

CONSTRUCTION NOTES/CONSTRUCTION SEQUENCING

1. INSTALL SEDIMENTATION AND EROSION CONTROLS PRIOR TO BEGINNING WORK.
2. ALL WORK SHALL BE CLOSELY COORDINATED WITH THE BOXFORD CONSERVATION COMMISSION OR THEIR DESIGNEE.
3. ALL IN-STREAM WORK SHALL BE COORDINATED SO THAT CULVERT REMOVAL AND NEW CULVERT INSTALLATION BEGINS AND IS COMPLETED DURING A PERIOD OF "LOW FLOW" CONDITIONS AND IS PERFORMED IN ACCORDANCE WITH THE ORDER OF CONDITIONS. CONTRACTOR'S PROPOSED WORK SCHEDULE AND VERIFICATION OF WEATHER CONDITIONS SHALL BE SUBMITTED TO THE BOXFORD DEPARTMENT OF PUBLIC WORKS FOR REVIEW AND APPROVAL PRIOR TO COMMENCING WORK.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONTROL OF WATER AND STORM WATER AT ALL TIMES INCLUDING BUT NOT LIMITED TO MAINTAINING, REPLACING AND RE-FASTENING EROSION AND SEDIMENTATION CONTROL DEVICES AS NEEDED TO PREVENT SEDIMENT FROM LEAVING THE SITE AND ENTERING WETLAND RESOURCE AREAS.
5. EXISTING STREAMBED MATERIAL SHALL BE STOCKPILED SEPARATELY FOR REUSE. ADDITIONAL STREAMBED MATERIAL SHALL CONSIST OF CLEAN GRANULAR MATERIAL WITH THE SAME GRADATION AS THE EXISTING STREAM CHANNEL. STREAMBED MATERIAL SHALL BE DURABLE WASHED ROUNDED AGGREGATE FREE OF FINES, ORGANIC AND DELETERIOUS MATERIAL. CONCRETE, BRICK AND OTHER CONSTRUCTION DEBRIS IS PROHIBITED. THE ENGINEER SHALL APPROVE MATERIAL PRIOR TO PLACEMENT.
6. THE REFUELING OF VEHICLES AND/OR THE STOCKPILING OF NEW OR EXCAVATED FILL MATERIALS WITHIN 100 FEET OF THE STREAM SHALL NOT BE PERMITTED.
7. WORK IN WETLAND RESOURCE AREAS SHALL BE CONDUCTED MANUALLY. WITH EXCEPTION OF HAND HELD TOOLS, NO MECHANICAL EQUIPMENT SHALL BE OPERATED WITHIN THE RESOURCE AREA.
8. DISTURBED AREAS AND SLOPES SHALL BE STABILIZED WITH APPROVED SEED MIX, PLANTINGS AND/OR EROSION CONTROL BLANKET, AS NECESSARY, AS SHOWN ON THE PLANS. SEED MIX AND EROSION CONTROL BLANKET SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURER'S REQUIREMENTS.
9. DEBRIS FROM CONSTRUCTION THAT FALLS INTO THE RESOURCE AREA WILL BE REMOVED PRIOR TO THE COMPLETION OF EACH WORKDAY.
10. ALL DISTURBED LAND UNDER WATER AREAS SHALL BE STABILIZED AS INDICATED ON THE PLANS, DETAILS AND SECTIONS, OR AS DIRECTED BY THE ENGINEER OR THE TOWN PRIOR TO REMOVING WATER CONTROL MEASURES.
11. EROSION AND SEDIMENTATION CONTROLS SHALL BE REMOVED AFTER COMPLETION AND ACCEPTANCE OF ALL WORK AND WHEN AUTHORIZED BY THE BOXFORD CONSERVATION COMMISSION OR DESIGNEE.

WORK IN VEGETATED WETLAND AREAS

1. WETLAND SOIL SHALL BE EXCAVATED TO A DEPTH OF 12 INCHES, AND STOCKPILED AND COVERED WITH BURLAP OR STRAW MULCH TO RETAIN MOISTURE. PERIODIC LIGHT APPLICATION OF WATER MAY BE REQUIRED TO MAINTAIN MOISTURE.
2. WETLAND SOIL SHALL BE RESPREAD 12 INCHES DEEP AND LIGHTLY COMPACTED BY HAND
3. WETLAND SEED MIX SHALL BE APPLIED AT A RATE OF 1/2 LB./1000 SQUARE FEET AND LIGHTLY RAKED TO ENSURE SOIL/SEED CONTACT.
4. WETLAND SEED MIX SHALL BE PURE LIVE SEED AND CONTAIN NATIVE NON-HYBRIDIZED SPECIES. SEED MIX SPECIES LIST SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL PRIOR TO APPLICATION.

PLAN REFERENCES:

1. PLAN ENTITLED "SITE PLAN IN BOXFORD, MA"; PREPARED FOR THE TOWN OF BOXFORD BY DONOHUE AND SURVEY, INC.; SCALE 1"=10'; DATED NOVEMBER 17, 2014; REV DECEMBER 1, 2014

VEGETATED AREAS/SLOPES:

4" LOAM AND SEED WITH EROSION CONTROL BLANKET (ON 3:1 SLOPE OR LESS USE NORTH AMERICAN GREEN S75BN SINGLE NET EROSION CONTROL BLANKET; ON SLOPES GREATER THAN 3:1 USE NORTH AMERICAN GREEN SC150BN DOUBLE NET EROSION CONTROL BLANKET, OR ENGINEER APPROVED EQUAL.)

PAVEMENT NOTES:

ROADWAY PAVEMENT: (FULL DEPTH RECONSTRUCTION)

SURFACE COURSE:
 3-1/2" HOT MIX ASPHALT PAVEMENT PLACED IN TWO LAYERS,
 1-1/2" TOP COURSE MATERIAL OVER
 2" BINDER COURSE MATERIAL.

BASE COURSE: 3" HOT MIX ASPHALT BASE COURSE MATERIAL, PLACED IN ONE LAYER.

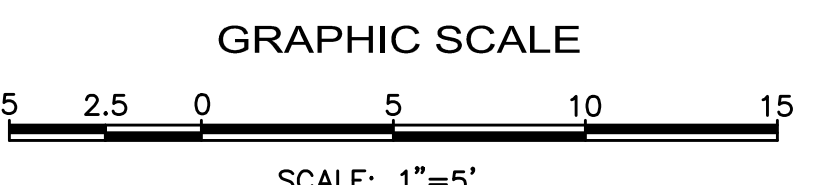
SUBBASE: 12" GRAVEL BORROW

TEMPORARY PATCH:
 3" HOT MIX ASPHALT BASE COURSE MATERIAL PLACED IN ONE LAYER.

SUBBASE: GRAVEL BORROW

CONSTRUCTION ITEM NOTE

ITEM 984.6 - STONE FOR EROSION CONTROL AND ITEM 698.4 GEOTEXTILE FABRIC FOR EROSION CONTROL ARE PROVIDED AS CONTINGENCY ITEMS FOR STABILIZING ANY EXISTING ERODED AREAS AS FOLLOWS: 12" THICK LAYER OF STONE FOR EROSION CONTROL OVER 6" THICK CRUSHED STONE OVER GEOTEXTILE FABRIC FOR EROSION CONTROL



REV.	COMMENTS	DATE

PROJECT # 2152008
 SCALE AS NOTED
 DATE JUNE 28, 2016
 DRAFTED BY BFS

CULVERT DETAILS
KELSEY ROAD CULVERT REPLACEMENT
BOXFORD, MASSACHUSETTS

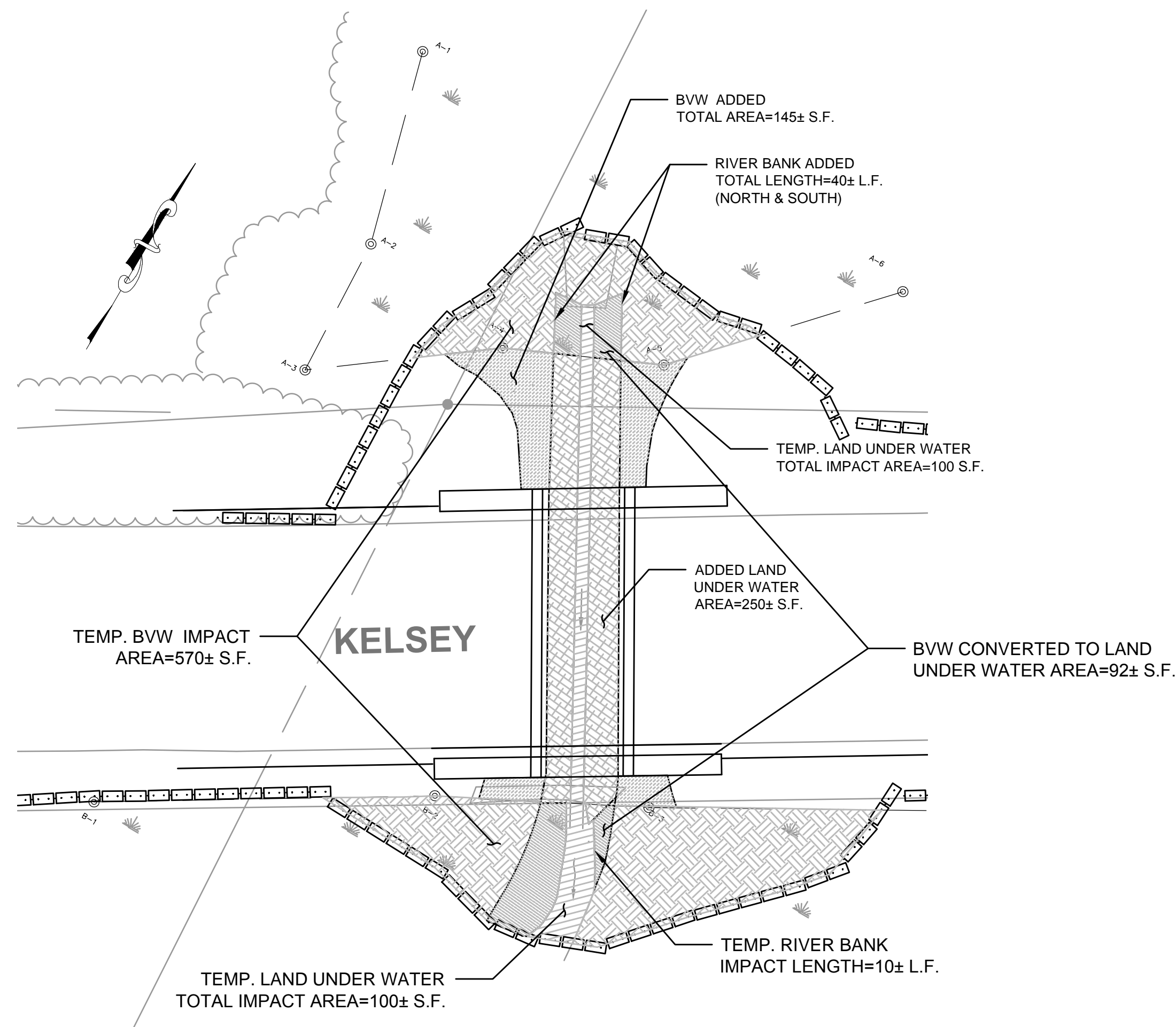
PREPARED FOR:
TOWN OF BOXFORD DEPARTMENT OF PUBLIC WORKS

Bridge & Structural Engineering
 Civil/Site Engineering
 Land Surveying
 Transportation Engineering
 Architectural Design & Building Renovations

BAYSIDE ENGINEERING
 600 Unicorn Park Drive Woburn MA 01801
 Phone: 781.932.3201 Fax: 781.932.3413

DATUM NAVD 88

S-1



RESOURCE AREA IMPACTS

SCALE: 1"=10'

RESOURCE IMPACTS

LAND UNDER WATER (LUW)

LUW ADDED..... 250 S.F.
 BVW CONVERTED TO LUW..... 92 S.F.
 LUW LOST..... 0 S.F.
 NET LUW.....+342 S.F.

LUW TEMP IMPACT..... 100 S.F.

TOTAL TEMPORARY AND PERMANENT LUW IMPACT..... 100 S.F.

BORDERING VEGETATED WETLAND (BVW)

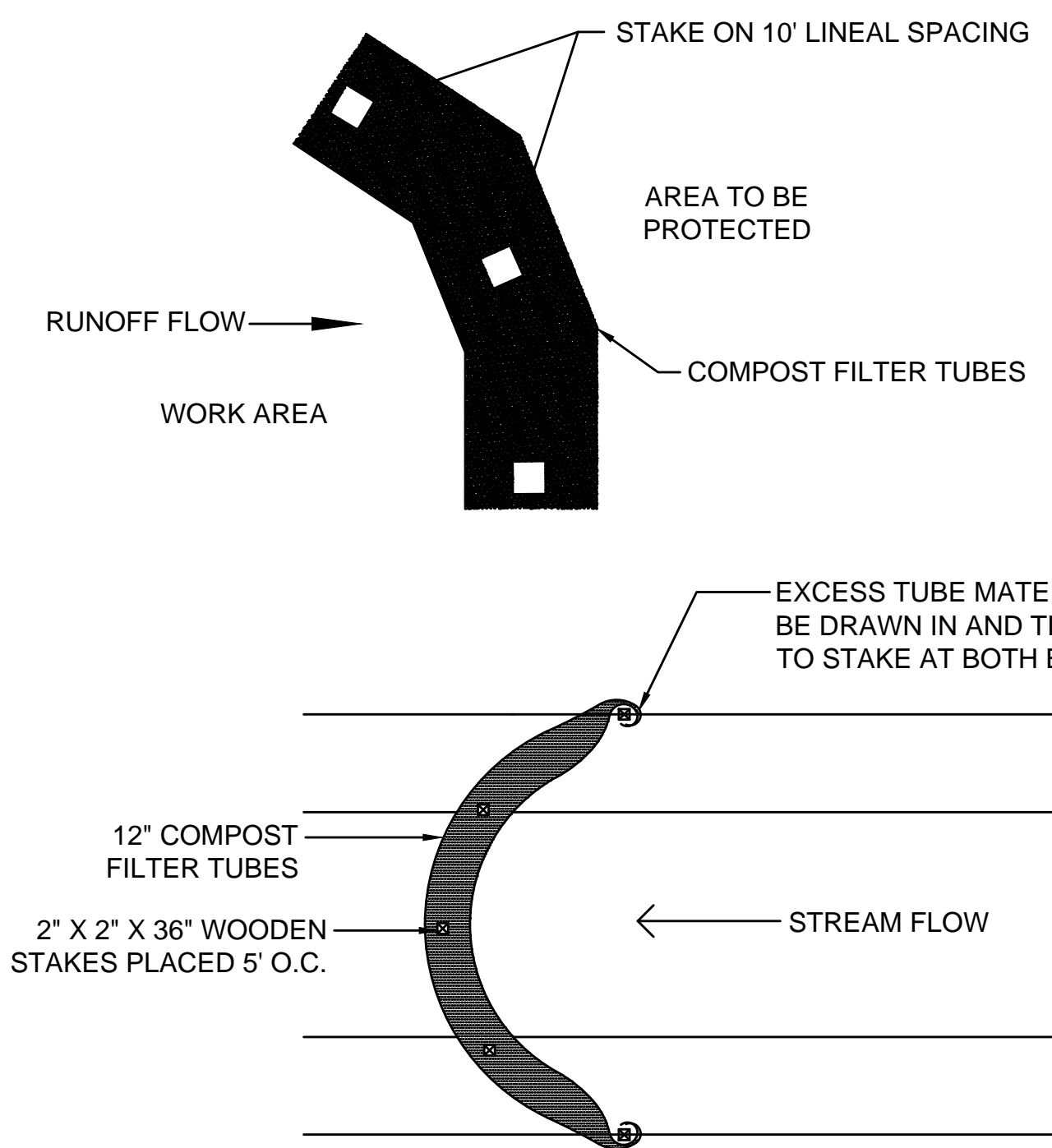
BVW CONVERTED TO LUW..... 92 S.F.
 BVW ADDED..... 145 S.F.
 BVW TEMP. IMPACT..... 570 S.F.
 NET BVW IMPACT..... +53 S.F.

TOTAL TEMPORARY AND PERMANENT BVW IMPACT..... 662 S.F.

RIVERFRONT RIPARIAN ZONE

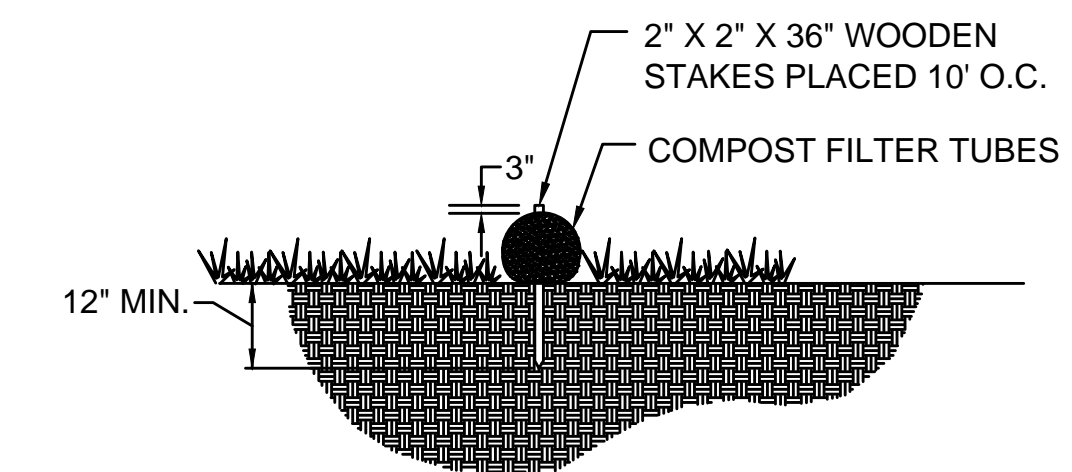
RIVERFRONT TEMP. IMPACT.....1,800 S.F.
 RIVERFRONT PERM. IMPACT.....1,370 S.F.
 RIVER BANK ADDED..... 40 L.F.
 TEMP RIVER BANK IMPACT..... 10 L.F.

TOTAL RIVERFRONT TEMPORARY AND PERMANENT IMPACTS.....3,170 S.F.



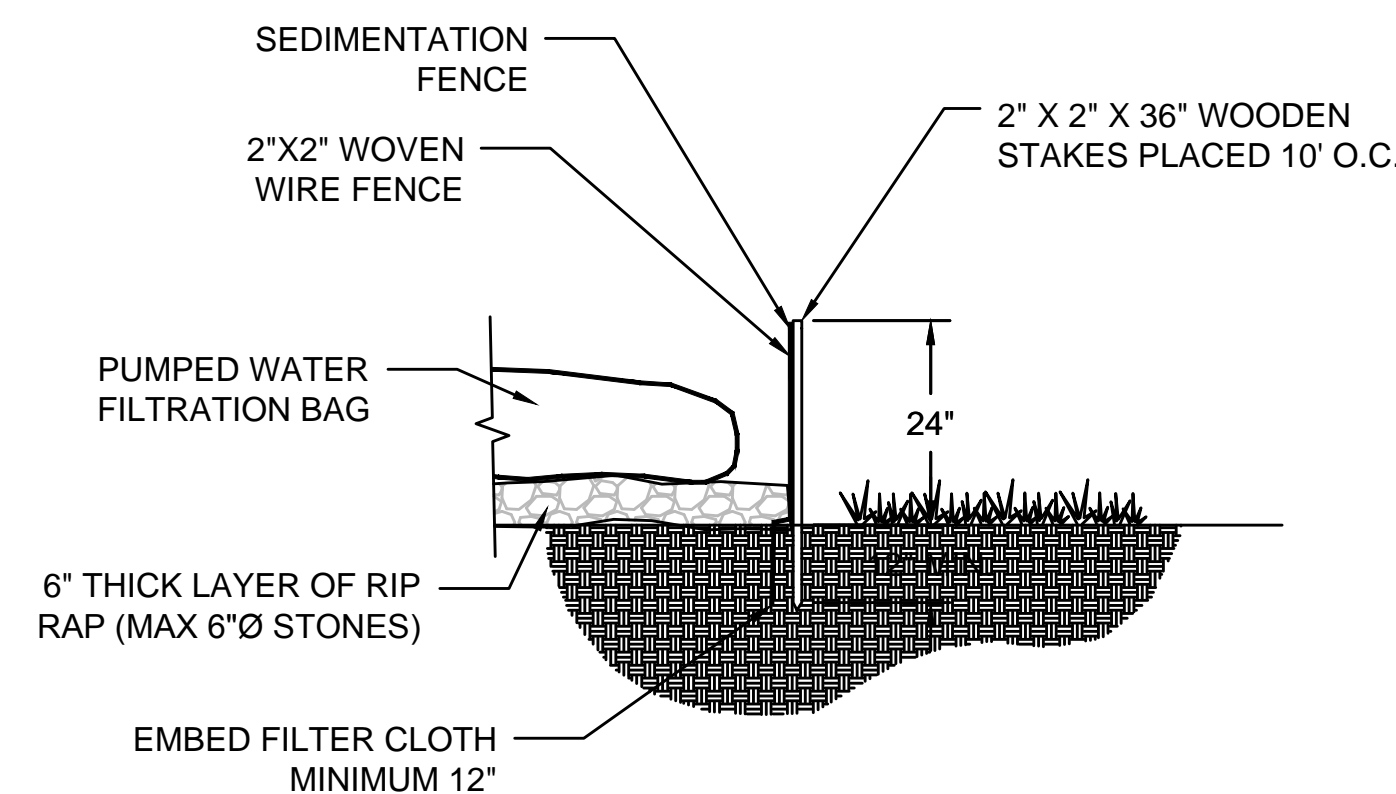
EROSION CONTROL NOTES:

1. PRIOR TO BEGINNING CONSTRUCTION OPERATIONS A SINGLE ROW OF COMPOST FILTER TUBES OR EQUAL FOR EROSION CONTROL SHALL BE INSTALLED AS SHOWN ON THIS PLAN. THIS SHALL SERVE AS THE LIMIT OF WORK LINE.
2. COMPOST FILTER TUBES SHOULD BE INSTALLED PARALLEL TO THE BASE OF THE SLOPE OR OTHER DISTURBED AREA.
3. STAKES SHALL BE INSTALLED THROUGH THE MIDDLE OF THE FILTER TUBES AT 10 FT. ON CENTER INTERVALS, USING 2" X 2" X 36" WOODEN STAKES.
4. STAKING DEPTH SHALL BE 12" MINIMUM.
5. THE CONTRACTOR SHALL MAINTAIN THE COMPOST FILTER TUBES IN A FUNCTIONAL CONDITION AT ALL TIMES, INCLUDING INSPECTIONS AFTER EACH RAINFALL AND AT LEAST DAILY DURING PROLONGED RAINFALL. THE CONTRACTOR SHALL IMMEDIATELY CORRECT ANY DEFICIENCIES. CONTRACTOR SHALL REMOVE SEDIMENT DEPOSITS AS NECESSARY TO MAINTAIN THE FILTERS IN WORKING CONDITION.
6. FILTER TUBES SHALL BE MAINTAINED UNTIL DISTURBED AREAS HAVE BEEN PERMANENTLY STABILIZED, OR AS DETERMINED BY THE ENGINEER.
7. NO WORK MAY PASS THE LINE OF STAKED FILTER TUBES DURING CONSTRUCTION. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE REMOVAL AND LAWFUL DISPOSAL OF ALL EXCAVATED MATERIALS AND DEBRIS NOT OTHERWISE REUSED ON THE SITE FOR GRADING PURPOSES



COMPOST FILTER TUBES

NOT TO SCALE

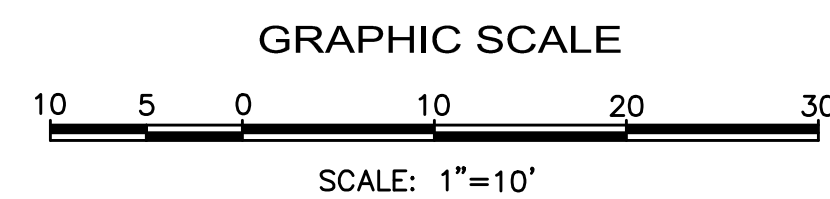


DEWATERING NOTES

1. INSTALL SEDIMENTATION AND EROSION CONTROLS PRIOR TO BEGINNING WORK.
2. ALL WORK SHALL BE CLOSELY COORDINATED WITH THE BOXFORD CONSERVATION COMMISSION OR THEIR DESIGNEE.
3. ALL IN-STREAM WORK SHALL BE COORDINATED SO THAT ALL CULVERT REMOVAL AND NEW CULVERT INSTALLATION BEGINS AND IS COMPLETED DURING A PERIOD OF "LOW FLOW" CONDITIONS AND IS PERFORMED IN ACCORDANCE WITH THE ORDER OF CONDITIONS. CONTRACTOR'S PROPOSED WORK SCHEDULE AND VERIFICATION OF WEATHER CONDITIONS SHALL BE SUBMITTED TO THE BOXFORD DEPARTMENT OF PUBLIC WORKS FOR REVIEW AND APPROVAL PRIOR TO COMMENCING WORK.
4. DEWATERING SHALL BE USED IF NECESSARY TO ENSURE THAT SOIL COMPACTION, CONCRETE PLACEMENT AND CULVERT INSTALLATION IS PERFORMED "IN THE DRY".
5. DIRECT DEWATERING DISCHARGE TO PORTER BROOK IS PROHIBITED.
6. DEWATERING EFFLUENT SHALL BE DISCHARGED INTO A WATER FILTRATION BAG SUITABLE FOR THE REQUIRED FLOW AND LOCATED WITHIN A DEWATERING SETTLING BASIN SURROUNDED BY SILT FENCE, LOCATED AS SHOWN ON THE PLANS.
7. THE DEWATERING BASIN SHOULD BE PLACED ON REASONABLY LEVEL, STABLE SOIL.
8. PUMPS AND HOSES SHALL BE IN GOOD WORKING CONDITION AND OF ADEQUATE CAPACITY FOR THE REQUIRED FLOW.
9. ALL EROSION CONTROL MEASURES SHALL BE INSTALLED PRIOR TO COMMENCING DEWATERING OPERATIONS.

DEWATERING BAG/BASIN

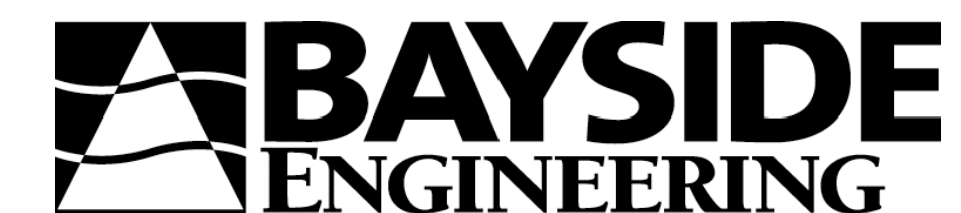
NOT TO SCALE



**CULVERT DETAILS
 KELSEY ROAD CULVERT REPLACEMENT
 BOXFORD, MASSACHUSETTS**

PREPARED FOR:
TOWN OF BOXFORD DEPARTMENT OF PUBLIC WORKS

Bridge & Structural Engineering
 Civil/Site Engineering
 Land Surveying
 Transportation Engineering
 Architectural Design & Building Renovations



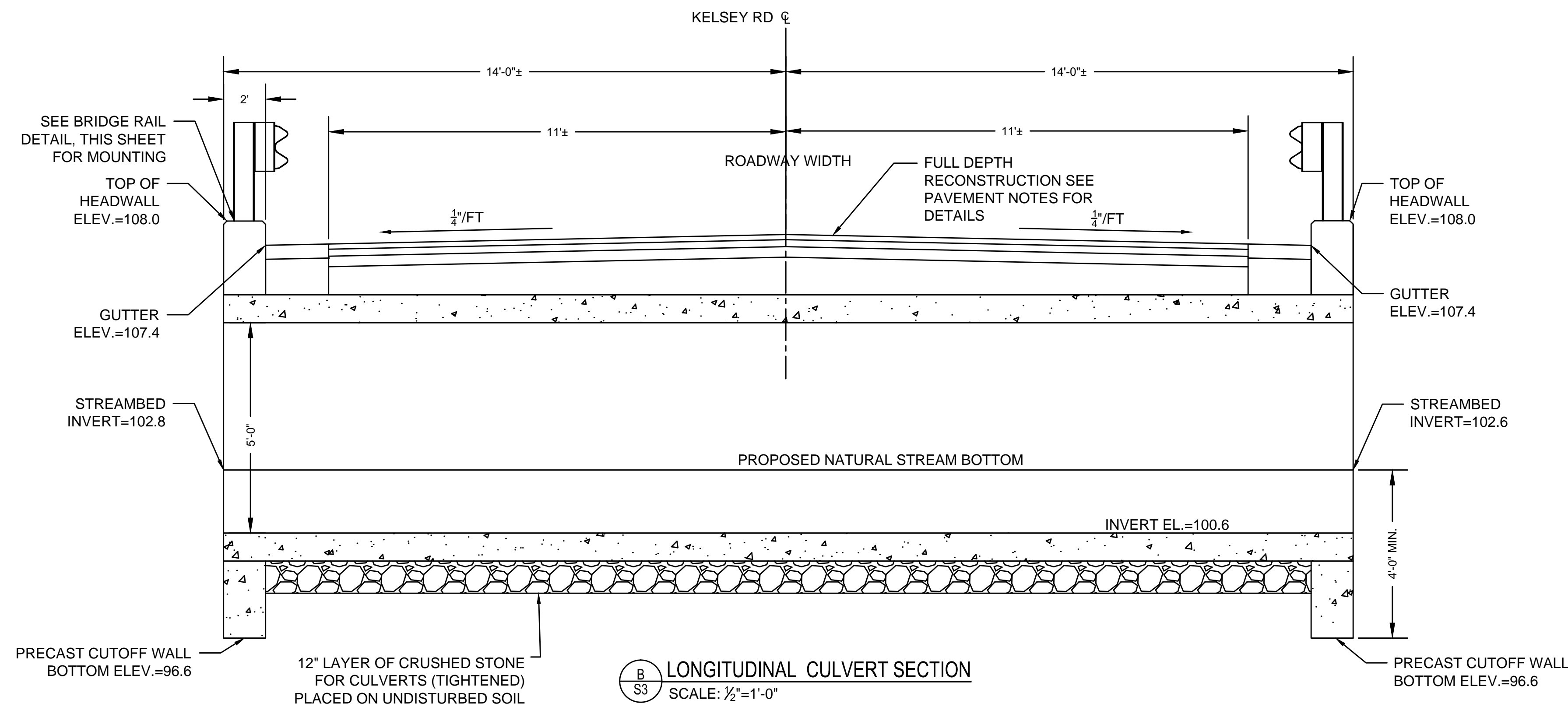
600 Unicorn Park Drive ▲ Woburn MA 01801
 Phone: 781.932.3201 ▲ Fax: 781.932.3413

S-2

SHEET: 2 of 4

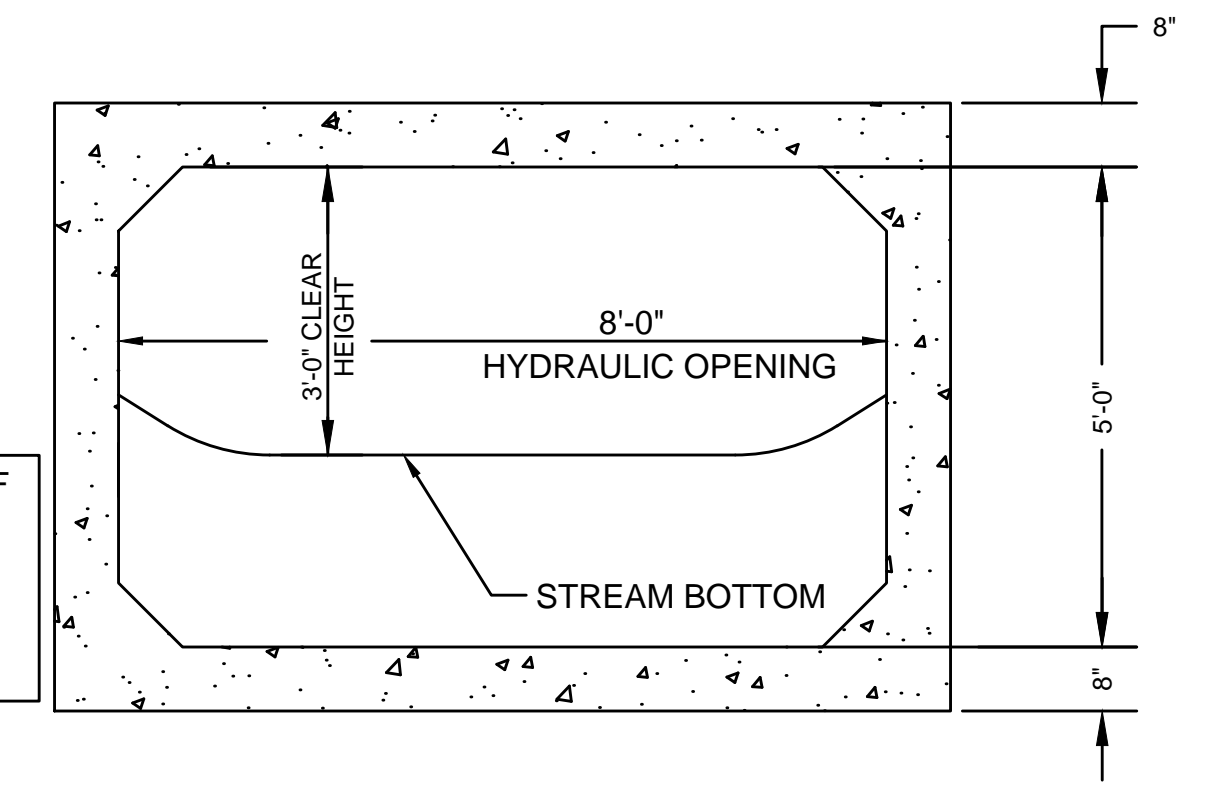
PROJECT # 2152008
 SCALE AS NOTED
 DATE JUNE 28, 2016
 DRAFTED BY BFS

REV.	COMMENTS	DATE



NOTE: THE BRIDGE RAIL MOUNTING STUDS MUST BE TEMPLATE CAST IN THE HEADWALL AS SHOWN IN THE DETAILS. ALL OTHER METHODS OF MOUNTING ARE PROHIBITED.

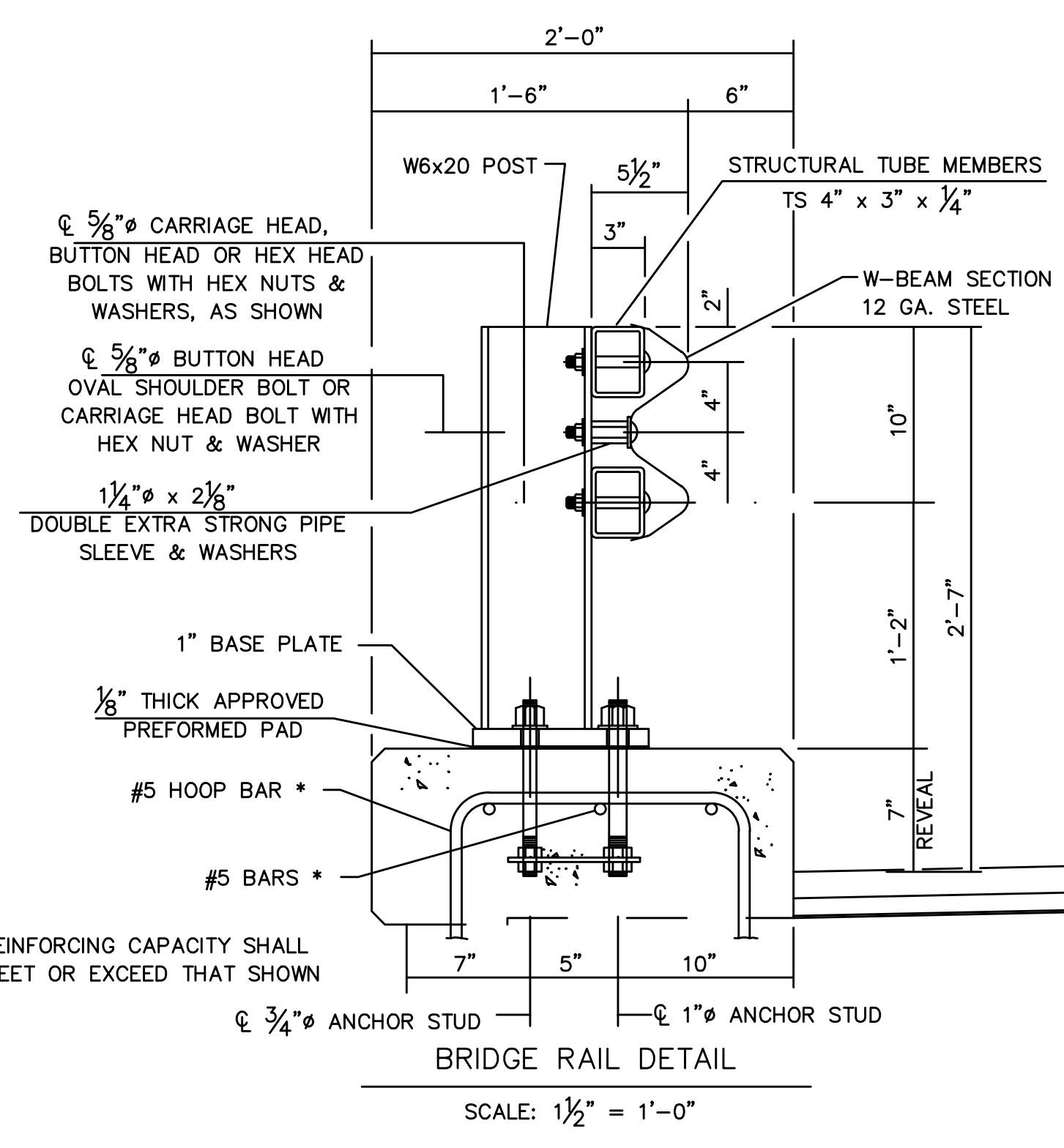
*ACTUAL DIMENSIONS OF PRECAST CULVERT AND FOOTINGS TO BE DESIGNED BY PRECAST SUPPLIER



PRECAST CONCRETE CULVERT NOTES:

1. CONTRACTOR SHALL SUBMIT PRECAST CONCRETE CULVERT DESIGN CALCULATIONS AND SHOP DRAWINGS SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN THE COMMONWEALTH OF MASSACHUSETTS FOR APPROVAL PRIOR TO FABRICATION.
2. THE CONTRACTOR SHALL APPROVE ALL ELEVATIONS AND DIMENSIONS OF THE SHOP DRAWINGS PRIOR TO FABRICATION.
3. ALL CONCRETE SHALL HAVE A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 5000 PSI. CEMENT TO BE TYPE III CONFORMING TO ASTM C-150.
4. ALL REINFORCING STEEL SHALL BE GRADE 60 BARS AND CONFORM TO ASTM A615. ALL REINFORCING SHALL BE BENT COLD. UNLESS OTHERWISE NOTED, REINFORCING SPLICE LENGTHS SHALL BE AS FOLLOWS:

BAR SIZE	SPLICE LENGTH (IN)
#8	36
#6	24
5. REINFORCEMENT SHALL BE PLACED WITH A MINIMUM OF 1 1/2" COVER FROM THE FACE OF CONCRETE.
6. THE LOADING FOR THE STRUCTURE IS HL-93 WITH 18" OF SOIL COVER AND 6-1/2" HOT MIX ASPHALT PAVEMENT.
7. A PRESUMPTIVE BEARING CAPACITY OF 2000 PSF SHALL BE USED IN THE DESIGN OF THE CULVERT. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE SUBGRADE PREPARATION SUCH THAT THE DESIGN BEARING CAPACITY SHALL BE ACHIEVED. THE CONTRACTOR SHALL NOTIFY THE ENGINEER IF THIS BEARING CAPACITY CANNOT BE MET.
8. CONTRACTOR SHALL SUBMIT AN ERECTION PROCEDURE/SHOP DRAWING FOR APPROVAL PRIOR TO STARTING ANY CONSTRUCTION.



REV.	COMMENTS	DATE

PROJECT # 2152008
SCALE AS NOTED
DATE JUNE 7, 2016
DRAFTED BY BFS

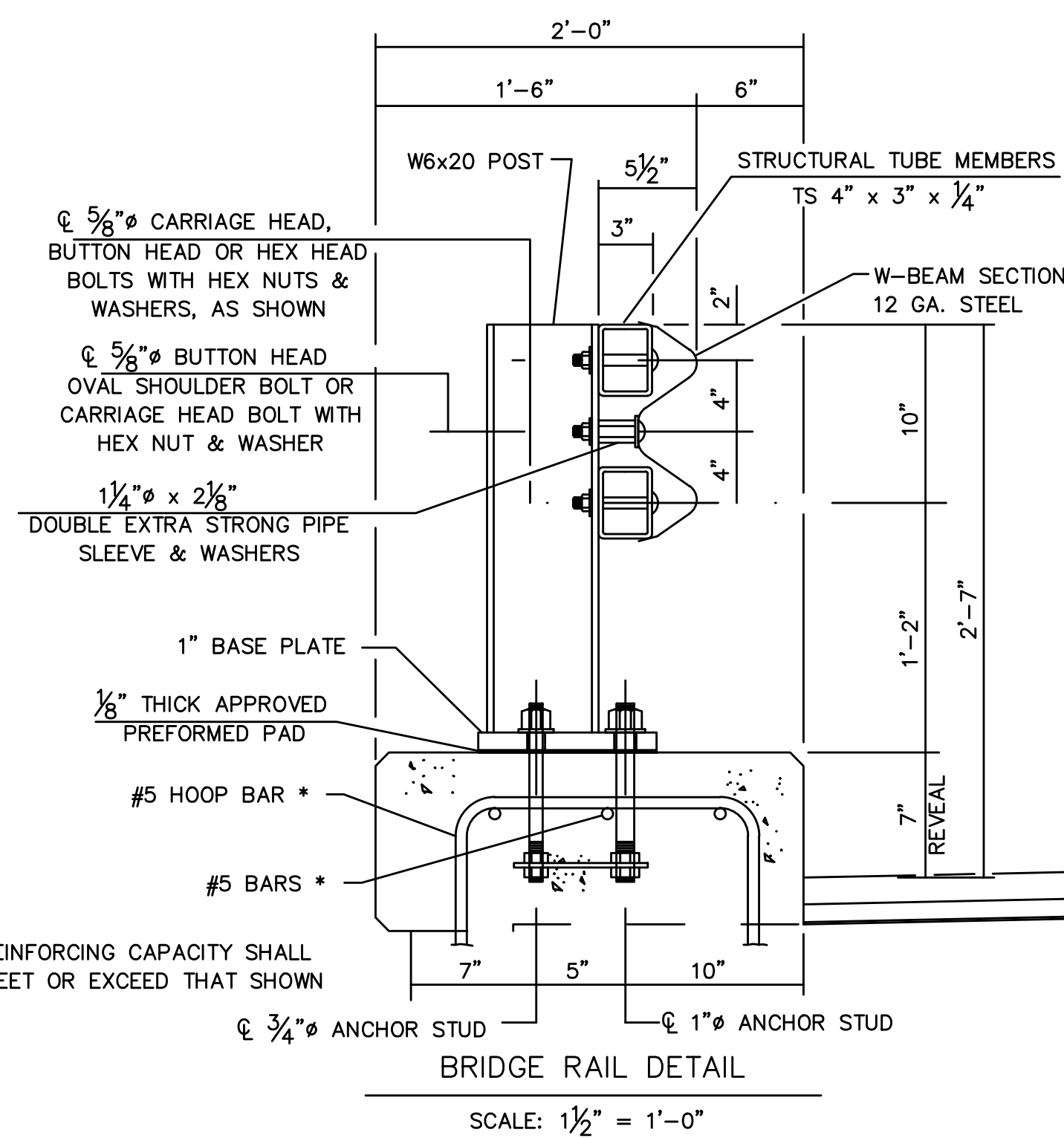
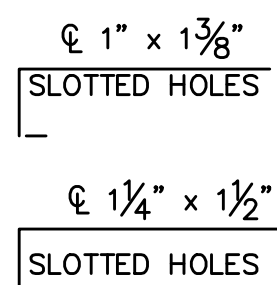
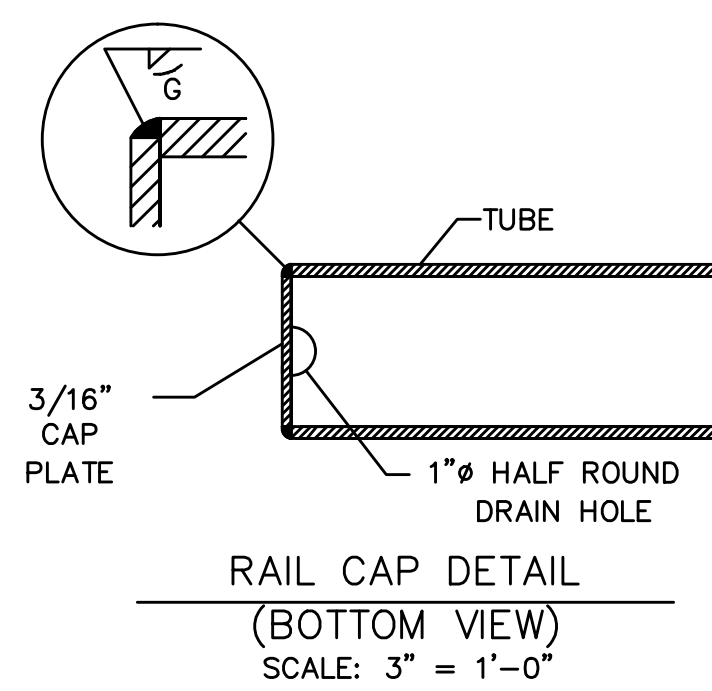
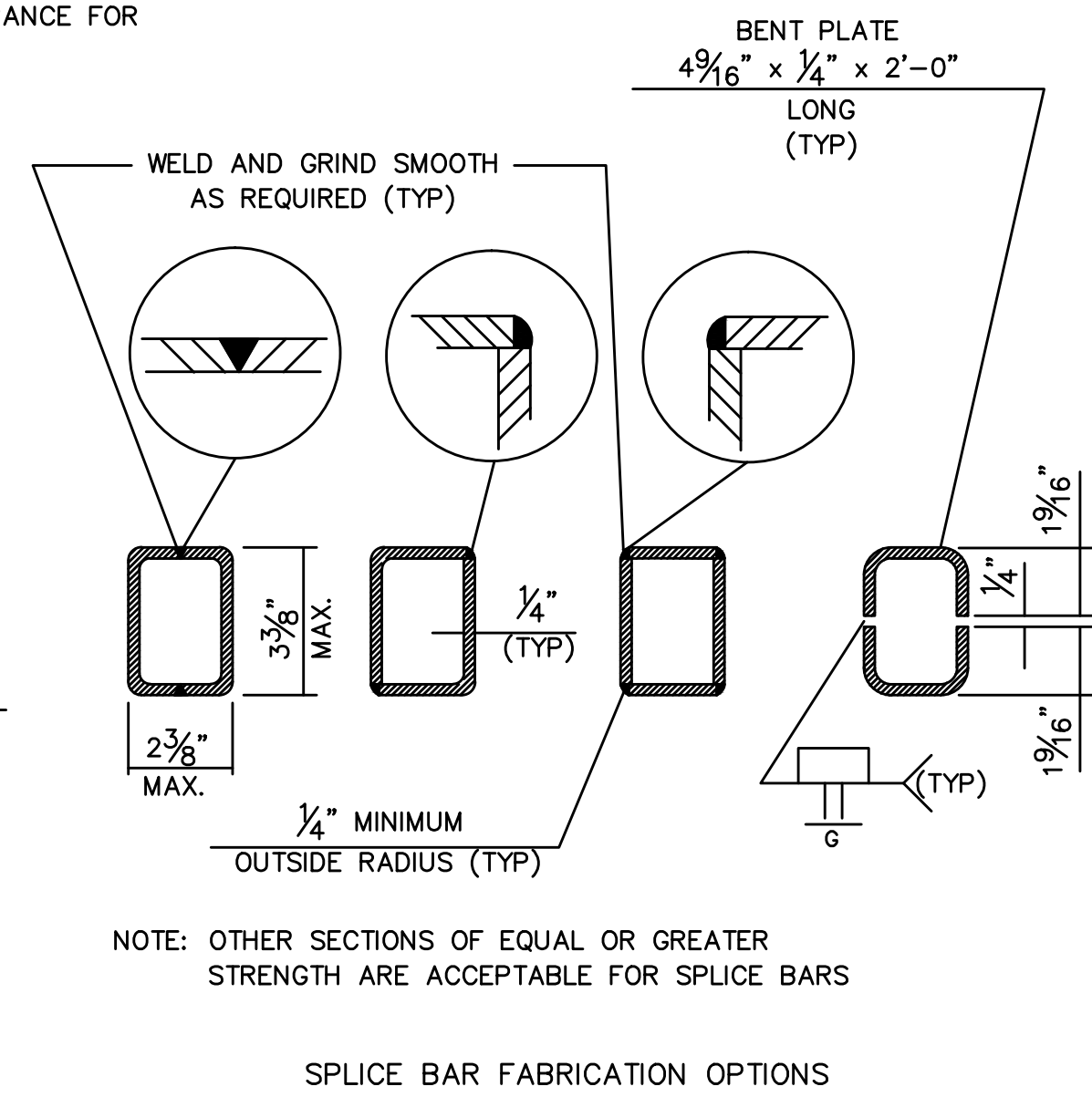
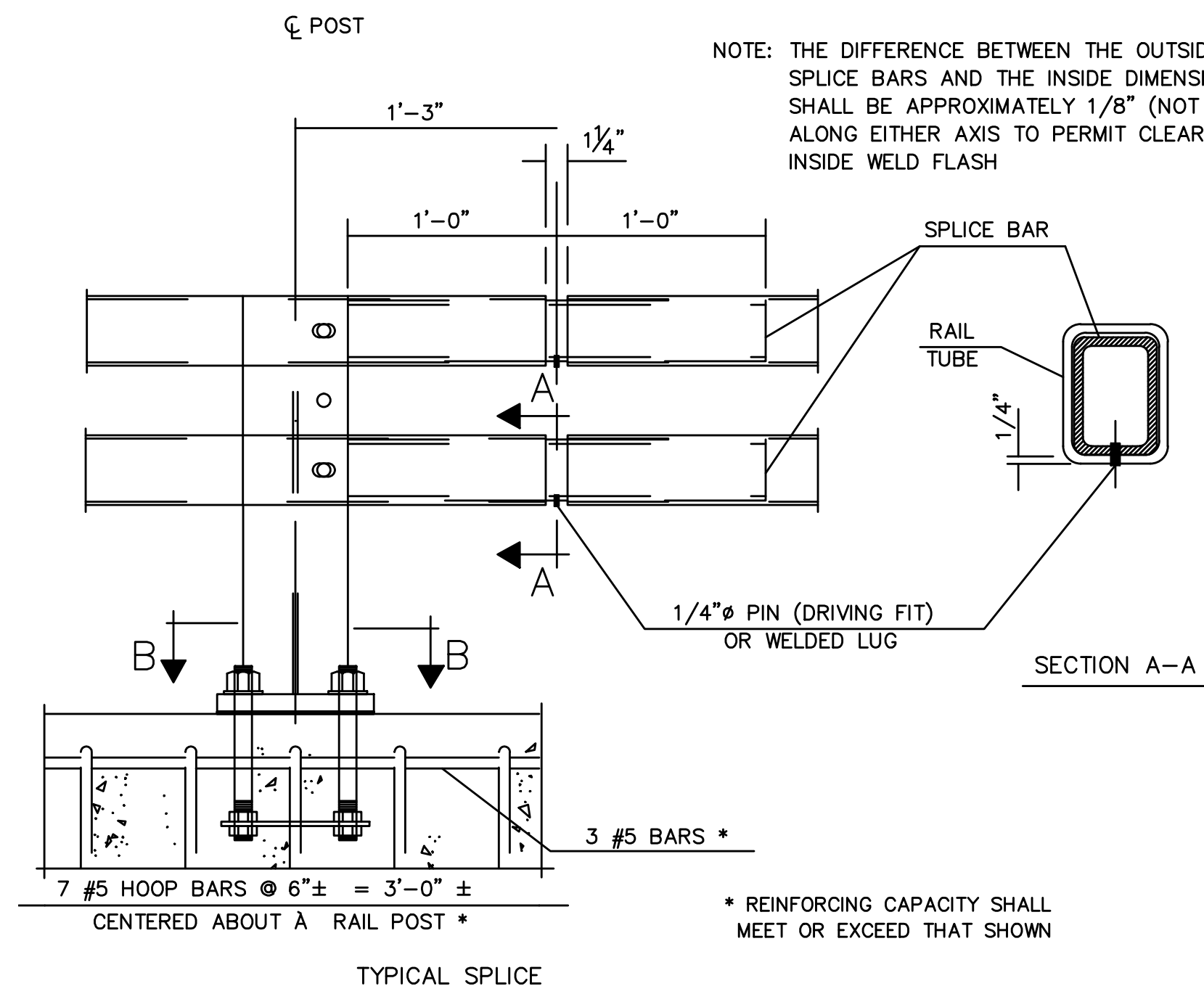
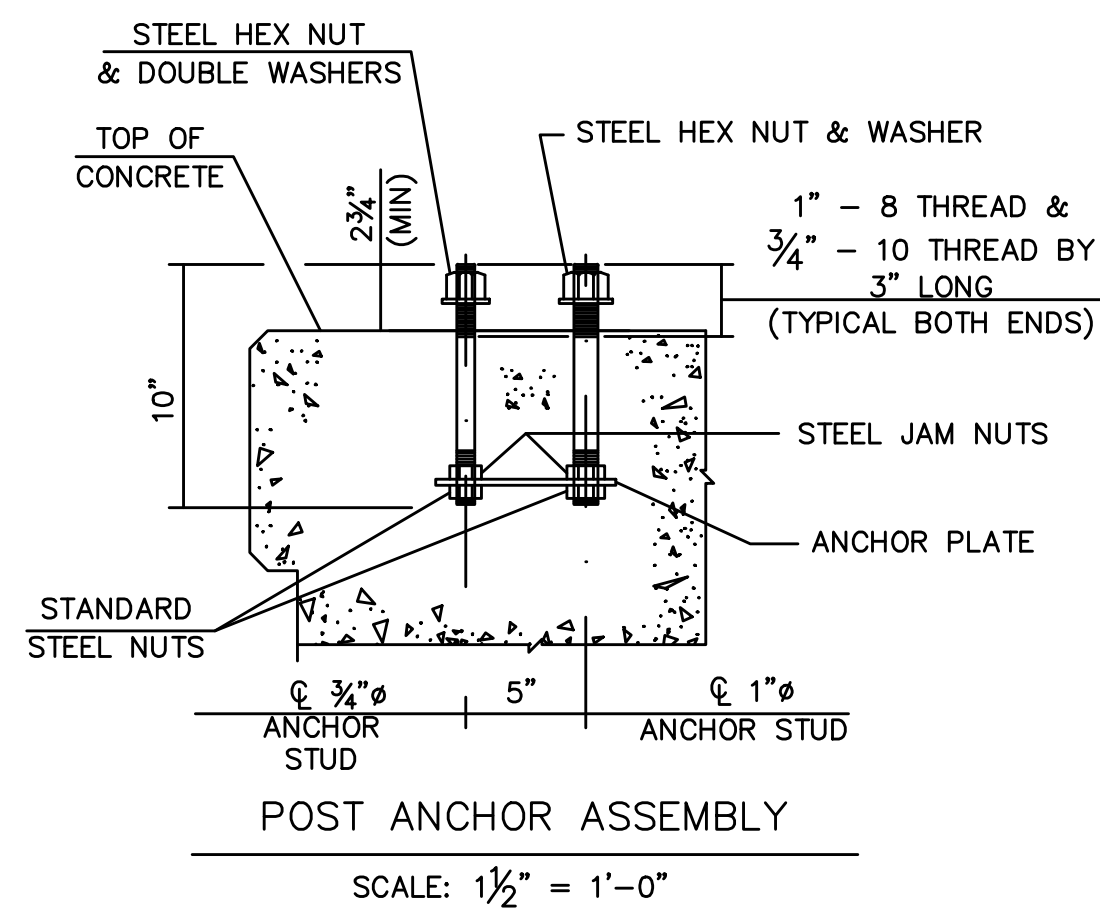
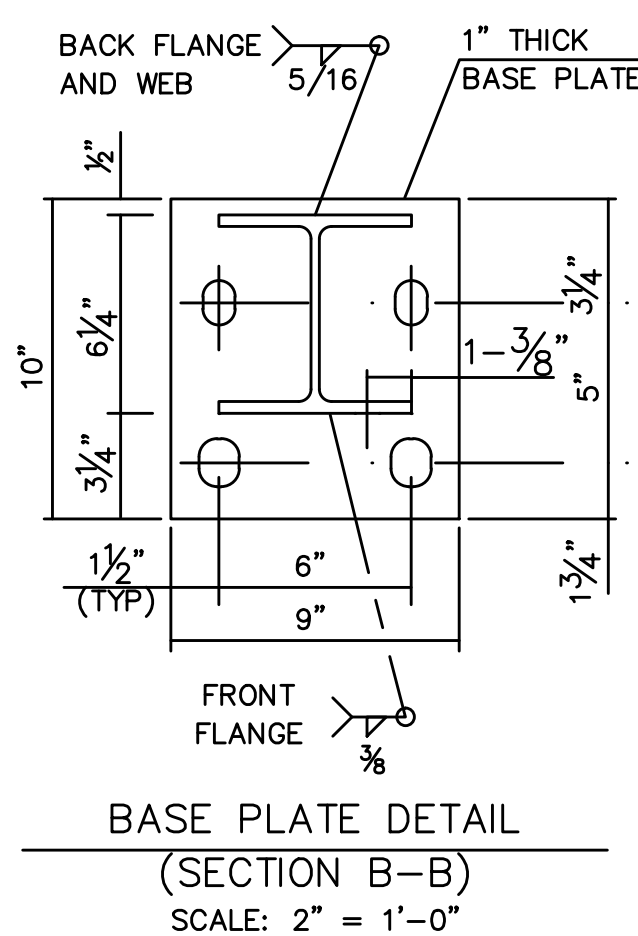
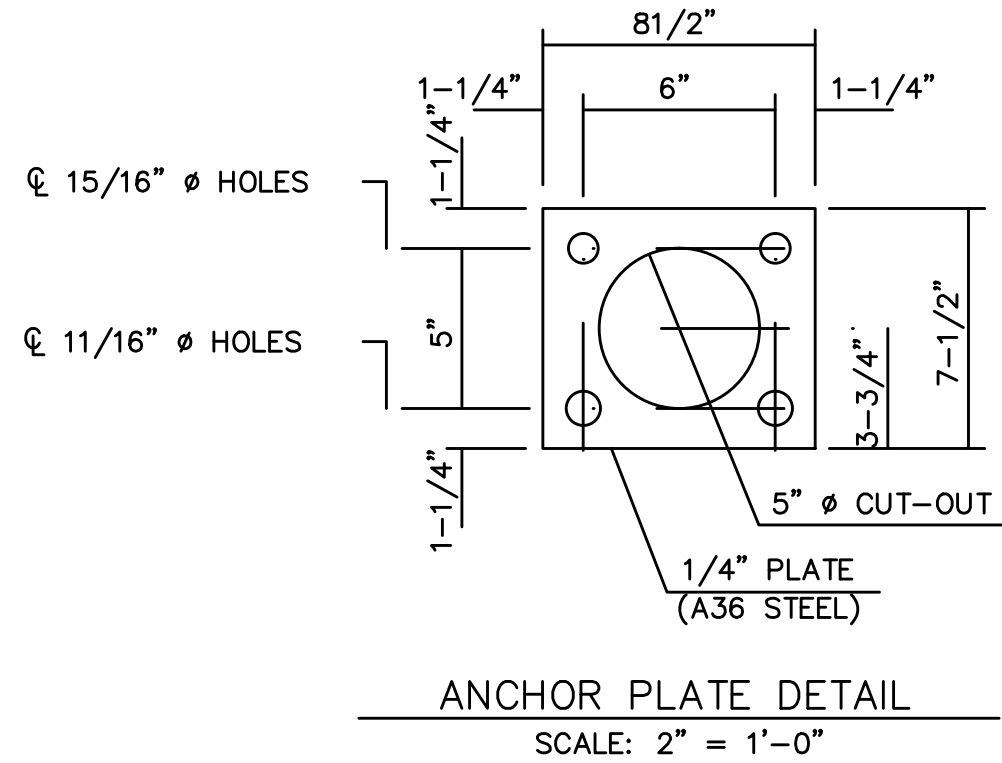
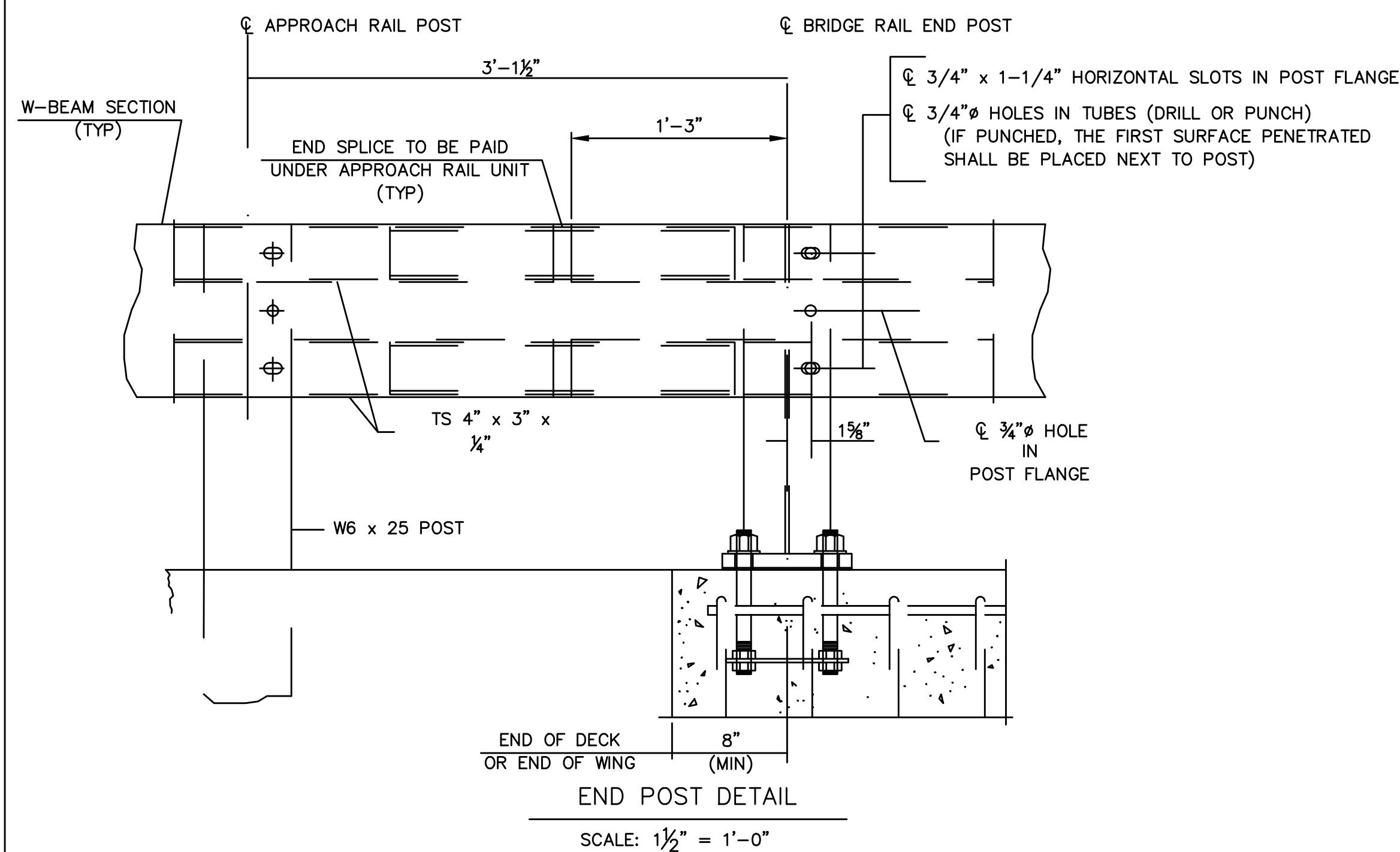
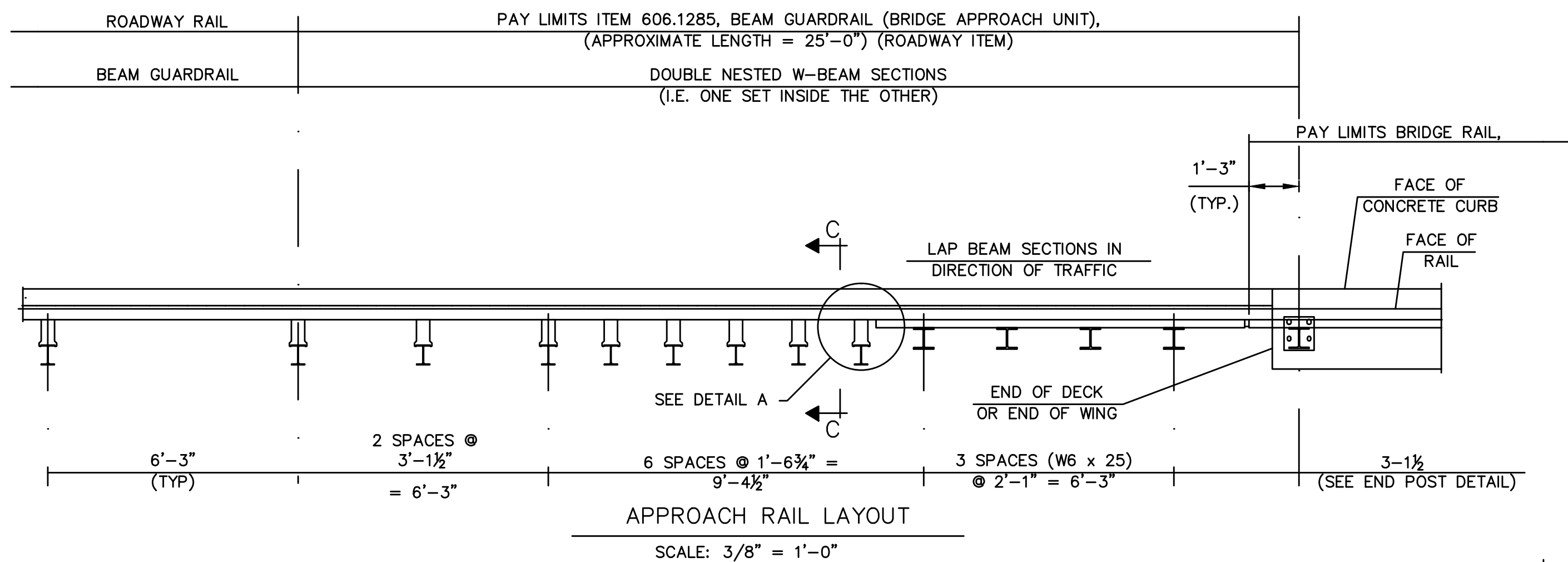
CULVERT DETAILS
KELSEY ROAD CULVERT REPLACEMENT
BOXFORD, MASSACHUSETTS

PREPARED FOR:
TOWN OF BOXFORD DEPARTMENT OF PUBLIC WORKS

Bridge & Structural Engineering
Civil/Site Engineering
Land Surveying
Transportation Engineering
Architectural Design & Building Renovations

BAYSIDE ENGINEERING

600 Unicorn Park Drive ▲ Woburn MA 01801
Phone: 781.932.3201 ▲ Fax: 781.932.3413



GENERAL NOTES

- BRIDGE RAIL T101 SHALL NOT BE USED ON NATIONAL HIGHWAY SYSTEMS.
- BRIDGE RAIL T101 WAS SUCCESSFULLY CRASHED TESTED FOR NCHRP 350 (@ HEIGHT OF 2'-3"), TL-3 PER FHWA MAY 30, 1997 MEMORANDUM. USE OF THIS SYSTEM SHALL BE FOR POSTED SPEEDS 45 MPH AND BELOW.
- BRIDGE RAIL T101, SHALL INCLUDE POSTS, BASE PLATES, ANCHOR PLATES, ANCHOR STUDS, PREFORMED PADS, RAIL ASSEMBLY BOLTS, NUTS, WASHERS, STRUCTURAL TUBING, SPLICE BARS, PIPE SLEEVES AND W-BEAM SECTIONS.
 - ASTM A588 : POSTS AND BASE PLATES
 - ASTM A500: GRADE B (PAINTED) OR ASTM A588 (UNPAINTED) OR ASTM A47 (UNPAINTED) : STRUCTURAL TUBING
 - ASTM A36 : PIPE SLEEVES AND RAIL SPLICE BARS (PAINTED) AND ANCHOR PLATES (GALVANIZED)
 - ASTM A449 (GALV) : ANCHOR STUDS WITH STANDARD NUTS AND STEEL COMMERCIAL TYPE A PLAIN WIDE WASHERS HARDENED
 - A325 TYPE 3 : RAIL BOLTS, NUTS AND WASHERS
 - AASHTO M180 TYPE IV : W-BEAM SECTIONS
- MEMBERS TO BE PAINTED SHALL FIRST BE GALVANIZED AFTER FABRICATION IN CONFORMANCE WITH AASHTO M111 (ASTM A123) AND THEN OUTSIDE SURFACES SHALL BE SHOP PAINTED WITH ONE COAT OF HIGH BUILD EPOXY POLYAMIDE (4-6 MILS DFT) AND ONE COAT OF ALIPHATIC POLYURETHANE (1.5 TO 2.5 MILS DFT), DARK BROWN (REFER TO SPECIAL PROVISIONS FOR PAINT SPECIFICATIONS). EXPOSED ANCHOR BOLTS, NUTS, WASHERS & RAIL BOLTS SHALL BE PAINTED DARK BROWN IN THE FIELD IN CONFORMANCE WITH THE STANDARDS IN THE SPECIAL PROVISIONS.
- STRUCTURAL TUBING SHALL BE SUPPLIED AS ONE PIECE FOR BRIDGE RAIL 40 FEET OR LESS IN LENGTH. IN OTHER CASES, TUBING SHALL BE SPLICED WITH A SPLICE BAR (SEE SPLICE BAR DETAILS). NO TRANSVERSE BUTT WELDS ARE PERMITTED ON RAIL TUBING WITHIN A CONTINUOUS LENGTH.
- EACH PIECE OF RAIL TUBING SHALL BE ATTACHED TO A MINIMUM OF THREE POSTS.
- FOR BRIDGE RAIL POST SPACING, SEE BRIDGE RAIL LAYOUT. THE MAXIMUM BRIDGE RAIL POST SPACING SHALL BE 8'-4". POST SPACING OF 8'-4" OR 6'-3" IS RECOMMENDED WHENEVER POSSIBLE FOR USE WITH 25' SECTIONS OF STANDARD W-BEAM RAIL.
- PREFORMED BEARING PADS SHALL CONFORM TO AASHTO M251.
- NUTS FOR THREADED ANCHOR STUDS CONNECTING THE BASE PLATE TO THE CONCRETE SHALL BE TIGHTENED TO A SNUG FIT AND GIVEN AN ADDITIONAL 1/8 TURN.
- OTHER TYPES OF OFFSET BLOCKS MAY BE SUBSTITUTED FOR THOSE SHOWN. SEE NOTES IN STANDARD PLAN GR-2 (BEAM GUARDRAIL STANDARD SECTION - STEEL POSTS & HARDWARE DETAILS) OF THE HIGHWAY DESIGN STANDARD PLANS FOR ROAD CONSTRUCTION.

REV.	COMMENTS	DATE

PROJECT # 2152008
SCALE AS NOTED
DATE JUNE 7, 2016
DRAFTED BY BFS

HIGHWAY GUARD DETAILS
KELSEY ROAD CULVERT REPLACEMENT
BOXFORD, MASSACHUSETTS

PREPARED FOR:
TOWN OF BOXFORD DEPARTMENT OF PUBLIC WORKS

Bridge & Structural Engineering
Civil/Site Engineering
Land Surveying
Transportation Engineering
Architectural Design & Building Renovations

BAYSIDE
ENGINEERING
600 Unicorn Park Drive Woburn MA 01801
Phone: 781.932.3201 Fax: 781.932.3413