Town of Thompson's Station
Utility Board & BOMA Work Sessions
Virtual Meeting Agenda
July 22nd, 2020

1. Wastewater Fund CIP Projects: 6:00 – 7:00

Documents:

TS WW TREATMENT PLANS UPGRADES REGIONAL - COMBINED DRAWING SET_06-11-2020.PDF
MAP REGIONAL WW TREATMENT PLANT UPGRADES.PDF
TS WW TREATMENT PLAN UPGRADES PRELIMINARY ENGINEERING REPORT COMBINED.PDF

2. General Fund CIP: 7:00 – 8:00

Documents:

CAPITAL IMPROVEMENT_TS_VER1.PDF
FY21 CIP PLANNING 2.PDF
RECOMMENDED IMPROVEMENT PROJECTS.PDF
REVISED PARKS_GREENWAYTRAIL_ALLPHASES_24X36.PDF
TDOT TERMINI EXHIBIT.PDF

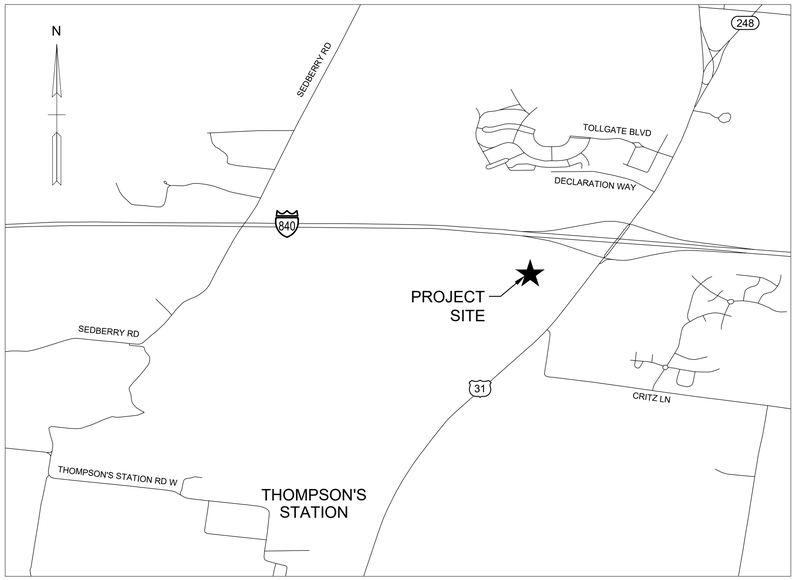
Adjourn

This meeting will be held at 6:00 p.m. remotely by electronic means due to the COVID-19 emergency.

THOMPSON'S STATION - REGIONAL WASTEWATER TREATMENT PLANT UPGRADES

THOMPSON'S STATION, TENNESSEE

TOWN OF THOMPSON'S STATION



LOCATION MAP

NOT TO SCALE

30% DESIGN REVIEW
JUNE 2020

BARGE DESIGN SOLUTIONS

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BARGE DESIGN SOLUTIONS

JUNE, 2020
PROJECT No.
36724-03

REGIONAL WASTEWATER TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

30% DESIGN REVIEW

00-G000
PROJECT No.
36724-03

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CREATED: 4/17/2020 LAST SAVED: 5/26/2020 BY: CNDAVIS
PLOT DATE: 5/26/2020

00-G000	COVER SHEET
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00-G004	GENERAL NOTES
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00-E001	ELECTRICAL LEGEND AND GENERAL NOTES
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01-C102	SITE DEMOLITION PLAN
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03-DI202	P&ID - INFLUENT SCREENING
03-DI203	P&ID - AERATION
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07-S701	INFLUENT LIFT STATION STRUCTURAL SECTIONS & DETAILS
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07-D301	INFLUENT LIFT STATION SECTIONS
07-E101	INFLUENT LIFT STATION ELECTRICAL PLAN
09-S101	INFLUENT SCREENING STRUCTURAL PLAN
09-S301	INFLUENT SCREENING STRUCTURAL SECTIONS
09-S701	INFLUENT SCREENING STRUCTURAL SECTIONS & DETAILS
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15-D101	AERATION BASINS PLAN
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85-P701	SLUDGE DEWATERING BUILDING - PLUMBING DETAILS & SCHEDULES
85-D101	SLUDGE DEWATERING BUILDING - PLAN
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85-E601	SLUDGE DEWATERING BUILDING - RISER DIAGRAM
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95-E703	ELECTRICAL DETAILS
95-E901	ELECTRICAL SCHEDULES
99-S701	GENERAL FOUNDATION SECTIONS & DETAILS
99-S711	GENERAL WALL SECTIONS & DETAILS
99-S712	GENERAL FRAMING SECTIONS & DETAILS
99-D501	STANDARD DETAILS
99-D502	STANDARD DETAILS
99-D503	STANDARD DETAILS
99-D504	STANDARD DETAILS
99-D505	STANDARD DETAILS

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PRELIMINARY
NOT FOR
CONSTRUCTION

DATE

INDEX OF DRAWINGS

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

00-G001

FILE NO. 36724-03

USER:CNDAVIS
FILE:F:\36\3672403724\03\04_CAD\GEN\3672403_00-G001_v18.dwg
SAVED:6/9/2020
PLOTTED:6/9/2020

ABBREVIATIONS

GENERAL ABBREVIATIONS

AB	ANCHOR BOLTS
ABAN	ABANDON
ABC	AGGREGATE BASE COURSE
ABS	ACRYLONITRILE BUTADIENE STYRENE
AC	ASBESTOS CEMENT
ACST	ACOUSTIC
ADDL	ADDITIONAL
ADJ	ADJUSTABLE
ADPT	ADAPTER
AFF	ABOVE FINISHED FLOOR
ALT	ALTERNATE
ALUM	ALUMINUM
APPROX	APPROXIMATE
ASCE	AMERICAN SOCIETY OF CIVIL ENGINEERS
ASPH	ASPHALT
ASSY	ASSEMBLY
AUTO	AUTOMATIC
AUX	AUXILIARY
AVE	AVENUE
AVG	AVERAGE
BC	BACK OF CURB
BKGD	BACKGROUND
BLT	BUILT
BM	BENCHMARK
BM	BLOWOFF
BOT	BOTTOM
BTWN	BETWEEN
BYP	BY PASS
C&G	CURB AND GUTTER
CAP	CAPACITY
CAT	CATALOG
CB	CATCH BASIN
CCW	COUNTER CLOCKWISE
CER	CERAMIC
CFM	CUBIC FEET PER MINUTE
CFS	CUBIC FEET PER SECOND
CHKR	CHECKER
CJ	CONSTRUCTION JOINT
CL	CENTER LINE
CL2	CHLORINE
CLG	CEILING
CLR	CLEAR
CM	CONCRETE MONUMENT
CMU	CONCRETE MASONRY UNIT
CO	CLEAN OUT
COL	COLUMN
COM	COMMON
CONC	CONCRETE
CONC FLR	CONCRETE FLOOR
CONN	CONNECT
CONSTR	CONSTRUCT
CONT	CONTINUOUS
CP	CONTROL PANEL
CPLG	COUPLING
CTR	CENTER
CU	COPPER
CU FT	CUBIC FEET
CU IN	CUBIC INCHES
CU YD	CUBIC YARD
CW	CLOCKWISE
dB	DECIBEL
dBA	UNIT OF SOUND LEVEL
DBL	DOUBLE
DEG	DEGREE
DEMO	DEMOLITION
DHW	DESIGN HIGH WATER
DIA	DIAMETER
DIAG	DIAGONAL
DIM	DIMENSION
DISC	DISCONNECT
DISCH	DISCHARGE
DIST	DISTANCE
DN	DOWN
DWG	DRAWING
E	EAST
EA	EACH
ECC	ECCENTRIC
ECC RDCR	ECCENTRIC REDUCER
ED	EQUIPMENT DRAIN
EF	EACH FACE
EFF	EFFLUENT
EJ	EXPANSION JOINT
EL	ELEVATION
ELEC	ELECTRIC
ELEC DR OP	ELECTRIC DOOR OPENER
EMER SHR	EMERGENCY SHOWER
ENCL	ENCLOSURE
EP	EDGE OF PAVEMENT (PAVING)
EQ	EQUAL
EQUIP	EQUIPMENT
EQUIV	EQUIVALENT
ESMT	EASEMENT
ET	ELAPSED TIME
EW	EACH WAY
EXP	EXPANSION
EXST	EXISTING
EXST GR	EXISTING GRADE
EXT	EXTERNAL
F	FAHRENHEIT
FB	FLAT BAR
FCO	FLOOR CLEANOUT
FD	FLOOR DRAIN
FE	FIRE EXTINGUISHER
FF EL	FINISHED FLOOR ELEVATION
FH	FIRE HYDRANT
FIG	FIGURE
FIN FLR	FINISH FLOOR
FIN GR	FINISH GRADE
FLEX	FLEXIBLE
FLL	FLOW LINE
FLR	FLOOR
FN	FENCE
FRP	FIBER REINFORCED PLASTIC
FT	FEET
FT	FOOT
FTG	FOOTING
G	NATURAL GAS
GA	GAUGE
GAL	GALLON
GALV	GALVANIZED
GBT	GRAVITY BELT THICKENER
GEN	GENERAL
GL	GLASS
GPD	GALLONS PER DAY
GPH	GALLONS PER HOUR
GPM	GALLONS PER MINUTE
GRD	SEWAGE GRINDER
GRTG	GRATING
GSKT	GASKET
H	HIGH
HB	HOSE BIBB
HGR	HANGER
HOA	HAND-OFF-AUTOMATIC
HORIZ	HORIZONTAL
HP	HIGH POINT
HS	HIGH SERVICE
HT	HEIGHT
HWA	HIGH WATER ALARM
HWL	HIGH WATER LEVEL
HWY	HIGHWAY
HYD	HYDRANT OR HYDRAULIC
Hz	HERTZ
ID	INSIDE DIAMETER
IN	INCH
IND	INDICATOR
INF	INFLUENT
INFO	INFORMATION
INSTR	INSTRUMENT
INSUL	INSULATION
INV	INVERT
INV EL	INVERT ELEVATION
IP	IRON PIN
IR	IRON ROD
JCT	JUNCTION
JT	JOINT
KWY	KEY WAY
L	ANGLE
LAB	LABORATORY
LAT	LATITUDE
LATL	LATERAL
LBS	POUND
LF	LINEAR FEET (FOOT)
LH	LEFT HAND
LIM SW	LIMIT SWITCH
LIN	LINEAR
LIQ	LIQUID
LLH	LONG LEG HORIZONTAL
LLV	LONG LEG VERTICAL
LNG	LONGITUDE
LOC	LOCATION
LOG	LOGARITHM
LONG	LONGITUDINAL
LP	LIGHT POLE
LT	LIGHT
LVR	LOUVER
LW	LOW WATER
LWA	LOW WATER ALARM
LWL	LOW WATER LEVEL
M	METER
MACH	MACHINE
MAINT	MAINTENANCE
MAN	MANUAL
MATL	MATERIAL
MAX	MAXIMUM
MCC	MOTOR CONTROL CENTER
MEAS	MEASURE
MECH	MECHANICAL
MED	MEDIUM
MFD	MANUFACTURED
MFG	MANUFACTURING
MFR	MANUFACTURER
MFR REC	MANUFACTURER'S RECOMMENDATION
MGD	MILLION GALLONS PER DAY
MG/L	MILLIGRAMS PER LITER
MH	MANHOLE
MID	MIDDLE
MIN	MINIMUM
MISC	MISCELLANEOUS
MON	MONUMENT
MOT	MOTOR
MSL	MEAN SEA LEVEL
MTD	MOUNTED
MTL	METAL
N	NORTH
NA	NOT APPLICABLE
NC	NORMALLY CLOSED
NEC	NATIONAL ELECTRIC CODE
NIC	NOT IN CONTRACT
NO	NORMALLY OPEN
NO	NUMBER
NOM	NOMINAL
NORM	NORMAL
NTS	NOT TO SCALE
NUM	NUMERAL
OA	OVERALL
OC	ON CENTER
OC EW	ON CENTER EACH WAY
OD	OUTSIDE DIAMETER
O/E	OR EQUAL
OH	OVERHEAD
OHE	OVERHEAD ELECTRIC
OL	OVERLOAD
OPNG	OPENING
OPP	OPPOSITE
OPT	OPTIONAL
ORIG	ORIGINAL
OVFL	OVERFLOW
PC	POINT OF CURVE
PERF	PERFORATED
PERIM	PERIMETER
PERM	PERMANENT
PERP	PERPENDICULAR
pH	ACID/ALKALINE SCALE
PI	POINT OF INTERSECTION
PKG	PACKAGE
PL	PROPERTY LINE OR PLATE
PLAT	PLATFORM
POS	POSITIVE
PPM	PARTS PER MILLION
PR	PAIR
PRESS	PRESSURE
PREV	PREVIOUS
PRI	PRIMARY
PRKG	PARKING
PSI	POUNDS PER SQUARE INCH
PSIA	POUNDS PER SQUARE INCH ABSOLUTE
PSIG	POUNDS PER SQUARE INCH, GAUGE
PSL	PIPE SLEEVE
PT	POINT OF TANGENCY
PVG	PAVING
PWR	POWER
Q	RATE OF FLOW
QTR	QUARTER
QTY	QUANTITY
R	RADIUS
RD	ROAD
RECD	RECEIVED
RECM	RECOMMENDATION
RED	REDUCER
REF	REFRIGERATOR OR REFERENCE
REINF	REINFORCE
REM	REMOVABLE
REP	REPAIR
REPL	REPLACE
REQD	REQUIRED
RESIL	RESILIENT
RM	ROOM
RND	ROUND
ROW	RIGHT OF WAY
RPM	REVOLUTIONS PER MINUTE
RPZ	REDUCED PRESSURE ZONE
RR	RAILROAD
S	SOUTH
S/S	START/STOP
SALV	SALVAGE
SAN	SANITARY
SCFM	STANDARD CUBIC FEET PER MINUTE
SCHED	SCHEDULE
SD	STORM DRAIN
SDMH	STORM DRAIN MANHOLE
SECT	SECTION
SEG	SEGMENT
SF	SQUARE FOOT (FEET)
SGL	SINGLE
SHLDR	SHOULDER
SHV	SHELVING
SIM	SIMILAR
SL	SLUDGE
SLDR	SOLDER
SLNT	SEALANT
SLV	SLEEVE
SOLN	SOLUTION
SOLV	SOLENOID VALVE
SPEC	SPECIFICATION
SQ	SQUARE
SQ IN	SQUARE INCH
SQ YD	SQUARE YARD
SST	STAINLESS STEEL
STA	STATION
STD	STANDARD
STIF	STIFFENER
STK	STOCK
STRUCT	STRUCTURAL
SWD	SIDE WATER DEPTH
SWR	SEWER
SYM	SYMBOL
SYMM	SYMMETRICAL
T	TREAD
T&B	TOP AND BOTTOM
TAN	TANGENT
TBM	TEMPORARY BENCHMARK
TDH	TOTAL DYNAMIC HEAD
TECH	TECHNICAL
TEL	TELEPHONE
TEMP	TEMPERATURE
TEMP	TEMPORARY
THK	THICKNESS
TOB	TOP OF BERM
TOS	TOP OF SLAB
TOW	TOP OF WALL
TYP	TYPICAL
UGND	UNDERGROUND
UNO	UNLESS NOTED OTHERWISE
UV	ULTRAVIOLET
V	VENT
VA	VOLT AMPERE
VAC	VACUUM
VAR	VARIES
VB	VACUUM BREAKER
VB	VALVE BOX
VERT	VERTICAL
VOC	VOLATILE ORGANIC COMPOUND
VOL	VOLUME
VTR	VENT THROUGH ROOF
W	WEST
W/	WITH
W/O	WITHOUT
WAS	WASTE ACTIVATED SLUDGE
WD	WOOD
WL	WATER LINE
WLD	WELDED
WM	WATER METER
WT	WATER TABLE
WW	WASTE WATER
XFER	TRANSFER
XFMR	TRANSFORMER
YD	YARD DRAIN
YH	YARD HYDRANT
YI	YARD INLET
YR	YEAR

PIPE MATERIALS

ABS	ACRYLONITRILE BUTADIENE STYRENE PIPE
ACP	ASBESTOS CEMENT PIPE
BSP	BLACK STEEL PIPE
CIP	CAST IRON PIPE
CISP	CAST IRON SOIL PIPE
CMP	CORRUGATED METAL PIPE
CP	CONCRETE PIPE
CPP	CONCRETE PRESSURE PIPE
CPVC	CHLORINATED POLYVINYL CHLORIDE PIPE
CU P	COPPER PIPE/TUBING
DIP	DUCTILE IRON PIPE
FRP	FIBERGLASS REINFORCED PLASTIC PIPE
GSP	GALVANIZED STEEL PIPE
HDPE	HIGH DENSITY POLYETHYLENE PIPE
PE	POLYETHYLENE (PLASTIC) PIPE
PVC	POLYVINYL CHLORIDE (PLASTIC) PIPE
PVF	POLYVINYL FLUORIDE (PLASTIC) PIPE
RCCP	REINFORCED CONCRETE CYLINDER PIPE
RCP	REINFORCED CONCRETE PIPE
SSP	STAINLESS STEEL PIPE
STL	STEEL PIPE
VCP	VITRIFIED CLAY PIPE

VALVES AND JOINTS

AC CHKV	AIR CUSHION CHECK VALVE
ARV	AIR RELEASE VALVE
B CHKV	BALL CHECK VALVE
BF	BLIND FLANGE
BFP	BACKFLOW PREVENTER
BFV	BUTTERFLY VALVE
BO	BURIED GEAR OPERATOR
BV	BALL VALVE
C	COMPRESSION JOINT
C CHKV	CUSHION CHECK VALVE
CHKV	CHECK VALVE
DMJ	DISMANTLING JOINT
EJ	EXPANSION JOINT
EL VA	ELECTRIC VALVE ACTUATOR
FAC	FLANGED ADAPTER COUPLING
FH	FIRE HYDRANT
FLG	FLANGED
GR	GROOVED END
GTV	GATE VALVE
HU	HUB AND SPIGOT
K GTV	KNIFE GATE VALVE
LR	LONG RADIUS
MJ	MECHANICAL JOINT
NV	NEEDLE VALVE
OC CHKV	OIL CUSHIONED CHECK VALVE
P CHKV	PRESSURE CHECK VALVE
PE	PLAIN END
PHV	PINCH VALVE
PNEU VA	PNEUMATIC VALVE ACTUATOR
PO	PUSH ON JOINT
PRV	PRESSURE REGULATING VALVE
PV	PLUG VALVE
RJ	RESTRAINED JOINT
RS GTV	RESILIENT SEAT GATE VALVE
S	SOLDERED JOINT
SAV	SURGE ANTICIPATOR VALVE
SOLV	SOLENOID VALVE
SW	SOLVENT WELDED
THD	THREADED
TS&V	TAPPING SLEEVE AND VALVE
W	WELDED
WSLV	WALL SLEEVE

PROCESS FLUIDS

ACS	CARBON SLURRY
AER	AERATION
AHP	HIGH PRESSURE AIR
ALP	LOW PRESSURE AIR
ALUM	ALUM
ANE	ANAEROBIC EFFLUENT
ANI	ANAEROBIC INFLUENT
ARCY	ANOXIC RECYCLE
ARE	AERATION EFFLUENT
ARI	AERATION INFLUENT
ASH	INCINERATOR ASH
ASR	AERATED SUPERNATANT RETURN
AWR	ACID WASH RETURN
AWS	ACID WASH SUPPLY
AXE	ANOXIC EFFLUENT
AXI	ANOXIC INFLUENT
BISULFITE	SODIUM BISULFITE
BISULFITE SOL	SODIUM BISULFITE SOLUTION
BWS	BACKWASH SUPPLY
BWW	BACKWASH WASTE
CCK	CENTRIFUGE BIOSOLIDS CAKE
CEN	CENTRATE
CFS	CENTRIFUGE FEED SOLIDS
CIP	CLEAN-IN PIPE
CL2	CHLORINE GAS
CLO2	CHLORINE DIOXIDE
CLS	CHLORINE SOLUTION
CN SCUM	CONCENTRATED SCUM
CNFS	CONDITIONING TANK FEED SOLIDS
CON	CONCENTRATE
CRW	CLARIFIED RAW WATER
CS	CONDITIONED SLUDGE
CTE	DISINFECTION CONTACT TANK EFFLUENT
CTS	CENTRIFUGE THICKENED BIOSOLIDS
CW	COLD WATER (POTABLE)
CYCL INF	CYCLONE INFLUENT
CYCL RCY	CYCLONE RECYCLE
D AL	DISSOLVED ALUM
DA	POLYMER DRY AIR
DEC	DECANT
DF	DIESEL FUEL
DFR	DIESEL FUEL RETURN
DFS	DIESEL FUEL SUPPLY
DGAS	DIGESTER GAS
DGR	DEWATERED GRIT
DPOLY	DRY POLYMER
DPSD	DRAINAGE PUMP STATION DISCHARGE
DR	DRAIN
DRS	DIGESTER RECIRCULATION SOLIDS
DS	DIGESTED SLUDGE
DSR	DECANT SUPERNATANT RETURN
DW FL	DEWATERING FLOCCULATION
DWS	DEWATERED SLUDGE
EI	EQUALIZATION INFLUENT
ER	EQUALIZATION RETURN
F	FILTRATE
FD	FLOOR DRAIN
FD SCUM	FEED SCUM
FE	FINAL EFFLUENT
FECL	FERRIC CHLORIDE
FES	FERROUS SULFATE
FIRE	FIRE PROTECTION
FLS	FOREIGN BIOSOLIDS LOADING
FO	FUEL OIL
FOR	FUEL OIL RETURN
FOS	FUEL OIL SUPPLY
FOV	FUEL OIL VENT
FSB	FLOTATION THICKENER SUBNATANT
FTFS	FLOTATION THICKENER FEED SOLIDS
FTRCY	FLOTATION THICKENER RECYCLE
FTS	FLOTATION THICKENED SOLIDS
FUS	FOREIGN BIOSOLIDS UNLOADING
GBFL	GRAVITY BELT THICKENER FILTRATE
GBFS	GRAVITY BELT THICKENER FEED SOLIDS
GBTS	GRAVITY BELT THICKENED SOLIDS
GRIT	GRIT
GSP	GRAVITY THICKENER OVERFLOW/SUPERNATANT
GTFS	GRAVITY THICKENER FEED SOLIDS
GTS	GRAVITY THICKENED SOLIDS
H2O2	PEROXIDE
HCL	HYDROCHLORIC ACID
HDO	HYDRAULIC OIL
HF	FLUORIDE
HPSA	SERVICE AIR (HIGH PRESSURE)
HPW	HOT POTABLE WATER
HTFS	HOLDING TANK FEED SOLIDS
HVAC	HVAC
HW	HOT WATER (POTABLE)
HW REV RET	HOT WATER REVERSE RETURN
HWR	HOT WATER RETURN
HWS	HOT WATER SUPPLY
HYPO	SODIUM HYPOCHLORITE
HYPO SOL	SODIUM HYPOCHLORITE SOLUTION
ICE	INTERMEDIATE CLARIFIER EFFLUENT
ICI	INTERMEDIATE CLARIFIER INFLUENT
IFC	INCINERATOR FEED CAKE
INS	INTERMEDIATE BIOSOLIDS
ISE	INCINERATOR SCRUBBER WATER EFFLUENT
LO	LUBE OIL
LP	PROPANE
LPOLY	LIQUID POLYMER
LPSA	SERVICE AIR (LOW PRESSURE)
LS	LIME SLURRY
ML	MIXED LIQUOR
NAOH	CAUSTIC
NAOH SOL	CAUSTIC SOLUTION
NAT GAS	NATURAL GAS
NG	NATURAL GAS
NH4	AMMONIA
NPW	NON POTABLE WATER
NPWW	NON POTABLE WELL WATER
NRCY	NITRIFIED RECYCLE
O3	OZONE
OA	ODOROUS AIR
OTE	OXIDATION TOWER EFFLUENT
OTI	OXIDATION TOWER INFLUENT
PCE	PRIMARY CLARIFIER EFFLUENT
PCI	PRIMARY CLARIFIER INFLUENT
PCS	PRIMARY CLARIFIER SOLIDS
PDFS	PRIMARY DIGESTER FEED SOLIDS
PDS	PRIMARY DIGESTED SOLIDS
PDSP	PRIMARY DIGESTER SUPERNATANT
PDXS	PRIMARY DIGESTER TRANSFER SOLIDS
PO4	PHOSPHATE COMPOUNDS
POLY SOL	POLYMER SOLUTION
PP	POTASSIUM PERMANGANATE
PW	POTABLE WATER
RAS	RETURN ACTIVATED SLUDGE
RCYW	RECYCLE WATER
RD	ROOF DRAIN
RWI	RAW WATER INFLUENT
RWW	RAW WASTEWATER INFLUENT
SBD	SCRUBBER BLOWDOWN
SCB	SCUM CONCENTRATOR SUBNATANT
SCE	SECONDARY CLARIFIER EFFLUENT
SCF	SCRUBBER CHEMICAL FEED
SCI	SECONDARY CLARIFIER INFLUENT
SCRUB EXH	SCRUBBER EXHAUST
SCRUB INTK	SCRUBBER INTAKE
SCUM	SCUM
SDS	SECONDARY DIGESTED SOLIDS
SDSP	SECONDARY DIGESTER SUPERNATANT
SE	SCREENED EFFLUENT
SE	SCRUBBER EXHAUST
SEPT UNLDG	SEPTIC TANK UNLOADING
SO	SULFUR DIOXIDE
SOA	SULFURIC ACID
SPD	SUMP PUMP DISCHARGE
SPRAY	SPRAY WATER
SRC	SCRUBBER RECIRCULATION CLEANING
SRD	SCRUBBER RECIRCULATION DISCHARGE
SRS	SCRUBBER RECIRCULATION SUCTION
SS	SANITARY SEWER
SSFM	SANITARY SEWER FORCE MAIN
STM	STEAM
STORM	STORM DRAIN
SW	SEAL WATER
V	VENT
VAC	VACUUM
WAS	WASTE ACTIVATED SLUDGE
	ANTISCALANT
	SODA ASH/SODIUM CARBONATE NA2CO3

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STANDARD ABBREVIATIONS

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

00-G002

FILE NO. 36724-03

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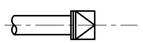
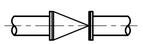
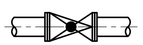
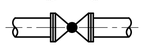
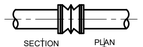
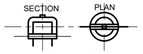
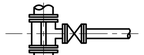
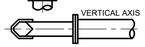
FILE:F:\36\36724\36724030\04_CAD\GEN\L36724403_00-G002_v18.dwg
SAVED:5/21/2020
PLOTTED:6/2/2020

VALVE DESIGNATIONS

SYMBOLS: DOUBLE LINE	SYMBOLS: SINGLE LINE	TYPE
		FOOT VALVE
		VACUUM RELIEF VALVE
		PRESSURE RELEASE VALVE
		HOSE BIBB
		GATE VALVE
		ALTITUDE VALVE, PRESSURE CONTROL REGULATING VALVE, SURGE OR PRESSURE RELIEF
		BUTTERFLY VALVE
		BALL CONTROL VALVE
		BALL VALVE
		DIAPHRAGM VALVE
		FLOODWATER (DUCKBILL) VALVE
		CHECK VALVE
		WAFER CHECK VALVE
		CONE VALVE
		GLOBE VALVE
		PLUG VALVE
		MUD VALVE
		PINCH VALVE
		TAPPING SLEEVE AND VALVE
		TELESCOPIC VALVE

SYMBOL LEGEND

DOUBLE LINE	SINGLE LINE	
		90° FLANGE BEND
		FLANGE TEE
		REDUCER CONCENTRIC
		FLOW METER
		FLEXIBLE CONNECTION
		PRESSURE INDICATOR
		SOLENOID OPERATED
		MOTOR OPERATED
		QUICK CONNECT COUPLING

JOINT DESIGNATIONS

SYMBOL	TYPE
	FLANGED JOINT
	MECHANICAL JOINT
	THREADED JOINT
	PUSH ON JOINT
	BOLTED FLEXIBLE COUPLING
	GROOVED COUPLING
	SHOP WELDED JOINT (STEEL PIPE)
	FIELD WELDED JOINT (STEEL PIPE)
	SOCKET TYPE JOINT (FRP OR PVC PIPE)
	EXPANSION JOINT
	FLANGE ADAPTER COUPLING
	BLIND FLANGE
	DISMANTLING JOINT
	RESTRAINED FLANGE ADAPTOR

PIPE DESIGNATIONS

SYMBOL	TYPE
	CORED HOLE IN EXISTING WALL
	WALL SLEEVE W/ WATER COLLAR (STANDARD)
	FLANGE X FLANGE WALL PIPE
	FLANGE X PLAIN END WALL PIPE
	FLANGE X PLAIN END WALL PIPE (TAPPED FOR STUDS)
	MECHANICAL JOINT X MECHANICAL JOINT WALL PIPE (TAPPED FOR STUDS)
	MECHANICAL JOINT X PLAIN END WALL PIPE (TAPPED FOR STUDS)
	PUSH ON BELL JOINT X PLAIN END WALL PIPE

PIPING AND VALVES GENERAL NOTES

1. INSTALL ALL PIPING SUPPORTS AND PIPING IN ACCORDANCE WITH THE LATEST EDITION OF THE ASME ANSI POWER PIPING CODE B 31.1.
2. LOCATE PRESSURE TAPS ON THE TOP OF PROCESS PIPES, UNLESS OTHERWISE INDICATED ON DWGS.
3. LOCATE SAMPLE TAPS ON THE SIDE OF PROCESS PIPES.
4. LOCATE DRAIN TAPS ON THE BOTTOM OF PROCESS PIPES.
5. UNLESS OTHERWISE NOTED, PIPE ELEVATIONS SHOWN ON PIPING DRAWINGS REFER TO CENTERLINE OF THE PIPE.
6. ALL GROUND BURIED PIPING TO HAVE A MINIMUM OF 36" OF EARTH COVER OR AS DETAILED ON THE DRAWINGS. MAINTAIN MINIMUM CLEARANCE BETWEEN PIPES OF 6".
7. INSTALL ALL PLUG, BUTTERFLY AND BALL VALVES WITH THE SHAFT IN THE HORIZONTAL POSITION, UNLESS OTHERWISE DIRECTED.

SITE PLAN LEGEND

	NEW BUILDING
	EXISTING BUILDING
	NEW STRUCTURE (TANKS, ETC.)
	EXISTING STRUCTURE (TANKS, ETC.)
	FUTURE STRUCTURE
	NEW PIPING SINGLE LINE
	NEW PIPING DOUBLE LINE
	EXISTING PIPING SINGLE LINE
	EXISTING PIPING DOUBLE LINE
	NEW MANHOLE
	EXISTING MANHOLE
	NEW VALVE BOX
	EXISTING VALVE BOX
	NEW VALVE MANHOLE AND NUMBER
	EXISTING VALVE MANHOLE
	NEW YARD HYDRANT ASSEMBLY
	NEW FIRE HYDRANT ASSEMBLY
	EXISTING FIRE HYDRANT ASSEMBLY
	NEW UNDERGROUND ELECTRICAL CONDUIT
	EXISTING UNDERGROUND ELECTRICAL CONDUIT
	NEW CATCH BASIN
	EXISTING CATCH BASIN
	PIPING OR EQUIPMENT TO BE DEMOLISHED
	STRUCTURE (TANKS, ETC.) OR PAVEMENT TO BE REMOVED
	STRUCTURE/ BUILDING TO BE RENOVATED
	ABANDON PIPE
	NEW CONCRETE PAVEMENT
	EXISTING CONCRETE PAVEMENT
	NEW ASPHALT PAVEMENT
	EXISTING ASPHALT PAVEMENT
	NEW GRAVEL DRIVE
	EXISTING GRAVEL DRIVE
	STRAW BALES
	RIP-RAP
1894	NEW CONTOURS
1895	EXISTING CONTOURS
	NEW FENCE
	EXISTING FENCE
	PROPERTY LINE
	NEW POWER POLE
	EXISTING POWER POLE
	STRUCTURE IDENTIFIER
	SILT FENCE
	EASEMENT BOUNDARY

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GENERAL LEGEND

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

00-G003

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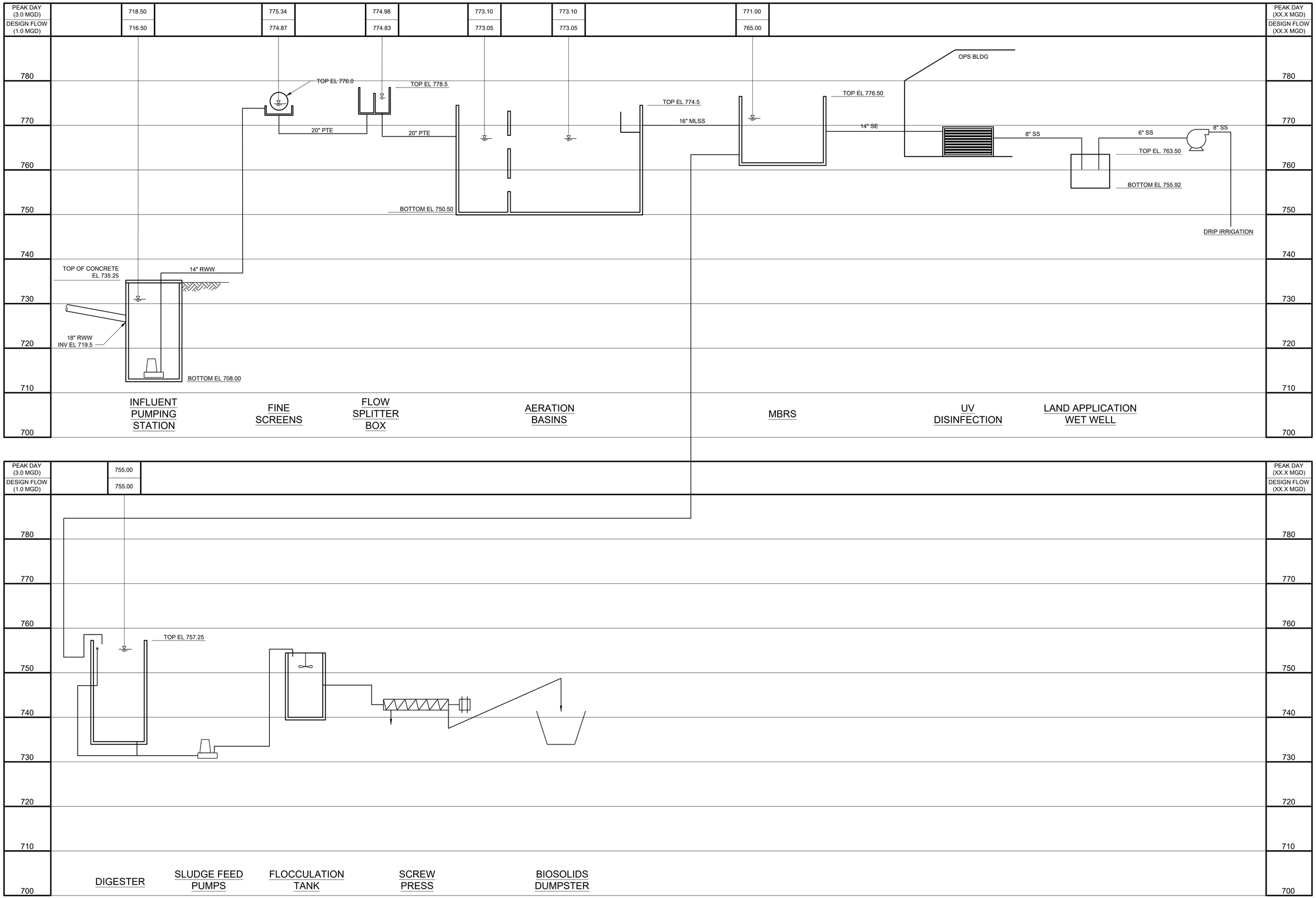

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HYDRAULIC PROFILE

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES

THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

00-G201

FILE NO. 36724-03

LEGEND

EXISTING FLOW

NEW FLOW

EXISTING STRUCTURE

NEW STRUCTURE

FUTURE STRUCTURE

PLANT DRAIN

D

MEMBRANE BLOWERS

FUTURE MEMBRANE SYSTEM

MEMBRANE SYSTEM 1

MEMBRANE SYSTEM 2

PROCESS BLOWERS

AERATION BASIN 1

AEROBIC

ANOXIC

AERATION BASIN 2

AEROBIC

ANOXIC

DRUM SCREEN 1

DRUM SCREEN 2

SCREENINGS CONTAINER 1

SCREENINGS CONTAINER 2

TOLLGATE FORCE MAIN

INFLUENT SANITARY SEWER

MH-A

MH-B

INFLUENT LIFT STATION

M INFLUENT METER

MH-1

SCUM PUMP STATION

PS-2

PS-1

MH-C

EXISTING FILTER

CELL 2

LAGOON PUMP

OPERATIONS BUILDING

UV TRAIN 1

UV TRAIN 2

CLEARWELL

IRRIGATION PUMP 1

IRRIGATION PUMP 2

TO DRIP FIELDS

TO DRIP FIELDS

OVERFLOW

TO TOLLGATE FORCE MAIN

DIGESTER BLOWERS

DIGESTER

SLUDGE PUMP

POLYMER

FLOCCULATION TANK

SCREW PRESS

TO DISPOSAL

BIOSOLIDS DEWATERING BUILDING

NOTES:

1. SEE P&IDS FOR PIPE SIZES, VALVE AND GATE LOCATIONS.

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PROCESS FLOW DIAGRAM

REGIONAL WASTEWATER TREATMENT PLANT

TREATMENT PLANT UPGRADES

THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

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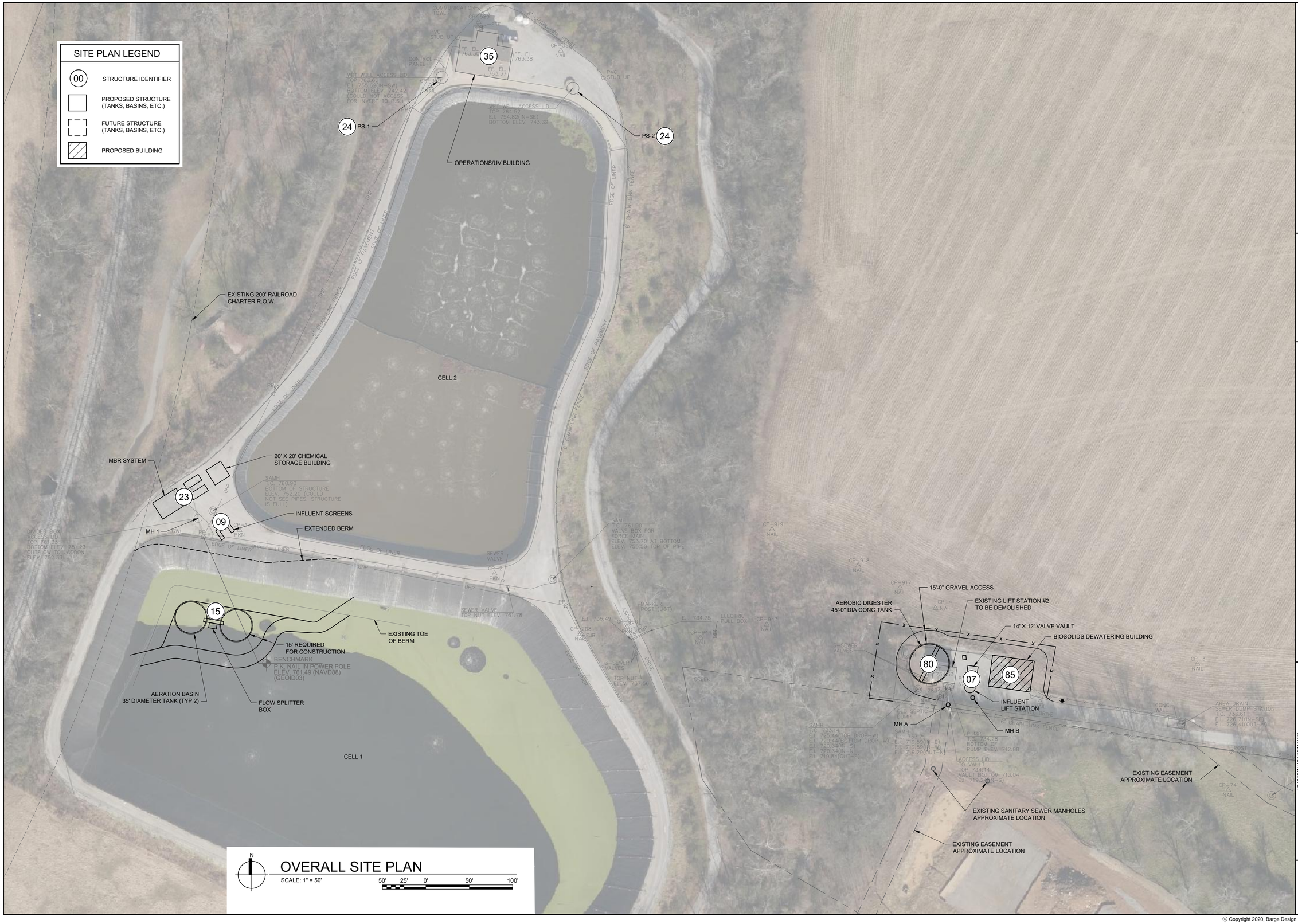

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OVERALL SITE PLAN

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

01-C101

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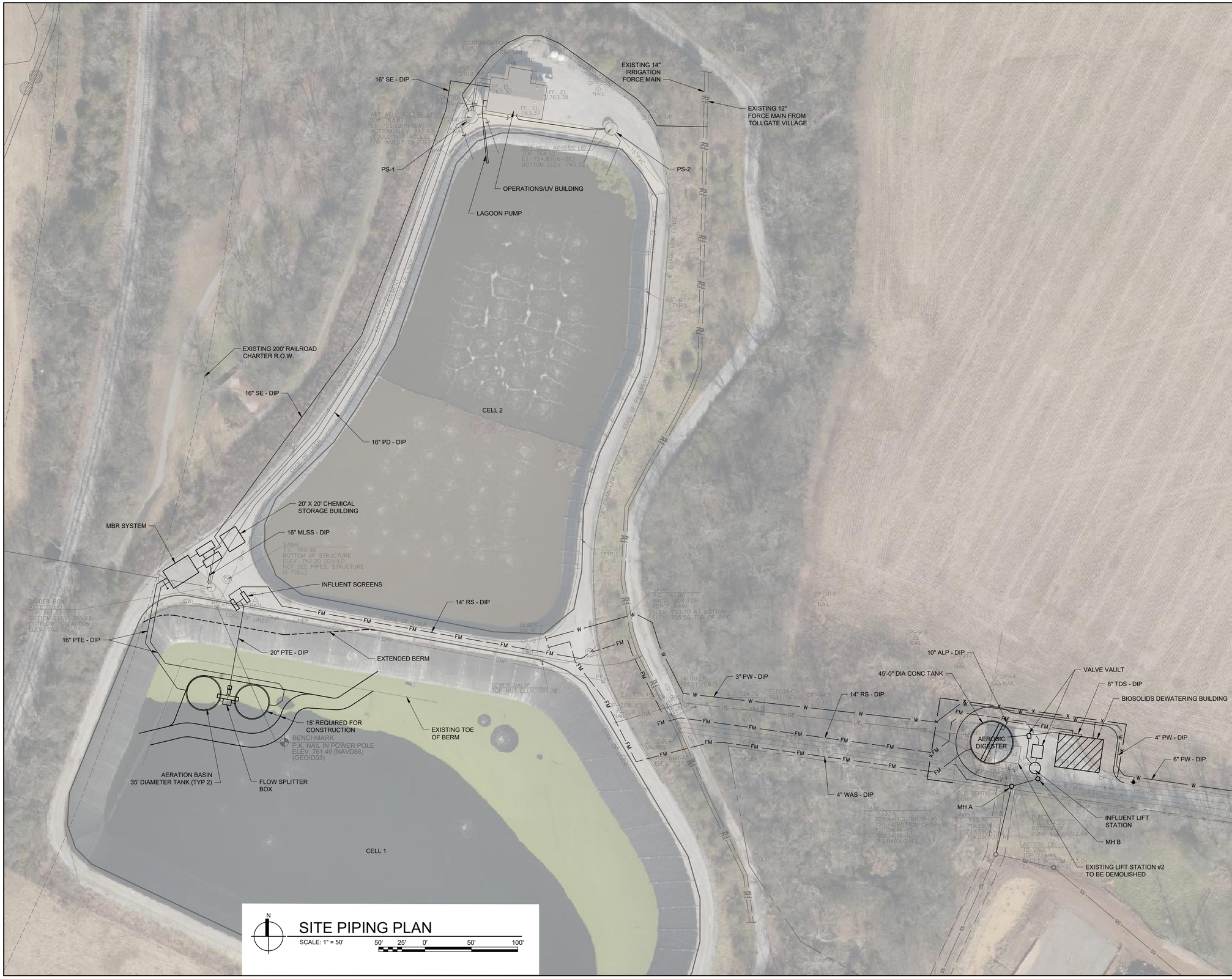

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SITE PIPING PLAN

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REV.	DR.	CHK.	DATE	DESCRIPTION
REVISION INFORMATION				

01-C120

FILE NO. 36724-03

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VALVES

- GATE VALVE OR OTHER IN-LINE TYPE NOT OTHERWISE IDENTIFIED
- BALL
- BUTTERFLY
- PLUG
- CHECK
- WAFER CHECK
- NEEDLE
- DIAPHRAGM
- GLOBE
- PINCH
- ANGLE
- THREE WAY
- FOUR WAY
- BACKFLOW PREVENTER
- KNIFE
- MUD (PLAN, SECT)
- PRESSURE REDUCING VALVE
- PRESSURE RELEASE VALVE
- VACUUM RELIEF VALVE
- TELESCOPING

GATES

- OR SLIDE
- WEIR
- FLAP

FITTING SYMBOLS

- REDUCER - CONCENTRIC
- REDUCER - ECCENTRIC
- PIPE CLEANOUT PORT
- UNION
- FLANGE
- PIPE BREAK
- CAP
- PLUG
- DRAIN - BELL UP
- DRAIN - FUNNEL
- FLEXIBLE TUBING
- EXPANSION JOINT
- QUICK CONNECT
- STRAINER - WYE TYPE
- STRAINER - BASKET TYPE
- DIAPHRAGM SEAL

PRIMARY ELEMENT

- ELECTROMAGNETIC FLOWMETER
- PARSHALL FLUME
- PROPELLER OR TURBINE FLOW METER
- ULTRASONIC FLOW METER (CLAMP-ON)
- VENTURI TUBE
- VORTEX FLOWMETER
- ROTAMETER
- FLOAT SWITCH
- BUBBLER TUBE

MISCELLANEOUS SYMBOLS

- FILTER
- SILENCER
- BELT WEIGH SCALE
- WEIGH SCALE

PUMP & BLOWER SYMBOLS

- CENTRIFUGAL PUMP OR OTHER TYPE NOT SPECIFIED
- PISTON PUMP
- VERTICAL PUMP
- METERING PUMP
- SUBMERSIBLE PUMP
- SUBMERSIBLE AXIAL FLOW PUMP
- PROGRESSIVE CAVITY PUMP
- GEAR OR ROTARY PUMP OR BLOWER (POSITIVE DISPLACEMENT)
- AIR COMPRESSOR (2 STAGE SHOWN)
- CENTRIFUGAL BLOWER OR FAN
- SCREW PUMP

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

WASTEWATER PROCESS SYMBOLS

- MIXER OR SURFACE ASPIRATOR
- DIFFUSER
- UV BANK
- DRAFT TUBE AERATOR

SOLIDS HANDLING EQUIPMENT SYMBOLS

- ROTARY SCREEN
- CYCLONE SEPARATOR
- GRIT COLLECTOR: HYDRAULIC TYPE
- GRIT COLLECTOR: VORTEX TYPE
- GRIT CONCENTRATOR & DEWATERING SCREW
- SCREW CONVEYOR OR SCREW PRESS
- BELT CONVEYOR
- INLINE GRINDER
- CHANNEL MTD GRINDER
- BAR SCREEN: MANUAL
- BAR SCREEN: MECHANICAL

VALVE & GATE ACTUATOR SYMBOLS

- MOTOR OPERATOR
- SOLENOID OPERATOR XX
- PNEUMATIC OPERATOR XX

THE FOLLOWING ADDITIONAL DESIGNATIONS MAY BE UTILIZED ADJACENT TO SOME VALVE OR GATE SYMBOLS.

XX:
- NC NORMALLY CLOSED
- NO NORMALLY OPEN
- FC FAILS CLOSED
- FO FAILS OPEN
- FIP FAILS IN LAST POSITION

CHEMICAL FEED EQUIPMENT SYMBOLS

- CHLORINE CYLINDER
- CHEMICAL STORAGE
- POLYMER BLENDER FEEDER
- EDUCTOR
- INJECTOR
- CALIBRATION COLUMN
- STATIC IN-LINE MIXER

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P&ID - STANDARD SYMBOLS

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

03-DI001

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	PRIMARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR (NOTE 1)	FIELD MOUNTED (NOTE 2)	AUXILIARY LOCATION NORMALLY ACCESSIBLE TO OPERATOR (NOTE 1)
DISCRETE INSTRUMENTS			
SHARED DISPLAY, SHARED CONTROL (SCADA)			
COMPUTER FUNCTION			
PROGRAMMABLE LOGIC CONTROL (PLC)			

INSTRUMENT WITH LONG TAG NUMBER	INSTRUMENT SHARING COMMON HOUSING	PILOT LIGHT	PURGE OR FLUSHING DEVICE
RESET FOR LATCH-TYPE ACTUATOR	DIAPHRAGM SEAL	NOTE 4 NOTE 3 UNDEFINED INTERLOCK LOGIC	TOTAL

NOTES

1. NORMALLY INACCESSIBLE TO BEHIND-THE-PANEL DEVICES OR FUNCTIONS ARE DEPICTED BY USING THE SAME SYMBOLS BUT WITH DASHED HORIZONTAL BARS, I.E.:
2. SUPERSCRIPT DENOTES ADDITIONAL FUNCTIONAL DESCRIPTION OF INSTRUMENT. SEE INSTRUMENT DESIGNATIONS FOR DEFINITIONS.
3. SUBSCRIPT DENOTES PANEL OR CABINET I.D.
4. SUPERSCRIPT REFERS TO INTERLOCK SPECIFICATION.

DIAPHRAGM, SPRING-OPPOSED	DIAPHRAGM, PRESSURE-BALANCED	SPRING-OPPOSED SINGLE-ACTING CYLINDER	DOUBLE-ACTING CYLINDER
SOLENOID	CYLINDER WITH POSITIONER	ELECTROHYDRAULIC	VALVE ACTUATOR W/ ATTACHED ELECTRO-PNEUMATIC CONVERTER
HAND ACTUATOR OR HANDWHEEL	INDICATING VARIABLE AREA METER W/ INTEGRAL MANUAL THROTTLE VALVE	RESTRICTION ORIFICE DRILLED IN VALVE (INSTRUMENT TAG NO. MAY BE OMITTED IF VALVE IS OTHERWISE IDENTIFIED)	FLOW SIGHT GLASS, PLAIN OR W/ PADDLE WHEEL, FLAPPER, ETC.
FLOW STRAIGHTENING VANE (TAG NUMBER IS OPTIONAL THE LOOP NUMBER MAY BE THE SAME AS THAT OF THE ASSOCIATED PRIMARY ELEMENT)	HAND CONTROL VALVE	LEVEL REGULATOR W/ MECHANICAL LINKAGE	PRESSURE-REDUCING REGULATOR, SELF-CONTAINED, WITH HANDWHEEL ADJUSTABLE SET POINT
PRESSURE-REDUCING REGULATOR WITH EXTERNAL PRESSURE TAP	DIFFERENTIAL-PRESSURE-REDUCING REGULATOR WITH INTERNAL AND EXTERNAL PRESSURE TAPS	BACKPRESSURE REGULATOR, SELF-CONTAINED	BACKPRESSURE REGULATOR WITH EXTERNAL PRESSURE TAP
PRESSURE-REDUCING REGULATOR W/ INTEGRAL OUTLET PRESSURE RELIEF VALVE, AND OPTIONAL PRESSURE INDICATOR (TYPICAL AIR SET)	PRESSURE RELIEF OR SAFETY VALVE, GENERAL SYMBOL	PRESSURE RELIEF OR SAFETY VALVE, STRAIGHT-THROUGH PATTERN, SPRING-OR WITH INTEGRAL PILOT	VACUUM RELIEF VALVE, GENERAL SYMBOL
PRESSURE AND VACUUM RELIEF VALVE, SPRING-OR WEIGHT-LOADED, OR WITH INTEGRAL PILOT	PRESSURE RELIEF OR SAFETY VALVE, ANGLE PATTERN, TRIPPED BY INTEGRAL SOLENOID	RUPTURE DISK OR SAFETY HEAD FOR PRESSURE RELIEF	RUPTURE DISK OR SAFETY HEAD FOR VACUUM RELIEF
TEMPERATURE REGULATOR, FILLED-SYSTEM TYPE	ALL TRAPS	TRAP WITH EQUALIZING CONNECTION	THREE-WAY VALVE, FAIL OPEN TO PATH A-C
FOUR-WAY VALVE, FAIL OPEN TO PATHS A-C AND D-B			

ORIFICE PLATE WITH FLANGE OR CORNER TAPS CONNECTED TO DIFFERENTIAL-PRESSURE TYPE FLOW INDICATOR	ORIFICE PLATE WITH VENA CONTRACTA TAPS	ORIFICE PLATE WITH VENA CONTRACTA, RADIUS, OR PIPE TAPS CONNECTED TO DIFFERENTIAL-PRESSURE-TYPE FLOW TRANSMITTER	ORIFICE PLATE IN QUICK-CHANGE FITTING
SINGLE PORT PITOT TUBE OR PITOT-VENTURI TUBE	VENTURI TUBE	AVERAGING PITOT TUBE	FLUME
WEIR	TURBINE-OR PROPELLER-TYPE PRIMARY ELEMENT	VARIABLE AREA FLOW INDICATOR	POSITIVE-DISPLACEMENT-TYPE FLOW TOTALIZING INDICATOR
FLOW ELEMENT INTEGRAL WITH TRANSMITTER	VORTEX SENSOR	TARGET TYPE SENSOR	FLOW NOZZLE
MAGNETIC FLOWMETER WITH INTEGRAL TRANSMITTER	SONIC FLOWMETER "DOPPLER" OR "TRANSIT TIME" MAY BE ADDED	CURRENT TRANSFORMER MEASURING CURRENT OF ELECTRIC MOTOR	PRESSURE INSTRUMENT INDICATOR CONNECTED TO DIAPHRAGM SEAL WITH FILLED SYSTEM WITH LEAD LINE
TEMPERATURE CONNECTION WITH WELL	TEMPERATURE ELEMENT WITHOUT WELL	TEMPERATURE ELEMENT WITH WELL	FILLED-SYSTEM-TYPE TEMPERATURE INDICATOR WITH WELL
SURFACE-MOUNTED TEMPERATURE SENSOR	ADJUSTABLE WEIR	BUBBLER TYPE LEVEL TRANSMITTER	RADAR ELEMENT
ULTRASONIC ELEMENT	FLOAT TYPE LEVEL INDICATOR	DUAL PROBE LEVEL TRANSMITTER	SINGLE PROBE LEVEL TRANSMITTER

SYMBOL	LINE DESCRIPTION
	FURNISHED BY OTHERS, INSTALLED BY CONTRACTOR
	INSTRUMENT SUPPLY OR CONNECTION TO PROCESS
	UNDEFINED SIGNAL
	PNEUMATIC SIGNAL
	ELECTRIC SIGNAL
	ELECTRONIC SIGNAL
A A	ANALOG SIGNAL
L L	HYDRAULIC SIGNAL
X X	CAPILLARY TUBE
	ELECTROMAGNETIC OR SONIC SIGNAL (GUIDED)
	ELECTROMAGNETIC OR SONIC SIGNAL (NOT GUIDED)
	INTERNAL SYSTEM LINK (SOFTWARE OR DATA LINK)
	MECHANICAL LINK
	PNEUMATIC BINARY SIGNAL
	ELECTRIC BINARY SIGNAL
	PRIMARY PROCESS LINE
	PROCESS OR MECHANICAL EQUIPMENT
	LIMITS OF EQUIPMENT SUPPLIED BY MANUFACTURE
	PROCESS SECONDARY LINE
E E	ELECTRICALLY TRACED AND INSULATED LINE
	DOUBLE CONTAINMENT LINE
	EXISTING LINE OR DEVICE

INSTRUMENT DESIGNATIONS

CL2	CHLORINE RESIDUAL
CO2	CARBON DIOXIDE
DO	DISSOLVED OXYGEN
LEL	LOWER EXPLOSIVE LIMIT
MCC	MOTOR CONTROL CENTER
MLSS	MIXED LIQUOR SUSPENDED SOLIDS
O2	OXYGEN (PURITY)
ORP	OXIDATION REDUCTION POTENTIAL
OVLD	OVERLOAD
pH	pH CELL
SD	SLUDGE DENSITY
TURB	TURBIDITY
UV	UV TRANSMITTANCE
LOR	LOCAL - OFF - REMOTE
EOT	END OF TRAVEL
RM	REVERSE MOTION

INSTRUMENT IDENTIFICATION LETTERS					
	FIRST-LETTER		SUCCEEDING-LETTERS		
	PROCESS VARIABLE	MODIFIER	READOUT OR PASSIVE FUNCTION	OUTPUT FUNCTION	MODIFIER
A	ANALYSIS		ALARM		
B	BURNER		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
C	CONDUCTIVITY			CONTROL	CLOSED
D	DENSITY	DIFFERENTIAL			
E	VOLTAGE		SENSOR PRIMARY ELEMENT		
F	FLOW RATE	RATIO			
G	USER'S CHOICE		GLASS		
H	HAND (MANUAL)				HIGH
I	CURRENT		INDICATE		
J	POWER	SCAN			
K	TIME / SCHEDULE	TIME RATE OF CHANGE		CONTROL STATION	
L	LEVEL		LIGHT		LOW
M	MOISTURE	MOMENTARY			MIDDLE
N	USER'S CHOICE		USER'S CHOICE	USER'S CHOICE	USER'S CHOICE
O	USER'S CHOICE		ORIFICE (RESTRICTION)		OPEN
P	PRESSURE, VACUUM		POINT (TEST) CONNECTION		
Q	QUANTITY	TOTALIZE			
R	RADIATION		RECORD		
S	SPEED / FREQ.	SAFETY		SWITCH	
T	TEMPERATURE			TRANSMIT	
U	MULTIVARIABLE		MULTIFUNCTION	MULTIFUNCTION	MULTIFUNCTION
V	VIBRATION, MECHANICAL ANALYSIS			VALVE, DAMPER	
W	WEIGHT / FORCE		WELL		
X	UNCLASSIFIED	X-AXIS	UNCLASSIFIED	UNCLASSIFIED	UNCLASSIFIED
Y	EVENT, STATE, PREFERENCE	Y-AXIS		RELAY/COMPUTE	
Z	POSITION	Z-AXIS		DRIVER/ACTUATOR	

08-DI-251 TO STRUCTURE A — PROCESS LINE CONTINUED ON ANOTHER SHEET

STREAM DESIGNATION

FLOW INDICATION

REFERENCE SHEET

08-DI-251 TO STRUCTURE A — PROCESS LINE COMING FROM ANOTHER SHEET

FLOW ARROW FOR PROCESS PIPING

PROCESS LINE CROSSING (NOT CONNECTED)

NOTES:

1. THIS IS A GENERAL LEGEND SHEET. SOME SYMBOLS AND ABBREVIATIONS MAY NOT BE UTILIZED ON THIS SPECIFIC PROJECT.
2. PIPING AND EQUIPMENT LEGEND APPLIES TO PROCESS AND INSTRUMENTATION SHEETS ONLY AND MAY DIFFER FROM LEGENDS ON OTHER SHEETS.

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P&ID - INSTRUMENTATION LEGEND

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

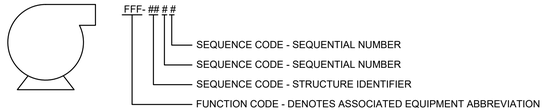
REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

03-DI002

FILE NO. 36724-03

USER:DGBOWERS
FILE:F:\36\36724\36724030\04_CAD\WATRPLOT\36724403_03-DI002_v18.dwg
SAVED:5/18/2020
PLOTTED:6/2/2020

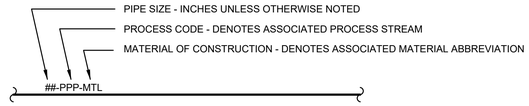
EQUIPMENT IDENTIFICATION DESCRIPTION



FUNCTION CODE ABBREVIATIONS

AER	AERATOR / AERATION
ASP	SURFACE ASPIRATOR
ASU	AUTOMATIC SWITCHOVER UNIT
BLR	BLOWER
BSN	BASIN
CLR	CLARIFIER
CMP	COMPRESSOR
CNV	CONVEYOR
COB	CONVEYOR: BELT
CRN	CRANE
DEC	SLUDGE DECANTER
DIF	DIFFUSER
DWS	DEWATERING SCREW PRESS
DWB	DEWATERING BOX
EDC	EDUCTOR
FIL	FILTER
G	GATE
GF	GAS FEEDER
GRB	GRIT BASIN
GRT	GRIT
HST	HOIST
INJ	INJECTOR
MXR	MIXER
P	PUMP
PMX	POLYMER MIX SKID
SB	SPLITTER BOX
SC	SCUM COLLECTOR
SCL	SCALE
SCR	SCREEN
SLC	SLUDGE COLLECTOR
SRS	SEPTAGE RECEIVING STATION
TNK	TANK
UV	ULTRAVIOLET
V	VALVE
WCMP	WASHER/COMPACTOR

PIPELINE IDENTIFICATION DESCRIPTION



PROCESS CODE ABBREVIATIONS

AER	AERATION
AHP	AIR HIGH PRESSURE
ALP	AIR LOW PRESSURE
BWS	BACKWASH SUPPLY
BWW	BACKWASH WASTE
CEN	CENTRATE
CIP	CLEAN-IN PIPE
CL2	CHLORINE GAS
CLS	CHLORINE SOLUTION
CMS	COMPRESSED AIR-SERVICE
CON	CONCENTRATE
CS	CONDITIONED SLUDGE
CW	COLD WATER (POTABLE)
DAL	DISSOLVED ALUM
DEC	DECANT
DF	DIESEL FUEL
DG	DIGESTER GAS
DR	DRAIN
DS	DIGESTED SLUDGE
DWFL	DEWATERING FLOCCULATION
EI	EQUALIZATION TANK INFLUENT
ER	EQUALIZATION TANK RETURN
F	FILTRATE
FACD	FACILITY DRAIN
FE	FINAL EFFLUENT
FM	FORCE MAIN
FO	FUEL OIL
FOV	FUEL OIL VENT
FOGS	FATS, OILS, GREASE & SEPTAGE
FS	FINAL TANK SLUDGE
FW	FILTERED WASTEWATER
GRT	GRIT
IA	INSTRUMENT AIR
IR	IRRIGATION
HW	HOT WATER
LP	LIQUID PETROLEUM GAS (PROPANE)
ML	MIXED LIQUOR
NG	NATURAL GAS
NPW	NON POTABLE WATER
OF	OVERFLOW
PA	PROCESS AIR
PD	PLANT DRAIN
PE	PRIMARY EFFLUENT
PFM	PLANT FORCE MAIN
PI	PRIMARY INFLUENT
POL	POLYMER (NEAT)
POLD	POLYMER (DILUTED)
PS	PRIMARY SLUDGE
PTE	SCREENED SEWAGE
PW	POTABLE WATER
RAS	RETURN ACTIVATED SLUDGE
RCS	RECIRCULATED SLUDGE
RS	RAW SEWAGE
S	SAMPLE
SC	SCUM
SCR	SCREENINGS
SD	STORM DRAIN
SE	SECONDARY EFFLUENT
SEP	SEPTAGE
SNT	SUPERNATANT
SS	SANITARY SEWER
TDS	THICKENED DIGESTED SLUDGE
TWAS	THICKENED WASTE ACTIVATED SLUDGE
UW	UTILITY WATER
V	VENT
WAS	WASTE ACTIVATED SLUDGE
WW	WASTE WATER

PIPELINE MATERIAL OF CONSTRUCTION ABBREVIATIONS

ACP	ASBESTOS CEMENT PIPE
BSP	BLACK STEEL PIPE
CI	CAST IRON
CISP	CAST IRON SOIL PIPE
CMP	CORRUGATED METAL PIPE
CPP	CONCRETE PRESSURE PIPE
CPVC	CHLORINATED POLY (VINYL CHLORIDE) PIPE
CU	COPPER PIPE
CUP	COPPER TUBING
DIP	DUCTILE IRON PIPE
FRH	FLEXIBLE RUBBER HOSE
FRP	FIBERGLASS REINFORCED PIPE
GSP	GALVANIZED STEEL PIPE
HDPE	HIGH DENSITY POLYETHYLENE PIPE
PE	POLYETHYLENE PIPE
PP	SANTOPRENE TUBING
PVC	POLY (VINYL CHLORIDE) PIPE
PVT	PVC TUBING
RCP	REINFORCED CONCRETE PIPE
STL	STEEL PIPE
SST	STAINLESS STEEL PIPE
VCP	VITRIFIED CLAY PIPE
(HT/INS)	HEAT TRACED AND INSULATED LINE

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P&ID - ABBREVIATIONS

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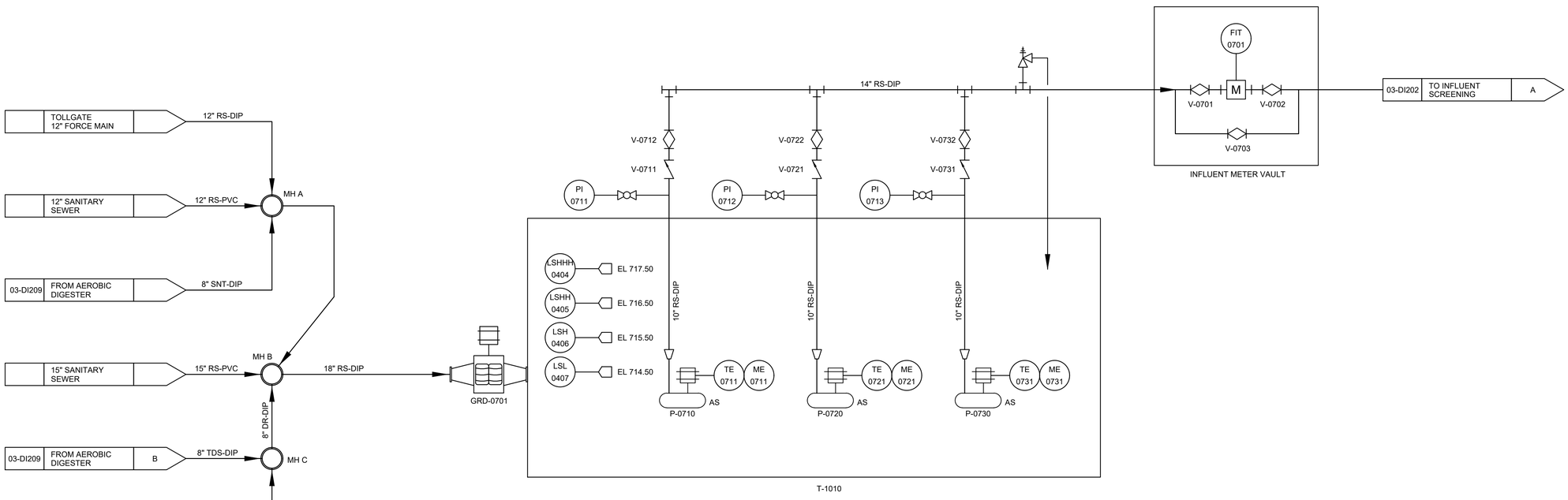
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

03-DI003

FILE NO. 36724-03

USER:DGBOWERS
FILE:F:\36\36724\36724003\04_CAD\WATRPLOT\3672403_03-DI003_v18.dwg
SAVED:6/8/2020
PLOTTED:6/11/2020



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P&ID - INFLUENT LIFT STATION

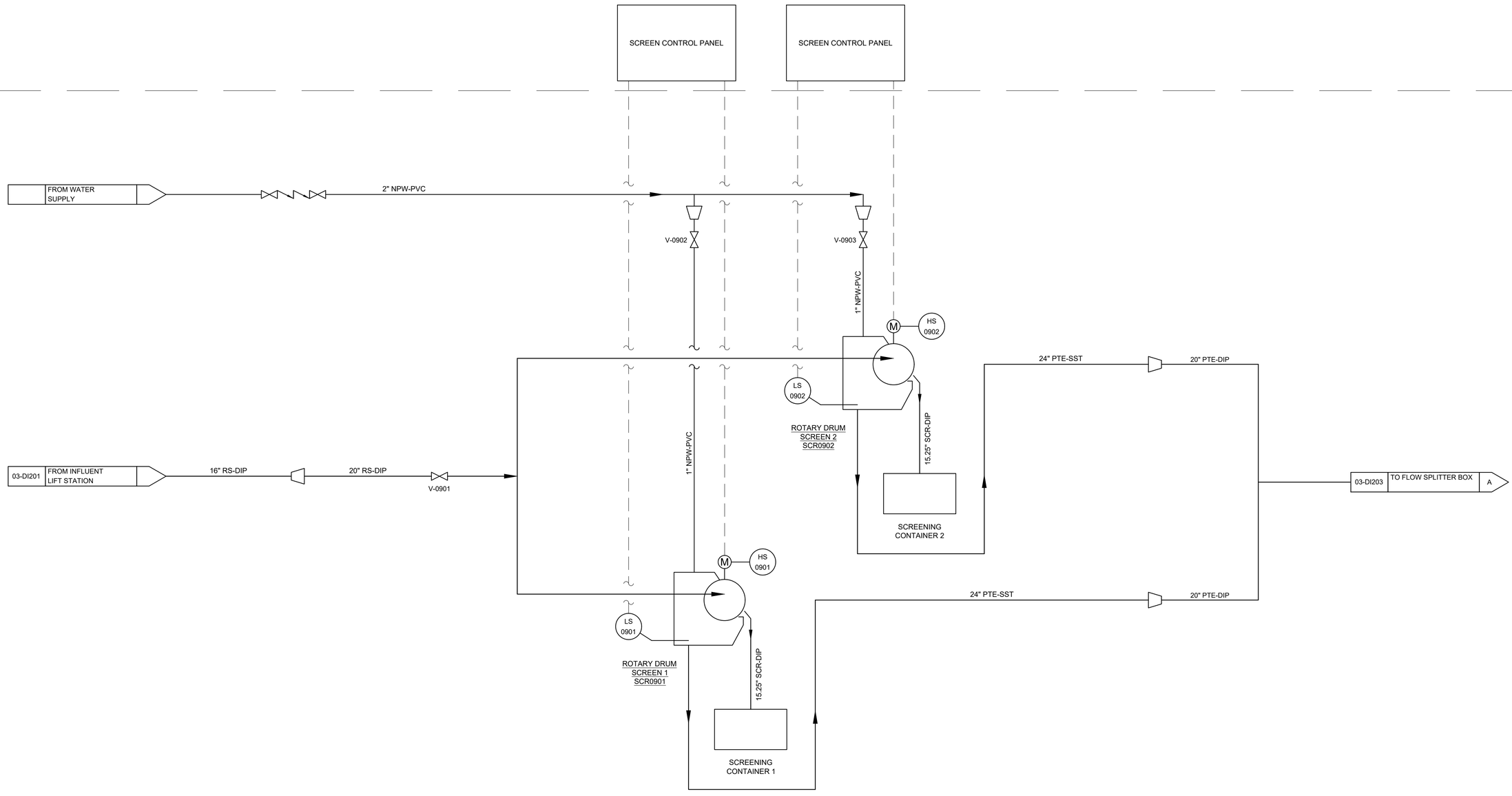
REGIONAL WASTEWATER TREATMENT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

03-DI201

FILE NO. 36724-03

USER:DGBOWERS
FILE:F:\383\36724\36724303\04_CAD\WATRPLOT\36724303_03-DI201_v18.dwg
SAVED:6/9/2020
PLOTTED:6/10/2020



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P&ID - INFLUENT SCREENING

REGIONAL WASTEWATER TREATMENT PLANT

TREATMENT PLANT UPGRADES

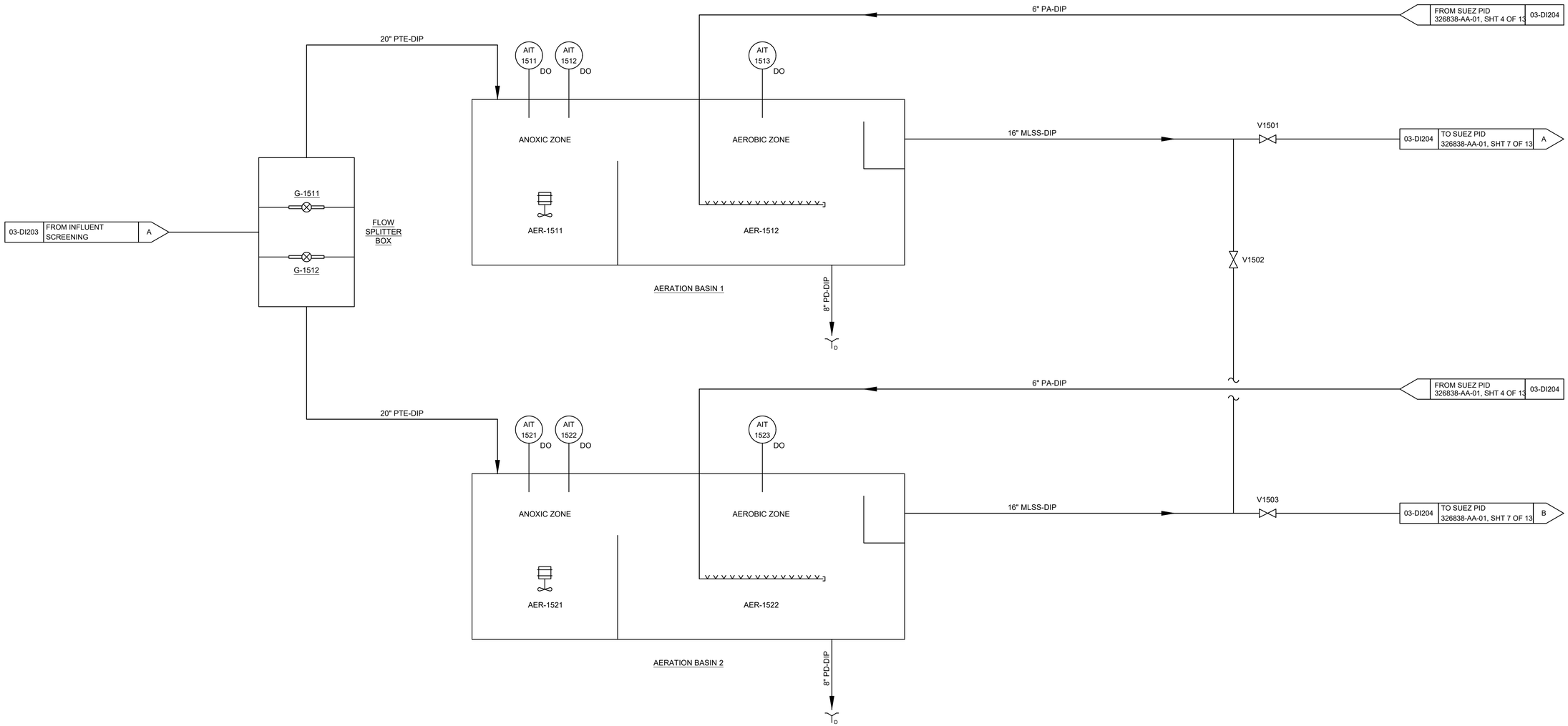
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

03-DI202

FILE NO. 36724-03

USER:ATLUTTRULL
FILE:F:\36\36724\36724i304_CADWATRPLOT\36724i303_03-DI202_v18.dwg
SAVED:6/11/2020
PLOTTED:6/11/2020



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P&ID - AERATION

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

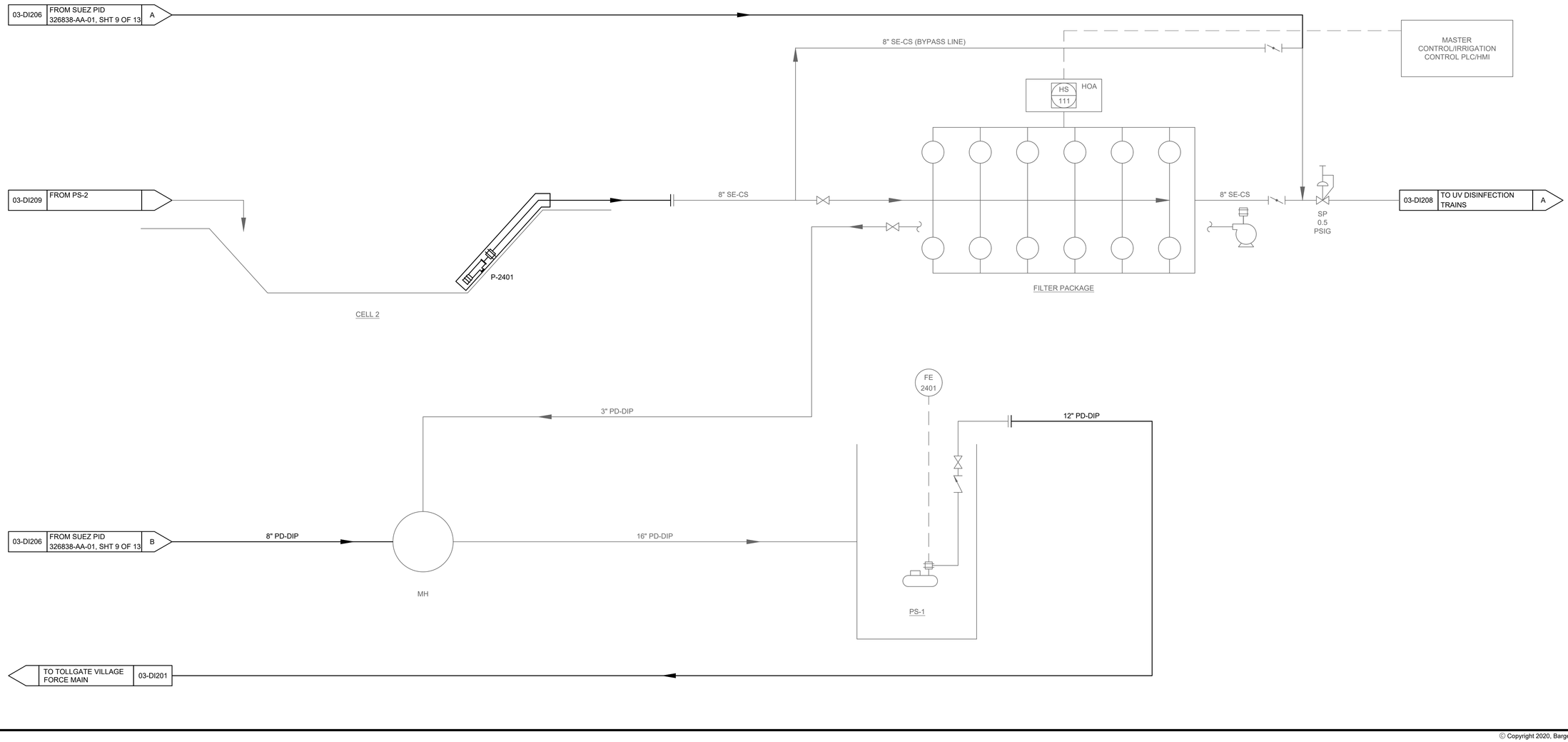
REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

03-DI203

FILE NO. 36724-03

USER:ATLUTTRULL
FILE:F:\36\36724\36724030\04_CAD\WATRPLOT\36724O3_03-DI203_v18.dwg
SAVED:6/11/2020
PLOTTED:6/11/2020



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P&ID - FILTERS

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

03-DI207

FILE NO. 36724-03

USER:ATLUTTRULL
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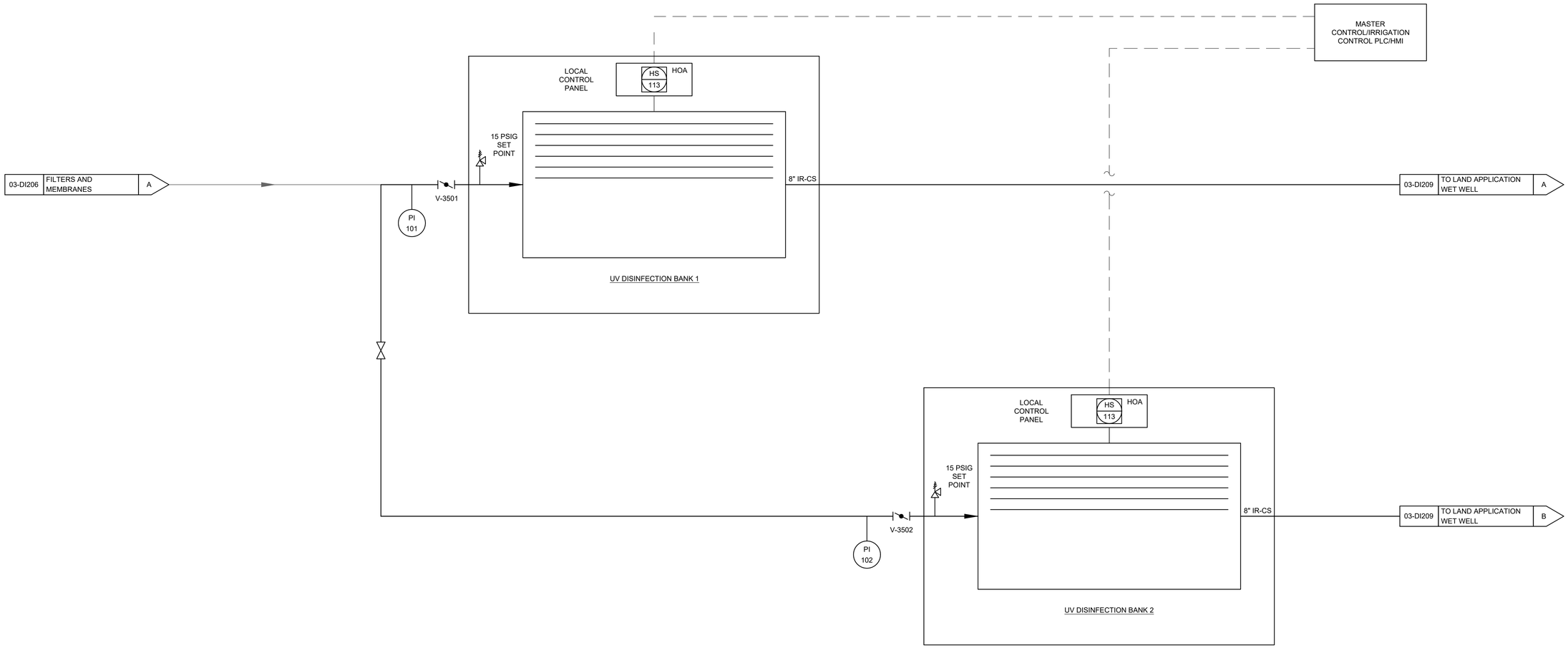
SAVED:6/11/2020
PLOTTED:6/11/2020



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P&ID - UV DISINFECTION

REGIONAL WASTEWATER TREATMENT FACILITY
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

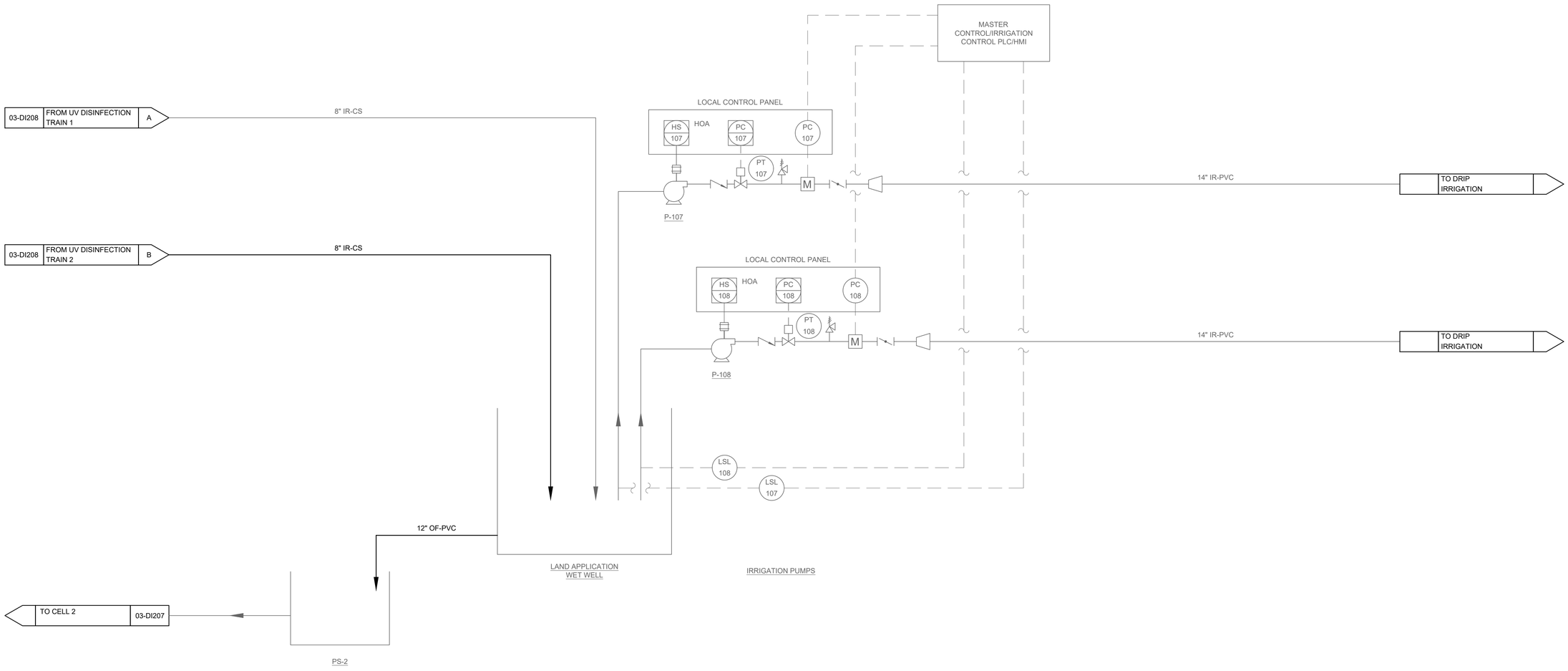
REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

03-DI208

FILE NO. 36724-03

USER:ATLUTTRULL
FILE:F:\36\36724\36724030\04_CAD\WATRP\LOT\36724403_03-DI208_v18.dwg
SAVED:6/11/2020
PLOTTED:6/11/2020



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P&ID - IRRIGATION PUMPING

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

03-DI209

FILE NO. 36724-03

USER:ATLUTTRULL
FILE:P:\36\36724\36724\03\04_CAD\WATRPLOT\36724\03_03-DI209_v18.dwg
SAVED:6/11/2020
PLOTTED:6/11/2020

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P&ID - AEROBIC DIGESTION

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

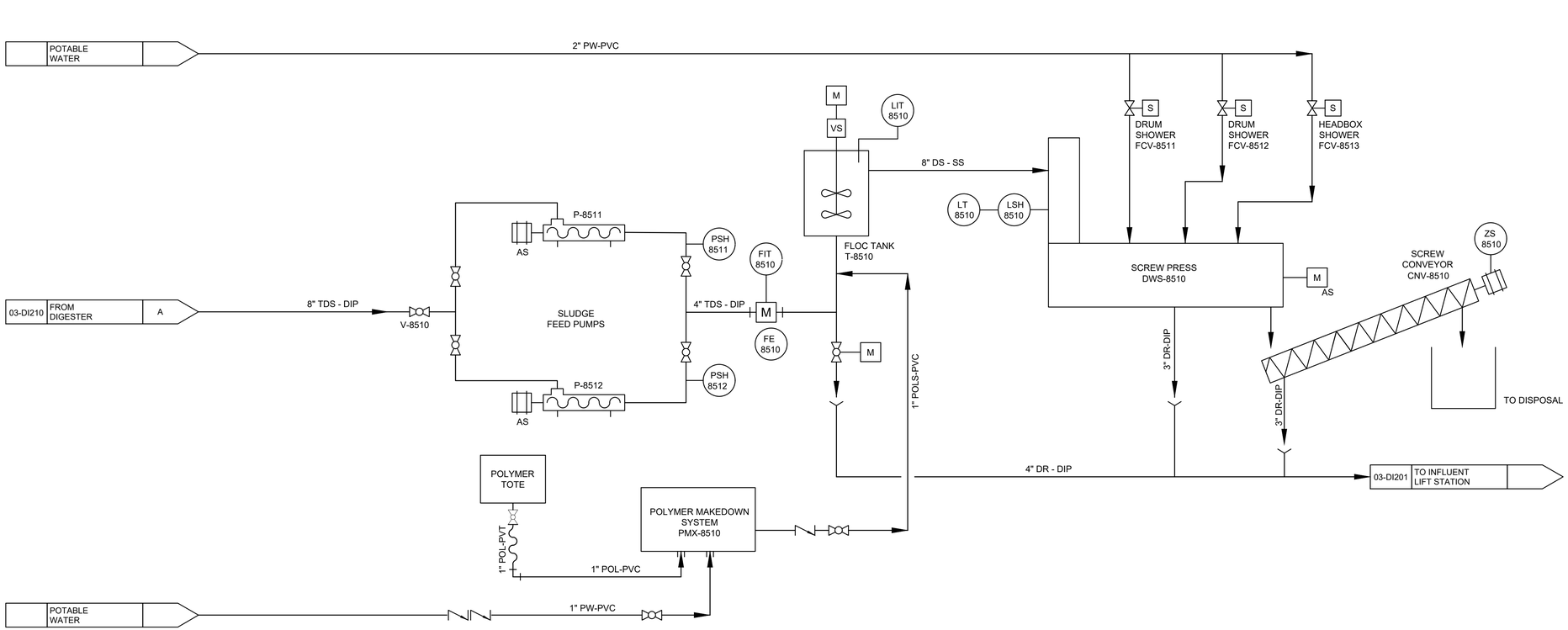
REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

03-DI210

FILE NO. 36724-03

USER:DGBOWERS
FILE:F:\36\36724\36724\03\04_CAD\WATRPLOT\3672403_03-DI210_v18.dwg
SAVED:6/9/2020
PLOTTED:6/10/2020



PRELIMINARY
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CONSTRUCTION

DATE

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P&ID - BIOSOLIDS DEWATERING

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

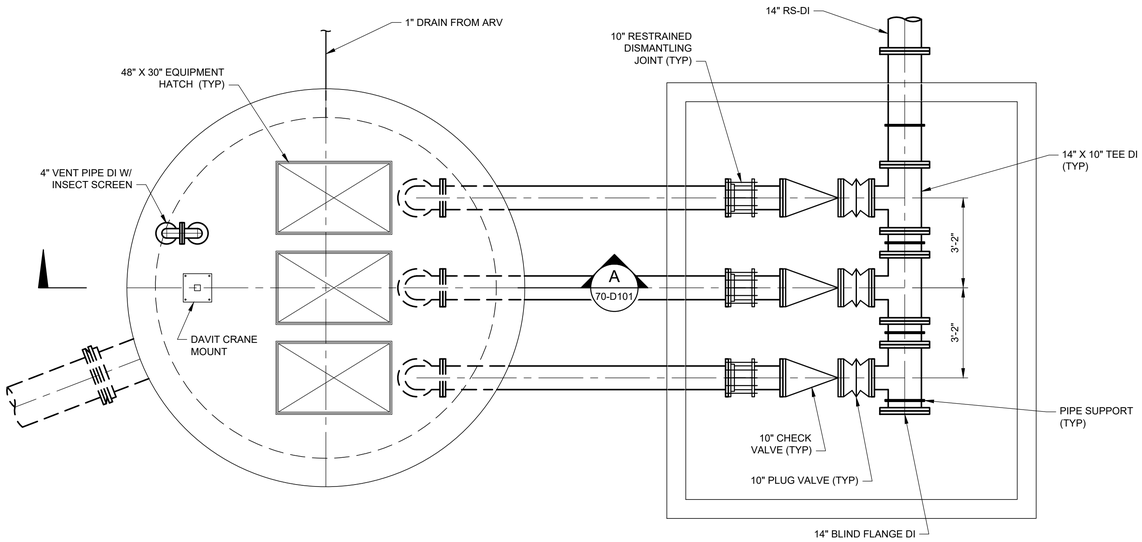
REV.	DR.	CHK.	DATE	DESCRIPTION

REVISION INFORMATION

03-DI211

FILE NO. 36724-03

USER:DGBOWERS
FILE:F:\36\36724\36724303\04_CAD\WATRPLOT\3672403_03-DI211_v18.dwg
SAVED:6/9/2020
PLOTTED:6/10/2020



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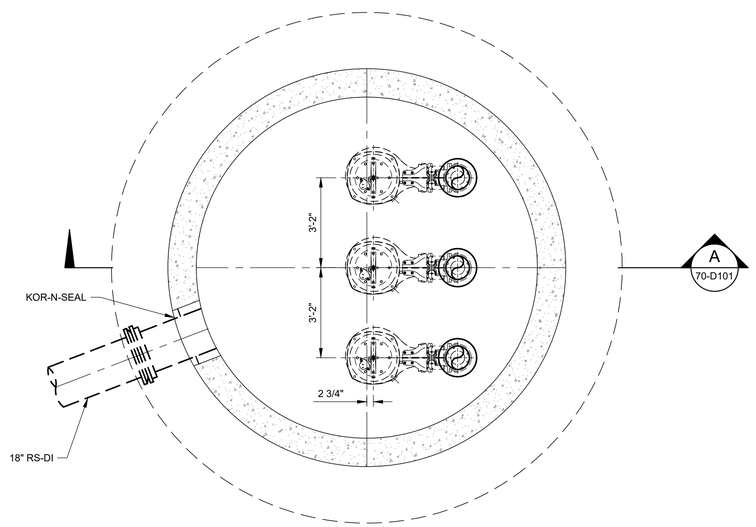
1 07-D101 INFLUENT LIFT STATION - UPPER PLAN

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

0 6" 1' 2' 4'



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2 07-D101 INFLUENT LIFT STATION - LOWER PLAN

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

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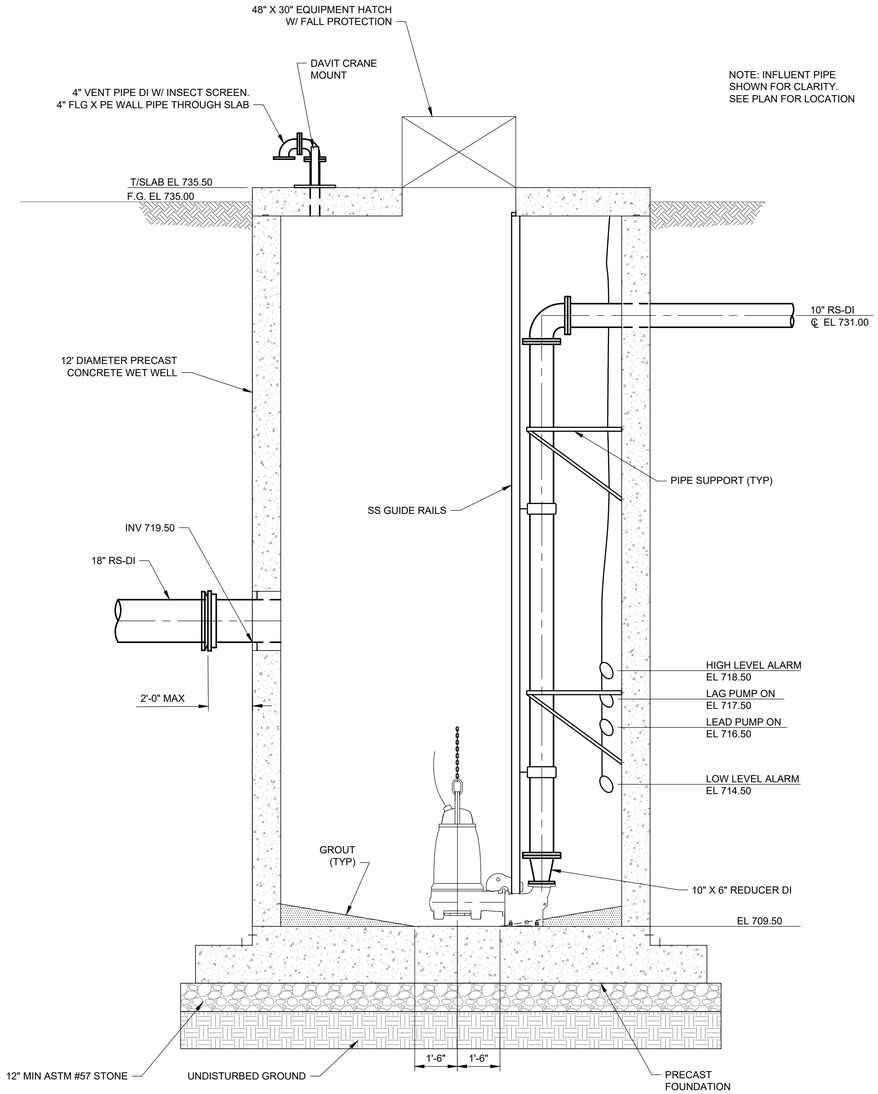

A 07-D101 INFLUENT LIFT STATION - SECTION

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

0 6" 1' 2' 4'

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INFLUENT LIFT STATION

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

07-D101

FILE NO. 36724-03

USER:DGBOWERS
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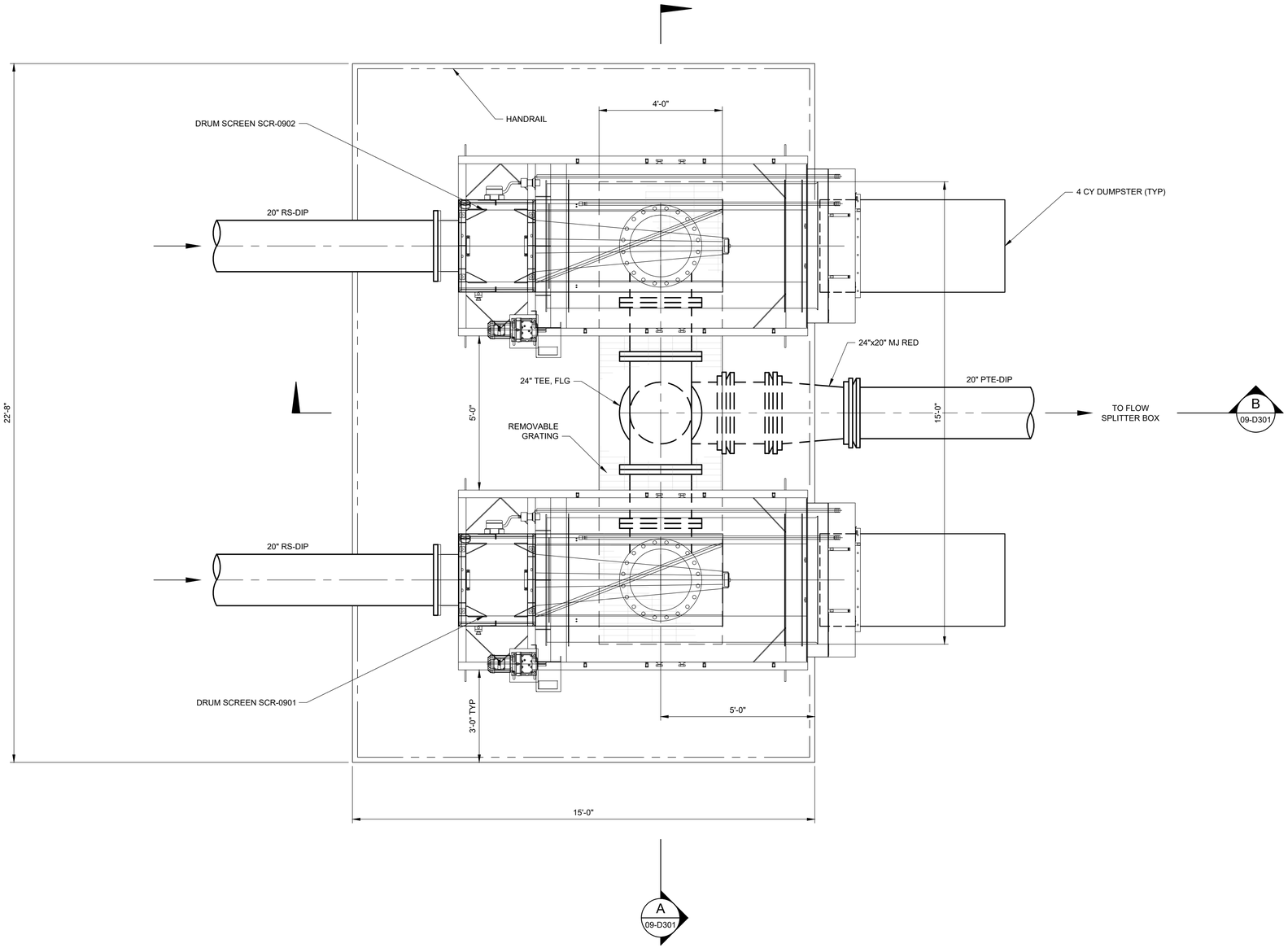

INFLUENT SCREENING PLAN

SCALE: 1/2" = 1'-0"

0 6" 1' 2' 4'

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INFLUENT SCREENING PLAN

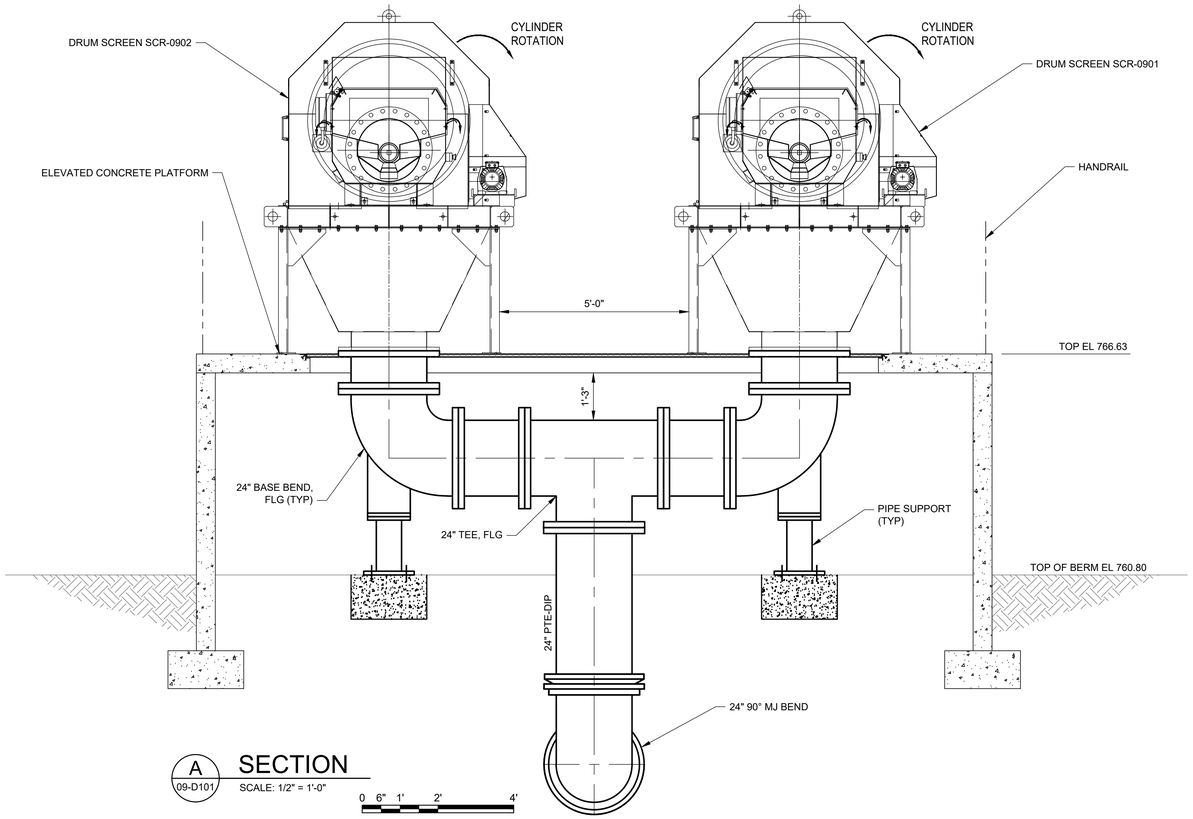
REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

09-D101

FILE NO. 36724-03

USER:ATLUTTRULL
FILE:F:\36\36724\36724303\04_CAD\WATRPLOT\36724303_09-D101_v18.dwg
SAVED:6/10/2020
PLOTTED:6/10/2020



A 09-D101 **SECTION**
SCALE: 1/2" = 1'-0"
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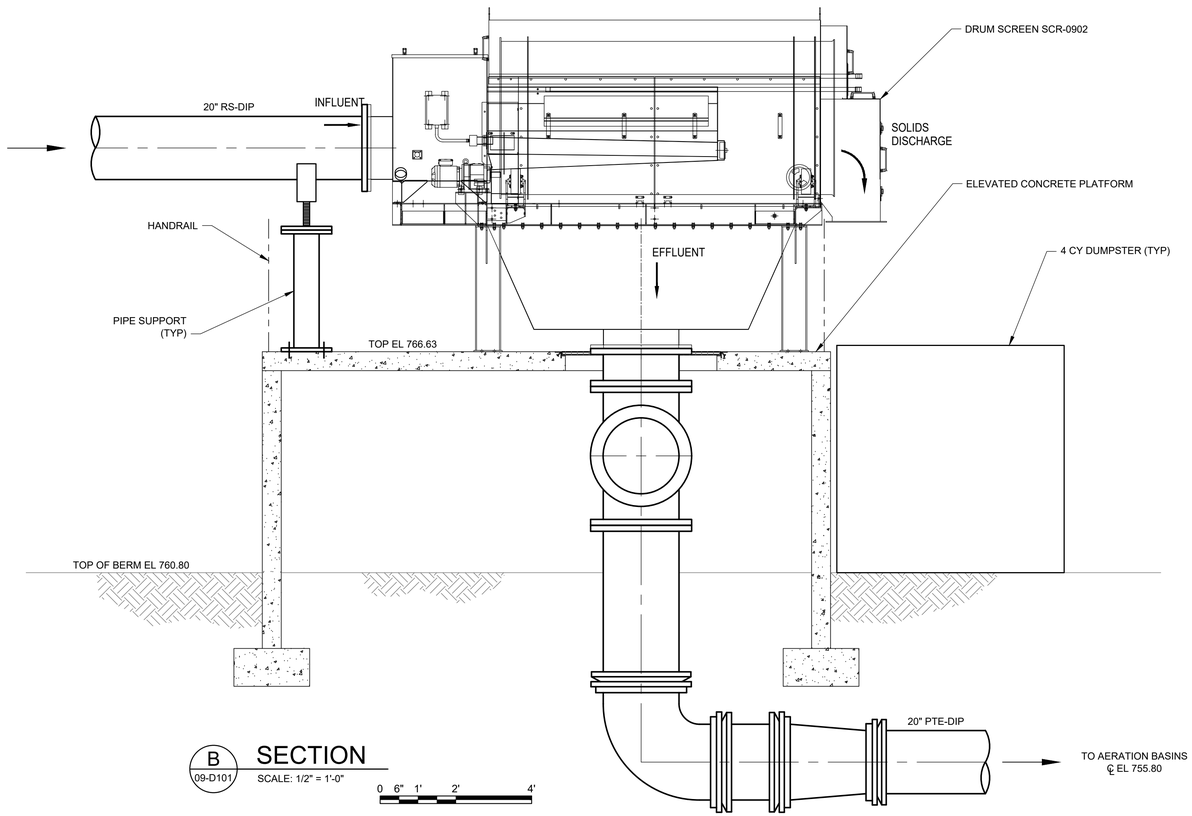

B 09-D101 **SECTION**
SCALE: 1/2" = 1'-0"
0 6" 1' 2' 4'

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NOT FOR
CONSTRUCTION
DATE

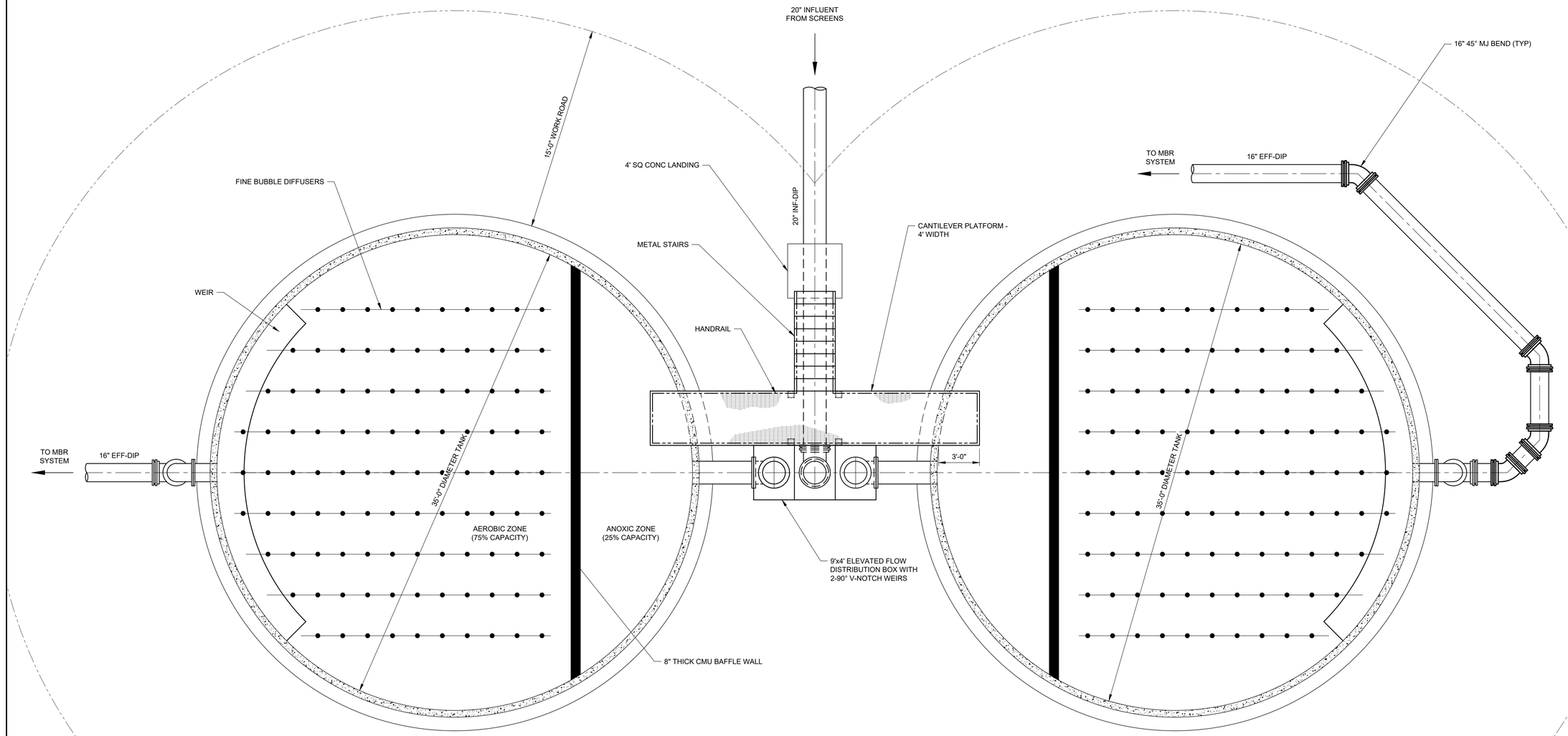
INFLUENT SCREENING SECTIONS

REGIONAL WASTEWATER TREATMENT FACILITY
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

09-D301
FILE NO. 36724-03

USER:ATLUTTRULL
FILE:F:\36\36724\36724030\4_CAD\WATRP\LOT\36724403_09-D301_v18.dwg
SAVED:6/10/2020
PLOTTED:6/10/2020



N

AERATION BASINS - PLAN

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

0 1' 2' 4' 8'

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PRELIMINARY
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CONSTRUCTION

DATE

AERATION BASINS PLAN

REGIONAL WASTEWATER TREATMENT PLANT

TREATMENT PLANT UPGRADES

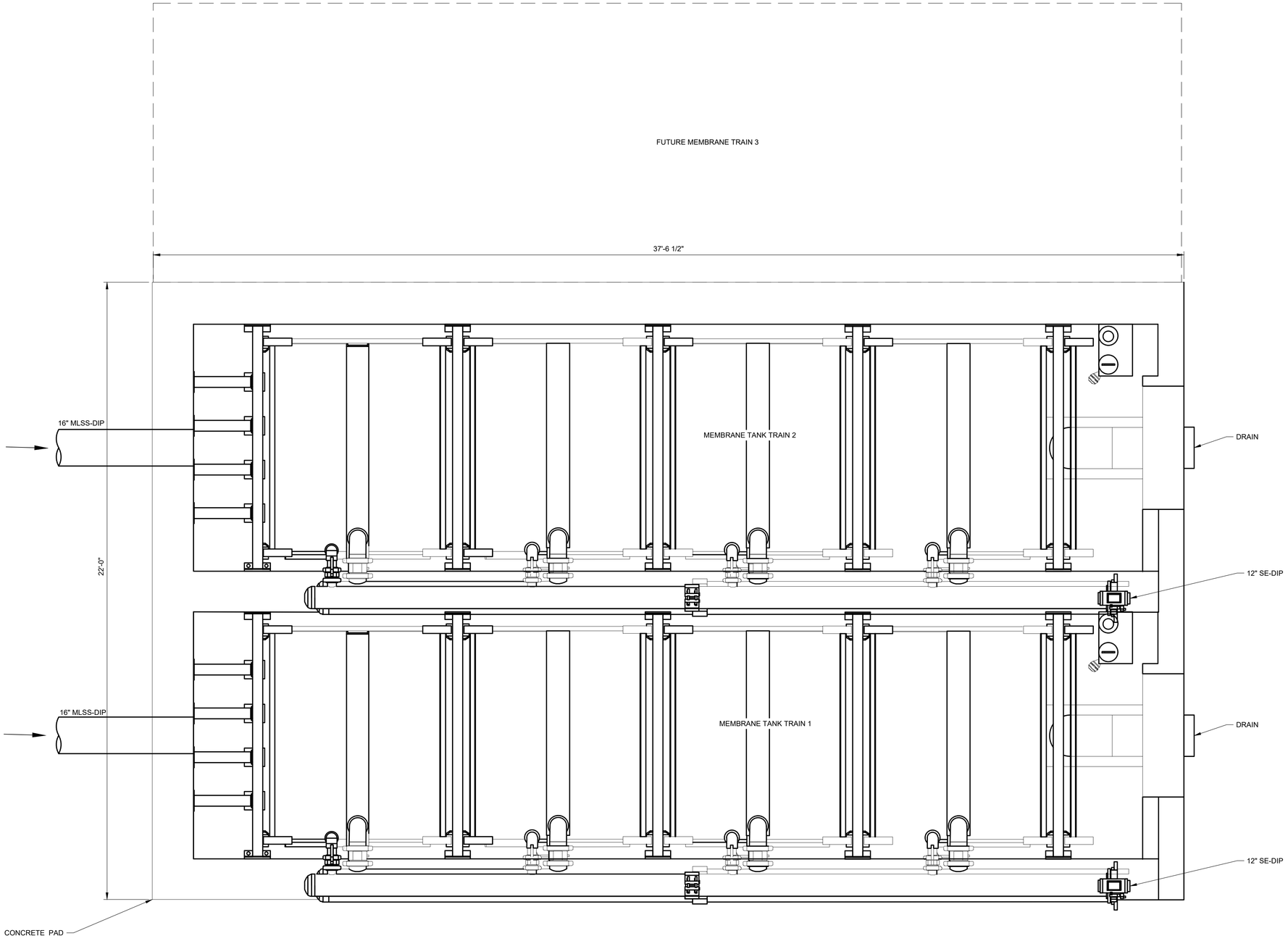
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

15-D101

FILE NO. 36724-03

USER:ATUITTRULL
FILE:F:\36\36724\36724\03\04_CAD\WATRPLOT\36724403_15-D101_v18.dwg
SAVED:6/10/2020
PLOTTED:6/10/2020



PLAN VIEW

SCALE: 1/2" = 1'-0"

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PRELIMINARY
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CONSTRUCTION

DATE

MBR PLAN

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

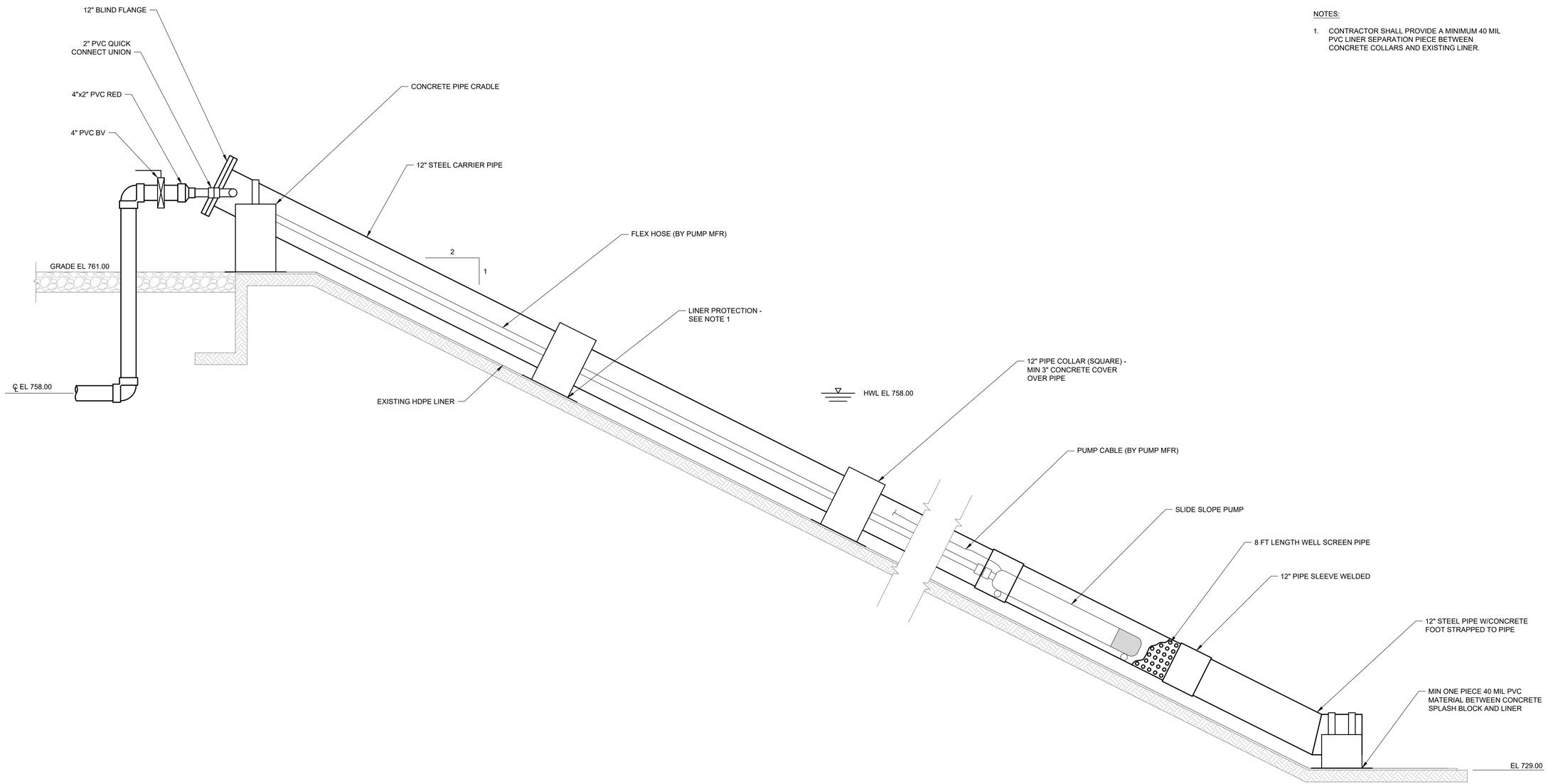
REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

23-D101

FILE NO. 36724-03

USER:CNDAVIS
FILE:F:\36\3672403724030\4_CAD\WATRPLOT\3672403_23-D101_v18.dwg
SAVED:6/11/2020
PLOTTED:6/11/2020



NOTES:

1. CONTRACTOR SHALL PROVIDE A MINIMUM 40 MIL PVC LINER SEPARATION PIECE BETWEEN CONCRETE COLLARS AND EXISTING LINER.

LAGOON PUMP - SECTION

SCALE: 3/4" = 1'-0"

0 6" 1' 2'

BARGE DESIGN SOLUTIONS
615 3rd Avenue South / Suite 700 // Nashville, Tennessee 37210
PHONE (615) 254-1500 // FAX (615) 255-6372

PRELIMINARY
NOT FOR
CONSTRUCTION

DATE

INTERMEDIATE LIFT STATIONS
SECTION - LAGOON PUMP

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

24-D302

FILE NO. 36724-03

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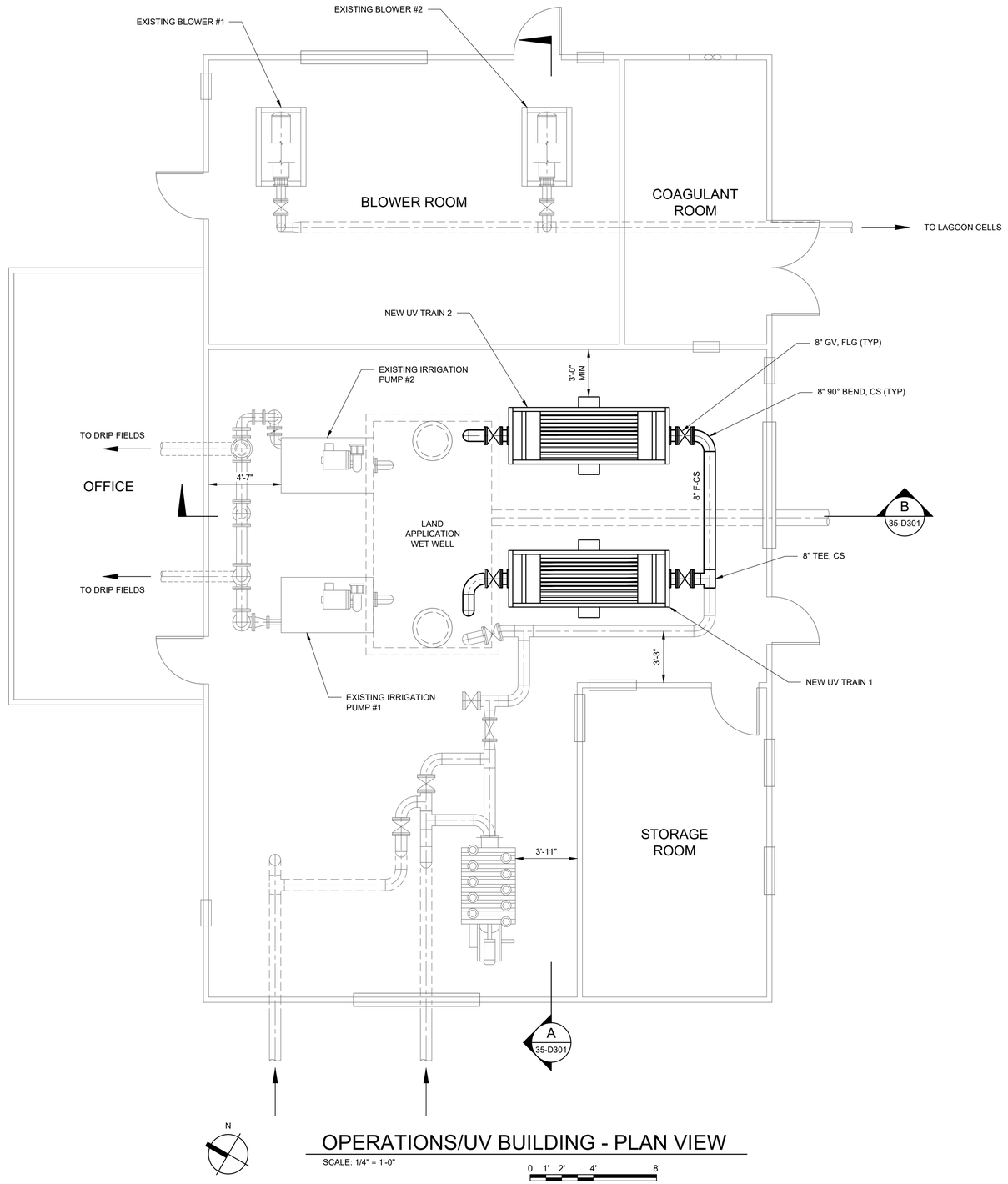

OPERATIONS/UV BUILDING - PLAN VIEW

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

0 1' 2' 4' 8'

BARGE DESIGN SOLUTIONS
615 3rd Avenue South / Suite 700 // Nashville, Tennessee 37210
PHONE (615) 254-1500 // FAX (615) 255-6372

PRELIMINARY
NOT FOR
CONSTRUCTION

DATE

OPERATIONS/UV BUILDING PLAN

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

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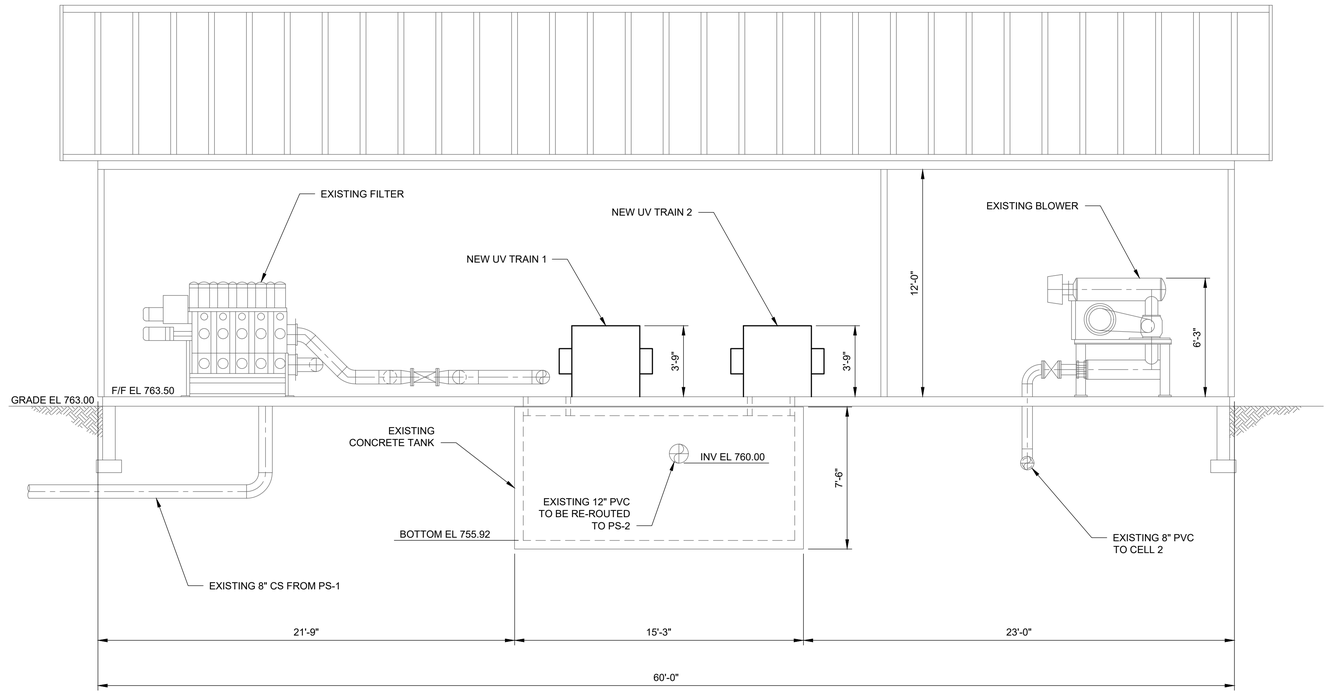

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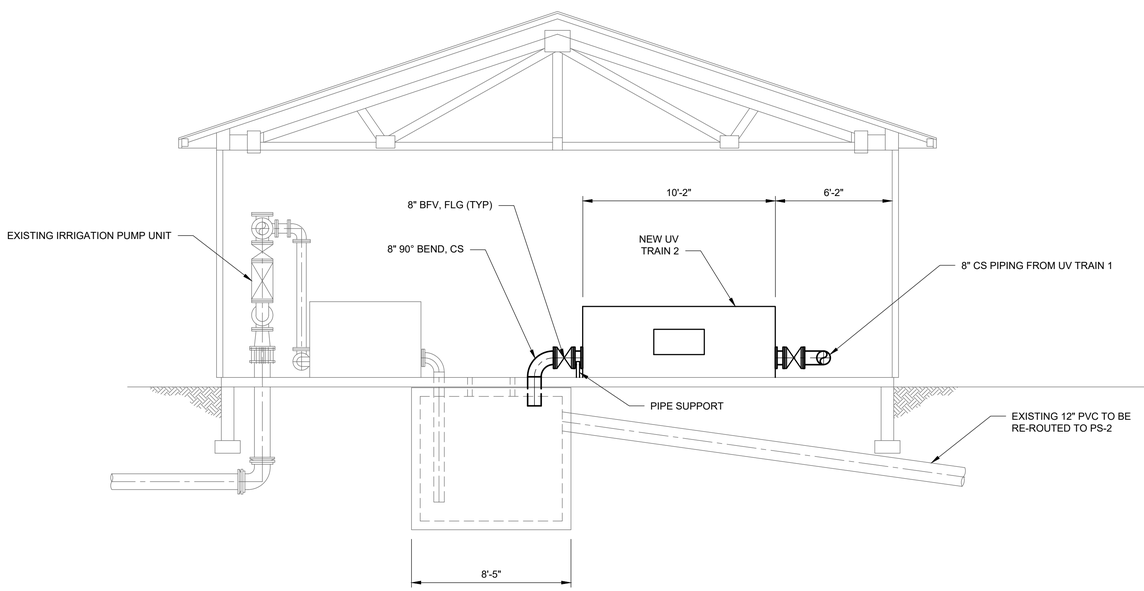

B 35-D101 OPERATIONS/UV BUILDING - SECTION

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

0 1' 2' 4' 8'

BARGE DESIGN SOLUTIONS
615 3rd Avenue South // Suite 700 // Nashville, Tennessee 37210
PHONE (615) 254-1500 // FAX (615) 255-6372

PRELIMINARY
NOT FOR
CONSTRUCTION

DATE

OPERATIONS/UV BUILDING SECTIONS

REGIONAL WASTEWATER TREATMENT PLANT

TREATMENT PLANT UPGRADES

THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION

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FILE NO. 36724-03

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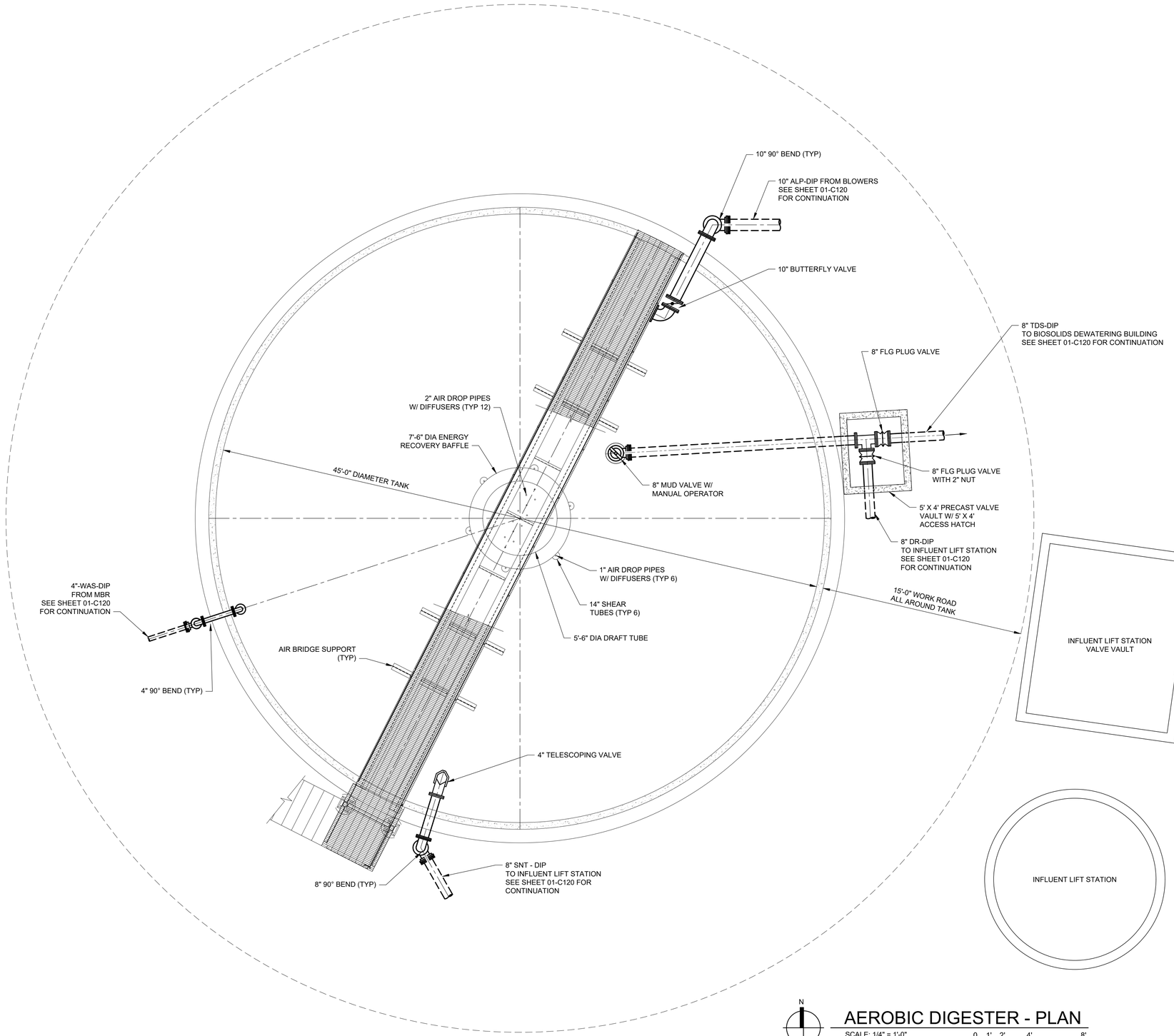
PLOTTED:6/11/2020



N

AEROBIC DIGESTER - PLAN

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

0 1' 2' 4' 8'

BARGE DESIGN SOLUTIONS
615 3rd Avenue South / Suite 700 // Nashville, Tennessee 37210
PHONE (615) 254-1500 // FAX (615) 255-6572

PRELIMINARY
NOT FOR
CONSTRUCTION

DATE

AEROBIC DIGESTER - PLAN

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

80-D101

FILE NO. 36724-03

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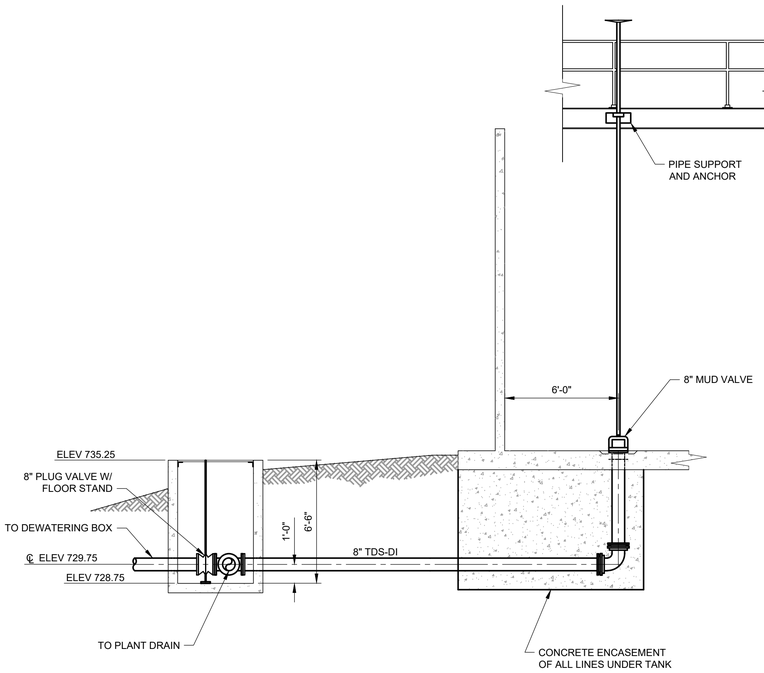
SAVED:6/10/2020
PLOTTED:6/11/2020



A 80-D101 AEROBIC DIGESTER - SECTION

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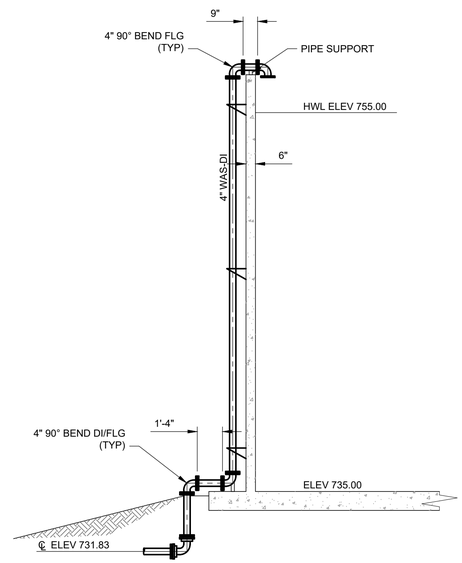

B 80-D101 AEROBIC DIGESTER - SECTION

SCALE: 1/4" = 1'-0" 0 1' 2' 4' 8'

BARGE DESIGN SOLUTIONS
615 3rd Avenue South // Suite 700 // Nashville, Tennessee 37210
PHONE (615) 254-1500 // FAX (615) 255-6372

PRELIMINARY
NOT FOR
CONSTRUCTION

DATE

AEROBIC DIGESTER - SECTION

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

80-D301

FILE NO. 36724-03

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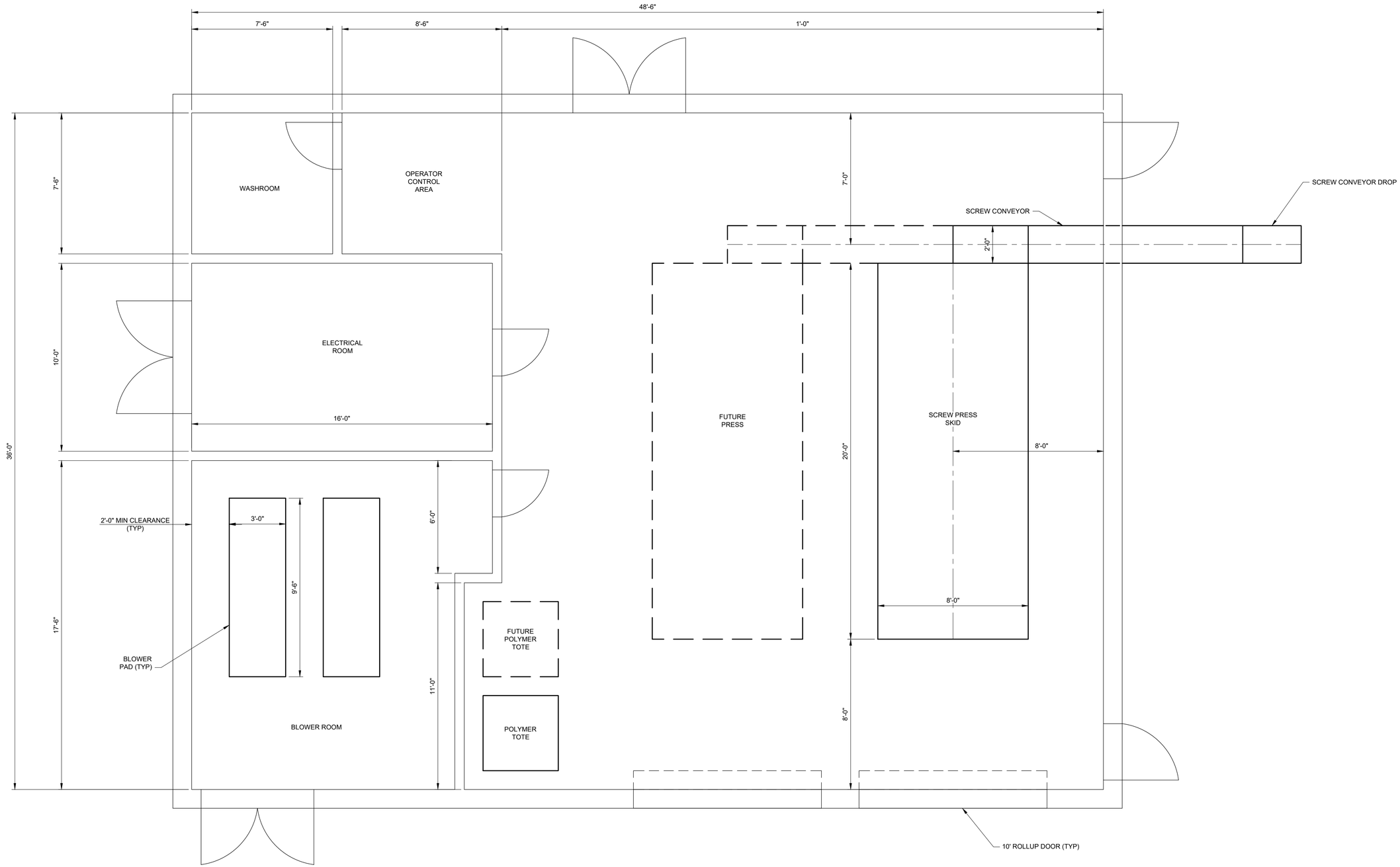

N

SLUDGE DEWATERING BUILDING - PLAN

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

0 6" 1' 2' 4'

BARGE DESIGN SOLUTIONS
615 3rd Avenue South // Suite 700 // Nashville, Tennessee 37210
PHONE (615) 254-1500 // FAX (615) 255-6372

PRELIMINARY
NOT FOR
CONSTRUCTION

DATE

SLUDGE DEWATERING BUILDING - PLAN

REGIONAL WASTEWATER TREATMENT PLANT
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION

85-D101

FILE NO. 36724-03

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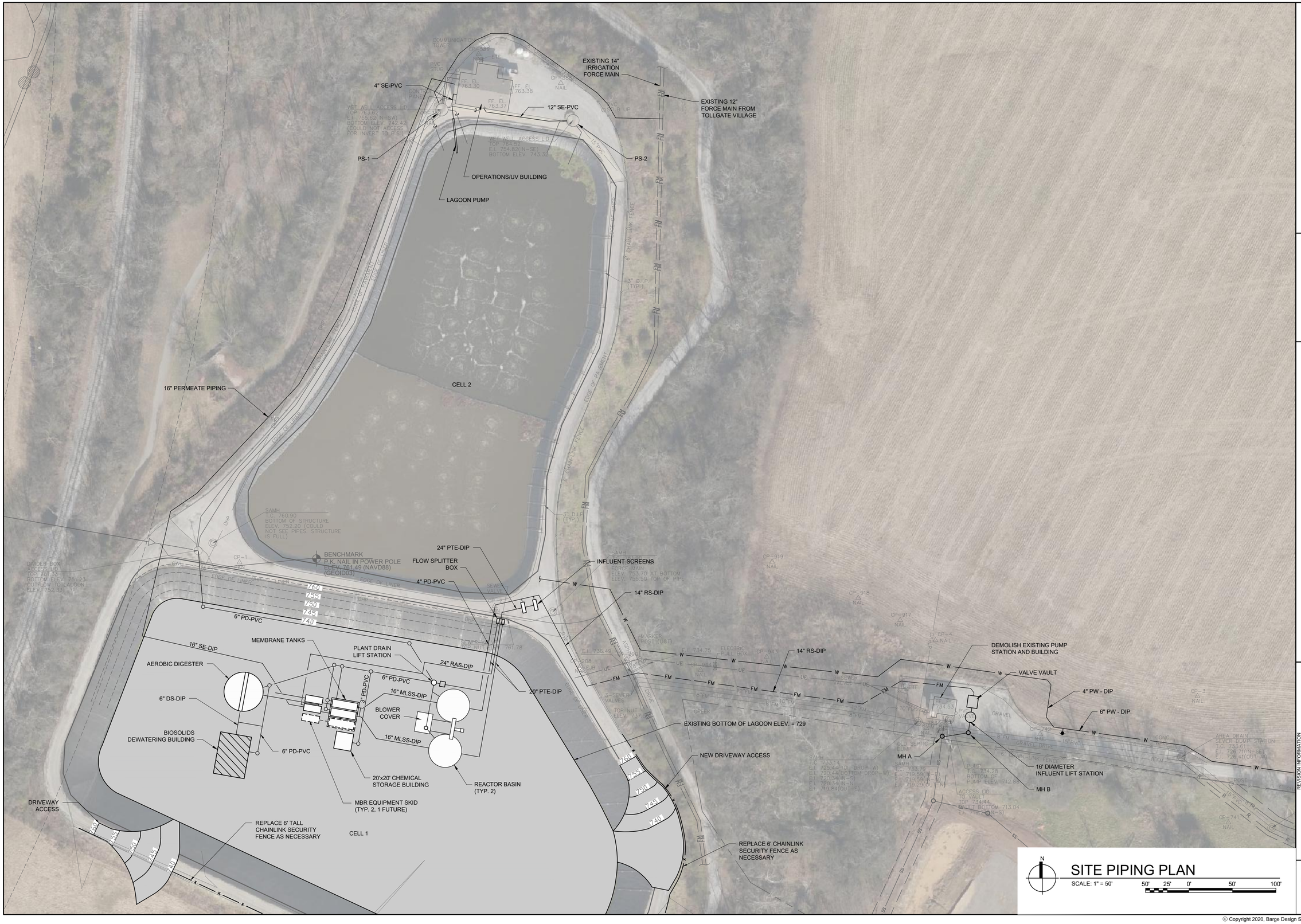
SAVED:5/26/2020
PLOTTED:6/10/2020


EXISTING 14" IRRIGATION FORCE MAIN
EXISTING 12" FORCE MAIN FROM TOLLGATE VILLAGE
4" SE-PVC
12" SE-PVC
PS-1
PS-2
OPERATIONS/UV BUILDING
LAGOON PUMP
16" PERMEATE PIPING
CELL 2
CELL 1
24" PTE-DIP
FLOW SPLITTER BOX
4" PD-PVC
INFLUENT SCREENS
14" RS-DIP
6" PD-PVC
16" SE-DIP
MEMBRANE TANKS
PLANT DRAIN LIFT STATION
24" RAS-DIP
AEROBIC DIGESTER
6" DS-DIP
3" PD-PVC
6" PD-PVC
16" MLSS-DIP
BLOWER COVER
20" PTE-DIP
BIOSOLIDS DEWATERING BUILDING
6" PD-PVC
16" MLSS-DIP
20'x20' CHEMICAL STORAGE BUILDING
REACTOR BASIN (TYP. 2)
MBR EQUIPMENT SKID (TYP. 2, 1 FUTURE)
DRIVEWAY ACCESS
REPLACE 6' TALL CHAINLINK SECURITY FENCE AS NECESSARY
EXISTING BOTTOM OF LAGOON ELEV. = 729
NEW DRIVEWAY ACCESS
REPLACE 6' CHAINLINK SECURITY FENCE AS NECESSARY
DEMOLISH EXISTING PUMP STATION AND BUILDING
VALVE VAULT
4" PW - DIP
6" PW - DIP
MH A
MH B
16' DIAMETER INFLUENT LIFT STATION
BENCHMARK
P.K. NAIL IN POWER POLE
ELEV. 761.49 (NAVD88)
(GEOID03)
SAMH
T.C. 760.90
BOTTOM OF STRUCTURE
ELEV. 752.20 (COULD NOT SEE PIPES. STRUCTURE IS FULL)
DIVIDER BOX
ACCESS LID
TOP 761.35
BOTTOM ELEV. 751.23
OUTFLOW TO LAGOON
ELEV. 752.33
WET WELL ACCESS LID
TOP 763.62
E.I. 755.62(IN-SW)
BOTTOM ELEV. 742.42
(COULD NOT ACCESS FOR INVERT TO PS1)
WET WELL ACCESS LID
TOP 764.52
E.I. 754.82(IN-SE)
BOTTOM ELEV. 743.32
COMMUNICATION TOWER
CP-2323
NAIL
ETF
PVC STUB
FF EL 763.30
FF EL 763.38
FF EL 763.37
CONTROL PANEL
CP-2355
NAIL
PVC STUB UP
CP-1
NAIL
CP-2
NAIL
CP-3
NAIL
CP-4
NAIL
CP-741
NAIL
CP-917
NAIL
CP-918
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NAIL

THOMPSON'S STATION WWTP UPGRADES PRELIMINARY ENGINEERING REPORT

Prepared For: Town of Thompson's Station

File No. 36724-03
June 2020

CONTENTS

FIGURES

TABLES

APPENDICES

1.0 INTRODUCTION

The Town of Thompson's Station (the Town) provides wastewater collection and treatment services for a portion of its residents. To provide this service, the Town operates two wastewater treatment plants (WWTPs), the Heritage Commons WWTP and the Regional WWTP. The Heritage Commons WWTP, located at 4625 Thompson's Ridge Road, serves the area surrounding Town Hall and the building south of Town Hall. The Heritage Commons WWTP is the smaller of the two plants and is currently not designated as requiring upgrades. The Regional WWTP, located at 4549 Columbia Pike, provides wastewater treatment for the majority of the Town's system. The plant was constructed in 2005 and operates Sheaffer System aerated lagoons and currently treats an average of 375,000 gallons per day (GPD). All wastewater is treated and then filtered using disc filters prior to ultraviolet (UV) disinfection. Disinfected filtered effluent is discharged to land application drip fields.

Treated effluent is currently land applied to two remote land application sites, known as the Ozzad and Tollgate properties, which total approximately 28 acres. Additional properties, the Hill property and Alexander property, have been purchased. Construction of 20 acres of drip system is currently (2020) underway on the Hill property. Disposal systems have not been designed or constructed for the Alexander property. Exhibit 1 (Appendix A) shows the location of the treatment facility, as well as the location of the two existing and two proposed effluent disposal sites. A process flow diagram is provided in Exhibit 3 (Appendix A).

The intent of this project is to upgrade the treatment facilities to accommodate future growth and to provide a higher level of treatment for future potential changes in effluent disposal permit limits. The new facility will convert the existing system from a lagoon system to membrane technology. The proposed improvements include upgraded influent pumping, new headworks screening, influent equalization utilizing the existing Cell 2, new aeration basins and membrane bioreactor (MBR) treatment, UV disinfection, aerobic digestion, and solids dewatering. The project will provide a higher level of treatment, reduced nutrient loading to the drip fields, and improved solids handling for the system. The new treatment capacity will be increased from the current 0.47 million gallons per day (MGD) to 1.0 MGD. The Town currently operates 28 acres of existing subsurface drip irrigation fields split between the Ozzad and Tollgate properties. The two land application sites support an effluent disposal capacity of at least 280,000 GPD. A third land application site, the Hill property, is currently under construction and will provide an additional 210,000 GPD of disposal capacity. In addition to these sites, the Town is currently in the process of analyzing the soil conditions of a property purchased in 2018, the Alexander property, to determine the potential effluent disposal capacity. To achieve the ultimate capacity of 1,000,000 GPD, the Town will pursue a phased approach to the permitting of the plant in accordance with Tennessee Department of Environment and Conservation (TDEC) requirements. TDEC is currently considering a new state regulation that would allow for permitted disposal by reuse. The Town intends to pursue this alternative means of effluent disposal once it becomes available.

2.0 PROJECT PLANNING

2.1 Location

The Town of Thompson's Station serves approximately 1,960 residents within the Town's boundary as well as surrounding residents and businesses near the Town limits. The Town is located in Williamson County, Tennessee, and is approximately 30 miles south of Nashville, Tennessee. Exhibit 1 (Appendix A) depicts the extent of the Town's wastewater system service area.

2.2 Environmental Resources Present

2.2.1 Physical Characteristics

2.2.1.1 Climate

The climate at the Regional WWTP is characterized by mild winters, warm summers, and abundant rainfall. Over the course of the year, the temperature in Thompson's Station typically varies from 30 degrees F to 89 degrees F and is rarely below 15 degrees F or above 95 degrees F. The hot season lasts for approximately 3.8 months from May to September, with an average daily high temperature above 80 degrees F. The cold season lasts for approximately 3.0 months from November to February, with an average daily high temperature below 56 degrees F.

The total annual precipitation for the Town is 38 inches per year. The heaviest rainfall months occur between March and August, with a greater than 32% chance of a given day being a wet day. Chances of snowfall are mild with an average accumulation during winter months of 0.3 inches.

2.2.1.2 Topography and Drainage

According to U.S. Geological Survey (USGS) quadrangle maps, the local topography within the Town's service area is generally hilly and drains to the Harpeth River (Exhibit 1, Appendix A) and is located within the Harpeth River Watershed. The Town has an average elevation of 801 feet National Geodetic Vertical Datum (NGVD).

2.2.1.3 Geology and Soils

According to United States Department of Agriculture (USDA) National Resources Conservation Services Williamson County Soils Survey (National Cooperative Soil Characterization Database, 1964), regional geology found in Williamson County is categorized into eight different soil associations and is underlain by sedimentary rocks ranging from the Mississippian to the Ordovician. Within the county, there are four main physiographic divisions; they are the Highland Rim, the outer Central Basin, the inner central Basin, and the Harpeth River Valley. The Town falls within the terraces and bottom lands of the Harpeth River Valley (Exhibit 4, Appendix A). The bottom lands and terraces within the valley gently slope to nearly level areas in the meanders of streams. In these areas, most of the soils have a medium to high content of phosphorus.

This region of soils can be characterized as generally having Maury-Armour-Braxton association and Dellrose-Mimosa-Rocklands association. The Maury-Armour-Braxton association contains gently rolling soils underlain by phosphatic limestone on uplands of the outer Central Basin. The soils are moderately deep to deep and generally are well drained. Erosion is slight to moderate on the gently sloped soils but is moderate to severe on the steeper soils. Similarly, the Dellrose-Mimosa-Rockland association consists of steep, cherty soils underlain by clayey phosphatic limestone on uplands of the outer Central Basin.

2.2.2 Water Resources

2.2.2.1 Hydrology

The Harpeth River drainage basin in which the Town is located covers approximately 863 square miles of land over five counties (Exhibit 5, Appendix A). There are 1,314 stream miles and 655 lake acres within the Harpeth River Watershed, with the Harpeth River, South Harpeth River, and West Harpeth River making up the larger rivers. All three begin in the northern-most point of the basin and flow towards the southeast to eventually drain into the Cumberland River.

2.2.2.2 Surface Water Quality

The West Harpeth River, which falls into the Harpeth River drainage basin, is the nearest body of water that is listed on the Section 303(d) list of impaired waters. This section of the Clean Water Act requires that each segment of a water body that is not meeting its designated uses based on an assessment of ambient water quality be tabulated for future completion of a total maximum daily load (TMDL) study. The West Harpeth River has history of recreational impairment caused by *Escherichia coli* (E. Coli) since reporting began in the 1990's. The most recent 303(d) list, completed in 2016, indicated two new causes for impairment due to alteration in stream-side or littoral vegetative covers and sedimentation. An implementation plan is in place to identify point and non-point sources of impairment and to continue monitoring the surface water quality of the river.

2.2.3 Environmental Sensitive Areas or Features

According to the National Wetlands Inventory (NWI), a freshwater forested/shrub wetland is located directly east of the Regional WWTP. This wetland is classified as nontidal and is dominated by trees, shrubs, persistent emergent, and emergent mosses or lichens. Within its classification, the water regime is seasonally flooded where surface water is present for extended periods but is absent during non-growing seasons.

2.2.3.1 Archeological and Historical Sites

According to data obtained from the Tennessee Division of Archaeology, there are no public archaeological sites located within the Town's service area. However, the Tennessee Historical Commission's database indicates there are several historical sites within the Town's service area. None of the historical sites will be disturbed as a part of the upgrades made to the Regional WWTP.

2.2.4 Floodplains

The floodplain map for the area immediately surrounding the Regional WWTP was created using the Federal Emergency Management Agency's mapping database (Exhibit 6, Appendix A). The mapping data depicts the area as an area of minimal flood hazard.

2.3 Growth Areas and Population Trends

Thompson's Station has seen rapid growth in the number of residential and commercial developments over the past two decades. According to U.S. Census data, the population of the Town of Thompson's Station was 2,194 in 2010 and is estimated to be 6,200 in 2020. Based on previous calculations made in 2018 for the Town's 2018 Master Plan, the Town's population is expected to be 20,673 by the year 2043. The Town continues to grow at a higher rate than the rest of the county and higher than the expected growth rate projections of the county. It is estimated that recent and proposed residential developments will account for approximately 2,500 new wastewater service taps. These developments are expected to be built out by the year 2026. Figure 2.1 and Table 2.1 outline the projected population growth that the Town is expected to see within the 30-year planning period.

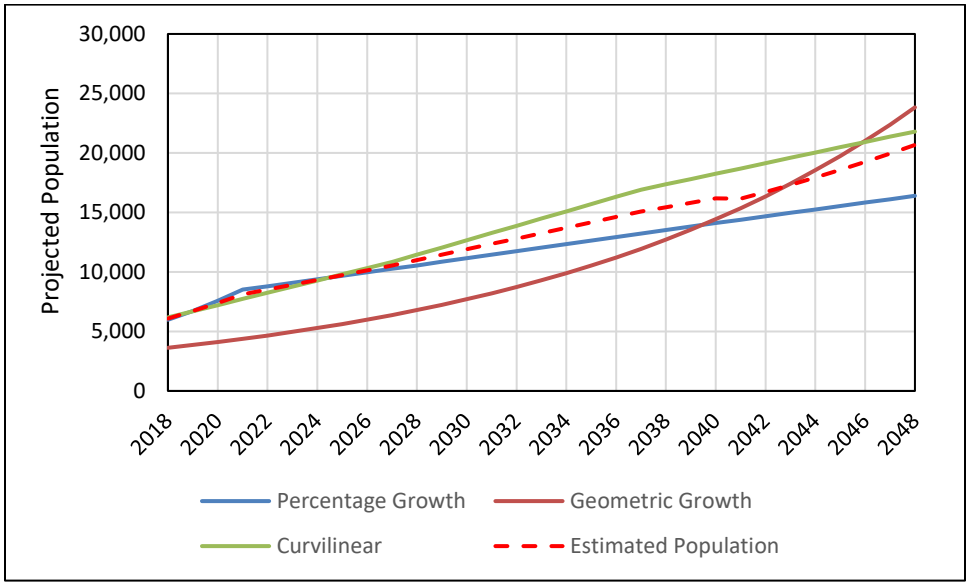

Figure 2.1 - Population Projections

Table 2.1 provides a summary of the population projections for the planning period. The estimated population is the average population of the percentage growth and geometric growth methods from 2018 to 2040 and the average population of all three methods from 2040 to 2048. The methodology of population projections and decision to use partial results from the geometric growth method is explained in detail in the town's 2018 Master Plan.

Table 2.1 - Population Projections

Year	Percentage Growth Population	Curvilinear Population	Geometric Growth Population	Average Population
2020	7,570	7,714	-	7,642
2023	9,086	8,766	-	8,926
2028	10,549	11,444	-	10,997
2038	13,514	17,364	-	15,439
2048	16,398	21,791	23,830	20,673

Town ordinances require that new developments connect to the Town's wastewater system. The Town's Monthly Operating Report (MOR) data from 2013 to January 2020 was analyzed to determine average flows and peaking factors to estimate peak flows at the regional treatment facility. Table 2.2 and Figure 2.2 show the projected average daily flow and peak daily flow from 2023 to 2043.

Table 2.2 - Wastewater Flow Projections at the Regional WWTP

Wastewater Flow Projections - Regional WWTP			
Year	Average Annual Day (GPD)	Maximum Month (GPD)	Peak Day (GPD)
2023	**463,950**	**556,740**	**788,720**
2028	**632,800**	**759,350**	**1,075,750**
2038	**976,500**	**1,171,850**	**1,660,100**
2048	**1,309,600**	**1,571,500**	**2,226,300**

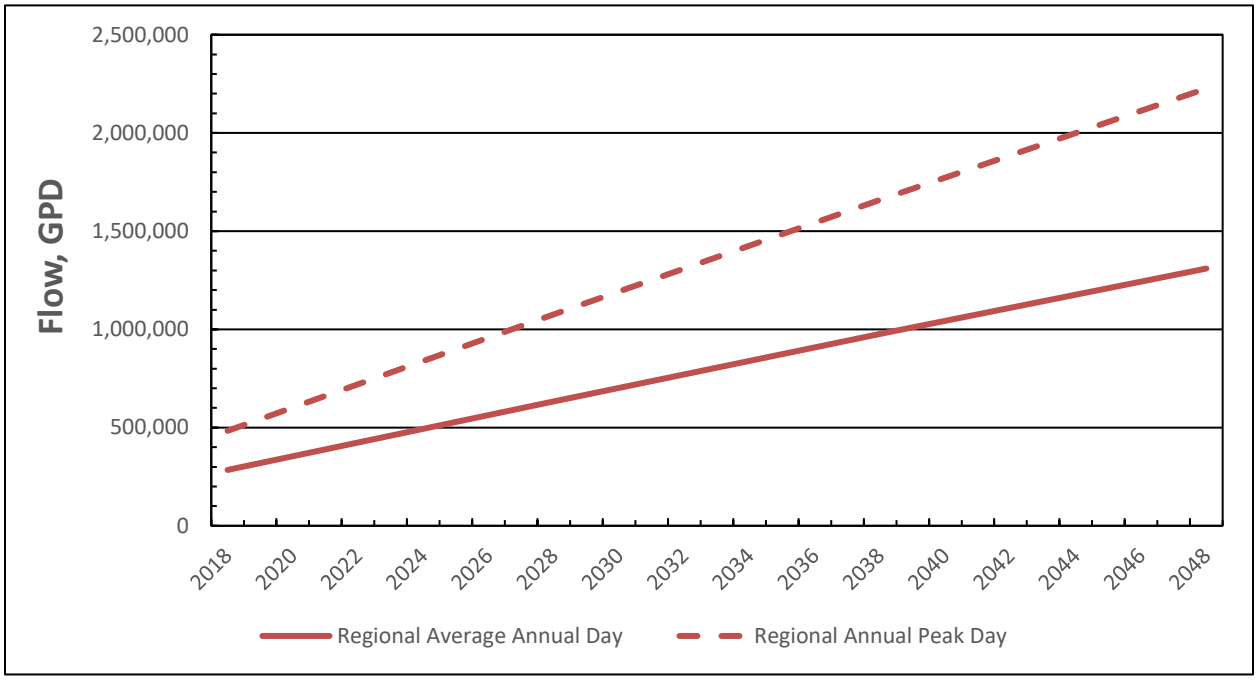

Figure 2.2 - Wastewater Flow Projections

2.4 Community Engagement

The Town will maintain engagement with the community throughout the planning and design phases of the WWTP expansion. Each month, the Town's utility board hosts a meeting and the needs and potential solutions for the wastewater treatment system are discussed. Funding strategies have also been presented at the meeting to ensure a greater community understanding of the costs and benefits of alternative solutions. These monthly meetings hosted at the Town Hall are open to the public and are also videotaped and posted online to the Town's webpage.

3.0 EXISTING FACILITIES

3.1 Location Map

A location map for the existing Regional WWTP site is included in Appendix A. The location map identifies the location of the following existing facilities:

- Influent Pump Station
- Plant Operations Building & Pump Stations
- Lagoon Cells

3.2 Condition of Existing Facilities

3.2.1 Influent Pump Station

The influent pump station consists of two non-clog suction lift centrifugal pumps, rated for 850 gallons per minute (GPM), each with a suction lift of approximately 19 feet. The current wet well depth is 23.5 feet, with a 12-foot by 12-foot square area. The incoming flow is routed through a channel grinder with a hydraulic drive mounted on the interior face of the wet well. The pump station has experienced flooding in the past and has a finished floor elevation below grade. Accessibility and maintenance have been issues reported by operators due to its multi-level floor plan (Figure 3.1). This entire structure is designated for demolition under the current design.

Figure 3.1 - Existing Influent Pump Station

3.2.2 Lagoon Cells

Two lagoon cells were constructed in 2005 and provide a total pond volume of 65.5 million gallons. Since 2005, there have been two major failures in the liner of both cells. The liner of Cell 2 was replaced in 2012 to mediate the failures. The wastewater enters the anaerobic zone of the lagoon (lowest portion) after being pumped from the influent pump station. The lagoons are designed with a stratified system of zones: sludge/anaerobic, aerobic treatment, storage, and freeboard zones, which are detailed in Table 3.1. Currently, Cell 1 is out of service and the daily demands are being met using only Cell 2. Each cell is aerated using course bubble static tube diffusers that are raised above the anaerobic zone. The static tube diffusers are intended to provide 20 standard cubic feet per minute (SCFM) each and provide mixing and oxygenation for the treatment process. Currently, Cell 1 has 107 diffusers and Cell 2 has 69 diffusers.

Table 3.1 – Summary of Treatment Pond Capacity

	Cell 1		Cell 2	
	Depth (ft)	Volume (MG)	Depth (ft)	Volume (MG)
Freeboard	3.0	5.1	3.0	3.1
Storage	5.5	8.7	10.0	8.9
Aerobic Zone	20.5	25.5	16.0	10.0
Anaerobic Zone	3.0	2.9	3.0	1.3
Total	**32.0**	**42.2**	**32.0**	**23.3**

3.2.3 Pump Stations

There are two pump stations (PS-1 and PS-2) constructed on the north berm of Cell 2. These pumps stations transfer wastewater from the lagoons to the filter and on to the clearwell using submersible pumps designed to pump 699 GPM at 90 feet of total dynamic head. Flow to the west pump station (PS-1) is supplied from gravity connectors in Cell 2. The wet well of the west station is hydraulically connected to Cell 2, and the level in the wet well floats based on the level in Cell 2. The east pump station (PS-2) was designed to provide additional pumping; however, current wastewater flows do not require the use of the east station and it is not operational. The wet well depth is monitored, and the pumps are operated based on the capacity in the effluent drip fields and the level in the wet well. All isolation and check valves are located within the wet well, and control floats are accessible from the double door hatch opening. The backwash is returned to the cells.

Figure 3.2 - PS-1

3.2.4 Plant Operations Building

The plant operations building is a block-framed building with a brick façade. The building is partitioned into a blower room, a filter room, an operations room, and two small storage rooms. The blower room contains two rotary lobe blowers. These blowers will remain in service in the current design to provide aeration for influent equalization.

The filter room includes the filters, UV disinfection, and final effluent irrigation pump station. The filters are fully automated disc filters designed to remove particulates that have the potential to clog downstream drip irrigation equipment. Backwash water from these filters is returned to the west pump station. The filtration system is reasonably well-maintained under normal operation; however, the filters are susceptible to clogging both from algae and plastics which enter the lagoon. These filters will not remain in service with the proposed design.

The effluent disinfection system is a self-contained UV system that is rated to disinfect up to 1.0 MGD. The UV modules in the unit are dry modules, and effluent is channeled through clear tubes passing between the UV light modules. The existing unit was rebuilt within the past five years. Under the proposed design, a second unit, designed to current standards, will be included for redundancy and to adequately disinfect the additional flows.

Figure 3.3 - Existing Ultraviolet Disinfection Unit

The effluent irrigation pump station consists of a skid-mounted end-suction pump that transfers filtered and disinfected effluent to the drip fields north and west of the plant. The pump lifts water out of the clearwell located beneath the existing operations building and operates on a variable frequency drive. The flow is monitored and measured as it leaves the facility. A second end-suction irrigation pump is currently being installed and is expected to be fully operational by Fall 2020.

Figure 3.4 - Filtered Water Skid-Mounted Pump Station

Plant operations are controlled from the operations building. The control room is located on the north side of the building and was added to the filter building. Control screens and office workspace are situated in the room to accommodate the plant operators.

3.3 Financial Status of any Existing Facilities

The Town is currently servicing approximately 1,888 residences and 72 commercial customers with wastewater treatment at the Regional WWTP. The current rate for users is $7.69 for the first 8,000 gallons, $9.78 for gallons 8,001 to 20,000, and $12.20 for gallons over 20,001. These rates are calculated from water usage data provided by the Hillsboro, Burwood, and Thompson's Station (H.B.&T.S.) utility company and increased by a factor of 107.5%. The maximum monthly residential fee is $55.00 and there is no maximum for nonresidential use.

Annual operations and maintenance (O&M) cost for the Town, including employee wages and benefits, insurance, repair and maintenance, training, and depreciation, will be tabulated once a funding agency has been procured. The most recent audit reports, liability, and total asset data will also be provided after the funding agency has been established.

3.4 Water/Energy/Waste Audits

There have been no known water, energy, or waste audits completed by the Town within the past five years.

4.0 NEED FOR PROJECT

4.1 Health, Sanitation and Security

The Town has a responsibility to provide adequate and safe wastewater treatment for its constituents. At the time of this report, there are no known safety concerns at the Regional WWTP.

4.2 Aging Infrastructure

Built primarily in 2005, the Regional WWTP's infrastructure is in fairly poor condition for its relative age. The cell liners, discussed in Section 3.3, have a typical service life of 20 years. Each cell under-performed the average life expectancy by 10 to 15 years. The lagoon liner failure in Cell 2 left the plant with one cell out of service for two to three years. Besides the lagoon liner failures, there are no other major infrastructure failures that have occurred due to aging equipment.

The Town is currently investigating possible inflow and infiltration (I&I) within the system. The results of this investigation will determine the need for future projects to repair the pipe network.

4.3 Regulatory Compliance

On April 19, 2017, the Town's State Operating Permit (SOP) No. SOP-04058 was renewed to give the Town permission to continue its operation of a grinder pump, low pressure collection system, aerated treatment/storage lagoons, disc filters, UV disinfection, and drip irrigation system (Appendix C). The permit, which is set to expire on September 30, 2020, also outlines a schedule to achieve regulatory compliance by the upgrade/modification of the existing wastewater treatment system. Phase one, which was scheduled to be completed by September 1, 2015, includes procuring professional assistance to accomplish the following:

- Evaluate existing WWTP operations
- Determine necessary upgrades to increase treatment capacity from 500,000 GPD to 1.0 MGD
- Determine necessary upgrades to meet 2012 Environmental Protection Agency (EPA) Unrestricted Urban Reuse standards
- Evaluate existing distribution/collection system to include upgrade recommendations based on potential future growth
- Identify potential irrigation sites for disposal and reuse
- Develop cost estimates for all recommended upgrades
- Assist the Town in developing a reasonable implementation plan

Phase one of the compliance schedule was achieved after the development of the Town's 2018 Master Plan and 2018 effluent disposal technical memorandum. The start of phase two of the compliance schedule has begun as the design of WWTP upgrades began in March 2020. Project completion is scheduled for December 2022.

4.4 Reasonable Growth

The anticipated growth of population and wastewater flow contributions within the system is described in section 2 of this report and the 2018 Wastewater Master Plan. As flows continue to increase and to approach 0.75 MGD, the capacity of the existing plant and the effluent disposal capacity will be exceeded. As a result, the improvements recommended in this report to the treatment plant will need to coincide with effluent disposal improvements.

As flows continue to increase and the plant's disposal capacity nears 1.0 MGD, it would be appropriate to begin planning for expansion of the plant and additional disposal alternatives. The expansion of the plant can be phased in each of the alternatives discussed below. Additional effluent disposal alternatives can include land application, reuse, or surface water discharge.

5.0 ALTERNATIVES CONSIDERED

Since 2018, four different alternatives have been developed and analyzed for the upgrades and improvements to the Regional WWTP. These alternatives were created and measured based on each alternative's ability to efficiently address the concerns presented in the previous sections of this report.

- Expansion of existing lagoons
- Membrane bioreactors
- Oxidation ditches
- Sequencing batch reactor (SBR)

For each of the four alternatives that were considered, the following key factors were analyzed: construction cost, O&M cost, land requirements, flexibility, and operational reliability/simplicity. This analysis of each alternative will provide the background information needed to present the engineer's recommendation for the Regional WWTP. An additional alternative to pump wastewater to a surrounding community for treatment was analyzed, but not listed above. This alternative was not pursued as a result of the cost, insufficient system capacity of neighboring communities, and agreement coordination that would be required.

5.1 Alternatives Descriptions

5.1.1 Alternative 1 - Expand Existing Lagoons

Alternative 1 describes the improvement made to the existing lagoon system to increase its capacity to 1.0 MGD. The existing lagoon system was designed to be upgradable to a capacity of 1.0 MGD. However, since its design in 2004, the TDEC design criteria for ponds and aerated lagoons has been updated. In January 2016, changes were made to the design equation that would make it difficult to permit the plant for its intended future capacity. The following scope is included in this alternative:

- Expand or replace the existing influent lift station
- Construct new influent fine screens and flow distribution box
- Construct a third lagoon with a volume roughly equivalent to Cell No. 1
- Install additional blowers to meet capacity
- Install additional static tube aerators or another form of aeration
- Replace existing filter fee pump and installing a second pump
- Replace the existing filter package with a new 100-micron filter
- Add an additional UV unit to the existing UV disinfection system
- Rehabilitate the existing operations building
- Add a new standby generator
- Expand land application system

5.1.2 Alternative 2 - Membrane Bioreactors

Alternative 2 consists of installing MBRs to increase the capacity of the Regional WWTP to 1.0 MGD, with the capability of future expansion to 1.5 MGD. The following scope is included in this alternative:

- Decommission the existing influent lift station and install a new influent lift station
- Construct new influent fine screens and flow distribution box
- Modify existing Cell 2 to provide effluent storage
- Install two new reactor basins with anoxic and aerobic zones
- Construct an MBR system
- Add an additional UV unit to the existing UV disinfection system
- Construct an aerobic digester and sludge dewatering press
- Implement improvements to the existing electrical system, including a new backup power generator
- Rehabilitate the existing operations building
- Implement site improvements, including piping, roadways, and other utilities
- Expand land application system
- Add a new standby generator

This alternative also provides a solution for a simple phased capacity increase with the addition of more membrane modules. Initially, process piping may be oversized.

5.1.3 Alternative 3 - Sequencing Batch Reactors

Alternative 3 includes the installation of an SBR system. With SBR system, wastewater treatment occurs in one tank over a specified period of time and is considered an extended aeration process. The work to complete this alternative includes:

- Decommission the existing influent lift station and install a new influent lift station
- Construct new influent fine screens and flow distribution box
- Install two new SBR basins, with provisions for a future 3rd basin
- Implement Post-SBR flow equalization
- Install additional disc filters for solids removal
- Install one new UV unit, and relocate the existing UV disinfection system
- Construct an aerobic digester and sludge dewatering press
- Construct a new blower and operations building
- Install a new backup power generator
- Implement site improvements, including piping, roadways, and other utilities
- Expand of land application system
- Add a new standby generator

5.1.4 Alternative 4 - Oxidation Ditch Process

Alternative 4 includes the installation of an oxidation ditch system. This type of plant is considered an extended aeration process and is established in the wastewater treatment industry. Alternative 4 would also include the following improvements:

- Decommission the existing influent lift station and install a new influent lift station
- Install new influent fine screens and flow distribution box
- Construct two new oxidation ditch/Carrousel basins, with anoxic zones and internal recycle
- Two secondary clarifiers with provisions for a third in the future
- Return activated sludge (RAS) and waste activated sludge (WAS) pumping
- Disc filters for solids removal
- One new UV unit, and relocate the existing UV disinfection system
- Aerobic digester and sludge dewatering press
- New blower and operations building
- New backup power generator
- Miscellaneous site improvements, including piping, roadways, and other utilities
- Expansion of land application system
- New standby generator

5.2 Design Criteria

The design criteria for all alternatives were examined to provide improvements to the existing Regional WWTP to increase its overall capacity and efficiency. The following codes and guidelines are utilized during the alternative selection process and design phase:

- TDEC, Design Criteria for Sewage Works
- Ten State Standards for Wastewater
- Water Environment Federation MOP 8 – Design of Water Resource Recovery Facilities
- U.S. EPA 2012 Guidelines for Water Reuse
- 2018 International Building Code
- 2018 International Existing Building Code
- 2018 International Mechanical Code

Influent loadings at the Regional WWTP for nitrogen and biochemical oxygen demand (BOD) were analyzed using influent data collected for a study completed by SSR in 2015. The sampled values included both raw wastewater and wastewater mixed with septage. Because the Town has stopped accepting septage, those latter values have been deleted from the analyzed data. The results of this data collection were utilized to outline the plant's design parameter, which are summarized in Table 5.1.

Table 5.1 - Influent Design Parameters

Parameter	Initial Design	Ultimate
Flow (MGD)		
Annual Average Daily Flow (AADF)	1.0	1.5
Peak Month Flow	1.2	1.7
Peak Daily Flow	1.7	2.4
Instantaneous Peak Flow	3.0	4.5
$BOD_{5,}$		
Avg. Concentration (mg/L)	223	223
Avg. Loading (lb/day)	1853	2790
Peak Month Load (lb/day)	2232	3162
Total Kjeldahl Nitrogen		
Avg. Concentration (mg/L)	55	55
Avg. Loading (lb/day)	459	688
Peak Month Load (lb/day)	550	780

Currently, there is minimal industrial flow. The Town will continue to monitor existing industrial users and will enforce the existing pretreatment program.

The facility will be designed for Class II reliability.

The plant will be designed to provide effluent suitable for unlimited public access (urban) reuse, in accordance with EPA reuse criteria. The design criteria for the effluent are listed in Table 5.2.

Table 5.2 - Effluent Design Criteria

Parameter	Initial Design	Ultimate
Flow (MGD)		
Annual Average Daily Flow (AADF)	1.0	1.5
$BOD_{5,}$ Concentration (mg/L)	≤10 mg/L	≤10 mg/L
TSS Concentration (mg/L)	≤ 5 mg/L	≤ 5 mg/L
Turbidity (NTU)	≤ 2 NTU	≤ 2 NTU
pH	6 - 9	6 - 9
Fecal Coliform	Non-detect	Non-detect

5.3 Reference Information

The following items were referenced in the creation of this report:

- Town of Thompson's Station 2018 Wastewater System Master Plan, Barge Design Solutions, September 2018
- Thompson's Station Regional Wastewater Treatment and Reuse System Background and Discussion of System Capacity, Sheaffer Wastewater Solutions, LLC, October 2013
- State Operating Permit No. SOP-04058, issued April 19, 2017

- SSR Town of Thompson's Station, Tennessee Evaluation of Wastewater Treatment Facility and Disposal Options, Study Report, September 1, 2015
- Regional Wastewater Treatment Plant As-Built Drawings, Sheaffer Wastewater Solutions, LLC, August 2006

5.4 Map

Maps of alternative 3 and 4 are presented in Appendix A.

5.5 Environmental Impacts

Each of the four alternatives will have minimal direct environmental impact. In each case, the effluent quality will be significantly better than the existing lagoon effluent, providing a beneficial impact on the environment, even when used strictly for subsurface land application. In the longer term, the provision of a high-quality reclaimed water, with a high degree of reliability, will provide additional environmental benefits. There will be more environmental impacts with Alternative 1 as land will have to be found for construction of the third lagoon in the future. Similarly, both Alternatives 3 and 4 will require additional land. However, none of the alternatives include any river, stream, or wetland crossings and do not impact the 100-year flood plain. The following table addresses the environmental impacts of each alternative.

Table 5.3 - Environmental Impacts for each Alternative

	1 - Aerated Lagoons	2 - MBRs	3 - SBRs	4 - Oxidation Ditch
Floodplain Impacts	Potential impact from expansion	None	None	None
Wetlands Impacts	None	None	None	None
Endangered Species Impacts	None	None	None	None
Historical/Archaeological Impacts	None	None	None	None
Permits Required	▪ Modified SOP ▪ Construction Permit ▪ NPDES Stormwater	▪ Modified SOP ▪ Construction Permit ▪ NPDES Stormwater	▪ Modified SOP ▪ Construction Permit ▪ NPDES Stormwater	▪ Modified SOP ▪ Construction Permit ▪ NPDES Stormwater

5.6 Land Requirements

The land requirements vary with each alternative. Alternative 1 requires the most land, as a large 42 million-gallon (MG) lagoon will have to be sited. This will require either purchasing additional property east of the existing lagoons or constructing the third lagoon over the existing dog park and community gardens west-northwest of the existing lagoons. Alternative 2 can be constructed essentially within the existing footprint of the treatment system. Both Alternatives 3 and 4 will require additional property; however, some portions of the Hill property which were deemed

unsuitable for effluent land application would be potential sites for the treatment facilities. The following table summarizes the land requirements for each alternative.

Table 5.4 - Land Requirements for each Alternative

	1 - Aerated Lagoons	2 - MBRs	3 - SBRs	4 - Oxidation Ditch
Additional Land Required	12 Acres	None	5 Acres	7 Acres
Acquisition	Either currently owned or to be acquired	Currently owned	Currently owned	Currently owned

5.7 Potential Construction Problems

Each of the alternatives has some potential construction problems. One problem common to all alternatives is the anticipated high groundwater at the influent lift station. Discussions with Town staff indicate that rock occurs at a relatively shallow depth but that previous lift station construction required significant dewatering. For this reason, the use of pre-cast structures for the new lift station is preferred.

For the remaining alternatives, the nature and extent of construction issues vary. The potential construction problems for each of the alternatives are summarized in the following table.

Table 5.5 - Potential Construction Problems for each Alternative

	1 - Aerated Lagoons	2 - MBRs	3 - SBRs	4 - Oxidation Ditch
Construction Problems Anticipated	Limited access to site due to CSX railroad	Limited construction space	Need to obtain RR crossing permits	Need to obtain RR crossing permits
	Repair of Cell No. 1 liner	Grading issues	High groundwater at influent lift station	High groundwater at influent lift station
	Maintaining treatment during construction	High groundwater at influent lift station		
	Rock removal			
	High groundwater at influent lift station			

5.8 Sustainability Considerations

Except for Alternative 1, all alternatives will provide effluent that will meet EPA's criteria for unrestricted public access reuse in urban areas. Although the Town currently has minimal reuse facilities, these alternatives will allow the extension of a "purple pipe" reuse system and provide a high quality effluent for potential industrial reuse at Mars, Inc., a nearby commercial customer, and for cooling water elsewhere.

None of the treatment alternatives are impacted by water efficiency or water conservation considerations. None of the treatment processes use potable water, except potentially for polymer make-down for residuals dewatering. Even in this case, reuse water will be provided, but potable water may be required. The potable water consumption will be the same for each alternative, as the dewatering system will be consistent between alternatives.

All new non-process construction will be in accordance with current building code requirements, which emphasize water efficiency and water conservation.

The energy efficiency of the alternatives varies widely. The lagoon alternative consumes the least energy but provides the lowest degree of treatment. Additionally, this will limit the Town's options for expansion of effluent disposal capacity by pursuit of reuse and/or a surface water discharge. MBRs tend to be relatively efficient, especially with the deep tanks and fine bubble aeration proposed for the anoxic/aerobic reactor basins. SBR efficiency can vary widely, depending on design parameters. Oxidation ditch technology, while simple, is a low-rate system and probably the least efficient from an energy usage standpoint. Because of the relatively small size of the facility, the use of anaerobic technology for renewable generation of energy is not feasible. The Town has considered installing solar photovoltaic cells in the subsurface application areas, but this would be a separate project in the future.

Given the Town's long dependence on aerated lagoon technology, operational simplicity is a consideration in alternative selection. While MBRs are relatively complex, the operator interface requirement has been reduced, and the staff understands the treatment process. SBRs have a similar level of operational and mechanical complexity. The oxidation ditch technology is probably the simplest but does require a relatively high level of operator attention to attain the desired treatment level.

Table 5.6 - Land Requirements for each Alternative

	1 - Aerated Lagoons	2 - MBRs	3 - SBRs	4 - Oxidation Ditch
Water Reuse Potential	Low	Highest	High	High
Water Efficiency	N/A	N/A	N/A	N/A
Water Conservation	N/A	N/A	N/A	N/A
Energy Efficient Design	Highest	Moderate	Moderate	Low to Moderate
Operational Simplicity	Simplest	Moderate Complexity	Moderate Complexity	Simple

5.9 Cost Estimate

Opinions of probable construction cost, as well as other non-construction costs, have been developed for each of the four alternatives. These are summarized in Table 5.7. Itemized opinions of probable project cost are provided in Appendix B. The annual O&M costs are summarized in Table 5.7 and broken down further in Appendix B.

Table 5.7 - Opinions of Probable Construction Cost

	1 – Expanded Lagoons	2 – MBRs	3 – SBRs	4 – Oxidation Ditch
Construction Cost (with 35% Contingency)	$ 18.3 M	$ 13.1 M	$ 20.6 M	$ 20.3 M
Design/Administrative Costs	$ 1.4 M	$ 1.9 M	$ 1.5 M	$ 1.5 M
Construction Administration	$ 1.4 M	$ 1.9 M	$ 1.5 M	$ 1.5 M
Property Acquisition	-	-	$ 150,000	$ 210,000
Total Capital Costs	$ 21.3 M	$ 14.5 M	$ 23.8 M	$ 23.5 M
Annual O&M Costs	$ 300,000	$ 500,000	$ 310,000	$ 360,000

6.0 SELECTION OF AN ALTERNATIVE

6.1 Life Cycle Cost Analysis

A present worth (life cycle) analysis was conducted to compare the four alternatives. For each of the alternatives, the total project costs are identified in terms of present worth value based on TDEC's guidelines for life cycle analysis. The uniform series present worth of annual O&M was calculated using a discount rate of 5.0% over a 30-year planning period. Life cycle cost analysis for each alternative is presented in the table below and Appendix B.

Table 6.1 - Life Cycle Cost Analysis

	1 – Expanded Lagoons	2 – MBRs	3 – SBRs	4 – Oxidation Ditch
Total Capital Costs	$ 21.3 M	$ 15.1 M	$ 23.8 M	$ 23.5 M
Uniform Series Present Worth of Annual O&M	$ 4.6 M	$ 8.1 M	$ 4.8 M	$ 5.5 M
Present Worth of Salvage Value (SPPW)	$ 3.3 M	$ 2.4 M	$ 3.8 M	$ 3.7 M
Net Present Value (NPV)	$ 22.5 M	$ 20.8 M	$ 24.8 M	$25.4 M

6.2 Non-Monetary Factors

Several non-monetary factors were taken into consideration with the analysis and selection of a potential alternative. These factors include community perception, operator training, and future permitting. Table 6.2 outlines the non-monetary factors for each alternative and gives it a rating on scale from low to high on the level of potential issues.

Community perception could be a potential factor involved in the selection of a recommended alternative. The community's involvement in the Town's monthly utility board meetings has previously revealed concerns about the potential risks of installing new facilities within and around the existing berm at the Regional WWTP. A geotechnical investigation will be completed to help dictate the validity of the community concerns.

With the installation of Alternatives 2 through 4, operators would be required to learn how to properly run the plant using the new technology. Each new technology provides a certain level of complication that would be new to the plant's existing operators. With Alternative 1, it is anticipated that no new operators would be required to properly run the plant. However, with Alternatives 2, 3 and 4, at least one additional operator would be required.

Permitting issues can arise easily with Alternative 3 and 4 due to the land acquisition that each of them require. The acquisition of land within the area can be costly and take up land that could potentially be used for future drip irrigation.

Table 6.2 - Analysis of Non-Monetary Factors

	1 – Expanded Lagoons	2 – MBRs	3 – SBRs	4 – Oxidation Ditch
Community Perception	Medium	High	Low	Low
Operator Training	N/A	Medium	High	High
Permitting	Low	Medium	High	High

7.0 RECOMMENDED ALTERNATIVE

Based on the estimated construction cost, life cycle cost, lack of potential construction problems, and analysis of non-monetary factors, Alternative 2, which includes the construction of a 1.5 MGD MBR plant, is the recommended alternative. Additionally, Alternative 2 can be readily phased and will provide a level of treatment that could be used for potential public access reuse in the future.

7.1 Preliminary Project Design

7.1.1 Influent Lift Station

A new influent lift station will be constructed to address capacity issues as well as maintenance issues that have resulted from previous flooding at the station. The existing 15-inch gravity sewer and 12-inch force main will both be re-routed to the new lift station through a new portion of 18-inch gravity sewer. Three new submersible pumps will be installed into a 12-foot diameter and 27-foot deep wet well. The influent pumps will be capable of handling flows to a firm capacity of 4.5 MGD and will be equipped with variable speed drives. The variable speed drives will allow the pumps to meet near-term average daily flows as well as future peak hourly flows. Pump curves for these pumps are located in Appendix B. Odor control will be achieved by a biological air scrubber capable of six air changes per hour.

Table 7.1 - Influent Lift Station Pumps

Influent Lift Station Pumps	
Number	3
Type	Non-clog submersible
Rated Capacity, GPM (ea.)	2,150
Rated Head, feet (ea.)	80
Depth of Wet Well, feet	27
Nominal Pump Operating Speed, rpm	1185
Motor Rating, hp	90
Drive	Variable speed
Electrical Service	460-volt, 3 Phase
Manufacturer	Flygt or equal
Meter	14-inch Electromagnetic Flow Meter, Endress Hauser, Rosemount, Toshiba, or equal

7.1.2 Influent Screening and Flow Distribution

Two new influent screens will be installed on an elevated structure next to the new MBRs. Each screen will have a rated capacity of 1.5 MGD to provide redundancy. The screens will require a dumpster to store the screenings and will have the capacity to install a screenings washer/compactor in the future. Access stairs will be provided for the cleaning and maintenance of the screens. An elevated steel flow distribution box with adjustable weir gates will be installed to split flow equally between the aeration basins.

Table 7.2 - Influent Screens

Influent Screens	
Number	2
Type	Rotary Drum
Hydraulic Capacity each, MGD	1.5
Bar Spacing, inch	2 mm
Channel Width, feet	3.0
Manufacturers	Ovivo, Parkson, Enviro-Care

7.1.3 Aeration/Anoxic Basins

Two new basins will be installed to provide biological treatment of the organic load in the influent wastewater. The basins will be partitioned with non-hydrostatic baffles to provide anoxic zones (for denitrification) and aeration zones. Mixed liquor from the membrane tank will be returned to the anoxic zone. The mixed liquor will flow from the reactor basins to the MBR skids.

Table 7.3 - Aeration / Anoxic Basins

Reactor Basins	
Number	2
Capacity, gals (each basin)	308,000
Anoxic Capacity, gals. (total)	74,000
Aeration Capacity, gals. (total)	234,000
Tank Diameter, feet	35
Tank Height, feet	24
Material/Coating	Pre-Stressed Concrete
Roof Type	Open top
Foundation Type	Diaphragm
Manufacturer	CROM or equal

7.1.4 Membrane Bioreactors

The recommended alternative includes an MBR system. The system is designed around tubular reinforced membranes, as these systems have the longest operational life and a large number of installations. The membranes will be housed in a concrete structure and ancillary equipment will be housed in two separate skids. Within the membrane structure, there will be room for two membrane trains, which each contain four membrane cassettes. The two membrane trains will provide adequate capacity for up to 1.0 MGD AADF and 3.0 MGD peak flow. In the future, as flows increase, an additional membrane train can be installed, providing an ultimate capacity of 1.5 MGD AADF and 4.0 MGD peak flow.

The equipment skids will house support equipment for the membrane system. These include membrane scour blowers, RAS pumps, permeate pumps, and chemical feed systems. A 20-foot by 20-foot pre-engineered metal building adjacent to the membrane container will house a

chemical storage tanks. Flow from the MBR will then be pumping directly to the UV disinfection system. A list of the equipment and sizing for the MBR system is provided in Table 7.5.

Table 7.4 - Membrane Bioreactor Equipment

Membrane Bioreactors	
Number of Trains	2
Capacity, MGD (each)	0.5
Train Width, feet	9.0
Train Length, feet	30.0
Manufacturer	Suez or equal

7.1.5 UV Disinfection

The existing Enaqua UV disinfection unit is located within the operations building. The existing unit was designed to treat lagoon effluent at flows up to roughly 1.0 MGD, with a resulting fecal coliform load of non-detectable colony-forming units (CFU) per 100 mL. The dosage rate for the existing unit is 35 mJ/cm^2-sec. A new unit designed to provide disinfection for unrestricted urban area public access reuse and to meet the anticipated flow demands will be installed. The new unit will be similar to the existing unit and will be a package-type open-channel system with low-pressure, high-intensity (LPHI) lamps designed to deliver a UV dose to the wastewater. Any flow that does not meet the transmittance requirements for disinfection will be diverted to land application.

Table 7.5 - UV Disinfection System

UV Disinfection System	
Number of channels	2
Peak Design Flow, MGD	3.0
UV Transmittance, % UVT (min.)	65.0
Dosage, mJ/cm^2-sec	80
Total Number of Reactors	4
Total Number of Banks	2
Lamps per Bank	5
Lamps per Rack	60
Total Number of Lamps in System	480
Manufacturer	Enaqua, Trojan, or Xylem

7.1.6 Effluent Storage

Plant flow is passed through the UV disinfection system and finished water is stored in a clearwell. The finished water is then pumped to drip irrigation fields via two end-suction pumps. During wet periods, excess flow is directed through the existing overflow pipe to PS-1. As a part of this alternative design solution, it is recommended that the overflow be re-directed to the existing PS-2. Any overflow would then accumulate in Cell 2 for long-term storage. After it is determined

that additional flow can be accommodated in the drip irrigation fields, a 150 GPM slide slope pump will pump the treated effluent back through the existing disc filters and back to the clearwell.

7.1.7 Plant Drain Lift Station

The existing PS-1 will be converted into a plant drain lift station. Drainage piping from the MBR system and drum screens will be directed to Manhole 1 (MH-1), thus flowing by gravity to PS-1. Piping from PS-1 to the operations building and Cell 2 will be capped and a new force main will be installed to the north of the station. The force main will wrap around the top of the north berm and connect into the existing 12-inch force main from Tollgate Village. This drain water will ultimately be directed back to the influent lift station.

7.1.8 Aerobic Digestion

Solids from the MBR system will be pumped to an aerobic digestion tank. The concrete digester tank will be located within the property of the existing influent pump station and west of the new influent pump station. The digester will provide approximately 263,000 gallons. Approximate detention time will be 63 days at 1.0 MGD and 40 days at 1.5 MGD to comply with PSRP/PFRP requirements. The digester will be equipped with two blowers each capable of 1,034 SCFM at 9 pounds per square inch gauge (PSIG) to diffusers in a draft tube arrangement. Decanting equipment will be provided in the digester to increase thickness of digested sludge and improve dewatering capabilities. At this stage in design, odor control is not provided with the digester.

Table 7.6 - Aerobic Digestion

Aerobic Digester	
Number	1
Capacity, gal	263,000
Tank Diameter, feet	45
Tank Height, feet	24
Material/Coating	Pre-stressed concrete
Roof Type	Open top
Foundation Type	Embedded starter ring
Manufacturer	CROM or equal
Blowers	Multistage centrifugal
Aeration Capacity	1,034 SCFM at 9 PSIG

7.1.9 Operations Building Modifications

The existing operations building was built in 2005 and houses the UV disinfection system and the blower room. Modifications will be made to the piping within the building to install the new UV unit, as described in Section 7.1.5.

7.1.10 Standby Generator

A diesel standby generator will be installed to provide 500 kilowatts (kW) of backup power supply. A 200 amperage (amp) automatic transfer switch will also be included in the design.

7.1.11 Biosolids Dewatering

Solids from the aerobic digester will be directed to the biosolids dewatering building. The new biosolids dewatering building will be constructed to the east of the new influent lift station and will house one screw press or fan press with room for a future unit. The pre-engineered metal building will also house all ancillary equipment required for the screw press including a polymer system and all electrical and mechanical equipment. The building will also house the blowers for the aerobic digester. The dewatering building will be equipped with roll-up doors for press and blower maintenance and removal. After dewatering, the biosolids will be transferred to a 30-cubic yard dumpster for final disposal.

Table 7.7 - Biosolids Dewatering

Biosolids Dewatering	
Number of Units	1
Type	Screw Press or Fan Press
Capacity, lbs dry solids per hour	340
Washwater Requirements	160 GPM @ 40 PSI
Manufacturers	FKC, Fournier
Polymer mixing system	USGI Polyblend or equal

7.2 Project Schedule

The proposed upgrades to the existing Regional WWTP are estimated to be designed by November 2020. The design process would include approval of all required documents, land and easement acquisition, permit application, advertisement for bids, loan closing, and contract award. The construction period would begin in January 2021. Final completion of the project is expected to occur in April 2022. A detailed schedule of the design, permitting, and construction phases is provided in Appendix B.

7.3 Permit Requirements

The proposed project will require a TDEC Division of Water Resources plan review, National Pollutant Discharge Elimination System (NPDES) general stormwater permit for construction, an Aquatic Resource Alteration Permit, and a Stormwater Pollution Prevention Plan (SWPPP). Application and processing of the required permits will begin during detailed design of the project.

7.4 Total Project Cost Estimate

The total capital cost of this project is approximately $15.1 million. An itemized opinion of probable project cost is provided in Appendix B.

8.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis in this report, Alternative 2, Membrane Bioreactor, is recommended for implementation and construction. An MBR system will provide Thompson's Station with a reliable, cost-effective system over the life of its 30-year planning period.

APPENDIX A - Figures

OZZAD AND
TOLLGATE PROPERTY

HILL PROPERTY

ALEXANDER
PROPERTY

REGIONAL WWTP

N

DRIP IRRIGATION SITE
LAGOON CELLS
USGS TOPOGRAPHY
THOMPSON'S STATION
CITY LIMITS

BARGE
DESIGN SOLUTIONS
615 3rd Avenue South | Suite 700 | Nashville, Tennessee 37210
PHONE (615) 254-1500 | FAX (615) 254-6672

PRELIMINARY
NOT FOR
CONSTRUCTION

DATE

SERVICE AREA

REGIONAL WASTEWATER TREATMENT FACILITY

TREATMENT PLANT UPGRADES

THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION
-	-	-	-	-

EXHIBIT 1
FILE NO. 36724-03

USER:CNDAVIS
FILE:F:\36\36724\36724403\04_CAD\WATR\PER\36724403_Service Area.dwg
SAVED:6/3/2020
PLOTTED:6/10/2020

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DATE

EXISTING SITE LAYOUT

REGIONAL WASTEWATER TREATMENT FACILITY

TREATMENT PLANT UPGRADES

THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION			
REV.	DR.	CHK.	DATE	DESCRIPTION
-	-	-	-	-

EXHIBIT 2

FILE NO. 36724-03

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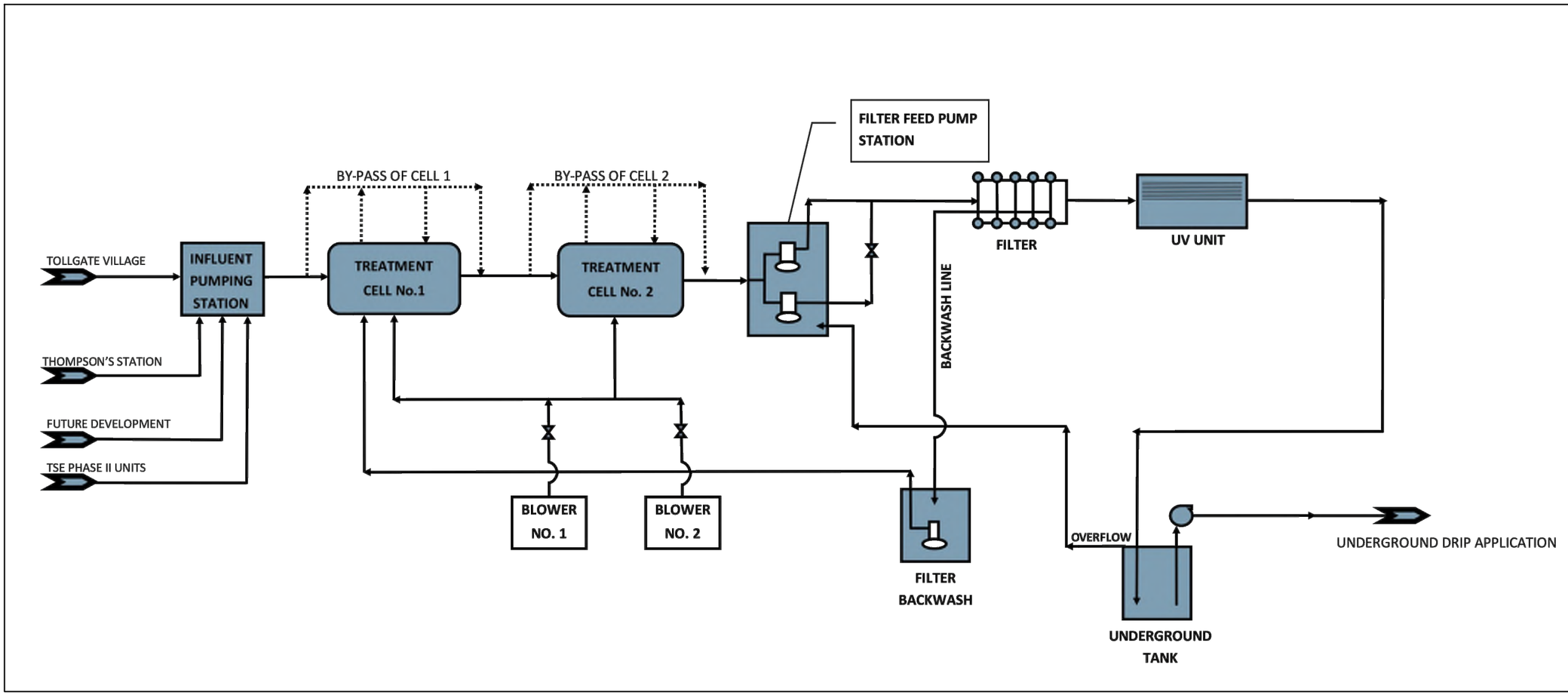
PLOTTED:6/10/2020



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DATE

PROCESS FLOW DIAGRAM

REGIONAL WASTEWATER TREATMENT FACILITY

TREATMENT PLANT UPGRADES

THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION
-	-	-	-	-

EXHIBIT 3

FILE NO. 36724-03

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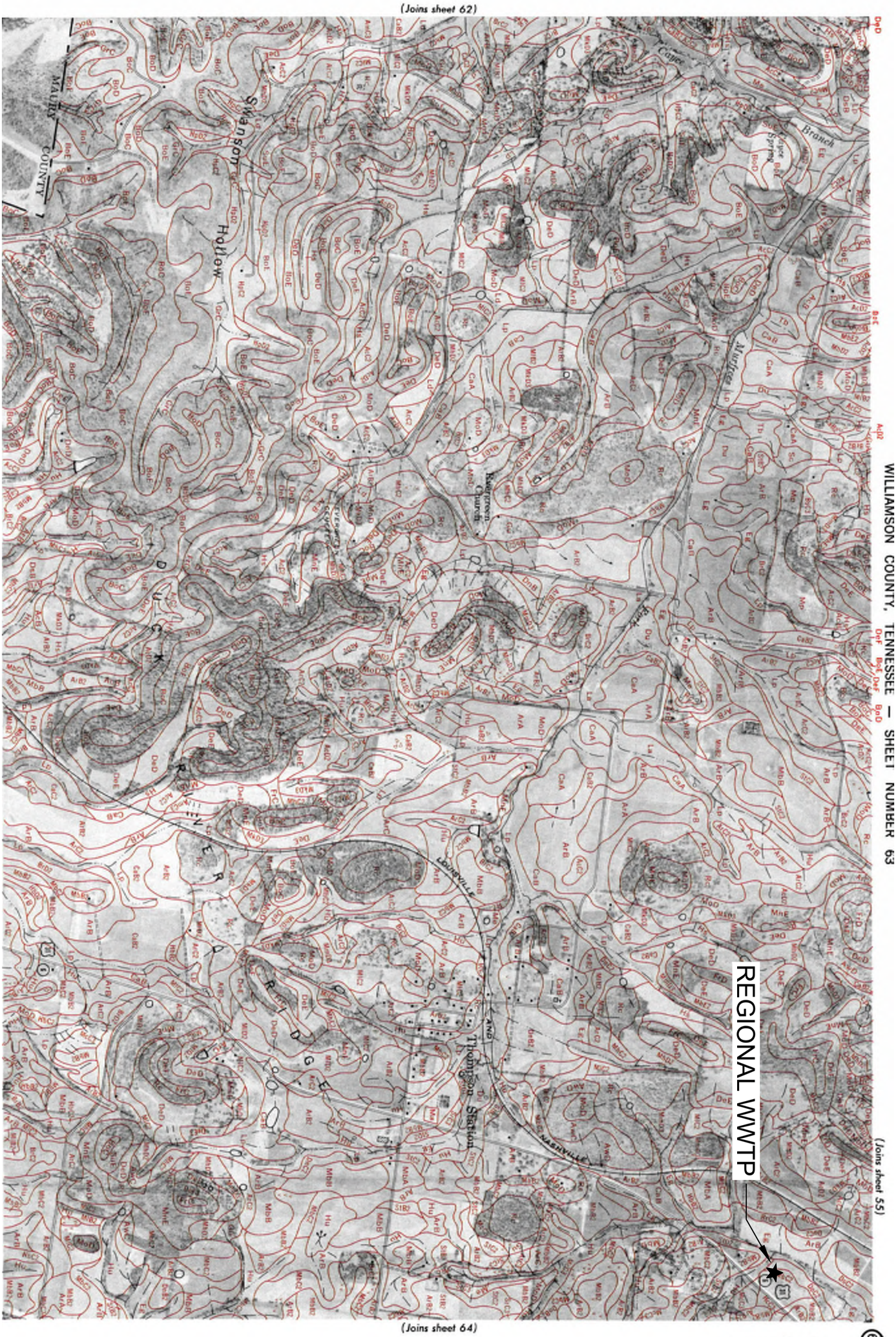
SAVED:6/10/2020
PLOTTED:6/10/2020

This map is one of a set compiled in 1963 as part of a soil survey by the Soil Conservation Service, United States Department of Agriculture, and the Tennessee Agricultural Experiment Station.



WILLIAMSON COUNTY, TENNESSEE — SHEET NUMBER 63

REVISION INFORMATION				
REV.	DR.	CHK.	DATE	DESCRIPTION

EXHIBIT 4
FILE NO. 36724-03

SOILS MAP

REGIONAL WASTEWATER TREATMENT FACILITY

TREATMENT PLANT UPGRADES

THOMPSON'S STATION, TENNESSEE

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CONSTRUCTION

DATE

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CONSTRUCTION

DATE

HARPETH RIVER WATERSHED

REGIONAL WASTEWATER TREATMENT FACILITY

TREATMENT PLANT UPGRADES

THOMPSON'S STATION, TENNESSEE

REV.	DIR.	CHK.	DATE	DESCRIPTION
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REVISION INFORMATION

EXHIBIT 5

FILE NO. 36724-03

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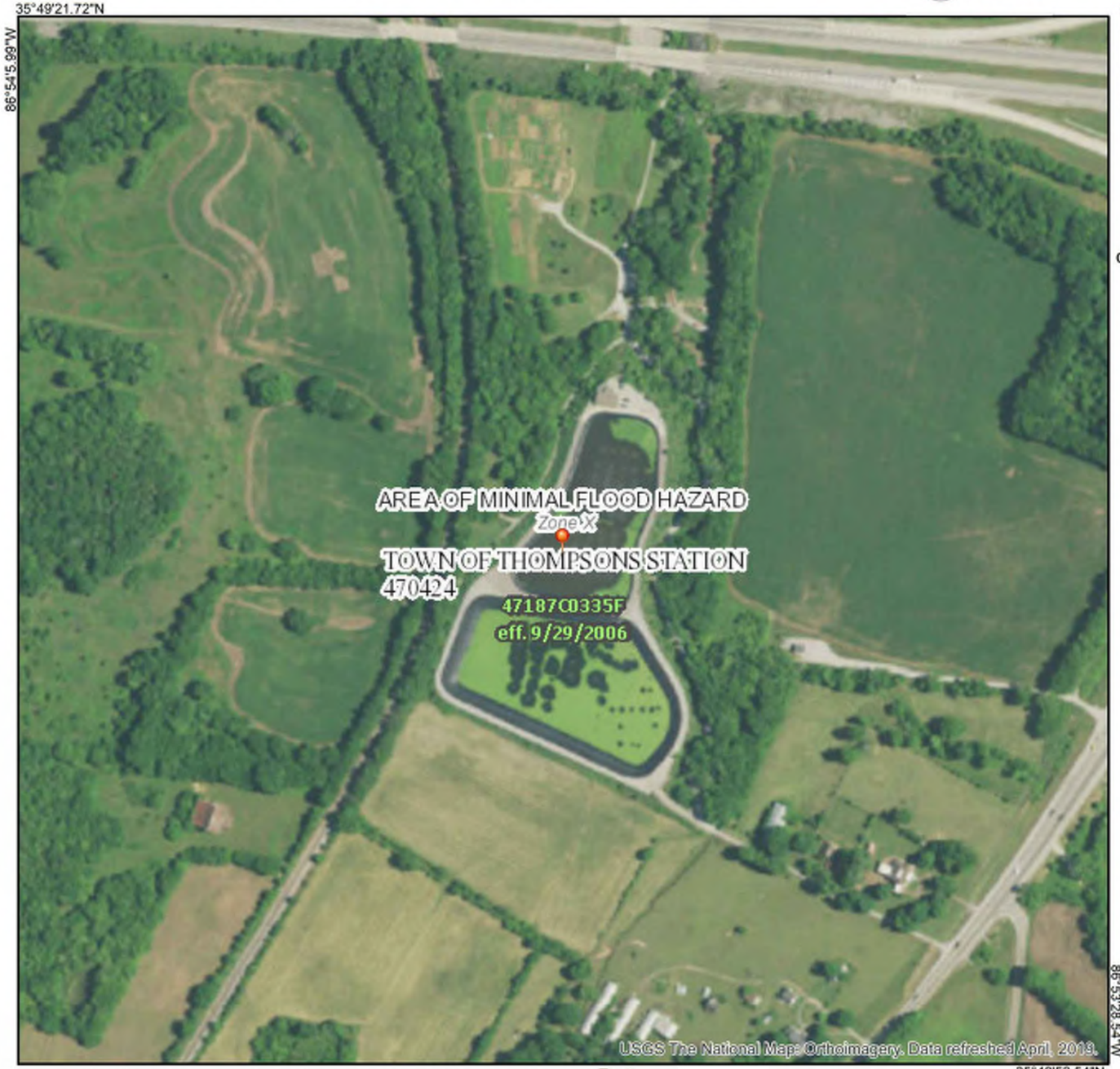
PLOTTED:6/10/2020

National Flood Hazard Layer FIRMette

FEMA

35°49'21.72"N

86°54'5.99"W



86°53'28.54"W

35°48'52.54"N

0 250 500 1,000 1,500 2,000 Feet

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS	Without Base Flood Elevation (BFE) *Zone A, V, A99*
	With BFE or Depth *Zone AE, AO, AH, VE, AR*
	Regulatory Floodway
OTHER AREAS OF FLOOD HAZARD	0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
	Future Conditions 1% Annual Chance Flood Hazard *Zone X*
	Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
	Area with Flood Risk due to Levee *Zone D*
OTHER AREAS	NO SCREEN Area of Minimal Flood Hazard *Zone X*
	Effective LOMRs
	Area of Undetermined Flood Hazard *Zone D*
GENERAL STRUCTURES	Channel, Culvert, or Storm Sewer
	Levee, Dike, or Floodwall
OTHER FEATURES	20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
	Coastal Transect
	513 Base Flood Elevation Line (BFE)
	Limit of Study
	Jurisdiction Boundary
	Coastal Transect Baseline
	Profile Baseline
	Hydrographic Feature
MAP PANELS	Digital Data Available
	No Digital Data Available
	Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 4/27/2020 at 4:57:52 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

N

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DATE

FEMA FLOOD MAP

REGIONAL WASTEWATER TREATMENT FACILITY
TREATMENT PLANT UPGRADES
THOMPSON'S STATION, TENNESSEE

REV.	DR.	CHK.	DATE	DESCRIPTION

REVISION INFORMATION

EXHIBIT 6
FILE NO. 36724-03

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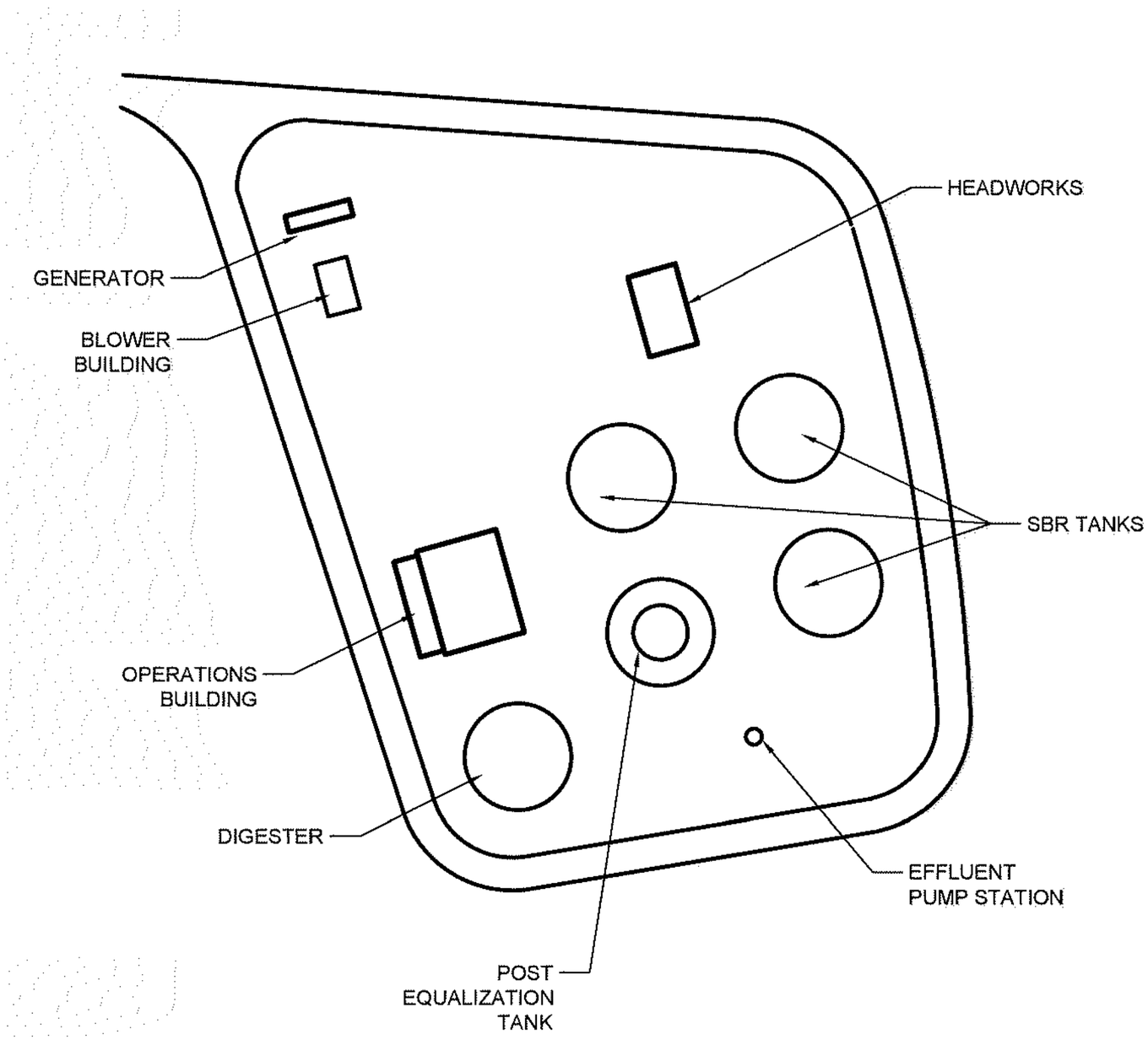

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SAVED:6/10/2020
PLOTTED:6/10/2020

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PRELIMINARY
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CONSTRUCTION
DATE

ALTERNATIVE 3 - SBR

REGIONAL WASTEWATER TREATMENT FACILITY

TREATMENT PLANT UPGRADES

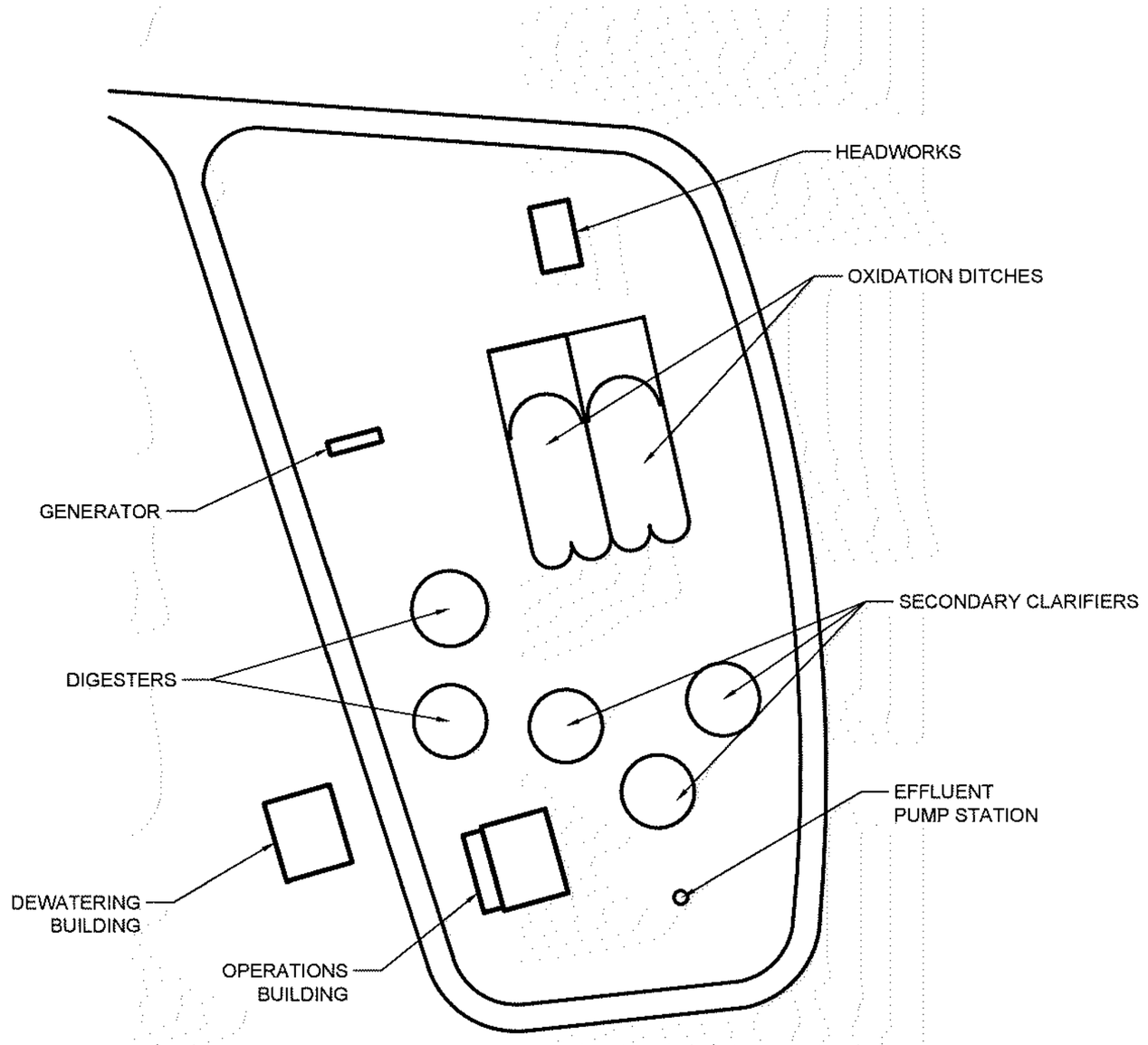
THOMPSON'S STATION, TENNESSEE

REVISION INFORMATION

REV.	DR.	CHK.	DATE	DESCRIPTION
-	-	-	-	

EXHIBIT 7

FILE NO. 36724-03



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SAVED:6/10/2020
PLOTTED:6/10/2020

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PRELIMINARY
NOT FOR
CONSTRUCTION

DATE

ALTERNATIVE 4 - OXIDATION DITCH

REGIONAL WASTEWATER TREATMENT FACILITY

TREATMENT PLANT UPGRADES

THOMPSON'S STATION, TENNESSEE

REV.	DR.	CHK.	DATE	DESCRIPTION

REVISION INFORMATION

EXHIBIT 7

FILE NO. 36724-03

APPENDIX B - Tables

Regional WWTP Upgrades - PER
Appendix B - Exhibit 1

ALTERNATIVE 1 - LAGOON EXPANSION

SCOPE	TOTAL COST
Sitework	$ -
Influent Lift Station	$ 565,000
Headworks	$ 823,000
42 MG Lagoon	$ 9,800,000
PD Blowers	$ 750,000
Pump Replacement	$ 285,000
Filters	$ 175,000
UV Disinfection	$ 1,190,000
OPCC	$ 13,588,000
Contingency (35%)	$ 4,755,800
Construction Cost	**$ 18,344,000**
Property Acquisition	$ 210,000
Engr./Admin. (10%)	$ 1,358,800
Construction Admin. (10%)	$ 1,358,800
Total Capital Cost	**$ 21,270,000**

ALTERNATIVE 2 - MBR

Scope	Total Cost
Sitework	$ 1,025,000
Influent Lift Station	$ 565,000
Influent Screening	$ 360,000
Lagoon Pump	$ 31,000
Aeration Basins	$ 1,131,000
MBR	$ 3,775,000
UV Disinfection	$ 1,190,000
Digester	$ 982,000
Dewatering Biosolids	$ 670,000
OPCC	$ 9,729,000
Contingency (35%)	$ 3,405,150
Construction Cost	**$ 13,134,000**
Property Acquisition	$ -
Engr./Admin. (10%)	$ 972,900
Construction Admin. (10%)	$ 972,900
Total Capital Cost	**$ 15,080,000**

ALTERNATIVE 3 - SBR

SCOPE	TOTAL COST
Sitework and New Force Main	$ 2,467,000
Influent Lift Station	$ 565,000
Headworks	$ 823,000
SBR tanks (including 3 blowers)	$ 5,949,000
Filters	$ 175,000
Operations Building	$ 575,000
Post EQ Tank	$ 1,681,000
0.275 MGD Digester	$ 549,000
UV Disinfection	$ 1,190,000
Effluent Pump Station	$ 433,000
Plant Drain Pump Station	$ 150,000
Dewatering Biosolids	$ 694,000
OPCC	$ 15,250,000
Contingency (35%)	$ 5,337,500
Construction Cost	**$ 20,588,000**
Property Acquisition	$ 150,000
Engr./Admin. (10%)	$ 1,525,000
Construction Admin. (10%)	$ 1,525,000
Total Capital Cost	**$ 23,790,000**

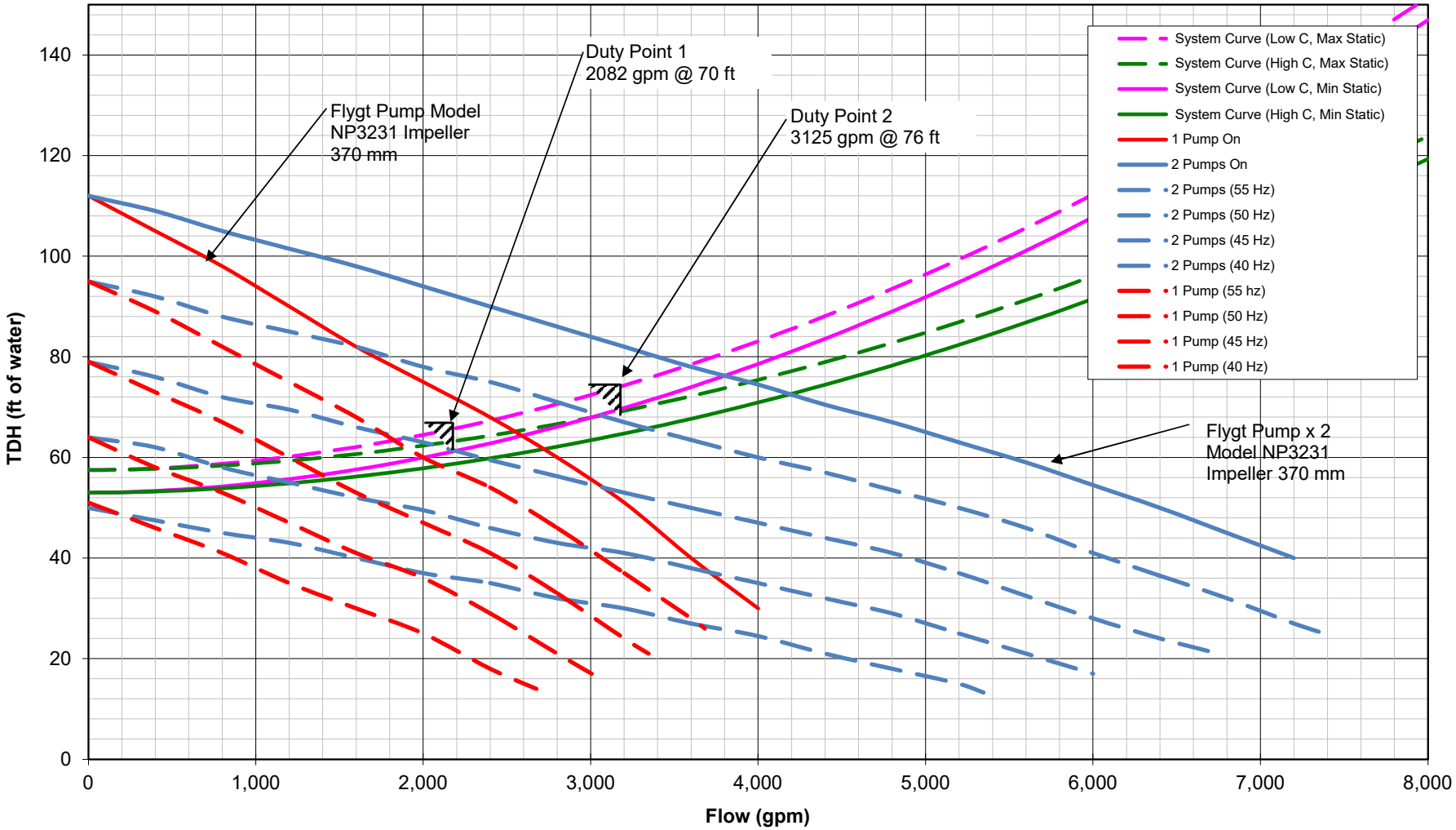
ALTERNATIVE 4 - OXIDATION DITCH

SCOPE	TOTAL COST
Sitework and New Force Main	$ 2,579,000
Influent Lift Station	$ 565,000
Headworks	$ 823,000
Oxidation Ditches	$ 3,833,000
Secondary Clarifiers	$ 2,380,000
RAS/WAS Pump Station	$ 251,000
Digester	$ 1,394,000
Filters	$ 175,000
Operations Building	$ 575,000
UV Disinfection	$ 1,190,000
Effluent Pump Station	$ 433,000
Plant Drain Pump Station	$ 150,000
Dewatering Biosolids	$ 694,000
OPCC	$ 15,040,000
Contingency (35%)	$ 5,264,000
Construction Cost	**$ 20,304,000**
Property Acquisition	$ 210,000
Engr./Admin. (10%)	$ 1,504,000
Construction Admin. (10%)	$ 1,504,000
Total Capital Cost	**$ 23,520,000**

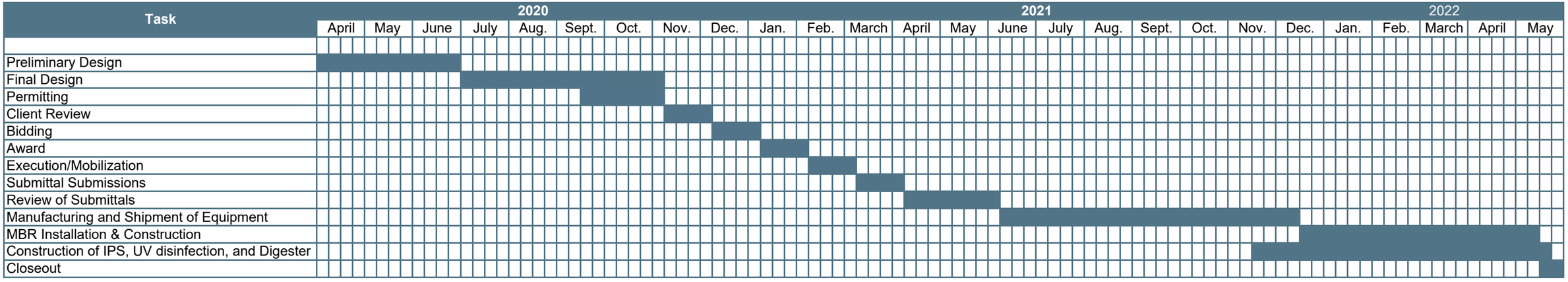
LIFT STATION DESIGN

Barge, Waggoner, Sumner and Cannon, Inc.

THOMPSONS STATION INFLUENT LIFT STATION HYDRAULIC SYSTEM CURVE



Project Schedule
Alternative 2 - Membrane Bioreactor



APPENDIX C - State Operating Permit No. SOP-04058

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

April 19, 2017

Mr. Joe Cosentini, Town Administrator
Town of Thompson's Station
e-copy: jcosentini@thompsons-station.com
PO Box 100
Thompsons Station, TN 37179

Re: State Operating Permit No. SOP-04058
Town of Thompson's Station - Regional WWTP

Thompson's Station, Williamson County, Tennessee

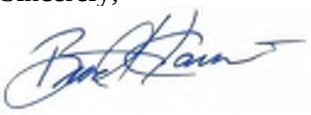
Dear Mr. Cosentini:

In accordance with the provisions of the Tennessee Water Quality Control Act, Tennessee Code Annotated (T.C.A.), Sections 69-3-101 through 69-3-120, the Division of Water Resources hereby issues the enclosed State Operating Permit. The continuance and/or reissuance of this Permit is contingent upon your meeting the conditions and requirements as stated therein.

Please be advised that a petition for permit appeal may be filed, pursuant to T.C.A. Section 69-3-105, subsection (i), by the permit applicant or by any aggrieved person who participated in the public comment period or gave testimony at a formal public hearing whose appeal is based upon any of the issues that were provided to the commissioner in writing during the public comment period or in testimony at a formal public hearing on the permit application. Additionally, for those permits for which the department gives public notice of a draft permit, any permit applicant or aggrieved person may base a permit appeal on any material change to conditions in the final permit from those in the draft, unless the material change has been subject to additional opportunity for public comment. Any petition for permit appeal under this subsection (i) shall be filed with the technical secretary of the Water Resources Board within thirty (30) days after public notice of the commissioner's decision to issue or deny the permit. A copy of the filing should also be sent to TDEC's Office of General Counsel.

If you have questions, please contact the Nashville Environmental Field Office at 1-888-891-TDEC; or, at this office, please contact Mr. Allen Rather at (615) 532-5819 or by E-mail at *Allen.Rather@tn.gov*.

Sincerely,



Brad Harris, P.E.
Manager, Land-Based Systems

Enclosure

cc/ec: Water-based Systems File
Nashville Environmental Field Office
Mr. Kenny Bond, Wastewater Operator, Town of Thompson's Station, kbond@thompsons-station.com
Mr. Bruce Meyer, Operations Manager, Cartwright Creek, LLC, bmeyer@sheafferwws.com

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES
William R. Snodgrass - Tennessee Tower
312 Rosa L. Parks Avenue, 11th Floor
Nashville, Tennessee 37243-1102

Permit No. SOP-04058

Modification (March 2017)

PERMIT

For the operation of Wastewater Treatment Facilities

In accordance with the provision of Tennessee Code Annotated section 69-3-108 and Regulations promulgated pursuant thereto:

PERMISSION IS HEREBY GRANTED TO

Town of Thompson's Station - Regional WWTP
Thompson's Station, Williamson County, Tennessee

FOR THE OPERATION OF

grinder pump, low pressure collection system, aerated treatment/storage lagoons, disc filters, UV disinfection and drip irrigation system located at latitude 35.81814 and longitude -86.89642 in Williamson County, Tennessee to serve the Town of Thompson's Station. The design capacity of the system is 0.47 MGD.

This permit is issued as a result of the application filed on February 23, 2017, in the office of the Tennessee Division of Water Resources and in conformity with approved plans, specifications and other data submitted to the Department in support of the above application, all of which are filed with and considered as a part of this permit, together with the following named conditions and requirements.

This permit shall become effective on: April 30, 2017

This permit shall expire on: September30, 2020

Issuance date: April 12, 2017

for Tisha Calabrese Benton
Director

PART I

A. GENERAL REQUIREMENTS

The treatment system using subsurface drip irrigation shall be monitored by the permittee as specified below:

Parameter	Sample Type	Daily Maximum	Sampling Point	Measurement Frequency
Flow *	calculated**	report gallons	*	Daily
$CBOD_5$	grab	**45** mg/l	*	Once/Month
Ammonia as N	grab	Report	*	Once/Month
Total nitrogen as N	grab	Report	*	Once/Month
E. Coli	grab	941 colonies/100 ml	*	Once/Month

Reuse water shall be monitored by the permittee as specified below:

Parameter	Sample Type	Daily Maximum	Sampling Point	Measurement Frequency
Flow	continuous	Report	Reuse system	Daily**
Ammonia as N	grab	5 mg/l	Reuse system	Once/Month
Total nitrogen as N	grab	23 mg/l	Reuse system	Once/Month
E. coli	grab	23/100 colonies (See the following Pagaraphs)	See notes (1) and (2)	7/week
Residual Chlorine	grab	1.0 mg/l	See note (1)	7/week or continuous

* Effluent to the drip irrigation plots
** calculated per day via pump run times and pump rates or via continuous measurement

(1). Daily *E. coli* and total residual chlorine samples shall be collected at the point of release from the treatment system. Additionally quarterly *E. coli* and total residual chlorine samples shall be collected for analysis at two points within the distribution system: one that is representative of the system's average residence time and one that is representative of the system's maximum residence time.

(2). In addition, the maximum concentration of the fecal coliform group of wastewater distributed for reuse shall not exceed 14 per 100 ml at any point in the distribution system.

REUSE DISTRIBUTION CONTROL AND ACCESS POINTS: The permittee shall take appropriate measures, including signs, tags, permanently imprinted warnings, etc, to insure that access points for control and use of the reuse distribution system clearly indicate the repurified water is unfit for drinking or other potable uses.

This permit allows the operation of a wastewater drip irrigation system. There shall be no discharge of wastewater to any surface stream or any location where it is likely to enter surface waters. There shall be no discharge of wastewater to any open throat sinkhole. In addition, the drip irrigation system shall be operated in a manner preventing the creation of a health hazard or a nuisance.

Instances of ponding or pools under dry weather conditions shall be promptly investigated and remedied. Instances of ponding or pools, or any wastewater runoff shall be noted on the monthly operation report. The report shall include details regarding the location(s), determined cause(s), the actions taken to eliminate the ponding or pools, or any wastewater runoff, and the dates the corrective actions were made. Any wastewater runoff due to improper operation must be reported in writing to the Division of Water Resources, Nashville Environmental Field Office within 5 days of discovery by the permittee.

All drip fields shall be fenced or restricted by vagetation sufficiently to prevent or impede unauthorized entry as well as to protect the facility from vandalism. Fencing shall be a minimum of four feet in height. Fencing shall be constructed of durable materials. Gates shall be designed and constructed in a manner to prevent or impede unauthorized entry. All designs are subject to division approval. Fence shall be installed prior to beginning of operation.

All drip lines shall be buried and maintained 6 to 10 inches below the ground surface.

The site shall be inspected by the certified operator or his/her designee, at a minimum, once per fourteen days (default) OR in accordance with an operating and maintenance inspection schedule in the permit administrative file record. The default inspection frequency will apply if an operating and maintenance inspection schedule is not submitted to be a part of the permit administrative file record. The operating and maintenance inspection schedule shall at a minimum evaluate the following via onsite visits or telemetry monitoring or a combination of the two:

- the condition of the treatment facility security controls (doors, fencing, gates, etc.),
- the condition of the drip area security controls (doors, fencing, gates, etc.),
- the condition of the site signage,
- the operational status of the mechanical parts of the treatment system (pumps, filters, telemetry equipment, etc.)
- the condition of the UV bulbs (if applicable)

Submission of the schedule, or revisions to the schedule, may be submitted to the division electronically. The schedule shall be submitted on or before the effective date of the permit. The

permittee is responsible for maintaining evidence that the schedule, or revisions, have been submitted to the division.

B. MONITORING PROCEDURES

1. Representative Sampling

Samples and measurements taken in compliance with the monitoring requirements specified above shall be representative of the volume and nature of the monitored discharge, and shall be taken at the following location(s):

Effluent to drip irrigation plots.

2. Test Procedures

Unless otherwise noted in the permit, all pollutant parameters shall be determined according to methods prescribed in Title 40, CFR, Part 136.

C. DEFINITIONS

The "daily maximum concentration" is a limitation on the average concentration, in milligrams per liter, of the discharge during any calendar day.

The "***monthly average concentration***", other than for *E. coli* bacteria, is the arithmetic mean of all the composite or grab samples collected in a one-calendar month period.

A "grab sample" is a single influent or effluent sample collected at a particular time.

For the purpose of this permit, "*continuous monitoring*" means collection of samples using a probe and a recorder with at least one data point per dosing cycle.

A "quarter" is defined as any one of the following three-month periods: January 1 through March 31, April 1 through June 30, July 1 through September 30, and/or October 1 through December 31.

D. REPORTING

1. Monitoring Results

Monitoring results shall be recorded monthly OR in accordance with the operating and maintenance inspection schedule in the permit administrative file record and submitted quarterly. The quarterly report shall detail the information required of Part A of this permit.

Submittals shall be postmarked no later than 15 days after the completion of the reporting period. A copy should be retained for the permittee's files. Operation reports and any communication regarding compliance with the conditions of this permit must be sent to:

Division of Water Resources
Nashville Environmental Field Office
711 R.S. Gass Boulevard
Nashville, TN 37216

The first operation report is due on the 15th of the month following the quarter containing the permit effective date.

2. Additional Monitoring by Permittee

If the permittee monitors any pollutant at the location(s) designated herein more frequently than required by this permit, using approved analytical methods as specified in 0400-40-05-.07(2)(h)2, the results of such monitoring shall be included in the calculation and reporting of the values required in the Quarterly Operation Report. Such increased frequency shall also be indicated.

3. Falsifying Reports

Knowingly making any false statement on any report required by this permit may result in the imposition of criminal penalties as provided for in Section 69-3-115 of the Tennessee Water Quality Control Act.

4. Signatory Requirement

All reports or information submitted to the commissioner shall be signed and certified by the persons identified in Rules 0400-40-05-.05(6)(a-c).

E. SCHEDULE OF COMPLIANCE

Full operational level for existing limits (CBOD, Ammonia, nitrogen and E.coli) shall be attained after the construction of the treatment system is complete and the treatment system is placed into operation. See Part III.G. for reuse schedule of compliance.

PART II

A. GENERAL PROVISIONS

1. Duty to Reapply

The permittee is not authorized to discharge after the expiration date of this permit. In order to receive authorization to discharge beyond the expiration date, the permittee shall submit such information and forms as are required to the Director of Water Resources (the "Director") no later than 180 days prior to the expiration date.

2. Right of Entry

The permittee shall allow the Director, or authorized representatives, upon the notification of permittee and presentation of credentials:

a. To enter upon the permittee's premises where an effluent source is located or where records are required to be kept under the terms and conditions of this permit, and at reasonable times to copy these records;

b. To inspect at reasonable times any monitoring equipment or method or any collection, treatment, pollution management, or discharge facilities required under this permit; and

c. To sample at reasonable times any discharge of pollutants.

3. Availability of Reports

All reports prepared in accordance with the terms of this permit shall be available for public inspection at the offices of the Division of Water Resources.

4. Proper Operation and Maintenance

The permittee shall at all times properly operate and maintain all facilities and systems (and related appurtenances) for collection and treatment which are installed or used by the permittee to achieve compliance with the terms and conditions of this permit. Proper operation and maintenance also includes adequate laboratory and process controls and appropriate quality assurance procedures. This provision requires the operation of backup or auxiliary facilities or similar systems which are installed by a permittee only when the operation is necessary to achieve compliance with the conditions of the permit. Backup continuous pH and flow monitoring equipment are not required.

The monitoring frequency stated in this permit shall not be construed as specifying a minimum level of operator attention to the facility. It is anticipated that visits to the treatment facility by the operator will occur at intervals frequent enough to assure proper operation and maintenance, but in no case less than one visit every fourteen days OR in accordance with an operating and maintenance inspection schedule in the permit administrative file record. If monitoring reports, division's inspection reports, or other information indicates a problem with the facility, the permittee may be subject to enforcement action and/or the permit may be modified to include

increased parameter monitoring, increased monitoring frequency or other requirements as deemed necessary by the division to correct the problem. The permittee shall ensure that the certified operator is in charge of the facility and observes the operation of the system frequently enough to ensure its proper operation and maintenance regardless of the monitoring frequency stated in the permit

Dilution water shall not be added to comply with effluent requirements.

The drip dispersal area shall not be used for vehicular traffic or vehicular parking. Dozers, trucks, tractors, and other heavy vehicles shall not be allowed to run over the drip dispersal area lines or other parts of the system.

5. Property Rights

The issuance of this permit does not convey any property rights in either real or personal property, or any exclusive privileges, nor does it authorize any injury to private property or any invasion of personal rights, nor any infringement of Federal, State, or local laws or regulations.

6. Severability

The provisions of this permit are severable. If any provision of this permit due to any circumstance, is held invalid, then the application of such provision to other circumstances and to the remainder of this permit shall not be affected thereby.

7. Other Information

If the permittee becomes aware that he failed to submit any relevant facts in a permit application, or submitted incorrect information in a permit application or in any report to the Director, then he shall promptly submit such facts or information.

B. CHANGES AFFECTING THE PERMIT

1. Planned Changes

The permittee shall give notice to the Director as soon as possible of any planned physical alterations or additions to the permitted facility.

2. Permit Modification, Revocation, or Termination

a. This permit may be modified, revoked and reissued, or terminated for cause as described in section 69-3-108 (h) The Tennessee Water Quality Control Act as amended.

b. The permittee shall furnish to the Director, within a reasonable time, any information which the Director may request to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit.

The permittee shall also furnish to the Director, upon request, copies of records required to be kept by this permit.

3. Change of Ownership

This permit may be transferred to another person by the permittee if:

a. The permittee notifies the Director of the proposed transfer at least 30 days in advance of the proposed transfer date;

b. The notice includes a written agreement between the existing and new permittees containing a specified date for transfer of permit responsibility, coverage, and liability between them; and

c. The Director, within 30 days, does not notify the current permittee and the new permittee of his intent to modify, revoke or reissue, or terminate the permit and to require that a new application be filed rather than agreeing to the transfer of the permit.

4. Change of Mailing Address

The permittee shall promptly provide to the Director written notice of any change of mailing address. In the absence of such notice the original address of the permittee will be assumed to be correct.

C. NONCOMPLIANCE

1. Effect of Noncompliance

Any permit noncompliance constitutes a violation of applicable State laws and is grounds for enforcement action, permit termination, permit modification, or denial of permit reissuance.

2. Reporting of Noncompliance

a. 24-Hour Reporting

In the case of any noncompliance which could cause a threat to public drinking supplies, or any other discharge which could constitute a threat to human health or the environment, the required notice of non-compliance shall be provided to the appropriate Division environmental assistance center within 24 hours from the time the permittee becomes aware of the circumstances. (The environmental field office should be contacted for names and phone numbers of emergency response personnel.)

A written submission must be provided within five days of the time the permittee becomes aware of the circumstances unless this requirement is waived by the Director on a case-by-case basis. The permittee shall provide the Director with the following information:

i. A description of the discharge and cause of noncompliance;

ii. The period of noncompliance, including exact dates and times or, if not corrected, the anticipated time the noncompliance is expected to continue; and

iii. The steps being taken to reduce, eliminate, and prevent recurrence of the non complying discharge.

b. Scheduled Reporting

For instances of noncompliance which are not reported under subparagraph 2.a. above, the permittee shall report the noncompliance on the Quarterly Operation Report. The report shall contain all information concerning the steps taken, or planned, to reduce, eliminate, and prevent recurrence of the violation and the anticipated time the violation is expected to continue.

3. Overflow

a. "***Overflow***" means the unintended discharge to land or waters of Tennessee of wastes from any portion of the collection, transmission, or treatment system other than through permitted outfalls.

b. Overflows are prohibited.

c. The permittee shall operate the collection system so as to avoid overflows. No new or additional flows shall be added upstream of any point in the collection system, which experiences chronic overflows (greater than 5 events per year) or would otherwise overload any portion of the system.

d. Unless there is specific enforcement action to the contrary, the permittee is relieved of this requirement after: 1) an authorized representative of the Commissioner of the Department of Environment and Conservation has approved an engineering report and construction plans and specifications prepared in accordance with accepted engineering practices for correction of the problem; 2) the correction work is underway; and 3) the cumulative, peak-design, flows potentially added from new connections and line extensions upstream of any chronic overflow point are less than or proportional to the amount of inflow and infiltration removal documented upstream of that point. The inflow and infiltration reduction must be measured by the permittee using practices that are customary in the environmental engineering field and reported in an attachment to a Operating Report submitted to the local TDEC Environmental Field Office on a quarterly basis. The data measurement period shall be sufficient to account for seasonal rainfall patterns and seasonal groundwater table elevations.

e. In the event that more than 5 overflows have occurred from a single point in the collection system for reasons that may not warrant the self-imposed moratorium or completion of the actions identified in this paragraph, the permittee may request a meeting with the Division of Water Resources EFO staff to petition for a waiver based on mitigating evidence.

4. Upset

a. "***Upset***" means an exceptional incident in which there is unintentional and temporary noncompliance with technology-based effluent limitations because of factors beyond the reasonable control of the permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, inadequate treatment facilities, lack of preventive maintenance, or careless or improper operation.

b. An upset shall constitute an affirmative defense to an action brought for noncompliance with such technology-based permit effluent limitations if the permittee demonstrates, through properly signed, contemporaneous operating logs, or other relevant evidence that:

i. An upset occurred and that the permittee can identify the cause(s) of the upset;

ii. The permitted facility was at the time being operated in a prudent and workman-like manner and in compliance with proper operation and maintenance procedures;

iii. The permittee submitted information required under "Reporting of Noncompliance" within 24-hours of becoming aware of the upset (if this information is provided orally, a written submission must be provided within five days); and

iv. The permittee complied with any remedial measures required under "Adverse Impact."

5. Adverse Impact

The permittee shall take all reasonable steps to minimize any adverse impact to the waters of Tennessee resulting from noncompliance with this permit, including such accelerated or additional monitoring as necessary to determine the nature and impact of the noncomplying discharge. It shall not be a defense for the permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit.

6. Bypass

a. "***Bypass***" is the intentional diversion of wastewater away from any portion of a treatment facility. "Severe property damage" means substantial physical damage to property, damage to the treatment facilities which would cause them to become inoperable, or substantial and permanent loss of natural resources which can reasonably be expected to occur in the absence of a bypass. Severe property damage does not mean economic loss caused by delays in production.

b. Bypasses are prohibited unless all of the following 3 conditions are met:

i. The bypass is unavoidable to prevent loss of life, personal injury, or severe property damage;

ii. There are no feasible alternatives to bypass, such as the construction and use of auxiliary treatment facilities, retention of untreated wastes, or maintenance during normal periods of equipment downtime. This condition is not satisfied if adequate back-up equipment should have been installed in the exercise of reasonable engineering judgment to prevent a bypass, which occurred during normal periods of equipment downtime or preventative maintenance;

iii. The permittee submits notice of an unanticipated bypass to the Division of Water Resources in the appropriate Environmental Field Office within 24 hours of becoming aware of the bypass (if this information is provided orally, a written submission must be provided within five days). When the need for the bypass is foreseeable, prior notification shall be submitted to the director, if possible, at least 10 days before the date of the bypass.

c. Bypasses not exceeding permit limitations are allowed **only** if the bypass is necessary for essential maintenance to assure efficient operation. All other bypasses are prohibited. Allowable bypasses not exceeding limitations are not subject to the reporting requirements of 6.b.iii, above.

7. Washout

a. For domestic wastewater plants only, a "washout" shall be defined as loss of Mixed Liquor Suspended Solids (MLSS) of 30.00% or more. This refers to the MLSS in the aeration basin(s) only. This does not include MLSS decrease due to solids wasting to the sludge disposal system. A washout can be caused by improper operation or from peak flows due to infiltration and inflow.

b. A washout is prohibited. If a washout occurs the permittee must report the incident to the Division of Water Resources in the appropriate Environmental Field Office within 24 hours by telephone. A written submission must be provided within five days. The washout must be noted on the discharge monitoring report. Each day of a washout is a separate violation.

D. LIABILITIES

1. Civil and Criminal Liability

Nothing in this permit shall be construed to relieve the permittee from civil or criminal penalties for noncompliance. Notwithstanding this permit, the permittee shall remain liable for any damages sustained by the State of Tennessee, including but not limited to fish kills and losses of aquatic life and/or wildlife, as a result of the discharge of wastewater to any surface or subsurface waters. Additionally, notwithstanding this Permit, it shall be the responsibility of the permittee to conduct its wastewater treatment and/or discharge activities in a manner such that public or private nuisances or health hazards will not be created.

2. Liability Under State Law

Nothing in this permit shall be construed to preclude the institution of any legal action or relieve the permittee from any responsibilities, liabilities, or penalties established pursuant to any applicable State law.

PART III

OTHER REQUIREMENTS

A. CERTIFIED OPERATOR

The waste treatment facilities shall be operated under the supervision of a Biological Natural System certified wastewater treatment operator and collection system shall be operated under the supervision of a the grade I certified collection system operator in accordance with the Water Environmental Health Act of 1984.

B. PLACEMENT OF SIGNS

The permittee shall place a sign at the entrance if the drip area if fenced or all reasonsable approaches to the drip irrigation lot. The sign should be clearly visible to the public. The minimum sign size should be two feet by two feet (2' x 2') with one inch (1") letters. The sign should be made of durable material

RECLAIMED WASTEWATER
DRIP IRRIGATION
(PERMITTEE'S NAME)
(PERMITTEE'S PHONE NUMBER)
TENNESSEE DIVISION OF WATER RESOURCES
Nashville Environmental Field Office
PHONE NUMBER: 1-888-891-8332

C. ADDITION OF WASTE LOADS

The permittee may not add wasteloads to the existing treatment system without the knowledge and approval of the division.

D. BIOSOLIDS MANAGEMENT PRACTICES

The current method of sludge disposal is to a municipal solid waste landfill (or co - composting facility). This method of disposal is controlled by the rules of the Tennessee Division of Solid Waste Management (DSWM) and Federal Regulations at 40 CFR 258. If the permittee anticipates changing its disposal practices to either land application or surface disposal, the Division of Water Resources shall be notified prior to the change. A copy of the results of pollutant analyses required by the Tennessee Division of Solid Waste Management (DSWM) and / or 40 CFR 258 shall be submitted to the Division of Water Resources.

E. OWNERSHIP OF THE TREATMENT FACILITIES

a. The permittee shall own the treatment facilities (and the land upon which they are constructed) including the land to be utilized for drip or spray irrigation. A perpetual easement (properly recorded) may be accepted in lieu of ownership. If the permittee elects to make the treated wastewater available for reuse (irrigation of a golf course for example) a backup dedicated land application site must be provided or a perpetual easement must be obtained for the property where reuse is to take place. The perpetual easement must allow year-round application of the wastewater except where the permittee has provided (and the division has approved) storage facilities for periods when reuse is not available. Evidence of ownership of the treatment facility land application site(s) and/or a copy of the perpetual easement(s) must be furnished to the division for approval prior to construction of the wastewater collection and treatment system.

b. Where the treatment facility serves private homes, condominiums, apartments, retirement homes, nursing homes, trailer parks, or any other place where the individuals being served have property ownership, rental agreements, or other agreements that would prevent their being displaced in the even of abandonment or noncompliance of the sewerage system, ownership of the treatment facilities must be by a municipality, a public utility, a wastewater authority, or a privately owned public utility (having a Certificate of Convenience and Necessity from the Tennessee Regulatory Authority), or another public agency.

F. POTW PRETREATMENT PROGRAM GENERAL PROVISIONS

1. The permittee shall enforce 40 CFR 403.5, "prohibited discharges". Pollutants introduced into the POTW by a non-domestic source shall not cause pass through or interference as defined in 40 CFR Part 403.3. These general prohibitions and the specific prohibitions in this section apply to all non-domestic sources introducing pollutants into the POTW whether the source is subject to other National Pretreatment Standards or any state or local pretreatment requirements.

   Specific prohibitions. Under no circumstances shall the permittee allow introduction of the following wastes in the waste treatment system:

   i. Pollutants which create a fire or explosion hazard in the POTW;

ii. Pollutants which will cause corrosive structural damage to the treatment works, but in no case discharges with pH less than 5.0 unless the system is specifically designed to accept such discharges.

iii. Solid or viscous pollutants in amounts which will cause obstruction to the flow in the treatment system resulting in interference.

iv. Any pollutant, including oxygen-demanding pollutants (BOD, etc.) released in a discharge at a flow rate and/or pollutant concentration which will cause interference with the treatment works.

v. Heat in amounts which will inhibit biological activity in the treatment works resulting in interference, but in no case heat in such quantities that the temperature at the treatment works exceeds 40°C (104°F) unless the works are designed to accommodate such heat.

vi. Any priority pollutant in amounts that will contaminate the treatment works sludge.

vii. Petroleum oil, nonbiodegradable cutting oil, or products of mineral oil origin in amounts that will cause interference or pass through;

viii. Pollutants which result in the presence of toxic gases, vapors or fumes within the POTW in a quantity that may cause acute worker health and safety problems;

ix. Any trucked or hauled pollutants except at discharge points designated by the POTW.

2. The permittee shall notify the Tennessee Division of Water Resources of any of the following changes in user discharge to the system no later than 30 days prior to change of discharge:

i. New introductions into such works of pollutants from any source which would be a new source as defined in Section 306 of the Act if such source were discharging pollutants.

ii. New introductions of pollutants into such works from a source which would be subject to Section 301 of the "Federal Water Quality Act as Amended" if it were discharging such pollutants.

iii. A substantial change in volume or character of pollutants being introduced into such works by a source already discharging pollutants into such works at the time the permit is issued.

This notice will include information on the quantity and quality of the wastewater introduced by the new source into the publicly owned treatment works, and on any anticipated impact on the effluent discharged from such works. If this discharge necessitates a revision of the current NPDES permit or pass-through guidelines, discharge by this source is prohibited until the Tennessee Division of Water Resources gives final authorization.

G. COMPLIANCE SCHEDULE (Reuse)

The permittee has elected to upgrade/modify the existing wastewater treatment system in terms of land base, capacity and quality of effluent produced. The overall goal of the permittee is to meet the 2012 EPA Standards for Unrestricted Urban Reuse, acquire additional irrigation sites, and increase treatment capacity. Full operational level of this wastewater treatment system and associated irrigation sites shall be attained after procurement of additional irrigation sites, the construction of the modifications to the treatment system is complete, and the treatment system is placed into operation. The compliance schedule to achieve the above stated goal, as prescribed by the Division of Water Resources, will be as follows:

PHASE ONE

Procure additional professional assistance to accomplish the following objectives:

1. Evaluate existing wastewater treatment plant (WWTP) operations.
2. Determine necessary upgrades to increase treatment capacity from 500,000 gallons per day (GPD) to 1,000,000 GPD.
3. Determine necessary upgrades to meet 2012 EPA Unrestricted Urban Reuse standards.
4. Evaluate existing distribution/collection system to include upgrade recommendations based on potential future growth.
5. Identify potential irrigation sites for disposal and reuse.
6. Develop cost estimates for all recommended upgrades.
7. Assist the Town of Thompson's Station in developing a reasonable implementation plan.

Phase One shall be completed by September 1, 2015.

PHASE TWO

The permittee shall begin implementation of the WWTP upgrades, approved by the DWR, no later than **March 1, 2016**.

PROJECT COMPLETION

The permittee shall complete all required WWTP upgrades, including the procurement of all necessary additional irrigation land base, and be fully operational no later than **March 1, 2018**.

Addendum to Rationale

SOP-04058

Thompson's Station-Regional WWTP

Modification

March 2017

The Thompson's Station-Regional WWTP submitted an application for modification on February 23, 2017, under Part III- Other Requirements, Section G.- Compliance Schedule (Reuse) requesting one year extension from March 1, 2017 to March 1, 2018. The division is granting the request.

Attachment

STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF WATER RESOURCES-LAND BASED SYSTEMS UNIT
William R. Snodgrass Tennessee Tower
312 Rosa L. Parks Avenue
Nashville, Tennessee 37243

MEMORANDUM

TO: Hari Akunuri, DWR-CO

FROM: Allen Rather, DWR- Land Based Systems Unit

DATE: 2/12/2015

SUBJECT: LCSS/SFDS (Class V Injection) Approval
Thompson Station Tollgate Property
Franklin, Williamson County, Tennessee
UIC File WIL 0000059 SOP-04058

The Division of Water Resources has reviewed the submittal of an Application for Authorization to Operate a Class V Underground Injection Well (Large Capacity Septic System/Subsurface Fluid Disposal System) utilizing drip dispersal for the waste water at the Thompson Station Tollgate Property located at City, County, Tennessee. This Division approves the application dated Date.

If at any time the Division learns that a ground water discharge system may be in violation of The Tennessee Water Quality Control Act, the Division shall:

a. require the injector to apply for an individual permit;
b. order the injector to take such actions including, where required, closure of the injection well as may be necessary to prevent the violation; or
c. take enforcement action.

All groundwater discharge activities must operate in such a manner that they do not present a hazard to groundwater.

Thompson Station shall also conduct a monthly visual inspection of the complete drip field looking for any signs of failure.

In accordance with Underground Injection Control (UIC) Rule 1200-4-6-.14 (3) "The owner of a Class V well shall be responsible for notifying the Department of change in ownership." This notification must be made to this Division within thirty (30) days of the change in ownership.

Also note that according to Underground Injection Control (UIC) Rule 1200-4-6-.14 (8)(d) "Upon completion of the well, the owner or operator must certify to the Department that the well has been completed in accordance with the approved construction plan, and must submit any other additional information required". The certification must be submitted to the UIC Program within thirty (30) days upon the completion/closure of the Class V well.

This Division will require a minimum of seven (7) working days advance notice before the construction on the drip system is to begin to allow for a witness from this Division to be present.

No drip emitters are to discharge directly into an open throat or crevice in the subsurface. All drip lines are to be installed on contour.

Our concurrence with your approach does not imply that this procedure is exempt from future changes or restrictions in the Underground Injection Control (UIC) Regulations, or any additional requirements set forth by the Division in order to protect the groundwater of Tennessee.

A copy of this authorization must be kept on site until the development has been completed and must be made available to inspection personnel.

Should you have any questions or comments please feel free to contact me at (615) 532-5819 or allen.rather@tn.gov.

c: file

Capital Improvement Program

BOMA / Utility Board Workshop

Town of Thompson's Station

July 22nd, 2020

Introduction:

What is a Capital Improvement Program (CIP)?

- The cornerstone for the capital budget is the capital improvement plan (CIP), which identifies the capital improvements that the local government wishes to undertake, typically over the next five years. The **first year of the CIP becomes the capital budget**, the financing plan for the projects that the government will undertake in the forthcoming year.
- Each year the CIP is updated, revenue and expenditure estimates are revised for the remaining years in the planning period, and a new fifth year of projects is added. *International City Management Association
- These improvements are based upon the need or desire for such improvements, according to the present and anticipated **financial standing**. Assuming that a town has limited resources to devote to improving its physical programming, it is a process through which determinations are made on **what projects are most important to the town and when.** *American Planning Association.

What is a Capital Improvement Program (CIP)?

- A Capital Improvement Plan (CIP) contains all the anticipated individual capital projects, large equipment purchases, and major studies for local government; in conjunction with construction and in consort with financing plans. The plan provides a working blueprint for sustaining and improving the community's infrastructures. A CIP is a dynamic community planning and fiscal management tool used to coordinate the location, timing, and financing of capital improvements over a multi-year period.
- The CIP is a working document and should be reviewed and updated annually with budgeting to reflect changing community needs, priorities and funding opportunities to ensure that the infrastructure exists to advance the community.

What is Included in a Capital Improvement Program?

- The Town determines what to include.
- Set a threshold to determine which costs are included in the CIP
  - Many smaller towns consider $5,000 or $10,000 as minimum cost
  - Municipalities with large budgets may set higher minimums
- Determine which projects are capital projects:
  - Land acquisition
  - Planning, design, engineering, and construction of buildings
  - Larger Equipment purchases
  - Vehicles (excluded from CIP by some communities)

How to Fund a Capital Improvement Program

- Taxes and permit fees (pay as you go)
- Grants
- Debt
- Impact fees
- Combination of Sources

CIP Presentation / Information

- 1. Wastewater Items / Barge Design
- 2. General Fund Items / Town Staff

Conclusion


CREATING YOUR
ROADMAP
REVISIT
Revisit annually to remove competed items, to re-prioritize or adjust based on funding opportunities
PEACE
Gives you peace of mind.
AHEAD
Puts you ahead of the game. Finding money takes time!
START
Shows you where to start.

Capital Improvement Plan	Estimated Project $	Amount Paid	Status	Est Completion Date	% Complete	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Infrastructure										
Town Hall / Streetscaping (Phase 1 -north) Const							$350,000			
Town Hall / Streetscaping (Phase 1 -north) Softcost						$50,000				
Technology Equipment/Upgrades						$6,000	$8,500	$10,000		$20,000
Infrastructure Total Expenditure						$56,000	$358,500	$10,000	$0	$20,000
Road Improvements										
- Critz Lane ROW acquistions										
- Critz Lane Phase 1						$3,157,900				
- Critz Lane Phase 2										
- Critz Lane Phase 3										
- Pratt Road						$125,000				
- Columbia Pike Widening								$5,339,900		
- Lewisburg Pike Widening									$5,163,600	
- Clayton Arnold road improvements										$848,800
- Pantall Road Improvements										
- Tom Anderson Road Improvements										
- Buckner Road Extension										
- Les Watkins Road										
- Sedberry Road							$4,467,300			
- Evergreen Road								$3,713,700		
- Thompson Station Rd East										$3,579,100
Road Improvements Total Expenditure						$3,282,900	$4,467,300	$9,053,600	$5,163,600	$4,427,900
Maintenance Equipment										
- Fleet Replacement needs										
- Equipment needs										

- Storage Cover						$18,000	$0	$0	$0	$0
Maintenance Equipment Total Expenditure						$18,000	$0	$0	$0	$0
Total for Infrastructure, Equipment and Roads						***$3,356,900***	***$4,825,800***	***$9,063,600***	***$5,163,600***	***$4,447,900***
- ATP Grant for Phase 2 of Trailways/greenway Total Award $1,930,000 (Town share $386k)	$1,930,000	$36,023				$386,000				
-TAP Grant for Phase 3 multimobile connectivity Total Award $1,298,753 (Town share $260k)	$1,298,753	$79,650				$260,000				
Preservation Park - Parking Lot paving						$59,000				
Parks Total Expenditure	***$3,228,753***	***$115,673***				***$705,000***	***$0***	***$0***	***$0***	***$0***
TOTAL CAPITAL IMPROVEMENT PROJECTS						**$4,061,900**	**$4,825,800**	**$9,063,600**	**$5,163,600**	**$4,447,900**
				Approved Budget		$ 2,904,000				
					var	$1,157,900	All Critz Lane			

Wastewater Fund	Estimated Project $	Amount Paid	Status	Est Completion Date	% Complete	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025
Fencing for Tollgate drip fields						$20,000				
Hill Property Drip Fields										
- Construction/Installation	$2,926,500	$2,056,128				$200,000				
- Project Management	$175,000	$124,357								
- Fencing										
- other										
MBR Facility										
- Design Fees	$885,000	$73,417				$635,000				
- Project Management						$250,000	$750,000			
- Construction/Installation						$2,400,000	$10,600,000			
- Other										
Alexander Property Drip Fields **										
** *subject to change due to less acreage for usage*										
- Pre-Design										
- Construction/Installation										$9,000,000
- Project Management									$670,000	
- Fencing										
- other										
Total Capital Improvements for Wastewater	**$3,986,500**					**$3,505,000**	**$11,350,000**	**$0**	**$670,000**	**$9,000,000**

Appendix A
Recommended Improvement Projects

Project	Length	Total Cost (Estimated)	Town Share of Cost (Est'd)	Roadway Classification	Priority
01. Columbia Pike Widening	4.59 miles	$26,699,800	$5,339,900	Arterial	Short-Term
02. Lewisburg Pike Widening	3.70 miles	$25,818,100	$5,163,600	Arterial	Mid-Term
03. Thompson's Station Road East Improvements	3.59 miles	$17,895,800	$3,579,100	Major Collector	Private Dev.
04. Clayton Arnold Road Improvements	1.26 miles	$4,243,900	$848,800	Minor Collector	Private Dev.
05. Pantall Road Improvements	1.29 miles	$4,492,500	$0	Minor Collector	Private Dev.
06. Tom Anderson Road Improvements	0.61 miles	$2,490,200	$0	Minor Collector	Private Dev.
07. Evergreen Road Realignment and Extension	4.05 miles	$18,568,800	$3,713,700	Major Collector	Private Dev.
08. Sedberry Road Realignment and Extension	5.32 miles	$22,336,300	$4,467,300	Major Collector	Private Dev.
09. Buckner Road Extension	1.53 miles	$8,689,200	$0	Major Collector	Private Dev.
10. Future Road 1	1.31 miles	$6,622,300	$0	New Minor Collector	Private Dev.
11. Future Road 2	1.24 miles	$5,798,800	$0	New Minor Collector	Private Dev.
12. Future Road 3	0.61 miles	$3,219,500	$0	New Minor Collector	Private Dev.
13. Future Road 4 (Critz Lane Extension)	1.28 miles	$6,882,400	$0	New Minor Collector	Private Dev.
14. Future Road 5 (Chaucer Park Lane Extension)	0.58 miles	$3,572,600	$0	New Minor Collector	Private Dev.
15. Future Road 6 (Critz - Tom Anderson Connector)	0.73 miles	$4,217,800	$0	New Minor Collector	Private Dev.
16. Future Road 7 (T.S. West - Harpeth Connector)	1.80 miles	$8,121,900	$0	New Minor Collector	Private Dev.
17. Future Road 8 (Harpeth - Coleman Connector)	2.04 miles	$9,058,900	$0	New Minor Collector	Private Dev.
18. Future Road 9 (Carters Cr. - Sedberry Connector)	3.42 miles	$13,700,100	$0	New Minor Collector	Private Dev.
19. Off-Street Greenways (Phase 1)	11.05 miles	$11,050,000	$2,210,000	New Greenway	Short-Term
20. Off-Street Greenways (Phase 2)	8.28 miles	$8,280,000	$1,656,000	New Greenway	Mid-Term
21. Off-Street Greenways (Phase 3)	10.25 miles	$10,250,000	$2,050,000	New Greenway	Long-Term
Total	**68.52 miles**	**$222,008,900**	**$29,028,400**		

Based on 2018 dollars

Estimated 20% match as part of TDOT projects

Possible for State funding at an 80/20 match

Area may not be developed by 2040, Town may want to pursue at an 80/20 match with TDOT

Anticipated to be 80/20 grants with TDOT

Greenway Trail System
Thompson's Station, TN

N

Legend

- Greenway Trail (Phase 1 complete)
- Greenway Trail (Phase 2)
- Future Phase (Town Center Connection)
- Greenway Trail (Phase 3)
- Existing Sidewalk
- Future Phase (School Connection)
- CSX Railroad
- Streams
- Roads
- Town Parks

Existing Trails

- Greenway Trail North
- Dog Park Loop
- Dog Park Entrance
- Depot Trail
- Hilltop Path
- Railroad Trail
- Battlefield Trail
- Service Road
- 1 Mile Loop
- Mars Sensory Garden
- Alexander Trail
- Stephen's Way
- Maint. Access Rd

Greenway Trail (Phase 1)

Tollgate Village

Independance High School

Community Gardens

Nutro Dog Park

Preservation Park

Fields of Canterbury

Greenway Trail (Phase 2)

Greenway Trail (Phase 3)

Greenway Trail (Future Phase)

Greenway Trail (Future Phase)

Bridgemore Village

Thompson's Station Elementary/Middle School

Town Center

AMERICUS DR
ALY
ROCHELLE AVE
ALY
NEWARK LN
TOLLGATE BLVD
ELLISTON WAY
DECLARATION WAY
SEDBERRY RD
PIONEER LN
INTERSTATE 840 HWY
COLUMBIA PIKE
SASSAFRAS LN
CLOISTER LN
CHAUCER PARK LN
CARENA TERRACE CT
WALDORF LN
LIONSGATE WAY
STOCKWOOD TRL
REDWOOD TRL
PADDOCK PARK DR
CALLAWAY PARK PL
HAMPSHIRE PL
CHANNING DR
CRITZ LN
TOLLIE LN
TOM ANDERSON RD
CABIN RUN BRIDGE RD
ROBBINS NEST RD
PULPMILL DR
RONSTADT RD
CLAYTON ARNOLD RD
FOUR WINDS LN
OLD THOMPSONS STATION RD
CSX Railroad
Depot Trail
Railroad Trail
Battlefield Trail

1 inch = 492 feet

T. Rainey, 2019