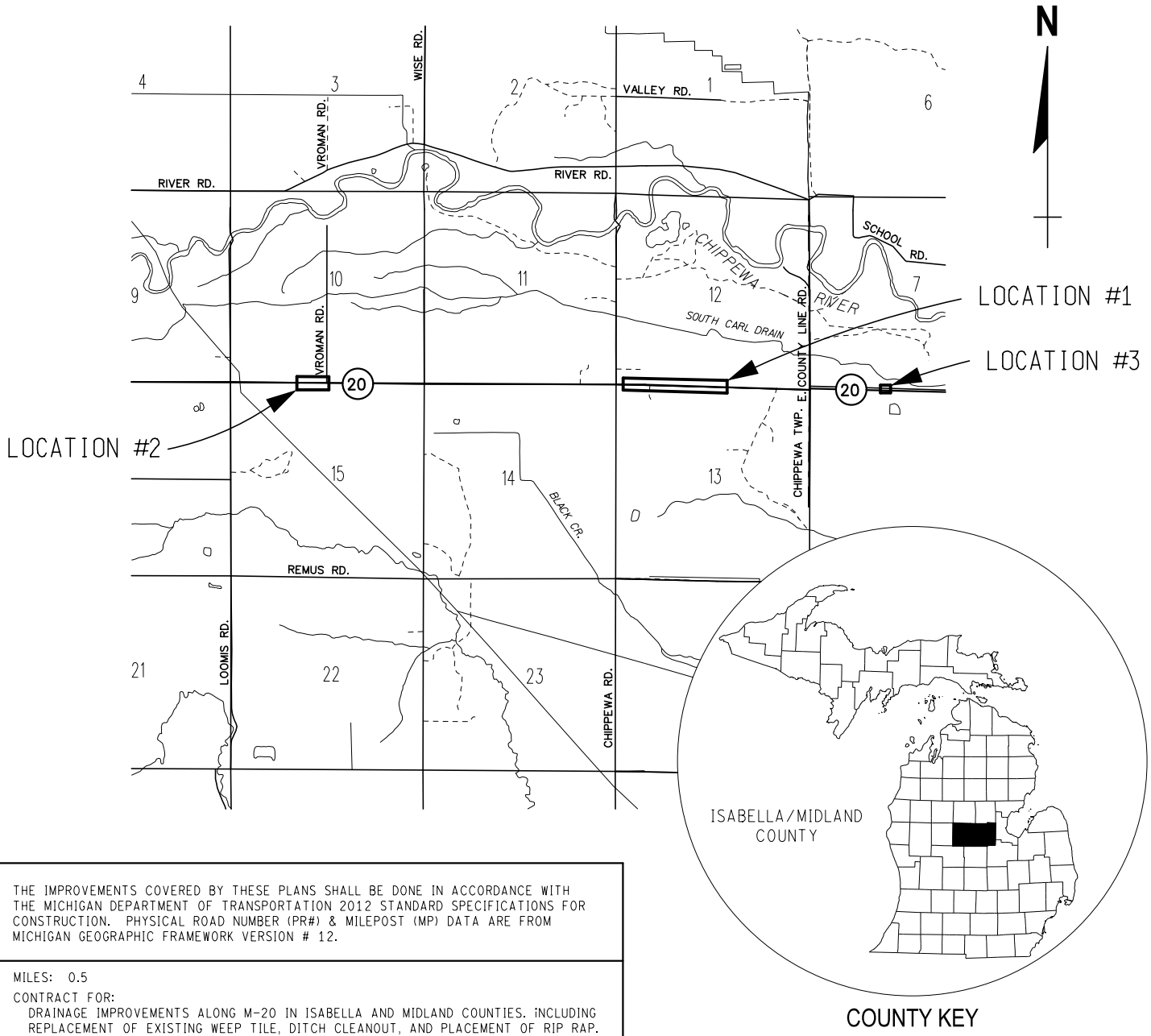
MICHIGAN DEPARTMENT OF TRANSPORTATION

ROUTE: M-20
CHIPPEWA & GREENDALE TOWNSHIP
ISABELLA & MIDLAND COUNTY

SECTION	CONTROL SEC	JOB NO.	FEDERAL PROJECT	FEDERAL ITEM
12	37022	17-3701		
15	37022	17-3701		
7	56021	17-3701		



COUNTY KEY

THE IMPROVEMENTS COVERED BY THESE PLANS SHALL BE DONE IN ACCORDANCE WITH THE MICHIGAN DEPARTMENT OF TRANSPORTATION 2012 STANDARD SPECIFICATIONS FOR CONSTRUCTION. PHYSICAL ROAD NUMBER (PR#) & MILEPOST (MP) DATA ARE FROM MICHIGAN GEOGRAPHIC FRAMEWORK VERSION # 12.

MILES: 0.5

CONTRACT FOR:
DRAINAGE IMPROVEMENTS ALONG M-20 IN ISABELLA AND MIDLAND COUNTIES. INCLUDING REPLACEMENT OF EXISTING WEEP TILE, DITCH CLEANOUT, AND PLACEMENT OF RIP RAP.

MDOT Michigan Department of Transportation
KIRK T. STEUDLE, P.E. - DIRECTOR

DATE: 2/14/17	M-20 DRAINAGE IMPROVEMENTS	DRAWING	SHEET
DESIGN UNIT: MYERS	LOCATION SHEET		
TSC: MT PLEASANT			1

PROGRESS SCHEDULE

Work must be completed within 30 days of award. No work shall be performed, or lane closures allowed during the Memorial Day holiday period, defined as beginning on Thursday, May 25th at noon until Tuesday, May 30th at normal starting time. Notice must be provided to Jason Potts at 989-737-0211 at least three (3) calendar days prior to beginning work.

JOB LOCATION

Location #1 (North side of M-20, from Chippewa Rd to ½ mile east of Chippewa Rd.):

CS Information
CS 37022 MP 7.357 (M-20)
PR Information
PR 242308 MP 21.366 (M-20)
Location Length = 1200 feet

Location #2 (South side of M-20, from Vroman Rd. to 850 feet west):

CS Information
CS 37022 MP 5.451 (M-20)
PR Information
PR 242308 MP 19.460 (M-20)
Location Length = 1/8 mile

Location #3 (North side of M-20, ½ mile east of Isabella County Line Rd.):

CS Information
CS 56021 MP 0.502 (M-20)
PR Information
PR 885110 MP 0.502 (M-20)
Location Length = 50 feet

DESCRIPTION OF WORK

Location #1: Remove and replace the existing 18" weep tile with new 18" Class A Sewer and cleanout existing drainage structures at the locations shown on the attached plan sheets. Where driveways are encountered, saw cut and remove the existing HMA to the minimum extent necessary; remove, salvage, and reset existing culverts to existing elevations; and restore the driveways with Approach, Cl II material. Existing gravel shoulders shall be restored with Shoulder, Cl II, Modified as necessary. All slopes that are disturbed shall be restored with Slope Restoration, Type B.

Location #2: Clean out ditch from the last drainage structure on the south side of M-20, located 600 feet west of Vroman Rd, east to Vroman Rd. Also, clean out the first two drainage structures to the west of Vroman Rd. on the south side of M-20. Drainage structure cleanout at these locations will also include cleaning the inlet pipe stems from the ditch to the drainage structures.

Location #3: Place riprap at the outlet of the drop structure. The use of crushed concrete will not be allowed.

ESTIMATED QUANTITIES

The quantities included in the summations below are approximate and for reference only. Contractor will be responsible for verifying quantities before bidding by site inspection and plan review. If any major discrepancies are noted, contractor must contact Collin Lorenz at (989) 274-2499.

This project is a Maintenance funded project, which means that there will be absolutely no overpayment or extras. All material, labor and mobilization shall be included in the bid.

MDOT will have the low bid reviewed and approved for funding. MDOT reserves the right to reject any bid that appears to be unqualified. Before award, MDOT may request a site and plan review meeting with the low bid contractor.

Items of Work (for information only)

Location #1 (North side of M-20, from Chippewa Rd to ½ mile East of Chippewa Rd.):

Sewer, Rem, Less than 24 inch	700	Ft
Sewer, Cl A, 18", Tr Det A	700	Ft
Slope Restoration, Type B	1400	Syd
Dr Structure, Cleanout	8	Ea
Approach, Cl II, 6 inch	85	Syd

Table 1 (For Information Only)

Location #1: North side of M-20, from Chippewa Rd to ½ mile East of Chippewa Rd.	
Road Stationing	**Comments**
370+21.34	Chippewa Road
374+00 to 375+50	Replace existing weep tile.
382+00 to 384+00	Replace existing weep tile and clean out both drainage structures.
389+00 to 390+50	Replace existing weep tile and clean out both drainage structures.
393+00 to 395+00	Replace existing weep tile and clean out both drainage structures.

Location #2 (South side of M-20, from Vroman Rd. to the West 850 feet):

Ditch Cleanout	5	Sta
Dr Structure, Cleanout	2	Ea

Table 2 (For Information Only)

Location #2: South side of M-20, from Vroman Rd. to the West 600 feet	
Road Stationing	**Comments**
285+00 to 290+45	Cleanout ditch
282+00 and 285+00	Clean out drainage structures
290+45	Vroman Road

Location #3 (North side of M-20, ½ mile east of Isabella County Line Rd.):

Riprap, Plain	10	Syd

Table 3 (For Information Only)

Location #3: North side of M-20, ½ mile East of Isabella County Line Rd.	
Road Stationing	**Comments**
423+45.67	Isabella County Line Rd.
451+54	Place rip rap at the outlet of the drop structure.

MAINTAINING TRAFFIC

Traffic Restrictions

Maintaining traffic will be accomplished with shoulder closures utilizing Maintaining Traffic Typicals M0020a and M0110a. Additionally, traffic shall be maintained according to Sections 104.07, 104.11, and 812 of the 2012 Standard Specifications for Construction, including any Supplemental Specifications, and as specified herein.

Sign covers shall be placed over any regulatory, warning, or construction signs that are not applicable during construction.

The Contractor shall not create any unsafe conditions within the Construction Influence Area (CIA) that form a hazard for motorists. The CIA shall extend as far as the required advanced construction signing, detour signing, or any other signs pertaining to this location. Extra caution should be used when delineating the work zone overnight to protect the roadway users.

Drop-offs will not be allowed overnight. The Contractor shall bring all slopes to a 1 on 3 slope or flatter in any location within 12 feet of live traffic at the end of each work day. This work shall be included in the overall project estimate.

The Contractor will be responsible for coordinating with landowners about maintaining driveway access.

Once work is initiated that includes any lane restrictions, that work shall be continuous until completed.

The storage restrictions in section 812.03.G.5 of the 2012 Standard Specifications for Construction will be strictly adhered to. The Contractor shall not park any vehicle or store any material on public recreational property.

Daily maintenance of traffic control items will not be paid for separately, but will be included in the lump sum price for the project.

GENERAL NOTES

MISS DIG/UNDERGROUND UTILITY NOTIFICATION
For the protection of underground utilities and in conformance with Public Act 174 of 2013, the Contractor shall contact MISS DIG System, Inc. by phone at 811 or 800-482-7171 or via the web at either elocate.missdig.org for single address or rte.missdig.org, a minimum of 3 business days prior to excavating, excluding weekends and holidays.

EXISTING WATER MAINS AND SEWERS
The Contractor shall be responsible for any damage to properly identified existing water mains and/or existing sewers during the construction of this project.

DITCH AND DRAINAGE STRUCTURE CLEANOUT
The material removed from the ditch and drainage structure cleanout operations shall become the property of the contractor and must be disposed of in accordance of section 205.03 of the 2012 Standard Specifications for Construction.

STATIONING
Stationing on this project was taken from old plans and is not necessarily accurate.

OLD ROAD PLANS
The following old road plans were referred to in the design of this project.

37022-36170 (1995)
56021-41155 (1996)

In addition, other old road plans that predate this project may be available. These plans may be reviewed in the Transportation Service Center (TSC) during normal working hours.

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

SEED MIXTURE
The symbol for the permanent turf seed mixture on this project is symbol THM.

EXISTING SIGN RELOCATION
Any permanent signs requiring relocation due to Contractor operations shall be salvaged and reset by the Contractor at locations designated by the Engineer. Signs and posts damaged during the removal and storage operations shall be replaced with new signs and

posts. The cost of this work shall be borne by the Contractor.

Notes Applying to Standard Plans

Where the following items are called for on the plans, they are to be constructed according to the Standard Plan or Special Detail given below opposite each item unless otherwise indicated.

Drainage Structures..... *R-1-G
Granular Blanket, Underdrains, Outlet Endings for Underdrains, and Sewer.....R-80-E
Utility Trenches *R-83-C
Soil Erosion & Sedimentation Control Measures.....R-96-E
Seeding and Tree Planting R-100-H
Temporary Traffic Control Devices..... WZD-125-E*
** indicates Special Detail*

PUBLIC UTILITIES

Control Section = 37022

Charter Communications
221 Ellis Place — Cable
Mt. Pleasant, Michigan 48858
Ph: 989-621-0505(W)
Attn: Bryon Carroll

City of Mt. Pleasant
1303 N. Franklin St. — Other
Mt. Pleasant, Michigan 48858
Ph: 989-779-5401x5402(W)
Attn: John Zang

Consumers Energy
1945 West Parnall Road, P12-208A — Electric
Jackson, Michigan 49201
Ph: 517-788-0817(W)
Attn: Pete Mulhearn

Consumers Energy
1325 Wright Avenue — Electric
Alma, Michigan 48801
Ph: 989-516-4128(W)
Attn: Doug Shuster

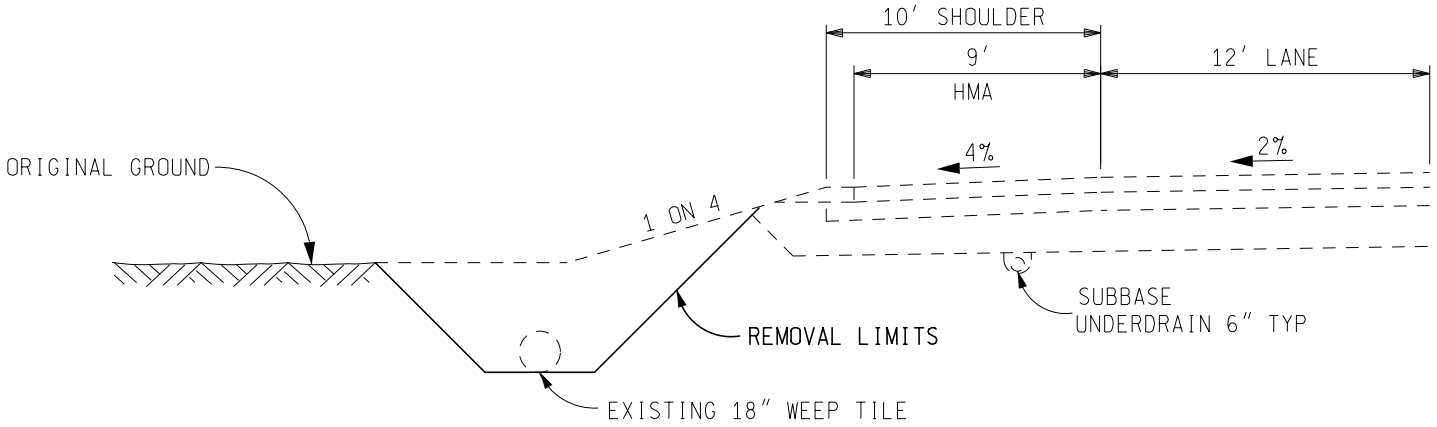
Consumers Energy 2400 Weiss Street Saginaw, Michigan 48602 Ph: 989-791-5885(W) Attn: Kyle Skrabut	Gas
Consumers Energy 1945 West Parnall Road, P23-228 Jackson, Michigan 49201 Ph: 517-788-0998(W) Attn: Timothy Coppernoll	Gas
DTE Energy / MichCon Gas 609 Bjornson Big Rapids, MI 49307 Ph: 231-592-3244(W) Attn: Larry Bourke	Gas
Frontier Communications 345 Pine Avenue Alma, Michigan 48801 Ph: 989-463-0392(W) Attn: Mark Marshall	Telecom
Great Lakes Gas Transmission 5250 Corporate Drive Troy, Michigan 48098 Ph: 248-205-7596(W) Attn: Kitty Martin	Gas
Isabella County Drain Commissioner 200 North Main Street Mt. Pleasant, Michigan 48858 Ph: 989-317-4072(W) Attn: Robert Willoughby	County Drain
Merit Energy Company 2273 N. Winans Road Alma, Michigan 48801 Ph: 989-466-9135(W) Attn: Jim Abell	Gas

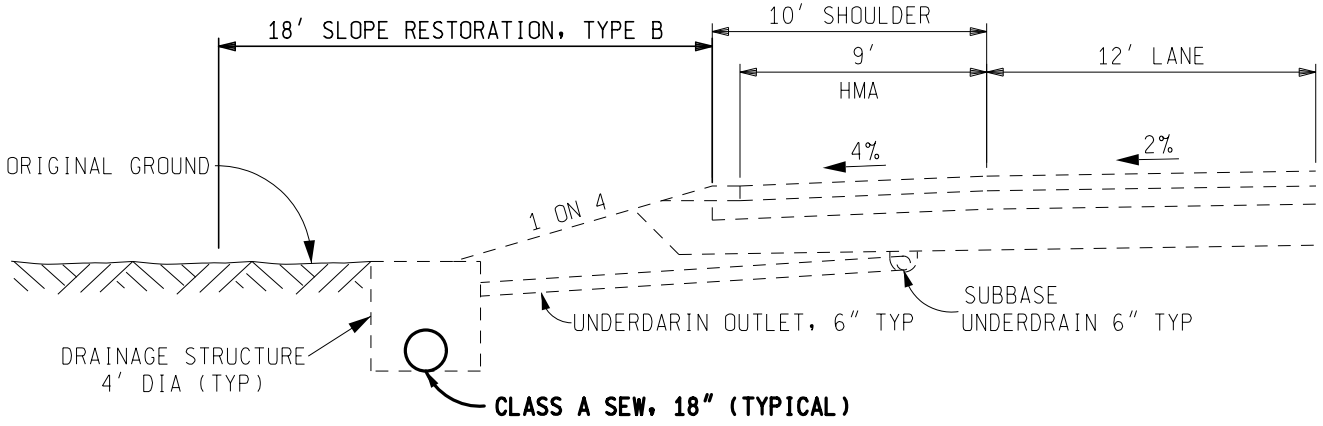
Merit Energy Company P.O. Box 910 Kalkaska, Michigan 49646 Ph: 231-258-6452(W) Attn: Randy Sanders	Gas
Mid Michigan Community College 5805 E. Pickard Mt. Pleasant, Michigan 48858 Ph: 989-386-6651(W) Attn: Kirk Lehr	Telecom
Midland County Educational Service Agency 3917 Jefferson Avenue Midland, Michigan 48640 Ph: 989-249-8752(W) Attn: Jim Mallory	Telecom
Saginaw Chippewa Indian Tribe 7070 E Broadway Rd Mt. Pleasant, Michigan 48858 Ph: 989-775-0150 (W) Attn: Daniel Staples	Telecom
Union Township 2010 S. Lincoln Road Mt. Pleasant, Michigan 48858 Ph: 989-772-4600x224(W) Attn: Kim Smith	Water
Windstream KDL 4074 S. Linden Road Flint, Michigan 48507 Ph: 810-691-1035(W) Attn: Dirk Welte	Telecom
Winn Telephone Company 402 N. Mission St Mt. Pleasant, Michigan 48858 Ph: 989-953-9879 (W) Attn: Mike Fitzpatrick	Telecom

Control Section = 56021

AT&T 136 E. 4th St. Clare, Michigan 48617 Ph: 989-980-7801(W) Attn: Rob Augustine	Telecom
Charter Communications 7372 Davison Rd Davison, Michigan 48423 Ph: 810-658-5140(W) Attn: David Kelly	Cable
City of Midland 333 W. Ellsworth Midland, Michigan 48640 Ph: 989-837-3353(W) Attn: Brian McManus	Water
Consumers Energy 2400 Weiss Street Saginaw, Michigan 48602 Ph: 989-791-5353(W) Attn: Greg Squanda	Electric
DOW Chemical Co. 921 Building Midland, Michigan 48667 Ph: 989-636-6779(W) Attn: Martin Hill	Other
Lee Township 1840 W. Olson Rd Sanford, Michigan 48657 Ph: 989-835-1491(W) Attn: Michael Glynn	Water

METC 27175 Energy Way Novi, Michigan 48377 Ph: 248-946-3298(W) Attn: Erin Keeler	Electric
Midland County Drain Commissioner 220 West Ellsworth Street, Room 229-30 Midland, Michigan 48640 Ph: 989-832-6772(W) Attn: Doug Enos	County Drain
Midland County Road Commission 2334 N. Meridian Road Sanford, Michigan 48657 Ph: 989-687-9060(W) Attn: Sam SanMiguel	Other
Midland County Water District No. 1 P.O. Box 320 Sanford, Michigan 48657 Ph: 989-687-2709(W) Attn: Ron Rose	Water
Wolverine Pipe Line Company 8075 Creekside Drive, Suite 210 Portage, Michigan 49024 Ph: 269-323-2491x124(W) Attn: Louis Kraus	Gas





MDOT Michigan Department of Transportation	NO SCALE	DATE: 2/14/17	CS: 37022	TYPICAL SECTIONS	DRAWING	SHEET
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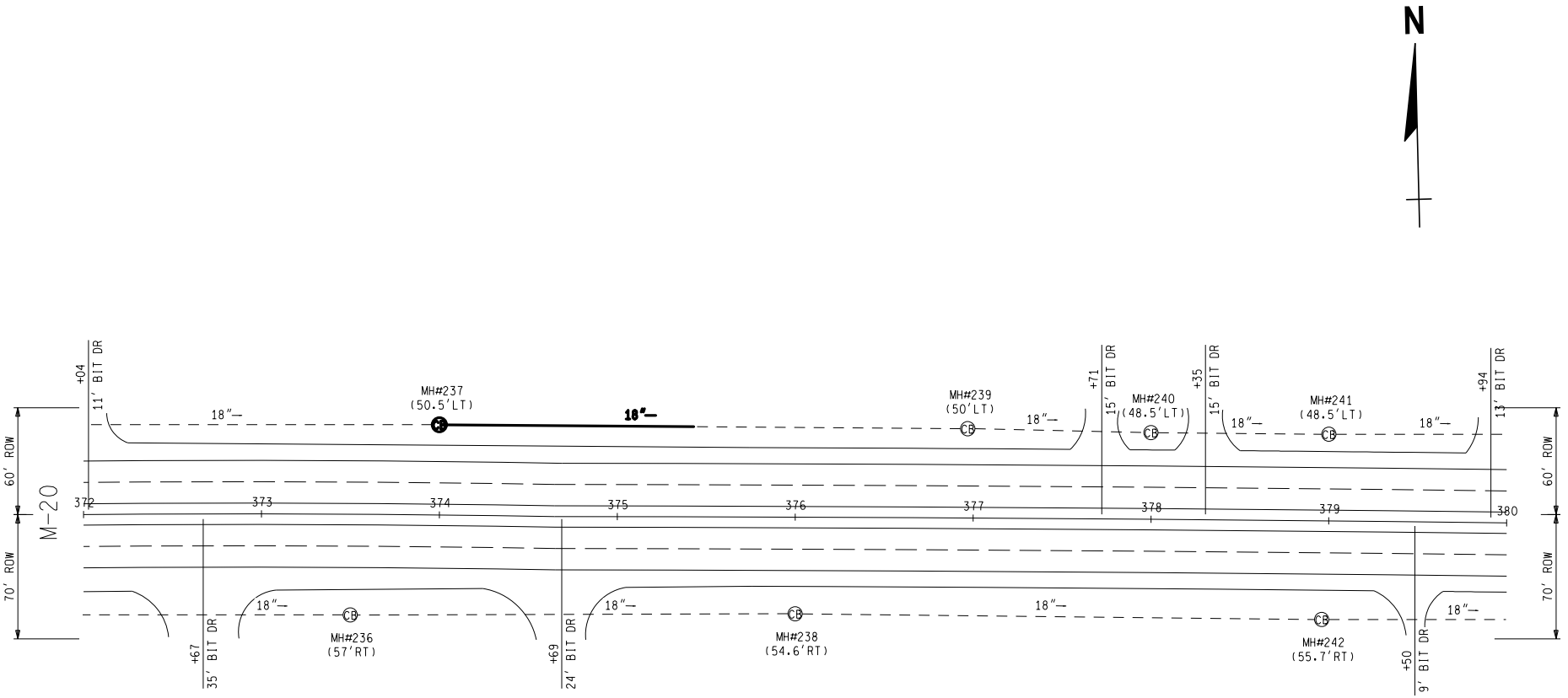
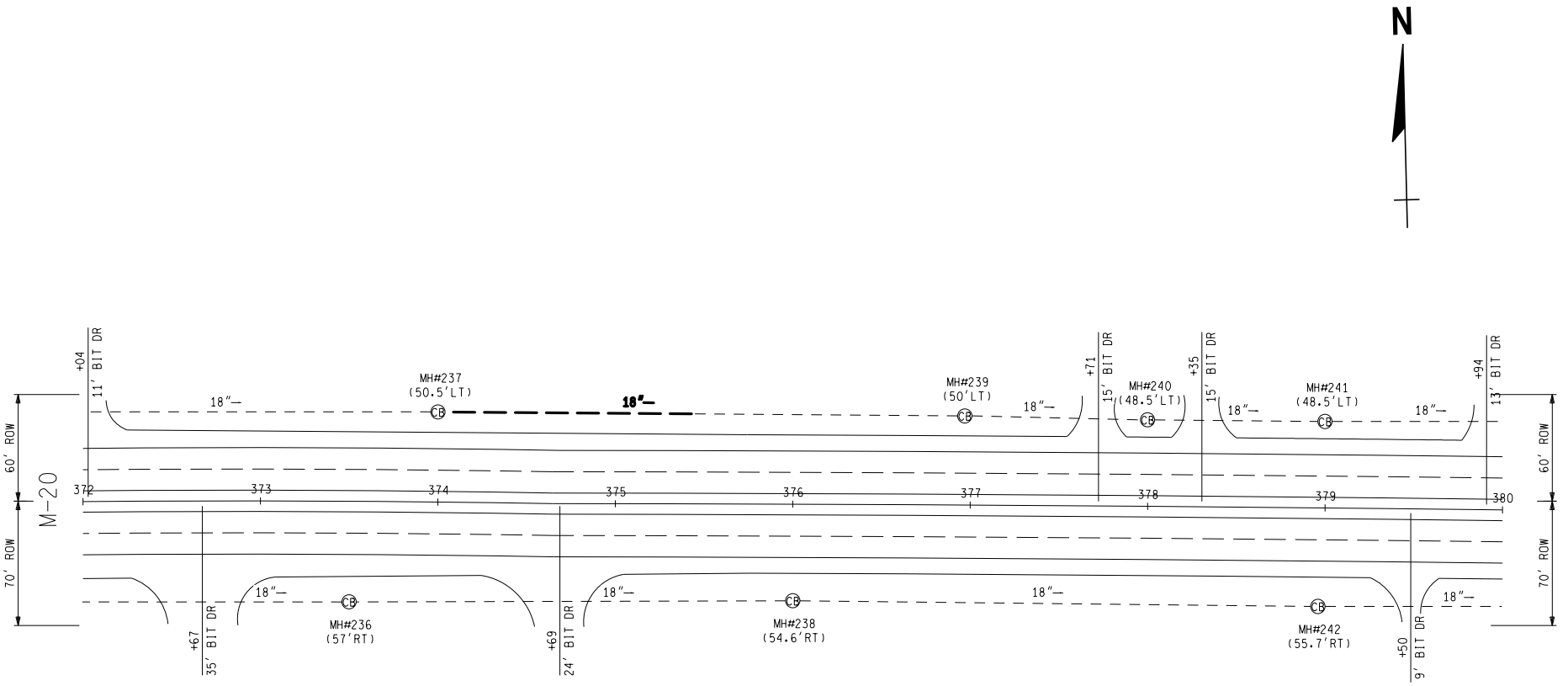
FILE:		TSC: MT PLEASANT				



REMOVAL QUANTITIES THIS SHEET

150	Ft	Sewer, Rem, Less than 24 inch
1	Ea	Dr Structure, Cleanout

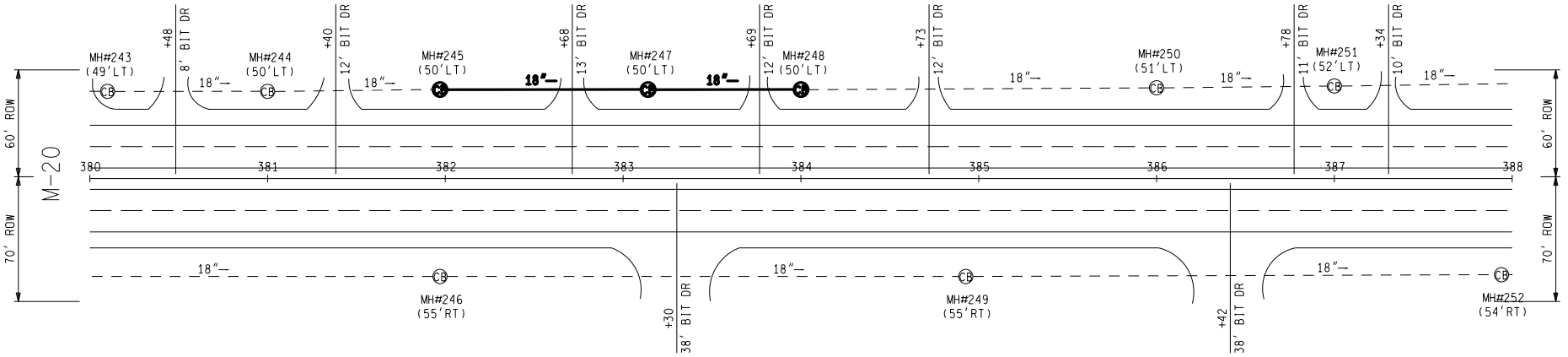
MDOT Michigan Department of Transportation	0 HORZ. (FT) 90	DATE: 2/14/17	CS: 37022	REMOVAL SHEET	DRAWING	SHEET
		DESIGN UNIT: MYERS	JN: 17-3701	M-20 STA 372+00 TO STA 380+00	M-20 REM	12
FILE:		TSC: MT PLEASANT		LOCATION #1		



CONSTRUCTION QUANTITIES THIS SHEET

150	Ft	Sewer, Cl A, 18", Tr Det A
300	Syd	Slope Restoration, Type B

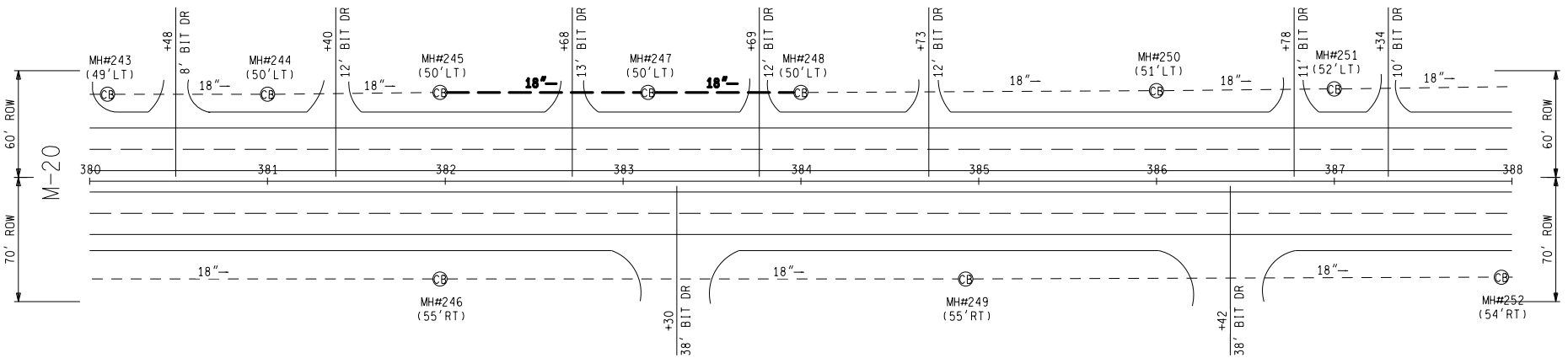
MDOT Michigan Department of Transportation	0 HORZ. (FT) 90	DATE: 2/14/17	CS: 37022	CONSTRUCTION SHEET	DRAWING	SHEET
		DESIGN UNIT: MYERS	JN: 17-3701	M-20 STA 372+00 TO STA 380+00	M-20 CON	13
FILE:		TSC: MT PLEASANT		LOCATION #1		



REMOVAL QUANTITIES THIS SHEET

200	Ft	Sewer, Rem, Less than 24 inch
3	Ea	Dr Structure, Cleanout

MDOT Michigan Department of Transportation	0 HORZ. (FT) 90	DATE: 2/14/17	CS: 37022	REMOVAL SHEET	DRAWING	SHEET
		DESIGN UNIT: MYERS	JN: 17-3701	M-20 STA 380+00 TO STA 388+00	M-20 REM	14
FILE:		TSC: MT PLEASANT		LOCATION #1		



CONSTRUCTION QUANTITIES THIS SHEET

200	Ft	Sewer, Cl A, 18", Tr Det A
400	Syd	Slope Restoration, Type B

MDOT Michigan Department of Transportation	0 HORZ. (FT) 90	DATE: 2/14/17	CS: 37022	CONSTRUCTION SHEET	DRAWING	SHEET
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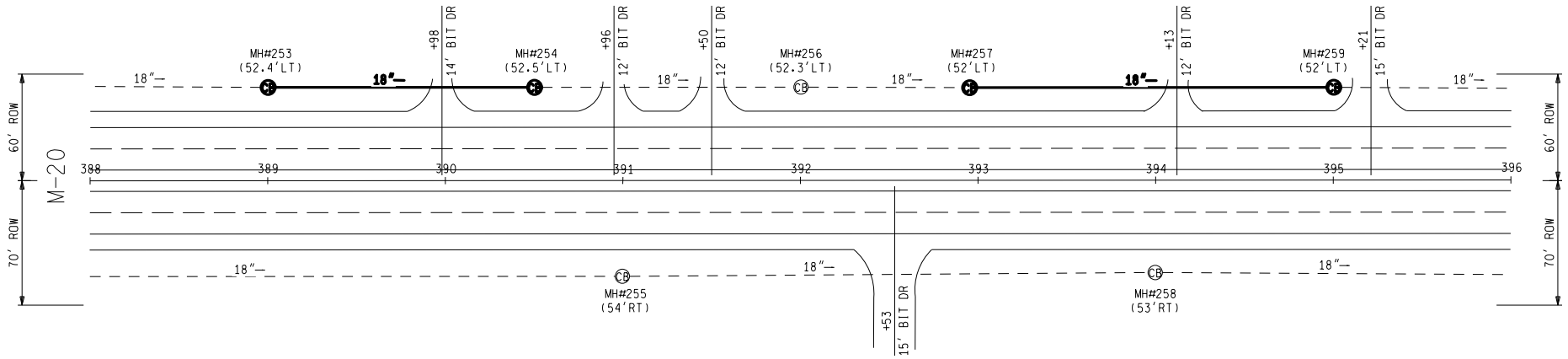

REMOVAL QUANTITIES THIS SHEET

350	Ft	Sewer, Rem, Less than 24 inch
4	Ea	Dr Structure, Cleanout

MDOT Michigan Department of Transportation	0 HORZ. (FT) 90	DATE: 2/14/17	CS: 37022	REMOVAL SHEET	DRAWING	SHEET
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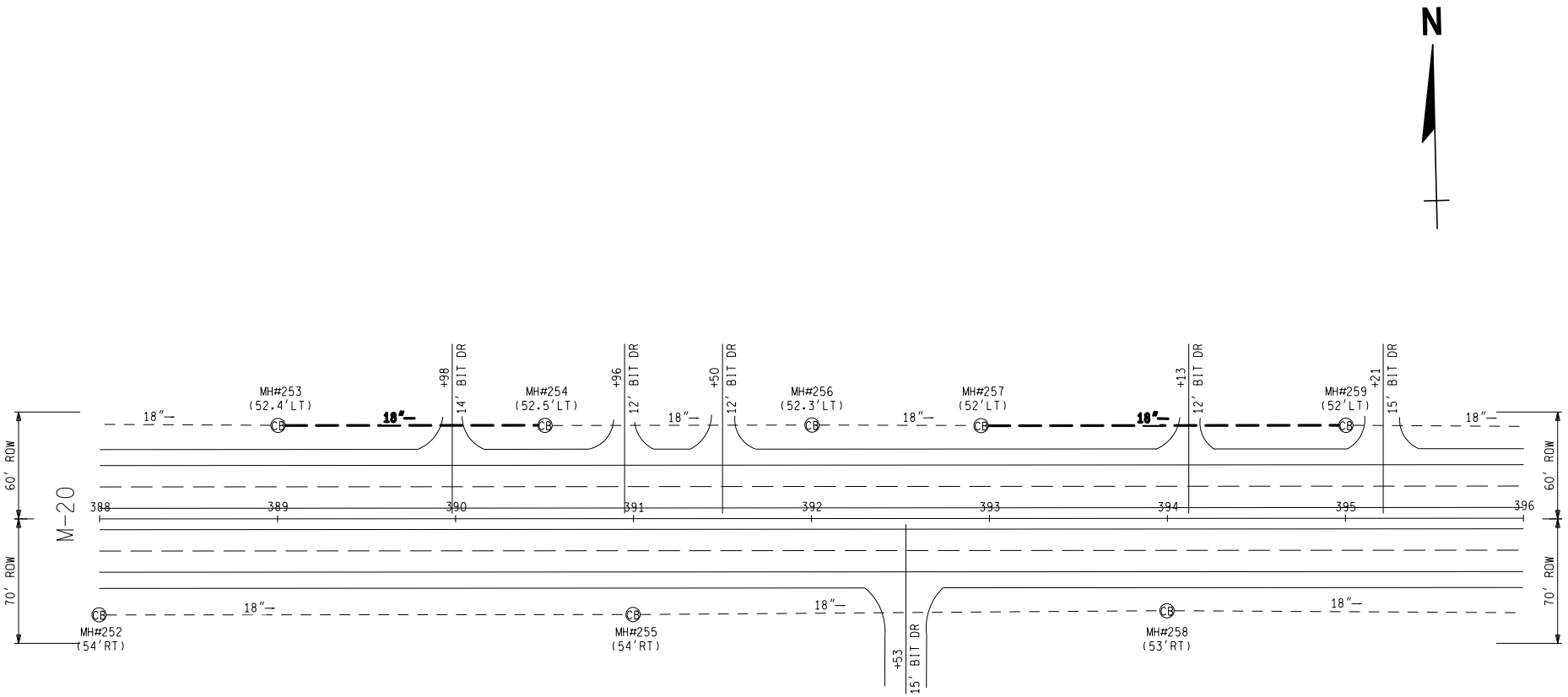


CONSTRUCTION QUANTITIES THIS SHEET

350	Ft	Sewer, Cl A, 18", Tr Det A
700	Syd	Slope Restoration, Type B

MDOT Michigan Department of Transportation	0 HORZ. (FT) 90	DATE: 2/14/17	CS: 37022	CONSTRUCTION SHEET	DRAWING	SHEET
		DESIGN UNIT: MYERS	JN: 17-3701	M-20 STA 388+00 TO STA 396+00	M-20 CON	17
FILE:		TSC: MT PLEASANT		LOCATION #1		

MINIMUM MERGING TAPER LENGTH "L" (FEET)

OFFSET	POSTED SPEED LIMIT, MPH (PRIOR TO WORK AREA)										
FEET	25	30	35	40	45	50	55	60	65	70	
1	10	15	20	27	45	50	55	60	65	70	TAPER LENGTH "L" IN FEET
2	21	30	41	53	90	100	110	120	130	140	
3	31	45	61	80	135	150	165	180	195	210	
4	42	60	82	107	180	200	220	240	260	280	
5	52	75	102	133	225	250	275	300	325	350	
6	63	90	123	160	270	300	330	360	390	420	
7	73	105	143	187	315	350	385	420	455	490	
8	83	120	163	213	360	400	440	480	520	560	
9	94	135	184	240	405	450	495	540	585	630	
10	104	150	204	267	450	500	550	600	650	700	
11	115	165	225	293	495	550	605	660	715	770	
12	125	180	245	320	540	600	660	720	780	840	
13	135	195	266	347	585	650	715	780	845	910	
14	146	210	286	374	630	700	770	840	910	980	
15	157	225	307	400	675	750	825	900	975	1050	

THE FORMULAS FOR THE MINIMUM LENGTH OF A MERGING TAPER IN DERIVING THE "L" VALUES SHOWN IN THE ABOVE TABLES ARE AS FOLLOWS:

$$"L" = \frac{W \times S^2}{60}$$ WHERE POSTED SPEED PRIOR TO THE WORK AREA IS 40 MPH OR LESS

"L" = S x W WHERE POSTED SPEED PRIOR TO THE WORK AREA IS 45 MPH OR GREATER

L = MINIMUM LENGTH OF MERGING TAPER
S = POSTED SPEED LIMIT IN MPH PRIOR TO WORK AREA
W = WIDTH OF OFFSET

TYPES OF TAPERS	TAPER LENGTH
UPSTREAM TAPERS	
MERGING TAPER	L - MINIMUM
SHIFTING TAPER	1/2 L - MINIMUM
SHOULDER TAPER	1/3 L - MINIMUM
TWO-WAY TRAFFIC TAPER	100 ' - MAXIMUM
DOWNSTREAM TAPERS (USE IS OPTIONAL)	100 ' - MINIMUM (PER LANE)

MDOT Michigan Department of Transportation
TRAFFIC AND SAFETY
MAINTAINING TRAFFIC TYPICAL

TABLES FOR "L", "D" AND "B" VALUES

DRAWN BY: CON:AE:djf	JUNE 2006 PLAN DATE:	M0020a	SHEET 1 OF 2
CHECKED BY: BMM			
FILE: K:/DGN/TSR/STDS/ENGLISH/MNTTRF/M0020a.dgn	REV. 08/21/2006		

DISTANCE BETWEEN TRAFFIC CONTROL DEVICES "D" AND LENGTH OF LONGITUDINAL BUFFER SPACE ON "WHERE WORKERS PRESENT" SEQUENCES

"D" DISTANCES	POSTED SPEED LIMIT, MPH (PRIOR TO WORK AREA)									
	25	30	35	40	45	50	55	60	65	70
D (FEET)	250	300	350	400	450	500	550	600	650	700

GUIDELINES FOR LENGTH OF LONGITUDINAL BUFFER SPACE "B"

SPEED* MPH	LENGTH FEET
20	33
25	50
30	83
35	132
40	181
45	230
50	279
55	329
60	411
65	476
70	542

* POSTED SPEED, OFF PEAK 85TH PERCENTILE SPEED PRIOR TO WORK STARTING, OR THE ANTICIPATED OPERATING SPEED

1 BASED UPON AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS (AASHTO) BRAKING DISTANCE PORTION OF STOPPING SIGHT DISTANCE FOR WET AND LEVEL PAVEMENTS (A POLICY ON GEOMETRIC DESIGN OF HIGHWAY AND STREETS), AASHTO. THIS AASHTO DOCUMENT ALSO RECOMMENDS ADJUSTMENTS FOR THE EFFECT OF GRADE ON STOPPING AND VARIATION FOR TRUCKS.

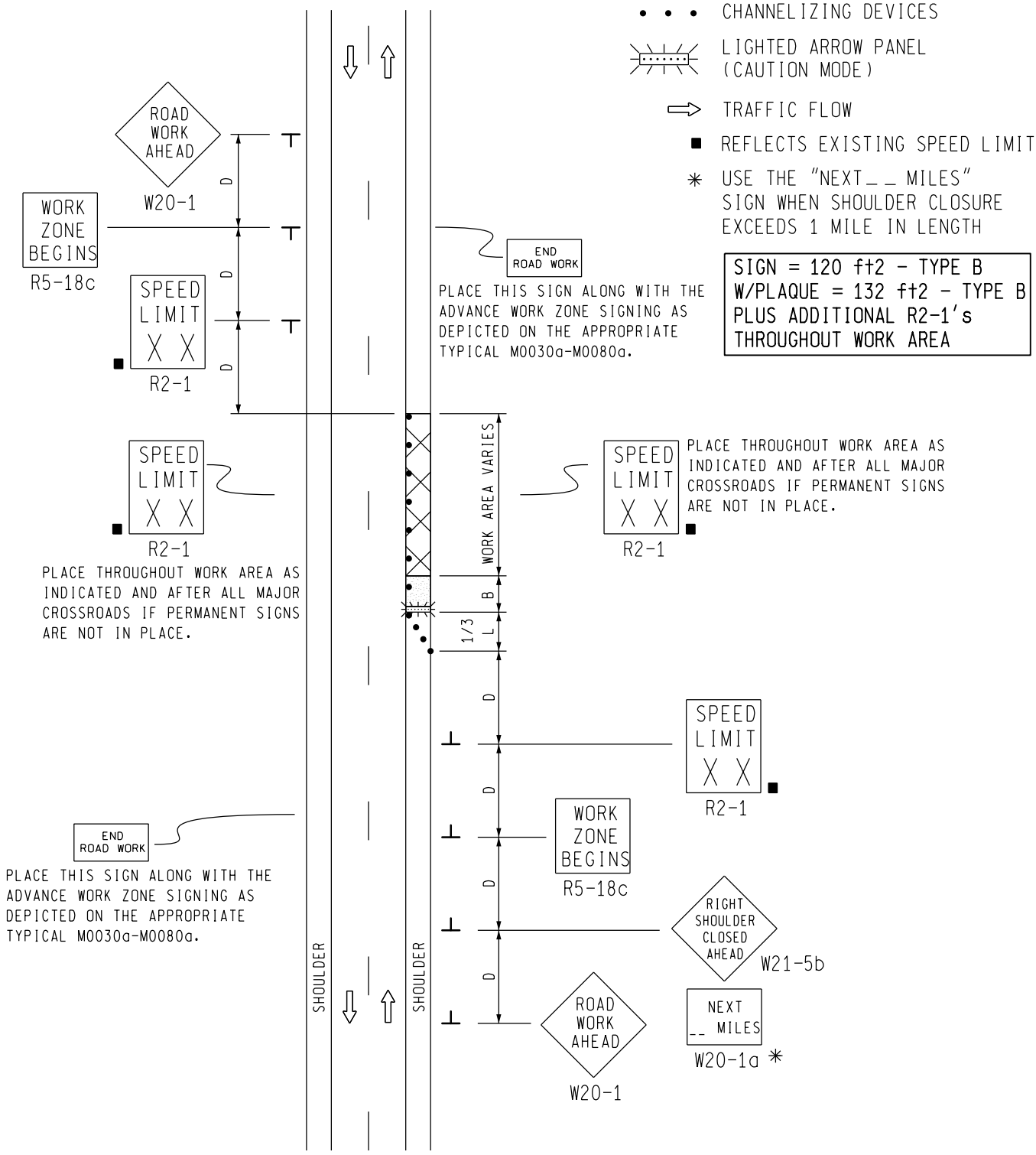
MDOT Michigan Department of Transportation

TRAFFIC AND SAFETY

MAINTAINING TRAFFIC TYPICAL

TABLES FOR "L", "D" AND "B" VALUES

DRAWN BY: CON:AE:djf	JUNE 2006	M0020a	SHEET 2 OF 2
CHECKED BY: BMM	PLAN DATE:		
FILE: K:/DGN/TSR/STDS/ENGLISH/MNTTRF/M0020a.dgn	REV. 08/21/2006		



NOT TO SCALE

MDOT Michigan Department of Transportation

TRAFFIC AND SAFETY

MAINTAINING TRAFFIC TYPICAL

TYPICAL TEMPORARY TRAFFIC CONTROL FOR A SHOULDER CLOSURE ON A TWO LANE TWO-WAY ROADWAY NO SPEED REDUCTION

DRAWN BY: CON:AE:djf	OCTOBER 2011	M0110a	SHEET 1 OF 2
CHECKED BY: BMM:CRB	PLAN DATE:		

FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0110a.dgn REV. 10/04/2011

NOTES

1. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES
   1/3 L = MINIMUM LENGTH OF TAPER
   B = LENGTH OF LONGITUDINAL BUFFER
   SEE M0020a FOR "D," "L," AND "B" VALUES

2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.

3. DISTANCES BETWEEN SIGNS, THE VALUES FOR WHICH ARE SHOWN IN TABLE D, ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.

3A. THE "WORK ZONE BEGINS" (R5-18c) SIGN SHALL BE USED ONLY IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE SHALL OMIT THIS SIGN AND THE QUANTITIES SHALL BE ADJUSTED APPROPRIATELY.

4E. THE MAXIMUM RECOMMENDED DISTANCE(S) BETWEEN CHANNELIZING DEVICES SHOULD BE EQUAL IN FEET TO THE POSTED SPEED IN MILES PER HOUR ON TAPER(S) AND TWICE THE POSTED SPEED IN THE PARALLEL AREA(S).

5. FOR OVERNIGHT CLOSURES, TYPE III BARRICADES SHALL BE LIGHTED.

6. WHEN CALLED FOR IN THE FHWA ACCEPTANCE LETTER FOR THE SIGN SYSTEM SELECTED, THE TYPE A WARNING FLASHER, SHOWN ON THE WARNING SIGNS, SHALL BE POSITIONED ON THE SIDE OF THE SIGN NEAREST THE ROADWAY.

7. ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING REQUIREMENTS SHALL MEET NCHRP 350 CRASHWORTHLY REQUIREMENTS STIPULATED IN THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.

8. WHEN BUFFER AREAS ARE ESTABLISHED, THERE SHALL BE NO EQUIPMENT OR MATERIALS STORED OR WORK CONDUCTED IN THE BUFFER AREA.

29A. THE TYPE OF REFLECTIVE SHEETING USED FOR THE W20-1a PLAQUE SHALL BE THE SAME AS THE TYPE USED FOR THE PARENT SIGN.

SIGN SIZES

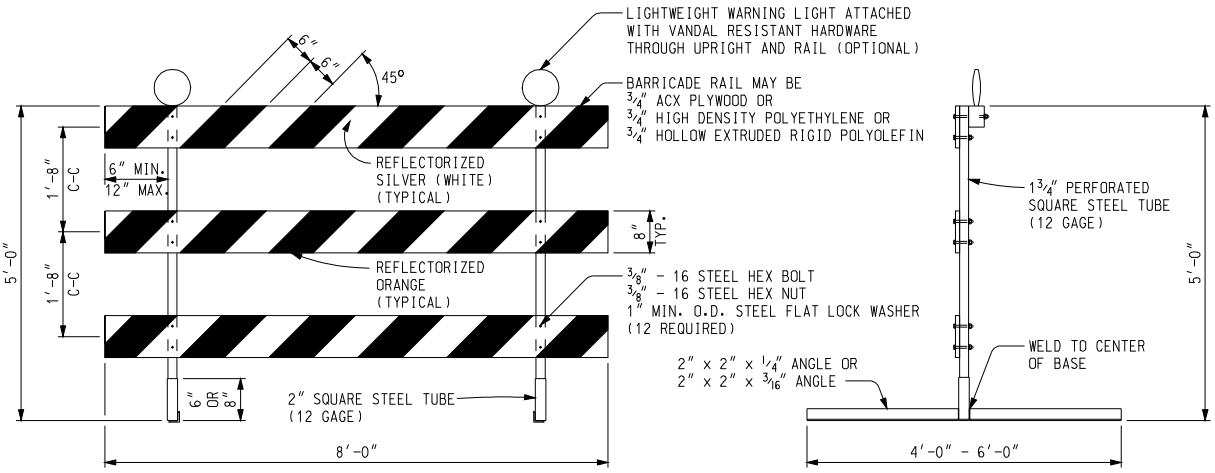
DIAMOND WARNING	- 48" x 48"
W20-1a PLAQUE	- 48" x 36"
R2-1 REGULATORY	- 48" x 60"
R5-18c REGULATORY	- 48" x 48"

NOT TO SCALE

MDOT Michigan Department of Transportation
TRAFFIC AND SAFETY
MAINTAINING TRAFFIC TYPICAL

TYPICAL TEMPORARY TRAFFIC CONTROL FOR A SHOULDER CLOSURE ON A TWO LANE TWO-WAY ROADWAY NO SPEED REDUCTION

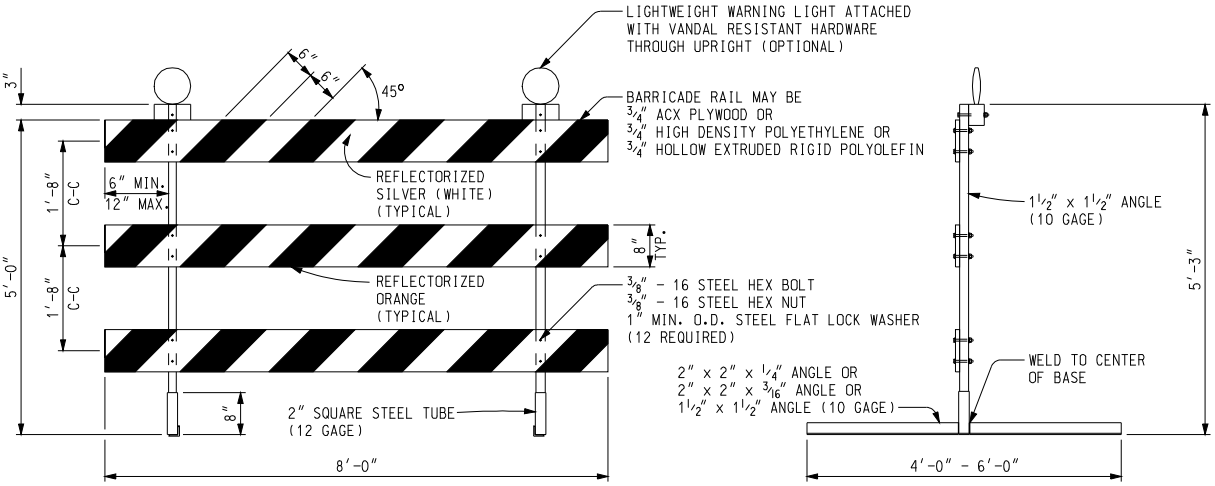
DRAWN BY: CON:AE:djf	OCTOBER 2011	M0110a	SHEET 2 OF 2
CHECKED BY: BMM:CRB	PLAN DATE:		
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0110a.dgn REV. 10/04/2011			



FRONT ELEVATION

SIDE VIEW

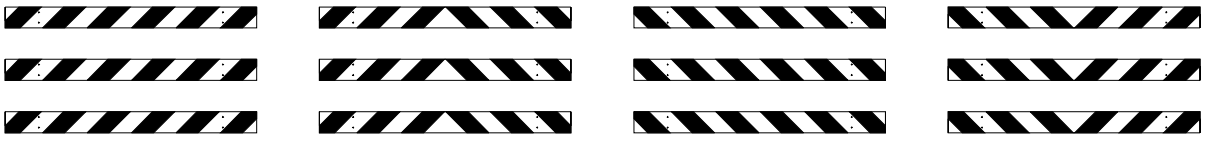
PERFORATED SQUARE STEEL TUBE OPTION



FRONT ELEVATION

SIDE VIEW

ANGLE IRON OPTION



LEFT DIRECTIONAL | BI-DIRECTIONAL | RIGHT DIRECTIONAL | CLOSURES

BARRICADE RAIL SHEETING OPTIONS
TYPE III BARRICADES

Other Type III Barricades meeting current NCHRP crash worthy criteria can be found on the FHWA Safety website at http://safety.fhwa.dot.gov/roadway_dept/road_hardware/wzd.htm

NOT TO SCALE

File: T&S/Typ/Signs/WorkZones/wzd 125 d Rev. 09/22/09 PJ

MDOT Michigan Department of Transportation

PREPARED BY TRAFFIC AND SAFETY

DRAWN BY: ECH

CHECKED BY: MWB

ENGINEER OF DELIVERY

ENGINEER OF DEVELOPMENT

(SPECIAL DETAIL)

FHWA APPROVAL DATE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN FOR

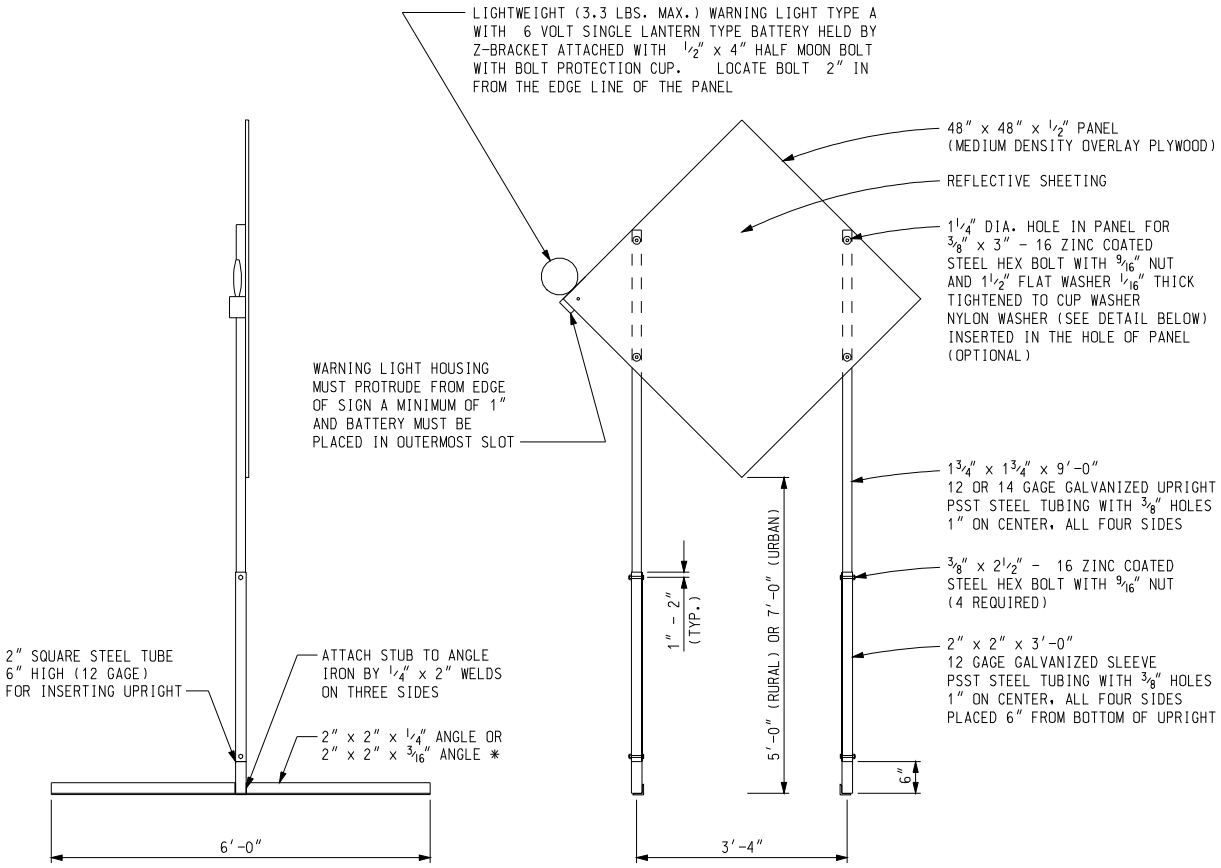
Temporary Traffic Control Devices

9/22/09
PLAN DATE

WZD-125-E

SHEET 1 of 3

NOTE: THE ORIGINAL SIGNED COPY IS KEPT ON FILE AT THE MICHIGAN DEPARTMENT OF TRANSPORTATION.



SIDE VIEW

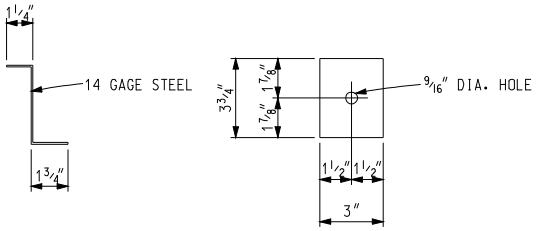
FRONT ELEVATION

TEMPORARY SIGN SUPPORT

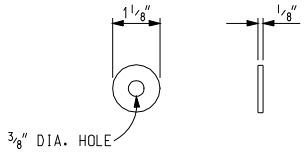
(WARNING LIGHT PLACED ON SIDE CLOSEST TO TRAFFIC)

* SIGN STAND IS BALLASTED WITH FOUR OR MORE 35 LB SANDBAGS. A MINIMUM OF ONE ON EACH END.

UPRIGHTS SHALL NOT EXTEND ABOVE THE SIGN PANEL.



Z-BRACKET DETAIL



OPTIONAL NYLON WASHER

Other temporary sign supports meeting current NCHRP crash worthy criteria can be found on the FHWA Safety website at http://safety.fhwa.dot.gov/roadway_dept/road_hardware/wzd.htm

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	9/22/09 PLAN DATE	WZD-125-E	SHEET 2 of 3
File: T&S/Typ/Signs/WorkZones/wzd 125 d	Rev. 09/22/09 PJ			

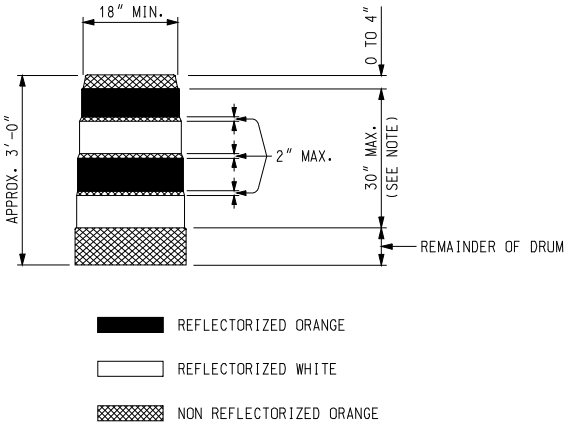
NOTE: THE ORIGINAL SIGNED COPY IS KEPT ON FILE AT THE MICHIGAN DEPARTMENT OF TRANSPORTATION.

PLASTIC DRUM

PROPOSED TYPE III BARRICADE

EXISTING TYPE III BARRICADE

SYMBOLS TO BE USED ON PLANS



NOTE:
DRUMS SHALL HAVE AT LEAST 4 HORIZONTAL REFLECTORIZED STRIPES (2 ORANGE AND 2 WHITE) OF 6" UNIFORM WIDTH, ALTERNATING IN COLOR WITH THE TOPMOST REFLECTORIZED STRIPE BEING ORANGE. NON REFLECTORIZED SPACES BETWEEN THE HORIZONTAL REFLECTORIZED ORANGE AND WHITE STRIPES SHALL BE ORANGE IN COLOR AND EQUAL IN WIDTH.

PLASTIC DRUM

NOTES:

2" PERFORATED SQUARE STEEL TUBES MAY BE USED TO FABRICATE THE HORIZONTAL BASE OF THE TYPE III BARICADE.

WARNING LIGHTS SHALL BE PLACED ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION AND ALL OTHER PROVISIONS IN THE CONTRACT WHEN THEY ARE USED ON TYPE III BARRICADES.

SEE ROAD STANDARD PLANS R-113-SERIES FOR TEMPORARY CROSSOVERS FOR DIVIDED ROADWAY, AND R-126-SERIES FOR TYPICAL LOCATION AND SPACING OF PLASTIC DRUMS FOR PLACEMENT OF TEMORARY CONCRETE BARRIER.

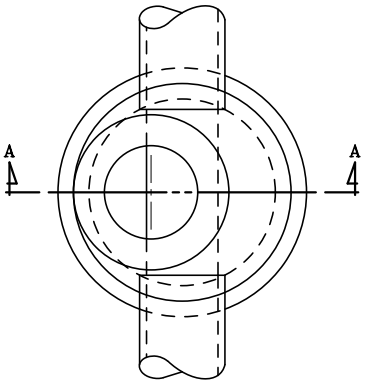
SIGNS, BARRICADES, AND PLASTIC DRUMS SHALL BE FACED WITH PRESSURE-SENSITIVE REFLECTIVE SHEETING ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS FOR CONSTRUCTION.

SANDBAGS SHALL BE USED WHEN SUPPLEMENTAL WEIGHTS ARE REQUIRED TO ACHIEVE STABILITY OF THE BARRICADE. THE SANDBAGS SHALL BE PLACED SO THEY WILL NOT COVER OR OBSTRUCT ANY REFLECTIVE PORTION OF THE TRAFFIC CONTROL DEVICE.

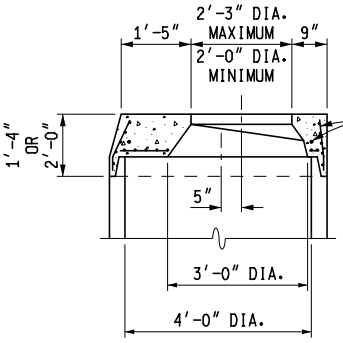
NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAYS DELIVERY STANDARD PLAN	(SPECIAL DETAIL) FHWA APPROVAL DATE	9/22/09 PLAN DATE	WZD-125-E	SHEET 3 of 3
File: T&S/Typ/Signs/WorkZones/wzd 125 d	Rev. 09/22/09 PJ			

NOTE: THE ORIGINAL SIGNED COPY IS KEPT ON FILE AT THE MICHIGAN DEPARTMENT OF TRANSPORTATION.

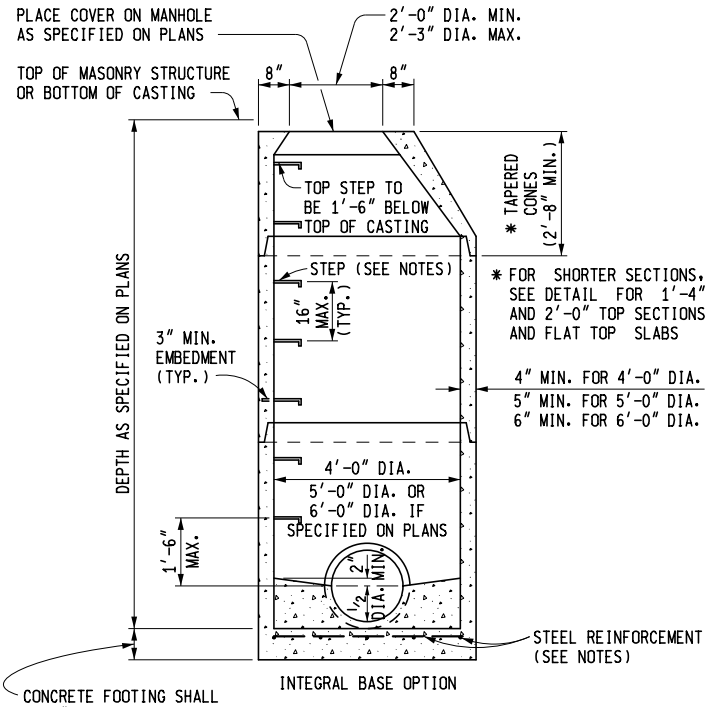


PLAN VIEW



DETAIL FOR 1′-4″ & 2′-0″ TOP SECTIONS

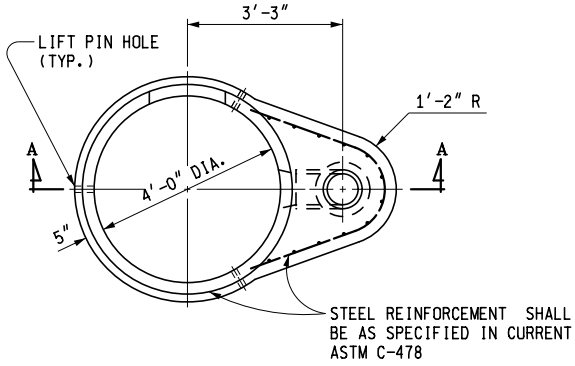
SHAPE MAY VARY FROM DETAIL SHOWN BUT MUST COMPLY WITH ASTM C-478 AND JOINTS SHALL BE COMPATIBLE WITH THE RISER

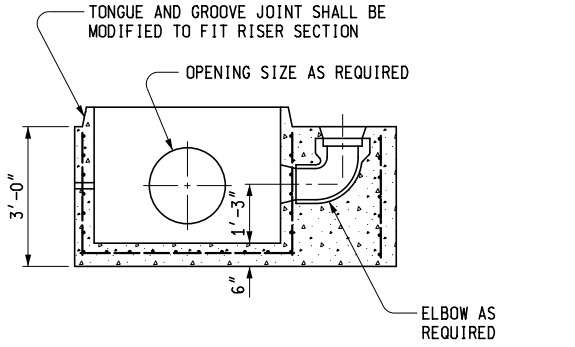


SECTION A - A

TYPICAL MANHOLE

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





SECTION A - A

TYPICAL PRECAST REINFORCED BOTTOM SECTION FOR DROP MANHOLE

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

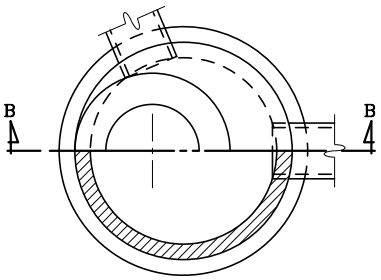
APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

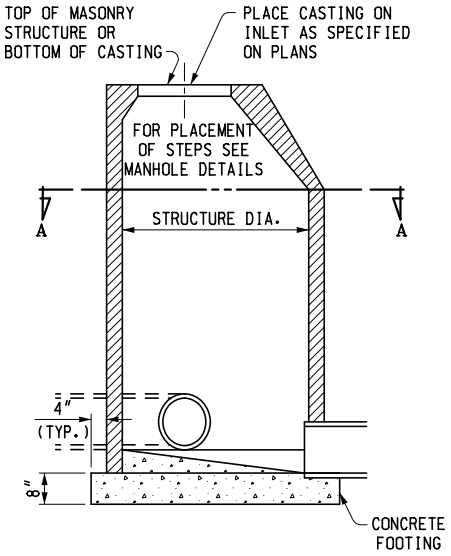
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

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



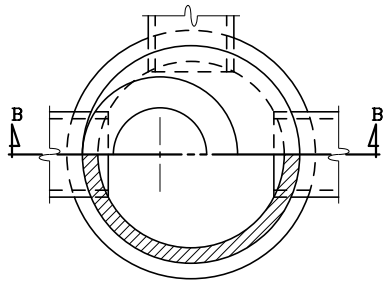
HALF SECTION A - A



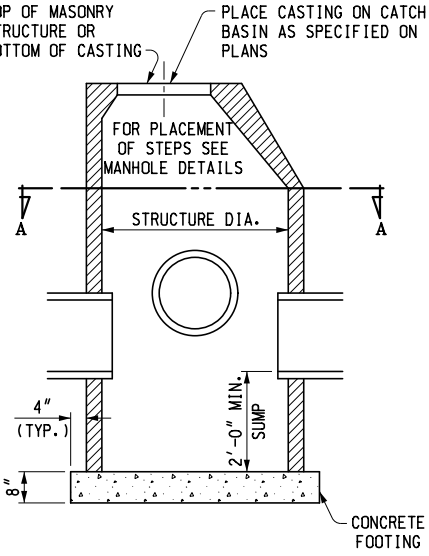
SEE MANHOLE DETAILS FOR SIZE AND BASE OPTIONS

SECTION B - B

INLET



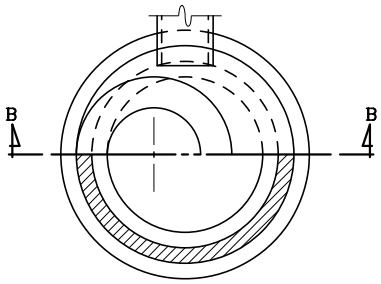
HALF SECTION A - A



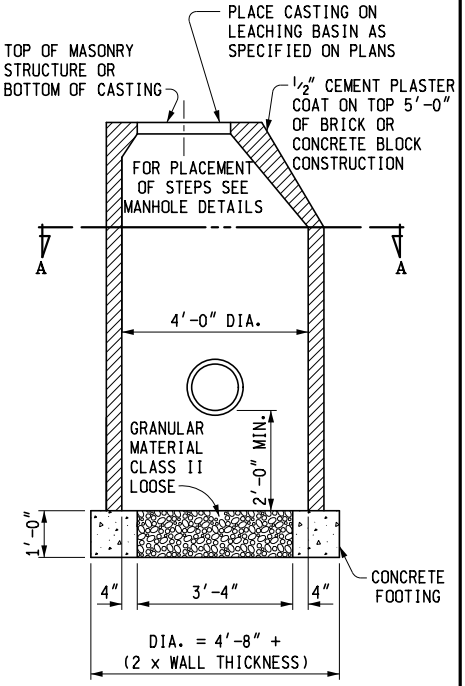
SEE MANHOLE DETAILS FOR SIZE AND BASE OPTIONS

SECTION B - B

CATCH BASIN



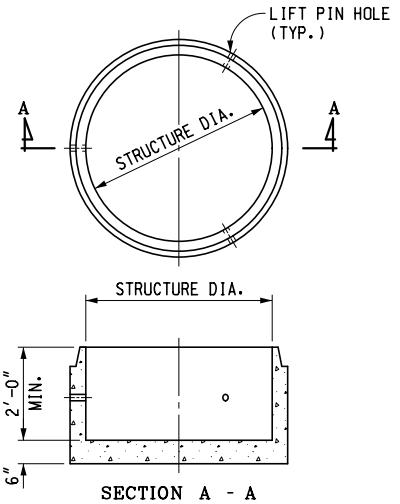
HALF SECTION A - A



SEE MANHOLE DETAILS FOR BASE OPTIONS

SECTION B - B

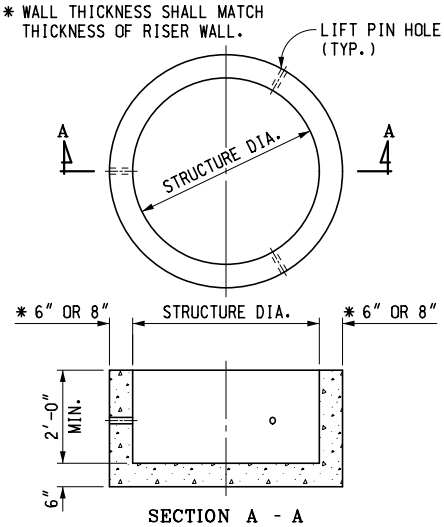
LEACHING BASIN



SECTION A - A

SEE MANHOLE DETAILS FOR SIZE AND BASE OPTIONS

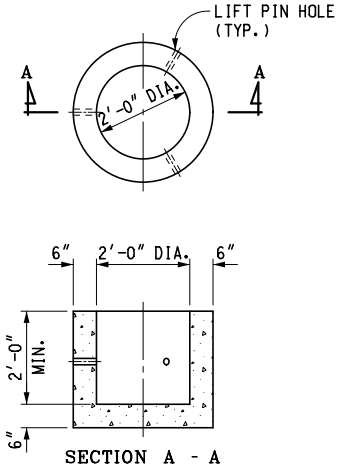
PRECAST SUMP FOR PRECAST RISERS



SECTION A - A

SEE TYPICAL BRICK AND BLOCK SECTION FOR SIZE AND BASE OPTIONS

PRECAST SUMP FOR BRICK OR BLOCK CONSTRUCTION



SECTION A - A

PRECAST SUMP FOR 2'-0" DIA. STRUCTURES

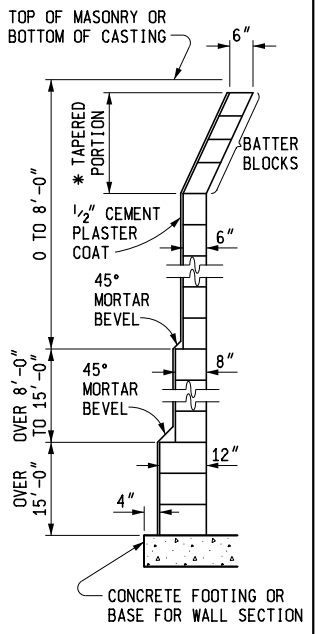
MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF DEVELOPMENT STANDARD PLAN FOR

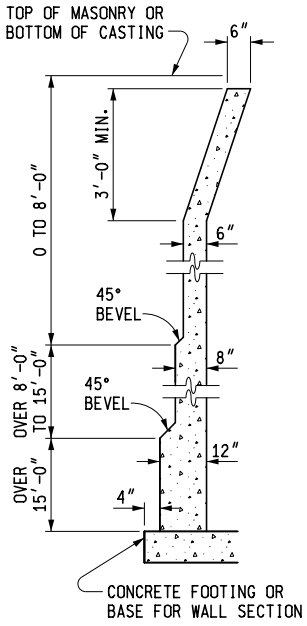
DRAINAGE STRUCTURES

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

* 4 BLOCK MIN. FOR 4′-0″ DIA. STRUCTURE
6 BLOCK MIN. FOR 5′-0″ DIA. STRUCTURE
6 BLOCK MIN. FOR 6′-0″ DIA. STRUCTURE

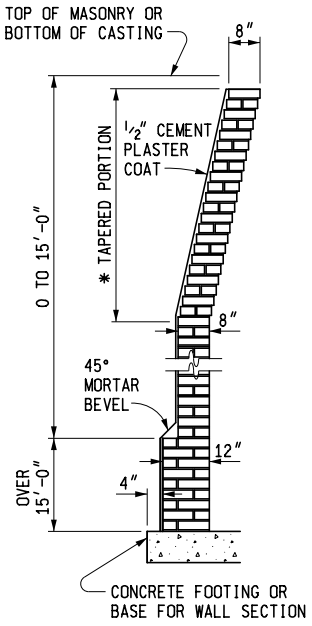


TYPICAL CONCRETE BLOCK WALL SECTION

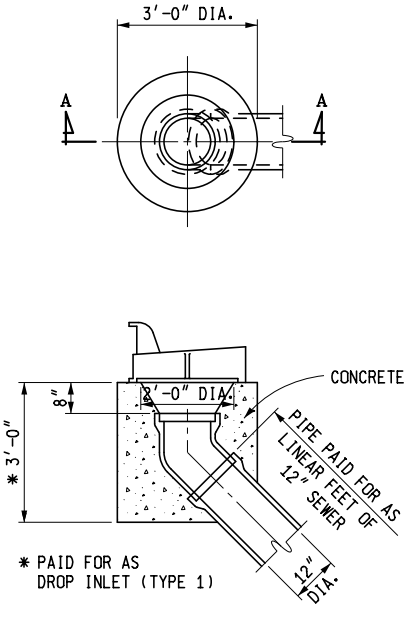


TYPICAL CAST-IN-PLACE CONCRETE WALL SECTION

* 5′-0″ MIN. FOR 4′-0″ DIA. STRUCTURE
6′-0″ MIN. FOR 5′-0″ DIA. STRUCTURE
6′-0″ MIN. FOR 6′-0″ DIA. STRUCTURE

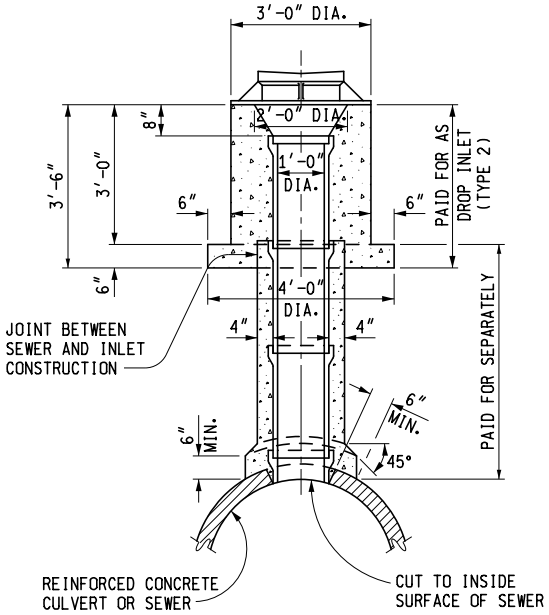


TYPICAL BRICK WALL SECTION



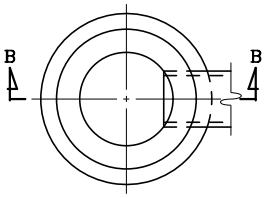
SECTION A - A

DROP INLET (TYPE 1)

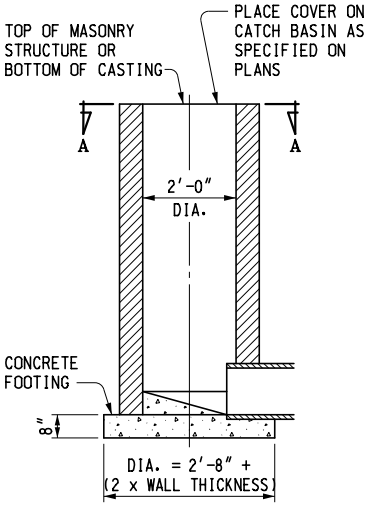


BACKFILL SHALL BE PLACED TO BOTTOM OF INLET AND COMPACTED BEFORE CONSTRUCTING THE INLET

DROP INLET (TYPE 2)

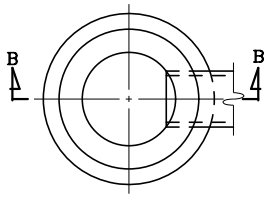


SECTION A - A

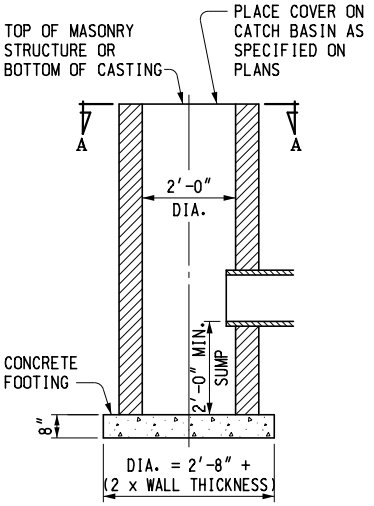


SECTION B - B

INLET



SECTION A - A



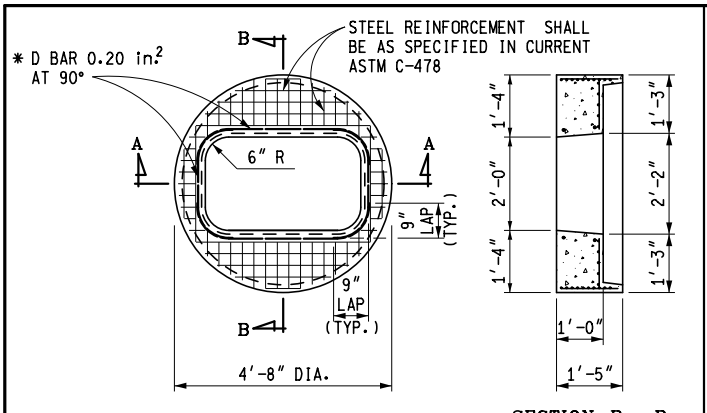
SECTION B - B

CATCH BASIN

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

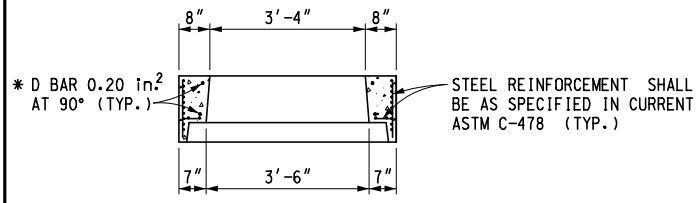
DRAINAGE STRUCTURES

F.H.W.A. APPROVAL	6-15-2016 PLAN DATE	R-1-G	SHEET 3 OF 9



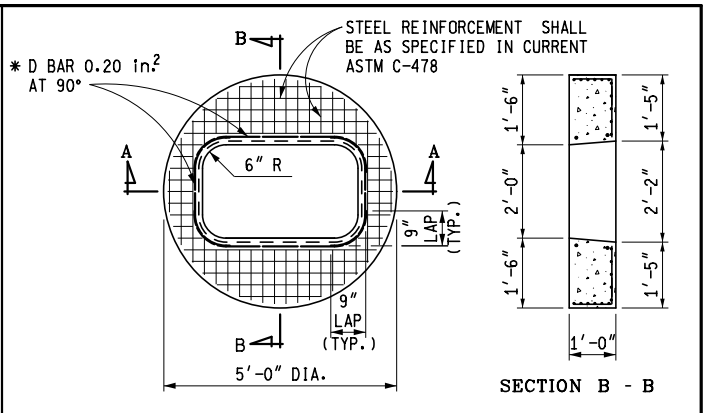
SECTION B - B

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



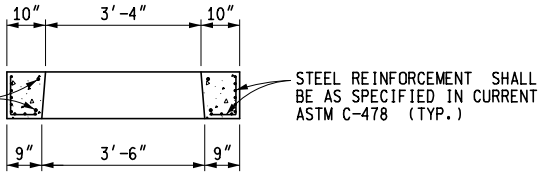
SECTION A - A

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



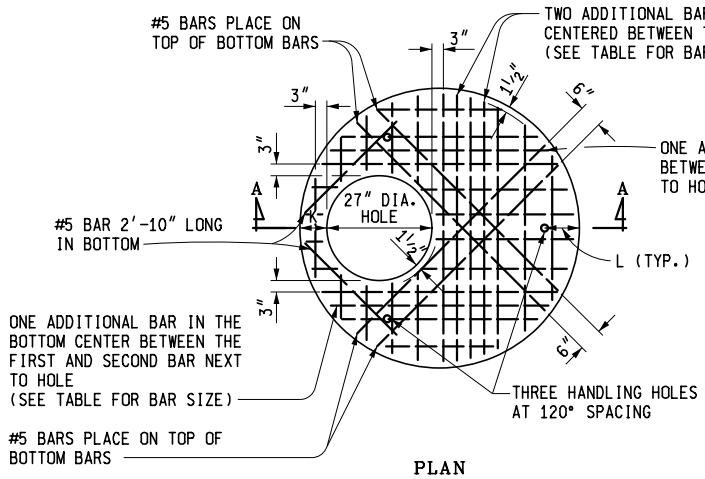
SECTION B - B

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

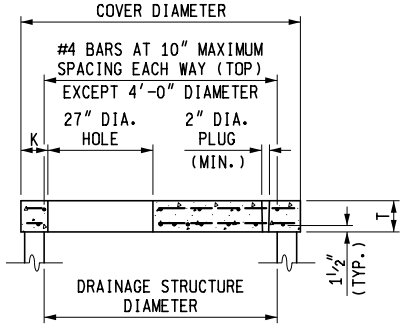


SECTION A - A

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



PLAN
(SHOWING BOTTOM LAYER OF REINFORCEMENT)



SECTION A - A

TABLE OF DIMENSIONS					
STRUCTURE DIAMETER	COVER DIAMETER	T	K	L	BAR MAXIMUM SPACING (BOTTOM EACH WAY)
* 4'-0"	58"	6"	6"	8"	#5 AT 6"
5'-0"	72"	8"	7"	9"	#5 AT 7"
6'-0"	86"	8"	8"	10"	#5 AT 6"
7'-0"	101½"	12"	8¾"	11"	#5 AT 5"
8'-0"	114"	12"	9"	11"	#6 AT 6"
9'-0"	128"	12"	10"	12"	#5 AT 6"
10'-0"	140"	12"	10"	13"	#5 AT 6"

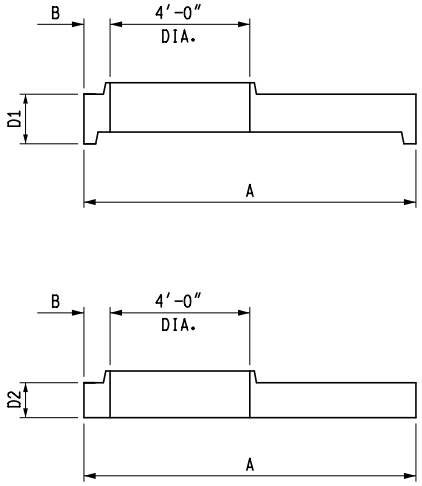
* ONLY BOTTOM LAYERS OF STEEL NECESSARY

PRECAST REINFORCED CONCRETE FLAT SLAB TOP

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

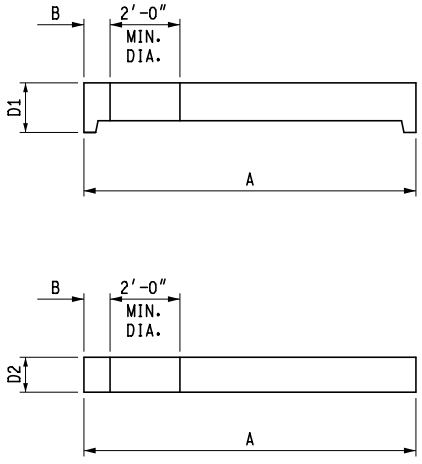
DRAINAGE STRUCTURES

F.H.W.A. APPROVAL	6-15-2016 PLAN DATE	R-1-G	SHEET 4 OF 9



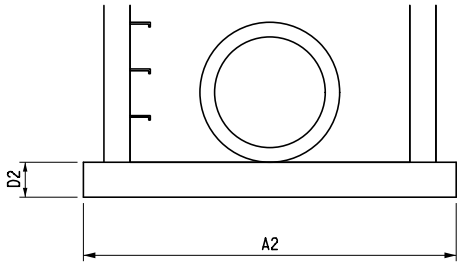
PRECAST REDUCER CAP

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



PRECAST FLAT SLAB TOP

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



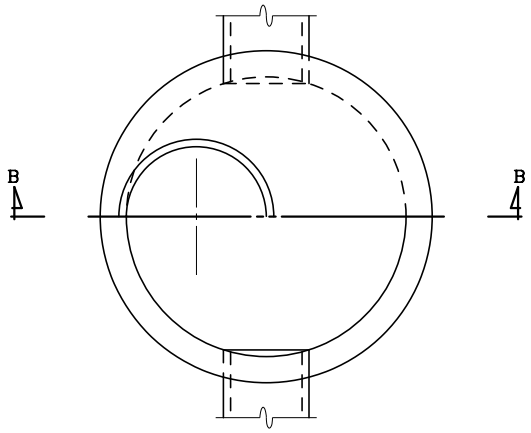
SEPARATE BASE OPTION

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

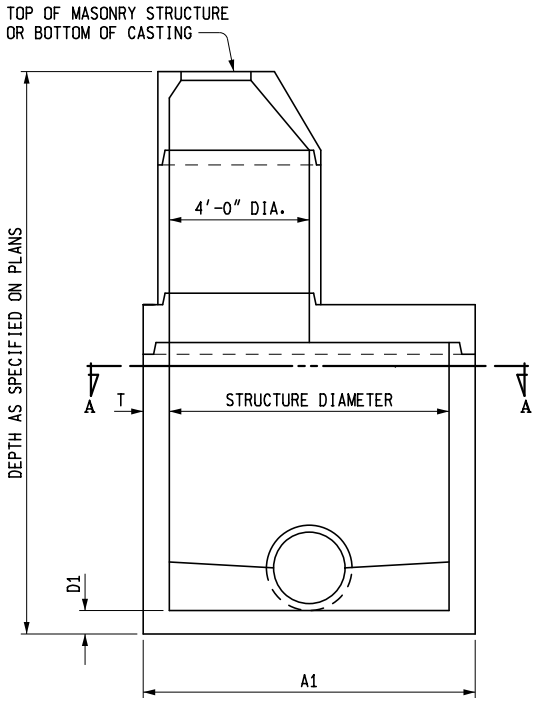
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

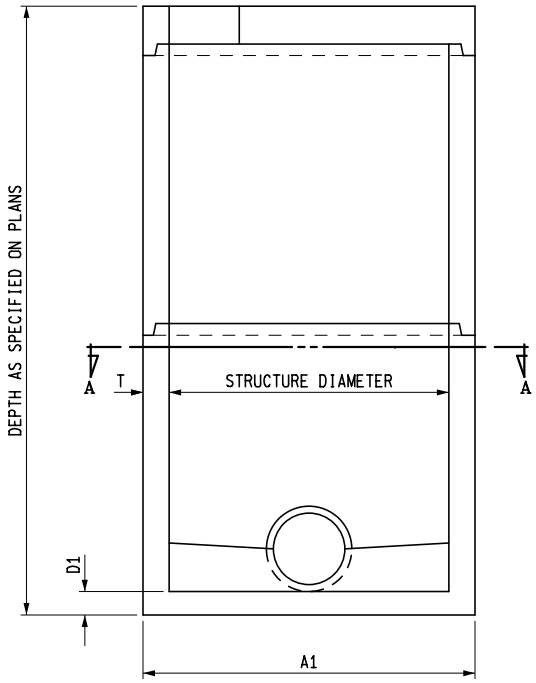
F.H.W.A. APPROVAL	6-15-2016 PLAN DATE	R-1-G	SHEET 5 OF 9



HALF SECTION A - A



SECTION B - B
SHOWING REDUCER CAP



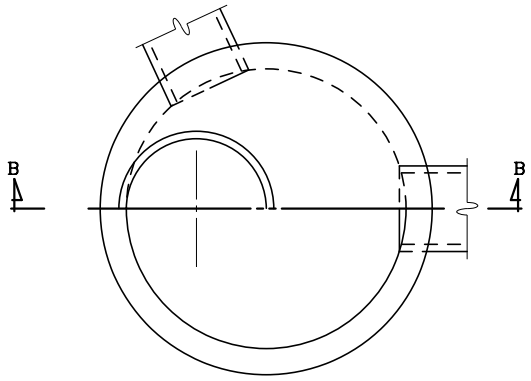
SECTION B - B
SHOWING FLAT SLAB TOP

PRECAST MANHOLE

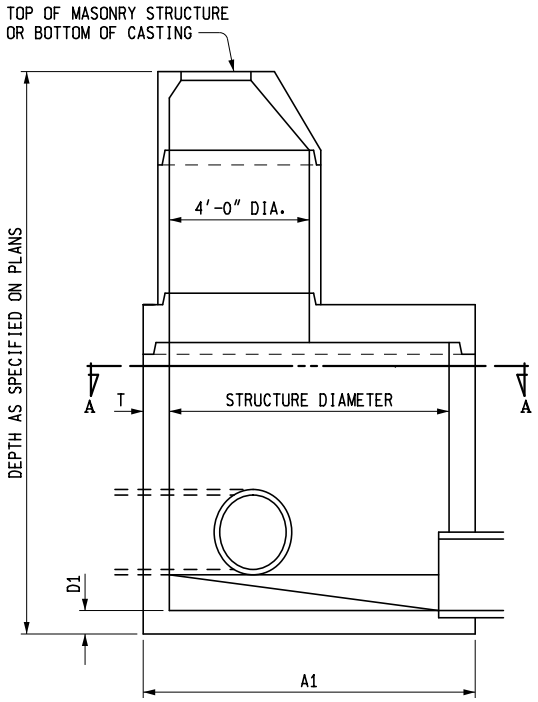
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

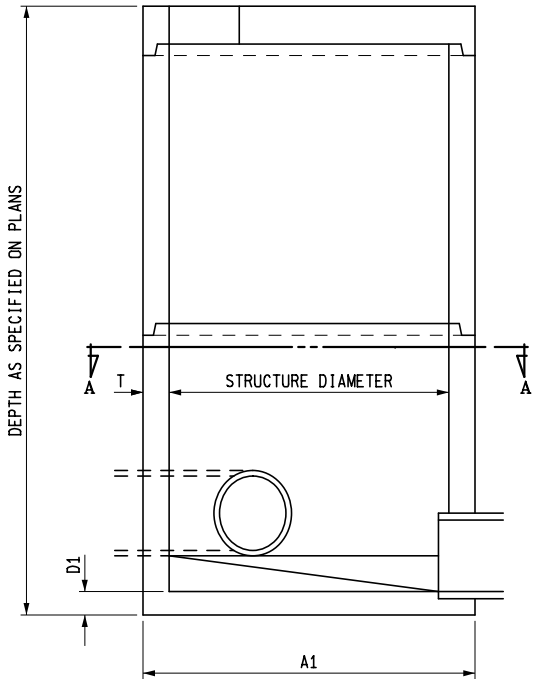
F.H.W.A. APPROVAL	6-15-2016 PLAN DATE	R-1-G	SHEET 6 OF 9



HALF SECTION A - A



SECTION B - B
SHOWING REDUCER CAP



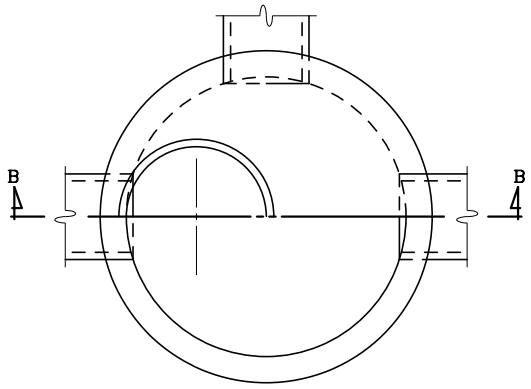
SECTION B - B
SHOWING FLAT SLAB TOP

PRECAST INLET

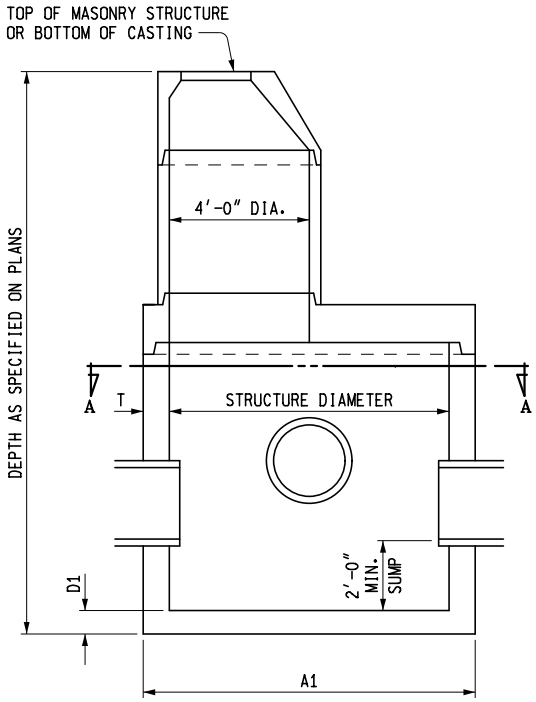
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

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



HALF SECTION A - A



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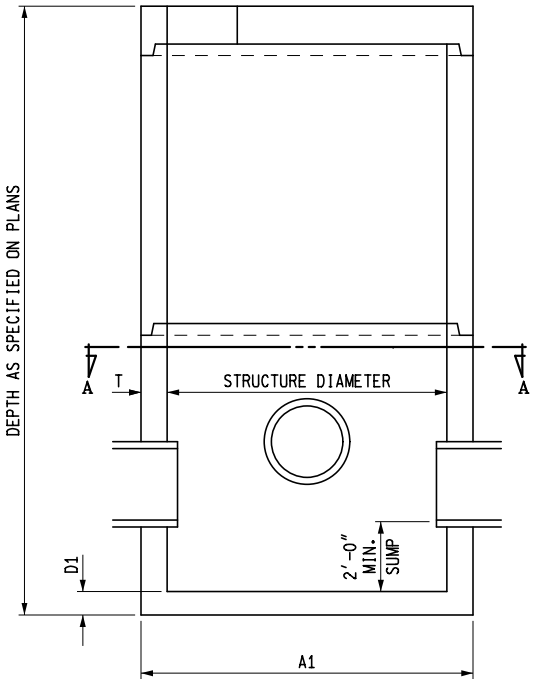


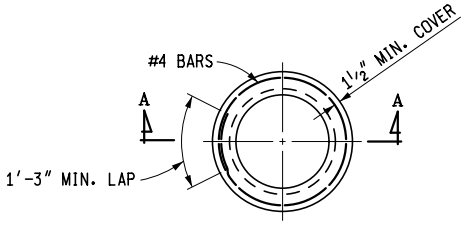
SECTION B - B
SHOWING FLAT SLAB TOP

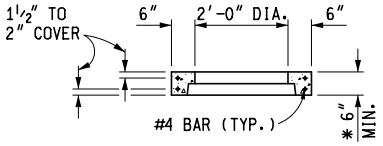
PRECAST CATCH BASIN

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

F.H.W.A. APPROVAL	6-15-2016 PLAN DATE	R-1-G	SHEET 8 OF 9





SECTION A - A

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

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

PRECAST RISER RING

(FOR 2'-0" DIAMETER STRUCTURE)

NOTES:

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

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

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

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

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

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

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

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

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

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

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

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

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

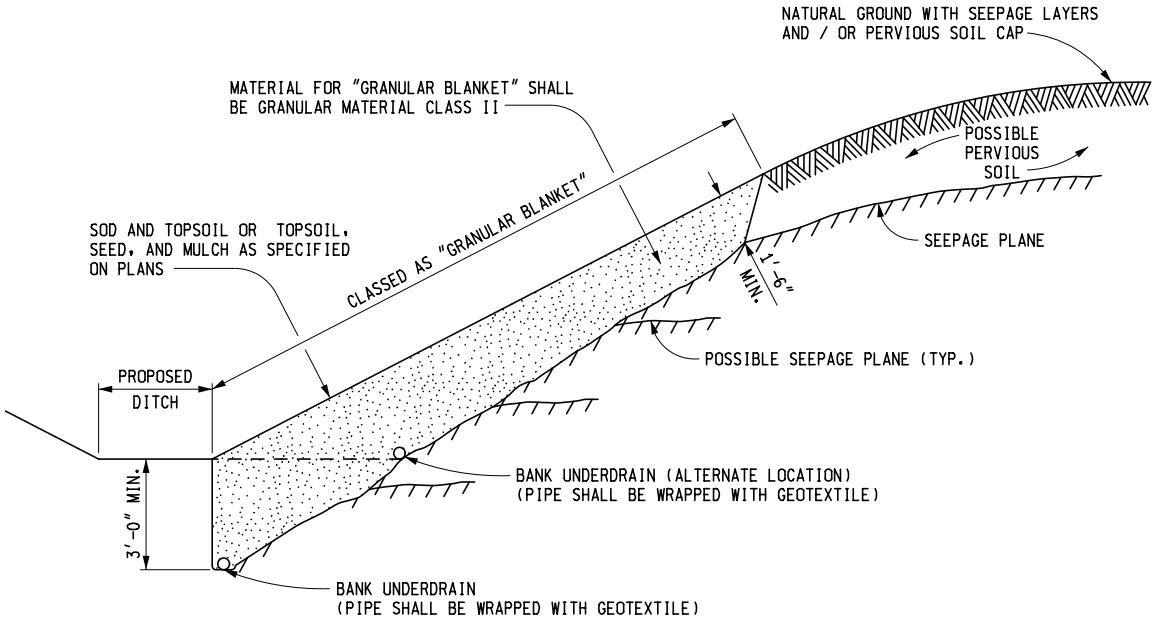
PREFORMED HIGH DENSITY POLYSTYRENE FILLER PIECES MAY BE USED TO CHANNEL FLOW IN THE BOTTOM OF MANHOLES PROVIDED THEY HAVE AT LEAST 2" OF CONCRETE COVER. THE USE OF THIS MATERIAL FOR CHANNEL FLOW IS RESTRICTED TO MANHOLES WHERE THE BOTTOM SECTION IS NOT SUBJECT TO FREEZING. THE USE OF THIS MATERIAL MUST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

MICHIGAN DEPARTMENT OF TRANSPORTATION

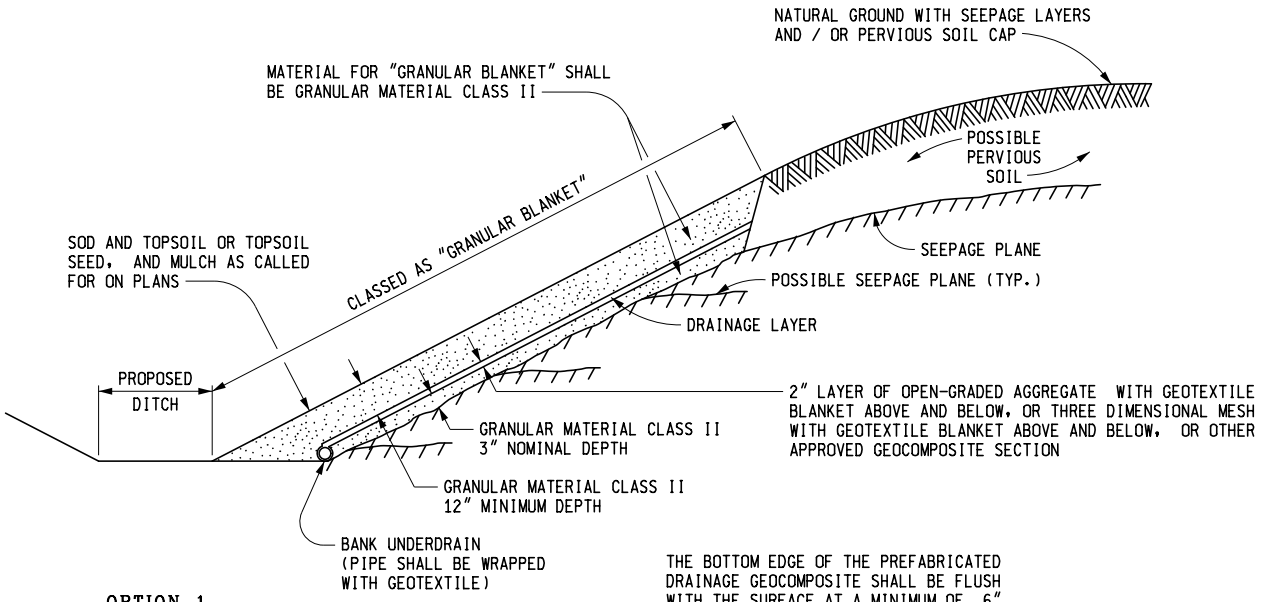
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

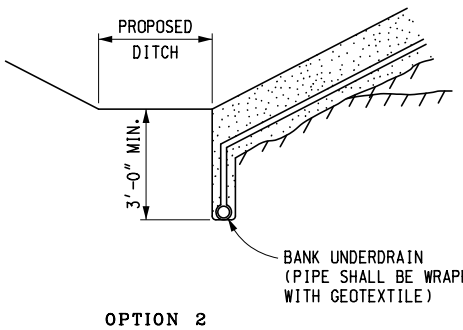
F.H.W.A. APPROVAL	6-15-2016 PLAN DATE	R-1-G	SHEET 9 OF 9



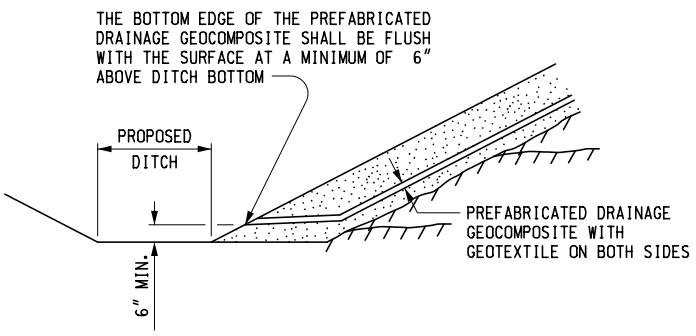
GRANULAR BLANKET TYPE 1



OPTION 1



OPTION 2



OPTION 3

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

GRANULAR BLANKET TYPE 2

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

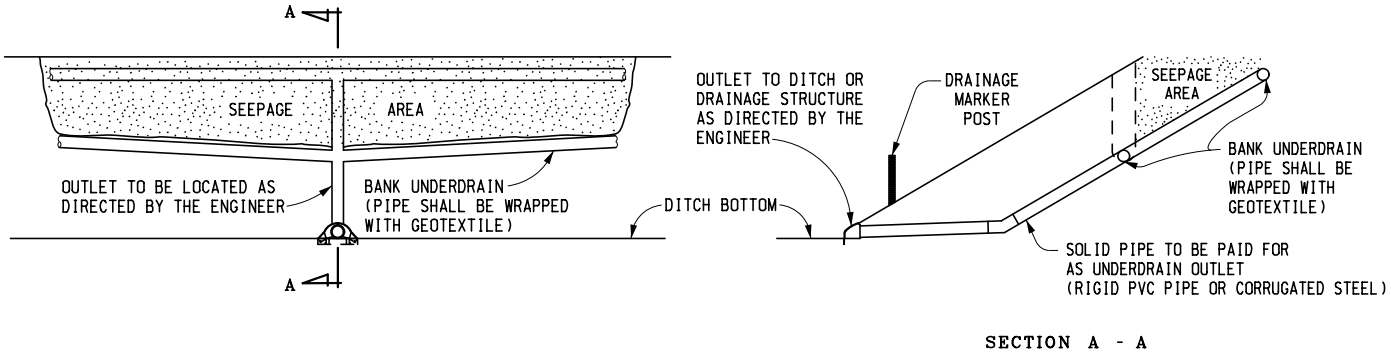
APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

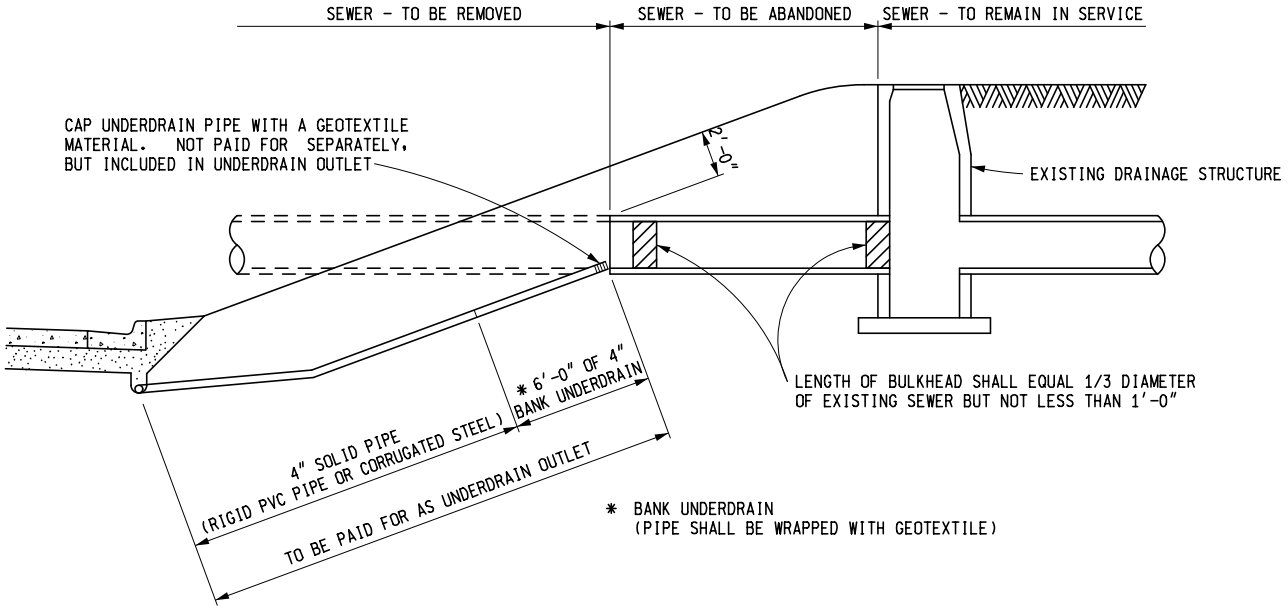
GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS FOR UNDERDRAINS, AND SEWER BULKHEADS

1-25-2013	6-13-2012	R-80-E	SHEET 1 OF 8
F.H.W.A. APPROVAL	PLAN DATE		



SECTION A - A

BANK UNDERDRAIN OUTLET

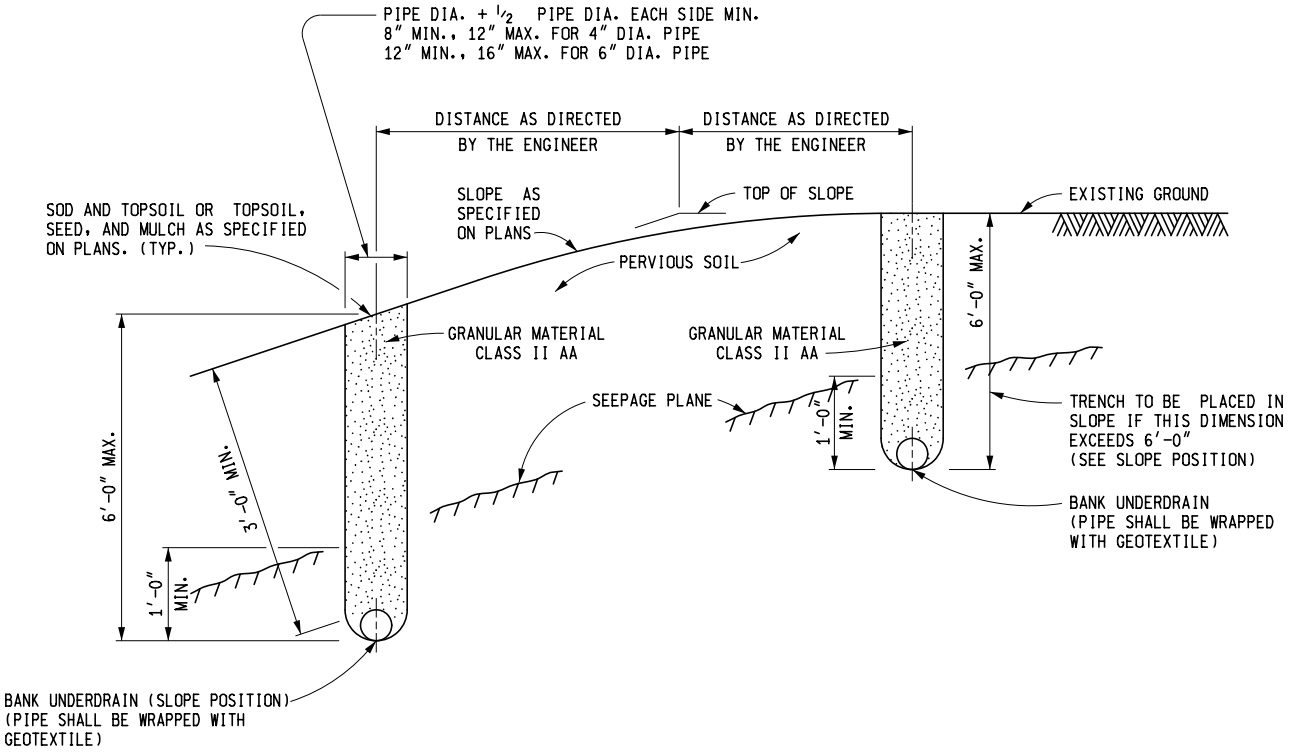


WEEPER UNDERDRAIN AND BULKHEADING SEVERED SEWER

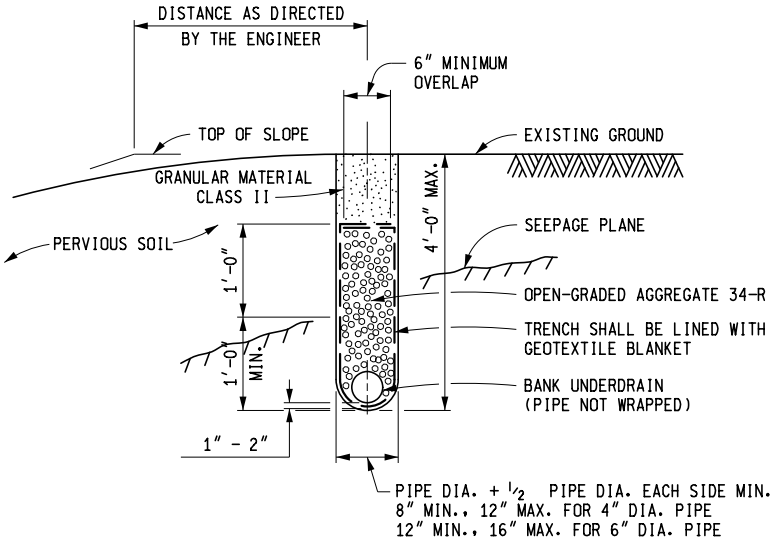
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

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

1-25-2013 F.H.W.A. APPROVAL	6-13-2012 PLAN DATE	R-80-E	SHEET 2 OF 8



BANK UNDERDRAINS

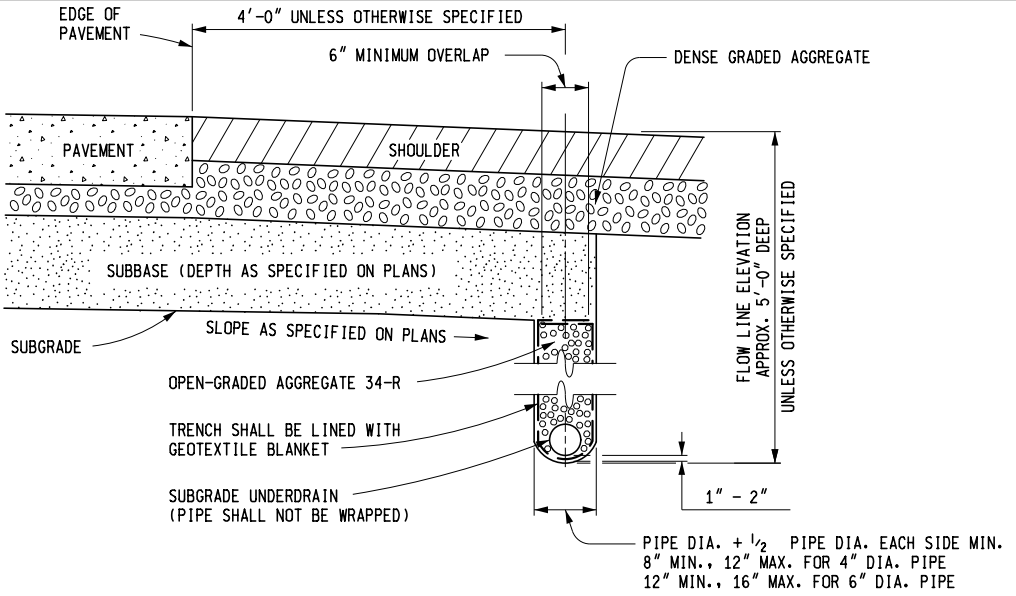


BANK UNDERDRAIN, OPEN-GRADED

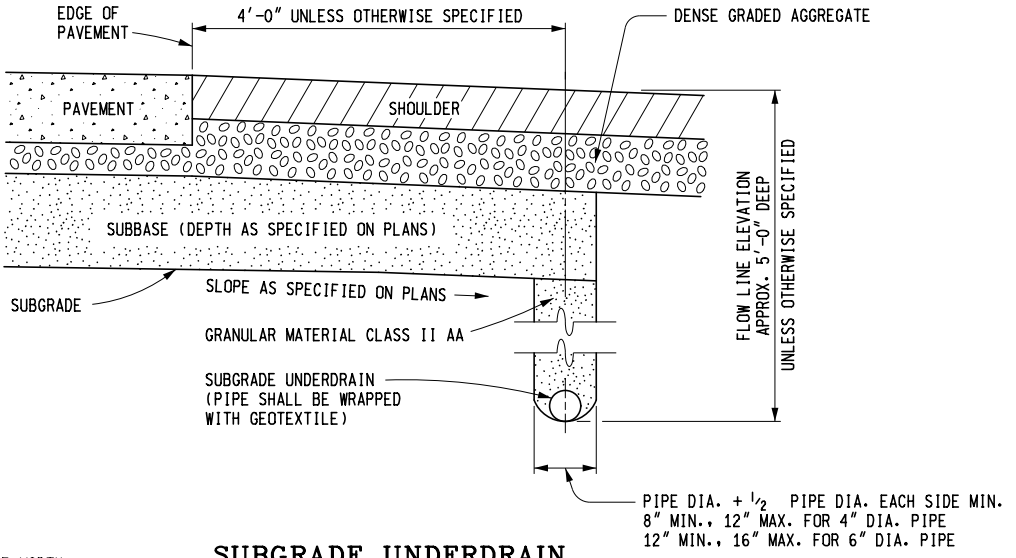
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

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

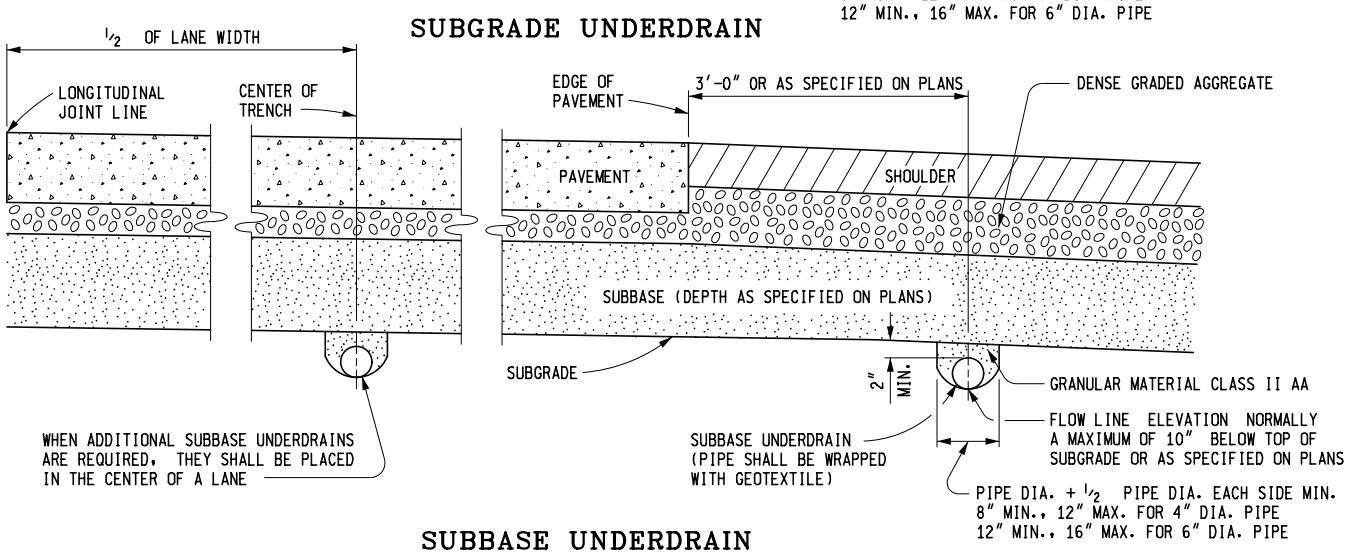
1-25-2013 F.H.W.A. APPROVAL	6-13-2012 PLAN DATE	R-80-E	SHEET 3 OF 8



SUBGRADE UNDERDRAIN - OPEN-GRADED



SUBGRADE UNDERDRAIN

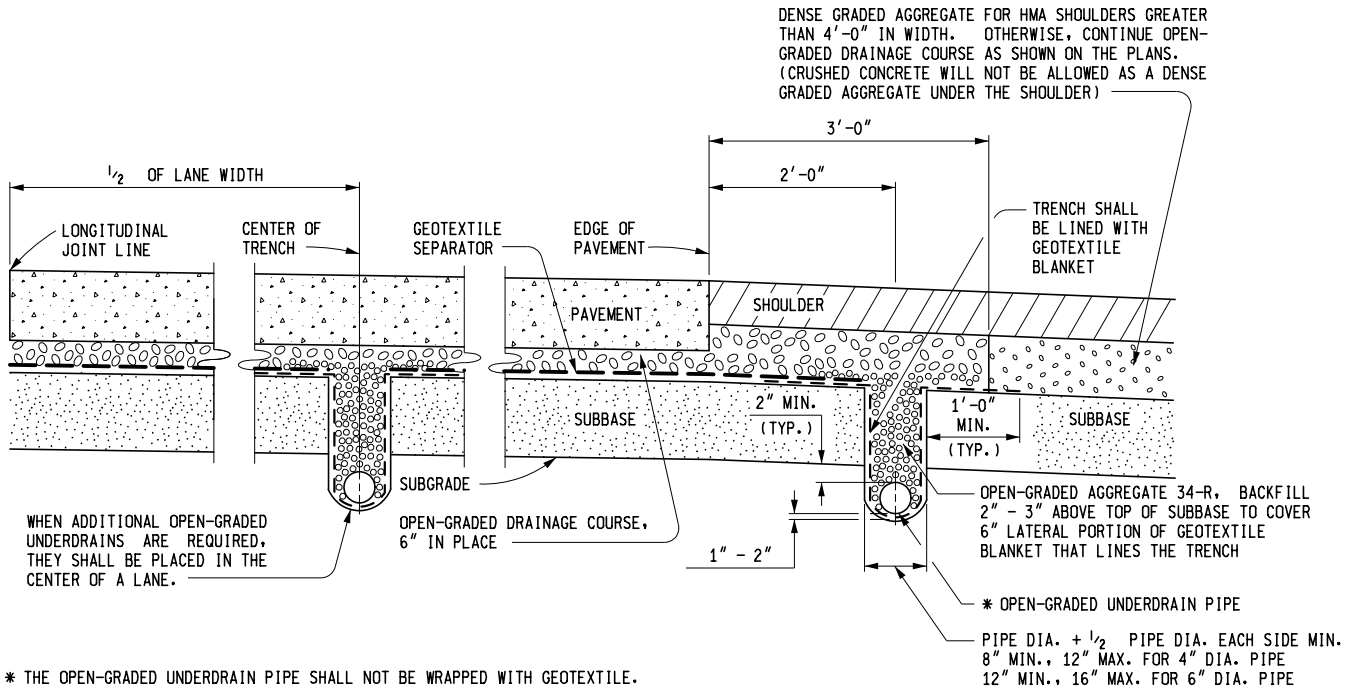


SUBBASE UNDERDRAIN

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

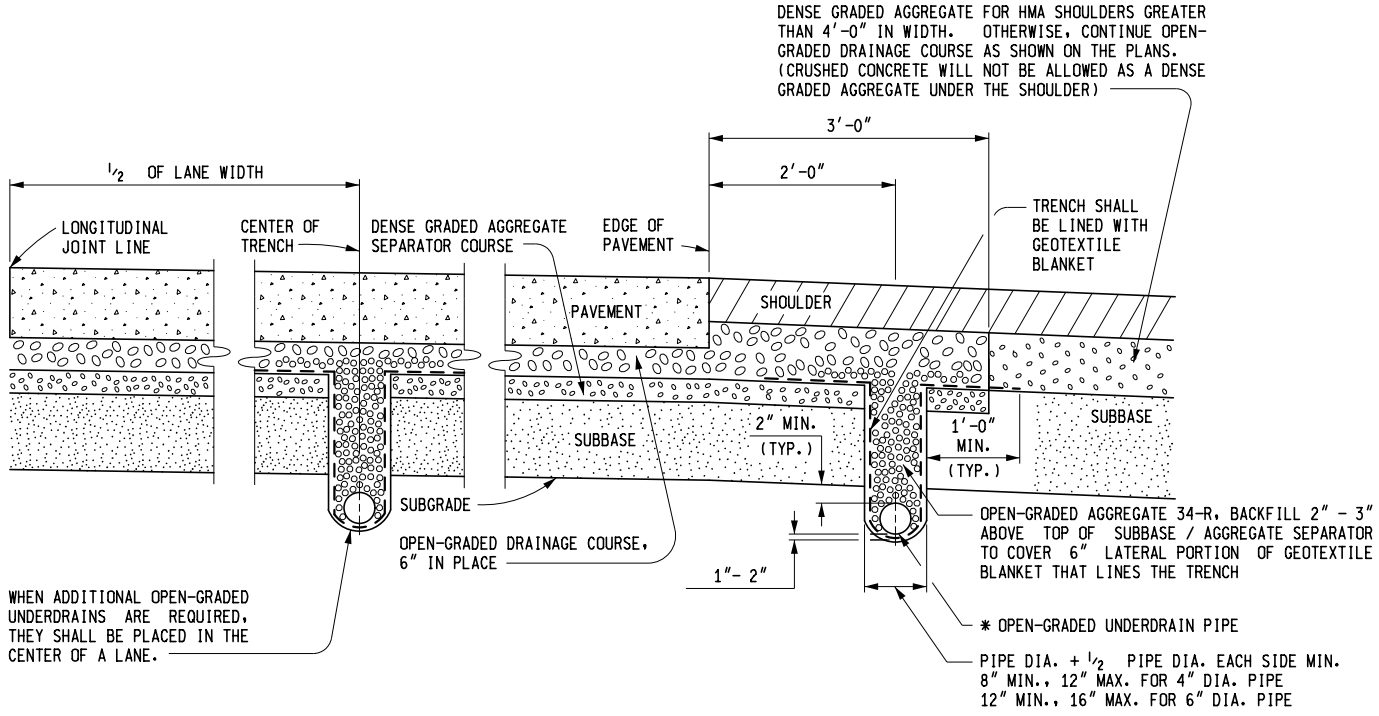
GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS FOR UNDERDRAINS, AND SEWER BULKHEADS

1-25-2013 F.H.W.A. APPROVAL	6-13-2012 PLAN DATE	R-80-E	SHEET 4 OF 8



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

OPEN-GRADED UNDERDRAIN PIPE WITH GEOTEXTILE SEPARATOR



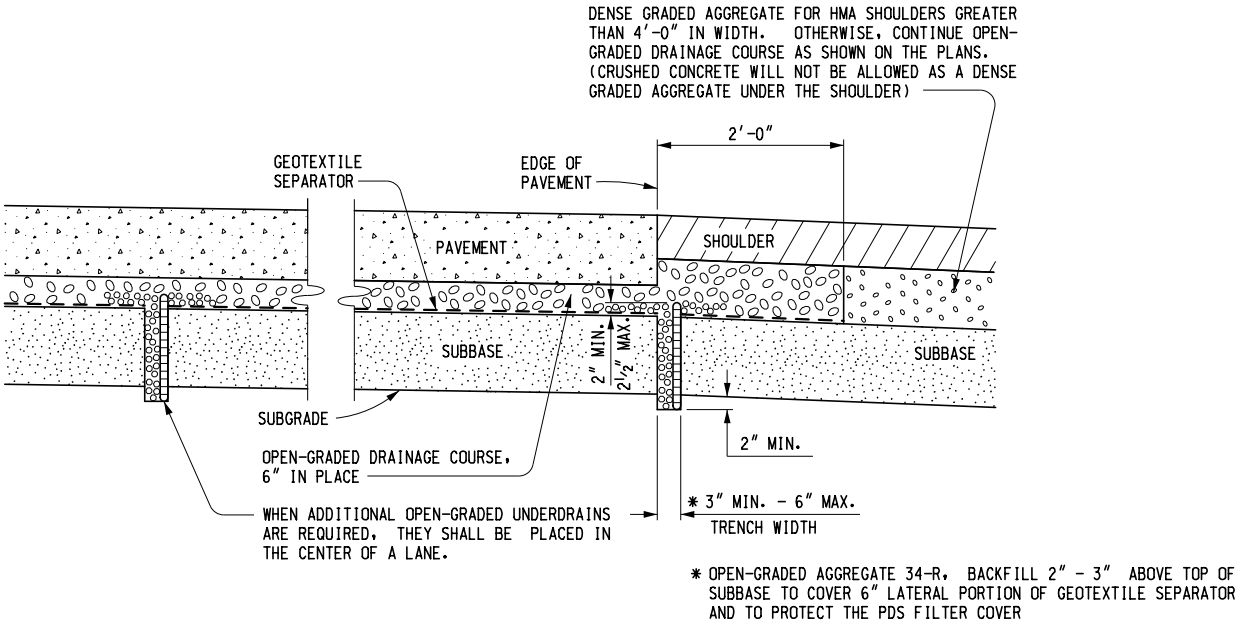
* THE OPEN-GRADED UNDERDRAIN PIPE SHALL NOT BE WRAPPED WITH GEOTEXTILE.

OPEN-GRADED UNDERDRAIN PIPE WITH DENSE GRADED AGGREGATE SEPARATOR COURSE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

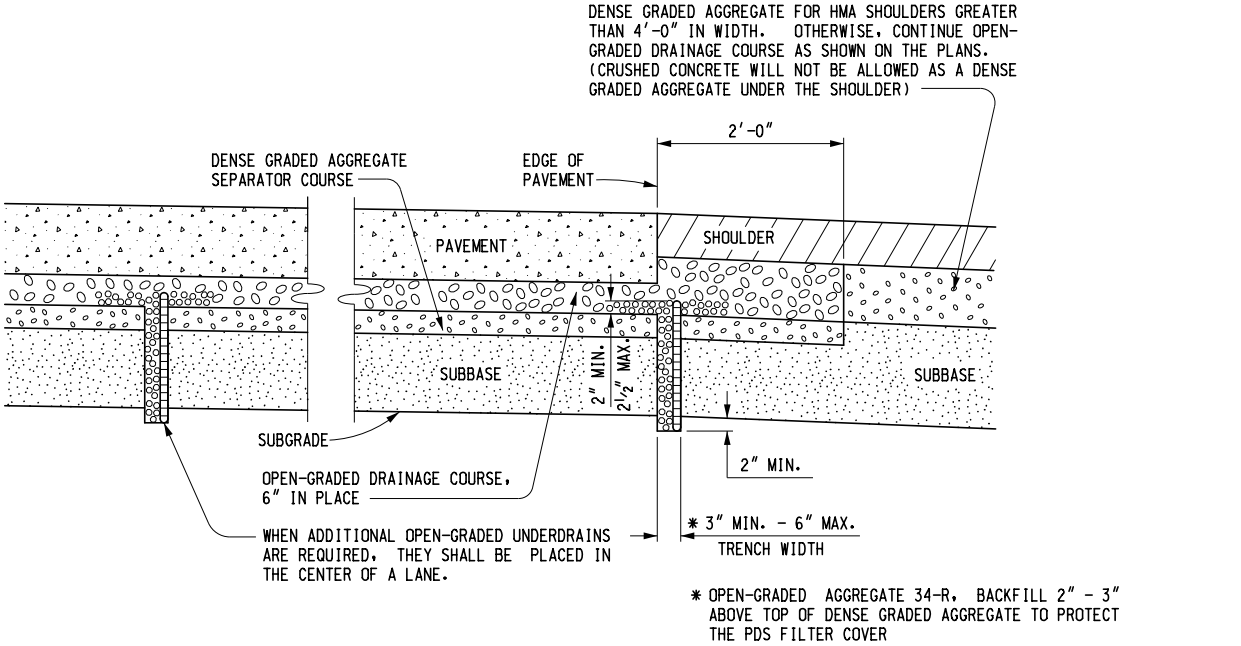
GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS FOR UNDERDRAINS, AND SEWER BULKHEADS

1-25-2013 F.H.W.A. APPROVAL	6-13-2012 PLAN DATE	R-80-E	SHEET 5 OF 8



* OPEN-GRADED AGGREGATE 34-R, BACKFILL 2" - 3" ABOVE TOP OF SUBBASE TO COVER 6" LATERAL PORTION OF GEOTEXTILE SEPARATOR AND TO PROTECT THE PDS FILTER COVER

OPEN-GRADED UNDERDRAIN (PDS) WITH GEOTEXTILE SEPARATOR



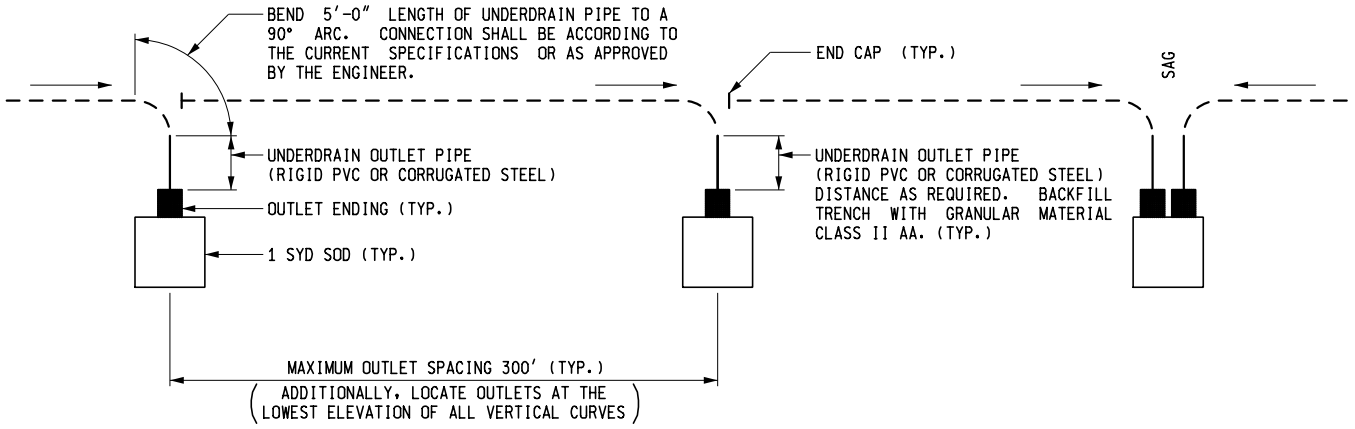
* OPEN-GRADED AGGREGATE 34-R, BACKFILL 2" - 3" ABOVE TOP OF DENSE GRADED AGGREGATE TO PROTECT THE PDS FILTER COVER

OPEN-GRADED UNDERDRAIN (PDS) WITH DENSE GRADED AGGREGATE SEPARATOR COURSE

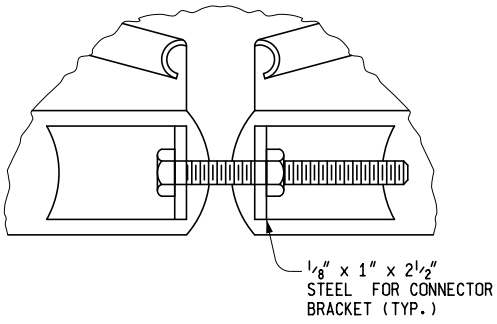
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

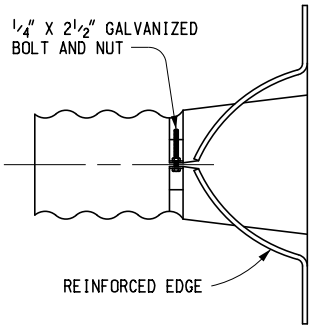
GRANULAR BLANKET, UNDERDRAINS, OUTLET ENDINGS FOR UNDERDRAINS, AND SEWER BULKHEADS

1-25-2013 F.H.W.A. APPROVAL	6-13-2012 PLAN DATE	R-80-E	SHEET 6 OF 8

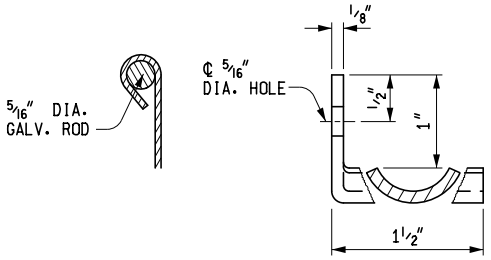


PLAN SHOWING OUTLETS FOR UNDERDRAINS

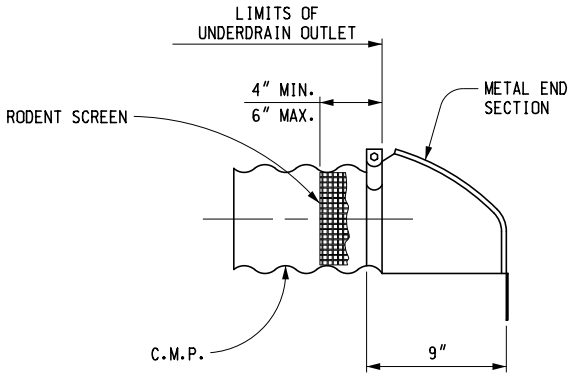


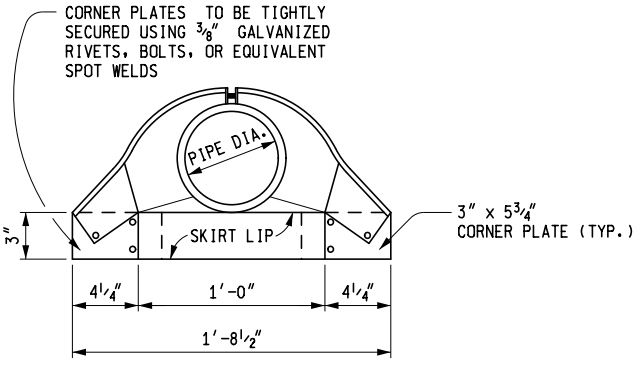


REINFORCED EDGE DETAIL



CONNECTOR BRACKET DETAIL



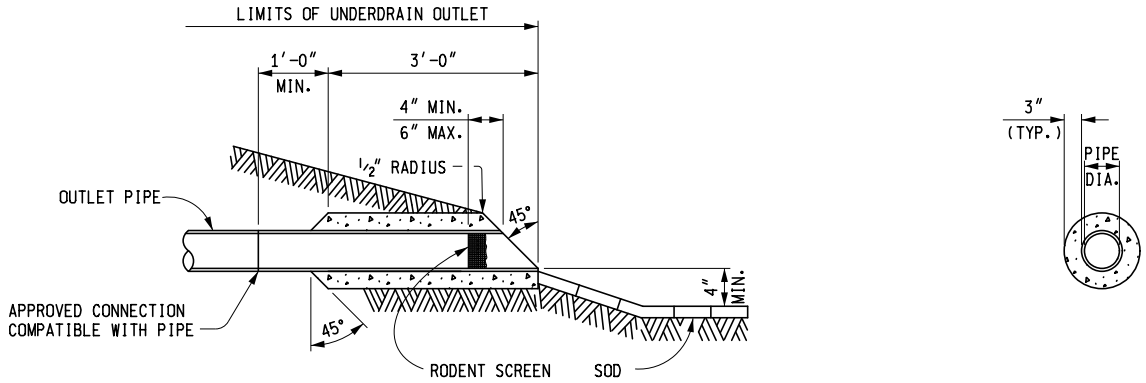


STEEL END SECTION FOR 4" OR 6" PIPE

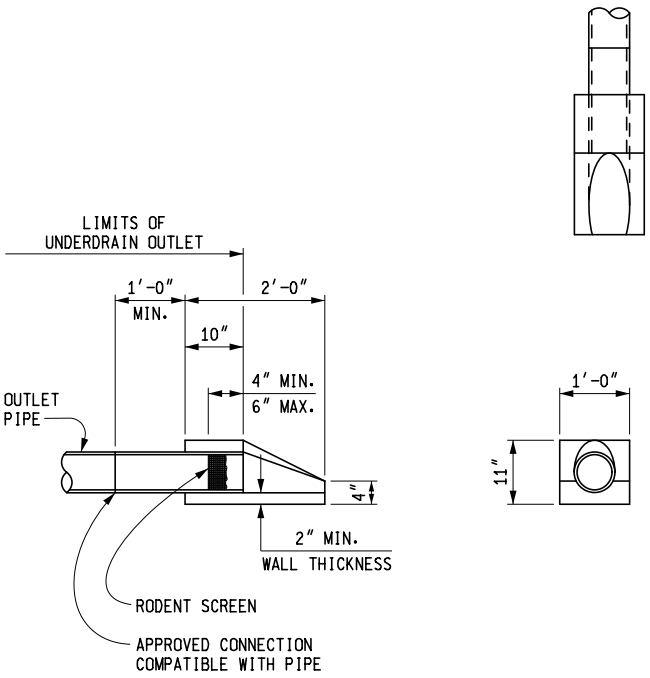
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

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

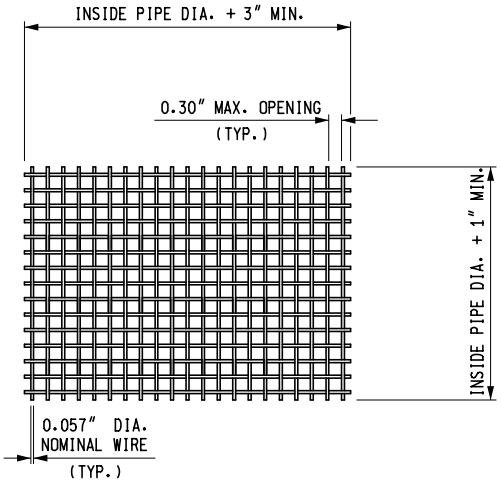
1-25-2013 F.H.W.A. APPROVAL	6-13-2012 PLAN DATE	R-80-E	SHEET 7 OF 8



CONCRETE RING FOR 4″ OR 6″ PIPE



CONCRETE END SECTION FOR 4″ OR 6″ PIPE



RODENT SCREEN

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 CURRENT STANDARD SPECIFICATIONS AND AS APPROVED BY THE ENGINEER.

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

OUTLET CONNECTIONS TO DRAINAGE STRUCTURES SHALL BE ACCORDING TO CURRENT STANDARD SPECIFICATIONS 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.

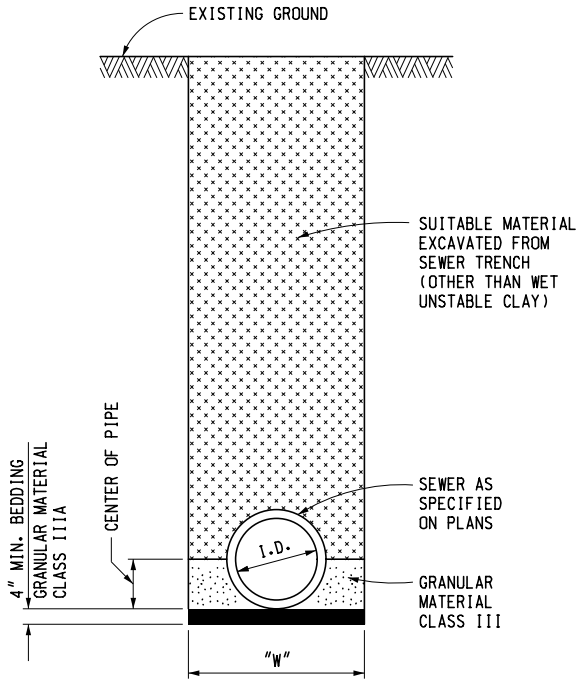
STEEL END SECTIONS MAY ALSO BE ATTACHED TO THE ENDS OF PVC OUTLET PIPE AS APPROVED BY THE ENGINEER BY USING A PVC ADAPTER THAT PROVIDES SIMILAR RESISTANCE TO MOVEMENT OF THE CONNECTION DEVICE AS THAT PROVIDED BY STEEL PIPE CORRUGATIONS. DIRECT ATTACHMENT OF THE STEEL END SECTION TO END OF STANDARD PVC OUTLET PIPE IS NOT ACCEPTABLE.

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

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

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

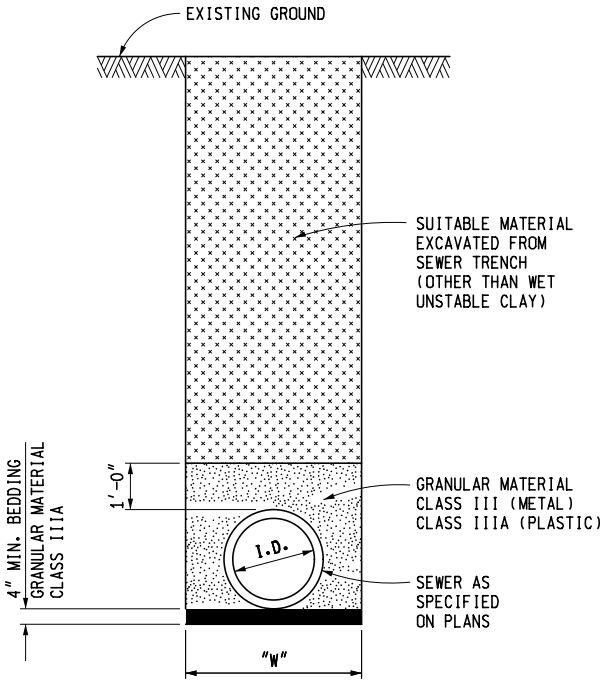
1-25-2013 F.H.W.A. APPROVAL	6-13-2012 PLAN DATE	R-80-E	SHEET 8 OF 8



SEWER NOT UNDER ROADBED
CONCRETE

NOTE: FOR "W" SEE NOTES ON SHEET 5

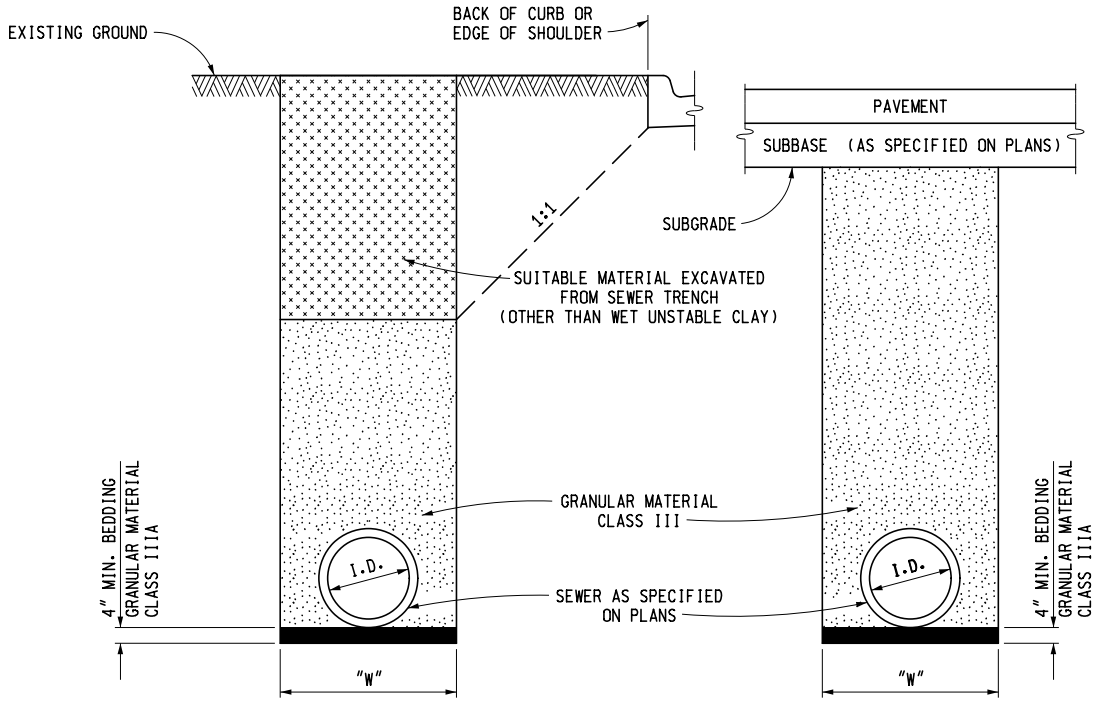
A1



SEWER NOT UNDER ROADBED
METAL & PLASTIC

NOTE: FOR "W" SEE NOTES ON SHEET 5

A2



SEWER UNDER ROADBED OR WITHIN INFLUENCE OF ROADBED
CONCRETE & METAL PIPE

B1

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

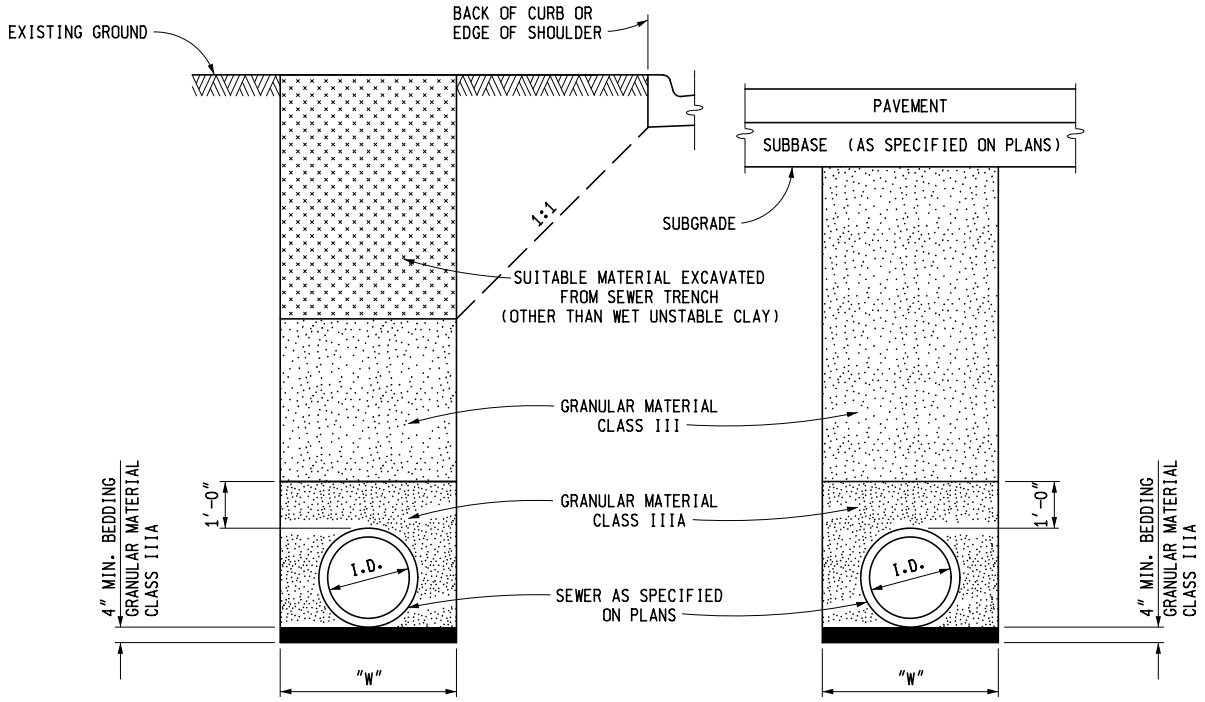
APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

UTILITY TRENCHES

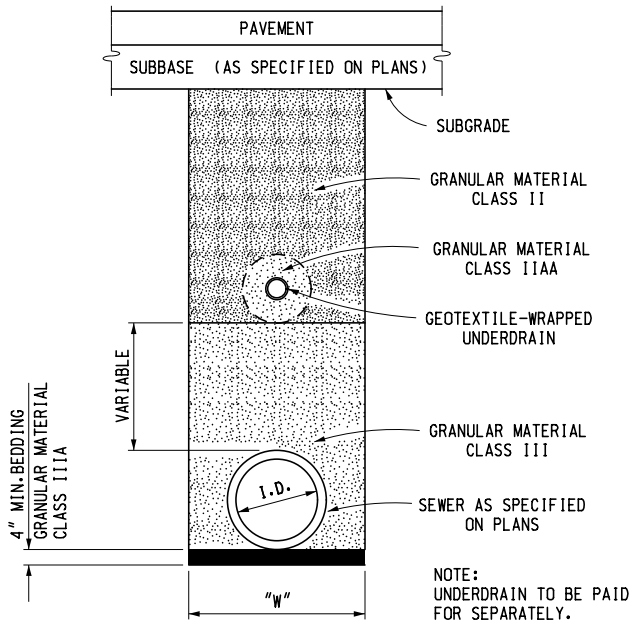
F.H.W.A. APPROVAL	2-8-2016 PLAN DATE	R-83-C	SHEET 1 OF 5



SEWER UNDER ROADBED OR WITHIN INFLUENCE OF ROADBED

PLASTIC PIPE

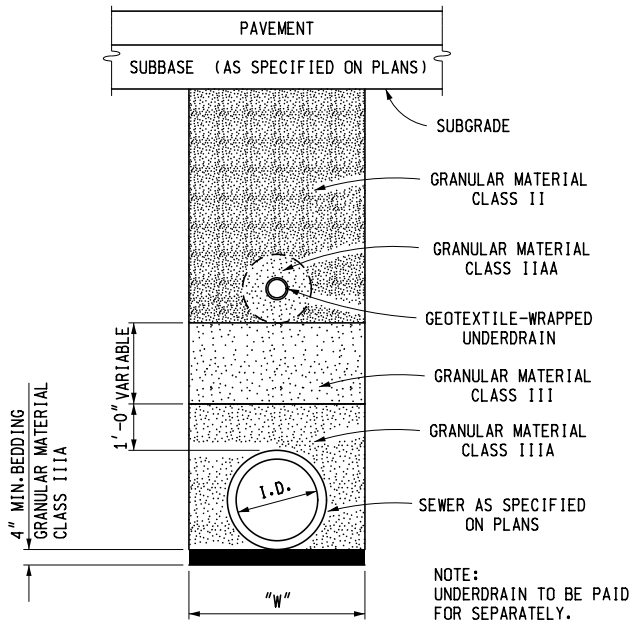
B2



SEWER WITH UNDERDRAIN UNDER ROADBED

CONCRETE & METAL PIPE

C1



SEWER WITH UNDERDRAIN UNDER ROADBED

PLASTIC PIPE

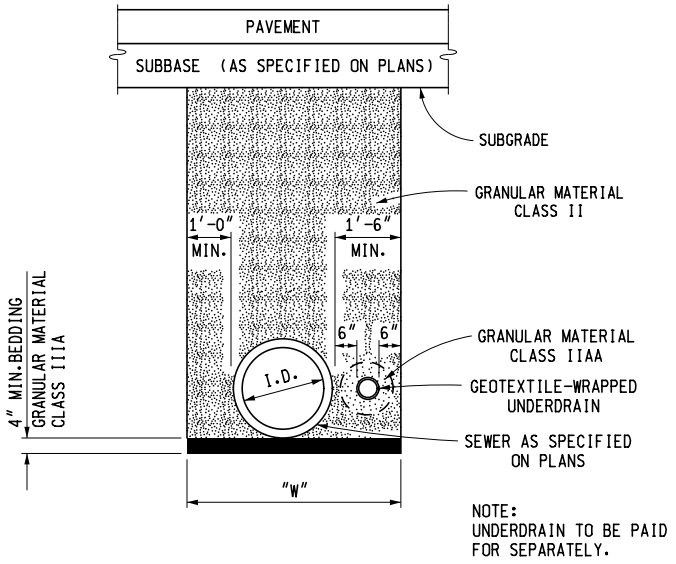
C2

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF DEVELOPMENT STANDARD PLAN FOR

UTILITY TRENCHES

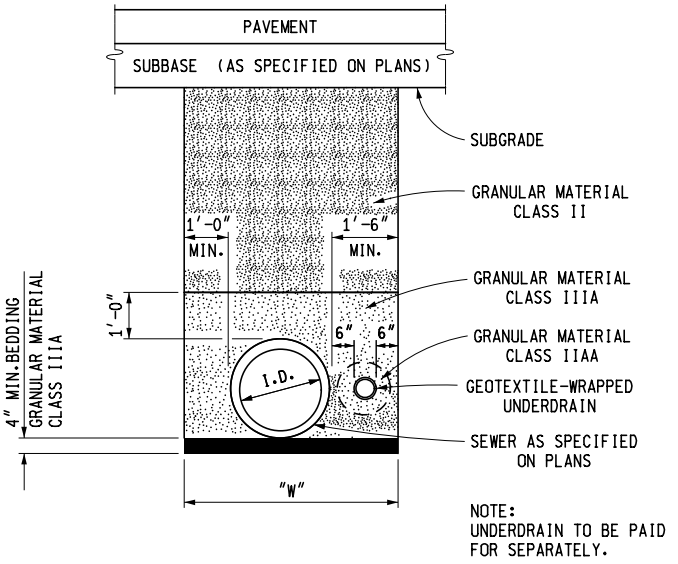
F.H.W.A. APPROVAL	2-8-2016 PLAN DATE	R-83-C	SHEET 2 OF 5



SEWER WITH UNDERDRAIN UNDER ROADBED

CONCRETE & METAL PIPE
(FOR SHALLOW SEWERS)

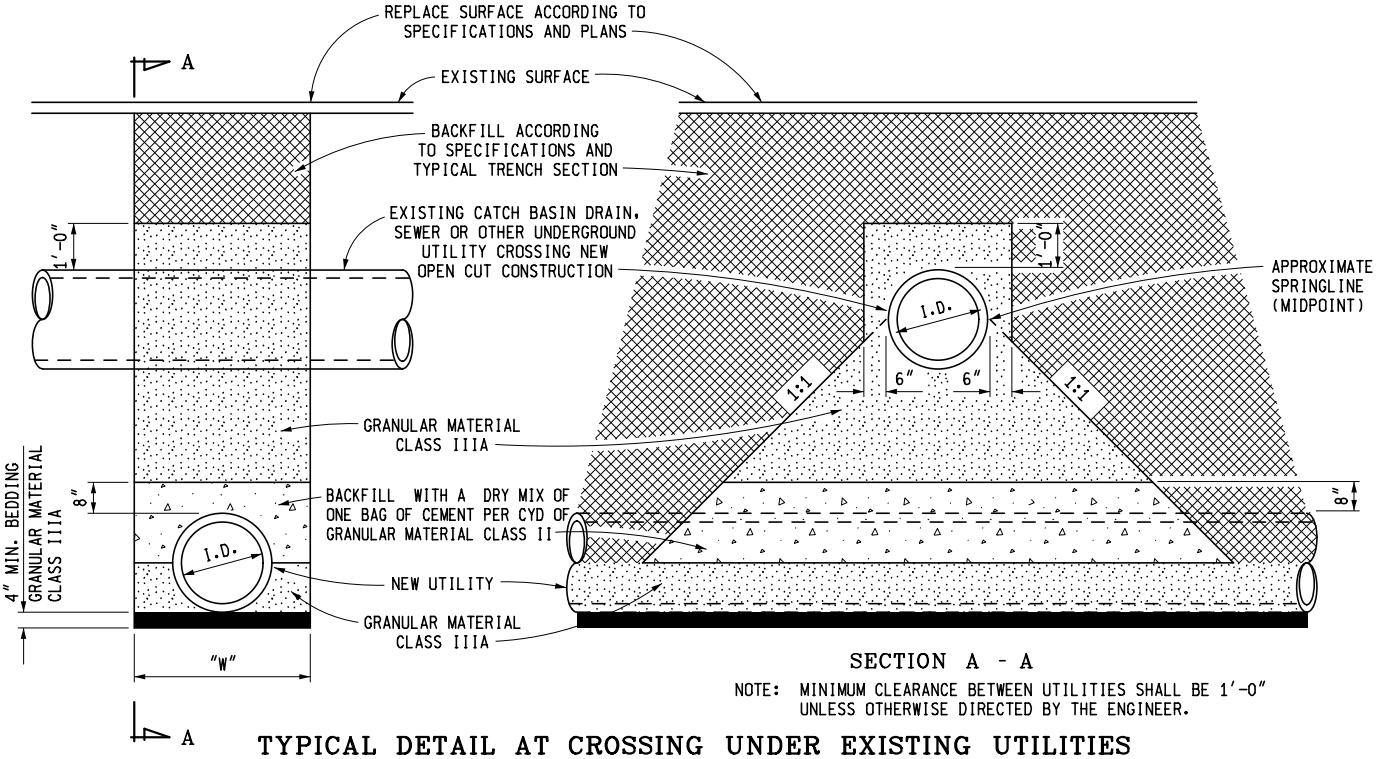
D1



SEWER WITH UNDERDRAIN UNDER ROADBED

PLASTIC PIPE
(FOR SHALLOW SEWERS)

D2



SECTION A - A

NOTE: MINIMUM CLEARANCE BETWEEN UTILITIES SHALL BE 1'-0" UNLESS OTHERWISE DIRECTED BY THE ENGINEER.

TYPICAL DETAIL AT CROSSING UNDER EXISTING UTILITIES

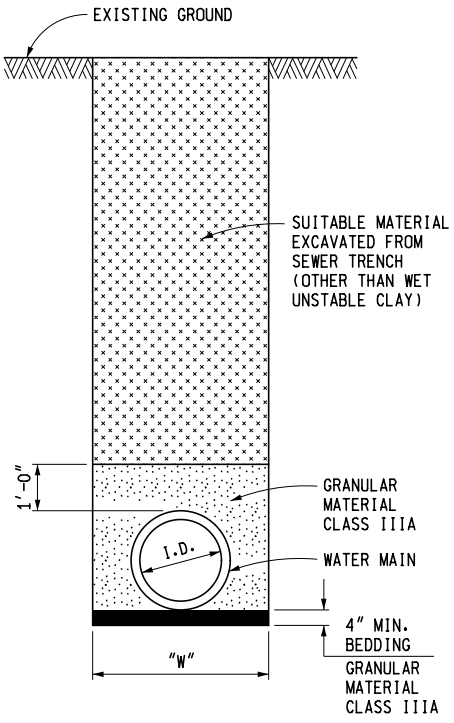
PAYMENT FOR THIS TRENCH DETAIL WILL BE INCLUDED WITH THE ADJACENT TRENCH DETAILS

E

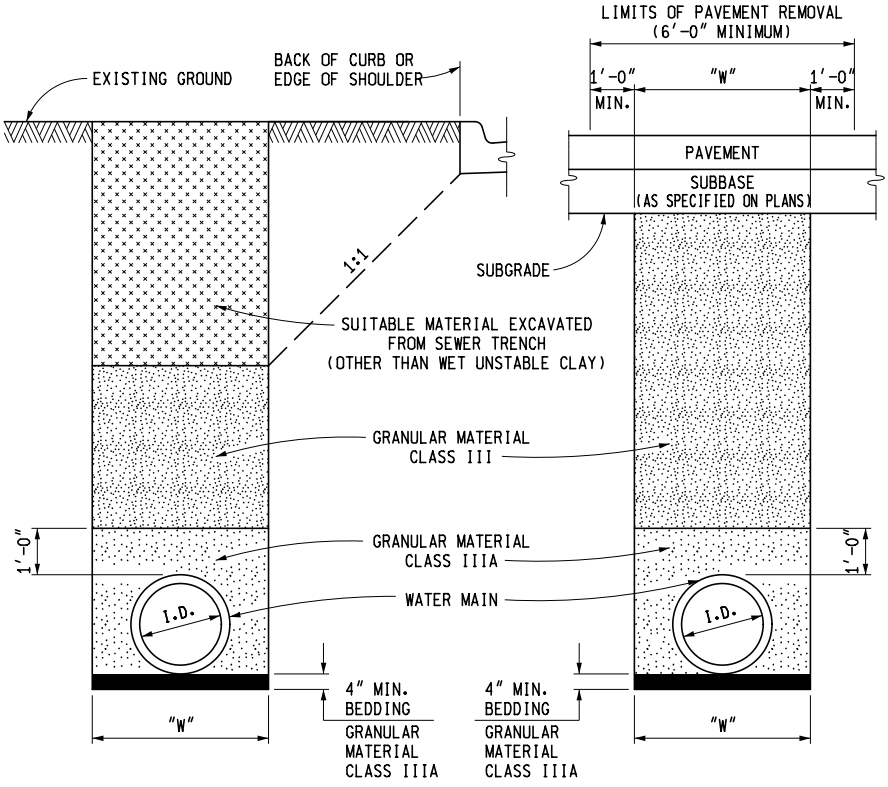
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

UTILITY TRENCHES

F.H.W.A. APPROVAL	2-8-2016 PLAN DATE	R-83-C	SHEET 3 OF 5

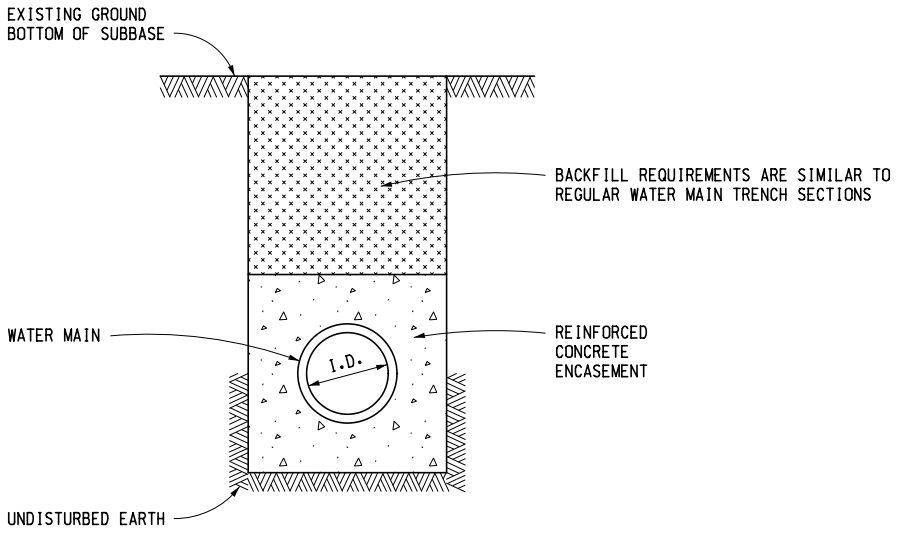


WATER MAINS NOT UNDER ROADBED F



NOTE: WHEN WATER MAIN IS PLACED IN PROPOSED ROADBED AREA, IT SHALL BE BACKFILLED WITH SELECTED EXCAVATION MATERIAL ABOVE FUTURE SUBGRADE TO EXISTING GROUND LINE.

WATER MAINS UNDER ROADBED OR WITHIN INFLUENCE OF ROADBED G



REQUIRED ENCASEMENT SIZE FOR RESPECTIVE PIPE SIZES	
DIAMETER OF PIPE	ENCASEMENT SIZE AND TRENCH WIDTH
6" - 12"	3'-0"
16"	3'-6"
24"	4'-6"
30"	5'-0"
36"	5'-6"
42"	6'-0"
48"	7'-0"
54"	7'-6"
60"	8'-0"
66"	8'-6"
72"	9'-0"

NOTE:
REINFORCEMENT SHALL BE AS SPECIFIED ON PLANS.

WATER MAINS IN REINFORCED CONCRETE ENCASEMENT H

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

UTILITY TRENCHES

F.H.W.A. APPROVAL	2-8-2016 PLAN DATE	R-83-C	SHEET 4 OF 5

NOTES:

BACKFILLING SHALL BE ACCORDING TO THE STANDARD SPECIFICATION.

SUFFICIENT TRENCH WIDTH SHALL BE PROVIDED TO ALLOW FREE WORKING SPACE AND TO PERMIT COMPACTING THE BACKFILL AROUND THE PIPE.

THE FOLLOWING ARE MINIMUM TRENCH WIDTHS:

I.D. PIPE SIZE (INCHES)	LESS THAN 18	21	24	30	36
"W" TRENCH WIDTH (FEET)	3.0	3.5	4.0	5.0	6.0

I.D. PIPE SIZE (INCHES)	42	48	54	60	66	72
"W" TRENCH WIDTH (FEET)	7.0	8.0	9.5	10.0	10.5	11.0

I.D. PIPE SIZE (INCHES)	78	84	90	96	102	108
"W" TRENCH WIDTH (FEET)	11.5	12.0	12.5	13.0	13.5	14.0

ESTIMATED PAVEMENT REMOVAL WIDTH IS TO BE TRENCH WIDTH "W" PLUS 1'-0" EACH SIDE OF THE TRENCH (6'-0" MINIMUM).

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF DEVELOPMENT STANDARD PLAN FOR

UTILITY TRENCHES

F.H.W.A. APPROVAL	2-8-2016 PLAN DATE	R-83-C	SHEET 5 OF 5

APPLICABLE SOIL EROSION AND SEDIMENTATION CONTROL MEASURES

(COMPREHENSIVE DETAILS ARE LOCATED IN SECTION 6 OF THE SOIL EROSION & SEDIMENTATION CONTROL MANUAL)

A = SLOPES

B = STREAMS AND WATERWAYS

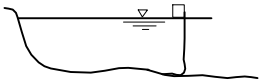
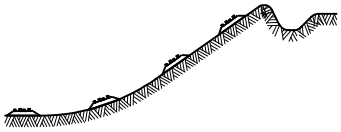
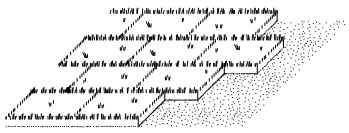
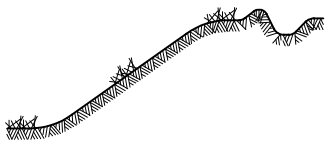
C = SURFACE DRAINAGEWAYS

D = ENCLOSED DRAINAGE (INLET & OUTFALL CONTROL)

E = LARGE FLAT SURFACE AREAS

F = BORROW AND STOCKPILE AREAS

G = DNRE PERMIT MAY BE REQUIRED

KEY	DETAIL	CHARACTERISTICS	A	B	C	D	E	F	G
1	 TURBIDITY CURTAIN	A Turbidity Curtain is used when slack water area is necessary to isolate construction activities from the watercourse. The still water area contains the sediments within the construction limits.		●					
2	 GRUBBING OMITTED	Retains existing root mat which assists in stabilizing slopes. Assists in the revegetation process by providing sprout growth. Reduces sheet flow velocities preventing rilling and gullying. Discourages off-road vehicle use.	●				●		
3	 PERMANENT/TEMPORARY SEEDING	Inexpensive but effective erosion control measure to stabilize flat areas and mild slopes. Permits runoff to infiltrate soil, reducing runoff volumes. Proper preparation of the seed bed, fertilizing, mulching and watering is critical to its success.	●		●		●	●	
4	 DUST CONTROL	Dust control can be accomplished by watering, and/or applying calcium chloride. The disturbed areas should be kept to a minimum. PERMANENT/TEMPORARY SEEDING (KEY 3) should be applied as soon as possible.	●				●	●	
5	 SODDING	Provides immediate vegetative cover such as at spillways and ditch bottoms. Proper preparation of the topsoil, placement of the sod, and watering is critical to its success.	●				●	●	
6	 VEGETATED BUFFER STRIPS	Reduces sheet flow velocities preventing rilling and gullying. Assists in the collection of sediments by filtering runoff. Assists in the establishment of a permanent vegetative cover.	●				●		

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

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Kirk T. Steudle

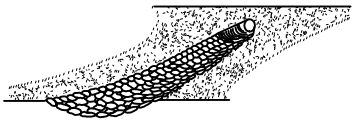
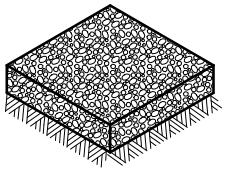
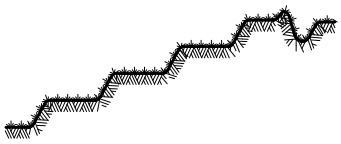
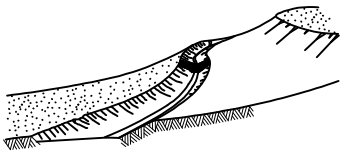
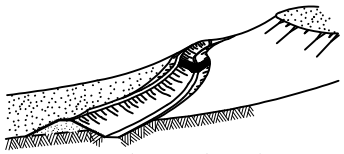
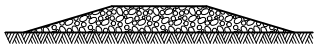
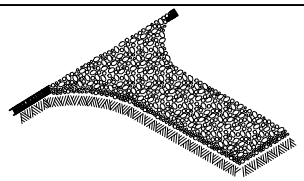
APPROVED BY: John C. Friend
ENGINEER OF DELIVERY

APPROVED BY: Mark A Van Portfleet
ENGINEER OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SOIL EROSION & SEDIMENTATION CONTROL MEASURES

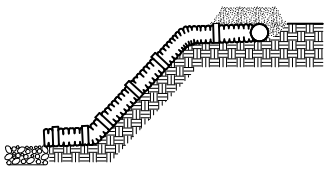
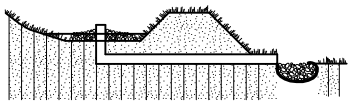
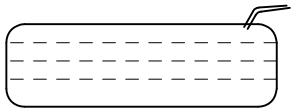
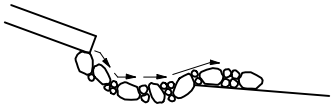
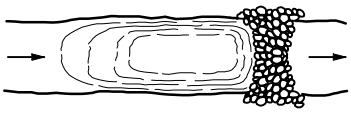
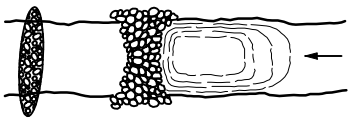
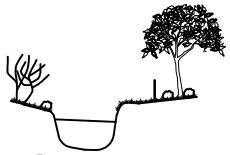
9-10-2010	6-3-2010	R-96-E	SHEET
F.H.W.A. APPROVAL	PLAN DATE		1 OF 6

KEY	DETAIL	CHARACTERISTICS	A	B	C	D	E	F	G
7	 RIPRAP	Used where vegetation cannot be established. Very effective in protecting against high velocity flows. Should be placed over a geotextile liner.	●	●	●	●			●
8	 AGGREGATE COVER	Can be used in any area where a stable condition is needed for construction operations, equipment storage or in heavy traffic areas. Reduces potential soil erosion and fugitive dust by stabilizing raw areas.	●				●	●	
9	 BENCHES	Reduces sheet flow velocities preventing rilling and gullying. Assists in the collection and filtering of sediments. Provides access for stabilizing slopes.	●					●	
10	 DIVERSION DIKE	Assists in the diversion of runoff to a stable outlet or sediment control device. Reduces sheet flow velocities preventing rilling and gullying. Collects and diverts runoff to properly stabilized drainage ways. Works well with INTERCEPTING DITCH (KEY 11)	●				●	●	
11	 INTERCEPTING DITCH	Assists in the diversion of runoff to a stable outlet or sediment control device. Reduces sheet flow velocities preventing rilling and gullying. Works well with DIVERSION DIKE (KEY 10)	●				●	●	
12	 INTERCEPTING DITCH AND DIVERSION DIKE	Assists in the diversion of runoff to a stable outlet or sediment control device. Reduces sheet flow velocities preventing rilling and gullying.	●				●	●	
13	 GRAVEL FILTER BERM	Useful in filtering flow prior to its reentry into a lake, stream or wetland. Works well with SEDIMENT TRAP (KEY 20) and TEMPORARY BYPASS CHANNEL (KEY 35). Not to be used in lieu of a CHECK DAM (KEY 37) in a ditch.	●		●			●	
14	 GRAVEL ACCESS APPROACH	Provides a stable access to roadways minimizing fugitive dust and tracking of materials onto public streets and highways.					●	●	

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SOIL EROSION & SEDIMENTATION CONTROL MEASURES

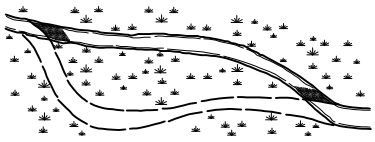
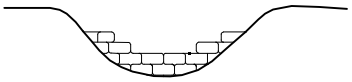
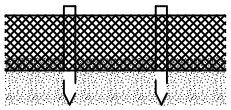
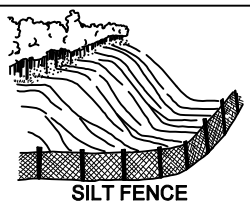
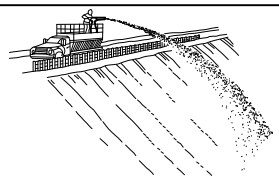
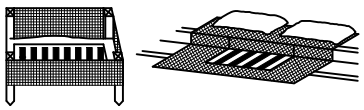
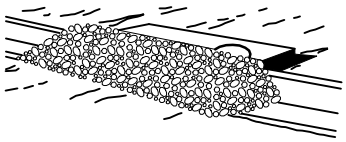
9-10-2010 F.H.W.A. APPROVAL	6-3-2010 PLAN DATE	R-96-E	SHEET 2 OF 6

KEY	DETAIL	CHARACTERISTICS	A	B	C	D	E	F	G
15	 SLOPE DRAIN SURFACE	Excellent device for carrying water down slopes without creating an erosive condition. Generally used in conjunction with DIVERSION DIKE (KEY 10), INTERCEPTING DITCH (KEY 11) and INTERCEPTING DITCH AND DIVERSION DIKE (KEY 12) to direct flow to a stable discharge area or SEDIMENT TRAP (KEY 20).	●		●				
16	 TREES, SHRUBS AND PERENNIALS	Trees, shrubs and perennials can provide low maintenance long term erosion protection. These plants may be particularly useful where site aesthetics are important along the roadside slopes.	●				●		
17	 PIPE DROP	Effective way to allow water to drop in elevation very rapidly without causing an erosive condition. Also works as a sediment collector device. May be left in place as a permanent erosion control device.	●		●				
18	 DEWATERING WITH FILTER BAG	It may be necessary to dewater from behind a cofferdam or construction dam to create a dry work site. Discharged water must be pumped to a filter bag. A GRAVEL FILTER BERM (KEY 13) may be placed downslope of the filter bag to provide additional filtration prior to entering any stream or wetland.		●					●
19	 ENERGY DISSIPATORS	A device to prevent the erosive force of water from eroding soils. Used at outlets of culverts, drainage pipes or other conduits to reduce the velocity of the water. Prevents structure scouring and undermining.	●	●	●	●			
20	 SEDIMENT TRAP	Used to intercept concentrated flows and prevent sediments from being transported off site or into a watercourse or wetland. The size of a Sediment Trap is 5 cubic yards or less. Works well when used with CHECK DAM (KEY 37).	●		●	●			
21	 SEDIMENT BASIN	A Sediment Basin is used to trap sediments from an upstream construction site. Requires periodic inspections, repairs, and maintenance. Where practical, sediments should be contained on site. A Sediment Basin should be the last choice of sediment control. The size of a Sediment Basin is greater than 5 cubic yards.		●					●
22	 VEGETATIVE BUFFER AT WATERCOURSE	This practice is used to maintain a vegetative buffer adjacent to a watercourse. When utilized with SILT FENCE (KEY 26) it will, under normal circumstances, prevent sediment from leaving the construction site.	●	●	●		●	●	

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SOIL EROSION & SEDIMENTATION CONTROL MEASURES

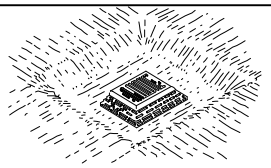
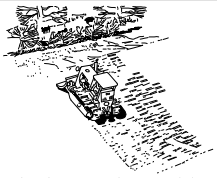
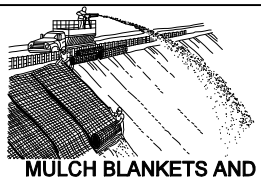
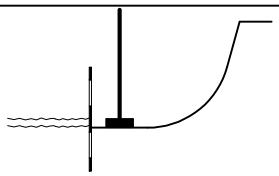
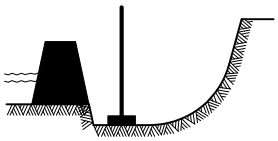
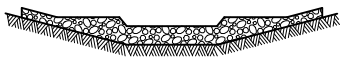
9-10-2010 F.H.W.A. APPROVAL	6-3-2010 PLAN DATE	R-96-E	SHEET 3 OF 6

KEY	DETAIL	CHARACTERISTICS	A	B	C	D	E	F	G
23	 STREAM RELOCATION	A detail depicting the proper procedures for stream relocation. Maintains same width, depth, and flow velocity as the natural stream. Revegetate banks with PERMANENT/TEMPORARY SEEDING (KEY 3), MULCHING AND MULCH ANCHORING (KEY 28), MULCH BLANKETS AND HIGH VELOCITY MULCH BLANKETS (KEY 33) and woody plants to shade the stream.		●					●
24	 SAND AND STONE BAGS	Sand and stone bags are a useful tool in the prevention of erosion. Can be used to divert water around a construction site by creating a DIVERSION DIKE (KEY 10). Works well for creating a CONSTRUCTION DAM (KEY 36) and temporary culvert end fill.	●	●	●	●	●	●	●
25	 SAND FENCE AND DUNE STABILIZATION	A Sand Fence traps blowing sand by reducing wind velocities. Can be used to prevent sand from blowing onto roads. Must be maintained until sand source is stabilized.	●				●	●	
26	 SILT FENCE	A permeable barrier erected below disturbed areas to capture sediments from sheet flow. Can be used to divert small volumes of water to stable outlets. Ineffective as a filter and should never be placed across streams or ditches where flow is concentrated.	●				●	●	
27	 PLASTIC SHEETS OR GEOTEXTILE COVER	Plastic Sheets can be used to create a liner in temporary channels. Can also be used to create a temporary cover to prevent erosion of stockpiled materials.	●	●	●			●	
28	 MULCHING AND MULCH ANCHORING	Anchored mulch provides erosion protection against rain and wind. Mulch must be used on seeded areas to promote water retention and growth. Should be inspected after every rainstorm and repaired as necessary until vegetation is well established.	●		●		●	●	
29	 INLET PROTECTION FABRIC DROP	Provides settling and filtering of silt laden water prior to its entry into the drainage system. Can be used in median and side ditches where vegetation will be disturbed. Allows for early use of drainage systems prior to project completion.			●		●		
30	 INLET PROTECTION GEOTEXTILE AND STONE	Provides settling and filtering of silt laden water prior to its entry into the drainage system. Should be used in paved areas where drainage structures are existing or proposed. Allows for early use of drainage systems prior to project completion.			●		●		

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SOIL EROSION & SEDIMENTATION CONTROL MEASURES

9-10-2010 F.H.W.A. APPROVAL	6-3-2010 PLAN DATE	R-96-E	SHEET 4 OF 6

KEY	DETAIL	CHARACTERISTICS	A	B	C	D	E	F	G
31	 INLET PROTECTION SEDIMENT TRAP	An Inlet Protection Sediment Trap is a temporary device that can be used in areas where medium flows are anticipated. Effective in trapping small quantities of sediments prior to water entering the drainage system. Can be used in areas such as median and side ditches.			●		●		
32	 SLOPE ROUGHENING AND SCARIFICATION	A simple and economical way to reduce soil erosion by wind and water. Can be accomplished by harrowing with a disk, back blading, or tracking with a dozer perpendicular to the slope.	●				●	●	
33	 MULCH BLANKETS AND HIGH VELOCITY MULCH BLANKETS	Mulch blankets provide an immediate and effective cover over raw erodible slopes affording excellent protection against rain and wind erosion. High velocity mulch blankets work well for stabilizing the bottom of ditches in waterways.	●		●		●	●	
34	 COFFERDAM	Used to create a dry construction area and protect the stream from raw erodible areas. Must be pumped dry or dewatered according to DEWATERING WITH FILTER BAG (KEY 18).		●					●
35	 TEMPORARY BYPASS CHANNEL	Utilized when a dry construction area is needed. Isolates stream flows from raw erodible areas minimizing erosion and subsequent siltation. Can incorporate SEDIMENT BASIN (KEY 21), CHECK DAM (KEY 37), and GRAVEL FILTER BERM (KEY 13) to remove sediments from water. Construction sequence of events may be necessary.		●					●
36	 CONSTRUCTION DAM	Used to create a dry or slack water area for construction. Isolates the stream from raw erodible areas. Can be created out of any non-erodible materials such as SAND AND STONE BAGS (KEY 24), a gravel dike with clay core or plastic liner, steel plates or plywood.		●					●
37	 CHECK DAM	Can be constructed across ditches or any area of concentrated flow. Protects vegetation in early stages of growth. A Check Dam is intended to reduce water velocities and capture sediment. A Check Dam is not a filtering device.	●		●			●	

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SOIL EROSION & SEDIMENTATION CONTROL MEASURES

9-10-2010 F.H.W.A. APPROVAL	6-3-2010 PLAN DATE	R-96-E	SHEET 5 OF 6

NOTES:

THIS STANDARD PLAN WILL SERVE AS A KEY IN THE SELECTION OF THE APPROPRIATE SOIL EROSION AND SEDIMENTATION CONTROL DETAILS. THIS PLAN ALSO PROVIDES THE KEY TO THE NUMBERED EROSION CONTROL ITEMS SPECIFIED ON THE CONSTRUCTION PLANS. REFER TO THE MDOT SOIL EROSION & SEDIMENTATION CONTROL MANUAL, SECTION 6 FOR SPECIFIC DETAILS, CONTRACT ITEMS (PAY ITEMS), AND PAY UNITS.

COLLECTED SILT AND SEDIMENT SHALL BE REMOVED PERIODICALLY TO MAINTAIN THE EFFECTIVENESS OF THE SEDIMENT TRAP, SEDIMENT BASIN, AND SILT FENCE. AGGREGATES PLACED IN STREAMS SHOULD CONTAIN A MINIMUM OF FINES.

TEMPORARY EROSION AND SEDIMENTATION CONTROL PROVISIONS SHALL BE COORDINATED WITH THE PERMANENT CONTROL MEASURES TO ASSURE EFFECTIVE CONTROL OF SEDIMENTS DURING CONSTRUCTION OF THE PROJECT.

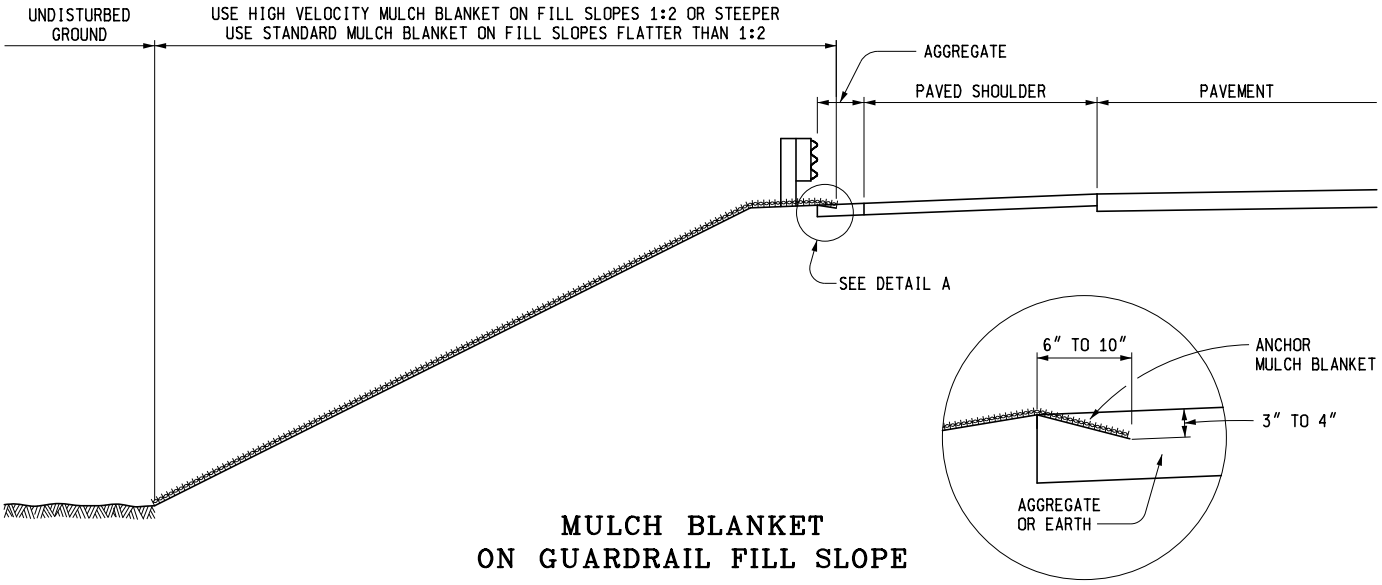
ALL TEMPORARY EROSION CONTROL DEVICES SHALL BE REMOVED AFTER VEGETATION ESTABLISHMENT OR AT THE DISCRETION OF THE ENGINEER. CARE SHALL BE TAKEN DURING REMOVAL TO MINIMIZE SILTATION IN NEARBY DRAINAGE COURSES.

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

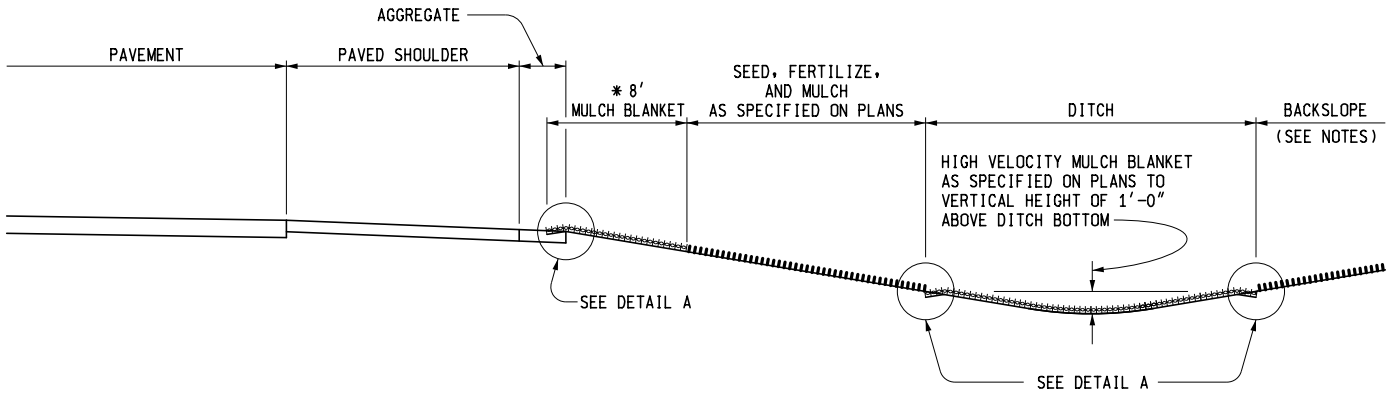
SOIL EROSION & SEDIMENTATION CONTROL MEASURES

9-10-2010 F.H.W.A. APPROVAL	6-3-2010 PLAN DATE	R-96-E	SHEET 6 OF 6

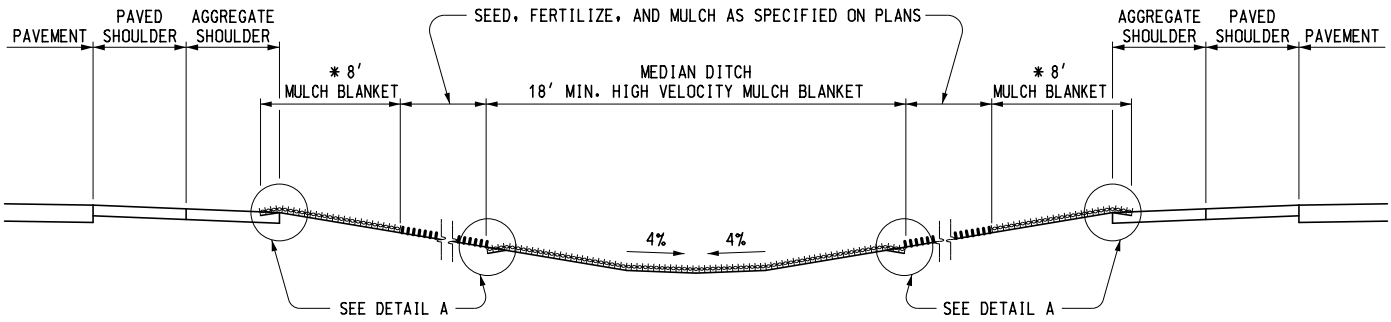


MULCH BLANKET ON GUARDRAIL FILL SLOPE

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%.

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

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DEPARTMENT DIRECTOR
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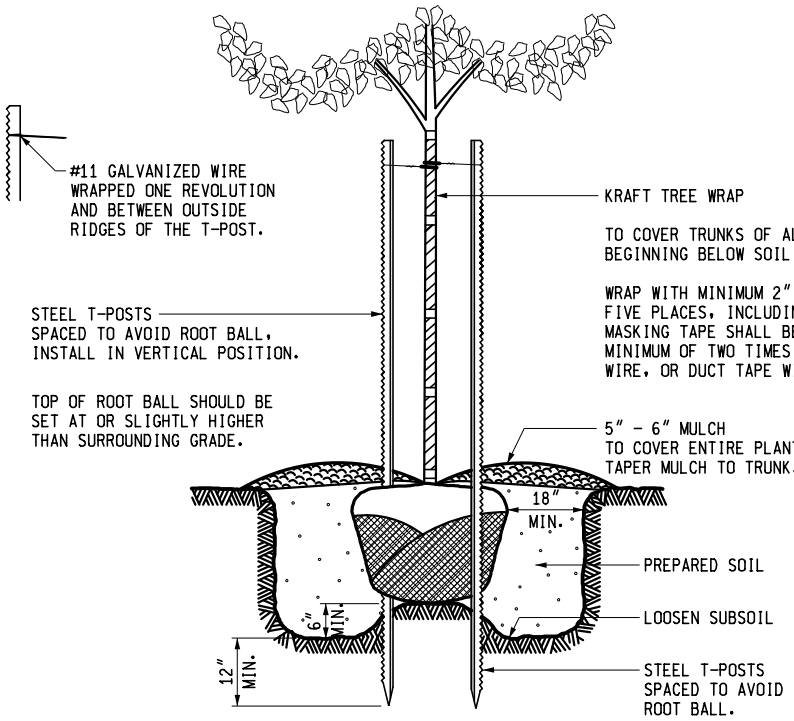
APPROVED BY: _____
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

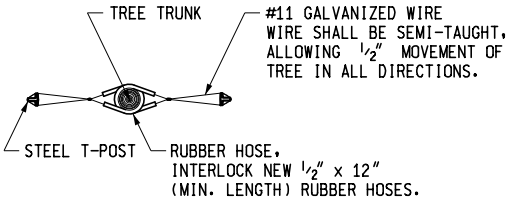
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SEEDING AND TREE PLANTING

9-30-2014	9-26-2013	R-100-H	SHEET 1 OF 4
F.H.W.A. APPROVAL	PLAN DATE		



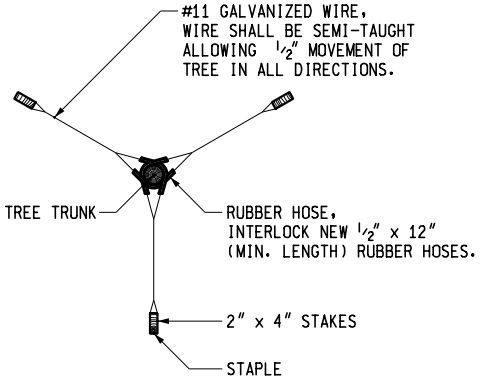
BRACING - VERTICAL STAKES



BRACING DETAIL

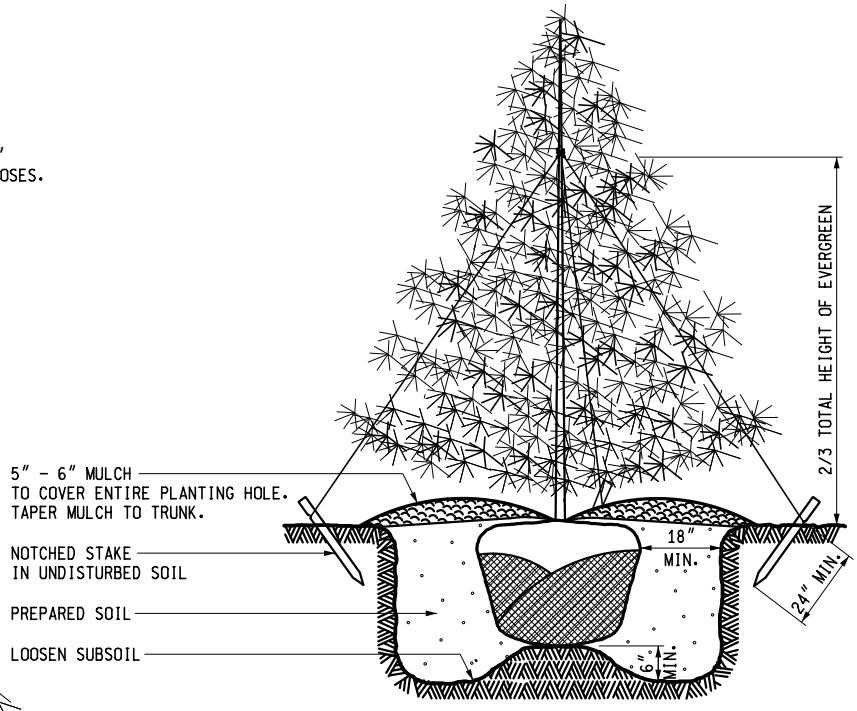
BRACE DECIDUOUS TREES 2" TO 4" IN CALIPER OR 8' OR MORE IN HEIGHT WITH TWO STAKES.

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

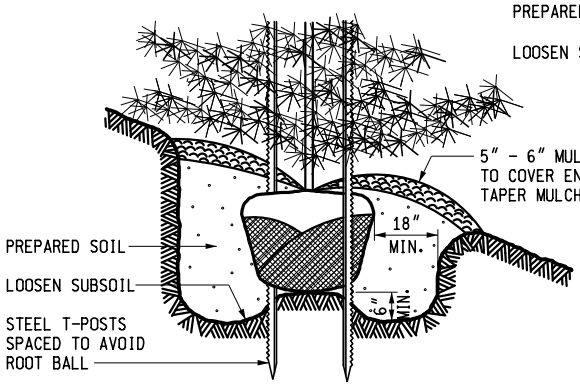


TRIPOD GUYING DETAIL

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



GUYING - TRIPOD METHOD



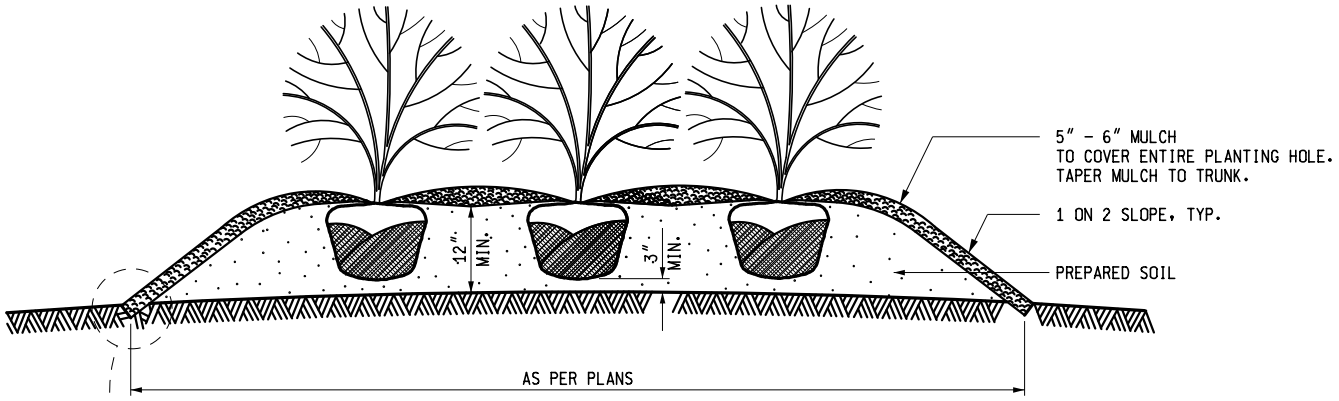
SLOPE PLANTING

MICHIGAN DEPARTMENT OF TRANSPORTATION

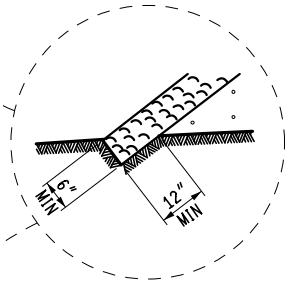
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SEEDING AND TREE PLANTING

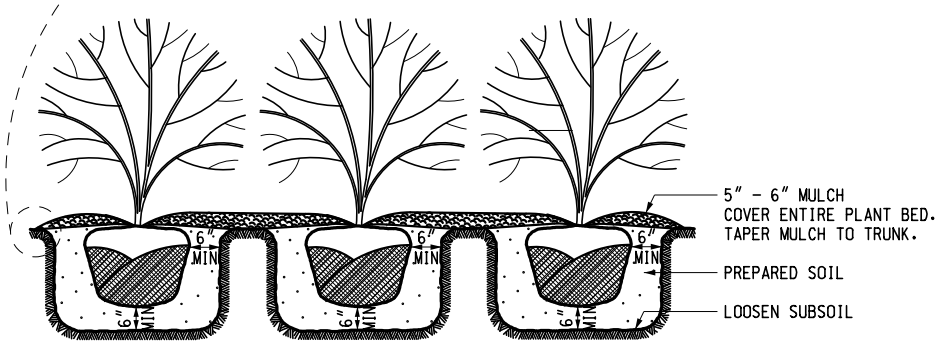
9-30-2014 F.H.W.A. APPROVAL	9-26-2013 PLAN DATE	R-100-H	SHEET 2 OF 4



RAISED SHRUB BED DETAIL



SHRUB BED EDGING DETAIL



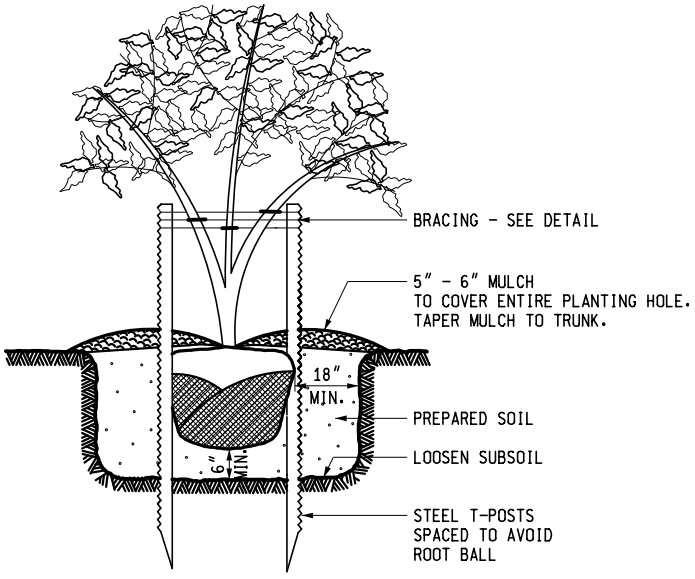
SHRUB BED DETAIL

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.



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 $^1/_2$ 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 5"-6" MULCH. PRUNE, WRAP, AND BRACE AND GUY.

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

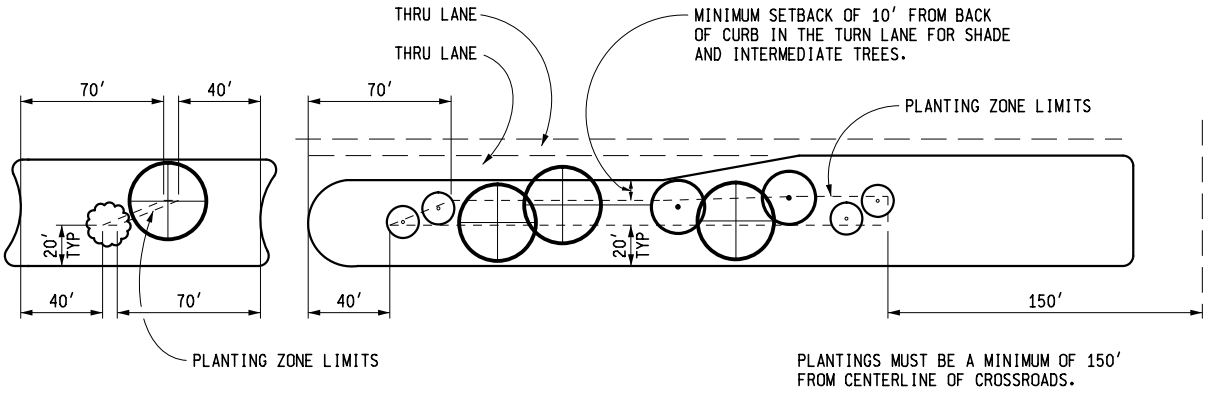
TREE HEIGHTS ARE SHOWN BEFORE PRUNING. TREE PLANTING DEPTHS ARE SHOWN AFTER SETTLING.

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

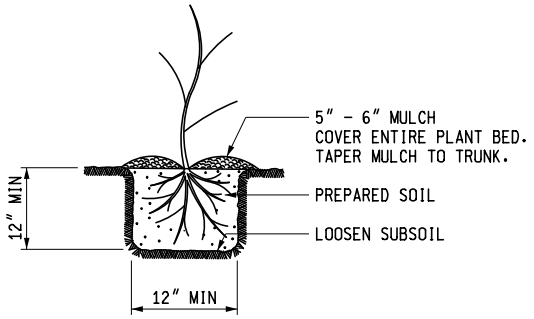
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SEEDING AND TREE PLANTING

9-30-2014 F.H.W.A. APPROVAL	9-26-2013 PLAN DATE	R-100-H	SHEET 3 OF 4



MEDIAN PLANTING
NOT TO SCALE



BARE ROOT 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.

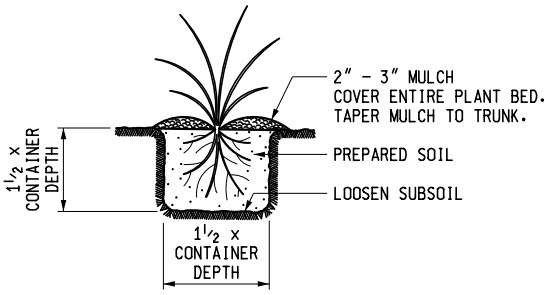
ROOT PRUNE AS NECESSARY TO REMOVE ALL DAMAGED OR BROKEN ROOTS, AND AS REQUIRED BY THE DISTRICT FORESTER OR RESOURCE SPECIALIST.

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 5″ – 6″ MULCH AS SHOWN.



PERENNIAL PLANTS

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 CURRENT SPECIFICATIONS.

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 6′ 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.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

SEEDING AND TREE PLANTING

9-30-2014 F.H.W.A. APPROVAL	9-26-2013 PLAN DATE	R-100-H	SHEET 4 OF 4