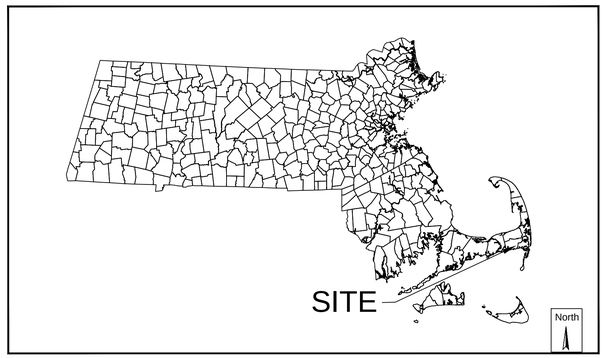
RED RIVER BEACH SALT MARSH RESTORATION
CONSTRUCTION DRAWINGS
HARWICH, MASSACHUSETTS

SEPT 2011

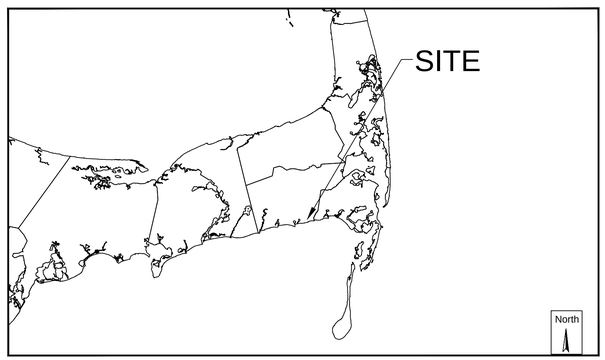


MASSACHUSETTS

Graphic Scale

0 150000

SCALE IN FEET
1:150000



HARWICH

Graphic Scale

0 12000

SCALE IN FEET
1:12000

IMPACT AREA CALCULATIONS:

Regulated Boundary	Site #1			Site #2		
	Permanent Impact	Temporary Impact	Total Impact Area	Permanent Impact	Temporary Impact	Total Impact Area
Limit of Work (SF)	-	-	6800	-	-	17700
Salt Marsh (SF)	197	601	798	113	1278	1391
100-ft Buffer (SF)	-	-	5979	-	-	16263
50-ft Buffer (SF)	-	-	4268	-	-	8253
Impact within the 100-yr Flood Zone (SF)	-	-	6792	-	-	17689
Impervious Area within LOW (SF)	2822	0	2822	10574	0	10574
Coastal Bank (SF)	-	-	1845	-	-	5707
Work along Coastal Bank (LF)	-	-	72	-	-	468

VICINITY MAP

Graphic Scale

1-inch = 1000-feet

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GENERAL NOTES:

1. THIS PLAN SET IS FOR CONSTRUCTION.
2. PROJECTED TIDAL ELEVATIONS ARE BASED UPON TIDE MONITORING AT THE UNRESTRICTED LOWER MARSH, AND BY REFERENCE TO THE *TIDAL FLOOD PROFILES - NEW ENGLAND COASTLINE* PREPARED BY THE HYDRAULICS AND WATER QUALITY SECTION, NEW ENGLAND DIVISION OF THE ARMY CORPS (SEPTEMBER 1988), THE FOLLOWING MEAN WATER LEVELS ARE ANTICIPATED AFTER CONSTRUCTION AT THE UPPER AND MIDDLE MARSHES:
   - 2.1. MEAN LOW WATER (MLW) = -2.38' (NAVD 1988)
   - 2.2. MEAN HIGH WATER (MHW) = 1.42' (NAVD 1988)
3. BASED UPON TIDE MONITORING AT THE UNRESTRICTED LOWER MARSH, THE FOLLOWING MAXIMUM WATER LEVELS ARE ANTICIPATED AFTER CONSTRUCTION:
   - 3.1. MAXIMUM HIGH TIDE LINE (HTL) AT THE MIDDLE MARSH = 3.00' (NAVD 1988)
   - 3.2. MAXIMUM HIGH TIDE LINE (HTL) AT THE UPPER MARSH = 2.50' (NAVD 1988). TO MINIMIZE RISK OF EXCESSIVE PONDING, TIDES WILL BE CONTROLLED AT THE OLD WHARF ROAD CULVERT WITH A PROPOSED TIDE GATE TO PREVENT WATER LEVELS FROM RISING ABOVE ELEVATION 2.50' AT THE UPPER MARSH.
4. PROJECT IS FUNDED IN PART BY THE ARRA, THE USDA NRCS, AND THE TOWN OF HARWICH, MASSACHUSETTS.

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

Plan Set:

RED RIVER BEACH SALT MARSH RESTORATION
CONSTRUCTION DRAWINGS
HARWICH, MASSACHUSETTS

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Designed By: KMH		Sheet Number: 1 of 9	
Drawn By: KMH		Drawing Number: C - 1	
Checked By: RAC			

Revisions

Rev.	Date	By	Appr.	Description
1				
2				
3				
4				
5				
6				
7				

GENERAL CONSTRUCTION NOTES

1. ALL SITE PREPARATION NECESSARY TO COMPLETE THIS PROJECT IS THE SOLE RESPONSIBILITY OF THE TOWN.
2. THE TOWN SHALL MAKE ALL NECESSARY CONSTRUCTION NOTIFICATIONS AND APPLY FOR AND OBTAIN ALL NECESSARY CONSTRUCTION PERMITS, PAY ALL FEES INCLUDING POLICE DETAILS AND POST ALL BONDS, IF NECESSARY, ASSOCIATED WITH THE SAME, AND COORDINATE WITH THE ENGINEER.
3. ALL EXISTING CONDITIONS SHOWN SHALL BE CONSIDERED APPROXIMATE AND ARE BASED ON THE BEST INFORMATION AVAILABLE. THE TOWN SHALL BE RESPONSIBLE FOR VERIFYING THAT THE PROPOSED IMPROVEMENTS SHOWN ON THE PLANS DO NOT CONFLICT WITH ANY KNOWN EXISTING OR OTHER PROPOSED IMPROVEMENTS. IF ANY CONFLICTS ARE DISCOVERED, THE TOWN SHALL NOTIFY THE OWNER AND THE ENGINEER PRIOR TO INSTALLING ANY PORTION OF THE SITE WORK WHICH WOULD BE AFFECTED.
4. THE TOWN IS SPECIFICALLY CAUTIONED THAT THE LOCATION AND/OR ELEVATION OF EXISTING UTILITIES AND STRUCTURES AS SHOWN ON THESE PLANS ARE BASED ON RECORDS OF VARIOUS UTILITY COMPANIES, AND WHEREVER POSSIBLE, MEASUREMENTS TAKEN IN THE FIELD. THIS INFORMATION IS NOT TO BE RELIED UPON AS BEING EXACT OR COMPLETE. THE LOCATION OF ALL UNDERGROUND UTILITIES AND STRUCTURES SHALL BE VERIFIED IN THE FIELD BY THE TOWN PRIOR TO THE START OF CONSTRUCTION. THE TOWN MUST CONTACT THE APPROPRIATE UTILITY COMPANY, ANY GOVERNING PERMITTING AUTHORITY IN THE TOWN, AND "DIGSAFE" (1-800-344-7233) AT LEAST 72 HOURS PRIOR TO ANY EXCAVATION WORK IN PREVIOUSLY UNALTERED AREAS TO REQUEST EXACT FIELD LOCATION OF UTILITIES. IT SHALL BE THE RESPONSIBILITY OF THE TOWN TO RESOLVE CONFLICTS BETWEEN THE PROPOSED UTILITIES AND FIELD-LOCATED UTILITIES AND SHALL REPORT ANY DISCREPANCIES TO THE ENGINEER IMMEDIATELY. THE ENGINEER ASSUMES NO RESPONSIBILITY FOR DAMAGES INCURRED AS A RESULT OF UTILITIES OMITTED, INCOMPLETELY OR INACCURATELY SHOWN. THE TOWN SHALL BE RESPONSIBLE FOR MAINTAINING ACCURATE RECORDS OF THE LOCATION AND ELEVATION OF ALL WORK INSTALLED AND EXISTING UTILITIES FOUND DURING CONSTRUCTION FOR THE PREPARATION OF THE AS-BUILT PLAN.
5. THE TOWN IS RESPONSIBLE FOR MAINTAINING ALL EXISTING UTILITIES IN WORKING ORDER AND FREE FROM DAMAGE DURING THE ENTIRE DURATION OF THE PROJECT. ALL COST RELATED TO THE REPAIR OF UTILITIES SHALL BE THE RESPONSIBILITY OF THE TOWN. EXCAVATION REQUIRED WITHIN THE PROXIMITY OF EXISTING UTILITY LINES SHALL BE DONE BY HAND. TOWN SHALL REPAIR ANY DAMAGE TO EXISTING UTILITY LINES OR STRUCTURES INCURRED DURING CONSTRUCTION OPERATIONS AT NO COST TO THE OWNER.
6. THE TOWN SHALL UTILIZE ALL PRECAUTIONS AND MEASURES TO ENSURE THE SAFETY OF THE PUBLIC, ALL PERSONNEL AND PROPERTY DURING CONSTRUCTION IN ACCORDANCE WITH OSHA STANDARDS, INCLUDING BARRICADES, SAFETY LIGHTING, CONES, POLICE DETAIL AND/OR FLAGMEN AS DETERMINED NECESSARY BY THE ENGINEER AND/OR TOWN. THE TOWN SHALL BE RESPONSIBLE FOR THE COST OF POLICE DETAIL AND FOR COORDINATING WITH THE LOCAL OR STATE POLICE DEPARTMENT FOR ALL REQUIRED POLICE DETAIL.
7. ALL TRENCHING WORK WITHIN A ROADWAY SHALL BE COORDINATED WITH THE PROPER LOCAL & STATE AGENCY. TRENCH SAFETY SHALL BE THE RESPONSIBILITY OF THE TOWN INCLUDING ANY LOCAL AND/OR STATE PERMITS REQUIRED FOR THE TRENCHWORK. THIS WORK MAY BE REQUIRED TO TAKE PLACE OUTSIDE OF NORMAL HOURS OF OPERATION FOR THE FACILITY. THE TOWN SHALL PLAN ACCORDINGLY. ALL TRENCHWORK AND EXCAVATION SHALL CONFORM TO OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA) STANDARDS.
8. ALL TRENCH WORK WITHIN EXISTING PAVEMENT SHALL BE SAWCUT PER THE APPLICABLE DETAILS. TRENCHWORK BACKFILL AND COMPACTION SHALL HAVE MAX. 8-INCH LIFTS. TOWN SHALL BE REQUIRED TO REMOVE PATCH AND REPAVE AFTER ONE COMPLETE 12-MONTH CYCLE IF SETTLEMENT OCCURS DUE TO INADEQUATE COMPACTION AS DETERMINED BY THE ENGINEER WITHIN THE WARRANTY PERIOD.
9. THE TOWN SHALL MAKE ALL CONNECTION ARRANGEMENTS WITH UTILITY COMPANIES, AS REQUIRED.
10. ALL IMPORTED MATERIAL SHALL BE CLEAN. NO MATERIAL WILL BE ACCEPTED FROM AN EXISTING OR FORMER 21E SITE AS DEFINED BY THE MASSACHUSETTS CONTINGENCY PLAN 310 CMR 40.0000 .
11. SITE LAYOUT SURVEY REQUIRED FOR CONSTRUCTION SHALL BE CONDUCTED BY A MASSACHUSETTS' REGISTERED PROFESSIONAL LAND SURVEYOR. THE TOWN IS RESPONSIBLE FOR COORDINATING WITH THE SURVEYOR AND/OR ENGINEER FOR ALL SITE SURVEY WORK.
12. THE TOWN SHALL BE RESPONSIBLE FOR ESTABLISHING AND MAINTAINING ALL CONTROL POINTS AND BENCHMARKS DURING CONSTRUCTION INCLUDING BENCHMARK LOCATIONS AND ELEVATIONS AT CRITICAL AREAS. THE LOCATION OF ALL CONTROL POINTS AND BENCHMARKS SHALL BE COORDINATED WITH THE ENGINEER.
13. THE TOWN SHALL BE RESPONSIBLE FOR MAINTAINING ALL GRADE STAKES SET BY THE SURVEYOR. GRADE STAKES SHALL REMAIN UNTIL A FINAL INSPECTION OF THE ITEM HAS BEEN COMPLETED BY THE ENGINEER. ANY RE-STAKING OF PREVIOUSLY SURVEYED SITE FEATURES SHALL BE THE RESPONSIBILITY (INCLUDING COST) OF THE TOWN.
14. UNLESS OTHERWISE SPECIFIED ON THE PLANS AND DETAILS/SPECIFICATIONS, ALL SITE CONSTRUCTION MATERIALS AND METHODOLOGIES ARE TO CONFORM TO THE MOST RECENT VERSION OF THE MASSACHUSETTS DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS (THE MASSACHUSETTS HIGHWAY DEPARTMENT 1988 STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, THE 2002 SUPPLEMENTAL SPECIFICATIONS, AND THE 2005 STANDARD SPECIAL PROVISIONS) .
15. CONSTRUCTION SHALL BE PERFORMED IN ACCORDANCE WITH APPLICABLE LAWS AND REGULATIONS REGARDING NOISE, VIBRATION, DUST, SEDIMENTATION CONTAINMENT, AND TRENCH WORK.
16. SOLID WASTES SHALL BE COLLECTED AND STORED IN A SECURED DUMPSTER. THE DUMPSTER SHALL MEET ALL LOCAL AND STATE SOLID WASTE MANAGEMENT REGULATIONS.
17. THE TOWN SHALL RESTORE ALL SURFACES EQUAL TO THEIR ORIGINAL CONDITION AFTER CONSTRUCTION IS COMPLETE. AREAS NOT DISTURBED BY CONSTRUCTION SHALL BE LEFT NATURAL. THE TOWN SHALL TAKE CARE TO PREVENT DAMAGE TO SHRUBS, TREES, OTHER LANDSCAPING AND/OR NATURAL FEATURES. WHEREAS THE PLANS DO NOT SHOW ALL LANDSCAPE FEATURES, EXISTING CONDITIONS MUST BE VERIFIED BY THE TOWN IN ADVANCE OF THE WORK.
18. ALL UNPAVED AREAS DISTURBED BY THE WORK SHALL HAVE A MINIMUM OF 4-INCHES OF LOAM INSTALLED AND BE SEEDED WITH GRASS SEED AS SHOWN ON THE PLAN AND/OR DIRECTED BY THE ENGINEER, UNLESS OTHERWISE SPECIFIED. THE TOWN SHALL BE RESPONSIBLE FOR WATERING ANY LOAM AND SEEDED AREAS UNTIL LAWN GROWTH IS ESTABLISHED AND APPROVED BY THE ENGINEER AND/OR OWNER.
19. ALL PROPOSED STRUCTURES SHALL BE DESIGNED BY THEIR MANUFACTURERS FOR AASHTO H-20 LOADING. PRECAST CONCRETE SHALL HAVE A MINIMUM 28-DAY STRENGTH OF 4000 PSI UNLESS OTHERWISE NOTED HEREIN.
20. A HIGH WATER TABLE IS ANTICIPATED. THE WATER TABLE SHALL BE TEMPORARILY LOWERED BY PUMPING. THE TOWN SHALL IMPLEMENT THE DEWATERING PLAN ACCORDING TO DEWATERING NOTES AND DETAILS AND COORDINATE ANY DEVIATIONS IN THE PLAN WITH THE ENGINEER PRIOR TO CONSTRUCTION. DEWATERING PUMP DISCHARGE SHALL BE DIRECTED TO A DEWATERING BASIN TO PREVENT SEDIMENTS FROM LEAVING THE CONSTRUCTION AREA. THE TOWN SHALL INSTALL ADDITIONAL BASINS IF REQUIRED. INSTALL THE BASIN AS SHOWN ON THE SITE PLAN OTHERWISE INSTALL THE BASIN(S) WITHIN THE LIMIT OF DISTURBANCE AS SHOWN BY THE STRAWBALES.
21. THE TOWN SHALL REGULARLY INSPECT THE PERIMETER OF THE PROPERTY TO CLEAN UP AND REMOVE LOOSE CONSTRUCTION DEBRIS BEFORE IT LEAVES THE SITE. ALL DEMOLITION DEBRIS SHALL BE PROMPTLY REMOVED FROM THE SITE TO AN APPROVED DUMP SITE. ALL TRUCKS LEAVING THE SITE SHALL BE COVERED.
22. CONCRETE TRUCKS SHALL NOT BE WASHED ONSITE. ANY CEMENT OR CONCRETE DEBRIS LEFT IN THE DISTURBED AREA SHALL BE REMOVED BY HAND AT THE TOWN'S EXPENSE.
23. BURIAL OF ANY STUMPS, SOLID DEBRIS, AND/OR STONES/BOULDERS ONSITE IS PROHIBITED. NO ROAD SALT OR OTHER DE-ICING CHEMICALS SHALL BE USED ON THE ACCESS ROADWAY.
24. IF ANY DEVIATION OR ALTERATION OF THE WORK PROPOSED ON THESE DRAWINGS IS REQUIRED, THE TOWN IS TO IMMEDIATELY CONTACT AND COORDINATE WITH THE ENGINEER AND OWNER.
25. AT THE END OF CONSTRUCTION, THE TOWN SHALL REMOVE ALL CONSTRUCTION DEBRIS AND SURPLUS MATERIALS FROM THE SITE. A THOROUGH INSPECTION OF THE WORK PERIMETER IS TO BE MADE AND ALL DISCARDED MATERIALS, BLOWN OR WATER CARRIED DEBRIS, SHALL BE COLLECTED, AND REMOVED FROM THE SITE.

GENERAL GRADING AND DRAINAGE NOTES

1. ALL CUT AND FILL SLOPES SHALL BE 3:1 OR FLATTER UNLESS OTHERWISE NOTED.
2. EXISTING GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT.
3. PROPOSED GRADE CONTOUR INTERVALS SHOWN AT 1 FOOT.
4. TOWN SHALL ADJUST AND/OR CUT EXISTING PAVEMENT AS NECESSARY TO ASSURE A SMOOTH FIT AND CONTINUOUS GRADE.
5. TOWN SHALL ASSURE POSITIVE DRAINAGE AWAY FROM BUILDINGS FOR ALL NATURAL AND PAVED AREAS.
6. PROPOSED ELEVATIONS ARE SHOWN TO FINISH PAVEMENT OR GRADE UNLESS NOTED OTHERWISE.
7. ROADS AND PARKING AREAS ARE NOT TO BE PAVED UNTIL THE ENTIRE PERMANENT DRAINAGE SYSTEM HAS BEEN INSTALLED AND ALL CONNECTIONS COMPLETE.
8. BACKFILL ADJACENT TO PIPES AND STRUCTURES SHALL BE OF THE TYPE AND QUALITY CONFORMING TO THAT SPECIFIED FOR THE ADJOINING FILL MATERIAL. BACKFILL SHALL BE PLACED IN HORIZONTAL LAYERS NOT TO EXCEED SIX INCHES IN THICKNESS AND COMPACTED TO A DENSITY OF 95% OF MAXIMUM DRY DENSITY WITH A MOISTURE CONTENT WITHIN +/- 2% OF OPTIMUM. ALL COMPACTION IS TO BE DETERMINED BY AASHTO METHOD T-99. TESTING OF BACKFILL MATERIAL SHALL BE THE RESPONSIBILITY OF THE TOWN.

WATER & SEWER INSTALLATION NOTES

1. WATER MAINS AND GRAVITY SEWER PIPES SHALL BE INSTALLED ACCORDING TO THE FOLLOWING GUIDELINES TO PREVENT FREEZING OF THE MAIN:

UTILITY TYPE	MIN. COVER OVER TOP OF PIPE	MIN. HORIZONTAL DIST. TO DRAIN STRUCTURE
GRAVITY SEWER	4'	2'
WATER MAIN	5'	2'

2. SEWER, WATER MAINS, HYDRANT PIPING, AND DEAD END WATER LINES SHALL BE INSULATED WHERE SOIL COVER OR HORIZONTAL SEPARATION TO PRECAST STRUCTURES IS LESS THAN THE DISTANCE SPECIFIED ABOVE AND/OR WHERE SHOWN ON PLANS.
3. INSULATION SHALL BE 2" THICK POLYURETHANE INSULATION WITH PVC JACKET PLACED AROUND PIPE OR DESIGNER APPROVED EQUAL.
4. WATER AND SEWER SEPARATION SHALL TYPICALLY BE 10-FEET MINIMUM HORIZONTAL AND 18-INCHES VERTICAL WITH SEWER PIPES BELOW THE WATER MAINS. IF SITE CONDITIONS REQUIRE LESS, THEN THE UTILITY INSTALLATION SHALL BE APPROVED BY THE ENGINEER.

WATER SYSTEM NOTES

1. THE TOWN SHALL CONSTRUCT THE WATER MAIN AND ITS APPURTENANCE IN ACCORDANCE WITH THE LOCAL WATER DEPARTMENT'S STANDARDS AND SPECIFICATIONS AND PAY FOR ALL ASSOCIATED FEES AS REQUIRED BY THE WATER DEPARTMENT.
2. ALL WATER MAIN 4-INCHES AND GREATER IN DIAMETER SHALL BE DUCTILE IRON CLASS 52. HDPE 3408 OR OTHER SHALL ONLY BE USED WHERE SHOWN IN THE PLANS OR AS APPROVED BY THE ENGINEER.
3. THE TOWN SHALL SUPPLY TWO COPIES OF SWORN CERTIFICATES TO PROVE THAT ALL PIPES AND FITTINGS ARE INSPECTED AND TESTED AS REQUIRED BY THE STANDARD SPECIFICATIONS TO WHICH THE MATERIAL IS MANUFACTURED.
4. GATE VALVES SHALL BE MUELLER (A 2360 SERIES), CLOW (AWWA STANDARD C509 SERIES), AMERICAN DARLING (RESILIENT WEDGE) OR APPROVED EQUAL. GATE VALVES SHALL BE USED ON ALL HYDRANT BRANCHES AND WATER MAIN. THE GATE VALVE SHALL TURN TO THE RIGHT TO OPEN (CLOCKWISE). ALL BOLTS AND NUTS SHALL BE RUST PROOF STEEL.
5. ALL NEWLY INSTALLED WATER SYSTEM COMPONENTS SHALL BE CLEARED OF ALL FOREIGN MATERIALS SUCH AS DIRT AND MISCELLANEOUS DEBRIS PRIOR TO SYSTEM TESTING AND SHALL BE WITNESSED BY THE DESIGNER. NO TESTING IS ALLOWED WITHOUT REMOVAL OF ALL FOREIGN MATERIALS.
6. A PRESSURE TEST AND DISINFECTION TEST OF ALL WATER MAINS SHALL BE CONDUCTED BY THE TOWN AND WITNESSED BY THE APPROVED INSPECTOR OR THE ENGINEER. THE TOWN SHALL BE RESPONSIBLE FOR PROVIDING A MINIMUM OF 48-HOUR ADVANCE NOTICE TO THE LOCAL WATER DEPARTMENT PRIOR TO THE PRESSURE AND DISINFECTION TESTS. THE TOWN SHALL BE RESPONSIBLE TO PROVIDE ALL NECESSARY EQUIPMENT AND CHEMICALS TO PROPERLY CONDUCT THE TESTS.
7. THE TOWN SHALL BE RESPONSIBLE TO INSTALL AND REMOVE ALL NECESSARY BLOWOFFS REQUIRED FOR THIS PROJECT AT NO EXTRA COST TO THE OWNER.
8. THE TOWN SHALL BE RESPONSIBLE TO COLLECT ALL BACTERIOLOGICAL SAMPLES AND PAY FOR ALL RELATED LABORATORY FEES.
9. THE TOWN SHALL BE RESPONSIBLE TO MAINTAIN UP-TO-DATE AS-BUILT DRAWINGS AND NOTES INDICATING THE HORIZONTAL AND VERTICAL LOCATION WITH TWO TIES OF ALL SYSTEM COMPONENTS INSTALLED. THESE AS-BUILT DRAWINGS AND NOTES WILL BE UTILIZED BY THE ENGINEER FOR THE PREPARATION OF RECORD PLANS.

EROSION & SEDIMENT CONTROL NOTES

1. THE SITE CONSTRUCTION FOREMAN SHALL BE DESIGNATED AS THE ON-SITE PERSONNEL RESPONSIBLE FOR THE DAILY INSPECTION AND MAINTENANCE OF ALL SEDIMENT AND EROSION CONTROLS AND SHALL IMPLEMENT ALL NECESSARY MEASURES TO CONTROL EROSION AND PREVENT SEDIMENT FROM LEAVING THE SITE.
2. THE TOWN SHALL INSTALL ALL SEDIMENT AND EROSION CONTROL MEASURES AS SHOWN ON THE DESIGN PLANS IN CONSULTATION WITH THE CONSERVATION AGENT , AND AS DETERMINED NECESSARY IN THE FIELD BY THE ENGINEER BEFORE ANY CONSTRUCTION ACTIVITIES ARE TO BEGIN. THESE MEASURES SHALL BE CHECKED, MAINTAINED/REPLACED AS NECESSARY DURING THE ENTIRE CONSTRUCTION PERIOD OF THE PROJECT. SUCH MEASURES SHALL REPRESENT THE LIMIT OF WORK. WORKERS SHALL BE INFORMED THAT NO CONSTRUCTION ACTIVITY IS TO OCCUR BEYOND THE LIMIT OF WORK AT ANY TIME THROUGH THE CONSTRUCTION PERIOD.
3. A MINIMUM SURPLUS OF 50-FEET OF EROSION CONTROL BARRIER (SILT FENCE AND/OR STRAWBALE) SHALL BE STOCKPILED ONSITE AT ALL TIMES.
4. THE TOWN SHALL PROTECT THE ADJACENT RESOURCE AREA FROM SEDIMENTATION DURING PROJECT CONSTRUCTION UNTIL ACCEPTANCE BY THE OWNER & IN CONFORMANCE WITH THE ORDER OF CONDITIONS.
5. THE LIMIT OF ALL CLEARING, GRADING AND DISTURBANCES SHALL BE KEPT TO A MINIMUM WITHIN THE PROPOSED AREA OF CONSTRUCTION. THE TOWN SHALL PHASE THE SITE WORK IN A MANNER TO MINIMIZE AREAS OF EXPOSED SOIL. IF TREES ARE TO BE CUT ON THE ENTIRE SITE, ONLY THOSE AREAS WHICH ARE ACTIVELY UNDER CONSTRUCTION SHALL BE GRUBBED. THE REQUIRED SEDIMENTATION CONTROL FACILITIES MUST BE PROPERLY ESTABLISHED, CLEARLY VISIBLE AND IN OPERATION PRIOR TO INITIATING ANY LAND CLEARING ACTIVITY AND/OR OTHER CONSTRUCTION RELATED WORK.
6. IT IS THE TOWN'S RESPONSIBILITY TO MONITOR LOCAL WEATHER REPORTS DURING CONSTRUCTION AND PRIOR TO SCHEDULING EARTHMOVING OR OTHER CONSTRUCTION ACTIVITIES WHICH WILL LEAVE LARGE DISTURBED AREAS UNSTABILIZED. IF INCLEMENT WEATHER IS PREDICTED, THE TOWN SHALL USE THEIR BEST PROFESSIONAL JUDGEMENT WHEN SCHEDULING CONSTRUCTION ACTIVITIES AND SHALL BE RESPONSIBLE FOR ENSURING THE NECESSARY EROSION CONTROL DEVICES ARE INSTALLED AND FUNCTIONING PROPERLY TO MINIMIZE EROSION FROM ANY IMPENDING WEATHER EVENTS.
7. SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE INSPECTED AND MAINTAINED ON A WEEKLY BASIS AND AFTER EACH RAINFALL EVENT OF 0.25 INCH OR GREATER DURING CONSTRUCTION TO ENSURE THAT THE EROSION AND SEDIMENTATION CONTROL MEASURES ARE INTACT AND FUNCTIONING PROPERLY. IDENTIFIED DEFICIENCIES SHALL BE CORRECTED IMMEDIATELY NO LATER THAN 24 HOURS AFTER IDENTIFICATION.
8. SOIL STOCKPILES LEFT OVERNIGHT SHALL BE SURROUNDED ON THEIR PERIMETERS WITH SILT FENCE, STRAWBALES, OR A COMBINATION OF SILT FENCE WITH STRAWBALE, AS DETERMINED NECESSARY.
9. DISTURBED AREAS AND SLOPES SHALL NOT BE LEFT UNATTENDED OR EXPOSED FOR EXCESSIVE PERIODS OF TIME SUCH AS THE INACTIVE WINTER SEASON. THE TOWN SHOULD PROVIDE APPROPRIATE STABILIZATION PRACTICES ON ALL DISTURBED AREAS AS SOON AS POSSIBLE BUT NOT MORE THAN 14 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT AREA HAS TEMPORARILY OR PERMANENTLY CEASED, TEMPORARY AREAS HAVING A SLOPE GREATER THAN 4:1 SHALL BE REINFORCED WITH EROSION BLANKETS OR APPROVED EQUAL UNTIL THE SITE IS PROPERLY STABILIZED. TEMPORARY SWALES MAY ALSO BE REQUIRED IF DETERMINED NECESSARY IN THE FIELD BY THE ENGINEER.
10. SMALL SEDIMENTATION BASINS MAY BE CONSTRUCTED ON AN AS-NEEDED BASIS DURING CONSTRUCTION TO AID IN THE CAPTURE OF SITE RUNOFF AND SEDIMENT. IT WILL BE THE RESPONSIBILITY OF THE TOWN, IN CONSULTATION WITH THE ENGINEER, TO SIZE AND CREATE THESE BASINS IN APPROPRIATE LOCATIONS.
11. THE TOWN SHALL CONTAIN ALL SEDIMENT ONSITE. ALL EXITS FROM THE SITE WILL BE SWEPT AS NECESSARY INCLUDING ANY SEDIMENT TRACKING. PAVED AREAS SHALL BE SWEPT AS NEEDED TO REMOVE SEDIMENT AND POTENTIAL POLLUTANTS WHICH MAY ACCUMULATE DURING SITE WORK.
12. ACCUMULATED SEDIMENT SHALL BE REMOVED FROM ALL TEMPORARY PRACTICES AND DISPOSED OF IN A PRE-APPROVED LOCATION BY THE TOWN AS DIRECTED BY THE ENGINEER.
13. THE TOWN SHALL PROVIDE ON SITE OR MAKE READILY AVAILABLE THE NECESSARY EQUIPMENT AND SITE PERSONNEL DURING CONSTRUCTION HOURS FOR THE DURATION OF THE PROJECT TO ENSURE ALL EROSION AND SEDIMENTATION CONTROL DEVICES ARE PROPERLY MAINTAINED AND REPAIRED IN A TIMELY AND RESPONSIBLE MANNER. IF SITE WORK IS SUSPENDED DURING THE WINTER MONTHS THE TOWN SHALL BE REQUIRED TO PROVIDE PERSONNEL AND EQUIPMENT EITHER ON SITE OR MAKE READILY AVAILABLE TO ENSURE ALL EROSION AND SEDIMENTATION CONTROL DEVICES ARE PROPERLY MAINTAINED AND REPAIRED IN A TIMELY AND RESPONSIBLE MANNER
14. PROPER MEASURES SHALL BE IMPLEMENTED BY THE TOWN FOR DEWATERING DURING THE CONSTRUCTION PROCESS. THESE MEASURES SHALL INCLUDE DEWATERING BAGS, TEMPORARY STRAWBALES, SILT FENCES, AND/OR OTHER APPROVED DEVICES. THE DEWATERING PLAN SHALL BE APPROVED BY THE ENGINEER.
15. DUST SHALL BE CONTROLLED BY WATERING OR OTHER APPROVED METHODS AS NECESSARY, OR AS DIRECTED BY THE ENGINEER AT NO EXTRA COST TO THE OWNER.
16. THE TOWN IS RESPONSIBLE FOR THE INSPECTION AND MAINTENANCE DURING CONSTRUCTION OF ALL STORMWATER FACILITIES INSTALLED OR AFFECTED BY THE PROJECT. ANY SEDIMENT OR DEBRIS COLLECTED WITHIN THESE FACILITIES FROM THE PROJECT WORK SHALL BE REMOVED PRIOR TO ENGINEER'S ACCEPTANCE.

BASIC OVERALL CONSTRUCTION SEQUENCE

THE FOLLOWING CONSTRUCTION SEQUENCE IS TO BE USED AS A GENERAL GUIDELINE. THE TOWN SHALL COORDINATE WITH THE ENGINEER AND LANDSCAPE ARCHITECTS AND SUBMIT A PROPOSED CONSTRUCTION SEQUENCE FOR REVIEW IF AN ALTERNATE SEQUENCE IS PREFERRED.

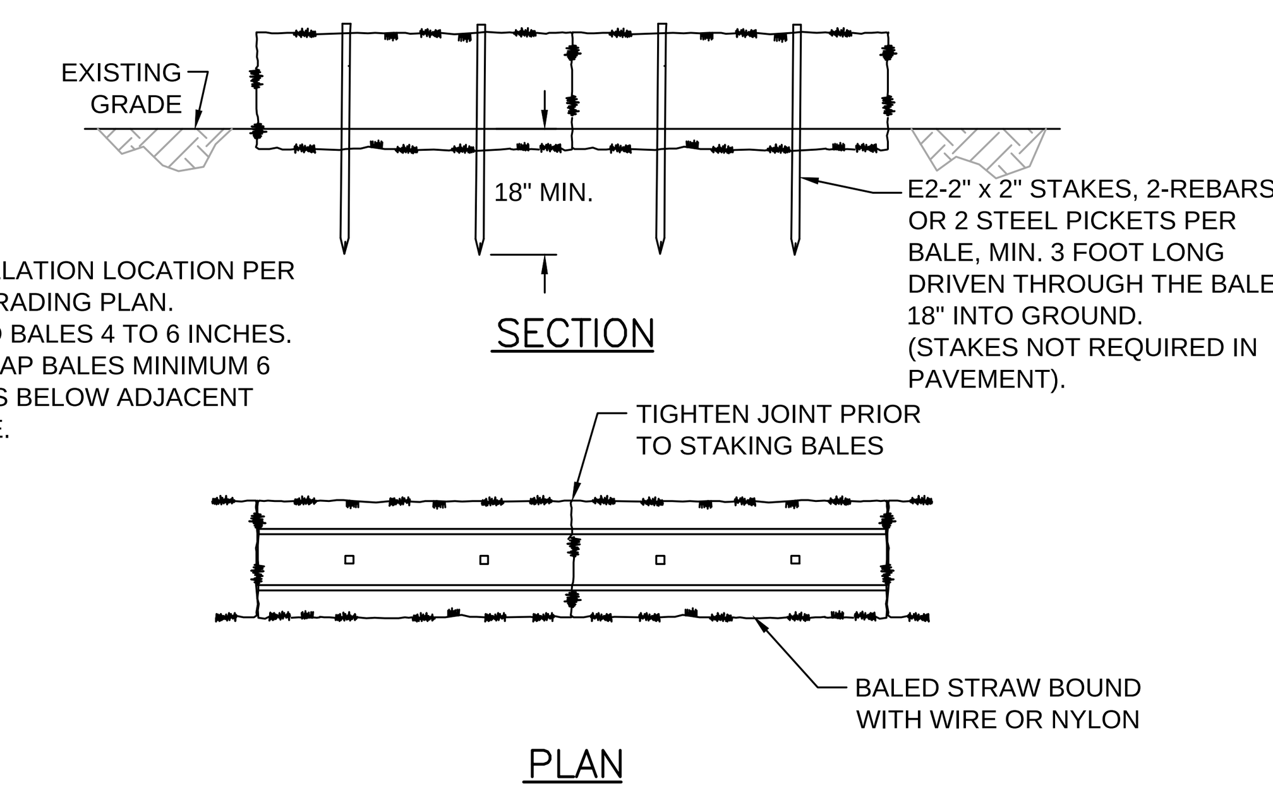
1. SURVEY AND STAKE THE PROPOSED LIMIT OF DISTURBANCE(S).
2. PLACE SEDIMENTATION BARRIERS (STRAWBALES, SILT FENCE, ETC.) AS SHOWN ON THE PLANS AND STAKED OUT IN THE FIELD. IN NO CASE IS THE LIMIT OF WORK TO EXTEND BEYOND THE SEDIMENTATION BARRIERS/LIMIT OF DISTURBANCE AS SHOWN ON THE PROJECT PLANS AND AS APPROVED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION (DEP) .
3. BEGIN CLEARING THE SITE AS REQUIRED.
4. SURVEY AND STAKE CENTERLINE OF THE PROPOSED CULVERTS AND STORMWATER MANAGEMENT AREAS.
5. CULVERT REPLACEMENT SHALL BEGIN AT THE OLD WHARF ROAD CROSSING (CULVERT 1). CONSTRUCTION SHALL NOT BEGIN AT THE UNCLE VENIES ROAD CULVERT (CULVERT 2) UNTIL THE OLD WHARF CULVERT IS OPERATIONAL AND SITE WORK IS NEAR COMPLETE.
6. INSTALL A COFFERDAM AROUND WORK AREAS AS DEPICTED ON THE PLANS AND DETAILS. EXCAVATE THE DEWATERING SUMP PIT(S) AND INSTALL THE DEWATERING APPURTENANCES AND CONTAINMENT AREAS. THE DEWATERING PLAN MUST BE APPROVED BY THE ENGINEER PRIOR TO BEGINNING CONSTRUCTION OPERATIONS.
7. SAWCUT AND REMOVE EXISTING PAVEMENT AS SHOWN ON THE PLAN.
8. BEGIN EARTH EXCAVATION FOR THE PROPOSED CULVERT. IN ORDER TO MAINTAIN FLOWS AND TIDAL FLUSHING DURING MOST OF CONSTRUCTION PERIOD, EXCAVATION AT THE ENDS OF THE CULVERT SHALL OCCUR LAST. A TEMPORARY 12" DIAMETER HDPE CULVERT SHALL BE INSTALLED IMMEDIATELY ADJACENT TO THE PROPOSED BOX CULVERT LOCATION TO PASS FLOWS DURING CONSTRUCTION. THE EXISTING RCP CULVERTS SHALL REMAIN UNTIL INSTALLATION OF THE TEMPORARY CULVERT IS COMPLETE. ANY EXCAVATED ROAD SUBGRADE OR TOPSOIL WHICH IS NOT IMMEDIATELY REMOVED FROM THE SITE SHALL BE ENCLOSED AND PROTECTED BY A SEDIMENT BARRIER.
9. INSTALL TEMPORARY CONVEYANCE DEVICES (PIPES, SWALES, CHECK DAMS, ETC.) AS NECESSARY TO CONVEY RUNOFF AWAY FROM THE CONSTRUCTION AREA.
10. RELOCATE ALL UNDERGROUND UTILITIES AS REQUIRED. PLACE COMPACTED GRAVEL FOUNDATION AND ROUGH GRADE THE ROADWAYS/PARKING AREAS IN ACCORDANCE WITH THE SITE PLANS AND IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REGULATIONS. UTILITIES SHALL BE PLACED ONLINE IN AS LITTLE TIME AS POSSIBLE.
11. PREP THE SUBGRADE FOR POURING OF THE CULVERT FLOWABLE FILL PAD. AFTER POURING, LEVELING, AND CURING, CONFIRM FINISH ELEVATIONS AND PREP THE PAD FOR CULVERT INSTALLATION. THE FLOWABLE FILL PAD MUST BE ALLOWED TO CURE FOR NO LESS THAN FIFTEEN HOURS. DEWATERING PUMPS SHALL REMAIN ACTIVE DURING THE CURING PERIOD.
12. INSTALL ALL PRECAST CULVERT SECTIONS ACCORDING TO THE PLANS AND DETAILS. INSTALL ALL HEADWALL AND WINGWALL STRUCTURES ACCORDING TO THE PLANS. CONFIRM FINISH ELEVATIONS PRIOR TO BACKFILL. INSTALL TIDE GATES WHERE APPLICABLE.
13. REMOVE COFFERDAM BACKFILL AROUND THE CULVERT. PLACE COMPACTED GRAVEL SUBBASE AND ROUGH GRADE THE ROADWAYS/PARKING AREAS IN ACCORDANCE WITH THE PLANS AND IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REGULATIONS AS SOON AS POSSIBLE.
14. PLACE CULVERT EMBEDMENT MATERIAL WITHIN THE CULVERT AND INSTALL RIPRAP APRONS ACCORDING TO THE PLANS.
15. COMPLETE ROAD AND PARKING CONSTRUCTION PER THE PLANS AND IN ACCORDANCE WITH APPLICABLE STATE AND LOCAL REGULATIONS. ROADS AND PARKING AREAS ARE NOT TO BE PAVED UNTIL THE ENTIRE PERMANENT DRAINAGE SYSTEM HAS BEEN INSTALLED AND ALL PIPE CONNECTIONS COMPLETE.
16. RESTORE ALL DUNE AND COASTAL BANK AREAS TO PRECONSTRUCTION CONDITIONS. PERMANENTLY SEED AND PLANT ALL DISTURBED AREAS OUTSIDE OF THE AREA TO BE PAVED.
17. FINISH PERMANENT STABILIZATION. SWEEP THE ROADWAY TO REMOVE ALL SEDIMENTS. REPAIR ANY DAMAGED OR UNSTABILIZED AREAS. TOWN SHALL INSPECT THE DRAINAGE NETWORK AND REPAIR ANY DAMAGE IMMEDIATELY.
18. COMPLETE ALL REMAINING PLANTING AND SEEDING.
19. REMOVAL OF ALL TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES FOLLOWING VEGETATIVE ESTABLISHMENT OF ALL DISTURBED AREAS SHALL BE APPROVED BY THE ENGINEER AND WHEN THE CONTRIBUTING AREA HAS REACHED A MINIMUM OF 80% STABILIZATION.

SITE OPERATION & MAINTENANCE:

1. THE TOWN OF HARWICH DEPARTMENT OF PUBLIC WORKS WILL MAINTAIN THE TIDE GATE IN ACCORDANCE WITH THE FOLLOWING REQUIREMENTS, IN ADDITION TO ALL MANUFACTURER RECOMMENDATIONS:
   - 1.1. FOLLOWING TIDE GATE INSTALLATION, THE DAILY HIGH TIDE LEVEL WITHIN THE UPPER MARSH WILL BE MONITORED DAILY FOR THE TWO WEEKS FOLLOWING INSTALLATION TO OBSERVE THE EXTENT OF TIDAL RANGE. DAILY ADJUSTMENTS TO THE TIDE GATE HEIGHT WILL BE NECESSARY DURING THIS TIME TO REGULATE THE TIDE LEVEL IN THE UPPER MARSH TO A MAXIMUM TIDAL ELEVATION OF 2.50' (NAVD, 1988).
   - 1.2. FOLLOWING THE FIRST TWO-WEEK MONITORING PERIOD, HIGH TIDE MONITORING WILL CONTINUE MONTHLY, OCCURRING DURING THE PREDICTED MONTHLY HIGHEST TIDE. NECESSARY ADJUSTMENTS TO THE TIDE GATE HEIGHT WILL BE MADE AT THIS TIME TO FURTHER REGULATE THE TIDE LEVEL IN THE UPPER MARSH BELOW ELEVATION 2.50' (NAVD,1988), OR ANOTHER ELEVATION AS DEEMED APPROPRIATE BASED UPON SITE OBSERVATION AND INPUT FROM ABUTTERS.
2. THE TOWN SHALL BE RESPONSIBLE FOR THE PROPER INSPECTION AND MAINTENANCE OF ALL STORMWATER MANAGEMENT FACILITIES UNTIL SUCH TIME THAT THE ROADWAYS AND ASSOCIATED UTILITIES ARE ACCEPTED BY THE ENGINEER.
3. THE TOWN SHALL INSPECT AND RESTORE/CLEAN ALL FACILITIES OF SEDIMENT AND DEBRIS PRIOR TO ACCEPTANCE.
4. ALL SEDIMENT AND DEBRIS SHALL BE DISPOSED OF PROPERLY IN A PRE-APPROVED LOCATION AS APPROVED BY THE TOWN.
5. ALL STORMWATER FACILITIES SHALL BE INSPECTED BY THE TOWN AFTER EVERY MAJOR RAINFALL EVENT FOR THE ENTIRE DURATION OF THE CONSTRUCTION PROJECT AND THE FIRST 3 MONTHS AFTER CONSTRUCTION TO ENSURE PROPER STABILIZATION AND CONSTRUCTION.
6. SPECIFIC ANNUAL MAINTENANCE SHALL BE AS FOLLOWS:
   - A. DRAINAGE FACILITIES : ALL DRAINAGE FACILITIES WILL BE INSPECTED ANNUALLY TO MONITOR FOR PROPER OPERATION, COLLECTION OF LITTER OR TRASH, AND STRUCTURAL DETERIORATION. THE FACILITIES WILL BE CLEANED OF SEDIMENT (INCLUDING SUMPS) AS NECESSARY, AND REPAIRED WHEN REQUIRED.
   - B. RIP-RAP SLOPE PROTECTION : RIP RAP AT THE OUTFALLS WILL BE INSPECTED ANNUALLY AND REPAIRED AS NECESSARY.
   - C. ROUTINE MAINTENANCE : OTHER ROUTINE MAINTENANCE WILL INCLUDE REMOVAL OF TRASH AND LITTER FROM PAVED AND PERIMETER AREAS, AND ANNUAL STREET AND PARKING LOT SWEEPING AFTER THE SPRING THAW TO AVOID EXCESSIVE ACCUMULATION OF SEDIMENT IN THE DRAINAGE SYSTEM. THE PIPES/CULVERTS WILL BE INSPECTED ANNUALLY FOR PROPER FLOW.

NOTE: OPERATION AND MAINTENANCE CHECKLIST AVAILABLE UPON REQUEST

NOTES:
1. INSTALLATION LOCATION PER THE GRADING PLAN.
2. EMBED BALES 4 TO 6 INCHES.
3. OVERLAP BALES MINIMUM 6 INCHES BELOW ADJACENT GRADE.



STRAWBALE DETAIL
NOT TO SCALE

Revisions

Rev.	Date	By	Appr.	Description
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Date: SEPT 2011 | Designed By: KMH | Drawn By: KMH | Checked By: RAC

Plan Set: *RED RIVER BEACH SALT MARSH RESTORATION CONSTRUCTION DRAWINGS HARWICH, MASSACHUSETTS*

Plan Title: *CONSTRUCTION NOTES*

Prepared For:
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Dated: May-June, Nov.-Dec. 2010

Registration:

Project Number: *10051*
Sheet : *2 of 9*

Sheet Number: C - 2

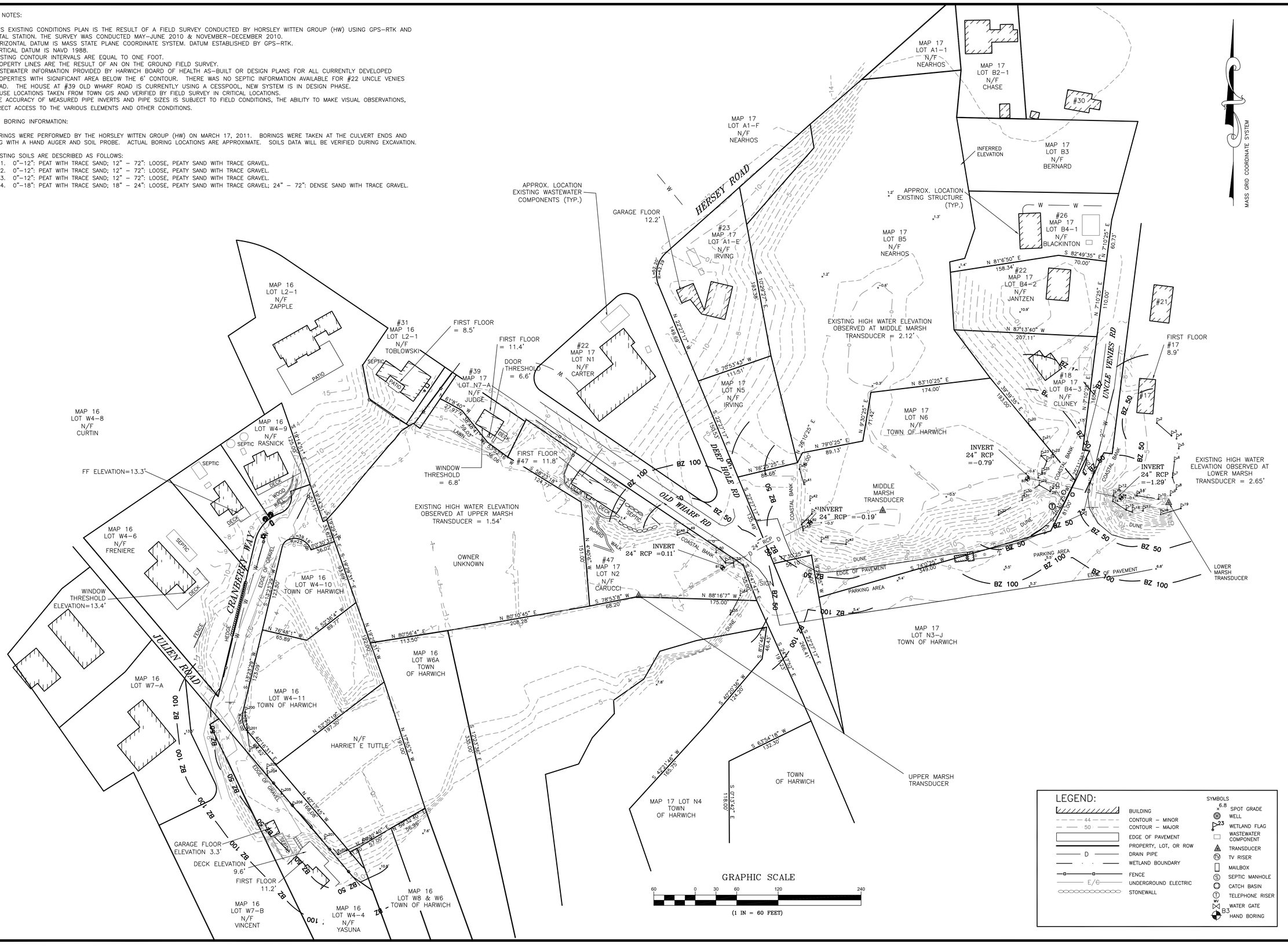
SURVEY NOTES:

1. THIS EXISTING CONDITIONS PLAN IS THE RESULT OF A FIELD SURVEY CONDUCTED BY HORSLEY WITTEN GROUP (HW) USING GPS–RTK AND TOTAL STATION. THE SURVEY WAS CONDUCTED MAY–JUNE 2010 & NOVEMBER–DECEMBER 2010.
2. HORIZONTAL DATUM IS MASS STATE PLANE COORDINATE SYSTEM. DATUM ESTABLISHED BY GPS–RTK.
3. VERTICAL DATUM IS NAVD 1988.
4. EXISTING CONTOUR INTERVALS ARE EQUAL TO ONE FOOT.
5. PROPERTY LINES ARE THE RESULT OF AN ON THE GROUND FIELD SURVEY.
6. WASTEWATER INFORMATION PROVIDED BY HARWICH BOARD OF HEALTH AS–BUILT OR DESIGN PLANS FOR ALL CURRENTLY DEVELOPED PROPERTIES WITH SIGNIFICANT AREA BELOW THE 6' CONTOUR. THERE WAS NO SEPTIC INFORMATION AVAILABLE FOR #22 UNCLE VENIES ROAD. THE HOUSE AT #39 OLD WHARF ROAD IS CURRENTLY USING A CESSPOOL, NEW SYSTEM IS IN DESIGN PHASE.
7. HOUSE LOCATIONS TAKEN FROM TOWN GIS AND VERIFIED BY FIELD SURVEY IN CRITICAL LOCATIONS.
8. THE ACCURACY OF MEASURED PIPE INVERTS AND PIPE SIZES IS SUBJECT TO FIELD CONDITIONS, THE ABILITY TO MAKE VISUAL OBSERVATIONS, DIRECT ACCESS TO THE VARIOUS ELEMENTS AND OTHER CONDITIONS.

SOILS / BORING INFORMATION:

1. BORINGS WERE PERFORMED BY THE HORSLEY WITTEN GROUP (HW) ON MARCH 17, 2011. BORINGS WERE TAKEN AT THE CULVERT ENDS AND DUG WITH A HAND AUGER AND SOIL PROBE. ACTUAL BORING LOCATIONS ARE APPROXIMATE. SOILS DATA WILL BE VERIFIED DURING EXCAVATION.

2. EXISTING SOILS ARE DESCRIBED AS FOLLOWS:
   - B1. 0"–12": PEAT WITH TRACE SAND; 12" – 72": LOOSE, PEATY SAND WITH TRACE GRAVEL.
   - B2. 0"–12": PEAT WITH TRACE SAND; 12" – 72": LOOSE, PEATY SAND WITH TRACE GRAVEL.
   - B3. 0"–12": PEAT WITH TRACE SAND; 12" – 72": LOOSE, PEATY SAND WITH TRACE GRAVEL.
   - B4. 0"–18": PEAT WITH TRACE SAND; 18" – 24": LOOSE, PEATY SAND WITH TRACE GRAVEL; 24" – 72": DENSE SAND WITH TRACE GRAVEL.



Revisions

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Drawn By: KMH
Checked By: RAC
Date: SEPT 2011

Plan Set: *RED RIVER BEACH SALT MARSH RESTORATION CONSTRUCTION DRAWINGS HARWICH, MASSACHUSETTS*

Plan Title: *EXISTING CONDITIONS*

Prepared For:
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Dated: May-June, Nov.-Dec. 2010

Registration:

Project Number: 10051

Sheet: 3 of 9

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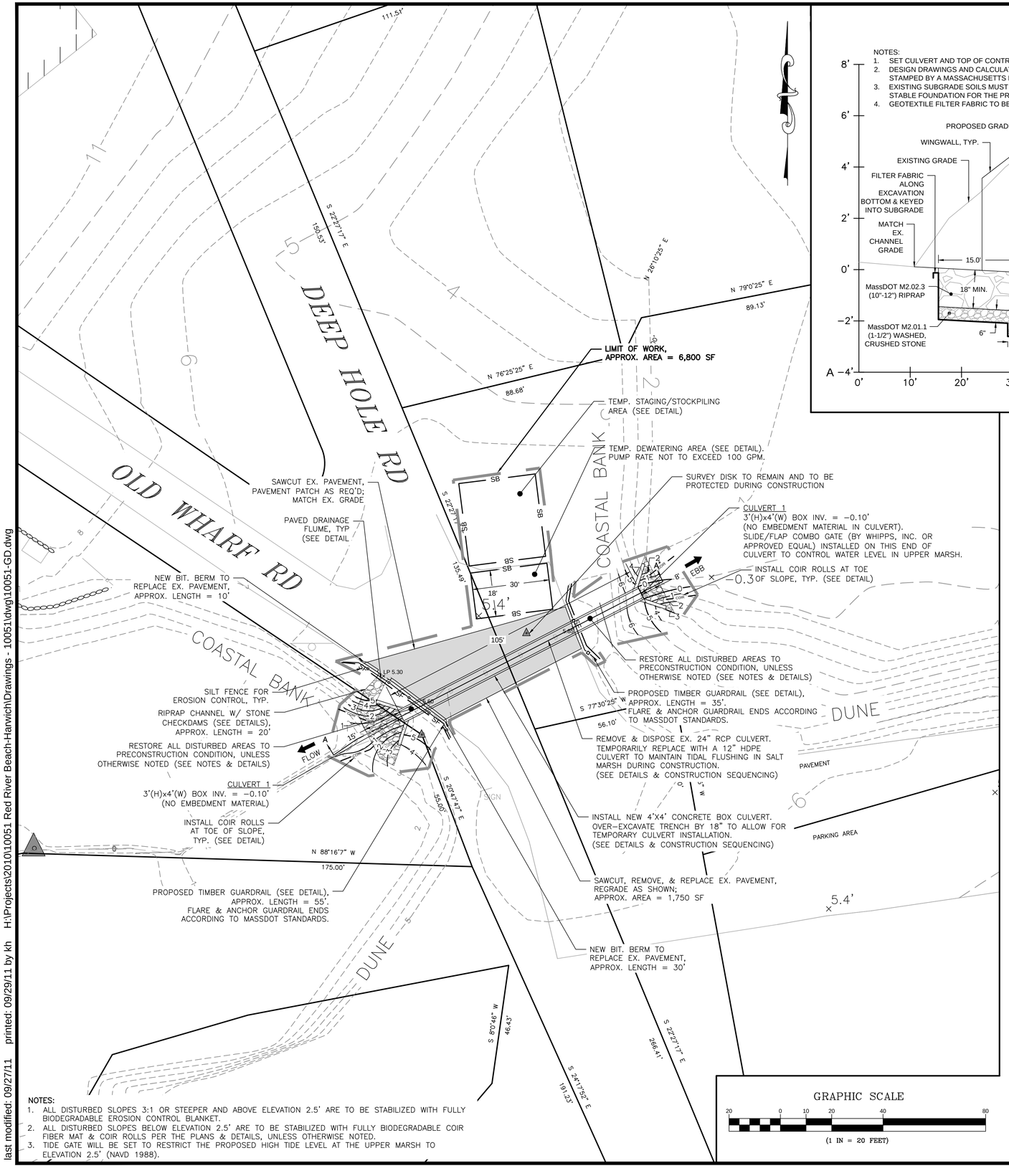
last modified: 09/20/11 printed: 10/20/11 by kh H:\Projects\2010\10051 Red River Beach-Harwich\Drawings - 10051\10051 EX.dwg

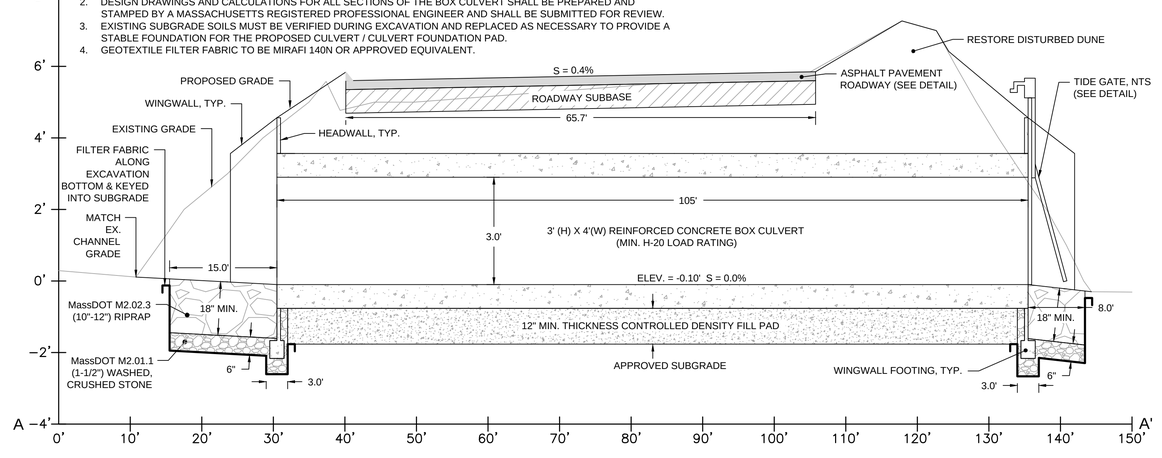


NOTES:
1. ALL DISTURBED SLOPES 3:1 OR STEEPER AND ABOVE ELEVATION 2.5' ARE TO BE STABILIZED WITH FULLY BIODEGRADABLE EROSION CONTROL BLANKET.
2. ALL DISTURBED SLOPES BELOW ELEVATION 2.5' ARE TO BE STABILIZED WITH FULLY BIODEGRADABLE COIR FIBER MAT & COIR ROLLS PER THE PLANS & DETAILS, UNLESS OTHERWISE NOTED.
3. TIDE GATE WILL BE SET TO RESTRICT THE PROPOSED HIGH TIDE LEVEL AT THE UPPER MARSH TO ELEVATION 2.5' (NAVD 1988).

OLD WHARF ROAD CROSS-SECTION A-A'

HORIZONTAL SCALE 1 : 10
VERTICAL SCALE 1 : 2

NOTES:
1. SET CULVERT AND TOP OF CONTROLLED DENSITY FILL PAD ACCORDING TO THE GRADING PLAN AND DETAILS.
2. DESIGN DRAWINGS AND CALCULATIONS FOR ALL SECTIONS OF THE BOX CULVERT SHALL BE PREPARED AND STAMPED BY A MASSACHUSETTS REGISTERED PROFESSIONAL ENGINEER AND SHALL BE SUBMITTED FOR REVIEW.
3. EXISTING SUBGRADE SOILS MUST BE VERIFIED DURING EXCAVATION AND REPLACED AS NECESSARY TO PROVIDE A STABLE FOUNDATION FOR THE PROPOSED CULVERT / CULVERT FOUNDATION PAD.
4. GEOTEXTILE FILTER FABRIC TO BE MIRAFI 140N OR APPROVED EQUIVALENT.



Revisions

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Designed By: KMH
Date: SEPT 2011

Plan Set: *RED RIVER BEACH SALT MARSH RESTORATION CONSTRUCTION DRAWINGS HARWICH, MASSACHUSETTS*

Plan Title: *GRADING & DRAINAGE SITE 1*

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Registration:

Project Number: 10051
Sheet: 4 of 9

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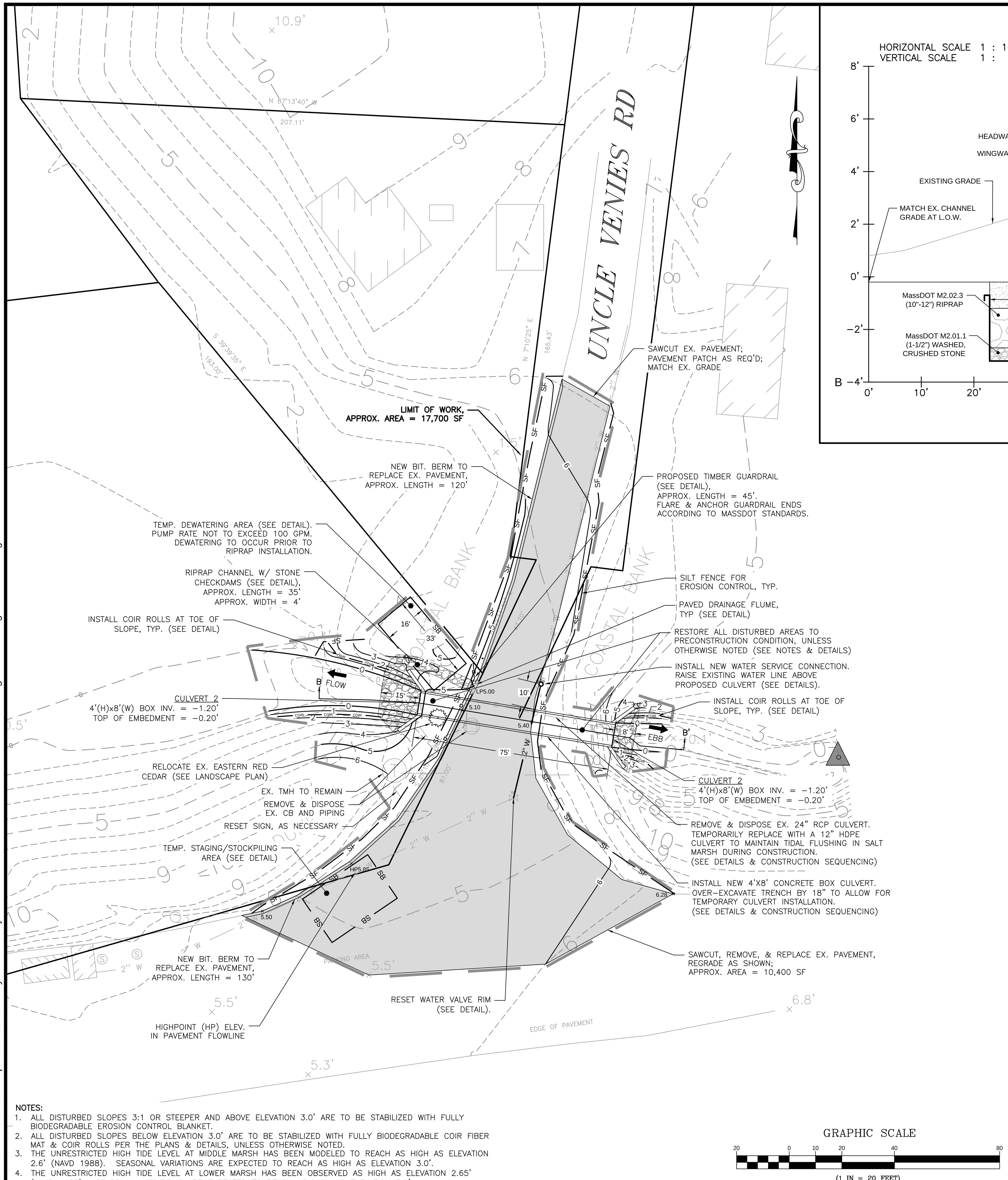

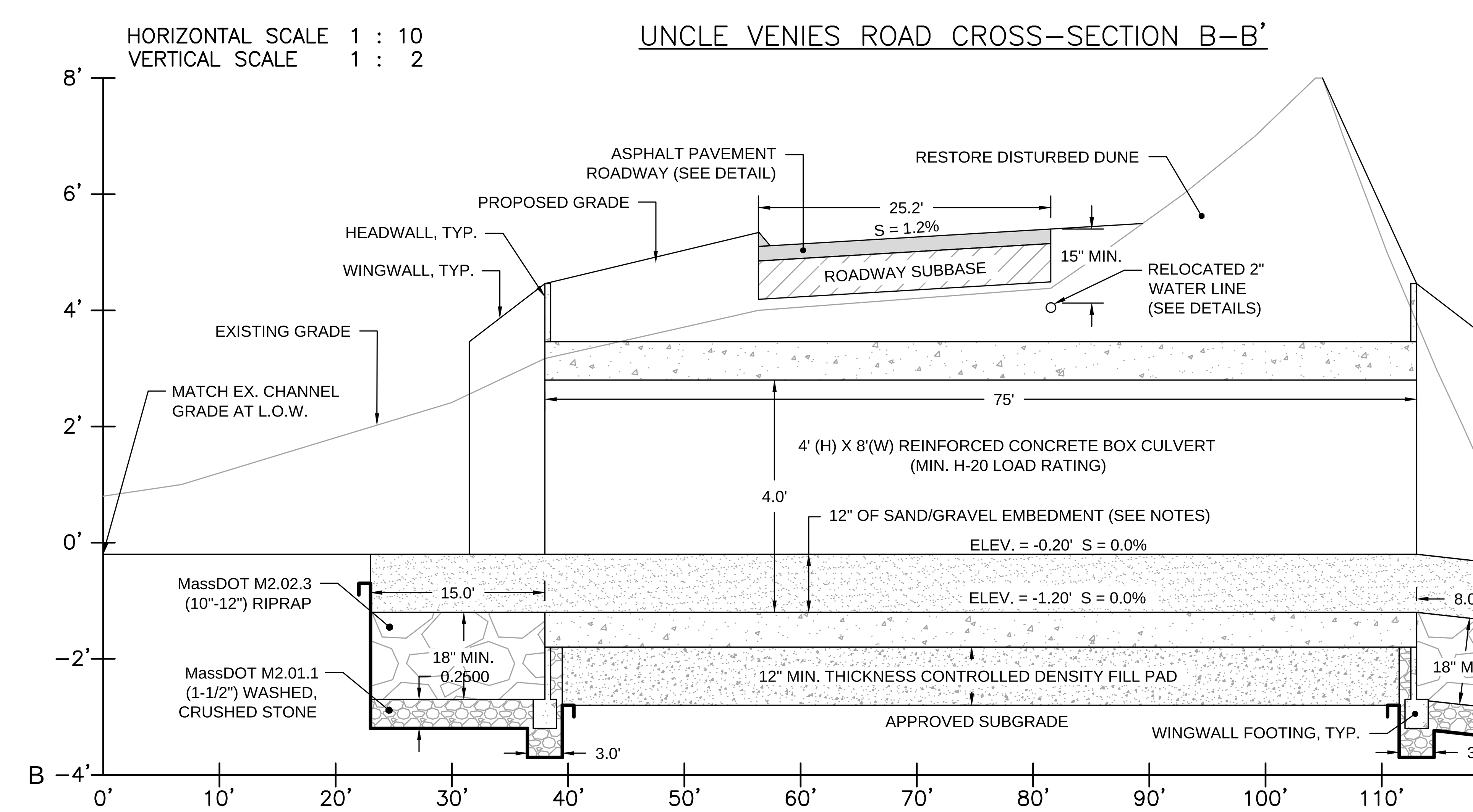

NOTES:
1. SET CULVERT AND TOP OF CONTROLLED DENSITY FILL PAD ACCORDING TO THE GRADING PLAN AND DETAILS.
2. DESIGN DRAWINGS AND CALCULATIONS FOR ALL SECTIONS OF THE BOX CULVERT SHALL BE PREPARED AND STAMPED BY A MASSACHUSETTS REGISTERED PROFESSIONAL ENGINEER AND SHALL BE SUBMITTED FOR REVIEW.
3. EXISTING SUBGRADE SOILS MUST BE VERIFIED DURING EXCAVATION AND REPLACED AS NECESSARY TO PROVIDE A STABLE FOUNDATION FOR THE PROPOSED CULVERT / CULVERT FOUNDATION PAD.
4. GEOTEXTILE FILTER FABRIC TO BE MIRAFI 140N OR APPROVED EQUIVALENT.
5. THE COARSE SAND EMBEDMENT MATERIAL MAY BE EXCAVATED NATIVE MATERIAL THAT PASSES THE NO. 4 SIEVE AND IS RETAINED ON THE NO. 40 SIEVE. THE EMBEDMENT MATERIAL SHALL BE FREE OF ORGANIC MUCK, SILT/CLAYS, CONCRETE, ASPHALT, OR OTHER DEBRIS. MATERIALS SHALL BE SUBJECT TO ENGINEER APPROVAL.

NOTES:
1. ALL DISTURBED SLOPES 3:1 OR STEEPER AND ABOVE ELEVATION 3.0' ARE TO BE STABILIZED WITH FULLY BIODEGRADABLE EROSION CONTROL BLANKET.
2. ALL DISTURBED SLOPES BELOW ELEVATION 3.0' ARE TO BE STABILIZED WITH FULLY BIODEGRADABLE COIR FIBER MAT & COIR ROLLS PER THE PLANS & DETAILS, UNLESS OTHERWISE NOTED.
3. THE UNRESTRICTED HIGH TIDE LEVEL AT MIDDLE MARSH HAS BEEN MODELED TO REACH AS HIGH AS ELEVATION 2.6' (NAVD 1988). SEASONAL VARIATIONS ARE EXPECTED TO REACH AS HIGH AS ELEVATION 3.0'.
4. THE UNRESTRICTED HIGH TIDE LEVEL AT LOWER MARSH HAS BEEN OBSERVED AS HIGH AS ELEVATION 2.65' (NAVD 1988). SEASONAL VARIATIONS ARE EXPECTED TO REACH AS HIGH AS ELEVATION 3.0'.

Revisions				
Rev.	Date	By	Appr.	Description
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Plan Set: *RED RIVER BEACH SALT MARSH RESTORATION CONSTRUCTION DRAWINGS HARWICH, MASSACHUSETTS*

Plan Title: *GRADING & DRAINAGE SITE 2*

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Registration:

Project Number: 10051
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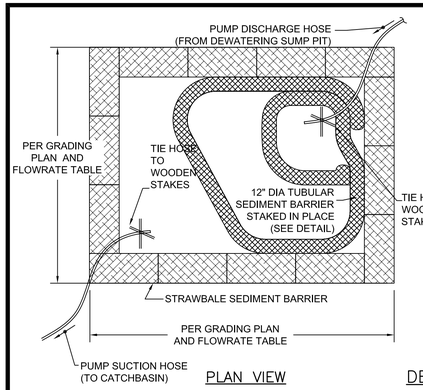
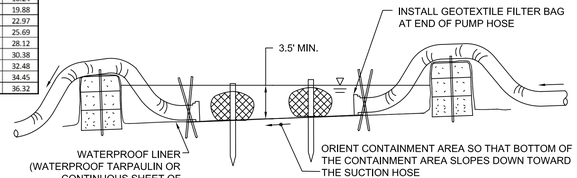


PLAN VIEW

Flow Rate		Required Surface Area	Length/Width=2:1	
Q (gpm)	Q (ft^3/s)	As (ft^2)	L (ft)	W (ft)
25	0.0565	131.86	16.24	8.14
50	0.1130	263.82	22.97	11.48
100	0.2225	527.54	32.48	16.24
150	0.3355	791.36	39.80	19.88
200	0.4450	1055.19	45.93	22.97
250	0.5580	1318.90	51.35	25.69
300	0.6674	1582.73	56.27	28.12
350	0.7805	1846.44	60.76	30.38
400	0.8899	2110.26	64.96	32.48
450	1.0029	2374.09	68.90	34.45
500	1.1124	2637.80	72.64	36.32

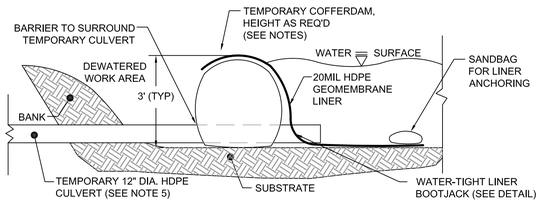


CROSS–SECTION

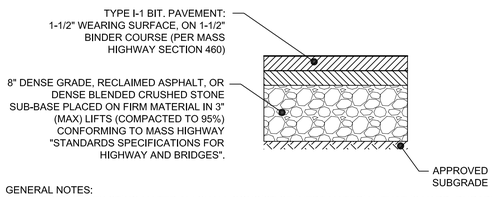
NOTE:
1. NUMBER OF BALES MAY VARY DEPENDING ON SITE CONDITIONS.
2. THE BASIN SHALL BE SIZED ACCORDING TO THE GRADING PLANS. WATER SHALL BE PREVENTED FROM OVERTOPPING THE STRAWBALES.
3. INLET HOSE TO BE INSTALLED IN AN EXCAVATED SUMP PIT FILLED WITH CRUSHED STONE.

DEWATERING CONTAINMENT AREA DETAIL

NOT TO SCALE



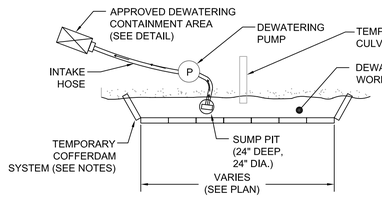
TEMPORARY COFFERDAM INSTALLATION DETAIL



GENERAL NOTES:
1. SUB-GRADE (EXISTING MATERIAL) SHALL CONSIST OF INERT MATERIAL THAT IS HARD, DURABLE STONE AND/OR COURSE SAND, FREE FROM LOAM AND CLAY TO A DEPTH NOT LESS THAN 4-FT BELOW THE FINISH PAVEMENT SURFACE.
2. SUBGRADE FILL SHALL BE COMPACTED TO 95% COMPACTION UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
3. SEE GRADING PLAN FOR PAVEMENT LOCATION, WIDTH, SLOPE, AND CROSS-SLOPE.
4. PRIOR TO INSTALLING THE WEARING COURSE THE BINDER COURSE SURFACE SHALL BE SWEPT COMPLETELY CLEAN BY A STREET SWEEPING MACHINE AND A TACK COAT SHALL BE INSTALLED TO A LEVEL APPROVED BY THE ENGINEER.

TYPICAL BITUMINOUS PAVEMENT

NOT TO SCALE



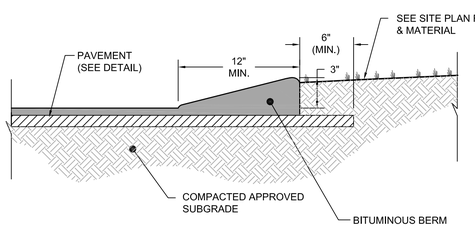
NOTE: DETAIL APPLICABLE FOR WORK ON EITHER SIDE OF MARSH. MIRROR DETAIL AS APPLICABLE.

DEWATERING PUMPING PLAN

NOTES:
1. THE DEWATERING PLAN, INCLUDING THE TEMPORARY COFFERDAM SYSTEM TO BE USED, SHALL BE APPROVED BY THE ENGINEER. PORTADAM, AQUA-BARRIER WATER-INFLATED BARRIERS, OR SAND-FILLED BULK BAGS MAY BE ACCEPTABLE ALTERNATIVES.
2. THE TERMPORARY COFFERDAM SYSTEM SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER RECOMMENDATIONS, BEGINNING AT THE MOST UPSTREAM LOCATION.
3. SANDBAGS SHALL CONSIST OF MATERIALS WHICH ARE RESISTANT TO ULTRA-VIOLET RADIATION, TEAR AND PUNCTURE AND WOVEN TIGHTLY ENOUGH TO PREVENT LEAKAGE OF FILL MATERIAL. (I.E. SAND, FINE GRAVEL, ECT.)
4. GEOMEMBRANE SHALL BE A 20MIL THICKNESS, HDPE LINER.
5. TEMPORARY HDPE CULVERT TO BE INSTALLED PARALLEL TO THE PROPOSED CULVERT LOCATION AND WITHIN THE REQUIRED EXCAVATION AREA FOR THE PERMANENT CULVERT. THERE SHALL BE NO NET INCREASE IN EXCAVATION AREA FOR INSTALLATION OF THE TEMPORARY CULVERT. PIPE BENDS/ANGLES MAY BE REQUIRED TO AVOID IMPACTS TO SURROUNDING SALT MARSH. TEMPORARY CULVERT SHALL MAINTAIN TIDAL INTERACTION BETWEEN SALT MARSHES DURING THE CONSTRUCTION PERIOD UNTIL THE PROPOSED CULVERT IS ON-LINE. TEMPORARY CULVERT TO BE INSTALLED THROUGH THE IMPERVIOUS LINER WITH A WATERTIGHT BOOT-JACK (SEE DETAIL).
6. ALL DEWATERING CONTAINMENT AREAS AND EROSION/SEDIMENT CONTROL DEVICES SHALL BE INSTALLED PRIOR TO ANY COFFERDAM INSTALLATION AND ACCORDING TO THE CONSTRUCTION PLANS AND DETAILS.
7. ALL EXCAVATED SEDIMENTS OR DEBRIS SHALL BE DISPOSED OF IN AN APPROVED STOCK PILE AREA AND PROTECTED WITH EROSION/SEDIMENT CONTROL BARRIERS.
8. EROSIONS/SEDIMENT CONTROL DEVICES ARE TO REMAIN IN PLACE UNTIL ALL DISTURBED AREAS ARE STABILIZED IN ACCORDANCE WITH THE SPECIFICATIONS.

TEMPORARY COFFERDAM DETAIL

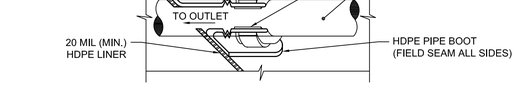
NOT TO SCALE



NOTES:
1. BERM TO BE CONSTRUCTED OF BITUMINOUS WEARING SURFACE COURSE AS SHOWN.
2. BERM TO BE CONSTRUCTED INTEGRAL WITH BITUMINOUS WEARING SURFACE.
3. WHEN BERM IS TO BE CONSTRUCTED ON A FRESH LAID BITUMINOUS SURFACE, THAT SURFACE MUST FIRST BE CLEANED.
4. BERM SHALL BE FOUNDED ENTIRELY ON THE BASE COURSE.
5. FINISH GRADE AT THE BACK OF THE BERM IS TO BE BROUGHT TO THE TOP OF THE BACK EDGE OF BERM.

TYPICAL BITUMINOUS BERM DETAIL

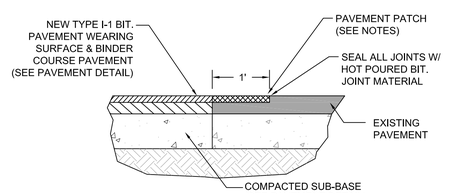
NOT TO SCALE



NOTES:
1. PREPARE THE SUB GRADE AROUND THE AREA OF THE PIPE. THE SUB GRADE MUST BE SMOOTH, UNIFORM, AND FREE OF ANY PROTRUSIONS.
2. CLEAN THE SURFACE OF THE LINER AROUND THE PENETRATION WHERE THE BOOT WILL BE WELDED IN PLACE. WIPE AWAY ANY DIRT OR DUST PARTICLES. THE SURFACES OF THE LINER, BOOT, AND THE PIPE MUST BE COMPLETELY CLEAN AND DRY.
3. SLIDE THE BOOT SLEEVE ON THE PIPE, MAKING SURE THE BOOT IS ALIGNED AND ALL SURFACES ARE SMOOTH. IT MAY BE NECESSARY TO TRIM THE EXCESS TAPERED PORTION OF THE BOOT SLEEVE.
4. WELD THE BOOT APRON TO THE LINER USING ADHESIVE. APPLY THE ADHESIVE TO THE LINER AND THE BOOT APRON. LET THE ADHESIVE SETUP FOR SEVERAL SECONDS BEFORE PRESSING THE BOOT APRON AND THE LINER TOGETHER USING A ROLLER. MAKE SURE TO SMOOTH OUT ANY BUBBLES OR WRINKLES.
5. SEAL THE BOOT SLEEVE TO THE PIPE USING THE STAINLESS STEEL HOSE CLAMP. THE CLAMP AROUND THE PIPE WILL FORM A WATERTIGHT SEAL TO THE PIPE.

LINER BOOTJACK DETAIL

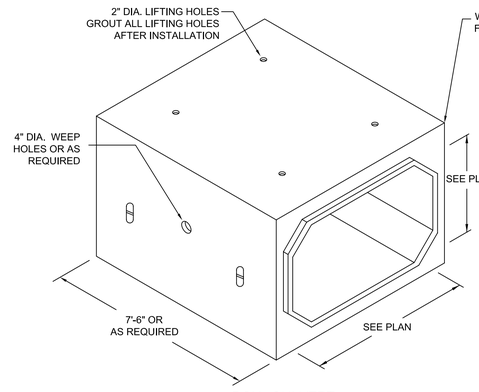
NOT TO SCALE



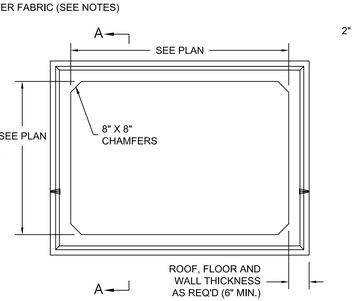
NOTES:
1. EXISTING BITUMINOUS PAVEMENT SHALL BE REMOVED TO A CLEAN STRAIGHT EDGE VIA SAW CUTTING. THE SAW CUT SHALL BE COMPLETED PERPENDICULAR TO THE ROADWAY/SIDEWALK.
2. PAVEMENT PATCH - PRIOR TO INSTALLATION OF THE BITUMINOUS WEARING COURSE, SAWCUT 1-1/2-INCHES INTO THE EXISTING PAVEMENT. MILL A 1-FT SECTION OF THE EXISTING TOP PAVEMENT SURFACE PERPENDICULAR TO THE SAWCUT. INSTALL WEARING COURSE OVER THE BINDER COURSE AND 1-FT MILLED SECTION.
3. PRIOR TO INSTALLING THE WEARING COURSE THE EXISTING BINDER COURSE SURFACE SHALL BE SWEPT COMPLETELY CLEAN & A TACK COAT SHALL BE INSTALLED TO A LEVEL APPROVED BY THE ENGINEER.

TYPICAL PAVEMENT PATCH DETAIL

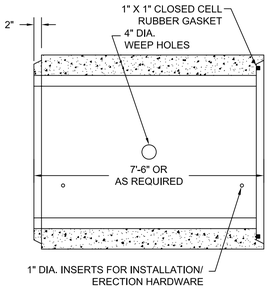
NOT TO SCALE



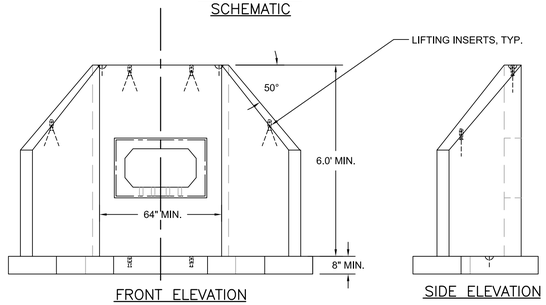
BOX CULVERT
SCHEMATIC



FRONT VIEW

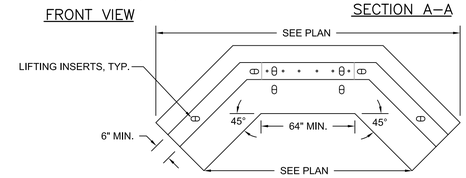


SECTION A–A



FRONT ELEVATION

SIDE ELEVATION

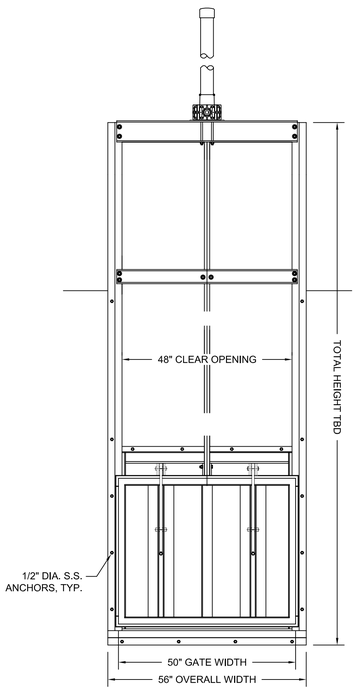


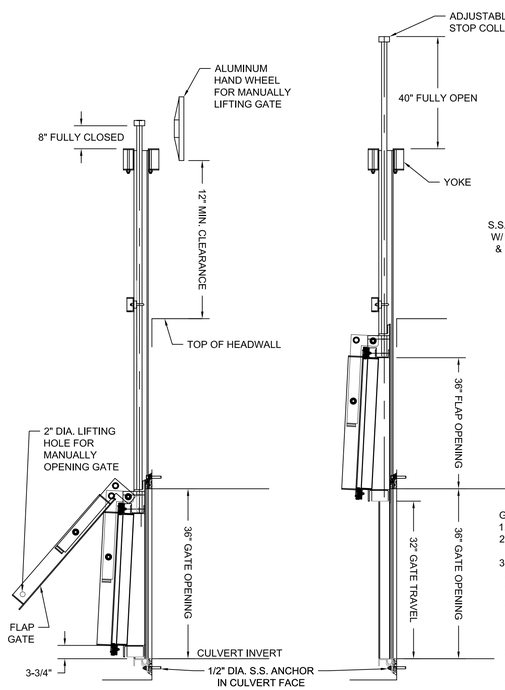
PLAN VIEW

GENERAL NOTES:
1. DETAILS PROVIDED BY OLD CASTLE PRECAST.
2. CONCRETE: 5,000 P.S.I MINIMUM COMPRESSIVE STRENGTH @ 28 DAYS.
3. STEEL REINFORCING BAR: ASTM A-615, GRADE 60. STEEL REINFORCING BARS TO BE EPOXY COATED (ASTM D3963) TO PREVENT CORROSION OR OTHER APPROVED EQUIVALENT.
4. COVER TO STEEL: 1" MINIMUM.
5. CULVERT SECTIONS SHALL BE DESIGNED TO MEET ASTM C1433 AND ACI 318 WITH AASHTO HS-20 LOADING.
6. CONSTRUCTION JOINTS:
   6.1. CULVERT JOINTS SEALED WITH 1" DIA. BUTYL RUBBER OR EQUIVALENT.
   6.2. WINGWALL JOINTS SEALED WITH 1" SQ. NEOPRENE CORD IN SHIPLAP JOINT.
8. WRAP ALL CONSTRUCTION JOINTS WITH A 2' WIDE (MIN.) STRIP OF FILTER FABRIC (MIRAFI 140N OR APPROVED EQUIVALENT). OVERLAP FABRIC BY AT LEAST 12-INCHES.
9. SECTIONS SHALL BE FASTENED TO EACH OTHER PER THE MANUFACTURER REQUIREMENTS.
9. SHOP DRAWING AND SUPPORTING CALCULATIONS OF PROPOSED CULVERT MUST BE SIGNED AND STAMPED BY A MA REGISTERED PROFESSIONAL ENGINEER AND BE SUBMITTED FOR REVIEW AND APPROVAL PRIOR TO FABRICATION OF THE CULVERT.

TYPICAL PRECAST BOX CULVERT & WINGWALL DETAIL

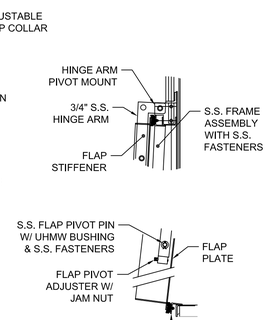
NOT TO SCALE





SLIDE GATE SHOWN IN CLOSED POSITION

SLIDE GATE SHOWN IN FULL OPEN POSITION



GENERAL NOTES:
1. DETAILS PROVIDED BY WHIPPS, INC.
2. GATE TO BE MANUFACTURED OF STAINLESS STEEL MATERIALS & HARDWARE.
3. MATERIALS SHALL INCLUDE THE FOLLOWING:
   3.1. YOKE: 6" CHANNEL
   3.2. VERTICAL STIFF. : 2" X 5" X $\frac{1}{4}$" ANGLE
   3.3. SLIDE GATE HORIZONTAL STIFF. : $\frac{3}{8}$" X 3" X 3" ANGLE
      3.3.1. LOWER: 6" CHANNEL (4.03 LBS/FT.)
      3.3.2. UPPER: 4" CHANNEL (2.33 LBS/FT.)
   3.4. FLAP GATE VERTICAL STIFFENERS: $\frac{3}{8}$" X 3" X 4" ANGLE
   3.5. FLAP GATE PERIMETER STIFFENERS: $\frac{3}{8}$" X 4" FLAT BAR

COMBINATION SLIDE/FLAP GATE DETAIL

NOT TO SCALE

Whipps, inc.
370 SOUTH ATHOL RD.
ATHOL, MA 01331

Revisions

Rev.	Date	By	Appr.	Description
1				
2				
3				
4				
5				
6				
7				

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
www.horsleywitten.com
90 Route 6A
Sandwich, MA 02563
508-833-6600 voice
508-833-3150 fax

Designed By: KMH
Drawn By: KMH
Checked By: RAC
Date: SEPT 2011

Plan Set: RED RIVER BEACH SALT MARSH RESTORATION
CONSTRUCTION DRAWINGS
HARWICH, MASSACHUSETTS

Plan Title: CONSTRUCTION DETAILS 1

Prepared For:
TOWN OF HARWICH
732 Main Street
Harwich, MA 02645
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Survey Provided By:
Horsley Witten Group
90 Route 6A
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Phone: (508) 833-6600
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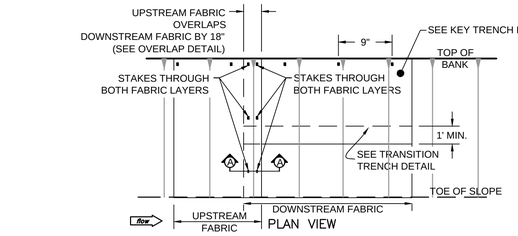
Date(s): May-June, Nov.-Dec. 2010

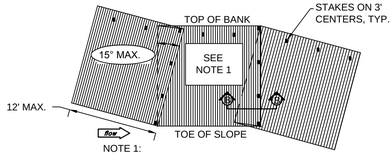
Registration:

Project Number: 10051
Sheet: 6 of 9

Sheet Number: C - 6

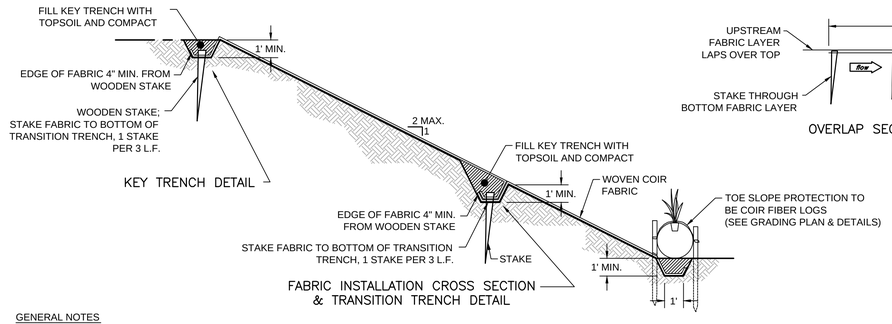


PLAN VIEW



NOTE 1:
ALL FABRIC FORMS WILL BE LAPPED IN AN UPSTREAM TO DOWNSTREAM DIRECTION.

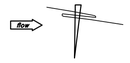
PLAN VIEW FOLDING FABRIC AT BENDS



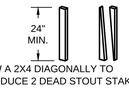
KEY TRENCH DETAIL

FABRIC INSTALLATION CROSS SECTION & TRANSITION TRENCH DETAIL

OVERLAP SECTION A–A



OVERLAP SECTION B–B



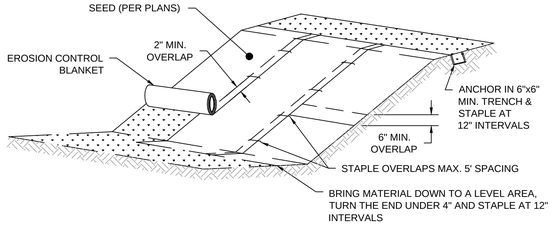
SAW A 2X4 DIAGONALLY TO PRODUCE 2 DEAD STOUT STAKES

TYPICAL STAKE DETAIL

GENERAL NOTES

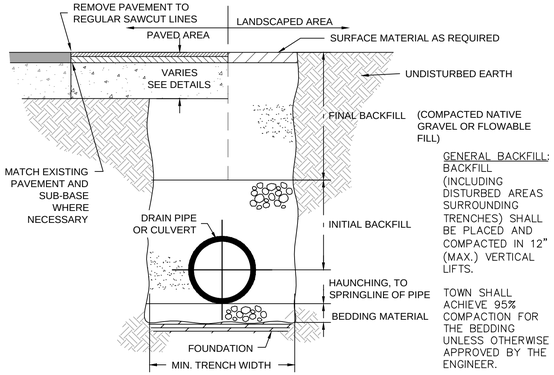
1. COIR FABRIC SHALL BE A WOVEN COCONUT EROSION CONTROL BLANKET ABLE TO WITHSTAND 10 FPS WATER VELOCITIES AND 4.5 PSF SHEAR STRESS. FABRIC SHALL BE 'GEOCOIR 700' OR APPROVED EQUAL.
2. PREPARE SOIL BEFORE INSTALLING COIR FABRIC EROSION CONTROL PRODUCTS, INCLUDING ANY NECESSARY APPLICATION OF LIME, FERTILIZER AND SEED.
3. WHERE LARGE TREES ARE PRESENT ON SLOPE, THE FABRIC SHALL BE CUT TO FORM AROUND THE TRUNK OF THE TREE. ALL SEEMS SHOULD OVERLAP AS SHOWN IN THE DETAIL.
4. BEGIN AT TOP OF THE SLOPE BY ANCHORING COIR FABRIC IN A 12" DEEP BY 12" WIDE TRENCH WITH APPROXIMATELY 12" EXTENDING BEYOND THE UPSLOPE PORTION OF THE TRENCH. ANCHOR THE COIR FABRIC WITH A ROW OF STAKES APPROXIMATELY 3' APART IN BOTTOM OF THE TRENCH. BACKFILL AND COMPACT THE TRENCH. APPLY SEED TO COMPACTED SOIL AND FOLD REMAINING 12" PORTION OF COIR FABRIC BACK OVER SEED AND COMPACTED SOIL. SECURE FABRIC OVER COMPACTED SOIL WITH A ROW OF STAKES SPACED APPROXIMATELY 12" APART ACROSS THE WIDTH OF THE FABRIC. THE EDGES OF COIR FABRIC MUST BE OVERLAPPED A MINIMUM OF 18".
5. COIR FABRIC TO BE INSTALLED ON ALL DISTURBED RIVERBANK SLOPES UNLESS OTHERWISE NOTED.

TYPICAL PERMANENT COIR FABRIC INSTALLATION DETAIL
NOT TO SCALE



NOTES:
1. EROSION CONTROL BLANKET TO BE NORTH AMERICAN GREEN BIONET S150BN OR APPROVED EQUIVALENT.
2. SLOPE SURFACE SHALL BE SMOOTH BEFORE PLACEMENT FOR PROPER SOIL CONTACT.
3. STAPLING PATTERN AS PER MANUFACTURER'S RECOMMENDATIONS.
4. DO NOT STRETCH BLANKETS/MATTINGS TIGHT. ALLOW THE ROLLS TO MOLD TO ANY IRREGULARITIES.
5. FOR SLOPES LESS THAN 3H:1V, ROLLS MAY BE PLACED IN HORIZONTAL STRIPS.
6. LIME, FERTILIZE AND SEED BEFORE INSTALLATION. PLANTING OF SHRUBS, TREES, ETC. SHOULD OCCUR AFTER INSTALLATION.

EROSION CONTROL BLANKET DETAIL
NOT TO SCALE



GENERAL BACKFILL: BACKFILL (INCLUDING DISTURBED AREAS SURROUNDING TRENCHES) SHALL BE PLACED AND COMPACTED IN 12" (MAX.) VERTICAL LIFTS.

TOWN SHALL ACHIEVE 95% COMPACTION FOR THE BEDDING UNLESS OTHERWISE APPROVED BY THE ENGINEER.

NOTES:
1. FOUNDATION: WHERE THE TRENCH BOTTOM IS UNSTABLE, THE TOWN SHALL EXCAVATE TO A DEPTH REQUIRED BY THE ENGINEER AND REPLACE WITH A SUITABLE COMPACTED GRAVEL MATERIAL OR AS AN ALTERNATIVE AND AT THE DISCRETION OF THE ENGINEER, THE TRENCH BOTTOM MAY BE STABILIZED USING A WOVEN GEOTEXTILE FABRIC.

2. BEDDING, HAUNCHING AND INITIAL BACKFILL : SUITABLE MATERIAL SHALL CONSIST OF CLEAN, HARD, PARTICLES OF GRAVEL MEETING THE FOLLOWING:

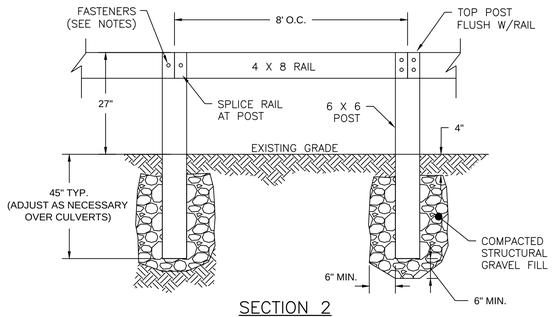
SIEVE SIZE	PERCENT PASSING
3/8"	85-95
NO. 4	5-15
NO. 8	0-2

UNLESS OTHERWISE APPROVED BY ENGINEER.

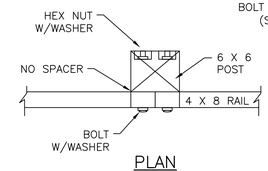
MATERIAL SHALL BE INSTALLED AS REQUIRED IN ASTM D2321, LATEST EDITION.

UNLESS OTHERWISE SPECIFIED BY THE ENGINEER, MINIMUM BEDDING THICKNESS SHALL BE 6" FOR CULVERTS.

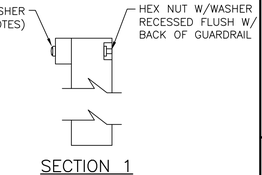
TYPICAL DRAIN PIPE TRENCH DETAIL
NOT TO SCALE



SECTION 2



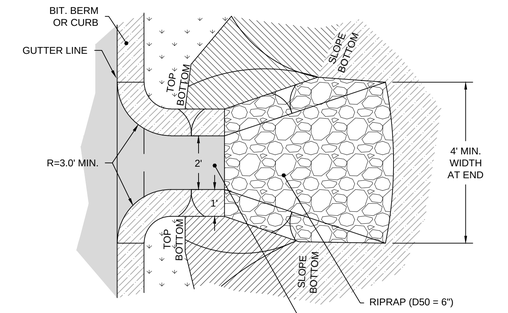
PLAN



SECTION 1

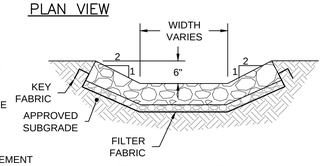
NOTES:
1. POST AND RAILS TO BE PRESSURE TREATED LUMBER.
2. ALL SPLICES ARE TO BE MADE AT POSTS.
3. BUMPER ANCHORS SHALL BE RAIL BOLTS WITH NUTS AND WASHER CONNECTION. FASTENERS SHALL BE HOT DIPPED GALVANIZED OR STAINLESS STEEL MATCHING ASTM A153 AND ASTM A653.
4. THE TOWN SHALL INSTALL EITHER TWO ¾"ø BOLTS OR ONE 2"ø BOLT AT EACH RAIL TO POST CONNECTION.
5. COMPACTED GRAVEL FOOTING SHALL EXTEND AROUND THE ENTIRE POST.
6. WOOD POSTS SHALL BE NOTCHED AS NECESSARY TO FACILITATE CURVES AND CHANGES IN DIRECTION. RAIL SHALL BE CUT TO CREATE A RAIL TO RAIL FLUSH FACE JOINT AS NECESSARY.
7. BEGINNING & END SECTIONS SHALL BE FLARED AND BURIED TO CONFORM TO MASSDOT STANDARDS.

TIMBER GUARDRAIL
NOT TO SCALE

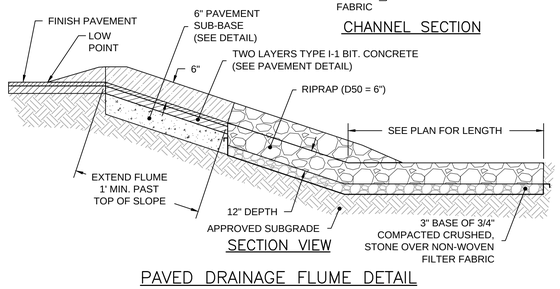


PLAN VIEW

NOTES:
1. THE STONE END SECTION SHALL BE UNDERCUT SO THAT THE INVERT OF THE APRON SHALL BE AT THE SAME GRADE (FLUSH) WITH THE SURFACE OF THE RECEIVING CHANNEL.
2. THE WIDTH OF THE END OF THE APRON SHALL BE EQUAL TO THE BOTTOM WIDTH OF THE RECEIVING CHANNEL. MAXIMUM TAPER TO RECEIVING CHANNEL 5:1.
6. THE GEOTEXTILE FILTER FABRIC SHALL BE MIRAFI 140N OR EQUIVALENT.

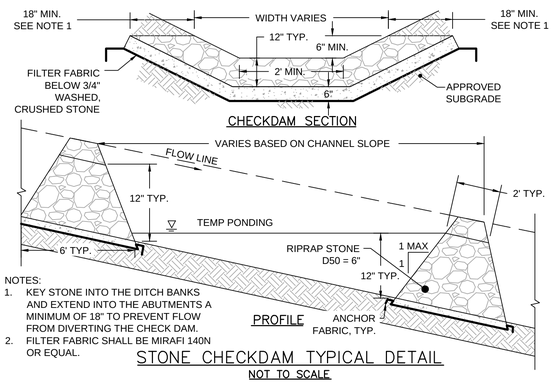


CHANNEL SECTION



SECTION VIEW

PAVED DRAINAGE FLUME DETAIL
NOT TO SCALE



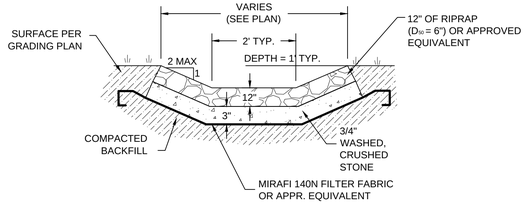
CHECKDAM SECTION

PROFILE

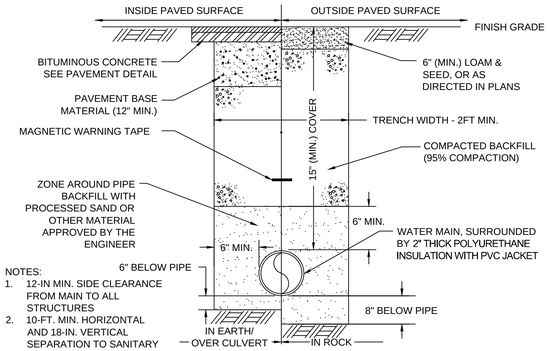
NOTES:
1. KEY STONE INTO THE DITCH BANKS AND EXTEND INTO THE ABUTMENTS A MINIMUM OF 18" TO PREVENT FLOW FROM DIVERTING THE CHECK DAM.
2. FILTER FABRIC SHALL BE MIRAFI 140N OR EQUAL.

STONE CHECKDAM TYPICAL DETAIL
NOT TO SCALE

NOTES:
1. FILTER FABRIC SHALL EXTEND AT LEAST 12 INCHES BEYOND THE SPILLWAY OPENING IN ALL DIRECTIONS AND SHALL BE KEYED INTO THE SOIL AS SHOWN.
2. ADJUST SIDESLOPE AS NECESSARY TO MEET EXISTING GRADE. MAX. SLOPE = 2:1

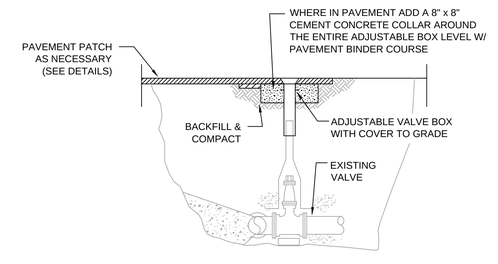


TYPICAL RIPRAP CHANNEL DETAIL
NOT TO SCALE



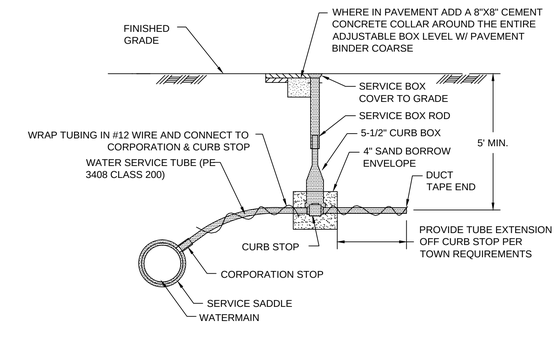
NOTES:
1. 12-IN MIN. SIDE CLEARANCE FROM MAIN TO ALL STRUCTURES
2. 10-FT. MIN. HORIZONTAL AND 18-IN. VERTICAL SEPARATION TO SANITARY SEWER.

WATER TRENCH DETAIL
NOT TO SCALE



NOTES:
1. SEE SITE PLAN FOR PROPER GRADE.
2. IF VALVE BOX IS FOUND DAMAGED OR NON-FUNCTIONIING CONTRACTOR SHALL INFORM THE ENGINEER.

VALVE BOX RIM ADJUSTMENT DETAIL
NOT TO SCALE



SERVICE CONNECTION
NOT TO SCALE

Revisions

Rev.	Date	By	App	Description

Horsley Witten Group, Inc.
Sustainable Environmental Solutions
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Sandwich, MA 02563
508-833-6600 voice
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Designed By: KAH
Drawn By: KAH
Checked By: RAC
Date: SEPT 2011

Plan Set: RED RIVER BEACH SALT MARSH RESTORATION CONSTRUCTION DRAWINGS HARWICH, MASSACHUSETTS

Plan Title: CONSTRUCTION DETAILS 2

Prepared For: TOWN OF HARWICH
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Phone: (508) 430-7513
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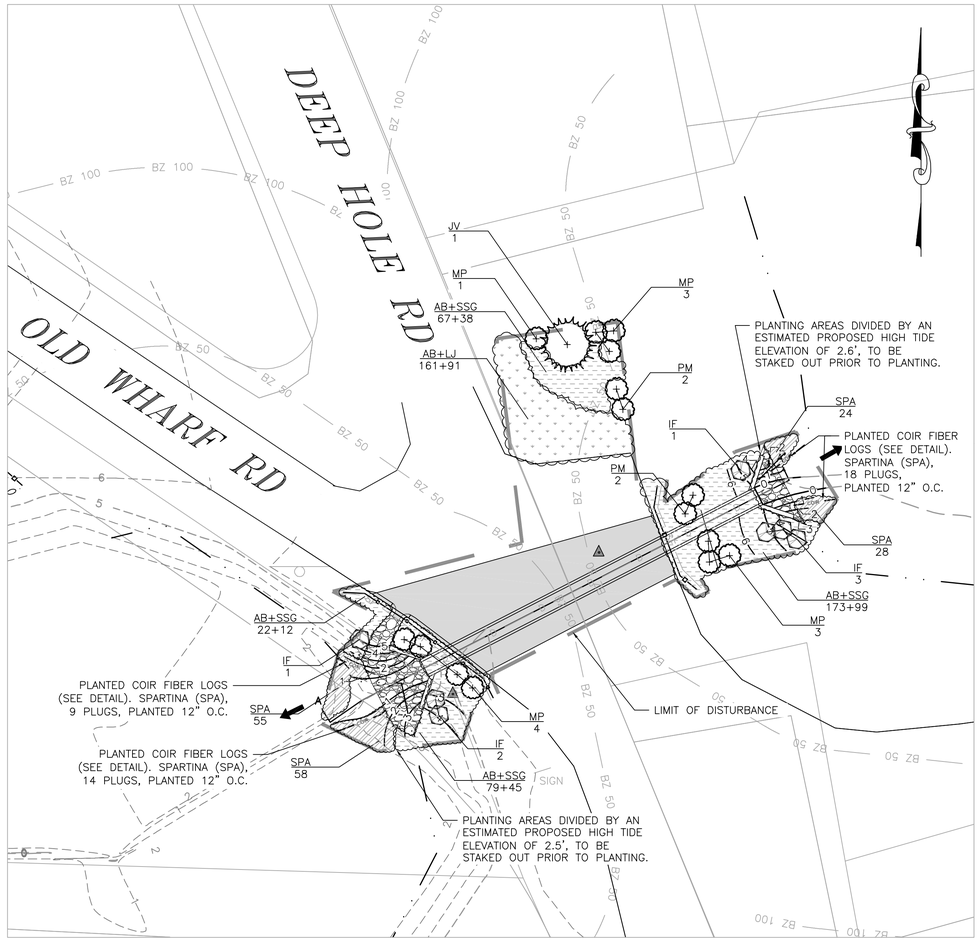
Survey Provided By: Horsley Witten Group
90 Route 6A
Sandwich, MA 02563
Phone: (508) 833-6600
Fax: (508) 833-3150
Date: May-June, Nov.-Dec. 2010

Registration:

Project Number: 10051

Sheet : 7 of 9

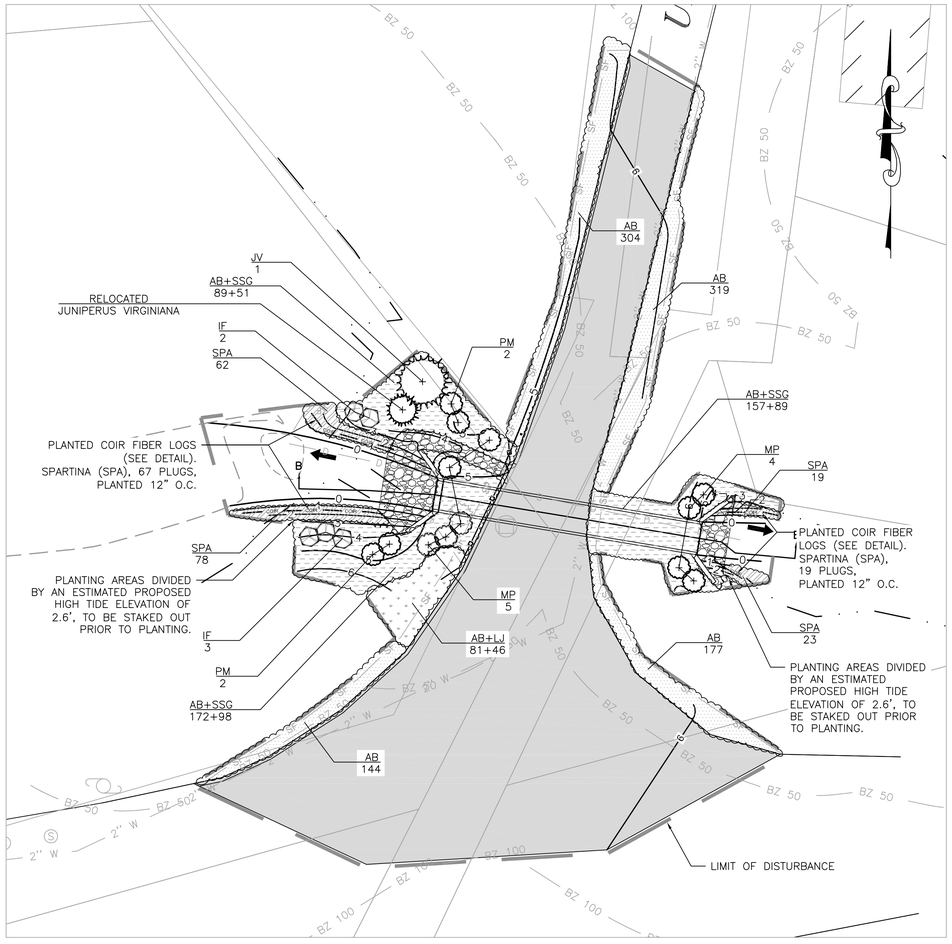
Sheet Number: C - 7



CULVERT 1 PLANTING PLAN

Culvert 1 Plant Schedule

Key	#	*Botanical Name*	Common Name	Size	Spacing	Notes
		Evergreen Trees				
JV	1	*Juniperus virginiana*	Eastern Red Cedar	8' - 10' h.	As Shown	
		Shrubs				
IF	7	*Iva frutescens*	Marsh Elder	#2	5' O.C., As Shown	
MP	11	*Myrica pensylvanica*	Northern Bayberry	3-4' B&B	5' O.C., As Shown	2 Males, 9 Females
PM	4	*Prunus maritima*	Beach Plum	3-4' B&B	6' O.C., As Shown	
		Ground Cover/Grasses/Perennials				
AB	502	*Ammophila breviligulata 'Cape'*	American Beach Grass	bare root (culms)	18" O.C.	
LJ	91	*Lathyrus japonicus*	Beach Pea	#1	24" O.C.	
SSG	194	*Solidago sempervirens*	Seaside Goldenrod	#1	24" O.C.	
SPA	178	*Spartina alterniflora*	Smooth Cordgrass	2" plugs	18" O.C.	



CULVERT 2 PLANTING PLAN

Culvert 2 Plant Schedule

Key	#	*Botanical Name*	Common Name	Size	Spacing	Notes
		Evergreen Trees				
JV	1	*Juniperus virginiana*	Eastern Red Cedar	8' - 10' h.	As Shown	
		Shrubs				
IF	5	*Iva frutescens*	Marsh Elder	#2	5' O.C., As Shown	
MP	9	*Myrica pensylvanica*	Northern Bayberry	3-4' B&B	5' O.C., As Shown	2 Males, 7 Females
PM	4	*Prunus maritima*	Beach Plum	3-4' B&B	6' O.C., As Shown	
		Ground Cover/Grasses/Perennials				
AB	1443	*Ammophila breviligulata 'Cape'*	American Beach Grass	bare root (culms)	18" O.C.	
LJ	46	*Lathyrus japonicus*	Beach Pea	#1	24" O.C.	
SSG	238	*Solidago sempervirens*	Seaside Goldenrod	#1	24" O.C.	
SPA	268	*Spartina alterniflora*	Smooth Cordgrass	2" plugs	18" O.C.	

GRAPHIC SCALE

20 0 10 20 40 80

(1 IN = 20 FEET)

Revisions

No.	Date	By	Appr	Description
1				
2				
3				
4				
5				
6				
7				

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Drawn By: HC
Checked By: BHK
Date: SEPT 2011

Plan Set: *RED RIVER BEACH SALT MARSH RESTORATION*
CONSTRUCTION DRAWINGS
HARWICH, MASSACHUSETTS

Plan Title: *LANDSCAPE PLAN*

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Dated: May-June, Nov.-Dec. 2010

Registration:

Project Number: *10051*
Sheet: *8 of 9*

Sheet Number: C - 8

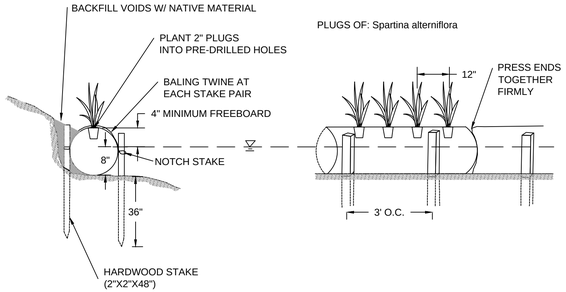
GENERAL PLANTING NOTES:

1. THE FOLLOWING NOTES ARE PROVIDED AS GENERAL PLANTING GUIDELINES ONLY. THE LANDSCAPE CONTRACTOR AND FOREMAN SHALL THOROUGHLY REVIEW THE PROJECT SPECIFICATIONS FOR ALL LANDSCAPE REQUIREMENTS PRIOR TO THE COMMENCEMENT OF ANY LANDSCAPE WORK. ANY QUESTIONS OR CLARIFICATIONS REQUIRED SHALL BE SUBMITTED IN WRITING TO THE LANDSCAPE ARCHITECT AT A MINIMUM OF 30 DAYS PRIOR TO ORDERING ANY MATERIALS OR BEGINNING ANY LANDSCAPE CONSTRUCTION.
2. THE CONTRACTOR SHALL INSPECT ALL AREAS TO BE PLANTED OR SEEDED PRIOR TO STARTING ANY LANDSCAPE WORK AND REPORT ANY DEFECTS SUCH AS INCORRECT GRADING, INCORRECT SUBGRADE ELEVATIONS OR DRAINAGE PROBLEMS, ETC. TO THE LANDSCAPE ARCHITECT AND ENGINEER PRIOR TO BEGINNING WORK. COMMENCEMENT OF WORK SHALL INDICATE ACCEPTANCE OF SUBGRADE AREAS TO BE PLANTED, AND THE LANDSCAPE CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR ALL LANDSCAPE WORK.
3. SEASONS FOR PLANTING:

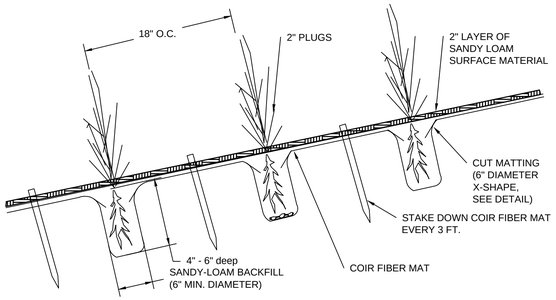
   SPRING: APRIL 15 THROUGH JUNE 1

   FALL: SEPTEMBER 15 THROUGH NOVEMBER 15

   PLANTING UNDER FROZEN CONDITIONS IN EITHER THE SPRING OR FALL WILL NOT BE PERMITTED . PLANTING BEFORE OR AFTER THE ABOVE REFERENCED PLANTING DATES WILL INCREASE THE LIKELIHOOD OF PLANT OR GRASS SEED ESTABLISHMENT FAILURE. ANY DEVIATION FROM THE ABOVE REFERENCED PLANTING DATES SHALL BE UNDERTAKEN AT SOLE RISK OF THE CONTRACTOR AND IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO PROVIDE ANY ADDITIONAL MAINTENANCE AND WATERING WHICH MAY BE REQUIRED TO ENSURE SATISFACTORY PLANT AND SEED ESTABLISHMENT.
4. FURNISH AND INSTALL ALL PLANTS AS SHOWN ON THE DRAWINGS AND IN THE SIZE AND QUANTITIES SPECIFIED ON THE PLANTING SCHEDULE.
5. CONTRACTOR TO PROVIDE A ONE (1) YEAR GUARANTEE FOR ALL MATERIALS. CONTRACTOR GUARANTEES THAT PLANTS WILL REMAIN HEALTHY FOR ONE (1) GROWING SEASON. CONTRACTOR TO MAINTAIN ALL PLANTING AND SEEDED AREAS UNTIL FINAL PROJECT ACCEPTANCE. GUARANTEE PERIOD TO COMMENCE AT FINAL ACCEPTANCE. ANY REPLACEMENT PLANTS SHALL BE OF THE SAME SIZE AND SPECIES AS SPECIFIED WITH NEW GUARANTEE COMMENCING ON THE DATE OF REPLACEMENT.
6. SUBMIT TO THE LANDSCAPE ARCHITECT FOR REVIEW AND APPROVAL ALL REQUIRED LANDSCAPE SUBMITTALS AS DESCRIBED IN THE SPECIFICATIONS INCLUDING A PLANT LIST WITH PLANT SIZE AND QUANTITIES TO BE ORDERED PRIOR TO DELIVERY TO THE PROJECT SITE.
7. THE CONTRACTOR SHALL SEND A REPRESENTATIVE SAMPLE OF THE TOPSOIL TO A TESTING LABORATORY FOR STANDARD SOIL ANALYSIS AS DESCRIBED IN THE SPECIFICATIONS. TEST RESULTS WITH RECOMMENDED SOIL TREATMENTS TO PROMOTE PLANT AND GRASS GROWTH SHALL BE SUBMITTED TO THE LANDSCAPE ARCHITECT AND ENGINEER. DEFICIENCIES IN THE LOAM AND STOCKPILED TOPSOIL SHALL BE CORRECTED BY THE CONTRACTOR AS DIRECTED BY THE TESTING AGENCY.
8. ALL PLANT MATERIAL SHALL CONFORM, IN ALL RESPECTS, TO THE GUIDELINES OF "THE AMERICAN STANDARD FOR NURSERY STOCK," LATEST EDITION, PUBLISHED BY THE AMERICAN NURSERY & LANDSCAPE ASSOCIATION, INC. AND SHALL HAVE BEEN GROWN UNDER CLIMATIC CONDITIONS SIMILAR TO THOSE IN THE LOCALITY OF THE PROJECT FOR AT LEAST TWO (2) YEARS. ALL PLANTS SHALL BE NURSERY GROWN AND HEALTHY, FREE OF DISEASE, INSECTS, PESTS, EGGS OR LARVAE, AND SHALL HAVE A WELL DEVELOPED ROOT SYSTEM.
9. ALL PLANTS SHALL BE PLANTED WITHIN ONE (1) WEEK OF PURCHASE. IF PLANTS ARE TO BE STORED AT THE SITE PRIOR TO PLANTING, IT IS THE CONTRACTOR'S RESPONSIBILITY TO ENSURE THEY ARE PROPERLY MAINTAINED, WATERED, AND REMAIN HEALTHY.
10. ALL PLANT LAYOUT AND ACTUAL PLANTING LOCATIONS ARE TO BE FIELD VERIFIED BY LANDSCAPE ARCHITECT PRIOR TO PLANTING. THE LANDSCAPE ARCHITECT SHALL BE NOTIFIED AT A MINIMUM OF 48 HOURS IN ADVANCE PRIOR TO SCHEDULING ANY FIELD INSPECTIONS.
11. ALL TREES WITHIN 5'-0" OF WALKWAYS AND SIDEWALKS TO HAVE A 6'-8" STANDARD BRANCHING HEIGHT.
12. PLANT SUBSTITUTION SELECTION MUST BE APPROVED BY BIOLOGIST OR LANDSCAPE ARCHITECT PRIOR TO INSTALLATION.
13. FOR POTTED PLANTS, REMOVE THE PLANT FROM THE POT AND LOOSEN OR SCORE THE ROOTS BEFORE PLANTING SO THAT THEY MAY GROW OUTWARDS INTO THE SOIL.
14. FOR FIELD GROWN PLANTS, CUT AND REMOVE ANY PLASTIC. CUT AND REMOVE WIRE FROM THE TOP HALF OF ROOTBALL. UNTIE, CUT AND REMOVE BURLAP WRAP FROM AT LEAST THE TOP HALF OF THE ROOTBALL AND TURN DOWN ANY EXTRA BURLAP INTO THE HOLE MAKING SURE TO BURY THE MATERIAL COMPLETELY.
15. ALL PLANT PLUGS SHALL BE PLANTED UPRIGHT AND NOT AT AN ANGLE. PLANTING HOLES SHALL BE DUG LARGE ENOUGH AND DEEP ENOUGH TO ACCOMMODATE THE ENTIRE ROOT MASS. THE PLUGS SHALL BE PLANTED WITH NO TWISTED OR BALLED ROOTS AND SHALL BE PLANTED WITH NO ROOTS EXPOSED ABOVE THE GRADE LINE. THE SOIL SHALL BE HAND PACKED AROUND THE ENTIRE PLUG ROOT MASS
16. THE PLANTING HOLE IS TO BE DUG THE SAME DEPTH AS THE ROOT BALL AND TWO TO THREE TIMES WIDER. SCORE ALL SIDES OF THE HOLE, PLACE THE PLANT IN THE HOLE SO THE TOP OF ROOT BALL IS EVEN WITH SOIL SURFACE. FILL THE HOLE HALFWAY AND THEN ADD WATER ALLOWING IT TO SEEP INTO BACK FILLED MATERIAL. BE SURE TO REMOVE ALL AIR POCKETS FROM BACK FILLED SOIL. DO NOT SPREAD SOIL ON TOP OF THE ROOTBALL. IF SOIL IS EXTREMELY POOR, REPLACE BACK FILL WITH GOOD QUALITY TOP SOIL. AMEND THE SOIL, AS NECESSARY.
17. CREATE A 2" TO 4" BERM AROUND THE EDGE OF PLANTING HOLE WITH REMAINING SOIL TO RETAIN WATER.
18. DO NOT MULCH PLANTS. COVER SHRUB AND TREE ROOTBALLS WITH A 1" LAYER OF SAND.
19. TRIM BROKEN AND DEAD BRANCHES FROM TREES AND SHRUBS AFTER PLANTING. NEVER CUT A LEADER.
20. ALL PLANT TAGS AND FLAGS SHOULD BE REMOVED FROM THE PLANTS AND PROPERLY DISCARDED.
21. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROPER PREPARATION OF ALL PROPOSED PLANTED AND SEEDED AREAS PER THE NOTES AND SPECIFICATIONS.
22. ALL AREAS THAT ARE DISTURBED AND/OR GRADED DURING CONSTRUCTION ARE TO BE BROUGHT TO FINISHED GRADE WITH AT LEAST 4" MINIMUM DEPTH OF GOOD QUALITY SOIL AND PLANTED WITH AMERICAN BEACH GRASS (AMMOPHILA BREVILIGULATA) AS SPECIFIED ON THE PLANS.
23. PRIOR TO THE PLACEMENT OF TOP SOIL, THE SUBGRADE OF ALL PROPOSED SEEDED AREAS SHALL BE LOOSENED TO A DEPTH OF 6" AND RAKED TO REMOVE STONES LARGER THAN 1 INCH, STICKS, ROOTS, RUBBISH AND OTHER EXTRANEOUS MATTER AND LEGALLY DISPOSED OF THEM TO AN OFF SITE LOCATION.
24. DO NOT SPREAD TOPSOIL IF THE SUBGRADE IS FROZEN, EXCESSIVELY WET, COMPACTED OR NOT PROPERLY PREPARED PER THE NOTES AND SPECIFICATIONS.
25. AN APPROPRIATE WATERING SCHEDULE SHALL BE ESTABLISHED BY THE LANDSCAPE CONTRACTOR FOR ALL PLANT MATERIAL BASED UPON PLANT SPECIES REQUIREMENTS AND PROVIDED IN WRITING TO THE LANDSCAPE ARCHITECT AND OWNER FOR REVIEW AND APPROVAL. THE APPROVED SCHEDULE SHOULD BE FOLLOWED UNTIL PLANTS ARE FULLY ESTABLISHED. AT A MINIMUM THE NEWLY SEEDED AND/OR HYDROSEEDED LAWNS SHOULD BE WATERED 2-3 TIMES A DAY. SPECIAL CARE SHOULD BE TAKEN TO ENSURE THAT THE LAWN IS NOT SATURATED DURING WATERING. IF AN IRRIGATION SYSTEM IS NOT PROVIDED, A TEMPORARY IRRIGATION SYSTEM OR HANDHELD GARDEN HOSE SHALL BE USED FOR WATERING SEEDED AREAS. THE AREA MUST BE MAINTAINED CONSISTENTLY MOIST FOR THE BEST GERMINATION RESULTS. ADDITIONAL WATERING WILL BE REQUIRED IF PLANTING AND SEEDING OCCUR OUTSIDE OF THE RECOMMENDED PLANTING SEASONS.
26. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROPER PLANT CARE, MAINTENANCE AND WATERING ON SITE UNTIL SUCH TIME AS THE LANDSCAPING IS ACCEPTED BY THE PROPERTY OWNER AS SATISFACTORY PER THE SPECIFICATIONS OR AS DETERMINED BY ANY WRITTEN AGREEMENTS BETWEEN THE CONTRACTOR AND PROPERTY OWNER.

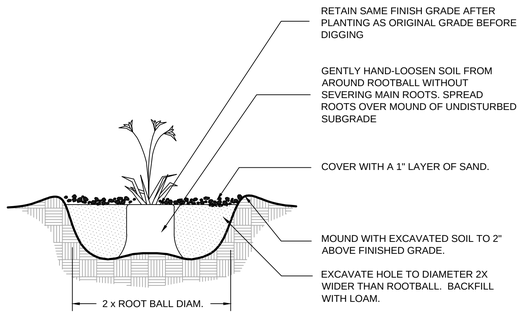


COIR FIBER LOG DETAIL
NOT TO SCALE



NOTES:
1. COIR FIBER MAT TO BE 'GEOCOIR' 700 OR ENGINEER APPROVED EQUIVALENT

SALT WATER CORDGRASS PLANTING DETAIL
NOT TO SCALE



PERENNIAL PLANTING DETAIL
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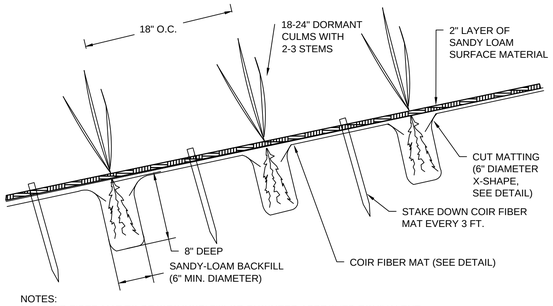
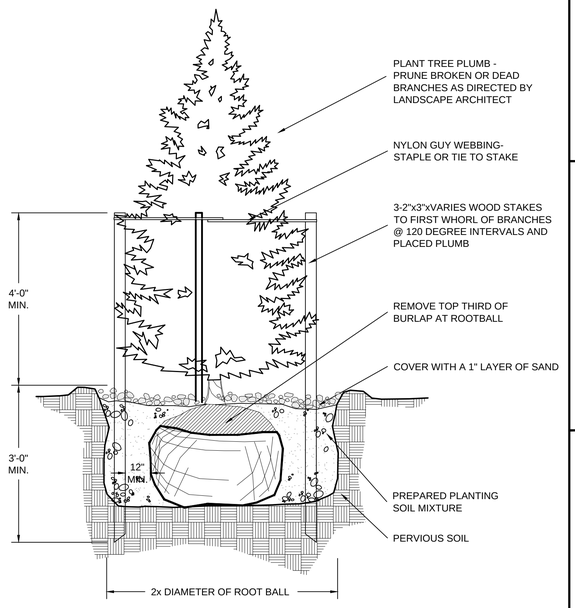
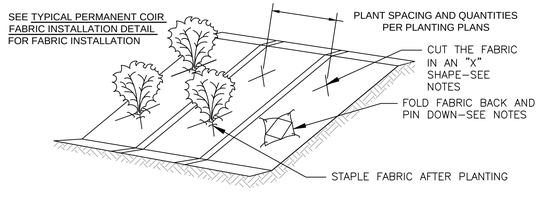


NOTES:
1. COIR FIBER MAT TO BE 'GEOCOIR' 700 OR ENGINEER APPROVED EQUIVALENT.
2. ONLY PLANT FROM OCTOBER 1 TO APRIL 30 WHILE BEACH GRASS IS DORMANT.

BEACH GRASS PLANTING DETAIL
NOT TO SCALE

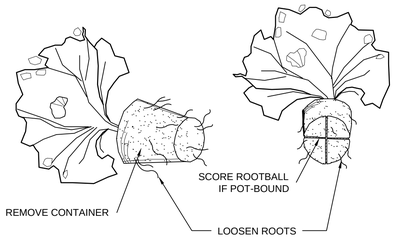


EVERGREEN TREE PLANTING DETAIL
NOT TO SCALE

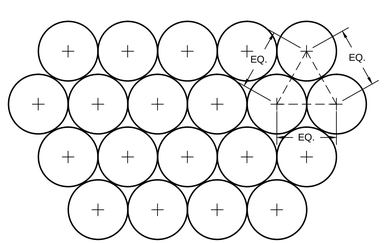


NOTES:
1. CUT THE FABRIC IN AN "X" SHAPE TO ACCOMODATE 2 TIMES THE DIAMETER OF THE ROOTBALL.
2. FOLD FABRIC BACK AND PIN DOWN TO CREATE A HOLE IN THE MAT.
3. DIG THE HOLE PER PLANTING DETAILS.
4. AFTER PLANTING, FOLD FABRIC BACK INTO PLACE AND STAPLE DOWN AS REQUIRED TO SECURE FABRIC IN PLACE.

PLANTING IN COIR FABRIC DETAIL
NOT TO SCALE

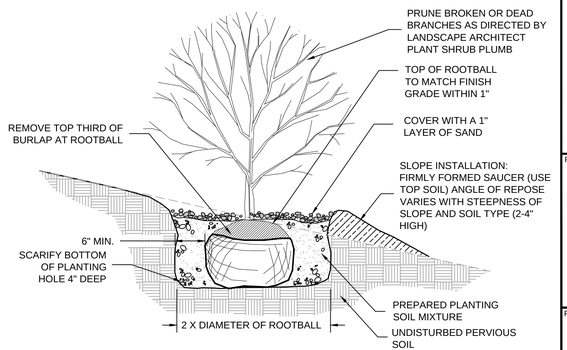


CONTAINER PLANT ROOTBALL TREATMENT
NOT TO SCALE



USE EQUIDISTANT TRIANGULAR SPACING FOR PLANTS - FOR ACTUAL SPACING SEE PLANS OR PLANTING SCHEDULE

PLANTING SPACING DETAIL
NOT TO SCALE



SHRUB PLANTING DETAIL
NOT TO SCALE

Revisions

Rev.	Date	By	Appr.	Description

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Drawn By: HC
Checked By: BRK
Date: SEPT 2011

Plan Set: *RED RIVER BEACH SALT MARSH RESTORATION CONSTRUCTION DRAWINGS HARWICH, MASSACHUSETTS*

Plan Title: *LANDSCAPE DETAILS*

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Date(s): May-June, Nov.-Dec. 2010

Registration:

Project Number: *10051*

Sheet: *9 of 9*

Sheet Number: C - 9