

MODIFICATION OF MAIN SWITCHGEAR M1
FOR EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO. 1

SPECIFICATION NO. SD-189A
VOLUME III, PART 2



OAKLAND, CALIFORNIA

GENERAL NOTES:

- 1. ALL ELECTRICAL LABOR AND MATERIALS SHALL BE IN ACCORDANCE WITH THE 1990 EDITION OF THE NATIONAL ELECTRICAL CODE (NEC) AND CURRENT LOCAL CODES.
- 2. NEW EQUIPMENT AND WIRING ARE SHOWN WITH HEAVY LINES ON THE PLAN AND SINGLE LINE DIAGRAM. RELEVANT EXISTING EQUIPMENT AND WIRING ARE SHOWN WITH LIGHT LINES.
- 3. ALL EQUIPMENT ENCLOSURES, RACEWAY AND NEUTRALS SHALL BE EFFECTIVELY GROUNDED.

INDEX OF DRAWINGS

SHEET NO.	DRAWING NO.	TITLE
GENERAL		
1	G - 1	TITLE SHEET, INDEX OF DRAWINGS, ELECTRICAL SYMBOLS AND LEGEND.
ELECTRICAL		
2	E - 1	SWITCHGEAR M1 BUS DIFFERENTIAL PROTECTION
3	E - 2	SWITCHGEAR M1 AUTOMATIC SYNCHRONIZATION
4	E - 3	SWITCHGEAR M1 UNINTERRUPTIBLE POWER SUPPLY
5	E - 4	SWITCHGEAR M1 DIFFERENTIAL PROTECTION SYSTEM CIRCUIT SCHEDULE
6	E - 5	SWITCHGEAR M1 AUTO. SYNCH. & UPS SYSTEMS CIRCUIT SCHEDULE

ELECTRICAL SYMBOLS & LEGEND

CONTROL DEVICES FUNCTION NUMBERS
(REFER TO ANSI/IEEE STD242-1986)

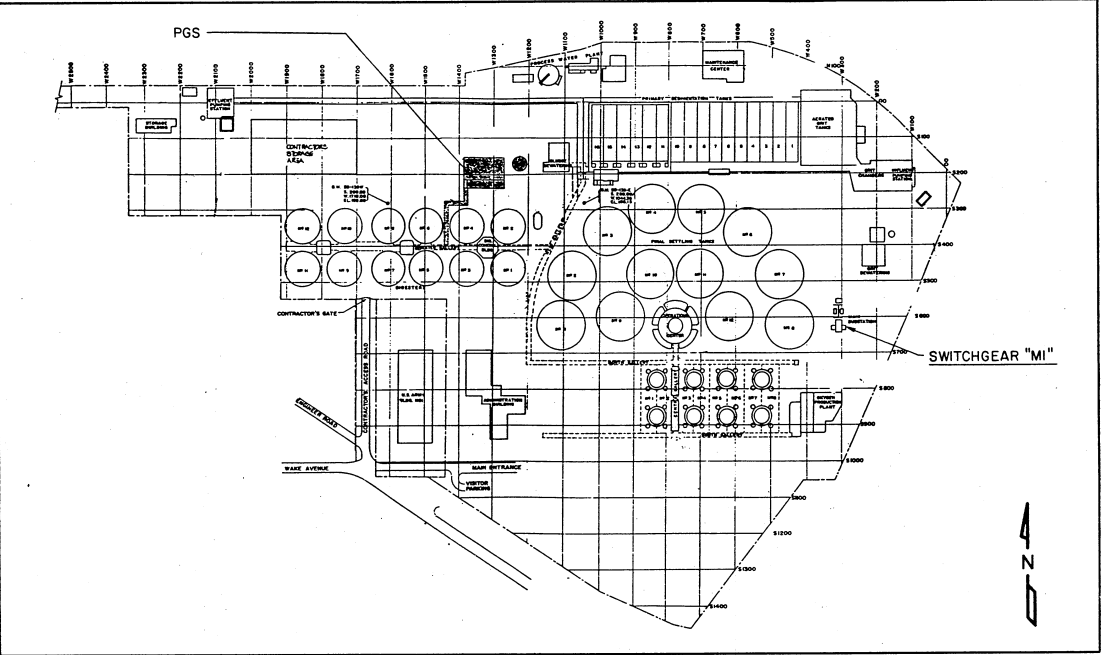
DEVICE NO.	FUNCTION AND DEFINITION
15	FREQUENCY MATCHING DEVICE
25	SYNCHRONIZING, OR SYNCHRONISM-CHECK DEVICE
43	MANUAL TRANSFER OR SELECTOR DEVICE
50	INSTANTANEOUS OVERCURRENT RELAY
51	A-C TIME OVERCURRENT RELAY
51GS	A-C TIME OVERCURRENT GROUND SENSOR RELAY
50/51	OVERCURRENT RELAY INSTANTANEOUS/TIMED
52	A-C CIRCUIT BREAKER
65	GOVERNOR
70	ELECTRICALLY (MOTOR) OPERATED RHEOSTAT (POTENTIOMETER)
86	LOCKOUT RELAY
87	DIFFERENTIAL PROTECTION RELAY

ABBREVIATIONS

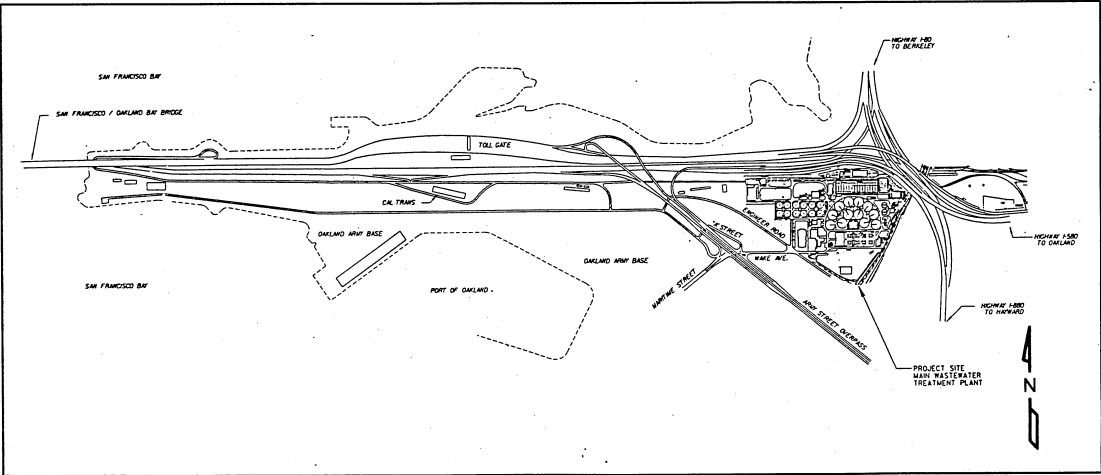
A	AMPERE, AMMETER
AC	ALTERNATING CURRENT
AR	AUXILIARY RELAY
AS	AMMETER SELECTOR SWITCH
B	BUS
BVM	BUS VOLT METER
C	(BREAKER) CLOSE
CB	CIRCUIT BREAKER
CR	CONTROL RELAY
CT	CURRENT TRANSFORMER
DC	DIRECT CURRENT
(E)	EXISTING
F	FUSE, FREQUENCY
FAR	FREQUENCY CONTROL AUXILIARY RELAY
FMOP	FREQUENCY MOTOR OPERATED POTENTIOMETER
GEN	GENERATOR
I/O	INPUT/OUTPUT (PLC CONNECTION)
KVA	KILOVOLT-AMPERE
L	LINE, LOWER
MOP	MOTOR OPERATED POTENTIOMETER
(N)	NEW
N	NEUTRAL
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRICAL CODE
NO	NORMALLY OPEN

ABBREVIATIONS

PGS	POWER GENERATION STATION
PLC	PROGRAMMABLE LOGIC CONTROLLER
PT	POTENTIAL TRANSFORMER
R	RAISE
SS	SELECTOR SWITCH
SUBSTN	SUBSTATION
SWGR	SWITCHGEAR
SYSC	SYNCHROSCOPE
SYSW	SYNCHRONIZING SWITCH
TSP	TWISTED SHIELDED PAIR
TC	TRIP COIL
T	(BREAKER) TRIP
UPS	UNINTERRUPTIBLE POWER SYSTEM
UVM	UTILITY VOLT METER
V	VOLTS, VOLTAGE
VAR	VOLTAGE CONTROL AUXILIARY RELAY
VS	VOLTMETER SELECTOR SWITCH
VMOP	VOLTAGE MOTOR OPERATED POTENTIOMETER



SITE PLAN



LOCATION PLAN

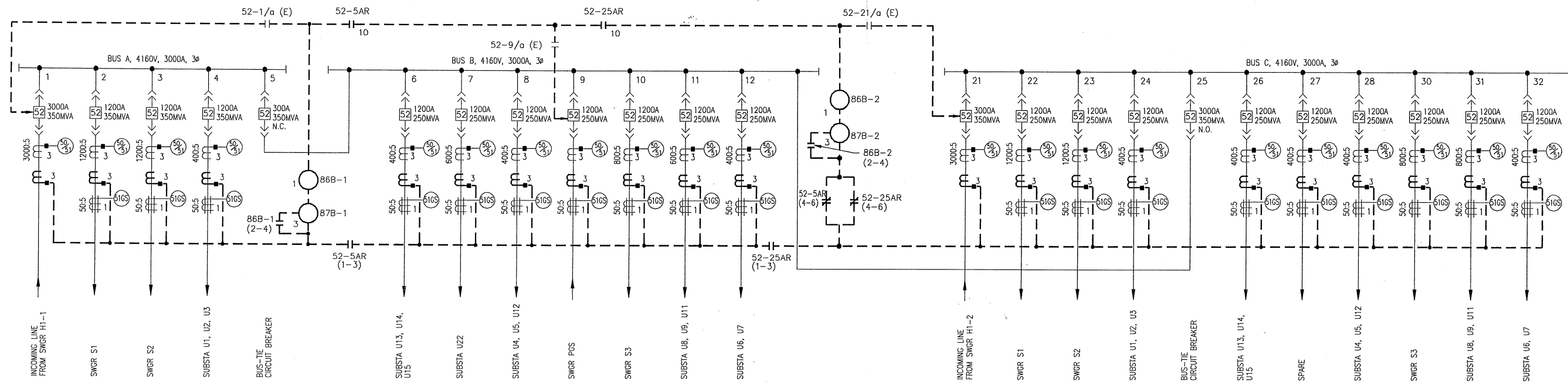
PARSONS BRINCKERHOFF
ENGINEERS-PLANNERS-ARCHITECTS-CONSTRUCTION MANAGERS
1068 MISSION STREET
SAN FRANCISCO, CALIFORNIA 94103

MODIFICATION OF MAIN
SWITCHGEAR M1
SPECIFICATION NO. SD-189A
VOLUME III, PART 2

DESIGNED BY	S. KONG
DESIGN CHECK BY	A. BORCIA
DRAWN BY	S. KONG
SR. PROJ. ENGR.	J.R. LINDAHL
APPROVED	3-16-97
PROJECT IN CHARGE	R.P.E. NO. M021371

PROJECT ENGR.	R.P.E. NO. C21966
PROJECT MGR.	R.P.E. NO. C30976
MGR. OF SUPPORT SERVICES	R.P.E. NO. C30976
MGR. OF WASTEWATER	R.P.E. NO. C21855

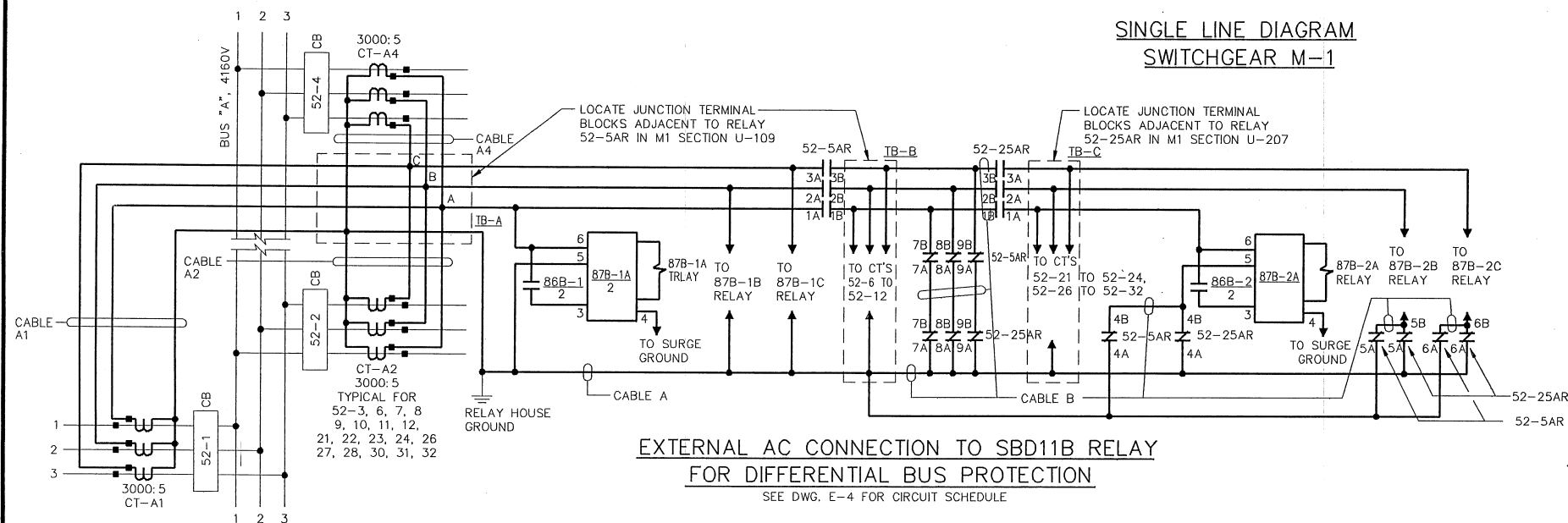
EAST BAY MUNICIPAL UTILITY DISTRICT SPECIAL DISTRICT NO. 1 OAKLAND, CALIFORNIA	
ELECTRICAL	
TITLE SHEET INDEX OF DRAWINGS ELECTRICAL SYMBOLS AND LEGEND	
DRAWN BY: SK	DRAWING NO. G-1
SCALE: NONE	SHEET 1 OF 6
DATE: 1-18-91	



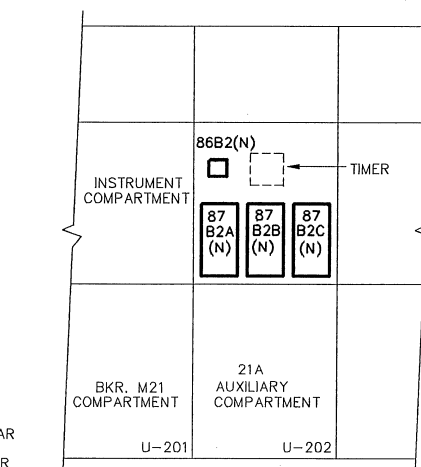
SINGLE LINE DIAGRAM
SWITCHGEAR M-1

NOTES:

- SEE DWG. G-1 FOR ELECTRICAL SYMBOLS AND LEGEND.

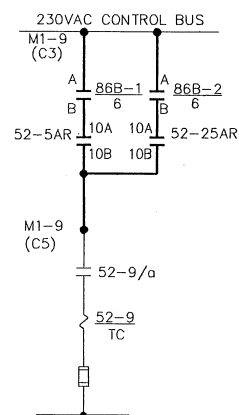


EXTERNAL AC CONNECTION TO SBD11B RELAY
FOR DIFFERENTIAL BUS PROTECTION
SEE DWG. E-4 FOR CIRCUIT SCHEDULE

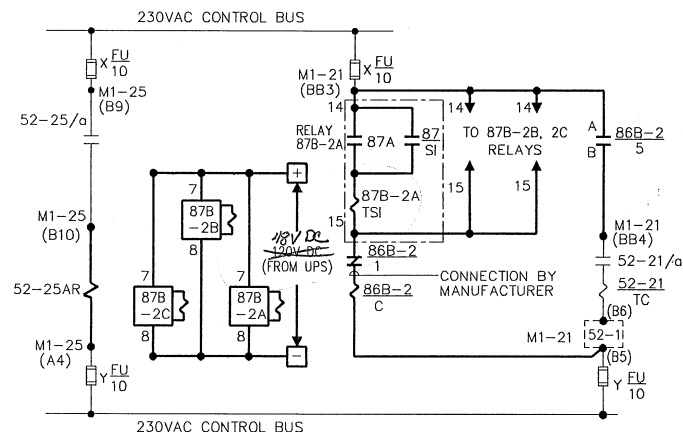


SWGR M-1 COMP. U-202 LAYOUT
(AUX. COMP. FOR BKR, M1-21 SHOWN, TYPICAL FOR BKR, M1-1 AUX. COMP. U-113)
(SEE DWG. E-3 FOR COMPLETE M-1 ARRANGEMENT)

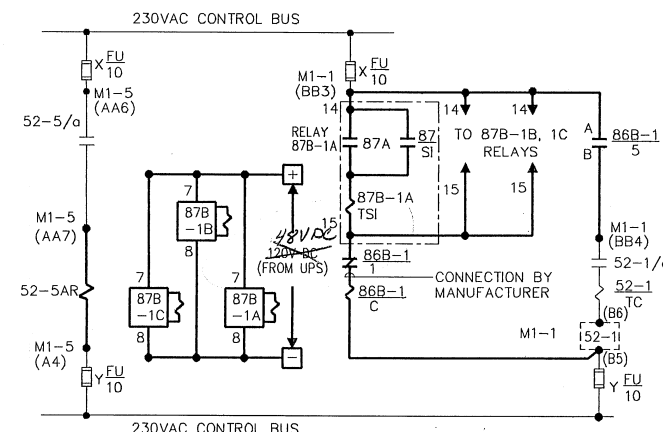
LEGEND			
DEVICE NO.	DEVICE TYPE	ELEMENT	DESCRIPTION
87B-1A 87B-2A	SBD11		SINGLE PHASE HIGH IMPEDANCE DIFFERENTIAL RELAY
		87A	OUTPUT TELEPHONE RELAY
		TSI	TARGET AND SEAL-IN UNIT
86B-1 86B-2	HEA61		LOCKOUT RELAY
52-5AR 52-25AR	CR120B		AUXILIARY RELAY (WITH OVERLAPPING CONTACTS)



SWGR M-1 BUS DIFFERENTIAL PROTECTION
CONTROL SCHEMATIC FOR M1-9
SEE DWG. E-4 FOR CIRCUIT SCHEDULE



SWGR M-1 BUS DIFFERENTIAL PROTECTION
CONTROL SCHEMATIC FOR M1-21
SEE DWG. E-4 FOR CIRCUIT SCHEDULE



SWGR M-1 BUS DIFFERENTIAL PROTECTION
CONTROL SCHEMATIC FOR M1-1
SEE DWG. E-4 FOR CIRCUIT SCHEDULE



EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO. 1
OAKLAND, CALIFORNIA

ELECTRICAL

SWITCHGEAR M1
BUS DIFFERENTIAL PROTECTION

DRAWN BY SHARAD/DAXESH
SCALE NONE
DATE 10-08-91
DRAWING NO. E-1
SHEET 2 OF 6

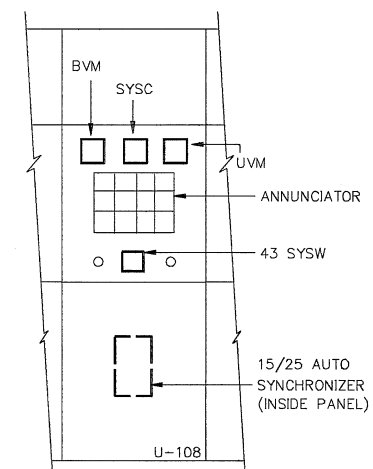
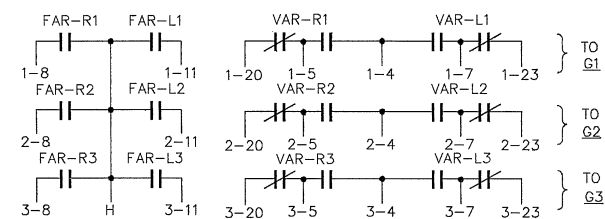
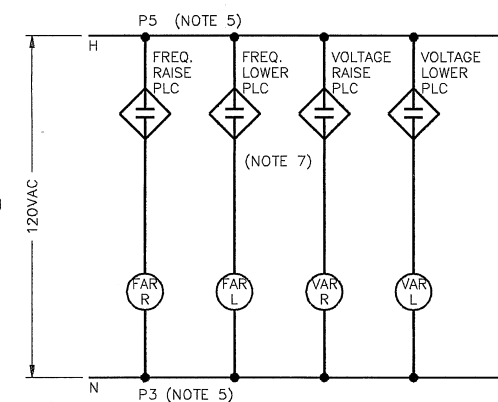
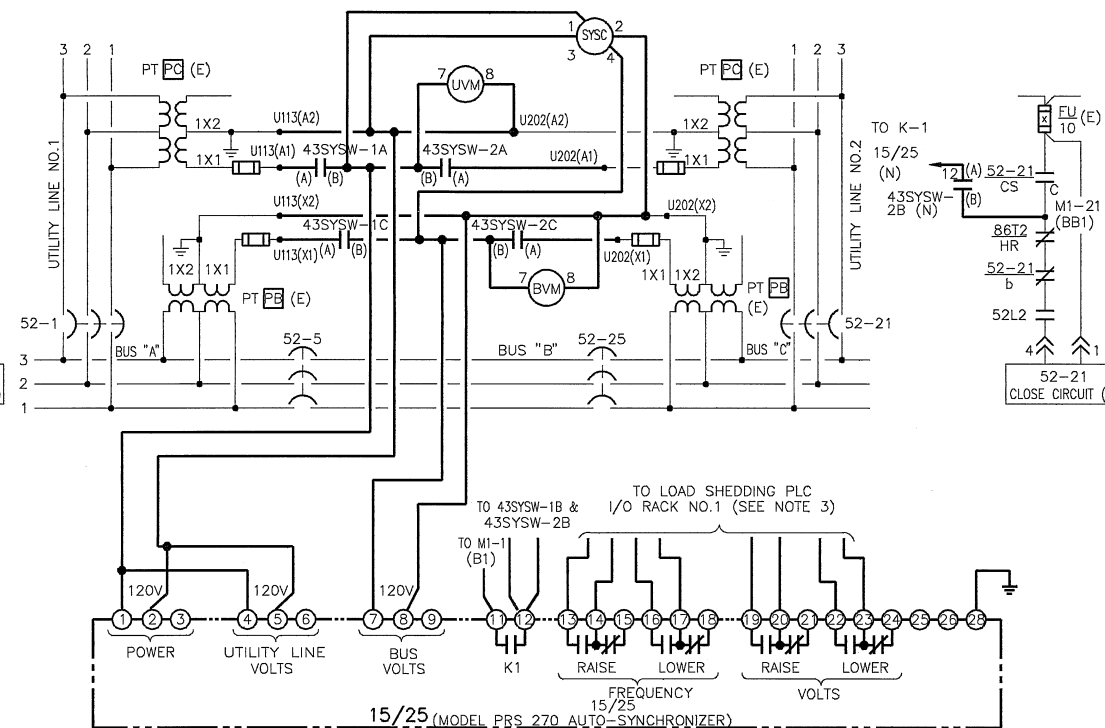
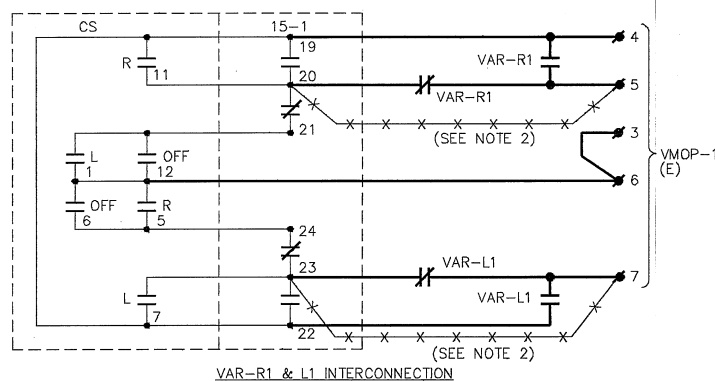
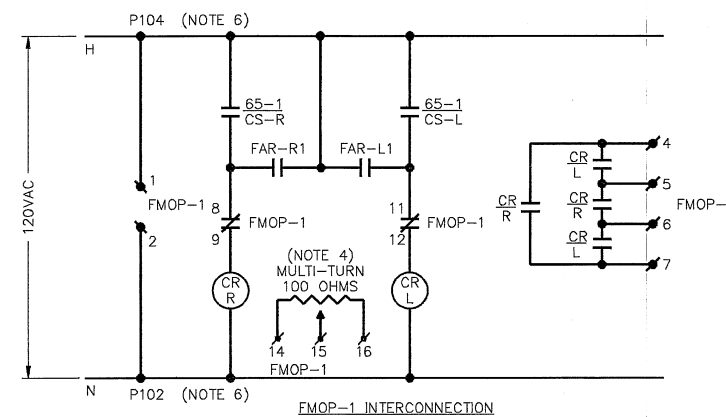
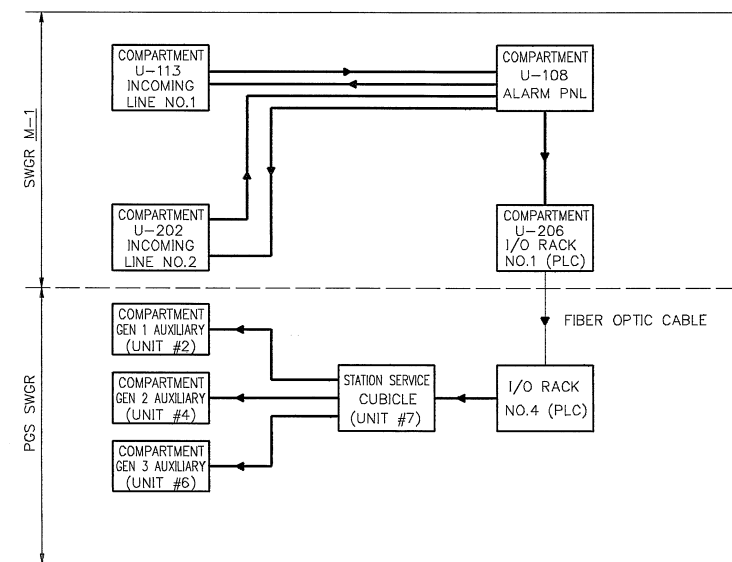
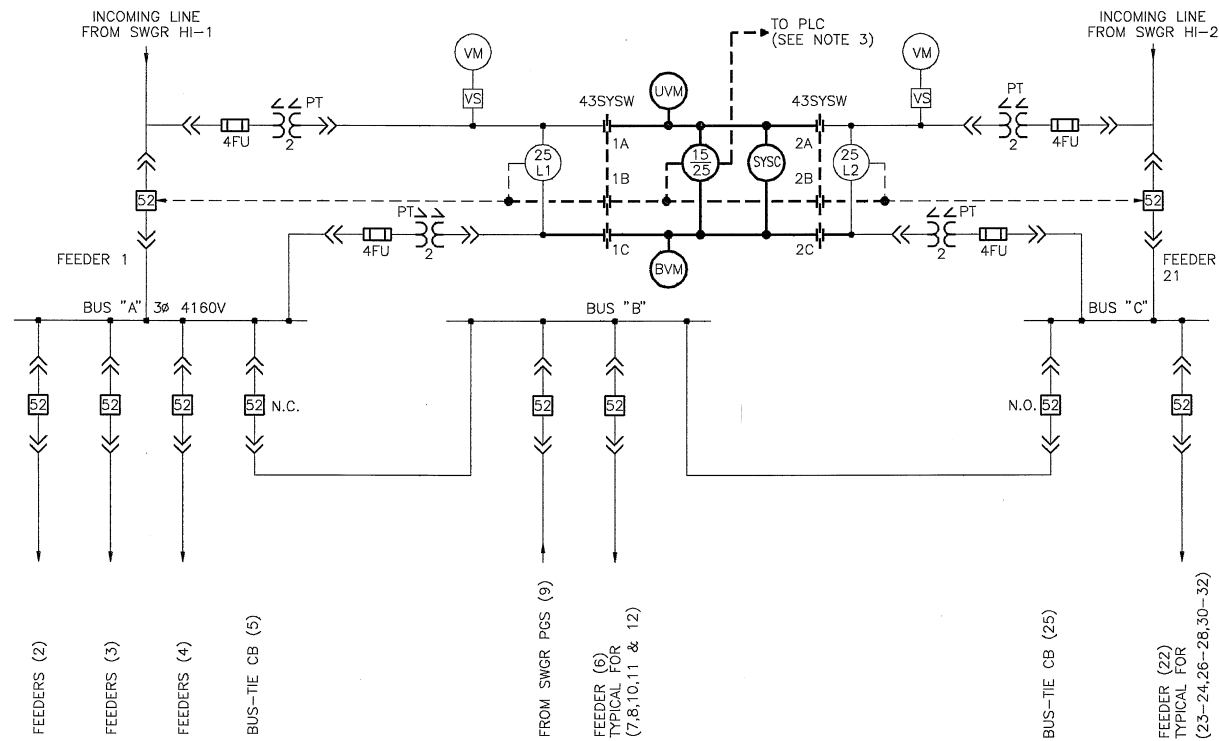
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ENGINEERS • PLANNERS • ARCHITECTS • CONSTRUCTION MANAGERS
106B MISSION STREET
SAN FRANCISCO, CALIFORNIA 94103

MODIFICATION OF MAIN
SWITCHGEAR M1
SPECIFICATION NO. SD-189A
VOLUME III, PART 2

DESIGNED BY G. PODKAMINER
DESIGN CHECK BY A. BORGIA
DRAWN BY L. WANG
SR. PROJ. ENGR. J.R. LINDAHL
APPROVED
PRINCE L. BORGIA R.P.E. NO. M021371

PROJECT ENGR. R.P.E. NO. C44278
PROJECT MGR. R.P.E. NO. C31966
MGR. OF SUPPORT SERVICES R.P.E. NO. C30476
MGR. OF MAINTENANCE R.P.E. NO. C24855

NO.	DATE	REVISION	BY	REC.	APP.
0	3-16-92	ISSUED FOR BID			



SWGR M-1 COMP. U-108 LAUOUT
(SEE DWG. E-3 FOR COMPLETE
M-1 ARRANGEMENT)

NOTES:

1. LEGEND AND GENERAL NOTES SEE DWG. G-1.
2. DISCONNECT EXISTING CONNECTIONS BETWEEN 15-1 TERM.20 AND MOP TERM.5
INSERT VAR-R1 N.C. CONTACT AS SHOWN,
AND BETWEEN 15-1 TERM.23 AND (VOLTAGE)
MOP TERM.7 AND INSERT VAR-L1 N.C.
CONTACT AS SHOWN.
3. RACK NO. 1 CONNECTIONS TO BE SPECIFIED AT
TIME OF CONSTRUCTION, CONTRACTOR SHALL
RETAIN THE SERVICES OF A-D CONTROLS TO
SPECIFY CONTACTS AND PERFORM REQUIRED
PROGRAMMING. REFER TO SPECIFICATION
SECTION 16940-1.04.B.1, 2.06.B.2, AND 2.06D.
4. REPLACE EXISTING MANUAL FREQUENCY
CONTROL POTENTIOMETER IN EACH GENERATOR
PANEL WITH NEW FMOP. RECONNECT TO
ENGINE GOVERNOR PER SCHEDULE ON E-5.
5. P3 AND P5 ARE LOCATED IN THE STATION
SERVICE CUBICLE (UNIT #7) OF THE PGS SWGR.
6. CORRESPONDING 120VAC CONNECTIONS FOR
G2 AND G3 ARE AS FOLLOWS:

G1	G2	G3
P104	P204	P304
P102	P202	P302
7. THESE SIGNALS ARE SENT TO PLC RACK
NO. 4 LOCATED IN THE PGS BLDG.

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO. 1
OAKLAND, CALIFORNIA

ELECTRICAL

SWITCHGEAR M1
AUTOMATIC SYNCHRONIZATION

DRAWN BY SK	DRAWING NO. E-2
SCALE NONE	
DATE 1-18-91	SHEET 3 OF 6

MODIFICATION OF MAIN
SWITCHGEAR M1
SPECIFICATION NO. SD-189A
VOLUME III, PART 2

DESIGNED BY	G. PODKAMINER
DESIGN CHECK BY	A. BORGIA
DRAWN BY	S. KONG
SR. PROJ. ENGR.	J.R. LINDAHL
APPROVED	
 3-16	
PRINCIPAL-IN-CHARGE, R.P.E. NO. M021	

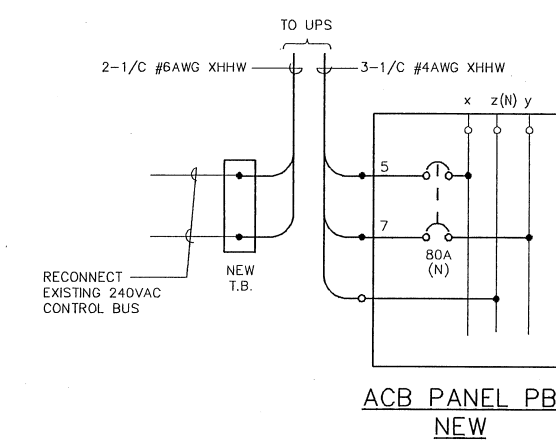
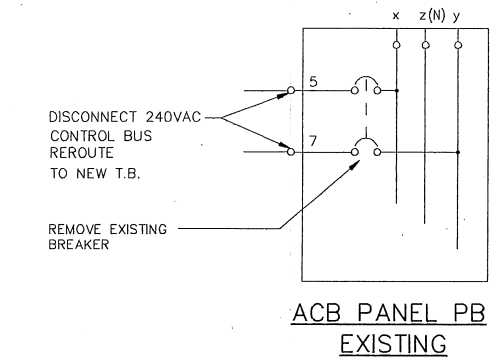
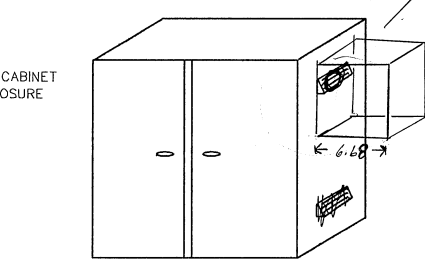
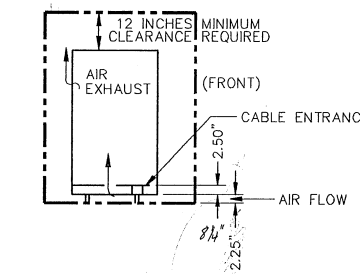
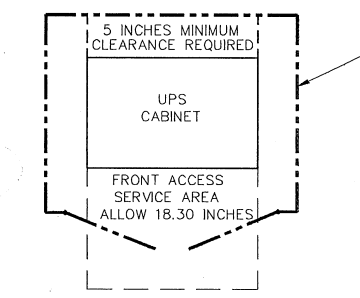
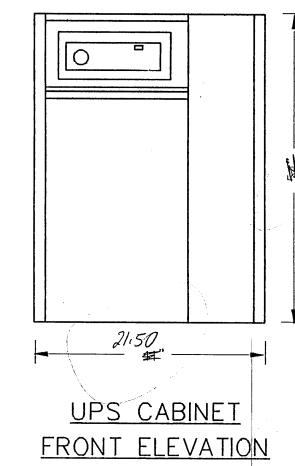
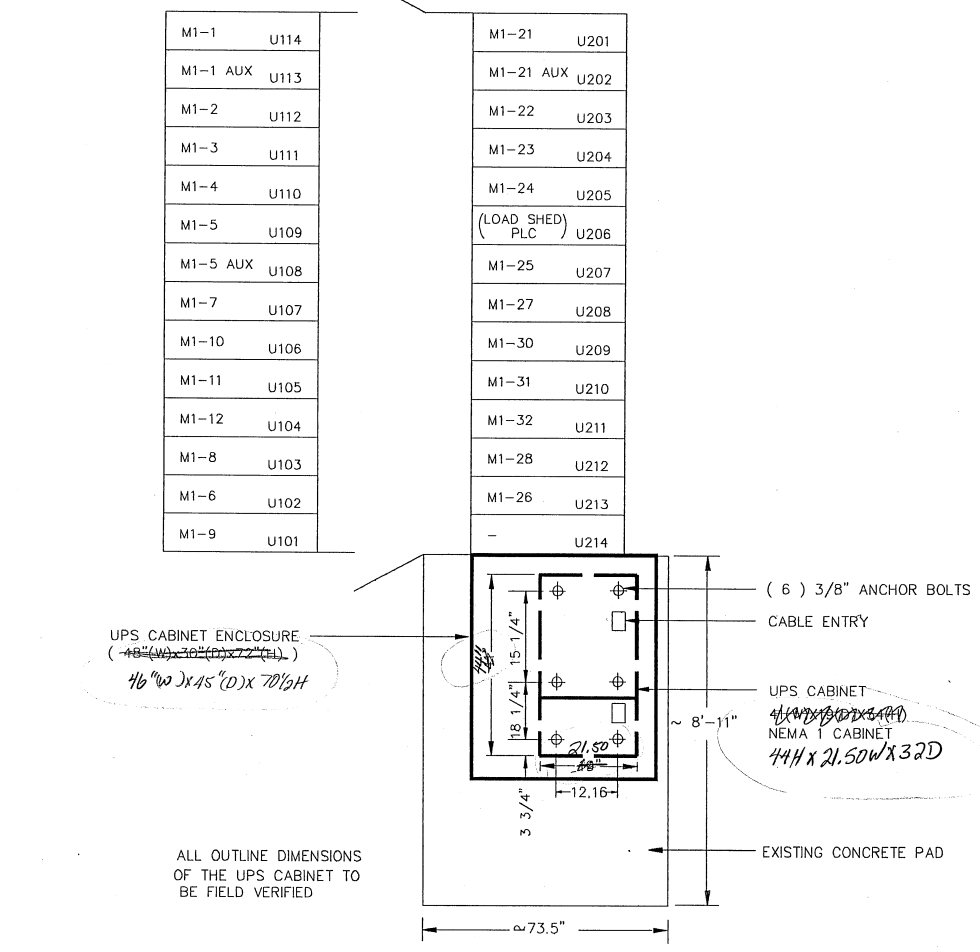
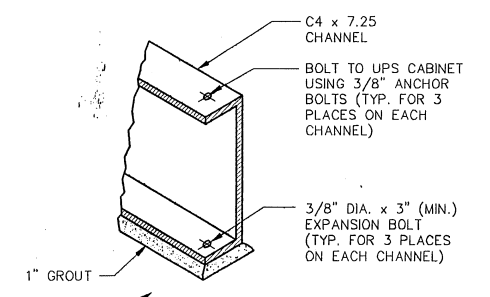
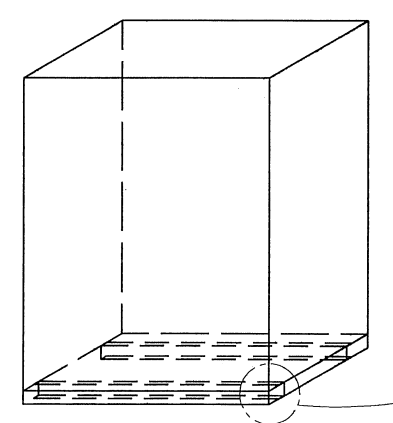
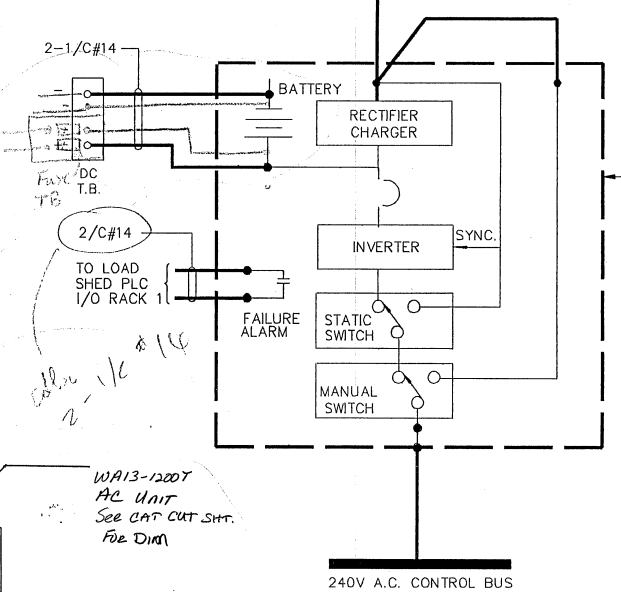
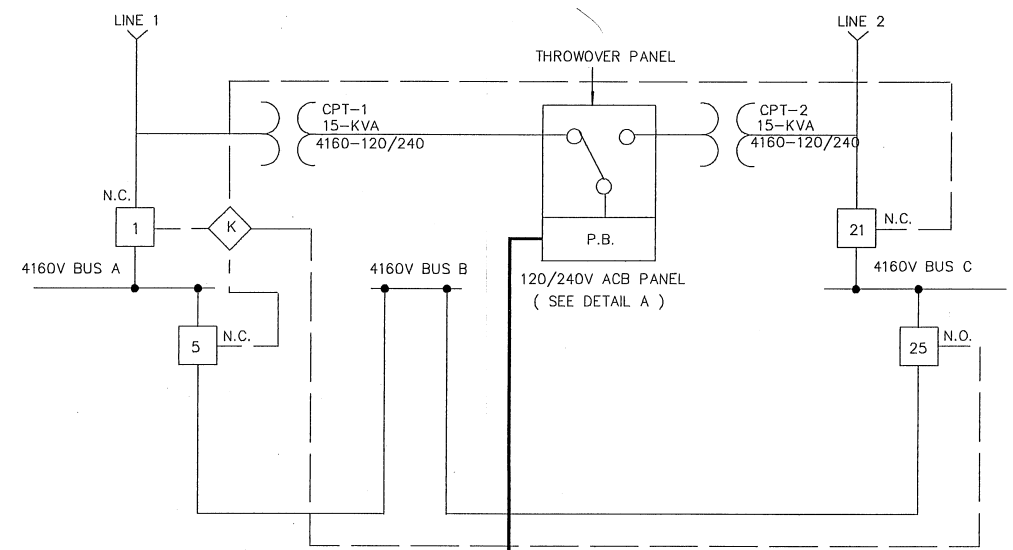
EMUD	PROJECT ENGR. R.P.E. NO. C44278	<i>O'Donoghue</i>
	PROJECT MGR. R.P.E. NO. C31966	<i>Marjory L. Mills</i>
	MGR. OF SUPPORT SERVICES R.P.E. NO. C30976	<i>Michael J. Wallis</i>
	MGR. OF WASTEWATER R.P.E. NO. C26855	<i>William F. Burkh</i>

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SAN FRANCISCO, CALIFORNIA 94103

[illegible]

IOB NO. 3554A302 FILE NO.

NOTES:
1. FAILURE ALARM CONTACT TO BE WIRED TO I/O RACK NO. 1 OF LOAD SHED PLC. RACK CONNECTIONS TO BE SPECIFIED AT TIME OF CONSTRUCTION CONTRACTOR TO RETAIN SERVICES OF A-D CONTROLS TO SPECIFY CONTACT AND PERFORM NECESSARY PROGRAMMING REF. SPEC. SECTION 16940 PARA 201.D.



DETAIL
NO SCALE
A
E-3 E-3



EAST BAY MUNICIPAL UTILITY DISTRICT SPECIAL DISTRICT NO. 1 OAKLAND, CALIFORNIA	
ELECTRICAL	
SWITCHGEAR M1 UNINTERRUPTIBLE POWER SUPPLY	
DRAWN BY: SHARAD/DAXESH	DRAWING NO. E-3
SCALE: NONE	SHEET 4 OF 6
DATE: 10-08-91	

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1068 MISSION STREET
SAN FRANCISCO, CALIFORNIA 94103

NO.	DATE	ISSUED FOR BID	REVISION	BY	REC.	APP.
0	3-16-92	ISSUED FOR BID				

MODIFICATION OF MAIN
SWITCHGEAR M1
SPECIFICATION NO. SD-189A
VOLUME III, PART 2

DESIGNED BY: J.S.B./NANAK ENGINEERS
DESIGN CHECK BY: A. BORGIA
DRAWN BY: SHARAD/DAXESH
SR. PROJ. ENGR. J.R. LINDAHL
APPROVED: [Signature] 3-16-92
PROJECT NO. C4427B
R.P.E. NO. C31966
MGR. OF SUPPORT SERVICES: [Signature]
MGR. OF WASTEWATER: [Signature]
ARCHITECT-IN-CHARGE, R.P.E. NO. M021371

PROJECT ENGR. J.S.B./NANAK ENGINEERS
PROJECT MGR. A. BORGIA
MGR. OF SUPPORT SERVICES: [Signature]
MGR. OF WASTEWATER: [Signature]
ARCHITECT-IN-CHARGE, R.P.E. NO. M021371

JOB NO. 35544302 FILE NO.

JOB NO. 3554A302 FILE NO.

DIFFERENTIAL PROTECTION SYSTEM CIRCUIT SCHEDULE

CIRCUIT NO.	DESCRIPTION	FROM	TERMINATIONS	TO	TERMINATIONS	SIZE	INSULATION TYPE	REF DRAWING	NOTES	CIRCUIT NO.	DESCRIPTION	FROM	TERMINATIONS	TO	TERMINATIONS	SIZE	INSULATION TYPE	REF DRAWING	NOTES
A1	CT SECONDARIES	CT-A1	A B C AN	J-BOX TBA	A1A A1B A1C N	4-1/C #10	SIS	E-1	J-BOX TB-A LOCATED IN SECT. U-109	JUMPER		52-5AR	1B 2B 3B 4A	52-AR	7B 8B 9B 5A,6A	5-1/C #10	SIS	E-1	
JUMPER		CT-A1	AN	CT-A1	BN	1-1/C #10	SIS	E-1		52-25AR	CT INTERCONNECTS	J-BOX TB-C	A B C	52-5AR	1A 2A 3A	3-1/C #10	SIS	E-1	
JUMPER		CT-A1	BN	CT-A1	CN	1-1/C #10	SIS	E-1				J-BOX TB-C	GND	52-5AR	4A	1-1/C #10	SIS	E-1	
A2	CT SECONDARIES	CT-A2	A B C AN	J-BOX TBA	A2A A2B A2C N	4-1/C #10	SIS	E-1	J-BOX TB-A LOCATED IN SECT. U-109	JUMPER		52-25AR	4A	52-25AR	5A	1-1/C #10	SIS	E-1	
JUMPER		CT-A2	AN	CT-A2	BN	1-1/C #10	SIS	E-1		JUMPER		52-25AR	5A	52-25AR	6A	1-1/C #10	SIS	E-1	
JUMPER		CT-A2	BN	CT-A2	CN	1-1/C #10	SIS	E-1		JUMPER		52-25AR	6A	52-25AR	7A	1-1/C #10	SIS	E-1	
A3	CT SECONDARIES	CT-A3	A B C AN	J-BOX TBA	A3A A3B A3C N	4-1/C #10	SIS	E-1	J-BOX TB-A LOCATED IN SECT. U-109	JUMPER		52-25AR	7A	52-25AR	8A	1-1/C #10	SIS	E-1	
JUMPER		CT-A3	AN	CT-A3	BN	1-1/C #10	SIS	E-1		JUMPER		52-25AR	8A	52-25AR	9A	1-1/C #10	SIS	E-1	
JUMPER		CT-A3	BN	CT-A3	CN	1-1/C #10	SIS	E-1		A	CT SECONDARIES	J-BOX TBA	GND	J-BOX TBB	GND	1-1/C #10	SIS	E-1	C.T. COMMON (GROUND) TIE
A4	CT SECONDARIES	CT-A4	A B C AN	J-BOX TBA	A4A A4B A4C N	4-1/C #10	SIS	E-1	J-BOX TB-A LOCATED IN SECT. U-109	B	CT SECONDARIES	52-5AR	7A 8A 9A 4B	52-25AR	7B 8B 9B 4B	9-1/C #10	SIS	E-1	C.T. COMMON (GROUND) TIE
JUMPER		CT-A4	AN	CT-A4	BN	1-1/C #10	SIS	E-1					5B 6B 7B 8B		5B 6B 1B 2B				
JUMPER		CT-A4	BN	CT-A4	CN	1-1/C #10	SIS	E-1					9B		3B				
B6	CT SECONDARIES	CT-B6	A B C AN	J-BOX TBB	B6A B6B B6C N	4-1/C #10	SIS	E-1	J-BOX TB-B LOCATED IN SECT. U-109			J-BOX TBA	GND	J-BOX TBC	GND	1-1/C #10	SIS		
JUMPER		CT-B6	AN	CT-B6	BN	1-1/C #10	SIS	E-1		87B-1A	RELAY CT INPUT	J-BOX TBA	A B C	87B-1	A6 B6 C6	3-1/C #10	SIS	E-1	
JUMPER		CT-B6	BN	CT-B6	CN	1-1/C #10	SIS	E-1					GND		A5	1-1/C #10	SIS		
B7	CT SECONDARIES	CT-B7	A B C AN	J-BOX TBB	B7A B7B B7C N	4-1/C #10	SIS	E-1	J-BOX TB-B LOCATED IN SECT. U-109	JUMPER		87B-1	A5	87B-1	B5	1-1/C #10	SIS	E-1	
JUMPER		CT-B7	AN	CT-B7	BN	1-1/C #10	SIS	E-1		JUMPER		87B-1	B5	87B-1	C5	1-1/C #10	SIS	E-1	
JUMPER		CT-B7	BN	CT-B7	CN	1-1/C #10	SIS	E-1											
B8	CT SECONDARIES	CT-B8	A B C AN	J-BOX TBB	B8A B8B B8C N	4-1/C #10	SIS	E-1	J-BOX TB-B LOCATED IN SECT. U-109										
JUMPER		CT-B8	AN	CT-B8	BN	1-1/C #10	SIS	E-1		87B-1A-PSI	DC POWER	DC-TB	POS NEG	87B-1	A7 A8	2-1/C #10	SIS	E-1	
JUMPER		CT-B8	BN	CT-B8	CN	1-1/C #10	SIS	E-1		JUMPER		87B-1	A7	87B	B7	1-1/C #10	SIS	E-1	
B9	CT SECONDARIES	CT-B9	A B C AN	J-BOX TBB	B9A B9B B9C N	4-1/C #10	SIS	E-1	J-BOX TB-B LOCATED IN SECT. U-109	JUMPER		87B-1	B7	87B	C7	1-1/C #10	SIS	E-1	
JUMPER		CT-B9	AN	CT-B9	BN	1-1/C #10	SIS	E-1		JUMPER		87B-1	A8	87B-1	B8	1-1/C #10	SIS	E-1	
JUMPER		CT-B9	BN	CT-B9	CN	1-1/C #10	SIS	E-1		JUMPER		87B-1	B8	87B-1	C8	1-1/C #10	SIS	E-1	
B10	CT SECONDARIES	CT-B10	A B C AN	J-BOX TBB	B10A B10B B10C N	4-1/C #10	SIS	E-1	J-BOX TB-B LOCATED IN SECT. U-109	JUMPER		87B-1	B8	87B-1	C8	1-1/C #10	SIS	E-1	
JUMPER		CT-B10	AN	CT-B10	BN	1-1/C #10	SIS	E-1		86B-1-S	SHORTING CONTACT	86B-1	2A/2B 3A/3B 4A/4B	87B-1	A3/6 B3/6 C3/6	6-1/C #10	SIS	E-1	
JUMPER		CT-B10	BN	CT-B10	CN	1-1/C #10	SIS	E-1		86B-1-T1	M1-1 TRIP	86B-1	5A 5B	M1-1	BB3 BB4	2-1/C #12	SIS	E-1	
B11	CT SECONDARIES	CT-B11	A B C AN	J-BOX TBB	B11A B11B B11C N	4-1/C #10	SIS	E-1	J-BOX TB-B LOCATED IN SECT. U-109	86B-1-T2	M1-9 TRIP	M1-9	C3	86B-1	6A	2-1/C #12	SIS	E-1	RUN AS PR. FROM 86B-1 TO M1-9 VIA 52-25AR
JUMPER		CT-B11	AN	CT-B11	BN	1-1/C #10	SIS	E-1				M1-9	C5	52-25AR	10B				
JUMPER		CT-B11	BN	CT-B11	CN	1-1/C #10	SIS	E-1				86B-1	6B	52-25AR	10A				
B12	CT SECONDARIES	CT-B12	A B C AN	J-BOX TBB	B12A B12B B12C N	4-1/C #10	SIS	E-1	J-BOX TB-B LOCATED IN SECT. U-109	86B-1-C1	86 TRIP COIL (CONTACT)	86B-1	1	87B-1	A15	1-1/C #12	SIS	E-1	
JUMPER		CT-B12	AN	CT-B12	BN	1-1/C #10	SIS	E-1		JUMPER		87B-1	A15	87B-1	B15	1-1/C #12	SIS	E-1	
JUMPER		CT-B12	BN	CT-B12	CN	1-1/C #10	SIS	E-1		JUMPER		87B-1	B15	87B-1	C15	1-1/C #12	SIS	E-1	
C21	CT SECONDARIES	CT-C21	A B C AN	J-BOX TBC	C21A C21B C21C N	4-1/C #10	SIS	E-1	J-BOX TB-C LOCATED IN SECT. U-207										
JUMPER		CT-C21	AN	CT-C21	BN	1-1/C #10	SIS	E-1		86B-1-C2	86 TRIP COIL	86B-1	C	M1-1	B5	1-1/C #12	SIS	E-1	
JUMPER		CT-C21	BN	CT-C21	CN	1-1/C #10	SIS	E-1		86B-1-C3	86 TRIP CONT	86B-1	5A	87B-1	A14	1-1/C #12	SIS	E-1	
C22	CT SECONDARIES	CT-C22	A B C AN	J-BOX TBC	C22A C22B C22C N	4-1/C #10	SIS	E-1	J-BOX TB-C LOCATED IN SECT. U-207	JUMPER		87B-1	A14	87B-1	B14	1-1/C #12	SIS	E-1	
JUMPER		CT-C22	AN	CT-C22	BN	1-1/C #10	SIS	E-1		JUMPER		87B-1	B14	87B-1	C14	1-1/C #12	SIS	E-1	
JUMPER		CT-C22	BN	CT-C22	CN	1-1/C #10	SIS	E-1		87B-2-A1	RELAY CT INPUTS	J-BOX TBC	A B C	87B-2	A6 B6 C6	3-1/C #10	SIS	E-1	
C23	CT SECONDARIES	CT-C23	A B C AN	J-BOX TBC	C23A C23B C23C N	4-1/C #10	SIS	E-1	J-BOX TB-C LOCATED IN SECT. U-207	87B-2-A2	RELAY CT INPUTS	52-25AR	4B 5B 6B	87B-2	A5 B5 C5	3-1/C #10	SIS	E-1	
JUMPER		CT-C23	AN	CT-C23	BN	1-1/C #10	SIS	E-1		87B-2APSI	DC POWER	DC-TB	POS NEG	87B-2	A7 A8	2-1/C #14	SIS	E-1	
JUMPER		CT-C23	BN	CT-C23	CN	1-1/C #10	SIS	E-1		JUMPER		87B-2	A7	87B-2	B7	1-1/C #14	SIS	E-1	
C24	CT SECONDARIES	CT-C24	A B C AN	J-BOX TBC	C24A C24B C24C N	4-1/C #10	SIS	E-1	J-BOX TB-C LOCATED IN SECT. U-207	JUMPER		87B-2	B7	87B-2	C7	1-1/C #14	SIS	E-1	
JUMPER		CT-C24	AN	CT-C24	BN	1-1/C #10	SIS	E-1		JUMPER		87B-2	A8	87B-2	B8	1-1/C #14	SIS	E-1	
JUMPER		CT-C24	BN	CT-C24	CN	1-1/C #10	SIS	E-1		JUMPER		87B-2	B8	87B-2	C8	1-1/C #14	SIS	E-1	
C26	CT SECONDARIES	CT-C26	A B C AN	J-BOX TBC	C26A C26B C26C N	4-1/C #10	SIS	E-1	J-BOX TB-C LOCATED IN SECT. U-207	86B-2-S	SHORTING CONTACTS	86B-2	2A/2B 3A/3B 4A/4B	87B-2	A3/6 B3/6 C3/6	6-1/C #10	SIS	E-1	
JUMPER		CT-C26	AN	CT-C26	BN	1-1/C #10	SIS	E-1		86B-2-T1	M1-21 TRIP	86B-2	5A 5B	M1-21	BB3 BB4	2-1/C #12	SIS	E-1	
JUMPER		CT-C26	BN	CT-C26	CN	1-1/C #10	SIS	E-1		86B-2-T2	M1-9 TRIP	M1-9	C3 C5	86B-2	6A	2-1/C #12	SIS	E-1	RUN AS PR. FROM 86B-2 TO M1-9 VIA 52-25AR
C27	CT SECONDARIES	CT-C27	A B C AN	J-BOX TBC	C27A C27B C27C N	4-1/C #10	SIS	E-1	J-BOX TB-C LOCATED IN SECT. U-207			M1-9	C5	52-25AR	10B				
JUMPER		CT-C27	AN	CT-C27	BN	1-1/C #10	SIS	E-1				86B-2	6B	52-25AR	10A				
JUMPER		CT-C27	AN	CT-C27	BN	1-1/C #10	SIS	E-1		86B-2-C1	86 TRIP COIL (CONTACT)	86B-2	1	87B-2	A15	1-1/C #12	SIS	E-1	
C28	CT SECONDARIES	CT-C28	A B C AN	J-BOX TBC	C28A C28B C28C N	4-1/C #10	SIS	E-1	J-BOX TB-C LOCATED IN SECT. U-207	JUMPER		87B-2	A15	87B-2	B15	1-1/C #12	SIS	E-1	
JUMPER		CT-C28	AN	CT-C28	BN	1-1/C #10	SIS	E-1		JUMPER		87B-2	B15	87B-2	C15	1-1/C #12	SIS	E-1	
JUMPER		CT-C28	BN	CT-C28	CN	1-1/C #10	SIS	E-1		86B-2-C2	86 TRIP COIL	86B-2	C	M1-21	B5	1-1/C #12	SIS	E-1	
C30	CT SECONDARIES	CT-C30	A B C AN	J-BOX TBC	C30A C30B C30C N	4-1/C #10	SIS	E-1	J-BOX TB-C LOCATED IN SECT. U-207	86B-2-C3	87 TRIP CONT	86B-2	5A	87B-2	A14	1-1/C #12	SIS	E-1	
JUMPER		CT-C30	AN	CT-C30	BN	1-1/C #10	SIS	E-1		JUMPER		87B-2	A14	87B-2	B14	1-1/C #12	SIS	E-1	
JUMPER		CT-C30	BN	CT-C30	CN	1-1/C #10	SIS	E-1		JUMPER		87B-2	B14	87B-2	C14	1-1/C #12	SIS	E-1	
C31	CT SECONDARIES	CT-C31	A B C AN	J-BOX TBC	C31A C31B C31C N	4-1/C #10	SIS	E-1	J-BOX TB-C LOCATED IN SECT. U-207										
JUMPER		CT-C31	AN	CT-C31	BN	1-1/C #10	SIS	E-1											
JUMPER		CT-C31	BN	CT-C31	CN	1-1/C #10	SIS	E-1											
C32	CT SECONDARIES	CT-C32	A B C AN	J-BOX TBC	C32A C32B C32C N	4-1/C #10	SIS	E-1	J-BOX TB-C LOCATED IN SECT. U-207										
JUMPER		CT-C32	AN	CT-C32	BN	1-1/C #10	SIS	E-1											
JUMPER		CT-C32	AN	CT-C32	BN	1-1/C #10	SIS	E-1											
52-5AR	CT INTERCONNECTS	J-BOX TB-A	A B C	52-5AR	1A 2A 3A	3-1/C #10	SIS	E-1											
		J-BOX TB-B	A B C	52-5AR	1B 2B 3B	3-1/C #10	SIS												
		J-BOX TB-A/B	GND	52-5AR	4A	1-1/C #10	SIS												
JUMPER		52-5AR	1B 2B 3B 4A	52-AR	7B 8B 9B 5A,6A	5-1/C #10	SIS	E-1											
52-25AR	CT INTERCONNECTS	J-BOX TB-C	A B C	52-5AR	1A 2A 3A	3-1/C #10	SIS	E-1											
		J-BOX TB-C	GND	52-5AR	4A	1-1/C #10	SIS												

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1068 MISSION STREET
SAN FRANCISCO, CALIFORNIA 94103

0	3-16-92	ISSUED FOR BID			
NO.	DATE	REVISION	BY	REC.	APP.

MODIFICATION OF MAIN
SWITCHGEAR M1
SPECIFICATION NO. SD-189A
VOLUME III, PART 2

DESIGNED BY A. BORGIA / T. SANCHEZ
DESIGN CHECK BY A. BORGIA
DRAWN BY S. KONG
SR. PROJ. ENGR. J.R. LINDAHL
APPROVED
PRINCIPAL IN CHARGE, R.P.E. NO. MD21371



EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO. 1
OAKLAND, CALIFORNIA

ELECTRICAL
SWITCHGEAR M1
DIFFERENTIAL PROTECTION SYSTEM
CIRCUIT SCHEDULE

DRAWN BY SK
SCALE NONE
DATE 2-21-92
DRAWING NO. E-4
SHEET 5 OF 6

AUTO SYNCH. & UPS SYSTEMS CIRCUIT SCHEDULE

CIRCUIT NO.	DESCRIPTION	FROM	TERMINATIONS				TO	TERMINATIONS				SIZE	INSULATION TYPE	REF DRAWING	NOTES	CIRCUIT NO.	DESCRIPTION	FROM	TERMINATIONS				TO	TERMINATIONS				SIZE	INSULATION TYPE	REF DRAWING	NOTES
43SYSW1	SYNC. SW. INPUT	U113	A1	A2	X1	X2	43SYSW	1A-A	GND	1C-A	GND	4-1/C #14	XHHW	E-2		CP2	CONTROL & PWR	CONT. PWR	H				FMOP-2	1				1-1/C #14	SIS	E-2	
43SYSW2	SYNC. SW. INPUT	U202	A1	A2	X1	X2	43SYSW	2A-A	GND	2C-A	GND	4-1/C #14	XHHW	E-2				CONT. PWR	H				65-2/CS	R				1-1/C #14	SIS		
43SYSW3	SYNC. SW. OUTPUT	43SYSW-2C	B	GND			BVM	7	8			2-1/C #14	XHHW	E-2				CONT. PWR	N				FMOP-2	2				1-1/C #14	SIS		
43SYSW4	SYNC. SW. OUTPUT	43SYSW-1C	B	GND			15/25	7	8			2-1/C #14	XHHW	E-2				CONT. PWR	N				CR	R COIL				1-1/C #14	SIS		
JUMPER		43SYSW-1C	B				43SYSW-2C	B				1-1/C #14	XHHW	E-2				FAR	R2	L2			FMOP-2	8	11			2-1/C #14	SIS		
JUMPER		BVM	7	8			SYSC	4	2			2-1/C #14	XHHW	E-2				VAR	R2	L2			15-2	20	23			2-1/C #14	SIS		
43SYSW5	SYNC. SW. OUTPUT	43SYSW-2A	B	GND			UVM	7	8			2-1/C #14	XHHW	E-2				VAR	R2	R2	L2		VMOP-2	4	5	7		3-1/C #14	SIS		
JUMPER		43SYSW-1A	B				43SYSW-2A	B				1-1/C #14	XHHW	E-2		JUMPER		65-2/CS	R				65-2/CS	L				1-1/C #14	SIS	E-2	
JUMPER		UVM	7	8			SYSC	1	3			2-1/C #14	XHHW	E-2		JUMPER		CR	R COIL				CR	L COIL				1-1/C #14	SIS	E-2	
43SYSW6	SYNC. SW. OUTPUT	43SYSW-2A	B	GND			15/25	4	5			2-1/C #14	XHHW	E-2		JUMPER		FMOP-2	8	11			65-2/CS	R	L			2-1/C #14	SIS	E-2	
JUMPER		15/25	4	5			15/25	1	2			2-1/C #14	XHHW	E-2		CP3	CONTROL & PWR	CONT. PWR	H				FMOP-3	1				1-1/C #14	SIS	E-2	
43SYSW7	52-1 CLOSE	43SYSW-1B	B				U-113: M1-1	BB1				1-1/C #14	XHHW	E-2				CONT. PWR	H				65-2/CS	R				1-1/C #14	SIS		
43SYSW8	52-21 CLOSE	43SYSW-2B	B				U-202: M1-21	BB1				1-1/C #14	XHHW	E-2				CONT. PWR	N				FMOP-3	2				1-1/C #14	SIS		
15/25OP1	AUTO SYNC. OUTPUT	15/25	13	14	16	17	PLC-RACK 1	*	*	*	*	8-1/C #14	XHHW	E-2	* TBD			CONT. PWR	N				CR	R COIL				1-1/C #14	SIS		
			19	20	22	23		*	*	*	*							FAR	R3	L3			FMOP-3	8	11			2-1/C #14	SIS		
15/25OP2	AUTO SYNC. BKR. CLOSE	15/25	12				43SYSW-1B	A				1-1/C #14	XHHW	E-2				VAR	R3	L3			15-3	20	23			2-1/C #14	SIS		
		15/25	12				43SYSW-2B	A				1-1/C #14	XHHW					VAR	R3	R3	L3		VMOP-3	4	5	7		3-1/C #14	SIS		
15/25IP1	AUTO SYNC. BKR. CL. PWR	15/25	11				U-113: M1-1	B1				1-1/C #14	XHHW	E-2		JUMPER		65-3/CS	R				65-3/CS	L				1-1/C #14	SIS	E-2	
PLC4OP	AUTO SYNC. OUTPUT	PLC-RACK 4	*				PGS SWGR-PWR	H				5-1/C #14	XHHW	E-2	* TBD	JUMPER		CR	R COIL				CR	L COIL				1-1/C #14	SIS	E-2	
			*	*			FAR	R	L						JUMPER		FMOP-3	8	11				65-3/CS	R	L			2-1/C #14	SIS	E-2	
			*	*			VAR	R	L						GEN1C1	CONTROL	FMOP-1	9	12				CR	R COIL	L COIL			2-1/C #14	SIS	E-2	
CP	CONTROL & PWR	CONT. PWR	H	N			FAR	R/L CONT. COIL	R COIL			2-1/C #14	XHHW	E-2				CR	R CONT	R CONT	L CONT	L CONT	FMOP-1	4	5	6	7	4-1/C #14	SIS		
JUMPER		FAR	R COIL				FAR	L COIL				1-1/C #14	XHHW	E-2		GEN1C2	CONTROL	FMOP-1	14	16			GEN.1 GOV. 2301A	23	24			2-1/C #16	TSP	E-2	
JUMPER		FAR	L COIL				VAR	R COIL				1-1/C #14	XHHW	E-2		JUMPER		FMOP-1	14				FMOP-1	15				1-1/C #6		E-2	
JUMPER		VAR	R COIL				VAR	L COIL				1-1/C #14	XHHW	E-2		GEN2C1	CONTROL	FMOP-2	9	12			CR	R COIL	L COIL			2-1/C #14	SIS	E-2	
CP1	CONTROL & PWR	CONT. PWR	H				FMOP-1	1				1-1/C #14	XHHW	E-2				CR	R CONT	R CONT	L CONT	L CONT	FMOP-2	4	5	6	7	4-1/C #14	SIS		
			H				65-1/CS	R				1-1/C #14			GEN2C2	CONTROL	FMOP-2	14	16			GEN.2 GOV. 2301A	23	24			2-1/C #16	TSP	E-2		
			N				FMOP-1	2				1-1/C #14			JUMPER		FMOP-2	14				FMOP-2	15				1-1/C #16		E-2		
			N				CR	R COIL				1-1/C #14			GEN3C1	CONTROL	FMOP-3	9	12			CR	R COIL	L COIL			2-1/C #14	SIS	E-2		
		FAR	R1	L1			FMOP-1	8	11			2-1/C #14					CR	R CONT	R CONT	L CONT	L CONT	FMOP-3	4	5	6	7	4-1/C #14	SIS			
		VAR	R1	L1			15-1	20	23			2-1/C #14			GEN3C2	CONTROL	FMOP-3	14	16			GEN.3 GOV. 2301A	23	24			2-1/C #16	TSP	E-2		
		VAR	R1	R1	L1		VMOP-1	4	5	7		3-1/C #14			JUMPER		FMOP-3	14				FMOP-3	15				1-1/C #16		E-2		
JUMPER		65-1/CS	R				65-1/CS	L				1-1/C #14	XHHW	E-2		PWR1	UPS 240V INPUT	ACB	5	7	GND		UPS INPUT	*	*	*		3-1/C #4	XHHW	E-3	* TBD
JUMPER		CR	R COIL				CR	L COIL				1-1/C #14	XHHW	E-2		PWR2	UPS 240V OUTPUT	AC-TB	-	-			UPS OUTPUT	*	*			2-1/C #6	XHHW	E-3	* TBD
JUMPER		FMOP-1	B	11			65-1/CS	R	L			2-1/C #14	XHHW	E-2		PWR3	UPS 120V DC OUTPUT	DC-TB	+	-			UPS BATTERY	+	-			2-1/C #14	XHHW	E-3	
															AL	UPS ALARM	UPS	AL CONT	AL CONT			PLC-RACK 1	*	*			2-1/C #14	XHHW	E-3	* TBD	
																												</			

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PROJECT ENGR. R.P.E. NO. E444278
PROJECT MGR. R.P.E. NO. E31966
MGR. OF SUPPORT SERVICES R.P.E. NO. E31976
MGR. OF WASTEWATER R.P.E. NO. E34822

EAST BAY MUNICIPAL UTILITY DISTRICT
SPECIAL DISTRICT NO. 1
OAKLAND, CALIFORNIA
ELECTRICAL
SWITCHGEAR M1
AUTO SYNCH. & UPS SYSTEMS
CIRCUIT SCHEDULE
DRAWN BY SK
SCALE NONE
DATE 2-21-92
DRAWING NO. E-6
SHEET 6 OF 6