LOWELL REGIONAL WASTEWATER UTILITY (LRWWU)

CITY OF LOWELL, MASSACHUSETTS

COPY NO. ____

DUCK ISLAND WASTEWATER TREATMENT FACILITY

TEMPORARY CENTRIFUGE INSTALLATION

LOWELL CITY MANAGER

BERNARD F. LYNCH

LOWELL CITY COUNCILORS

PATRICK MURPHY, MAYOR
JOSEPH MENDONCA, VICE MAYOR
JOHN LEAHY
RODNEY ELLIOTT
WILLIAM MARTIN
RITA MERCIER
EDWARD KENNEDY
MARTIN LORRY
VESNA NUON

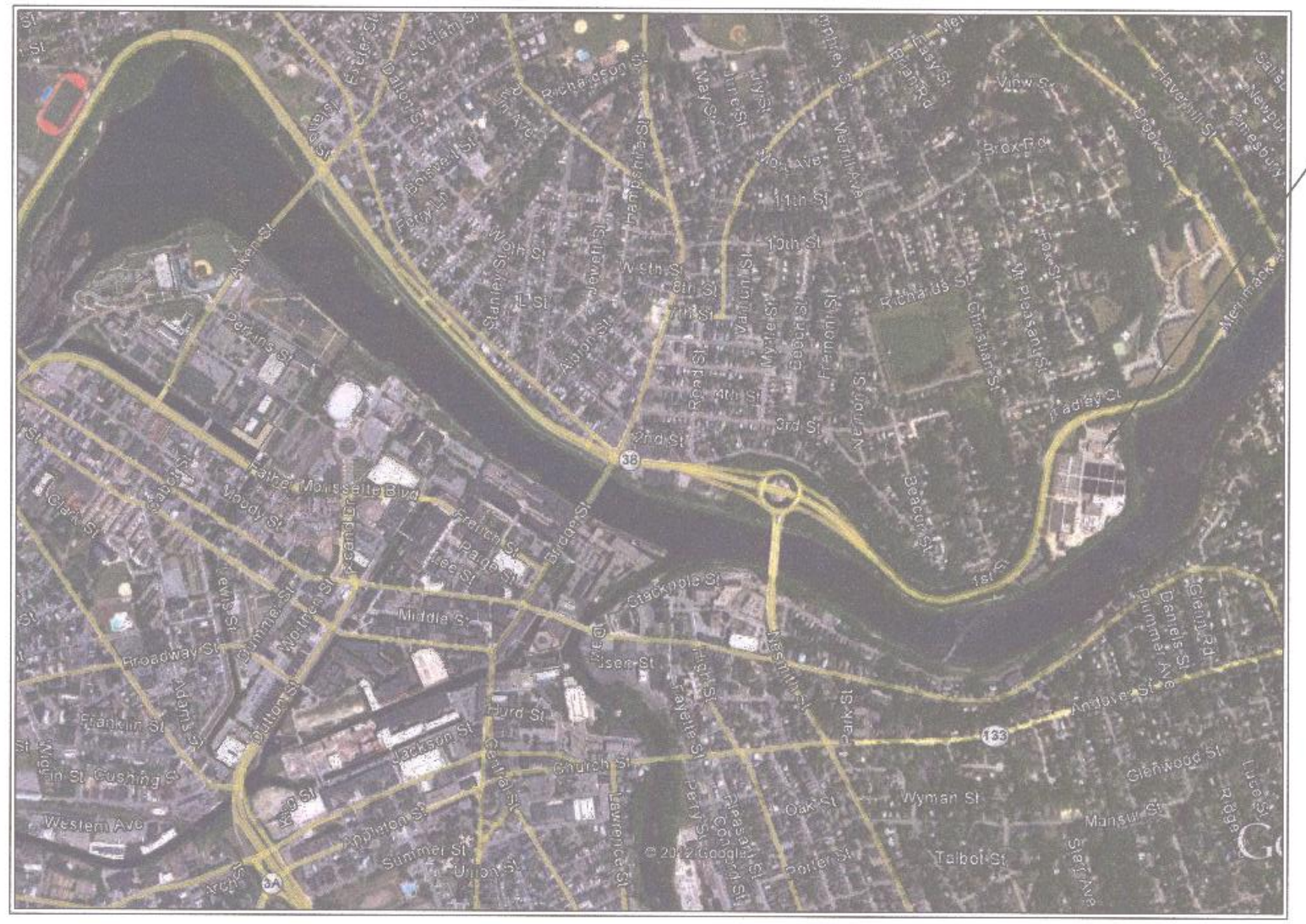
LRWWU EXECUTIVE DIRECTOR

MARK YOUNG

LRWWU ENGINEERING MANAGER

MICHAEL STUER

FEBRUARY 2013



LOCUS MAP
NOT TO SCALE

SHEET INDEX

M-901	SLUDGE PROCESS AND ADMINISTRATION BUILDING TEMPORARY DEWATERING PLAN
M-902	SLUDGE PROCESS AND ADMINISTRATION BUILDING POLYMER ROOM PLAN
M-903	PIPE TUNNELS – INTERTANK PLANS & SECTIONS
M-904	PHOTOS
EG-001	ELECTRICAL LEGEND
EC-901	SLUDGE PROCESS AND ADMINISTRATION BUILDING TRUCK LOADING AREA DEWATERING OIT DETAILS
EO-006	MCC-4 ONE-LINE DIAGRAM
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EP-903	SLUDGE PROCESS AND ADMINISTRATION BUILDING TRUCK LOADING AREA POWER AND INSTRUMENT PLAN

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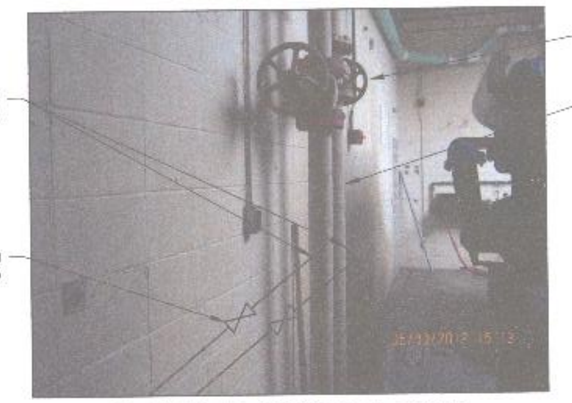
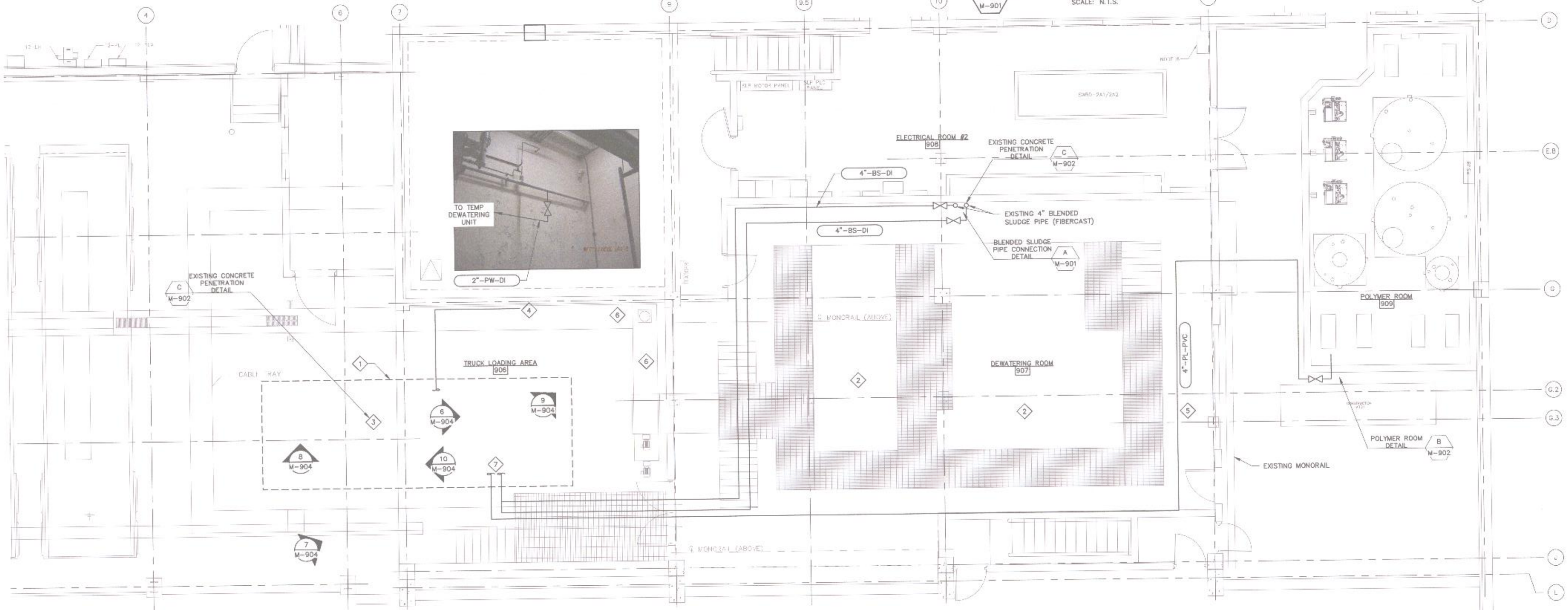
COMMONWEALTH OF MASSACHUSETTS
ERIK OSBORN
ENVIRONMENTAL
NO. 45435
REGISTERED PROFESSIONAL ENGINEER
2/15/13

0552-XXXXX



BLENDED SLUDGE PIPE CONNECTION DETAIL
A M-901
SCALE: N.T.S.



UPPER LEVEL PLAN VIEW
SCALE: 3/16" = 1'-0"

MECHANICAL KEYED NOTES

1. APPROXIMATE LOCATION OF TEMPORARY CENTRIFUGE SKID (FURNISHED BY OTHERS). CONTRACTOR SHALL ADJUST FINAL LOCATION OF SKID AND ANCHOR AS REQUIRED BY VENDOR.
2. BELT FILTER PRESSES NOT SHOWN.
3. CONTRACTOR SHALL FIELD LOCATE AND CORE THROUGH THE FLOOR AND TIE INTO THE PLANT'S GRAVITY DRAIN PIPING, SEE M-903.
4. CONTRACTOR SHALL TIE INTO THE EXISTING PLANT WATER PIPING (FIBERCAST) AND FIELD ROUTE TO CONNECTION POINT(S) ON CENTRIFUGE SKID.
5. CONTRACTOR SHALL INSTALL NEW SCHED 80 PVC POLYMER PIPING AND BALL VALVES.
6. CONTRACTOR SHALL INSTALL CENTRIFUGE DISCHARGE CONVEYOR (FURNISHED BY OTHERS) TO CONVEY SLUDGE CAKE FROM CENTRIFUGE SKID TO EITHER OF THE EXISTING SCREW CONVEYORS (HORIZONTAL OR INCLINED). SKID CONVEYOR SHALL DISCHARGE DIRECTLY ABOVE EXISTING CONVEYOR. DIAGONAL CHUTES OF ANY LENGTH SHALL NOT BE ACCEPTABLE. CONTRACTOR SHALL PERFORM ANY MISCELLANEOUS METALWORK REQUIRED INCLUDING MODIFYING EXISTING COVERS AND CONSTRUCTING A VERTICAL CHUTE WITH VERTICAL SIDES. SHEET METAL SHALL BE 304L SS, WELDED OR BOLTED WITH 316 SS HARDWARE. SUBMIT SHOP DRAWINGS TO ENGINEER FOR APPROVAL.
7. FIELD-ROUTE SLUDGE & POLYMER TO CONNECTION POINTS ON CENTRIFUGE SKID.

MECHANICAL GENERAL NOTES

1. NOT ALL EXISTING PIPING, EQUIPMENT, CABLE TRAYS ETC ARE SHOWN.
2. THE LAYOUT OF THE TEMPORARY DEWATERING UNIT SHALL NOT BLOCK ACCESS TO STAIRS, DOORS, OR EQUIPMENT. MINIMUM 3 FEET OF CLEARANCE SHALL BE PROVIDED AROUND THE DEWATERING CENTRIFUGE FOR ACCESS.
3. CONTRACTOR SHALL PROVIDE & FIELD ROUTE ALL DRAIN, SLUDGE, PLANT WATER, POLYMER AND OTHER PIPING REQUIRED FROM SOURCE TO CONNECTION POINT ON CENTRIFUGE SKID TO PROVIDE A FULLY FUNCTIONING SYSTEM INCLUDING ANY COUPLINGS AND TRANSITION FITTINGS NEEDED TO CONNECT THE PIPING TO THE CENTRIFUGE.
4. PIPE ROUTES SHOWN ARE FOR ILLUSTRATIVE PURPOSES ONLY. CONTRACTOR SHALL ROUTE PIPING AS NEEDED TO PREVENT CONFLICTS WITH EXISTING EQUIPMENT, PIPING, DUCTS, CONDUIT, ETC..
5. PIPE, VALVES, HANGERS, ETC SHALL BE IN ACCORDANCE WITH SPECIFICATIONS.
6. SEE SHEET M-902 FOR FLOOR AND WALL PENETRATION DETAILS.

6' 4' 2' 0 4' 8'
BAR SCALE
3/16" = 1'-0"
CHECK GRAPHIC SCALE BEFORE USING

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ERIK DEBROSSE ENVIRONMENTAL No. 39471 REGISTERED PROFESSIONAL COMMONWEALTH OF MASSACHUSETTS

NO.	DESCRIPTION	DATE
TECH	CHECKED BY: KCO	
	DESIGNED BY: RNF	
	DRAWN BY: DWS	

SLUDGE PROCESS AND ADMINISTRATION BUILDING TEMPORARY CENTRIFUGE PLAN

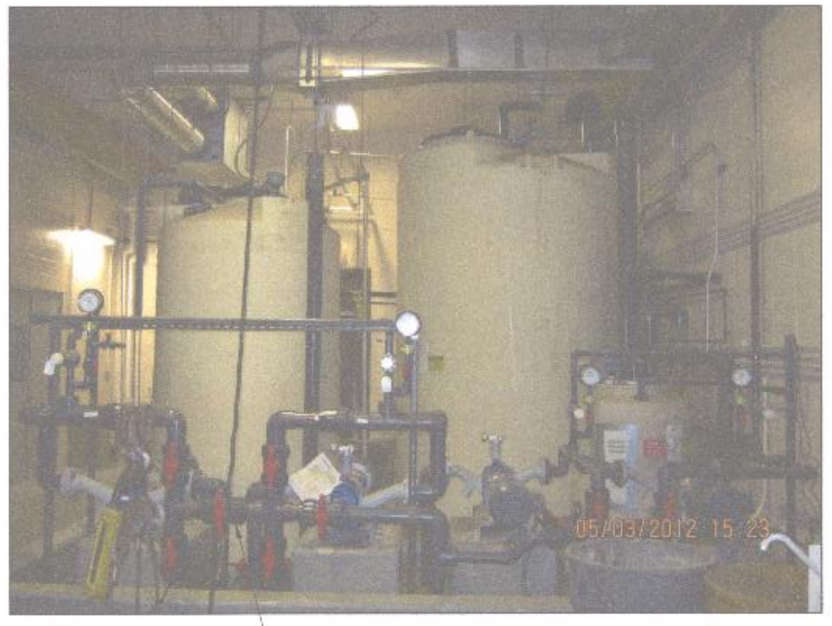
LOWELL REGIONAL WASTEWATER UTILITY
DUCK ISLAND WASTEWATER TREATMENT FACILITY

DUCK ISLAND WASTEWATER TREATMENT
TEMPORARY DEWATERING

JOB NO.: 21989.03/005
DATE: FEBRUARY 2013
SCALE: AS NOTED
SHEET: 1 OF 9

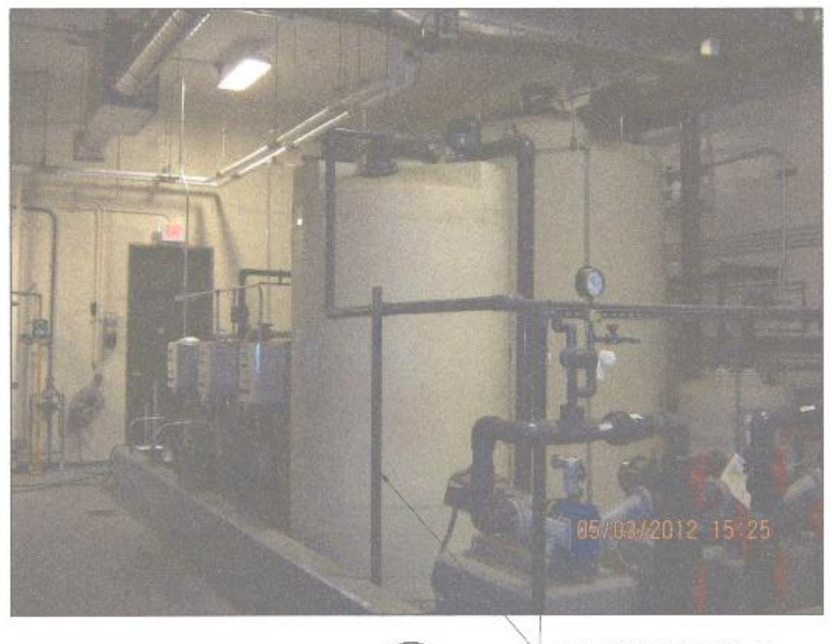
M-901

\\WOODARDFS-vip\proj\21989 Lowell\Tasks\06 Temporary Centrifuge Installation\Drawings\Revision\21989902 M Rev_902.dwg Feb 15, 2013 - 8:53am



CONTRACTOR SHALL TIE INTO DEWATERING POLYMER FEED PUMP DISCHARGE AND INSTALL NEW PIPING AND VALVE TO CONVEY DEWATERING POLYMER TO THE CENTRIFUGE.

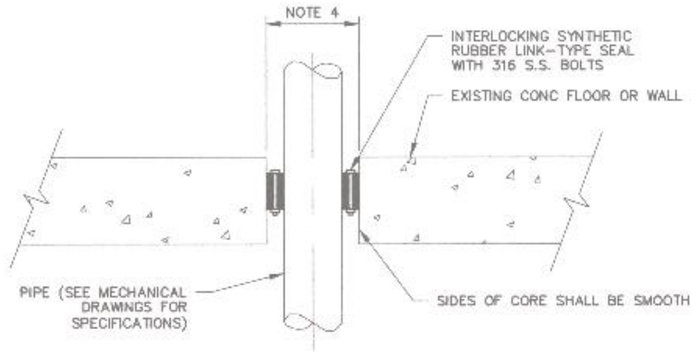
1 / M-902



2 / M-902

CONTRACTOR SHALL USE THE EXISTING VERTICAL SUPPORTS FOR THE NEW POLYMER PIPING

3 / M-902

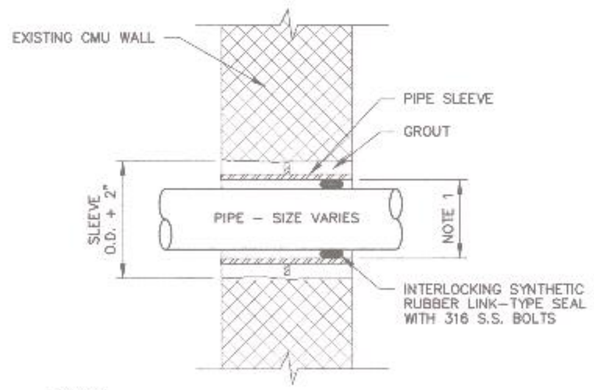


NOTES:

1. CORED OPENING DIAMETER AS RECOMMENDED BY LINK-SEAL MANUFACTURER.

C / M-901 EXISTING CONCRETE PENETRATION DETAILS

SCALE: N.T.S.

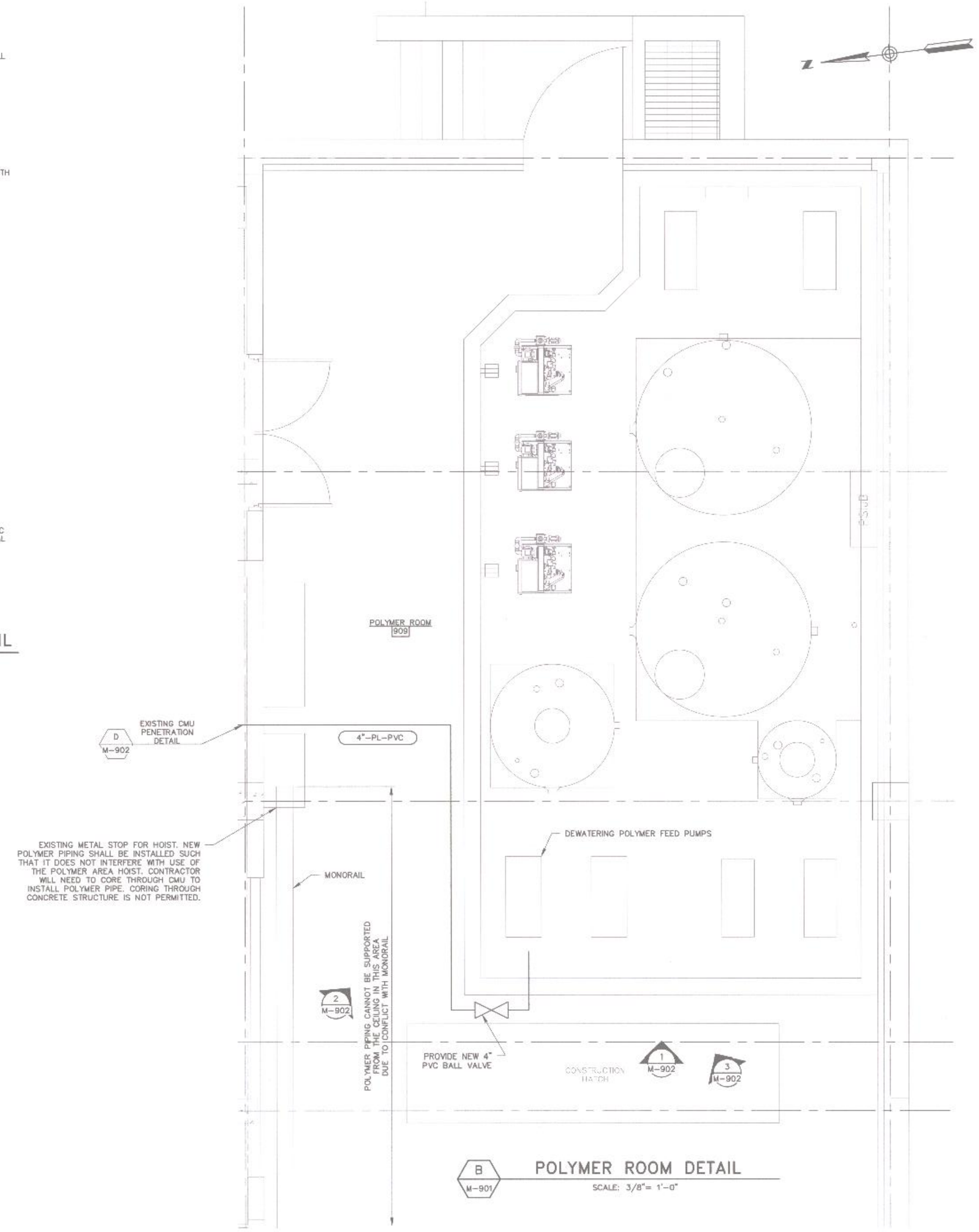


NOTES:

1. SLEEVE I.D. AS RECOMMENDED BY LINK-SEAL MANUFACTURER.

D / M-902 EXISTING CMU PENETRATION DETAIL

SCALE: N.T.S.



B / M-901 POLYMER ROOM DETAIL

SCALE: 3/8"= 1'-0"

4' 3' 2' 1' 0 3' 6'

BAR SCALE
3/8" = 1'-0"
CHECK GRAPHIC SCALE BEFORE USING

22x34 SHEET
1:1

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COMMONWEALTH OF MASSACHUSETTS
ERIK OSBORN
ENVIRONMENTAL
NO. 49471
REGISTERED PROFESSIONAL ENGINEER
2/13/13

REV	DESCRIPTION	DATE

DESIGNED BY: RNF
DRAWN BY: DMB
CHECKED BY: ECG
219889.03-M-901_902.dwg

SLUDGE PROCESS AND ADMINISTRATION BUILDING POLYMER ROOM PLAN

LOWELL REGIONAL WASTEWATER UTILITY
DUCK ISLAND WASTEWATER TREATMENT FACILITY

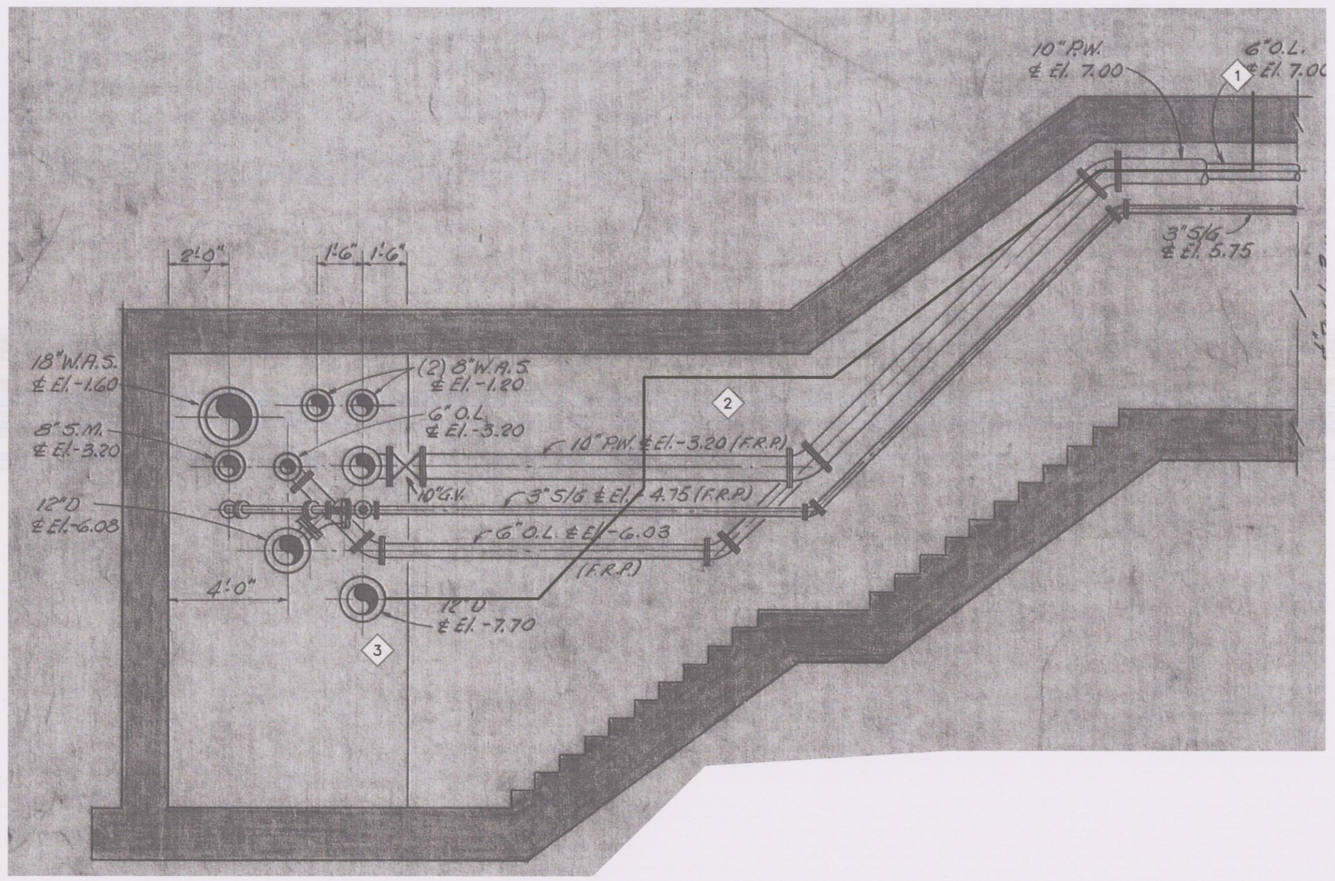
DUCK ISLAND WASTEWATER TREATMENT
TEMPORARY DEWATERING

JOB NO.: 219889.03/006
DATE: FEBRUARY 2013
SCALE: AS NOTED
SHEET 2 OF 9

M-902

MECHANICAL KEYED NOTES

1. CONTRACTOR SHALL FIELD LOCATE PENETRATION FOR THE CENTRATE DRAIN.
2. CONTRACTOR SHALL PROVIDE AND FIELD ROUTE NEW 8" PVC OR DI PIPE TO CONVEY CENTRATE TO EXISTING GRAVITY DRAIN PIPE. MIN 2% SLOPE TO DRAIN & MAINTAIN A CLEAR PATHWAY DOWN STAIRS. CONTRACTOR SHALL PROVIDE EITHER A TRAP OR INLINE CHECK VALVE FOR ODOR PREVENTION ON THE NEW PIPE. THE TRAP SHALL PROVIDE A MINIMUM OF 16 INCHES OF STANDING WATER. THE CHECK VALVE SHALL BE A SERIES 39-33 RED VALVE TIDEFLEX DUCKBILL INLINE CHECK VALVE.
3. CONNECT TO EXISTING 12" FRP DRAIN PIPE.

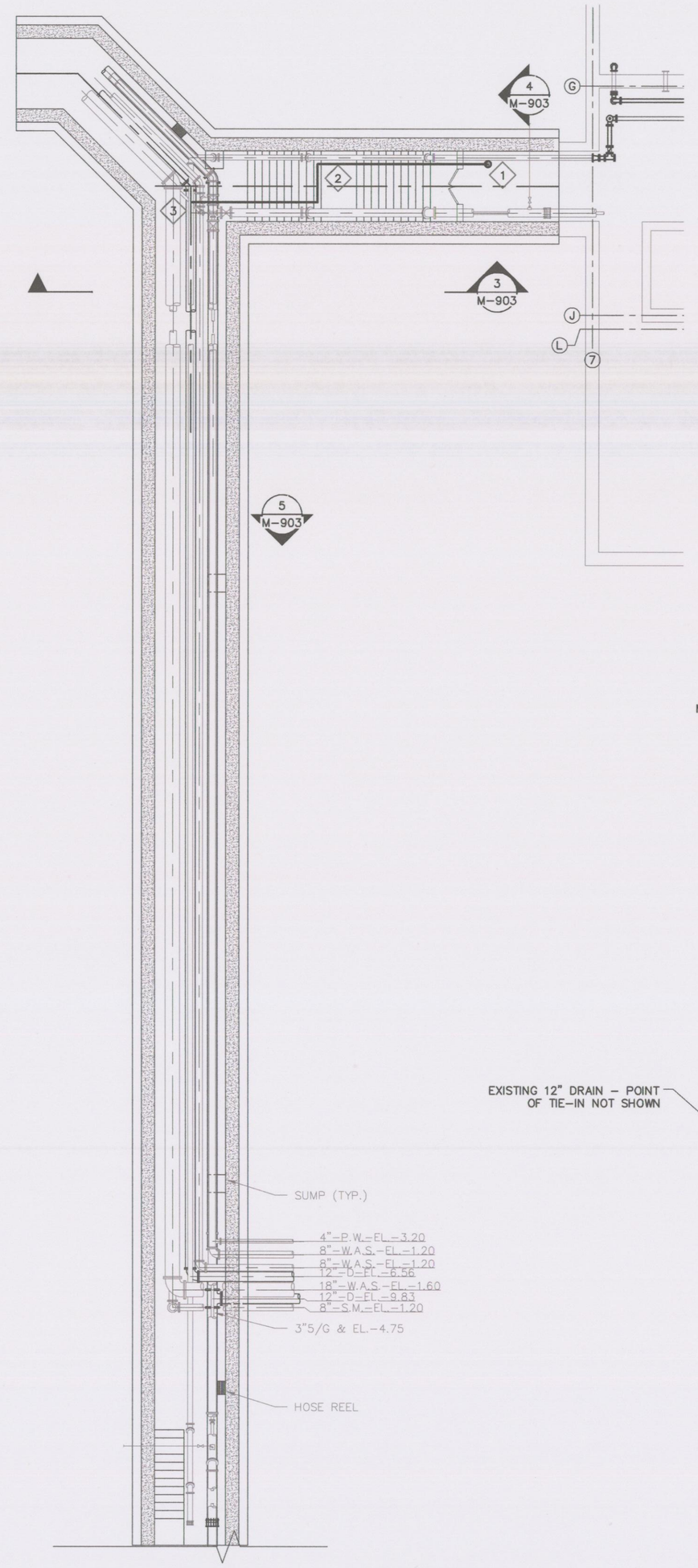


SCALE: NOT TO SCALE

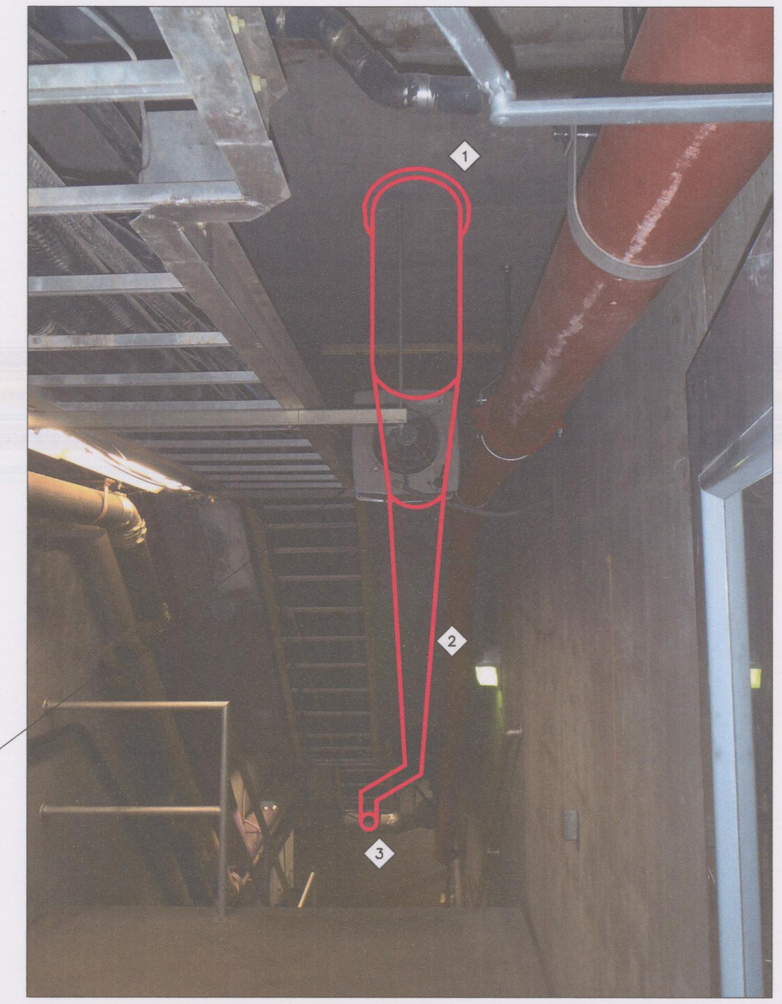
SECTION
SCALE: 1/4" = 1'-0"
3 / M-903

NOTES:

1. EXISTING CABLE TRAY & HEATER NOT SHOWN.
2. EXISTING PIPING DIFFER FROM SHOWN



PLAN OF CONNECTOR TUNNEL BETWEEN SECONDARY CLARIFIERS, SLUDGE PROCESSING BUILDING AND AERATION TANKS
SCALE: 3/32" = 1'-0"



4 / M-903

5 / M-903

16' 12' 8' 4' 0 12' 24'

BAR SCALE
3/32" = 1'-0"
CHECK GRAPHIC SCALE BEFORE USING

IMAGE SOURCE: WHITMAN & HOWARD INC., 89 BROAD ST., BOSTON, MASS., WASTEWATER TREATMENT PLANT FACILITIES, LOWELL, MASS., PIPE TUNNELS - INTERTANK PLANS & SECTIONS DRAWING NO. 10M-2, DATED MARCH 1975.

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COMMONWEALTH OF MASSACHUSETTS
ERIK OSBORN
PROFESSIONAL ENGINEER
NO. 39471
REGISTERED
2/15/13

REV	DESCRIPTION	DATE

DESIGNED BY: ECO | CHECKED BY: TS
DRAWN BY: DMB | 219889D-M-903.dwg

PIPE TUNNELS - INTERTANK PLANS & SECTIONS DEMOLITION

LOWELL REGIONAL WASTEWATER UTILITY
DUCK ISLAND WASTEWATER TREATMENT FACILITY

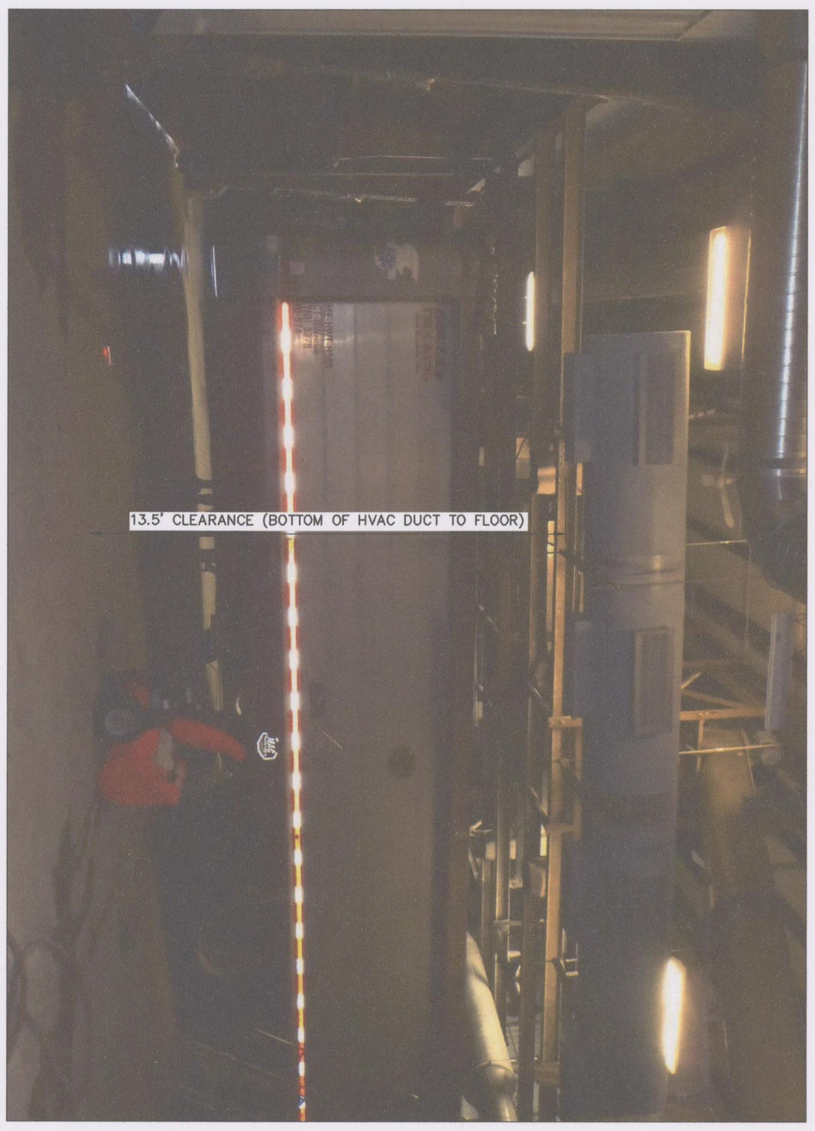
DUCK ISLAND WASTEWATER TREATMENT
TEMPORARY DEWATERING

JOB NO.: 219889.03/006
DATE: FEBRUARY 2013
SCALE: AS NOTED
SHEET: 3 OF 9

M-903

\\ANDOVER\Projects\219889 LRWU\wip\Task 06B Temporary Centrifuge Installation\Drawings\Mechanical\219889D-M-903.dwg, Feb 15, 2013 - 10:47am

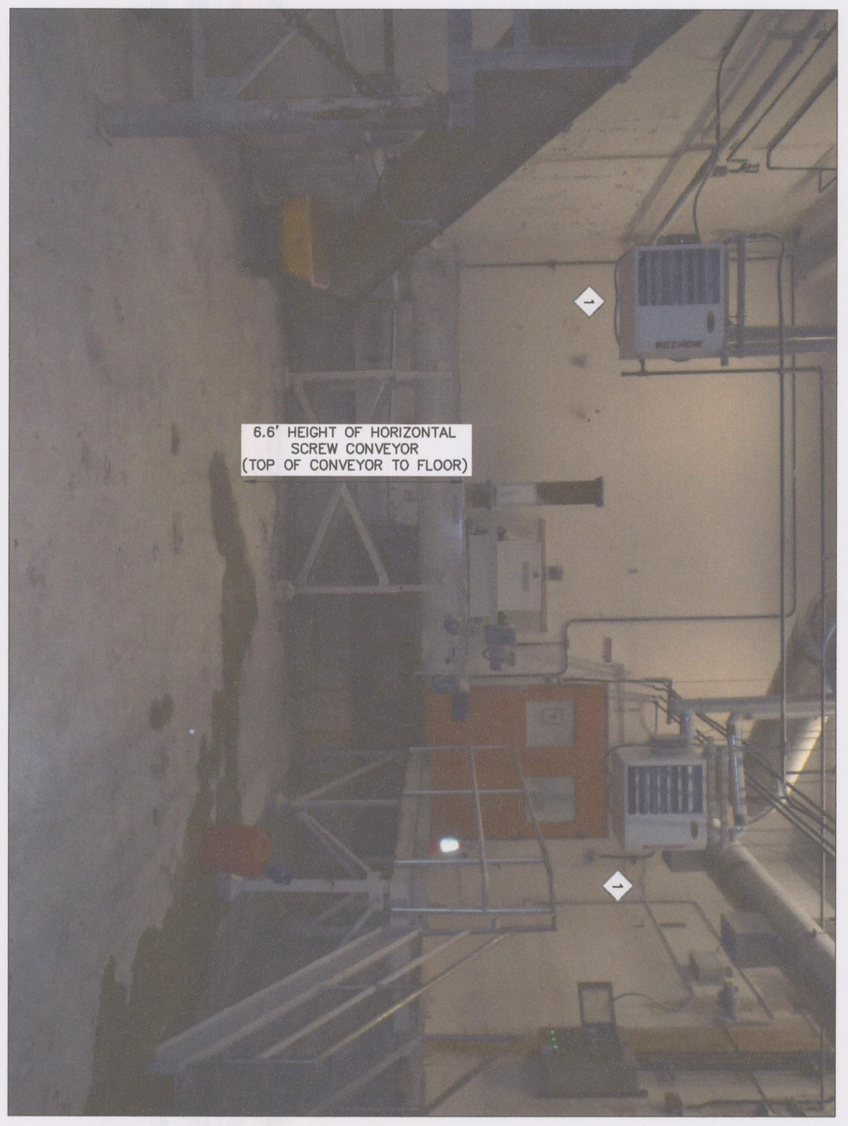
9 / M-903



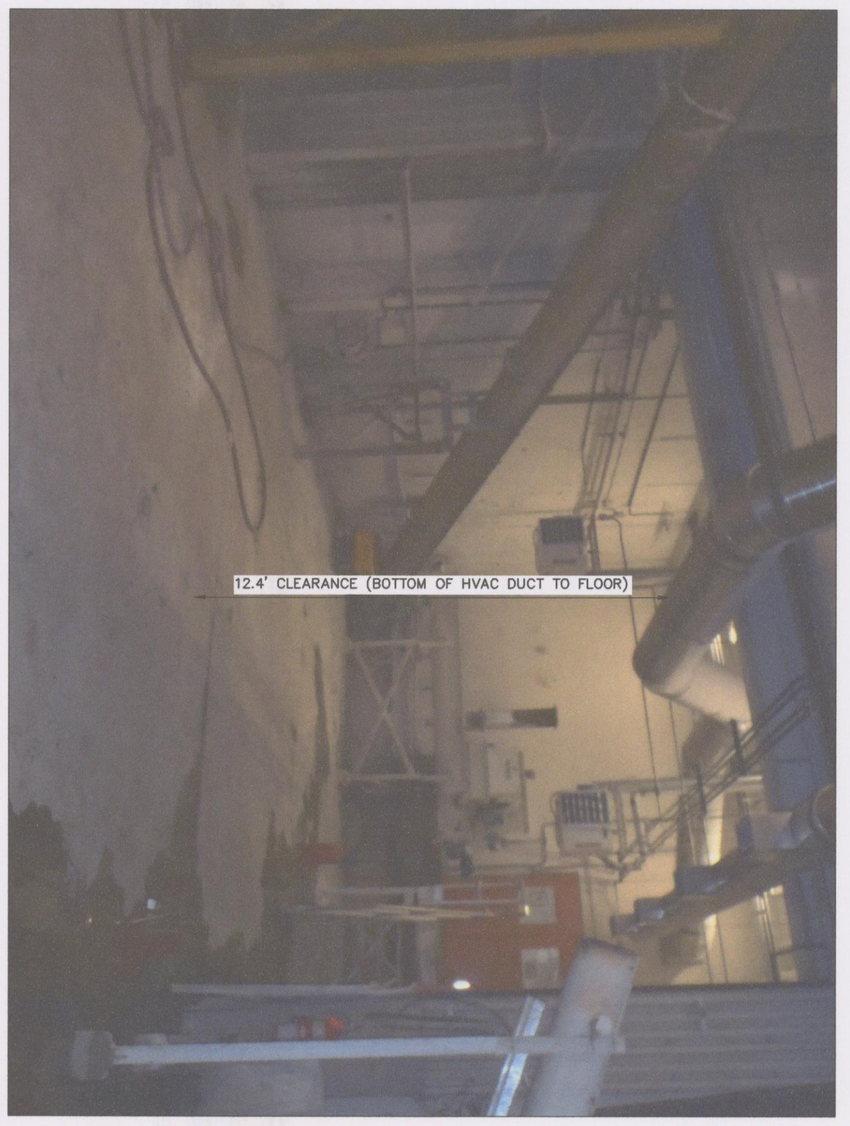
10 / M-903

MECHANICAL KEYED NOTES

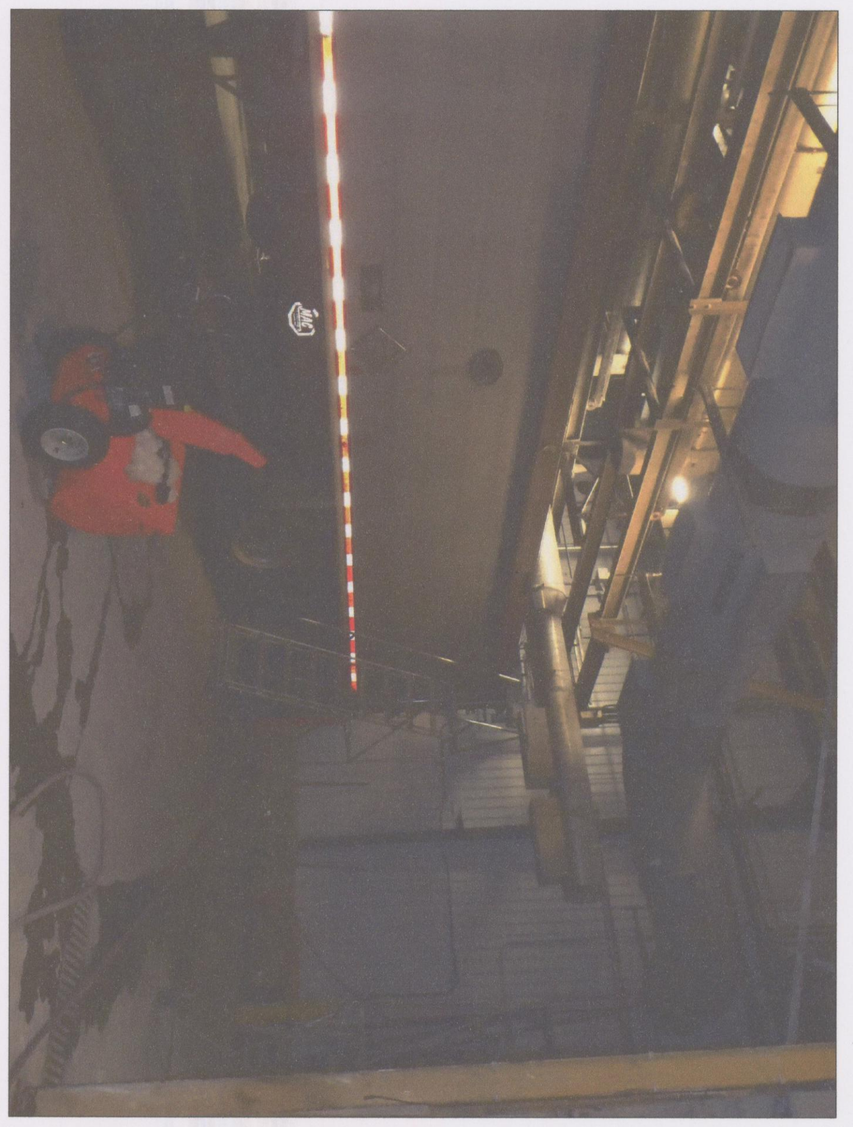
1. HEATERS TO BE RAISED/RELOCATED BY OTHERS.



6 / M-903



7 / M-903



8 / M-903

REV	DESCRIPTION	DATE

DESIGNED BY: ECO	CHECKED BY: TS
DRAWN BY: DMB	21988903-M-904.dwg

2/15/13
COMMONWEALTH OF MASSACHUSETTS
ERIK OSBORN ENVIRONMENTAL
NO. 48471
REGISTERED PROFESSIONAL ENGINEER

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M-904

JOB NO.: 219889.03/006
DATE: FEBRUARY 2013
SCALE: AS NOTED
SHEET: 4 OF 9

LOWELL REGIONAL WASTEWATER UTILITY
DUCK ISLAND WASTEWATER
TREATMENT FACILITY

DUCK ISLAND WASTEWATER TREATMENT

TEMPORARY DEWATERING

TRUCK LOADING AREA PHOTOS

22x34 SHEET
1:1

POWER

- HOME RUN. ARROWS INDICATE NUMBER OF CIRCUITS, CROSS LINES INDICATE NUMBER OF WIRES, OTHER THAN TWO (2). (P1–#)
- INDICATES CIRCUIT NUMBER
- PANEL DESIGNATION
- WIRING IN RACEWAY
- WIRING IN RACEWAY CONCEALED UNDERGROUND OR UNDERSLAB, MINIMUM 3/4"C
- WIRING IN RACEWAY CONCEALED UNDERGROUND, MINIMUM 3/4"C (–E–)
- CONDUIT TURNING UP
- CONDUIT TURNING DOWN
- CONDUIT STUB
- EY CONDUIT SEAL
- FLEXIBLE NON–METALLIC CONDUIT
- PANELBOARD
- CP — CONTROL PANEL
- ATC — AUTOMATIC TEMPERATURE CONTROL PANEL
- POWER COMPANY METER
- NON–FUSED SAFETY SWITCH
- F — FUSED SAFETY SWITCH
- NON–FUSED DISCONNECT/MAGNETIC MOTOR STARTER
- M — MANUAL MOTOR SWITCH (MOTOR RATED SWITCH), TOGGLE OPERATED, SINGLE PHASE. 1 OR 2 POLE AS REQUIRED
- CB 100A — ENCLOSED CIRCUIT BREAKER, AMPERE RATING
- (M) — ELECTRIC MOTOR, NUMBER INDICATES HORSEPOWER RATING
- HS H/O/A — LOCAL SELECTOR SWITCH; H/O/A – HAND/OFF/AUTO; H/O/R – HAND/OFF/REMOTE; L/O/R – LOCAL/OFF/REMOTE
- ST SP — STOP START PUSHBUTTON
- PUSHBUTTON STATION
- J — JUNCTION BOX
- T — TRANSFORMER
- P — POWER POLE
- DUPLEX RECEPTACLE, NEMA 5–20R – MTD CL UP 24" OR AS NOTED
- GFCI DUPLEX RECEPTACLE, NEMA 5–20R – MOUNTED CL UP 24", 6" ABOVE COUNTER, OR AS NOTED
- DOUBLE DUPLEX GFCI RECEPTACLE, NEMA 5–20R – MOUNTED CL UP 24", 6" ABOVE COUNTER, OR AS NOTED
- DUPLEX RECEPTACLE, NEMA 5–20R – MOUNTED CL UP 24" OR AS NOTED
- DOUBLE DUPLEX RECEPTACLE, NEMA 5–20R – MTD CL UP 24" OR AS NOTED
- SINGLE RECEPTACLE, NEMA 5–20R – MTD CL UP 24" OR AS NOTED
- FLUSH FLOOR OUTLET, DUPLEX RECEPTACLE, NEMA 5–20R
- MULTI SERVICE FLUSH FLOOR BOX WITH DUPLEX RECEPTACLE AND PROVISIONS FOR DATA
- FLUSH CEILING MTD DEVICE BOXES, ONE W/ DUPLEX RCPT FOR PROJECTOR POWER AND ONE FOR DATA TO SERVE OH PROJECTOR. RUN ONE 1 1/2"C TO JBOX LOCATED AT FRONT OF ROOM FOR PROJECTOR CABLE PATHWAY. VERIFY FINAL LOCATION W/ OWNER PRIOR TO ROUGH IN.
- 480V POWER RECEPTACLE, NEMA CONFIGURATION AS NOTED OR AS REQUIRED FOR EQUIPMENT SERVED.
- 208V OR 240V POWER RECEPTACLE, NEMA CONFIGURATION AS NOTED OR AS REQUIRED FOR EQUIPMENT SERVED.
- RECEPTACLE WITH CIRCLE INDICATES PENDANT MOUNTED.
- MD — MOTORIZED DAMPER
- T — THERMOSTAT
- R — RELAY
- TS — TORQUE SWITCH
- BT — DOOR BELL/BUZZER AND TRANSFORMER – MTD CL UP 7'–0" AFF
- X–# — CABLE ID TAG, LABEL CABLES AS SHOWN
- X–# — EQUIPMENT TAG
- # — GENERAL NOTE TAG

SECURITY

- SEC — SECURITY PANEL
- DS — DOOR INTRUSION SWITCH
- CR — CARD READER
- KP — KEY PAD
- E — EMERGENCY EXIT DOOR
- MOTION SENSOR
- CAM — SECURITY CAMERA, PTZ = PAN/TILT/ZOOM

LIGHTING

- 2x4 FLUORESCENT FIXTURE
- Ab — ASSOCIATED CONTROL DEVICE; FIXTURE TYPE (SEE LIGHT FIXTURE SCHEDULE)
- 1x4 FLUORESCENT FIXTURE
- 2x2 FLUORESCENT FIXTURE
- FIXTURE W/ CROSSED LINES INDICATE FIXTURES WITH EMERGENCY BATTERY BACK–UP UNITS
- DOWN LIGHT
- WALL MOUNTED FIXTURES
- FLOOD LIGHT
- WP — WALL PACK
- EXIT SIGN, CEILING MOUNTED. ARROW INDICATES EGRESS DIRECTION. SHADING INDICATES SIGN FACE. NUMERAL INDICATES BATTERY UNIT CONNECTED
- EXIT SIGN, WALL MOUNTED 6" ABOVE DOOR. SHADING INDICATES SIGN FACE. NUMERAL INDICATES SPECIFIED BATTERY UNIT.
- BATT — DUAL HEAD EMERGENCY LIGHT BATTERY PACK WITH NUMBER OF HEADS AS INDICATED – WALL MOUNTED MTD 7'–6" AFF. NUMERAL INDICATES BATTERY ID NUMBER.
- TANDEM EMERGENCY LIGHT BATTERY PACK & EXIT SIGN – WALL MOUNTED MTD 7'–6" AFF. NUMERAL INDICATES BATTERY ID NUMBER.
- REMOTE EMERGENCY LIGHTING HEAD – WALL MOUNTED MTD 7'–6" AFF. NUMERAL INDICATES BATTERY UNIT CONNECTED TO.
- S — SINGLE POLE TOGGLE SWITCH – MTD CL UP 4'–0" AFF
- S_3 — 3–WAY TOGGLE SWITCH – MTD CL UP 4'–0" AFF
- S_4 — 4–WAY TOGGLE SWITCH – MTD CL UP 4'–0" AFF
- S_M — WALL MOUNTED OCCUPANCY SENSOR – MTD CL UP 4'–0" AFF
- S_P — TOGGLE SWITCH WITH PILOT LIGHT – MTD CL UP 4'–0" AFF
- S_D — DIMMER SWITCH – MTD CL UP 4'–0" AFF
- S_{LV} — LOW VOLTAGE SWITCH – MTD CL UP 4'–0" AFF (SEE LIGHTING CONTROL SCHEDULE)
- S_{XP} — EXPLOSION PROOF SWITCH
- a — OCCUPANCY SENSOR; a. INDICATES CONTROLLED FIXTURE
- LC — LIGHTING CONTACTOR
- MS — MOTION SENSOR
- PC — PHOTOCELL

COMMUNICATIONS

- TEL — TELEPHONE BACKBOARD
- W — TELEPHONE SYSTEM WALL JACK; W–INDICATES WALL MOUNTED AT 60" AFF; P–INDICATES PAYPHONE; (2)–INDICATES 2 OUTLETS, SINGLE BOX
- PROVISIONS FOR TELEPHONE OUTLET. TWO–GANG WALL BOX WITH ONE 1"C STUB TO ABOVE ACCESSIBLE CEILING – MTD CL UP SAME AS ASSOCIATED RECEPTACLE
- PROVISIONS FOR DATA OUTLET. TWO–GANG WALL BOX WITH ONE 1"C STUB TO ABOVE ACCESSIBLE CEILING – MTD CL UP SAME AS ASSOCIATED RECEPTACLE
- PROVISIONS FOR TELEPHONE & DATA OUTLET. TWO–GANG WALL BOX WITH ONE 1"C STUB TO ABOVE ACCESSIBLE CEILING – MTD CL UP SAME AS ASSOCIATED RECEPTACLE
- PROVISIONS FOR SCADA SYSTEM OUTLET. TWO–GANG WALL BOX WITH ONE 1"C STUB TO ABOVE ACCESSIBLE CEILING – MTD CL UP SAME AS ASSOCIATED RECEPTACLE
- CEILING MOUNTED TELEPHONE SYSTEM OUTLET
- CEILING MOUNTED DATA SYSTEM OUTLET
- CEILING MOUNTED VOICE & DATA OUTLET
- FLUSH TELEPHONE FLOOR OUTLET
- FLUSH DATA FLOOR OUTLET
- FLUSH VOICE & DATA FLOOR OUTLET
- TV — TELEVISION COAXIAL OUTLET. MOUNTED UP SAME AS ASSOCIATED RECEPTACLE

INTERCOM & PAGING SYSTEM

- S — WALL MOUNTED SPEAKER
- S — CEILING MOUNTED SPEAKER
- PA — PAGING SYSTEM CONTROL PANEL
- HS — PAGING SYSTEM HANDSET

FIRE ALARM DIAGRAM SYMBOLS

- FACP — FIRE ALARM CONTROL PANEL
- FAA — FIRE ALARM ANNUNCIATOR
- FCPS — FIELD CHARGER POWER SUPPLY
- M — FIRE ALARM MASTER BOX
- K — KNOX BOX
- F — FIRE ALARM MANUAL PULL STATION – WALL MTD CL UP 4'–0"
- HL — FIRE ALARM AUDIBLE/VISIBLE NOTIFICATION APPLIANCE CANDELA (CD) POWER PER NFPA 72 OR AS NOTED – WALL MTD BOTTOM UP 80" AFF.
- L — FIRE ALARM VISUAL NOTIFICATION APPLIANCE CANDELA (CD) POWER PER NFPA 72 OR AS NOTED – WALL MTD BOTTOM UP 80" AFF
- CEILING MOUNTED SMOKE DETECTOR
- CEILING MOUNTED HEAT DETECTOR
- DUCT SMOKE DETECTOR S=SUPPLY, R=RETURN
- FS — SPRINKLER SYSTEM FLOW SWITCH
- TS — SPRINKLER SYSTEM TAMPER SWITCH
- PS — SPRINKLER SYSTEM PRESSURE SWITCH
- DH — FIRE ALARM SYSTEM MAGNETIC DOOR HOLDER
- M — MONITOR MODULE
- C — CONTROL MODULE
- R — RELAY MODULE

GROUNDING

- GROUND ROD
- EXOTHERMIC WELD CONNECTION
- G — BARE COPPER CONDUCTOR RUN EXPOSED
- G — BARE COPPER CONDUCTOR EMBEDDED IN CONCRETE OR BURIED
- BOLTED CONNECTION

ONE–LINE DIAGRAM SYMBOLS

- AI / AF / EO — LOW VOLTAGE DRAWOUT CIRCUIT BREAKER; AF – AMP FRAME; AT – AMP TRIP; EO – ELECTRICALLY OPERATED
- ST — ST – SHUNT TRIP; GF – GROUND FAULT; EO – ELECTRICALLY OPERATED
- DISCONNECT, ISOLATION OR SAFETY SWITCH
- FUSED DISCONNECT SWITCH
- MAGNETIC MOTOR STARTER. NUMERAL INDICATES NEMA SIZE. FVNR UNLESS OTHERWISE NOTED. FVR – FULL VOLTAGE REVERSING; RVAT – REDUCING VOLTAGE AUTO TRANSFORMER; 2S – TWO SPEED; YD – WYE DELTA REDUCED VOLTAGE STARTER; L – LIGHTING CONTACTOR
- CAPACITOR
- VFD — VFD = VARIABLE FREQUENCY DRIVE; SS = SOLID STATE STARTER; FILTER = HARMONIC FILTER; DCD = DIRECT CURRENT DRIVE; RVSS = REVERSE VOLTAGE SOFT STARTER; X–INDICATES AMP RATING
- POWER TRANSFORMER; OA – LIQUID TYPE SELF COOLED; AA – DRY TYPE SELF COOLED; FA – FAN COOLED
- CONNECTION
- 2 / 480/120 — POTENTIAL TRANSFORMER; RATIO; NUMBER REQUIRED
- 2 / 600/5 — CURRENT TRANSFORMER; RATIO; NUMBER REQUIRED
- 5 — MOTOR, NUMERAL INDICATES HORSEPOWER
- X — GENERAL LOAD, NUMERAL INDICATES LOAD IN KVA
- GENERATOR

ONE–LINE DIAGRAM SYMBOLS CON'T

- ATS — ATS – AUTOMATIC TRANSFER SWITCH; MTS – MANUAL TRANSFER SWITCH
- A — METER; A – AMMETER; V – VOLTMETER; W – WATTMETER; KWH – KILOWATT HOUR; KVAR – KILOVAR METER; VAR – VAR METER; HZ – FREQUENCY METER; PF – POWER FACTOR METER
- 3 — LINE OR LOAD REACTOR; NUMERAL INDICATES % IMPENDENCE
- DPM — DIGITAL POWER MONITOR
- AS — METER TRANSFER SWITCH; AS – AMMETER SWITCH; VS – VOLTMETER SWITCH
- TVSS — TRANSIENT VOLTAGE SURGE SUPPRESSOR
- DRAWOUT DEVICE
- GROUND
- XA — VACUUM BREAKER; X–AMP RATING

INSTRUMENTATION SYMBOLS PARTIAL LIST

- LS XX — LEVEL SWITCH
- FT XX — FLOW TRANSMITTER
- FIT XX — FLOW INDICATING TRANSMITTER
- FS XX — FLOW SWITCH
- GS XX — GAS SWITCH
- LSL XX — LEVEL SWITCH LOW
- LSH XX — LEVEL SWITCH HIGH
- LS XX — LEVEL TRANSMITTER
- LIT XX — LEVEL INDICATING TRANSMITTER
- MOV XX — MOTOR OPERATED VALVE
- PT XX — PRESSURE TRANSMITTER
- PIT XX — PRESSURE INDICATING TRANSMITTER
- PS XX — PRESSURE SWITCH
- SV XX — SOLENOID VALVE
- TT XX — TEMPERATURE TRANSMITTER
- ZS XX — PROXIMITY SWITCH
- FCV XX — FLOW CONTROL VALVE
- FS XX — FIELD MOUNTED INSTRUMENT – NEW DENOTES FURNISHED AND INSTALLED UNDER BASE BID
- FS XX — FIELD MOUNTED INSTRUMENT – EXISTING
- FS XXX — VENDER SUPPLIED INSTRUMENT
- FS XX — INSTRUMENT IDENTIFICATION TYPE; INSTRUMENT LOOP #; DESTINATION & LOOP IDENTIFICATION #; PLC# DO–XXX

CONTROL DIAGRAM SYMBOLS

NOTE: ALL CONTROL SYMBOLS ARE DRAWN ASSUMING DEENERGIZED CIRCUITS, EMPTY TANKS, UNPRESSURIZED LINES, ETC.

OPEN ON INCREASE	CLOSE ON INCREASE	
		PRESSURE SWITCH
		LEVEL SWITCH
		FLOW SWITCH
		TEMPERATURE SWITCH
NORMALLY CLOSED	NORMALLY OPEN	
		PUSH BUTTON
		INSTANTANEOUS CONTACT
		TIMED CLOSE CONTACT
		TIMED OPEN CONTACT
		LIMIT SWITCH

- H O A / XOO / OOX — SELECTOR SWITCH: QUANTITY OF ARROWS INDICATES NUMBER OF POSITIONS. XOO INDICATES UPPER CONTACT CLOSED IN LEFT POSITION AND OPEN IN CENTER AND RIGHT POSITIONS
- INTERNAL WIRING
- FIELD WIRING (BY E.C.)

CORROSIVE — TAG INDICATES ENVIRONMENT OF LOCATION.

GENERAL NOTES:

ALL HANGERS, SUPPORTS AND HARDWARE SHALL BE 304 OR 316 STAINLESS STEEL.

ALL NEW WORK INCLUDING EQUIPMENT, PIPING, DUCTWORK, CONDUIT, ENCLOSURES, LIGHTING, COATINGS, AND APPURTENANCES SHALL MEET THE REQUIREMENTS OF THE ENVIRONMENT AND NFPA 820 CLASSIFICATIONS.

ALL CORES GREATER THAN 4" TO BE DONE BY THE GENERAL CONTRACTOR.

COLVD — 54.38' — NAVD88

DATUM

N.T.S.

NOTE:
ALL ELEVATIONS SHOWN ON DRAWINGS ARE NAVD 1988 DATUM. TO CONVERT TO THE CITY OF LOWELL DATUM, SUBTRACT 54.38 FROM THE ELEVATION

ABBREVIATIONS

A,AMP	AMPERES
ACB	AIR CIRCUIT BREAKER
AC	ALTERNATING CURRENT
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AHJ	AUTHORITY HAVING JURISDICTION
AIC	AMPERE INTERRUPT CAPACITY
AWG	AMERICAN WIRE GAUGE
BFG	BELOW FINISHED GRADE
BW	BUSWAY
CATV	CABLE, TELEVISION
CB	CIRCUIT BREAKER
CCTV	CLOSED CIRCUIT TELEVISION
CL	CENTER LINE
CKT	CIRCUIT
CPT	CONTROL POWER TRANSFORMER
CT	CURRENT TRANSFORMER
CU	COPPER
DIG	DIGITAL
DISC	DISCONNECT
E.C.	ELECTRICAL CONTRACTOR
EMT	ELECTRIC METALLIC TUBING
EM	EMERGENCY
FAA	FIRE ALARM ANNUNCIATOR
FACP	FIRE ALARM CONTROL PANEL
FBO	FURNISHED BY OTHERS
FC	FOOT CANDLES
FLA	FULL LOAD AMPS
FLOUR	FLUORESCENT
F/R	FOWARD/REVERSE
FWE	FURNISHED WITH EQUIPMENT
G.C.	GENERAL CONTRACTOR
GEN	GENERATOR
GFCI	GROUND FAULT CIRCUIT INTERRUPTER
G,GND	GROUND
HID	HIGH INTENSITY DISCHARGE
HOA	HAND–OFF–AUTO
HP	HORSEPOWER
HPS	HIGH PRESSURE SODIUM
HTR	HEATER
HZ	FREQUENCY IN CYCLES/SECOND
IG	ISOLATED GROUND
IMT	INTERMEDIATE METALLIC CONDUIT
INC	INCANDESCENT
IS	INTRINSIC SAFTEY BARRIER
JB	JUNCTION BOX
K	KILO
KCMIL	1000 CIRCULAR MILS
KVA	KILOVOLT AMPERE
KVAR	KILOVOLT AMPERE REACTIVE
KW	KILOWATT
KWH	KILOWATT HOUR
LPS	LOW PRESSURE SODIUM
M.C.	MECHANICAL CONTRACTOR
MCC	MOTOR CONTROL CENTER
MCB	MAIN CIRCUIT BREAKER
MEC	MASSACHUSETTS ELECTRIC CODE
MFG	MANUFACTURER
MH	MANHOLE
MLO	MAIN LUGS ONLY
MTD	MOUNTED
MTR	MOTOR
MV	MEDIUM VOLTAGE
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NEUT	NEUTRAL
NO	NORMALLY OPEN
OL	OVERLOAD ELEMENT
PF	POWER FACTOR
PH	PHASE
PL	PILOT LIGHT
PRI	PRIMARY
PT	POTENTIAL TRANSFORMER
PVC	POLYVINYL CHLORIDE
RGS	RIGID STEEL CONDUIT
RTD	RESISTANCE TEMPERATURE DETECTOR
SEC	SECONDARY
SHLD	SHIELDED WIRE
SS	SOLID STATE
SST	SOLID STATE TRIP
S.STL	STAINLESS STEEL
ST	SINGLE THROW
SV	SOLENOID VALVE
T	TELEPHONE
TB	TERMINAL BOX
TC	TRAY RATED CABLE
TEMP	TEMPERATURE
TV	TELEVISION
TVSS	TRANSIENT VOLTAGE SURGE SUPPRESSOR
TYP	TYPICAL
UE	UNDERGROUND ELECTRIC
UG	UNDERGROUND
UH	UNIT HEATER
UPS	UNINTERRUPTED POWER SUPPLY
V	VOLTS
VA	VOLT–AMPERES
VAR	VOLT–AMPERE REACTIVE
VFD	VARIABLE FREQUENCY DRIVE
W	WATT
WM	WATT METER
WP	WEATHER PROOF
XFMR	TRANSFORMER
XP	EXPLOSION PROOF

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REV	DESCRIPTION	DATE

DESIGNED BY: SB | CHECKED BY: TMG
DRAWN BY: PFH | 219889-EG-001.dwg

ELECTRICAL LEGEND

LOWELL REGIONAL WASTEWATER UTILITY
DUCK ISLAND WASTEWATER TREATMENT FACILITY

DUCK ISLAND WASTEWATER TREATMENT
TEMPORARY DEWATERING

JOB NO.: 219889.03/006
DATE: FEBRUARY 2013
SCALE: AS NOTED
SHEET: 5 OF 9

EG-001

\\ANDOVER\Projects\219889_LRWWU\wip\Task 06B Temporary Centrifuge Installation\Drawing\Electrical\219889-03-006-EG-001.dwg, Feb 15, 2013 - 9:36am

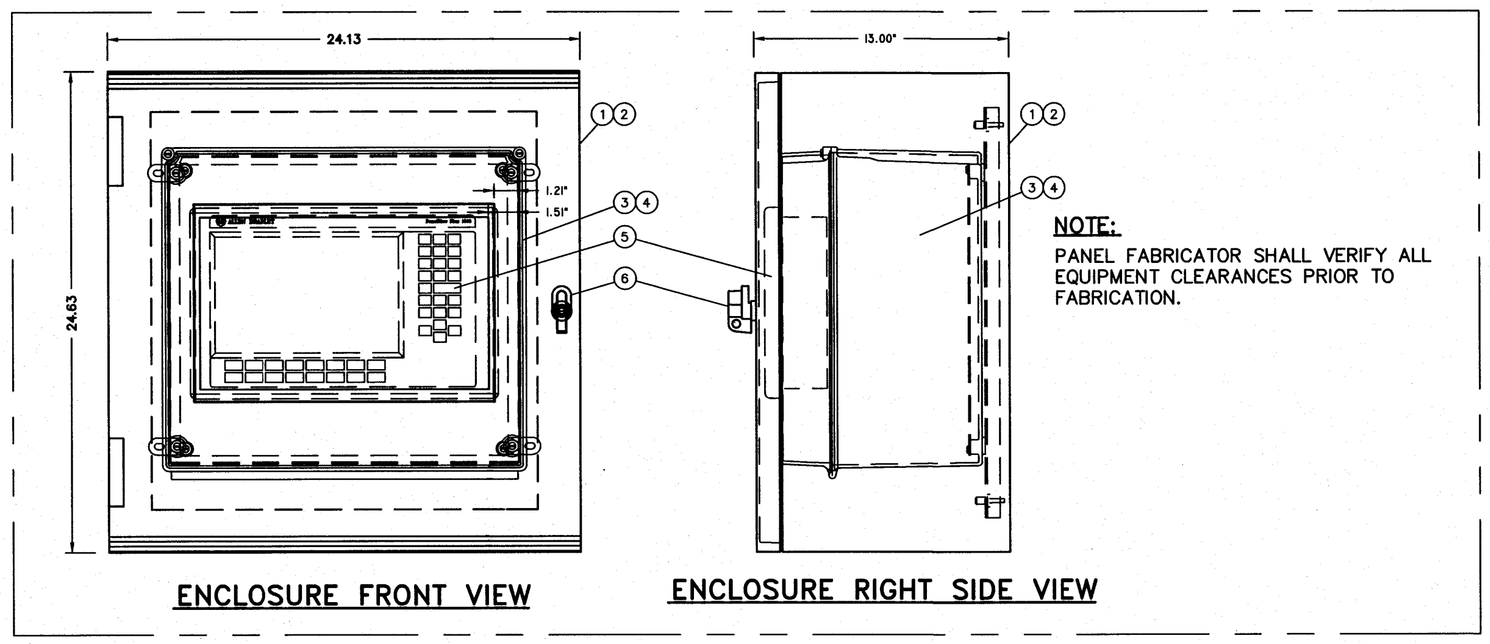
GENERAL NOTES:

1) REFERENCE SHEET EP-903 FOR LOCATION OF POWER PANEL 4 AND NODE 6.
2) IP ADDRESS OF OIT TO BE DETERMINED.

BILL OF MATERIAL

ITEM	QTY.	MANUFACTURER	PART NUMBER	DESCRIPTION	DESIGNATION
1	1	HOFFMAN	UU606030W	ENCLOSURE, NEMA 4X FIBERGLASS, 24.00" x 24.00" x 13.00"	OPERATOR INTERFACE PANEL
2	1	HOFFMAN	A24P24	BACKPANEL, 21.00" x 21.00"	OPERATOR INTERFACE PANEL
3	1	HOFFMAN	A181610CHSCFG	ENCLOSURE, NEMA 4X FIBERGLASS, 18.00" x 16.00" x 10.00"	OPERATOR INTERFACE PANEL
4	1	HOFFMAN	A18P16	BACKPANEL, 16.75" x 14.88"	OPERATOR INTERFACE PANEL
5	1	ALLEN BRADLEY	2711P-K10C4A1	PANELVIEW PLUS 1000 WITH KEYPAD	OPERATOR INTERFACE
6	1	HOFFMAN	UUHPL	ENCLOSURE PUSHBUTTON STYLE HANDLE	OPERATOR INTERFACE PANEL

OPERATOR INTERFACE PANEL



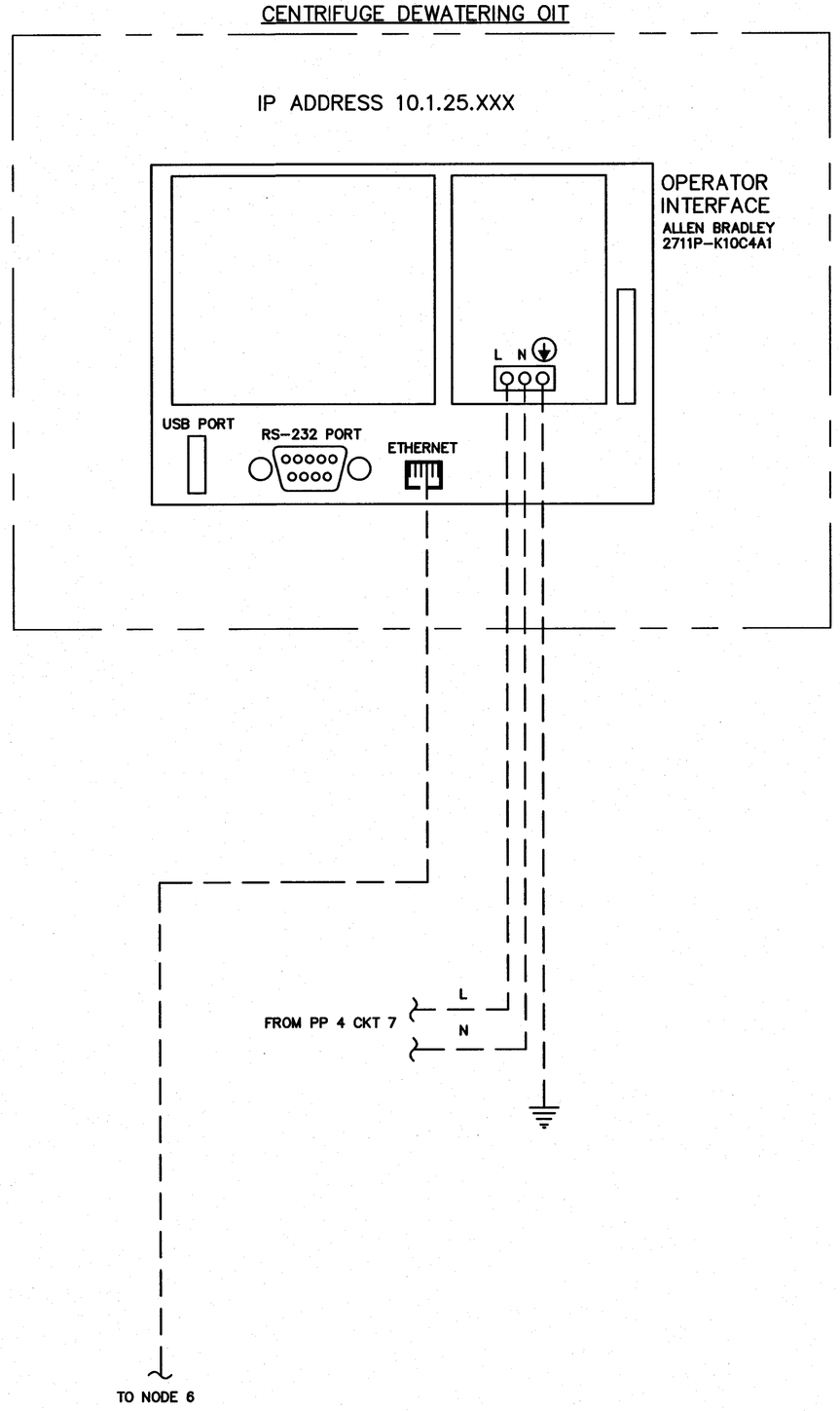
NOTE:
PANEL FABRICATOR SHALL VERIFY ALL EQUIPMENT CLEARANCES PRIOR TO FABRICATION.

ENCLOSURE FRONT VIEW

ENCLOSURE RIGHT SIDE VIEW

EQUIPMENT LAYOUT

CENTRIFUGE DEWATERING OIT



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COMMONWEALTH OF MASSACHUSETTS
TODD M. GIFFORD
ELECTRICAL
No. 46813
REGISTERED PROFESSIONAL ENGINEER

REV	DESCRIPTION	DATE

DESIGNED BY: JHG
DRAWN BY: PRM
CHECKED BY: JHG
2198903-EC-901.dwg

SLUDGE PROCESS & ADMINISTRATION BUILDING TRUCK LOADING AREA DEWATERING OIT DETAILS

LOWELL REGIONAL WASTEWATER UTILITY
DUCK ISLAND WASTEWATER TREATMENT FACILITY

DUCK ISLAND WASTEWATER TREATMENT
TEMPORARY DEWATERING

JOB NO.: 219889.03/006
DATE: FEBRUARY 2013
SCALE: AS NOTED
SHEET: 6 OF 9

EC-901

\\ANDOVER\Projects\219889 LRWWU\wip\Task 06B Temporary Centrifuge Installation\Drawings\Electrical\21988903-EC-901.dwg, Feb 15, 2013 - 9:36am

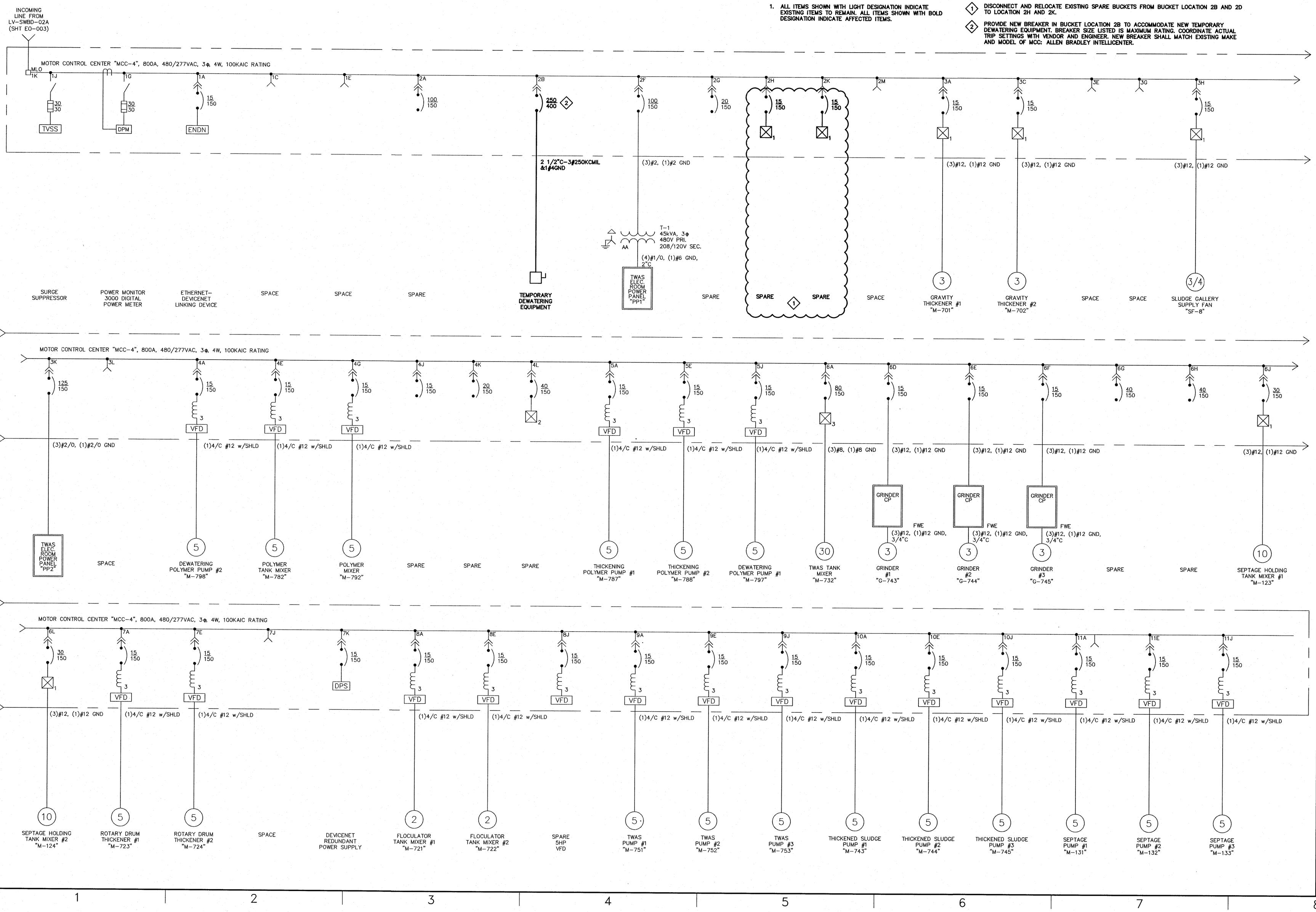
22x34 SHEET
1:1

ELECTRICAL GENERAL NOTES:

1. ALL ITEMS SHOWN WITH LIGHT DESIGNATION INDICATE EXISTING ITEMS TO REMAIN. ALL ITEMS SHOWN WITH BOLD DESIGNATION INDICATE AFFECTED ITEMS.

ELECTRICAL KEYED NOTES:

1. DISCONNECT AND RELOCATE EXISTING SPARE BUCKETS FROM BUCKET LOCATION 2B AND 2D TO LOCATION 2H AND 2K.
2. PROVIDE NEW BREAKER IN BUCKET LOCATION 2B TO ACCOMMODATE NEW TEMPORARY DEWATERING EQUIPMENT. BREAKER SIZE LISTED IS MAXIMUM RATING. COORDINATE ACTUAL TRIP SETTINGS WITH VENDOR AND ENGINEER. NEW BREAKER SHALL MATCH EXISTING MAKE AND MODEL OF MCC: ALLEN BRADLEY INTELLICENTER.



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COMMONWEALTH OF MASSACHUSETTS — JEFFREY T. GOFFORD — 38613 — REGISTERED PROFESSIONAL ENGINEER — 12/31/13

REV	DESCRIPTION	DATE

DESIGNED BY: SB | CHECKED BY: TMG
DRAWN BY: PTH | 2188903-10-006.dwg

MCC-4 ONE-LINE DIAGRAM

LOWELL REGIONAL WASTEWATER UTILITY
DUCK ISLAND WASTEWATER TREATMENT FACILITY

DUCK ISLAND WASTEWATER TREATMENT
TEMPORARY DEWATERING

JOB NO.: 219889.03/006
DATE: FEBRUARY 2013
SCALE: AS NOTED
SHEET: 7 OF 9

EO-006

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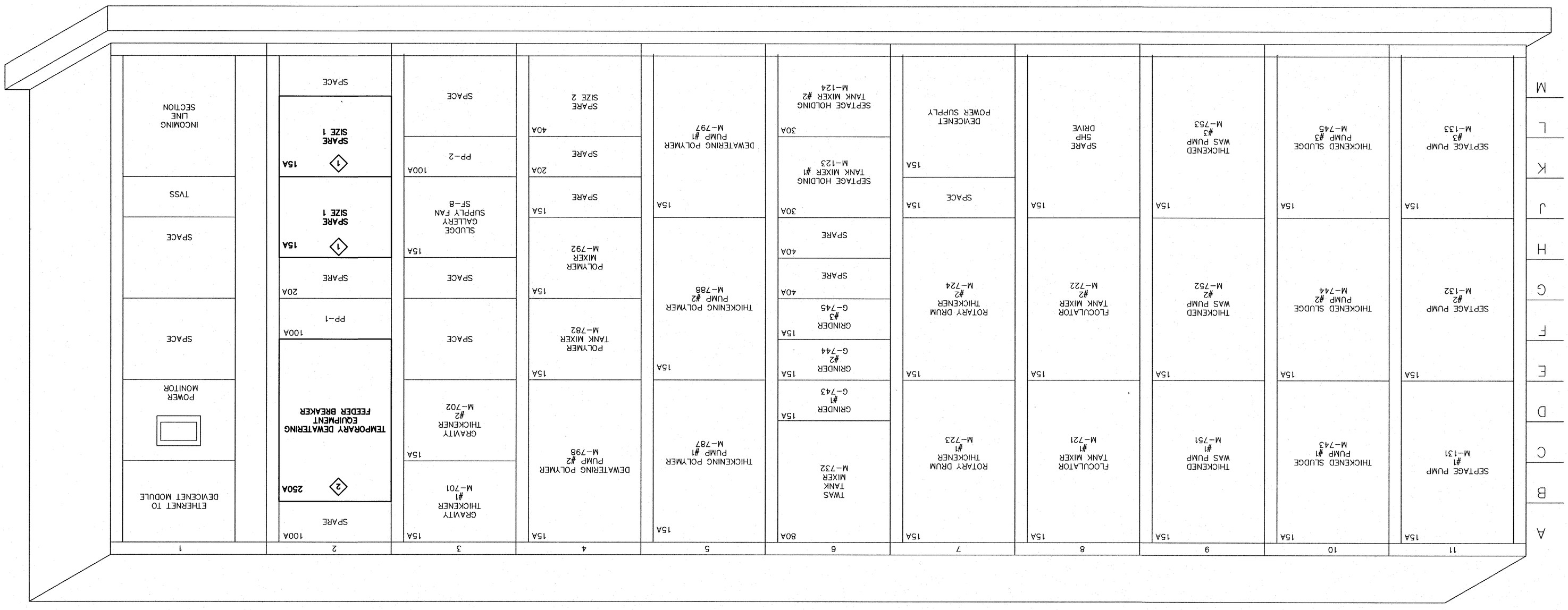

ELECTRICAL GENERAL NOTES:

1. ALL ITEMS SHOWN WITH LIGHT DESIGNATION INDICATE EXISTING ITEMS TO REMAIN. ALL ITEMS SHOWN WITH BOLD DESIGNATION INDICATE AFFECTED ITEMS.

ELECTRICAL KEYED NOTES:

1. DISCONNECT AND RELOCATE EXISTING SPARE BUCKETS FROM BUCKET LOCATION 2B AND 2D TO LOCATION 2H AND 2K.
2. NEW BUCKET SHALL BE TOP FED.

MCC-4 ELEVATION

LOWELL REGIONAL WASTEWATER UTILITY
DUCK ISLAND WASTEWATER TREATMENT FACILITY

DUCK ISLAND WASTEWATER TREATMENT
TEMPORARY DEWATERING

REV	DESCRIPTION	DATE

DESIGNED BY: SB
DRAWN BY: PTH
CHECKED BY: TMG
219889-EO-006A.dwg

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SCALE: AS NOTED
SHEET: 8 OF 9

EO-006A

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22x34 SHEET
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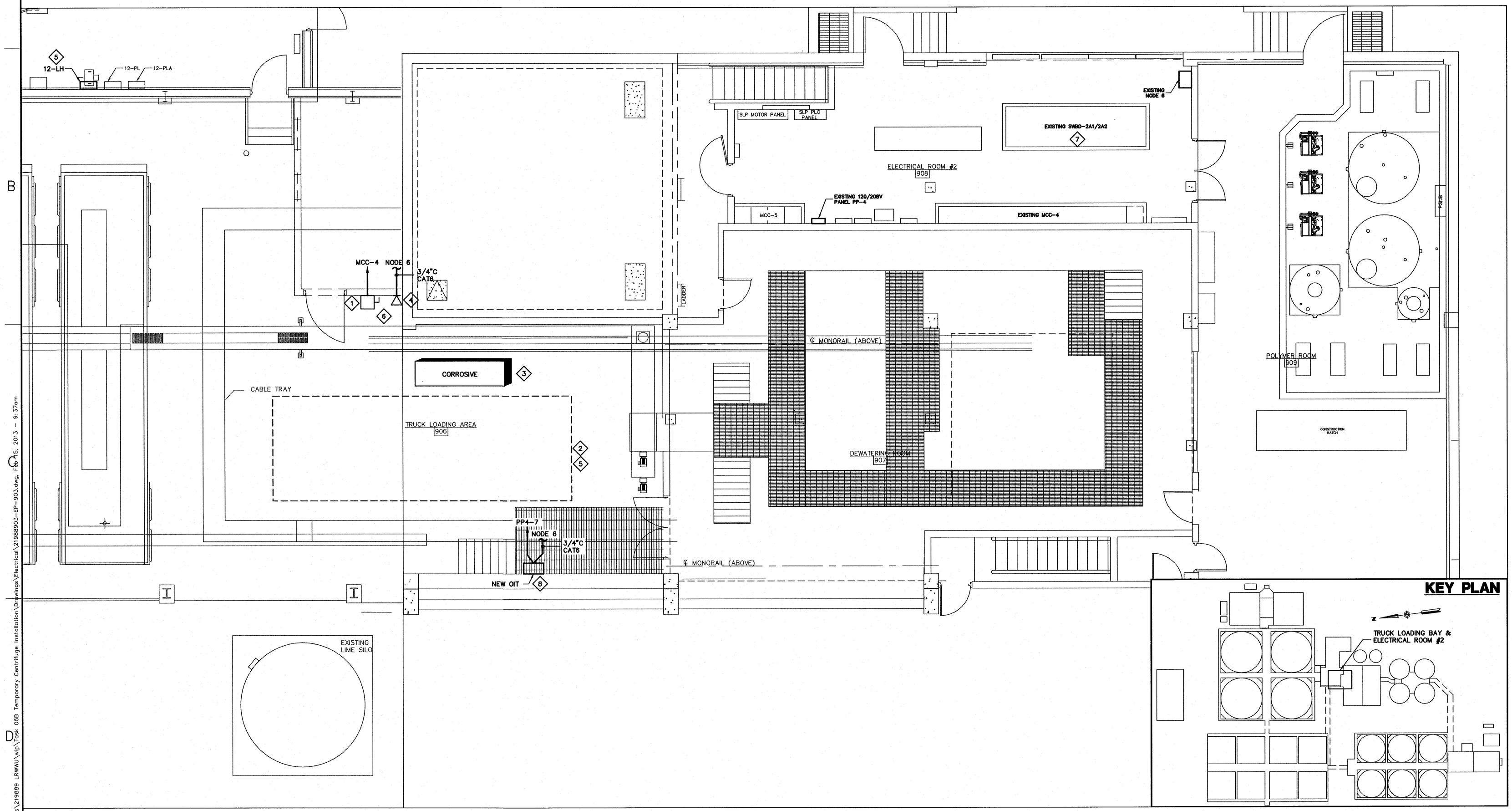
ELECTRICAL GENERAL NOTES:

1. ALL ITEMS SHOWN WITH LIGHT DESIGNATION INDICATE EXISTING ITEMS TO REMAIN. ALL ITEMS SHOWN WITH BOLD DESIGNATION INDICATE AFFECTED ITEMS.
2. ALL HANGERS, SUPPORTS AND HARDWARE SHALL BE 304 OR 316 STAINLESS STEEL.
3. ROUTE ALL CONDUIT TIGHT TO BUILDING STEEL ALONG EXISTING RACEWAYS.
4. CONTRACTOR SHALL FIELD VERIFY LOCATION OF ALL EQUIPMENT. NOT ALL OBSTRUCTIONS MAY BE SHOWN.

ELECTRICAL KEYED NOTES:

1. PROVIDE S.STL. NEMA 4X, 3PH, 400A LOCAL DISCONNECT FOR TEMPORARY DEWATERING EQUIPMENT. COORDINATE FINAL LOCATION WITH GC AND ENGINEER. PROVIDE 480V 3PH BREAKER IN MCC-4. ALL EQUIPMENT SHALL MATCH EXISTING MANUFACTURER MAKE AND MODEL: ALLEN BRADLEY INTELLICENTER. COORDINATE CABLE SIZES, BREAKER SIZES AND CONDUIT SIZES WITH EQUIPMENT VENDOR AND ENGINEER. FLA SHALL NOT EXCEED 240A. IF FLA IS GREATER THAN 240A COORDINATE WITH ENGINEER PRIOR TO INSTALLATION OF BREAKER.
2. ACCEPTABLE EQUIPMENT LOCATIONS. REFER TO M-901 FOR FURTHER DETAILS.
3. THE CORROSIVE DESIGNATION INDICATES THAT THE ATMOSPHERIC CONDITIONS IN THE TRUCK LOADING AREA ARE SUCH THAT PER NFPA SIX AIR CHANGES PER HOUR ARE REQUIRED.
4. PROVIDE S.STL. NEMA 4X CAT6 DATA OUTLET WITH WHILE-IN-USE COVER.
5. ANY LIGHTING FIXTURES THAT ARE REMOVED DUE TO INSTALLATION OF TEMPORARY DEWATERING EQUIPMENT SHALL BE RELOCATED OR REMOVED FROM THE SITE AS DIRECTED BY THE ENGINEER. FIXTURES ARE FED FROM LOCAL LIGHTING PANEL 12-LH.
6. LOCATION OF LOCAL DISCONNECT AND DATA OUTLET ARE SHOWN FOR CLARITY. COORDINATE FINAL LOCATION OF DISCONNECT AND DATA OUTLET WITH TEMPORARY DEWATERING EQUIPMENT ORIENTATION, ELECTRICAL CONNECTION POINT AND DATA CONNECTION POINT.
7. COORDINATE ADJUSTMENT OF TRIP SETTING OF MAIN BREAKER FOR MCC-4 IN SWBD-2A WITH ADDITION OF NEW TEMPORARY DEWATERING EQUIPMENT LOAD.
8. COORDINATE FINAL LOCATION OF OIT WITH OWNER AND ENGINEER.



TRUCK LOADING AREA POWER & INSTRUMENT PLAN

SCALE: 3/16" = 1'-0"

6' 4' 2' 0 4' 8'

BAR SCALE
3/16" = 1'-0"
CHECK GRAPHIC SCALE BEFORE USING

KEY PLAN

SCALE: NTS

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COMMONWEALTH OF MASSACHUSETTS — TERRY A. DIFFORD — 38417 — REGISTERED PROFESSIONAL ENGINEER

REV	DESCRIPTION	DATE

DESIGNED BY: RPH
DRAWN BY: DMB
CHECKED BY: TMG
219889D3-EP-903.dwg

SLUDGE PROCESS AND ADMINISTRATION BUILDING TRUCK LOADING AREA POWER AND INSTRUMENT PLAN

LOWELL REGIONAL WASTEWATER UTILITY
DUCK ISLAND WASTEWATER TREATMENT FACILITY

DUCK ISLAND WASTEWATER TREATMENT
TEMPORARY DEWATERING

JOB NO.: 219889.03/006
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EP-903

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