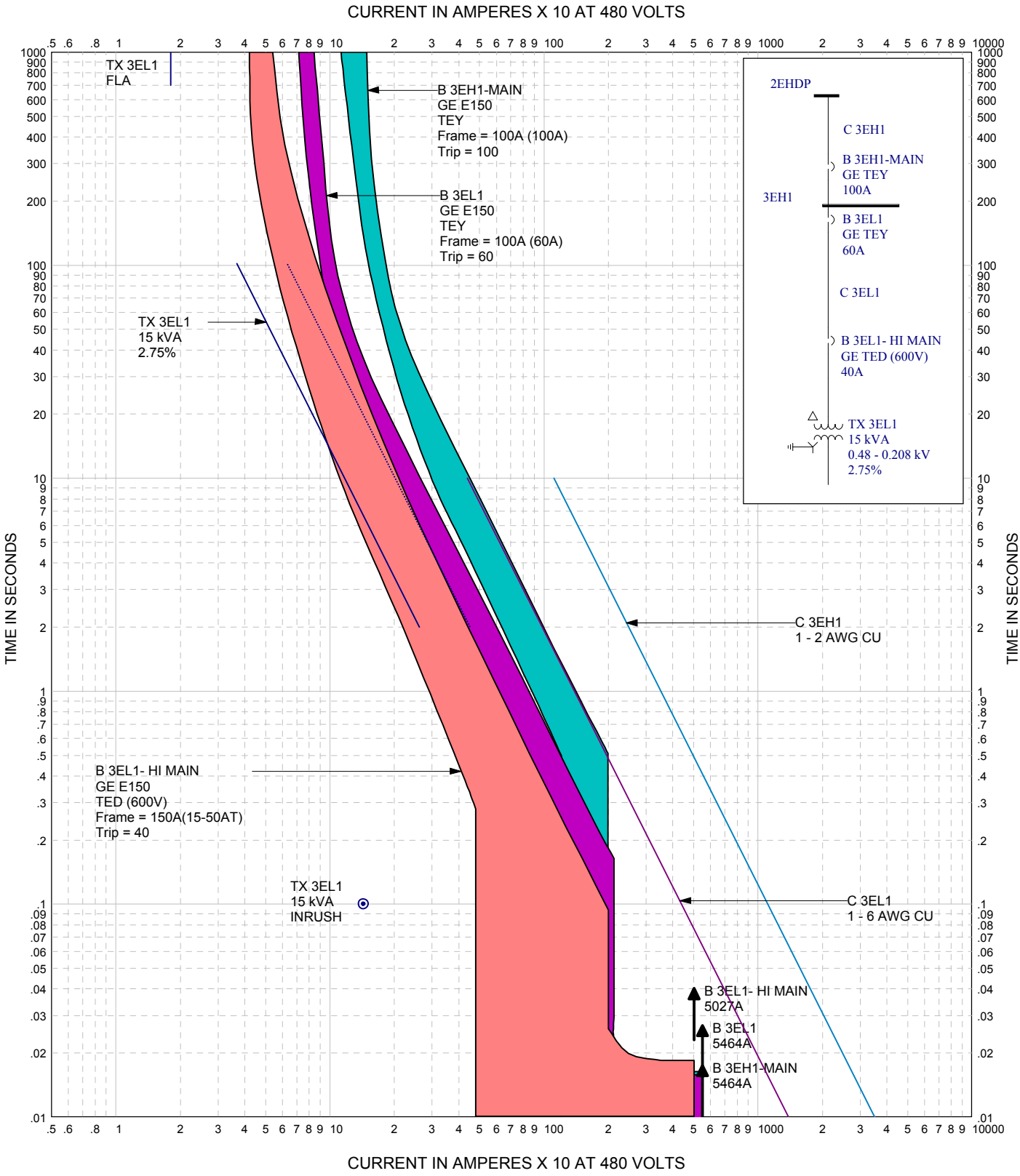
PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	2EHDP to 3EH1

Clark County School District - Career and Technical Center E502

Breaker Settings: Feeder 3EH1, 3EH1-Main

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 502



PQTSI	***EasyPower*** ® **TIME-CURRENT CURVES**	Tx 3EL1

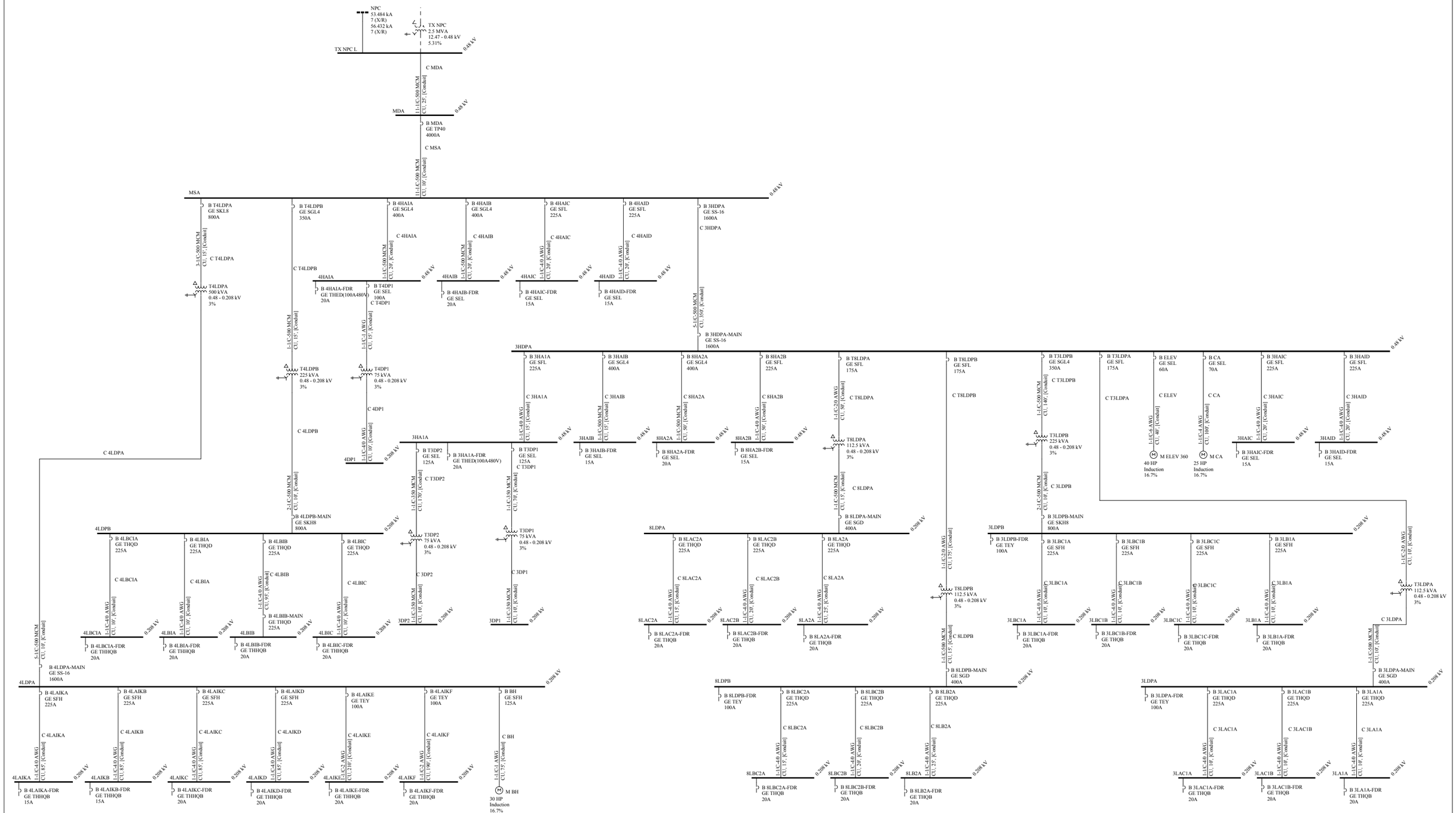
Clark County School District - Career and Technical Center E502

Breaker Settings: 3EH1-Main, Feeder 3EL1, 3EL1-HI Main

FAULT: Phase
DATE: Jul 27, 2006
BY: Joe Dietrich
REVISION: 0

CCSD CTC 502

Single Line Diagrams



Clark County School District - Career & Tech Center
Single Line Model E Sh. 5.01
PQTSi - October 9, 2005

Printed by EasyPower

NPC
53.484 kA
7 (X/R)
56.432 kA
7 (X/R)

TX NPC
2.5 MVA
12.47 - 0.48 kV
5.31%

TX NPC L

0.48 kV

C MDB

1-1/C-500 MCM
CU, 15', [Conduit]

MDB

0.48 kV

B MDB
GE TP40
4000A

C MSB

1-1/C-500 MCM
CU, 85', [Conduit]

GEN EGH1
0.125 MVA
8.8%
14.7%
3%

EGH1

0.48 kV

B EGH1-ATS EH2A

C EGH1-ATS EH2A

1-1/C-3/0 AWG
CU, 55', [Conduit]

ATS EH2A1

C 2EHDP

1-1/C-4/0 AWG
CU, 10', [Conduit]

2EHDP

B 2EHDP-MAIN
GE SFL
200A

1-1/C-4/0 AWG
CU, 10', [Conduit]

MSB

B MSB-ATS EH2A
GE SFL
200A

C MSB-ATS EH2A

1-1/C-3/0 AWG
CU, 55', [Conduit]

B 6HDPA
GE SKH12
1000A

C 6HDPA

4-1/C-250 MCM
CU, 115', [Conduit]

6HDPA

B 6HDPA-MAIN
GE SKH12
1000A

0.48 kV

B 6H1AA
GE SFL
225A

C 6H1AA

1-1/C-4/0 AWG
CU, 10', [Conduit]

6H1AA

0.48 kV

B 6H1AA-FDR
GE TEY
20A

B 6H1AB
GE SFL
225A

C 6H1AB

1-1/C-4/0 AWG
CU, 10', [Conduit]

6H1AB

0.48 kV

B 6H1AB-FDR
GE TEY
15A

B 6H1AC
GE SFL
225A

C 6H1AC

1-1/C-4/0 AWG
CU, 10', [Conduit]

6H1AC

0.48 kV

B 6H1AC-FDR
GE TEY
20A

B TX T6L4A1A
GE SEL
125A

C TX T6L4A1A

1-1/C-4 AWG
CU, 15', [Conduit]

TX T6L4A1A
75 kVA
0.48 - 0.208 kV
3%

C 6L4A1A

1-1/C-4/0 AWG
CU, 10', [Conduit]

6L4A1A

0.208 kV

B 6L4A1A-MAIN
GE TQD
225A

C 6L4A1A

1-1/C-4/0 AWG
CU, 10', [Conduit]

6L4A1A

0.208 kV

B 6L4A1A-FDR
GE THQB
20A

B TX T6L4C1A
GE SEL
125A

C TX T6L4C1A

1-1/C-4 AWG
CU, 10', [Conduit]

TX T6L4C1A
75 kVA
0.48 - 0.208 kV
3%

C 6L4C1A

1-1/C-4/0 AWG
CU, 10', [Conduit]

6L4C1A

0.208 kV

B 6L4C1A-MAIN
GE TQD
225A

C 6L4C1A

1-1/C-4/0 AWG
CU, 10', [Conduit]

6L4C1A

0.208 kV

B 6L4C1A-FDR
GE THQB
20A

B 1HDPA
GE SFH
800A

C 1HDPA

3-1/C-500 MCM
CU, 85', [Conduit]

1HDPA

B 1HDPA-MAIN
GE SKH8
800A

0.48 kV

B 1H1AA
GE SFH
225A

C 1H1AA

1-1/C-4/0 AWG
CU, 10', [Conduit]

1H1AA

0.48 kV

B 1H1AA-FDR
GE THED(100A480V)
20A

B 1H1AB
GE SFH
225A

C 1H1AB

1-1/C-4/0 AWG
CU, 10', [Conduit]

1H1AB

0.48 kV

B 1H1AB-FDR
GE SEL
15A

B 1H1AC
GE SFH
225A

C 1H1AC

1-1/C-4 AWG
CU, 10', [Conduit]

1H1AC

0.48 kV

B 1H1AC-FDR
GE TEY
15A

B ELEV 160
GE SEL
70A

C ELEV 160

1-1/C-4 AWG
CU, 165', [Conduit]

40 HP
Induction
16.7%

M ELEV 160

B TX T1LDPA
GE SFH
175A

C TX T1LDPA

1-1/C-2/0 AWG
CU, 10', [Conduit]

TX T1LDPA
112.5 kVA
0.48 - 0.208 kV
3%

C T1LDPA

1-1/C-500 MCM
CU, 10', [Conduit]

T1LDPA

B T1LDPA-MAIN
GE SGD
400A

0.208 kV

B 1LAC1A
GE TQD
225A

C 1LAC1A

1-1/C-4/0 AWG
CU, 10', [Conduit]

1LAC1A

0.208 kV

B 1LAC1A-FDR
GE THQB
20A

B 1LAC2A
GE TQD
225A

C 1LAC2A

1-1/C-4/0 AWG
CU, 20', [Conduit]

1LAC2A

0.208 kV

B 1LA1A
GE TQD
225A

C 1LA1A

1-1/C-4/0 AWG
CU, 30', [Conduit]

1LA1A

0.208 kV

B 1LA1A-FDR
GE THQB
20A

B 1LA2A
GE TQD
225A

C 1LA2A

1-1/C-4/0 AWG
CU, 20', [Conduit]

1LA2A

0.208 kV

B 1LA2A-FDR

B 2HDPA
GE SKL12
1000A

C 2HDPA

4-1/C-350 MCM
CU, 130', [Conduit]

2HDPA

B 2HDPA-MAIN
GE SKL12
1000A

0.48 kV

B 2HAIA
GE SFL
225A

C 2HAIA

1-1/C-4/0 AWG
CU, 20', [Conduit]

2HAIA

0.48 kV

B 2HAIA-FDR
GE THED(100A480V)
20A

B 2HAIB
GE SGL4
400A

C 2HAIB

1-1/C-4/0 AWG
CU, 10', [Conduit]

2HAIB

0.48 kV

B 2HAIB-FDR
GE SEL
15A

B 2HAIC
GE SFL
225A

C 2HAIC

1-1/C-4/0 AWG
CU, 15', [Conduit]

2HAIC

0.48 kV

B 2HAIC-FDR
GE SEL
15A

B 2HS1
GE SFL
225A

C 2HS1

1-1/C-4/0 AWG
CU, 20', [Conduit]

2HS1

0.48 kV

B 2HS1-FDR
GE THED(100A480V)
20A

B 2HS2
GE SFL
225A

C 2HS2

1-1/C-4/0 AWG
CU, 15', [Conduit]

2HS2

0.48 kV

B 2HS2-FDR
GE THED(100A480V)
20A

B TX T2LDPA
GE SGL4
350A

C TX T2LDPA

3-1/C-500 MCM
CU, 90', [Conduit]

TX T2LDPA
225 kVA
0.48 - 0.208 kV
3%

C 2LDPA

2-1/C-500 MCM
CU, 30', [Conduit]

2LDPA

B 2LDPA-MAIN
GE SKH8
800A

0.208 kV

B 2LDPA-FDR
GE THQD
150A

B 2LAC1A
GE THQD
225A

C 2LAC1A

1-1/C-4/0 AWG
CU, 20', [Conduit]

2LAC1A

0.208 kV

B 2LAC1A-FDR
GE THHQB
20A

B 2LA1A
GE THQD
225A

C 2LA1A

1-1/C-4/0 AWG
CU, 20', [Conduit]

2LA1A

0.208 kV

B 2LA1A-FDR
GE THQB
20A

B 2LA1B
GE THQD
225A

C 2LA1B

1-1/C-4/0 AWG
CU, 20', [Conduit]

2LA1B

0.208 kV

B 2LA1B-FDR
GE THQB
20A

B 2LA1KA
GE THQD
225A

C 2LA1KA

1-1/C-4/0 AWG
CU, 100', [Conduit]

2LA1KA

0.208 kV

B 2LA1KA-FDR
GE THQB
20A

B 2LA1KB
GE THQD
225A

C 2LA1KB

1-1/C-4/0 AWG
CU, 100', [Conduit]

2LA1KB

0.208 kV

B 2LA1KB-FDR
GE THQB
20A

B 2LA1KC
GE THQD
225A

C 2LA1KC

1-1/C-4/0 AWG
CU, 100', [Conduit]

2LA1KC

0.208 kV

KC 2LA1KC-FDR
GE THQB
20A

B MCCA
GE SGL4
400A

C MCCA

4-1/C-500 MCM
CU, 65', [Conduit]

MCCA

0.48 kV

B 2EHDP-MAIN
GE SFL
200A

0.48 kV

B 2EH1
GE SEL
60A

C 2EH1

1-1/C-2 AWG
CU, 10', [Conduit]

B 2EH1-MAIN
GE TEY
100A

0.48 kV

B 1EH1
GE SEL
60A

C 1EH1

1-1/C-2 AWG
CU, 45', [Conduit]

0.48 kV

B 3EH1
GE SEL
100A

C 3EH1

1-1/C-2 AWG
CU, 335', [Conduit]

B 3EH1-MAIN
GE TEY
100A

0.48 kV

B 4EH1
GE SEL
60A

C 4EH1

1-1/C-2 AWG
CU, 360', [Conduit]

0.48 kV

B 5EH1
GE SEL
60A

C 5EH1

1-1/C-2 AWG
CU, 265', [Conduit]

B 5EH1-MAIN
GE TEY
100A

0.48 kV

B 6EH1
GE SEL
60A

C 6EH1

1-1/C-2 AWG
CU, 100', [Conduit]

0.48 kV

2EH1

B 2EL1
GE TEY
30A

B 2EH1-FDR
GE TEY
20A

C 2EL1

1-1/C-10 AWG
CU, 10', [Conduit]

B 2EL1- HI MAIN
GE TED (600V)
40A

TX 2EL1
15 kVA
0.48 - 0.208 kV
2.75%

B 2EL1-MAIN
GE THQL
50A

0.208 kV

2EL1

B 2EL1-FDR
GE THQL
20A

1EH1

B 1EL1
GE TEY
30A

B 1EH1-FDR
GE TEY
20A

C 1EL1

1-1/C-10 AWG
CU, 10', [Conduit]

B 1EL1- HI MAIN
GE TED (600V)
40A

TX 1EL1
15 kVA
0.48 - 0.208 kV
2.75%

B 1EL1-MAIN
GE THQL
50A

0.208 kV

1EL1

B 1EL1-FDR
GE THQL
20A

3EH1

B 3EL1
GE TEY
60A

B 3EH1-FDR
GE TEY
20A

C 3EL1

1-1/C-6 AWG
CU, 10', [Conduit]

B 3EL1- HI MAIN
GE TED (600V)
40A

TX 3EL1
15 kVA
0.48 - 0.208 kV
2.75%

B 3EL1-MAIN
GE THQL
50A

0.208 kV

3EL1

B 3EL1-FDR
GE THQL
20A

4EH1

B 4EL1
GE TEY
60A

B 4EH1-FDR
GE TEY
20A

C 4EL1

1-1/C-6 AWG
CU, 10', [Conduit]

B 4EL1- HI MAIN
GE TED (600V)
70A

TX 4EL1
22.5 kVA
0.48 - 0.208 kV
2.75%

B 4EL1-MAIN
GE THQL
70A

0.208 kV

4EL1

B 4EL1-FDR
GE THQL
20A

5EH1

B 5EL1
GE TEY
60A

B 5EH1-FDR
GE TEY
20A

C 5EL1

1-1/C-6 AWG
CU, 10', [Conduit]

B 5EL1- HI MAIN
GE TED (600V)
40A

TX 5EL1
15 kVA
0.48 - 0.208 kV
2.75%

B 5EL1-MAIN
GE THQL
70A

0.208 kV

5EL1

B 5EL1-FDR
GE THQL
20A

6EH1

B 6EL1
GE TEY
30A

B 6EH1-FDR
GE TEY
20A

C 6EL1

1-1/C-10 AWG
CU, 10', [Conduit]

B 6EL1- HI MAIN
GE TED (600V)
40A

TX 6EL1
15 kVA
0.48 - 0.208 kV
2.75%

B 6EL1-MAIN
GE THQL
70A

0.208 kV

6EL1

B 6EL1-FDR
GE THQL
20A

B UPS 8
GE THQL
100A

C UPS 8

1-1/C-2 AWG
CU, 10', [Conduit]

UPS 8

C UPS8A

1-1/C-2 AWG
CU, 10', [Conduit]

B UPS 8A-MAIN
GE THQB
100A

0.208 kV

UPS8A

B UPS8A-FDR
GE THQB
20A

C UPS3A

1-1/C-2 AWG
CU, 10', [Conduit]

B UPS 3A-MAIN
GE THQB
100A

0.208 kV

UPS3A

B UPS3A-FDR
GE THQB
20A

B UPS 5
GE THQL
100A

C UPS 5

1-1/C-2 AWG
CU, 10', [Conduit]

UPS 5

C UPS5A

1-1/C-2 AWG
CU, 10', [Conduit]

B UPS 5A-MAIN
GE THQB
100A

0.208 kV

UPS5A

B UPS5A-FDR
GE THQB
20A

C UPS9A

1-1/C-2 AWG
CU, 10', [Conduit]

B UPS 9A-MAIN
GE THQB
100A

0.208 kV

UPS9A

B UPS9A-FDR
GE THQB
20A

Clark County School District - Career & Tech Center
Single Line Model E Sh. 5.02 (a)
PQTSi - October 9, 2005

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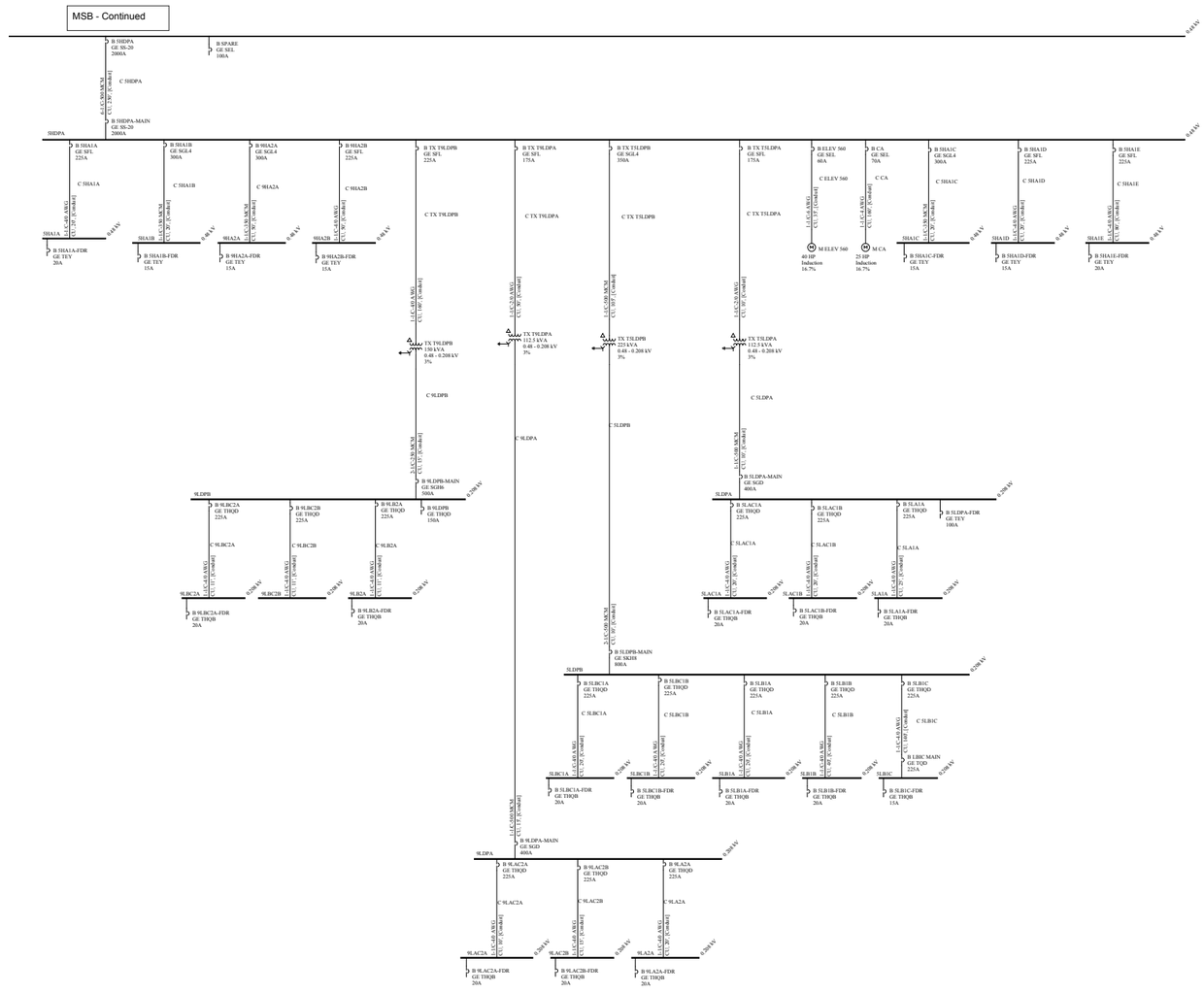
MSB - Continued



Clark County School District - Career & Tech Center
Single Line Model E Sh. 5.02 (b)
PQTSi - October 9, 2005

Printed by EasyPower