

BACKGROUND PLAN AND ONE LINE SYMBOLS

SYMBOL	DESCRIPTION
	CONTROL SWITCH (REL. OR P.B.) SEE CIRCUITS FOR SPECIFIC TYPE
	FLOAT SWITCH - FLOW SWITCH
	TEMPERATURE - HUMIDISTAT SWITCH (SUBSCRIPT - FLOW SWITCH)
	LIMIT - PRESSURE - VACUUM SWITCH
	ELECTRICAL OR MECHANICAL ALTERNATOR
	OVERLOAD SWITCH OR DEVICE
	TERMINAL BOX
	SOLENOID VALVE
	PHOTOCELL LINE VOLTAGE
	ITEM NO. INTERCOM EQUIPMENT
	INTERCOMMUNICATION SYSTEM
	AMPLIFIER - WALL STATION - LINE BALANCE
	INTERCOMMUNICATION DESK SET
	INTERCOM. SPEAKER (SURFACE MTD.)
	INTERCOM. SPEAKER (CEILING LAT-IN)
	TELEPHONE OUTLET OR JUNCTION BOX
	WELDING RECEPTACLE - NEMA 19-50R
	600V, 2P, 3W, SIMPLEX
	INTERCOM. HANDSET - SURFACE MOUNTED WITH REMOTE SPEAKER AMPLIFIER
	INTERCOM VOLUME CONTROL
	INTERCOM. SPEAKER - SURFACE MOUNTED
	INTERCOM. HANDSET - FLUSH MOUNTED WITH REMOTE SPEAKER AMPLIFIER
	AS NOTED (LIGHTING PANEL, CONTROL PANEL, DISTRIBUTION PANEL, ETC.) WALL MOUNTED
	JUNCTION BOX
	HEATER
	TRANSFORMER
	CONDUIT WITH CONDUIT SEAL FITTING
	CONDUIT EXPOSED
	CONDUIT CONCEALED
	DIRECT BURIED CONDUIT
	DIRECT BURIED CABLE
	OVERHEAD LINE
	UNDERGROUND DUCT BANK
	CONCRETE ENCASED DUCT BANK, WITH CABLE LOCATIONS AND SPARE DUCTS AS INDICATED ON DRAWINGS
	POWER CIRCUIT BREAKER DRAWOUT TYPE

SYMBOL	DESCRIPTION
	LOW VOLTAGE DISCONNECT SWITCH
	LOW VOLTAGE FUSE (BELOW 600V)
	ALL STARTERS SHALL BE FULL VOLTAGE NON-REVERSING UNLESS OTHERWISE INDICATED
	125/250V, 3P, SIMPLEX, 3W, RANGE TYPE
	20A, 120/277 V SWITCH
	20A, 120/277 V SWITCH
	20A, 120/277 V SWITCH
	20A, 120/277 V DIMMER SWITCH
	250V, 2P, SIMPLEX, 3W, 50A
	125V, 2P, MULTI-RECEPTACLE
	250V, 2P, SIMPLEX, 3W, 20A
	600V, 2P, 3W, SIMPLEX WELDING
	208V, 3P, SIMPLEX, 4W, LOCKING
	277V, 2P, DUPLEX, 3W
	DISCONNECT SWITCH (F) = FUSED (C) = CIRCUIT BREAKER
	MAGNETIC STARTER
	COMBINATION MAGNETIC STARTER FUSED UNLESS NOTED (CIRCUIT BREAKER)
	INTERCOM. HANDSET - SURFACE MOUNTED WITH REMOTE SPEAKER AMPLIFIER
	MANUAL STARTER (N) = REVERSING
	CONTROL PANEL
	TEMPERATURE CONTROL PANEL
	UNIT HEATER, 1/8 HORSEPOWER
	120/240 V, 150 AMP (1) (SEE GEN. NOTE 4)
	LIGHTNING ARRESTER
	LOW VOLTAGE HOME RUNS
	NEMA 4
	NEMA 4X
	NEMA 7
	NEMA 9
	EXIT LIGHT
	CABLE REEL
	KEYLOCK
	SMOKE DETECTOR
	FLUORESCENT LUMINAIRE
	INCANDESCENT LUMINAIRE
	HIGH INTENSITY DISCHARGE LIGHT
	EMERGENCY BATTERY PACK
	X = NUMBER OF HEADS

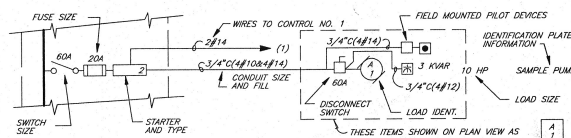
CONTROL CIRCUIT & PILOT DEVICE LEGEND

SYMBOL	DESCRIPTION
	PRESS. ACTUATED SWITCH
	FLOAT ACTUATED SWITCH
	FLOW ACTUATED SWITCH
	TEMP. ACTUATED SWITCH
	LIMIT SWITCH - NORMALLY OPEN
	LIMIT SWITCH - NORMALLY CLOSED
	LIMIT SWITCH - NORMALLY CLOSED - HELD OPEN
	LIMIT SWITCH - NORMALLY OPEN - HELD CLOSED
	LATCHING CABLE SWITCH
	TIME-DELAY FUSE
	CONTROL RELAY COIL
	CONTROL RELAY CONTACT - NORMALLY OPEN
	CONTROL RELAY CONTACT - NORMALLY CLOSED
	TWO COIL LATCHING RELAY
	TIMING RELAY COIL
	TIMED CLOSED CONTACT ON ENERGIZATION
	TIMED OPEN CONTACT ON ENERGIZATION
	TIMED OPEN CONTACT ON DE-ENERGIZATION
	TIMED CLOSED CONTACT ON DE-ENERGIZATION
	120 VAC TRANSFORMER

SYMBOL	DESCRIPTION
	SELECTOR SWITCH OPERATOR WITH FUNCTION SHOWN
	MOMENTARY PUSHBUTTON OPERATOR - NORMALLY OPEN
	MOMENTARY PUSHBUTTON OPERATOR - NORMALLY CLOSED
	PUSHBUTTON OPERATOR WITH MUSHROOM HEAD
	FIELD LOCATED STOP BUTTON
	MAINTAINED PUSH-PULL OPERATOR
	MAINTAINED STOP-START PUSHBUTTON OPERATOR
	SOLENOID OR CLUTCH
	PUSH-TO-TEST INDICATING LIGHT
	MAINTAINED STOP - MOMENTARY START PUSHBUTTON (LOC)
	ZERO SPEED OR ANTI- PLUGGING SWITCH
	LOCAL TERMINALS WITH EXTERNAL WIRING
	ELAPSED TIME INDICATOR
	TIMING RELAY INSTANTANEOUS CONTACTS

WIRING DEVICE SCHEDULE

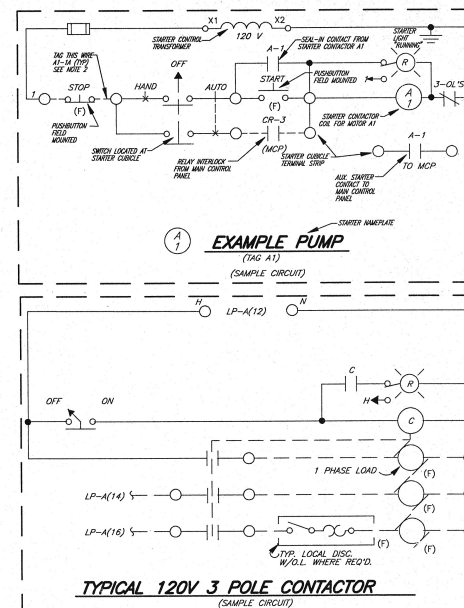
SYMBOL	DESCRIPTION	NEMA TYPE
	125V, 2P, SIMPLEX, CLOCK HANGER	1-15 R
	125V, 2P, SIMPLEX, 3W	5-20 R
	125V, 2P, DUPLEX, 3W	5-20 R
	125/250V, 3P, SIMPLEX, 3W, RANGE TYPE	10-50 R
	20A, 120/277 V SWITCH	SPST
	20A, 120/277 V SWITCH	2PST
	20A, 120/277 V SWITCH	3 WAY
	20A, 120/277 V SWITCH	4 WAY
	20A, 120/277 V DIMMER SWITCH	
	250V, 2P, SIMPLEX, 3W, 50A	6-50R
	125V, 2P, MULTI-RECEPTACLE	5-15R
	250V, 2P, SIMPLEX, 3W, 20A	6-20R
	600V, 2P, 3W, SIMPLEX WELDING	19-50R
	208V, 3P, SIMPLEX, 4W, LOCKING	L14-20R
	277V, 2P, DUPLEX, 3W	7-15R



M.C.C. LEGEND EXAMPLE

GENERAL NOTES:

- ELECTRICAL MATERIALS AND EQUIPMENT ITEMS SHOWN IN LIGHT LINE WEIGHTS ON THE DRAWINGS ARE EXISTING ITEMS TO REMAIN. ELECTRICAL MATERIALS AND EQUIPMENT ITEMS SHOWN IN HEAVY LINE WEIGHTS ARE NEW THIS CONTRACT.
- ITEMS SHOWN CROSSHATCHED ON THE DRAWINGS ARE EXISTING ITEMS TO BE REMOVED.
- FOR ITEMS INDICATED AS "FIELD LOCATE" CHECK DRAWINGS OF OTHER TRADES (IN PARTICULAR PILING AND STRUCTURAL) FOR INTERFERENCE AND FOR LOCATIONS OF MOUNTING FLANGES, CONNECTION POINTS, ETC.
- INSTALL A SINGLE CONDUCTOR INSULATED (RWK, THIN, OR XHHW) COPPER GROUND WIRE IN EACH CONDUIT. SIZE AS SHOWN ON DRAWINGS OR AS A MINIMUM PER THE NATIONAL ELECTRICAL CODE. THIS GROUND WIRE SHALL BE CONNECTED AT EACH END TO THE EQUIPMENT GROUNDING.
- THE FOLLOWING COMPONENT IDENTIFICATION SHALL BE USED AS APPROPRIATE:
 - FIELD MOUNTED, NOT AT STARTER OR OTHER CONTROL PANELS.
 - STARTER PANEL MOUNTED.
 - TEMPERATURE CONTROL PANEL.
 - AT MAIN CONTROL PANEL.
 - AT CONTROL PANEL NO. 1.
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NOTES:

- THE FOLLOWING COMPONENT IDENTIFICATION SHALL BE USED AS APPROPRIATE:
 - FIELD MOUNTED NOT AT STARTER OR OTHER CONTROL PANELS.
 - STARTER PANEL MOUNTED.
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- ALL WIRE NUMBERS (1-5) ETC. SHALL BE PREFIXED WITH STARTER TAG NUMBERS. THE WIRE NUMBER AFTER THE PREFIX MAY BE THE MANUFACTURER'S WIRE NUMBERING SYSTEM. WIRE MARKERS SHALL BE USED AT EACH WIRE TERMINATION POINT.
- ALL PURPOSED CONDUIT ROUTING SHOWN ON BACKGROUNDS AND SITE PLAN WORK SHALL BE FIELD VERIFIED PRIOR TO BEGINS. NO EXTRAS WILL BE GIVEN FOR LACK OF FIELD VERIFICATION. DURING INSTALLATION, ALL ROUTING SHALL BE CO-ORDINATED WITH THE OWNER.

REV	DESCRIPTION	BY	DATE	CHECK
1	REWORK ALT. NO. 1			
2	ISSUED FOR BIDS		05-92	
3	CHANGING TO SUBSTATION RECORDS		06-94	



MATCH LINE SEE BELOW

1. 3" (34250KCMIL, 1#4) SEE NOTE 14
2. 1" (12-CONM. CABLES)-PVC-RGS
3. 3" (34250KCMIL, 1#2) SEE NOTE 14 (CONDUIT TO BE INSTALLED)
4. 3" (34250KCMIL, 1#4)
5. 1" (12-CONM. CABLES)-PVC-RGS

NOTES:

1. INSTALL NEW GROUND MAT AROUND GENERATOR BUILDING. CONNECT 4/0 AWG TO FRAME OF GENERATOR, TO PRIMARY SWITCH AND TO EXISTING GROUND.
2. REMOVE THE EXISTING CABLE POLE IN FRONT OF THE PADMOUNT TRANSFORMER. INSTALL NEW POLE, AND RECONNECT EXISTING OVERHEAD LINES TO POLE AND FUSED SWITCH ON POLE. CO-ORDINATE FINAL CONNECTIONS WITH TRAVERSE CITY POWER AND LIGHT. OVERHEAD LINE CONNECTION TO MATCH EXISTING CONSTRUCTION.
3. THE CONTRACTOR SHALL FIELD VERIFY ALL WORK ASSOCIATED WITH THE REPLACEMENT OF THE SERVICE ENTRANCE CABLES TO THE LOW SERVICE PUMP STATION.
4. THE CONTRACTOR SHALL PROVIDE FOR THE SUM OF \$5,000 IN THIS PROJECT FOR PAYMENT TO TRAVERSE CITY POWER AND LIGHT FOR THE CONSTRUCTION OF ELECTRICAL SERVICES AS SHOWN ON THE DRAWINGS. THE SUM PAID TO THE CONTRACTOR SHALL BE ADJUSTED UPWARDS OR DOWNWARDS TO MEET THE ACTUAL INVOICE AMOUNT. A COPY OF THE INVOICE MUST BE PRESENTED FOR REIMBURSEMENT. CONTRACTOR MARK-UP (FEE) ON THE AMOUNT OF THE ADJUSTMENT WILL NOT BE GRANTED.
5. AT THE BASE OF THE POWER POLE NEAR THE LOW SERVICE PUMP STATION, PROVIDE 45" OF CABLE AND CO-ORDINATE FINAL CONNECTION WITH TRAVERSE CITY POWER AND LIGHT.
6. CORE UNDER EACH ROAD CROSSING, TO INSTALL 1" (12-CONM. CABLES) AND 3" (34250KCMIL, 1#4) TO THE LOW SERVICE PUMP STATION.
7. SEE SHEET G-1 FOR ADDITIONAL INFORMATION ABOUT BIKE PATH RESTORATION.
8. FROM THE GENERATOR BUILDING, THE POWER AND COMM. CONDUITS ARE TO BE CONCRETE ENCASED WHERE THEY CROSS UNDER THE DRIVEWAY. THE POWER CONDUIT SHALL BE PVC SCHEDULE 40. THE CONDUIT FOR THE COMM. CABLE SHALL BE PVC-RGS.
9. ANY DAMAGE SUSTAINED TO EXISTING CONTROL CABLES, BIKEPATH, SIDEWALK AND OTHER UTILITIES DURING INSTALLATION OF THE POWER AND COMM CABLES TO THE LOW SERVICE PUMP STATION SHALL BE REPAIRED AT THE CONTRACTORS EXPENSE.
10. ALL WORK ASSOCIATED WITH OVERHEAD LINES AND POLES SHALL BE FIELD VERIFIED.
11. AT THE LOW SERVICE PUMP STATION, REMOVE EXISTING SERVICE ENTRANCE CABLES AND CONDUIT JUST OUTSIDE OF LIPS. CAP AND ABANDON EXISTING CONDUITS IN PLACE.
12. CO-ORDINATE CONDUIT ROUTING FOR CHLORINE LEAK SENSORS WITH THE OWNER.
13. INSTALL THE CHLORINE LEAK DETECTORS IN THE VALVE VAULT AND STORAGE AREAS SHOWN. ALL CABLE TO BE SUPPLIED WITH APPROPRIATE LENGTH FROM SENSOR TO MCP. CO-ORDINATE INSTALLATION WITH SENSOR MANUFACTURER.
14. THE GENERATOR BUILDING, AND POWER CABLE TO THE LOW SERVICE PUMP STATION TO BE DELETED UNDER DEDUCTIBLE ALTERNATE NO. 1 (CONDUIT TO BE INSTALLED WITH PULL CORDS).

LOW SERVICE PUMP STATION

SCALE: 1" = 40'-0"

MATCH LINE SEE ABOVE

WATER PLANT ELECTRICAL SITE PLAN

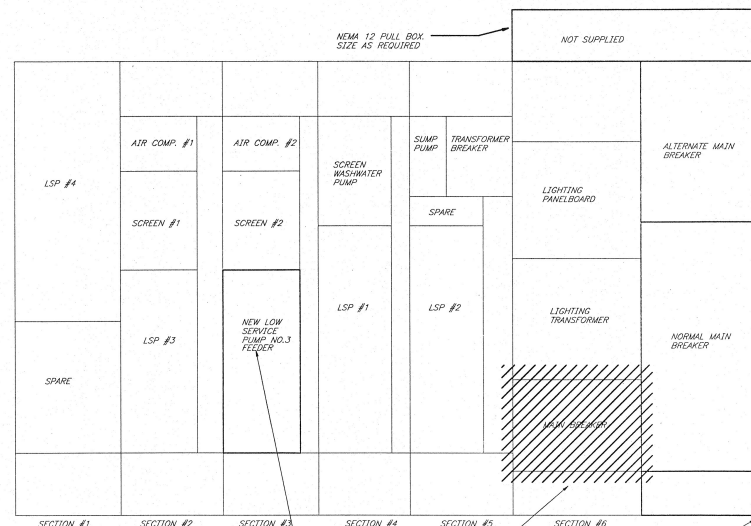
SCALE: 1" = 40'-0"

GENERATOR BUILDING PLAN

SCALE: 1" = 20'-0"

303 South State Street Ann Arbor, MI 48106			
DESIGNED BY: G. JONES			
CHECKED BY: T. PITTER		DATE: 05-92	
SCALE: AS NOTED		CADD DATE: 05-94 ERM 7	
PROJECT: WATER PLANT ELECTRICAL			
CITY OF TRAVERSE CITY, MICHIGAN WATER TREATMENT PLANT IMPROVEMENTS			
ELECTRICAL SITE PLAN			
DESIGNER	CONTRACT	SHEET	
	225.13.W-1	E-2 OF 20	

REV	DESCRIPTION	BY	DATE	CHK'D
1	DUCTIBLE ALT. NO. 1			
2	ISSUED FOR BIDS		05-92	
3	CONFORMING TO SUBSTATION RECORDS		06-94	
4				
5				



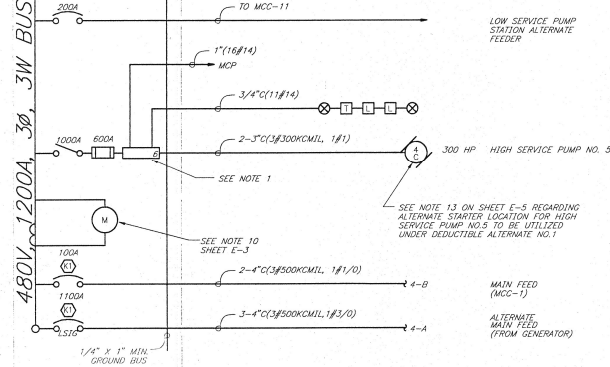
EXISTING MCC #11 - PROPOSED WORK

(LOCATED IN LOW SERVICE PUMP STATION)

NOTES MCC-11:

- WITHIN THE SPARE COMPARTMENT, THE CONTRACTOR SHALL DO THE FOLLOWING:
 - INSTALL NEW FUSED SWITCH.
 - MODIFY COMPARTMENT DOOR FOR INSTALLATION OF FUSED SWITCH AS REQ'D.
 - PROVIDE NAMEPLATES AS REQUIRED.
 - RECONNECT EXISTING START/STOP AND RUN STATUS CONTROL WIRES TO NEW LSP #1 STARTER.
- EXTEND THE EXISTING CONCRETE PAD AND TILE BASE TO MATCH EXISTING CONSTRUCTION AT LSPS.
- INSTALL NEW MCC SECTION AS SHOWN. PROVIDE ALL NECESSARY BUS OR CABLED CONNECTIONS TO INTERWAVE NEW MAIN CIRCUIT BREAKER AND ALTERNATE MAIN CIRCUIT TO EXISTING MOTOR CONTROL CENTER BUS. BUS RATING TO MATCH EXISTING EQUIPMENT SHORT CIRCUIT RATINGS AS A MINIMUM.
- EXISTING MCC-11 IS FEDERAL PACIFIC ELECTRIC COMPANY 800A MAIN BUS, 3M, 480VAC.
- REMOVE EXISTING MAIN CIRCUIT BREAKER (TYPE-50-800), AND ALL ASSOCIATED APPURTENANCES. PROVIDE NEW DOOR AND NAME TAG TO INDICATE "MAIN INCOMING CABLES" (USE SPACE FOR CONNECTING INCOMING CABLES TO NEW MAIN CIRCUIT BREAKER (NORMAL)).
- RECONNECT EXISTING 600V INTERMEDIATE CLASS LIGHTING ARRESTORS. ACTUAL ARRESTORS ARE LOCATED IN A NEMA 4 ENCLOSURE IN PUMP ROOM BASEMENT. CONTRACTOR TO FIELD VERIFY.
- REMOVE ALL ASSOCIATED WIRE AND CONDUIT FROM MOTOR STARTER TO LOW SERVICE PUMP NO. 3. REMOVE CONTROL WIRES FROM MCP FOR REMOTE CONTROL TO EXISTING LSP NO. 3 MOTOR STARTER. RECONNECT AS SHOWN IN WIRING DIAGRAM.
- MOTOR STARTER FOR LSP NO. 3 SHALL BE AN ALLEN-BRADLEY SMC SMART MOTOR CONTROLLER-REDUCED VOLTAGE STARTER.
- AN ADDITIONAL 2#14 AS SHOWN FROM EACH LSP MOTOR STARTER TO THE LSCP. INSTALL AND COIL UP WITHIN EACH STARTER BUCKET, AND AT LSCP FOR FUTURE CONNECTION BY OWNER.
- UNDER DUCTIBLE ALTERNATE NO. 1, A 90" HIGH COMPLETE VERTICAL IS REQUIRED FOR THE 600A AND 200A MAIN BREAKERS. BREAKERS ARE TO BE PROVIDED THAT ARE SUITABLE FOR FUTURE INSTALLATION OF AIR KEY INTERLOCKS.

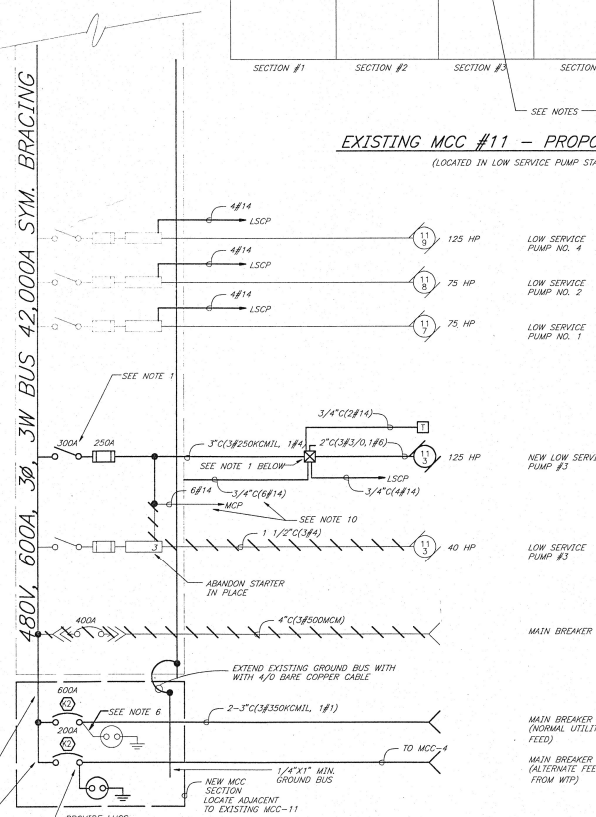
480V, 1200A, 3Ø, 3W BUS 42,000A SYM. BRACING



NEW MOTOR CONTROL CENTER NO. 4

LOCATED IN GENERATOR ROOM

- MOTOR STARTER SHALL BE AN ALLEN-BRADLEY SMC SMART MOTOR CONTROLLER-REDUCED VOLTAGE STARTER.



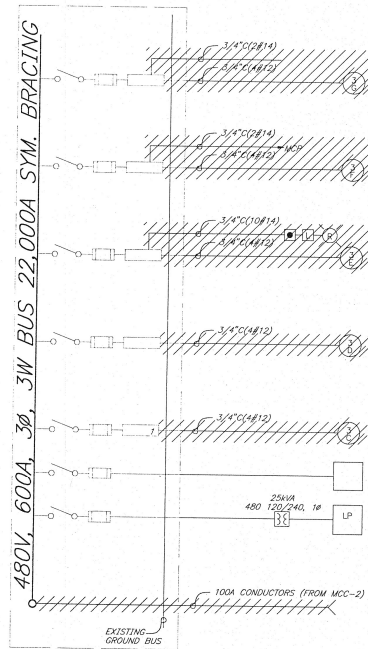
EXISTING MOTOR CONTROL CENTER NO. 11/PARTIAL ONE-LINE

LOCATED IN LOW SERVICE PUMP STATION

- MOTOR STARTER SHALL BE AN ALLEN-BRADLEY SMC SMART MOTOR CONTROLLER-REDUCED VOLTAGE STARTER.

3131 South State Street Ann Arbor MI 48108			
DESIGNED BY: JONES		CHECKED BY: J. LITTLER	
SCALE: NONE		CADD DATE: 6-8-94 REV: 5	
CITY OF TRAVERSE CITY, MICHIGAN WATER TREATMENT PLANT IMPROVEMENTS			
ELECTRICAL ONE-LINES			
DIVISION:	PROJECT:	SHEET:	
	225.13.W-1	E-4	OF 20

REV	DESCRIPTION	BY	DATE	CHK'D
△	ISSUED FOR BIDS		05-92	
△	CONFORMING TO			
△	CONSTRUCTION RECORDS		06-94	
△				
△				



**EXISTING MCC-3 PARTIAL ONE-LINE
PROPOSED DEMOLITION**
LOCATED IN THE FIRST FLOOR FILTER ROOM

SLUDGE PUMP
NO. 2

SLUDGE PUMP
NO. 1

COLLECTOR

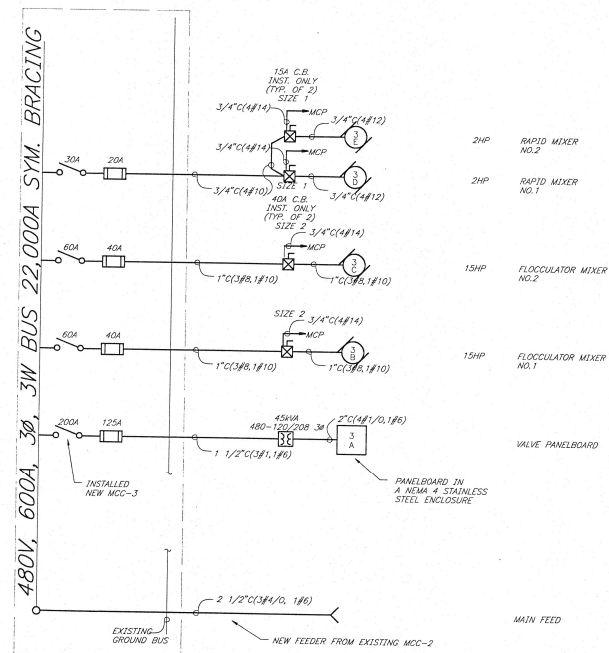
FLOCCULATOR

FLOCCULATOR

ULTRAVIOLETIFIER

LIGHTING
PANEL

MAIN FEED



**EXISTING MCC-3
PROPOSED WORK**
LOCATED IN THE FIRST FLOOR FILTER ROOM

2HP RAPID MIXER
NO. 2

2HP RAPID MIXER
NO. 1

15HP FLOCCULATOR MIXER
NO. 2

15HP FLOCCULATOR MIXER
NO. 1

VALVE PANELBOARD

MAIN FEED

333 South State Street Ann Arbor MI 48108		WILLIAMS ELECTRICAL	
CITY OF TRAVEL CITY, MICHIGAN WATER TREATMENT PLANT IMPROVEMENTS			
ELECTRICAL			
MCC ONE-LINES			
DIVISION	CONTRACT	SHEET	
	225.13.W-1	E-5 OF 20	