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[MailTo:ContractAdministration@TampaGov.net](mailto:ContractAdministration@TampaGov.net)

Please Let Us Know If You Plan To Bid

City of Tampa
Contract Administration Department
306 E. Jackson St. #280A4N
Tampa, FL 33602
(813)274-8456

DAVID L. TIPPIN WATER TREATMENT FACILITY BROMATE CONTROL PROJECT

PREPARED BY:

HAZEN AND SAWYER
Environmental Engineers & Scientists

10002 Princess Palm Ave., Suite 200
Tampa, Florida 33619
Certificate of Authorization Number: 2771

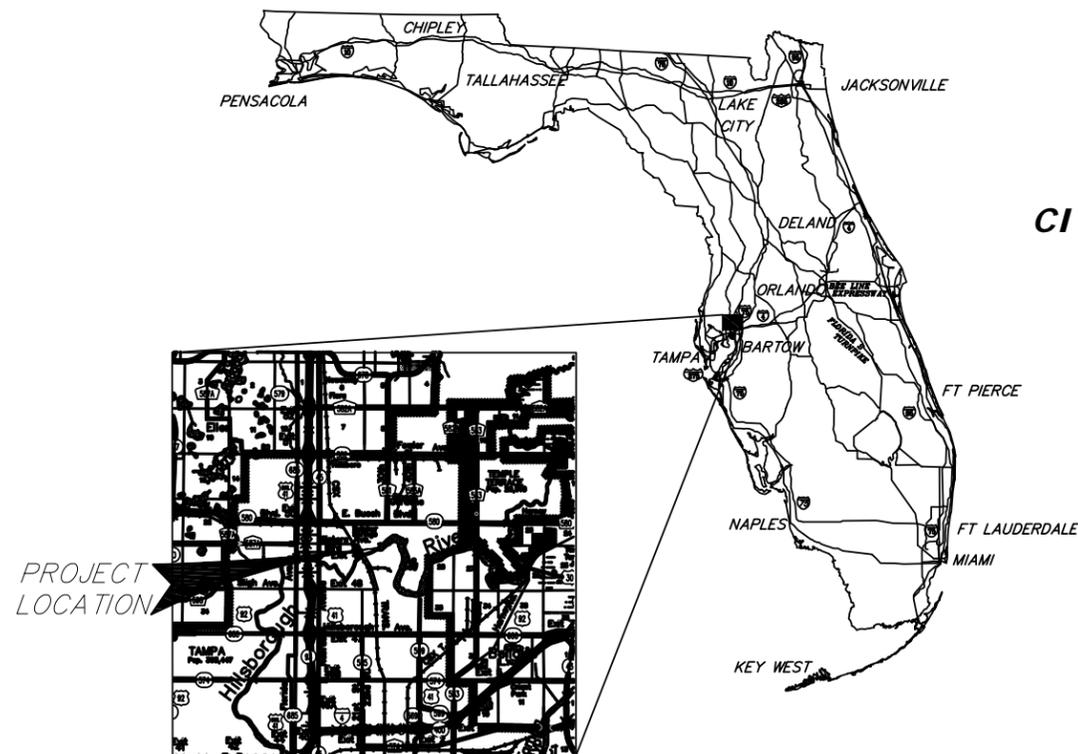
CONTRACT NO. 13-C-22

PREPARED FOR:

CITY OF TAMPA WATER DEPARTMENT
306 E. JACKSON STREET
TAMPA, FL 33602

INDEX OF DRAWINGS

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-	COVER SHEET
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I-3	ANALYZER DETAILS



LOCATION MAP

SEC. 29 TWN. 28 RNG. 19

PROJECT ADDRESS

7125 N. 30TH STREET
TAMPA, FL 33610

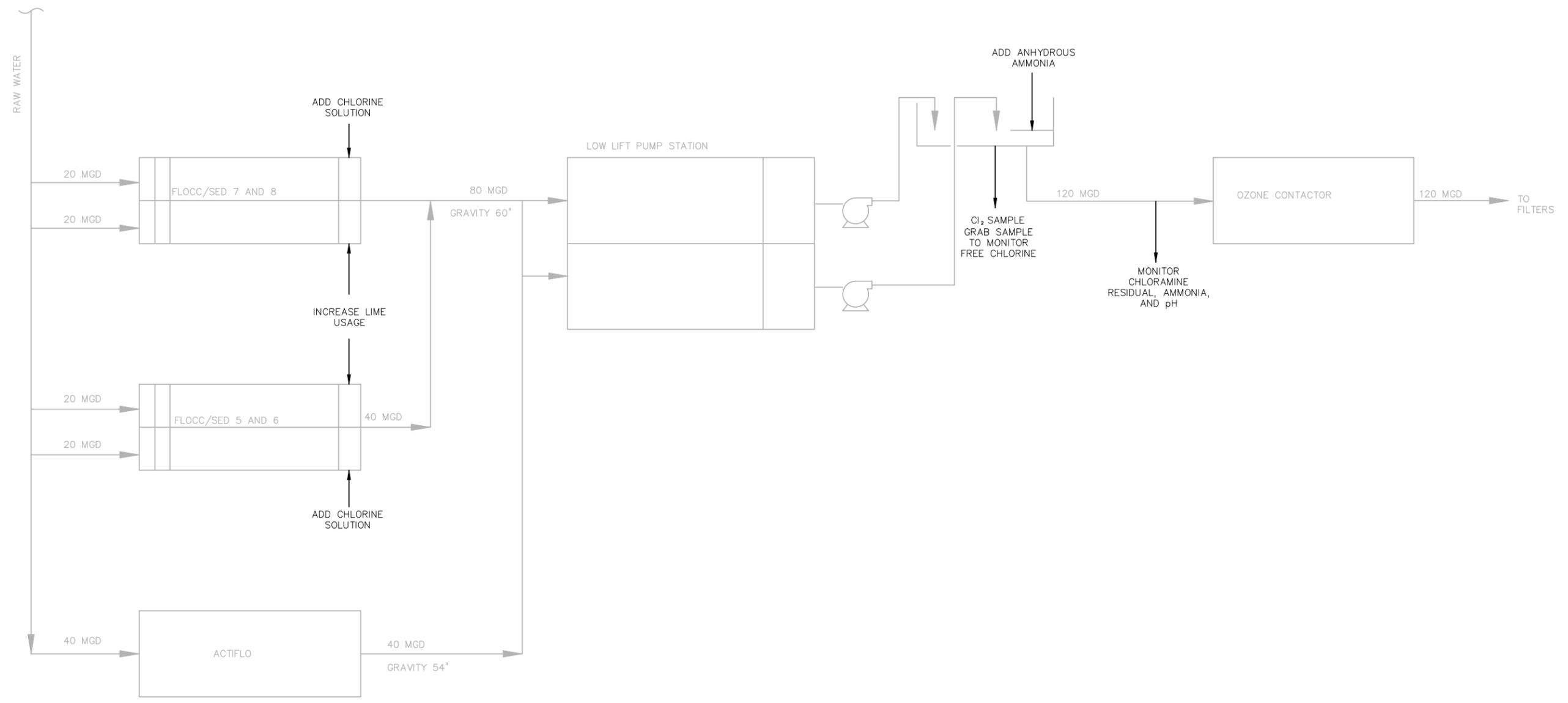


APRIL 2013

CONSTRUCTION DRAWINGS

NOTE: THE SCALE OF THESE PLANS MAY
HAVE CHANGED DUE TO REPRODUCTION.

NOTES:
 1. CHLORINE WILL BE ADDED AT ONE OR BOTH PAIRS OF FLOCC/SED BASINS.



LEGEND
 ——— EXISTING
 ——— PROPOSED PROCESS CHANGES

DESIGNED	RKA
DRAWN	ESM
CHECKED	AAD
PROJ. ENGR.	RKA
1	CONSTRUCTION
NO.	ISSUED FOR
04/2013	DATE
RKA	BY
APPROVED	

ROBERT K. ANDERSON P.E.
 No. 47129



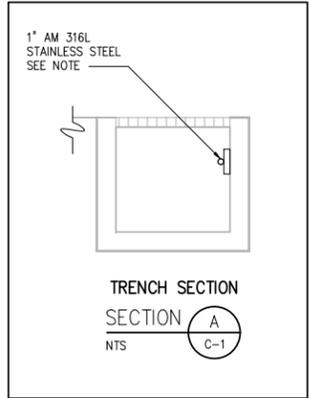
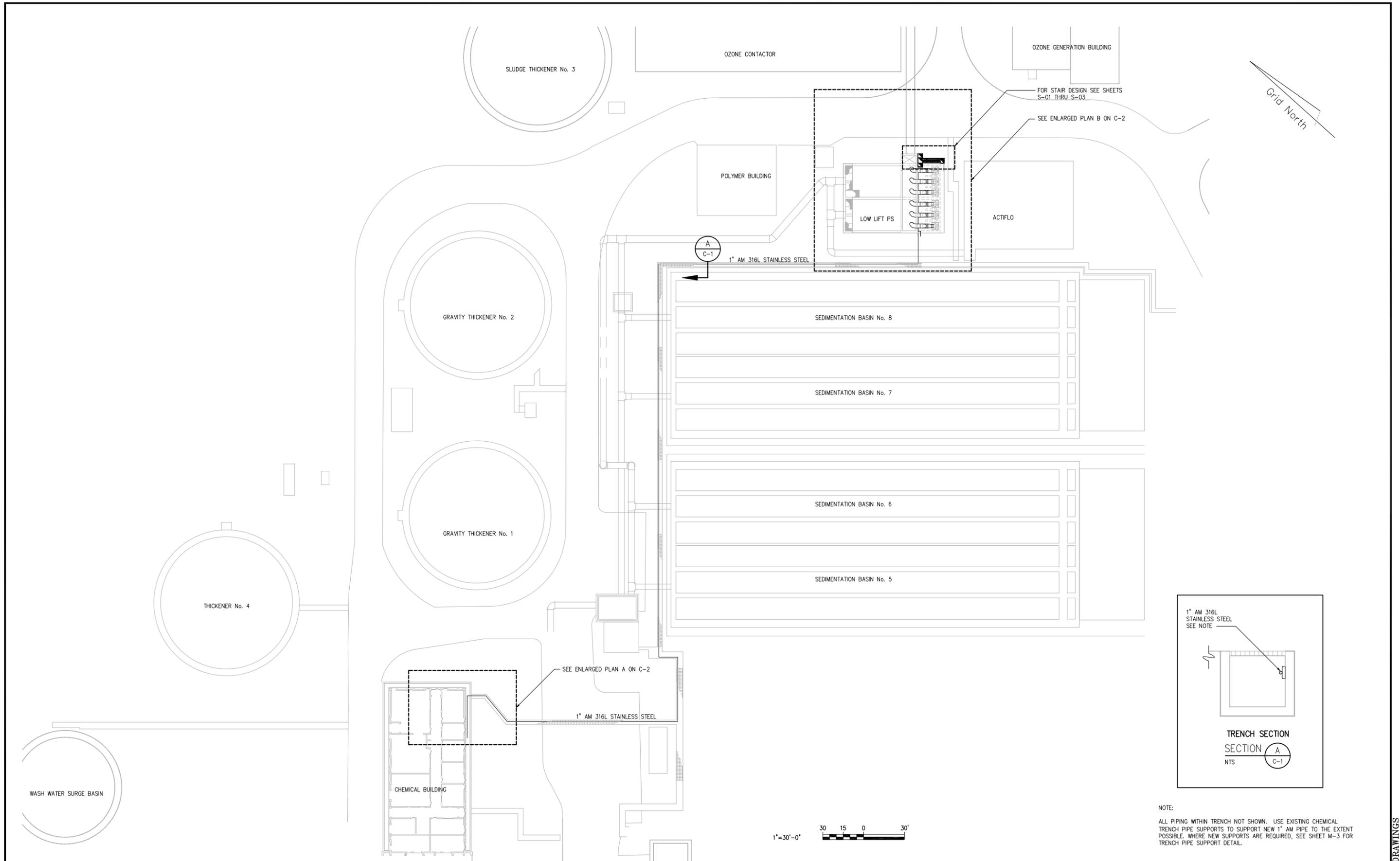
HAZEN AND SAWYER
 Environmental Engineers & Scientists

CITY OF TAMPA
 WATER DEPARTMENT
 ENGINEERING DIVISION
 DL TIPPIN WTP
 BROMATE CONTROL

MODIFIED PROCESS FLOW DIAGRAM

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE APRIL 2013
	H & S JOB NUMBER 41077-002
	DRAWING NUMBER G-2
	SHEET OF

CONSTRUCTION DRAWINGS



NOTE:
 ALL PIPING WITHIN TRENCH NOT SHOWN. USE EXISTING CHEMICAL TRENCH PIPE SUPPORTS TO SUPPORT NEW 1" AM PIPE TO THE EXTENT POSSIBLE. WHERE NEW SUPPORTS ARE REQUIRED, SEE SHEET M-3 FOR TRENCH PIPE SUPPORT DETAIL.

DESIGNED	RKA
DRAWN	SMZ
CHECKED	AAD
PROJ. ENGR.	RKA
NO.	1
ISSUED FOR	CONSTRUCTION
DATE	04/2013
BY	RKA
APPROVED	

ROBERT K. ANDERSON P.E.
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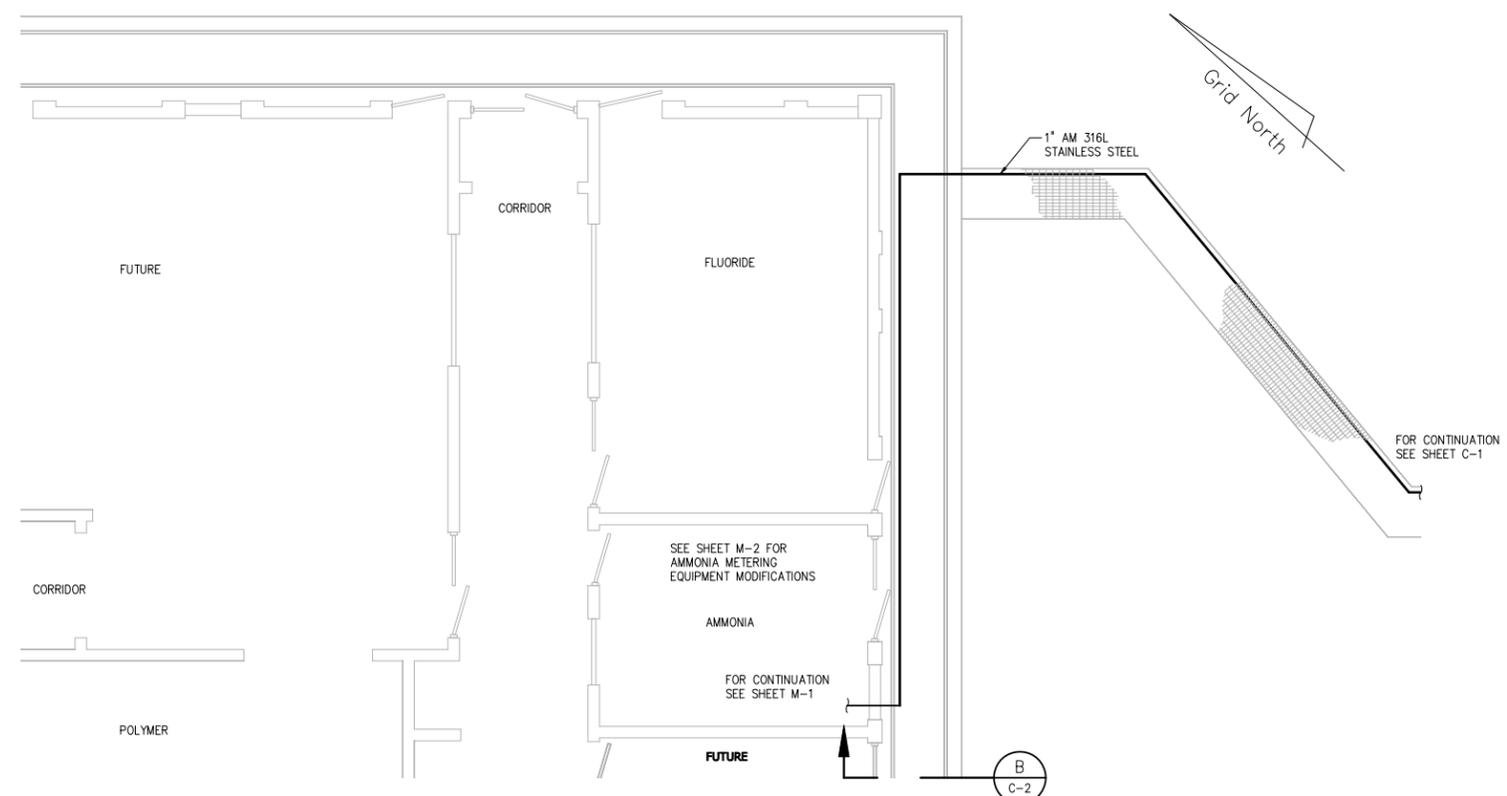
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BROMATE CONTROL

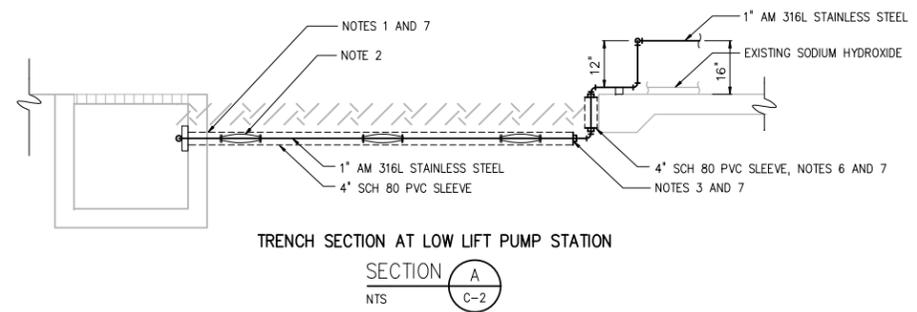
PARTIAL SITE PLAN

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	APRIL 2013
	H & S JOB NUMBER	41077-002
	DRAWING NUMBER	C-1
	SHEET	OF

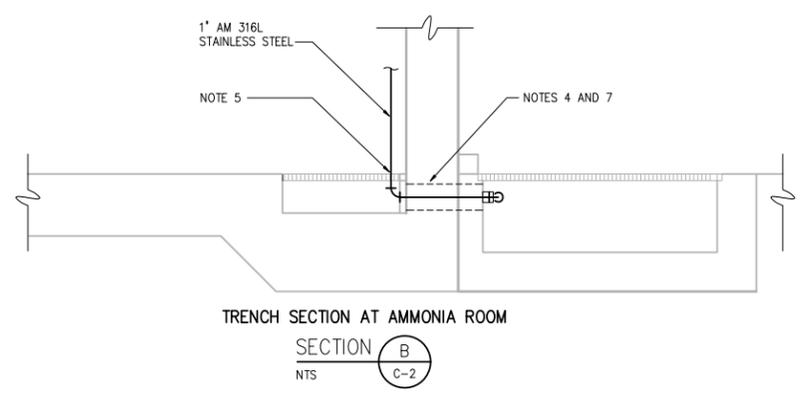
CONSTRUCTION DRAWINGS



ENLARGED PLAN A - EXISTING AMMONIA ROOM
 1"=5' 1"=5'-0"

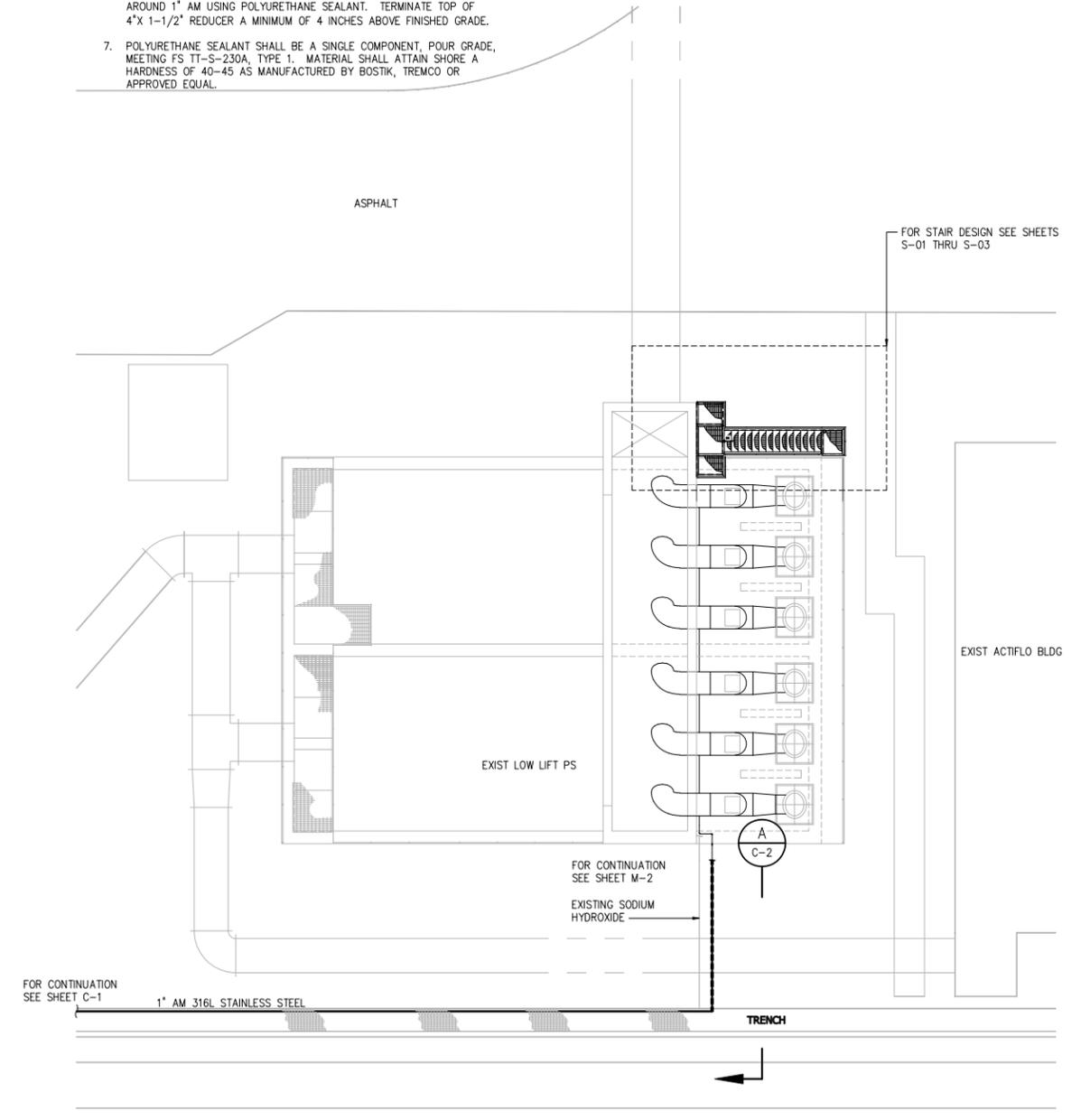


TRENCH SECTION AT LOW LIFT PUMP STATION
 SECTION A
 NTS C-2



TRENCH SECTION AT AMMONIA ROOM
 SECTION B
 NTS C-2

- NOTES:
- 6" CORE DRILL EXISTING CHEMICAL TRENCH WALL FOR 4" SCH 80 PVC SLEEVE. SEAL AROUND SLEEVE USING POLYURETHANE SEALANT INSIDE AND OUTSIDE SURFACES OF TRENCH WALL.
 - CENTER 1" AM PIPING INSIDE 4" PVC SLEEVE USING THREE STAINLESS STEEL PIPE CASING CENTRALIZERS, ONE ON EACH END AND ONE IN THE MIDDLE OF THE SLEEVE. CENTRALIZERS SHALL BE MANUFACTURED BY ATLANTIC SCREEN, INC ITEM No. 15SSC, OR FOSTCO, INC, OR APPROVED EQUAL.
 - INSTALL 4"x1-1/2" REDUCER BUSHING ON END OF 4" PIPE SLEEVE AND INSTALL 1"AM PIPE THROUGH THE OPENING. SEAL AROUND 1"AM USING POLYURETHANE SEALANT.
 - 2" CORE DRILL EXISTING TRENCH WALL FOR 1" AM PIPING. SEAL BETWEEN 1" AM AND CONCRETE USING POLYURETHANE SEALANT ON INSIDE SUMP AND TRENCH.
 - NOTCH GRATING FOR 1" AM PIPE PENETRATION.
 - INSTALL 4"x 1-1/2" REDUCER BUSHING ON BOTH ENDS OF 4" PIPE SLEEVE AND INSTALL 1" AM PIPE THROUGH THE OPENING. SEAL AROUND 1" AM USING POLYURETHANE SEALANT. TERMINATE TOP OF 4"x 1-1/2" REDUCER A MINIMUM OF 4 INCHES ABOVE FINISHED GRADE.
 - POLYURETHANE SEALANT SHALL BE A SINGLE COMPONENT, POUR GRADE, MEETING FS TT-S-230A, TYPE 1. MATERIAL SHALL ATTAIN SHORE A HARDNESS OF 40-45 AS MANUFACTURED BY BOSTIK, TREMCO OR APPROVED EQUAL.



ENLARGED PLAN B - EXISTING LOW LIFT PS
 1"=10' 1"=10'-0"

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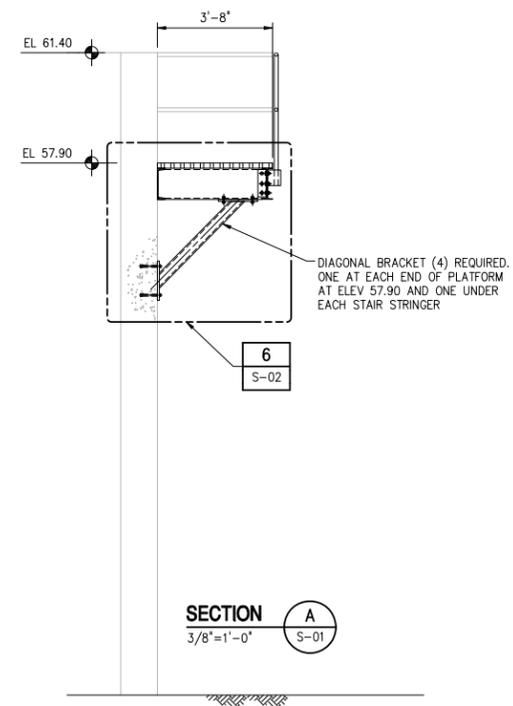
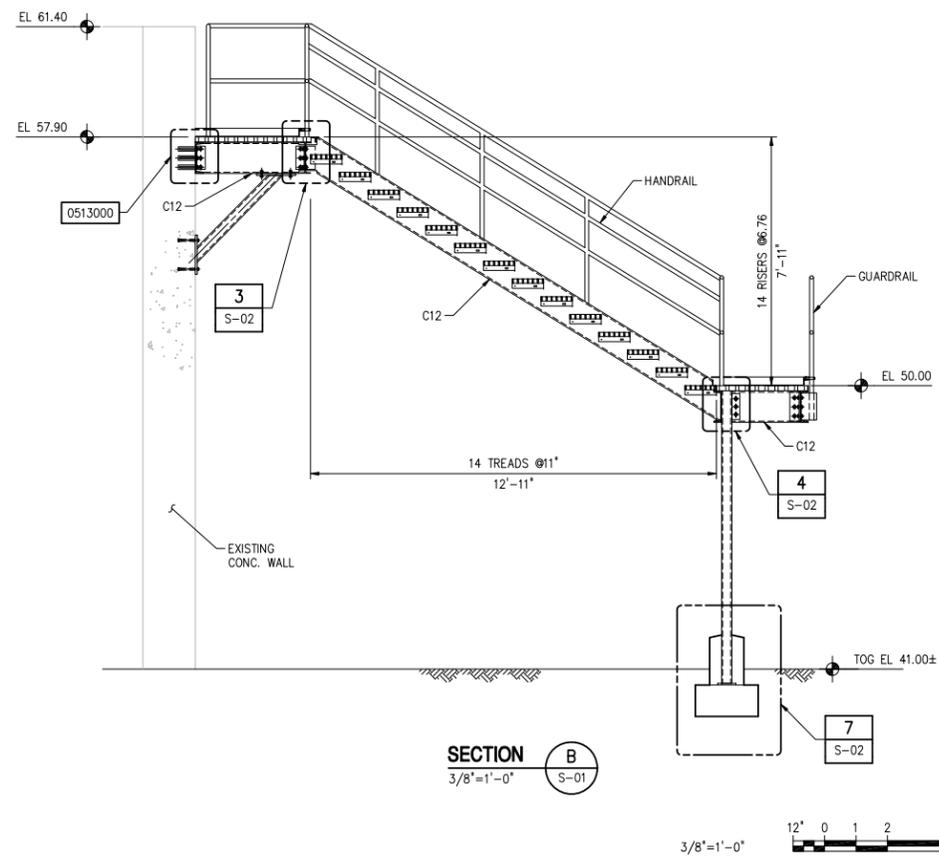
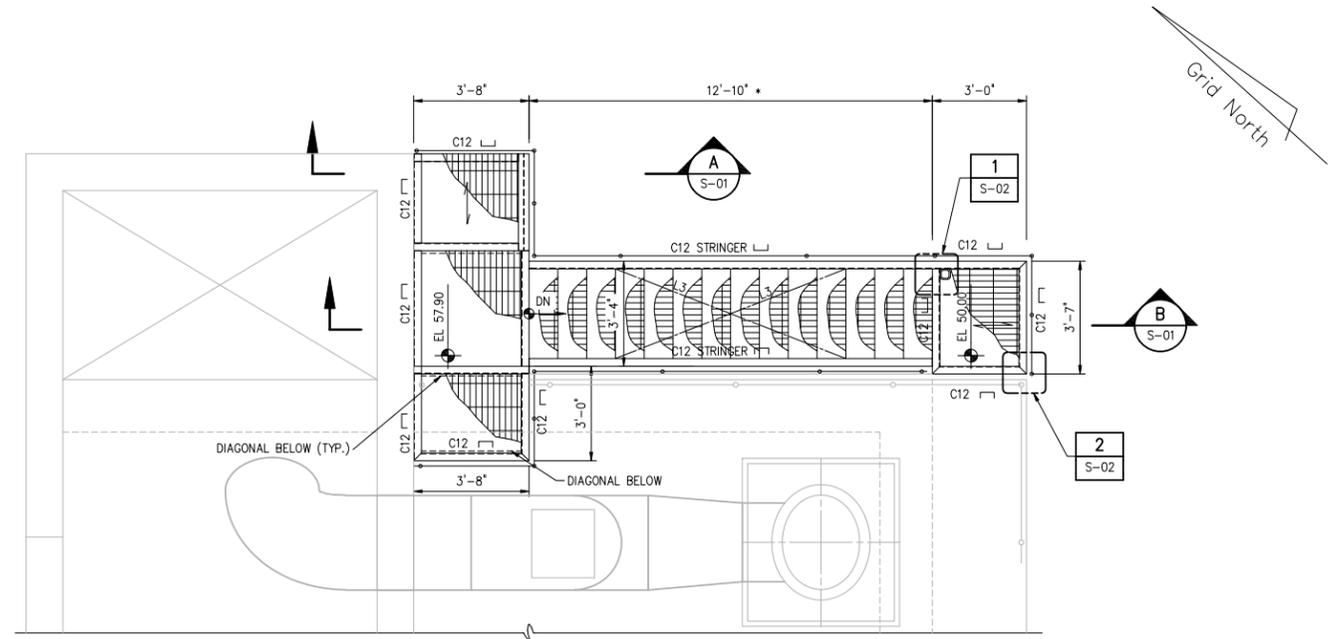
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BROMATE CONTROL

YARD PIPING ENLARGED PLANS

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	DRAWING NUMBER C-2
	SHEET OF

CONSTRUCTION DRAWINGS



NOTES:

- DIMENSIONS MARKED WITH (*) SHALL BE FIELD VERIFIED BY CONTRACTOR.
- C12 DENOTES ALUMINUM C12x7.41
AL4 DENOTES ALUMINUM 4" x 0.500" SQ TUBE
I2 DENOTES ALUMINUM I 12x11.0
L3 DENOTES ALUMINUM L 3"x3"x 0.375
↓ DENOTES GRATING SPAN DIRECTION
- ELEVATIONS BASED ON AS-BUILT DRAWINGS. CONTRACTOR SHALL VERIFY ALL ELEVATIONS.

DESIGNED	AV
DRAWN	ABC
CHECKED	JPS
PROJ. ENGR.	JPS
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APPROVED	

JEAN PAUL SILVA P.E.
No. 66522



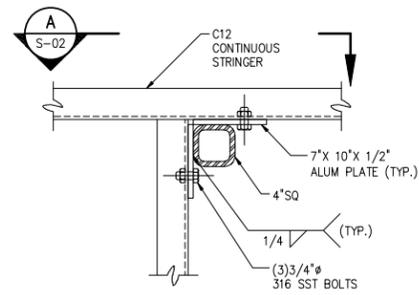
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BROMATE CONTROL

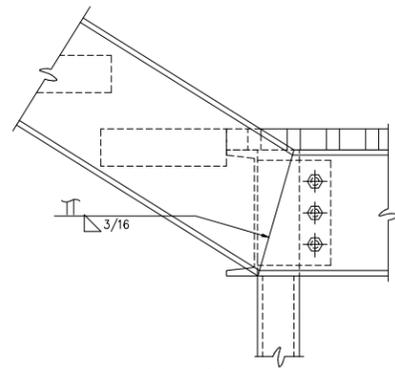
LOW LIFT PS STAIRS
PLANS AND SECTIONS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	APRIL 2013
	H & S JOB NUMBER	41077-002
	DRAWING NUMBER	S-01
	SHEET	OF

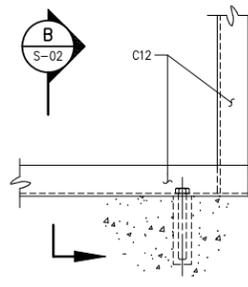
CONSTRUCTION DRAWINGS



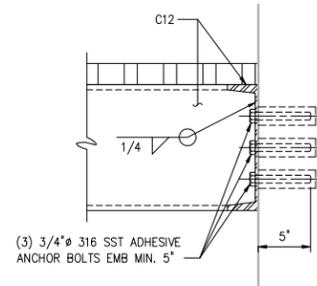
DETAIL 1
1 1/2'-0" S-01



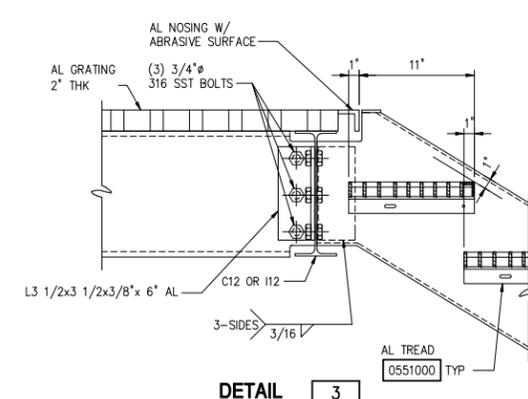
SECTION A
1 1/2'-0" S-02



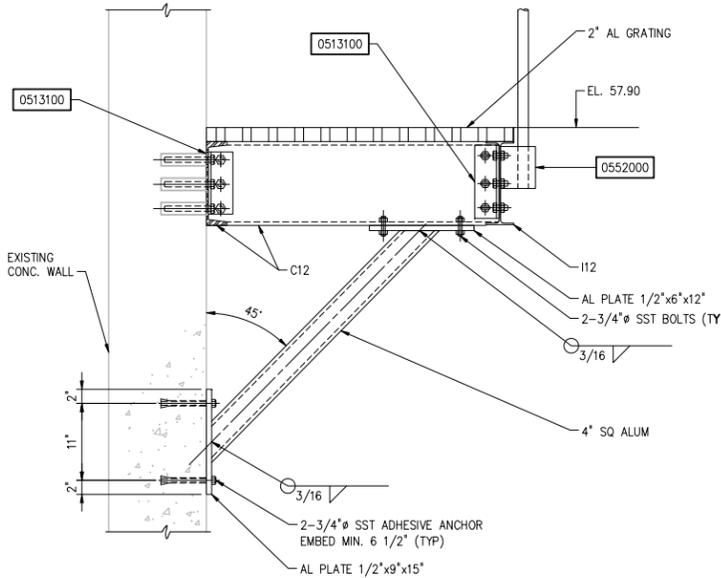
DETAIL 2
1 1/2'-0" S-01



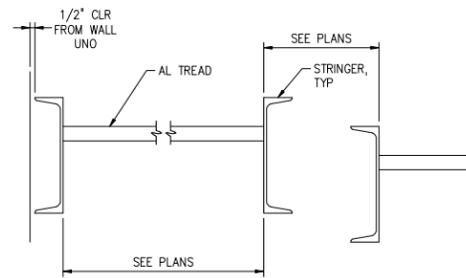
SECTION B
1 1/2'-0" S-02



DETAIL 3
1 1/2'-0" S-01

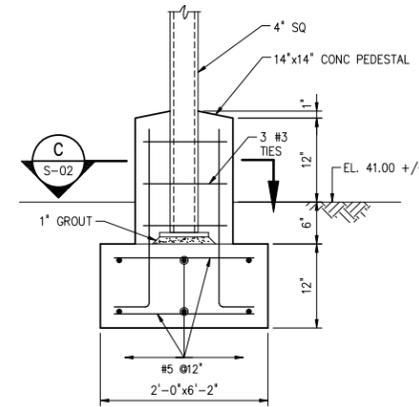


DETAIL 6
1'-0" S-01

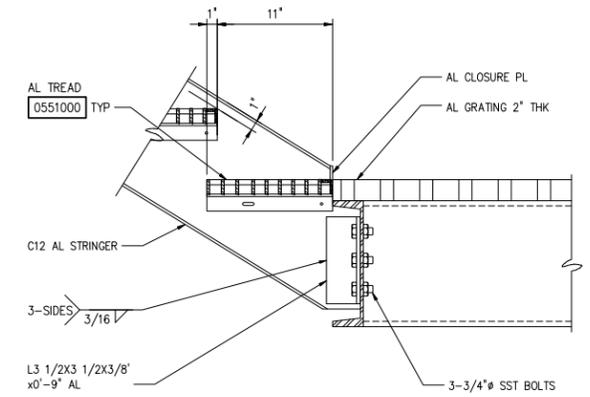


DETAIL 5
1 1/2'-0" S-01

TYPICAL TREAD CROSS SECTION

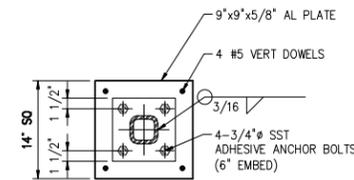


DETAIL 7
1'-0" S-01



LOWER STRINGER CONNECTION TO FRAMING MEMBER

DETAIL 4
1 1/2'-0" S-01



SECTION C
1'-0" S-02

NOTES:

- 1. C12 DENOTES ALUMINUM C12x7.41
- 4'SQ DENOTES ALUMINUM 4'x 0.500" SQ TUBE
- I12 DENOTES ALUMINUM I 12x11.0
- L3 DENOTES ALUMINUM L 3'x3'x 0.375



DESIGNED	AV
DRAWN	ABC
CHECKED	JPS
PROJ. ENGR.	JPS
1	CONSTRUCTION
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	DATE
	BY
	APPROVED

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No. 66522



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Environmental Engineers & Scientists

CITY OF TAMPA
WATER DEPARTMENT
ENGINEERING DIVISION
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BROMATE CONTROL

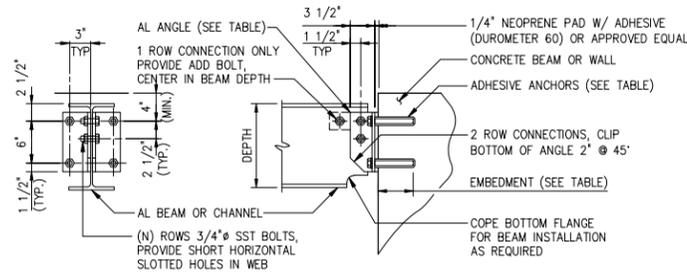


LOW LIFT PS STAIRS
DETAILS - SHEET 1

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	H & S JOB NUMBER 41077-002
	DRAWING NUMBER S-02
	SHEET OF

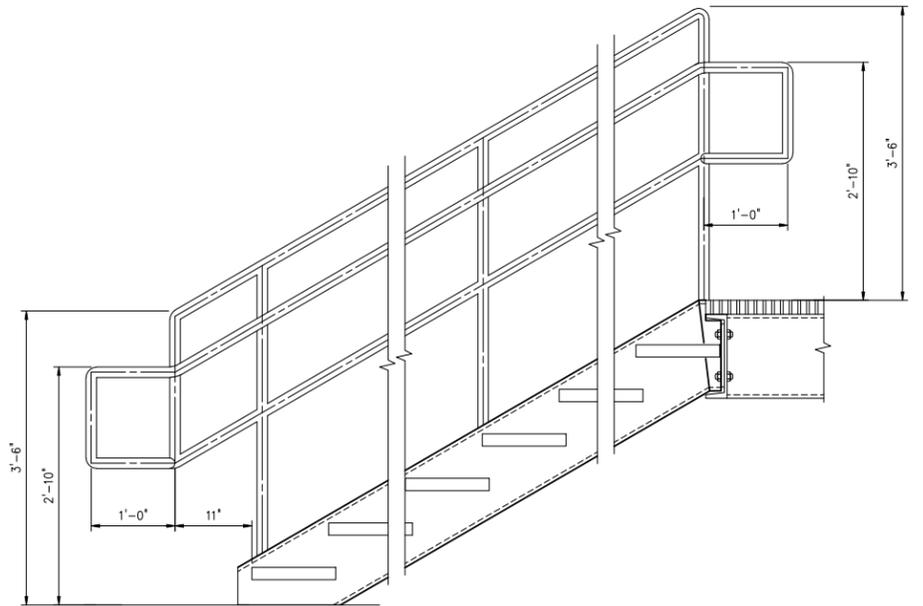
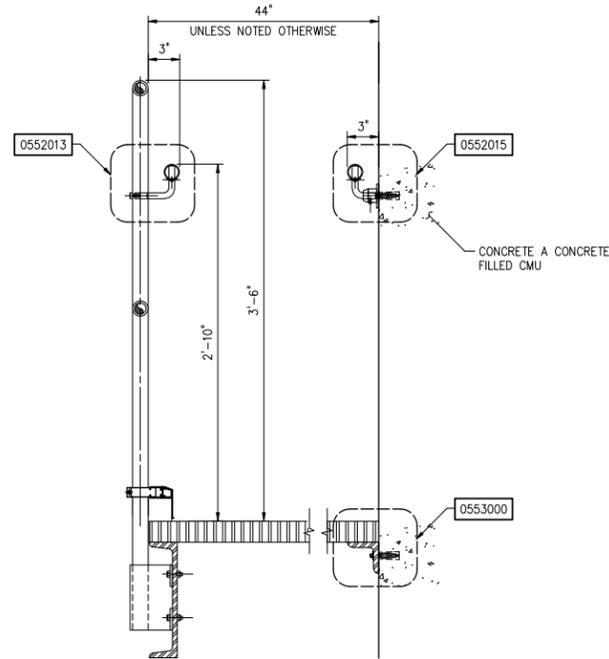
CONSTRUCTION DRAWINGS

AL MEMBER DEPTH	AL DOUBLE ANGLES	(N) ROWS	SST ADHESIVE ANCHORS	EMBEDMENT
4", 5", 6"	2-L6x4x3/8x0'-3" LONG	1	2-5/8" SST ADHESIVE ANCHORS	5", MIN
8"	2-L4x3 1/2x3/8x0'-9"	2	4-5/8" SST ADHESIVE ANCHORS	5", MIN
10", 12", 15"	2-L4x3 1/2x3/8x0'-9"	3	4-3/4" SST ADHESIVE ANCHORS	6 1/2", MIN



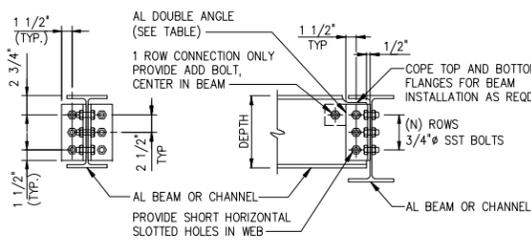
NOTE:
 DURING INSTALLATION OF ADHESIVE ANCHORS BEAM TOP REINFORCEMENT SHALL NOT BE CUT. PRIOR TO FABRICATION FIELD LOCATE REINFORCEMENT AND LENGTHEN ANGLES AS REQUIRED LOWER ANCHORS TO CLEAR REINFORCEMENT.

ALUMINUM BEAM TO CONCRETE CONNECTION
 0513000

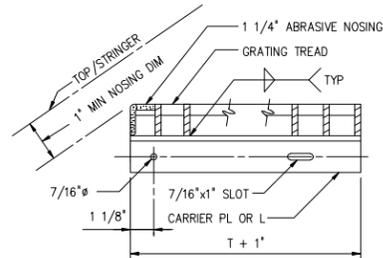


GUARDRAIL WITH HANDRAIL AT METAL STAIRS
 0552010

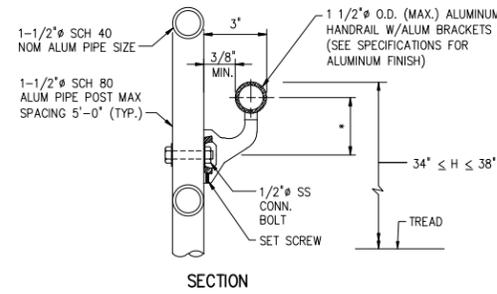
AL MEMBER DEPTH	AL DOUBLE ANGLES	(N) ROWS
4", 5", 6"	2-L6x4x3/8x0'-3" LONG	1
8"	2-L4x4x5/16x0'-5 1/2"	2
10", 12", 15"	2-L4x4x5/16x0'-8"	3



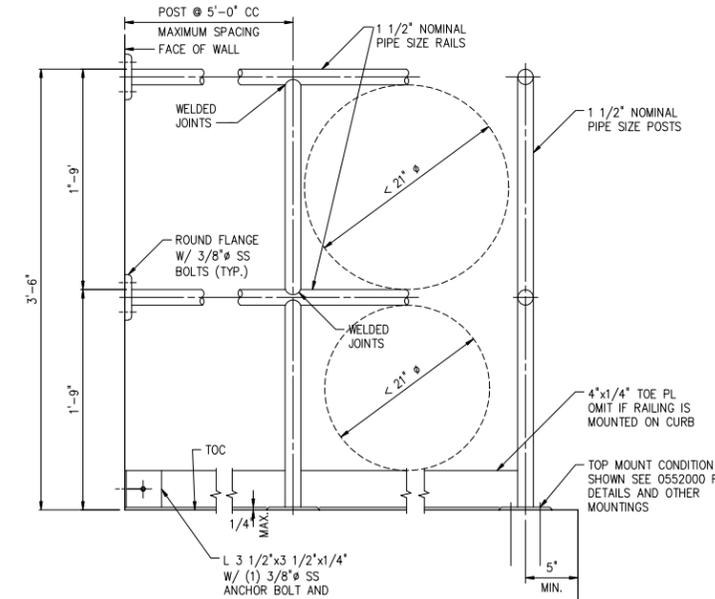
ALUMINUM FRAMING CONNECTION
 0513100



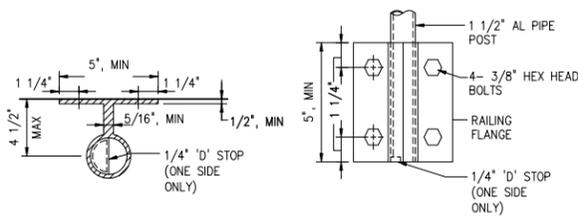
TYP TREAD DETAIL
 0551000



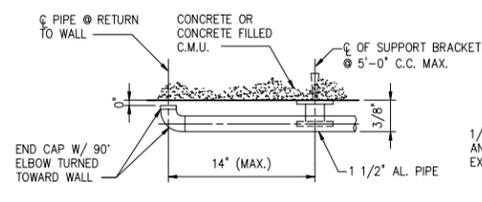
SECTION
 * DIMENSION PER MANUFACTURER 2 1/2" (MIN.)
 HANDRAIL ATTACHMENT AT GUARDRAIL
 0552013



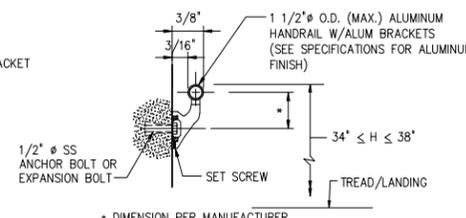
SECTION
 ELEVATION
 SECTION
 TYPICAL GUARDRAIL AT LANDINGS AND WALKWAYS
 0552005
 NOTE:
 THE ALUMINUM GUARDRAILS SHOWN SHALL APPLY TO ALL STRUCTURES AND BUILDINGS WHERE GUARDRAILS ARE SHOWN, AND OR THAT ARE SPECIFICALLY CALLED OUT ON DRAWINGS



PLAN
 FRONT
 ALUMINUM HANDRAIL POST CONNECTIONS
 0552000



PLAN
 TYPICAL HANDRAILING ENDS
 WALL SUPPORTED HANDRAIL
 0552015



SECTION
 HANDRAIL ATTACHMENT DETAIL

DESIGNED	AV		
DRAWN	ABC		
CHECKED	JPS		
PROJ. ENGR.	JPS		
1	CONSTRUCTION	04/2013	RKA
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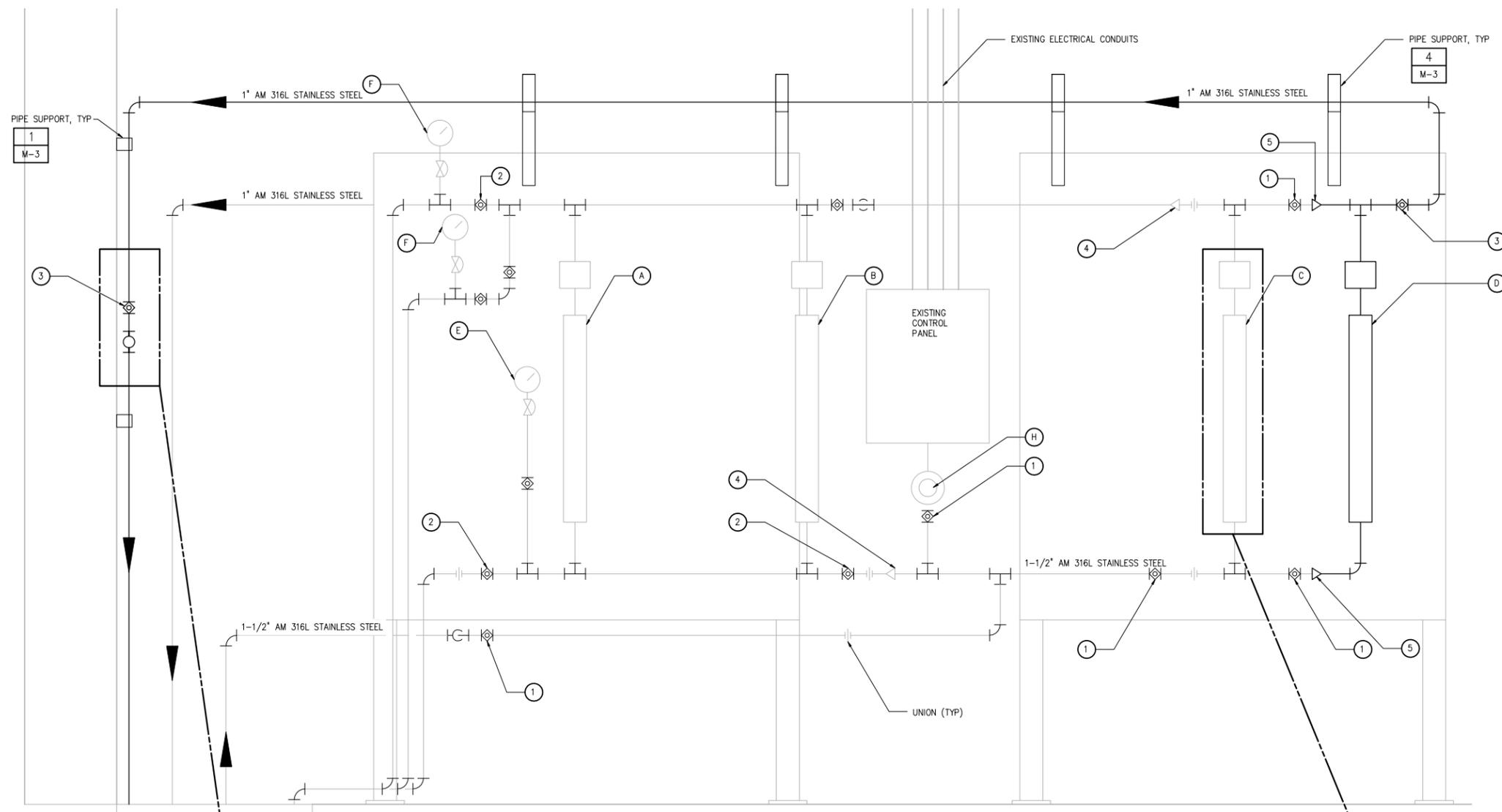
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BROMATE CONTROL

LOW LIFT PS STAIRS
 DETAILS - SHEET 2

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE APRIL 2013
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	DRAWING NUMBER S-03
	SHEET OF

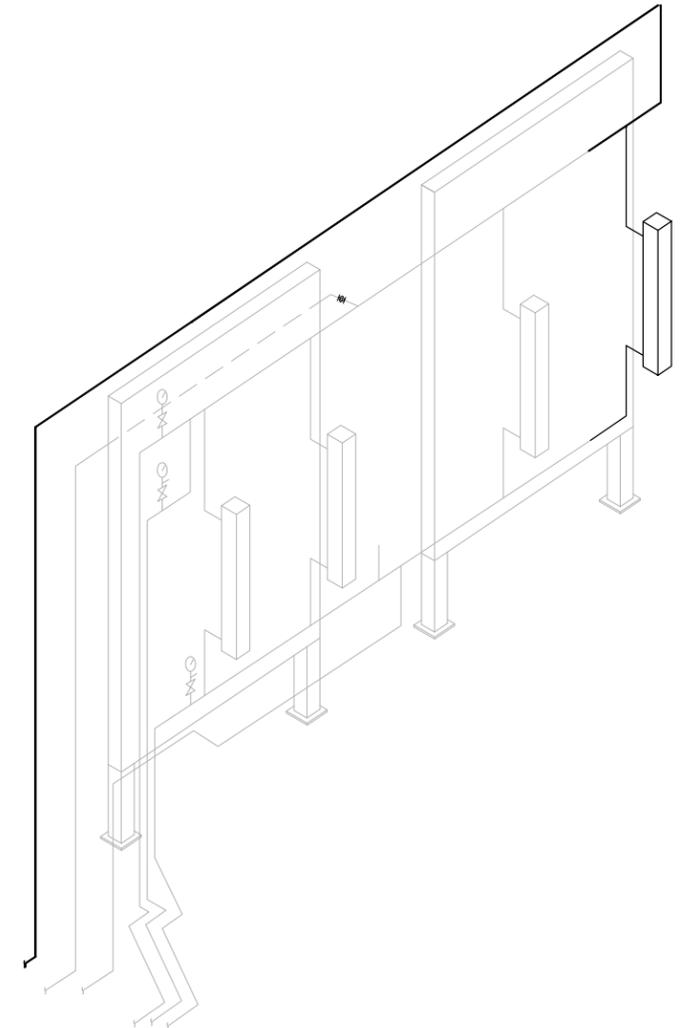
100% SUBMITTAL



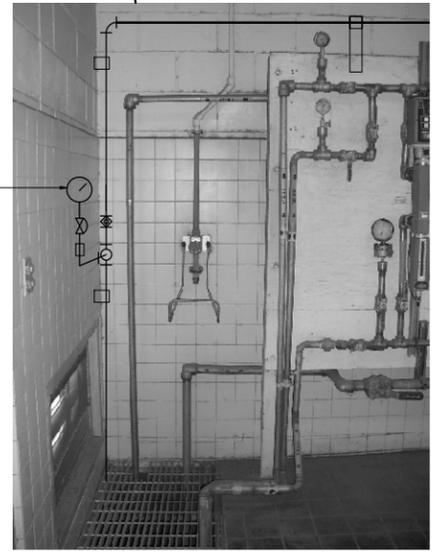
- EQUIPMENT LIST LEGEND**
- (A) AMMONIATOR [A-14-7-10-1] EXISTING
 - (B) AMMONIATOR [A-14-7-10-2] EXISTING
 - (C) AMMONIATOR [A-14-7-10-3] EXISTING
 - (D) AMMONIATOR [A-14-7-10-4] NEW
 - (E) INLET PRESSURE INDICATOR (0-30 PSI) EXISTING
 - (F) OUTLET PRESSURE INDICATOR (0-30 PSI) EXISTING
 - (G) OUTLET PRESSURE INDICATOR (0-30 PSI) NEW
 - (H) AMMONIA GAS LEAK DETECTOR EXISTING

- VALVES AND FITTINGS LEGEND**
- (1) 1-1/2\"/>

PROPOSED AMMONIA METERING MODIFICATIONS
1 1/2"=1'-0"



ANHYDROUS AMMONIA MODIFICATIONS SCHEMATIC
1"=1'-0"



PROPOSED PRESSURE GAUGE



EXISTING ANHYDROUS AMMONIA METERING EQUIPMENT



EXISTING AMMONIATOR

DESIGNED	RKA		
DRAWN	SMZ		
CHECKED	AAD		
PROJ. ENGR.	RKA		
1	CONSTRUCTION	04/2013	RKA
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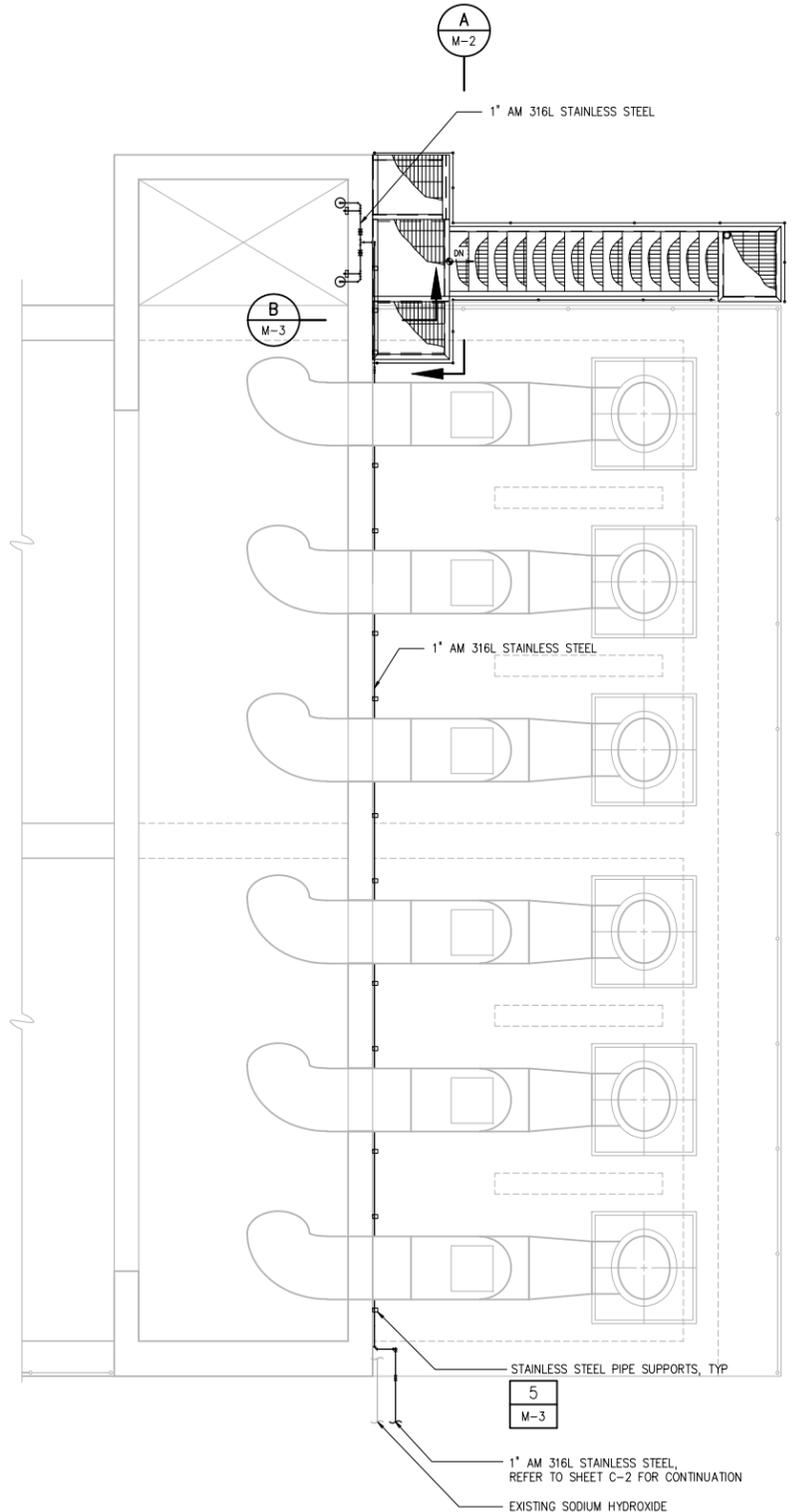
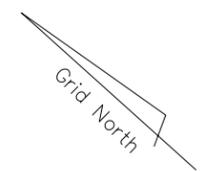
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BROMATE CONTROL

ANHYDROUS AMMONIA METERING
EQUIPMENT MODIFICATIONS

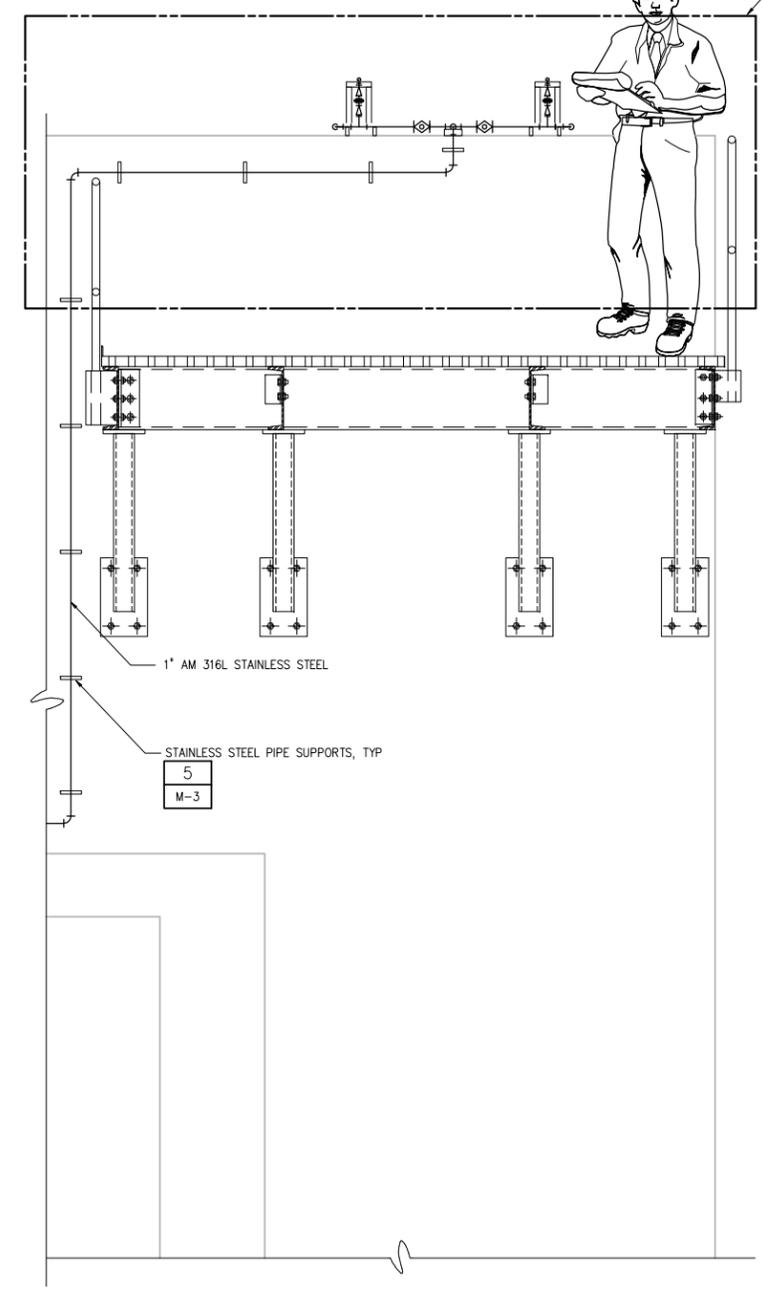
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	SHEET OF

CONSTRUCTION DRAWINGS

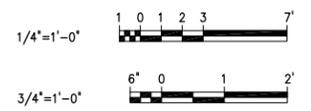
SEE ENLARGED VIEW A ON SHEET M-3



TOP PLAN
1/4"=1'-0"



SECTION A
3/4"=1'-0"



DESIGNED	RKA		
DRAWN	ESM		
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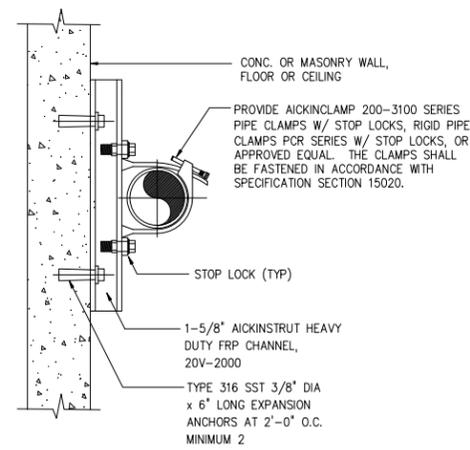
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BROMATE CONTROL

LOW LIFT PS ANHYDROUS AMMONIA
INJECTION

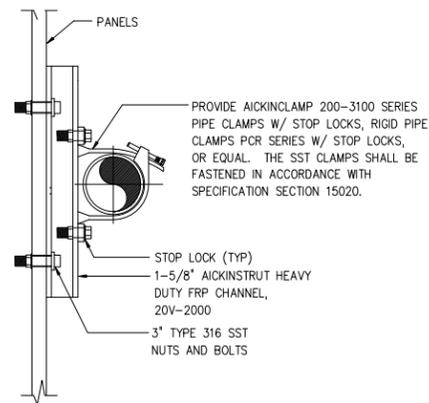
THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	APRIL 2013
	H & S JOB NUMBER	41077-002
	DRAWING NUMBER	M-2
	SHEET	OF

CONSTRUCTION DRAWINGS



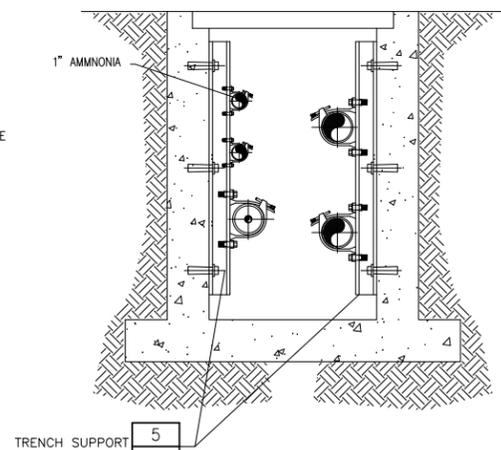
NON-METALLIC CHANNEL ON CONCRETE PIPE SUPPORT

DETAIL	1
NTS	M-3



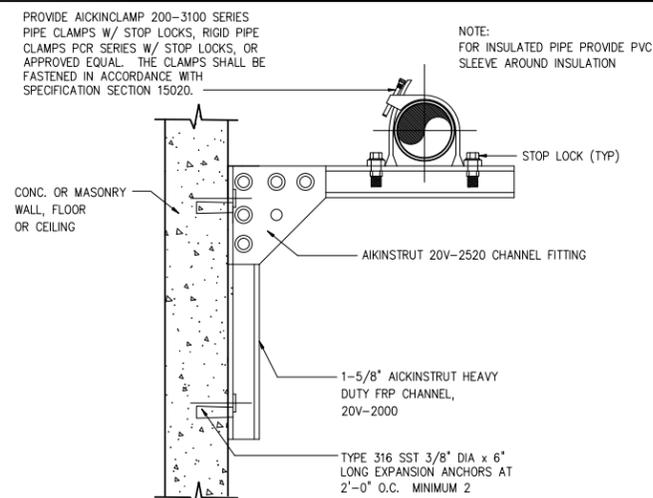
NON-METALLIC CHANNEL ON PANELS PIPE SUPPORT

DETAIL	2
NTS	M-3



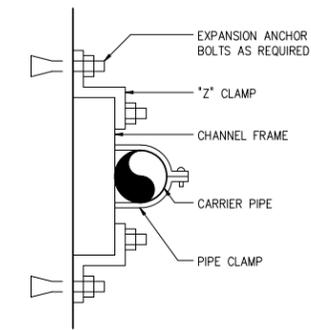
TRENCH SECTION

DETAIL	3
NTS	M-3



NON-METALLIC WALL BRACKET

DETAIL	4
NTS	M-3



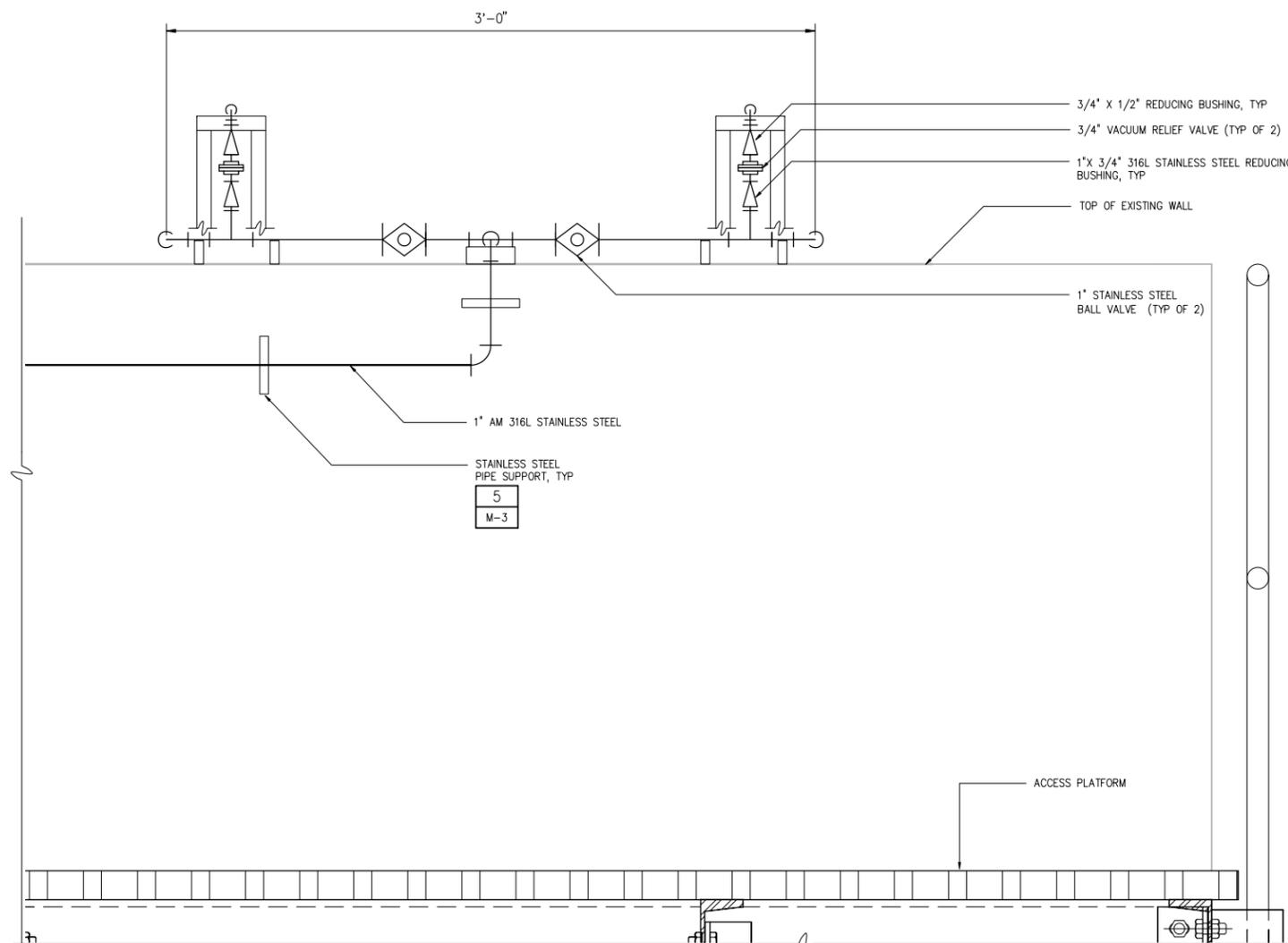
PIPE WALL SUPPORT AND SUPPORT RACK SHALL BE ASSEMBLED W/ TYPE 316 STAINLESS STEEL CHANNEL FRAMES AND ACCESSORIES AS MANUFACTURED BY UNISTRUT CORP OR APPROVED EQUAL

PIPE WALL SUPPORT

DETAIL	5
NTS	M-3

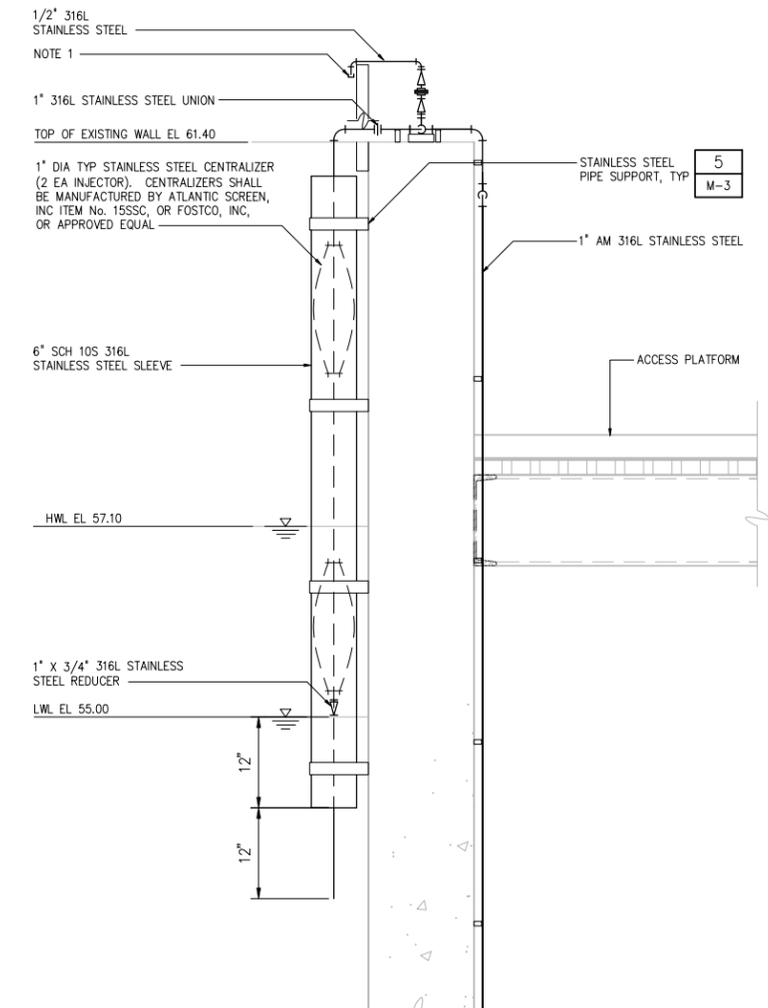
NOTES:

- COVER OPEN END OF AIR PIPE WITH 18 MESH, .009\"/>



ENLARGED VIEW A - AMMONIA INJECTION PIPING

NTS



SECTION B

NTS

DESIGNED	RKA
DRAWN	ESM
CHECKED	AAD
PROJ. ENGR.	RKA
NO.	1
ISSUED FOR	CONSTRUCTION
DATE	04/2013
BY	RKA
APPROVED	

ROBERT K. ANDERSON P.E.
No. 47129



HAZEN AND SAWYER
Environmental Engineers & Scientists

CITY OF TAMPA
WATER DEPARTMENT
ENGINEERING DIVISION
DL TIPPIN WTF
BROMATE CONTROL



MISCELLANEOUS PIPING DETAILS AND SECTION

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	APRIL 2013
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	SHEET	OF

CONSTRUCTION DRAWINGS

ELECTRICAL SYMBOLS AND LEGEND

PLAN

SINGLE LINE DIAGRAM

- EXPOSED CONDUIT
- CONDUIT RUN UNDERGROUND OR IN CONCRETE
- CONDUIT RUN - CHANGE IN ELEVATION
- CONDUIT TURNING UP
- CONDUIT TURNING DOWN
- CONDUITS GROUPED TOGETHER BUT SHOWN AS A SINGLE LINE FOR CLARITY
- GROUND GRID CABLE
- FROM FLOOR ABOVE TO FLOOR BELOW
- GROUND CONDUCTOR
- CONDUIT CAPPED, OR SEALED
- HOMERUN TO EQUIPMENT INDICATED (3/4" CONDUIT, 2 #12, 1 #12 GND UNLESS OTHERWISE INDICATED)
- RACEWAY BOX
* - BOX TYPE
MH = MANHOLE
HH = HANDHOLE
PB = PULLBOX
- JUNCTION BOX OR FITTING
- INCANDESCENT, HPS OR MH FIXTURE
X - LIGHTING PANEL DESIGNATION
- CIRCUIT NUMBER, a - SWITCH DESIGNATION
- WALL MOUNTED FIXTURE
- POLE, BRACKET, ARM AND STREETLIGHT
- STANCHION MOUNTED HPS FIXTURE
- CEILING MOUNTED HPS FIXTURE
- SECURITY GROUND LIGHT
- LIGHT POLE
- FLUORESCENT LIGHTING FIXTURE
LETTER INDICATES TYPE.
SEE DWG. E-2 (TYP.)
- FLUORESCENT LIGHT FIXTURE, UNSWITCHED
- EMERGENCY LIGHT FIXTURE, BATTERY OPERATED
- EXIT/EMERGENCY COMBINATION LIGHT FIXTURE, BATTERY OPERATED
- EXIT LIGHT

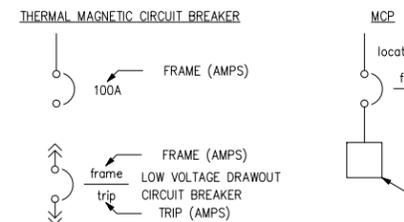
- LIGHT SWITCH
X - LIGHTING PANEL DESIGNATION
- CIRCUIT DESIGNATION
a - SWITCH DESIGNATION
* - SWITCH TYPE
3 = 3 WAY
4 = 4 WAY
D = DIMMER
M = MANUAL MOTOR STARTER
- 120V DUPLEX RECEPTACLE, NEMA CONFIGURATION 5-20R (WALL MOUNT)
X - LIGHTING PANEL DESIGNATION
- CIRCUIT DESIGNATION
* - TYPE
WP = WEATHERPROOF
XP = EXPLOSION PROOF
GFI = GROUND FAULT CIRCUIT INTERRUPTER
- WALL TYPE TELEPHONE SYSTEM OUTLET
- WALL TYPE COMPUTER OUTLET
- LIGHTING PANEL
- POWER PANEL
- DISCONNECT SWITCH
- MOTOR
- THERMOSTAT
- HORN
- GROUND ROD AND GROUND WELL
- GROUND ROD 3/4" x 20' - 0" (UNLESS OTHERWISE NOTED)
- GROUND CONNECTION BOLTED TYPE
- GROUND CONNECTION - EXOTHERMIC TYPE
- BARE COPPER GROUND TO GROUND WIRE IN SLAB, UNDERGROUND GROUND GRID, OR EXPOSED SIZE AS NOTED

- ALARM HORN WITH STROBE
- AMPLIFIER/LOUDSPEAKER
- DETECTOR, * INDICATES TYPE
SD = SMOKE DETECTOR
HD = HEAT DETECTOR
CD = COMBINATION DETECTOR
- FIRE ALARM PULL STATION
- SEPARATE OR ACCESSORY STROBE LIGHT
- FIRE BELL WITH STROBE LIGHT
- FIRE SUPPRESSION SWITCH
- END-OF-LINE TERMINATOR
- INTERCOM SPEAKER
* INDICATES TYPE, REFER TO SPECIFICATIONS
- INTERCOM SPEAKER WITH STROBE LIGHT
* INDICATES TYPE, REFER TO SPECIFICATIONS
- INTERCOM WALL JACK
- INTERCOM HANDSET, WALL MOUNTED
- POLE MOUNTED VIDEO CAMERA
- SECURITY ACCESS DEVICE, * INDICATES TYPE
CR = CARD READER
KS = KEY SWITCH
PS = DIGITAL KEYPAD
- CONDUIT DESIGNATION
SEE E-2

- MEDIUM VOLTAGE VACUUM DRAW-OUT STARTER
- MEDIUM VOLTAGE DRAWOUT BREAKER
- ANSI RELAY DEVICE
* INDICATES ANSI DEVICE
(#) INDICATES QUANTITY
25 = SYNCHRONISM CHECK RELAY
27 = UNDERVOLTAGE
27/47 = UNDERVOLTAGE, PHASE SEQUENCE, UNBALANCED VOLTAGE
32 = DIRECTIONAL POWER RELAY
41 = FIELD CONTACTOR
43 = SELECTOR SWITCH
49 = HIGH OIL TEMPERATURE
50/51 = INSTANTANEOUS AND TIME OVERCURRENT
50/51N = INSTANTANEOUS AND TIME RESIDUALLY CONNECTED GROUND OVERCURRENT
51G = GROUND FAULT
60 = VOLTAGE BALANCE
62 = TIME DELAY
63 = SUDDEN PRESSURE
67 = AC DIRECTIONAL CURRENT RELAY
71L = LOW OIL LEVEL
81 = FREQUENCY RELAY
83 = CONTROL POWER TRANSFORMER
86 = LOCKOUT
87TL = TRANSFORMER DIFFERENTIAL
87M = MOTOR DIFFERENTIAL

- METERING DEVICE
* INDICATES METER TYPE
WHM = WATT HOUR METER
WM = WATT METER
AM = AMMETER
VM = VOLTMETER
PFM = POWER FACTOR METER

- AMMETER SWITCH
- VOLTMETER SWITCH



- GENERATOR, RATING AS INDICATED
- FURNISHED WITH EQUIPMENT
- FUSED DISCONNECT SWITCH

- POTENTIAL TRANSFORMER, RATIO AND NUMBER OF PT'S AS NOTED
- CURRENT TRANSFORMER, RATIO AND NUMBER OF CT'S AS NOTED
- FUSE, SIZED AS NOTED
- MOTOR, HORSEPOWER AS NOTED
- TRANSFORMER WITH GROUNDED SECONDARY, KVA SIZE & VOLTAGE RATIO AS INDICATED
- DRY TYPE TRANSFORMER
KVA & VOLTAGE RATING AS NOTED
- FUSED CONTROL POWER TRANSFORMER
- ELECTRICAL MOTOR OPERATED VALVE, WITH INTEGRAL REVERSING STARTER
- DISCONNECT SWITCH, SIZE AS NOTED
- FUSED DISCONNECT SWITCH, SIZED AS NOTED
- CAPACITOR
- TRANSIENT VOLTAGE SURGE SUPPRESSOR
- SOLID STATE METERING DEVICE
- SOLID STATE MOTOR PROTECTIVE DEVICE
- LIGHTNING ARRESTOR AND SURGE CAPACITOR
- CROSSING OF CONDUCTORS - NOT CONNECTED
- CONDUCTORS CONNECTED
- LOCAL CONTROL PANEL
- LOCAL PULL BOX
- VARIABLE FREQUENCY DRIVE UNIT
- HEATER
- MOTOR TERMINATOR BOX

DESIGNED	DBS
DRAWN	DBS
CHECKED	JCB
PROJ. ENGR.	RKA
1	CONSTRUCTION
NO.	ISSUED FOR
04/2013	DATE
RKA	BY
APPROVED	

DANIEL B. SCHMIDT P.E.
No. 40233



HAZEN AND SAWYER
Environmental Engineers & Scientists

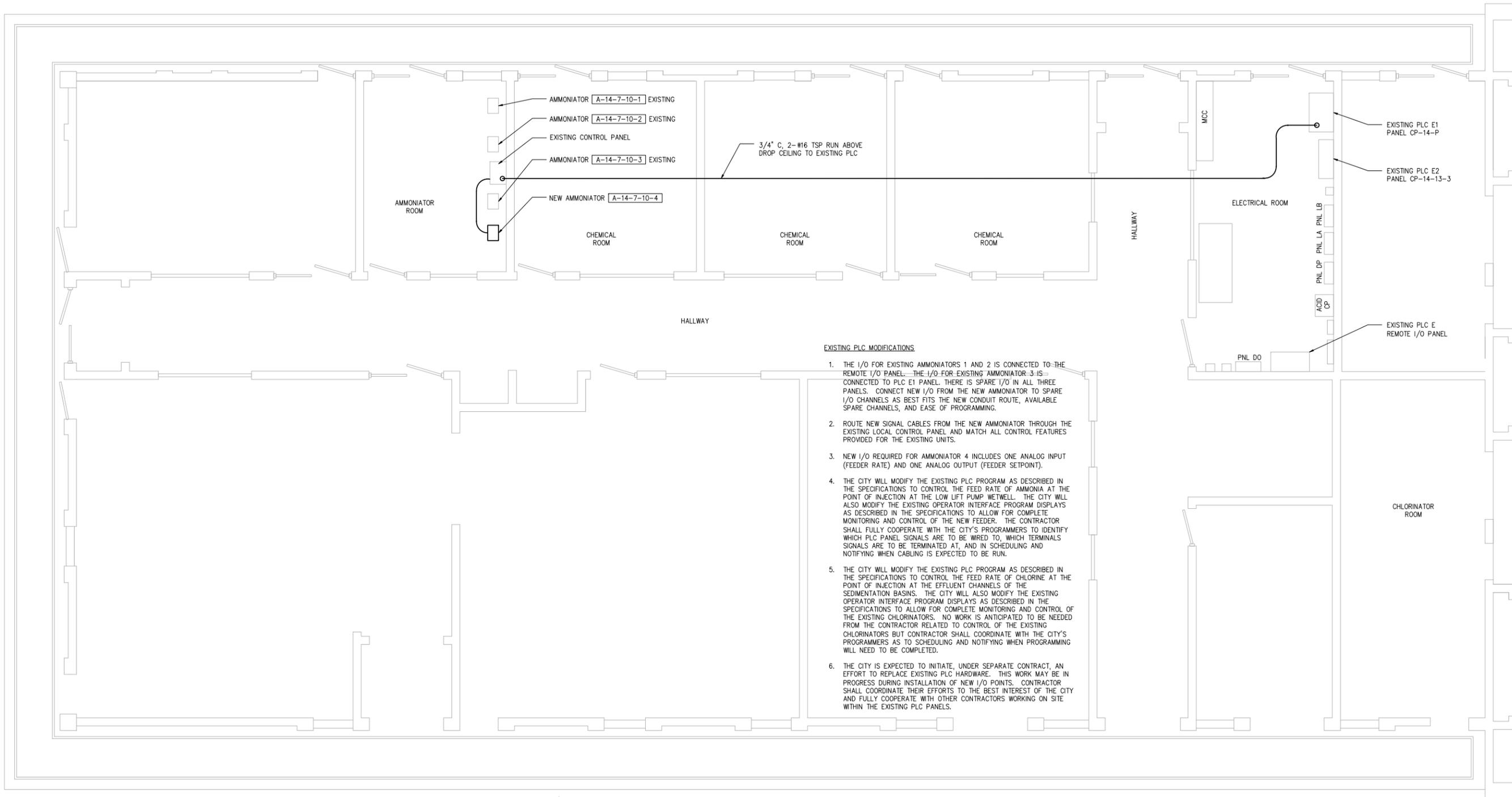
CITY OF TAMPA
WATER DEPARTMENT
ENGINEERING DIVISION
DL TIPPIN WTF
BROMATE CONTROL



ELECTRICAL LEGEND AND SYMBOLS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE	APRIL 2013
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CONSTRUCTION DRAWINGS



EXISTING PLC MODIFICATIONS

1. THE I/O FOR EXISTING AMMONIATORS 1 AND 2 IS CONNECTED TO THE REMOTE I/O PANEL. THE I/O FOR EXISTING AMMONIATOR 3 IS CONNECTED TO PLC E1 PANEL. THERE IS SPARE I/O IN ALL THREE PANELS. CONNECT NEW I/O FROM THE NEW AMMONIATOR TO SPARE I/O CHANNELS AS BEST FITS THE NEW CONDUIT ROUTE, AVAILABLE SPARE CHANNELS, AND EASE OF PROGRAMMING.
2. ROUTE NEW SIGNAL CABLES FROM THE NEW AMMONIATOR THROUGH THE EXISTING LOCAL CONTROL PANEL AND MATCH ALL CONTROL FEATURES PROVIDED FOR THE EXISTING UNITS.
3. NEW I/O REQUIRED FOR AMMONIATOR 4 INCLUDES ONE ANALOG INPUT (FEEDER RATE) AND ONE ANALOG OUTPUT (FEEDER SETPOINT).
4. THE CITY WILL MODIFY THE EXISTING PLC PROGRAM AS DESCRIBED IN THE SPECIFICATIONS TO CONTROL THE FEED RATE OF AMMONIA AT THE POINT OF INJECTION AT THE LOW LIFT PUMP WETWELL. THE CITY WILL ALSO MODIFY THE EXISTING OPERATOR INTERFACE PROGRAM DISPLAYS AS DESCRIBED IN THE SPECIFICATIONS TO ALLOW FOR COMPLETE MONITORING AND CONTROL OF THE NEW FEEDER. THE CONTRACTOR SHALL FULLY COOPERATE WITH THE CITY'S PROGRAMMERS TO IDENTIFY WHICH PLC PANEL SIGNALS ARE TO BE WIRED TO, WHICH TERMINALS SIGNALS ARE TO BE TERMINATED AT, AND IN SCHEDULING AND NOTIFYING WHEN CABLING IS EXPECTED TO BE RUN.
5. THE CITY WILL MODIFY THE EXISTING PLC PROGRAM AS DESCRIBED IN THE SPECIFICATIONS TO CONTROL THE FEED RATE OF CHLORINE AT THE POINT OF INJECTION AT THE EFFLUENT CHANNELS OF THE SEDIMENTATION BASINS. THE CITY WILL ALSO MODIFY THE EXISTING OPERATOR INTERFACE PROGRAM DISPLAYS AS DESCRIBED IN THE SPECIFICATIONS TO ALLOW FOR COMPLETE MONITORING AND CONTROL OF THE EXISTING CHLORINATORS. NO WORK IS ANTICIPATED TO BE NEEDED FROM THE CONTRACTOR RELATED TO CONTROL OF THE EXISTING CHLORINATORS BUT CONTRACTOR SHALL COORDINATE WITH THE CITY'S PROGRAMMERS AS TO SCHEDULING AND NOTIFYING WHEN PROGRAMMING WILL NEED TO BE COMPLETED.
6. THE CITY IS EXPECTED TO INITIATE, UNDER SEPARATE CONTRACT, AN EFFORT TO REPLACE EXISTING PLC HARDWARE. THIS WORK MAY BE IN PROGRESS DURING INSTALLATION OF NEW I/O POINTS. CONTRACTOR SHALL COORDINATE THEIR EFFORTS TO THE BEST INTEREST OF THE CITY AND FULLY COOPERATE WITH OTHER CONTRACTORS WORKING ON SITE WITHIN THE EXISTING PLC PANELS.



EXISTING CHEMICAL FEED BUILDING



DESIGNED	DBS
DRAWN	DBS
CHECKED	JCB
PROJ. ENGR.	RKA
NO.	ISSUED FOR
1	CONSTRUCTION
	DATE
	04/2013
	BY
	RKA
	APPROVED

DANIEL B. SCHMIDT P.E.
No. 40233



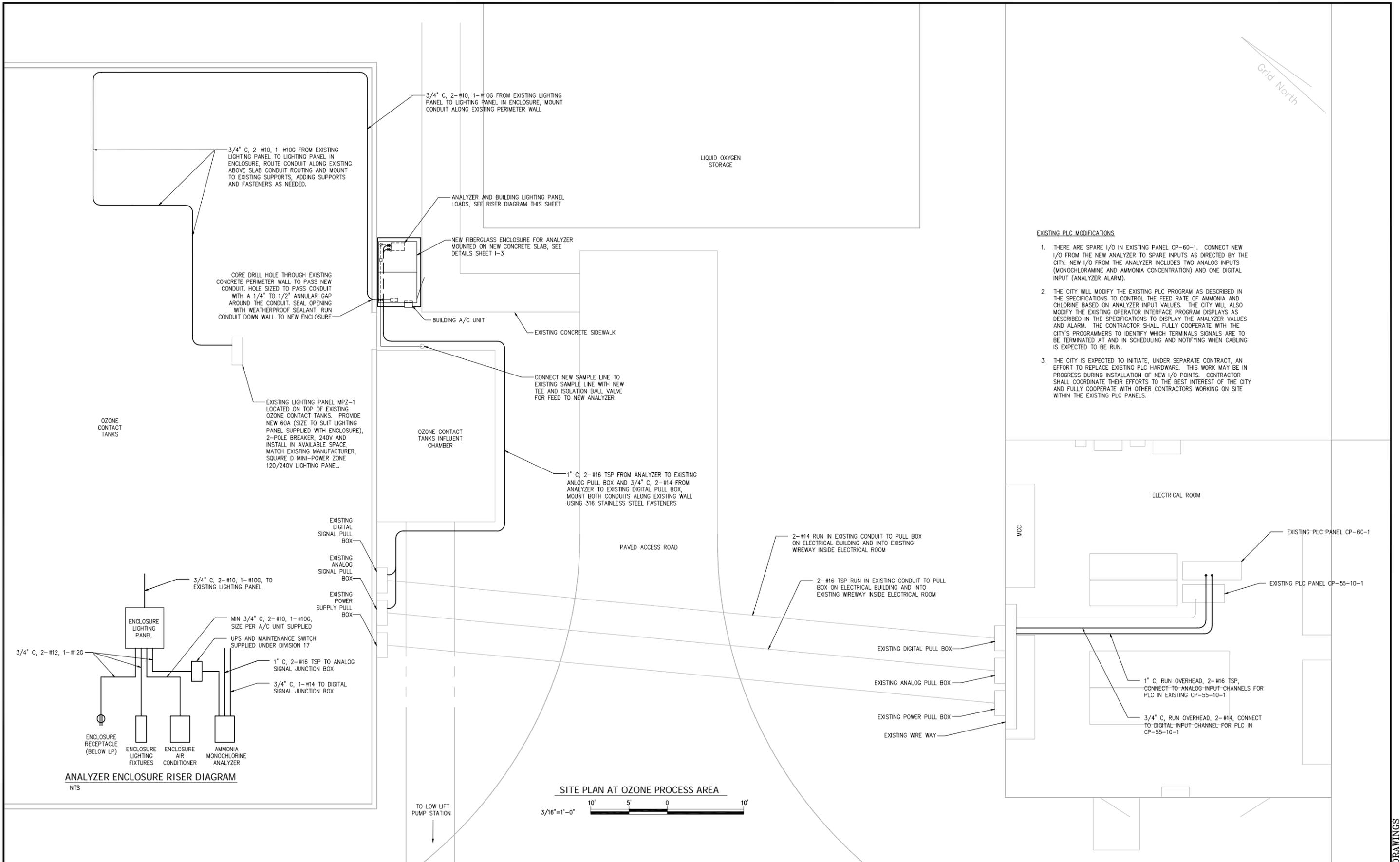
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CITY OF TAMPA
WATER DEPARTMENT
ENGINEERING DIVISION
DL TIPPIN WTF
BROMATE CONTROL

ANHYDROUS AMMONIA METERING
EQUIPMENT MODIFICATIONS

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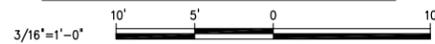


EXISTING PLC MODIFICATIONS

1. THERE ARE SPARE I/O IN EXISTING PANEL CP-60-1. CONNECT NEW I/O FROM THE NEW ANALYZER TO SPARE INPUTS AS DIRECTED BY THE CITY. NEW I/O FROM THE ANALYZER INCLUDES TWO ANALOG INPUTS (MONOCHLORAMINE AND AMMONIA CONCENTRATION) AND ONE DIGITAL INPUT (ANALYZER ALARM).
2. THE CITY WILL MODIFY THE EXISTING PLC PROGRAM AS DESCRIBED IN THE SPECIFICATIONS TO CONTROL THE FEED RATE OF AMMONIA AND CHLORINE BASED ON ANALYZER INPUT VALUES. THE CITY WILL ALSO MODIFY THE EXISTING OPERATOR INTERFACE PROGRAM DISPLAYS AS DESCRIBED IN THE SPECIFICATIONS TO DISPLAY THE ANALYZER VALUES AND ALARM. THE CONTRACTOR SHALL FULLY COOPERATE WITH THE CITY'S PROGRAMMERS TO IDENTIFY WHICH TERMINALS SIGNALS ARE TO BE TERMINATED AT AND IN SCHEDULING AND NOTIFYING WHEN CABLING IS EXPECTED TO BE RUN.
3. THE CITY IS EXPECTED TO INITIATE, UNDER SEPARATE CONTRACT, AN EFFORT TO REPLACE EXISTING PLC HARDWARE. THIS WORK MAY BE IN PROGRESS DURING INSTALLATION OF NEW I/O POINTS. CONTRACTOR SHALL COORDINATE THEIR EFFORTS TO THE BEST INTEREST OF THE CITY AND FULLY COOPERATE WITH OTHER CONTRACTORS WORKING ON SITE WITHIN THE EXISTING PLC PANELS.

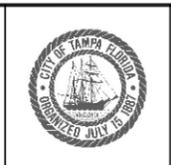
ANALYZER ENCLOSURE RISER DIAGRAM
NTS

SITE PLAN AT OZONE PROCESS AREA



DESIGNED	DBS
DRAWN	DBS
CHECKED	JCB
PROJ. ENGR.	RKA
DATE	04/2013
BY	RKA
APPROVED	

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ANALYZER AT OZONE
PROCESS INFLUENT

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CONSTRUCTION DRAWINGS

INSTRUMENT AND FUNCTION SYMBOLS

	PRIMARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR	FIELD MOUNTED	AUXILIARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR	NORMALLY INACCESSIBLE OR BEHIND THE PANEL DEVICES OR FUNCTIONS
FIELD/PANEL EQUIPMENT				
SHARED DISPLAY, SHARED CONTROL (OIT)				
PROGRAMMABLE LOGIC CONTROLLER				
SUPERVISORY COMPUTER FUNCTION (HMI/SERVER)				

SINGLE INSTRUMENT OR OTHER DEVICE HAVING MULTIPLE FUNCTIONS OR SHARING A COMMON HOUSING

SOFTWARE LOGIC XXXX AND SUB-MODULE YYY OR INPUT/OUTPUT POINT RESIDENT IN OR AT PLC. REFER TO CONTRACT DOCUMENTS FOR CONTROL DESCRIPTIONS.
"R" IN LOWER LEFT INDICATES REMOTE I/O POINT

DESIGNATIONS OF CONTROL FUNCTIONS (ZZZ) ASSOCIATED WITH INSTRUMENT OR OTHER DEVICES.

- | | |
|------------------------|------------------------|
| ALT - ALTERNATE | O/C - OPEN/CLOSE |
| AM - AUTO/MANUAL | OSC - OPEN/STOP/CLOSED |
| AVG - AVERAGE | POT - POTENTIOMETER |
| HQA - HAND/OFF/AUTO | RAIS - RAISE |
| MOA - MANUAL/OFF/AUTO | RL - RAISE/LOWER |
| HOR - HAND/OFF/REMOTE | RSL - RAISE/STOP/LOWER |
| LOS - LOCKOUT STOP | SD - SHUTDOWN |
| L/R - LOCAL/REMOTE | SEL - SELECT |
| LOR - LOCAL/OFF/REMOTE | SP - SET POINT |
| OCA - OPEN/CLOSE/AUTO | SR - START/RESET |
| | SS - START/STOP |

INSTRUMENT PANEL MOUNTED WITH COMPUTING OR CONVERTING FUNCTION

CONVERT E - VOLTAGE H - HYDRAULIC
I - CURRENT O - ELECTROMAGNETIC, SONIC
P - PNEUMATIC R - RESISTANCE (ELECT.)
A - ANALOG D - DIGITAL
B - BINARY

COMPUTE SUMMING EXPONENTIAL
 SUBTRACTOR AVERAGING
 MULTIPLYING RATIO
 DIVIDING HIGH SELECTING
 ROOT EXTRACTION LOW SELECTING
 PROPORTIONAL INTEGRAL
 DERIVATIVE PID

PANEL MOUNTED PILOT LIGHT

ANALYZER, XXXX = TYPE
XXXXX ALK - ALKALINITY O₂ - OXYGEN CONCENTRATION
RCL2 - RESIDUAL CHLORINE O₃ - OZONE
COMB - COMBUSTIBLE GAS ORP - OXIDATION/REDUCTION
COND - CONDUCTIVITY POT - POTENTIAL
DO - DISSOLVED OXYGEN pH - HYDROGEN ION
DOC - DISSOLVED ORGANICS TH - THIOCYANATE
H₂S - HYDROGEN SULFIDE UV - ULTRAVIOLET
LEL - LOWER EXPLOSIVE LIMIT

(*) ASTERISK IDENTIFIES FIELD INSTRUMENTS OR CONTROL PANELS FURNISHED BY EQUIPMENT SUPPLIER

OPERATIONAL INTERLOCK
 COMPLEX INTERLOCK AND LOGIC
 # = 1, 2, 3, etc. INTERLOCK NUMBER DESCRIPTION ON SAME SHEET OR LOGIC

VALVE AND ACTUATOR SYMBOLS

GATE VALVE	PLUG VALVE	GLOBE VALVE	BALL VALVE
BALL VALVE (3-WAY)	3-WAY VALVE (GENERAL)	PINCH VALVE	COMBINATION VACUUM AND PRESSURE RELIEF VALVE
BUTTERFLY VALVE	CHECK VALVE	BALL CHECK VALVE	DIAPHRAGM VALVE
NEEDLE VALVE	ANGLE VALVE	ROTARY VALVE	THROUGH PLUG VALVE
PRESSURE RELIEF OR SAFETY VALVE	VACUUM RELIEF VALVE	PRESSURE-REDUCING REGULATOR	BACKPRESSURE REGULATOR
BACKFLOW PREVENTER	SLUICE GATE	STOP/SLIDE GATE	STRAINER
BACKFLOW PREVENTER	ELECTRIC ACTUATOR	SOLENOID ACTUATOR	PNEUMATIC ACTUATOR
ELECTROPNEUMATIC ACTUATOR	ELECTROHYDRAULIC ACTUATOR	HAND WHEEL	

INSTRUMENT SYMBOLS

MAGNETIC FLOW METER	VENTURI FLOW TUBE	TURBINE FLOW METER	ROTAMETER	ULTRASONIC FLOW METER	PADDLE WHEEL FLOW METER	VORTEX FLOW METER	POSITIVE DISPLACEMENT FLOW METER
PITOT TUBE	PARSHALL FLUME	WEIR	ORIFICE PLATE	STRAIGHTENING VANES	ULTRASONIC LEVEL SENSOR	SUBMERSIBLE LEVEL SENSOR	FLOAT TYPE LEVEL SWITCH
TAPPED RING SEAL	DIAPHRAGM SEAL	FULL LINE RING SEAL	VALVED TAP	RTD AND THERMOWELL	RADAR LEVEL SENSOR (UNGUIDED)	RADAR LEVEL SENSOR (GUIDED)	CAPACITANCE LEVEL SENSOR

NOTES:
1. LIGHT LINES AND SYMBOLS INDICATE EXISTING ITEMS (OR FUTURE ITEMS WHERE NOTED). DARK LINES AND SYMBOLS INDICATE PROPOSED ITEMS.
2. SYMBOLS AND NOMENCLATURE ARE BASED ON ISA STANDARDS S5.1, S5.2, AND S5.4. SEE ASSOCIATED ELECTRICAL AND MECHANICAL SYMBOL SHEETS FOR ADDITIONAL SYMBOLS AND ABBREVIATIONS.

PUMP AND EQUIPMENT SYMBOLS

CENTRIFUGAL PUMP	CENTRIFUGAL WET PIT PUMP (SUBMERSIBLE)	BLOWER (CENTRIFUGAL)	GEAR PUMP OR BLOWER (POSITIVE DISPLACEMENT)
PROGRESSIVE CAVITY PUMP	SCREW PUMP	PISTON PUMP	DIAPHRAGM PUMP
VERTICAL PUMP	SUBMERSIBLE VERTICAL PUMP	CHEMICAL FEED PUMP	COMPRESSOR
	MIXER		TURBINE

MISCELLANEOUS SYMBOLS

DRAWING REFERENCE	EQUIPMENT TAG	MOTOR	AIR FILTER	STATIC MIXER	INJECTOR	PULSATION DAMPENER	CALIBRATION CYLINDER
VENT	DRAIN	FILTER	REDUCER	PIPE MATERIAL CHANGE	QUICK CONNECT	BLIND FLANGE	EXPANSION TANK
HORN	HORN/STROBE	RUPTURE DISK					

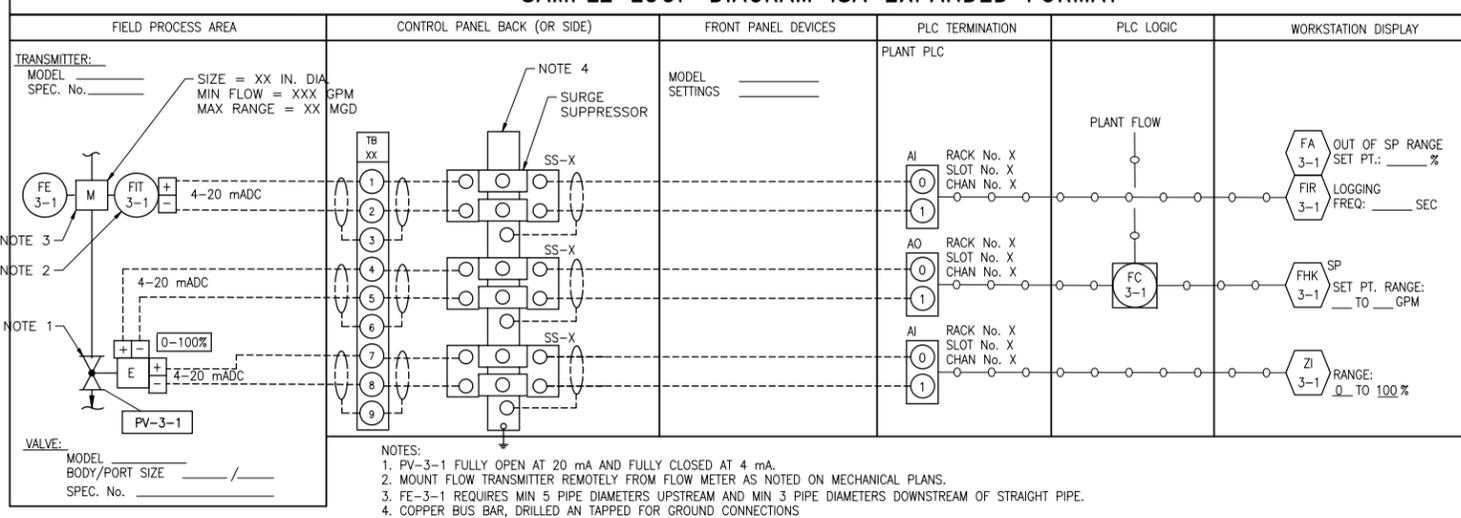
INSTRUMENT/DEVICE IDENTIFICATION LETTERS

	FIRST-LETTER		SUCCEEDING-LETTERS		
	MEASURED OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER, COMBUSTION				
C				CONTROL	CLOSE/CLOSED
D		DIFFERENTIAL			
E	VOLTAGE		SENSOR (PRIMARY ELEMENT)		
F	FLOW RATE	RATIO (FRACTION)			
G	GAUGE		GLASS, VIEWING DEVICE		
H	HAND				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M		MOMENTARY			MIDDLE, INTERMEDIATE
N	TORQUE				
O			ORIFICE, RESTRICTION		OPEN/OPENED
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RUN		RECORD & STORE	REPORT	
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, VOLUME MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	FAILURE OR TROUBLE	X AXIS			
Y	EVENT, STATE OR PRESENCE	Y AXIS		COMPUTE, CONVERT, RELAY	
Z	POSITION, DIMENSION	Z AXIS		DRIVER, ACTUATOR, FINAL CONTROL ELEMENT	

LINETYPE LEGEND

- MAJOR PROCESS PIPES OR CHANNELS
- SECONDARY PROCESS OR MECHANICAL CONNECTIONS
- CAPILLARY OR IMPULSE TUBING
- AIR SUPPLY OR SIGNAL
- HYDRAULIC SUPPLY OR SIGNAL
- ELECTRICAL SIGNAL (DIGITAL OR ANALOG)
- SHIELDED TWISTED PAIR
- FIBER OPTIC CABLE
- COAXIAL CABLE
- FIELD BUS, DATA LINK OR INTERNAL SOFTWARE LINK

SAMPLE LOOP DIAGRAM ISA EXPANDED FORMAT



DESIGNED	DBS
DRAWN	DBS
CHECKED	JCB
PROJ. ENGR.	RKA
1 CONSTRUCTION ISSUED FOR	04/2013 DATE
	RKA BY
	APPROVED

DANIEL B. SCHMIDT P.E.
No. 40233



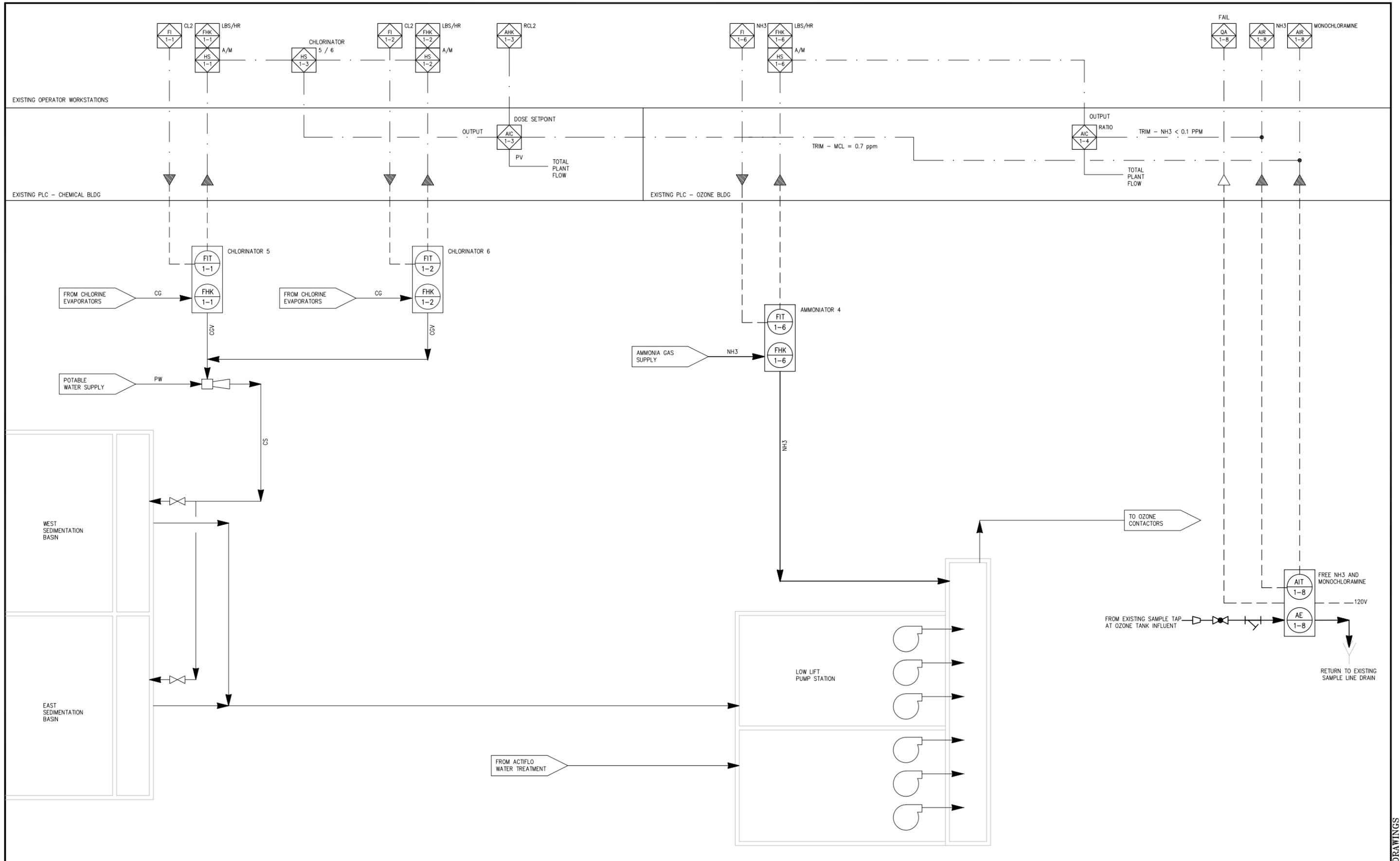
HAZEN AND SAWYER
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INSTRUMENTATION LEGEND AND ABBREVIATIONS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE APRIL 2013 H & S JOB NUMBER 41077-002 DRAWING NUMBER 1-1 SHEET OF
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CONSTRUCTION DRAWINGS



1	CONSTRUCTION	04/2013	RKA	BY
NO.	ISSUED FOR	DATE	BY	APPROVED

DESIGNED	DBS
DRAWN	DBS
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DANIEL B. SCHMIDT P.E.
No. 40233



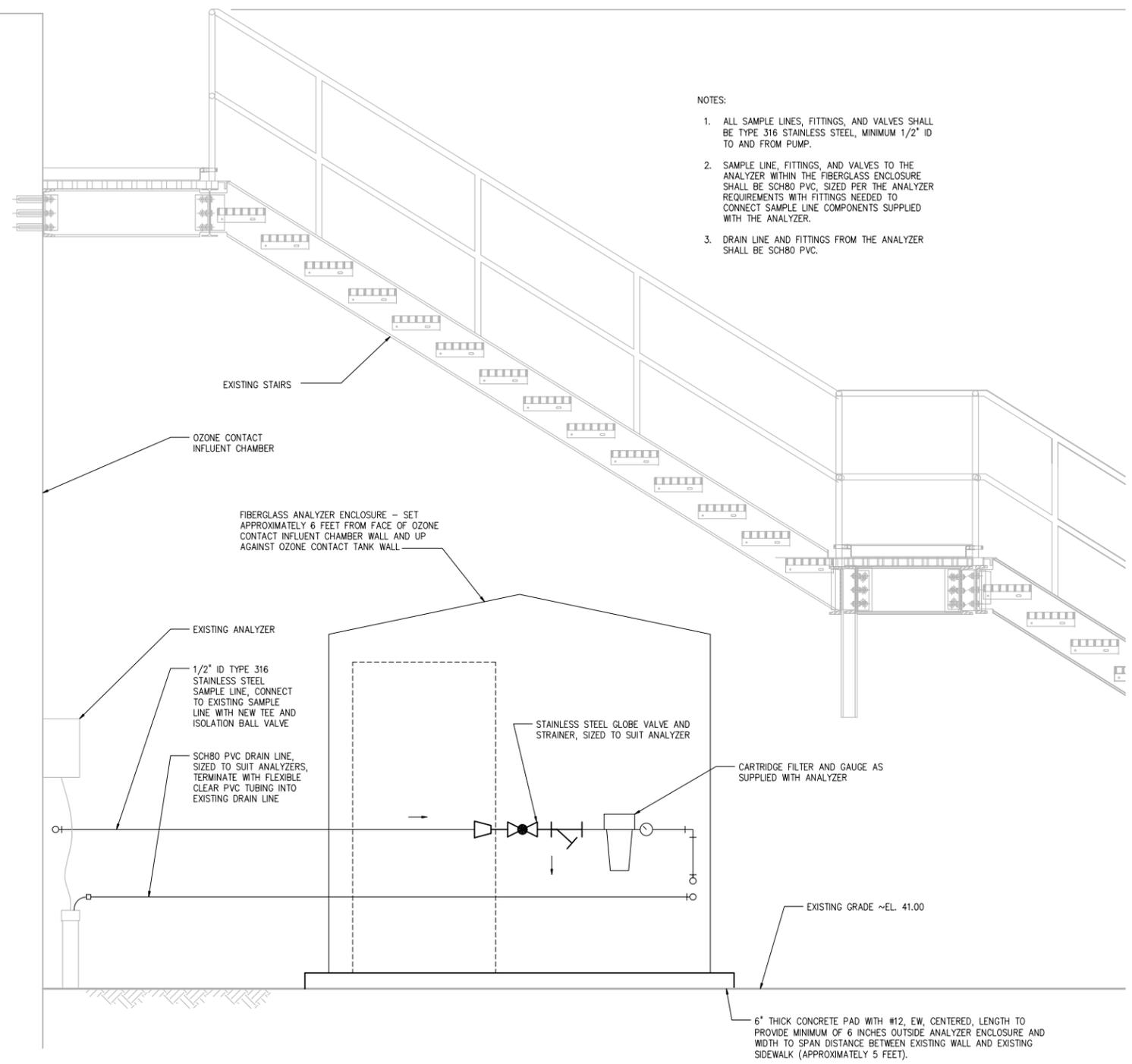
HAZEN AND SAWYER
Environmental Engineers & Scientists

CITY OF TAMPA
WATER DEPARTMENT
ENGINEERING DIVISION
DL TIPPIN WTP
BROMATE CONTROL

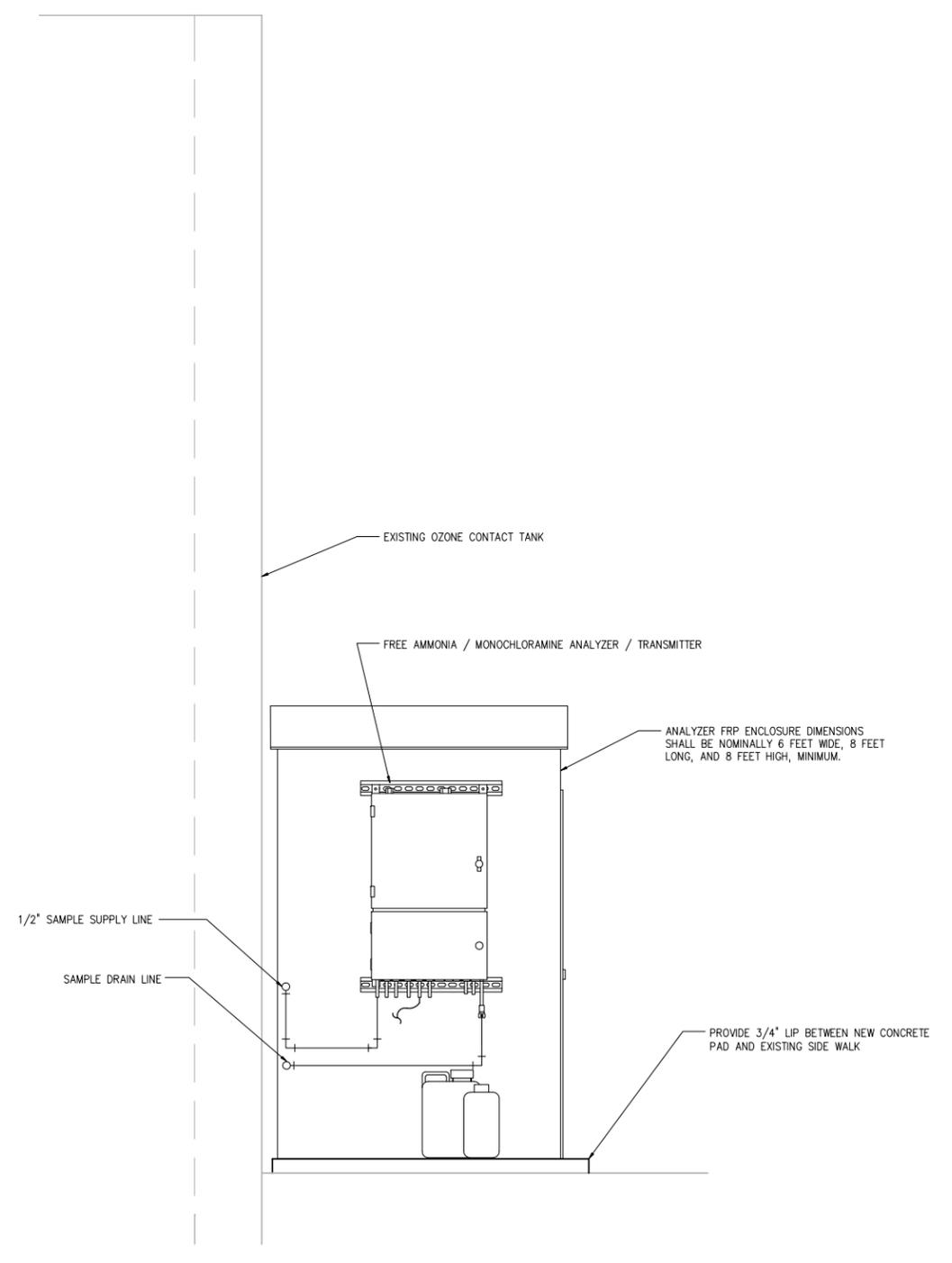
BROMATE CONTROL P & ID

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE APRIL 2013
	H & S JOB NUMBER 41077-002
	DRAWING NUMBER 1-2
	SHEET OF

CONSTRUCTION DRAWINGS



- NOTES:
1. ALL SAMPLE LINES, FITTINGS, AND VALVES SHALL BE TYPE 316 STAINLESS STEEL, MINIMUM 1/2" ID TO AND FROM PUMP.
 2. SAMPLE LINE, FITTINGS, AND VALVES TO THE ANALYZER WITHIN THE FIBERGLASS ENCLOSURE SHALL BE SCH80 PVC, SIZED PER THE ANALYZER REQUIREMENTS WITH FITTINGS NEEDED TO CONNECT SAMPLE LINE COMPONENTS SUPPLIED WITH THE ANALYZER.
 3. DRAIN LINE AND FITTINGS FROM THE ANALYZER SHALL BE SCH80 PVC.



SECTION VIEW OF ANALYZER ENCLOSURE AT OZONE CONTACT TANK (LOOKING NORTH)

SECTION VIEW OF ANALYZER ENCLOSURE AT OZONE CONTACT TANK (LOOKING EAST)



DESIGNED	DBS
DRAWN	DBS
CHECKED	JCB
PROJ. ENGR.	RKA
DATE	04/2013
BY	RKA
APPROVED	

DANIEL B. SCHMIDT P.E.
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ANALYZER DETAILS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.	DATE APRIL 2013
	H & S JOB NUMBER 41077-002
	DRAWING NUMBER 1-3
	SHEET OF

CONSTRUCTION DRAWINGS