DRAWINGS

ABBREVIATIONS

A	AMMETER, AMPERES, AWNINGS
AB	ANCHOR BOLT, ABOVE
ABDN	ABANDON
AC	ACOUSTICAL, ACOUSTICAL CEILING
AC	ALTERNATING CURRENT
AC	ASPHALTIC CONCRETE
ACFL	ACCESS FLOORING
ACI	AMERICAN CONCRETE INSTITUTE
ACMU	ACOUSTICAL CONCRETE MASONRY UNIT, ACOUSTICAL CMU
ACP	ACOUSTICAL PANELS
ACST	ACOUSTICAL
ACT	ACOUSTICAL TILE
AD	AREA DRAIN
ADDL	ADDITIONAL
ADJ	ADJACENT
ADW	DRY WEATHER AVERAGE
AFD	ADJUSTABLE FREQUENCY DRIVE
AFF	ABOVE FINISHED FLOOR
AFG	ABOVE FINISHED GRADE
AG	ACOUSTICAL, ACOUSTICAL GLASS
AGGR	AGGREGATE
AHR	ANCHOR
AISC	AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AJ	ADJUSTABLE
AL	ALUMINUM
ALKY	ALKALINITY
ALTN	ALTERNATE
AM	AUTO-MANUAL
AMRD	ACOUSTICAL METAL ROOF DECKING
ANDZ	ANODIZE
APPROX	APPROXIMATE
APVD	APPROVED
ARCH	ARCHITECTURAL
AR	ANALOG RELAY
AS	AS SELECTED
ATS	AUTOMATIC TRANSFER SWITCH
AUTO	AUTOMATIC
AUX	AUXILIARY
AVG	AVERAGE
AWW	WET WEATHER AVERAGE
@	AT
B	BELL
BAL	BALANCE
BETW	BETWEEN
BF	BLIND FLANGE, BOTTOM FACE
BFV	BUTTERFLY VALVE
BL	BASELINE
BFP	BACKFLOW PREVENTER
BLDG	BUILDING
BLK	BLOCK
BM	BEAM, BENCHMARK
BO	BOTTOM OF
B.O.B.	BOTTOM OF BEAM
BOD	BOTTOM OF DUCT
BOP	BOTTOM OF PIPE
BOT	BOTTOM
BRG	BEARING
BRK	BRICK
BRKR	BREAKER
BSP	BLACK STEEL PIPE
BV	BALL VALVE, BLOCK VENT
BVC	BEGINNING OF VERTICAL CURVE
C	CONDUIT, CASEMENT
°C	DEGREE CELSIUS
C TO C	CENTER TO CENTER
CAB	CABINET
CB	CATCH BASIN, CIRCUIT BREAKER
CC	CENTER OF CIRCLE
CC	CONTROL CABLE
CCP	CENTRAL CONTROL PANEL
CCS	CENTRAL CONTROL SYSTEM
CDF	CONTROLLED DENSITY FILL
CE	CONSTRUCTION ENTRANCE
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CHEM	CHEMICAL
CHKD	CHECKERED
CI	CAST IRON
CIP	CAST IRON PIPE, CAST IN PLACE
CIP	CULVERT INLET PROTECTION
CISP	CAST IRON SOIL PIPE
CJ	CONSTRUCTION JOINT
CKT	CIRCUIT
CL	CENTERLINE
CLDI	CEMENT LINED DUCTILE IRON
CLSF	CONTROLLED LOW STRENGTH FILL
CLG	CEILING
CLR	CLEAR, CLEARANCE
CLSM	CONTROLLED LOW STRENGTH MATERIAL
CMP	CENTRAL MONITORING PANEL
CMP	CORRUGATED METAL PIPE
CMU	CONCRETE MASONRY UNIT
CNTR	COUNTER
CO	CLEANOUT, CARBON MONOXIDE
COL	COLUMN, COLOR
CONC	CONCRETE
COND	CONDENSATE
CONDTN	CONDITIONED
CONN	CONNECTION
CONSTR	CONSTRUCTION
CONT	CONTINUED, CONTINUOUS, CONTINUATION
CONTR	CONTRACTOR
COORD	COORDINATE
COP	COPPER
CP	CENTER PIVOT
CP-X	CONTROL PANEL NO. X
CPLG	COUPLING
CPRSR	COMPRESSOR
CPT	CONTROL POWER TRANFORMER, CARPET
CPVC	CHLORINATED PVC
CR	CONTROL RELAY
CRS	COLD ROLLED STEEL
CRS	CONSTRUCTION ROAD STABILIZATION
CT	CERAMIC TILE
CT	CURRENT TRANSFORMER
CTC	COMPUTER TERMINAL CABINET
CTR	CENTER
CTRD	CENTERED
CTSK	COUNTERSUNK
CU	CUBIC
CU FT	CUBIC FOOT
CU IN	CUBIC INCH
CUH	COPPER TUBING, HARD DRAWN
CV	CHECK VALVE
CWR	CABINET DOOR MOUNTED WASTE RECEPTACLE
CY, CU YD	CUBIC YARD
CWS	CLEAN WATER SERVICES
D	DEEP, DRAIN
d	PENNY NAIL SIZE
DA	DUAL ACTION
DAS	DATA ACQUISTION SYSTEM
DBA	DEFORMED BAR ANCHOR
DBL	DOUBLE
DC	DIRECT CURRENT
DEG	DEGREE
DET	DETAIL
DF	DOUGLAS FIR, DRINKING FOUNTAIN
DDI	DROP INLET
DH	DOUBLE HUNG
DI	DUCTILE IRON
DIA	DIAMETER
DIAG	DIAGONAL
DIP	DUCTILE IRON PIPE
DIR	DIRECTION
DISCH	DISCHARGE
DN	DOWN
DO	DISSOLVED OXYGEN
DOL	DIRECT-ON-LINE
DP, DPNL	DISTRIBUTION PANEL
DR	DOOR
DS	DOWNSPOUT
DWG	DRAWING
DWL	DOWEL
△	DELTA
E	EAST, EMPTY
EA	EACH, EXHAUST AIR
EB, EBCT	EMPTY BED CONTACT TIME
ECC	ECCENTRIC
EE	EMERGENCY EYEWASH
EDF	EGG-SHAPED DIGESTER FACILITY
EF	EACH FACE, EXHAUST FAN
EFF	EFFICIENCY, EFFICIENT
EFL	EFFLUENT
EIFS	EXTERIOR INSULATION AND FINISH SYSTEM
EL	ELEVATION
ELB	ELBOW
ELC	ELECTRICAL LOAD CENTER
ELEC	ELECTRICAL, ELECTRICAL
ENGR	ENGINEER
EOP	EDGE OF PAVEMENT
ESC	EROSION AND SEDIMENT CONTROL
EP	EXPLOSION PROOF, EDGE OF PAVING
EQL	EQUAL
EQL SP	EQUALLY SPACED
EQPT	EQUIPMENT
ESC	EROSION AND SEDIMENT CONTROL
ETM	ELAPSED TIME METER
EVC	END OF VERTICAL CURVE
EW	EACH WAY
EWC	ELECTRIC WATER COOLER
EXH	EXHAUST
EXP	EXPANSION, EXPOSED
EXP AB	EXPANSION ANCHOR BOLT
EXP JT	EXPANSION JOINT
EXST, EXIST	EXISTING
EXT	EXTERIOR
°F	DEGREE FAHRENHEIT
FB	FLAT BAR
F, FU	FUSE
F, FX	FIXED
FAP	FIRE ALARM PANEL
FC	FLEXIBLE CONDUIT
FCA	FLANGED COUPLING ADAPTER
FCL2	FREE CHLORINE RESIDUAL
FCO	FLOOR CLEANOUT
FCTY	FACTORY
FD	FLOOR DRAIN
FDN	FOUNDATION
FDR	FEEDER
FEXT	FIRE EXTINGUISHER
FF	FINISHED FLOOR
FG	FINISH GRADE, FLOAT GLASS
FH	FLAT HEAD
FHY	FIRE HYDRANT
FIG	FIGURE
FL	FLOW LINE
FLG	FLANGE
FL	FLOOR
FLEX	FLEXIBLE
FLH	FLAT HEAD
FLTR	FILTER
FLUOR	FLUORESCENT
FNSH	FINISH
FOB	FLAT ON BOTTOM
FOT	FLAT ON TOP
FP	FIELD PANEL
FPM	FEET PER MINUTE
FR	FORWARD REVERSE
FRP	FIBERGLASS REINFORCED PLASTIC
FSHS	FOLDING SHOWER SEAT
FT	FOOT OR FEET
FTG	FOOTING
FU	FIXTURE UNIT
FVNR	FULL VOLTAGE NON-REVERSING
FVR	FULL VOLTAGE REVERSING
FWD	FORWARD
G, GND	GROUND
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GB	GYPSUM BOARD
GC	GROOVED COUPLING
GCMU	GLAZED CONCRETE MASONRY UNITS
GFA	GROOVED FLANGE ADAPTER
GFI	GROUND FAULT INTERRUPTER
GFR	GROUND FAULT RELAY
GH	GREENHOUSE
GL	GLASS
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GPS	GLOBAL POSITION SYSTEM
GRTG	GRATING
GSB	GYPSUM SOFFIT BOARD
GSP	GALVANIZED STEEL PIPE
GV	GATE VALVE
GVL	GRAVEL
GWB	GYPSUM WALLBOARD
GYP	GYPSUM
H	HIGH, HORN OR HOWLER
H2S	HYDROGEN SULFIDE
H.A.S.	HEADED ANCHOR STUD
HC	HOLLOW CORE WOOD
HCL	HYDROCHLORIC ACID
HDNR	HARDENER
HDNS	HARDNESS
HDR	HEADER
HDW	HARDWARE
HGL	HYDRAULIC GRADE LINE
HK	HOOK
HGT	HEIGHT
HH	HANDHOLE
HID	HIGH INTENSITY DISCHARGE
HK	HOOK
HM	HOLLOW METAL
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
HORIZ	HORIZONTAL
HP	HORSEPOWER
HPT	HIGH POINT
HPU	HYDRAULIC POWER UNIT
HR	HOSE RACK, HANDRAIL
HV	HOSE VALVE
HVAC	HEATING, VENTILATING AND AIR CONDITIONING
HWL	HIGH WATER LEVEL
IC	INTERRUPTING CAPACITY
ID	INDUCED DRAFT, INSIDE DIAMETER
IE	INVERT ELEVATION
I.F.	INSIDE FACE
IG	INSULATING, INSULATING GLASS
IN	INCH
INCAND	INCANDESCENT
INFL	INFLUENT
INJS	INJECTIONS
INST	INSTANTANEOUS
INSTM	INSTRUMENT, INSTRUMENTATION
INSUL	INSULATION
INVT	INVERT
IP	INLET PROTECTION, INSTRUMENTATION PANEL
IRRIG	IRRIGATION
ITG	INSULATED TEMPERED GLASS
ITX	ISOLATION TRANSFORMER
IU	INTAKE UNIT
IW	IRRIGATION WELL
J	JALOUSIE
JA	JAL-AWNING
JB	JUNCTION BOX
JAN	JANITOR
JCT	JUNCTION
JT	JOINT
K	KEY GROUP, KEY INTERLOCK
KIP	THOUSAND POUNDS
KIT	KITCHEN
K-PL	KICKPLATE
KSK	KITCHEN SINK
KV	KILOVOLTS
KVA	KILOVOLT AMPERES
KVAR	KILOVOLT AMPERES REACTIVE
KW	KILOWATT
L	ANGLE, LENGTH
LA	LIGHTNING ARRESTER
LAB	LABORATORY
LAM	LAMINATE
LAT	LATITUDE
LB	POUND
LC	LIGHTING CONTACTOR
LD	COMBINATION LOUVER/DAMPER
LDG	LOADING DOCK
LEL	LOWER EXPLOSIVE LIMIT
LF	LINEAR FEET
LG	LONG
LH	LEFT HAND
LHR	LEFT HAND REVERSE
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LNTL	LINTEL
LONG	LONGITUDINAL
LOS	LOCK-OUT STOP PUSHBUTTON
LP	LIGHT POLE, LIGHTING PANEL, LOCAL PANEL
LPT	LOW POINT
LR	LATCHING RELAY
LR	LOCAL-REMOTE
LR	LONG RADIUS
LS	LABORATORY SINK
LT	LEFT
LTG, LTS	LIGHTS OR LIGHTING
LTX	LIGHTING TRANSFORMER
LWL	LOW WATER LEVEL
MA	MANUAL-AUTO
MAS	MASONRY
MATL	MATERIAL
MAX	MAXIMUM
MB	MACHINE BOLT
MC	MASONRY CLEARANCE
MC	MODULATE-CLOSE
MCC	MOTOR CONTROL CENTER
MCJ	MASONRY CONTROL JOINT
MDO	MEDIUM DENSITY OVERLAY
MECH	MECHANICAL
MFD	MANUFACTURED
MFR	MANUFACTURER
MGD	MILLION GALLONS PER DAY
MH	MANHOLE, MOUNTING HEIGHT
MIN	MINIMUM
MISC	MISCELLANEOUS
MJ	MECHANICAL JOINT
MLO	MAIN LUGS ONLY
MMDW	DRY WEATHER MAXIMUM MONTH
MMP	MECHANICAL MOUNTING PANEL
MMWW	WET WEATHER MAXIMUM MONTH
MO	MANUAL OPERABLE, MASONRY OPENING
MP	METAL PANEL
MPU	MULTIPURPOSE UNIT
MS	MANUFACTURER'S STANDARD
MSC	MANUFACTURER SUPPLIED CABLE
MSR	GROUPED MOTOR CONTROL
MT	MOUNT
MTD	MOUNTED
MTG	MOUNTING
MTS	MANUAL TRANSFER SWITCH
MTS	MILL TYPE STEEL PIPE
MU	MULCHING
MV	MERCURY VAPOR
MWS	MAXIMUM WATER SURFACE
N	NORTH, NEUTRAL
NA	NOT APPLICABLE
NA	NON-AUTOMATIC
NC	NORMALLY CLOSED
NEUT	NEUTRAL
NG	NATURAL GAS
NGVD	NATIONAL GEODETIC VERTICAL DATUM
NIC	NOT IN CONTRACT
N.O.	NORMALLY OPEN
NO., #	NUMBER
NOM	NOMINAL
NP	NON-PROTECTED
NPT	NATIONAL PIPE THREADS
NS	NON-SHRINK
NTS	NOT TO SCALE
O2	OXYGEN
O TO O	OUT TO OUT
OA	OVERALL, ODOROUS AIR
OC	ON CENTER
OC	OPEN-CLOSE (O)
OCA	OPEN-CLOSE-AUTO
OCR	OPEN-CLOSE-REMOTE
OD	OUTSIDE DIAMETER, OVERFLOW DRAIN
O.F.	OUTSIDE FACE
OFCI	OWNER FURNISHED, CONTRACTOR INSTALLED
OFOI	OWNER FURNISHED, OWNER INSTALLED
OL	OVERLOAD RELAY
OO	ON-OFF
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
OP	OPAQUE PANEL, OUTLET PROTECTION
OPER	OPERATOR
OPNG	OPENING
OPP	OPPOSITE
OSA	OUTSIDE AIR
OSC	OPEN-STOP-CLOSE
OSD	OPEN SITE DRAIN
OWSJ	OPEN WEB STEEL JOIST
OZ	OUNCE
P	PROJECTED
P	PILASTER, PIPE
PAVT	PAVER TILE
PB	PUSHBUTTON SWITCH
PC	POINT OF CURVE, PHOTOCELL
PC	PRECAST CONCRETE PANEL
PCCP	PRECAST CONCRETE CYLINDER PIPE
PCV	PRESSURE CONTROL VALVE
PE	PLAIN END
PED	PEDESTAL, PEDESTRIAN
PEP	POLYETHYLENE PIPE
PEN.	PENETRATION
PFC	POUNDS PER CUBIC FOOT
PH	PENTHOUSE
pH	HYDROGEN ION CONCENTRATION
PH	PHASE
PI	POINT OF INTERSECTION
PIT	PILOT TUBE TEST STATION
PJF	PREMOULDED JOINT FILLER
PL	PLATE (STEEL)
PL	PROPERTY LINE
PLAM	PLASTIC LAMINATE
PLAS	PLASTER, PLASTIC
PLC	PROGRAMMABLE LOGIC CONTROLLER
PLYWD	PLYWOOD
PNL	PANEL
PP	POWER POLE
P-P	PUSH-PULL
PPL	POLYPROPYLENE LINED
PR	PAIR
PRC	POINT OF REVERSE CURVE
PRCST	PRECAST
PREFAB	PREFABRICATION
PRES	PRESSURE
PRI	PRIMARY
PRM	PERMANENT REFERENCED MARKER
PROJ	PROJECTION
PROP	PROPERTY
PS	PLASTIC SHEET, POLYCARBONATE SHEET
PS	PAINT SYSTEM
PSF	POUNDS PER SQUARE FOOT
PSI	POUNDS PER SQUARE INCH
PSIG	POUNDS PER SQUARE INCH, GAUGE
PT	POINT OF TANGENCY
PT	POTENTIAL TRANSFORMER
PT	PRESSURE TREATED
PTD	PAPER TOWEL DISPENSER
PTN	PARTITION
PV	PLUG VALVE
PVC	POLYVINYL CHLORIDE
PVI	POINT OF VERTICAL INTERSECTION
PVMT	PAVEMENT
PVT	POINT OF VERTICAL TANGENCY
QAA	AVERAGE FLOW
QMM	MAXIMUM 30 DAY FLOW
QPI	PEAK INSTANTANEOUS FLOW
QPP	PEAK PUMPING FLOW
QT	QUARRY TILE
R	RISER
R OR RAD	RADIUS
RA	RETURN AIR
RC	REINFORCED CONCRETE
RCP	REINFORCED CONCRETE PIPE
RCPT	RECEPTACLE
RD	ROAD, ROOF DRAIN
RDCR	REDUCER
RDW	REDWOOD
RECIR	RECIRCULATION
REF	REFER OR REFERENCE
REFR	REFRIGERATE, REFRIGERANT
REINF	REINFORCED, REINFORCING, REINFORCE
REQD	REQUIRED
RESIL	RESILIENT
RFS	ROLL-UP FIRE SHUTTER
RH	RIGHT HAND
RH	RODHOLE
RHR	RIGHT HAND REVERSE
RL	RAIN LEADER
RLS	RUBBER LINED STEEL
RM	ROOM
RO	ROUGH OPENING
ROL	RAISE-OFF-LOWER
RPM	REVOLUTIONS PER MINUTE
RR	RIPRAP

NOTES:

1. CONTACT ENGINEER FOR ABBREVIATIONS USED BUT NOT SHOWN ON THIS DRAWING.

GENERAL NOTE:

1. THIS IS A STANDARD LEGEND SHEET. THEREFORE, NOT ALL OF THE INFORMATION SHOWN MAY BE USED ON THIS PROJECT.

NO.	DATE	REVISION	BY	APVD
DSGN	M TENNANT	DR	CHK K RINER	APVD

SWWRF NITROGEN REMOVAL AND DIGESTER MODIFICATIONS
MANATEE COUNTY UTILITIES
MANATEE COUNTY, FL

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GENERAL

ABBREVIATIONS

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	MARCH 2013
PROJ	457133
DWG	001-G-0101
SHEET	of

ISSUED FOR BID

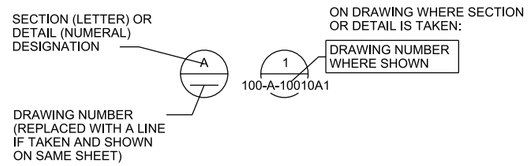
ABBREVIATIONS

RRUB	RADIAL RUBBER
RS	RIGID STEEL
RST	REINFORCING STEEL
RT	RIGHT
RTN	RETURN
RTO	REGENERATIVE THERMAL OXIDIZER
RUB	RUBBER
RUBC	RUBBER CUSHIONED FLOORING
RUBS	RUBBER ESD CONTROL FLOORING
R/W	RIGHT OF WAY
S	I-BEAM
S	SLOPE, SOUTH, SWITCH
SA	SUPPLY AIR
SATC	SUSPENDED ACCUSTICAL TILE CEILING
SB	SEDIMENT BASIN
SC	SHOWER CURTAIN, SOLID CORE WOOD
SCADA	SUPERVISORY CONTROL AND DATA ACQUISITION
SCC	SOLID CORE
SCFM	STANDARD CUBIC FEED PER MINUTE
SCHED	SCHEDULE
SCU	SPEED CONTROL UNIT
SDP	SUB-DISTRIBUTION PANEL
SDWK	SIDEWALK
SEC	SECONDARY
SECT	SECTION
SED	SEDIMENTATION
SEW	SEWAGE
SG	LAMINATED SAFETY GLASS, SAFETY
SGWB	SUSPENDED GYPSUM WALL BOARD
SH	SHEET
SHA	SURFACE HARDENING AGENT
SHS	SOLIDS HANDLING SYSTEM
SIM	SIMILAR
SK	SINK
SLR	SEALER
SMLS	SEAMLESS EPOXY
SOI	SPRAY- ON INSULATION
SOLN	SOLUTION
SP	SPACE OR SPACES, SPANDREL PANEL, STORMPROOF
SPEC, SPECS	SPECIFICATIONS
SPD	SUMP PUMP DISCHARGE
SPG	SPACING
SPLY	SUPPLY
SQ	SQUARE
SQ FT	SQUARE FOOT, FEET
SQ IN	SQUARE INCH
SR	SHORT RADIUS
SS	START-STOP
SST	STAINLESS STEEL
SSC	SUPERVISORY SET POINT CONTROL
ST	STORM DRAIN
ST	STRAIGHT
STA	STATUS, STATION
STD	STANDARD
STIF	STIFFENER
STIRR	STIRRUP
STL	STEEL
STRL	STRUCTUAL
STRUCT	STRUCTURE
SUBFL	SUBFLOOR
SUSP	SUSPENDED
SV	SOLENOID VALVE
SVIN	SHEET VINYL
SWBD	SWITCHBOARD
SWGR	SWITCHGEAR
SYMM	SYMMETRICAL
T	THERMOSTAT, TREAD
T&B	TOP AND BOTTOM
T&G	TONGUE AND GROOVE
TA	TRANSFER AIR
TAN	TANGENT
TB	TERMINAL BOARD
TBG	TUBING
TC	TIME TO CLOSE
TC	TURBIDITY CURTAIN
TCAD	TIME CLOSE AFTER DE-ENERGIZATION
TCAE	TIME CLOSE AFTER ENERGIZATION
TDH	TOTAL DYNAMIC HEAD
TDR	TIME DELAY RELAY
TECH	TECHNICAL
TEL	TELEPHONE
TEMP	TEMPORARY, TEMPERATURE
TF	TOP FACE
TFG	TEMPERED FLOAT GLASS
TG	TEMPERED
TH	TOP-HINGED
THD	THREAD
THK	THICKNESS
THRU	THROUGH
TJB	TERMINAL JUNCTION BOX
TL	TEFLON LINED PIPE
T.O.	TIME TO OPEN, TOP OF
TOAE	TIME OPEN AFTER ENERGIZATION
TOC	TOP OF CONCRETE
TOC	TOP OF CURB
TOD	TIME ON DELAY, TOP OF DUCT TOTAL OXYGEN DEMAND
TOF	TOP OF FOOTING
TOG	TOP OF GROUT, TOP OF GRATE
T.O.P.	TOP OF PARAPET
TOS	TOP OF SLAB
TOW	TOP OF WALL
TP	TURNING POINT
TR	TRANSOM, TRUSS
TRANS	TRANSFORMER, TRANSITION
TRANSV	TRANSVERSE
TRD	TREAD
TS	TEMPORARY SEEDING, TUBE STEEL
TSHT	THRESHOLD
TSS	TOTAL SUSPENSION SOLIDS
TST	TOP OF STEEL
TTC	TELEPHONE TERMINAL CABINET
TTD	TOILET TISSUE DISPENSER
TU-X	TREATMENT UNIT NO. X
TURB	TURBIDITY
TWP	TRANSLUCENT WALL PANEL
TX	TRANSFORMER
TYP	TYPICAL
UON	UNLESS OTHERWISE NOTED
UNO	UNLESS NOTED OTHERWISE
UPS	UNINTERRUPTIBLE POWER SUPPLY
USB	UNIT SUBSTATION
UVR	UNDER VOLTAGE RELAY
V	VENT, VALVE
V	VOLTMETER, VOLTS
VB	VAPOR BARRIER (RETARDER)
VC	VERTICAL CURVE
VCP	VITRIFIED CLAY PIPE
VCT	VINYL COMPOSITION TILE
VEL	VELOCITY
VERT	VERTICAL
VHC	VOLATILE HYDROCARBONS
VIB	VIBRATION
VIF	VERIFY IN FIELD
VIN	VINYL
VINT, VT	VINYL TILE
VP	VERTICAL PIVOTED
VPS	VENEER PLASTER SYSTEM
VPC	POINT OF VERTICAL CURVATURE
VPI	POINT OF VERTICAL INTERSECTION
VPT	POINT OF VERTICAL TANGENT
VS	VERTICAL SLIDE
VTR	VENT THRU ROOF
VWC	VINYL WALL COVERING
W	WEST
W/	WITH
WC	WATER COLUMN
WEASTRIP	WEATHERSTRIP
WG	WIRE, WIRE GLASS
WH	WATTHOUR METER
WHD	WATTHOUR DEMAND METER
WP	WATERPROOF, WEATHERPROOF, WORKPOINT
WR	WASTE RECEPTACLE
WRB	WATER RESISTANT GWB
WS	WATER SURFACE, WATERSTOP, WELDED STEEL
WWF	WELDED WIRE FABRIC
WWPH	WET WEATHER PEAK HOUR

NOTES:

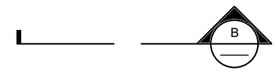
1. CONTACT ENGINEER FOR ABBREVIATIONS USED BUT NOT SHOWN ON THIS DRAWING.

SECTION / DETAIL DESIGNATIONS

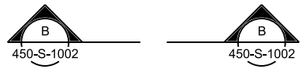


DRAWING TITLE
SCALE

ON DRAWING WHERE ONLY A TITLE IS REQUIRED WITH NO REFERENCE (eg: ELEVATIONS)



SECTION CALLOUT WHERE SECTION IS ON THE SAME SHEET AND CUT EXTENDS TO A FIXED LIMIT



SECTION CALLOUT WHERE SECTION IS ON ANOTHER SHEET AND CUT EXTENDS THROUGHOUT ENTIRE SHEET

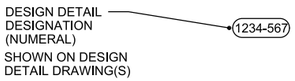
GRID LINE INDICATOR

KEYNOTE NUMBER

REVISION / ADDENDA NUMBER

NORTH ARROW; CAN BE MODIFIED TO INCLUDE MAGNETIC NORTH ALONG WITH PROJECT NORTH

DESIGN DETAIL DESIGNATION



NOTES:

1. ALL DESIGN DETAILS ARE TYPICAL AND MUST BE USED IF DESIGN DETAIL DESIGNATION IS NOT SHOWN
2. THE TERM STANDARD DETAIL, OR A FORM OF IT, IS SYNOMONOUS WITH DESIGN DETAIL. THE DESIGN DETAILS REPRESENT THE CHARACTER AND NATURE OF THE WORK REQUIRED THROUGHOUT THE PROJECT. ALL ASSOCIATED WORK SHALL BE IN ACCORDANCE WITH THE DESIGN DETAILS SHOWN WHETHER THE DETAILS ARE SPECIFICALLY REFERENCED OR NOT.

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DATE	MARCH 2013
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DWG	001-G-0102
SHEET	of

FILENAME: 001-G-0102_457133.dgn PLOT DATE: 2/28/2013 PLOT TIME: 5:24:24 PM

PIPE AND FITTING SYMBOLS

DOUBLE LINE	SINGLE LINE	
		EXISTING PIPE
		NEW PIPE
		EXISTING PIPE TO BE ABANDONED
		EXISTING PIPE TO BE REMOVED
		WELDED JOINT
		GROOVED END JOINT
		FLANGED JOINT
		MECHANICAL JOINT & PROPRIETARY RESTRAINED JOINT
		BELL & SPIGOT JOINT (LEADED)
		HUB & SPIGOT JOINT (RUBBER GASKET)
		BALL JOINT
		ADAPTER SIDE GROOVED END ADAPTER FLANGE
		FLANGED COUPLING ADAPTER
		FLEXIBLE COUPLING
		METAL BELLOWS EXP JOINT
		ELASTOMER BELLOWS EXP JOINT
		ELBOW UP
		ELBOW DOWN
		TEE UP
		TEE DOWN
		LATERAL UP
		LATERAL DOWN
		CONCENTRIC REDUCER
		ECCENTRIC REDUCER

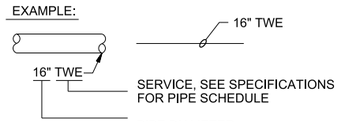
DOUBLE LINE	SINGLE LINE	
		REDUCING BUSHING
		UNION
		CAP
		ANCHOR
		ELBOW, 90 DEGREE
		CROSS
		TEE
		ELBOW, 45 DEGREE
		LATERAL

NOTES:

1. ONLY FLANGED END CONNECTIONS ARE SHOWN HERE FOR DOUBLE LINE FITTINGS. FITTINGS WITH OTHER END PATTERNS ARE SHOWN SIMILARLY ON THE CONSTRUCTION DRAWINGS. ALSO SEE PIPING SPECIFICATIONS.
2. SYMBOLS SHOWN HERE FOR SINGLE LINE FITTINGS ARE GENERIC ONLY. REFER TO PIPING SPECIFICATIONS FOR SPECIFIC END CONNECTIONS FOR SINGLE LINE PIPE AND FITTINGS.
3. EXISTING PIPE AND EQUIPMENT IS SHOWN LIGHT-LINED AND/OR SCREENED AND IS NOTED AS EXISTING. NEW PIPING AND EQUIPMENT IS SHOWN HEAVY-LINED.

PIPING DESIGNATION

EXAMPLE:



MECHANICAL LEGEND AND NOTES

GENERAL PIPING NOTES

1. UNDERGROUND UTILITIES SHOWN ARE TAKEN FROM EXISTING RECORDS AND ARE SHOWN FOR THE CONVENIENCE OF THE CONTRACTOR ONLY. THE CONTRACTOR SHALL CONTACT ALL UTILITY OWNERS AND CONFIRM LOCATIONS OF EXISTING UTILITIES AT LEAST 48 HOURS BEFORE BEGINNING CONSTRUCTION. THE CONTRACTOR SHALL ACCURATELY LOCATE AND UNCOVER ALL EXISTING UTILITIES BEFORE BEGINNING CONSTRUCTION. ANY DAMAGE RESULTING FROM THE CONTRACTOR'S OPERATIONS SHALL BE REPAIRED AT THE CONTRACTOR'S EXPENSE. WHERE CROSSING OF EXISTING UTILITIES OCCUR, PROVIDE 12" MINIMUM CLEARANCE.
2. UNLESS OTHERWISE NOTED, LAY PIPE TO UNIFORM GRADE BETWEEN INDICATED ELEVATION POINTS.
3. SIZE OF FITTINGS SHOWN ON PLANS SHALL CORRESPOND TO ADJACENT STRAIGHT RUN OF PIPE, UNLESS OTHERWISE INDICATED. TYPE OF JOINT AND FITTING MATERIAL SHALL BE THE SAME AS SHOWN FOR ADJACENT STRAIGHT RUN OF PIPE.
4. LOCATION AND NUMBER OF PIPE HANGERS AND PIPE SUPPORTS SHOWN IS ONLY APPROXIMATE. CONTRACTOR SHALL DESIGN AND PROVIDE ALL HANGERS AND SUPPORTS NECESSARY TO COMPLY WITH SPACING AND LOCATON REQUIREMENTS IN ACCORDANCE WITH SPECIFICATION SECTION 40 05 15.
5. ALL JOINTS SHALL BE WATERTIGHT. WALL PIPES SHALL BE USED WHEREVER PIPING PASSES FROM A STRUCTURE TO BACKFILL.
6. ALL FLEXIBLE CONNECTORS AND FLANGED COUPLING ADAPTERS SHALL BE PROVIDED WITH THRUST TIES, BLOCKS, AND ANCHORS, UNLESS OTHERWISE NOTED. THRUST PROTECTION SHALL BE ADEQUATE FOR TEST PRESSURES SPECIFIED IN SPECIFICATION SECTION 40 27 00.
7. SYMBOLS, LEGENDS, AND PIPE USE IDENTIFICATIONS SHOWN SHALL BE FOLLOWED THROUGHOUT THE PLANS, WHEREVER APPLICABLE. NOT ALL OF THE VARIOUS PIPING COMPONENTS ARE NECESSARILY USED IN THE PROJECT.
8. ALL BURIED PIPING SPECIFIED TO BE PRESSURE TESTED, EXCEPT FLANGED, WELDED, OR SCREWED PIPING, SHALL BE PROVIDED WITH THRUST RESTRAINTS AT ALL DIRECTION CHANGES. SEE THRUST DETAILS AND NOTES ON THIS SHEET AND SPECIFICATION SECTION 40 27 00.
9. NUMBER AND LOCATION OF UNIONS SHOWN ON PLANS IS ONLY APPROXIMATE. PROVIDE ALL UNIONS NECESSARY TO FACILITATE CONVENIENT REMOVAL OF VALVES AND MECHANICAL EQUIPMENT.
10. WHERE A GROOVED END COUPLING IS SHOWN, IT SHALL BE THE RIGID JOINT TYPE, UNLESS OTHERWISE SPECIFIED. WHERE A FLANGED COUPLING ADAPTER IS SHOWN, A STANDARD FLANGE SHALL BE JOINED TO THE COUPLING ADAPTER.
11. UNLESS SHOWN OTHERWISE ON DRAWINGS, THE UNDERGROUND PIPES SHALL HAVE 3-FEET MINIMUM SOIL COVER.

VALVE SYMBOLS

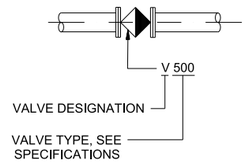
SINGLE LINE	DOUBLE LINE
GATE	
KNIFE GATE	OR
BUTTERFLY	OR
GLOBE	OR
BALL	OR
SEATING PORT	
ECCENTRIC PLUG	OR
PLUG OR COCK	OR
NEEDLE	OR
DIAPHRAGM	OR
PINCH	OR
SWING CHECK	OR
BALL CHECK	OR
HOSE VALVE (HV- X) OR (V-X) X = NO. IN SPECS	
SAMPLE	
MUD	
PRESSURE RELIEF	
AIR AND/OR VACUUM RELEASE	
REGULATED SIDE PRESSURE CONTROL (INTERNAL PILOT)	
REGULATED SIDE PRESSURE CONTROL (EXTERNAL PILOT)	
MULTI-PORT VALVE, ARROWS INDICATE FLOW PATTERN. SEATING PORTS ARE IMPLIED BY INDICATED FLOW PATTERN.	
TELESCOPING SCUM VALVE	

ACTUATOR SYMBOLS

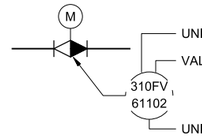
PNEUMATIC DIAPHRAGM	HYDRAULIC
PNEUMATIC CYLINDER	MANUAL
ELECTRIC MOTOR	SOLENOID
	ELECTRO HYDRAULIC

VALVE DESIGNATIONS

MANUAL VALVES AND CHECK VALVES

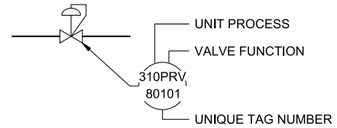


CONTROL VALVES



NOTE:
SEE I&C LEGENDS FOR FURTHER DEFINITIONS AND ACTUATOR TYPES.

SELF-CONTAINED REGULATING VALVES



NOTE:
FLOW STREAM IDENTIFICATIONS ARE SHOWN ON THE INSTRUMENTATION AND CONTROL LEGENDS

NO.	DSGN	DATE	DR	REVISION	CHK	APVD	BY	APVD
			T FU		K RINER			

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SWWRF NITROGEN REMOVAL AND DIGESTER MODIFICATIONS
MANATEE COUNTY UTILITIES
MANATEE COUNTY, FL

GENERAL

PROCESS MECHANICAL LEGEND

ISSUED FOR BID

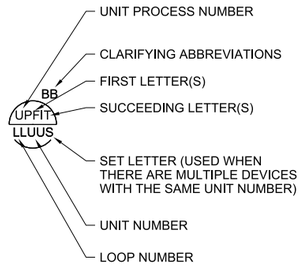
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	MARCH 2013
PROJ	457133
DWG	001-G-0201
SHEET	of

FILENAME: 001-G-0201_457133.dgn PLOT DATE: 2/28/2013 PLOT TIME: 5:24:30 PM

INSTRUMENT IDENTIFICATION

EXAMPLE SYMBOLS



DIGITAL SYSTEM INTERFACES

- ▲ ANALOG INPUT
- ▼ ANALOG OUTPUT
- $\triangle_X$ DISCRETE INPUT
- ∇_X DISCRETE OUTPUT

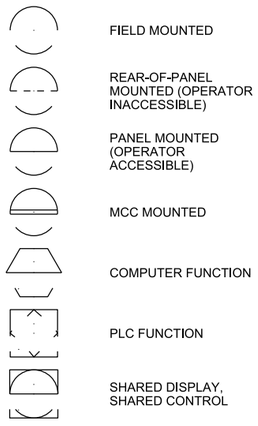
INSTRUMENT IDENTIFICATION LETTERS TABLE

LETTER	FIRST-LETTER		SUCCEEDING-LETTERS		
	PROCESS OR INITIATING VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	READOUT OR PASSIVE FUNCTION	READOUT OR PASSIVE FUNCTION
A	ANALYSIS (+)		ALARM		
B	BURNER, COMBUSTION		USER'S CHOICE (*)	USER'S CHOICE (*)	USER'S CHOICE (*)
C	USER'S CHOICE (*)			CONTROL	
D	DENSITY (S.G.)	DIFFERENTIAL			
E	VOLTAGE		PRIMARY ELEMENT, SENSOR		
F	FLOW RATE	RATIO (FRACTION)			
G	USER'S CHOICE (*)		GLASS, GAUGE VIEWING DEVICE	GATE	
H	HAND (MANUAL)				HIGH
I	CURRENT (ELECTRICAL)		INDICATE		
J	POWER	SCAN			
K	TIME, TIME SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT (PILOT)		LOW
M	MOTION	MOMENTARY			MIDDLE, INTERMEDIATE
N	TORQUE		USER'S CHOICE (*)	USER'S CHOICE (*)	USER'S CHOICE (*)
O	USER'S CHOICE (*)		ORIFICE, RESTRICTION		
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	INTEGRATE, TOTALIZE			
R	RADIATION		RECORD OR PRINT		
S	SPEED, FREQUENCY	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTI VARIABLE		MULTI FUNCTION	MULTI FUNCTION	MULTI FUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER, LOUVER	
W	WEIGHT, FORCE		WELL		
X	UNCLASSIFIED (*)	X AXIS	UNCLASSIFIED (*)	UNCLASSIFIED (*)	UNCLASSIFIED (*)
Y	EVENT, STATE OR PRESENCE	Y AXIS		RELAY, COMPUTE, CONVERT	
Z	POSITION	Z AXIS		DRIVE, ACTUATOR, UNCLASSIFIED FINAL CONTROL ELEMENT	

TABLE BASED ON THE INTERNATIONAL SOCIETY OF AUTOMATION (ISA) STANDARD.

(+) WHEN USED, EXPLANATION IS SHOWN ADJACENT TO INSTRUMENT SYMBOL. SEE ABBREVIATIONS AND LETTER SYMBOLS.
(*) WHEN USED, DEFINE THE MEANING HERE FOR THE PROJECT.

GENERAL INSTRUMENT OR FUNCTIONAL SYMBOLS



TRANSDUCERS

A	ANALOG	I	CURRENT
D	DIGITAL	P	PNEUMATIC
E	VOLTAGE	PF	PULSE FREQUENCY
F	FREQUENCY	PD	PULSE DURATION
H	HYDRAULIC	R	RESISTANCE

EXAMPLE

CURRENT TO PNEUMATIC TRANSDUCER (BACK OF PANEL, IN A FLOW LOOP)

ACCESSORY DEVICES

A	ALARM
C	CONTROLLER
I	INDICATOR
R	RECORDER
S	SWITCH
T	TRANSMITTER
X	UNCLASSIFIED

EXAMPLE

TRANSMITTER AS AN ACCESSORY TO A FLOW ELEMENT

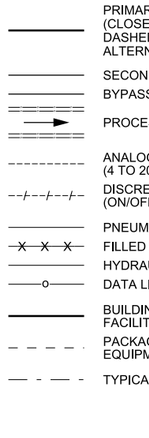
SPECIAL CASES

ON AND OFF EVENT LIGHTS

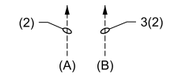
ON-OFF HAND SWITCH, MAINTAINED CONTACT SWITCH (CONTROLLED DEVICE WILL RESTART ON RETURN OF POWER AFTER POWER FAILURE).

STOP-START HAND SWITCH MOMENTARY CONTACT SWITCHES (CONTROLLED DEVICE WILL NOT RESTART ON RETURN OF POWER AFTER POWER FAILURE).

LINE LEGEND



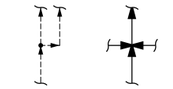
PARALLELING LINES



(A) TOTAL OF 2 SIGNALS

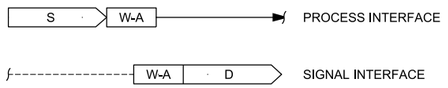
(B) 3 TYPICAL SETS OF 2 SIGNALS EACH. TOTAL OF 6 SIGNALS.

CONNECTING LINES

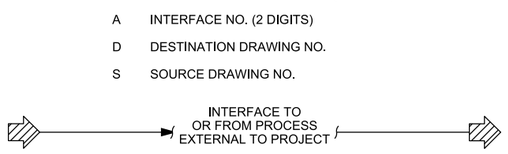


NON-CONNECTING LINES

INTERFACE SYMBOLS



- W SOURCE UNIT PROCESS NO. (3 DIGITS)
- A INTERFACE NO. (2 DIGITS)
- D DESTINATION DRAWING NO.
- S SOURCE DRAWING NO.



SELF CONTAINED VALVE & EQUIPMENT TAG NUMBERS

W-D-X-Y

W		UNIT PROCESS NUMBER
D	ARV	AIR RELEASE VALVE
	AVRV	AIR AND VACUUM RELEASE VALVE
	BLR	BLOWER
	CMP	COMPRESSOR
	E	EJECTOR
	GTE	GATE
	M	MECHANICAL EQUIPMENT
	MIX	MIXER
	NMH	MONORAIL
	PMP	PUMP
	PRV	PRESSURE RELIEF VALVE
	T	TANK
	SCR	SCREEN
X		LOOP NUMBER
Y		UNIT NUMBER

ABBREVIATIONS & LETTER SYMBOLS

AC	ALTERNATING CURRENT
AFD	ADJUSTABLE FREQUENCY DRIVE
AM	AUTO-MANUAL
CAM	COMPUTER-AUTO-MANUAL
CCS	CENTRAL CONTROL SYSTEM
CL_2 etc.	CHLORINE (TYPICAL; USE STANDARD CHEMICAL ELEMENT ABBREVIATIONS)
CM	COMPUTER-MANUAL
COD	CHEMICAL OXYGEN DEMAND
CP-X	CONTROL PANEL NO. X
DC	DIRECT CURRENT
DCS	DISTRIBUTED CONTROL SYSTEM
DCU	DISTRIBUTED CONTROL UNIT
DO	DISSOLVED OXYGEN
FCL_2	FREE CHLORINE RESIDUAL
FOS	FAST-OFF-SLOW
FOSA	FAST-OFF-SLOW-AUTO
FOSR	FAST-OFF-SLOW-REMOTE
FP-W-X	FIELD PANEL NO. WX (W=UNIT PROCESS NUMBER X=PANEL NUMBER)
FR	FORWARD-REVERSE
HOA	HAND-OFF-AUTO
HOR	HAND-OFF-REMOTE
ISR	INTRINSICALLY SAFE RELAY
LEL	LOWER EXPLOSIVE LIMIT
LOS	LOCKOUT STOP
LR	LOCAL-REMOTE
MA	MANUAL-AUTO
MC	MODULATE-CLOSE
MCC-X	MOTOR CONTROL CENTER NO. X
MSC	MANUFACTURER SUPPLIED CABLE
OC	OPEN-CLOSE(D)
OCA	OPEN-CLOSE-AUTO
OCR	OPEN-CLOSE-REMOTE
OO	ON-OFF
OOA	ON-OFF-AUTO
OOR	ON-OFF-REMOTE
OIU	OPERATOR INTERFACE UNIT
ORP	OXIDATION REDUCTION POTENTIAL
OSC	OPEN-STOP-CLOSE
pH	HYDROGEN ION CONCENTRATION
PLC	PROGRAMMABLE LOGIC CONTROLLER
RIO	REMOTE I/O UNIT
RM-X	REMOTE MULTIPLEXING MODULE NO. X
RTU-X	REMOTE TELEMETRY UNIT NO. X
SF	SLOWER-FASTER
SS	START-STOP
SSC	SUPERVISORY SET POINT CONTROL
TCL_2	TOTAL CHLORINE RESIDUAL
TOC	TOTAL ORGANIC CARBON
TOD	TOTAL OXYGEN DEMAND
TURB	TURBIDITY
VHC	VOLATILE HYDROCARBONS
VIB	VIBRATION
Δ	DIFFERENCE
Σ	SUM
×	MULTIPLY
÷	DIVIDE
F(X)	CHARACTERIZED
X^n	RAISED TO THE Nth POWER
$\sqrt{\ }$	SQUARE ROOT
AVG	AVERAGE
1:1	REPEAT OR BOOST
>	SELECT HIGHEST SIGNAL
<	SELECT LOWEST SIGNAL
}	BIAS
%	GAIN OR ATTENUATE

GENERAL NOTES

1. COMPONENTS AND PANELS SHOWN WITH A SINGLE ASTERISK (∗) ARE TO BE PROVIDED AS PART OF A PACKAGE SYSTEM.
2. COMPONENTS AND PANELS SHOWN WITH A DOUBLE ASTERISK (∗∗) ARE TO BE PROVIDED UNDER DIVISION 26, ELECTRICAL.
3. COMPONENTS SHOWN WITH A DIAMOND (◆) ARE PART OF PROCESS INSTRUMENTATION AND CONTROLS.
4. THIS IS A STANDARD LEGEND. THEREFORE, NOT ALL OF THIS INFORMATION MAY BE USED ON THE PROJECT.

NO.	DATE	DSGN	REVISION	CHK	APVD
		C. SAHARKHIZ	DR K RINER		BY APVD

SWWRF NITROGEN REMOVAL AND DIGESTER MODIFICATIONS
MANATEE COUNTY UTILITIES
MANATEE COUNTY, FL

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GENERAL
INSTRUMENTATION AND CONTROLS LEGEND SHEET 1

ISSUED FOR BID

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	MARCH 2013
PROJ	457133
DWG	001-G-0401
SHEET	of

FILENAME: 001-G-0401_457133.dgn PLOT DATE: 2/28/2013 PLOT TIME: 5:24:34 PM

VALVE SYMBOLS

- GATE
- KNIFE GATE
- BUTTERFLY
- GLOBE
- BALL
- V — VEE-BALL
- PLUG
- SEAT PORT ECCENTRIC PLUG
- DIAPHRAGM
- PINCH
- NEEDLE
- SWING CHECK
- BALL CHECK
- BACKFLOW PREVENTER
- ROTARY
- TELESCOPE
- S — SAMPLE
- MUD
- PRESSURE RELIEF
- AIR AND/OR VACUUM RELEASE
- REGULATED SIDE PRESSURE CONTROL
- PRESSURE REGULATION (CLAY-TYPE)
- MULTI-PORT VALVE (GATE VALVE SHOWN. FOR OTHER VALVE TYPES, APPROPRIATE VALVE SYMBOL SHOWN.) SEAT PORTS ARE IMPLIED BY INDICATED FLOW PATTERN.
- ANGLE GATE

GATE SYMBOLS

- SLUICE
- BUTTERFLY
- FABRICATED SLIDE
- FLAP
- STOP LOG
- SHEAR

ACTUATOR SYMBOLS

- PNEUMATIC DIAPHRAGM SPRING-OPPOSED, SINGLE OR DOUBLE ACTING
- PNEUMATIC CYLINDER SINGLE OR DOUBLE ACTING ACTUATED BY ONE INPUT
- M — ELECTRIC MOTOR
- S — SOLENOID
- VALVE POSITIONER
- H — HYDRAULIC
- DIAPHRAGM, DIFFERENTIAL PRESSURE
- E/H — ELECTROHYDRAULIC
- MANUAL

NOTE:
ON LOSS OF PRIMARY POWER (PNEUMATIC, ELECTRICAL, OR HYDRAULIC)

XX: FO FAIL OPEN
FC FAIL CLOSED
FLP FAIL TO LAST POSITION

PRIMARY ELEMENT SYMBOLS

- PARSHALL FLUME
- WEIR
- ORFICE PLATE
- FLOW TUBE
- J — PITOT-STATIC
- VORTEX METER
- ULTRASONIC FLOWMETER
- M — ELECTROMAGNETIC FLOWMETER
- PROPELLER OR TURBINE METER
- THERMAL FLOWMETER
- LEVEL (BUBBLER TUBE)
- LS — LEVEL (FLOAT)
- FI — ROTAMETER
- DE — DENSITY METER
- XX — GENERIC
- LE — LEVEL

MISCELLANEOUS SYMBOLS

- V — VENT TO ATMOSPHERE
- AIR GAP
- T — DRIP TRAP
- PIG INSERT POINT
- PIG CATCH POINT
- A — SELF CONTAINED AIR SUPPLY
- AP — AIR PURGE SET
- F — FLUSHING CONNECTION
- S — SEAL WATER SET
- WP — WATER PURGE SET
- FLEXIBLE CONNECTION
- AERATOR
- DIAPHRAGM SEAL
- ANNULAR DIAPHRAGM SEAL
- SS — COMPOSITE SAMPLER
- FLAME TRAP
- CALIBRATION COLUMN
- F — INLINE EXHAUST FAN
- S — INLINE SILENCER
- BLIND FLANGE
- CO — CLEAN OUT
- PIPE CAP
- HOSE CONNECTION
- STRAINER
- BASKET STRAINER
- SCREEN
- PULSATION DAMPENER
- EXPANSION CHAMBER
- IN LINE STATIC MIXER
- FFLCPLLLX — PANEL CONTINUED ON SAME OR OTHER DRAWING
- PANEL OUTLINE
- PANEL NAME
- 120V — 120 VOLT, 60 HZ POWER
- 480V — 480 VOLT, 60 HZ POWER
- XX — AIR SET XX = SUPPLY PRESSURE IN PSIG.
- PLUG
- RECEPTACLE
- RUPTURE DISK (VACUUM)
- RUPTURE DISK (PRESSURE)
- TV — TV MONITOR
- TV — TV CAMERA
- A, B → AND → C — LOGIC ELEMENT: IF A AND NOT B THEN C
- A, B → OR → C — LOGIC ELEMENT: IF A OR B THEN C
- RADIO ANTENNA
- I — OR — I — INTERLOCK, SEE CONTROL DIAGRAMS
- VOICE COMMUNICATION POINT
- SKIMMING MECHANISM
- SCREW CONVEYOR
- MIXER
- ELECTRIC MOTOR
- CARTRIDGE FILTER
- F — INLINE EXHAUST FAN
- AIR COMPRESSOR

PUMP AND COMPRESSOR SYMBOLS

- XX — CENTRIFUGAL WET PIT PUMP OR TURBINE PUMP
- XX — RECIPROCATING OR METERING PUMP (POSITIVE DISPLACEMENT)
- XX — DIAPHRAGM PUMP
- XX — GEAR PUMP OR BLOWER (POSITIVE DISPLACEMENT)
- XX — PROGESSING CAVITY PUMP
- XX — COMPRESSOR (CENTRIFUGAL)
- XX — COMPRESSOR (PISTON)
- XX — BLOWER, PUMP,OR FAN (CENTRIFUGAL)
- EJECTOR
- XX — PISTON PUMP
- XX — SUBMERSIBLE SUMP PUMP
- ROTARY PUMP
- VACUUM PUMP
- SCREW PUMP

XX: AS ADJUSTABLE SPEED
CS-1 CONSTANT SPEED (SINGLE SPEED)
CS-2 CONSTANT SPEED (TWO SPEED)

LINE SIZE IDENTIFICATION

XX
FLOW STREAM IDENTIFICATION

FLOW STREAM IDENTIFICATION

ALP	AIR LOW PRESSURE	RS	RAW SEWAGE
BWR	BACKWASH RECYCLE	SE	SECONDARY EFFLUENT
DR	PROCESS DRAIN	SH	SODIUM HYPOCHLORITE
DSL	DECANT	SRS	SCREENED RAW SEWAGE
DWS	DEWATERED SLUDGE	WAS	WASTE ACTIVATED SLUDGE
F	FILTRATE	W3	PLANT REUSE WATER.
FE	FILTER EFFLUENT		
ML	MIXED LIQUOR		
NRCY	NITRIFIED RECYCLE		
OFL	OVERFLOW		
POS	POLYMER SOLUTION		
RAS	RETURN ACTIVATED SLUDGE		

NO.	DATE	DSGN	DR	CHK	BY	APVD
		C. SAHARKHIZ	K RINER			

REVISION

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SWWRF NITROGEN REMOVAL AND DIGESTER MODIFICATIONS
MANATEE COUNTY UTILITIES
MANATEE COUNTY, FL

GENERAL
INSTRUMENTATION AND CONTROLS LEGEND SHEET 2

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

DATE	MARCH 2013
PROJ	457133
DWG	001-G-0402
SHEET	of

FILENAME: 001-G-0402_457133.dgn PLOT DATE: 2/28/2013 PLOT TIME: 5:24:40 PM

SP-14

UPS

SS1

SP-14-PLC-1

DISSOLVED OXYGEN (2) LEVEL (2)

SS2 (2) SS2 (2)

120V

SS4 SS3

DO 830AIT 001-01 830LIT 001-01

MSC MSC

DO 830AE 001-001 830LE 001-01

FROM TWAS PUMP STATION — TWAS

TO DISSOLVED AIR FLOTATION — WAS

FROM WAS PUMP STATION — WAS

FAULT (2) ON (2)

RUN (2) REMOTE (2) VALVE CLOSED (2)

@ MCC (2)

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

REMOTE (2) ON (2)

RUN (2) FAULT (2)

(2)

TWAS/WAS — A — 008-N-6004 — TO SLUDGE HOLDING TANK NO. 2

TWAS/WAS — B — 008-N-6005 — TO SLUDGE HOLDING TANK NO. 3

830TI 003-01 830TSH 003-02 830PI 003-01 830PSH 003-01 830PRV 003-01 830TSH 003-01

ALP

DISCHARGE SILENCER 830-SCR-003-01

SLUDGE HOLDING BLOWER 1 830-BLR-003-01

INTAKE FILTER/ SILENCER 830-SCR-003-02

ATMOSPHERIC AIR SUPPLY

OFL — TO PLANT HEADWORKS

TWAS/WAS — TO EXISTING TRANSFER PUMP STATION (SECONDARY SLUDGE HOLDING TANK 4)

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

SLUDGE HOLDING TANK NO. 1 830-T-001-01

830-ARV-002-01

830TSH 002-01 830PI 002-01 830ZSC 002-01

CS SLUDGE PUMP 1 830-PMP-002-01

WAS

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

120V

SS4 SS3

DO 830AIT 004-01 830LIT 004-01

MSC MSC

DO 830AE 004-01 830LE 004-02

TWAS/WAS

FROM EXISTING TRANSFER P.S. (TANK 1) — TWAS/WAS

FROM EXISTING TRANSFER P.S. (TANK 2) — TWAS/WAS

FROM EXISTING TRANSFER P.S. (TANK 3) — TWAS/WAS

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

SECONDARY SLUDGE HOLDING TANK NO. 4 830-T-004-01

ALP

OFL

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

ALP

DISCHARGE SILENCER 830-SCR-004-01

830-PRV-004-01 830-TI-004-01 830-PI-004-01 830-PSH-004-01 830-TSH-004-02

830-TSH-004-01

SLUDGE HOLDING BLOWER 4 830-BLR-004-01

INTAKE FILTER/ SILENCER 830-SCR-004-02

(SIMILAR TO ABOVE)

ATMOSPHERIC AIR SUPPLY

OFL/DSL — TO PLANT HEADWORKS

TWAS/WAS — TO DEWATERING

830-ARV-005-01

830TSH 005-01 830PI 005-01 830ZSC 005-01

CS SLUDGE PUMP 4 830-PMP-005-01

WAS

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

NO.	DATE	DSGN
		C SAHARKHIZ
DR	REVISION	AL CLOUGH
CHK		
APVD		
BY		
APVD		

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INSTRUMENTATION AND CONTROL

SWWRF NITROGEN REMOVAL AND DIGESTER MODIFICATIONS

MANATEE COUNTY UTILITIES

MANATEE COUNTY, FL

P&ID

SLUDGE HOLDING TANKS AND JET AERATION SYSTEMS

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NTS

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING. 0 1"

DATE	MARCH 2013
PROJ	457133
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SHEET	of

FILENAME: 008-N-6004_457133.dgn PLOT DATE: 2/28/2013 PLOT TIME: 5:24:44 PM

SP-14 ◆

UPS

SS1

SP-14-PLC-1

DISSOLVED OXYGEN (2) LEVEL (2)

(2) SS2 SS2 (2)

120V

SS4 ◆ SS3 ◆

DO 830AIT 007-01 ◆ 830LIT 007-01 ◆

MSC MSC

DO 830AE 007-001 ◆ 830LE 007-01 ◆

FAULT (2) ON (2) VALVE CLOSED (2)

RUN (2) REMOTE (2)

@ MCC (2)

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

REMOTE (2) ON (2)

RUN (2) FAULT (2)

830PRV 007-01

830TI 007-01 | 830TSH 007-02 | 830PI 007-01 | 830PSH 007-01 | P | 830TSH 007-01

ALP

DISCHARGE SILENCER 830-SCR-007-03

CS SLUDGE HOLDING BLOWER 2 830-BLR-007-01

INTAKE FILTER/ SILENCER 830-SCR-007-02

ATMOSPHERIC AIR SUPPLY

OFL — TO PLANT HEADWORKS

TWAS/WAS — TO EXISTING TRANSFER PUMP STATION SECONDARY SLUDGE HOLDING TANK 4

008-N-6004 A TWAS/WAS

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

SLUDGE HOLDING TANK NO. 2 830-T-002-01

830-ARV-008-01

830TSH 008-01 | 830PI 008-01 | P | 830ZSC 008-01

CS SLUDGE PUMP 2 830-PMP-008-01

WAS

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

120V

SS4 ◆ SS3 ◆

DO 830AIT 010-01 ◆ 830LIT 010-01 ◆

MSC MSC

DO 830AE 010-01 ◆ 830LE 010-02 ◆

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

ALP

DISCHARGE SILENCER 830-SCR-010-01

830-PRV-010-01 | 830-TI-010-01 | 830-PI-010-01 | 830-PSH-010-01 | 830-TSH-010-02

SLUDGE HOLDING BLOWER 3 830-BLR-010-01

830-TSH-010-01

INTAKE FILTER/ SILENCER 830-SCR-010-02

(SIMILAR TO ABOVE)

ATMOSPHERIC AIR SUPPLY

008-N-6004 B TWAS/WAS

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

SLUDGE HOLDING TANK NO. 3 830-T-003-01

TWAS/WAS — TO TRANSFER PUMP STATION SECONDARY HOLDING SLUDGE HOLDING TANK 4

830-ARV-011-01

830TSH 011-01 | 830PI 011-01 | P | 830ZSC 011-01

CS SLUDGE PUMP 3 830-PMP-011-01

WAS

TO BE INCLUDED IN JET-AERATION PRE-PURCHAGE PACKAGE SYSTEM

NO.	DATE	DSGN
	REVISION	CHK
		APVD
		BY
		APVD

C. SAHARKHIZ | AL CLOUGH

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SLUDGE HOLDING TANKS AND BLOWERS

NTS	
VERIFY SCALE	
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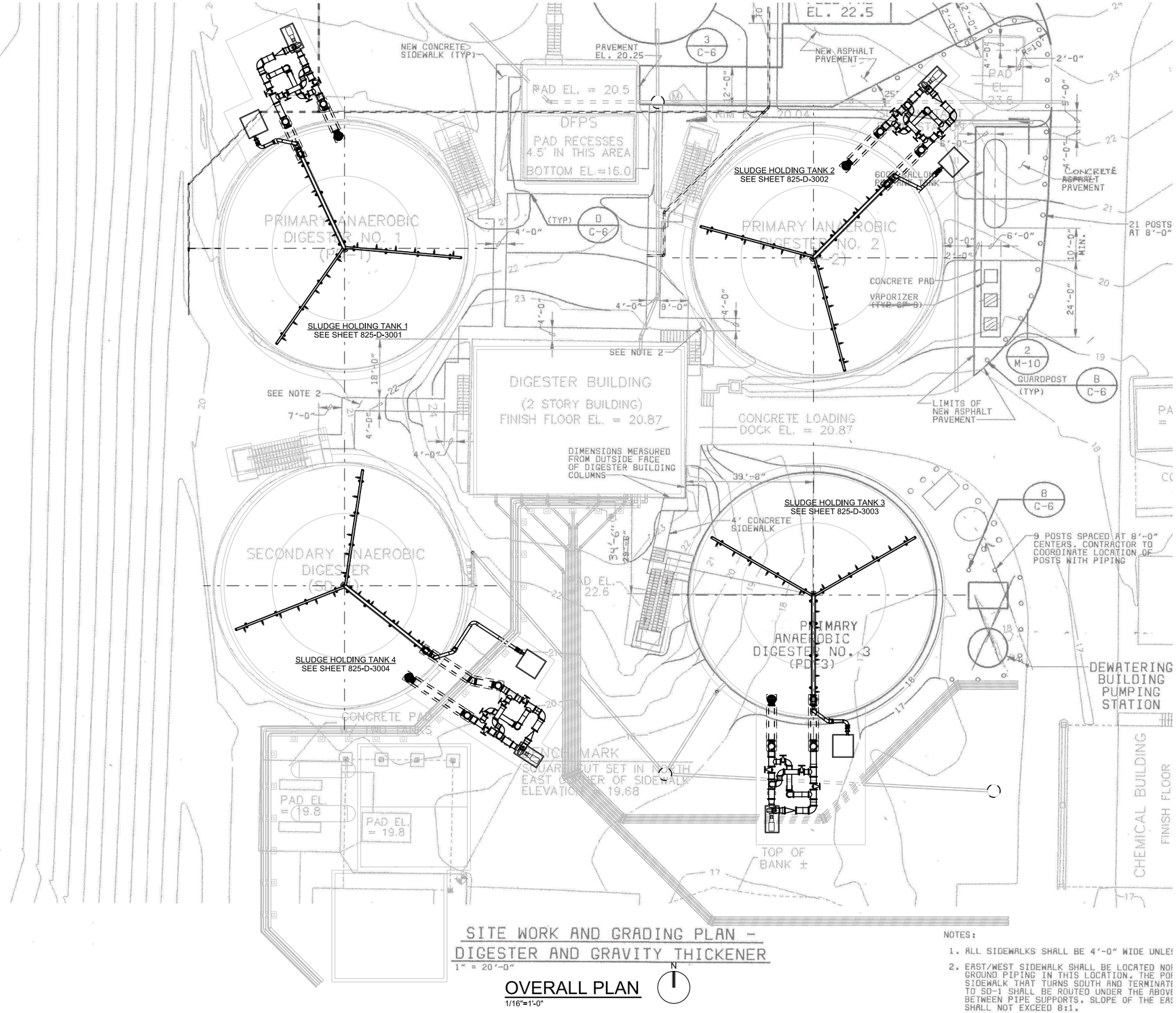
DATE	MARCH 2013
PROJ	457133
DWG	008-N-6005
SHEET	of

FILENAME: 008-N-6005_457133.dgn PLOT DATE: 2/28/2013 PLOT TIME: 5:24:49 PM



SITE WORK AND GRADING PLAN – DIGESTER AND GRAVITY THICKENER

1" = 20'-0"

OVERALL PLAN

1/16"=1'-0"

NOTES:

1. ALL SIDEWALKS SHALL BE 4'-0" WIDE UNLES
2. EAST/WEST SIDEWALK SHALL BE LOCATED NOR GROUND PIPING IN THIS LOCATION. THE POR SIDEWALK THAT TURNS SOUTH AND TERMINATE TO SD-1 SHALL BE ROUTED UNDER THE ABOVE BETWEEN PIPE SUPPORTS. SLOPE OF THE EAS SHALL NOT EXCEED 8:1.

NO.	DATE	REVISION	BY	APVD
DSGN	T FU	DR N PATTERSON	CHK	APVD

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PROCESS
SLUDGE HOLDING TANKS OVERALL PLAN

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VERIFY SCALE
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0 1"

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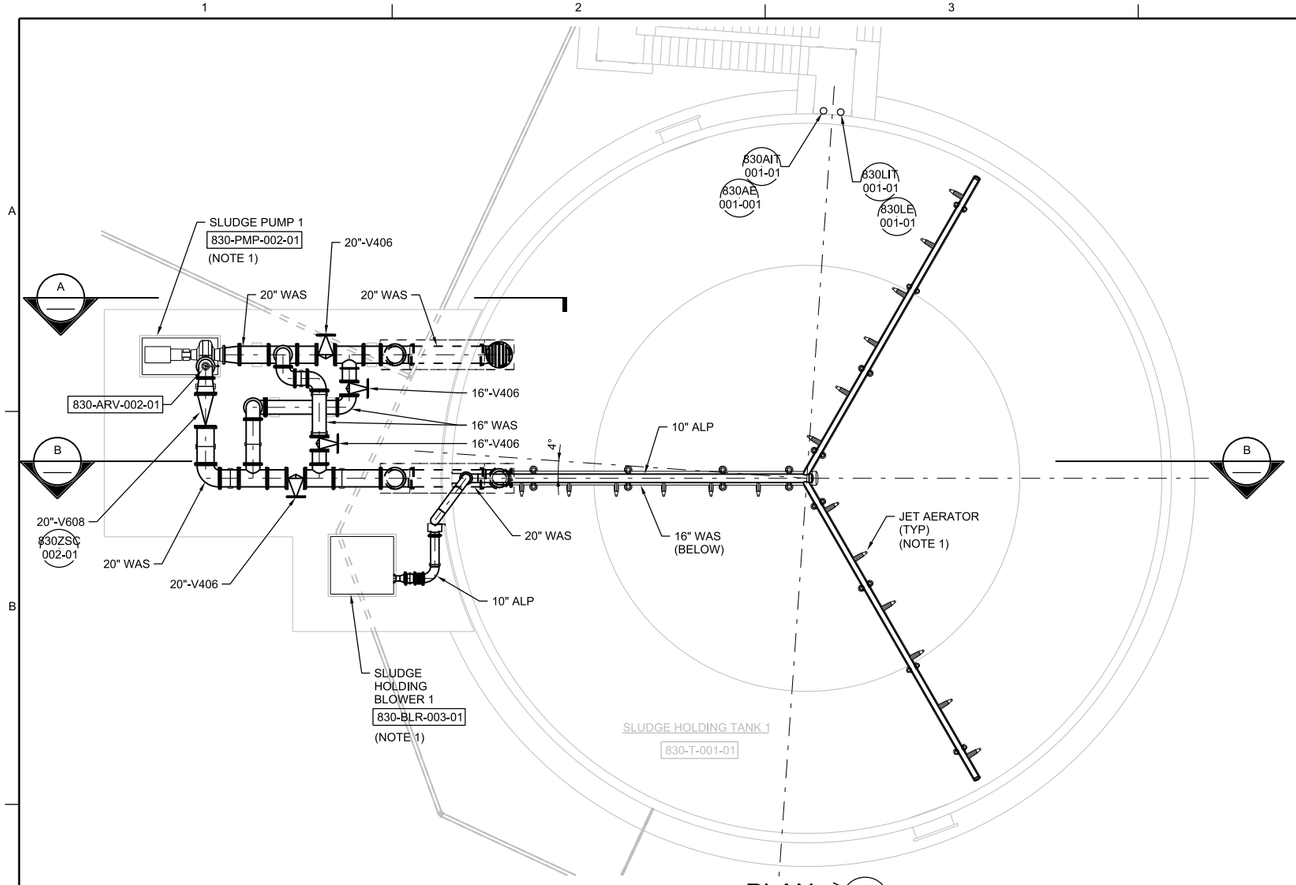
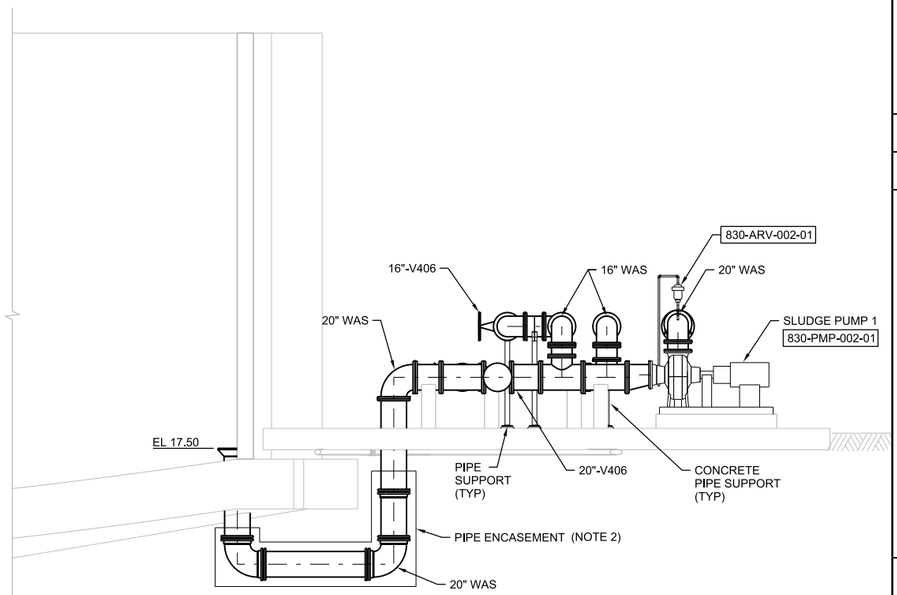
PROJ	457133
DWG	825-D-2001
SHEET	of

FILENAME: 825-D-2001_457133.dgn PLOT DATE: 2/28/2013 PLOT TIME: 5:24:53 PM



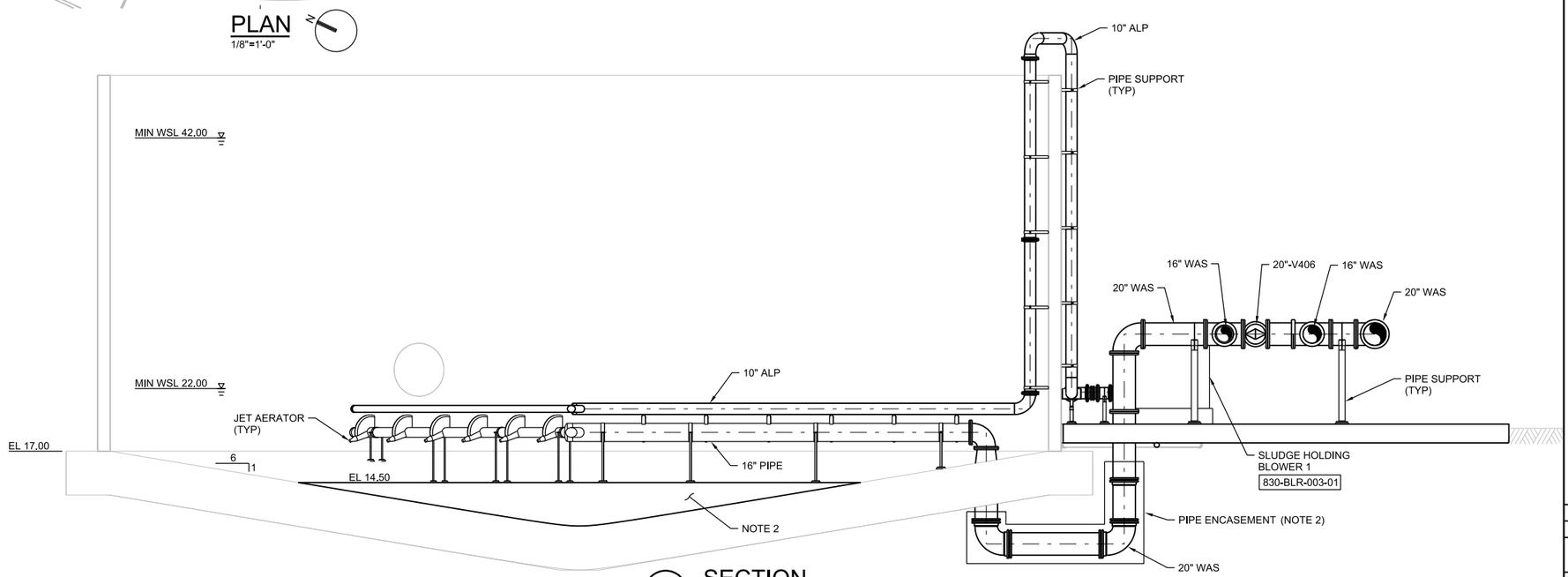
PLAN
1/8"=1'-0"



A SECTION
3/16"=1'-0"

NOTES:

1. COORDINATE EQUIPMENT AND PIPING WITH JET AERATION SYSTEM MANUFACTURER. THE EQUIPMENT SHOWN IS BASED ON ONE MANUFACTURER. DIFFERENT MANUFACTURER WILL HAVE DIFFERENT EQUIPMENT AND PIPING LAYOUT.
2. SEE STRUCTURAL DRAWINGS FOR DETAILS OF PIPE ENCASEMENT AND FILL.



B SECTION
3/16"=1'-0"

NO.	DATE	DR	REVISION	CHK	APVD	BY	APVD
DSGN		T FU	N PATTERSON				

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PROCESS
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VERIFY SCALE
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0 1"

DATE	MARCH 2013
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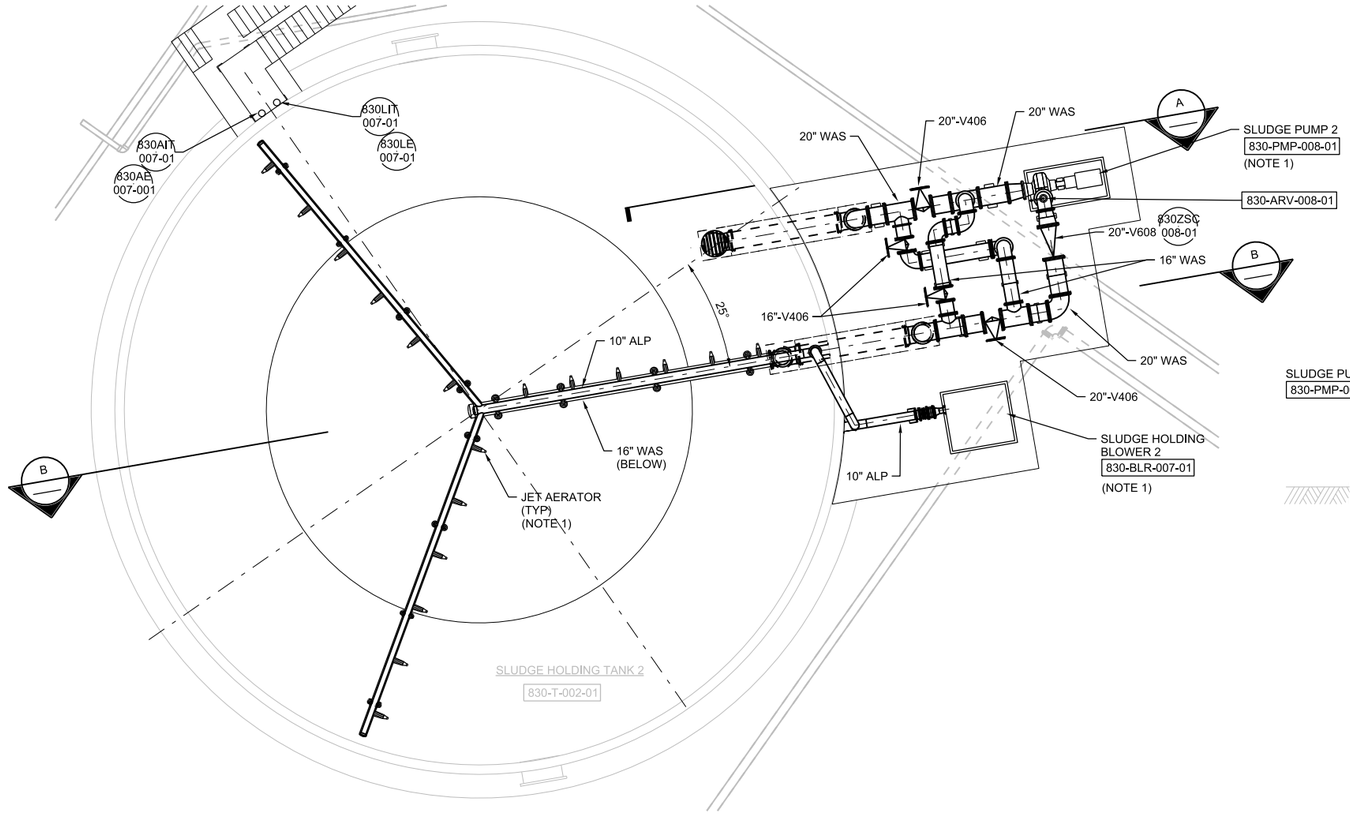
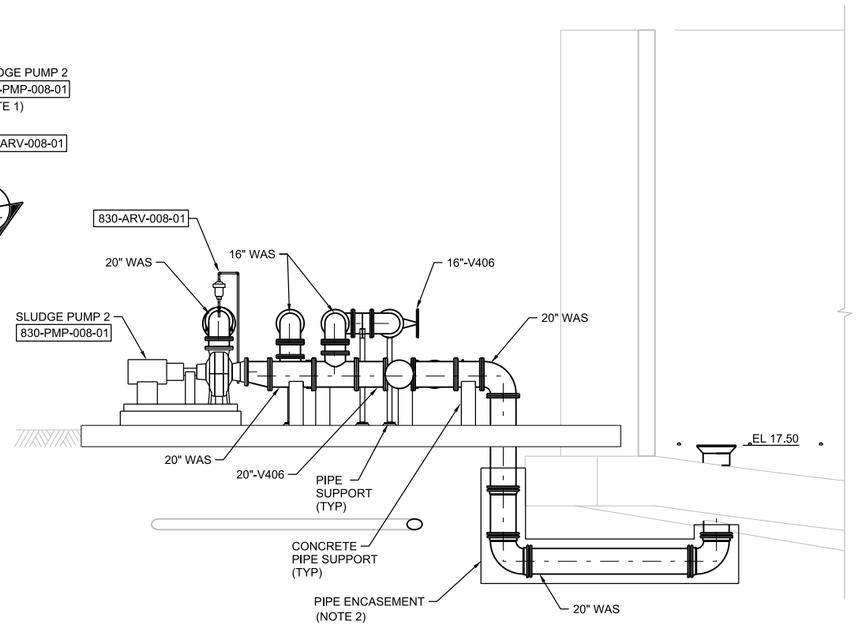
SHEET	of

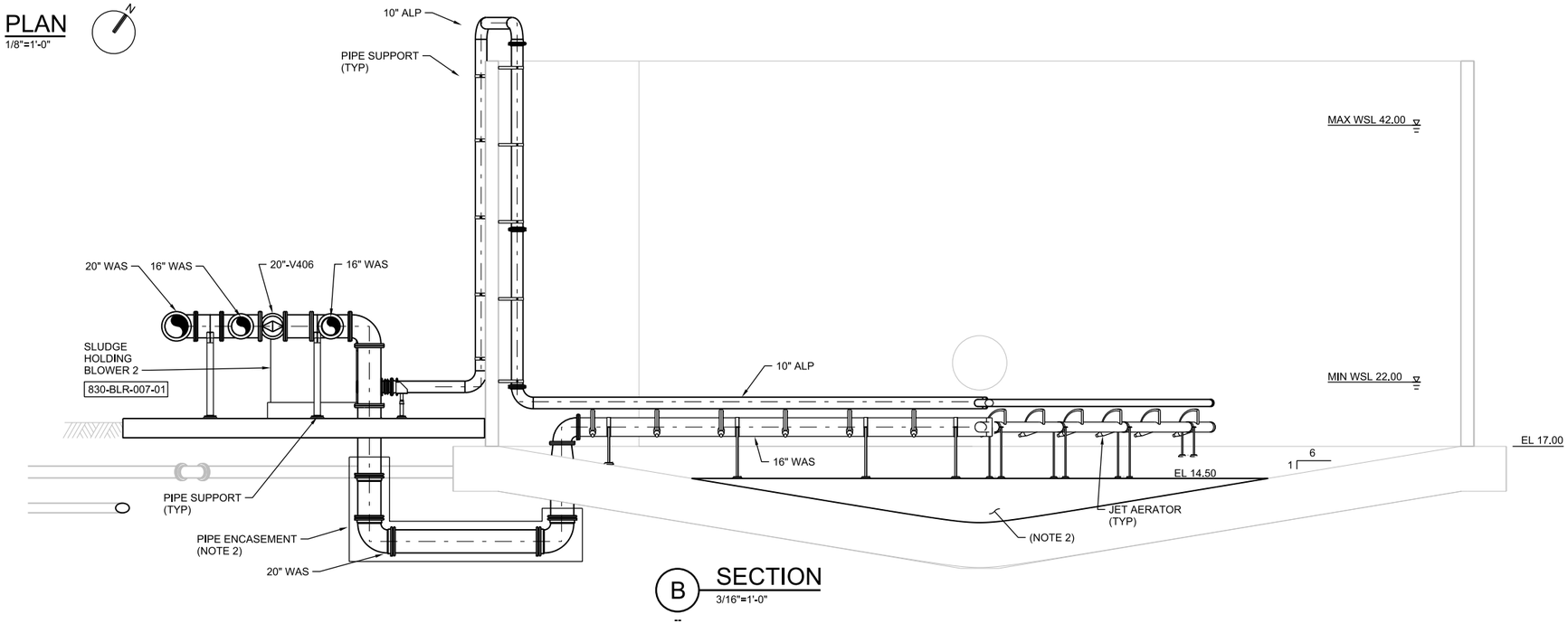
FILENAME: PLOT DATE: 2/28/2013 PLOT TIME: 5:25:09 PM





A SECTION
3/16"=1'-0"

PLAN
1/8"=1'-0"



B SECTION
3/16"=1'-0"

NOTES:

1. COORDINATE EQUIPMENT AND PIPING WITH JET AERATION SYSTEM MANUFACTURER. THE EQUIPMENT SHOWN IS BASED ON ONE MANUFACTURER. DIFFERENT MANUFACTURER WILL HAVE DIFFERENT EQUIPMENT AND PIPING LAYOUT.
2. SEE STRUCTURAL DRAWINGS FOR DETAILS OF PIPE ENCASEMENT AND FILL.

NO.	DATE	DSGN	DR	CHK	APVD	BY	APVD
		T FU	N PATTERSON				

REVISION

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VERIFY SCALE
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0 1"

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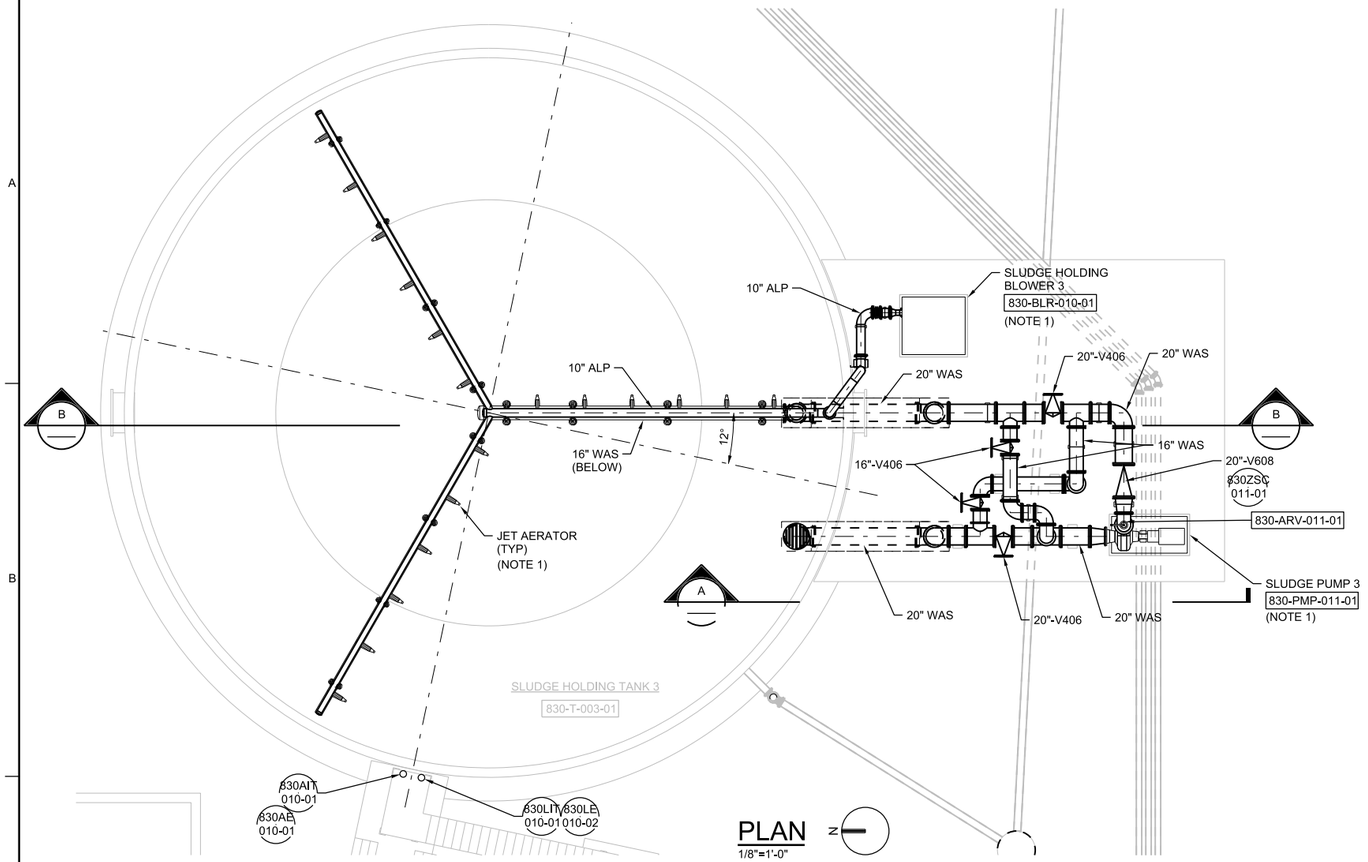
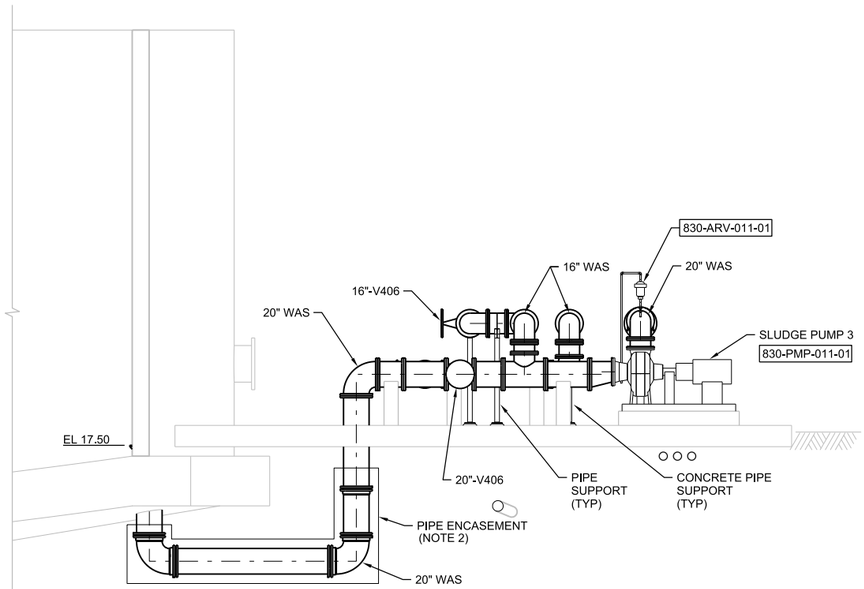
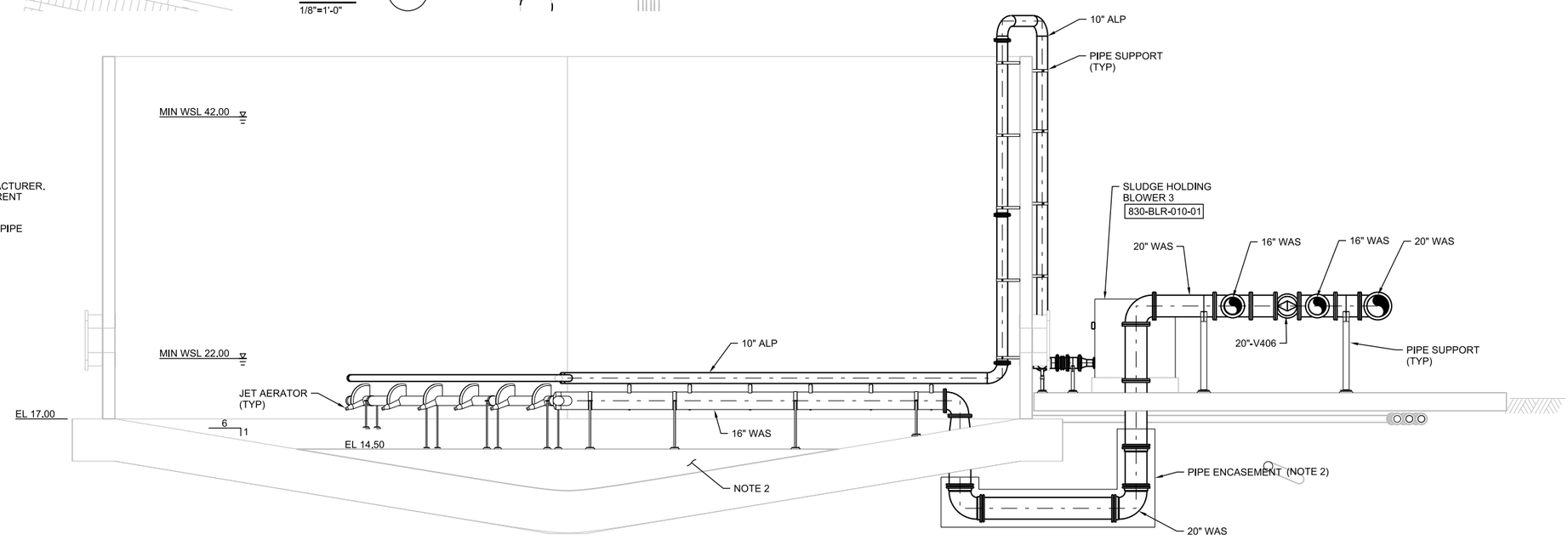




NOTES:

1. COORDINATE EQUIPMENT AND PIPING WITH JET AERATION SYSTEM MANUFACTURER. THE EQUIPMENT SHOWN IS BASED ON ONE MANUFACTURER. DIFFERENT MANUFACTURER WILL HAVE DIFFERENT EQUIPMENT AND PIPING LAYOUT.
2. SEE STRUCTURAL DRAWINGS FOR DETAILS OF PIPE ENCASEMENT AND FILL.



NO.	DSGN	DATE	DR	REVISION	CHK	BY	APVD
			T FU	N PATTERSON			APVD

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PROCESS
SLUDGE HOLDING TANKS
PLAN AND SECTIONS

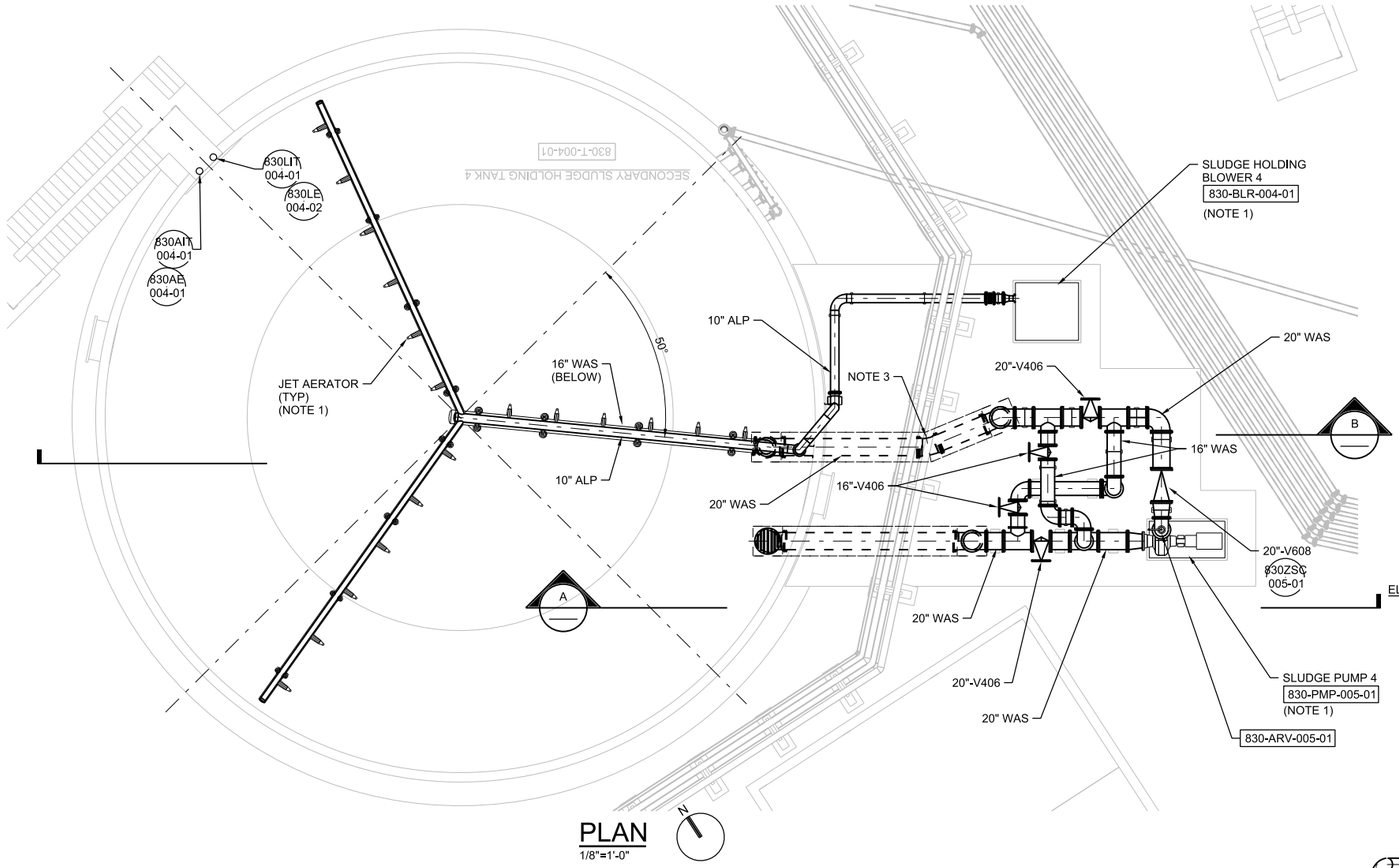
ISSUED FOR BID

VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
0 1"

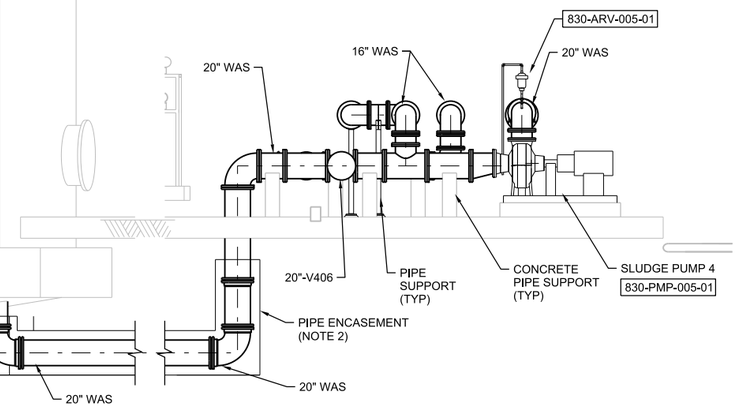
DATE	MARCH 2013
PROJ	457133
DWG	825-D-3003
SHEET	of

NOTES:

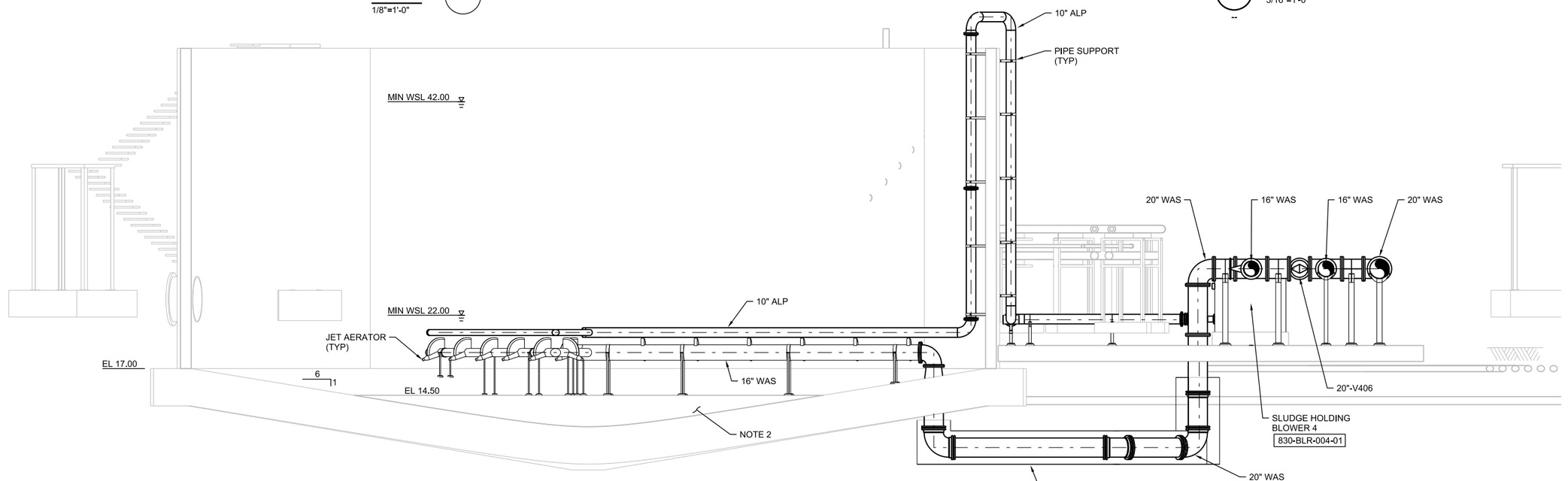
1. COORDINATE EQUIPMENT AND PIPING WITH JET AERATION SYSTEM MANUFACTURER. THE EQUIPMENT SHOWN IS BASED ON ONE MANUFACTURER. DIFFERENT MANUFACTURER WILL HAVE DIFFERENT EQUIPMENT AND PIPING LAYOUT.
2. SEE STRUCTURAL DRAWINGS FOR DETAILS OF PIPE ENCASEMENT AND FILL.
3. FIELD VERIFY LOCATION OF BEND TO AVOID INTERFERENCE WITH EXISTING PIPE SUPPORT.



PLAN
1/8"=1'-0"



A SECTION
3/16"=1'-0"



B SECTION
3/16"=1'-0"

NO.	DATE	DR	REVISION	CHK	APVD	BY	APVD
DSGN		T FU		N PATTERSON			

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PROCESS
SLUDGE HOLDING TANKS PLAN AND SECTIONS

VERIFY SCALE
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0 1"

DATE	MARCH 2013
PROJ	457133
DWG	825-D-3004
SHEET	of

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