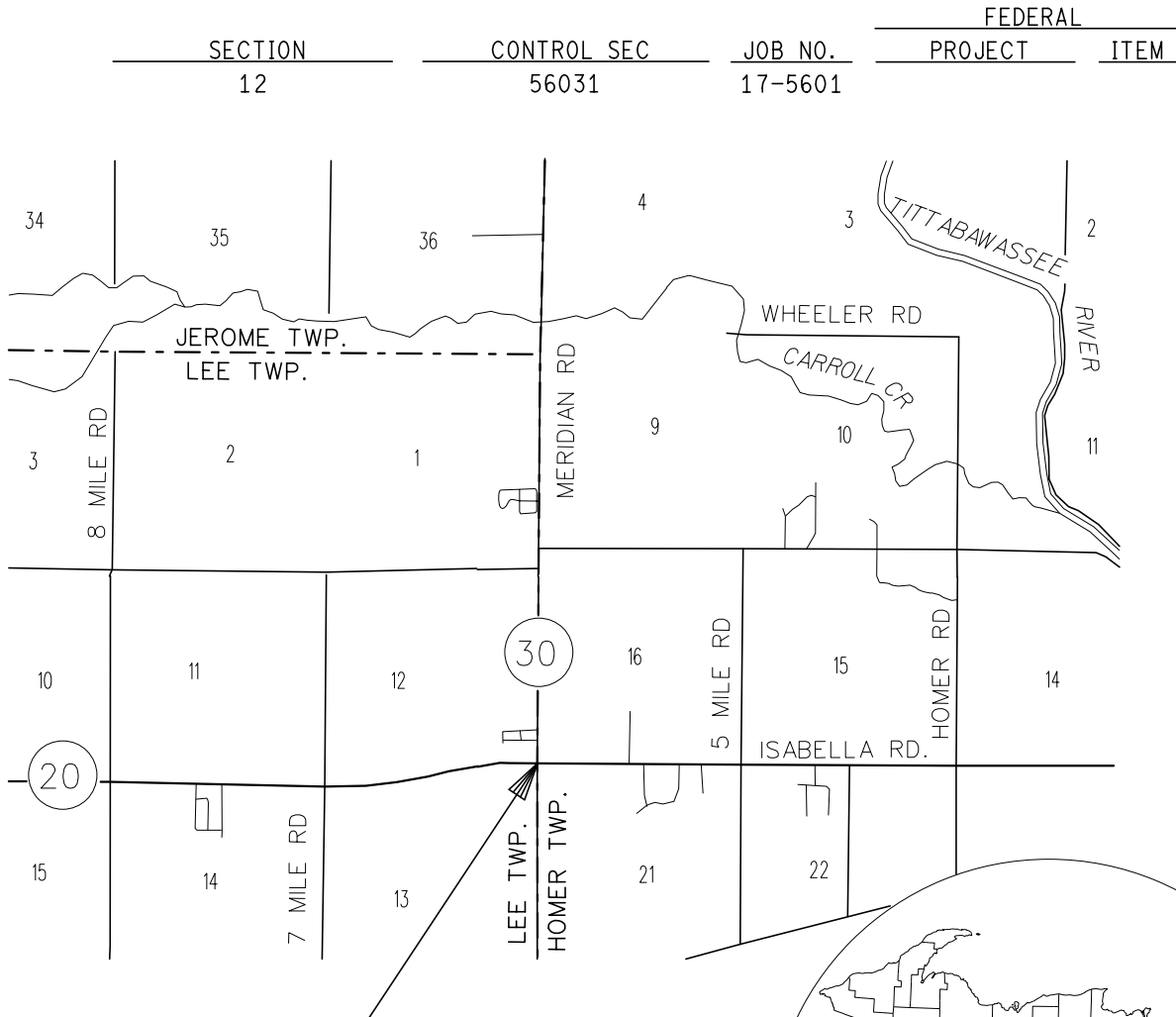


MICHIGAN DEPARTMENT OF TRANSPORTATION

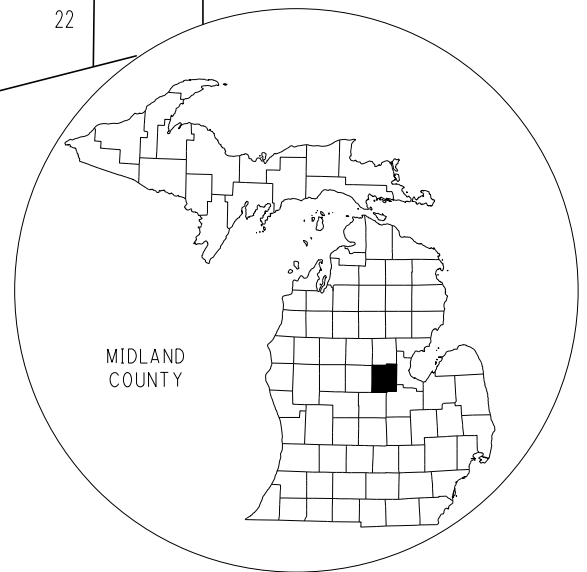
ROUTE: M-30 & M-20

LEE TOWNSHIP

MIDLAND COUNTY



JOB NUMBER 17-5601
 CONTROL SECTION 56031
 CSMP 0.007
 PR 889906
 PRMP 10.112



MIDLAND
COUNTY

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 # 16.

MILES: 0.02

CONTRACT FOR:

LANE WIDENING OF M-30 AT THE INTERSECTION OF M-20 INCLUDING REMOVAL OF HMA SURFACE AND CURB AND GUTTER, REMOVAL OF SIDEWALK RAMP, INSTALLATION OF HMA APPROACH AND CURB AND GUTTER, INSTALLATION OF SIDEWALK RAMP IN COMPLIANCE TO ADA STANDARDS, AND SLOPE RESTORATION.



KIRK T. STEUDLE, P.E. - DIRECTOR

DATE: 2/21/17

DESIGN UNIT: MYERS

TSC: MT PLEASANT

M-30 LANE WIDENING

LOCATION SHEET

DRAWING SHEET

1

LOG OF PROJECT

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C.S. 56031

J.N. 17-5601

PROGRESS SCHEDULE

Work may begin immediately after receiving approval from MDOT. Work must be completed within 30 days of the 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 five (5) calendar days prior to beginning work.

JOB LOCATION

North side of M-20 (Isabella) at M-30 (Meridian):

CS Information

CS 56031 MP 0.008 (M-30)

PR Information

PR 889906 MP 10.113 (M-30)

Location Length = 0.02 miles

DESCRIPTION OF WORK

The work shall consist of the following: Widen southbound M-30 (Meridian) on the north side of the M-20 (Isabella) intersection to allow for a right turn lane; remove existing HMA and concrete curb & gutter, place new HMA and concrete curb and gutter, adjust existing drain structure, and install new drain structure in proposed curb line. Remove and replace existing sidewalk ramp in accordance with ADA standards. Grade intersection to match the cross slope on M-30 (Meridian) and ensure positive longitudinal drainage towards the catch basin in the proposed curb and gutter.

Along M-20 (Isabella) west of the intersection, remove existing concrete curb & gutter and pavement around drainage structure, adjust structure, and replace concrete curb & gutter and HMA.

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, contractor staking, 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.

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J.N. 17-5601

Items of Work (for information only)

Curb and Gutter, Rem	135	Ft
HMA Surface, Rem	83	Syd
Sidewalk, Rem	6	Syd
Excavation, Earth	170	Cyd
Subbase, CIP	110	Cyd
Aggregate Base, 6 inch	180	Syd
HMA Approach	43.0	Tons
Hand Patching	1.5	Tons
Curb and Gutter, Conc, Det B2	197	Ft
Sidewalk Ramp, Conc, 6 inch	55	Sft
Dr Structure, 24 inch dia	1	Ea
Sewer, Cl A, 12 inch, Tr Det B	7	Ft
Embankment, CIP	70	Cyd
Slope Restoration, Type B	60	Syd
Traf Loop	3	Ea
Sewer Tap, 12 inch	1	Ea
Dr Structure Cover, Adj, Case 1	2	Ea
Dr Structure Cover, Type J	1	Ea
Dr Structure Cover, Type B	1	Ea
Erosion Control, Inlet Protection, Fabric Drop	3	Ea
Pavt Mrkg, Longit, 6 inch or Less Width, Rem	215	Ft
Rem Spec Mrkg	285	Sft
Pavt Mrkg, Ovly Cold Plastic, 24 inch, Stop Bar	36	Ft
Pavt Mrkg, Ovly Cold Plastic, 6 inch, Crosswalk	145	Ft
Pavt Mrkg, Waterborne, 8 inch, White	165	Ft
Pavt Mrkg, Waterborne, 6 inch, White	50	Ft
Pavt Mrkg, Ovly Cold Plastic, Only	2	Ea
Pavt Mrkg, Ovly Cold Plastic, Lt Turn Arrow Sym	1	Ea
Pavt Mrkg, Ovly Cold Plastic, Rt Turn Arrow Sym	1	Ea
Sign, Type IIB (R3-8b)	10	Sft

Miscellaneous

Maintaining Traffic	1	LS
---------------------	---	----

MAINTAINING TRAFFIC

Maintaining traffic will be accomplished with shoulder and lane closures utilizing Maintaining Traffic Typical M0020a, M0110a, and M0250a. 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.

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C.S. 56031

J.N. 17-5601

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.

Maintain a minimum of one lane of traffic in each direction at all times on M-20 and M-30. Maintain access to driveways at all times, including the park and ride lot.

A speed reduction will be used during single-lane closures.

All work shall be conducted during daytime hours only. No weekend work will be allowed. All lanes and shoulders shall be open to traffic unless work is in progress which prohibits opening of lanes due to safety or other reasons approved by the Engineer. 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. The storage of materials and/or equipment will not be allowed in the park and ride lot.

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

SPECIFICATIONS FOR CONSTRUCTION

The improvements covered by these plans shall be done in accordance with the MDOT 2012 Standard Specifications for Construction.

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.

This work consists of contacting the appropriate people to ensure the proper staking of MDOT infrastructure for electrical devices. Contact Travis Phillips, Bay Region - Signals Engineer and Scott Holzhei, Bay Region Electrician, 72 hours in advance with staking requests and prior to any work commencing near any of the traffic signals, electrical devices or freeway lighting. Note: that MDOT underground infrastructure is

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C.S. 56031

J.N. 17-5601

not part of the Miss Dig system. Contact Travis Phillips at (989)-233-7363 and Scott Holzhei at (989)-754-0784.

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.

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.

56031-107044 (2010)

56021-105611 (1979)

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.

GRADES FOR INTERSECTIONS

All intersections are to be considered as complete units and their grades determined before construction is started.

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 erodible 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.

AGGREGATE BASE

Aggregate bases shall use Aggregate 22A unless otherwise specified.

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.

RECREATIONAL PROPERTIES

The Contractor shall not park any vehicles or store any equipment on public recreational property. Access to the recreational properties must also be maintained at all times. Non compliance, even without the knowledge and approval of MDOT personnel, can result in penalties up to and including termination of the construction contractor and loss of federal funding for the project. Should there be any questions regarding this requirement, contact the MDOT Environmental Section at (517) 373-8350.

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J.N. 17-5601

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
Cover B	R-7-F
Cover J	R-14-D
Sidewalk Ramp and Detectable Warning Details.....	*R-28-J
Concrete Curb and Concrete Curb & Gutter.....	R-30-G
Utility Trenches	*R-83-C
Soil Erosion & Sedimentation Control Measures.....	R-96-E
Seeding and Tree Planting	R-100-H
Grading Cross Sections.....	R-105-D
Temporary Traffic Control Devices.....	WZD-125-E*
Right Turn Lane and Island Pavement Markings	PAVE-940-C
Intersection, Stop Bar and Crosswalk Markings.....	PAVE-945-C
Standard Sign Installations	SIGN-100-F
Roadside Sign Locations and Support Spacing	SIGN-120-D
Steel Posts	SIGN-200-D

* *indicates Special Detail*

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J.N. 17-5601

PUBLIC UTILITIES

Utility Owner

Type

ACD Telecom, Inc.
1800 N. Grand River Ave
Lansing, Michigan 48906
Ph: 517-999-3213(W)
Attn: Phil Brown

Cable

AT&T
136 E. 4th St.
Clare, Michigan 48617
Ph: 989-980-7801(W)
Attn: Rob Augustine

Telecom

CenturyLink
100 Second Street, P.O. Box 389
Pinconning, Michigan 48650-0389
Ph: 989-879-8710(W)
Attn: Glen Rogers

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

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

Electric

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J.N. 17-5601

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

DOW Chemical Co.
921 Building
Midland, Michigan 48667
Ph: 989-636-6779(W)
Attn: Martin Hill

Other

Frontier Communications
345 Pine Avenue
Alma, Michigan 48801
Ph: 989-463-0392(W)
Attn: Mark Marshall

Telecom

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 Educational Service Agency
3917 Jefferson Avenue
Midland, Michigan 48640
Ph: 989-249-8752(W)
Attn: Jim Mallory

Telecom

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J.N. 17-5601

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

TDS Telecom (Wolverine Telephone)
104 N. Cedar St., P.O. Box 78
Sanford, Michigan 48657
Ph: 989-687-2111(W)
Attn: Ron Cay

Telecom

US Signal Company
201 Ionia Avenue, SW
Grand Rapids, Michigan 49503

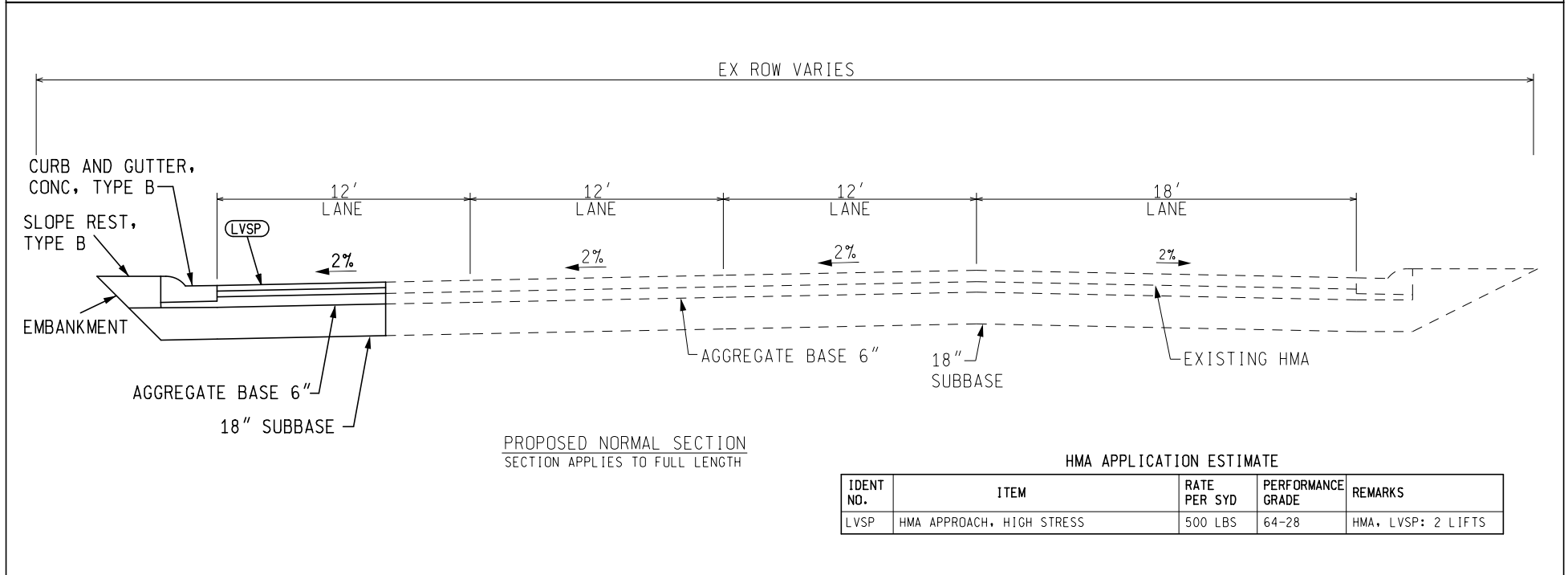
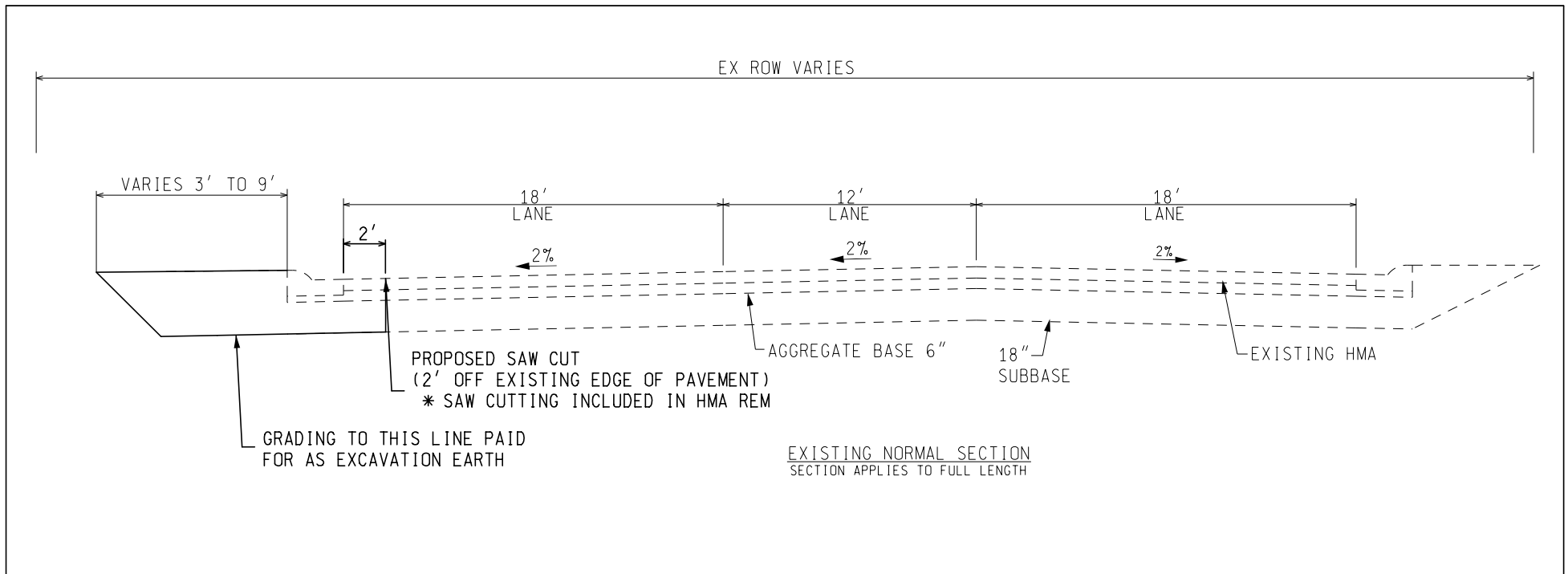
Telecom

Windstream KDL
4074 S. Linden Road
Flint, Michigan 48507
Ph: 810-691-1035(W)
Attn: Dirk Welte

Telecom

Wolverine Pipe Line Company
8075 Creekside Drive, Suite 210
Portage, Michigan 49024
Ph: 269-323-2491x124(W)
Attn: Louis Kraus

Gas



HMA APPLICATION ESTIMATE




IDENT NO.	ITEM	RATE PER SYD	PERFORMANCE GRADE	REMARKS
LVSP	HMA APPROACH, HIGH STRESS	500 LBS	64-28	HMA, LVSP: 2 LIFTS



SECTION 12
T14N,R1W
LEE TOWNSHIP

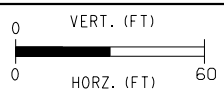
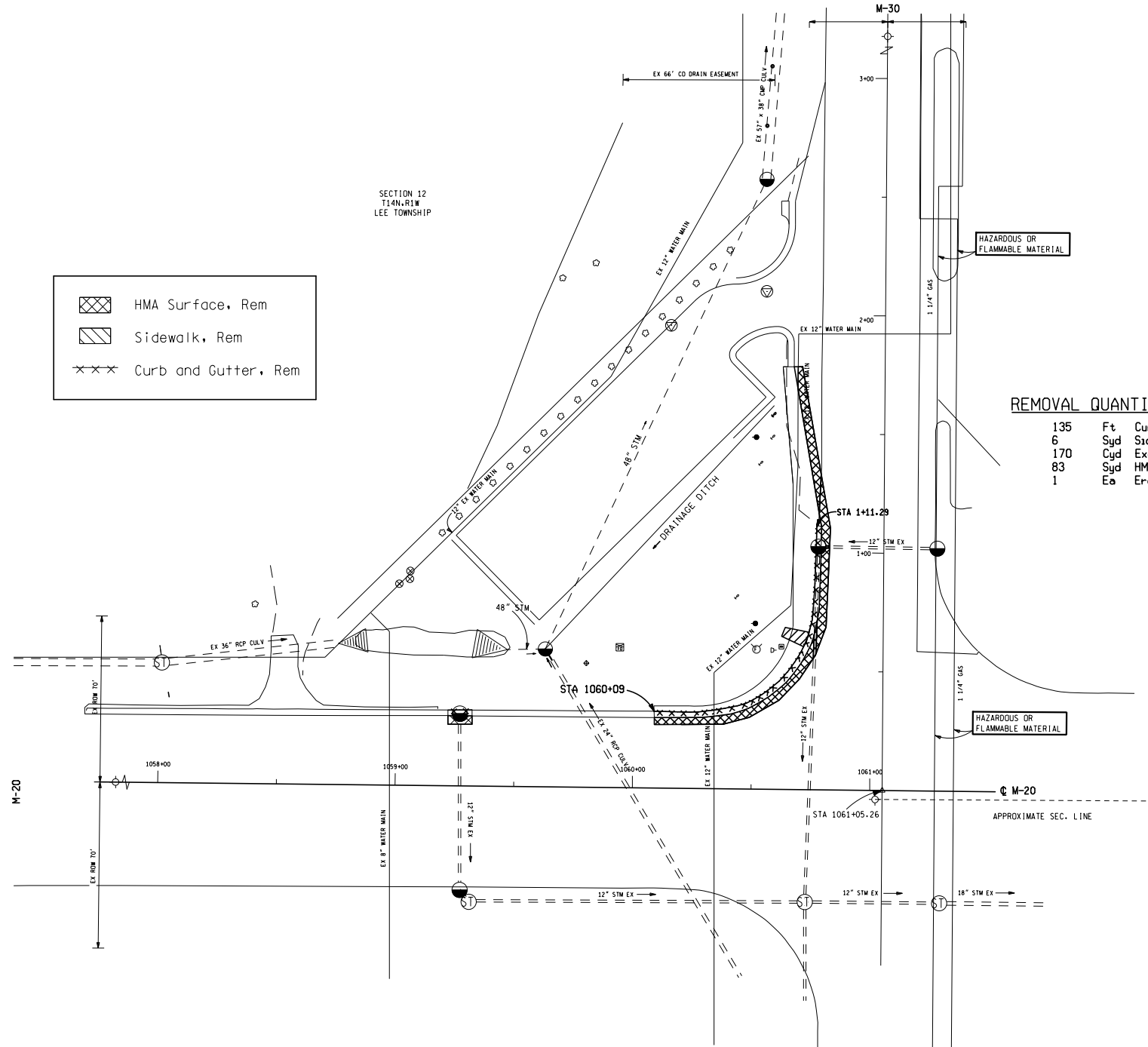
SECTION 16
T14N,R1E
HOMER TOWNSHIP

SECTION 21
T14N,R1E
HOMER TOWNSHIP

-  HMA Surface, Rem
-  Sidewalk, Rem
-  Curb and Gutter, Rem

REMOVAL QUANTITIES THIS SHEET

135	Ft	Curb and Gutter, Rem
6	Syd	Sidewalk, Rem
170	Cyd	Excavation, Earth
83	Syd	HMA Surface, Rem
1	Ea	Erosion Control, Inlet Protection, Fabric Drop



DATE: 01/23/2017
DESIGN UNIT: MYERS
TSC: MT. PLEASANT

CS: 56031
JN: 17-5601

M-30 & M-20 INTERSECTION
REMOVAL SHEET

DRAWING	SHEET
M-30 REM	11

FILE: REMOVAL SHEET

SECTION 12
T14N,R1W
LEE TOWNSHIP

SECTION 16
T14N,R1E
HOMER TOWNSHIP



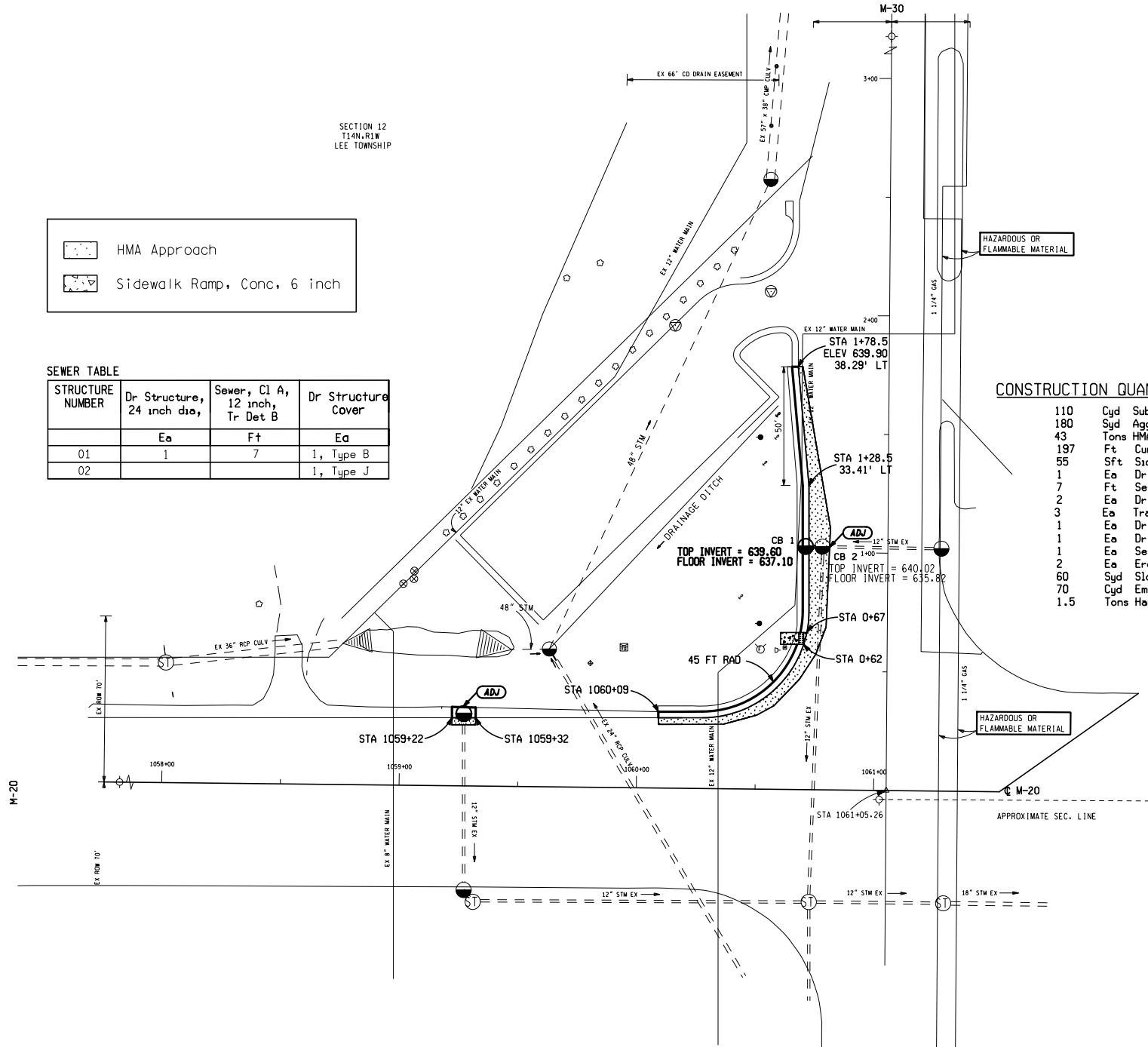
	HMA Approach
	Sidewalk Ramp, Conc, 6 inch

SEWER TABLE

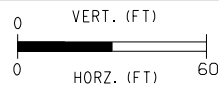
STRUCTURE NUMBER	Dr Structure, 24 inch dia,	Sewer, C1 A, 12 inch, Tr Det B	Dr Structure Cover
	Ea	Ft	Ea
01	1	7	1, Type B
02			1, Type J

CONSTRUCTION QUANTITIES THIS SHEET

110	Cyd	Subbase, CIP
180	Syd	Aggregate Base, 6 inch
43	Tons	HMA Approach
197	Ft	Curb and Gutter, Conc, Det B2
55	Sft	Sidewalk Ramp, Conc, 6 inch
1	Ea	Dr Structure, 24 inch dia
7	Ft	Sewer, C1 A, 12 inch, Tr Det B
2	Ea	Dr Str Cover, Adj, Case 1
3	Ea	Traf Loop
1	Ea	Dr Structure Cover, Type B
1	Ea	Dr Structure Cover, Type J
1	Ea	Sewer Tap, 12 inch
2	Ea	Erosion Control, Inlet Protection, Fabric Drop
60	Syd	Slope Restoration, Type B
70	Cyd	Embankment
1.5	Tons	Hand Patching



FILE: CONSTRUCTION SHEET



DATE: 01/23/2017
DESIGN UNIT: MYERS
TSC: MT. PLEASANT

CS: 56031
JN: 17-5601

M-30 & M-20 INTERSECTION
CONSTRUCTION SHEET

DRAWING	SHEET
M-30 CON	12

(R3-8b)

50'

165'

12' 12' 12' 12'



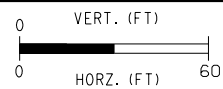
PAVEMENT MARKING QUANTITIES THIS SHEET

36	Ft	Pavt Mrkg, Ovly Cold Plastic, 24 inch, Stop Bar
145	Ft	Pavt Mrkg, Ovly Cold Plastic, 6 inch, Crosswalk
1	Ea	Pavt Mrkg, Ovly Cold Plastic, Rt Turn Arrow Sym
1	Ea	Pavt Mrkg, Ovly Cold Plastic, Lt Turn Arrow Sym
165	Ft	Pavt Mrkg, Waterborne, 8 inch, White
50	Ft	Pavt Mrkg, Waterborne, 6 inch, White
285	Sft	Rem Spec Mrkg
215	Ft	Pavt Mrkg, Longit, 6 inch or Less Width, Rem
10	Sft	Sign, Type IIB (R3-8b)

*Remove all special pavement markings on M-30, and the crosswalk markings across M-20, but only replace on M-30.



FILE: PAVEMENT MARKING SHEET



DATE: 01/23/2017
DESIGN UNIT: MYERS
TSC: MT. PLEASANT

CS: 56031
JN: 17-5601

M-30 & M-20 INTERSECTION
PAVEMENT MARKING SHEET

DRAWING	SHEET
M-30 PVT MRKG	13

MINIMUM MERGING TAPER LENGTH "L" (FEET)

OFFSET	POSTED SPEED LIMIT, MPH (PRIOR TO WORK AREA)										TAPER LENGTH "L" IN FEET
FEET	25	30	35	40	45	50	55	60	65	70	
1	10	15	20	27	45	50	55	60	65	70	
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

UPSTREAM TAPERS

MERGING TAPER
SHIFTING TAPER
SHOULDER TAPER
TWO-WAY TRAFFIC TAPER

DOWNSTREAM TAPERS
(USE IS OPTIONAL)

TAPER LENGTH

L - MINIMUM
1/2 L - MINIMUM
1/3 L - MINIMUM
100' - MAXIMUM
100' - MINIMUM
(PER LANE)



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

DRAWN BY: CON:AE:djf
CHECKED BY: BMM

JUNE 2006
PLAN DATE:

M0020a

SHEET
1 OF 2

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.



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

DRAWN BY: CON:AE:djf

JUNE 2006

M0020a

SHEET
2 OF 2



CHECKED BY: BMM

PLAN DATE:

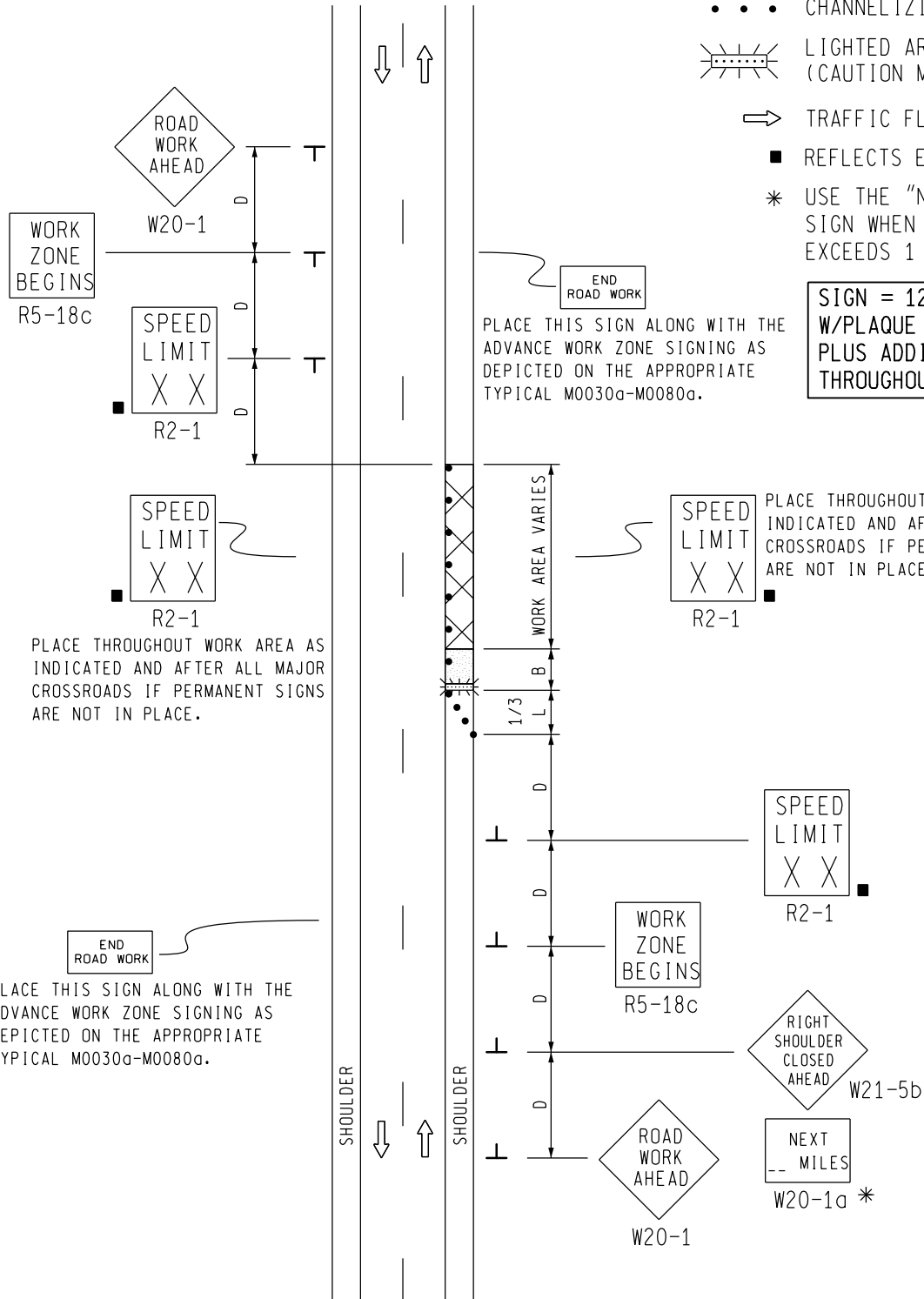
FILE: K:/DGN/TSR/STDS/ENGLISH/MNTTRF/M0020a.dgn


REV. 08/21/2006

KEY

- • • CHANNELIZING DEVICES
-  LIGHTED ARROW PANEL (CAUTION MODE)
-  TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT
- * USE THE "NEXT _ _ MILES" SIGN WHEN SHOULDER CLOSURE EXCEEDS 1 MILE IN LENGTH

SIGN = 120 ft±2 - TYPE B
W/PLAQUE = 132 ft±2 - TYPE B
PLUS ADDITIONAL R2-1's
THROUGHOUT WORK AREA



 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 CHECKED BY: BMM:CRB	OCTOBER 2011 PLAN DATE:	M0110a	SHEET 1 OF 2
FILE: PW RD/TS/Typicals/Signs/MT NON Fwy/M0110a.dgn REV. 10/04/2011			

NOT TO SCALE


NOTES

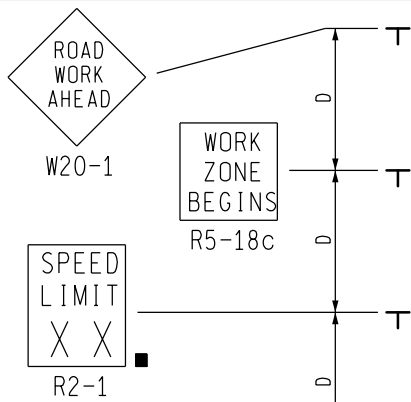
1. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES
 $\frac{1}{3} L$ = MINIMUM LENGTH OF TAPER
 B = LENGTH OF LONGITUDINAL BUFFER
 SEE **M0020a** FOR "D," "L," AND "B" VALUES
2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.
3. DISTANCES BETWEEN SIGNS, 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

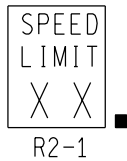
DIAMOND WARNING	- 48" x 48"
W20-1a PLAQUE	- 48" x 36"
R2-1 REGULATORY	- 48" x 60"
R5-18c REGULATORY	- 48" x 48"

NOT TO SCALE

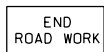
 Michigan Department of Transportation TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL		TYPICAL TEMPORARY TRAFFIC CONTROL FOR A SHOULDER CLOSURE ON A TWO LANE TWO-WAY ROADWAY NO SPEED REDUCTION	
DRAWN BY: CON:AE:djf	OCTOBER 2011	<div style="font-size: 1.2em; font-weight: bold;">M0110a</div>	SHEET 2 OF 2
CHECKED BY: BMM:CRB	PLAN DATE:		
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0110a.dgn REV. 10/04/2011			



NO SPEED REDUCTION
THIS DIRECTION



PLACE THROUGHOUT WORK AREA AS
INDICATED AND AFTER ALL MAJOR
CROSSROADS IF PERMANENT SIGNS
ARE NOT IN PLACE.

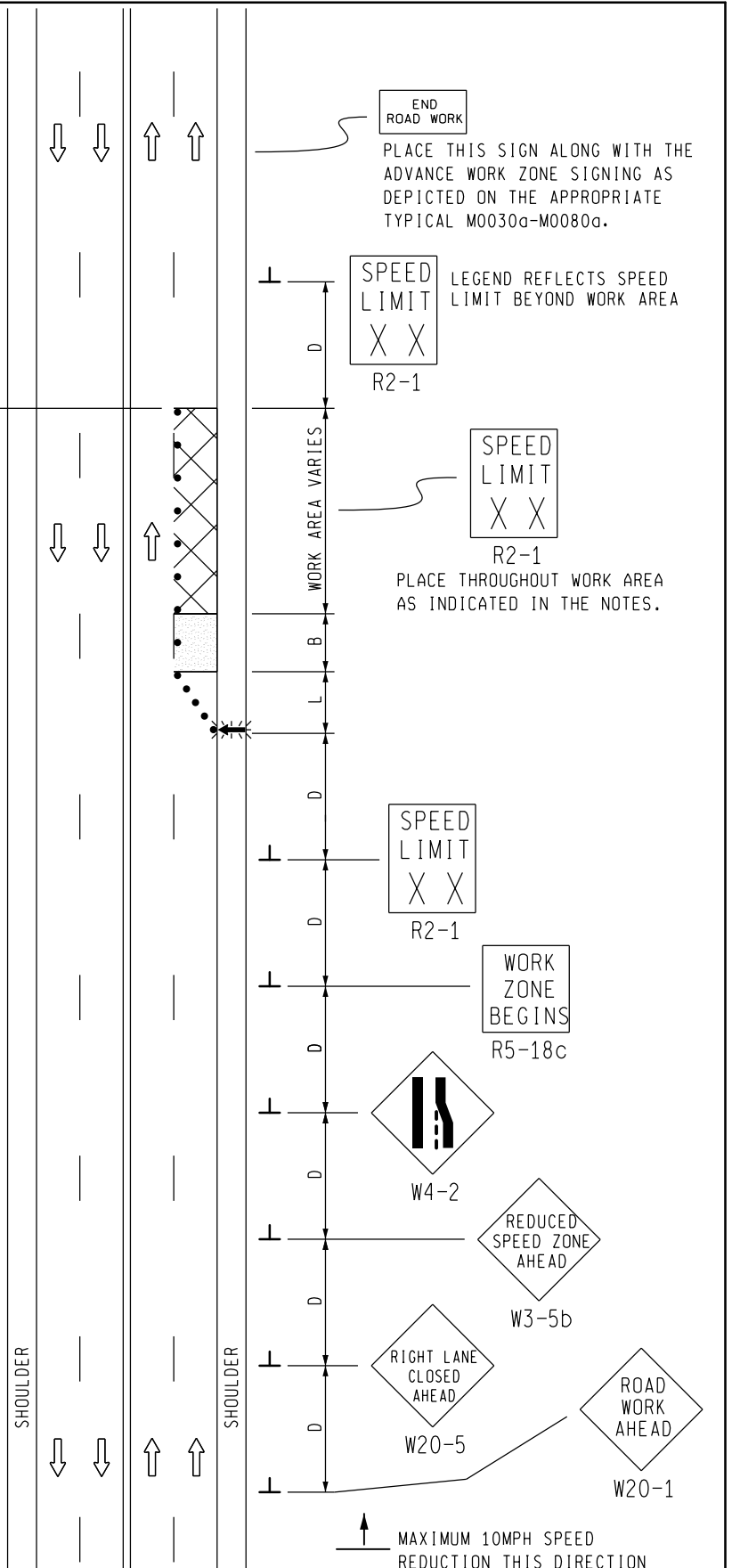


PLACE THIS SIGN ALONG WITH THE
ADVANCE WORK ZONE SIGNING AS
DEPICTED ON THE APPROPRIATE
TYPICAL M0030a-M0080a.

KEY

- • • CHANNELIZING DEVICES
- ← LIGHTED ARROW PANEL
- TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT

SIGN = 172 f+2 - TYPE B
PLUS ADDITIONAL R2-1's
THROUGHOUT WORK AREA



MDOT
Michigan Department of Transportation
TRAFFIC AND SAFETY
MAINTAINING TRAFFIC
TYPICAL

TYPICAL TEMPORARY TRAFFIC CONTROL FOR
A ONE-LANE CLOSURE ON AN UNDIVIDED
MULTI-LANE ROADWAY USING A SINGLE
STEP DOWN IN SPEED LIMIT
IN ONE DIRECTION ONLY

DRAWN BY: CON:AE:djf
CHECKED BY: BMM:CRB

OCTOBER 2011
PLAN DATE:

M0250a

SHEET
1 OF 2

NOT TO SCALE

FILE: PW RD/TS/Typicals/Signs/MT NON Fwy/M0250a.dgn REV. 10/11/2011


NOTES

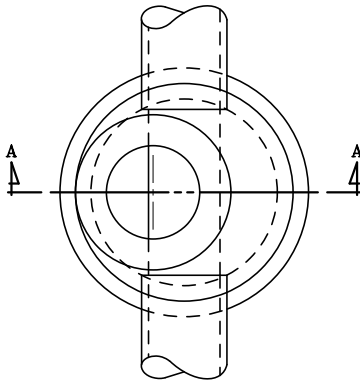
- 1B. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES
L = MINIMUM LENGTH OF TAPER
B = LENGTH OF LONGITUDINAL BUFFER
SEE **M0020a** FOR "D," "L," AND "B" VALUES
2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.
3. DISTANCES BETWEEN SIGNS, THE VALUES FOR 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.
- 16A. ADDITIONAL SPEED LIMIT SIGNS REFLECTING THE REDUCED SPEED SHALL BE PLACED AFTER EACH MAJOR CROSSROAD THAT INTERSECTS THE WORK AREA WHERE THE REDUCED SPEED IS IN EFFECT, AND AT INTERVALS ALONG THE ROADWAY SUCH THAT NO SPEED LIMIT SIGNS REFLECTING THE REDUCED SPEED ARE MORE THAN TWO MILES APART.
- 16B. WHEN REDUCED SPEED LIMITS ARE UTILIZED IN THE WORK AREA, ADDITIONAL SPEED LIMIT SIGNS RETURNING TRAFFIC TO ITS NORMAL SPEED SHALL BE PLACED BEYOND THE LIMITS OF THE REDUCED SPEED AS INDICATED.
- 16E. WHEN EXISTING SPEED LIMITS ARE REDUCED MORE THAN 10 MPH, THE SPEED LIMIT SHALL BE STEPPED DOWN IN NO MORE THAN 10 MPH INCREMENTS.
21. ALL EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH EITHER PROPOSED CHANGES IN TRAFFIC PATTERNS OR PROPOSED TEMPORARY TRAFFIC MARKINGS, SHALL BE REMOVED BEFORE ANY CHANGE IS MADE IN THE TRAFFIC PATTERN. EXCEPTION WILL BE MADE FOR DAYTIME-ONLY TRAFFIC PATTERNS THAT ARE ADEQUATELY DELINEATED BY OTHER TRAFFIC CONTROL DEVICES.
26. THE LIGHTED ARROW PANEL SHALL BE LOCATED AT THE BEGINNING OF THE TAPER AS SHOWN. WHEN PHYSICAL LIMITATIONS RESTRICT ITS PLACEMENT AS INDICATED, THEN IT SHALL BE PLACED AS CLOSE TO THE BEGINNING OF THE TAPER AS POSSIBLE.

SIGN SIZES

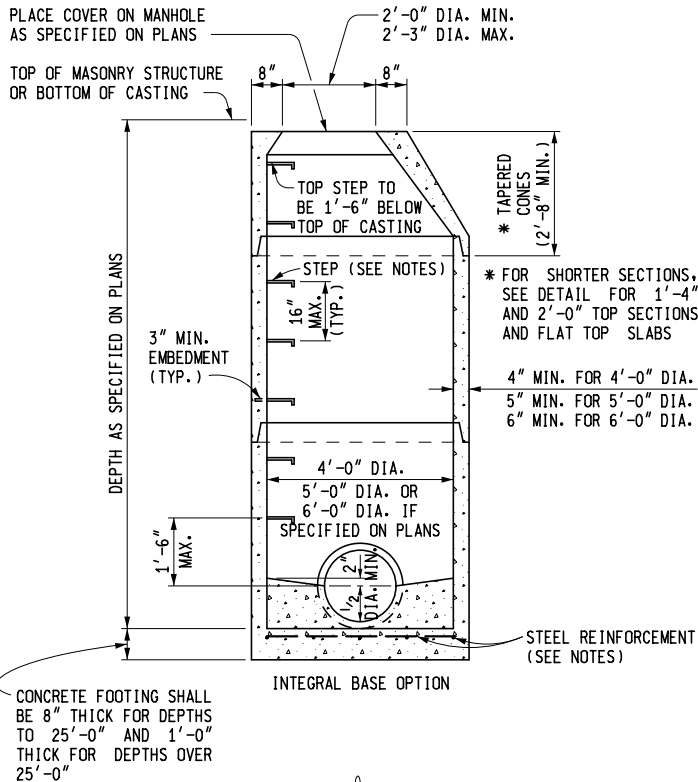
DIAMOND WARNING	- 48" x 48"
RECTANGULAR REGULATORY	- 48" x 60"
R5-18c REGULATORY	- 48" x 48"

NOT TO SCALE

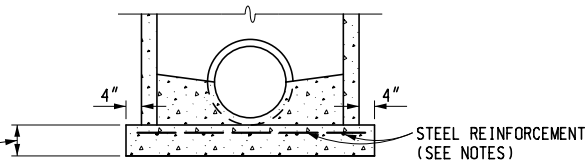
 Michigan Department of Transportation TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL		TYPICAL TEMPORARY TRAFFIC CONTROL FOR A ONE-LANE CLOSURE ON AN UNDIVIDED MULTI-LANE ROADWAY USING A SINGLE STEP DOWN IN SPEED LIMIT IN ONE DIRECTION ONLY	
DRAWN BY: CON:AE:djf	OCTOBER 2011	M0250a	SHEET 2 OF 2
CHECKED BY: BMM:CRB	PLAN DATE:		
FILE: PW RD/TS/Typicals/Signs/MT NON Fwy/M0250a.dgn REV. 10/11/2011			



PLAN VIEW



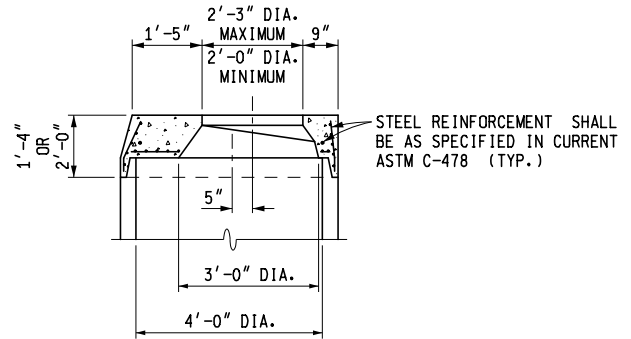
INTEGRAL BASE OPTION



SEPARATE BASE OPTION

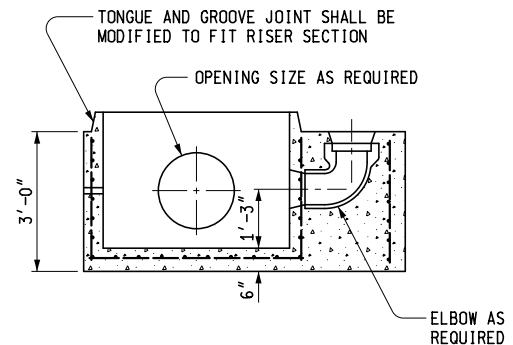
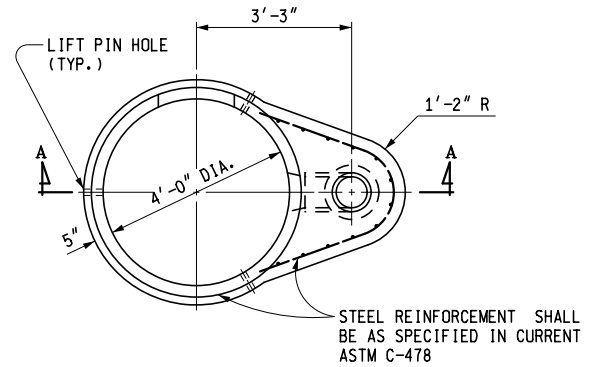
SECTION A - A TYPICAL MANHOLE

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



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

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



SECTION A - A

TYPICAL PRECAST REINFORCED BOTTOM SECTION FOR DROP MANHOLE



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

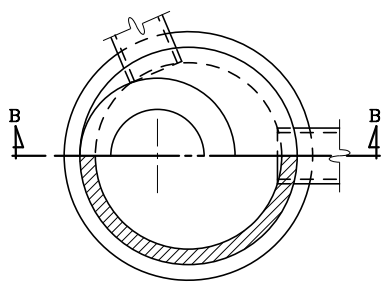
DRAINAGE STRUCTURES

F.H.W.A. APPROVAL

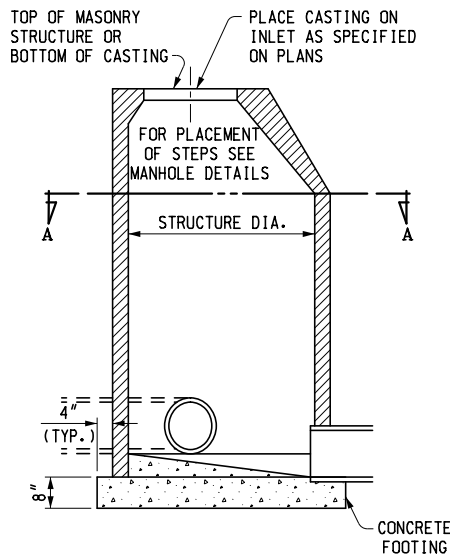
6-15-2016
PLAN DATE

R-1-G

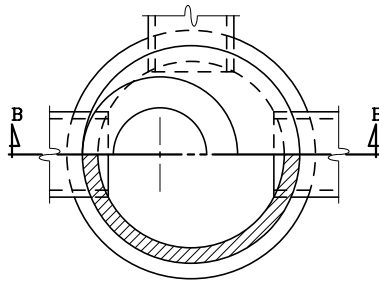
SHEET
1 OF 9



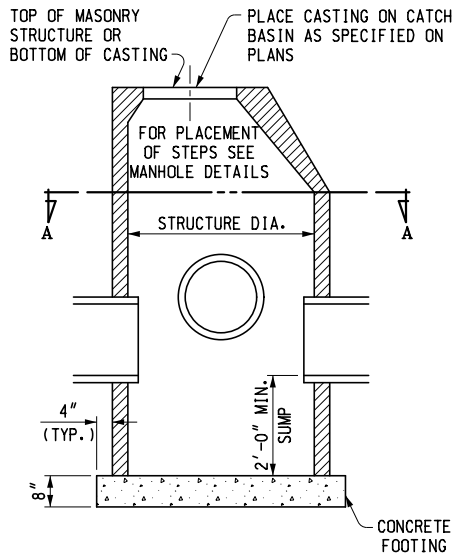
HALF SECTION A - A



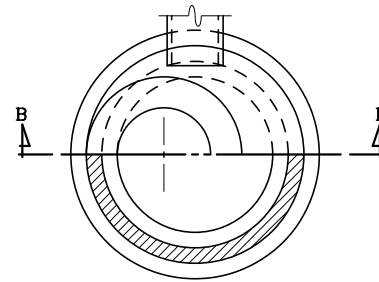
SEE MANHOLE DETAILS FOR SIZE AND BASE OPTIONS
SECTION B - B
INLET



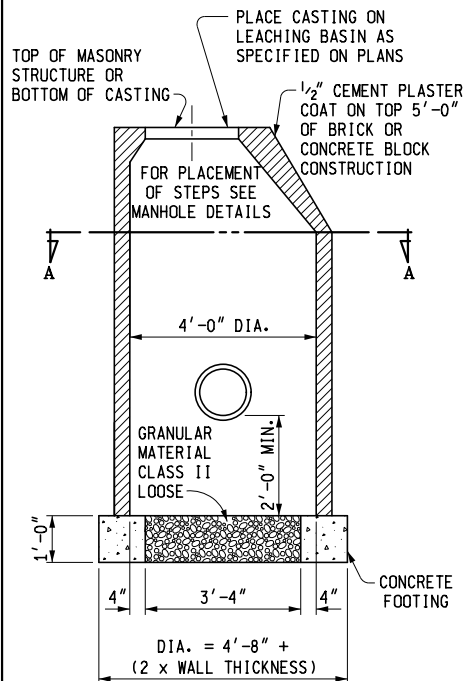
HALF SECTION A - A



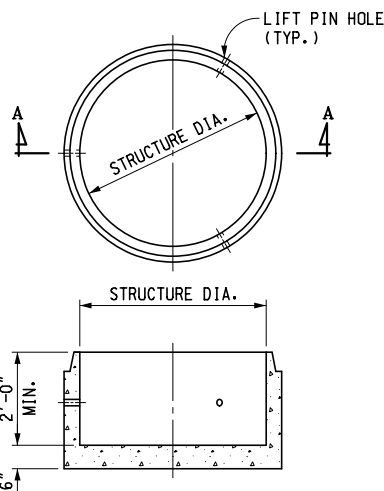
SEE MANHOLE DETAILS FOR SIZE AND BASE OPTIONS
SECTION B - B
CATCH BASIN



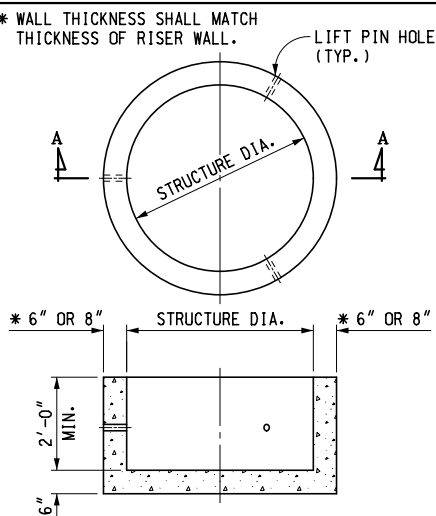
HALF SECTION A - A



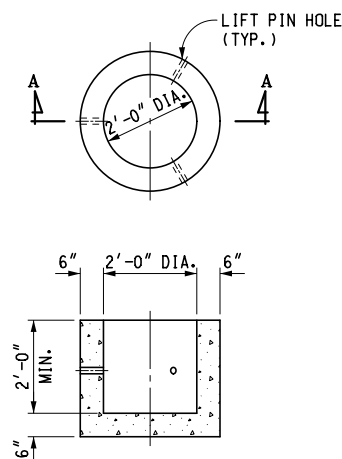
SEE MANHOLE DETAILS FOR BASE OPTIONS
SECTION B - B
LEACHING BASIN



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

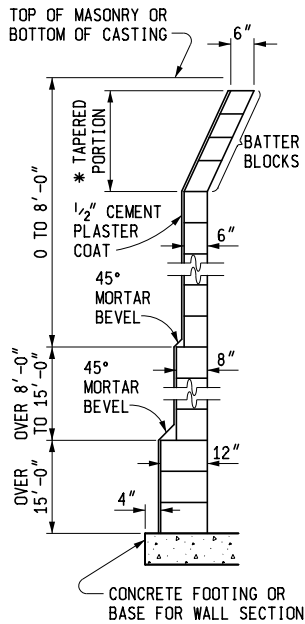
F.H.W.A. APPROVAL

6-15-2016
PLAN DATE

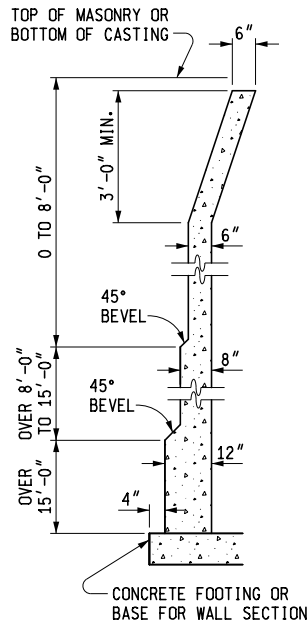
R-1-G

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

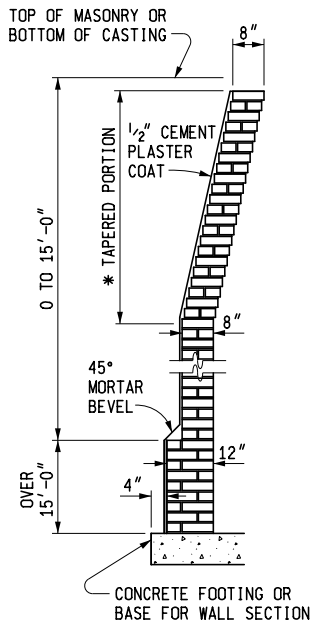


TYPICAL
 CONCRETE BLOCK
 WALL SECTION

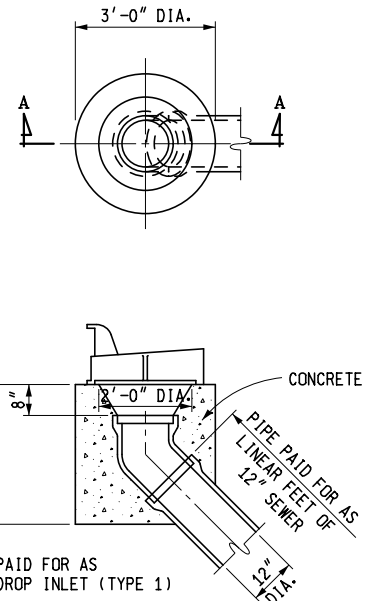


TYPICAL
 CAST-IN-PLACE
 CONCRETE
 WALL SECTION

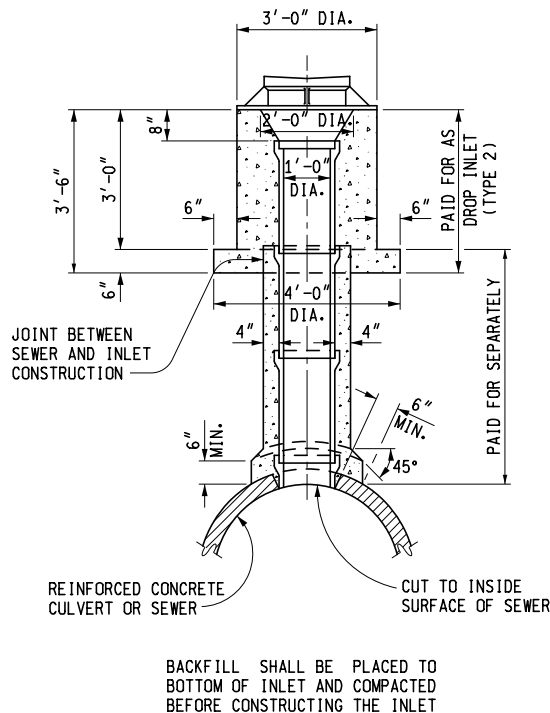
* 5'-0" MIN. FOR 4'-0" DIA. STRUCTURE
 6'-0" MIN. FOR 5'-0" DIA. STRUCTURE
 6'-0" MIN. FOR 6'-0" DIA. STRUCTURE



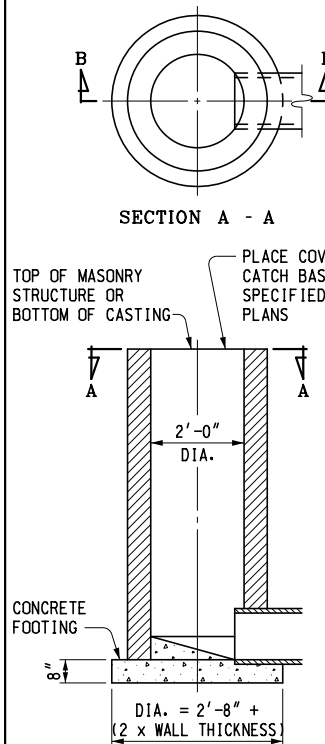
TYPICAL BRICK
 WALL SECTION



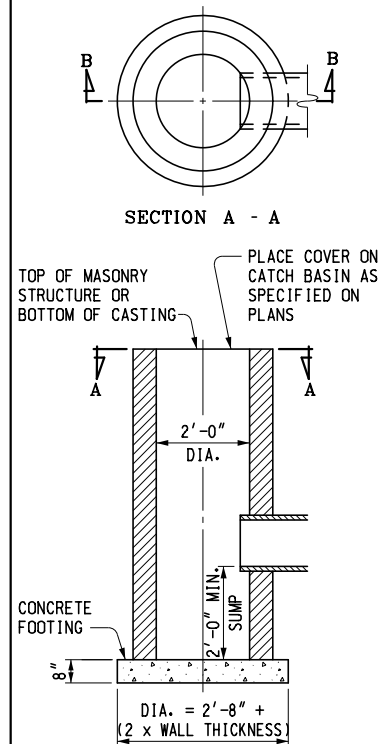
SECTION A - A
 DROP INLET (TYPE 1)



DROP INLET (TYPE 2)



SECTION B - B
 INLET



SECTION B - B
 CATCH BASIN

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF DEVELOPMENT STANDARD PLAN FOR

DRAINAGE STRUCTURES

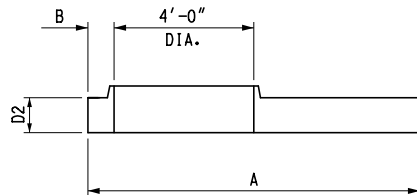
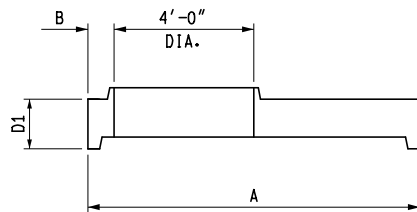
F.H.W.A. APPROVAL

6-15-2016
 PLAN DATE

R-1-G

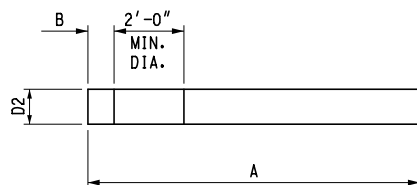
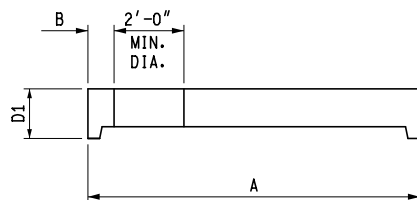
SHEET
 3 OF 9

SHEET
4 OF 9



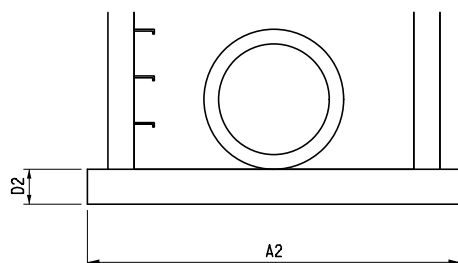
PRECAST REDUCER CAP

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

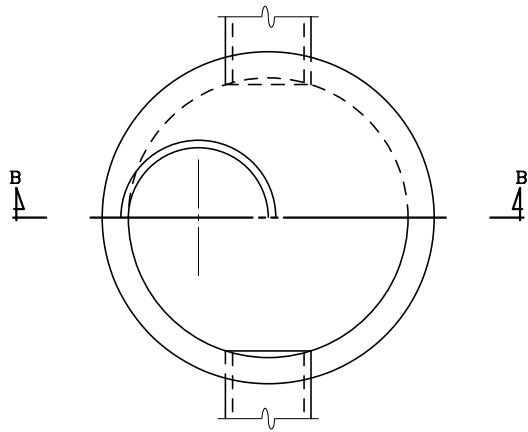
DRAINAGE STRUCTURES

F.H.W.A. APPROVAL

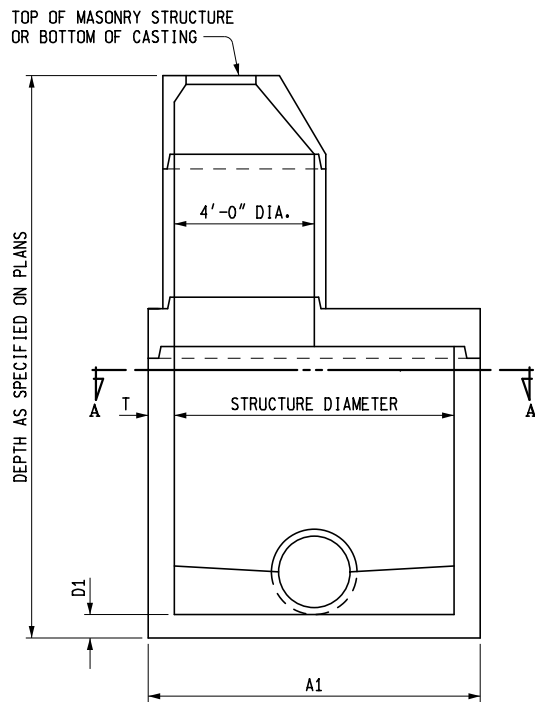
6-15-2016
PLAN DATE

R-1-G

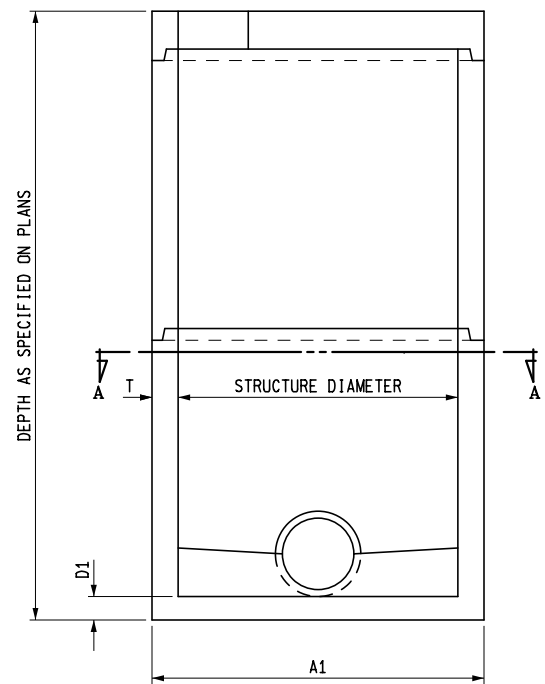
SHEET
5 OF 9



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

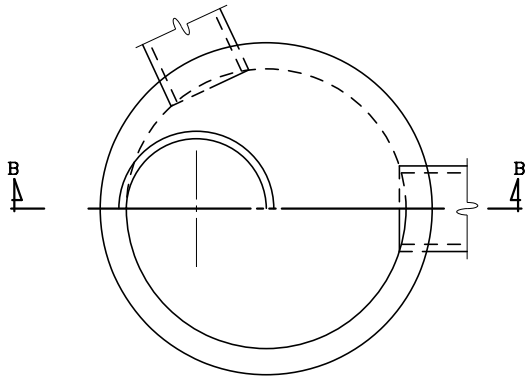
DRAINAGE STRUCTURES

F.H.W.A. APPROVAL

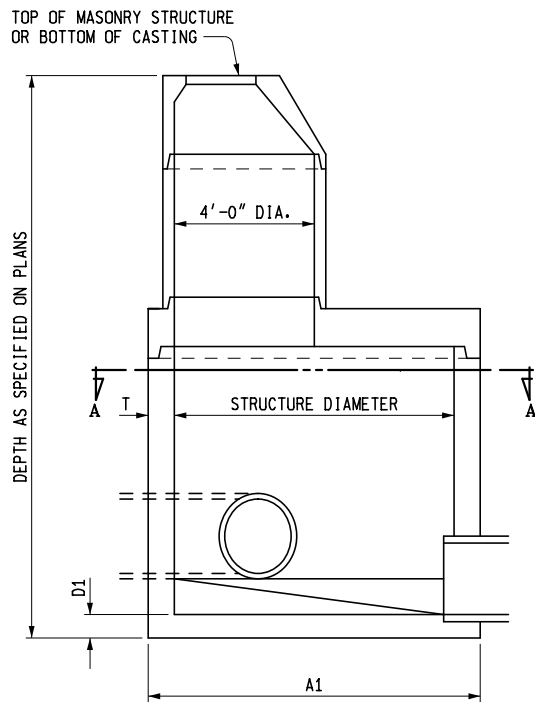
6-15-2016
PLAN DATE

R-1-G

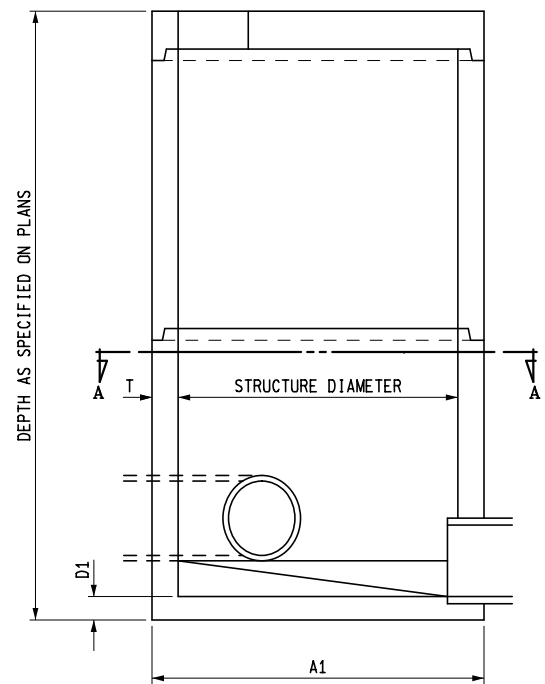
SHEET
6 OF 9



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

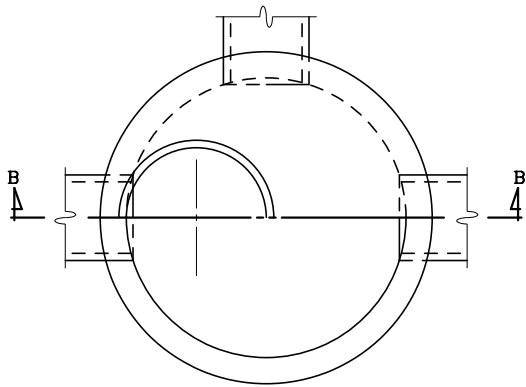
DRAINAGE STRUCTURES

F.H.W.A. APPROVAL

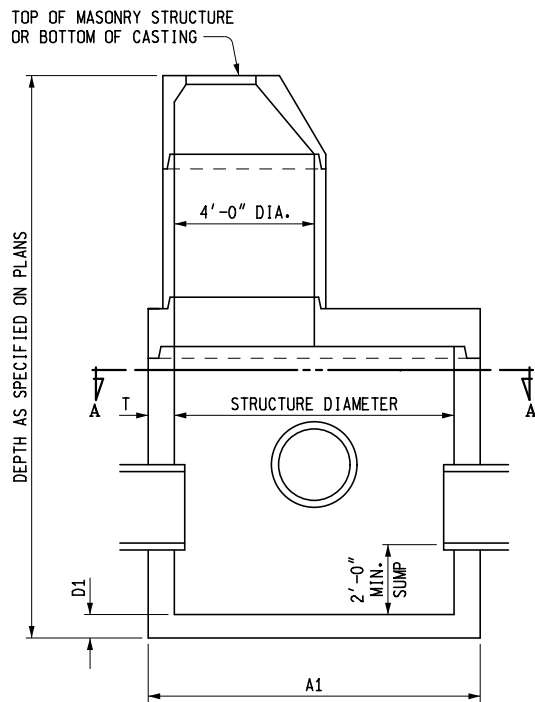
6-15-2016
PLAN DATE

R-1-G

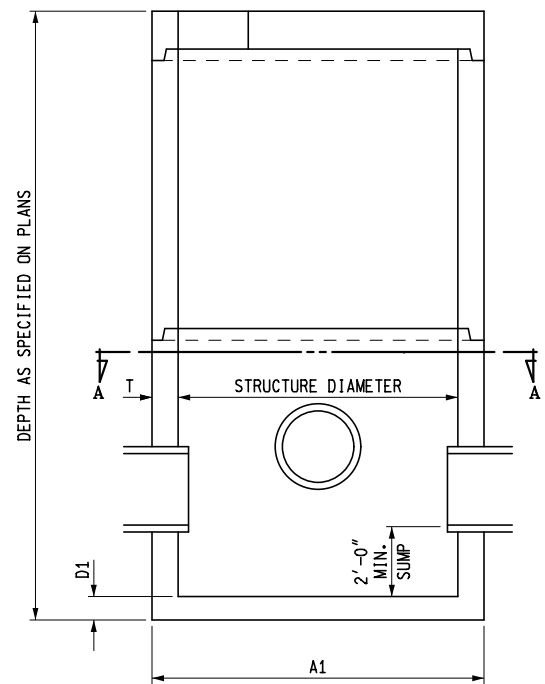
SHEET
7 OF 9



HALF SECTION A - A



SECTION B - B
SHOWING REDUCER CAP



SECTION B - B
SHOWING FLAT SLAB TOP

PRECAST CATCH BASIN

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

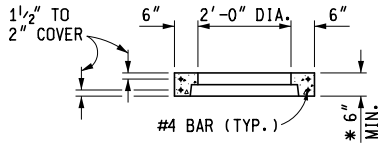
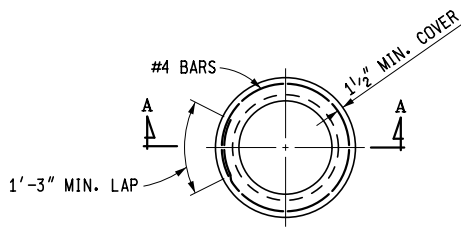
DRAINAGE STRUCTURES

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

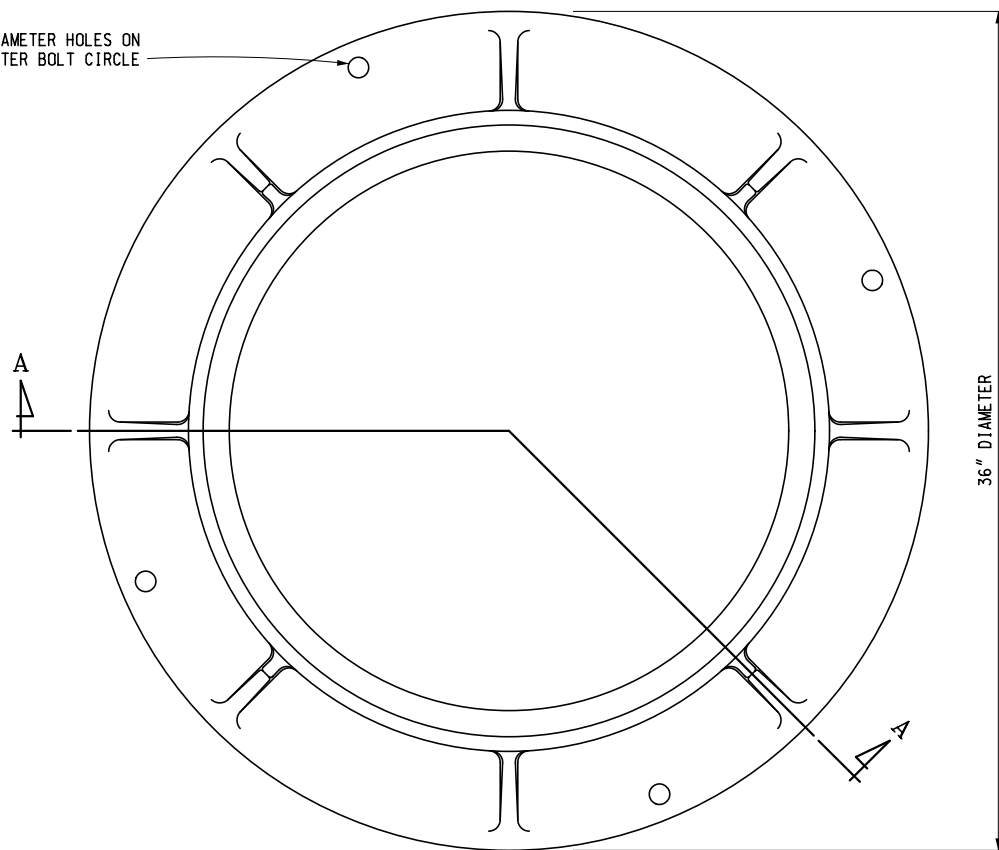
F.H.W.A. APPROVAL

6-15-2016
PLAN DATE

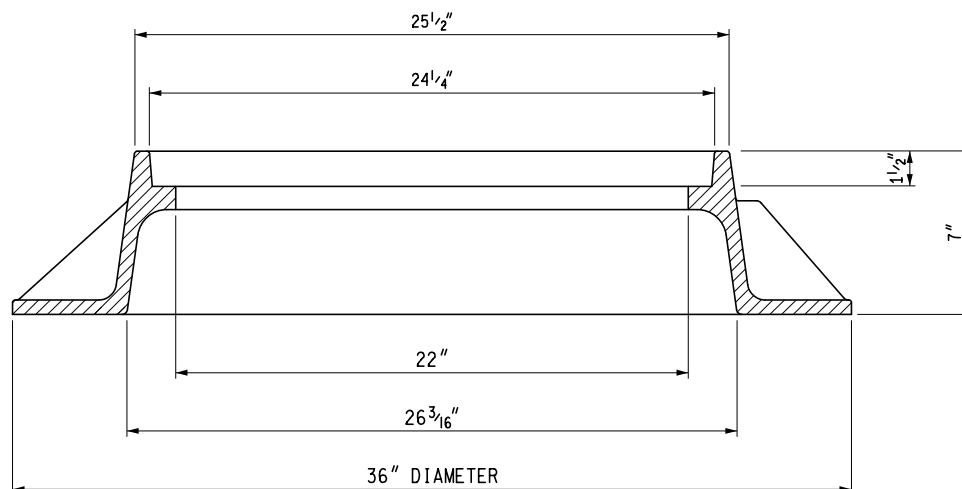
R-1-G

SHEET
9 OF 9

FOUR $\frac{7}{8}$ " DIAMETER HOLES ON
 $33\frac{3}{4}$ " DIAMETER BOLT CIRCLE



TOP VIEW OF FRAME



SECTION A - A



PREPARED
 BY
 DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
 Kirk T. Steudle

APPROVED BY:

Randy V. Burtch
 DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY:

Mark A. Van Pelt
 DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
 BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

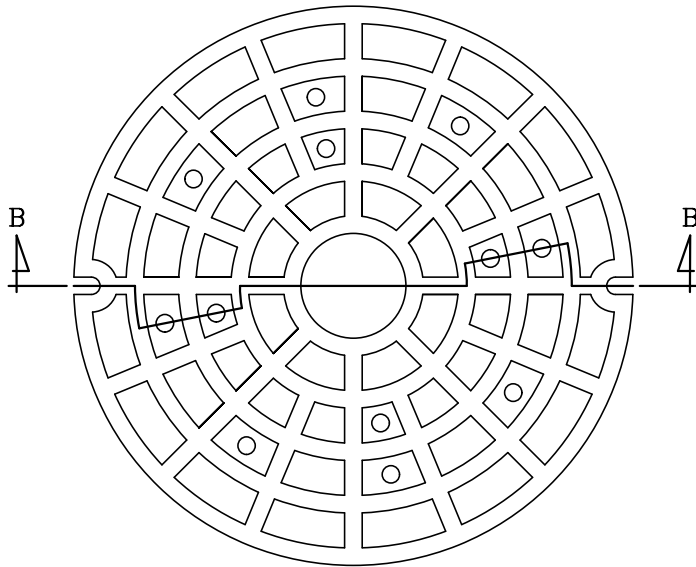
COVER B
 FOR USE ON MANHOLES

9-30-2014
 F.H.W.A. APPROVAL

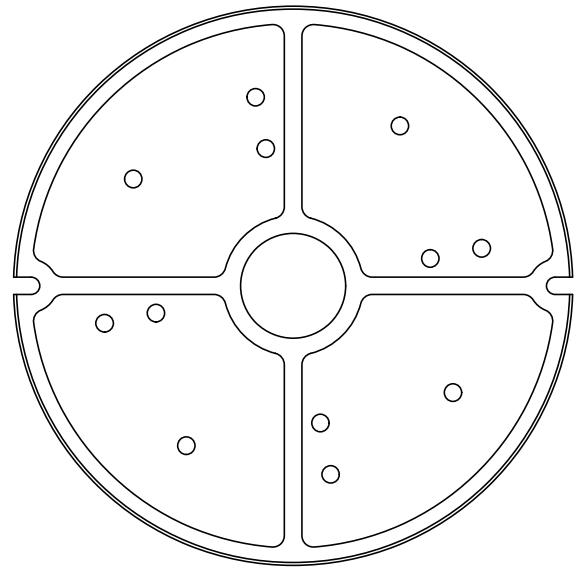
3-7-2014
 PLAN DATE

R-7-F

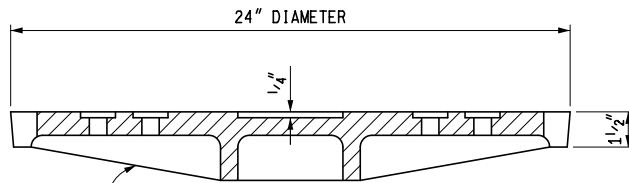
SHEET
 1 OF 2



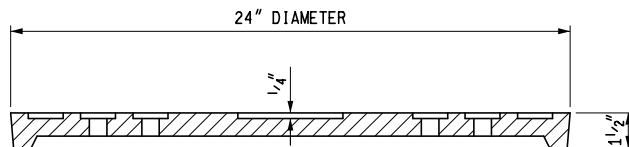
TOP VIEW OF COVER



BOTTOM VIEW OF COVER



ALTERNATE PROFILES PERMITTED
SECTION B - B



SECTION B - B
ALTERNATE PROFILE EXAMPLE

NOTES:

THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE SEATING FACE OF THE LID AND THE SEAT FOR THE SAME ON THE FRAME SHALL BE GROUND OR MACHINED SO THAT THE LID WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

THIS COVER IS DESIGNED TO FIT ON ANY MANHOLE OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

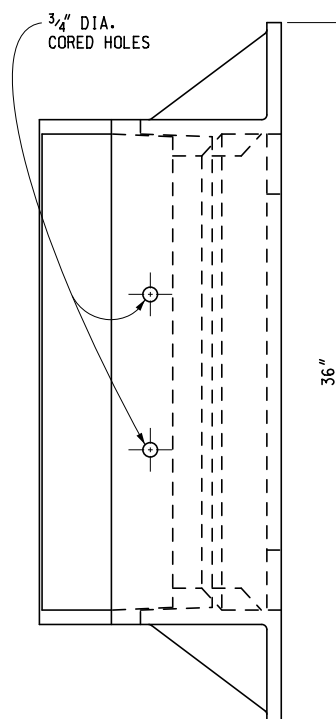
COVER B
FOR USE ON MANHOLES

9-30-2014
F.H.W.A. APPROVAL

3-7-2014
PLAN DATE

R-7-F

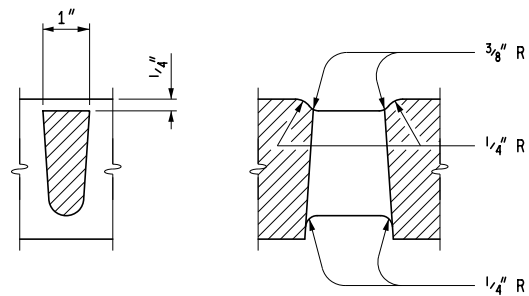
SHEET
2 OF 2



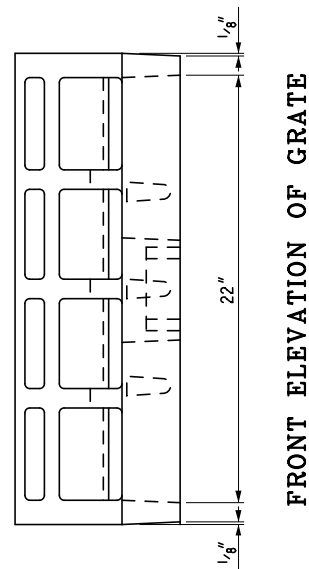
FRONT ELEVATION OF FRAME

SIDE ELEVATION OF FRAME

SHEET
1 OF 2



SECTION X - X SECTION Y - Y



FRONT ELEVATION OF GRATE



THE CASTINGS SHALL MEET THE REQUIREMENTS OF THE CURRENT STANDARD SPECIFICATION FOR GRAY IRON CASTINGS.

ALL CASTINGS SHALL BE CLEANED BY CURRENT APPROVED BLASTING METHODS.

THE SEATING FACE OF THE GRATE AND THE SEAT FOR THE SAME ON THE FRAME SHALL BE GRIND OR MACHINED SO THAT THE GRATE WILL HAVE AN EVEN BEARING ON ITS SEAT TO PREVENT ROCKING OR TILTING.

THE CASTINGS SHALL BE FREE OF POURING FAULTS, BLOW HOLES, CRACKS AND OTHER IMPERFECTIONS. THEY SHALL BE SOUND, TRUE TO FORM AND THICKNESS, CLEAN AND NEATLY FINISHED, AND SHALL BE COATED WITH COAL TAR PITCH VARNISH.

THIS COVER IS DESIGNED TO FIT ON ANY INLET, CATCH BASIN OR ON ANY EXISTING SIMILAR STRUCTURE WHEN SO DESIGNATED ON THE PLANS.

SECTION B - B

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

COVER J

FOR USE WITH
CONCRETE CURB & GUTTER DETAIL B

9-30-2014
F.H.W.A. APPROVAL

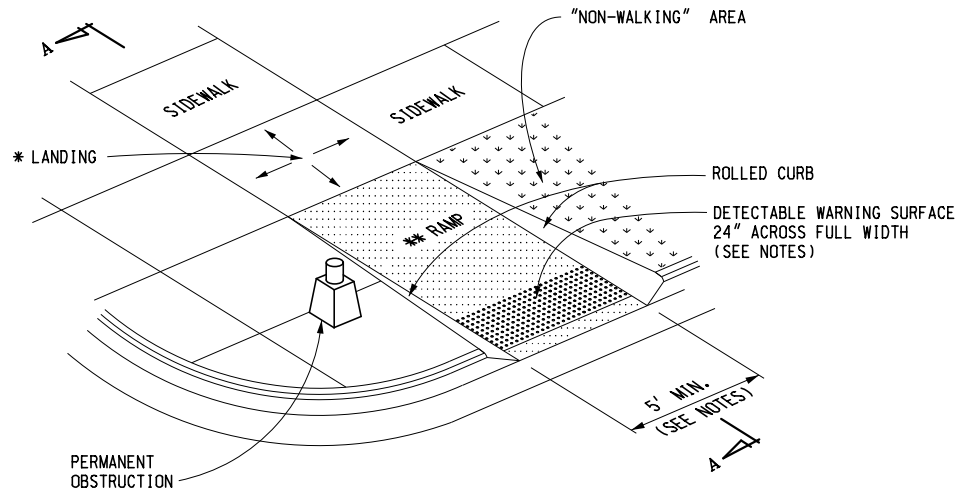
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PLAN DATE

R-14-D

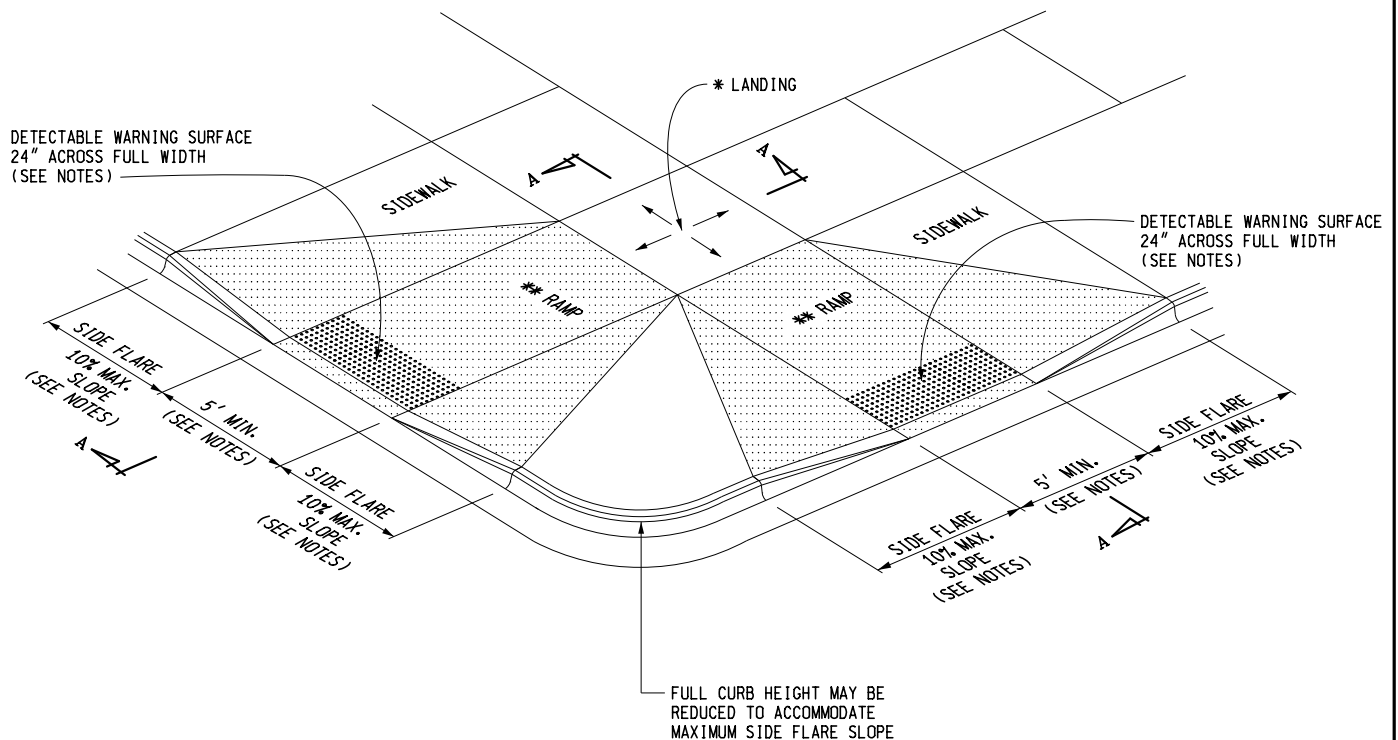
SHEET
2 OF 2

* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.0%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



SIDEWALK RAMP TYPE R
(ROLLED SIDES)



SIDEWALK RAMP TYPE F
(FLARED SIDES, TWO RAMPS SHOWN)



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

SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

F.H.W.A. APPROVAL

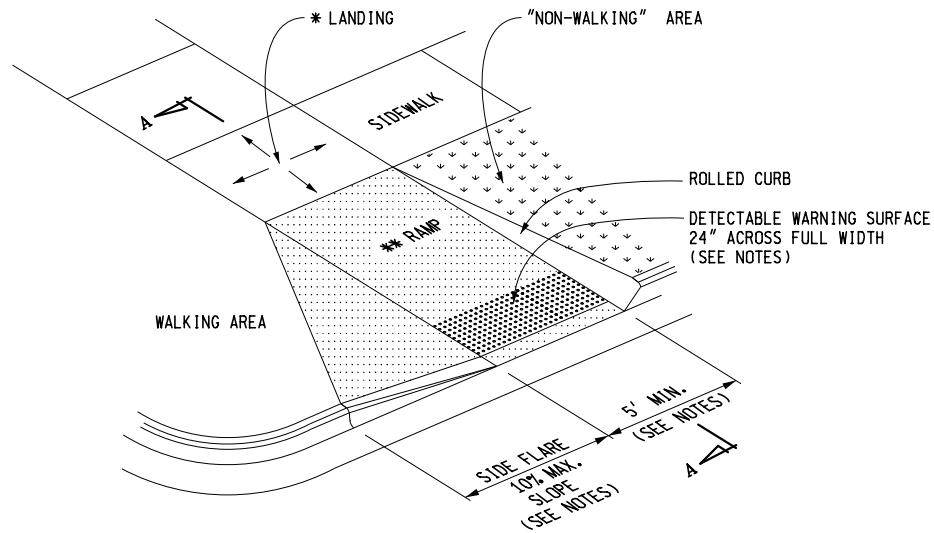
3-15-2016
PLAN DATE

R-28-J

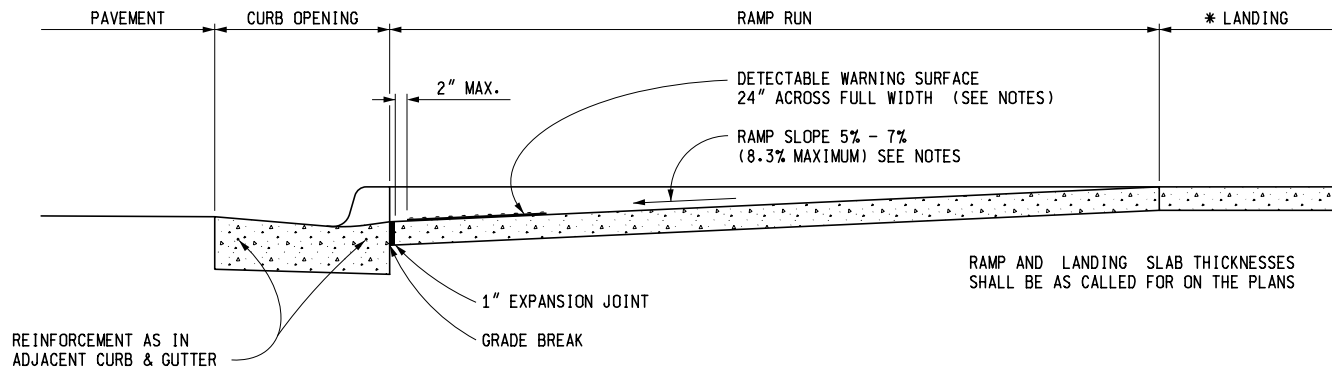
SHEET
1 OF 7

* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

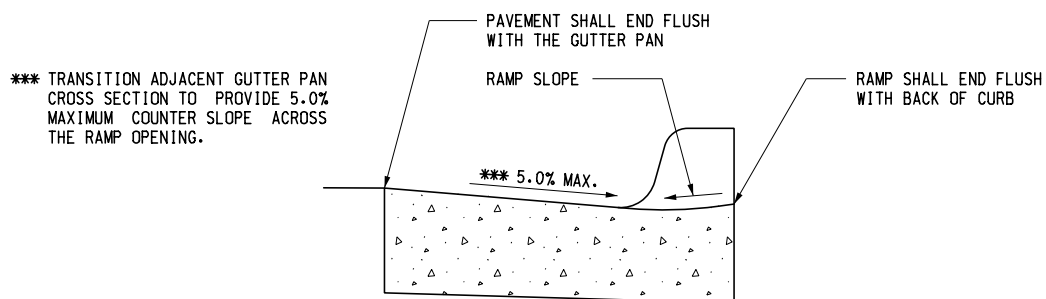
** MAXIMUM RAMP CROSS SLOPE IS 2.0%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



SIDEWALK RAMP TYPE RF
(ROLLED / FLARED SIDES)



SECTION A-A



SECTION THROUGH CURB OPENING
(TYPICAL ALL RAMP TYPES)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

**SIDEWALK RAMP AND
DETECTABLE WARNING DETAILS**

F.H.W.A. APPROVAL

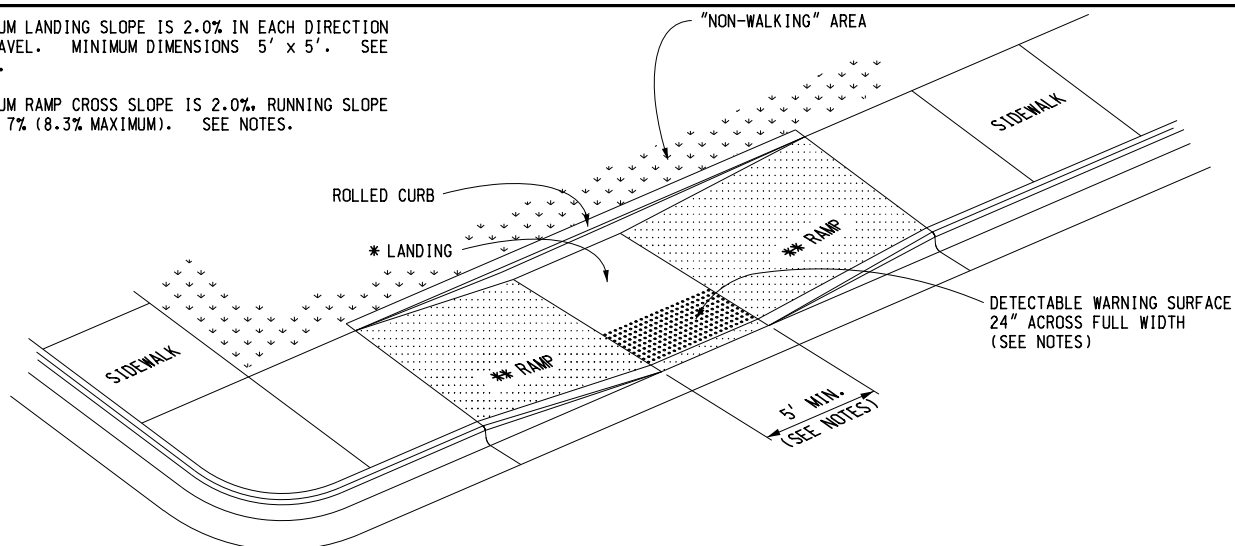
3-15-2016
PLAN DATE

R-28-J

SHEET
2 OF 7

* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

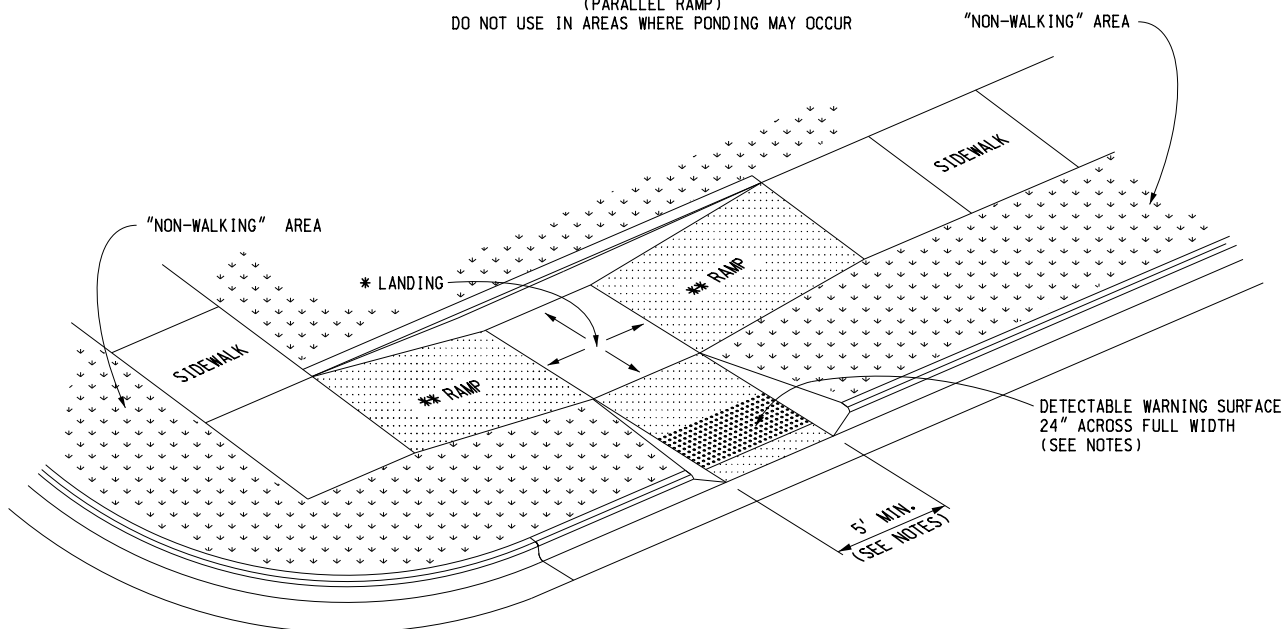
** MAXIMUM RAMP CROSS SLOPE IS 2.0%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



SIDEWALK RAMP TYPE P

(PARALLEL RAMP)

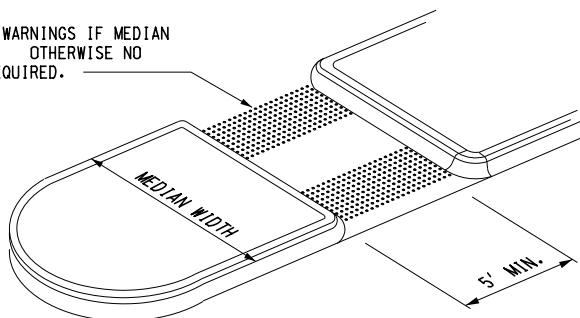
DO NOT USE IN AREAS WHERE PONDING MAY OCCUR



SIDEWALK RAMP TYPE C

(COMBINATION RAMP)

USE 24" DEEP DETECTABLE WARNINGS IF MEDIAN WIDTH IS AT LEAST 6'-0". OTHERWISE NO DETECTABLE WARNING IS REQUIRED.



SIDEWALK RAMP TYPE M

(MEDIAN ISLAND)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

F.H.W.A. APPROVAL

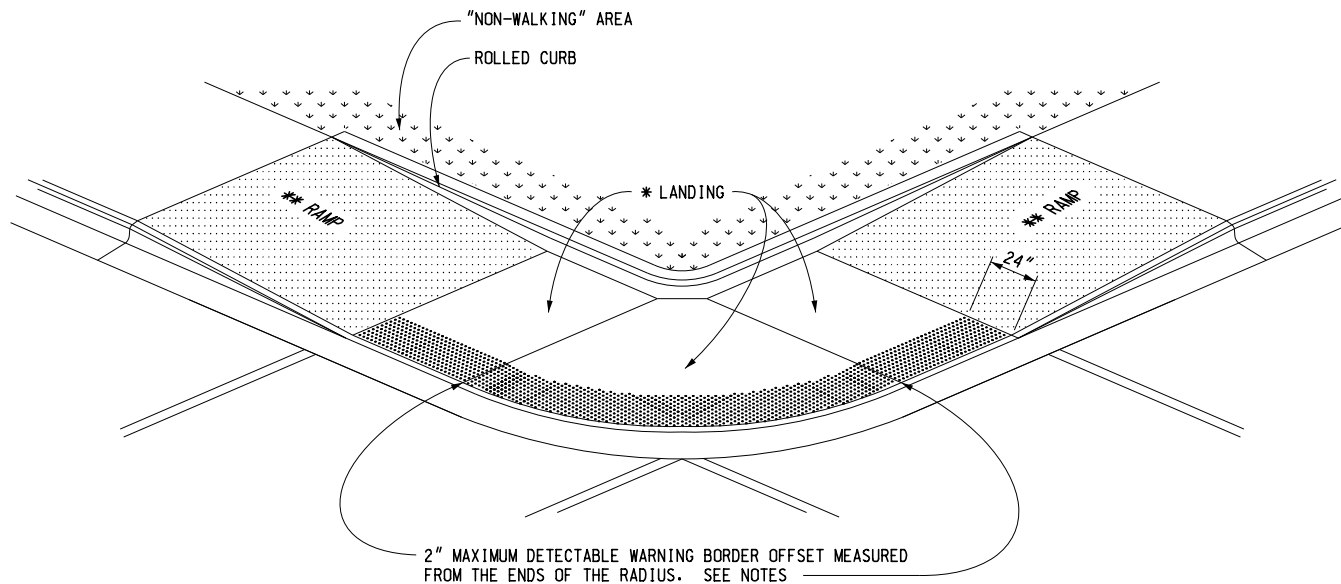
3-15-2016
PLAN DATE

R-28-J

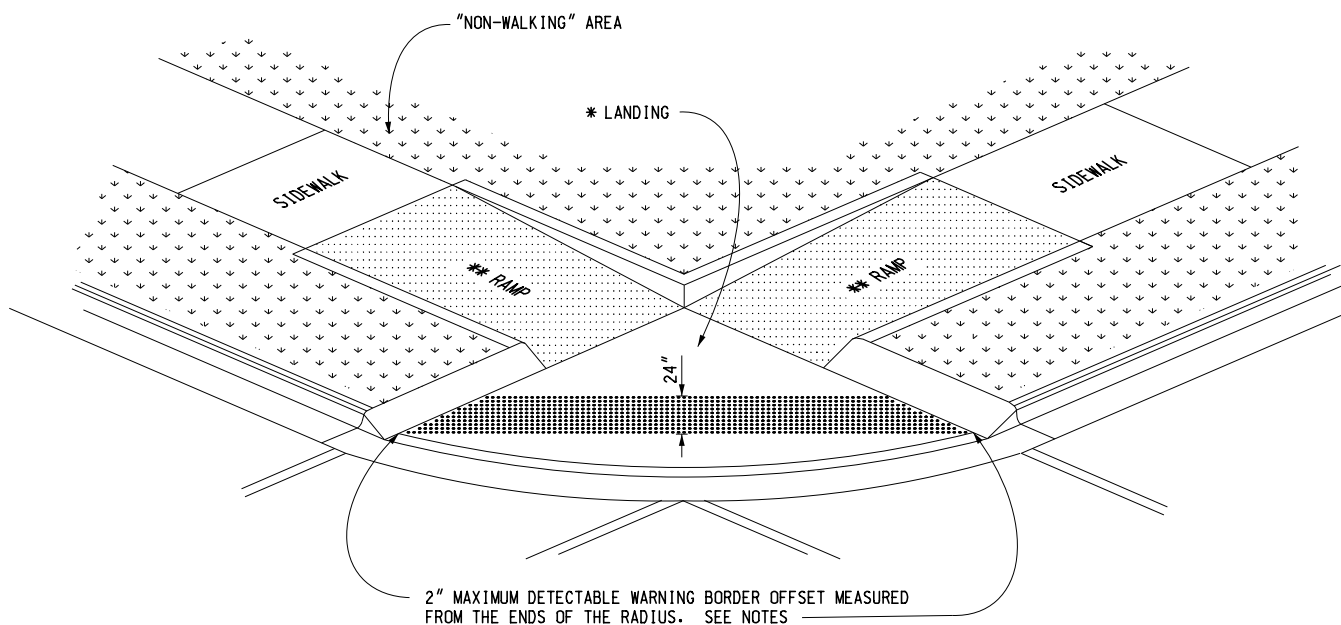
SHEET
3 OF 7

* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.0%, RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



(RADIAL DETECTABLE WARNING SHOWN)



(TANGENT DETECTABLE WARNING SHOWN)

SIDEWALK RAMP TYPE D

(DEPRESSED CORNER)

USE ONLY WHEN INDEPENDENT DIRECTIONAL RAMPS CAN NOT BE CONSTRUCTED FOR EACH CROSSING DIRECTION

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

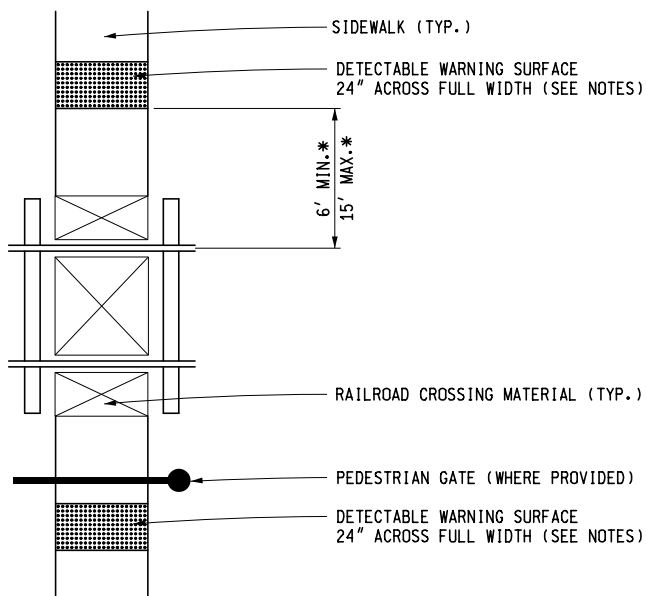
F.H.W.A. APPROVAL

3-15-2016
PLAN DATE

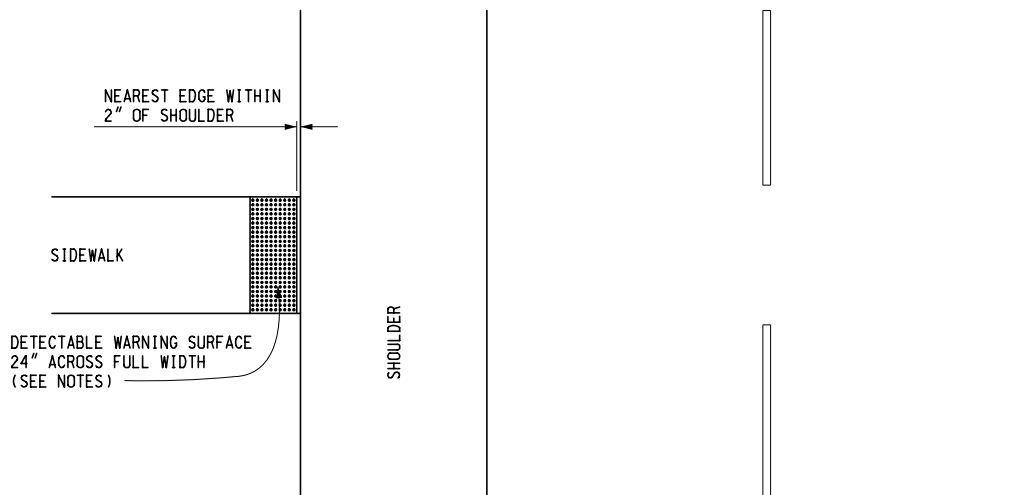
R-28-J

SHEET
4 OF 7

* THE DETECTABLE WARNING SURFACE SHALL BE LOCATED SO THAT THE EDGE NEAREST THE RAIL CROSSING IS 6' MINIMUM AND 15' MAXIMUM FROM THE CENTERLINE OF THE NEAREST RAIL. DO NOT PLACE DETECTABLE WARNING ON RAILROAD CROSSING MATERIAL.



DETECTABLE WARNING AT RAILROAD CROSSING



DETECTABLE WARNING AT FLUSH SHOULDER OR ROADWAY

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

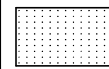
F.H.W.A. APPROVAL

3-15-2016
PLAN DATE

R-28-J

SHEET
5 OF 7

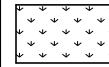
LEGEND



SLOPED SURFACE



DETECTABLE WARNING



"NON-WALKING" AREA



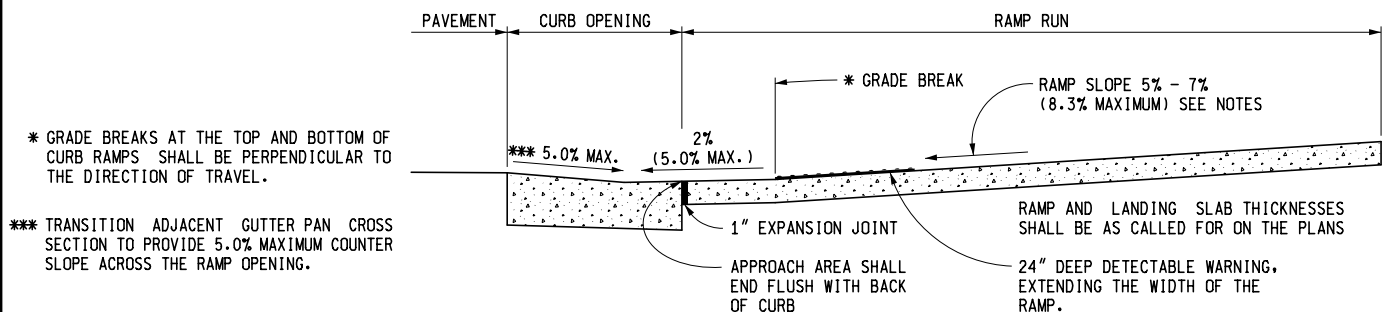
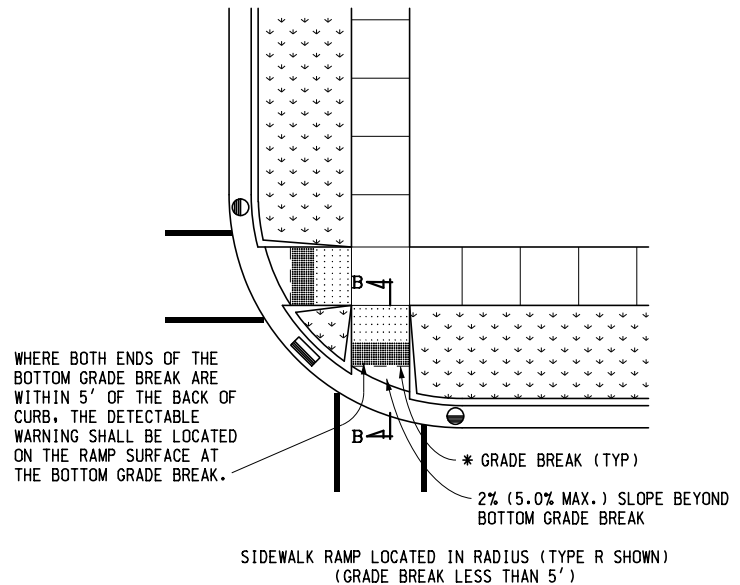
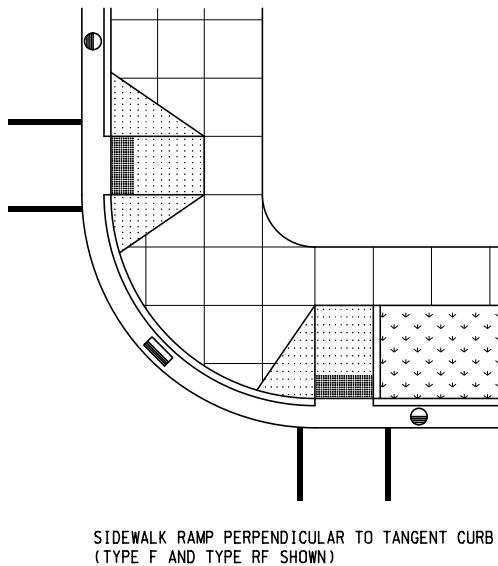
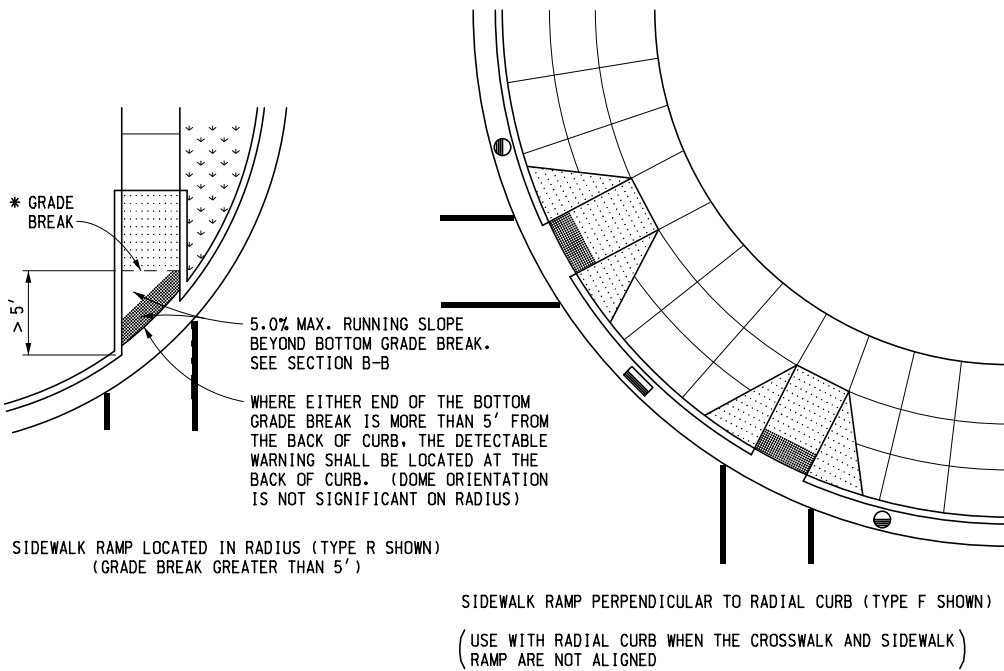
CROSSWALK MARKING



PREFERRED LOCATION OF DRAINAGE INLET (TYP.)



ALTERNATE LOCATION OF DRAINAGE INLET (TYP.)



SECTION B-B SIDEWALK RAMP ORIENTATION

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

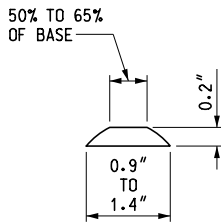
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

F.H.W.A. APPROVAL

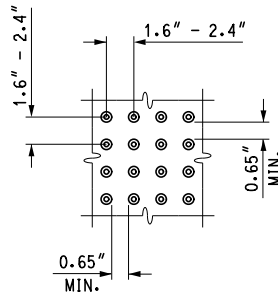
3-15-2016
PLAN DATE

R-28-J

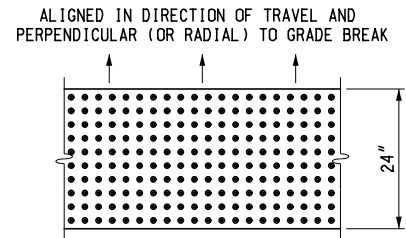
SHEET
6 OF 7



DOME SECTION



DOME SPACING



DOME ALIGNMENT

DETECTABLE WARNING DETAILS

NOTES:

DETAILS SPECIFIED ON THIS PLAN APPLY TO ALL CONSTRUCTION, RECONSTRUCTION, OR ALTERATION OF STREETS, CURBS, OR SIDEWALKS IN THE PUBLIC RIGHT OF WAY.

SIDEWALK RAMPS ARE TO BE LOCATED AS SPECIFIED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

RAMPS SHALL BE PROVIDED AT ALL CORNERS OF AN INTERSECTION WHERE THERE IS EXISTING OR PROPOSED SIDEWALK AND CURB. RAMPS SHALL ALSO BE PROVIDED AT MARKED AND/OR SIGNALIZED MID-BLOCK CROSSINGS.

SURFACE TEXTURE OF THE RAMP SHALL BE THAT OBTAINED BY A COARSE BROOMING, TRANSVERSE TO THE RUNNING SLOPE.

SIDEWALK SHALL BE RAMPED WHERE THE DRIVEWAY CURB IS EXTENDED ACROSS THE WALK.

CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP. WHERE CONDITIONS PERMIT, IT IS DESIRABLE THAT THE SLOPE OF THE RAMP BE IN ONLY ONE DIRECTION, PARALLEL TO THE DIRECTION OF TRAVEL.

RAMP WIDTH SHALL BE INCREASED, IF NECESSARY, TO ACCOMMODATE SIDEWALK SNOW REMOVAL EQUIPMENT NORMALLY USED BY THE MUNICIPALITY.

WHEN 5' MINIMUM WIDTHS ARE NOT FEASIBLE, RAMP WIDTH MAY BE REDUCED TO NOT LESS THAN 4' AND LANDINGS TO NOT LESS THAN 4' x 4'.

DETECTABLE WARNING SURFACE COVERAGE IS 24" MINIMUM IN THE DIRECTION OF RAMP/PATH TRAVEL AND THE FULL WIDTH OF THE RAMP/PATH OPENING EXCLUDING CURBED OR FLARED CURB TRANSITION AREAS. A BORDER OFFSET NOT GREATER THAN 2" MEASURED ALONG THE EDGES OF THE DETECTABLE WARNING IS ALLOWABLE. FOR RADIAL CURB THE OFFSET IS MEASURED FROM THE ENDS OF THE RADIUS.

FOR NEW ROADWAY CONSTRUCTION, THE RAMP CROSS SLOPE MAY NOT EXCEED 2.0%. FOR ALTERATIONS TO EXISTING ROADWAYS, THE CROSS SLOPE MAY BE TRANSITIONED TO MEET AN EXISTING ROADWAY GRADE. THE CROSS SLOPE TRANSITION SHALL BE APPLIED UNIFORMLY OVER THE FULL LENGTH OF THE RAMP.

THE MAXIMUM RUNNING SLOPE OF 8.3% IS RELATIVE TO A FLAT (0%) REFERENCE. HOWEVER, IT SHALL NOT REQUIRE ANY RAMP OR SERIES OF RAMPS TO EXCEED 15 FEET IN LENGTH.

DRAINAGE STRUCTURES SHOULD NOT BE PLACED IN LINE WITH RAMPS. THE LOCATION OF THE RAMP SHOULD TAKE PRECEDENCE OVER THE LOCATION OF THE DRAINAGE STRUCTURE. WHERE EXISTING DRAINAGE STRUCTURES ARE LOCATED IN THE RAMP PATH OF TRAVEL, USE A MANUFACTURER'S ADA COMPLIANT GRATE. OPENINGS SHALL NOT BE GREATER THAN 1/2". ELONGATED OPENINGS SHALL BE PLACED SO THAT THE LONG DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.

TRANSITION THE GUTTER PAN CROSS SECTION SUCH THAT THE COUNTER SLOPE IN THE DIRECTION OF RAMP TRAVEL IS NOT GREATER THAN 5.0%. MAINTAIN THE NORMAL GUTTER PAN CROSS SECTION ACROSS DRAINAGE STRUCTURES.

THE TOP OF THE JOINT FILLER FOR ALL RAMP TYPES SHALL BE FLUSH WITH THE ADJACENT CONCRETE.

CROSSWALK AND STOP LINE MARKINGS, IF USED, SHALL BE SO LOCATED AS TO STOP TRAFFIC SHORT OF RAMP CROSSINGS. SPECIFIC DETAILS FOR MARKING APPLICATIONS ARE GIVEN IN THE "MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES".

FLARED SIDES WITH A SLOPE OF 10% MAXIMUM, MEASURED ALONG THE ROADSIDE CURB LINE, SHALL BE PROVIDED WHERE AN UNOBSTRUCTED CIRCULATION PATH LATERALLY CROSSES THE SIDEWALK RAMP. FLARED SIDES ARE NOT REQUIRED WHERE THE RAMP IS BORDERED BY LANDSCAPING, UNPAVED SURFACE OR PERMANENT FIXED OBJECTS. WHERE THEY ARE NOT REQUIRED, FLARED SIDES CAN BE CONSIDERED IN ORDER TO AVOID SHARP CURB RETURNS AT RAMP OPENINGS.

DETECTABLE WARNING PLATES MUST BE INSTALLED USING FABRICATED OR FIELD CUT UNITS CAST AND/OR ANCHORED IN THE PAVEMENT TO RESIST SHIFTING OR HEAVING.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

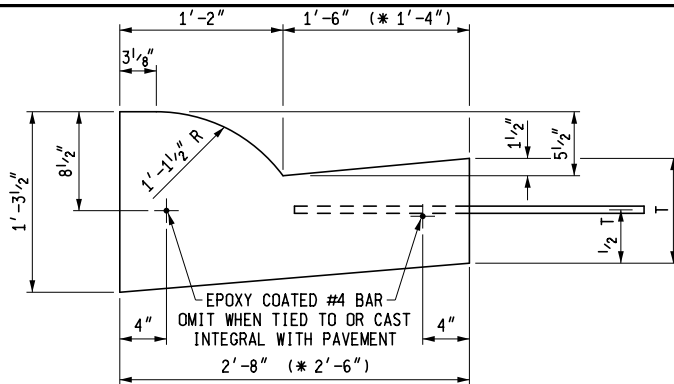
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

F.H.W.A. APPROVAL

3-15-2016
PLAN DATE

R-28-J

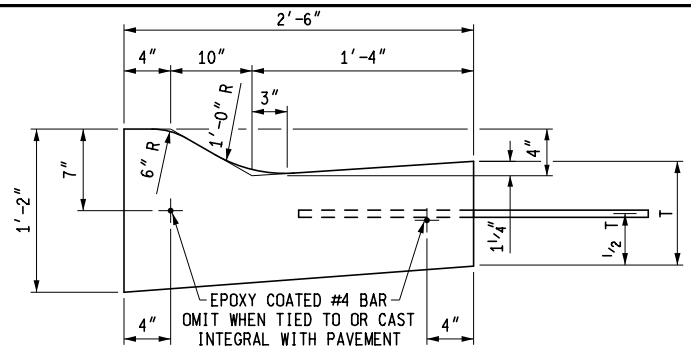
SHEET
7 OF 7



(* GUTTER PAN WIDTH MAY BE REDUCED WHEN APPROVED BY THE ENGINEER)

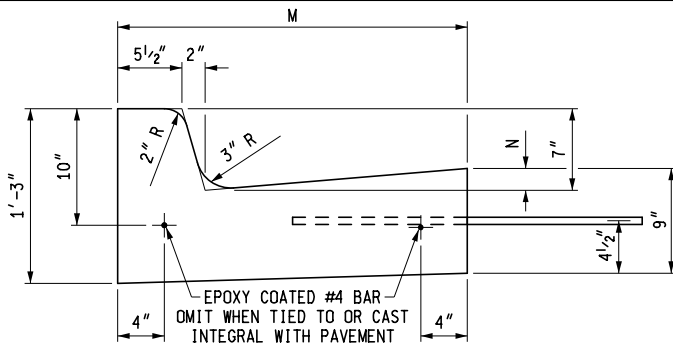
DETAIL	DIMENSION	LANE TIES	CONCRETE CYD / LFT	CONCRETE CYD / LFT
	T			
B1	9"	AS SHOWN	0.0900	(* 0.0855)
B2	9"	OMITTED	0.0900	(* 0.0855)
B3	10"	AS SHOWN	0.0941	(* 0.0894)

B



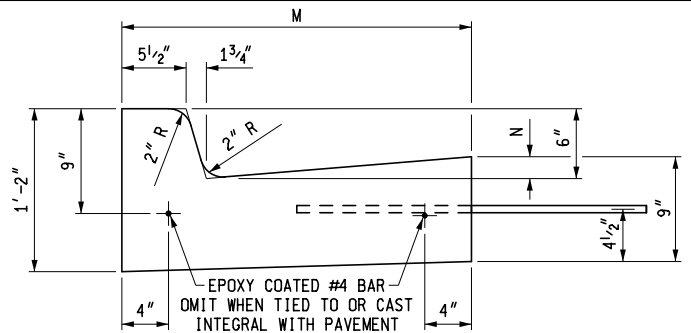
DETAIL	DIMENSION	LANE TIES	CONCRETE CYD / LFT
	T		
D1	9"	AS SHOWN	0.0788
D2	9"	OMITTED	0.0788
D3	10"	AS SHOWN	0.0826

D



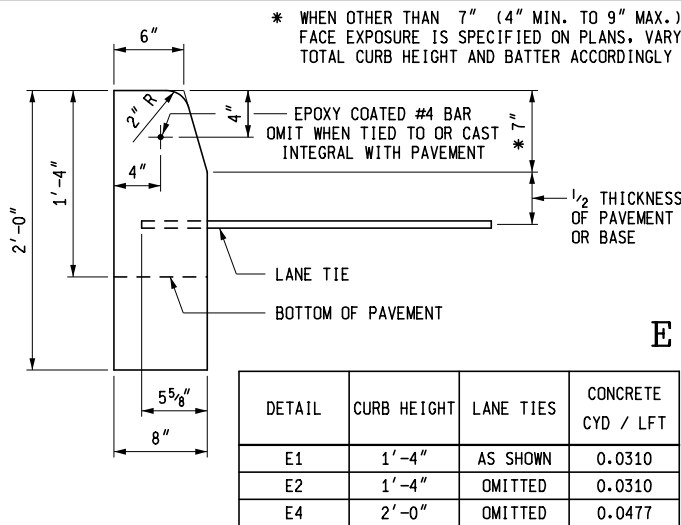
DETAIL	DIMENSION		LANE TIES	CONCRETE CYD / LFT
	M	N		
C1	1'-6"	7/8"	AS SHOWN	0.0506
C2	1'-6"	7/8"	OMITTED	0.0506
C3	2'-0"	1 3/8"	AS SHOWN	0.0632
C4	2'-0"	1 3/8"	OMITTED	0.0632
C5	2'-6"	1 7/8"	AS SHOWN	0.0757
C6	2'-6"	1 7/8"	OMITTED	0.0757

C



DETAIL	DIMENSION		LANE TIES	CONCRETE CYD / LFT
	M	N		
F1	1'-6"	7/8"	AS SHOWN	0.0484
F2	1'-6"	7/8"	OMITTED	0.0484
F3	2'-0"	1 3/8"	AS SHOWN	0.0610
F4	2'-0"	1 3/8"	OMITTED	0.0610
F5	2'-6"	1 7/8"	AS SHOWN	0.0737
F6	2'-6"	1 7/8"	OMITTED	0.0737

F



DETAIL	CURB HEIGHT	LANE TIES	CONCRETE CYD / LFT
E1	1'-4"	AS SHOWN	0.0310
E2	1'-4"	OMITTED	0.0310
E4	2'-0"	OMITTED	0.0477

E



PREPARED
BY
DESIGN DIVISION
DRAWN BY: B.L.T.
CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY: *Randy V. Puffel*
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: *Mark A. Van Pelt*
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

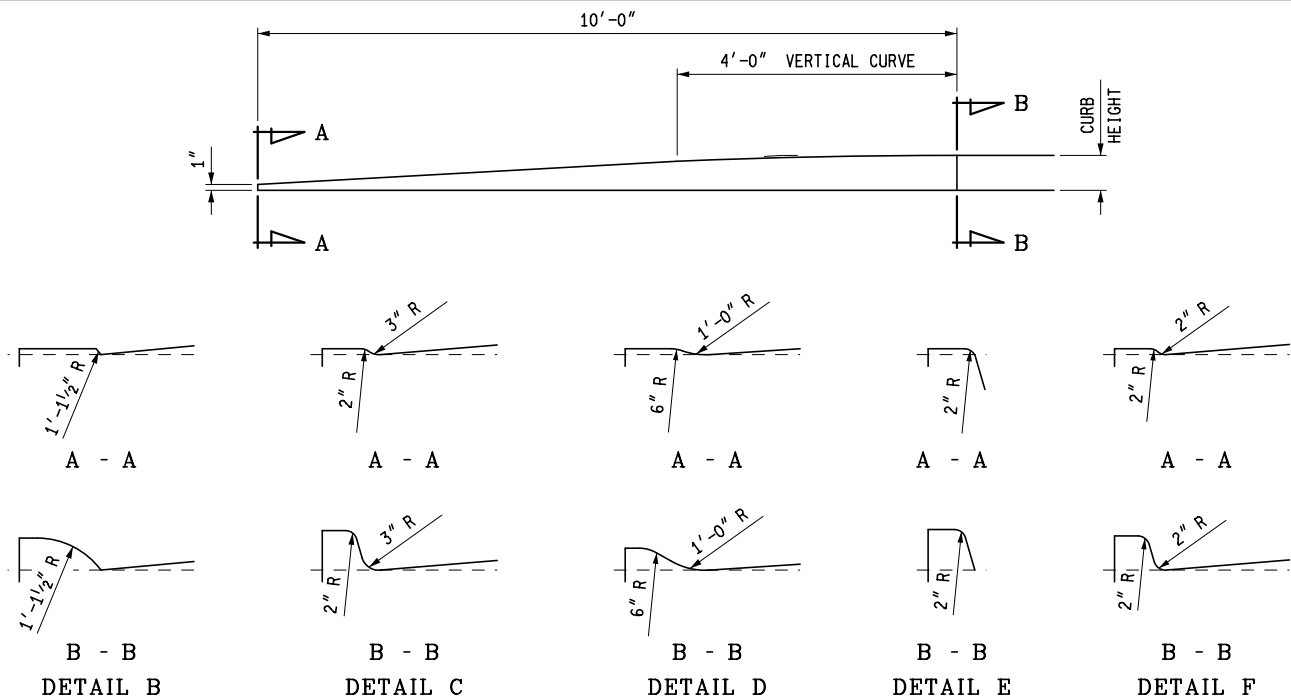
CONCRETE CURB AND CONCRETE CURB & GUTTER

9-30-2014
F.H.W.A. APPROVAL

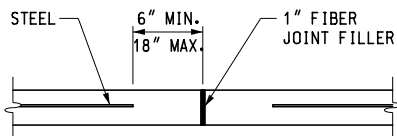
2-6-2014
PLAN DATE

R-30-G

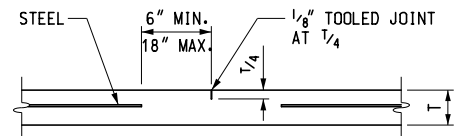
SHEET
1 OF 2



CONCRETE CURB, CURB AND GUTTER ENDINGS



1" FIBER JOINT FILLER



CONTRACTION JOINT

NOTES:

CURB AND GUTTER RADII SHALL BE DIMENSIONED TO THE FRONT EDGE OF THE GUTTER PAN OR EDGE OF PAVEMENT.

CONCRETE CURB AND GUTTER ENDINGS WILL BE PAID FOR IN LINEAR FEET OF THE ADJACENT CURB DETAIL.

JOINTS SHALL BE PLACED AT RIGHT ANGLES TO THE EDGE OF CONCRETE CURB AND GUTTER.

JOINTS DETAILED ON THE PLANS SHALL SUPERSEDE THOSE SPECIFIED ON THIS STANDARD PLAN.

BOTTOM SLOPE OF CURB AND GUTTER STRUCTURE MAY BE THE SAME SLOPE AS BOTTOM OF PAVEMENT. BACK OF CURB AND VERTICAL EDGE OF GUTTER PAN MAY HAVE A MAXIMUM 1/2" BATTER TO FACILITATE FORMING.

WHEN CURB AND GUTTER IS CAST INTEGRALLY, SEE CURRENT STANDARD PLAN R-31-SERIES.

ALL JOINTS FOR CURB OR CURB AND GUTTER ARE INCLUDED IN THE PAY ITEM FOR THE CURB OR CURB AND GUTTER.

JOINTS IN CURB OR CURB AND GUTTER NOT TIED TO CONCRETE PAVEMENT; ADJACENT TO CONCRETE BASE COURSE; OR ADJACENT TO HMA PAVEMENT:

- PLACE 1" FIBER JOINT FILLER AT 400' MAXIMUM INTERVALS.
- PLACE 1" FIBER JOINT FILLER AT SPRING POINTS OF INTERSECTING STREETS.
- PLACE 1/2" ISOLATION JOINT AT CATCH BASINS PER STANDARD PLAN R-37-SERIES.
- PLACE CONTRACTION JOINTS AT 40' MAXIMUM INTERVALS.

JOINTS IN CURB OR CURB AND GUTTER TIED TO JOINTED PAVEMENT

- PLACE 1" FIBER JOINT FILLER OPPOSITE ALL TRANSVERSE EXPANSION JOINTS IN PAVEMENT.
- PLACE 1/2" ISOLATION JOINT AT CATCH BASINS PER STANDARD PLAN R-37-SERIES.
- PLACE CONTRACTION JOINTS OPPOSITE ALL TRANSVERSE CONTRACTION JOINTS IN PAVEMENT.
- A SYMBOL (B) JOINT SHALL BE PLACED BETWEEN CURB OR CURB AND GUTTER AND ADJACENT CONCRETE PAVEMENT AS SPECIFIED ON STANDARD PLAN R-41-SERIES.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

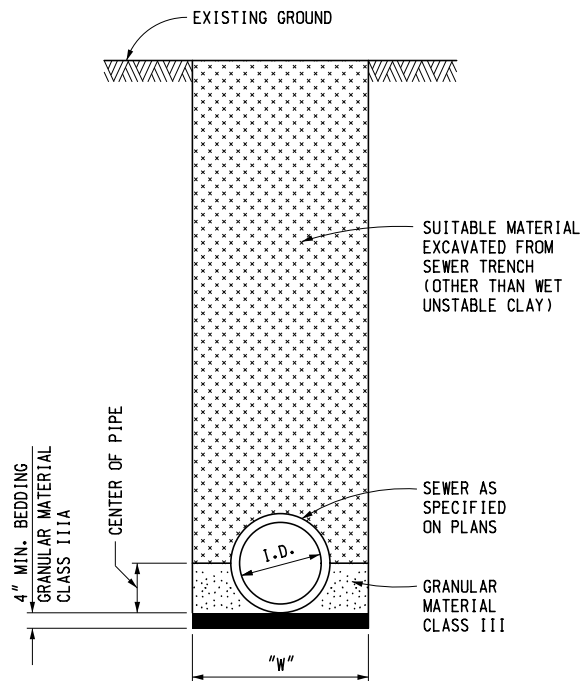
CONCRETE CURB AND CONCRETE CURB & GUTTER

9-30-2014
F.H.W.A. APPROVAL

2-6-2014
PLAN DATE

R-30-G

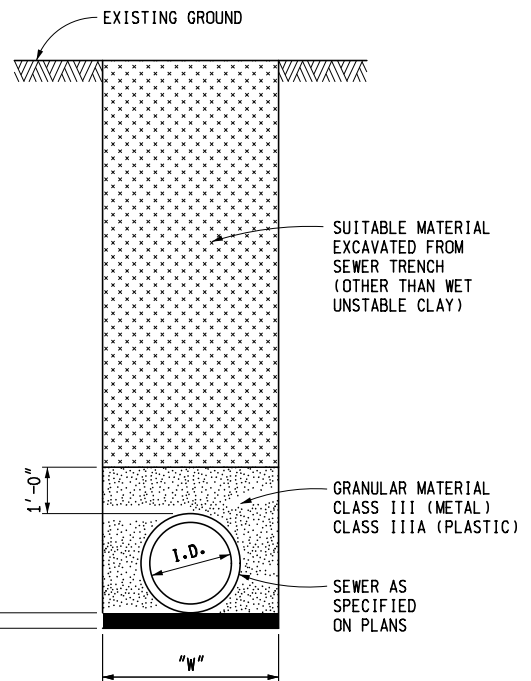
SHEET
2 OF 2



SEWER NOT UNDER ROADBED CONCRETE

NOTE: FOR "W" SEE NOTES ON SHEET 5

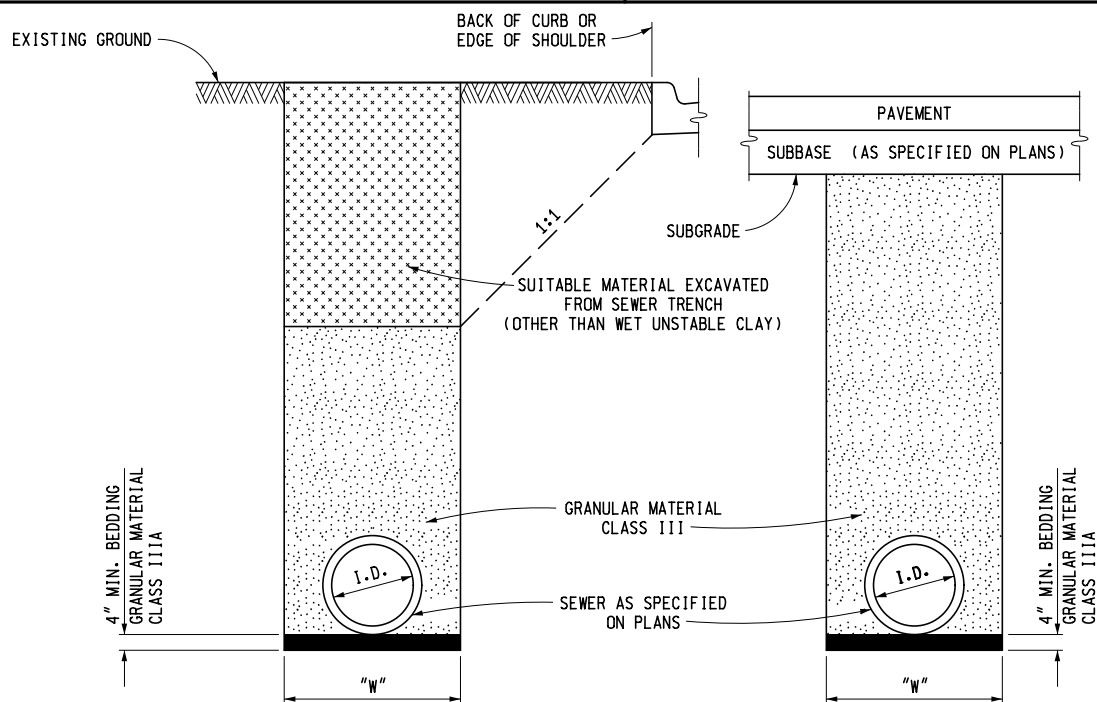
A1



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



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

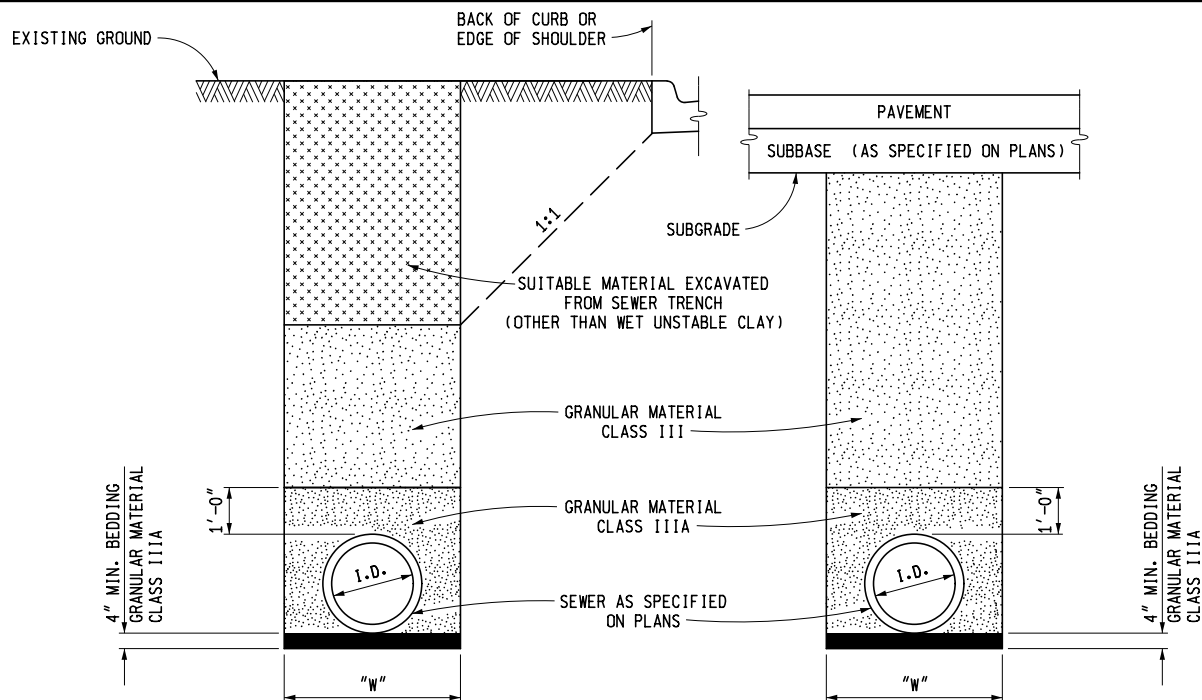
UTILITY TRENCHES

F.H.W.A. APPROVAL

2-8-2016
PLAN DATE

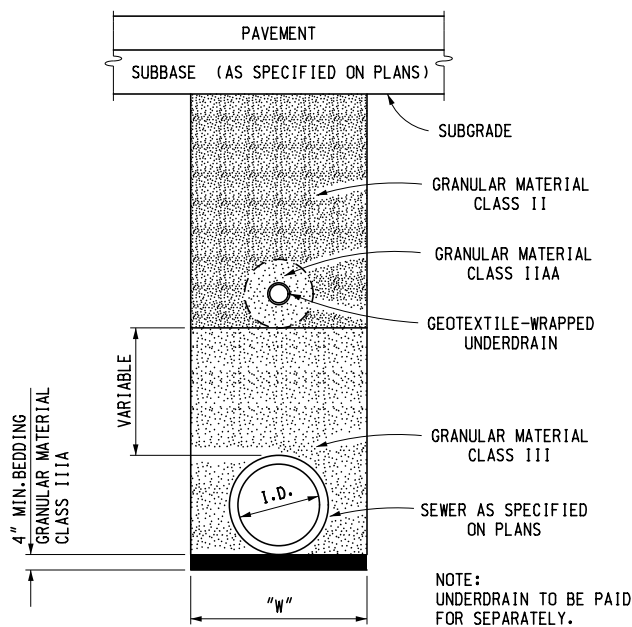
R-83-C

SHEET
1 OF 5



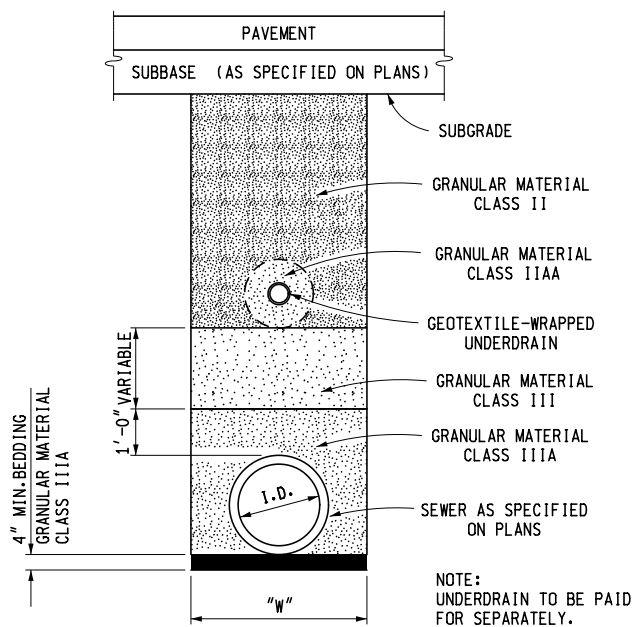
**SEWER UNDER ROADBED OR
WITHIN INFLUENCE OF ROADBED
PLASTIC PIPE**

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

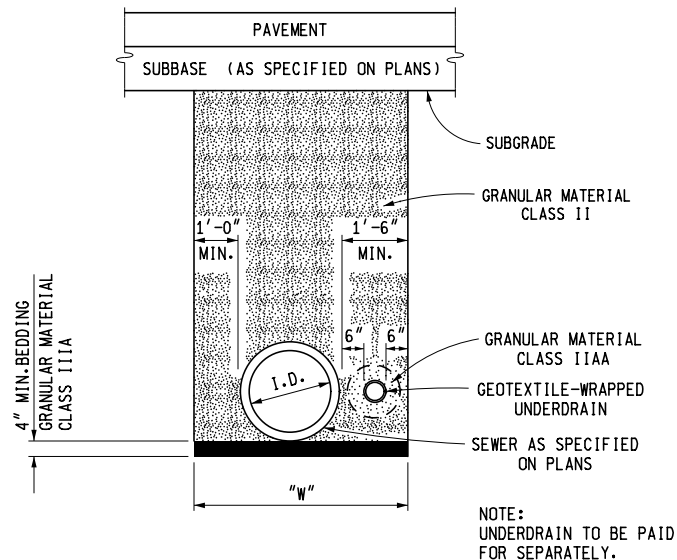
UTILITY TRENCHES

F.H.W.A. APPROVAL

2-8-2016
PLAN DATE

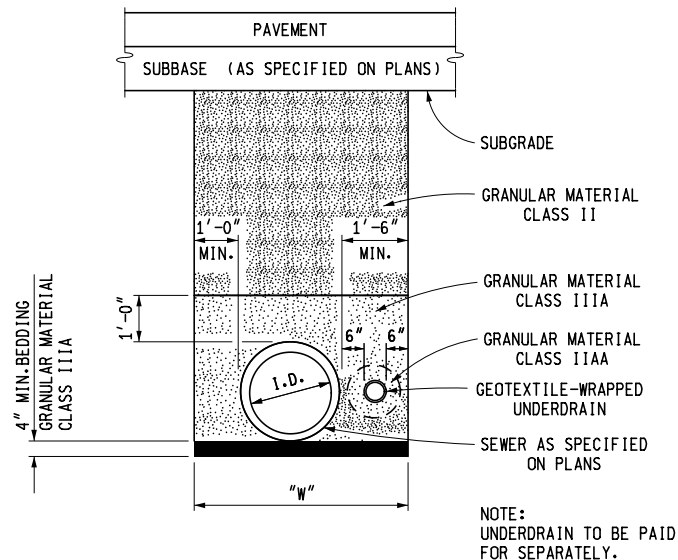
R-83-C

SHEET
2 OF 5



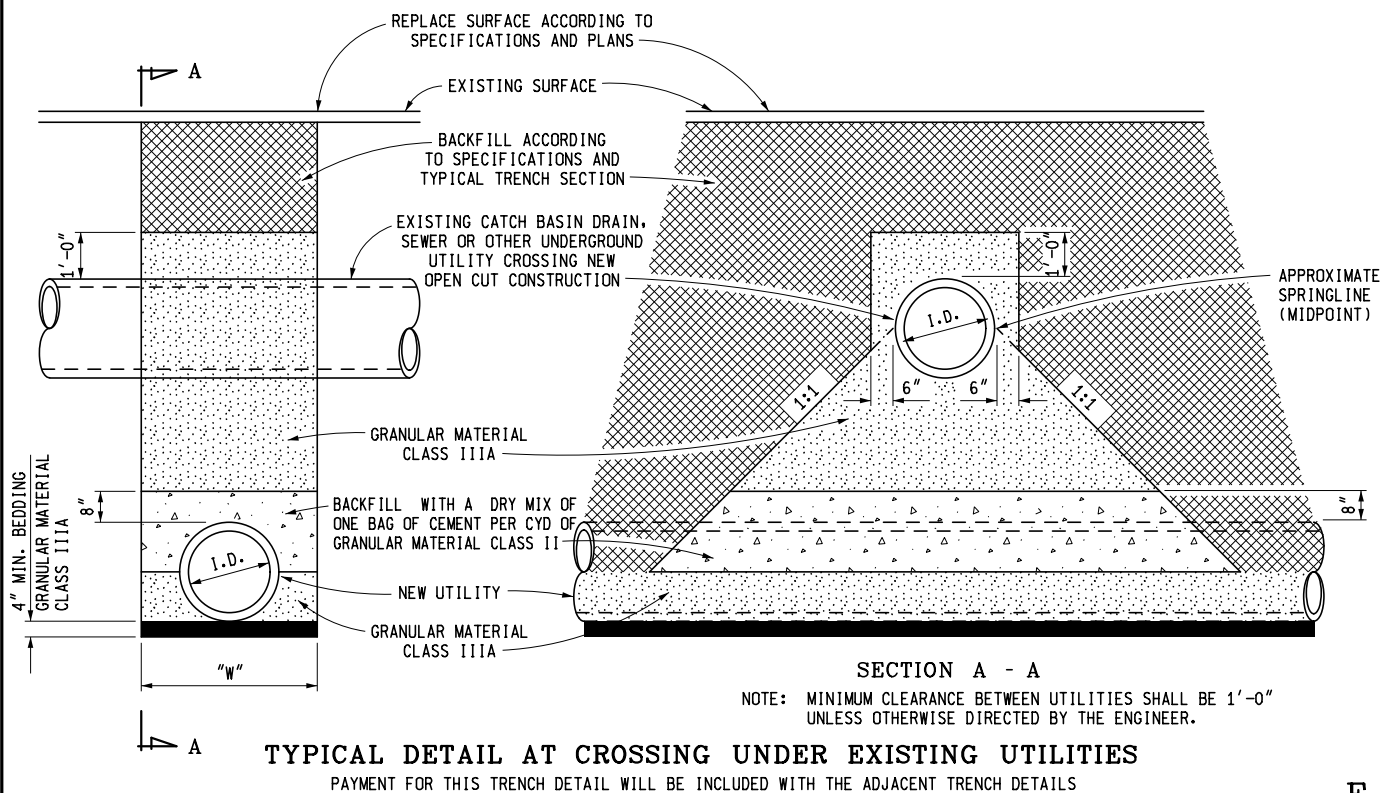
**SEWER WITH UNDERDRAIN UNDER ROADBED
CONCRETE & METAL PIPE
(FOR SHALLOW SEWERS)**

D1



**SEWER WITH UNDERDRAIN UNDER ROADBED
PLASTIC PIPE
(FOR SHALLOW SEWERS)**

D2



E

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

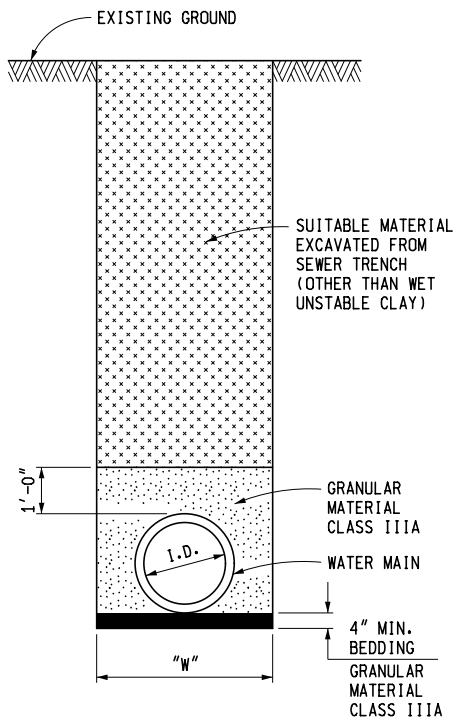
UTILITY TRENCHES

F.H.W.A. APPROVAL

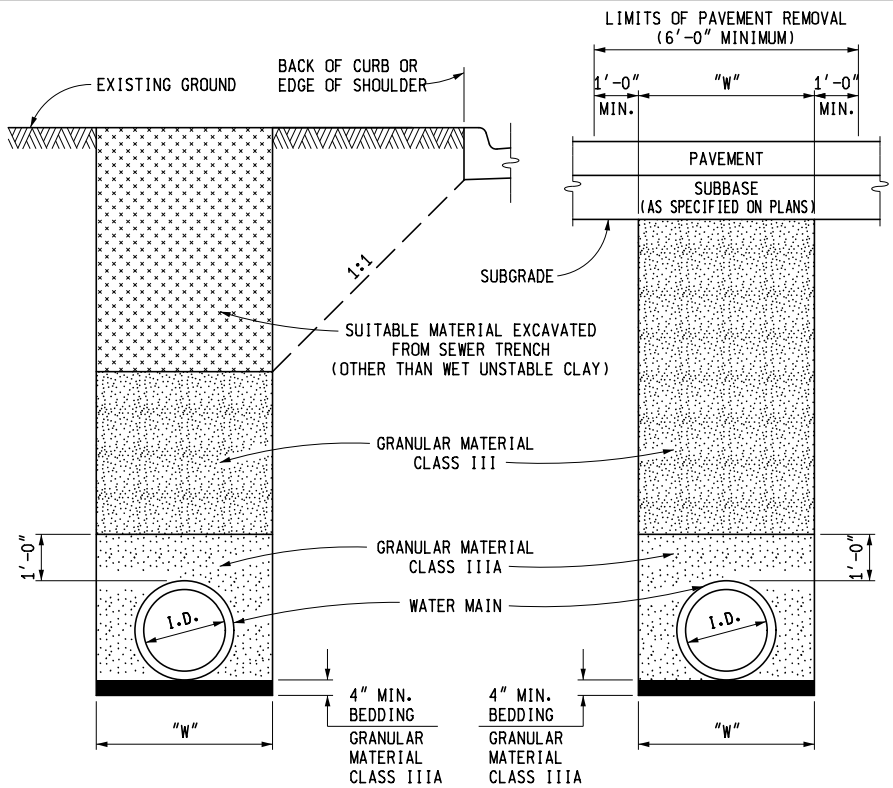
2-8-2016
PLAN DATE

R-83-C

SHEET
3 OF 5

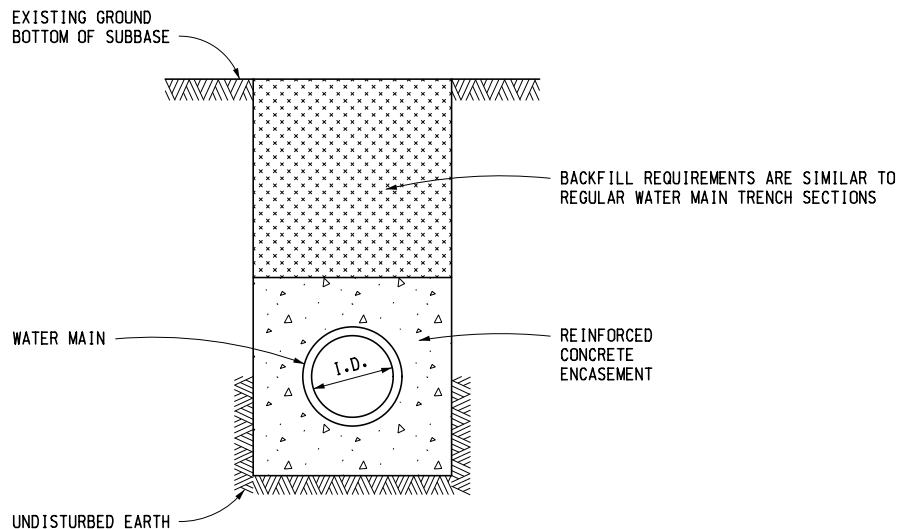


**WATER MAINS
NOT UNDER ROADBED** F



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



NOTE:
REINFORCEMENT SHALL BE AS SPECIFIED ON PLANS.

WATER MAINS IN REINFORCED CONCRETE ENCASEMENT H

**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"

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

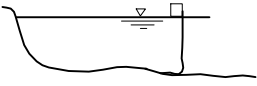
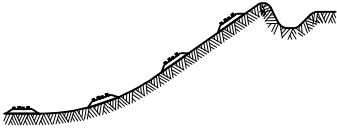


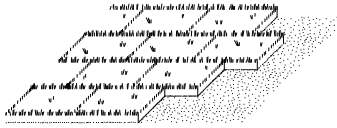
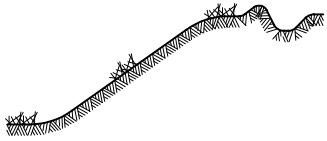
2-8-2016
PLAN DATE

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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 gulying. 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 gulying. Assists in the collection of sediments by filtering runoff. Assists in the establishment of a permanent vegetative cover.	●				●		



PREPARED
BY
DESIGN DIVISION

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CHECKED BY: W.K.P.

DEPARTMENT DIRECTOR
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APPROVED BY:

ENGINEER OF DELIVERY

APPROVED BY:

ENGINEER OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

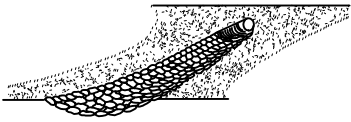
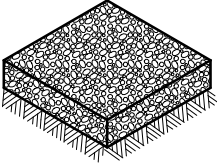
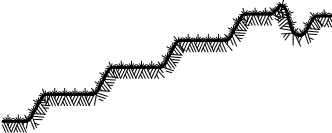
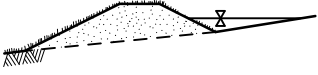
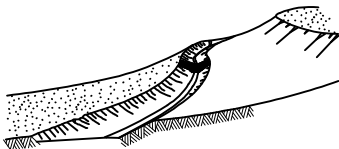
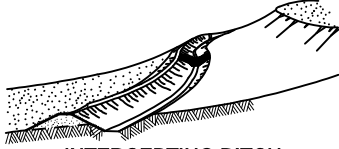
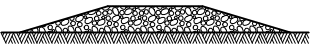
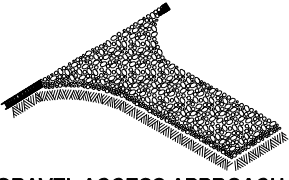
**SOIL EROSION & SEDIMENTATION
CONTROL MEASURES**

9-10-2010
F.H.W.A. APPROVAL

6-3-2010
PLAN DATE

R-96-E

SHEET
1 OF 6

KEY	DETAIL	CHARACTERISTICS	A	B	C	D	E	F	G
7	 <p>RIPRAP</p>	Used where vegetation cannot be established. Very effective in protecting against high velocity flows. Should be placed over a geotextile liner.	•	•	•	•			•
8	 <p>AGGREGATE COVER</p>	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	 <p>BENCHES</p>	Reduces sheet flow velocities preventing rilling and gulying. Assists in the collection and filtering of sediments. Provides access for stabilizing slopes.	•					•	
10	 <p>DIVERSION DIKE</p>	Assists in the diversion of runoff to a stable outlet or sediment control device. Reduces sheet flow velocities preventing rilling and gulying. Collects and diverts runoff to properly stabilized drainage ways. Works well with INTERCEPTING DITCH (KEY 11)	•				•	•	
11	 <p>INTERCEPTING DITCH</p>	Assists in the diversion of runoff to a stable outlet or sediment control device. Reduces sheet flow velocities preventing rilling and gulying. Works well with DIVERSION DIKE (KEY 10)	•				•	•	
12	 <p>INTERCEPTING DITCH AND DIVERSION DIKE</p>	Assists in the diversion of runoff to a stable outlet or sediment control device. Reduces sheet flow velocities preventing rilling and gulying.	•				•	•	
13	 <p>GRAVEL FILTER BERM</p>	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	 <p>GRAVEL ACCESS APPROACH</p>	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

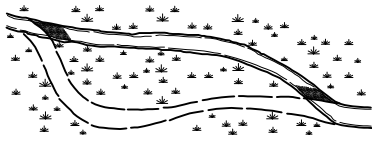
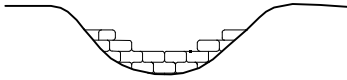
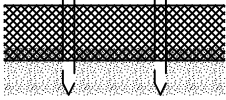
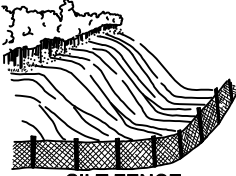

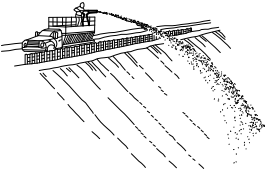
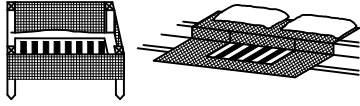
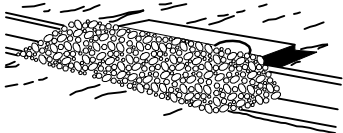
SOIL EROSION & SEDIMENTATION CONTROL MEASURES

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
23	 <p>STREAM RELOCATION</p>	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	 <p>SAND AND STONE BAGS</p>	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	 <p>SAND FENCE AND DUNE STABILIZATION</p>	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	 <p>SILT FENCE</p>	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	 <p>PLASTIC SHEETS OR GEOTEXTILE COVER</p>	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	 <p>MULCHING AND MULCH ANCHORING</p>	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	 <p>INLET PROTECTION FABRIC DROP</p>	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	 <p>INLET PROTECTION GEOTEXTILE AND STONE</p>	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

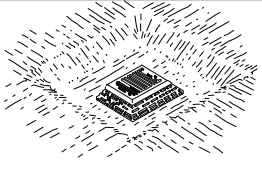
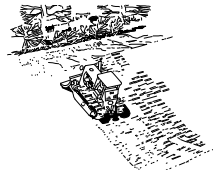
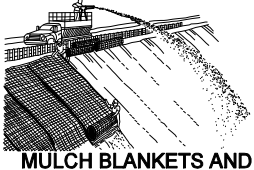
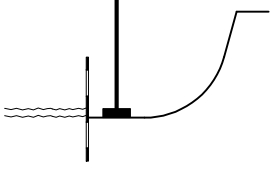


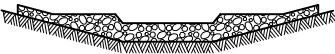
SOIL EROSION & SEDIMENTATION CONTROL MEASURES

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

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

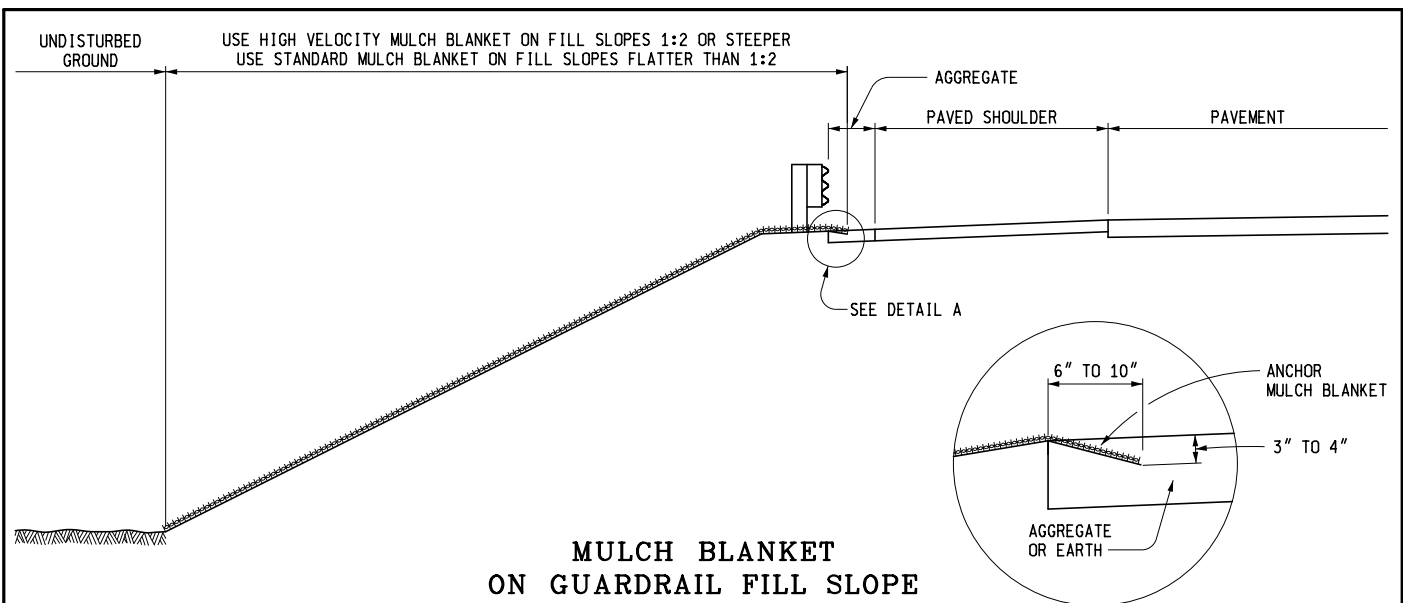
**SOIL EROSION & SEDIMENTATION
CONTROL MEASURES**

9-10-2010
F.H.W.A. APPROVAL

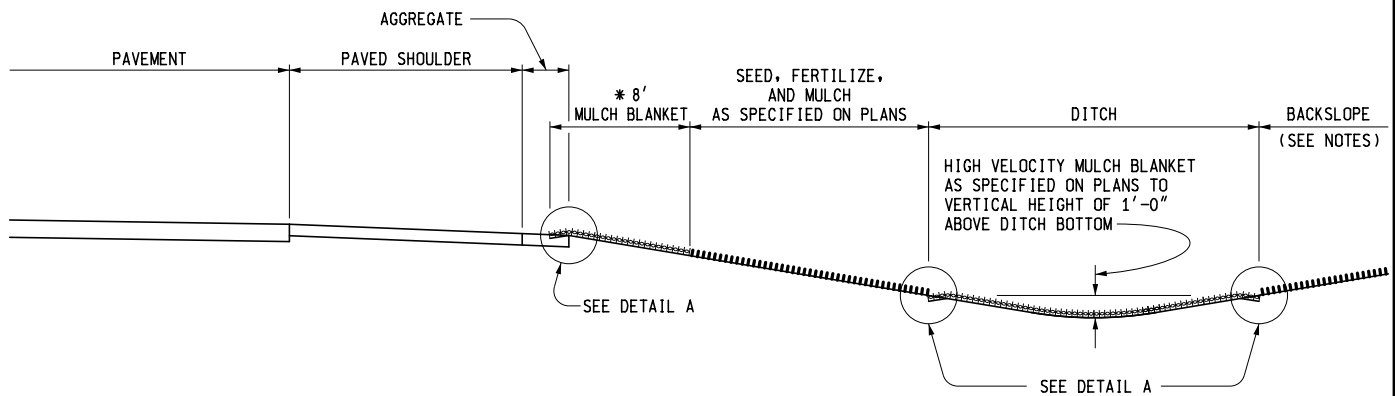
6-3-2010
PLAN DATE

R-96-E

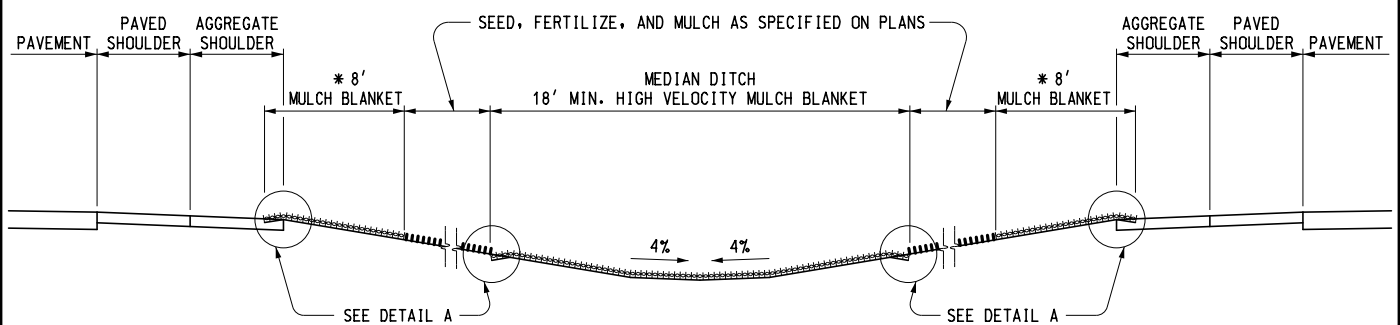
SHEET
6 OF 6



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%.



PREPARED
BY
DESIGN DIVISION

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APPROVED BY:

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APPROVED BY:

Mark A. Van Pelt
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

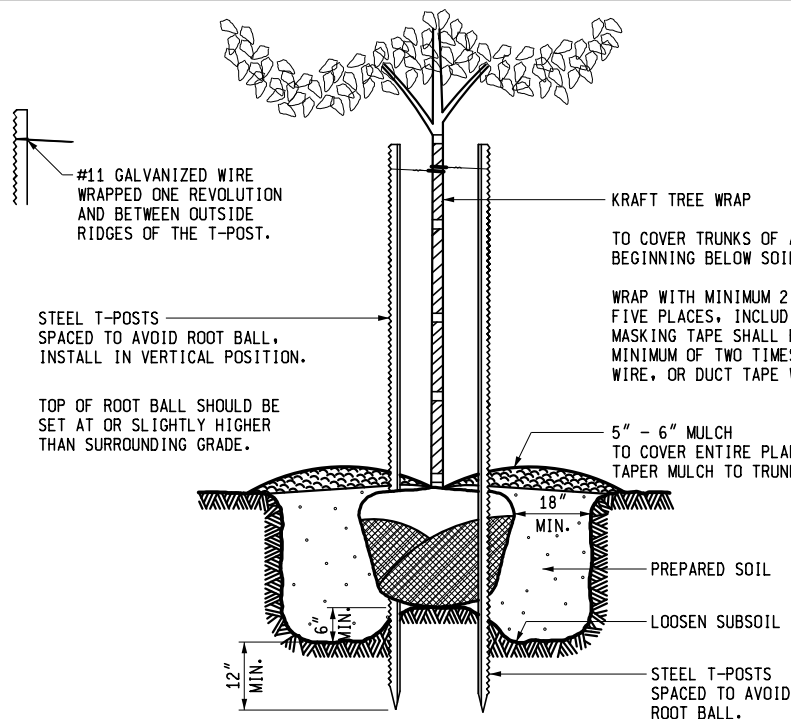
SEEDING
AND TREE PLANTING

9-30-2014
F.H.W.A. APPROVAL

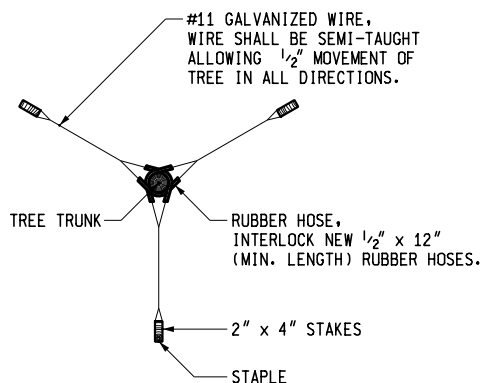
9-26-2013
PLAN DATE

R-100-H

SHEET
1 OF 4

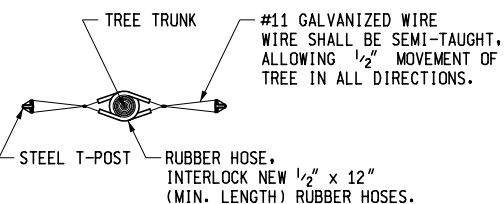


BRACING - VERTICAL STAKES



TRIPOD GUYING DETAIL

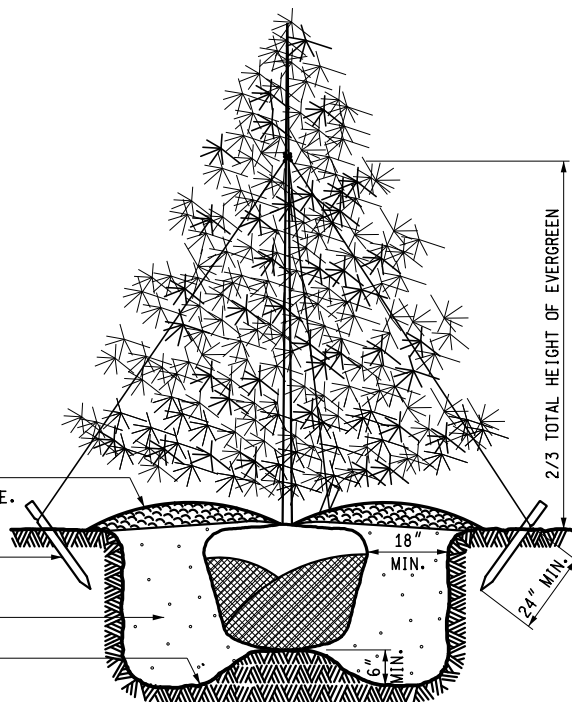
GUY EVERGREENS OVER 4" IN CALIPER OR 6' IN HEIGHT WITH THE TRIPOD METHOD AND UNDER 6' IN HEIGHT WITH TWO STAKES.



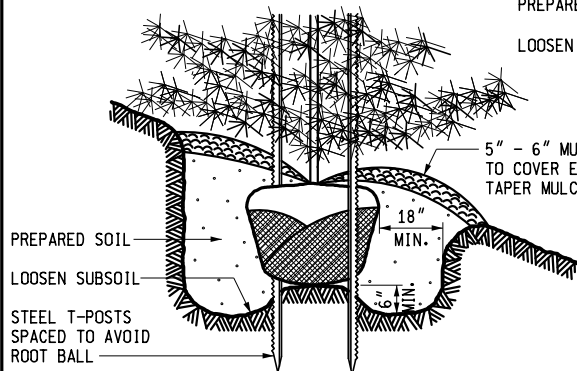
BRACING DETAIL

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.



GUYING - TRIPOD METHOD



SLOPE PLANTING

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

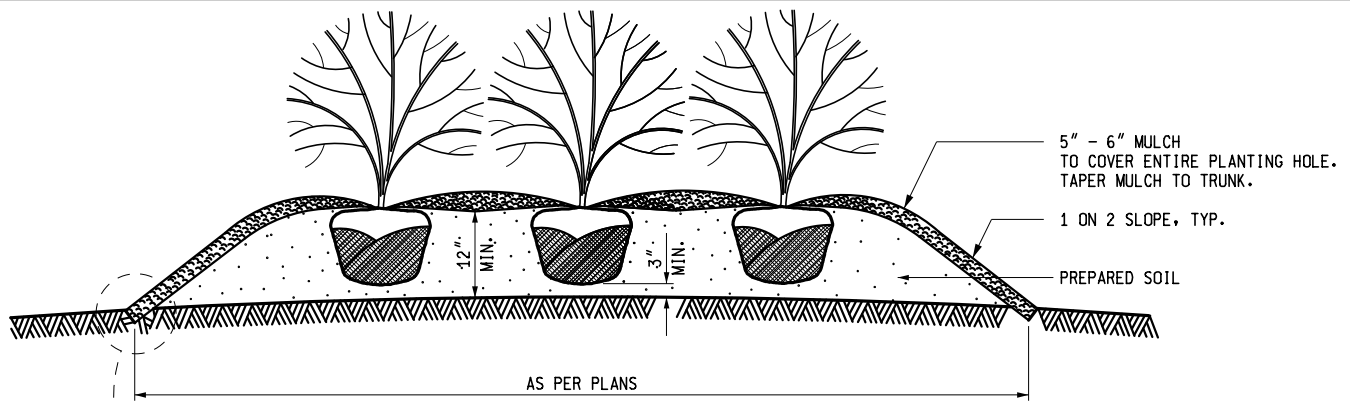
SEEDING AND TREE PLANTING

9-30-2014
F.H.W.A. APPROVAL

9-26-2013
PLAN DATE

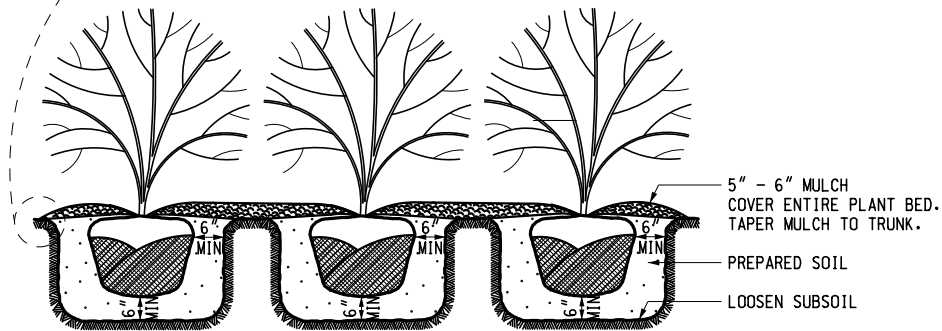
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2 OF 4



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-PERSISTENT 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.

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 $\frac{1}{2}$ THE DEPTH OF THE ROOT BALL, PACK FIRMLY, AND PUDDLE WITH WATER.

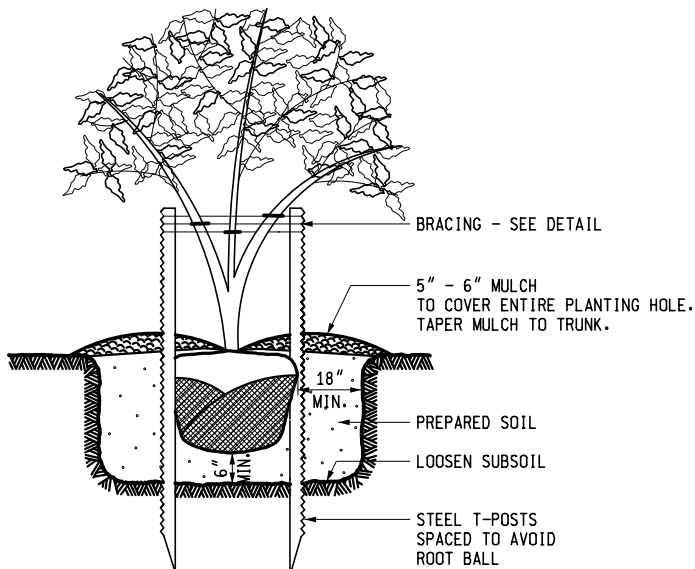
BACKFILL WITH PREPARED SOIL WHICH, AFTER COMPACTION, IS FLUSH WITH SURROUNDING GROUND LEVEL.

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.



MULTIPLE STEM TREES

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

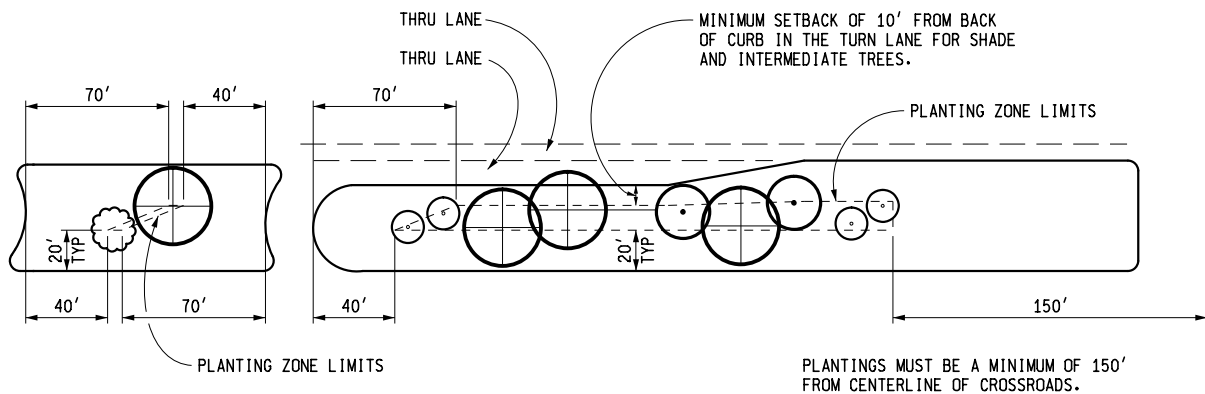
**SEEDING
AND TREE PLANTING**

9-30-2014
F.H.W.A. APPROVAL

9-26-2013
PLAN DATE

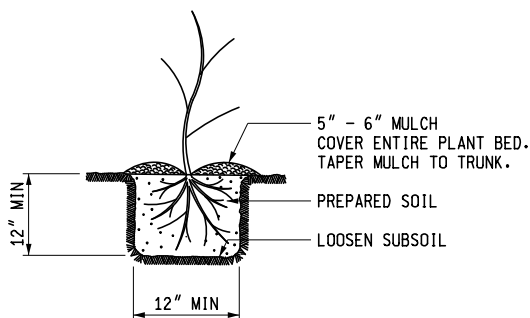
R-100-H

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.

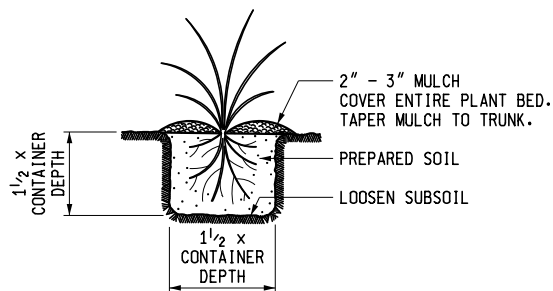
ROOT PRUNE AS NECESSARY TO REMOVE ALL DAMAGED OR BROKEN ROOTS, AND AS REQUIRED BY THE DISTRICT FORESTER OR RESOURCE SPECIALIST.

DIG PLANTING HOLES AT LEAST 12" WIDE AND 12" DEEP TO ACCOMMODATE 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

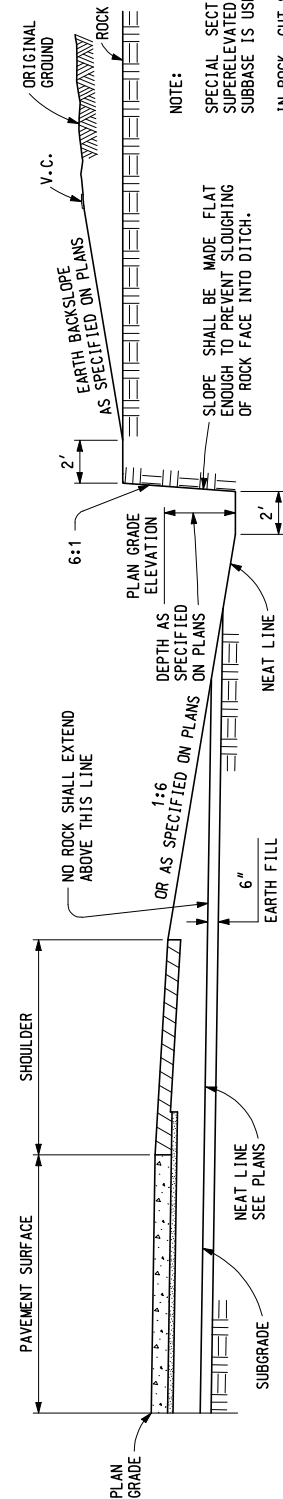
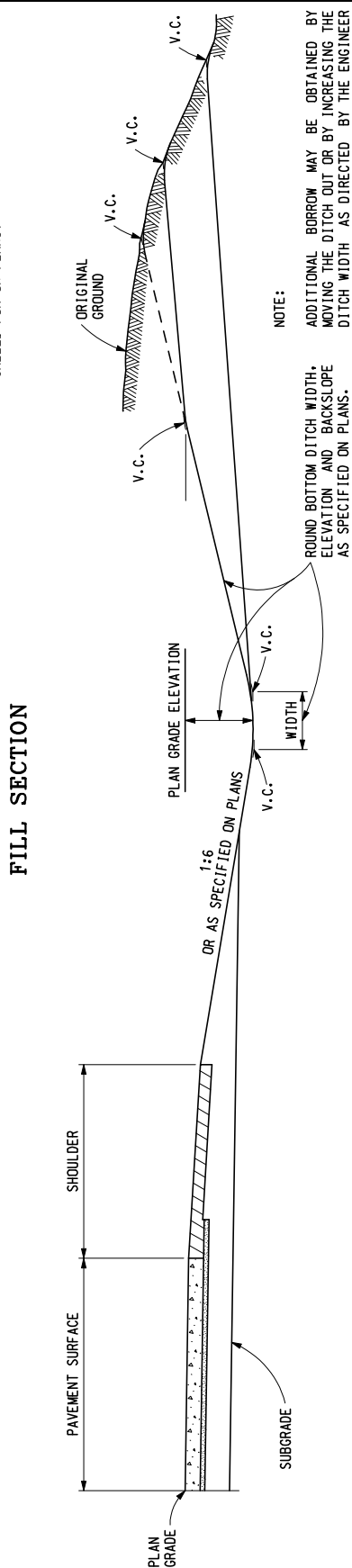
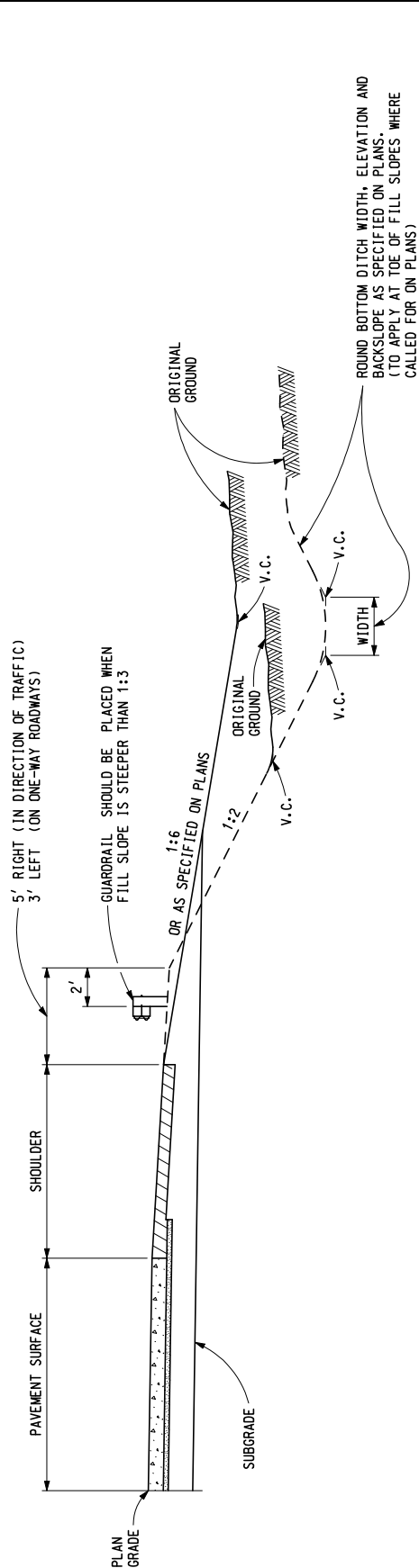
SEEDING AND TREE PLANTING

9-30-2014
F.H.W.A. APPROVAL

9-26-2013
PLAN DATE

R-100-H

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NOTE:
ROCK EXCAVATION WILL BE PAID FOR
TO THE NEAT LINE SHOWN.

NOTE:
SPECIAL SECTIONS ARE NECESSARY ON SUPERELEVATED CURVES AND WHERE DEEP SUBBASE IS USED.
IN ROCK CUT SECTIONS, THE NEED FOR A CONCRETE BARRIER OR OTHER TYPE OF PROTECTION SHOULD BE EVALUATED.

ROCK CUT SECTION



Michigan Department of Transportation

PREPARED BY
DESIGN
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CHECKED BY: W.K.P.

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DEPARTMENT DIRECTOR
Gloria J. Jeff


ENGINEER OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

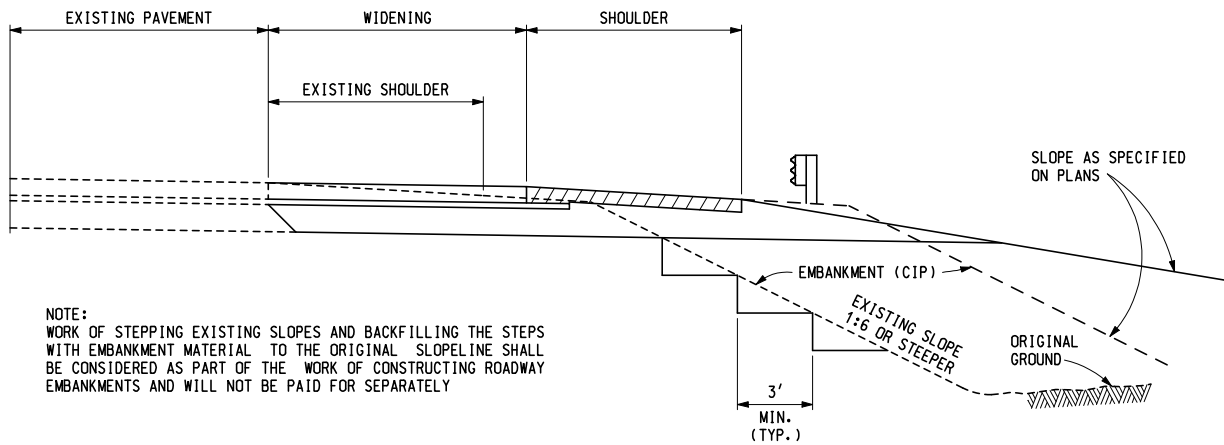
GRADING CROSS-SECTIONS

11-14-2003
F.H.W.A. APPROVAL

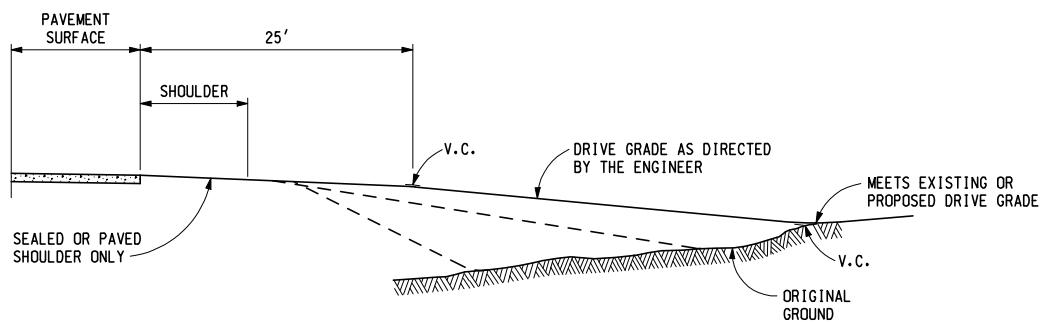
6-19-2002
PLAN DATE

R-105-D

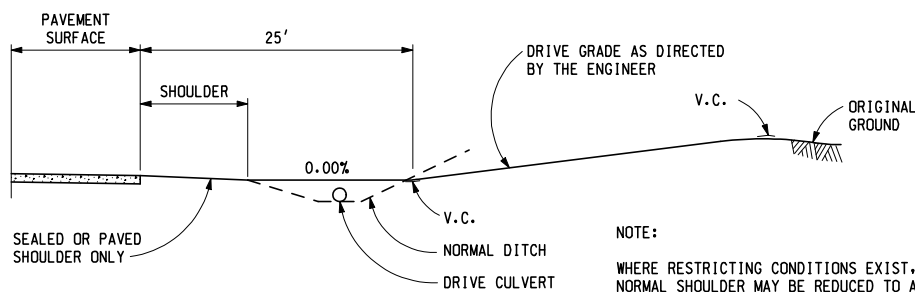
SHEET
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ADDING EMBANKMENT TO EXISTING SLOPES



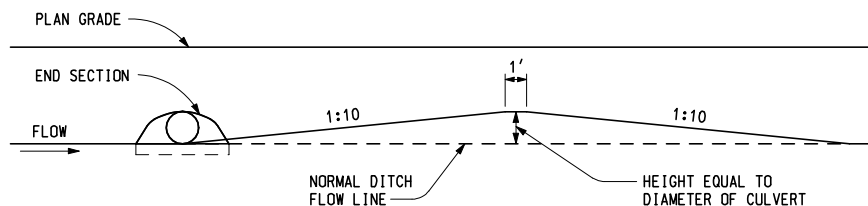
GRADING OF DRIVES IN FILL SECTIONS



NOTE:

WHERE RESTRICTING CONDITIONS EXIST, THE FLAT AREA DISTANCE OUTSIDE THE NORMAL SHOULDER MAY BE REDUCED TO A MINIMUM OF 4' VERTICAL CURVE. IN ALL CASES THE NORMAL FULL WIDTH SHOULDER SHALL BE MAINTAINED AND THE FLAT AREA SHOULD BE MAXIMIZED.

GRADING OF DRIVES IN CUT SECTIONS



DIKE IN DITCH SECTION

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

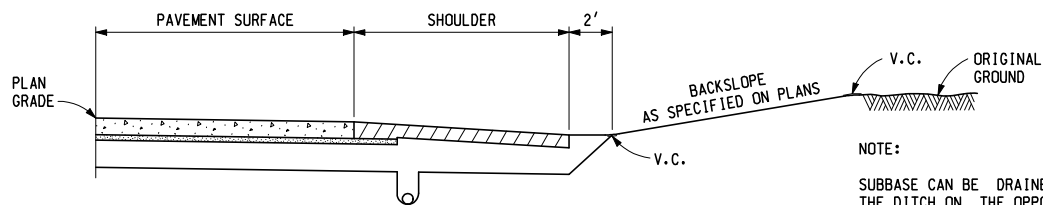
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11-14-2003
F.H.W.A. APPROVAL

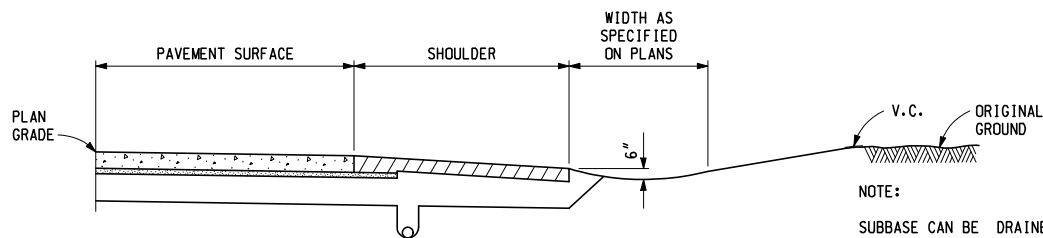
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PLAN DATE

R-105-D

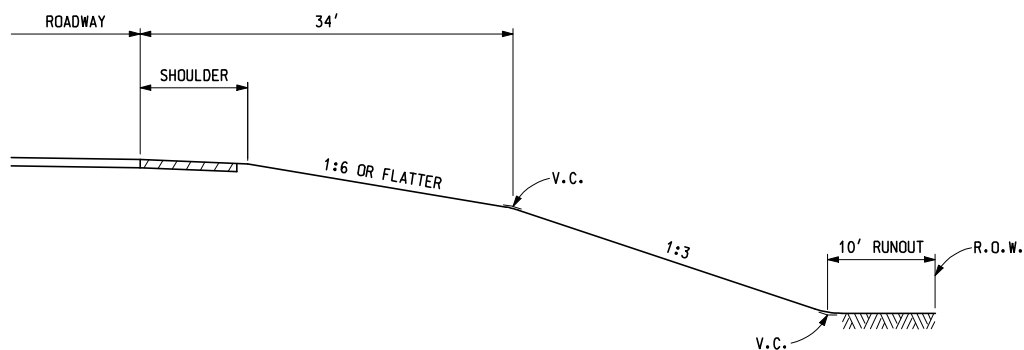
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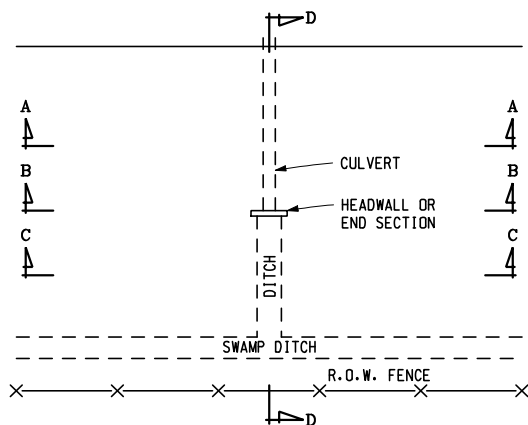
NO DITCH SECTION



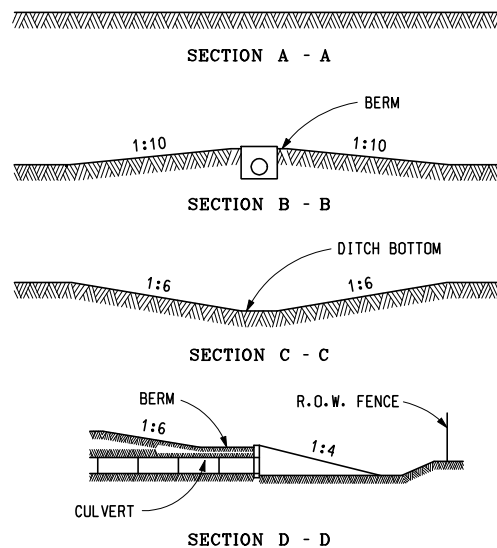
VALLEY DITCH SECTION



BARN ROOF FILL SECTION
(TO APPLY ON TANGENT SECTIONS ONLY)



OUTLET CULVERT IN BERM OR SWAMP DITCH SECTION



MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

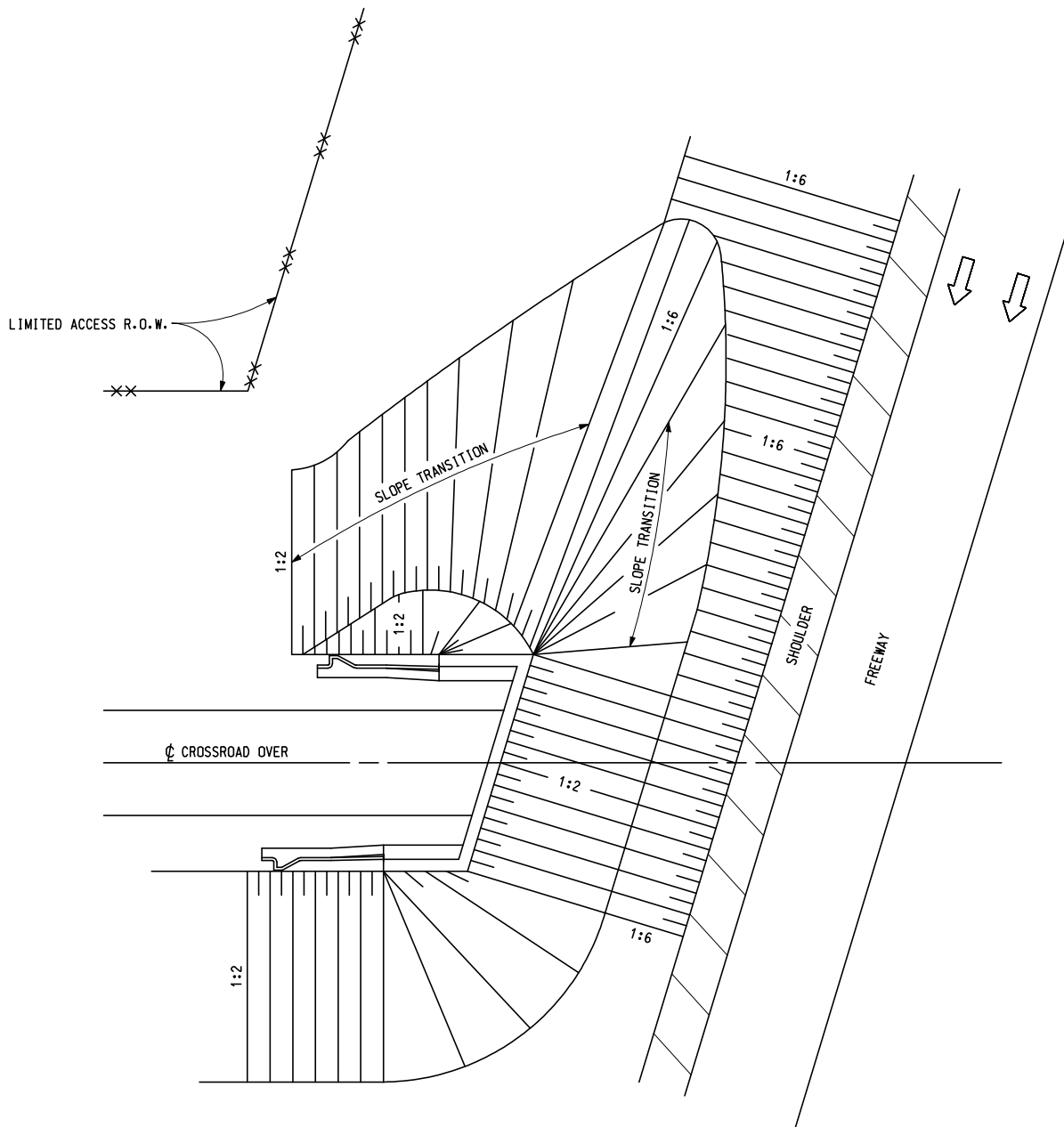
GRADING CROSS-SECTIONS

11-14-2003
F.H.W.A. APPROVAL

6-19-2002
PLAN DATE

R-105-D

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NOTE:

THE 1:6 SLOPE FACING FREEWAY TRAFFIC SHOULD BE USED ON ALL NEW CONSTRUCTION UNLESS THE DISTANCE FROM THE EDGE OF THE NEAREST FREEWAY THROUGH LANE TO THE TOE OF THE 1:2 SLOPE UNDER THE BRIDGE EXCEEDS THE CLEAR ZONE.

**GRADING DETAILS FOR FLATTENING LONG SLOPE AT
BRIDGE APPROACH FILLS FACING ONCOMING TRAFFIC**

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

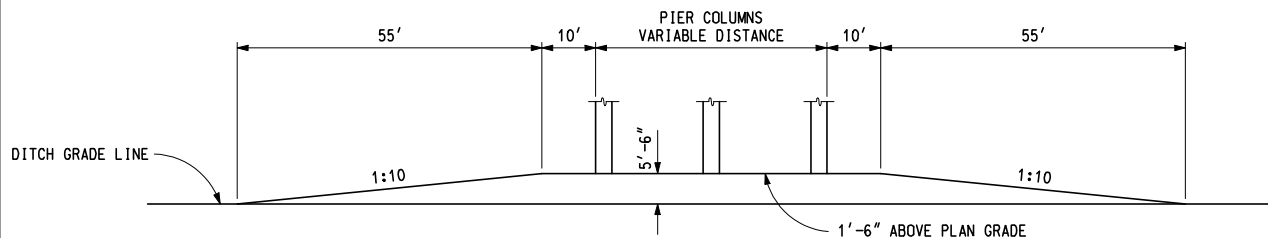
GRADING CROSS-SECTIONS

11-14-2003
F.H.W.A. APPROVAL

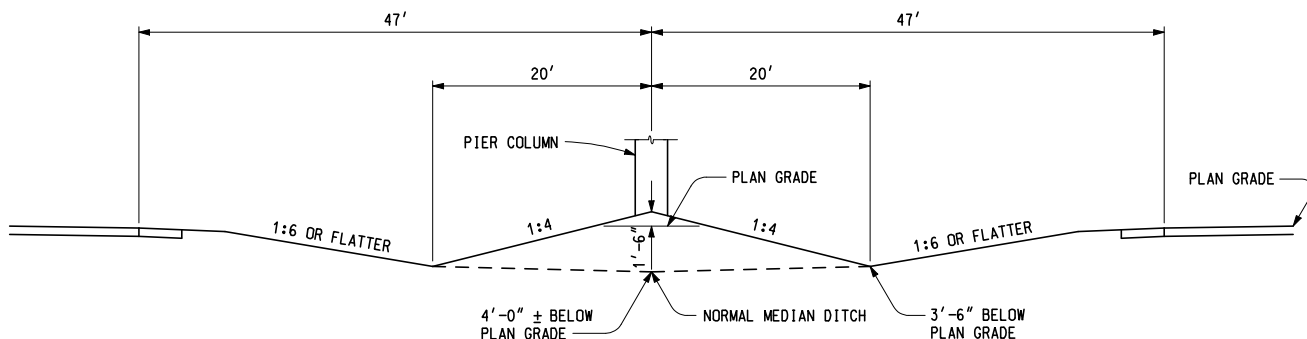
6-19-2002
PLAN DATE

R-105-D

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LONGITUDINAL SECTION ALONG MEDIAN



TRANSVERSE SECTION AT STRUCTURES

TYPICAL GRADING DETAILS AROUND PIERS FOR MEDIANS 94' OR WIDER

NOTES:

THIS STANDARD APPLIES PRINCIPALLY FOR VARIOUS DITCH TYPES AND FOR THE ROUNDING OF SLOPES. THE SUBGRADE WILL BE SPECIFIED ON THE PLANS. SLOPES OTHER THAN THOSE SPECIFIED ON THIS PLAN MAY BE USED WHEN THEY ARE SPECIFIED ON THE PROJECT PLANS. IN THE EVENT OF A DISCREPANCY BETWEEN THIS PLAN AND THE PROJECT PLANS, THE PROJECT PLANS WILL GOVERN.

SEE CURRENT STANDARD PLAN R-107-SERIES FOR SUPERELEVATED SECTIONS.

DITCHES SHOULD ALWAYS BE DEEP ENOUGH TO GRAVITY DRAIN THE SUBBASE, WHERE SUBBASE IS USED.

THE SUBGRADE SHOULD BE SLOPED TO DRAIN TO THE OUTSIDE DITCH IF THE MEDIAN ON DUAL ROADWAYS IS OF INSUFFICIENT WIDTH TO ALLOW DITCHES DEEP ENOUGH TO DRAIN THE SUBBASE.

THE TOP OF BACKSLOPES AND THE BOTTOM OF FILL SLOPES SHALL BE ROUNDED WITH VERTICAL CURVES AS FOLLOWS, PROVIDED TREES OR OTHER RESTRICTIONS DO NOT INTERFERE:

1. USE 4' VERTICAL CURVE ON CUTS OR FILLS LESS THAN 4'.
2. USE 8' TO A MAXIMUM 16' VERTICAL CURVE ON CUTS OR FILLS 4' TO 16'.
3. USE A MAXIMUM 16' VERTICAL CURVE ON CUTS OR FILLS GREATER THAN 16'.

ALL TRANSITIONS IN LENGTH OF VERTICAL CURVES SHALL BE GRADUAL AND GRADED TO PRESENT A UNIFORM AND ATTRACTIVE APPEARANCE.

WHEN 1:6 OR FLATTER SLOPES CANNOT BE CONSTRUCTED WITHIN THE EXISTING R.O.W., THE BARN ROOF FILL SECTION MAY BE USED TO ELIMINATE THE NEED FOR ADDITIONAL R.O.W.. THEY WILL BE USED ONLY WHERE SPECIFIED ON THE PLANS.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

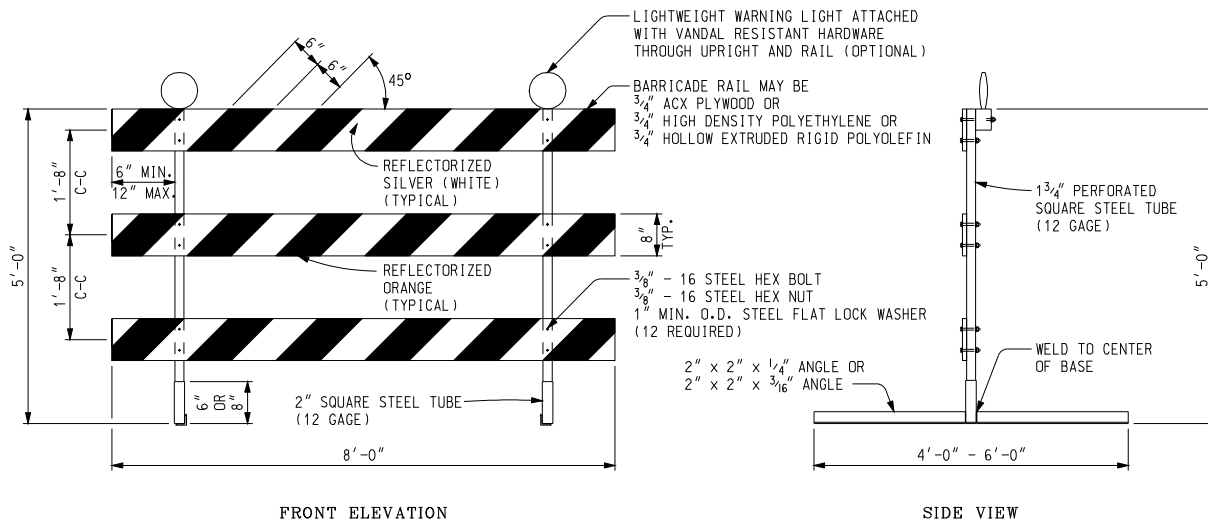
GRADING CROSS-SECTIONS

11-14-2003
F.H.W.A. APPROVAL

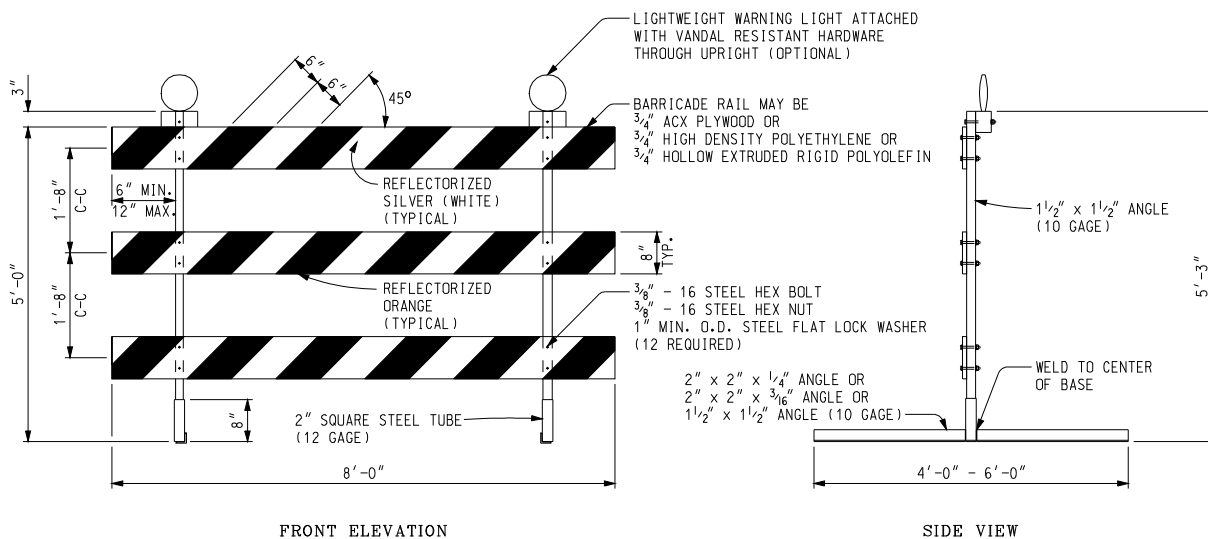
6-19-2002
PLAN DATE

R-105-D

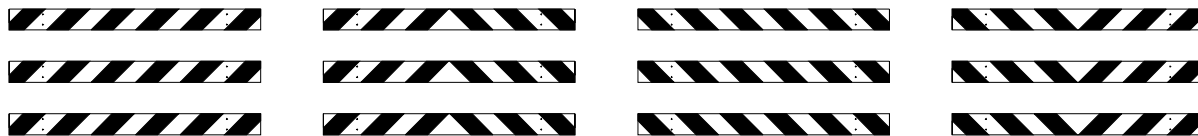
SHEET
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PERFORATED SQUARE STEEL TUBE OPTION



ANGLE IRON OPTION



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



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

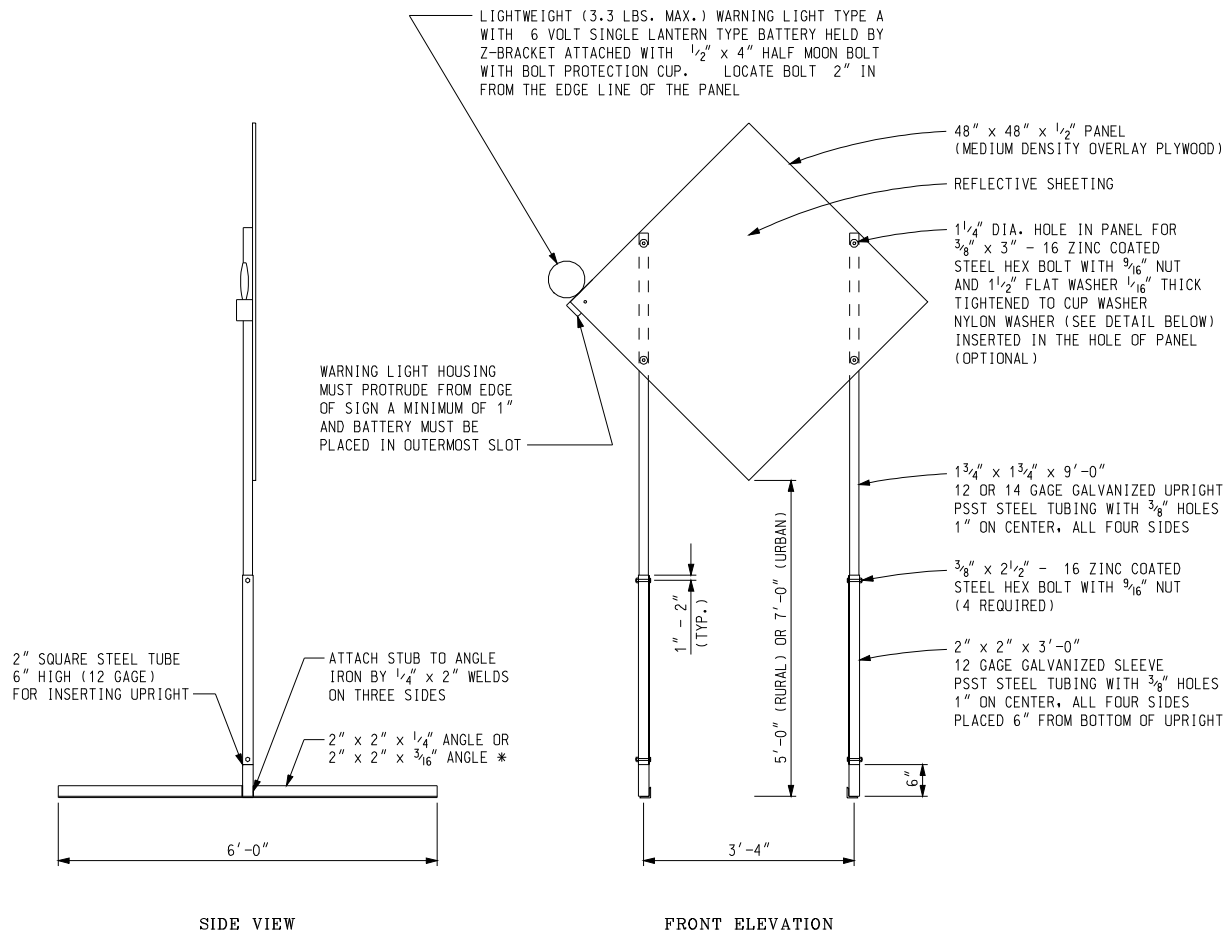
Temporary
Traffic Control Devices

9/22/09
PLAN DATE

WZD-125-E

SHEET
1 of 3

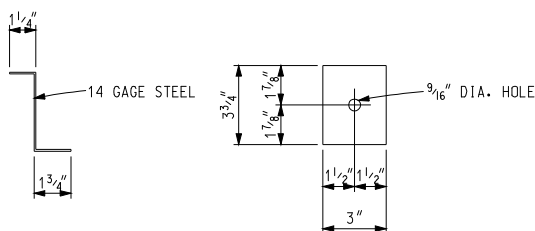
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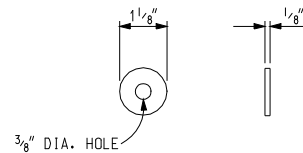
TEMPORARY SIGN SUPPORT

(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

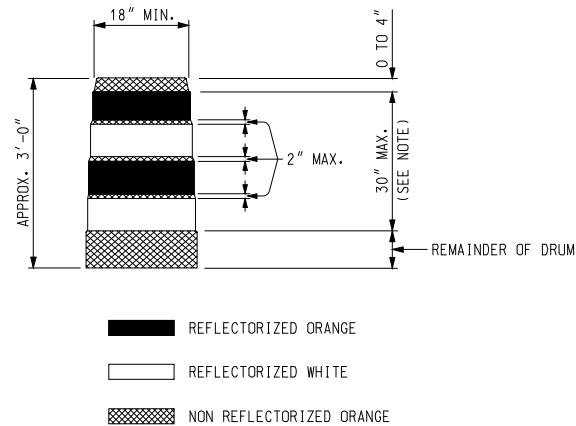
NOT TO SCALE

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

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.

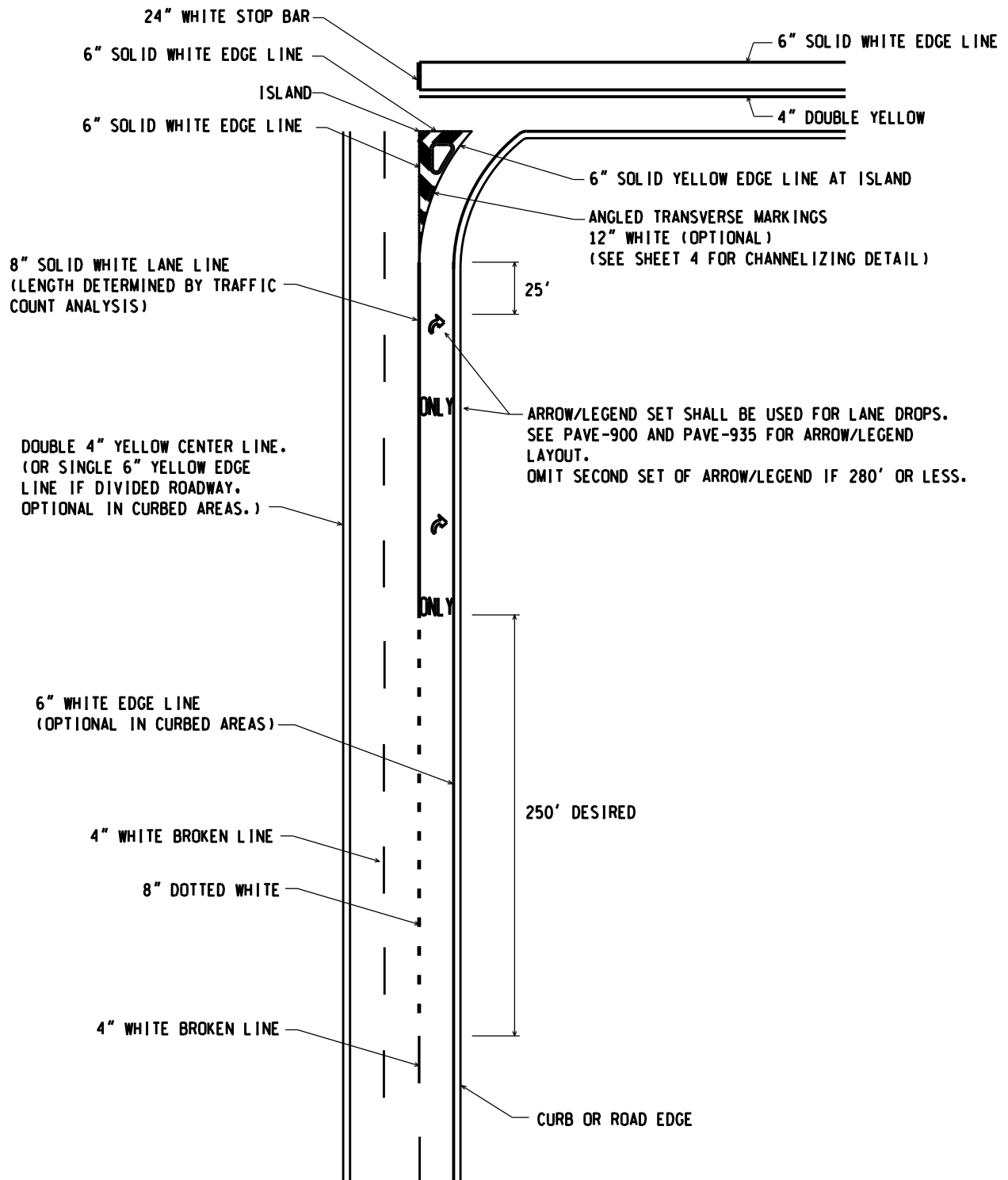
PLASTIC DRUM

- 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 TEMPORARY 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	WZD-125-E	SHEET 3 of 3
File: T&S/Typ/Signs/WorkZones/wzd 125 d	Rev. 09/22/09 PJ	PLAN DATE		

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



RIGHT TURN LANE DROP AND ISLAND DETAILS

(ALSO APPLIES TO ONE WAY LEFT TURN LANE DROPS)



PREPARED
BY
DESIGN DIVISION

DRAWN BY: LMF

CHECKED BY: JGM

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY: *Randy V. Puffel*
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: *Paul A. Van Pelt*
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

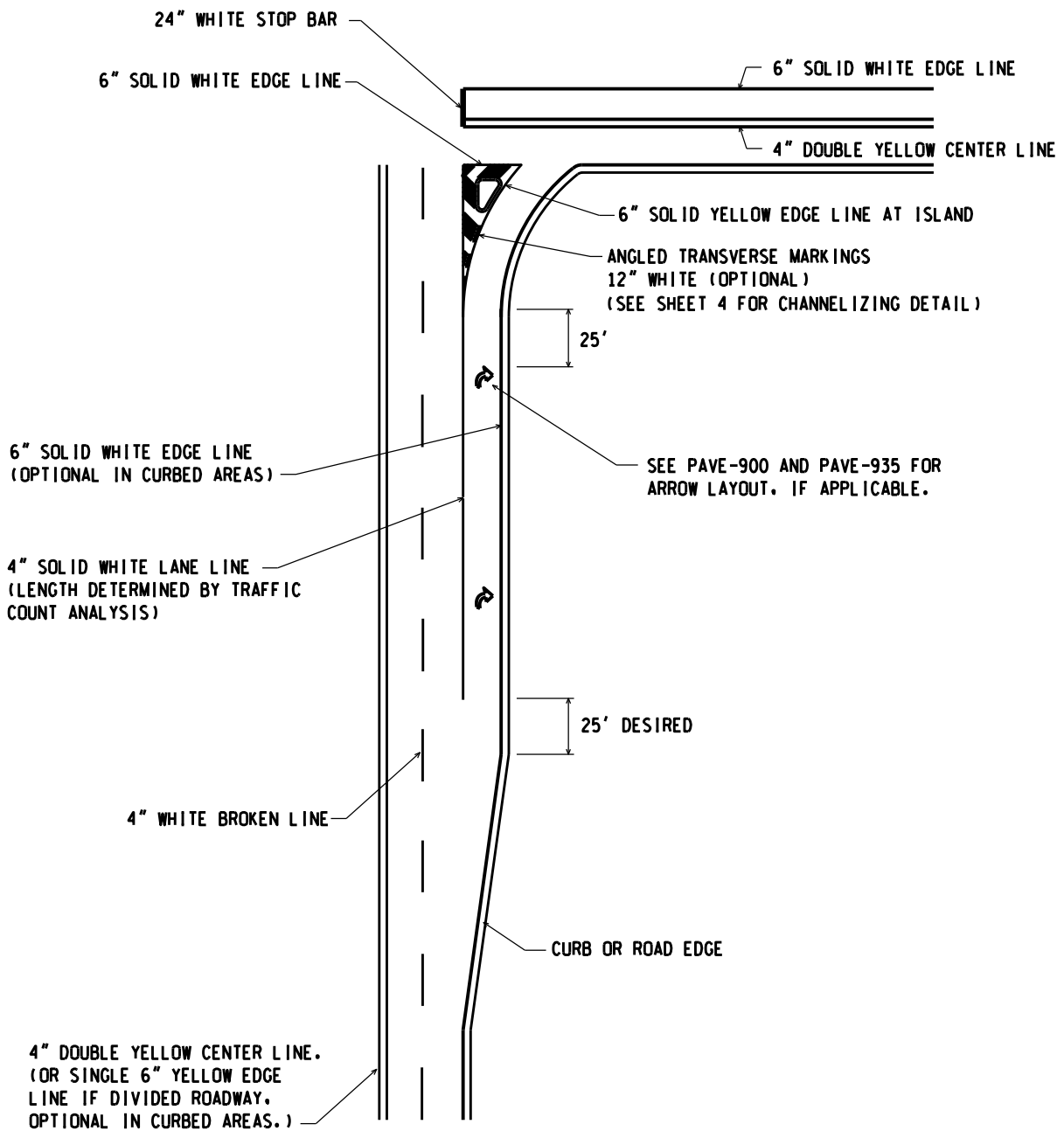
RIGHT TURN LANE AND ISLAND PAVEMENT MARKING

08/12/15
F.H.W.A. APPROVAL

07/14/14
PLAN DATE

PAVE-940-C

SHEET
1 OF 5



RIGHT TURN LANE WITH CHANNELIZING ISLAND

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

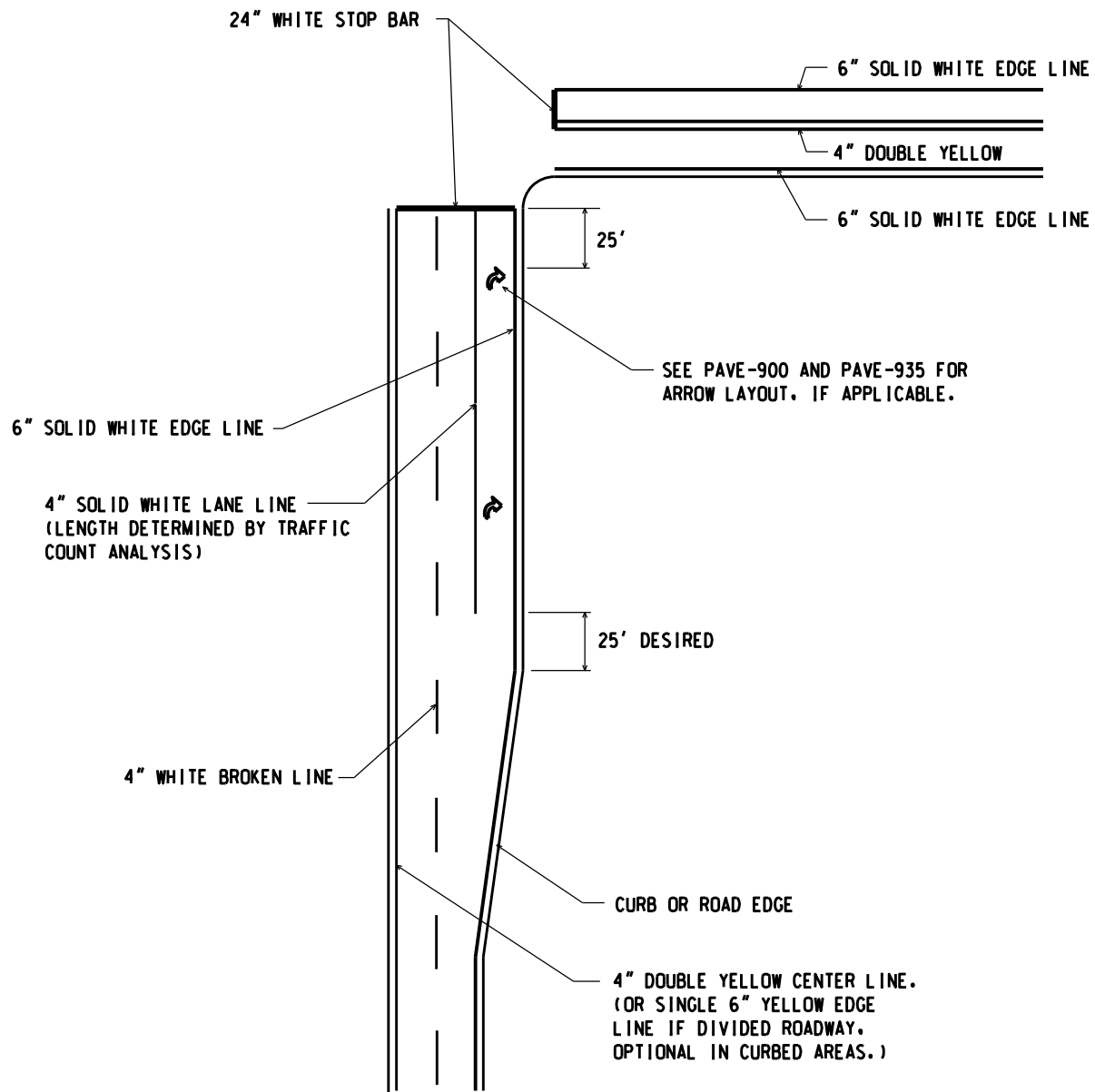
08/12/15
F.H.W.A. APPROVAL

07/14/14
PLAN DATE

PAVE-940-C

SHEET
2 OF 5

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



RIGHT TURN LANE

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

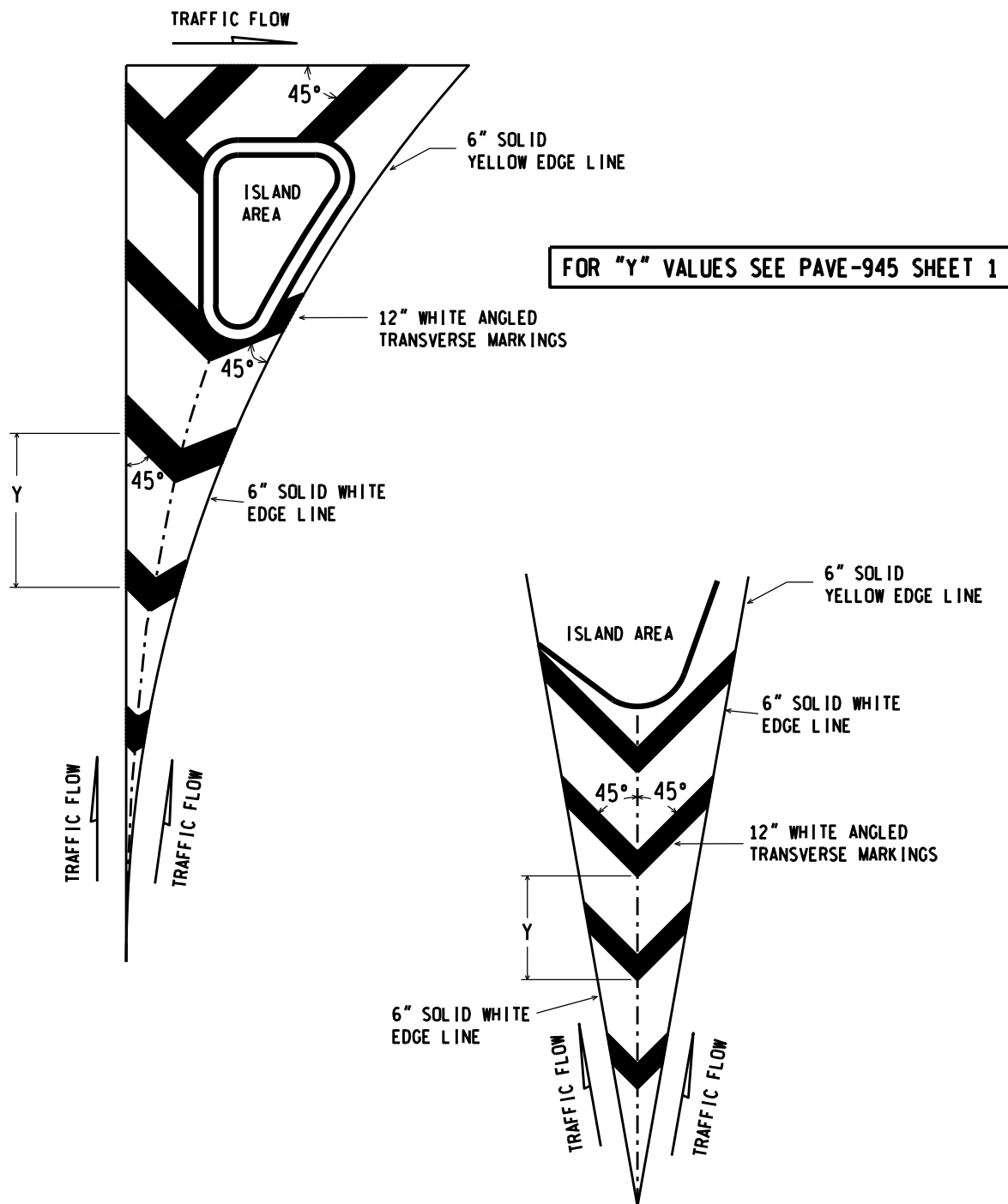
08/12/15
F.H.W.A. APPROVAL

07/14/14
PLAN DATE

PAVE-940-C

SHEET
3 OF 5

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



CHANNELIZING ISLANDS

(TRAFFIC FLOWS IN SAME DIRECTION)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

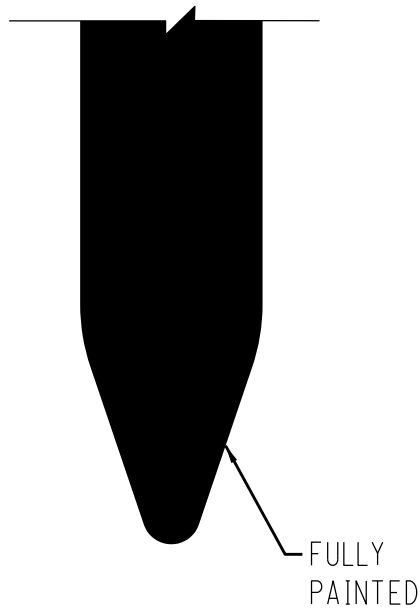
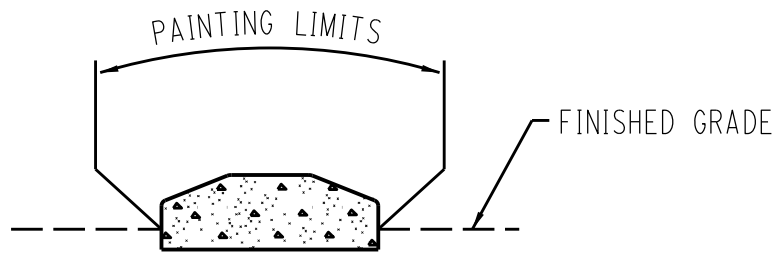
08/12/15
F.H.W.A. APPROVAL

07/14/14
PLAN DATE

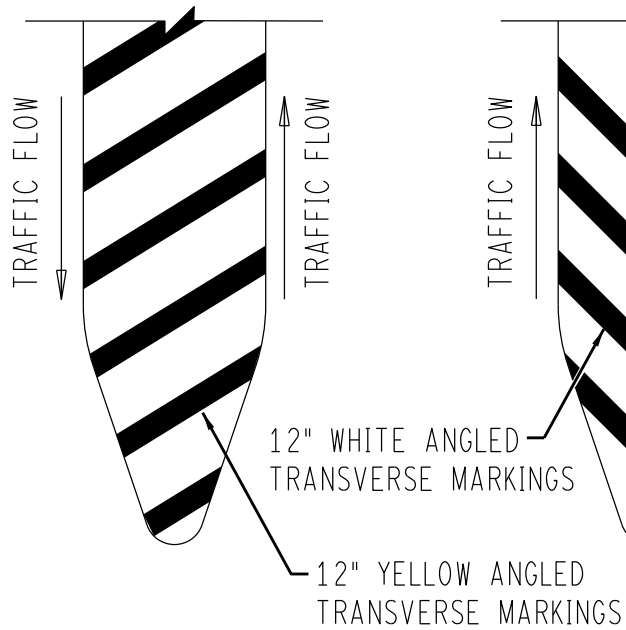
PAVE-940-C

SHEET
4 OF 5

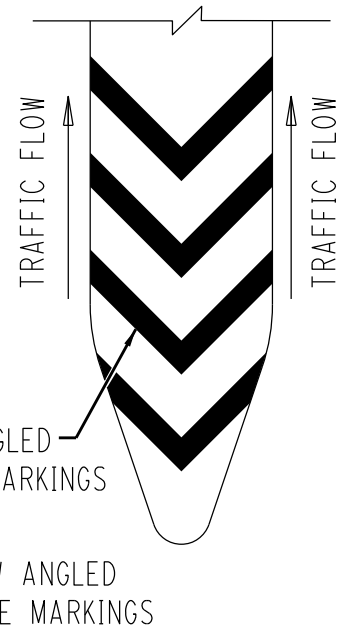
NOTE: THE ORIGINAL SIGNED COPY IS KEPT ON FILE AT THE MICHIGAN DEPARTMENT OF TRANSPORTATION.



OPTION A



OPTION B



OPTION C

RAISED CHANNELIZING ISLAND PAINTING

NOTE:

1. See Sheet 4 of 5 and PAVE-945 for transverse marking details.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

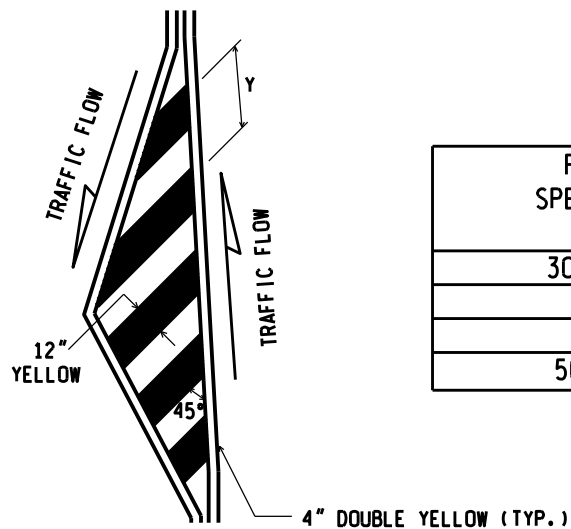
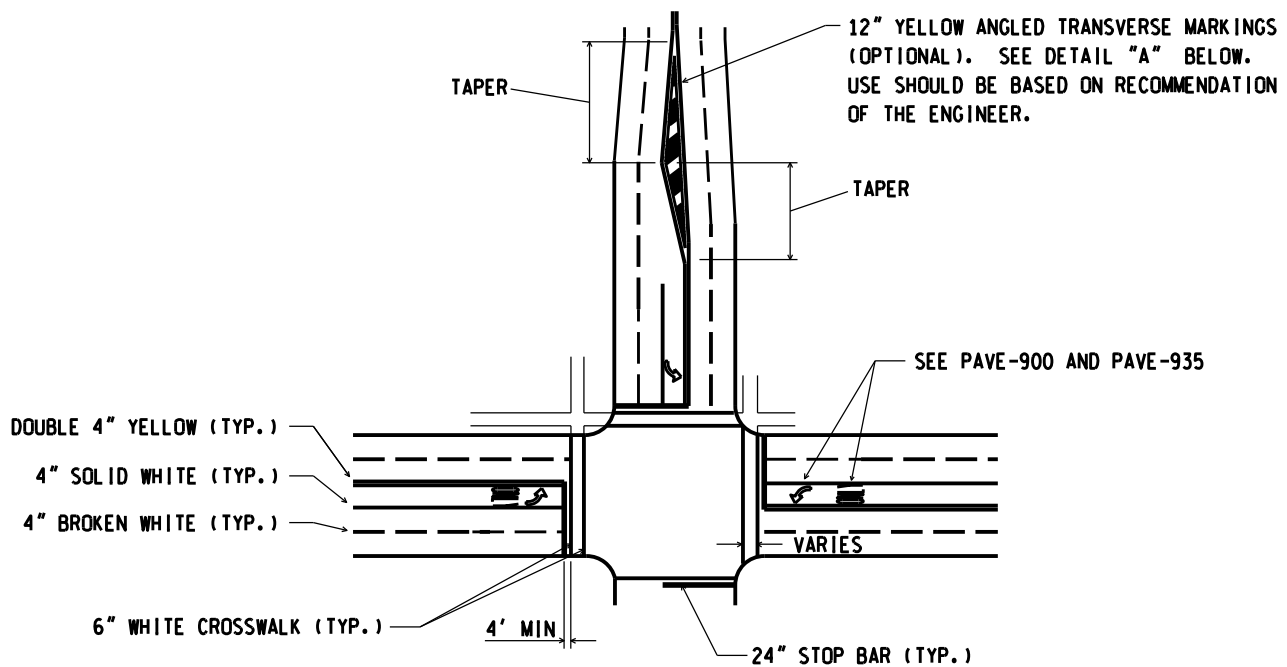
08/12/15
F.H.W.A. APPROVAL

07/14/14
PLAN DATE

PAVE-940-C

SHEET
5 OF 5

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



POSTED SPEED LIMIT (MPH)	"Y" FT
30 OR LESS	10
35-40	20
45	30
50 OR MORE	40

DETAIL "A" ANGLED TRANSVERSE MARKING



PREPARED
BY
DESIGN DIVISION

DRAWN BY: LMF

CHECKED BY: JGM

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY: *Randy V. Puntigam*
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: *Paul A. Van Pelt*
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

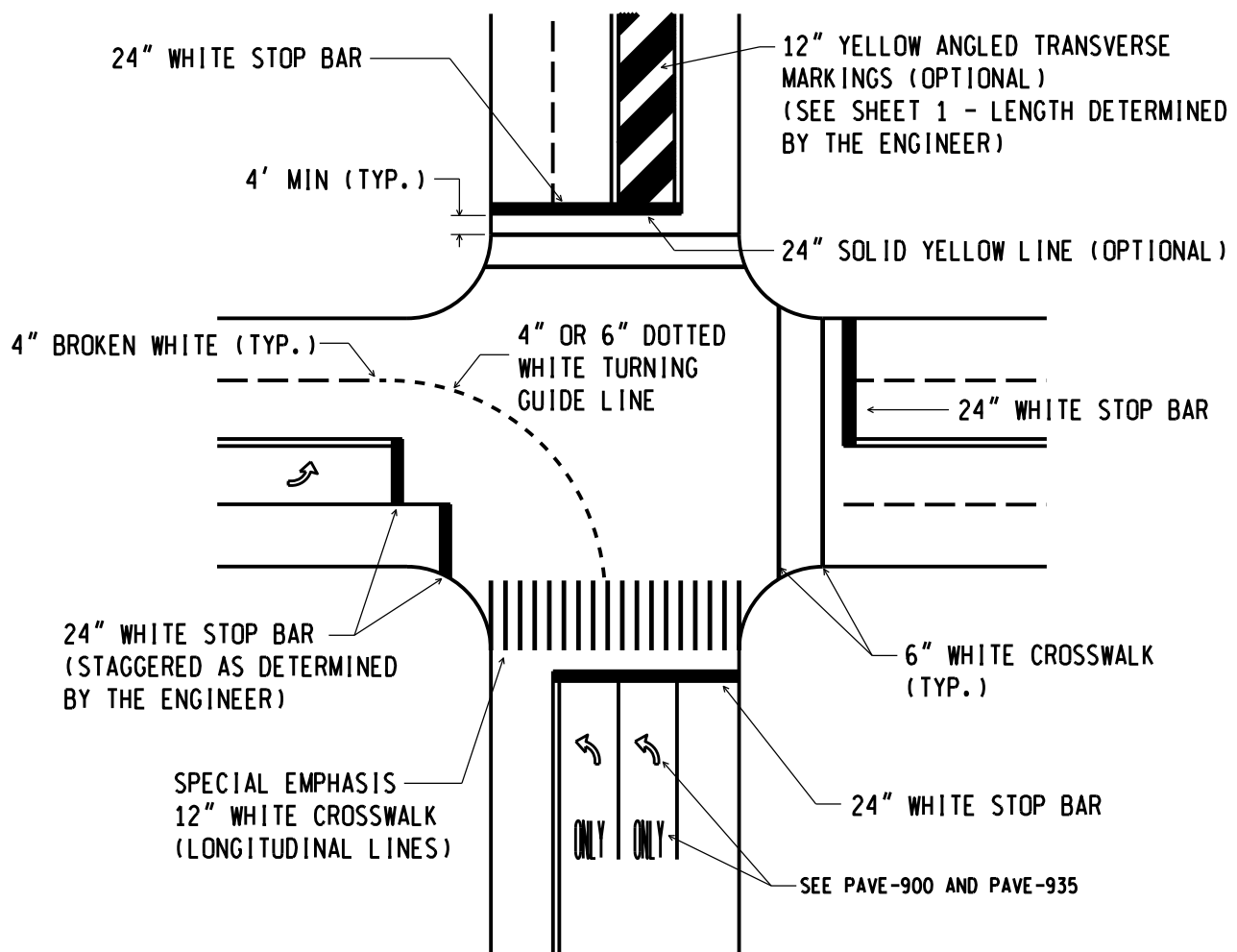
INTERSECTION, STOP BAR & CROSSWALK MARKINGS

08/12/15
F.H.W.A. APPROVAL

12/02/14
PLAN DATE

PAVE-945-C

SHEET
1 OF 3



SIGNALIZED OR STOP SIGN CONTROLLED INTERSECTION

NOTES:

1. Stop Bars should be located 40-150 ft from the signal head. Optional stop bars, if used at stop controlled intersections, should be 4-30 ft from the edge of the intersecting roadway. Exact location to be determined by the Engineer.
2. Standard crosswalk is two 6 inch white transverse lines. Special emphasis crosswalk is 12 inch white longitudinal lines.
3. Install special emphasis crosswalks at mid-block crossings, established school crossings (as defined by the MMUTCD) or when directed by the Engineer. See sheet 3 for detail of special emphasis crosswalk markings.
4. Width of crosswalk should equal width of the adjacent sidewalk, but shall not be less than 6 ft (measured inside the lines).
5. 12 inch transverse lines can be used in place of 6 inch transverse lines at the Engineer's discretion.
6. When practical, crosswalk location should avoid conflict with drainage inlets.
7. Turning guide lines should be placed to direct the driver into the closest through lane. Include a dotted turning guide line for all double turn movements.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

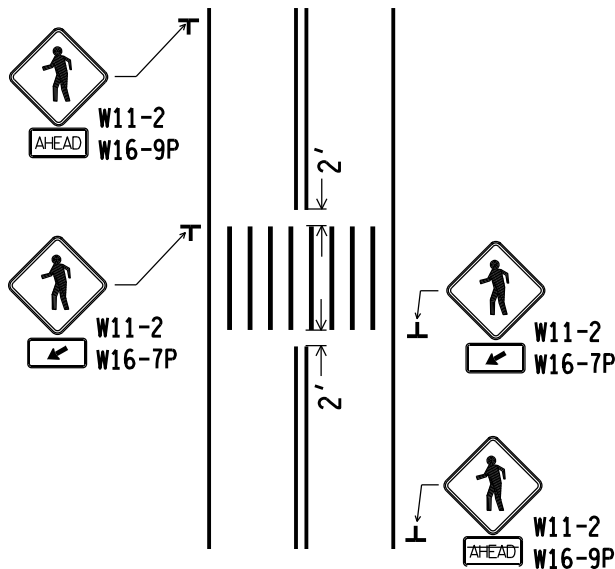
08/12/15
F.H.W.A. APPROVAL

12/02/14
PLAN DATE

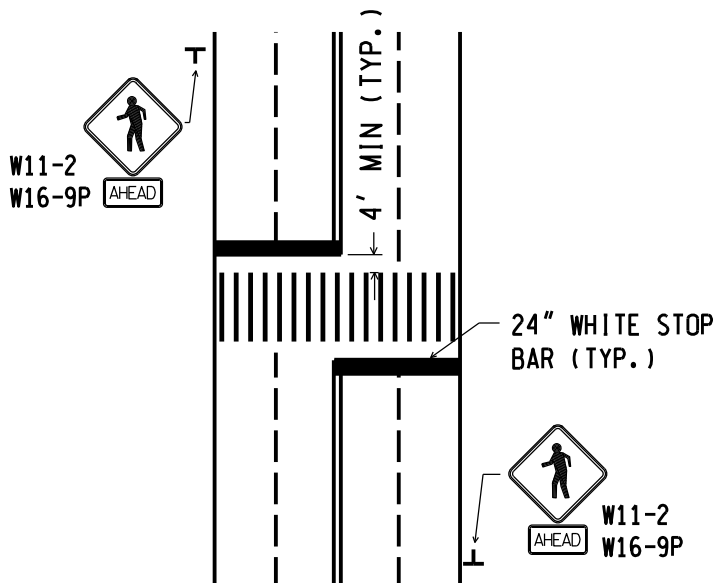
PAVE-945-C

SHEET
2 OF 3

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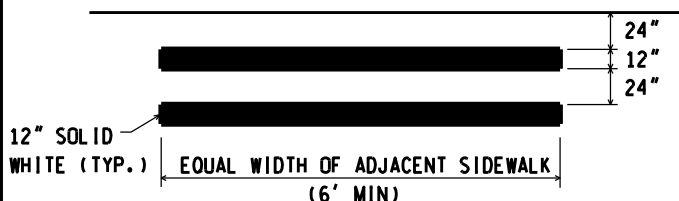


MID-BLOCK TWO LANE NON-SIGNALIZED



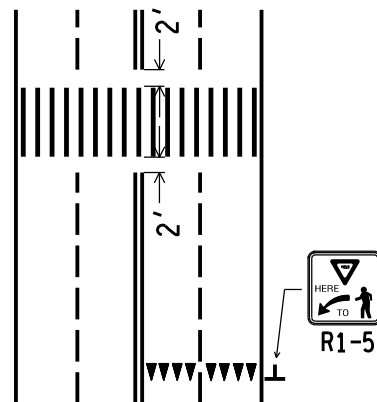
MID-BLOCK MULTI-LANE SIGNALIZED

ACCESSIBLE RAMP

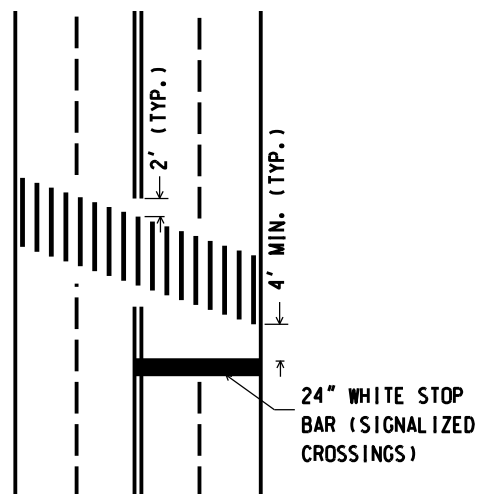


DETAIL OF SPECIAL EMPHASIS CROSSWALK MARKING

NOT TO SCALE



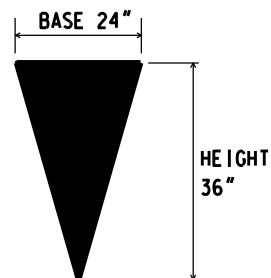
MID-BLOCK MULTI-LANE NON-SIGNALIZED



SKewed CROSSINGS

NOTES:





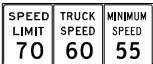














1. Install special emphasis crosswalk markings parallel to traffic flow.



DETAIL OF YIELD TRIANGLE FOR YIELD LINE


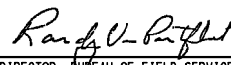

NOTES:







1. Install four triangles per lane.
2. Adjust spacing (between 3 to 12 inches) as necessary.

					SUPPORT			
SIGN	SIGN CODE	SIZE	SIGN AREA ft ²	SIGN TYPE	NO.	SIZE	TOTAL LENGTH ft	BOTTOM HEIGHT (H)
	R1-1(30)	2.5' x 2.5'	6.25	IIIA	1	3 lbs	14	7 ft
	R1-1(36)	3' x 3'	9	IIIA	2	3 lbs	30	7 ft
	R1-2(36)	3' x 3' x 3'	4	IIIA	1	3 lbs	14	7 ft
	R1-2(48)	4' x 4' x 4'	7	VA	2		32	7 ft
	R2-1(24)	2' x 2.5'	5	IIIB	1	3 lbs	14	7 ft
	R2-1(30)	2.5' x 3'	7.5					
	R2-1(36)	3' x 4'	12	VB	2	3 lbs	32	7 ft
	R2-4a	4' x 8'	32	IIB	2	4" x 6" WOOD POSTS OR SIGN-207	46	7 ft
	R2-4b	12' x 5'	60	IB	2	6" x 8" (NOMINAL) WOOD POSTS	36	7 ft
	R3-1(24)	2' x 2'	4	IIIB	1	3 lbs	14	7 ft
	R3-2(36)	3' x 3'	9	IIIB	2	3 lbs	30	7 ft
	R4-7(24)	2' x 2.5'	5	IIIB	1	3 lbs	14	7 ft
	R4-7(36)	3' x 4'	12	VB	2	3 lbs	30	7 ft
 	R5-1(30)	2.5' x 2.5'	10	IIIA	1	3 lbs	14	7 ft
	R5-1a(30)	2.5' x 1.5'						
	R5-1(36)	3' x 3'	15	IIIA	2	3 lbs	28	7 ft
	R5-1a(36)	3' x 2'						
	R5-1a(36)	3' x 2'	6	IIIA	2	3 lbs	26	7 ft
	R5-1a(42)	3.5' x 2.5'	8.75	IIA	2	3 lbs	28	7 ft
 	R5-11a(24)	2' x 2.5'	5	IIIB	1	4" x 6" (NOMINAL) WOOD POSTS	16	7 ft
	R5-12(24)	2' x 2.5'	5	IIIB				
	R5-11(30)	2.5' x 2'	5	IIIB	1	3 lbs	14	7 ft
	R6-1(36) L	3' x 1'	3	IIIB	1	3 lbs	14	7 ft
	R6-1(36) R	3' x 1'	3					
	R6-1(54) L OR R	4.5' x 1.5'	6.75	IIB	2	3 lbs	28	7 ft
 	W1-1(36)	3' x 3'	13	IIIB	2	3 lbs	32	* 7 ft
	W13-1(24)	2' x 2'						
	W1-1(48)	4' x 4'	16	VB	2	3 lbs	32	* 7 ft
	W13-1(30)	2.5' x 2.5'	6.25	IIIB				
 	W1-2(36)	3' x 3'	13	IIIB	2	3 lbs	32	* 7 ft
	W13-1(24)	2' x 2'						
	W1-2(48)	4' x 4'	16	VB	2	3 lbs	32	* 7 ft
	W13-1(30)	2.5' x 2.5'	6.25	IIIB				

* 7 ft BOTTOM HEIGHT APPLIES TO PARENT SIGN

FOR INFORMATION ONLY

 Michigan Department of Transportation PREPARED BY DESIGN DIVISION DRAWN BY: <u>AKJ</u> CHECKED BY: <u>AJU</u>	DEPARTMENT DIRECTOR Kirk T. Steudle APPROVED BY:  DIRECTOR, BUREAU OF FIELD SERVICES	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR	
	APPROVED BY:  DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT	STANDARD SIGN INSTALLATIONS	
		05/01/15 F.H.W.A. APPROVAL	04/06/15 PLAN DATE
		SIGN-100-F	SHEET 1 OF 3

SIGN	SIGN CODE	SIZE	SIGN AREA ft ²	SIGN TYPE	SUPPORT			
					NO.	SIZE	TOTAL LENGTH ft	BOTTOM HEIGHT (H)
	W1-6(48)	4' x 2'	8	VB	2	3 lbs	26	7 ft
	W1-6(60)	5' x 2.5'	12.5	IIB	2	4" x 6" WOOD POSTS	32	7 ft
	W1-6(96)	8' x 4'	32	IIB	2	6" x 8" WOOD POSTS	38	7 ft
	W1-7(48)	4' x 2'	8	VB	2	3 lbs	26	7 ft
	W1-7(60)	5' x 2.5'	12.5	IIB	2	4" x 6" WOOD POSTS	32	7 ft
	W1-7(96)	8' x 4'	32	IIB	2	6" x 8" WOOD POSTS	38	7 ft
	(30)	2.5' x 2.5'	6.25	IIB	1	3 lbs	15	7 ft
	(36)	3' x 3'	9	IIB	2	3 lbs	30	7 ft
	(48)	4' x 4'	16	VB	2	3 lbs	32	7 ft
	W10-1(30)	(R) 1' 3"	6.25	IIB	1	3 lbs	14	7 ft
	W10-1(36)	(R) 1' 6"	9	IIB	1	3 lbs	14	7 ft
	W10-1(48)	(R) 2'	16	VB	2	3 lbs	26	7 ft
	W13-2(48) OR W13-3(48) (RAMP)	4' x 5'	20	IIB	2	3 lbs	32	7 ft
	W14-3 (30)	40" x 30"	4.25	VB	2	3 lbs	29	7 ft
	W14-3 (36)	48" x 36"	6	VB	2	3 lbs	29	7 ft
	W14-3 (48)	64" x 48"	10.75	IIB	2	3 lbs	29	7 ft
	E5-1	6' x 5'	30	IIA	2	4" x 6" WOOD POSTS OR	32	7 ft
	E5-1a	6' x 5'	30	IIA	2	REFER TO SIGN-207 SERIES	32	7 ft
		7.5' x 5'	37.5	IIA	2			
		9' x 5'	45	IIA	2			
	** D10-4	1.5' x 4.5'	6.75	IIIA	1	4" x 6" WOOD POSTS OR	14	4 ft
	** D10-5	1.5' x 5'	7.5	IIIA	1	REFER TO SIGN-207 SERIES	16	4 ft
	W8-13 (36)	3' x 3'	9	IIB	2	3 lbs	30	7 ft
	W8-13 (48)	4' x 4'	16	VB	2	3 lbs	32	7 ft
	W1-8(24) 10-40 RAMP	2' x 2.5'	5	IIB	1	3 lbs	15	7 ft
	W1-8(36) 45-55 RAMP	3' x 4'	12	VB	2	3 lbs	30	7 ft
	W1-8(24) NON-FWY	2' x 2.5'	5	IIB	1	3 lbs	15	7 ft
	W1-8(36) FWY	3' x 4'	12	VB	2	3 lbs	30	7 ft
	S1-1(30)	2.5' x 2.5'	6.25	IIB	1	3 lbs	14	7 ft
	S1-1(36)	3' x 3'	9	IIB	2	3 lbs	26	7 ft
	S1-1(48)	4' x 4'	16	VB	2	3 lbs	28	7 ft

* 7 ft BOTTOM HEIGHT APPLIES TO PARENT SIGN
 ** BEHIND GUARDRAIL, USE 1 - 4" x 6" WOOD POST

FOR INFORMATION ONLY

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN	05/01/15 F.H.W.A. APPROVAL	04/06/15 PLAN DATE	SIGN-100-F	SHEET 2 OF 3
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NOTE: THE ORIGINAL SIGNED COPY IS KEPT ON FILE AT THE MICHIGAN DEPARTMENT OF TRANSPORTATION.

NOTES:

1. TOTAL SUPPORT LENGTHS ARE FOR ESTIMATING PURPOSES ONLY.
2. THE SUPPORT(S) LISTED FOR STANDARD SIGNS SHALL BE USED, UNLESS SHOWN OTHERWISE ON CONTRACT SIGN PLAN SHEETS. FOR SIGNS NOT LISTED HERE, SEE SIGN-150-SERIES FOR PROPER SUPPORT.
3. FOR TWO PANEL SIGN INSTALLATIONS, ALLOW A 2 INCH (S) SPACE BETWEEN PANELS AS SHOWN ON PAGE ONE. THIS 2 in. REQUIREMENT DOES NOT APPLY TO RAMP SERVICES SIGNS (E11-15 SERIES) WHICH SHALL BE INSTALLED AS CLOSE AS POSSIBLE TO EACH OTHER.
4. BOTTOM HEIGHT IS DEFINED AS HEIGHT FROM THE NEAR EDGE OF TRAVEL LANE PAVEMENT (EDGE-OF-METAL) TO THE BOTTOM OF THE SIGN PANEL. SEE SIGN-120-SERIES FOR REQUIRED MINIMUM SIGN BOTTOM HEIGHTS.
5. M8 SIGN SERIES \leq 44 SFT PLACED IN THE CORE SECTION SHOULD BE TYPE IIA ON 2-PERFORATED STEEL SQUARE TUBE SIGN BREAKAWAY SYSTEM.
6. FOR ECONOMIC AND MAINTENANCE PURPOSES, DO NOT USE PERFORATED STEEL SQUARE TUBE SIGN BREAKAWAY SYSTEM BEHIND GUARDRAILS OR PROTECTION BARRIERS. REFER TO THE SIGN SUPPORT SELECTION CHART FOR APPROPRIATE SUPPORTS.

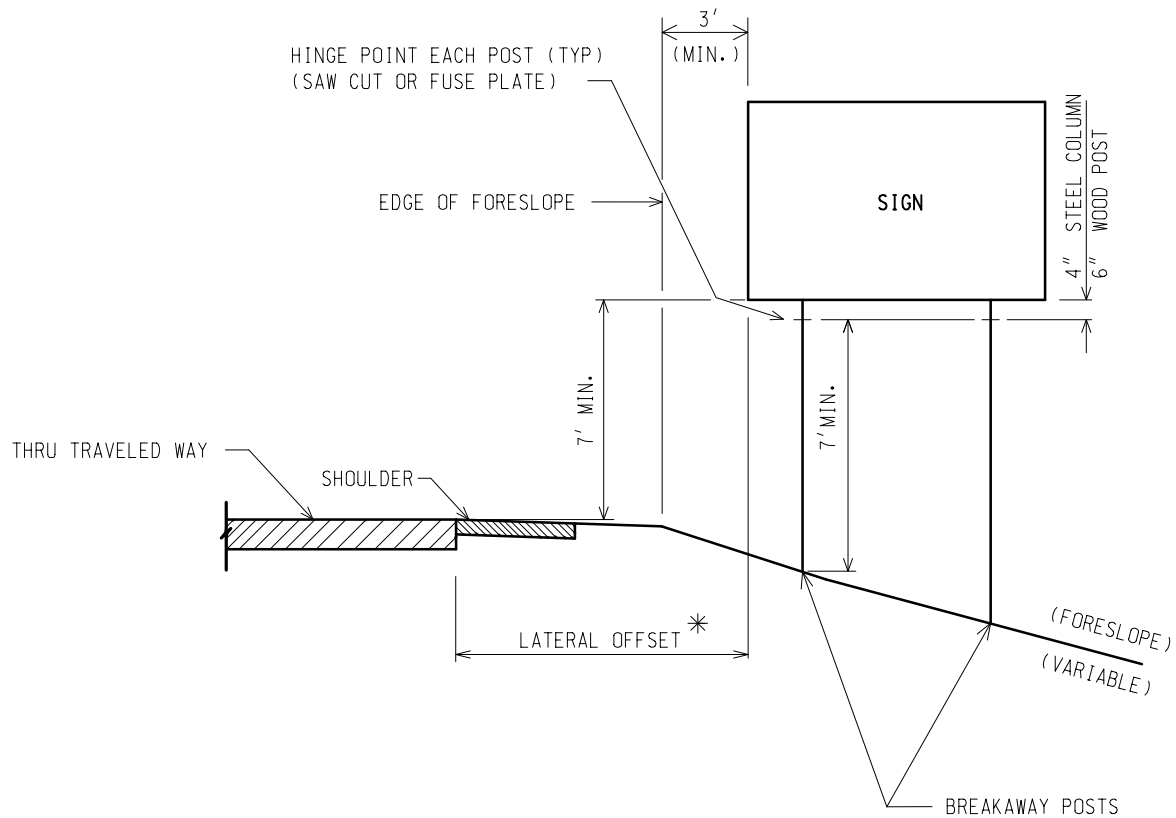
* 7 ft BOTTOM HEIGHT APPLIES TO PARENT SIGN

FOR INFORMATION ONLY

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN	05/01/15 F.H.W.A. APPROVAL	04/06/15 PLAN DATE	SIGN-100-F	SHEET 3 OF 3
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NOTE: THE ORIGINAL SIGNED COPY IS KEPT ON FILE AT THE MICHIGAN DEPARTMENT OF TRANSPORTATION.



* THE LATERAL OFFSET SHALL BE 30' (MIN.), FOR MAINTENANCE PURPOSES.

SIGN PLACEMENT-ELEVATION VIEW: FREEWAY (FORESLOPE)



PREPARED
BY
DESIGN DIVISION

DRAWN BY: DHD

CHECKED BY: AJU

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY: *Randy V. Bittler*
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: *Paul A. Van Park*
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

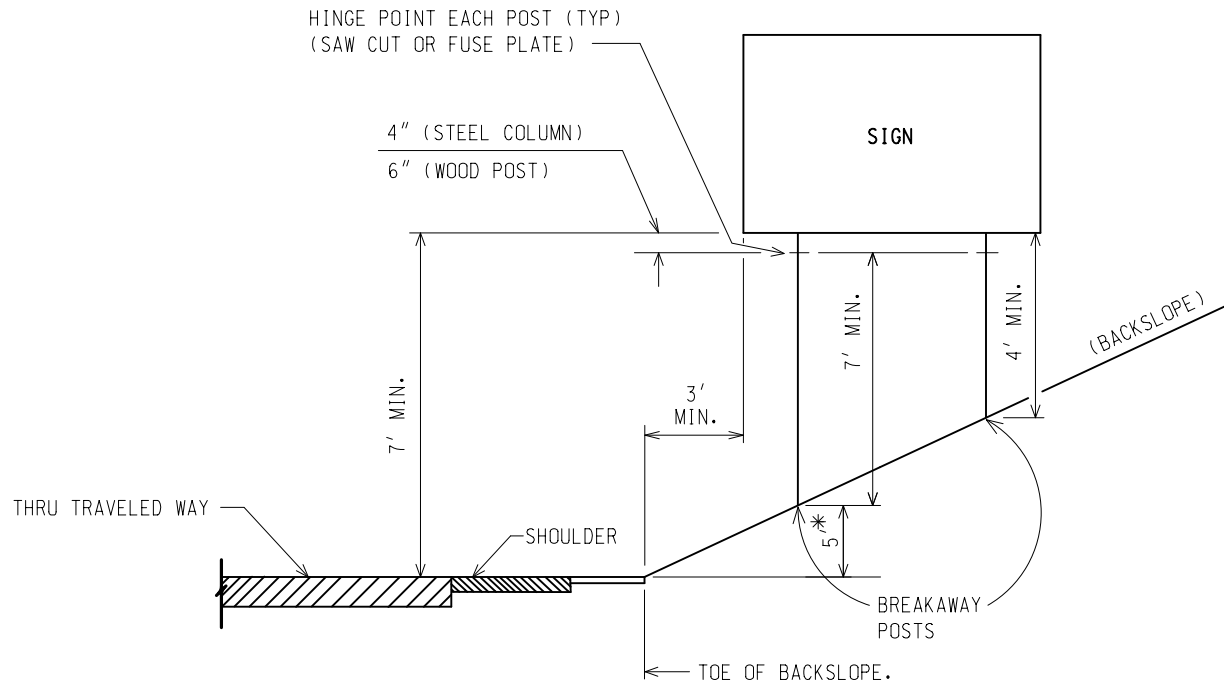
ROADSIDE SIGN LOCATIONS & SUPPORT SPACING

12/22/11
F.H.W.A. APPROVAL

12/08/11
PLAN DATE

SIGN-120-D

SHEET
1 OF 8



* IN DEPRESSED SECTIONS WITH 3:1 OR STEEPER BACKSLOPE, IF THE FRONT (TRAFFIC SIDE) POST CANNOT BE LOCATED AT 7' ABOVE SHOULDER ELEVATION, THEN A 3' MINIMUM OFFSET FROM THE TOE OF SLOPE SHALL BE MAINTAINED AND THE SIGN PROTECTED WITH AN APPROVED BARRIER. SEE GENERAL NOTE 5.

SIGN PLACEMENT-ELEVATION VIEW: FREEWAY (BACKSLOPE)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

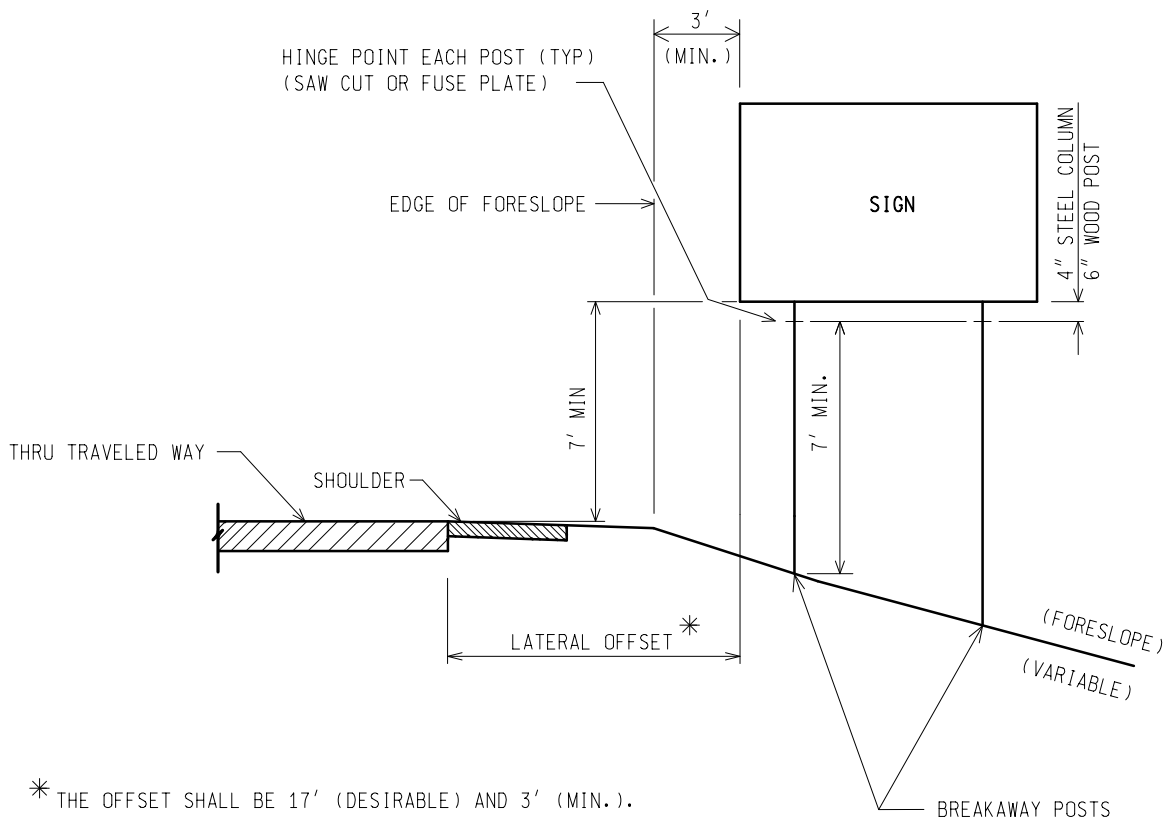
12/22/11
F.H.W.A. APPROVAL

12/08/11
PLAN DATE

SIGN-120-D

SHEET
2 OF 8

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



SIGN PLACEMENT-ELEVATION VIEW: NON-FREEWAY (FORESLOPE)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

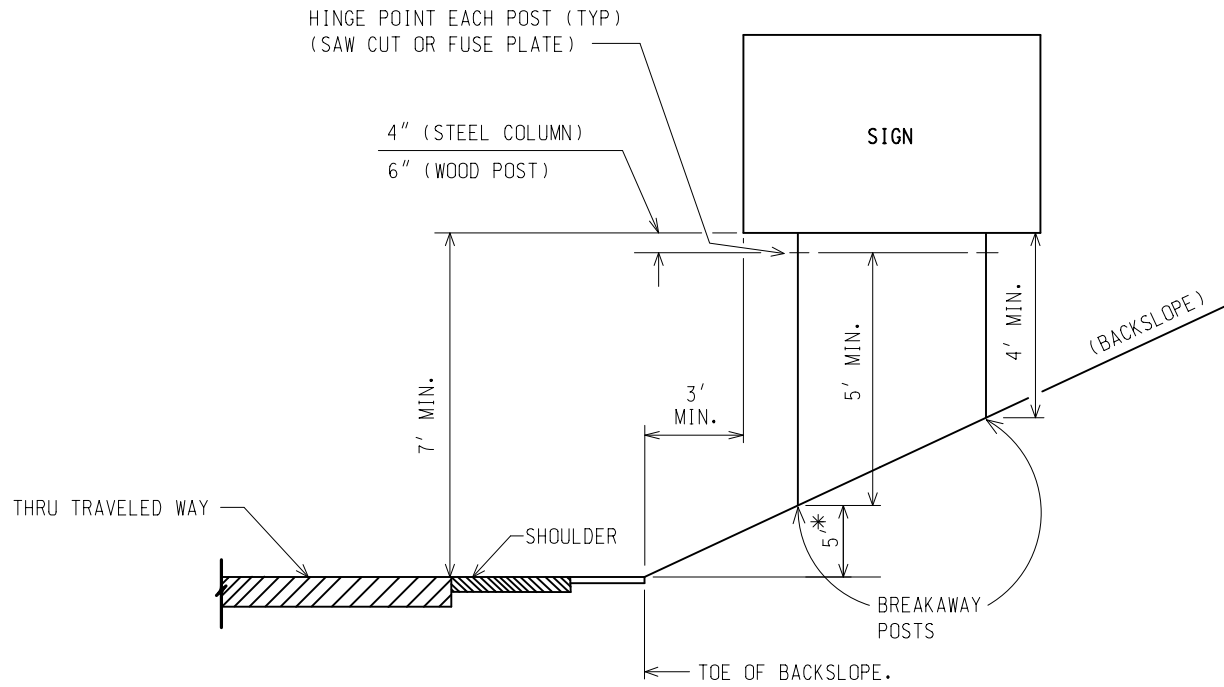
12/22/11
F.H.W.A. APPROVAL

12/08/11
PLAN DATE

SIGN-120-D

SHEET
3 OF 8

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* IN DEPRESSED SECTIONS WITH 3:1 OR STEEPER BACKSLOPE, IF THE FRONT (TRAFFIC SIDE) POST CANNOT BE LOCATED AT 5' ABOVE SHOULDER ELEVATION, THEN A 3' MINIMUM OFFSET FROM THE TOE OF SLOPE SHALL BE MAINTAINED AND THE SIGN PROTECTED WITH AN APPROVED BARRIER. SEE GENERAL NOTE 5.

SIGN PLACEMENT-ELEVATION VIEW: NON-FREEWAY (BACKSLOPE)

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

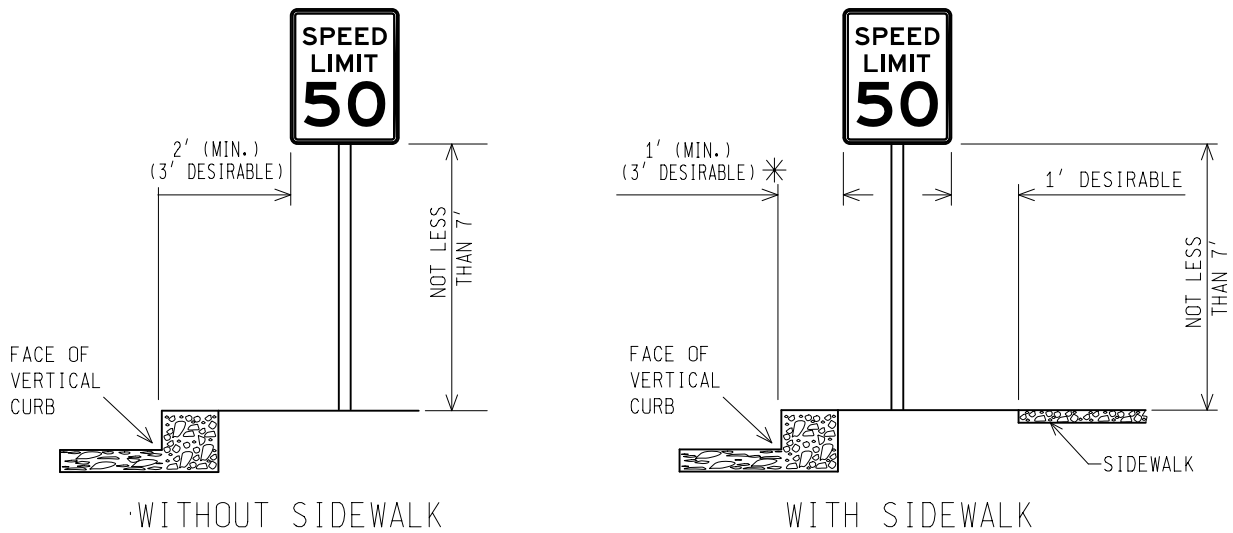
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PLAN DATE

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SHEET
4 OF 8

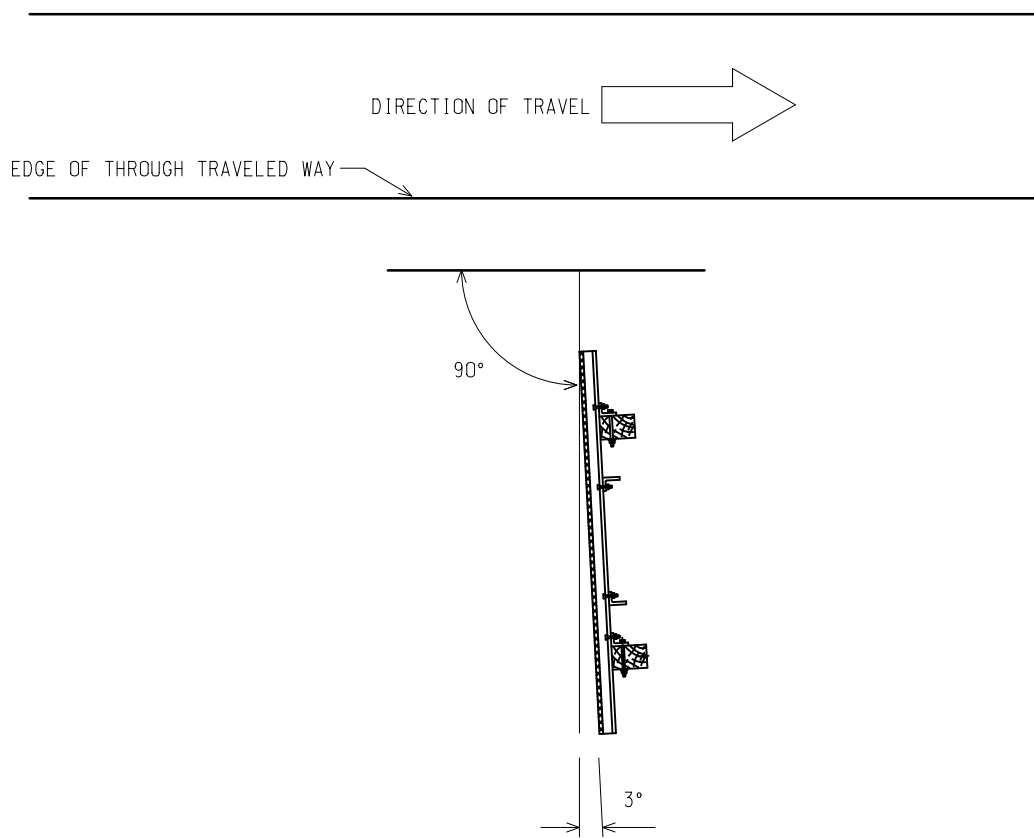
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*WHEN DIRECTED BY THE ENGINEER, 1' IS PERMITTED IN AREAS WHERE SIDEWALK OR UTILITY POLES ARE CLOSE TO CURB PER MMUTCD.

NOTE: SLOPING CURBS SHOULD BE TREATED AS FLAT.

SIGN PLACEMENT ALONG VERTICAL CURB ELEVATION VIEW



SIGN ORIENTATION

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

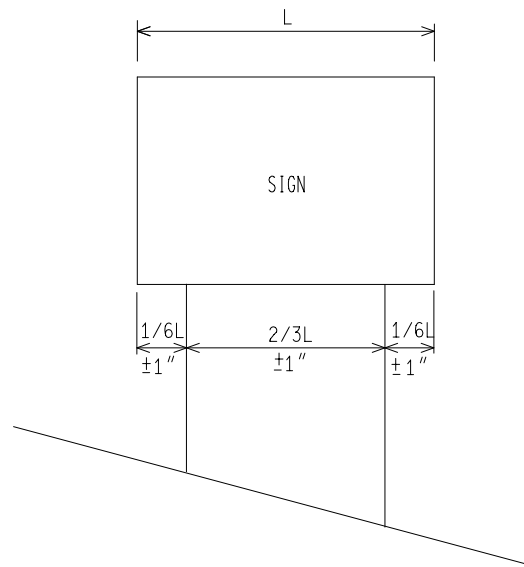
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2 POST SIGN SUPPORT SPACING

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BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

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SIGN BOTTOM HEIGHTS

CONVENTIONAL ROADS

7' - RURAL AREAS

7' - URBAN AREAS

7' - ALL CONDITIONS WHERE SIDEWALKS EXISTS

RAMPS/CROSSROADS

7' - RAMP AND CROSSROAD SIGNING
(WITHOUT VERTICAL CURB)

7' - RAMP AND CROSSROAD SIGNING
(WITH VERTICAL CURB)

7' - ALL CONDITIONS WHERE SIDEWALK EXISTS

4' - DO NOT ENTER AND WRONG WAY SIGNS
(FOR FREEWAY RAMPS)

FREEWAYS/EXPRESSWAYS

7' - ROUTE MARKERS, WARNING AND
REGULATORY SIGNS

7' - ALL OTHER FREEWAY/EXPRESSWAY SIGNS

NOTES:

1. PARKING SIGNS MOUNTED BELOW A PARENT SIGN MAY HAVE A BOTTOM HEIGHT 1' OR 1.5' (DEPENDING ON SIGN SIZE) LESS THAN BOTTOM HEIGHTS LISTED FOR PARENT SIGNS.
2. BOTTOM HEIGHT OF ALL SIGNS ARE 7' EXCEPT THE FOLLOWING:
OBJECT MARKERS- 4'
MILE POST MARKERS- 4'
WRONG WAY/DO NOT ENTER (FRWY RAMPS)- 4'
3. CONVENTIONAL ROAD-A STREET OR HIGHWAY OTHER THAN A FREEWAY OR EXPRESSWAY.
4. EXPRESSWAY-A DIVIDED HIGHWAY WITH PARTIAL CONTROL OF ACCESS.
5. FREEWAY-A DIVIDED HIGHWAY WITH FULL CONTROL OF ACCESS.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

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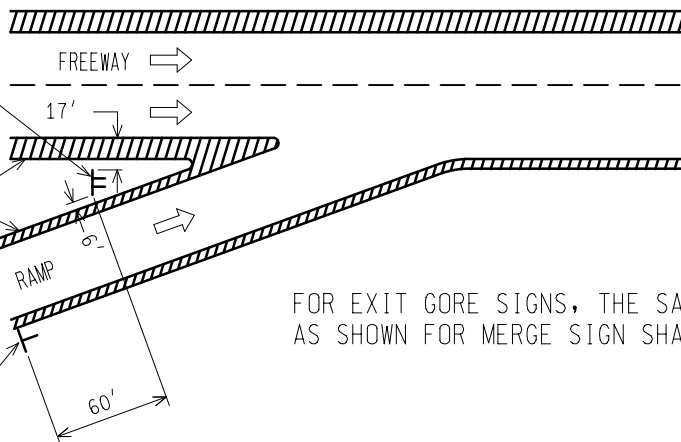


W4-1 AS CALLED FOR
ON PLANS



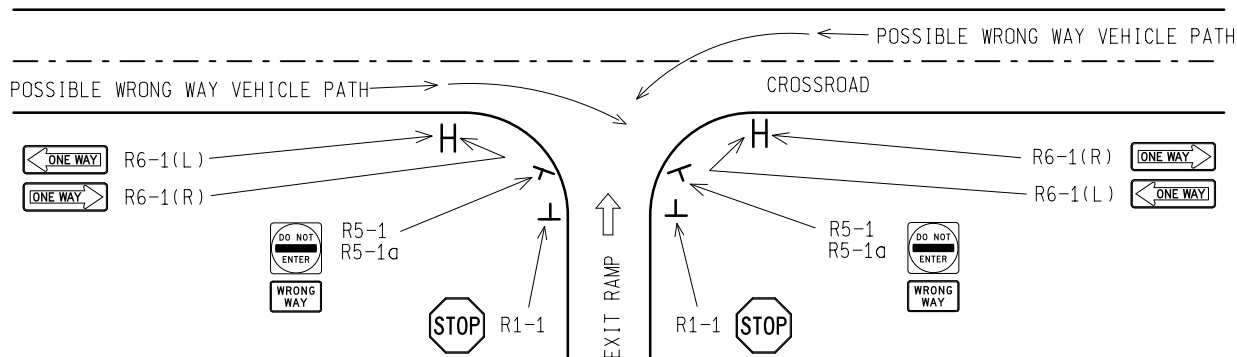
R3-2 (24") AS CALLED
FOR ON PLANS.
15' OFFSET FROM EDGE OF
RAMP PAVEMENT (NOT EDGE OF
PAVED SHOULDER).

EDGE OF PAVED SHOULDER(S)



FOR EXIT GORE SIGNS, THE SAME OFFSETS
AS SHOWN FOR MERGE SIGN SHALL BE USED

PLACEMENT OF MERGE & NO LEFT TURN SIGNS AT ENTRANCE RAMP



TYPICAL LOCATION OF R5-1 & R5-1a ON EXIT RAMPS. THESE SIGNS SHOULD BE TURNED APPROXIMATELY 20 DEGREES FROM THE CROSSROAD TO FACE THE PATHS OF POSSIBLE WRONG WAY VEHICLE MOVEMENTS.

PLACEMENT OF SIGNS AT EXIT RAMP TERMINALS

GENERAL NOTES:

1. LATERAL OFFSET CLEARANCE OF ALL SIGNS SHALL BE AS INDICATED UNLESS OTHERWISE SHOWN ON CONTRACT SIGN PLAN SHEETS OR IN THE PROPOSAL.
2. THE TERM "SIGN" AS USED ON THIS PLAN MEANS A SINGLE PANEL OR GROUP OF PANELS COMBINED TO FORM ONE INSTALLATION.
3. BOTTOM HEIGHT (BH) SHALL BE AS INDICATED ON SHEET 7 UNLESS OTHERWISE SHOWN ON THE ELEVATION SIGN PLAN SHEET OR IN THE PROPOSAL. BOTTOM HEIGHT IS THE DIFFERENCE IN ELEVATION OF THE NEAREST EDGE OF THE TRAVELED LANE AND BOTTOM OF THE SIGN.
4. SIGN LOCATIONS SHALL BE AS SHOWN UNLESS OTHERWISE SPECIFIED ON CONTRACT SIGN PLAN SHEETS OR IN THE PROPOSAL.
5. WHEN SIGNS ARE TO BE INSTALLED BEHIND CONCRETE BARRIER OR GUARDRAIL, THE NEAR EDGE OF SIGN SHOULD BE SET BACK A MINIMUM OF 3' MEASURED FROM THE BACK OF BARRIER OR GUARDRAIL POSTS. BREAKWAY SIGN POSTS ARE NOT REQUIRED AT THESE LOCATIONS.
6. FOR PLACEMENT OF STOP SIGNS AT CROSSROADS SEE MMUTCD.
7. WRONG WAY AND DO NOT ENTER SIGN SUPPORTS FOR FREEWAY RAMPS SHALL HAVE RED REFLECTIVE SHEETING INSTALLED ON THE SIGN SUPPORTS.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN

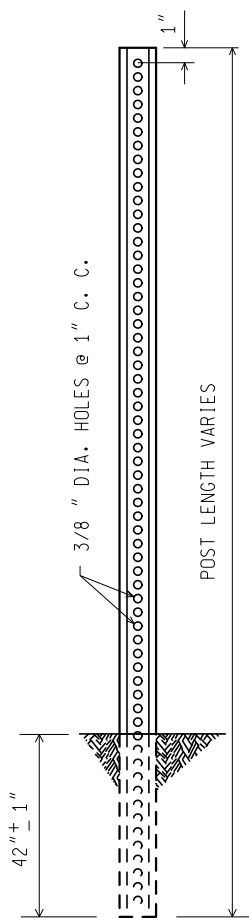
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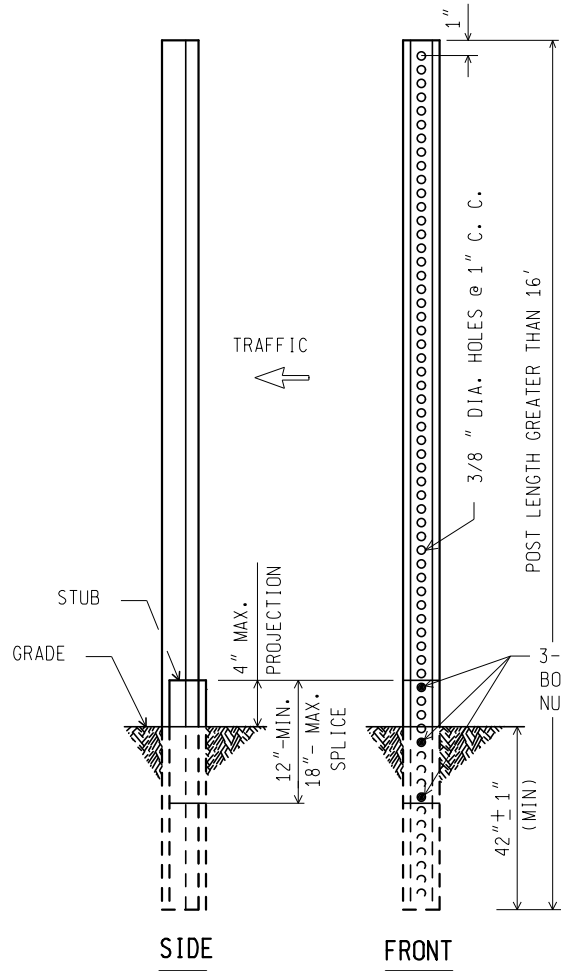
SIGN-120-D

SHEET
8 OF 8

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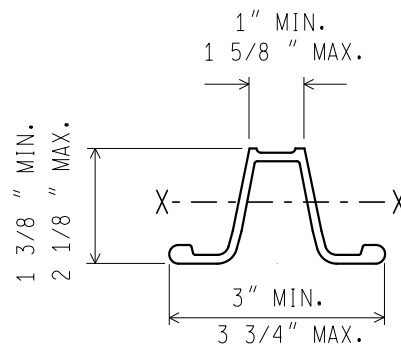


3 lbs STEEL POST



3 lbs STEEL POST WITH SPLICE

(OPTIONAL SPLICE DETAIL FOR POSTS GREATER THAN 16')



WEIGHT = 3 lbs/ft MIN.

SECTION MODULUS X-X = 0.31 in 3 MIN.



PREPARED
BY
DESIGN DIVISION

DRAWN BY: BMS

CHECKED BY: AJU

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY: Randy V. Bittler
DIRECTOR, BUREAU OF FIELD SERVICES

APPROVED BY: Mark A. Van Pelt
DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

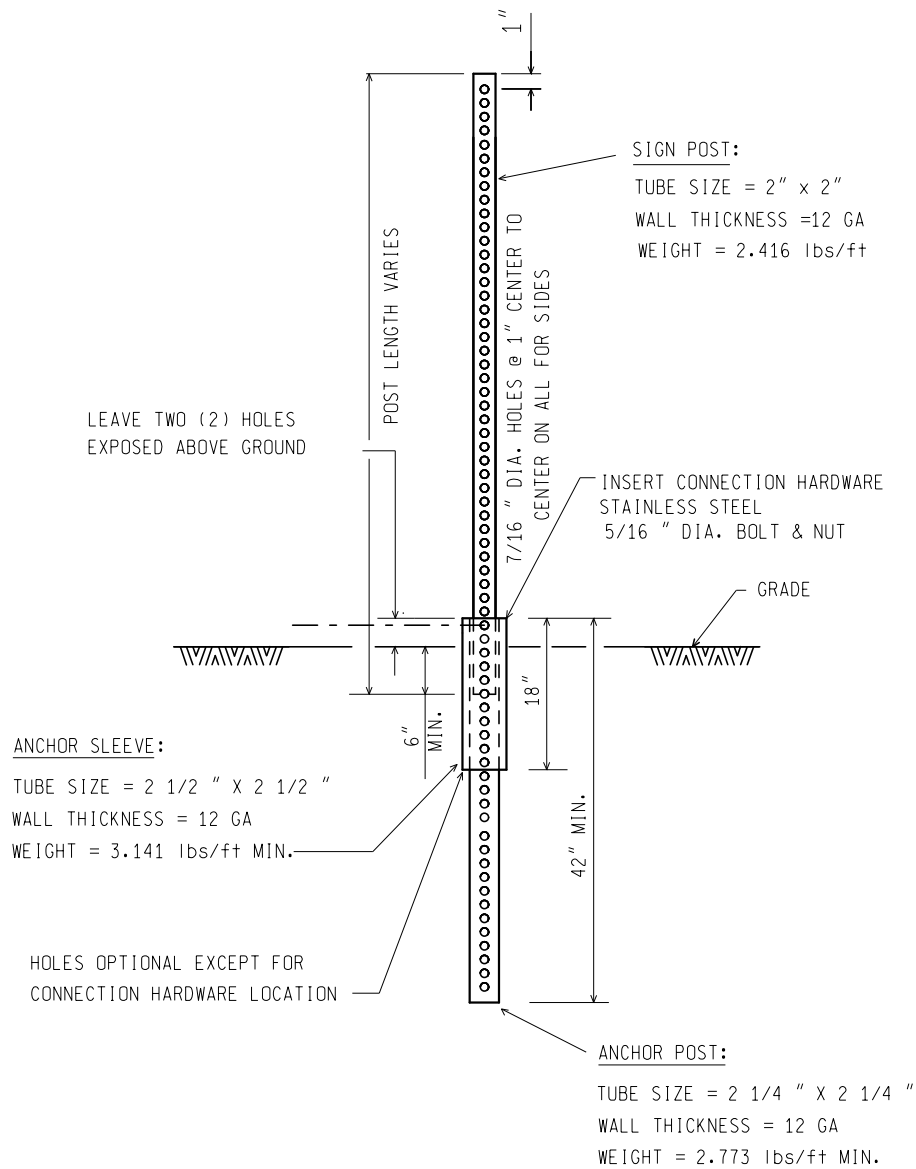
STEEL POSTS

05/01/15
F.H.W.A. APPROVAL

08/06/14
PLAN DATE

SIGN-200-D

SHEET
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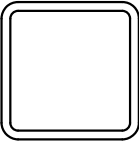
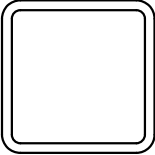
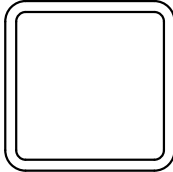
SQUARE TUBULAR STEEL POST

NOTE: SQUARE TUBULAR STEEL POSTS ARE PRIMARILY INTENDED FOR USE IN URBAN AREAS, CHANNELIZATION ISLANDS AND OTHER SPECIFIED LOCATIONS REQUIRING MULTIPLE SIGN PANEL INSTALLATIONS.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN	05/01/15 F.H.W.A. APPROVAL	08/06/14 PLAN DATE	SIGN-200-D	SHEET 2 OF 3
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TABLE 1		
ELEMENTS OF SECTION		
 <p>2" x 2"</p> <p><u>SECTION PROPERTIES</u></p> <p>A = 0.5090 in² I = 0.372 in⁴ S = 0.372 in³ r = 0.794 in</p>	 <p>2 1/4 " x 2 1/4 "</p> <p><u>SECTION PROPERTIES</u></p> <p>A = 0.695 in² I = 0.561 in⁴ S = 0.499 in³ r = 0.898 in</p>	 <p>2 1/2 " x 2 1/2 "</p> <p><u>SECTION PROPERTIES</u></p> <p>A = 0.803 in² I = 0.804 in⁴ S = 0.643 in³ r = 1.001 in</p>
TOLERANCES		
1. OUTSIDE TOLERANCE FOR ALL SIDES AT CORNERS	± 0.01 in	
2. WALL THICKNESS	-0.008 in TO + 0.011 in	
3. CONVEXITY AND CONCAVITY	± 0.01 in	
4. SQUARENESS OF SIDES	± 0.14 in	
5. TWIST PERMISSIBLE IN 3 in LENGTH	0.062 in	
6. STRAIGHTNESS	1/16 in IN 3 ft	
7. CORNER RADIUS	5/32 in ± 1/32 in	
8. LENGTH	± 1/4 in	

NOTES:

1. POST SHALL BE GALVANIZED EXCEPT ON TEMPORARY CONSTRUCTION SIGNS.
2. BOLTS & NYLON INSERT LOCK NUTS SHALL BE STAINLESS STEEL, PER CURRENT MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
3. SEE SIGN-740-SERIES-ENG FOR SIGN CONNECTION.
4. POSTS SHALL BE MARKED AT THE 42" POINT WITH SPRAY PAINT PRIOR TO DRIVING TO INDICATE MINIMUM EMBEDMENT.
5. POSTS WILL BE MEASURED FOR PAYMENT TO THE NEAREST COMMERCIAL LENGTH.
6. SELF-ALIGNING STEEL SIGN REINFORCING PLATE (SEE SIGN-740-SERIES-ENG) REQUIRED FOR USE WITH ALL TYPE III (SHEET STEEL OR ALUMINUM) SIGNS INSTALLED ON 3 lbs. SELF-ALIGNING STEEL SIGN REINFORCING PLATE IS NOT TO BE USED WITH SQUARE TUBULAR STEEL POSTS.
7. MAXIMUM SIGN SQUARE FOOT FOR 1-3 LB. POST SHALL BE 8 SQUARE FEET.
8. MAXIMUM SIGN SQUARE FOOT FOR 2-3 LB. POST SHALL BE EQUAL TO THE 2-3 LB. STEEL POST PER SIGN-150-SERIES.

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN	05/01/15 F.H.W.A. APPROVAL	08/06/14 PLAN DATE	SIGN-200-D	SHEET 3 OF 3
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