PROJECT	COUNTY	CITY	SHEET NO.	TOTAL SHEETS
TORREY ROAD	GENESEE	FLINT	01	17
SAGINAW STREET	GENESEE	FLINT	18	##

CITY OF FLINT
TRANSPORTATION DEPARTMENT AND UTILITIES DEPARTMENT
IN COOPERATION WITH
MICHIGAN DEPARTMENT OF TRANSPORTATION
AND
FEDERAL HIGHWAY ADMINISTRATION
PLAN AND PROFILE OF PROPOSED

TORREY ROAD (12TH ST) OVER THE CARMAN CREEK BRIDGE REPLACEMENT PROJECT
STRUCTURE NUMBER: 2828
JOB NUMBER: 126579
CONTROL SECTION: BRT 25402
SECTION 24, T7N–R6E

SAGINAW STREET OVER THE FLINT RIVER PREVENTIVE MAINTENANCE PROJECT
STRUCTURE NUMBER: 2849
JOB NUMBER: 129257
CONTROL SECTION: BHT 25000
SECTION 7, T7N–R7E

INDEX OF SHEETS

M.D.O.T. STANDARD PLANS

R–12–E	COVER G
R–15–F	COVER K
R–30–G	CONCRETE CURB AND CONCRETE CURB & GUTTER
R–41–H	LONGITUDINAL PAVEMENT JOINTS
R–45–J	PAVEMENT REINFORCEMENT FOR BRIDGE APPROACH
R–59–E	GUARDRAIL AT BRIDGES AND EMBANKMENTS
R–80–E	GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS FOR UNDERDRAINS, AND SEWER BULKHEADS
R–83–C	UTILITY TRENCHES
R–96–E	SOIL EROSION & SEDIMENTATION CONTROL MEASURES
R–100–H	SEEDING AND TREE PLANTING
B–103–E	MOLDING, BEVEL, LIGHT STANDARD ANCHOR BOLT ASSEMBLY AND NAME PLATE DETAILS

M.D.O.T. SPECIAL DETAILS
(INCLUDED IN CONSTRUCTION PLANS)

R–1–G	DRAINAGE STRUCTURES
R–45–J	PAVEMENT REINFORCEMENT FOR BRIDGE APPROACH
R–60–J	GUARDRAIL TYPES A, B, BD, T, TD, MGS–8, & MGS–8D
R–66–E	GUARDRAIL DEPARTING TERMINAL TYPES B, T & MGS
R–73–F	GUARDRAIL OVER BOX OR SLAB CULVERTS
21	GUARDRAIL AT INTERSECTIONS

TRAFFIC AND SAFETY SPECIAL DETAILS
(INCLUDED IN PROPOSAL)

WZD–100–A	GROUND DRIVEN SIGN SUPPORTS FOR TEMP SIGNS
WZD–125–E	TEMPORARY TRAFFIC CONTROL DEVICES

UTILITIES

EXISTING UTILITIES LISTED BELOW AND SHOWN ON THESE PLANS REPRESENT THE BEST INFORMATION AVAILABLE AS OBTAINED FROM SURVEYS. THIS INFORMATION DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO BE SATISFIED AS TO IT'S ACCURACY AND THE LOCATION OF EXISTING UTILITIES.

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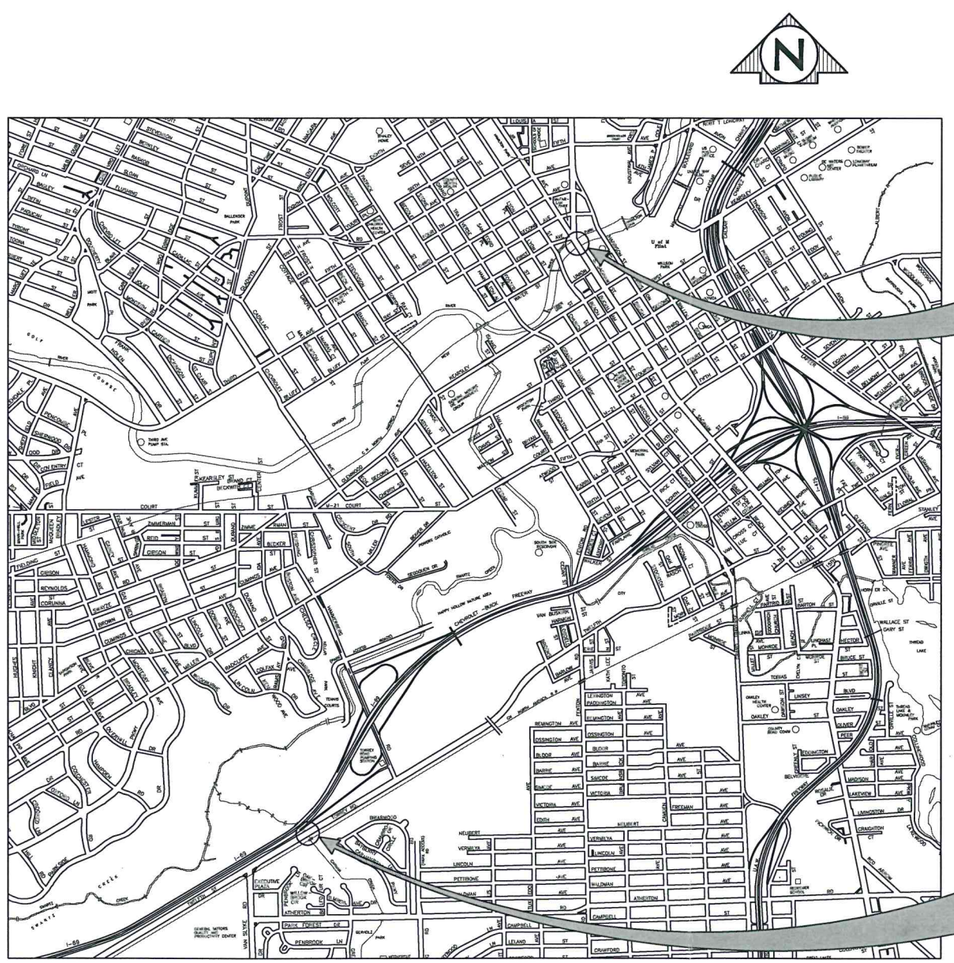

PROJECT LOCATION
NO SCALE

TRAFFIC DATA

PRESENT ADT (2018)	= 14,204 VEHICLES/DAY
FUTURE ADT (2038)	= 17,333 VEHICLES/DAY
% COMMERCIAL	= 10%
DESIGN SPEED	= 30 MPH
POSTED SPEED	= 25 MPH

TRAFFIC DATA

PRESENT ADT (2018)	= 7,699 VEHICLES/DAY
FUTURE ADT (2038)	= 9,394 VEHICLES/DAY
% COMMERCIAL	= 10%
DESIGN SPEED	= 50 MPH
POSTED SPEED	= 45 MPH

Know what's **below.**
Call before you dig.

GENERAL NOTES:

THE CULVERT DESIGN ON TORREY ROAD SHALL BE BASED ON 1.2 TIMES THE CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATION HL–93 LOADING WITH THE EXCEPTION THAT THE DESIGN TANDEM PORTION OF THE HL–93 LOAD DEFINITION SHALL BE REPLACED BY A SINGLE 60 KIP AXLE LOAD BEFORE APPLICATION OF THIS 1.2 FACTOR. THE RESULTING LOAD IS DESIGNATED HL–93 MOD.

THE REHABILITATION DESIGN OF SAGINAW ST BRIDGE IS BASED ON THE 17TH EDITION OF AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES H–20 LOADING. LIVE LOAD PLUS IMPACT DEFLECTION DOES NOT EXCEED 1/800 OF SPAN LENGTH. THE ORIGINAL STRUCTURE WAS DESIGNED FOR H–20 LOADING BASED ON AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES.

EXCEPT WHERE OTHERWISE INDICATED ON THESE PLANS, OR IN THE PROPOSAL AND SUPPLEMENTAL SPECIFICATIONS CONTAINED HEREIN, ALL MATERIALS AND WORKMANSHIP SHALL BE IN ACCORDANCE WITH THE MICHIGAN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION 2012 EDITION.

THE DESIGN OF THE STRUCTURAL MEMBERS IS BASED ON MATERIAL OF THE FOLLOWING GRADES AND STRESSES:

CONCRETE: GRADE S2	f'c	= 3,000	PSI
CONCRETE: GRADE D	f'c	= 4,000	PSI
CONCRETE: PRECAST CULVERT	MIN f'c	= 5,000	PSI
STEEL REINFORCEMENT	Fy	= 60,000	PSI

ALL EXPOSED CONCRETE CORNERS SHOW SQUARE ON THE PLANS SHALL BE BEVELED WITH 1/2" TRIANGULAR MOLDINGS EXCEPT AS OTHERWISE NOTED.

OLD PLANS DO NOT EXIST FOR THE TORREY ROAD (12TH ST) STRUCTURE.

EXISTING PLANS FOR THE SAGINAW ST BRIDGE ARE ATTACHED TO THE PLAN SET AND AVAILABLE IN THE REFERENCE INFORMATION DOCUMENT FOLDER.

UNLESS OTHERWISE SHOWN ON THE PLANS PROVIDE MINIMUM CONCRETE CAST IN PLACE CLEAR COVER FOR REINFORCEMENT ACCORDING TO THE FOLLOWING:

CONCRETE CAST AGAINST EARTH:	3 INCH
ALL OTHER UNLESS SHOWN ON PLANS:	2 INCH

FOR THE PROTECTION OF UNDERGROUND UTILITIES, THE CONTRACTOR SHALL CALL "MISS DIG" AT 1–800–482–7171 or VIA THE WEB AT EITHER ELOCATE.MISSDIG.ORG FOR SINGLE ADDRESS OR RTE.MISSDIG.ORG, A MINIMUM OF 3 WORKING DAYS EXCLUDING WEEKENDS AND HOLIDAYS PRIOR TO EXCAVATING IN THE VICINITY OF UTILITY LINES. ALL "MISS DIG" PARTICIPATING MEMBERS WILL THUS BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING UTILITY OWNERS WHO MAY NOT BE A PART OF THE "MISS DIG" ALERT SYSTEM.

THE TORREY ROAD PROJECT HAS BEEN EVALUATED USING THE FAA NOTICE CRITERIA TOOL FOR A STRUCTURE HEIGHT OF 99 FEET ABOVE A GROUND ELEVATION OF 740 FEET AND NO PERMITS ARE REQUIRED.

THE PROPOSED IMPROVEMENTS COVERED BY THESE PLANS ARE DESIGNED IN ACCORDANCE WITH THE AASHTO; A POLICY ON GEOMETRIC DESIGN OF HIGHWAYS AND STREETS, 2011 EDITION.

CONTRACT FOR TORREY ROAD BRIDGE REPLACEMENT AND SAGINAW STREET PREVENTIVE MAINTENANCE

CITY OF FLINT APPROVAL

Betty J. Wideman — 2/15/19
BETTY WIDEMAN – DIRECTOR OF TRANSPORTATION — DATE

2/14/19
MARK ADAS, PE – CITY ENGINEER — DATE

PREPARED UNDER SUPERVISION OF

AMANDA N. HEMEYER — 59406
REGISTERED PROFESSIONAL ENGINEER — REGISTRATION NO.

STATE OF MICHIGAN
AMANDA N. HEMEYER
ENGINEER
No. 59406
LICENSED PROFESSIONAL ENGINEER
2/14/19

ROWE PROFESSIONAL SERVICES COMPANY
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Flint, MI 48502
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www.rowepsc.com

STRUCTURE SYMBOLS

- EXISTING CATCH BASIN IN CURB LINE
- PROPOSED CATCH BASIN IN CURB LINE
- EXISTING CATCH BASIN IN GREEN SPACE
- PROPOSED CATCH BASIN IN GREEN SPACE
- EXISTING STORM MANHOLE
- PROPOSED STORM MANHOLE
- PROPOSED CULVERT END SECTION
- EXISTING HEADWALL
- PROPOSED HEADWALL
- EXISTING WATER SHUTOFF (SERVICE VALVE)
- EXISTING GATE VALVE AND BOX (STOP BOX)
- PROPOSED GATE VALVE AND BOX
- EXISTING GATE VALVE AND WELL
- PROPOSED GATE VALVE AND WELL
- EXISTING SPRINKLER HEAD
- EXISTING WATER WELL
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- PROPOSED WATER MAIN FITTINGS
- EXISTING CLEAN OUT
- EXISTING SANITARY SEWER MANHOLE
- PROPOSED SANITARY SEWER MANHOLE
- EXISTING MONITORING WELL

EXISTING TOPOGRAPHICAL SYMBOLS

- SIGN
- STREET SIGN
- END OF PIPE
- SWAMP OR WETLAND
- DECIDUOUS TREE
- CONIFEROUS TREE
- TREE STUMP
- MAIL BOX
- SOIL BORING
- ROCK
- METAL POST
- BUMPER BLOCK

UTILITY SYMBOLS

- UTILITY POLE
- GUY ANCHOR CABLE
- LIGHT POLE / ORNAMENTAL LIGHT
- POWER LIGHT POLE
- TELEPHONE MANHOLE
- UNDERGROUND GAS LINE MARKER
- GAS RISER
- GAS VENT
- GAS VALVE
- RAILROAD SIGNAL
- METAL LIGHT POLE
- OUTLET
- CIRCUIT BREAKER PANEL
- ELECTRICAL TRANSFORMER PAD
- ELECTRICAL TRANSFORMER RISER
- ELECTRIC METER
- TELEPHONE PEDESTAL / RISER
- TRAFFIC SIGNAL ON POLE
- PHONE BOOTH / PAY PHONE

SURVEY SYMBOLS

- MONUMENT
- BENCHMARK
- TRAVERSE POINT
- SECTION CORNER
- FOUND SURVEY MONUMENTATION

MISCELLANEOUS SYMBOLS

- EXISTING STRUCTURE NUMBER (ex. B3 1070)
- PROPOSED STRUCTURE NUMBER (ex. 1)
- FLOW DIRECTION
- PROPOSED PLAIN RIPRAP
- PROPOSED HEAVY RIPRAP

CAUTION SYMBOLS

- ••CAUTION•• HAZARDOUS FLAMMABLE MATERIAL UNDERGROUND — USED WITH UNDERGROUND GAS & ELECTRICAL LINES
- ••CAUTION•• FIBER OPTIC — USED WITH FIBER OPTICS LINES

PLAN VIEW LINE TYPES

- 12" STM — EXISTING STORM SEWER
- 12" CONC — EXISTING CULVERT
- PROPOSED STORM SEWER
- 12" SAN — EXISTING SANITARY SEWER
- PROPOSED SANITARY SEWER
- 12" WM — EXISTING WATER MAIN
- PROPOSED WATER MAIN
- SECTION LINE
- 60' ROW — EXISTING RIGHT OF WAY
- 60' ROW — PROPOSED RIGHT OF WAY
- PROPOSED EASEMENT
- EXISTING CENTER LINE DITCH
- PROPOSED DITCH CENTERLINE
- EXISTING CENTER LINE ROADWAY
- PARCEL LINE / LOT LINE
- O/H — EXISTING OVERHEAD UTILITIES
- U/G ELEC — UNDERGROUND ELECTRICAL LINE
- 6" S-MP GAS — GAS LINE OR PETROLEUM PIPELINE
- U/G TEL — UNDERGROUND TELEPHONE LINE
- U/G CATV — UNDERGROUND CABLE TV LINE
- U/G FIBER OPTIC — UNDERGROUND FIBER OPTIC
- 11+00 — PROJECT CONTROL LINE
- TREE LINE
- EXISTING FENCE
- PROPOSED FENCE
- EXISTING GUARD RAIL
- PROPOSED SLOPE STAKE LINE
- PROPOSED SILT FENCE

TOPOGRAPHY

- 960 — EXISTING CONTOURS MAJOR
- 958 — EXISTING CONTOURS MINOR
- 960 — PROPOSED CONTOUR MAJOR
- 958 — PROPOSED CONTOURS MINOR

PARCEL INFORMATION

- 401-069 — PARCEL/TAX IDENTIFICATION NUMBER
- #5324 — ADDRESS/BUSINESS NAME

PAVEMENT IDENTIFICATION

- EXISTING CURB AND GUTTER
- PROPOSED CURB AND GUTTER

HATCHING LEGEND

- REMOVE PAVEMENT
- COLD MILLING EXISTING PAVEMENT
- REMOVE SIDEWALK
- REMOVE BRIDGE STRUCTURE
- REMOVE CURB AND GUTTER
- REMOVE AND REPLACE CURB AND GUTTER
- SAND BACKFILL (PROFILE)
- PROPOSED CONCRETE PAVEMENT

PROPOSED CALLOUTS

TOPO CALLOUTS	PLAN VIEW	
ADJ	(ADJ)	ADJUST STRUCTURE
ADJ-B/O	(ADJ-B/O)	ADJUST STRUCTURE BY OTHERS
REC	(REC)	RECONSTRUCT STRUCTURE
REL	(REL)	RELOCATE
REL-B/O	(REL-B/O)	RELOCATE BY OTHERS
REM	(R)	REMOVE
R&R	(R&R)	REMOVE AND REPLACE
SALV	(SALV)	SALVAGE
SAVE	(S)	SAVE
ABN	(A)	ABANDON
	(B)	BULKHEAD
	(SR-F)	SIDEWALK RAMP TYPE
	[6]	SOIL EROSION CONTROL MEASURE

Know what's **below.** **Call** before you dig.

DATE OF PLAN: FEBRUARY 2019

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JN 126579
JN 129257

PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT

LEGEND SHEET

TORREY ROAD BRIDGE
AND
SAGINAW STREET BRIDGE

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	12/18
CHECKED BY	ANH	12/18
SHEET	02 OF	53
STR NO.	2828	

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TORREY ROAD
JN 126579

PROJECT QUANTITIES
CATEGORY 1 - ROAD WORK

DESCRIPTION	QUANTITY	UNITS
Mobilization, Max	0.7	LSUM
Clearing, Modified	3	Sta
Dr Structure, Abandon	1	Ea
Dr Structure, Rem	5	Ea
Sewer, Rem, Less than 24 inch	243	Ft
Guardrail, Rem	232	Ft
Masonry and Conc Structure, Rem	1	Cyd
Exploratory Investigation, Vertical	40	Ft
Pavt, Rem, Modified	1090	Syd
Embankment, CIP	78	Cyd
Excavation, Earth	808	Cyd
Erosion Control, Inlet Protection, Fabric Drop	13	Ea
Erosion Control, Silt Fence	500	Ft
Subbase, CIP	497	Cyd
Aggregate Base, 8 inch, Modified	1367	Syd
Sewer, Cl A, 12 inch, Tr Det A	162	Ft
Sewer, Cl A, 12 inch, Tr Det B	172	Ft
Sewer Tap, 12 inch	1	Ea
Sewer Bulkhead, 12 inch	1	Ea
Dr Structure Cover, Type G	3	Ea
Dr Structure Cover, Type K	6	Ea
Dr Structure, 48 inch dia	9	Ea
Dr Structure, Add Depth of 48 inch dia, 8 foot to 15 foot	18	Ft
Underdrain, Subbase, 4 inch	440	Ft
HMA, 3E3	229	Ton
HMA, 4E3	191	Ton
HMA, 5E3	153	Ton
Curb and Gutter, Conc, Det F4	440	Ft
Guardrail, Type B	375	Ft
Guardrail, Curved, Type B	25	Ft
Guardrail Approach Terminal, Type 2B	1	Ea
Guardrail Departing Terminal, Type B	3	Ea
Guardrail Post, Culv	18	Ea
Guardrail Reflector	20	Ea
Fence, Chain Link, 48 inch	132	Ft
Post, Steel, 3 lb	28	Ft
Sign, Type III, Erect, Salv	2	Ea
Sign, Type III, Rem	2	Ea
Pavt Mrkg, Waterborne, 4 inch, White	110	Ft
Pavt Mrkg, Waterborne, 4 inch, Yellow	440	Ft
Pavt Mrkg, Waterborne, 2nd Application, 4 inch, White	110	Ft
Pavt Mrkg, Waterborne, 2nd Application, 4 inch, Yellow	440	Ft
Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	22	Ea
Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	22	Ea
Lighted Arrow, Type C, Furn	2	Ea
Lighted Arrow, Type C, Oper	2	Ea
Minor Traf Devices	0.7	LSUM
Plastic Drum, High Intensity, Furn	100	Ea
Plastic Drum, High Intensity, Oper	100	Ea
Sign, Type B, Temp, Prismatic, Furn	525	Sft
Sign, Type B, Temp, Prismatic, Oper	525	Sft
Sign, Type B, Temp, Prismatic, Special, Furn	234	Sft
Sign, Type B, Temp, Prismatic, Special, Oper	234	Sft
Turf Establishment, Performance-No Rye, Special	1250	Syd
Abandon Water Main, 24 inch	203	Ft
Water Main, 24 inch, Directional Drill	202	Ft
Water Main, 24 inch, Cut and Plug, Modified	2	Ea
Water Main, Connect New 24 inch to Existing 24 inch	2	Ea
Flowable Fill, Non-Structural	3	Cyd
Reimbursed Permit Fees	100	Dlr

TORREY ROAD
JN 126579

PROJECT QUANTITIES
CATEGORY 2 - STRUCTURE WORK

DESCRIPTION	QUANTITY	UNITS
Structures, Rem	1	LSUM
Excavation, Channel	340	Cyd
Backfill, Structure, CIP	1713	Cyd
Excavation, Fdn	2183	Cyd
Bypass Pumping	1	Ea
Construction Dam	1	Ea
Underdrain, Fdn, 4 inch	250	Ft
Culv Bedding, Box Culv	73	Cyd
Culv, Precast Conc Box, 25 foot by 14 foot	66.5	Ft
Steel Sheet Piling, Permanent, Modified	2891	Sft
False Decking	1200	Sft
Pipe Sleeve, 10 inch	2	Ea
Pipe Sleeve, 10 inch, Placed	2	Ea
Pipe Sleeve, 20 inch	2	Ea
Pipe Sleeve, 20 inch, Placed	2	Ea
Joint Waterproofing	340	Sft
Membrane, Preformed Waterproofing	1742	Sft
Flowable Fill, Non-Structural	9	Cyd

SAGINAW STREET
JN 129257

PROJECT QUANTITIES
CATEGORY 1 - ROADWORK

DESCRIPTION	QUANTITY	UNITS
Mobilization, Max	0.3	LSUM
Pavt, Rem, Special	502	Syd
Erosion Control, Inlet Protection, Fabric Drop	8	Ea
Aggregate Base, Modified	6	Ton
Conc Pavt, Bridge Approach, Reinf	502	Syd
Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	15	Ea
Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	15	Ea
Pedestrian Type II Barricade, Temp	22	Ea
Lighted Arrow, Type C, Furn	2	Ea
Lighted Arrow, Type C, Oper	2	Ea
Minor Traf Devices	0.3	LSUM
Plastic Drum, High Intensity, Furn	30	Ea
Plastic Drum, High Intensity, Oper	30	Ea
Sign, Type B, Temp, Prismatic, Furn	586	Sft
Sign, Type B, Temp, Prismatic, Oper	586	Sft
Sign, Type B, Temp, Prismatic, Special, Furn	23	Sft
Sign, Type B, Temp, Prismatic, Special, Oper	23	Sft

PROJECT QUANTITIES
CATEGORY 2 - STRUCTURE WORK

DESCRIPTION	QUANTITY	UNITS
HMA Patch, Rem	5	Syd
Joint, Expansion, E3	54	Ft
Lane Tie, Epoxy Anchored	184	Ea
Conc, Grade D	31	Cyd
Expansion Joint Device	216	Ft
False Decking	4680	Sft
Reinforcement, Steel, Epoxy Coated	4414	Lb
Water Repellent Treatment, Penetrating	193	Syd
Substructure Horizontal Surface Sealer	39	Syd
Hand Chipping, Deep	250	Syd
Hand Chipping, Other Than Deck	133	Cft
Patch, Forming	126	Sft
Epoxy Ovly	940	Syd
Adhesive Anchoring of Horizontal Bar, 1/2 inch	3	Ea
Adhesive Anchoring of Vertical Bar, 1/2 inch	3	Ea
Deck Joint, Rem	216	Ft
Structural Crack, Repr	8	Ft
Patching Conc, C-L	32	Cyd
Embedded Galvanic Anode	545	Ea
Support, Column, Temp	5	Ea
Railing for Steps	11.5	Ft

DATE OF PLAN: FEBRUARY 2019

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PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT

QUANTITY SHEET

TORREY ROAD BRIDGE
AND
SAGINAW STREET BRIDGE

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	12/18
CHECKED BY	ANH	12/18
SHEET 03 OF 53		
STR NO. 2828		

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GENERAL NOTES

1. THE CONTRACTOR SHALL COMPLY WITH ALL STATE AND LOCAL REGULATIONS FOR WORK AT THE SITE. THIS SHALL INCLUDE ALL M.I.O.S.H.A. REGULATIONS.
2. ANY PROPERTY CORNERS OR GOVERNMENT CORNERS DISTURBED OR REMOVED BY THIS PROJECT MUST BE RESET BY A LICENSED SURVEYOR AT THE EXPENSE OF THE CONTRACTOR.
3. THE CITY OF FLINT OR THEIR DESIGNATED REPRESENTATIVE WILL PROVIDE ALL REQUIRED CONSTRUCTION STAKING.

CONSTRUCTION NOTES

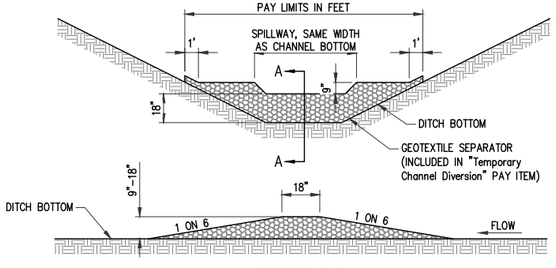
1. REMOVE ALL BRUSH AND TRIM TREE BRANCHES WITHIN THE PROPOSED SLOPE STAKE LIMITS AS DIRECTED BY THE ENGINEER. THE COST SHALL BE CONSIDERED INCLUDED IN THE PAY ITEM FOR "Clearing, Modified".
2. PUBLIC UTILITIES SHOWN ARE BASED ON INFORMATION PROVIDED BY THE UTILITY OWNERS. THE CITY OF FLINT IS NOT RESPONSIBLE FOR THE ACCURACY OF THE INFORMATION. THE CONTRACTOR SHALL VERIFY THE LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO BEGINNING CONSTRUCTION, AND WILL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITIES DURING CONSTRUCTION.
3. ALL PUBLIC UTILITIES WHICH ARE NOT SHOWN ON THE PLANS AS TO BE MOVED SHALL BE PROTECTED AND SUPPORTED BY THE CONTRACTOR AT HIS OWN EXPENSE.

EROSION AND SEDIMENTATION CONTROL NOTES

1. SOIL EROSION AND SEDIMENTATION CONTROL DEVICES SHALL BE UTILIZED ON THIS PROJECT TO EFFECTIVELY REDUCE ACCELERATED SOIL EROSION AND SEDIMENTATION. ANTICIPATED CONTROL MEASURES ARE SHOWN ON THIS SHEET.
2. TIMING AND SEQUENCING OF EROSION CONTROL DEVICES FOR THE MAJOR ITEMS OF WORK SHALL BE IDENTIFIED AND SUBMITTED TO THE CONSTRUCTION ENGINEER AT THE PRECONSTRUCTION MEETING.
3. PERMANENT SOIL EROSION CONTROL MEASURES FOR ALL SLOPES AND DITCHES AND/OR DISTURBED LAND AREA SHALL BE COMPLETED WITH IN 5 CALENDAR DAYS AFTER FINAL GRADING OR THE FINAL EARTH CHANGE HAS BEEN COMPLETED.
4. CLEANUP WILL BE DONE IN A MANNER TO INSURE THAT EROSION CONTROL MEASURES ARE NOT DISTURBED.
5. THE PROJECT WILL CONTINUALLY BE INSPECTED FOR SOIL EROSION AND SEDIMENTATION CONTROL COMPLIANCE. DEFICIENCIES SHALL BE CORRECTED BY THE CONTRACTOR WITHIN 24 HOURS.
6. TEMPORARY EROSION CONTROL MEASURES SHALL BE COMPLETELY REMOVED BY THE CONTRACTOR UPON ESTABLISHMENT OF PERMANENT CONTROLS MEASURES.
7. A N.P.D.E.S. PERMIT IS NOT REQUIRED FOR THIS PROJECT.

FEDERAL AVIATION ADMINISTRATION NOTES

1. THIS PROJECT HAS BEEN EVALUATED USING THE FAA NOTICE CRITERIA TOOL FOR A STRUCTURE HEIGHT OF 99 FEET ABOVE A GROUND LEVEL ELEVATION OF 740 FEET AND NO PERMITS ARE REQUIRED.



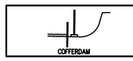
SECTION A–A

37 CHECK DAM DETAILS

CHECK DAM STONE:
6A STONE FOR CHANNEL GRADE LESS THAN 1%
PLAIN RIPRAP FOR CHANNEL GRADE 1% OR GREATER

PLACEMENT OF CHECK DAM AND REMOVAL OF CHECK DAM AND ACCUMULATED SEDIMENT AT COMPLETION OF THE PROJECT INCLUDED IN "Temporary Channel Diversion" PAY ITEM.

✱ INDICATES APPLICABILITY OF A SPECIFIC CONTROL MEASURE TO ONE OR MORE OF THE SEVEN PROBLEM AREAS

KEY	DETAIL	CHARACTERISTICS	A SLOPES	B STREAMS AND WATERWAYS	C SURFACE DRAINAGEWAYS	D ENCLOSED DRAINAGE (Inlet & Outfall Control)	E LARGE FLAT SURFACE AREAS	F BORROW AND STOCKPILE AREAS	G ADJACENT PROPERTIES
3	 PERMANENT/TEMPORARY SEEDING	INEXPENSIVE BUT EFFECTIVE EROSION CONTROL MEASURE TO STABILIZING FLAT AREAS AND MILD SLOPES. PERMITS RUNOFF TO INFILTRATE SOIL REDUCING RUNOFF VOLUMES. PROPOER PREPARATION ON THE SEED BED, FERTILIZING, MULCHING AND WATERING IS CRITICAL TO ITS SUCCESS.	✱		✱		✱	✱	
13	 GRAVEL FILTER BERM	USEFUL IN FILTERING FLOW PRIOR TO ITS REENTRY INTO A LAKE, STREAM OR WETLAND. WORKS WELL WITH SEDIMENT TRAP (KEY 20) AND TEMPORARY BYPASS CHANNEL (KEY 35). NOT TO BE USED IN LIEU OF A CHECK DAM (KEY 37) IN A DITCH.	✱		✱			✱	
18	 DEWATERING WITH FILTER BAG	IT MAY BE NECESSARY TO DEWATER FROM BEHIND A COFFERDAM OR CONSTRUCTION DAM TO CREATE A DRY WORK SITE. DISCHARGED WATER MUST BE PUMPED TO A FILTER BAG. A GRAVEL FILTER BERM (KEY 13) MAY BE PLACED DOWNSLOPE OF THE FILTER BAG TO PROVIDE ADDITIONAL FILTRATION PRIOR TO ENTERING ANY STREAM OR WETLAND.		✱					✱
21	 SEDIMENT BASIN	A SEDIMENT BASIN IS USED TO TRAP SEDIMENTS FROM AN UPSTREAM CONSTRUCTION SITE. REQUIRES PERIODIC INSPECTIONS, REPAIRS, AND MAINTENANCE. WHERE PRACTICAL, SEDIMENTS SHOULD BE CONTAINED ON SITE. A SEDIMENT BASIN SHOULD BE THE LAST CHOICE OF SEDIMENT CONTROL. THE SIZE OF A SEDIMENT BASIN IS GREATER THAN 5 CUBIC YARDS.		✱					✱
26	 GEOTEXTILE SILT FENCE	A PERMEABLE BARRIER ERECTED BELOW DISTURBED AREAS TO CAPTURE SEDIMENTS FROM SHEET FLOW. CAN BE USED TO DIVERT SMALL VOLUMES OF WATER TO STABLE OUTLETS. INEFFECTIVE AS A FILTER AND SHOULD NEVER TO PLACED ACROSS STREAMS OR DITCHES WHERE FLOW IS CONCENTRATED.	✱				✱	✱	
28	 MULCHING AND MULCH ANCHORING	ANCHORED MULCH PROVIDES EROSION PROTECTION AGAINST RAIN AND WIND. MULCH MUST BE USED ON SEEDED AREAS TO PROMOTE WATER RETENTION AND GROWTH. SHOULD BE INSPECTED AFTER EVERY RAINSTORM AND REPAIRED AS NECESSARY UNTIL VEGETATION IS WELL ESTABLISHED.	✱		✱		✱	✱	
29	 INLET PROTECTION FABRIC DROP	PROVIDES SETTLING AND FILTERING OF SILT LADEN WATER PRIOR TO ITS ENTRY INTO THE DRAINAGE SYSTEM. CAN BE USED IN MEDIAN AND SIDE DITCHES WHERE VEGETATION WILL BE DISTURBED. ALLOWS FOR EARLY USE OF DRAINAGE SYSTEMS PRIOR TO PROJECT COMPLETION.			✱		✱		
33	 MULCH BLANKETS AND HIGH VELOCITY MULCH BLANKETS	MULCH BLANKETS PROVIDE AN IMMEDIATE AND EFFECTIVE COVER OVER RAW ERODIBLE SLOPES AFFORDING EXCELLENT PROTECTION AGAINST RAIN AND WIND EROSION. HIGH VELOCITY MULCH BLANKETS WORK WELL FOR STABILIZING THE BOTTOM OF DITCHES IN WATERWAYS.	✱		✱		✱	✱	
34	 COFFERDAM	USED TO CREATE A DRY CONSTRUCTION SITE AND PROTECT THE STREAM FROM RAW ERODIBLE AREAS. MUST BE PUMPED DRY OR DEWATERED ACCORDING TO DEWATERING WITH FILTER BAG (KEY 18)		✱					✱
36	 CONSTRUCTION DAM	USED TO CREATE A DRY OR SLACK WATER AREA FOR CONSTRUCTION. PROTECTS THE STREAM FROM RAW ERODIBLE AREAS. CAN BE CREATED OUT OF ANY NON-ERODIBLE MATERIAL SUCH AS SAND AND STONE BAGS (KEY 24), A GRAVEL DIKE WITH CLAY CORE OR PLASTIC LINER, STEEL PLATES OR PLYWOOD.		✱					✱
37	 CHECK DAM	CAN BE CONSTRUCTED ACROSS DITCHES OR ANY AREA OF CONCENTRATED FLOW. PROTECTS VEGITATION IN EARLY STAGES OF GROWTH. A CHECK DAM IS INTENDED TO REDUCE WATER VELOCITIES AND CAPTURE SEDIMENT. A CHECK DAM IS NOT A FILTERING DEVICE.	✱		✱			✱	

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JN 126579

PLAN SUBMITTALS AND CHANGES
BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT
NOTE SHEET

TORREY ROAD
OVER THE
CARMAN CREEK

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	12/18
CHECKED BY	ANH	12/18
SHEET 04 OF 53		
STR NO. 2828		

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TORREY ROAD (12TH STREET) ALIGNMENT

BENCHMARK DATA TABLE

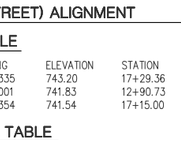
NUMBER	NORTHING	EASTING	ELEVATION	STATION	OFFSET	DESCRIPTION
BM 2	544615	13299335	743.20	17+29.36	32.95' LT	SET CHISELED "X" ON WEST-SOUTHWEST FLANGE BOLT OF HYDRANT, 9'± NORTH OF BACK OF CURB OF TORREY ROAD (12TH STREET) & 240'± EAST OF BRIDGE
BM 4	544321	13299001	741.83	12+90.73	42.34' RT	SET SPIKE IN SOUTHEAST FACE OF POWER POLE, 15'± SOUTH OF BACK OF CURB OF TORREY ROAD (12TH STREET) & 160'± WEST OF BRIDGE
BM 6	544557	13299354	741.54	17+15.00	25.78' RT	SET SPIKE IN SOUTHWEST FACE OF POWER POLE WITH LIGHT, 3'± SOUTH OF BACK OF CURB OF TORREY ROAD (12TH STREET) & 225'± EAST OF BRIDGE

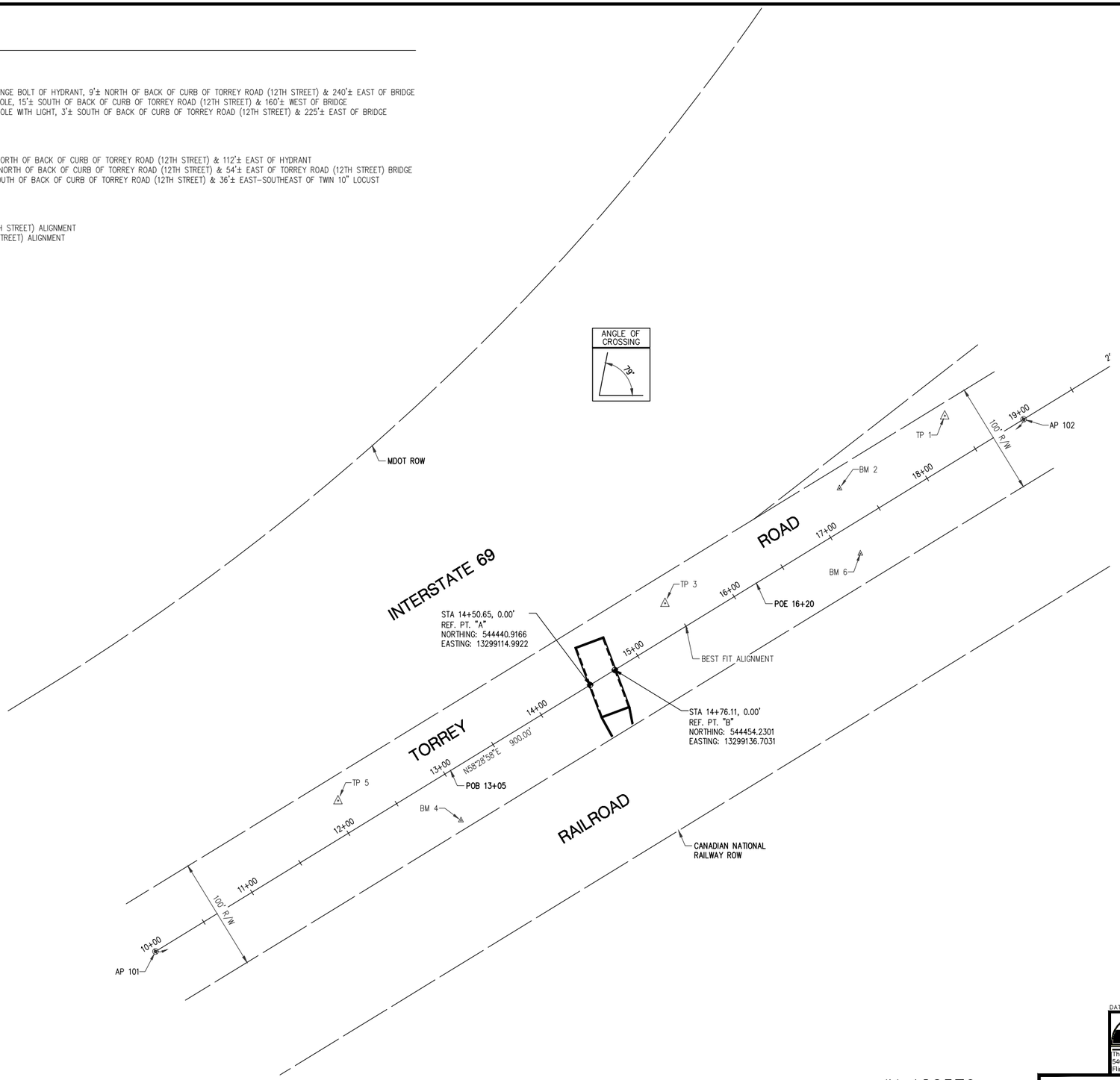
TRAVERSE POINT DATA TABLE

NUMBER	NORTHING	EASTING	STATION	OFFSET	DESCRIPTION
TP 1	544678.9070	13299428.3370	18+42.18	39.08' LT	SET ROD WITH ROWE TRAVERSE CAP, 15'± NORTH OF BACK OF CURB OF TORREY ROAD (12TH STREET) & 112'± EAST OF HYDRANT
TP 3	544513.1810	13299181.1660	15+44.84	27.01' LT	SET ROD WITH ROWE TRAVERSE CAP, 4.5'± NORTH OF BACK OF CURB OF TORREY ROAD (12TH STREET) & 54'± EAST OF TORREY ROAD (12TH STREET) BRIDGE
TP 5	544338.6530	13298892.1380	12+07.21	29.32' LT	SET ROD WITH ROWE TRAVERSE CAP, 4'± SOUTH OF BACK OF CURB OF TORREY ROAD (12TH STREET) & 36'± EAST-SOUTHEAST OF TWIN 10" LOCUST

ALIGNMENT POINT DATA TABLE

NUMBER	NORTHING	EASTING	STATION	OFFSET	DESCRIPTION
AP 101	544205.3388	13298730.8238	10+00.00	0.00' RT	POINT OF BEGINNING OF TORREY ROAD (12TH STREET) ALIGNMENT
AP 102	544675.8186	13299498.0583	19+00.00	0.00' RT	POINT OF ENDING OF TORREY ROAD (12TH STREET) ALIGNMENT





LEGEND

- BENCHMARK
- TRAVERSE POINT
- ALIGNMENT POINT
- SECTION CORNER

NOTES:

VERTICAL DATUM IS NAVD88
HORIZONTAL DATUM IS MICHIGAN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE NAD83 (2011)
UNITS ARE INTERNATIONAL FEET.

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PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT

ALIGNMENT SHEET

TORREY ROAD
OVER THE
CARMAN CREEK

APPROVED _____

MDOT UNIT			
CONSULT UNIT			
DRAWN BY	MJS	12/18	
CHECKED BY	ANH	12/18	
SHEET 05 OF 53			
STR NO. 2828			

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DATE STARTED:	8/23/18	DRILL COMPANY:	PSI
DATE COMPLETED:	8/23/18	DRILLER: D. Guajardo	LOGGED BY: H. Ross
COMPLETION DEPTH	50.0 ft	DRILL RIG:	CME-55
BENCHMARK:	N/A	DRILLING METHOD:	3 1/4" HSA
ELEVATION:	739 ft	SAMPLING METHOD:	SS
LATITUDE:		HAMMER TYPE:	Automatic
LONGITUDE:		EFFICIENCY	82%
STATION: N/A	OFFSET: N/A	REVIEWED BY:	M. Nabil
REMARKS: None			

BORING SB-01

Water		
▽	While Drilling	N/A
▼	Upon Completion	N/A
▼	Cave Depth	39 feet

BORING LOCATION:
See Boring Location Diagram

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ○ Moisture ◪ PL ✱ LL (0 25 50) STRENGTH, tsf ▲ Qu ✳ Qp (0 2.0 4.0)	Additional Remarks
SURFACE ELEVATION ELEV = 739.00	0					14" TOPSOIL					
				10	15	Mottled gray and brown SILTY CLAY, trace Gravel and Sand, moist (FILL)		4-6-10 N=16	17		
				1	11			10-9-14 N=23	15		
	5					Gray SILTY CLAY, trace Gravel and Sand, moist, firm to hard					
				2	12			5-7-10 N=17	16		
				3	18			10-21-22 N=43	15		
	10										
				4	18			5-5-6 N=11	9		
	15										
CULVERT INVERT ELEV = 721.50							CL				
BOTTOM OF MUDSILL/FOOTING ELEV = 718.00	20			5	18			23-26-32 N=58	7		
				6	18			7-15-18 N=33	13		
	25										
				7	18			5-8-12 N=20	7		
	30					Gray SILTY CLAY, trace Gravel and Sand, moist, firm to hard					
				8	18			9-16-30 N=46	7		
	35										
				9	18		CL	20-41-50	6		
	40										
				11	18			21-50-50	6		
	45										
				12	18			23-50-50	6		
	50					Boring terminated 50 feet below existing ground surface.					

Professional Service Industries, Inc.
3120 Sovereign Drive, Suite C
Lansing, MI 48911
Telephone: (517) 394-5700

PROJECT NO.: 0406-249
PROJECT: Torrey Road Bridge Rehabilitation
LOCATION: 12th Street, Flint, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

Sheet 2 of 2

BORING #01

SAMPLE COMPLETED – 8/23/18
STA 15+50, 35' LT

DATE STARTED:	8/23/18	DRILL COMPANY:	PSI
DATE COMPLETED:	8/23/18	DRILLER: D. Guajardo	LOGGED BY: H. Ross
COMPLETION DEPTH	5.0 ft	DRILL RIG:	CME-55
BENCHMARK:	N/A	DRILLING METHOD:	3 1/4" HSA
ELEVATION:	739 ft	SAMPLING METHOD:	SS
LATITUDE:		HAMMER TYPE:	Automatic
LONGITUDE:		EFFICIENCY	82%
STATION: N/A	OFFSET: N/A	REVIEWED BY:	M. Nabil
REMARKS: None			

BORING SB-02

Water		
▽	While Drilling	N/A
▼	Upon Completion	N/A
▼	Cave Depth	N/A

BORING LOCATION:
See Boring Location Diagram

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ○ Moisture ◪ PL ✱ LL (0 25 50) STRENGTH, tsf ▲ Qu ✳ Qp (0 2.0 4.0)	Additional Remarks
SURFACE ELEVATION ELEV = 739.00	0					12" TOPSOIL					
				1		Brown fine to coarse SAND, trace Gravel, Silt, and Clay (FILL)		65-4-4 N=8	12		
				2		Gray SILTY CLAY, trace Gravel and Sand (FILL)		56-7-11 N=18	17		
	5					Boring terminated 5 feet below existing ground surface.					

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PROJECT NO.: 0406-249
PROJECT: Torrey Road Bridge Rehabilitation
LOCATION: 12th Street, Flint, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

Sheet 1 of 1

BORING #02

SAMPLE COMPLETED – 8/23/18
STA 18+00, 35' LT

DATE STARTED:	8/23/18	DRILL COMPANY:	PSI
DATE COMPLETED:	8/23/18	DRILLER: D. Guajardo	LOGGED BY: H. Ross
COMPLETION DEPTH	5.0 ft	DRILL RIG:	CME-55
BENCHMARK:	N/A	DRILLING METHOD:	3 1/4" HSA
ELEVATION:	739 ft	SAMPLING METHOD:	SS
LATITUDE:		HAMMER TYPE:	Automatic
LONGITUDE:		EFFICIENCY	82%
STATION: N/A	OFFSET: N/A	REVIEWED BY:	M. Nabil
REMARKS: None			

BORING SB-03

Water		
▽	While Drilling	N/A
▼	Upon Completion	N/A
▼	Cave Depth	N/A

BORING LOCATION:
See Boring Location Diagram

Elevation (feet)	Depth, (feet)	Graphic Log	Sample Type	Sample No.	Recovery (inches)	MATERIAL DESCRIPTION	USCS Classification	SPT Blows per 6-inch (SS)	Moisture, %	STANDARD PENETRATION TEST DATA N in blows/ft ○ Moisture ◪ PL ✱ LL (0 25 50) STRENGTH, tsf ▲ Qu ✳ Qp (0 2.0 4.0)	Additional Remarks
SURFACE ELEVATION ELEV = 739.00	0					10" TOPSOIL					
				1	18	Gray and brown CLAYEY SAND, trace Gravel, occasional Clay lenses (FILL)		8-7-7 N=14	10		
				2	12			4-6-8 N=14	15		
	5					Boring terminated 5 feet below existing ground surface.					

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3120 Sovereign Drive, Suite C
Lansing, MI 48911
Telephone: (517) 394-5700

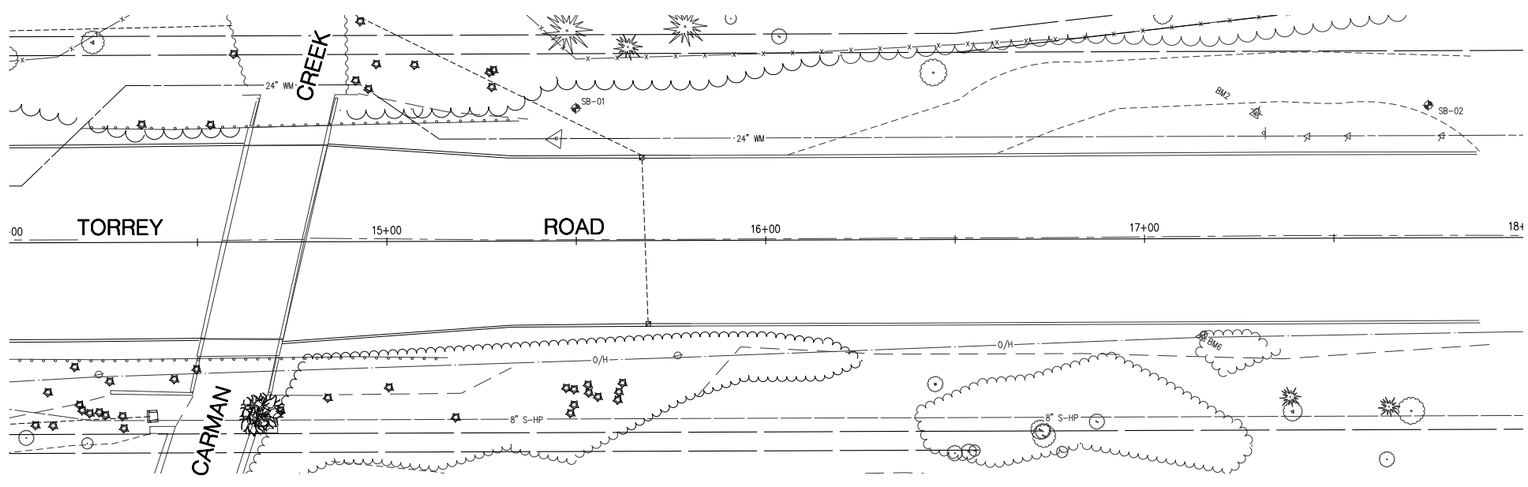
PROJECT NO.: 0406-249
PROJECT: Torrey Road Bridge Rehabilitation
LOCATION: 12th Street, Flint, Michigan

The stratification lines represent approximate boundaries. The transition may be gradual.

Sheet 1 of 1

BORING #03

SAMPLE COMPLETED – 8/23/18
STA 20+50, 35' LT



SOIL BORING MAP

SAMPLE COMPLETED – 8/23/18
SCALE: 1"=20'

NOTES

1. "N" BLOWS PER FOOT DENOTES NUMBER OF BLOWS REQUIRED TO DRIVE A 2" O.D. SPLIT SPOON SAMPLER THROUGH 3 SUCCESSIVE 6 INCH INCREMENTS USING A 165# HAMMER FALLING 30".
2. CONSISTENCY WAS DETERMINED BY INSPECTION OF SAMPLES AND SUBSTANTIATED BY SOILS RESISTANCE TO DRILLING TOOLS.
3. THE SOIL BORING LOGS REPRESENT POINT INFORMATION. PRESENTATION OF THIS INFORMATION IN NO WAY INFERS THAT SUBSURFACE CONDITIONS ARE THE SAME AT LOCATIONS OTHER THAN THE EXACT LOCATION OF THE BORING.
4. LOCATION OF SOIL BORINGS ARE ALSO SHOWN ON SHEET 09. (GENERAL PLAN OF SITE SHEET)
5. SOIL BORINGS WERE TAKEN BY PSI, PROJECT NO. 0406-249. THE SOILS REPORT IS ON FILE AT THE CORPORATE OFFICE OF ROWE PROFESSIONAL SERVICES COMPANY.

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CITY OF FLINT
LOG OF BORINGS
TORREY ROAD
OVER THE
CARMAN CREEK

APPROVED _____

MDOT UNIT			
CONSULT UNIT			
DRAWN BY	MJS	12/18	
CHECKED BY	ANH	12/18	
SHEET 06 OF 53			
STR NO. 2828			

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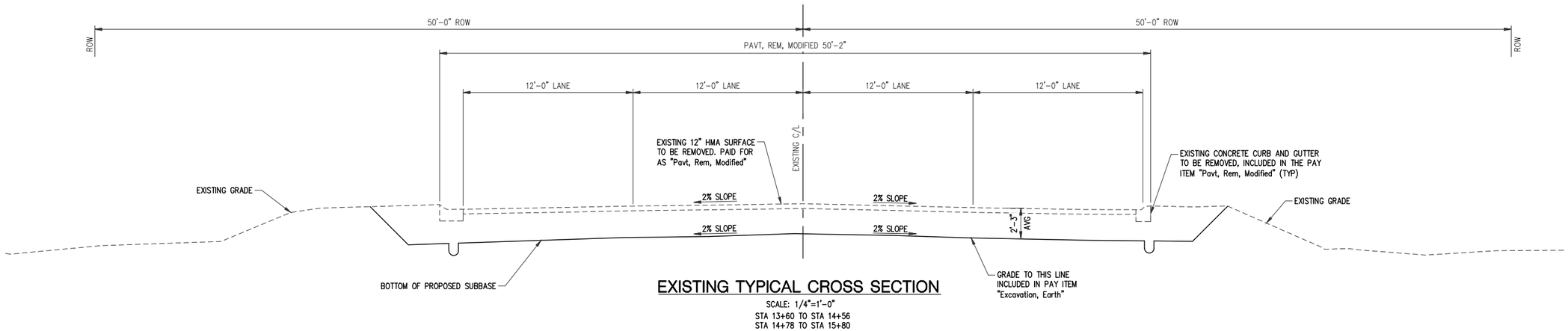
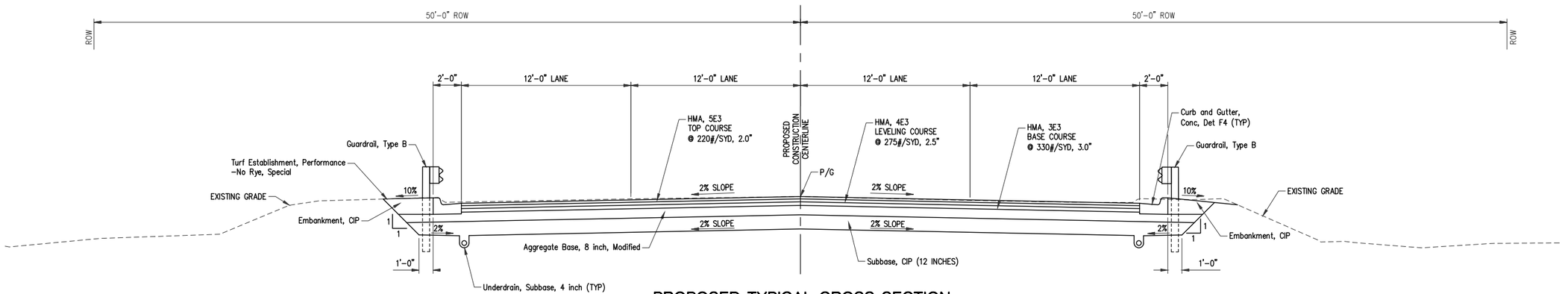


EXISTING TYPICAL CROSS SECTION

SCALE: 1/4"=1'-0"
STA 13+60 TO STA 14+56
STA 14+78 TO STA 15+80



PROPOSED TYPICAL CROSS SECTION

SCALE: 1/4"=1'-0"
STA 13+60 TO STA 15+80

HMA SURFACING APPLICATION CHART			
ITEM	RATE OF APPLICATION	ESTIMATED THICKNESS	PERFORMANCE GRADE
HMA, 5E3 (TOP COURSE)	220 #/SYD	2.0"	64-28
HMA, 4E3 (LEVELING COURSE)	275 #/SYD	2.5"	64-28
HMA, 3E3 (BASE COURSE)	330 #/SYD	3.0"	64-28

HMA BOND COAT SHALL BE APPLIED AT A RATE OF 0.05 TO 0.15 GAL/SYD FOR TACK COAT AS DIRECTED BY THE ENGINEER, COST INCLUDED IN HMA ITEMS.

WHERE RECLAIMED ASPHALT PAVEMENT (RAP) IS TO BE USED, A MAXIMUM OF 17% RAP BINDER BY WEIGHT OF THE TOTAL BINDER IN THE MIXTURE (TIER 1) SHALL APPLY. NO SHINGLES SHALL BE USED IN RAP. THE ENGINEER SHALL APPROVE THE MIX DESIGN PRIOR TO THE PLACEMENT OF THE MIXTURE.

TESTING COMPACTION SHALL BE COMPLETED USING THE DIRECT DENSITY METHOD PER SPECIAL PROVISION 12SP501J SERIES ACCEPTANCE OF HMA MIXTURE ON LOCAL AGENCY PROJECTS.

AGGREGATE WEAR INDEX	
HMA MIXTURE	REQ. A.W.I. #
5E3	260

THE AGGREGATE WEAR INDEX (AWI) NUMBER REQUIRED FOR THE AGGREGATE USED IN THE PRODUCTION OF THE HMA MIXTURE USED IN THE TOP COURSE OF THE TRAVELED WAY ON THIS PROJECT IS SHOWN IN THE TABLE ABOVE. THIS AWI NUMBER APPLIES TO ALL AGGREGATE SOURCES (NATURAL OR MANUFACTURED).

EARTHWORK TABLE		
ITEM	UNIT	QUANTITY
Excavation, Earth	CYD	808
Embankment, CIP	CYD	78

EARTHWORK NOTES:

1. CONTRACTOR MAY USE EXCAVATED MATERIAL AS EMBANKMENT ONLY IF IT IS SUITABLE MATERIAL APPROVED BY THE ENGINEER.
2. FINAL PAYMENT FOR Excavation, Earth AND Embankment, CIP PAY ITEMS WILL BE BASED ON PLAN QUANTITIES UNLESS OTHERWISE APPROVED BY THE ENGINEER.

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OVER THE
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CHECKED BY	ANH	12/18
SHEET 07 OF 53		
STR NO. 2828		

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BENCHMARKS

BENCHMARK #2
ELEVATION – 743.20
SET CHISELED "X" ON WEST-SOUTHWEST FLANGE BOLT OF HYDRANT, 9'± NORTH OF BACK OF CURB OF TORREY ROAD & 240'± EAST OF BRIDGE.

BENCHMARK #4
ELEVATION – 741.83
SET SPIKE IN SOUTHEAST FACE OF POWER POLE, 15'± SOUTH OF BACK OF CURB OF TORREY ROAD & 150'± WEST OF BRIDGE.

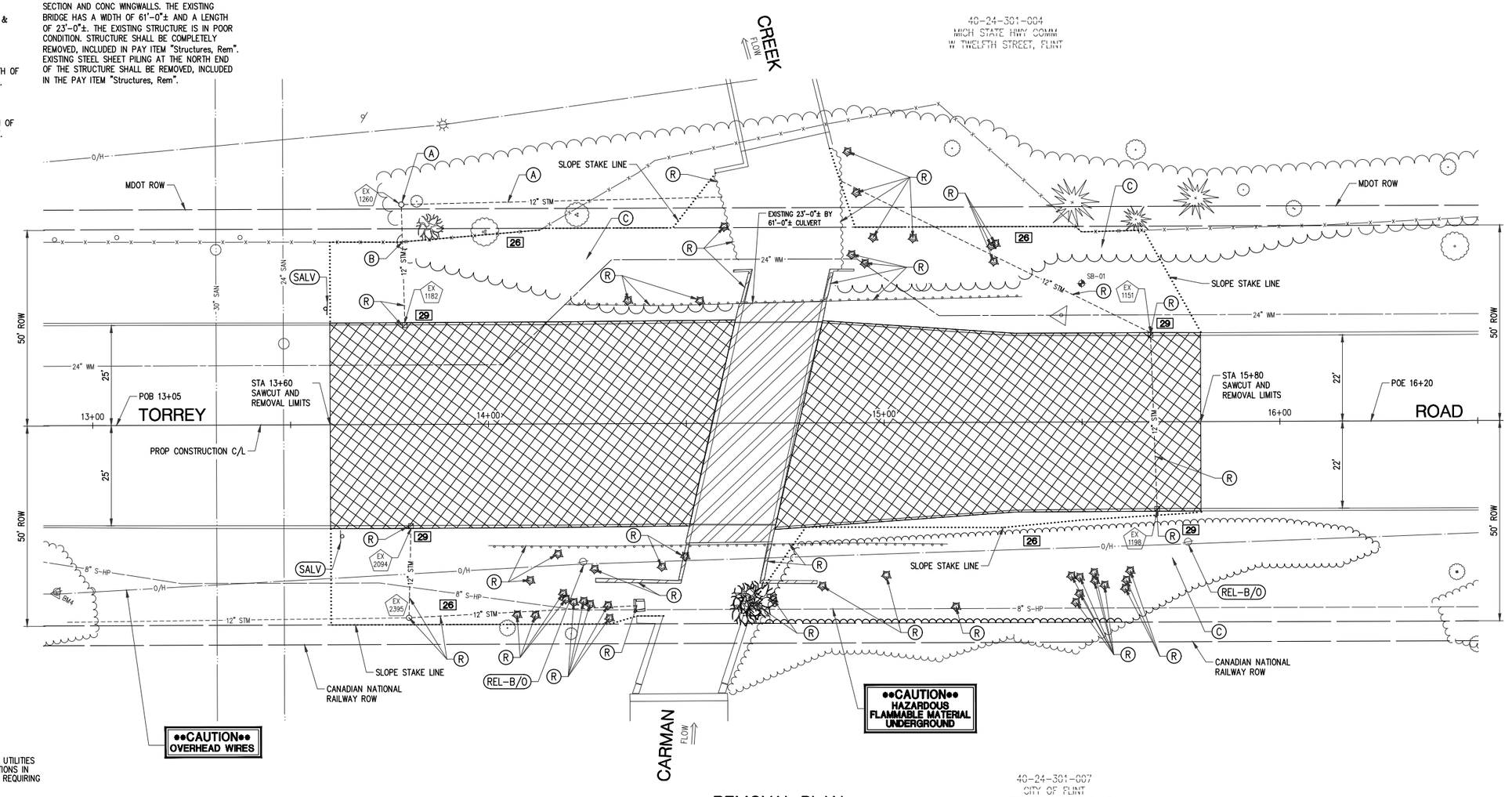
BENCHMARK #6
ELEVATION – 741.54
SET SPIKE IN FACE OF POWER POLE WITH LIGHT, 3'± SOUTH OF BACK OF CURB OF TORREY ROAD & 225'± EAST OF BRIDGE.

HORIZONTAL DATUM: MICHIGAN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE NAD83 (2011)
VERTICAL DATUM: NAVD88

EXISTING STRUCTURE:

THE EXISTING STRUCTURE IS A CONCRETE SLAB BRIDGE WITH A CONCRETE BOX BEAM WIDENED SECTION AND CONC WINGWALLS. THE EXISTING BRIDGE HAS A WIDTH OF 61'-0"± AND A LENGTH OF 23'-0"±. THE EXISTING STRUCTURE IS IN POOR CONDITION. STRUCTURE SHALL BE COMPLETELY REMOVED, INCLUDED IN PAY ITEM "Structures, Rem". EXISTING STEEL SHEET PILING AT THE NORTH END OF THE STRUCTURE SHALL BE REMOVED, INCLUDED IN THE PAY ITEM "Structures, Rem".

12+90 47.0't METAL POST
13+06 47.5't METAL POST
13+31 44.3't SANITARY MH
13+37 47.4't METAL POST
13+48 20.6't STORM MH
SALV 13+59 29.3't PARKING SIGN
13+69 77.8't MISC SIGN
REM 13+78 55.6't ROUND CB
REM 13+79 25.5't CURB INLET B/C
13+82 56.3't DECID. TREE
13+85 49.8't 7" DEAD TREE
13+89 75.7't LIGHT POLE
13+99 48.5't 7" THREE STEM TREE
REM 14+19 30.1't GUARD RAIL
14+22 52.8't 6" THREE STEM TREE
REM 14+35 31.1't 5" THREE STEM STUMP
REM 14+54 31.0't 18" STUMP
14+59.52't 12" RND METAL PIPE (CMP)
REM 14+60 49.6't 9" STUMP
REM 14+91 68.5't 4" THREE STEM STUMP
REM 14+92 42.5't 4" STUMP
REM 14+93 58.2't 4" THREE STEM STUMP
REM 14+95 40.3't 12" STUMP
REM 14+97 46.8't 4" TWO STEM STUMP
REM 15+07 46.6't 6" STUMP
15+17 69.2't 4" DECID. TREE
REM 15+27 44.6't 4" STUMP
15+28 40.7't 3" TWO STEM STUMP
REM 15+28 45.1't 4" STUMP
REM 15+35 31.7't GUARD RAIL
15+48 55.5't 14" PINE
15+51 98.4't LIGHT POLE
15+64 68.7't 5" LOCUST
REM 15+69 20.6't SQUARE CB
15+79 56.5't 12" PINE
15+89 58.5't 3" DECID. TREE
16+04 53.7't 4" TWO STEM TREE
16+43 64.0't 4" POPLAR
16+44 44.0't 7" LOCUST



REMOVAL NOTES:

THE CONTRACTOR SHALL LOCATE ALL ACTIVE UNDERGROUND UTILITIES PRIOR TO STARTING WORK AND SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER AS TO ENSURE THAT THOSE UTILITIES NOT REQUIRING RELOCATION WILL NOT BE DISTURBED.

TORREY ROAD TRAFFIC IS TO BE DETOURED OVER OTHER EXISTING ROADS.

THE WATER LEVEL IS SUBJECT TO CHANGE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING A DETERMINATION OF WATER LEVELS THAT MAY EXIST DURING CONSTRUCTION.

FALSE DECKING SHALL INCLUDE THE AREA BOUNDED BY REFERENCE LINES A & B AND OUTSIDE FLANGE OF FASCIA BEAMS. THE ESTIMATED AREA IS 1,200 SQUARE FEET DURING REMOVAL.

TEMPORARILY STORED EXCAVATED MATERIAL SHALL BE STORED ON AN UPLAND SITE, AND SHALL NOT BE ALLOWED TO ERODE INTO THE WATERCOURSE.

MEASURES SHALL BE TAKEN TO PREVENT DEBRIS FROM FALLING FROM THE STRUCTURE INTO THE CREEK. IF DEBRIS FALLS INTO THE CREEK, IT SHALL BE REMOVED IMMEDIATELY.

EXCAVATED MATERIAL FROM THE COFFERDAM SHALL NOT BE TEMPORARILY OR PERMANENTLY STORED IN THE 100 YR. FLOOD PLAIN OR ANY PRIVATELY OWNED LAND, WITHOUT WRITTEN PERMISSION OF THE PROPERTY OWNER.

SOIL EROSION AND SEDIMENTATION CONTROL DEVICES SHALL BE UTILIZED ON THIS PROJECT TO EFFECTIVELY REDUCE ACCELERATED SOIL EROSION AND SEDIMENTATION. ANTICIPATED CONTROL MEASURES ARE:

3 7 26 29

PLAN ELEVATIONS REFER TO NAVD88 DATUM.

12+91 42.2't BM 4
12+91 42.0't ELEC POLE

REMOVAL PLAN

SCALE: 1" = 15'

40-24-301-007
CITY OF FLINT
W TWELFTH STREET, FLINT

13+63 28.2't PARKING SIGN SALV
13+80 26.1't CURB INLET B/C REM
13+80 48.9't ROUND CB REM
14+00 30.7't GUARD RAIL REM
14+05 51.5't 4" DECID. TREE
14+07 48.2't 6" STUMP REM
14+10 39.5't 3" STUMP REM
14+12 48.3't 4" STUMP REM
14+17 32.9't 14" STUMP REM
14+19 42.8't 4" STUMP REM
14+21 53.0't 3" DECID. TREE
14+24 34.8't ELEC POLE REL-B/O
14+26 44.4't 4" STUMP REM
14+27 36.7't 4" STUMP REM
14+30 49.1't 5" STUMP REM
14+37 46.0't 12" RND METAL PIPE (CMP) REM
14+44 36.1't 3" THREE STEM STUMP REM
14+50 33.6't 9" THREE STEM STUMP REM
14+65 47.2't 8" DEAD TREE REM
14+65 44.1't 8" DEAD TREE REM
14+72 44.5't 4" STUMP REM
14+84 41.2't 6" STUMP REM
15+00 38.5't 20" STUMP REM
15+16 30.7't GUARD RAIL REM
15+18 46.5't 5" STUMP REM
15+48 45.5't 5" FIVE STEM STUMP REM
15+49 39.2't 3" TWO STEM STUMP REM
15+53 38.0't 4" STUMP REM
15+56 41.2't 3" STUMP REM
15+61 39.3't 6" THREE STEM STUMP REM
15+62 37.6't 5" STUMP REM
15+69 20.7't SQUARE CB REM
15+77 30.3't ELEC POLE REL-B/O
16+43 38.2't 4" FOUR STEM TREE
16+50 56.4't 4" DECID. TREE

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PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT
REMOVAL SHEET
TORREY ROAD OVER THE CARMAN CREEK

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	12/18
CHECKED BY	ANH	12/18
SHEET	08 OF	53
STR NO.	2828	

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BENCHMARKS

BENCHMARK #2
ELEVATION – 743.20
SET CHISELED "X" ON WEST-SOUTHWEST FLANGE BOLT OF HYDRANT, 9'± NORTH OF BACK OF CURB OF TORREY ROAD (12TH STREET) & 240'± EAST OF BRIDGE

BENCHMARK #4
ELEVATION – 741.83
SET SPIKE IN SOUTHEAST FACE OF POWER POLE, 15'± SOUTH OF BACK OF CURB OF TORREY ROAD (12TH STREET) & 160'± WEST OF BRIDGE

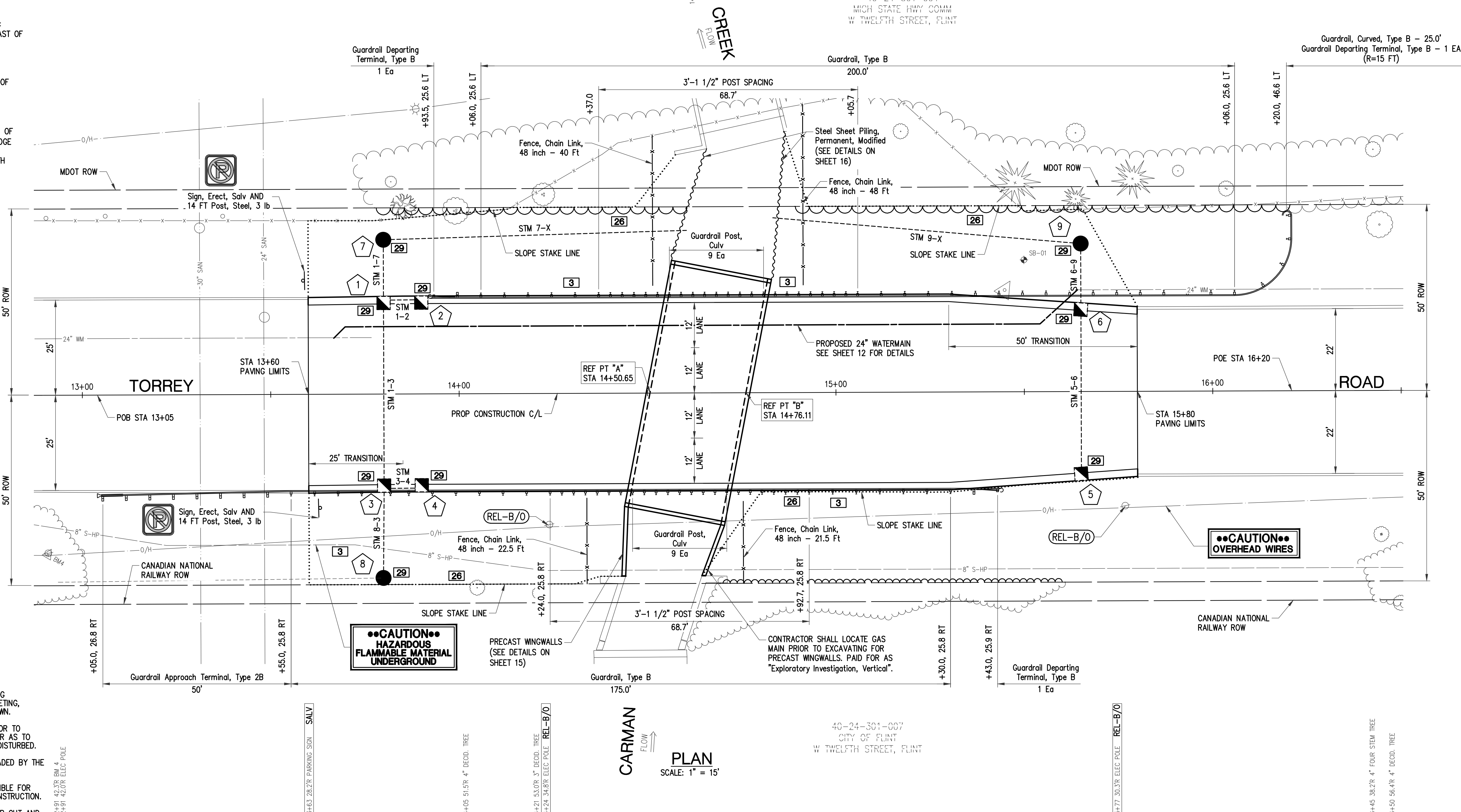
BENCHMARK #6
ELEVATION – 741.54
SET SPIKE IN SOUTHWEST FACE OF POWER POLE WITH LIGHT, 3'± SOUTH OF BACK OF CURB OF TORREY ROAD (12TH STREET) & 225'± EAST OF BRIDGE

HORIZONTAL DATUM: MICHIGAN STATE PLANE COORDINATE SYSTEM, SOUTH ZONE NAD83 (2011)
VERTICAL DATUM: NAVD88

CARMAN CREEK - SUMMARY OF HYDRAULIC ANALYSIS

FLOOD DATA	DISCHARGE IN CFS	EXISTING CONDITION			PROPOSED CONDITION			CHANGE IN ELEV.
		WSEL UPSTREAM (ft.)	WATERWAY AREA (sq./ft.)	VELOCITY DOWNSTREAM (ft./s.)	WSEL UPSTREAM (ft.)	WATERWAY AREA (sq./ft.)	VELOCITY DOWNSTREAM (ft./s.)	CHANGE IN WSEL UPSTREAM
50 YEAR	1500	734.15	198.58	7.51	734.14	282.39	7.51	−0.01
100 YEAR	1700	735.46	224.36	7.43	735.44	310.65	7.43	−0.02

MAX AREA BELOW LOW CHORD IS 264.00 sq./ft. THE WATER SURFACE AND/OR ENERGY GRADE ELEVATIONS SHOWN ON THE ABOVE HYDRAULIC TABLE ARE TO BE USED FOR COMPARISON PURPOSES ONLY AND ARE NOT TO BE USED FOR ESTABLISHING A REGULATORY FLOODPLAIN. THE ELEVATIONS MAY BE USED PROVIDED THEY ARE VERIFIED WITH THE LAND AND WATER MANAGEMENT DIVISION, MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY.



PLAN
SCALE: 1" = 15'

GENERAL PLAN OF SITE NOTES:

THE WORK COVERED BY THESE PLANS INCLUDES REMOVAL OF THE EXISTING STRUCTURE, CONSTRUCTION OF THE NEW STRUCTURE, PLACING STEEL SHEETING, MAINTAINING TRAFFIC, AND RELATED APPROACH WORK TO THE LIMITS SHOWN.

THE CONTRACTOR SHALL LOCATE ALL ACTIVE UNDERGROUND UTILITIES PRIOR TO STARTING WORK AND SHALL CONDUCT HIS OPERATIONS IN SUCH A MANNER AS TO ENSURE THAT THOSE UTILITIES NOT REQUIRING RELOCATION WILL NOT BE DISTURBED.

THE GROUND ADJACENT TO THE STRUCTURE AND SHEETING SHALL BE GRADED BY THE CONTRACTOR TO PROVIDE DRAINAGE.

THE WATER LEVEL IS SUBJECT TO CHANGE. THE CONTRACTOR IS RESPONSIBLE FOR MAKING A DETERMINATION OF WATER LEVELS THAT MAY EXIST DURING CONSTRUCTION.

SOIL CLASSIFIED AS UNSTABLE MATERIAL BELOW CULVERT SHALL BE UNDER CUT AND REPLACED WITH Backfill, Structure, CIP COMPACTED TO 95% OF ITS MAXIMUM UNIT WEIGHT. ACTUAL LIMITS OF EXCAVATION WILL BE DETERMINED BY THE ENGINEER AT THE TIME OF CONSTRUCTION. COST FOR THIS WORK TO BE PAID FOR AS Excavation, Fdn AND Backfill, Structure, CIP.

TEMPORARILY STORED EXCAVATED MATERIAL SHALL BE STORED ON AN UPLAND SITE, AND SHALL NOT BE ALLOWED TO ERODE INTO THE WATERCOURSE.

MEASURES SHALL BE TAKEN TO PREVENT DEBRIS FROM FALLING FROM THE STRUCTURE INTO THE CREEK. IF DEBRIS FALLS INTO THE CREEK, IT SHALL BE REMOVED IMMEDIATELY.

THE CARMAN CREEK AT TORREY ROAD IN SECTION 24, T7N-R6E, CITY OF FLINT, GENESEE COUNTY, HAS A DRAINAGE AREA OF 12.9 SQUARE MILES. THE 10%, 2%, 1%, AND 0.2% CHANCE PEAK FLOWS ARE ESTIMATED TO BE 1000, 1500, 1700, AND 2200 CFS, RESPECTIVELY.

PLAN ELEVATIONS REFER TO NAVD88 DATUM.

REFERENCE POINTS ARE LOCATED AT THE INSIDE EDGE OF THE CULVERT WALLS.

STORM STRUCTURE OFFSETS ARE TO BACK OF CURB AND GUTTER FOR K COVERS AND TO CENTER OF STRUCTURE FOR ALL OTHERS.

PROPOSED STORM SEWER STRUCTURE TABLE

STRUCT NO.	DIA.	COVER TYPE	RIM ELEVATION	INVERT	STATION	OFFSET
1	48"	K	T/C=739.05	12" 727.34 NE (PR) 12" 727.44 NW (PR) 12" 727.54 SE (PR)	13+80.0	24.9 L
2	48"	K	T/C=739.08	12" 727.44 SW (PR)	13+90.0	25.0 L
3	48"	K	T/C=739.05	12" 733.75 NE (PR) 12" 731.14 SE (PR) 12" 728.04 NW (PR)	13+80.0	25.1 R
4	48"	K	T/C=739.08	12" 733.85 SW (PR)	13+90.0	25.0 R
5	48"	K	T/C=739.93	12" 735.29 NW (PR)	15+65.1	22.6 R

PROPOSED STORM SEWER STRUCTURE TABLE

STRUCT NO.	DIA.	COVER TYPE	RIM ELEVATION	INVERT	STATION	OFFSET
6	48"	K	T/C=739.93	12" 734.84 SE (PR) 12" 734.74 NW (PR)	15+65.1	22.5 L
7	48"	G	RIM=738.83	12" 727.50 NE (PR) 12" 727.28 SE (PR)	13+80.0	41.0 L
8	48"	G	RIM=735.44	12" 731.38 NW (PR) 12" 731.38 SW (EX)	13+79.7	48.8 R
9	48"	G	RIM=739.95	12" 734.57 SE (PR) 12" 730.00 SW (PR)	15+65.1	39.3 L

PROPOSED STORM SEWER PIPE TABLE

PIPE NUMBER	DIAMETER	PAY ITEM	TOTAL LENGTH	SLOPE	TRENCH DETAIL A (T.D. A)	TRENCH DETAIL B (T.D. B)
1–2	12"	Sewer, Cl A, 12 inch	10'	1.00%	0'	10'
1–3	12"	Sewer, Cl A, 12 inch	50'	1.00%	0'	50'
1–7	12"	Sewer, Cl A, 12 inch	16'	1.00%	0'	16'
3–4	12"	Sewer, Cl A, 12 inch	10'	1.00%	0'	10'
5–6	12"	Sewer, Cl A, 12 inch	45'	1.00%	0'	45'
6–9	12"	Sewer, Cl A, 12 inch	17'	1.00%	0'	17'
7–X	12"	Sewer, Cl A, 12 inch	80'	2.05%	80'	0'
9–X	12"	Sewer, Cl A, 12 inch	82'	5.07%	82'	0'
STM 8–3	12"	Sewer, Cl A, 12 inch	24'	1.00%	0'	24'

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PLAN SUBMITTALS AND CHANGES
BIDDING DOCUMENTS

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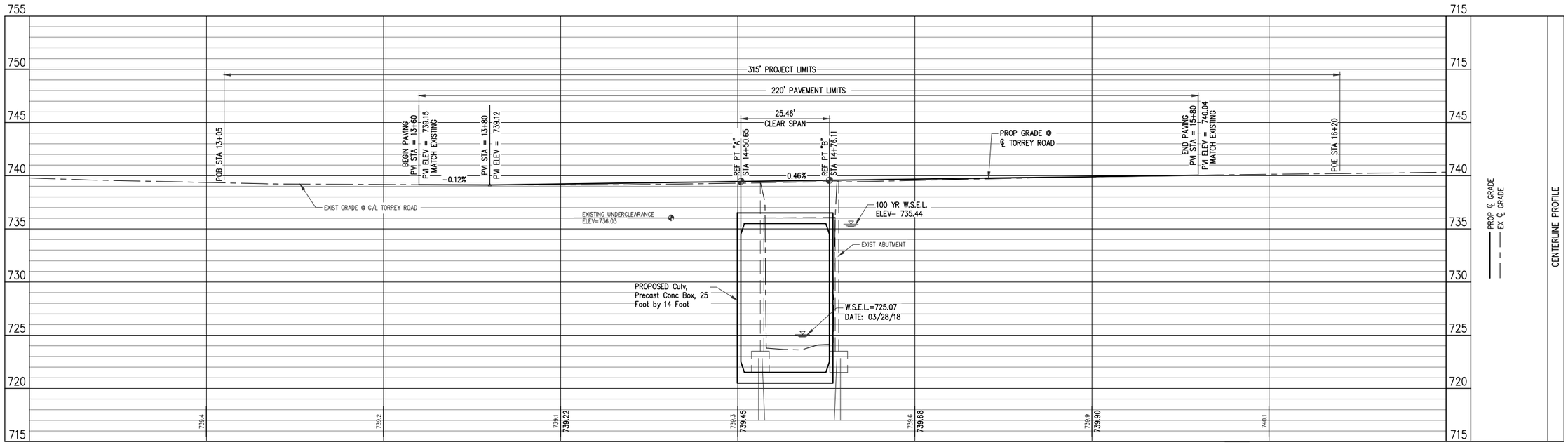
CITY OF FLINT
GENERAL PLAN OF SITE
TORREY ROAD
OVER THE
CARMAN CREEK

APPROVED ____________

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	12/18
CHECKED BY	ANH	12/18

STR NO. 2828



PROFILE

SCALE: HORIZ– 1" = 15'
VERT– 1" = 5'

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CITY OF FLINT

GENERAL PLAN OF SITE

TORREY ROAD
OVER THE
CARMAN CREEK

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	12/18
CHECKED BY	ANH	12/18
SHEET 10 OF 53		
STR NO. 2828		

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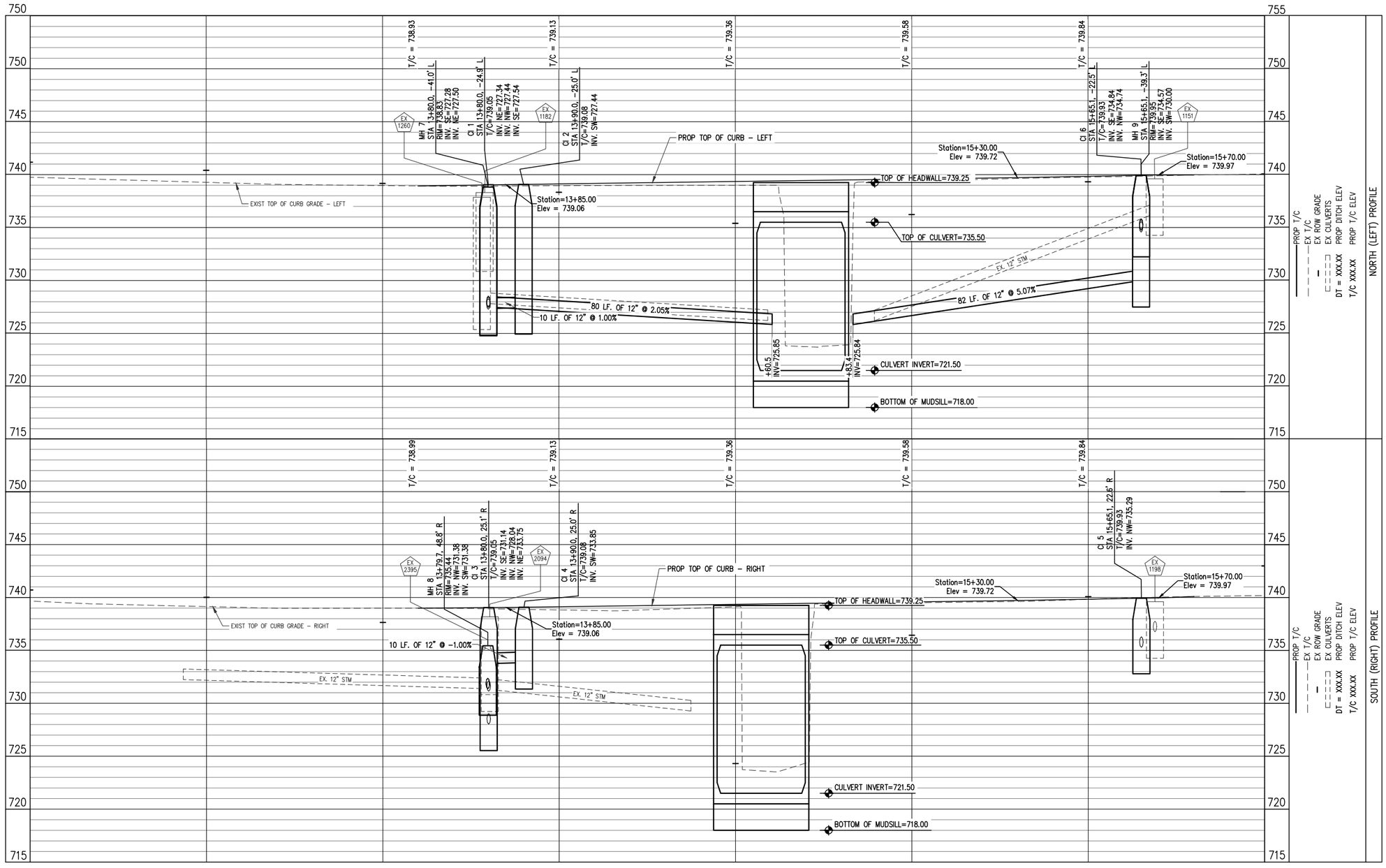

PROFILE

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GENERAL PLAN OF SITE

TORREY ROAD
OVER THE
CARMAN CREEK

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CONSULT UNIT		
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SHEET 11 OF 53		
STR NO. 2828		

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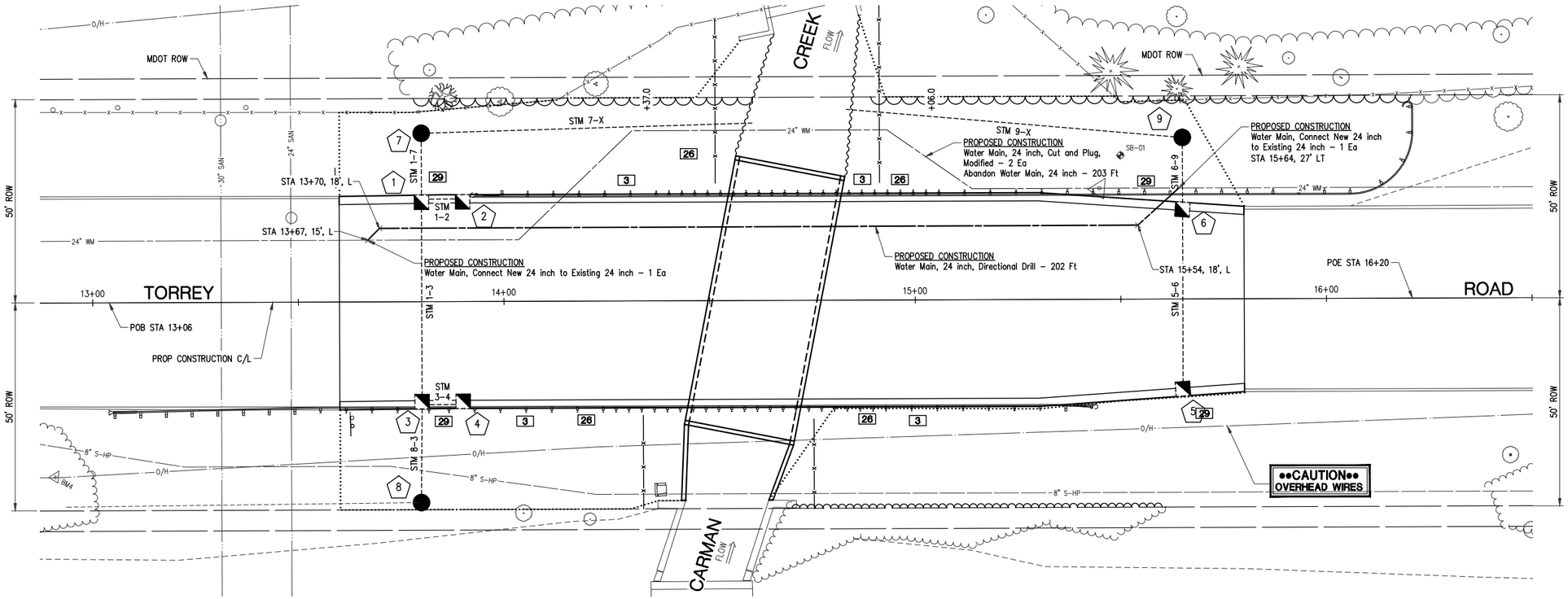
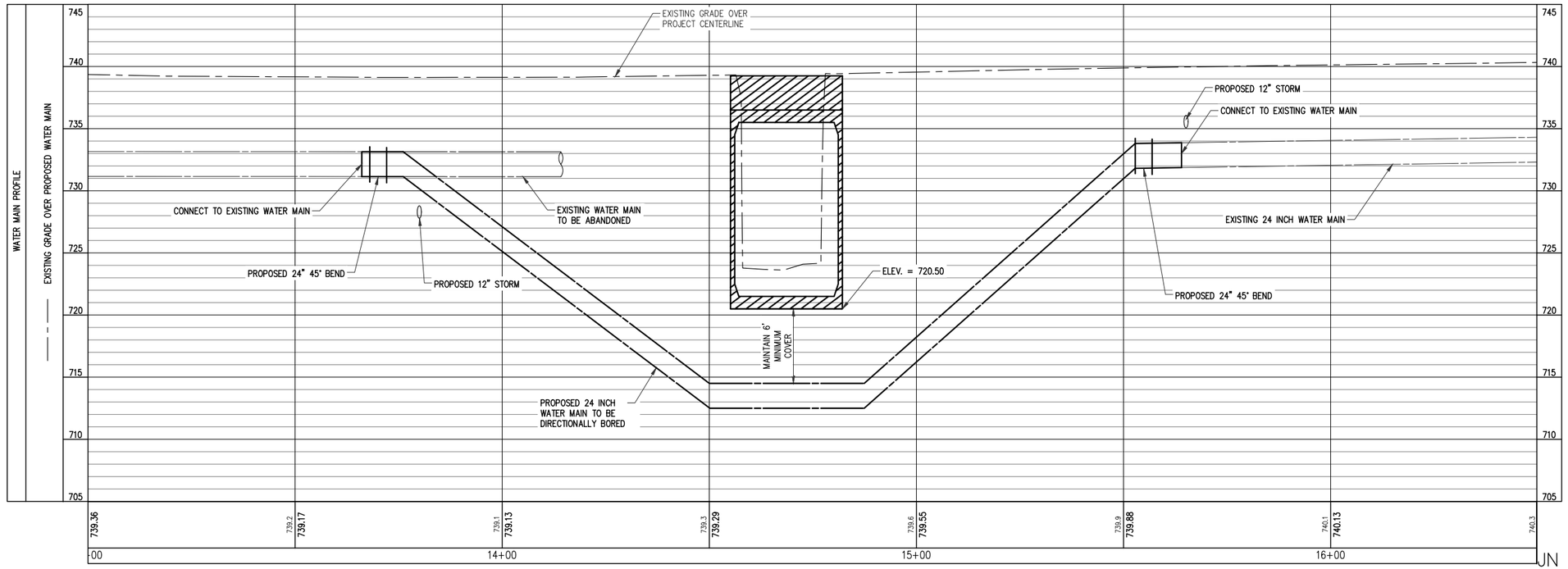


NOTE: BOTH CONNECTIONS TO EXISTING WATER MAIN MUST BE DONE THE SAME DAY UPON COMPLETION AND PASSING OF PRESSURE TESTING AND DISINFECTION.



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CITY OF FLINT

WATER MAIN DETAILS

TORREY ROAD
OVER THE
CARMAN CREEK

APPROVED _____

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CONSULT UNIT		
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SHEET	12 OF	53
STR NO.	2828	

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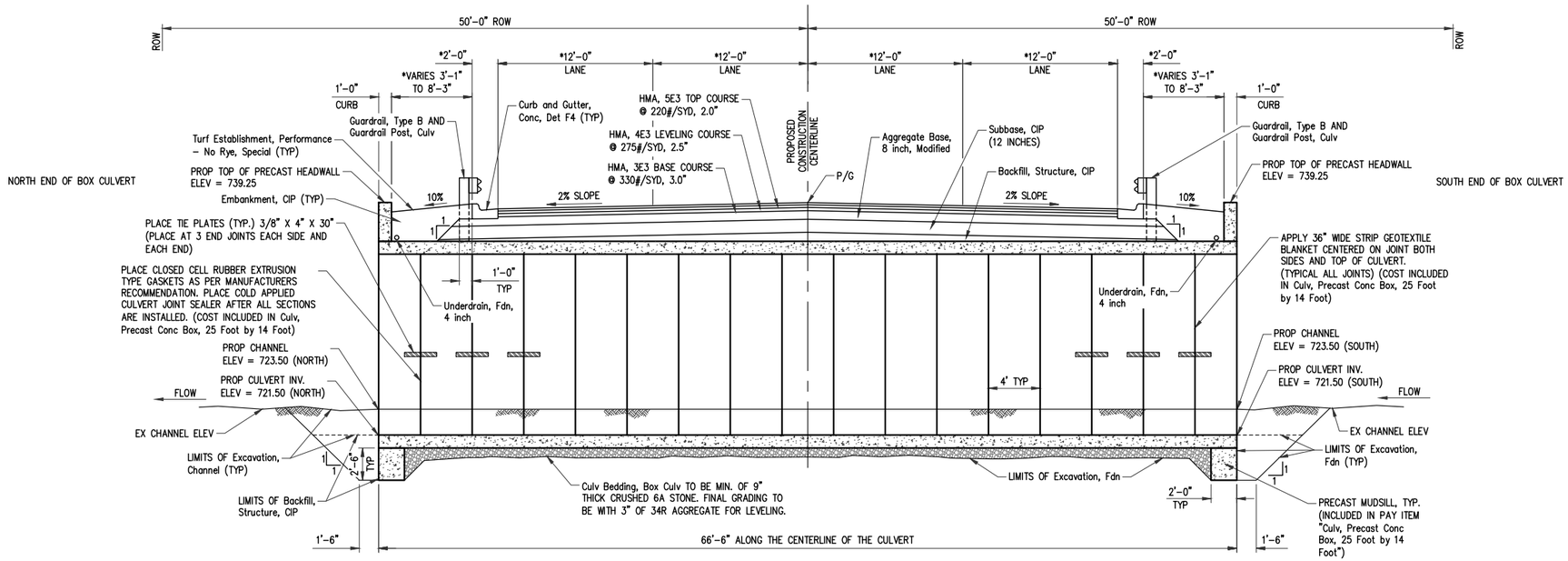
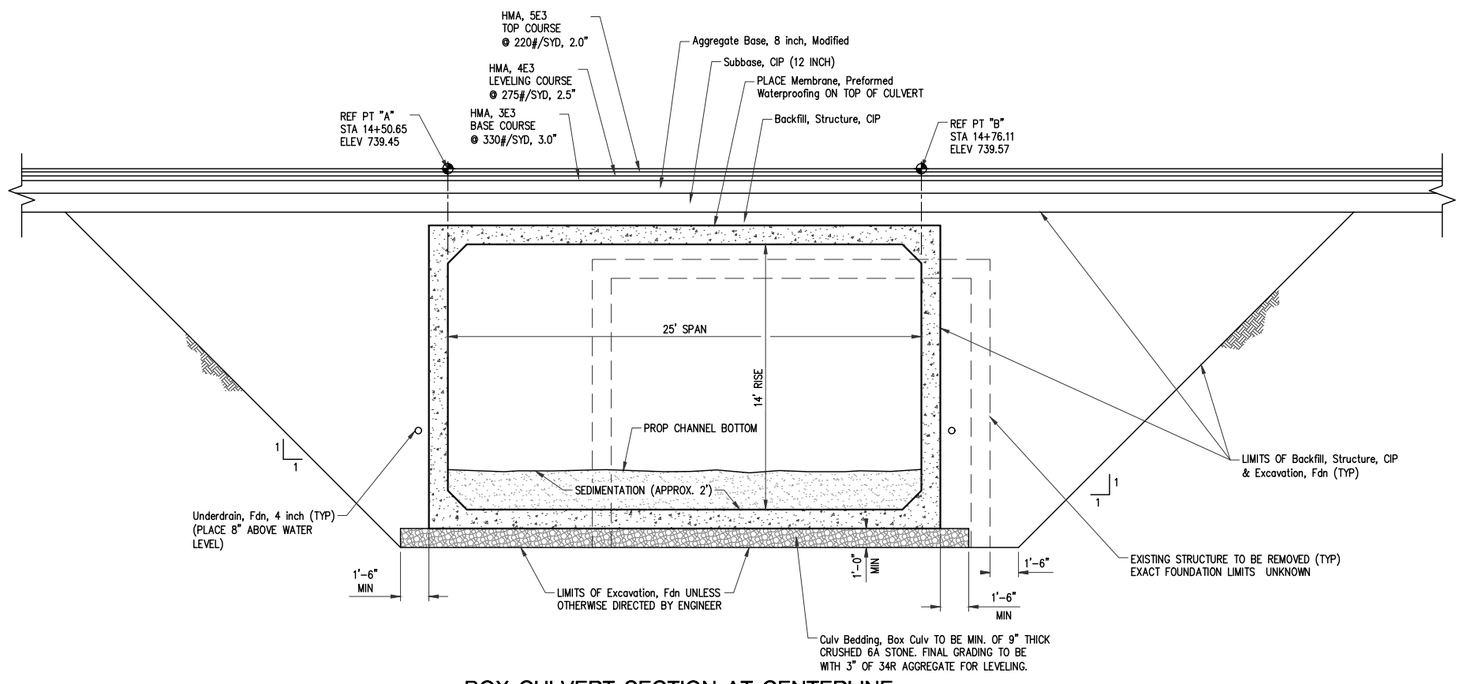


PROFILE VIEW OF BOX CULVERT

SCALE: 3/16" = 1'-0"

NOTE: * DENOTES DIMENSIONS PERPENDICULAR TO CONSTRUCTION ℄



BOX CULVERT SECTION AT CENTERLINE

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

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PLAN SUBMITTALS AND CHANGES

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CITY OF FLINT

CULVERT DETAILS

TORREY ROAD OVER THE CARMAN CREEK

APPROVED _____

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SHEET 13 OF 53		
STR NO. 2828		

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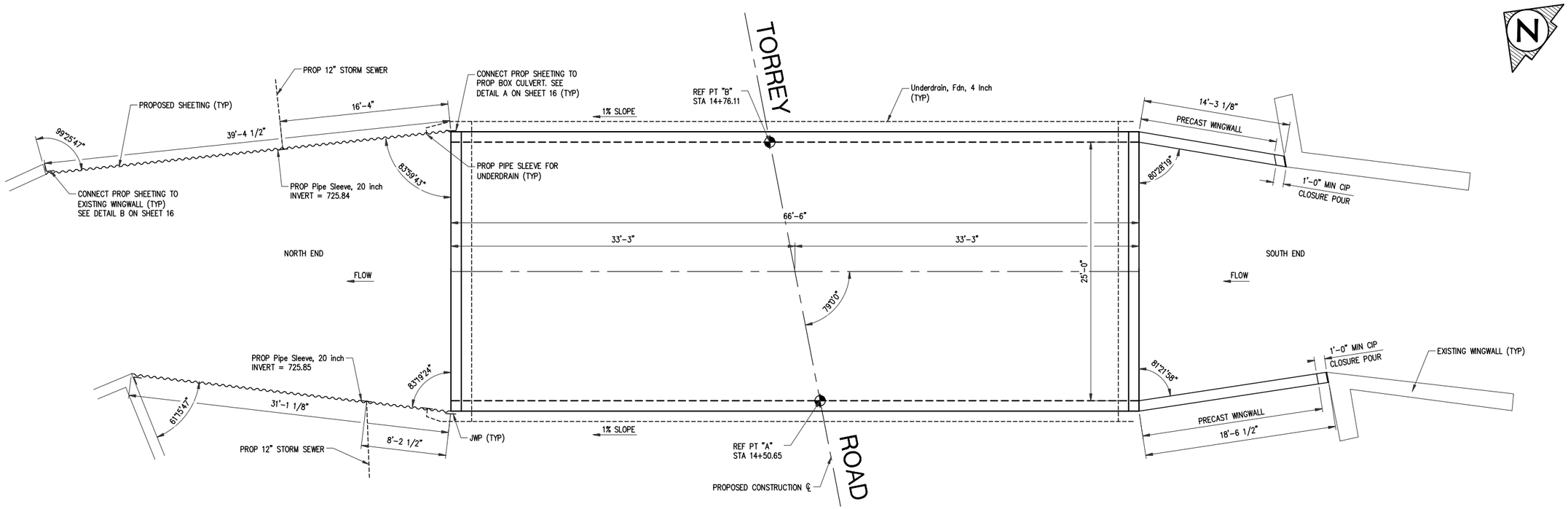
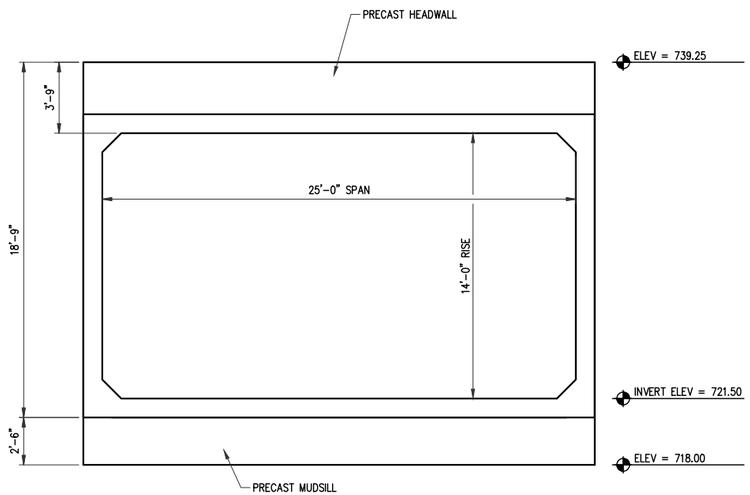


PLAN

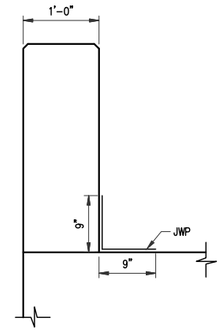
SCALE: 3/16" = 1'-0"

BOX CULVERT MISC QUANTITIES		
PAY ITEM	UNIT	AMOUNT
CULV BEDDING, BOX CULV	CYD	73
JOINT WATERPROOFING	SFT	240
MEMBRANE, PREFORMED WATERPROOFING	SFT	1742
UNDERDRAIN, FDN, 4 INCH	FT	250
STEEL SHEET PILING, PERMANENT, MODIFIED	SFT	4526



END VIEW OF BOX CULVERT

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



PRECAST HEADWALL DETAIL

SCALE: 1"=1'-0"

*NOTE: JWP DENOTES JOINT WATERPROOFING.

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2/1/19	ISSUED FOR BIDS

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CULVERT DETAILS

TORREY ROAD OVER THE CARMAN CREEK

APPROVED _____

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CONSULT UNIT		
DRAWN BY	MJS	12/18
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SHEET 14 OF 53		
STR NO. 2828		

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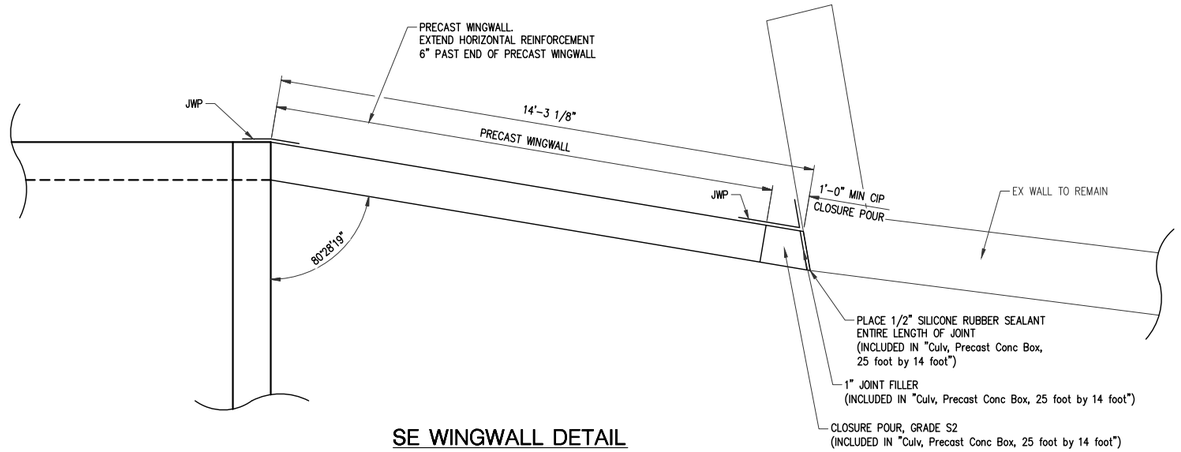
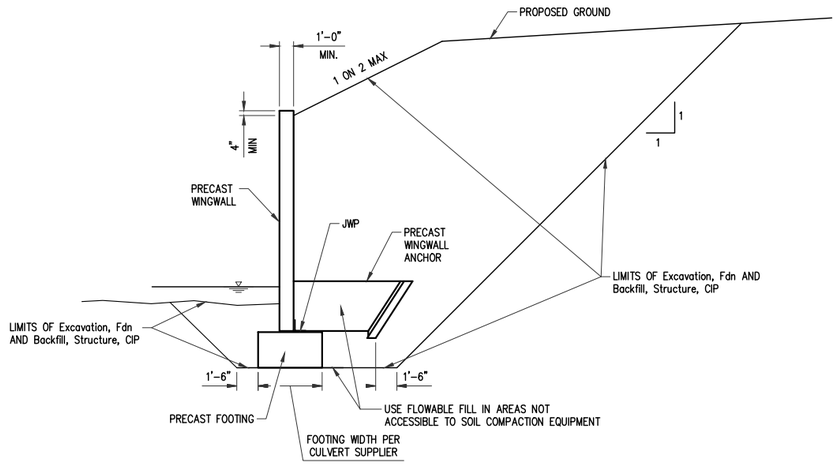


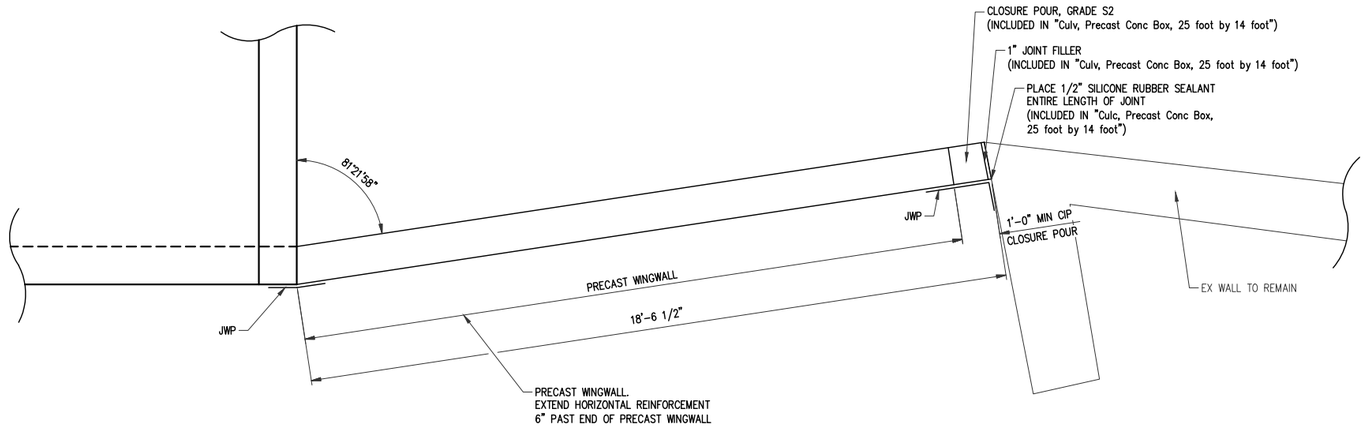
SE WINGWALL DETAIL

SCALE: 1/2" = 1'-0"



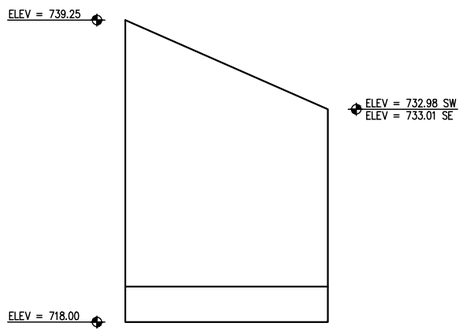
SECTION THROUGH WINGWALL

SCALE: 3/16"=1'-0"



SW WINGWALL DETAIL

SCALE: 1/2" = 1'-0"



WINGWALL ELEVATION DETAIL

SCALE: 3/16"=1'-0"

MISCELLANEOUS NOTES

JWP DENOTES JOINT WATERPROOFING.

FOR WINGWALL DESIGN, THE NET ALLOWABLE BEARING CAPACITY OF THE SOIL IS 4,000 PSF.

THE CONTRACTOR IS RESPONSIBLE FOR ASSURING THAT A POSITIVE CONNECTION IS PROVIDED BETWEEN THE END CULVERT SEGMENT AND PRECAST WINGWALLS IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS. WORK AND MATERIALS ASSOCIATED WITH THIS CONNECTION WILL NOT BE PAID FOR SEPARATELY, BUT WILL BE INCLUDED WITH THE PAY ITEM FOR THE BOX CULVERT.

Know what's **below.**
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PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT

CULVERT DETAILS

TORREY ROAD
OVER THE
CARMAN CREEK

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	12/18
CHECKED BY	ANH	12/18
SHEET 15 OF 53		
STR NO. 2828		

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STEEL SHEET PILING NOTES

ALL PERMANENT SHEET PILING SHALL BE PZ27. WHERE ALLOWED BY THE ENGINEER, SELECT ALTERNATE HOT ROLLED STEEL PILING WITH A NOMINAL SECTION MODULUS OF AT LEAST 30.2 CUBIC INCHES PER FOOT OR COLD ROLLED SHEET PILING WITH A NOMINAL SECTION MODULUS OF AT LEAST 32.4 CUBIC INCHES PER FOOT.

THE CAP SHALL BE A STEEL CHANNEL OR SHALL BE A BENT PLATE FABRICATED FROM STEEL PLATE WITH A MINIMUM THICKNESS OF 1/4". THE CAP SHALL BE LARGE ENOUGH TO COVER THE STEEL SHEET PILING AND ALLOW WELDING OF THE CAP TO THE SHEETING. THE STEEL FOR THE CAP SHALL BE GRADE 36 STEEL OR BETTER.

THE CAP SHALL BE TACK WELDED TO THE STEEL SHEETING AT SUFFICIENT INTERVALS TO PROVIDE ADEQUATE ATTACHMENT.

THE CAP SHALL BE A CONTINUOUS PIECE ALONG THE LENGTH OF SHEETING WHEREVER POSSIBLE. WHERE THE CAP CAN NOT BE INSTALLED AS ONE CONTINUOUS PIECE, BUT THE TOP OF THE STEEL SHEETING IS NOT STEPPED, THE SECTIONS SHALL BE WELDED TOGETHER.

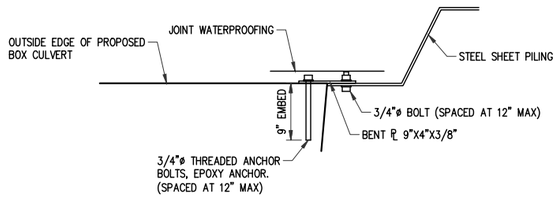
ALL ATTACHMENT HARDWARE SHALL BE GALVANIZED IN ACCORDANCE WITH AASHTO M232 AND MEET THE REQUIREMENTS FOR HIGH STRENGTH STEEL BOLTS, NUTS AND WASHERS.

BECAUSE OF THE VARIABILITY IN SHEET PILING LAYING LENGTHS, THE PAY QUANTITY WILL BE PLAN QUANTITY REGARDLESS OF THE AREA DRIVEN UNLESS THERE IS A DESIGN CHANGE.

THREADED ANCHOR BOLTS MUST MEET THE REQUIREMENTS OF ASTM F1554, FOR GRADE 36. BOLTS MUST MEET THE REQUIREMENTS OF AASHTO M164 TYPE 1 BOLTS.

MISCELLANEOUS QUANTITIES

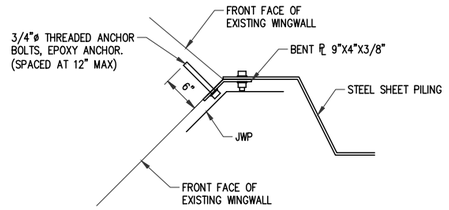
PAY ITEM	UNIT	AMOUNT
JOINT WATERPROOFING	SFT	100
PIPE SLEEVE, 10 INCH	EA	2
PIPE SLEEVE, 10 INCH, PLACED	EA	2
PIPE SLEEVE, 20 INCH	EA	2
PIPE SLEEVE, 20 INCH, PLACED	EA	2



DETAIL A - PROP CULVERT

SCALE: 1" = 1'-0"

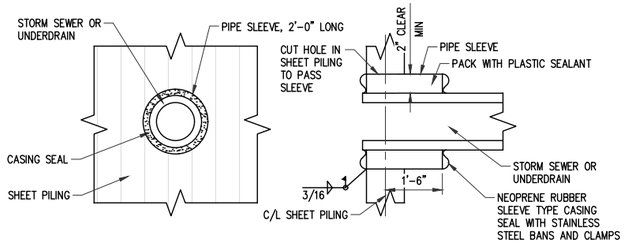
CONNECTION PLATES, HARDWARE, EPOXY ANCHOR SYSTEM, AND STEEL CAP INCLUDED IN PAY ITEM Steel Sheet Piling, Permanent, Modified.



DETAIL B - EXISTING WINGWALL

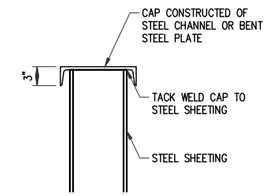
SCALE: 1" = 1'-0"

CONNECTION PLATES, HARDWARE, EPOXY ANCHOR SYSTEM, AND STEEL CAP INCLUDED IN PAY ITEM Steel Sheet Piling, Permanent, Modified.



TYPICAL PIPE THRU STEEL SHEET PILING

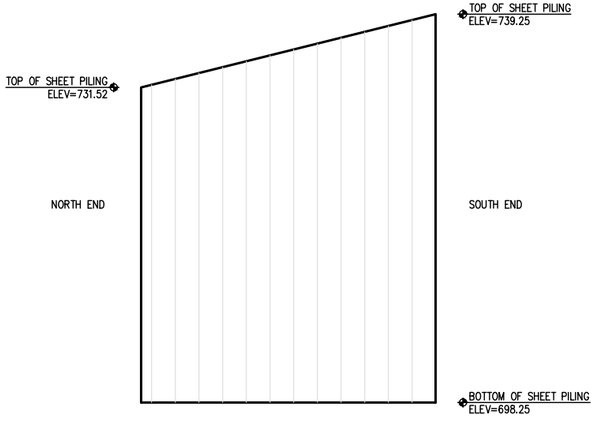
SCALE: 1/2"=1'-0"



STEEL PILING CAP DETAIL

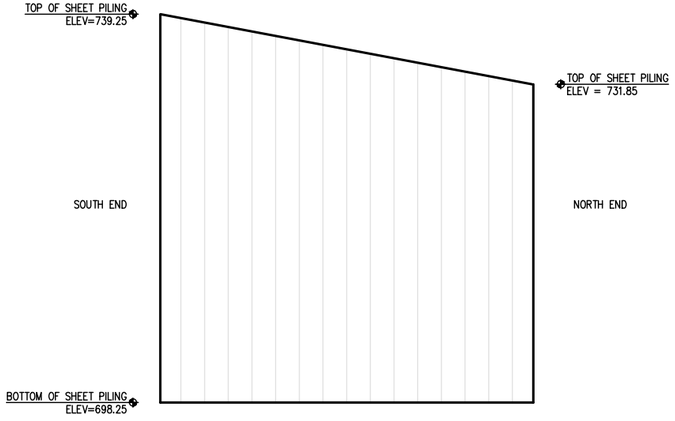
NOT TO SCALE

CONNECTION PLATES, HARDWARE, EPOXY ANCHOR SYSTEM, AND STEEL CAP INCLUDED IN PAY ITEM Steel Sheet Piling, Permanent, Modified.



NW SHEET PILE DETAIL

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



NE SHEET PILE DETAIL

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

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PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT

CULVERT DETAILS

TORREY ROAD OVER THE CARMAN CREEK

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	12/18
CHECKED BY	ANH	12/18
SHEET	16 OF	53
STR NO.	2828	

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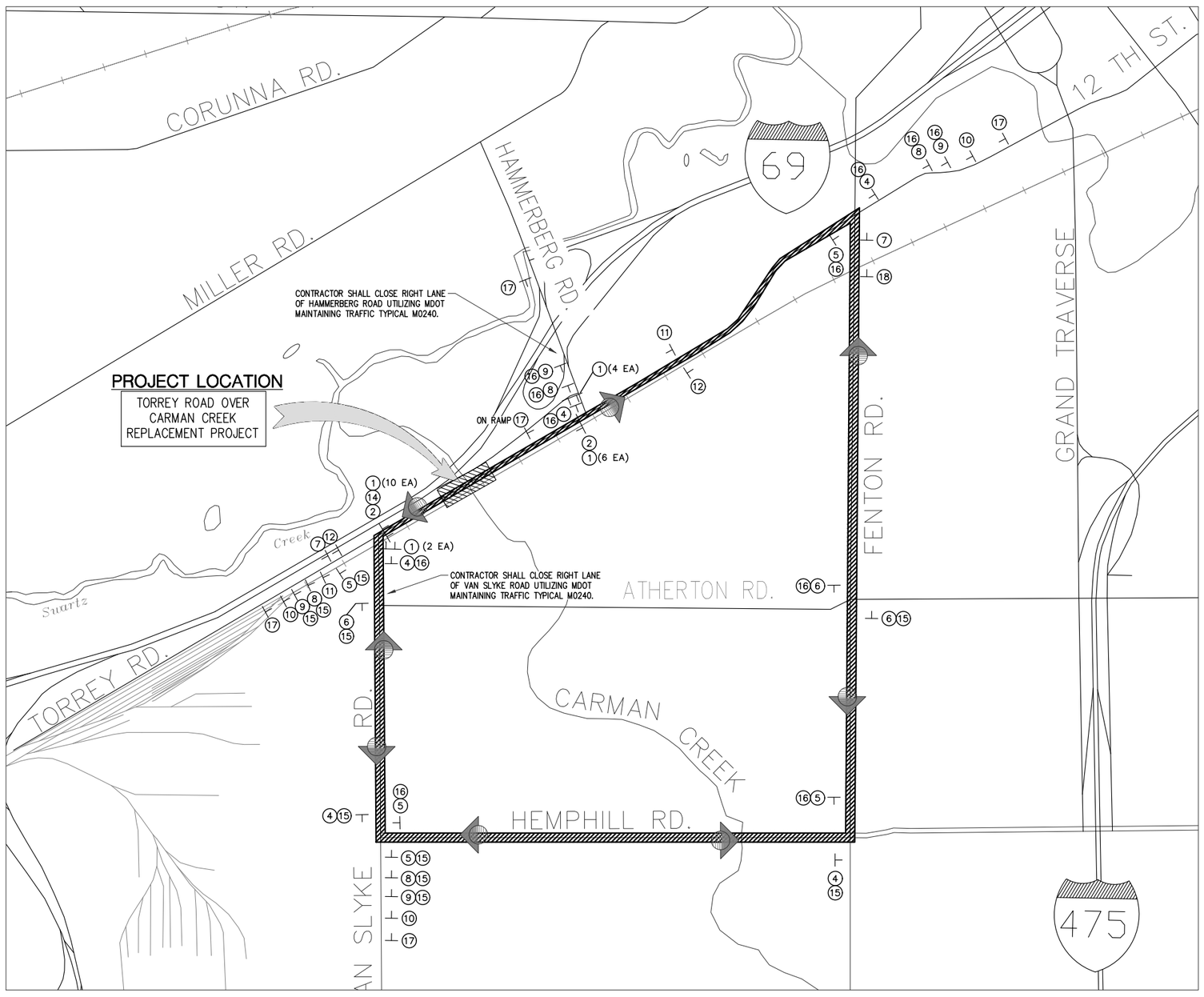
SIGN LEGEND

	1	TYPE III – 8 FT BARRICADE – DOUBLE SIDED, LIGHTED
ROAD CLOSED	2	R11–2 (48" X 30")
ROAD CLOSED AT BRIDGE LOCAL TRAFFIC ONLY	3	R11–3a (60" X 30")
DETOUR ←	4	M4–9L (30" X 24")
DETOUR →	5	M4–9R (30" X 24")
DETOUR ↑	6	M4–9 (30" X 24")
DETOUR ENDS	7	M4–8a (24" X 18")
DETOUR AHEAD	8	W20–2 (36" X 36")
ROAD CLOSED AHEAD	9	W20–3 (36" X 36")
ROAD WORK AHEAD	10	W20–1 (36" X 36")
WORK ZONE BEGINS	11	R5–18c (48" X 48")
END ROAD WORK	12	G20–2 (24" X 48")
DETOUR	13	M4–10L (48" X 18")
DETOUR	14	M4–10R (48" X 18")
EB 12TH STREET	15	SPECIAL (36" X 6")
WB 12TH STREET	16	SPECIAL (36" X 6")
12TH STREET CLOSED FROM VANSLYKE ROAD TO HAMMERBERG ROAD	17	SPECIAL (108" X 54")
TO	18	M4–5 (24" X 12")
69		M1–1 (24" X 24")
		M6–1 (21" X 15")



TORREY ROAD DETOUR PLAN

DETOUR ROUTE

TRAFFIC CONTROL NOTES

1. ALL MEASURES REQUIRED FOR TRAFFIC CONTROL DURING CONSTRUCTION SHALL CONFORM WITH THE 2011 EDITION OF THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (M.M.U.T.C.D.), AND THE M.D.O.T. 2012 STANDARD SPECIFICATIONS FOR CONSTRUCTION, SECTION 812, UNLESS MODIFIED BY THIS PLAN OR DIRECTED OTHERWISE BY THE ENGINEER.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING, PLACING, MAINTAINING, AND REMOVING ALL TRAFFIC CONTROL DEVICES.
3. ALL SIGNS SHALL BE TYPE B – TEMPORARY WITH A 5 FOOT BOTTOM HEIGHT. SIGNS SHALL BE MOUNTED ON SUITABLE, DRIVEN STEEL SUPPORT POSTS THAT WILL PROVIDE THE 5 FOOT BOTTOM HEIGHT. COST FOR SIGN POSTS SHALL BE INCLUDED IN THE "Sign, Type B, Temp, Prismatic" OR "Sign, Type B, Temp, Prismatic, Special" PAY ITEM.
4. PRIOR TO DRIVING POSTS FOR SIGNS, THE CONTRACTOR SHALL CALL MISS DIG (1–800–482–7171 OR 811) OR VISIT www.missdig.org FOR THE LOCATIONS OF ALL UNDERGROUND UTILITIES, THREE WORKING DAYS PRIOR TO STARTING WORK.
5. ALL BARRICADES LEFT IN PLACE AT NIGHT SHALL BE LIGHTED. ADVANCE WARNING SIGNS SHALL BE PROVIDED WITH A DAY–GLOW ORANGE FLAG FOR DAY USE, AND TWO FLASHING LIGHTS FOR NIGHT USE.
6. REASONABLE ACCESS MUST BE MAINTAINED TO ALL DRIVEWAYS AT ALL TIMES.
7. PAYMENT FOR TEMPORARY SIGNS AND BARRICADES LIGHTED–FURNISHED AND LIGHTED–OPERATED WILL BE BASED ON THE MAXIMUM NUMBER OF UNITS REQUIRED AT ANY ONE TIME DURING THE LIFE OF THE CONTRACT.
8. ALL BARRICADES AND TEMPORARY SIGNS SHALL BE PROPERLY WEIGHTED, AND LIGHTS SHALL BE KEPT IN WORKING ORDER AT ALL TIMES. ANY BARRICADES OR TEMPORARY SIGNS DAMAGED BY THE CONTRACTOR OR DUE TO IMPROPER USE SHALL BE REPLACED PROMPTLY AT THE CONTRACTOR'S EXPENSE.
9. ALL NON–APPLICABLE WARNING SIGNS, REGULATORY SIGNS, AND CONSTRUCTION SIGNS SHALL BE COVERED OR REMOVED AS DIRECTED BY THE ENGINEER.
10. DISTANCES BETWEEN ADVANCED WARNING SIGNS SHALL BE AS SHOWN IN THE MDOT MAINTAINING TRAFFIC TYPICALS M0020.
11. TEMPORARY SIGN LOCATIONS SHALL BE STAKED BY THE ENGINEER.
12. ALL WARNING SIGNS TO BE LIGHTED.
13. CONTRACTOR SHALL CLOSE RIGHT TURN LANES AT THE INTERSECTIONS OF HAMMERBERG/TORREY AND VAN SLYKE/TORREY UTILIZING MDOT MAINTAINING TRAFFIC TYPICAL M0240.
14. CONTRACTOR SHALL PLACE PLASTIC DRUMS AT EB I–69 EXIT RAMP INTERSECTION WITH HAMMERBERG ROAD TO TIE INTO RIGHT LANE CLOSURE.

MAINTAINING TRAFFIC QUANTITIES

SYMBOL	ITEM	QUANTITY	SIGNS	
			SIGN AREA SFT	TOTAL AREA SFT
2	R11–2	2	10	20
3	R11–3a	0	12.5	0
4	M4–9L	5	5	25
5	M4–9R	5	5	25
6	M4–9	3	5	15
7	M4–8a	2	3	6
8	W20–2	4	9	36
9	W20–3	4	9	36
10	W20–1	3	9	27
11	R5–18c	2	16	32
12	G20–2	2	8	16
13	M4–10L	0	6	0
14	M4–10R	1	6	6
18	VARIES	1	8.19	8.19
M0240a		2	136	272
SIGN, TYPE B, TEMP, PRISMATIC				524.19 SFT
15	SPECIAL	10	1.5	15
16	SPECIAL	11	1.5	16.5
17	SPECIAL	5	40.5	202.5
SIGN, TYPE B, TEMP, PRISMATIC, SPECIAL				234 SFT
BARRICADE, TYPE III, HIGH INTENSITY, DOUBLE SIDED, LIGHTED, FURN & OPER				22 EA
LIGHTED ARROW, TYPE C, FURN & OPER				2 EA
MINOR TRAFFIC DEVICES				1 LS
PLASTIC DRUM, HIGH INTENSITY, FURN & OPER				100 EA

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PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT

DETOUR SHEET

TORREY ROAD OVER THE CARMAN CREEK

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	12/18
CHECKED BY	ANH	12/18
SHEET	17 OF	53
STR NO.	2828	

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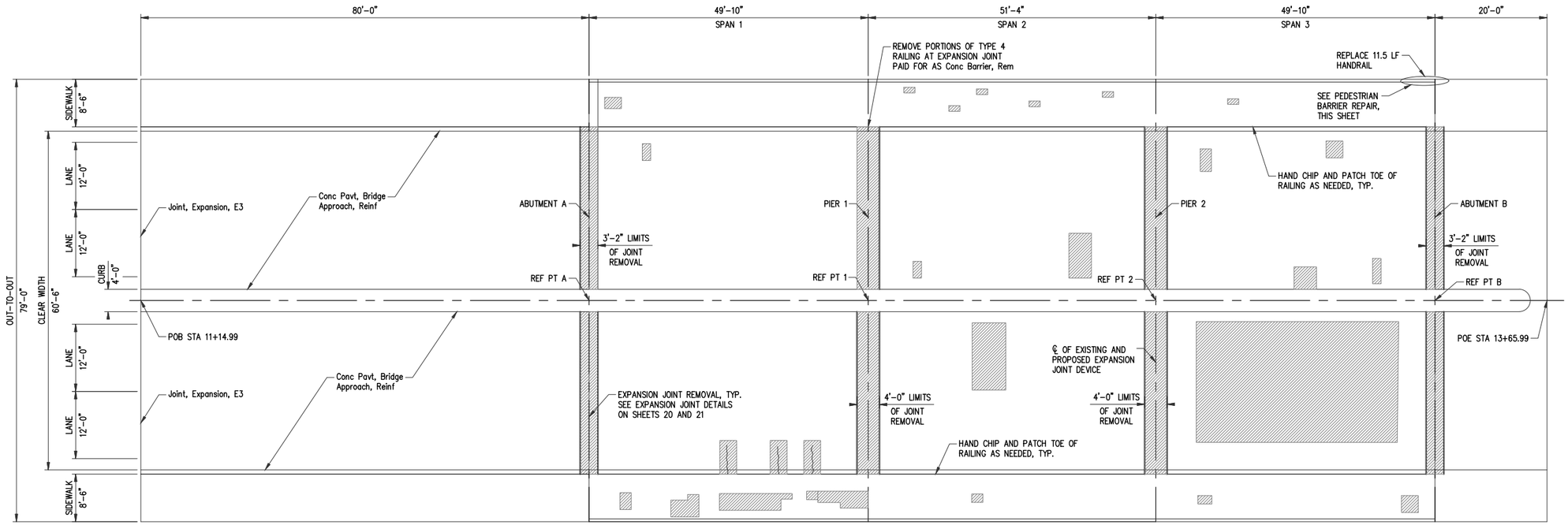

PLAN OF DECK

NOT TO SCALE

EXISTING SPALL, DELAMINATION, OR HMA PATCH ESTIMATED REPAIRS

*NOTE: APPROXIMATE LOCATION OF REPAIRS FOR INFORMATION ONLY. DECK WILL BE SOUNDED AT TIME OF CONSTRUCTION.

THE CONTRACTOR SHALL PREVENT DEBRIS FROM FALLING INTO THE WATERWAY THROUGH THE GRATES AT THE CENTERLINE OF THE STRUCTURE. PAYMENT INCLUDED IN "False Decking"

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PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
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CITY OF FLINT

SUPERSTRUCTURE DETAILS

SAGINAW STREET
OVER THE
FLINT RIVER

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	08/18
CHECKED BY	ENJ	08/18
SHEET	18 OF	53
STR NO.	2849	

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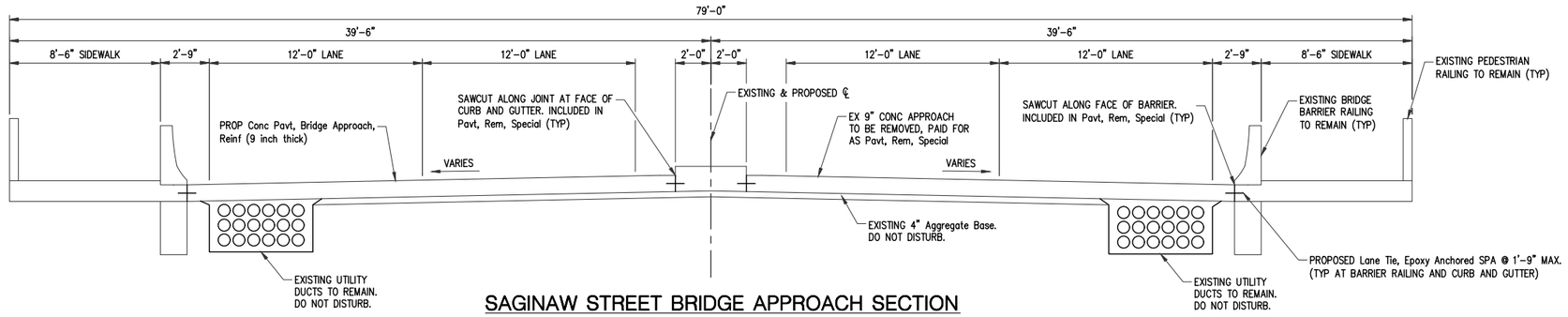
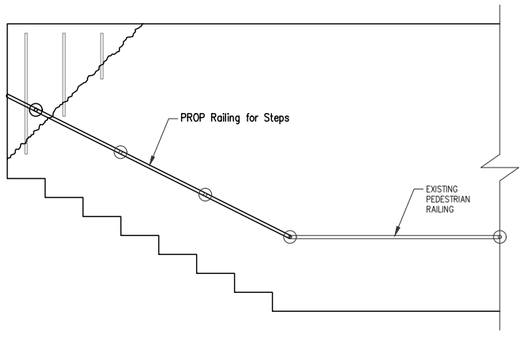


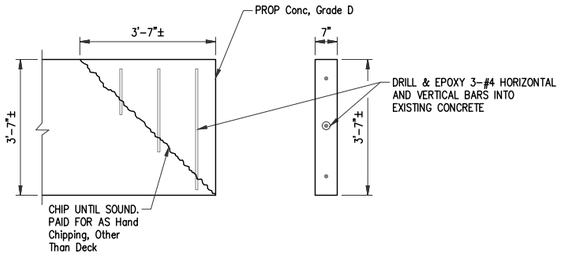
SAGINAW STREET BRIDGE APPROACH SECTION

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



RAILING REPAIR

SCALE: 1/2" = 1'-0"



PEDESTRIAN BARRIER REPAIR

SCALE: 1/2" = 1'-0"

NOTE: BARS SHALL BE EMBEDDED A MINIMUM OF 3 INCHES INTO EXISTING CONCRETE

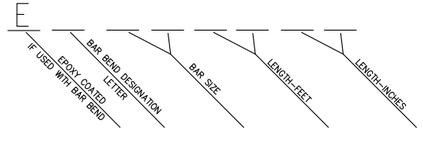
STEEL REINFORCEMENT

BAR	DIMENSIONS a	b	c	d	e	f	g	SIZE	LENGTH	NO. REQ'D	TOTAL WEIGHT
SUPERSTRUCTURE											
DECK											
EA062600	26'-0"							6	26'-0"	100	3905.2
RAILING											
EA040302	3'-2"							4	3'-2"	2	4.2
EA040202	2'-2"							4	2'-2"	2	2.9
EA040102	1'-2"							4	1'-2"	2	1.6
MISCELLANEOUS											500
TOTAL REINFORCEMENT, STEEL, EPOXY COATED											4413.9 LBS

A.S.T.M. STANDARD REINFORCING BARS

BAR SIZE DESIGNATION	WEIGHT (LBS/FT.)	DIAMETER (INCH)
#2	.167	.250
#3	.376	.375
#4	.668	.500
#5	1.043	.625
#6	1.502	.750
#7	2.044	.875
#8	2.670	1.000
#9	3.400	1.128
#10	4.303	1.270

NOTE:
REINFORCEMENT IS TO BE SHOP CUT AS SHOWN.
THE EPOXY COATING SHALL BE REPAIRED ACCORDING TO THE STANDARD SPECIFICATIONS.

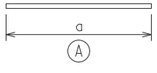


MISCELLANEOUS SUPERSTRUCTURE REPAIR QUANTITIES

PAY ITEM	UNIT	TOTAL
LANE TIE, EPOXY ANCHORED	EA	184
CONC, GRADE D	CYD	31
HAND CHIPPING, DEEP	SYD	251
EPOXY OVLY	SYD	1070
ADHESIVE ANCHORING OF HORIZONTAL BAR, 1/2 INCH	EA	3
ADHESIVE ANCHORING OF VERTICAL BAR, 1/2 INCH	EA	3
DECK JOINT, REM	FT	216
PATCHING CONC, C-L	CYD	27
EMBEDDED GALVANIC ANODE	EA	483

*MISCELLANEOUS QUANTITIES ONLY. ACTUAL QUANTITIES TO BE DETERMINED BY ENGINEER IN FIELD.

STANDARD REINFORCING BAR TYPES



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PLAN SUBMITTALS AND CHANGES

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SUPERSTRUCTURE DETAILS

SAGINAW STREET
OVER THE
FLINT RIVER

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	08/18
CHECKED BY	ENJ	08/18
SHEET	19 OF	53
STR NO.	2849	

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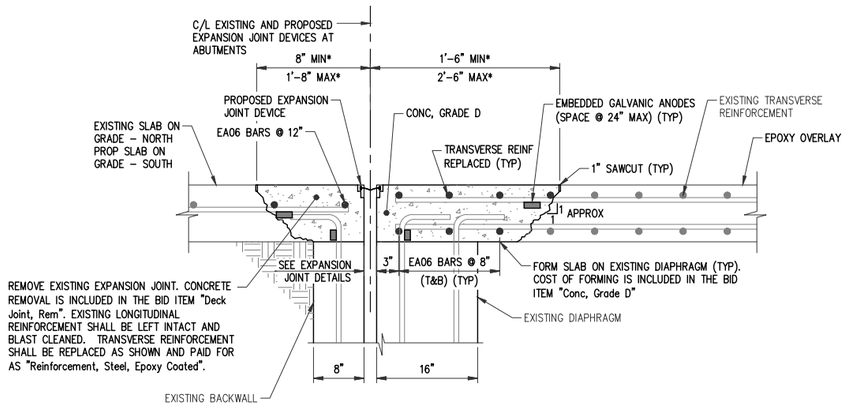


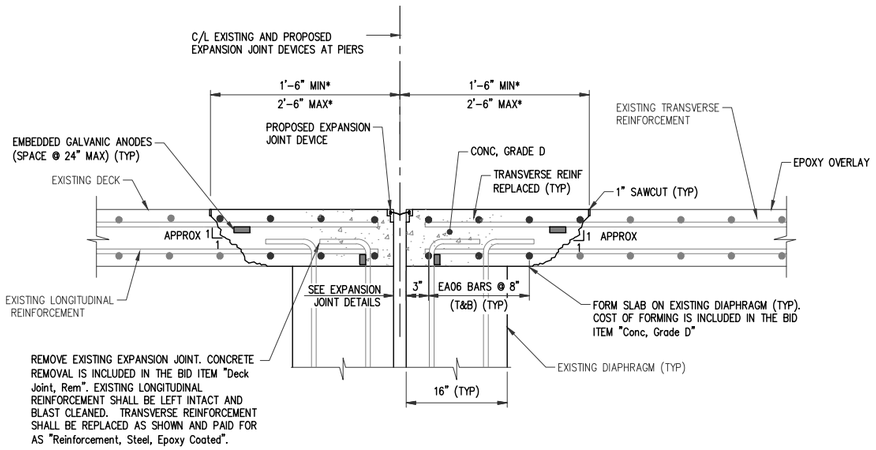
AS DIRECTED BY THE ENGINEER, SAW CUT AS SHOWN AND REMOVE THE EXISTING JOINT AND ADJACENT CONCRETE.

* ENGINEER TO VERIFY AND APPROVE THE LIMITS PRIOR TO REMOVAL OF THE DECK JOINT. ANY ADDITIONAL REMOVAL WITHOUT THE ENGINEER'S APPROVAL SHALL BE REPLACED AT THE EXPENSE OF THE CONTRACTOR, AS DIRECTED BY THE ENGINEER.

SECTION AT PROPOSED EXPANSION JOINT DEVICE AT INDEPENDENT BACKWALL

SCALE: 1"=1'-0"

THIS DETAIL APPLIES TO EXISTING EXPANSION JOINTS NEAR NORTH AND SOUTH ABUTMENTS. DIMENSIONS TAKEN FROM EXISTING PLANS. CONTRACTOR SHALL FIELD VERIFY.



AS DIRECTED BY THE ENGINEER, SAW CUT AS SHOWN AND REMOVE THE EXISTING JOINT AND ADJACENT CONCRETE.

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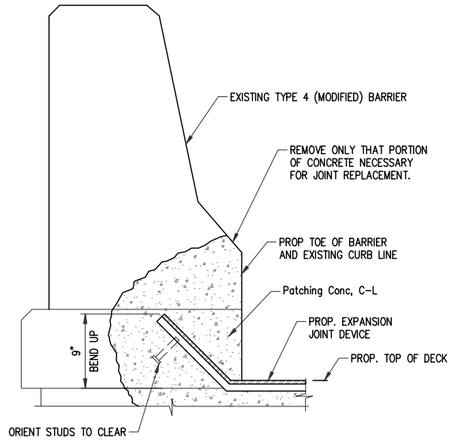
SECTION AT PROPOSED EXPANSION JOINT DEVICE

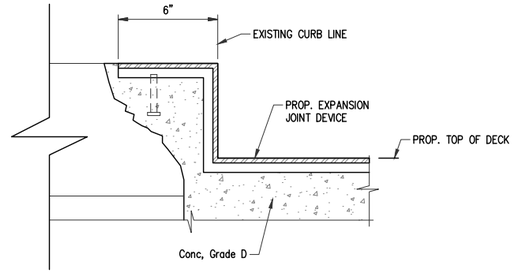
SCALE: 1"=1'-0"

NOTE: THIS DETAIL APPLIES TO EXISTING EXPANSION JOINTS NEAR PIERS. DIMENSIONS TAKEN FROM EXISTING PLANS. CONTRACTOR SHALL FIELD VERIFY.



SECTION THRU BARRIER AT EXPANSION JOINT

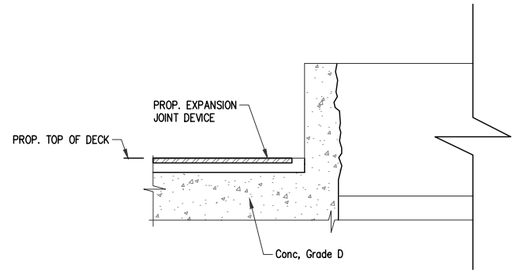
NOTE: THIS DETAIL APPLIES TO EXISTING EXPANSION JOINTS NEAR PIERS. DIMENSIONS TAKEN FROM EXISTING PLANS. CONTRACTOR SHALL FIELD VERIFY.



SECTION THRU CURB AT EXPANSION JOINT

SCALE: 1"=1'-0"

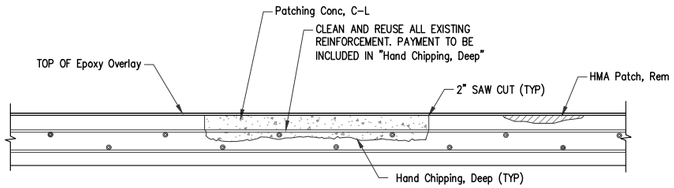
NOTE: THIS DETAIL APPLIES TO EXISTING EXPANSION JOINTS AT ABUTMENTS. DIMENSIONS TAKEN FROM EXISTING PLANS. CONTRACTOR SHALL FIELD VERIFY.



SECTION THRU CURB AT EXPANSION JOINT

SCALE: 1"=1'-0"

NOTE: THIS DETAIL APPLIES TO EXISTING EXPANSION JOINTS AT PIERS. DIMENSIONS TAKEN FROM EXISTING PLANS. CONTRACTOR SHALL FIELD VERIFY.



PARTIAL DECK SECTION

(SHOWING TYPICAL DECK PATCH)
NOT TO SCALE

NOTE: THE CONTRACTOR SHALL SAW CUT A 2" DEEP LINE AROUND THE PERIMETER OF THE HAND CHIPPING LOCATIONS, TO ENSURE PATCHING AGAINST A VERTICAL SURFACE, NOT PAID FOR SEPARATELY BUT INCLUDED IN THE BID ITEM "Hand Chipping, Deep" OR "Hand Chipping, Other Than Deck".

NOTES:

THE WORK COVERED IN THESE PLANS INCLUDES JOINT REPLACEMENT, CONCRETE DECK AND BARRIER PATCHES, SUBSTRUCTURE REPAIRS, EPOXY OVERLAY, CONCRETE WALL REPAIRS, APPROACH PAVEMENT REPLACEMENT, AND MAINTAINING TRAFFIC.

SAGINAW STREET TRAFFIC IS TO BE DETOURED OVER OTHER EXISTING ROADS.

MEASURES SHALL BE TAKEN TO PREVENT DEBRIS FROM FALLING FROM THE STRUCTURE. IF DEBRIS FALLS INTO THE RIVER, IT SHALL BE REMOVED IMMEDIATELY.

THE CONTRACTOR SHALL REMOVE THE DECK JOINTS AND DECK TO THE LIMITS SHOWN. ANY ADDITIONAL DECK REMOVAL SHALL BE AT THE CONTRACTOR'S EXPENSE. ENGINEER SHALL APPROVE REMOVAL LIMITS PRIOR TO CONSTRUCTION.

THE CONTRACTOR SHALL REMOVE AND REPLACE ONLY THAT PORTION OF THE SIDEWALK AND RAILING THAT IS NECESSARY FOR INSTALLATION OF THE DECK JOINT. ENGINEER SHALL APPROVE REMOVAL LIMITS PRIOR TO CONSTRUCTION.

THE BID ITEM "Deck Joint, Rem" INCLUDES HAND CHIPPING WITHIN LIMITS REQUIRED FOR REMOVAL.

ALL STEEL FOR EXPANSION JOINT SHALL BE AASHTO M270, GRADE 36.

THE CONTRACTOR SHALL NOTIFY EACH UTILITY COMPANY A MINIMUM OF THREE FULL WORKING DAYS IN ADVANCE OF WORK IMPACTING THAT COMPANY'S CONDUITS OR FACILITIES.

CONTRACTOR SHALL PROTECT THE UTILITIES DURING CONSTRUCTION. PROTECTION WILL NOT BE PAID FOR SEPARATELY BUT WILL BE INCLUDED IN OTHER ITEMS.

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JN 129257

PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT

SUPERSTRUCTURE DETAILS

SAGINAW STREET OVER THE FLINT RIVER

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	08/18
CHECKED BY	ENJ	08/18
SHEET	20 OF	53
STR NO.	2849	

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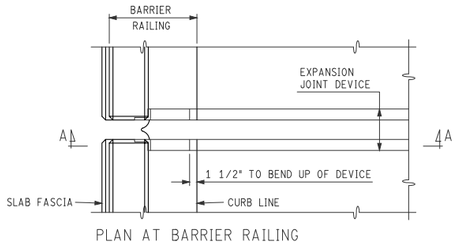
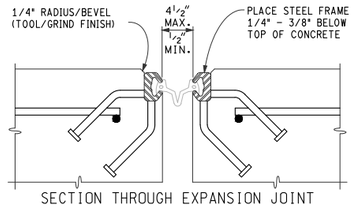
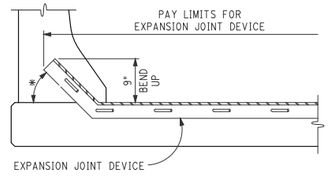


PLAN AT BARRIER RAILING



SECTION THROUGH EXPANSION JOINT



SECTION A - A

* BEND ANCHORAGE UP 45° ALONG CL OF EXPANSION JOINT.

NOTES:

JOINT TYPES

THE EXPANSION JOINT DEVICE SHALL BE OF A TYPE THAT INCLUDES A CONTINUOUS NEOPRENE (OR EQUIVALENT) SEAL ACROSS THE DECK. UNLESS OTHERWISE NOTED ON THE PLANS, THE CONTRACTOR HAS THE OPTION OF USING ANY OF THE DEVICES LISTED BELOW:

DEVICE	MANUFACTURER
WABO STRIP SEAL - TYPE M	WATSON-BOWMAN & ACME, INC.
WABO STRIP SEAL - TYPE A	WATSON-BOWMAN & ACME, INC.
STEELFLEX-SSA2	D.S. BROWN
STEELFLEX-SSCM	D.S. BROWN
ONFLEX 40 SS	STRUCTURAL RUBBER PRODUCTS CO.
ONFLEX 40 SSA	STRUCTURAL RUBBER PRODUCTS CO.

THE MODEL OF THE JOINT TYPE SELECTED SHALL BE SUITABLE TO ACCOMMODATE THE TOTAL MOVEMENT NOTED ON THE PLANS.

COMPLETE WORKING DRAWINGS OF ALL DETAILS OF FABRICATION OF THE EXPANSION JOINT DEVICE SHALL BE SUBMITTED FOR REVIEW IN ACCORDANCE WITH STANDARD SPECIFICATION 104.02. THIS REQUIREMENT IS WAIVED FOR EXPANSION JOINT DEVICES FOR WHICH A SET OF STANDARD INSTALLATION DETAILS HAS BEEN APPROVED. STANDARD INSTALLATION DETAILS CAN BE OBTAINED FROM THE DESIGN DIVISION.

FABRICATION AND INSTALLATION

REMOVE SHIPPING BOLTS PRIOR TO PLACEMENT OF CONCRETE.

THE EXPANSION JOINT SHALL BE SHOP FABRICATED TO CONFORM TO THE CONTOUR OF THE BRIDGE DECK, BARRIERS, ETC. IT SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURER'S RECOMMENDATIONS SUBJECT TO NOTES HEREIN AND THE APPROVAL OF THE ENGINEER.

TIE DECK REINFORCING STEEL TO STEEL FRAME ANCHORS TO MAXIMUM EXTENT PRACTICABLE WITHOUT DAMAGING GALVANIZED OR EPOXY COATINGS.

THE TOP OF THE EXPANSION JOINT DEVICE SHALL BE SET 1/4"- 3/8" BELOW THE CONCRETE SLAB (PAVEMENT).

THE STEEL ANCHORAGE FOR STRIP SEAL GLANDS SHALL BE HOT DIP GALVANIZED IN ACCORDANCE WITH SUBSECTION 707.03C.17 OF THE STANDARD SPECIFICATIONS.

THE AREA OF THE STEEL ANCHORAGE AND SEALING GLAND WHICH WILL BE IN CONTACT WITH A SEALANT, OR LUBRICANT-ADHESIVE SHALL BE CLEANED WITH TOLUENE OR OTHER APPROVED SOLVENT.

IN THE EVENT THAT SPLICING IS REQUIRED OF THE SEALING GLAND, IT SHALL BE SPLICED BY AN APPROVED METHOD (SUCH AS COLD VULCANIZATION) BY A TRAINED REPRESENTATIVE OF THE MANUFACTURER.

DETAILS AT CURBS OR BARRIERS

THE DETAILS ON THIS SHEET SHOW AN APPROVED MEANS OF TERMINATING THE EXPANSION JOINT DEVICE AT CURBS OR BARRIERS. VARIATIONS OR ALTERNATIVE SCHEMES WILL BE CONSIDERED AND MAY BE USED IF APPROVED BY THE ENGINEER.

MATERIALS

THE COST OF ALL MATERIALS AND LABOR REQUIRED FOR PROPER INSTALLATION OF THE EXPANSION JOINT AND THE TERMINAL ASSEMBLIES AT THE CURBS, SIDEWALKS, OR BARRIERS IS INCLUDED IN THE PAYMENT FOR THE EXPANSION JOINT DEVICE.

STRUCTURE NUMBER	ANGLE OF CROSSING TO NEAREST 10°	LOCATION OF JOINT	MIN. TOT. TRAVEL ALONG CENTERLINE OF BRIDGE *	REQUIRED LENGTH OF EXPANSION JOINT DEVICE
2849	0 DEG	ABUTMENT A,B	1"	54'-0"
2849	0 DEG	PIER 1, 2	1"	54'-0"

QUANTITY		
ITEM	UNIT	AMOUNT
Expansion Joint Device	Ft	216

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OVER THE
FLINT RIVER

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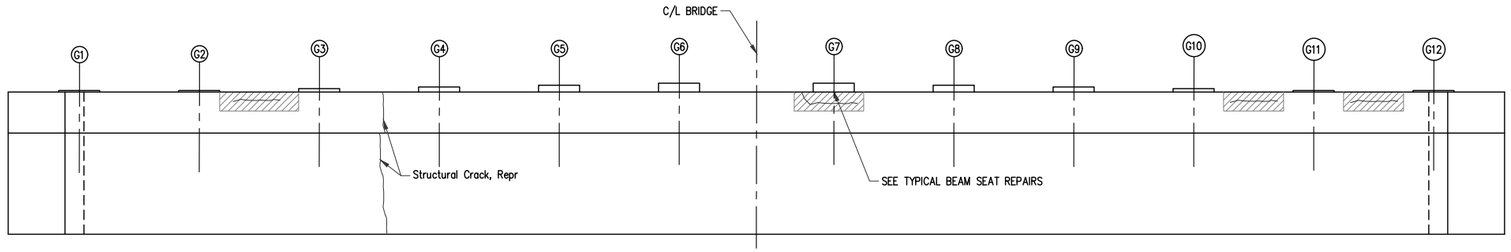
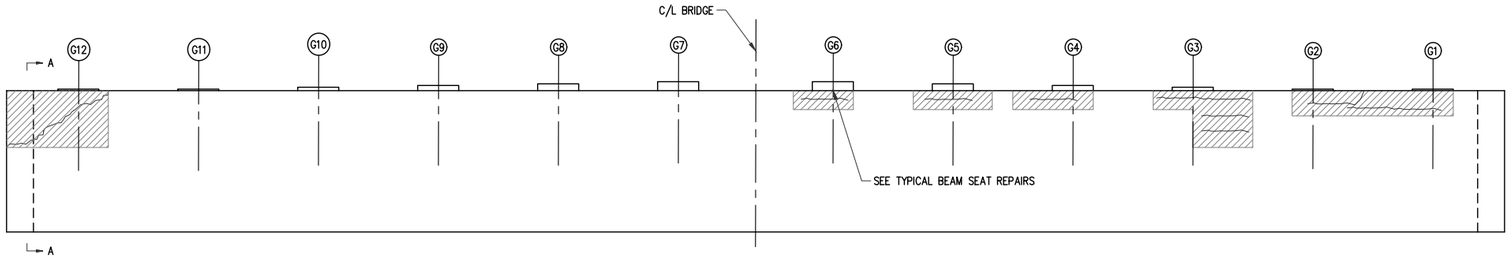


ELEVATION OF NORTH ABUTMENT

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

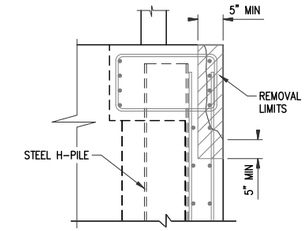
ESTIMATED CONCRETE WALL PATCHING
SEE TYPICAL SUBSTRUCTURE REPAIRS



ELEVATION OF SOUTH ABUTMENT

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

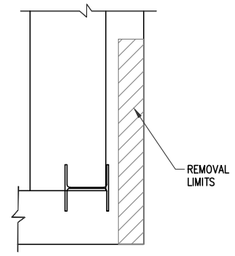
ESTIMATED CONCRETE WALL PATCHING
SEE TYPICAL SUBSTRUCTURE REPAIRS



ELEVATION OF SECTION A-A

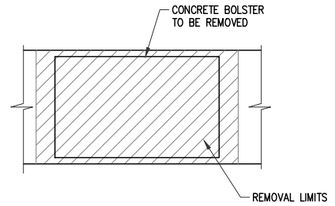
SCALE: 1/2" = 1'-0"

CONTRACTOR SHALL CLEAN REBAR PRIOR TO CONCRETE PLACEMENT.



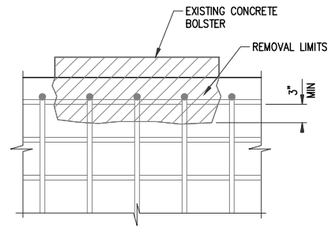
PLAN OF SECTION A-A

SCALE: 1/2" = 1'-0"



PLAN OF TYPICAL BEAM SEAT REPAIRS

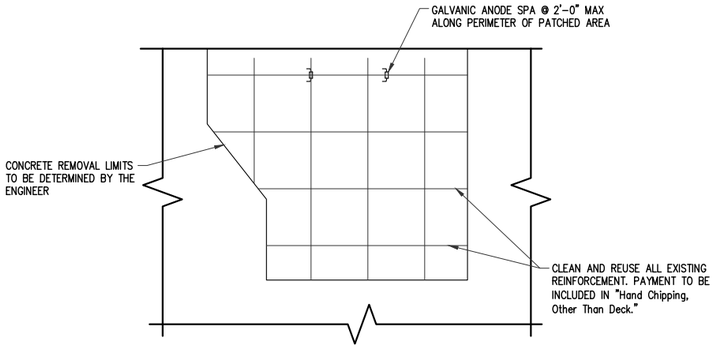
SCALE: 1" = 1'-0"



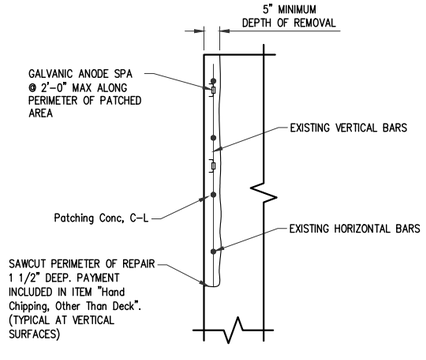
ELEVATION OF TYPICAL BEAM SEAT REPAIRS

SCALE: 1" = 1'-0"

CONTRACTOR SHALL CLEAN REBAR PRIOR TO CONCRETE PLACEMENT.



ELEVATION



TYPICAL SECTION

TYPICAL SUBSTRUCTURE REPAIRS

SCALE: 1/2" = 1'-0"

NOTE: LIMITS OF PATCHING WILL BE DETERMINED BY ENGINEER AT TIME OF CONSTRUCTION.

MISCELLANEOUS SUBSTRUCTURE REPAIR QUANTITIES

PAY ITEM	UNIT	TOTAL
REINFORCEMENT, STEEL, EPOXY COATED	LB	9
HAND CHIPPING, OTHER THAN DECK	CFT	133
PATCHING CONC, C-L	CYD	5
EMBEDDED GALVANIC ANODE	EA	62
PATCH, FORMING	SFT	126
STRUCTURAL CRACK, REPR	FT	8

*MISCELLANEOUS QUANTITIES ONLY. ACTUAL QUANTITIES TO BE DETERMINED BY ENGINEER IN FIELD.

SUBSTRUCTURE REPAIR NOTES:

MECHANICAL EXPANSION ANCHORS ALONG WITH ADHESIVE ANCHOR SYSTEMS SHALL BE CHOSEN FROM THE QUALIFIED PRODUCTS LIST IN THE CURRENT MDOT MATERIALS SOURCE GUIDE.

FORMS FOR LARGE PATCHES SHALL BE INSTALLED IN 2'-0" TO 4'-0" HIGH SECTIONS WITH THE TOP OF FORM NO MORE THAN 4'-0" ABOVE THE LEVEL OF CONCRETE AS THE POUR PROGRESSES.

Water Repellent Treatment, Penetrating SHALL BE APPLIED TO THE ENTIRE EXPOSED SURFACE OF ABUTMENT A & B AND THE FRONT FACE OF THE INDEPENDENT BACKWALL.

Substructure Horizontal Surface Sealer SHALL BE APPLIED TO THE TOP OF ABUTMENT A & B. VERTICAL SURFACES ACCIDENTALLY COATED SHALL BE CLEANED AT CONTRACTOR'S EXPENSE.

Substructure Horizontal Surface Sealer SHALL BE APPLIED TO THE TOP OF PIERS 1 & 2. VERTICAL SURFACES ACCIDENTALLY COATED SHALL BE CLEANED AT CONTRACTOR'S EXPENSE.

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CITY OF FLINT

SUBSTRUCTURE DETAILS

SAGINAW STREET
OVER THE
FLINT RIVER

APPROVED _____

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DRAWN BY	MJS	08/18
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SHEET 22 OF 53		
STR NO. 2849		

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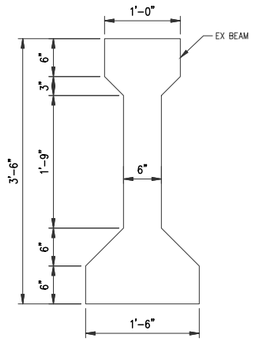
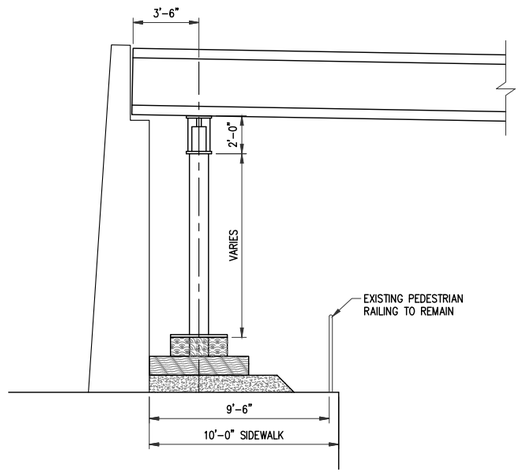


DETAIL "B"

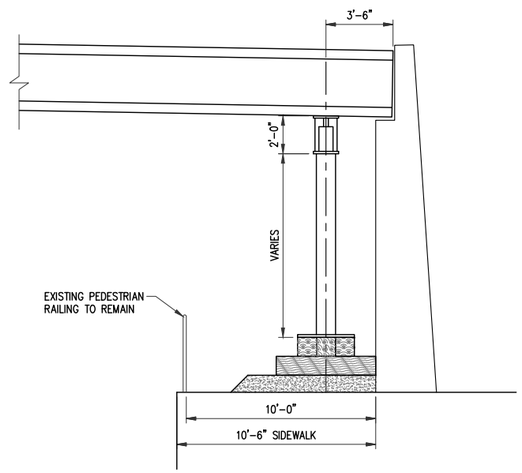
SCALE: 1"=1'-0"

*FIELD VERIFY DIMENSIONS PRIOR TO FABRICATION.
COST INCLUDED IN "SUPPORT, COLUMN, TEMP".



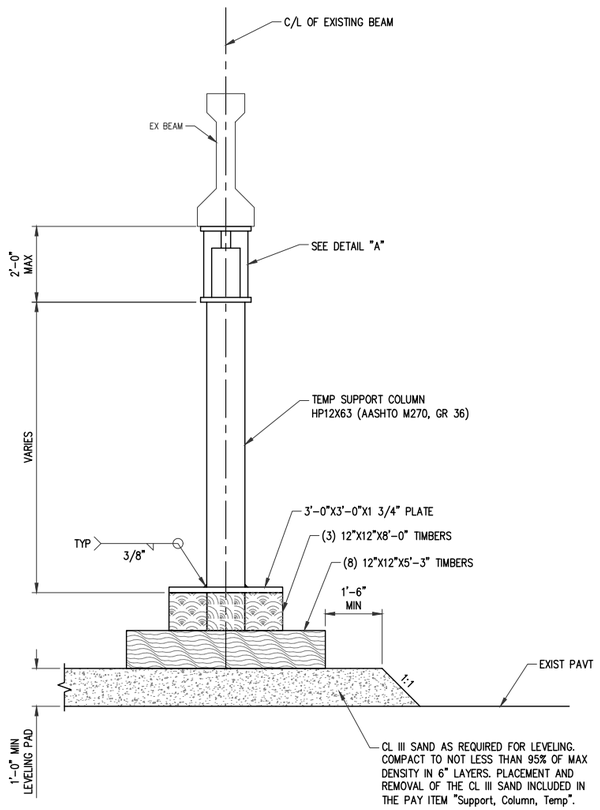
TEMP SUPPORT AT ABUT A

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



TEMP SUPPORT AT ABUT B

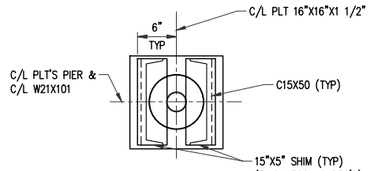
SCALE: 1/4"=1'-0"



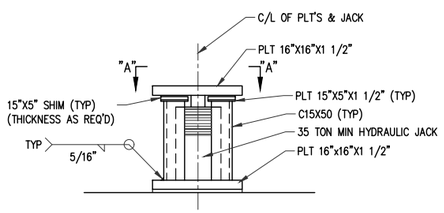
NOTE:
EXACT HEIGHT TO BE DETERMINED BY THE CONTRACTOR.

PROPOSED TEMP SUPPORT DETAIL

SCALE: 1/2"=1'-0"



SECTION "A-A"



DETAIL "A"

SCALE: 1/2"=1'-0"

TEMPORARY SUPPORT NOTES:

TEMPORARY SUPPORTS MUST REMAIN IN PLACE UNTIL SUCH TIME AS THE CONCRETE HAS ATTAINED 70 PERCENT OF ITS 28-DAY STRENGTH, AND IN NO CASE SHALL THEY BE REMOVED IN LESS THAN FIVE DAYS AFTER THE CONCRETE HAS BEEN PLACED. THE CONTRACTOR SHALL REMOVE THE TEMPORARY SUPPORTS IN SUCH A MANNER AS TO ENSURE A GRADUAL AND UNIFORM REDUCTION OF LOADS AS APPROVED BY THE ENGINEER.

ALL TEMPORARY SUPPORTS SHALL MEET THE APPROVAL OF THE ENGINEER.

TIMBER SHALL BE STRUCTURAL GRADE HAVING A MINIMUM FLEXURAL STRENGTH OF 1,200 PSI AND A MINIMUM HORIZONTAL SHEAR STRENGTH OF 100 PSI.

TEMPORARY SUPPORTS SHALL NOT REMAIN LOADED FOR A PERIOD GREATER THAN FOUR WEEKS.

NOTE:

1. CARE SHOULD BE TAKEN TO AVOID DAMAGING EXISTING PEDESTRIAN RAILING. ALL DAMAGE IS THE CONTRACTOR'S RESPONSIBILITY.

2. TEMPORARY SUPPORTS ARE NEEDED AT 4 LOCATIONS. ABUTMENT A, BEAMS G11 AND G12, AND ABUTMENT B, BEAMS G7 AND G8. AN ADDITIONAL QUANTITY IS PROVIDED IF FIELD CONDITIONS DICTATE THE NEED FOR MORE. ENGINEER TO CONFIRM LOCATIONS NEEDING SUPPORT.

3. TEMPORARY SUPPORT WILL BE REQUIRED WHEN THERE IS 25% LOSS OR MORE OF BEARING AREA.

JACK LOADS

BEAM	DEAD LOAD* (kips)	LIVE LOAD (kips)
ABUTMENT A G11	52	32
ABUTMENT A G12	52	–
ABUTMENT B G7	52	40
ABUTMENT B G8	52	49

*SERVICE II DESIGN, INCLUDES 1.30 FACTOR. AASHTO LRFD 3.4.3.1.

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CITY OF FLINT

SUPPORT DETAILS

SAGINAW STREET
OVER THE
FLINT RIVER

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
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SHEET	23 OF	53
STR NO.	2849	

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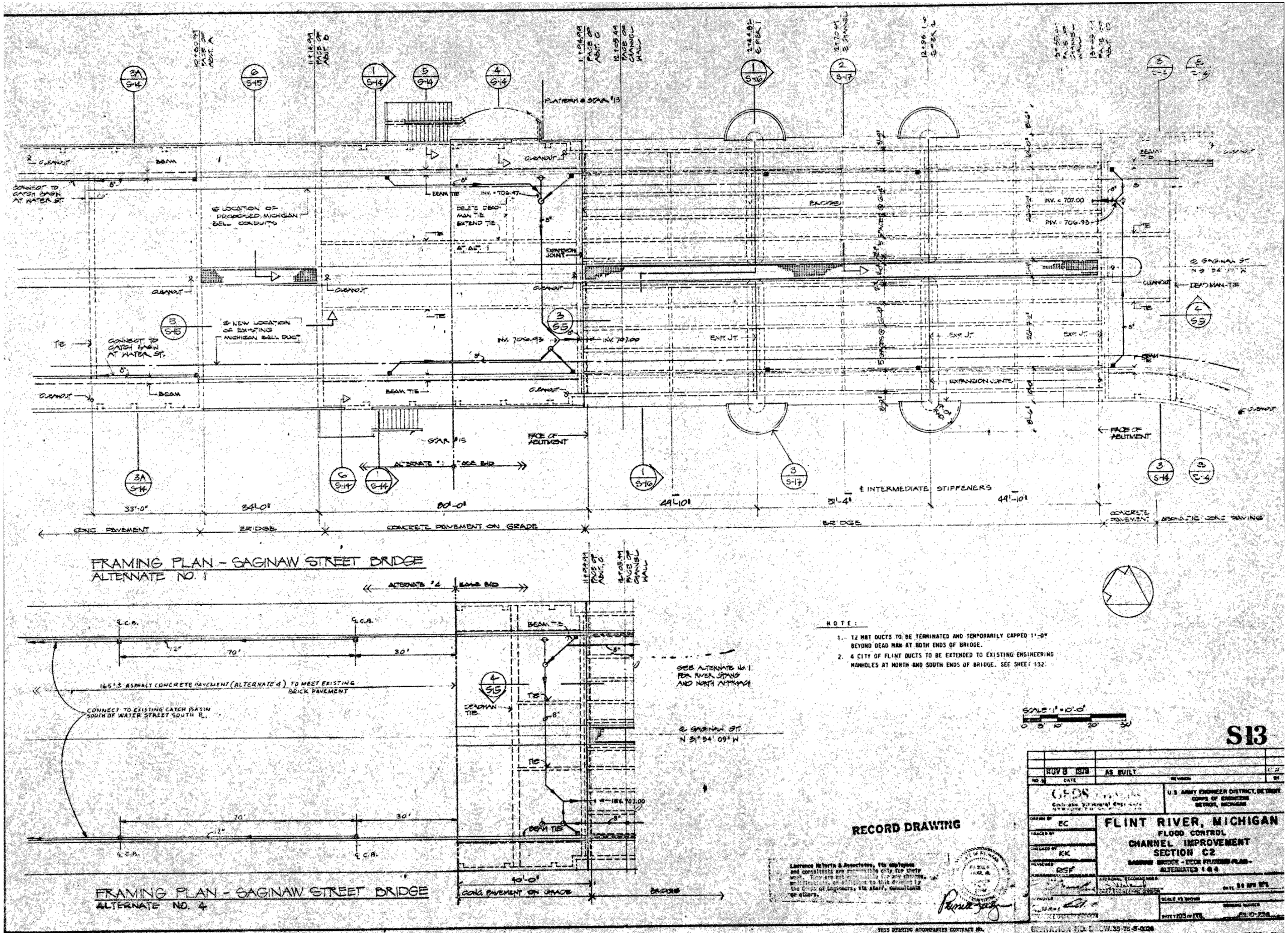

FRAMING PLAN - SAGINAW STREET BRIDGE
ALTERNATE NO. 1
FRAMING PLAN - SAGINAW STREET BRIDGE
ALTERNATE NO. 4
NOTE:
1. 12 MBT DUCTS TO BE TERMINATED AND TEMPORARILY CAPPED 1'-0" BEYOND DEAD MAN AT BOTH ENDS OF BRIDGE.
2. 4 CITY OF FLINT DUCTS TO BE EXTENDED TO EXISTING ENGINEERING MANHOLES AT NORTH AND SOUTH ENDS OF BRIDGE. SEE SHEET 132.
RECORD DRAWING
S13
FLINT RIVER, MICHIGAN
FLOOD CONTROL
CHANNEL IMPROVEMENT
SECTION C2
U.S. ARMY ENGINEER DISTRICT, DETROIT
CORPS OF ENGINEERS
DETROIT, MICHIGAN

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CITY OF FLINT
EXISTING PLANS

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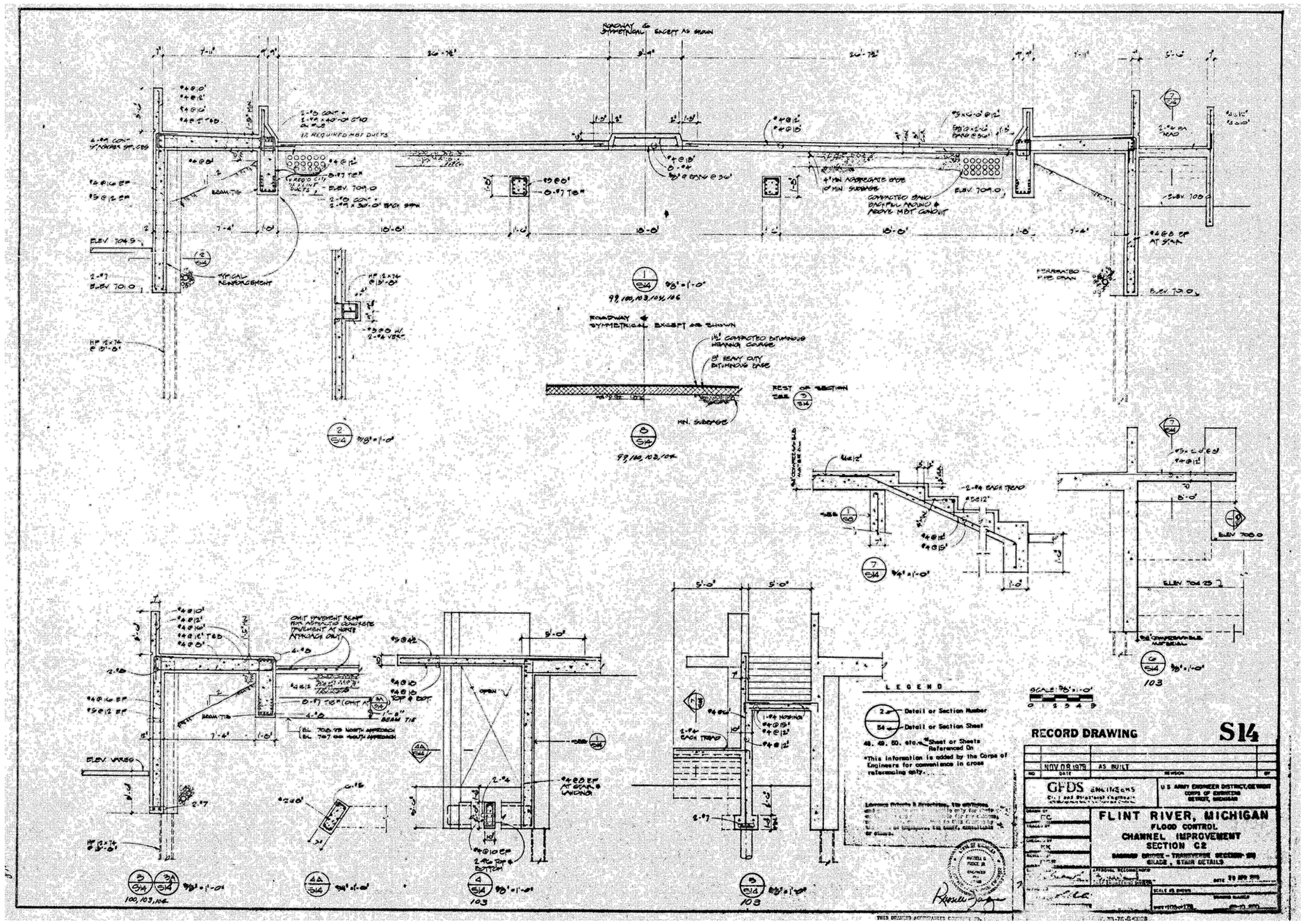

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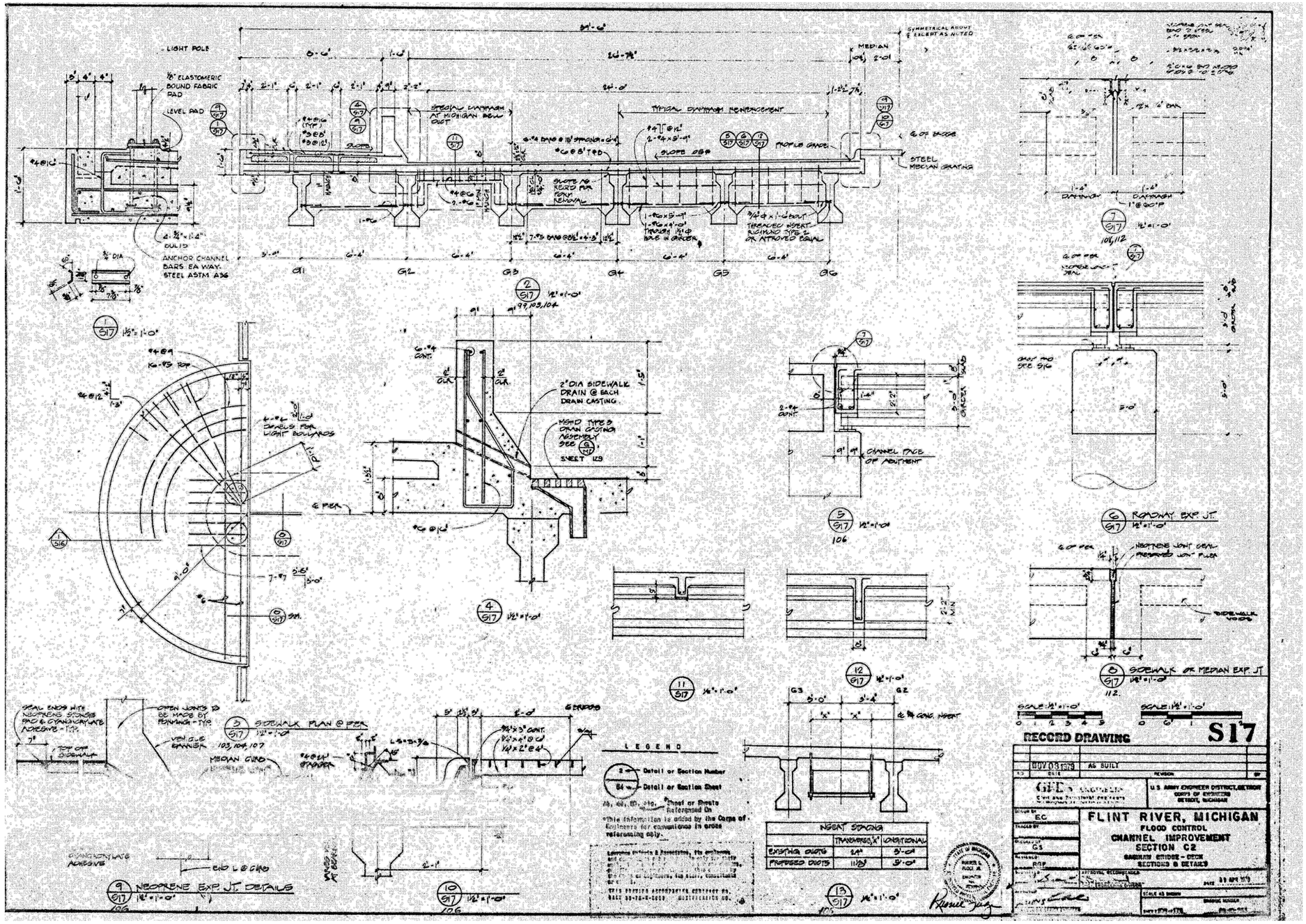

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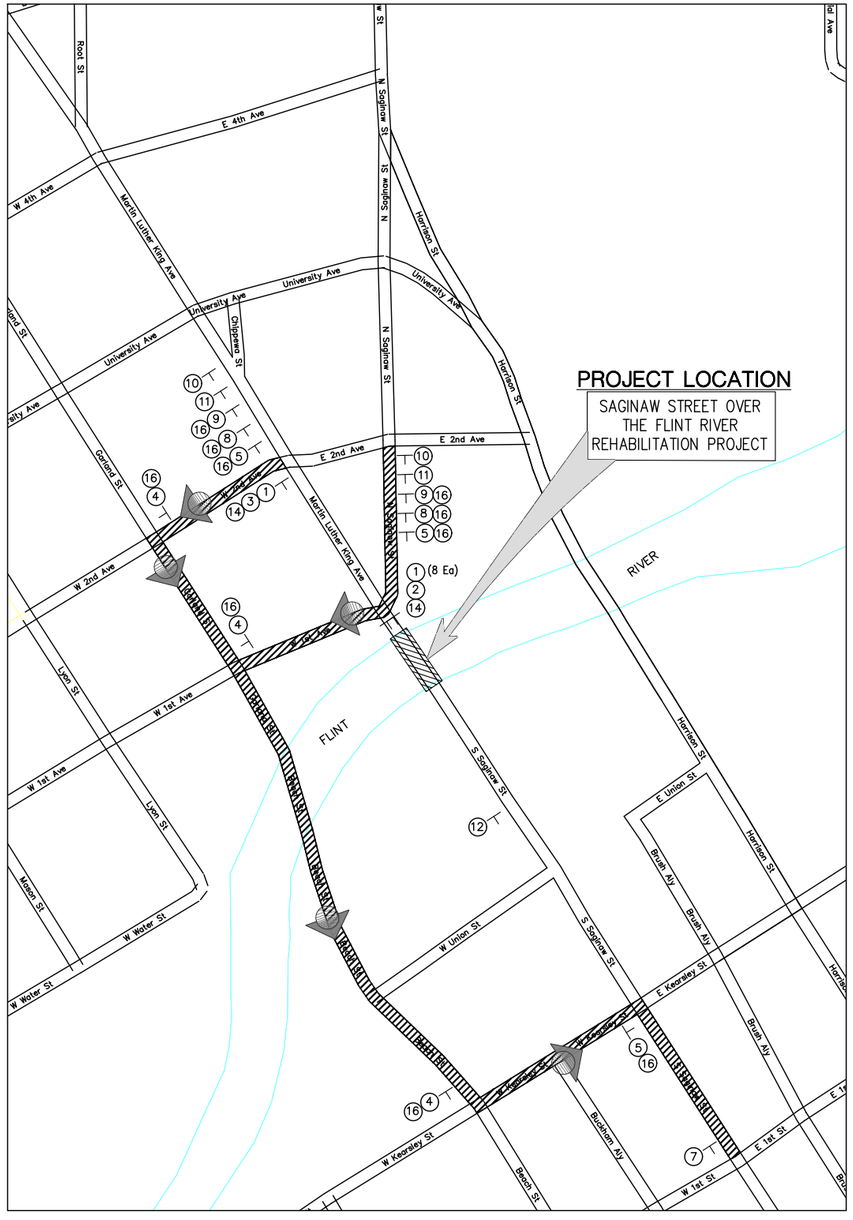
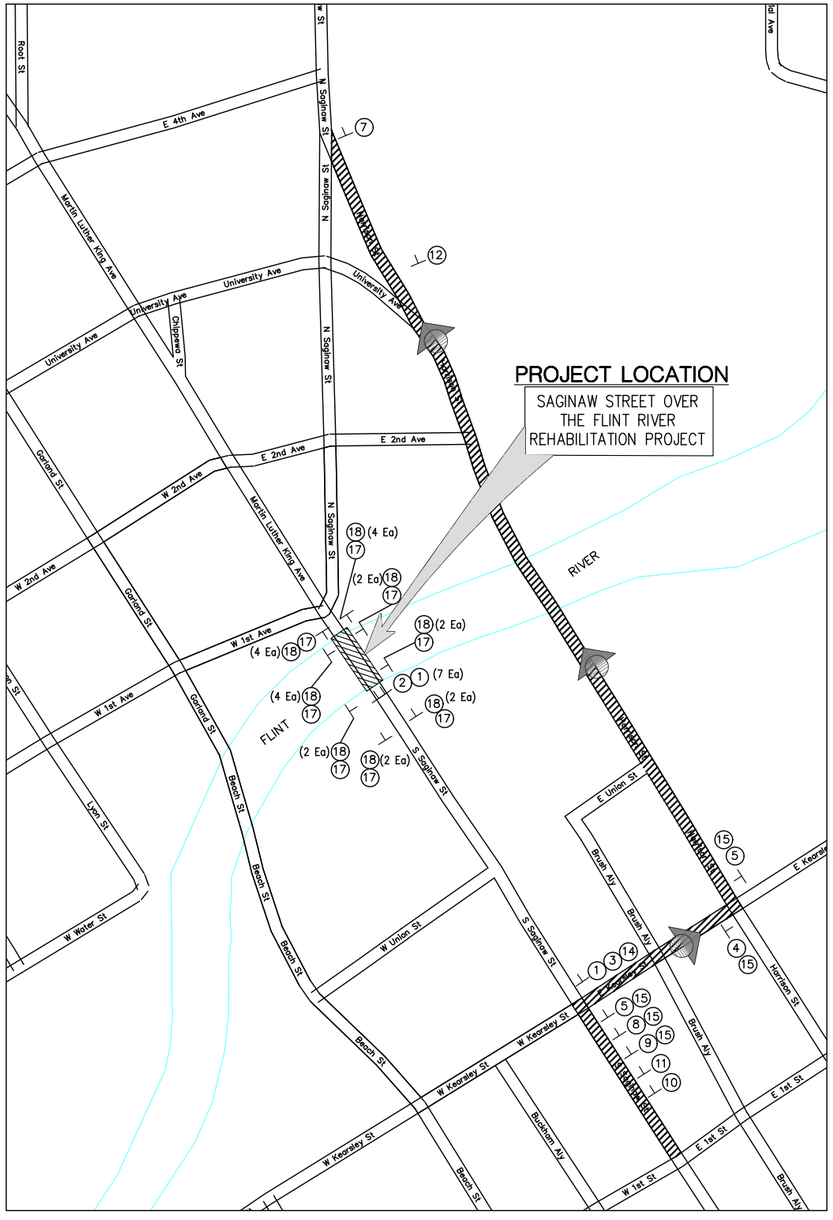
SIGN LEGEND

	1	TYPE III – 8 FT BARRICADE – DOUBLE SIDED, LIGHTED
ROAD CLOSED	2	R11–2 (48" X 30")
ROAD CLOSED AT BRIDGE LOCAL TRAFFIC ONLY	3	R11–3a (60" X 30")
DETOUR ←	4	M4–9L (30" X 24")
DETOUR →	5	M4–9R (30" X 24")
DETOUR ↑	6	M4–9 (30" X 24")
DETOUR ENDS	7	M4–8a (24" X 18")
DETOUR AHEAD	8	W20–2 (36" X 36")
ROAD CLOSED AHEAD	9	W20–3 (36" X 36")
ROAD WORK AHEAD	10	W20–1 (36" X 36")
WORK ZONE BEGINS	11	R5–18c (48" X 48")
END ROAD WORK	12	G20–2 (24" X 48")
DETOUR	13	M4–10L (48" X 18")
DETOUR	14	M4–10R (48" X 18")
NB SAGINAW ST	15	SPECIAL (36" X 6")
SB SAGINAW ST	16	SPECIAL (36" X 6")
SIDEWALK CLOSED	17	R9–9 (30" X 18")
	18	TYPE II – 4 FT PEDESTRIAN BARRICADE



SOUTHBOUND CLOSURE DETAIL



NORTHBOUND CLOSURE & SIDEWALK CLOSURE DETAIL

DETOUR ROUTE

SAGINAW STREET DETOUR PLAN

TRAFFIC CONTROL NOTES

1. ALL MEASURES REQUIRED FOR TRAFFIC CONTROL DURING CONSTRUCTION SHALL CONFORM WITH THE 2011 EDITION OF THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (M.M.U.T.C.D.), AND THE M.D.O.T. 2012 STANDARD SPECIFICATIONS FOR CONSTRUCTION, SECTION 812, UNLESS MODIFIED BY THIS PLAN OR DIRECTED OTHERWISE BY THE ENGINEER.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING, PLACING, MAINTAINING, AND REMOVING ALL TRAFFIC CONTROL DEVICES.
3. ALL SIGNS SHALL BE TYPE B – TEMPORARY WITH A 7 FOOT BOTTOM HEIGHT. SIGNS SHALL BE MOUNTED ON SUITABLE, DRIVEN STEEL SUPPORT POSTS THAT WILL PROVIDE THE 7 FOOT BOTTOM HEIGHT. COST FOR SIGN POSTS SHALL BE INCLUDED IN THE "Sign, Type B, Temp, Prismatic" OR "Sign, Type B, Temp, Prismatic, Special" PAY ITEM.
4. PRIOR TO DRIVING POSTS FOR SIGNS, THE CONTRACTOR SHALL CALL MISS DIG (1–800–482–7171 OR 811) OR VISIT www.missdig.org FOR THE LOCATIONS OF ALL UNDERGROUND UTILITIES, THREE WORKING DAYS PRIOR TO STARTING WORK.
5. ALL BARRICADES LEFT IN PLACE AT NIGHT SHALL BE LIGHTED. ADVANCE WARNING SIGNS SHALL BE PROVIDED WITH A DAY–GLOW ORANGE FLAG FOR DAY USE, AND TWO FLASHING LIGHTS FOR NIGHT USE.
6. REASONABLE ACCESS MUST BE MAINTAINED TO ALL DRIVEWAYS AT ALL TIMES.
7. PAYMENT FOR TEMPORARY SIGNS AND BARRICADES LIGHTED–FURNISHED AND LIGHTED–OPERATED WILL BE BASED ON THE MAXIMUM NUMBER OF UNITS REQUIRED AT ANY ONE TIME DURING THE LIFE OF THE CONTRACT.
8. ALL BARRICADES AND TEMPORARY SIGNS SHALL BE PROPERLY WEIGHTED, AND LIGHTS SHALL BE KEPT IN WORKING ORDER AT ALL TIMES. ANY BARRICADES OR TEMPORARY SIGNS DAMAGED BY THE CONTRACTOR OR DUE TO IMPROPER USE SHALL BE REPLACED PROMPTLY AT THE CONTRACTOR'S EXPENSE.
9. ALL NON–APPLICABLE WARNING SIGNS, REGULATORY SIGNS, AND CONSTRUCTION SIGNS SHALL BE COVERED OR REMOVED AS DIRECTED BY THE ENGINEER.
10. DISTANCES BETWEEN ADVANCED WARNING SIGNS SHALL BE AS SHOWN IN THE MDOT MAINTAINING TRAFFIC TYPICALS M0020.
11. TEMPORARY SIGN LOCATIONS SHALL BE STAKED BY THE ENGINEER.
12. ALL WARNING SIGNS TO BE LIGHTED.
13. DURING EPOXY OVERLAY, CONTRACTOR SHALL MAINTAIN ONE LANE IN EACH DIRECTION OF TRAFFIC UTILIZING MDOT MAINTAINING TRAFFIC TYPICAL M0240.

MAINTAINING TRAFFIC QUANTITIES

SYMBOL	ITEM	QUANTITY	SIGNS	
			SIGN AREA SFT	TOTAL AREA SFT
2	R11–2	2	10	20
3	R11–3a	2	12.5	50
4	M4–9L	4	5	20
5	M4–9R	5	5	25
6	M4–9	0	5	0
7	M4–8a	2	3	6
8	W20–2	3	9	27
9	W20–3	3	9	27
10	W20–1	3	9	27
11	R5–18c	3	16	48
12	G20–2	2	8	16
13	M4–10L	0	6	6
14	M4–10R	2	6	12
17	R9–9	8	3.75	30
M0240		2	136	272
SIGN, TYPE B, TEMP, PRISMATIC				586 SFT
15	SPECIAL	5	1.5	7.5
16	SPECIAL	10	1.5	15
SIGN, TYPE B, TEMP, PRISMATIC, SPECIAL				22.5 SFT
PEDESTRIAN TYPE II BARRICADE, TEMP FURN & OPER				22 EA
BARRICADE, TYPE III, HIGH INTENSITY, DOUBLE SIDED, LIGHTED, FURN & OPER				15 EA
LIGHTED ARROW, TYPE C, FURN & OPER				2 EA
MINOR TRAFFIC DEVICES				1 LS
PLASTIC DRUM, HIGH INTENSITY, FURN & OPER				30 EA

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JN 129257

PLAN SUBMITTALS AND CHANGES
BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT
DETOUR SHEET
SAGINAW STREET OVER THE FLINT RIVER

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	08/18
CHECKED BY	ENJ	08/18
SHEET	27 OF	53
STR NO.	2849	

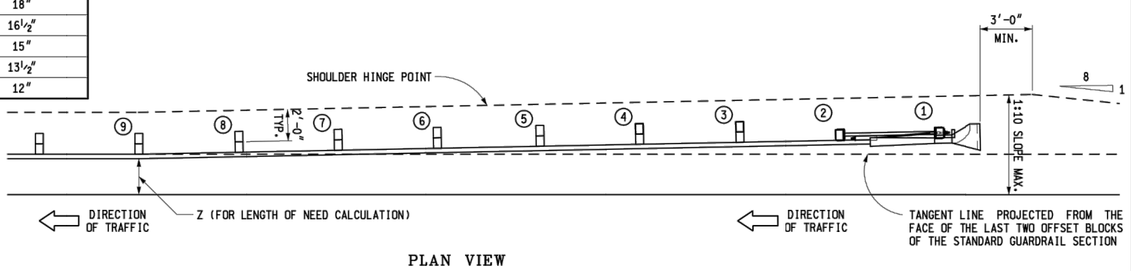
R:\Projects\18C0065\Dwg\Construction Drawings\SH–18C065–D1R.dwg
PLOTTED: 2/1/2019 4:17 PM

POST	** POST OFFSET DISTANCE (FROM TANGENT LINE TO CENTER OF POST)
1	16″
2	14½″
3	21″
4	19½″
5	18″
6	16½″
7	15″
8	13½″
9	12″

** USING 1:50 FLARE

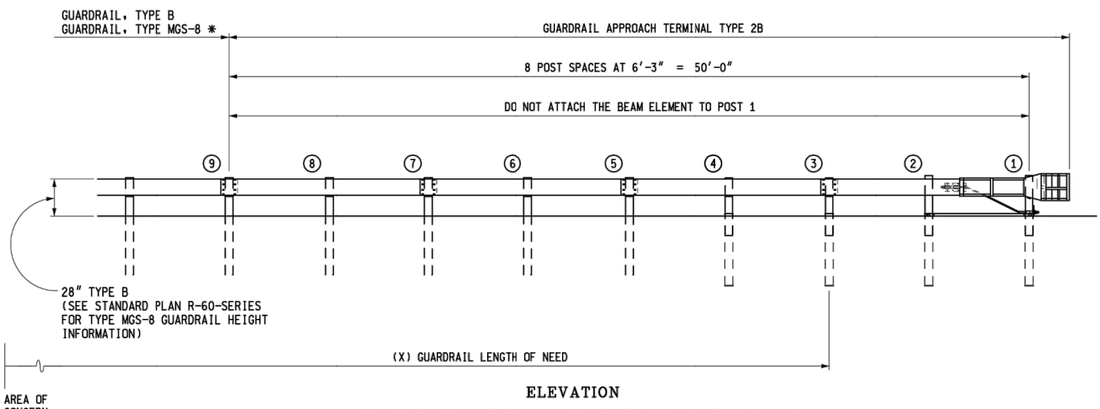
OPTION 1

(DETAILED ON SHEETS 1 THROUGH 4)



PLAN VIEW

* SEE STANDARD PLAN R-60-SERIES FOR POST SPACING AND GUARDRAIL LAYOUT TO TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL APPROACH TERMINAL TYPE 2B



ELEVATION

GUARDRAIL APPROACH TERMINAL TYPE 2B
"SKT"

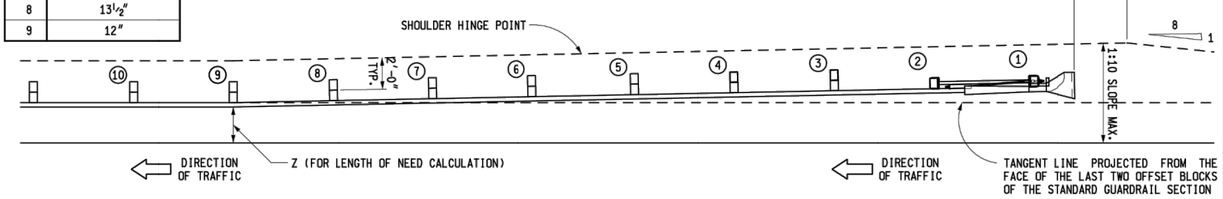
GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T
(SKT & ET-PLUS)

R-62-H-LAP

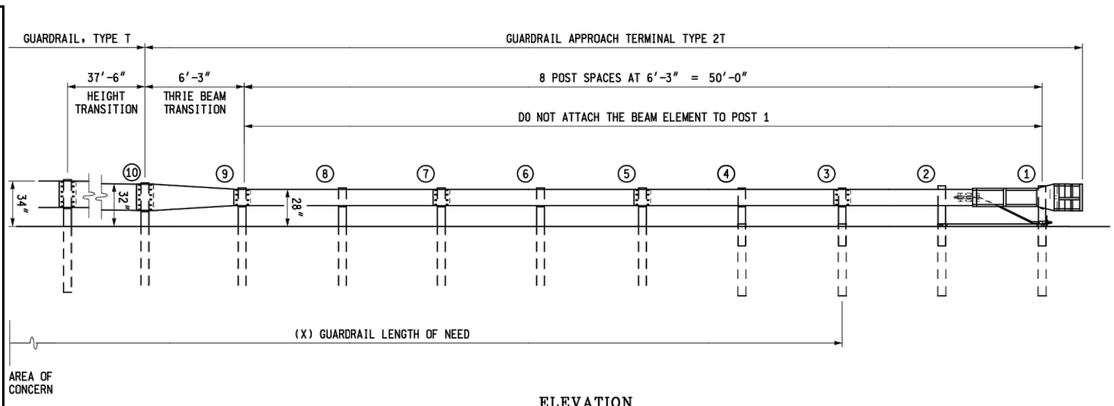
SHEET 1 OF 9

POST	** POST OFFSET DISTANCE (FROM TANGENT LINE TO CENTER OF POST)
1	16″
2	14½″
3	21″
4	19½″
5	18″
6	16½″
7	15″
8	13½″
9	12″

** USING 1:50 FLARE



PLAN VIEW



ELEVATION

GUARDRAIL APPROACH TERMINAL TYPE 2T
"SKT"

GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T
(SKT & ET-PLUS)

R-62-H-LAP

SHEET 2 OF 9

PLAN SUBMITTALS AND CHANGES

DATE	DESCRIPTION
2/1/19	BIDDING DOCUMENTS ISSUED FOR BIDS

CITY OF FLINT

GUARDRAIL APPR TERMINALS

SAGINAW STREET OVER THE FLINT RIVER

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SHEET	28 OF 53
STR NO.	2849

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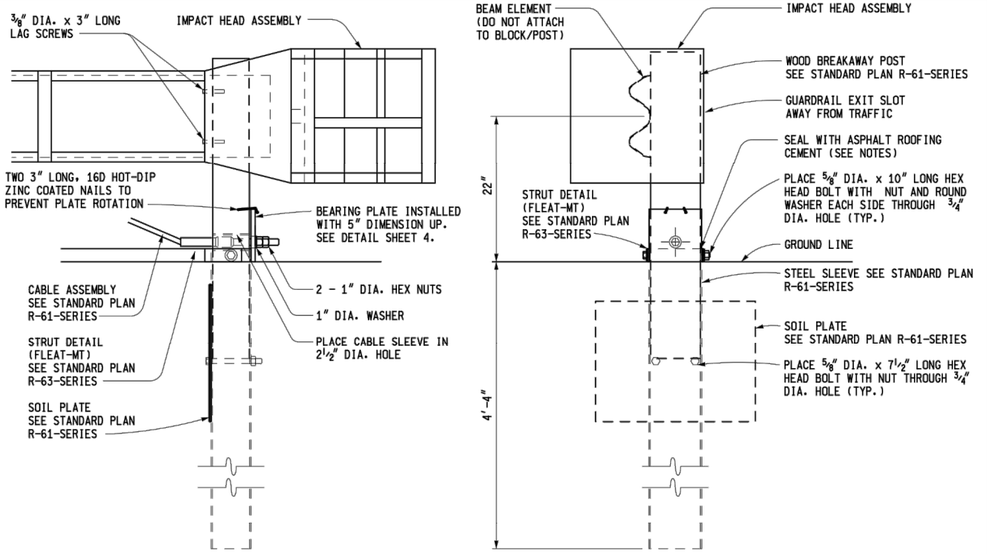
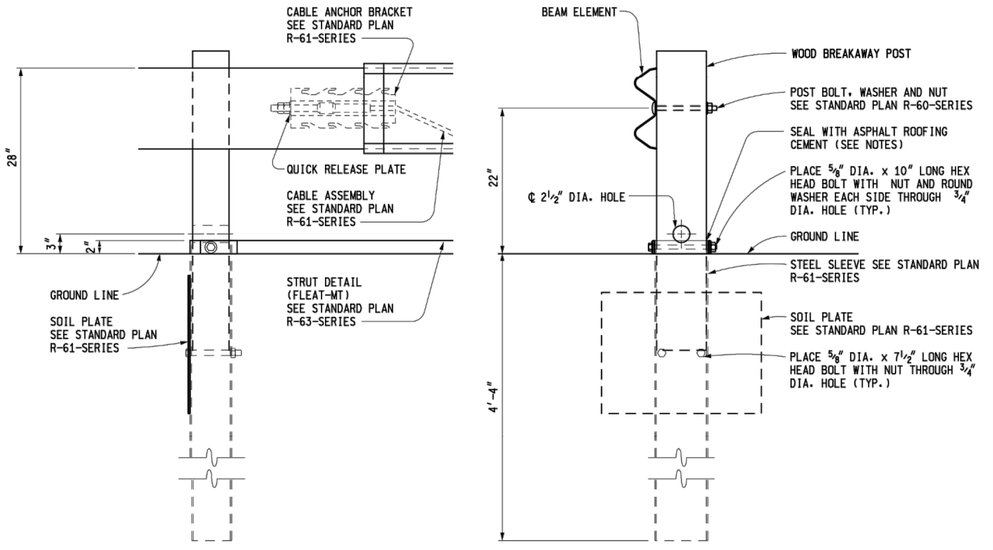


POST 1 DETAIL
(SKT)



POST 2 DETAIL
(SKT)

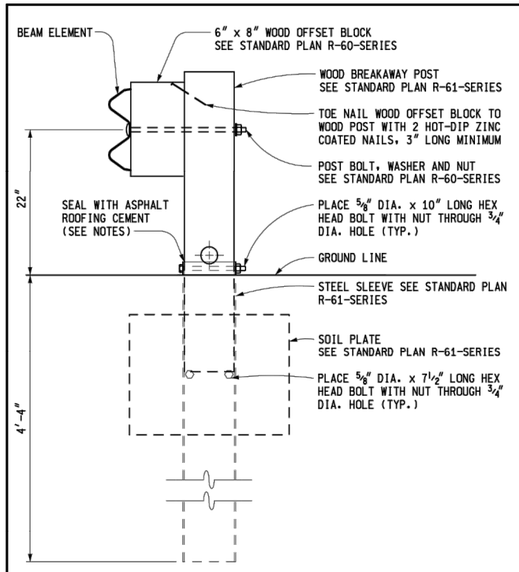
NOTE:

AFTER THE CABLE ASSEMBLY IS TAUT, A SECOND NUT SHALL BE INSTALLED ON EACH END OF THE CABLE SO THAT THE CABLE WILL NOT LOOSEN.

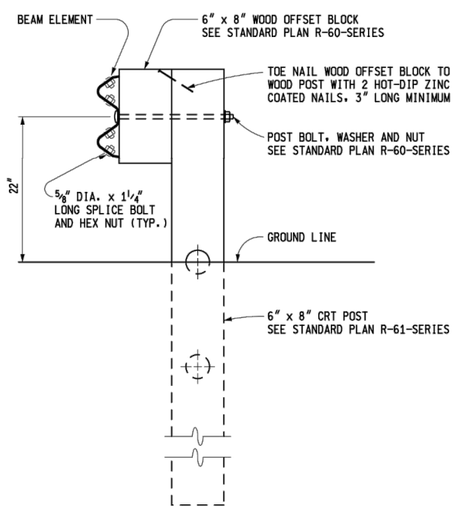
ASPHALT ROOFING CEMENT SHALL BE USED TO SEAL THE PERIMETER AREA BETWEEN THE STEEL SLEEVE (SOIL TUBE) AND THE WOOD BREAKAWAY POST.

GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T
(SKT & ET-PLUS)

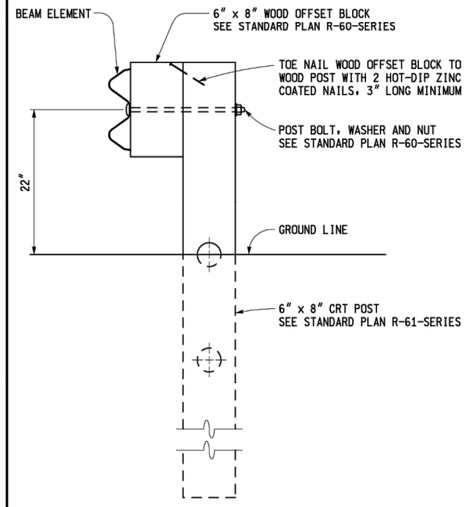
		R-62-H-LAP	SHEET 3 OF 9



POST 3 AND 4 DETAIL
NOTE: BEAM ELEMENTS ARE SPLICED TOGETHER AT POST 3
(SKT)



POST 5 AND 7 DETAIL
(SKT)



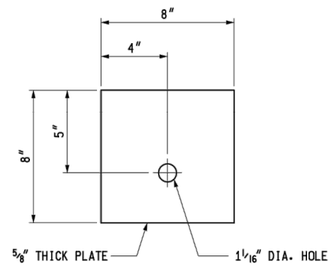
POST 6 AND 8 DETAIL
(SKT)

NOTE:

ASPHALT ROOFING CEMENT SHALL BE USED TO SEAL THE PERIMETER AREA BETWEEN THE STEEL SLEEVE (SOIL TUBE) AND THE WOOD BREAKAWAY POST.

THE SECOND, THIRD, AND FOURTH BEAM ELEMENTS ARE STANDARD RAIL. (POSTS 3 THROUGH 9)

POST 9 IS A STANDARD LINE POST.



BEARING PLATE
(SKT & ET-PLUS)

GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T
(SKT & ET-PLUS)

		R-62-H-LAP	SHEET 4 OF 9

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PLAN SUBMITTALS AND CHANGES	
BIDDING DOCUMENTS	
DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT
GUARDRAIL APPR TERMINALS
SAGINAW STREET OVER THE FLINT RIVER

APPROVED _____

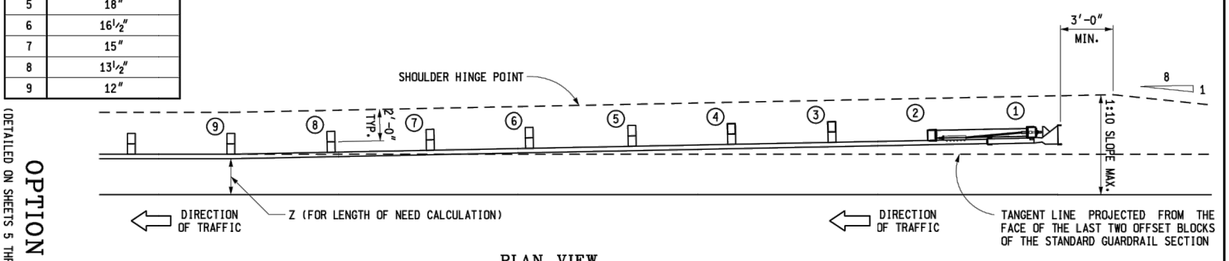
MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	08/18
CHECKED BY	ENJ	08/18
SHEET 29 OF 53		
STR NO. 2849		

POST	** POST OFFSET DISTANCE (FROM TANGENT LINE TO CENTER OF POST)
1	16″
2	14½″
3	21″
4	19½″
5	18″
6	16½″
7	15″
8	13½″
9	12″

** USING 1:50 FLARE

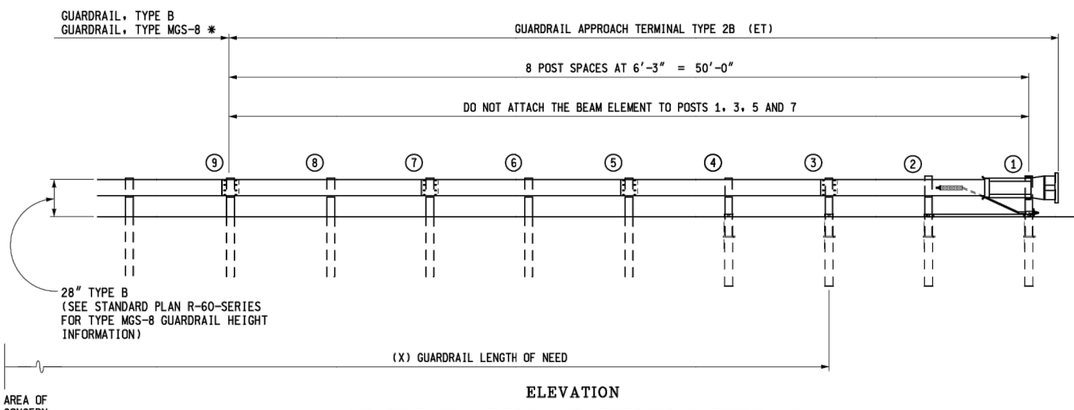
OPTION 2

(DETAILED ON SHEETS 5 THROUGH 8 AND 9)



PLAN VIEW

* SEE STANDARD PLAN R-60-SERIES FOR POST SPACING AND GUARDRAIL LAYOUT TO TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL APPROACH TERMINAL TYPE 2B



ELEVATION

GUARDRAIL APPROACH TERMINAL TYPE 2B
"ET-PLUS"

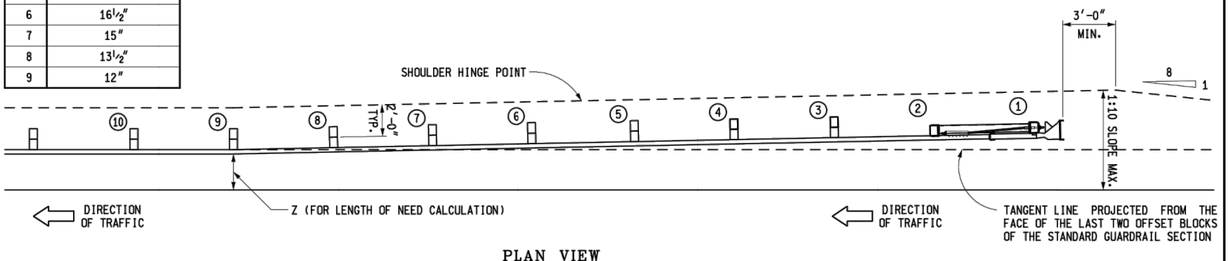
GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T
(SKT & ET-PLUS)

R-62-H-LAP

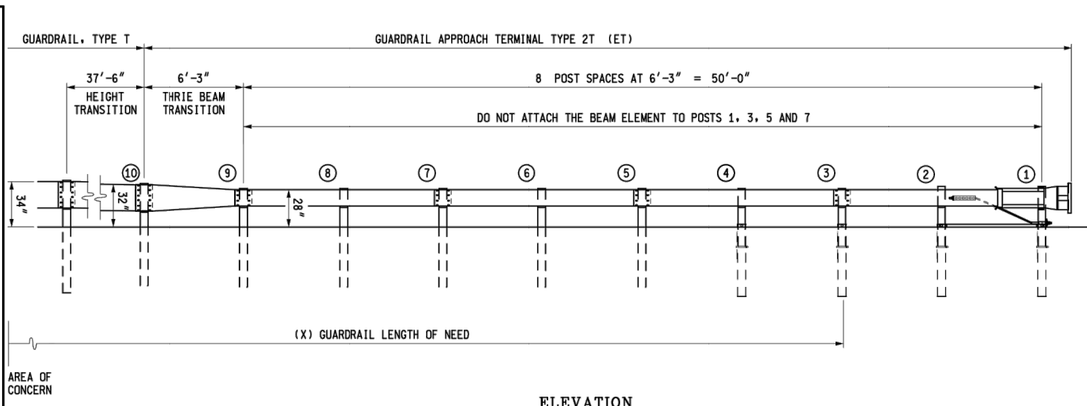
SHEET 5 OF 9

POST	** POST OFFSET DISTANCE (FROM TANGENT LINE TO CENTER OF POST)
1	16″
2	14½″
3	21″
4	19½″
5	18″
6	16½″
7	15″
8	13½″
9	12″

** USING 1:50 FLARE



PLAN VIEW



ELEVATION

GUARDRAIL APPROACH TERMINAL TYPE 2T
"ET-PLUS"

GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T
(SKT & ET-PLUS)

R-62-H-LAP

SHEET 6 OF 9

PLAN SUBMITTALS AND CHANGES

DATE	DESCRIPTION
2/1/19	BIDDING DOCUMENTS ISSUED FOR BIDS

CITY OF FLINT

GUARDRAIL APPR TERMINALS

SAGINAW STREET OVER THE FLINT RIVER

APPROVED _____

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CHECKED BY	ENG	08/18
SHEET 30 OF 53		
STR NO. 2849		

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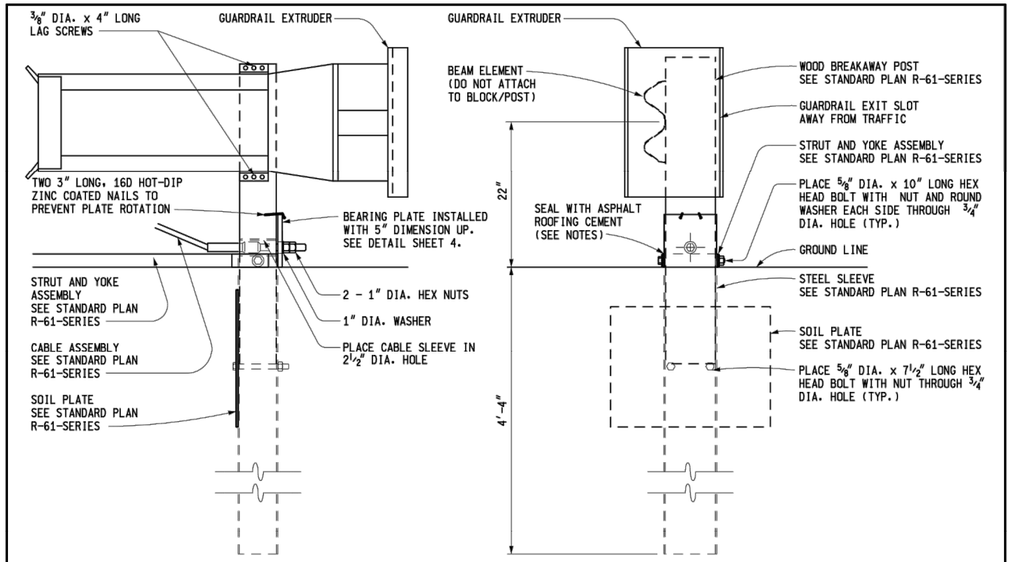
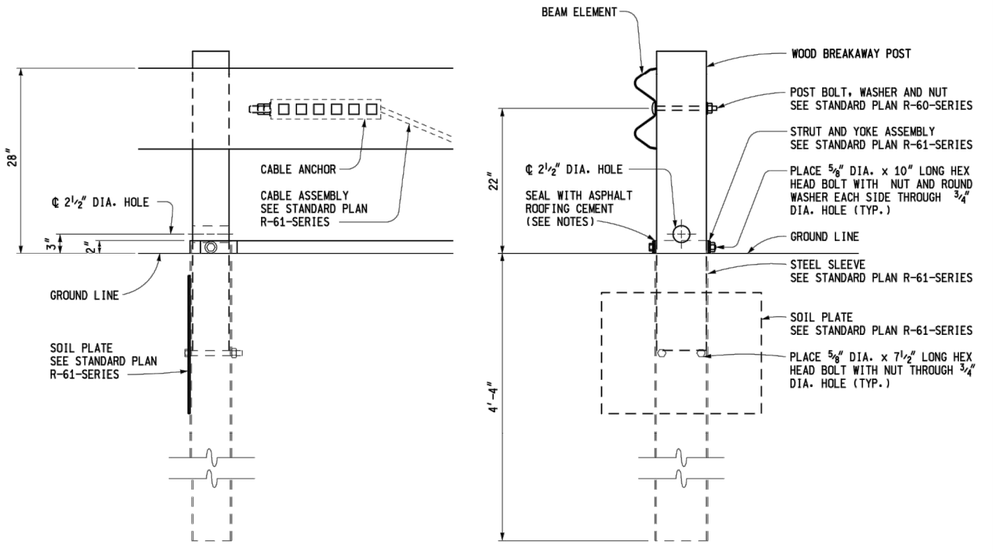


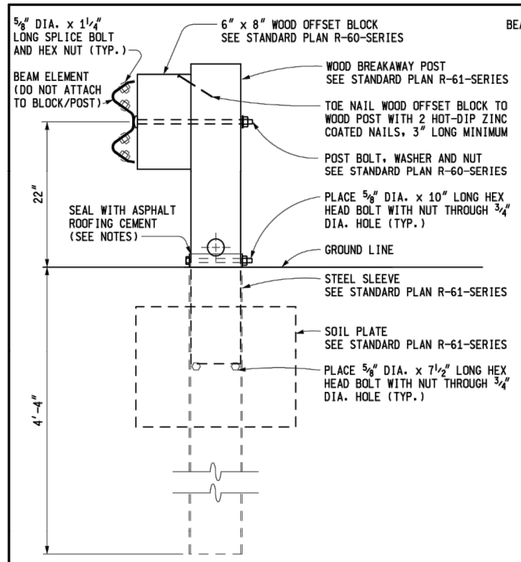
POST 1 DETAIL
(ET-PLUS)



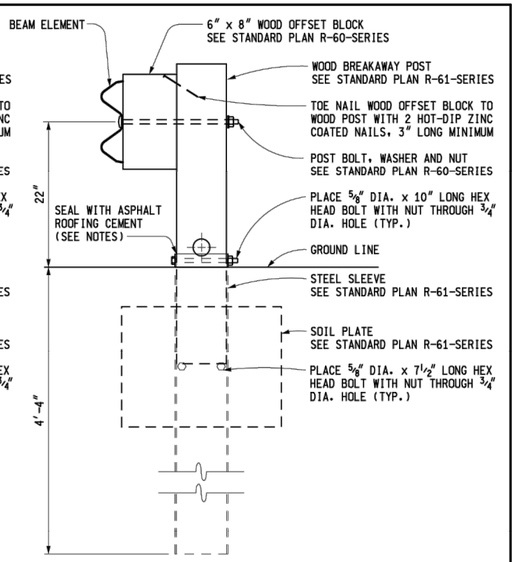
POST 2 DETAIL
(ET-PLUS)

GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T
(SKT & ET-PLUS)

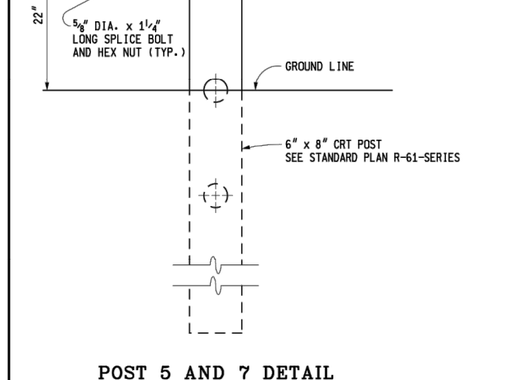
		R-62-H-LAP	SHEET 7 OF 9



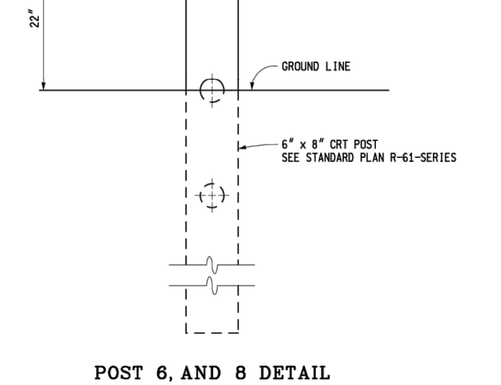
POST 3 DETAIL
(ET-PLUS)



POST 4 DETAIL
(ET-PLUS)



POST 5 AND 7 DETAIL
(ET-PLUS)



POST 6, AND 8 DETAIL
(ET-PLUS)

NOTE: POST 9 IS A STANDARD LINE POST.

NOTE:

ASPHALT ROOFING CEMENT SHALL BE USED TO SEAL THE PERIMETER AREA BETWEEN THE STEEL SLEEVE (SOIL TUBE) AND THE WOOD BREAKAWAY POST.

THE SECOND, THIRD, AND FOURTH BEAM ELEMENTS ARE STANDARD RAIL. (POSTS 3 THROUGH 9)

POST 9 IS A STANDARD LINE POST.

GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T
(SKT & ET-PLUS)

		R-62-H-LAP	SHEET 8 OF 9

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PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT

GUARDRAIL APPR TERMINALS

SAGINAW STREET OVER THE FLINT RIVER

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	08/18
CHECKED BY	ENJ	08/18
SHEET 31 OF 53		
STR NO. 2849		

NOTES:

ALL POSTS, OFFSET BLOCKS, BEAM ELEMENTS, AND HARDWARE (INCLUDING BOLTS, NUTS, AND WASHERS) SHALL CONFORM TO THE CURRENT STANDARD SPECIFICATIONS AND TO THE CURRENT STANDARD PLAN R-60-SERIES, WHERE APPLICABLE, EXCEPT AS SPECIFIED ON THIS STANDARD.

ALL 1:10 SLOPES SHALL BE GRADED TO CLASS A SLOPE TOLERANCES.

WHEN SITE CONDITIONS WARRANT AND WITH THE APPROVAL OF THE ENGINEER, GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T CAN BE INSTALLED STRAIGHT (WITHOUT THE 1'-0" OFFSET FROM THE TANGENT LINE TO THE TRAFFIC FACE OF POST 1).

GUARDRAIL REFLECTORS AND OTHER ATTACHMENTS ARE NOT TO BE USED ON THE GUARDRAIL APPROACH TERMINAL. PLACE REFLECTORS BEGINNING ON STANDARD RUN OF GUARDRAIL.

USE REFLECTIVE SHEETING ACCORDING TO THE FOLLOWING TRAFFIC CONDITIONS: (NOTE: ALTERNATE 3" BLACK AND 3" YELLOW STRIPES ON A 45° ANGLE)

TRAFFIC PASSING ON THE LEFT SIDE | TRAFFIC PASSING ON BOTH SIDES | TRAFFIC PASSING ON THE RIGHT SIDE

THE PORTION OF THE IMPACT HEAD ASSEMBLY FACING TRAFFIC SHALL BE COMPLETELY COVERED WITH HIGH INTENSITY ADHESIVE REFLECTIVE SHEETING.

GUARDRAIL APPROACH TERMINAL TYPES 2B & 2T
(SKT & ET-PLUS)

R-62-H-LAP

SHEET 9 OF 9

SHEET OF

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PLAN SUBMITTALS AND CHANGES

BIDDING DOCUMENTS

DATE	DESCRIPTION
2/1/19	ISSUED FOR BIDS

CITY OF FLINT

GUARDRAIL APPR TERMINALS

SAGINAW STREET OVER THE FLINT RIVER

APPROVED _____

MDOT UNIT		
CONSULT UNIT		
DRAWN BY	MJS	08/18
CHECKED BY	ENJ	08/18
SHEET 32 OF 53		
STR NO. 2849		

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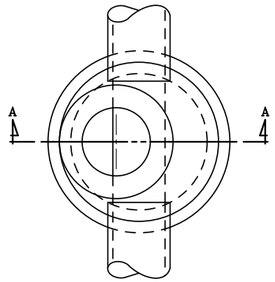
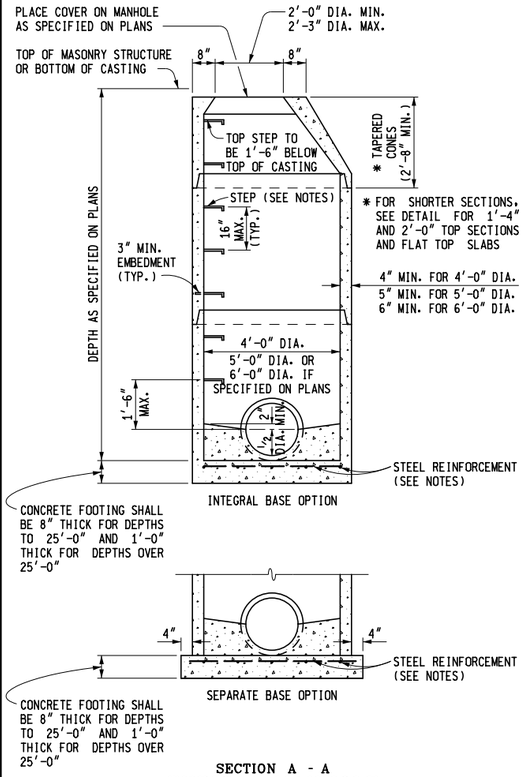


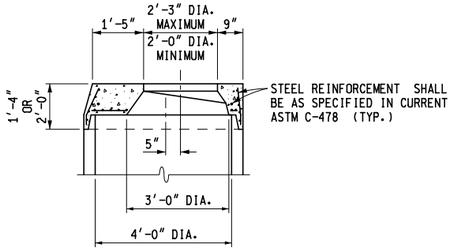
PLAN VIEW



SECTION A - A

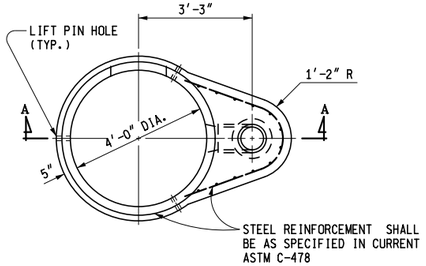
TYPICAL MANHOLE

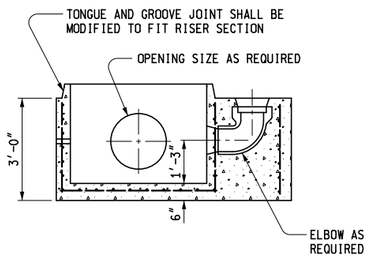
PRECAST REINFORCED CONCRETE SHOWN
OTHER OPTIONS INCLUDE CONCRETE BLOCK, BRICK, OR CAST-IN-PLACE WALL SECTIONS
SEE TYPICAL WALL SECTIONS FOR WALL THICKNESS



DETAIL FOR 1'-4" & 2'-0" TOP SECTIONS

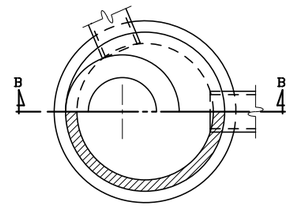
SHAPE MAY VARY FROM DETAIL SHOWN BUT MUST COMPLY WITH ASTM C-478 AND JOINTS SHALL BE COMPATIBLE WITH THE RISER



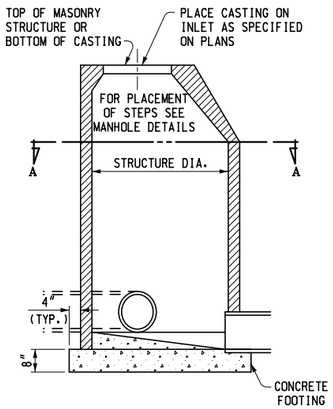


SECTION A - A

TYPICAL PRECAST REINFORCED BOTTOM SECTION FOR DROP MANHOLE

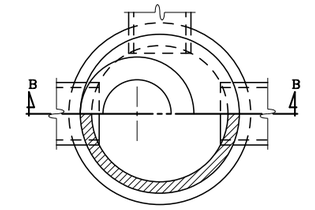


HALF SECTION A - A

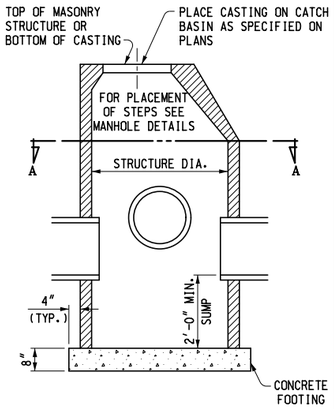


SEE MANHOLE DETAILS FOR SIZE AND BASE OPTIONS
SECTION B - B

INLET

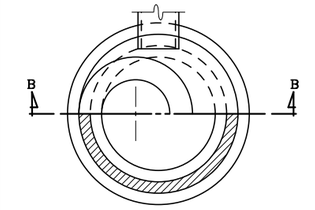


HALF SECTION A - A

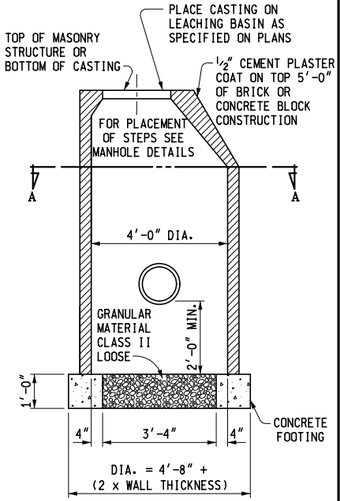


SEE MANHOLE DETAILS FOR SIZE AND BASE OPTIONS
SECTION B - B

CATCH BASIN

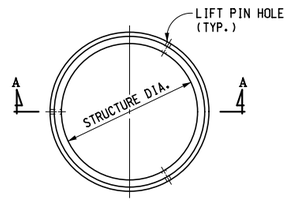


HALF SECTION A - A



SEE MANHOLE DETAILS FOR BASE OPTIONS
SECTION B - B

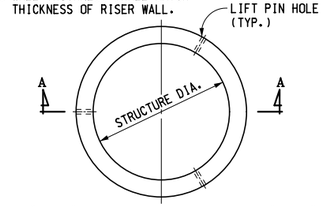
LEACHING BASIN



SECTION A - A
SEE MANHOLE DETAILS FOR SIZE AND BASE OPTIONS

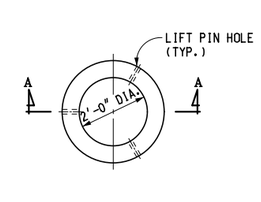
PRECAST SUMP FOR PRECAST RISERS

* WALL THICKNESS SHALL MATCH THICKNESS OF RISER WALL.



SECTION A - A
SEE TYPICAL BRICK AND BLOCK SECTION FOR SIZE AND BASE OPTIONS

PRECAST SUMP FOR BRICK OR BLOCK CONSTRUCTION



SECTION A - A

PRECAST SUMP FOR 2'-0" DIA. STRUCTURES

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

F.H.W.A. APPROVAL	6-15-2016 PLAN DATE	R-1-G	SHEET 1 OF 9

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

F.H.W.A. APPROVAL	6-15-2016 PLAN DATE	R-1-G	SHEET 2 OF 9

AS-LET PLAN REVISIONS

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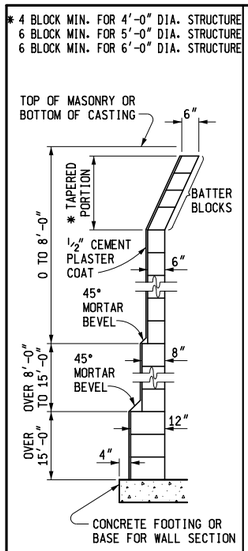
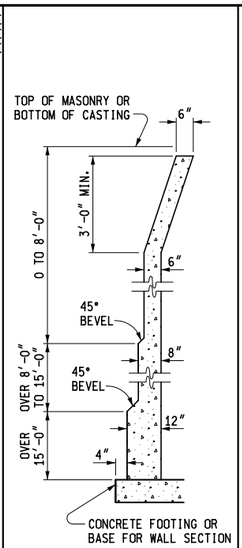
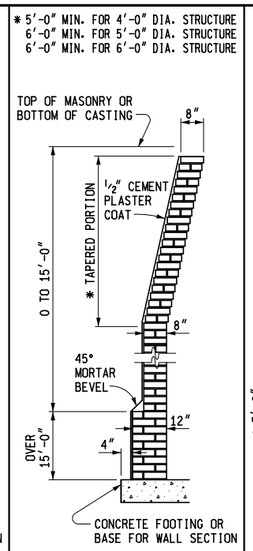
33	



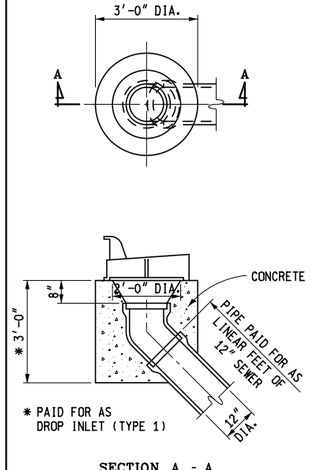
TYPICAL CONCRETE BLOCK WALL SECTION



TYPICAL CAST-IN-PLACE CONCRETE WALL SECTION

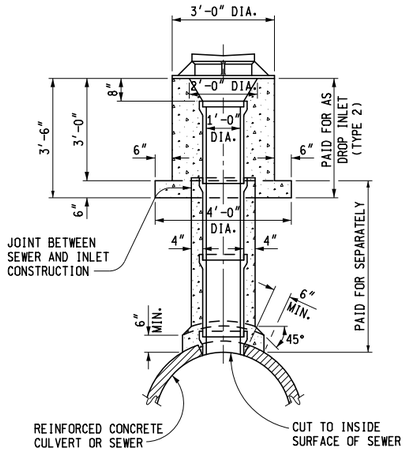


TYPICAL BRICK WALL SECTION



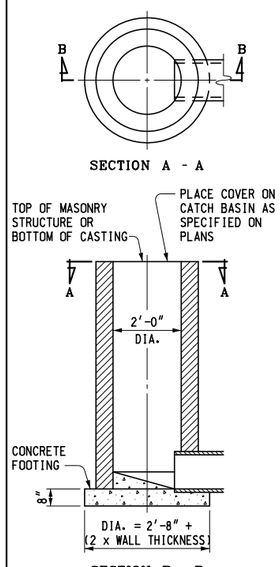
SECTION A - A

DROP INLET (TYPE 1)

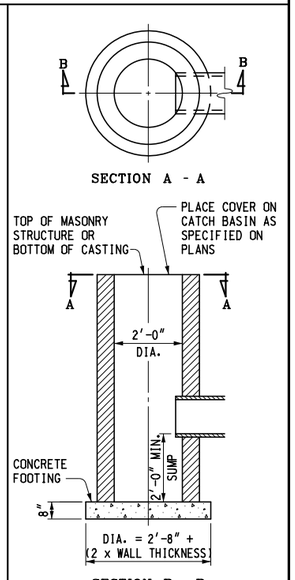


BACKFILL SHALL BE PLACED TO BOTTOM OF INLET AND COMPACTED BEFORE CONSTRUCTING THE INLET

DROP INLET (TYPE 2)



INLET



CATCH BASIN

MICHIGAN DEPARTMENT OF TRANSPORTATION
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DRAINAGE STRUCTURES

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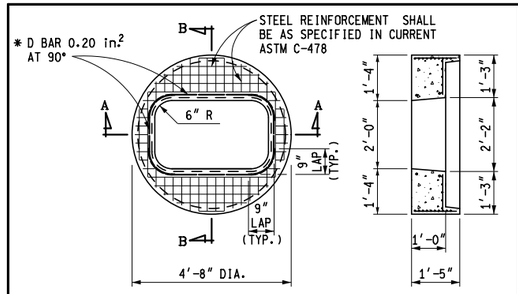
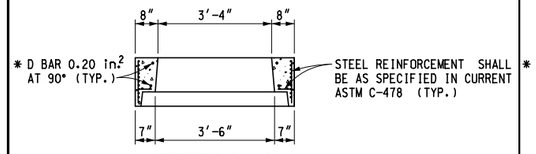


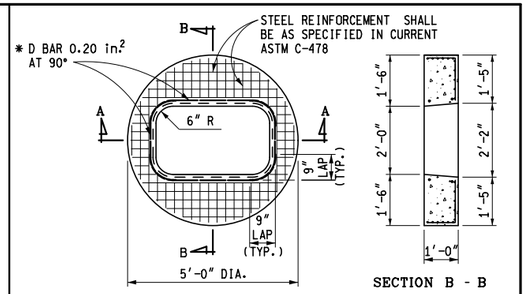
SECTION B - B

* D BARS MAY BE BENT AT A SMALLER RADIUS RATHER THAN PARALLELING THE RADIUS IN THE DRAIN OPENING



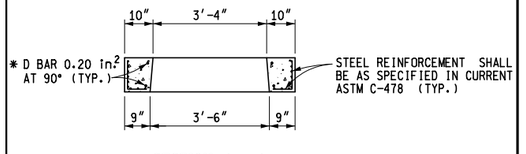
SECTION A - A

PRECAST FLAT SLAB TOP FOR PRECAST CONCRETE STRUCTURE, 2' x 4' CASTING



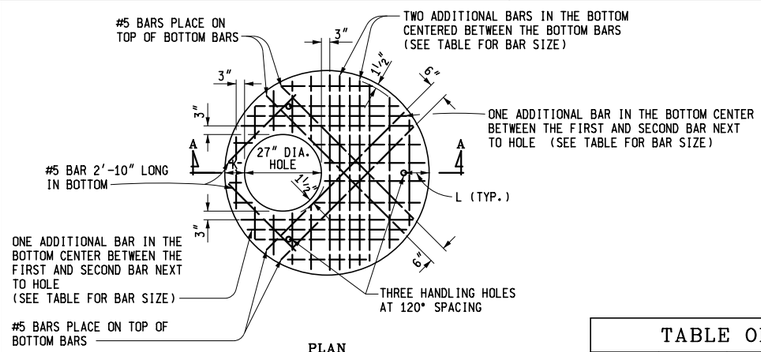
SECTION B - B

* D BARS MAY BE BENT AT A SMALLER RADIUS RATHER THAN PARALLELING THE RADIUS IN THE DRAIN OPENING

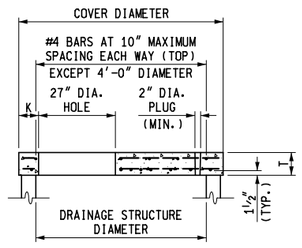


SECTION A - A

PRECAST FLAT SLAB TOP FOR MASONRY STRUCTURE, 2' x 4' CASTING



PLAN
(SHOWING BOTTOM LAYER OF REINFORCEMENT)



SECTION A - A

TABLE OF DIMENSIONS					
STRUCTURE DIAMETER	COVER DIAMETER	T	K	L	BAR MAXIMUM SPACING (BOTTOM EACH WAY)
* 4'-0"	58"	6"	6"	8"	#5 AT 6"
5'-0"	72"	8"	7"	9"	#5 AT 7"
6'-0"	86"	8"	8"	10"	#5 AT 6"
7'-0"	101 1/2"	12"	8 3/4"	11"	#5 AT 5"
8'-0"	114"	12"	9"	11"	#6 AT 6"
9'-0"	128"	12"	10"	12"	#5 AT 6"
10'-0"	140"	12"	10"	13"	#5 AT 6"

* ONLY BOTTOM LAYERS OF STEEL NECESSARY

PRECAST REINFORCED CONCRETE FLAT SLAB TOP

MICHIGAN DEPARTMENT OF TRANSPORTATION
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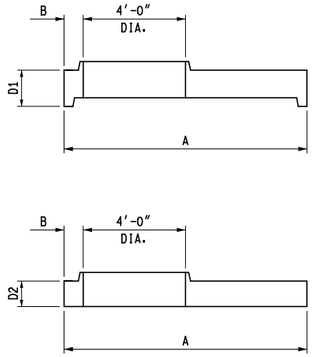
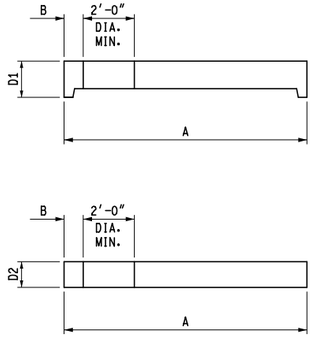


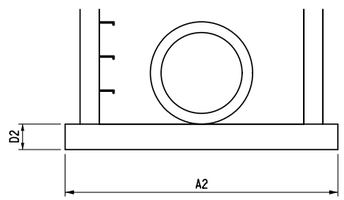
PRECAST REDUCER CAP

REDUCER CAP DIMENSIONS				
STRUCTURE DIAMETER	CAP DIAMETER "A"	B	CAP DEPTH "D1"	CAP DEPTH "D2"
7′-0″	101½″	8¾″	1′-5″	12″
8′-0″	114″	9″	1′-5″	12″
9′-0″	128″	10″	1′-5″	12″
10′-0″	140″	10″	1′-6″	12″



PRECAST FLAT SLAB TOP

FLAT SLAB TOP DIMENSIONS				
STRUCTURE DIAMETER	COVER DIAMETER "A"	B	COVER DEPTH "D1"	COVER DEPTH "D2"
7′-0″	101½″	8¾″	1′-5″	12″
8′-0″	114″	9″	1′-5″	12″
9′-0″	128″	10″	1′-5″	12″
10′-0″	140″	10″	1′-6″	12″



SEPARATE BASE OPTION

BASE AND RISER DIMENSIONS					
STRUCTURE DIAMETER	BASE DIAMETER "A1"	BASE DIAMETER "A2"	MIN. WALL THICKNESS "T"	BASE DEPTH "D1"	BASE DEPTH "D2"
7′-0″	101½″	108″	7″	8″	12″
8′-0″	114″	128″	8″	8″	12″
9′-0″	128″	140″	9″	8″	12″
10′-0″	140″	154″	10″	8″	12″

MICHIGAN DEPARTMENT OF TRANSPORTATION
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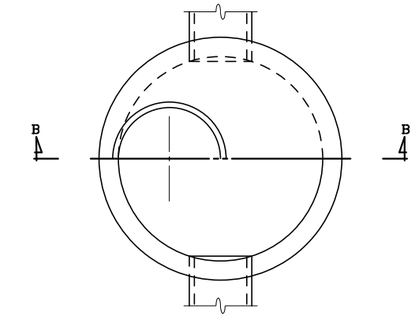
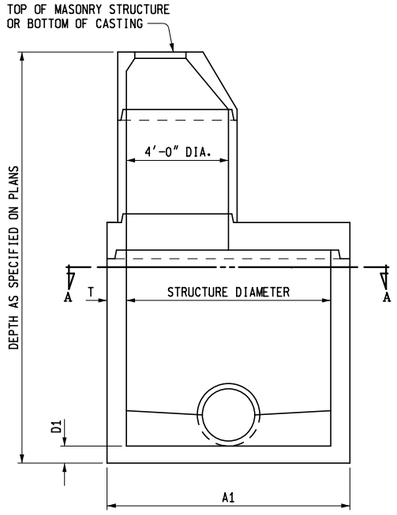
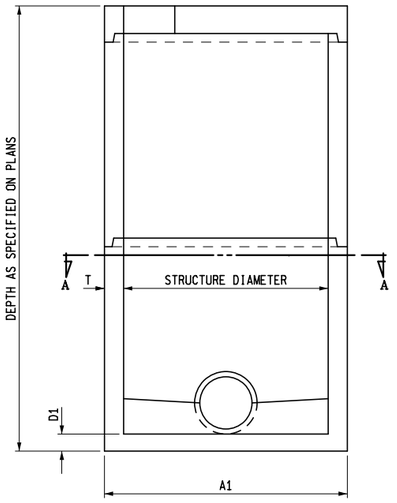


HALF SECTION A - A



SECTION B - B
SHOWING REDUCER CAP



SECTION B - B
SHOWING FLAT SLAB TOP

PRECAST MANHOLE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

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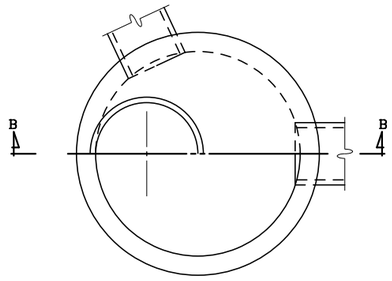
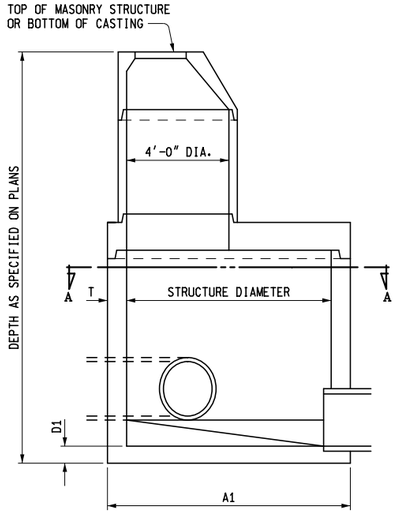
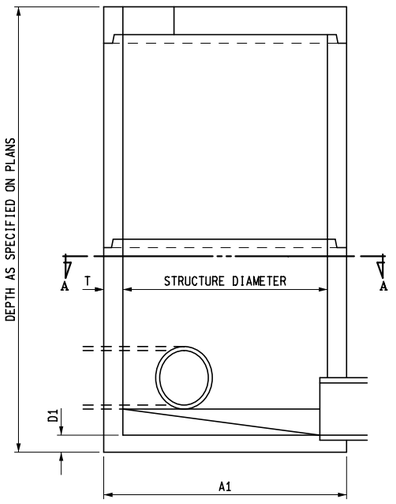


HALF SECTION A - A



SECTION B - B
SHOWING REDUCER CAP



SECTION B - B
SHOWING FLAT SLAB TOP

PRECAST INLET

MICHIGAN DEPARTMENT OF TRANSPORTATION
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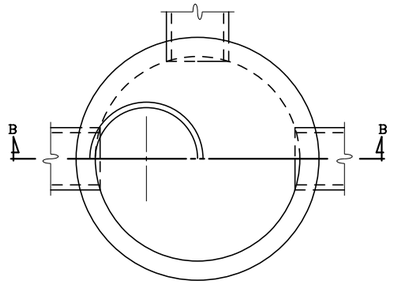
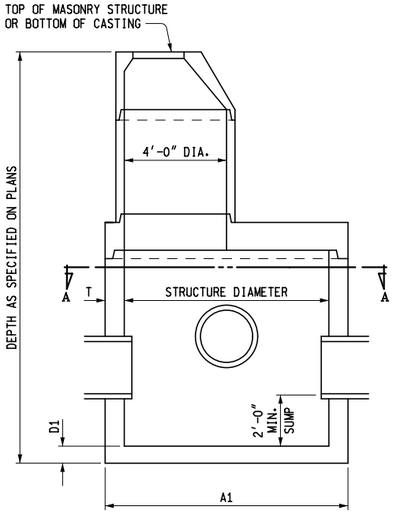
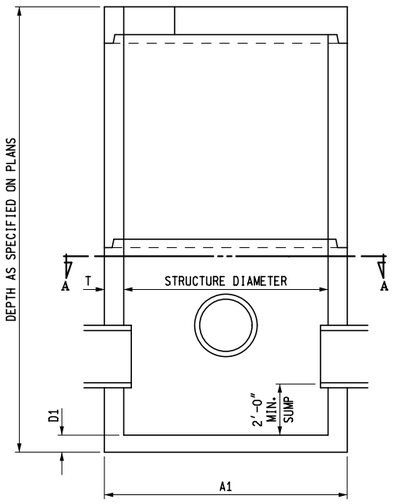
F.H.W.A. APPROVAL	6-15-2016 PLAN DATE	R-1-G	SHEET 7 OF 9



HALF SECTION A - A



SECTION B - B
SHOWING REDUCER CAP



SECTION B - B
SHOWING FLAT SLAB TOP

PRECAST CATCH BASIN

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

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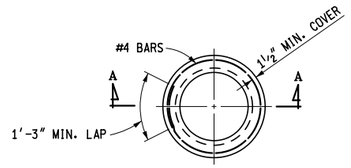

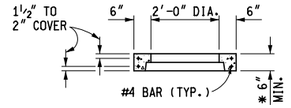

SECTION A - A

* WHEN RISER TONGUE LENGTH IS GREATER THAN 3", USE 2 TIMES THE TONGUE LENGTH.

NOTE: PRECAST RISER SHALL FULLY ENGAGE THE TONGUE OF THE RISER PIPE.

PRECAST RISER RING

(FOR 2'-0" DIAMETER STRUCTURE)

NOTES:

THE DRAINAGE STRUCTURE COVERS ALLOWED FOR USE ON THESE DRAINAGE STRUCTURES ARE SPECIFIED IN SUBSEQUENT STANDARD PLANS AND ARE INTERCHANGEABLE ON ANY STRUCTURE.

THE TOPS OF MASONRY STRUCTURES SHALL BE SUFFICIENTLY LOW TO PERMIT PROPER ADJUSTMENT OF COVER TO GRADE USING MORTAR OR BRICK AS DIRECTED BY THE ENGINEER.

PREMIUM JOINTS ARE REQUIRED ON ALL SANITARY MANHOLES. SEE ASTM DESIGNATION C-923.

GRANULAR MATERIAL CLASS III SHALL BE USED IN BACKFILLING AROUND ALL STRUCTURES THAT FALL WITHIN THE 1:1 INFLUENCE LINES FROM THE EDGE OF PAVEMENT OR BACK OF CURB.

STEPS FOR DRAINAGE STRUCTURES SHALL BE OF AN APPROVED DESIGN AND MADE FROM CAST IRON, ALUMINUM, OR PLASTIC COATED STEEL. RUNGS SHALL BE A MINIMUM OF 10" IN CLEAR LENGTH, DESIGNED TO PREVENT THE FOOT FROM SLIPPING OFF THE END. THE MINIMUM HORIZONTAL PULL OUT LOAD SHALL BE 400 LBS. THE MINIMUM VERTICAL LOAD SHALL BE 800 LBS.

THE BELL SHALL BE REMOVED FOR THE FIRST LENGTH OF OUTLET PIPE PROJECTING THROUGH THE WALL OF THE MANHOLE.

PRECAST CONCRETE SECTIONS, SUMPS, AND FLAT TOP SLABS SHALL BE BUILT ACCORDING TO CURRENT ASTM C-478 AND ACCORDING TO DETAILS SPECIFIED ON THIS PLAN. PRECAST REINFORCED CONCRETE FLAT TOP SLAB SHALL BE MARKED TO SHOW LOCATION OF REINFORCEMENT. THE WALLS OF THE PRECAST UNITS MAY HAVE A SLIGHT TAPER TO ALLOW FOR FORM REMOVAL. PRECAST CONCRETE 2'-0" DIAMETER DRAINAGE STRUCTURES SHALL HAVE A MINIMUM 3" WALL THICKNESS WITH A 6" MINIMUM BEARING SURFACE ON TOP. SEE PRECAST RISER RING FOR 2'-0" DIAMETER STRUCTURE.

THE MAXIMUM INSIDE DIAMETER OF PIPES ENTERING OR LEAVING PRECAST DRAINAGE STRUCTURES SHALL BE 2'-0" LESS THAN THE INSIDE DIAMETER OF THE DRAINAGE STRUCTURE. A PIPE LEAVING A 2'-0" DIAMETER DRAINAGE STRUCTURE IS ALLOWED TO HAVE 1'-0" INSIDE DIAMETER OR LESS.

THE NUMBER OF PIPE OPENINGS IN A RISER SHALL BE DETERMINED BY THE DESIGNER. SPACING BETWEEN OPENINGS SHALL BE 1'-0" MINIMUM. OPENINGS MAY BE CONSTRUCTED BY CASTING OR SCRIBING IN PRECAST STRUCTURES DURING FABRICATION OR BY CORING THE CURED CONCRETE.

PRECAST CONCRETE FOOTINGS OR BASES SHALL BE REINFORCED WITH #4 BARS SPACED AT 1'-0" BOTH WAYS OR WITH TWO LAYERS OF WELDED WIRE FABRIC OF EQUIVALENT CROSS SECTIONAL AREA LAID AT RIGHT ANGLES AND WIRED TOGETHER. REINFORCEMENT SHALL BE PLACED IN TOP OF FOOTING AND SHALL BE MARKED.

PRECAST CONCRETE FOOTINGS SHALL BE SUPPORTED BY A COMPACTED 6" GRANULAR SUBBASE.

THE MINIMUM WALL THICKNESS FOR ALL 2'-0", 4'-0", 5'-0", AND 6'-0" DRAINAGE STRUCTURES USING CONCRETE BLOCK, BRICK, OR CAST-IN-PLACE CONCRETE SHALL BE AS SPECIFIED IN TYPICAL WALL SECTIONS.

THE CONICAL SECTION OF MANHOLES OR CATCH BASINS CONSTRUCTED OF BLOCK OR BRICK SHALL BE SHROUDED WITH GEOTEXTILE FABRIC TO A MINIMUM DEPTH OF 5'-0" OR THROUGH THE FROST ZONE. ENOUGH GEOTEXTILE MATERIAL SHALL BE LEFT ON THE TOP (8" OR MORE) TO ROLL OVER THE TOP OF THE CONE.

PREFORMED HIGH DENSITY POLYSTYRENE FILLER PIECES WAY BE USED TO CHANNEL FLOW IN THE BOTTOM OF MANHOLES PROVIDED THEY HAVE AT LEAST 2" OF CONCRETE COVER. THE USE OF THIS MATERIAL FOR CHANNEL FLOW IS RESTRICTED TO MANHOLES WHERE THE BOTTOM SECTION IS NOT SUBJECT TO FREEZING. THE USE OF THIS MATERIAL MUST BE APPROVED BY THE ENGINEER.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

F.H.W.A. APPROVAL	6-15-2016 PLAN DATE	R-1-G	SHEET 9 OF 9

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

F.H.W.A. APPROVAL	PLAN DATE		SHEET OF

AS-LET PLAN REVISIONS

NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

MDOT Michigan Department of Transportation

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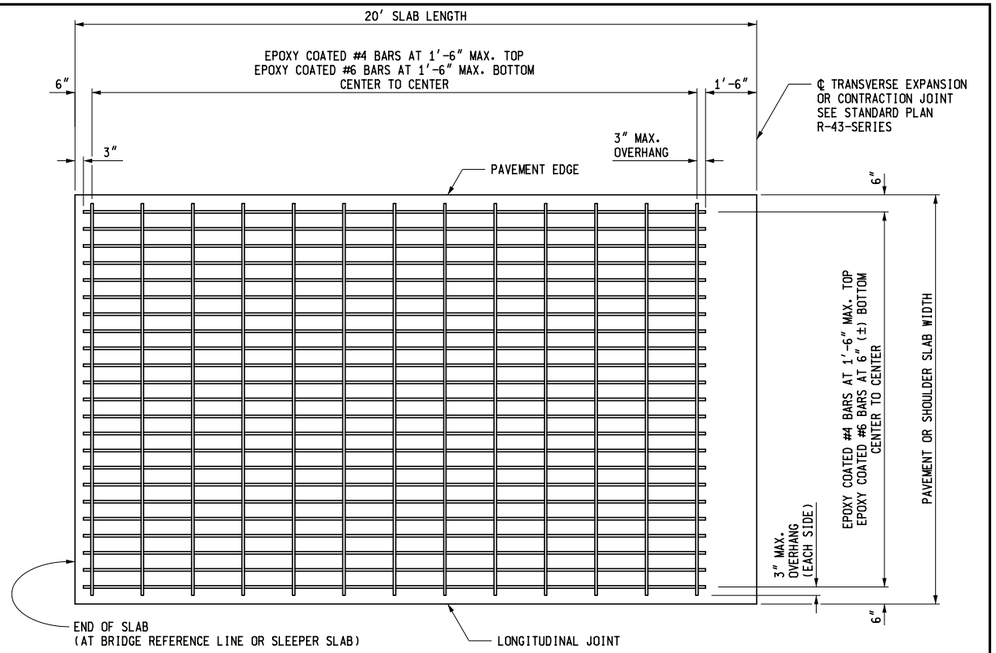
0 HORZ. (FT)

	DATE: *FEBRUARY 2019*	CS:		DRAWING / SHEET
	DESIGN UNIT:	JN: 126579, 129257		37
FILE:	TSC:			



SKEWED BRIDGES WHERE SLAB IS SQUARED OFF WILL REQUIRE TRANSVERSE REINFORCEMENT TO BE FANNED IN OR THE USE OF CUT BARS WILL BE REQUIRED. MAINTAIN REINFORCEMENT SPACING AT ACUTE CORNER AND FAN IN AT OBTUSE CORNER.

REINFORCEMENT DETAIL

STEEL REINFORCEMENT		
LONGITUDINAL REINFORCEMENT		
PAVEMENT/SHOULDER SLAB WIDTH	TOP REINFORCEMENT #4 BARS AT 1′-6″ MAX.	BOTTOM REINFORCEMENT #6 BARS AT 6″ (±)
	NUMBER OF BARS (MIN.)	NUMBER OF BARS (MIN.)
10′-0″	7	19
11′-0″	8	21
12′-0″	9	23
14′-0″	10	27
3′-0″	3	5
4′-0″	3	7
5′-0″	4	9
7′-0″	5	13
9′-0″	7	17
TRANSVERSE REINFORCEMENT		
	TOP REINFORCEMENT #4 BARS AT 1′-6″ MAX.	BOTTOM REINFORCEMENT #6 BARS AT 1′-6″ MAX.

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

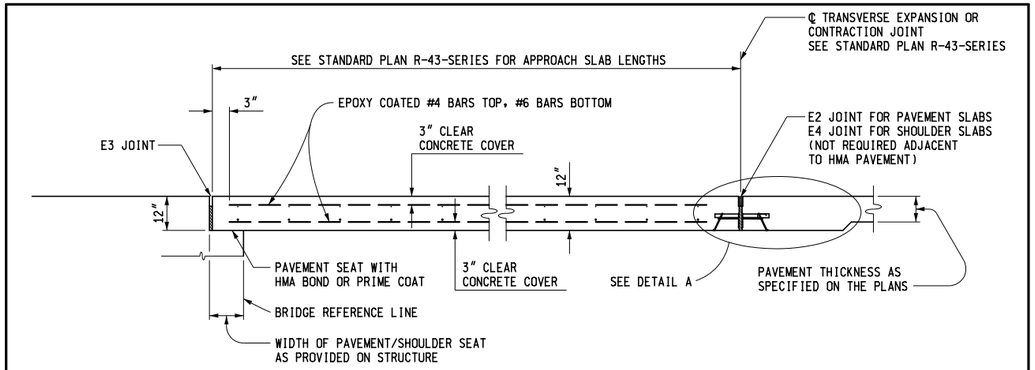
APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

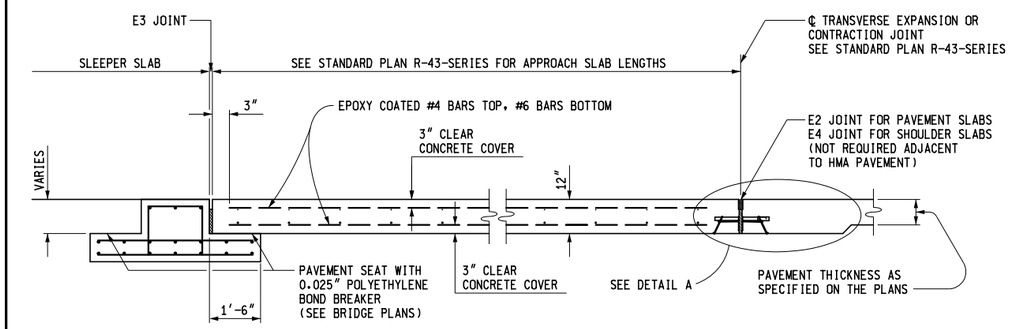
APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

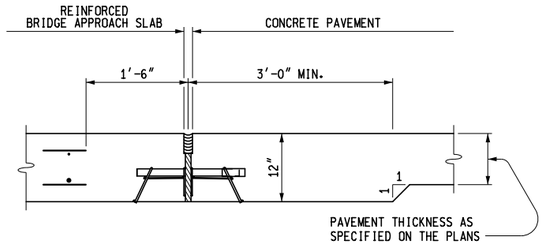
PAVEMENT REINFORCEMENT FOR BRIDGE APPROACH

F.H.W.A. APPROVAL	6-25-2018 PLAN DATE	R-45-J	SHEET 1 OF 2





PAVEMENT AND SHOULDER SLABS ADJACENT TO STRUCTURES



DETAIL A

NOTES:

SEE STANDARD PLANS R-39-SERIES AND R-40-SERIES FOR DETAILS OF JOINTS AND LOAD TRANSFER ASSEMBLIES.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

PAVEMENT REINFORCEMENT FOR BRIDGE APPROACH

F.H.W.A. APPROVAL	6-25-2018 PLAN DATE	R-45-J	SHEET 2 OF 2

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DRAWING 38
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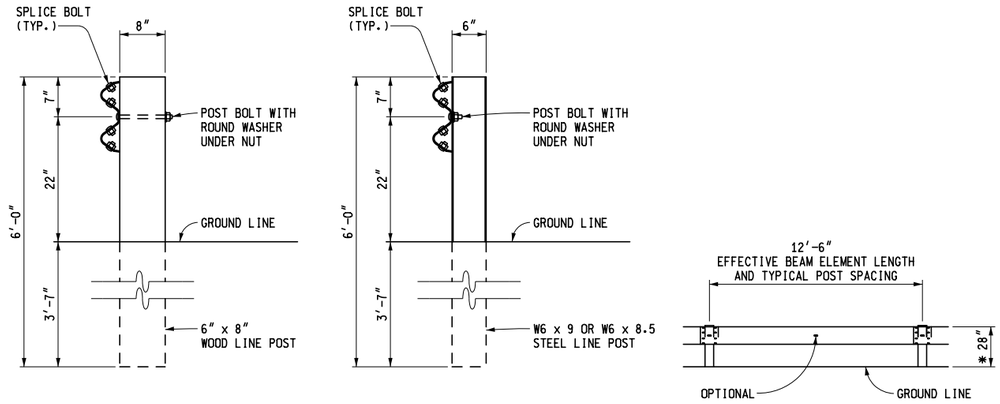
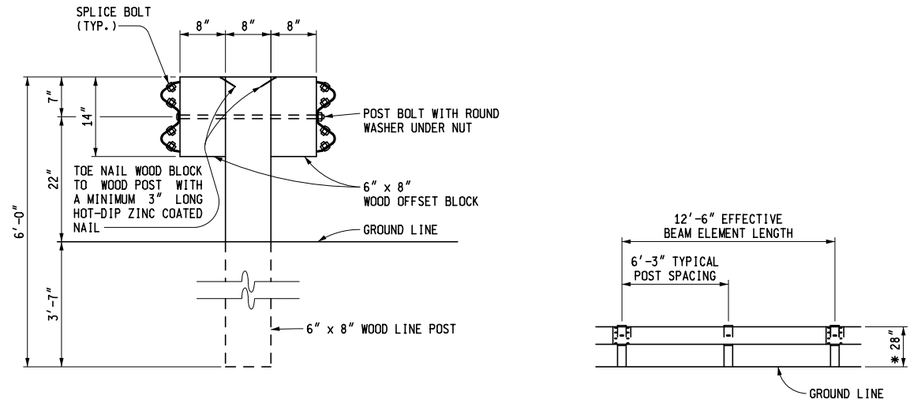
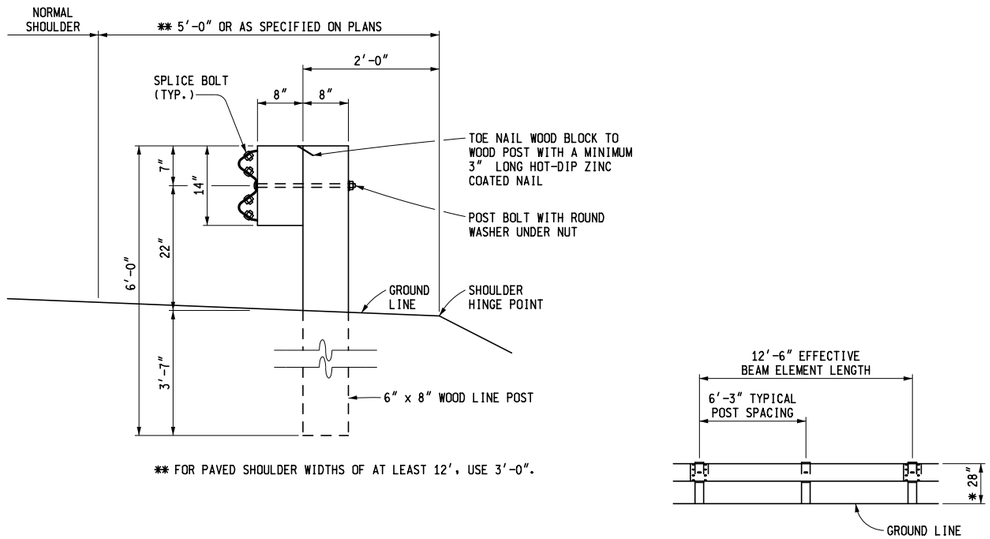


GUARDRAIL, TYPE A



GUARDRAIL, TYPE BD
(WOOD POST)



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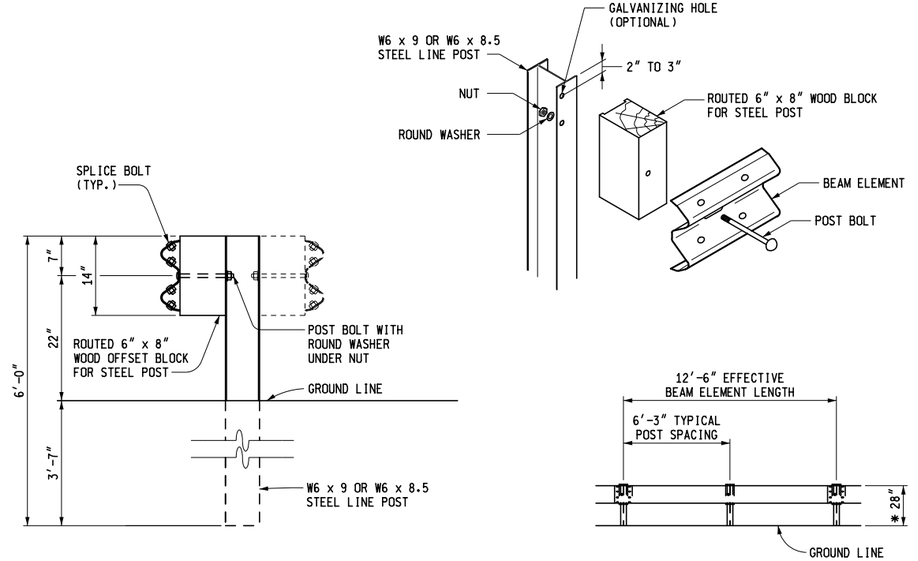

GUARDRAIL, TYPE B (OR BD)
(STEEL POST)

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

F.H.W.A. APPROVAL	7-26-2017 PLAN DATE	R-60-J	SHEET 1 OF 17

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

F.H.W.A. APPROVAL	7-26-2017 PLAN DATE	R-60-J	SHEET 2 OF 17

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DRAWING 39
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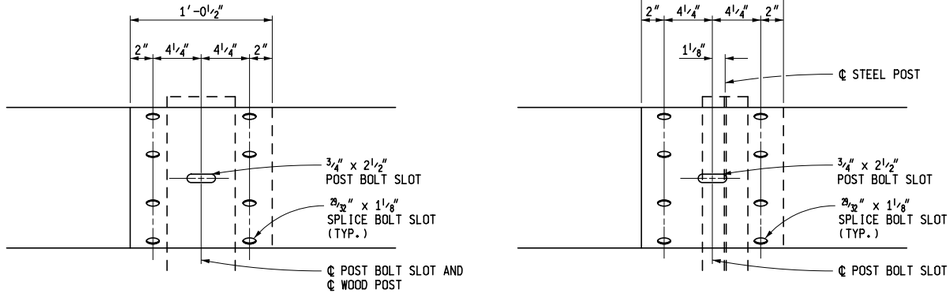
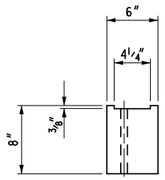


WOOD POST STEEL POST

BEAM ELEMENT SPLICE DETAILS



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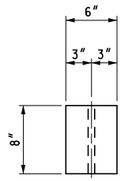

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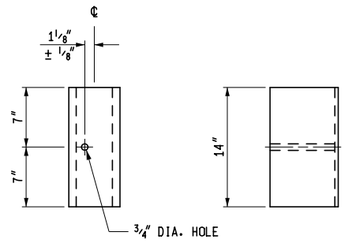


FRONT SIDE FRONT SIDE

FOR USE ON STEEL POSTS

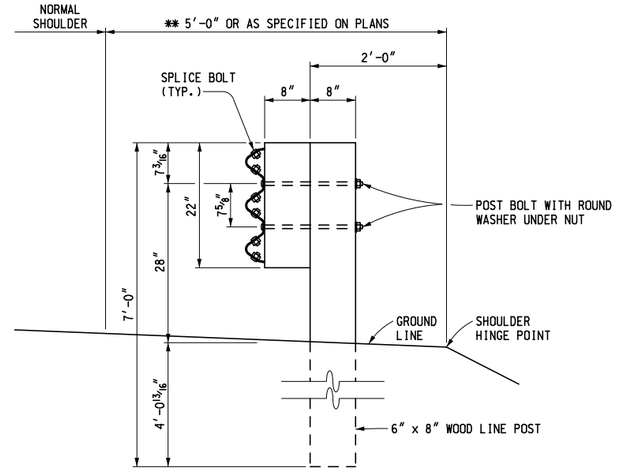
FOR USE ON WOOD POSTS
(SEE NOTES ON SHEET 16 OF 16)

WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE B AND TYPE BD

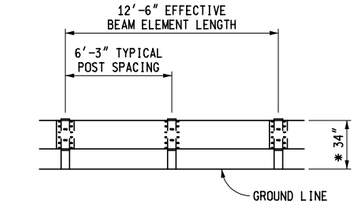
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

F.H.W.A. APPROVAL	7-26-2017 PLAN DATE	R-60-J	SHEET 3 OF 17

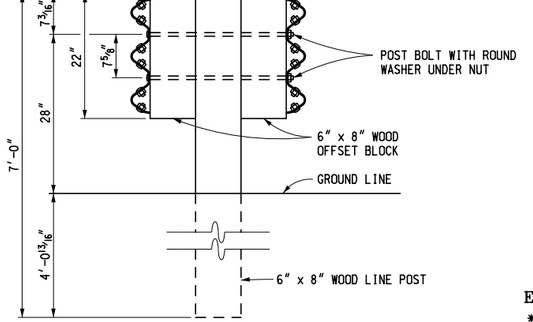


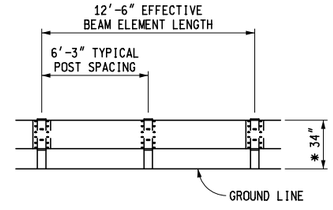
** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12′, USE 3′-0″.



ELEVATION SHOWING POST SPACING
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

GUARDRAIL, TYPE T
(WOOD POST)





ELEVATION SHOWING POST SPACING
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

GUARDRAIL, TYPE TD
(WOOD POST)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

F.H.W.A. APPROVAL	7-26-2017 PLAN DATE	R-60-J	SHEET 4 OF 17

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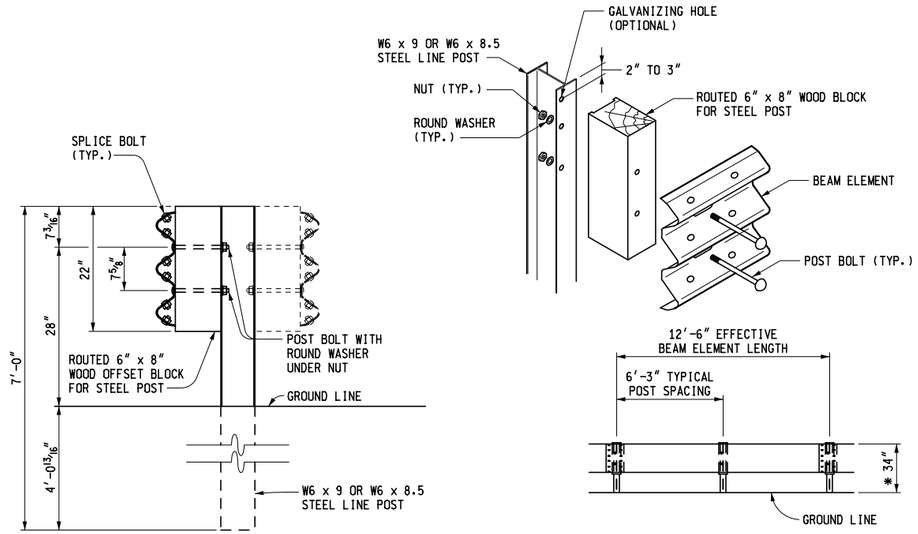
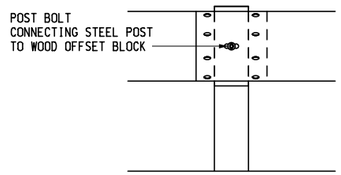
DRAWING 40
SHEET



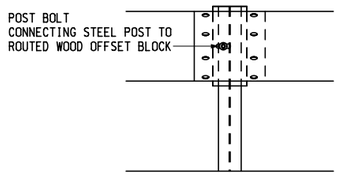
ELEVATION SHOWING POST SPACING

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

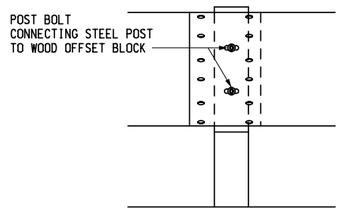
GUARDRAIL, TYPE T OR TD
(STEEL POST)



GUARDRAIL, TYPE B
WOOD POST



GUARDRAIL, TYPE B
STEEL POST



GUARDRAIL, TYPE T
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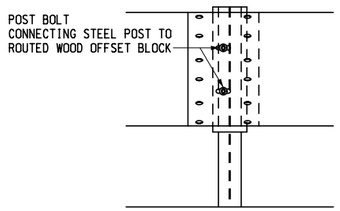


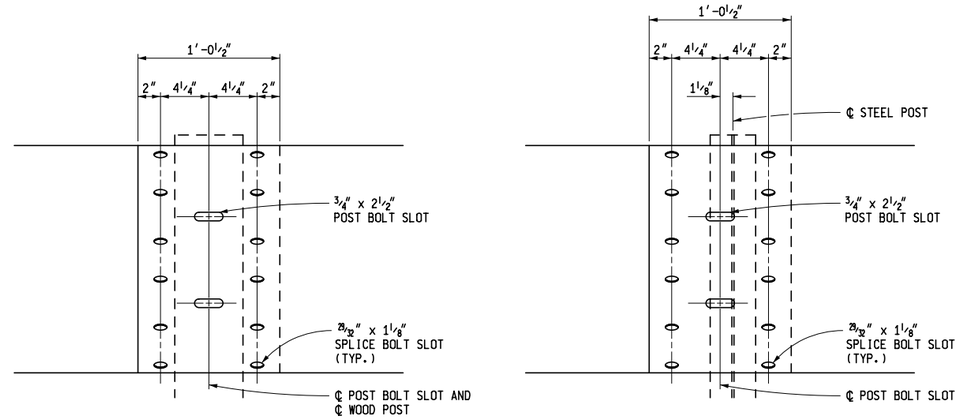
GUARDRAIL, TYPE T
STEEL POST

BLOCK AND POST CONNECTION DETAILS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

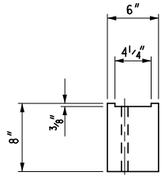
GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

F.H.W.A. APPROVAL	7-26-2017 PLAN DATE	R-60-J	SHEET 5 OF 17



WOOD POST STEEL POST

THRIE BEAM ELEMENT SPLICE DETAILS



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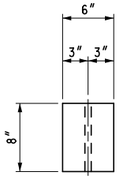

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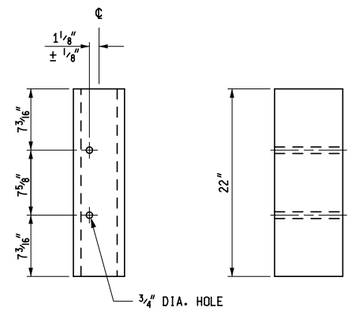
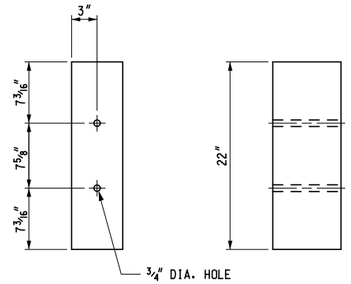


FRONT SIDE

FOR USE ON STEEL POSTS



FRONT SIDE

FOR USE ON WOOD POSTS
(SEE NOTES ON SHEET 16 OF 16)

WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE T AND TYPE TD

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

F.H.W.A. APPROVAL	7-26-2017 PLAN DATE	R-60-J	SHEET 6 OF 17

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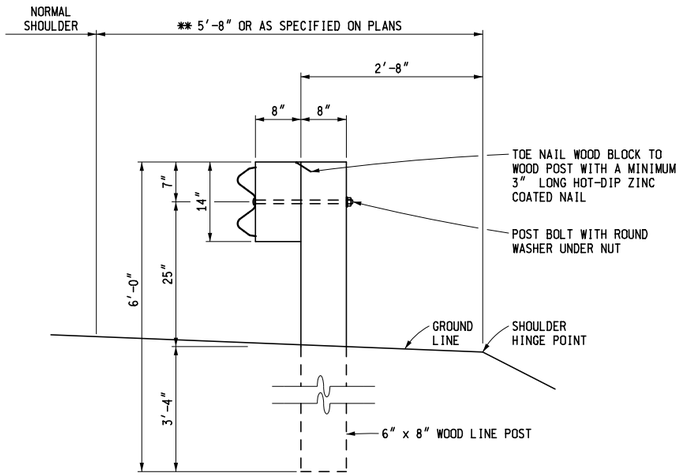
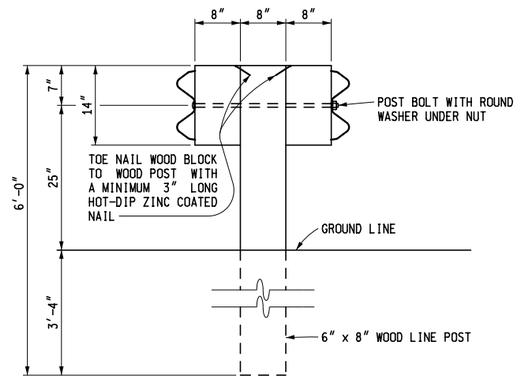


** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12′, USE 3′-8″.

GUARDRAIL, TYPE MGS-8
(WOOD POST)



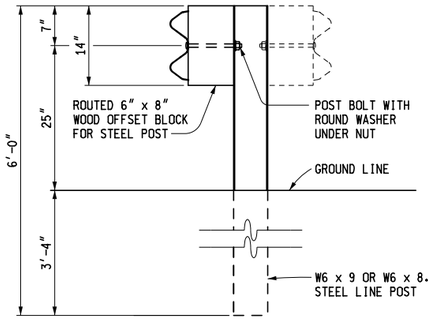
** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12′, USE 3′-0″.

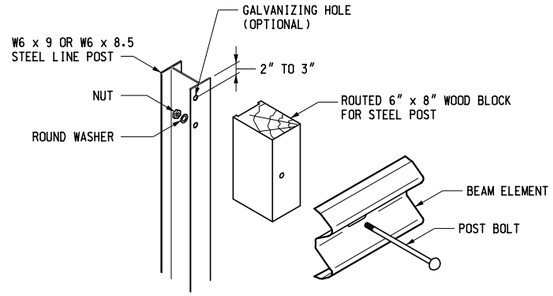
GUARDRAIL, TYPE MGS-8D
(WOOD POST)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

F.H.W.A. APPROVAL	7-26-2017 PLAN DATE	R-60-J	SHEET 7 OF 17





GUARDRAIL, TYPE MGS-8 (OR MGS-8D)
(STEEL POST)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

F.H.W.A. APPROVAL	7-26-2017 PLAN DATE	R-60-J	SHEET 8 OF 17

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DRAWING 42
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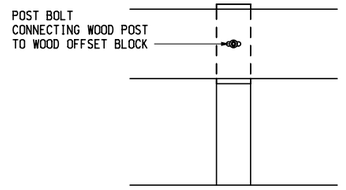
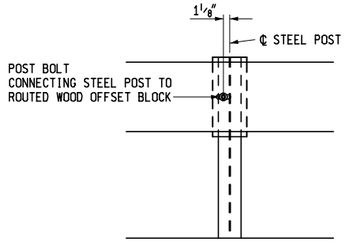
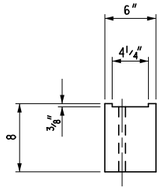


WOOD POST



STEEL POST

BLOCK AND POST CONNECTION DETAILS



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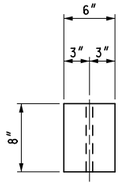

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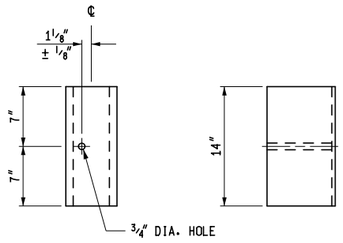
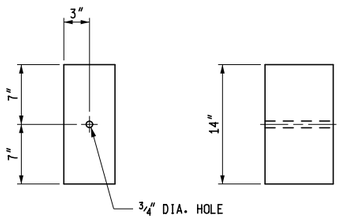


FRONT SIDE

FOR USE ON STEEL POSTS



FRONT SIDE

FOR USE ON WOOD POSTS
(SEE NOTES ON SHEET 16 OF 16)

WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE MGS-8 AND TYPE MGS-8D

MICHIGAN DEPARTMENT OF TRANSPORTATION
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GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

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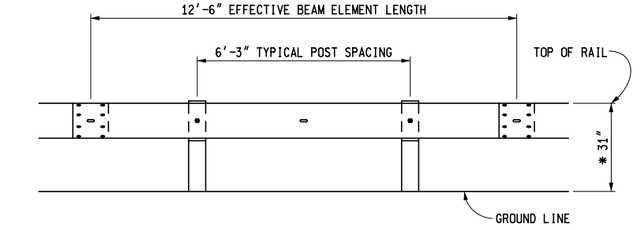
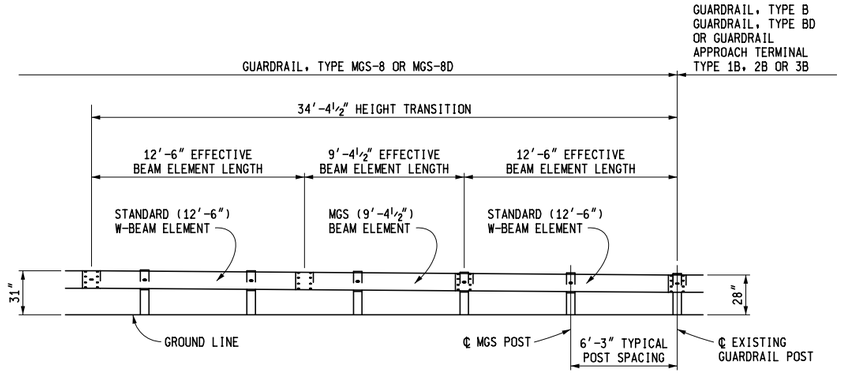
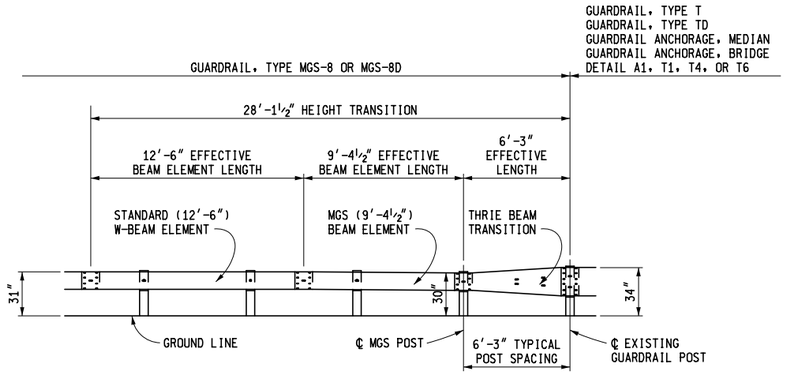


ELEVATION SHOWING POST SPACING FOR GUARDRAIL, TYPE MGS-8 OR MGS-8D

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB



ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING GUARDRAIL, TYPE MGS-8 OR MGS-8D TO GUARDRAIL, TYPE B, GUARDRAIL, TYPE BD, OR GUARDRAIL APPROACH TERMINAL TYPE 1B, 2B, OR 3B



ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING GUARDRAIL, TYPE MGS-8 OR MGS-8D TO GUARDRAIL, TYPE T, GUARDRAIL, TYPE TD, GUARDRAIL ANCHORAGE, MEDIAN, GUARDRAIL ANCHORAGE, BRIDGE DETAIL A1, T1, T4 OR T6

MICHIGAN DEPARTMENT OF TRANSPORTATION
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GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

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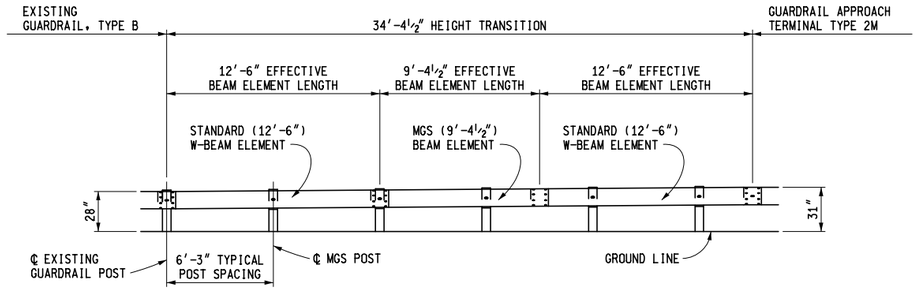
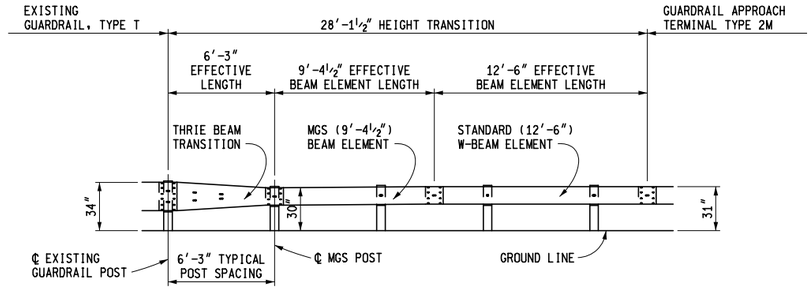


ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING
GUARDRAIL, TYPE B TO
GUARDRAIL APPROACH TERMINAL TYPE 2M



ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING
GUARDRAIL, TYPE T TO
GUARDRAIL APPROACH TERMINAL TYPE 2M

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

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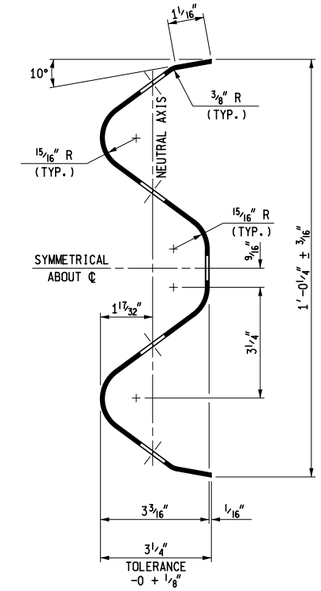
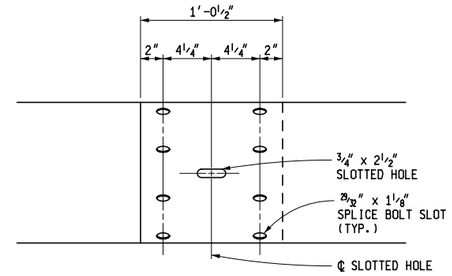
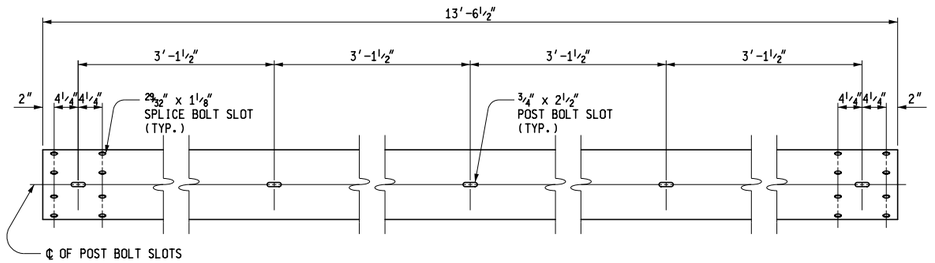


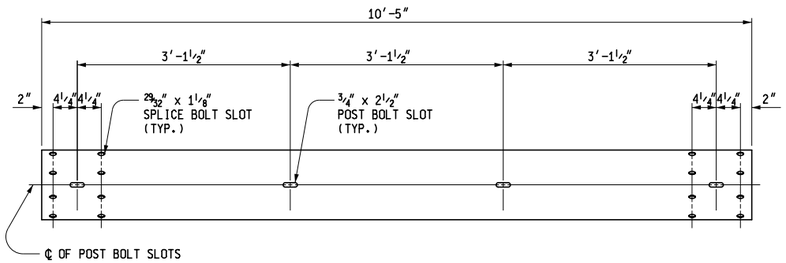
SECTION THROUGH BEAM ELEMENT



BEAM ELEMENT SPLICE DETAILS



FRONT ELEVATION OF BEAM ELEMENT



FRONT ELEVATION OF MGS (9′-4½″) BEAM ELEMENT

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GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

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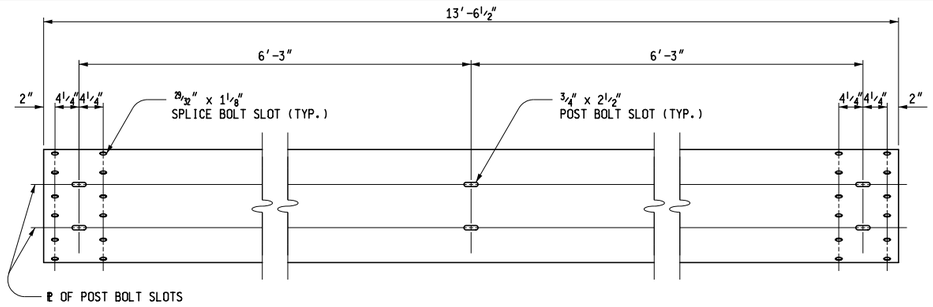
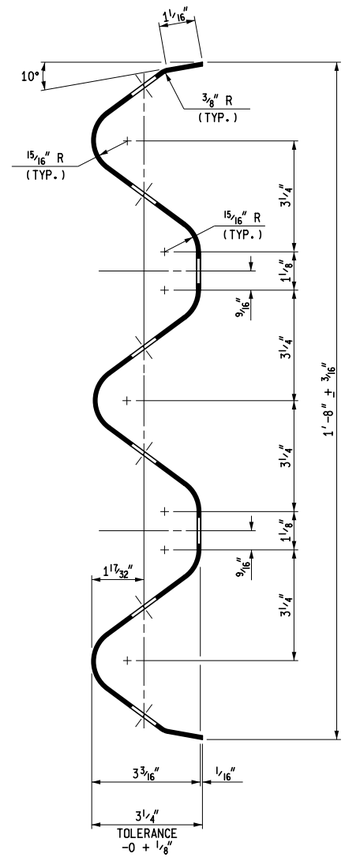


FRONT ELEVATION OF THRIE BEAM ELEMENT



SECTION THROUGH THRIE BEAM ELEMENT
(FOR GUARDRAIL, TYPE T AND TD)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

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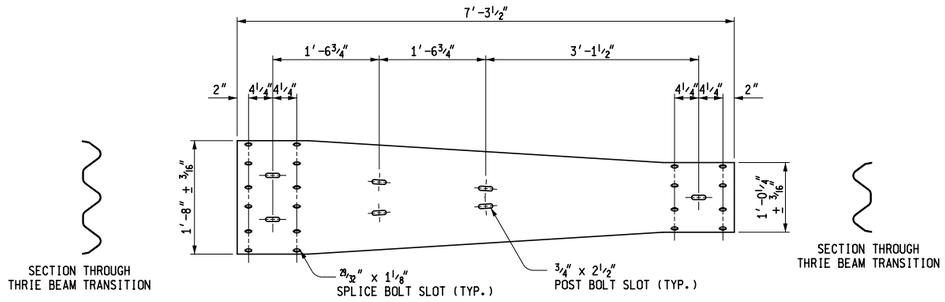
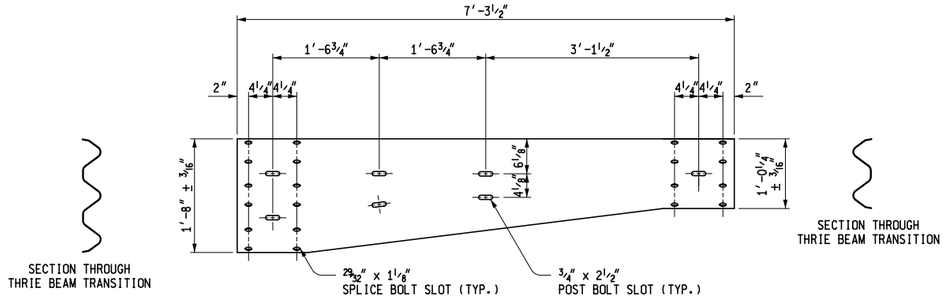
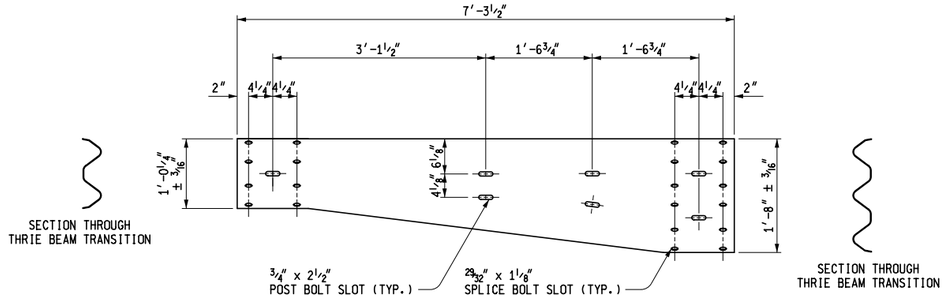


THRIE BEAM TRANSITION





ASYMMETRICAL THRIE BEAM TRANSITIONS
NOTE: ASYMMETRICAL TRANSITION TYPE WILL VARY BY LOCATION DEPENDING ON GUARDRAIL LAYOUT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

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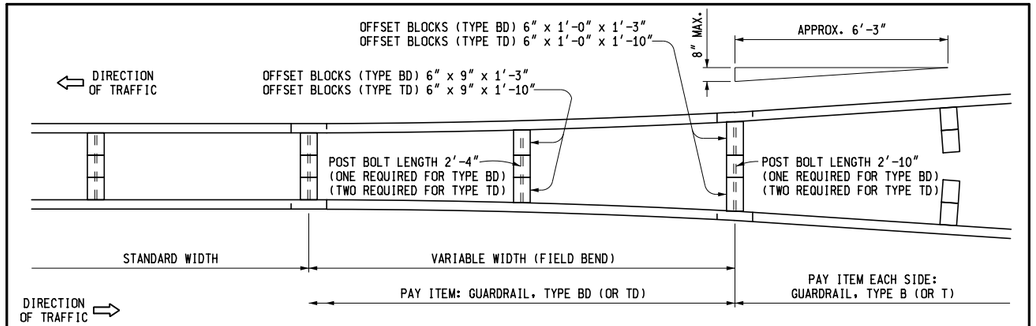


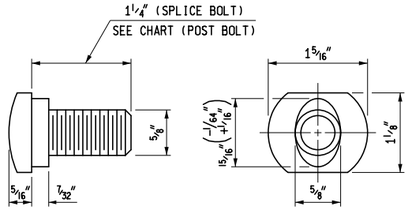
DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE B (OR TYPE T) TO GUARDRAIL, TYPE BD (OR TYPE TD)

POST BOLTS, SPLICE BOLTS AND WASHERS AT BEAM ELEMENT SPLICE POSTS AND AT INTERMEDIATE POSTS							
GUARDRAIL TYPE	POST	OFFSET BLOCK	POST BOLTS NO. REQ'D	POST BOLTS LENGTH	SPLICE BOLTS (1¼″ LONG) (NO. REQ'D)	NOT NEEDED AT INTERMEDIATE POSTS	WASHERS (ROUND) (NO. REQ'D)
A	WOOD	N/A	1	9½″	8		1
	STEEL	N/A	1	2″			1
B	WOOD	WOOD	1	18″	8		1
	STEEL	WOOD	1	9½″			1
BD	WOOD	WOOD	1	*26½″	16		———
	STEEL	WOOD	2	9½″			2
T	WOOD	WOOD	2	18″	12		2
	STEEL	WOOD	2	9½″			2
TD	WOOD	WOOD	2	*26½″	24		———
	STEEL	WOOD	4	9½″			4

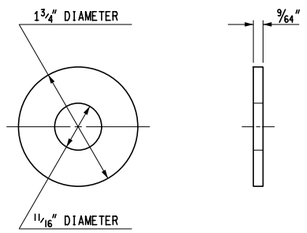
THRIE BEAM TRANSITIONS REQUIRE 20 SPLICE BOLTS EACH (12 ON TYPE T END AND 8 ON TYPE B END).

* EXCEPT AS SPECIFIED ON DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE B (OR TYPE T) TO GUARDRAIL, TYPE BD (OR TYPE TD). POST BOLTS SHALL NOT EXTEND MORE THAN ½″ BEYOND NUT.

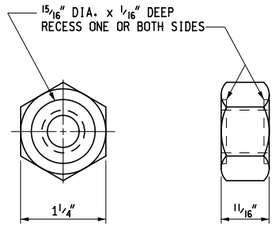
MINIMUM POST BOLT THREAD LENGTH	
BOLT LENGTH	MINIMUM THREAD LENGTH
9½″	1¾″
18″	2½″
26½″	3″



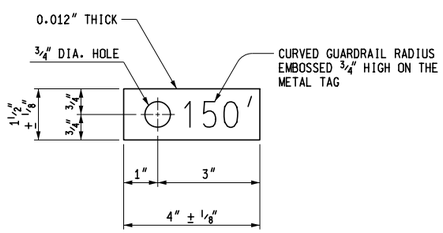
SPLICE BOLT AND POST BOLT



ROUND WASHER



NUT



METAL TAG

FOR CURVED GUARDRAIL WITH RADIUS OF 150′ OR LESS

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D

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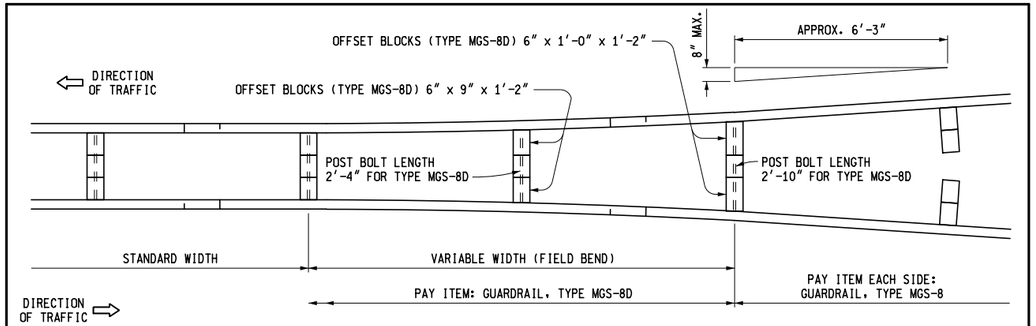

DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL, TYPE MGS-8D

POST BOLTS, SPLICE BOLTS AND WASHERS AT BEAM ELEMENT SPLICE POSTS AND AT INTERMEDIATE POSTS						
GUARDRAIL TYPE	POST	OFFSET BLOCK	POST BOLTS NO. REQ'D	POST BOLTS LENGTH	SPLICE BOLTS (1¼″ LONG) (NO. REQ'D)	WASHERS (ROUND) (NO. REQ'D)
MGS-8	WOOD	WOOD	1	18″	8	1
	STEEL	WOOD	1	9½″		1
MGS-8D	WOOD	WOOD	1	*26½″	16	———
	STEEL	WOOD	2	9½″		2

THRIE BEAM TRANSITIONS REQUIRE 20 SPLICE BOLTS EACH (12 ON TYPE T END AND 8 ON TYPE MGS END).

* EXCEPT AS SPECIFIED ON DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL, TYPE MGS-8D POST BOLTS SHALL NOT EXTEND MORE THAN ½″ BEYOND NUT.

MINIMUM POST BOLT THREAD LENGTH	
BOLT LENGTH	MINIMUM THREAD LENGTH
9½″	1¾″
18″	2½″
26½″	3″

MICHIGAN DEPARTMENT OF TRANSPORTATION
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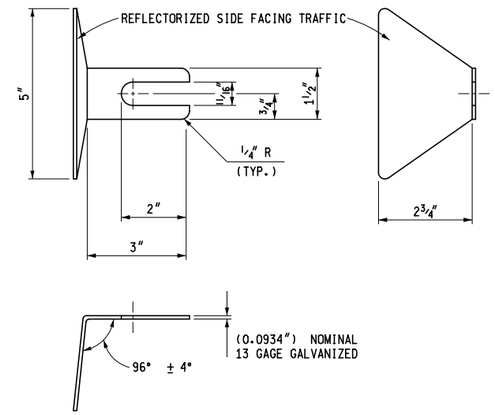
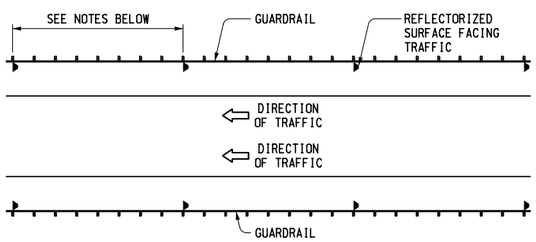
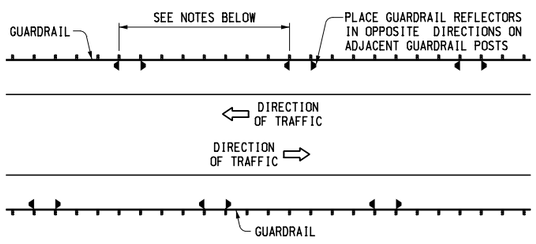


GUARDRAIL REFLECTOR



ONE-WAY TRAFFIC

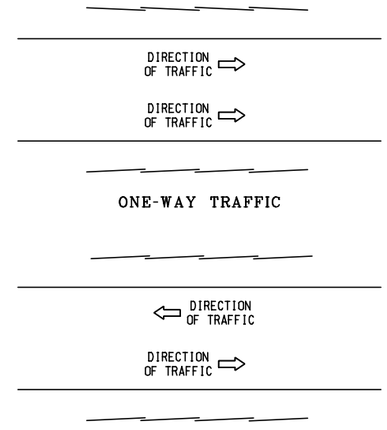


TWO-WAY TRAFFIC

PLACEMENT OF GUARDRAIL REFLECTORS

NOTES GOVERNING THE USE OF GUARDRAIL REFLECTORS

1. GUARDRAIL REFLECTORS SHALL BE USED ON ALL STANDARD GUARDRAIL RUNS, REGARDLESS OF ROADWAY LIGHTING.
2. GUARDRAIL REFLECTORS ARE TO BE SPACED AT THE FOLLOWING INTERVALS:
   a) 50′-0″ ON TANGENT SECTIONS AND CURVES WITH A RADIUS OF 1150′ OR MORE.
   b) 25′-0″ ON CURVES WITH A RADIUS LESS THAN 1150′.
3. FOR GUARDRAIL REFLECTOR PLACEMENT ON APPROACH TERMINALS, SEE THE APPROPRIATE GUARDRAIL APPROACH TERMINAL STANDARD PLAN.
4. A GUARDRAIL REFLECTOR IS TO BE PLACED ON THE SECOND POST FROM THE GUARDRAIL DEPARTING TERMINAL.
5. ON GUARDRAIL, TYPE T AND TYPE TD GUARDRAIL REFLECTORS ARE TO BE PLACED ON THE UPPER POST BOLT.
6. GUARDRAIL REFLECTORS SHALL MATCH COLOR OF EDGE LINE.



TWO-WAY TRAFFIC

DIRECTION OF RAIL LAP

NOTES:

DETAILS SPECIFIED ON THIS STANDARD ARE ACCORDING TO THE AASHTO-AGC-ARTBA JOINT COMMITTEE, TASK FORCE 13 PUBLICATION TITLED "A GUIDE TO STANDARDIZED HIGHWAY BARRIER HARDWARE."

BEAM ELEMENTS SHALL BE SHOP BENT TO PLAN RADIUS FOR CURVE RADII 150′ OR LESS. A TAG IDENTIFYING THE CURVATURE OF THE SHOP BENT SECTION WILL BE REQUIRED FOR EACH CURVED ELEMENT.

SEE STANDARD PLAN R-61-SERIES, R-62-SERIES OR R-63-SERIES FOR GUARDRAIL APPROACH TERMINALS, STANDARD PLAN R-66-SERIES FOR GUARDRAIL DEPARTING TERMINALS AND STANDARD PLAN R-67-SERIES FOR GUARDRAIL ANCHORAGE, BRIDGE.

WHEN THE PLANS SPECIFY GUARDRAIL (TYPE B OR T) TO BE PLACED ON THE SHOULDER HINGE POINT, RATHER THAN AS SPECIFIED ON THIS PLAN, 8′-0″ POSTS SHALL BE PROVIDED, WITH THE ADDITIONAL LENGTH EMBEDDED FOR ADDED STABILITY. (NOT NECESSARY WHEN THE SLOPE IS REASONABLY LEVEL BEYOND THE SHOULDER HINGE POINT, AS DETERMINED BY THE ENGINEER.)

WHEN THE PLANS SPECIFY GUARDRAIL TYPE MGS-8 TO BE PLACED ON THE SHOULDER HINGE POINT, RATHER THAN AS SPECIFIED ON THIS PLAN, 9′-0″ POSTS SHALL BE PROVIDED, WITH THE ADDITIONAL LENGTH EMBEDDED FOR ADDED STABILITY. (NOT NECESSARY WHEN THE SLOPE IS REASONABLY LEVEL BEYOND THE SHOULDER HINGE POINT, AS DETERMINED BY THE ENGINEER.)

WOOD POSTS WITH ½″ BEVELS AT THE TOP MAY BE USED IN LIEU OF WOOD POSTS WITHOUT BEVELS SPECIFIED. THE LENGTH, WIDTH AND DEPTH OF THE POST SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT.

WOOD OFFSET BLOCKS WITH ½″ BEVELS AT THE TOP AND BOTTOM OR A 1″ BEVELED TOP MAY BE USED IN LIEU OF WOOD BLOCKS WITHOUT BEVELS SPECIFIED. THE LENGTH (FRONT AND BACK FACE), WIDTH AND DEPTH OF THE BLOCK SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT AND COMPATIBILITY WITH POST HOLES.

WHEN THE FACE OF GUARDRAIL IS PLACED FLUSH WITH FACE OF CURB, THE RAIL HEIGHT SHOULD BE MEASURED FROM THE FRONT EDGE OF THE GUTTER PAN, WHICH IS THE POINT ON THE GUTTER PAN THAT IS CLOSEST TO THE EDGE OF THE TRAVELED LANE. WHEN THE FACE OF THE GUARDRAIL PANEL IS LOCATED BEHIND THE CURB THE RAIL HEIGHT SHOULD BE MEASURED FROM THE GROUND JUST IN FRONT OF THE GUARDRAIL.

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			OF

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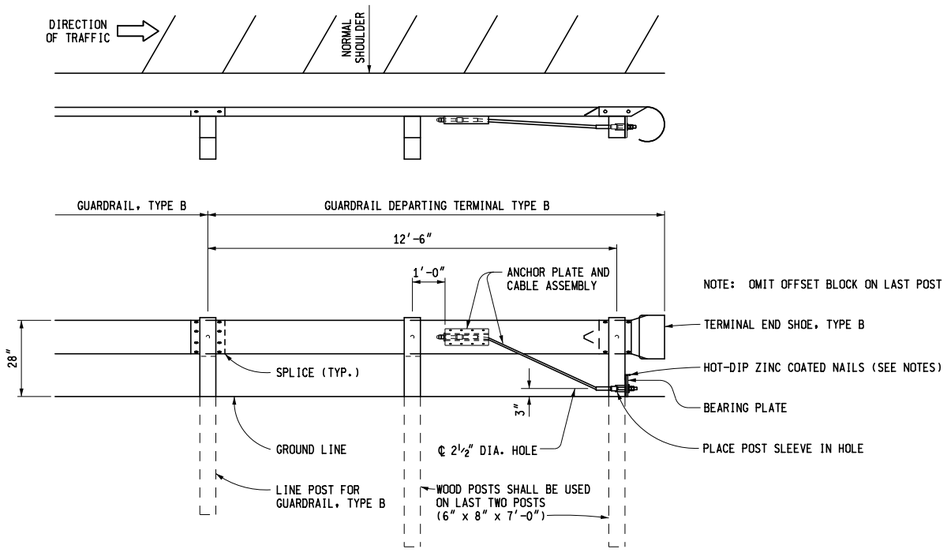
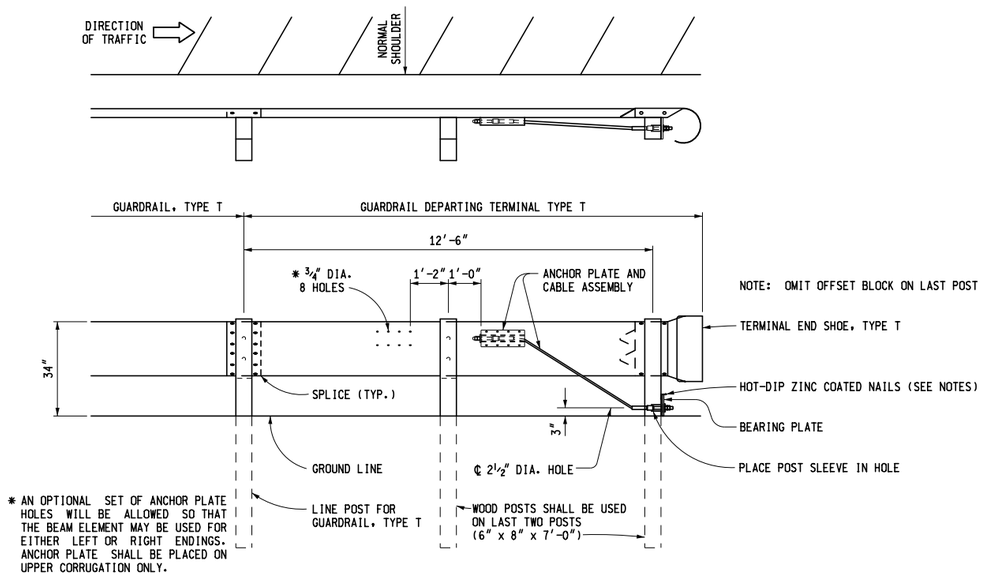
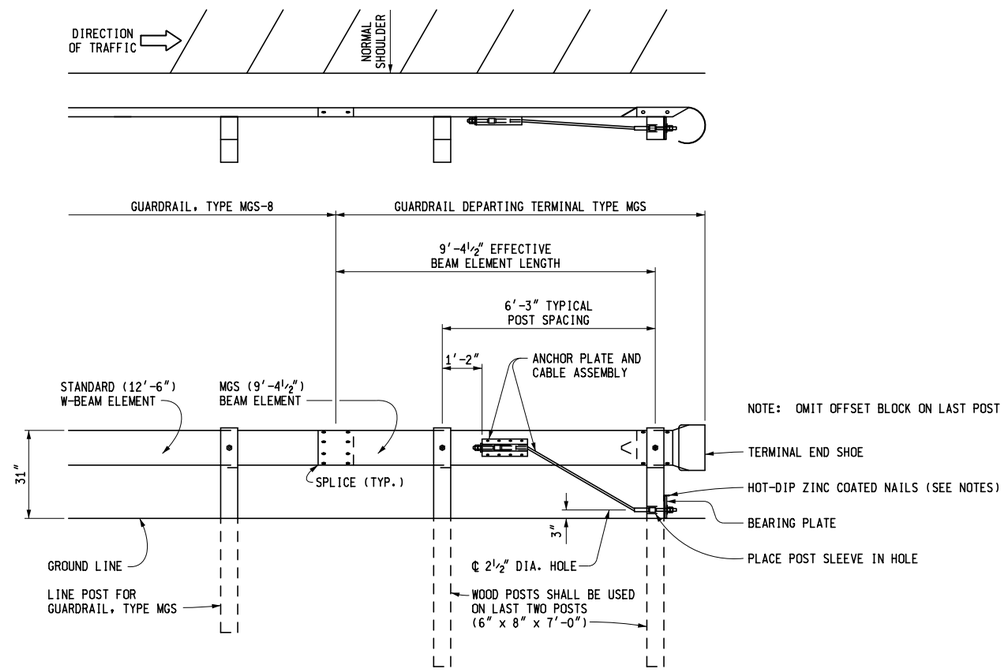


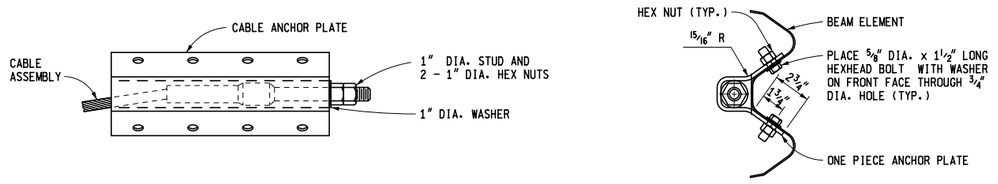
GUARDRAIL DEPARTING TERMINAL TYPE B



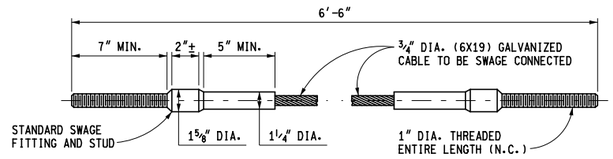
GUARDRAIL DEPARTING TERMINAL TYPE T



GUARDRAIL DEPARTING TERMINAL TYPE MGS



CABLE ANCHOR PLATE DETAILS



CABLE ASSEMBLY

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS

F.H.W.A. APPROVAL	PLAN DATE		SHEET
	9-28-2018	R-66-E	1 OF 4

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS

F.H.W.A. APPROVAL	PLAN DATE		SHEET
	9-28-2018	R-66-E	2 OF 4

AS-LET PLAN REVISIONS

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MDOT Michigan Department of Transportation

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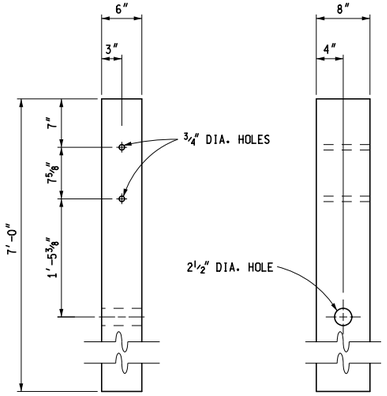
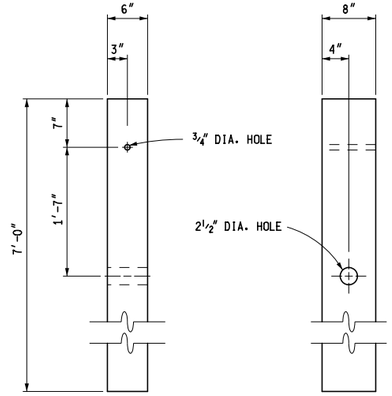
SHEET



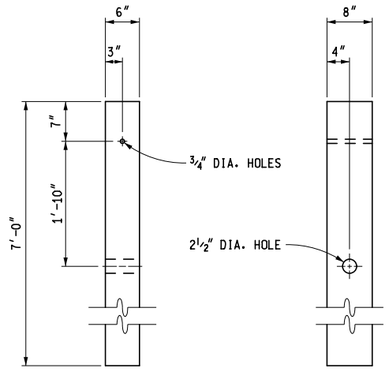
WOOD POST DETAIL

(FOR LAST POST, GUARDRAIL DEPARTING TERMINAL TYPE T)



WOOD POST DETAIL

(FOR LAST POST, GUARDRAIL DEPARTING TERMINAL TYPE B)



WOOD POST DETAIL

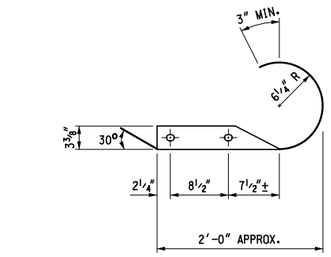
(FOR LAST POST, GUARDRAIL DEPARTING TERMINAL TYPE MGS)

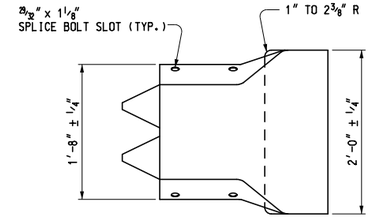
MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF DEVELOPMENT STANDARD PLAN FOR

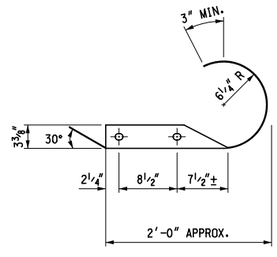
GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS

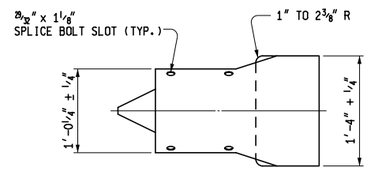
F.H.W.A. APPROVAL	9-28-2018 PLAN DATE	R-66-E	SHEET 3 OF 4



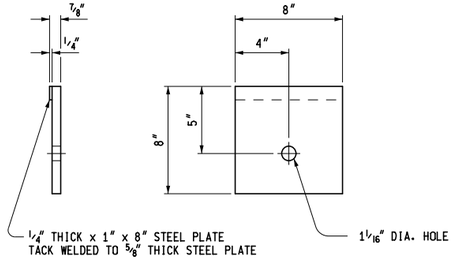


TERMINAL END SHOE, TYPE T

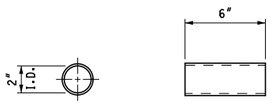




TERMINAL END SHOE, TYPE B OR TYPE MGS



BEARING PLATE



POST SLEEVE

NOTES:

ALL POSTS, OFFSET BLOCKS, BEAM ELEMENTS, AND HARDWARE (INCLUDING BOLTS, NUTS, AND WASHERS) SHALL CONFORM TO THE CURRENT STANDARD SPECIFICATIONS AND TO THE CURRENT STANDARD PLAN R-60-SERIES, WHERE APPLICABLE, EXCEPT AS SPECIFIED ON THIS STANDARD.

ALL 1:10 SLOPES SHALL BE GRADED TO CLASS A SLOPE TOLERANCES.

FOR DETAILS OF GUARDRAIL PLACEMENT, SEE STANDARD PLAN R-59-SERIES.

AFTER THE CABLE ASSEMBLY HAS BEEN TIGHTENED, A SECOND NUT SHALL BE INSTALLED ON EACH END OF THE CABLE SO THAT THE CABLE WILL NOT LOOSEN.

TWO HOT-DIP ZINC COATED NAILS SHALL BE DRIVEN INTO THE WOOD POST AT THE TOP OF THE BEARING PLATE TO KEEP THE BEARING PLATE FROM ROTATING.

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS

F.H.W.A. APPROVAL	9-28-2018 PLAN DATE	R-66-E	SHEET 4 OF 4

AS-LET PLAN REVISIONS

NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

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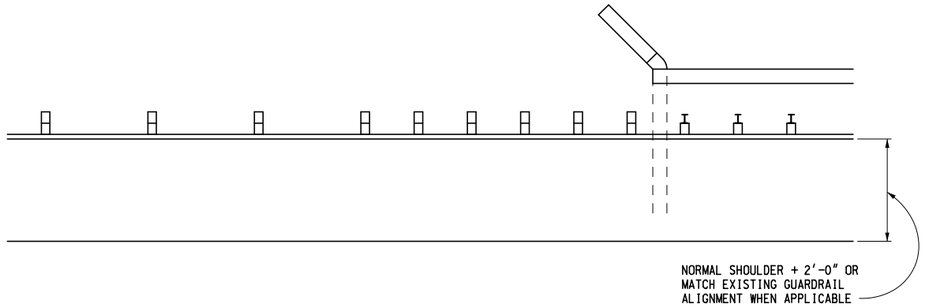
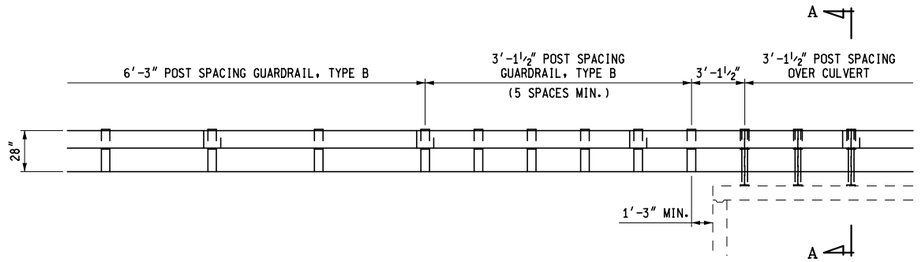
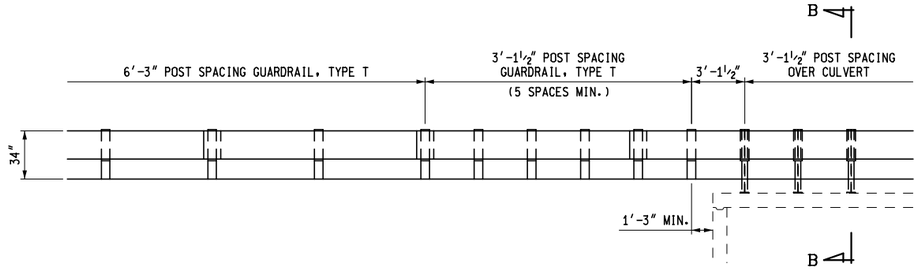
49	



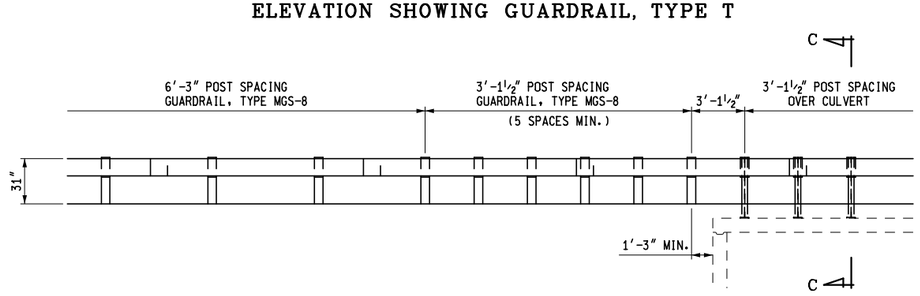
PLAN VIEW



ELEVATION SHOWING GUARDRAIL, TYPE B



ELEVATION SHOWING GUARDRAIL, TYPE T



ELEVATION SHOWING GUARDRAIL, TYPE MGS-8

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

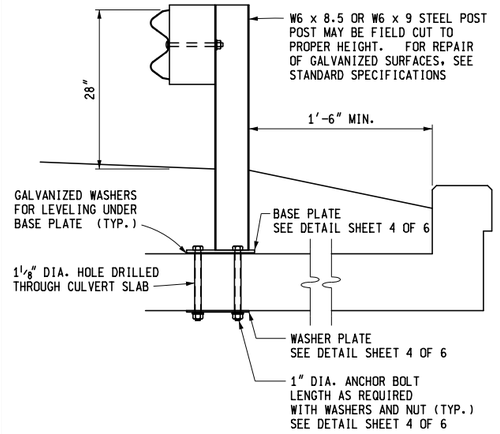
APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

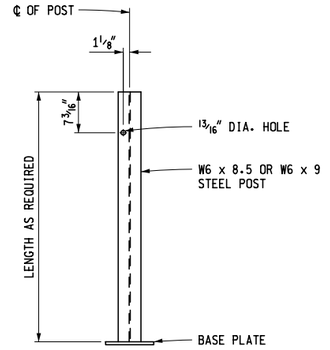
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL OVER BOX OR SLAB CULVERTS

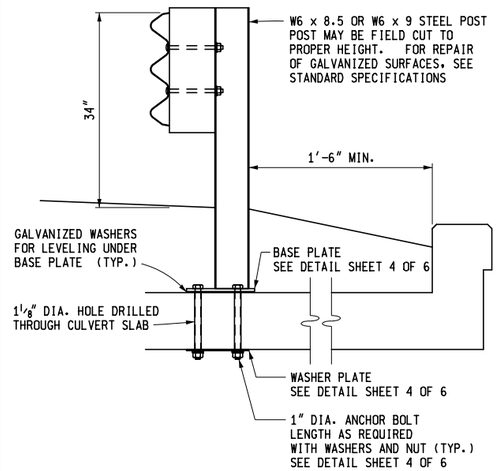
F.H.W.A. APPROVAL	3-15-2016 PLAN DATE	R-73-F	SHEET 1 OF 6



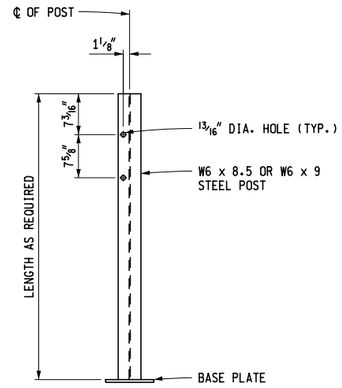
SECTION A - A



STEEL POST DETAIL FOR GUARDRAIL, TYPE B



SECTION B - B



STEEL POST DETAIL FOR GUARDRAIL, TYPE T

PREFERRED CONSTRUCTION METHOD

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL OVER BOX OR SLAB CULVERTS

F.H.W.A. APPROVAL	3-15-2016 PLAN DATE	R-73-F	SHEET 2 OF 6

AS-LET PLAN REVISIONS

NO.	DATE	AUTH	DESCRIPTION	NO.	DATE	AUTH	DESCRIPTION

MDOT Michigan Department of Transportation

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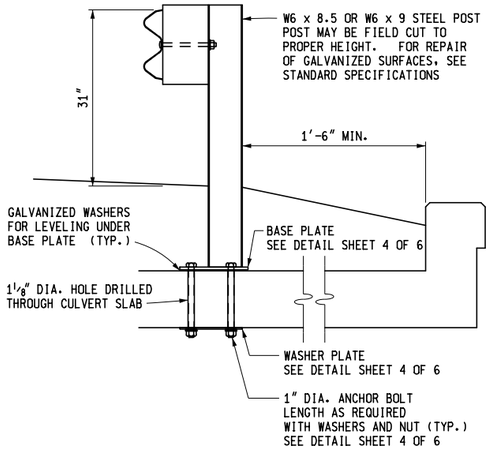
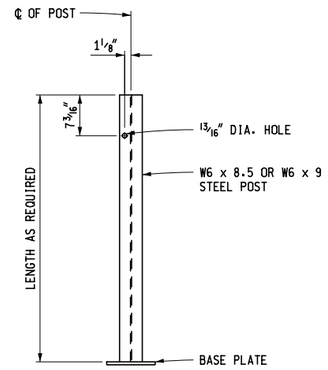
SHEET

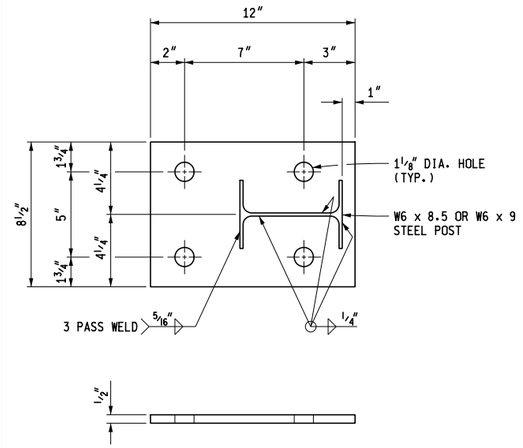


SECTION C - C
GUARDRAIL, TYPE MGS-8

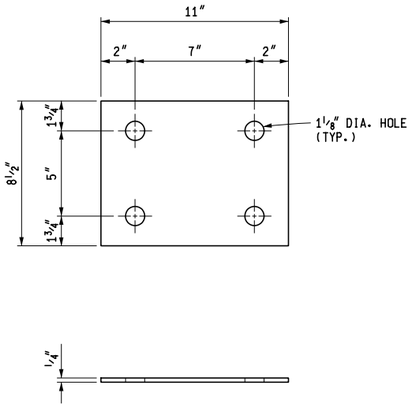
PREFERRED CONSTRUCTION METHOD



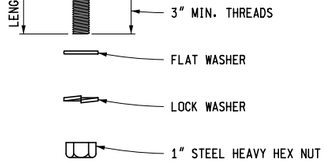
STEEL POST DETAIL FOR
GUARDRAIL, TYPE MGS-8



BASE PLATE DETAIL



WASHER PLATE DETAIL



ANCHOR BOLT DETAIL

NOTES:

GUARDRAIL SHALL BE CONSTRUCTED AND PAID FOR ACCORDING TO THE CURRENT STANDARD PLAN R-60-SERIES AND THE CURRENT STANDARD SPECIFICATIONS. IN ADDITION, POSTS ANCHORED TO THE CULVERT SLAB WILL BE PAID FOR AS "GUARDRAIL POST, CULV", WHICH INCLUDES ALL LABOR AND MATERIALS REQUIRED TO CONSTRUCT THE POST AS DETAILED ON THIS PLAN.

ALL MATERIALS FOR GUARDRAIL POST, CULVERT SHALL MEET THE CURRENT STANDARD SPECIFICATIONS FOR BRIDGE RAILINGS.

ALL WORK AND MATERIALS SHALL BE ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL OVER
BOX OR SLAB CULVERTS

F.H.W.A. APPROVAL	3-15-2016 PLAN DATE	R-73-F	SHEET 3 OF 6

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL OVER
BOX OR SLAB CULVERTS

F.H.W.A. APPROVAL	3-15-2016 PLAN DATE	R-73-F	SHEET 4 OF 6

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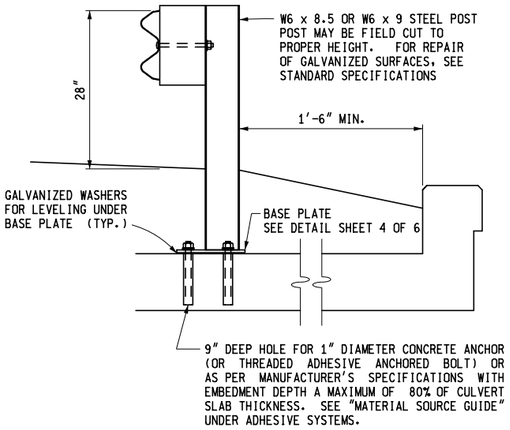
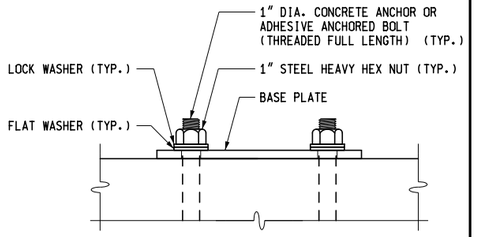
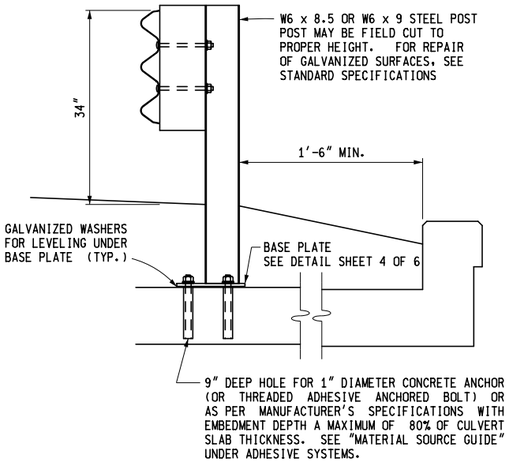
DRAWING 51
SHEET



SECTION A - A



ANCHOR DETAIL



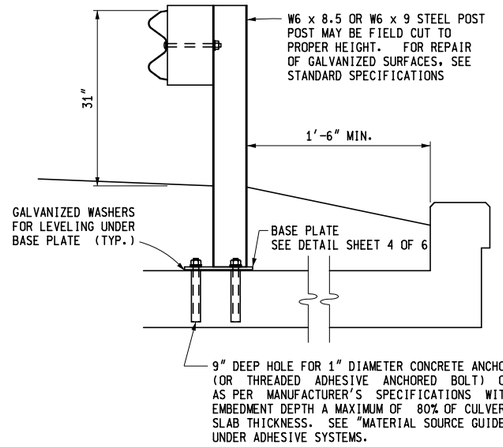
SECTION B - B

ALTERNATE CONSTRUCTION METHOD

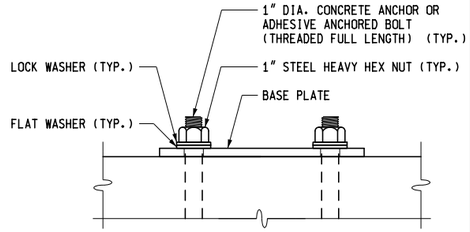
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL OVER BOX OR SLAB CULVERTS

F.H.W.A. APPROVAL	3-15-2016 PLAN DATE	R-73-F	SHEET 5 OF 6



SECTION C - C
GUARDRAIL, TYPE MGS-8



ANCHOR DETAIL

ALTERNATE CONSTRUCTION METHOD

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL OVER BOX OR SLAB CULVERTS

F.H.W.A. APPROVAL	3-15-2016 PLAN DATE	R-73-F	SHEET 6 OF 6

AS-LET PLAN REVISIONS

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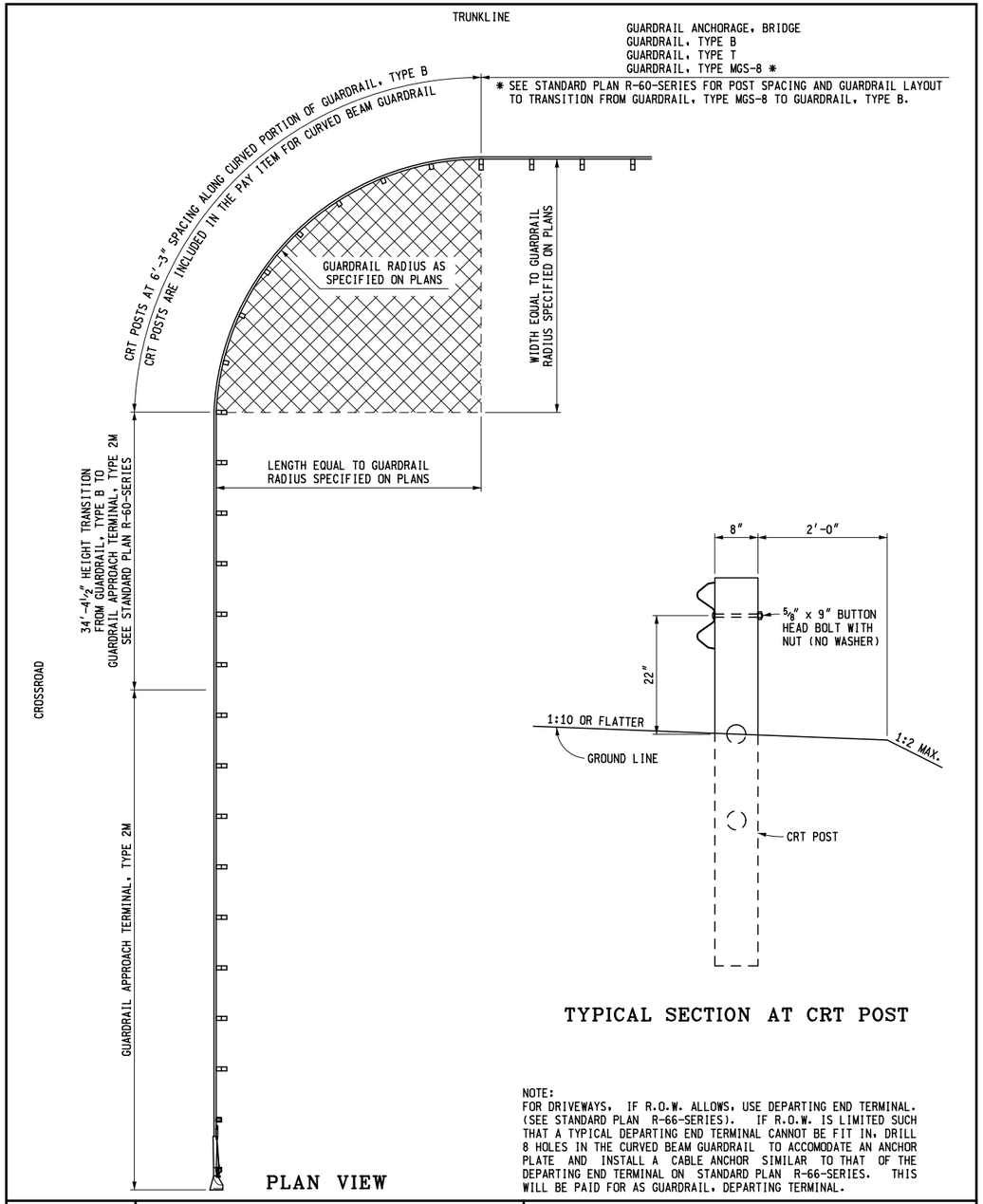
SHEET



PLAN VIEW

TYPICAL SECTION AT CRT POST

NOTE:
FOR DRIVEWAYS, IF R.O.W. ALLOWS, USE DEPARTING END TERMINAL. (SEE STANDARD PLAN R-66-SERIES). IF R.O.W. IS LIMITED SUCH THAT A TYPICAL DEPARTING END TERMINAL CANNOT BE FIT IN, DRILL 8 HOLES IN THE CURVED BEAM GUARDRAIL TO ACCOMODATE AN ANCHOR PLATE AND INSTALL A CABLE ANCHOR SIMILAR TO THAT OF THE DEPARTING END TERMINAL ON STANDARD PLAN R-66-SERIES. THIS WILL BE PAID FOR AS GUARDRAIL, DEPARTING TERMINAL.

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

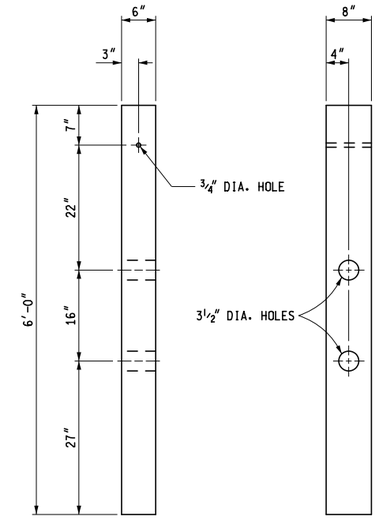
APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT SPECIAL DETAIL

GUARDRAIL AT INTERSECTIONS

F.H.W.A. APPROVAL	4-9-2018 PLAN DATE	SPECIAL DETAIL 21	SHEET 1 OF 2



CONTROLLED RELEASING TERMINAL POST
(CRT)

NOTES:

THE SLOPE IN FRONT OF THE INSTALLATION SHOULD NOT EXCEED 1:10 AND EXTEND TO 2'-0" BEYOND THE GUARDRAIL POST. THE SLOPE BEYOND THIS HINGE LINE SHALL BE 1:2 OR FLATTER.

THE CROSS HATCHED AREA BEHIND THE CURVED GUARDRAIL SHOULD BE KEPT FREE OF FIXED OBJECTS.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT SPECIAL DETAIL

GUARDRAIL AT INTERSECTIONS

F.H.W.A. APPROVAL	4-9-2018 PLAN DATE	SPECIAL DETAIL 21	SHEET 2 OF 2

AS-LET PLAN REVISIONS

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SHEET