

RIDEM FRESHWATER WETLAND SUBMISSION

# GRADING & DRAINAGE PLAN

FOR

## “KEYES WAY DEVELOPMENT”

ASSESSORS PLAT 30 LOT 51

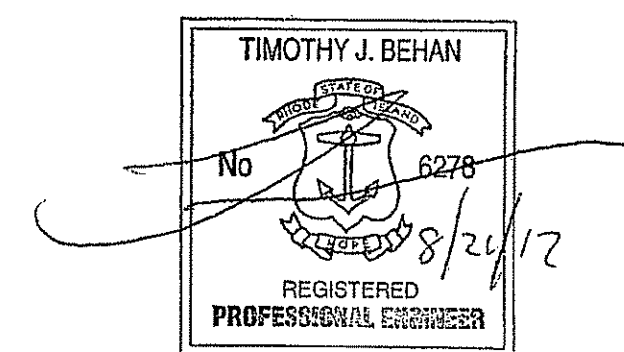
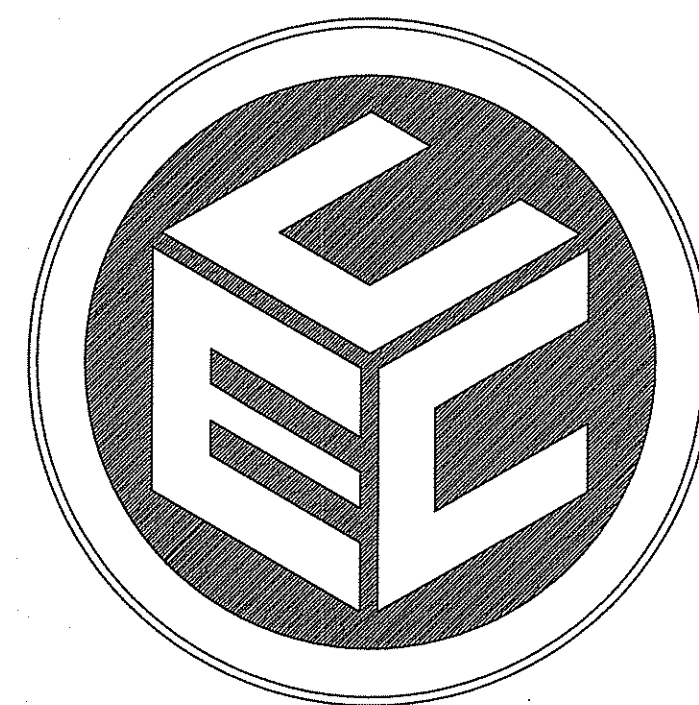
ON

KEYES WAY

IN

WEST WARWICK, RHODE ISLAND

OWNER/APPLICANT  
KEYES PARTNERS LLC  
612 GREENWICH AVENUE  
WARWICK, RI 02886



**COMMONWEALTH**  
ENGINEERS & CONSULTANTS, INC.

400 SMITH STREET  
PROVIDENCE, RHODE ISLAND 02908

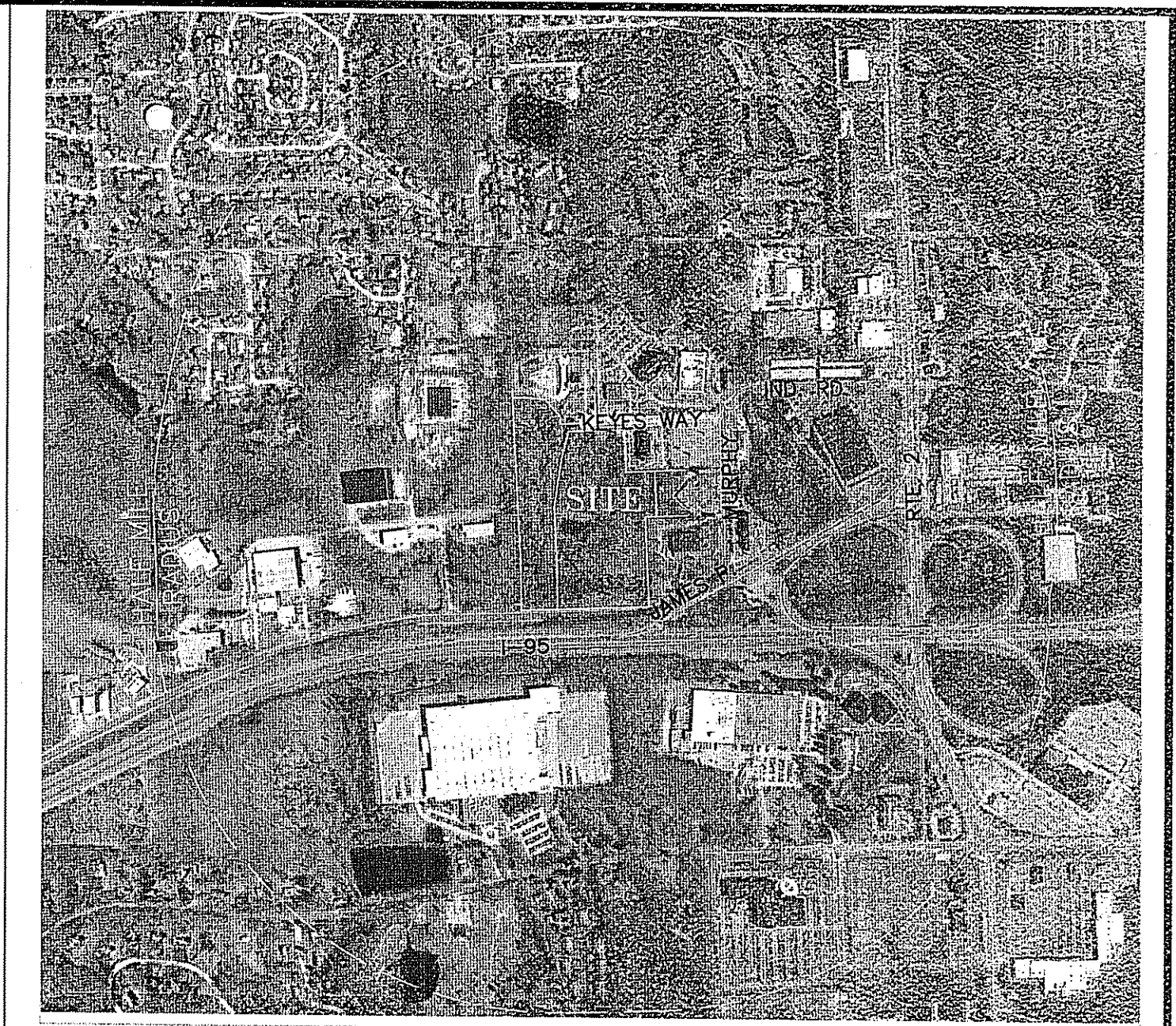
DATE: APRIL 27, 2017  
REVISED: AUGUST 21, 2017

LEGEND	
SUBJECT PROPERTY LINE	—————
ABUTTER LINE	—————
BUILDING SETBACK LINE	—————
EXISTING CONTOUR LINE	---580---
EXISTING FENCE LINE	—X—
EXISTING UTILITY POLE	⊕
WETLAND EDGE	AA-2 AA-3
PERIMETER WETLAND & RIVERBANK WETLAND FLOOD ZONE 'AE'	—————
EXISTING WATER LINE	—W—
EXISTING SEWER LINE	—S—
EXISTING DRAIN LINE	—D—
EXISTING GAS LINE	—G—
EXISTING SEWER MANHOLE	⊙
EXISTING CATCH BASIN	⊕
EXISTING WATER VALVE	⊕
EXISTING HYDRANT	⊕
EXISTING STREAM OR RIVER	~~~~~
EXISTING EASEMENT LINE	—E—
PROPOSED DRAIN LINE	—D—
PROPOSED WATER LINE	—W—
PROPOSED SEWER LINE	—S—
PROPOSED CATCH BASIN	⊕
PROPOSED FLARED END SECTION	⊕
PROPOSED SEWER MANHOLE	⊙
PROPOSED WATER SHUT-OFF	⊕
PROPOSED RETAINING WALL	—R—
PROPOSED CONTOUR LINE	---280---
LIMIT OF DISTURBANCE	—X265.3---
PROPOSED SPOT GRADE	—X265.3---
EXISTING SOILS BOUNDARY	—X265.3---
TEST HOLE	TH-1

CB	CATCH BASIN
CD	CLEANDUT
DMH	DRAIN MAHOLE
EL. OR ELEV.	ELEVATION
FES	FLARED END SECTION
INV.	INVERT
MAX.	MAXIMUM
MIN.	MINIMUM
OW	OBSERVATION WELL
S.F.	SQUARE FEET
SMH	SEWER MANHOLE
TYP.	TYPICAL

THIS PLAN SET HAS BEEN PREPARED TO SERVE ONLY AS THE RIDEM PERMIT AGENCY REVIEW SET AND SHALL NOT BE USED FOR CONSTRUCTION.



LOCUS MAP  
SCALE: 1"=1000'

### LIST OF DRAWINGS

- TITLE SHEET
- EXISTING CONDITIONS
- GRADING & DRAINAGE PLAN
- PROFILE PLAN
- SOIL EROSION AND SEDIMENT CONTROL PLAN
- CONSTRUCTION DETAILS-1
- CONSTRUCTION DETAILS-2

### PROJECT DATA

#### ASSESSORS REFERENCE:

A.P. LOT

#### ZONING REFERENCE:

ZONE: BUSINESS PARK

MINIMUM LOT AREA : 40,000 S.F.  
MINIMUM FRONTAGE : N/A  
MINIMUM SETBACK : FRONT YARD - 50 FEET  
SIDE YARD - 20 FEET  
REAR YARD - 50 FEET  
MAX. BUILDING HEIGHT - 90 FEET  
MAXIMUM BUILDING COVERAGE - 50%

### NOTES:

- THIS PLAN SET HAS BEEN PREPARED FOR GRADING, STORMWATER DESIGN, AND WETLAND PERMIT.
- THE LOCATION AND ELEVATION FOR ALL EXISTING UTILITIES SHALL BE CONSIDERED APPROXIMATE AND MUST BE VERIFIED BY THE CONTRACTOR PRIOR TO ANY CONSTRUCTION. THE CONTRACTOR SHALL VERIFY THE LOCATIONS OF ANY CROSSINGS OF PROPOSED UTILITIES AND EXISTING UTILITIES. ANY DISCREPANCIES IN THE LOCATION OF ANY UTILITY SHOWN OR ENCOUNTERED DURING CONSTRUCTION SHALL BE REPORTED TO COMMONWEALTH ENGINEERS & CONSULTANTS, INC. 400 SMITH STREET, PROVIDENCE, RHODE ISLAND 02908; (401) 273-6600.
- THE CONTRACTOR SHALL BE RESPONSIBLE TO NOTIFY DIG-SAFE (1-800-344-7233) A MINIMUM OF 72 WORKING HOURS, EXCLUDING WEEKENDS AND HOLIDAYS, PRIOR TO THE START OF ANY EXCAVATION WORK. THE NAME OF THE COMPANY PERFORMING THE EXCAVATION MUST BE SUPPLIED TO DIG-SAFE, IF IT IS DIFFERENT FROM THE CALLER.
- IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO MAINTAIN THE INTEGRITY OF ALL EXISTING UTILITIES, STRUCTURES, AND ABUTTING PROPERTIES. THE COST OF ANY REPAIR OR REPLACEMENT OF DAMAGED ITEMS SHALL BE BORNE BY THE CONTRACTOR.
- ONLY RHODE ISLAND DEPARTMENT OF TRANSPORTATION (RIDOT) APPROVED MATERIALS SHALL BE USED. REFER TO RIDOT'S APPROVED MATERIAL LIST.

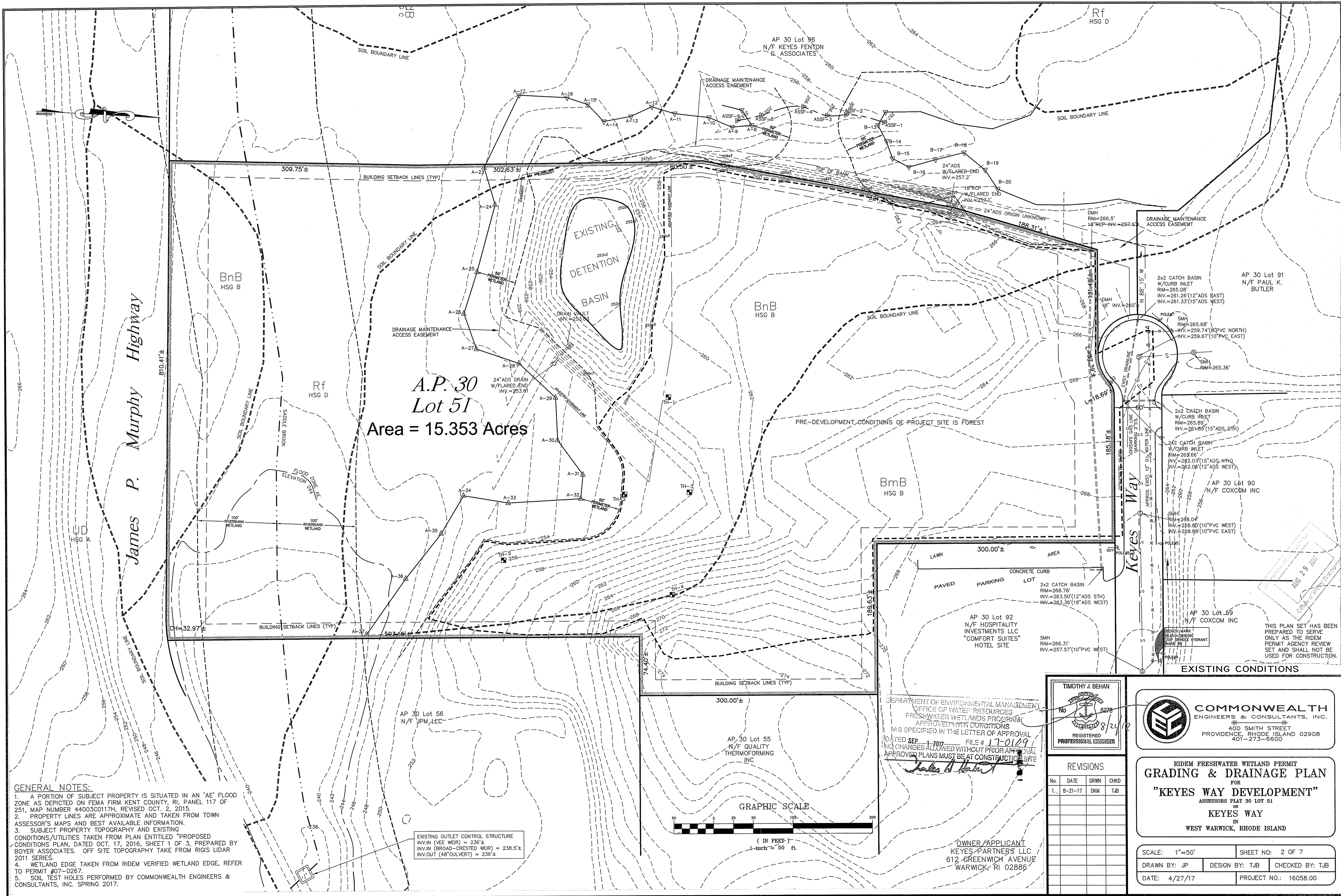
DEPARTMENT OF TRANSPORTATION (RIDOT) APPROVED MATERIALS LIST  
FRESHWATER WETLANDS PROGRAM  
APPROVED WITH CONDITIONS  
AS SPECIFIED IN THE LETTER OF APPROVAL  
DATED SEP 1 2017 FILE # 17-0109  
NO CHANGES ALLOWED WITHOUT PRIOR APPROVAL  
APPROVED PLANS MUST BE AT CONSTRUCTION SITE

*James H. Harker*

### REVISIONS

DATE	DRWN	CHKD

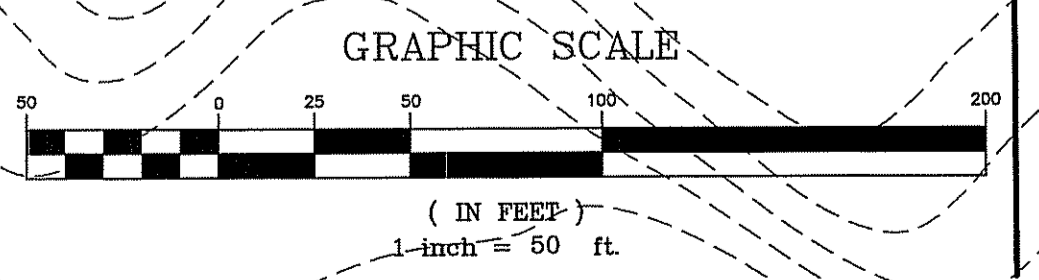
PROJECT NO. 16058.00



**A.P. 30  
Lot 51**  
Area = 15.353 Acres

**GENERAL NOTES:**  
 1. A PORTION OF SUBJECT PROPERTY IS SITUATED IN AN 'AE' FLOOD ZONE AS DEPICTED ON FEMA FIRM KENT COUNTY, RI, PANEL 117 OF 251, MAP NUMBER 44030017H, REVISED OCT. 2, 2015.  
 2. PROPERTY LINES ARE APPROXIMATE AND TAKEN FROM TOWN ASSESSOR'S MAPS AND BEST AVAILABLE INFORMATION.  
 3. SUBJECT PROPERTY TOPOGRAPHY AND EXISTING CONDITIONS/UTILITIES TAKEN FROM PLAN ENTITLED "PROPOSED CONDITIONS PLAN, DATED OCT. 17, 2016, SHEET 1 OF 3, PREPARED BY BOYER ASSOCIATES. OFF SITE TOPOGRAPHY TAKE FROM RIGIS LIDAR 2011 SERIES.  
 4. WETLAND EDGE TAKEN FROM RIDEM VERIFIED WETLAND EDGE, REFER TO PERMIT #07-0267.  
 5. SOIL TEST HOLES PERFORMED BY COMMONWEALTH ENGINEERS & CONSULTANTS, INC. SPRING 2017.

EXISTING OUTLET CONTROL STRUCTURE  
 INV. IN (VEE WEIR) = 236'±  
 INV. IN (BROAD-CRESTED WEIR) = 238.5'±  
 INV. OUT (48" CULVERT) = 236'±



DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
 OFFICE OF WATER RESOURCES  
 FRESHWATER WETLANDS PROGRAM  
 APPROVED WITH CONDITIONS  
 AS SPECIFIED IN THE LETTER OF APPROVAL  
 DATED SEP 1 2017 FILE # 17-0109  
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OWNER/APPLICANT  
 KEYES PARTNERS LLC  
 612 GREENWICH AVENUE  
 WARWICK, RI 02886

TIMOTHY J. BEHAN  
 No. 6278  
 REGISTERED PROFESSIONAL ENGINEER

REVISIONS

No.	DATE	DRWN	CHKD
1.	8-21-17	DKM	TJB

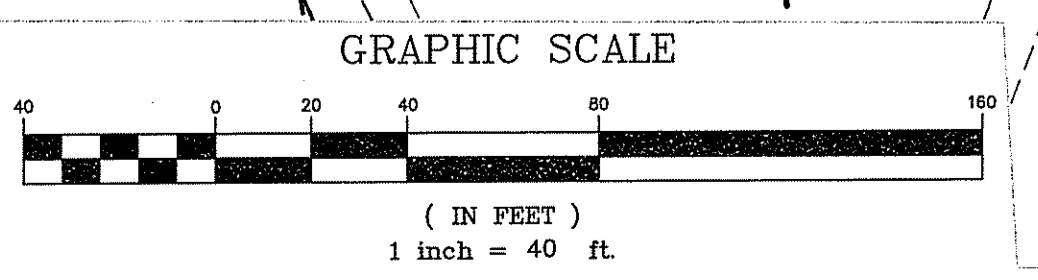
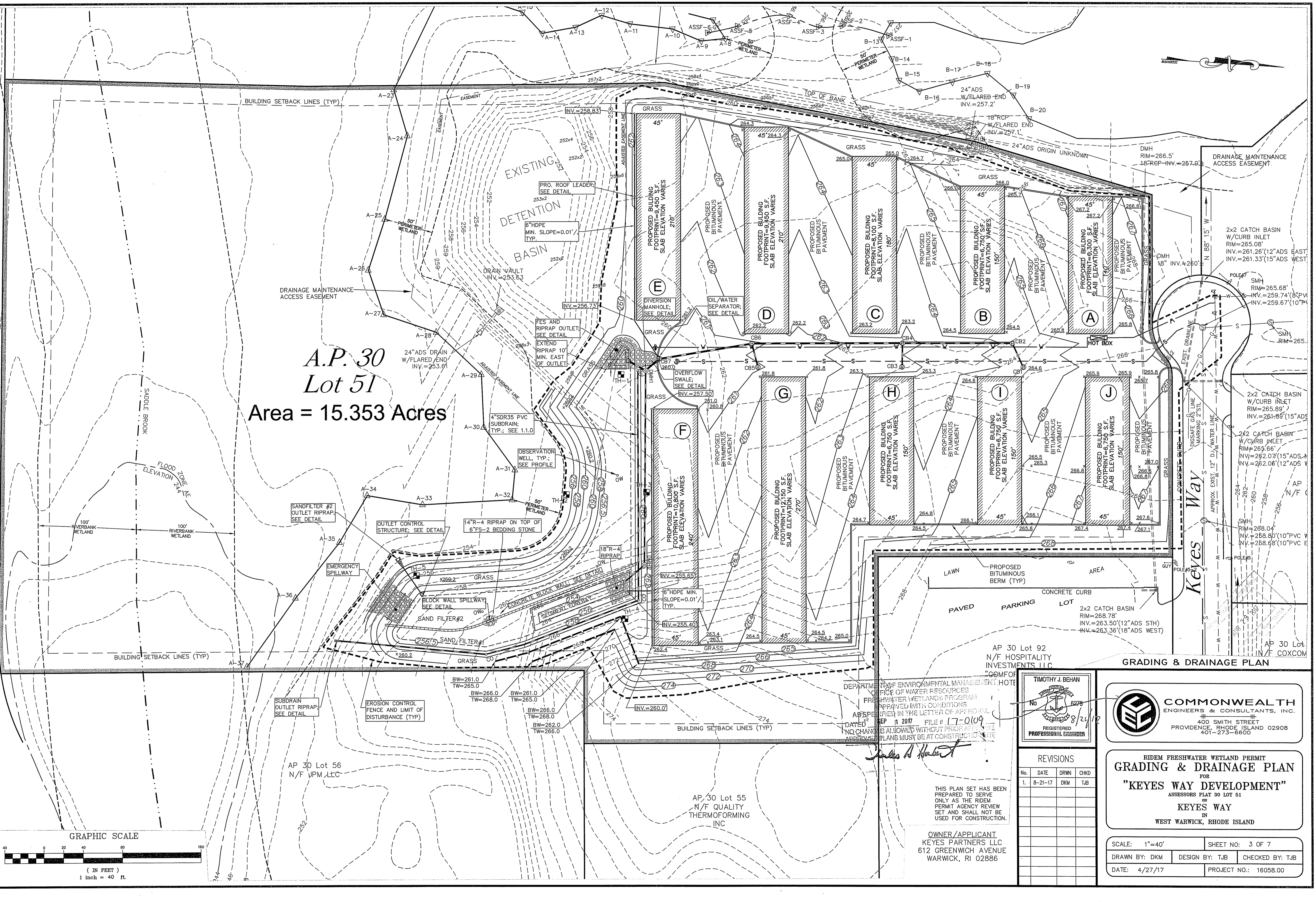
**COMMONWEALTH ENGINEERS & CONSULTANTS, INC.**  
 400 SMITH STREET  
 PROVIDENCE, RHODE ISLAND 02908  
 401-273-6600

RIDEM FRESHWATER WETLAND PERMIT  
**GRADING & DRAINAGE PLAN**  
 FOR  
**"KEYES WAY DEVELOPMENT"**  
 ASSESSORS PLAT 30 LOT 51  
 ON  
**KEYES WAY**  
 IN  
 WEST WARWICK, RHODE ISLAND

SCALE: 1"=50' SHEET NO: 2 OF 7  
 DRAWN BY: JP DESIGN BY: TJB CHECKED BY: TJB  
 DATE: 4/27/17 PROJECT NO.: 16058.00

THIS PLAN SET HAS BEEN PREPARED TO SERVE ONLY AS THE RIDEM PERMIT AGENCY REVIEW SET AND SHALL NOT BE USED FOR CONSTRUCTION.

**A.P. 30  
Lot 51  
Area = 15.353 Acres**



DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF WATER RESOURCES  
FRESHWATER WETLANDS PROGRAM  
APPROVED WITH CONDITIONS  
SPECIFIED IN THE LETTER OF APPROVAL  
DATE: SEP 11 2017 FILE # 17-0109  
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*James A. Hallett*

TIMOTHY J. BEHAN  
No. 6278  
REGISTERED PROFESSIONAL ENGINEER

**COMMONWEALTH**  
ENGINEERS & CONSULTANTS, INC.  
400 SMITH STREET  
PROVIDENCE, RHODE ISLAND 02908  
401-273-6600

REVISIONS

No.	DATE	DRWN	CHKD
1.	8-21-17	DKM	TJB

RIDEM FRESHWATER WETLAND PERMIT  
**GRADING & DRAINAGE PLAN**  
FOR  
**"KEYES WAY DEVELOPMENT"**  
ASSESSORS PLAT 30 LOT 51  
IN  
**KEYES WAY**  
IN  
WEST WARWICK, RHODE ISLAND

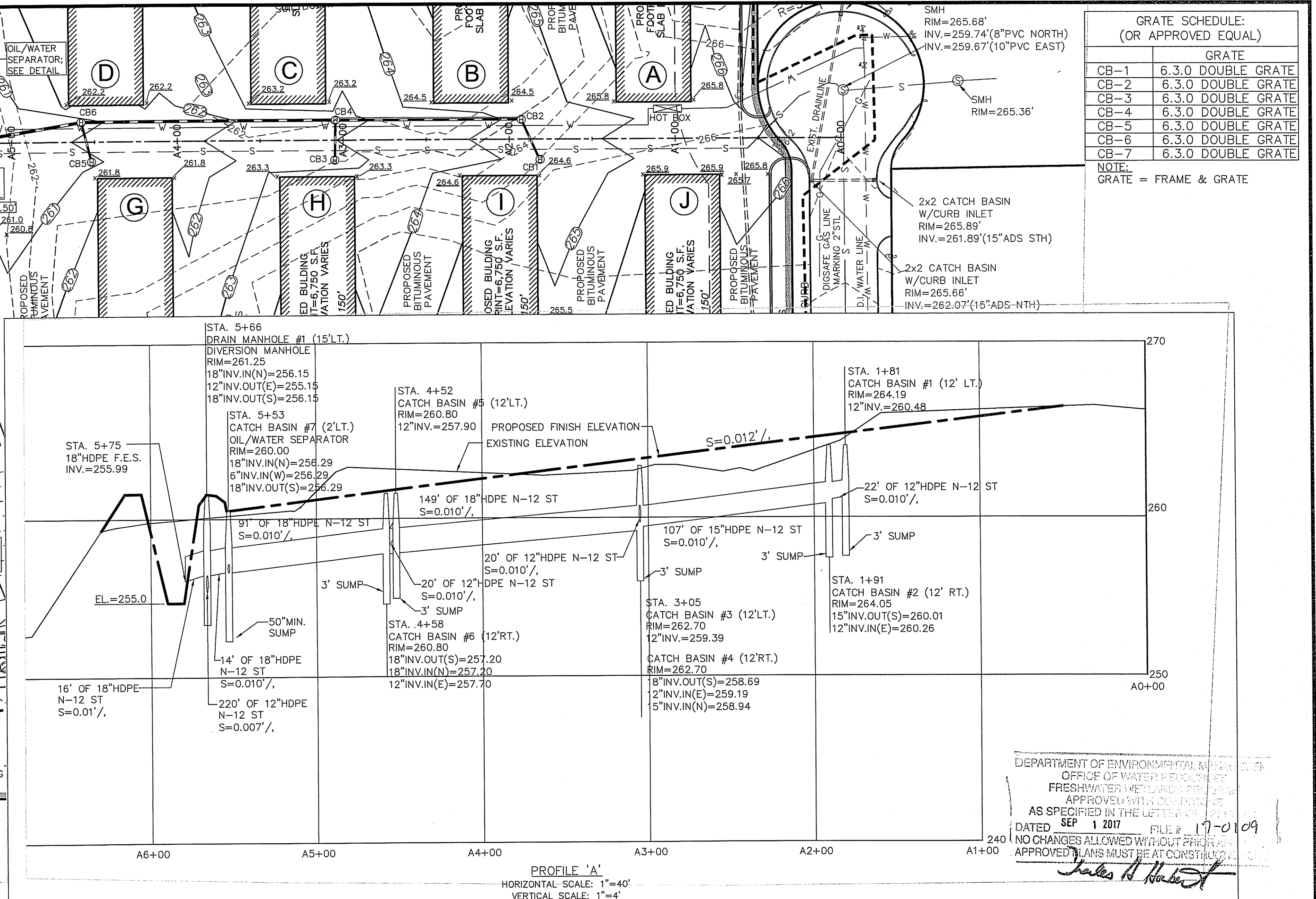
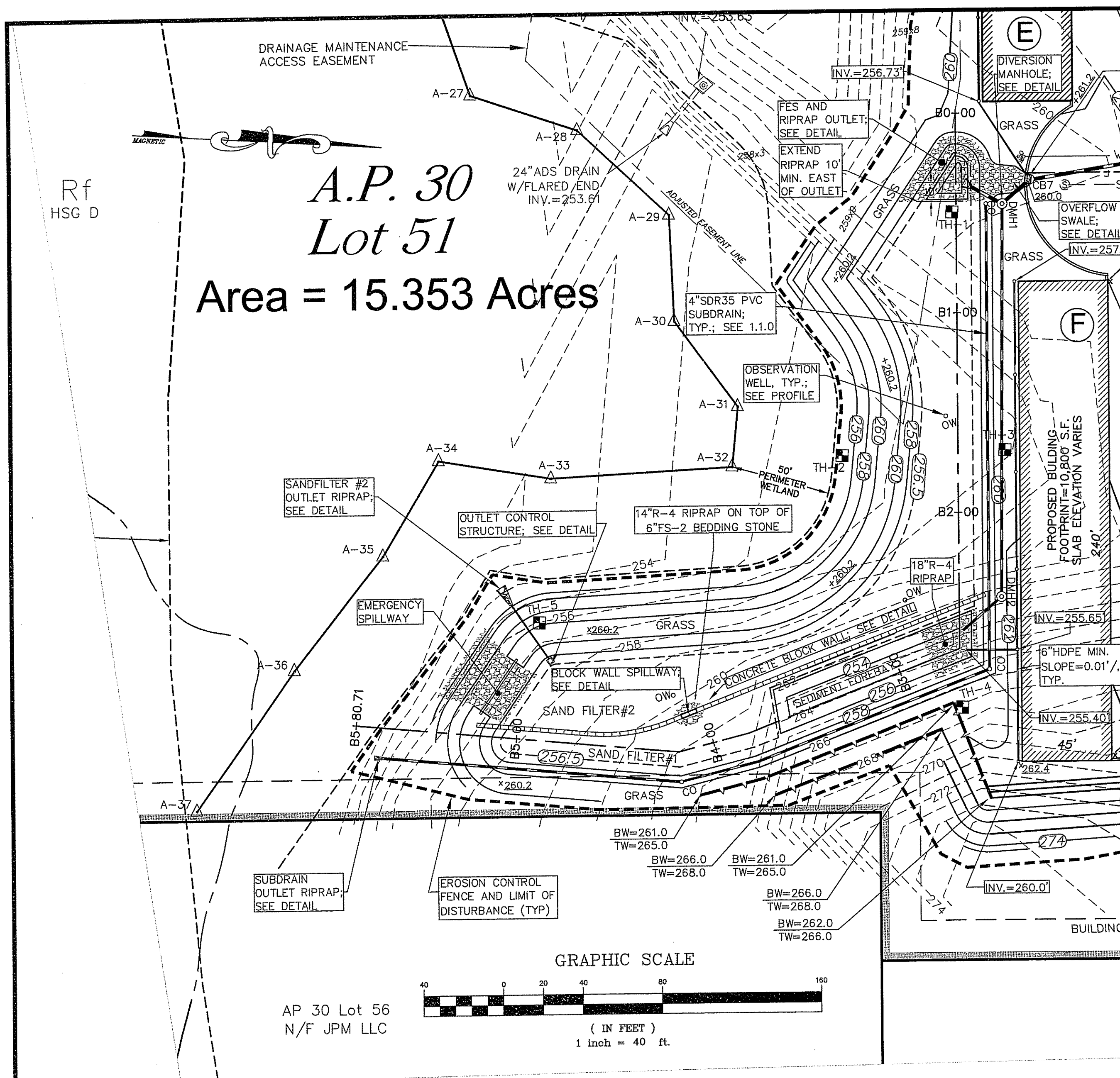
SCALE: 1"=40'  
DRAWN BY: DKM DESIGN BY: TJB CHECKED BY: TJB  
DATE: 4/27/17 SHEET NO: 3 OF 7 PROJECT NO.: 16058.00

OWNER/APPLICANT  
KEYES PARTNERS LLC  
612 GREENWICH AVENUE  
WARWICK, RI 02886

AP 30 Lot 92  
N/F HOSPITALITY  
INVESTMENTS LLC  
COMFOR

AP 30 Lot 55  
N/F QUALITY  
THERMOFORMING  
INC

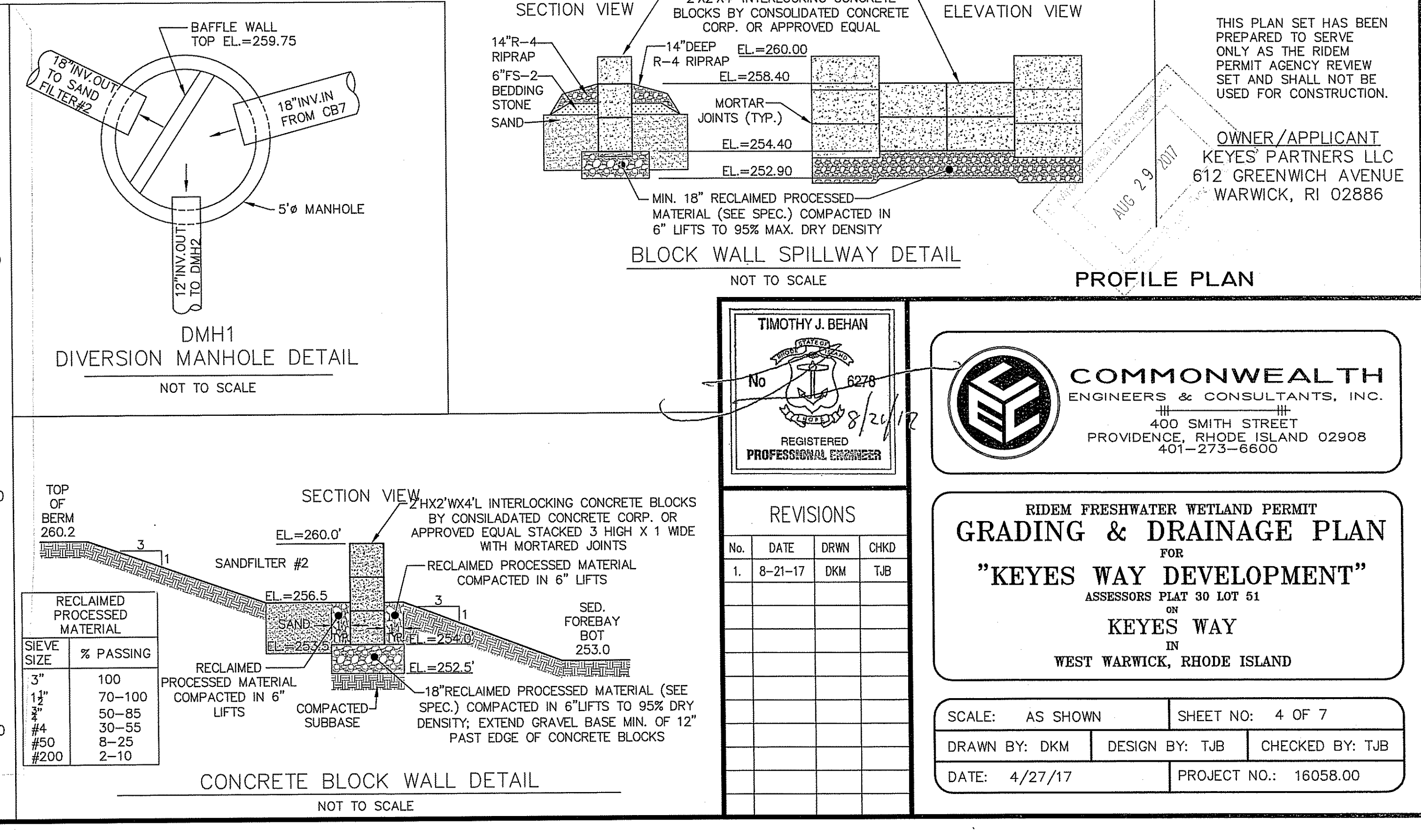
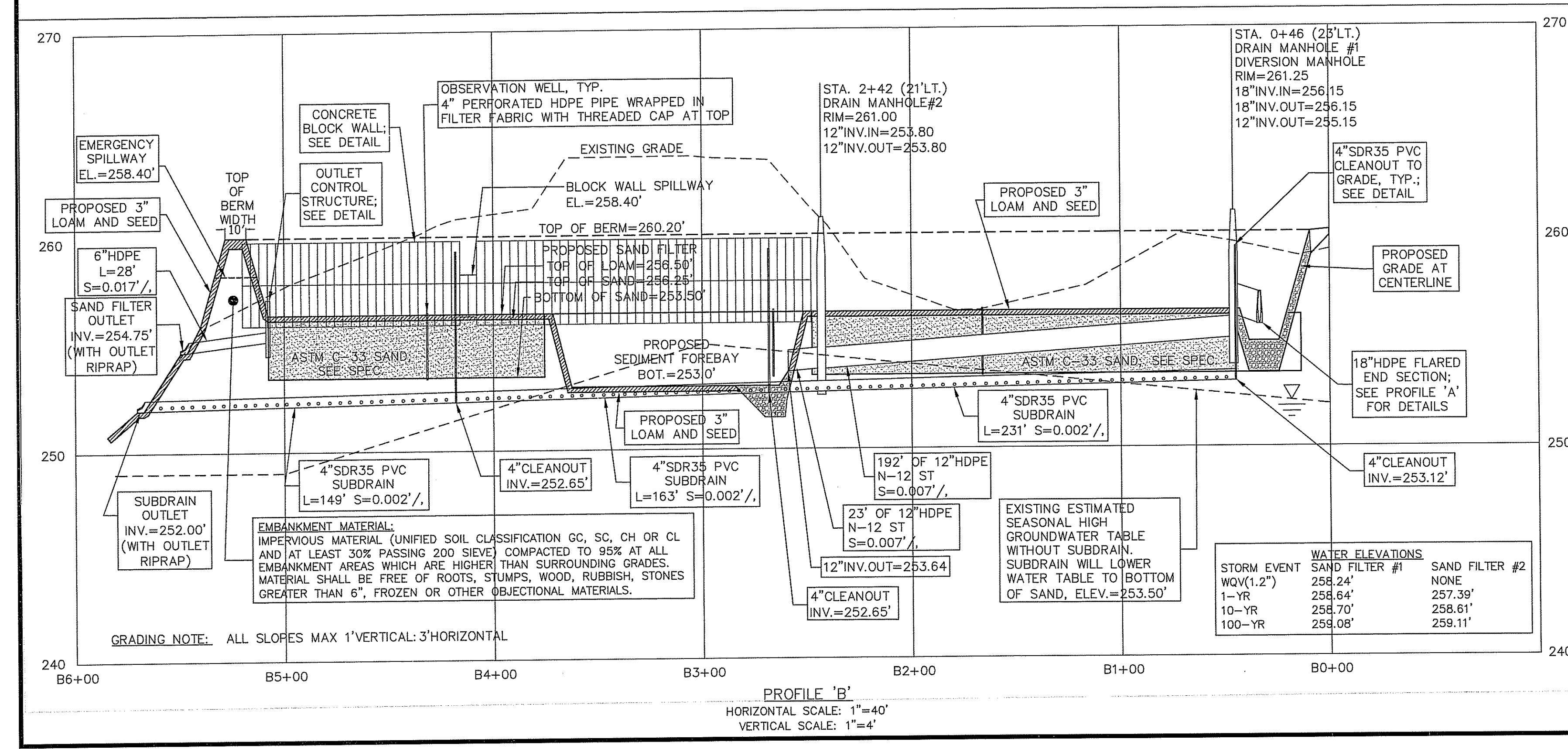
AP 30 Lot 56  
N/F UPM LLC

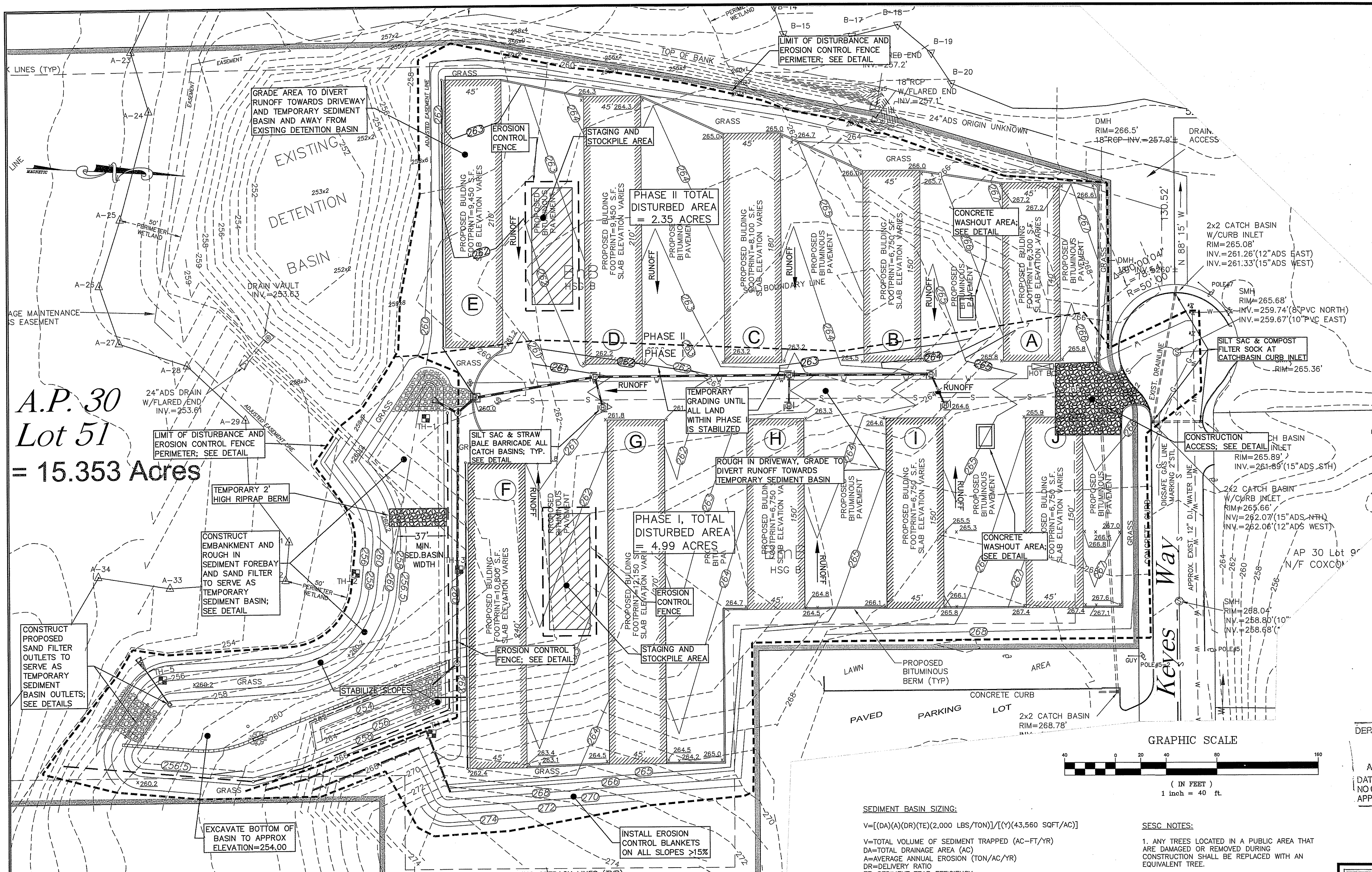


**GRATE SCHEDULE:  
(OR APPROVED EQUAL)**

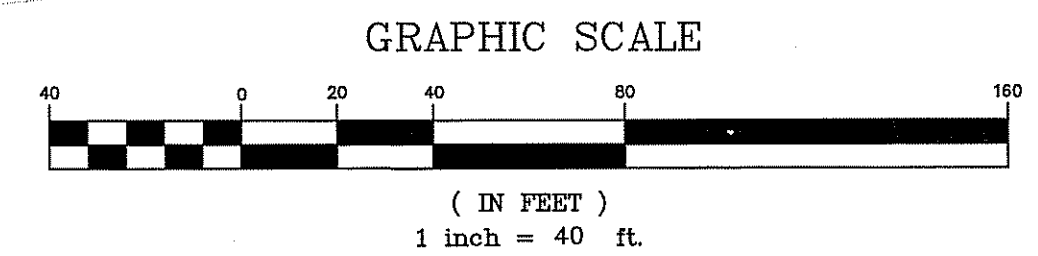
GRATE	GRATE
CB-1	6.3.0 DOUBLE GRATE
CB-2	6.3.0 DOUBLE GRATE
CB-3	6.3.0 DOUBLE GRATE
CB-4	6.3.0 DOUBLE GRATE
CB-5	6.3.0 DOUBLE GRATE
CB-6	6.3.0 DOUBLE GRATE
CB-7	6.3.0 DOUBLE GRATE

NOTE:  
GRATE = FRAME & GRATE





**A.P. 30  
Lot 51  
= 15.353 Acres**



DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF WATER RESOURCES  
FRESHWATER WETLAND PERMIT  
APPROVED WITH CONDITIONS  
AS SPECIFIED IN THE LETTER OF APPROVAL  
DATED SEP 1 2017 FILE # 17-0109  
NO CHANGES ALLOWED WITHOUT PROPER  
APPROVED PLANS LISTED AT COMMONWEALTH

*Charles A. Hurd*

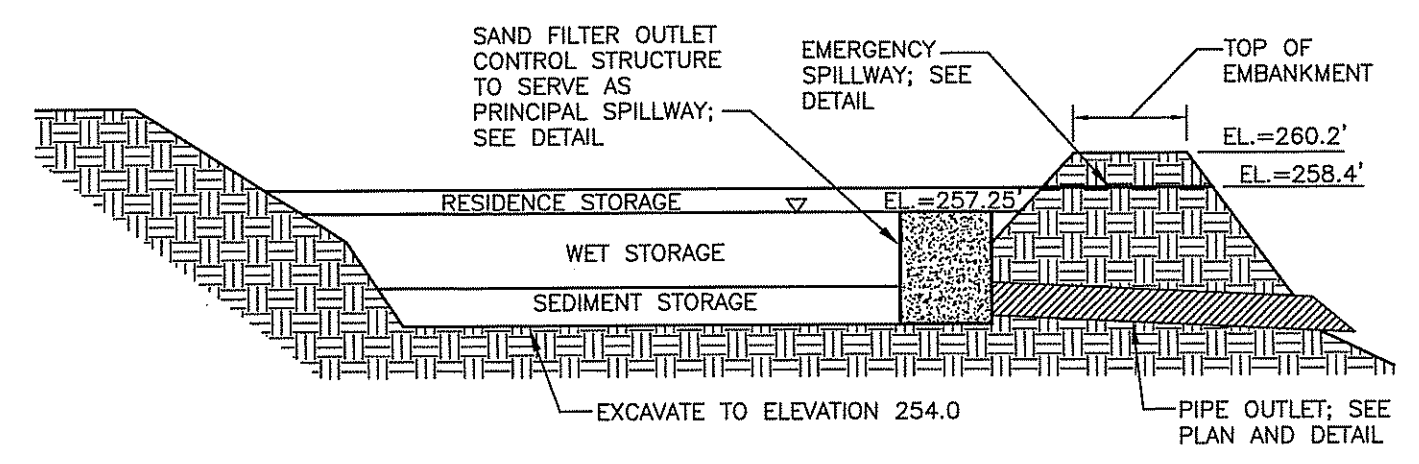
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**SOIL EROSION & SEDIMENT CONTROL PLAN**

- GENERAL NOTES:**
1. THE TEMPORARY SEDIMENT BASIN SHALL MEET ALL REQUIREMENTS FOR TEMPORARY SEDIMENT BASINS OUTLINED IN THE RHODE ISLAND SOIL EROSION AND SEDIMENT CONTROL HANDBOOK (LATEST REVISION) SECTION SIX: SEDIMENT CONTROL MEASURES.
  2. THE TEMPORARY SEDIMENT BASIN SHALL BE SIZED AS SHOWN BELOW.
  3. ALL CUT AND FILL SLOPES SHALL BE 3:1 OR FLATTER.
  4. THE OUTLET SHALL BE LOCATED AT THE MOST DISTANT HYDRAULIC POINT FROM THE INLET.
  5. THE OUTLET CONSISTS OF A PERVIOUS STAKE DIKE WITH A CORE OF MODIFIED RIP RAP AND FACED ON THE UPSTREAM SIDE WITH STONE.
  6. TEMPORARY SEDIMENT BASINS MUST OUTLET ONTO STABILIZED GROUND.
  7. MAXIMUM HEIGHT OF A TEMPORARY SEDIMENT TRAP EMBANKMENT IS LIMITED TO FIVE FEET.
  8. SIDE SLOPES OF THE EMBANKMENT SHALL BE 3:1 OR FLATTER.
  9. MODIFIED RIP RAP SHALL MEET THE REQUIREMENTS OF RIDOT STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION SUBSECTION M.10.03.2 AND BE R-4 GRADE RIPRAP.
- INSPECTION, MAINTENANCE AND REMOVAL REQUIREMENTS:**
1. INSTALL SEDIMENT STORAGE STAKE WITH A MARKER AT ONE HALF OF THE WET STORAGE VOLUME.
  2. INSPECT THE TEMPORARY SEDIMENT TRAP AT LEAST ONCE A WEEK AND WITHIN 24 HOURS OF THE END OF A STORM WITH A RAINFALL AMOUNT OF 0.25 INCHES OR GREATER.
  3. CHECK THE OUTLET TO ENSURE THAT IT IS STRUCTURALLY SOUND AND HAS NOT BEEN DAMAGED BY EROSION OF CONSTRUCTION EQUIPMENT.
  4. CHECK FOR SEDIMENT ACCUMULATION AND FILTRATION PERFORMANCE.
  5. WHEN SEDIMENTS HAVE ACCUMULATED TO ONE HALF THE MINIMUM REQUIRED VOLUME OF THE WET STORAGE, DEWATER THE TRAP AS NEEDED, REMOVE SEDIMENTS AND RESTORE THE TRAP TO ITS ORIGINAL DIMENSIONS.
  6. DISPOSE OF THE SEDIMENT REMOVED FROM THE BASIN IN A SUITABLE AREA.

- INSTALLATION NOTES:**
1. CLEAR, GRUB, AND STRIP ANY VEGETATION AND ROOT MAT FROM ANY PROPOSED EMBANKMENT AND OUTLET AREA.
  2. REMOVE STONES AND ROCKS WHOSE DIAMETER IS GREATER THAN 3 INCHES AND OTHER DEBRIS.
  3. EXCAVATE WET STORAGE AND CONSTRUCT THE EMBANKMENT AND/OR OUTLET AS NEEDED TO ATTAIN THE NECESSARY STORAGE REQUIREMENTS.
  4. USE ONLY FILL MATERIAL AS SPECIFIED IN THE DETAILS FOR THE EMBANKMENT THAT IS FREE FROM EXCESSIVE ORGANICS, DEBRIS, LARGE ROCKS (OVER SIX INCHES) OR OTHER UNSUITABLE MATERIALS. COMPACT THE EMBANKMENT IN 6 INCH LAYERS BY TRAVERSING WITH EQUIPMENT WHILE IT IS BEING CONSTRUCTED.
  5. STABILIZE THE EARTHEN EMBANKMENT USING ANY OF THE FOLLOWING MEASURES: SEEDING FOR TEMPORARY VEGETATION COVER, SEEDING FOR PERMANENT VEGETATIVE COVER, OR SLOPE PROTECTION, IMMEDIATELY AFTER INSTALLATION.



**TEMPORARY SEDIMENT BASIN DETAIL**  
NOT TO SCALE

**SEDIMENT BASIN SIZING:**

$$V = [(DA)(DR)(TE)(2,000 \text{ LBS/TON})] / [(Y)(43,560 \text{ SQFT/AC})]$$

V = TOTAL VOLUME OF SEDIMENT TRAPPED (AC-FT/YR)  
 DA = TOTAL DRAINAGE AREA (AC)  
 DR = DELIVERY RATIO  
 TE = SEDIMENT TRAP EFFICIENCY  
 Y = ESTIMATED SEDIMENT DENSITY IN SEDIMENT BASIN (LBS/CUFT)

DA = 7.5 AC  
 A = 50 TON/AC/YR (CONSTRUCTION AREA)  
 DR = 0.8 (SILT LOAM)  
 TE = 0.8 (AS PER RISESC HANDBOOK)  
 Y = 95 LBS/CUFT (SAND SILT MIXTURE)

**SESC NOTES:**

1. ANY TREES LOCATED IN A PUBLIC AREA THAT ARE DAMAGED OR REMOVED DURING CONSTRUCTION SHALL BE REPLACED WITH AN EQUIVALENT TREE.

V = 0.116 AC-FT/YEAR = 5,100 CUFT  
 WET STORAGE VOLUME MUST BE TWICE THE SEDIMENT STORAGE VOLUME: WET STORAGE VOLUME = 10,200 CUFT  
 MINIMUM WIDTH (MEASURED AT ELEVATION OF SPILLWAY HEIGHT)

W = 10'√Q  
 W = MINIMUM BASIN WIDTH  
 Q = PEAK DISCHARGE FROM 5YR STORM (CFS)  
 Q = 10.73 CFS (AS CALCULATED FROM HYDROCAD)  
 W = 33 FT.

THE MINIMUM LENGTH MUST BE TWICE AS LONG AS THE MINIMUM WIDTH. THEREFORE, THE MINIMUM LENGTH IS 66 FT.

SEDIMENT BASIN DATA:	REQUIRED	PROVIDED
SEDIMENT STORAGE VOLUME	5,100 CU.FT.	>10,000 CU.FT.
WET STORAGE VOLUME	10,200 CU.FT.	>20,000 CU.FT.
WET STORAGE DEPTH	2.0 FT.	2.0 FT.
TOTAL DEPTH	4.0 FT.	4.4 FT.
MINIMUM WIDTH	33 FT.	37 FT.
LENGTH	66 FT.	400 FT.

TIMOTHY J. BEHAN  
No. 6278  
REGISTERED PROFESSIONAL ENGINEER

**REVISIONS**

No.	DATE	DRWN	CHKD
1.	8-21-17	DKM	TJB

RIDEM FRESHWATER WETLAND PERMIT  
**GRADING & DRAINAGE PLAN**  
FOR  
**"KEYES WAY DEVELOPMENT"**  
ASSESSORS PLAT 30 LOT 51  
ON  
**KEYES WAY**  
IN  
WEST WARWICK, RHODE ISLAND

SCALE: 1"=40'	SHEET NO: 5 OF 7
DRAWN BY: DKM	DESIGN BY: TJB
CHECKED BY: TJB	
DATE: 4/27/17	PROJECT NO.: 16058.00

**GENERAL EROSION CONTROL NOTES:**

- THE STATE OF RHODE ISLAND STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION, AMENDED AUG. 2013, AND THE RHODE ISLAND STANDARD DETAILS ARE MADE A PART HEREOF AS FULLY AND COMPLETELY AS IF ATTACHED HERETO. THE 2013 STANDARD SPECIFICATIONS MAY BE OBTAINED AT THE RHODE ISLAND DEPARTMENT OF TRANSPORTATION WEB PAGE. THESE SPECIFICATIONS ARE MADE A PART HEREOF AS FULLY AND COMPLETELY AS IF ATTACHED HERETO.
- ALL REQUIRED SITE IMPROVEMENTS SHALL BE INSPECTED BY THE TOWN ENGINEER TO ENSURE SATISFACTORY COMPLETION. IN NO CASE SHALL THE INSTALLATION OF ANY IMPROVEMENTS BE STARTED UNTIL PRIOR NOTICE IS GIVEN TO THE TOWN ENGINEER. AT LEAST A 48-HOUR NOTICE SHALL BE GIVEN TO THE TOWN ENGINEER PRIOR TO ANY SUCH START OF CONSTRUCTION. A FINAL INSPECTION OF ALL SITE IMPROVEMENTS, UTILITIES AND GRADING WILL BE MADE TO DETERMINE WHETHER THE WORK IS SATISFACTORY AND IN SUBSTANTIAL AGREEMENT WITH THE APPROVED FINAL CONSTRUCTION DRAWING AND THE TOWN SPECIFICATIONS.
- LOCATION AND DEPTH OF EXISTING UTILITIES ARE APPROXIMATE AND HAVE BEEN PLOTTED FROM THE BEST AVAILABLE INFORMATION. THE CONTRACTOR SHALL CHECK AND VERIFY LOCATIONS OF ALL EXISTING UTILITIES BOTH UNDERGROUND AND OVERHEAD. ANY DAMAGE TO EXISTING UTILITIES AS SHOWN OR NOT SHOWN ON THE PLANS SHALL BE THE CONTRACTOR'S RESPONSIBILITY. COSTS OF SUCH DAMAGE SHALL BE BORNE BY THE CONTRACTOR. NO EXCAVATION SHALL BE DONE UNTIL ALL INVOLVED UTILITY COMPANIES ARE NOTIFIED 48-HOURS IN ADVANCE. THE CONTRACTOR SHALL BE RESPONSIBLE TO NOTIFY DIG-SAFE (1-800-344-7233) A MINIMUM OF 48 WORKING HOURS, EXCLUDING WEEKENDS AND HOLIDAYS, PRIOR TO THE START OF ANY EXCAVATION AND/OR BLASTING WORK. THE NAME OF THE COMPANY PERFORMING THE EXCAVATION AND/OR BLASTING WORK MUST BE SUPPLIED TO DIG-SAFE, IF IT IS DIFFERENT FROM THE CALLER.
- IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO OBTAIN ANY AND ALL PERMITS REQUIRED BY, BUT NOT LIMITED TO, THE STATE OF RHODE ISLAND, THE FEDERAL GOVERNMENT, LOCAL (TOWN/CITY) GOVERNMENT AND ALL INDIVIDUAL UTILITY COMPANIES PRIOR TO COMMENCING ANY WORK.
- THE CONTRACTOR SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING ALL TEMPORARY SEDIMENTATION AND EROSION CONTROLS.
- ALL MATERIAL FOR FILL SHALL BE CLEAN AND FREE OF MATTER WHICH COULD POLLUTE ANY DOWN STREAM WATERCOURSE.
- FILL MATERIAL SHALL BE COMPACTED IN ONE FOOT (MAXIMUM) LIFTS TO AT LEAST 95% OF THE MAXIMUM DRY DENSITY AS DETERMINED IN ACCORDANCE WITH ASTM D-1557 (MODIFIED PROCTOR TEST).
- ALL CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS.
- ALL AREAS NOT TO BE DEVELOPED THAT ARE COMPACTED BY CONSTRUCTION ACTIVITIES SHALL BE RESTORED BY TILLING THE TOP 12" OF SOIL.
- ANY TREE LOCATED ON PUBLIC PROPERTY THAT IS DAMAGED OR REMOVED DURING CONSTRUCTION, SHALL BE REPLACED WITH AN EQUIVALENT TREE.

**EROSION CONTROL AND SOIL STABILIZATION PROGRAM:**

- TEMPORARY TREATMENTS SHALL CONSIST OF A STRAW, FIBER MULCH OR PROTECTIVE COVERS SUCH AS A MAT OR FIBER LINING (BURLAP, JUTE, FIBERGLASS NETTING, EXCELSIOR BLANKETS). THEY SHALL BE INCORPORATED INTO THE WORK AS WARRANTED OR AS ORDERED BY THE ENGINEER.
- STRAW APPLICATIONS SHOULD BE IN THE AMOUNT OF 2000 LBS/ACRE.
- ALL STRAW BALES OR TEMPORARY PROTECTION SHALL REMAIN IN-PLACE UNTIL AN ACCEPTABLE STAND OF GRASS OR APPROVED GROUND COVER IS ESTABLISHED.
- THE TOPSOIL SHALL HAVE A SANDY LOAM TEXTURE RELATIVELY FREE OF SUBSOIL MATERIAL, STONES, ROOTS, LUMPS OF SOIL, TREE LIMBS, TRASH OR CONSTRUCTION DEBRIS AND SHALL CONFORM WITH RHODE ISLAND STANDARD SPECIFICATION M.20.01, AS AMENDED.
- THE SEED MIX SHALL BE INOCULATED WITHIN 24-HOURS BEFORE MIXING AND PLANTING, WITH APPROPRIATE INOCULUM FOR EACH VARIETY.
- THE DESIGN MIX UTILIZED IN ALL DISTURBED AREAS TO BE SEED SHALL BE COMPRISED OF THE FOLLOWING:
 

TYPE	% BY WEIGHT	SEEDING DATE
CREeping RED FESCUE	70	APRIL 1 - JUNE 15
ASTORIA BENTGRASS	5	AUGUST 15 - OCT.
BIRDFOOT TREEFOIL	15	
PERENNIAL RYEGRASS	10	
- APPLICATION RATE 100 LBS/ACRE  
LIMING AND FERTILIZING AS REQUIRED TO COMPLIMENT OR UPGRADE EXISTING CONDITIONS.

- THE CONTRACTOR MUST REPAIR AND/OR RESEED ANY AREAS THAT DO NOT DEVELOP WITHIN THE PERIOD OF ONE YEAR, AND SHALL DO SO AT NO ADDITIONAL EXPENSE.
- THE NORMAL ACCEPTABLE SEASONAL SEEDING DATES ARE APRIL 1ST THROUGH OCTOBER 15TH.
- STABILIZATION OF ONE FORM OR ANOTHER AS DESCRIBED ABOVE SHALL BE ACHIEVED WITHIN FIFTEEN (15) DAYS OF FINAL GRADING.
- STOCKPILES OF TOPSOIL AND EARTH MATERIALS SHALL NOT BE LOCATED NEAR WATERWAYS. THEY SHALL HAVE SIDE SLOPES NO GREATER THAN THIRTY PERCENT (30%) AND STOCKPILE SHALL ALSO BE SEED AND/OR STABILIZED.
- ON BOTH STEEP AND LONG SLOPES, CONSIDERATION SHOULD BE GIVEN TO "CRIMPING" OR "TRACKING" TO TACK DOWN MULCH APPLICATIONS.
- TREES TO BE RETAINED SHALL BE FENCED OR ROPED OFF TO PROTECT THEM FROM CONSTRUCTION EQUIPMENT.
- ALL PROPOSED PLANTINGS MUST BE ACCOMPLISHED AS EARLY AS POSSIBLE UPON COMPLETION OF GRADING AND CONSTRUCTION, AND AT LEAST PRIOR TO ANY ON-SITE OCCUPANCY.
- ALL PROPOSED PLANTINGS MUST BE MAINTAINED BY THE PROPERTY OWNER TO ENSURE SURVIVAL.
- SHOULD ANY OR ALL OF THE PROPOSED PLANTS FAIL TO SURVIVE AT LEAST ONE (1) FULL GROWING SEASON FROM THE TIME THEY HAVE BEEN PLANTED, THE OWNER SHALL BE FULLY RESPONSIBLE FOR REPLACING AND MAINTAINING THE SAME PLANT SPECIES FOR ONE (1) ADDITIONAL GROWING SEASON.
- ALL DISTURBED AREAS MUST BE SEED OR PLANTED WITHIN THE CONSTRUCTION SEASON.
- TEMPORARY SEEDING MUST BE DONE WITHIN ONE (1) MONTH AFTER DISTURBANCE.
- ALL DISTURBED AREAS MUST BE PERMANENTLY SEED OR PLANTED BEFORE OCTOBER 1ST, IF NOT THEY MUST BE TEMPORARILY SEED.
- SLOPES CONSTRUCTED AT, OR STEEPER THAN, 15% SHALL HAVE TEMPORARY EROSION CONTROL MATTING UTILIZED AS A SUPPORTIVE METHOD IN ADDITION TO THE METHODS DESCRIBED ABOVE.
- ALL PROPOSED INLETS AND OUTLETS SHALL BE PROTECTED WITH RIPRAP BOTH TEMPORARILY AND PERMANENTLY. SEE DETAILS.
- ALL CONSTRUCTION SHALL BE IN ACCORDANCE WITH THE STANDARDS AND PROCEDURES SET FORTH IN THE TOWN ZONING ORDINANCES; RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL, AMENDED MARCH 2015 AS PREPARED BY THE RIDEM AND CRMC; AND RHODE ISLAND EROSION AND SEDIMENT CONTROL HANDBOOK AS PREPARED BY RHODE ISLAND STATE CONSERVATION COMMITTEE, REVISED 2014, (AS REVISED).

- EXTREME CARE SHALL BE EXERCISED AS TO PREVENT ANY MATERIALS FROM ENTERING WETLANDS, THE ROADWAYS, ROADWAY DRAINAGE SYSTEMS, AND ADJACENT PROPERTY.
- STAKED STRAW BALES OR SILT FENCE SHALL BE INSTALLED WHERE SHOWN ON THE PLAN AND AS REQUIRED TO PREVENT SEDIMENTATION ONTO ADJACENT PROPERTIES, WETLANDS AND THE ROADWAY DRAINAGE SYSTEMS.
- DENUDED SLOPES SHALL NOT BE UNATTENDED OR EXPOSED FOR MORE THAN 2 WEEKS OF TIME OR FOR THE INACTIVE WINTER SEASON.
- NO UNDISTURBED AREAS SHALL BE CLEARED OF EXISTING VEGETATION AFTER OCTOBER 15 OF ANY CALENDAR YEAR OR DURING ANY PERIOD OF FULL OR LIMITED WINTER SHUTDOWN. ALL DISTURBED SOILS EXPOSED PRIOR TO OCTOBER 15 OF ANY CALENDAR YEAR SHALL BE SEED OR PROTECTED BY THAT DATE. ANY SUCH AREAS THAT DO NOT HAVE ADEQUATE VEGETATIVE STABILIZATION, AS DETERMINED BY THE RESIDENT ENGINEER OR ENVIRONMENTAL INSPECTOR, BY NOVEMBER 15 OF ANY CALENDAR YEAR, MUST BE STABILIZED THROUGH THE USE OF EROSION CONTROL MATTING OR STRAW MULCH, IN ACCORDANCE WITH SPECIFICATIONS CONTAINED WITHIN THE R.I. SOIL EROSION AND SEDIMENT CONTROL HANDBOOK. IF WORK CONTINUES WITHIN ANY OF THESE AREAS DURING THE PERIOD FROM OCTOBER 15 THROUGH APRIL 15, CARE MUST BE TAKEN TO ENSURE THAT ONLY THE AREA REQUIRED FOR THAT DAY'S WORK IS EXPOSED, AND ALL ERODIBLE SOIL MUST BE RESTABILIZED WITHIN WORKING DAYS. ANY WORK TO CORRECT PROBLEMS RESULTING FROM FAILURE TO COMPLY WITH THIS PROVISION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. THERE WILL BE NO SEPARATE PAYMENT FOR THIS PROVISION. IT SHALL BE CONSIDERED INCIDENTAL TO CONSTRUCTION OPERATIONS. STABILIZATION OF ONE FORM OR ANOTHER AS DESCRIBED ABOVE SHALL BE ACHIEVED WITHIN 2 WEEKS OF FINAL GRADING.
- PREPARE TEMPORARY SEEDING AREA, PROVIDE AND PLANT SEED IN ACCORDANCE WITH "RHODE ISLAND EROSION AND SEDIMENT CONTROL HANDBOOK" AS PREPARED BY THE RHODE ISLAND STATE CONSERVATION COMMITTEE, REVISED 2014, (AS REVISED).

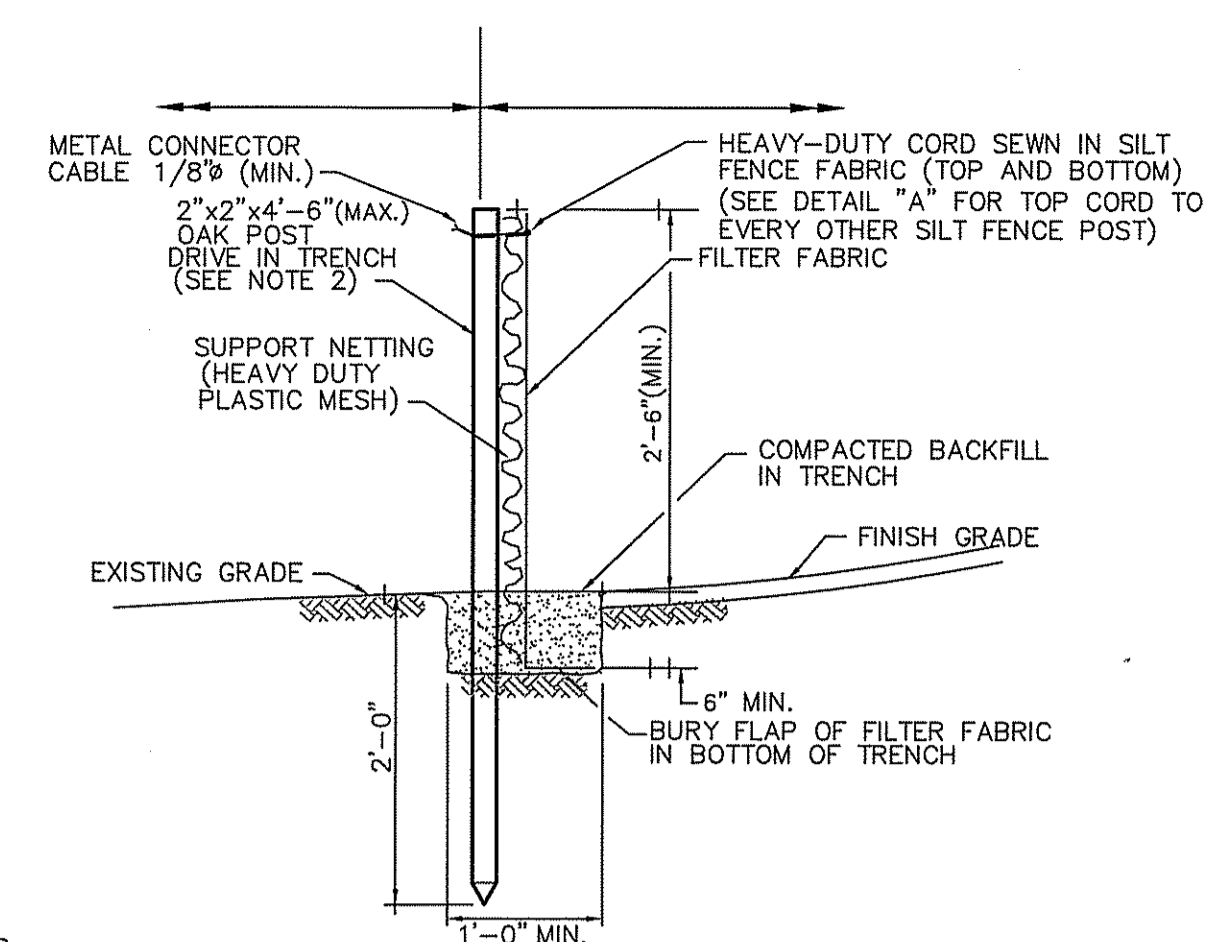
- SEED MIX:**
- ANNUAL RYE GRASS 1.5 LBS/1,000 SQ. FT.
- TEMPORARY TREATMENTS TO STABILIZE EXPOSED SOILS SHALL CONSIST OF STRAW OR FIBER MULCH OR PROTECTIVE COVERS, SUCH AS A MAT OR FIBER LINING (BURLAP, JUTE, FIBERGLASS NETTING, EXCELSIOR BLANKETS). THEY SHALL BE INCORPORATED INTO THE WORK WHEN SOILS ARE EXPOSED FOR TWO WEEKS OR MORE OR AS ORDERED BY THE TOWN ENGINEER OR OWNER AT NO ADDITIONAL COST.
  - STRAW APPLICATIONS SHALL BE IN THE AMOUNT OF 3,000-4,000 LBS/ACRE.
  - ALL NEW STRAW BALES OR TEMPORARY PROTECTION SHALL REMAIN IN PLACE UNTIL AN ACCEPTABLE STAND OF GRASS OR APPROVED GROUND COVER IS ESTABLISHED AND POTENTIAL SEDIMENTATION SOURCES ARE REMOVED.
  - STOCKPILES SHALL HAVE NO SLOPE GREATER THAN 2:1 AND SHALL BE SURROUNDED BY STAKED STRAW BALES OR SILT FENCE. STOCKPILES EXPOSED FOR EXTENSIVE PERIODS OF TIME SHALL RECEIVE TEMPORARY TREATMENT CONSISTING OF PLANTING ANNUAL RYE GRASS OR PROTECTING WITH STRAW OR FIBER MATTING.
  - DURING CONSTRUCTION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EROSION CONTROL MAINTENANCE AND SHALL INSPECT/RATE AS NEEDED.
  - ADDITIONAL STRAW BALES/SILT FENCE OR OTHER TREATMENTS SHALL BE PROVIDED AS DIRECTED BY ENGINEER, RIDEM OR LOCAL REPRESENTATIVES AT NO ADDITIONAL COST.
  - THE CONTRACTOR SHALL INSPECT THE SOIL EROSION AND CONTROL DEVICES AFTER EVERY RAIN EVENT. ANY SOIL MIGRATION PAST THE DEVICES SHALL BE REMOVED AND THE SOIL EROSION CONTROL DEVICES SHALL BE RE-ESTABLISHED TO PREVENT SOIL EROSION. ALL ACCUMULATED SEDIMENT IN FRONT OF THE DEVICES SHALL BE REMOVED AFTER EVERY RAIN STORM EVENT.
  - ALL DISTURBED SOIL AREAS SHALL BE PROTECTED AGAINST SOIL EROSION BY PLACEMENT OF STRAW BALES AND/OR SILT FENCE ON THE DOWN GRADIENT SIDE OF THE DISTURBED AREA(S). SHOULD THE VOLUME AND/OR RATE OF STORMWATER RUNOFF BE TOO GREAT FOR A SINGLE DEVICE, THEN MULTIPLE DEVICES ARE REQUIRED SUCH AS SILT FENCE BACKED-UP WITH STRAW BALES. THESE ADDITIONAL DEVICES ARE NOT SHOWN ON THE PLAN BUT SHALL BE PROVIDED AND INSTALLED BY THE CONTRACTOR AT NO ADDITIONAL COST TO THE OWNER.
  - AT THE END OF THE PROJECT CONSTRUCTION ALL SEDIMENT IN MANHOLE SUMPS AND WITHIN ANY DRAINAGE STRUCTURE OR BASIN SHALL BE REMOVED.
  - WHEN CONSTRUCTING THE SAND FILTER AND SEDIMENT FOREBAY BMPs, EXCAVATE OUT AN AREA TILL THE BOTTOM EXCAVATION OF THE BMPs AS NEEDED TO RESTORE THE PRE-EXISTING SOIL INFILTRATION RATES.

**SEQUENCE AND STAGING OF LAND DISTURBING ACTIVITIES:**

- CONTRACTOR TO REFER TO RIDEM RIPDES SOIL EROSION AND SEDIMENT CONTROL (SESC) REPORT AS WELL AS THESE DRAWINGS.
  - SURVEY AND STAKE LIMIT OF DISTURBANCE FOR PLACEMENT OF SEDIMENTATION CONTROL DEVICES.
  - PLACE PERIMETER SEDIMENTATION CONTROL DEVICES, SEE DETAILS. IN NO CASE SHALL THE LIMIT OF WORK EXTEND BEYOND THE SEDIMENTATION CONTROL DEVICES.
  - CONSTRUCT CONSTRUCTION ENTRANCE DEVICE, SEE DETAIL.
- PHASE I**
- CLEAR & ROUGH GRADE SITE DRIVEWAY AND AREA FOR STOCKPILING SOIL. GRADE SITE DRIVEWAY TO SERVE AS A SWALE TO DIRECT RUNOFF TO TEMPORARY SEDIMENT BASIN.
  - CONSTRUCT SEDIMENT FOREBAY AND SAND/FILTER EMBANKMENT AND OUTLET DEVICES. EXCAVATE OUT SEDIMENT FOREBAY AND SAND FILTER TO SERVE AS TEMPORARY SEDIMENT BASIN. EXCAVATE TO ELEVATION SPECIFIED (EL.=254.0) AND DO NOT INSTALL SAND LAYER IN SAND FILTER.
  - CLEAR & GRUB PHASE I AREA.
  - GRADE & COMPACT PHASE I AREA.
  - CONSTRUCT UTILITIES WITH SITE ACCESSWAY (SEWER, WATER, DRAINAGE, ETC.) INSTALL SILT SACS AND INLET PROTECTION FOR CATCH BASINS.
  - EXCAVATE & POUR PHASE I BUILDING FOUNDATIONS.
- PHASE II**
- CLEAR & GRUB PHASE II AREA.
  - GRADE & COMPACT PHASE II AREA.
  - EXCAVATE & POUR PHASE II BUILDING FOUNDATIONS.
  - INSTALL & COMPACT GRAVEL BASE COURSE.
  - PAVE BINDER COURSE.
  - CLEAN OUT SEDIMENT FOREBAY, SAND FILTER, OUTLET DEVICES, AND ALL DRAINAGE STRUCTURES. REMOVE AND DISPOSE ALL ACCUMULATED SEDIMENT IN A SUITABLE AREA. EXCAVATE OUT BMPs TO REQUIRED ELEVATION AND TILL BOTTOM IF NEEDED TO RESTORE SOIL INFILTRATION RATES. FINISH CONSTRUCTION OF SEDIMENT FOREBAY AND SAND FILTER.
  - FINISH REMAINDER OF CONSTRUCTION AND PAVE SURFACE COURSE.
  - REMOVE TEMPORARY SOIL EROSION DEVICES.

**POLLUTION PREVENTION NOTES:**

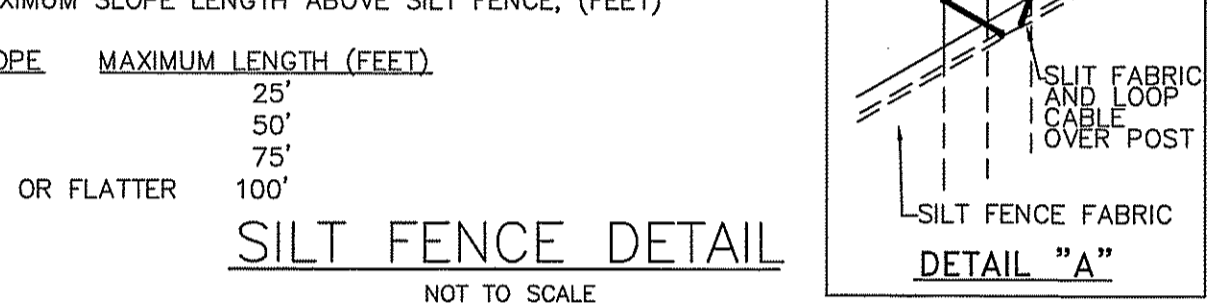
- REFERENCE IS MADE TO APPENDIX G "POLLUTION PREVENTION AND SOURCE CONTROLS" OF THE RHODE ISLAND STORMWATER DESIGN AND INSTALLATION STANDARDS MANUAL, AMENDED 2015. THIS DOCUMENT SHALL BE REFERENCED WHEN IMPLEMENTING THE POLLUTION PREVENTION TECHNIQUES. A BRIEF SUMMARY OF THE TECHNIQUES IS PROVIDED BELOW. REFER TO THE ABOVE REFERENCE FOR ALL TECHNIQUES TO BE IMPLEMENTED.
- COLLECT WASTE CONTAINERS:**
  - OWNER TO PROVIDE TRASH CONTAINER. CONTAINER TO HAVE A COVER TO PREVENT TRASH FROM BLOWING OUT.
  - SWEEP STREET/PARKING AREA ANNUALLY.
- HAZARDOUS MATERIALS:**
  - CONTRACTOR TO STORE ALL HAZARDOUS MATERIALS INSIDE STORAGE LOCKERS OR OTHER APPROVED METHODS WHICH HAVE SECONDARY CONTAINMENT SYSTEMS.
  - SECONDARY CONTAINMENT MUST BE INCLUDED WHEREVER SPILLS MIGHT OCCUR (E.G. FUELING AND HAZARDOUS MATERIAL TRANSFER AND LOADING AREAS).
- ROADS AND PARKING AREA MANAGEMENT:**
  - SWEEP STREET/PARKING AREA ANNUALLY.
  - USE DEICING CHEMICALS AND SAND JUDICIOUSLY SINCE THEY CAUSE WATER QUALITY PROBLEMS. PROVIDE AND SPREAD IN ACCORDANCE WITH APPENDIX G RECOMMENDATIONS.
  - PLOW SNOW AND STORE ACCUMULATED SNOW PILES AWAY FROM SAND FILTER SYSTEM AND SEDIMENT FOREBAY.
    - KEEP SNOW PILES 50 FEET FROM WETLAND EDGE AND AREA SUBJECT TO STORM FLOW.
    - DEBRIS SHOULD BE CLEANED FROM THE SITE PRIOR USING THE SITE FOR SNOW DISPOSAL.
    - DEBRIS SHOULD BE CLEARED FROM THE SITE AND PROPERLY DISPOSED OF AT THE END OF THE SNOW SEASON.
  - ONLY USE ASPHALT BASED SEALANTS WHEN SEALING THE PAVEMENTS. DO NOT USE COAL-TAR BASED SEALANTS SINCE THESE ARE MORE TOXIC.
- SEPTIC SYSTEM:**
  - NO SEPTIC SYSTEMS PROPOSED.
- LAWN, GARDEN, AND LANDSCAPE MANAGEMENT:**
  - LAWN CONVERSION - REDUCE THE AMOUNT OF LAWN BY REPLACING LAWN WITH GARDEN BEDS CONTAINING FLOWERS/SHRUBS. LAWNS REQUIRE MORE MAINTENANCE THAN FLOWER BEDS.
  - SOIL BUILDING - MAINTAIN A HEALTHY LAWN BY TESTING SOIL FOR PH, FERTILITY, COMPACTION, TEXTURE, AND EARTH WORM CONTENT.
  - GRASS SELECTION - SELECT DROUGHT TOLERANT GRASS SPECIES. REFER TO APPENDIX G FOR ADDITIONAL INFORMATION.
  - MOWING AND THATCH MANAGEMENT - KEEP GRASS HEIGHT HIGH SUCH AS 2 TO 3 INCHES IN HEIGHT. THIS WILL REDUCE WEED GROWTH.
  - FERTILIZATION - MINIMIZE FERTILIZATION. FERTILIZE NO MORE THAN TWICE A YEAR. APPLY CAREFULLY SO FERTILIZER DOES NOT SPREAD TO ADJACENT SURFACES. REFRAIN FROM THE USE OF PHOSPHATE BASED FERTILIZERS. REFER TO APPENDIX G FOR ADDITIONAL INFORMATION.
  - PEST MANAGEMENT - LIMIT PESTICIDE USE. CHOOSE PESTICIDES THAT POSE THE LEAST RISK TO HUMAN HEALTH AND THE ENVIRONMENT. REFER TO APPENDIX G FOR ADDITIONAL INFORMATION.
  - SENSIBLE IRRIGATION - WATER NO MORE THAN 1" PER WEEK. USE DROUGHT-RESISTANT GRASSES. CUT GRASS AT 2-3 INCHES.



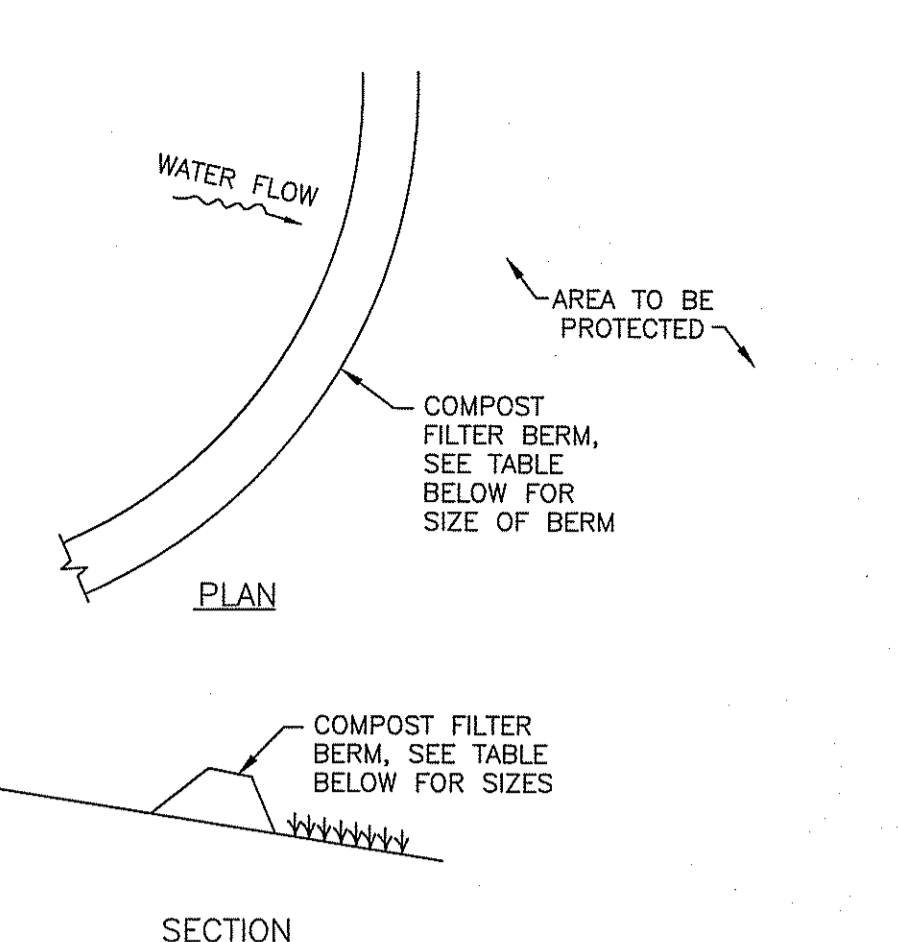
- NOTES:**
- SHALL BE IN ACCORDANCE WITH SECTION 206 OF THE R.I. STANDARD SPECIFICATIONS.
  - 22"x2"x4"-6" (MAX.) OAK POSTS FOR SILT FENCE SHALL BE LOCATED 0'-0" (MAX.) O.C. IN WETLAND AREAS AND 3' 1"x4"-6" (MIN.) POSTS PERMITTED FOR PRE-FABRICATED SILT FENCE.
  - SILT FENCE SHALL BE INSTALLED BEFORE ANY GRUBBING OR EARTH EXCAVATION TAKES PLACE.

**TABLE:**

SLOPE	MAXIMUM LENGTH (FEET)
2:1	25'
3:1	50'
4:1	75'
5:1 OR FLATTER	100'



**COMPOST FILTER BERM DETAIL "A"**

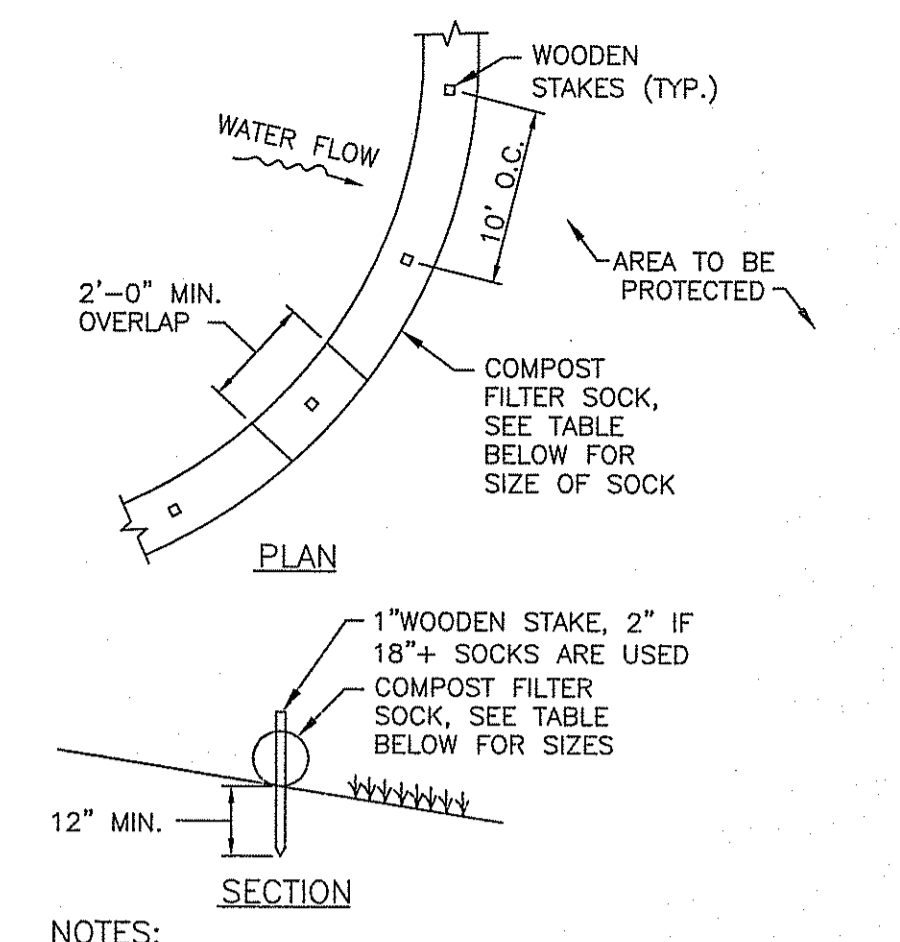


- NOTES:**
- MATERIAL SHALL BE WOOD CHIP MULCH OR APPROVED EQUAL IN ACCORDANCE WITH RI SOIL EROSION CONTROL MANUAL, AS AMENDED.
  - SUBMIT SHOP DRAWING OF COMPOST MATERIAL FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT.
  - COMPOST FILTER BERM SHALL BE INSTALLED IN ACCORDANCE WITH THE TABLE PROVIDED BELOW:

**TABLE:**

SLOPE	MAXIMUM SLOPE LENGTH ABOVE COMPOST FILTER BERM, (FEET)			
	8" SOCK	12" SOCK	18" SOCK	24" SOCK
2%	300'	375'	500'	650'
5%	200'	250'	275'	325'
10%	100'	125'	150'	200'
20%	50'	65'	70'	130'
30%	30'	40'	45'	65'
40%	30'	40'	45'	50'
50%	20'	25'	30'	35'

**COMPOST FILTER BERM**



- NOTES:**
- ALL MATERIAL TO MEET REQUIREMENTS OF SECTION 206 OF RI STANDARD SPECIFICATIONS.
  - SUBMIT SHOP DRAWING OF COMPOST MATERIAL FOR REVIEW AND APPROVAL PRIOR TO PLACEMENT.
  - COMPOST FILTER SOCK IS AN 'OR EQUAL' TO COMPOST FILTER BERM WHEN INSTALLED IN ACCORDANCE WITH THE TABLE PROVIDED BELOW:

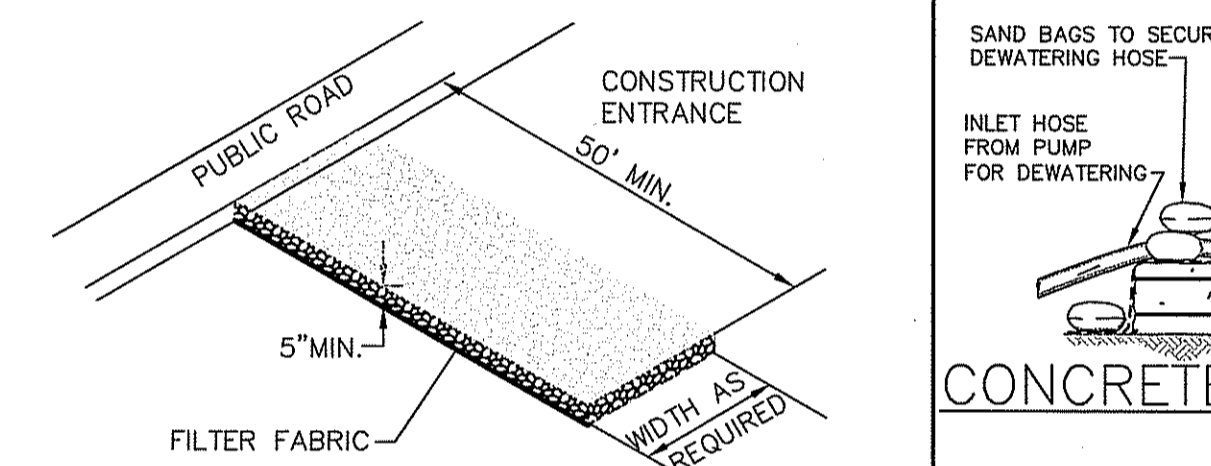
**TABLE:**

SLOPE	MAXIMUM SLOPE LENGTH ABOVE COMPOST FILTER SOCK, (FEET)			
	8" SOCK	12" SOCK	18" SOCK	24" SOCK
2%	300'	375'	500'	650'
5%	200'	250'	275'	325'
10%	100'	125'	150'	200'
20%	50'	65'	70'	130'
30%	30'	40'	45'	65'
40%	30'	40'	45'	50'
50%	20'	25'	30'	35'

**COMPOST FILTER SOCK**

**SEDIMENTATION CONTROL PROGRAM:**

- EXTREME CARE SHALL BE EXERCISED SO AS TO PREVENT ANY UNSUITABLE MATERIAL FROM ENTERING DOWNSTREAM WATERCOURSES AND STORMWATER DRAINAGE SYSTEMS.
- DURING CONSTRUCTION, THE CONTRACTOR AND/OR DEVELOPER SHALL BE RESPONSIBLE FOR MAINTAINING DRAINAGE AND RUN-OFF FLOW DURING STORMS.
- SEDIMENTATION CONTROL DEVICES SHALL BE INSPECTED CLOSELY AND MAINTAINED PROMPTLY AFTER EACH RAINFALL.
- CARE SHALL BE TAKEN SO AS NOT TO PLACE "REMOVED SEDIMENTS" WITHIN THE PATH OF EXISTING, NEWLY CREATED (BOTH TEMPORARY AND PERMANENT) DRAINAGE WATERCOURSES OR THOSE AREAS SUBJECT TO STORMWATER FLOWAGE.
- ADDITIONAL STRAW BALES OR SACKS SHALL BE LOCATED AS CONDITIONS WARRANT OR AS DIRECTED BY THE ENGINEER.
- SEDIMENTATION TRAPS SHALL BE PROVIDED AT ALL DRAINAGE STRUCTURES DURING CONSTRUCTION (SILT SACS, STRAW BALES, TEMPORARY DITCHES, ETC.).
- EROSION AND SEDIMENTATION CONTROLS SHALL BE INSTALLED AT THE SITE PRIOR TO THE START OF CONSTRUCTION AND BE PROPERLY MAINTAINED UNTIL ALL DISTURBED AREAS ARE STABILIZED INCLUDING:
  - THE INSTALLATION OF AN EROSION CONTROL FENCE IN ALL LOCATIONS SHOWN ON THE APPROVED SITE PLANS AND WHERE OTHERWISE NECESSARY TO PREVENT SEDIMENTS FROM ENTERING DOWNSTREAM WATERCOURSES AND STORMWATER DRAINAGE SYSTEMS.
  - ALL DISTURBED AREAS ARE TO BE PERMANENTLY STABILIZED WITH APPROVED GROUND COVER PRIOR TO THE COMPLETION OF THE PROJECT. AREAS EXPOSED TO EROSION ARE TO BE COMPLETELY COVERED WITH SPREAD STRAW MULCH.
  - CATCH BASINS WILL BE PROTECTED WITH SILT SACS & STRAW BALE FILTERS THROUGHOUT THE CONSTRUCTION PERIOD AND UNTIL ALL DISTURBED AREAS ARE THOROUGHLY STABILIZED. SUMPS ARE TO BE CLEANED IMMEDIATELY FOLLOWING INSTALLATION OF PERMANENT PAVEMENT.
  - OUTFALLS ARE TO BE PROTECTED BY STRAW BALE FILTERS UNTIL DISTURBED AREAS ARE PERMANENTLY STABILIZED WITH APPROVED GROUND COVER.
  - ALL CONTROL MEASURES WILL BE MAINTAINED IN EFFECTIVE CONDITION THROUGHOUT THE CONSTRUCTION PERIOD.
  - THE LIMITS OF ALL CLEARING, GRADING AND DISTURBANCE SHALL BE KEPT TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. ALL AREAS OUTSIDE OF THE LIMITS OF DISTURBANCE SHALL REMAIN TOTALLY UNDISTURBED.
  - UPON COMPLETION OF CONSTRUCTION OF SITE IMPROVEMENTS AND THE STORMWATER DRAINAGE SYSTEM, ALL CATCH BASINS AND STORM DRAIN PIPING SHALL BE CLEANED OF SEDIMENT. SEDIMENT FOREBAY AND SAND FILTER SHALL BE CLEANED OF SEDIMENT TO THE DESIGN GRADES INDICATED.
  - NO TRAFFIC DURING CONSTRUCTION SHALL THE SUBGRADE OF THE SITE BE SUCH THAT SURFACE RUNOFF WILL BE PERMITTED TO DIRECTLY ENTER ANY DRAINAGE STRUCTURE. A TEMPORARY DEPRESSED AREA AROUND THE STRUCTURE SHALL BE INCORPORATED AS A SEDIMENTATION TRAP. THE MOUTH OF THE TRAP SHALL BE LINED WITH STRAW BALES AROUND THE COMPLETE PERIMETER DURING ALL PRELIMINARY STAGES. THE TOP OF THE STRUCTURE SHALL ALWAYS BE HIGHER THAN THE SUBGRADE.
  - STRAW BALE EROSION CHECKS SHALL BE MAINTAINED AROUND ALL CATCH BASINS UNTIL ALL UPGRADIENT DISTURBED AREAS ARE STABILIZED BY PAVEMENT OR VEGETATION.
  - ALL COMPONENTS OF THE DRAINAGE SYSTEM MUST BE CLEANED OF SEDIMENT BY THE APPLICANT OR HIS REPRESENTATIVE IMMEDIATELY AFTER CONSTRUCTION IS COMPLETED.
  - INSPECT TEMPORARY DIVERSIONS AND THEIR COMPONENTS ONCE A WEEK AND AFTER EVERY RAINFALL. DAMAGE CAUSED BY CONSTRUCTION TRAFFIC OR OTHER ACTIVITY SHOULD BE REPAIRED BEFORE THE END OF EACH WORKING DAY. A SEDIMENTATION TRAP. THE MOUTH OF THE TRAP SHALL BE LINED WITH STRAW BALES AROUND THE COMPLETE PERIMETER. DURING ALL PRELIMINARY STAGES, THE TOP OF THE STRUCTURE SHALL ALWAYS BE HIGHER THAN THE SUBGRADE.
  - CHECK DAMS SHALL BE INSTALLED EVERY 300 FEET FOR SLOPES OF 1% OR LESS, EVERY 200 FEET FOR SLOPES OF 2%, EVERY 150 FEET FOR SLOPES OF 3% TO 5%, AND EVERY 100 FEET FOR SLOPES OF 5% OR GREATER.
  - SEDIMENTS SHOULD BE REMOVED FROM THE CHECK DAM WHEN IT REACHES ONE-HALF THE DAM HEIGHT.

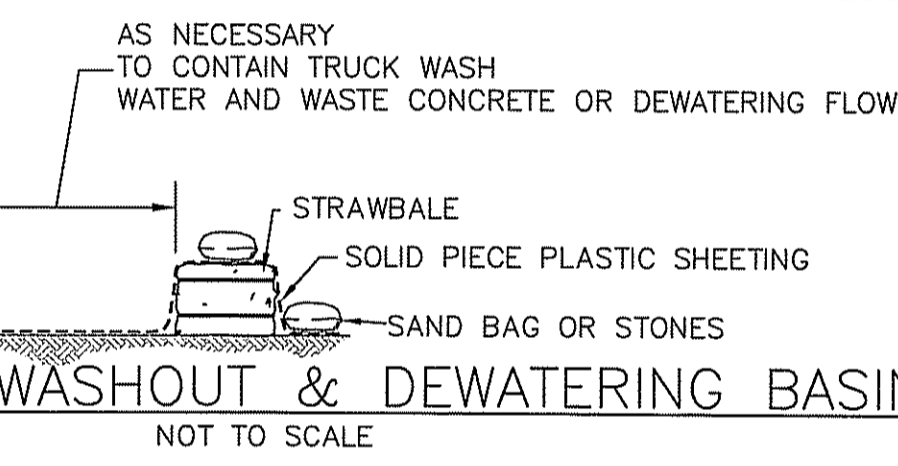


**MATERIALS SIZE**

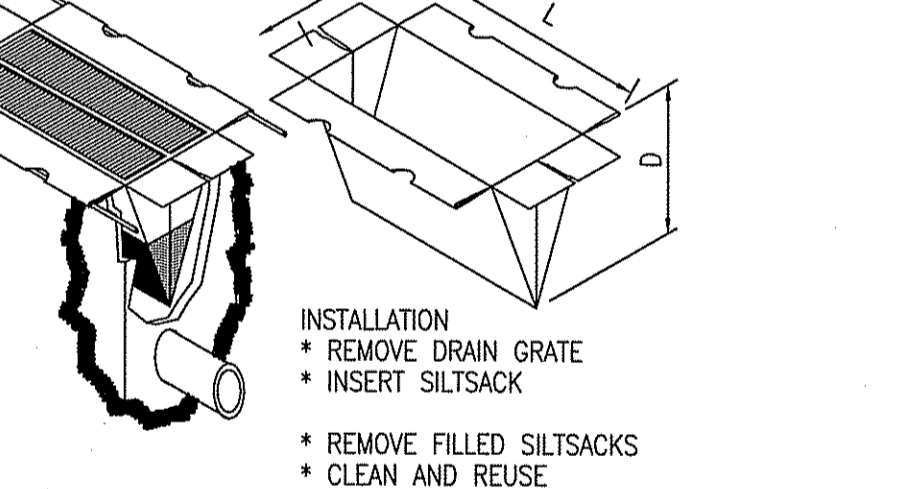
SQUARE MESH SIEVES	2" CRUSHED STONE OR GRAVEL	ASTM C-33 NO. 2	ASTM C-33 NO. 3
	% FINER	% FINER	% FINER
2-1/2 INCHES	100	90-100	
2 INCHES	95-100	35-70	90-100
1-1/2 INCHES	30-55	0-15	35-70
1-1/4 INCHES	0-25		
1 INCH	0-5		0-15
3/4 INCH		0-5	
1/2 INCH			
3/8 INCH			

**CONSTRUCTION ACCESS**

SCALE: NOT TO SCALE

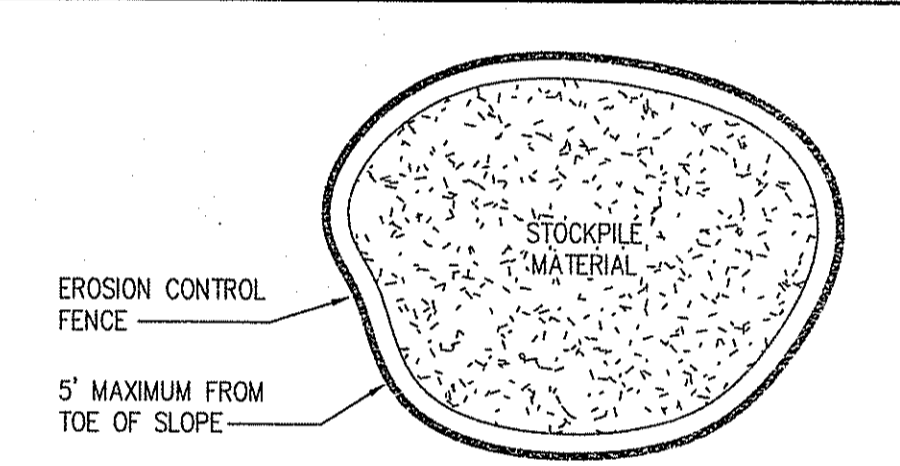


**CONCRETE WASHOUT & DEWATERING BASIN**



**SILT SAC**

SCALE: NOT TO SCALE



**STOCKPILE DETAIL**

DEPARTMENT OF ENVIRONMENTAL MANAGEMENT  
OFFICE OF WATER RESOURCES  
FRESHWATER WETLAND PERMITS  
APPROVED WITH CONDITIONS  
AS SPECIFIED IN THE LETTERS OF PERMIT  
DATED SEP 1 2017 FILE # 17-0109  
NO CHANGES ALLOWED WITHOUT PERMIT  
APPROVED PLANS MUST BE RECORDED

*James R. Hester*

THIS PLAN SET HAS BEEN PREPARED TO SERVE ONLY AS THE RIDEM PERMIT AGENCY REVIEW SET AND SHALL NOT BE USED FOR CONSTRUCTION.

**CONSTRUCTION DETAILS - I**

OWNER/APPLICANT  
KEYES PARTNERS LLC  
612 GREENWICH AVENUE  
WARWICK, RI 02886

**COMMONWEALTH ENGINEERS & CONSULTANTS, INC.**

400 SMITH STREET  
PROVIDENCE, RHODE ISLAND 02908  
401-273-6600

**RIDEM FRESHWATER WETLAND PERMIT GRADING & DRAINAGE PLAN FOR "KEYES WAY DEVELOPMENT"**

ASSESSORS PLAT 30 LOT 51  
KEYES WAY  
WEST WARWICK, RHODE ISLAND

SCALE: AS SHOWN SHEET NO: 6 OF 7

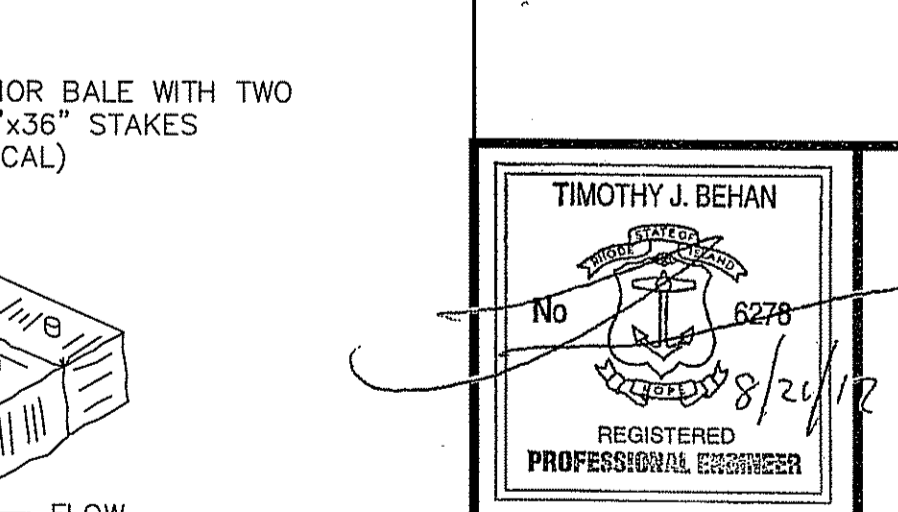
DRAWN BY: DKM DESIGN BY: TJB CHECKED BY: TJB

DATE: 4/27/17 PROJECT NO.: 16058.00

TIMOTHY J. BEHAN  
REGISTERED PROFESSIONAL ENGINEER

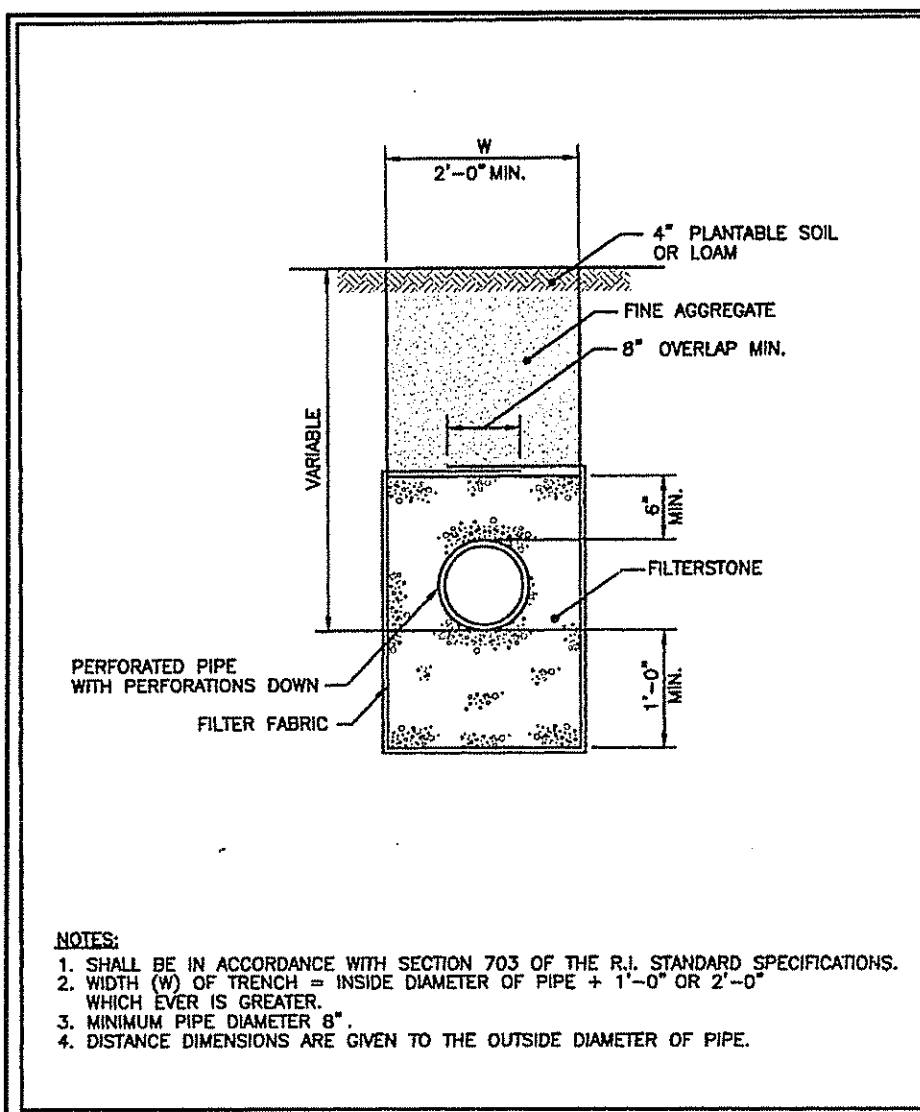
**REVISIONS**

No.	DATE	DRWN	CHKD
1.	8-21-17	DKM	TJB



**STRAW BALE CATCH BASIN PROTECTION**

NOT TO SCALE

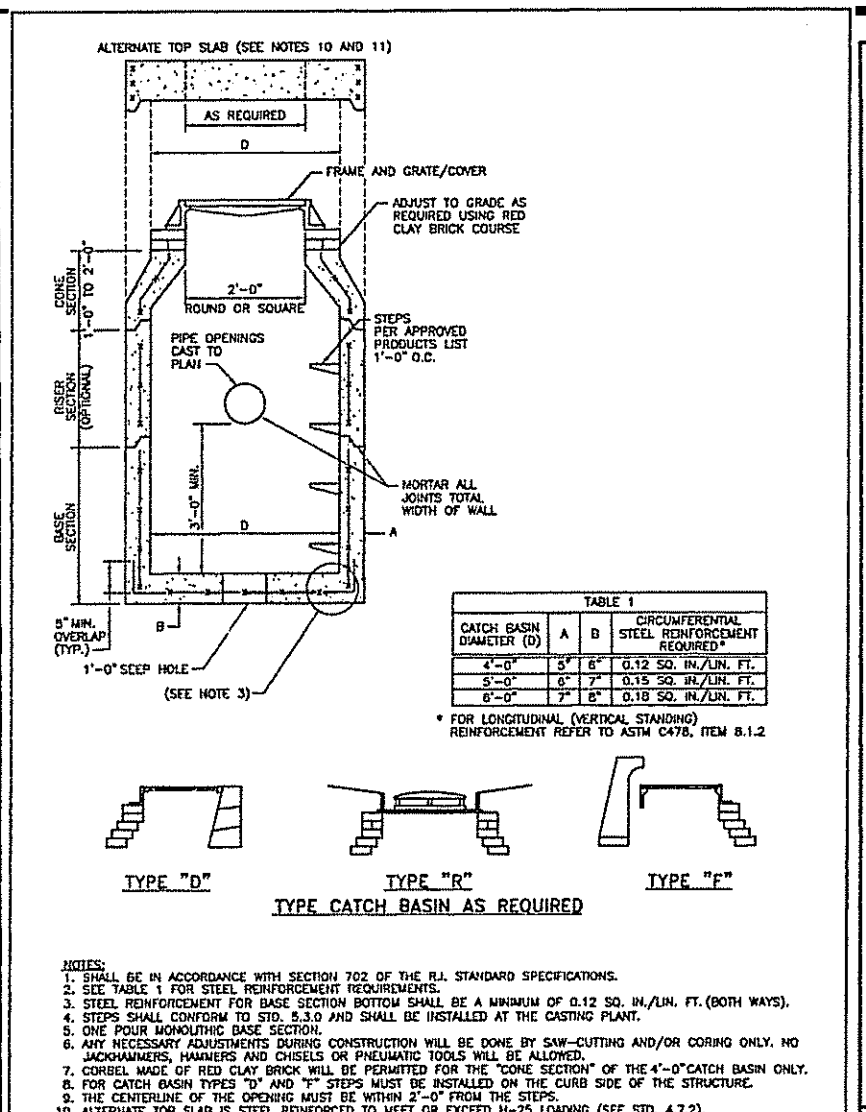


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**UNDERDRAIN**

R.I. STANDARD 1.1.0

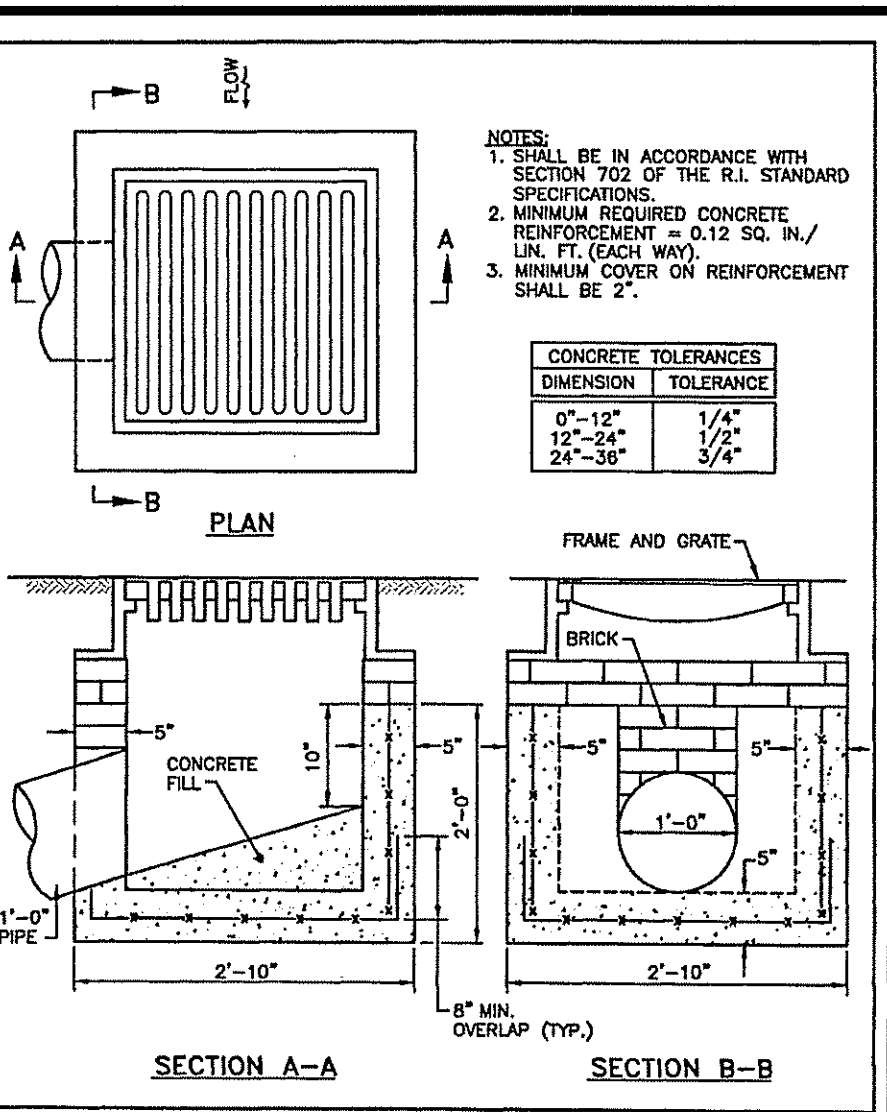


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**PRECAST CONCRETE DROP INLET**

R.I. STANDARD 4.5.0

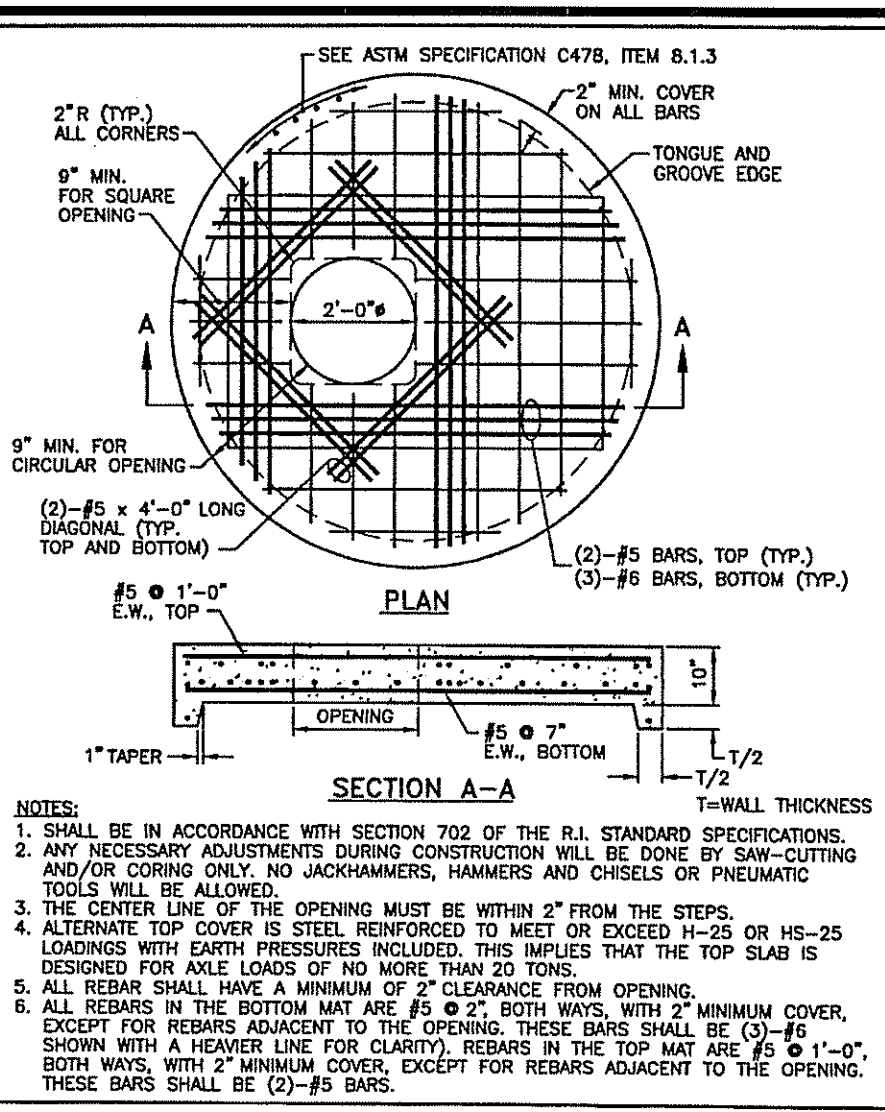


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**ALTERNATE TOP COVER FOR ROUND PRECAST MANHOLES AND CATCH BASINS**

R.I. STANDARD 4.7.2

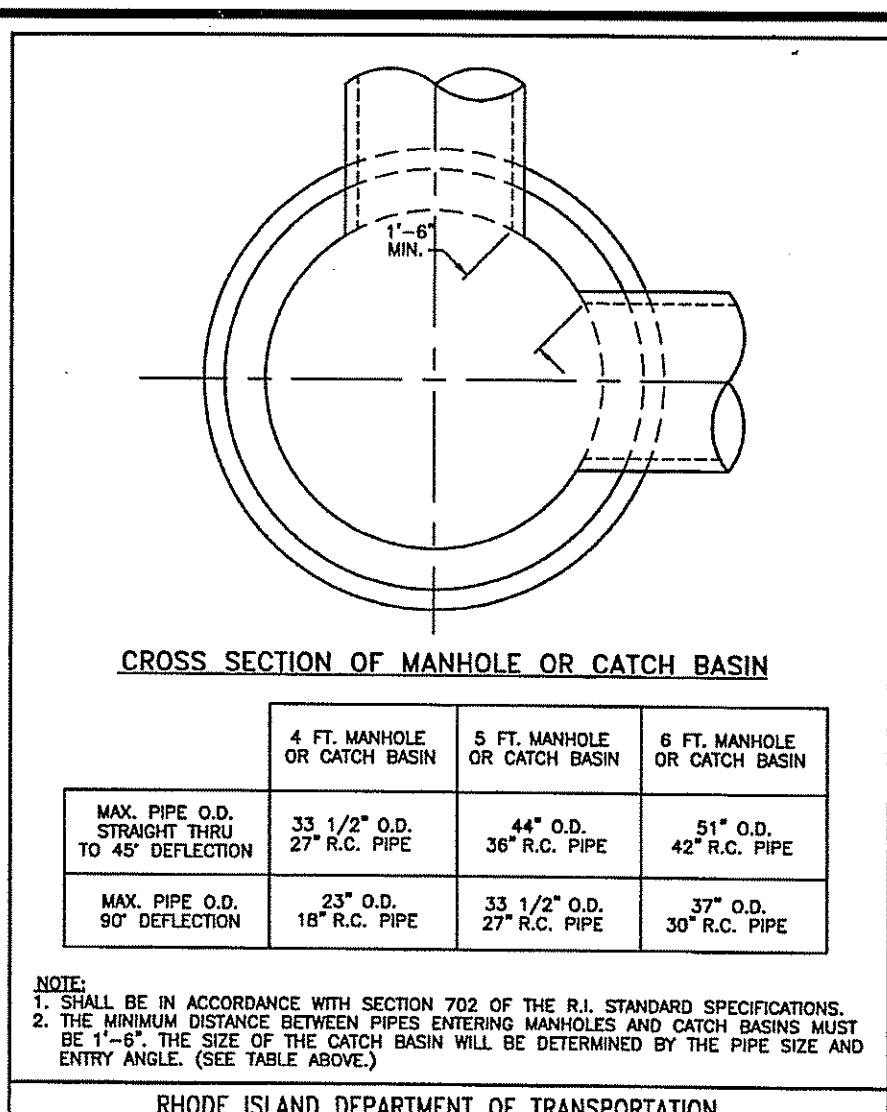


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**CATCH BASIN AND MANHOLE STEP**

R.I. STANDARD 5.3.0

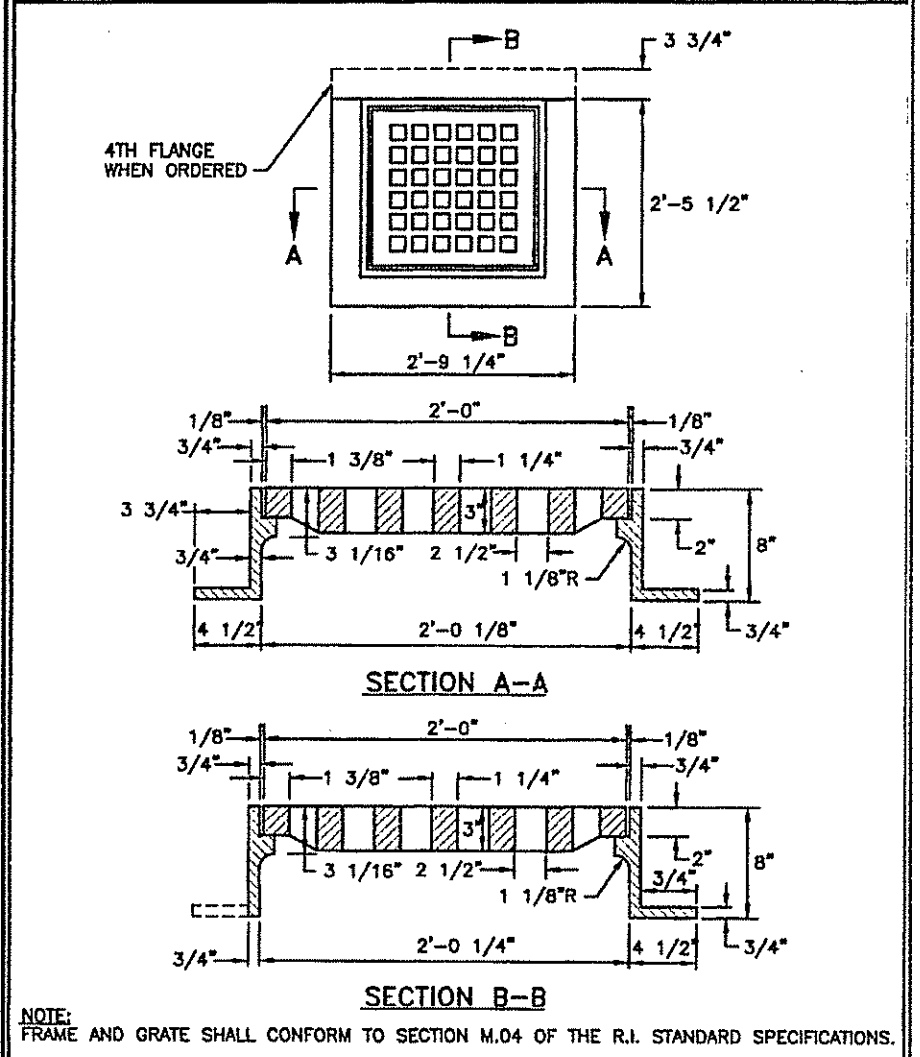


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**CONCRETE COLLARS**

R.I. STANDARD 5.4.0

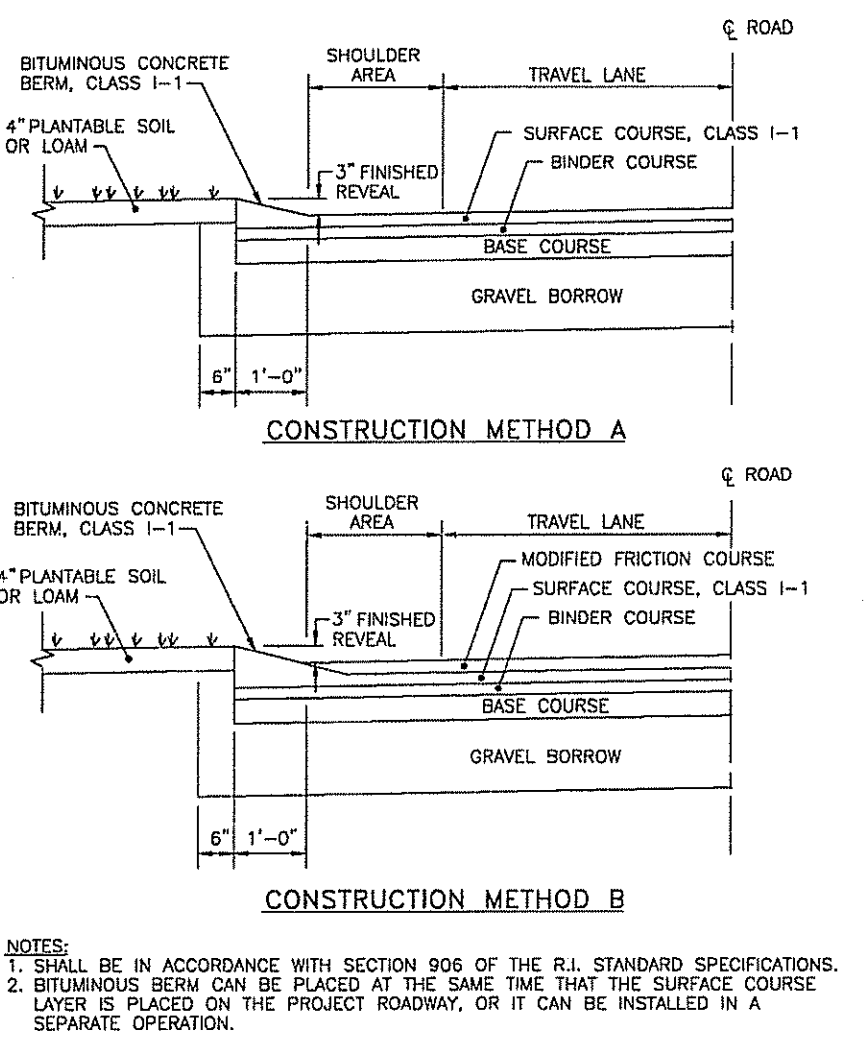


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**SQUARE FRAME AND GRATE**

R.I. STANDARD 6.3.0

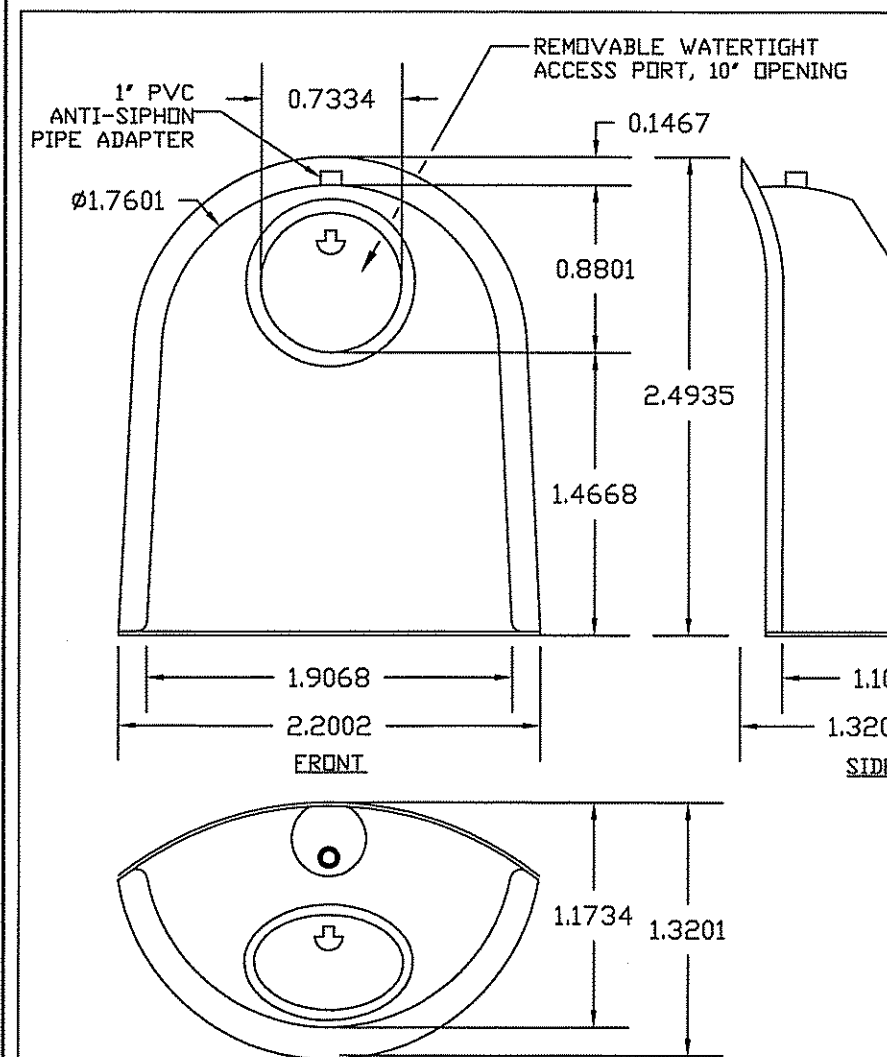


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**BITUMINOUS BERM**

R.I. STANDARD 7.5.1

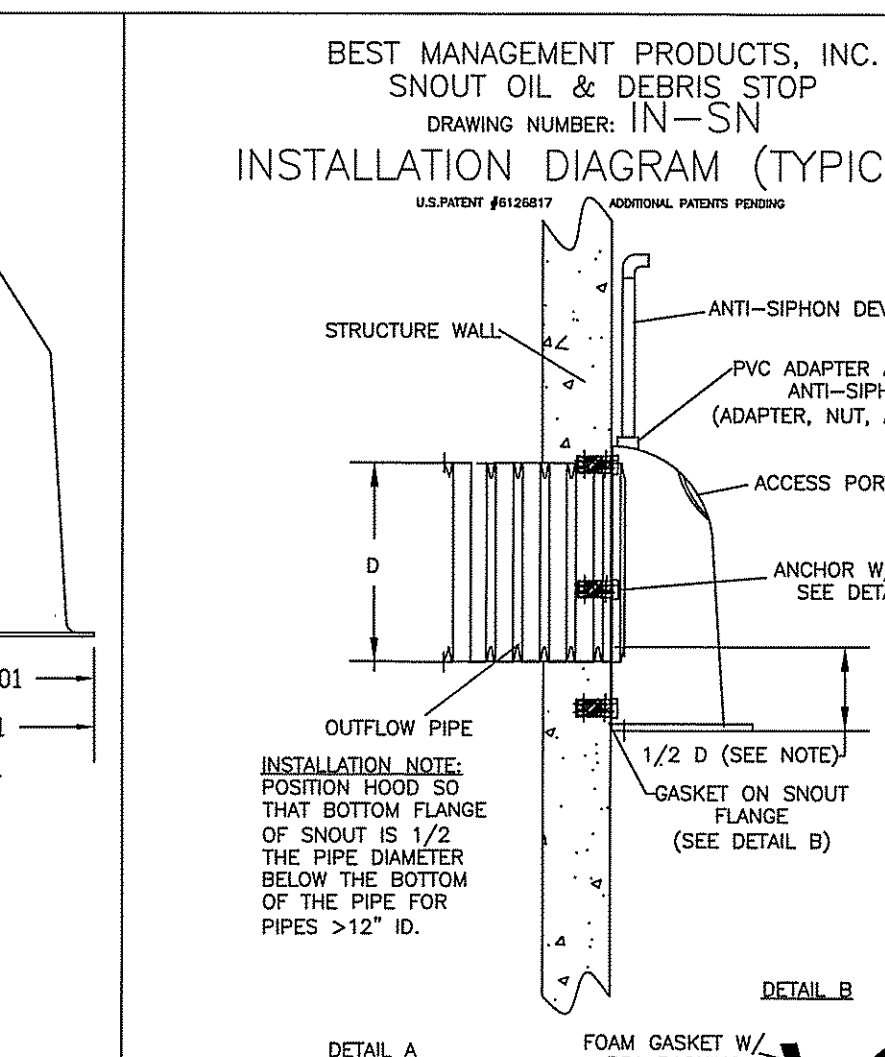


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**SNOUT OIL & DEBRIS STOP**

R.I. STANDARD 8.1.3

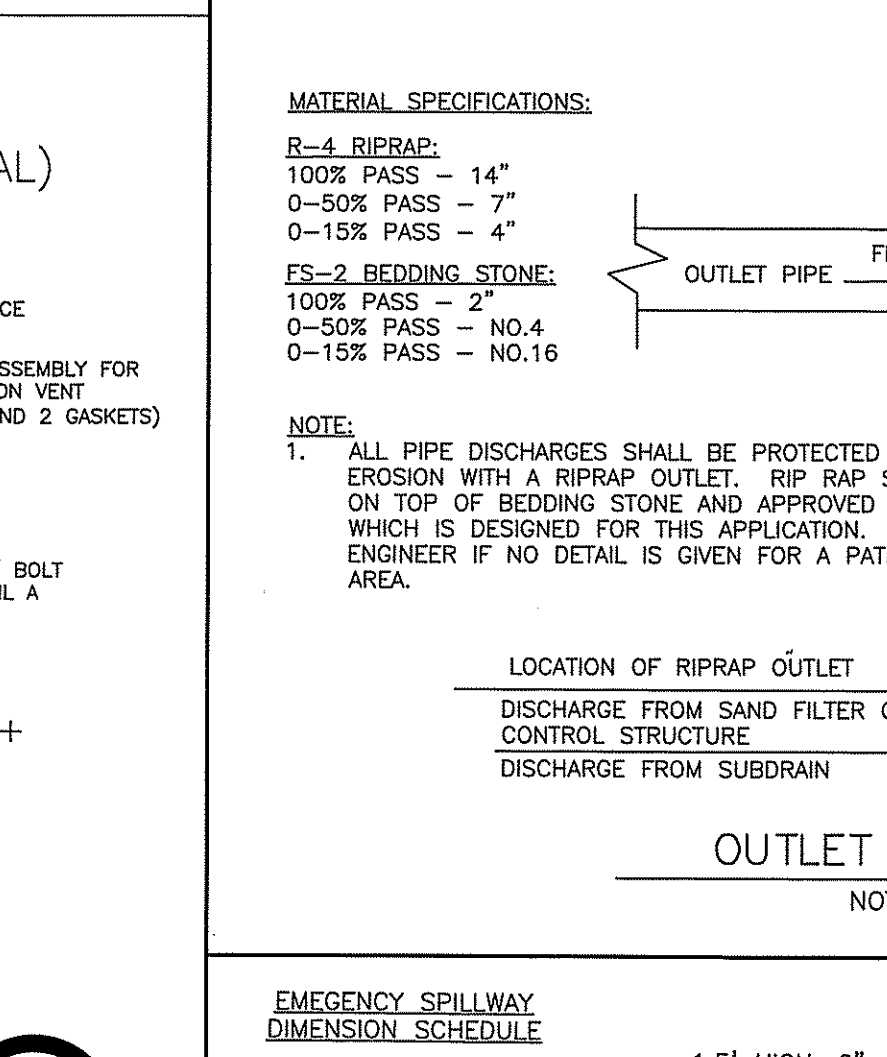


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**OUTLET RIPRAP DETAIL**

R.I. STANDARD 8.2.1

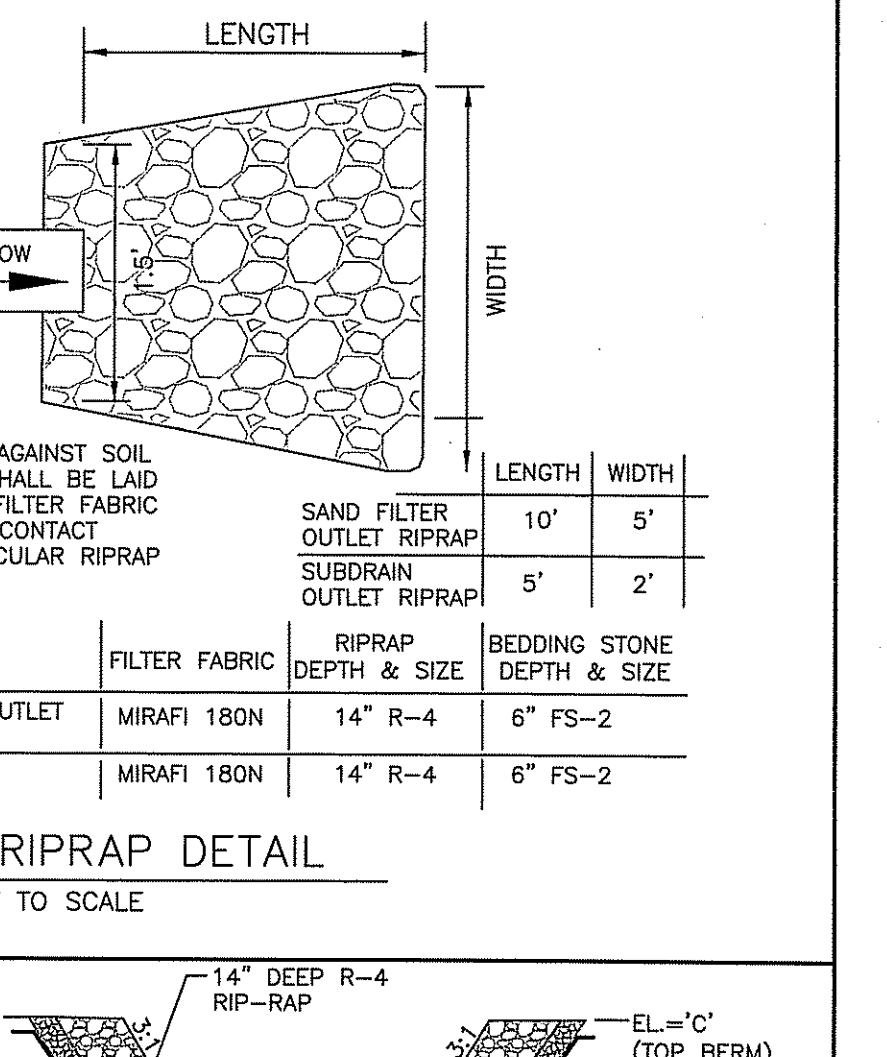


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**EMERGENCY SPILLWAY**

R.I. STANDARD 8.3.1



**REVISIONS**

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**OIL/WATER SEPARATOR**

R.I. STANDARD 8.4.1

**RECOMMENDED MINIMUM TRENCH WIDTHS**

PIPE DIAM.	MIN. TRENCH WIDTH
4"	21"
6"	27"
8"	33"
10"	39"
12"	45"
14"	51"
16"	57"
18"	63"
20"	69"
24"	81"
30"	93"
36"	105"
42"	117"
48"	123"
54"	129"
60"	135"
72"	153"
84"	171"
96"	189"
108"	207"
120"	225"
144"	273"
168"	321"
192"	369"

**MINIMUM RECOMMENDED COVER BASED ON VEHICLE LOADING CONDITIONS**

PIPE DIAM.	H-25	H-20	HEAVY CONSTRUCTION (EST. AXLE LOADS)
12"-48"	12"	12"	48"
300mm - 1200mm	300mm	300mm	1219mm
1500mm	21"	21"	84"
1500mm	810mm	810mm	1524mm

**MAXIMUM RECOMMENDED COVER BASED ON VEHICLE LOADING CONDITIONS**

PIPE DIAM.	CLASS I			CLASS II			CLASS III		
	COMPACTED	DUMPED	95%	90%	85%	95%	90%	85%	
4"	34	16	23	16	17	19	15	17	
6"	40	19	27	19	21	23	18	21	
8"	46	22	31	22	24	26	20	24	
10"	52	25	35	25	27	29	22	27	
12"	58	28	39	28	30	32	24	30	
14"	64	31	43	31	33	35	26	33	
16"	70	34	47	34	36	38	28	36	
18"	76	37	51	37	39	41	30	39	
20"	82	40	55	40	42	44	32	42	
24"	94	46	63	46	48	50	36	48	
30"	110	54	75	54	56	58	42	56	
36"	126	62	87	62	64	66	48	64	
42"	142	70	99	70	72	74	54	72	
48"	158	78	111	78	80	82	60	80	
54"	174	86	123	86	88	90	66	88	
60"	190	94	135	94	96	98	72	96	
72"	222	110	159	110	112	114	84	112	
84"	254	126	183	126	128	130	96	128	
96"	286	142	207	142	144	146	108	144	
108"	318	158	231	158	160	162	120	160	
120"	350	174	255	174	176	178	132	176	
144"	414	210	303	210	212	214	156	212	
168"	478	246	351	246	248	250	180	248	
192"	542	282	399	282	284	286	204	284	

**NOTES:**

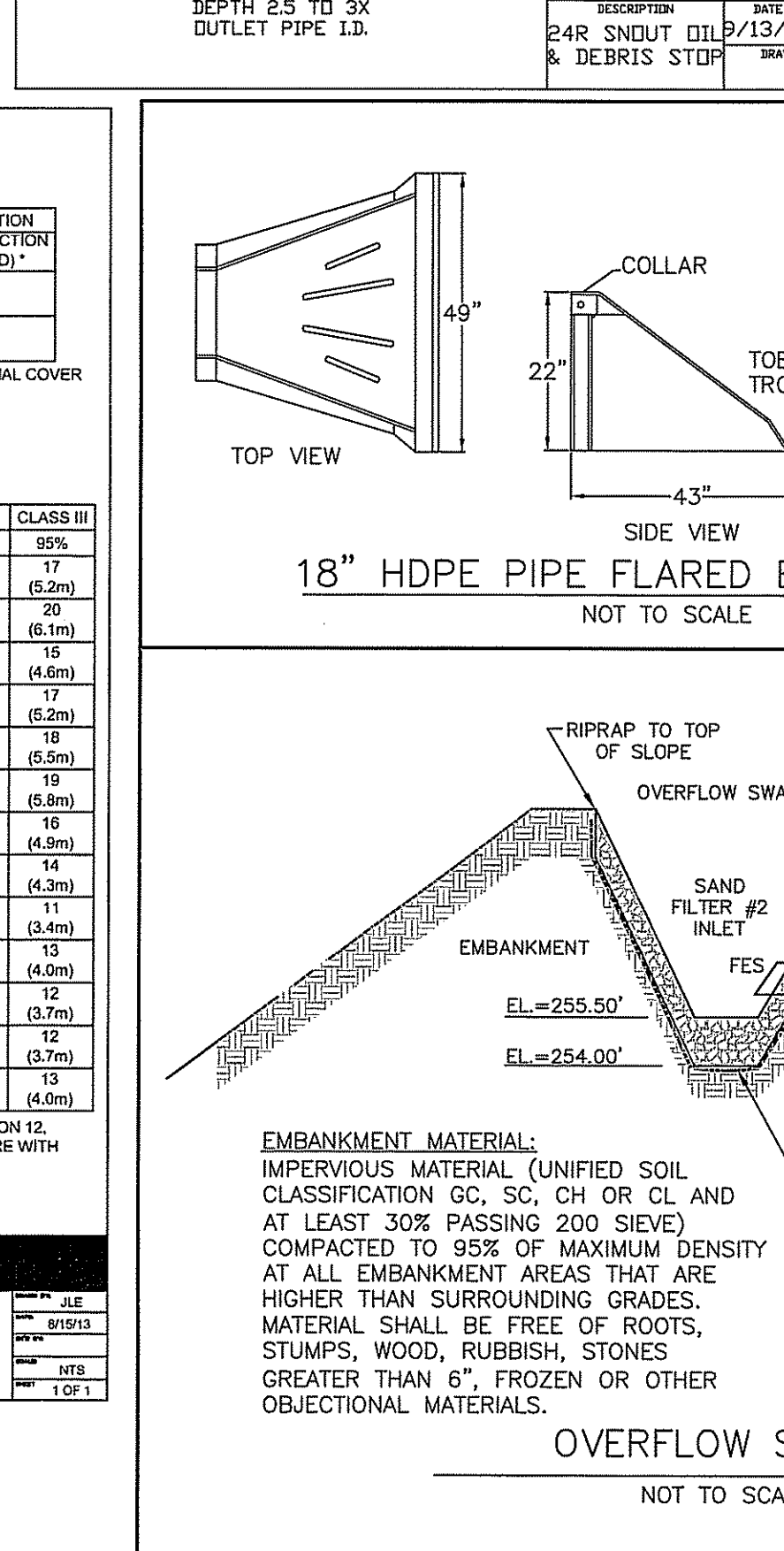
- ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH ASTM D2221, "STANDARD PRACTICE FOR UNDERGROUND INSTALLATION OF THERMOPLASTIC PIPE FOR SEWERS AND OTHER GRAVITY FLOW APPLICATIONS." LATEST EDITION.
- MEASURES SHOULD BE TAKEN TO PREVENT MIGRATION OF NATIVE FINES INTO BACKFILL MATERIAL, WHEN REQUIRED.
- FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE CONTRACTOR SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH SUITABLE MATERIAL AS SPECIFIED BY THE ENGINEER, AS AN ALTERNATIVE AND AT THE DISCRETION OF THE DESIGN ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A GEOTEXTILE MATERIAL.
- BEDDING: SUITABLE MATERIAL SHALL BE CLASS I, II OR III. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER, UNLESS OTHERWISE NOTED BY THE ENGINEER. MINIMUM BEDDING THICKNESS SHALL BE 4" (100mm) FOR 4"-24" (100mm-600mm) & 150mm (6") FOR 30"-60" (750mm-1500mm).
- INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS I, II OR III IN THE PIPE ZONE EXTENDING NOT LESS THAN 6" ABOVE CROWN OF PIPE. THE CONTRACTOR SHALL PROVIDE DOCUMENTATION FOR MATERIAL SPECIFICATION TO ENGINEER. MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2221, LATEST EDITION.
- MINIMUM COVER: MINIMUM COVER, H, IN NON-TRAFFIC APPLICATIONS (GRASS OR LANDSCAPE AREAS) IS 12" FROM THE TOP OF PIPE TO GROUND SURFACE. ADDITIONAL COVER MAY BE REQUIRED TO PREVENT FLUTATION. FOR TRAFFIC APPLICATIONS, MINIMUM COVER, H, IS 18" UP TO 48" DIAMETER PIPE AND 24" OF COVER FOR 60" DIAMETER PIPE, MEASURED FROM TOP OF PIPE TO BOTTOM OF FLEXIBLE PAVEMENT OR TO TOP OF RIGID PAVEMENT. FOR TRAFFIC APPLICATIONS WITH LESS THAN FOUR FEET OF COVER, EMBEDMENT OF THE PIPE SHALL BE USING ONLY A CLASS I OR CLASS II BACKFILL.

**REVISIONS**

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**OVERFLOW SWALE**

R.I. STANDARD 8.5.1

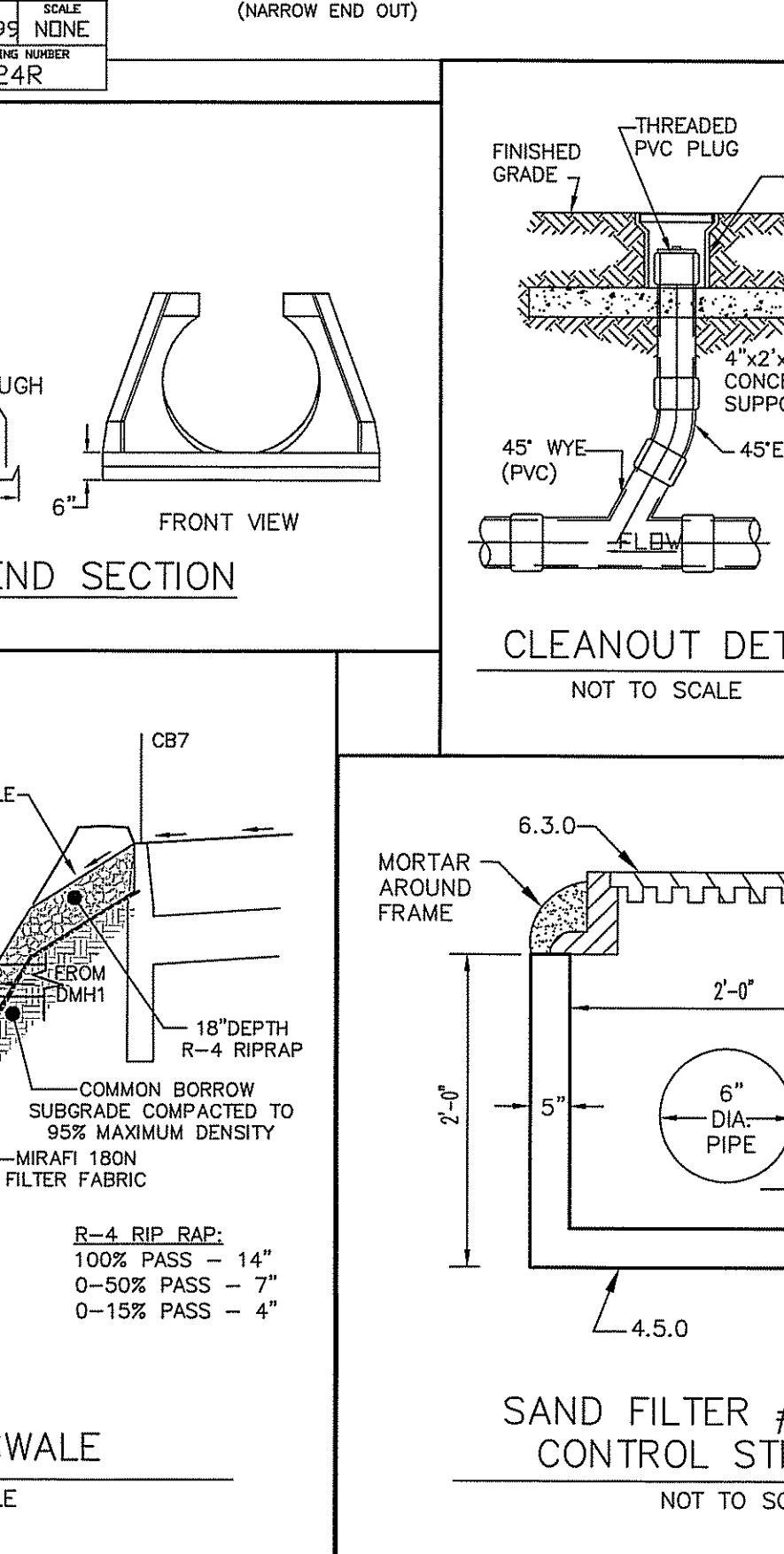


**REVISIONS**

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1	JG	6/15/1998

**18" HDPE PIPE FLARED END SECTION**

R.I. STANDARD 8.6.1

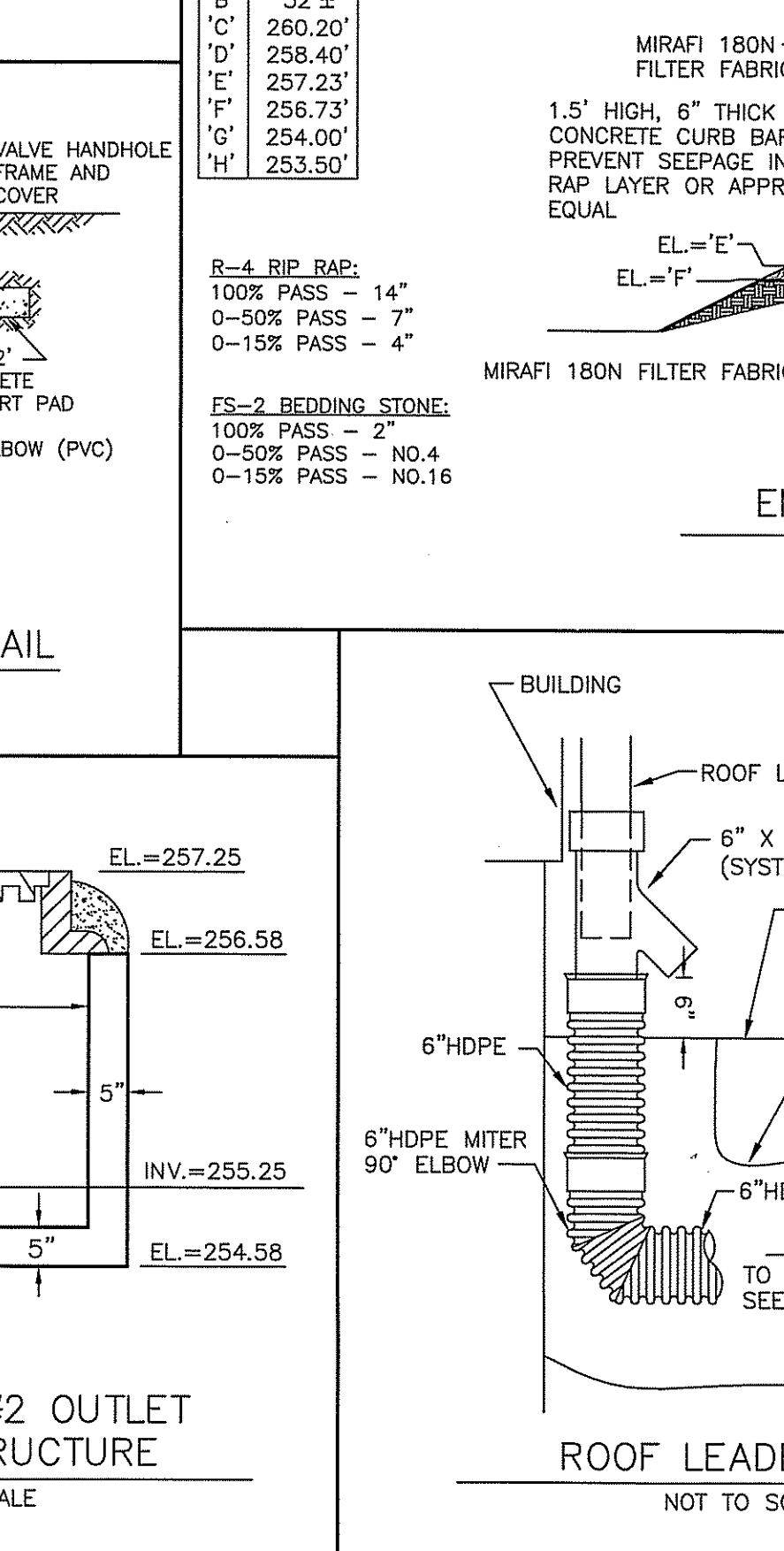


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**CLEANOUT DETAIL**

R.I. STANDARD 8.7.1

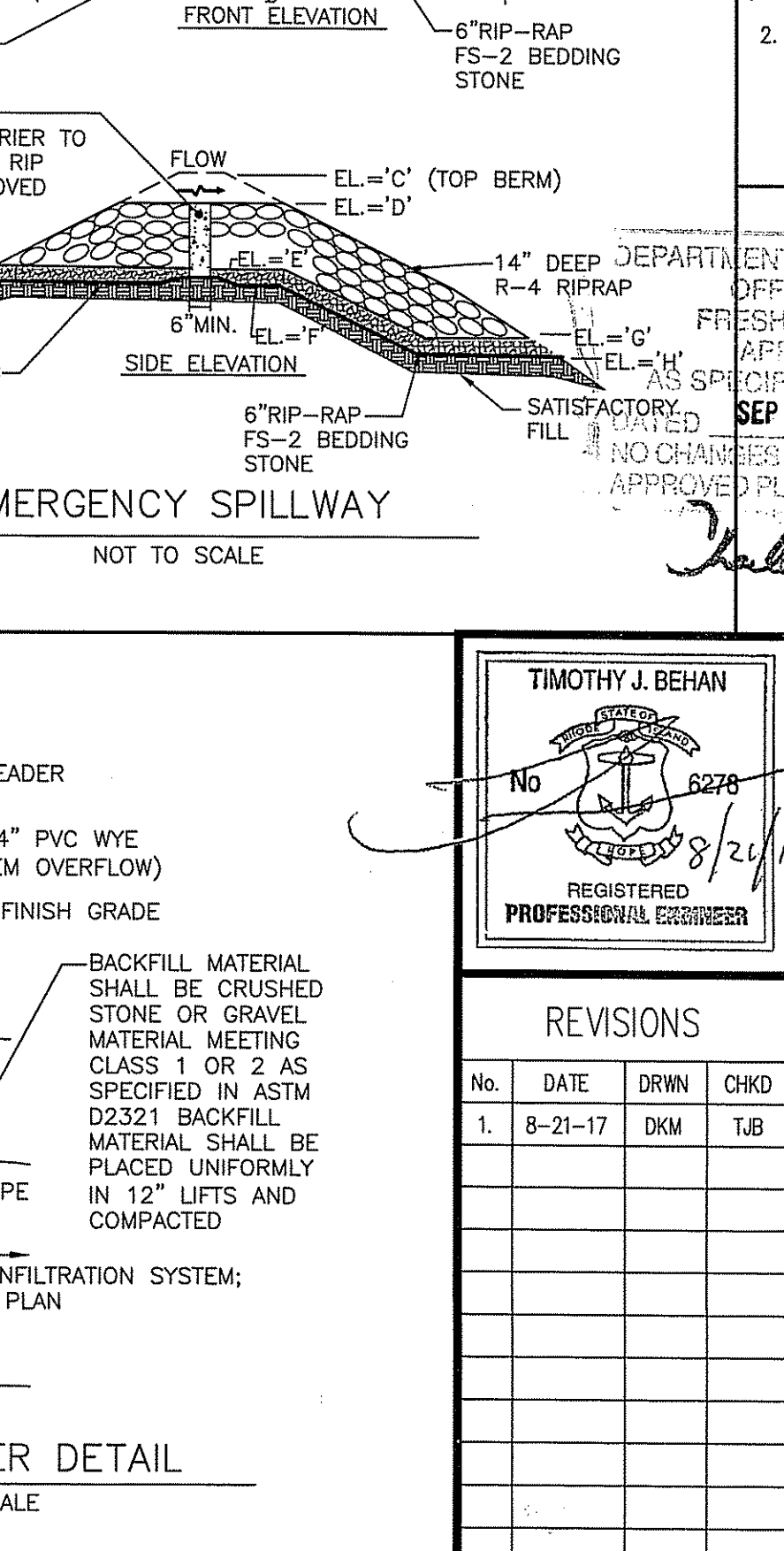


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**SAND FILTER #2 OUTLET CONTROL STRUCTURE**

R.I. STANDARD 8.8.1

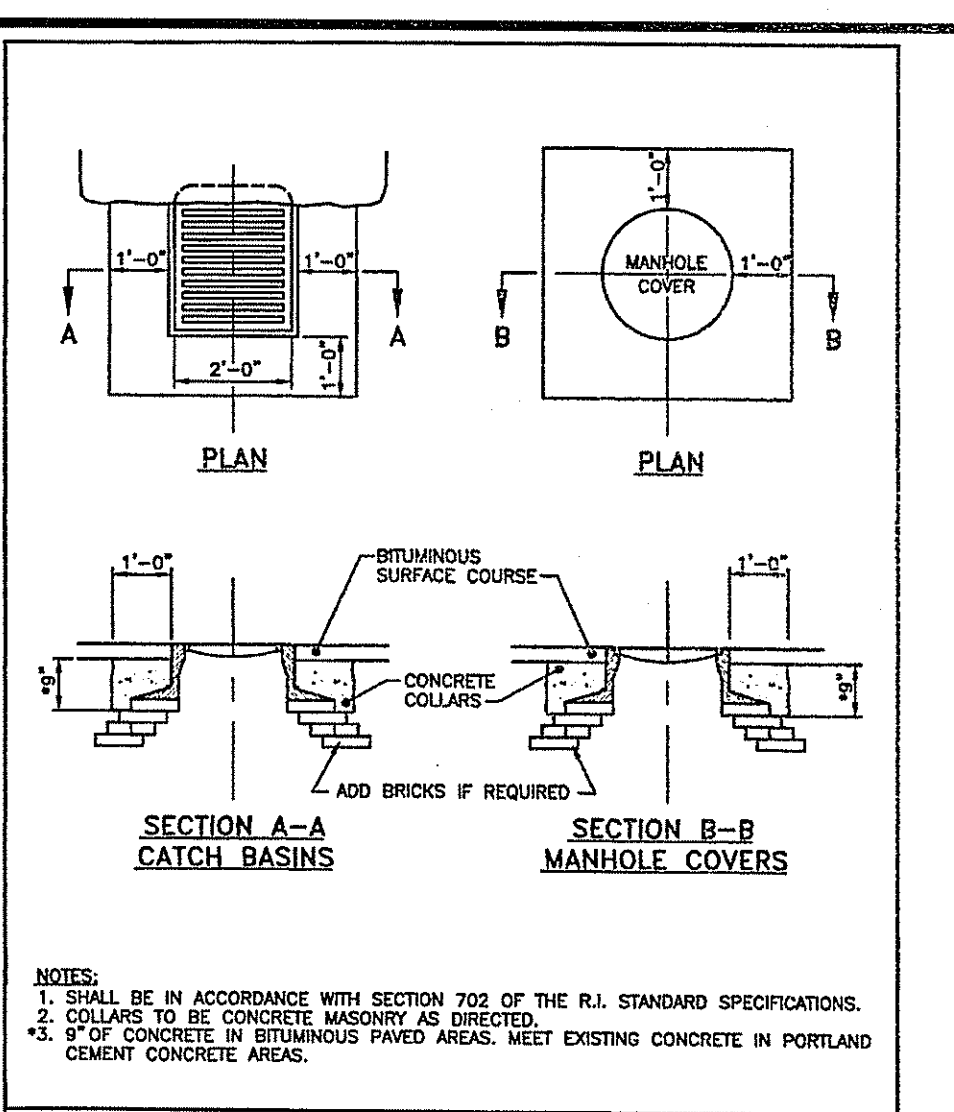


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**ROOF LEADER DETAIL**

R.I. STANDARD 8.9.1

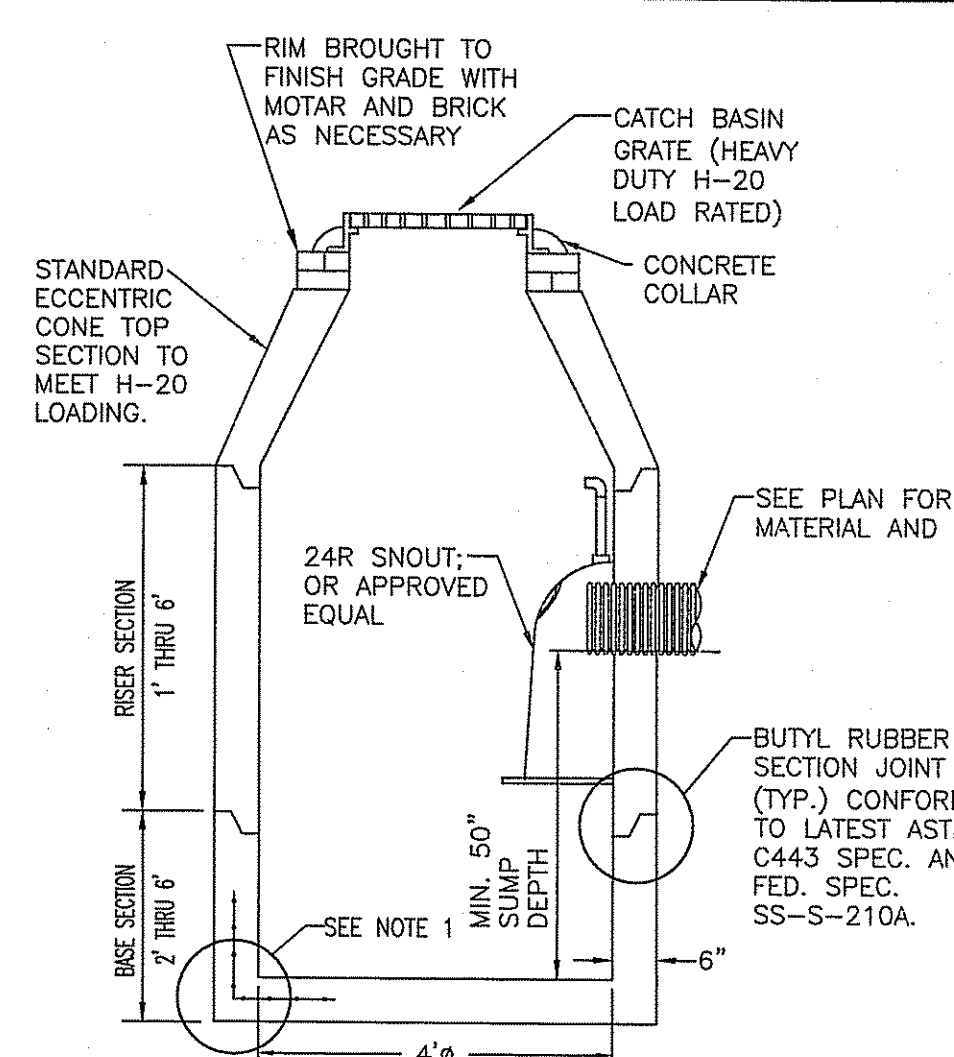


**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**CATCH BASIN AND MANHOLE STEP**

R.I. STANDARD 5.3.0



**REVISIONS**

NO.	BY	DATE
1	JG	6/15/1998

**EMERGENCY SPILLWAY**

R.I. STANDARD 8.3.1

**COMMONWEALTH ENGINEERS & CONSULTANTS, INC.**

400 SMITH STREET  
PROVIDENCE, RHODE ISLAND 02908  
401-273-6600

**RIDEM FRESHWATER WETLAND PERMIT GRADING & DRAINAGE PLAN FOR "KEYES WAY DEVELOPMENT" ASSESSORS PLAT 30 LOT 51 IN WEST WARWICK, RHODE ISLAND**

**REVISIONS**

No.	DATE	DRWN	CHKD
1.	8-21-17	DKM	TJB

SCALE: AS SHOWN SHEET NO: 7 OF 7  
DRAWN BY: DKM DESIGN BY: TJB CHECKED BY: TJB  
DATE: 4/27/17 PROJECT NO.: 16058.00