



technical report II

Denver Police Department Crime Lab || Denver, Colorado

lighting || electrical

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Executive Summary

The purpose of this report is to detail the electrical systems criteria and scope, as well as existing electrical conditions. The criteria is then compared to the current design. Serving as a laboratory, the Denver Police Department Crime Lab must remain powered nearly 24/7 as to accommodate the demanding schedule of its employees. Security must be maintained, as well as sustainable data and power.

The current electrical design and layout is efficient, and serves a large amount of mechanical and receptacle loads. The laboratory is supplied 480/277V, through a transformer vault located in the basement of the building. The voltage is then fed through distribution panels and sub-panelboards. The project has received LEED Gold for new construction by utilizing water efficient landscaping, light pollution reduction, implementing a heat island effect, and daylight. As competent as the crime lab is, there are still opportunities to increase the reliability and reduce the energy use within the building.

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The documents in the Appendices are courtesy SSG.

Building Overview

All 60,000 SF of the Denver Police Department Crime Lab serve the public of Colorado through proper and thorough forensic investigation. Neighboring the lab in downtown Denver is the Police Department and Department of Safety, along with several other government buildings. The lab itself houses many facilities such as conference rooms, a multipurpose room, open offices, and various laboratories that allow their users to be able to work efficiently and effectively. Architecturally, the crime lab showcases a unique façade that was modeled after a double helix, or DNA molecule. This contemporary look continues on the interior of the building, where distinctive ceiling systems and modern labs.

Preliminary Load Calculation

The preliminary load was calculated using the NEC and the knowledge that the Crime Lab is a laboratory classified as Occupancy Type B and A-3 with a gross square footage of 60,000.

Table 1.1 | Preliminary Load Calculation

Load	VA/SF	Area (SF)	Total VA	Demand Factor	Total kVA
Lighting	3.5	60,000	210,000	1.0	210
Receptacles					
First 10kVA	1.0	10,000	10,000	1.0	10
Remainder	1.0	50,000	50,000	0.5	25
Mechanical	7.0	60,000	420,000	0.8	336
Elevator	1.1	60,000	66,000	1.0	66
TOTAL kVA: 647					

Utility Company

The Denver Police Crime Lab is served by Xcel Energy, a local utility provider used by most of the state of Colorado.

Service Voltage & Rate Schedule

The Service Voltage provided by Xcel Energy is 480V, 3φ 4-wire. The rate schedule provided by Xcel Energy in the Colorado Electric Tariff Book is Schedule SG and the rates are in Table 1.2 seen below:

Table 1.2 | Electric Rates – Schedule SG

Monthly Rate	Rate
Service and Facility Charge	\$40.00
Demand Charge (All kilowatts of billing demand, per kW)	
Distribution Demand	\$4.84
Generation and Transmission Demand – Summer Season*	\$10.96
Generation and Transmission Demand – Winter Season**	\$8.00
Energy Charge (All kilowatt hours used, per kWh)	\$0.00473

* Summer Season: June 1 – September 30

**Winter Season: October 1 – May 31

Building Utilization Voltage & Voltage Systems

The primary Building Utilization Voltage for the building is 480/277V, and the voltage systems for lighting, receptacle, mechanical and special equipment are located below. The service enters the building through the basement, where the transformer vault is located.

Lighting: 120V

Receptacle: 120V

Mechanical: 480V 3 ϕ

Special Equipment:

Elevator | 120V

Office Furnishings | 120V

Audio Signal Processing, Amplification, and Reproduction Equipment | 120V

IT Equipment | 120V

Emergency Power Requirements

IBC 2009 classifies the crime lab as a Business (B) and Assembly (A-3). The size of the building would warrant a generator as a source of emergency power.

[1006.2 | Means of Egress Illumination Level](#)

The means of egress illumination level shall not be less than 1 footcandle at the walking service.

[2702.2.1 | Group A Occupancies](#)

Emergency power shall be provided for emergency voice/alarm communication systems in Group A occupancies in accordance with Section 901.5.2.2.4.

[2702.2.2 | Smoke Control Systems](#)

Standby power shall be provided for smoke control systems in accordance with Section 909.11.

[2702.2.3 | Exit Signs](#)

Emergency power shall be provided for exit signs in accordance with Section 1011.5.3.

[2702.2.10 | Hazardous Materials](#)

Emergency or standby power shall be provided in occupancies with hazardous materials in accordance with Section 414.5.4.

[2702.2.19 | Elevators](#)

Standby power for elevators shall be provided as set forth in Sections 3003.1, 3007.7, and 3008.15.

Special Occupancy Requirements

Due to this building having multiple lab spaces with hazardous materials contained within, some special occupancy requirements are necessary. NEC 2011 indicates the spaces as Class I, Division I in Article 500.

[501.5 | Zone Equipment](#)

Equipment listed and marked in accordance with 505.9(C)(2) for use in Zone 0 locations shall be permitted in Class I, Division I or Division 2 locations for the same gas with a suitable temperature class.

Part I | Electrical Systems Criteria & Scope of Work

501.10(A)(1) | Wiring Methods

In Class I, Division I locations, the wiring methods in (a) through (d) shall be permitted.

- (a) Threaded rigid metal conduit or threaded steel intermediate metal conduit.
- (b) Type MI cable terminated with fittings listed for the location.
- (c) & (d) are for industrial establishments.

501.15(A)(4) | Conduit Seals Boundary

In each conduit run leaving a Class I, Division I location. The sealing fitting shall be permitted on either side of the boundary of such location within 3.05 m (10 ft) of the boundary and shall be designed and installed so as to minimize the amount of gas or vapor within the Division I portion of the conduit from being communicated to the conduit beyond the seal. Except for listed explosionproof reducers at the conduit seal, there shall be no union, coupling, box, or fitting between the conduit seal and the point at which the conduit leaves the Division I location.

501.100(A) | Transformers and Capacitors

In Class I, Division I locations, transformers and capacitors shall comply with 501.100(A)(1) and (A)(2).

501.130(A) | Luminaires

Luminaires shall comply with 501.130(A) or (B).

Priority Assessment

A categorized (high/medium/low) list of priorities based off of the building type and use can be found below.

High

- Reliability
- Low Life Cycle Cost
- Flexibility

Medium

- Redundancy
- Flexibility

Low

- Low First Cost

Optional Back-Up Power

Short-term and long-term power may be desired for the Denver Police Crime Lab being that employees work in the building nearly 24/7, and contains confidential information on suspects.

Short Term Power | UPS

- Security
- Surveillance
- IT Equipment

Long Term Power | Generator

- Elevators
- Emergency Lighting
- Life Safety

Part I | Electrical Systems Criteria & Scope of Work

Communication Systems

Below is a list of communications systems that may be applicable to the Denver Police Crime Lab.

Telephone/Data

Fire Alarm

The Fire Alarm code in the IBC is more stringent for the Group B rating, so that will be followed.

907.2.2 | Group B

A manual fire alarm system shall be installed in Group B occupancies where one of the following conditions exists:

- (1) The combined Group B occupant load of all floors is 500 or more.
- (2) The Group B occupant load is more than 100 persons above or below the lowest level of exit discharge.

Access Control

Video Surveillance

Major Equipment

Below is a preliminary list of equipment that will require some floor space within the building.

Electrical

Transformers

Automatic Transfer Switches

Generators

UPS

Switchboards

Panelboards

Mechanical

Air-Handling Units

Fire Pump

Chilled Water Unit

VFD

Part II | Electrical Systems as Designed

Actual Connected Load

Please reference the Appendix for additional information on the panelboard schedules.

Table 2.1 | Existing Connected Building Loads (kVA)

Panel	Lighting	Receptacle	Mechanical	Other
LBA	-	8.3	36.7	12.8
HBA	6.2	-	76.8	-
L1A	0.1	10.2	36.2	2.6
L1B	0.7	14.2	-	19.7
L1B-IS	-	0.7	-	16.5
L1C	1.6	34.6	2.4	3.4
H1A	14.4	-	61.2	-
L2A	-	7.7	47.6	3.5
L2B	7.7	11.3	1.2	1.5
L2C	1.8	26.3	1.2	0.7
L2D	0.8	11.9	1.2	0.3
L2F	-	36.2	5.2	8.5
H2A	20.7	-	-	-
L3A	-	4.7	54.5	1.8
L3B	0.8	15.3	4.0	0.3
L3C	1.5	25.7	8.0	7.8
L3D	1.4	22.5	1.2	3.7
L3F	6.4	13.3	5.9	5.0
L3G	-	31.1	3.5	4.2
H3A	17.8	-	-	-
LPA	0.7	3.6	0.9	-
HPA	0.7	3.6	246.9	-
TOTAL	83.3	258.7	594.6	92.3

TOTAL CONNECTED kVA: 1028.9

Table 2.2 | Emergency Existing Connected Building Loads (kVA)

Panel	Lighting	Receptacle	Mechanical	Other
EGLBA	-	-	2.5	36.7
EGHBA	20.6	-	5.0	73.4
EGLBB	-	-	3.3	7.1
EGHBB	-	-	35.8	3.8
EGL1A	-	-	-	10.5
EGH1A	4.3	-	-	-
EGL1B	-	1.4	3.1	0.2
EGL2A	-	-	-	9.0
EGH2A	8.9	-	-	-
EGL2B	-	-	1.8	-
EGL2C	-	-	-	5.1
EGL2D	-	-	15.9	33.8
EGL3A	-	-	-	10.0
EGH3A	5.0	-	-	-
EGL3B	-	-	1.2	-
EGL3C	-	-	-	7.0
EGLPA	-	-	5.0	3.0
EGHPA	-	-	360.47	3.0
EGHPB	-	-	12.5	-
TOTAL	38.8	1.4	446.57	202.6
TOTAL EMERGENCY kVA: 689.37				

TOTAL SYSTEM CONNECTED LOAD: 1,718.27 kVA

Part II | Electrical Systems as Designed

Utility Company

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Service Voltage & Rate Schedule

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Energy Charge (All kilowatt hours used, per kWh)	\$0.00473

* Summer Season: June 1 – September 30

**Winter Season: October 1 – May 31

Building Utilization Voltage & Voltage Systems

The primary Building Utilization Voltage for the building is 480/277V, and the voltage systems for lighting, receptacle, mechanical and special equipment are located below. The service enters the building through the basement, where the transformer vault is located.

Lighting: 120V | 277V

Receptacle: 120V

Mechanical: 120V | 208V 3 ϕ | 480V 3 ϕ

Special Equipment:

 Elevator | 120V

 Office Furnishings | 120V

 Audio Signal Processing, Amplification, and Reproduction Equipment | 120V

 IT Equipment | 120V

Emergency Power

The connected loads for the emergency power system can be found in Table 2.2 (previous page). Emergency power in the Denver Police Crime Lab is supplied by a diesel-fueled generator located in the exterior Southwest corner of the building. The generator is 500kW, 480V, 3 ϕ , and 4-wire and has a 12 inch base fuel tank. It is also in a sound attenuated enclosure and is connected to the building automation system. The annunciator for the generator is located in the Building Maintenance Office in B102.

The generator is connected to the electrical system through automatic transfer switches. There are three ATS' that can be viewed on the Single Line Diagram provided in Appendix A. ATS-1 is a 200A, 480V, 3 ϕ , open transition bypass isolation for life safety switch. ATS-2 is an 800A, 480V, 3 ϕ , delayed transition bypass isolation for standby switch. ATS-3 is a 100A, 480V, 3 ϕ , open transition bypass isolation legally required switch.

Special Occupancy Requirements

Due to this building having multiple lab spaces with hazardous materials contained within, some special occupancy requirements are necessary. NEC 2011 indicates the spaces as Class I, Division I in Article 500.

Part II | Electrical Systems as Designed

501.5 | Zone Equipment

Equipment listed and marked in accordance with 505.9(C)(2) for use in Zone 0 locations shall be permitted in Class I, Division I or Division 2 locations for the same gas with a suitable temperature class.

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501.100(A) | Transformers and Capacitors

In Class I, Division I locations, transformers and capacitors shall comply with 501.100(A)(1) and (A)(2).

501.130(A) | Luminaires

Luminaires shall comply with 501.130(A) or (B).

Special Equipment

NEC 2011 indicates the special equipment found within rooms in the crime lab in Article 600.

605 | Office Furnishings

620 | Elevator

640 | Audio Signal Processing, Amplification, and Reproduction Equipment

645 | Information Technology Equipment

690 | Solar Photovoltaic Systems (Note: A PV Array is not installed, but the circuitry to install one is there.)

695 | Fire Pumps

Ratings

Wiring

Copper: All conductors #1/0 and smaller with 75°C terminations up to #1 AWG.

Aluminum: All conductors #2/0 and larger are aluminum with 75°C terminations.

The Single Line Diagram in Appendix A has every connection labeled with conductor and wire type.

Conduit

Conduit is typically EMT, unless noted in the drawing set. The size of the conduit is based on THWN/THHN wire.

Wiring Devices

Switches, sensors, and receptacles are standard grade and must comply with NFPA 70.

Part II | Electrical Systems as Designed

Panelboards

All 22 normal panelboards are bolt-in, and are either designed for high or low loads. Their ratings are indicated in Table 2.3 below. The emergency panels are located after the line break in the table. Further panelboard elaboration can be found in Appendix B.

Table 2.3 | Panelboard Ratings

Panel	Voltage	Phase	MCB/MLO	AIC (kA)
LBA	208/120V	3 ϕ	225A MCB	10
HBA	480/277V	3 ϕ	400A MLO	50
L1A	208/120V	3 ϕ	200A MLO	10
L1B	208/120V	3 ϕ	125A MLO	10
L1B-IS	208/120V	3 ϕ	100A MLO	10
L1C	208/120V	3 ϕ	125A MLO	10
H1A	480/277V	3 ϕ	400A MLO	42
L2A	208/120V	3 ϕ	200A MLO	10
L2B	208/120V	3 ϕ	100A MLO	10
L2C	208/120V	3 ϕ	100A MLO	10
L2D	208/120V	3 ϕ	100A MLO	10
L2F	208/120V	3 ϕ	200A MLO	10
H2A	480/277V	3 ϕ	400A MLO	42
L3A	208/120V	3 ϕ	200A MLO	10
L3B	208/120V	3 ϕ	100A MLO	10
L3C	208/120V	3 ϕ	125A MLO	10
L3D	208/120V	3 ϕ	125A MLO	10
L3F	208/120V	3 ϕ	125A MLO	10
L3G	208/120V	3 ϕ	125A MLO	10
H3A	480/277V	3 ϕ	400A MLO	42
LPA	208/120V	3 ϕ	100A MCB	10
HPA	480/277V	3 ϕ	400A MLO	42
EGLBA	208/120V	3 ϕ	150A MCB	10
EGHBA	480/277V	3 ϕ	200A MCB	42
EGLBB	208/120V	3 ϕ	100A MCB	10
EGHBB	480/277V	3 ϕ	100A MLO	42
EGL1A	208/120V	3 ϕ	150A MLO	10
EGH1A	480/277V	3 ϕ	200A MLO	42
EGL1B	208/120V	3 ϕ	100A MLO	10

Part II | Electrical Systems as Designed

Table 2.3 | Panelboard Ratings (continued)

EGL2A	208/120V	3 ϕ	150A MLO	10
EGH2A	480/277V	3 ϕ	200A MLO	42
EGL2B	208/120V	3 ϕ	100A MLO	10
EGL2C	208/120V	3 ϕ	100A MLO	10
EGL2D	208/120V	3 ϕ	150A MLO	10
EGL3A	208/120V	3 ϕ	150A MLO	10
EGH3A	480/277V	3 ϕ	200A MLO	22
EGL3B	208/120V	3 ϕ	100A MLO	10
EGL3C	208/120V	3 ϕ	100A MLO	10
EGLPA	208/120V	3 ϕ	100A MCB	10
EGHPA	480/277V	3 ϕ	600A MLO	42
EGHPB	480/277V	3 ϕ	100A MCB	22

Transformers

All the ratings for the transformers are listed in Table 2.4, with the first three (T1, T1, T3) being the main service transformers.

Table 2.4 | Transformer Schedule

Transformer	kVA	Primary	Secondary	Mounting
Main Service T1	750	Utility	480V, 3 ϕ	PAD-MOUNTED
Main Service T2	750	Utility	480V, 3 ϕ	PAD-MOUNTED
Main Service T3	750	Utility	480V, 3 ϕ	PAD-MOUNTED
TBA	75	480V, 3 ϕ	208/120V, 3 ϕ	SUSPENDED
T1A	112.5	480V, 3 ϕ	208/120V, 3 ϕ	SUSPENDED
T2A	150	480V, 3 ϕ	208/120V, 3 ϕ	FLOOR
T3A	225	480V, 3 ϕ	208/120V, 3 ϕ	FLOOR
TPA	30	480V, 3 ϕ	208/120V, 3 ϕ	SUSPENDED
TEGBA	45	480V, 3 ϕ	208/120V, 3 ϕ	SUSPENDED
TEGBB	30	480V, 3 ϕ	208/120V, 3 ϕ	SUSPENDED
TEG2A	112.5	480V, 3 ϕ	208V, 3 ϕ	SUSPENDED
TEGPA	30	480V, 3 ϕ	208/120V, 3 ϕ	SUSPENDED

Motor Starters

The motor starters for the building are individual.

UPS

There is a UPS sub-distribution panel is located on the penthouse level of the crime lab. This system serves most of the lab equipment, surveillance devices, and IT servers. It is 208V, 3 ϕ , 400A and fully bussed. Panel schedules for the UPS are located in Appendix C.

Part II | Electrical Systems as Designed

Communication Systems

Below is a list of communications systems that are applicable to the Denver Police Crime Lab.

Telephone/Data

Voice and data outlets utilizing CAT-6A cable can be found on all floors.

Fire Alarm

The Fire Alarm code in the IBC is more stringent for the Group B rating, so that will be followed.

907.2.2 | Group B

A manual fire alarm system shall be installed in Group B occupancies where one of the following conditions exists:

- (1) The combined Group B occupant load of all floors is 500 or more.
- (2) The Group B occupant load is more than 100 persons above or below the lowest level of exit discharge.

Building Automation System

There is an electronic demand meter that connects the ATS to the BAS. The BAS also meters the high-load panels and 1000A buss riser.

Access Control

There are monitored and card access doors throughout the building.

Video Surveillance

Floor Space

A list of electrical and telecommunications floor areas along with how much of the building percentage those areas are can be found below. The total building square footage is 60,000.

Electrical Room B100A	81 SF	0.1%
DCL SES B113	238 SF	0.4%
Transformer Vault B112	962 SF	1.6%
Electrical 132	101 SF	0.1%
Telecom 133	134 SF	0.2%
Secure Data Room 206	162 SF	0.2%
AV Room 215	76 SF	0.1%
Electrical 236	105 SF	0.1%
Telecom 237	106 SF	0.1%
Electrical 344	101 SF	0.1%
Telecom 345	106 SF	0.1%
TOTAL	2,172 SF	3.6%

Energy Reduction Techniques

The Denver Police Crime Lab is LEED Gold for New Construction and utilizes occupancy sensors. There are also designs for a future solar array when the funds become available.

Single Line Diagram

Please see Appendix A.

Estimated vs. Actual Connected Load

The estimated load was lower than the actual load that was calculated. The estimated load was 647 kVA while the actual load was 1028.9 kVA. This could be due to some receptacle and mechanical loads which are more accurately calculated in the panelboards, but not accounted for in the estimated calculation.

Utility Rate Schedule & Building Utilization Voltage

The current rate schedule is appropriate for the location and type of building. The utilization voltage for the Denver Police Crime Lab is 480/277V, which is stepped down to 208/120V to serve some panelboards. These voltages are a good choice for the building, which utilizes all of them for lighting, receptacle, mechanical or emergency loads. Currently, the building uses both copper and aluminum. It may be worth it to analyze which conductor would serve the crime lab better and switch to a wiring system that consists of just that metal.

Electrical Equipment

The distribution system is very straightforward, and laid out within the building well. Some of the panelboards are scattered across the floor plans, and could benefit from a more uniform layout.

Emergency Power System

There are no discrepancies between the code analysis and the generator and UPS system installed. Since the generator is located on the exterior of the building, a lot of architectural space issues are avoided and the vibrations and sound will not bother any employees.

Optional Back-Up Power

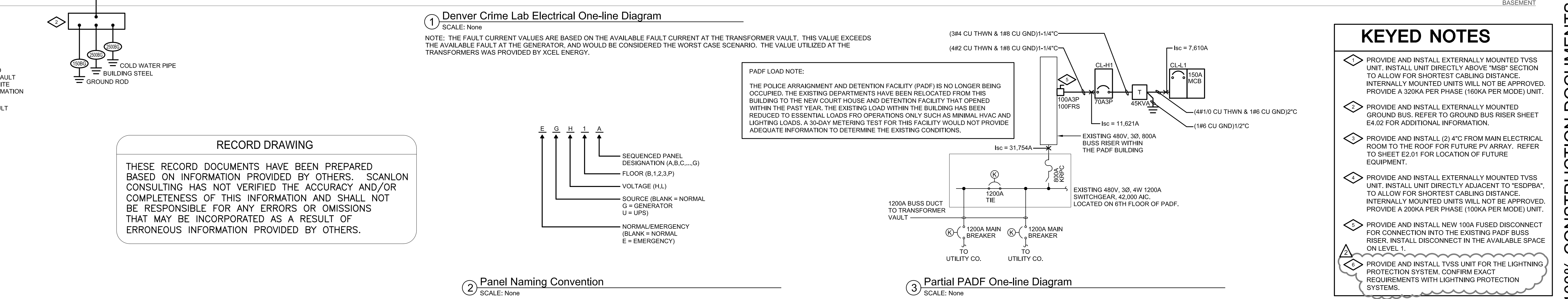
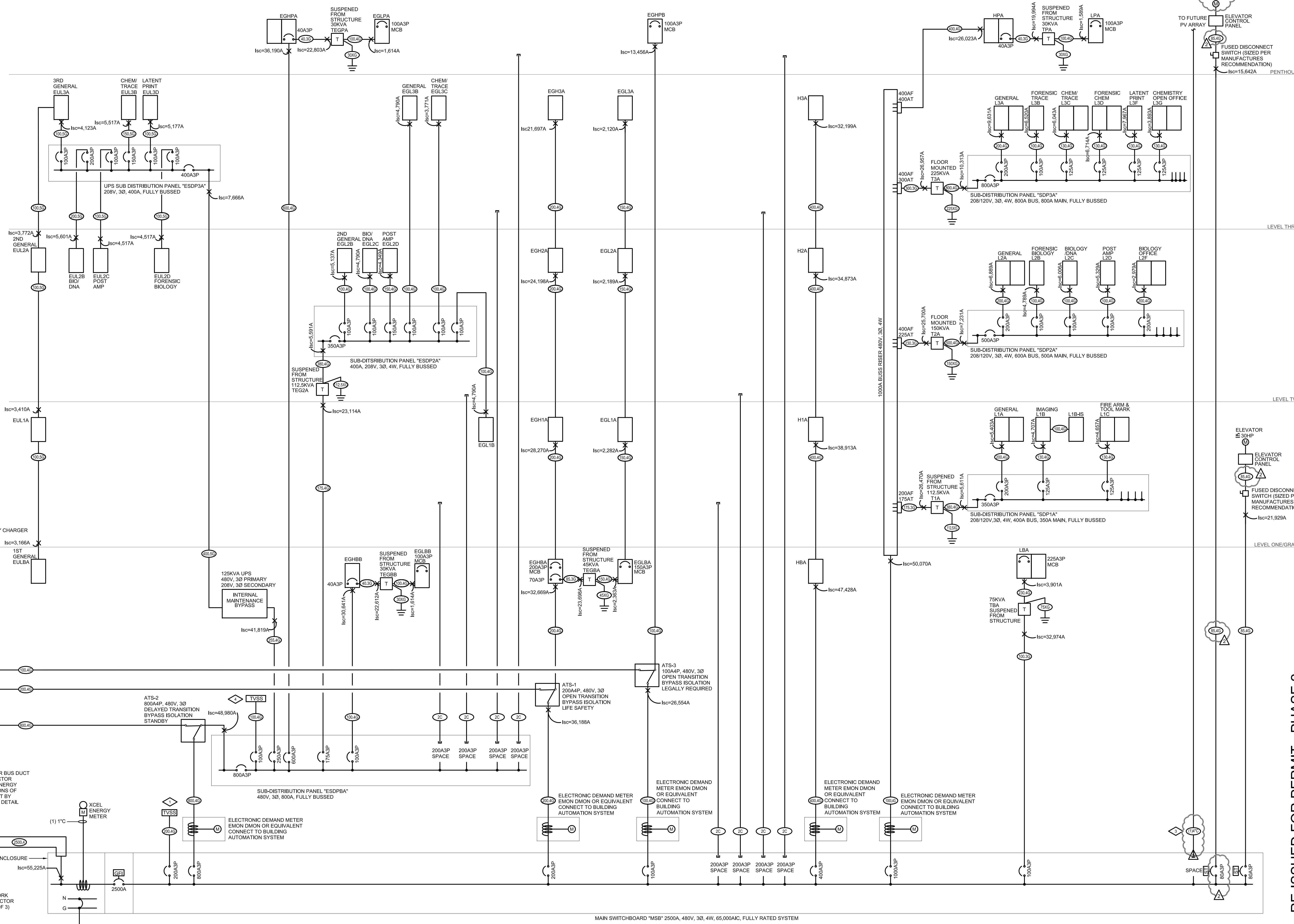
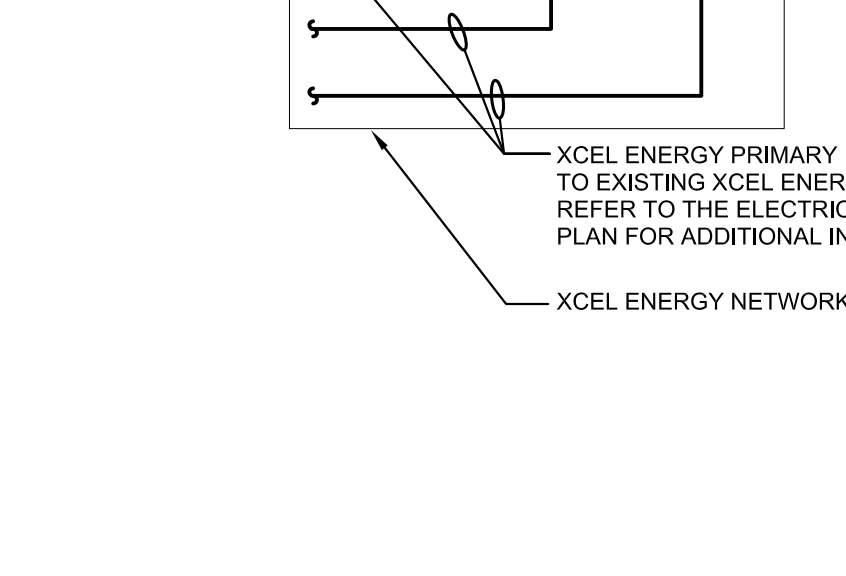
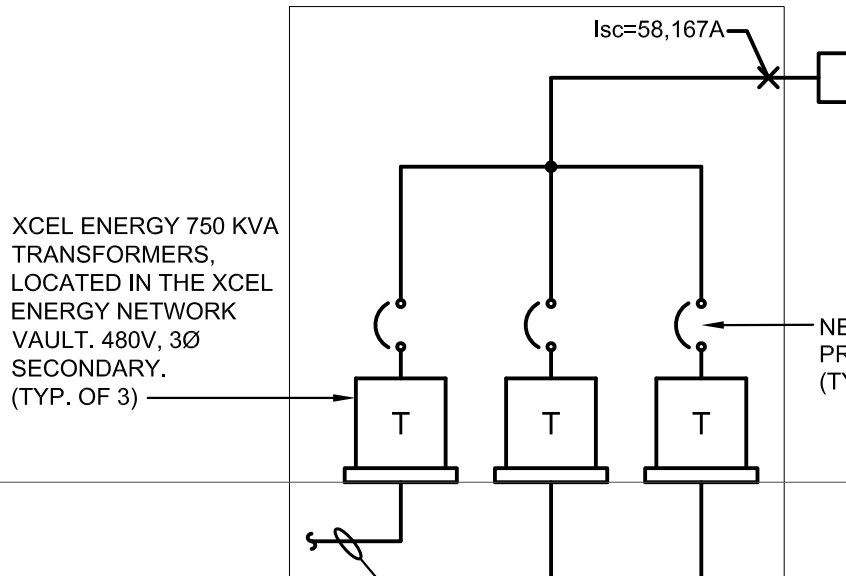
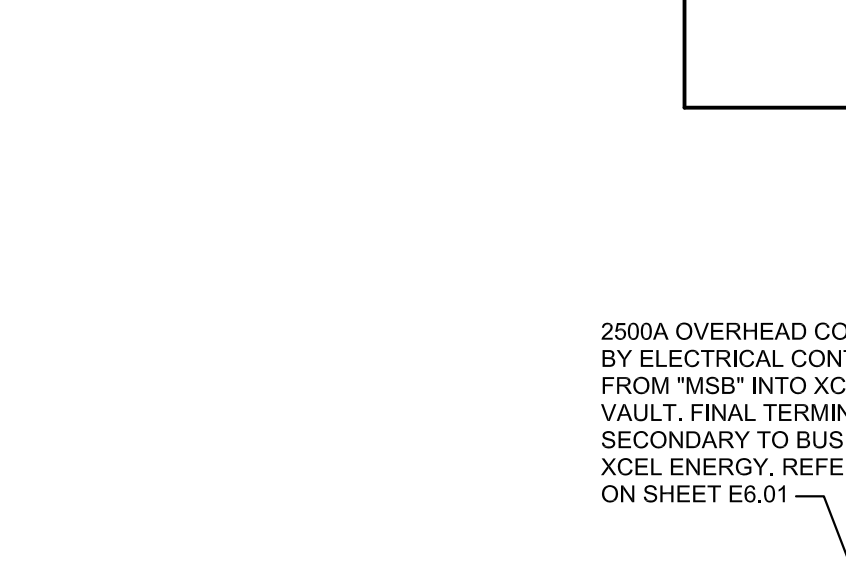
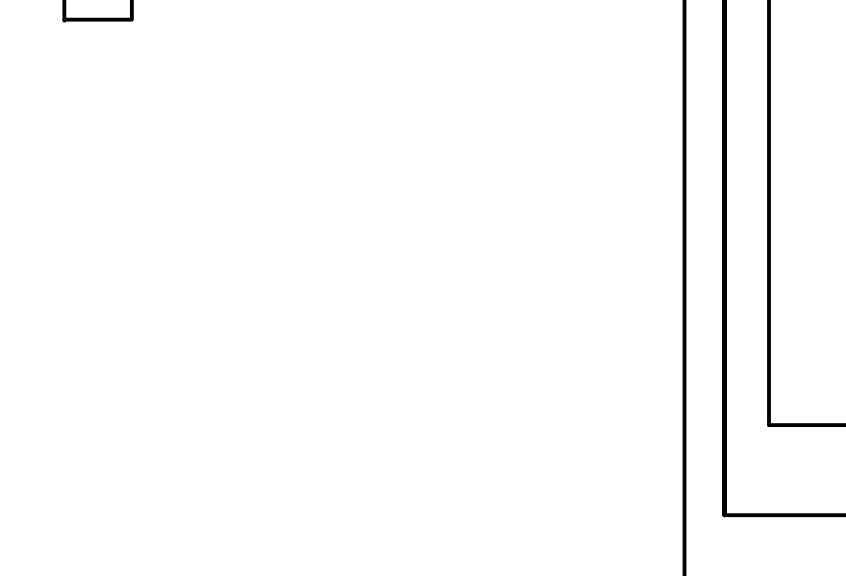
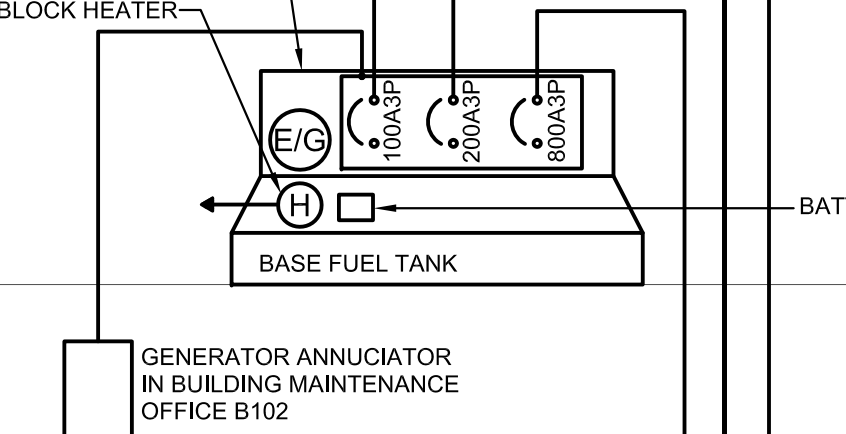
The UPS could be changed to a Double Conversion On-line UPS. This type UPS requires no switching, and the load never sees an outage. It could be a viable option in the crime lab since it is run 24/7, and has need for surveillance and data to remain intact.

Energy Reduction Strategies

Since a rough-in was installed for Solar Photovoltaic arrays, it may be interesting to see if placing panels on the roof will significantly reduce energy. The south plaza may also be another place to consider a PV array. It could double as a shading system for employees, while gathering energy to offset the electrical demand.

KEY	CONDUCTORS	WIRE TYPE	MINIMUM CONDUIT SIZE
40.3G	(3 #8 & 1 #10 GND)	CU	3/4"
85.3G	(3 #4 & 1 #8 GND)	CU	1-1/4"
85.4G	(4 #4 & 1 #8 GND)	CU	1-1/4"
100.3G	(3 #2 & 1 #8 GND)	CU	1-1/4"
175.3G	(3 #4/0 & 1 #4 GND)	AL	2"
230.3G	(3-300 KCMIL & 1 #2 GND)	AL	2-1/2"
300.3G	(3-500 KCMIL & 1 #2 GND)	AL	3"
100.4G	(4 #2 & 1 #8 GND)	CU	1-1/4"
100.5G	(5 #2 & 1 #8 GND)	CU	1-1/2"
130.4G	(4 #1 & 1 #6 GND)	CU	1-1/2"
150.4G	(4 #1/0 & 1 #6 GND)	CU	2"
150.5G	(5 #1/0 & 1 #6 GND)	CU	2"
200.4G	(4-250 KCMIL & 1 #4 GND)	AL	2-1/2"
200.5G	(5-250 KCMIL & 1 #4 GND)	AL	2-1/2"
230.4G	(4-300 KCMIL & 1 #2 GND)	AL	2-1/2"
255.4G	(4-350 KCMIL & 1 #2 GND)	AL	3"
380.4G	(24-250 KCMIL & 1 #1 GND)	AL	2-1/2"
400.4G	(24-250 KCMIL & 1 #1 GND)	AL	2-1/2"
400.5G	(25-250 KCMIL & 1 #1 GND)	AL	2-1/2"
500.4G	(24-350 KCMIL & 1 #1 GND)	AL	3"
600.4G	(24-500 KCMIL & 1 #2 GND)	AL	3"
800.4G	(34-400 KCMIL & 1 #3 GND)	AL	3"
1000.4G	(44-350 KCMIL & 1 #4 GND)	AL	3"
2500.4	(104-350 KCMIL)	AL	3"
30G	(1 #8 GND)	CU	1/2"
45G	(1 #6 GND)	CU	1/2"
75G	(1 #2 GND)	CU	1/2"
112.5G	(1 #1/0 GND)	CU	3/4"
150G	(1 #1/0 GND)	CU	3/4"
225G	(1 #2/0 GND)	CU	3/4"
150B	(1 #6 GND)	CU	1/2"
2500B	(1 #3/0 GND)	CU	3/4"
2C			2"
(2)4C			(2) 4"

- NOTES:
- ALL CONDUCTORS #1/0 AND SMALLER ARE COPPER WITH 75 DEG C TERMINATIONS UP TO #1 AWG, AND 75 DEG TERMINATIONS FOR LARGER CONDUCTORS. ALL CONDUCTORS #2/0 AND LARGER ARE ALUMINUM WITH 75 DEG C TERMINATIONS.
 - CONDUIT SIZES ARE BASED ON THWN / THHN WIRE SIZE.
 - CONDUIT MATERIAL IS BASED ON EMT, UNLESS NOTED OTHERWISE.



- ### KEYED NOTES
- ◇ PROVIDE AND INSTALL EXTERNALLY MOUNTED TVSS UNIT. INSTALL UNIT DIRECTLY ABOVE "MSB" SECTION TO ALLOW FOR SHORTEST CABLING DISTANCE. INTERNALLY MOUNTED UNITS WILL NOT BE APPROVED. PROVIDE A 320KA PER PHASE (160KA PER MODE) UNIT.
 - ◇ PROVIDE AND INSTALL EXTERNALLY MOUNTED GROUND BUS. REFER TO GROUND BUS RISER SHEET E4.02 FOR LOCATION OF FUTURE EQUIPMENT.
 - ◇ PROVIDE AND INSTALL (2) 4C FROM MAIN ELECTRICAL ROOM TO THE ROOF FOR FUTURE PV ARRAY. REFER TO SHEET E2.01 FOR LOCATION OF FUTURE EQUIPMENT.
 - ◇ PROVIDE AND INSTALL EXTERNALLY MOUNTED TVSS UNIT. INSTALL UNIT DIRECTLY ABOVE "ESDP3A" TO ALLOW FOR SHORTEST CABLING DISTANCE. INTERNALLY MOUNTED UNITS WILL NOT BE APPROVED. PROVIDE A 200KA PER PHASE (100KA PER MODE) UNIT.
 - ◇ PROVIDE AND INSTALL NEW 100A FUSED DISCONNECT FOR CONNECTION INTO THE EXISTING PADF BUS RISER. INSTALL DISCONNECT IN THE AVAILABLE SPACE ON LEVEL 1.
 - ◇ PROVIDE AND INSTALL TVSS UNIT FOR THE LIGHTNING PROTECTION SYSTEM. CONFIRM EXACT REQUIREMENTS WITH LIGHTNING PROTECTION SYSTEMS.

RECORD DRAWING

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100% CONSTRUCTION DOCUMENTS - RE-ISSUED FOR PERMIT - PHASE 2

DENVER POLICE CRIME LAB

14TH AVE AND CHEROKEE DENVER, CO

DURRANT®

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PROJECT NO: 06039.00
DATE: SEPTEMBER 04 2012
DRAWN BY: ADC
CHECKED BY: KATKBM/SCS

REVISIONS
2 02-11-11 Bulletin #3
09-04-12 RECORD DRAWING

SHEET
E4.01

PANEL "L3A"
VOLTS: 208/120V,3PH,4W MAINS: 200A M.L.O.
MTG: SURFACE NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

PANEL "L3C" (CHEM TRACE LAB)
VOLTS: 208/120V,3PH,4W MAINS: 125A M.L.O.
MTG: FLUSH NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

PANEL "L3G" (CHEMISTRY OFFICE)
VOLTS: 208/120V,3PH,4W MAINS: 125A M.L.O.
MTG: FLUSH NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

PANEL "H3A"
VOLTS: 480/277V,3PH,4W MAINS: 400A M.L.O.
MTG: SURFACE NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

PANEL "L3B" (FORENSIC TRACE LAB)
VOLTS: 208/120V,3PH,4W MAINS: 100A M.L.O.
MTG: SURFACE NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

PANEL "L3D" (FORENSIC CHEM LAB)
VOLTS: 208/120V,3PH,4W MAINS: 125A M.L.O.
MTG: FLUSH NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

PANEL "LPA"
VOLTS: 208/120V,3PH,4W MAINS: 100A MAIN BREAKER
MTG: SURFACE NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

PANEL "HPA"
VOLTS: 480/277V,3PH,4W MAINS: 400A M.L.O.
MTG: SURFACE NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

PANEL "L3F" (LATENT PRINT LAB)
VOLTS: 208/120V,3PH,4W MAINS: 125A M.L.O.
MTG: FLUSH NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

PANEL "L2A"
VOLTS: 208/120V,3PH,4W MAINS: 100A MAIN BREAKER
MTG: SURFACE NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

PANEL "H2A"
VOLTS: 480/277V,3PH,4W MAINS: 400A M.L.O.
MTG: SURFACE NEMA 1 MFR: SEE SPECS TYPE: BOLT-ON
DESCRIPTION T KVA BKR CKT# BKR KVA T DESCRIPTION

DENVER POLICE CRIME LAB
14TH AVE AND CHEROKEE DENVER, CO

DURRANT SCANLON
SCANLON SZYNSKIE GROUP, INC.
1501 Project Number 080109

100% CONSTRUCTION DOCUMENTS - RE-ISSUED FOR PERMIT - PHASE 2

REVISIONS
1 2010-10-20 ADDENDUM #1
2 02-11-11 BUDGET #5
3 07-30-11 ASI #22
09-04-12 RECORD DRAWING

PROJECT NO 06039.00
DATE SEPTEMBER 04 2012
DRAWN BY ADC
CHECKED BY KATIKBM/SCS

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Panel Schedule Table with columns L3A, L3C, L3G, H3A, L3B, L3D, LPA, HPA, L3F, H2A



PANEL "EGH3A" (LIFE SAFETY)
VOLTS: 480/277V, 3PH, 4W
MAGS: 200A M.L.O.
A.I.C.: 22KA
MTG: SURFACE NEMA 1
MFGR: SEE SPECS
TYPE: BOLT-ON
DESCRIPTION, T, KVA, BKR, CKT#, BKR, KVA, T, DESCRIPTION

PANEL "EGL3A" (LIFE SAFETY)
VOLTS: 208/120V, 3PH, 4W
MAGS: 150A M.L.O.
A.I.C.: 10KA
MTG: SURFACE NEMA 1
MFGR: SEE SPECS
TYPE: BOLT-ON
DESCRIPTION, T, KVA, BKR, CKT#, BKR, KVA, T, DESCRIPTION

PANEL "EGLPA" (OPTIONAL - GENERAL)
VOLTS: 208/120V, 3PH, 4W
MAGS: 100A MAIN BREAKER
A.I.C.: 10KA
MTG: SURFACE NEMA 1
MFGR: SEE SPECS
TYPE: BOLT-ON
DESCRIPTION, T, KVA, BKR, CKT#, BKR, KVA, T, DESCRIPTION

PANEL "EGHPA" (OPTIONAL - GENERAL)
VOLTS: 480/277V, 3PH, 4W
MAGS: 800A M.L.O.
A.I.C.: 42KA
MTG: SURFACE NEMA 1
MFGR: SEE SPECS
TYPE: BOLT-ON
DESCRIPTION, T, KVA, BKR, CKT#, BKR, KVA, T, DESCRIPTION

PANEL "EGL3B" (OPTIONAL - GENERAL)
VOLTS: 208/120V, 3PH, 4W
MAGS: 100A M.L.O.
A.I.C.: 10KA
MTG: SURFACE NEMA 1
MFGR: SEE SPECS
TYPE: BOLT-ON
DESCRIPTION, T, KVA, BKR, CKT#, BKR, KVA, T, DESCRIPTION

PANEL "EGL3C" (OPTIONAL - CHEM TRACE LAB)
VOLTS: 208/120V, 3PH, 4W
MAGS: 100A M.L.O.
A.I.C.: 10KA
MTG: FLUSH NEMA 1
MFGR: SEE SPECS
TYPE: BOLT-ON
DESCRIPTION, T, KVA, BKR, CKT#, BKR, KVA, T, DESCRIPTION

PANEL "EGHPB" (LEGALLY REQUIRED)
VOLTS: 480/277V, 3PH, 4W
MAGS: 100A MAIN BREAKER
A.I.C.: 14KA
MTG: SURFACE NEMA 1
MFGR: SEE SPECS
TYPE: BOLT-ON
DESCRIPTION, T, KVA, BKR, CKT#, BKR, KVA, T, DESCRIPTION

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Legend table with columns EGH3A, EGL3A, EGLPA, EGHPA, EGL3B, EGHPB, EGL3C

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SHEET E5.05

SCALE: NOT TO SCALE

