

# FACTORY MUTUAL RESEARCH CENTER REPAIRS TO LOWER POND DAM NO. 392 743 REYNOLDS ROAD, GLOCESTER, RHODE ISLAND

JULY 2021

Kindly be advised that this Permit is not equivalent to a verification of the type or extent of freshwater wetlands on site.

PREPARED FOR:

**FM GLOBAL**

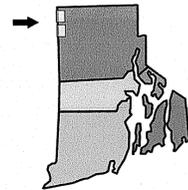
743 REYNOLDS ROAD  
WEST GLOCESTER, RHODE ISLAND 02814

PROJECT ENGINEER

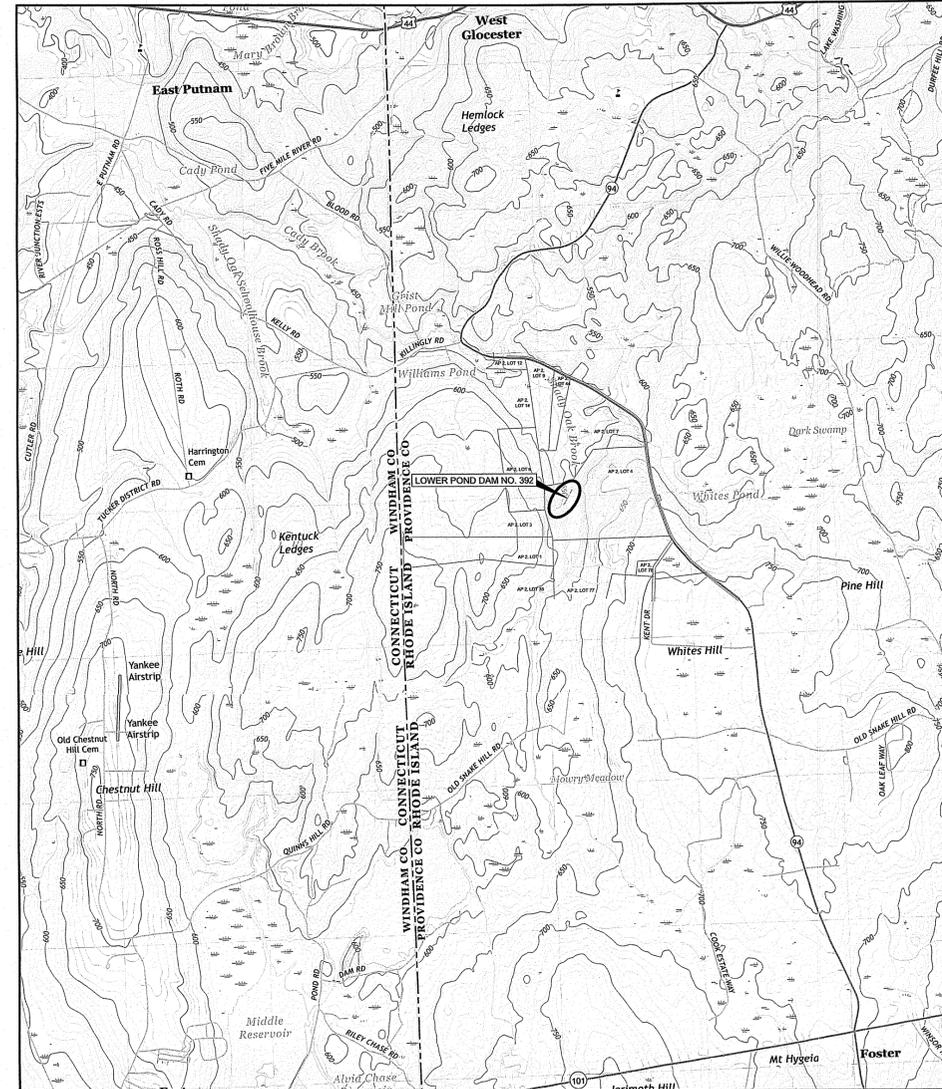


GeoEnvironmental, Inc.  
Engineers and Scientists  
530 Broadway Providence,  
Rhode Island 02909

RHODE ISLAND



(QUADRANGLE MAP LOCATIONS)  
RHODE ISLAND



PROJECT LOCUS MAP



SOURCE: BASE MAP FROM THE FOLLOWING USGS QUADRANGLE MAPS:  
THOMPSON, CT, RI (2018) & EAST KILLINGLY, CT, RI (2018)

DIGITAL TOPOGRAPHIC MAPS PROVIDED BY USGSSTORE.GOV.

CONTOUR ELEVATIONS REFERENCE NAVD 88,  
CONTOURS ARE SHOWN IN FEET AT 10' INTERVALS

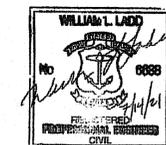
## INDEX OF DRAWINGS

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DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF WATER RESOURCES  
FRESHWATER WETLANDS PROGRAM  
APPROVED WITH CONDITIONS  
AS SPECIFIED IN THE LETTER OF APPROVAL  
DATED SEP 08 2021 FILE # 21-0202  
NO CHANGES ALLOWED WITHOUT PRIOR APPROVAL.  
APPROVED PLANS MUST BE AT CONSTRUCTION SITE  
*Martin D. Semek*

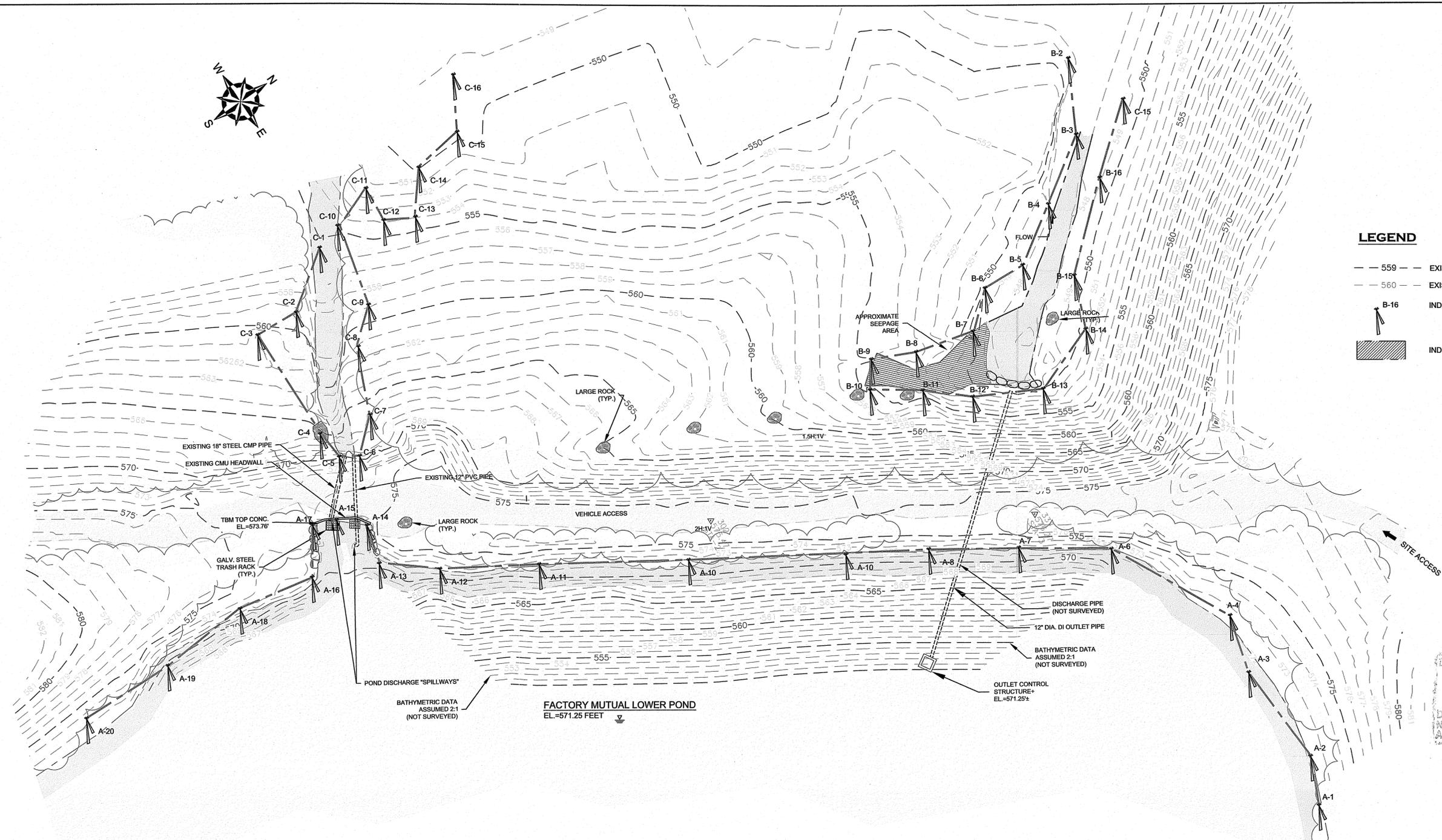
Environmental Management  
JUL 29 2021  
Office of Water Resources

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COVER SHEET No.1

© 2021 - GZA GeoEnvironmental, Inc. GZA-J:\GEO\34335.01\W\FIGURES\CAD\DWGS\CRB FILES\34335.01\_FDWG EC-PLAN NO PRINTS (FIG-2) JULY 15, 2021 10:35AM TIMOTHY MARTIN



Environmental Management  
**JUL 20 2021**  
 Office of Water Resources

**LEGEND**

- 559 --- EXISTING CONTOUR IN FEET (INTERVAL ONE)
- 560 --- EXISTING CONTOUR IN FEET (INTERVAL FIVE)
- B-16 INDICATES WETLAND FLAG AND DESIGNATION
- [Hatched Box] INDICATES EXISTING SEEPAGE AREA

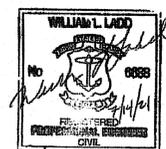
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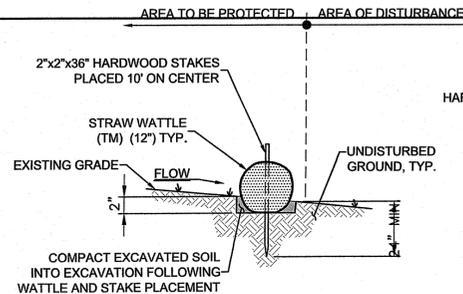
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 GLOCESTER, RHODE ISLAND**

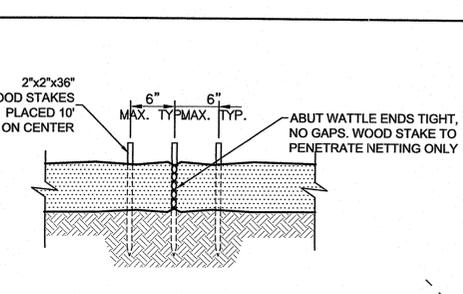
**EXISTING CONDITIONS PLAN**

PREPARED BY: <b>GZA GeoEnvironmental, Inc.</b> Engineers and Scientists www.gza.com	PREPARED FOR: FM GLOBAL 743 REYNOLDS ROAD WEST GLOCESTER, RHODE ISLAND		
PROJ MGR: WLL DESIGNED BY: JEB DATE: JULY 2021	REVIEWED BY: RJM DRAWN BY: TRM PROJECT NO. 34335.01	CHECKED BY: WLL SCALE: 1"=20' REVISION NO. 0	SHEET <b>2</b> SHEET NO. 2 OF 5

© 2021 - GZA GeoEnvironmental, Inc. GZA-UGED 34335.01.WLL\FIGURES\CAD\DWG\CRB FILES\34335.01\_F\_V2.DWG PRO-PLAN (FIG-3) JULY 15, 2021 10:36AM TIMOTHY MARTIN



**STRAW WATTLE DETAIL**  
NOT TO SCALE



**STRAW WATTLE OVERLAP**  
NOT TO SCALE

**GENERAL NOTES:**

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING ALL TEMPORARY SEDIMENTATION AND EROSION CONTROL.
2. IMMEDIATELY UPON COMPLETION OF THE CLEARING AND GRUBBING AND PRIOR TO ROUGH GRADING, TEMPORARY STRAW WATTLES SHALL BE PLACED AT THE LIMITS OF CONSTRUCTION.
3. ALL EROSION AND SEDIMENT CONTROL DEVICES SHALL BE PERIODICALLY MAINTAINED ON A REGULAR BASIS DURING CONSTRUCTION, AND PROMPTLY FOLLOWING STORMS OR PERIODS OF RAINFALL.

**EROSION AND SOIL STABILIZATION PROGRAM:**

1. TEMPORARY TREATMENTS SHALL CONSIST OF A HAY, STRAW, FIBER MULCH OR PROTECTIVE COVERS SUCH AS FABRIC MATS.
2. ALL STRAW WATTLES OR TEMPORARY PROTECTION SHALL REMAIN IN PLACE UNTIL AN ACCEPTABLE STAND OF GRASS OR APPROVED GROUND COVER IS ESTABLISHED.
3. NORMAL ACCEPTABLE SEASONAL SEEDING DATES ARE APRIL 1ST THROUGH OCTOBER 15TH
4. TOPSOIL SHALL HAVE A SANDY LOAM TEXTURE RELATIVELY FREE OF SUBSOIL MATERIAL, STONES, ROOTS, LUMPS, TREE LIMBS, TRASH OR DEBRIS AND SHALL CONFORM WITH RIDOT STANDARD SPECIFICATIONS.
5. THE SEED MIX SHALL BE INOCULATED WITHIN 24 HOURS OF APPLICATION WITH APPROPRIATE INOCULUM FOR EACH VARIETY. LIME AND FERTILIZER SHALL BE APPLIED TO UPGRADE EXISTING CONDITIONS AS NECESSARY. THE SEED MIX FOR OPEN NATURAL AREAS SHALL CONSIST OF 70% CREEPING RED FESCUE, 5% ASTORIA BENTGRASS, 15% BIRDSFOOT TREEFOIL, 10% PERENNIAL RYEGRASS AND SHALL BE APPLIED AT A RATE OF 100 POUNDS PER ACRE.
6. THE CONTRACTOR MUST REPAIR AND/OR RESEED ANY AREAS THAT DO NOT DEVELOP WITHIN ONE YEAR OF PLANTING.
7. ALL FILL SHALL BE CLEAN AND THOROUGHLY COMPACTED UPON PLACEMENT IN CONFORMANCE WITH RIDOT STANDARD SPECIFICATIONS.
8. DENUDE SLOPES SHALL NOT REMAIN EXPOSED FOR MORE THAN 15 DAYS. SLOPES NOT PROTECTED BY SEEDING PRIOR TO OCTOBER 15TH SHALL BE PROTECTED USING OTHER TEMPORARY MEANS SUCH AS HAY, STRAW, FIBER MULCH, OR PROTECTIVE MATS OR BURLAP OR FIBERGLASS NETTING AS DIRECTED BY THE ENGINEER. THESE TEMPORARILY STABILIZED SLOPES SHALL BE SEEDD UPON COMMENCEMENT OF THE NEXT FOLLOWING PLANTING SEASON.
9. HAY AND STRAW APPLICATIONS SHALL BE IN THE AMOUNT OF 2000 POUNDS PER ACRE.

**SEDIMENTATION CONTROL PROGRAM:**

1. TEMPORARY STRAW WATTLES ARE TO BE INSTALLED PRIOR TO CONSTRUCTION AND SHALL BE MAINTAINED ON A REGULAR BASIS. IN ADDITION TO THE STRAW WATTLES AT THE LIMIT OF CONSTRUCTION, TEMPORARY BARRIERS SHALL BE CONSTRUCTED AT THE TOE OF ALL DISTURBED (CUT OR FILL) SLOPES UNTIL VEGETATIVE COVER HAS BEEN ESTABLISHED.
2. CARE SHALL BE TAKEN NOT TO PLACE REMOVED SEDIMENTS WITHIN THE PATH OF THE EXISTING, NEWLY CREATED OR PROPOSED AREAS THAT ARE OR MAY BE SUBJECTED TO STORM WATER FLOW.
3. ALL DISTURBED AREAS THAT ARE SUBJECT TO EROSION, EITHER NEWLY FILLED OR EXCAVATED ARE TO BE PROTECTED. ACCEPTABLE METHODS OF PROTECTION ARE STONE RIP RAP OR SEEDING WITH FIBER MULCH PROTECTION. ANY CULVERTS OR DRAINAGE SWALES DISCHARGING TO A WATERWAY OR AREA SUBJECT TO STORM FLOWAGE SHALL BE PROTECTED WITH A RIP RAP SPLASH PAD.
4. DURING CONSTRUCTION THE CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING ADEQUATE DRAINAGE FLOW DURING STORMS AND PERIODS OF RAINFALL.
5. SEDIMENTATION CONTROL DEVICES SHALL BE INSPECTED CLOSELY AND MAINTAINED PROMPTLY AFTER EACH RAINFALL.
6. ADDITIONAL SEDIMENT CONTROL MEASURES SHALL BE PLACED AS CONDITIONS WARRANT OR AS DIRECTED BY THE ENGINEER, SITE INSPECTOR, LOCAL OR STATE ENVIRONMENTAL OFFICIAL.

**SLOPE STABILIZATION AND VEGETATION:**

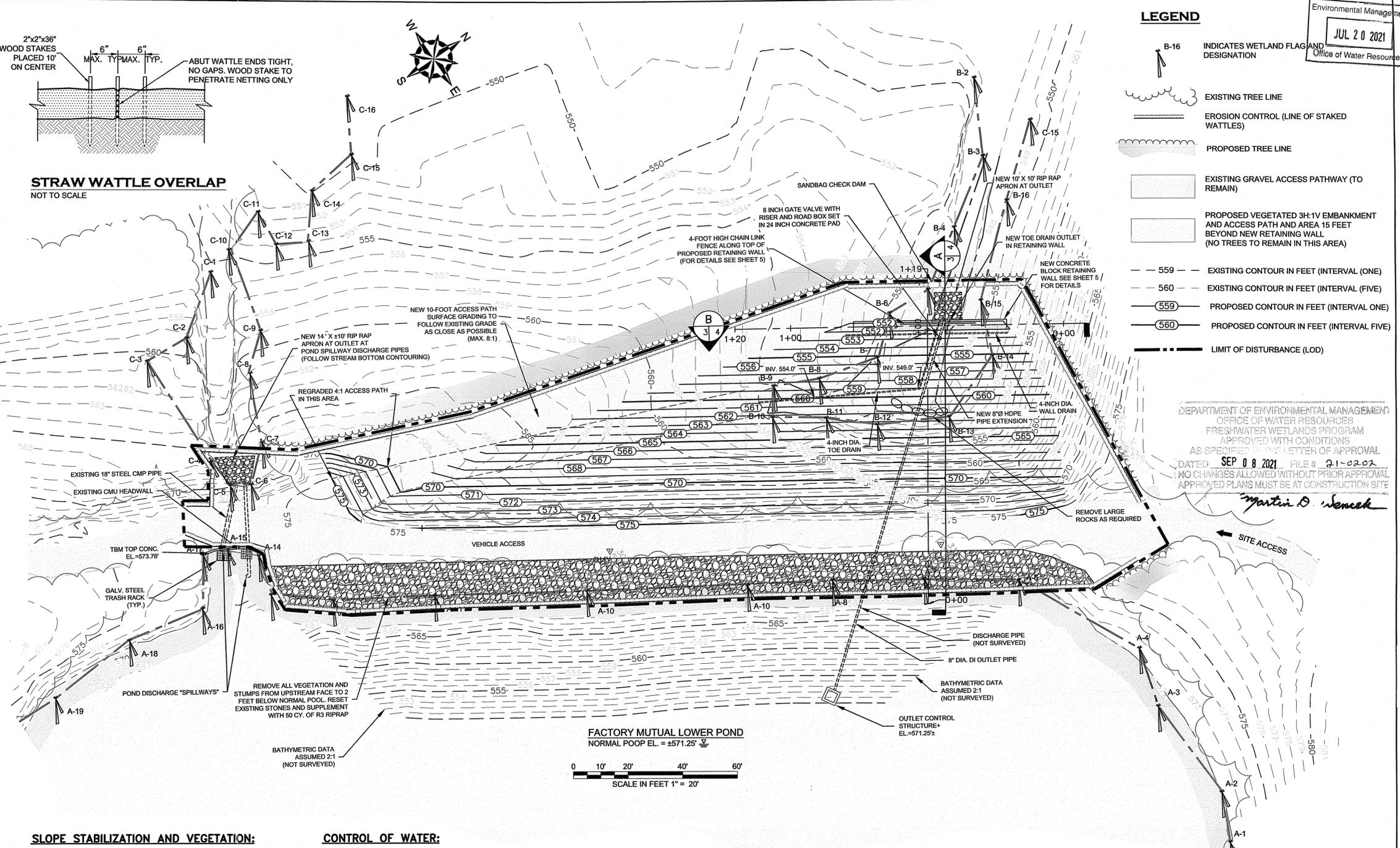
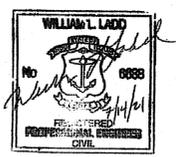
1. THE REMOVAL OF EXISTING VEGETATION IN THE SITE SHALL BE MINIMIZED.
2. A LINE OF STAKED STRAW WATTLES SHALL BE PLACED AT THE TOE OF ALL DISTURBED SLOPES AND MAINTAINED AS A SEDIMENT BARRIER UNTIL THE SLOPES ARE STABILIZED WITH GRASS.
3. VEGETATION REMOVED MAY BE SHREDDED AND CHIPPED ON SITE FOR USE AS MULCH, OR IT MAY BE REMOVED AND DISPOSED IN ANY LEGAL MANNER.
4. THE RESEEDING OF THE DISTURBED AREAS SHALL BE WITH SEED MATERIALS SELECTED FOR PRODUCTION OF A QUICK COVER AND HARDY STAND. THE SEEDING SHALL BE IN ACCORDANCE WITH COMMON NURSERY PRACTICE IN THE RHODE ISLAND AREA.
5. MULCH APPLICATIONS ON STEEP OR LONG SLOPES SHALL BE "CRIMPED" OR "TRACKED" TO PREVENT DISTURBANCE.
6. STOCKPILING OF SOILS SHALL NOT BE LOCATED NEAR WATERWAYS OR AREAS SUBJECT TO STORM FLOWAGE. STOCKPILES SHALL BE MAINTAINED WITH SIDE SLOPES LESS THAN 30%.

**CONTROL OF WATER:**

1. THE IMPOUNDMENT SHALL BE DRAWN DOWN NO MORE THAN TWO FEET DURING THE COMPLETION OF THE EMBANKMENT REPAIRS. THE IMPOUNDMENT DRAWDOWN SHALL ONLY BE PERFORMED DURING THE LOW FLOW PERIOD FROM JULY 15 THROUGH OCTOBER 31.
2. THE IMPOUNDMENT DRAWDOWN MAY BE ACCOMPLISHED BY EITHER OPERATING THE LOW LEVEL OUTLET OR BY BYPASS PUMPING. THE IMPOUNDMENT DOES NOT HAVE ANY INLETS, AND IS FED ONLY BY GROUNDWATER AND DIRECT RUNOFF. IN THE EVENT THAT EXTREME PRECIPITATION OCCURS DURING THE WORK THAT EXCEEDS THE CAPACITY OF THE LOW LEVEL OUTLET OR BYPASS PUMPS, THE SITE SHALL BE SECURED AND WATER ALLOWED TO PASS OVER THE EXISTING SPILLWAY AS NECESSARY.
3. PROVIDE A SANDBAG CHECK DAM AS NECESSARY IN THE LOW LEVEL DISCHARGE CHANNEL TO CONTAIN SEDIMENTS.
4. ANY DEWATERING OF EXCAVATIONS SHALL BE ROUTED THROUGH A SILT SACK GEOTEXTILE BAG TO REMOVE SEDIMENTS. THE SILT SACK SHALL BE LOCATED IN AN UPLAND AREA AND ROUTED TO THE OUTLET CHANNEL IN A NON-EROSIVE MANNER.
5. THE INSTALLATION OF THE RIPRAP APRON IN THE SPILLWAY DISCHARGE CHANNEL SHALL BE PERFORMED WHEN THERE IS NO FLOW OF WATER THROUGH THE SPILLWAY.

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**LEGEND**

- B-16 INDICATES WETLAND FLAG AND DESIGNATION
- EXISTING TREE LINE
- EROSION CONTROL (LINE OF STAKED WATTLES)
- PROPOSED TREE LINE
- EXISTING GRAVEL ACCESS PATHWAY (TO REMAIN)
- PROPOSED VEGETATED 3H:1V EMBANKMENT AND ACCESS PATH AND AREA 15 FEET BEYOND NEW RETAINING WALL (NO TREES TO REMAIN IN THIS AREA)
- 559 --- EXISTING CONTOUR IN FEET (INTERVAL ONE)
- 560 --- EXISTING CONTOUR IN FEET (INTERVAL FIVE)
- 559 --- PROPOSED CONTOUR IN FEET (INTERVAL ONE)
- 560 --- PROPOSED CONTOUR IN FEET (INTERVAL FIVE)
- --- LIMIT OF DISTURBANCE (LOD)

Environmental Management  
Office of Water Resources  
JUL 20 2021

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*Martin D. Senack*

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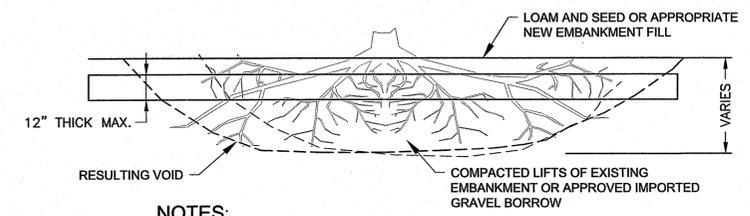
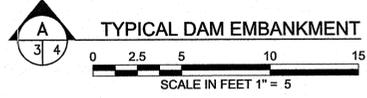
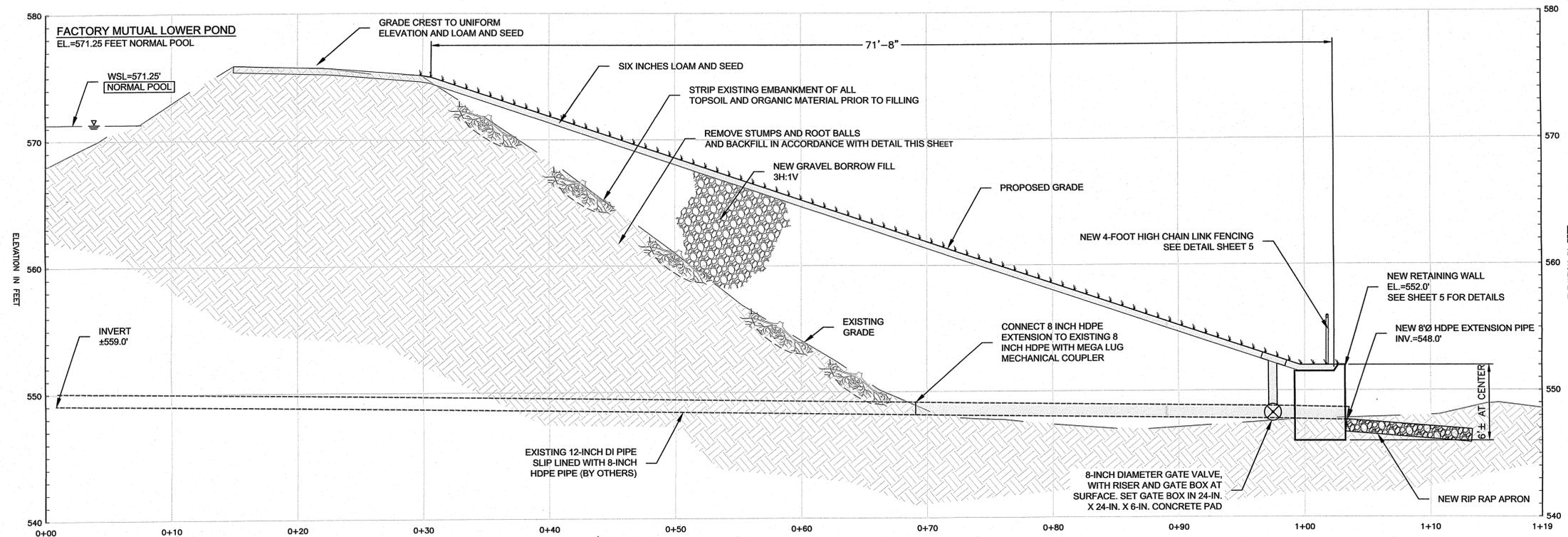
**FACTORY MUTUAL RESEARCH CENTER  
LOWER POND DAM NO. 392  
GLOUCESTER, RHODE ISLAND**

**PROPOSED CONDITIONS & SOIL EROSION  
AND SEDIMENT CONTROL PLAN**

PREPARED BY: GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com	PREPARED FOR: FM GLOBAL 743 REYNOLDS ROAD WEST GLOUCESTER, RHODE ISLAND
PROJ MGR: WLL DESIGNED BY: JEB DATE: JULY 2021	REVIEWED BY: RJM DRAWN BY: TRM PROJECT NO. 34335.01
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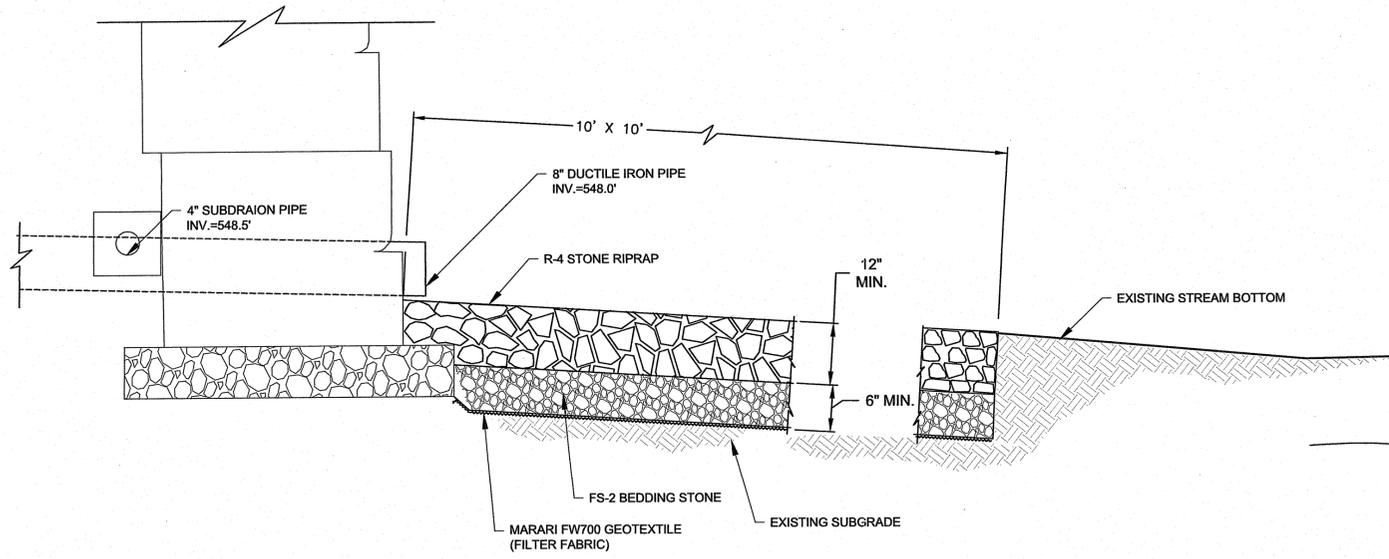
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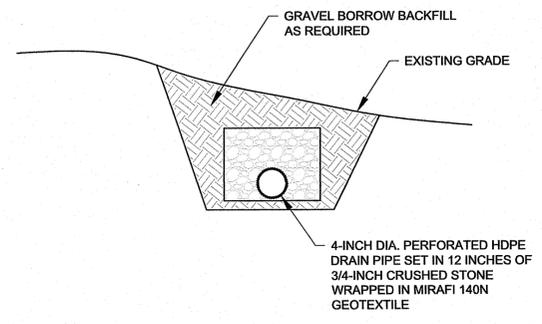


- NOTES:**
1. CONTRACTOR TO FILL ALL VOIDS RESULTING FROM STUMP REMOVAL
  2. (1/2-INCH MAXIMUM DIAMETER TO REMAIN OUTSIDE THE CONE OF THE RESULTING VOID).

**ROOT BALL REMOVAL & BACKFILL DETAIL**  
 NOT TO SCALE



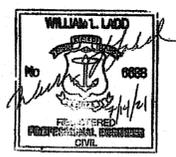
**RIP RAP APRON DETAIL**  
 NOT TO SCALE



**TOE AND WALL DRAIN DETAIL**  
 NOT TO SCALE

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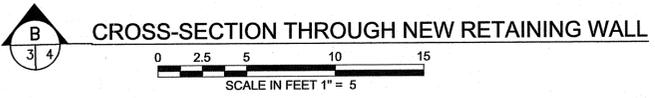
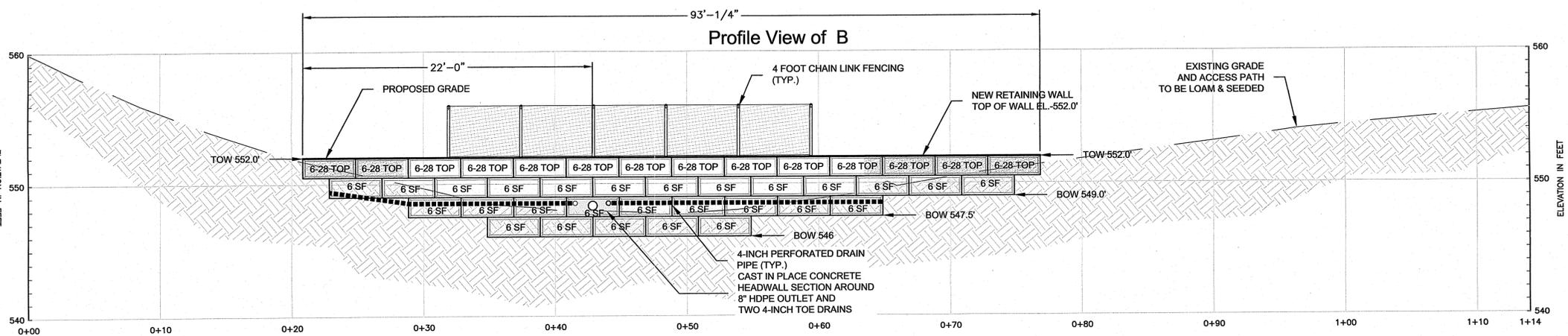
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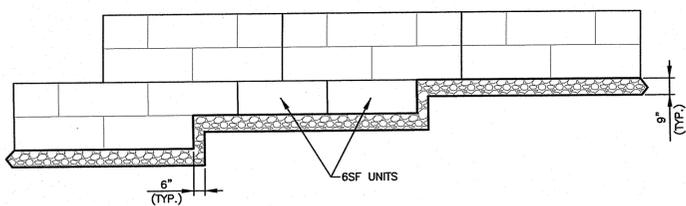
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 GLOUCESTER, RHODE ISLAND**

**TYPICAL SECTIONS AND DETAILS**

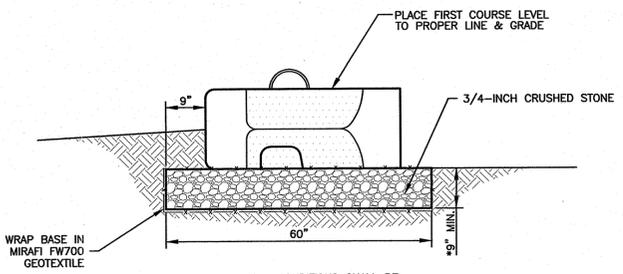
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CHECKED BY: WLL SCALE: AS NOTED REVISION NO. 0	SHEET <b>4</b> SHEET NO. 4 OF 5



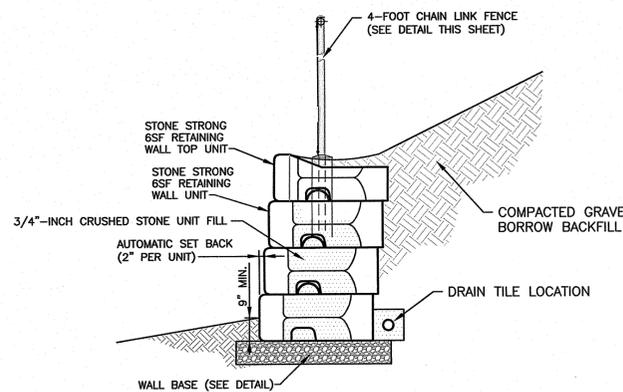
- FENCING SPECIFICATIONS:**
- CODES AND OTHER REGULATIONS: FENCES SHALL CONFORM TO THE REQUIREMENTS OF ANY STATE OR LOCAL CODES HAVING JURISDICTION. THE MORE RIGID SPECIFICATION SHALL GOVERN IN CASE ONE CODE CONFLICTS WITH ANOTHER, OR WITH ANY PART OF THIS SPECIFICATION.
  - FENCE SHALL HAVE A HEIGHT OF 4'-0" OVERALL, UNLESS THE DEGREE OF HAZARD REQUIRES A HIGHER FENCE FOR PERSONNEL PROTECTION. FABRIC SHALL BE 2" MESH CHAIN LINK OF #11 GAGE WIRE WITH TOP AND BOTTOM SELVAGES. ALL FABRIC AND OTHER STEEL PARTS SHALL BE BLACK PVC COATING OR GALVANIZED TO CONFORM TO NOTE 15 OF THIS SPECIFICATION.
  - POST SHALL BE PLACED NOT MORE THAN 10'-0" ON CENTERS. PULL AND LINE POSTS SHALL BE A 1 1/4 STD PIPE. END AND CORNER POST SHALL BE 2" O.D. STD. PIPE.3
  - POST SETTING: ALL POSTS SHALL BE EMBEDDED IN CONCRETE AS SHOWN ON TYPICAL SECTION.
  - TOP AND BOTTOM TENSION WIRE SHALL BE #7 GAGE COILED SPRING TENSION WIRE. FASTEN TO FABRIC WITH PIG RINGS AT 2'-0" INTERVALS.
  - TOP RAIL SHALL BE 1 1/4" DIA. STD PIPE AND SHALL PASS THROUGH BASE OF LINE POST TOPS AND FORM A CONTINUOUS BRACE FROM END TO END STRAIGHT RUN OF FENCE AND SHALL BE SECURELY FASTENED TO TERMINAL POSTS.
  - FABRIC BANDS: THE FABRIC SHALL BE FASTENED TO THE LINE POSTS WITH BANDS OF 11 GAGE WIRE, SPACED AT ABOUT 14" ON CENTER, AND TO THE TOP RAIL WITH 11 GAGE WIRE AT ABOUT 24" CENTERS. THE WIRE SHALL BE GALVANIZED STEEL. AT END, CORNER, AND GATE POSTS, THE FABRIC SHALL BE FASTENED WITH GALVANIZED STRAPS CONNECTED TO A STIFFENING BAR LACED THROUGH THE END LINKS OF THE MESH. THE STRAPS AND BAR SHALL BE MANUFACTURER'S STANDARD.
  - GALVANIZING
    - FABRIC SHALL BE HOT-DIP GALVANIZED AFTER WEAVING AND SHALL HAVE MINIMUM COATING OF 1.2 OUNCES OF ZINC PER SQUARE FOOT OF UNCOATED WIRE SURFACE. OR, AS AN ALTERNATE, MAY BE BAETHANIZED "B" ELECTROLYTICALLY COATED WITH PURE ZINC, 1.2 OUNCES PER SQUARE FOOT OR WIRE SURFACE OF OPTIONAL BLACK PVC COATED.
    - ALL OTHER STEEL PARTS SHALL BE GALVANIZED WITH ASTM A-120, ASTM 1-121, ASTM A-123 OR 1-153 OF BLACK PVC COATED WHICHEVER OWNER SPECIFIES.
    - ANY WELDING TO GALVANIZED MATERIAL SHALL BE GROUND AND CLEAN BEFORE WELDING AND HAND PAINTED. GALVANIZED WHEN WORK IS COMPLETED.



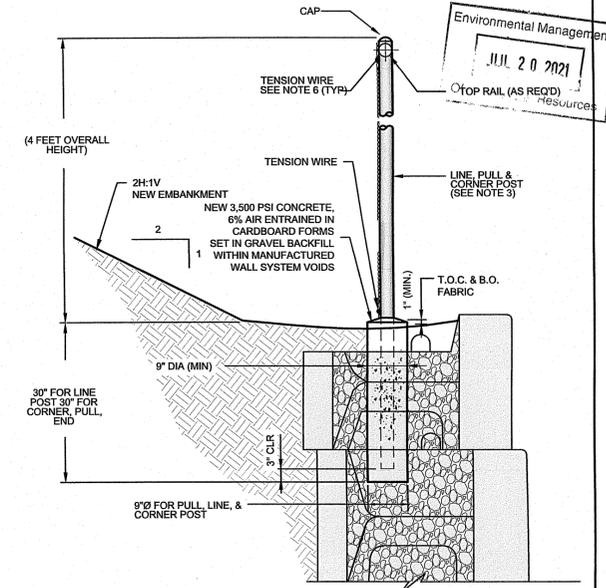
**WALL STEP BASE**  
NOT TO SCALE



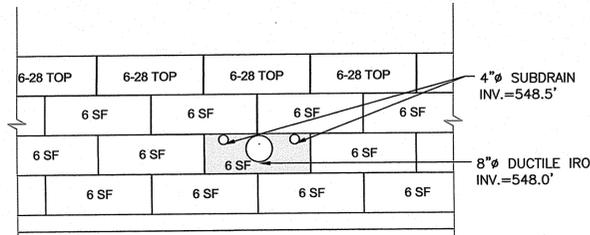
**WALL BASE DETAIL**  
NOT TO SCALE



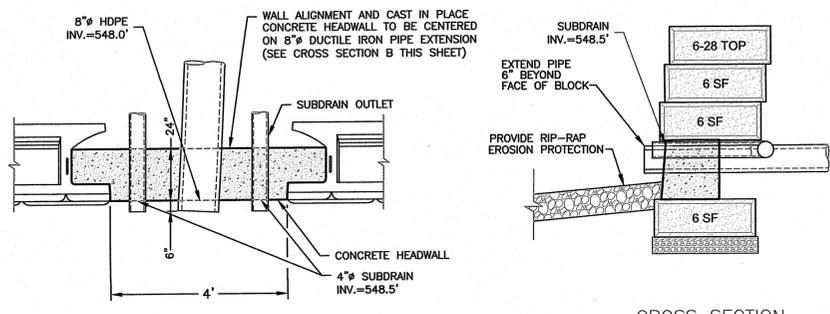
**TYPICAL RETAINING WALL SECTION**  
NOT TO SCALE



**4 FOOT CHAIN LINK FENCING AT TOP OF RETAINING WALL DETAIL**  
NOT TO SCALE



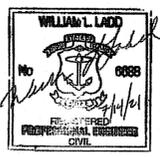
**ELEVATION**



**CONCRETE HEADWALL DETAIL**  
NOT TO SCALE

*William D. Ladd*  
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 APPROVED WITH CONDITIONS  
 AS SPECIFIED IN THE LETTER OF APPROVAL  
 DATED SEP 08 2021 FILE # 21-0202  
 NO CHANGES ALLOWED WITHOUT PRIOR APPROVAL  
 APPROVED PLANS MUST BE AT CONSTRUCTION SITE

**ISSUED FOR PERMIT**



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**FACTORY MUTUAL RESEARCH CENTER  
LOWER POND DAM NO. 392  
GLOUCESTER, RHODE ISLAND**

**RETAINING WALL PLAN AND PROFILE**

PREPARED BY: <b>GZA</b> GZA GeoEnvironmental, Inc. Engineers and Scientists www.gza.com	PREPARED FOR: FM GLOBAL 743 REYNOLDS ROAD WEST GLOUCESTER, RHODE ISLAND
PROJ MGR: WLL DESIGNED BY: JEB DATE: JULY 2021	REVIEWED BY: RJM DRAWN BY: TRM PROJECT NO: 34335.01
CHECKED BY: WLL SCALE: AS NOTED REVISION NO: 0	SHEET <b>5</b> SHEET NO. 5 OF 5

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