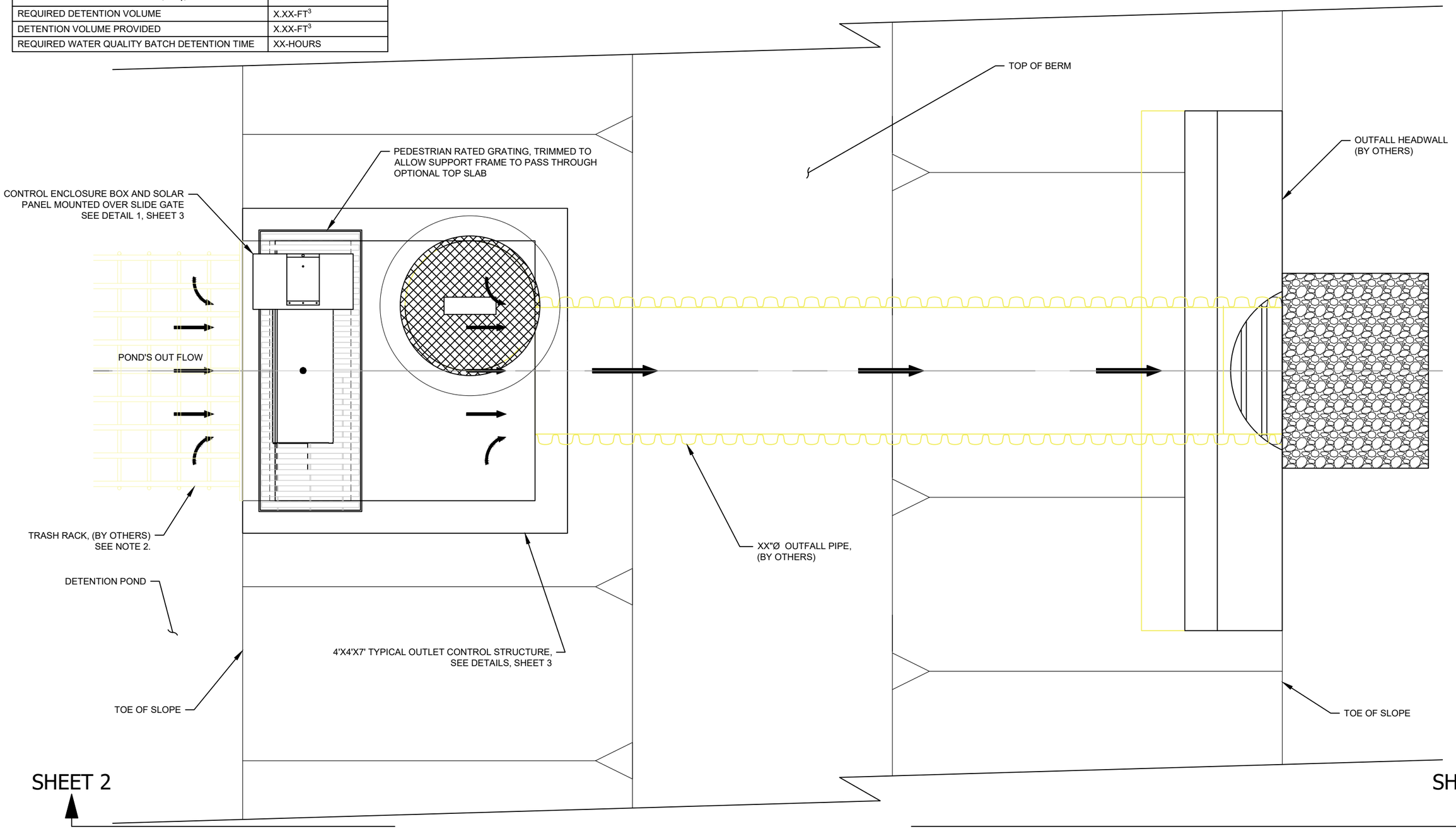
smartPOND™ REAL TIME OPTIMIZER (RTO)

OPTIMIZER VALVE DISCHARGE RATE AND WATER QUALITY & DETENTION VOLUME SETTINGS	
ALLOWABLE DISCHARGE RATE ($Q_{ALLOWABLE}$)	X.XX-FT^3/S (XX.X-GPM)
WATER QUALITY BATCH DEPTH (WQ_V)	XX.XX-FT^3
REQUIRED DETENTION VOLUME	X.XX-FT^3
DETENTION VOLUME PROVIDED	X.XX-FT^3
REQUIRED WATER QUALITY BATCH DETENTION TIME	XX-HOURS



DESIGN

1. TRASH RACK DESIGNED, SUPPLIED AND INSTALLED BY OTHERS.

PROJECT:

PROJECT NAME
CITY, STATE

MODEL:

REAL TIME OPTIMIZER
DETENTION
OPTIMIZATION

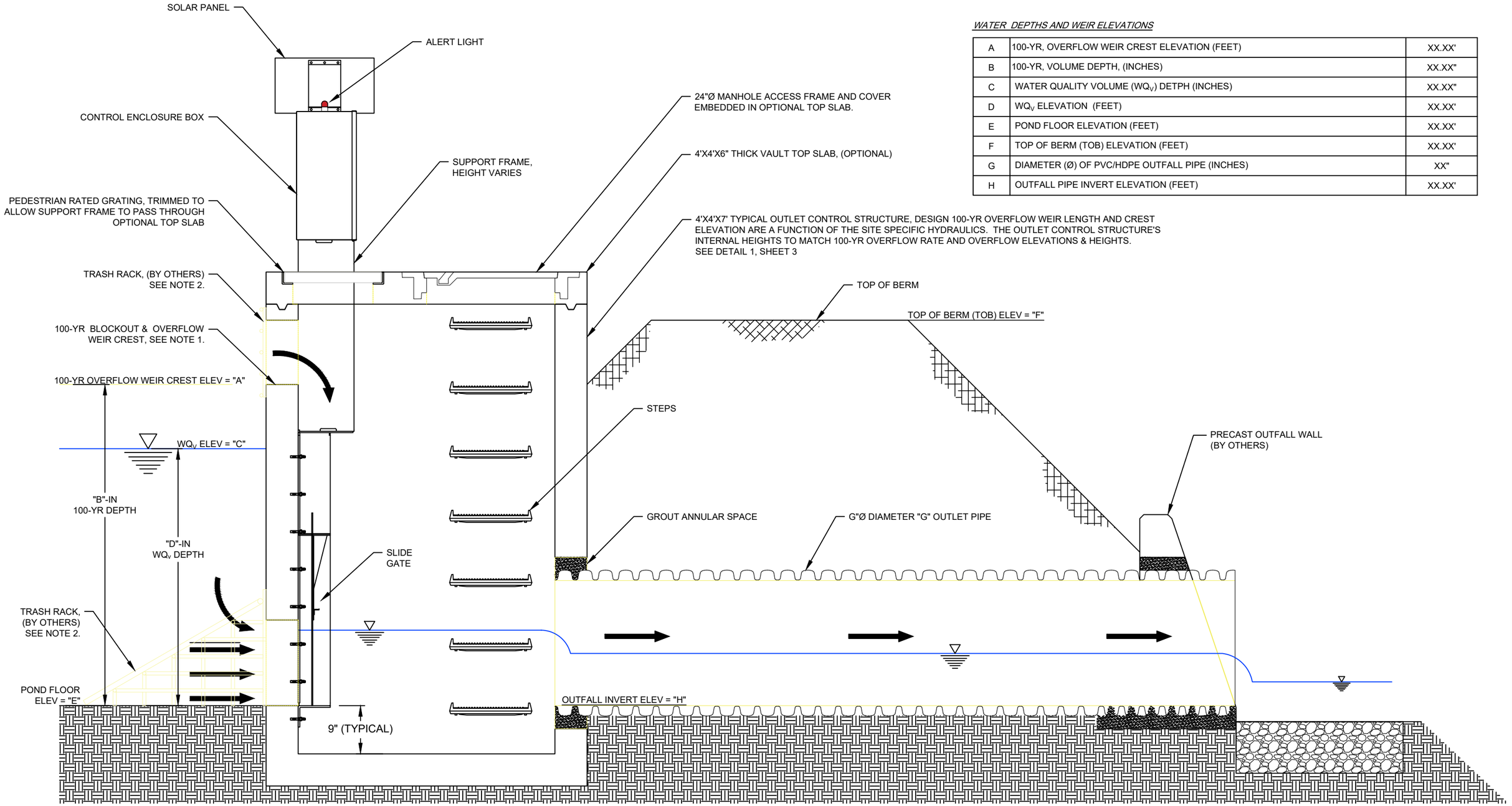
smartPOND
Automated Stormwater Control.

FOR ADDITIONAL INFORMATION CONTACT:
CONVERGENT WATER TECHNOLOGIES
1-800-711-5428
www.convergentwater.com

CONVERGENT WATER TECHNOLOGIES

REVISION NO. 0
DATE 9/9/2023
SHEET NO. 1

ELEVATION VIEW, OUTLET STRUCTURE WITH CONTROL ENCLOSURE BOX & SLIDE GATE



WATER DEPTHS AND WEIR ELEVATIONS

A	100-YR, OVERFLOW WEIR CREST ELEVATION (FEET)	XX.XX'
B	100-YR, VOLUME DEPTH, (INCHES)	XX.XX"
C	WATER QUALITY VOLUME (WQ_V) DETPH (INCHES)	XX.XX"
D	WQ_V ELEVATION (FEET)	XX.XX'
E	POND FLOOR ELEVATION (FEET)	XX.XX'
F	TOP OF BERM (TOB) ELEVATION (FEET)	XX.XX'
G	DIAMETER (Ø) OF PVC/HDPE OUTFALL PIPE (INCHES)	XX"
H	OUTFALL PIPE INVERT ELEVATION (FEET)	XX.XX'

DESIGN

1. THE FINAL DESIGN OF THE OUTLET STRUCTURE, ITS OVERFLOW BLOCKOUT, 100-YR OVERFLOW WEIR LENGTH AND CREST ELEVATION, HEIGHT OF THE SUPPORT FRAME FOR THE CONTROL BOX ENCLOSURE ARE ALL SITE SPECIFIC DIMENSIONS.
2. TRASH RACK DESIGNED, SUPPLIED AND INSTALLED BY OTHERS.

PROJECT:
PROJECT NAME
CITY, STATE

MODEL:
REAL TIME OPTIMIZER
DETENTION
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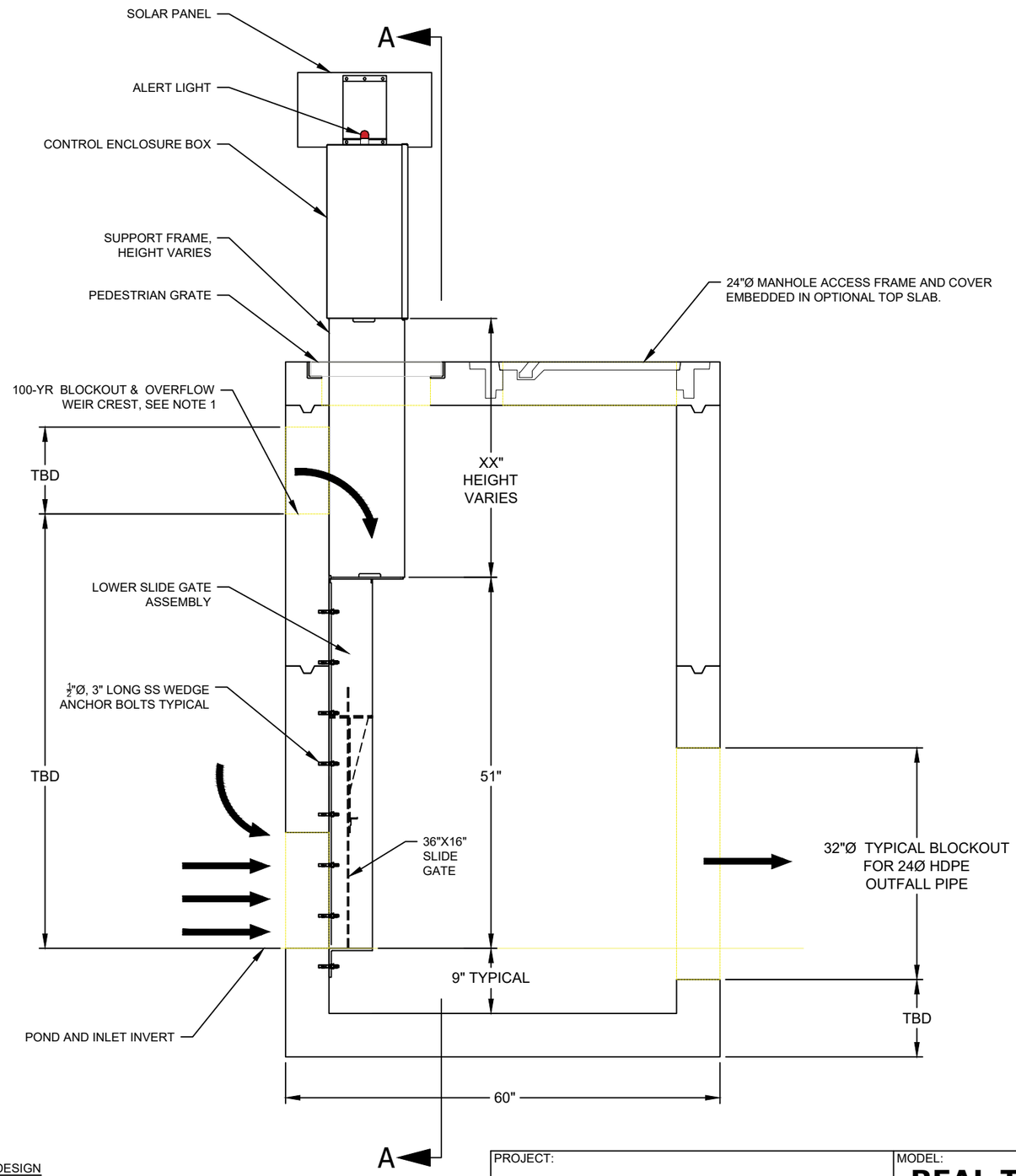
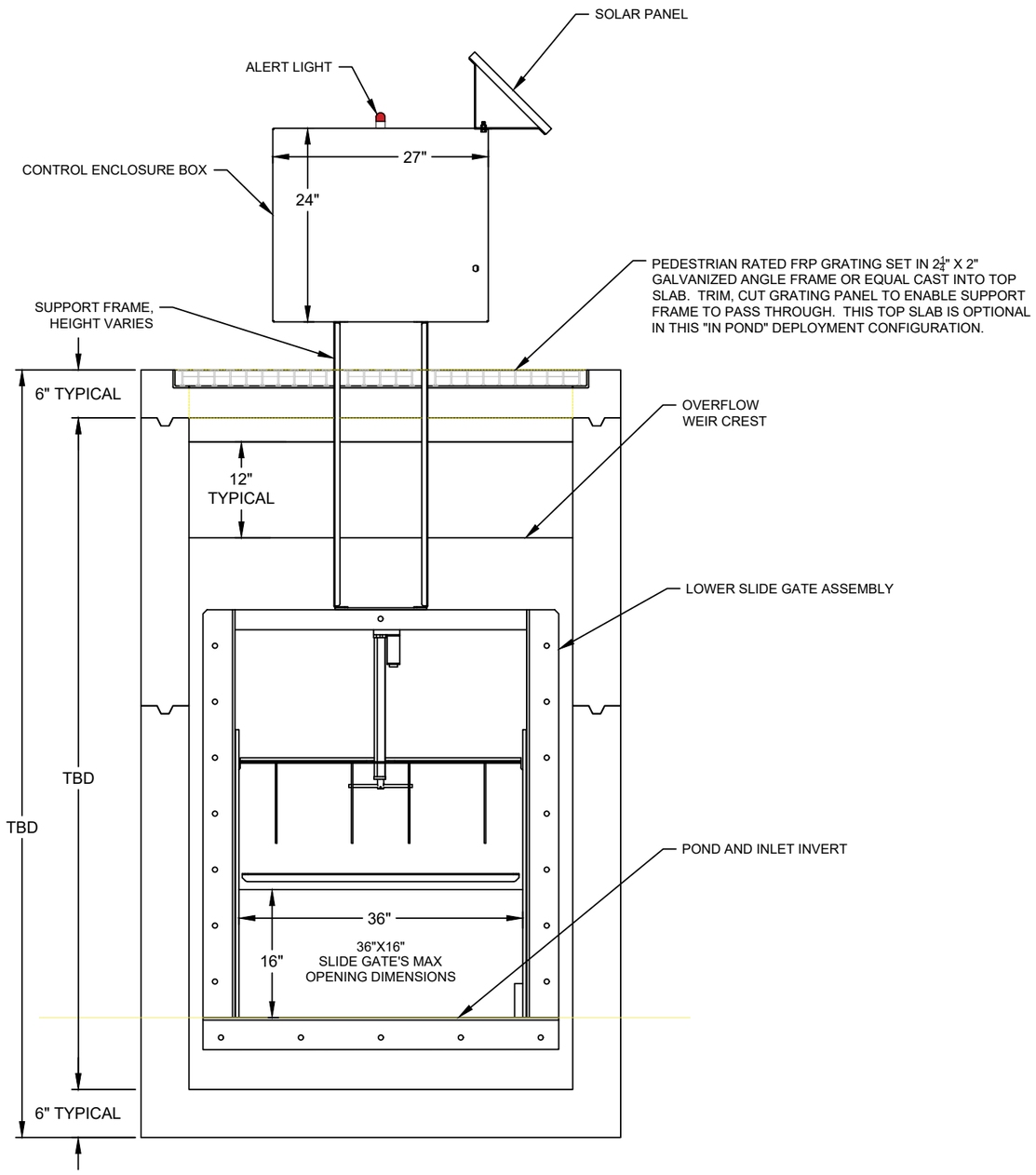
SHEET NO. 2

DETAIL 1 - DIMENSIONAL ELEVATION VIEW, TYPICAL 4' WIDE x 4' LONG VARIABLE HEIGHT OUTLET STRUCTURE WITH SLIDE GATE

DESIGN NOTE: DATA ACQUISITION SYSTEM DESIGN NOT SHOWN



ELEVATION A-A VIEW



DESIGN

1. THE FINAL DESIGN OF THE OUTLET STRUCTURE, ITS OVERFLOW BLOCKOUT, 100-YR OVERFLOW WEIR LENGTH AND CREST ELEVATION, HEIGHT OF THE SUPPORT FRAME FOR THE CONTROL BOX ENCLOSURE ARE ALL SITE SPECIFIC DIMENSIONS.
2. TRASH RACKS NOT SHOWN FOR CLARITY.

PROJECT:

PROJECT NAME
CITY, STATE

MODEL:

REAL TIME OPTIMIZER
DETENTION OPTIMIZATION

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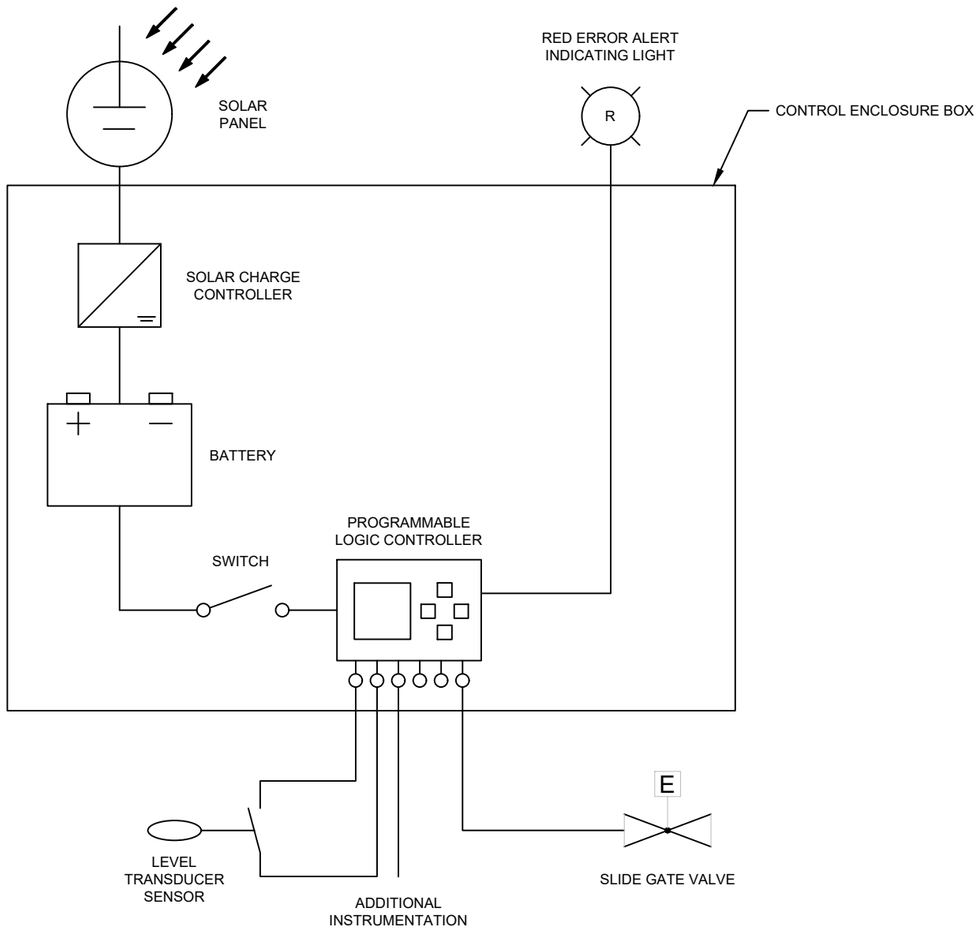
SHEET NO. 3

PROCESS & INSTRUMENTATION DIAGRAM (P&ID)



PROJECT:

PROJECT NAME
CITY, STATE

MODEL:

REAL TIME OPTIMIZER
DETENTION OPTIMIZATION

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DATE
8/25/2023

SHEET NO.
4

smartPOND ™ REAL TIME OPTIMIZER (RTO)

1. **CONTINUOUSLY MONITORED AUTOMATED STORMWATER SYSTEM (C-MASS) DEVICE**: THE CONTINUOUSLY MONITORED AUTOMATED STORMWATER SYSTEM (C-MASS), SHOWN ON THE PLANS AS THE OUTFALL ASSEMBLY SHALL BE A smartPOND™ REAL TIME OPTIMIZER (RTO), SLIDE GATE VALVE PROVIDED BY:

   CONVERGENT WATER TECHNOLOGIES
   800.711.5428
   WWW.CONVERGENTWATER.COM

   THE smartPOND™ RTO SHALL PROVIDE FOR ACTIVE MANAGEMENT OF DETAINED STORMWATER VOLUME AND / OR ITS ALLOWABLE DISCHARGE RATE. THE smartPOND™ RTO SHALL BE PROGRAMMABLE TO DETAIN A SPECIFIED VOLUME OF STORMWATER FOR A SPECIFIED REQUIRED PERIOD OF TIME AND / OR PROGRAMMED TO CONTROL THE OUTFLOW RATE TO MATCH THE MAXIMUM ALLOWABLE DISCHARGE RATE OR BOTH OF THESE OPERATIONS SIMULTANEOUSLY. THE smartPOND™ RTO ENABLES THE SIZING OF THE MOST EFFICIENT DETENTION POND OR RESERVOIR VOLUME AND/OR MAXIMIZES THE DETENTION TO PROMOTE THE SETTLEMENT OF SOLIDS BEFORE AUTOMATICALLY DEWATERING THE DETENTION POND COMPLETELY. FOR STORMWATER RETENTION SYSTEMS, THE SYSTEM SHALL BE PROGRAMMED TO MANAGE THE REQUIRED RETENTION VOLUME WHILE MAINTAINING A SPECIFIED AMOUNT OF CAPACITY FOR FLOOD STORAGE OR OTHER USE.

   THE FOLLOWING SPECIFICATIONS DESCRIBE THE COMPONENTS, GENERAL FUNCTIONS, AND APPLICATIONS OF A CONTINUOUSLY MONITORED AUTOMATED STORMWATER SYSTEM (C-MASS), USING THE PROGRAMMED smartPOND™ RTO.

   THIS smartPOND™ RTO SHALL FUNCTION AS AN ELECTRONICALLY CONTROLLED, SOLAR POWERED STORMWATER MANAGEMENT DEVICE, PROVIDING PRECISION STORMWATER VOLUME MANAGEMENT CAPABILITIES AND REAL-TIME DATA. USING SENSORS, SOLAR POWER, AN ELECTRONIC ACTUATOR, AND AN INTERNET-BASED CONTROL INTERFACE. THE smartPOND™ RTO ENABLES CONTROL OF REQUIRED DETAINED OR RETAINED STORMWATER CONTROL VOLUMES, WHILE CONTINUALLY ALLOWING THE RELEASE OF MAXIMUM ALLOWABLE DISCHARGE RATES AUTOMATICALLY OR IN REAL TIME FOR BOTH THE WATER QUALITY STORM AS WELL AS THE SPECIFIED Q-10, 25, 50 OR 100-YR FLOOD STORM VOLUMES. THE smartPOND™ RTO CAN BE CONFIGURED IN A VAULT LOCATED WITHIN THE POND OR IN AN UNDERGROUND VAULT, DOWNSTREAM OF AN UNDERGROUND DETENTION SYSTEM.

   1.1 PRE-PROGRAMMED SLIDE GATE OPTIMIZER VALVE CONTROL: THE smartPOND™ RTO SHALL BE PRE-PROGRAMMED TO EXECUTE COMMANDS BASED THE ALLOWABLE DISCHARGE RATES OF DESIGN STORM EVENTS, ENABLING THE RELEASE OF OUTFLOWS MATCHING ALLOWABLE DISCHARGE RATES FOR THE WATER QUALITY AND MAXIMUM DESIGN STORM EVENTS.

      1.1.1 DETENTION POND OPTIMIZATION: THE smartPOND™ RTO SHALL BE PROGRAMMED TO DISCHARGE FLOWS FROM THE DETENTION SYSTEM AT THE MAXIMUM ALLOWABLE RELEASE, WHICH IS TYPICALLY A PREDEVELOPMENT VALUE. OTHER PROGRAM CONSIDERATIONS MAY INCLUDE PREVENTION OF OVER TOPPING OR BYPASS.

   1.2 REAL TIME MONITORING: THE smartPOND™ RTO SHALL COME WITH TELEMETRY THAT SHALL ENABLE REAL-TIME REMOTE MONITORING & VALVE OPERATION CAPACITIES THROUGH A SECURE WEB-BASED USER INTERFACE. THIS INTERFACE ENABLES COMMANDS TO BE SENT TO THE SLIDE GATE OPTIMIZER VALVE TO CHANGE THE VALVE'S POSITION TO CONTROL DISCHARGE RATE AND POND DEPTH. THROUGH THIS SECURE WEB-BASED USER INTERFACE THE DETENTION POND'S STORAGE-STAGE AND DISCHARGE RATE CAN BE MONITORED IN REAL-TIME. THE SECURE WEB-BASED USER INTERFACE SHALL ALSO ENABLE A USER TO:

   - VERIFY THE OUTFLOW RELEASE RATE
   - CONTROL THE SLIDE GATE VALVE, EITHER OPEN OR CLOSE.
   - DETERMINE THE WATER SURFACE ELEVATION (WSE) OR POND DEPTH.
   - RECEIVE MAINTENANCE AND OPERATIONAL ALERTS SUCH AS: LOW BATTERY, VALVE OPEN OR CLOSURE FAILURES, ETC.
   - MAINTAIN SPECIFIED WATER SURFACE LEVEL (WSE).

2. **COMPONENTS**: THE smartPOND™ RTO MAY BE DEPLOYED IN THE POND OR DOWNSTREAM OF AN UNDERGROUND DETENTION SYSTEM IN A BELOW GROUND VAULT, AND IS COMPRISED OF THE FOLLOWING COMPONENTS:

   2.1 HARDWARE AND CONFIGURATION:

   THE STANDARD smartPOND™ RTO ASSEMBLY CONSISTS OF THE SLIDE GATE AS ITS LOWEST COMPONENT, A SUPPORT ASSEMBLY ABOVE IT AND A CONTROL ENCLOSURE BOX ON ITS VERY TOP. THE LOWER SLIDE GATE COMPONENT IS THE 36' WIDE BY 16" TALL ACTUATED SLIDE SLIDE GATE ALONG WITH A PRESSURE TRANSDUCER HOUSING. THIS SLIDE GATE SHALL HAVE ANGLE FLANGES ON EACH OF ITS SIDES AND ALONG ITS BOTTOM FOR FASTENING TO THE PRECAST CONCRETE. ON TOP OF THE VARIABLE HEIGHT SUPPORT SITS THE LOCKABLE STEEL WEATHERPROOF CONTROL ENCLOSURE BOX WITH A SOLAR PANEL AND ALERT LIGHT MOUNTED ON THE BOX'S TOP. THIS CONTROL ENCLOSURE BOX HOUSES THE PROGRAMMABLE CONTROLLER INSIDE A NEMA-3R BOX AND A BATTERY TO POWER THE SLIDE GATE OPERATION.

   2.2 OTHER ELECTRONICS SPECIFICATIONS:

   - ELECTRICAL ACTUATED RAM - OPERATES ON 12-VOLTS.
   - BATTERY - THIS IS A GEL BATTERY THAT PROVIDES 12-VOLTS, 30 AMP/HOUR OF POWER TO THE VALVE ASSEMBLY.
   - SOLAR PANEL - PROVIDES 15-WATT CHARGING TO THE 12-VOLT GEL BATTERY.
   - SOLAR CHARGE CONTROLLER - REGULATES THE VOLTAGE AND CURRENT DELIVERED TO THE GEL BATTERY.

   SENSORS:

   - PRESSURE TRANSDUCER - A SENSOR CAPABLE OF STAYING SUBMERSED IN WATER INDEFINITELY AND IS MOUNTED AT THE BOTTOM OF THE SLIDE GATE.
   - OUTFALL VALVE POSITION SENSOR - DETERMINES THE POSITION OF THE OUTFALL VALVE.

   OPTIONAL SENSORS & HARDWARE:

   - CELL DATA MODEM - REQUIRED FOR REAL TIME CONTROL AND ALERTS.
   - HYDROCARBON SENSOR - THIS OPTIONAL SENSOR MAY BE FITTED TO THE smartPOND™ RTO TO PERFORM SPECIFIC FUNCTIONS BASED ON THE PRESENCE OF HYDROCARBON CONTAMINATION.
   - 120 ALTERNATING CURRENT CONVERTER TO 12-VOLT CONVERTING WHEN CONTROL IS POWER BY 120-VOLT AC VIA A POWER CONDUIT DESIGNED IN BY THE ENGINEER AND INSTALLED BY THE CONTRACTOR.

3. **REAL TIME MONITORING INTERFACE (OPTIONAL)**: THE smartPOND™ RTO SHALL HAVE REAL-TIME REMOTE MONITORING CAPACITIES THROUGH A SECURE WEB-BASED USER INTERFACE THAT SHALL ALSO ENABLE REMOTE OPERATIONS. THIS WEB-BASED USER INTERFACE SHALL PROVIDE REAL-TIME DIRECT CONTROL AS WELL AS FULLY AUTOMATED OPERATING MODES AND MONITORING. A COMPLETE SET OF USER INSTRUCTIONS FOR THIS WEB-BASED INTERFACE SHALL BE PROVIDED IN THE CONSTRUCTION SUBMITTALS AND A COPY OF THESE INSTRUCTIONS SHALL BE PLACED IN THE CONTROL ENCLOSURE BOX.

   THE WEB-BASED INTERFACE SHALL PROVIDE LIVE AND HISTORICAL DATA AND PROVIDE THE ALERTS LISTED IN SECTION 4. IT WILL ALSO ENABLE COMMANDS TO BE SENT TO THE ROTARY VALVE DRUM TO CHANGE POSITION TO CONTROL POND DEPTH AND DISCHARGE RATE.

4. **ALERTS**: THE smartPOND™ RTO WILL INDICATE THE FOLLOWING ALERTS BY ILLUMINATING AN EXTERIORLY VISIBLE RED LED LIGHT ON TOP OF THE ENCLOSURE BOX:

   - LOW BATTERY
   - LOSS OF FUNCTION
   - VALVE MALFUNCTION
   - HYDROCARBON CONTAMINATION (OPTIONAL)

   IF THE TELEMETRY OPTION IS SELECTED, THE UNIT WILL UPLOAD THE ABOVE ALERTS TO THE WEB-BASED USER INTERFACE AND NOTIFY THE OPERATOR VIA TEXT OR EMAIL.

5. **OPERATION & MAINTENANCE SUBMITTAL**: AN OPERATION AND MAINTENANCE MANUAL SHALL BE PROVIDED, REVIEWED AND APPROVED DURING THE CONSTRUCTION SUBMITTAL PROCESS AND SHALL INCLUDE AT A MINIMUM: GREASING AND LUBRICATION ITEMS AND CYCLE FOR THE ACTUATOR, MOTOR AND VALVE; INSPECTION AND MAINTENANCE OF THE SOLAR PANEL, GEL BATTERY TRASH CAGE AND INTAKE RISER; AND PROCEDURES FOR VALVE OPERATION IN CASE OF TOTAL ELECTRONIC OR MOTOR FAILURE.

6. **SHIPPING AND HANDLING STORAGE**: THE smartPOND™ RTO IS SHIPPED IN A NEAR-FULLY ASSEMBLED CONFIGURATION AND SHOULD BE STORED LIKEWISE. THE SYSTEMS ARE TRANSPORTED AND STORED ON PALLETS AND MUST REMAIN SECURED VIA STRAPS OR STEEL BANDS TO SAID PALLET AT ALL TIMES. THE SOLAR PANEL IS NOT INSTALLED AT TIMES OF TRANSPORT OR STORAGE AND SHOULD NOT BE INSTALLED UNTIL THE UNIT IS READY TO BEGIN OPERATION. THE BATTERY MAY BE STORED INSIDE THE ELECTRONICS BOX AND IF REMOVED, SHOULD NEVER BE STORED ON A CONCRETE SURFACE.

7. **INSTALLATION**: INSTALL THE COMPLETE smartPOND™ RTO ASSEMBLY FIRST WITHOUT THE SOLAR PANEL. MOUNT SOLAR PANEL WITH THE CONNECTION BOLTS PROVIDED AFTER THE ASSEMBLY IS ANCHORED TO THE WALL OF THE CONCRETE VAULT USING THE STAINLESS STEEL WEDGE ANCHOR BOLTS CALLED OUT ON THE PLANS. THE smartPOND™ RTO SHALL BE INSTALLED SO THAT THE CONTROL ENCLOSURE BOX IS SET ABOVE THE 100-YR FLOOD ELEVATION.

   7.1 BELOW GROUND INSTALLATIONS: THE UPPER COMPONENT CONSISTING OF THE CONTROL ENCLOSURE BOX SHOULD BE FASTENED TO THE BAFFLE WALL OF THE PRECAST VAULT.AND SHOULD BE INSTALLED ABOVE THE 100-YEAR FLOOD ELEVATION. SEE DESIGN DETAILS FOR STANDARD VAULT DESIGN.

8. **SAFETY INFORMATION AND WARNINGS**:

   - ALWAYS KEEP HANDS CLEAR OF THE OUTFALL VALVE AND MOTOR WHEN UNIT IS IN OPERATION.
   - TURN THE POWER SWITCH OFF WHEN DOING ANY ELECTRICAL WORK.
   - DO NOT ENTER THE WATER WHEN THE DEVICE IS ACTIVELY DRAINING WATER.
   - ALWAYS USE PROPER PERSONAL PROTECTION EQUIPMENT (PPE), AND CONFINED SPACE PROTOCOL WHEN SERVICING A OUTFALL VALVE BELOW GROUND.

9. **PRODUCTS**: THE MANUFACTURER SHALL BE AN ESTABLISHED STORMWATER COMPANY THAT HAS AT LEAST FIVE (5X) INSTALLATIONS OF C-MASS DEVICES THAT HAVE BEEN IN USE AND FUNCTIONAL FOR FIVE (5X) OR MORE YEARS.

10. **QUALITY ASSURANCE AND PERFORMANCE SPECIFICATIONS**: THE QUALITY OF ALL SYSTEM COMPONENTS AND ALL OTHER APPURTENANCES AND THEIR ASSEMBLY PROCESS SHALL BE SUBJECT TO INSPECTION UPON DELIVERY OF THE SYSTEM TO THE WORK SITE. INSTALLATION IS TO BE PERFORMED ONLY BY SKILLED WORK PEOPLE WITH SATISFACTORY RECORD OF PERFORMANCE ON EARTHWORKS, PIPE, WELDING, CHAMBER, OR POND/LANDFILL CONSTRUCTION PROJECTS OF COMPARABLE SIZE AND QUALITY.

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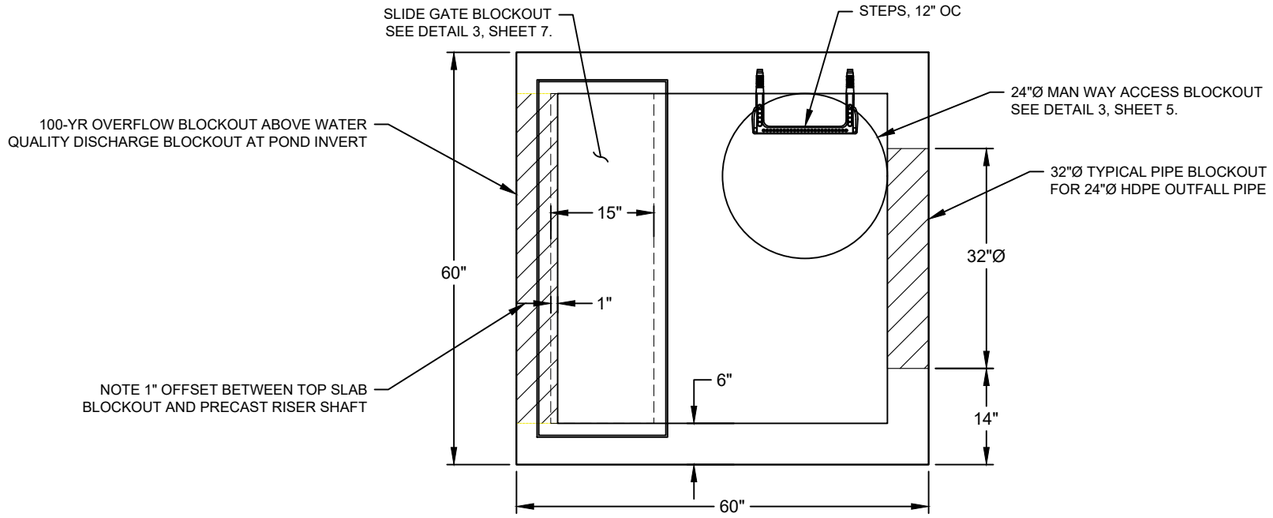
smartPOND™ REAL TIME OPTIMIZER

SPECIFICATIONS

REVISION NO.
0
DATE
9/9/2023
SHEET NO.
5

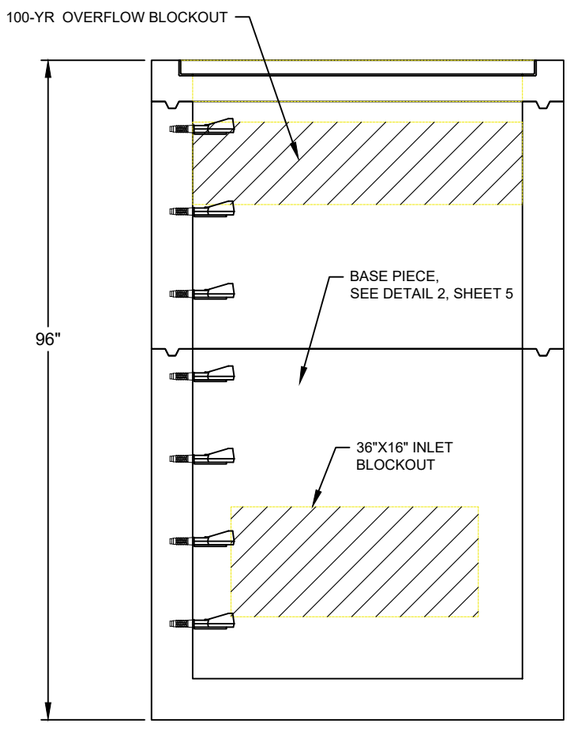
DETAIL 1 - OUTLET STRUCTURE DIMENSIONS



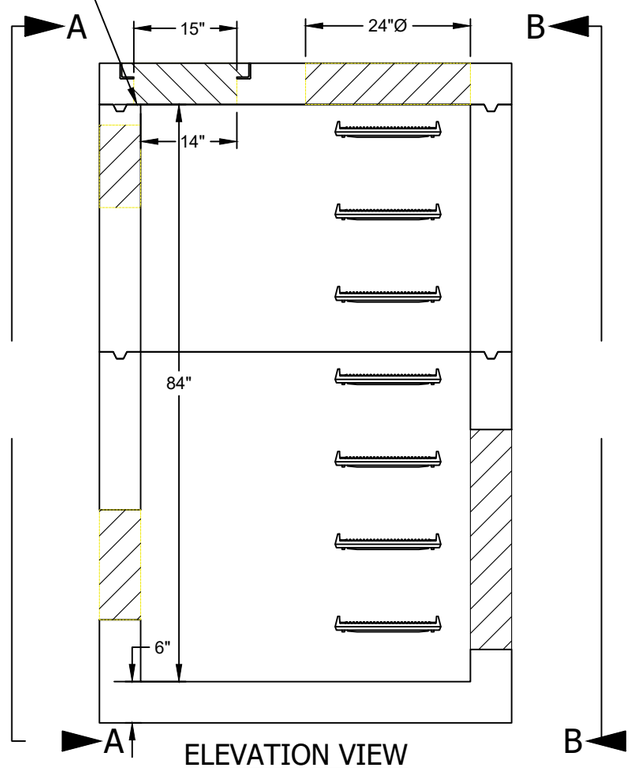
PRECAST MATERIAL NOTES:

1. ALL DIMENSIONS ARE IN FEET OR DECIMAL INCHES
2. PRECAST MATERIALS AND MANUFACTURING METHODS SHALL CONFORM TO ASTM C-857 & C-478.
3. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH F'c = 3,000-PSI AT 28-DAYS.
4. THE PORTLAND CEMENT USED IN THE PRECAST SECTION SHALL MEET THE REQUIREMENTS OF TYPE II/V HIGH SULFATE RESISTANT CEMENT IN ACCORDANCE WITH ASTM CLASS M C-150.
5. DESIGN LOAD: H-20 TRAFFIC FROM 1' TO 6' COVER PER ASTM C890 & C915 & AASHTO LOADING METHODS.

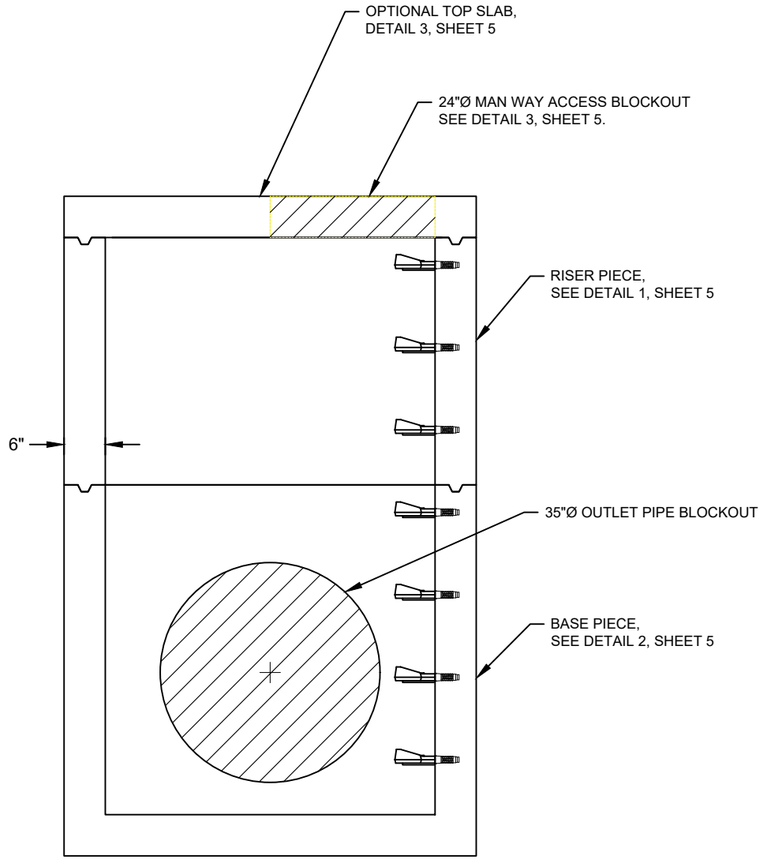
THIS DETAIL SHEET TO BE REVISED FOR CONDTRUCITON SUBMITTAL TO MATCH PROJECT SPECIFIC LAYOUT AND ELEVATION INSTALLATION CONDITIONS



VIEW A-A



ELEVATION VIEW

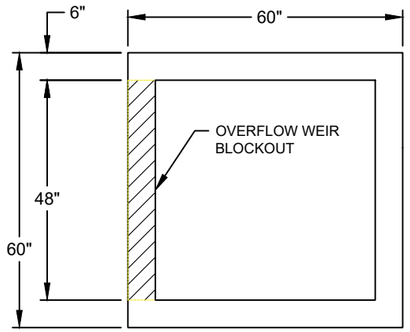


VIEW B-B

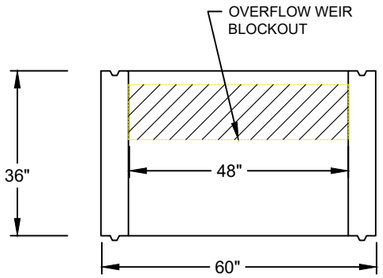
PROJECT: PROJECT NAME CITY, STATE	MODEL: **REAL TIME OPTIMIZER** DETENTION OPTIMIZATION	smartPOND Automated Stormwater Control.	FOR ADDITIONAL INFORMATION CONTACT: CONVERGENT WATER TECHNOLOGIES 1-800-711-5428 www.convergentwater.com

REVISION NO.	DATE	SHEET NO.
0	9/7/2023	6

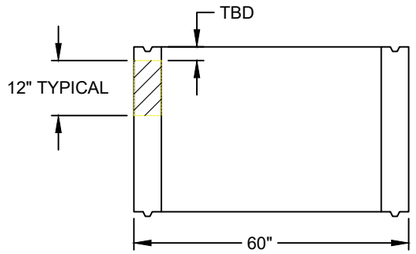
DETAIL 1 -RISER PIECE STRUCTURE DIMENSIONS



PLAN VIEW

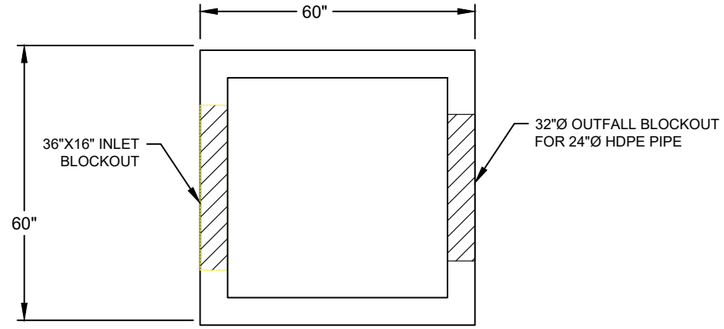


FRONT VIEW

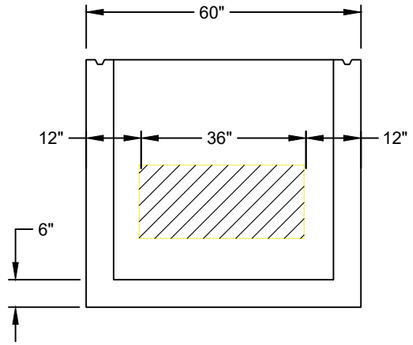


ELEVATION VIEW

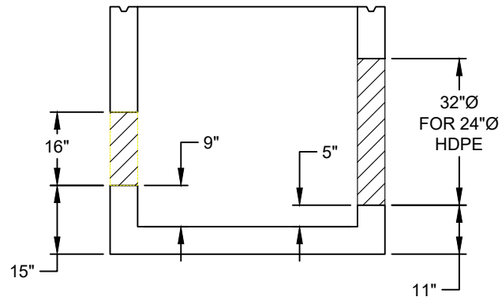
DETAIL 2 -BASE PIECE STRUCTURE DIMENSIONS



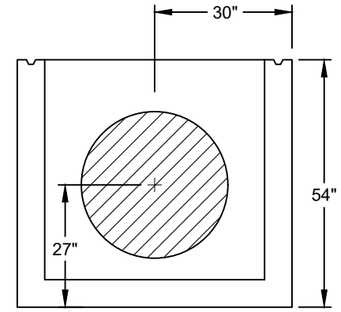
PLAN VIEW



FRONT VIEW



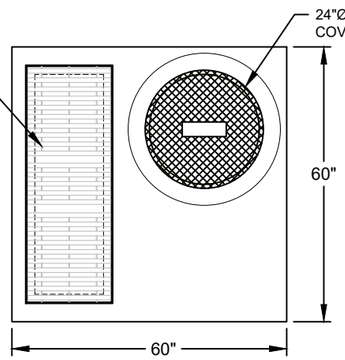
ELEVATION VIEW



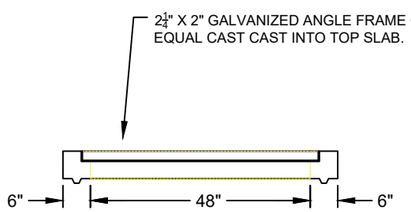
BACK VIEW

DETAIL 3 - TOP SLAB, OPTIONAL

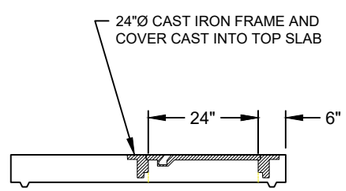
PEDESTRIAN RATED FRP GRATING SET IN 2¼" X 2" GALVANIZED ANGLE FRAME OR EQUAL CAST INTO TOP SLAB. TRIM, CUT GRATING PANEL TO ENABLE SUPPORT FRAME TO PASS THROUGH. THIS TOP SLAB IS OPTIONAL IN THIS "IN POND" DEPLOYMENT CONFIGURATION.



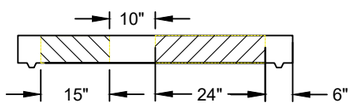
SIDE - TOP SLAB WITH CASTINGS



FRONT - TOP SLAB WITH CASTINGS



BACK - TOP SLAB WITH CASTINGS



SIDE - TOP SLAB WITH BLOCKOUTS ONLY

THIS DETAIL SHEET TO BE REVISED FOR CONDTRUCITON SUBMITTAL TO MATCH PROJECT SPECIFIC LAYOUT AND ELEVATION INSTALLATION CONDITIONS

PRECAST MATERIAL NOTES:

1. ALL DIMENSIONS ARE IN FEET OR DECIMAL INCHES
2. PRECAST MATERIALS AND MANUFACTURING METHODS SHALL CONFORM TO ASTM C-857 & C-478.
3. CONCRETE SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH F'c = 3,000-PSI AT 28-DAYS.
4. THE PORTLAND CEMENT USED IN THE PRECAST SECTION SHALL MEET THE REQUIREMENTS OF TYPE II/V HIGH SULFATE RESISTANT CEMENT IN ACCORDANCE WITH ASTM CLASS M C-150.
5. DESIGN LOAD: H-20 TRAFFIC FROM 1' TO 6' COVER PER ASTM C890 & C915 & AASHTO LOADING METHODS.

MODEL:
REAL TIME OPTIMIZER
DETENTION OPTIMIZATION

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