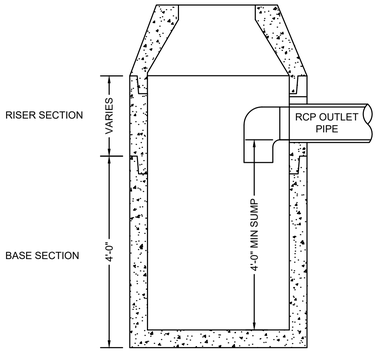
WESTFORD
ROUTE 40 (GROTON ROAD) & DUNSTABLE ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/STP-0033(193)X	41	73
PROJECT FILE NO.	608037		

CONSTRUCTION DETAILS - 1 OF 4

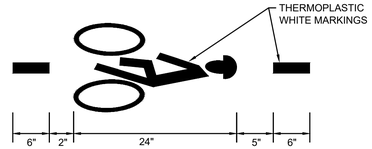


NOTE:

ALL CATCH BASINS SHALL CONFORM TO MASSDOT CONSTRUCTION STANDARD E 201.4.0 EXCEPT FOR 4' SUMP DEPTH AS SHOWN

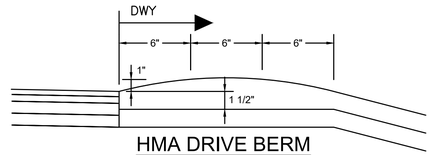
DEEP SUMP CATCH BASIN WITH HOOD

N.T.S.



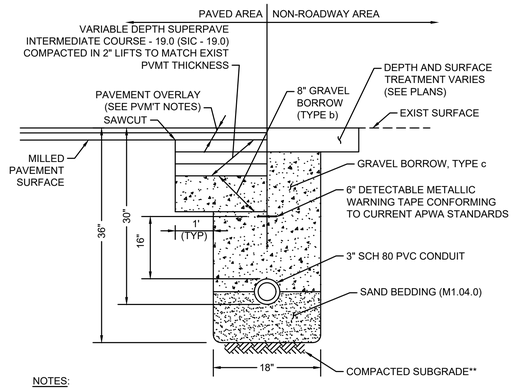
BICYCLE DETECTOR PAVEMENT MARKING

N.T.S.



HMA DRIVE BERM

N.T.S.

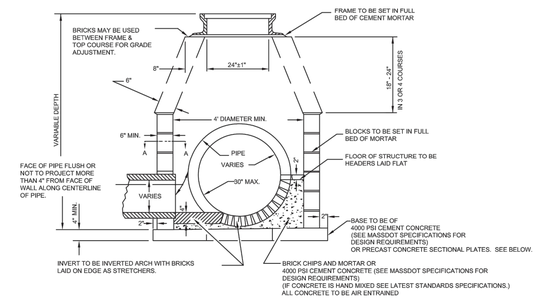


NOTES:

**SOFT OR UNSUITABLE MATERIAL EXISTING BELOW THE REQUIRED BEDDING GRADE SHALL BE REMOVED AS DIRECTED AND REPLACED WITH SAND, GRAVEL, CRUSHED STONE OR OTHER SUITABLE MATERIAL AND THOROUGHLY COMPACTED.

CONDUIT TRENCH

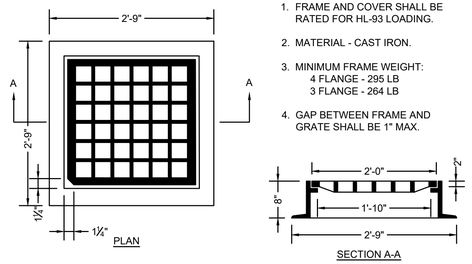
N.T.S.



NOTE:
1. DESIGN SHOWN IS FOR MANHOLE OF 9' OR LESS AND PIPE DIAMETER OF 30" OR LESS.
2. STANDARD MANHOLE DEPTH TO BE 6'-6" OR LESS

CONCRETE BLOCK MANHOLE

N.T.S.

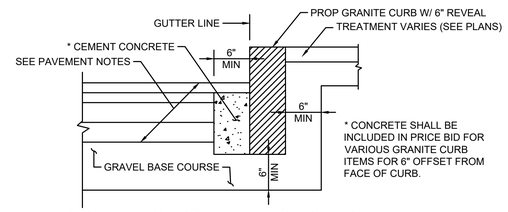


NOTES:

1. FRAME AND COVER SHALL BE RATED FOR HL-93 LOADING.
2. MATERIAL - CAST IRON.
3. MINIMUM FRAME WEIGHT:
   4 FLANGE - 295 LB
   3 FLANGE - 264 LB
4. GAP BETWEEN FRAME AND GRATE SHALL BE 1" MAX.

CATCH BASIN FRAME & GRATE (MUNICIPAL STANDARD)

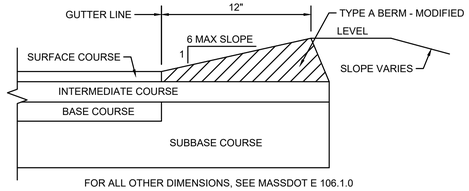
N.T.S.



* CONCRETE SHALL BE INCLUDED IN PRICE BID FOR VARIOUS GRANITE CURB ITEMS FOR 6" OFFSET FROM FACE OF CURB.

GRANITE CURB IN FULL DEPTH PAVEMENT

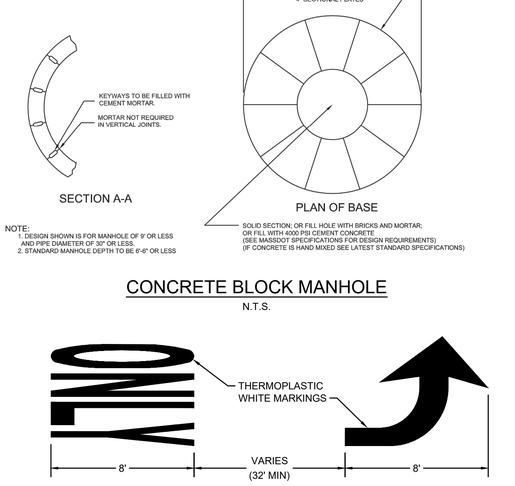
N.T.S.



FOR ALL OTHER DIMENSIONS, SEE MASSDOT E 106.1.0

HOT MIX ASPHALT BERM, TYPE A - MODIFIED

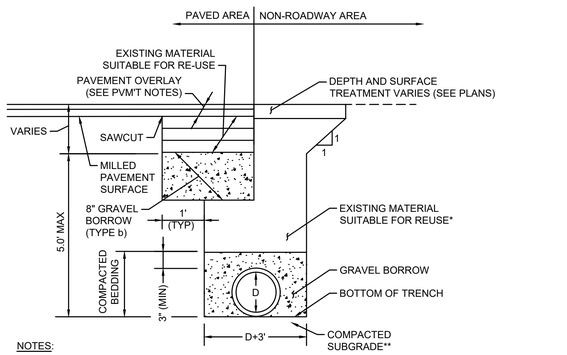
N.T.S.



NOTE: SPACING SHALL BE SAME FOR RIGHT TURN LANE AND THRU ONLY PAVEMENT MARKING (REFER TO MASSDOT STANDARD DRAWING TR.6.1)

LEFT TURN LANE PAVEMENT MARKING

N.T.S.



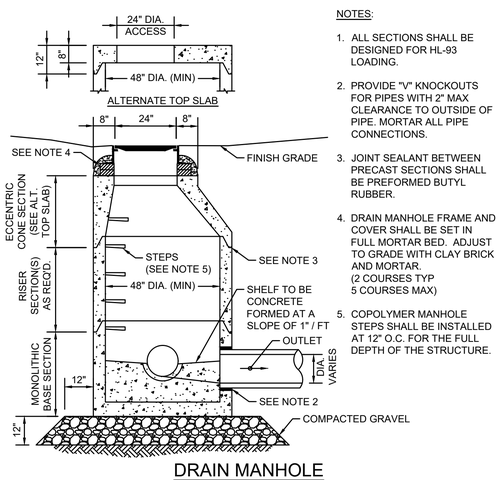
NOTES:

* EXISTING MATERIAL OBTAINED FROM EXCAVATION THAT IS DETERMINED TO BE SUITABLE, AND APPROVED BY THE ENGINEER SHALL BE USED. BACKFILL SHALL BE PLACED IN LAYERS NO MORE THAN 6" IN DEPTH AND THOROUGHLY COMPACTED. BACKFILLING TO A POINT 2' OVER THE PIPE SHALL CONTAIN NO STONES LARGER THAN 3".

**SOFT OR UNSUITABLE MATERIAL EXISTING BELOW THE REQUIRED BEDDING GRADE SHALL BE REMOVED AS DIRECTED AND REPLACED WITH SAND, GRAVEL, CRUSHED STONE OR OTHER SUITABLE MATERIAL AND THOROUGHLY COMPACTED.

UTILITY TRENCH

N.T.S.

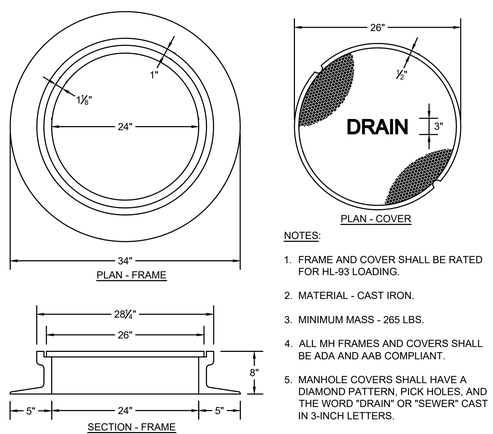


NOTES:

1. ALL SECTIONS SHALL BE DESIGNED FOR HL-93 LOADING.
2. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
3. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.
4. DRAIN MANHOLE FRAME AND COVER SHALL BE SET IN FULL MORTAR BED. ADJUST TO GRADE WITH CLAY BRICK AND MORTAR. (2 COURSES TYP. 5 COURSES MAX)
5. COPOLYMER MANHOLE STEPS SHALL BE INSTALLED AT 12" O.C. FOR THE FULL DEPTH OF THE STRUCTURE.

DRAIN MANHOLE

N.T.S.

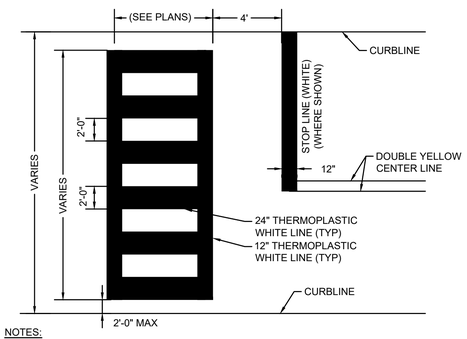


NOTES:

1. FRAME AND COVER SHALL BE RATED FOR HL-93 LOADING.
2. MATERIAL - CAST IRON.
3. MINIMUM MASS - 265 LBS.
4. ALL MH FRAMES AND COVERS SHALL BE ADA AND AAB COMPLIANT.
5. MANHOLE COVERS SHALL HAVE A DIAMOND PATTERN, PICK HOLES, AND THE WORD "DRAIN" OR "SEWER" CAST IN 3-INCH LETTERS.

MANHOLE FRAME & COVER

N.T.S.

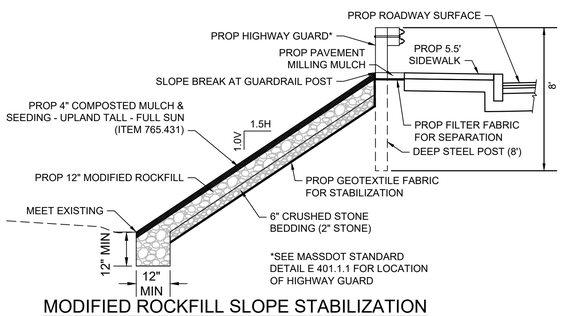


NOTES:

1. ALL 12" LINES SHALL BE APPLIED IN ONE APPLICATION, NO COMBINATION OF LINES (TWO - 6" LINES) WILL BE ACCEPTED. ALL 24" LINES MAY BE EITHER ONE 24" LINE OR A COMBINATION OF TWO - 12" LINES.
2. LAYOUT OF CROSSWALKS SHALL BE APPROVED BY THE ENGINEER PRIOR TO APPLICATION.
3. CROSSWALK BARS SHALL BE PLACED OUTSIDE THE VEHICULAR WHEEL PATH WHEREVER POSSIBLE.

CROSSWALK PAVEMENT MARKING

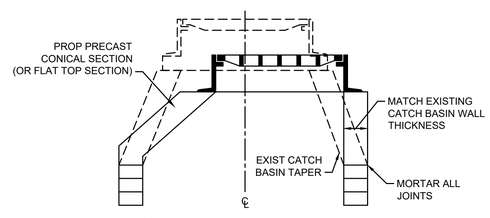
N.T.S.



*SEE MASSDOT STANDARD DETAIL E 401.1.1 FOR LOCATION OF HIGHWAY GUARD

MODIFIED ROCKFILL SLOPE STABILIZATION

N.T.S.



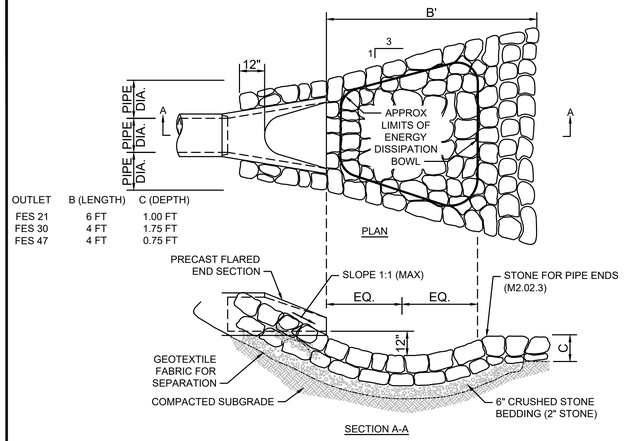
CATCH BASIN REMODEL

N.T.S.

608037(PS&E2)HD12(CONSTRUCTION DETAILS).DWG Plotted on 7/6/2018 9:44 AM

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/STP-0033(193)X	42	73
PROJECT FILE NO.	608037		

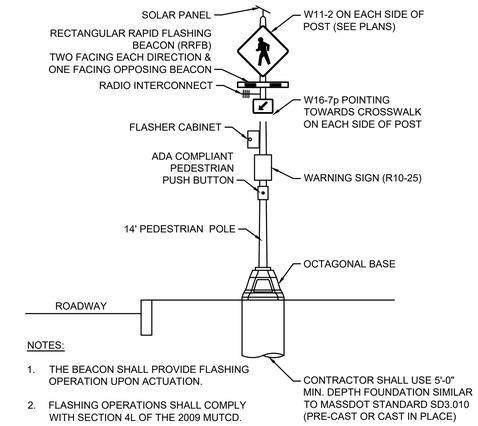
CONSTRUCTION DETAILS - 2 OF 4



OUTLET	B (LENGTH)	C (DEPTH)
FES 21	6 FT	1.00 FT
FES 30	4 FT	1.75 FT
FES 47	4 FT	0.75 FT

STONE AT FLARED END SECTION

N.T.S.

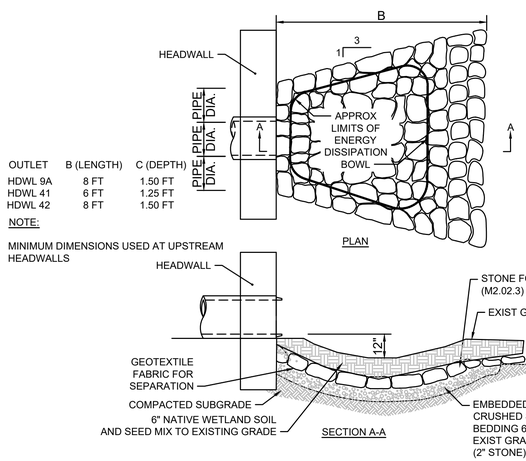


NOTES:

1. THE BEACON SHALL PROVIDE FLASHING OPERATION UPON ACTUATION.
2. FLASHING OPERATIONS SHALL COMPLY WITH SECTION 4L OF THE 2009 MUTCD.
3. THERE SHALL BE NO PUSH BUTTON CONFIRMATION INDICATION.

RECTANGULAR RAPID FLASHING BEACON

N.T.S.



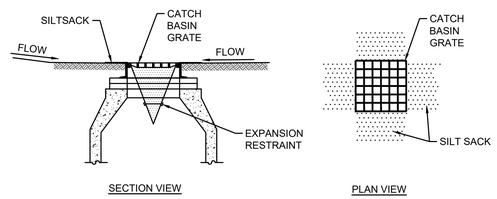
OUTLET	B (LENGTH)	C (DEPTH)
HDWL 9A	8 FT	1.50 FT
HDWL 41	6 FT	1.25 FT
HDWL 42	8 FT	1.50 FT

NOTE:

MINIMUM DIMENSIONS USED AT UPSTREAM HEADWALLS

STONE APRON AT HEADWALL

N.T.S.

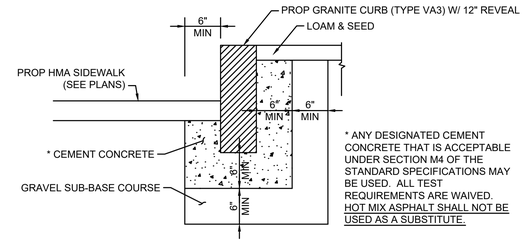


NOTES:

1. INSTALL SILT SACK IN EXISTING CATCH BASINS BEFORE COMMENCING WORK, AND IN NEW CATCH BASINS IMMEDIATELY AFTER INSTALLATION OF STRUCTURE. MAINTAIN UNTIL BINDER COURSE PAVING IS COMPLETE OR A PERMANENT STAND OF GRASS HAS BEEN ESTABLISHED.
2. GRATE TO BE PLACED OVER SILT SACK.
3. SILT SACK SHALL BE INSPECTED PERIODICALLY AND AFTER ALL STORM EVENTS AND CLEANING OR REPLACEMENT SHALL BE PERFORMED PROMPTLY AS NEEDED.

INLET PROTECTION SILT SACK IN CATCH BASIN

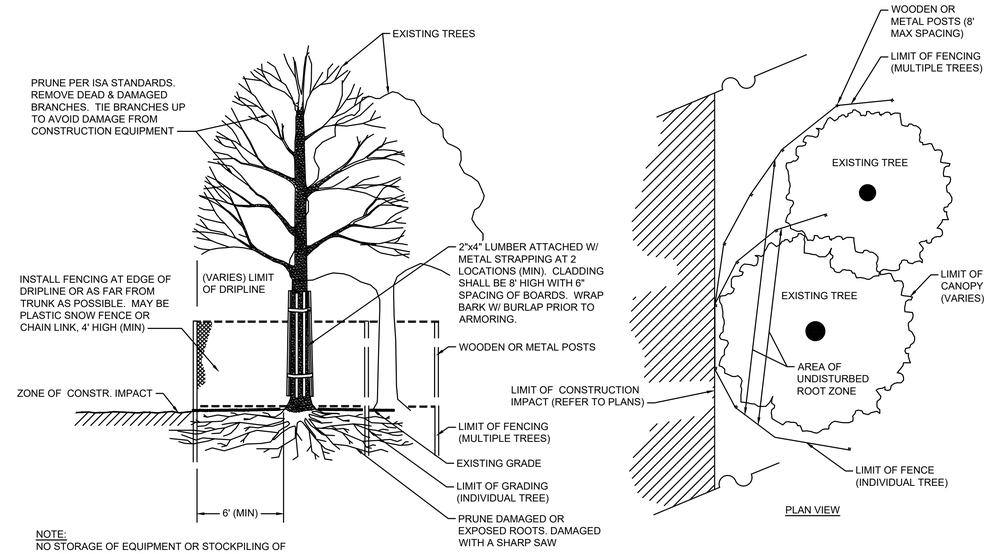
N.T.S.



* ANY DESIGNATED CEMENT CONCRETE THAT IS ACCEPTABLE UNDER SECTION M4 OF THE STANDARD SPECIFICATIONS MAY BE USED. ALL TEST REQUIREMENTS ARE WAIVED. HOT MIX ASPHALT SHALL NOT BE USED AS A SUBSTITUTE.

GRANITE BACK CURB

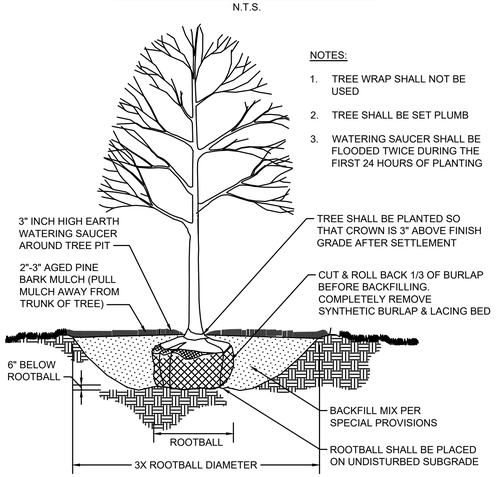
N.T.S.



NOTE:
NO STORAGE OF EQUIPMENT OR STOCKPILING OF MATERIALS WITHIN DRIPLINE IS ALLOWED.

TREE PROTECTION

N.T.S.

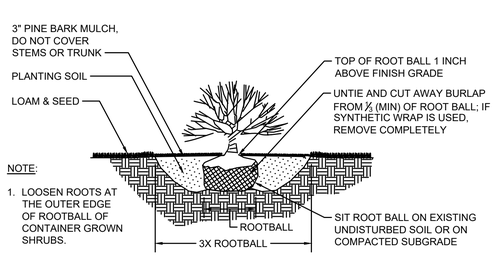


NOTES:

1. TREE WRAP SHALL NOT BE USED
2. TREE SHALL BE SET PLUMB
3. WATERING SAUCER SHALL BE FLOODED TWICE DURING THE FIRST 24 HOURS OF PLANTING

DECIDUOUS TREE PLANTING

N.T.S.



NOTE:

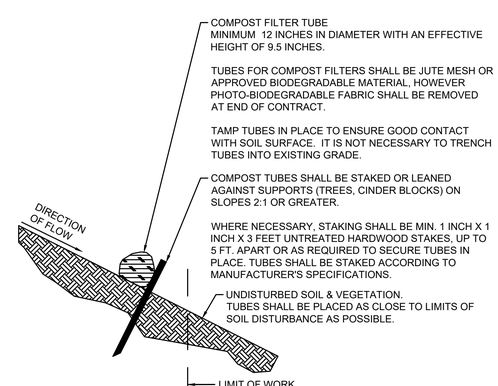
1. LOOSEN ROOTS AT THE OUTER EDGE OF ROOTBALL OF CONTAINER GROWN SHRUBS.

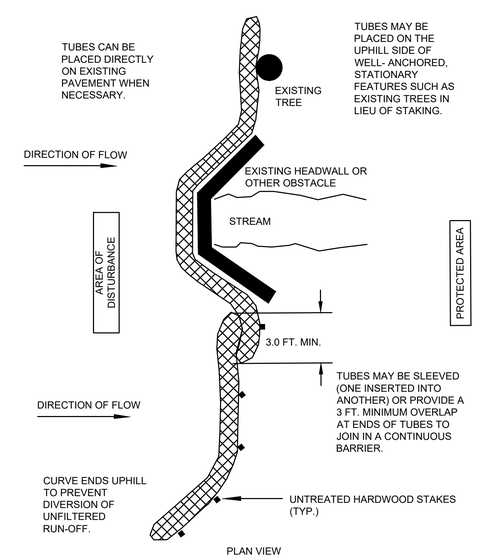
SHRUB PLANTING

N.T.S.

NOTES:

1. PROVIDE A MINIMUM TUBE DIAMETER OF 12 INCHES FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES OF 3H:1V MAY REQUIRE LARGER TUBE DIAMETER OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
2. INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO SHEET OR CONCENTRATED FLOW.
3. TUBE LOCATION MAY BE SHIFTED TO ADJUST TO LANDSCAPE FEATURES, BUT SHALL PROTECT UNDISTURBED AREA AND VEGETATION TO MAXIMUM EXTENT POSSIBLE.
4. DO NOT INSTALL IN PERENNIAL, EPHEMERAL OR INTERMITTENT STREAMS.
5. ADDITIONAL TUBES SHALL BE USED AT THE DIRECTION OF THE ENGINEER.
6. ADDITIONAL STAKING SHALL BE USED AT THE DIRECTION OF THE ENGINEER.





COMPOST FILTER TUBE

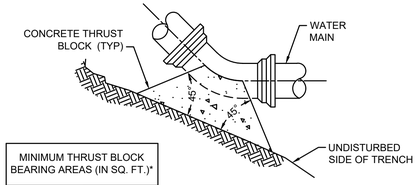
N.T.S.

608037(PS&E2)HD12(CONSTRUCTION DETAILS).DWG Plotted on 7/6/2018 9:44 AM

WESTFORD
ROUTE 40 (GROTON ROAD) & DUNSTABLE ROAD

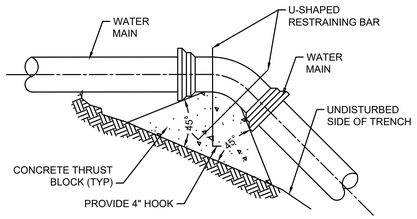
STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/STP-0033(193)X	43	73
PROJECT FILE NO.	608037		

CONSTRUCTION DETAILS - 3 OF 4



MINIMUM THRUST BLOCK BEARING AREAS (IN SQ. FT.)*	
PIPE Ø	45° BEND
4", 6"	3.6
8"	6.5
12"	8.4

PLAN AT UPWARD VERTICAL BEND



MINIMUM THRUST BLOCK BEARING AREAS (IN SQ. FT.)*	
PIPE Ø	45° BEND
4", 6"	.9
8"	1.6
12"	3.3

RESTRAINING BAR DIMENSIONS		
PIPE Ø	BAR SIZE	EMBEDMENT LENGTH
4", 6"	#4	15"
8"	#4	15"
12"	#6	2'-0"

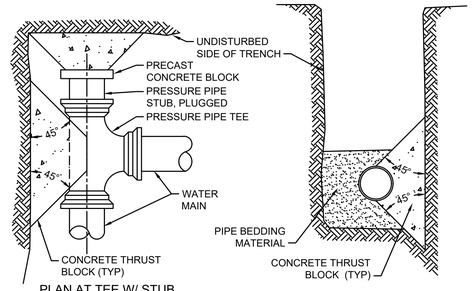
PLAN AT DOWNWARD VERTICAL BEND

NOTES:

1. ALL WATER MAIN BENDS SHALL BE RESTRAINED W/ THRUST BLOCKS EXCEPT WHERE NOTED.
2. ALL THRUST BLOCKS & COLLARS SHALL BE INSTALLED SO THAT THEY BEAR AGAINST UNDISTURBED EARTH.
3. MINIMUM COMPRESSIVE STRENGTH OF THRUST BLOCK CONCRETE SHALL BE 3,000 P.S.I.
4. KEEP CONCRETE CLEAR OF MECHANICAL JOINTS.
5. MINIMUM BEARING AREAS ARE BASED ON 250 P.S.I INTERNAL PIPE PRESSURE & 1.5 TON/S.F. ALLOWABLE SOIL BEARING CAPACITY.

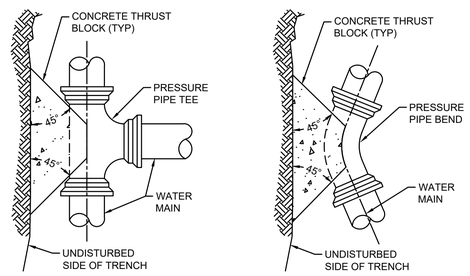
THRUST BLOCK DETAILS - VERTICAL BENDS

N.T.S.



PLAN AT TEE W/ STUB FOR FUTURE USE

SECTION



PLAN AT TEE

PLAN AT BEND

MINIMUM THRUST BLOCK BEARING AREAS (IN SQ. FT.)*				
PIPE Ø	90° BEND	45° BEND	22.5° BEND	TEE / END
4", 6", 8"	6.0	2.9	2.3	4.5
10"	9.6	5.2	2.3	6.7
12"	13.3	6.7	3.7	9.6

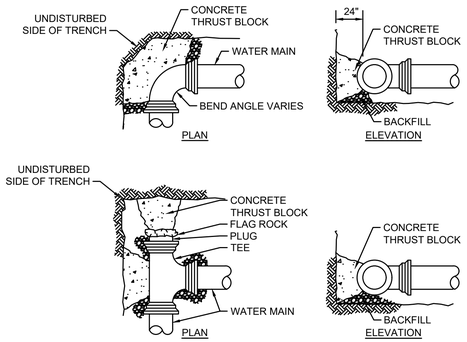
MINIMUM PIPE RESTRAINT LENGTH (IN FEET)*					
PIPE Ø	90° BEND	45° BEND	22.5° BEND	TEES	PLUG/CAP
8"	21.0	9.0	4.0	29.0	38.0
10"	26.0	11.0	5.0	38.0	46.0
12"	33.0	14.0	6.0	48.0	69.0

NOTES:

1. ALL WATER MAIN FITTINGS, BENDS, TEES, PLUGS ETC. SHALL BE RESTRAINED W/ THRUST BLOCKS EXCEPT WHERE NOTED.
2. ALL THRUST BLOCKS & COLLARS SHALL BE INSTALLED SO THAT THEY BEAR AGAINST UNDISTURBED EARTH.
3. MINIMUM COMPRESSIVE STRENGTH OF THRUST BLOCK CONCRETE SHALL BE 3,000 P.S.I.
4. KEEP CONCRETE CLEAR OF MECHANICAL JOINTS.
5. MINIMUM BEARING AREAS ARE BASED ON 250 P.S.I INTERNAL PIPE PRESSURE & 1.5 TON/S.F. ALLOWABLE SOIL BEARING CAPACITY.
6. MINIMUM PIPE RESTRAINT LENGTH IS BASED ON DUCTILE IRON PIPE WITH A 150 P.S.I INTERNAL PIPE PRESSURE WITH 5.0' OF BURY IN UNIFIED SOIL CLASSIFICATION SM.

THRUST BLOCK DETAILS - HORIZONTAL BENDS

N.T.S.



MINIMUM THRUST BLOCK BEARING AREAS (IN SQ. FT.)*				
PIPE Ø	90° BEND	45° BEND	22.5° BEND	TEES, PLUGS, CAPS & HYDRANTS
4", 6", 8"	6.0	2.9	2.3	4.5
10"	9.6	5.2	2.3	6.7
12"	13.3	6.7	3.7	9.6
* BASED ON 250 P.S.I. & 1.5 TON/S.F. ALLOWABLE SOIL BEARING CAPACITY				

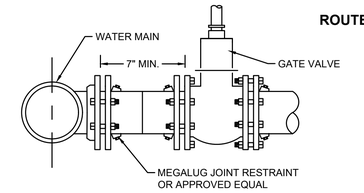
MINIMUM PIPE RESTRAINT LENGTH (IN FEET)*					
PIPE Ø	90° BEND	45° BEND	22.5° BEND	TEES	PLUG/CAP
8"	21.0	9.0	4.0	29.0	38.0
10"	26.0	11.0	5.0	38.0	46.0
12"	33.0	14.0	6.0	48.0	69.0
* BASED ON DUCTILE IRON PIPE WITH A 150 P.S.I. TEST PRESSURE WITH 5.0 FEET OF BURY IN UNIFIED SOIL CLASSIFICATION SM.					
**NOTE: LONGER LENGTHS REQUIRED FOR PIPES WITH PLASTIC SLEEVES					

NOTES:

1. ALL WATER MAIN FITTINGS, BENDS, TEES, PLUGS ETC. SHALL BE RESTRAINED W/ THRUST BLOCKS EXCEPT WHERE NOTED.
2. ALL THRUST BLOCKS & COLLARS SHALL BE INSTALLED SO THAT THEY BEAR AGAINST UNDISTURBED EARTH.
3. MINIMUM COMPRESSIVE STRENGTH OF THRUST BLOCK CONCRETE SHALL BE 3,000 P.S.I.
4. KEEP CONCRETE CLEAR OF MECHANICAL JOINTS.

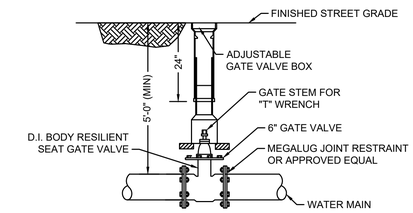
THRUST BLOCK & PIPE RESTRAINT DETAILS

N.T.S.



MECHANICAL JOINT RESTRAINT

N.T.S.



GATE VALVE AND BOX

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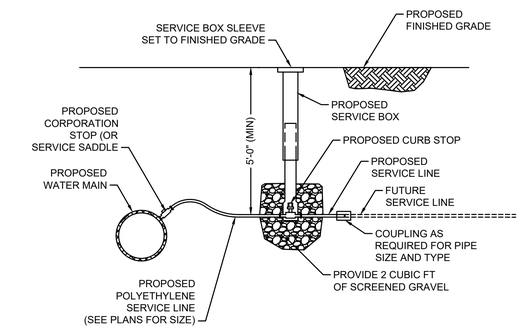

WATER SERVICE CONNECTION

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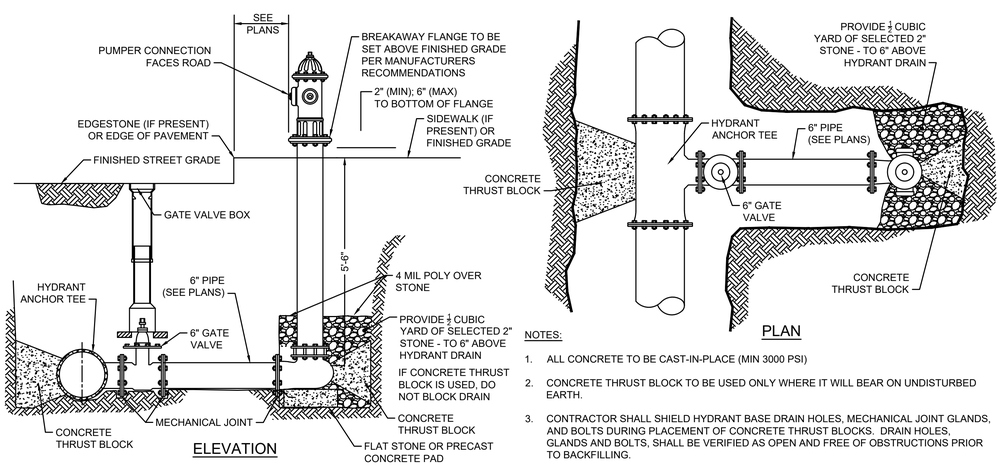
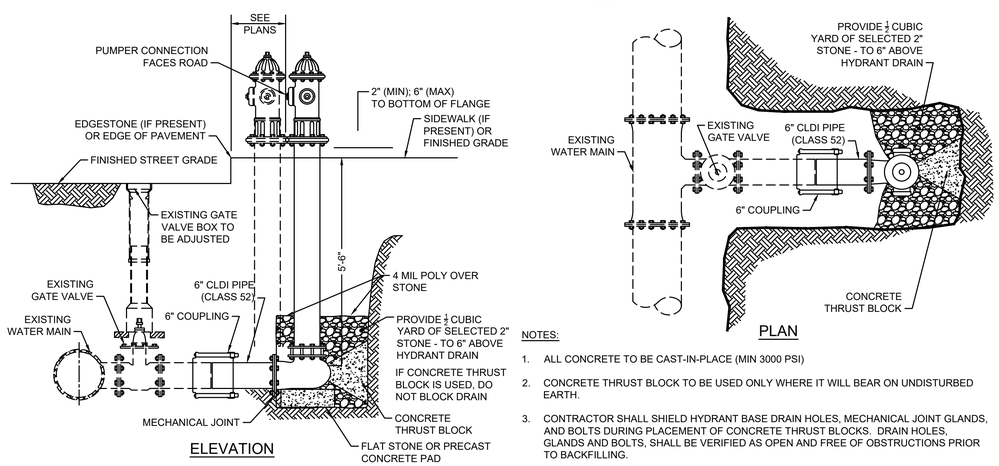


NOTES:

1. ALL CONCRETE TO BE CAST-IN-PLACE (MIN 3000 PSI)
2. CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH.
3. CONTRACTOR SHALL SHIELD HYDRANT BASE DRAIN HOLES, MECHANICAL JOINT GLANDS, AND BOLTS DURING PLACEMENT OF CONCRETE THRUST BLOCKS. DRAIN HOLES, GLANDS AND BOLTS, SHALL BE VERIFIED AS OPEN AND FREE OF OBSTRUCTIONS PRIOR TO BACKFILLING.

HYDRANT ASSEMBLY

N.T.S.



NOTES:

1. ALL CONCRETE TO BE CAST-IN-PLACE (MIN 3000 PSI)
2. CONCRETE THRUST BLOCK TO BE USED ONLY WHERE IT WILL BEAR ON UNDISTURBED EARTH.
3. CONTRACTOR SHALL SHIELD HYDRANT BASE DRAIN HOLES, MECHANICAL JOINT GLANDS, AND BOLTS DURING PLACEMENT OF CONCRETE THRUST BLOCKS. DRAIN HOLES, GLANDS AND BOLTS, SHALL BE VERIFIED AS OPEN AND FREE OF OBSTRUCTIONS PRIOR TO BACKFILLING.

HYDRANT REMOVED AND RESET

N.T.S.

608037(PS&E2)HD12(CONSTRUCTION DETAILS).DWG Plotted on 7/6/2018 9:44 AM

WETLAND REPLICATION SPECIFICATIONS & GENERAL NOTES:

REPLICATION SITE SELECTION

THE WETLAND REPLICATION AREA SELECTED IS PROPOSED NEAR THE BORDERING VEGETATED WETLAND. THE PROPOSED WETLAND REPLICATION IS 370 S. F. AND WILL CONSIST OF PLANTING WETLAND SHRUBS AS SHOWN ON THE DETAILS OR AS DIRECTED BY THE PROFESSIONAL WETLAND SCIENTIST. THE REPLICATION AREA SHOULD READILY TAKE BECAUSE IT IS LOCATED ADJACENT TO THE MAIN WETLAND AREA. IN ADDITION IT IS LOCATED ADJACENT TO THE NATURAL WETLAND AND THIS WILL AID IN RE-VEGETATION BY OPPORTUNISTIC NATIVE SPECIES.

HYDROLOGY

THE HYDROLOGY AT THE REPLICATION SITE IS CRITICAL IN CONTROLLING THE PLANT COMMUNITY THAT DEVELOPS, AND MANY OF THE ECOLOGICAL FUNCTIONS OF THE SITE. THERE WILL BE UNRESTRICTED HYDRAULIC CONNECTIONS BETWEEN THE REPLICATED WETLAND AND WATER SOURCE. THE REPLICATION AREA WILL BE EXCAVATED TO THE GROUNDWATER ELEVATION AND SHALL BE FED BY RUNOFF FROM ROUTE 40 (GROTON ROAD). INITIAL EXCAVATION FOR THE REPLICATION AREA SHALL BE CONDUCTED AT THE SAME TIME AS THE WETLAND FILLING. FINISHED GRADES OF THE REPLICATION AREA SHALL BE ADJUSTED IN THE FIELD BY A QUALIFIED WETLAND SCIENTIST TO ASSURE PROPER HYDROLOGIC CONNECTION WITH ADJACENT WETLAND AND PROPER RELATION TO GROUNDWATER ELEVATIONS TO ASSURE THE AREA WILL PERMANENTLY FUNCTION AS WETLAND.

SOILS

AN IMPORTANT FACTOR IN THE SUCCESS OF A REPLICATION AREA IS THE PROPER USE OF SOILS EITHER TRANSLOCATED (I.E. THE RELOCATION AND REUSE OF HYDRIC SOILS FROM THE IMPACTED RESOURCE AREA TO THE PROPOSED REPLICATION AREA) FROM THE IMPACTED WETLAND OR SOIL AMENDMENTS BROUGHT FROM OFF-SITE.

SOIL TRANSLOCATION

SOIL TRANSLOCATION IS THE PREFERRED METHODOLOGY FOR OBTAINING REPLICATION SOILS. A WETLAND SCIENTIST, PRIOR TO THE USE AND INSTALLATION, WILL INSPECT THE SOIL. PRIOR TO PLACEMENT OF HYDRIC SOILS IN THE REPLICATION AREA, ALL EXCAVATION OF THE REPLICATION AREA TO APPROPRIATE SUBGRADE ELEVATIONS SHOULD BE COMPLETED. SOIL TAKEN FROM AREAS WHERE THE INVASIVE SPECIES ARE PRESENT SHOULD ALWAYS BE AVOIDED. A QUALIFIED SOIL SCIENTIST SHALL INSPECT THE EXCAVATED AREA.

SOIL AMENDMENTS

COMPOST IS TO BE MIXED WITH TOPSOIL AS AN AMENDMENT. THE OBJECTIVE IS TO OBTAIN APPROXIMATELY 50% ORGANIC MATERIAL/TOPSOIL. AFTER THE SOIL IS MANAGED FOR PROPER CONSISTENCY (E.G. LOOSE TO FRIABLE), THE SOIL CONSISTENCY SHOULD BE TESTED. IF THE PROPER CONSISTENCY HAS NOT BEEN ACHIEVED, FURTHER EFFORTS SHOULD BE UNDERTAKEN TO ACHIEVE PROPER CONSISTENCY. SURVEYING OF SUBGRADES AND FINISHED ELEVATIONS SHOULD BE CONDUCTED FREQUENTLY DURING CONSTRUCTION. TO SUPPLEMENT ORGANIC MATERIAL, IT IS RECOMMENDED THAT COURSE WOODY DEBRIS (E.G. LOGS) BE SCATTERED ON THE REPLICATION AREA IN BETWEEN PLANTINGS TO ADD STRUCTURE AND A LONG-TERM SOURCE OF DECAYING ORGANIC MATERIAL, TO COVER AT LEAST FIVE PERCENT OF THE AREA. SOILS TO BE USED AT THE MITIGATION SITE SHOULD BE USED IMMEDIATELY IF POSSIBLE AND STOCKPILED FOR AS LITTLE TIME AS POSSIBLE. WHILE STOCKPILED, THE SOILS SHOULD BE KEPT WET AND NOT BE ALLOWED TO DRY OUT. CONTAMINATION OF THESE SOILS SHOULD BE PREVENTED. THEY SHOULD BE TRANSPORTED IN VEHICLES THAT HAVE BEEN WASHED SO THAT NO EXOTIC/INVASIVE SEEDS FROM OTHER SITES GET MIXED IN WITH THEM.

PLANTING REQUIREMENTS

A QUALIFIED PROFESSIONAL, WITH TRAINING IN WETLAND SCIENCE, SHALL OVERSEE PLANTING PROCEDURES. SHRUBS SHOULD BE PLANTED 8-10 FEET ON CENTER IN A RANDOM PATTERN. THE FOLLOWING IS A LIST OF ACCEPTABLE WETLAND PLANTS THAT MAY BE USED:

COMMON NAME	LATIN NAME
ARROW-WOOD	VIBURNUM DENTATUM
AZALEA, SWAMP	RHODODENDRON VISCOSUM
DOGWOOD, SILKY	CORNUS AMOMUM
RED MAPLE	ACER RUBRUM

INVASIVE SPECIES

IF THE FOLLOWING INVASIVE SPECIES ARE FOUND GROWING IN REPLICATION AREAS, MEASURES SHOULD BE TAKEN TO ELIMINATE THEM AS SOON AS POSSIBLE BY HAND WEEDING. SOILS FROM EXISTING WETLANDS CONTAINING THESE SPECIES SHOULD NEVER BE USED IN REPLICATION AREAS.

- •PURPLE LOOSESTRIFE (L YTHRUM SALICARIA)
- • PHRAGMITES (PHRAGMITES AUSTRALIS)
- • BUCKTHORN (RHAMNUS FRANGULA ALNUS)
- •HONEYSUCKLES (LONICERA SPP.)
- •GARLIC MUSTARD (ALLIARIA PETIOLATA)
- •JAPANESE KNOTWEED (POLYGONUM CUSPIDATUM OR FALLOPIA JAPONICA)
- •JAPANESE STILT GRASS (MICROSTEGIURN VIRNINEURN)
- •REED CANARY GRASS (PHALARIS ARUNDINACEA)
- •BITTERSWEET NIGHTSHADE (CELASTRUS ORBICULA TUS)
- •BLACK SWALLOW-WORT (CYNANCHUM NIGRUM)
- •PALE SWALLOW-WORT (CYNANCHUM ROSSICUM)
- •MULTIFLORA ROSE (ROSA MULTIFLORA)

TRUCKS THAT HAVE PREVIOUSLY BEEN ON OTHER SITES SHOULD BE WASHED PRIOR TO INTRODUCTION TO THE REPLICATION SITE SO THAT MUD/DIRT WITH EXOTIC/INVASIVE SEEDS IS NOT INADVERTENTLY BROUGHT TO THE REPLICATION SITE.

TIMING OF PLANTINGS

ALL PLANTING SHOULD OCCUR AT THE BEGINNING OR END OF THE GROWING SEASON. FALL PLANTINGS SHOULD BE DONE BEFORE THE FIRST FROST. SHRUBS AND TREES, HOWEVER, MAY BE PLANTED UP TO NOVEMBER 15, WEATHER PERMITTING.

EROSION CONTROL

EROSION CONTROLS WILL BE PLACED ALONG THE BOUNDARY OF THE WETLAND REPLICATION AREA. UPON COMPLETION OF THE REPLICATION AREA, INSTALLATION OF SILTATION FENCING AND COMPOST FILTER TUBES BETWEEN THE REPLICATION AREA AND THE ADJACENT UPLAND WILL BE PROVIDED TO PREVENT SILT FROM ENTERING THE REPLICATION AREA. PRIOR TO PERMANENT ESTABLISHMENT OF VEGETATION IN THE REPLICATION AREA, SOILS WILL BE TEMPORARILY STABILIZED TO PREVENT IMPACTS FROM EROSION BY MULCHING AND SEEDING WITH A WETLAND SEED MIXTURE UNTIL RE-ESTABLISHMENT OF WETLAND VEGETATION OCCURS. HYDRO SEEDING IS A VALUABLE EROSION CONTROL MEASURE AND MAY DISCOURAGE COLONIZATION BY INVASIVE SPECIES. ALL EMBANKMENT SLOPES ADJACENT TO WETLAND REPLICATION AREAS SHOULD HAVE SLOPES NO GREATER THAN 2H:1V UNLESS STABILIZED BY STRUCTURAL MEANS. BIOENGINEERING STABILIZATION METHODS ARE RECOMMENDED FOR SLOPE STABILIZATION. ORGANIC SOILS AND WETLAND VEGETATION SHOULD NOT BE PLACED IN THE REPLICATION AREA UNTIL THE WETLAND SCIENTIST HAS VERIFIED THAT THE FINAL EXCAVATED GRADE FOR THE REPLICATION AREA WILL ALLOW THE FINISHED GRADE OF THE REPLICATION SITE TO MEET THE DESIGN SPECIFICATIONS. FOLLOWING EXCAVATION WORK, FINAL GRADING AND LANDSCAPING SHOULD BE COMPLETED AS SOON AS POSSIBLE TO MINIMIZE EROSION. ALL EXPOSED SOIL WILL BE STABILIZED USING SEED-FREE MULCH OR OTHER APPROPRIATE EROSION CONTROL MEASURES IN THE EVENT THAT SEASONAL CONDITIONS RESULT IN A DELAY IN PLANTING. IF THE SITE IS EXCAVATED TO THE SUBGRADE IN THE FALL AND A DELAY IS INEVITABLE, CONSIDERATION SHOULD BE GIVEN TO STABILIZING THE SITE FOR WINTER, AND CONDUCTING FINAL GRADING IN THE SPRING.

MONITORING REQUIREMENTS

MONITORING IS CRITICAL IN WETLAND REPLICATION EFFORTS DUE TO THE COMPLEX ISSUES THAT CAN ARISE WHEN TRYING TO REPLACE THE SPECIFIC ECOLOGICAL CONDITIONS OF WETLANDS. MONITORING TO ENSURE THAT THE PROJECT IS BUILT ACCORDING TO THE DESIGN SPECIFICATIONS WILL ENSURE THAT THE MOST COMMON CAUSE OF FAILURE IS AVOIDED. A QUALIFIED WETLAND SCIENTIST SHALL BE ON-SITE TO MONITOR THE EXCAVATION, GRADING, AND PLANTING OF THE REPLICATION AREA. THE WETLAND SCIENTIST SHALL BE PRESENT DURING THE MOST IMPORTANT TASKS IN REPLICATION CONSTRUCTION INCLUDING:

1. BEFORE EXCAVATION OR EROSION CONTROL INSTALLATION WORK BEGINS TO INSPECT SITE FLAGGING:
2. DURING EXCAVATION OF THE ALTERED AREA IF VEGETATION IS TO BE TRANSLOCATED TO THE REPLICATION AREA TO ENSURE SURVIVAL OF THE PLANTINGS;
3. BEFORE SOIL TRANSLOCATION OR ADDITION INTO THE REPLICATION AREA TO INSPECT EXCAVATED ELEVATIONS AND LIKELY POST-CONSTRUCTION GROUND WATER ELEVATIONS FOR THE REPLICATION AREA;
4. AFTER EACH STAGE OF GRADING WORK IS COMPLETED TO INSPECT FINISHED ELEVATIONS;
5. DURING PLANTING AND SEEDING AND AFTER THE FIRST MONTH OF THE GROWING SEASON TO INSPECT PROPAGATION TECHNIQUES.

MONITORING REPORT & SCHEDULE

1. END OF FIRST GROWING SEASON: AT THE END OF THE FIRST FULL GROWING SEASON BEFORE PLANTS ENTER DORMANCY, TYPICALLY IN SEPTEMBER, INSPECT TO DOCUMENT THE MONITORING PARAMETERS DEFINED IN THE MASSDOT CONTRACT DOCUMENTS AND SPECIAL PROVISIONS.

2. END OF SECOND GROWING SEASON: AT THE END OF THE SECOND GROWING SEASON BEFORE PLANTS ENTER DORMANCY, TYPICALLY IN SEPTEMBER, INSPECT TO DOCUMENT THE MONITORING PARAMETERS DEFINED IN THE MASSDOT CONTRACT DOCUMENTS AND SPECIAL PROVISIONS.

GENERAL NOTES

1. ALL WETLAND REPLICATION WORK SHALL BE PERFORMED UNDER THE DIRECTION OF A QUALIFIED WETLAND SCIENTIST AND IN ACCORDANCE WITH THE ORDER OF CONDITIONS ISSUED BY THE WESTFORD CONSERVATION COMMISSION ON _____, 2018 (MASSDEP FILE #_334-1703_) AND THE SPECIFICATIONS AND PROCEDURES OUTLINED ON THIS SHEET.

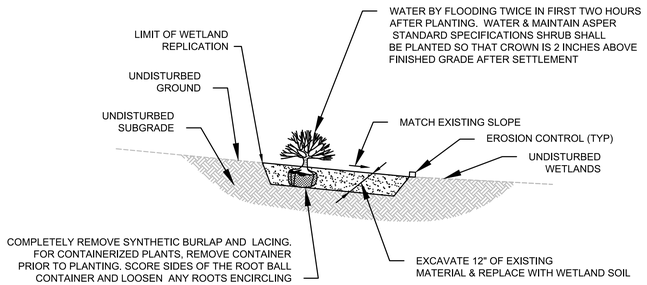
2. ALL WORK, MATERIALS, ETC. REQUIRED TO CONSTRUCT THE WETLAND REPLICATION AREA SHALL BE INCLUDED IN THE BID PRICE.

PROPOSED PLANTING SUMMARY TABLE

SYMBOL	QTY	BOTANICAL NAME	COMMON NAME	SIZE	COMMENTS
	5	AZALEA VISCOSUM	AZALEA - SWAMP	18" - 24"	CONTAINER
	4	VIBURNUM DENTATUM	ARROWWOOD	18" - 24"	CONTAINER
	5	CORNUS AMOMUM	SILKY DOGWOOD	24" - 36"	CONTAINER
	3	ACER RUBRUM	RED MAPLE	2-2.5" CAL.	B&B

PLANTING NOTES:

1. CONTRACTOR SHALL HAVE ALL SUBSURFACE UTILITIES MARKED PRIOR TO THE START OF WORK.
2. FINAL LOCATION OF ALL PLANT MATERIAL WILL BE APPROVED BY THE RESIDENT ENGINEER PRIOR TO PLANTING.
3. ALL PLANT MATERIAL WILL HAVE TAGS INDICATING COMMON NAME, BOTANICAL NAME & SIZE.
4. ALL PLANTS WILL BE MULCHED PER THE PLANTING SPECIFICATIONS AND DETAILS.
5. WETLAND SOIL OR LOAM SHALL BE APPLIED TO ALL DISTURBED AREAS AND SEEDED WITH THE CORRESPONDING SEED MIX PER THE APPLICABLE DETAIL.
6. WETLAND SEED MIX SHALL BE IN ACCORDANCE WITH MASSDOT STANDARDS. SEED MIX SHALL BE SITE SPECIFIC THAT IS NATIVE TO THE TOWN OF WESTFORD.

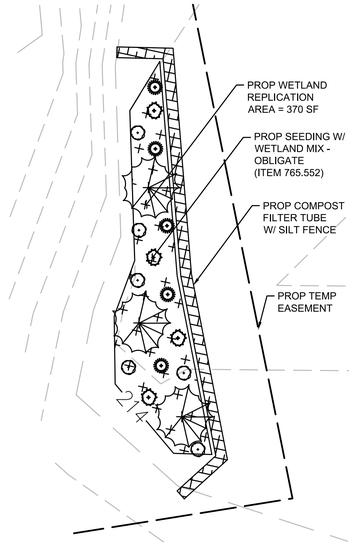


NOTES:

1. ALL DISTURBED AREAS TO BE SEEDED WITH WETLAND MIX - OBLIGATE (ITEM 765.552).

WETLAND REPLICATION DETAIL

N.T.S.



WETLAND REPLICATION PLAN

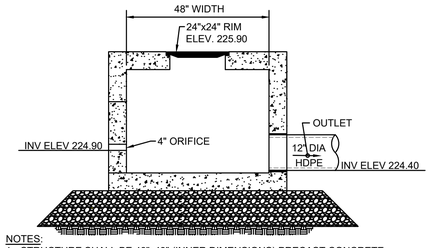
NOTE:

1. EROSION CONTROL MATS ARE REQUIRED ON ALL SLOPES EXCEEDING 3H:1V IN STEEPNESS.
2. EROSION CONTROL MAT SHALL CONSIST OF BIODEGRADABLE MESH CONSTRUCTED OF NATURAL MATERIALS SUCH AS JUTE OR COIR. THE MATS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S INSTRUCTIONS, INCLUDING ANCHORING TO EXISTING SLOPES.

WESTFORD
ROUTE 40 (GROTON ROAD) & DUNSTABLE ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/STP-0033(193)X	44	73
PROJECT FILE NO.	608037		

CONSTRUCTION DETAILS - 4 OF 4



NOTES:

1. STRUCTURE SHALL BE 48"x48" (INNER DIMENSIONS) PRECAST CONCRETE BOX STRUCTURE
2. ALL SECTIONS SHALL BE DESIGNED FOR HS-20 LOADING.
3. PROVIDE "V" KNOCKOUTS FOR PIPES WITH 2" MAX CLEARANCE TO OUTSIDE OF PIPE. MORTAR ALL PIPE CONNECTIONS.
4. JOINT SEALANT BETWEEN PRECAST SECTIONS SHALL BE PREFORMED BUTYL RUBBER.

OUTLET CONTROL STRUCTURE 1 (OCS 1) DETAIL

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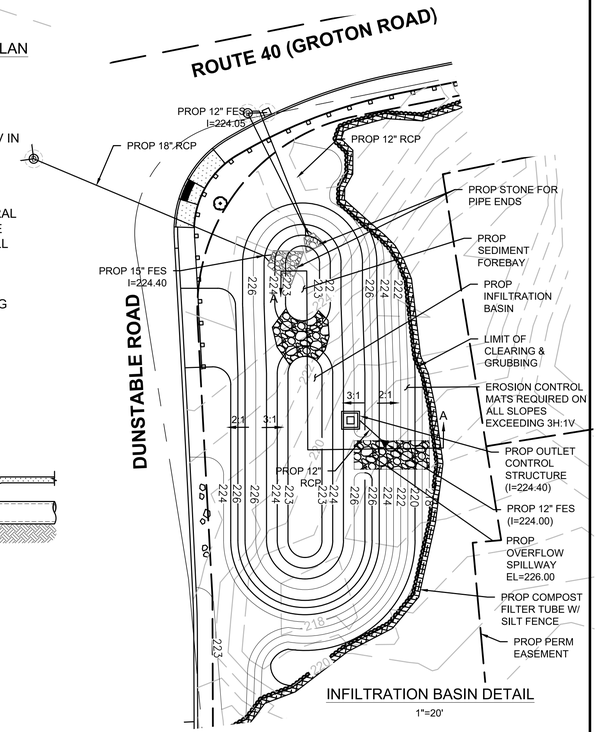
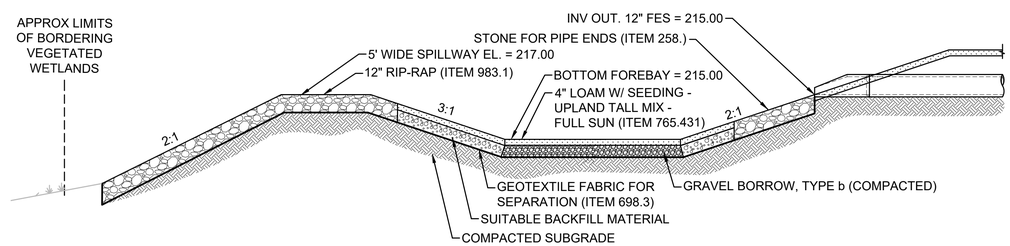


INFILTRATION BASIN DETAIL

1"=20'



SEDIMENT OUTLET TRAP

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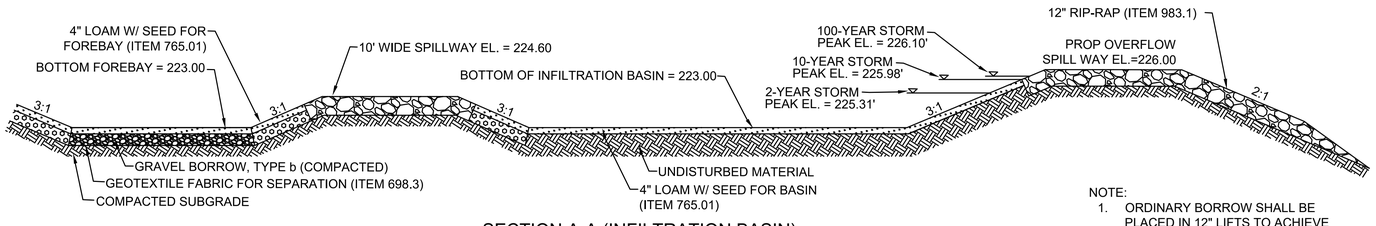

SECTION A-A (INFILTRATION BASIN)

N.T.S.

NOTE:

1. ORDINARY BORROW SHALL BE PLACED IN 12" LIFTS TO ACHIEVE PROPOSED GRADING

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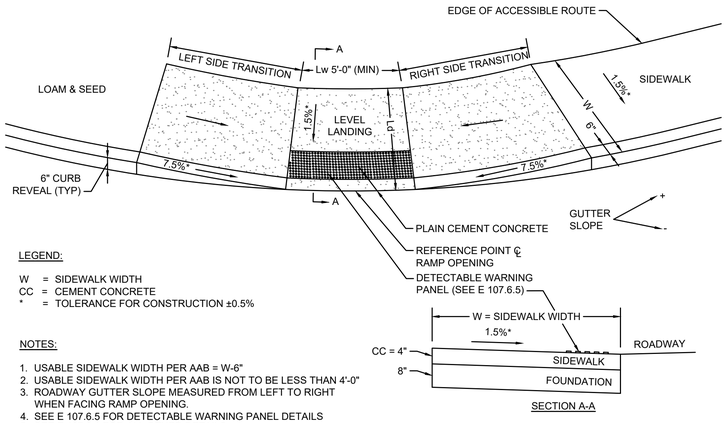
WESTFORD
ROUTE 40 (GROTON ROAD) & DUNSTABLE ROAD

STATE	FED. AID PROJ. NO.	SHEET NO.	TOTAL SHEETS
MA	CMQ/STP-0033(193)X	45	73
PROJECT FILE NO.	608037		

WHEELCHAIR RAMP AND DRIVEWAY DETAILS



LEGEND:

W = SIDEWALK WIDTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

NOTES:

1. USABLE SIDEWALK WIDTH PER AAB = W-6"
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING RAMP OPENING.
4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS
5. SEE E 107.2.1 FOR ALL OTHER DETAILS

WHEELCHAIR RAMP TYPE A

N.T.S.

WHEELCHAIR RAMP DATA											
RAMP #	BASELINE REFERENCE	STATION	OFFSET	LEVEL LANDING		ROADWAY GUTTER SLOPE	LEFT SIDE			RIGHT SIDE		
				WIDTH (Lw)	DEPTH (Ld)		TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH	TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH
1	GROTON ROAD	7+75	20' LT	5'-0"	5'-6"	+3.6%/-2.1%	6'-6"	6"	-	6'-6"	6"	5'-6"
4	GROTON ROAD	8+31	15' LT	5'-0"	5'-6"	+4.7%	3'-3"	3"	5'-6"	15'-0"	6"	5'-6"
5	GROTON ROAD	8+32	16' RT	5'-0"	5'-6"	-4.7%	15'-0"	6"	-	3'-3"	3"	5'-6"
7	GROTON ROAD	24+48	20' LT	5'-0"	6'-6"	-3.4%	14'-0"	6"	6'-0"	6'-6"	6"	-
8	GROTON ROAD	24+47	20' RT	5'-0"	5'-6"	+3.0%	4'-4"	4"	5'-6"	11'-0"	6"	-
9	DUNSTABLE ROAD	43+07	20' LT	5'-0"	5'-6"	+4.7%	6'-6"	6"	-	10'-0"	4"	5'-6"
10	DUNSTABLE ROAD	43+12	14' RT	5'-0"	5'-6"	-2.7%	11'-0"	6"	5'-6"	6'-6"	6"	-
11	GROTON ROAD	33+95	13' RT	5'-0"	5'-6"	-1.2%	7'-8"	6"	-	6'-6"	6"	5'-6"

WHEELCHAIR RAMP NOTES:

1. A MINIMUM OF 3'-0" CLEAR SHALL BE MAINTAINED AT ANY PERMANENT OBSTACLE IN ACCESSIBLE ROUTE (I.E., HYDRANTS, UTILITY POLES, TREE WELLS, SIGNS, ETC.).
2. CURB TREATMENT VARIES, SEE PLANS FOR CURB TYPE.
3. RAMP, CURB AND ADJACENT PAVEMENTS SHALL BE GRADED TO PREVENT PONDING.
4. WHERE ACCESSIBLE ROUTES ARE LESS THAN 5' IN WIDTH (EXCLUDING CURBING) A 5'x5' PASSING AREA SHALL BE PROVIDED AT INTERVALS NOT TO EXCEED 200 FT.
5. ELIMINATE CURBING AT RAMP WHERE IT ABUTS ROADWAY.
6. DETECTABLE WARNING PANELS ARE REQUIRED ON ALL OF THE PROPOSED WHEELCHAIR RAMPS AND ARE TO BE INSTALLED IN ACCORDANCE WITH CONSTRUCTION STANDARD E 107.6.5 (OCTOBER 2017). CONTRACTOR SHALL PROVIDE 6" BETWEEN DETECTABLE WARNING PANEL AND EDGE OF CONCRETE WHERE IT ABUTS LOAM & SEED.
7. WHEELCHAIR RAMP SLOPES AND CROSS SLOPES SHALL HAVE A CONSTRUCTION TOLERANCE OF ±0.5%.
8. DETECTABLE WARNING PANELS SHALL BE YELLOW IN COLOR AS APPROVED BY THE WESTFORD DPW.

WHEELCHAIR RAMP NOTES

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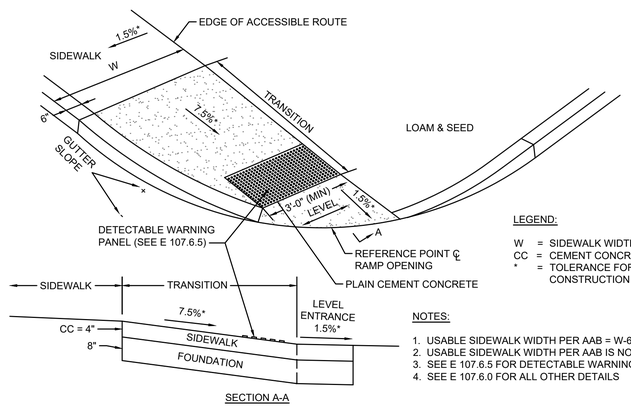


LEGEND:

W = SIDEWALK WIDTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

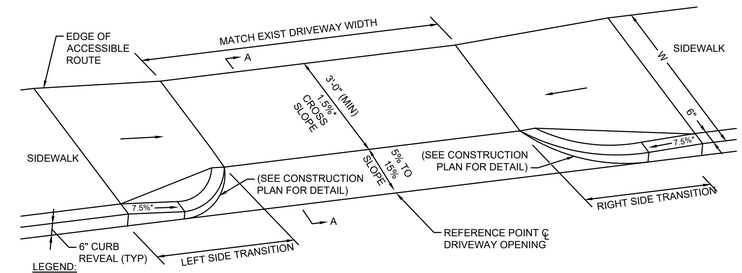
NOTES:

1. USABLE SIDEWALK WIDTH PER AAB = W-6"
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS
4. SEE E 107.6.0 FOR ALL OTHER DETAILS

WHEELCHAIR RAMP TYPE 1B

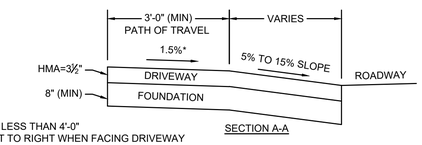
N.T.S.

WHEELCHAIR RAMP DATA							
RAMP #	BASELINE REFERENCE	STATION	OFFSET	ROADWAY GUTTER SLOPE	LEFT SIDE		
					TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH
2	GROTON ROAD	8+10	20' RT	-4.7%	7'-6"	3"	5'-6"
6	GROTON ROAD	10+96	19' LT	+3.7%	6'-6"	6"	5'-6"



LEGEND:

W = SIDEWALK WIDTH
Wc = CURB WIDTH
HMA = HOT MIX ASPHALT
* = TOLERANCE FOR CONSTRUCTION ±0.5%



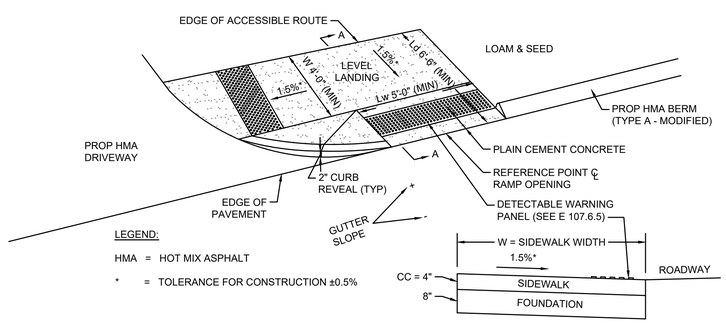
NOTES:

1. USABLE SIDEWALK WIDTH PER AAB = W-6"
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING DRIVEWAY
4. SURFACE TREATMENT VARIES; SEE PLANS
5. SEE E 107.8.1 FOR ALL OTHER DETAILS

SIDEWALK THROUGH DRIVEWAY TYPE B

N.T.S.

DRIVEWAY DATA													
DWY #	BASELINE REFERENCE	STATION	OFFSET	DRIVEWAY SURFACE	DWY WIDTH @ GUTTER	ROADWAY GUTTER SLOPE	WIDTH OF ACCESSIBLE ROUTE	LEFT SIDE			RIGHT SIDE		
								LENGTH	CURB REVEAL	SW WIDTH	LENGTH	CURB REVEAL	SW WIDTH
1	GROTON ROAD	9+80	15' LT	HMA	15'-0"	+4.6%	3'-6"	6'-6"	6"	5'-6"	15'-0"	6"	5'-6"
5	DUNSTABLE ROAD	45+90	12' LT	HMA	10'-6"	+3.5%	3'-6"	6'-6"	6"	5'-6"	-	-	-
6	DUNSTABLE ROAD	43+97	18' LT	HMA	30'-0"	+4.2%	3'-6"	6'-6"	6"	5'-6"	15'-0"	6"	5'-6"



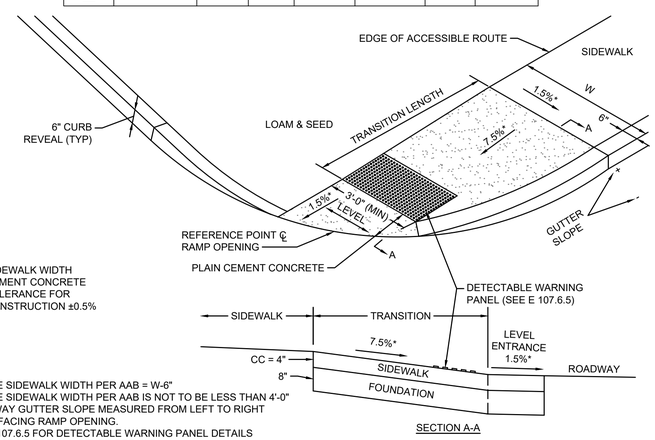
LEGEND:

HMA = HOT MIX ASPHALT
* = TOLERANCE FOR CONSTRUCTION ±0.5%

WHEELCHAIR RAMP NO. 12 DETAIL

N.T.S.

WHEELCHAIR RAMP DATA				
RAMP #	BASELINE REFERENCE	STATION	OFFSET	ROADWAY GUTTER SLOPE
12	GROTON ROAD	33+95	19' LT	+1.2%



LEGEND:

W = SIDEWALK WIDTH
CC = CEMENT CONCRETE
* = TOLERANCE FOR CONSTRUCTION ±0.5%

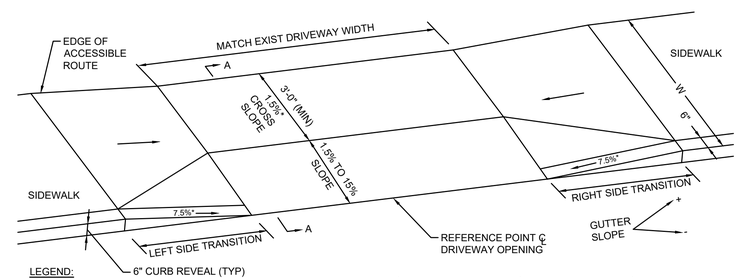
NOTES:

1. USABLE SIDEWALK WIDTH PER AAB = W-6"
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING RAMP OPENING.
4. SEE E 107.6.5 FOR DETECTABLE WARNING PANEL DETAILS
5. SEE E 107.6.0 FOR ALL OTHER DETAILS

WHEELCHAIR RAMP TYPE 2B

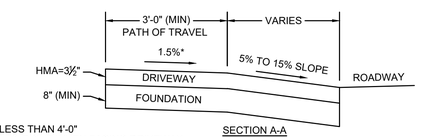
N.T.S.

WHEELCHAIR RAMP DATA							
RAMP #	BASELINE REFERENCE	STATION	OFFSET	ROADWAY GUTTER SLOPE	RIGHT SIDE		
					TRANSITION LENGTH	CURB REVEAL	SIDEWALK WIDTH
3	GROTON ROAD	8+12	19' LT	+4.8%	7'-6"	3"	5'-6"
6A	GROTON ROAD	11+30	19' LT	+3.7%	14'-0"	6"	5'-6"



LEGEND:

W = SIDEWALK WIDTH
Wc = CURB WIDTH
HMA = HOT MIX ASPHALT
* = TOLERANCE FOR CONSTRUCTION ±0.5%



NOTES:

1. USABLE SIDEWALK WIDTH PER AAB = W-6"
2. USABLE SIDEWALK WIDTH PER AAB IS NOT TO BE LESS THAN 4'-0"
3. ROADWAY GUTTER SLOPE MEASURED FROM LEFT TO RIGHT WHEN FACING DRIVEWAY
4. SURFACE TREATMENT VARIES; SEE PLANS
5. SEE E 107.7.0 FOR ALL OTHER DETAILS

SIDEWALK THROUGH DRIVEWAY TYPE A

N.T.S.

DRIVEWAY DATA													
DWY #	BASELINE REFERENCE	STATION	OFFSET	DRIVEWAY SURFACE	DWY WIDTH @ GUTTER	ROADWAY GUTTER SLOPE	WIDTH OF ACCESSIBLE ROUTE	LEFT SIDE			RIGHT SIDE		
								LENGTH	CURB REVEAL	SW WIDTH	LENGTH	CURB REVEAL	SW WIDTH
2	GROTON ROAD	30+87	13' RT	HMA	26'	+5.2%	3'-6"	3'-3"	3"	5'-6"	15'-0"	6"	5'-6"
* 3	GROTON ROAD	31+24	13' RT	HMA	18'	+5.5%	3'-6"	6'-6"	6"	5'-6"	7'-6"	3"	5'-6"
* 4	GROTON ROAD	33+14	13' RT	HMA	48'	+2.1%	3'-6"	6'-6"	6"	5'-6"	11'-0"	6"	5'-6"

* PROPOSED RAMP WILL REQUIRE VARIANCE FROM AAB

608037(PS&E2)HD12(CONSTRUCTION DETAILS).DWG Plotted on 7/6/2018 9:44 AM