WESTERN VIRGINIA WATER AUTHORITY
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

AS-BUILTS
APRIL 2015

HAZEN AND SAWYER
Environmental Engineers & Scientists

RECORD DRAWINGS

THESE "RECORD DRAWINGS" REPRESENT THE FINAL CONDITIONS OF THE CONSTRUCTION PROJECT BASED UPON THE LOCATIONS, DOCUMENTATION, AND INFORMATION FURNISHED TO HAZEN & SAWYER BY OTHERS, FIELD OBSERVATION AND SUPPORTING PROJECTS RECORDS.

ABBREVIATIONS

AB	ANCHOR BOLT
AC	ALTERNATING CURRENT/ ASBESTOS CEMENT
ACT	ACOUSTIC TILE
AD	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJUSTABLE
AFF	ABOVE FINISHED FLOOR
AGGR	AGGREGATE
AL	ALUMINUM
ALLOW	ALLOWANCE/ALLOWABLE
ALT	ALTERNATE
APPROX	APPROXIMATE
ARCH	ARCHITECTURAL
ASB	ASBESTOS
ASPH	ASPHALT
AT	ASPHALT TILE
B	BORING
BD	BOARD
BFE	BOTTOM OF FITTING ELEV
BFV	BUTTERFLY VALVE
BITUM	BITUMINOUS
BL	BASELINE
BL	BUILDING LINE
BLDG	BUILDING
BLK	BLOCK
BM	BENCH MARK
BOC	BACK OF CURB
BOT	BOTTOM
BRG	BEARING
BRK	BRICK
BRZ	BRONZE
BSMT	BASEMENT
BT	BOLT
BUR	BUILT-UP ROOFING
BV	BALL VALVE
C	CLOSET/CARPET/CHANNEL
CAB	CABINET
CB	CATCH BASIN
C/C	CENTER TO CENTER
CE	CONSTRUCTION EASEMENT
CEM	CEMENT
CER	CERAMIC
CF	CUBIC FEET
CFM	CUBIC FEET PER MINUTE
CI	CAST IRON/CUBIC INCHES
CIP	CAST IRON PIPE
CL	CENTER LINE
CL2	CHLORINE
CLG	CEILING
CLKG	CAULKING
CLR	CLEAR
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CO	CLEANOUT
COL	COLUMN
CONC	CONCRETE
CONST	CONSTRUCTION
CONT	CONTINUOUS
CONTR	CONTRACTOR
CORP	CORPORATION
CORR	CORRIDOR
CP	CONCRETE PLANK
CRS	COURSE
CT	CERAMIC TILE
CTJ	CONTROL JOINT
CU	COPPER
CV	CHECK VALVE
CW	COLD WATER
CY	CUBIC YARD
DC	DIRECT CURRENT
DET	DETAIL
DF	DRINKING FOUNTAIN
DIA (?)	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DIP	DUCTILE IRON PIPE
DISCH	DISCHARGE
DIST	DISTRIBUTION
DJ	DOUBLE JOIST
DL	DEAD LOAD
DN	DOWN
DOZ	DOZEN
DR	DOOR
DWG	DRAWING
DWL	DOWEL
E	EAST/EASEMENT
EA	EACH
ECC	ECCENTRIC
EF	EACH FACE
EFF	EFFLUENT
EIP	EXIST IRON PIPE
EL OR ELEV	ELEVATION
ELEC	ELECTRIC/ELECTRICAL
ELL	ELBOW
ENGR	ENGINEER
ENT	ENTRANCE
EOG	EDGE OF GRAVEL
EOP	EDGE OF PAVEMENT
EQ	EQUAL
EQPT	EQUIPMENT
EW	EACH WAY
EX	EXISTING
EXC	EXCAVATE
EXH	EXHAUST
EXP	EXPANSION
EXT	EXTERIOR
FAB	FABRICATE
F&C	FRAME AND COVER
F&G	FRAME AND GRATE
FC	FLUSHING CONNECTION
FD	FLOOR DRAIN
FDN	FOUNDATION
FE	FIRE EXTINGUISHER
FF	FINISH FLOOR
FH	FIRE HYDRANT
FIN	FINISH
FIX	FIXTURE
FL	FLASHING/FLOOR
FLEX	FLEXIBLE
FLG	FLANGE
FLUOR	FLUORESCENT
FLXC	FLEXIBLE CONNECTION
FM	FORCE MAIN
FPRF	FIREPROOF
FRP	FIBERGLASS REINFORCED POLYESTER LAMINATE
FT	FEET
FTG	FOOTING/FITTING
FURR	FURRING/FURRED
G	GAS/GAS LINE
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GC	GENERAL CONTRACTOR
GEN	GENERATOR
GI	GALVANIZED IRON
GL	GLASS
GPM	GALLONS PER MINUTE
GR	GRADE
GV	GATE VALVE
GW	GUY WIRE
GWB	GYPSUM WALL BOARD
GWF	GLAZED WALL FINISH
GYP	GYPSUM
H	HEIGHT
HDW	HARDWARE
HEX	HEXAGONAL
HM	HOLLOW METAL
HORZ	HORIZONTAL
HP	HORSEPOWER
HPT	HIGH POINT
HTR	HEATER
HVAC	HEATING, VENTILATION AND AIR CONDITIONING
HW	HOT WATER
HWL	HIGH WATER LEVEL
HWY	HIGHWAY
HYD	HYDRAULIC
I	IRON
ID	INSIDE DIAMETER
IF	INSIDE FACE
IN	INCH
INCL	INCLUDED
INF	INFLUENT
INS	INSULATION
INT	INTERIOR
INV	INVERT
J	JOIST
JB	JUNCTION BOX
JCT	JUNCTION
JT	JOINT
L	LENGTH/ANGLE
LA	LINE AHEAD
LAB	LABORATORY
LAM	LAMINATED
LAT	LATERAL
LAV	LAVATORY
LB	POUND/LINE BACK
LF	LINEAR FEET
LG	LONG
LL	LIVE LOAD
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LP	LIGHT POLE
LPT	LOW POINT
LT	LIGHT
LTG	LIGHTING
LVR	LOUVER
LWL	LOW WATER LEVEL
MAINT	MAINTENANCE
MATL	MATERIAL
MAX	MAXIMUM
MECH	MECHANICAL
MEMB	MEMBRANE
MET	METAL
MFR	MANUFACTURER
MG	MILLION GALLONS
MGD	MILLION GALLONS PER DAY
MH	MANHOLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MLDG	MOLDING
MO	MASONRY OPENING
MOD	MODIFY/MODIFIED
MON	MONUMENT
MOT	MOTOR
MTD	MOUNTED
MTG	MOUNTING
MULT	MULTIPLE
N	NORTH
NA	NOT APPLICABLE
NF	NEAR FACE
NIC	NOT IN CONTRACT
NO	NUMBER
NOM	NOMINAL
NPW	NON POTABLE WATER
NTS	NOT TO SCALE
OC	ON CENTER
OD	OUTSIDE DIAMETER
OF	OUTSIDE FACE
OFF	OFFICE
OPER	OPERATOR
OPNG	OPENING
OPP	OPPOSITE
ORIG	ORIGINAL
OT	OPEN TRUSS
OVHD	OVERHEAD
PAR	PARALLEL
PC	POINT OF CURVE/PIECE
PCC	POINT OF COMPOUND CURVE
PCF	POUNDS PER CUBIC FOOT
PE LINING	POLYETHYLENE LINING
PERF	PERFORATED
PERP	PERPENDICULAR
PI	POINT OF INTERSECTION
PL	PROPERTY LINE/PLATE
PNL	PANEL
PP	POWER POLE
PREFAB	PREFABRICATED
PRV	PRESSURE RELIEF VALVE
PS	PUMPING STATION
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PT	POINT OF TANGENT/POINT
PTN	PARTITION
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PVMT	PAVEMENT
PW	POTABLE WATER
QTY	QUANTITY
R	RADIUS/RISER
RCP	REINFORCED CONCRETE PIPE
RD	ROAD/ROOF DRAIN
RECIR	RECIRCULATION
RECP	RECEPTACLE
RECT	RECTANGULAR
RED	REDUCER
REF	REFERENCE
REG	REGISTER
REINF	REINFORCING
REM	REMOVE
REQD	REQUIRED
REST	RESTRAINED
REV	REVISE
RF	ROOF
RFG	ROOFING
RJ	RESTRAINED JOINT
RM	ROOM
RND	ROUND
RO	ROUGH OPENING
RPM	REVOLUTIONS PER MINUTE
RR	RAILROAD
RT	RIGHT
RTU	REMOTE TERMINAL UNIT
RW	RAW WATER
R/W	RIGHT OF WAY
S	SOUTH/SLOPE
SAN	SANITARY
SBL	SURVEY BASELINE
SCH	SCHEDULE
SD	STORM/SITE DRAIN
SECT	SECTION
SERV	SERVICE
SEW	SEWER
SF	SQUARE FEET
SHT	SHEET
SI	SQUARE INCH
SIM	SIMILAR
SJ	STEEL JOIST
SPEC	SPECIFICATION
SQ	SQUARE
SS	SANITARY SEWER
SST	STAINLESS STEEL
ST	STREET
STA	STATION
STD	STANDARD
STG	STORAGE
STIR	STIRRUP
STL	STEEL
STR	STRUCTURAL
SUB	SUBSTITUTE
SUP	SUPPLY
SUPT	SUPERINTENDENT
SUR	SURFACE
SUSP	SUSPENDED
SW	SWITCH
SWBD	SWITCHBOARD
SWD	SIDE WATER DEPTH
SYM	SYMMETRICAL
T	TREAD
T&B	TOP AND BOTTOM
T&G	TONGUE AND GROOVE
TAN	TANGENT
TBM	TEMPORARY BENCH MARK
TC	TOP OF CURB
TDH	TOTAL DYNAMIC HEAD
TECH	TECHNICAL
TEL	TELEPHONE
TEMP	TEMPERATURE
TER	TERRAZZO
THERMO	THERMOSTAT
THK	THICK
THRU	THROUGH
TOD	TOP OF DECK
TOF	TOP OF FOOTING
TOM	TOP OF MASONRY/MANHOLE
TOS	TOP OF SLAB
TOW	TOP OF WALL
TOL	TOLERANCE
TPS	TWISTED PAIR SHIELDED
TRANS	TRANSFORMER
TYP	TYPICAL
UG	UNDERGROUND
UH	UNIT HEATER
UNFIN	UNFINISHED
UR	URINAL
UTIL	UTILITY
VAC	VACUUM
VAT	VINYL ASBESTOS TILE
VCP	VITRIFIED CLAY PIPE
VEL	VELOCITY
VENT	VENTILATING/VENTILATION
VERT	VERTICAL
VOL	VOLUME
VP	VENT PIPE
VWC	VINYL WALL COVERING
W	WEST/WIDTH
W/	WITH
WC	WATER CLOSET
WF	WIDE FLANGE
WH	WALL HYDRANT
WI	WROUGHT IRON
WL	WATER LEVEL
W/L	WATER LINE
WO	WINDOW OPENING
W/O	WITHOUT
WP	WATERPROOF
WPFG	WATER PROOFING
WPT	WALL PENETRATING TYPE
WSE	WATER SURFACE ELEVATION
WSP	WEATHERSTRIP
WT	WEIGHT
WV	WATER VALVE
WWF	WELDED WIRE FABRIC
YD	YARD
YR	YEAR

INDEX OF DRAWINGS

GENERAL

MECHANICAL

ELECTRICAL

PIPE DESIGNATIONS

AM	AMMONIA
BWD	BACKWASH DRAIN
BWS	BACKWASH SUPPLY
BWW	BACKWASH WASTE
CLG	CHLORINE GAS
CLS	CHLORINE SOLUTION
D	DRAIN
F	FLUORIDE
FLW	FILTERED WATER
FW	FINISHED WATER
NPW	NONPOTABLE WATER
PW	POTABLE WATER
RC	RECYCLE
RW	RAW WATER
SLW	SETTLED WATER
SN	SUPERNATANT
SO	SOLIDS
SPD	SUMP PUMP DISCHARGE
SS	SANITARY SEWER
SW	SOFTENED WATER
TW	TEMPERED WATER

LEGEND

MATERIALS

- GRADE OR EARTH
- ROCK
- ASPHALT PAVING
- STEEL
- SAND
- INSULATION
- GRAVEL
- WATER SURFACE
- CONCRETE
- GRATING
- CONC. FILL OR GROUT
- CHECKERED PLATE
- CONC. MASONRY UNIT
- GLASS
- BRICK
- WOOD BLOCKING

SYMBOLS

- GATE VALVE
- BUTTERFLY VALVE
- PLUG VALVE
- SWING CHECK VALVE
- GLOBE VALVE
- PINCH VALVE
- DIAPHRAGM VALVE
- BALL VALVE
- BALL CHECK VALVE
- HARNESSED FLANGED ADAPTER
- HARNESSED SLEEVE TYPE COUPLING
- SLEEVE TYPE COUPLING
- HARNESSED FLEXIBLE COUPLING
- WALL PENETRATION
- MECHANICAL COUPLING
- WELDED JOINT
- FLANGED JOINT
- MECHANICAL, PUSH ON OR RESTRAINED JOINT
- SLUICE GATE
- SLIDE GATE/STOP GATE
- FLUSHING CONNECTION
- HOSE BIBB
- QUICK DISCONNECT FITTING
- YARD HYDRANT
- FIRE HYDRANT
- SOIL BORING

SECTION AND DETAIL KEYING

DRAWINGS ARE CROSS REFERENCED IN THE FOLLOWING METHOD:

(A) A SECTION CUT ON DRAWING A3 IS IDENTIFIED AS FOLLOWS:

A / A6 — SECTION LETTER; DRAWING WHERE SECTION IS SHOWN

A / A3 — SECTION LETTER; DRAWING FROM WHERE SECTION WAS TAKEN

DETAILS ARE CROSS REFERENCED IN A SIMILAR MANNER, EXCEPT DETAILS ARE IDENTIFIED BY A SQUARE WITH A NUMBER IN THE UPPER HALF.

STANDARD DETAILS ARE REFERENCED BY A UNIQUE SEVEN DIGIT NUMBER AND ARE SHOWN ON THE CONTRACT DRAWINGS BY ONE OF TWO METHODS:

1509203 → REFERENCED ITEM

OR:

SEE 1509203 → REFERENCED ITEM

STANDARD DETAILS ARE COMPILED IN APPROXIMATE NUMERICAL ORDER IN THE BACK OF THE CONTRACT DRAWINGS ON THE D* DRAWINGS.

LINETYPES

- PROPOSED ITEMS
- EXISTING ITEMS
- HIDDEN ITEMS
- DEMOLITION ITEMS
- CENTER LINE
- MATCH LINE

RECORD DRAWINGS

NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

DESIGNED ABL
DRAWN KJO
CHECKED
PROJ.ENGR. ALS
APPROVED

COMMONWEALTH OF VIRGINIA ALAN L. STONE Lic. No. 24446 PROFESSIONAL ENGINEER

RECORD DRAWING
THIS DRAWING HAS BEEN MODIFIED TO REFLECT FIELD CHANGES REPORTED BY THE CONTRACTOR OR ANOTHER PARTY, BUT NOT VERIFIED BY THE CERTIFYING ENGINEER

THIS DOCUMENT ORIGINALLY ISSUED FOR CONSTRUCTION AND SEALED BY ALAN L. STONE, LIC NUMBER 24446

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WESTERN VIRGINIA WATER AUTHORITY
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY DISINFECTION IMPROVEMENTS

INDEX, ABBREVIATIONS AND LEGEND

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER G1

GENERAL STRUCTURAL NOTES

G-1 THE DESIGN IS IN ACCORDANCE WITH AND ALL CONSTRUCTION SHALL COMPLY WITH THE PROVISIONS OF THE 2012 VIRGINIA UNIFORM STATEWIDE BUILDING CODE.

G-2 ALL DIMENSIONS INDICATED (*) SHALL BE VERIFIED EITHER BY FIELD MEASUREMENTS FOR EXISTING STRUCTURES OR BY SHOP DRAWINGS FOR EQUIPMENT FURNISHED. STRUCTURAL DIMENSIONS NOT SHOWN BUT CONTROLLED BY OR RELATED TO EQUIPMENT SHALL BE VERIFIED BY THE CONTRACTOR WITH THE MANUFACTURER PRIOR TO CONSTRUCTION.

G-3 THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING INFORMATION IN THE FIELD AS REQUIRED FOR NEW WORK.

G-4 IF A CONFLICT IS FOUND BETWEEN DIFFERENT PORTIONS OF THE CONTRACT DOCUMENTS, THE CONTRACTOR SHALL NOTIFY THE ENGINEER IMMEDIATELY. CONTINUED CONSTRUCTION OF THE AREA IN CONFLICT SHALL BE AT THE CONTRACTOR'S OWN RISK UNTIL THE CONFLICT IS RESOLVED.

G-5 EQUIPMENT ANCHOR BOLT SIZES, TYPES, EMBEDMENT AND PATTERNS SHALL BE VERIFIED WITH THE MANUFACTURER. ALL BOLT PATTERNS SHALL BE TEMPLATED TO INSURE ACCURACY OF PLACEMENT.

G-6 THESE NOTES SHALL BE USED IN COORDINATION WITH THE DRAWINGS OF ALL OTHER DISCIPLINES AND MANUFACTURER'S SHOP DRAWINGS.

G-7 STRUCTURES HAVE BEEN DESIGNED FOR OPERATIONAL LOADS ON THE COMPLETED STRUCTURE. DURING CONSTRUCTION, THE STRUCTURES SHALL BE PROTECTED BY BRACING AND TEMPORARY SUPPORTS WHEREVER EXCESSIVE CONSTRUCTION LOADS MAY OCCUR. OVERSTRESSING OF ANY STRUCTURAL ELEMENT IS PROHIBITED.

G-8 NO GEOTECHNICAL INVESTIGATION WAS PERFORMED FOR THIS CONTRACT. AS SUCH, FOR THE DESIGN OF EQUIPMENT ANCHORAGE THE CONTRACTOR SHALL ASSUME A SITE CLASS D AND AN OCCUPANCY CATEGORY III.

STRUCTURAL METALS

M-1 DETAIL, FABRICATE, AND ERECT STRUCTURAL STEEL IN ACCORDANCE WITH AISC SPECIFICATION FOR STRUCTURAL STEEL BUILDINGS, ALLOWABLE STRESS DESIGN AND PLASTIC DESIGN, LATEST EDITION.

M-2 STEEL MATERIAL:

A) STRUCTURAL TUBING:	ASTM A500, GRADE B OR A501 (42 KSI)
B) STRUCTURAL PIPE:	ASTM A53, TYPE E OR S, GRADE B (35 KSI)
C) PLATES AND ANGLES:	ASTM A36 UNO (36 KSI)
D) STRUCTURAL W SHAPES:	ASTM A992 (50 KSI)
E) STRUCTURAL S, M, C & H SHAPES:	ASTM A572 GRADE 50 (50 KSI)

M-3 PROVIDE MINIMUM 3/4" DIAMETER ASTM A325 HIGH STRENGTH BOLTS WITH SNUG TIGHTENED TYPE N CONNECTIONS FOR STRUCTURAL STEEL UNLESS NOTED OTHERWISE. HOLES FOR BOLTS SHALL BE STANDARD SIZE UNLESS NOTED OTHERWISE.

M-4 DO NOT PAINT STEEL SURFACES WHICH ARE TO BE WELDED OR ARE TO BE ENCASED IN CONCRETE.

M-5 ALUMINUM SHALL BE ISOLATED FROM CONTACT WITH CONCRETE AND DISSIMILAR METALS.

NONSTRUCTURAL COMPONENT ANCHORAGE

A-1 ALL ARCHITECTURAL, MECHANICAL, AND ELECTRICAL COMPONENTS SHALL BE DESIGNED AND INSTALLED TO RESIST THE CONTROLLING CONDITION OF OPERATIONAL FORCES OR SEISMIC FORCES IN ACCORDANCE WITH THE GOVERNING BUILDING CODE. SEISMIC FORCES SHALL ALSO BE AS PER ASCE 7. COMPONENT SEISMIC ATTACHMENTS SHALL BE BOLTED, WELDED, OR OTHERWISE POSITIVELY FASTENED WITHOUT CONSIDERATION OF FRICTIONAL RESISTANCE PRODUCED BY THE EFFECTS OF GRAVITY. A CONTINUOUS LOAD PATH OF SUFFICIENT STRENGTH AND STIFFNESS BETWEEN THE COMPONENT AND THE SUPPORTING STRUCTURE SHALL BE PROVIDED. CONNECTIONS FOR BOTH ORTHOGONAL DIRECTIONS (TRANSVERSE AND LONGITUDINAL) SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER CURRENTLY REGISTERED IN THE COMMONWEALTH OF VIRGINIA.

A-2 COMPONENT REACTION FORCES AT THE POINT OF ATTACHMENT TO THE STRUCTURE SHALL BE SUBMITTED TO AND COORDINATED WITH THE ENGINEER FOR CONFIRMATION SUPPORTING STRUCTURE CAN WITHSTAND REACTION FORCES.

A-3 CONTRACTOR SHALL PROVIDE SPECIAL SEISMIC CERTIFICATION (SSC) FROM MANUFACTURER OF EQUIPMENT FOR ALL SYSTEMS DEEMED NECESSARY BY SPECIFICATIONS. SPECIAL SEISMIC CERTIFICATION SHALL BE IN COMPLIANCE WITH ASCE 7.

FIBERGLASS REINFORCED PLASTICS

FRP-1 SEE SPECIFICATION 06610 FOR REQUIREMENTS

PRECAST CONCRETE

PC-1 PRECAST VAULTS AND MANHOLES SHALL BE DESIGNED BY A PROFESSIONAL ENGINEER CURRENTLY REGISTERED IN THE COMMONWEALTH OF VIRGINIA. STRUCTURAL DRAWINGS SHALL INDICATE DESIGN IS IN COMPLIANCE WITH THE VIRGINIA UNIFORM STATEWIDE BUILDING CODE.

CONCRETE (CAST-IN-PLACE)

C-1 CONCRETE MIX DESIGN:

A. COMPRESSIVE STRENGTH (28 DAY)	4500 PSI (MINIMUM)
B. MAXIMUM WATER/CEMENTITIOUS MATERIAL RATIO (BY WEIGHT)	0.42
C. SLUMP RANGE	4" NOMINAL
D. AIR CONTENT	6% ± 1.5%

E. PORTLAND CEMENT: TYPE I OR TYPE II CONFORMING TO ASTM C 150 WITH TOTAL ALKALIS IN THE CEMENT NOT EXCEEDING 0.60%, TRICALCIUM ALUMINATE NOT MORE THAN 8% AND TETRACALCIUM ALUMINOFERRITE NOT MORE THAN 12%

F. FLY ASH: FLY ASH SHALL MEET THE REQUIREMENTS OF ASTM C 618 FOR CLASS F AND SHALL CONSTITUTE BETWEEN 15% AND 25% OF THE TOTAL WEIGHT OF THE COMBINED PORTLAND CEMENT AND FLY ASH.

G. SLAG CEMENT: SLAG CEMENT SHALL MEET THE REQUIREMENTS OF ASTM C 989, INCLUDING APPENDIX X3, AND SHALL CONSTITUTE BETWEEN 35% AND 45% OF THE TOTAL WEIGHT OF THE COMBINED PORTLAND CEMENT AND SLAG

H. WATER: WATER USED FOR MIXING CONCRETE SHALL BE CLEAR, POTABLE AND FREE FROM DELETERIOUS SUBSTANCES.

I. COARSE AND FINE AGGREGATES: AGGREGATES SHALL MEET THE GRADATION REQUIREMENTS OF ASTM C33. COARSE AGGREGATES SHALL BE EITHER SIZE #57 OR SIZE #67 STONE. FINE AGGREGATES SHALL CONSIST OF EITHER NATURAL OR MANUFACTURED SILICEOUS SANDS. AGGREGATES SHALL BE TESTED FOR GRADATION IN CONFORMANCE WITH ASTM C 136.

J. AIR ENTRAINING ADMIXTURE: AIR ENTRAINING ADMIXTURES SHALL BE ADDED TO ALL CONCRETE AND SHALL CONSIST OF A NEUTRALIZED VINSOL RESIN SOLUTION OF PURIFIED HYDROCARBON WITH CEMENT CATALYST AND SHALL MEET THE REQUIREMENTS OF ASTM 260.

K. WATER REDUCING ADMIXTURE: WATER REDUCING ADMIXTURE SHALL CONFORM TO ASTM C 494, TYPE A AND SHALL CONTAIN NO MORE THAN 0.05% CHLORIDE IONS. ACCEPTABLE PRODUCTS ARE "EUCON SERIES" BY THE EUCLID CHEMICAL COMPANY, "POZZOLITH SERIES" BY BASF, AND "PLASTOCRETE SERIES" BY SIKA CORPORATION.

L. ADMIXTURES CONTAINING CALCIUM CHLORIDE, THIOCYANATE OR MORE THAN 0.05 PERCENT CHLORIDE IONS ARE NOT PERMITTED.

M. THE USE OF FLY ASH OR SLAG CEMENT WITHIN THE MIX IS MANDATORY.

N. SUBMITTALS: SUBMIT TO THE ENGINEER CONCRETE MIX DESIGN INCLUDING SOURCES OF ALL MATERIALS, CHEMICAL ANALYSIS OF PORTLAND CEMENT (LESS THAN 1 YEAR OLD), CHEMICAL ANALYSIS OF FLY ASH OR SLAG (LESS THAN 1 YEAR OLD), MANUFACTURERS DATA ON ALL ADMIXTURES AND FIELD EXPERIENCE RECORDS OR TRIAL MIX DATA FOR PROPOSED CONCRETE MIX.

O. CONCRETE SHALL BE SUPPLIED BY A READY MIXED PLANT AND SHALL BE DELIVERED TO THE JOB SITE IN A TRUCK EQUIPPED WITH A MIXING DRUM. ALL CONCRETE DELIVERIES SHALL BE ACCOMPANIED BY A DELIVERY TICKET. ANY CONCRETE DELIVERY THAT DOES NOT INCLUDE A DELIVERY TICKET WILL BE REJECTED.

P. PLACEMENT AND CURING OF CONCRETE SHALL MEET THE REQUIREMENTS OF ACI 305 – SPECIFICATION FOR HOT WEATHER CONCRETING AND ACI 306 STANDARD SPECIFICATION FOR COLD WEATHER CONCRETING WHEN ENVIRONMENTAL CONDITIONS DICTATE SUCH. IN ADDITION, FOR CONCRETE PLACED OUTSIDE OF STRUCTURES, THE SUBGRADE SHALL BE FREE OF FROST AND MOIST PRIOR TO THE PLACING OF CONCRETE

Q. ALL EXPOSED CONCRETE EDGES SHALL HAVE MINIMUM 3/4" CHAMFER.

C-2 CONCRETE ACCESSORIES:

A. FORMS: FORMS SHALL BE CONSTRUCTED OF WOOD, METAL OR FIBERGLASS AND SHALL BE UTILIZED FOR ALL CONCRETE WORK EXCEPT CONCRETE PLACED DIRECTLY AGAINST GRADE AND THE USE OF SIDE FORMS IS MANDATORY FOR CONSTRUCTION OF EXTERIOR CONCRETE PADS. FORMS SHALL BE COATED WITH A NON-STAINING FORM RELEASE AGENT. SUBMIT MANUFACTURERS DATA FOR FORM RELEASE AGENT TO BE USED.

B. REINFORCING BARS: ALL BAR REINFORCING SHALL CONFORM TO ASTM A615, GRADE 60 FOR DEFORMED BARS. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185. CONTRACTOR SHALL SUBMIT REINFORCING PLACEMENT DRAWINGS FOR ENGINEERS REVIEW

C. REINFORCING BAR ACCESSORIES: ACCESSORIES SHALL INCLUDE ALL NECESSARY CHAIRS, SLAB BOLSTERS, CONCRETE BLOCKS, TIE WIRES, DIPS, SUPPORTS, SPACERS AND OTHER DEVICES TO POSITION REINFORCING DURING CONCRETE PLACEMENT. SLAB BOLSTERS SHALL HAVE GRAY PLASTIC-COATED LEGS. CONCRETE BLOCKS (DOBIES), USED TO SUPPORT AND POSITION BOTTOM REINFORCING STEEL, SHALL HAVE THE SAME OR HIGHER COMPRESSIVE STRENGTH AS SPECIFIED FOR THE CONCRETE IN WHICH IT IS LOCATED. REINFORCING BARS AND ACCESSORIES SHALL NOT BE IN CONTACT WITH ANY METAL PIPE, PIPE FLANGE, METAL CONDUIT, OR OTHER METAL PARTS EMBEDDED IN CONCRETE. A MINIMUM CLEARANCE OF 2" SHALL BE PROVIDED.

D. DOWEL ADHESIVE SYSTEM: WHERE SHOWN ON THE DRAWINGS, REINFORCING BARS ANCHORED INTO HARDENED CONCRETE WITH A DOWEL ADHESIVE SYSTEM SHALL USE A TWO-COMPONENT ADHESIVE MIX WHICH SHALL BE INJECTED WITH A STATIC MIXING NOZZLE FOLLOWING MANUFACTURER'S INSTRUCTIONS. ALL HOLES SHALL BE DRILLED WITH A CARBIDE BIT UNLESS OTHERWISE RECOMMENDED BY THE MANUFACTURER AND SHALL BE NO LARGER THAN 1/8" THE BAR DIAMETER. IF CORING HOLES IS ALLOWED BY THE MANUFACTURER AND APPROVED BY THE ENGINEER, CORED HOLES SHALL BE ROUGHENED IN ACCORDANCE WITH MANUFACTURER REQUIREMENTS. THOROUGHLY CLEAN DRILL HOLES OF ALL DEBRIS AND DRILL DUST WITH COMPRESSED AIR FOLLOWED BY A WIRE BRUSH PRIOR TO INSTALLATION OF ADHESIVE AND REINFORCING BAR. DEGREE OF HOLE DAMPNESS SHALL BE IN STRICT ACCORDANCE WITH MANUFACTURER RECOMMENDATIONS. WHERE DEPTH OF HOLE EXCEEDS THE LENGTH OF THE STATIC MIXING NOZZLE, A PLASTIC EXTENSION HOSE SHALL BE USED TO ENSURE PROPER ADHESIVE INJECTION FROM THE BACK OF THE HOLE. INJECTION OF ADHESIVE INTO THE HOLE SHALL UTILIZE A PISTON PLUG TO MINIMIZE THE FORMATION OF AIR POCKETS. THE EMBEDMENT DEPTH OF THE BAR SHALL BE PER MANUFACTURER'S RECOMMENDATIONS, SO AS TO PROVIDE A MINIMUM ALLOWABLE BOND STRENGTH THAT IS EQUAL TO 125 PERCENT OF THE YIELD STRENGTH OF THE BAR, UNLESS NOTED OTHERWISE ON THE DRAWINGS. THE ADHESIVE SYSTEM SHALL BE "EPCON SYSTEM G5" AS MANUFACTURED BY ITW REDHEAD, " HIT HY 200 INJECTION ADHESIVE ANCHOR SYSTEM" AS MANUFACTURED BY HILTI, INC. "SET-XP" AS MANUFACTURED BY SIMPSON STRONG-TIE CO. OR "PE-1000 SD" BY POWERS FASTENERS. ENGINEER'S APPROVAL IS REQUIRED FOR USE OF THIS SYSTEM IN LOCATIONS OTHER THAN THOSE SHOWN ON THE DRAWINGS. FAST-SET EPOXY FORMULATIONS SHALL NOT BE ACCEPTABLE. NO OR EQUAL PRODUCTS WILL BE CONSIDERED, UNLESS PRE-QUALIFIED AND APPROVED BY ENGINEER AND OWNER. SUBMIT MANUFACTURERS DATA FOR SYSTEM TO BE USED.

E. EXPANSION JOINT MATERIAL: EXPANSION JOINT MATERIAL SHALL BE SPONGE RUBBER CONFORMING TO ASTM D1752, TYPE 1. ALL EXPANSION JOINTS EXPOSED IN THE FINISH WORK SHALL BE SEALED WITH A JOINT SEALER WITH A BOND BREAKER INSTALLED BETWEEN THE EXPANSION JOINT MATERIAL AND THE SEALER. THE SEALER SHALL BE A MULTI-COMPONENT, NON-SAG, LOW-MODULUS POLYURETHANE RUBBER SEALANT MEETING ASTM C-920, TYPE M, GRADE NS, CLASS 25, USE NT, M, A, AND O. CAPABLE OF WITHSTANDING 50% IN EXTENSION OR COMPRESSION SUCH AS SIKAFLEX-2C NS/SL, SIKA CORPORATION, OR SONOLASTIC NP-2, SONNEBORN, OR DYNATROL II BY PECORA CORPORATION.

F. EPOXY BONDING AGENT: EPOXY BONDING AGENT SHALL CONFORM TO ASTM C881 AND SHALL BE SIKADUR 32 HI-MOD, SIKA CORPORATION, LYNDHURST, N.J.; EUCO #452 EPOXY SYSTEM, EUCLID CHEMICAL COMPANY, CLEVELAND, OH, CONCRESIVE LV1 BY BASF CONSTRUCTION CHEMICALS.

CONCRETE (CAST-IN-PLACE), CONTINUED

C-3 CONCRETE FINISHES: CONCRETE EQUIPMENT PADS SHALL BE SCREEDED AND FLOATED WITH A WOOD OR MAGNESIUM FLOAT AFTER CONCRETE PLACEMENT AND ALL EDGES SHALL BE EDGED WITH A CONCRETE EDGING TOOL. FOLLOWING FLOATING THE CONCRETE SHALL RECEIVE A TEXTURED FINISH CREATED BY DRAWING A BROOM OR BURLAP BELT ACROSS THE SURFACE.

ALL EXPOSED SURFACES OF CONCRETE WALLS SHALL HAVE ALL FINS, BURRS, OFFSETS, MARKS AND ALL OTHER PROJECTIONS LEFT BY THE FORMS REMOVED. ALL HOLES LEFT BY REMOVAL OF ENDS OF TIES, AND ALL OTHER HOLES, DEPRESSIONS, BUCHOLES, AIR/BLOW HOLES OR VOIDS SHALL BE FILLED SOLID WITH CEMENT GROUT AFTER FIRST BEING THOROUGHLY WETTED AND THEN STRUCK OFF FLUSH. ALL HOLES SHALL BE FILLED WITH TOOLS, SUCH AS SPONGE FLOATS AND TROWELS WHICH WILL PERMIT PACKING THE HOLE SOLIDLY WITH CEMENT GROUT. CEMENT GROUT SHALL CONSIST OF ONE PART CEMENT TO THREE PARTS SAND, EPOXY BONDING AGENT (FOR TIE HOLES ONLY) AND THE AMOUNT OF MIXING WATER SHALL BE AS LITTLE AS CONSISTENT WITH THE REQUIREMENTS OF HANDLING AND PLACING. COLOR OF CEMENT GROUT SHALL MATCH THE ADJACENT WALL SURFACE. AFTER ALL SURFACE IMPERFECTIONS HAVE BEEN REPAIRED THE SURFACE SHALL BE PREDAMPENED AND GROUT CLEANED WITH A SLURRY CONSISTING OF ONE PART CEMENT (INCLUDING AN APPROPRIATE QUANTITY OF WHITE CEMENT IN ORDER TO PRODUCE A COLOR MATCHING THE SURROUNDING CONCRETE) AND 1-1/2 PARTS SAND PASSING THE NO. 16 SIEVE, BY DAMP LOOSE VOLUME. THE SLURRY SHALL BE SPREAD OVER THE SURFACE WITH CLEAN BURLAP PADS OR SPONGE RUBBER FLOATS. MIX PROPORTIONS SHALL BE SUBMITTED TO THE ENGINEER AFTER A SAMPLE OF THE WORK IS ESTABLISHED AND ACCEPTED. ANY SURPLUS SHALL BE REMOVED BY SCRAPING AND THEN RUBBING WITH CLEAN BURLAP.

C-4 CURING: CONCRETE SHALL BE CURED BY PONDING OR CONTINUOUS FOGGING OR SPRINKLING, APPLICATIONS OF MATS OR FABRIC KEPT CONTINUOUSLY WET, CONTINUOUS APPLICATION OF STEAM OR APPLICATION OF SHEETING MATERIALS CONFORMING TO ASTM C 171.

C-5 CLEAR DISTANCE FROM ANCHOR BOLTS TO ANY CONCRETE EDGE SHALL BE 4" MINIMUM UNLESS OTHERWISE NOTED.

C-6 CHEMICAL RESISTANT RETROFIT WATERSTOPS: RETROFIT WATERSTOPS SHALL BE MANUFACTURED OF THERMOPLASTIC ELASTOMERIC RUBBER (TPER) UNLESS ALTERNATIVE MATERIAL IS RECOMMENDED BY THE MANUFACTURER AND THE MANUFACTURER SHALL PROVIDE A COMPLETE SYSTEM INCLUDING WATERSTOP, STAINLESS STEEL ANCHORING HARDWARE AND BATTEN BARS AND EPOXY FOR INSTALLATION. AT WATERSTOP INTERSECTIONS FACTORY FABRICATED CORNERS AND TRANSITIONS SHALL BE USED AND SPLICES SHALL BE MADE WITH A THERMOSTATICALLY CONTROLLED HEATING ELEMENT AS APPROVED BY THE MANUFACTURER, WATESTOP SHALL BE WESTEC MODEL 629 BY SIKA GREENSTREAK OR APPROVED EQUAL.

DEMOLITION

D-1 THE CONTRACTOR SHALL TAKE NECESSARY PRECAUTIONS TO PREVENT DUST FROM RISING BY WETTING DEMOLISHED MASONRY, CONCRETE, PLASTER AND SIMILAR DEBRIS. UNALTERED PORTIONS OF THE EXISTING BUILDINGS AFFECTED BY THE WORK SHALL BE PROTECTED BY DUST-PROFF PARTITIONS AND OTHER ADEQUATE MEANS.

D-2 CONCRETE DEMOLITION WITHIN STRUCTURES BEING MODIFIED SHALL BE SELECTIVE DEMOLITION BY CORE DRILLING OR SAWCUTTING AND CAREFUL REMOVAL OF CONCRETE SHOWN TO BE REMOVED. NO OVER CUTTING OF AREAS TO BE DEMOLISHED SHALL BE PERMITTED. CONTRACTOR SHALL CORE DRILL CORNERS OF OPENING PRIOR TO SAWCUTTING IF NECESSARY. VIBRATORY HAMMERS SHALL NOT BE USED FOR SELECT DEMOLITION WORK. JACK HAMMERS, HOE RAMS AND OTHER HIGH ENERGY DEMOLITION EQUIPMENT MAY BE USED FOR COMPLETE REMOVAL OF A STRUCTURE. EXPLOSIVES SHALL NOT BE USED FOR ANY DEMOLITION.

D-3 UNLESS ANCHORING DEVICES AND/OR REINFORCEMENT ARE NOTED TO REMAIN FOLLOWING DEMOLITION, REMOVE AND/OR BURN BACK ANCHORS AND REINFORCEMENT STEEL 1/2" MIN BELOW SURFACE. VOIDS CREATED SHALL BE FILLED WITH EPOXY RESIN BINDER.

D-4 WHERE DRAWINGS INDICATE A CONCRETE EQUIPMENT PAD TO BE DEMOLISHED, THE FLOOR SLAB SURFACE SHALL BE REPAIRED AS APPROVED BY ENGINEER. FOLLOWING SELECT DEMOLITION AND REMOVAL OF THE EQUIPMENT PAD, THE FLOOR SLAB SURFACE SHALL BE INSPECTED. IF THE FLOOR SLAB IS DAMAGED FROM THE EQUIPMENT PAD REMOVAL THE REPAIR SHALL BE:

A) SAW CUT THE FLOOR SLAB AROUND THE EQUIPMENT PAD PERIMETER TO A DEPTH OF 1/4 INCH.
B) SCARIFY AND REMOVE SLAB CONCRETE WITHIN THE PERIMETER TO A NOMINAL 1/4 INCH DEPTH. CLEAN AND REMOVE ALL CONCRETE LAITANCE.
C) RESURFACE THE AREA BY APPLYING A POLYMER MODIFIED OR SILICA FUME ENHANCED CEMENTITIOUS REPAIR MORTAR, APPROVED BY THE ENGINEER, FOLLOWING THE MANUFACTURERS SURFACE PREPARATION AND APPLICATION RECOMMENDATIONS. LEVEL AND FINISH THE SURFACE TO MATCH THE FLOOR SLAB SURROUNDING AREA.

D-5 CONCRETE SURFACES LEFT EXPOSED FOLLOWING DEMOLITION SHALL BE SEALED WITH A HIGH-BUILD, MOISTURE TOLERANT, EPOXY RESIN COATING. THE COATING SHALL BE SIKAGUARD 62 BY SIKA CORPORATION OR APPROVED EQUAL. FOR POTABLE WATER APPLICATIONS, REQUIREMENTS OF ANSI/NSF STANDARD 61 SHALL BE SATISFIED.

D-6 A DETAILED CONSTRUCTION AND DEMOLITION PLAN SHALL BE SUBMITTED TO THE ENGINEER AND APPROVED BY THE ENGINEER AND OWNER PRIOR TO BEGINNING CONSTRUCTION. ANY SHUTDOWNS SHALL BE SUBMITTED TO, COORDINATED WITH, AND APPROVED BY THE OWNER IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.

EXISTING INFORMATION

X-1 ALL EXISTING INFORMATION SHOWN ON THESE DRAWINGS INCLUDING LOCATION, DIMENSIONS, ELEVATIONS, AND CONFIGURATIONS IS DERIVED FROM THE "CARVINS COVE FILTER PLANT IMPROVEMENTS – PHASE 1, APRIL 1992 BY MATTERN AND CRAIG CONSULTING ENGINEERS" CONTRACT DRAWINGS AND IS NOT GUARANTEED TO BE COMPLETE OR CORRECT.

X-2 THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL EXISTING INFORMATION IN THE FIELD AS REQUIRED FOR DEMOLITION AND MODIFICATIONS.

RECORD DRAWINGS

NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

DESIGNED AGM
DRAWN KJO
CHECKED
PROJ.ENGR. ALS
APPROVED

COMMONWEALTH OF VIRGINIA — ALAN L. STONE — Lic. No. 24446 — PROFESSIONAL ENGINEER

RECORD DRAWING
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THIS DOCUMENT ORIGINALLY ISSUED FOR CONSTRUCTION AND SEALED BY ALAN L. STONE, LIC NUMBER 24446

HAZEN AND SAWYER
Environmental Engineers & Scientists
4011 WestChase Boulevard, Suite 500
Raleigh, North Carolina 27607
License No. : C-0381

WESTERN VIRGINIA WATER AUTHORITY
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

GENERAL NOTES

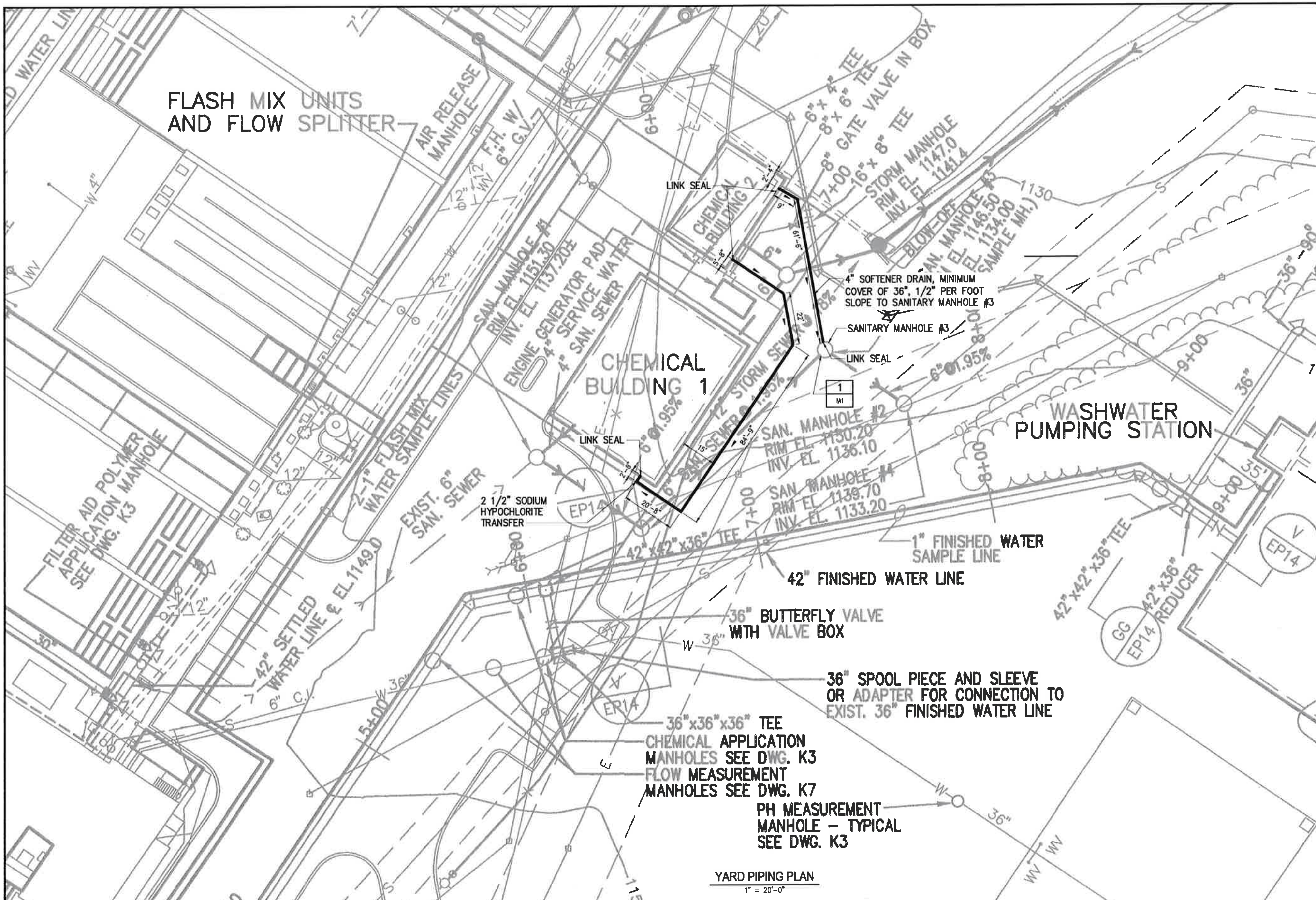
THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000

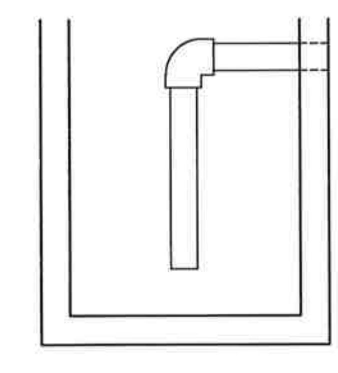
CONTRACT NUMBER	DRAWING NUMBER
1	G2

NOTES:

1. PIPE WAS BEDDED IN SAND.



YARD PIPING PLAN
1" = 20'-0"



SANITARY MANHOLE 3

1
M1

1"=20'-0" 20 10 0 20'

RECORD DRAWINGS

NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

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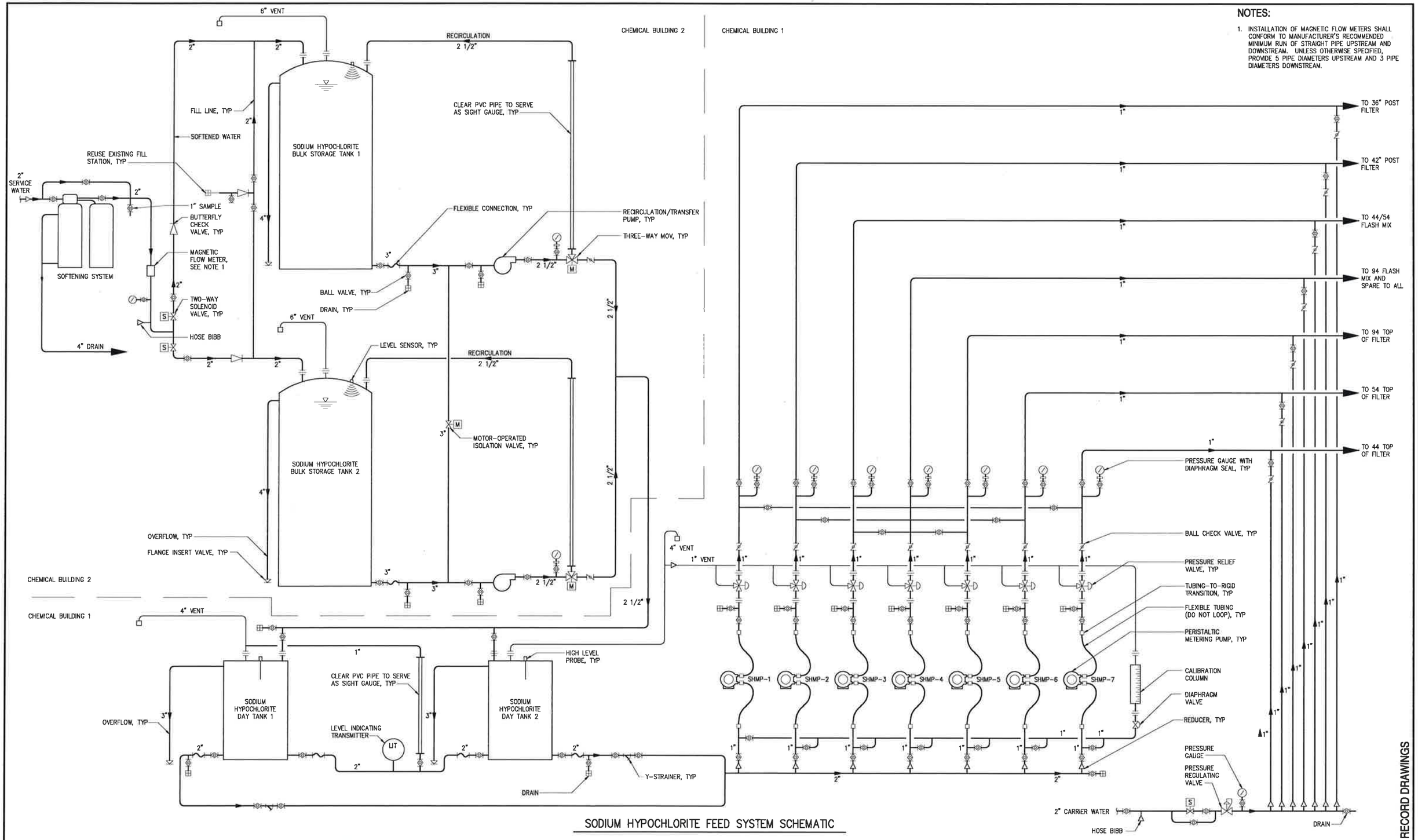
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

YARD PIPING PLAN

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER M1



NOTES:

1. INSTALLATION OF MAGNETIC FLOW METERS SHALL CONFORM TO MANUFACTURER'S RECOMMENDED MINIMUM RUN OF STRAIGHT PIPE UPSTREAM AND DOWNSTREAM. UNLESS OTHERWISE SPECIFIED, PROVIDE 5 PIPE DIAMETERS UPSTREAM AND 3 PIPE DIAMETERS DOWNSTREAM.

SODIUM HYPOCHLORITE FEED SYSTEM SCHEMATIC

RECORD DRAWINGS

NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

APPROVED

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COMMONWEALTH OF VIRGINIA ALAN L. STONE No.24446 PROFESSIONAL ENGINEER 11/5/15

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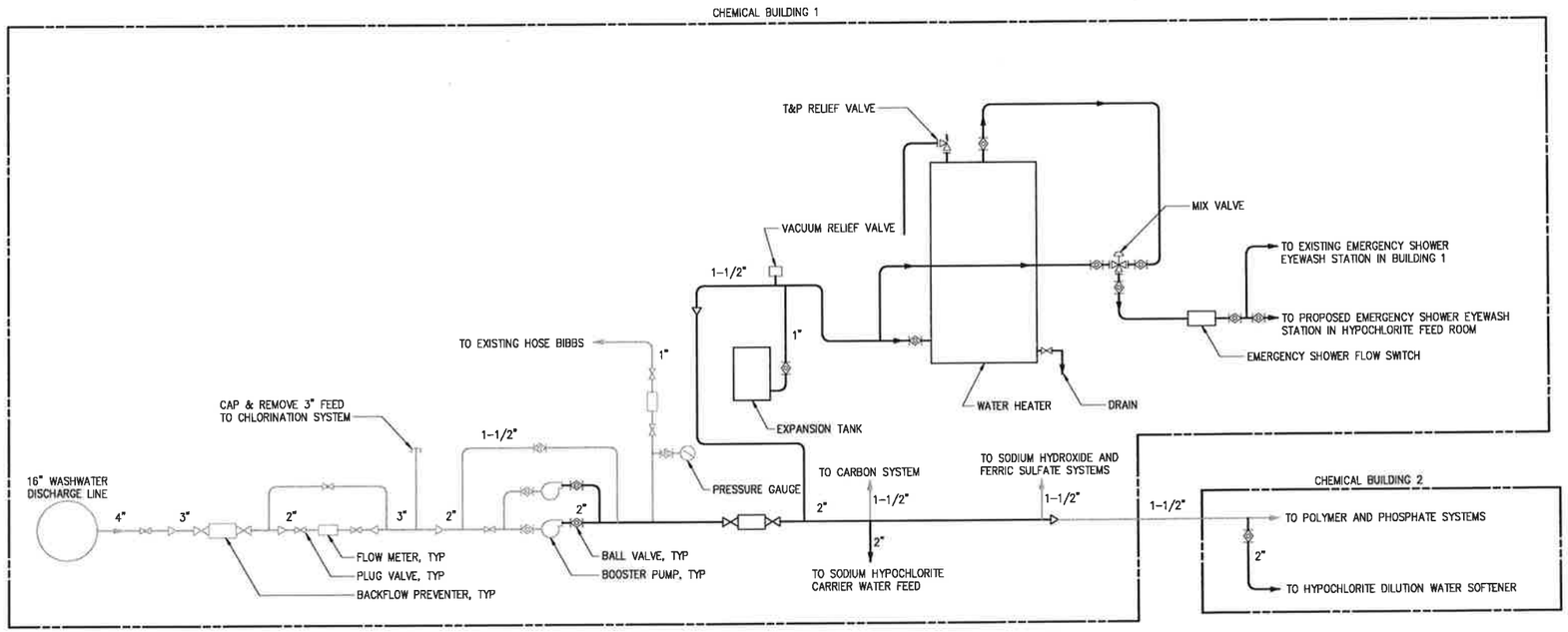
WESTERN VIRGINIA WATER AUTHORITY
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

SODIUM HYPOCHLORITE FEED SYSTEM SCHEMATIC

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER M100



SERVICE WATER SCHEMATIC

RECORD DRAWINGS

NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

DESIGNED ABL
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PROJ.ENGR. ALS
APPROVED

COMMONWEALTH OF VIRGINIA ALAN L. STONE No. 24446 PROFESSIONAL ENGINEER

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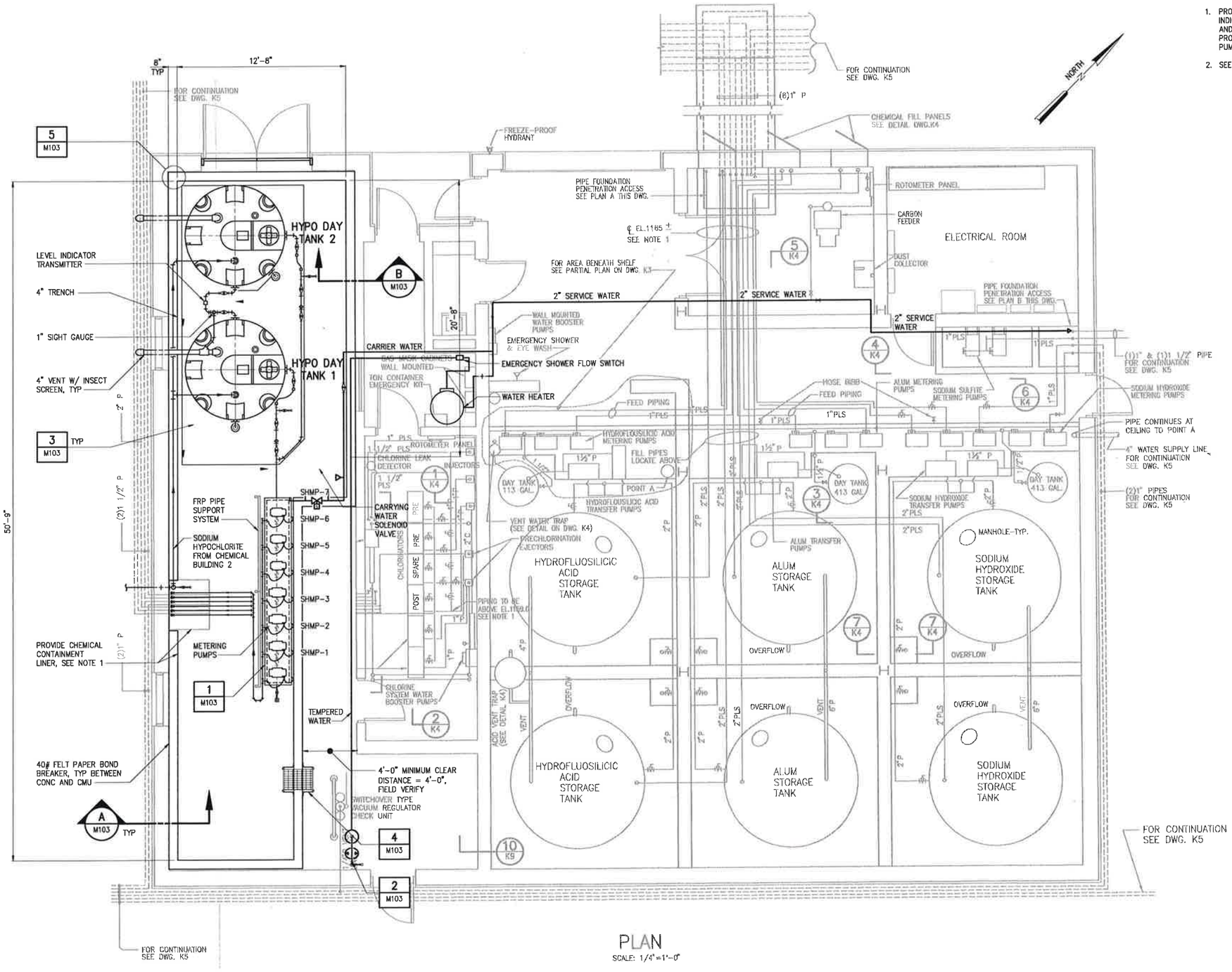
SERVICE WATER SCHEMATIC

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER M101

NOTES:

1. PROVIDE A CHEMICAL RESIST CONTAINMENT LINER, AS INDICATED IN SPECIFICATION 09900, ON ALL VERTICAL AND HORIZONTAL CONCRETE SURFACES OF THE PROPOSED CONTAINMENT AREA AND THE EXISTING PUMP PIT.
2. SEE DRAWING M101 FOR SERVICE WATER SCHEMATIC.



PLAN
SCALE: 1/4" = 1'-0"

RECORD DRAWINGS

NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

DESIGNED ABL
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PROJ.ENGR. ALS
APPROVED

ALAN L. STONE No.24446 COMMONWEALTH OF VIRGINIA PROFESSIONAL ENGINEER

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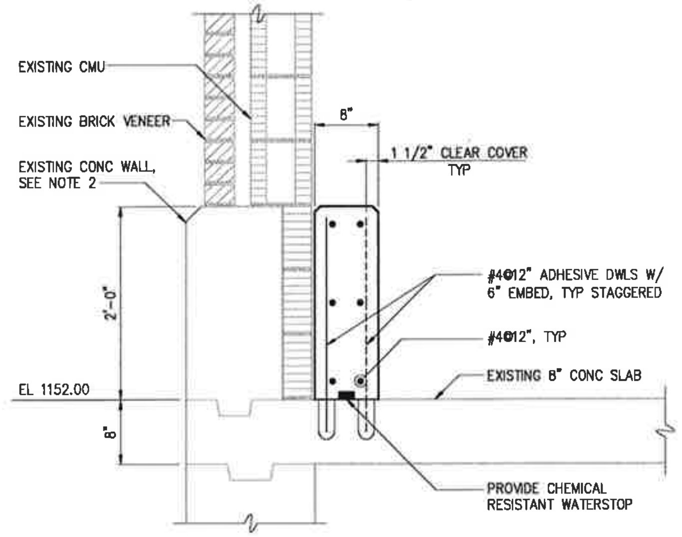
DISINFECTION IMPROVEMENTS

CHEMICAL BUILDING 1 DAY TANK AND FEED PUMPS

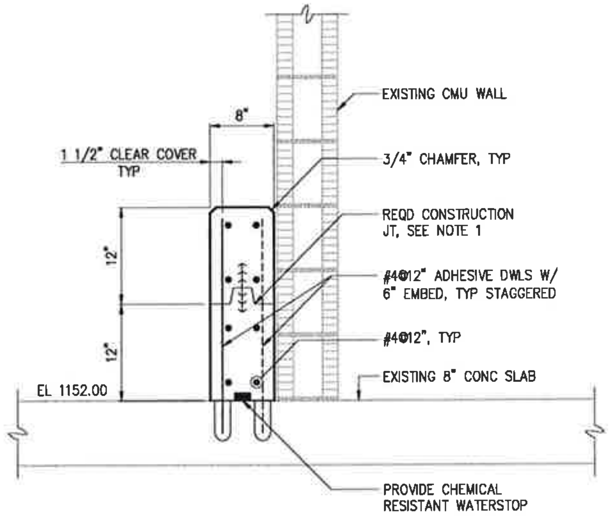
THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER M102



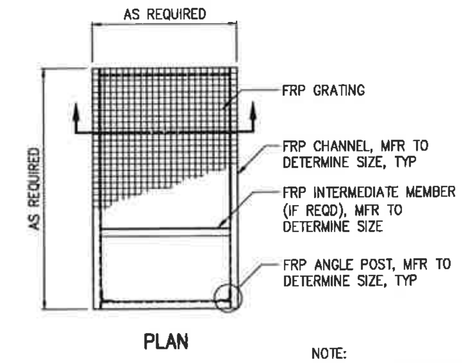
TYPICAL CONTAINMENT WALL

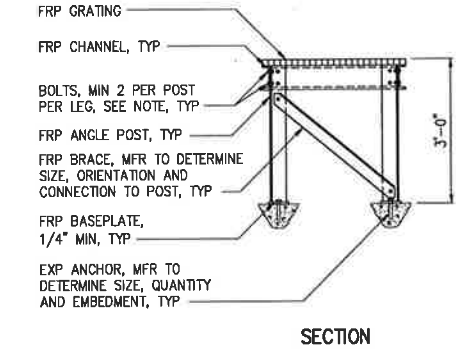
SECTION A — 1" = 1'-0" — M102



SECTION AT UNREINFORCED CMU

SECTION B — 1" = 1'-0" — M102





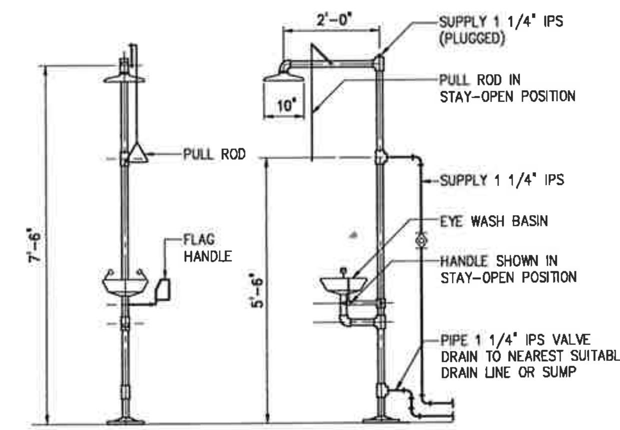
NOTE:
SEE SPECIFIATION SECTION 06610, GLASS FIBER AND RESIN APPLICATIONS, FOR REQUIREMENTS OF FRP GRATING, STRUCTURAL SHAPES AND BOLTED CONNECTIONS.

FRP EQUIPMENT TABLE

DETAIL 1 — 1" = 1'-0" — M102

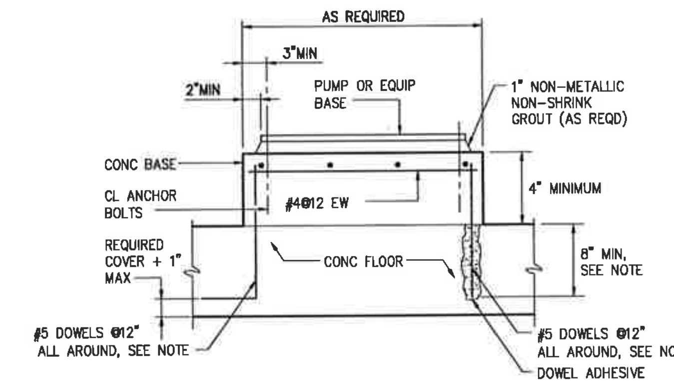
NOTES:

1. EXISTING UNGROUTED CMU WALL DOES NOT HAVE SUFFICIENT STRENGTH TO ALLOW CONTAINMENT WALL TO BE CONSTRUCTED IN ONE FULL HEIGHT PLACEMENT. AS SUCH, THE NORTHERN MOST CONTAINMENT WALL SHALL BE PLACED IN TWO 12" LIFTS WITH A CHEMICAL RESISTANT WATERSTOP IN THE JOINT BETWEEN LIFTS. IN LIEU OF PLACING IN TWO LIFTS THE CONTRACTOR MAY BRACE THE CMU WALL TO PREVENT OVER STRESSING OR SHIFTING OF THE CMU WALL AND PLACE THE PROPOSED CONCRETE WALL IN ONE LIFT. IF BRACING IS DESIRED SUBMIT INTENDED METHOD OF BRACING TO ENGINEER FOR REVIEW. LOCATION AND LENGTH OF TIME BRACING WILL BE IN PLACE SHALL BE COORDINATED WITH AND APPROVED BY THE OWNER PRIOR TO INSTALLATION.
2. EXISTING DRAWINGS INDICATE THAT THE EXTERIOR WALLS OF CHEMICAL BUILDING 1 CONSIST OF A 24" HIGH CONCRETE KNEE WALL. WHERE THIS KNEE WALL EXISTS THE PROPOSED CONCRETE CONTAINMENT WALL MAY BE PLACED FULL HEIGHT. IF AT ANY LOCATION ALONG THE EXTERIOR WALLS THIS CONCRETE KNEE WALL DOES NOT EXIST THEN THE PROPOSED WALL SHALL BE PLACED AS REQUIRED BY SECTION B/M103.



EMERGENCY SHOWER AND EYEWASH

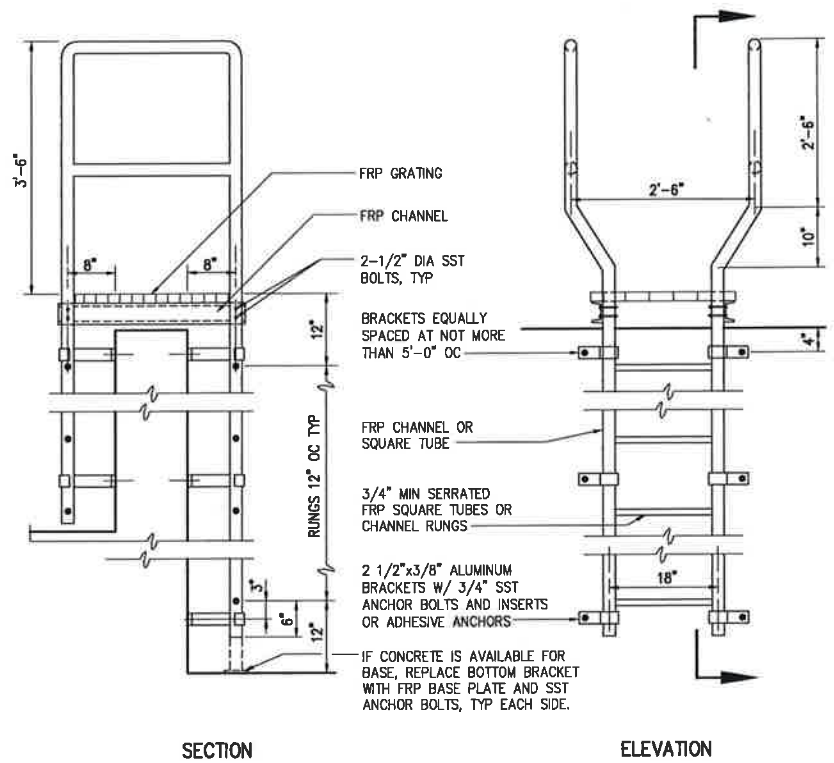
DETAIL 2 — 1" = 1'-0" — M102



NOTE:
DOWELS MAY BE CAST IN WITH 90° HOOK OR ANCHORED WITH DOWEL ADHESIVE AT CONTRACTORS OPTION. WHERE FLOOR IS 8" THICK OR LESS, USE #4 DOWELS EMBEDDED TO WITHIN 2" OF BOTTOM OF FLOOR SLAB.

CONCRETE EQUIPMENT PAD

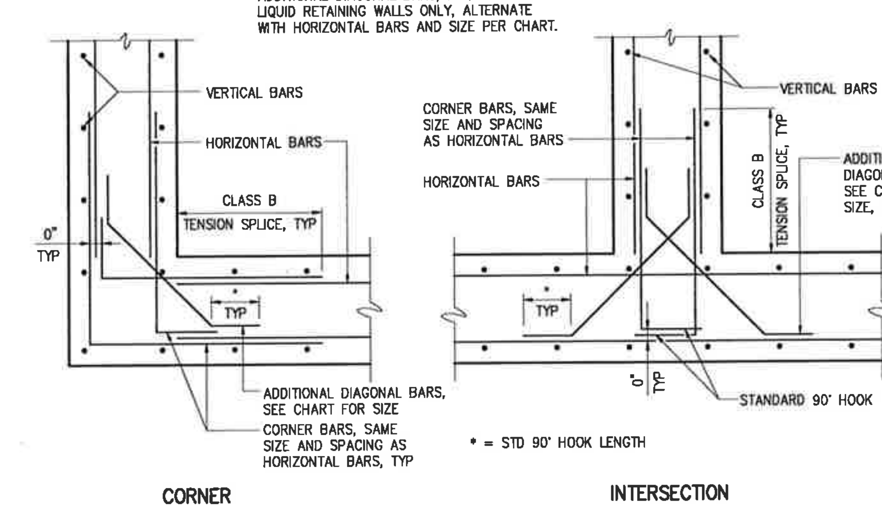
DETAIL 3 — 1" = 1'-0" — M102



FRP CROSSOVER LADDER

DETAIL 4 — NTS — M102

ADDITIONAL DIAGONAL BARS, REQUIRED IN LIQUID RETAINING WALLS ONLY, ALTERNATE WITH HORIZONTAL BARS AND SIZE PER CHART.



DIAGONAL BAR SIZE CHART	
BAR SIZE – HORIZONTAL REINFORCEMENT	BAR SIZE – DIAGONAL REINFORCEMENT
# 3	# 3
# 4	# 3
# 5	# 4
# 6	# 5
# 7	# 5
# 8	# 6
# 9	# 7
# 10	# 8
# 11	# 9

AT LOCATIONS WHERE DIFFERENT SIZE HORIZONTAL BARS CONVERGE, THE LARGER BAR SIZE SHALL CONTROL

TYPICAL WALL REINFORCING

DETAIL 5 — 1" = 1'-0" — M102

RECORD DRAWINGS

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1	FINAL DESIGN	09/2014	ALS

DESIGNED AGM
DRAWN KJO
CHECKED
PROJ.ENGR. ALS
APPROVED

COMMONWEALTH OF VIRGINIA — ALAN L. STONE — No. 24446 — PROFESSIONAL ENGINEER — 4/9/15

RECORD DRAWING
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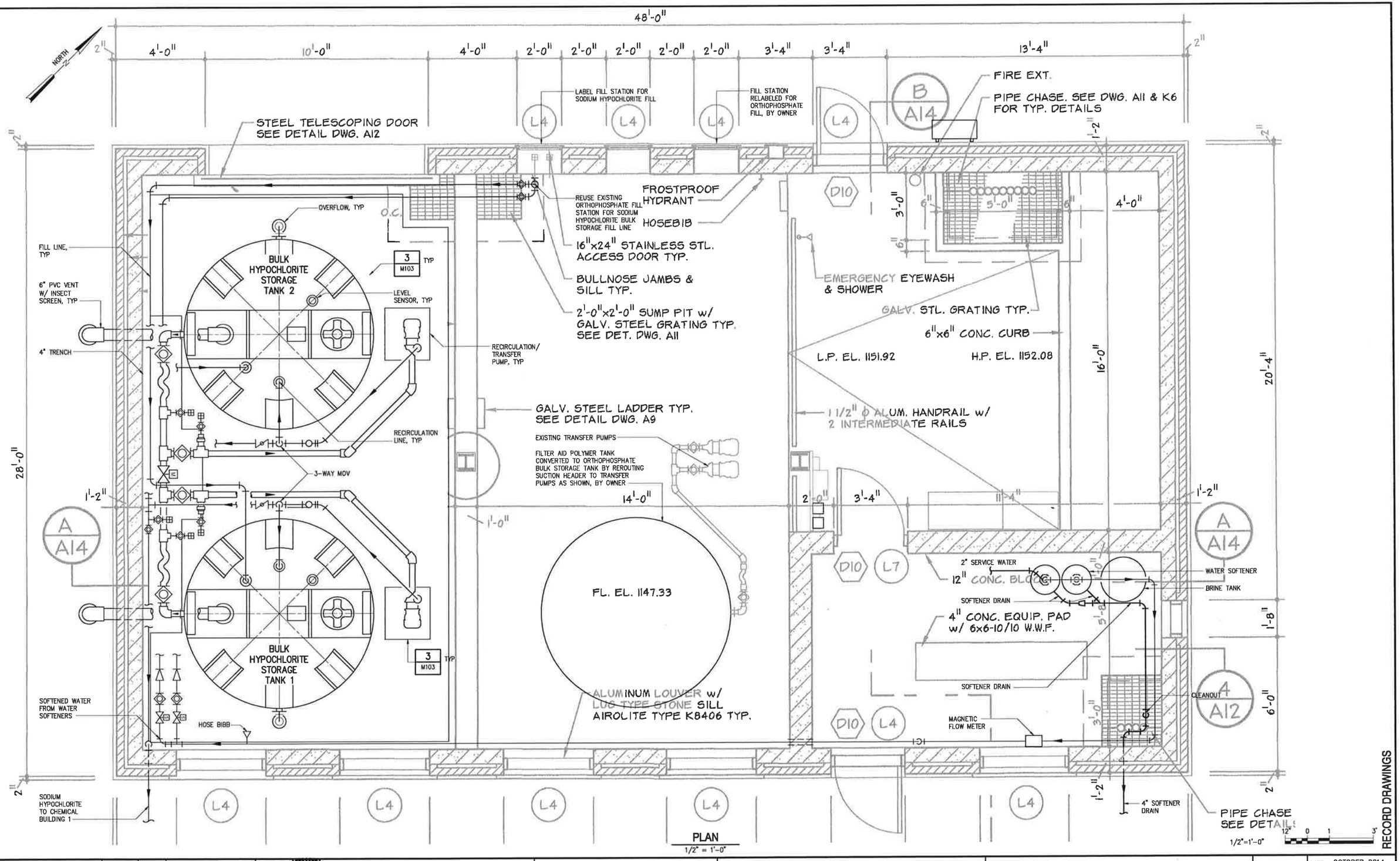
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

CHEMICAL BUILDING 1
DETAILS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER M103



RECORD DRAWINGS

NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

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DRAWN KJO
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PROJ.ENGR. ALS
APPROVED

ALAN L. STONE COMMONWEALTH OF VIRGINIA REG. No. 24446 PROFESSIONAL ENGINEER

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HAZEN AND SAWYER
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4011 WestChase Boulevard, Suite 500
Raleigh, North Carolina 27607
License No. : C-0381

WESTERN VIRGINIA WATER AUTHORITY
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

CHEMICAL BUILDING 2 BULK TANK AND TRANSFER PUMPS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER M200

BLOCK DIAGRAMS

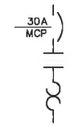
FUSE

LOW-VOLTAGE MOLDED CASE CIRCUIT BREAKER

MOTOR CIRCUIT PROTECTOR

THERMAL OVERLOAD RELAY

GROUND



FVNR STARTER:
X DENOTES NEMA SIZE
DP DENOTES DEFINITE PURPOSE CONTACTOR

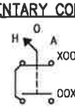
DUPLEX RECEPTACLE
X DENOTES RECEPTACLE TYPE (TYP.):
GFCI DENOTES GROUND FAULT CIRCUIT INTERRUPT
UPS DENOTES UNINTERRUPTABLE POWER SUPPLY
WPCR DENOTES WEATHERPROOF CORROSION RESISTANT

JUNCTION BOX

PULL BOX

120VAC SURGE PROTECTION DEVICE

ELEMENTARY CONTROL SCHEMATICS



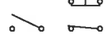
3-POSITION SELECTOR SWITCH:
HOA DENOTES HAND/OFF/AUTO
LOR DENOTES LOCAL/OFF/REMOTE
FOR DENOTES FORWARD/OFF/REVERSE

PUSHBUTTON SWITCHES:
LEFT: N.O./RIGHT: N.C.
TEXT DENOTES LEGEND PLATE

MUSHROOM HEAD EMERGENCY STOP
PUSHBUTTON SWITCH N.C. MAINTAINED:
TEXT DENOTES LEGEND PLATE

PUSHBUTTON SWITCH N.C. WITH LOCK-OUT:
TEXT DENOTES LEGEND PLATE

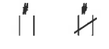
SELECTOR SWITCH:
TEXT DENOTES LEGEND PLATE



DISCONNECT SWITCHES:
LEFT: N.O./RIGHT: N.C.

TEMPERATURE SWITCHES/THERMOSTATS (N.O.)

CONTACTS:
LEFT: N.O./RIGHT: N.C.
# DENOTES COIL NUMBER



INDICATOR LIGHT:
LEFT: STANDARD/RIGHT: PUSH-TO-TEST
X DENOTES COLOR

RUN TIME METER

SOLENOID VALVE

CONTROL POWER TRANSFORMER

COIL:
X DENOTES TYPE:
M DENOTES MOTOR STARTER
CR DENOTES CONTROL RELAY
TR DENOTES TIME DELAY RELAY
PR DENOTES INTERPOSING PILOT RELAY
# DENOTES REFERENCE LINE NUMBER

ABBREVIATIONS

ANSI	AMERICAN NATIONAL STANDARDS INSTITUTE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASME	AMERICAN SOCIETY OF MECHANICAL ENGINEERS
ATS	AUTOMATIC TRANSFER SWITCH
BC	BYPASS CONTACTOR
CT	CURRENT TRANSFORMER
DB	DUCTBANK
DSW	DISCONNECT SWITCH
EHH	ELECTRIC HAND HOLE
EMH	ELECTRIC MANHOLE
EO	ELECTRICALLY OPERATED
FAAP	FIRE ALARM ANNUNCIATOR PANEL
FACP	FIRE ALARM CONTROL PANEL
FVNR	FULL VOLTAGE NON-REVERSING
FVR	FULL VOLTAGE REVERSING
GFCI	GROUND FAULT CIRCUIT INTERRUPT
GFCT	GROUND FAULT CURRENT TRANSFORMER
IC	INPUT CONTACTOR
IEEE	INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS
ISO	INTL ORGANIZATION FOR STANDARDIZATION
LCS	LOCAL CONTROL STATION
LP	LIGHTING PANEL
MFR	MULTI-FUNCTION RELAY
MOD	MOTOR OPERATED DAMPER
MOG	MOTOR OPERATED GATE
MOL	MOTOR OPERATED LOUVER
MOV	MOTOR OPERATED VALVE
MTS	MANUAL TRANSFER SWITCH
NC/NO	NORMALLY CLOSED/NORMALLY OPEN
NEC	NATIONAL ELECTRICAL CODE
NEMA	NATIONAL ELECTRICAL MANUFACTURERS ASSN
NTS	NOT TO SCALE
OC	OUTPUT CONTACTOR
OL	OVERLOAD
PC	PHOTOCELL
PCC	POINT OF COMMON COUPLING
PLC	PROGRAMMABLE LOGIC CONTROLLER
PNL	PANEL
PP	POWER PANEL
PT	POTENTIAL TRANSFORMER
RCS	REMOTE CONTROL STATION
RIO	REMOTE I/O
RVAT	REDUCED VOLTAGE AUTO TRANSFORMER
RVSS	REDUCED VOLTAGE SOLID STATE
SP. C.	SPARE CONDUIT
SST	STAINLESS STEEL
TB	TEST BLOCK
TC/TO	TIMED CLOSE//TIMED OPEN
TSH	TWISTED SHIELDED
TX	TRANSFORMER
UPS	UNINTERRUPTABLE POWER SUPPLY
VFD	VARIABLE FREQUENCY DRIVE
WPCR	WEATHER PROOF CORROSION RESISTANT
WT	WALK THROUGH

EQUIPMENT/DEVICE LOCATION SYMBOLS

*	LOCATED AT MCC
△	LOCATED IN FIELD
⬡X	LOCATED AT PANEL: X DENOTES PANEL ID

NOTES:

1. UNLESS OTHERWISE SPECIFIED OR NOTED, ALL WALL MOUNTED ELECTRICAL PANELS, ENCLOSURES, AND SIMILAR EQUIPMENT SHALL BE MOUNTED 6'-6" (MAX) FROM THE TOP OF THE PANEL TO FINISHED FLOOR OR GRADE.
2. UNLESS OTHERWISE NOTED, ALL LIGHTING SWITCHES, CONTROL SWITCHES, AND SIMILAR EQUIPMENT SHALL BE MOUNTED WITH THEIR CENTERLINE APPROXIMATELY 4'-0" ABOVE FINISHED FLOOR, SLAB, OR GRADE.
3. A SEPARATE EQUIPMENT GROUNDING CONDUCTOR SHALL BE PROVIDED FOR EACH CIRCUIT (SEPARATE CONDUCTOR IN THE CONDUIT). THE CONDUCTOR SHALL BE TERMINATED AT THE PROPER DEVICE, TERMINAL, OR LUG AT THE POWER SOURCE (MCC GROUND BUS, PANELBOARD GROUND BUS, ETC.). GROUND CONDUCTOR SIZE SHALL BE PER THE LATEST EDITION OF THE NEC.

RECORD DRAWINGS

NO.	ISSUED FOR	DATE	BY
2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

DESIGNED JAD
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PROJ.ENGR. ALS
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COMMONWEALTH OF VIRGINIA
ALAN L. STONE
Lic. No. 21446
PROFESSIONAL ENGINEER

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WESTERN VIRGINIA WATER AUTHORITY
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

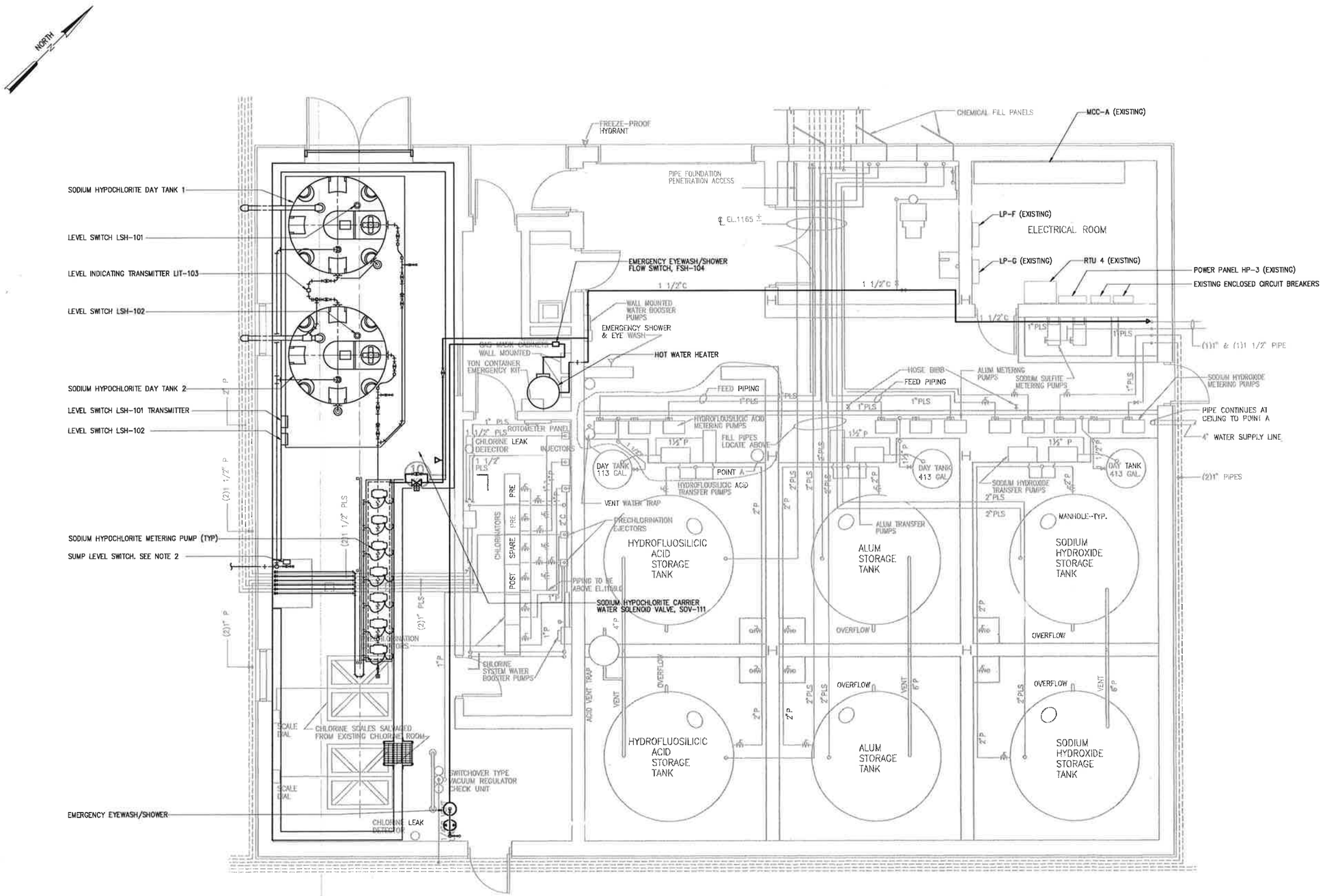
ELECTRICAL
LEGEND AND GENERAL NOTES

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER E1

NOTES:

1. ALL CONDUIT SHALL BE SCHEDULE 80 PVC. CONDUIT SHALL BE LISTED TO UL-651.
2. FLOAT LEVEL SWITCH IS LOCATED 6" ABOVE THE BOTTOM OF SUMP.



POWER PLAN

1/4"=1'-0"

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1	FINAL DESIGN	09/2014	ALS

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WESTERN VIRGINIA WATER AUTHORITY
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CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

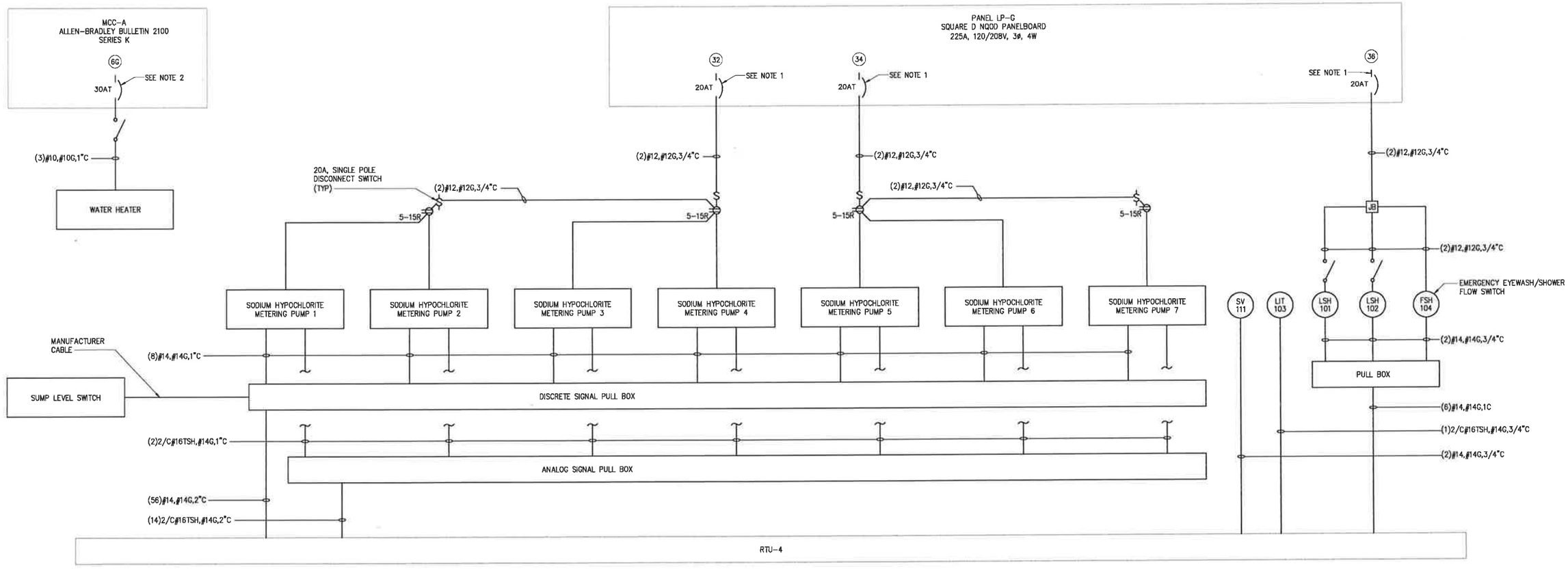
ELECTRICAL
CHEMICAL BUILDING 1 POWER PLAN

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER E100

NOTES:

1. FURNISH AND INSTALL NEW MOLDED CASE CIRCUIT BREAKER AS INDICATED. CIRCUIT BREAKER SHALL BE 120VAC, 1-POLE, 1-PHASE, BOLT-ON TYPE WITH 10KA SHORT CIRCUIT RATING MATCHING THE EXISTING PANEL.
2. FURNISH AND INSTALL NEW CIRCUIT BREAKER, ALLEN-BRADLEY MODEL 2193FZ-AKB-32TGM, AND BLANK DOOR, ALLEN-BRADLEY MODEL 2100-BK05, IN EXISTING SPARE MCC SPACE IN SECTION 6G.



RECORD DRAWINGS

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1	FINAL DESIGN	09/2014	ALS

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WESTERN VIRGINIA WATER AUTHORITY
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

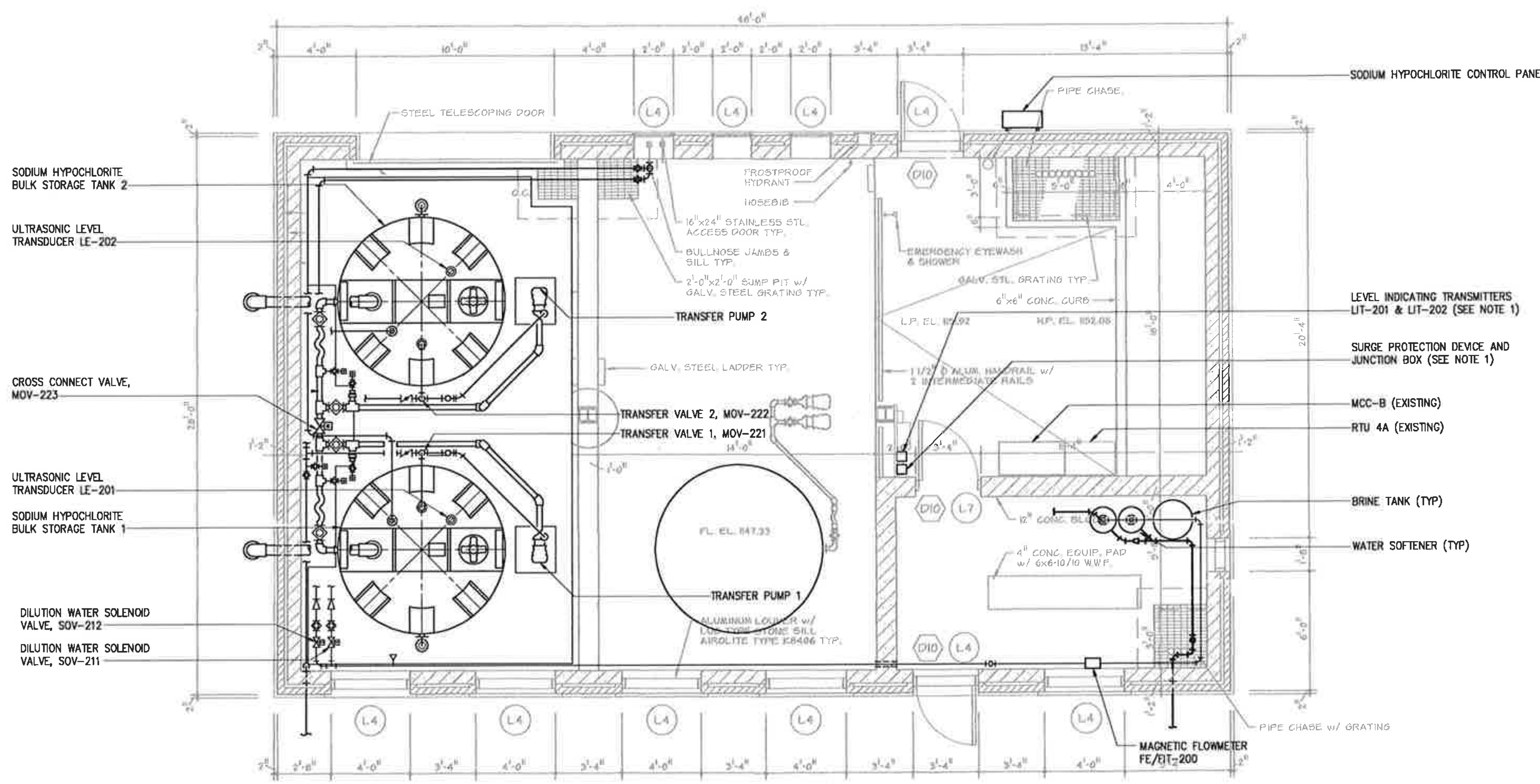
CHEMICAL BUILDING NO.1
ELECTRICAL
SINGLE LINE DIAGRAM AND ELEVATION

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER E101

NOTES:

1. MOUNT TWO NEW LEVEL INDICATING TRANSMITTERS, ONE NEW SURGE PROTECTION DEVICE AND NEW JUNCTION BOX ABOVE THE EXISTING MILLTRONICS AIRANGER XPL LEVEL MEASUREMENT SYSTEM.
2. ALL CONDUIT SHALL BE SCHEDULE 80 PVC. CONDUIT SHALL BE LISTED TO UL-651.



POWER PLAN

1/4"=1'-0"

RECORD DRAWINGS

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2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

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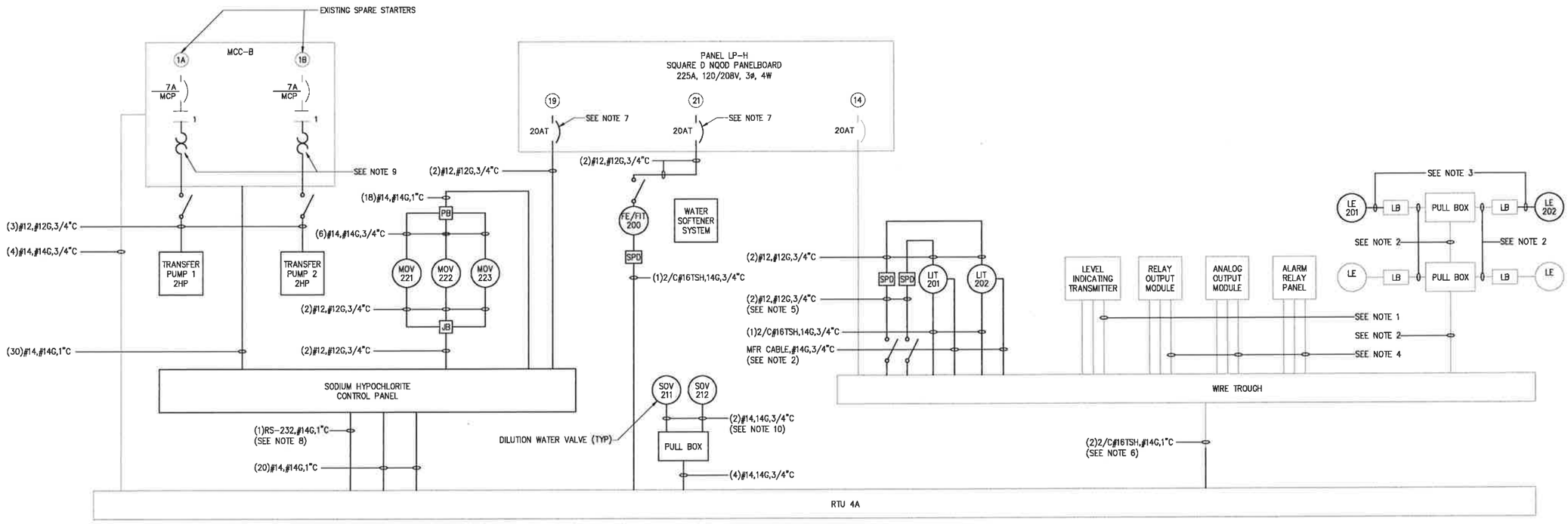
WESTERN VIRGINIA WATER AUTHORITY
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY DISINFECTION IMPROVEMENTS

ELECTRICAL
CHEMICAL BUILDING 2 PLAN

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER E200



NOTES:

1. DISCONNECT AND REMOVE THE TWO EXISTING CABLES CURRENTLY ROUTED FROM THE EXISTING ULTRASONIC LEVEL MEASUREMENT SYSTEM TO THE FURTHEST STORAGE TANK LEVEL TRANSDUCERS.
2. FURNISH AND INSTALL NEW CABLES FROM THE NEW LEVEL INDICATING TRANSMITTERS TO THE ASSOCIATED LEVEL TRANSDUCERS USING EXISTING CONDUIT.
3. REPLACE THE EXISTING FLEXIBLE NONMETALLIC CONDUIT ROUTED FROM THE NEAREST EXISTING LB-TYPE CONDUIT BODY TO THE NEW LEVEL TRANSDUCER.
4. DISCONNECT AND LABEL AS SPARE THE EXISTING WIRE/CABLES ASSOCIATED WITH THE TWO FURTHEST STORAGE TANK LEVEL TRANSDUCERS.
5. EXTEND EXISTING ULTRASONIC LEVEL MEASUREMENT SYSTEM POWER CIRCUIT TO SUPPLY POWER TO THE NEW LEVEL INDICATING TRANSMITTERS.
6. FURNISH AND INSTALL NEW WIRE IN EXISTING SPARE CONDUIT. EXTEND EXISTING CONDUIT TO RTU 4A ENCLOSURE.
7. FURNISH AND INSTALL NEW MOLDED CASE CIRCUIT BREAKER AS INDICATED. CIRCUIT BREAKER SHALL BE 120VAC, 1-POLE, 1-PHASE, BOLT-ON TYPE WITH 10KA SHORT CIRCUIT RATING MATCHING THE EXISTING PANEL.
8. CABLE SHALL BE BELDEN 9934 OR EQUAL. MAXIMUM CABLE CAPACITANCE SHALL NOT EXCEED 2,500 pF.
9. REPLACE EXISTING OVERLOAD UNIT WITH ONE APPROPRIATELY SIZED FOR THE NEW MOTOR. NEW OVERLOAD UNIT SHALL HAVE A NORMALLY OPEN CONTACT FOR REMOTE INDICATION AS SHOWN ON DRAWING E202.
10. FURNISH AND INSTALL A 120VAC INTERPOSING RELAY IN THE EXISTING RTU 4A ENCLOSURE TO CONTROL THE SOLENOID VALVE.

RECORD DRAWINGS

NO.		DATE	BY
2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

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ALAN L. STONE 014446 COMMONWEALTH OF VIRGINIA PROFESSIONAL ENGINEER

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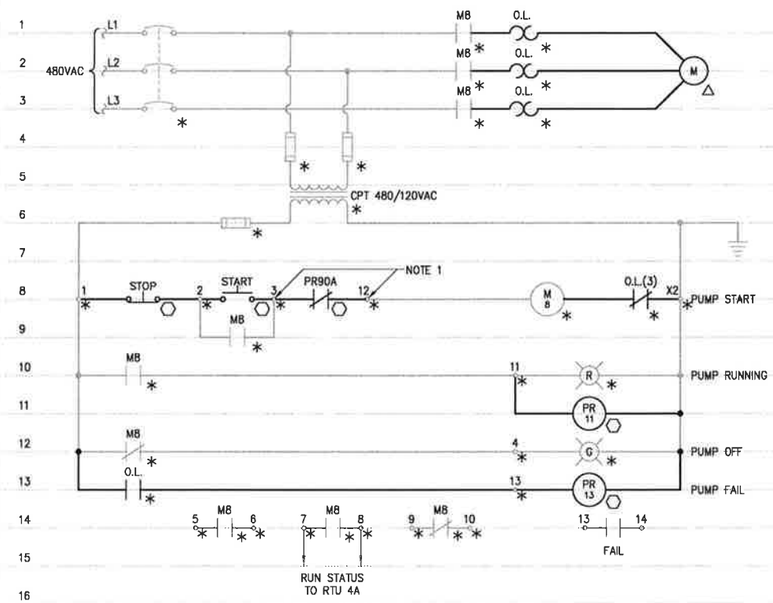
WESTERN VIRGINIA WATER AUTHORITY
ROANOKE, VIRGINIA

CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

ELECTRICAL
CHEMICAL BUILDING 2 BLOCK DIAGRAM

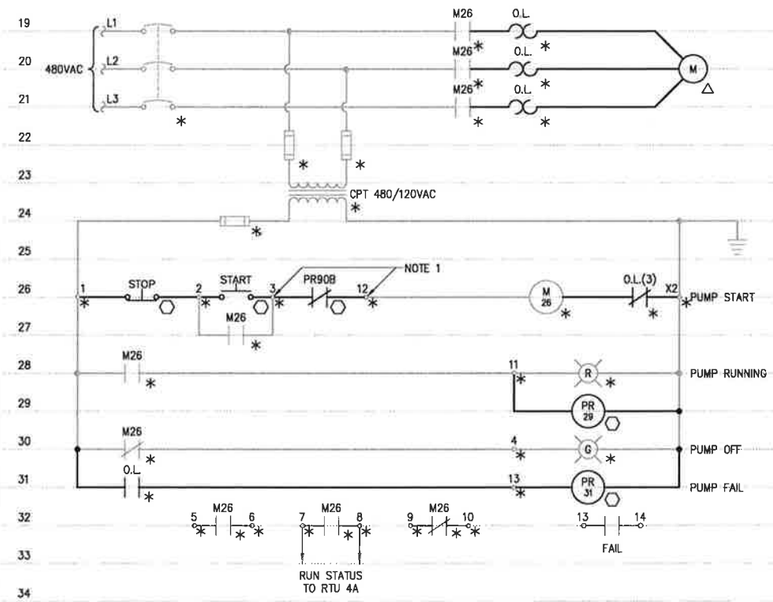
THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER E201



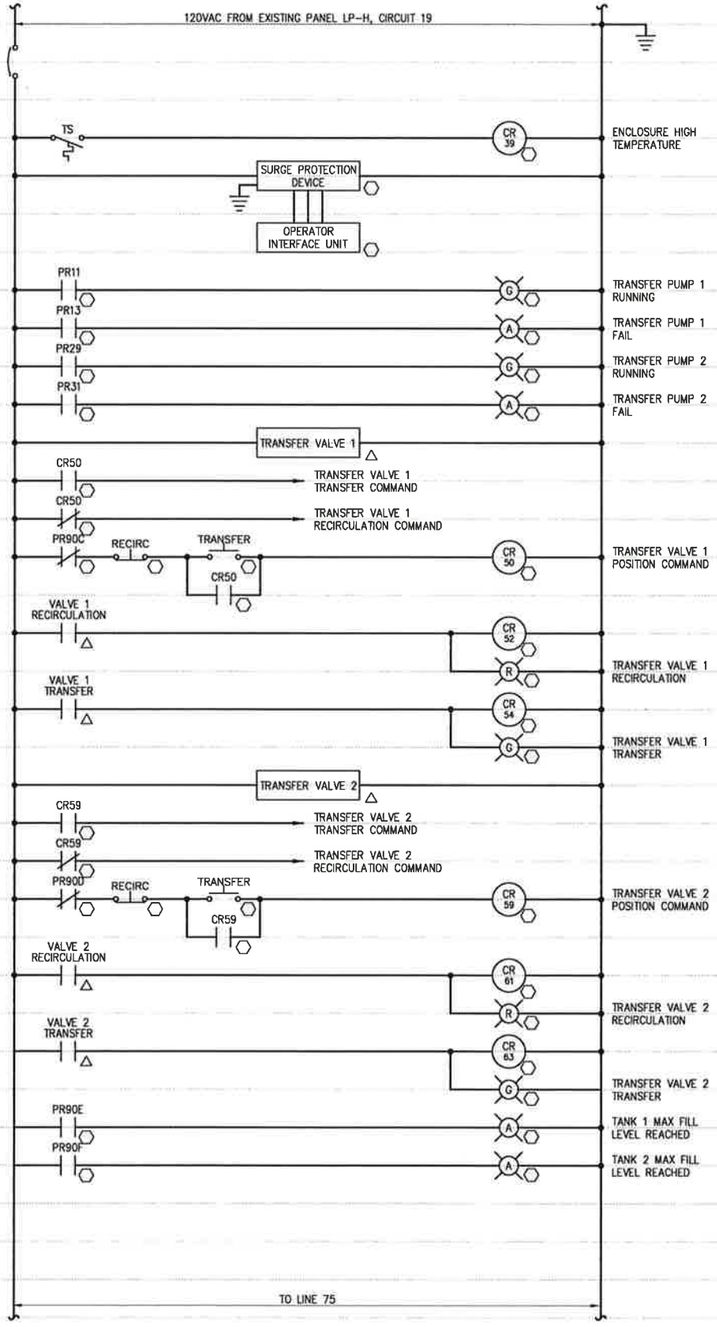
SODIUM HYPOCHLORITE TRANSFER PUMP 1

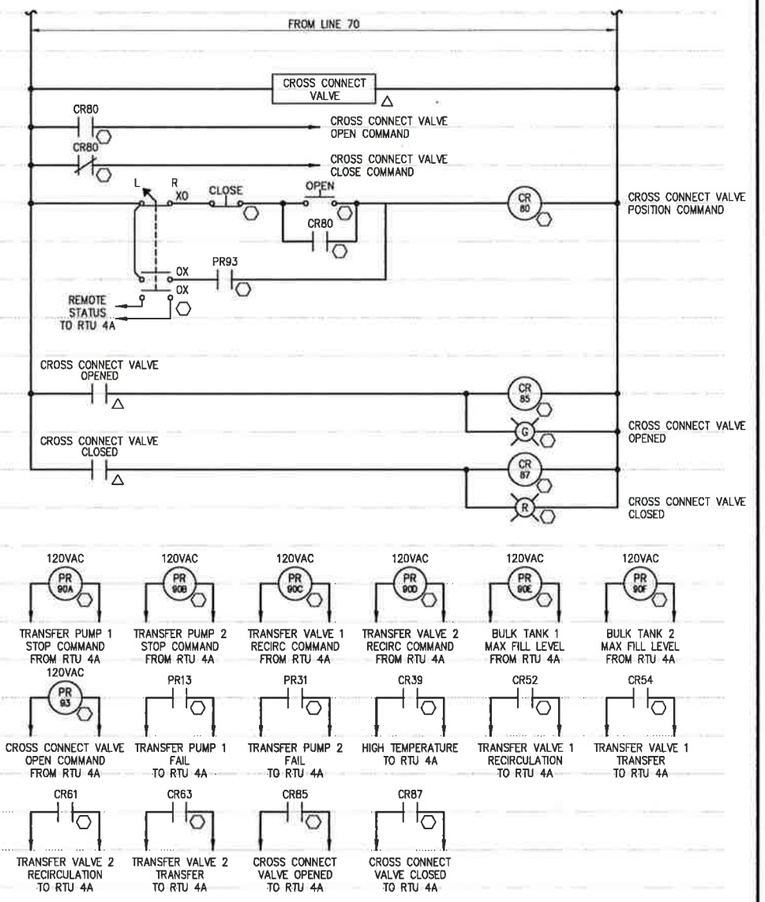
ELEMENTARY CONTROL SCHEMATIC



SODIUM HYPOCHLORITE TRANSFER PUMP 2

ELEMENTARY CONTROL SCHEMATIC





SODIUM HYPOCHLORITE CONTROL PANEL (⬡)

ELEMENTARY CONTROL SCHEMATIC
(NOTES 2,3,4)

NOTES:

1. DISCONNECT EXISTING FIELD WIRES THAT ARE NOT CONNECTED TO NEW TRANSFER PUMP MOTOR AND LABEL AS SPARE.
2. AFFIX A RED LAMINATED PLASTIC WARNING SIGN ON THE INSIDE OF THE PANEL DOOR INSCRIBED "WARNING – This Device Is Connected to Multiple Sources of Power". LETTERS IN THE WORD "WARNING" SHALL BE 0.75 INCH HIGH AND WHITE IN COLOR.
3. FURNISH AND INSTALL A TOTAL OF 10 SINGLE-TIER TERMINAL BLOCKS NEAR THE PANEL DOOR HINGE TO FACILITATE OPERATOR INTERFACE TERMINAL COMMUNICATION.
4. SEE ATTACHED CONTROL PANEL DRAWINGS FOR AS-BUILTS.

RECORD DRAWINGS

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2	RECORD DRAWINGS	04/2015	ALS
1	FINAL DESIGN	09/2014	ALS

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PROJ.ENGR. ALS
APPROVED

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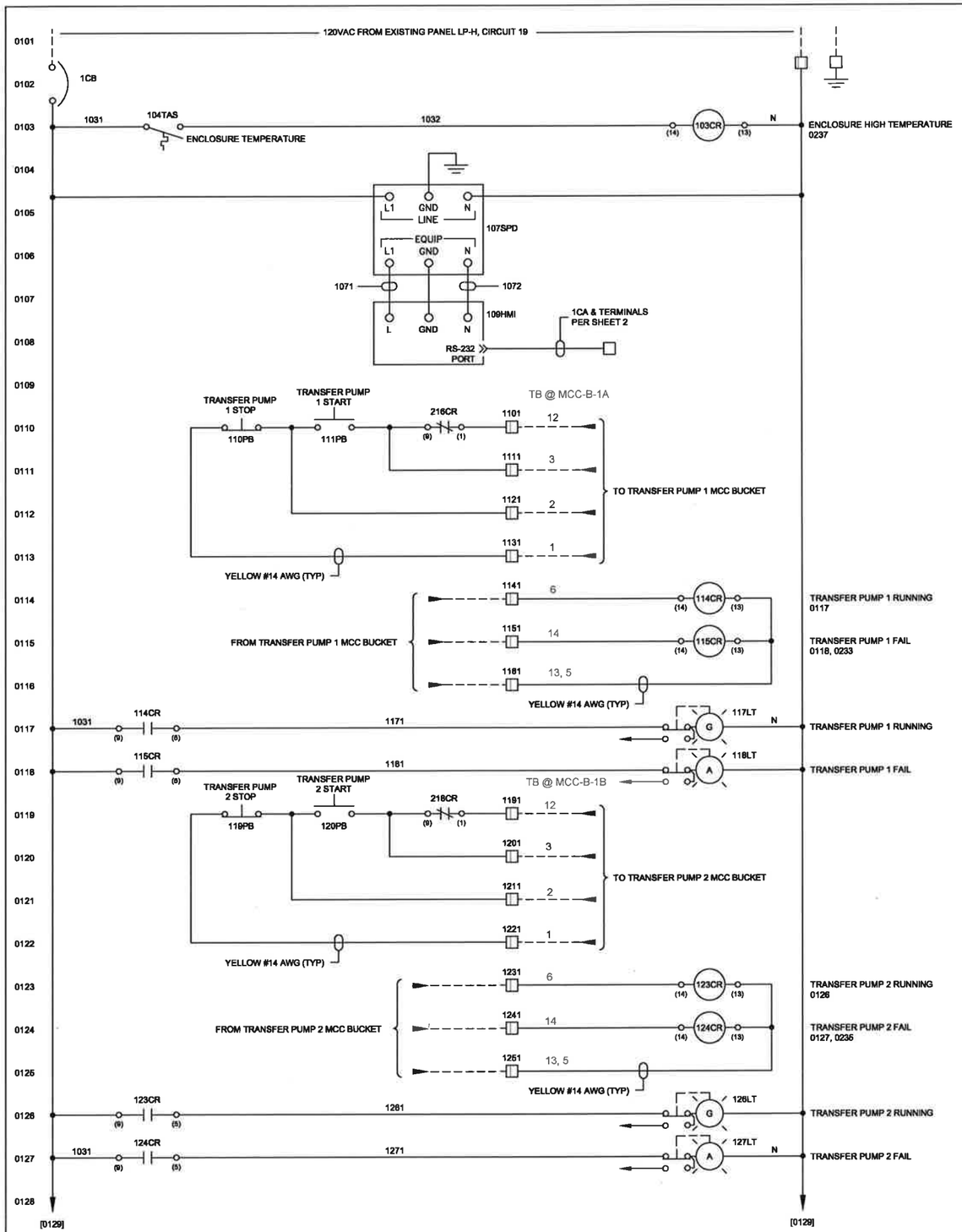
ROANOKE, VIRGINIA

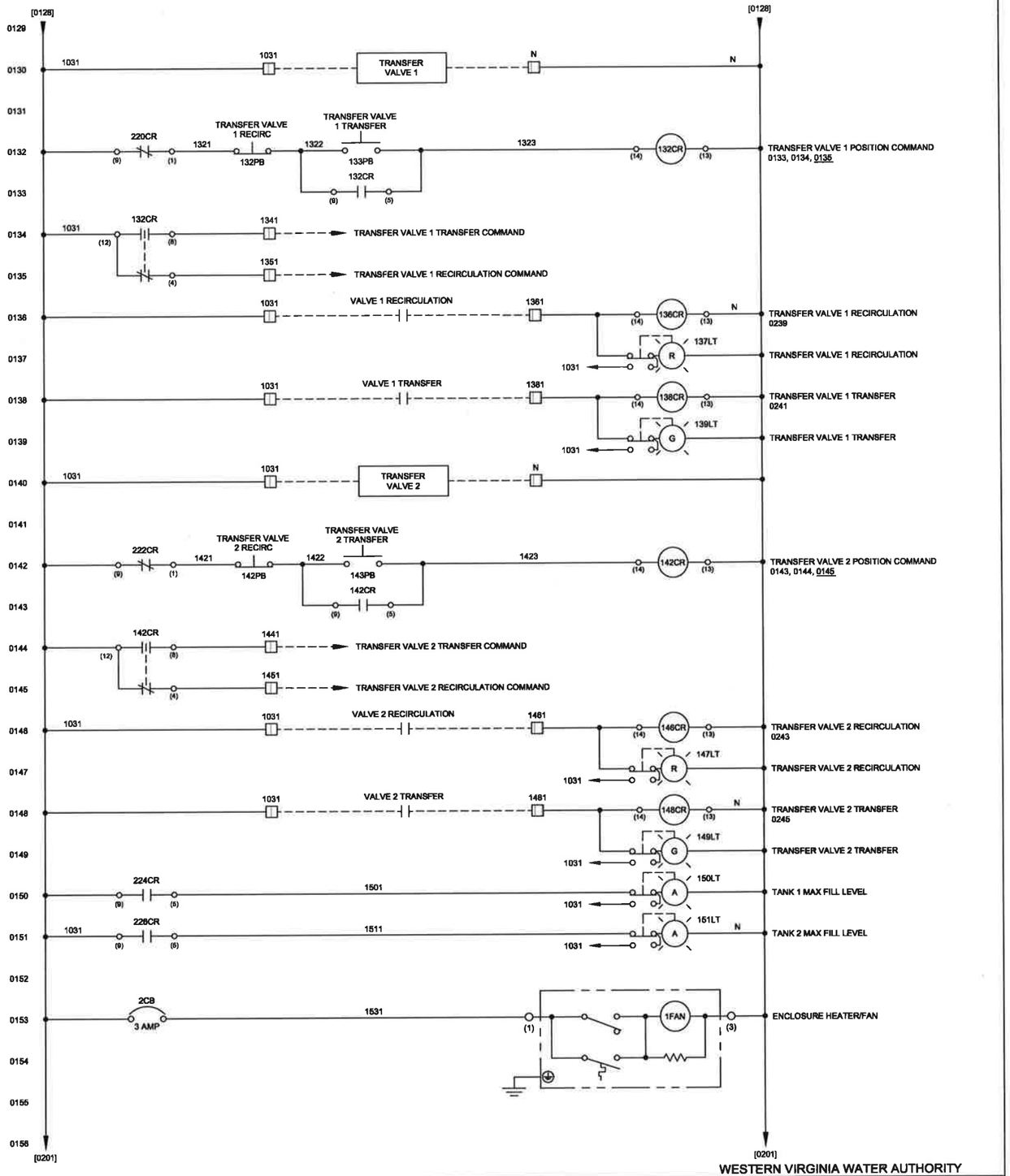
CARVINS COVE WATER TREATMENT FACILITY
DISINFECTION IMPROVEMENTS

ELECTRICAL
CHEMICAL BUILDING 2 WIRING DIAGRAMS

THE SCALE BAR SHOWN BELOW MEASURES ONE INCH LONG ON THE ORIGINAL DRAWING.

DATE OCTOBER 2014
H&S JOB NUMBER 31197-000
CONTRACT NUMBER 1
DRAWING NUMBER E202





WESTERN VIRGINIA WATER AUTHORITY

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APP	DATE
0	ORIGINAL ISSUE	ADH	--	--	10/8/2014
A	REVISED PER CUSTOMERS COMMENTS	ADH	--	--	10/21/2014

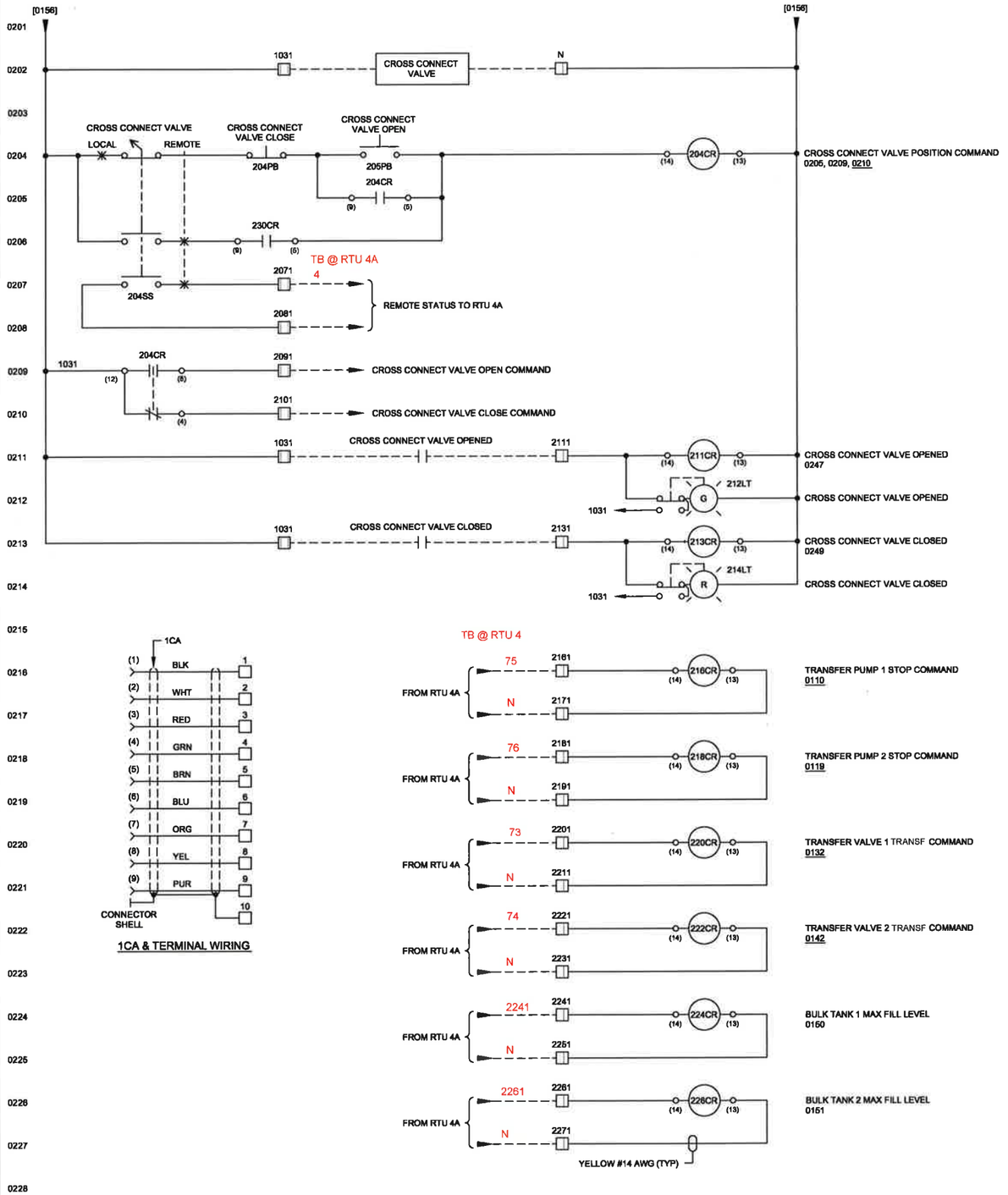
Apex Automation & Controls
10991 Leadbetter Road Ashland, VA 23005
(804) - 550 - 1814
www.apex-automation.com

	BY	DATE
DRAWN	ADH	10/8/14
CHECKED	--	--
APP	--	--

IOSE JOB NO. P14-2129
REF.
SCALE N/A

CARVINS COVE WTF CHEMICAL BUILDING 2
SODIUM HYPOCHLORITE CONTROL PANEL
CONTROL WIRING

SIZE D | DWG. NO. 175-14-100 | SHEET 1 of 2 | REVISION A



REV	REVISION DESCRIPTION	DRAWN	CHECKED	APP	DATE
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A	REVISED PER CUSTOMERS COMMENTS	ADH	--	--	10/21/2014

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(804) - 550 - 1814
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	BY	DATE
DRAWN	ADH	10/8/14
CHECKED	--	--
APP	--	--

IOSC JOB NO: P14-2129
REF.
SCALE: N/A

WESTERN VIRGINIA WATER AUTHORITY
CARVINS COVE WTF CHEMICAL BUILDING 2
SODIUM HYPOCHLORITE CONTROL PANEL
CONTROL WIRING

SIZE: D | DWG. NO: 175-14-100 | SHEET: 2 of 2 | REVISION: A

Item	QTY	Symbol	Description	Mfg. & Part Number
1	1		Enclosure, 30 X 30 X 12, SS, NEMA 4X	Saginaw #SCE-30EL3012SS6LP
2	1		Sub-Panel	Saginaw #SCE-30P30
3	1		Dead Front Panel	Saginaw #SCE-DF30EL30LP
4	1		Mounting Foot Kit	Saginaw #SCE-ELMFK4SS
5	1	109HMI	PanelView Plus 6 700	Allen-Bradley #2711P-T7C4A8
6	1	107SPD	Surge Suppressor	Edco #HSP121BT-1RU
7	3	137LT, 147LT, 214LT	Pilot Light, Red LED, Push-to Test	Allen-Bradley #800H-QRTH10R
8	5	117LT, 126LT, 139LT, 149LT, 212LT	Pilot Light, Green LED, Push-to Test	Allen-Bradley #800H-QRTH10G
9	4	118LT, 127LT, 150LT, 151LT	Pilot Light, Amber LED, Push-to Test	Allen-Bradley #800H-QRTH10A
10	5	111PB, 120PB, 133PB, 143PB, 205PB	Pushbutton, Green Flush Head	Allen-Bradley #800H-AR1A
11	5	110PB, 119PB, 132PB, 142PB, 204PB	Pushbutton, Red Flush Head	Allen-Bradley #800H-AR6A
12	1	204SS	Selector Switch,2-Position	Allen-Bradley #800H-HR2B
13	23		Legend Plate, NEMA 4X (engraved as shown)	Allen-Bradley #800H-W500J
14	1	104TAS	Thermostat	Saginaw #SCE-TEMNO
15	1	1CB	Circuit Breaker, 15 AMP	AutomationDirect #WMZT1C15
16	21	All CR's	Relay, 2PDT	Idec #RH2B-ULCAC110-120V
17	21	(for above)	Relay Socket	Idec #SH2B-05
18	116		Terminal Block	Allen-Bradley #1492-J4
19	4		Terminal Block End Barrier	Allen-Bradley #1492-EBJ3
20	11		Terminal Block End Anchor	Allen-Bradley #1492-ERL35
21	2		Terminal Block, Grounding	Allen-Bradley #1492-JG4
22	A/R		DIN Rail, 35mm	Allen-Bradley #199-DR1
23	A/R		DIN Rail, 35mm, Raised	AutomationDirect #DN-R35SAL2-2
24	1		Ground Lug	Blackburn #L35 (or equal)
25	A/R		Wireway with Cover, 1" X 3"	Panduit (or equal)
26	1	1FAN	Fan Heater with Thermostat, 200 Watt	Saginaw #SCE-HF2001A
27	1	2CB	Circuit Breaker, 3 AMP	AutomationDirect #WMZT1C03
28	A/R	1CA	Shielded Cable, #24 AWG, 9-Conductor	Belden #9934 (or equal)
29	1		Connector, DB-9, Female	Purchase
30				

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APP	DATE
0	ORIGINAL ISSUE	ADH	--	--	10/9/2014
A	REVISED PER CUSTOMERS COMMENTS	ADH	--	--	10/21/2014

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APP	DATE

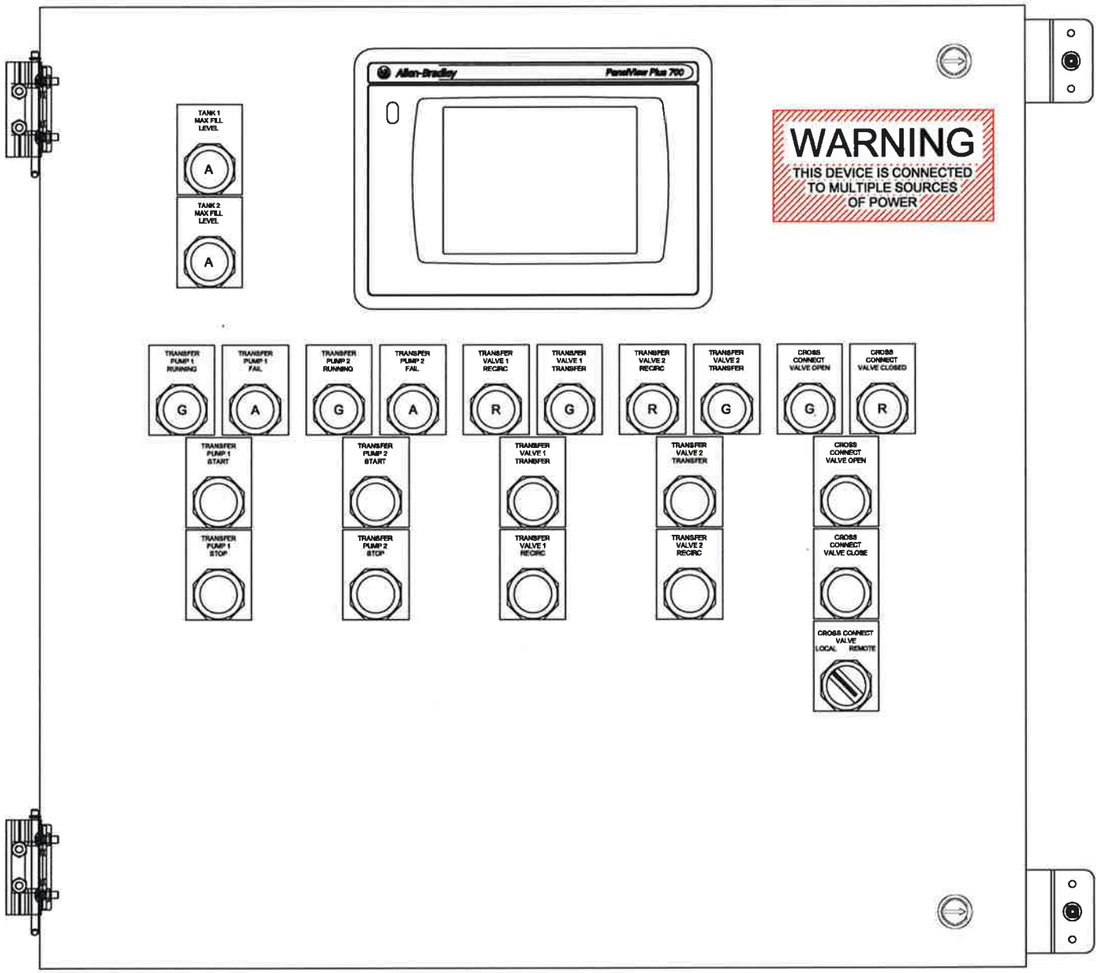
Apex Automation & Controls
10991 Leadbetter Road Ashland, VA 23005
(804) - 550 - 1814
www.apex-automation.com

	BY	DATE
DRAWN	ADH	10/9/14
CHECKED	--	--
APP	--	--

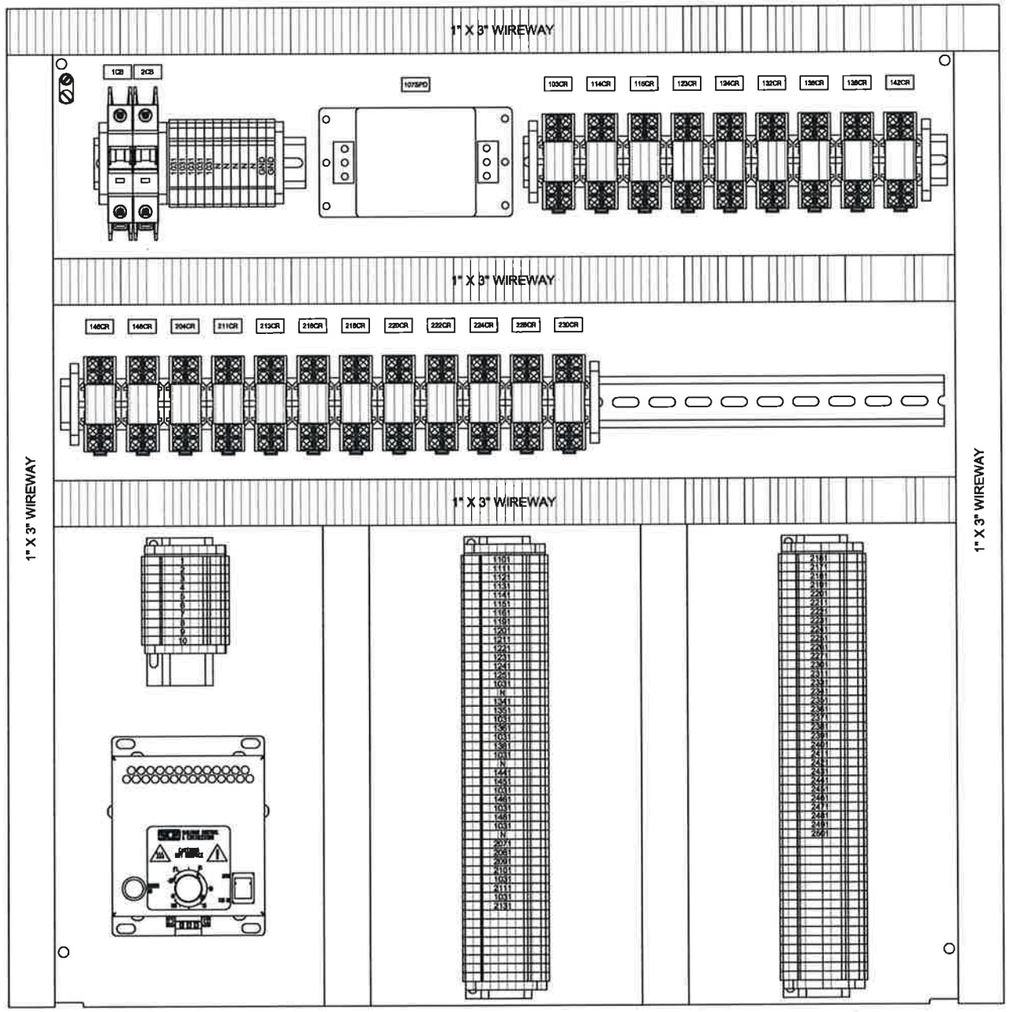
ICSE JOB NO. P14-2129
REF.
SCALE N/A

WESTERN VIRGINIA WATER AUTHORITY
CARVINS COVE WTF CHEMICAL BUILDING 2
SODIUM HYPOCHLORITE CONTROL PANEL
MATERIALS LIST

SIZE D | DWG NO. 175-14-200 | SHEET 1 of 1 | REVISION A



DEAD FRONT PANEL LAYOUT



SUB- PANEL LAYOUT

REV	REVISION DESCRIPTION	DRAWN	CHECKED	APP	DATE
0	ORIGINAL ISSUE	ADH	--	--	10/8/2014
A	REVISED PER CUSTOMERS COMMENTS	ADH	--	--	10/21/2014

Apex Automation & Controls
10991 Leadbetter Road Ashland, VA 23005
(804) - 550 - 1814
www.apex-automation.com

	BY	DATE
DRAWN	ADH	10/8/14
CHECKED	--	--
APP	--	--

ICSE JOB NO. P14-2129
REF.
SCALE N/A

WESTERN VIRGINIA WATER AUTHORITY
CARVINS COVE WTF CHEMICAL BUILDING 2
SODIUM HYPOCHLORITE CONTROL PANEL
DEAD FRONT & SUB-PANEL LAYOUTS

SIZE D | DWG. NO. 175-14-201 | SHEET 2 of 2 | REVISION A