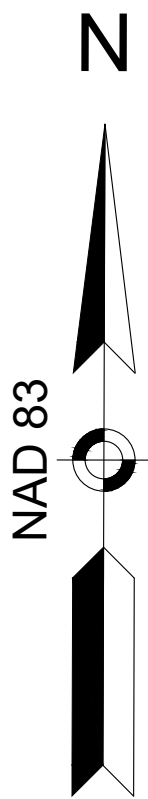
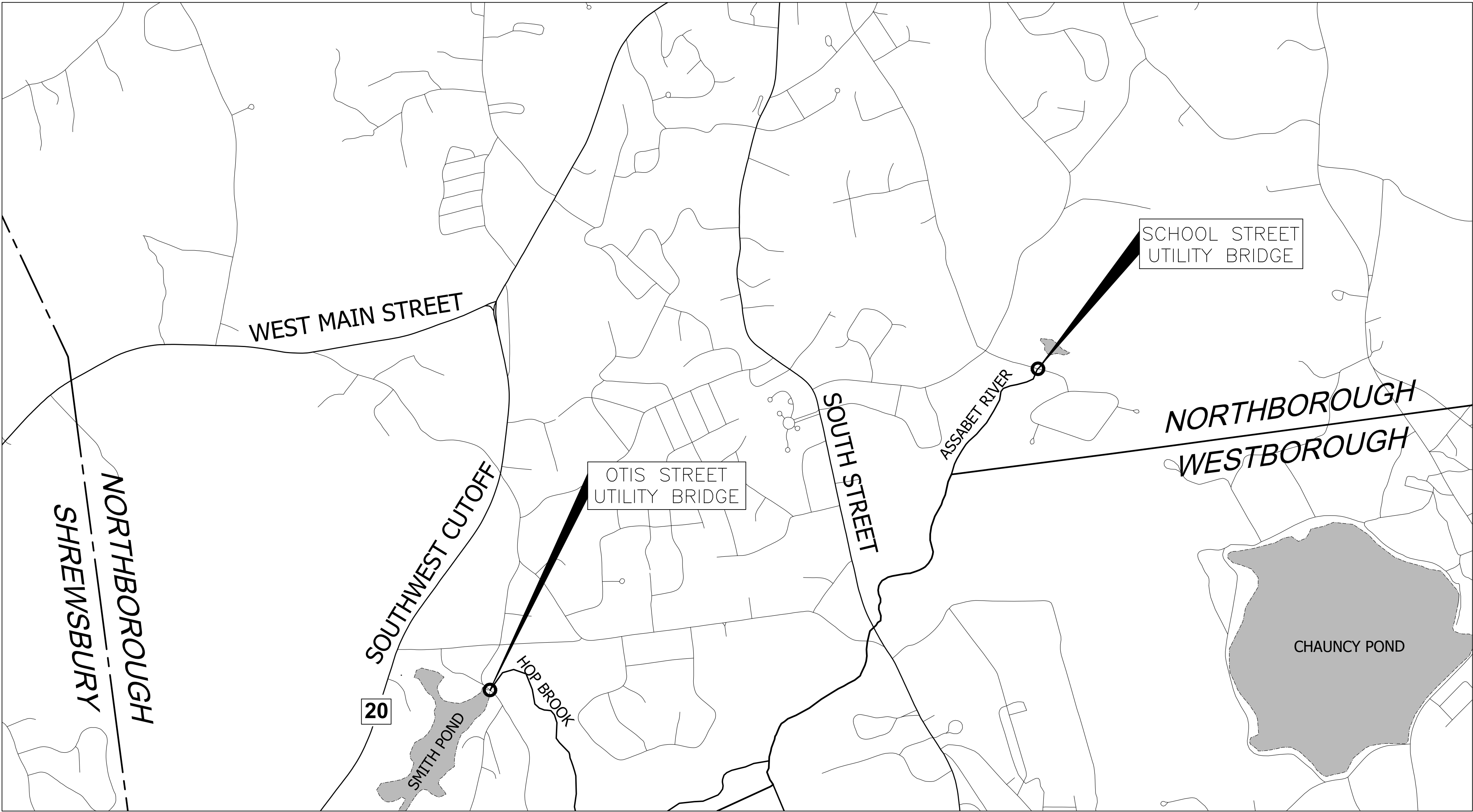


# UTILITY BRIDGE REPAIR AND REPLACEMENT PROJECT

PLAN OF  
SCHOOL STREET OVER ASSABET RIVER  
& OTIS STREET OVER HOP BROOK

IN THE TOWN OF  
NORTHBOROUGH  
WORCESTER COUNTY

THESE PLANS ARE SUPPLEMENTED BY THE 2025 MASSDOT STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES, THE MASSDOT OCTOBER 2017 CONSTRUCTION STANDARD DETAILS, THE MASSDOT TRAFFIC MANAGEMENT PLANS AND DETAIL DRAWINGS, THE MASSDOT WORKZONE SAFETY TEMPORARY TRAFFIC CONTROL, THE MASSDOT 1990 STANDARD DRAWINGS FOR SIGNS AND SUPPORTS, THE 2023 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES (MUTCD) WITH MASSACHUSETTS AMENDMENTS AND THE STANDARD MUNICIPAL TRAFFIC CODE, THE TOWN OF NORTHBOROUGH SUBDIVISION RULES AND REGULATIONS, THE LATEST EDITION OF THE AMERICAN STANDARD FOR NURSERY STOCK, AND NORTHBOROUGH WATER REGULATIONS, ADOPTED 2023.

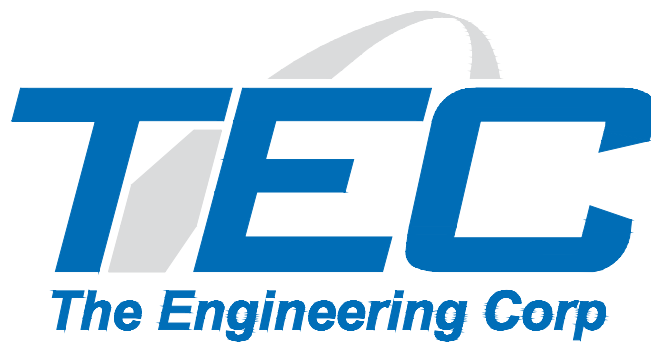


LOCUS

SCALE: 1" = 1000'

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DATE	12/30/2025
SCALE	AS SHOWN

PREPARED FOR

Town of Northborough  
63 Main Street  
Northborough, MA, 01532

REVISIONS

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Final Plans

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Northborough  
Utility Bridges

PROJECT LOCATION

Northborough, MA

DRAWING TITLE

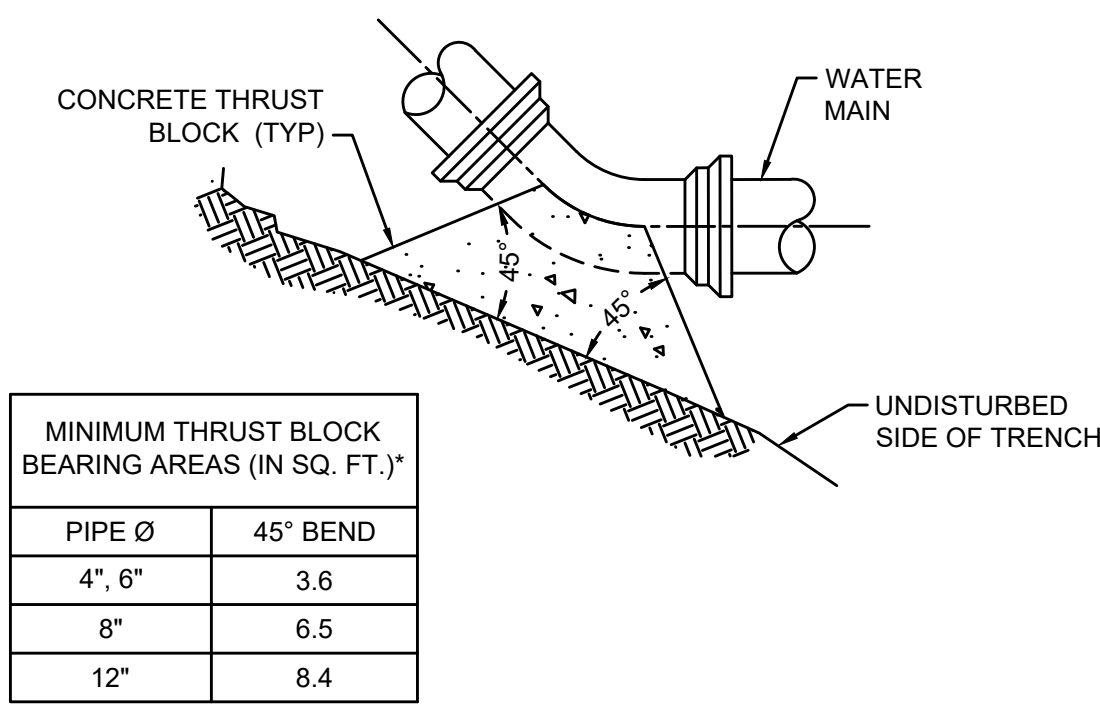
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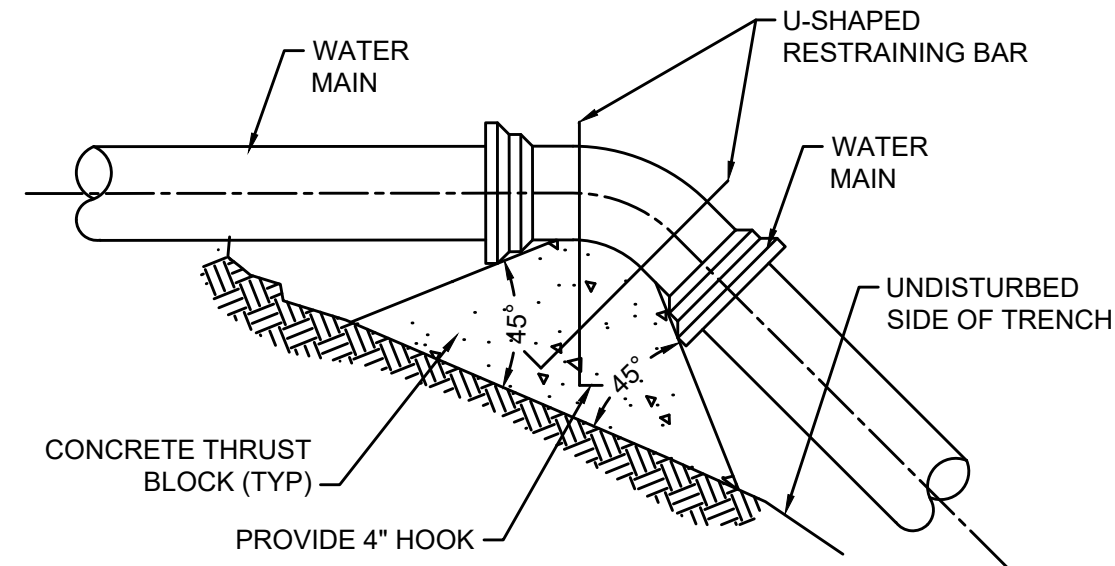
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PROJECT NO.  
T1487  
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Phase1  
DRAWING NO.  
**S-1**  
SHEET 1 OF 10





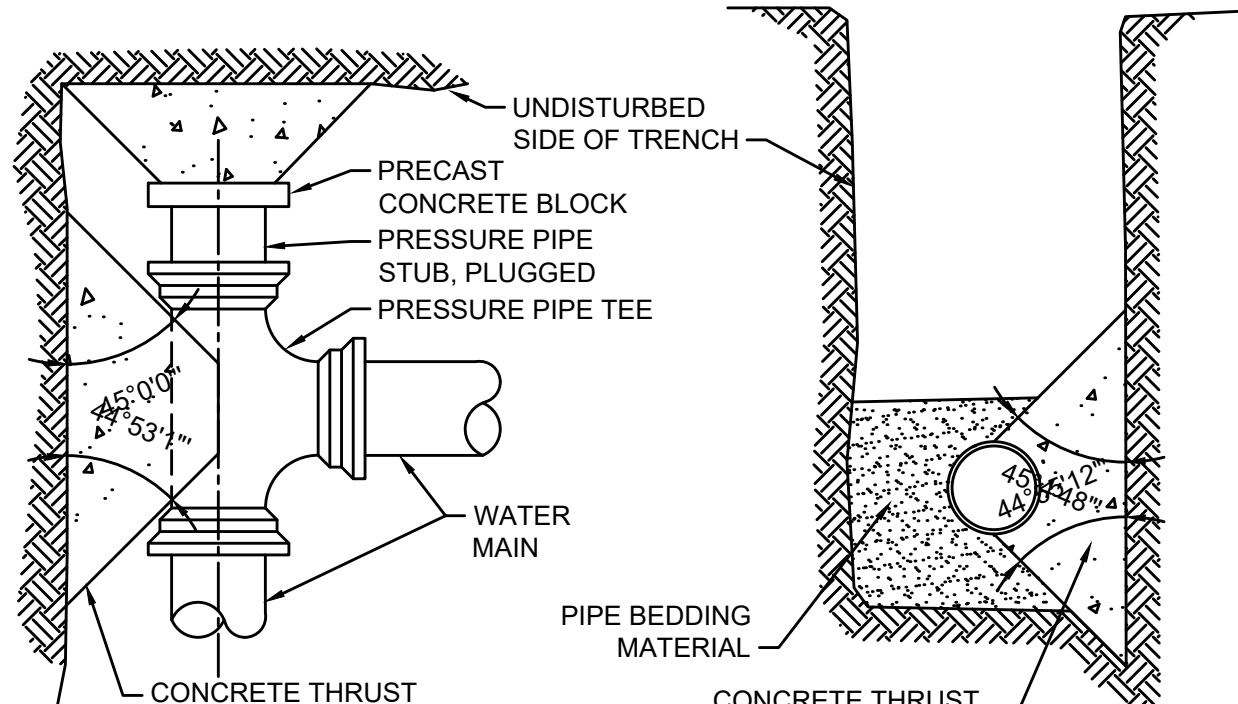
PLAN AT UPWARD VERTICAL BEND



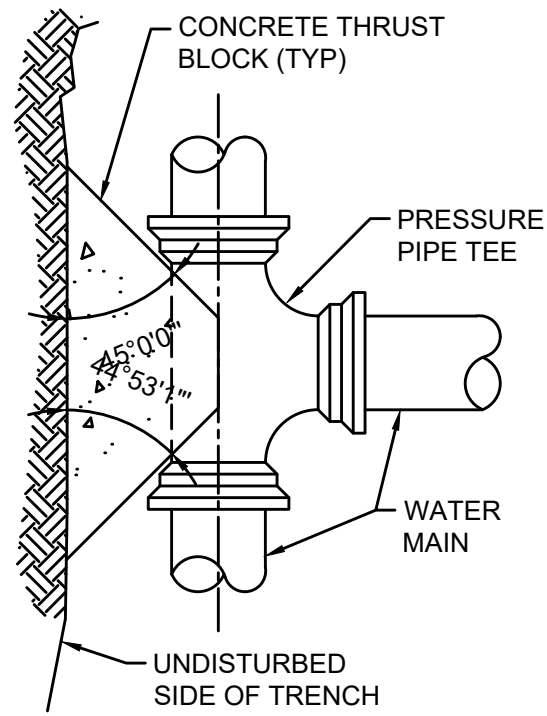
MINIMUM THRUST BLOCK BEARING AREAS (IN SQ. FT.)*		RESTRAINING BAR DIMENSIONS		
PIPE Ø	45° BEND	PIPE Ø	BAR SIZE	EMBEDMENT LENGTH
4", 6"	.9	4", 6"	#4	15"
8"	1.6	8"	#4	15"
12"	3.3	12"	#6	2'-0"

PLAN AT DOWNWARD VERTICAL BEND

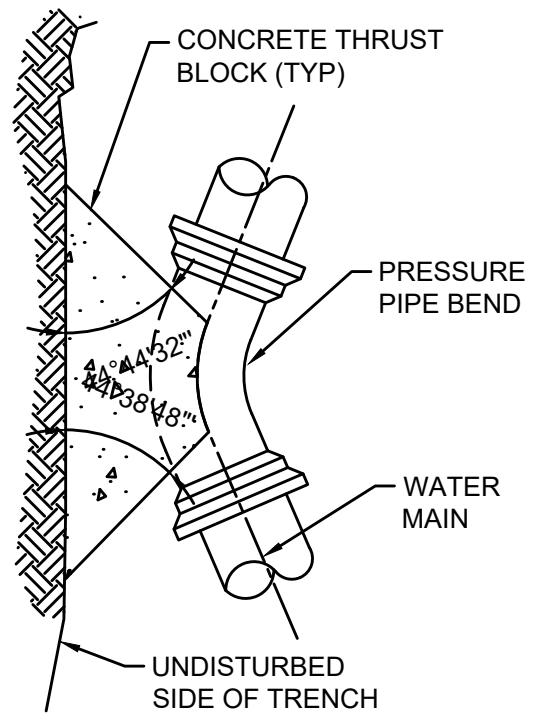
- NOTES:
- ALL WATER MAIN BENDS SHALL BE RESTRAINED W/ THRUST BLOCKS EXCEPT WHERE NOTED.
  - ALL THRUST BLOCKS & COLLARS SHALL BE INSTALLED SO THAT THEY BEAR AGAINST UNDISTURBED EARTH.
  - MINIMUM COMPRESSIVE STRENGTH OF THRUST BLOCK CONCRETE SHALL BE 3,000 P.S.I.
  - KEEP CONCRETE CLEAR OF MECHANICAL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



PLAN AT TEE W/ STUB FOR FUTURE USE

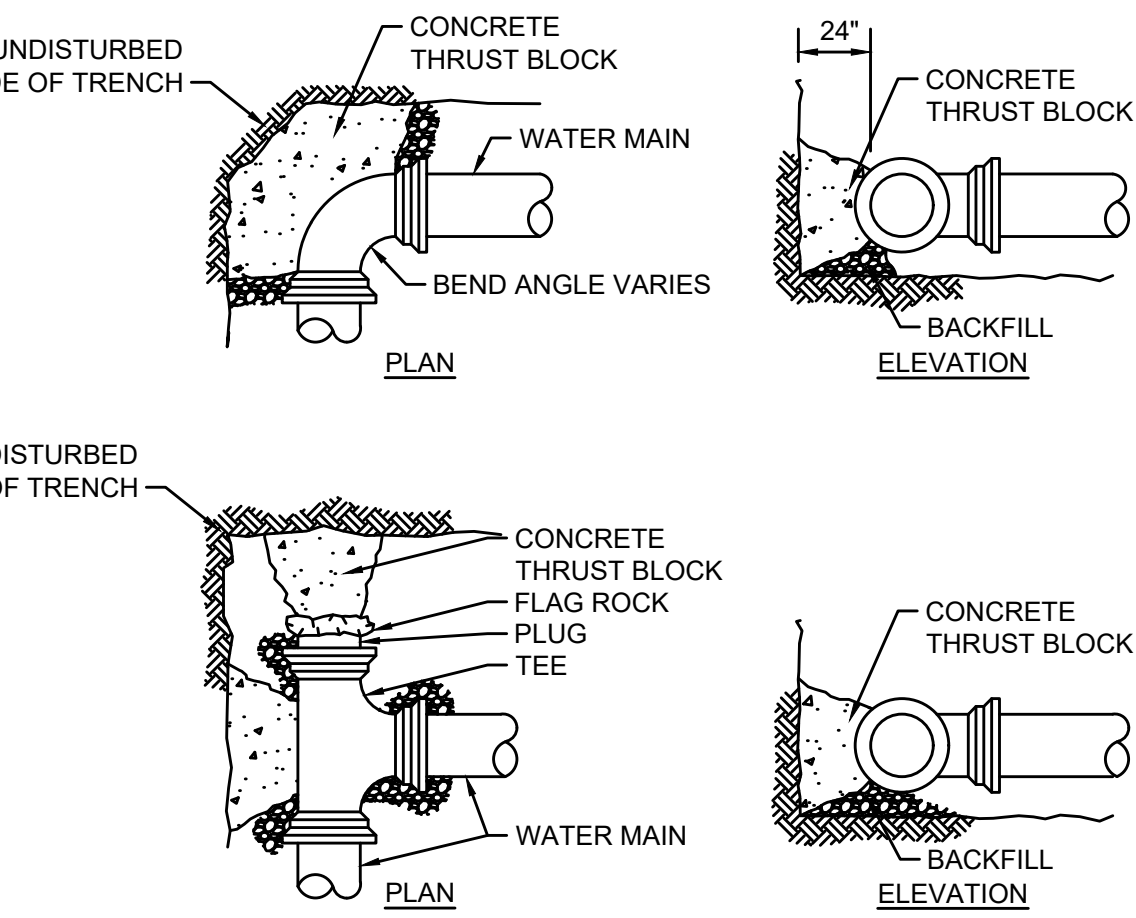


PLAN AT TEE



PLAN AT BEND

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



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				

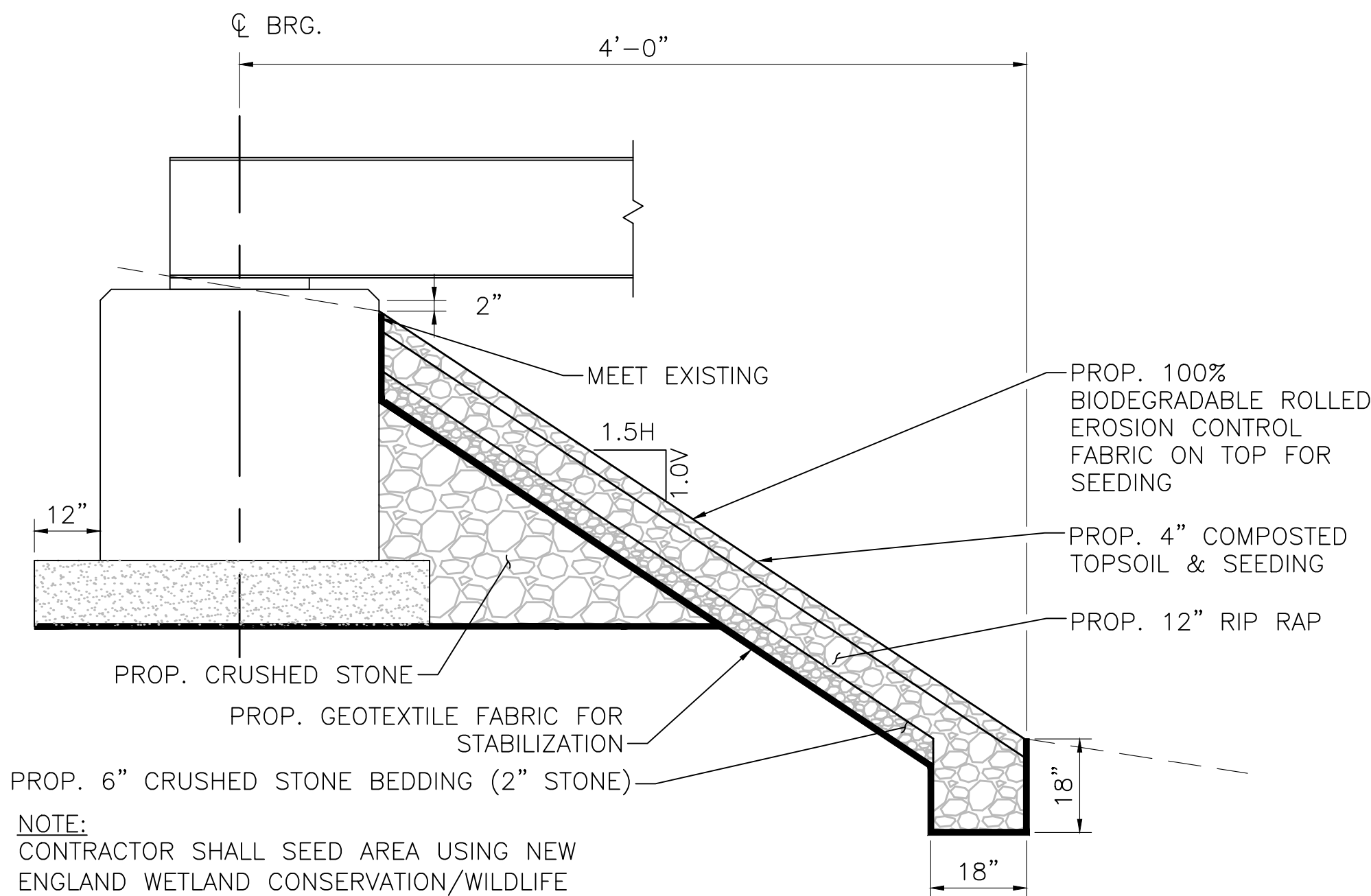
MINIMUM PIPE RESTRAINT LENGTH (IN FEET)*					
PIPE Ø	90° BEND	45° BEND	22.5° BEND	TEES	PLUG/CAP
8"	21.0	9.0	4.0	29.0	38.0
10"	26.0	11.0	5.0	38.0	46.0
12"	33.0	14.0	6.0	48.0	69.0
* BASED ON DUCTILE IRON PIPE WITH A 150 P.S.I. TEST PRESSURE WITH 5.0 FEET OF BURY IN UNIFIED SOIL CLASSIFICATION SM.					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

### THRUST BLOCK - HORIZONTAL BENDS & PIPE RESTRAINT DETAILS

N.T.S.

### THRUST BLOCK DETAILS - VERTICAL BENDS

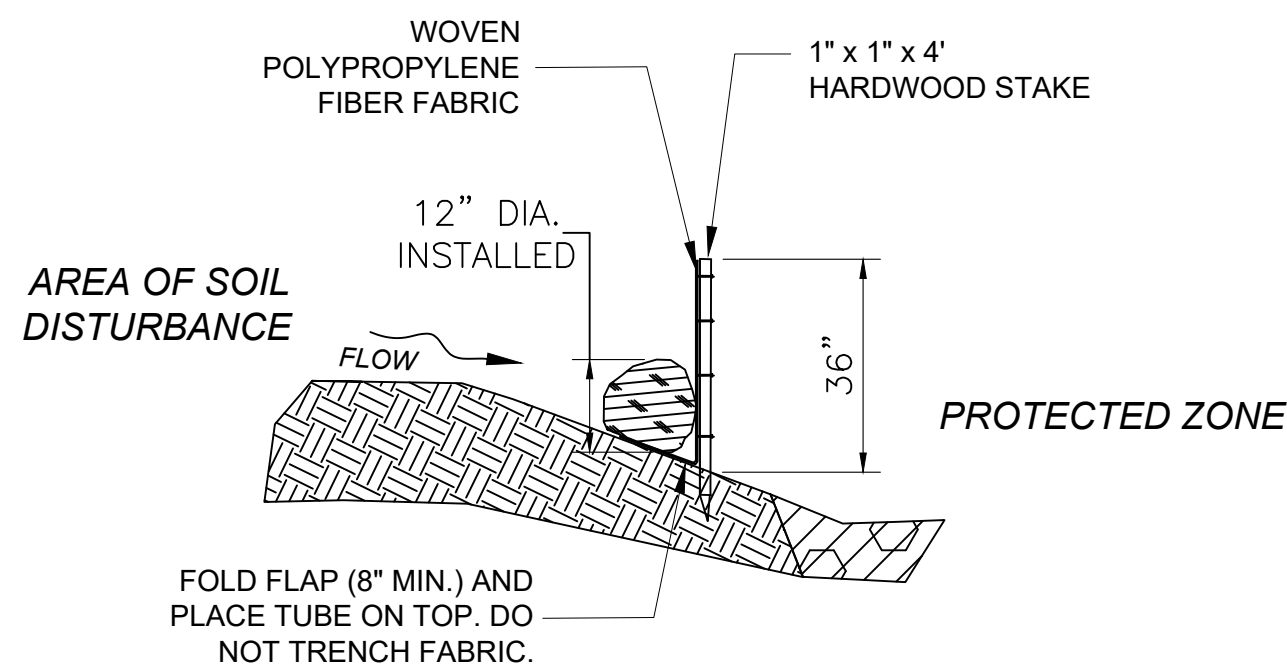
N.T.S.



NOTE:  
CONTRACTOR SHALL SEED AREA USING NEW ENGLAND WETLAND CONSERVATION/WILDLIFE SEED MIX OR APPROVED REPLACEMENT.

### MODIFIED ROCKFILL SLOPE STABILIZATION

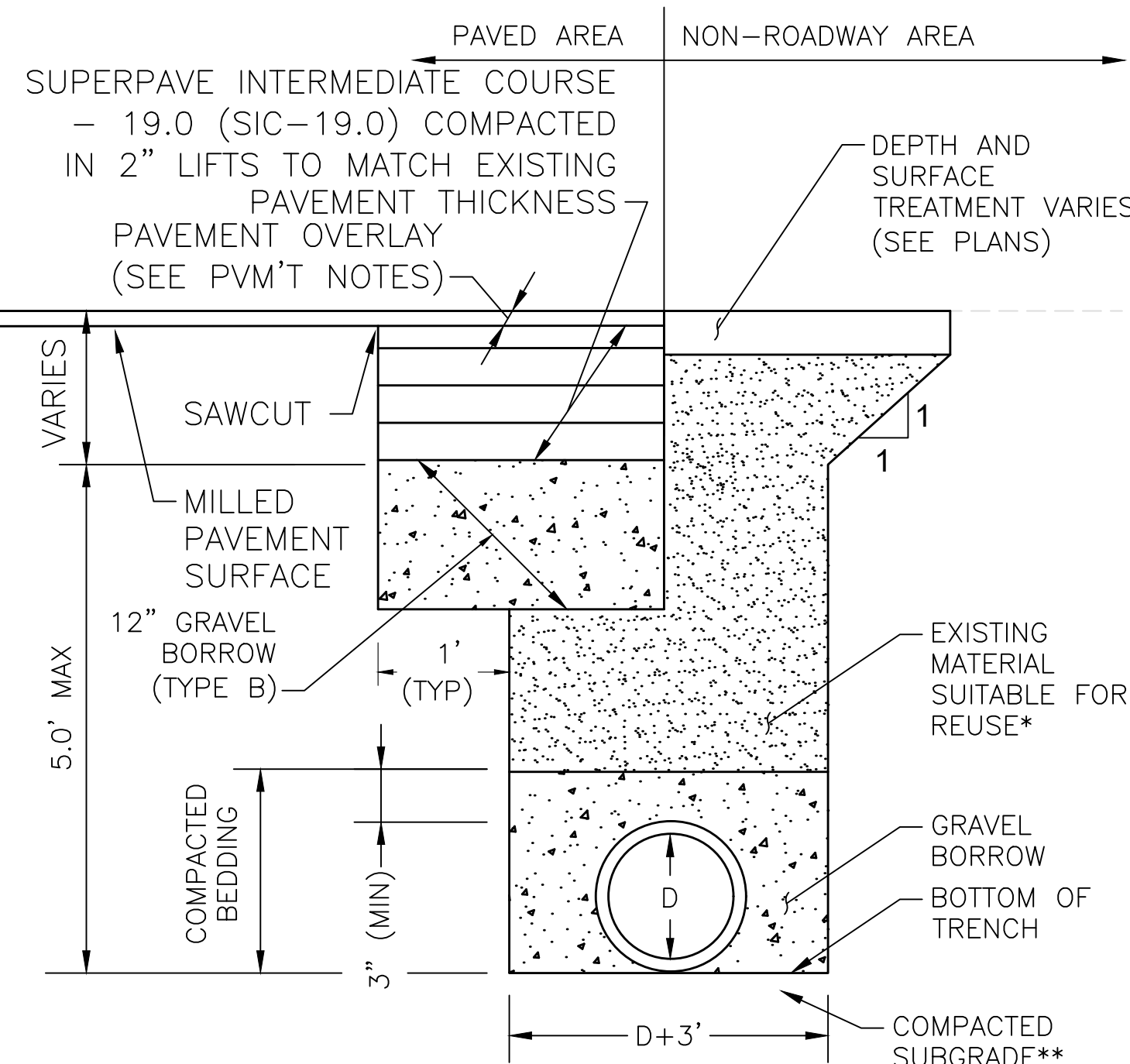
N.T.S.



- NOTES:
- PROVIDE A MINIMUM TUBE DIAMETER OF 12" FOR SLOPES UP TO 50 FEET IN LENGTH WITH A SLOPE RATIO OF 3H:1V OR STEEPER. LONGER SLOPES MAY REQUIRE LARGER TUBE DIAMETERS OR ADDITIONAL COURSING OF FILTER TUBES TO CREATE A FILTER BERM. REFER TO MANUFACTURER'S RECOMMENDATIONS FOR SITUATIONS WITH LONGER OR STEEPER SLOPES.
  - INSTALL TUBES ALONG CONTOURS AND PERPENDICULAR TO FLOW.
  - TUBE LOCATION MAY BE SHIFTED TO ADJUST TO LANDSCAPE FEATURES, BUT SHALL PROTECT UNDISTURBED AREAS AND VEGETATION TO THE MAXIMUM EXTENT POSSIBLE.
  - DO NOT INSTALL IN PERENNIAL, EPHEMERAL, OR INTERMITTENT STREAMS.
  - ADDITIONAL TUBES AND STAKING SHALL BE USED AT THE DIRECTION OF THE ENGINEER.
  - CONTRACTOR TO INSPECT AFTER ALL STORM EVENTS. MAINTENANCE SHALL BE PERFORMED IF <6" OF TUBE IS VISIBLE.

### COMPOST FILTER TUBE & SEDIMENTATION FENCE

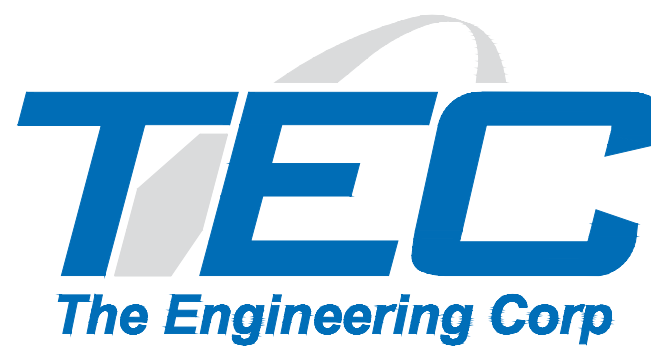
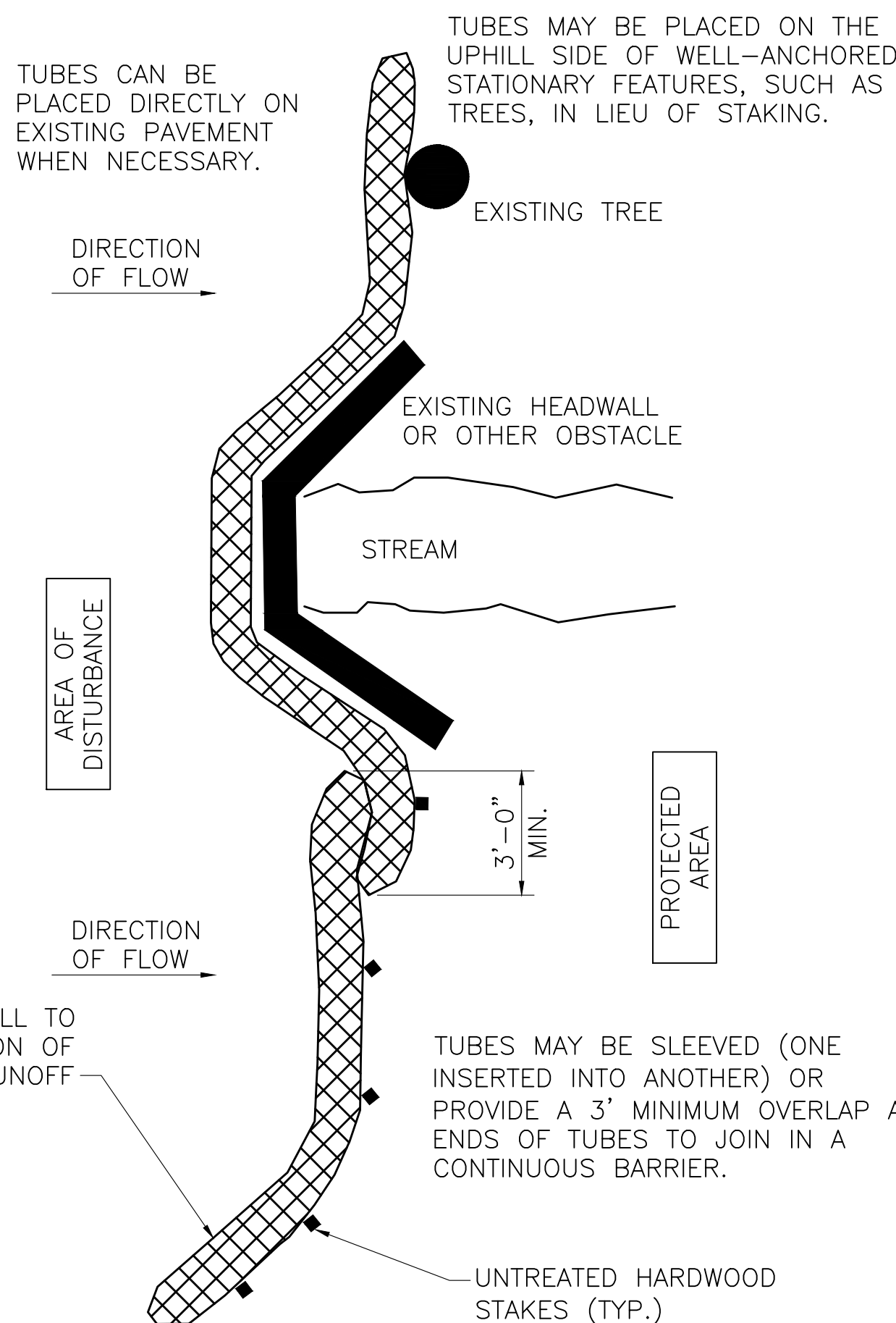
N.T.S.



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

### UTILITY TRENCH

N.T.S.



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DRAWING TITLE

Construction Details

PROJECT NO. T1487  
TEC CAD FILE T1487\_BR02(ConstDetails).dwg  
Phase1  
DRAWING NO. S-2  
SHEET 2 OF 10



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GENERAL NOTES:

DESIGN:

IN ACCORDANCE WITH THE 2020 AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS LRFD BRIDGE DESIGN SPECIFICATIONS. ALL WORK SHALL BE COMPLETED IN ACCORDANCE WITH MASSDOT 2025 STANDARD SPECIFICATIONS FOR HIGHWAYS AND BRIDGES.

EXISTING CONDITIONS:

THE CONTRACTOR SHALL DETERMINE AND ESTABLISH ALL DIMENSIONS AND EXISTING DETAILS NECESSARY FOR THE COMPLETION OF WORK BY FIELD MEASUREMENT AND SURVEY. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE ADEQUACY AND ACCURACY THEREOF AND SHALL NOT ORDER ANY MATERIALS OR COMMENCE ANY FABRICATION UNTIL THE REQUIRED MEASUREMENTS HAVE BEEN MADE ON THE ACTUAL STRUCTURE AND THE EXTENT OF THE PROPOSED WORK HAS BEEN APPROVED BY THE ENGINEER.

SURVEY NOTES:

THE HORIZONTAL DATUM FOR THIS SURVEY IS THE MASSACHUSETTS COORDINATE SYSTEM, NAD 1983, MAINLAND ZONE. THE VERTICAL DATUM FOR THIS SURVEY IS THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88). SAID DATUMS WERE ESTABLISHED VIA GPS OBSERVATIONS UTILIZING NAD83 (NA2011) EPOCH 2010.00 (MYCS2) AND GEOID 18.

ABUTTING PROPERTY LINES HAVE BEEN COMPILED FROM RECORD INFORMATION.

SCALES:

SCALES NOTED ON THE PLANS ARE NOT APPLICABLE TO REDUCED SIZE PRINTS. DIVIDE SCALES BY 2 FOR HALF-SIZE PRINTS (A3).

SHOP DRAWINGS:

THE CONTRACTOR SHALL SUBMIT ALL SHOP DRAWINGS AS REQUIRED BY THE STANDARD SPECIFICATION AND THE LATEST MASSDOT BRIDGE MANUAL. PROPOSED COMPONENTS THAT REQUIRE FIELD MEASUREMENTS SHALL BE DESIGNED, DETAILED, AND SUBMITTED TO THE ENGINEER FOR APPROVAL.

STRUCTURAL STEEL:

- ALL STRUCTURAL STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M270 GRADE 50. ALL STEEL AT OTIS STREET SHALL BE PAINTED ACCORDING TO PROJECT SPECIFICATIONS. ALL STEEL AT SCHOOL STREET SHALL BE METALLIZED ACCORDING TO PROJECT SPECIFICATIONS. IT MUST BE CONSIDERED A MAIN MEMBER AND CONFORM TO THE M270 ZONE T2 ASSHTO V-NOTCH REQUIREMENTS.
- EXISTING STEEL MEMBERS AT OTIS STREET MUST BE CLEANED AND PAINTED AT AREAS OF PROPOSED WORK PRIOR TO INSTALLATION OF CONNECTIONS (SEE SPECIAL PROVISION FOR ITEM 961.2).
- REMOVE ANY OBSTACLES THAT INTERFERE WITH STEEL WORK. THE CONTRACTOR SHALL PROTECT EXISTING UTILITIES DURING STEEL REPAIR OPERATIONS.

CONCRETE:

UNLESS OTHERWISE SPECIFIED, ALL CONCRETE SHALL BE 5000 HP CONCRETE. THE MAXIMUM AGGREGATE SIZE FOR CONCRETE SHALL BE  $\frac{3}{8}$ ".

FOUNDATIONS:

FOUNDATIONS MAY BE ALTERED, IF NECESSARY, TO SUIT CONDITIONS ENCOUNTERED DURING CONSTRUCTION, WITH THE APPROVAL OF THE ENGINEER.

REINFORCEMENT:

REINFORCING STEEL SHALL CONFORM TO THE REQUIREMENTS OF AASHTO M 31 GRADE 60. ALL REINFORCING STEEL SHALL BE EPOXY COATED. UNLESS OTHERWISE NOTED ON THE CONSTRUCTION DRAWINGS, ALL BARS SHALL BE LAPPED AS FOLLOWS:

MODIFICATION CONDITION:	#4 BARS	#5 BARS	#6 BARS
1. NONE	16"	17"	21"
2. 12" OF CONCRETE BELOW BAR	18"	22"	27"
3. EPOXY COATED BARS, COVER < 3DB, OR CLEAR SPACING < 6DB	21"	26"	31"
4. COATED BARS, ALL OTHER CASES	17"	21"	25"
5. CONDITION 2. AND 3.	23"	29"	35"
6. CONDITION 2. AND 4.	21"	27"	32"

ALL OTHER BARS SHALL BE LAPPED AS SHOWN ON THE CONSTRUCTION DRAWINGS.

ANCHOR BOLTS:

ALL ANCHOR BOLTS AT SCHOOL STREET SHALL BE SET BY TEMPLATE BEFORE THE CONCRETE IS PLACED.

UTILITIES:

- THE CONTRACTOR SHALL LOCATE AND PROTECT FROM DAMAGE ALL EXISTING UTILITIES.
- EXISTING OVERHEAD WIRES AND UTILITY POLES ARE TO REMAIN AND ACTIVE THROUGHOUT THE DURATION OF CONSTRUCTION. CONTRACTOR SHALL USE CAUTION WHILE WORKING AROUND THE EXISTING UTILITIES SCHEDULED TO REMAIN. CONTRACTOR SHALL UTILIZE LOW HEIGHT HOISTING EQUIPMENT TO SET THE ELEMENTS IN ORDER TO STAY UNDERNEATH THE EXISTING OVERHEAD WIRES. THIS SHALL BE DESIGNED AND EXPLAINED IN THE CONTRACTOR'S ERECTION PROCEDURE. CONTRACTOR SHALL COORDINATE WITH RESPECTIVE UTILITY OWNERS REGARDING ANY CLEARANCES, DE-ENERGIZING, ETC. THAT MAY NEED TO BE CONSIDERED IN THE CONTRACTORS ERECTION PROCEDURE.

UTILITY NOTES:

- PROPOSED WATER MAIN SHALL BE 8" CEMENT LINED IRON PIPE (CLDIP) UNLESS OTHERWISE NOTED.
- RUBBER GASKET PIPE SHALL BE USED UNDERGROUND AND MECHANICAL JOINTS SHALL BE USED ABOVE GROUND.
- PROPOSED WATER MAIN SHALL MAINTAIN 5' (MAX) OF COVER.
- PROPOSED WATER MAIN SHALL MAINTAIN A MINIMUM OF 6" CLEARANCE BETWEEN EXISTING UTILITIES.
- WATER MAIN SHALL BE TEMPORARILY SERVICED WHILE THE REALIGNMENT OF THE PROPOSED 8" WATER MAIN IS BEING CONSTRUCTED. CONTRACTOR SHALL COORDINATE WITH THE TOWN OF NORTHBOROUGH TO DETERMINE THE METHOD FOR TEMPORARY WATER SERVICE AND LOCATE EXISTING GATE VALVES TO CLOSE DURING CONSTRUCTION OF PROPOSED WATER MAIN.
- ANY EXISTING WATER MAIN PIPE THAT IS DEEMED REUSABLE SHALL BE REMOVED AND STACKED. WATER MAIN THAT IS NOT DEEMED REUSABLE SHALL BE REMOVED AND DISCARDED.

PROPOSED HMA MILL & OVERLAY:

LIMITS: STA 10+15 TO STA 10+55  
STA 11+53 TO STA 11+73

SURFACE: 1½" SUPERPAVE SURFACE COURSE – 12.5 (SSC –12.5) OVER  
1½" PAVEMENT FINE MILLING

PROPOSED PERMANENT PAVEMENT TRENCH PATCH:

SURFACE: 1½" SUPERPAVE SURFACE COURSE – 12.5 (SSC – 12.5) OVER  
1¾" SUPERPAVE INTERMEDIATE COURSE – 19.0 (SIC – 19.0) OVER  
VARIABLE DEPTH (SEE GENERAL PAVEMENT NOTE 5)  
SUPERPAVE INTERMEDIATE COURSE – 19.0 (SIC –19.0) COMPACTED  
IN 2¼" (MIN) AND 3' (MAX) LIFTS OVER

BASE: 8" GRAVEL BORROW, TYPE B OVER

SUBBASE: EXISTING MATERIAL SUITABLE FOR REUSE SUPPLEMENTED WITH  
GRAVEL BORROW AS NECESSARY TO MATCH GRADE.

GENERAL PAVEMENT:

- ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED BETWEEN ALL ASPHALT SURFACES AND SAWCUT JOINTS BEFORE PAVING. HMA JOINT ADHESIVE SHALL BE APPLIED TO ALL COLD JOINTS (LONGITUDINAL AND TRANSVERSE) BEFORE PAVING SURFACE COURSE. ASPHALT EMULSION FOR TACK COAT SHALL BE APPLIED AT A RATE CONSISTENT WITH MASSDOT STANDARD SPECIFICATION 460.43.G.2. ALL SURFACES SHALL BE CLEAN OF ALL ORGANICS, DEBRIS, AND SAND PRIOR TO PAVING.
- ALL HMA SHALL BE IN ACCORDANCE WITH SECTION 460.
- ASPHALT EMULSION FOR TACK COAT SHALL BE RS-1H TO RESIST TRACKING OF TACK BY HAUL VEHICLES.
- ALL GRAVEL BORROW MEETING SPECIFICATION, AS DETERMINED BY THE ENGINEER, SHALL BE RETAINED IN PLACE, COMPACTED, AND LEVELED AS REQUIRED.
- TOTAL DEPTH OF PROPOSED PAVEMENT IN TRENCH PATCH SHALL BE 6¾" OR SHALL MATCH THE EXISTING PAVEMENT DEPTH, WHICHEVER DEPTH IS DEEPER.



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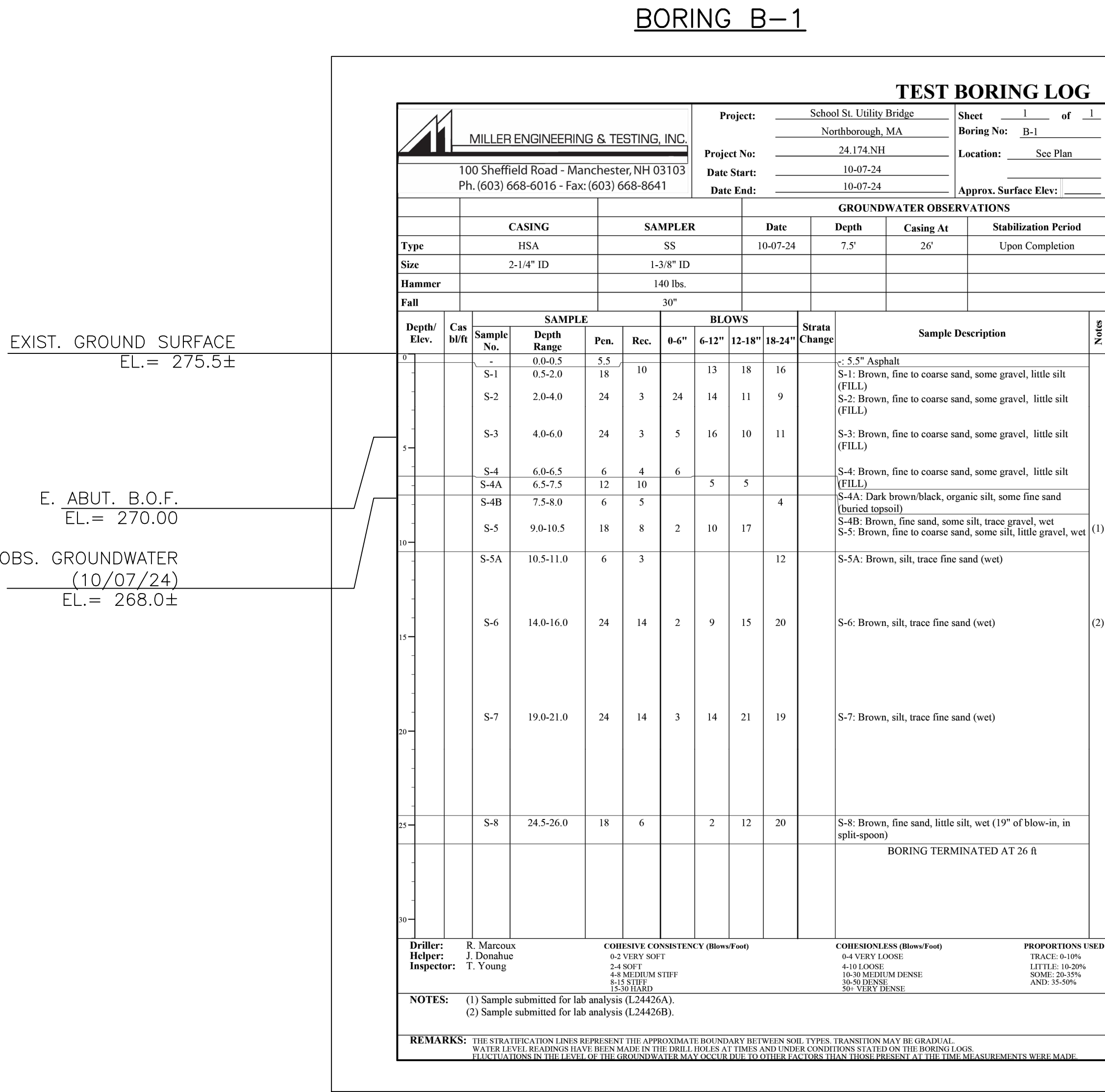
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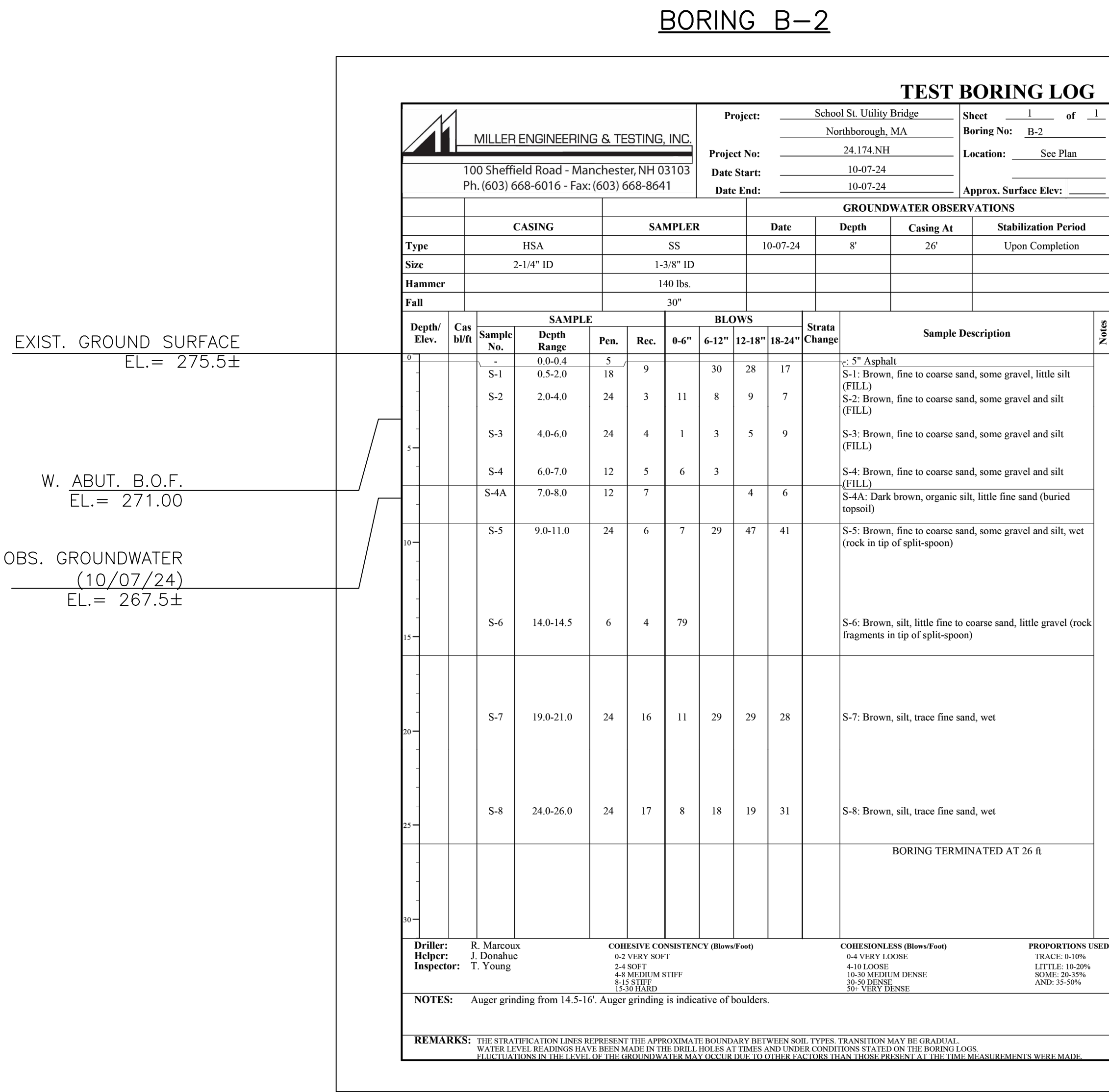
Charles M. Riccardi

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T1487  
TEC CAD FILE  
T1487\_BR03(GenNotes).dwg  
Phase1  
DRAWING NO.  
**S-3**  
SHEET 3 OF 10



BORING NOTES:

- LOCATION OF BORINGS SHOWN ON THE PLAN THUS:
- BORINGS ARE TAKEN FOR PURPOSE OF DESIGN AND SHOW CONDITIONS AT BORING POINTS ONLY, BUT DO NOT NECESSARILY SHOW THE NATURE OF THE MATERIALS TO BE ENCOUNTERED DURING CONSTRUCTION.
- WATER LEVELS SHOWN ON THE BORING LOGS WERE OBSERVED AT THE TIME OF TAKING BORINGS AND DO NOT NECESSARILY SHOW THE TRUE GROUND WATER LEVEL.
- FIGURES IN COLUMNS INDICATE NUMBER OF BLOWS REQUIRED TO DRIVE A 1-3/8" O.D., 24 INCH LONG, SPLIT SPOON SAMPLER IN 6" INTERVALS USING A 140 POUND WEIGHT FALLING 30".
- BORING SAMPLES ARE STORED AT MILLER ENGINEERING & TESTING (100 SHEFFILED ROAD) IN MANCHESTER, NH. THE CONTRACTOR MAY EXAMINE THE SOIL AND ROCK SAMPLES BY CONTACTING THE ENGINEERING CORP AT 282 MERRIMACK STREET, LAWRENCE, MA.
- ALL BORINGS WERE MADE ON OCTOBER 07, 2024 BY MILLER ENGINEERING & TESTING INC.
- THE NORTH AMERICAN VERTICAL DATUM (NAVD) OF 1988 IS USED THROUGHOUT.



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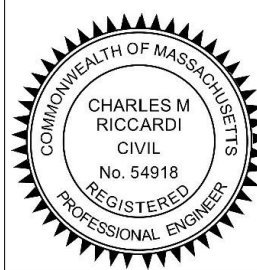
Northborough  
Utility Bridges

PROJECT LOCATION

Northborough, MA

DRAWING TITLE

School Street  
Boring Logs



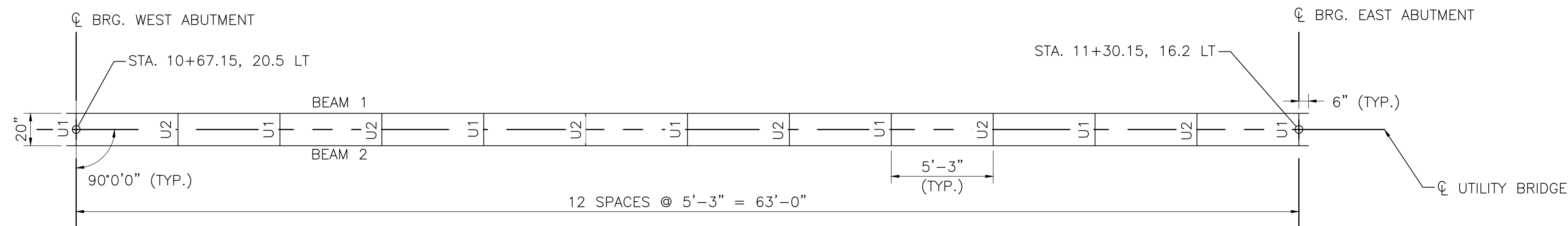
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Phase1  
DRAWING NO. S-4  
SHEET 4 OF 10

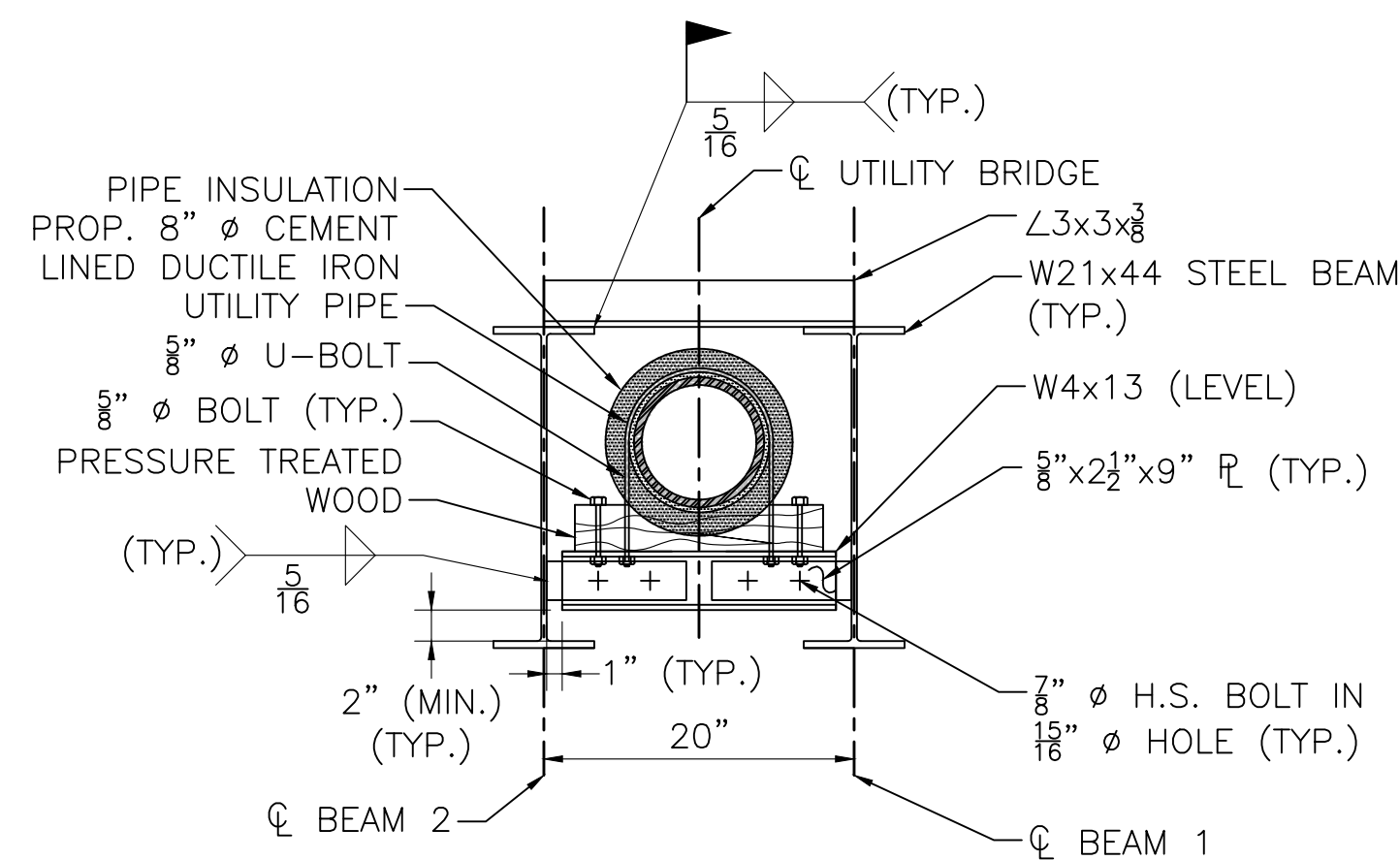




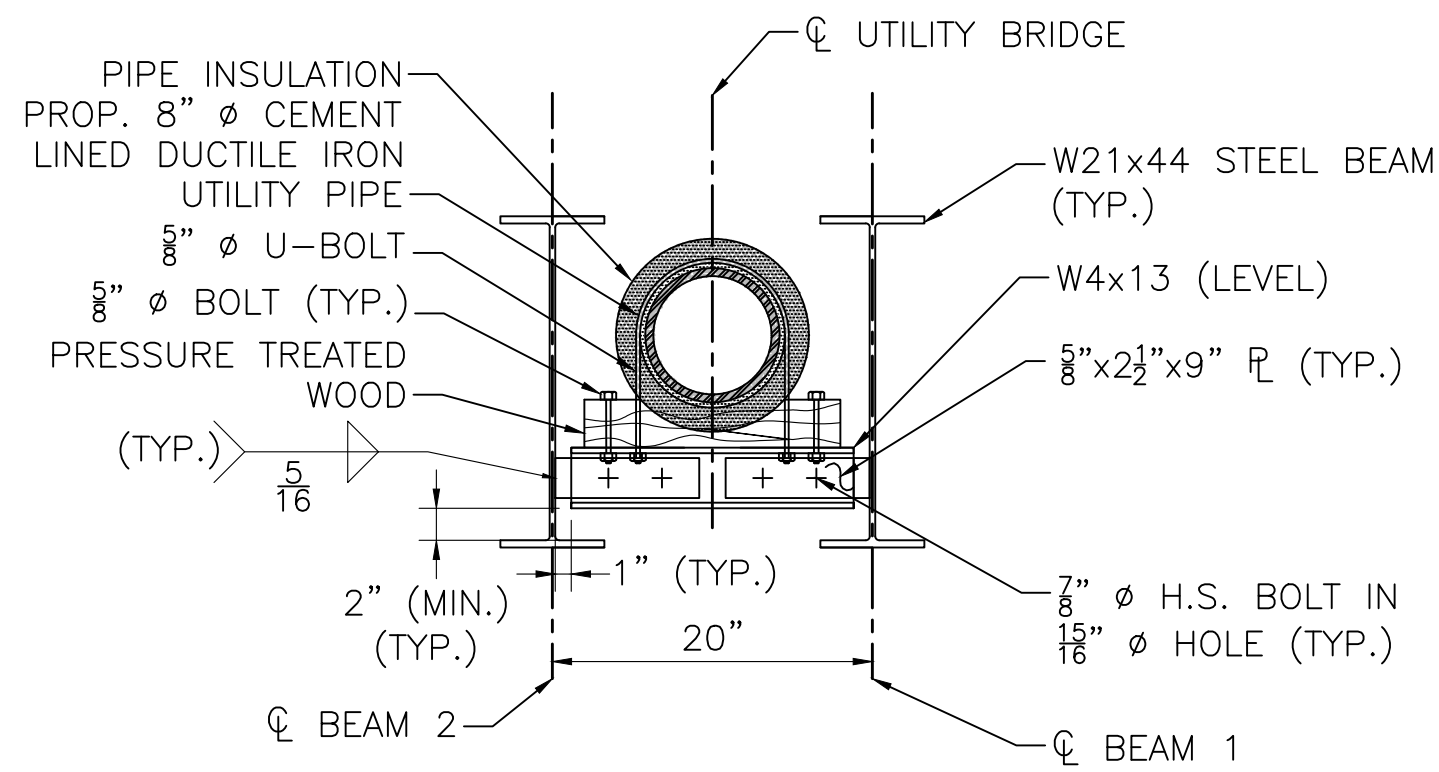




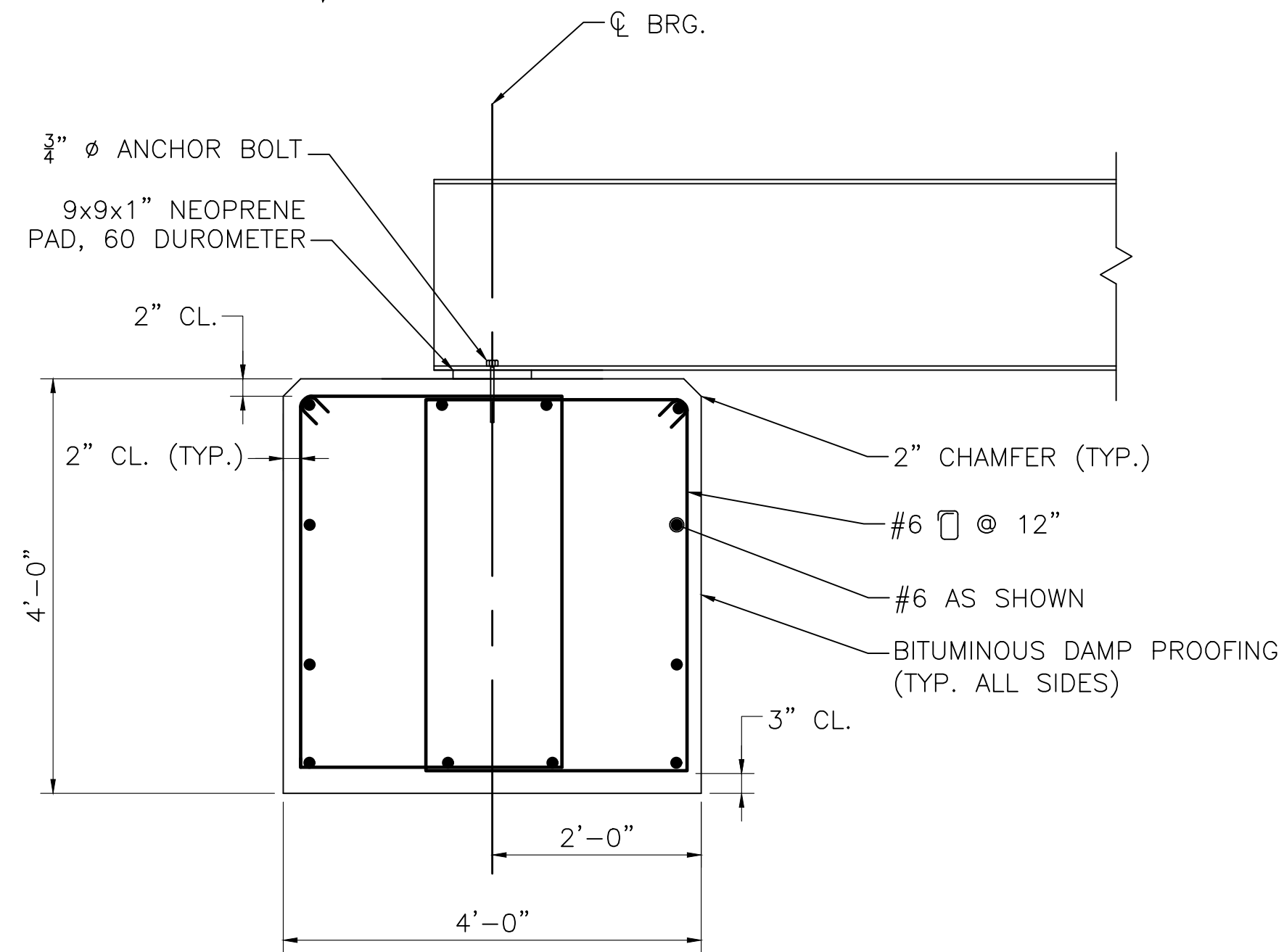
**FRAMING PLAN**  
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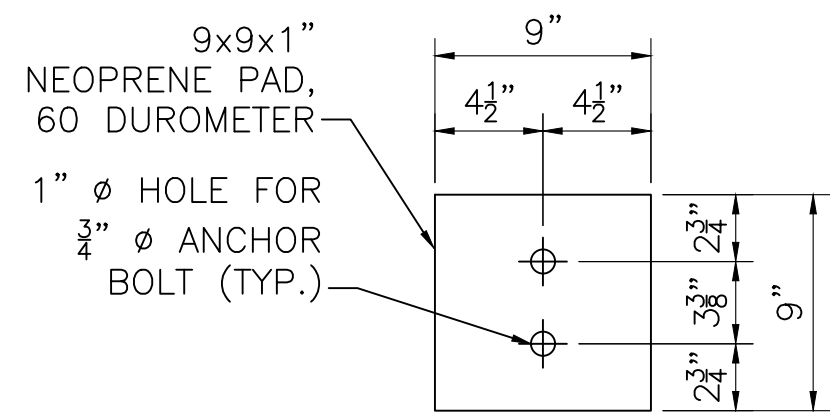
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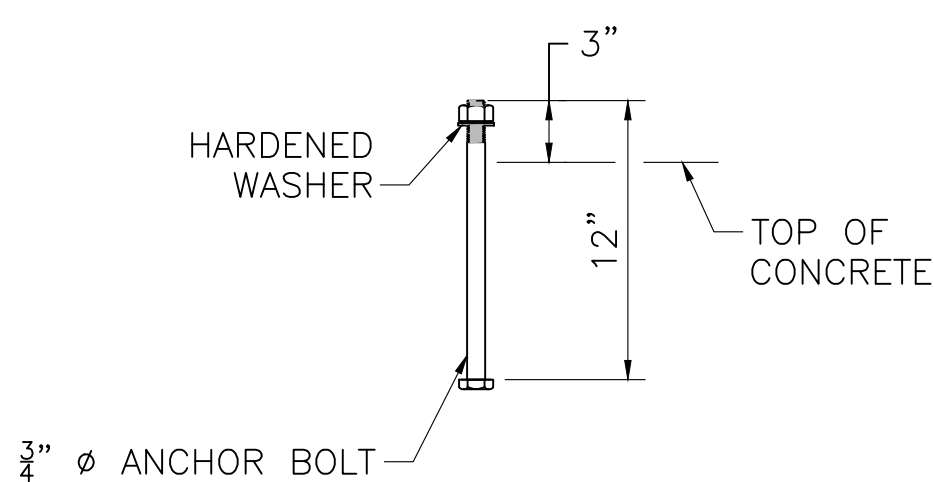
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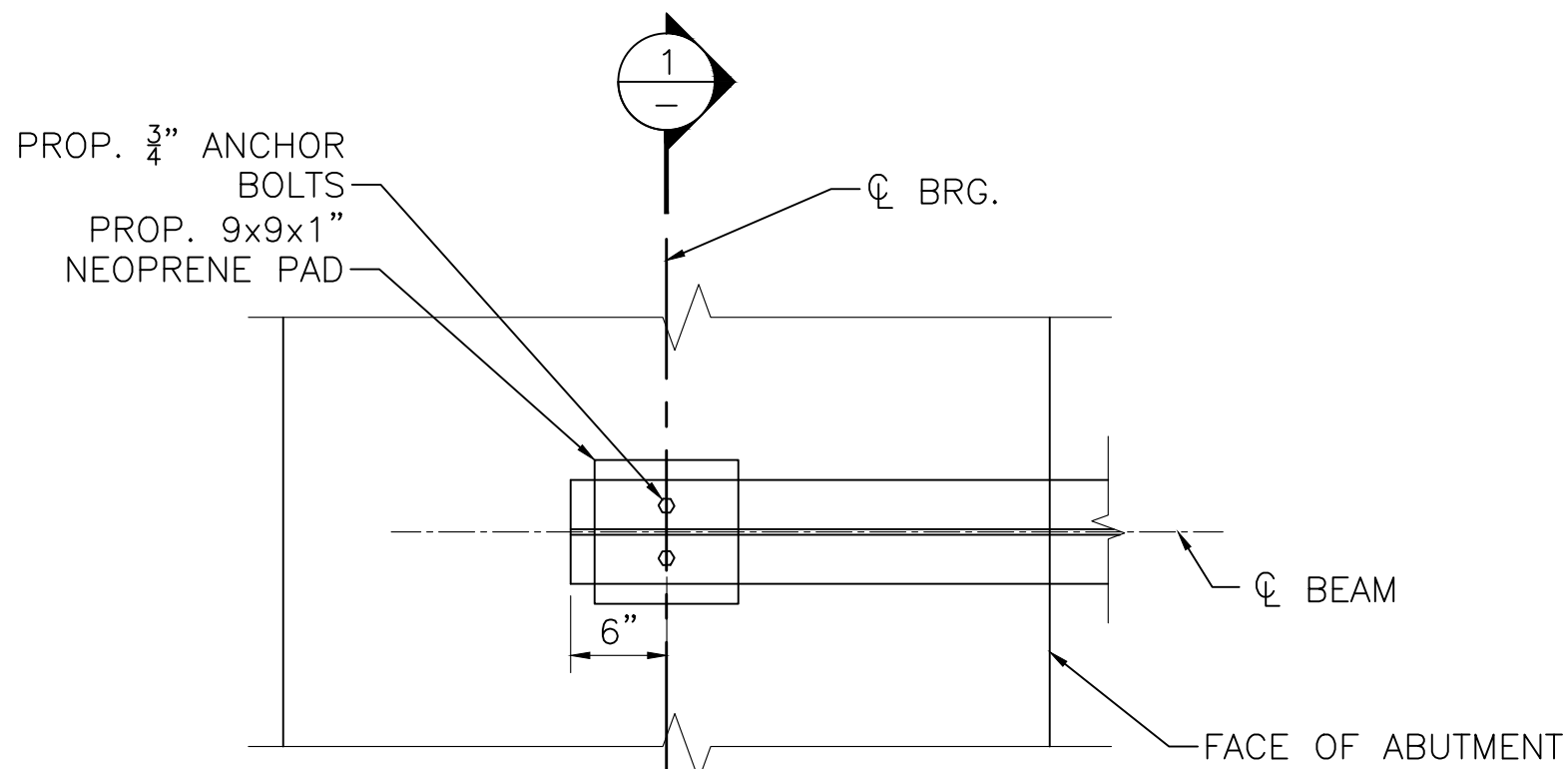
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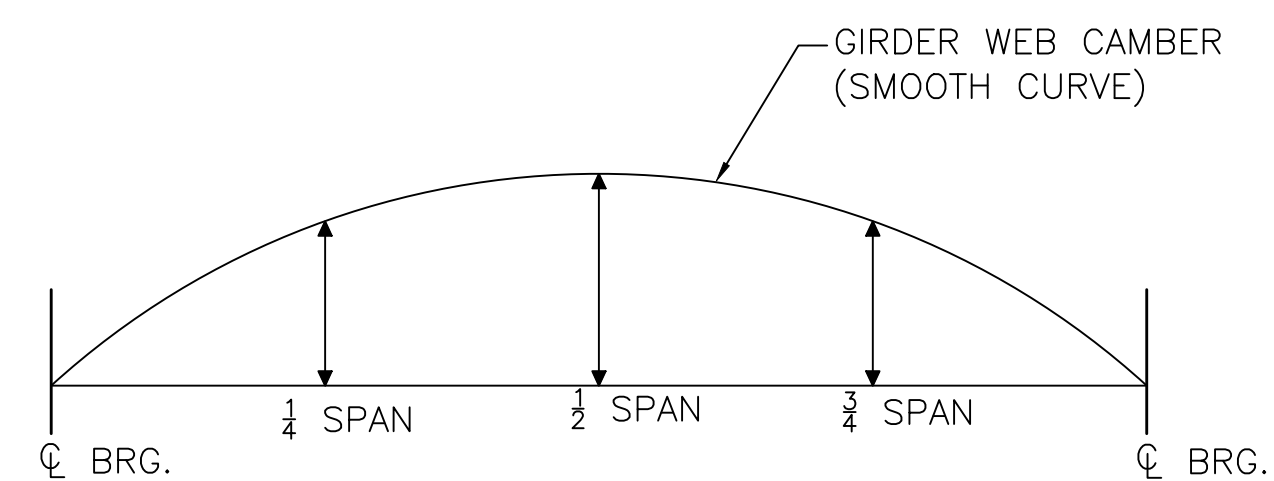
**NEOPRENE PAD**  
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**ANCHOR BOLT**  
SCALE:  $\frac{3}{4}" = 1'-0"$

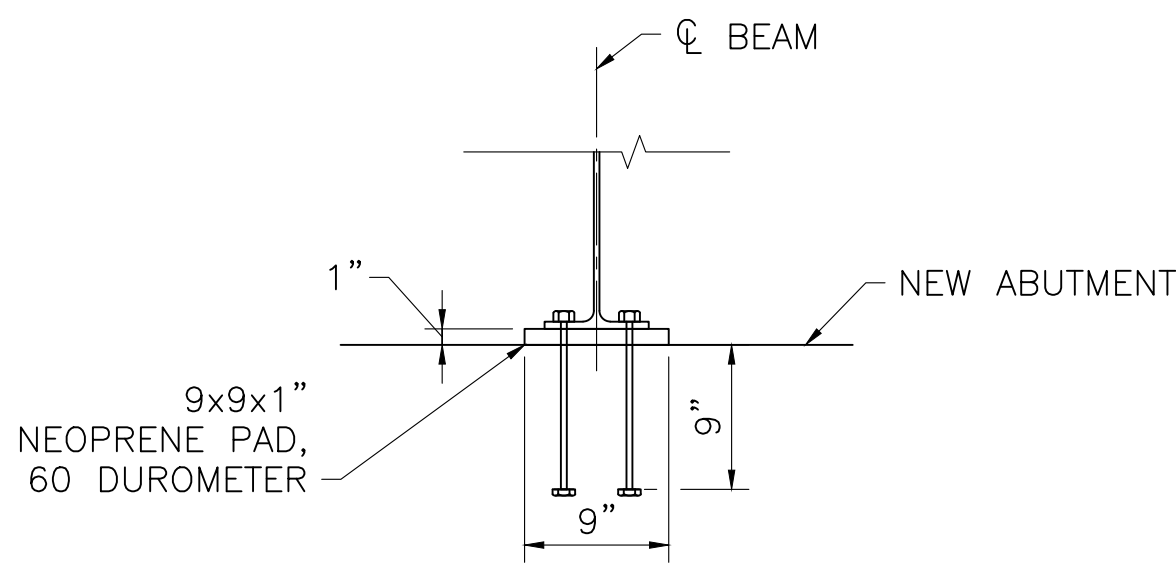


**BEARING ASSEMBLY PLAN**  
SCALE: 1" = 1'-0"



CAMBER TABLE				
LOCATION	1/4 SPAN	1/2 SPAN	3/4 SPAN	
CAMBER (INCHES)	0.81	1.14	0.81	

- NOTES:**
- FABRICATE GIRDER WEB TO CURVE SHOWN WHEN PERFORMING FABRICATION IN A NO-LOAD CONDITION. CAMBER VALUES ARE MEASURED UPWARDS FROM REFERENCE LINE.
  - THE UTILITY SUPPORT BEAMS SHALL BE CAMBERED FOR FINAL DEAD-LOAD DEFLECTION. CAMBERING SHALL ACCOUNT FOR SELF-WEIGHT, PIPE WEIGHT, WATER WEIGHT AND ALL PERMANENT UTILITY COMPONENTS. THE RESULTING CAMBER SHALL NOT EXCEED THE ALLOWABLE VERTICAL DEFLECTION OR CURVATURE PERMITTED BY THE PIPE MANUFACTURER. UTILITY SUPPORTS SHALL ACCOMMODATE INITIAL UPWARD CAMBER, FABRICATION TOLERANCES, AND THERMAL MOVEMENT. THE FINAL INSTALLED CONFIGURATION SHALL NOT EXCEED THE MAXIMUM ALLOWABLE DEFLECTION INDICATED BY THE PIPE MANUFACTURER AND ACCEPTED STANDARDS.



**SECTION 1**  
SCALE: 1" = 1'-0"

DESIGNED BY	SWM
DRAWN BY	SWM
CHECKED BY	CMR
DATE	12/30/2025
SCALE	AS SHOWN

PREPARED FOR

Town of Northborough  
63 Main Street  
Northborough, MA, 01532

REVISIONS

ISSUED FOR

**Final Plans**

PROJECT TITLE

**Northborough  
Utility Bridges**

PROJECT LOCATION

**Northborough, MA**

DRAWING TITLE

**School Street  
Details**



*Chl Ric*

PROJECT NO.  
T1487

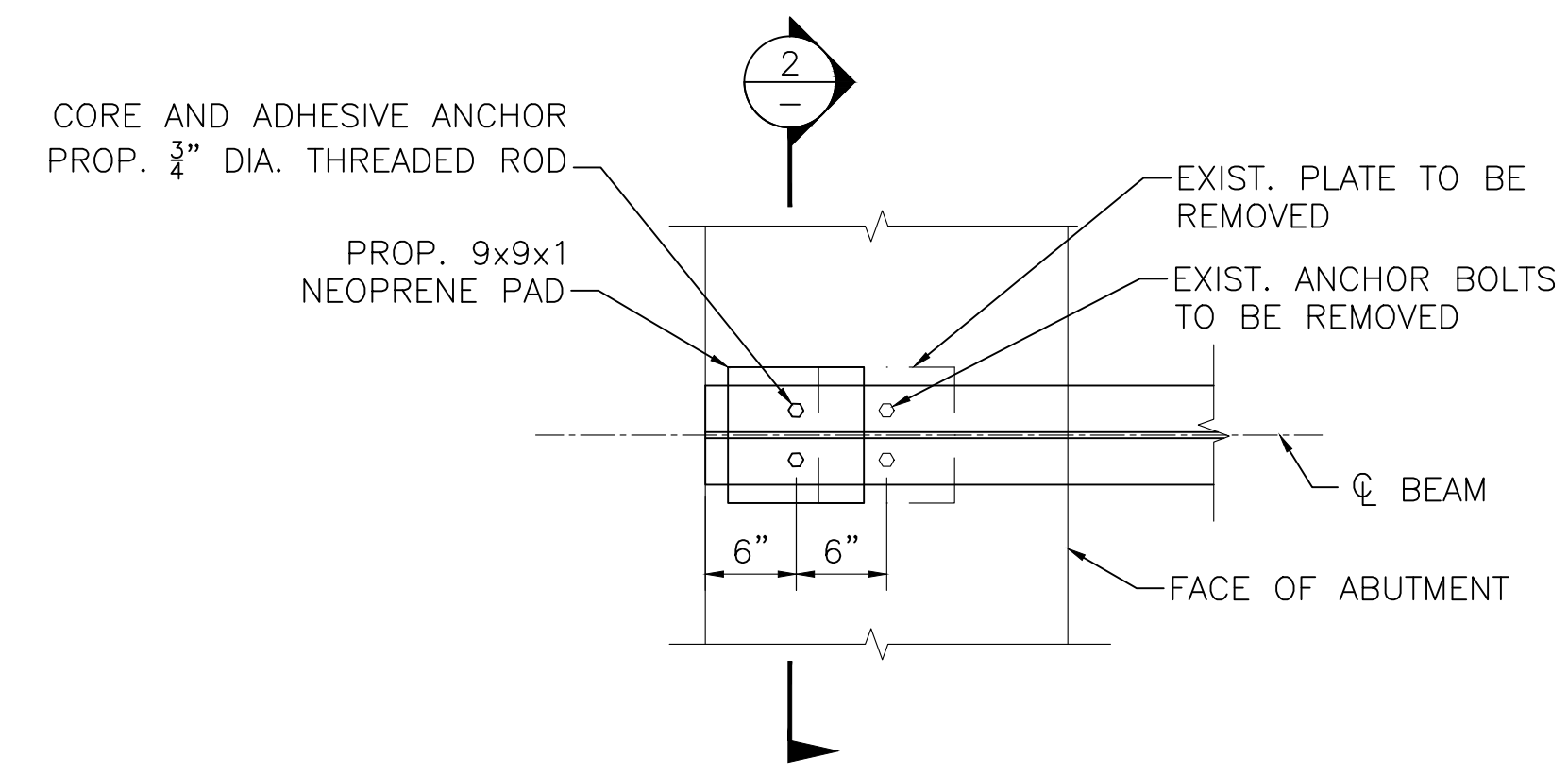
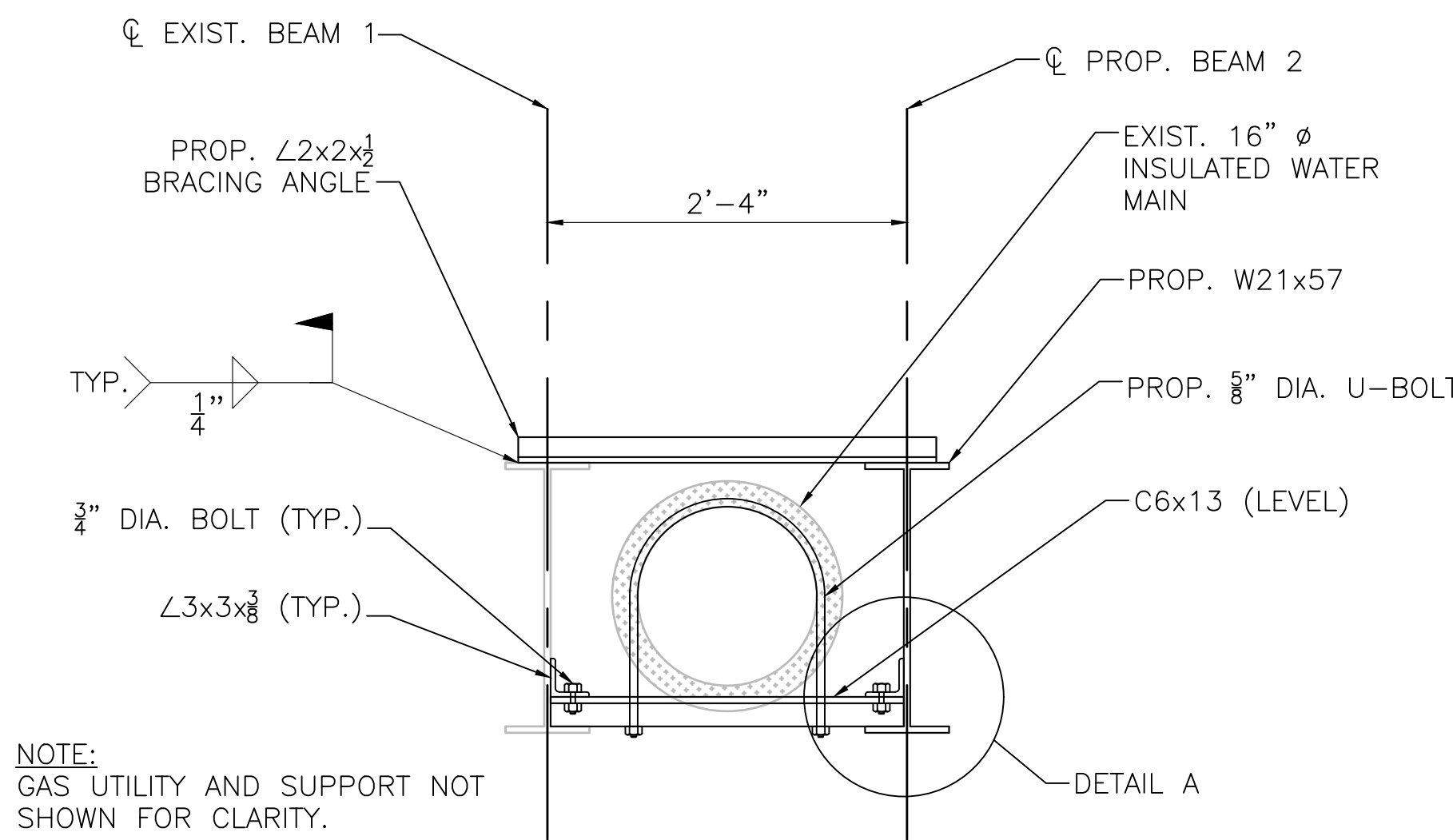
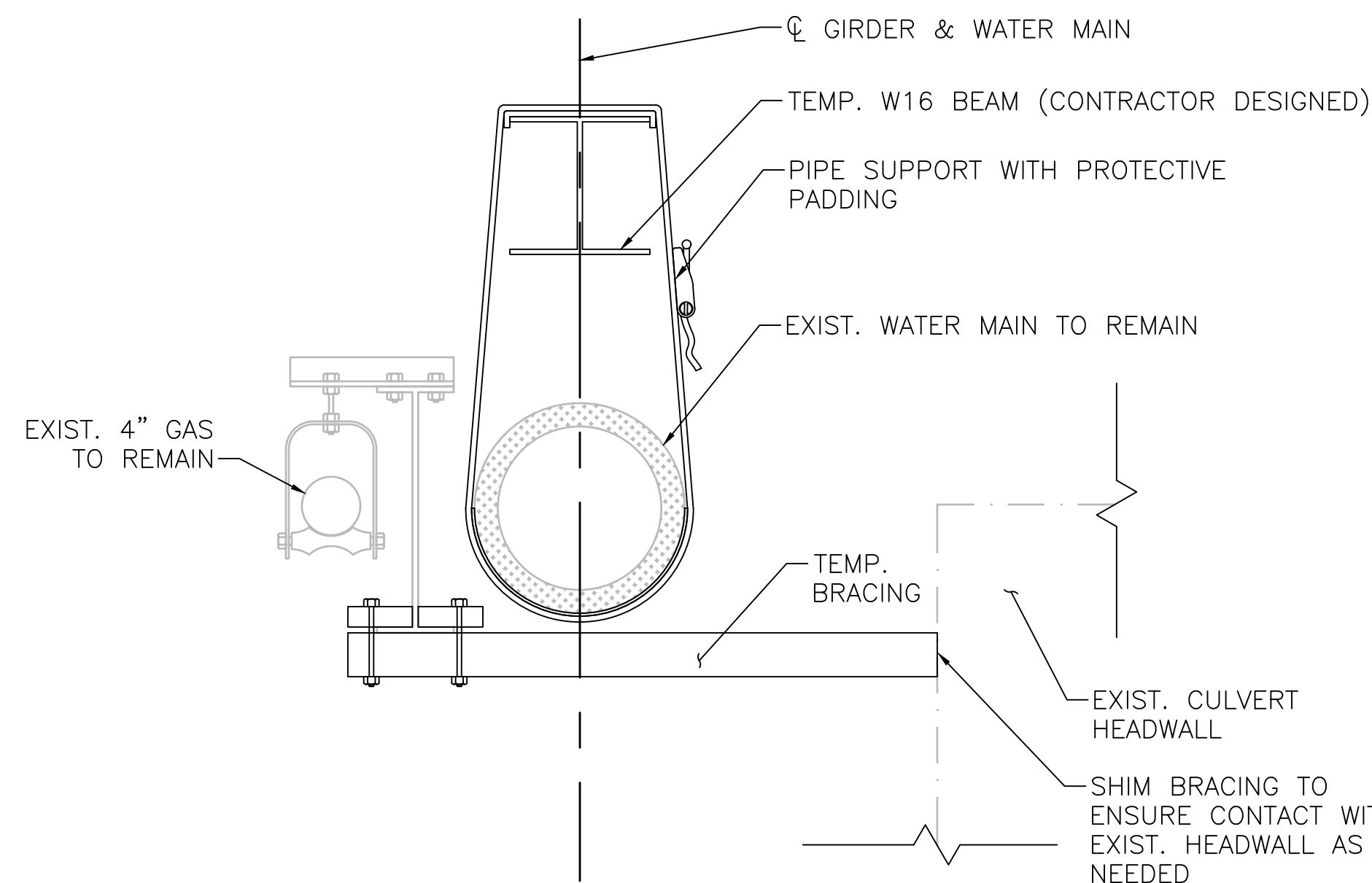
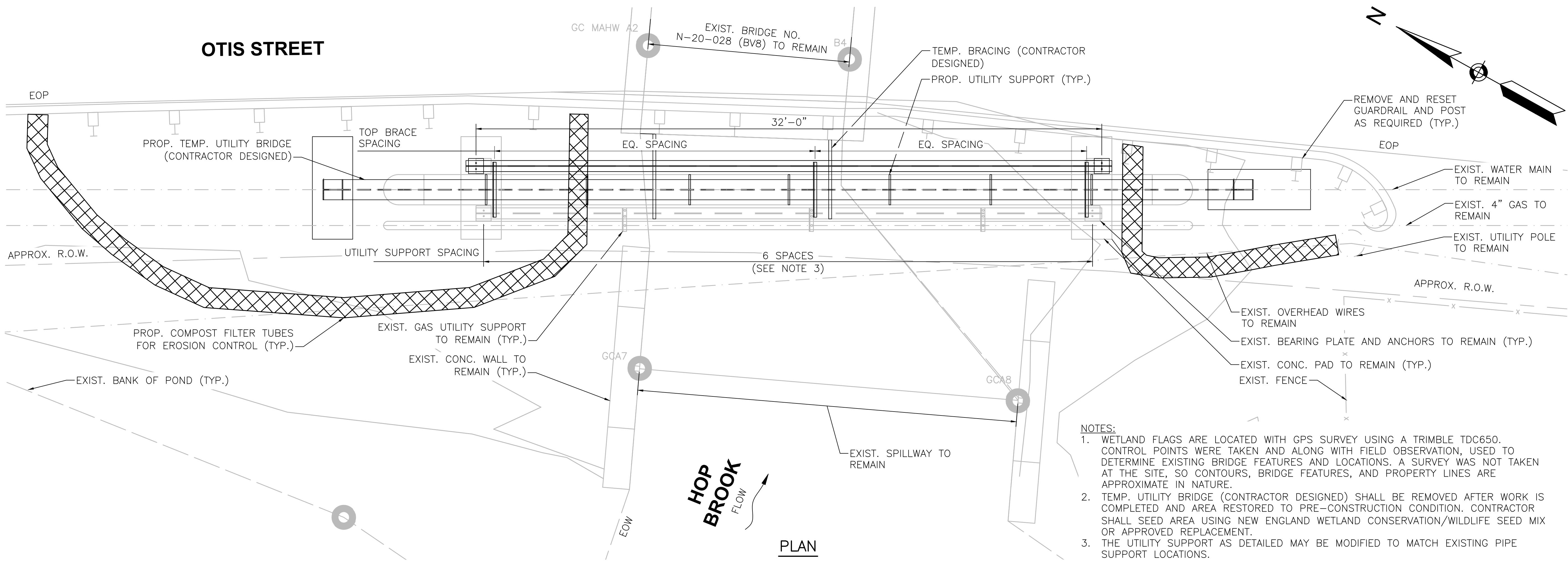
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Phase1

DRAWING NO.

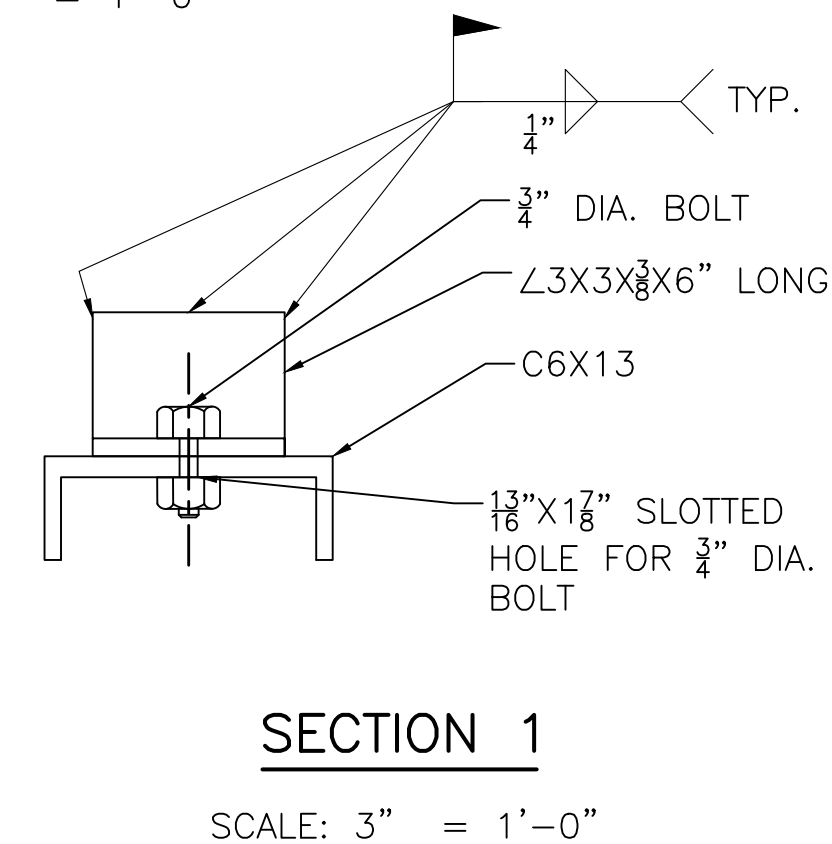
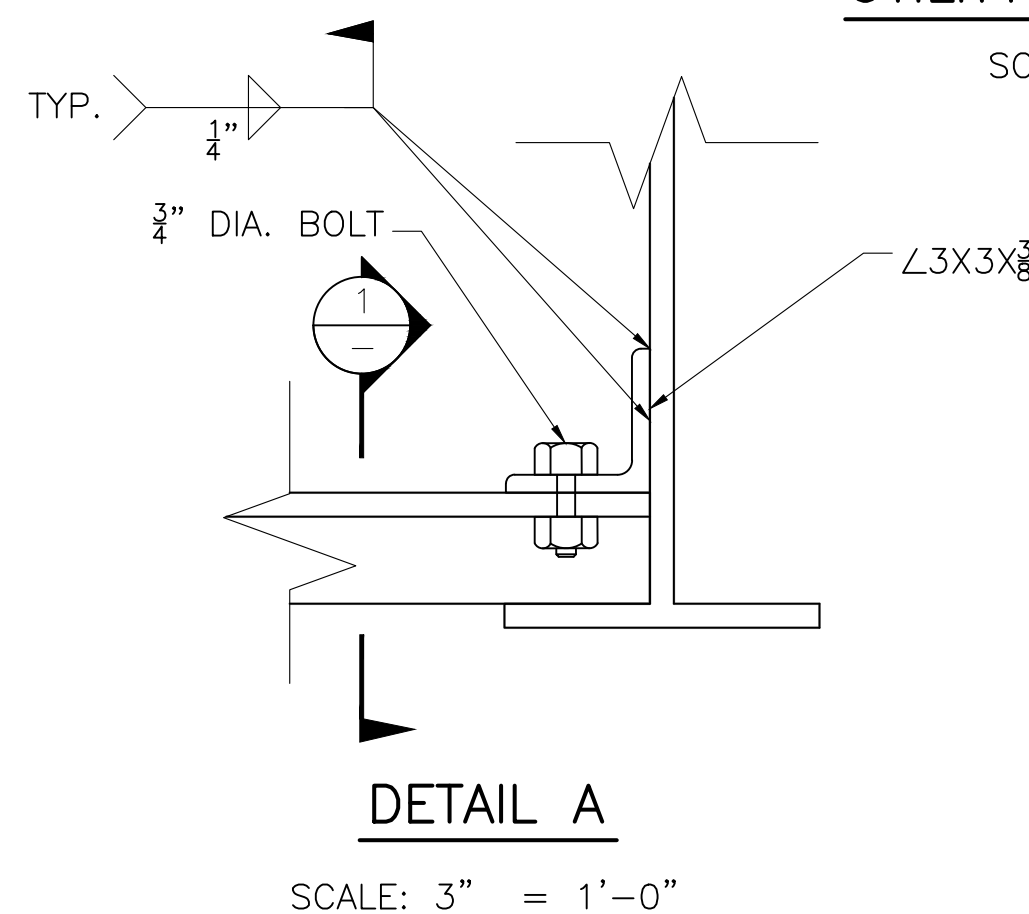
**S-6**

SHEET 6 OF 10

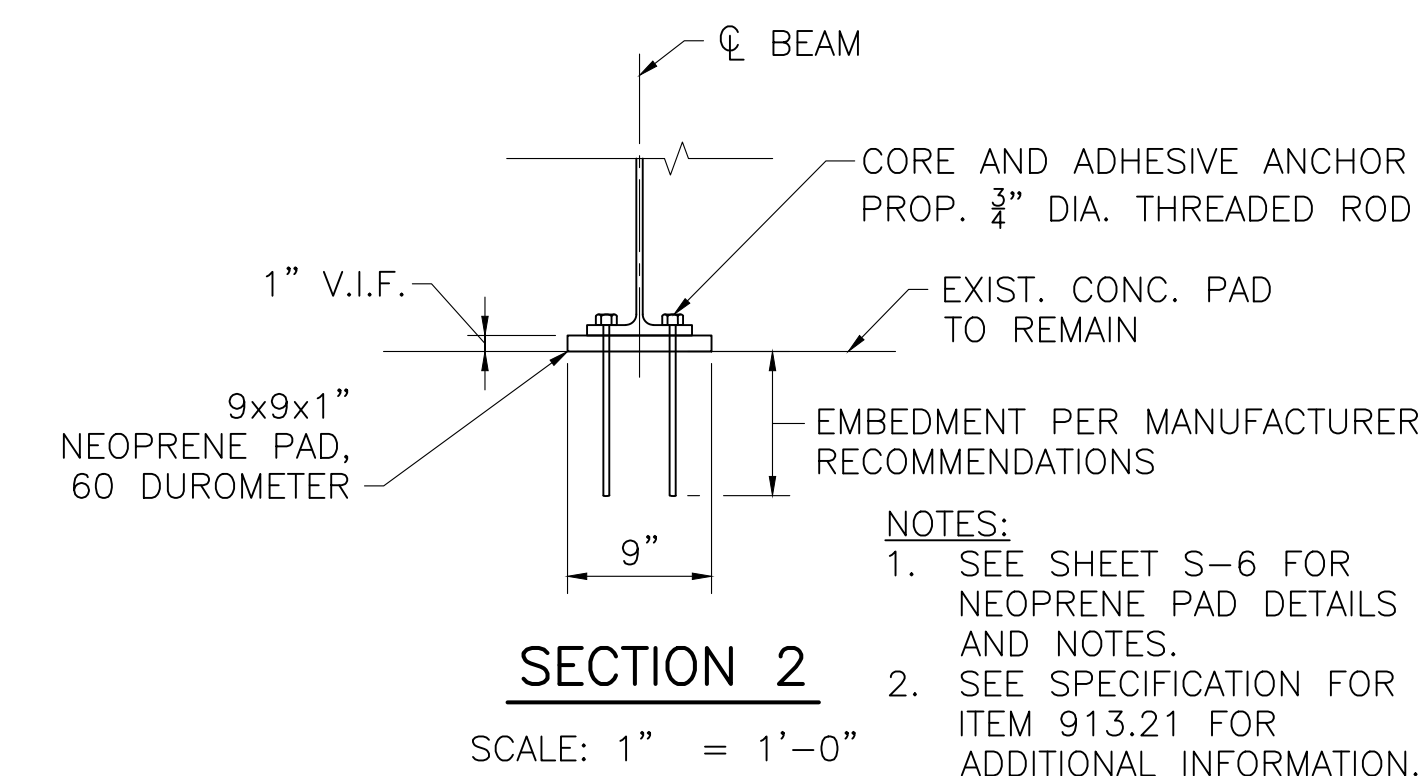




- NOTES:
1. DETAIL IS CONCEPTUAL ONLY. ALL BRIDGE ELEMENTS (SUPERSTRUCTURE AND SUBSTRUCTURE) FOR THE TEMPORARY UTILITY BRIDGE SHALL BE RESPONSIBILITY OF THE CONTRACTOR. THE DESIGN SHALL ENSURE THAT THE EXISTING STEEL GIRDER TO REMAIN IS BRACED TO PREVENT MISALIGNMENT.
  2. THE TEMPORARY UTILITY BRIDGE SHALL BE LOCATED WITHIN THE EXISTING R.O.W.
  3. SEE ITEM 992.31 FOR STIPULATED REQUIREMENTS.
  4. TEMPORARY BRACING MAY BE CLAMPED TO BOTTOM FLANGE BUT SHALL NOT BE WELDED OR BOLTED TO EXISTING BEAM.
  5. TEMPORARY BRACING SPACING SHALL NOT EXCEED 10 FEET.



- NOTE:
- AT CONTRACTOR'S OPTION, A BOLTED ANGLE CONNECTION MAY BE SUBSTITUTED FOR THE WELDED CONNECTION OF THE ANGLE TO THE EXISTING AND PROPOSED BEAMS. CONTRACTOR TO SUBMIT ALTERNATIVE DETAIL PRIOR TO FABRICATION.



- NOTES:
1. SEE SHEET S-6 FOR NEOPRENE PAD DETAILS AND NOTES.
  2. SEE SPECIFICATION FOR ITEM 913.21 FOR ADDITIONAL INFORMATION.



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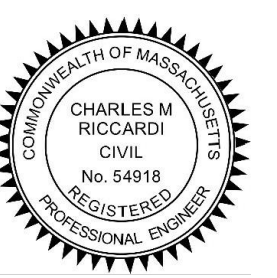
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**Final Plans**

PROJECT TITLE  
**Northborough  
Utility Bridges**

PROJECT LOCATION  
**Northborough, MA**

DRAWING TITLE  
**Otis Street  
Plan &  
Details**

PROJECT NO. T1487  
TEC CAD FILE T1487\_BR07(OSPlans).dwg  
Phase1  
DRAWING NO. S-7  
SHEET 7 OF 10



cll m.



TEMPORARY TRAFFIC CONTROL NOTES:

- TEMPORARY TRAFFIC CONTROL LAYOUTS ARE AN ASSUMPTION BASED ON THE NOTED SCOPE OF WORK BUT ADDITIONAL OR SLIGHTLY MODIFIED SET-UPS MAY BE USED BY THE CONTRACTOR WITH CONSULTATION FROM MASSDOT, THE TOWN OF NORTHBOROUGH, AND THE ENGINEER.
- ALL TEMPORARY TRAFFIC CONTROL WORK SHALL CONFORM TO THE LATEST EDITION OF THE "MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES" (MUTCD) AND ALL REVISIONS, UNLESS SUPERCEDED BY THESE PLANS.
- ALL SIGN LEGENDS, BORDERS, AND MOUNTING SHALL BE IN ACCORDANCE WITH THE MUTCD. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS AT THE DISCRETION OF THE CONTRACTOR.
- TEMPORARY CONSTRUCTION SIGNING AND ALL OTHER TRAFFIC CONTROL DEVICES SHALL BE IN PLACE PRIOR TO THE START OF ANY WORK. ALL SIGNS SHALL BE MOUNTED ON THEIR OWN STANDARD SIGN SUPPORTS.
- TEMPORARY CONSTRUCTION SIGNING, BARRICADES, AND ALL OTHER NECESSARY WORK ZONE TRAFFIC CONTROL DEVICES SHALL BE REMOVED FROM THE HIGHWAY OR COVERED WHEN THEY ARE NOT REQUIRED FOR CONTROL OF TRAFFIC.
- SIGNS AND SIGN SUPPORTS LOCATED ON OR NEAR THE TRAVELED WAY, CHANNELIZING DEVICES, BARRIERS, AND CRASH ATTENUATORS MUST PASS THE CRITERIA SET FORTH IN NCHRP 350, "RECOMMENDED PROCEDURES FOR THE SAFETY PERFORMANCE EVALUATION OF HIGHWAY FEATURES" AND/OR THE "MANUAL FOR ASSESSING SAFETY HARDWARE" (MASH).
- THE FIRST TEN (10) PLASTIC DRUMS OF A TAPER SHALL BE MOUNTED WITH SEQUENTIAL FLASHING LIGHTS.
- THE ADVISORY SPEED LIMIT, IF REQUIRED, SHALL BE DETERMINED BY THE ENGINEER IN CONSULTATION WITH MASSDOT.
- DISTANCES ARE A GUIDE AND MAY BE ADJUSTED IN THE FIELD BY THE ENGINEER.
- ALL DRUMS AND/OR CONES ALONG THE INTERSTATE ROADWAYS SHALL BE SET AT 20" O.C. MAXIMUM UNLESS OTHERWISE NOTED OR ADJUSTED BY THE ENGINEER.
- MINIMUM LANE WIDTH IS TO BE ELEVEN (11) FEET UNLESS OTHERWISE SHOWN ON THE PLANS.
- THE CONTRACTOR SHALL BE RESPONSIBLE TO REPLACE ALL PAVEMENT MARKINGS WITHIN THE OUTSIDE LIMITS OF EACH BRIDGE, FOLLOWING THE COMPLETION OF WORK.

TEMPORARY TRAFFIC CONTROL PHASING:

BRIDGE NO. N-20-012  
- SCHOOL STREET OVER ASSABET RIVER, SHOULDER CLOSURE

BRIDGE NO. N-20-028  
- OTIS STREET OVER HOP BROOK, LANE CLOSURE

TAPER LENGTH CRITERIA FOR TEMPORARY TRAFFIC CONTROL ZONES

TAPER TYPE	TAPER LENGTH
MERGING TAPER	AT LEAST L
SHIFTING TAPER	AT LEAST 0.5L
SHOULDER TAPER	AT LEAST 0.33L
ONE-LANE, TWO-WAY TRAFFIC TAPER	50 FEET MIN, 100 FEET MAX
DOWNSTREAM TAPER	50 FEET MIN., 100 FEET MAX (PER LANE)
TANGENT LENGTH	AT LEAST 2L

SPEED LIMIT	TAPER LENGTH (L) FEET
40 MPH OR LESS	$L = WS^2/60$
45 MPH OR GREATER	$L = WS$

WHERE: L = TAPER LENGTH IN FEET  
W = WIDTH OF OFFSET IN FEET  
S = POSTED SPEED LIMIT, OR  
OFF-PEAK 85TH-PERCENTILE  
SPEED PRIOR TO WORK  
STARTING, OR THE  
ANTICIPATED OPERATING  
SPEED IN MPH

BUFFER SPACING

SPEED (MPH)	DISTANCE (FEET)
20	115
25	155
30	200
35	250
40	305
45	360
50	425
55	495
60	570
65	645
70	730
75	820

BUFFER SPACING NOTES:

- SPEED NOTED EQUALED TO POSTED SPEED, OFF-PEAK 85TH PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED.

TTC CONSTRUCTION STANDARD DETAILS		
DRAWING NUMBER	TITLE	VERSION
851.1.1	CONES & DRUMS	JAN 2025
852.4.4	ALTERNATING ONE-WAY (TRAFFIC OFFICER)	JAN 2025

NOTES:  
1. SEE MOST RECENT MASSDOT CONSTRUCTION STANDARD DETAILS

SUGGESTED WORK ZONE WARNING SIGN SPACING

ROAD TYPE	DISTANCE BETWEEN SIGNS			
	A	B	C	D
URBAN (30MPH OR LESS)	100 FEET	100 FEET	100 FEET	100 FEET
URBAN (35MPH OR GREATER)	350 FEET	350 FEET	350 FEET	350 FEET
RURAL	500 FEET	500 FEET	500 FEET	500 FEET
EXPRESSWAY/FREEWAY	1,000 FEET	1,500 FEET	2,640 FEET	500 FEET

SIGN SPACING NOTES:

- ROAD TYPE TO BE DETERMINED BY MASSDOT OFFICE OF TRANSPORTATION PLANNING
- THE "A" DIMENSION SHOULD BE MEASURED FROM THE START OF THE TRAVEL LANE RESTRICTION OR THE SHOULDER / BREAKDOWN LANE RESTRICTION, WHICHEVER IS APPLICABLE.
- THE "D" DIMENSION SHOULD BE THE DISTANCE FOLLOWING THE TERMINATION OF THE WORK ZONE TO THE PLACEMENT OF THE MA-R2-10e "END WORK ZONE - DOUBLE FINES END" SIGN.
- MA-R2-10a SIGNS SHALL BE PLACED HALFWAY BETWEEN THE SECOND AND THIRD SIGNS NOTED ABOVE.
- SIGN SPACING MAY NEED TO BE INCREASED IF ADDITIONAL SIGNS ARE REQUIRED PER THE DETAIL / TYPICAL SETUP FIGURES.



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PREPARED FOR

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63 Main Street  
Northborough, MA, 01532

REVISIONS

ISSUED FOR

Final Plans

PROJECT TITLE

Northborough  
Utility Bridges

PROJECT LOCATION

Northborough, MA

DRAWING TITLE

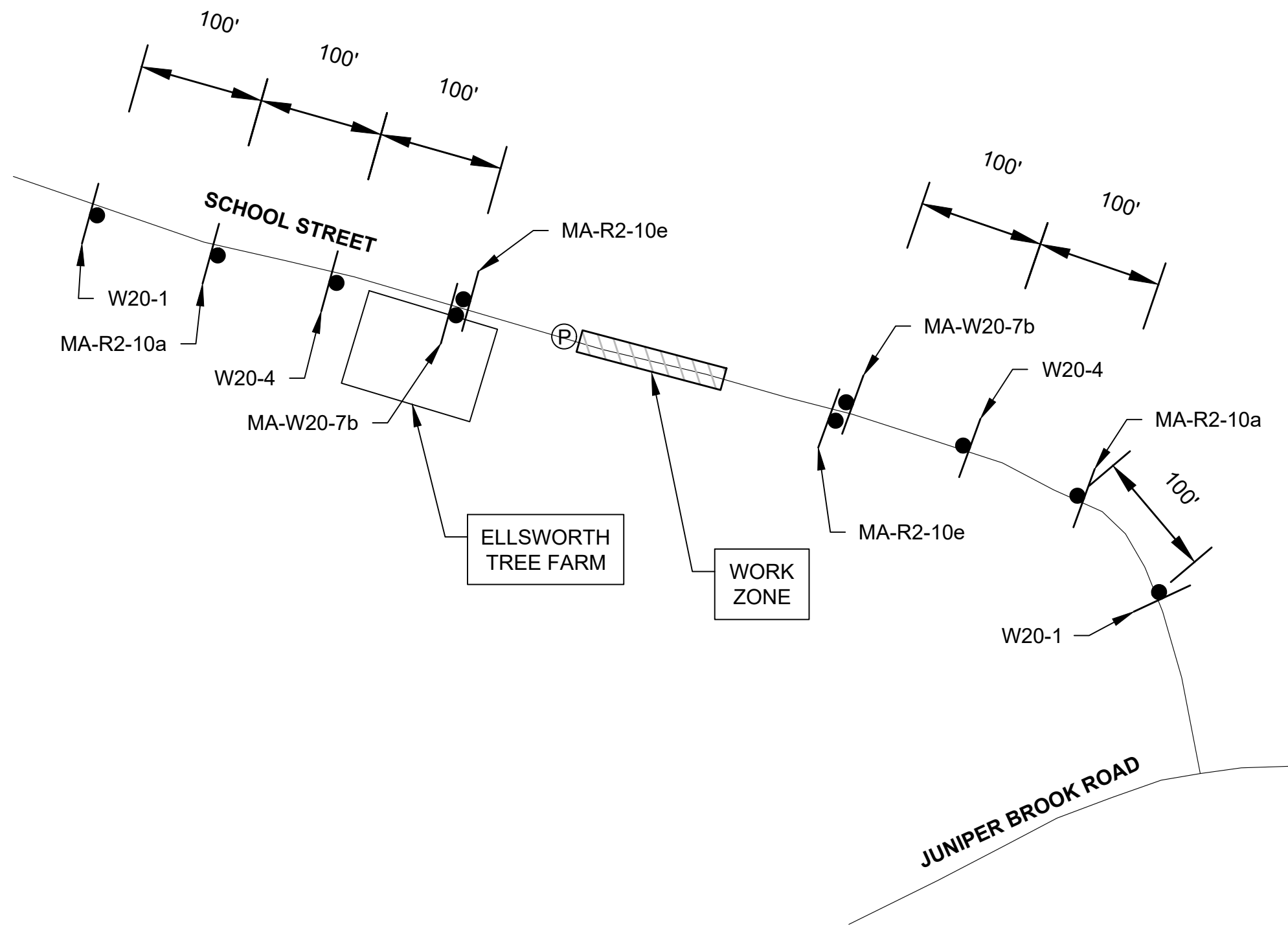
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General Notes



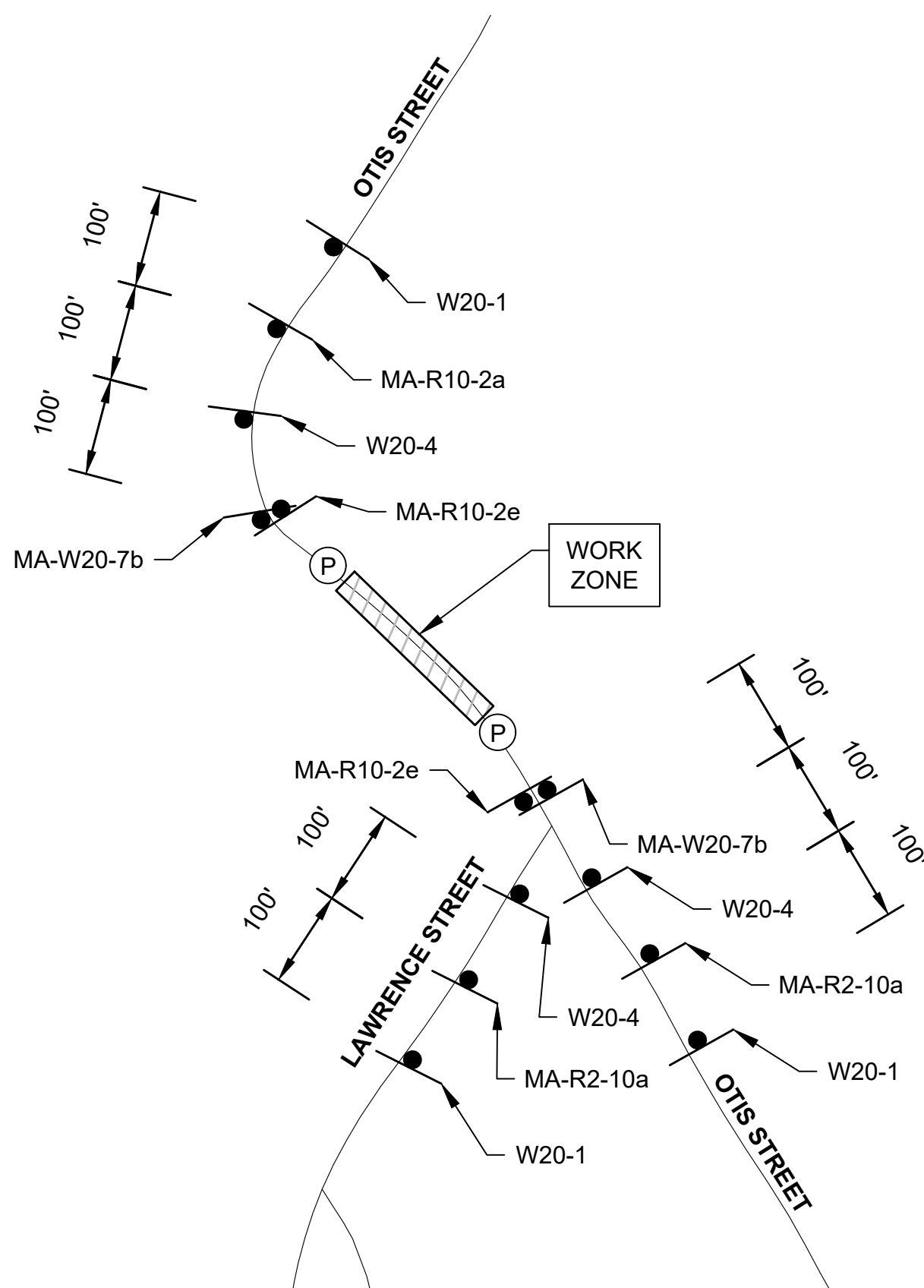
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PROJECT NO.  
T1487  
TEC CAD FILE  
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Phase1  
DRAWING NO.  
**S-8**  
SHEET 8 OF 10

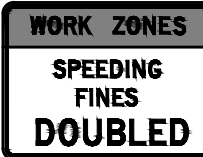
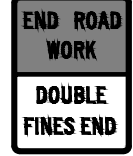







ADVANCED SIGNAGE SCHEMATIC FOR SCHOOL STREET  
SCALE: 1" = 100'



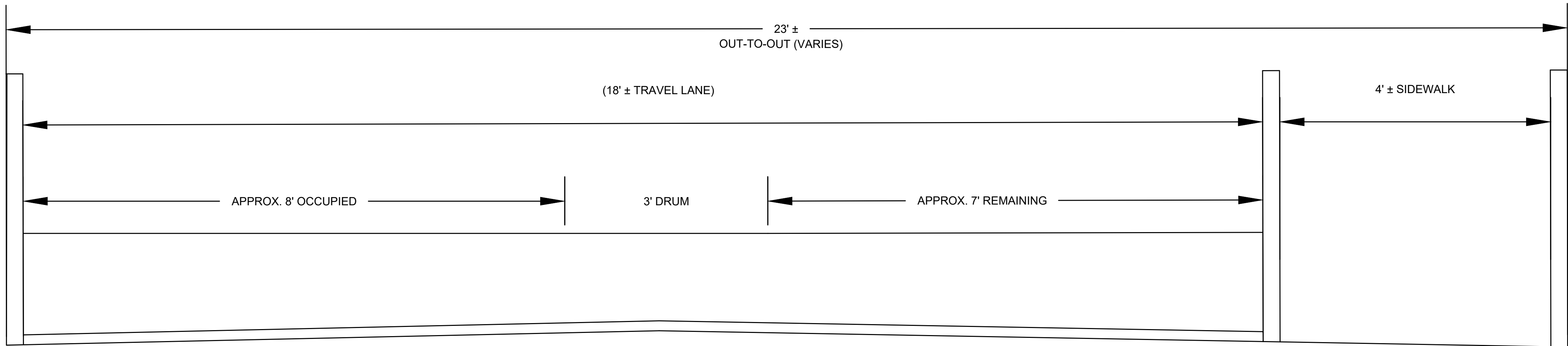
ADVANCED SIGNAGE SCHEMATIC FOR OTIS STREET  
SCALE: 1" = 150'

TEMPORARY TRAFFIC SIGN SUMMARY												
IDENTIFICATION NUMBER	SIZE OF SIGN (INCHES)		LEGEND	TEXT DIMENSIONS (INCHES)			NUMBER OF SIGNS REQUIRED	COLOR			UNIT AREA (S.F.)	AREA IN SQUARE FEET
	WIDTH	HEIGHT		LETTER HEIGHT	VERTICAL SPACING	ARROW RTE. MKR.		BACKGROUND	LEGEND	BORDER		
MA-R2-10a	48	36		1.			2	FLUORESCENT ORANGE / WHITE	BLACK	BLACK	12.00	24.00
MA-R2-10e	36	48					2	FLUORESCENT ORANGE / WHITE	BLACK	BLACK	12.00	24.00
MA-W20-7b	36	36					2	ORANGE	BLACK	BLACK	9.00	18.00
W20-1	36	36		2.			2	FLUORESCENT ORANGE	BLACK	BLACK	9.00	18.00
W20-4	36	36					2	FLUORESCENT ORANGE	BLACK	BLACK	9.00	18.00

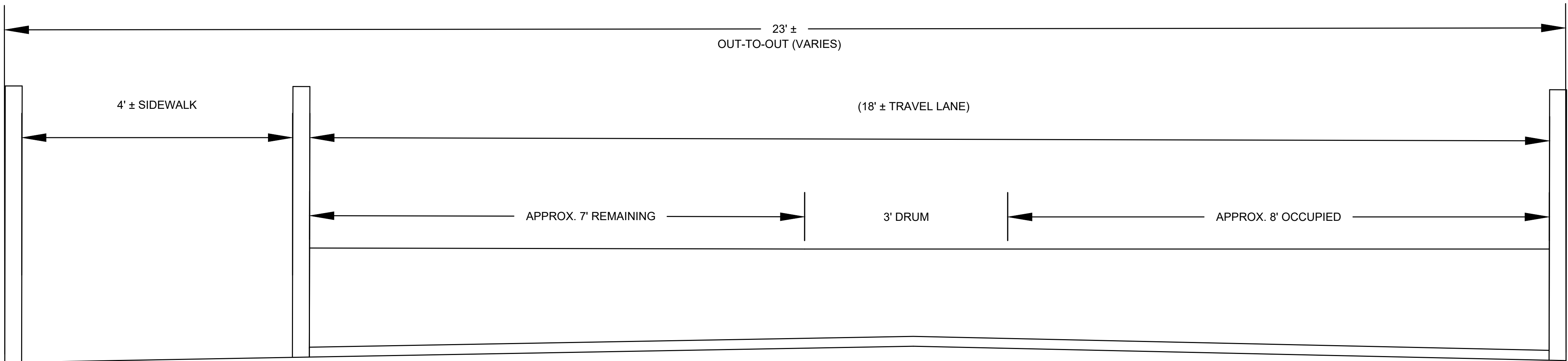
SIGN SUMMARY NOTES:

- MASSDOT STANDARD SIGNS.
- CONTRACTOR SHALL FURNISH SIGNS CONSISTENT WITH 2009 MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES FOR STREETS AND HIGHWAYS (OR LATEST EDITION). SEE MANUAL FOR TEXT AND DIMENSIONS.





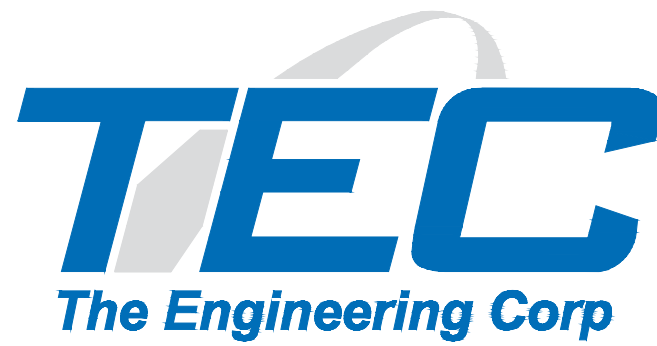
TYPICAL SECTION  
SCHOOL STREET BRIDGE OVER ASSABET RIVER EB APPROACH  
NTS



TYPICAL SECTION  
SCHOOL STREET BRIDGE OVER ASSABET RIVER WB APPROACH  
NTS

SCHOOL STREET BRIDGE NOTE:

1. WHEN STATIONARY CONSTRUCTION VEHICLE IS ATOP THE BRIDGE CROSSING, POLICE DETAIL MUST BE PRESENT TO ASSIST WITH GUIDING VEHICLES AND PEDESTRIANS THROUGH THE NARROW SPACE BETWEEN THE BRIDGE RAIL AND THE CONSTRUCTION DRUMS SURROUNDING THE STATIONARY CONSTRUCTION VEHICLE.
2. SEE UPSTREAM/DOWNSTREAM APPROACH FOR ADVANCE TEMPORARY TRAFFIC CONTROL SIGNAGE AND DRUM LAYOUT DETAIL DEPICTED ON DRAWING 852.4.4 AND ON ADVANCED SIGNING SCHEMATIC ON PAGE 9.



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PROJECT LOCATION  
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DRAWING TITLE  
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Sections

PROJECT NO.  
T1487  
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Charles M. Riccardi