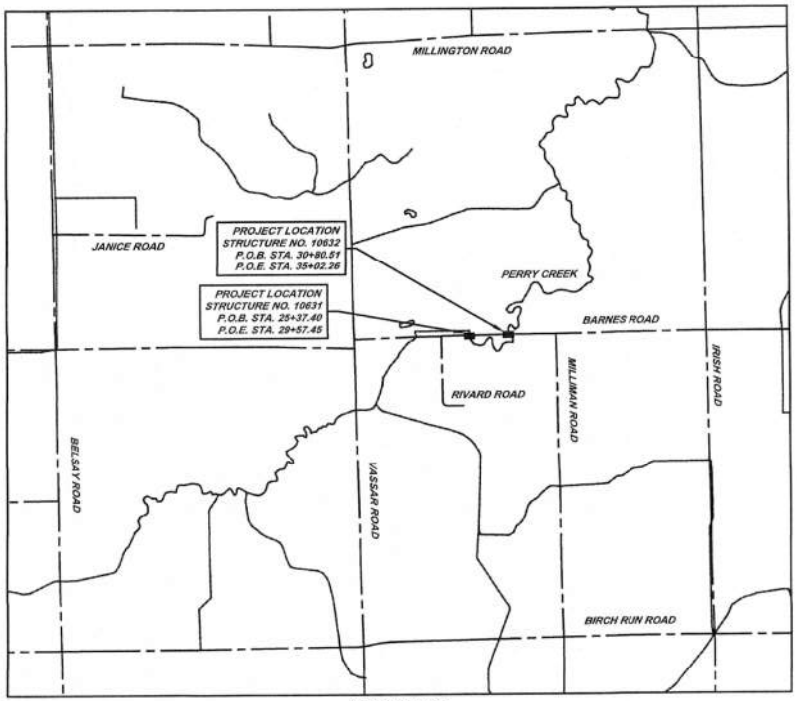
| | PLAN INDEX | |
|---|---|---|
| | DESCRIPTION | NO. |
| | TITLE SHEET | 1 |
| | LEGEND SHEET | 2 |
| | PROJECT INFORMATION SHEET | 3 |
| | TYPICAL CROSS SECTIONS | 4-5 |
| BARNES ROAD OVER PERRY CREEK - 10631 | GUARDRAIL DETAILS | 6 |
| | REMOVAL SHEET | 7 |
| | STREAM PROFILES | 8 |
| | GENERAL PLAN OF SITE | 9 |
| | SOIL BORINGS | 10 |
| | GENERAL PLAN OF STRUCTURE | 11-12 |
| BARNES ROAD OVER PERRY CREEK - 10632 | GUARDRAIL DETAILS | 13 |
| | REMOVAL SHEET | 14 |
| | STREAM PROFILES | 15 |
| | GENERAL PLAN OF SITE | 16 |
| | SOIL BORINGS | 17 |
| | GENERAL PLAN OF STRUCTURE | 18-19 |
| | MDOT SPECIAL DETAILS | 20-40 |

# TUSCOLA COUNTY ROAD COMMISSION

## PLANS OF PROPOSED BRIDGES, BARNES ROAD OVER PERRY CREEK STRUCTURE NO. 10631 AND 10632


AREA MAP
NOT TO SCALE




LOCATION MAP
NOT TO SCALE

**TITLE SHEET LEGEND**

PROPOSED PROJECT
EXISTING ROADS
PROPOSED DETOUR ROUTE

### GENERAL NOTES

THE REHABILITATION DESIGN IS 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. LIVE LOAD PLUS DYNAMIC LOAD ALLOWANCE DEFLECTION DOES NOT EXCEED 1/800 OF SPAN LENGTH. THE ORIGINAL STRUCTURE WAS DESIGNED FOR HS20-44 LOADING.

THE BRIDGE DECK SURFACE HAS AN HMA OVERLAY, HMA CAP OR HMA PATCHES. REMOVAL OF HMA AS A RESULT OF REMOVAL OF OTHER SUPERSTRUCTURES ITEMS SHALL BE INCLUDED IN THE REMOVAL OF THOSE ITEMS.

EXCEPT WHERE OTHERWISE INDICATED ON THESE PLANS, OR IN THE PROPOSAL AND SUPPLEMENTAL SPECIFICATIONS CONTAINED HEREIN, ALL MATERIALS AND WORKMANSHIP SHALL BE ACCORDING TO THE MICHIGAN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION 2020 EDITION.

THE DESIGN OF THE STRUCTURAL MEMBERS IS BASED ON MATERIAL OF THE FOLLOWING GRADES AND STRESSES:
CONCRETE: GRADE 4500 ---------- f'c = 4,000 psi
CONCRETE: GRADE 3500 ---------- f'c = 3,000 psi
STEEL REINFORCEMENT ---------- fy = 60,000 psi

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

BIDDERS WILL BE FURNISHED WITH SCANNED IMAGES OF PLAN SHEETS OF THE EXISTING STRUCTURE IF REQUESTED.

THE BRIDGE PAINT MAY CONTAIN LEAD.

UNLESS OTHERWISE SHOWN ON THE PLANS PROVIDE MINIMUM CONCRETE CLEAR COVER FOR REINFORCEMENT ACCORDING TO THE FOLLOWING:
CONCRETE CAST AGAINST EARTH: 3 IN
PRESTRESSED BEAMS: 1 IN
ALL OTHER UNLESS SHOWN ON PLANS: 2 IN

THIS PROJECT HAS BEEN EVALUATED USING THE FAA NOTICE CRITERIA TOOL FOR A STRUCTURE HEIGHT OF 200 FEET ABOVE A GROUND LEVEL ELEVATION OF 721 FEET AND NO PERMITS ARE REQUIRED.




SECTION 18 & 19, T10N-R8E,
MILLINGTON TOWNSHIP,
TUSCOLA COUNTY, MICHIGAN

CONTRACT FOR: BRIDGE REPLACEMENT WITH CULVERT, APPROACH WORK AND MAINTAINING TRAFFIC

TUSCOLA COUNTY ROAD COMMISSION APPROVAL

| | | |
|---|---|---|
| CHAIRMAN | JOHN G. LAUBE | DATE 12-16-24 |
| VICE CHAIRMAN | GARY L. FARRELL | DATE |
| MEMBER | KYLE MATTSON | DATE 12-19-24 |
| MEMBER | DUANE WEIPERT | DATE 12-19-24 |
| MEMBER | DAVID KENNARD | DATE 12-19-24 |
| HIGHWAY ENGINEER | BRENT J. DANNERY, P.E. | DATE 12-19-24 |

THESE PLANS WERE PREPARED FOR THE TUSCOLA COUNTY ROAD COMMISSION BY

STATE OF MICHIGAN
DANIEL ZEDDIES
ENGINEER
No. 6201067919
LICENSED PROFESSIONAL ENGINEER

DANIEL ZEDDIES, P.E.
REGISTRATION NO. 12/24/24 DATE

Xplor group

TUSCOLA COUNTY ROAD COMMISSION

| JOB NUMBER | SHEET NO. |
|---|---|
| X321755G2022 | 1 |

## REAL ESTATE SYMBOLS

- PROPERTY OWNERSHIP ARROW
- CONTIGUOUS PROPERTY SYMBOL
- PARCEL LINES
- 123456 PARCEL NUMBER BOX

## WATER & DRAINAGE SYMBOLS

- EXISTING CATCH BASIN
- PROPOSED CATCH BASIN
- EXISTING MANHOLE
- PROPOSED MANHOLE
- EXISTING CULVERT END SECTION
- PROPOSED CULVERT END SECTION
- EXISTING HEADWALL
- PROPOSED HEADWALL
- WATER SHUTOFF (Curb Stop)
- GATE VALVE
- GATEWELL
- WATER METER
- WATER MANHOLE
- EXISTING FIRE HYDRANT
- PROPOSED FIRE HYDRANT
- ADJ-HYD ADJUST FIRE HYDRANT
- ADJ ADJUST DRAINAGE STRUCTURE
- ADJ-K ADJUST DRAINAGE STRUCTURE W/COVER
- ADJ-B/O ADJUST DRAINAGE STRUCTURE BY OTHERS
- REC RECONSTRUCT DRAINAGE STRUCTURE
- REC-K RECONSTRUCT DRAINAGE STRUCTURE W/COVER
- REL-B/O RELOCATE - BY OTHERS
- SR-1 SIDEWALK RAMP TYPE
- CHECK DAM (PROFILES)
- DIKE (PROFILES)
- W.T. ft WATER TABLE (PROFILES)
- GUARD POST
- WATER WELL

## UTILITIES SYMBOLS

- POWER POLE
- TELEPHONE POLE
- GUY POLE
- LIGHT POLE
- POWER LIGHT POLE
- TELEPHONE MANHOLE
- POWER TOWER
- GAS VALVE
- WALK/NO-WALK
- DEADMAN FOR GUYWIRE
- RXR RAILROAD SIGNAL
- E ELECTRICAL MANHOLE
- E ELECTRICAL HANDHOLE
- TELEPHONE PEDESTAL/RISER

## MISCELLANEOUS SYMBOLS

- RIPRAP
- SIGN
- STUMP
- SWAMP
- DECIDUOUS TREE
- EVERGREEN TREE
- MAIL BOX
- QUARTER CORNER
- SECTION CORNER
- HALF QUARTER SECTION
- T.H.# TEST HOLE NO.
- 123 BEAM G. R. RUN NUMBER (EXISTING)
- 123 BEAM G. R. RUN NUMBER (PROPOSED)
- HAZARDOUS OR FLAMMABLE MATERIAL — USED WITH UNDERGROUND GAS & ELECTRICAL LINES
- CAUTION - CRITICAL UNDERGROUND UTILITY — USED WITH FIBER OPTICS LINES

## UTILITY PATTERNS

- ELEC — ELECTRICAL LINE
- 24" GAS — GAS LINE
- 12" OIL — OIL LINE
- TELE — TELEPHONE LINE
- 36" WM — WATER LINE
- CTV — CABLE TV
- FO — FIBER OPTICS
- POWER TRANSMISSION LINE
- PROP 36" — PROPOSED CULVERT/SEWER
- EX 18" CMP — EXISTING CULVERT/SEWER

## R.O.W. PATTERNS

- EX. LIMITED ACCESS R.O.W.
- EXISTING R.O.W.
- PROP LIMITED ACCESS R.O.W.
- PROP FREE ACCESS R.O.W.
- SECTION LINE

## TOPO PATTERNS

- HEDGE LINE
- TREE LINE
- EXISTING FENCE
- PROPOSED FENCE
- EXISTING GUARD RAIL
- PROPOSED GUARD RAIL
- DRAINAGE CRS/EDGE OF WATER
- WETLANDS AREA
- ABANDON ANY UTILITY
- CITY LIMITS
- RAILROAD
- SOUND ABATEMENT WALL
- CONCRETE MEDIAN BARRIER
- SLOPE STAKE LINE

## SPECIAL LEGEND THIS PROJECT

- MONUMENT

## DRIVE/APPROACH LEGEND

- CONCRETE
- BITUMINOUS
- AGGREGATE

## REMOVAL LEGEND

- DEMOLITION
- REMOVING BITUMINOUS
- REMOVING SIDEWALK
- COLD-MILLING
- REMOVING CURB & GUTTER
- REMOVING ..... R
- ABANDONING ..... A
- SAVE ..... S
- BULKHEAD ..... B
- CLEARING ..... C

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |



BARNES ROAD BRIDGES
BRIDGE REPLACEMENTS
TUSCOLA COUNTY, MICHIGAN

# LEGEND SHEET

SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607 Tel.
989-754-4717 Fax.
989-754-4440
www.SpicerGroup.com

| | | | |
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | | SHEET 2 OF 19 | DB 2 |
| DATE OCTOBER, 2024 | | FILE NO. | |
| SCALE NOT TO SCALE | | DB-1242-2 | |

## GENERAL PLAN NOTES

**UNDERGROUND UTILITIES**
FOR PROTECTION OF UNDERGROUND UTILITIES AND IN CONFORMANCE WITH PUBLIC ACT 53, 1974, THE CONTRACTOR SHALL DIAL 1-800-482-7171 OR 811 A MINIMUM OF THREE FULL WORKING DAYS, EXCLUDING SATURDAYS, SUNDAYS, AND HOLIDAYS PRIOR TO BEGINNING EACH EXCAVATION IN AREAS WHERE PUBLIC UTILITIES HAVE NOT BEEN PREVIOUSLY LOCATED. 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. PLAN INFORMATION INDICATES AN EXISTING UNDERGROUND UTILITY IS OR WILL BE OUT OF SERVICE WITHIN THE LIMITS OF THIS CONTRACT. THE CONTRACTOR IS CAUTIONED TO TREAT SUCH A LINE AS IF IT WERE STILL IN SERVICE AND NOTIFY "MISS DIG" WHEN WORKING IN THE AREA OF THE OUT OF SERVICE FACILITY.

**ADJUSTING MONUMENT BOXES**
ALL GOVERNMENT CORNERS ON THIS PROJECT SHALL BE PRESERVED, WHETHER SHOWN OR NOT. IT MAY BE NECESSARY TO PLACE OR ADJUST MONUMENT BOXES, AS REQUIRED.

**SLOPES**
CLASS C SLOPES SHALL BE REQUIRED ON THIS PROJECT.

**SOIL EROSION MEASURES**
APPROPRIATE SOIL EROSION AND SEDIMENTATION CONTROL MEASURES SHALL BE IN PLACE PRIOR TO EARTH-DISTURBING ACTIVITIES. PLACE TURF ESTABLISHMENT ITEMS AS SOON AS POSSIBLE ON POTENTIAL ERODABLE SLOPES AS DIRECTED BY THE ENGINEER. CRITICAL DITCH GRADES SHALL BE PROTECTED WITH EITHER SOD OR SEED/MULCH OR MULCH BLANKET AS DIRECTED BY THE ENGINEER.

**UNDERGROUND UTILITIES**
VERIFYING THE LOCATION OF ALL UNDERGROUND UTILITIES PRIOR TO BEGINNING CONSTRUCTION, AND WILL BE RESPONSIBLE FOR ANY DAMAGE TO EXISTING UTILITIES DURING CONSTRUCTION.

**EARTHWORK**
EARTHWORK QUANTITIES ARE COMPUTED BY THE AVERAGE END AREA METHOD BASED UPON GROUND SURVEY INFORMATION.

**TOPSOIL**
CONTRACTOR MAY USE SALVAGED TOPSOIL IF IT MEETS THE REQUIREMENTS SPECIFIED IN SECTIONS 816 AND 917 OF THE 2020 MICHIGAN DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR CONSTRUCTION.

**SEED MIXTURE**
THE SYMBOL FOR THE PERMANENT TURF SEED MIXTURE ON THIS PROJECT IS TUF.

**ACCESS**
CONTRACTOR SHALL PROVIDE ACCESS TO ADJACENT PROPERTY OWNERS AT ALL TIMES.

**ELECTRICAL UTILITIES**
IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO PROTECT ALL EXISTING ELECTRICAL UTILITIES DURING CONSTRUCTION.

## NOTES APPLYING TO STANDARD PLANS

WHERE THE FOLLOWING ITEMS ARE CALLED FOR ON PLANS, THEY ARE TO BE CONSTRUCTED ACCORDING TO THE STANDARD PLAN GIVEN BELOW OPPOSITE EACH ITEM UNLESS OTHERWISE INDICATED.

| | |
|---|---|
| GUARDRAIL TYPES A, B, BD, T, AND TD, MGS-8 & MGS-8D | R-60-J* |
| GUARDRAIL APPROACH TERMINAL TYPE 2M | R-62-H* |
| GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS | R-66-E* |
| GUARDRAIL OVER BOX OR SLAB CULVERTS | R-73-F* |
| GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS FOR UNDERDRAINS, AND SEWER BULKHEADS | R-80-F* |
| SOIL EROSION AND SEDIMENTATION CONTROL MEASURES | R-96-E |
| SEEDING AND TREE PLANTING | R-100-I* |
| * SPECIAL DETAIL | |

## NOTES APPLYING TO TRAFFIC & SAFETY STANDARD PLANS

WHERE THE FOLLOWING ITEMS ARE CALLED FOR ON PLANS, THEY ARE TO BE CONSTRUCTED ACCORDING TO THE STANDARD PLAN GIVEN BELOW OPPOSITE EACH ITEM UNLESS OTHERWISE INDICATED.

| | |
|---|---|
| ROADSIDE SIGN LOCATIONS & SUPPORT SPACING | SIGN-120-E |
| STEEL POSTS | SIGN-200-E |
| LONGITUDINAL LINE TYPES AND PLACEMENT | PAVE-905-E |
| GROUND DRIVEN SIGN SUPPORTS FOR TEMP SIGNS | WZD-100-A* |
| TEMPORARY TRAFFIC CONTROL DEVICES | WZD-125-E* |
| * SPECIAL DETAIL | |

| STRUCTURE NO. 10631 | | |
|---|---|---|
| 945 | --- | PRESENT ADT (2009) |
| 1705 | --- | FUTURE ADT (2029) |
| 55 MPH | --- | POSTED SPEED |
| EST. 0% | --- | DESIGN COMMERCIAL |

| STRUCTURE NO. 10632 | | |
|---|---|---|
| 945 | --- | PRESENT ADT (2009) |
| 1705 | --- | FUTURE ADT (2029) |
| 55 MPH | --- | POSTED SPEED |
| EST. 0% | --- | DESIGN COMMERCIAL |

## UTILITIES

THE EXISTING UTILITIES LISTED BELOW AND SHOWN ON THESE PLANS REPRESENT THE BEST INFORMATION AVAILABLE AS OBTAINED ON OUR SURVEY DATED MARCH 2022. THIS INFORMATION DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY TO BE SATISFIED AS TO ITS ACCURACY AND THE LOCATION OF EXISTING UTILITIES.

## CONTACTS

BRENT J. DANKERT P.E. — OWNER
TUSCOLA COUNTY ROAD COMMISSION
1733 MERTZ ROAD
CARO, MI 48723
(989) 751-3873

DANIEL ZEDDIES P.E. — ENGINEER
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230 S. WASHINGTON AVENUE
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(989) 245-1468

BRANDON BRUCE — ELECTRIC
THUMB ELECTRIC
2231 E MAIN ST.
UBLY, MI 48475
(989) 553-6582
BBRUCE@TECMI.COOP

BENJAMIN LEWIS — GAS
CONSUMERS ENERGY
2400 WEISS ST
SAGINW, MI 48602
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BENJAMIN.LEWIS@CMSENERGY.COM

WILLIAM BOUMAN — CABLE/FIBER
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4712 MAIN ST.
MILLINGTON, MI 48746
(989) 971-5101
WILLIAM.BOUMAN@TDSTELECOM.COM

MISCELLANEOUS QUANTITIES - 10631

| | | |
|---|---|---|
| 0.5 | LSUM | Mobilization, Max 10% |
| 0.5 | LSUM | Slope Restoration, Type A, Modified |
| 0.5 | LSUM | Soil Erosion Sediment Control |
| 0.5 | LSUM | Traffic Control |

MISCELLANEOUS QUANTITIES - 10632

| | | |
|---|---|---|
| 0.5 | LSUM | Mobilization, Max 10% |
| 0.5 | LSUM | Slope Restoration, Type A, Modified |
| 0.5 | LSUM | Soil Erosion Sediment Control |
| 0.5 | LSUM | Traffic Control |

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |

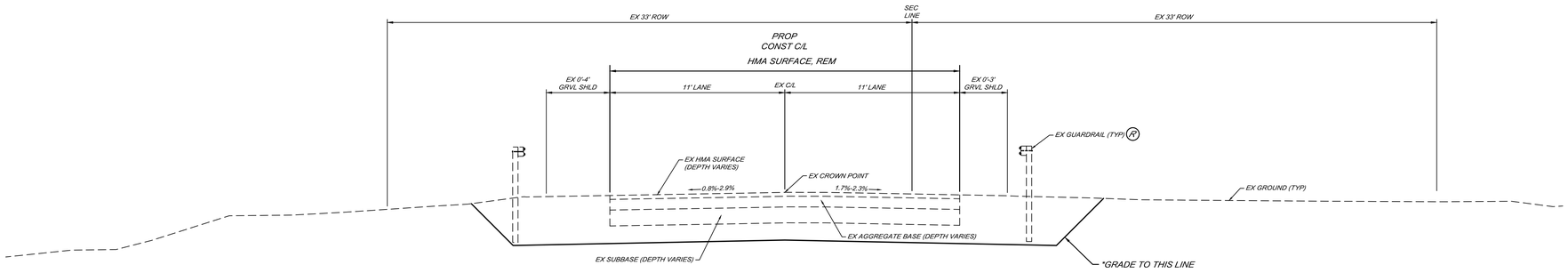


BARNES ROAD BRIDGES
BRIDGE REPLACEMENTS
TUSCOLA COUNTY, MICHIGAN

NOTE SHEET

SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607 Tel.
989-754-4717 Fax.
989-754-4440
www.SpicerGroup.com

| | | | |
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | SHEET 3 OF 19 | DB 3 | |
| DATE FEBRUARY, 2025 | FILE NO. | | |
| SCALE NOT TO SCALE | DB-1242-3 | | |




*INCLUDED IN PAYMENT FOR MACHINE GRADING, MODIFIED

## EXISTING TYPICAL CROSS SECTION

TO APPLY:
STA 26+84 TO STA 28+12
STA 32+27 TO STA 33+55

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|



BARNES RD BRIDGES
BRIDGE REPLACEMENTS
TUSCOLA COUNTY, MICHIGAN

# TYPICAL CROSS SECTIONS
# BARNES ROAD

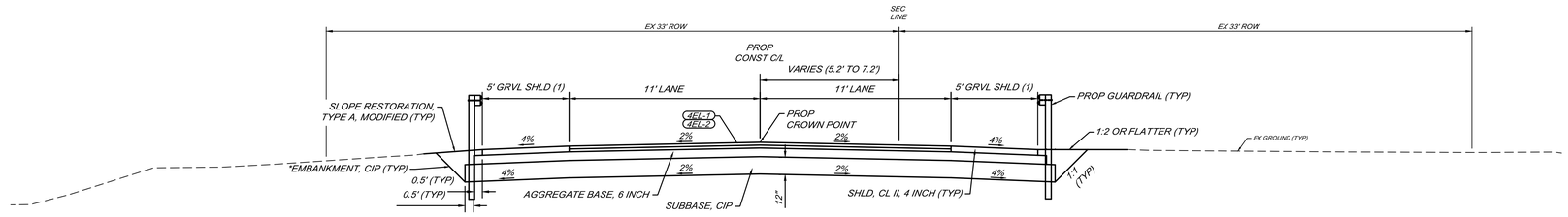
SAGINAW OFFICE
230 S. Washington Ave. Saginaw, MI 48607 Tel. 989-754-4717 Fax. 989-754-4440
www.SpicerGroup.com

| | | | |
|---|---|---|---|
| DE. BY: RVR | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: RVR | APP. BY: DPZ | 132175SG2022 | |
| STDS. | | SHEET 4 OF 19 | DB 4 |
| DATE FEBRUARY, 2025 | | FILE NO. | |
| SCALE 1" = 4' | | DB-1242-04 | |

PLOTTING SCALE: RET. F.B. PG. ACAD FILE:

0 1 2 4 8

SCALE: 1" = 4'




(1) TRANSITIONS FROM 1' AT STA 26+84 TO 5' AT STA 27+09
5' WIDTH FROM STA 27+09 TO STA 27+87
TRANSITIONS FROM 5' AT STA 27+87 TO 2' AT STA 28+12
TRANSITIONS FROM 1' AT STA 32+27 TO 5' AT STA 32+52
5' WIDTH FROM STA 32+52 TO STA 33+30
TRANSITIONS FROM 5' AT STA 33+30 TO 3' AT STA 33+55

*INCLUDED IN PAYMENT FOR MACHINE GRADING, MODIFIED

## PROPOSED TYPICAL CROSS SECTION

TO APPLY:
STA 26+84 TO STA 28+12
STA 32+27 TO STA 33+55

HMA APPLICATION ESTIMATE

| IDENT NO. | ITEM | RATE LBS PER SYD | PERFORMANCE GRADE | REMARKS |
|---|---|---|---|---|
| 4EL-1 | HMA, 4EL | 220 | 58-28 | HMA TOP COURSE |
| 4EL-2 | HMA, 4EL | 220 | 58-28 | HMA LEVELING COURSE |

PLACE HMA BOND COAT AT 0.05-0.15 GAL/SYD BETWEEN LAYERS AS DIRECTED BY THE ENGINEER (INCLUDED IN PAYMENT FOR HMA PAVING)
THE AGGREGATE WEAR INDEX (AWI) FOR THE TOP COURSE SHALL BE 220 MINIMUM

FOR INFORMATION ONLY

| MACHINE GRADING, MODIFIED | |
|---|---|
| VOLUME | ITEM |
| 26 CYD | EMBANKMENT, CIP |
| 302 CYD | EXCAVATION, EARTH |

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|



BARNES RD BRIDGES
BRIDGE REPLACEMENTS
TUSCOLA COUNTY, MICHIGAN

# TYPICAL CROSS SECTIONS BARNES ROAD

SAGINAW OFFICE
230 S. Washington Ave. Saginaw, MI 48607 Tel. 989-754-4717 Fax. 989-754-4440
www.SpicerGroup.com

DE. BY: RVR CH. BY: DPZ
DR. BY: RVR APP. BY: DPZ
PROJECT NO. 132175SG2022
STDS.
SHEET 5 OF 19
DB 5
DATE DECEMBER, 2024
SCALE 1" = 4'
FILE NO. DB-1242-05

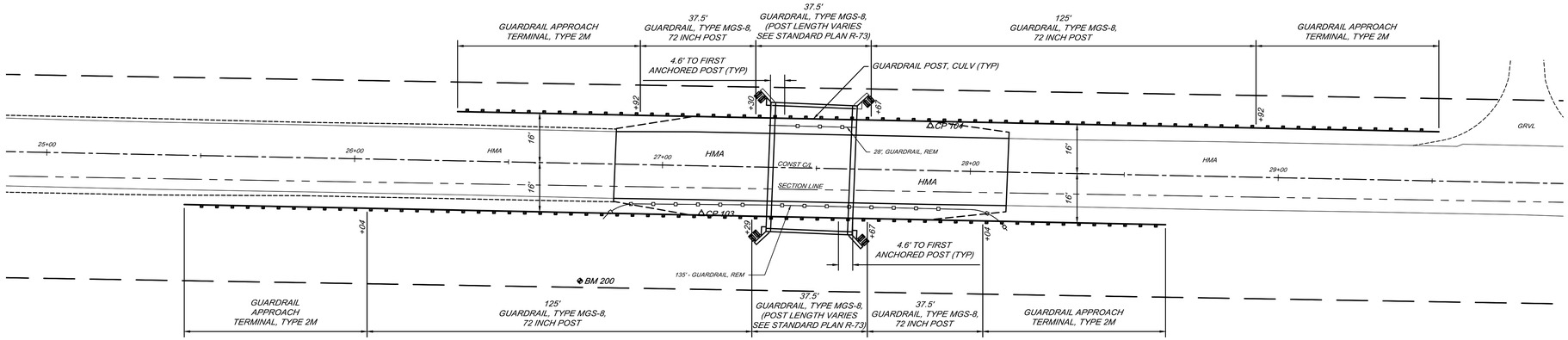
PLOTTING SCALE: RET. F.B. PG. ACAD FILE:

N

CP 104 - EL. 719.66
STA 27+86.74 14.77' L
SET 1/2" X 18" ROD & CAP 40'
± EAST OF MIDDLE CROSSING
OF BARNES ROAD OVER
PERRY CREEK, 15' ± NORTH
OF CL BARNES ROAD.
N: 644815.730 E: 13334576.869

SECTION 18
T10N, R8E
MILLINGTON TOWNSHIP
TUSCOLA COUNTY, MICHIGAN

## PERRY CREEK




## PERRY CREEK

SECTION 19
T10N, R8E
MILLINGTON TOWNSHIP
TUSCOLA COUNTY, MICHIGAN

BM 200 - EL. 717.27
STA 26+73.85 38.11' R
SET GEAR SPIKE IN NW FACE 8"
MAPLE 40' ± SOUTH OF THE CL
OF BARNES RD. 110' WEST OF
MIDDLE CROSSING OF BARNES
ROAD OVER PERRY CREEK.
N: 644760.848 E: 13334465.193

CP 103 - EL. 719.01
STA 27+12.81 15.58' R
SET 1/2" X 18" ROD & CAP 40'
± WEST OF MIDDLE
CROSSING OF BARNES ROAD
OVER PERRY CREEK, 20' ±
SOUTH OF CL BARNES ROAD.
N: 644784.241 E: 13334503.690

CONSTRUCTION QUANTITIES - THIS SHEET (STR 10631)

| | | |
|---|---|---|
| 163 | Ft | Guardrail, Rem |
| 4 | Ea | Guardrail Approach Terminal, Type 2M |
| 8 | Ea | Guardrail Post, Culv |
| 400 | Ft | Guardrail, Type MSG-8, 72 inch Post |

0 5 10 20 40
SCALE: 1" =20'-0"

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREON IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

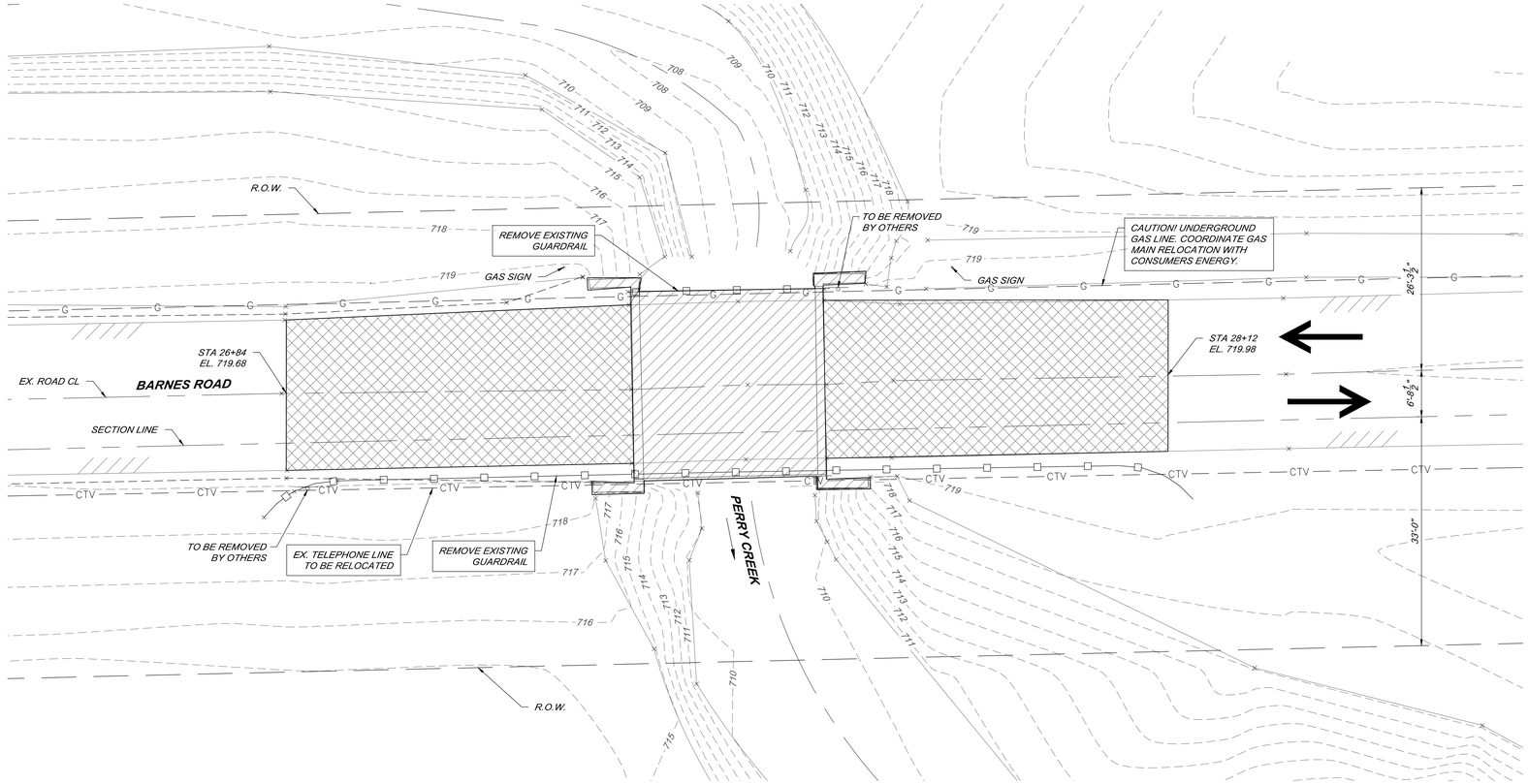
BARNES RD BRIDGES
BRIDGE REPLACEMENTS
TUSCOLA COUNTY, MICHIGAN

# GUARDRAIL DETAILS
# STRUCTURE NO. 10631


SAGINAW OFFICE
230 S. Washington Ave. Saginaw,
MI 48607 Tel. 989-754-4717 Fax.
989-754-4440
www.SpicerGroup.com

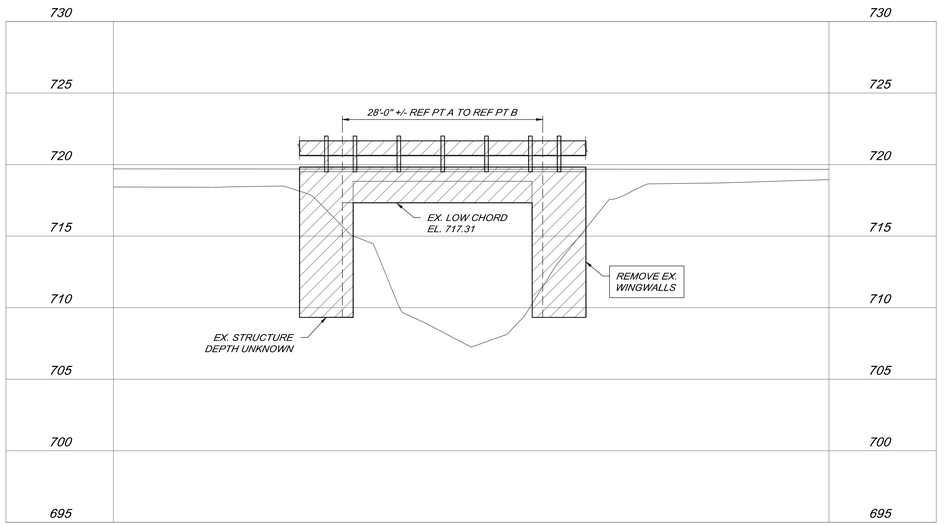

| | | | |
|---|---|---|---|
| DE. BY: RVR | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: RVR | APP. BY: DPZ | 132175SG2022 | |
| STDS. | | SHEET 6 OF 19 | DB 6 |
| DATE DECEMBER, 2024 | | FILE NO. | |
| SCALE 1" = 20' | | DB-1242-06 | |

PLOTTING SCALE: RET. F.B. PG. ACAD FILE:




## REMOVAL PLAN

SCALE: 1" = 10'-0"




## REMOVAL ELEVATION

H SCALE: 1" = 10'-0"
V SCALE: 1" = 5'-0"

NOTE: AS BUILT INFORMATION IS NOT AVAILABLE FOR THIS STRUCTURE. EXTENT OF EXISTING FOUNDATION IS UNKNOWN. IF PILES ARE DISCOVERED FOR THE FOUNDATION, THEY ARE TO BE CUT OFF 1' BELOW BOTTOM OF CULVERT OR FOOTING AND LEFT IN PLACE. CUTTING OF PILES TO BE INCLUDED IN PAY ITEMS "STRUCTURES, REM (STR 10631)".

N

0 2.5 5 10 20

SCALE: 1" = 10'-0"

| REMOVAL QUANTITIES 10631 - THIS SHEET | | |
|---|---|---|
| 1 | LSUM | Structures, Rem (STR 10631) |
| 247 | Syd | HMA Surface, Rem |

PROPOSED WORK

COMPLETE REMOVAL OF EXISTING STEEL I-BEAM, AND SUBSTRUCTURE FOR BARNES RD. BRIDGE AS SHOWN.

HMA SURFACE REMOVAL

NOTE: ALL I-BEAMS ARE TO BE SALVAGED AND DELIVERED TO THE TUSCOLA COUNTY ROAD COMMISSION VASSAR GARAGE. ADDRESS IS 430 KITELINGER ROAD, VASSAR. THIS IS INCLUDED IN THE PAY ITEM "STRUCTURES, REM (STR 10631)".

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREON IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

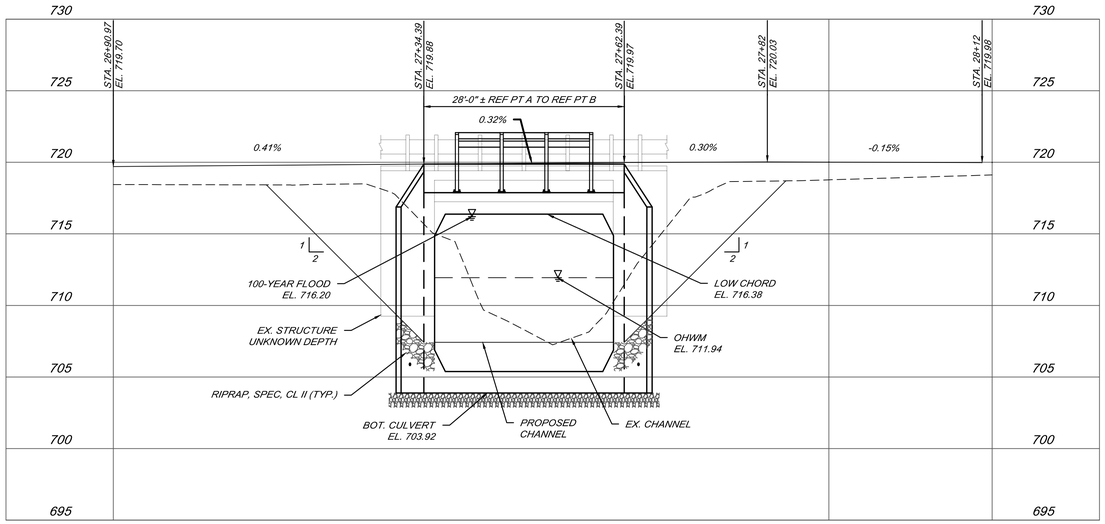
**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
**TUSCOLA COUNTY, MICHIGAN**

# REMOVAL SHEET
# STRUCTURE NO. 10631


SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607
Tel. 989-754-4717
Fax. 989-754-4440
www.SpicerGroup.com

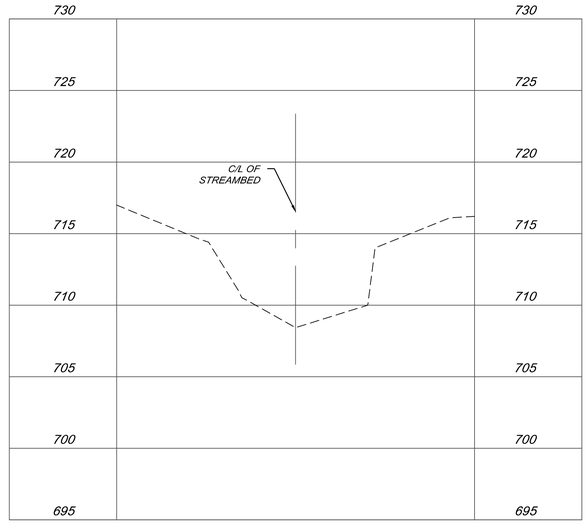

| | | | |
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | SHEET 7 OF 19 | DB 7 | |
| DATE DECEMBER, 2024 | FILE NO. | | |
| SCALE AS SHOWN | DB-1242-7 | | |

N



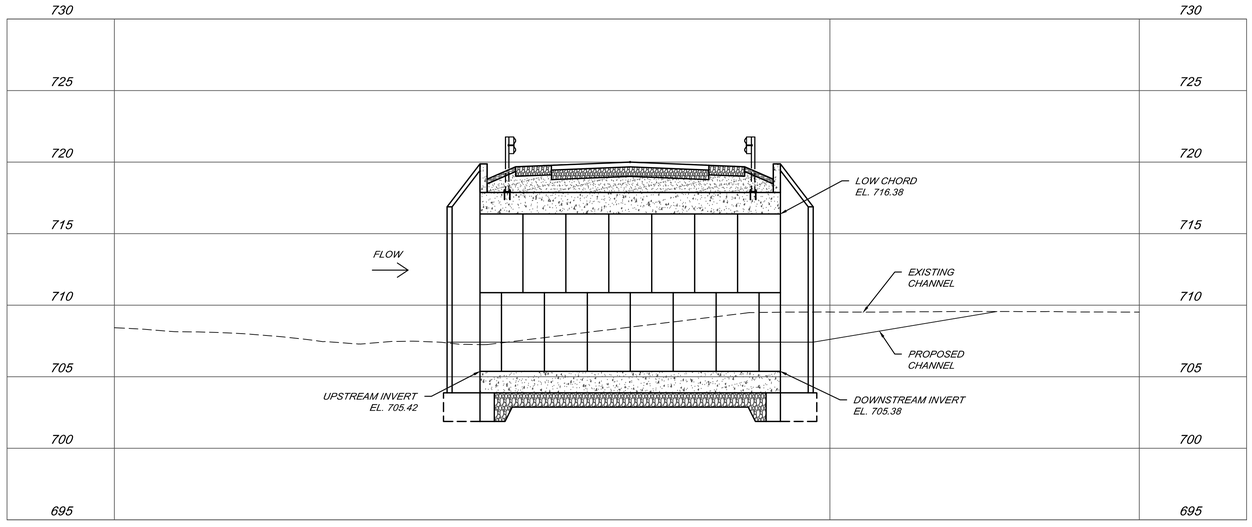

***PROPOSED STRUCTURE PROFILE***

*H SCALE: 1" = 10'-0"*
*V SCALE: 1" = 5'-0"*



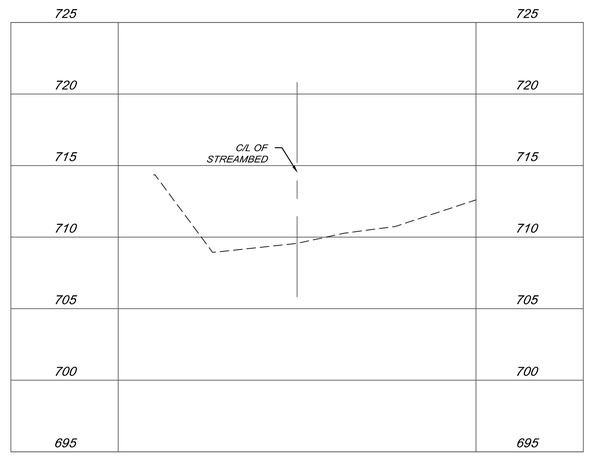

***50' UPSTREAM PROFILE VIEW***

*H SCALE: 1" = 10'-0"*
*V SCALE: 1" = 5'-0"*




***STREAM PROFILE***

*H SCALE: 1" = 10'-0"*
*V SCALE: 1" = 5'-0"*




***50' DOWNSTREAM PROFILE VIEW***

*H SCALE: 1" = 10'-0"*
*V SCALE: 1" = 5'-0"*

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |



***BARNES ROAD BRIDGES***
***BRIDGE REPLACEMENTS***
***TUSCOLA COUNTY, MICHIGAN***

# *STREAM PROFILES STRUCTURE NO. 10631*

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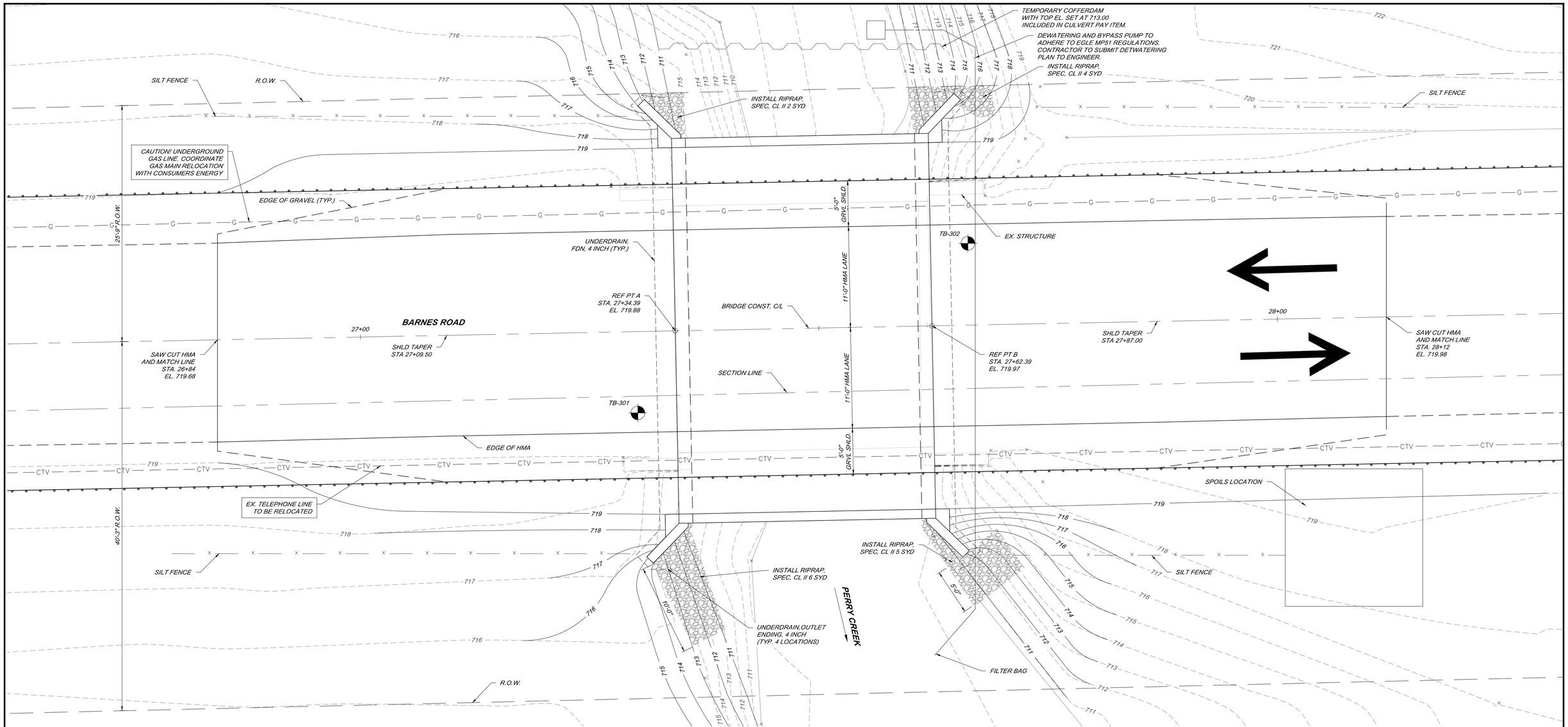
| | | | |
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | SHEET 8 OF 19 | DB 8 | |
| DATE DECEMBER, 2024 | FILE NO. | | |
| SCALE AS SHOWN | DB-1242-8 | | |




## SITUATION PLAN

SCALE: 1" = 5'-0"

N

0 1.25 2.5 5 10

SCALE: 1" =5'-0"

| CUT AND FILL VOLUMES BELOW OHWM | | | | | |
|---|---|---|---|---|---|
| | AVERAGE WIDTH (FT) | AVERAGE DEPTH (FT) | AVERAGE LENGTH (FT) | VOLUME (CFT) | VOLUME (CYD) |
| CULVERT (FILL) | 8.16 | 4.88 | 42.00 | 1672 | 62 |
| BACKFILL (FILL) | 28.10 | 5.63 | 42.00 | 6645 | 246 |
| RIPRAP (FILL) | 11.20 | 2.00 | 12.50 | 280 | 10 |
| SHEET PILE (FILL) | 0.03 | 10.00 | 32 | 10 | 1 |
| SUBTOTAL (FILL) | | | | 8607 | 319 |
| CUT | 45.51 | 5.20 | 42.00 | 9939 | 368 |
| | | NET VOLUME = 49 CYD CUT | | | |

| CUT AND FILL VOLUMES BETWEEN FLOODPLAIN AND OHWM | | | | | |
|---|---|---|---|---|---|
| | AVERAGE WIDTH (FT) | AVERAGE DEPTH (FT) | AVERAGE LENGTH (FT) | VOLUME (CFT) | VOLUME (CYD) |
| CULVERT (FILL) | 3.00 | 2.83 | 42.00 | 357 | 13 |
| BACKFILL (FILL) | 22.70 | 4.25 | 42.00 | 4052 | 150 |
| RIPRAP (FILL) | 11.20 | 1.00 | 12.50 | 140 | 5 |
| SHEET PILE (FILL) | 0.03 | 1.06 | 32 | 1 | 1 |
| SUBTOTAL (FILL) | | | | 4550 | 169 |
| CUT | 30.63 | 3.83 | 42.00 | 4927 | 183 |
| | | NET VOLUME = 14 CYD CUT | | | |

CONSTRUCTION QUANTITIES 10631 - THIS SHEET

| | | |
|---|---|---|
| 2 | Sta | Machine, Grading, Modified |
| 200 | Ft | Erosion Control, Silt Fence |
| 1 | Ea | Erosion Control, Filter Bag |
| 20 | Syd | Riprap, Spec, CL II |
| 79 | Ton | HMA, 4 EL |
| 170 | Cyd | Subbase, CIP |
| 449 | Syd | Aggregate Base, 6 inch |
| 123 | Syd | Shld, CL II, 4 inch |
| 466 | Cyd | Backfill, Structure, CIP |
| 741 | Cyd | Excavation, Fdn |
| 55 | Cyd | Culv Bedding, Box Culv |
| 120 | Ft | Underdrain, Fdn, 4 inch |
| 40 | Ft | Underdrain Outlet, 4 inch |
| 4 | Ea | Underdrain, Outlet Ending, 4 inch |
| 379 | Sft | Joint Waterproofing |
| 42 | Ft | Culv, Precast Conc Box, 25 foot by 11 foot |
| 750 | Sft | False Decking |

## NOTES:

THE WORK COVERED BY THESE PLANS INCLUDES REMOVAL OF THE EXISTING BRIDGE, CONSTRUCTION OF THE PROPOSED BRIDGE, PLACING SLOPE AND SCOUR PROTECTION TO THE LIMITS SHOWN AND ROADWAY APPROACH RECONSTRUCTION.

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.

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

MEASURES SHALL BE TAKEN TO PREVENT DEBRIS FROM FALLING FROM THE STRUCTURE. IF DEBRIS FALLS INTO THE WATERWAY, IT SHALL BE REMOVED WITHIN 24 HOURS. SINCE DISTURBANCE OF THE WATERWAY MAY BE AS HARMFUL AS THE DEBRIS ITSELF, THE PREVENTATIVE MEASURES MUST BE EFFECTIVE.

FALSE DECKING INCLUDES THE AREA BOUNDED BY REFERENCE LINES A AND B AND OUTSIDE FLANGE FASCIAS OF FASCIA BEAMS. THE ESTIMATED AREA IS 750 SQUARE FEET DURING REMOVAL.

DETOUR TRAFFIC OVER OTHER EXISTING ROADS.

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREON IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
**TUSCOLA COUNTY, MICHIGAN**

# PROPOSED GENERAL PLAN OF SITE STRUCTURE NO. 10631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Fax. 989-754-4440
www.SpicerGroup.com


| | | | |
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | | SHEET 9 OF 19 | DB 9 |
| DATE FEBRUARY, 2025 | | FILE NO. | |
| SCALE AS SHOWN | | DB-1242-9 | |

## LOG OF SOIL BORING NO.: TB-301

SHEET 1 OF 3

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10631
**Project Location:** West Abutment, Tuscola County, Michigan
**Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc.
**Date:** 10/28/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 720 | | | | | | | 719.6 PAVEMENT: ASPHALT (5") 0.4 | 0 | | | | | | |
| | | | | | | | 719.0 FILL: GRAVEL 1.0 | | | | | | | |
| | SS-1 | 18 | 17 13 11 | 24 | | | | | | | | | | |
| | | | | | | | FILL: Brown and Dark Gray SAND with Trace of Silt and Gravel | | | | | | | |
| 715 | SS-2 | 18 | 5 14 11 | 25 | | | | 5 | | | | | | |
| | SS-3 | 18 | 6 14 7 | 21 | | | 712.0 8.0 | | | | | | | |
| | | | | | | | Medium Dense Brown SILTY SAND with Trace of Clay and Gravel | | | | | | | |
| 710 | SS-4 | 18 | 3 6 8 | 14 | | | 708.0 12.0 | 10 | | | | | | |
| | | | | | | | Medium Dense Gray SANDY SILT with Some Clay and Trace of Gravel | | | | | | | |
| 705 | SS-5 | 18 | 3 14 14 | 28 | | | *DOWNSTREAM BOT. CULVERT EL. 703.88* | 15 | | | | | | |
| | | | | | | | 703.0 17.0 | | | | | | | |
| | SS-6 | 18 | 4 7 9 | 16 | | | | 20 | | | | | | |
| | | | | | | | Medium Dense to Very Dense Gray SILTY SAND with Trace of Gravel | | | | | | | |
| 695 | SS-7 | 18 | 6 8 9 | 17 | | | | 25 | | | | | | |

Stratification lines represent approximate boundaries; In-situ, transition may be gradual.

**Total Drilling Depth:** 75 ft
**Drilling Contractor:** Schmidt Drilling Co.
**Driller:** M. Schmidt
**Drilling Method:**
CME 75 Truck Mounted Drilling Rig, Using 2-1/4-inch I.D. Hollow Stem Auger to 20 feet and 3-7/8 in. Tri -Cone Rotary Wash to End of Boring.

**Backfill Procedure:**
Borehole backfilled with excavated materials and pavement repaired with asphalt cold patch.

**Groundwater Levels:**
**At Time of Drilling:** 14.5 ft
**End of Drilling:** Not Obtained
**Notes:**
No groundwater measurement upon completion due to use of rotary wash drilling method.

**Logged By:** R. Muthala **Reviewed By:** D. Yip

**Figure No.: 3**

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD 2012.GDT - 12/5/23 13:45 - G:\MY DRIVE\GEOTRAN_DYD\2022\22-03001G - TUSCOLA COUNTY BRIDGES\22-03001G-10 STR10631 QA.GPJ

## LOG OF SOIL BORING NO.: TB-301

SHEET 2 OF 3

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10631
**Project Location:** West Abutment, Tuscola County, Michigan
**Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc.
**Date:** 10/28/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 690 | SS-8 | 18 | 11 14 15 | 29 | | | | 30 | | | | | | |
| 685 | SS-9 | 18 | 10 16 12 | 28 | | | | 35 | | | | | | |
| 680 | SS-10 | 18 | 14 16 20 | 38 | | | | 40 | | | | | | |
| 675 | SS-11 | 18 | 14 25 31 | 56 | | | Medium Dense to Very Dense Gray SILTY SAND with Trace of Gravel | 45 | | | | | | |
| 670 | SS-12 | 18 | 9 15 21 | 36 | | | | 50 | | | | | | |
| 665 | SS-13 | 18 | 14 28 30 | 58 | | | | 55 | | | | | | |
| 660 | SS-14 | 18 | 12 28 38 | 66 | | | | 60 | | | | | | |

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD 2012.GDT - 12/5/23 13:45 - G:\MY DRIVE\GEOTRAN_DYD\2022\22-03001G - TUSCOLA COUNTY BRIDGES\22-03001G-10 STR10631 QA.GPJ

## LOG OF SOIL BORING NO.: TB-301

SHEET 3 OF 3

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10631
**Project Location:** West Abutment, Tuscola County, Michigan
**Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc.
**Date:** 10/28/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 655 | SS-15 | 18 | 19 25 30 | 55 | | | | 65 | | | | | | |
| 650 | SS-16 | 18 | 10 15 30 | 45 | | | Medium Dense to Very Dense Gray SILTY SAND with Trace of Gravel | 70 | | | | | | |
| 645 | SS-17 | 18 | 11 17 33 | 50 | | | 645.0 End of Boring at 75.0 ft. 75.0 | 75 | | | | | | |

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD 2012.GDT - 12/5/23 13:45 - G:\MY DRIVE\GEOTRAN_DYD\2022\22-03001G - TUSCOLA COUNTY BRIDGES\22-03001G-10 STR10631 QA.GPJ

*NOTES:*
*NUMBERS IN CIRCLES DENOTE NUMBER OF BLOWS REQUIRED TO DRIVE A 2" O.D. (1 1/2" I.D.) SPLIT SPOON SAMPLER 3 SUCCESSIVE 6" INCREMENTS USING A 140 LBS. HAMMER FALLING 30".*

12
14
15

*(WHERE THE SAMPLER IS DRIVEN DISTANCES OTHER THAN 18", THE DISTANCE IS SHOWN IN THE CIRCLE WITH THE NUMBER OF BLOWS IN THE FORM OF A FRACTION*

31 / 4" — *NUMBER OF BLOWS / DISTANCE DRIVEN*

*CONSISTENCY WAS DETERMINED BY INSPECTION OF SAMPLES AND SUBSTANTIATED BY SOILS RESISTANCE TO DRILLING TOOLS.*

*WATER LEVELS MAY BE INFLUENCED BY RESIDUAL BORING WATER.*

*THE SOIL BORING LOGS REPRESENT POINT INFORMATION. PRESENTATION OF THIS INFORMATION IN NO WAY IMPLIES THAT SUBSURFACE CONDITIONS ARE THE SAME AT LOCATIONS OTHER THAN THE EXACT LOCATION OF THE BORING.*

*SEE GENERAL PLAN OF STRICTURE SHEET FOR SOIL BORING LOCATIONS.*

## LOG OF SOIL BORING NO.: TB-302

SHEET 1 OF 2

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10631
**Project Location:** East Abutment, Tuscola County, Michigan
**Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc.
**Date:** 10/24/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 720 | | | | | | | 719.6 PAVEMENT: ASPHALT (5") 0.4 | 0 | | | | | | |
| | | | | | | | 719.0 FILL: GRAVEL 1.0 | | | | | | | |
| | SS-1 | 18 | 9 8 10 | 18 | | | | | | | | | | |
| | | | | | | | FILL: Brown and Dark Gray SAND with Trace of Silt and Gravel | | | | | | | |
| 715 | SS-2 | 18 | 4 5 4 | 9 | | | 714.5 5.5 | 5 | | | | | | |
| | SS-3 | 18 | 3 3 4 | 7 | | | Loose Brown SILTY SAND with Trace of Clay and Gravel | | | | | | | |
| | | | | | | | 712.0 8.0 | | | | | | | |
| 710 | SS-4 | 18 | 1 3 4 | 7 | 5000 | | Very Stiff Brown SANDY CLAY with Trace of Silt and Gravel | 10 | | | | | | |
| | | | | | | | 708.0 12.0 | | | | | | | |
| 705 | SS-5 | 18 | 4 7 11 | 18 | | | Medium Dense Gray SILTY SAND with Trace of Clay | 15 | | | | | | |
| | | | | | | | *UPSTREAM BOT. CULVERT EL. 703.92* | | | | | | | |
| | | | | | | | 703.0 17.0 | | | | | | | |
| | SS-6 | 18 | 6 9 13 | 22 | | | Medium Dense Gray SANDY SILT with Some Clay and Trace of Gravel | 20 | | | | | | |
| | | | | | | | 698.0 22.0 | | | | | | | |
| 695 | SS-7 | 18 | 11 24 31 | 55 | | | Dense to Very Dense Gray SILTY SAND with Trace of Gravel | 25 | | | | | | |

Stratification lines represent approximate boundaries; In-situ, transition may be gradual.

**Total Drilling Depth:** 60 ft
**Drilling Contractor:** Schmidt Drilling Co.
**Driller:** M. Schmidt
**Drilling Method:**
CME 75 Truck Mounted Drilling Rig, Using 2-1/4-inch I.D. Hollow Stem Auger to 20 feet and 3-7/8 in. Tri -Cone Rotary Wash to End of Boring.

**Backfill Procedure:**
Borehole backfilled with excavated materials and pavement repaired with asphalt cold patch.

**Groundwater Levels:**
**At Time of Drilling:** 15 ft
**End of Drilling:** Not Obtained; Caved at 60 ft
**Notes:**
No groundwater measurement upon completion due to use of rotary wash drilling method.

**Logged By:** R. Muthala **Reviewed By:** D. Yip

**Figure No.: 4**

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD 2012.GDT - 12/5/23 13:46 - G:\MY DRIVE\GEOTRAN_DYD\2022\22-03001G - TUSCOLA COUNTY BRIDGES\22-03001G-10 STR10631 QA.GPJ

## LOG OF SOIL BORING NO.: TB-302

SHEET 2 OF 2

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10631
**Project Location:** East Abutment, Tuscola County, Michigan
**Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc.
**Date:** 10/24/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 690 | SS-8 | 18 | 21 33 22 | 55 | | | | 30 | | | | | | |
| 685 | SS-9 | 18 | 15 21 21 | 42 | | | Dense to Very Dense Gray SILTY SAND with Trace of Gravel | 35 | | | | | | |
| 680 | SS-10 | 18 | 13 16 20 | 36 | | | | 40 | | | | | | |
| 675 | SS-11 | 18 | 11 18 20 | 38 | | | 676.0 44.0 | 45 | | | | | | |
| 670 | SS-12 | 18 | 16 14 13 | 27 | | | Medium Dense to Dense Gray SANDY GRAVEL with Little Silt | 50 | | | | | | |
| 665 | SS-13 | 18 | 10 13 15 | 28 | | | | 55 | | | | | | |
| 660 | SS-14 | 18 | 12 18 19 | 37 | | | 660.0 60.0 Boring terminated at 60 ft due to excessive caving within borehole. End of Boring at 60.0 ft. | 60 | | | | | | |

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD 2012.GDT - 12/5/23 13:46 - G:\MY DRIVE\GEOTRAN_DYD\2022\22-03001G - TUSCOLA COUNTY BRIDGES\22-03001G-10 STR10631 QA.GPJ

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |



**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
**TUSCOLA COUNTY, MICHIGAN**

# LOG OF BORINGS
# STRUCTURE NO. 10631

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989-754-4440
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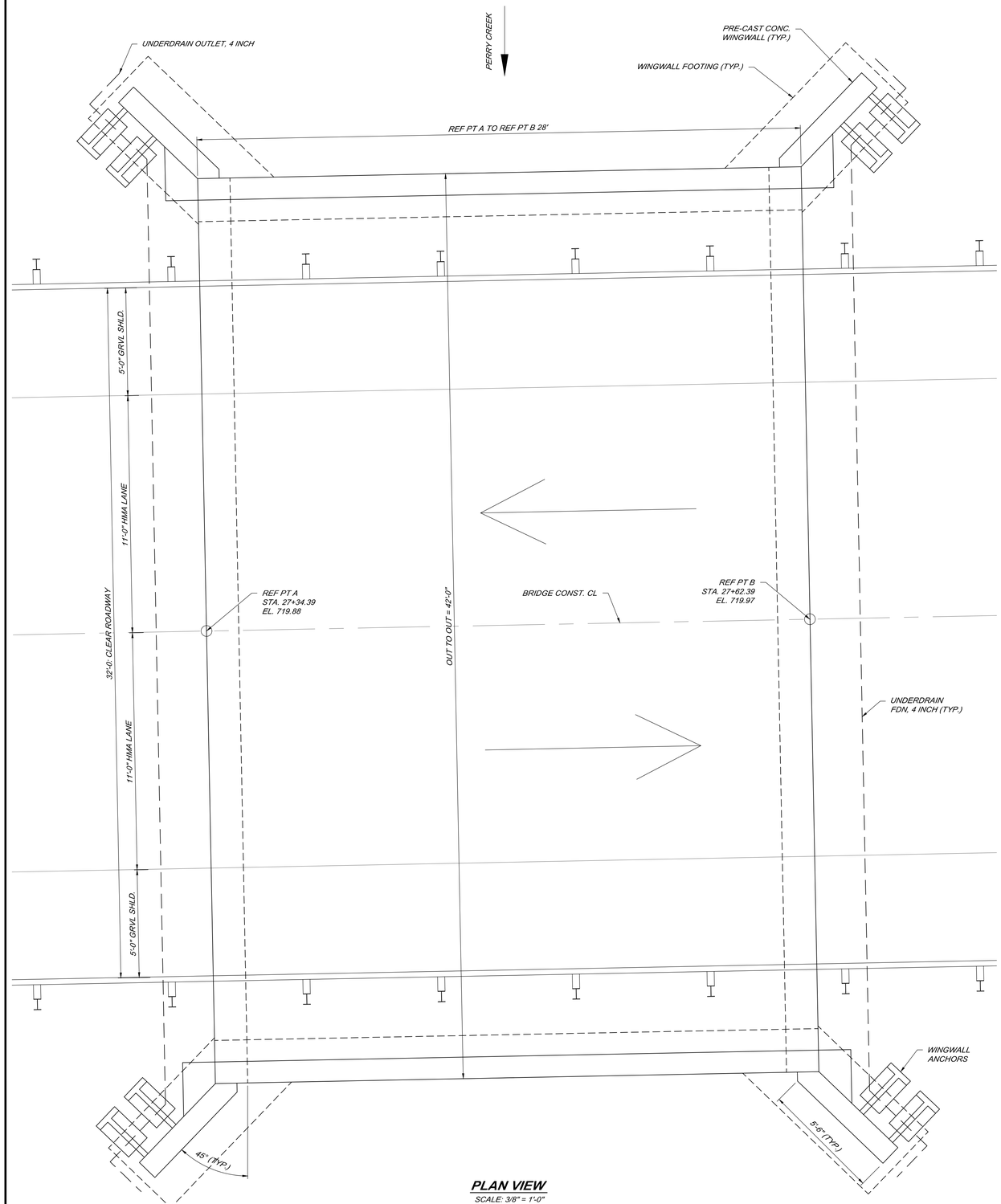
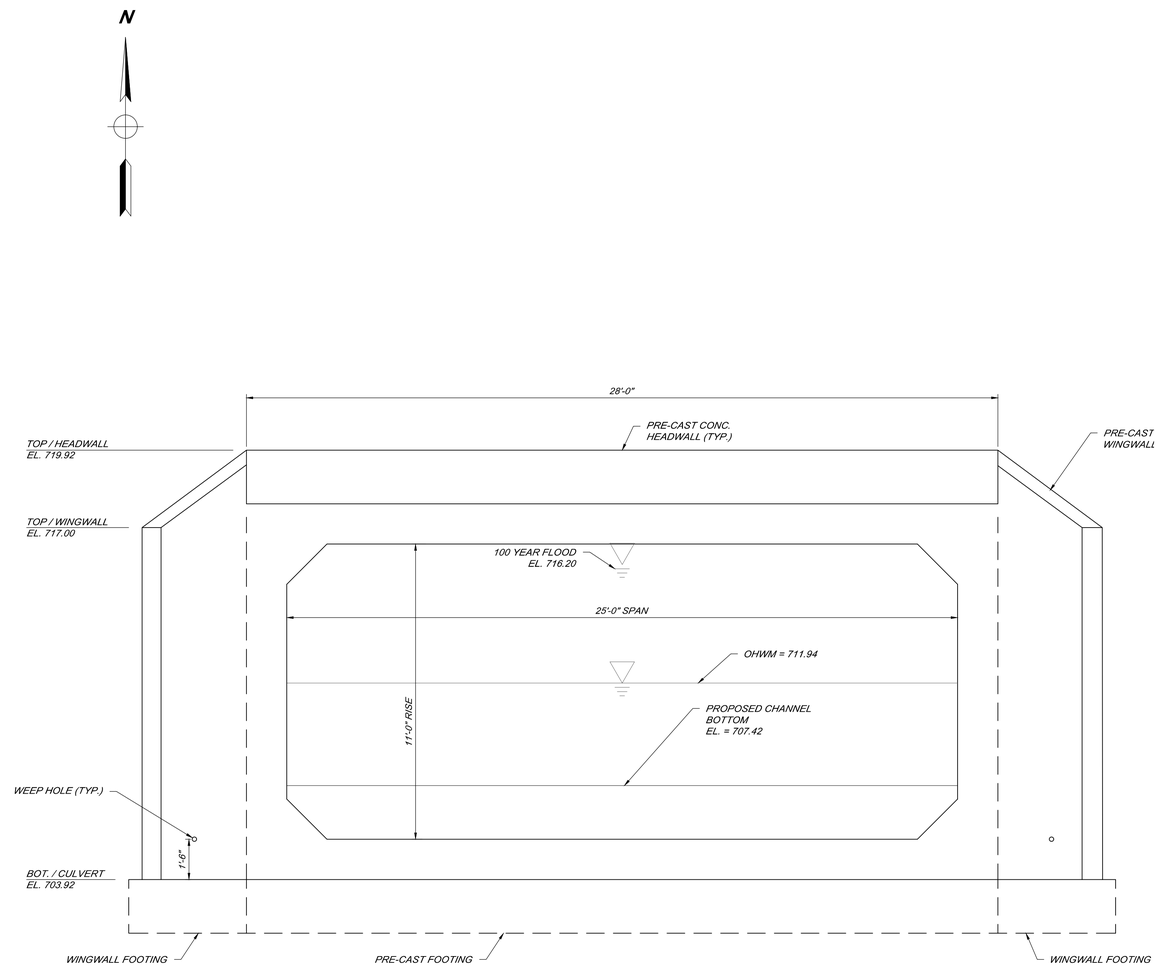
| | | | |
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | SHEET 10 OF 19 | DB 10 | |
| DATE OCTOBER, 2024 | FILE NO. | | |
| SCALE AS SHOWN | DB-1242-10 | | |




## PLAN VIEW

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




## UPSTREAM ELEVATION

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

| SUMMARY OF HYDRAULIC ANALYSIS | | | | | | | |
|---|---|---|---|---|---|---|---|
| EXISTING | | | | PROPOSED | | | |
| FLOOD DATA | DISCHARGE (CFS) | WATER SURFACE ELEV. AT UPSTREAM FACE OF STRUCTURE (FT) | VELOCITY IN DOWNSTREAM CHANNEL (FPS) | WATER SURFACE ELEV. AT UPSTREAM FACE OF STRUCTURE (FT) | VELOCITY IN DOWNSTREAM CHANNEL (FPS) | WATERWAY AREA AT DOWNSTREAM FACE (SF) | CHANGE IN WATER SURFACE ELEVATION UPSTREAM OF PROPOSED STRUCTURE (FT) |
| 50 - YEAR | 850 | 716.13 | 5.06 | 715.96 | 4.19 | 212 | -0.17 |
| 100 - YEAR | 950 | 716.37 | 5.47 | 716.20 | 4.55 | 217 | -0.17 |
| MAXIMUM BRIDGE AREA BELOW LOW CHORD IS 224 SQUARE FEET | | | | | | | |

THE DRAINAGE AREA CONTRIBUTORY TO THIS CROSSING IS 23 SQUARE MILES.

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 ENVIRONMENT, GREAT LAKES, AND ENERGY.

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |

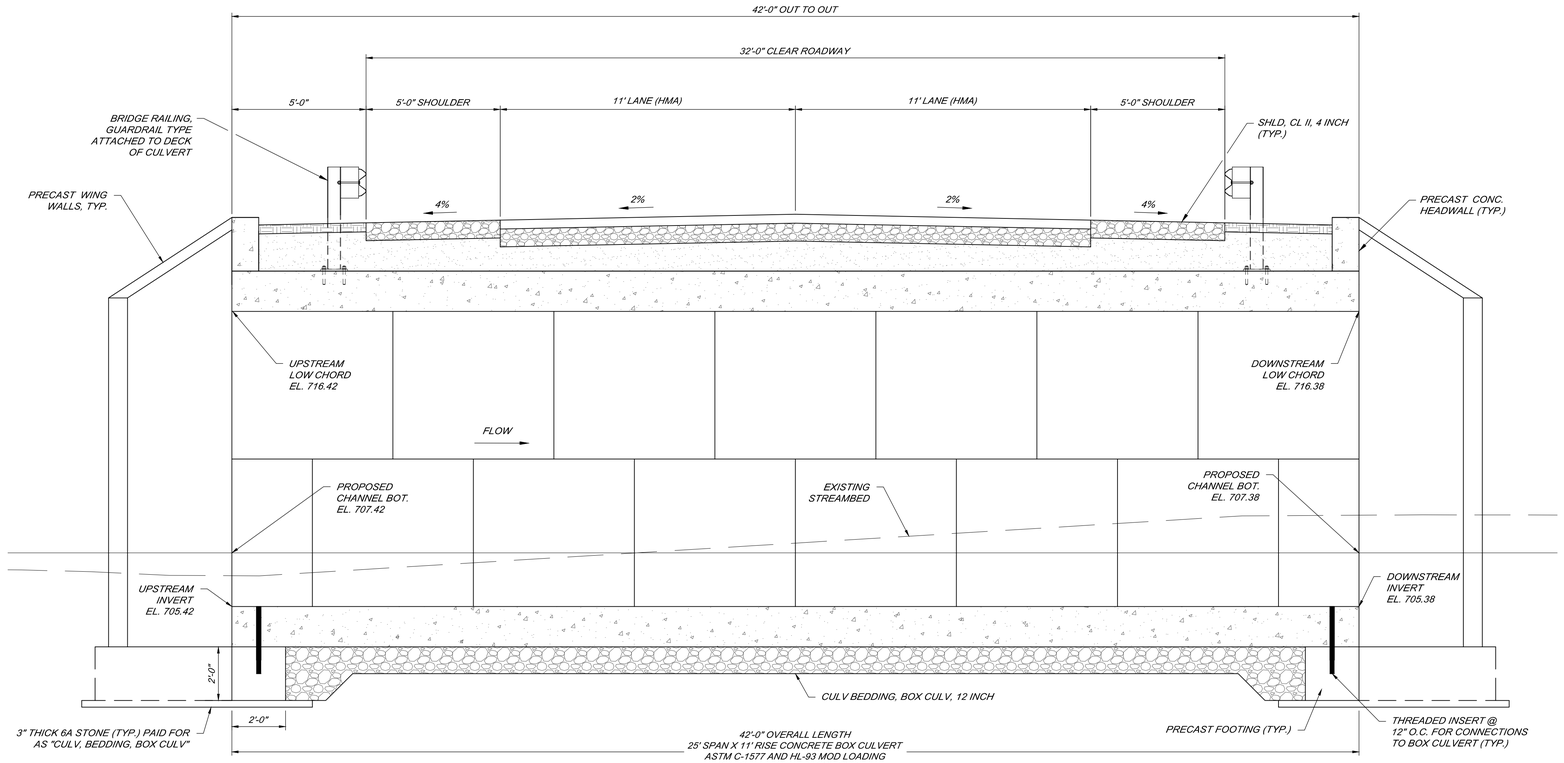


**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
**TUSCOLA COUNTY, MICHIGAN**

# GENERAL PLAN OF STRUCTURE
# STRUCTURE NO. 10631

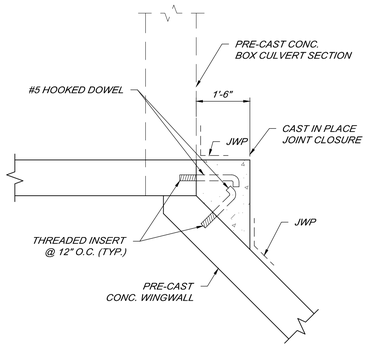
SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607 Tel.
989-754-4717 Fax.
989-754-4440
www.SpicerGroup.com

| | | | |
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | SHEET 11 OF 19 | DB 11 | |
| DATE DECEMBER, 2024 | FILE NO. | | |
| SCALE AS SHOWN | DB-1242-11 | | |




## TYPICAL CROSS SECTION

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




## CONNECTION DETAIL

NOT TO SCALE

* JOINT CLOSURE POUR INCLUDED IN CULV, PRECAST CONC BOX, 25 FOOT BY 11 FOOT

### NOTES:

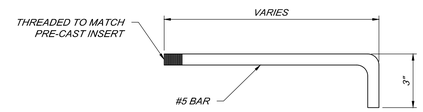
THE DESIGN OF THIS STRUCTURE IS BASED ON 1.2 TIMES THE CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATION HL-93 LOADING WITH THE EXCEPTION THAT THE DESIGN TAMDEM PORTION OF THE HL-93 LOAD DEFINITION SHALL BE REPLACED BY A SINGLE 60 KIP AXLE LOAD BEFORE APPLICATION OF THIS 1.2 FACTOR. THE RESULTING LOAD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

GEOTEXTILE LINER SHALL BE PLACED ON ALL SLOPES PRIOR TO PLACING RIPRAP. PAYMENT FOR GEOTEXTILE LINER SHALL BE INCLUDED IN THE PAYMENT FOR RIPRAP.

DE-WATERING OF FOOTING AREA SHALL BE DONE IN A MANNER ACCEPTABLE TO THE ENGINEER (PUMPS, WELL POINTS, ETC), AND IS INCLUDED IN CULVERT PAY ITEM. WATER PUMPED FROM COFFERDAMS SHALL BE DISCHARGED INTO A GEOTEXTILE FILTER BAG.

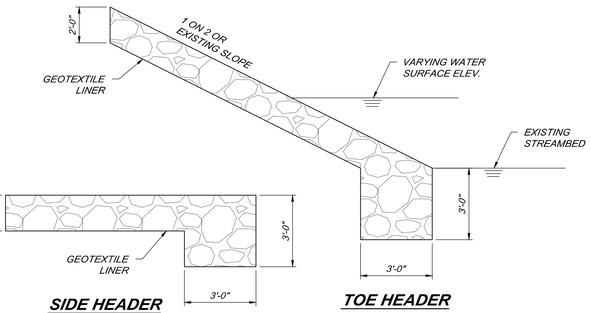
THE RIPRAP QUANTITY IS BASED ON THE LATERAL DIMENSIONS OF THE AREA TO BE PROTECTED, REGARDLESS OF THE NUMBER OF LAYERS REQUIRED. THE ESTIMATED WEIGHT OF RIPRAP IS 27 TONS.

FOR DETAILS OF SLOPE PROTECTION, SEE STANDARD PLAN R-100 SERIES.




## HOOKED DOWEL DETAIL

NOT TO SCALE




## SIDE HEADER

## TOE HEADER

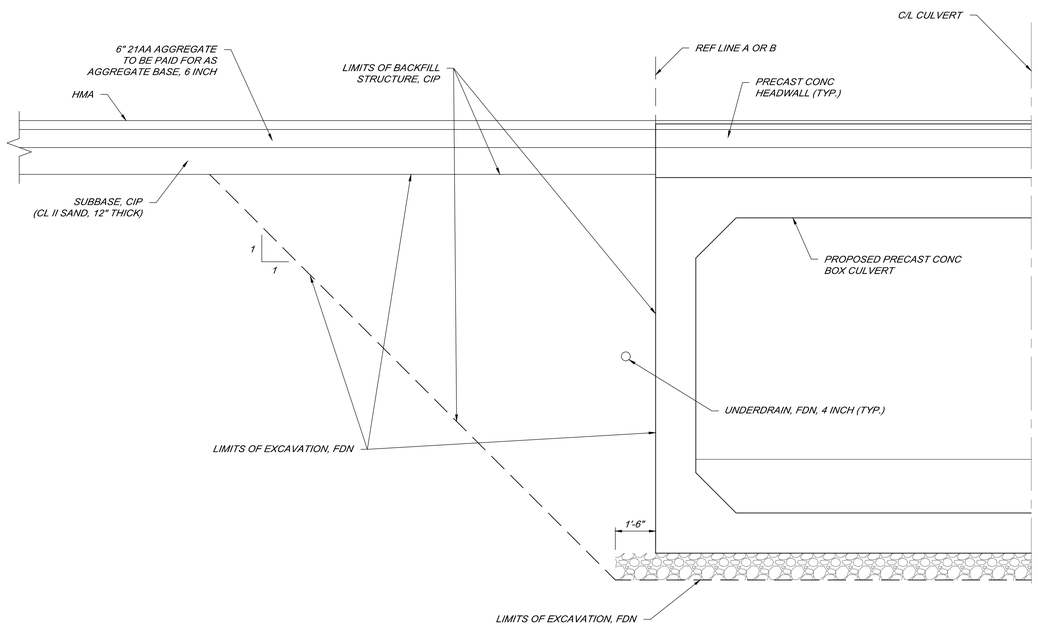
## RIPRAP HEADER DETAILS

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

TOP OF RIPRAP MUST BE AT OR BELOW EXISTING STREAMBED / SLOPE ELEVATION.

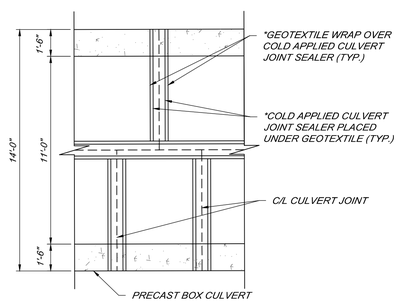
AN APPROPRIATE METHOD OF WATER DIVERSION FOR PLACING RIPRAP SHALL BE PROPOSED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. IF WATER IS SHALLOW (LESS THAN TWO FEET), TEMPORARY CONCRETE BARRIER OR SANDBAGS MAY BE USED TO DIVERT FLOW.

THE RIPRAP SCHEME SHOWN IS A MINIMUM REQUIREMENT FOR SCOUR.




## TYPICAL CROSS SECTION

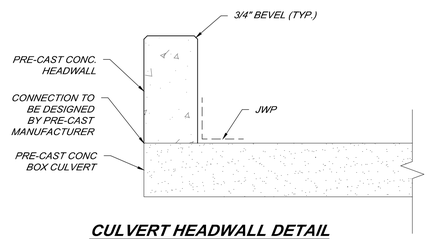
SCALE: 3/8" = 1'-0"




## JOINT WATERPROOFING DETAIL

NOT TO SCALE

(TYPICAL ELEVATION AT CULVERT JOINT)




## CULVERT HEADWALL DETAIL

NOT TO SCALE

* HEADWALL INCLUDED IN CULV, PRECAST CONC BOX, 25 FOOT BY 11 FOOT

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |



**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
**TUSCOLA COUNTY, MICHIGAN**

# GENERAL PLAN OF STRUCTURE
# STRUCTURE NO. 10631

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989-754-4717 Fax.
989-754-4440
www.SpicerGroup.com

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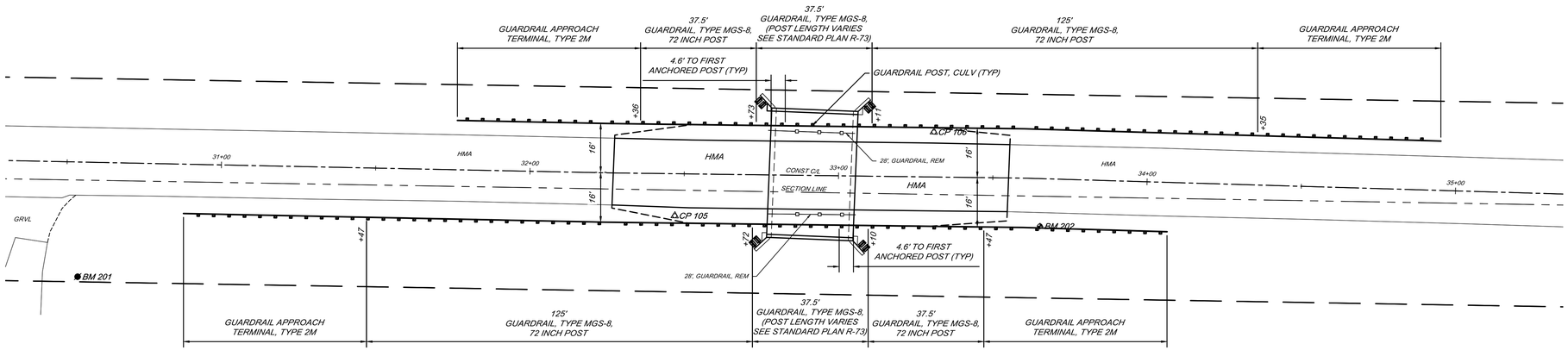
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | SHEET 12 OF 19 | DB 12 | |
| DATE FEBRUARY, 2025 | FILE NO. | | |
| SCALE AS SHOWN | DB-1242-12 | | |

N

CP 106 - EL. 719.88
STA 33+30.69 14.59' L
SET 1/2" X 18" ROD & CAP 40'
± EAST OF EAST CROSSING
OF BARNES ROAD OVER
PERRY CREEK, 20' ± NORTH
OF CL BARNES ROAD.
N: 644827.299 E: 13335120.653'

SECTION 18
T10N, R8E
MILLINGTON TOWNSHIP
TUSCOLA COUNTY, MICHIGAN

## PERRY CREEK




## PERRY CREEK

SECTION 19
T10N, R8E
MILLINGTON TOWNSHIP
TUSCOLA COUNTY, MICHIGAN

BM 201 - EL. 719.77
STA 30+54.11 37.33' R
GEAR SPIKE IN NORTH FACE
POWER POLE 40' ± SOUTH OF CL
BARNES ROAD AT HOUSE #8825.
N: 644769.262 E: 13334945.305'

CP 105 - EL. 719.15
STA 32+46.86 13.98' R
SET 1/2" X 18" ROD & CAP 45'
± WEST OF MIDDLE
CROSSING OF BARNES ROAD
OVER PERRY CREEK, 20' ±
SOUTH OF CL BARNES ROAD.
N: 644796.801 E: 13335037.820'

BM 202 - EL. 722.30
STA 33+65.72 15.42' R
SET GEAR SPIKE IN NORTH
FACE OF 30" ELM 66' ± EAST OF
EAST CROSSING OF BARNES
ROAD OVER PERRY CREEK, 18'
± SOUTH OF CL BARNES ROAD.
N: 644798.163 E: 13335156.203'

CONSTRUCTION QUANTITIES - THIS SHEET (STR 10632)

| | | |
|---|---|---|
| 56 | Ft | Guardrail, Rem |
| 4 | Ea | Guardrail Approach Terminal, Type 2M |
| 8 | Ea | Guardrail Post, Culv |
| 400 | Ft | Guardrail, Type MSG-8, 72 inch Post |

0 5 10 20 40
SCALE: 1" =20'-0"

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREON IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

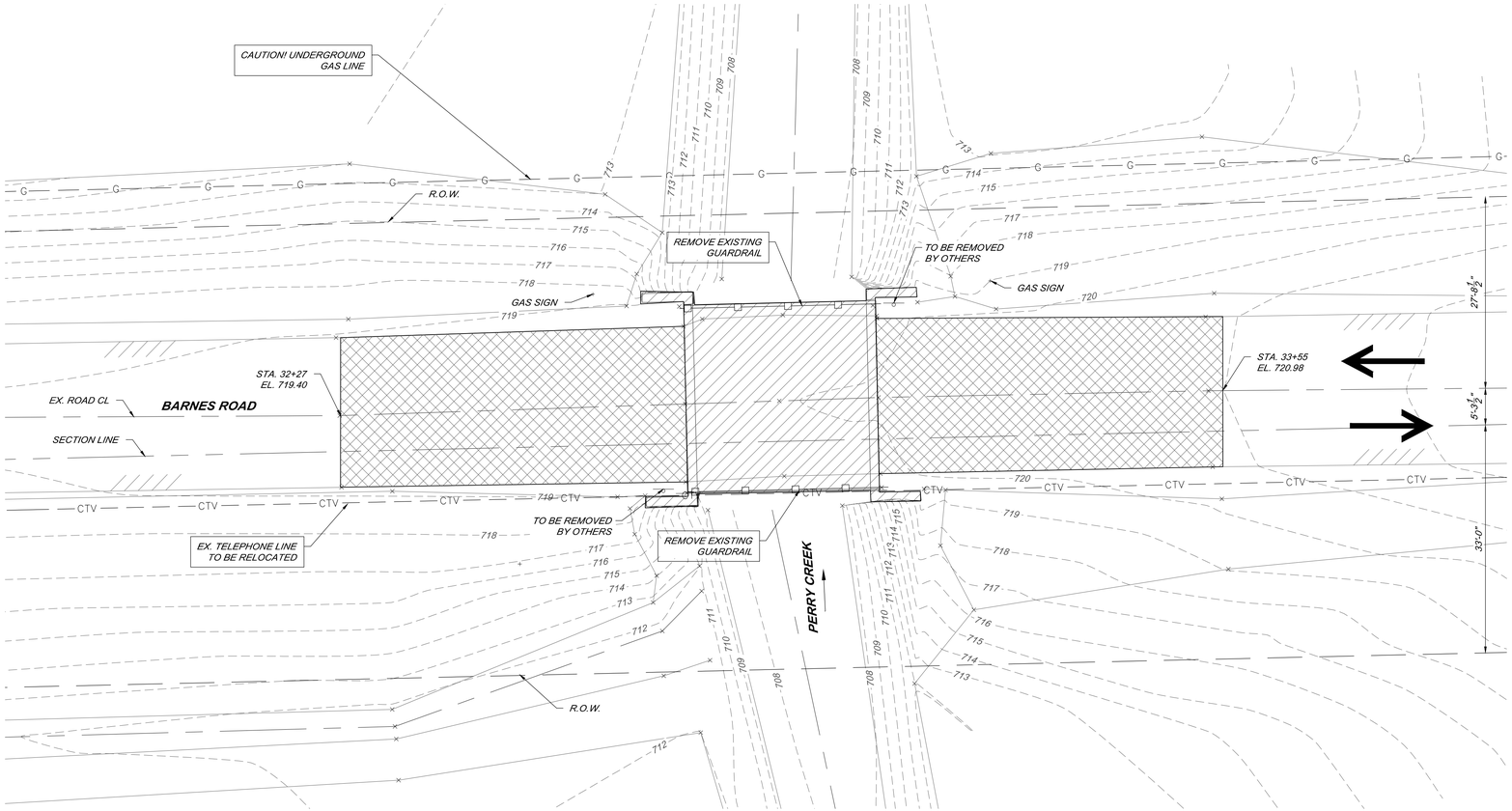
BARNES RD BRIDGES
BRIDGE REPLACEMENTS
TUSCOLA COUNTY, MICHIGAN

# GUARDRAIL DETAILS
# STRUCTURE NO. 10632


SAGINAW OFFICE
230 S. Washington Ave. Saginaw, MI 48607 Tel. 989-754-4717 Fax. 989-754-4440
www.SpicerGroup.com

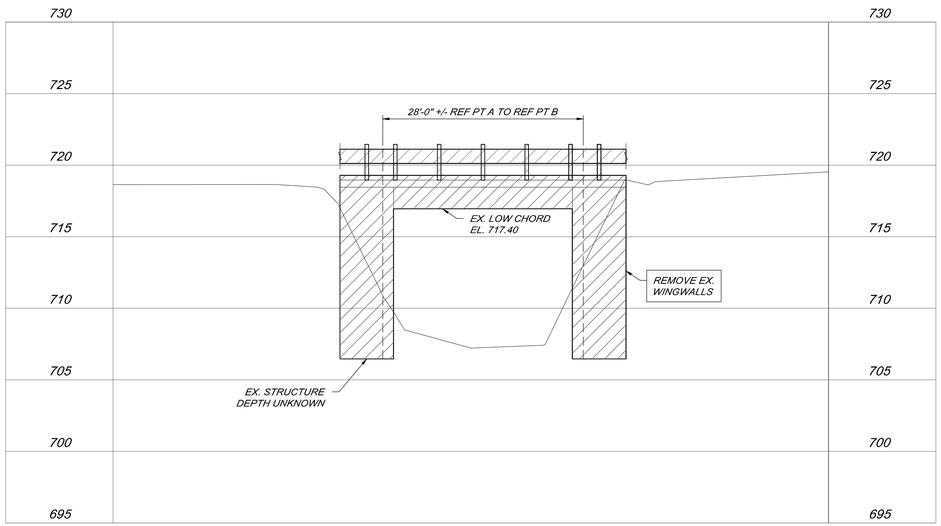

| | | | |
|---|---|---|---|
| DE. BY: RVR | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: RVR | APP. BY: DPZ | 132175SG2022 | |
| STDS. | | SHEET 13 OF 19 | DB 13 |
| DATE DECEMBER, 2024 | | FILE NO. | |
| SCALE 1" = 20' | | DB-1242-13 | |

ACAD FILE:
PG.
F.B.
RET.
PLOTTING SCALE:




## REMOVAL PLAN VIEW

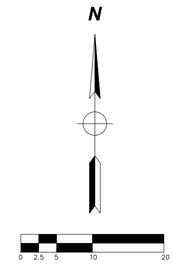
SCALE: 1" = 10'




## REMOVAL ELEVATION VIEW

H SCALE: 1" = 10'-0"
V SCALE: 1" = 5'-0"

NOTE: AS BUILT INFORMATION IS NOT AVAILABLE FOR THIS STRUCTURE. EXTENT OF EXISTING FOUNDATION IS UNKNOWN. IF PILES ARE DISCOVERED FOR THE FOUNDATION, THEY ARE TO BE CUT OFF 1' BELOW BOTTOM OF CULVERT OR FOOTING AND LEFT IN PLACE. CUTTING OF PILES TO BE INCLUDED IN PAY ITEMS "STRUCTURES, REM (STR 10632)".




SCALE: 1" = 10'-0"

PROPOSED WORK

COMPLETE REMOVAL OF EXISTING STEEL I-BEAM, AND SUBSTRUCTURE FOR BARNES RD. BRIDGE AS SHOWN.

HMA SURFACE REMOVAL

NOTE: ALL I-BEAMS ARE TO BE SALVAGED AND DELIVERED TO THE TUSCOLA COUNTY ROAD COMMISSION VASSAR GARAGE. ADDRESS IS 430 KITELINGER ROAD, VASSAR. THIS IS INCLUDED IN THE PAY ITEM "STRUCTURES, REM (STR 10632)".

REMOVAL QUANTITIES 10632 - THIS SHEET

| | | |
|---|---|---|
| 1 | LSUM | Structures, Rem (STR 10632) |
| 247 | Syd | HMA Surface, Rem |

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |



**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
**TUSCOLA COUNTY, MICHIGAN**

# REMOVAL SHEET
# STRUCTURE NO. 10632

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Tel. 989-754-4717
Fax. 989-754-4440
www.SpicerGroup.com

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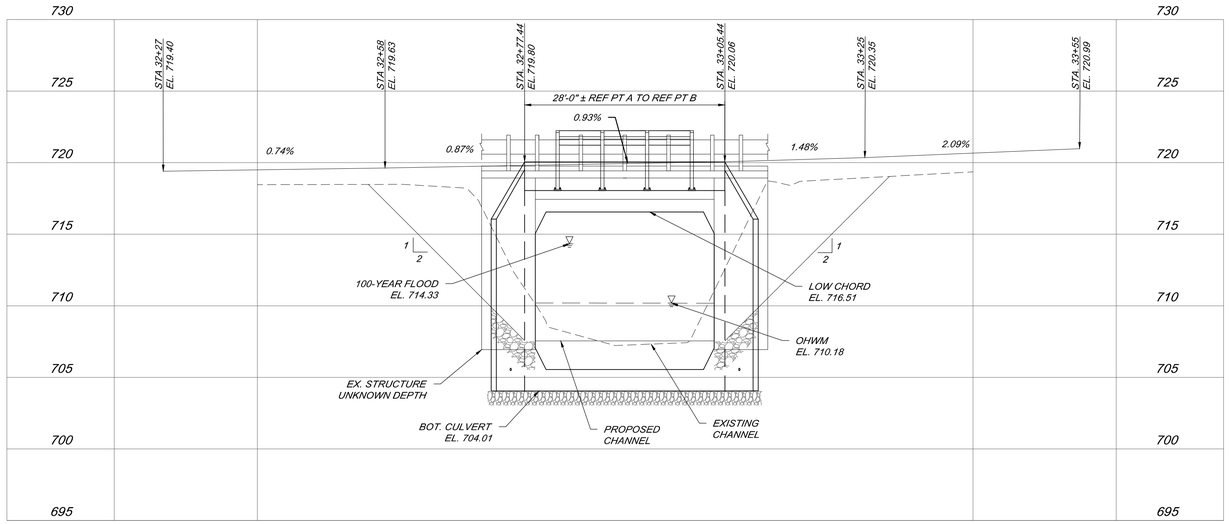
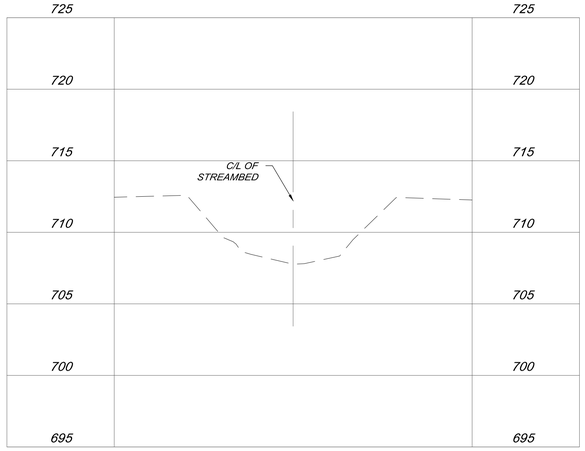
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | SHEET 14 OF 19 | DB 14 | |
| DATE FEBRUARY, 2025 | FILE NO. | | |
| SCALE AS SHOWN | DB-1242-14 | | |

N



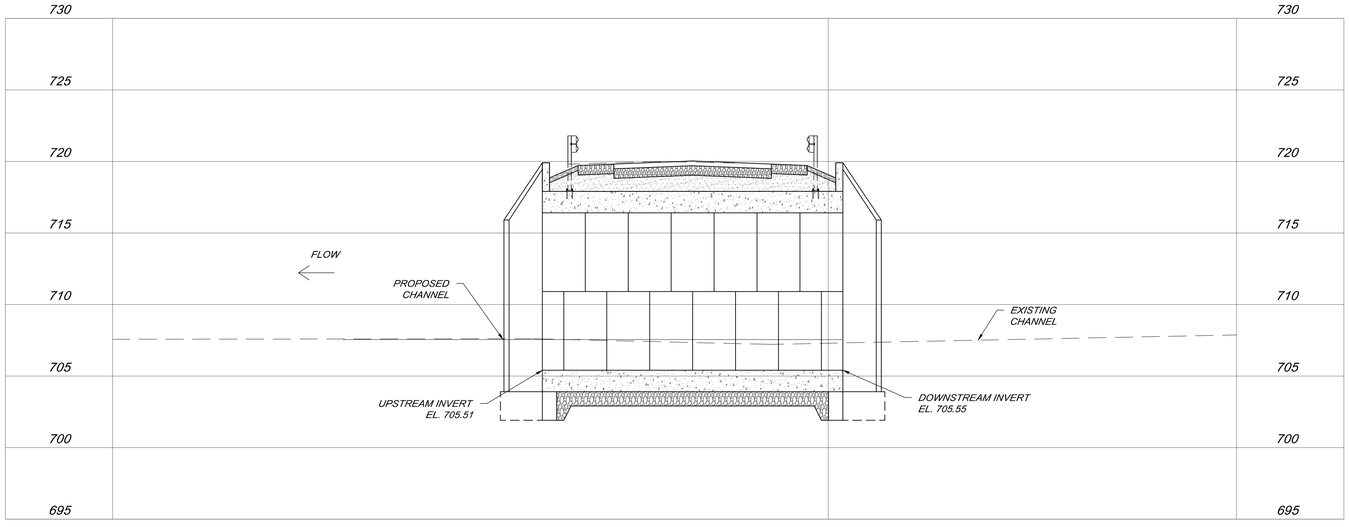

## PROPOSED STRUCTURE PROFILE

H SCALE: 1" = 10'-0"
V SCALE: 1" = 5'-0"



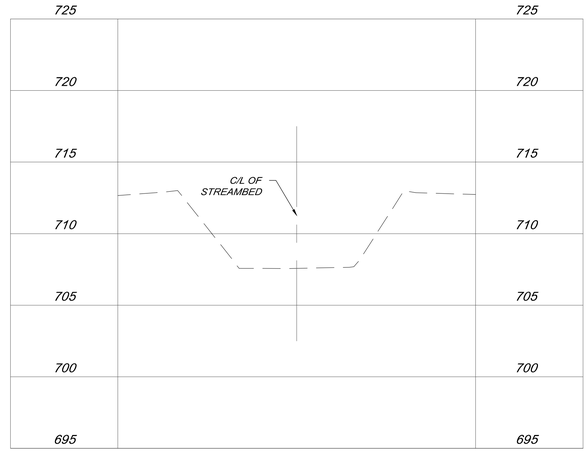

## 50' UPSTREAM PROFILE

H SCALE: 1" = 10'-0"
V SCALE: 1" = 5'-0"




## STREAM PROFILE

H SCALE: 1" = 10'-0"
V SCALE: 1" = 5'-0"




## 50' DOWNSTREAM PROFILE

H SCALE: 1" = 10'-0"
V SCALE: 1" = 5'-0"

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |



**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
**TUSCOLA COUNTY, MICHIGAN**

# STREAM PROFILES
# STRUCTURE NO. 10632

SAGINAW OFFICE
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Saginaw, MI 48607
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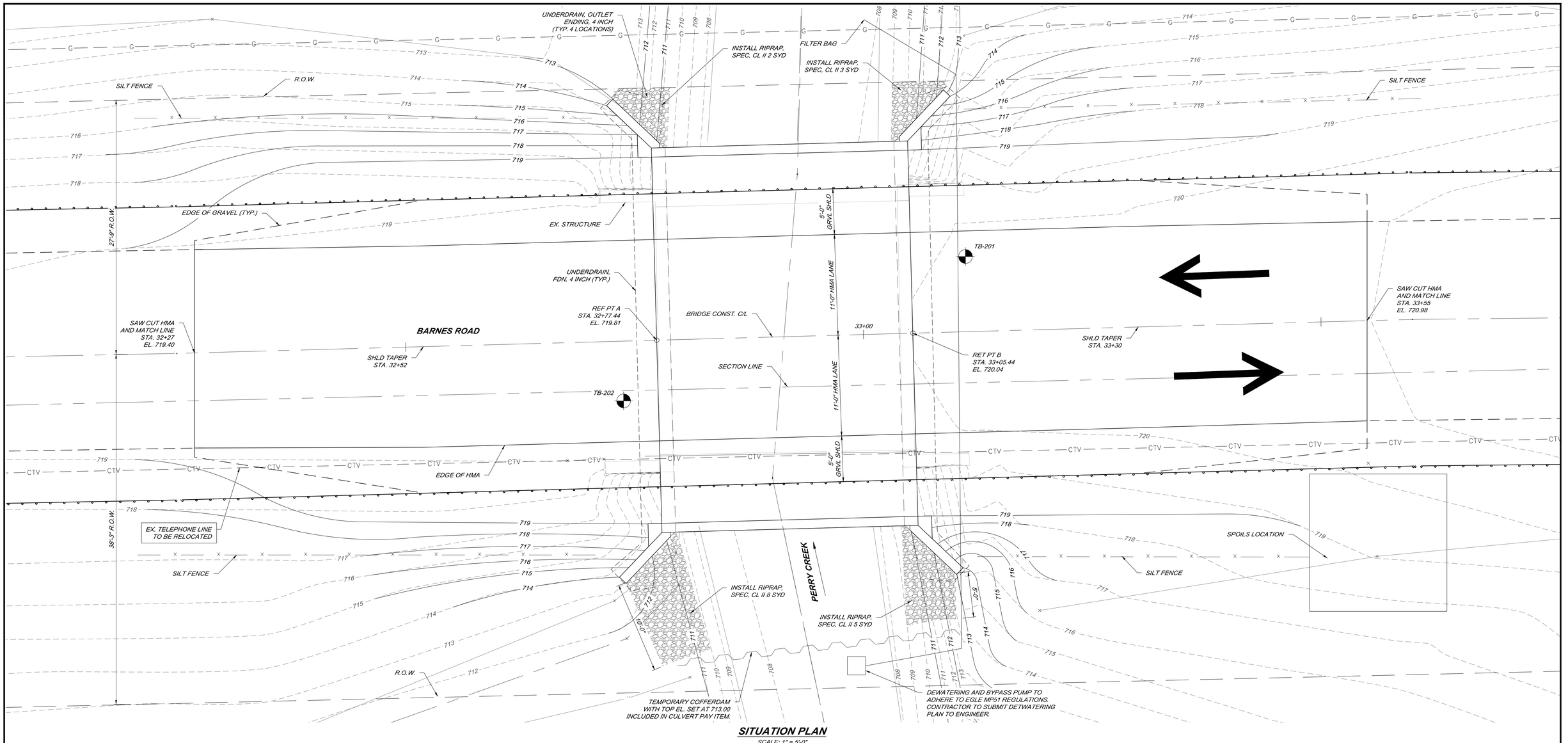
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | SHEET 15 OF 19 | DB 15 | |
| DATE FEBRUARY, 2025 | FILE NO. | | |
| SCALE AS SHOWN | DB-1242-15 | | |




## SITUATION PLAN

SCALE: 1" = 5'-0"

N

0 1.25 2.5 5 10

SCALE: 1" = 5'-0"

CUT AND FILL VOLUMES BELOW OHWM

| | AVERAGE WIDTH (FT) | AVERAGE DEPTH (FT) | AVERAGE LENGTH (FT) | VOLUME (CFT) | VOLUME (CYD) |
|---|---|---|---|---|---|
| CULVERT (FILL) | 10.69 | 3.55 | 42.00 | 1594 | 59 |
| BACKFILL (FILL) | 29.94 | 4.23 | 42.00 | 5319 | 197 |
| RIPRAP (FILL) | 11.00 | 2.00 | 17.50 | 385 | 14 |
| SHEETPILE (FILL) | 0.03 | 10.00 | 32.00 | 10 | 1 |
| SUBTOTAL (FILL) | | | | 7308 | 271 |
| CUT | 44.64 | 4.15 | 42.00 | 7781 | 288 |
| | | NET VOLUME = 17 CYD CUT | | | |

CUT AND FILL VOLUMES BETWEEN FLOODPLAIN AND OHWM

| | AVERAGE WIDTH (FT) | AVERAGE DEPTH (FT) | AVERAGE LENGTH (FT) | VOLUME (CFT) | VOLUME (CYD) |
|---|---|---|---|---|---|
| CULVERT (FILL) | 3.00 | 3.17 | 42.00 | 399 | 15 |
| BACKFILL (FILL) | 19.70 | 4.75 | 42.00 | 3930 | 145 |
| RIPRAP (FILL) | 11.00 | 1.00 | 17.50 | 193 | 7 |
| SHEETPILE (FILL) | 0.03 | 1.06 | 32.00 | 1 | 1 |
| SUBTOTAL (FILL) | | | | 4523 | 168 |
| CUT | 31.22 | 3.50 | 42.00 | 4590 | 170 |
| | | NET VOLUME = 2 CYD CUT | | | |

CONSTRUCTION QUANTITIES 10631 - THIS SHEET

| | | |
|---|---|---|
| 2 | Sta | Machine, Grading, Modified |
| 200 | Ft | Erosion Control, Silt Fence |
| 1 | Ea | Erosion Control, Filter Bag |
| 20 | Syd | Riprap, Spec, CL II |
| 79 | Ton | HMA, 4 EL |
| 172 | Cyd | Subbase, CIP |
| 453 | Syd | Aggregate Base, 6 inch |
| 129 | Syd | Shld, CL II, 4 inch |
| 480 | Cyd | Backfill, Structure, CIP |
| 675 | Cyd | Excavation, Fdn |
| 56 | Cyd | Culv Bedding, Box Culv |
| 128 | Ft | Underdrain, Fdn, 4 inch |
| 40 | Ft | Underdrain Outlet, 4 inch |
| 4 | Ea | Underdrain, Outlet Ending, 4 inch |
| 379 | Sft | Joint Waterproofing |
| 42 | Ft | Culv, Precast Conc Box, 25 foot by 11 foot |
| 750 | Sft | False Decking |

**NOTES:**

THE WORK COVERED BY THESE PLANS INCLUDES REMOVAL OF THE EXISTING BRIDGE, CONSTRUCTION OF THE PROPOSED BRIDGE, PLACING SLOPE AND SCOUR PROTECTION TO THE LIMITS SHOWN AND ROADWAY APPROACH RECONSTRUCTION.

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.

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

MEASURES SHALL BE TAKEN TO PREVENT DEBRIS FROM FALLING FROM THE STRUCTURE. IF DEBRIS FALLS INTO THE WATERWAY, IT SHALL BE REMOVED WITHIN 24 HOURS. SINCE DISTURBANCE OF THE WATERWAY MAY BE AS HARMFUL AS THE DEBRIS ITSELF, THE PREVENTATIVE MEASURES MUST BE EFFECTIVE.

FALSE DECKING INCLUDES THE AREA BOUNDED BY REFERENCE LINES A AND B AND OUTSIDE FLANGE FASCIAS OF FASCIA BEAMS. THE ESTIMATED AREA IS 750 SQUARE FEET DURING REMOVAL.

DETOUR TRAFFIC OVER OTHER EXISTING ROADS.

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |

THE WORK REPRESENTED BY THIS DRAWING WAS DESIGNED BY THE ENGINEER FOR THIS SPECIFIC APPLICATION AND SPECIFIC LOCATION DESCRIBED HEREON IN ACCORDANCE WITH THE CONDITIONS PREVALENT AT THE TIME THE DESIGN WAS DONE. THE ENGINEER DOES NOT GUARANTEE AND WILL NOT BE LIABLE FOR ANY OTHER LOCATION, CONDITION, DESIGN OR PURPOSE.

**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
**TUSCOLA COUNTY, MICHIGAN**

# PROPOSED GENERAL PLAN OF SITE STRUCTURE NO. 10632


SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607
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Fax. 989-754-4440
www.SpicerGroup.com


DE. BY: GTF CH. BY: DPZ
DR. BY: GTF APP. BY: RDK

PROJECT NO. 132175SG2022

STDS.

SHEET 16 OF 19

DB 16

DATE FEBRUARY, 2025
SCALE AS SHOWN

FILE NO. DB-1242-16

## LOG OF SOIL BORING NO.: TB-201

SHEET 1 OF 3

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10632
**Project Location:** East Abutment, Tuscola County, Michigan — **Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc. — **Date:** 10/20/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 720 | | | | | | | | 0 | | | | | | |
| | | | | | | | 719.4 PAVEMENT: ASPHALT (7") 0.6 | | | | | | | |
| | SS-1 | 18 | 4 4 5 | 9 | | | FILL: Brown to Dark Brown SAND with Trace to Little Silt and Trace of Gravel | | | | | | | |
| 715 | SS-2 | 18 | 2 2 3 | 5 | | | | 5 | | | | | | |
| | | | | | | | 714.0 6.0 | | | | | | | |
| | SS-3 | 18 | 2 2 2 | 4 | | | FILL: Dark Brown CLAYEY SAND with Little Silt and Trace of Gravel | | | | | | | |
| 710 | SS-4 | 18 | 3 5 2 | 7 | | | | 10 | | | | | | |
| | | | | | | | 708.0 12.0 | | | | | | | |
| | | | | | | | *DOWNSTREAM BOT. CULVERT EL. 704.01* | | | | | | | |
| 705 | SS-5 | 18 | 8 12 19 | 31 | | | Medium Dense to Dense Gray SANDY SILT with Trace of Clay and Gravel | 15 | | | | | | |
| 700 | SS-6 | 18 | 7 12 18 | 30 | | | | 20 | | | | | | |
| | | | | | | | 698.0 22.0 | | | | | | | |
| 695 | SS-7 | 18 | 10 11 14 | 25 | | | Medium Dense Gray SILTY SAND with Trace of Clay and Gravel | 25 | | | | | | |

Stratification lines represent approximate boundaries; In-situ, transition may be gradual.

**Total Drilling Depth:** 75 ft
**Drilling Contractor:** Schmidt Drilling Co.
**Driller:** M. Schmidt
**Drilling Method:** CME 75 Truck Mounted Drilling Rig, Using 2-1/4-inch I.D. Hollow Stem Auger to 20 feet and 3-7/8 in. Tri -Cone Rotary Wash to End of Boring.
**Backfill Procedure:** Borehole backfilled with excavated materials and pavement repaired with asphalt cold patch.

**Groundwater Levels:**
**At Time of Drilling:** 14 ft
**End of Drilling:** Not Obtained
**Notes:** No groundwater measurement upon completion due to use of rotary wash drilling method.

**Logged By:** R. Muthala **Reviewed By:** D. Yip

**Figure No.: 3**

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD-2012.GDT - 10/9/23 01:29 - O:\MY DRIVE\GEOTRAN_MI\2022_MI\22-03001G_TUSCOLA BRIDGES\22-03001G-10_QA.GPJ

## LOG OF SOIL BORING NO.: TB-201

SHEET 2 OF 3

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10632
**Project Location:** East Abutment, Tuscola County, Michigan — **Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc. — **Date:** 10/20/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 690 | SS-8 | 18 | 6 10 13 | 23 | | | Medium Dense Gray SILTY SAND with Trace of Clay and Gravel | 30 | | | | | | |
| | | | | | | | 688.0 32.0 | | | | | | | |
| 685 | SS-9 | 18 | 9 19 27 | 46 | >9000 | | Hard Gray SANDY CLAY with Trace to Little Silt and Trace of Gravel | 35 | | | | | | |
| 680 | SS-10 | 18 | 12 15 22 | 37 | >9000 | | | 40 | | | | | | |
| 675 | SS-11 | 18 | 10 10 16 | 26 | >9000 | | | 45 | | | | | | |
| 670 | SS-12 | 18 | 6 10 14 | 24 | >9000 | | | 50 | | | | | | |
| 665 | SS-13 | 18 | 5 6 10 | 16 | >9000 | | | 55 | | | | | | |
| | | | | | | | 663.0 57.0 | | | | | | | |
| 660 | SS-14 | 18 | 10 13 15 | 28 | | | Medium Dense to Dense Gray SILTY SAND with Trace of Gravel | 60 | | | | | | |

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD-2012.GDT - 10/9/23 01:29 - O:\MY DRIVE\GEOTRAN_MI\2022_MI\22-03001G_TUSCOLA BRIDGES\22-03001G-10_QA.GPJ

## LOG OF SOIL BORING NO.: TB-201

SHEET 3 OF 3

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10632
**Project Location:** East Abutment, Tuscola County, Michigan — **Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc. — **Date:** 10/20/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 655 | SS-15 | 18 | 12 17 26 | 43 | | | Medium Dense to Dense Gray SILTY SAND with Trace of Gravel | 65 | | | | | | |
| 650 | SS-16 | 18 | 11 16 22 | 38 | | | | 70 | | | | | | |
| 645 | SS-17 | 18 | 4 4 7 | 11 | | | 645.0 End of Boring at 75.0 ft. 75.0 | 75 | | | | | | |

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD-2012.GDT - 10/9/23 01:29 - O:\MY DRIVE\GEOTRAN_MI\2022_MI\22-03001G_TUSCOLA BRIDGES\22-03001G-10_QA.GPJ

*NOTES:*
*NUMBERS IN CIRCLES DENOTE NUMBER OF BLOWS REQUIRED TO DRIVE A 2" O.D. (1 1/2" I.D.) SPLIT SPOON SAMPLER 3 SUCCESSIVE 6" INCREMENTS USING A 140 LBS. HAMMER FALLING 30".*

12
14
15

*(WHERE THE SAMPLER IS DRIVEN DISTANCES OTHER THAN 18", THE DISTANCE IS SHOWN IN THE CIRCLE WITH THE NUMBER OF BLOWS IN THE FORM OF A FRACTION*

31 / 4" — *NUMBER OF BLOWS* / *DISTANCE DRIVEN*

*CONSISTENCY WAS DETERMINED BY INSPECTION OF SAMPLES AND SUBSTANTIATED BY SOILS RESISTANCE TO DRILLING TOOLS.*

*WATER LEVELS MAY BE INFLUENCED BY RESIDUAL BORING WATER.*

*THE SOIL BORING LOGS REPRESENT POINT INFORMATION. PRESENTATION OF THIS INFORMATION IN NO WAY IMPLIES THAT SUBSURFACE CONDITIONS ARE THE SAME AT LOCATIONS OTHER THAN THE EXACT LOCATION OF THE BORING.*

*SEE GENERAL PLAN OF STRICTURE SHEET FOR SOIL BORING LOCATIONS.*

## LOG OF SOIL BORING NO.: TB-202

SHEET 1 OF 3

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10632
**Project Location:** West Abutment, Tuscola County, Michigan — **Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc. — **Date:** 10/21/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 720 | | | | | | | | 0 | | | | | | |
| | | | | | | | 719.5 PAVEMENT: ASPHALT (6") 0.5 | | | | | | | |
| | SS-1 | 18 | 4 3 4 | 7 | | | FILL: Brown SAND with Trace to Little Silt and Gravel | | | | | | | |
| 715 | SS-2 | 18 | 5 6 5 | 11 | | | | 5 | | | | | | |
| | SS-3 | 18 | 1 3 2 | 5 | | | | | | | | | | |
| 710 | SS-4 | 18 | 1 2 9 | 11 | | | | 10 | | | | | | |
| | | | | | | | 708.0 12.0 | | | | | | | |
| | | | | | | | Very Dense Gray SILTY SAND with Little Clay and Trace of Gravel | | | | | | | |
| 705 | SS-5 | 18 | 5 25 30 | 55 | | | *UPSTREAM BOT. CULVERT EL. 704.05* | 15 | | | | | | |
| | | | | | | | 703.0 17.0 | | | | | | | |
| 700 | SS-6 | 18 | 7 11 11 | 22 | | | Medium Dense Gray SANDY SILT with Little Clay and Trace of Gravel | 20 | | | | | | |
| | | | | | | | 698.0 22.0 | | | | | | | |
| 695 | SS-7 | 18 | 4 7 8 | 15 | 9000 | | Hard Gray SANDY CLAY with Little Silt and Trace of Gravel | 25 | | | | | | |

Stratification lines represent approximate boundaries; In-situ, transition may be gradual.

**Total Drilling Depth:** 75 ft
**Drilling Contractor:** Schmidt Drilling Co.
**Driller:** M. Schmidt
**Drilling Method:** CME 75 Truck Mounted Drilling Rig, Using 2-1/4-inch I.D. Hollow Stem Auger to 20 feet and 3-7/8 in. Tri -Cone Rotary Wash to End of Boring.
**Backfill Procedure:** Borehole backfilled with excavated materials and pavement repaired with asphalt cold patch.

**Groundwater Levels:**
**At Time of Drilling:** 14 ft
**End of Drilling:** Not Obtained
**Notes:** No groundwater measurement upon completion due to use of rotary wash drilling method.

**Logged By:** R. Muthala **Reviewed By:** D. Yip

**Figure No.: 4**

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD-2012.GDT - 10/9/23 01:29 - O:\MY DRIVE\GEOTRAN_MI\2022_MI\22-03001G_TUSCOLA BRIDGES\22-03001G-10_QA.GPJ

## LOG OF SOIL BORING NO.: TB-202

SHEET 2 OF 3

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10632
**Project Location:** West Abutment, Tuscola County, Michigan — **Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc. — **Date:** 10/21/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 690 | SS-8 | 18 | 7 10 10 | 20 | >9000 | | Hard Gray SANDY CLAY with Little Silt and Trace of Gravel | 30 | | | | | | |
| 685 | SS-9 | 18 | 7 10 9 | 19 | 9000 | | | 35 | | | | | | |
| 680 | SS-10 | 18 | 4 6 8 | 14 | | | | 40 | | | | | | |
| | | | | | | | 678.0 42.0 | | | | | | | |
| 675 | SS-11 | 18 | 5 7 10 | 17 | | | Medium Dense to Dense Gray SILTY SAND with Trace of Gravel | 45 | | | | | | |
| 670 | SS-12 | 18 | 18 17 21 | 38 | | | | 50 | | | | | | |
| | | | | | | | 668.0 52.0 | | | | | | | |
| 665 | SS-13 | 18 | 18 16 13 | 29 | 9000 | | Hard Gray SANDY CLAY with Little Silt and Trace of Gravel | 55 | | | | | | |
| 660 | SS-14 | 18 | 8 11 17 | 28 | >9000 | | | 60 | | | | | | |
| | | | | | | | 658.0 62.0 | | | | | | | |

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD-2012.GDT - 10/9/23 01:29 - O:\MY DRIVE\GEOTRAN_MI\2022_MI\22-03001G_TUSCOLA BRIDGES\22-03001G-10_QA.GPJ

## LOG OF SOIL BORING NO.: TB-202

SHEET 3 OF 3

GeoTran Consultants, LLC

**Project Name:** Barnes Road over Perry Creek Bridge Replacement - STR 10632
**Project Location:** West Abutment, Tuscola County, Michigan — **Project Number:** 22-03001G-10
**Client:** Spicer Group, Inc. — **Date:** 10/21/2022

| SAMPLE DATA | | | | | | PROFILE DESCRIPTION | | LABORATORY DATA | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ELEV. (ft) | SAMPLE TYPE/ NUMBER | REC. (in.) | BLOWS/ 6 INCHES | STD. PEN. RESIST. N-VALUE | POCKET PEN. (psf) | GRAPHIC LOG | GROUND SURFACE ELEVATION: 720.0 ft ± | DEPTH (ft) | MOIST. CONT. (%) | DRY DENSITY (pcf) | UNCONF. COMP. ST. (psf) | ATTERBERG LIMITS: LIQUID LIMIT | ATTERBERG LIMITS: PLASTICITY INDEX | Loss on Ignition (%) |
| 655 | SS-15 | 18 | 17 23 24 | 47 | | | Medium Dense to Dense Gray SAND with Trace of Silt and Gravel | 65 | | | | | | |
| 650 | SS-16 | 18 | 12 12 14 | 26 | | | | 70 | | | | | | |
| 645 | SS-17 | 18 | 5 16 17 | 33 | | | 645.0 End of Boring at 75.0 ft. 75.0 | 75 | | | | | | |

GEOTRAN LOG OF SOIL BORING - GEOTRAN STD-2012.GDT - 10/9/23 01:29 - O:\MY DRIVE\GEOTRAN_MI\2022_MI\22-03001G_TUSCOLA BRIDGES\22-03001G-10_QA.GPJ

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |

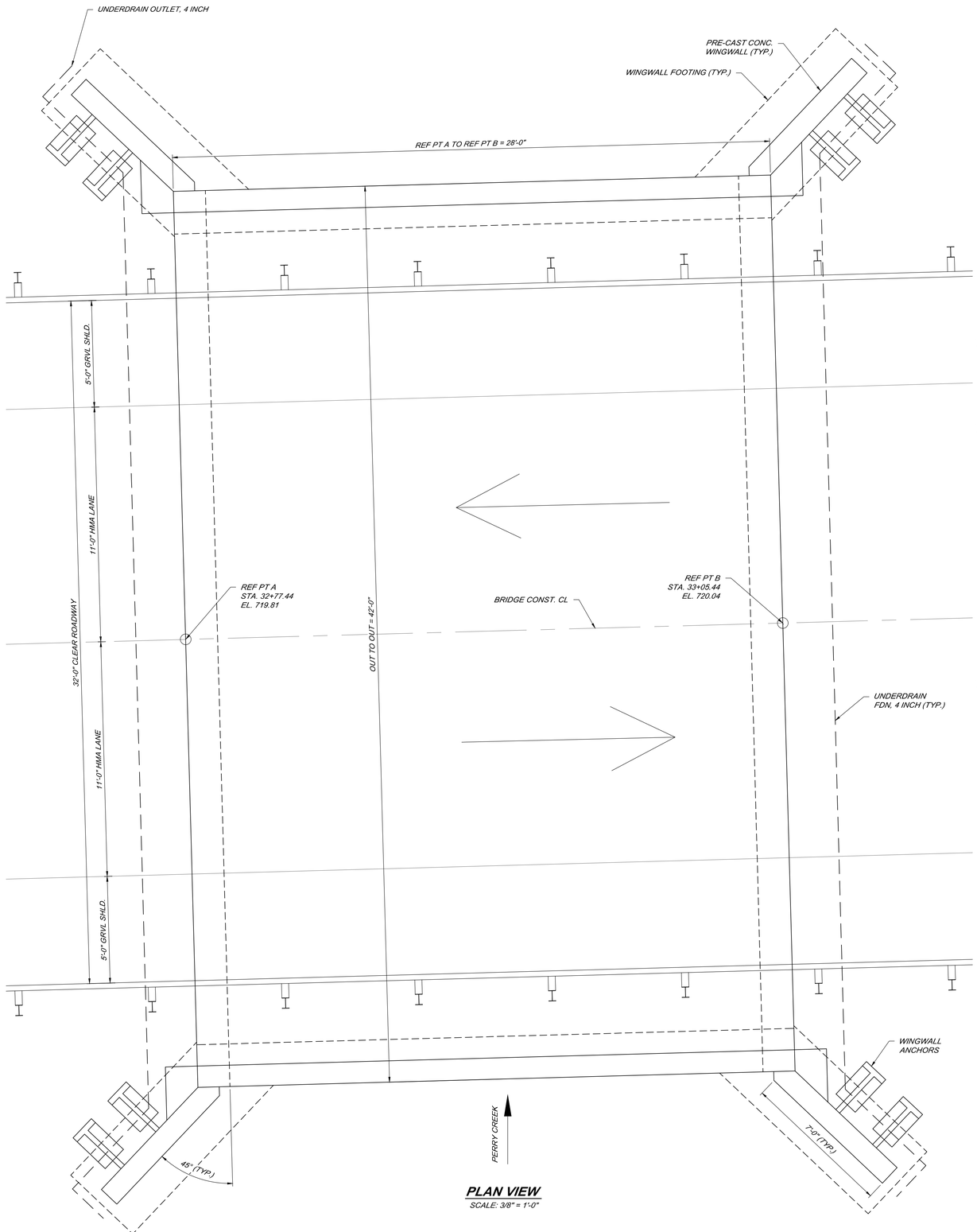


**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
**TUSCOLA COUNTY, MICHIGAN**

**LOG OF BORINGS**
**STRUCTURE NO. 10632**

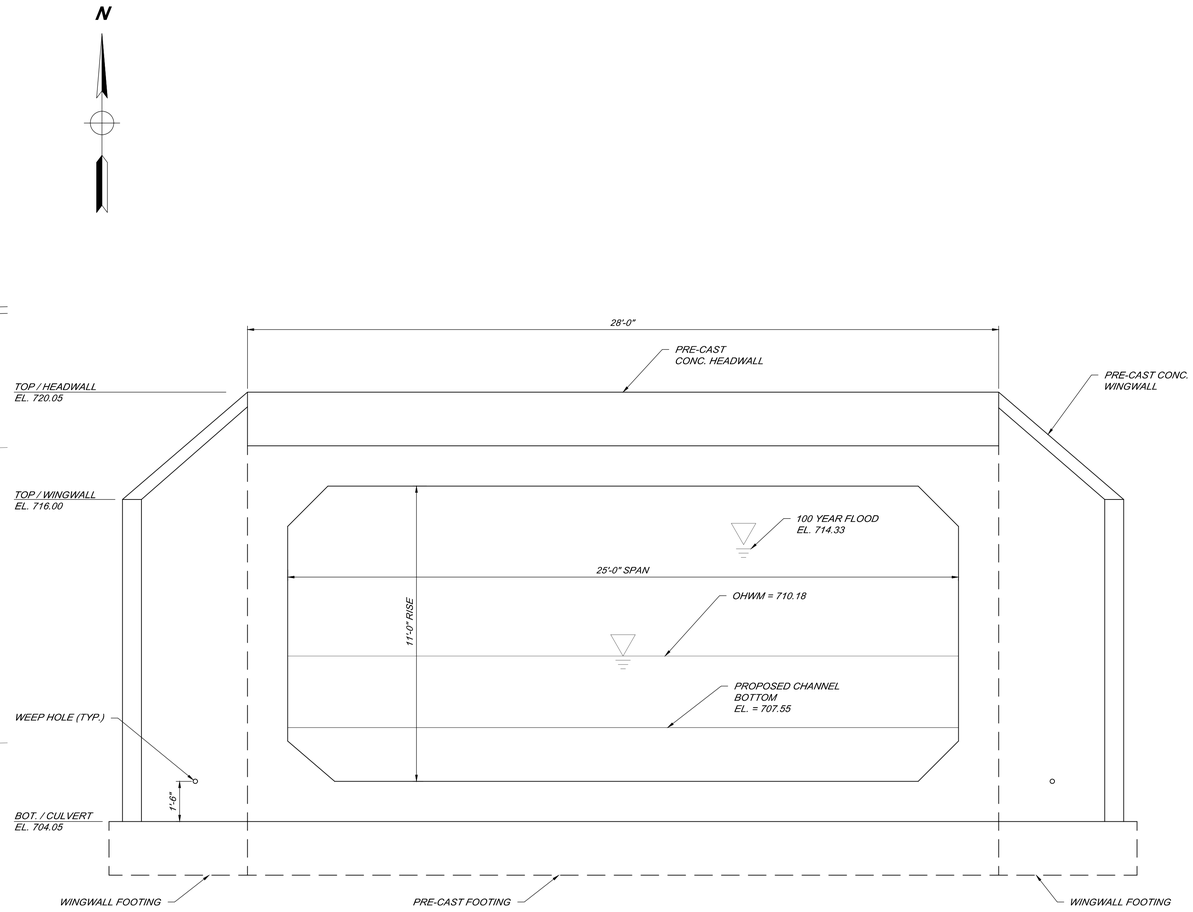
SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607 Tel.
989-754-4177 Fax.
989-754-4440
www.SpicerGroup.com

| | | | |
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | SHEET 17 OF 19 | DB 17 | |
| DATE OCTOBER, 2024 | FILE NO. | | |
| SCALE AS SHOWN | DB-1242-17 | | |




## PLAN VIEW

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




## UPSTREAM ELEVATION

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

| SUMMARY OF HYDRAULIC ANALYSIS | | | | | | | |
|---|---|---|---|---|---|---|---|
| EXISTING | | | | PROPOSED | | | |
| FLOOD DATA | DISCHARGE (CFS) | WATER SURFACE ELEV. AT UPSTREAM FACE OF STRUCTURE (FT) | VELOCITY IN DOWNSTREAM CHANNEL (FPS) | WATER SURFACE ELEV. AT UPSTREAM FACE OF STRUCTURE (FT) | VELOCITY IN DOWNSTREAM CHANNEL (FPS) | WATERWAY AREA AT DOWNSTREAM FACE (SF) | CHANGE IN WATER SURFACE ELEVATION UPSTREAM OF PROPOSED STRUCTURE (FT) |
| 50 - YEAR | 850 | 714.33 | 5.45 | 714.14 | 5.3 | 160 | -0.19 |
| 100 - YEAR | 950 | 714.49 | 5.94 | 714.33 | 5.79 | 163 | -0.16 |
| MAXIMUM BRIDGE AREA BELOW LOW CHORD IS 224 SQUARE FEET | | | | | | | |

THE DRAINAGE AREA CONTRIBUTORY TO THIS CROSSING IS 23 SQUARE MILES.

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 ENVIRONMENT, GREAT LAKES, AND ENERGY.

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |

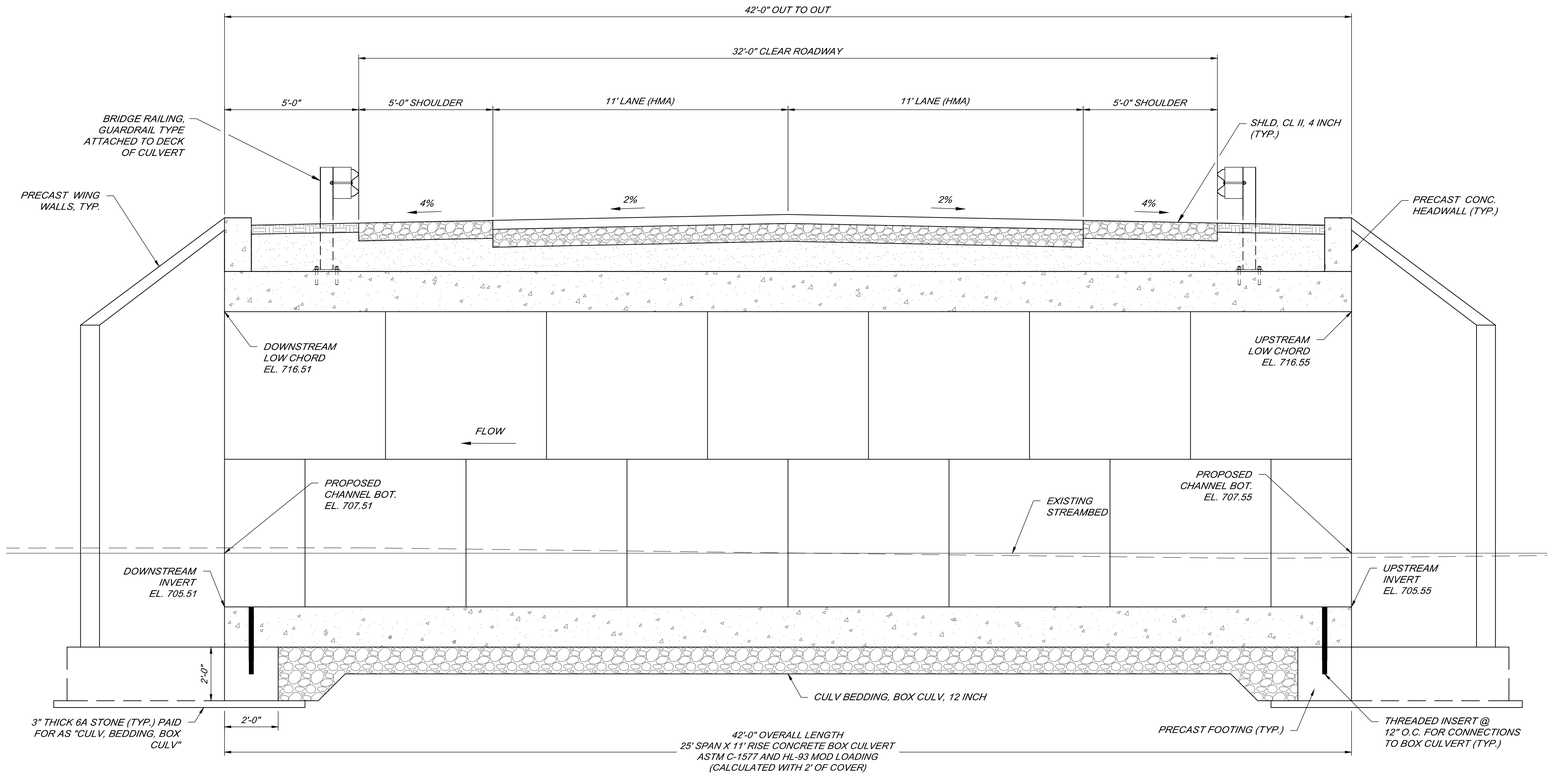


**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
**TUSCOLA COUNTY, MICHIGAN**

# GENERAL PLAN OF STRUCTURE
# STRUCTURE NO. 10632

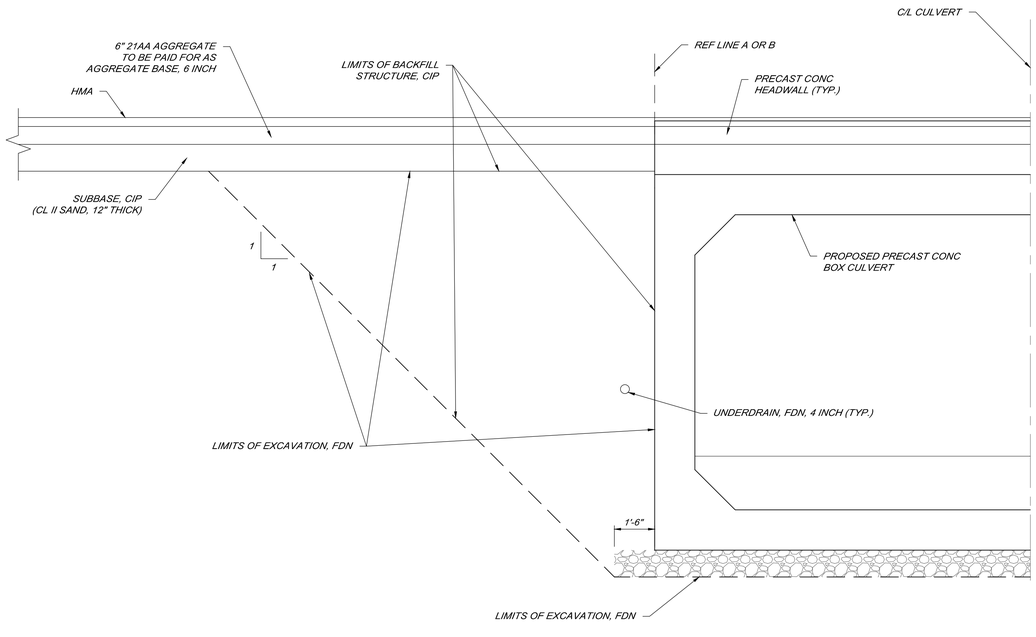
Spicer group
SAGINAW OFFICE
230 S. Washington Ave.
Saginaw, MI 48607 Tel.
989-754-4717 Fax.
989-754-4440
www.SpicerGroup.com

| | | | |
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | | SHEET 18 OF 19 | DB 18 |
| DATE DECEMBER, 2024 | | FILE NO. | |
| SCALE AS SHOWN | | DB-1242-18 | |



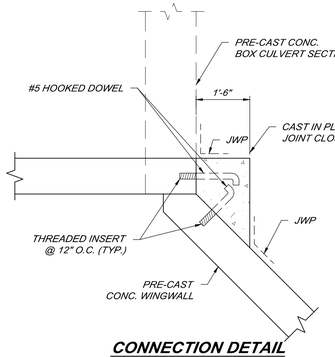

## TYPICAL CROSS SECTION

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




## TYPICAL CROSS SECTION

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




## CONNECTION DETAIL

NOT TO SCALE

* JOINT CLOSURE POUR INCLUDED IN CULV, PRECAST CONC BOX, 25 FOOT BY 11 FOOT

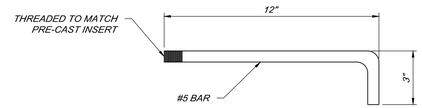
THE DESIGN OF THIS STRUCTURE IS BASED ON 1.2 TIMES THE CURRENT AASHTO LRFD BRIDGE DESIGN SPECIFICATION HL-93 LOADING WITH THE EXCEPTION THAT THE DESIGN TAMDEM PORTION OF THE HL-93 LOAD DEFINITION SHALL BE REPLACED BY A SINGLE 60 KIP AXLE LOAD BEFORE APPLICATION OF THIS 1.2 FACTOR. THE RESULTING LOAD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

GEOTEXTILE LINER SHALL BE PLACED ON ALL SLOPES PRIOR TO PLACING RIPRAP. PAYMENT FOR GEOTEXTILE LINER SHALL BE INCLUDED IN THE PAYMENT FOR RIPRAP.

DE-WATERING OF FOOTING AREA SHALL BE DONE IN A MANNER ACCEPTABLE TO THE ENGINEER (PUMPS, WELL POINTS, ETC), AND IS INCLUDED IN CULVERT PAY ITEM. WATER PUMPED FROM COFFERDAMS SHALL BE DISCHARGED INTO A GEOTEXTILE FILTER BAG.

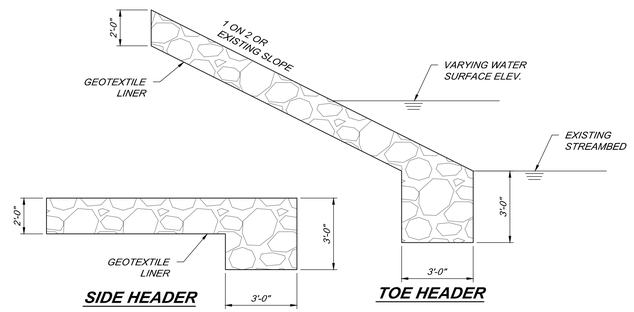
THE RIPRAP QUANTITY IS BASED ON THE LATERAL DIMENSIONS OF THE AREA TO BE PROTECTED, REGARDLESS OF THE NUMBER OF LAYERS REQUIRED. THE ESTIMATED WEIGHT OF RIPRAP IS 27 TONS.

FOR DETAILS OF SLOPE PROTECTION, SEE STANDARD PLAN R-100 SERIES.




## HOOKED DOWEL DETAIL

NOT TO SCALE




## SIDE HEADER

## TOE HEADER

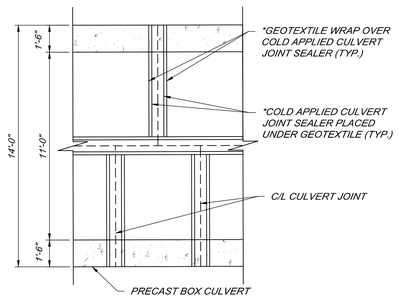
## RIPRAP HEADER DETAILS

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

TOP OF RIPRAP MUST BE AT OR BELOW EXISTING STREAMBED / SLOPE ELEVATION.

AN APPROPRIATE METHOD OF WATER DIVERSION FOR PLACING RIPRAP SHALL BE PROPOSED BY THE CONTRACTOR AND APPROVED BY THE ENGINEER. IF WATER IS SHALLOW (LESS THAN TWO FEET), TEMPORARY CONCRETE BARRIER OR SANDBAGS MAY BE USED TO DIVERT FLOW.

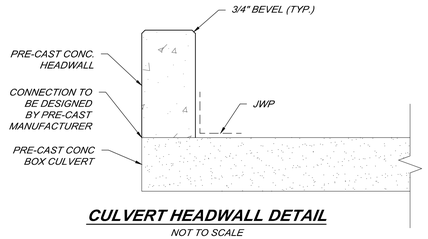
THE RIPRAP SCHEME SHOWN IS A MINIMUM REQUIREMENT FOR SCOUR.




## JOINT WATERPROOFING DETAIL

NOT TO SCALE

(TYPICAL ELEVATION AT CULVERT JOINT)




## CULVERT HEADWALL DETAIL

NOT TO SCALE

* HEADWALL INCLUDED IN CULV, PRECAST CONC BOX, 25 FOOT BY 11 FOOT

| BY | MARK | REVISIONS | DATE |
|---|---|---|---|
| | | | |



**BARNES ROAD BRIDGES**
**BRIDGE REPLACEMENTS**
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# GENERAL PLAN OF STRUCTURE
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230 S. Washington Ave.
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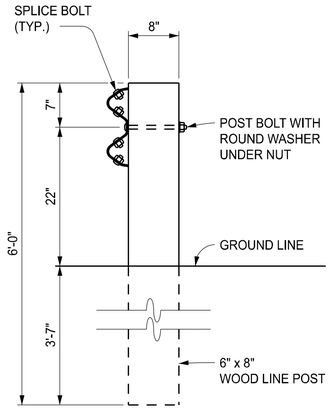
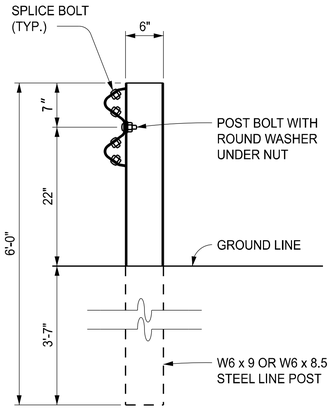
989-754-4717 Fax.
989-754-4440
www.SpicerGroup.com

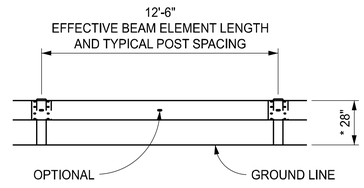
| | | | |
|---|---|---|---|
| DE. BY: GTF | CH. BY: DPZ | PROJECT NO. | |
| DR. BY: GTF | APP. BY: RDK | 132175SG2022 | |
| STDS. | SHEET 19 OF 19 | DB 19 | |
| DATE FEBRUARY, 2025 | FILE NO. | | |
| SCALE AS SHOWN | DB-1242-19 | | |




WOOD POST




STEEL POST

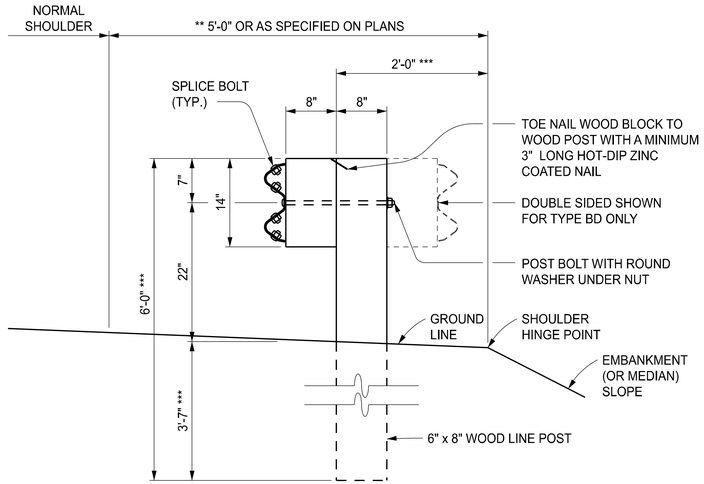


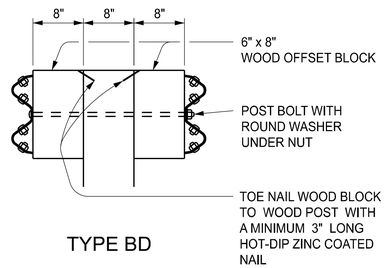

ELEVATION SHOWING POST SPACING

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

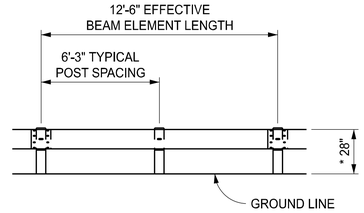
## GUARDRAIL, TYPE A

| | | | | |
|---|---|---|---|---|
| APPROVED BY: _____ DIRECTOR, BUREAU OF FIELD SERVICES<br>APPROVED BY: _____ DIRECTOR, BUREAU OF DEVELOPMENT | MDOT Michigan Department of Transportation<br>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE | STANDARD PLAN FOR<br>GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D | | |
| | | (SPECIAL DETAIL)<br>FHWA APPROVAL | 01/29/2024<br>PLAN DATE | R-60-J | SHEET<br>1 OF 16 |




TYPE BD



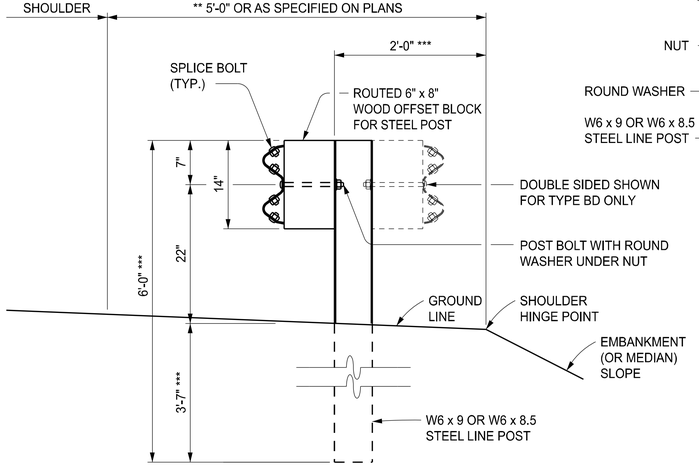

ELEVATION SHOWING POST SPACING

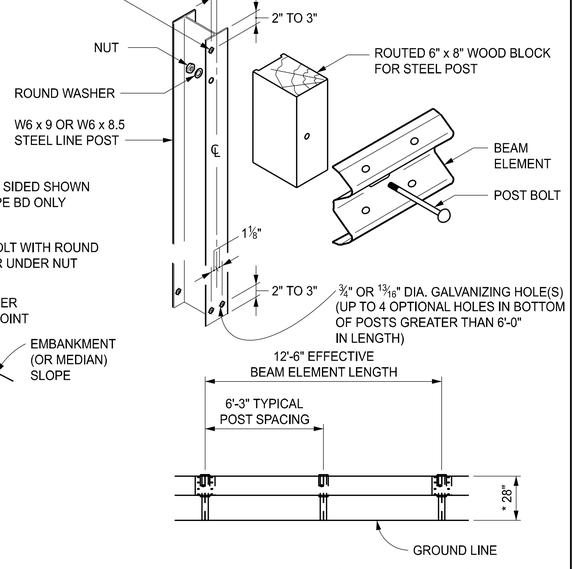
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".

*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-0" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 8'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

## GUARDRAIL, TYPE B (OR BD)
( WOOD POST )




ELEVATION SHOWING POST SPACING

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

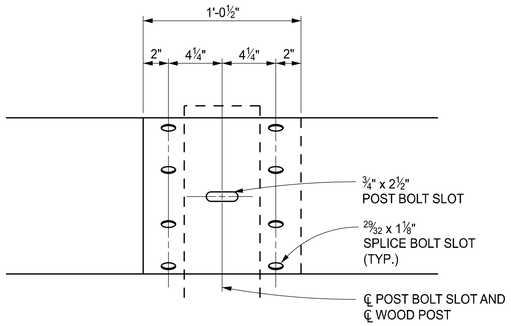
** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".

*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-0" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 8'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

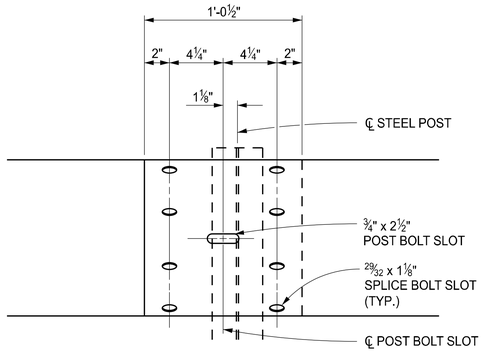
## GUARDRAIL, TYPE B (OR BD)
( STEEL POST )

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation<br>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE | STANDARD PLAN FOR<br>GUARDRAIL, TYPES A, B, BD, T, TD, MGS-8, & MGS-8D | | | |
| | (SPECIAL DETAIL)<br>FHWA APPROVAL | 01/29/2024<br>PLAN DATE | R-60-J | SHEET<br>2 OF 16 |

SECT 20

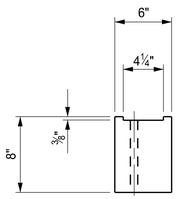



WOOD POST

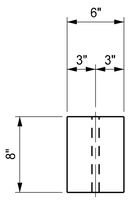



STEEL POST

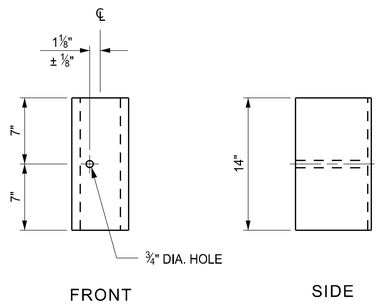
## BEAM ELEMENT SPLICE DETAILS




TOP

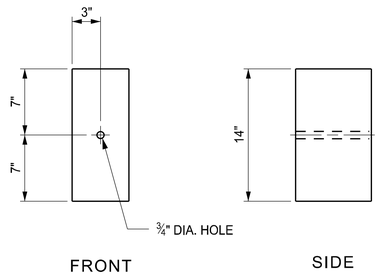



TOP




FRONT SIDE

FOR USE ON STEEL POSTS

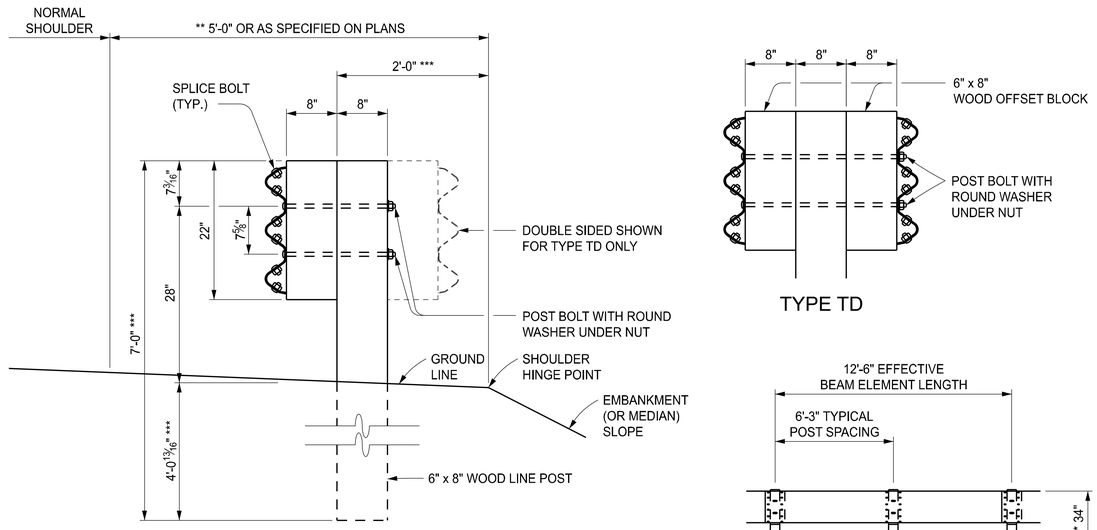



FRONT SIDE

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

## WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE B AND TYPE BD









TYPE TD




ELEVATION SHOWING POST SPACING

** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".

*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-0" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 8'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

## GUARDRAIL, TYPE T (OR TD)
( WOOD POST )









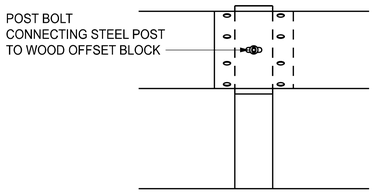

ELEVATION SHOWING POST SPACING

** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-0".

*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-0" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 8'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

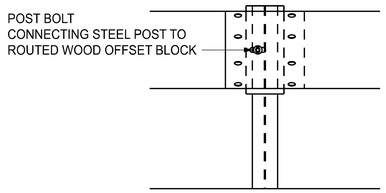
* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

## GUARDRAIL, TYPE T (OR TD)
( STEEL POST )



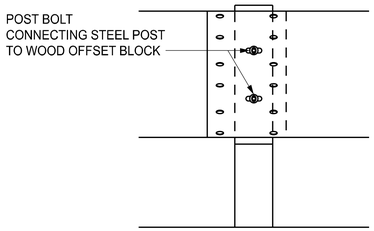

GUARDRAIL, TYPE B

WOOD POST



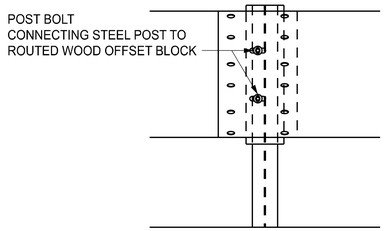

GUARDRAIL, TYPE B

STEEL POST




GUARDRAIL, TYPE T

WOOD POST

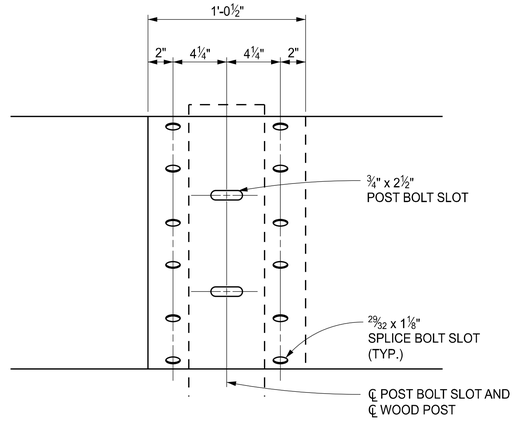



GUARDRAIL, TYPE T

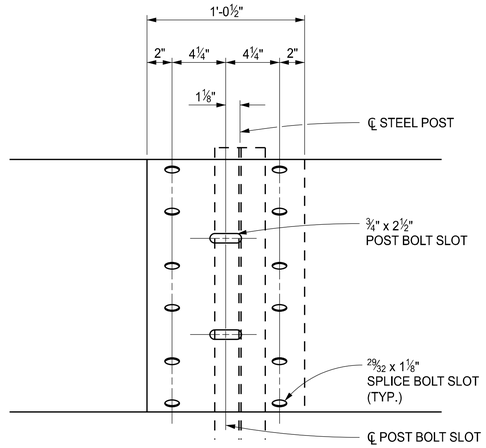
STEEL POST

BLOCK AND POST CONNECTION DETAILS



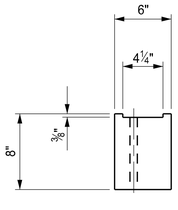



WOOD POST




STEEL POST

THRIE BEAM ELEMENT SPLICE DETAILS

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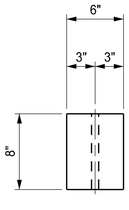


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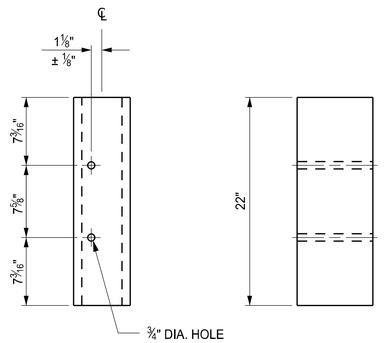
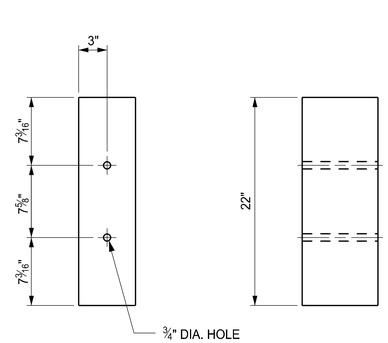



FRONT SIDE

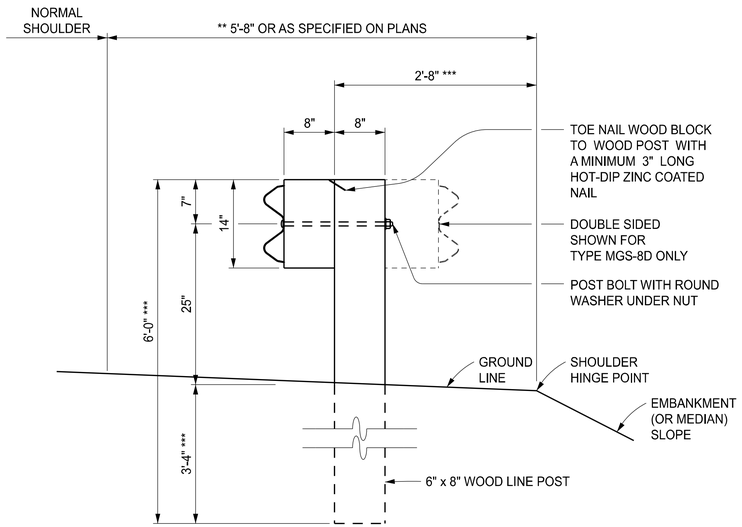
FOR USE ON STEEL POSTS

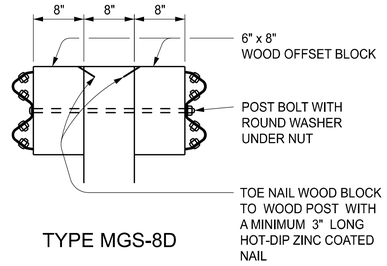



FRONT SIDE

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

WOOD OFFSET BLOCKS FOR GUARDRAIL, TYPE T AND TYPE TD



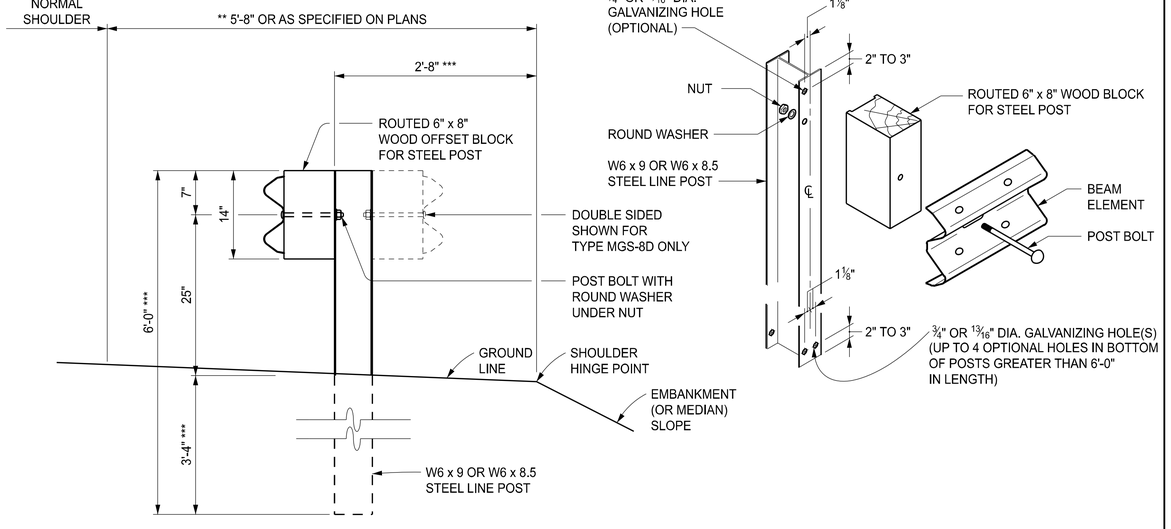




TYPE MGS-8D

** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-8".

*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-8" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 9'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

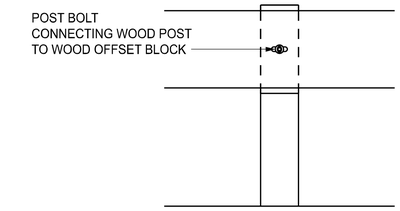
## GUARDRAIL, TYPE MGS-8 (OR MGS-8D)
( WOOD POST )

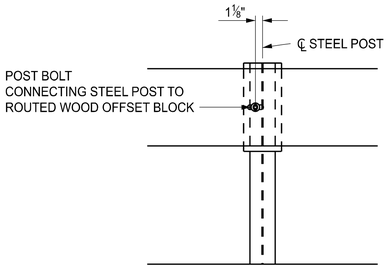



** FOR PAVED SHOULDER WIDTHS OF AT LEAST 12', USE 3'-8".

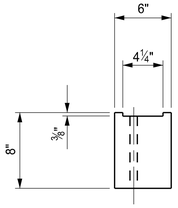
*** IF THE OFFSET FROM THE FACE OF POST TO THE SHOULDER HINGE POINT IS LESS THAN 2'-8" AND THE EMBANKMENT (OR MEDIAN) SLOPE IS STEEPER THAN 1:10, USE 9'-0" POST WITH THE ADDITIONAL LENGTH EMBEDDED.

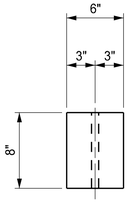
## GUARDRAIL, TYPE MGS-8 (OR MGS-8D)
( STEEL POST )

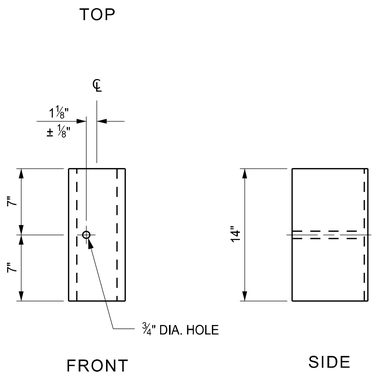


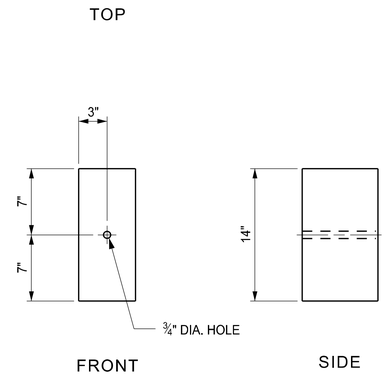

## BLOCK AND POST CONNECTION DETAILS



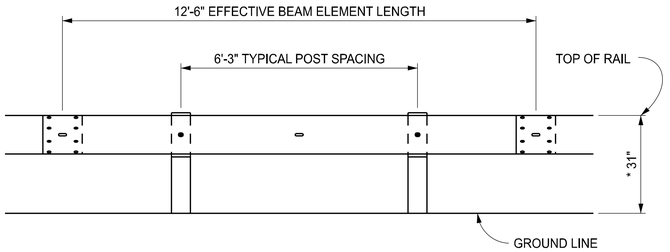




FOR USE ON STEEL POSTS



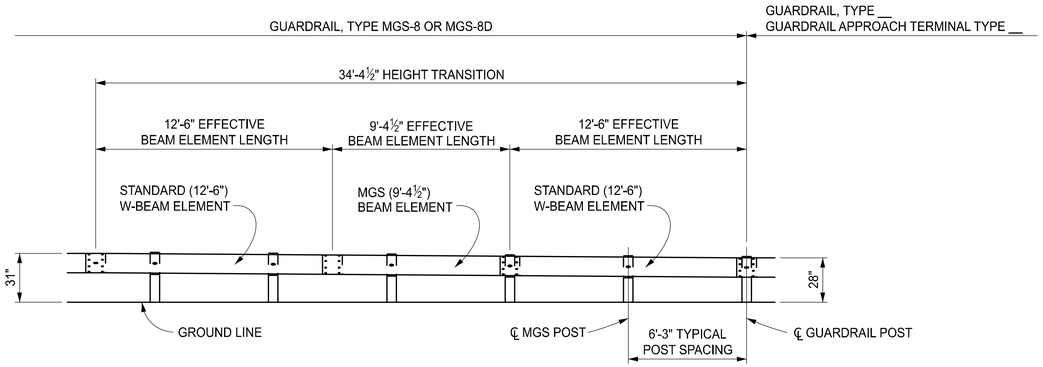

FOR USE ON WOOD POSTS
(SEE NOTES ON SHEET 16 OF 16)

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

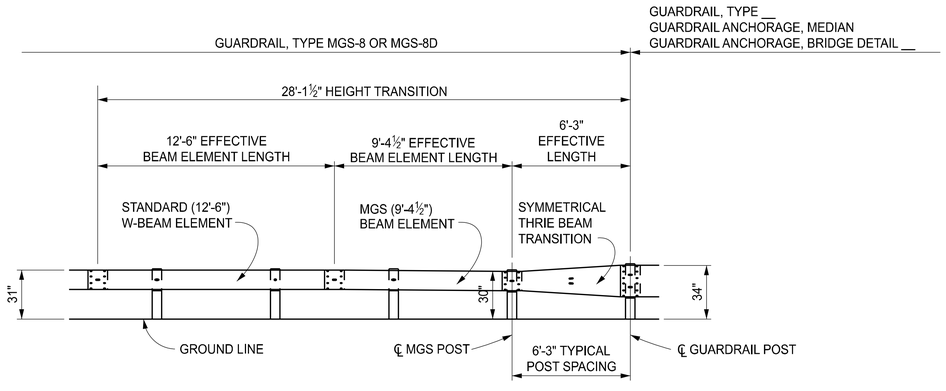



ELEVATION SHOWING POST SPACING FOR
GUARDRAIL, TYPE MGS-8 (OR MGS-8D)

* SEE NOTES FOR GUARDRAIL IN CONJUNCTION WITH CURB

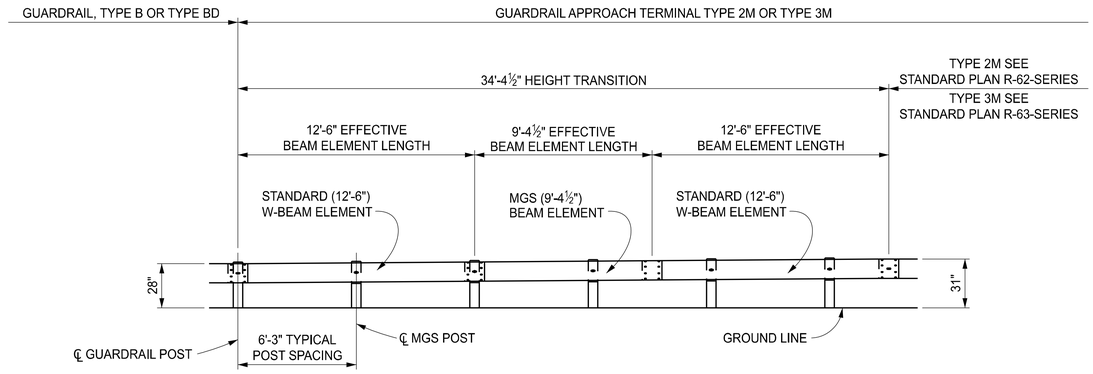



ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING
GUARDRAIL, TYPE MGS-8 (OR MGS-8D) TO
GUARDRAIL, TYPE B, GUARDRAIL, TYPE BD, OR
GUARDRAIL APPROACH TERMINAL TYPE 1B, 2B, OR 3B

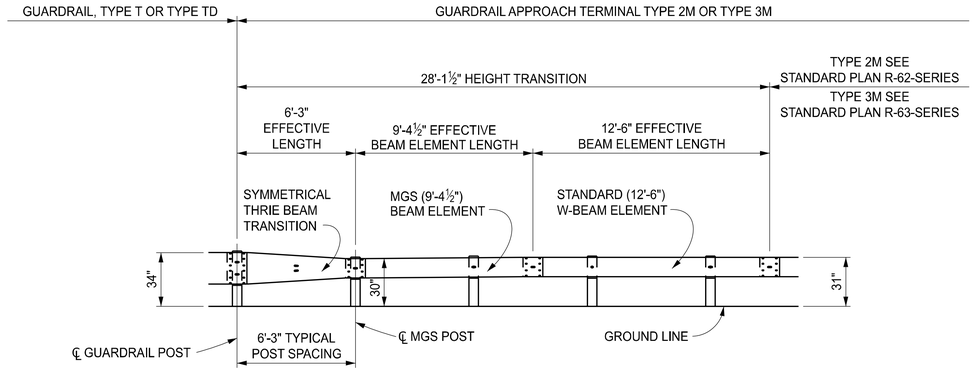



ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING
GUARDRAIL, TYPE MGS-8 (OR MGS-8D) TO
GUARDRAIL, TYPE T, GUARDRAIL, TYPE TD,
GUARDRAIL ANCHORAGE, MEDIAN,
GUARDRAIL ANCHORAGE, BRIDGE DETAIL A1, T1, T4 OR T6

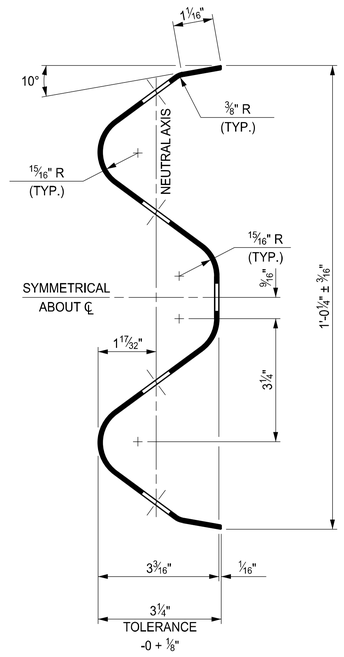




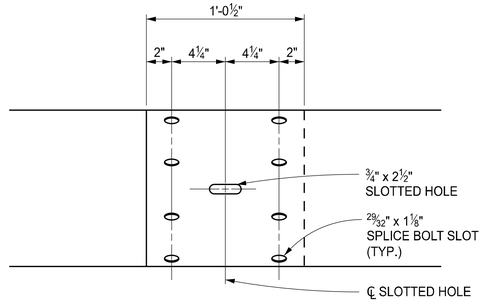

ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING
GUARDRAIL, TYPE B (OR TYPE BD) TO
GUARDRAIL APPROACH TERMINAL TYPE 2M OR TYPE 3M



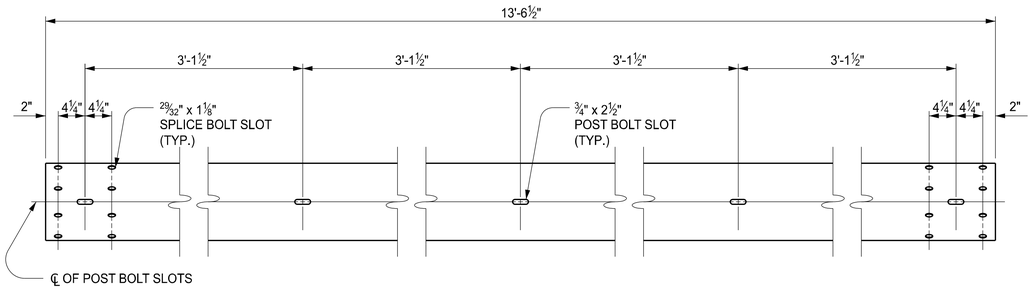

ELEVATION SHOWING TRANSITION DETAIL FOR CONNECTING
GUARDRAIL, TYPE T (OR TYPE TD) TO
GUARDRAIL APPROACH TERMINAL TYPE 2M OR TYPE 3M



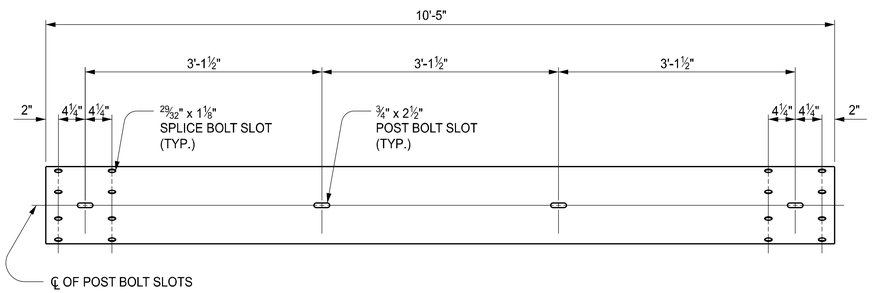

SECTION THROUGH BEAM ELEMENT




BEAM ELEMENT SPLICE DETAILS

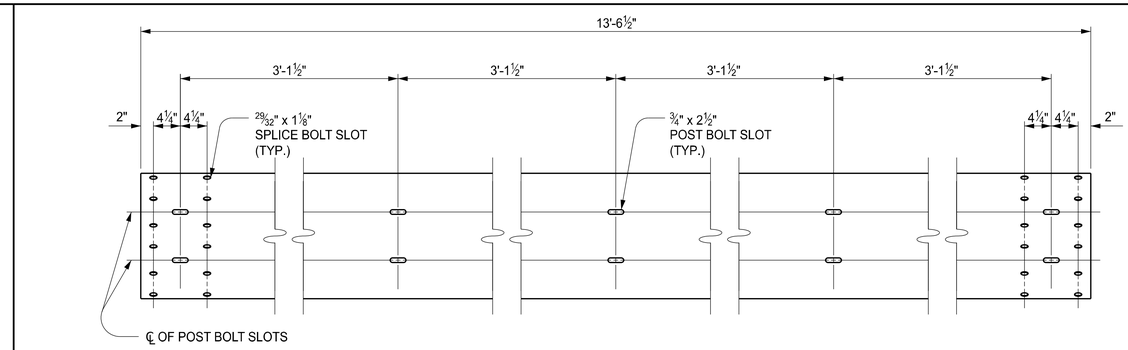



FRONT ELEVATION OF BEAM ELEMENT

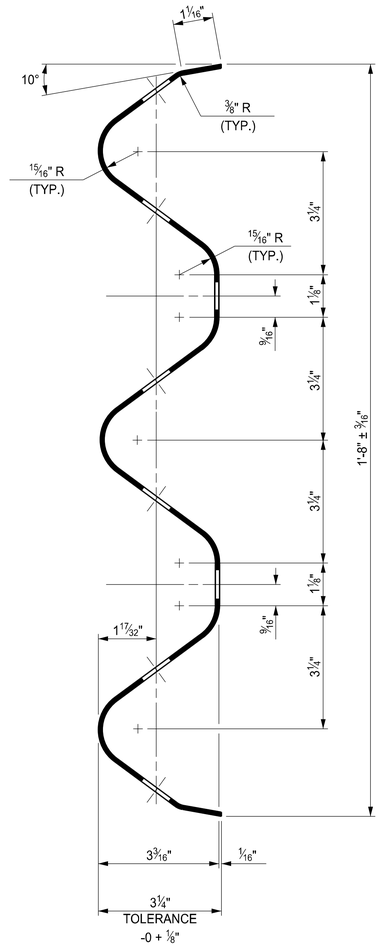



FRONT ELEVATION OF MGS (9'-4 1/2") BEAM ELEMENT

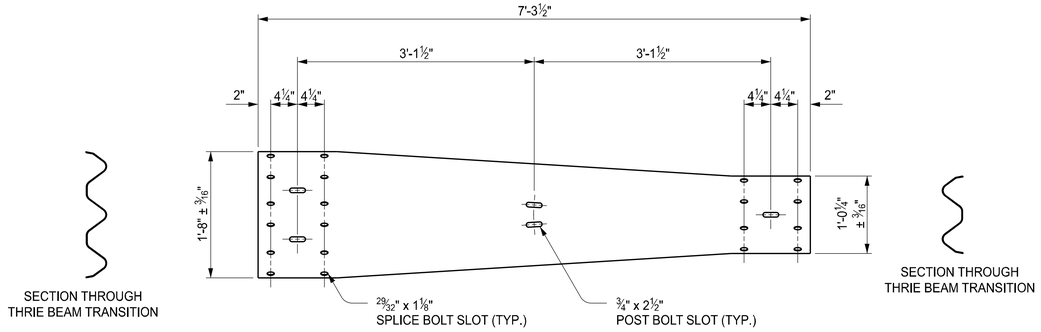




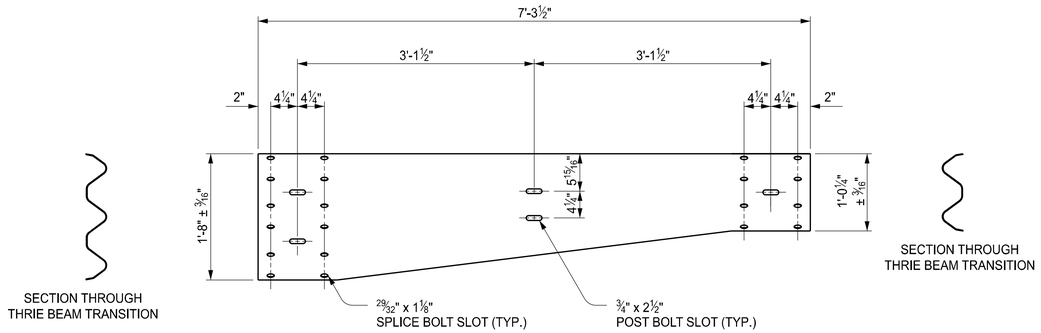

FRONT ELEVATION OF THRIE BEAM ELEMENT

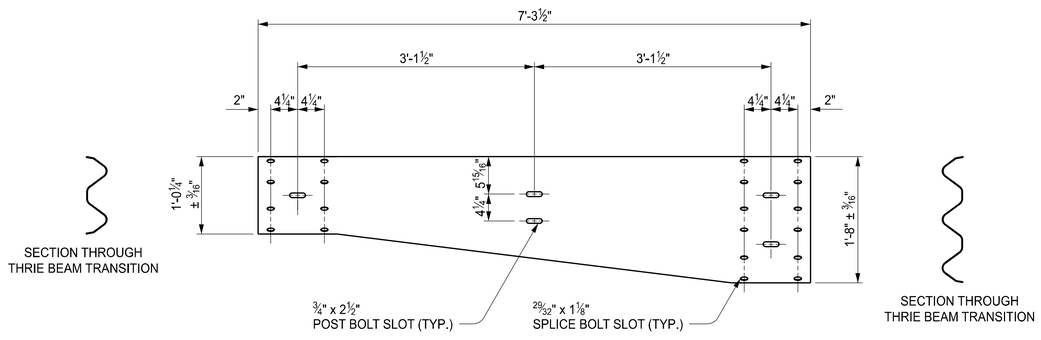



SECTION THROUGH THRIE BEAM ELEMENT
(FOR GUARDRAIL, TYPE T AND TD)




SYMMETRICAL THRIE BEAM TRANSITIONS

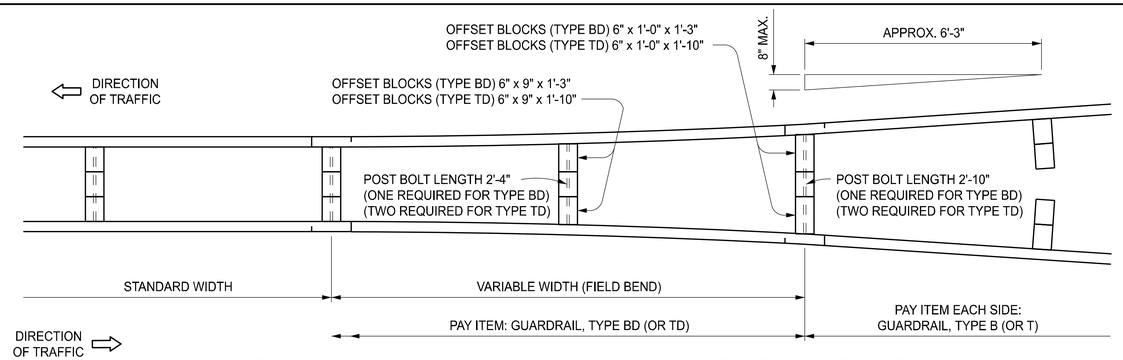



ASYMMETRICAL THRIE BEAM TRANSITIONS

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






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

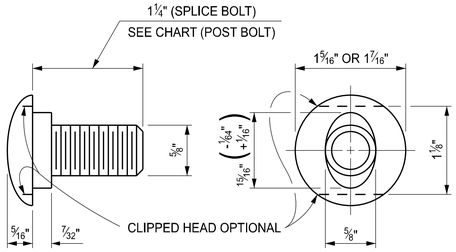
**POST BOLTS, SPLICE BOLTS AND WASHERS AT BEAM ELEMENT SPLICE POSTS AND AT INTERMEDIATE POSTS**

| 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 |

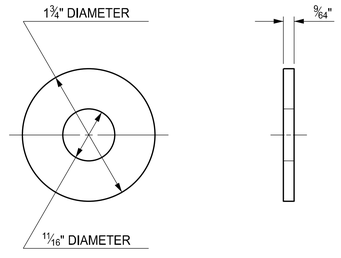
THRIE BEAM TRANSITIONS REQUIRE 20 SPLICE BOLTS EACH (12 0N TYPE T END AND 8 ON TYPE B END).

* 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.

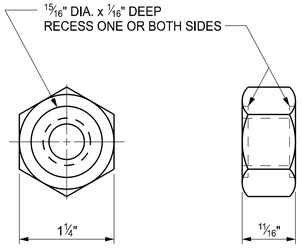
| MINIMUM POST BOLT THREAD LENGTH | |
|---|---|
| BOLT LENGTH | MINIMUM THREAD LENGTH |
| 9½" | 1¾" |
| 18" | 2½" |
| 26½" | 3" |



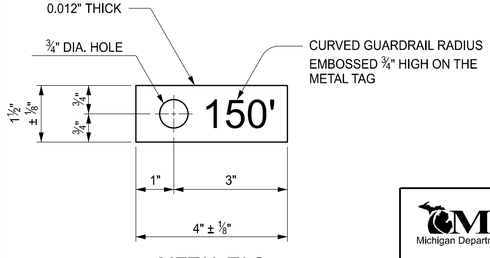

SPLICE BOLT AND POST BOLT




ROUND WASHER

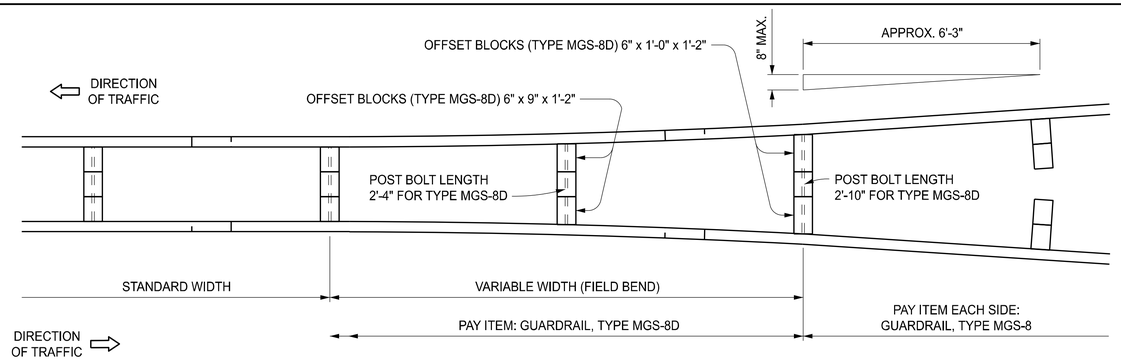



NUT




METAL TAG

FOR CURVED GUARDRAIL WITH RADIUS OF 150' OR LESS




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

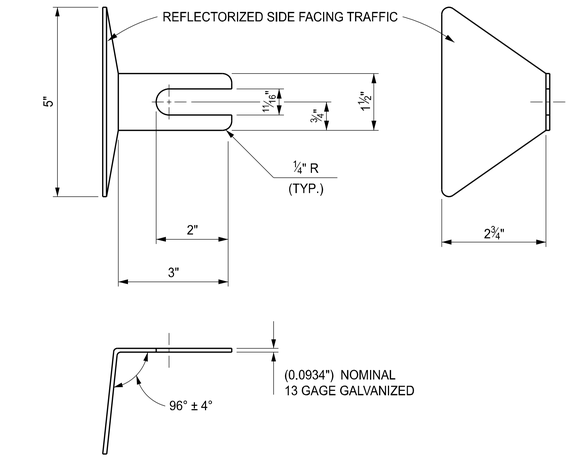
| POST BOLTS, SPLICE BOLTS AND WASHERS AT BEAM ELEMENT SPLICE POSTS AND AT INTERMEDIATE POSTS | | | | | | |
|---|---|---|---|---|---|---|
| GUARDRAIL TYPE | POST | OFFSET BLOCK | POST BOLTS | | SPLICE BOLTS | WASHERS |
| | | | NO. REQ'D | LENGTH | (1¼" LONG) (NO. REQ'D) | (ROUND) (NO. REQ'D) |
| MGS-8 | 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 0N TYPE T END AND 8 ON TYPE MGS END).

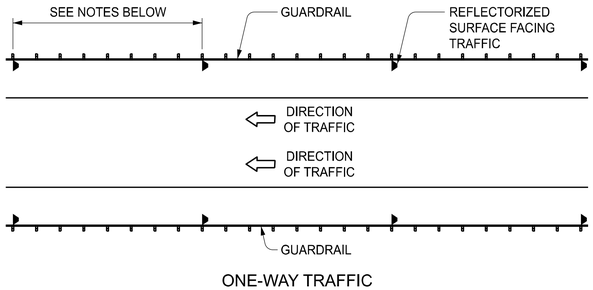
* EXCEPT AS SPECIFIED ON DETAIL SHOWING TRANSITION FROM GUARDRAIL, TYPE MGS-8 TO GUARDRAIL, TYPE MGS-8D POST BOLTS SHALL NOT EXTEND MORE THAN ½" BEYOND NUT.

| MINIMUM POST BOLT THREAD LENGTH | |
|---|---|
| BOLT LENGTH | MINIMUM THREAD LENGTH |
| 9½" | 1¾" |
| 18" | 2½" |
| 26½" | 3" |

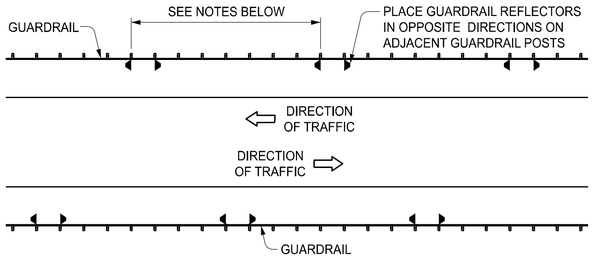





## GUARDRAIL REFLECTOR




ONE-WAY TRAFFIC

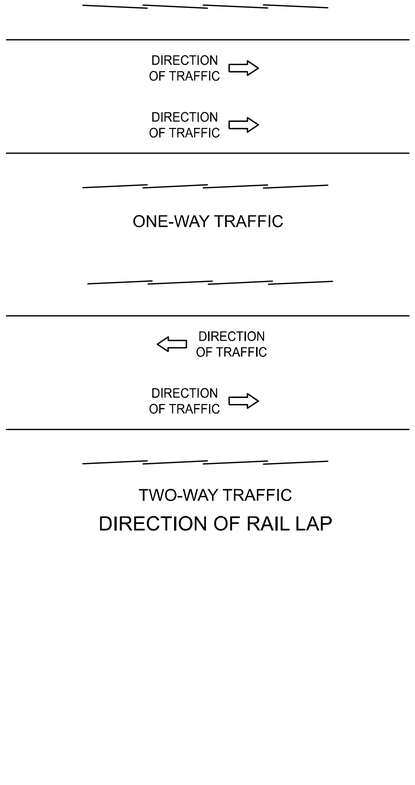



TWO-WAY TRAFFIC

## 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.




## 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."

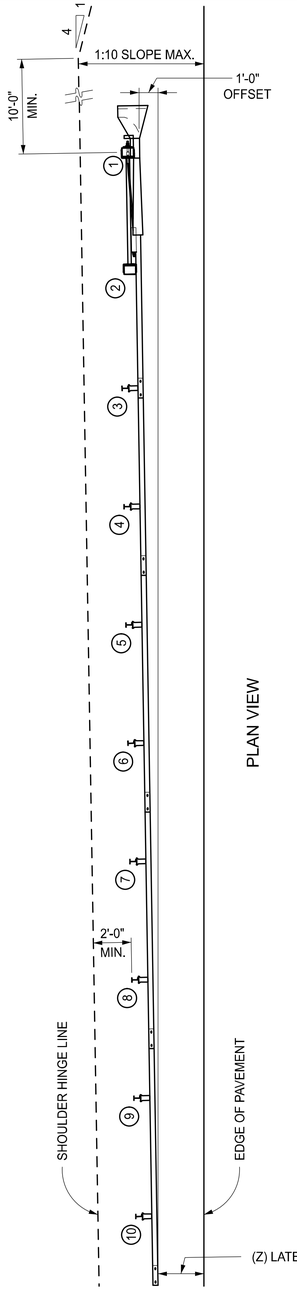
BEAM ELEMENTS SHALL BE SHOP BENT TO PLAN RADIUS FOR CURVE RADII 150' OR LESS. A TAG IDENTIFYING THE CURVATURE OF THE SHOP BENT SECTION WILL BE REQUIRED FOR EACH CURVED ELEMENT.

SEE STANDARD PLAN R-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.

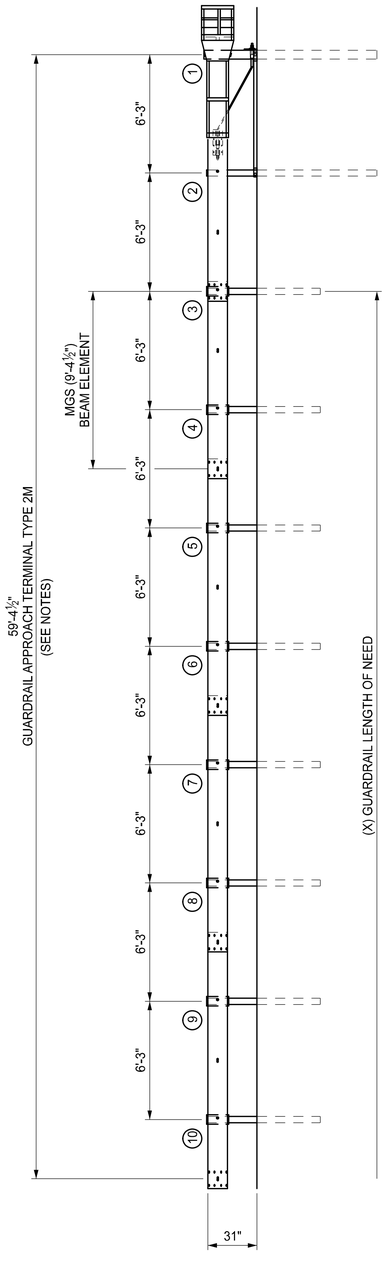
WOOD POSTS WITH ½" BEVELS AT THE TOP MAY BE USED IN LIEU OF WOOD POSTS WITHOUT BEVELS SPECIFIED. THE LENGTH, WIDTH AND DEPTH OF THE POST SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT.

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.




PLAN VIEW

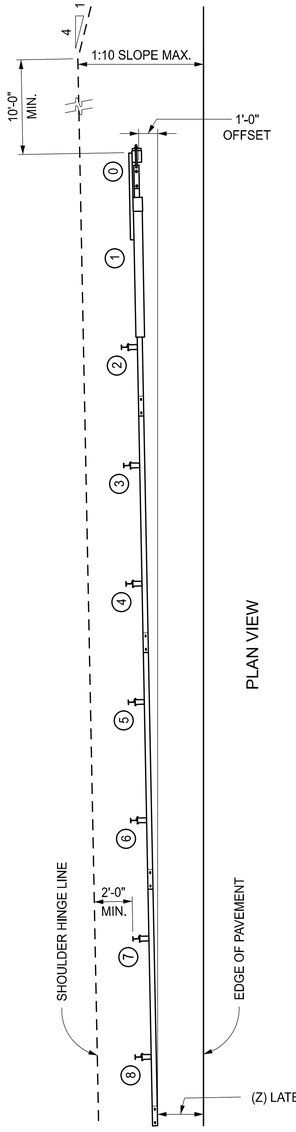



ELEVATION

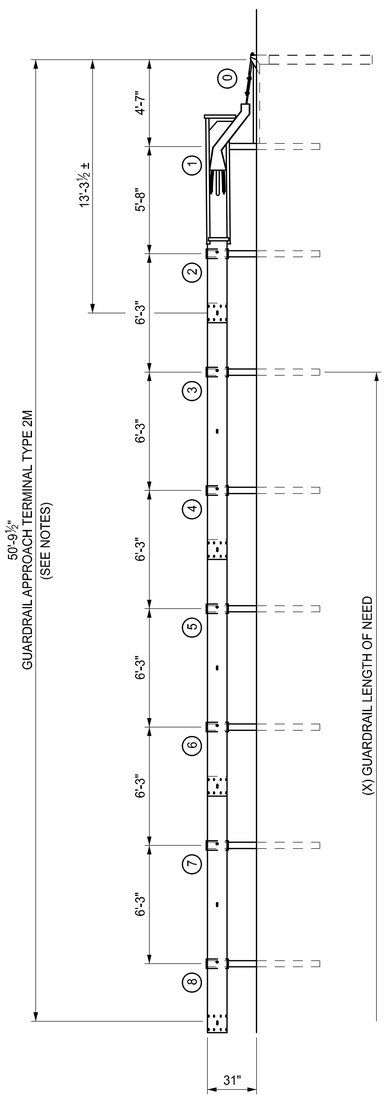
GUARDRAIL APPROACH TERMINAL TYPE 2M
"MSKT"

OPTION 1

| | | | | |
|---|---|---|---|---|
| APPROVED BY: _____ DIRECTOR, BUREAU OF FIELD SERVICES<br>APPROVED BY: _____ DIRECTOR, BUREAU OF DEVELOPMENT | MDOT Michigan Department of Transportation<br>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE | STANDARD PLAN FOR<br>GUARDRAIL APPROACH TERMINAL TYPE 2M | | |
| | | (SPECIAL DETAIL)<br>FHWA APPROVAL | 06/16/2022<br>PLAN DATE | R-62-H | SHEET<br>1 OF 4 |




PLAN VIEW



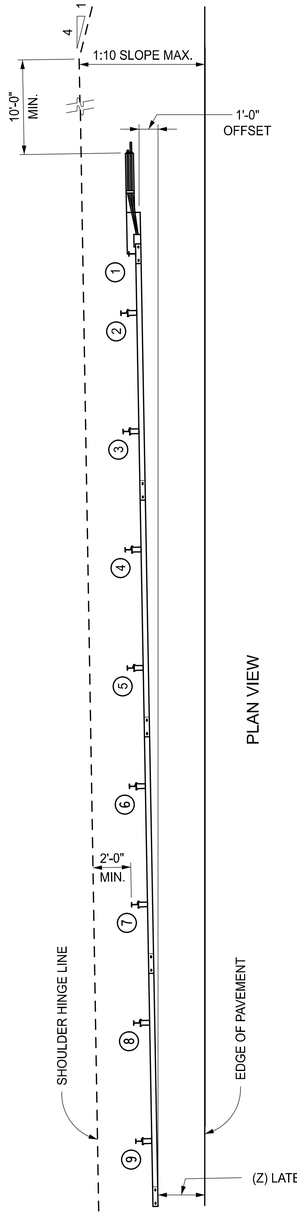

ELEVATION

GUARDRAIL APPROACH TERMINAL TYPE 2M
"SOFT-STOP"

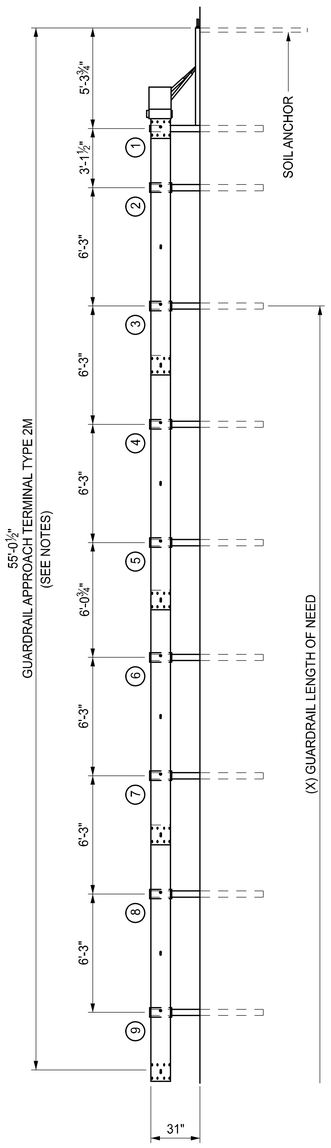
OPTION 2

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation<br>DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE | STANDARD PLAN FOR<br>GUARDRAIL APPROACH TERMINAL TYPE 2M | | | |
| | (SPECIAL DETAIL)<br>FHWA APPROVAL | 06/16/2022<br>PLAN DATE | R-62-H | SHEET<br>2 OF 4 |

SECT
28




PLAN VIEW




ELEVATION

GUARDRAIL APPROACH TERMINAL TYPE 2M
"MAX-TENSION"

OPTION 3

| MDOT Michigan Department of Transportation | STANDARD PLAN FOR GUARDRAIL APPROACH TERMINAL TYPE 2M | | | |
|---|---|---|---|---|
| DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE | (SPECIAL DETAIL) FHWA APPROVAL | 06/16/2022 PLAN DATE | R-62-H | SHEET 3 OF 4 |

NOTES:

SEE STANDARD PLAN R-60-SERIES FOR ADDITIONAL TRANSITION LENGTHS WHEN ATTACHING TERMINALS TO OTHER THAN TYPE MGS-8 GUARDRAIL.

ALL POSTS, OFFSET BLOCKS, BEAM ELEMENTS, AND HARDWARE (INCLUDING BOLTS, NUTS, AND WASHERS) SHALL CONFORM TO THE MANUFACTURER'S DETAILS AND SPECIFICATIONS.

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 TYPE 2M 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)

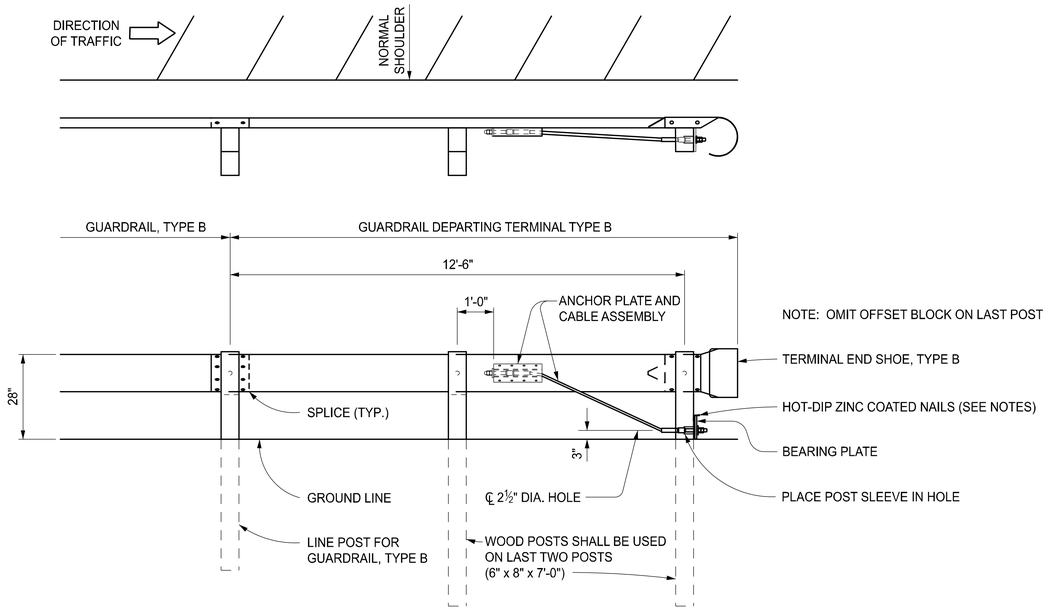
TRAFFIC PASSING ON THE LEFT SIDE

TRAFFIC PASSING ON BOTH SIDES

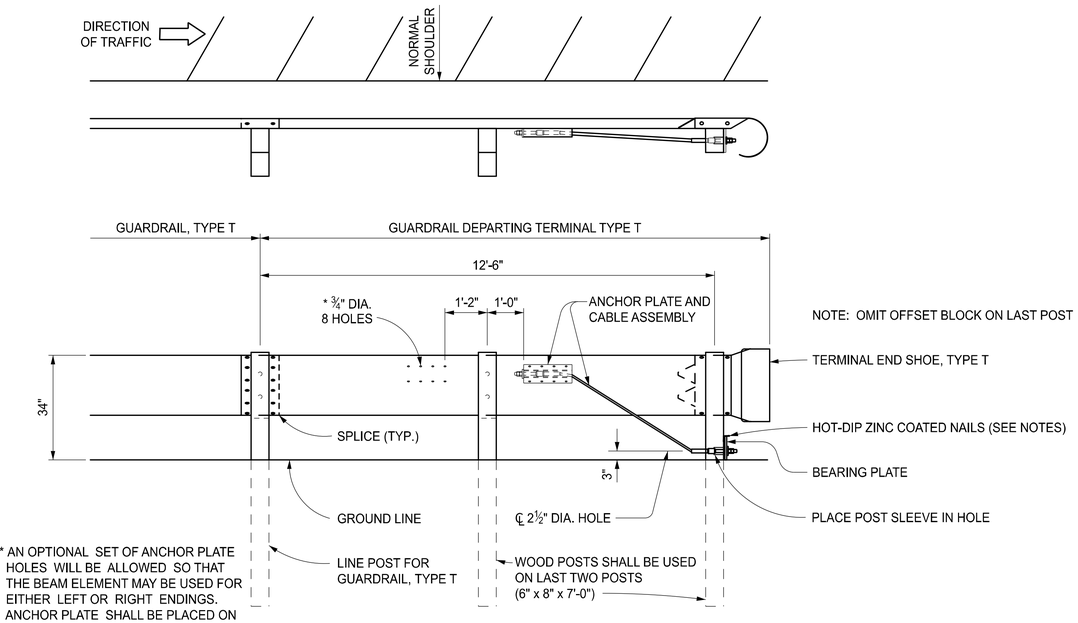
TRAFFIC PASSING ON THE RIGHT SIDE

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

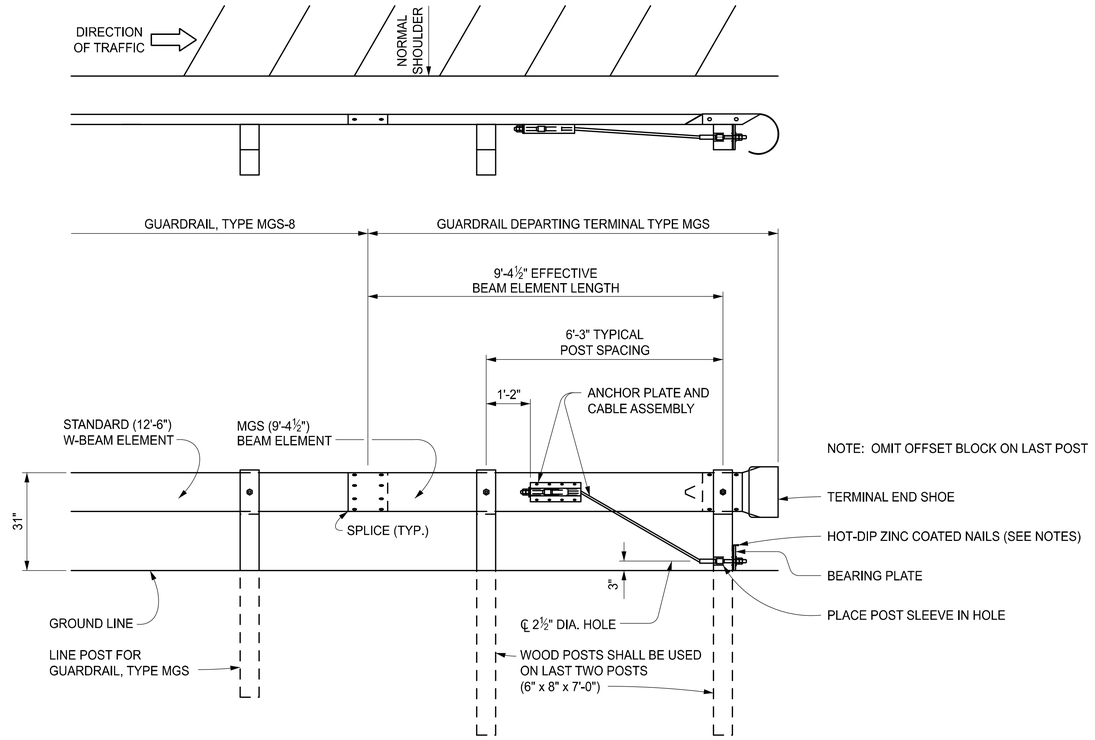
| MDOT Michigan Department of Transportation | STANDARD PLAN FOR GUARDRAIL APPROACH TERMINAL TYPE 2M | | | |
|---|---|---|---|---|
| DEPARTMENT DIRECTOR BRADLEY C. WIEFERICH, PE | (SPECIAL DETAIL) FHWA APPROVAL | 06/16/2022 PLAN DATE | R-62-H | SHEET 4 OF 4 |



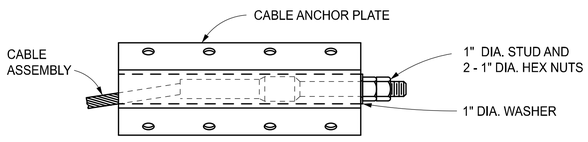

GUARDRAIL DEPARTING TERMINAL TYPE B

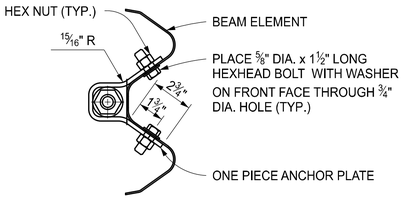



GUARDRAIL DEPARTING TERMINAL TYPE T

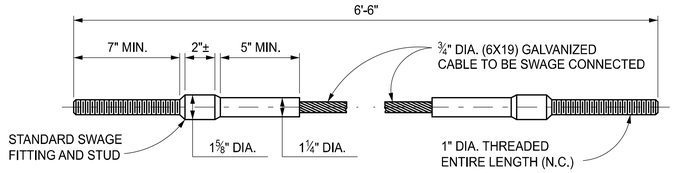



GUARDRAIL DEPARTING TERMINAL TYPE MGS




CABLE ANCHOR PLATE DETAILS




CABLE ASSEMBLY

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MDOT Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS

| (SPECIAL DETAIL) | 09/14/2023 | R-66-E | SHEET 1 OF 4 |
|---|---|---|---|
| FHWA APPROVAL | PLAN DATE | | |

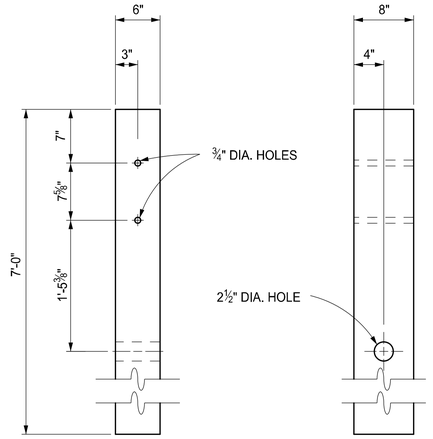
MDOT Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GUARDRAIL DEPARTING TERMINAL TYPES B, T, & MGS

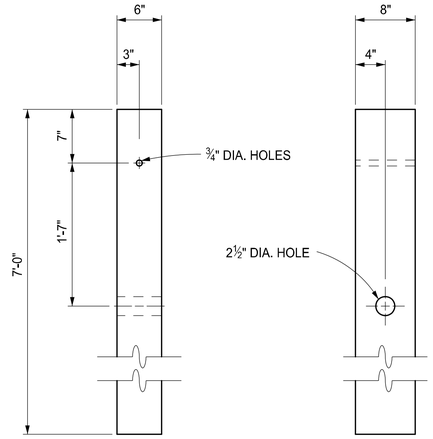
| (SPECIAL DETAIL) | 09/14/2023 | R-66-E | SHEET 2 OF 4 |
|---|---|---|---|
| FHWA APPROVAL | PLAN DATE | | |

SECT 30



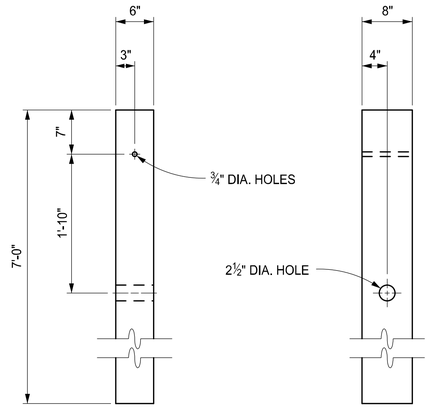

WOOD POST DETAIL

( FOR LAST POST, GUARDRAIL DEPARTING TERMINAL TYPE T )



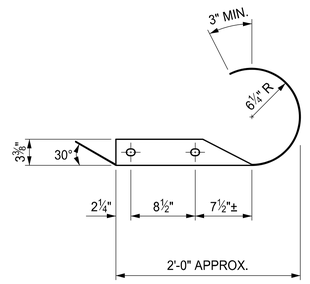

WOOD POST DETAIL

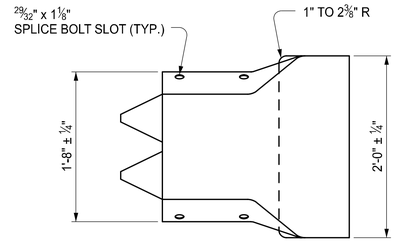
( FOR LAST POST, GUARDRAIL DEPARTING TERMINAL TYPE B )



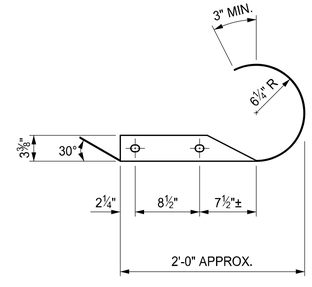

WOOD POST DETAIL

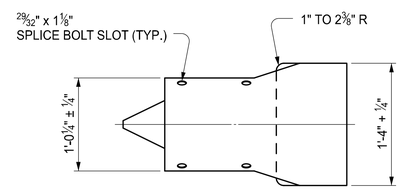
( FOR LAST POST, GUARDRAIL DEPARTING TERMINAL TYPE MGS )



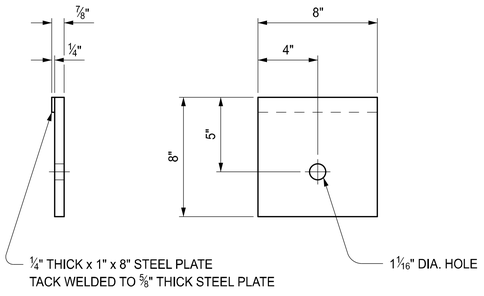




TERMINAL END SHOE, TYPE T

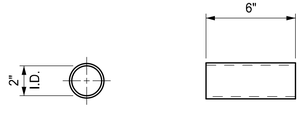



TERMINAL END SHOE,
TYPE A, TYPE B OR TYPE MGS




BEARING PLATE




POST SLEEVE

NOTES:

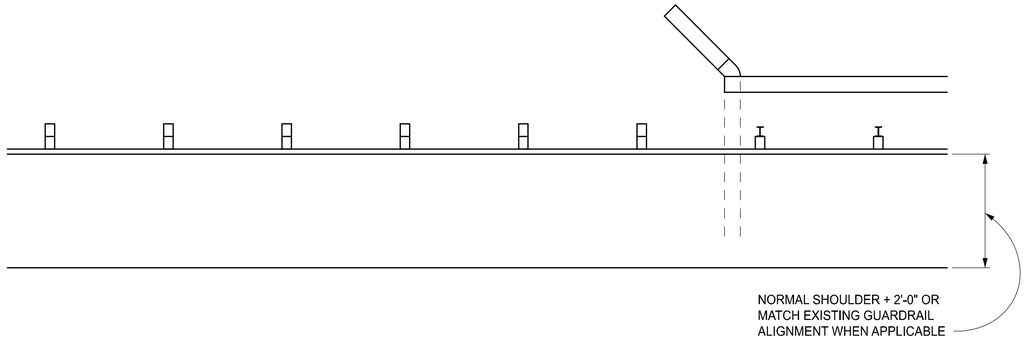
ALL POSTS, OFFSET BLOCKS, BEAM ELEMENTS, AND HARDWARE (INCLUDING BOLTS, NUTS, AND WASHERS) SHALL CONFORM TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION AND TO STANDARD PLAN R-60-SERIES, WHERE APPLICABLE, EXCEPT AS SPECIFIED ON THIS STANDARD.

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

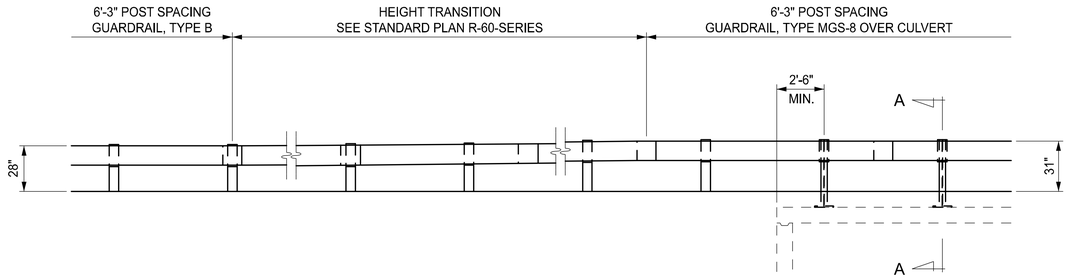
FOR DETAILS OF GUARDRAIL PLACEMENT, SEE STANDARD PLAN R-59-SERIES.

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.

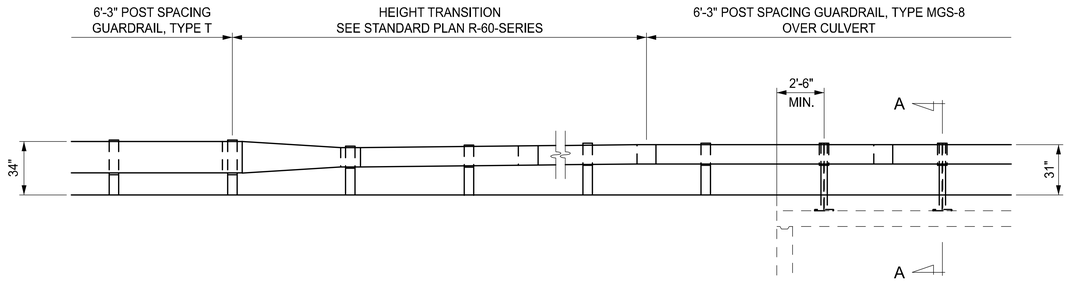
TWO HOT-DIP ZINC COATED NAILS SHALL BE DRIVEN INTO THE WOOD POST AT THE TOP OF THE BEARING PLATE TO KEEP THE BEARING PLATE FROM ROTATING.



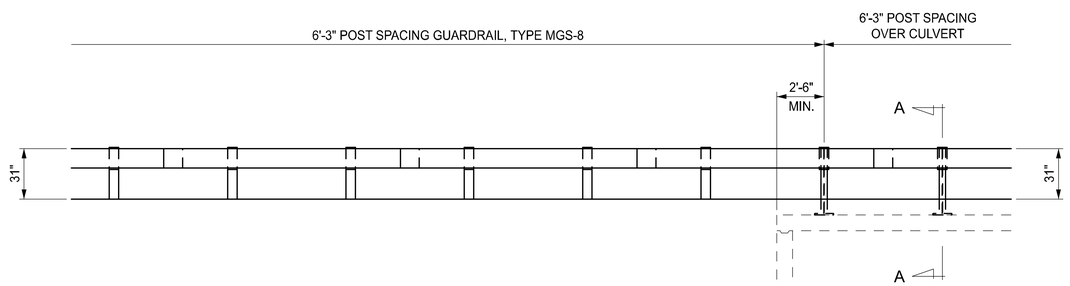

PLAN VIEW




ELEVATION SHOWING GUARDRAIL, TYPE B

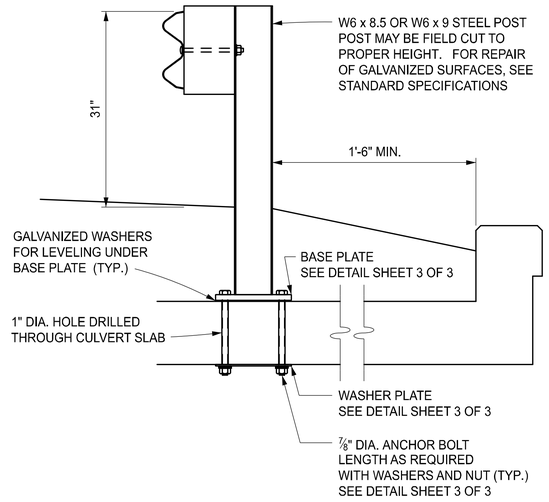



ELEVATION SHOWING GUARDRAIL, TYPE T



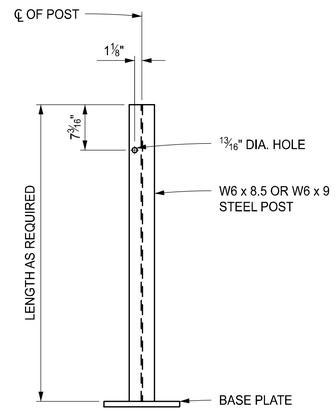

ELEVATION SHOWING GUARDRAIL, TYPE MGS-8

| | | | | |
|---|---|---|---|---|
| APPROVED BY: _____ DIRECTOR, BUREAU OF FIELD SERVICES<br>APPROVED BY: _____ DIRECTOR, BUREAU OF DEVELOPMENT | MDOT Michigan Department of Transportation<br>DEPARTMENT DIRECTOR<br>BRADLEY C. WIEFERICH, PE | STANDARD PLAN FOR<br>GUARDRAIL OVER BOX OR SLAB CULVERTS | | |
| | | (SPECIAL DETAIL)<br>FHWA APPROVAL | 08/01/2019<br>PLAN DATE | R-73-F | SHEET<br>1 OF 3 |

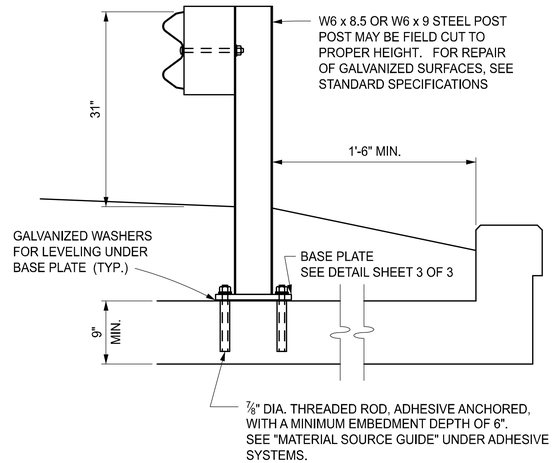



SECTION A - A

## PREFERRED CONSTRUCTION METHOD

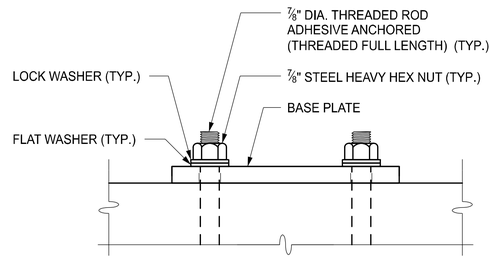



STEEL POST DETAIL FOR
GUARDRAIL, TYPE MGS-8




SECTION A - A

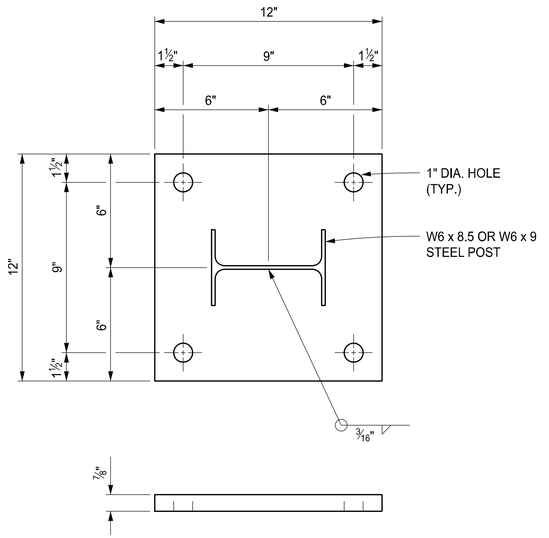
## ALTERNATE CONSTRUCTION METHOD



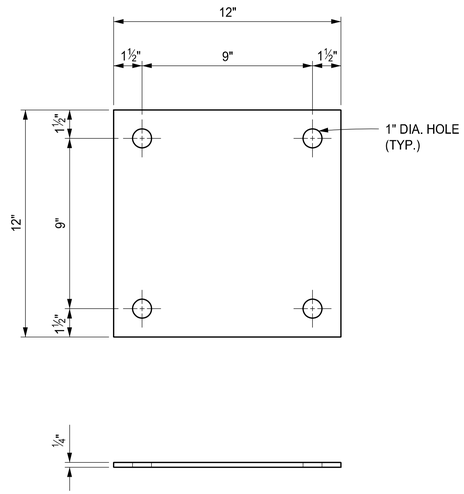

ANCHOR DETAIL

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation<br>DEPARTMENT DIRECTOR<br>BRADLEY C. WIEFERICH, PE | STANDARD PLAN FOR<br>GUARDRAIL OVER BOX OR SLAB CULVERTS | | | |
| | (SPECIAL DETAIL)<br>FHWA APPROVAL | 08/01/2019<br>PLAN DATE | R-73-F | SHEET<br>2 OF 3 |

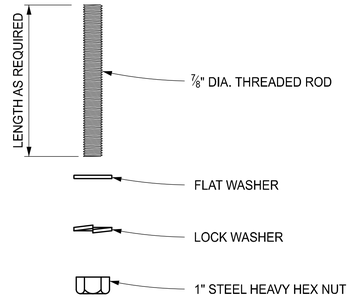
SECT
32




BASE PLATE DETAIL




WASHER PLATE DETAIL




THREADED ROD DETAIL

NOTES:

GUARDRAIL SHALL BE CONSTRUCTED AND PAID FOR ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION AND STANDARD PLAN R-60-SERIES. 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 STANDARD SPECIFICATIONS FOR CONCTRUCTION FOR BRIDGE RAILINGS.

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

MDOT
Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GUARDRAIL OVER BOX OR SLAB CULVERTS

| (SPECIAL DETAIL) | 08/01/2019 | R-73-F | SHEET |
|---|---|---|---|
| FHWA APPROVAL | PLAN DATE | | 3 OF 3 |

SECT
33

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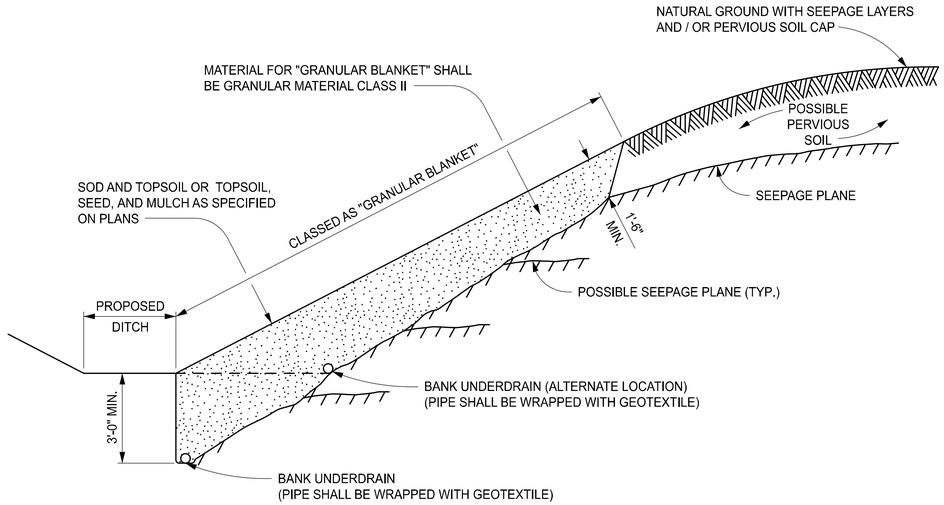
Michigan Department of Transportation

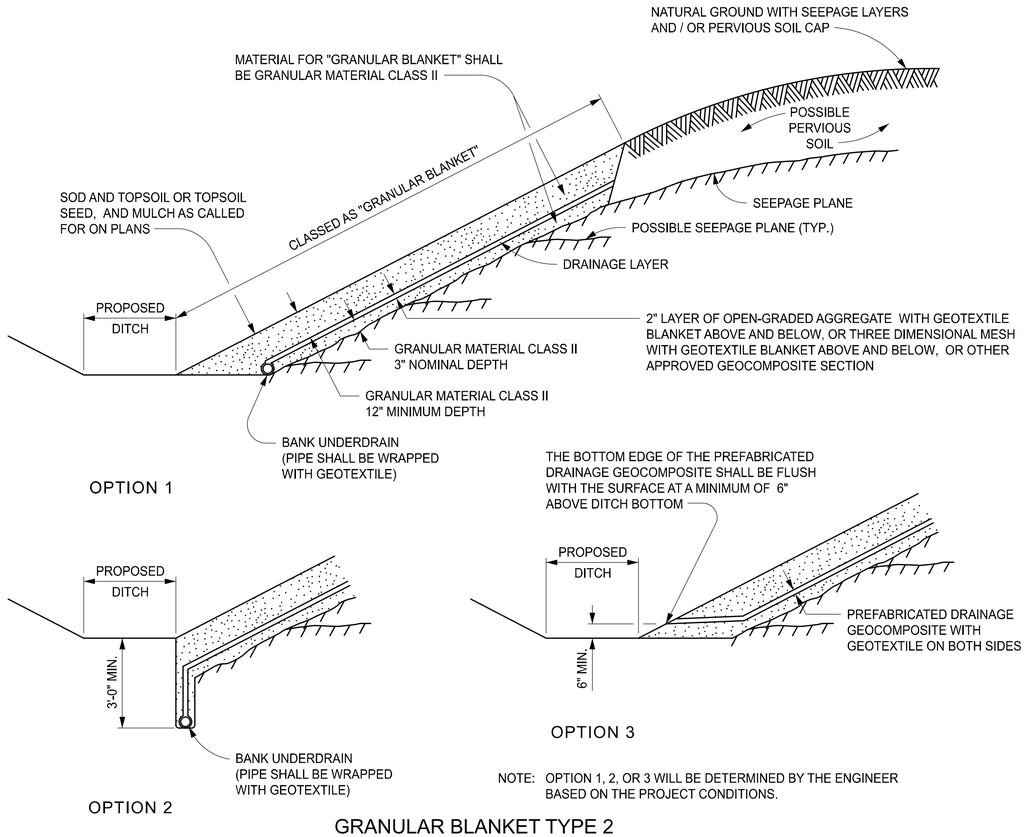
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR

| (SPECIAL DETAIL) | 00/00/0000 | | SHEET |
|---|---|---|---|
| FHWA APPROVAL | PLAN DATE | | OF |

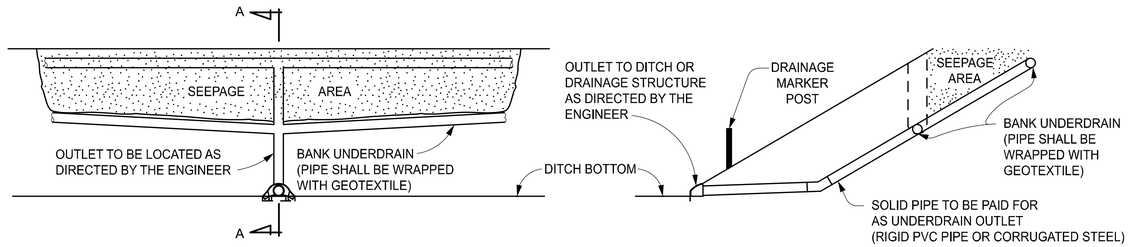



GRANULAR BLANKET TYPE 1



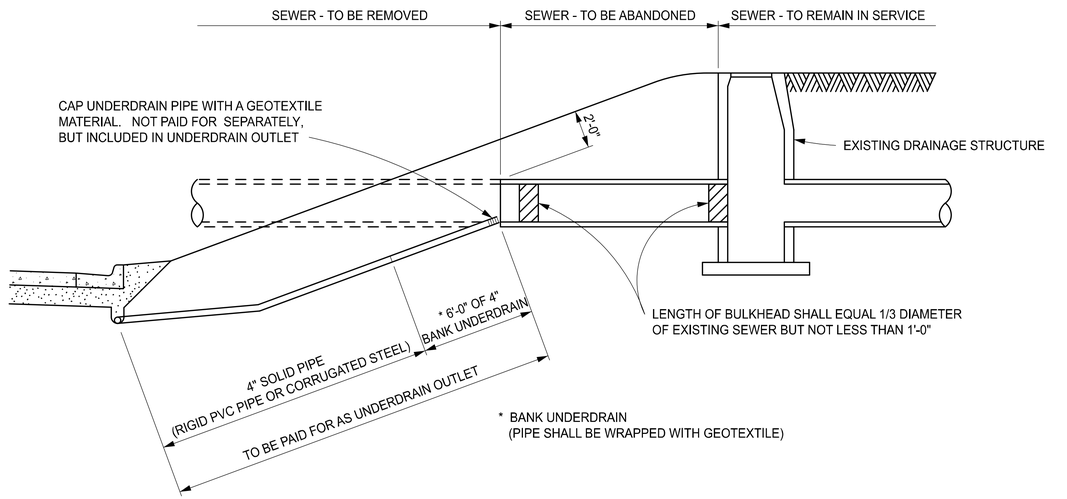

NOTE: OPTION 1, 2, OR 3 WILL BE DETERMINED BY THE ENGINEER BASED ON THE PROJECT CONDITIONS.

GRANULAR BLANKET TYPE 2




SECTION A - A

BANK UNDERDRAIN OUTLET




WEEPER UNDERDRAIN AND BULKHEADING SEVERED SEWER

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MDOT Michigan Department of Transportation
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

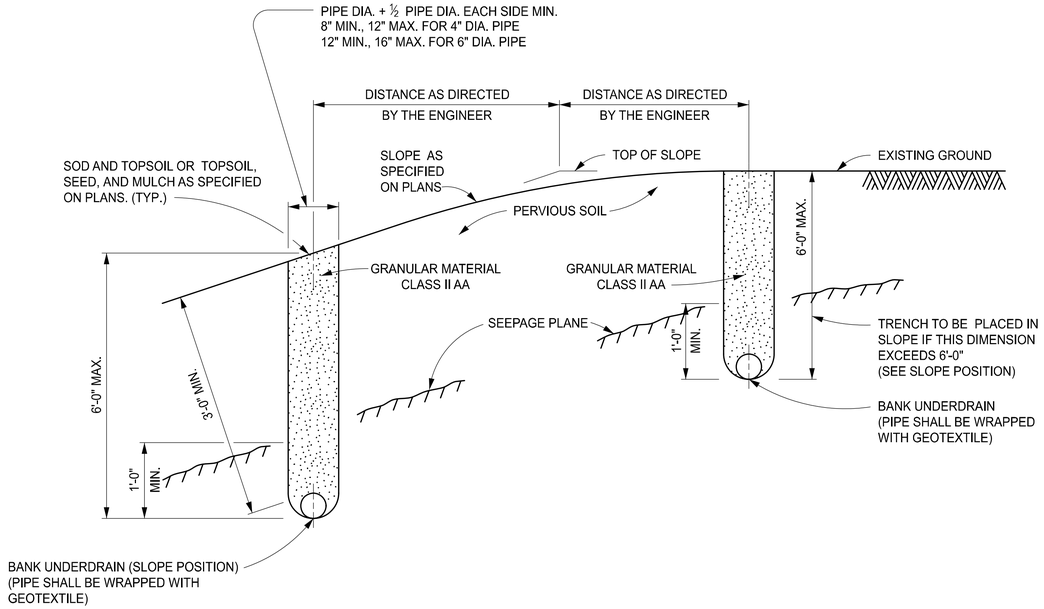
STANDARD PLAN FOR
GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS
FOR UNDERDRAINS, AND SEWER BULKHEADS

| (SPECIAL DETAIL) FHWA APPROVAL | 06/28/2021 PLAN DATE | R-80-F | SHEET 1 OF 8 |
|---|---|---|---|

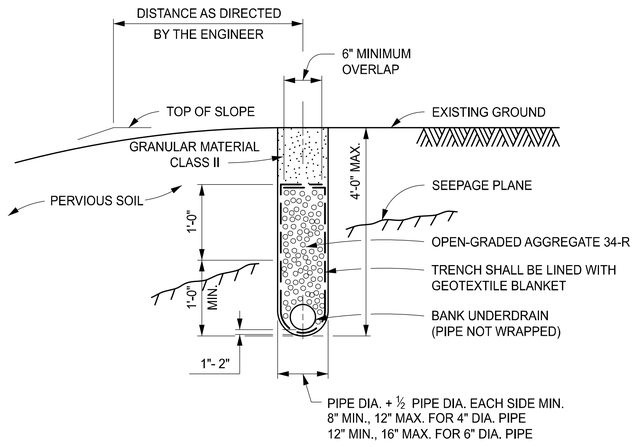
MDOT Michigan Department of Transportation
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS
FOR UNDERDRAINS, AND SEWER BULKHEADS

| (SPECIAL DETAIL) FHWA APPROVAL | 06/28/2021 PLAN DATE | R-80-F | SHEET 2 OF 8 |
|---|---|---|---|

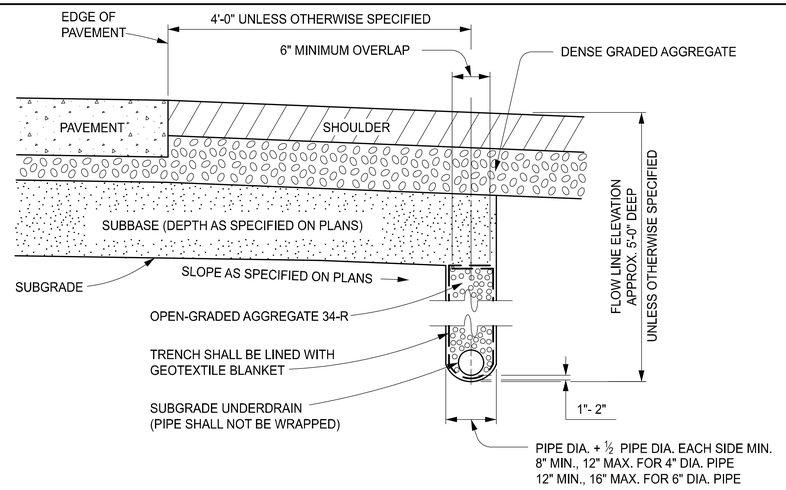



## BANK UNDERDRAINS

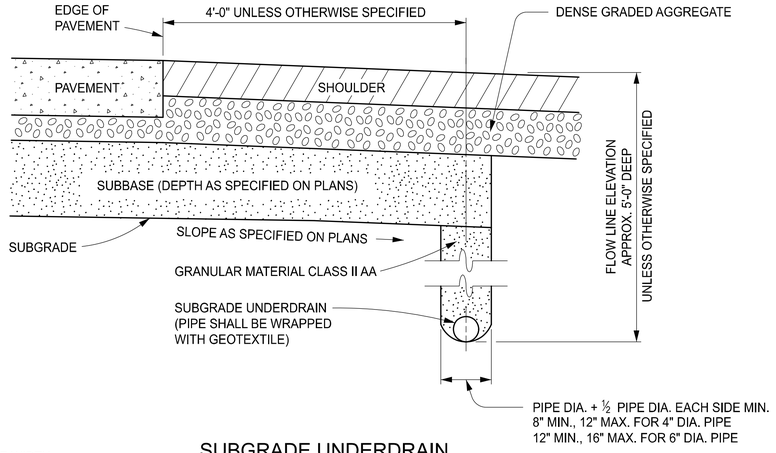



## BANK UNDERDRAIN, OPEN-GRADED

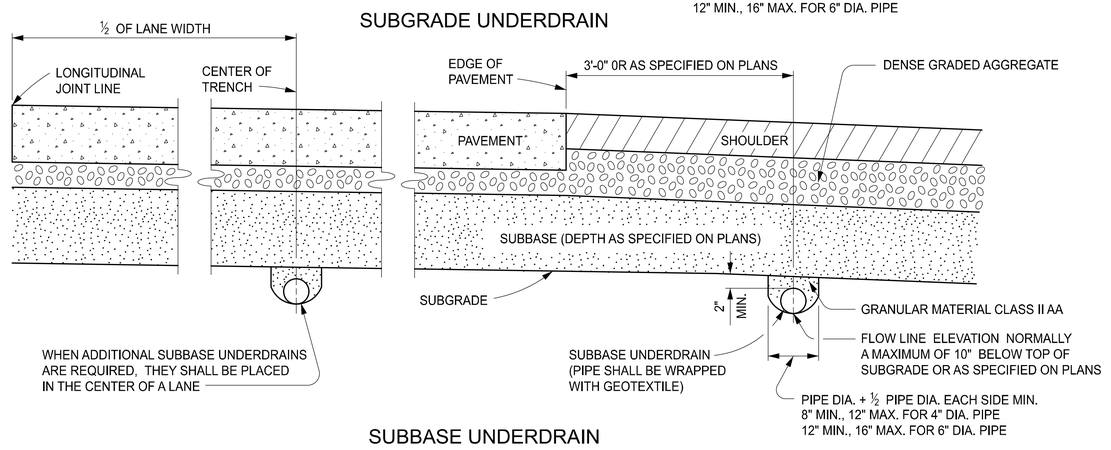
| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation<br>DEPARTMENT DIRECTOR<br>BRADLEY C. WIEFERICH, PE | STANDARD PLAN FOR<br>GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS<br>FOR UNDERDRAINS, AND SEWER BULKHEADS | | | |
| | (SPECIAL DETAIL)<br>FHWA APPROVAL | 06/28/2021<br>PLAN DATE | R-80-F | SHEET<br>3 OF 8 |




## SUBGRADE UNDERDRAIN - OPEN-GRADED

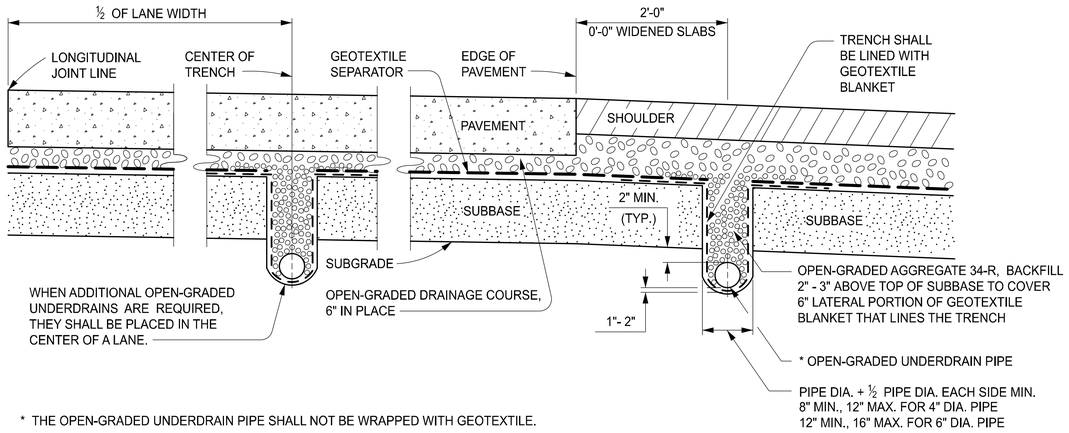



## SUBGRADE UNDERDRAIN



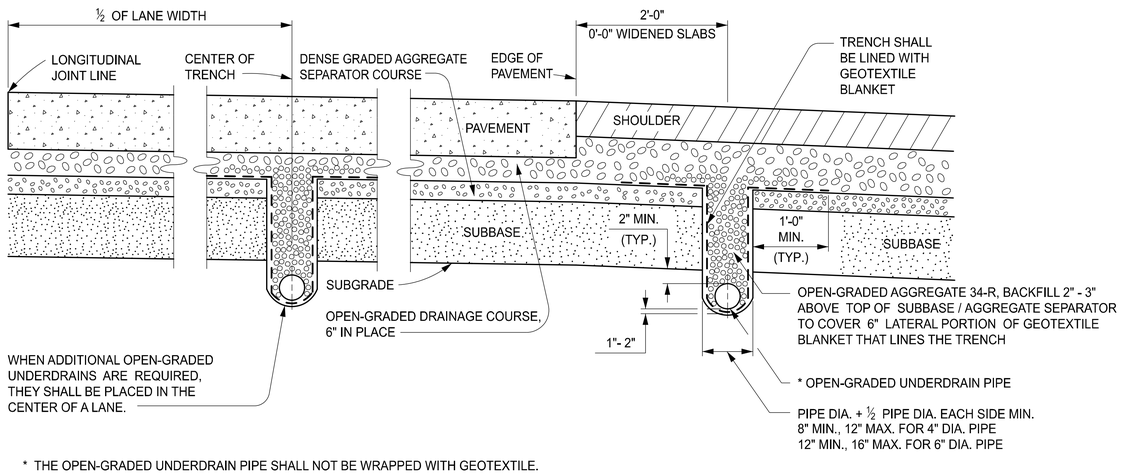

## SUBBASE UNDERDRAIN

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation<br>DEPARTMENT DIRECTOR<br>BRADLEY C. WIEFERICH, PE | STANDARD PLAN FOR<br>GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS<br>FOR UNDERDRAINS, AND SEWER BULKHEADS | | | |
| | (SPECIAL DETAIL)<br>FHWA APPROVAL | 06/28/2021<br>PLAN DATE | R-80-F | SHEET<br>4 OF 8 |



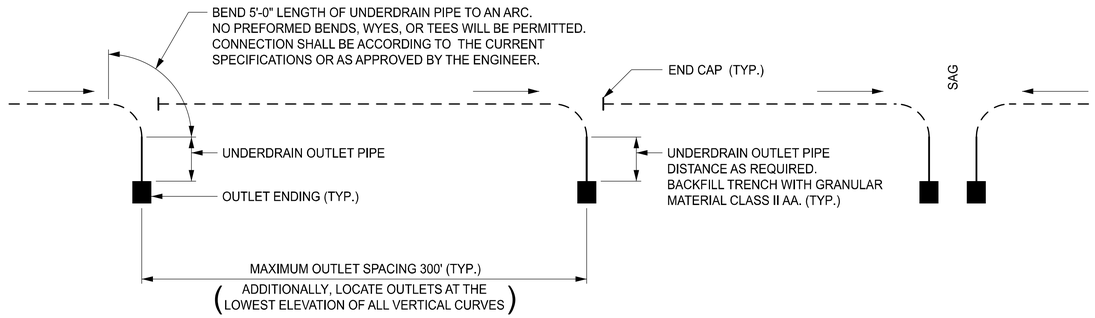

* THE OPEN-GRADED UNDERDRAIN PIPE SHALL NOT BE WRAPPED WITH GEOTEXTILE.

OPEN-GRADED UNDERDRAIN PIPE
WITH GEOTEXTILE SEPARATOR

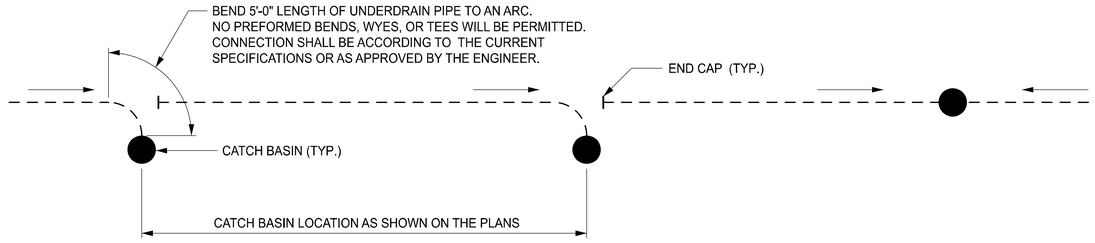



* THE OPEN-GRADED UNDERDRAIN PIPE SHALL NOT BE WRAPPED WITH GEOTEXTILE.

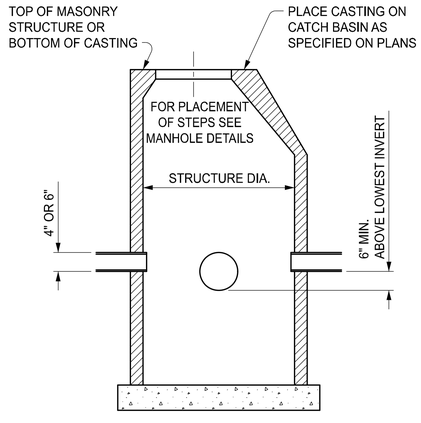
OPEN-GRADED UNDERDRAIN PIPE
WITH DENSE GRADED AGGREGATE SEPARATOR COURSE



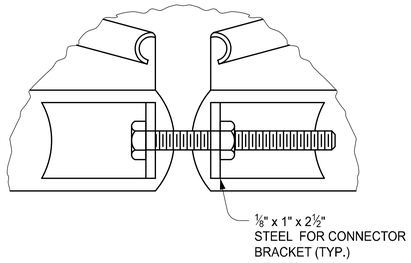

PLAN SHOWING OUTLETS FOR UNDERDRAINS

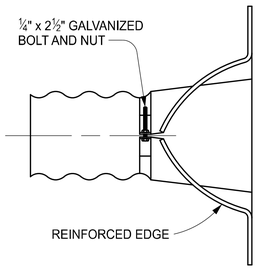



PLAN SHOWING UNDERDRAINS TAPPED INTO CATCH BASINS

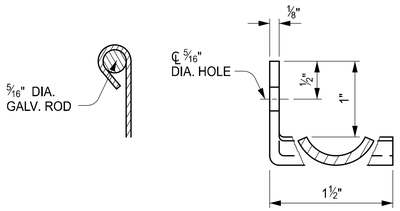



PROFILE VIEW

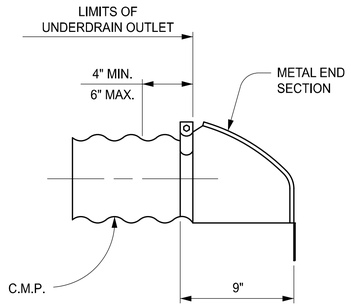


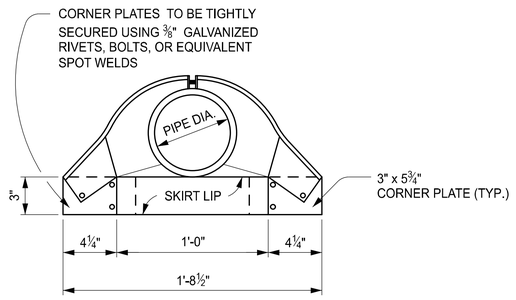




REINFORCED EDGE DETAIL



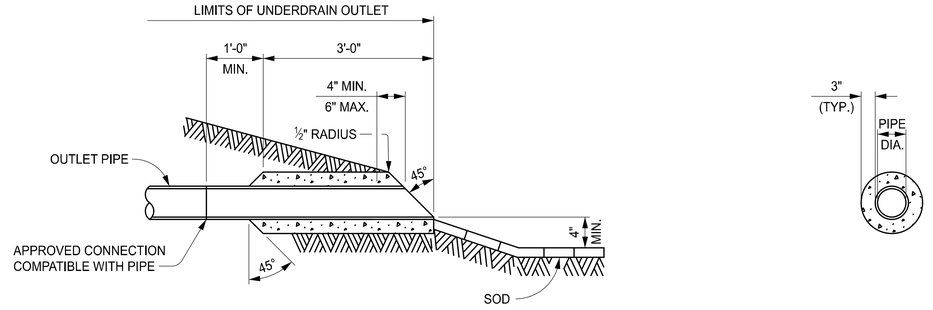

CONNECTOR BRACKET DETAIL



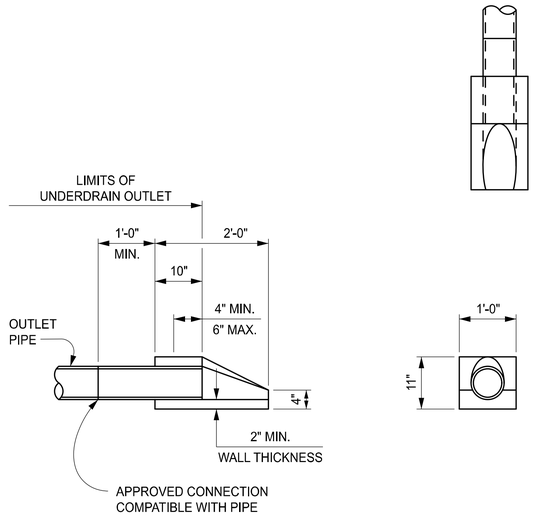




STEEL END SECTION FOR 4" OR 6" PIPE






CONCRETE RING FOR 4" OR 6" PIPE




CONCRETE END SECTION
FOR 4" OR 6" PIPE

NOTES:

POSITIVE DRAINAGE SHALL BE PROVIDED FOR UNDERDRAINS AND UNDERDRAIN OUTLETS.

UNDERDRAIN PIPE SIZES SHALL BE AS SPECIFIED ON THE PLANS.

CONNECTIONS BETWEEN UNDERDRAIN PIPE AND UNDERDRAIN OUTLET PIPE SHALL BE CONSTRUCTED ACCORDING TO THE STANDARD SPECIFICATIONS FOR CONSTRUCTION AND AS APPROVED BY THE ENGINEER.

CONNECTIONS, IF REQUIRED WITHIN THE OUTLET PIPE, SHALL BE ACCORDING TO APPLICABLE ASTM SPECIFICATIONS REFERENCED IN THE STANDARD SPECIFICATIONS FOR CONSTRUCTION. THEY SHALL BE WATER TIGHT, AND OF THE SAME MATERIAL AS THE OUTLET PIPE.

OUTLET CONNECTIONS TO DRAINAGE STRUCTURES SHALL BE ACCORDING TO STANDARD SPECIFICATIONS FOR CONSTRUCTION FOR DRAINAGE STRUCTURES.

UNDERDRAIN OUTLET PIPE SHALL BE RIGID PVC OR CORRUGATED METAL ONLY.

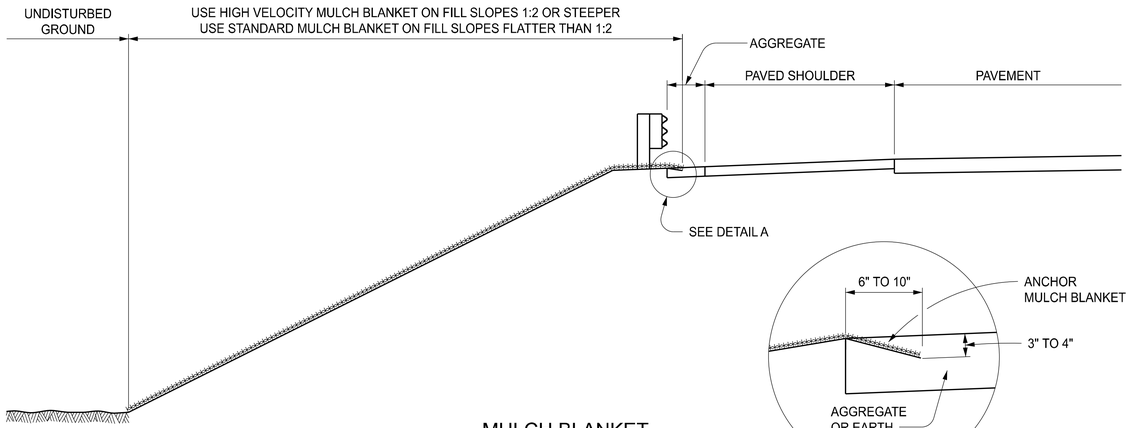
THE CONCRETE RING OR CONCRETE END SECTION SHALL BE CAST AROUND THE SAME TYPE OF PIPE AS THAT USED FOR UNDERDRAIN OUTLET PIPE.

STEEL END SECTIONS SHALL BE ATTACHED TO THE ENDS OF CORRUGATED METAL PIPE AS SPECIFIED ON THIS STANDARD PLAN, BY STANDARD METAL BANDS, OR BY OTHER CONNECTING DEVICES AS APPROVED BY THE ENGINEER.

STEEL END SECTIONS ARE NOT ALLOWED ON PVC OUTLET PIPE. CONCRETE END SECTIONS ARE REQUIRED.

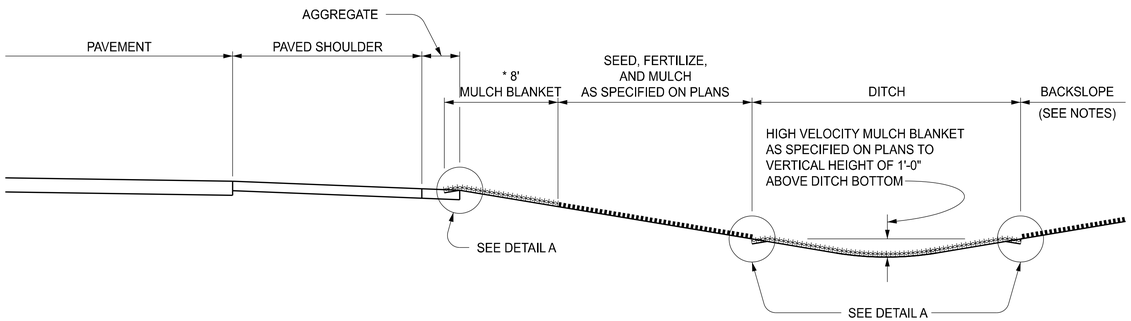
HELICALLY CORRUGATED PIPE (EXCEPT PERFORATED PIPE) SHALL HAVE THE ENDS OF THE PIPE REROLLED TO FORM ANNULAR CORRUGATIONS FOR CONNECTING THE END SECTION.

GRANULAR MATERIAL PRODUCED FROM CRUSHED PORTLAND CEMENT CONCRETE IS NOT PERMITTED FOR ANY BACKFILL MATERIAL.

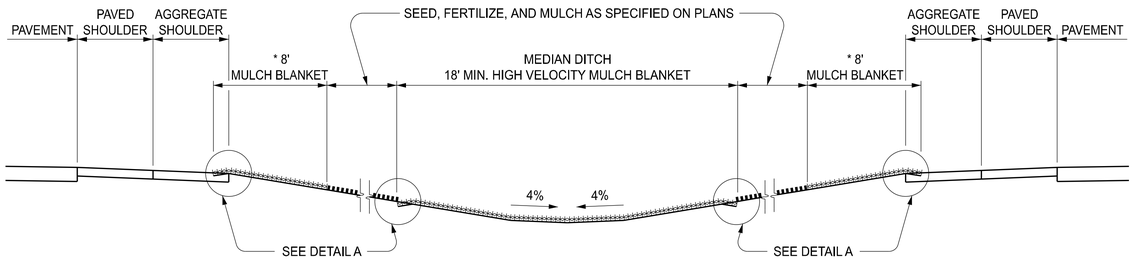



MULCH BLANKET
ON GUARDRAIL FILL SLOPE

DETAIL A




TYPICAL SLOPE AND DITCH PROTECTION




MULCH BLANKET SPILLWAY DITCH

* NOTE:

MULCH BLANKET SHALL BE USED ON BOTH SIDES OF NORMAL SECTIONS, HIGH SIDES OF ALL SUPERELEVATED SECTIONS, AND LOW SIDES OF PAVEMENTS HAVING A SUPERELEVATION OF 5% OR LESS. HIGH VELOCITY MULCH BLANKET SHALL BE USED ON THE LOW SIDE OF PAVEMENTS HAVING A RATE OF SUPERELEVATION GREATER THAN 5%.

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MDOT Michigan Department of Transportation
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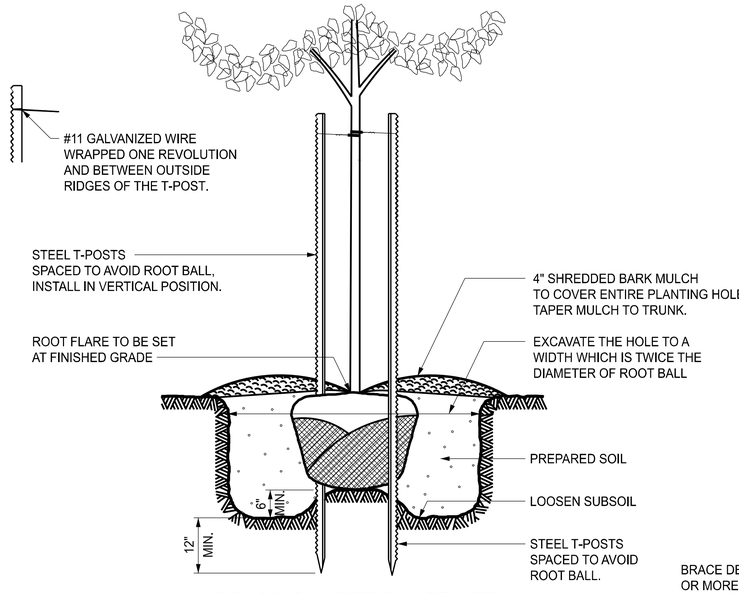
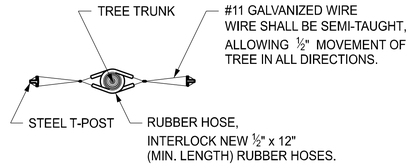
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
SEEDING AND TREE PLANTING

| (SPECIAL DETAIL) | 12/08/2023 | R-100-I | SHEET |
|---|---|---|---|
| FHWA APPROVAL | PLAN DATE | | 1 OF 4 |



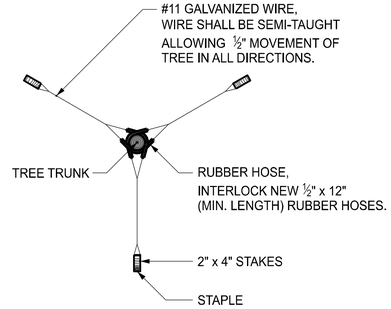

BRACING - VERTICAL STAKES




BRACING DETAIL

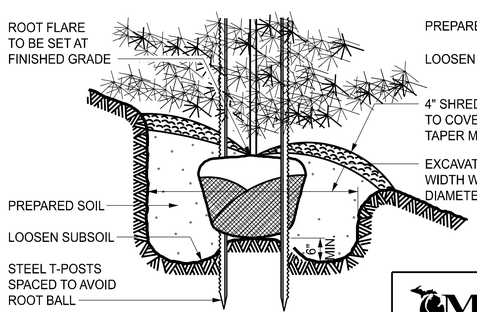
BRACE DECIDUOUS TREES 2" TO 4" IN CALIPER OR 8' OR MORE IN HEIGHT WITH TWO STAKES.

BRACE DECIDUOUS TREES LESS THAN 2" IN CALIPER OR 8' IN HEIGHT WITH ONE STAKE ON THE WESTERLY SIDE OF THE PLANT.

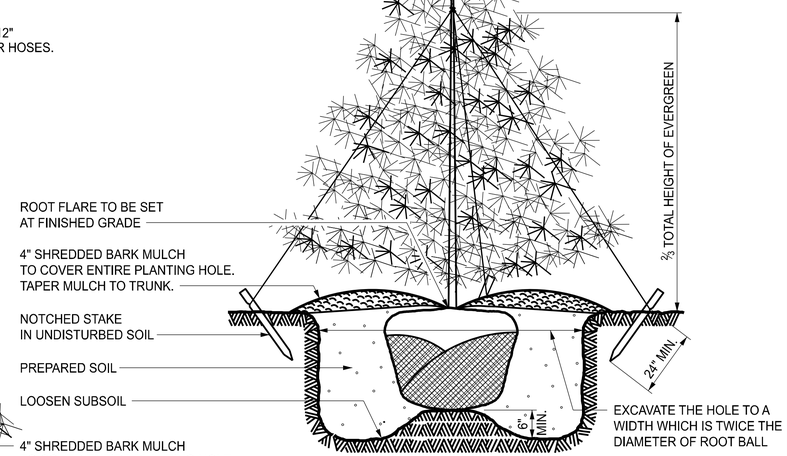



TRIPOD GUYING DETAIL

GUY EVERGREENS OVER 4" IN CALIPER OR 6' IN HEIGHT WITH THE TRIPOD METHOD AND UNDER 6' IN HEIGHT WITH TWO STAKES.




SLOPE PLANTING



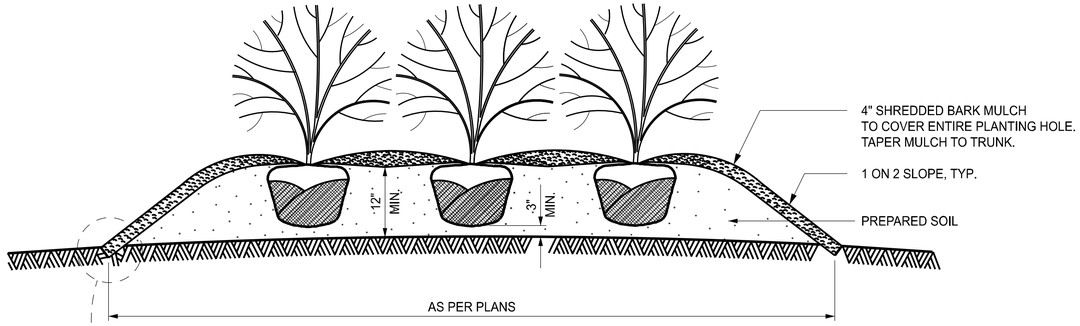

GUYING - TRIPOD METHOD

MDOT Michigan Department of Transportation
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

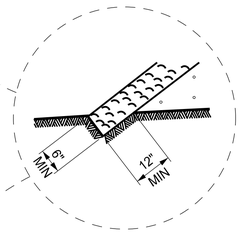
STANDARD PLAN FOR
SEEDING AND TREE PLANTING

| (SPECIAL DETAIL) | 12/08/2023 | R-100-I | SHEET |
|---|---|---|---|
| FHWA APPROVAL | PLAN DATE | | 2 OF 4 |

SECT 38




RAISED SHRUB BED DETAIL



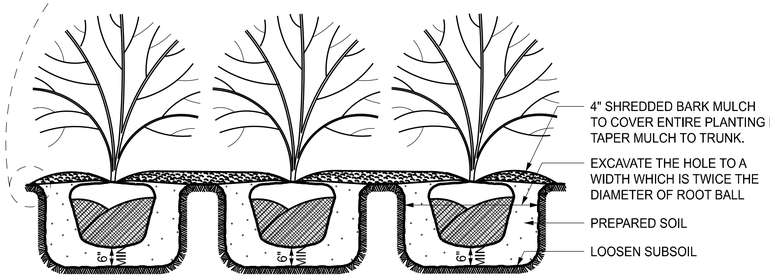

SHRUB BED EDGING DETAIL

FIRST AND SECOND WATERING AND CULTIVATION SHALL INCLUDE SHRUB BEDS.

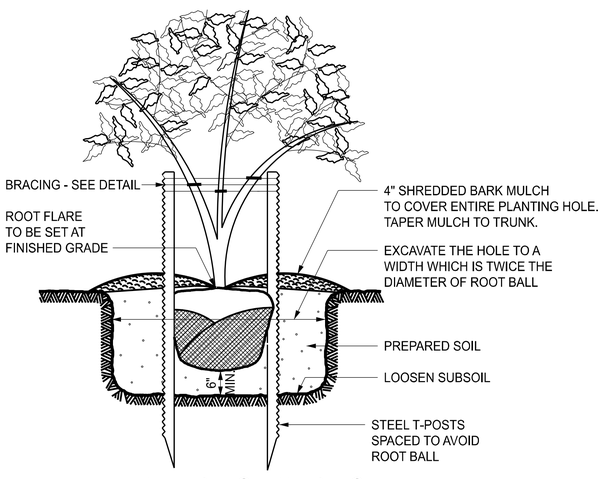
CUT 6" x 12" (MIN.) EDGING AROUND THE PERIMETER OF ALL SHRUB BEDS SHOWN ON THE PLANS. SPRAY A NON-PERSISTANT GLYPHOSATE HERBICIDE TO ENTIRE SHRUB BEDS PRIOR TO PLANTING AND BARK PLACEMENT.

SHRUB BEDS ARE TO BE PAID FOR BY THE PAY ITEM 'SITE PREPARATION'.

ALL PLANTS SHALL BE SET PLUMB AND HAVE THE BEST SIDE OF PLANT FACING THE MAIN VIEWING DIRECTION.




SHRUB BED DETAIL




MULTIPLE STEM TREES

PLANTING NOTES:

ALL EXCAVATED MATERIAL SHALL BE REMOVED FROM THE SITE - IMMEDIATELY.

LOOSEN SUBSOIL TO A DEPTH OF 4". LOOSEN EARTH ON SIDES OF PLANT POCKET TO BREAK ANY GLAZING CAUSED BY DIGGING.

FILL PREPARED SOIL TO ½ THE DEPTH OF THE ROOT BALL, PACK FIRMLY, AND PUDDLE WITH WATER.

BACKFILL WITH PREPARED SOIL WHICH, AFTER COMPACTION, IS FLUSH WITH SURROUNDING GROUND LEVEL.

COVER ENTIRE PLANT POCKET AREA WITH 4" MULCH. PRUNE AND BRACE AND GUY.

WHEN PLANTS ARE FURNISHED IN CONTAINERS, CONTAINERS SHALL BE COMPLETELY REMOVED AT THE TIME OF PLANTING.

TREE HEIGHTS ARE SHOWN BEFORE PRUNING. TREE PLANTING DEPTHS ARE SHOWN AFTER SETTLING.

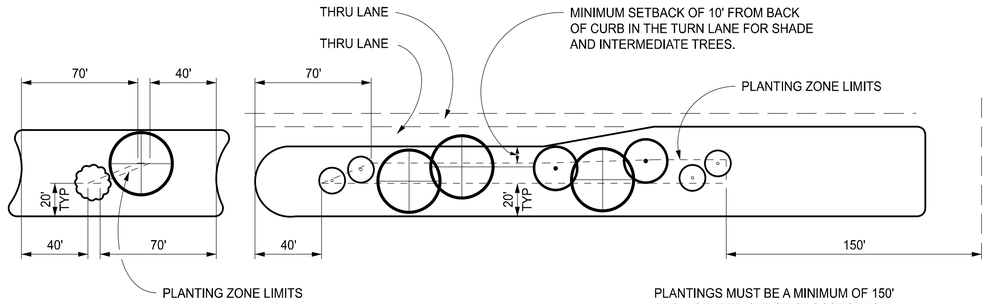
TREES AND SHRUBS SHALL NOT BE PLANTED WITHIN 50' AND 30' RESPECTIVELY OF THE NEAREST EDGE OF METAL - EXCEPT WHERE INACCESSIBLE TO VEHICLES.

MDOT Michigan Department of Transportation

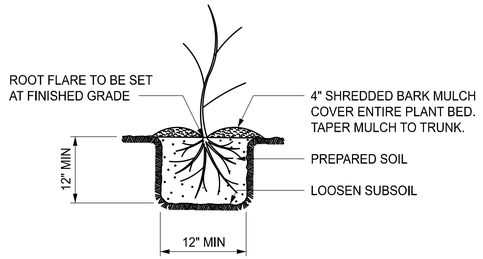
DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
SEEDING AND TREE PLANTING

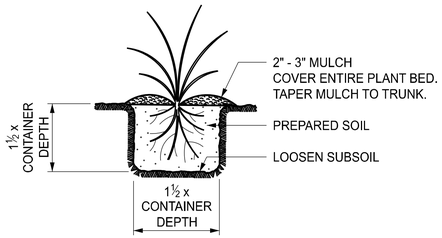
| (SPECIAL DETAIL) | 12/08/2023 | R-100-I | SHEET |
|---|---|---|---|
| FHWA APPROVAL | PLAN DATE | | 3 OF 4 |




MEDIAN PLANTING
NOT TO SCALE




BARE ROOT PLANTS




PERENNIAL PLANTS

## PLANTING BARE ROOT PLANT MATERIAL

REFER TO THE "SPECIAL PROVISIONS FOR BARE ROOT PLANTING" FOR SHIPPING, STORAGE AND HANDLING REQUIREMENTS.

MAINTAIN ROOT MOISTURE BY KEEPING ROOTS IMMERSED IN WATER PRIOR TO PLANTING.

ROOT PRUNE AS NECESSARY TO REMOVE ALL DAMAGED OR BROKEN ROOTS, AND AS REQUIRED BY THE DISTRICT FORESTER OR RESOURCE SPECIALIST.

DIG PLANTING HOLES AT LEAST 12" WIDE AND 12" DEEP TO ACCOMODATE ROOT MASS.

SET PLANTS PLUMB WITH THE ROOTS SPREAD PUT IN A NATURAL POSITION AT A DEPTH EQUAL TO THE DEPTH AT THE NURSERY.

HOLD PLANT FIRMLY AND PUDDLE (NOT TAMP) THE BACKFILL AROUND THE ROOTS WITH WATER. SUFFICIENT WATER SHALL BE USED TO ENSURE SATURATION OF THE BACKFILL, BUT CARE SHOULD BE TAKEN NOT TO OVERWATER, CAUSING A FLOATING SOIL MASS THAT PREVENTS COMPACTION AND MAY RESULT IN AIR POCKETS ADJACENT TO THE ROOTS. BACKFILL SHOULD BE FLUSH WITH THE GROUND AFTER COMPACTION.

COVER ENTIRE PLANT POCKET AREA WITH 4" MULCH AS SHOWN.

FIRST AND SECOND WATERING AND CULTIVATION SHALL INCLUDE PERENNIAL BEDS.

PERENNIALS ARE TO BE FULLY DEVELOPED TWO YEAR #2 CONTAINER PLANTS.

ENTIRE PERENNIAL BED SHALL BE EXCAVATED DOWN 12" AND REPLACED WITH 12" OF PREPARED SOIL.

PERENNIAL BEDS ARE TO BE PAID FOR BY THE PAY ITEM 'SITE PREPARATION'.

SEEDING NOTES:

THIS STANDARD ILLUSTRATES THE TYPICAL USE OF SEEDING WITH MULCH, AS THESE ITEMS RELATE TO ROADWAY CONSTRUCTION. THE ACTUAL DESIGN AND MATERIALS USED TO CONSTRUCT THE COMPLETE SECTION, WHICH INCLUDES SEEDING WITH MULCHING, WILL BE ACCORDING TO THE PLANS AND THE STANDARD SPECIFICATIONS FOR CONSTRUCTION.

ITEMS CALLED FOR ON THIS STANDARD MAY ALSO BE USED DURING CONSTRUCTION AS AN EROSION CONTROL MEASURE. SEE STANDARD PLAN R-96-SERIES.

ALL DITCHES SHOULD HAVE HIGH VELOCITY MULCH BLANKET FOR EROSION CONTROL.

THE FIRST 8' BEHIND THE CURB OR SHOULDER IN URBAN MEDIAN AREAS WILL BE SEEDED, FERTILIZED, AND MULCHED WITH MULCH BLANKET. THE REMAINING AREAS WILL BE SEEDED, FERTILIZED, AND MULCHED WITH MULCH BLANKET OR STANDARD MULCH ANCHORED IN PLACE WITH A MULCH ADHESIVE OR WITH A MULCH NET.

ALL AREAS WHERE MULCH BLANKET IS CALLED FOR SHALL BE SEEDED, FERTILIZED, AND TOPSOILED AS SPECIFIED ON PLANS. NO MULCH OR ANCHORING MULCH IS REQUIRED WHERE MULCH BLANKET IS INSTALLED.

BACKSLOPE RESTORATION TREATMENT SHALL BE THE SAME AS THE FRONT SLOPE.

MDOT Michigan Department of Transportation

DEPARTMENT DIRECTOR
BRADLEY C. WIEFERICH, PE

STANDARD PLAN FOR
SEEDING AND TREE PLANTING

| (SPECIAL DETAIL) | 12/08/2023 | R-100-I | SHEET |
|---|---|---|---|
| FHWA APPROVAL | PLAN DATE | | 4 OF 4 |