

SPECIFICATIONS FOR UNDERGROUND WATER STORAGE TANKS FOR FIRE PROTECTION

1. INTRODUCTION

1.1. SCOPE

THE CONSTRUCTION OF UNDERGROUND TANKS FOR FIRE PROTECTION IN ACCORDANCE WITH HOWARD COUNTY CODE, TITLE 17 AND THIS SPECIFICATION IS PART OF A PROGRAM DESIGNED TO IMPROVE THE LEVEL OF PROTECTION FROM FIRES IN RESIDENTIAL AND COMMERCIAL PROPERTIES. THESE SPECIFICATIONS, ALONG WITH ASSOCIATED DOCUMENTS, PROVIDE THE INFORMATION NECESSARY FOR THE CONSTRUCTION AND PLACEMENT OF FIRE PROTECTION TANKS USED FOR THIS PURPOSE.

1.2. PURPOSE

THE PURPOSE OF THIS SPECIFICATION IS TO PROVIDE THE TECHNICAL INFORMATION REQUIRED FOR THE CONSTRUCTION OF UNDERGROUND WATER STORAGE TANKS IN ACCORDANCE WITH HOWARD COUNTY MARYLAND, TITLE 17 AND ALL DATA THEREIN REFERENCED.

2. UNDERGROUND TANKS

2.1. MATERIALS FOR A STATIC WATER SUPPLY TANK

2.1.1. TANKS SHALL BE CONSTRUCTED OF SINGLE-WALL FIBERGLASS PER THESE SPECIFICATIONS AND IN ACCORDANCE WITH THE APPROVED MANUFACTURER'S SPECIFICATIONS.

2.1.2. THE MANUFACTURER SHALL PROVIDE A 30-YEAR WARRANTY, AGAINST DEFECTS IN MATERIAL FOR THE TANK SYSTEM, TO THE PURCHASER OF THE TANK AND THEIR HEIRS, SUCCESSORS, AND ASSIGNS.

2.2. FEATURES

2.2.1. THE TANK SYSTEM SHALL INCLUDE A DEVICE FOR HOLDING THE TANK IN POSITION AGAINST FLOATATION (DEADMAN). THIS CONFIGURATION SHALL BE SUPPLIED BY THE TANK MANUFACTURER AS PART OF THE TANK PACKAGE. INSTALLATION SHALL BE IN ACCORDANCE WITH THESE SPECIFICATIONS AND THE MANUFACTURER'S RECOMMENDATIONS.

2.2.2. THE TANK SHALL INCLUDE A REMOVABLE ACCESS COVER AT GRADE (MANHOLE), AT LEAST 52" IN DIAMETER, TO ALLOW ENTRY FOR MAINTENANCE AND INSPECTION OF THE INSIDE OF THE TANK. THE ACCESS COVER SHALL BE PROPERLY SECURED AND LOCKED.

2.2.3. A PAD CONSISTING OF 6 INCH THICK CONCRETE SHALL BE PLACED OVER THE TANK, AND SHALL ENCOMPASS ALL FITTINGS. REFER TO TANK DRAWINGS FOR CONCRETE SPECIFICATIONS.

2.2.4. FITTINGS

2.2.4.1. ONE DRAFT CONNECTION SHALL CONSIST OF A 6 INCH NOMINAL DIAMETER DUCTILE IRON PIPE. THE DRAFT CONNECTION SHALL TERMINATE IN A 6NH (NATIONAL HYDRANT FEMALE) SWIVEL CONNECTOR WITH PLUG OR CAP. A PVC DRAFT PIPE WITH AN ANTI-VORTEX PLATE SHALL BE INSTALLED INSIDE THE TANK BY THE MANUFACTURER. THE DRAFT CONNECTION ALLOWS A FIRE DEPARTMENT PUMPER TO CONNECT AND REMOVE WATER FROM THE TANK AT THE SPECIFIED RATE OF FLOW (FIRE FLOW). DRAFT CONNECTION SHALL BE PAINTED FIRE ENGINE RED.

2.2.4.2. ONE COMBINATION VENT/FILL INDICATOR SHALL CONSIST OF AN 8 INCH DIAMETER PVC PIPE WHICH ALLOWS VISUAL INSPECTION OF THE TANK WATER LEVEL, AS WELL AS PROVIDING THE REQUIRED AMOUNT OF VENTING TO THE TANK.

2.2.4.3. ONE FILL CONNECTION SHALL CONSIST OF A 4 INCH NOMINAL DIAMETER DUCTILE IRON PIPE, WITH A SIAMESE CONNECTION WITH TWO, TWO AND ONE HALF INCH (2-1/2") CONNECTION AND ONE 4" STORTZ CONNECTION. THE FITTING SHALL BE ANGLED DOWNWARD AT 30 DEGREES TO REDUCE HOSE AND FITTING STRAIN DURING FILLING OPERATIONS.

2.2.4.4. ALL PIPE JOINTS ABOVE THE SLAB SHALL BE FLANGED BREAK AWAY CONNECTIONS AT OR NEAR SLAB.

2.2.5. SUBMITTALS

2.2.5.1. SHOP DRAWINGS SHALL BE PROVIDED FOR ALL MATERIALS OR COMPONENTS OF CONSTRUCTION, AND PROPOSED PIPING LAYOUTS. THESE SHOP DRAWINGS SHALL BE PROVIDED WELL IN ADVANCE OF CONSTRUCTION IN ORDER TO ALLOW FOR DISTRIBUTION AND REVIEW BY THE OWNER AND THE FIRE MARSHALL. THE CONTRACTOR SHALL PROVIDE A LIST OF ALL ANTICIPATED SHOP DRAWINGS TO THE OWNER FOR REVIEW PRIOR TO CONSTRUCTION. ADDITIONAL SUBMITTALS OR DOCUMENTATION MAY BE REQUIRED BY THE OWNER OR OTHER REVIEWING PARTIES, FOR WHICH THE CONTRACTOR SHALL NOT SEEK ADDITIONAL COMPENSATION.

2.2.5.2. IN THE EVENT THAT SITE CONDITIONS DICTATE THE USE OF STRUCTURAL ELEMENTS NOT EXPLICITLY DETAILED IN THE DRAWINGS, THE CONTRACTOR SHALL SUBMIT DRAWINGS AND CALCULATIONS SIGNED AND SEALED BY A STRUCTURAL ENGINEER LICENSED IN THE STATE OF MARYLAND.

2.2.5.3. OPERATION AND MAINTENANCE MANUALS SHALL BE PROVIDED BY THE TANK MANUFACTURER, INCLUDING OPERATIONAL TESTING PROCEDURES.

2.2.6. ANY FEATURES NOT INCLUDED IN THIS SPECIFICATION, AS WELL AS ANY SPECIAL CIRCUMSTANCES SUCH AS MULTIPLE-TANK DESIGNS SHALL BE EVALUATED AND APPROVED DURING DESIGN PHASE AND BEFORE ANY CONSTRUCTION IS STARTED.

2.2.7. THE STANDARD TANK DETAIL, 30,000 GALLON TANK, FIRE SUPPRESSION WATER STORAGE, ON SHEET 4 OF 6, DEFINES THE REQUIREMENTS FOR A TYPICAL 30,000 GALLON, 10-FOOT DIAMETER TANK INSTALLATION. TANK SIZES OTHER THAN 30,000 GALLONS MAY REQUIRE ADDITIONAL DRAWINGS TO BE PROVIDED TO FIT THE REQUIREMENTS OF A PARTICULAR SITE.

2.3. INSTALLATION

2.3.1. ALL TANKS SHALL BE INSTALLED IN ACCORDANCE WITH THESE SPECIFICATIONS AND THE APPROVED MANUFACTURER'S SPECIFICATIONS.

2.3.2. LOCATION AND ORIENTATION OF THE TANK SHALL BE DETERMINED DURING SITE PLAN OR PRELIMINARY SUBDIVISION PLAN LAYOUT, AS APPROVED BY THE HOWARD COUNTY FIRE OFFICIAL.

2.3.3. THE INSTALLING CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS FOR WORK AND FOR SCHEDULING REQUIRED INSPECTIONS.

2.3.4. THE FITTINGS SHALL BE PLACED AS FOLLOWS:

2.3.4.1. THE DRAFT CONNECTION SHALL BE LOCATED 8 FEET OR LESS FROM THE EDGE OF THE PARKING SURFACE OR CURB LINE. THIS ALLOWS FOR ONE 10 FOOT SECTION OF SUCTION SLEEVE TO BE USED FOR DRAFTING. THE DRAFT CONNECTION OPENING SHALL BE TURNED FACING DIRECTLY TOWARD THE ROAD SURFACE.

2.3.4.2. TOTAL ELEVATION FROM THE BOTTOM OF THE SUCTION PIPE TO THE CENTERLINE OF THE DRAFT CONNECTION SHALL NOT EXCEED 15 FEET ZERO INCHES. THIS DIMENSION SHALL BE MINIMIZED AS MUCH AS POSSIBLE TO REDUCE HEAD LOSS, WHILE MAINTAINING CORRECT DEPTH OF COVER OVER TANK, PER MANUFACTURER'S SPECIFICATIONS.

2.3.4.3. THE DRAFT CONNECTION SHALL BE FIXED AT A HEIGHT OF 18 INCHES ABOVE FINISHED GRADE OF THE PULL OFF PAD, TO THE CENTERLINE OF THE FITTING.

2.3.4.4. THE FILL CONNECTION SHALL BE FIXED AT A HEIGHT OF 18 INCHES ABOVE FINISHED GRADE OF THE PULL OFF PAD, TO THE CENTERLINE OF THE FITTING.

2.3.5. EXCAVATION SHALL BE PERFORMED PER ALL APPLICABLE REGULATIONS. THE EXCAVATION SHALL BE BACKFILLED WITH A MATERIAL PER HOWARD COUNTY SPECIFICATIONS. IN DESIGNS IN WHICH THE DRAFT PIPE IS PLACED ON THE TANK END, THE TANK SHALL HAVE A 2 PERCENT SLOPE TOWARD THE DRAFT CONNECTION END.

2.4. TESTING AND ACCEPTANCE

2.4.1. THE TANK SHALL BE OPERABLE WITH A RATE OF FLOW (FIRE FLOW) OF 1000 GALLONS PER MINUTE (GPM) MINIMUM USING A FIRE DEPARTMENT PUMPER OPERATING UNDER NORMAL CONDITIONS.

2.4.2. A PRESSURE TEST SHALL BE PERFORMED PRIOR TO INSTALLATION OF THE TANK, PER THESE SPECIFICATIONS AND THE APPROVED MANUFACTURER'S SPECIFICATIONS.

2.4.3. A PRESSURE TEST SHALL BE PERFORMED PRIOR TO INSTALLATION AT A MAXIMUM PRESSURE OF 5 PSI (POUNDS PER SQUARE INCH) AND HELD FOR A TIME PERIOD AS DETERMINED BY THE HOWARD COUNTY FIRE OFFICIAL, OR PER MANUFACTURER'S SPECIFICATIONS, WHICHEVER IS MORE STRINGENT.

2.4.4. AN OPERATIONAL TEST SHALL BE PERFORMED WHEN CONSTRUCTION IS COMPLETED, IN ACCORDANCE WITH THE APPROVED PROCEDURES. THE TEST SHALL BE CONDUCTED BY THE FIRE DEPARTMENT AND THE INSTALLER. WHEN TESTING HAS BEEN COMPLETED, THE INSTALLER SHALL REFILL THE TANK TO FULL CAPACITY AS REQUIRED. ONCE ACCEPTED, FURTHER USE OF THE TANK SHALL BE LIMITED TO FIREFIGHTING OPERATIONS AND ROUTINE TESTING. THE FIRE DEPARTMENT SHALL BE RESPONSIBLE FOR SUBSEQUENT REFILLING TO FULL CAPACITY WITHIN 12 HOURS AFTER USING WATER FROM THE TANK.

2.4.5. FINAL APPROVAL WILL BE MADE PER NOTIFICATION IN WRITING BY THE HOWARD COUNTY FIRE OFFICIAL.

2.5. ACCESSIBILITY AND SURROUNDING FEATURES

2.5.1. A PULLOFF SHALL BE CONSTRUCTED AS SHOWN ON THE DRAWINGS. THE REQUIREMENTS FOR EACH SITE WILL BE EVALUATED AND APPROVED BY THE FIRE OFFICIAL PRIOR TO START OF WORK. DETAILS SHALL BE INDICATED ON THE SITE OR SUBDIVISION PLAN AS APPLICABLE.

2.5.2. NO OBSTRUCTIONS SHALL IMPEDE ACCESS TO TANK FITTINGS. THE FACILITY SHALL REMAIN ACCESSIBLE ON A YEAR-ROUND BASIS.

2.5.2.1. LANDSCAPING, BRUSH, AND TREES SHALL BE TRIMMED AWAY FROM FITTINGS. OVERHANGING BRANCHES SHALL BE TRIMMED AWAY AT A MINIMUM OF 12 FEET OVERHEAD. GRASS AND WEEDS SHALL BE CUT AS NEEDED.

2.5.3. PROTECTIVE DEVICES SHALL BE USED AS APPLICABLE TO PREVENT DAMAGE TO THE FITTINGS AND TO PROVIDE SAFETY TO OPERATORS. THESE INCLUDE, BUT ARE NOT LIMITED TO THE FOLLOWING:

A. BOLLARDS
B. GUARD RAILS
C. FENCING
D. WALKWAYS
E. CURBS
F. ANY OTHER BARRIERS/DEVICES AS DETERMINED BY THE FIRE OFFICIAL

2.5.4. A REFLECTIVE SIGN SHALL BE POSTED WHICH CLEARLY INDICATES TANK FULL CAPACITY AND IDENTIFICATION (ID) NUMBER. AN IDENTIFICATION NUMBER SHALL BE ASSIGNED BY THE COUNTY AND POSTED AT THE SITE. SIGNS SHALL BE PLACED ON ALL MAJOR ROADS INDICATING THE DISTANCE AND DIRECTION TO TANK WITHIN A 2,500 FOOT RADIUS.

2.5.5. AN APPROVED NO PARKING SIGN SHALL BE PROVIDED AND ATTACHED TO A METAL POST AT EACH END OF THE PULL-OFF AREA.

2.5.6. ALL FITTINGS ABOVE GRADE SHALL BE PAINTED WITH EXTERIOR-GRADE ENAMEL. COLOR SHALL BE YELLOW UNLESS OTHERWISE SPECIFIED, WITH THE EXCEPTION OF THE DRAFT CONNECTION WHICH SHALL BE PAINTED RED.

3. REFERENCES

3.1. PUBLISHED STANDARDS

3.1.1. NFPA 1963 - STANDARD FOR FIRE HOSE SCREW THREADS

3.1.2. NFPA 1142 - STANDARD FOR WATER SUPPLIES FOR SUBURBAN AND RURAL FIRE PROTECTION

3.1.3. NFPA 1141 - STANDARD FOR FIRE PROTECTION IN PLANNED BUILDING GROUPS

3.1.4. ASTM C33

3.2. OTHER REFERENCED DOCUMENTS

3.2.1. THE CODE OF PUBLIC LOCAL LAWS AND ORDINANCES OF HOWARD COUNTY MARYLAND, CHAPTER 112.

3.2.2. UNDERGROUND TANKS & DRY FIRE HYDRANTS MAINTENANCE AND INSPECTION, CHIEF GREG DODS / REGIONAL FIRE PROTECTION COMMITTEE, 2003.

4. PREPARATION FOR INSTALLATION

4.1. THE TANK INSTALLER SHALL TAKE CARE SO THAT THE TANK IS NOT DROPPED OR DAMAGED DURING DELIVERY, UNLOADING AND HANDLING ON THE JOB SITE.

4.2. BEFORE UNLOADING THE TANK FROM THE TRUCK, THE TANK INSTALLER SHALL MAKE SURE THAT ALL TOOLS OR OTHER ITEMS THAT MAY DAMAGE THE TANK DURING UNLOADING ARE REMOVED FROM THE TRAILER BED.

4.3. BEFORE THE TANK IS UNLOADED OR RELOCATED ON THE JOB SITE (AND BEFORE REINSTALLATION TESTING AT JOB SITE), THE TANK INSTALLER SHALL COMPLETE THE FOLLOWING STEPS:

4.3.1. VISUALLY INSPECT THE ENTIRE EXTERIOR SURFACE OF THE TANK TO MAKE SURE THAT NO SHIPPING OR HANDLING DAMAGE HAS OCCURRED. LOOK PARTICULARLY FOR HOLES, CRACKS OR DEEP SCRAPES.

4.3.2. BE SURE THAT ALL EQUIPMENT USED TO LIFT THE TANK IS RATED TO HANDLE THE LOAD.

4.3.3. TO UNLOAD TANKS, USE THE LIFTING LUGS THAT ARE SITUATED ON TOP OF THE TANK IN ITS ROTATED POSITION.

4.3.4. DO NOT WRAP CHAIN OR CABLE AROUND THE TANK.

4.3.5. USE GUY ROPES TO GUIDE THE TANK WHEN NEEDED.

4.3.6. DO NOT ROLL THE TANK TO MOVE IT.

4.4. WHENEVER A TANK IS TEMPORARILY PLACED ABOVEGROUND AT THE SITE, CHOCK IT IN PLACE TO PREVENT ROLLING. TIE THE TANK DOWN IF HIGH WINDS ARE EXPECTED.

4.5. WHENEVER A TANK IS TEMPORARILY PLACED ABOVE THE GROUND AT THE SITE, ALWAYS TAKE EXTRA CARE SO WATER DOES NOT ENTER THE COLLAR. THE TANK BE ROTATED AND/OR THE COLLAR COVERED.

5. PRE-INSTALLATION TESTING

5.1. PRIOR TO ANY INSTALLATION IT IS THE REQUIREMENT OF THE CONTRACTOR TO MEET OR OBTAIN ALL CERTIFICATION REQUIRED BY THE TANK MANUFACTURER.

5.2. TANK MUST BE RETESTED AT THE SITE PRIOR TO INSTALLATION IN ORDER TO VERIFY THE ABSENCE OF SHIPPING AND HANDLING DAMAGE.

5.3. THE INSTALLER SHALL VERIFY THAT ALL OF THE TEST EQUIPMENT IS IN GOOD WORKING CONDITION, AND IS PROPERLY CONFIGURED AND CALIBRATED.

5.4. CONSTRUCT A TEST MANIFOLD WITH TWO AIR-SUPPLY GAUGES. EACH AIR SUPPLY GAUGE MUST HAVE A MAXIMUM FULL-SCALE READING OF 15 PSIG WITH 1/4-LB. OR 1/10-LB. INCREMENTS, AND A PRESSURE-RELIEF DEVICE SET AT 6 PSIG.

5.5. IT IS THE INSTALLER'S RESPONSIBILITY TO SELECT A THREAD SEALANT THAT IS COMPATIBLE WITH THE PRODUCT BEING STORED. SOME SEALANTS CANNOT BE USED WITH SOME PRODUCTS. REMOVE, CLEAN AND REDOPE ALL FACTORY-FURNISHED TEMPORARY PLUGS WITH APPROPRIATE THREAD SEALANT. INSTALL PERMANENT PLUGS IN ALL OPENINGS WHERE PIPING WILL NOT BE INSTALLED. MAKE SURE ALL MANWAY BOLTS ARE TIGHTENED, AND FITTING PLUGS ARE PROPERLY DOPED AND SEALED.

5.6. WHEN CHECKING THE TANK FOR LEAKS DURING AN AIR/SOAP TEST, ROTATE THE TANK TO CHECK THE BOTTOM.

5.7. BEFORE ROTATING THE TANK DURING AN AIR/SOAP TEST, PLACE PROTECTIVE MATERIAL ON THE AREA ON WHICH THE TANK WILL BE ROTATED. MAKE SURE THE AREA IS FLAT AND IS FREE OF LARGE OR SHARP OBJECTS, SUCH AS ROCKS, WHICH MAY DAMAGE THE TANK.

5.8. ROTATE THE TANK SLOWLY AND CAREFULLY TO AVOID DEVELOPING TOO MUCH MOMENTUM. DO NOT ROTATE THE TANK MORE THAN 120 DEGREES FROM THE INITIAL STARTING POINT.

6. TANK TESTING

6.1. REMOVE ALL TEMPORARY SERVICE-FITTING PLUGS.

6.2. RE-DOPE FITTINGS AND INSTALL PLUGS IN ALL OPENINGS, EXCEPT ONE SERVICE FITTING (NEEDED FOR THE TEST MANIFOLD).

6.3. INSTALL THE TEST MANIFOLD IN THE OPEN SERVICE FITTING. CONNECT THE PRESSURE SOURCE TO THE TEST MANIFOLD.

6.4. PRESSURIZE THE TANK TO 5 PSIG. ALLOW THE PRESSURE TO STABILIZE BY ADDING OR REMOVING AIR AS NECESSARY.

6.5. CLOSE THE AIR-SUPPLY VALVE ON THE TEST MANIFOLD. DISCONNECT THE AIR-SUPPLY LINE.

6.6. SOAP THE ENTIRE EXTERIOR OF THE TANK, CHECKING FOR LEAKS. WATCH FOR ACTIVE AIR BUBBLES, WHICH INDICATE A LEAK. PAY SPECIAL ATTENTION TO FITTINGS AND MANWAYS.

6.7. MONITOR THE PRESSURE FOR ONE HOUR. 5 PSIG SHALL BE MAINTAINED.

6.8. WHEN THE TEST IS COMPLETE, CAREFULLY RELEASE THE AIR PRESSURE FROM THE TANK BY OPENING THE AIR-SUPPLY VALVE.

6.9. WHEN AIRFLOW STOPS, REMOVE THE TEST MANIFOLD.

6.10. REPLACE THE PROTECTIVE COVERS IN THE SERVICE FITTINGS.

7. BACKFILL MATERIAL

7.1. TANKS MUST BE INSTALLED USING EITHER PEA GRAVEL OR CRUSHED STONE AS BACKFILL MATERIAL.

7.2. USING OTHER THAN APPROVED BEDDING AND BACKFILL MATERIALS WITHOUT PRIOR WRITTEN AUTHORIZATION FROM HOWARD COUNTY DPW IS PROHIBITED.

7.3. USE OF UNAPPROVED BACKFILL MATERIAL MAY CAUSE TANK FAILURE, OR DAMAGE THE TANK OR SURROUNDING PROPERTY.

7.4. APPROVED BACKFILL MATERIAL MUST MEET THE FOLLOWING SPECIFICATIONS:

7.4.1. THE MATERIAL IS WASHED, FREE-FLOWING, AND FREE OF ICE, SNOW AND DEBRIS.

7.4.2. WHEN USING PEA GRAVEL, THE MATERIAL IS TO BE A MIX OF ROUNDED PARTICLES, SIZES BETWEEN 1/8 INCH AND 3/4 INCH. THE PEA GRAVEL SHALL CONFORM TO THE SPECIFICATIONS OF ASTM C-33, PARAGRAPH 9.1, SIZES 6, 67, OR 7.

7.4.3. WHEN USING CRUSHED STONE, THE MATERIAL IS TO BE A MIX OF ANGULAR PARTICLES, SIZES BETWEEN 1/8 INCH AND 1/2 INCH. THE CRUSHED STONE MUST CONFORM TO THE SPECIFICATIONS OF ASTM C-33, PARAGRAPH 9.1, SIZES 7 OR 8.

7.4.4. NO MORE THAN 5% (BY WEIGHT) OF THE MATERIAL MAY PASS THROUGH A #8 SIEVE.

7.4.5. THE MATERIALS SUPPLIER SHALL CERTIFY THAT THE MATERIAL CONFORMS TO ASTM C-33 AND ANY OTHER APPLICABLE SPECIFICATIONS.

8. EXCAVATION

8.1. CONTRACTOR MUST TAKE ALL PRECAUTIONS NECESSARY TO PROTECT EMPLOYEES WORKING IN OR NEAR A TANK EXCAVATION. THESE PRECAUTIONS SHOULD INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING:

8.2. LOCATE AND PROTECT ANY UTILITY INSTALLATIONS NEAR THE EXCAVATION BEFORE OPENING THE EXCAVATION.

8.3. SECURE THE WALLS OF THE EXCAVATION.

8.4. PREVENT EXPOSURE OF EMPLOYEES TO HAZARDOUS FUMES FROM THE EXCAVATION.

8.5. PROTECT EMPLOYEES FROM HAZARDS ASSOCIATED WITH WATER ACCUMULATION IN THE EXCAVATION.

8.6. ERECT BARRICADES, ETC., TO PREVENT UNAUTHORIZED VEHICLE OR PEDESTRIAN TRAFFIC.

8.7. INSPECT, A MINIMUM OF ONCE A DAY, THE EXCAVATION AND SURROUNDING AREA.

9. BURIAL DEPTH

9.1. TANKS SUBJECT TO TRAFFIC LOADS (H=20 LOADS) MUST HAVE A COVER DEPTH OF AT LEAST 36 INCHES OF BACKFILL, OR 18 INCHES OF BACKFILL PLUS 6 INCHES OF REINFORCED CONCRETE OR 9 INCHES OF ASPHALT. IN A WET CONDITION, SUFFICIENT OVERBURDEN AND/OR AN APPROPRIATE ANCHORING SYSTEM MUST BE PRESENT TO OFFSET BUOYANCY OF THE TANK.

9.2. TANKS NOT SUBJECT TO TRAFFIC LOADS MUST HAVE A COVER DEPTH OF AT LEAST 24 INCHES OF BACKFILL, OR 12 INCHES OF BACKFILL PLUS 4 INCHES OF REINFORCED CONCRETE OR 6 INCHES OF ASPHALT. IN A WET CONDITION, SUFFICIENT OVERBURDEN AND/OR AN APPROPRIATE ANCHORING SYSTEM MUST BE PRESENT TO OFFSET BUOYANCY OF THE TANK.

9.3. IN A NONTRAFFIC INSTALLATION, ENSURE THAT THE AREAS ABOVE THE TANKS ARE NOT SUBJECT TO TRAFFIC OR OTHER TYPES OF LOADS, WHICH COULD CAUSE TANK DAMAGE AND RESULT IN DEATH OR SERIOUS INJURY.

9.4. THE MAXIMUM BURIAL DEPTH IS 7 FEET OF COVER OVER THE TOP OF THE TANK. DEVIATION FROM THIS MAY BE PERMISSIBLE WITH PRIOR WRITTEN AUTHORIZATION FROM DPW

9.5. IF THERE IS AN UNATTACHED MANWAY RISER, IT MUST NOT TRANSMIT LOAD FROM THE CONCRETE SLAB TO THE TANK. A MINIMUM SPACE OF 6 INCHES MUST EXIST BETWEEN THE BOTTOM OF THE RISER AND THE TOP OF THE TANK.

9.6. TRAFFIC LOADS FROM THE TOP SLAB MUST NOT BE TRANSMITTED TO AN ATTACHED SUMP OR RISER. A MINIMUM SPACE OF 3 INCHES MUST EXIST BETWEEN THE RISER OR SUMP AND THE SLAB.

10. UNSTABLE IN SITU SOIL CONDITIONS

10.1. IF THE SOIL HAS LESS THAN 750 LBS./SQ. FT. COHESION AS CALCULATED FROM AN UNCONFINED COMPRESSION TEST, OR IN SOILS HAVING AN ULTIMATE BEARING CAPACITY OF LESS THAN 3,500 LBS./SQ. FT.; OR WHERE SOIL WILL NOT MAINTAIN A VERTICAL WALL, THE EXCAVATION MUST ALLOW A MINIMUM SPACE EQUAL TO HALF THE DIAMETER OF THE TANK BETWEEN THE EXCAVATION WALL AND BOTH THE SIDE AND THE ENDCAP OF THE TANK TO ENHANCE LATERAL RESISTANCE.

10.2. A REINFORCED CONCRETE SLAB MAY BE REQUIRED UNDER THE TANK AS A FOUNDATION IN THE EXCAVATION WHERE THE BOTTOM IS UNSTABLE.

11. TANK LOCATION - NEARBY STRUCTURES

11.1. THE CONTRACTOR SHALL SEEK THE ADVICE OF A MARYLAND-LICENSED PROFESSIONAL ENGINEER TO DETERMINE THE PROPER PLACEMENT OF A TANK EXCAVATION NEAR ANY EXISTING STRUCTURE(S). IMPROPER PLACEMENT MAY RESULT IN TANK AND/OR OTHER PROPERTY DAMAGE.

11.2. ENSURE THAT DOWNWARD FORCES FROM LOADS CARRIED BY THE FOUNDATIONS AND SUPPORTS OF NEARBY STRUCTURES (CONSTRUCTED BEFORE OR AFTER TANK INSTALLATION) ARE NOT TRANSMITTED TO THE TANKS.

12. GEOTEXTILE

12.1. GEOTEXTILE ALLOWS THE PASSAGE OF WATER BUT PREVENTS THE MIGRATION AND MIXING OF IN SITU SOIL AND THE SELECT BACKFILL MATERIAL. GEOTEXTILE HELPS PRESERVE THE INTEGRITY OF THE SELECT BACKFILL ENVELOPE, WHICH SURROUNDS AND SUPPORTS THE TANK.

12.2. GEOTEXTILE ENVELOPE IS REQUIRED ON ALL UNDERGROUND TANK INSTALLATIONS

12.3. POLYETHYLENE FILM IS NOT AN ACCEPTABLE SUBSTITUTE FOR GEOTEXTILE

SPECIFICATIONS ARE CONTINUED ON SHEET 3 OF 7

PROFESSIONAL CERTIFICATION I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 31383, Expiration Date 01/16/2018.

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<p>DEPARTMENT OF PUBLIC WORKS HOWARD COUNTY, MARYLAND</p>	
<p><i>[Signature]</i> 7/20/17 DIRECTOR OF PUBLIC WORKS DATE</p>	<p><i>[Signature]</i> 7/18/17 CHIEF, BUREAU OF ENGINEERING DATE</p>
<p><i>[Signature]</i> 7/20/17 CHIEF, BUREAU OF UTILITIES DATE</p>	<p><i>[Signature]</i> 7/18/17 CHIEF, UTILITY DESIGN DIVISION DATE</p>

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DATE: JULY, 2017	BY	NO.	REVISION	DATE

SPECIFICATIONS - 1

UNDERGROUND WATER STORAGE TANKS FOR FIRE SUPPRESSION

CAPITAL PROJECT No. F-5972
CONTRACT No. 65-4959
HOWARD COUNTY, MARYLAND

SCALE AS SHOWN
SHEET 2 OF 7

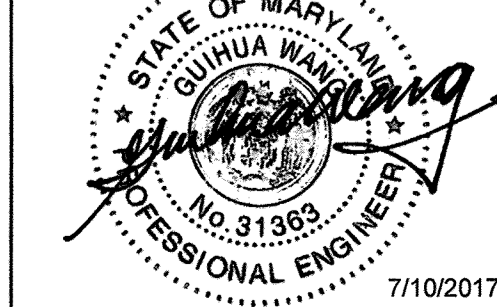
13. ANCHORING TANKS
- 13.1 EVERY SITE SHALL BE THOROUGHLY EVALUATED FOR THE POTENTIAL OF A RISE IN THE LOCAL WATER TABLE OR OF TRAPPED WATER. FAILURE TO ANCHOR A TANK WHEN REQUIRED MAY CAUSE TANK FAILURE, OR DAMAGE THE TANK OR SURROUNDING PROPERTY.
- 13.2 UNLESS NOTED OTHERWISE ON THE DRAWINGS, DEADMEN USED TO PREVENT FLOATATION SHALL HAVE THE FOLLOWING CHARACTERISTICS:
- 13.1.1. DEADMEN SHALL BE REINFORCED CONCRETE BEAMS.
 - 13.1.2. THE LENGTH OF DEADMEN SHALL BE EQUAL TO THE LENGTH OF THE TANK, AT A MINIMUM.
 - 13.1.3. PREFABRICATED DEADMEN ARE SUPPLIED WITH 3/4 -INCH-DIAMETER, GALVANIZED, ADJUSTABLE ANCHOR POINTS (SUBSEQUENTLY REFERRED TO AS ANCHOR POINTS). THESE ANCHOR POINTS PROTRUDE UP THROUGH THE SLOTS IN THE DEADMEN AND ARE HELD UP WITH COTTER PINS.
- 13.3 ONLY USE THE ANCHOR POINTS WHEN LIFTING AND POSITIONING THE DEADMEN. A SPREADER BAR MAY BE REQUIRED TO LIFT LONGER SECTIONS OF DEADMEN. USE GUY ROPES TO GUIDE THE DEADMEN WHEN LIFTING.
- 13.4 THE ANCHOR POINTS CAN BE MOVED AND POSITIONED TO MATCH THE HOLD-DOWN STRAP LOCATIONS ON THE TANK
- 13.5 CARE SHOULD BE TAKEN TO KEEP BACKFILL FROM ENTERING THE ANCHOR-POINT SLOT UNTIL FINAL ADJUSTMENT IS MADE.
- 13.6 THE DEADMEN ARE TO BE BUTTED TOGETHER WHEN MULTIPLE SECTIONS ARE USED.
- 13.7 USE ONE ANCHOR POINT PER STRAP END AND ONLY ONE STRAP PER ANCHOR POINT.
14. ANCHOR SLAB (GROUNDWATER INSTALLATION ONLY)
- 14.1 THE ANCHOR SLAB SHALL BE REINFORCED CONCRETE.
 - 14.2 THE TOTAL LENGTH OF THE SLAB SHALL BE AT LEAST THE SAME AS THE LENGTH OF THE TANK.
 - 14.3 THE MINIMUM SLAB THICKNESS IS 8 INCHES.
 - 14.4 THE WIDTH OF THE SLAB DEPENDS ON THE TANK DIAMETER. THE SLAB SHALL EXTEND A MINIMUM OF 18 INCHES BEYOND EACH SIDE OF THE TANK.
 - 14.5 PROVIDE A SEPARATE ANCHOR POINT FOR EACH HOLD-DOWN STRAP.
 - 14.6 ALL ANCHOR POINTS MUST BE ENGINEERED TO WITHSTAND THE TANK'S BUOYANCY FORCES.
 - 14.7 WHEN USING A CONCRETE BASE SLAB, ALLOW SUFFICIENT DEPTH IN THE EXCAVATION FOR 12 INCHES OF BEDDING MATERIAL BELOW THE TANK.
15. HOLD-DOWN STRAPS
- 15.1 EVENLY DISTRIBUTE LOADS BY TIGHTENING ALL HOLD-DOWN STRAPS UNIFORMLY UNTIL THEY ARE SNUG OVER THE RIBS BUT CAUSE NO DEFLECTION OF THE TANK.
 - 15.2 TAKE A MEASUREMENT OF THE INTERNAL DIAMETER OF THE TANK TO DETERMINE WHETHER VERTICAL DEFLECTION IS WITHIN THE LIMITS SPECIFIED AFTER THE STRAPS HAVE BEEN INSTALLED AND TIGHTENED.
 - 15.3 ALL ANCHORING HARDWARE SHALL BE GALVANIZED AND SIZED ACCORDING TO THE FOLLOWING MINIMUM REQUIREMENTS (FOR A 10' DIAMETER TANK):
 - 15.3.1. HOOK - 1 1/4"
 - 15.3.2. JAW - 3/4"
 - 15.3.3. EYE - 3/4"
 - 15.3.4. WIRE ROPE - 1/2"
 - 15.4 THE INSTALLING CONTRACTOR IS RESPONSIBLE FOR PROVIDING HARDWARE AND ANCHOR POINTS OF SUFFICIENT SIZE AND STRENGTH.
 - 15.5 THE PARTICULAR CONFIGURATION OF HARDWARE WILL BE DETERMINED BY THE CONTRACTOR, THE OWNER OR THE OWNER'S REPRESENTATIVE.
16. INSTALLATION
- 16.1 USE ONLY APPROVED BACKFILL MATERIAL.
 - 16.2 DO NOT MIX APPROVED BACKFILL MATERIAL WITH SAND OR IN SITU SOIL.
 - 16.3 DO NOT USE IN SITU SOIL AS BACKFILL MATERIAL.
 - 16.4 PREPARE A SMOOTH, LEVEL BED, 12 INCHES THICK, OF APPROVED BACKFILL MATERIAL.
 - 16.5 PLACE THE TANK OR TANKS ONTO THE BED.
 - 16.6 USE THE TOPS OF THE RIBS TO ESTABLISH LONGITUDINAL LEVEL. ESTABLISH LATERAL LEVEL BY PLACING THE LEVEL ACROSS THE TOP OF A FITTING OR A MANWAY.
 - 16.7 WHEN THE TANK IS PLACED, TAKE A MEASUREMENT OF THE INTERNAL DIAMETER OF THE TANK. RECORD THIS MEASUREMENT AS INITIAL INTERNAL DIAMETER ON THE TANK INSTALLATION CHECKLIST.
 - 16.8 IF THE TANK IS TO BE ANCHORED, INSTALL THE ANCHORING HARDWARE AT THIS TIME.
 - 16.9 PLACE ONE 12-INCH LIFT OF APPROVED BACKFILL MATERIAL EVENLY AROUND THE TANK. FROM THE EDGE OF THE HOLE OR THE TOP OF AN ADJACENT TANK, PUSH THE BACKFILL IN PLACE BY USING A NON-METAL PROBE LONG ENOUGH TO REACH BENEATH THE TANK. WORK THE BACKFILL MATERIAL UNDER THE TANK BODY AND DOMES SO THE TANK IS FULLY SUPPORTED - THAT IS, SO THERE ARE NO VOIDS UNDER THE TANK.
 - 16.10 REPEAT POINT 16.9 WITH A SECOND 12-INCH LIFT.
 - 16.11 AFTER THE SECOND LIFT OF MATERIAL HAS BEEN PLACED AND WORKED UNDER THE TANK, BRING THE BACKFILL TO THE TOP OF THE TANK.

- 16.12 FOR GROUNDWATER INSTALLATION, FOLLOW THE INSTALLATION PROCEDURE ABOVE WITH THE FOLLOWING MODIFICATIONS:
- 16.12.1. BEFORE PERFORMING POINT 16.4 OF THE DRY-HOLE INSTALLATION, TAKE A MEASUREMENT OF THE INTERNAL DIAMETER OF THE TANK BEFORE THE TANK IS PLACED IN THE EXCAVATION HOLE. RECORD THIS MEASUREMENT AS INITIAL INTERNAL DIAMETER ON THE TANK INSTALLATION CHECKLIST.
 - 16.12.2. BEFORE PERFORMING POINT 16.4 OF THE DRY-HOLE INSTALLATION, PUMP THE WATER FROM THE HOLE AND CONTINUE PUMPING TO MAINTAIN MINIMUM WATER LEVEL DURING TANK INSTALLATION.
 - 16.12.3. DURING POINT 16.5 OF THE DRY-HOLE INSTALLATION, WHEN SETTING AND LEVELING THE TANK, PARTIALLY BALLAST THE TANK UNTIL IT SETTLES FIRMLY ON THE PREPARED BED. THE BALLAST LEVEL IN THE TANK MUST NEVER EXCEED THE WATER LEVEL IN THE HOLE BY MORE THAN 1 FOOT UNTIL THE BACKFILL REACHES THE TOP OF THE TANK.
 - 16.12.4. COVER DEPTH MUST MEET MINIMUM DEPTH SPECIFIED IN SECTION 9.
 - 16.12.5. COMPLETELY BALLAST THE TANK ONCE BACKFILL IS EVEN WITH THE TOP OF THE TANK.
 - 16.12.6. AFTER BACKFILL IS BROUGHT TO THE TOP OF THE TANK, TAKE A MEASUREMENT OF THE INTERNAL DIAMETER OF THE TANK AS A DEFLECTION CHECK.
17. POST-INSTALLATION TESTING
- 17.1 AFTER THE INTERNAL DIAMETER OF THE TANK HAS BEEN MEASURED AND VERTICAL DEFLECTION IS DETERMINED TO BE WITHIN THE LIMITS THE TANK MUST BE PRESSURE-TESTED TO ENSURE THAT NO DAMAGE OCCURRED DURING INSTALLATION.
 - 17.2 FOLLOW THE PROCEDURE IN SECTION 6, SOAPING ALL EXPOSED AREAS OF THE TANK AND ALL FITTINGS, AND MONITORING THE PRESSURE FOR ONE HOUR.
 - 17.3 CAREFULLY RELIEVE THE PRESSURE IN THE TANK.
18. BACKFILLING TO GRADE
- 18.1 CONTINUE TO TAKE SAFETY MEASURES (SUCH AS PLACING BARRICADES) AROUND THE EXCAVATION SITE UNTIL INSTALLATION IS COMPLETED.
 - 18.2 WHEN THE TANK HAS BEEN SET, TESTED AND BACKFILLED, AND ALL PIPING AND VENTING HAS BEEN COMPLETED, ADD THE BALANCE OF THE BACKFILL MATERIAL.
 - 18.3 THE BACKFILL MUST BE FREE OF DEBRIS, ICE OR SNOW. ANY BLOCKS OR BRICKS USED AS SUPPORT MATERIAL DURING PIPING MUST BE REMOVED PRIOR TO COMPLETION OF BACKFILLING.
 - 18.4 THE BACKFILL MATERIAL SPECIFIED IN SECTION 7 MUST BE USED TO COMPLETELY FILL EXCAVATION.
 - 18.5 THE INSTALLATION SHALL MEET ALL THE REQUIREMENTS OF MINIMUM COVER AS SPECIFIED IN SECTION 9.
 - 18.6 WHEN THE TANK HAS BEEN BACKFILLED TO SUBGRADE (BEFORE PLACEMENT OF ASPHALT OR CONCRETE), TAKE A MEASUREMENT OF THE INTERNAL DIAMETER OF THE TANK. RECORD THIS MEASUREMENT AS FINAL INTERNAL DIAMETER ON THE TANK INSTALLATION CHECKLIST.
 - 18.7 COMPLETE THE TANK INSTALLATION CHECKLIST.
19. DEFLECTION MEASUREMENT
- 19.1 OBTAIN THE DEFLECTION MEASUREMENT BY TAKING A MINIMUM OF TWO MEASUREMENTS OF THE INTERNAL DIAMETER OF THE TANK.
 - 19.2 TWO METHODS OF MEASURING THE INTERNAL DIAMETER OF THE TANK ARE DESCRIBED HERE. BOTH METHODS USE A DIPSTICK. (SIMILAR METHODS CAN BE USED, SUCH AS USING A TAPE MEASURE, ETC.)
 - 19.3 THE DEFLECTION MEASUREMENT CAN BE OBTAINED BY USING EITHER METHOD TWICE OR BY USING EACH METHOD ONCE. EACH WILL BE DESCRIBED HERE AS IF THAT METHOD WERE BEING USED TWICE.
 - 19.4 TAKE THE INITIAL INTERNAL-DIAMETER MEASUREMENT BEFORE BACKFILLING THE TANK, AND RECORD THE MEASUREMENT ON THE TANK INSTALLATION CHECKLIST. IN A GROUNDWATER INSTALLATION, TAKE THIS MEASUREMENT BEFORE THE TANK IS PLACED IN THE EXCAVATION HOLE.
 - 19.5 TAKE OTHER DIAMETER MEASUREMENTS DURING THE BACKFILLING PROCESS TO DETERMINE WHETHER VERTICAL DEFLECTION CONTINUES TO BE WITHIN THE LIMITS SPECIFIED BY THE TANK MANUFACTURER.
 - 19.6 TAKE THE FINAL INTERNAL-DIAMETER MEASUREMENT WHEN THE TANK HAS BEEN BACKFILLED TO SUBGRADE.
 - 19.7 TO GET THE DEFLECTION MEASUREMENT AT ANY TIME, SUBTRACT THE CURRENT INTERNAL-DIAMETER MEASUREMENT FROM THE INITIAL INTERNAL-DIAMETER MEASUREMENT.
 - 19.8 COMPARE THIS MEASUREMENT TO THE ALLOWABLE DEFLECTIONS PROVIDED BY THE TANK MANUFACTURER AND RECORD THE INFORMATION ON THE TANK INSTALLATION CHECKLIST.
 - 19.9 VERTICAL DEFLECTION IN EXCESS OF THIS MEASUREMENT INDICATES IMPROPER INSTALLATION AND VOIDS THE TANK WARRANTY.
20. OPERATING GUIDELINES
- 20.1 NO PERSON SHALL BE PERMITTED TO ENTER THE TANK UNLESS IT HAS BEEN PROPERLY EMPTIED AND VENTED, AND UNLESS THE PERSON ENTERING THE TANK HAS BEEN TRAINED IN CONFINED-SPACE ENTRY PROCEDURES, APPLICABLE OSHA REGULATIONS, AND IS IN POSSESSION OF A VALID HOWARD COUNTY CONFINED SPACE ENTRY PERMIT.
 - 20.2 NEVER OVERFILL THE TANK.
 - 20.3 EACH TIME THE TANK IS FILLED, THE OWNER/OPERATOR SHALL MAKE SURE THE TANK IS PROPERLY VENTED.
 - 20.4 OWNER/OPERATOR SHALL DETERMINE WHETHER THE TANK HAS OVERFILL PROTECTION, SUCH AS AUTOMATIC SHUT-OFF DEVICES OR VENT-RESTRICTION DEVICES ('BALL-FLOAT VALVES'), WHICH WILL CLOSE OFF THE INTERNAL PIPING AND REDUCE THE TANK'S CAPACITY.
 - 20.5 OWNER/OPERATOR SHALL NOTIFY WHOEVER FILLS THE TANK THAT IT HAS OVERFILL PROTECTION, WHICH REDUCES THE TANK'S CAPACITY.
 - 20.6 BEFORE EACH TANK FILLING, OWNER/OPERATOR OR THE DELIVERY SERVICE MUST DETERMINE THE TANK'S REDUCED CAPACITY DUE TO THE OVERFILL PROTECTION, AND CONSULT THE INSTRUCTIONS OR GUIDELINES PROVIDED BY THE INSTALLER AND MANUFACTURER OF THE OVERFILL-PROTECTION DEVICE TO DETERMINE HOW MUCH ADDITIONAL PRODUCT THE TANK CAN HOLD.
 - 20.7 THE MAXIMUM TEMPERATURE FOR STORING NONPOTABLE WATER IS 150° F. NOTE: POTABLE WATER IS TO BE STORED AT AMBIENT TEMPERATURE.

PROFESSIONAL CERTIFICATION: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 31363. Expiration Date 01/16/2018.

DEPARTMENT OF PUBLIC WORKS HOWARD COUNTY, MARYLAND	
[Signature] 7/20/17 DIRECTOR OF PUBLIC WORKS DATE	[Signature] 7/18/17 CHIEF, BUREAU OF ENGINEERING DATE
[Signature] 7/20/17 CHIEF, BUREAU OF UTILITIES DATE	[Signature] 7/18/17 CHIEF, UTILITY DESIGN DIVISION DATE PSD


KCI TECHNOLOGIES
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 www.kci.com


 STATE OF MARYLAND
 PROFESSIONAL ENGINEER
 License No. 31363
 7/10/2017

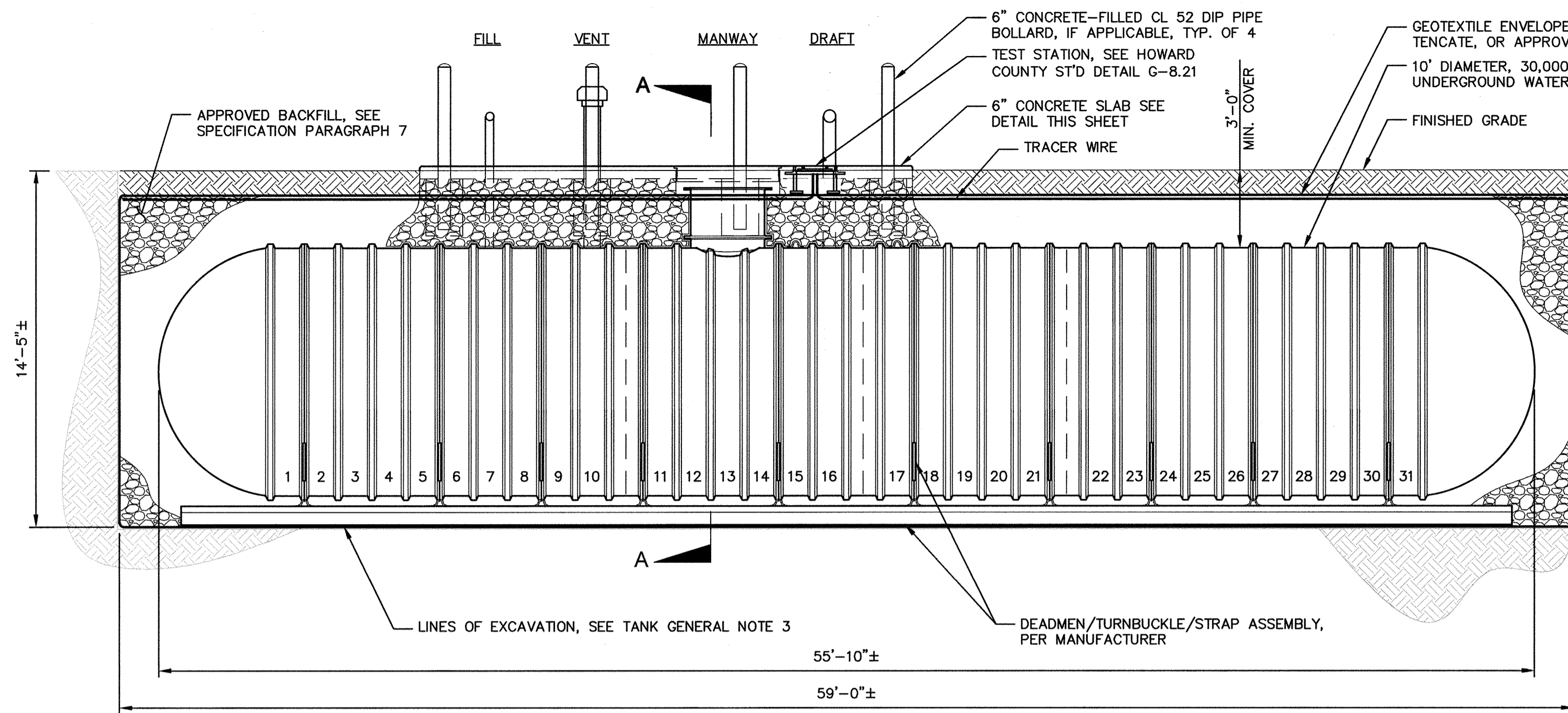
DES: KFJ				
DRN: KFJ				
CHK: GW				
DATE: JULY, 2017	BY	NO.	REVISION	DATE

SPECIFICATIONS - 2

UNDERGROUND WATER STORAGE TANKS FOR FIRE SUPPRESSION

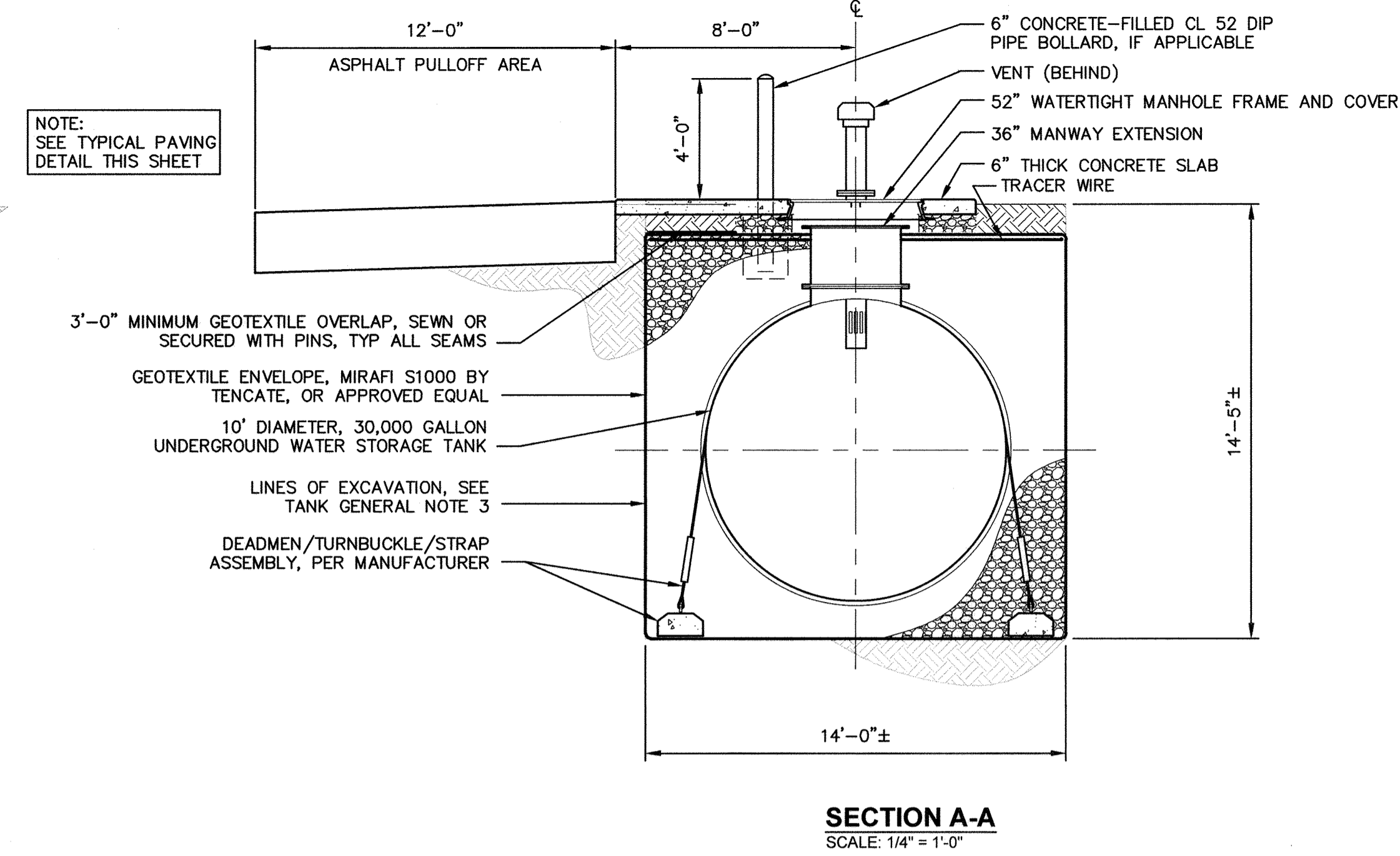
CAPITAL PROJECT No. F-5972
 CONTRACT No. 65-4959
 HOWARD COUNTY, MARYLAND

KCI TECHNOLOGIES PROJECT No.: 13122677.38



ELEVATION: 30,000 GALLON FIRE SUPPRESSION WATER STORAGE TANK
SCALE: 1/4" = 1'-0"

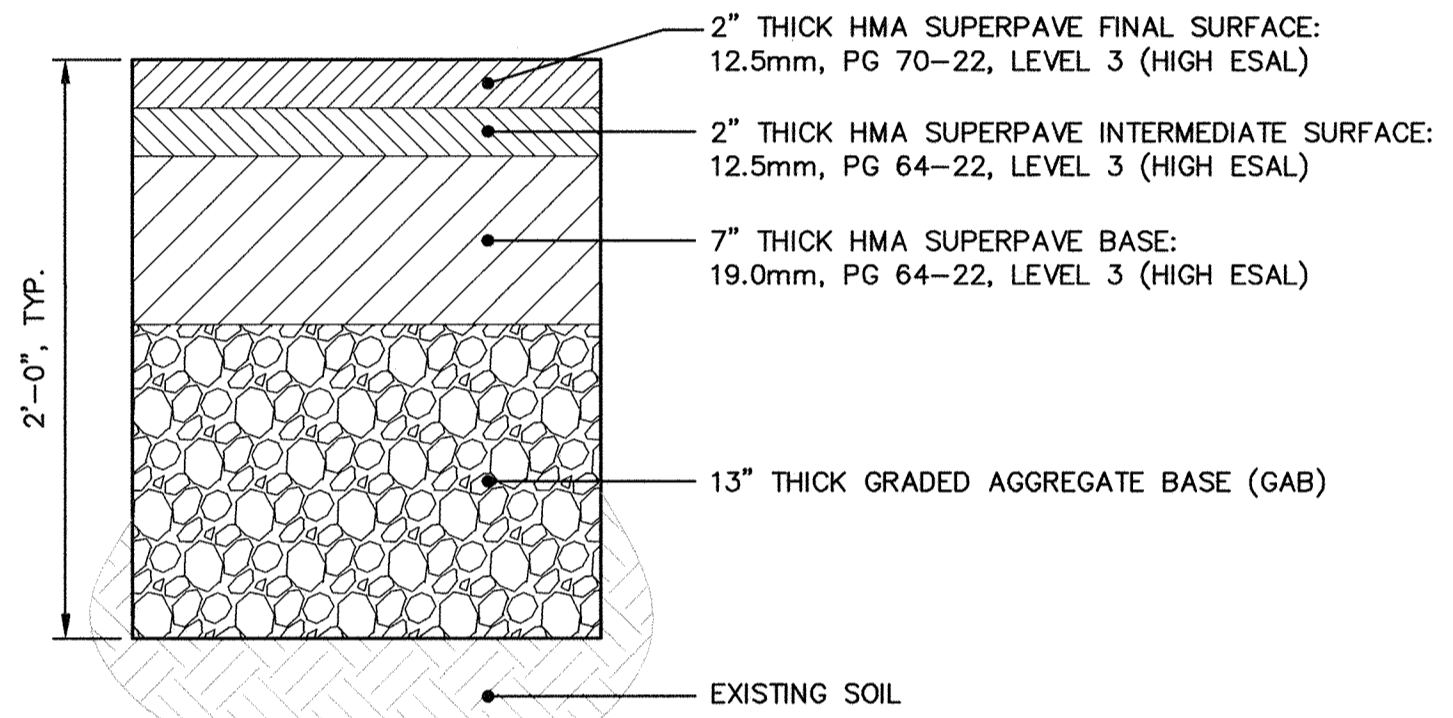
NOTE:
TANK DIMENSIONS AND LAYOUT ARE FOR REFERENCE ONLY. ACTUAL TANK DIMENSIONS WILL VARY WITH MANUFACTURER. FITTINGS SHALL BE PER DETAILS ON SHEET 5 OF 7.



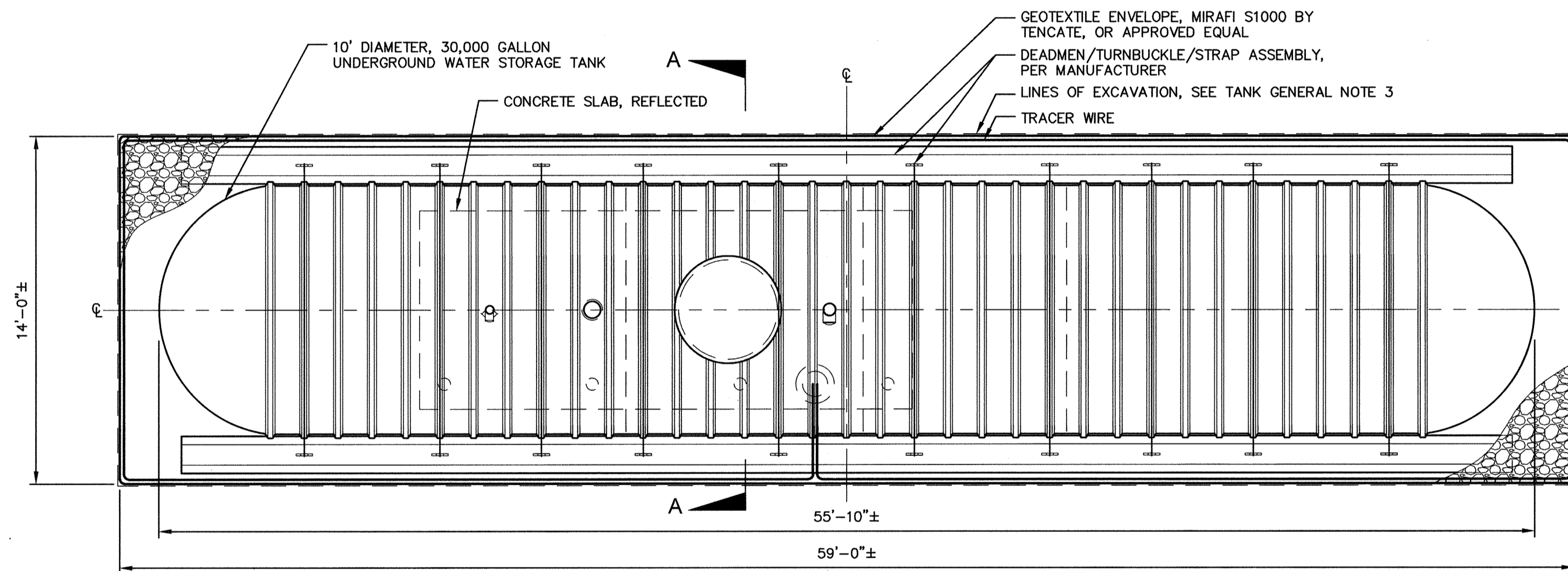
SECTION A-A
SCALE: 1/4" = 1'-0"

PAVING NOTES:

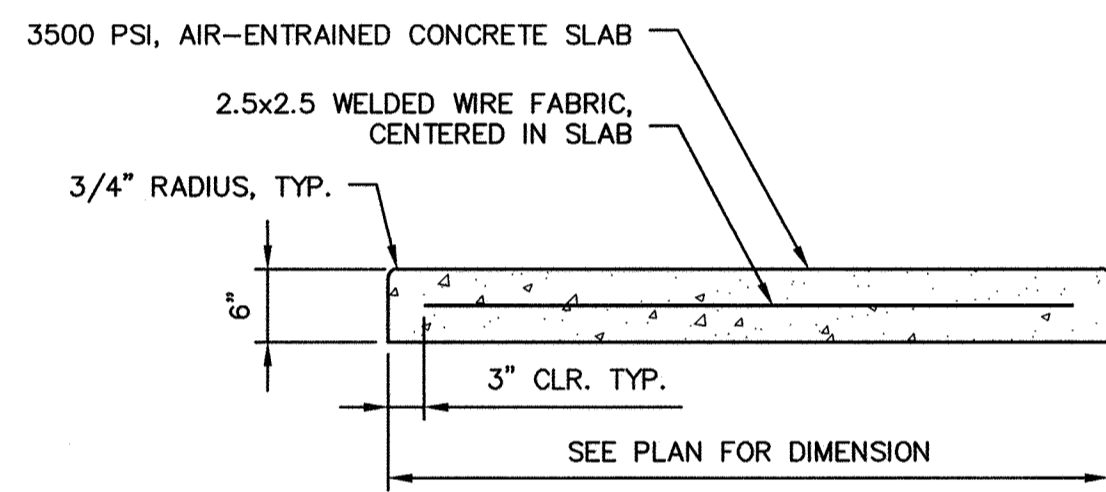
- PAVING SHALL COMPLY WITH THE LATEST EDITION OF THE HOWARD COUNTY VOLUME IV DESIGN MANUAL, STANDARD SPECIFICATIONS AND DETAILS FOR CONSTRUCTION.
- PAVING FOR THE ASPHALT PULLOFF SHALL CONFORM TO DETAIL R-2.02, SECTION NUMBER P-6 OF THE LATEST EDITION OF THE HOWARD COUNTY DESIGN MANUAL.
- HOWARD COUNTY DPW RESERVES THE RIGHT TO REQUIRE AN ALTERNATE PAVING SECTION, BASED ON SITE CONDITIONS OR VEHICULAR REQUIREMENTS.
- ALL PAVING THICKNESSES SHOWN, DIMENSIONED OR OTHERWISE NOTED ARE MINIMUM THICKNESSES.



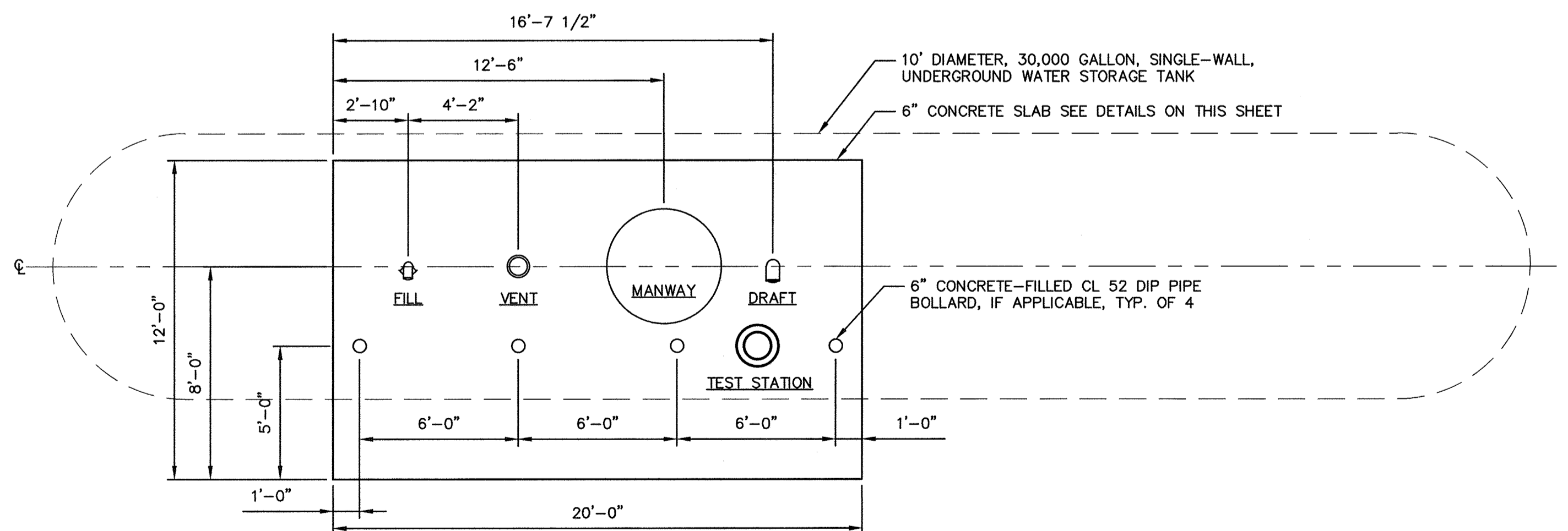
DETAIL: PAVING TYPICAL SECTION
SCALE: 1 1/2" = 1'-0"



PLAN: 30,000 GALLON FIRE SUPPRESSION WATER STORAGE TANK
SCALE: 1/4" = 1'-0"



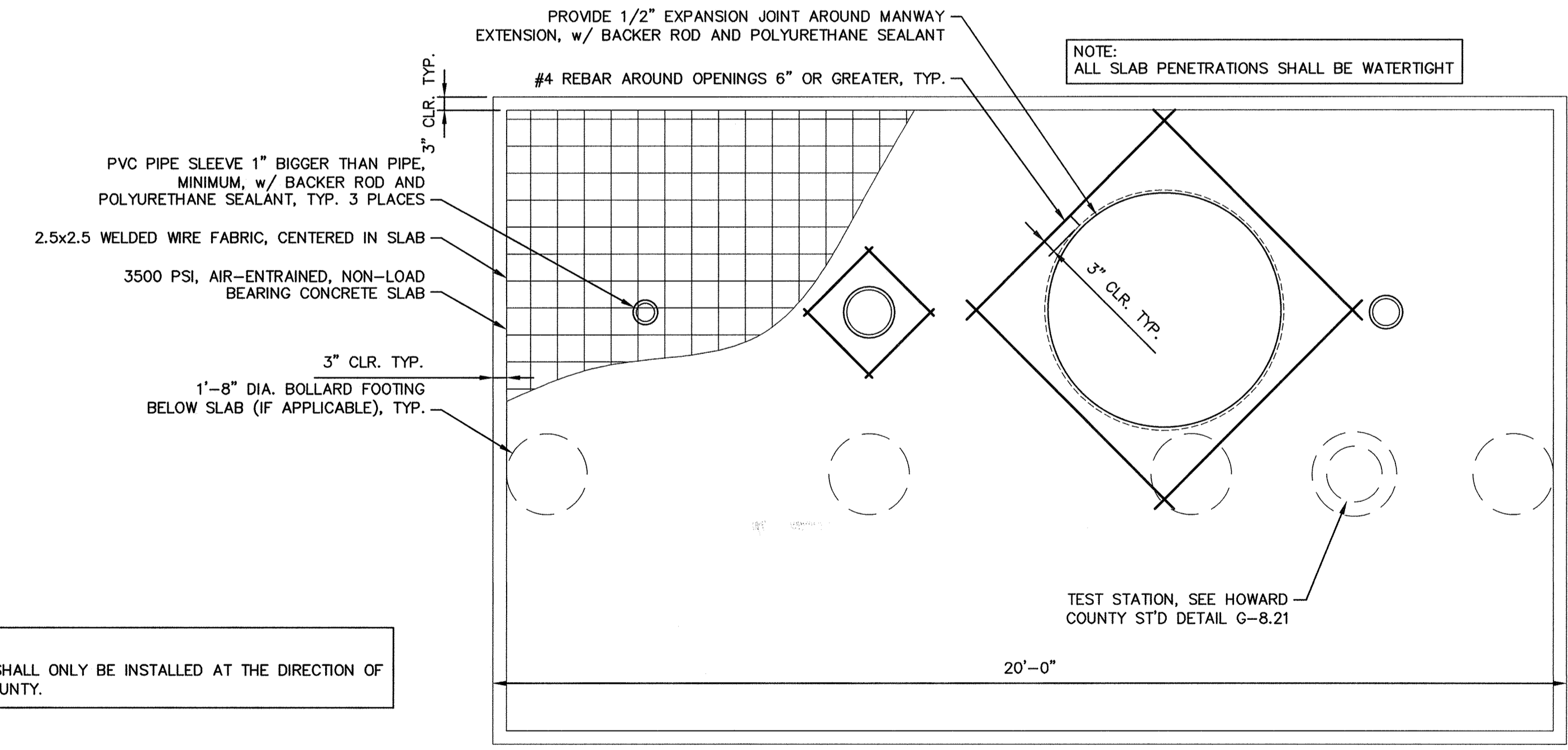
DETAIL: CONCRETE SLAB TYPICAL SECTION
SCALE: 3/4" = 1'-0"



DETAIL: CONCRETE SLAB
SCALE: 1/4" = 1'-0"

PROFESSIONAL CERTIFICATION: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 31363, Expiration Date 01/16/2018.

NOTE:
BOLLARDS SHALL ONLY BE INSTALLED AT THE DIRECTION OF HOWARD COUNTY.



DETAIL: CONCRETE SLAB REINFORCEMENT
SCALE: 1/2" = 1'-0"

July 10, 2017 - 11:28am User: kci\jacobson M:\2017\13122677\38\Drawings\Common Sheets\1704_GENERAL DETAILS - 1.dwg

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

Director of Public Works: *[Signature]* DATE: 7/24/17
Chief, Bureau of Engineering: *[Signature]* DATE: 7/18/17
Chief, Bureau of Utilities: *[Signature]* DATE: 7/10/17
Chief, Utility Design Division: *[Signature]* DATE: PSD

ENGINEERS
PLANNERS
SCIENTISTS
CONSTRUCTION MANAGERS

KCI TECHNOLOGIES
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Phone: (410) 316-7800
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www.kci.com

STATE OF MARYLAND
GUINIA WALKER
PROFESSIONAL ENGINEER
7/10/2017

DES: KFJ				
DRN: KFJ				
CHK: GW				
DATE: JULY, 2017	BY	NO.	REVISION	DATE

GENERAL DETAILS - 1

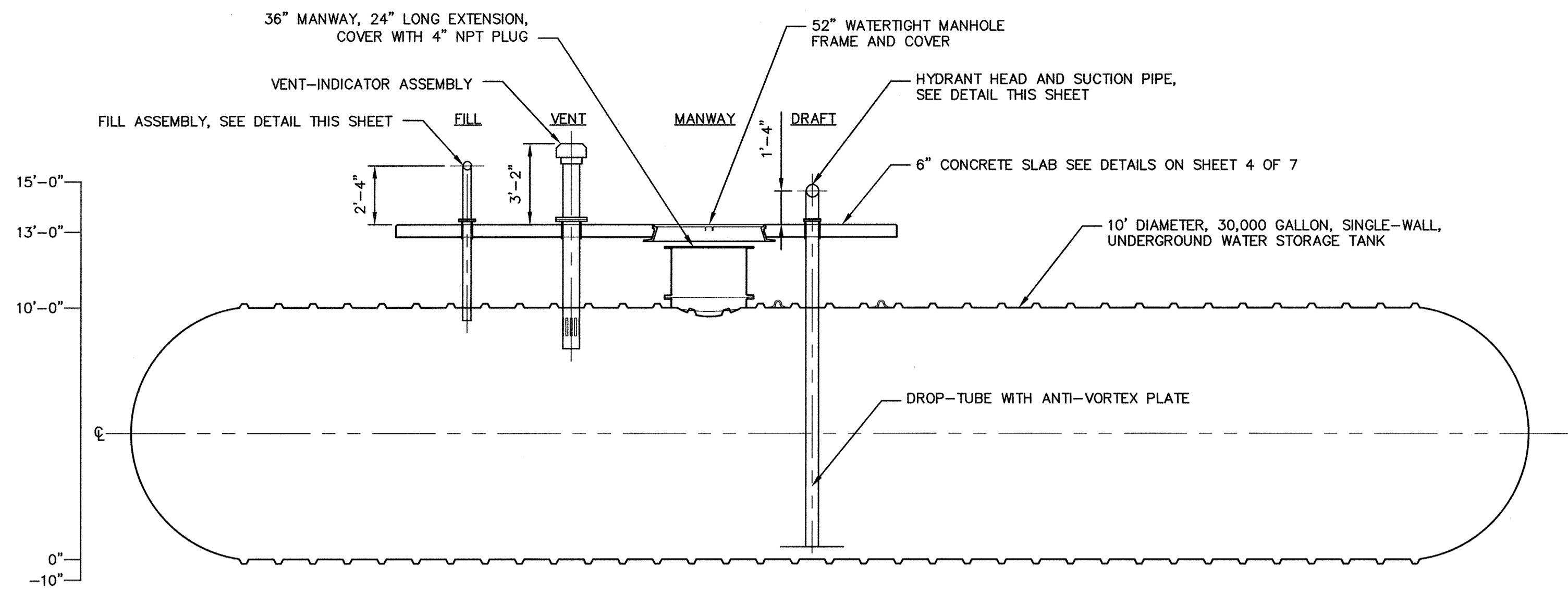
UNDERGROUND WATER STORAGE TANKS FOR FIRE SUPPRESSION

CAPITAL PROJECT No. F-5972
CONTRACT No. 65-4959
HOWARD COUNTY, MARYLAND

SCALE
AS SHOWN

SHEET
4 OF 7

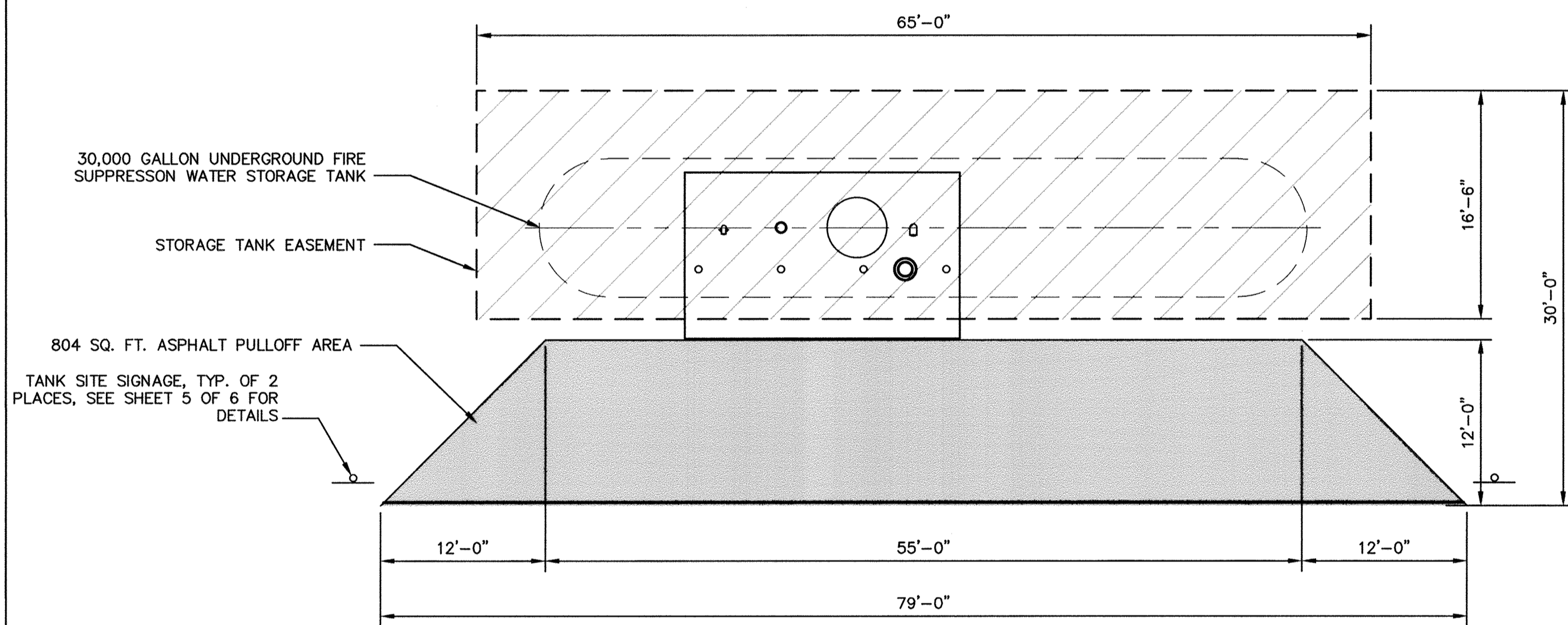
KCI TECHNOLOGIES PROJECT NO.: 13122677.38



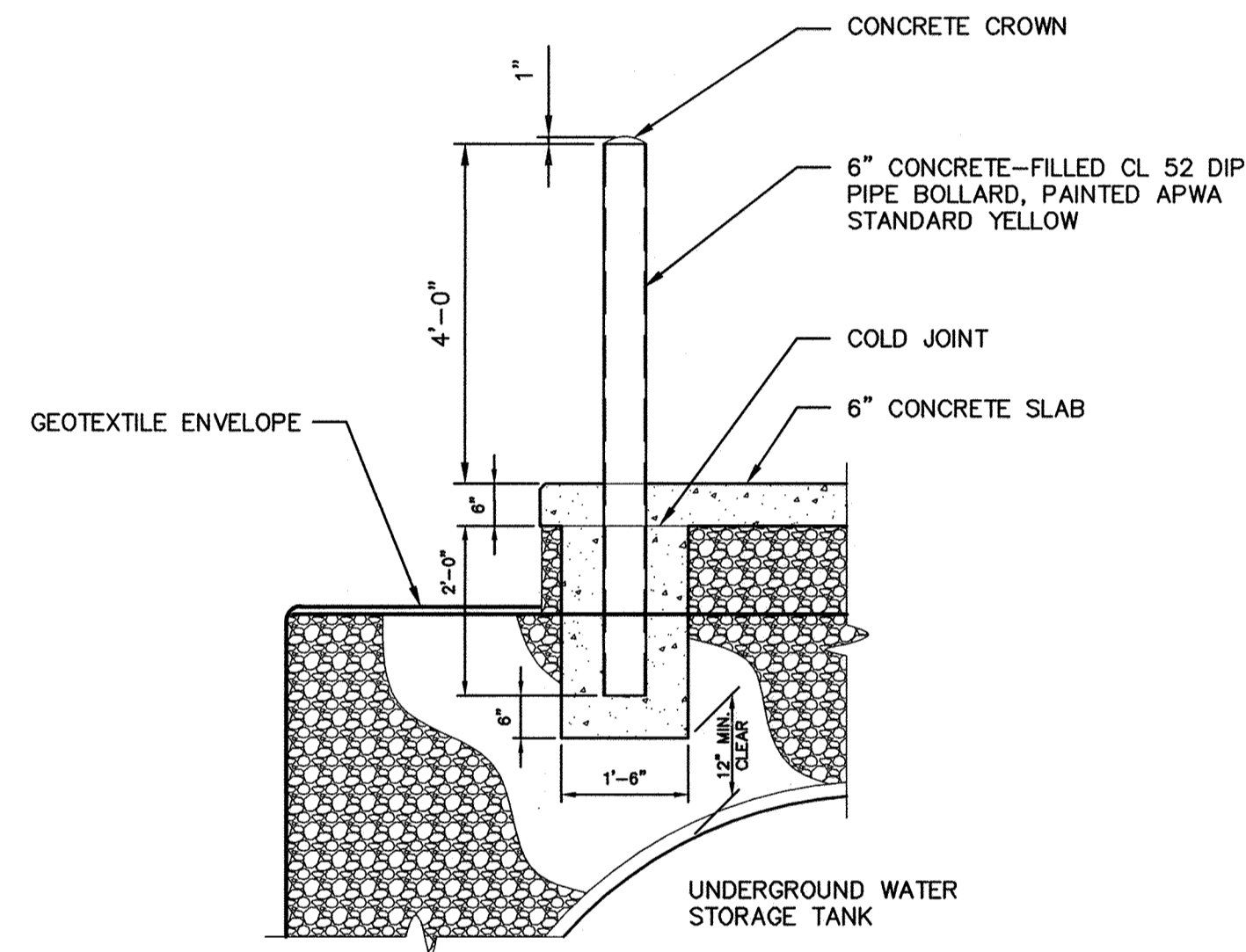
SECTION THROUGH 30,000 GALLON FIRE SUPPRESSION WATER STORAGE TANK
SCALE: 1/4" = 1'-0"

NOTE:
TANK DIMENSIONS AND LAYOUT ARE FOR REFERENCE ONLY. ACTUAL TANK DIMENSIONS WILL VARY WITH MANUFACTURER.

NOTE:
BOLLARDS SHALL ONLY BE INSTALLED AT THE DIRECTION OF HOWARD COUNTY.



DETAIL: TYPICAL TANK SITE LAYOUT
SCALE: 1/8" = 1'-0"



DETAIL: TYPICAL BOLLARD
SCALE: 1/2" = 1'-0"
(WHEN REQUIRED)

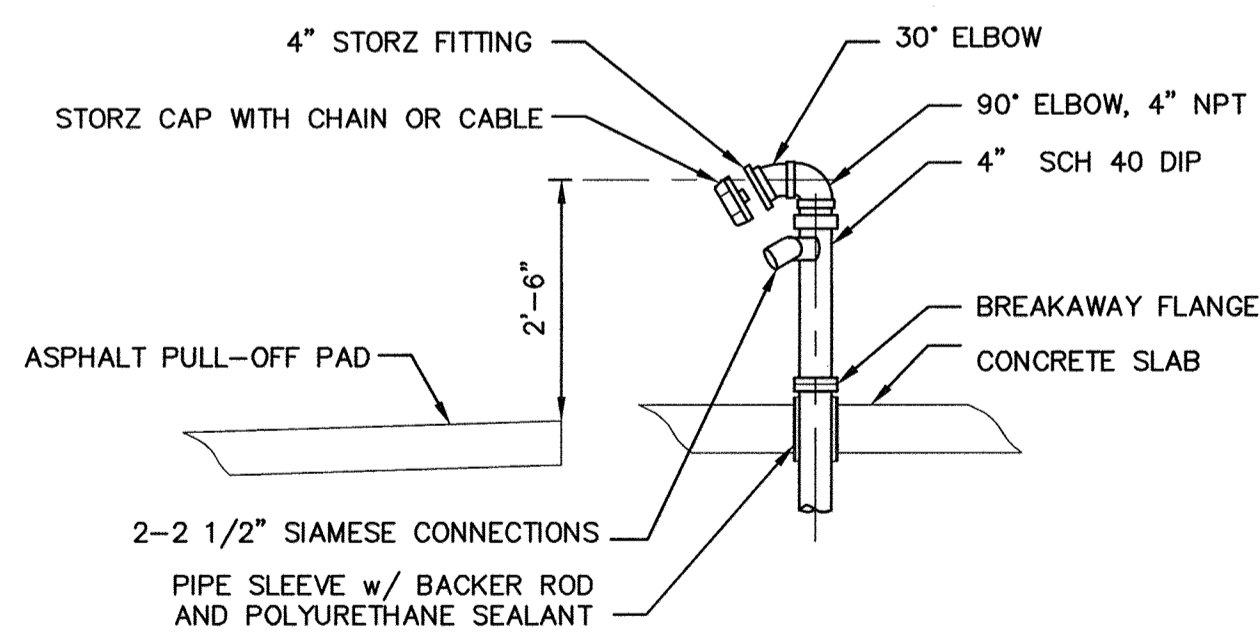
FITTING	DESCRIPTION	SPECIFICATION	CENTER DRAFT		END DRAFT	
			SECTION*	OFFSET**	SECTION*	OFFSET**
DRAFT	6" 6NH FEMALE SWIVEL (DIP)	2.2.4.1	16	22'-0"	1	0"
FILL	4" DIP, (2) 2 1/2" FEMALE SIAMESE, AND (1) 4" STORTZ	2.2.4.3	7	8'-2 1/2"	10	12'-4 1/2"
VENT	8" PVC	2.2.4.2	10	12'-4 1/2"	12	16'-6"
MANWAY	36" DIAMETER, 52" COVER	2.2.2	12-14	17'-10 1/2"	5-7	7'-0"

* SEE ELEVATION ON SHEET 4 FOR SECTION NUMBERING
** OFFSET FROM CENTER OF SECTION 1

ELEVATION	DESCRIPTION
15'-0" (MAX.)	DRAFT PIPE CENTERLINE
13'-0"	TOP OF SLAB
10'-0"	TOP OF TANK
0	BOTTOM OF TANK
-10"	BOTTOM OF EXCAVATION

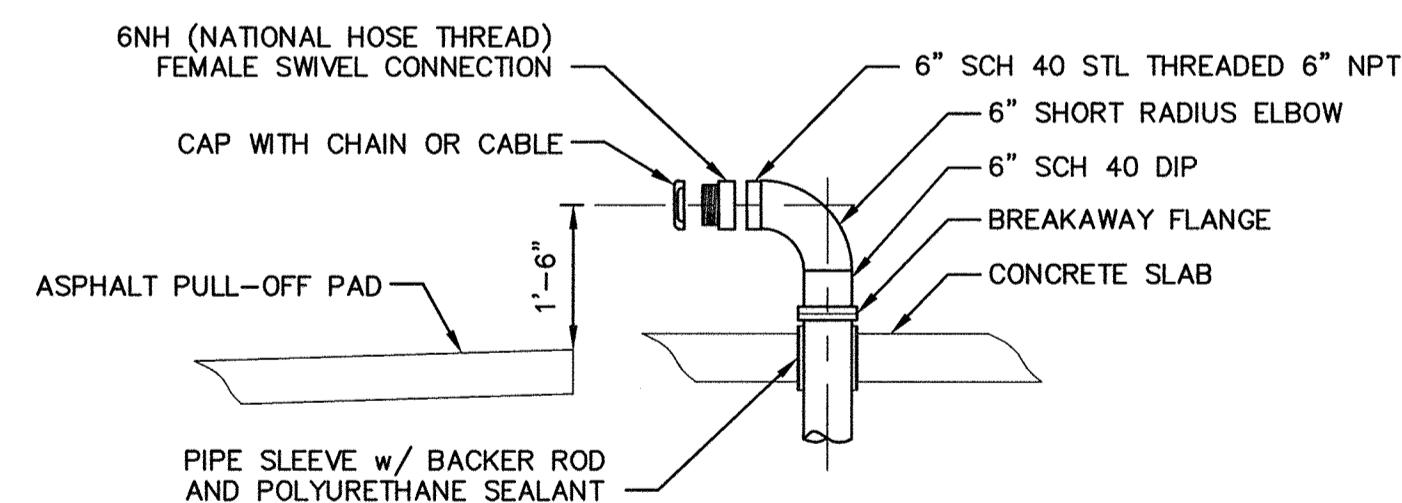
FITTING	DESCRIPTION	CENTER DRAFT		END DRAFT	
		SECTION*	OFFSET**	SECTION*	OFFSET**
DRAFT	6" NPT FULL COUPLING	16	22'-0"	1	0"
FILL	4" NPT FULL COUPLING	7	8'-2 1/2"	10	12'-4 1/2"
VENT	10" CLASS 150 FLANGE	10	12'-4 1/2"	12	16'-6"
MANWAY	36" MANWAY, 24" EXTENSION, 4" NPT COUPLING AND PLUG	12-14	17'-10 1/2"	5-7	7'-0"

* SEE ELEVATION ON SHEET 4 FOR SECTION NUMBERING
** OFFSET FROM CENTER OF SECTION 1



NOTE:
REFER TO SPECIFICATION 2.2.4 - FITTINGS, ON SHEET 2 OF 7

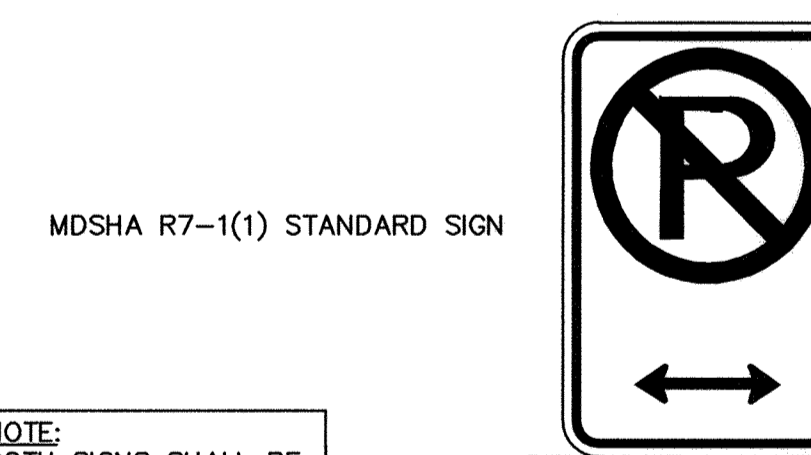
DETAIL: FILL ASSEMBLY
SCALE: 1/2" = 1'-0"



* PVC FITTINGS WILL NOT BE PERMITTED FOR DRAFT ASSEMBLY

NOTE:
REFER TO SPECIFICATION 2.2.4 - FITTINGS, ON SHEET 2 OF 7

DETAIL: HYDRANT HEAD (DRAFT) ASSEMBLY
SCALE: 1/2" = 1'-0"



NOTE:
BOTH SIGNS SHALL BE MOUNTED ON A SINGLE POST, IN ACCORDANCE WITH HOWARD COUNTY STANDARD DETAILS

MDSHA BLANK STANDARDS HORIZONTAL RECTANGLE 21" X 15"

DETAIL: TYPICAL TANK SITE SIGNAGE
SCALE: 1/2" = 1'-0"



MDSHA BLANK STANDARDS HORIZONTAL RECTANGLE 30" X 24"

DETAIL: TYPICAL ADVANCE SIGNAGE
SCALE: 1/2" = 1'-0"

PROFESSIONAL CERTIFICATION I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 31363, Expiration Date 01/16/2018.

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

[Signature] 7/16/17
DIRECTOR OF PUBLIC WORKS DATE
[Signature] 7/10/17
CHIEF, BUREAU OF UTILITIES DATE

[Signature] 7/16/17
CHIEF, BUREAU OF ENGINEERING DATE
[Signature] 7/16/17
CHIEF, UTILITY DESIGN DIVISION DATE

ENGINEERS
PLANNERS
SCIENTISTS
CONSTRUCTION MANAGERS
KCI TECHNOLOGIES
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Sparks, MD 21152
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Fax: (410) 316-7817
www.kci.com

STATE OF MARYLAND
QUIRINA WANG
PROFESSIONAL ENGINEER
NO. 31363
7/10/2017

DES: Kfj					
DRN: Kfj					
CHK: GW					
DATE: JULY, 2017	BY	NO.	REVISION	DATE	

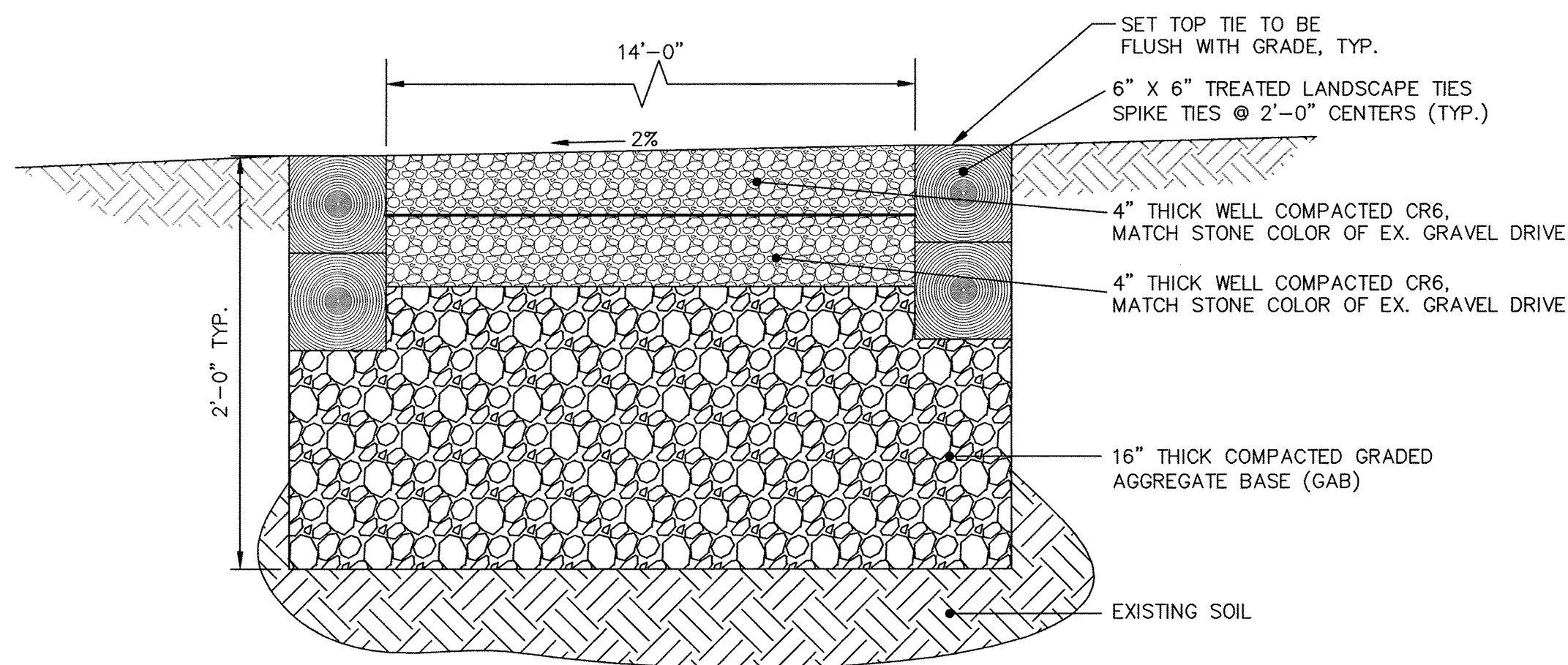
GENERAL DETAILS - 2

UNDERGROUND WATER STORAGE
TANKS FOR FIRE SUPPRESSION

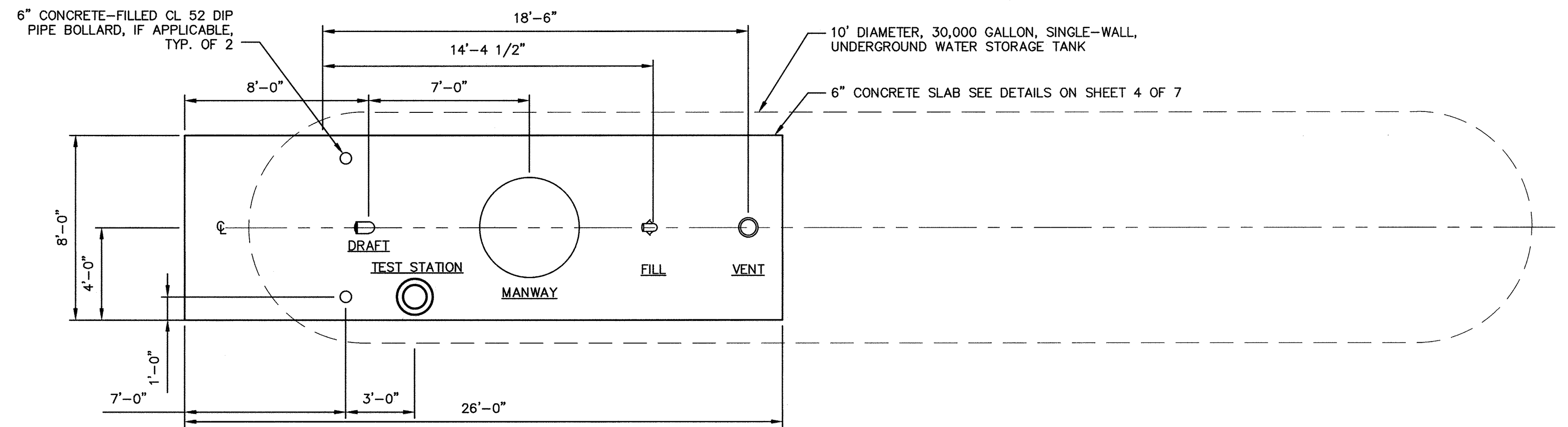
CAPITAL PROJECT No. F-5972
CONTRACT No. 65-4959
HOWARD COUNTY, MARYLAND

SCALE
AS SHOWN
SHEET
5 OF 7

13122677.38.dwg User: jk Date: 7/16/17 10:00 AM Plot Date: 7/16/17 10:00 AM Plot Scale: 1/2" = 1'-0" Plot Path: C:\Users\jk\AppData\Local\Temp\13122677.38.dwg



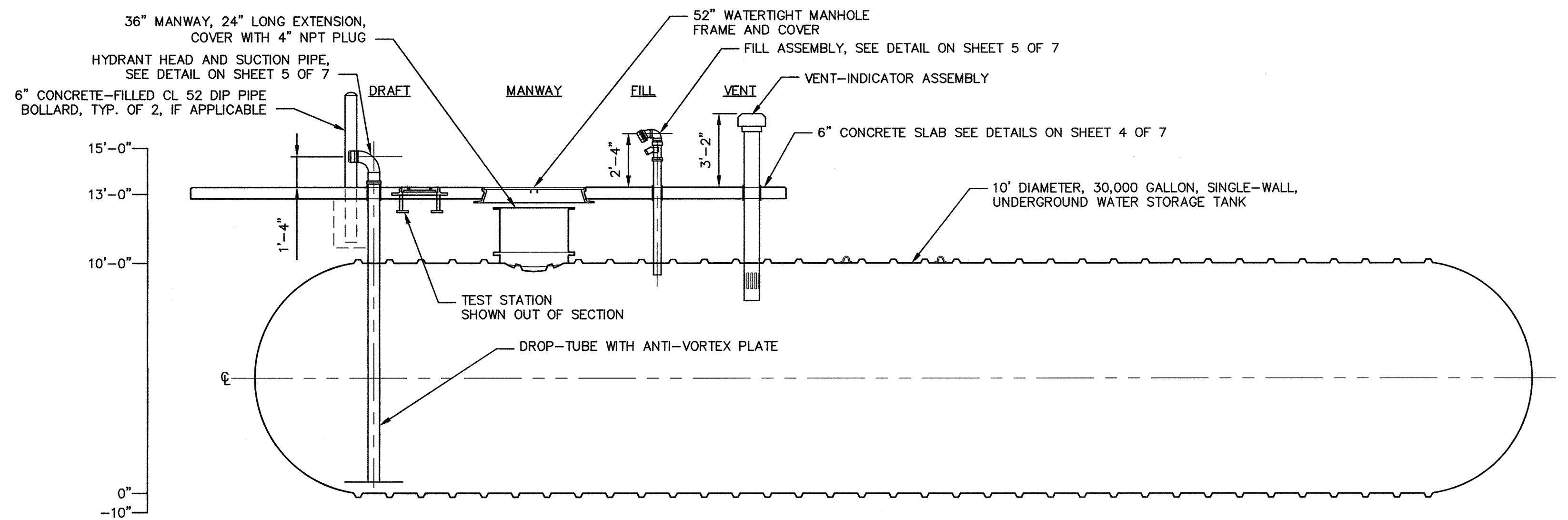
DETAIL: SPECIAL PAVING SECTION
SCALE: NOT TO SCALE



PLAN: 30,000 GALLON FIRE SUPPRESSION WATER STORAGE TANK, END-DRAFT CONFIGURATION
SCALE: 1/4" = 1'-0"

NOTE:
BOLLARDS SHALL ONLY BE INSTALLED AT THE DIRECTION OF HOWARD COUNTY.

NOTE:
TANK DIMENSIONS AND LAYOUT ARE FOR REFERENCE ONLY. ACTUAL TANK DIMENSIONS WILL VARY WITH MANUFACTURER.



SECTION THROUGH 30,000 GALLON FIRE SUPPRESSION WATER STORAGE TANK, END-DRAFT CONFIGURATION
SCALE: 1/4" = 1'-0"

PROFESSIONAL CERTIFICATION: I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 31363, Expiration Date 01/16/2018.

DEPARTMENT OF PUBLIC WORKS HOWARD COUNTY, MARYLAND		ENGINEERS PLANNERS SCIENTISTS CONSTRUCTION MANAGERS	
Director of Public Works <i>[Signature]</i>	DATE 7/26/17	Chief, Bureau of Engineering <i>[Signature]</i>	DATE 7/18/17
Chief, Bureau of Utilities <i>[Signature]</i>	DATE 7/26/17	Chief, Utility Design Division <i>[Signature]</i>	DATE 7/17/17

KCI TECHNOLOGIES

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 www.kci.com

STATE OF MARYLAND
 QUINCY WALKER
 PROFESSIONAL ENGINEER
 NO. 31363
 7/10/2017

DES: KFJ				
DRN: KFJ				
CHK: GW				
DATE: JULY, 2017	BY	NO.	REVISION	DATE

GENERAL DETAILS - 3

UNDERGROUND WATER STORAGE TANKS FOR FIRE SUPPRESSION

CAPITAL PROJECT No. F-5972
 CONTRACT No. 65-4959
 HOWARD COUNTY, MARYLAND

SCALE AS SHOWN
SHEET 6 OF 7

KCI TECHNOLOGIES PROJECT No. : 13122677_38

DETAIL E-1 SILT FENCE

CONSTRUCTION SPECIFICATIONS

- USE WOOD POSTS 1 1/2 X 1 1/2 X 3/4 INCH (MINIMUM) SQUARE CUT OF SOUND QUALITY HARDWOOD, AS AN ALTERNATIVE TO WOODEN POST USE STANDARD "T" OR "U" SECTION STEEL POSTS WEIGHING NOT LESS THAN 1 POUND PER LINEAR FOOT.
- USE 36 INCH MINIMUM POSTS DRIVEN 16 INCH MINIMUM INTO GROUND NO MORE THAN 6 FEET APART.
- USE WOVEN SILT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS AND FASTEN GEOTEXTILE SECURELY TO UPSLOPE SIDE OF FENCE POSTS WITH WIRE TIES OR STAPLES AT TOP AND MID-SECTION.
- PROVIDE MANUFACTURER CERTIFICATION TO THE AUTHORIZED REPRESENTATIVE OF THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT THE GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS.
- EMBED GEOTEXTILE A MINIMUM OF 8 INCHES VERTICALLY INTO THE GROUND, BACKFILL AND COMPACT THE SOIL ON BOTH SIDES OF FABRIC.
- WHERE TWO SECTIONS OF GEOTEXTILE ADJOIN: OVERLAP, TWIST, AND STAPLE TO POST IN ACCORDANCE WITH THIS DETAIL.
- EXTEND BOTH ENDS OF THE SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SILT FENCE.
- REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN SILT FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL FENCE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE 2011 MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-1 SILT FENCE

CONSTRUCTION SPECIFICATIONS

- USE WOOD POSTS 1 1/2 X 1 1/2 X 3/4 INCH (MINIMUM) SQUARE CUT OF SOUND QUALITY HARDWOOD, AS AN ALTERNATIVE TO WOODEN POST USE STANDARD "T" OR "U" SECTION STEEL POSTS WEIGHING NOT LESS THAN 1 POUND PER LINEAR FOOT.
- USE 36 INCH MINIMUM POSTS DRIVEN 16 INCH MINIMUM INTO GROUND NO MORE THAN 6 FEET APART.
- USE WOVEN SILT FILM GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS AND FASTEN GEOTEXTILE SECURELY TO UPSLOPE SIDE OF FENCE POSTS WITH WIRE TIES OR STAPLES AT TOP AND MID-SECTION.
- PROVIDE MANUFACTURER CERTIFICATION TO THE AUTHORIZED REPRESENTATIVE OF THE INSPECTION/ENFORCEMENT AUTHORITY SHOWING THAT THE GEOTEXTILE USED MEETS THE REQUIREMENTS IN SECTION H-1 MATERIALS.
- EMBED GEOTEXTILE A MINIMUM OF 8 INCHES VERTICALLY INTO THE GROUND, BACKFILL AND COMPACT THE SOIL ON BOTH SIDES OF FABRIC.
- WHERE TWO SECTIONS OF GEOTEXTILE ADJOIN: OVERLAP, TWIST, AND STAPLE TO POST IN ACCORDANCE WITH THIS DETAIL.
- EXTEND BOTH ENDS OF THE SILT FENCE A MINIMUM OF FIVE HORIZONTAL FEET UPSLOPE AT 45 DEGREES TO THE MAIN FENCE ALIGNMENT TO PREVENT RUNOFF FROM GOING AROUND THE ENDS OF THE SILT FENCE.
- REMOVE ACCUMULATED SEDIMENT AND DEBRIS WHEN BULGES DEVELOP IN SILT FENCE OR WHEN SEDIMENT REACHES 25% OF FENCE HEIGHT. REPLACE GEOTEXTILE IF TORN. IF UNDERMINING OCCURS, REINSTALL FENCE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE 2011 MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL E-9-2 AT-GRADE INLET PROTECTION

CONSTRUCTION SPECIFICATIONS

- USE NONWOVEN GEOTEXTILE AS SPECIFIED IN SECTION H-1 MATERIALS.
- LIFT GRATE AND WRAP WITH NONWOVEN GEOTEXTILE TO COMPLETELY COVER ALL OPENINGS. SECURE WITH WIRE TIES AND SET GRATE BACK IN PLACE.
- PLACE CLEAN 3/4 TO 1 1/2 INCH STONE OR EQUIVALENT RECYCLED CONCRETE 6 INCHES THICK ON THE GRATE.
- STORM DRAIN INLET PROTECTION REQUIRES FREQUENT MAINTENANCE. REMOVE ACCUMULATED SEDIMENT AFTER EACH RAIN EVENT TO MAINTAIN FUNCTION AND AVOID PREMATURE CLOGGING. IF INLET PROTECTION DOES NOT COMPLETELY DRAIN WITHIN 24 HOURS AFTER A STORM EVENT, IT IS CLOGGED. WHEN THIS OCCURS, REMOVE ACCUMULATED SEDIMENT AND CLEAN, OR REPLACE GEOTEXTILE AND STONE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE 2011 MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-4-6-C PERMANENT SOIL STABILIZATION MATTING CHANNEL APPLICATION

CONSTRUCTION SPECIFICATIONS

- USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
- USE PERMANENT SOIL STABILIZATION MATTING MADE OF OPEN WEAVE SYNTHETIC, NON-DEGRADABLE FIBERS OR ELEMENTS OF UNIFORM THICKNESS AND DISTRIBUTION THROUGHOUT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2 1/2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
- SECURE MATTING USING STEEL STAPLES OR WOOD STAKES. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1 1/2 INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST AVERAGE 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1 1/2 INCH IN CROSS SECTION, AND WEDGE SHAPE AT THE BOTTOM.
- PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS, UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
- UNROLL MATTING IN DIRECTION OF WATER FLOW, CENTERING THE FIRST ROLL ON THE CHANNEL CENTER LINE. WORK FROM CENTER OF CHANNEL OUTWARD WHEN PLACING ROLLS. LAY MATTING SMOOTHLY AND FIRMLY UPON THE SEEDBED SURFACE. AVOID STRETCHING THE MATTING.
- OVERLAP OR ABUT EDGES OF MATTING ROLLS PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSTREAM MAT OVERLAPPING ON TOP OF THE NEXT DOWNSTREAM MAT.
- KEY IN THE TOP OF SLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.
- STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
- IF SPECIFIED BY THE DESIGNER OR MANUFACTURER AND DEPENDING ON THE TYPE OF MAT BEING INSTALLED, OCEAN THE MATTING IS KEYPED AND STAPLED IN PLACE, FILL THE MAT VOIDS WITH TOP SOIL OR GRANULAR MATERIAL AND LIGHTLY COMPACT OR ROLL TO MAXIMIZE SOIL/MAT CONTACT WITHOUT CRUSHING MAT.
- ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE 2011 MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-4-6-D PERMANENT SOIL STABILIZATION MATTING SLOPE APPLICATION

CONSTRUCTION SPECIFICATIONS

- USE MATTING THAT HAS A DESIGN VALUE FOR SHEAR STRESS EQUAL TO OR HIGHER THAN THE SHEAR STRESS DESIGNATED ON APPROVED PLANS.
- USE PERMANENT SOIL STABILIZATION MATTING MADE OF OPEN WEAVE SYNTHETIC, NON-DEGRADABLE FIBERS OR ELEMENTS OF UNIFORM THICKNESS AND DISTRIBUTION THROUGHOUT. CHEMICALS USED IN THE MAT MUST BE NON-LEACHING AND NON-TOXIC TO VEGETATION AND SEED GERMINATION AND NON-INJURIOUS TO THE SKIN. IF PRESENT, NETTING MUST BE EXTRUDED PLASTIC WITH A MAXIMUM MESH OPENING OF 2 1/2 INCHES AND SUFFICIENTLY BONDED OR SEWN ON 2 INCH CENTERS ALONG LONGITUDINAL AXIS OF THE MATERIAL TO PREVENT SEPARATION OF THE NET FROM THE PARENT MATERIAL.
- SECURE MATTING USING STEEL STAPLES OR WOOD STAKES. STAPLES MUST BE "U" OR "T" SHAPED STEEL WIRE HAVING A MINIMUM GAUGE OF NO. 11 AND NO. 8 RESPECTIVELY. "U" SHAPED STAPLES MUST AVERAGE 1 TO 1 1/2 INCHES WIDE AND BE A MINIMUM OF 6 INCHES LONG. "T" SHAPED STAPLES MUST AVERAGE 8 INCH MAIN LEG, A MINIMUM 1 INCH SECONDARY LEG, AND MINIMUM 4 INCH HEAD. WOOD STAKES MUST BE ROUGH-SAWN HARDWOOD, 12 TO 24 INCHES IN LENGTH, 1 1/2 INCH IN CROSS SECTION, AND WEDGE SHAPE AT THE BOTTOM.
- PERFORM FINAL GRADING, TOPSOIL APPLICATION, SEEDBED PREPARATION, AND PERMANENT SEEDING IN ACCORDANCE WITH SPECIFICATIONS. PLACE MATTING WITHIN 48 HOURS OF COMPLETING SEEDING OPERATIONS, UNLESS END OF WORKDAY STABILIZATION IS SPECIFIED ON THE APPROVED EROSION AND SEDIMENT CONTROL PLAN.
- UNROLL MATTING DOWN SLOPE. LAY MATTING SMOOTHLY AND FIRMLY UPON THE SEEDBED SURFACE. AVOID STRETCHING THE MATTING.
- OVERLAP OR ABUT EDGES OF MATTING ROLLS PER MANUFACTURER RECOMMENDATIONS. OVERLAP ROLL ENDS BY 6 INCHES (MINIMUM), WITH THE UPSTREAM MAT OVERLAPPING ON TOP OF THE DOWNSTREAM MAT.
- KEY IN THE TOP OF SLOPE END OF MAT 6 INCHES (MINIMUM) BY DIGGING A TRENCH, PLACING THE MATTING ROLL END IN THE TRENCH, STAPLING THE MAT IN PLACE, REPLACING THE EXCAVATED MATERIAL, AND TAMPING TO SECURE THE MAT END IN THE KEY.
- STAPLE/STAKE MAT IN A STAGGERED PATTERN ON 4 FOOT (MAXIMUM) CENTERS THROUGHOUT AND 2 FOOT (MAXIMUM) CENTERS ALONG SEAMS, JOINTS, AND ROLL ENDS.
- IF SPECIFIED BY THE DESIGNER OR MANUFACTURER AND DEPENDING ON THE TYPE OF MAT BEING INSTALLED, OCEAN THE MATTING IS KEYPED AND STAPLED IN PLACE, FILL THE MAT VOIDS WITH TOP SOIL OR GRANULAR MATERIAL AND LIGHTLY COMPACT OR ROLL TO MAXIMIZE SOIL/MAT CONTACT WITHOUT CRUSHING MAT.
- ESTABLISH AND MAINTAIN VEGETATION SO THAT REQUIREMENTS FOR ADEQUATE VEGETATIVE ESTABLISHMENT ARE CONTINUOUSLY MET IN ACCORDANCE WITH SECTION B-4 VEGETATIVE STABILIZATION.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE 2011 MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

DETAIL B-1 STABILIZED CONSTRUCTION ENTRANCE

CONSTRUCTION SPECIFICATIONS

- PLACE STABILIZED CONSTRUCTION ENTRANCE IN ACCORDANCE WITH THE APPROVED PLAN. VEHICLES MUST TRAVEL OVER THE ENTIRE LENGTH OF THE SCE. USE MINIMUM LENGTH OF 50 FEET (*30 FEET FOR SINGLE RESIDENCE LOT), USE MINIMUM WIDTH OF 10 FEET. FLARE SCE TO 10 FEET MINIMUM AT THE EXISTING ROAD TO PROVIDE A TURNING RADIUS.
- PIPE ALL SURFACE WATER FLOWING TO OR DIVERTED TOWARD THE SCE UNDER THE ENTRANCE. MAINTAINING POSITIVE DRAINAGE. PROTECT PIPE INSTALLED THROUGH THE SCE WITH A MOUNTABLE BERM WITH 5:1 SLOPES AND A MINIMUM OF 12 INCHES OF STONE OVER THE PIPE. PROVIDE PIPE AS SPECIFIED ON APPROVED PLAN. WHEN THE SCE IS LOCATED AT A HIGH SPOT AND HAS NO DRAINAGE TO CONVEY, A PIPE IS NOT NECESSARY. A MOUNTABLE BERM IS REQUIRED WHEN SCE IS NOT LOCATED AT A HIGH SPOT.
- PREPARE SUBGRADE AND PLACE NONWOVEN GEOTEXTILE, AS SPECIFIED IN SECTION H-1 MATERIALS.
- PLACE CRUSHED AGGREGATE (2 TO 3 INCHES IN SIZE) OR EQUIVALENT RECYCLED CONCRETE (WITHOUT REBAR) AT LEAST 6 INCHES DEEP OVER THE LENGTH AND WIDTH OF THE SCE.
- MAINTAIN ENTRANCE IN A CONDITION THAT MINIMIZES TRACKING OF SEDIMENT. ADD STONE OR MAKE OTHER REPAIRS AS CONDITIONS DEMAND TO MAINTAIN CLEAN SURFACE. MOUNTABLE BERM, AND SPECIFIED DIMENSIONS. IMMEDIATELY REMOVE STONE AND/OR SEDIMENT SPILLED, DROPPED, OR TRACKED ON ADJACENT ROADWAY BY VACUUMING, SCRAPING, AND/OR SWEEPING. WASHING ROADWAY TO REMOVE MUD TRACKED ONTO PAVEMENT IS NOT ACCEPTABLE UNLESS WASH WATER IS DIRECTED TO AN APPROVED SEDIMENT CONTROL PRACTICE.

MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE 2011 MARYLAND DEPARTMENT OF ENVIRONMENT WATER MANAGEMENT ADMINISTRATION

STANDARD SEDIMENT CONTROL NOTES

- A MINIMUM OF 48 HOURS NOTICE MUST BE GIVEN TO THE CHARLES COUNTY DEPARTMENT OF INSPECTIONS, LICENSES AND PERMITS, SEDIMENT CONTROL DIVISION (301-645-0700) PRIOR TO THE START OF ANY CONSTRUCTION.
- ALL VEGETATIVE AND STRUCTURAL PRACTICES ARE TO BE INSTALLED ACCORDING TO THE PROVISIONS OF THIS PLAN AND ARE TO BE IN CONFORMANCE WITH THE MOST CURRENT "MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL", AND REVISIONS THERETO.
- FOLLOWING INITIAL SOIL DISTURBANCE OR RE-DISTURBANCE, SEEDING FOR PERMANENT OR TEMPORARY STABILIZATION SHALL BE COMPLETED WITHIN THREE (3) CALENDER DAYS AS TO THE SURFACE OF ALL PERIMETER CONTROLS, DIKES, SWALES, DITCHES, PERIMETER SLOPES AND ALL SLOPES GREATER THAN 3 HORIZONTAL TO 1 VERTICAL (3:1); AND SEVEN (7) CALENDAR DAYS AS TO ALL OTHER DISTURBED OR GRADED AREAS ON THE PROJECT SITE NOT UNDER ACTIVE GRADING. ONCE VEGETATION IS ESTABLISHED, THE SITE SHALL HAVE 95% GROUND COVER TO BE CONSIDERED ADEQUATELY STABILIZED.
- ALL SEDIMENT TRAPS/BASINS SHOWN MUST BE FENCED AND WARNING SIGNS POSTED AROUND THEIR PERIMETER IN ACCORDANCE WITH CHARLES COUNTY STANDARD SPECIFICATIONS.
- ALL DISTURBED AREAS MUST BE STABILIZED WITHIN THE TIME PERIOD SPECIFIED ABOVE IN ACCORDANCE WITH THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL (SEC. G2.0.) FOR PERMANENT SEEDINGS, SO2, TEMPORARY SEEDING AND MULCHING. TEMPORARY STABILIZATION WITH MULCH ALONE CAN ONLY BE DONE WHEN RECOMMENDED SEEDING DATES DO NOT ALLOW FOR PROPER GERMINATION AND ESTABLISHMENT OF GRASSES.
- ALL SEDIMENT CONTROL STRUCTURES ARE TO REMAIN IN PLACE AND ARE TO BE MAINTAINED IN OPERATIVE CONDITION UNTIL PERMISSION FOR THEIR REMOVAL HAS BEEN OBTAINED FROM THE CHARLES SEDIMENT CONTROL INSPECTOR.
- SITE ANALYSIS:

TOTAL AREA OF SITE	SEE SITE PLANS	ACRES
AREA DISTURBED	SEE SITE PLANS	ACRES
AREA TO BE ROOFED OR PAVED	SEE SITE PLANS	ACRES
AREA TO BE VEGETATIVELY STABILIZED	SEE SITE PLANS	ACRES
TOTAL CUT	SEE SITE PLANS	CU.YDS.
TOTAL FILL	SEE SITE PLANS	CU.YDS.
ONSITE WASTE/BORROW AREA LOCATION	SEE SITE PLANS	ACRES
- ANY SEDIMENT CONTROL PRACTICE WHICH IS DISTURBED BY GRADING ACTIVITY FOR PLACEMENT OF UTILITIES MUST BE REPAIRED ON THE SAME DAY OF THE DISTURBANCE.
- ADDITIONAL SEDIMENT CONTROLS MUST BE PROVIDED, IF DEEMED NECESSARY BY THE CHARLES SEDIMENT CONTROL INSPECTOR.
- ON ALL SITES WITH DISTURBED AREAS IN EXCESS OF 2 ACRES, APPROVAL OF THE INSPECTION AGENCY SHALL BE REQUESTED UPON COMPLETION OF INSTALLATION OF PERIMETER EROSION AND SEDIMENT CONTROLS, BUT BEFORE PROCEEDING WITH ANY OTHER EARTH DISTURBANCE OR GRADING. OTHER BUILDING OR GRADING INSPECTION APPROVALS MAY NOT BE AUTHORIZED UNTIL THIS INITIAL APPROVAL BY THE INSPECTION AGENCY IS MADE.
- TRENCHES FOR THE CONSTRUCTION OF UTILITIES IS LIMITED TO THREE (3) PIPE LENGTHS OR THAT WHICH CAN BE BACK FILLED AND STABILIZED WITHIN ONE WORKING DAY, WHICHEVER IS SHORTER.
- CONTRACTOR SHALL PLACE EXCAVATED MATERIALS ON UPHILL SIDE OF TRENCH AND PLACE SILT FENCE ON DOWNHILL SIDE OF TRENCH.
- ALL SITES WHERE SEDIMENT AND EROSION CONTROL DEVICES ARE INSTALLED SHALL BE RESTORED THE SAME DAY THAT SUCH DEVICES ARE REMOVED.

PERMANENT SEEDING NOTES

APPLY TO GRADED OR CLEARED AREAS NOT SUBJECT TO IMMEDIATE FURTHER DISTURBANCE WHERE A PERMANENT LONG-LIVED VEGETATIVE COVER IS NEEDED.

SEEDBED PREPARATION: LOOSEN UPPER THREE INCHES OF SOIL BY RAKING, DISKING OR OTHER ACCEPTABLE MEANS BEFORE SEEDING, IF NOT PREVIOUSLY LOOSENED.

SOIL AMENDMENTS: IN LIEU OF SOIL TEST RECOMMENDATIONS, USE ONE OF THE FOLLOWING SCHEDULES:

- 1) PREFERRED - APPLY 2 TONS PER ACRES DOLOMITIC LIMESTONE (92 LBS/1000 SQ FT.) AND 600 LBS PER ACRE 10-10-10 FERTILIZER (14 LBS/1000 SQ FT.) BEFORE SEEDING. HARROW OR DISK INTO UPPER THREE INCHES OF SOIL. AT TIME OF SEEDING, APPLY 400 LBS PER ACRE 30-0-0 UREAFORM FERTILIZER (9 LBS/1000 SQ FT.).
- 2) ACCEPTABLE - APPLY 2 TONS PER ACRE DOLOMITIC LIMESTONE (92 LBS/1000 SQ FT.) AND 1000 LBS PER ACRE 10-10-10 FERTILIZER (23 LBS/1000 SQ FT.) BEFORE SEEDING. HARROW OR DISK INTO UPPER THREE INCHES OF SOIL.

SEEDING - FOR THE PERIODS MARCH 1 THRU APRIL 30, AND AUGUST 1 THRU OCTOBER 15, SEED WITH 60 LBS PER ACRE (1.4 LBS/1000 SQ FT.) OF KENTUCKY 31 TALL FESCUE. FOR THE PERIOD MAY 1 THRU JULY 31, SEED WITH 60 LBS KENTUCKY 31 TALL FESCUE PER ACRE AND 2 LBS PER ACRE (0.5 LBS/1000 SQ FT.) OF WEEPING LOVEGRASS. DURING THE PERIOD OF OCTOBER 16 THRU FEBRUARY 28, PROTECT SITE BY: OPTION (1) 2 TONS PER ACRE OF WELL ANCHORED STRAW MULCH AND SEED AS SOON AS POSSIBLE IN THE SPRING. OPTION (2) USE SO2. OPTION (3) SEED WITH 60 LBS/ACRE KENTUCKY 31 TALL FESCUE AND MULCH WITH 2 TONS/ACRE WELL ANCHORED STRAW.

MULCHING - APPLY 1-1/2 TO 2 TONS PER ACRE (70 TO 90 LBS/1000 SQ FT.) OF UNROTATED SMALL GRASS STRAW IMMEDIATELY AFTER SEEDING. ANCHOR MULCH IMMEDIATELY AFTER APPLICATION USING MULCH ANCHORING TOOL OR 218 GALLONS PER ACRE (5 GAL/1000 SQ FT.) OF EMULSIFIED ASPHALT ON FLAT AREAS. ON SLOPES 8 FEET OR HIGHER, USE 348 GALLONS PER ACRE (8 GAL/1000 SQ FT.) FOR ANCHORING.

MAINTENANCE - INSPECT ALL SEEDBED AREAS AND MAKE NEEDED REPAIRS, REPLACEMENTS AND RESEEDINGS.

TEMPORARY SEEDING NOTES

APPLY TO GRADED OR CLEARED AREAS LIKELY TO BE REDISTURBED WHERE A SHORT-TERM VEGETATIVE COVER IS NEEDED.

SEEDBED PREPARATION: LOOSEN UPPER THREE INCHES OF SOIL BY RAKING, DISKING OR OTHER ACCEPTABLE MEANS BEFORE SEEDING, IF NOT PREVIOUSLY LOOSENED.

SOIL AMENDMENTS: - APPLY 600 LBS PER ACRE 10-10-10 FERTILIZER (14 LBS/1000 SQ FT.).

SEEDING - FOR PERIODS MARCH 1 THRU APRIL 30 AND FROM AUGUST 15 THRU OCTOBER 15, SEED WITH 2-1/2 BUSHEL PER ACRE OF ANNUAL RYE (3.2 LBS/1000 SQ FT.). FOR THE PERIOD MAY 1 THRU AUGUST 14, SEED WITH 3 LBS PER ACRE OF WEEPING LOVEGRASS (0.7 LBS/1000 SQ FT.). FOR THE PERIOD NOVEMBER 16 THRU FEBRUARY 28, PROTECT SITE BY APPLYING 2 TONS PER ACRE OF WELL ANCHORED STRAW MULCH AND SEED AS SOON AS POSSIBLE IN THE SPRING, OR USE SO2.

MULCHING - APPLY 1-1/2 TO 2 TONS PER ACRE (70 TO 90 LBS/1000 SQ FT.) OF UNROTATED SMALL GRASS STRAW IMMEDIATELY AFTER SEEDING. ANCHOR MULCH IMMEDIATELY AFTER APPLICATION USING MULCH ANCHORING TOOL OR 218 GAL PER ACRE (5 GAL/1000 SQ FT.) OF EMULSIFIED ASPHALT ON FLAT AREAS. ON SLOPES 8 FT OR HIGHER, USE 348 GAL PER ACRE (8 GAL/1000 SQ FT.) FOR ANCHORING.

REFER TO THE 2011 MARYLAND STANDARDS AND SPECIFICATIONS FOR SOIL EROSION AND SEDIMENT CONTROL FOR RATE AND METHODS NOT COVERED.

SEQUENCE OF CONSTRUCTION

- INSTALL SEDIMENT CONTROL DEVICES AS SHOWN ON SITE PLAN, (1 DAY).
- INLET PROTECTION SHALL BE INSTALLED ON INLETS DOWN GRADE OF THE SITE.
- ROADS AND STREETS SHALL BE KEPT BROOM CLEAN AT ALL TIMES.
- SITE EXCAVATION AND GRADING, (3 DAYS). SITE STAGING AND STOCK-PILE AREAS.
- EXCAVATE FOR TANK (2 DAYS).
- INSTALL TANK ACCORDING TO PLAN AND DETAILS. (3 DAYS)
- BACKFILL AROUND TANK, (1 DAY).
- INSTALL CONCRETE SLAB ACCORDING TO PLAN AND DETAILS. (5 DAYS)
- INSTALL ASPHALT PULLOFF ACCORDING TO PLAN AND DETAILS. (2 DAYS)
- PERFORM FINAL GRADING, SEEDING AND LANDSCAPING, (1 DAY).
- REMOVE SEDIMENT CONTROL DEVICES AFTER PERMISSION IS GRANTED BY SEDIMENT CONTROL INSPECTOR, (2 DAYS).

BEST MANAGEMENT PRACTICES FOR WORKING IN NONTIDAL WETLANDS, WETLAND BUFFERS, WATERWAYS, AND 100-YEAR FLOODPLAINS

- No excess fill, construction material, or debris shall be stockpiled or stored in nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
- Place materials in a location and manner which does not adversely impact surface or subsurface water flow into or out of nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
- Do not use the excavated material as backfill if it contains waste metal products, unsightly debris, toxic material, or any other deleterious substance. If additional backfill is required, use clean material free of waste metal products, unsightly debris, toxic material, or any other deleterious substance.
- Place heavy equipment on mats or suitably operate the equipment to prevent damage to nontidal wetlands, nontidal wetland buffers, waterways, or the 100-year floodplain.
- Repair and maintain any serviceable structure or fill so there is no permanent loss of nontidal wetlands, nontidal wetland buffers, or waterways, or permanent modification of the 100-year floodplain in excess of that lost under the originally authorized structure or fill.
- Rectify any nontidal wetlands, wetland buffers, waterways, or 100-year floodplain temporarily impacted by any construction.
- All stabilization in the nontidal wetland and nontidal wetland buffer shall consist of the following species: Annual Ryegrass (*Lolium multiflorum*), Millet (*Setaria italica*), Barley (*Hordeum sp.*), Oats (*Lolium sp.*), and/or Rye (*Sesale cereale*). These species will allow for the stabilization of the site while also allowing for the voluntary revegetation of natural wetland species. Other non-persistent vegetation may be acceptable, but must be approved by the Nontidal Wetlands and Waterways Division. Kentucky 31 fescue shall not be utilized in wetland or buffer areas. The area should be seeded and mulched to reduce erosion after construction activities have been completed.
- After installation has been completed, make post-construction grades and elevations the same as the original grades and elevations in temporarily impacted areas.
- To protect aquatic species, in-stream work is prohibited as determined by the classification of the stream:
 - Use I waters: In-stream work shall not be conducted during the period March 1 through June 15, inclusive, during any year.
 - Use III waters: In-stream work shall not be conducted during the period October 1 through April 30, inclusive, during any year.
 - Use IV waters: In-stream work shall not be conducted during the period March 1 through May 31, inclusive, during any year.
- Stormwater runoff from impervious surfaces shall be controlled to prevent the washing of debris into the waterway.
- Culverts shall be constructed and any riprap placed so as not to obstruct the movement of aquatic species, unless the purpose of the activity is to impound water.

PROFESSIONAL CERTIFICATION I hereby certify that these documents were prepared or approved by me, and that I am a duly licensed professional engineer under the laws of the State of Maryland, License No. 31363. Expiration Date 01/16/2018.

DEPARTMENT OF PUBLIC WORKS
HOWARD COUNTY, MARYLAND

Director of Public Works: [Signature] DATE: 7/20/17
Chief, Bureau of Engineering: [Signature] DATE: 7/18/17
Chief, Bureau of Utilities: [Signature] DATE: 7/20/17
Chief, Utility Design Division: [Signature] DATE: 7/18/17

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STATE OF MARYLAND
Professional Engineer
No. 31363
Expiration Date 01/16/2018

DES:	KFJ	BY	NO.	REVISION	DATE
DRN:	KFJ				
CHK:	GW				
DATE:	JULY, 2017				

SEDIMENT AND EROSION CONTROL NOTES AND DETAILS

UNDERGROUND WATER STORAGE TANKS FOR FIRE SUPPRESSION

CAPITAL PROJECT No. F-5972
CONTRACT No. 65-4959
HOWARD COUNTY, MARYLAND

SCALE: AS SHOWN
SHEET: 7 OF 7