

FINAL HYDRAULICS REPORT

HYDROLOGIC DATA

DRAINAGE AREA = 6.3 SQUARE MILES
 CHARACTER OF TERRAIN: MOUNTAINOUS, PREDOMINANTLY RURAL
 CHARACTER & TYPE OF STREAM: PERENNIAL, NON-ALLUVIAL, SINUOUS, NOT BRAIDED AND INCISED
 NATURE OF STREAMBED: GRAVEL TO BEDROCK
 Q2.33 = 350 cfs Q50 = 1350 cfs
 Q10 = 800 cfs Q100 = 1600 cfs
 Q25 = 1075 cfs Q500 = 2050 cfs
 DATE OF FLOOD RECORD: NOVEMBER 1997
 WATER SURFACE ELEV.: UNKNOWN ESTIMATED DISCHARGE: UNKNOWN
 NATURAL STREAM VELOCITY @ Q25 = 10.6 fpm
 ICE CONDITIONS: MODERATE DEBRIS: MODERATE
 DOES THE STREAM REACH MAXIMUM HIGHWATER ELEVATION RAPIDLY? YES
 IS ORDINARY RISE RAPID? YES
 IS STAGE AFFECTED BY UPSTREAM OR DOWNSTREAM CONDITIONS? NO
 IF YES, DESCRIBE.

PROPOSED STRUCTURE

STRUCTURE TYPE: SINGLE SPAN COMPOSITE STEEL BEAM WITH CONCRETE DECK
 CLEAR SPAN (NORMAL TO STREAM): 47 FEET
 VERTICAL CLEARANCE ABOVE STREAMBED: 7 FEET
 WATERWAY OF FULL OPENING: 165 SQUARE FEET
 WATER SURFACE ELEV. @ Q2.33 = 912.4 FEET VELOCITY = 8.4 fpm
 Q10 = 914.1 FEET " 13.0 fpm
 Q25 = 914.9 FEET " 14.1 fpm
 Q50 = 916.2 FEET " 11.4 fpm
 Q100 = 916.5 FEET " 11.7 fpm
 IS THE ROADWAY OVERTOPPED BELOW THE Q100? YES FREQUENCY: 40 YEAR STORM
 RELIEF ELEVATION: 915.5 FT DISCHARGE OVER ROAD @ Q100: 35 cfs
 AVERAGE LOW ELEVATION OF SUPERSTRUCTURE: 914.7 FEET
 VERTICAL CLEARANCE @ Q10 = 0.7 FEET
 SCOUR: NO CONTRACTION SCOUR - PER USGS 1993 LEVEL II SCOUR STUDY
 REQUIRED CHANNEL PROTECTION: STONE FILL TYPE III

EXISTING STRUCTURE

STRUCTURE TYPE: SINGLE SPAN STEEL BEAM WITH CONCRETE DECK YEAR BUILT: 1947
 CLEAR SPAN (NORMAL TO STREAM): 47 FEET
 VERTICAL CLEARANCE ABOVE STREAMBED: 7.0 FEET
 WATERWAY OF FULL OPENING: 165 SQUARE FEET
 DISPOSITION OF STRUCTURE: SUPERSTRUCTURE TO BE REPLACED
 TYPE OF MATERIAL UNDER SUBSTRUCTURE: UNKNOWN
 WATER SURFACE ELEV. @ Q2.33 = 912.4 FEET VELOCITY = 8.4 fpm
 Q10 = 914.0 FEET " 12.5 fpm
 Q25 = 914.8 FEET " 13.6 fpm
 Q50 = 916.2 FEET " 11.4 fpm
 Q100 = 916.5 FEET " 11.7 fpm
 LONG TERM STREAM BED CHANGES: NONE NOTED

PERMIT INFORMATION

STRUCTURE TYPE: YEAR BUILT:
 AVERAGE DAILY FLOW: 13 cfs
 ORDINARY LOW WATER: 6 cfs DEPTH: 0.5 FEET
 ORDINARY HIGH WATER: 150 cfs DEPTH: 2.5 FEET

ADDITIONAL COMMENTS

IS THE ROADWAY OVERTOPPED BELOW THE Q100? YES FREQUENCY: 40 YEAR EVENT
 RELIEF ELEVATION: 915.5 FT DISCHARGE OVER ROAD @ Q100: 35 cfs

UPSTREAM STRUCTURE: TOWN: WARREN DISTANCE: 6500 FEET
 HIGHWAY NO.: TH-25 STRUCTURE NO.: 17
 STRUCTURE TYPE: SINGLE SPAN - CONCRETE SLAB BRIDGE
 CLEAR SPAN: 14 FEET CLEAR HEIGHT: 13 FEET
 YEAR BUILT: 1961 FULL WATERWAY: UNKNOWN
 DOWNSTREAM STRUCTURE: TOWN: WARREN DISTANCE: 1000 FEET
 HIGHWAY NO.: TH STRUCTURE NO.: 5
 STRUCTURE TYPE: SINGLE SPAN - CONCRETE SLAB BRIDGE
 CLEAR SPAN: 19 FEET CLEAR HEIGHT: 10 FEET
 YEAR BUILT: 1963 FULL WATERWAY: 180 SQUARE FEET

TRAFFIC DATA

YEAR	ADT	DHV	% D	% T	ADTT
2003	1200	170	57	4	80
2023	1600	230	57	3	90

18 kip ESAL for flexible pavement from 2003 to 2023: 596,000
 18 kip ESAL for flexible pavement from 2003 to 2043: 1,497,000
 Design speed: 25 MPH

DESIGN CRITERIA:

- DESIGN LIVE LOAD AASHTO HS-25
- DESIGN SPAN 61.70 FEET
- ALLOWABLE LOAD FOR SPREAD FOOTINGS ON SOIL UNKNOWN ON LEDGE N/A
- ALLOWABLE LOAD FOR PILING N/A TYPE N/A ESTIMATED LENGTH N/A
- STRUCTURAL STEEL AASHTO GRADE M270 GR50 (PAINTED)
- REINFORCING STEEL GRADE 60
- CONCRETE HPC, CLASS A f'_c : 4000 PSI
 CONCRETE HPC, CLASS B f'_c : 3500 PSI

TRAFFIC MAINTENANCE:

- IS TRAFFIC TO BE MAINTAINED? YES IF YES, ON EXISTING STRUCTURE YES OR ON TEMPORARY BRIDGE N/A
 * PHASED CONSTRUCTION
- TEMPORARY BRIDGE REQUIREMENTS: ONE OR TWO WAY N/A TRAFFIC CONTROL SIGNALS REQUIRED NO
 ARE SIDEWALKS REQUIRED? NO IF SO, ON WHAT SIDE? N/A

LOAD FACTOR LOAD RATING (TONS)

LOADING LEVELS (LOAD FACTOR)	TRUCK						
	H	HS	3S2	6 AXLE	3A. STR.	4A. STR.	5A. SEMI
INVENTORY A=2.17; B=1.00	* 37	* 47					
POSTED A=1.55; B=1.40	* 52	* 65	* 84		* 58	* 60	* 74
OPERATING A=1.30; B=1.67		* 78	* 100	* 118	* 69	* 71	

STRENGTH RF = $\frac{0.95 M_N - 1.3 M_{DL}}{A \times M_{LL+1}}$ * SERVICEABILITY RF = B $\frac{0.95 F_y S_{LL+1} - M_{DL} S_{LL+1} - M_{SD} S_{LL+1}}{1.67 M_{LL+1}}$

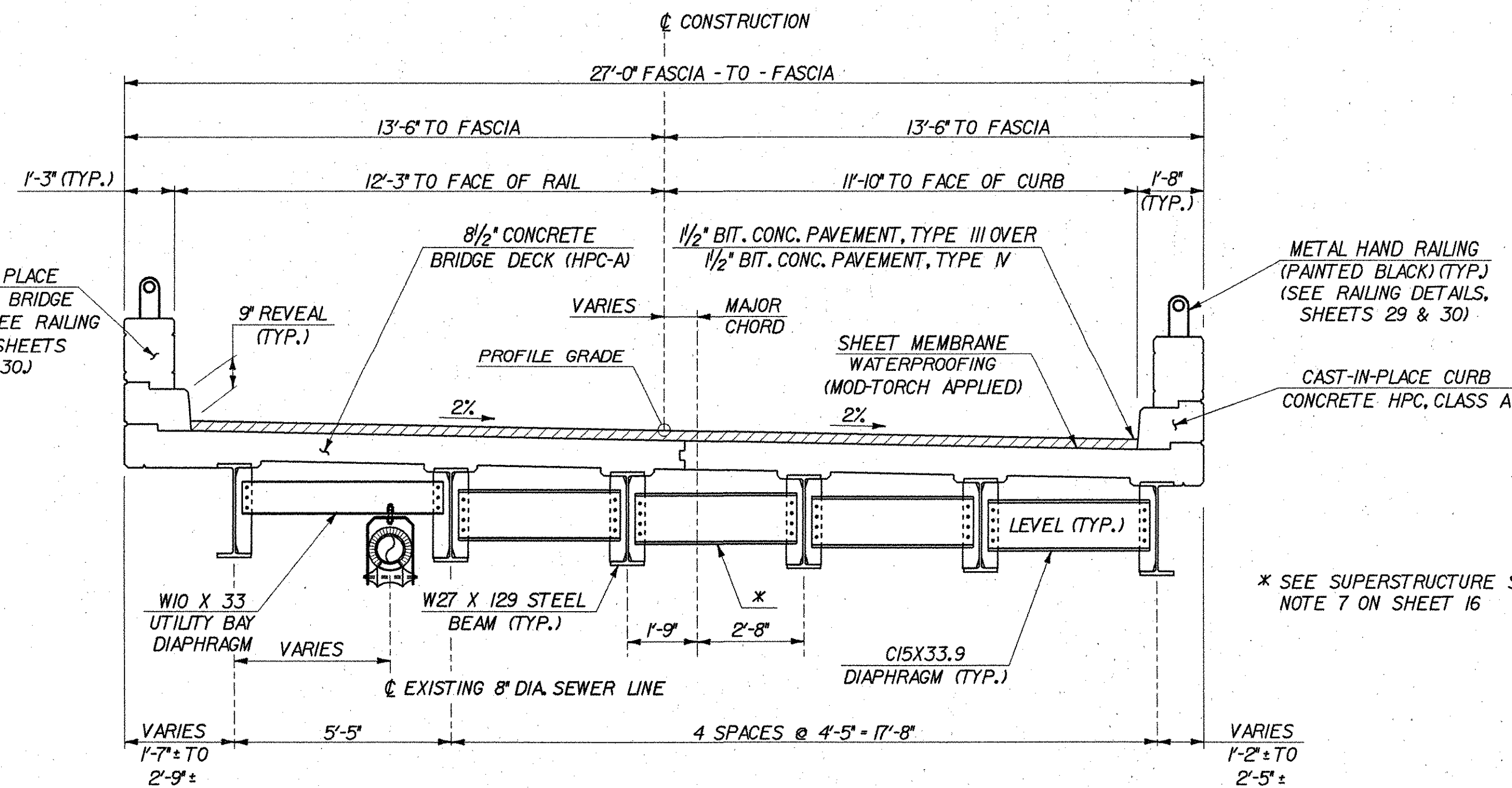
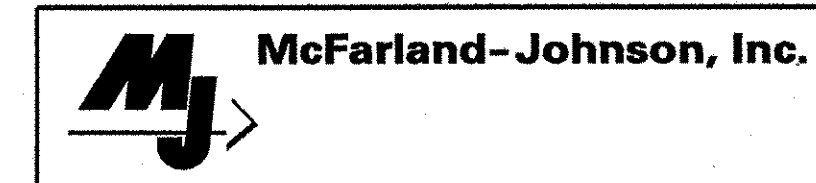
STATE OF VERMONT AGENCY OF TRANSPORTATION

Town Of WARREN Bridge No. 7
 Highway No. TH 1 Log Sta.
 Surv. Sta.

BROOK ROAD OVER FREEMAN BROOK PRELIMINARY INFORMATION SHEET

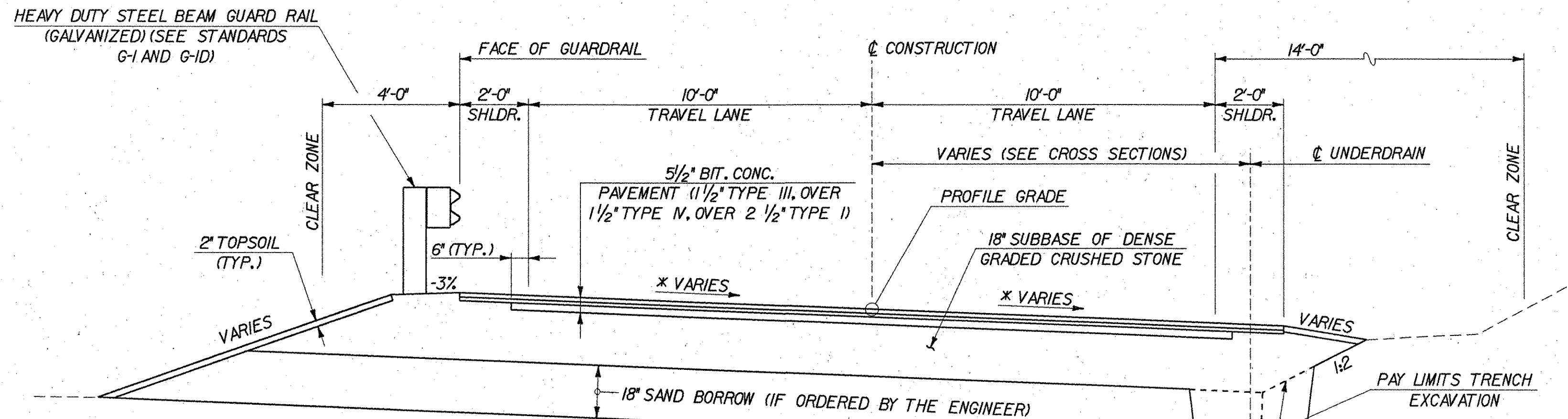
Designed By S. DELIA / VTRANS Drawn By S. MERKMAN
 Checked By Date Bridge Design Supervisor
 R. JOY 02/07 R. ROONEY Date 02/07

PROJECT WARREN PROJECT NO. BHF 0188(7)
 I.G.C. Info. m:\549107-Warren\BRIDGE\Final\z\276pl.dgn
 Bridge Sheet No. Sheet 2 of 36



TYPICAL BRIDGE SECTION

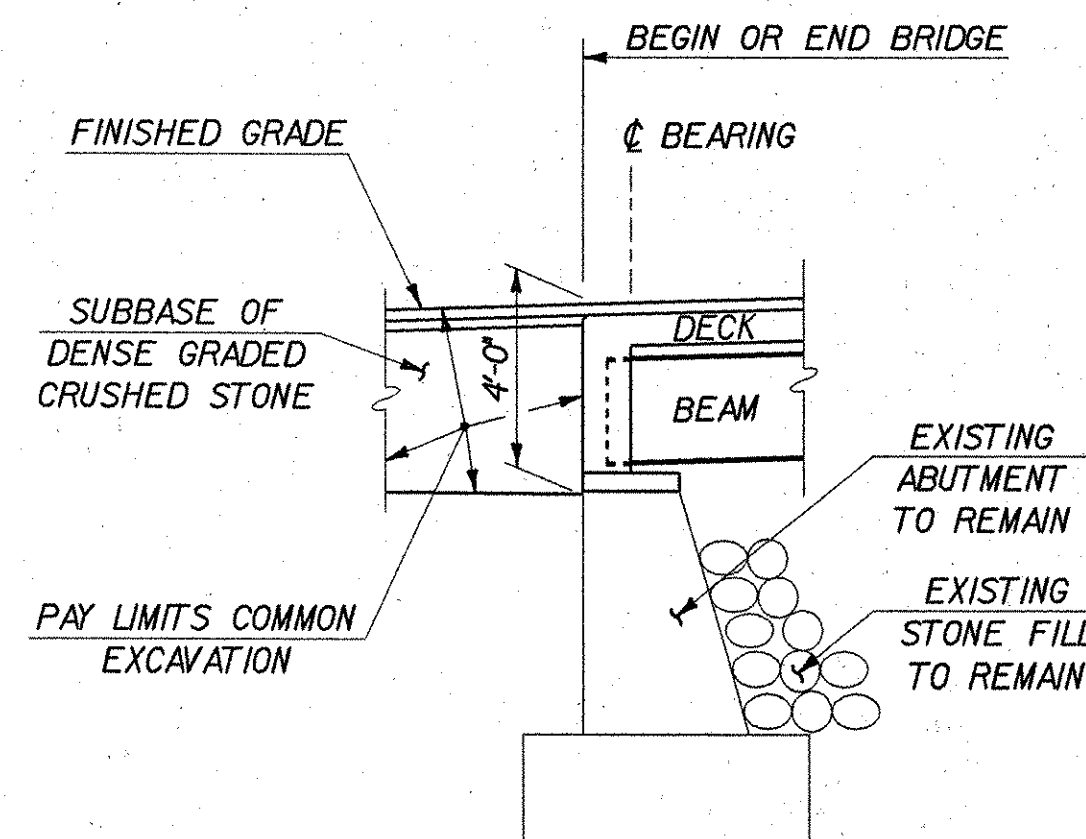
SCALE: 3/8" = 1'-0"



TYPICAL ROADWAY SECTION

SCALE: 3/8" = 1'-0"

* SEE BANKING DIAGRAM ON SHEET 6.

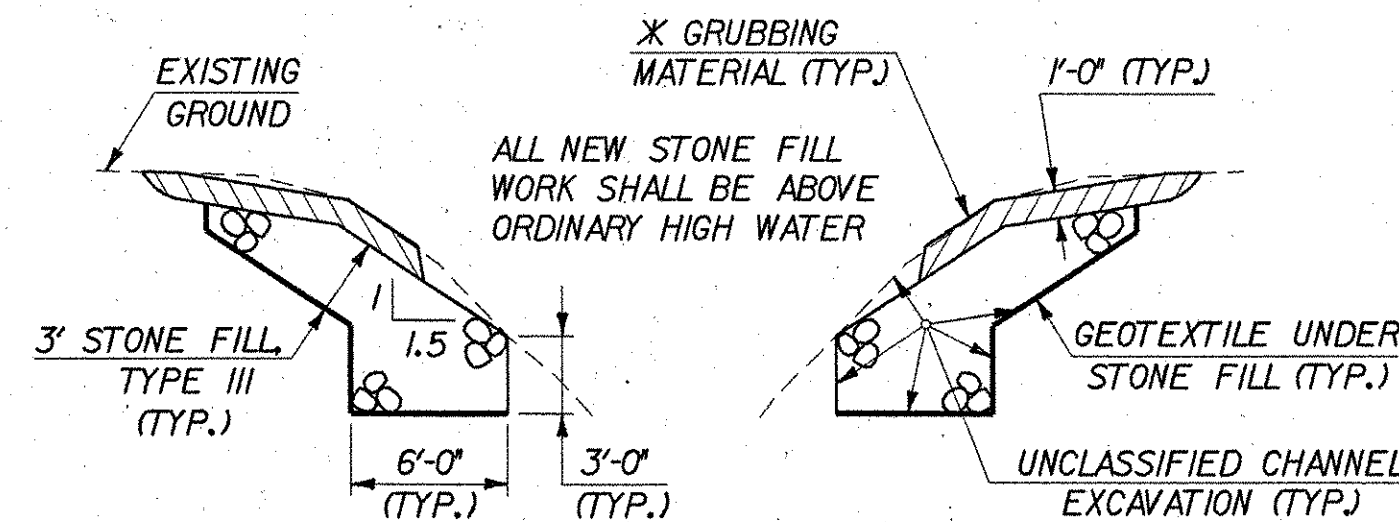


TYPICAL ABUTMENT SECTION

SCALE: 1/4" = 1'-0"

MATERIAL TOLERANCES

MATERIAL ITEM	TOLERANCE
PAVEMENT	± 1/4" TOTAL THICKNESS
SUBBASE	± 1"
SAND BORROW	± 1"



TYPICAL STONE FILL SECTION

NOT TO SCALE

* GRUBBING MATERIAL SHALL NOT BE PLACED ON THE STONE FILL IN THE AREA UNDER THE BRIDGE. WHENEVER CHANNEL SLOPE INTERSECTS ROADWAY SUBBASE, GRUBBING MATERIAL SHALL BEGIN AT THE BOTTOM OF SUBBASE. GRUBBING MATERIAL SHALL BE PLACED ON THE NEW STONE FILL ONLY, AND NOT PLACED ON EXISTING STONE FILL.