

Service Load Justification		
Unit Ops		
Service Size (kVA):	216	
Service Size (A):	600	
Voltage:	120 / 208	
Billed Peak (kW):	28.2	
06/2017-03/2021 on 05/2018		
Corrected Power (kVA)	28.2 kW / 0.9 =	31.3
NEC 220.87 Adjusted Peak (kVA)	31.3 kVA x 125% =	39.2
	kVA	Amps
Existing building demand	39.17	108.80
Load added to electrical service as a result of this project		
Replace Distribution Panels	0.00	-
	-	-
	-	-
	-	-
New Ampacity	108.80	
Existing electrical service size	600.00	
Spare ampacity on electrical service (A)	491.20	

Short Circuit Current Calculations:

1	Using Infinite Bus Method, SCC at the transformer is: $\frac{300\text{kVA}_{3\text{PH}}}{0.208\text{kV}\cdot L\cdot \sqrt{3}} = \text{FLA}_{\text{Secondary}} = 832.72\text{A}$
2	$\frac{\text{FLA}_{\text{Secondary}}}{3.6\%Z} = \text{SCA}_{\text{Secondary}} = 23,131\text{A}$
3	Distance from Transformer to LDP: 70.9 ft of 500kcmil CU (Metal Raceway) (22,185)
4	$\frac{1.732 * 70.9\text{ft} * 23,131\text{A}}{2 * 22,185 * 208\text{V}} = f = 0.3078$ $\frac{1}{1+f} = M = 0.7647$ $23,131\text{A} * M = 17,687\text{A}$
5	Distance from LDP to LA: 56.0 ft of 4/0 CU (Metal Raceway) (15,082)
6	$\frac{1.732 * 56.0\text{ft} * 17,687\text{A}}{15,082 * 208\text{V}} = f = 0.5469$ $\frac{1}{1+f} = M = 0.6465$ $17,687\text{A} * M = 11,434\text{A}$
7	Distance from LDP to LB: 68.6 ft of 4/0 CU (Metal Raceway) (15,082)
8	$\frac{1.732 * 68.6\text{ft} * 17,687\text{A}}{15,082 * 208\text{V}} = f = 0.6699$ $\frac{1}{1+f} = M = 0.5988$ $17,687\text{A} * M = 10,592\text{A}$
9	Distance from LDP to PB: 8.0 ft of 1/0 CU (Metal Raceway) (8,925)
10	$\frac{1.732 * 8.0\text{ft} * 17,687\text{A}}{8,925 * 208\text{V}} = f = 0.1320$ $\frac{1}{1+f} = M = 0.8834$ $17,687\text{A} * M = 15,624\text{A}$

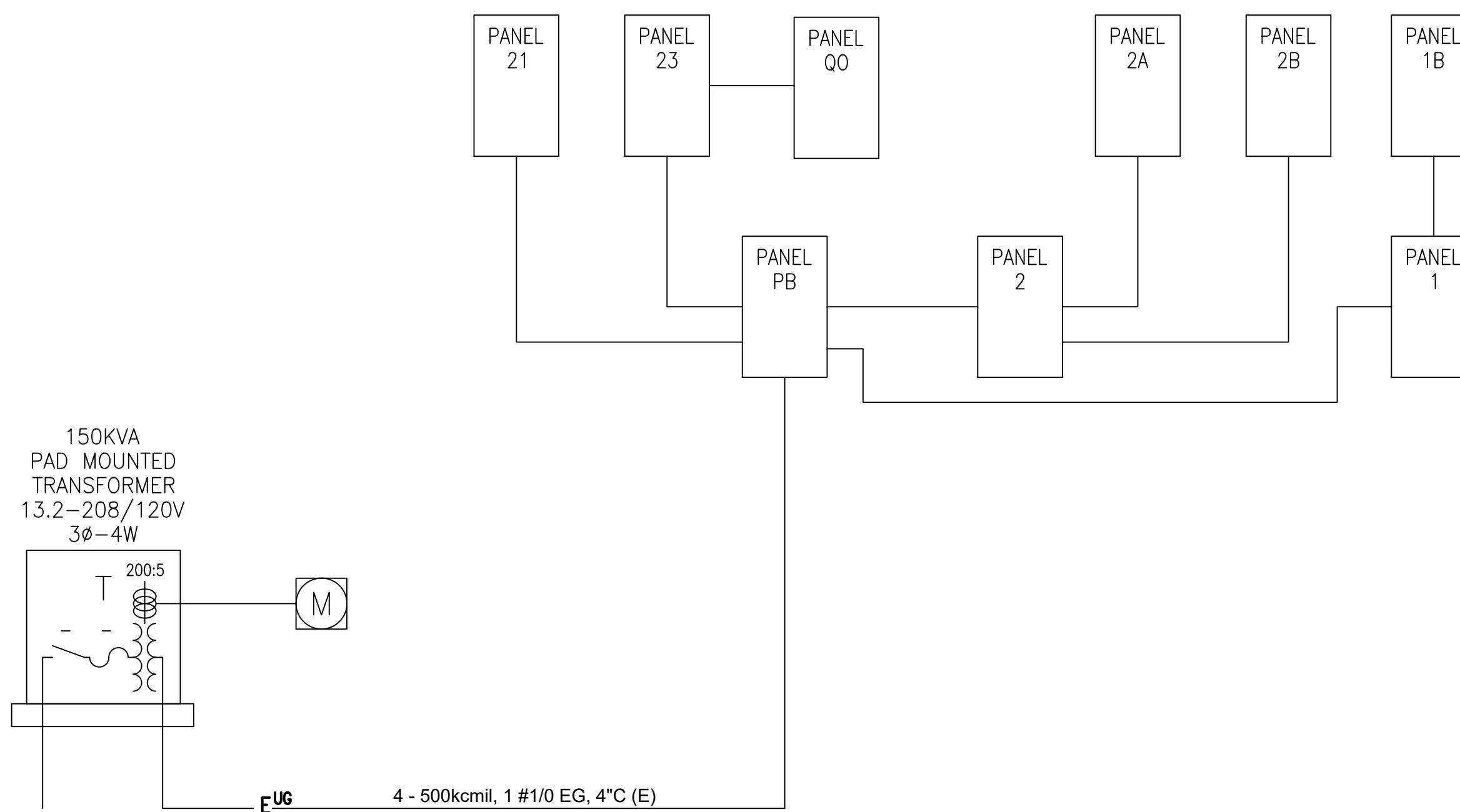
Unit Ops Scope of Work:

First Power Outage:

- Replace panel 1 with LB
- Replace panel 2 with LA
- Reroute Loads from 1B to LB
- Reroute Loads from 2A & 2B to LA
- Remove 1B, 2A and 2B
- Feed LA from one 225A Breaker on the New Distribution Panel
- Feed LB from the other 225A Breaker on the New Distribution Panel
- Feed PB from the 150A temp on the New Distribution Panel

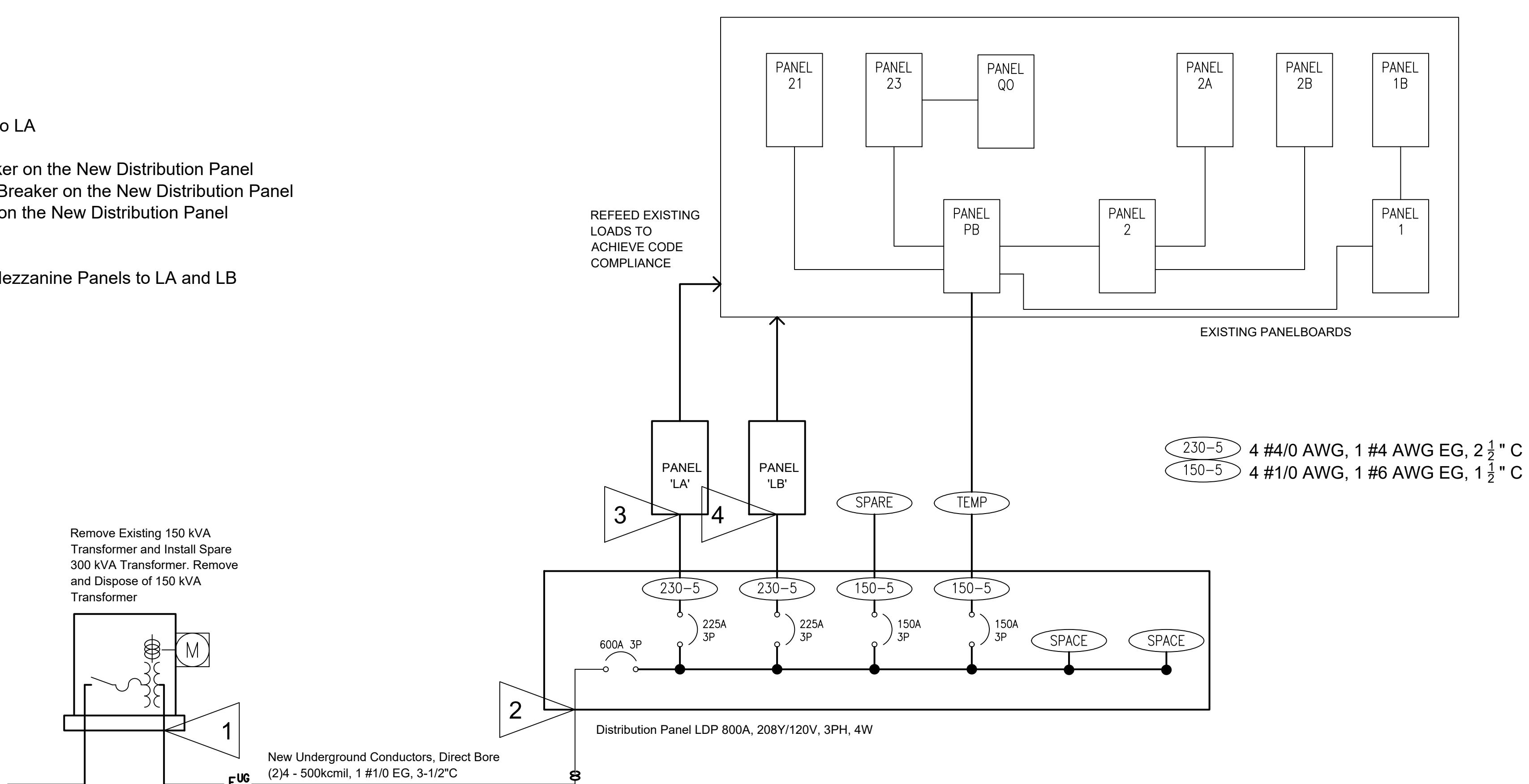
Second Power Outage:

- Reroute Loads from PB and Mezzanine Panels to LA and LB
- Remove PB, 21, 23 and QO



EXISTING ONE-LINE DIAGRAM

NOT TO SCALE

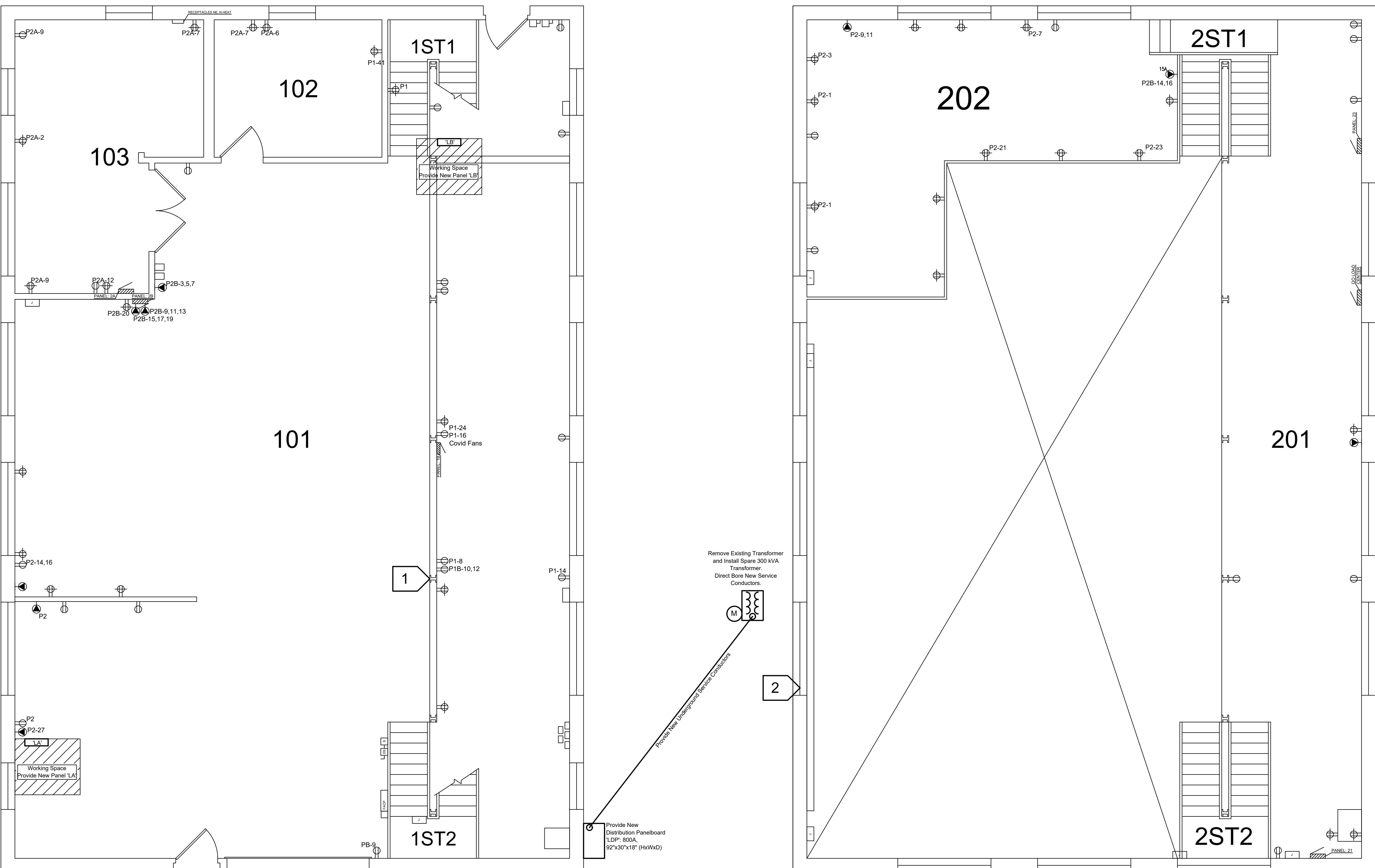


UNIT OPS PROPOSED ONE-LINE DIAGRAM

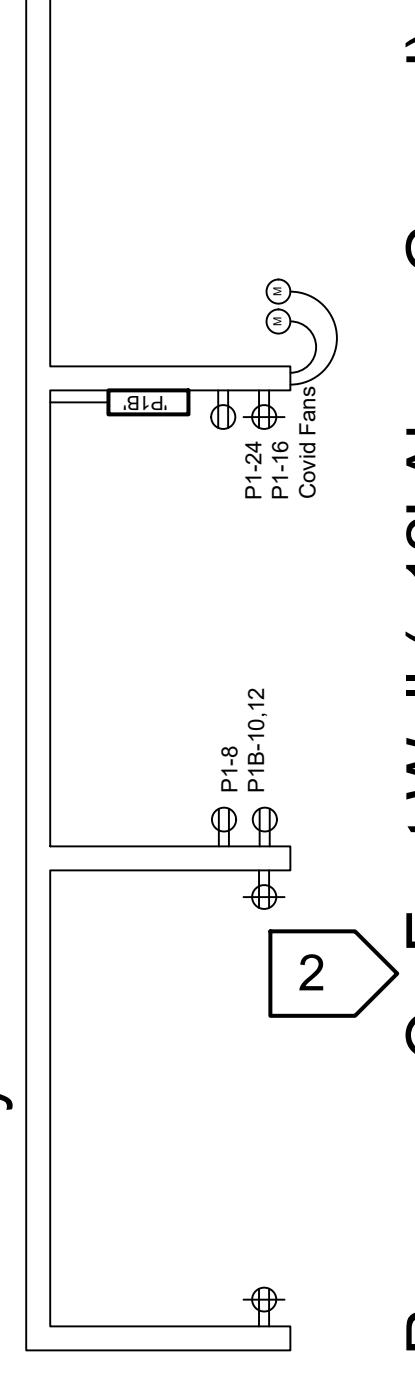
NOT TO SCALE

DUPLEX RECEPTACLE, +15" UNLESS NOTED OTHERWISE.
 DOUBLE-DUPLEX RECEPTACLE, +15" UNLESS NOTED OTHERWISE.
 HALF SWITCHED DUPLEX RECEPTACLE, +15" UNLESS NOTED OTHERWISE.
 CEILING MOUNTED DOUBLE-DUPLEX RECEPTACLE.
 SPECIAL RECEPTACLE, +15" UNLESS NOTED OTHERWISE.
 FLUSH FLOOR MOUNTED DUPLEX/TELE/DATA RECEPTACLE.
 WIREMOLD WITH POWER AND TELE. COMM. DEVICES AS SHOWN.
 PLUGMOLD WITH RECEPTACLES AS NOTED.
 JUNCTION BOX, WALL MOUNTED AT +15" UNLESS NOTED OTHERWISE.
 JUNCTION BOX ABOVE CEILING.
 VOICE/DATA JACK, +15" ABOVE FLOOR IN A 2 1/8"D x 4 11/16" SQ. BOX WITH A SINGLE GANG MUD RING AND 1" CONDUIT TO DATA BASKET WIREWAY.
 WIRELESS ACCESS POINT.
 FRACTIONAL HP THERMAL-OVERLOAD SWITCH.
 MOTOR, SUBSCRIPT INDICATES HORSEPOWER.
 FUSIBLE MODULE, SIZE AS NOTED.
 DISCONNECT SWITCH, SIZE AND POLES AS SHOWN.
 PUSH-BUTTON CONTROL WITH 1/2"C. TO ACCESSIBLE CEILING.
 BRANCH CIRCUIT PANELBOARD, +66" TO TOP OF PANEL.
 MAIN DISTRIBUTION CENTER.
 UTILITY METER.
 CT CABINET.

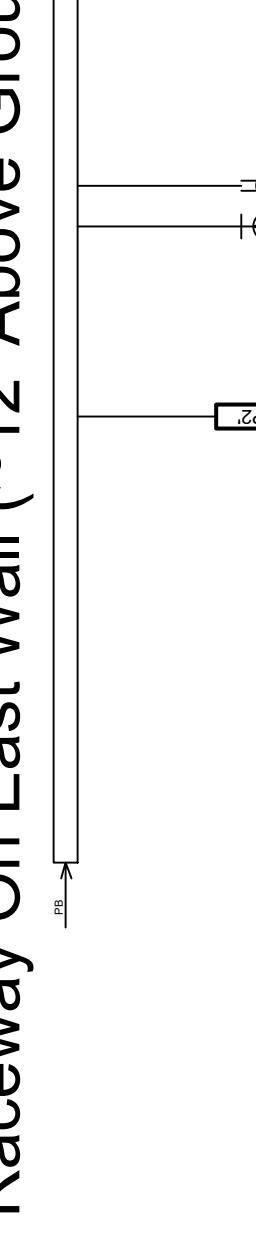
Power Distribution



1 Raceway Under Mezzanine:

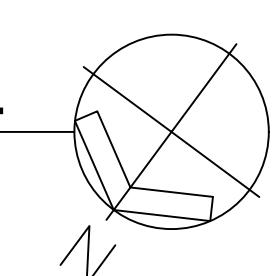


Raceway On East Wall (~12' Above Ground):



UNIT OPS PROPOSED ELECTRICAL

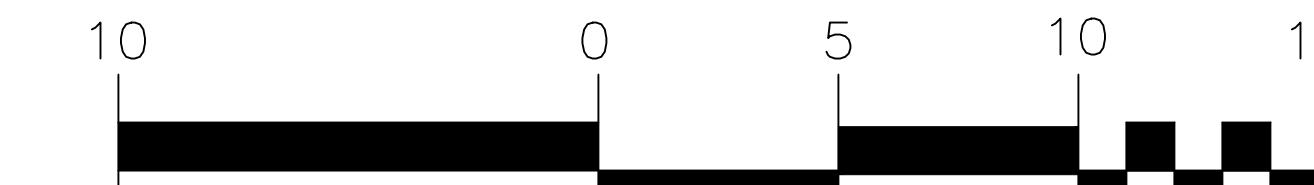
1st Floor Plan SCALE: 1/4" = 1' 0"



PLAN
NORTH

UNIT OPS PROPOSED ELECTRICAL

Mezzanine Floor Plan SCALE: 1/4" = 1' 0"



CLIENT NAME: Colorado School of Mines
PROJECT NAME: Unit Ops Electrical Upgrade
DRAWING TITLE: Unit Ops ELEC Floor Plan

DESIGNER: J. Evans
DRAFTER: J. Evans
CHECKER: D. Feron
PROJECT: IH21-017
CAD FILE: UO_ELEC

E 200

ISSUE B

COLORADO SCHOOL OF MINES
EARTH • ENERGY • ENVIRONMENT
OFFICE OF DESIGN AND CONSTRUCTION
1801 MOLY ROAD, GOLDEN, CO 80401

ISSUE	DESCRIPTION	DATE
B	Code Review/I/C Review Set	06/29/2021
A		09/09/2021

Current UO Panel Schedule:

COLORADO SCHOOL OF MINES
EARTH • ENERGY • ENVIRONMENT
OFFICE OF DESIGN AND CONSTRUCTION
1801 MOLY ROAD, GOLDEN, CO 80401

	B	Code Review / IFC
		Review Set

CLIENT NAME:	PROJECT NAME:	DRAWING TITLE:
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DESIGNER: J. Evans
DRAFTER: J. Evans
CHECKER: D. Feron
PROJECT: IH21-017

CAD FILE: UO_ELEC

10 of 10

DRAWING NO.

F 400

- 10 -

ISSUE B

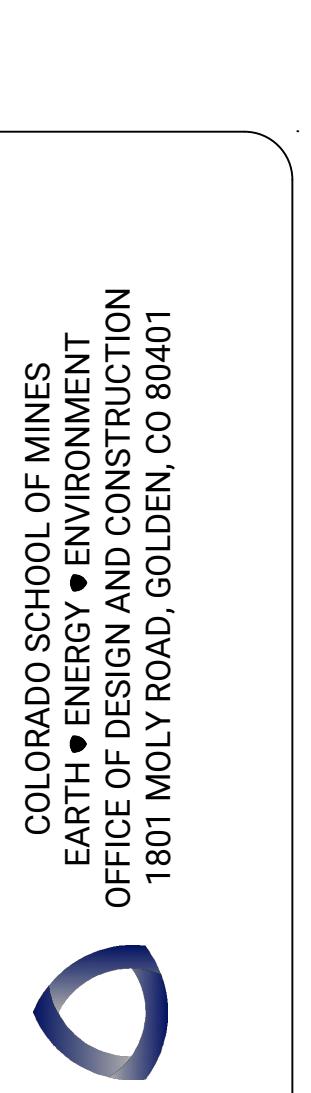
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Proposed UO Panel Schedule:

Name	LDP	Main Bus Rating (A)	800	Voltage	120/208	Phase	3		Surface	PDU	
Fed From:	Transformer	Main Breaker (A)	400	SCCR	22,000	Wire	4		Flush	200% Neutral	
60Hz											
Wire&Conduit	Info	For Panel Loads Only (VA)					VA	Physical			Info
Wire Size	Cond. (in)	Type	Name:	L	R	LM	M	ME	K	Total:	Info
4/0	2 1/2	P	LA	0	180	1704	1300	0	0	3184	225
-	-	P	-	0	0	1704	0	0	0	1704	-
-	-	P	-	0	0	1704	1300	0	0	3004	-
4/0	2 1/2	P	LB	0	1440	0	4548	0	0	5988	225
-	-	P	-	0	720	0	4548	0	0	5268	-
-	-	P	-	0	720	0	4548	0	0	5268	-
-	-		SPARE							150	3
-	-									-	13
-	-									-	15
-	-									-	17
Phase Totals											
								A	B	C	
								9172	6972	8272	

Name	LA	Main Bus Rating (A)	250	Voltage	120/208	Phase	3	Surface	PDU
Fed From:	LDP	Main Lugs Only		SCCR	18,000	Wire	4	Flush	200% Neutral
Wire&Conduit	Info	For Panel Loads Only (VA)					VA	Physical	
Wire Size	Cond. (in)	Type	Name:	L	R	LM	M	ME	K
12	3/4		RECEPTS EAST MEZZ						
12	3/4		"						
12	3/4		"						
12	3/4		"						
12	3/4		208V EAST MEZZ						
-	-								
12	3/4		208V EAST MEZZ						
-	-								
12	3/4		STILL CONTROL POWER 115V						
12	3/4		WETTED WALL UNIT						
12	3/4		NEW RECEPTS MEZZ						
12	3/4		"						
12	3/4		WETTED WALL AND ROUNDOUT						
10	3/4		DISTALLATION COLUMN POWER						
12	3/4		DISTALLATION COLUMN RECEPT						
12	3/4		PUMP						
-	-								
12	3/4		RECEPTACLE N						
10	3/4		LITS (LIGHTS?)						
12	3/4		RECEPTACLE S						
12	3/4		RECEPTACLE S						
12	3/4	R	Receptacle, Exterior Wall	180	20	1	43	180	
12	3/4		Spare Split Breaker						
12	3/4		WK 4600 LOUDA						
-	-								
-	-								
12	3/4		Small Crane						
-	-								
-	-								
12	3/4		Wall Receptacle, Crane						
-	-								
-	-								
-	-		SPACE						
Phase Totals					A	B	C		
					3184	1704	3004		

Name	LB	Main Bus Rating (A)	250	Voltage	120/208	Phase	3	<input type="checkbox"/> Surface	<input type="checkbox"/> PDU
Fed From:	LDP	Main Lugs Only		SCCR	18,000	Wire	4	<input type="checkbox"/> Flush	<input type="checkbox"/> 200% Neutral
Wire&Conduit	Info	For Panel Loads Only (VA)	VA	Physical	Phase	Physical	VA	Info	Loads Only (VA)
Wire Size	Cond. (in)	Type Name: L R LM M ME K Total:	Breaker Phase Circuit	A B C	Circuit Phase Breaker	Total:	Name: L R LM M ME K Type Cond. (in) Wire Size		
12	3/4	Outside Lights	20 1 1 0		2 1 20		OVERHEAD BLOWER NORTH (SPLIT BREAKER)		3/4 12
12	3/4	M Pump 2HP	1068 20 3 3 1068	1068	4 1 20		RECEPT ON PUMP CONTROL BOARD (SPLIT BREAKER)		3/4 12
-	-	M -	1068 - - 5	1068	6 1 20		FLOURSCENT LIGHTS UNDER BALCONY		3/4 12
-	-	M -	1068 - - 7	1068	8 1 20		Ovens		3/4 12
8	3/4	M VFD Cooling Tower	3480 40 3 9 3480	3480	10 1 20		CHEMICAL PUMPS FOR COOLING TOWER		3/4 12
-	-	M -	3480 - - 11	3480	12 1 20		High Bay Lights		3/4 12
-	-	M -	3480 - - 13	3480	14 1 20		Ovens		3/4 12
12	3/4	SOUTH OUTLET?	20 1 15 0		16 1 20		OVERHEAD BLOWER SOUTH		3/4 12
12	3/4	OFFICES	20 1 17 0		18 1 20		Ovens		3/4 12
12	3/4	DIGITAL METERS HEATING IN TANK EXP	20 3 19 0		20 1 20		OFFICE		3/4 12
-	-	-	- - 21 0		22 1 20		DIGITAL METERS AND OUTLETS		3/4 12
-	-	-	- - 23 0		24 2 20		PUMP 1 AND 2		3/4 12
12	3/4	?	20 1 25 0		26 - -		-		- -
12	3/4	-	20 1 27 0		28 1 20		TEMP IN DT BALANCE		3/4 12
12	3/4	-	20 1 29 0		30 1 20		COMP PLAN METERS		3/4 12
12	3/4	DATA CABINET	20 1 31 720		32 3 20 720		Shell & Tube Receptacle	R 3/4 12	
12	3/4	Receptacle Motor	20 1 33 720		34 - - 720		-	R - -	
12	3/4	Receptacle	20 1 35 720		36 - - 720		-	R - -	
12	3/4	Flow Meter	20 1 37 720		38 1 20 720		Shell & Tube Receptacle	R 3/4 12	
12	3/4	QO-1	20 1 39 0		40 3 20		3PH OUTSIDE PUMP		3/4 12
12	3/4	QO-2	20 1 41 0		42 - -		-		- -
12	3/4	QO-3	20 1 43 0		44 - -		-		- -
12	3/4	FUME HOOD	20 45 0		46 1 20		DIGITAL WATER/GLYCOL		3/4 12
12	3/4	FUME HOOD EXH FAN	20 47 0		48 1 20		WATER PUMP		3/4 12
12	3/4	FUME HOOD EXH FAN	20 49 0		50 2 20		LOAD		3/4 12
-	-	SPACE	51 0		52 - -		-		- -
-	-	SPACE	53 0		54 1 20		LOAD		3/4 12
-	-	SPACE	55 0		56 1 20		LOAD		3/4 12
-	-	SPACE	57 0		58 1 20		GLYCOL PUMP		3/4 12
-	-	SPACE	59 0		60 2 20		GLYCOL PUMP		3/4 12
-	-	SPACE	61 0		62 - -		-		- -
-	-	SPACE	63 0		64 - -		SPACE		- -
-	-	SPACE	65 0		66 - -		SPACE		- -
Phase Totals				A B C					
				5988 5268 5268					



CLIENT NAME: Colorado School of Mines

PROJECT NAME: Unit Ops Electrical Upgrade

DRAWING TITLE: Unit Ops Proposed Panels

DESIGNER: J. Evans
DRAFTER: J. Evans
CHECKER: D. Feron
PROJECT: IH21-017

DRAWING NO.

C 401