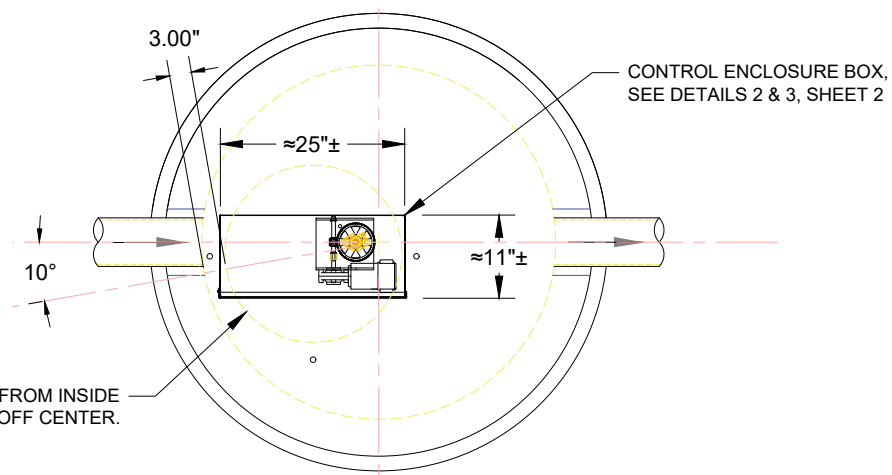


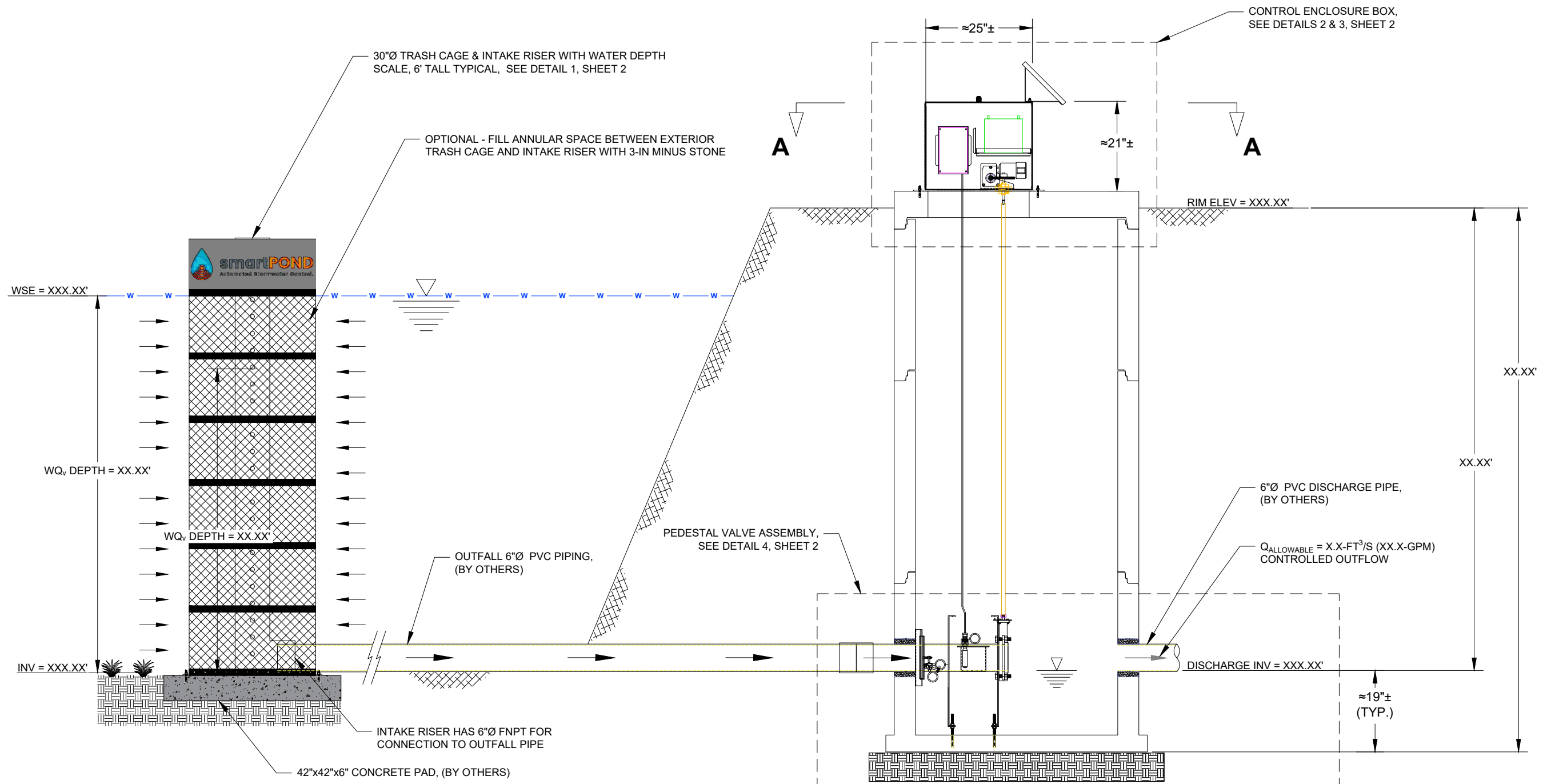
smartPOND VAULT VALVE MANHOLE CONFIGURED IN DETENTION EMBANKMENT

VAULT VALVE DISCHARGE RATE AND DETENTION SETTING	
ALLOWABLE DISCHARGE RATE ($Q_{ALLOWABLE}$)	X.XX-FT ³ /S (XX.X-GPM)
REQUIRED DETENTION VOLUME	X.XX-FT ³
DETENTION VOLUME PROVIDED	X.XX-FT ³ /S
REQUIRED DETENTION TIME	XX-HOURS



24"Ø MANWAY ACCESS, OFFSET BY 3" FROM INSIDE OF PRECAST MANHOLE, ROTATED 10° OFF CENTER.

PLANVIEW AA - 4"Ø MANHOLE WITH ACTUATED VALVE AND CONTROL PANEL



NOTE: ENGINEER OF RECORD TO REVIEW, APPROVE AND ENDORSE FINAL SITE SPECIFIC DESIGN.

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smartPOND VAULT VALVE

PROJECT NAME
CITY, STATE

REVISION NO.

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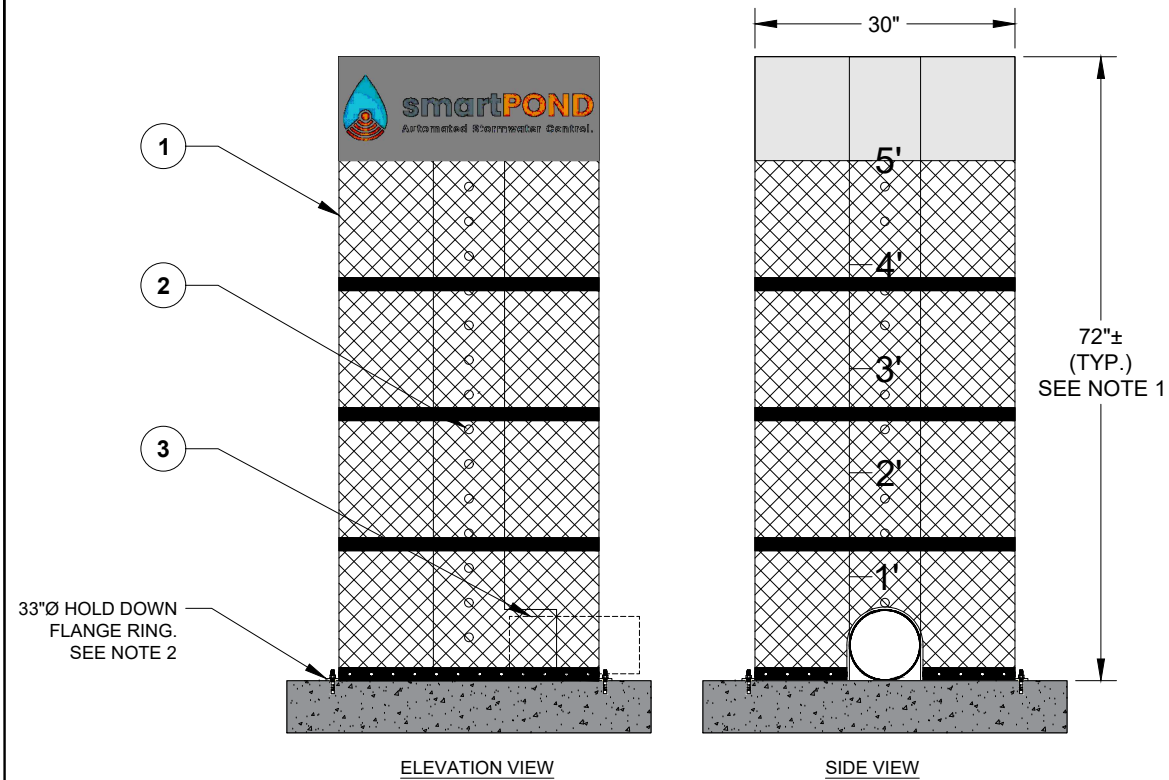
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DETAIL 1 - TRASH CAGE & INTAKE RISER

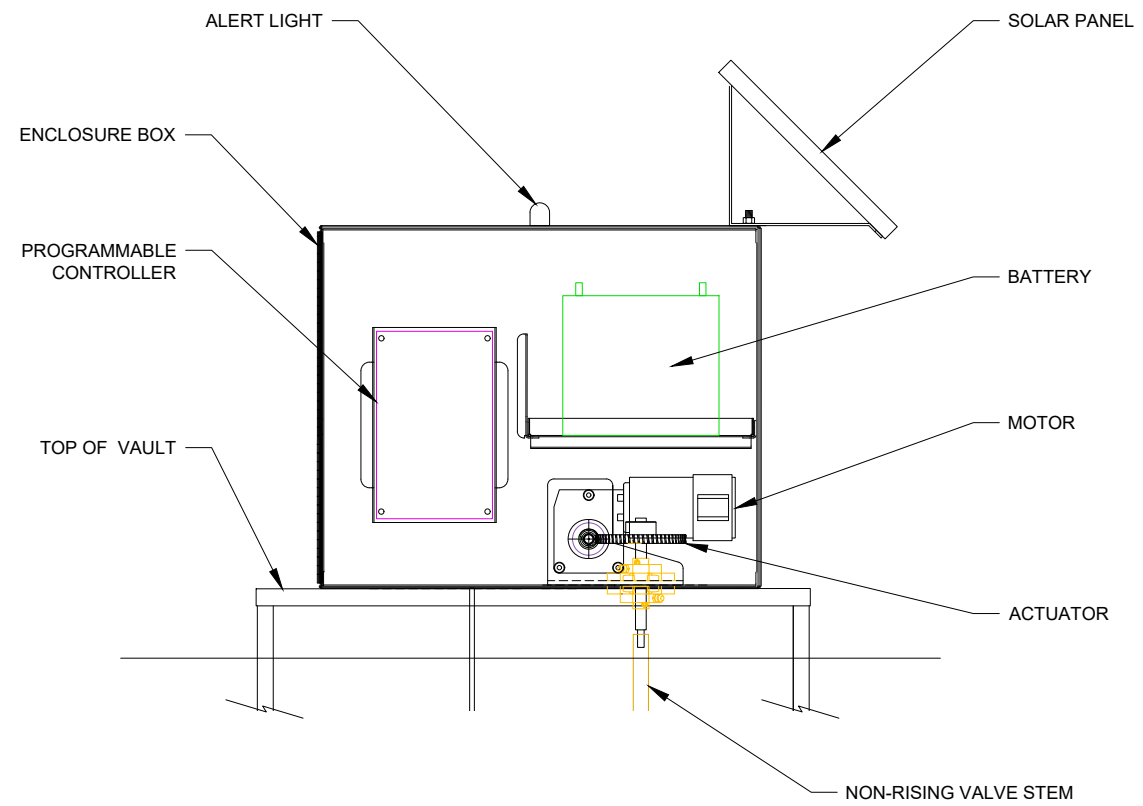


TRASH CAGE & INTAKE RISER NOTES:

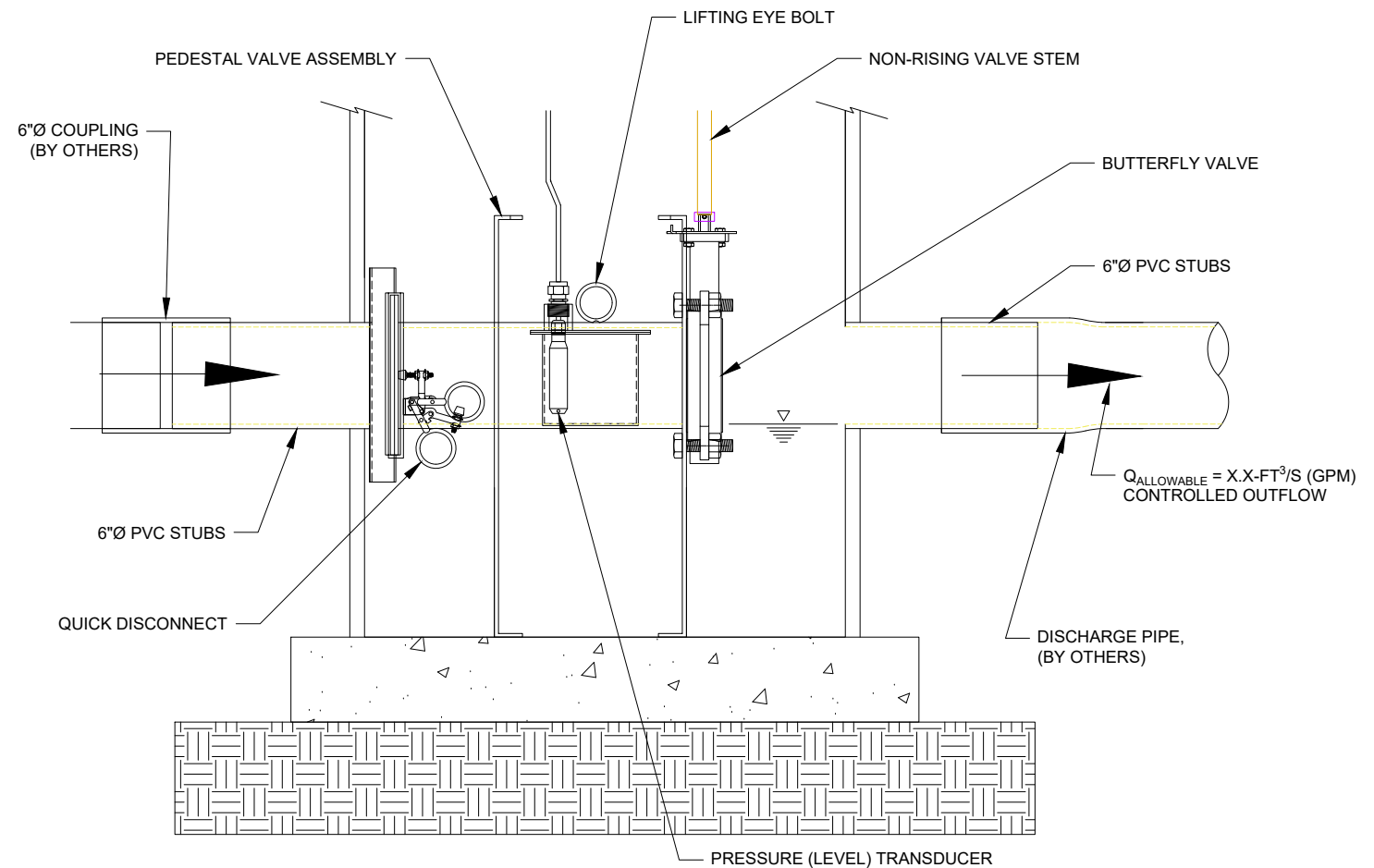
- DESIGN HEIGHT OF INTAKE TRASH CAGE AND INTAKE RISER TO MATCH REQUIRED DETENTION DEPTHS.
- USE 4X, 1/2" X 3.5" SS WEDGE ANCHOR BOLTS TO CONNECT OUTFALL ASSEMBLY TO CONCRETE PAD, 2.5" MINIMUM EMBEDMENT.

TRASH CAGE WITH INTAKE RISER - PARTS LIST	
ITEM	COMPONENT DESCRIPTION
1	30"Ø CAGE WITH 1.5" GALVANIZED MESH SCREEN
2	8" SQUARE PERFORATED TUBING WITH 1"Ø PERFORATIONS, SPACED 4" ON CENTERS WITH WATER DEPTH SCALE
3	6"Ø FNPTS PROVIDED AT BOTTOM DISCHARGE OF INTAKE RISER

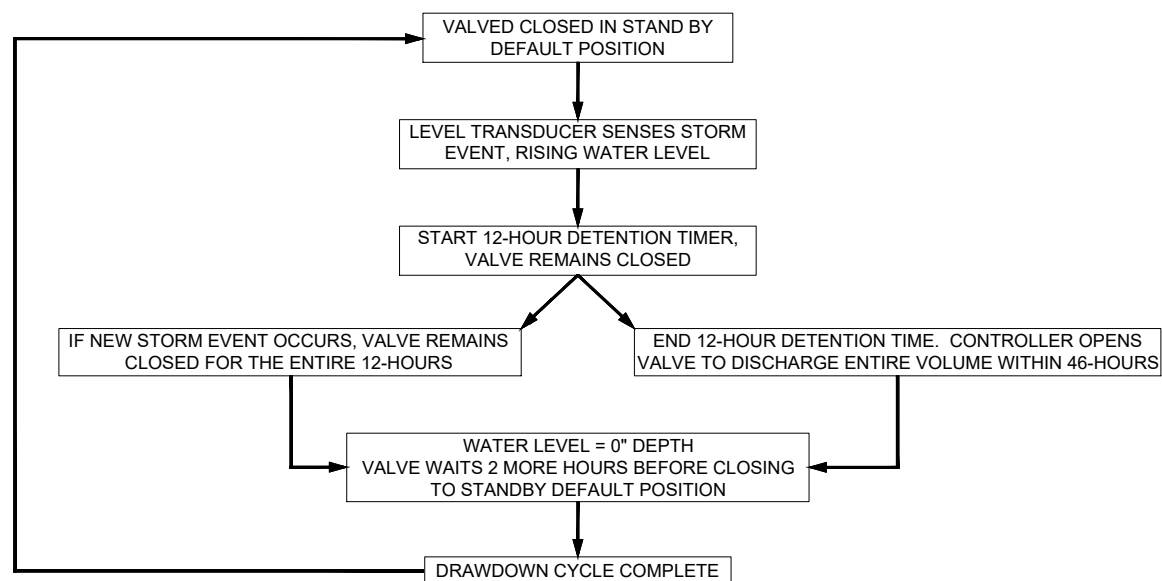
DETAIL 3 - CONTROL ENCLOSURE BOX



DETAIL 4 - PEDESTAL VALVE ASSEMBLY



DETAIL 2 - PROGRAMMABLE LOGIC FLOW CHART, VAULT VALVE OPERATION FOR DETENTION AND/OR WATER QUALITY



smartPOND VAULT VALVE, MH SPECIFICATIONS

CONTINUOUSLY MONITORED AUTOMATED STORMWATER SYSTEM (C-MASS), WITH PROGRAM CONTROLLED VAULT VALVE

1. **CONTINUOUSLY MONITORED AUTOMATED STORMWATER SYSTEM (C-MASS) DEVICE:** THE CONTINUOUSLY MONITORED AUTOMATED STORMWATER SYSTEM (C-MASS), SHOWN ON THE PLANS AS THE VAULT ASSEMBLY SHALL BE A smartPOND™ VAULT VALVE PROVIDED BY:

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THE smartPOND™ VAULT VALVE SHALL PROVIDE FOR ACTIVE MANAGEMENT OF DETAINED STORMWATER VOLUME AND / OR ITS ALLOWABLE DISCHARGE RATE. THE smartPOND™ VAULT VALVE 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 THIS OPERATIONS SIMULTANEOUSLY. THE smartPOND™ VAULT VALVE 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™ VAULT VALVE.

THIS smartPOND™ VAULT VALVE 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™ VAULT VALVE CONNECTS TO A SPECIALIZED PERFORATED INTAKE RISER INSIDE THE STORMWATER IMPOUNDMENT AREA TO ENABLE PRECISE CONTROL OF REQUIRED DETAINED OR RETAINED STORMWATER CONTROL VOLUMES AND ALLOWABLE DISCHARGE RATES AUTOMATICALLY OR IN REAL TIME. THE smartPOND™ ASSEMBLY CAN BE CONFIGURED ABOVE GROUND OR BELOW IN SMALL MANHOLE OR VAULT STRUCTURE.

- 1.1 PRE-PROGRAMMED VAULT VALVE CONTROL: THE VAULT VALVE SHALL BE PRE-PROGRAMMED TO EXECUTE COMMANDS BASED ON STORM EVENTS, REQUIRED CONTROL VOLUMES AND ALLOWABLE DISCHARGE RATES.
- 1.1.1 DETENTION POND OPTIMIZATION: THE smartPOND™ VAULT VALVE 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 OVERTOPPING OR BYPASS.
- 1.1.2 BATCH DETENTION FUNCTION FOR STORMWATER QUALITY: THE smartPOND™ VAULT VALVE MAY BE PROGRAMMED TO PROVIDE BATCH DETENTION TO ACHIEVE STORMWATER QUALITY EFFLUENT GOAL OF 80% OR MORE REMOVAL OF TOTAL SUSPENDED SOLID (TSS) REMOVAL BY HOLDING THE WATER QUALITY VOLUME (WQ_v) FOR SETTLEMENT TREATMENT, FOR A REQUIRED PERIOD OF TIME. HOLDING TIMES ARE TYPICALLY SET FORTH IN STORMWATER MANAGEMENT REGULATIONS AS 2, 24 OR 48-HOURS.
- 1.1.3 SPILL CONTROL OF HAZARDOUS MATERIAL (HAZMAT): smartPOND™ WHEN SPECIFIED FOR HAZMAT SPILL CONTROL SHALL BE EQUIPPED WITH POLLUTANT SPECIFIC SENSORS THAT WHEN TRIGGERED AUTOMATICALLY CLOSE THE VAULT VALVE UNTIL THE COMMAND IS OVERRIDDEN.
- 1.2 REAL TIME MONITORING: smartPOND™ SHALL COME WITH TELEMETRY AND THE "AUTOFLOW APP" USER APPLICATION SOFTWARE AT NO ADDITIONAL COST FOR 1-YEAR. THIS AUTOFLOW APP ENABLES REAL TIME MONITORING OF THE DETENTION POND'S STORAGE-STAGE AND DISCHARGE RATE. THE AUTOFLOW APP SHALL ENABLE A USER TO:
- CONTROL THE VAULT VALVE, EITHER OPEN OR CLOSE.
 - DETERMINE THE WATER SURFACE ELEVATION (WSE) OR POND DEPTH.
 - DETERMINE IF TRASH OR DEBRIS IS SURROUNDING THE TRASH CAGE AND INTAKE RISER.
 - RECEIVE MAINTENANCE ALERTS SUCH AS: LOW BATTERY, VAULT VALVE FAILURE, ETC.
 - MAINTAIN SPECIFIED WATER SURFACE LEVEL.

2. **COMPONENTS:** THE smartPOND™ VAULT VALVE MAY BE IMPLEMENTED EITHER ABOVE OR BELOW GROUND, AND IS COMPRISED OF THE FOLLOWING COMPONENTS:

2.1 HARDWARE AND CONFIGURATION:

THE STANDARD smartPOND™ VAULT VALVE SYSTEM CONSISTS OF A LOWER AND UPPER COMPONENT: THE LOWER COMPONENT IS THE PEDESTAL VALVE ASSEMBLY WITH 6"Ø PIPE SPOOL AND 6"Ø ACTUATED VAULT VALVE AND PRESSURE TRANSDUCER HOUSING. THIS LOWER PEDESTAL SHALL HAVE A QUICK DISCONNECT SYSTEM ENABLING THE PEDESTAL VALVE ASSEMBLY TO BE DISCONNECTED FROM THE SURFACE AND HOISTED UP USING THE LIFTING EYE-BOLT ON TOP OF THE PEDESTAL VALVE ASSEMBLY.

THE SECOND, UPPER COMPONENT IS THE LOCKABLE STEEL WEATHERPROOF ENCLOSURE BOX WITH A SOLAR PANEL AND ALERT LIGHT MOUNTED ON ITS TOP. THIS ENCLOSURE BOX HOUSES THE PROGRAMMABLE CONTROLLER INSIDE A NEMA-3R BOX, BATTERY, ELECTRIC MOTOR, ACTUATOR GEARING AND AN EXTENDABLE NON-RISING VALVE STEM BETWEEN THE ACTUATOR AND THE 6"Ø VAULT VALVE.

THE ENCLOSURE BOX SHALL BE BOLTED TO THE TOP OF THE VAULT WITH ½"Ø " STAINLESS STEEL (SS) BOLT, NUTS AND WASHERS. USE ¾"Ø, 3.5" LONG STAINLESS STEEL (SS) WEDGE ANCHORS IF VAULT'S TOP SLAB IS CONCRETE.

THIS ENCLOSURE BOX MAY BE INSTALLED WITHIN THE UNDERGROUND STRUCTURE AS LONG AS ACCESS TO THE ENTIRE VAULT ASSEMBLY IS ENSURED WITH A PROPERLY SIZED STRUCTURE. IN SUCH AN UNDERGROUND DEPLOYMENT CONFIGURATION, THE ENCLOSURE BOX SHOULD BE MOUNTED ABOVE THE MAXIMUM WATER SURFACE ELEVATION (WSE), OF THE DETENTION/DRAINAGE SYSTEM ION. THIS DEPLOYMENT CONFIGURATION STILL REQUIRES THE SOLAR PANEL TO BE LOCATED ABOVE GROUND.

THE LOWER PEDESTAL VALVE ASSEMBLY IS INSTALLED IN A MANHOLE OR VAULT AS NEEDED. AN EXTENDED NON-RISING VALVE STEM, AKA: "DRIVE SHAFT" CONNECTS THE UNDERGROUND VAULT VALVE TO THE ACTUATOR IN THE ABOVE GROUND ENCLOSURE BOX.

THE OUTFALL PIPE FROM THE DETENTION SYSTEM CONNECTS TO THE 6"Ø PVC INLET STUB PVC VAULT.

2.2 OTHER ELECTRONICS SPECIFICATIONS:

- **MOTOR** - OPERATES ON 12-VOLTS AND HAS TWO WIRES CONNECTING TO THE MOTOR CONTROLLER BOARD.
- **BATTERY** - THIS IS A GEL BATTERY THAT PROVIDES 12-VOLTS, 30 AMP/HOUR OF POWER TO THE VAULT 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 IN CENTER PIPE SPOOL OF THE LOWER PEDESTAL COMPONENT.
- **VAULT VALVE POSITION SENSOR** - DETERMINES THE POSITION OF THE OUTFALL VALVE.

OPTIONAL SENSORS & HARDWARE:

- **HYDROCARBON SENSOR** - THIS OPTIONAL SENSOR MAY BE FITTED TO THE smartPOND™ VAULT VALVE TO PERFORM SPECIFIC FUNCTIONS BASED ON THE PRESENCE OF HYDROCARBON CONTAMINATION.
- **CELL DATA MODEM** - REQUIRED FOR REAL TIME CONTROL AND ALERTS.

3. **ADDITIONAL COMPONENTS LIST:**

- 3.1 **INTAKE RISER:** THIS SHALL BE A PERFORATED STEEL RISER CONNECTED TO THE 6"Ø VAULT PIPE WITHIN THE POND AREA. THIS INTAKE RISER SHALL BE AN 8" SQUARE STEEL WITH FOUR (4X) 1"Ø HOLES AT 90-DEGREES EACH, EVERY 4 VERTICAL INCHES. THE DISCHARGE OF THIS INTAKE TUBING SHALL HAVE FEMALE NATIONAL PIPE THREADS (FNPT) TO MATCH THE 6"Ø SCHEDULE 40 PVC VAULT PIPE.
- 3.2 **TRASH CAGE:** THE TRASH CAGE ATTACHES TO THE PERFORATED RISER WITH A COUPLING AND CALDER PIN PROVIDED WITH THE THE SYSTEM. THE TRASH CAGE SHALL BE COMPRISED OF STEEL BANDING AND A 1.5" X 1.5" MESH TO PREVENT FLOATABLE'S AND OTHER CONTAMINANTS FROM ENTERING AND CLOGGING THE PERFORATED RISER. THE TRASH CAGE WILL SIT 0.5" ABOVE THE BOTTOM OF THE IMPOUNDMENT TO ALLOW THE LAST 0.5" OUT OF THE IMPOUNDMENT.
- 3.3 **VAULT VALVE STEM EXTENSION:** THE NON-RISING STEM, AKA: "DRIVE SHAFT" OF THE smartPOND™ SYSTEM MAY BE EXTENDED TO ANY LENGTH NECESSARY FOR DEPLOYMENT CONFIGURATIONS INSTANCES WHERE THE VAULT VALVE WILL BE IN AN UNDERGROUND VAULT OR MANHOLE. THE VAULT VALVE STEM WILL CONNECT THE VAULT VALVE TO THE ABOVE GROUND CONTROLS.

4. **REAL TIME MONITORING INTERFACE (OPTIONAL):** THE AUTOFLOW APP SHALL BE THE SOFTWARE USED IF THE REAL TIME MONITORING OPTION IS SPECIFIED FOR LONG-TERM POND OPERATIONS. A COMPLETE SET OF USER INSTRUCTIONS SHALL BE PROVIDED IN THE CONSTRUCTION SUBMITTALS AND COPY OF THESE INSTRUCTIONS SHALL BE PLACED IN THE ENCLOSURE BOX.

THIS AUTOFLOW APP SHALL PROVIDE LIVE AND HISTORICAL DATA AND PROVIDE THE ALERTS LISTED IN SECTION 6. IT WILL ALSO ENABLE COMMANDS TO BE SENT TO THE VAULT VALVE TO CHANGE THE VALVES POSITION TO CONTROL DISCHARGE RATE AND POND DEPTH.

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

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

IF THE TELEMETRY OPTION IS SELECTED, THE UNIT WILL UPLOAD THE ABOVE ALERTS TO THE AUTOFLOW APP AND NOTIFY THE OPERATOR VIA TEXT OR EMAIL.

6. **MAINTENANCE & OPERATION 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.

7. **SHIPPING AND HANDLING STORAGE:** THE smartPOND™ VAULT VALVE 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.

8. **INSTALLATION:** INSTALL THE smartPOND™ VAULT ASSEMBLY FIRST WITHOUT THE SOLAR PANEL. MOUNT SOLAR PANEL WITH THE CONNECTION BOLTS PROVIDED AFTER THE ASSEMBLY IS ANCHORED TO THE CONCRETE PAD USING THE ANCHOR BOLTS CALLED OUT ON THE PLANS. AS . BOLTS SHOULD BE REMOVED DURING THE INSTALLATION PROCESS. THERE ARE SEVERAL WAYS TO INSTALL THE smartPOND™ VAULT VALVE WITH THE KEY BEING STRUCTURED SUPPORT.

- 8.1 **BELOW GROUND INSTALLATIONS:** THE UPPER COMPONENT CONSISTING OF THE ENCLOSURE BOX AND ALL ITS INTERNALS SHOULD BE FASTENED TO THE SURFACE OF THE CONCRETE VAULT. FOR VAULT INSTALLATIONS, SEE DESIGN DETAILS FOR STANDARD VAULT DESIGN.

9. **SAFETY INFORMATION AND WARNINGS:**

- ALWAYS KEEP HANDS CLEAR OF THE VAULT 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 VAULT VALVE BENEATH GROUND.

10. **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.

11. **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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SPECIFICATIONS

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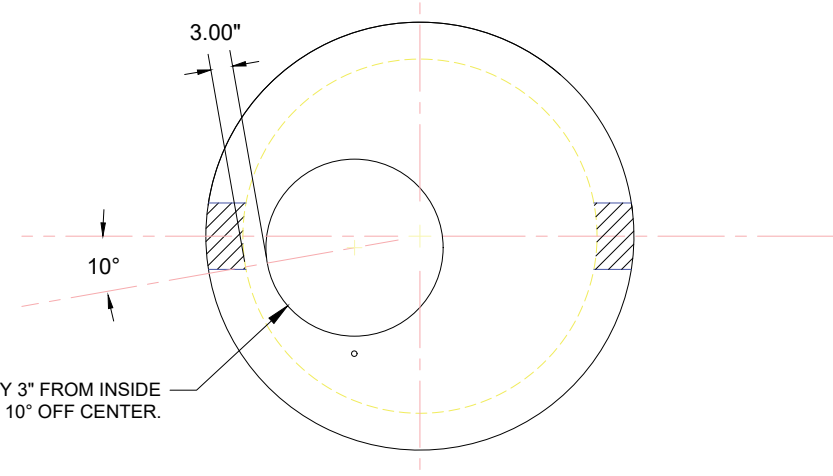
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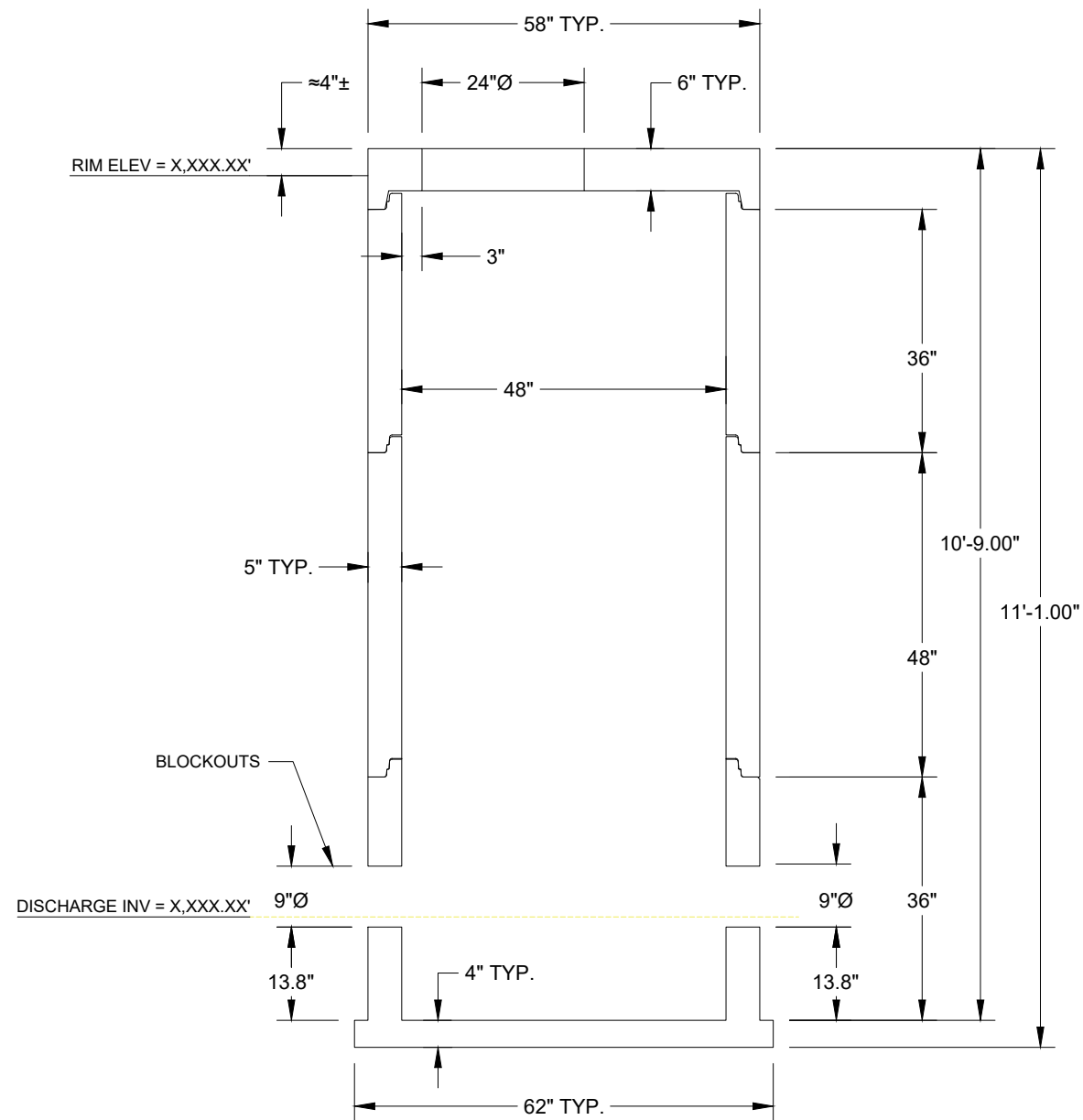
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48"Ø MANHOLE CONFIGURED IN DETENTION EMBANKMENT



24"Ø MANWAY ACCESS, OFFSET BY 3" FROM INSIDE OF PRECAST MANHOLE, ROTATED 10° OFF CENTER.

PLANVIEW AA - 4'Ø MANHOLE



SUGGESTED MANHOLE - ELEVATION VIEW

NOTE: ENTIRE PRECAST MANHOLE STRUCTURE PROVIDED BY OTHERS.

PRECAST MATERIAL AND DESIGN:
 1. PRECAST CONCRETE MANHOLE CONFORMS TO ASTM C-478 SPECIFICATIONS.
 2. PRECASTER TO PROVIDE COMPLETE DESIGN AND PRODUCT INFORMATION.

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PRECAST MANHOLE VAULT

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