

ABBREVIATIONS

AD	area drain
ABV	above
AFF	above finished floor
AR	argon
BCP	buffer chemical polish
BFP	back flow preventer
BTU	British thermal unit
CA	compressed air
CLG	ceiling
CTS	countertop sink
CW	cold water
DCW	domestic cold water
DHW	domestic hot water
DHWR	domestic hot water return
DN	down
DOM	domestic
DWG	drawing
DWH	domestic water heater
DWRP	domestic water return pump
(E)	existing to remain
EP	electro chem polish
ES/EW	emergency shower / emergency eyewash
EW	electric water cooler
(F)	future
FCO	floor cleanout
FD	floor drain
FF	finished floor
FH	fume hood
FL	floor
FU	fixture units
FV	flush valve
G	gallon
GPM	gallons per minute
GW	grey water
HE	helium
HP	horsepower
HS	hand sink
HW	hot water
HWR	hot water return
HWRP	hot water return pump
HUPWR	hot ultra pure water return
HUPWS	hot ultra pure water supply
HX	heat exchanger
ICW	industrial cold water
IHW	industrial hot water
IHW	industrial hot water return
IHW	invert elevation
IWH	industrial water heater
IW	industrial waste
IV	industrial vent
LAV	lavatory
LCWR	low conductivity water return
LCWS	low conductivity water supply
LS	laboratory sink
MBH	thousand BTU's per hour
MR	mop receptor
(N)	new
N2	nitrogen
NTS	not to scale
(R)	remove
S	soil piping
SA	shock absorber
SAN	sanitary
SH	shower
SK	sink
SS	service sink or stainless steel
ST	storm
TYP	typical
UR	urinal
UPW	ultra pure water
V	vent
W	waste piping
WC	water closet
WCO	wall cleanout

PIPING SYMBOLS

— IW —	industrial waste
— IV —	industrial vent
— IW —	industrial waste (below grade)
— S —	sanitary waste
— S —	sanitary vent
— S —	sanitary waste (below grade)
— ST —	storm water
— DCW —	domestic cold water
— DHW —	domestic hot water
— DHWR —	domestic hot water return
— ICW —	industrial cold water
— IHW —	industrial hot water
— IHW —	industrial hot water return
— LCWS —	low conductivity water supply
— LCWR —	low conductivity water return
— AR —	argon
— CA —	compressed air
— G —	natural gas piping
— GW —	grey water
— GC —	gas cock
— HE —	helium
— N ₂ —	nitrogen
— FC —	floor cleanout
— FD —	direction of flow
— HW —	hot water return balancing system
— SV —	shutoff valve
— PR —	pipe riser-down
— PU —	pipe riser-up
— VD —	valve in drop
— PC —	pressure control monitor
— TW —	two-way control valve
— PV —	plug valve
— RE —	remove from existing
— CE —	connect to existing

GENERAL NOTES

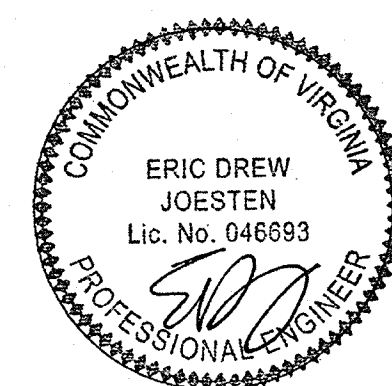
- DISCONNECT & REMOVE EXISTING MATERIAL, EQUIPMENT AND OTHER WORK AS NOTED OR REQUIRED FOR PROPER INSTALLATION OF A NEW SYSTEM. DISPOSE OF REMOVED MATERIAL IN AN APPROVED MANNER.
- REMOVAL OF CERTAIN EXISTING WORK WILL BE NECESSARY FOR THE SATISFACTORY PERFORMANCE OF THE GENERAL WORK. ALL EXISTING CONDITIONS ARE NOT COMPLETELY DETAILED ON THE DRAWINGS. THE CONTRACTOR SHALL SURVEY THE SITE AND MAKE ALL NECESSARY CHANGES REQUIRED BASED ON EXISTING CONDITIONS FOR PROPER INSTALLATION OF WORK.
- ALL NECESSARY CUTTING AND PATCHING FOR THE PLUMBING WORK SHALL BE PERFORMED BY THIS CONTRACTOR. RESTORE TO MATCH EXISTING CONDITIONS.
- PLAN INSTALLATION OF NEW WORK AND CONNECTIONS TO EXISTING WORK TO INSURE MINIMUM INTERFERENCE WITH REGULAR OPERATION OF EXISTING FACILITIES. ALL SYSTEM SHUTDOWNS AFFECTING OTHER AREA SHALL BE COORDINATED WITH BUILDING FACILITIES.
- THE CONTRACTOR SHALL COORDINATE DEMOLITION WORK WITH OTHER TRADE SECTIONS IN ESTABLISHING EXTENT OF REQUIRED REMOVALS TO COMPLY WITH CONSTRUCTION DOCUMENTS & SPECIFICATIONS.
- ENTIRE INSTALLATION SHALL CONFORM TO THE REQUIREMENTS OF THE INTERNATIONAL PLUMBING CODE, INTERNATIONAL BUILDING CODE, AND ALL OTHER APPLICABLE CODES AND REGULATIONS.

PLUMBING DRAWING INDEX

DRAWING NUMBER	SHEET NUMBER	DRAWING TITLE			
100011-128-P1-SITE	PG. 1	PLUMBING INDEX SHEET	✓	✓	✓
100011-130-P2-SITE	PS. 1	PLUMBING SPECIFICATION SHEET	✓	✓	✓
100011-131-P3-SITE	PS. 2	PLUMBING SPECIFICATION SHEET	✓	✓	✓
TLR-P1.8.G		BASEMENT - DEMOLITION - WASTE & SERVICE PIPING - SEGMENT G	✓	✓	✓
TLR-P1.9.D		UNDERGROUND - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT D	✓	✓	✓
TLR-P1.9.E		UNDERGROUND - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT E	✓	✓	✓
TLR-P1.9.F		UNDERGROUND - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT F	✓	✓	✓
TLR-P1.9.G		UNDERGROUND - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT G	✓	✓	✓
TLR-P1.1.D		FIRST FLOOR - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT D	✓	✓	✓
TLR-P1.1.E		FIRST FLOOR - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT E	✓	✓	✓
TLR-P1.1.F		FIRST FLOOR - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT F	✓	✓	✓
TLR-P1.1.G		FIRST FLOOR - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT G	✓	✓	✓
TLR-P1.2.D		FIRST FLOOR - DEMOLITION - PRESSURE SERVICE PIPING - SEGMENT D	✓	✓	✓
TLR-P1.2.E		FIRST FLOOR - DEMOLITION - PRESSURE SERVICE PIPING - SEGMENT E	✓	✓	✓
TLR-P1.2.F		FIRST FLOOR - DEMOLITION - PRESSURE SERVICE PIPING - SEGMENT F	✓	✓	✓
TLR-P1.2.G		FIRST FLOOR - DEMOLITION - PRESSURE SERVICE PIPING - SEGMENT G	✓	✓	✓
TLR-P1.3.D		SECOND FLOOR - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT D	✓	✓	✓
TLR-P1.3.E		SECOND FLOOR - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT E	✓	✓	✓
TLR-P1.3.F		SECOND FLOOR - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT F	✓	✓	✓
TLR-P1.3.G		SECOND FLOOR - DEMOLITION - WASTE, VENT, & STORM PIPING - SEGMENT G	✓	✓	✓
TLR-P1.4.D		SECOND FLOOR - DEMOLITION - PRESSURE SERVICE PIPING - SEGMENT D	✓	✓	✓
TLR-P1.4.E		SECOND FLOOR - DEMOLITION - PRESSURE SERVICE PIPING - SEGMENT E	✓	✓	✓
TLR-P1.4.F		SECOND FLOOR - DEMOLITION - PRESSURE SERVICE PIPING - SEGMENT F	✓	✓	✓
TLR-P1.4.G		SECOND FLOOR - DEMOLITION - PRESSURE SERVICE PIPING - SEGMENT G	✓	✓	✓
TLR-P1.5		ROOF PLAN - DEMOLITION - SEGMENTS D,E,F & G	✓	✓	✓
TLR-P2.8.G		BASEMENT - NEW WORK - WASTE & SERVICE PIPING - SEGMENT G	✓	✓	✓
100011-132-P4-SITE	TLR-P2.0.A1	UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT A1	✓	✓	✓
100011-133-P5-SITE	TLR-P2.0.A2	UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT A2	✓	✓	✓
	TLR-P2.0.B	UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT B	✓	✓	✓
	TLR-P2.0.C	UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT C	✓	✓	✓
	TLR-P2.0.D	UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT D	✓	✓	✓
	TLR-P2.0.E	UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT E	✓	✓	✓
	TLR-P2.0.F	UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT F	✓	✓	✓
	TLR-P2.0.G	UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT G	✓	✓	✓
TLR-P2.0.H		NEW WORK - WASTE, VENT, STORM, & PRESSURE SERVICE PIPING - CHILLER PLANT	✓	✓	✓
100011-134-P6-SITE	TLR-P2.0.J	NEW WORK - WASTE, VENT, STORM, & PRESSURE SERVICE PIPING - GUARD HOUSE	✓	✓	✓
100011-135-P7-SITE	TLR-P2.1.A	FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT A	✓	✓	✓
	TLR-P2.1.B	FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT B	✓	✓	✓
	TLR-P2.1.C	FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT C	✓	✓	✓
	TLR-P2.1.D	FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT D	✓	✓	✓
	TLR-P2.1.E	FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT E	✓	✓	✓
	TLR-P2.1.F	FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT F	✓	✓	✓
	TLR-P2.1.G	FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT G	✓	✓	✓
100011-136-P8-SITE	TLR-P2.2.A	FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT A	✓	✓	✓
	TLR-P2.2.B	FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT B	✓	✓	✓
	TLR-P2.2.C	FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT C	✓	✓	✓
	TLR-P2.2.D	FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT D	✓	✓	✓
	TLR-P2.2.E	FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT E	✓	✓	✓
	TLR-P2.2.F	FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT F	✓	✓	✓
	TLR-P2.2.G	FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT G	✓	✓	✓
TLR-P2.3.A		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT A	✓	✓	✓
TLR-P2.3.B		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT B	✓	✓	✓
TLR-P2.3.C		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT C	✓	✓	✓
TLR-P2.3.D		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT D	✓	✓	✓
TLR-P2.3.E		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT E	✓	✓	✓
TLR-P2.3.F		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT F	✓	✓	✓
TLR-P2.3.G		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT G	✓	✓	✓
TLR-P2.4.A		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT A	✓	✓	✓
TLR-P2.4.B		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT B	✓	✓	✓
TLR-P2.4.C		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT C	✓	✓	✓
TLR-P2.4.D		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT D	✓	✓	✓
TLR-P2.4.E		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT E	✓	✓	✓
TLR-P2.4.F		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT F	✓	✓	✓
TLR-P2.4.G		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT G	✓	✓	✓
TLR-P2.5.A		ROOF PLAN - NEW WORK - SEGMENTS A,B & C	✓	✓	✓
TLR-P2.5.B		ROOF PLAN - NEW WORK - SEGMENTS D,E,F & G	✓	✓	✓
TED-P2.0.A		UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT A	✓	✓	✓
TED-P2.0.B		UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT B	✓	✓	✓
TED-P2.0.C		UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT C	✓	✓	✓
TED-P2.0.D		UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT D	✓	✓	✓
TED-P2.1.A		FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT A	✓	✓	✓
TED-P2.1.B		FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT B	✓	✓	✓
TED-P2.1.C		FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT C	✓	✓	✓
TED-P2.1.D		FIRST FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT D	✓	✓	✓
TED-P2.2.A		FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT A	✓	✓	✓
TED-P2.2.B		FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT B	✓	✓	✓
TED-P2.2.C		FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT C	✓	✓	✓
TED-P2.2.D		FIRST FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT D	✓	✓	✓
TED-P2.3.A		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT A	✓	✓	✓
TED-P2.3.B		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT B	✓	✓	✓
TED-P2.3.C		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT C	✓	✓	✓
TED-P2.3.D		SECOND FLOOR - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT D	✓	✓	✓
TED-P2.4.A		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT A	✓	✓	✓
TED-P2.4.B		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT B	✓	✓	✓
TED-P2.4.C		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT C	✓	✓	✓
TED-P2.4.D		SECOND FLOOR - NEW WORK - PRESSURE SERVICE PIPING - SEGMENT D	✓	✓	✓
TED-P2.5		ROOF PLAN - NEW WORK - SEGMENTS A,B,C & D	✓	✓	✓
P3.1		SCHEDULE SHEET	✓	✓	✓
P3.2		SCHEDULE SHEET	✓	✓	✓
P4.1		DETAILS	✓	✓	✓
P4.2		DETAIL - SECTION - UTILITY PIPING - CORRIDOR	✓	✓	✓
P5.1		STORM WATER RISER DIAGRAM	✓	✓	✓
P5.1.1		STORM WATER RISER DIAGRAM	✓	✓	✓
P5.2		SANITARY WASTE RISER DIAGRAM	✓	✓	✓
P5.2.1		SANITARY WASTE RISER DIAGRAM	✓	✓	✓
P5.2.2		SANITARY WASTE RISER DIAGRAM	✓	✓	✓
P5.2.3		SANITARY WASTE RISER DIAGRAM	✓	✓	✓
P5.3		ACID WASTE RISER DIAGRAM	✓	✓	✓
P5.4		DOMESTIC AND INDUSTRIAL WATER FLOW DIAGRAM	✓	✓	✓
P5.4.1		DOMESTIC AND INDUSTRIAL WATER FLOW DIAGRAM	✓	✓	✓
P5.5		LOW CONDUCTIVITY WATER AND ULTRA PURE WATER FLOW DIAGRAM	✓	✓	✓
P5.6		COMPRESSED AIR FLOW DIAGRAM	✓	✓	✓
P5.6.1		COMPRESSED AIR FLOW DIAGRAM	✓	✓	✓
P5.6.2		EXISTING COMPRESSED AIR SCHEMATIC	✓	✓	✓
P5.7		ARGON GAS FLOW DIAGRAM	✓	✓	✓
P5.8		NITROGEN GAS FLOW DIAGRAM	✓	✓	✓
P5.9		HELIUM GAS FLOW DIAGRAM	✓	✓	✓
100011-137-P9-SITE	TLR-P6.2.A	PROCESS SUPPORT BUILDING - TEMPORARY WORK - PRESSURE SERVICE PIPING	✓	✓	✓
100011-138-P10-SITE	TLR-P6.2.B	1-AREA - NEW WORK - PRESSURE SERVICE PIPING	✓	✓	✓
100011-139-P11-SITE	TLR-P6.2.C	WATER SYSTEMS ROOM - NEW WORK - PRESSURE SERVICE PIPING	✓	✓	✓
100011-140-P12-SITE	TLR-P6.2.D	WATER SYSTEMS ROOM - NEW WORK - PRESSURE SERVICE PIPING	✓	✓	✓

EWING COLE

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TECHNICAL ENGINEERING & DEVELOPMENT FACILITY

(TEDF)

12000 JEFFERSON AVENUE, NEWPORT NEWS, VIRGINIA 23608

REV	ZONE	DESCRIPTION	APPR.	DATE
		ISSUE NO. 1 / EPP		02/08/10

REVISIONS			

FACILITY USERS		FACILITIES & LOGISTICS	
APPROVED	DATE	DESIGNER	DATE
APPROVED		JLC	6.12.09
APPROVED		DRAWN	6.12.09
APPROVED		CHECKED	6.12.09
APPROVED		FA	6.12.09
APPROVED		APPROVED	

Jefferson Lab

TITLE: PLUMBING INDEX SHEET

SCALE	DRAWING NUMBER	SHEET	REV
N.T.S.	100011-128-P1-SITE	PG.1	

1. SANITARY WASTE, VENT PIPING, AND STORM

A. PIPE AND FITTINGS (ABOVE GROUND): SERVICE WEIGHT CAST IRON, NO-HUB SOIL PIPE AND FITTINGS, ASTM A-888, WITH COMPRESSION TYPE COUPLINGS.

B. PIPE AND FITTINGS (BELOW GROUND): SERVICE WEIGHT CAST IRON, HUB AND SPIGOT SOIL PIPE AND FITTINGS, ASTM A74, WITH COMPRESSION TYPE GASKETS.

2. INDUSTRIAL WASTE AND VENT PIPING (ABOVE GROUND)

A. PIPE AND FITTING: FLAME RETARDANT POLYPROPYLENE DRAINAGE PIPE SCHEDULE 40.

B. JOINTS: ELECTRIC FUSION

3. INDUSTRIAL WASTE AND VENT PIPING (UNDERGROUND)

A. PIPE AND FITTING: POLYPROPYLENE DRAINAGE PIPE SCHEDULE 40.

B. JOINTS: ELECTRIC FUSION

4. INDUSTRIAL & DOMESTIC WATER PIPING

A. PIPE: TYPE L, HARD DRAWN COPPER TUBING, ASTM B88.

B. FITTINGS: WROUGHT COPPER, ANSI B16.22, CAST BRASS FITTINGS, ANSI B16.18, ANY BE USED FOR LARGE PIPE SIZES WHERE WROUGHT COPPER FITTINGS ARE NOT AVAILABLE.

C. JOINTS: SOLDERED (LEAD FREE).

D. VALVES: BALL TYPE FOR 2 INCHES AND SMALLER, CAST BRONZE BODY, SWING-AWAY TYPE WITH FULL PORT, CHROME PLATED BRASS OR BRONZE BALL, THE SEATS AND PACKING WITH ADJUSTABLE STEM PACKING GLAND, 150 WSP, 400 WOG, 300 F. STEM EXTENDED TO SUITE INSULATION THICKNESS. HAMMOND NO. 8814 FOR COPPER PIPING INSTALLATION WITH HIGH TEMPERATURE SOLDER JOINT (95-9).

5. COMPRESSED AIR AND NITROGEN

A. PIPE AND FITTINGS: TYPE K COPPER TUBING ASTM B88, WITH WROUGHT COPPER FITTINGS AND SILVER BRAZED JOINTS.

B. VALVES: BRONZE BODIED, BOLTED UNION TYPE BALL VALVES WITH THREADED ENDS, SOLDER JOINTS OR TUBING EXTENSIONS AS REQUIRED AND DESIGNED FOR 300 PSIG WORKING PRESSURE.

6. INSULATION

A. FURNISH ALL LABOR, MATERIAL, EQUIPMENT AND SERVICE NECESSARY FOR INSULATION OF PIPING AND EQUIPMENT.

B. ACCEPTABLE MANUFACTURERS

1. MANVILLE PRODUCTS CORPORATION.

2. ARMSTRONG WORLD INDUSTRIES, INC.

3. CERTAIN-TEED CORP.

4. OWENS-CORNING FIBERGLAS CORP.

5. KNAUF FIBERGLASS

6. RUBATEX

C. ALL MATERIALS SHALL HAVE A COMPOSITE NONCOMBUSTIBLE FIRE AND SMOKE HAZARD RATING AND LABEL, AS TESTED IN ACCORDANCE WITH U.S. PUBLIC HEALTH SERVICE REQUIREMENTS, ASTM E-84, NFPA 255 AND UL 723, NOT EXCEEDING FLAME SPREAD 25, FUEL CONTRIBUTION 50 AND SMOKE DEVELOPED 50.

D. PIPE INSULATION MATERIALS

1. TYPE P-1, FIBROUS GLASS INSULATION WITH FACTORY-APPLIED VAPOR BARRIER JACKET, MAX. 22 "K" FACTOR @ 750F, MANVILLE "MIRCO-LOK AP-T" WITH PREMOLDED PVC FITTING AND VALVE COVERS.

E. PREPARATION

1. DETERMINE REQUIRED CLEARANCES AND COORDINATE WITH OTHER TRADES.

2. INSTALL INSULATION AFTER SYSTEM HAVE BEEN SUCCESSFULLY LEAK TESTED AND/OR PRESSURE TESTED.

3. ENSURE SURFACE AND INSULATION ARE CLEAN AND DRY BEFORE INSTALLATION.

4. INSTALLATION

5. APPLY INSULATION AND ADHESIVES IN ACCORDANCE WITH MANUFACTURERS' INSTRUCTIONS.

6. DO NOT INSTALL INSULATION UNTIL BUILDING IS ADEQUATELY CLOSED IN.

7. PLUMBING AND DRAINAGE SYSTEMS TO BE INSULATED AND THICKNESS (TYPE P1 UNLESS NOTED OTHERWISE): (1) DOMESTIC HOT AND COLD WATER PIPING, 1/2 INCH THICK.

8. REPAIR EXISTING INSULATION DAMAGED THROUGH INSTALLATION OF NEW WORK.

CHEMICAL DELIVERY SYSTEM:

1. THE FLEXCHEM SYSTEM WILL BE SET UP FOR DELIVERY OF CHEMICALS - BY OTHERS. THE SYSTEM WILL HAVE ONE CONTROL CABINET AND FOUR PUMP CABINETS (NON-SECONDARY CONTAINMENT) THAT WILL PUMP FROM EIGHT SUPPLIED IBS (TOTES). EACH PUMP CABINET WILL PROVIDE AUTOMATIC SWITCH-OVER UPON EMPTY BETWEEN TWO TOTES.

THE CONCENTRATED CHEMICALS WILL BE DELIVERED FROM THE IBC CONTAINERS TO REMOTELY LOCATED VALVE MANIFOLD BOXES THAT DISTRIBUTE THE CHEMICAL OUT TO EIGHT PROCESS TOOLS. THE CHEMICAL WILL BE DELIVERED VIA LOW PRESSURE PUMPED DISPENSE AND DOUBLE CONTAINED PLUMBING LINES. CHEMICAL FEED LINES (NOT INCLUDED IN QUOTE) WILL BE CONNECTED FROM THE IBCS TO THE FLEXCHEM AND FROM THE FLEXCHEM TO THE VMB'S AND THE PROCESS TOOLS.

PLEASE NOTE THAT IT IS ASSUMED THAT THE LIQUID LEVEL IN EACH IBC WILL BE DETERMINED BY DEDICATED & SEPARATE SCALES THAT EACH IBC WILL BE PLACED ONTO. EACH SCALE WILL NEED TO HAVE A 4-20MA OUTPUT SIGNAL THAT WILL BE ROUTED TO THE MEI FLEXCHEM CONTROLLER.

THE FLEXCHEM CABINETS WILL BE CONSTRUCTED USING FM 4910 PLASTIC, AND ALL WETTED COMPONENTS WILL BE COMPATIBLE WITH THE CHEMISTRIES USED. MANUAL AND PNEUMATIC ISOLATION VALVES FOR EACH CHEMICAL DELIVERY POINT ARE SUPPLIED.

2. CHEMICALS:

. BCP - MIXED (HF ACID / PHOSPHORIC ACID / NITRIC ACID)

. EP - MIXED (HF ACID / SULFURIC ACID)

3. FEATURES OF SYSTEM:

A. SYSTEM OVERVIEW:

FRONT ACCESS CHEMICAL DELIVERY SYSTEM WITH FOUR PUMP-BOXES AND A CONTROL BOX.

B. CABINET:

THE CABINET WILL BE CONSTRUCTED USING FM 4910 PLASTICS. ALL ELECTRONICS WILL BE HOUSED IN A SEPARATE ISOLATED N2 PURGED CONTROL BOX.

C. CONTROL SCHEME:

A. THE DELIVERY & RECOVERY SYSTEM WILL BE CONTROLLED VIA TOUCHSCREEN HMI AND CELL CONTROL COMPUTER RUNNING MICROSOFT WINCC AND IXC AUTOMATION SOFTWARE.

D. THE CELL CONTROLLER COMMUNICATES WITH INDIVIDUAL PLC ASSEMBLIES IN EACH PUMP BOX. THE PLC IS HOUSED IN A SEPARATE ENCLOSURE WITH N2 PURGE. THE CONTROL BOX WILL HAVE A POWER ON/OFF, EMO SWITCH, INTERLOCK/ALARM LIGHT TOWER, AND AUDIBLE ALARM, ALARM SILENCE AND A SEPARATE POWER DISCONNECT SWITCH WITH LOCKOUT CAPABILITY. THE CONTROLLER WILL ALSO COMMUNICATE WITH THE MEI ACHIEVER WET PROCESS SYSTEM USING A DRY CONTACT INTERFACE IS AS FOLLOWS: OUTPUTS FROM THE DELIVERY & RECOVERY SYSTEM ARE SYSTEM ENABLED, AND SYSTEM ALARM. OUTPUTS FROM THE WET PROCESS SYSTEM ARE SYSTEM READY AND CHEMICAL REQUEST.

4. USER INTERFACE:

THE FLAT PANEL TOUCH SCREEN WILL ACT AS A GRAPHICAL REPRESENTATION INTERFACE OF THE DELIVERY & RECOVERY SYSTEM, CAPABLE OF SHOWING THE STATUS OF ALL CONTROLLED POINTS ON THE UNIT, AS WELL AS ALARM AND INTERLOCK STATUS. THE REMOTE ALARM PANEL WILL PROVIDE SYSTEM STATUS OF ANY ERROR CONDITIONS.

5. SYSTEM FEATURES:

. CABINETS DESIGNED WITH EASILY REMOVABLE PANELS FOR FRONT ACCESS TO ALL INTERNAL COMPONENTS.

. CONNECTS TO CUSTOMER SUPPLIED IBC AND SCALES

. UL-508A LISTING OF THE POWER DISTRIBUTION PANELS

. TEFLO® TUBING, FINE THREAD FLARE FITTINGS AND DOUBLE DIAPHRAGM VALVES FOR FLUID PATHS.

. EXHAUST PRESSURE MONITORING.

. N2 AND CDA SUPPLY PRESSURE MONITORING.

. ISOLATED AND N2 PURGED ELECTRONIC CONTROL ENCLOSURE.

. LOCAL AND OPTIONAL REMOTE EMO SHUT DOWN WITH LOW VOLTAGE CIRCUIT.

. CONCENTRATED CHEMICAL SUPPLY ON DEMAND 1 TO 2 GPM @ 3-15 PSIG, TEFLO® USING HIGH QUALITY DIAPHRAGM PUMPS FOR CHEMICALS INCLUDING A SURGE SUPPRESSOR AND INLINE MANUAL FLOW VALVE.

. DRY CONTACT INTERFACE TO CONNECTED WET PROCESS SYSTEM.

. VISUAL ALARM LIGHT TOWER WITH INTEGRATED AUDIBLE ALARM.

6. CHEMICAL PIPING

A. THE PRIMARY CHEMICAL SUPPLY TUBING SHALL BE FLUORINATED ETHYLENE PROPYLENE (FEP), MANUFACTURED BY CHEMFLOUR. SECONDARY PIPING SHALL BE HDPE ASTM-1248.

7. ACCEPTABLE MANUFACTURERS:

1. MEI

2. AMERIMADE

TESTING OF PIPING SYSTEMS - COMMON REQUIREMENTS

A. TEST PIPING SYSTEMS PRIOR TO APPLICATION OF INSULATION. TESTING AS STIPULATED HEREIN SHALL BE CONSIDERED MINIMUM, AND WHERE TESTS STIPULATED BY LAWFUL JURISDICTIONAL AUTHORITIES EXCEED THESE REQUIREMENTS, SUCH MORE STRINGENT TESTS SHALL BE PERFORMED. TESTS SHALL BE WITNESSED AND APPROVED BY JEFFERSON LABS OVER THE WORK.

B. CONCEALED WORK SHALL REMAIN UNCOVERED UNTIL REQUIRED TEST HAVE BEEN COMPLETED. PROVIDE PROPER SECTIONALIZING DEVICES SO THAT PORTIONS OF A SYSTEM MAY BE TESTED AS APPROPRIATE.

C. ISOLATE AND EXCLUDE FROM TESTS ALL IN LINE EQUIPMENT, INSTRUMENTS, GAUGE GLASSES, FLOW METERS AND ALL OTHER DEVICES NOT CAPABLE OF WITHSTANDING TEST PRESSURE.

D. APPLY SOAP SOLUTION TO ALL JOINTS OF PNEUMATICALLY TESTED SYSTEM WHILE SYSTEM IS BEING SUBJECTED TO TEST PRESSURE.

E. MAINTAIN TEST PRESSURES SUFFICIENT LENGTH OF TIME TO PERMIT THOROUGH INSPECTION OF ALL JOINTS, WHERE LEAKS ARE OBSERVED, REPLACE DEFECTIVE WORK OR MATERIAL. CAULKING OF SCREW JOINTS OR HOLES IS NOT ACCEPTABLE. REPEAT ENTIRE TEST AS MANY TIMES AS NECESSARY, UNTIL SUCCESSFUL COMPLETION OF TEST WITH NO LEAKS.

F. PREPARE WRITTEN REPORT OF TESTING.

TESTING OF PIPING SYSTEMS

A. FIELD QUALITY CONTROL

1. DO NOT ENCLOSE, COVER, OR PUT INTO OPERATION WATER DISTRIBUTION PIPING SYSTEM AND DRAINAGE AND VENT PIPING SYSTEM UNTIL EACH HAS BEEN INSPECTED AND APPROVED BY JEFFERSON LABS.

2. REINSECTIONS: WHEN THE REPRESENTATIVE OF JEFFERSON LABS FINDS THAT PIPING SYSTEM WILL NOT PASS TEST OR INSPECTION, MAKE REQUIRED CORRECTIONS AND ARRANGE FOR REINSPECTION BY JEFFERSON LABS.

3. REPORTS: PREPARE INSPECTION REPORTS SIGNED BY THE REPRESENTATIVE OF JEFFERSON LABS.

4. TEST IN ACCORDANCE WITH THE MORE STRINGENT OF THE REQUIREMENTS OF JEFFERSON LABS OR THE FOLLOWING:

C. GRAVITY DRAINAGE SYSTEMS

1. COMBINATION WATER/AIR TEST

A. ROUGH PLUMBING TEST PROCEDURE: EXCEPT FOR OUTSIDE LEADERS AND PERFORATED OR OPEN-JOINTED DRAIN TILE, TEST NEW AND/OR ALTERED PIPING OF PLUMBING DRAINAGE AND VENTING SYSTEMS ON COMPLETION OF ROUGHING IN PIPING INSTALLATION. TIGHTLY CLOSE ALL OPENINGS IN PIPING SYSTEM AND FILL WITH WATER TO POINT OF OVERFLOW, BUT NOT LESS THAN 10 FEET HEAD OF WATER. WATER LEVEL SHALL NOT DROP DURING THE PERIOD FROM 15 MINUTES BEFORE INSPECTION STARTS THROUGH 15 MINUTES AFTER COMPLETION OF INSPECTION. INSPECT ALL JOINTS FOR LEAKS.

B. FINISHED PLUMBING TEST PROCEDURE:

AFTER PLUMBING FIXTURES HAVE BEEN SET AND THEIR TRAPS FILLED WITH WATER, TEST CONNECTIONS AND PROVE GASTIGHT AND WATERTIGHT. PLUS STACK OPENINGS ON ROOF AND BUILDING DRAIN WHERE IT LEAVES THE BUILDING AND INTRODUCE AIR INTO THE SYSTEM EQUAL TO PRESSURE OF 1 INCH WATER COLUMN. USE A U TUBE OR MANOMETER INSERTED IN THE TRAP OF A WATER CLOSET TO MEASURE THIS PRESSURE. AIR PRESSURE SHALL REMAIN CONSTANT WITHOUT INTRODUCING ADDITIONAL AIR THROUGHOUT PERIOD BEGINNING 15 MINUTES BEFORE INSPECTION STARTS AND 15 MINUTES AFTER COMPLETION OF INSPECTION. INSPECT PLUMBING FIXTURE CONNECTIONS FOR GAS, AIR AND WATER LEAKS.

2. AIR TEST ONLY

A. ROUGH PLUMBING TEST PROCEDURE:

IF TESTS ARE MADE WITH AIR, APPLY A PRESSURE OF NOT LESS THAN 5 PSIG WITH A FORCE PUMP AND TEST AS SPECIFIED ABOVE. USE MERCURY-COLUMN GAUGE REGISTERING 10 INCHES IN HEIGHT IN AIR TEST. USE AIR TESTS ONLY WHEN AIR TEMPERATURES AROUND TESTED SYSTEM ARE 320 F. OR BELOW AND TEMPORARY HEAT IS NOT AVAILABLE.

B. PUMPED SYSTEMS (INDUSTRIAL):

TEST HYDROSTATICALLY. MAINTAIN PRESSURE FOR 4 HOURS WITH 2% MAXIMUM LOSS IN PRESSURE.

INSTALLATION

CLEANOUTS

A. PROVIDE CLEANOUTS ON ALL DRAINAGE PIPING AT 75 FOOT INTERVALS ON PIPING 4 INCHES AND SMALLER AND AT NOT MORE THAN 100 FOOT INTERVALS ON LARGER PIPE SIZES. AT EACH CHANGE IN DIRECTION OF MORE THAN 45°, AT THE BASE OF DRAINAGE STACKS AND AT OTHER LOCATIONS SHOWN. CLEANOUTS FULL SIZE FOR PIPES UP TO 4 INCHES AND NOT LESS THAN 4 INCHES FOR LARGER PIPES EXCEPT WHERE CODE REQUIRES CLEANOUTS LARGER THAN 4 INCHES. CLEANOUT SIZES SHALL COMPLY WITH APPLICABLE PLUMBING CODE.

B. INSTALL CLEANOUTS IN DRIVEWAYS AND YARDS FLUSH WITH TOP OF A 16 INCH BY 16 INCH BY 8 INCH CONCRETE PAD SET FLUSH WITH GRADE OR ROAD, WHERE CLEANOUTS ARE PROVIDED IN VITRIFIED CLAY BELOW GROUND, LAST 5 FOOT LENGTH OF VERTICAL RISER SHALL BE CAST IRON.

DRAINS

A. FLASH DRAINS INSTALLED IN WATERPROOFED FLOOR OR IN TOILET ROOMS AND MECHANICAL EQUIPMENT ROOM ABOVE GRADE WITH 2 FOOT, 6 INCH SQUARE, SHEET MEMBRANE CLAMPED INTO CLAMPING DEVICE OF THE DRAIN AND MOFFED INTO WATERPROOFING OR CAST INTO CONCRETE. MEMBRANE SHALL BE THERMOPLASTIC ELASTOMERIC, ASTM D 4088, CHLORALLOY 240, AS MANUFACTURED BY THE NOBLE COMPANY. INSTALLATION SHALL BE IN STRICT ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS.

PIPING CONNECTIONS

A. BELL AND SPIGOT, CAST IRON PIPE JOINTS: CAULK FIRMLY WITH OAKUM OR HEMP AND FILL WITH MOLTEN LEAD NOT LESS THAN 1 INCH DEEP AND NOT TO EXCEED MORE THAN 18 INCH BELOW FORM OF HUB; NO PAINT, VARNISH OR OTHER COATINGS PERMITTED ON JOINTING MATERIAL UNTIL AFTER JOINT HAS BEEN TESTED AND APPROVED. NEOPRENE GASKETING SYSTEM OR GASKET AND CLAMP TYPE MECHANICAL FASTENER WHERE SPECIFIED.

B. PLASTIC PIPE AND FITTING HEAT-FUSION JOINTS: PREPARE PIPE AND FITTINGS AND JOIN WITH HEAT-FUSION EQUIPMENT ACCORDING TO MANUFACTURER'S PRINTED INSTRUCTIONS.

1. PLAIN-END PIPE AND FITTINGS: BUTT JOINING.

2. PLAIN-END PIPE AND SOCKET TYPE FITTINGS: SOCKET JOINING.

RAINWATER CONDUCTOR SHOES

A. CAULK RAINWATER CONDUCTOR SHOES DIRECTLY INTO BELL OF DRAIN PIPING BELOW GRADE, WITH LEAD AND OAKUM CAULKING. OMIT FOLLOWING ARTICLE FOR "SMALL PROJECTS".

SANITARY, STORM, AND INDUSTRIAL WASTE PIPING

A. SET TRUE TO LINE AND EVEN SLOPE USING GRADE BOARDS AND TARGETS OR GRADE LINES. INSTALL CAST IRON SOIL PIPE AND FITTINGS AND MAKE JOINTS IN ACCORDANCE WITH "CAST IRON SOIL PIPE & FITTINGS HANDBOOK".

B. SLOPE SUSPENDED SANITARY AND STORM PIPING DOWNWARD MINIMUM 1/4 INCH PER FOOT WHERE POSSIBLE FOR PIPES 3 INCH AND SMALLER, AND 1/8 INCH PER FOOT FOR PIPES 4 INCH DIAMETER AND LARGER, AND IN ALL CASES, CONFORM TO CODE REQUIREMENTS.

C. SLOPE UNDERGROUND SANITARY AND STORM PIPING DOWNWARD A MINIMUM OF 1/4 INCH PER FOOT FOR 3 INCH PIPE AND LESS, A MINIMUM OF 1/8 INCH PER FOOT FOR PIPING LARGER THAN 3 INCH DIAMETER, AND IN ALL CASES, CONFORM TO CODE REQUIREMENTS.

D. INSTALL ALL PIPING IN ACCORDANCE WITH MANUFACTURERS RECOMMENDATIONS REGARDING CONNECTIONS, HANGERS, HANGER SPACING, UNDERGROUND INSTALLATION, ETC. SUPPORT SUSPENDED HORIZONTAL SOIL PIPE NEAR EACH HUB, WITH MAXIMUM SPACING BETWEEN HANGERS OF 5 FEET FOR PIPE FABRICATED IN 5 FOOT LENGTHS AND 10 FEET FOR PIPE FABRICATED IN 10 FOOT LENGTHS.

INDUSTRIAL VENT PIPING

A. PIPE AND FITTING: FLAME RETARDANT POLYPROPYLENE DRAINAGE PIPE SCHEDULE 40.

B. JOINTS: ELECTRIC FUSION

SPECIFICATIONS CONTINUED

TESTING OF PIPING SYSTEMS - COMMON REQUIREMENTS

A. TEST PIPING SYSTEMS PRIOR TO APPLICATION OF INSULATION. TESTING AS STIPULATED HEREIN SHALL BE CONSIDERED MINIMUM, AND WHERE TESTS STIPULATED BY LAWFUL JURISDICTIONAL AUTHORITIES EXCEED THESE REQUIREMENTS, SUCH MORE STRINGENT TESTS SHALL BE PERFORMED. TESTS SHALL BE WITNESSED AND APPROVED BY THE AUTHORITIES HAVING JURISDICTION OVER THE WORK.

B. CONCEALED WORK SHALL REMAIN UNCOVERED UNTIL REQUIRED TESTS HAVE BEEN COMPLETED. PROVIDE PROPER SECTIONALIZING DEVICES SO THAT PORTIONS OF A SYSTEM MAY BE TESTED AS APPROPRIATE.

C. ISOLATE AND EXCLUDE FROM TESTS ALL IN LINE EQUIPMENT, INSTRUMENTS, GAUGE GLASSES, FLOW METERS AND ALL OTHER DEVICES NOT CAPABLE OF WITHSTANDING TEST PRESSURE.

D. APPLY SOAP SOLUTION TO ALL JOINTS OF PNEUMATICALLY TESTED SYSTEMS WHILE SYSTEM IS BEING SUBJECTED TO TEST PRESSURE.

E. MAINTAIN TEST PRESSURES SUFFICIENT LENGTH OF TIME TO PERMIT THOROUGH INSPECTION OF ALL JOINTS, WHERE LEAKS ARE OBSERVED, REPLACE DEFECTIVE WORK OR MATERIAL. CAULKING OF SCREW JOINTS OR HOLES IS NOT ACCEPTABLE. REPEAT ENTIRE TEST AS MANY TIMES AS NECESSARY, UNTIL SUCCESSFUL COMPLETION OF TEST WITH NO LEAKS.

F. PREPARE WRITTEN REPORT OF TESTING.

TESTING OF PIPING SYSTEMS

A. FIELD QUALITY CONTROL

1. DO NOT ENCLOSE, COVER, OR PUT INTO OPERATION WATER DISTRIBUTION PIPING SYSTEM AND DRAINAGE AND VENT PIPING SYSTEM UNTIL EACH HAS BEEN INSPECTED AND APPROVED BY JEFFERSON LABS.

2. REINSECTIONS: WHEN THE REPRESENTATIVE OF JEFFERSON LABS FINDS THAT PIPING SYSTEM WILL NOT PASS TEST OR INSPECTION, MAKE REQUIRED CORRECTIONS AND ARRANGE FOR REINSPECTION BY AUTHORITY HAVING JURISDICTION.

3. REPORTS: PREPARE INSPECTION REPORTS SIGNED BY THE REPRESENTATIVE OF JEFFERSON LABS.

4. TEST IN ACCORDANCE WITH THE MORE STRINGENT OF THE REQUIREMENTS OF JEFFERSON LAB OR THE FOLLOWING:

B. AIR TEST ONLY

1. DOMESTIC HOT AND COLD WATER: TEST HYDROSTATICALLY UPON COMPLETION OF THE ROUGH-IN AND BEFORE INSULATING OR SETTING FIXTURES. MAINTAIN PRESSURE FOR NOT LESS THAN 4 HOURS WITHOUT LEAKAGE.

EWING COLE

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COMMONWEALTH OF VIRGINIA

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PROFESSIONAL ENGINEER

TECHNICAL ENGINEERING & DEVELOPMENT FACILITY (TEDF)				
12000 JEFFERSON AVENUE, NEWPORT NEWS, VIRGINIA 23606				
		ISSUE NO. 1 / EPP		02/08/10
REV	ZONE	DESCRIPTION	APPR.	DATE
REVISIONS				
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APPROVED	DATE	DESIGNER JLC	DATE 6.12.09	
APPROVED		DRAWN JLC	6.12.09	
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<div>Jefferson Lab</div>				
TITLE: PLUMBING SPECIFICATION SHEET				
SCALE	DRAWING NUMBER	SHEET	REV	
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DUPLEX BATCH PH ADJUSTMENT SYSTEM

PART 1 GENERAL

1.01 SCOPE

THE VENDOR SHALL SUPPLY ONE PACKAGED DUPLEX BATCH PH ADJUSTMENT SYSTEM. THE SYSTEM SHALL BE A BATCH/TREAT 8760_PP_PHY_E02_2 AS MANUFACTURED BY DIGITAL ANALYSIS CORPORATION.

THIS IS A BATCH SYSTEM WHICH COMPLETELY CAPTURES A BATCH, TREATS THE BATCH, QUALIFIES THE BATCH FOR DISCHARGE AND THEN PUMPS THE BATCH TO DRAIN. CONTINUOUS FLOW THROUGH SYSTEMS, AND SYSTEMS THAT CANNOT INTERRUPT EFFLUENT FLOW ARE NOT ACCEPTABLE. DISCHARGE TO THE DRAIN CANNOT OCCUR UNLESS THE PH OF THE EFFLUENT IS WITHIN THE FIELD SPECIFICATIONS AND THE DISCHARGE IS QUALIFIED BY NO LESS THAN TWO PH PROBES.

THE SYSTEM WILL BE COMPLETELY SKID MOUNTED. THE ENTIRE SYSTEM, WHICH INCLUDES THE TREATMENT TANK, CHEMICAL STORAGE TANKS, RECIRCULATION LOOP, AND THE CONTROL SYSTEM ARE MOUNTED ON A SINGLE PLATFORM.

THE ENTIRE SYSTEM IS TO BE FULLY CONSTRUCTED IN THE VENDORS SHOP AND TESTED PRIOR TO SHIPPING.

1.02 DESIGN CRITERIA:

1. THE SYSTEM SHALL BE CAPABLE OF ACCEPTING WATER FLOW AT A RATE THAT VARIES FROM 0 TO 200 GPM WITHOUT INTERRUPTING INCOMING FLOW. AVERAGE SUSTAINED FLOW WILL BE 60 GPM.
2. EFFLUENT AGGREGATE: WASTE STREAM MAY BE ACIDIC AT ONE MOMENT AND ALKALINE THE NEXT. INCOMING PH RANGES FROM 2.0-12.0 PH UNITS. CONCENTRATED ACIDS WILL ALSO BE TREATED. THESE ARE TO BE SEGREGATED AND COLLECTED IN SPENT ACID TANKS FROM WHICH THE ACID IS SLOWLY METERED INTO THE SYSTEM.
3. WASTE STREAM TEMPERATURE RANGES FROM 70_120 DEG. F.
4. THE PH OF THE EFFLUENT STREAM MUST BE WITHIN 6.2 < PH < 8.8. STABILITY OF THE WASTE STREAM MUST BE DEMONSTRATED PRIOR TO DISCHARGE TO THE SANITARY SEWER. THE DISCHARGE RANGE MUST BE USER CONFIGURABLE AND VARIABLE FROM 6.0 < PH < 9.0 PH UNITS. THE STABILITY TIME MEASUREMENT MUST ALSO BE USER CONFIGURABLE.
5. THE SYSTEM SHALL EMPLOY SELF DIAGNOSTICS AND ERROR DETECTION. ALARMS ARE TO BE ANNUNCIATED VIA AND ALARM HORN, AND AN OPERATOR INTERFACE UNIT (OIU), WHICH CONSISTS OF A GRAPHICAL DISPLAY AND KEYPAD. HIGH LEVEL ALARMS ARE TO ALSO BE ANNUNCIATED VIA A PILOT LIGHT OR BEACON ON THE MAIN CONTROL PANEL (MCP).
6. AN EFFLUENT MONITORING STAGE SHALL CONTINUOUSLY MONITOR AND RECORD THE FLOW RATE AND PH OF THE SYSTEM DISCHARGE. THE SYSTEM SHALL BE EQUIPPED WITH A FLOW TOTALIZER AS WELL AS PH ALARMS. THE ALARMS SHALL BE TIED DIRECTLY TO THE CENTRAL CONTROL SYSTEM AND SHALL SHUT DOWN DISCHARGE AND THE SYSTEM WILL REVERT BACK TO THE TREATMENT MODE. A TWO PEN, MICROPROCESSOR BASED CIRCULAR CHART RECORDER SHALL CONTINUOUSLY RECORD EFFLUENT FLOW AND PH.
7. THE SYSTEM SHALL BE SKID MOUNTED AND COMPLETELY ASSEMBLED AND TESTED IN THE MANUFACTURERS FACILITY PRIOR TO SHIPMENT. THE UNIT WILL BE MADE AVAILABLE FOR A CUSTOMER DEMONSTRATION BEFORE SHIPMENT. TEST RESULTS WILL BE PROVIDED TO THE CUSTOMER COMPLETION OF THE TESTING IN THE MANUFACTURERS FACILITY.

1.03 QUALITY ASSURANCE:

ALL COMPONENTS OF THE PH ADJUSTMENT SYSTEM SHALL BE FREE OF DEFECTS, AND SHALL BE CERTIFIED BY THE MANUFACTURER TO MEET OR EXCEED REQUIREMENTS AS SPECIFIED.

ANY DEFECTS OR DESIGN FLAWS SHALL BE CORRECTED BY THE MANUFACTURER PRIOR TO ACCEPTANCE OF THE UNIT BY THE CUSTOMER AND AT NO COST TO THE CUSTOMER.

THE SYSTEM MUST UNDERGO A DOCUMENTED FACTORY ACCEPTANCE TEST (FAT) WHICH DOCUMENTS THE FINAL INSPECTION AND PERFORMANCE OF ALL COMPONENTS WITHIN THE SYSTEM.

THE SUPPLIER IS TO GUARANTEE IN WRITING THAT THE SUPPLIED SUPPLIER WILL TREAT IN EXCESS OF 60 GPM WITH INFLUENT FLOWS RANGING ANYWHERE FROM 2.0 < PH < 12.0. IF THE SYSTEM FAILS TO PERFORM FOR ANY REASON THEN THE VENDOR SHALL EFFECT ANY AND ALL UPGRADES AND REPAIRS, AT NO COST TO THE PURCHASER / USER. SYSTEM PERFORMANCE IS TO BE DEMONSTRATED OVER A PERIOD OF 48 CONTINUOUS HOURS AT MAXIMUM FLOWS WITH INFLUENT FLOW MANUALLY SPIKED HIGH AND LOW PH, IF REQUIRED.

POTENTIAL MANUFACTURER SHALL HAVE AT LEAST 10 FUNCTIONING SYSTEMS INSTALLED WITHIN THE LAST FIVE YEARS. ACCEPTABLE MANUFACTURERS:

1. DIGITAL ANALYSIS CORPORATION
2. BURT PROCESS SYSTEMS
3. CORROSION PRODUCTS

PART 2 OPERATIONAL DESCRIPTION

2.01A OVERVIEW.

THE ENTIRE SYSTEM SHALL BE SKID MOUNTED ON A SINGLE SKID. THE SKID SHALL BE FABRICATED FROM WELDED STRUCTURAL STEEL COMPONENTS. THE SKID IS TO BE BLAST CLEANED, COATED WITH A TWO PART EPOXY AND LINED WITH A POLYPROPYLENE LINER (PP). SUMP DRAINS WILL BE SUPPLIED IN THE SKID SO THAT ANY LEAKS OR SPILLS ARE EASILY CONTAINED.

THE PH ADJUSTMENT TANK IS A 1,100 GALLON RECTANGULAR POLYPROPYLENE (PP) WITH A USABLE VOLUME OF NO LESS THAN 900 GALLONS. THE TANK IS EQUIPPED WITH AN IMPELLER TYPE MIXER THAT PROVIDES IN EXCESS OF 1.5 TANK TURNS PER MINUTE OF TANK AGITATION. THE TANK IS SUPPLIED WITH A REINFORCED AND GASKETED COVER WITH AMPLE INSPECTION PORTS.

RECIRCULATION PORTS SHALL ALSO BE PROVIDED SUCH THAT THE TANK CONTENTS CAN BE RECIRCULATED THROUGH AN EDUCION MIXING SYSTEM WITH RECIRCULATION PUMPS ON THE SERVICE SUPPORT SKID.

AN EFFLUENT MONITORING SYSTEM IS TO BE SUPPLIED FOR MONITORING THE EFFLUENT QUALITY AND FLOW RATE. THIS SYSTEM CONSISTS OF AN EFFLUENT PH PROBE AND MAGNETIC FLOW SENSOR. THE OUTPUTS FROM THESE ARE USED TO TRIGGER ALARMS AND TO SHUTDOWN THE EFFLUENT DISCHARGE VALVE.

2.01B SYSTEM STAGES:

THE SYSTEM WILL BE COMPRISED OF THE FOLLOWING MAJOR STAGES -

1. INFLUENT COLLECTION / TRANSFER
2. INFLUENT EQUALIZATION
3. SPENT ACID COLLECTION AND METERING
4. PH ADJUSTMENT / TREATMENT
5. FINAL EFFLUENT MONITORING.

2.1 INFLUENT COLLECTION / TRANSFER:

A DUPLEX COLLECTION / TRANSFER SYSTEM (CTS) SHALL BE SUPPLIED TO COLLECT, BY GRAVITY, ALL WASTEWATER. A SUFFICIENT VOLUME EXISTS FOR TRANSFER. ONE OF THE TWO TRANSFER PUMPS STARTS AUTOMATICALLY AND TRANSFERS THE CTS CONTENTS TO THE INFLUENT EQUALIZATION STAGE OF THE PH ADJUSTMENT SYSTEM. DUPLEX CTS PUMPS ARE SUPPLIED AS AN AUTOMATICALLY ALTERNATING LEAD / LAG DUPLEX PAIR WITH AUTOMATIC FAILED PUMP BACKUP. A CONTINUOUS OUTPUT LEVEL SENSOR PROVIDES AN ANALOG LEVEL SIGNAL TO THE PROGRAMMABLE LOGIC CONTROLLER (PLC) IN THE MAIN CONTROL PANEL (MCP). THE PRIMARY LEVEL SENSOR IN THE CTS IS BACKED UP BY A REDUNDANT HIGH / HIGH LEVEL SENSOR WHICH WILL PROVIDE CTS CONTROL. IN THE EVENT OF A FAILURE OF THE PRIMARY LEVEL SENSOR.

THE CTS TANK WILL BE A CUSTOM FABRICATED 660 GALLON POLYPROPYLENE VESSEL DESIGNED TO MAXIMUM THE SPACE AVAILABLE IN THE BELOW GRADE PIT. THE CTS TANK WILL BE DESIGNED FOR AN INFLUENT SPECIFIC GRAVITY OF NO LESS THAN 1.5. THE CTS PUMPS WILL BE CAPABLE OF DELIVERING NO LESS THAN 90 GPM @ 20' TDH.

THIS SYSTEM SHALL BE DELIVERED AS A PACKAGED UNIT COMPLETELY ASSEMBLED AND TESTED AND READY TO DROP INTO THE PIT. CONTROLS WILL INTERFACE THROUGH A SINGLE COVER MOUNTED J BOX TO THE PH SYSTEM MCP.

THE ENTIRE SYSTEM MUST BE SUITABLE FOR AN OUTDOOR INSTALLATION WITH INSULATION AND HEAT TRACING FOR FREEZE PROTECTION.

2.2 INFLUENT EQUALIZATION.

AN INFLUENT EQUALIZATION SYSTEM IS PROVIDED FOR THE EQUALIZATION OF INFLUENT FLOW AND CHEMISTRY. THE STAGE WILL COLLECT INFLUENT FLOW AT RATES AS HIGH AS 200 GPM WITH AN AVERAGE RATE NOT TO EXCEED 3600 GPM. BATCHES OF ROUGHLY 900 GALLONS EACH WILL BE TRANSFERRED FROM THIS STAGE TO THE TREATMENT STAGE WHEN THE TREATMENT TANK IS READY TO ACCEPT ANOTHER BATCH.

THIS STAGE CONSISTS OF A LARGE INFLUENT EQUALIZATION TANK, DUPLEX TRANSFER PUMPS, AN AUTOMATED RECIRCULATION TRANSFER VALVE, A FULLY ASSEMBLED PIPING HEADER, AND CONTROLS.

THE INFLUENT EQUALIZATION TANK SHALL PROVIDE A USABLE VOLUME OF NO LESS THAN 4,000 GALLONS AND SHALL BE EQUIPPED WITH A NON CONTACT CONTINUOUS OUTPUT LEVEL SENSOR WITH A REDUNDANT HIGH / HIGH LEVEL BACKUP SENSOR THAT CAN PROVIDE BACKUP TO THE PRIMARY SENSOR IN THE EVENT OF A FAILURE.

DUPLEX RECIRC / TRANSFER PUMPS ARE SUPPLIED AS AN AUTOMATICALLY ALTERNATING LEAD / LAG DUPLEX PAIR WITH AUTOMATIC FAILED PUMP BACKUP. A CONTINUOUS OUTPUT LEVEL SENSOR PROVIDES AN ANALOG LEVEL SIGNAL TO THE PROGRAMMABLE LOGIC CONTROLLER (PLC) IN THE MAIN CONTROL PANEL (MCP).

THE RECIRCULATION / TRANSFER PIPING NETWORK ALLOWS THE EQUALIZATION / TRANSFER PUMPS TO PROVIDE RECIRCULATION FLOW TO THE EQUALIZATION TANK FOR LOW LEVEL TANK AGITATION. AN AUTOMATED TRANSFER VALVE DIRECTS THE PUMP FLOW TO THE TREATMENT TANK FOR BATCH TREATMENT TRANSFER. THE PUMPS SHALL BE CAPABLE OF FILLING THE TREATMENT TANK AT A RATE OF NO LESS THAN 200 GPM.

DURING RECIRCULATION MODE PRETREATMENT OF THE EQUALIZATION TANK CONTENTS TAKES PLACE WHEN SUITABLE LOW OR HIGH PH IS DETECTED (I.E. PH < 4.0 OR PH > 10.0).

A FLOW SWITCH IN THE RECIRC / TRANSFER HEADER DETECTS PUMP FLOW AND TRIGGERS A PROBABLE PUMP FAILURE ALARM WITHIN THE CONTROL SYSTEM IN THE EVENT OF NO PUMP FLOW.

THE ENTIRE SYSTEM MUST BE SUITABLE FOR AN OUTDOOR INSTALLATION WITH INSULATION AND HEAT TRACING FOR FREEZE PROTECTION.

2.3 SPENT ACID COLLECTION AND METERING.

TWO INDEPENDENT SPENT ACID COLLECTION AND METERING SYSTEMS SHALL BE PROVIDED FOR COLLECTING CONCENTRATED MINERAL ACIDS AND SLOWLY DISPENSING THE SPENT ACID INTO THE TREATMENT SYSTEM, SO AS TO MINIMIZE POTENTIALLY HAZARDOUS CONDITIONS THAT RESULT FROM MIXING CONCENTRATED ACIDS TWO SYSTEMS ARE PROVIDED FOR APPROPRIATE SEGREGATION OF THE STRONG ACIDS.

MATERIALS OF CONSTRUCTION SHALL BE APPROPRIATE FOR CONCENTRATED MINERAL ACIDS (I.E. HF, H2SO4, HNO3, ETC.). METERING PUMPS CONTROLLED FROM THE PH SYSTEM MCP SHALL BE EMPLOYED TO SLOWLY METER THE SPENT ACID INTO THE RECIRCULATION LOOP OF THE EQUALIZATION SYSTEM WHEN THE PH IS NOT BELOW A USER DEFINED SETPOINT (I.E. PH > 2.0).

LEVEL SENSORS WITH A REDUNDANT HIGH / HIGH LEVEL POINT (FOR PRIMARY LEVEL SENSOR BACKUP) SHALL BE USED TO DETECT TO SPENT ACID LEVEL.

THE SPENT ACID TANKS SHALL BE CONSTRUCTED OF A SUITABLE THERMOPLASTIC MATERIAL AND SHALL BE EQUIPPED WITH GASKETED AND REINFORCED COVERS WITH A SUITABLE VENT CONNECTION. THE TANKS SHALL PROVIDE A USABLE VOLUME OF NO LESS THAN 100 GALLONS EACH.

2.4 PH ADJUSTMENT SYSTEM.

THE ENTIRE PH ADJUSTMENT SYSTEM SHALL BE SKID MOUNTED PER THE DESIGN DRAWINGS. THE ENTIRE SYSTEM WILL BE FABRICATED AND TESTED IN THE SUPPLIERS FACTORY PRIOR TO SHIPPING. FUNCTIONALITY SHALL BE DEMONSTRATED THROUGH AN APPROVED FACTORY ACCEPTANCE TEST (FAT).

PRIMARY CONTROL AND ADJUSTMENT OF PH IS PROVIDED IN THIS STAGE THROUGH ACTIVE CHEMICAL TREATMENT. ACID AND CAUSTIC REAGENTS ARE ADDED AS NECESSARY TO BRING INTO THE TREATMENT STAGE. A HORIZONTAL CENTRIFUGAL PUMP PROVIDES IN EXCESS OF 100GPM OF RECIRCULATION FLOW. THE LOOP RETURN FLOW IS DIRECTED THROUGH A BANK OF MIXING EDUCATORS. THIS PROVIDES ENHANCED CHEMICAL MIXING AND DISTRIBUTION THROUGH THE TANK.

A GEAR REDUCED PROP (IMPELLER) TYPE AGITATOR PROVIDES TANK MIXING. THE TANK TURNOVER RATE IS TO BE BETWEEN ONE AND TWO TURN OVERS PER MINUTE (I.E. MIXING > 1,500 GPM). THE PROP AND SHAFT SHALL BE 316 SS. THE MOTOR SHALL BE TEFC, 3 PHASE. ACCEPTABLE MANUFACTURERS SHARPE, EMI, OR APPROVED EQUAL.

A RECIRCULATION LOOP IS EMPLOYED ON THIS SYSTEM FOR THE PURPOSE OF OPTIMIZING PH MEASUREMENT AND CHEMICAL INJECTION. A HORIZONTAL CENTRIFUGAL PUMP PROVIDES IN EXCESS OF 100GPM OF RECIRCULATION FLOW. THE LOOP RETURN FLOW IS DIRECTED THROUGH A BANK OF MIXING EDUCATORS. THIS PROVIDES ENHANCED CHEMICAL MIXING AND DISTRIBUTION THROUGH THE TANK.

THE CHEMICAL INJECTION IS PROVIDED VIA PRECISION ELECTRONIC SOLENOID DRIVEN CHEMICAL METERING PUMPS THAT ARE PACED BY THE SYSTEM PLC. ONE PUMP IS TO PUMP THE CONCENTRATED ACIDIC REAGENT WHILE THE OTHER IS TO PUMP THE CONCENTRATED CAUSTIC REAGENT. THE PUMPS WILL BE CONFIGURED TO ACCEPT A REMOTE PULSE INPUT FROM THE CONTROL SYSTEM. PUMP SIZE IS TO BE 70PH MINIMUM. ACCEPTABLE MANUFACTURERS LMI, PROMINENT OR EQUAL.

THE PH PROBES SHALL BE A DOUBLE JUNCTION, DISPOSABLE, FLAT SURFACE, HIGH SURFACE AREA SO CALLED "SELF CLEANING" DESIGN. ACCEPTABLE MANUFACTURER ROSEMOUNT, PHOENIX, OR APPROVED EQUAL. THERE ARE A MINIMUM OF TWO PH PROBES ON THE SYSTEM, ONE IN THE TREATMENT TANK AND THE OTHER IS UTILIZED IN THE EFFLUENT MONITORING STAGE.

THE PH TRANSMITTER IS TO BE A MICROPROCESSOR BASED DEVICE WITH PH PROBE. DIAGNOSTICS. THE TRANSMITTER IS TO PROVIDE A 4-20MA OUTPUT TO THE SYSTEM CONTROLLER. ACCEPTABLE MANUFACTURERS ROSEMOUNT, GREAT LAKES, OR APPROVED EQUAL.

DUPLEX RECIRC / DISCHARGE PUMPS ARE SUPPLIED AS AN AUTOMATICALLY ALTERNATING LEAD / LAG DUPLEX PAIR WITH AUTOMATIC FAILED PUMP BACKUP. A CONTINUOUS OUTPUT LEVEL SENSOR PROVIDES AN ANALOG LEVEL SIGNAL TO THE PROGRAMMABLE LOGIC CONTROLLER (PLC) IN THE MAIN CONTROL PANEL (MCP).

A FLOW SWITCH IN THE RECIRC / DISCHARGE HEADER DETECTS PUMP FLOW AND TRIGGERS A PROBABLE PUMP FAILURE ALARM WITHIN THE CONTROL SYSTEM IN THE EVENT OF NO PUMP FLOW.

THE ENTIRE SYSTEM MUST BE SUITABLE FOR AN OUTDOOR INSTALLATION WITH INSULATION AND HEAT TRACING FOR FREEZE PROTECTION.

2.4.A. REAGENT STORAGE.

THE ALKALINE NEUTRALIZATION AGENT SODIUM HYDROXIDE (NAOH) SHALL BE STORED IN A 100 GALLON POLYETHYLENE STORAGE DAY TANK. THE DAY TANK IS TO BE SUPPLIED WITH A GASKETED AND BOLTED COVER, HIGH AND LOW LEVEL SENSORS, FILL PORTS, VENTS AND METERING PUMP SUCTION PORTS. THE TANK SHALL BE ROTATIONALLY MOLDED PE AND SUITABLE FOR STORING THE CONCENTRATED REAGENTS OVER LONG PERIODS OF TIME. ACCEPTABLE MANUFACTURERS CHEMTAINER, NALGENE, OR EQUAL.

THE ENTIRE SYSTEM MUST BE SUITABLE FOR AN OUTDOOR INSTALLATION WITH INSULATION AND HEAT TRACING FOR FREEZE PROTECTION.

ACID DEMAND IS EXPECTED TO BE VERY LOW OR NON-EXISTENT. THE ACIDIC NEUTRALIZING AGENT (I.E. 93% H2SO4) WILL BE PUMPED DIRECTLY FROM AN OWNER SUPPLIED 55 GALLON DOT DRUM VIA A CUSTOM FABRICATED SUCTION WARD (SUPPLIED WITH THIS SYSTEM) THAT CONSISTS OF A LOW LEVEL SENSOR, SUCTION FOOTVALVE AND A VENT CONNECTION.

2.5 FINAL EFFLUENT MONITORING

THE QUALITY OF THE TREATED EFFLUENT SHALL BE CONTINUOUSLY MONITORED AND RECORDED VIA A FINAL EFFLUENT PH PROBE AND A FINAL EFFLUENT FLOW SENSOR. THESE DEVICES SHALL BE INDEPENDENT OF THOSE USED FOR PRIMARY PH CONTROL IN THE TREATMENT SYSTEM.

THE FINAL EFFLUENT MONITORING SYSTEM DIRECTLY INTERFACES TO THE PLC IN THE MCP AND IS USED FOR MONITORING THE ALARM WINDOW DESCRIBED BELOW. IN THE EVENT OF A PH ALARM THE TREATMENT SYSTEM WILL REVERT BACK TO TREATMENT THEREBY HALTING THE DISCHARGE MODE AND AN ALARM WILL BE PROVIDED. DISCHARGE CANNOT RESUME UNTIL THE ALARM IS "CLEARED" BY AN OPERATOR.

THE FINAL EFFLUENT PH AND FLOW WILL BE CONTINUOUSLY RECORDED ON A FINAL EFFLUENT CIRCULAR CHART RECORDER.

PART 3 CONSTRUCTION

3.01 TANKS.

THE TANKS ARE TO BE MANUFACTURED TO BE SUITABLE FOR THE ENVIRONMENT AS DESCRIBED ABOVE. ALL FITTINGS ARE TO BE WELDED OR MOLDED FLANGED CONNECTION WITH GUSSET REINFORCEMENT. SIDEWALL FITTINGS BELOW THE FLUID LINE ARE TO BE AVOIDED WHEN POSSIBLE.

3.02 PLUMBING.

ALL PLUMBING SHALL BE PVC, PP, OR TFE AS REQUIRED. THE RECIRCULATION/DISCHARGE PLUMBING HEADER SHALL BE PVC AND SHALL BE EASILY REMOVED FOR SERVICE. ALL CONNECTIONS SHALL BE FLANGED, SOLVENT WELDED, OR SOCKET FUSED. A SUFFICIENT NUMBER OF FLANGES SHALL BE USED SO AS TO FACILITATE DISASSEMBLY. UNIONS WILL NOT BE ACCEPTED.

FLUID FLOW VELOCITIES SHALL BE CONSIDERED IN THE SYSTEM DESIGN AND DOCUMENTED ON SYSTEM DRAWINGS. THE PH SENSOR SHALL BE MOUNTED IN THE RECIRCULATION LOOP AND SHALL BE VERY ACCESSIBLE. NO PH ELECTRODES SHALL BE IMMERSD IN THE TANK.

PRESSURIZED REAGENT INJECTION LINES SHALL BE OF DOUBLE CONTAINED TPE. IN THE EVENT OF A FITTING LEAK OR A LINE RUPTURE THE LEAK SHALL BE SUFFICIENTLY CONTAINED SO AS NOT TO PRESENT AN IMMEDIATE THREAT TO PERSONNEL IN THE VICINITY.

3.03 ELECTRICAL.

ALL ELECTRICAL COMPONENTS SHALL CONFORM TO INDUSTRY STANDARDS FOR USE IN WET CORROSIVE ENVIRONMENTS. ELECTRICAL ENCLOSURES SHALL BE NEMA 4X AND ALL CONDUIT SHALL BE WATER TIGHT AND CORROSION RESISTANT. GALVANIZED METALLIC CONDUIT IS NOT CONSIDERED CORROSION RESISTANT. ALL METAL ENCLOSURES SHALL BE EPOXY COATED OR FRP. ALL MOTORS SHALL BE PAINTED WITH A BAKED ON EPOXY OSHA SAFETY BLUE COATING. THE ELECTRICAL SYSTEM, AS AN ENTITY, MUST BE "HOSE DOWN PROOF" AFTER THE SYSTEM IS COMPLETED. FREQUENT CLEANING WITH A PRESSURIZED WATER STREAM MUST NOT AFFECT THE INTEGRITY OF THE SYSTEM. THE SYSTEM MUST COMPLY WITH NFPA 79 AND OSHA. FURTHERMORE THE MAIN CONTROL PANEL AND THE CONTROL SYSTEM SHALL BE FABRICATED BY AUL 508 CERTIFIED INDUSTRIAL CONTROLS MANUFACTURER AND SHALL BE UL 508 LISTED. SEE SECTION 4 "INSTRUMENTATION" FOR MORE DETAILED INFORMATION.

3.04 PUMPS AND MIXERS

HORIZONTAL CENTRIFUGAL PUMP (RECIRCULATION PUMP). THE PUMPS SHALL EMPLOY CONSTRUCTION THAT DOES NOT EXPOSE METALLIC COMPONENTS TO THE PROCESS FLUIDS. PUMPS SHAFTS MUST BE SLEEVED. SEALS MUST BE OF AN APPROPRIATE MATERIAL OF CONSTRUCTION.

PH SYSTEM RECIRCULATION PUMP CAPACITY: 200 GPM @ 40' TDH. NON-OVERLOADING. CONTINUOUS DUTY.

ACCEPTABLE MANUFACTURER: GOULDS, PENGUIN, STARTTE, VANTON, SERFILCO OR EQUAL.

MIXERS:

THE MIXERS SHALL BE SINGLE IMPELLER TYPE GEAR REDUCED MIXERS WITH TEFC MOTORS. THE AGITATORS SHALL BE SIZED TO PROVIDE A MINIMUM OF ONE TO TWO TANK TURNS PER MINUTE. THE MIXER SHAFT SHALL BE 316SS. THE MIXER SHALL BE PROVIDED WITH A SHAFT GUARD THAT PROTECTS OPERATING PERSONNEL FROM ROTATING EQUIPMENT. THE MIXER SHALL BE MANUFACTURED BY SHARPE, EMI OR EQUAL.

METERING PUMPS: THE METERING PUMPS SHALL BE POSITIVE DISPLACEMENT PRECISION ELECTRONIC DIAPHRAGM PUMPS CAPABLE OF CONTINUOUSLY PUMPING CONCENTRATED REAGENTS SUCH AS 93% SULFURIC ACID OR 50% SODIUM HYDROXIDE. THEY SHALL BE EQUIPPED WITH VARIABLE STROKE LENGTH CONTROL AND PUMPING STROKE RATE SHALL BE EASILY MAINTAINED. PUMP OUTPUT WILL VARY FROM 0 TO 7 GPM @ 30 PSI. SUCTION FOOT VALVES WITH STRAINERS AND SPRING LOADED INJECTION VALVES SHALL BE PROVIDED. LOW LEVEL SENSORS SHALL BE USED TO DETECT LOW REAGENT LEVEL AND PROVIDE A SIGNAL TO THE CENTRAL CONTROL SYSTEM. ACCEPTABLE MANUFACTURERS: LMI OR PROMINENT.

PART 4 INSTRUMENTATION

4.01 MAIN CONTROL PANEL (MCP)

THE MCP AND ALL ASSOCIATED WIRING AND DOCUMENTATION SHALL CONFORM TO ALL APPLICABLE INDUSTRY STANDARDS SUCH AS NEC, NEMA, ISA, ANSI, AND NFPA79 AND UL.

THE MCP SHALL HOUSE THE CENTRAL CONTROL SYSTEM WHICH CONSISTS OF AN ALLEN-BRADLEY SLC500 FAMILY PROGRAMMABLE LOGIC CONTROLLER (PLC), WITH A 5606 CPU EQUIPPED WITH AN ETHERNET PORT OR AN ALLEN-BRADLEY PLC FROM THE COMPACT OR CONTROLLOGIX FAMILY. OPERATOR INTERFACEMESSAGE DISPLAY CENTER PH TRANSMITTER, PH INDICATOR, POWER SUPPLIES, ANNUNCIATOR LIGHTS, ALARM HORN, MOTOR STARTERS, BRANCH CIRCUIT PROTECTION ETC.

THE MCP SHALL BE A NEMA 4 EPOXY COATED STEEL OR FRP ELECTRICAL ENCLOSURE SIZED TO SUFFICIENTLY HOUSE ALL THE REQUIRED COMPONENTS. ALL CONDUIT PENETRATIONS TO THE PANEL SHALL BE WATER TIGHT AND THE INTEGRITY OF THE PANEL SHALL NOT BE VIOLATED BY ANY OF THE PENETRATIONS.

THE ENTIRE CONTROL CIRCUIT SHALL OPERATE FROM GROUND ISOLATED 24VDC TO ASSURE OPERATOR PROTECTION. HIGHER VOLTAGES ARE ACCEPTABLE FOR MOTOR POWER ONLY. CONTROL CIRCUIT POWER SHALL BE ISOLATED FROM 24VDC LOOP POWER.

MOTOR LOAD SWITCHING DEVICES MUST PROTECT THE MOTOR FROM LONG TERM OVERLOAD AS WELL AS SHORT CIRCUIT PROTECTION, PHASE LOSS, AND BROWN OUTS. ALL WIRING MUST COMPLY TO NEC, NFPA79, AND LOCAL CODES.

MOTOR POWER WIRING IS TO BE 12 AWG BLK MTW, 24 VDC CONTROL CIRCUIT WIRING SHALL BE 18 (OR 16) AWG BLU MTW. SIGNAL WIRING SHALL BE BELDEN 9750 OR EQUAL. ALL PUMPS AND MIXERS SHALL BE EQUIPPED WITH A PANEL MOUNTED HAND-OFF-AUTO SELECTOR.

PILOT LIGHTS SHALL BE 24VDC AND EQUIPPED WITH A PUSH TO TEST (PTT) BUTTON FOR LAMP CHECK. THE FOLLOWING STATUS/ALARMS SHALL BE ANNUNCIATED WITH PILOT LIGHTS:

- LEVEL ALARMS: PH ADJUSTMENT TANK HIGH LEVEL, CAUSTIC DRUM HIGH AND LOW, ACID DRUM HIGH AND LOW.
- PROCESS ALARMS:
 - EFFLUENT PH ALARM: INDICATES THAT THE EFFLUENT PH IS NOT WITHIN THE ALARM LIMITS.
 - PROBABLE TREAT PUMP FAILURE: INDICATES THAT THERE IS INSUFFICIENT RECIRCULATION LOOP FLOW.
 - EXCESSIVE TREAT TIME: INDICATES THAT THE BATCH CYCLE IS TAKING TOO LONG, INDICATIVE OF OTHER PROBLEMS SUCH AS CHEMICAL DELIVERY, PH PROBE CALIBRATIONS, ETC.

STATUS INDICATORS: FOR ALL PUMPS, MIXERS AND AUTOMATED VALVES.

ALL OTHER ALARM/STATUS INDICATIONS WILL BE DISPLAYED ON THE OPERATOR INTERFACEMESSAGE DISPLAY CENTER.

AN AUDIBLE ALARM WITH SILENCE BUTTON SHALL BE PROVIDED TO INDICATE THE PRESENCE OF ANY ALARM OR AN ALARM THAT THE SILENCE CIRCUIT SHALL ALLOW REACTIVATION OF THE HORN WHENEVER A NEW ALARM IS DETECTED.

AT LEAST TWO SEPARATE PROGRAMMABLE ALARM CONTACTS MUST BE AVAILABLE TO PROVIDE AN INDICATION OF AN ALARM STATE AT A REMOTE LOCATION. THE ALARM CONTACTS MUST BE FIELD PROGRAMMABLE AND CAN REPRESENT ANY FAILURE MODE (I.E. PUMP FAILURE, LOW REAGENT, ETC.) OR SYSTEM STATUS MONITORED BY THE SYSTEM.

4.02 AUTOMATED CONTROL.

THE PLC SHALL PROVIDE CONTROL OVER ALL AUTOMATED SYSTEM COMPONENTS SUCH AS PUMPS, MIXERS, AND ALARMS. THE CONTROL SYSTEMS SHALL BE SOPHISTICATED ENOUGH TO BE CONFIGURED FOR ANY TITRATION CURVE. A PI CONTROL ALGORITHM MUST BE PROVIDED THAT ALLOWS FOR CONTROL CURVE CUSTOMIZATION. AN INDEPENDENT SIX SLOPE CURVE FOR EACH METERING PUMP MUST BE USER DEFINED TO FIT THE TITRATION CURVE FOR THE WASTE STREAM TO BE TREATED. THE RESPONSE CURVE MUST BE EASILY DEFINED IN THE FIELD BY THE OPERATOR. THE FACTORY WILL SHIP THE UNIT WITH ALL PARAMETERS PROGRAMMED BASED ON PRELIMINARY INFORMATION SUPPLIED BY THE USER. THE CONTROL SYSTEM SHALL COMPLY WITH DIGITAL ANALYSIS SPECIFICATIONS FOR CONTROL SYSTEM "OPTIMIZATION".

STANDARD PID LOOPS OR LINEAR CONTROL ALGORITHMS AS SUPPLIED RESIDENT WITHIN THE PLC SHALL NOT BE ACCEPTABLE.

A MULTIPLE WINDOW CONTROL MECHANISM WILL BE ESTABLISHED THAT DEFINES AN ACCEPTABLE DISCHARGE WINDOW, A DISCHARGE LIMIT WINDOW A TREATMENT WINDOW, AND A BULK ASSIST WINDOW AND AN EFFLUENT ALARM WINDOW.

THE DISCHARGE LIMIT WINDOW IS AN OPERATOR CONFIGURABLE SET OF PARAMETERS THAT DEFINES THE ABSOLUTE LIMITS OF THE SYSTEM DISCHARGE. IF THE DISCHARGE REACHES EITHER END OF THIS WINDOW THEN A PROCESS ALARM IS PROVIDED AND THE SYSTEM HALTS EFFLUENT FLOW.

THE ACCEPTABLE DISCHARGE WINDOW IS AN OPERATOR CONFIGURABLE SET OF PARAMETERS THAT DEFINE THE PH RANGE THAT THE SYSTEM DISCHARGE MAY OCCUR. THIS WINDOW IS ALWAYS INSIDE OF THE DISCHARGE LIMIT WINDOW.

THE TREATMENT WINDOW IS AN OPERATOR CONFIGURABLE SET OF PARAMETERS THAT DEFINES THE TREATMENT GOALS FOR THE METERING PUMPS. THIS WINDOW IS ALWAYS INSIDE OF THE DISCHARGE WINDOW

INITIAL SETTINGS FOR THE FOUR WINDOWS ARE AS FOLLOWS:

- DISCHARGE / ALARM LIMIT: 6.0 < PH < 8.0
- ACCEPTABLE DISCHARGE: 6.2 < PH < 8.8
- TREATMENT GOAL: 7.0 < PH < 8.0
- BULK ASSIST WINDOW: (AS REQUIRED).

4.02 OPERATOR INTERFACE

AN OPERATOR INTERFACE UNIT (OIU) WILL BE DIRECTLY INTERFACED TO DIGITAL COMMUNICATION PORT ON THE PLC. THIS INTERFACE WILL PROVIDE DIRECT INDICATION OF SYSTEM MODE OR ALARM STATUS THROUGH IT'S MESSAGE DISPLAY CENTER. THE OIU WILL BE THE USERS "WINDOW" INTO THE HEART OF THE PLC. ALL USER CONFIGURABLE SETPOINTS AND PARAMETERS MUST BE EASILY ACCESSIBLE THROUGH THIS UNIT. A DETAILED MANUAL SHALL BE PROVIDED BY THE SYSTEM MANUFACTURER DESCRIBING THE USE OF EACH VARIABLE AND THE MEANING OF ALL MESSAGES.

ACCEPTABLE MANUFACTURER: ALLEN-BRADLEY.

4.03 PH PROBE

THE PH SENSOR EMPLOYED BY THIS SYSTEM SHALL BE PVO BODIED DOUBLE JUNCTION COMBINATION "SELF CLEANING" TYPE ELECTRODE. THE PROBES MUST BE CONFIGURED WITH QUICK CONNECT ELECTRICAL CONNECTIONS AND MUST BE EASILY REMOVED FROM SERVICE. MEASURING RANGE 0-14.

ACCEPTABLE MANUFACTURERS: ROSEMONT, GREAT LAKES, PHOENIX.

4.04 PH TRANSMITTER

THE PH TRANSMITTERS MUST BE MICROPROCESSOR BASED UNITS THAT PROVIDE PH BUFFER SOLUTION TABLES THAT ASSIST THE OPERATOR IN THE CALIBRATION OF THE PH PROBE. THE TRANSMITTER MUST PROVIDE A 4-20MA OUTPUT. THE PH INDICATOR SHALL BE A DEDICATED BACKLIT LCD DISPLAY (OR LED) CAPABLE OF PROVIDING AN EASILY SEEN READOUT IN A WIDE RANGE OF LIGHTING CONDITIONS. THE DISPLAY RESOLUTION SHALL BE 0.01 UNITS OVER A RANGE OF 0.00 TO 14.00. THE UNIT SHALL EMPLOY PROBE DIAGNOSTICS TO WARN OF A PH PROBE PROBLEM.

ACCEPTABLE MANUFACTURER: ROSEMOUNT, GREAT LAKES OR EQUAL.

4.05 EFFLUENT RECORDER

THE EFFLUENT RECORDER SHALL BE A FULLY PROGRAMMABLE TWO PEN CIRCULAR CHART RECORDER. PEN 1 SHALL DISPLAY THE EFFLUENT PH WHILE PEN 2 DISPLAYS THE EFFLUENT FLOW RATE. BOTH PENS MUST BE CONFIGURED TO ACCEPT ISOLATED 4-20MA INPUTS FROM THE RESPECTIVE TRANSMITTERS. CHART ROTATION TIME IS TO BE PROGRAMMABLE FROM 1 TO 168 HOURS.

ACCEPTABLE MANUFACTURERS: PARTLOW, FOXBORO, HONEYWELL.

4.07 EFFLUENT FLOW SENSOR AND TRANSMITTER

THE EFFLUENT FLOW SENSOR SHALL EMPLOY A PADDLEWHEEL THAT IS DIRECTLY INTERFACED TO A TRANSMITTER TO PROVIDE AN ISOLATED 4-20MA SIGNAL TO THE CHART RECORDER. FLOW MEASURING RANGE SHALL BE 0-280 GPM.

ACCEPTABLE MANUFACTURERS: SIGNET OR EQUAL.

PART 5 TESTING

ALL INSTRUMENTATION SHALL BE BURNED IN FOR NO LESS THAN 48 HOURS PRIOR TO INSTALLATION.

ALL PUMPS MUST BE TESTED FOR NO LESS THAN EIGHT (8) CONSECUTIVE HOURS AND CONFIRMED AGAINST THEIR PUBLISHED CURVES.

ALL TANKS MUST BE HYDRO CHECKED FOR NO LESS THAN 24 HOURS.

THE ENTIRE SYSTEM MUST BE FUNCTIONALLY CHECKED AND RUN AT 100% CAPACITY FOR NO LESS THAN 8 HOURS.

A DETAILED FACTORY ACCEPTANCE TEST (FAT) PROCEDURE WILL BE SUBMITTED FOR ACCEPTANCE. FAT IS TO INCLUDE ALL ASSOCIATED ONGOING TEST DOCUMENTATION.

ALL TESTING TO BE DONE AT MANUFACTURERS FACILITY PRIOR TO SHIPPING THE UNIT. THE CUSTOMER WILL BE INVITED TO WITNESS THIS TESTING. TEST RESULTS WILL BE MADE AVAILABLE.

PART 6 DOCUMENTATION AND SUPPORT

6.01 DRAWINGS

ALL DRAWINGS SHALL BE CAD PRODUCED AND "B" SIZED (11"x17") ALL DRAWINGS TO BE INCLUDED IN THE OPERATION AND MAINTENANCE MANUALS.

A COMPLETE ENGINEERING PACKAGE SHALL BE SUBMITTED THAT CONSISTS OF A PROCESS AND INSTRUMENT DIAGRAM (P & ID), ELECTRICAL DRAWINGS AND MECHANICAL DRAWINGS.

6.02 MANUALS

FORMAL OPERATION AND MAINTENANCE MANUALS SHALL BE COMPILED AND SUBMITTED PRIOR TO COMMENCING CONSTRUCTION OF THE SYSTEM. THE MANUALS SHALL CONTAIN THE FOLLOWING SECTIONS:

TITLE PAGE DISPLAYING PERTINENT INFORMATION SUCH AS JOB NUMBER, MANUFACTURER CONTACT, AND PHONE NUMBER ETC.

PRECAUTION AND WARNINGS ALERTING THE USER TO POTENTIAL HAZARDS AS DEFINED BY OSHA.

DETAILED SEQUENCE OF OPERATION EXPLAINING, IN DETAIL, HOW THE SYSTEM WORKS AND HOW IT HANDLES VARIOUS SCENARIOS.

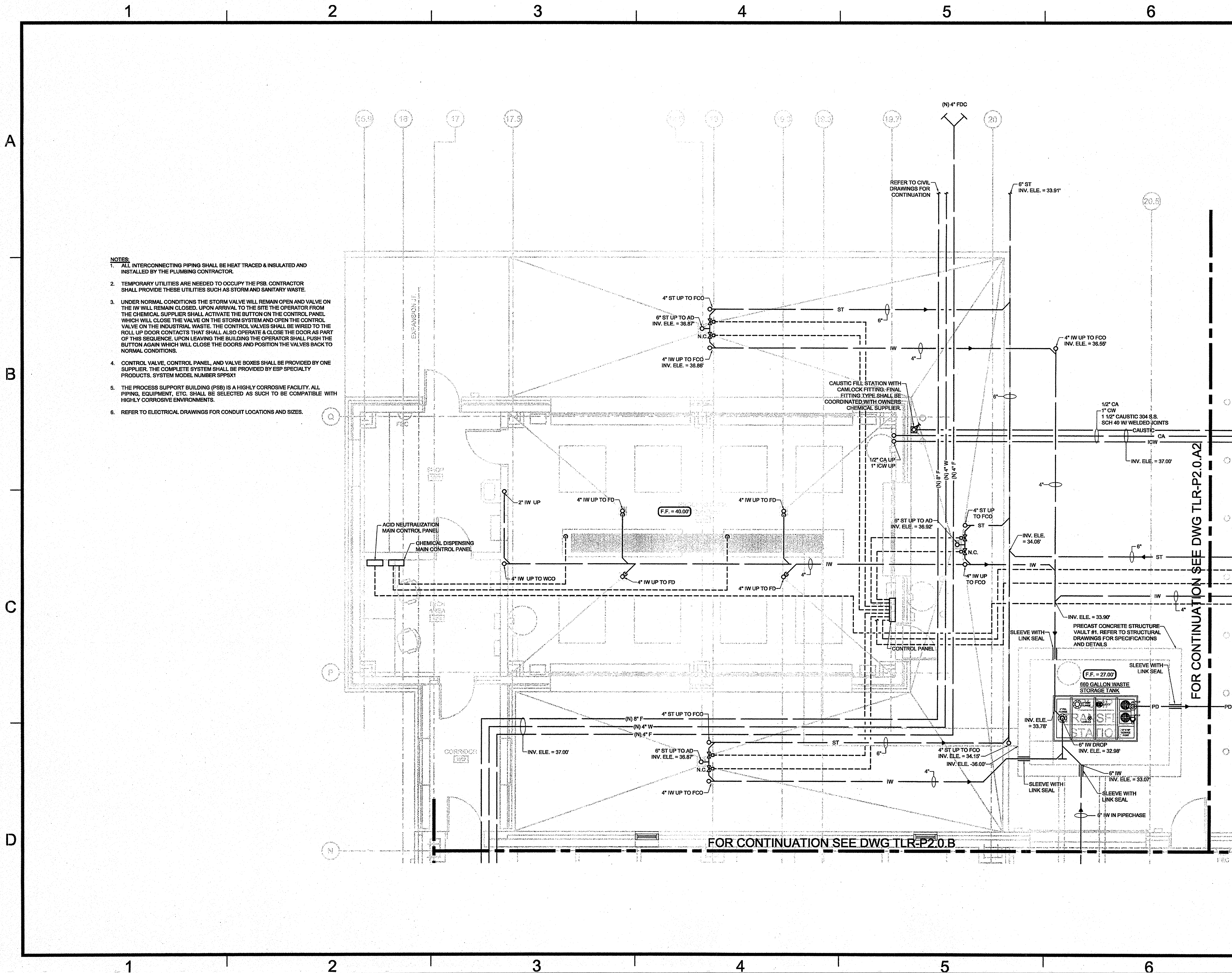
INSTALLATION GUIDELINES IN SUFFICIENT DETAILS AS TO PRECLUDE THE NECESSITY OF A MANUFACTURERS REPRESENTATIVE DURING INSTALL. DRAWINGS SHALL BE INCLUDED IN THE BOOK WHICH HIGHLIGHTS THE LOCATION OF ALL MAJOR COMPONENTS AS WELL AS INLET AND OUTLET PIPING CONNECTIONS.

CONTROL SYSTEM DESCRIPTION AND INSTRUCTIONS. THIS SHOULD FULLY EXPLAIN THE USE OF ALL VARIABLES AND PARAMETERS THAT ARE USER CONFIGURABLE. SHOULD INCLUDE CHARTS AND CHECKLISTS AS WELL AS SAMPLE PROGRAM SHEETS.

CALIBRATION AND MAINTENANCE SECTION SHOULD FULLY EXPLAIN THE REQUIRED PERIODIC CALIBRATION AND MAINTENANCE REQUIRED TO OPERATE THE MACHINE. RECOMMENDED SPARE PARTS LIST SHALL BE INCLUDED.

DETAILED MECHANICAL SECTION SHOWING A MECHANICAL BILL OF MATERIAL. THIS SECTION IS TO ALSO INCLUDE THE INDIVIDUAL OPERATION BOOKS FROM THE MANUFACTURERS USED ON ALL OF THE EQUIPMENT WITHIN THE SYSTEM.

DETAILED ELECTRICAL SECTION SHOWING A ELECTRICAL BILL OF MATERIAL. THIS SECTION IS TO ALSO INCLUDE THE INDIVIDUAL OPERATION BOOKS FROM THE MANUFACTURERS USED ON ALL OF THE EQUIPMENT WITHIN THE SYSTEM.

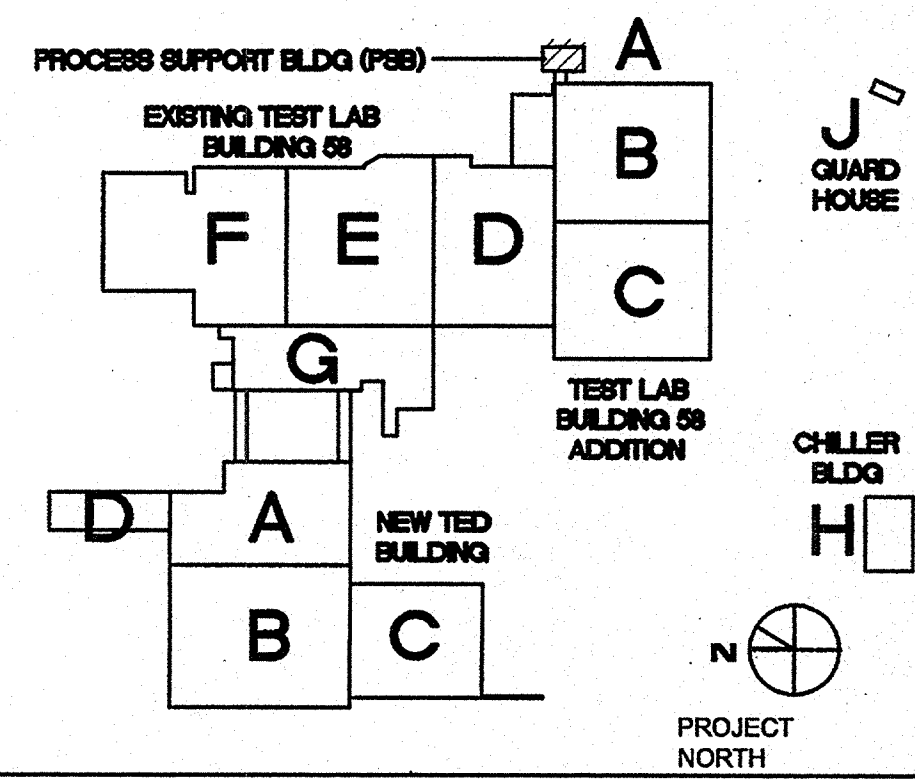


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COMMONWEALTH OF VIRGINIA

ERIC DREW JOESTEN
Lic. No. 046693

PROFESSIONAL ENGINEER



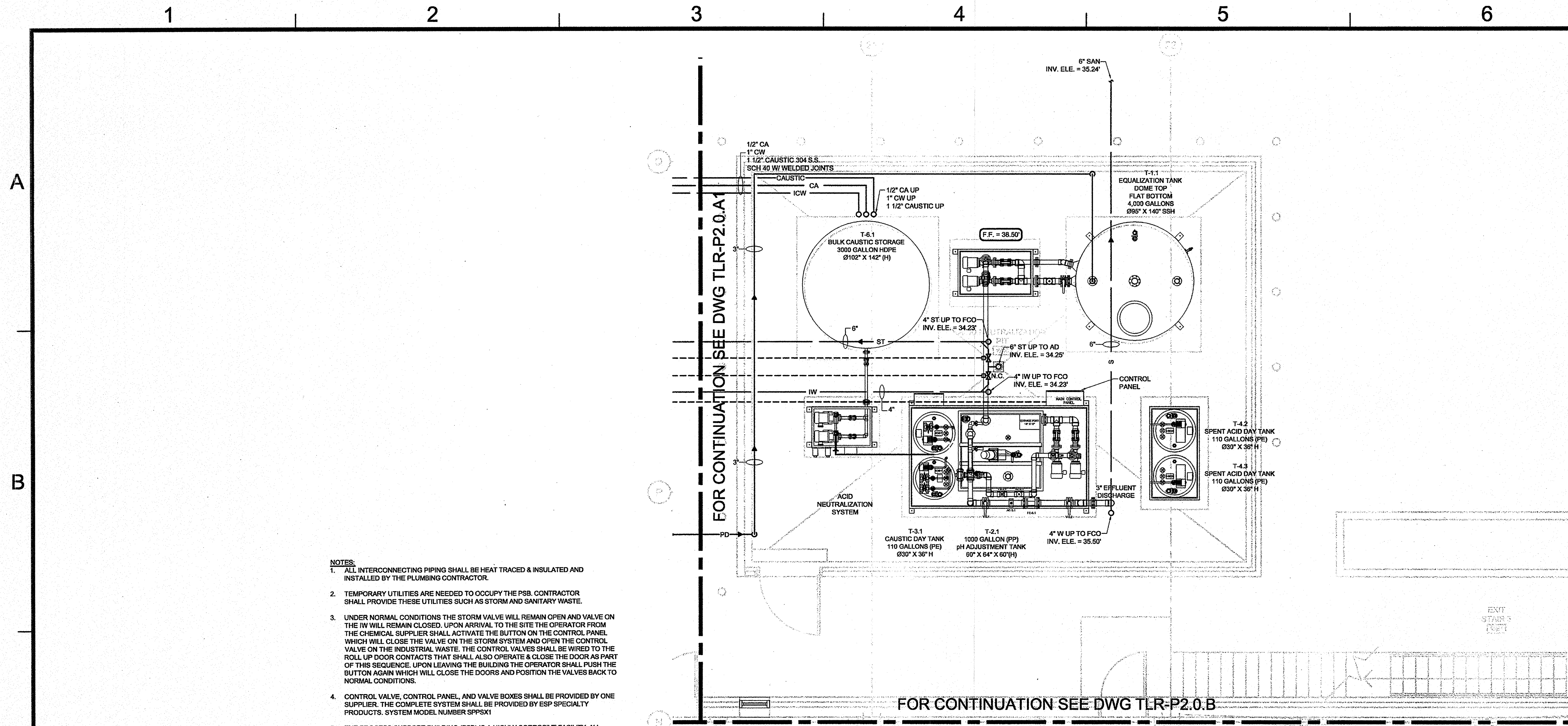
TECHNICAL ENGINEERING & DEVELOPMENT FACILITY (TEDF)
12000 JEFFERSON AVENUE, NEWPORT NEWS, VIRGINIA 23606

REV	ZONE	DESCRIPTION	APPR.	DATE

FACILITY USERS		FACILITIES & LOGISTICS	
APPROVED	DATE	DESIGNER	DATE
APPROVED		JLC	6.19.09
APPROVED		DRAWN	
APPROVED		JLC	6.19.09
APPROVED		CHECKED	
APPROVED		FA	6.19.09
APPROVED		APPROVED	

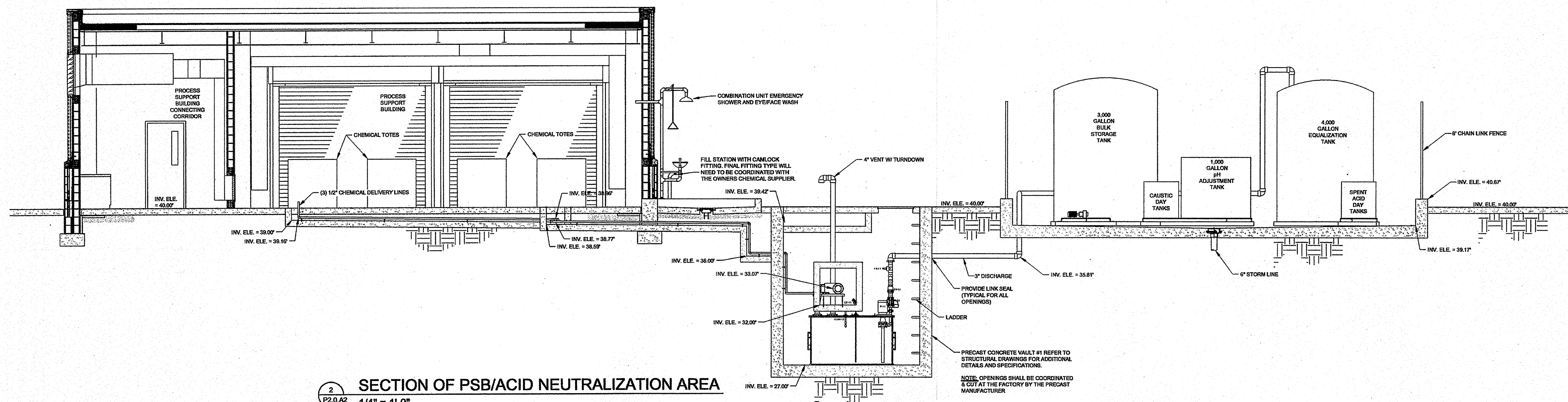
TITLE:
UNDERGROUND - NEW WORK -
WASTE, VENT, & STORM PIPING - SEGMENT A1

SCALE	DRAWING NUMBER	SHEET	REV
1/4" = 1'-0"	100011-132-P4-SITE	TLR-P2.0.A1	



- NOTES:
1. ALL INTERCONNECTING PIPING SHALL BE HEAT TRACED & INSULATED AND INSTALLED BY THE PLUMBING CONTRACTOR.
 2. TEMPORARY UTILITIES ARE NEEDED TO OCCUPY THE PSB. CONTRACTOR SHALL PROVIDE THESE UTILITIES SUCH AS STORM AND SANITARY WASTE.
 3. UNDER NORMAL CONDITIONS THE STORM VALVE WILL REMAIN OPEN AND VALVE ON THE IW WILL REMAIN CLOSED. UPON ARRIVAL TO THE SITE THE OPERATOR FROM THE CHEMICAL SUPPLIER SHALL ACTIVATE THE BUTTON ON THE CONTROL PANEL WHICH WILL CLOSE THE VALVE ON THE STORM SYSTEM AND OPEN THE CONTROL VALVE ON THE INDUSTRIAL WASTE. THE CONTROL VALVES SHALL BE WIRED TO THE ROLL UP DOOR CONTACTS THAT SHALL ALSO OPERATE & CLOSE THE DOOR AS PART OF THIS SEQUENCE. UPON LEAVING THE BUILDING THE OPERATOR SHALL PUSH THE BUTTON AGAIN WHICH WILL CLOSE THE DOORS AND POSITION THE VALVES BACK TO NORMAL CONDITIONS.
 4. CONTROL VALVE, CONTROL PANEL, AND VALVE BOXES SHALL BE PROVIDED BY ONE SUPPLIER. THE COMPLETE SYSTEM SHALL BE PROVIDED BY ESP SPECIALTY PRODUCTS. SYSTEM MODEL NUMBER SPPSX1
 5. THE PROCESS SUPPORT BUILDING (PSB) IS A HIGHLY CORROSIVE FACILITY. ALL PIPING, EQUIPMENT, ETC. SHALL BE SELECTED AS SUCH TO BE COMPATIBLE WITH HIGHLY CORROSIVE ENVIRONMENTS.
 6. REFER TO ELECTRICAL DRAWINGS FOR CONDUIT LOCATIONS AND SIZES.

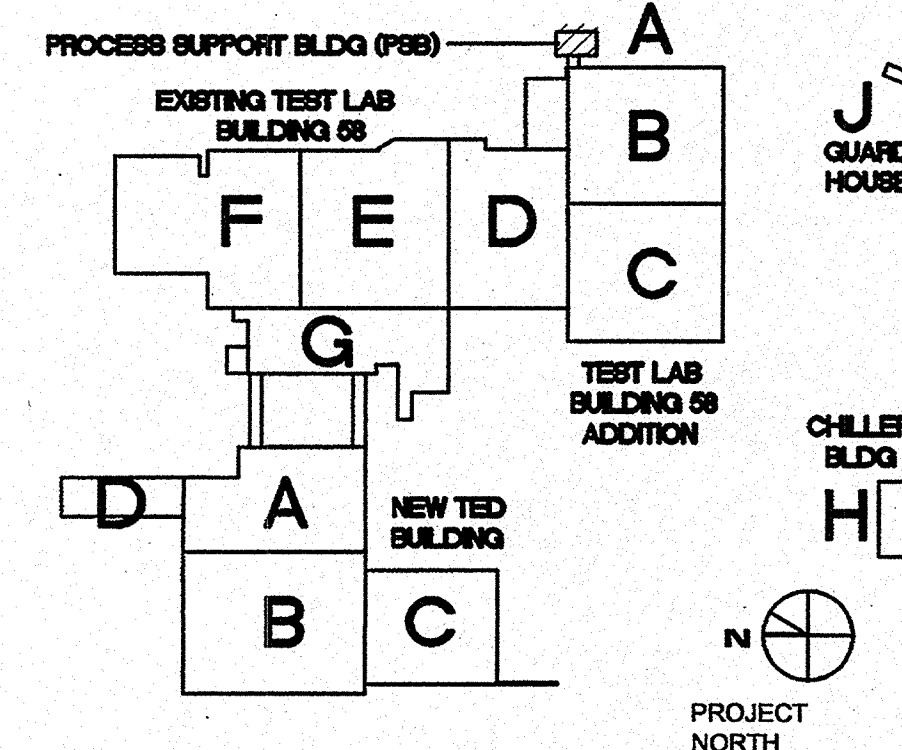
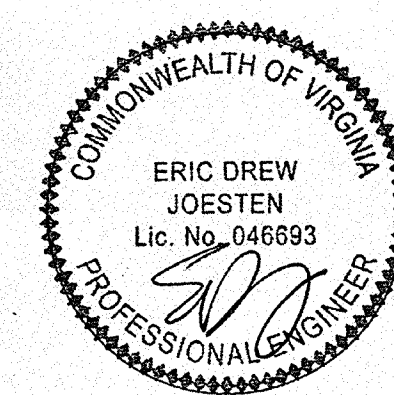
1
P2.0.A2
ACID NEUTRALIZATION PART PLAN
1/4" = 1'-0"



2
P2.0.A2
SECTION OF PSB/ACID NEUTRALIZATION AREA
1/4" = 1'-0"

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TECHNICAL ENGINEERING & DEVELOPMENT FACILITY (TEDF)

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REV	ZONE	DESCRIPTION	APPR.	DATE

REVISIONS			
FACILITY USERS		FACILITIES & LOGISTICS	
APPROVED	DATE	DESIGNER	DATE
APPROVED		JLC	6.19.09
APPROVED		DRAWN	6.19.09
APPROVED		JLC	6.19.09
APPROVED		CHECKED	6.19.09
APPROVED		FA	6.19.09
APPROVED		APPROVED	

Jefferson Lab

TITLE:
UNDERGROUND - NEW WORK - WASTE, VENT, & STORM PIPING - SEGMENT A2

SCALE	DRAWING NUMBER	SHEET	REV
1/4" = 1'-0"	100011-133-P5-STE	TLR-P2.0.A2	

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Philadelphia, PA 19106-1590
Tel: 215-923-2020 Fax: 215-574-0952

NOTES

1. THE FOLLOWING ITEMS ARE PROVIDED BY PAR-KUT AND SHIPPED LOOSE. ITEMS ARE FIELD INSTALLED BY CONTRACTOR. CONTRACTOR TO SUPPLY PLUMBING COMPONENTS TO MAKE A FULLY FUNCTIONAL SYSTEM AND MAKE FINAL CONNECTION TO EQUIPMENT.

A. LAVATORY
B. WATER CLOSET
C. WATER HEATER - POINT-OF-USE

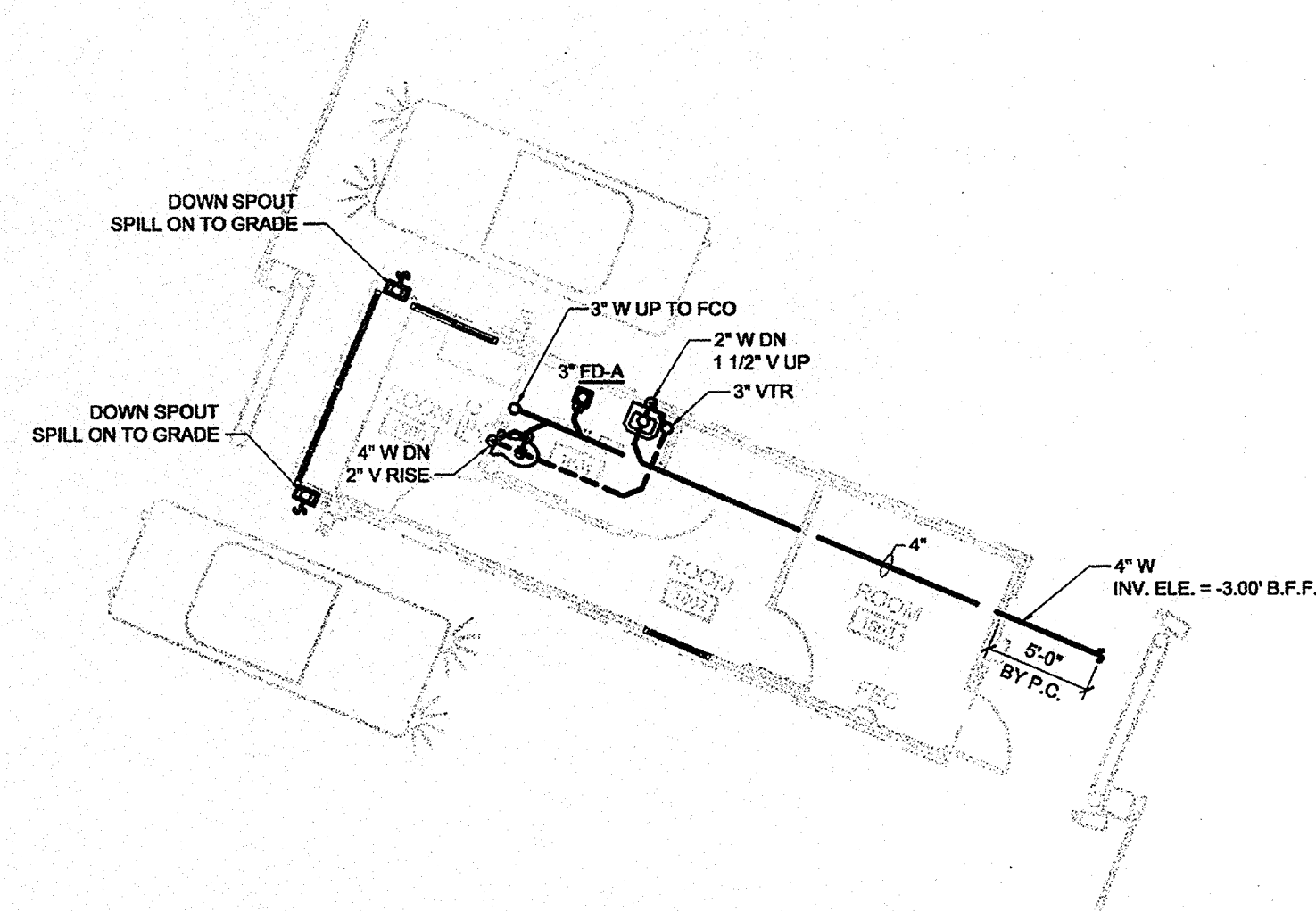
2. DESIGN DATA TABLE

SYSTEM : DOMESTIC WATER
DESIGN WORKING PRESSURE: 60 PSIG
DESIGN WORKING TEMPERATURE : AMBIENT F MAX.
SYSTEM FLUID : WATER
DESIGN CODE : ASME/ANSI 831.9
FLUID CATEGORY : NOT APPLICABLE TO THIS CODE
PIPING MATERIAL : COPPER TYPE L
PIPING COMPONENTS : FITTINGS
JOINTS : SOLDERED
FABRICATION ORGANIZATION : TBD
DESIGN ORGANIZATION : EWING COLE
JOINT EXAMINATION REQUIREMENTS : VISUAL EXAM
TESTING REQUIREMENTS : HYDROSTATIC TO 1.5 TIMES

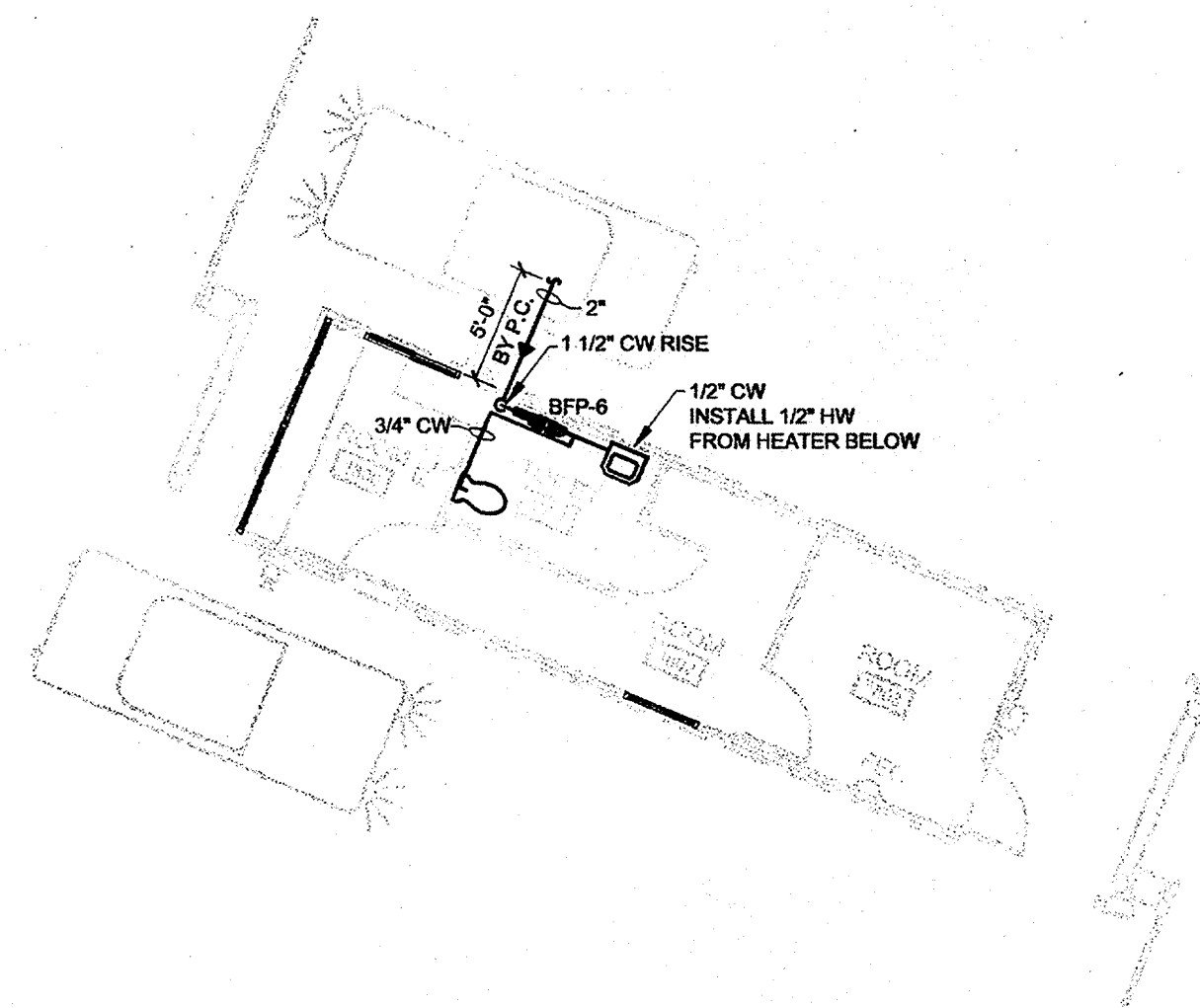
3. SEE SPECIFICATION SHEET FOR PIPE MATERIAL AND INSTALLATION REQUIREMENTS.

NOTE :

THE WORKING PRESSURE IN ACCORDANCE WITH DESIGN
CODE FABRICATOR NAME TO BE COMPLETED BY CONTRACTOR

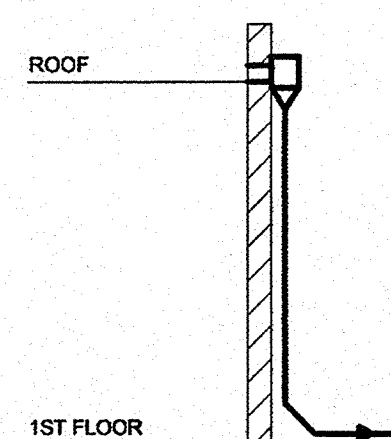


1 NEW WORK - WASTE, VENT & STORM PIPING
P2.0.J SCALE: 1/8"= 1'-0"



2
P2.0.J

NEW WORK - PRESSURE SERVICE PIPING
SCALE: 1/8"= 1'-0"



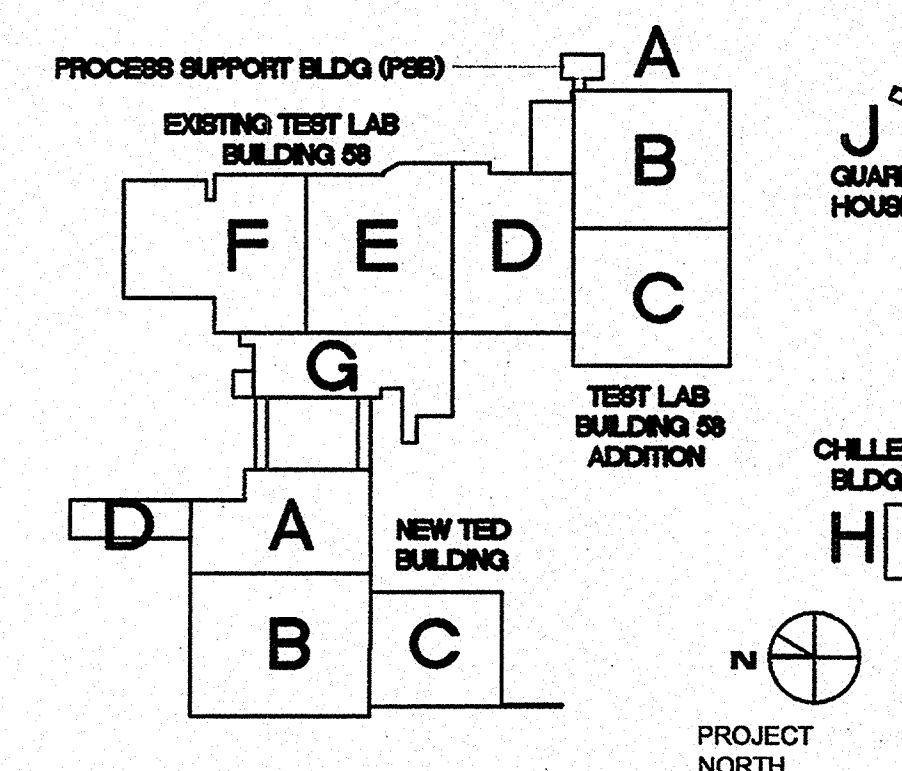
3
P2.0.J

STORM WATER RISER DIAGRAM

SCALE: NONE

DRAIN SCHEDULE						
SYMBOL	TYPE	MANUFACTURER	BASIS OF DESIGN	OUTLET	LOCATION	REMARKS
FD-A	FLOOR DRAIN	JR SMITH	2010 / 2005	3"	TOILET ROOMS	WITH TRAP PRIMER CONNECTION

BACKFLOW PREVENTER SCHEDULE						
SYMBOL	DESCRIPTION	LOCATION	SIZE	PRESSURE DROP	BASIS OF DESIGN	REMARKS
BFP-6	BACKFLOW PREVENTOR	PLUMB 1803	1 1/2"	10 PSI	WATTS 909M1-QTS	PIPE DISCHARGE TO FLOOR DRAIN



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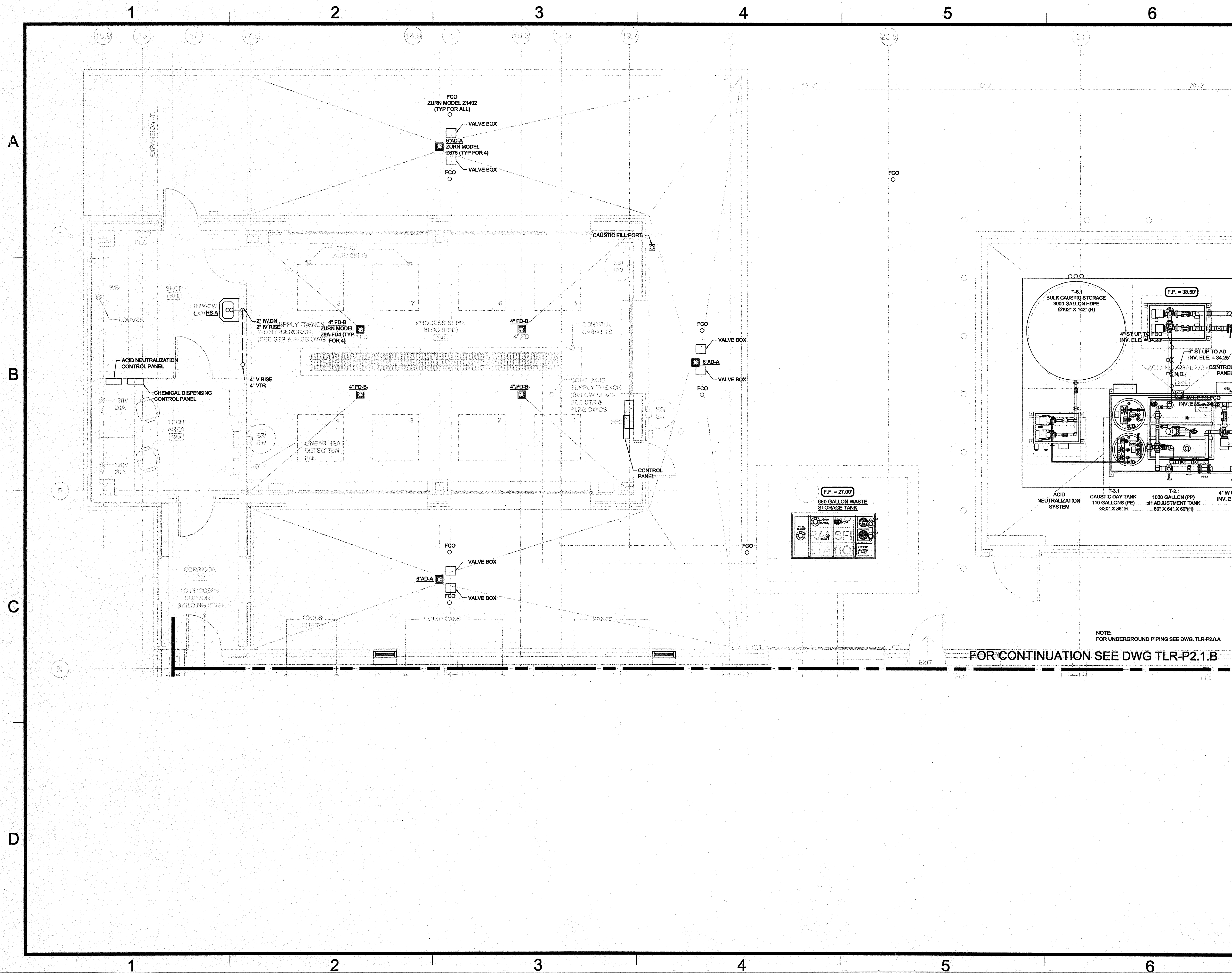
REVISIONS

FACILITY USERS		FACILITIES & LOGISTICS	
APPROVED	DATE	DESIGNER JLC	DATE 6.19.09
APPROVED		DRAWN JLC	6.19.09
APPROVED		CHECKED FA	6.19.09
APPROVED		APPROVED	

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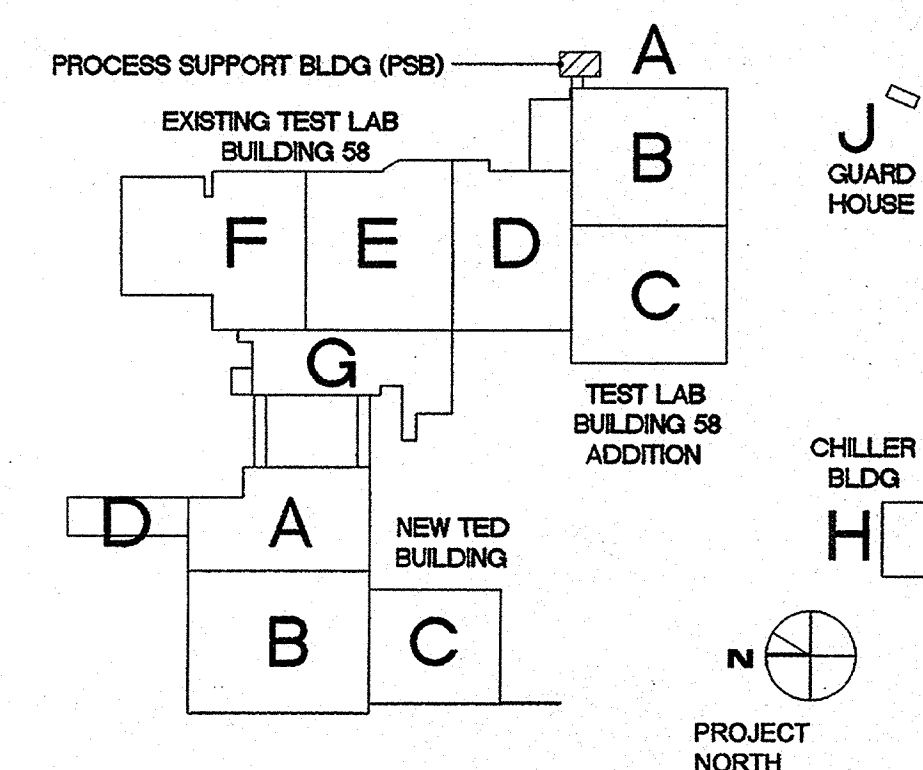
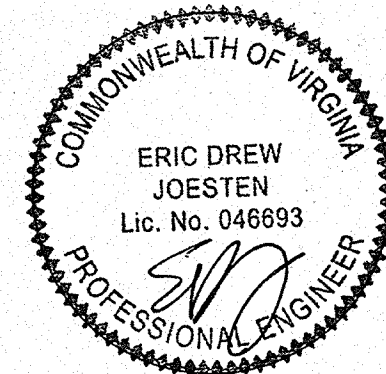
TITLE: NEW WORK- WASTE AND PRESSURE
SERVICE PIPING - AREA J

SCALE	DRAWING NUMBER	SHEET	REV
1/8" = 1'-0"	-	TLR-P-20J	



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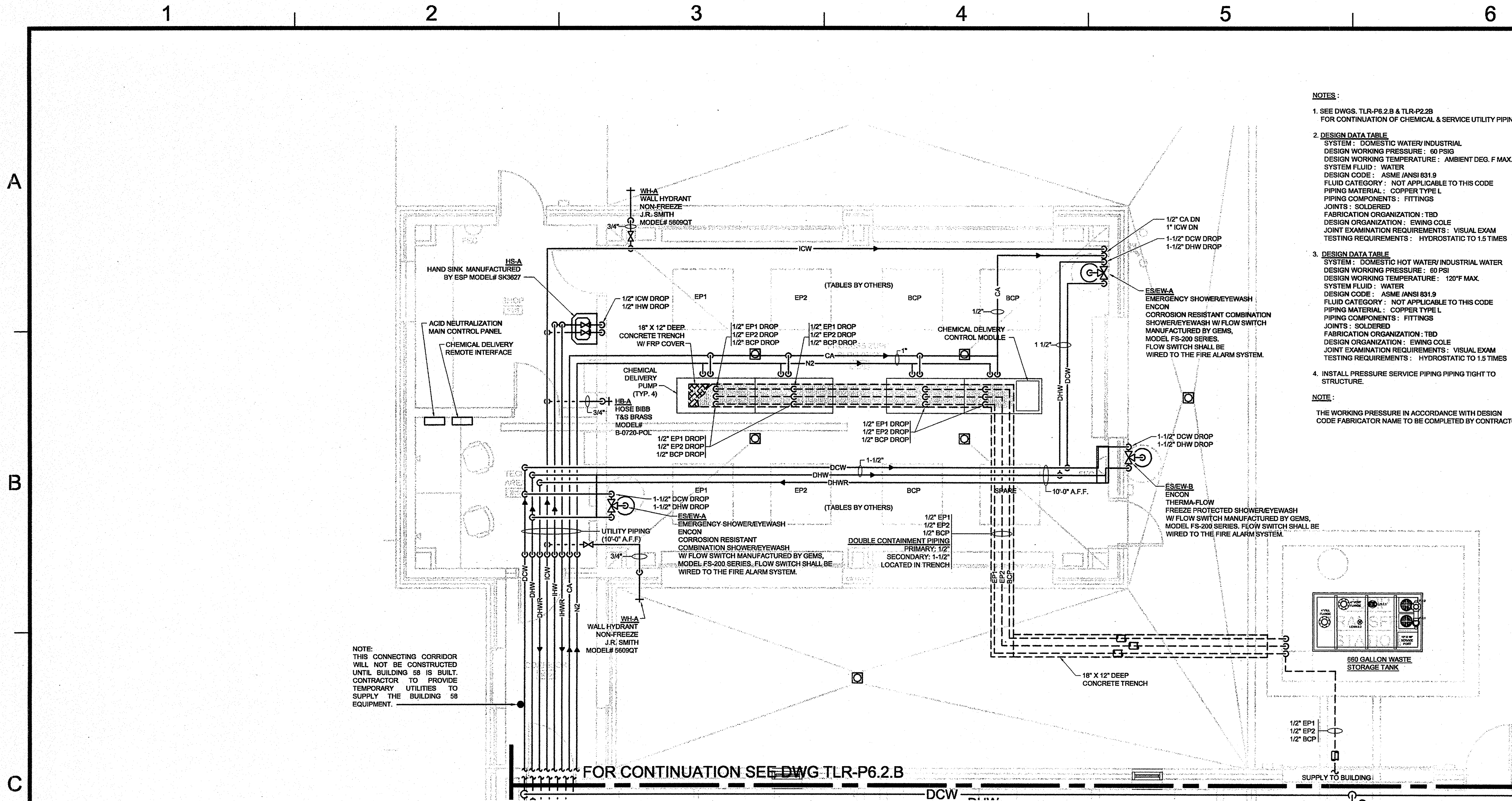
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APPROVED		APPROVED	

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TITLE: FIRST FLOOR - NEW WORK -
WASTE, VENT, & STORM PIPING - SEGMENT A

SCALE	DRAWING NUMBER	SHEET	REV
1/4" = 1'-0"	100011-135-P7-STE	TLR-P2.1A	



NOTES:

1. SEE DWGS. TLR-P6.2.B & TLR-P2.2.B FOR CONTINUATION OF CHEMICAL & SERVICE UTILITY PIPING.
2. DESIGN DATA TABLE
- SYSTEM: DOMESTIC WATER/INDUSTRIAL
- DESIGN WORKING PRESSURE: 60 PSIG
- DESIGN WORKING TEMPERATURE: AMBIENT DEG. F MAX.
- SYSTEM FLUID: WATER
- DESIGN CODE: ASME (ANSI 831.9)
- FLUID CATEGORY: NOT APPLICABLE TO THIS CODE
- PIPING MATERIAL: COPPER TYPE L
- PIPING COMPONENTS: FITTINGS
- JOINTS: SOLDERED
- FABRICATION ORGANIZATION: TBD
- DESIGN ORGANIZATION: EWING COLE
- JOINT EXAMINATION REQUIREMENTS: VISUAL EXAM
- TESTING REQUIREMENTS: HYDROSTATIC TO 1.5 TIMES

3. DESIGN DATA TABLE
- SYSTEM: DOMESTIC HOT WATER/INDUSTRIAL WATER
- DESIGN WORKING PRESSURE: 60 PSI
- DESIGN WORKING TEMPERATURE: 120°F MAX.
- SYSTEM FLUID: WATER
- DESIGN CODE: ASME (ANSI 831.9)
- FLUID CATEGORY: NOT APPLICABLE TO THIS CODE
- PIPING MATERIAL: COPPER TYPE L
- PIPING COMPONENTS: FITTINGS
- JOINTS: SOLDERED
- FABRICATION ORGANIZATION: TBD
- DESIGN ORGANIZATION: EWING COLE
- JOINT EXAMINATION REQUIREMENTS: VISUAL EXAM
- TESTING REQUIREMENTS: HYDROSTATIC TO 1.5 TIMES

NOTE:

THE WORKING PRESSURE IN ACCORDANCE WITH DESIGN CODE FABRICATOR NAME TO BE COMPLETED BY CONTRACTOR.

NOTES:

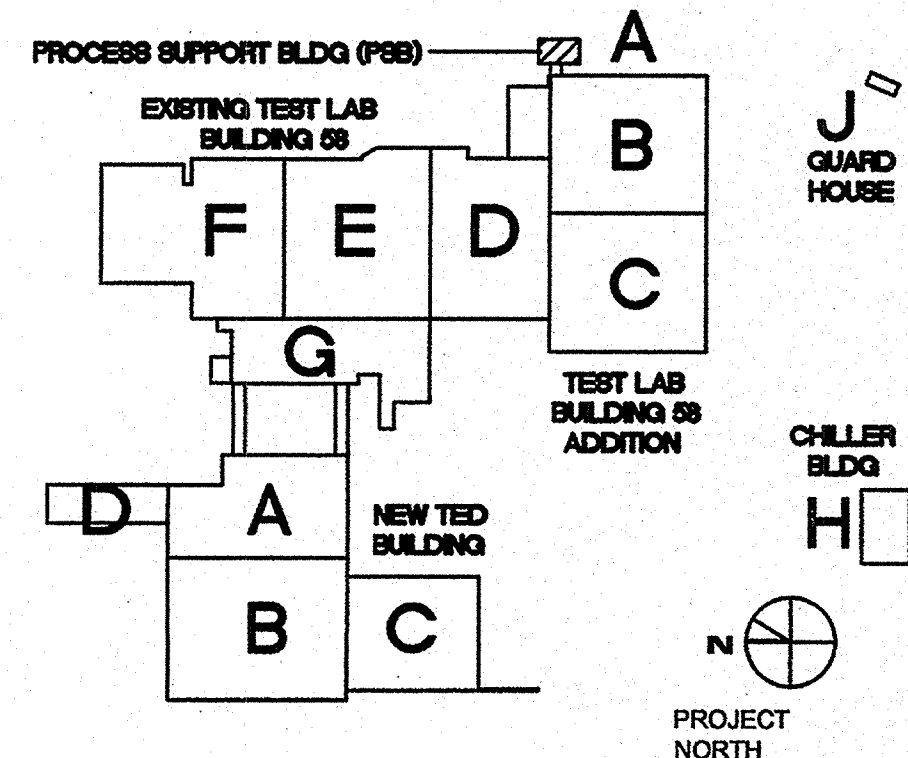
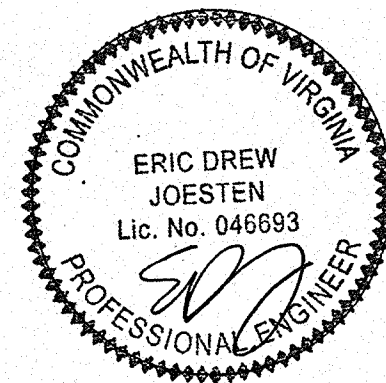
1. TEMPORARY UTILITIES ARE NEEDED TO OCCUPY THE PSB. THE CONTRACTOR SHALL PROVIDE THESE UTILITIES TO MAKE THE PSB A FULLY OPERATIONAL FACILITY. (SEE DRAWING)
2. THE CHEMICAL SUPPLY LINES SHOWN ARE INSTALLED WHEN BUILDING 58 IS FULLY CONSTRUCTED. THE CONTRACTOR SHALL PROVIDE TEMPORARY ROUTING OF THE CHEMICAL DELIVERY SUPPLY LINES TO PROVIDE CHEMICALS TO THE EXISTING SUPPORT SPACES. CONTRACTOR SHALL PROVIDE TEMPORARY HEAT TRACING, INSULATION, CONDUIT, ETC. TO MAKE THE TEMPORARY CHEMICAL SUPPLY A COMPLETE AND FULLY OPERATIONAL SYSTEM.
3. THE PROCESS SUPPORT BUILDING (PSB) IS A HIGHLY CORROSIVE FACILITY. ALL PIPING, EQUIPMENT, ETC. SHALL BE SELECTED AS SUCH TO BE COMPATIBLE WITH HIGHLY CORROSIVE ENVIRONMENTS.

HEAT TRACE

1. PROVIDE ELECTRICAL HEAT-TRACING WHERE INDICATED ON DRAWINGS. HEAT TRACE SHALL BE SIZED FOR 3WFT., 277V. SYSTEM SHALL BE EQUIPPED WITH A TEMP SENSOR / CONTROLLER THAT SHALL BE ADJUSTABLE AND HAVE THE ABILITY TO SET THE TEMPERATURE TO AVOID OVER HEATING OF THE SYSTEM. COORDINATE CONNECTION AND TERMINATION POINTS WITH THE ELECTRICAL DRAWINGS AND ELECTRICAL CONTRACTOR.

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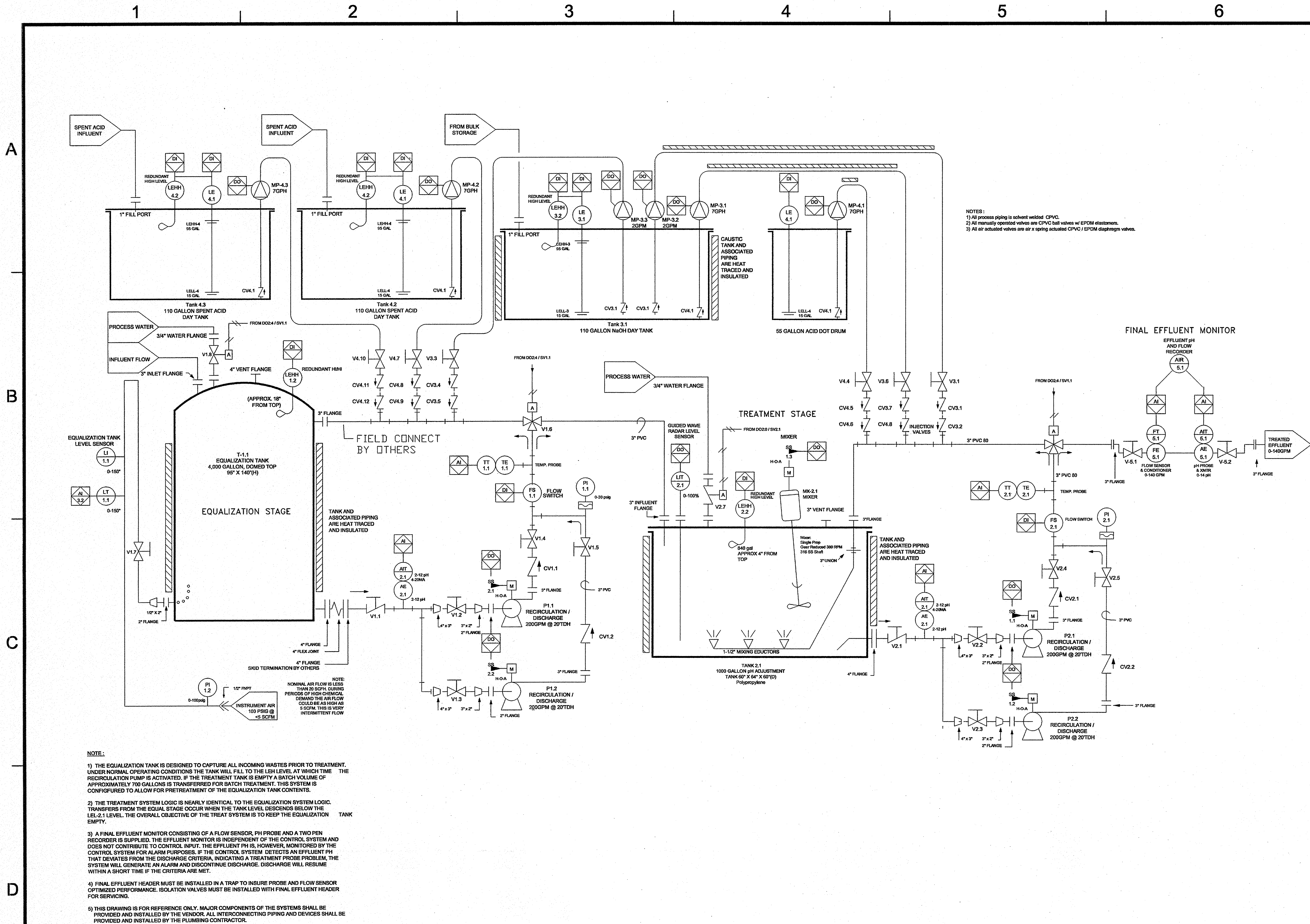
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APPROVED		FA	6.19.09
APPROVED		APPROVED	

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TITLE: FIRST FLOOR - NEW WORK -
PRESSURE SERVICE PIPING - SEGMENT A

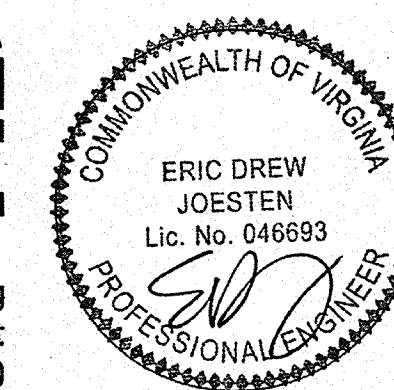
SCALE	DRAWING NUMBER	SHEET	REV
1/4" = 1'-0"	100011-138-P6-SITE	TLR-P2.2.A	



- NOTE:
- 1) THE EQUALIZATION TANK IS DESIGNED TO CAPTURE ALL INCOMING WASTES PRIOR TO TREATMENT. UNDER NORMAL OPERATING CONDITIONS THE TANK WILL FILL TO THE LEH LEVEL AT WHICH TIME THE RECIRCULATION PUMP IS ACTIVATED. IF THE TREATMENT TANK IS EMPTY A BATCH VOLUME OF APPROXIMATELY 700 GALLONS IS TRANSFERRED FOR BATCH TREATMENT. THIS SYSTEM IS CONFIGURED TO ALLOW FOR PRETREATMENT OF THE EQUALIZATION TANK CONTENTS.
 - 2) THE TREATMENT SYSTEM LOGIC IS NEARLY IDENTICAL TO THE EQUALIZATION SYSTEM LOGIC. TRANSFERS FROM THE EQUAL STAGE OCCUR WHEN THE TANK LEVEL DESCENDS BELOW THE LEH-2.1 LEVEL. THE OVERALL OBJECTIVE OF THE TREAT SYSTEM IS TO KEEP THE EQUALIZATION TANK EMPTY.
 - 3) A FINAL EFFLUENT MONITOR CONSISTING OF A FLOW SENSOR, PH PROBE AND A TWO PEN RECORDER IS SUPPLIED. THE EFFLUENT MONITOR IS INDEPENDENT OF THE CONTROL SYSTEM AND DOES NOT CONTRIBUTE TO CONTROL INPUT. THE EFFLUENT PH IS, HOWEVER, MONITORED BY THE CONTROL SYSTEM FOR ALARM PURPOSES. IF THE CONTROL SYSTEM DETECTS AN EFFLUENT PH THAT DEVIATES FROM THE DISCHARGE CRITERIA, INDICATING A TREATMENT PROBE PROBLEM, THE SYSTEM WILL GENERATE AN ALARM AND DISCONTINUE DISCHARGE. DISCHARGE WILL RESUME WITHIN A SHORT TIME IF THE CRITERIA ARE MET.
 - 4) FINAL EFFLUENT HEADER MUST BE INSTALLED IN A TRAP TO INSURE PROBE AND FLOW SENSOR OPTIMIZED PERFORMANCE. ISOLATION VALVES MUST BE INSTALLED WITH FINAL EFFLUENT HEADER FOR SERVICING.
 - 5) THIS DRAWING IS FOR REFERENCE ONLY. MAJOR COMPONENTS OF THE SYSTEMS SHALL BE PROVIDED AND INSTALLED BY THE VENDOR. ALL INTERCONNECTING PIPING AND DEVICES SHALL BE PROVIDED AND INSTALLED BY THE PLUMBING CONTRACTOR.

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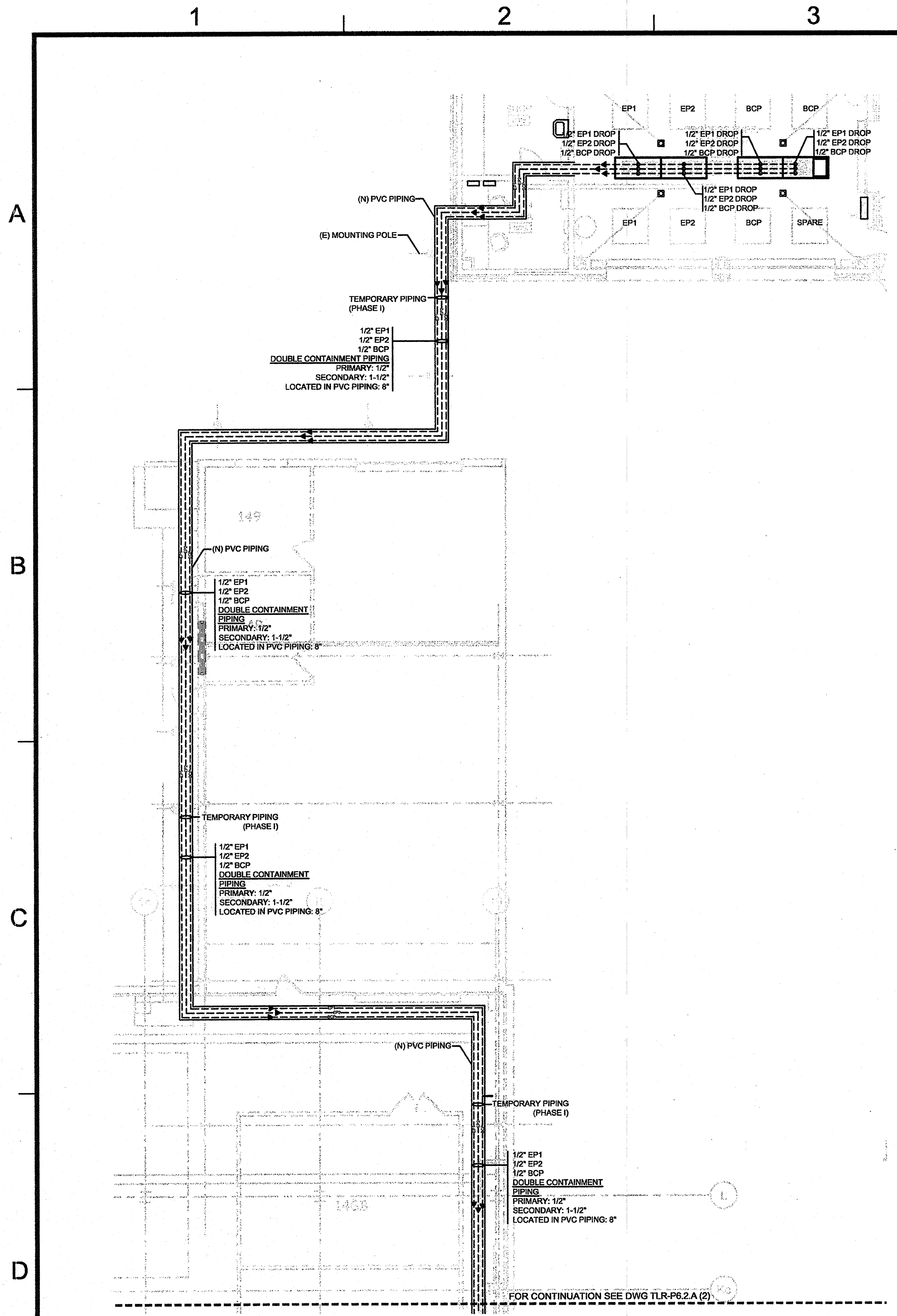
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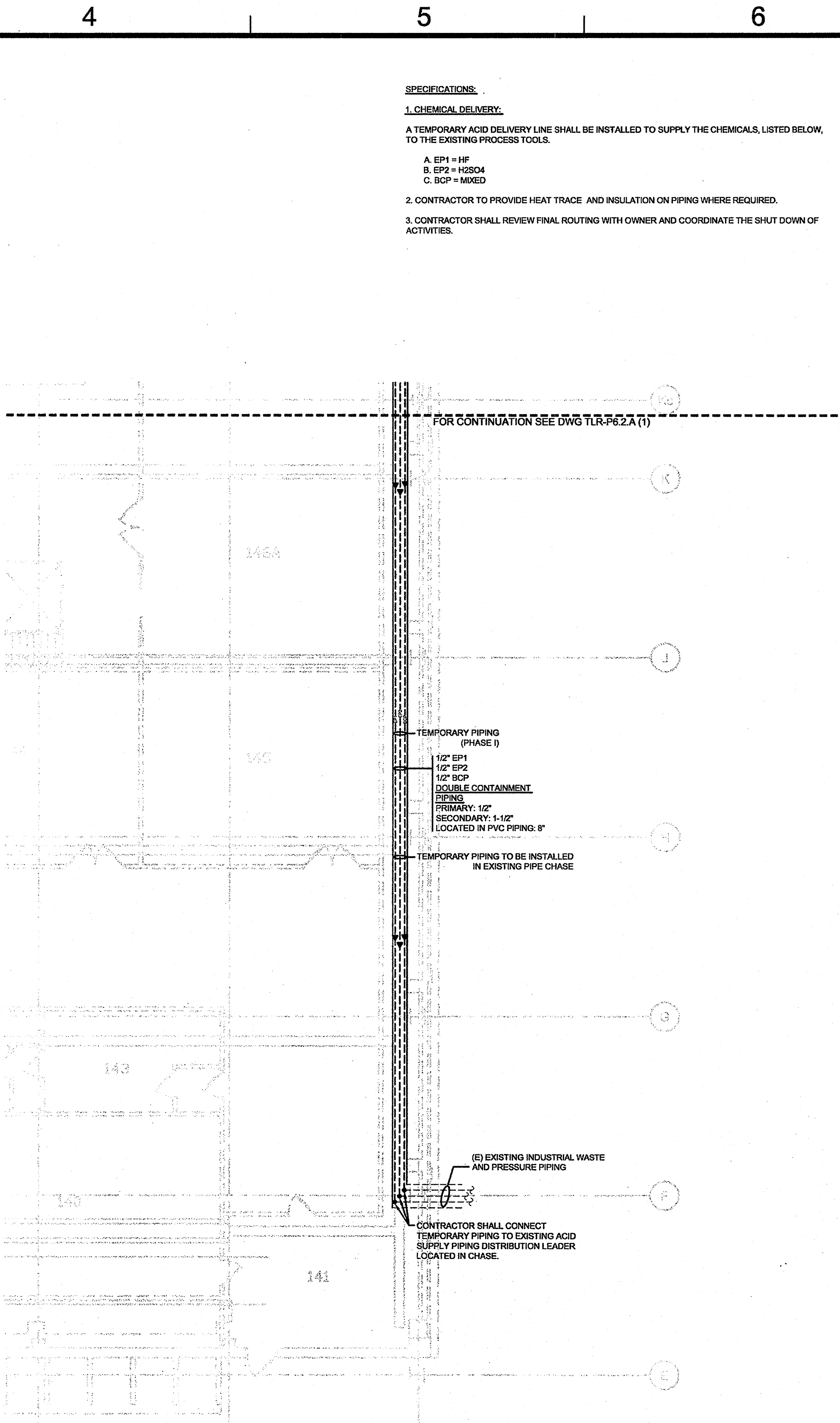
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TITLE:
**ACID NEUTRALIZATION SYSTEM
SCHEMATIC**

SCALE	DRAWING NUMBER	SHEET	REV
NTS	100011-138-P10-STE	P5.11	



1 PROCESS SUPPORT BUILDING - TEMPORARY WORK - PRESSURE SERVICE PIPING
P6.2.A SCALE: 1/8" = 1'-0"



2 PROCESS SUPPORT BUILDING - TEMPORARY WORK - PRESSURE SERVICE PIPING
P6.2.A SCALE: 1/8" = 1'-0"

SPECIFICATIONS:

1. CHEMICAL DELIVERY:

A TEMPORARY ACID DELIVERY LINE SHALL BE INSTALLED TO SUPPLY THE CHEMICALS, LISTED BELOW, TO THE EXISTING PROCESS TOOLS.

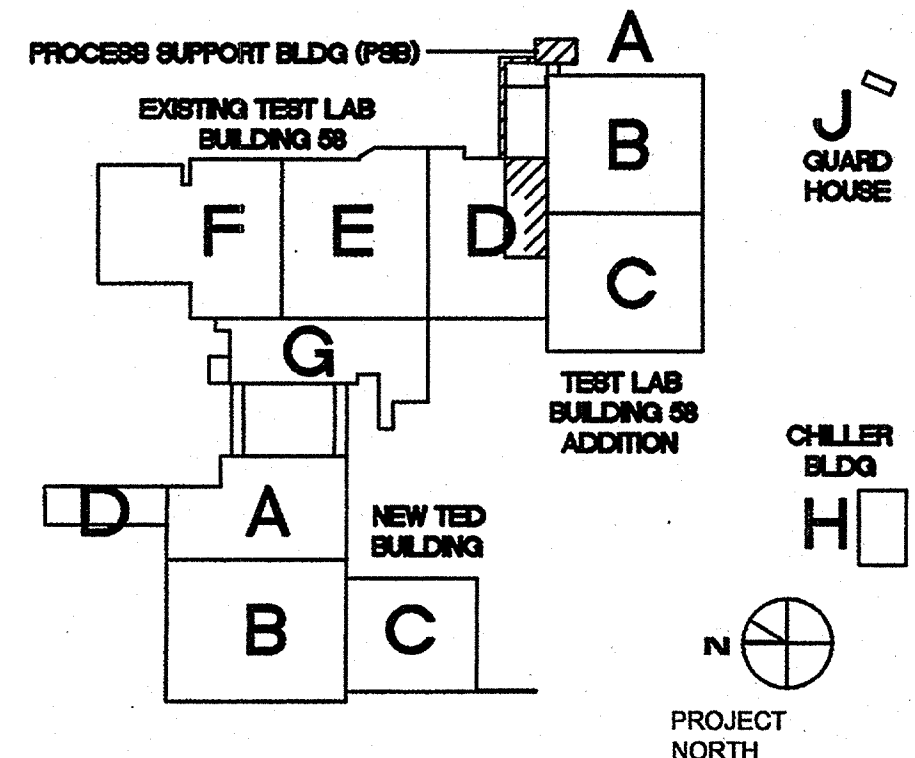
- A. EP1 = HF
- B. EP2 = H2SO4
- C. BCP = MIXED

2. CONTRACTOR TO PROVIDE HEAT TRACE AND INSULATION ON PIPING WHERE REQUIRED.

3. CONTRACTOR SHALL REVIEW FINAL ROUTING WITH OWNER AND COORDINATE THE SHUT DOWN OF ACTIVITIES.

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APPROVED		JLC	6.19.09
APPROVED		CHECKED	6.19.09
APPROVED		FA	6.19.09
APPROVED		APPROVED	

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TITLE:
PROCESS SUPPORT BUILDING - TEMPORARY
WORK - PRESSURE SERVICE PIPING

SCALE	DRAWING NUMBER	SHEET	REV
1/8" = 1'-0"	100011-140-P12-SITE	TLR-P6.2.A	