2025 HMA M-81 Railroad Crossing Reconstruction
Letting Date – August 14th, 2025, 8:30 am

Contractor: _____

Address: _____

_____

Sign & Print: _____

Date: _____

Phone & Fax: _____

Email: _____

Bid Letting Total _____

COMPLETION DATE: Seasonal Limitations per the MDOT 2020 Standard Specifications for Construction except as modify here. All work must be completed by November 1st, 2025. Signed Insurance, Agreement, and bid tab shall be enclosed.

Bids are to be submitted on the Road Commission forms in a plainly marked, sealed envelope. No faxed or emailed bids accepted. Plans and specifications are available online at www.tuscolaroad.org. Please contact Brent Dankert, Tuscola County Highway Engineer at 989-233-7472 or highwayengineer@tuscolaroad.org with any questions. Any addenda must be noted and initialed.

If you are interested in bidding and have downloaded plans from the website, please email highwayengineer@tuscolaroad.org to be added to the plan holders list to make sure you receive addendums.

The Contractor has examined the proposal, permits, plans, and the location of the work described here in and is fully informed as to the nature of the work and the conditions relating to its performance. Proposals will be received from contractors having a current (Ea) prequalification with the Michigan Department of Transportation. All work will be done in accordance with the requirements of 2020 MDOT Standard Specifications for Construction and as modified herein.

General:
This work shall be at the M-81 railroad crossing between Millwood and Bush Street in the City of Caro, Tuscola County. This work shall include all necessary labor, equipment, and material to remove existing pavement, sidewalk, curb and gutter and reconstruct it back in accordance with the attached plans and specifications. Contractor shall be responsible for coordinating with the railroad contractor for reconstruction of the railroad crossing. Quantities shown are estimated and are subject to increase or decrease by the Engineer. Changes in quantities will not change unit prices as bid.

Work may be added or deleted as mutually agreed upon by the Road Commission, MDOT, and the Contractor.

Schedule:
- See attached progress clause. The entire project must be completed and open to traffic by the final completion date of November 1st, 2025.
- Biweekly Progress Meetings. The Contractor must attend biweekly progress meetings with the Engineer. The Engineer will determine the day, time, and place for the progress meetings.
- **Liquidated Damages will apply in accordance with Section 108, Table 108-1, of the 2020 Standard Specification for Construction**

Specifications:
All work shall be performed in accordance with the 2020 MDOT Standard Specifications for Construction except as modified herein:

Removals

- Curb and Gutter, Pavement, Sidewalk – Section 204
- Earth Excavation – Section 205
- Cold Milling HMA Surface – Section 501
- Sidewalk, Clay Brick Pavers – Section 803

Construction

- Aggregate Base – Section 302
- Hand Patching and HMA Approach – Section 501
  1. **Compaction** - The Nuclear Gauge Method for testing compaction will be used on Primary roads and state trunklines. The Number of Rollers Method chart below shall apply, at the discretion of the Engineer.

Number of Rollers Required Based on Placement Rate:

Average Laydown Rate, Square Yards Per Hour	Number of Rollers Required	
	Compaction Rollers	Finish Rollers
Less than 600	1	1*
601 – 1200	1	1
1201 – 2400	2	1
2401 – 3600	3	1
3601 and more	4	1

*The Compaction roller may be used as the finish roller also.

An approved self-propelled pneumatic-tired roller shall be provided and used as directed while placing Bit Mix for leveling or wedging.

  2. **Temporary Pavement Marking Tape** - Shall be required on Michigan Department of Transportation projects. Temporary pavement marking tape shall be Type NR unless specified by the Engineer. No additional payment will be made for the tape; payment for temporary pavement marking tape shall be included in other items of work.
- Curb and Gutter – Section 802
- Detectable Warning Surface and Cub Ramp – Section 803
- Pavement Markings – Section 811
- Slope Restoration – Section 816
- Traffic Control – Section 812

1. Road Closure – Will be implemented in accordance with the maintaining traffic special provision. Prior to commencing work, Contractor shall contact Central Dispatch, (989) 673-8338, and School District if in session to inform of Road Closure & Road Opening.

2. Warning Signs and Detour Signs– The contractor will be responsible for supplying, installing, and maintaining any signs necessary to protect the motoring public from situations that have occurred due to unfinished work, i.e. Uneven Lanes Sign W8-11, Bump Sign W8-1, Low Shoulder W8-9. Such signs shall be installed in such a manner to NOT obscure visibility of existing regulatory and warning signs.

3. Traffic Regulators – Traffic regulators shall be equipped with High-visibility Class 2 or Class 3 safety apparel, Stop/Slow or Stop/Stop Sign Paddles, and a two-way radio system and a standby backup system if traffic regulators are not visible to each other. Ensure persons designated to regulate traffic receive training, no more than 12 months before traffic regulating operations, on property traffic regulating procedures. Ensure this training consists of at least viewing "Safely Regulating Traffic in Michigan" and reading the current MDOT handbook, Traffic Regulators Instruction Manual. Maintain documentation on persons trained and dates trained and provide to the Engineer upon request.

Materials:
All materials must meet the 2020 MDOT Standard Specification for Construction except as modified herein:

1. **Bituminous Materials** – Bituminous Mixture shall be 4EL. See Below for more details.
2. **Bond Coat** – Shall be SS-1h or low tracking bond coat and shall meet the requirement of MDOT SSFC 2020 Section 501 and 904.
3. **Asphalt Cement** – Shall be PG 58-28 in accordance with 2020 MDOT SSFC Section 501 and 904.
4. **Bituminous Mixture 5EL** – Shall meet the gradation as specified in 2020 MDOT SSFC Section 902 Table 902-5 and Physical Requirements specified in 2020 MDOT SSFC Section 902 Table 902-6. Asphalt cement content of the mix shall be from 5.7% to 6.5% in the surface course as directed by the Engineer. If/When Reclaimed Asphalt Pavement (RAP) is used a maximum of 27% RAP binder by weight of the total binder in the mixture shall apply. Reference Special Provision 20SP-501F-01 for Recycled Hot Mix Asphalt Mixture on Local Agency Projects. The mix design shall be approved by the Engineer prior to the placement of the mixture.
5. **Testing of Asphalt Materials –** All materials must be tested and approved in accordance with the MDOT Specifications before they enter the construction of the projects. The mix designs must be submitted and approved by the Engineer prior to placing any asphalt. Acceptance of asphalt material will be based on MDOT Special Provision 20SP-501I-01 Acceptance of HMA Mixture on Local Agency Projects, except as herein noted. Air voids shall be 3.0% for leveling and top course. The Engineer will perform Quality Assurance

sampling and testing a minimum of two tests per day of production for each mix type. A failing test will result in additional testing with possible penalties. The Engineer will measure density with a Nuclear Density Gauge using the Gmm from the JMF for the density control target on all Primary Road Projects. Local Road Projects will use the Number of Rollers Method, unless requested otherwise by the Engineer. The Engineer may at their discretion verify the roller pattern as established by the contractor utilizing the Nuclear Density Gauge. The Contractor shall submit Quality Control test results for each day of paving to the Engineer. **Lack of test reports may delay payment.** A new mix design must be approved prior to changes in the aggregate used. The Road Commission reserves the right to test randomly as necessary.

Measurement and Payment:
The completed work will be paid for at the contract unit price for the following contract pay item and includes all material, equipment, and labor to complete these items.

Projectwide Pay Items	**Unit**	**Pay Item Code**
Mobilization, Max	LSUM	1100001
Removal Pay Items	**Unit**	**Pay Item Code**
Curb and Gutter, Rem	Ft	2040020
Pavt, Rem	Syd	2040050
Sidewalk, Rem	Syd	2040055
Excavation, Earth	Cyd	2050016
Cold Milling HMA Surface	Syd	5010002
Sidewalk, Clay Brick Pavers, Rem	Sft	8030051
Construction Pay Items	**Unit**	**Pay Item Code**
Aggregate Base	Ton	3020001
Hand Patching	Ton	5010025
HMA Approach	Ton	5010061
Curb and Gutter, Conc, Det C2	Ft	8020021
Detectable Warning Surface	Ft	8030010
Curb Ramp, Conc, 6 inch	Sft	8032002
Pavt Mrkg, Ovly Cold Plastic, 24 inch, Stop Bar	Ft	8110045
Slope Restoration, Non-Freeway, Type B	Syd	8162002
Maintenance of Traffic Pay Items	**Unit**	**Pay Item Code**
Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	Ea	8120012
Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	Ea	8120013
Pedestrian Type II Barricade, Temp	Ea	8120026
Pedestrian Type II Channelizer, Temp	Ft	8120027
Channelizing Device, 42 inch, Fluorescent, Furn	Ea	8120035
Channelizing Device, 42 inch, Fluorescent, Oper	Ea	8120036
Minor Traf Devices	LSUM	8120170
Plastic Drum, Fluorescent, Furn	Ea	8120252
Plastic Drum, Fluorescent, Oper	Ea	8120253
Sign, Portable, Changeable Message, NTCIP-Compliant, Furn	Ea	8120332
Sign, Portable, Changeable Message, NTCIP-Compliant, Oper	Ea	8120333
Sign, Type B, Temp, Prismatic, Furn	Ea	8120350
Sign, Type B, Temp, Prismatic, Oper	Ea	8120351

Measurement will be made by the unit specified above. Proper material tickets shall be provided with the invoice documenting quantity used of each material.

All invoices **MUST** include the job number and project location.

Warranty:
The Contractor hereby warrants his work and material for one year from date of placement. The Road Commission may choose to hold up to 10% of the project bid cost until the warranty expires.

Liability:
The Contractor shall at all times exercise extreme care and shall assume all liability for any damages resulting from his operations and shall hold the Tuscola County Road Commission harmless from any such claims or damages.

The contractor must obtain a Tuscola County Right of Way Permit before any work can begin.

The successful bidder must also furnish certificates or policies giving satisfactory evidence of insurance coverage to the minimum extent of $500,000.00 property damage and $1,000,000.00 personal liability to insure adequate payment for any damage caused by his operations.

The contractor shall, prior to the start of work, file with the Tuscola County Road Commission a certificate of Workmen's Compensation Insurance. The attached certificate of insurance is required for the successful bidder or bidders.

N**ON-COMPLIANCE WITH PROJECT SPECIFICATION PROVISIONS:**
Any variation from the specifications of the project herein without written approval from the Tuscola County Road Commission and/or its authorized representative may result in, at the discretion of the Road Commission, the voiding and/or canceling of the acceptance of any bid and/or contract, resulting from this project.

The Board reserves the right to accept or reject any or all proposals and to re-advertise or to accept the proposal, which in their opinion, is in the best interest of Tuscola County.

Attachments:

1. Title IV and VI Compliance
2. MDOT Project Log
3. Project Bid Tab
4. Special Provision 20SP-501A-01 – Sampling Asphalt Binder on Local Agency Project
5. Special Provision 20SP-501F-01 – Recycled Hot Mix Asphalt Mixture on Local Agency Projects
6. Special Provision 20SP-501I-01 – Acceptance of Hot Mix Asphalt Mixture on Local Agency Projects

TUSCOLA COUNTY ROAD COMMISSION
TITLE IV COMPLIANCE
APPENDIX A

During the performance of this contract, the contractor, for itself, its assignees, and successors in interest (hereinafter referred to as the "contractor") agrees as follows:

1. Compliance with Regulations: The contractor shall comply with the Regulations relative to non-discrimination in Federally-assisted programs of the Department of Transportation, Title 49, code of Federal Regulations, Part 21 as they may be amended from time to time, (hereinafter referred to as the Regulations), which are herein incorporated by reference and made a part of this contract.
2. Non-discrimination: The contractor, with regard to the work performed by it during the contract, shall not discriminate on the grounds of race, color, or national origin in the selection and retention of subcontractors, including procurements of materials and leases of equipment.
3. The contractor shall not participate either directly or indirectly in the discrimination prohibited by section 21.5 of the Regulation, including employment practices when the contractor covers a program set forth in Appendix B of the Regulations.
4. Solicitations for Subcontracts, Including Procurements of Materials and Equipment: In all solicitations either by competitive bidding or negotiation made by the contractor for work to be performed under a subcontract, including procurements of materials or leases of equipment, each potential subcontractor or supplier shall be notified by the contractor of the contractor's obligations under this contract and the Regulations relative to non-discrimination on the grounds of race, color, or national origin.
5. Information and Reports: The contractor shall provide all information and reports required by the Regulations, or directives issued pursuant thereto, and shall permit access to its books, records, accounts, other sources of information, and its facilities us may be determined by the Tuscola County Road Commission to be pertinent to ascertain compliance with such Regulations or directives. Where any information required of a contractor is in the exclusive possession of another who fails or refuses this information, the contractor shall so certify to the State high· way department, or the Federal Highway Administration as appropriate, and shall set forth what efforts it has made to obtain the information.
6. Sanctions for Non-compliance: In the event of the contractor's non-compliance with the non-discrimination provisions of this contract, the Tuscola County Road Commission Shall Impose such contract sanctions as it or the Federal Highway Administration may determine to be appropriate, including, but not limited to:
    a) Withholding of payments to the contractor under the contract until the contractor complies, and/or
    b) Cancellation, termination, or suspension of the contract, in whole or in part.
7. Incorporation of Provisions: The contractor shall Include the provisions of paragraphs (l) through (6) in every subcontract, including procurement of materials and leases of equipment, unless exempt by the Regulations, or directives Issues pursuant thereto. The contractor shall take such action with respect to any subcontract or procurement as the Tuscola County Road Commission may direct as a means of enforcing such provisions including sanctions for noncompliance: Provided, however, that, in the event u contractor becomes involved in, or is threatened with, litigation with a subcontractor or supplier as a result of such direction, the contractor may request the Tuscola County Road Commission to enter into such litigation to protect the interests of the County, and, in addition, the contractor may request the State highway department to enter into such litigation to protect the interests of the State and/or the United States to enter into such litigation to protect the interests of the United States.

"The TUSCOLA COUNTY ROAD COMMISSION, in accordance with Title VI of the Civil Rights Act of 1964, 78-252, 42 U.S.C. 2000d-222d-4, the Civil Rights Act of 1987, P.L. 100-259, and Title 49, Code of Federal Regulations, Department of Transportation, subtitle A, Office of the Secretary, Part 21, Non- discrimination in federally assisted programs of the Department of Transportation issued pursuant to such Act, hereby notifies all bidders that it will affirmatively insure that in any contract entered into pursuant to this advertisement, Disadvantaged Business Enterprise firms will be afforded full oppo1iunity to submit bids in response to this invitation and will not be discriminated against on the grounds of Race, Color, Sex, Age, National Origin, or Handicap in consideration for an award. For additional compliance information, please see Appendix A."

PROGRESS CLAUSE: Submit a Progress Schedule. The Engineer for this project is as follows:

Craig C. Innis, P.E.
MDOT Huron TSC
(989) 233-4778
InnisC@michigan.gov

After receiving Notice of Award, start work on the date approved by the Engineer, which must be no earlier than **Project Award Date**. In no case may any work be commenced prior to receipt of formal notice of award by the Department.

The entire project must be completed and open to traffic by the final completion date of **November 1st, 2025**.

The Contractor is responsible to provide sufficient resources and adjust work schedules to complete work within the contract time.

Failure by the Contractor to meet final completion date will result in the assessment of liquidated damages in accordance with subsections 108.10.C.1 of the Standard Specifications for Construction. Liquidated damages will continue to be assessed for each calendar day that the work associated with the open to traffic and final completion dates remains incomplete, even if these days extend into or beyond seasonal suspension, unless approved otherwise by the Engineer.

Unless specific pay items are provided in the contract any extra costs incurred by the Contractor due to cold-weather protection and winter grading will not be paid for separately but will be included in the payment of other pay items in the contract.

Failure on the part of the Contractor to carry out the provisions of this Progress Clause may be considered sufficient cause to prevent bidding future projects.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
MAINTAINING TRAFFIC

a. Description. This special provision consists of requirements and restrictions to maintain traffic for Railroad Crossing on M-81 in the city of Caro, Tuscola County.

b. General. Maintain traffic throughout the project in accordance with the standard specifications, typicals, and supplemental specifications in the contract and as described on the plans for this project.

c. Construction Influence Area (CIA). The CIA includes the right-of-way of the following roadways, within the approximate limits described below:

1. On M-81 from approximately 500 feet west and 500 feet east of Huron & Eastern rail crossing.

2. In addition, the CIA includes the right-of-way of any designated detour route or alternate route, intersecting roads and ramps adjacent to the work zone for a distance of approximately 1/4 mile in advance of the work zone or as far as the construction or detour signing extends. The roads include but are not limited to S Hoopes St, Congress St, Washington St, Adams St, Almers St, Frank St, Lincoln St, Burnside St, Sherman St, Grant St, Bush St, Millwood St, Gilford St, M-24 (Ellingston St), Golf Club Rd, Oakridge Dr, Golfview Dr, Almer Dr, Cass River Dr, Romain Dr, and Cameron Rd.

d. Traffic Restrictions. Maintain traffic in accordance with the Maintaining Traffic Typicals contained herein, except as noted below. Changes or adjustments to the Maintaining Traffic Typicals may be necessary to fit field conditions, subject to approval of the Engineer or as determined by the Engineer.

1. Utilize the following Maintaining Traffic Typicals:

   A. 100-GEN-KEY

   B. 101-GEN-SPACING-CHARTS

   C. 102-GEN NOTES

   D. 103-GEN-SIGN

   E. WZD-100-A

   F. WZD-125-E

2. Do not deliver material, or close lanes during the holiday periods as defined in Table 1. Cover or remove “45 where workers present” signing during the holiday periods as defined in Table 1.

Table 1: 2025 Holiday Periods

Holiday	Start Date and Time	End Date and Time
Memorial Day	3:00 PM Thursday, May 22	6:00 AM Tuesday, May 27
Independence Day	3:00 PM Wednesday, July 2	6:00 AM Tuesday, July 8
Labor Day	3:00 PM Thursday, August 28	6:00 AM Tuesday, September 2
Thanksgiving	3:00 PM Wednesday, November, 26	6:00 AM Monday, December 1

3. Do not deliver material, or close lanes during the Special Events as defined in Table 2. Cover or remove “45 where workers present” signing during the Special Event periods as defined in Table 2.

Table 2: 2025 Special Events

Local Event	Start Dates and Time	End Date and Time
Tuscola County Fair	3:00 p.m. Friday, July 18th	6:00 a.m. Monday, June 28th
Tuscola County Pumpkin Festival	3:00 p.m. Wednesday, October 1	6:00 a.m. Monday, August 6
Caro Cars & Crafts	3:00 p.m. Thursday, June 5	6:00 a.m. Monday, June 9

4. Perform work and lane closures within the allowable time frames as shown in Table 3, unless otherwise approved by the Engineer. Traffic switch operations on freeways may take place within the allowable times listed below in the traffic restriction tables and/or as otherwise approved by the Engineer. Additional lane, ramp, and/or roadway closures and shifts may be implemented during maintaining traffic stage and traffic switch operations with prior Engineer approval.

Table 3: M-81 Eastbound/Westbound Traffic Restrictions

Closure Type	Start Time	End Time	M	Tu	W	Th	F	Sa	Su
Full Closure	00:00	24:00	14 Calendar Days						

☼ = half hour before sunrise as defined by the National Oceanic and Atmospheric Administration (NOAA)
▼ = half hour after sunset as defined by NOAA
∞ = Closure is allowed, and the frequency is not limited during the project timeframe
= The number of times closures can take place during the project timeframe.

5. Maintain a minimum of one lane of traffic in each direction at all times on all signalized side roads.

6. When a lane is closed, place channelizing devices at cross streets and major drives to form a radius that clearly defines the approaches to the through and turning traffic.

7. Restrict access to M-81 from side roads for short durations at specific locations as the Engineer directs or approves. Where an intersection is closed or partially closed, allow the adjacent intersections one block to the west and east to remain open to traffic, unless otherwise approved by the Engineer. The following work items listed are eligible to take place under a traffic stoppage. Additional work items can be allowed as approved by the Engineer.

8. Maintain access to all driveways as directed by the Engineer unless prior agreements are made with the respective property owners. The cost of constructing driveways part width will not be paid for separately but will be considered included in the cost of other driveway pay items.

e. Traffic General.

1. For any lane open to traffic, provide a minimum lane width of 11 feet with 2 feet of shy distance on both sides unless identified otherwise on plans.

2. Do not close lanes or utilize traffic regulation sequences where work can be accomplished with a shoulder closure. Do not occupy any part of the active traffic lane with personnel or equipment when utilizing a shoulder closure. Place lane closures and traffic regulation operations only in areas as show on the plans unless otherwise directed by the Engineer.

3. Prior to shifting traffic onto shoulders or opening any lanes/shoulders and/or ramps, remove, by sweeping all accumulated debris that has collected within the shoulder and/or within the closed lane/shoulder.

4. A speed reduction will not be used.

5. Develop and submit to the Engineer an Internal Traffic Control Plan (ITCP) per subsection 104.11.B of the Standard Specifications for Construction. The requirements listed herein are the requirements for a Type A ITCP. Submit the Type A ITCP at the preconstruction meeting. The Engineer will have 7 calendar days to review the ITCP for approval or provide comments for revisions required to obtain approval. Include in the ITCP, at a minimum, the proposed ingress/egress locations for construction equipment and vehicles, traffic control devices that will be utilized to warn the motoring public of ingress/egress locations, and measures that will be taken to ensure compliance with the ITCP. Ensure that the ITCP minimizes conflicts between construction vehicles and motorists and maintains overall safety and mobility within the work zone. No work may begin prior to approval of the ITCP. Additional time required to obtain an approved ITCP will not be cause for delay or impact claims. All costs associated with obtaining an approved ITCP, providing and executing all parts of the approved ITCP including required traffic control devices, or resolving an incomplete or unacceptable ITCP will be borne by the Contractor.

6. Upon approval of the ITCP, complete and submit the “Lane Closure Notification/Request Form or approved equal” to the Engineer for approval prior to the actual closure date. Submit the lane closure request 7 calendar days in advance of the lane closure

for approval. This includes all shifts/shoulder/lane/ramp closures as stated per the proposal or any new lane closure requests submitted by the Contractor. The Engineer will have 4 calendar days to review the lane closure request for approval or provide comments for revisions required to obtain approval. Do not implement a lane closure prior to approval by the Engineer. In addition, notify the Engineer when the lane closure is removed or cancelled. See Lane Closure Notification/Request Form contained in the proposal.

7. Protect the work area at the end of each day. Close all open access points on the project to traffic with Type III barricades or other devices approved by the Engineer.

8. The Engineer will be responsible for notifying emergency services, transit agencies, law enforcement and schools prior to any lane closures, detours or major traffic shifts. In addition, the Contractor will be responsible for working with and complying with any coordination that is necessary with the Department and emergency services, transit agencies, law enforcement and schools. All costs associated with these coordination efforts will be considered included in the pay item “Minor Traf Devices”.

9. Obtain all necessary permits from local governments within areas of local jurisdiction, including noise/dust ordinance waivers when required, prior to placing construction signing on local roads.

A. The Department will reimburse permit costs in accordance with subsection 107.02.A of the Standard Specification for Construction. Adhere to all requirements made by local maintaining agencies regarding placement of traffic control devices prior to closing lanes on roadways not under MDOT jurisdiction.

10. Bolt or tack weld all structure castings that will be required to carry traffic prior to implementation of any construction staging or traffic shifts.

11. Remove all temporary traffic control devices from MDOT right-of-way during any shut down periods unless needed for directly maintaining or channelizing traffic. No additional payment will be made for removal and/or redeployment of these devices except for in the case of an approved extension of time.

12. Cover or remove construction signing that refers to work zone speed when work at a location is planned to be inactive for a period greater than 2 days, unless otherwise specified on the plans or as directed by the Engineer.

13. Once work is initiated that includes any lane restrictions, that work must be continued daily until completed. A lack of work activity for more than 3 days will require the removal of lane closures at no expense to the Department.

f. Stage Construction. Maintain traffic in accordance with the restrictions listed in section d. Traffic Restrictions and the sequence of operations contained herein. Use of an alternate traffic control plan is subject to review and approval by the Engineer.

1. Stage 1.

A. Complete all work.

B. Close and detour M-81. Detour traffic for a maximum of 14 calendar days.

g. Detours.

1. Do not detour traffic until all proposed contract work on the detour route is completed, inspected, and approved by the Engineer.

2. Signs should be on both sides of the roadway when the work is taking place on the freeway or a boulevard section.

3. Cover all detour signs installed prior to closing a road or ramp. Do not uncover detour signing until just before the closure is in effect. Immediately remove or cover all detour signing upon opening the road or ramp to traffic.

h. Special Considerations at Railroad Crossings.

1. Any work (or equipment being staged onsite during the work) performed at or near a railroad crossing must not obstruct the view of railroad protective warning devices (signs, flashing light units or gates) to oncoming traffic at any time.

2. Do not extend lane closure taper(s) through the crossing. Traffic lane shifts cannot transition over the crossing.

3. Do not place construction traffic control devices in the railroad crossing or closer than 25 feet from the outside rail on either crossing approach.

4. The presence of a railroad flagger does not relieve the Contractor of the responsibility for intermediate traffic regulators.

5. Nighttime work or nighttime traffic control that impacts the crossing requires approval from the railroad. The contractor is responsible to provide lighting to illuminate traffic regulators and railroad flaggers when nighttime work is being performed. This approval may necessitate temporary railroad flashers.

6. Changes in Contract during construction phase that impacts crossings require approval from the railroad.

i. Pedestrian or Non-Motorized Facilities.

1. Maintain all facilities in accordance with *The Americans with Disability Act* (ADA) requirements and the Public Rights-of Way Accessibility Guidelines (PROWAG). Provide facilities equivalent to or better than the route a person would have encountered prior to construction activities.

2. Submit an “ADA Work Plan” for sidewalk and ADA ramp construction prior to any sidewalk ramp closures or removals. The work plan must address pedestrian access and detours. Plan will allow a ramp closure up to (96) hours. The Engineer will have 7 calendar days to review the plan for approval or provide comments for revisions required to obtain approval. Do not proceed with the work until the Engineer has approved the plan.

3. Close and detour any sidewalk ramps and crosswalk areas to pedestrian traffic that are impacted by the work. Cover pedestrian signal heads when the crosswalk or ramp is affected.

4. Always keep sidewalk areas clear of any equipment or materials when the sidewalks are open to pedestrian traffic. When open to pedestrian traffic, maintain a 4 foot clear path on all sidewalks.

j. Earthwork and Excavation.

1. Restore undercuts or excavations in the work areas within 3 feet of the active traffic lanes to no steeper than a 1 on 4 slope from the edge of the roadway at the end of each work day. If this condition is not met, provide a nighttime closure.

2. Delineate excavated areas located within 3 feet of traffic with channelizing devices at 20 feet spacing along the excavated area, and 100 feet before the area, or as shown on the maintaining traffic plans.

3. Use protective fencing to protect open excavations within the work zone during non-working hours.

k. Hot Mix Asphalt (HMA) Work.

1. No traffic is allowed on the HMA milled surface, unless directed by the Engineer.

2. Provide transverse and longitudinal HMA tapers at all grade changes greater than X inches caused by cold milling and overlay. Place W8-1 (“BUMP”) signs in advance of transverse HMA tapers. Place W8-11 (“UNEVEN LANES”) signs in advance of longitudinal HMA tapers. Place W8-9 (“LOW SHOULDER”) signs in advance of and every mile within the shoulder drop off**.**

l. Traffic Control Devices. Ensure all traffic control devices are in accordance with the *MMUTCD* and must meet the “acceptable” criteria as defined in the *ATSSA* publication entitled “*Quality Guidelines for Temporary Traffic Control Devices and Features*” at the time of initial deployment and after each major stage change.

1. During non-working periods, place applicable advance signs and channelizing devices at specific locations, as directed by the Engineer, at no additional cost to the Department.

2. Notify the Engineer 24 hours in advance of when traffic control devices are being delivered to the project site, to allow for initial inspection of devices to take place.

3. Remove from the project site all traffic control devices (including detour signing) no longer needed for a particular operation and equipment for construction within 14 calendar days of reopening the shoulder/lane/roadway.

4. Channelizing Devices.

A. Ensure all devices have sufficient ballast to prevent moving or tipping. If moving or tipping occurs, place additional ballast, as directed by the Engineer, at no additional

cost to the Department. No more than two ballasts are allowed on each channelizing device.

B. Do not use caution tape on channelizing devices for traffic control and/or pedestrian traffic control on this project.

C. Space channelizing devices at 35 for tapers and 65 for tangents or tighter as directed by the Engineer.

5. Temporary Signs.

A. Additional W20-1 (ROAD WORK AHEAD) signs are included in the quantities to be placed on all intersecting or adjacent roads where construction activities may be encountered.

6. Portable Changeable Message Signs (PCMS's). Use PCMS's to warn traffic of upcoming and changing traffic control during the life of the project. Obtain approval from the Engineer for all sign locations.

A. Install PCMS's and make them operational a minimum of 7 calendar days prior to the start of work, unless otherwise directed by the Engineer. Messages displayed on the PCMS's must conform to MDOT's policy on PCMS's. Notify the Engineer if displaying a different message than those listed below for the project.

B. Do not leave PCMS's with a blank screen within the clear zone of any roadway at any time. Remove the PCMS or display flashing dots in each corner of the screen when there is no message to display. Update the PCMS messages at the end of each work period to reflect current traffic lane restrictions.

A. Display the following two messages within 7 days prior to work.

M-81 CLOSED AT RAIL	BEGIN DAY DD/MM

D. Display the following two messages during work.

M-81 CLOSED AHEAD	FOLLOW DETOUR

m. Measurement and Payment. Payment will be in accordance with the standard specifications unless otherwise specified. No additional payment will be made for the following activities:

1. Transporting traffic control items from site to site.

2. Providing sufficient vehicles and staff to make changes as-needed on site during work.

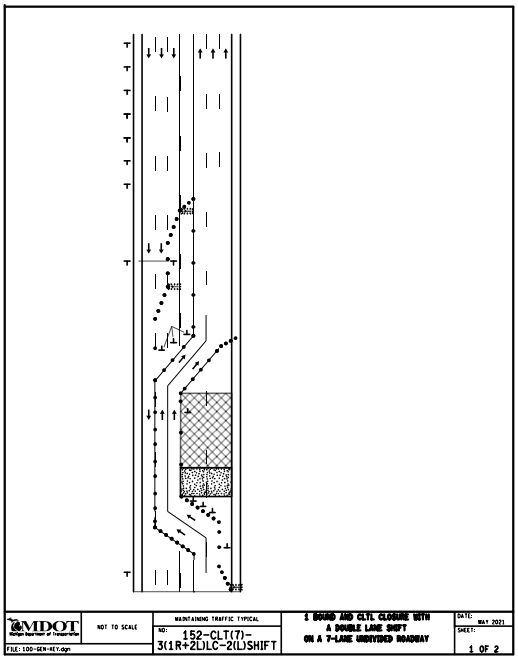
3. Providing sufficient vehicles and staff to remove closures from the roadway.

4. Providing additional traffic control devices required to expedite the construction for the convenience of the Contractor.

TYPICAL NUMBER KEY

CODES

AB = ARROW BOARD AW = ADVANCE WARNING C = CLOSURE CLT = CENTER LEFT TURN LANE CROSS = CROSSOVER CruSha = CRUSH AND SHAPE EM = EARLY MERGE EnR = ENTRANCE RAMP ExR = EXIT RAMP FW = FREEWAY GEN = GENERAL INFORMATION GORE = FREEWAY GORE AREA IN = INSIDE INT = INTERSECTION L = LANE (L) = LEFT LC = LANE CLOSURE LD = LONG DURATION	LO = LANE OPEN O = OUTSIDE (LANE CLOSURE) OUT = OUTSIDE OF SHOULDER MID = MIDDLE OF INTERSECTION OR ROAD NFW = NON-FREEWAY PARK = PARKING LANE PCMS = PORTABLE CHANGEABLE MESSAGE SIGN (R) = RIGHT ROLL = ROLLING ROADBLOCK RUM = RUMBLE STRIP SD = SHORT DURATION SHL = SHOULDER CLOSURE SIGN = SIGN SP = SPECIAL SPEED = SPEED STA = STOPPED TRAFFIC ADVISORY TR = TRAFFIC REGULATOR TS = TEMPORARY SIGNAL ZIP = ZIPPER MERGE



100 - GENERAL NOTES 110 - TRAFFIC REGULATORS 120 - NON-FREEWAY 130 - CENTER LEFT TURN (CLT) LANES 140 - PARKING LANES 150 - CLT 7 LANE SECTIONS 160 - SIGNAL WORK 200 - FREEWAY CLOSURES 210 - FREEWAY LANE SHIFTS 220 - FREEWAY ENTRANCE RAMPS 230 - FREEWAY EXIT RAMPS 300 - ADVANCE WARNINGS 310 - CROSSOVER CLOSURE 320 - CRUSH AND SHAPE 340 - MERGE SYSTEMS 350 - GORE LOCATIONS 360 - ROLLING ROADBLOCK 4000 - MAINTENANCE 5000 - SURVEY

EXAMPLE TYPICAL

CODE: 152-CTL(7)-3(1R+2L)LC-2(L)SHIFT

152 - TYPICAL NUMBER
CTL(7) = CENTER LEFT TURN LANE, 7 LANES TOTAL.
3(1R+2L)LC = 3 LANES CLOSED, (1 RIGHT LANE AND 2 LEFT LANES).
2(L)SHIFT = 2 LANES SHIFTED TO THE LEFT.

NOT TO SCALE

MDOT Michigan Department of Transportation	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	TYPICAL NUMBERING KEY	DATE: DECEMBER 2021
		NO: 100-GEN-KEY		SHEET: 1 OF 1
FILE: 100-GEN-KEY.dgn				

DISTANCE BETWEEN TRAFFIC SIGNS, "D"

"D" DISTANCES	POSTED SPEED LIMIT, MPH (PRIOR TO WORK AREA)										
	25	30	35	40	45	50	55	60	65	70	75
D (FEET)	250	300	350	400	450	500	550	600	650	700	750

GUIDELINES FOR LENGTH OF LONGITUDINAL BUFFER SPACE, "B"

"B" LENGTHS	SPEED,* MPH (PRIOR TO WORK AREA)											
	20	25	30	35	40	45	50	55	60	65	70	75
B (FEET)	33	50	83	132	181	230	279	329	411	476	542	625

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

MINIMUM MERGING TAPER LENGTH, "L" (FEET)

OFFSET (FEET)	POSTED SPEED LIMIT, MPH (PRIOR TO WORK AREA)										
	25	30	35	40	45	50	55	60	65	70	75
1	11	15	21	27	45	50	55	60	65	70	75
2	21	30	41	54	90	100	110	120	130	140	150
3	32	45	62	80	135	150	165	180	195	210	225
4	42	60	82	107	180	200	220	240	260	280	300
5	53	75	103	134	225	250	275	300	325	350	375
6	63	90	123	160	270	300	330	360	390	420	450
7	73	105	143	187	315	350	385	420	455	490	525
8	84	120	164	214	360	400	440	480	520	560	600
9	94	135	184	240	405	450	495	540	585	630	675
10	105	150	205	267	450	500	550	600	650	700	750
11	115	165	225	294	495	550	605	660	715	770	825
12	125	180	245	320	540	600	660	720	780	840	900
13	136	195	266	347	585	650	715	780	845	910	975
14	146	210	286	374	630	700	770	840	910	980	1050
15	157	225	307	400	675	750	825	900	975	1050	1125

NOT TO SCALE

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

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

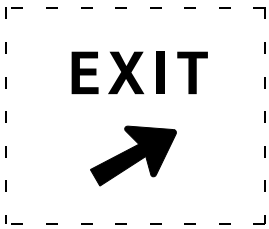
TYPES OF TAPERS	TAPER LENGTH
UPSTREAM TAPERS	
MERGING TAPER	L - MINIMUM
SHIFTING TAPER	1/2 L - MINIMUM
SHOULDER TAPER	1/3 L - MINIMUM
2 TO 1 LANE ROAD TAPER	100' - MAXIMUM
DOWNSTREAM TAPERS	
(USE IS RECOMMENDED)	100' (PER LANE)

MAXIMUM SPACING FOR CHANNELIZING DEVICES

WORK ZONE SPEED LIMIT	DRUM AND 42" DEVICE SPACING (FT)		NIGHTTIME 42" DEVICE SPACING (FT)	
	TAPER	TANGENT	TAPER	TANGENT
< 45 MPH	1 x SPEED LIMIT	2 x SPEED LIMIT	25 FEET	50 FEET
≥ 45 MPH	50 FEET	100 FEET	25 FEET	50 FEET

SIGN OUTLINE KEY

DASHED OUTLINES INDICATE A SIGN THAT EXISTS ON SITE, AND NEEDS TO BE COVERED.



SOLID OUTLINES INDICATE A SIGN THAT IS TO BE PLACED ON THE PROJECT

NOT TO SCALE

GUIDELINES FOR ROLL-AHEAD DISTANCES FOR TMA VEHICLES - TEST LEVEL 2

WEIGHT OF TMA VEHICLE	PREVAILING SPEED (POSTED SPEED PRIOR TO WORK ZONE)	ROLL-AHEAD DISTANCE* (DISTANCE FROM FRONT OF TMA VEHICLE TO WORK AREA)
5.5 TONS (STATIONARY)	40 MPH OR LESS	25 FT

* ROLL-AHEAD DISTANCES ARE CALCULATED USING A 4,410 POUND IMPACT VEHICLE WEIGHT.

GUIDELINES FOR ROLL-AHEAD DISTANCES FOR TMA VEHICLES - TEST LEVEL 3

WEIGHT OF TMA VEHICLE	PREVAILING SPEED (POSTED SPEED PRIOR TO WORK ZONE)	ROLL-AHEAD DISTANCE* (DISTANCE FROM FRONT OF TMA VEHICLE TO WORK AREA)
5 TONS (MOBILE)	45 MPH	100 FT
	50-55 MPH	150 FT
	60-75 MPH	175 FT
12 TONS (STATIONARY)	45 MPH	25 FT
	50-55 MPH	25 FT
	60-75 MPH	50 FT

* ROLL-AHEAD DISTANCES ARE CALCULATED USING A 10,000 POUND IMPACT VEHICLE WEIGHT.

THE FOLLOWING NOTES APPLY IF CALLED FOR ON THE TRAFFIC TYPICAL

GENERAL NOTES

G1: SEE GEN-SPACING-CHARTS FOR COMMON VALUES INCLUDING:
D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES
L = MINIMUM LENGTH OF TAPER
B = LENGTH OF LONGITUDINAL BUFFER
ROLL AHEAD DISTANCE

G2: DISTANCE BETWEEN SIGNS, "D", THE VALUES FOR WHICH ARE SHOWN IN TYPICAL GEN-KEY ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.

G3: ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING MUST MEET NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 350 (NCHRP 350) TEST LEVEL 3, OR MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) TL-3 AS WELL AS 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.

G4: DO NOT STORE EQUIPMENT, MATERIALS OR PERFORM WORK IN ESTABLISHED BUFFER AREAS.

G5: 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 TRAFFIC PATTERNS FOR WORK LESS THAN THREE DAYS THAT ARE ADEQUATELY DELINEATED BY OTHER TRAFFIC CONTROL DEVICES.

SIGN NOTES

S1: ALL NON-APPLICABLE SIGNING WITHIN THE CIA MUST BE MODIFIED TO FIT CONDITIONS, COVERED, OR REMOVED. FOR GUIDANCE SEE THE WORK ZONE SAFETY AND MOBILITY MANUAL, SECTIONS 6.01.09 AND 6.01.10.

S2: R5-18b SIGNS ARE ONLY REQUIRED ON FREEWAY PROJECTS WITH A DURATION OF 15 DAYS OR LONGER OR NON-FREEWAY PROJECTS WITH A DURATION OF 90 DAYS OR LONGER. TO APPLY THIS TYPICAL WITHOUT R5-18b SIGNS, REMOVE THE SIGNS AND CONSOLIDATE THE SEQUENCE AS APPROPRIATE.

S3: R5-18c IS ONLY REQUIRED IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. OMIT THIS SIGN IN SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE.

S4: ADDITIONAL SIGNING AND/OR ELONGATED SIGNING SEQUENCES SHOULD BE USED WHEN TRAFFIC VOLUMES ARE SIGNIFICANT ENOUGH TO CREATE BACKUPS BEYOND THE W20-5 SIGNS.

S5: PLACE ADDITIONAL SPEED LIMIT SIGNS REFLECTING THE WORK ZONE SPEED AFTER EACH MAJOR CROSSROAD THAT INTERSECTS THE WORK ZONE, OR AFTER EACH ENTRANCE RAMP THAT COMES ONTO THE FREEWAY WHERE THE REDUCED SPEED IS IN EFFECT. PLACE ADDITIONAL SPEED LIMIT SIGNS AT INTERVALS ALONG THE ROADWAY SUCH THAT NO SPEED LIMIT SIGNS ARE MORE THAN 2 MILES APART. WHEN REDUCED SPEED LIMITS ARE UTILIZED IN THE WORK AREA, PLACE ADDITIONAL SPEED LIMIT SIGNS RETURNING TRAFFIC TO ITS NORMAL SPEED BEYOND THE LIMITS OF THE WORK AREA AS INDICATED. IF PERMANENT SIGNS DISPLAYING THE CORRECT SPEED LIMIT ARE POSTED, OMIT ALL W3-5b AND R2-1 SIGNS AND REDUCE SPACING ACCORDINGLY.

S6: FABRICATE SPECIAL SIGNS IN ACCORDANCE WITH CURRENT SIGNING DESIGN STANDARDS.

S7: PLACE ADDITIONAL R8-3 SIGNS AT A MAXIMUM 500' SPACING THROUGHOUT THE WORK ZONE.

S8: WHEN SPEED LIMIT SIGNS CANNOT BE PLACED SIDE BY SIDE AS SHOWN, PLACE THEM "D" DISTANCE APART.

S9: STOP SIGNS NOT REQUIRED IF SIGNALS ARE ON 4-WAY FLASHING RED. STOP AHEAD SIGNS ARE NOT REQUIRED IF THERE IS ADEQUATE VISIBILITY OF THE STOP SIGN OR IF SIGNALS ARE BEING USED TO CONTROL TRAFFIC.

S10: PLACE REDUCED SPEED ZONE AHEAD SIGN (W3-5b) HERE WHEN USING A SPEED REDUCTION IN THIS DIRECTION.

S11: THE NUMBER OF W1-6 SHIFT SIGNS TO PLACE FOR A SHIFT IS AS FOLLOWS:
SHIFTS 4FT OR LESS, PLACE ONE W1-6(R)(L)
SHIFTS 5FT TO 12FT, PLACE TWO W1-6(R)(L)
SHIFTS MORE THAN 12FT, PLACE THREE OR MORE W1-6(R)(L) SIGNS DEPENDING UPON LENGTH OF SHIFT AND AS PER THE ENGINEER.

S12: PLACE R2-1 SIGNS AS DETAILED IN NOTE S5 WHEN THERE IS A SPEED REDUCTION IN THIS DIRECTION

TRAFFIC REGULATOR NOTES

TR1: TRAFFIC REGULATORS MUST FOLLOW ALL THE REQUIREMENTS IN THE STANDARD SPECIFICATIONS, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS, THE CURRENT VERSIONS OF THE TRAFFIC REGULATOR'S INSTRUCTION MANUAL AND THE VIDEO "HOW TO SAFELY REGULATE TRAFFIC IN MICHIGAN". THE MAXIMUM DISTANCE BETWEEN THE TRAFFIC REGULATORS IS DETERMINED BY THE ROADWAY ADT, GEOMETRICS, AND AS DIRECTED BY THE ENGINEER.

TR2: PROVIDE APPROPRIATE BALLOON LIGHTING TO SUFFICIENTLY ILLUMINATE TRAFFIC REGULATOR'S STATIONS WHEN TRAFFIC REGULATING IS ALLOWED DURING THE HOURS OF DARKNESS.

TR3: PROVIDE EITHER A STOP/SLOW AFAD OR A RED/YELLOW LENS AFAD, MEETING THE REQUIREMENTS OF THE MMUTCD

TEMPORARY TRAFFIC CONTROL DEVICE NOTES

TCD1: THE MAXIMUM DISTANCE IN FEET BETWEEN CHANNELIZING DEVICES IN A TAPER SHOULD NOT EXCEED 1.0 TIMES THE WORK ZONE SPEED LIMIT IN MPH FOR ROADWAYS WITH A POSTED WORK ZONE SPEED LIMIT LESS THAN 45 MPH AND SHOULD NOT EXCEED 50 FEET ON ROADWAYS WITH A POSTED WORK ZONE SPEED LIMIT OF 45 MPH OR GREATER. THE SPACING FOR 42 INCH CHANNELIZING DEVICE TAPERS ARE NOT TO EXCEED 25 FEET AT NIGHT.

TCD2: THE MAXIMUM DISTANCE IN FEET BETWEEN CHANNELIZING DEVICES IN A TANGENT SHOULD NOT EXCEED TWICE THE WORK ZONE SPEED LIMIT IN MPH FOR ROADWAYS WITH A POSTED WORK ZONE SPEED LIMIT LESS THAN 45 MPH AND SHOULD NOT EXCEED 100 FEET ON ROADWAYS WITH A POSTED WORK ZONE SPEED LIMIT OF 45 MPH OR GREATER. THE SPACING FOR 42 INCH CHANNELIZING DEVICE TANGENTS ARE NOT TO EXCEED 50 FEET AT NIGHT.

TCD3: TYPE III BARRICADES MUST BE LIGHTED FOR OVERNIGHT CLOSURES.

TCD4: WHEN THE HAUL ROAD IS NOT IN USE, PLACE LIGHTED TYPE III BARRICADES WITH "ROAD CLOSED" EXTENDING COMPLETELY ACROSS THE HAUL ROAD.

TCD5: USE OBJECT MARKER SIGNS IN LIEU OF THE TYPE B HIGH INTENSITY LIGHT SHOWN IN THE STANDARD PLAN FOR TEMPORARY CONCRETE BARRIER (R-53, AND R-126) WHEN USED WITH A TEMPORARY SIGNAL SYSTEM. THE OBJECT MARKERS MUST BE A MINIMUM OF 12 INCHES IN WIDTH AND 36 INCHES IN HEIGHT AND HAVE ORANGE AND WHITE RETROREFLECTIVE SHEETING. THE RETROREFLECTIVE SHEETING MUST HAVE ALTERNATING DIAGONAL ORANGE AND WHITE STRIPES SLOPING DOWNWARD AT AN ANGLE OF 45 DEGREES IN THE DIRECTION VEHICULAR TRAFFIC IS TO PASS.

TCD6: PLACE LIGHTED ARROW PANELS AS CLOSE TO THE BEGINNING OF TAPERS AS PRACTICAL, BUT NOT IN A MANNER THAT WILL OBSCURE OR CONFUSE APPROACHING MOTORISTS WHEN PHYSICAL LIMITATIONS RESTRICT PLACEMENT. IN CURBED SECTIONS, IF ARROW BOARD CANNOT BE PLACED BEHIND CURB, PLACE ARROW BOARD IN THE CLOSED LANE AS CLOSE TO THE BEGINNING OF TAPER AS POSSIBLE.

TCD7: ADDITIONAL TYPE III BARRICADES MAY BE REQUIRED TO COMPLETELY CLOSE OFF ROAD FROM EDGE OF PAVEMENT TO EDGE OF PAVEMENT.

TCD8: WHERE THE SHIFTED SECTION IS SHORTER THAN 600 FEET, A DOUBLE REVERSE CURVE SIGN (W24-1) CAN BE USED INSTEAD OF THE FIRST REVERSE CURVE SIGN, AND THE SECOND REVERSE CURVE SIGN CAN BE OMITTED.

TCD9: RUMBLE STRIPS ARE TO BE PLACED AS SPECIFIED IN THE CONTRACT. IF NOT SPECIFIED IN THE CONTRACT, PLACE RUMBLE STRIPS AS SHOWN, AND IN ACCORDANCE WITH THE RUMBLE STRIP MANUFACTURER'S RECOMMENDATIONS. AN ARRAY OF RUMBLE STRIPS CONTAINS THREE RUMBLE STRIPS. PLACE THE RUMBLE STRIPS IN THE ARRAY AT A CONSISTENT DISTANCE, BETWEEN 10' AND 20' APART.

TCD10: SEE THE WORK ZONE SAFETY AND MOBILITY MANUAL, PORTABLE CHANGEABLE MESSAGE SIGN GUIDELINES FOR RECCOMENDED AND CORRECT PCMS MESSAGING. STAGGER PCMS THAT ARE ON OPPOSING SIDES OF THE ROAD 1000 FEET FROM EACH OTHER.

RAMP NOTES

RMP1: WHEN CONDITIONS ALLOW, E5-1 SIGNS MUST BE REMOVED OR COVERED AND CHANELIZING DEVICES MUST BE POSITIONED TO ENABLE RAMP TRAFFIC TO DIVERGE IN A FREE MANNER

RMP2: STOP AND YIELD CONDITIONS SHOULD BE AVOIDED WHENEVER PRACTICAL. WHEN CONDITIONS WARRANT, R1-1 SIGNS MAY BE USED IN PLACE OF R1-2 SIGNS. WHEN R-1 SIGNS ARE USED, W3-1 SIGNS MUST BE USED IN PLACE OF W3-2 SIGNS. CONSIDERATION SHOULD BE GIVEN TO CLOSING THE RAMP TO COMPLETE WORK TO ALLOW AN ADEQUATE MERGE DISTANCE. WORK SHOULD BE EXPEDITED TO AVOID THE STOP AND/OR YIELD CONDITIONS.

THE FOLLOWING NOTES APPLY IF CALLED FOR ON THE TRAFFIC TYPICAL

SIGNAL NOTES

SIG1: EXISTING SIGNAL MUST BE EITHER 4-WAY FLASHING RED, BAGGED, OR TURNED OFF.

SIG2: SIGNAL IS IN OPERATION.

SIG3: DELINEATE THE WORK ZONE AREA WITH 28 INCH CONES FOR DAYTIME WORK, OR 42 INCH CHANNELIZING DEVICES FOR NIGHTTIME WORK.

SIG4: THE CONTRACTOR MUST HAVE A DESIGNATED SPOTTER IF THE AERIAL BUCKET TRUCK IS LOCATED OVER ACTIVE TRAVEL LANES.

SIG5: THE LOWEST POINT OF THE BUCKET MAY NOT TRAVEL BELOW 14 FOOT VERTICAL CLEARANCE. THE CONTRACTOR MUST UTILIZE AN ALTERNATE SET UP, OR PLACE THE INTERSECTION IN A 4 WAY STOP IF THE 14 FOOT VERTICAL CLEARANCE IS COMPROMIZED. USE TRAFFIC REGULATORS TO CONTROL TRAFFIC THROUGH THE INTERSECTION WHEN TRAFFIC IS PLACED IN A 4 WAY STOP.

SIG6: DELINEATE THE TRUCK WITH CHANNELIZING DEVICES. THE POSITION OF THE TRUCK MAY BE MOVED TO FACILITATE WORK.

MAINTENANCE AND SURVEYING NOTES

MS1: WHENEVER STOPPING SIGHT DISTANCE EXISTS TO THE REAR, THE SHADOW VEHICLES SHOULD MAINTAIN THE RECOMENDED DISTANCE FROM THE WORK AREA AND PROCEEED AT THE SAME SPEED. THE SHADOW VEHICLE SHOULD SLOW DOWN AND TRAVEL AT A FARTHER DISTANCE TO PROVIDE ADEQUATE SIGHT DISTANCE IN ADVANCE OF VERTICAL OR HORIZONTAL CURVES.

MS2: WORKERS OUTSIDE OF VEHICLES SHOULD WORK WITHIN 150' OF WORK VEHICLES WITH AN ACTIVATED BEACON, BETWEEN THE "BEGIN WORK CONVOY" SIGN AND THE "END WORK CONVOY" SIGN, OR BETWEEN THE "WORK ZONE BEGINS" AND "END ROAD WORK" SIGN.

MS3: WORK OR SHADOW VEHICLES WITH OR WITHOUT A TMA MAY BE USED TO SEPARATE THE WORK SPACE FROM TRAFFIC. IF USED, THE VEHICLES SHOULD BE PARKED ACCORDING TO THE ROLL AHEAD DISTANCE TABLES.

MS4: WORK AND SHADOW VEHICLES SHALL BE APPROPRIATELY EQUIPPED WITH AN ACTIVATED AMBER BEACON.

MS5: WHEN WORKERS ARE OUTSIDE THEIR VEHICLES IN AN EXISTING LANE WHILE A MOBILE OPERATION IS OCCURRING DURING THE NIGHTTIME HOURS, CHANNELIZING DEVICES TO DELINEATE OPEN OR CLOSED LANES AT 50 FT SPACING MUST BE USED. AN EXAMPLE OF AN OPERATION (BUT NOT LIMITED TO) IS THE LAYOUT OF CONCRETE PATCHES.

MS6: W21-6 AND W20-1 SIGNS MAY BE SUBSTITUTED AS DETERMINED BY THE TYPE OF WORK TAKING PLACE AS PER THE ENGINEER.

SIGN NUMBER KEY

E5-1f
48" x 48"
60" x 48"

E5-2
48" x 36"

E5-2a
48" x 36"

E5-3
48" x 36"

E13-1P
VAR x 24"

E13-1aP
36" x 24"

G20-1
60" x 24"

G20-2
48" x 24"

G20-4
36" x 18"


I-6a
18" x 18"
24" x 24"
30" x 30"

M1-1
18" x 18"
24" x 24"
36" x 36"
48" x 48"

M1-1
22.5" x 18"
30" x 24"
45" x 36"
60" x 48"

M1-2
18" x 18"
24" x 24"
36" x 36"
48" x 48"

M1-2
22.5" x 18"
30" x 24"
45" x 36"
60" x 48"

M1-3
18" x 18"
24" x 24"
36" x 36"
48" x 48"

M1-3
22.5" x 18"
30" x 24"
45" x 36"
60" x 48"

M1-4
18" x 18"
24" x 24"
36" x 36"
48" x 48"

M1-4
22.5" x 18"
30" x 24"
45" x 36"
60" x 48"

M1-5
18" x 18"
24" x 24"
30" x 30"
36" x 36"

M1-5a
18" x 18"
24" x 24"

M1-6
18" x 18"
24" x 24"
36" X 36"

M1-6
22.5" x 18"
30" x 24"
45" x 36"

M3-1
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M3-2
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M3-3
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M3-4
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M4-1
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M4-1a
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M4-2
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M4-3
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M4-4
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M4-5
12" X 6"
18" x 9"
24" X 12"
30" X 15"
36" X 18"

M4-6
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M4-7
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M4-7a
12" x 6"
18" x 9"
24" x 12"
30" x 15"
36" x 18"

M4-8
12" x 6"
18" x 9"
24" x 12"
30" x 15"

M4-8a
24" x 18"

M4-8b
24" x 12"

M4-9L
30" x 24"
48" x 36"
60" x 48"

M4-9R
30" x 24"
48" x 36"
60" x 48"

M4-9j
30" x 24"
48" x 36"
60" x 48"

M4-9kL
30" x 24"
48" x 36"
60" x 48"

M4-9kR
30" x 30"
48" x 42"
60" x 54"

M4-9mL
30" x 30"
48" x 42"
60" x 54"

M4-9mR
30" x 30"
48" x 42"
60" x 54"

M4-9dL
12" x 18"

M4-9dR
12" x 18"

M4-9e
12" x 18"

M4-9f
12" x 18"

M4-9gL
12" x 18"

M4-9gR
12" x 18"

M4-9h
12" x 24"

M4-9i
12" x 18"

M4-10L
48" x 18"

M4-10R
48" x 18"

M4-11a
12" X 6"
18" x 9"
24" X 12"
30" X 15"
36" X 18"

M5-1L
12" x 9"
21" x 15"
30" x 21"

M5-1R
12" x 9"
21" x 15"
30" x 21"

M5-2L
12" x 9"
21" x 15"
30" x 21"

M5-2R
12" x 9"
21" x 15"
30" x 21"

M5-3
12" x 9"
21" x 15"
30" x 21"

M6-1L
12" x 9"
18" x 12"
21" x 15"
30" x 21"

M6-1R
12" x 9"
18" x 12"
21" x 15"
30" x 21"

M6-2L
12" x 9"
18" x 12"
21" x 15"
30" x 21"

M6-2R
12" x 9"
18" x 12"
21" x 15"
30" x 21"

M6-3
12" x 9"
18" x 12"
21" x 15"
30" x 21"

M6-4
12" x 9"
18" x 12"
21" x 15"
30" x 21"

M6-5
12" x 9"
18" x 12"
21" x 15"
30" x 21"

M6-6L
12" x 9"
18" x 12"
21" x 15"
30" x 21"

M6-6R
12" x 9"
18" x 12"
21" x 15"
30" x 21"

M6-7L
12" x 9"
18" x 12"
21" x 15"
30" x 21"

M6-7R
12" x 9"
18" x 12"
21" x 15"
30" x 21"

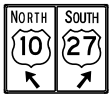
SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS

MDOT Michigan Department of Transportation	MAINTAINING TRAFFIC TYPICAL	STANDARD HIGHWAY SIGNS	DATE: 10/17/24
NO SCALE	CODE: 103-GEN-SIGN		SHEET: 1 OF 5

SIGN NUMBER KEY

M8-1gL
36" x 66"

M8-1gR
36" x 66"

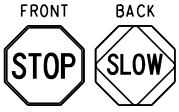


M8-2d
60" x 48"


OM-3L
12" x 36"
24" x 48"
36" x 72"


OM-3R
12" x 36"
24" x 48"
36" x 72"

R1-1
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"



R1-1a
18" x 18"
24" x 24"

R1-2
18"
24"
30"
36"
48"
60"

R1-2aP
24" x 18"
36" x 30"
48" x 36"

R2-1
18" x 24"
24" x 30"
30" x 36"
36" x 48"
48" x 60"

R2-1a
48" x 60"


R3-1
24" x 24"
30" x 30"
36" x 36"
48" x 48"


R3-2
24" x 24"
30" x 30"
36" x 36"
48" x 48"

R3-3
24" x 24"
36" x 36"
48" x 48"


R3-4
24" x 24"
30" x 30"
36" x 36"
48" x 48"

R3-5L
30" x 36"
36" x 48"

R3-5R
30" x 36"
36" x 48"

R3-5a
30" x 36"
36" x 48"

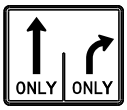

R3-6L
30" x 36"
42" x 48"


R3-6R
30" x 36"
42" x 48"

R3-7L
30" x 30"
36" x 36"

R3-7R
30" x 30"
36" x 36"

R3-8c
36" x 30"



R3-8d
36" x 30"

R4-1
12" x 18"
18" x 24"
24" x 30"
36" x 48"
48" x 60"

R4-2
12" x 18"
18" x 24"
24" x 30"
36" x 48"
48" x 60"


R4-7
12" x 18"
18" x 24"
24" x 30"
36" x 48"
48" x 60"


R4-8
18" x 24"
24" x 30"
36" x 48"
48" x 60"

R4-9
18" x 24"
24" x 30"
36" x 48"
48" x 60"

R5-1
30" x 30"
36" x 36"
48" x 48"

R5-1a
30" x 18"
36" x 24"
42" x 30"

R5-18b
48" x 60"

R5-18c
48" x 48"

R5-18d
78" x 12"

R5-18e
72" x 12"

R5-18f
48" x 60"

R5-18g
30" x 42"

R5-18h
48" x 60"

R6-1L
36" x 12"
54" x 18"

R6-1R
36" x 12"
54" x 18"

R6-2L
12" x 16"
18" x 24"
24" x 30"
36" x 48"
48" x 60"

R6-2R
12" x 16"
18" x 24"
24" x 30"
36" x 48"
48" x 60"

R8-3
12" x 12"
18" x 18"
24" x 24"
36" x 36"
48" x 48"

R9-8
36" x 18"

R9-9
24" x 12"
30" x 18"

R9-10
24" x 12"
48" x 24"

R9-11L
24" x 12"
48" x 36"

R9-11R
24" x 12"
48" x 36"

R9-11aL
24" x 12"
48" x 24"

R9-11aR
24" x 12"
48" x 24"

R10-6b
36" x 54"

R11-2
48" x 30"

R11-2a
48" x 30"

R11-2b
48" x 30"

R11-2c
60" x 30"

R11-3a
60" x 30"

R11-3b
60" x 30"

R11-4
60" x 30"

SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS

MDOT Michigan Department of Transportation	MAINTAINING TRAFFIC TYPICAL	STANDARD HIGHWAY SIGNS	DATE: 10/17/24
NO SCALE	CODE: 103-GEN-SIGN		SHEET: 2 OF 5

SIGN NUMBER KEY

W1-1L
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-1R
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-2L
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-2R
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-2bL
36" x 36"
48" x 48"

W1-2bR
36" x 36"
48" x 48"

W1-3L
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-3R
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-4L
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-4R
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-4bL
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-4bR
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-4cL
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W1-4cR
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W24-1L
30" x 30"
36" x 36"
48" x 48"

W24-1cP
24" x 18"
30" x 24"

W24-1R
30" x 30"
36" x 36"
48" x 48"

W24-1aL
30" x 30"
36" x 36"
48" x 48"

W24-1aR
30" x 30"
36" x 36"
48" x 48"

W24-1bL
30" x 30"
36" x 36"
48" x 48"

W24-1bR
30" x 30"
36" x 36"
48" x 48"

W1-6L
24" x 12"
36" x 18"
48" x 24"
60" x 30"
96" x 48"

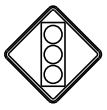
W1-6R
24" x 12"
36" x 18"
48" x 24"
60" x 30"
96" x 48"

W1-8L
12" x 18"
18" x 24"
24" x 30"
30" x 36"
36" x 48"

W1-8R
12" x 18"
18" x 24"
24" x 30"
30" x 36"
36" x 48"

W3-1
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W3-2
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"



W3-3
18" x 18"
30" x 30"
36" x 36"
48" x 48"

W3-4
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W3-4b
30" x 30"
36" x 36"
48" x 48"

W3-5
36" x 36"
48" x 48"

W3-5a
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W3-5b
30" x 30"
36" x 36"
48" x 48"

W4-1L
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W4-1R
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W4-2L
30" x 30"
36" x 36"
48" x 48"

W4-2R
30" x 30"
36" x 36"
48" x 48"

W4-3L
30" x 30"
36" x 36"
48" x 48"

W4-3R
30" x 30"
36" x 36"
48" x 48"

W4-5L
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W4-5R
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W4-5P
18" x 24"
24" x 30"

W4-6L
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W4-6R
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W4-7L
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W4-7R
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W5-1
30" x 30"
36" x 36"
48" x 48"

W5-2
18" x 18"
30" x 30"
36" x 36"
48" x 48"

W5-3
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W5-4
30" x 30"
36" x 36"
48" x 48"

W6-1
30" x 30"
36" x 36"
48" x 48"

W6-2
30" x 30"
36" x 36"
48" x 48"

W6-3
30" x 30"
36" x 36"
48" x 48"

W6-4
12" x 18"

W7-1
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W7-1a
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-1
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS

MDOT Michigan Department of Transportation	MAINTAINING TRAFFIC TYPICAL	STANDARD HIGHWAY SIGNS	DATE: 10/17/24
NO SCALE	CODE: 103-GEN-SIGN		SHEET: 3 OF 5

SIGN NUMBER KEY

W8-2
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-3
18" x 18"
30" x 30"
36" x 36"
48" x 48"

W8-4
18" x 18"
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-5
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-5P
24" x 18"
30" x 24"
36" x 30"

W8-7
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-8
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-9
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-11
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-12
30" x 30"
36" x 36"
48" x 48"

W8-14
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-15
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-15P
24" x 18"
30" x 24"
36" x 30"

W8-17L
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-17R
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-17P
24" x 18"
30" x 24"
36" x 30"

W8-18
24" x 24"
36" x 36"
48" x 48"

W8-23
24" x 24"
36" x 36"
48" x 48"

W8-24
30" x 30"
36" x 36"
48" x 48"

W8-25
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W8-26
36" x 36"
48" x 48"

W9-1L
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W9-1R
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W9-2L
30" x 30"
36" x 36"
48" x 48"

W9-2R
30" x 30"
36" x 36"
48" x 48"

W9-3C
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W9-3L
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W9-3R
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W9-3a
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W9-3b
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W11-10
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W11-10a
24" x 24"
30" x 30"
36" x 36"
48" x 48"

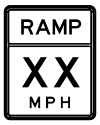
W11-24
36" x 36"
48" x 48"

W12-1
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W12-2
18" x 18"
30" x 30"
36" x 36"
48" x 48"

W13-1P
18" x 18"
24" x 24"
30" x 30"

W13-2
24" x 30"
36" x 48"
48" x 60"



W13-3
24" x 30"
36" x 48"
48" x 60"

W13-4P
24" x 24"
36" x 36"

W13-6
24" x 42"
36" x 60"
48" x 84"

W13-6a
24" x 42"
36" x 60"
48" x 84"

W13-7
24" x 42"
36" x 60"
48" x 84"

W13-7a
24" x 42"
36" x 60"
48" x 84"

W14-3
36" x 24"
40" x 30"
48" x 36"
64" x 48"

W16-2P
18" x 12"
24" x 18"
30" x 24"

W16-4aP
18" x 12"
24" x 18"
30" x 24"
36" x 30"

W16-12P
24" x 18"

W16-13P
24" x 18"
30" x 24"

W20-1
24" x 24"
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W20-1a
24" x 24"
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W20-1b
24" x 24"
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W20-1c
24" x 24"
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W20-1d
24" x 24"
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W20-2
30" x 30"
36" x 36"
48" x 48"

W20-3
30" x 30"
36" x 36"
48" x 48"

W20-3a
30" x 30"
36" x 36"
48" x 48"

SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS

MDOT Michigan Department of Transportation	MAINTAINING TRAFFIC TYPICAL	STANDARD HIGHWAY SIGNS	DATE: 10/17/24
NO SCALE	CODE: 103-GEN-SIGN		SHEET: 4 OF 5

SIGN NUMBER KEY

W20-3b
30" x 30"
36" x 36"
48" x 48"

W20-4
30" x 30"
36" x 36"
48" x 48"

W20-4c
36" x 36"
48" x 48"

W20-5C
30" x 30"
36" x 36"
48" x 48"

W20-5L
30" x 30"
36" x 36"
48" x 48"

W20-5L1
30" x 30"
36" x 36"
48" x 48"

W20-5L2
30" x 30"
36" x 36"
48" x 48"

W20-5R
30" x 30"
36" x 36"
48" x 48"

W20-5R1
30" x 30"
36" x 36"
48" x 48"

W20-5R2
30" x 30"
36" x 36"
48" x 48"

W20-5aL2
30" x 30"
36" x 36"
48" x 48"

W20-5aL3
30" x 30"
36" x 36"
48" x 48"

W20-5aR2
30" x 30"
36" x 36"
48" x 48"

W20-5aR3
30" x 30"
36" x 36"
48" x 48"

W20-7a
30" x 30"
36" x 36"
48" x 48"

W20-8
24" x 18"

W20-9
54" x 48"

W20-10
48" x 24"
66" x 30"

W20-11
12" x 18"

W20-12P
VARIABLE x 12"

W20-13P
VARIABLE x 12"

W20-14L
36" x 36"
48" x 48"

W20-14R
36" x 36"
48" x 48"

W20-14aP
36" x 12"
48" x 12"

W20-14bP
36" x 12"
48" x 12"

W20-15
36" x 36"
48" x 48"

W20-16
36" x 36"
48" x 48"

W20-17
36" x 36"
48" x 48"

W20-18
48" x 54"

W20-18a
48" x 54"

W21-1
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W21-2
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W21-2
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W21-3
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W21-4
36" x 18"

W21-5
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W21-5aL
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W21-5aR
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W21-5bL
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W21-5bR
30" x 30"
36" x 36"
48" x 48"
60" x 60"

W21-6
24" x 24"
30" x 30"
36" x 36"
48" x 48"

W21-7
30" x 30"
36" x 36"
48" x 48"

W21-8
30" x 30"
36" x 36"
48" x 48"

W22-1
30" x 30"
36" x 36"
48" x 48"

W22-2
42" x 36"

W22-3
36" x 30"
42" x 36"

W23-1
48" x 24"

W23-2
36" x 36"
48" x 48"

SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS

MDOT Michigan Department of Transportation	MAINTAINING TRAFFIC TYPICAL	STANDARD HIGHWAY SIGNS	DATE: 10/17/24
NO SCALE	CODE: 103-GEN-SIGN		SHEET: 5 OF 5

SIGN MATERIAL SELECTION TABLE

	SIGN MATERIAL TYPE		
SIGN SIZE	TYPE I	TYPE II	TYPE III
≤ 36" X 36"		X	X
>36" X 36" ≤ 96" TO WIDE		X	
> 96" WIDE TO 144" WIDE	X	X	
> 144" WIDE	X		

TYPE I ALUMINUM EXTRUSION
TYPE II PLYWOOD
TYPE III ALUMINUM SHEET

ROUNDING OF CORNERS IS NOT REQUIRED FOR TYPE I OR II SIGNS.
VERTICAL JOINTS ARE NOT PERMITTED.
HORIZONTIAL JOINTS THROUGH SIGN LEGEND OR SYMBOLS ARE NOT PERMITTED.

POST SIZE REQUIREMENTS TABLE

	POST TYPE		
SIGN AREA (ft^2)	U-CHANNEL STEEL	SQUARE TUBULAR STEEL	WOOD
≤9	1 - 3 lb/ft*	1 - 2" 12 or 14 GA*	N/A
9 ≤ 20	2 - 3 lb/ft	2 - 2" 12 or 14 GA	1 - 4" X 6"*
> 20 ≤ 30	N/A	N/A	2 - 4" X 6"
> 30 ≤ 60	N/A	N/A	2 - 6" X 8"
> 60 ≤ 84	N/A	N/A	3 - 6" X 8"

*SIGNS 4 FEET AND GREATER IN WIDTH REQUIRE 2 POSTS.
SIGNS GREATER THAN 8 FEET IN WIDTH REQUIRE 2 OR 3 WOOD POSTS DEPENDING ON AREA OF SIGN.
A MAXIMUM OF 2 POSTS WITHIN A 7' PATH IS PERMITTED.

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: CON/ECH

CHECKED BY: AUG

DEPARTMENT DIRECTOR
Kirk T. Steudle

APPROVED BY: _____
DIRECTOR, BUREAU OF FIELD SERVICES

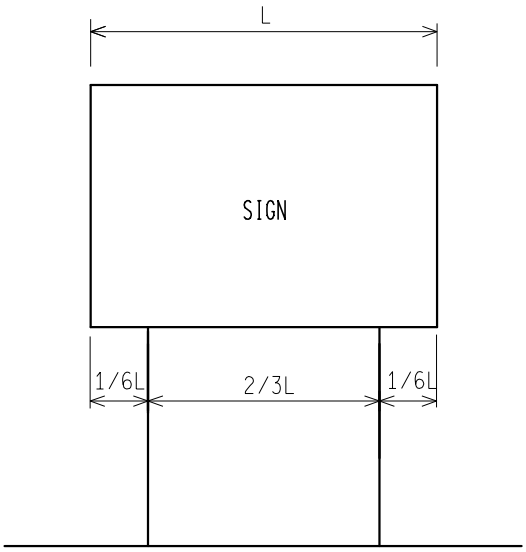
APPROVED BY: _____
DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR

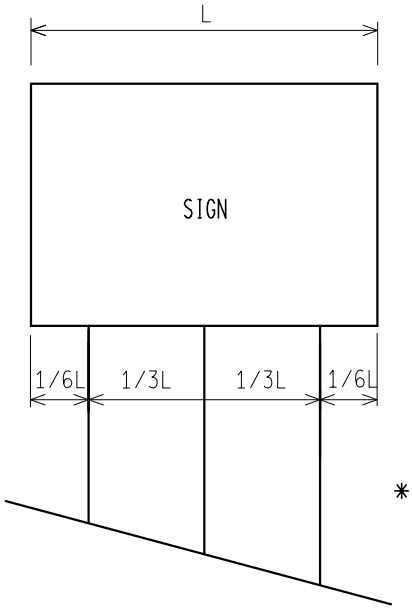
GROUND DRIVEN SIGN SUPPORTS FOR TEMP SIGNS

F.H.W.A. APPROVAL	11/2/2017 PLAN DATE	WZD-100-A	SHEET 1 OF 11

2 POST SIGN SUPPORT SPACING

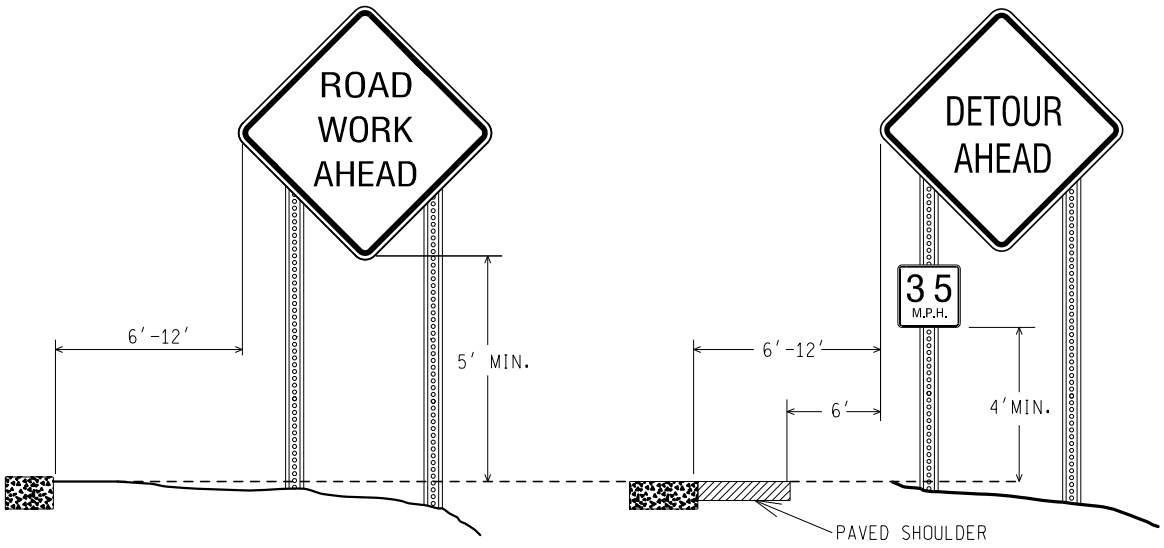


3 POST SIGN SUPPORT SPACING



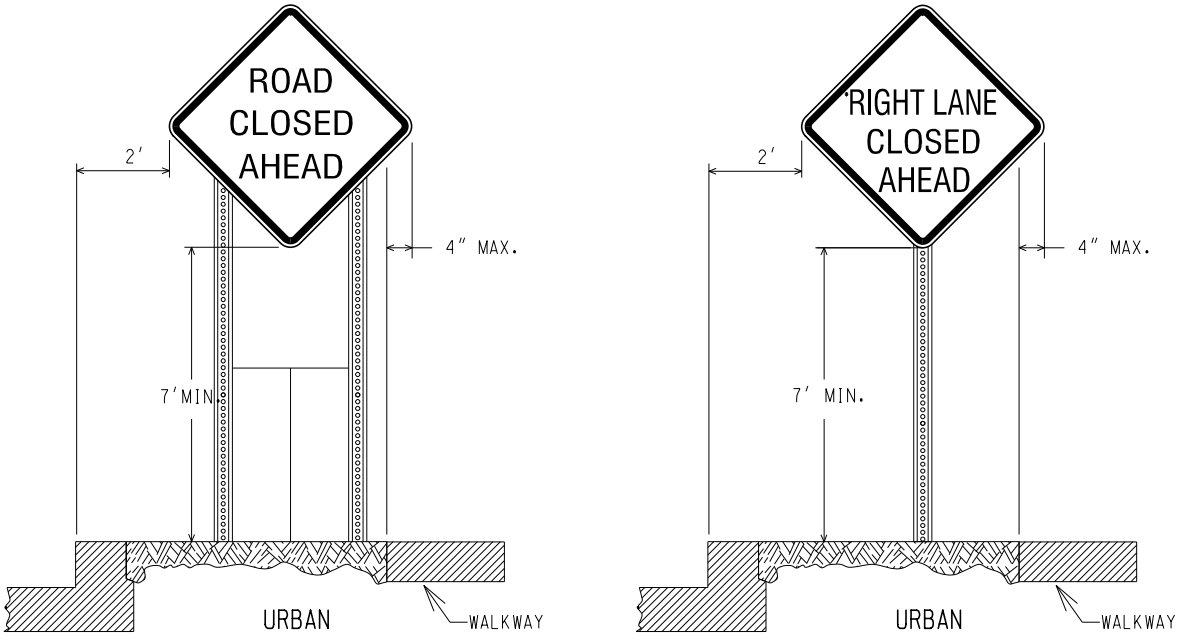
* FOR ALL 11' AND 12' LONG SIGNS ON 3 WOOD SUPPORTS, SPREAD POSTS SO AS TO HAVE A 8' MIN. TO 9' MAX. DISTANCE BETWEEN OUTSIDE POSTS.

NOT TO SCALE



RURAL

RURAL WITH ADVISORY
SPEED PLATE



(CURBED AREAS OR WHERE
WALKWAYS ARE PRESENT)

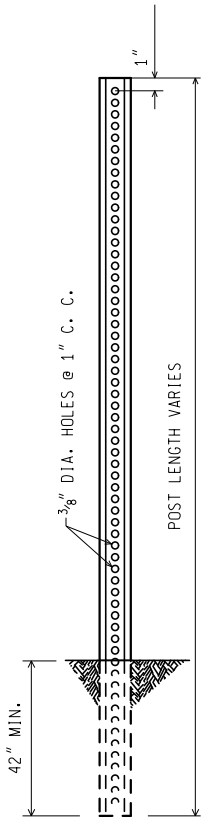
(CURBED AREAS OR WHERE
WALKWAYS ARE PRESENT)

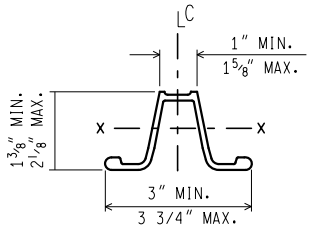
BOTTOM HEIGHT AND OFFSET

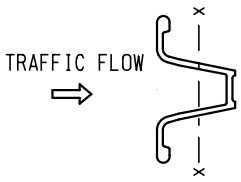
NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN	F.H.W.A. APPROVAL	11/2/2017 PLAN DATE	WZD-100-A	SHEET 3 OF 11

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







WEIGHT = 3 lbs/ft
SECT. MOD. X.-X. = 0.31 CUBIC INCHES MIN.

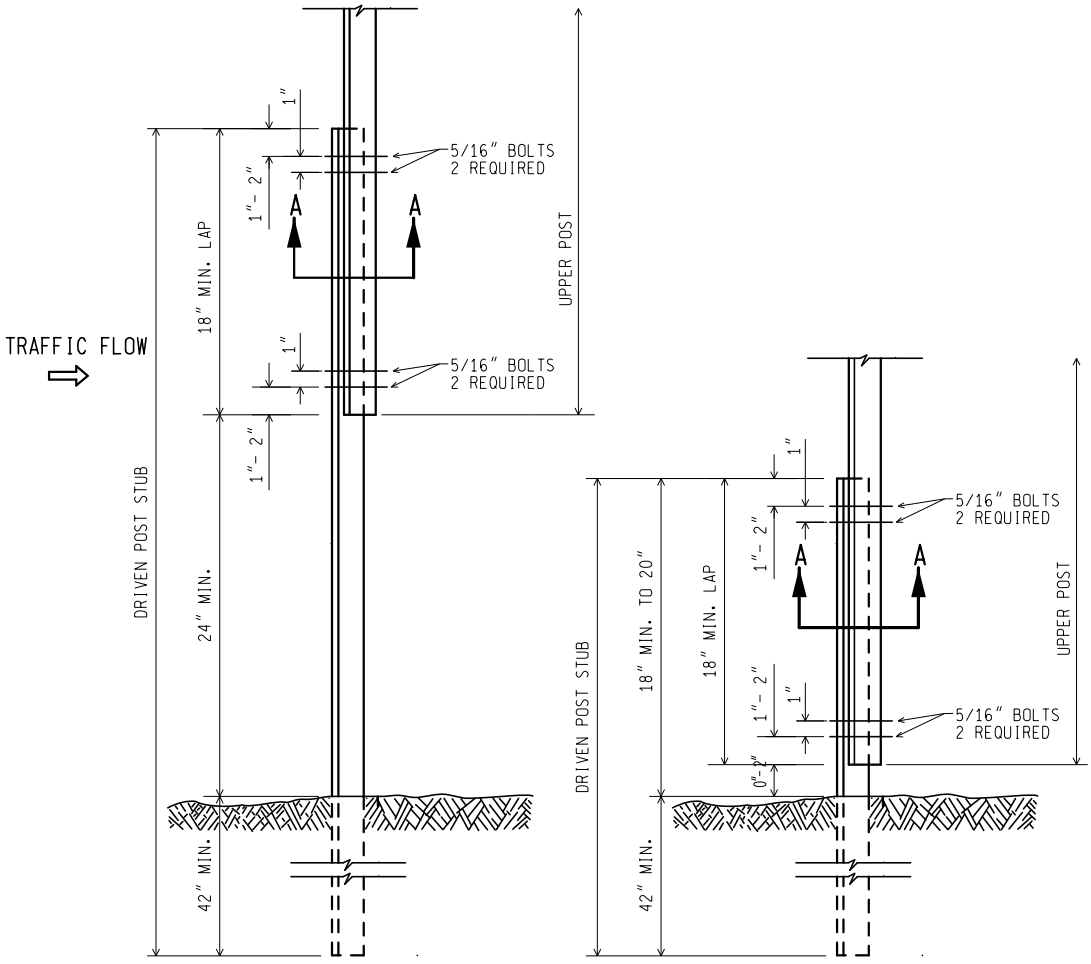
3 lb. U - CHANNEL STEEL POST
(NO SPLICE)

MOUNT SIGN ON OPEN FACE OF
U - CHANNEL STEEL POST

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN	F.H.W.A. APPROVAL	11/2/2017 PLAN DATE	WZD-100-A	SHEET 4 OF 11

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



UPPER SPLICE

LOWER SPLICE

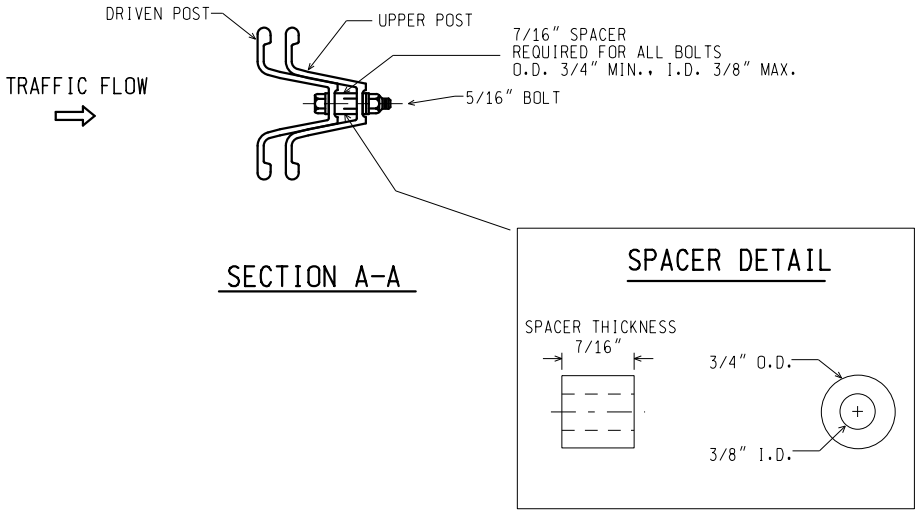
3 lb. U - CHANNEL STEEL POST
(WITH SPLICE)

MOUNT SIGN ON OPEN FACE OF
UPPER U - CHANNEL STEEL POST

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN	F.H.W.A. APPROVAL	11/2/2017 PLAN DATE	WZD-100-A	SHEET 5 OF 11

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



NOTES:

1. THE SPACER THICKNESS SHALL BE 1/16" LESS THAN THE GAP BETWEEN THE POST WHEN POSITIONED IN THE UNBOLTED CONFIGURATION.

2. THE EXTERIOR BOLT (CLOSEST TO LAP), SPACER, WASHER, AND NUT SHALL BE INSTALLED IN A PREPUNCHED HOLE 1" to 2" FROM THE END OF THE LAP.

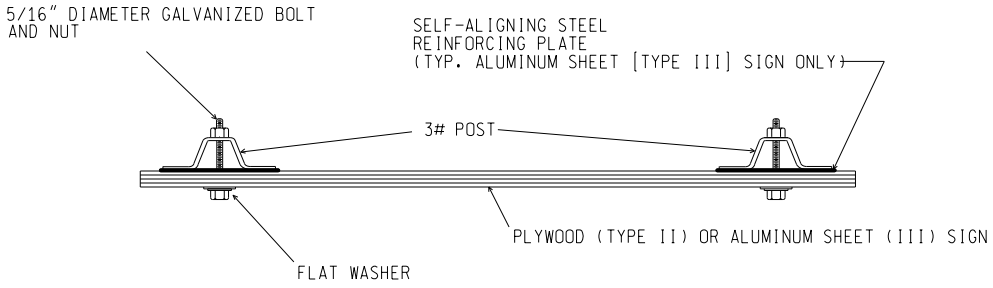
3. THE INTERIOR BOLT (FARTHEST FROM LAP), SPACER, WASHER, AND NUT SHALL BE INSTALLED IN THE NEXT PREPUNCHED HOLE.

4. THE DRIVEN POST SHALL ALWAYS BE MOUNTED IN FRONT OF THE UPPER POST WITH RESPECT TO THE ADJACENT ONCOMING TRAFFIC, REGARDLESS OF THE DIRECTION THE SIGN IS FACING.

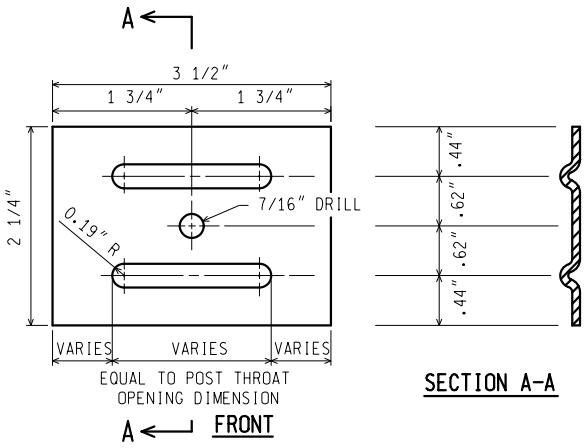
5. THE SPLICE LAP SHALL BE FASTENED BY FOUR-5/16" DIA. GALVANIZED A449 BOLTS (SAE J429 GRADE 5) OR GALVANIZED A325 BOLTS.

3 lb. U - CHANNEL STEEL POST
(WITH SPLICE)

NOT TO SCALE



SIGN TO 3 lb. POST CONNECTION



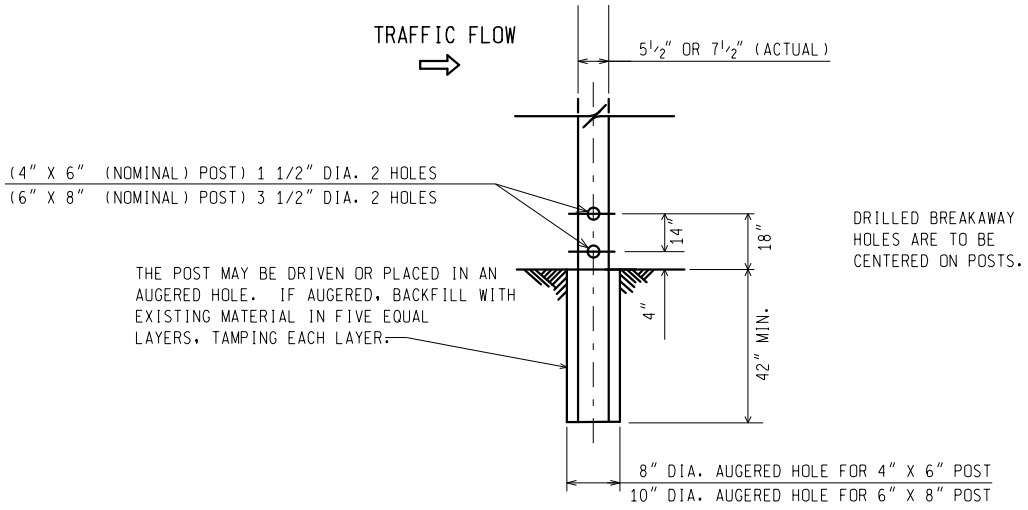
NOTES: (FOR STEEL SIGN REINF' PLATE)

1. MATERIAL: 12 GAUGE CARBON STEEL.
2. TOLERANCE ON ALL DIMENSIONS ± 0.0625"
3. FINISH-AFTER STAMPING AND PUNCHING, GALVANIZE ACCORDING TO CURRENT SPECIFICATIONS FOR ZINC (HOT GALVANIZE) COATINGS ON PRODUCTS FABRICATED FROM PLATES OR STRIPS

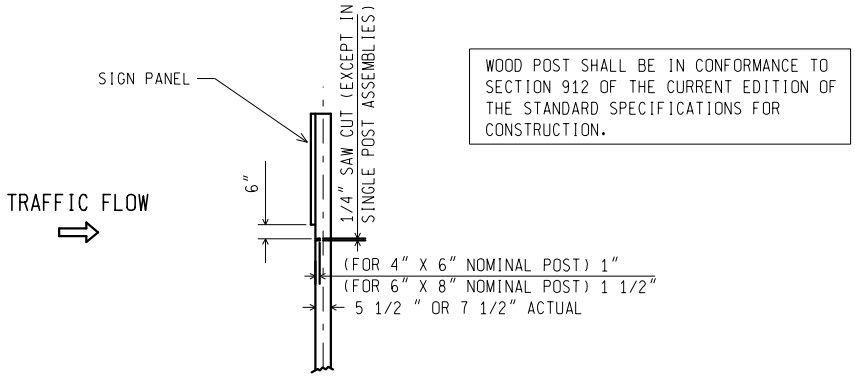
STEEL SIGN REINFORCING PLATE
REQUIRED FOR TYPE III SIGNS ONLY

3 lb. U - CHANNEL STEEL POST SIGN CONNECTION

NOT TO SCALE



WOOD POST BREAKAWAY HOLES/ DIRECT EMBEDMENT DETAILS



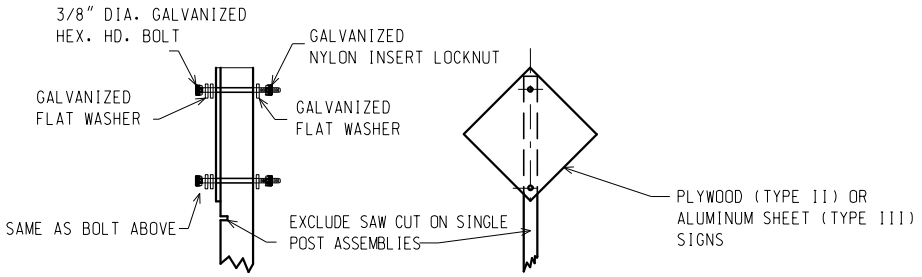
SAW CUT DETAIL (MULTIPLE POST INSTALLATIONS)

WOOD POST DETAILS

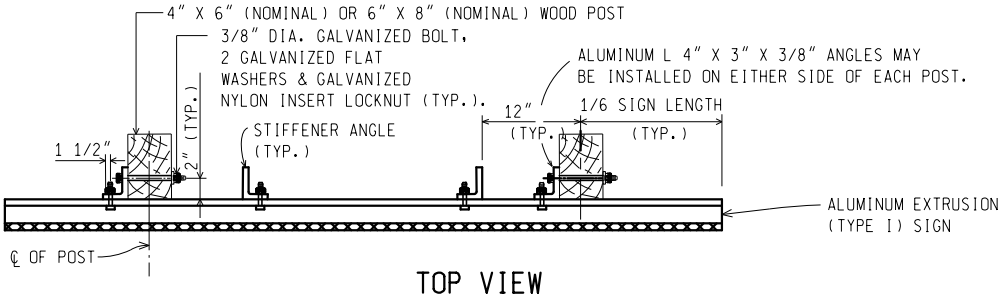
NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN	F.H.W.A. APPROVAL	11/2/2017 PLAN DATE	WZD-100-A	SHEET 8 OF 11

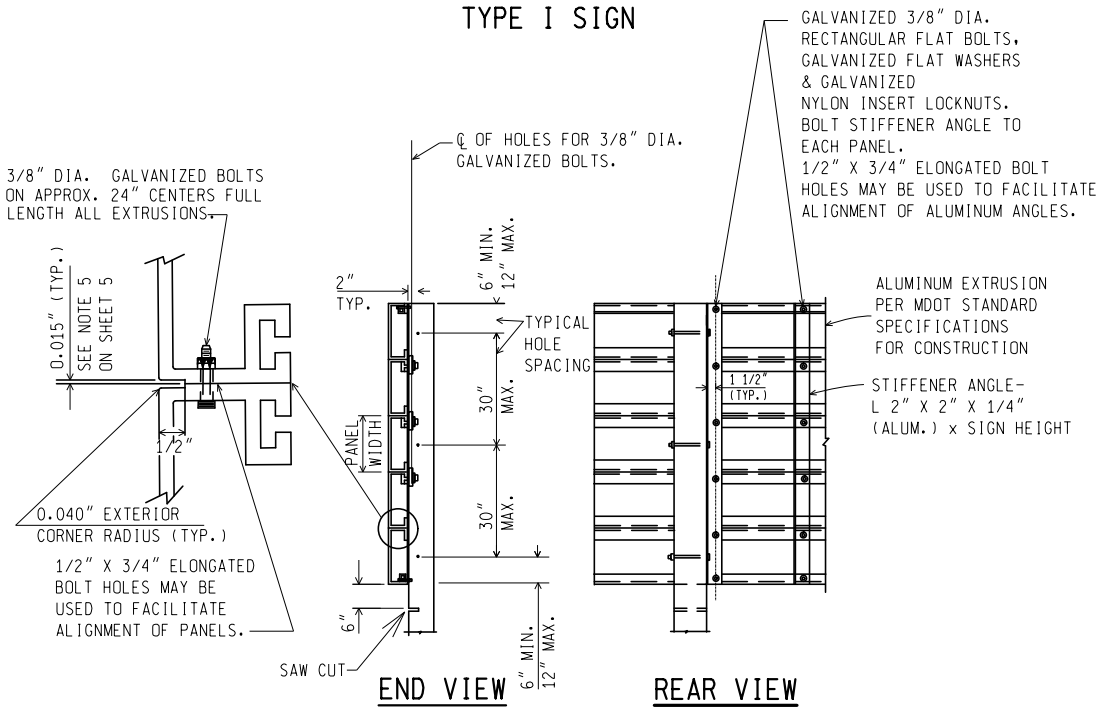
NOTE: THE ORIGINAL SIGNED COPY IS KEPT ON FILE AT THE MICHIGAN DEPARTMENT OF TRANSPORTATION.



TYPE II AND TYPE III SIGNS



TOP VIEW
TYPE I SIGN



END VIEW
REAR VIEW

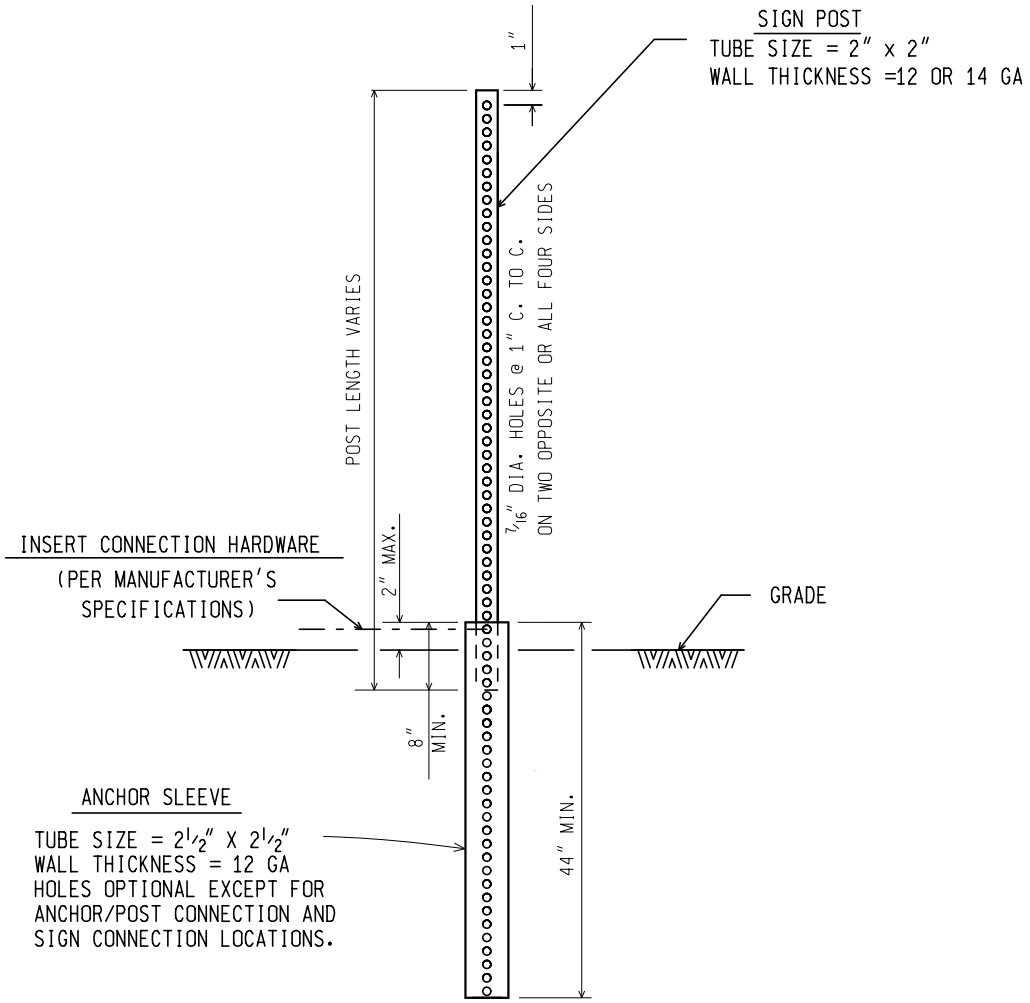
TYPE I SIGN - ERECTION DETAILS

WOOD POST CONNECTIONS

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN	F.H.W.A. APPROVAL	11/2/2017 PLAN DATE	WZD-100-A	SHEET 9 OF 11

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



SQUARE TUBULAR STEEL POST

NOT TO SCALE

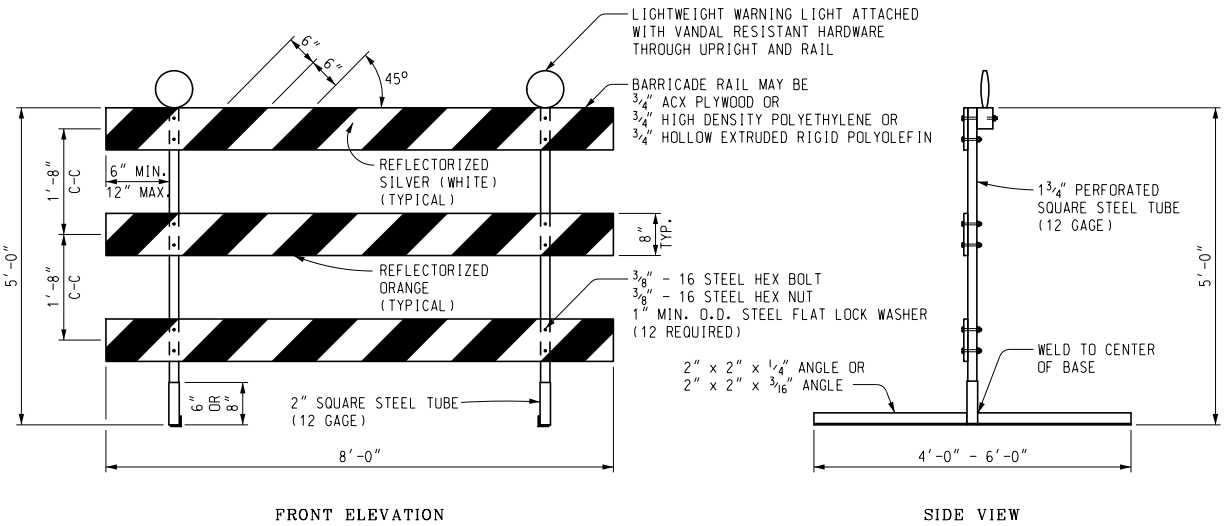
MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF DEVELOPMENT STANDARD PLAN	F.H.W.A. APPROVAL	11/2/2017 PLAN DATE	WZD-100-A	SHEET 10 OF 11

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

GENERAL NOTES:

1. A MAXIMUM OF TWO POSTS WITHIN A 7 FOOT PATH IS PERMITTED.
2. ALL SIGN POSTS SHALL COMPLY WITH NCHRP 350.
3. ALL POSTS SHALL BE EMBEDDED A MINIMUM OF 42".
4. BRACING OF POST IS NOT PERMITTED.
5. SIGN SHALL BE LEVEL, AND UPRIGHT FOR THE DURATION OF INSTALLATION.
6. ERECT POSTS SO THE SIGN FACE AND SUPPORTS DO NOT VARY FROM PLUMB BY MORE THAN 3/16" IN 3'. PROVIDE A CENTER-TO-CENTER DISTANCE BETWEEN POSTS WITHIN 2 PERCENT OF PLAN DISTANCE.
7. NO MORE THAN ONE SPLICE PER POST, AS SHOWN, WILL BE PERMITTED.
8. POST TYPES SHALL NOT BE MIXED WITHIN A SIGN SUPPORT INSTALLATION.
9. NO VERTICAL JOINTS ARE PERMITTED IN SIGN. NO HORIZONTIAL JOINTS THROUGH SIGN LEGEND OR SYMBOLS ARE PERMITTED IN SIGN
10. REMOVE SIGN POSTS AND/OR POST STUBS IN THEIR ENTIRETY WHEN NO LONGER REQUIRED.
11. ALL LABOR, MATERIALS, AND EQUIPMENT, INCLUDING TEMPORARY SUPPORTS REQUIRED TO INSTALL, MAINTAIN, RELOCATE, AND/OR REMOVE THE TEMPORARY SIGN, INCLUDING SUPPORTS, ARE CONSIDERED TO BE INCLUDED IN THE COST OF THE TEMPORARY SIGN.
12. SAW CUTS IN WOOD POSTS ARE TO BE PARALLEL TO THE BOTTOM OF THE SIGN.
13. POSTS SHALL NOT EXTEND MORE THAN 4" ABOVE TOP OF SIGN.
14. TEMPORARY WOOD SUPPORTS DO NOT REQUIRE PRESERVATIVE TREATMENT.

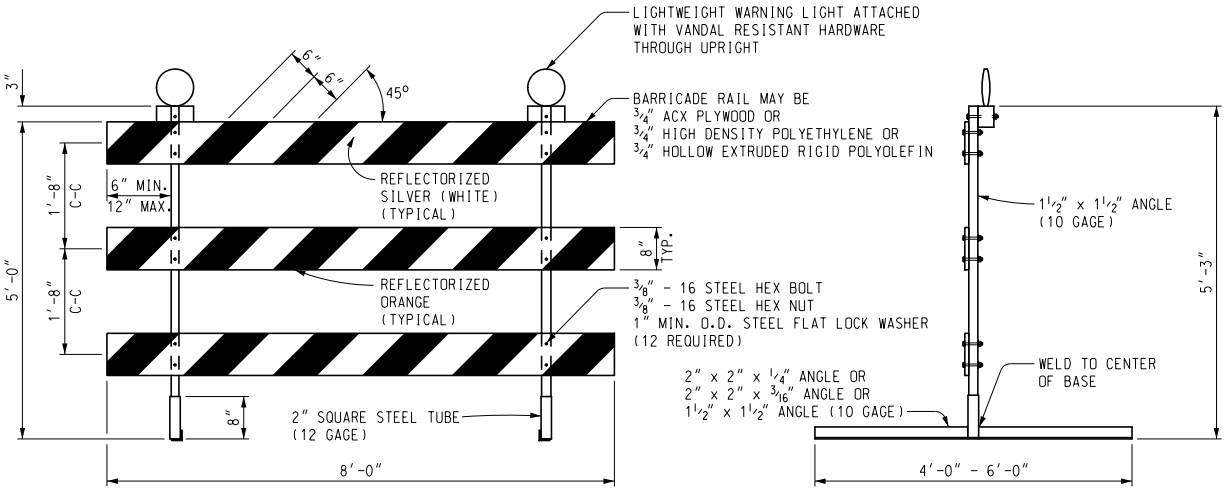
NOT TO SCALE



FRONT ELEVATION

SIDE VIEW

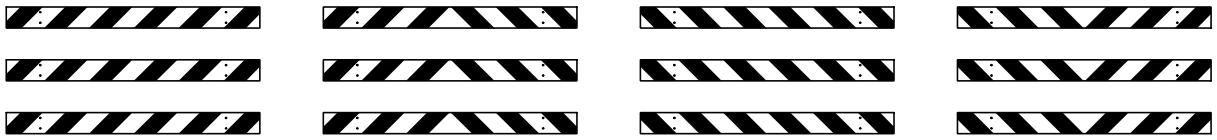
PERFORATED SQUARE STEEL TUBE OPTION



FRONT ELEVATION

SIDE VIEW

ANGLE IRON OPTION



LEFT DIRECTIONAL

BI-DIRECTIONAL

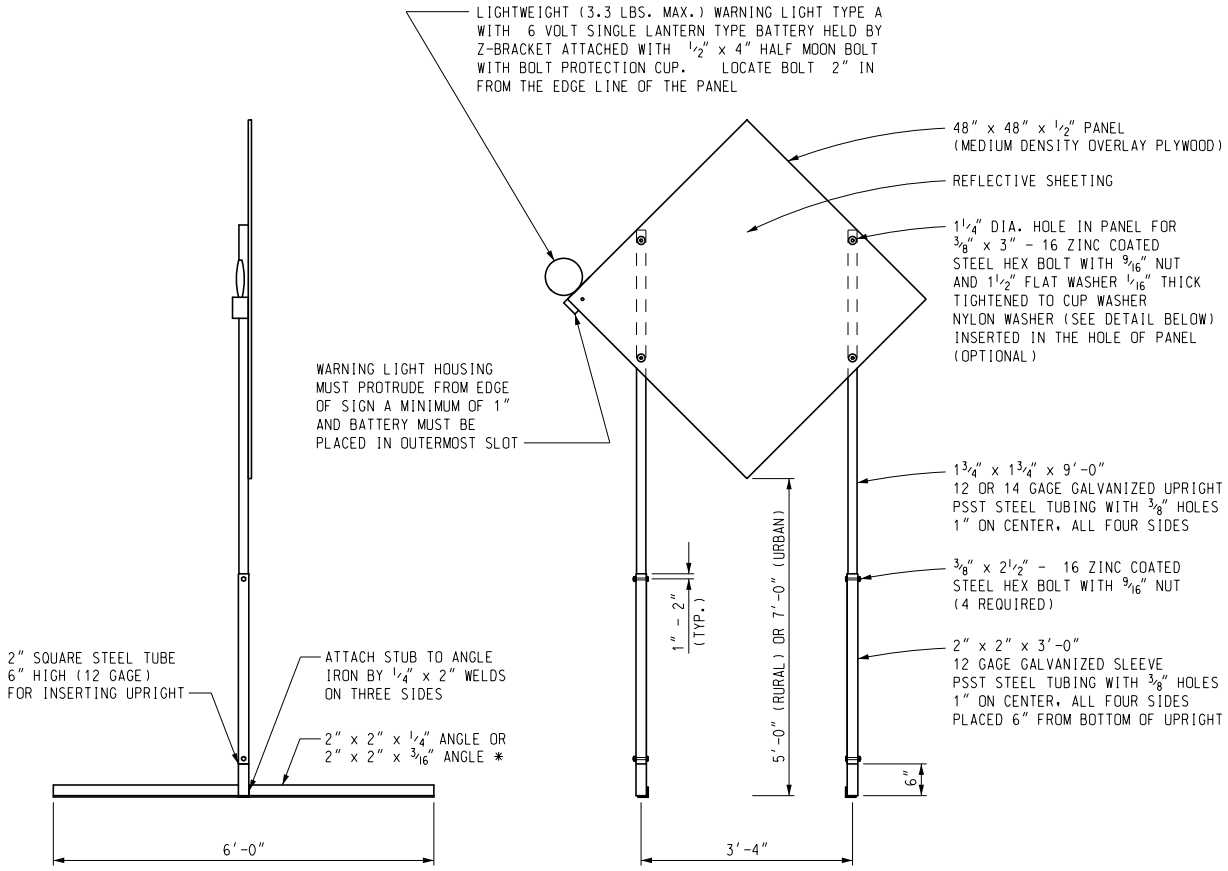
RIGHT DIRECTIONAL

CLOSURES

BARRICADE RAIL SHEETING OPTIONS
TYPE III BARRICADES

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

MDOT Michigan Department of Transportation PREPARED BY OPERATIONS FIELD SERVICES DRAWN BY: ECH CHECKED BY: MWB	DEPARTMENT DIRECTOR Paul C. Ajegba APPROVED BY: _____ DIRECTOR, BUREAU OF FIELD SERVICES APPROVED BY: (SPECIAL DETAIL) DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF FIELD SERVICES SPECIAL DETAIL FOR Temporary Traffic Control Devices	
		F.H.W.A. APPROVAL	6/16/22 PLAN DATE
		WZD-125-E	SHEET 1 OF 3



SIDE VIEW

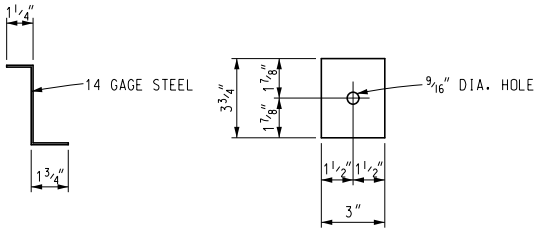
FRONT ELEVATION

TEMPORARY SIGN SUPPORT

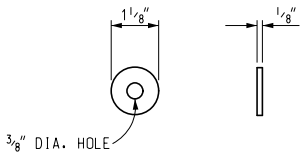
(WARNING LIGHT PLACED ON SIDE CLOSEST TO TRAFFIC)

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

UPRIGHTS SHALL NOT EXTEND ABOVE THE SIGN PANEL.



Z-BRACKET DETAIL



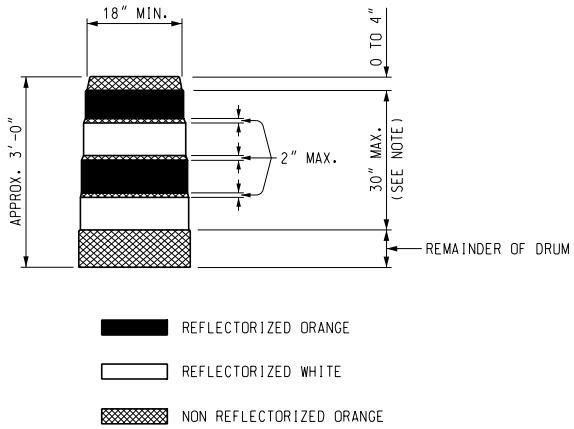
OPTIONAL NYLON WASHER

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

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF FIELD SERVICES SPECIAL DETAIL	SPECIAL DETAIL F.H.W.A. APPROVAL	6/16/22 PLAN DATE	WZD-125-E	SHEET 2 OF 3

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



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 ON TYPE III BARRICADES.

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

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

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

NOT TO SCALE

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF FIELD SERVICES SPECIAL DETAIL	(SPECIAL DETAIL) F.H.W.A. APPROVAL	6/16/22 PLAN DATE	WZD-125-E	SHEET 3 OF 3

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

MICHIGAN
DEPARTMENT OF TRANSPORTATION

PROJECT COORDINATION CLAUSE

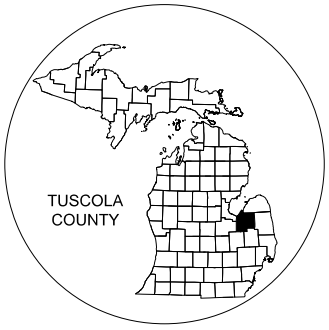
Control Section: 79061
Job Number: TWA

Contracts for other projects within or adjacent to, the work limits of this contract may be in force during the life of this contract. The Contractor's attention is called to the requirements of cooperation with others as covered in section 104.08 of the Standard Specifications for Construction.

The contract(s) include but are not limited to:

MICHIGAN DEPARTMENT OF TRANSPORTATION

ROUTE: M-81
CITY OF CARO
TUSCOLA COUNTY

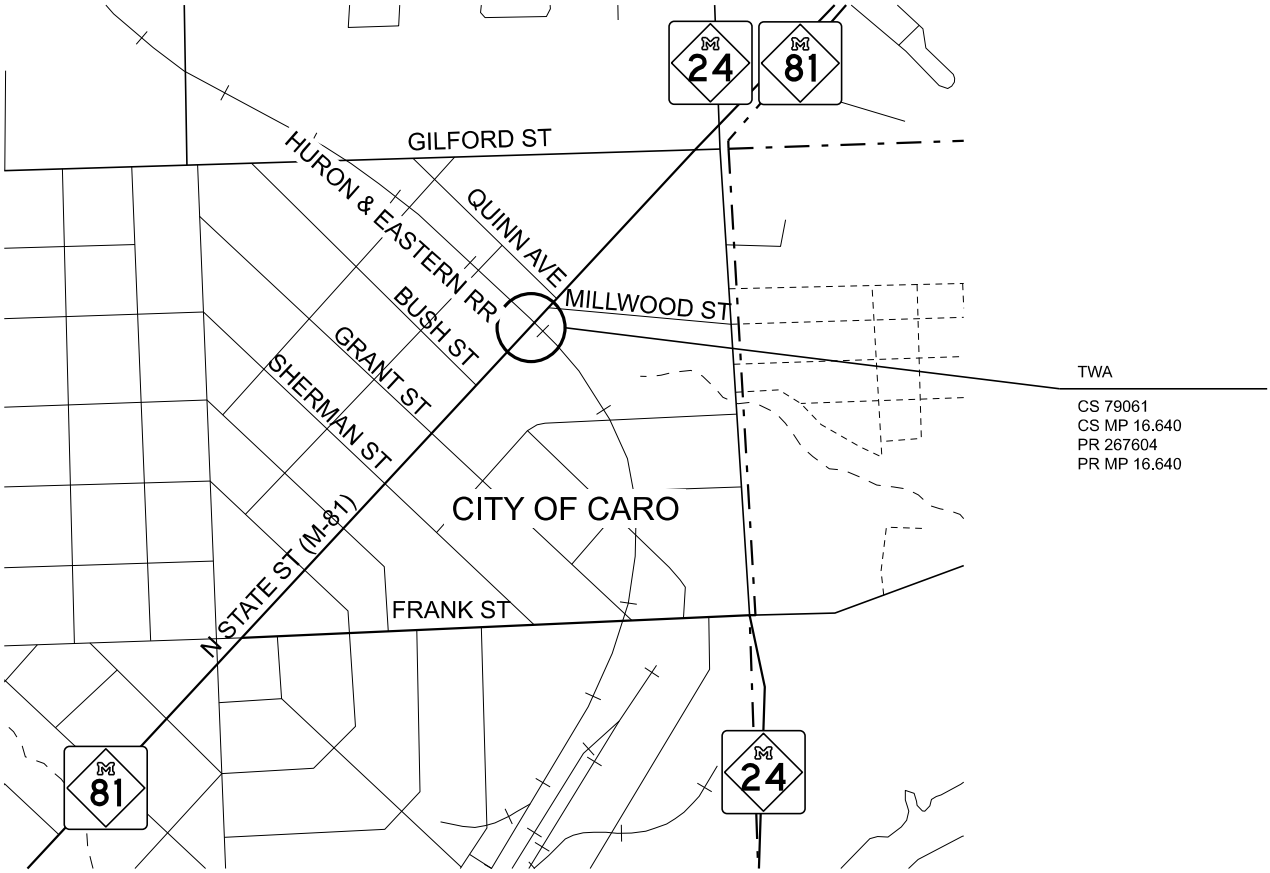


COUNTY KEY

SECTION	CONTROL SEC	JOB NO.	FED AID PROJ
001	79061	TWA	NO

TRAFFIC DATA

ROAD	YEAR	ADT	DHV	COMM	SPEED DATA DESIGN	POSTED	LIMITS
M-81	2022	10,202	918	10%	40	35	FRANK ST TO M-24 (ELLINGSTON ST)



THE IMPROVEMENTS COVERED BY THESE PLANS SHALL BE DONE IN ACCORDANCE WITH THE MICHIGAN DEPARTMENT OF TRANSPORTATION 2020 STANDARD SPECIFICATIONS FOR CONSTRUCTION. PHYSICAL ROAD NUMBER (PR#) & MILEPOST (MP) DATA ARE FROM MICHIGAN GEOGRAPHIC FRAMEWORK VERSION # 24.

MILES: 0.10

CONTRACT FOR:
RAILROAD CROSSING RECONSTRUCTION, HMA COLD MILLING, HOT MIX ASPHALT OVERLAY, CURB AND GUTTER, AND CONCRETE SIDEWALK

BRADLEY C. WIEFERICH, P.E. - DIRECTOR

MDOT Michigan Department of Transportation	NO SCALE	DESIGN UNIT: TERVO	TSC: HURON	DATE: 06/18/25
		CS: 79061	TITLE	DRAWING / SHEET
		JN: TWA	HURON & EASTERN RAILROAD CROSSING	M-81 TITLE 1 / SECT 1
FILE: TWA_M81_RxR_Title.dgn				

LOG OF PROJECT

LOCATION

The project is located on M-81 at the rail crossing for the Huron and Eastern Railway in the City of Caro, Tuscola County

Route	M-81
CS	79061
CS MP	16.64
PR	267604
PR MP	16.64

DESCRIPTION OF WORK.

The following items apply throughout the project:

Project Wide Pay Items	Quantity	Unit
Mobilization, Max	1.00	LSUM

Perform removal and construction as shown on removal and construction sheets.

Removal Pay Items	Quantity	Unit
Curb and Gutter, Rem	55	Ft
Pavt, Rem	77	Syd
Sidewalk, Rem	30	Syd
Excavation, Earth	15	Cyd
Cold Milling HMA Surface	210	Syd
Sidewalk, Clay Brick Pavers, Rem	200	Sft

Construction Pay Items	Quantity	Unit
Aggregate Base	30	Ton
Hand Patching	88	Ton
HMA Approach	22	Ton
Curb and Gutter, Conc, Det C2	55	Ft
Detectable Warning Surface	40	Ft
Curb Ramp, Conc, 6 inch	450	Sft
Pavt Mrkg, Ovly Cold Plastic, 24 inch, Stop Bar	60	Ft
Slope Restoration, Non-Freeway, Type B	10	Syd

Maintain traffic per the special provision for maintaining traffic. Detour traffic per the Detour Sheets.

Maintenance of Traffic Pay Items (For Information Only)	Quantity	Unit
Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	20	Ea
Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	20	Ea
Pedestrian Type II Barricade, Temp	12	Ea
Pedestrian Type II Channelizer, Temp	150	Ft
Channelizing Device, 42 inch, Fluorescent, Furn	50	Ea
Channelizing Device, 42 inch, Fluorescent, Oper	50	Ea
Minor Traf Devices	1.00	LSUM
Plastic Drum, Fluorescent, Furn	25	Ea
Plastic Drum, Fluorescent, Oper	25	Ea
Sign, Portable, Changeable Message, NTCIP-Compliant, Furn	4	Ea
Sign, Portable, Changeable Message, NTCIP-Compliant, Oper	4	Ea
Sign, Type B, Temp, Prismatic, Furn	650	Ea
Sign, Type B, Temp, Prismatic, Oper	650	Ea

GENERAL NOTES

MISS DIG/UNDERGROUND UTILITY NOTIFICATION
For the protection of underground utilities and in conformance with MCL 460.171 et seq, the Contractor shall contact MISS DIG System, Inc. by phone at 811 or 800-482-7171 or via the web at either locate.missdig.org for single address or rte.missdig.org, a minimum of 3 work days prior to excavating, excluding weekends and holidays.

MONUMENT BOXES
All government corners on this project shall be protected during construction.

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

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

JN 34934A M-81 1995 Railroad Crossing Improvements

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.

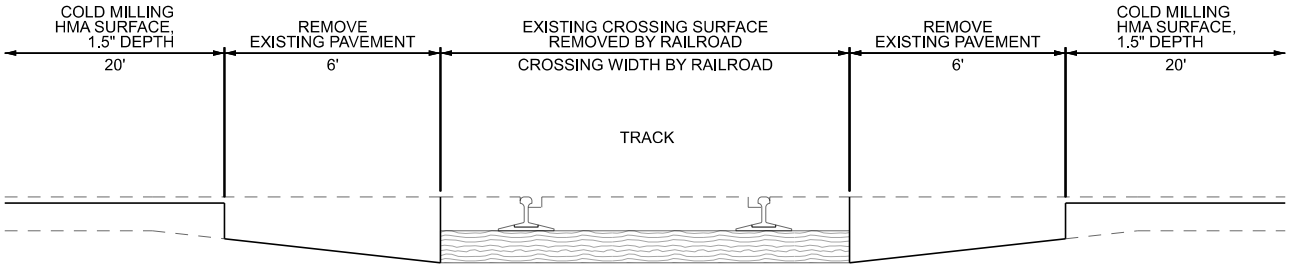
PUBLIC UTILITIES
There are no anticipated utility conflicts within the scope of this project. For utility company contacts during construction, please contact John DeLang, MDOT Huron TSC at delangj1@michigan.gov or (810) 347-9250.

NOTES APPLYING TO STANDARD PLANS

Where the following items are called for on plans, they are to be constructed according to the standard plan given below opposite each item unless otherwise indicated.

Title	Plan No.
ROAD	
CURB RAMP AND DETECTABLE WARNING DETAILS	R-28-K
CONCRETE CURB AND CONCRETE CURB & GUTTER	R-30-G
SOIL EROSION & SEDIMENTATION CONTROL MEASURES	R-96-E
TRACK CROSSINGS	R-121-B
PAVEMENT MARKINGS	
INTERSECTION, STOP BAR, AND CROSSWALK MARKINGS	PAVE-945-E

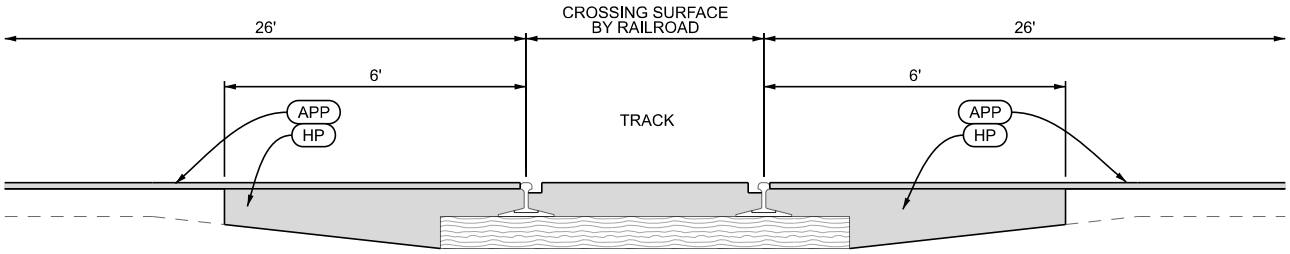
*** Denotes Special Detail**



MISCELLANEOUS DETAIL 01

RAILROAD CROSSING REMOVAL

PERFORM ALL WORK AT RAILROAD CROSSING
AS SHOWN IN STANDARD PLAN R-121 SERIES



MISCELLANEOUS DETAIL 02

RAILROAD CROSSING CONSTRUCTION

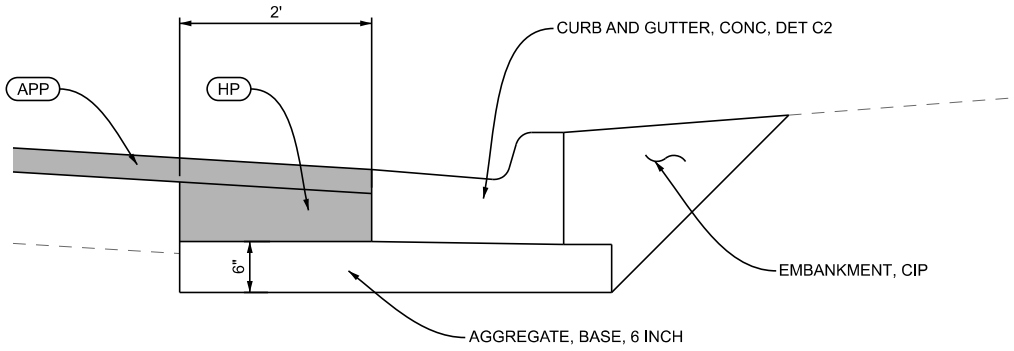
HMA APPLICATION ESTIMATE

IDENT NO.	ITEM	RATE LBS PER SYD	PERFORMANCE GRADE	REMARKS
APP	HM APPROACH	165	58-28	HMA, 5EML, TOP COURSE
HP	HAND PATCHING	VARIES	58-28	HMA, 5EML, AWI = 260
	* BOND COAT	0.05-0.15 GAL		

* FOR INFORMATION ONLY

PERFORM ALL WORK AT RAILROAD CROSSING
AS SHOWN IN STANDARD PLAN R-121 SERIES

MDOT Michigan Department of Transportation	NO SCALE	DESIGN UNIT: TERVO	TSC: HURON	DATE: 06/18/25	
		CS: 79061	MISCELLANEOUS DETAILS	DRAWING	SHEET
		JN: TWA	HURON & EASTERN RAILROAD CROSSING	M-81 MSCDET 1	SECT 1 2
FILE: M81_RR_MiscDetail_01.dgn					

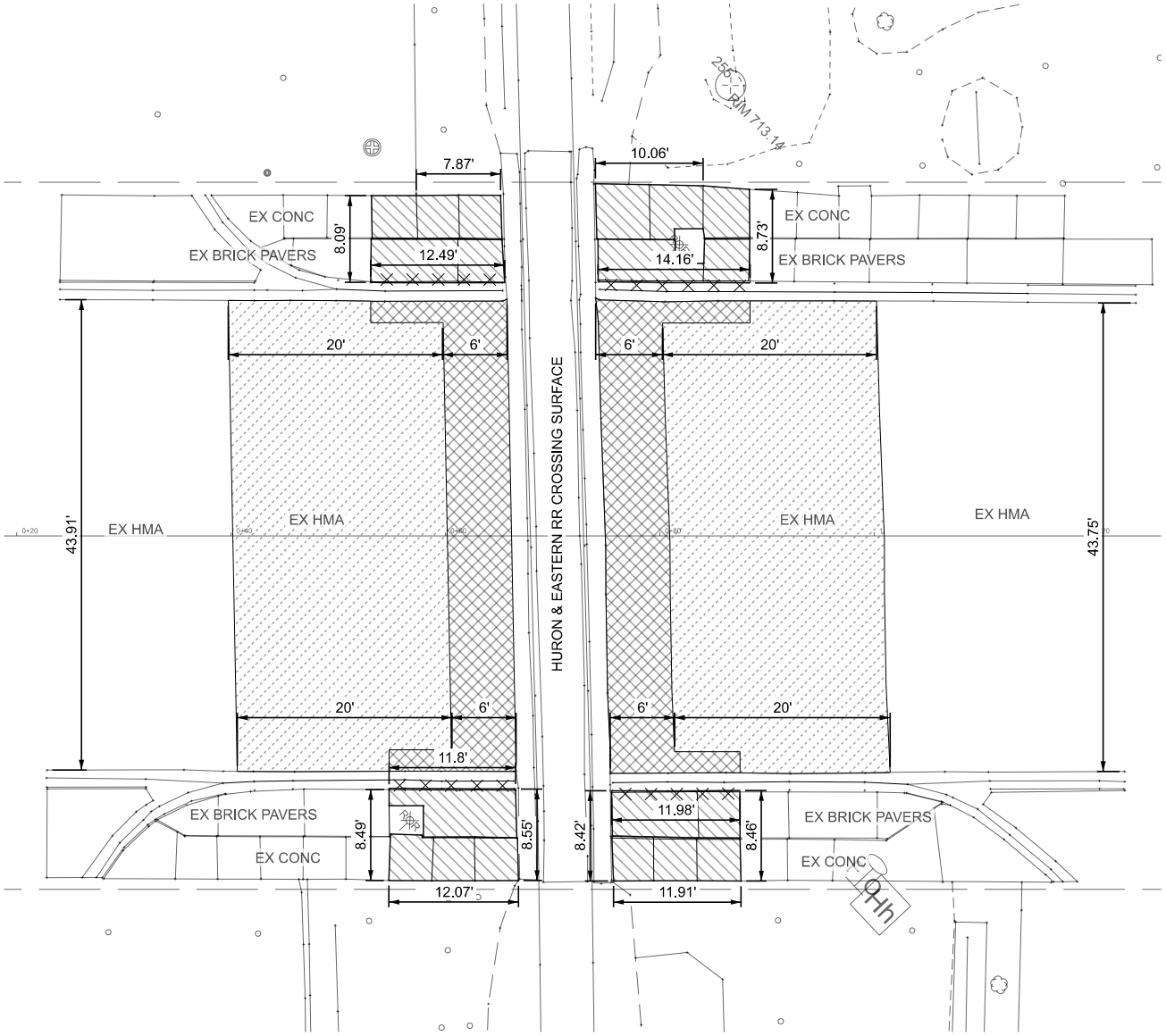


MISCELLANEOUS DETAIL 01

RAILROAD CROSSING REMOVAL

MDOT Michigan Department of Transportation	NO SCALE	DESIGN UNIT: TERVO	TSC: HURON	DATE: 06/18/25	
		CS: 79061	MISCELLANEOUS DETAILS	DRAWING	SHEET
		JN: TWA	HURON & EASTERN RAILROAD CROSSING	M-81 MSCDET 2	SECT 1 3
FILE: M81_RR_MiscDetail_01.dgn					

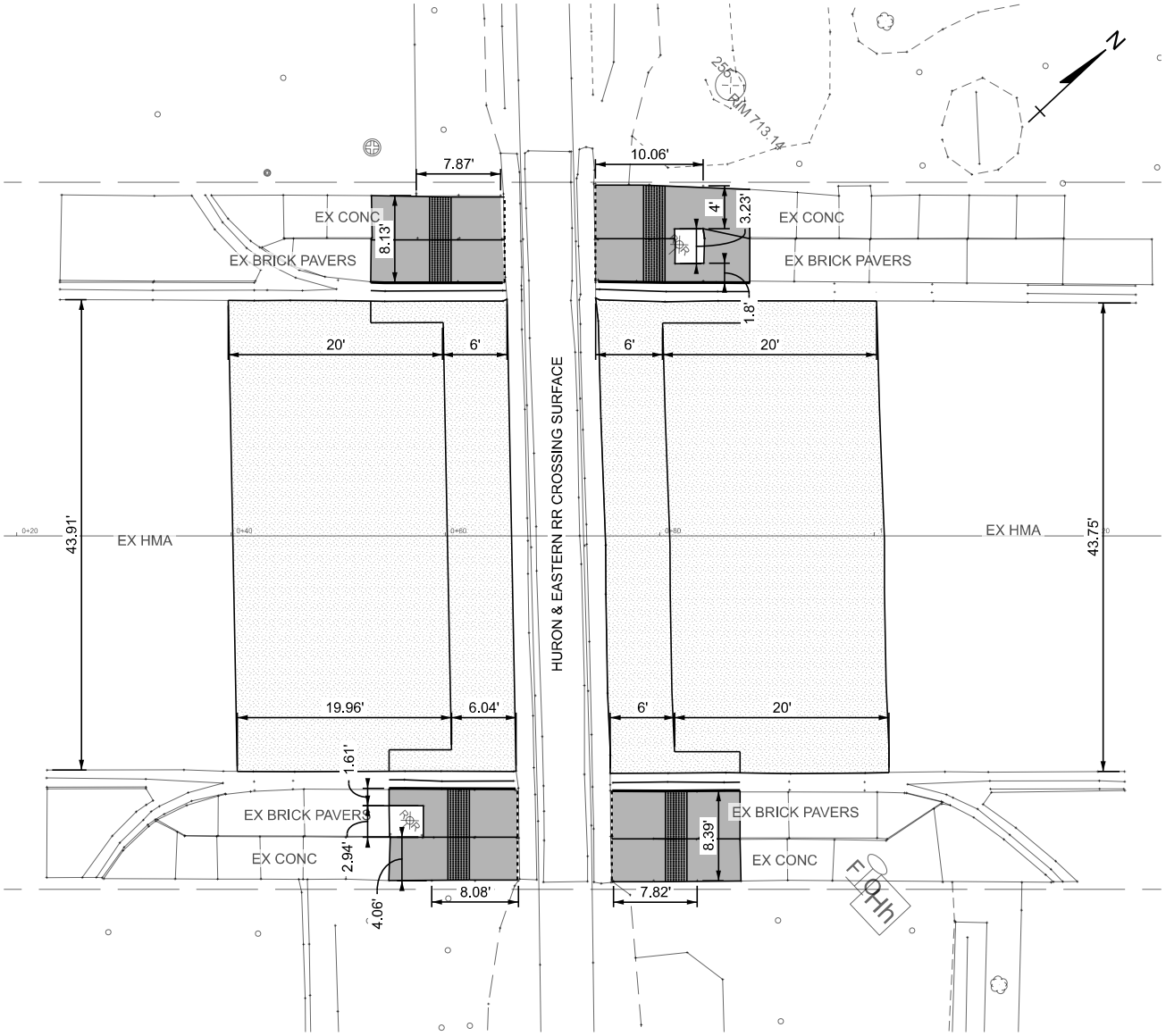
HURON & EASTERN RR



HURON & EASTERN RR

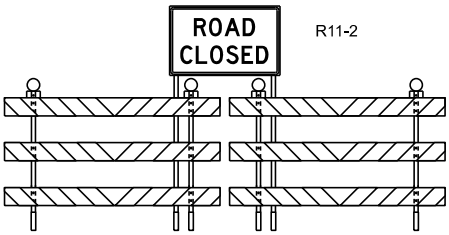
MDOT Michigan Department of Transportation	16 / 0 HORZ. (FT)	DESIGN UNIT: TERVO	TSC: HURON	DATE: 06/18/25
		CS: 79061	REMOVAL	DRAWING: M-81 REM 1 / SHEET: SECT 1 4
FILE: M81_RxR_Con.dgn		JN: TWA	HURON & EASTERN RAILROAD CROSSING	

HURON & EASTERN RR



HURON & EASTERN RR

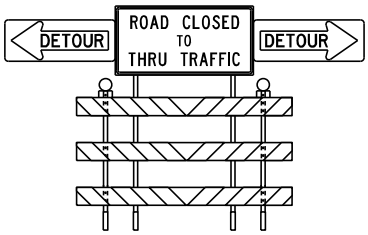
MDOT Michigan Department of Transportation	0 16 HORZ. (FT)	DESIGN UNIT: TERVO	TSC: HURON	DATE: 06/18/25
		CS: 79061	CONSTRUCTION	DRAWING / SHEET
		JN: TWA	HURON & EASTERN RAILROAD CROSSING	M-81 CON 2 / SECT 1 5
FILE: M81_RxR_Con.dgn				



R11-2

ERECT R11-2 BEHIND BARRICADE ON SEPARATE SIGN SUPPORTS. SUPPLY ENOUGH TYPE III BARRICADES TO COMPLETELY CLOSE ROAD BETWEEN SHOULDER EDGES OR CURB FACES.

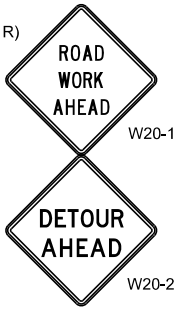
(1)



M4-10(L OR R)

ERECT R11-4 BEHIND BARRICADE ON SEPARATE SIGN SUPPORTS. PLACE TYPE III BARRICADE AND R11-4 ON THE SHOULDER.

(2)



W20-1

W20-2

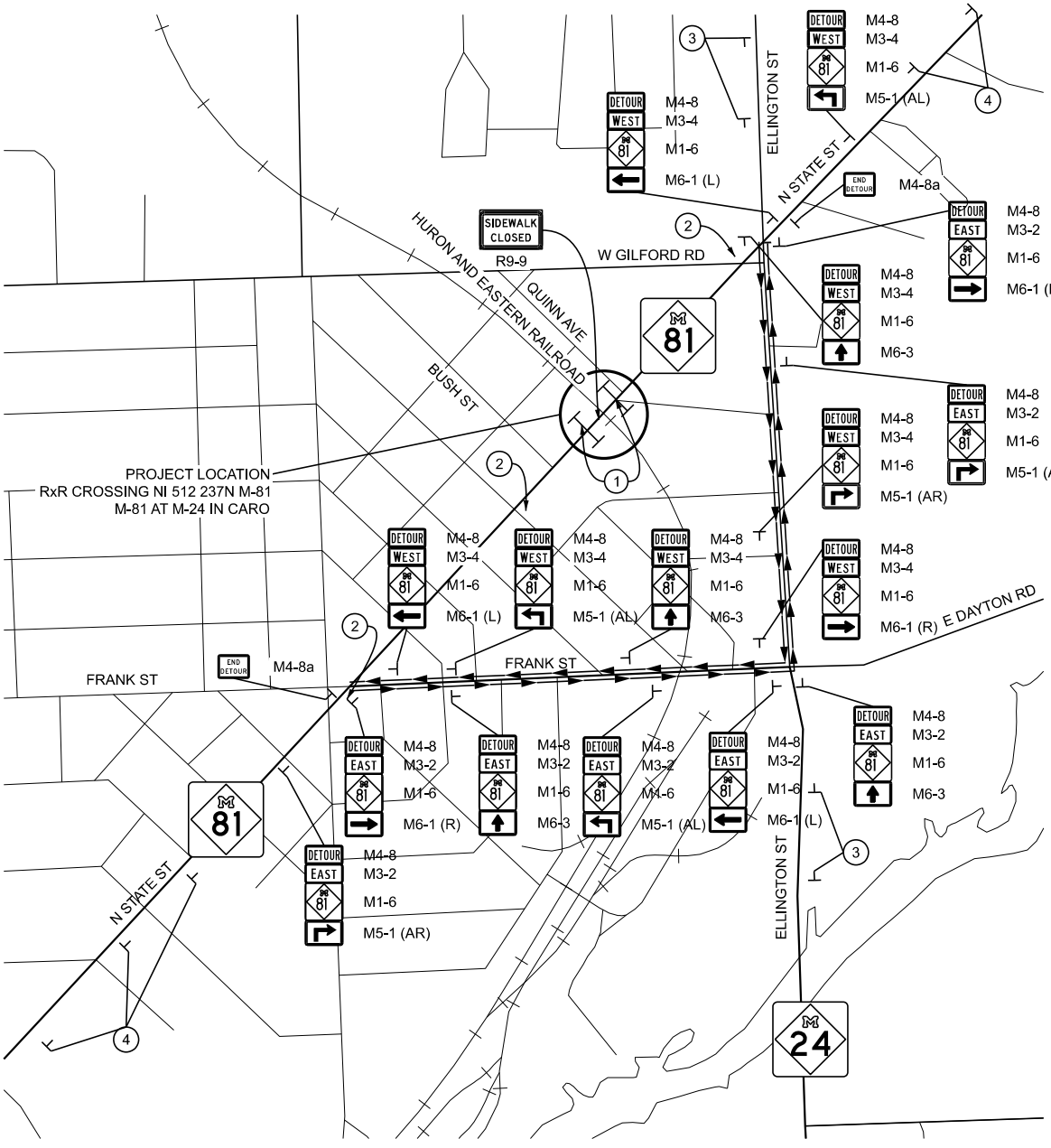
(3)

W20-3

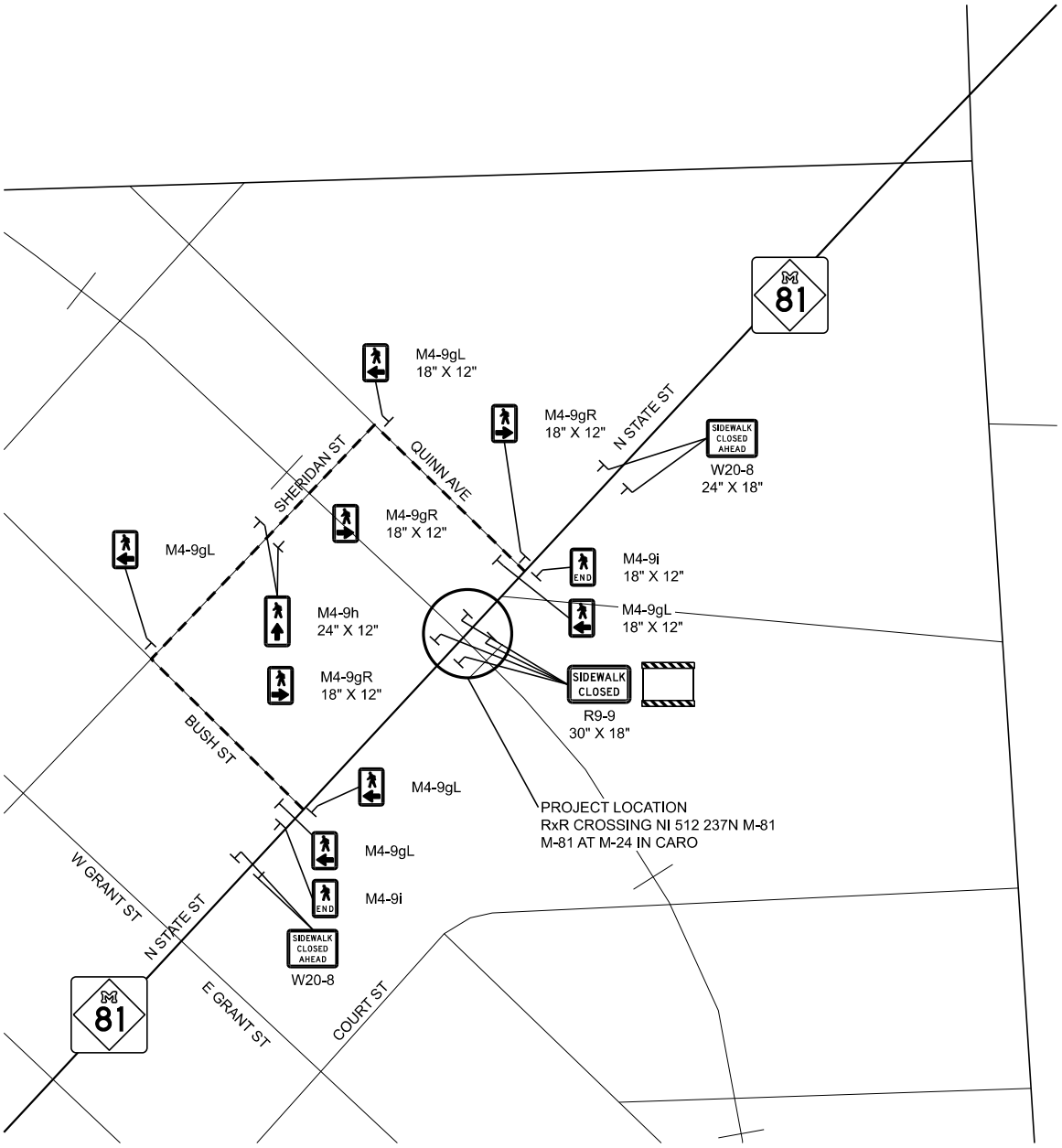
W20-1

W20-2

(4)



MDOT Michigan Department of Transportation	NO SCALE	DESIGN UNIT: TERVO	TSC: HURON	DATE: 06/18/25
		CS: 79061	MAINTAINING TRAFFIC DETOUR MAP	DRAWING: M-81 MTDETR 1 / SHEET: SECT 1 6
		JN: TWA	HURON & EASTERN RAILROAD CROSSING	
FILE: TWA M-81 RxR at M-24_Detour.dgn				



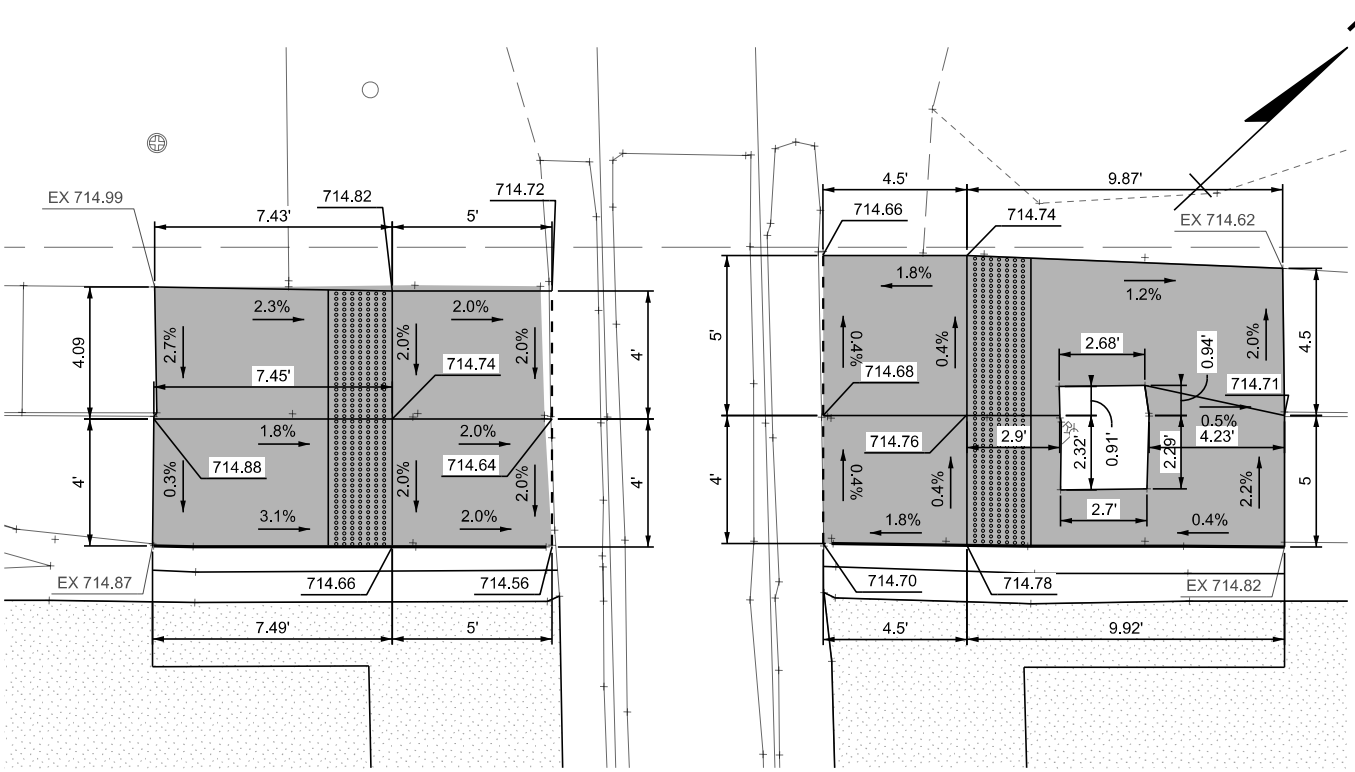
MDOT Michigan Department of Transportation	NO SCALE	DESIGN UNIT: TERVO	TSC: HURON	DATE: 06/18/25
		CS: 79061	MAINTAINING TRAFFIC DETOUR MAP	DRAWING: M-81 MTDETR 2 / SHEET: SECT 1, 7
FILE: TWA M-81 RxR at M-24_Detour.dgn		JN: TWA	HURON & EASTERN RAILROAD CROSSING	

M-81 DETOUR ROUTE SIGN SUMMARY

SIGN CODE	SIGN LEGEND	EB DETOUR	WB DETOUR	SIZE			AREA	TOTAL AREA
		(EA)	(EA)	(IN)	X	(IN)	(SFT)	(SFT)
M1-6	STATE ROUTE MARKER M-81	8	8	24	x	24	4.0	64.0
M3-2	EAST	8	0	24	x	12	2.0	16.0
M3-4	WEST	0	8	24	x	12	2.0	16.0
M4-8a	END DETOUR	1	1	24	x	18	3.0	6.0
M4-8	DETOUR	8	8	24	x	18	3.0	48.0
M4-10L	DETOUR LEFT ARROW	0	1	48	x	18	6.0	6.0
M4-10R	DETOUR RIGHT ARROW	1	0	48	x	18	6.0	6.0
M5-1L	LEFT ARROW AHEAD	1	2	21	x	15	2.2	6.6
M5-1R	RIGHT ARROW AHEAD	2	1	21	x	15	2.2	6.6
M6-1L	TURN ARROW	1	2	21	x	15	2.2	6.6
M6-1R	TURN ARROW	2	1	21	x	15	2.2	6.6
M6-3	THRU ARROW	2	2	21	x	15	2.2	8.8
R9-9	SIDEWALK CLOSED	2	2	30	x	18	3.8	15.0
R11-2	ROAD CLOSED	1	1	48	x	30	10.0	20.0
R11-4	ROAD CLOSED TO THRU TRAFFIC	2	1	60	x	30	12.5	37.5
W20-1	ROAD WORK AHEAD	2	2	48	x	48	16.0	64.0
W20-2	DETOUR AHEAD	2	2	48	x	48	16.0	64.0
W20-3	ROAD CLOSED AHEAD	1	1	48	x	48	16.0	32.0
			DETOUR SIGN TYPE B TOTAL					**429.5**

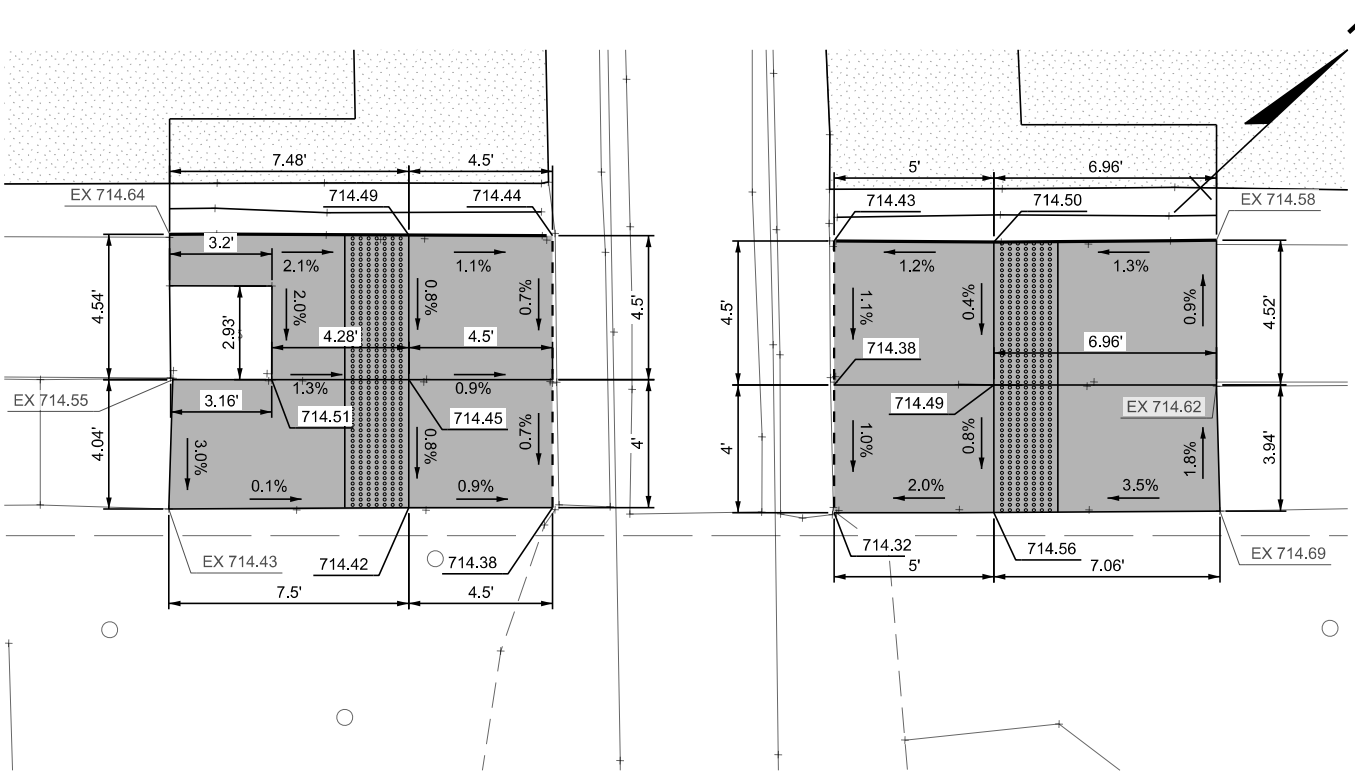
M-81 PEDESTRIAN DETOUR ROUTE SIGN SUMMARY

SIGN CODE	SIGN LEGEND	EB DETOUR	WB DETOUR	SIZE			AREA	TOTAL AREA
		(EA)	(EA)	(IN)	X	(IN)	(SFT)	(SFT)
M4-9gL	PEDESTRIAN SYMBLE LEFT ARROW DETOUR	2	3	18	x	12	1.5	7.5
M4-9gR	PEDESTRIAN SYMBLE RIGHT ARROW DETOUR	2	1	18	x	12	1.5	4.5
M4-9h	PEDESTRIAN SYMBLE UP ARROW DETOUR	1	1	24	x	12	2.0	4.0
M4-9i	PEDESTRIAN SYMBOL END DETOUR	1	1	18	x	12	1.5	3.0
R9-9	SIDEWALK CLOSED	2	2	30	x	18	3.8	15.0
W20-8	SIDEWALK CLOSED AHEAD	2	2	24	x	18	3.0	12.0
			PEDESTRIAN DETOUR SIGN TYPE B TOTAL					**46.0**



HESR CROSSING - NORTH
SIDEWALK RAMP DETAIL

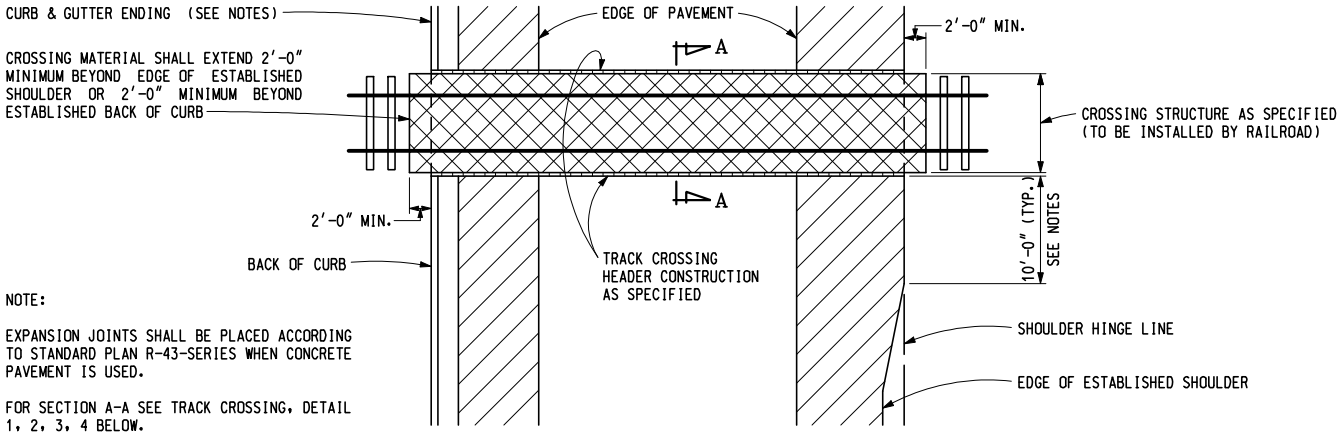
CONSTRUCTION



HESR CROSSING - SOUTH
SIDEWALK RAMP DETAIL

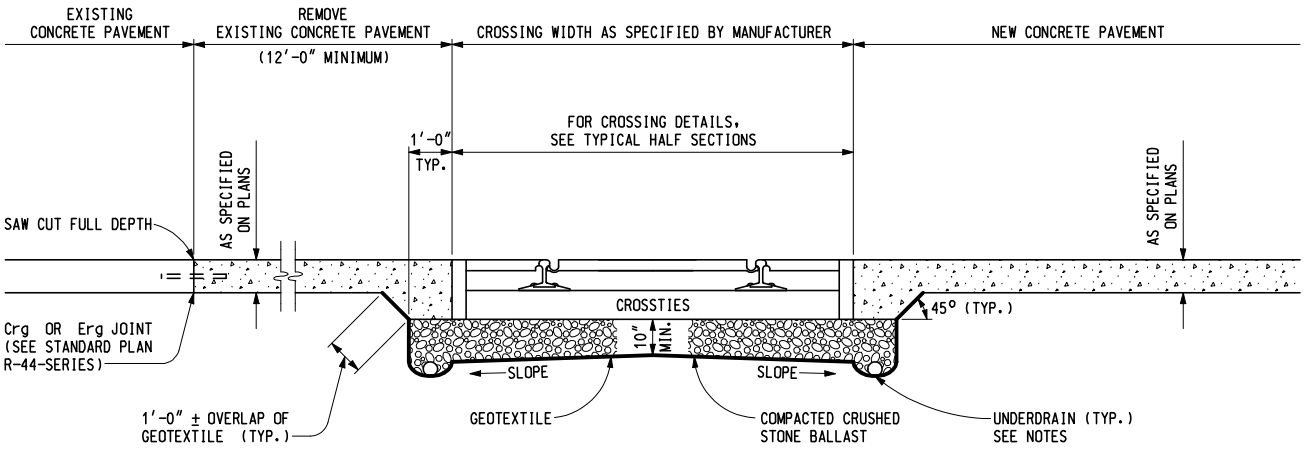
CONSTRUCTION

MDOT Michigan Department of Transportation	0 6 HORZ. (FT)	DESIGN UNIT: TERVO	TSC: HURON	DATE: 06/18/25
		CS: 79061	DETAIL GRADES	DRAWING: M-81 DETGRD 1 / SHEET: SECT 1 9
FILE: M81_RxR_DetGrd_001.dgn		JN: TWA	HURON & EASTERN RAILROAD CROSSING	



PLAN SHOWING SINGLE CROSSING STRUCTURE

(CURB) (PAVED SHOULDER)



TRACK CROSSING, DETAIL 1

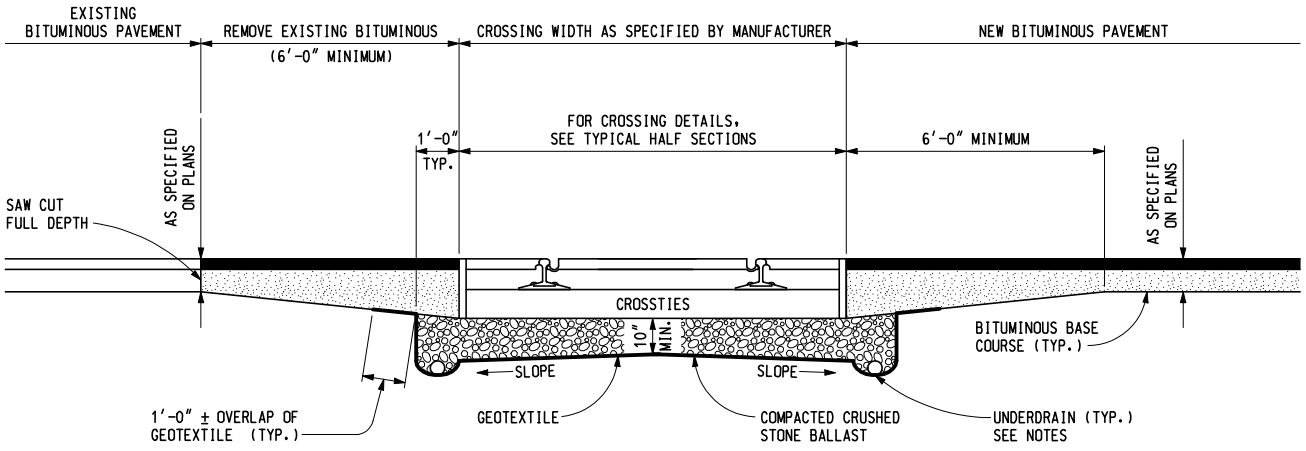
(EXISTING CONCRETE PAVEMENT SHOWN)

TRACK CROSSING, DETAIL 2

(NEW CONCRETE PAVEMENT SHOWN)

SECTION A - A

FULL OR PARTIAL DEPTH CONCRETE PAVEMENT
SEE PLAN SHOWING SINGLE CROSSING STRUCTURE



TRACK CROSSING, DETAIL 3

(EXISTING BITUMINOUS PAVEMENT SHOWN)

TRACK CROSSING, DETAIL 4

(NEW BITUMINOUS PAVEMENT SHOWN)

SECTION A - A

FULL DEPTH BITUMINOUS PAVEMENT
SEE PLAN SHOWING SINGLE CROSSING STRUCTURE

MDOT Michigan Department of Transportation

PREPARED BY DESIGN DIVISION

DRAWN BY: B.L.T.

CHECKED BY: W.K.P.

RAILROAD COORDINATION ENGINEER

ENGINEER OF CONSTRUCTION & TECHNOLOGY

ENGINEER OF MAINTENANCE

ENGINEER OF TRAFFIC AND SAFETY

ENGINEER - ROAD DESIGN

ENGINEER OF DESIGN

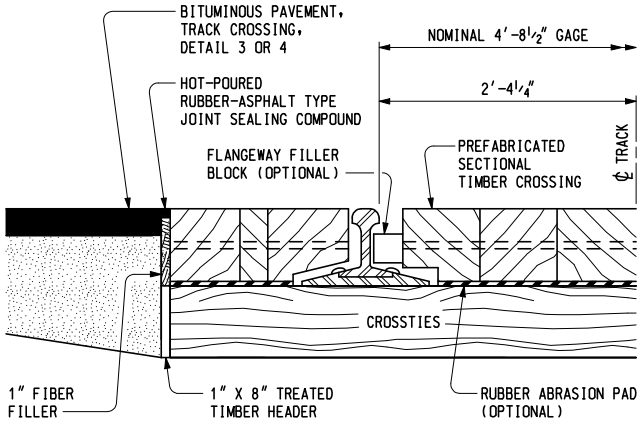
DEPARTMENT DIRECTOR
Gregory J. Rosine

BY: for CHIEF ENGINEER/DEPUTY DIRECTOR
BUREAU OF HIGHWAY TECHNICAL SERVICES

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR

TRACK CROSSINGS

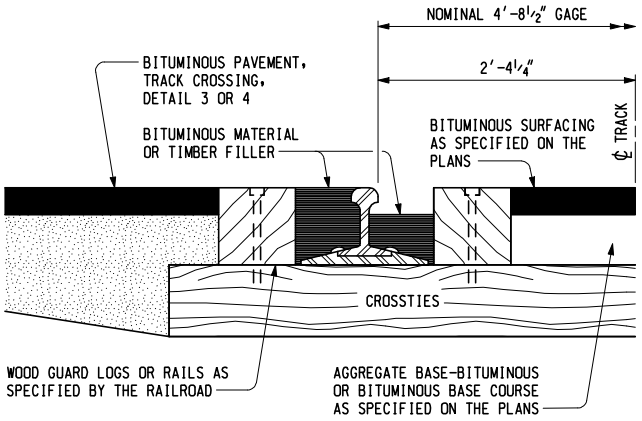
9-14-2001	3-20-2001	R-121-B	SHEET 1 OF 4
F.H.W.A. APPROVAL	PLAN DATE		



NOTE: USE 3" FILLER WITH POLYURETHANE FOAM CAP AND JOINT SEALING COMPOUND FOR CONCRETE PAVEMENT APPROACHES. (FULL OR PARTIAL DEPTH)

TYPICAL HALF SECTION

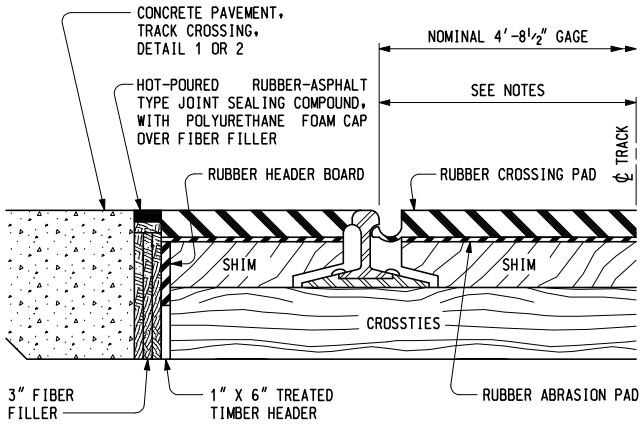
PREFABRICATED TREATED TIMBER SECTIONAL CROSSING



NOTE: FOR OTHER TYPES OF PAVEMENT APPROACHES, INSTALL AS SPECIFIED ON THE PLANS.

TYPICAL HALF SECTION

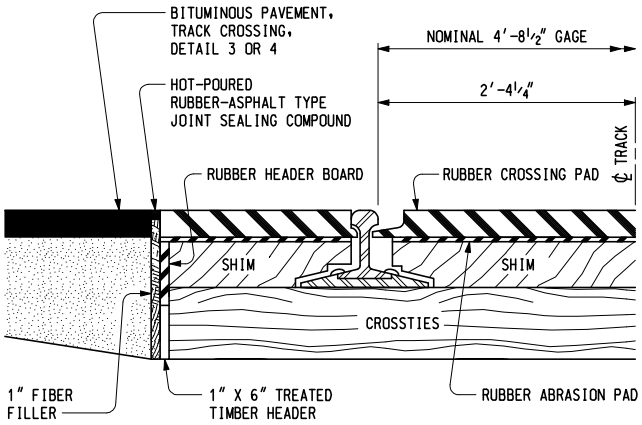
BITUMINOUS WITH GUARD LOG CROSSING OR BITUMINOUS WITH FLANGE RAIL CROSSING



NOTE: WHEN INSTALLING A FULL DEPTH RUBBER CROSSING, USE 2" FIBER FILLER WITH POLYURETHANE FOAM CAP AND JOINT SEALING COMPOUND.

TYPICAL HALF SECTION

SHIMMED RUBBER CROSSING (CONCRETE PAVEMENT, FULL OR PARTIAL DEPTH)

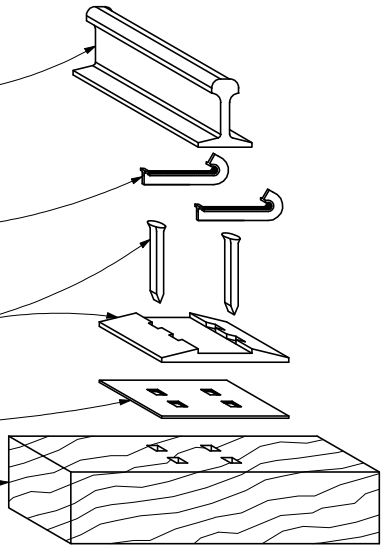


NOTE: WHEN INSTALLING A FULL DEPTH RUBBER CROSSING, ELIMINATE THE FIBER FILLER JOINT.

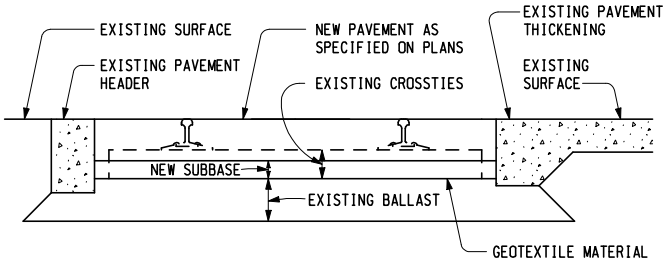
TYPICAL HALF SECTION

SHIMMED RUBBER CROSSING (BITUMINOUS PAVEMENT)

1. ELIMINATE RAIL JOINTS WITHIN ROADWAY AND FOR A DISTANCE OF AT LEAST 30'-0" BEYOND EACH END OF THE ROADWAY CROSSING MATERIAL
2. FULLY BOX ANCHOR ALL TIES THROUGH THE CROSSING AREA AND AT LEAST 20'-0" BEYOND OR APPROPRIATELY BOX ANCHOR TIES ON EACH SIDE OF THE CROSSING
3. USE AT LEAST TWO SPIKES IN EACH TIE PLATE, USE DOUBLE SHOULDER TIE PLATES TO PROVIDE ADEQUATE BEARING
4. USE RUBBER TIE PADS UNDER TIE PLATES ON EACH CROSSTIE WITHIN LIMIT OF CROSSING (OPTIONAL)
5. CROSSTIE, EXACT LENGTH AS SPECIFIED



TYPICAL CONNECTION OF RAIL TO CROSSTIE



1. REMOVE EXISTING PAVEMENT HEADERS, RAILS, TIES, CROSSING MATERIALS AND BALLAST TO BOTTOM OF EXISTING CROSSTIES OR AS SPECIFIED ON THE PLANS.
2. STABILIZE ANY REMAINING BALLAST WITH A ROLLER.
3. INSTALL GEOTEXTILE MATERIAL AS RECOMMENDED.
4. ADD NEW SUBBASE TO UNDISTURBED SUBGRADE.
5. PLACE CONCRETE OR BITUMINOUS SURFACE AS SPECIFIED ON PLANS TO MEET EXISTING SURFACE.

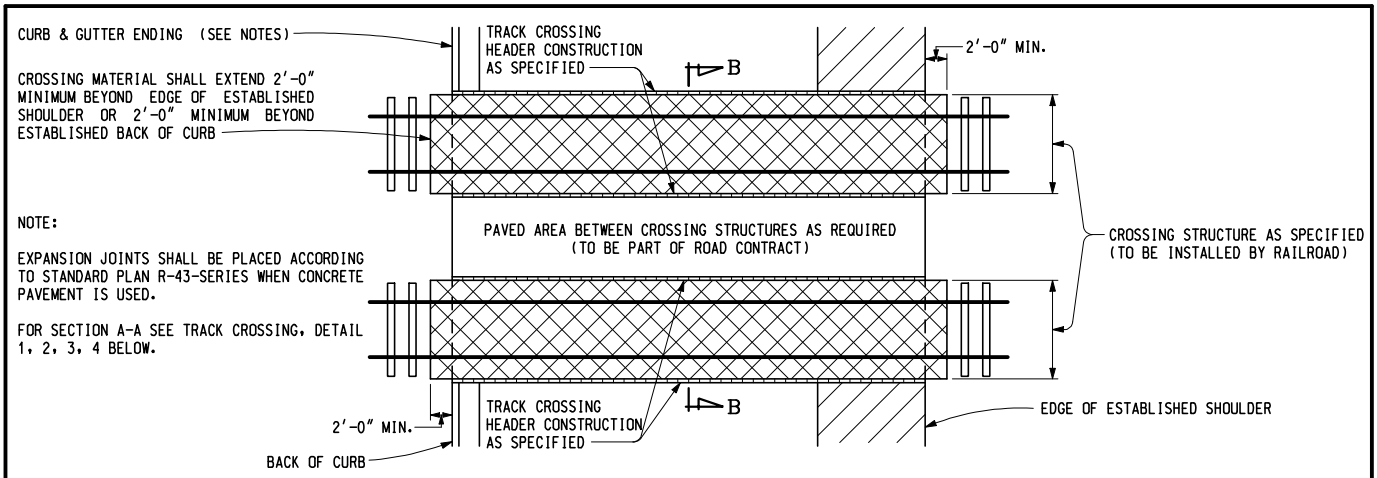
DETAIL 5
TYPICAL SECTION FOR PAVEMENT REPLACEMENT OF ABANDONED CROSSING

MICHIGAN DEPARTMENT OF TRANSPORTATION

BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR

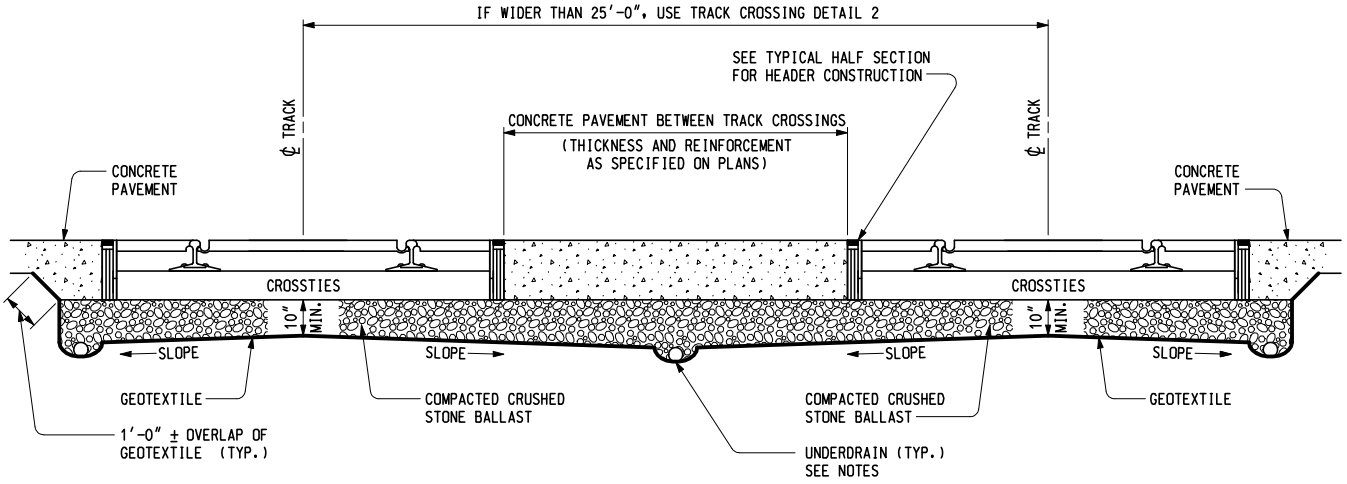
TRACK CROSSINGS

9-14-2001 F.H.W.A. APPROVAL	3-20-2001 PLAN DATE	R-121-B	SHEET 2 OF 4



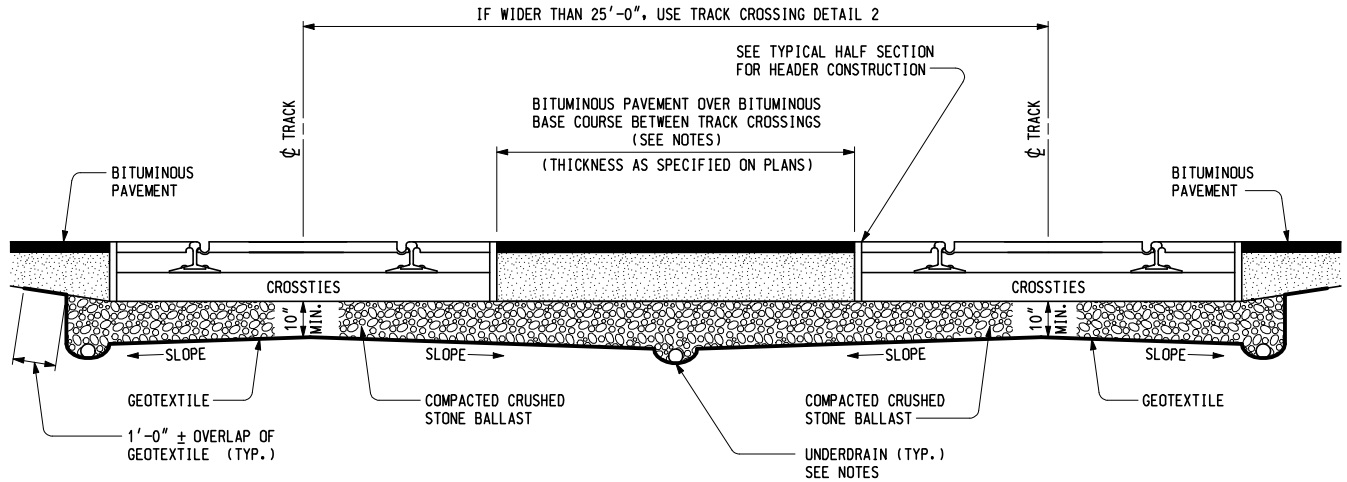
PLAN SHOWING MULTIPLE CROSSING STRUCTURES

(CURB) (PAVED SHOULDER)



TRACK CROSSING, DETAIL 6
SECTION B - B

CONCRETE PAVEMENT BETWEEN CROSSING STRUCTURES
SEE PLAN SHOWING MULTIPLE CROSSING STRUCTURES



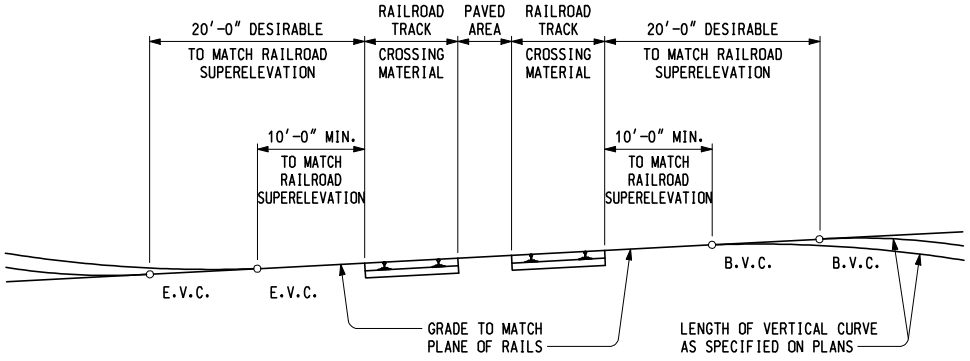
TRACK CROSSING, DETAIL 7
SECTION B - B

BITUMINOUS PAVEMENT BETWEEN CROSSING STRUCTURES
SEE PLAN SHOWING MULTIPLE CROSSING STRUCTURES

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR

TRACK CROSSINGS

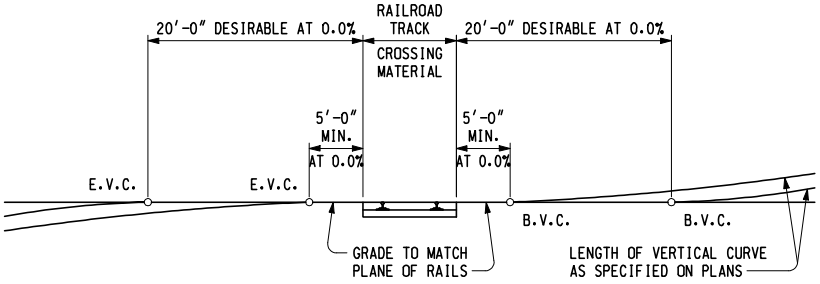
9-14-2001 F.H.W.A. APPROVAL	3-20-2001 PLAN DATE	R-121-B	SHEET 3 OF 4



B.V.C. = BEGINNING OF VERTICAL CURVE
E.V.C. = END OF VERTICAL CURVE

NOTE: WHEN CROSSING CONSISTS OF TWO OR MORE TRACKS, ALL TRACKS SHOULD BE IN THE SAME PLANE.

TYPICAL SECTION WITH RAILROAD IN SUPERELEVATION



TYPICAL SECTION WITH RAILROAD ON LEVEL PLANE

NOTES:

THE RAILROAD COMPANY WILL FURNISH AND INSTALL THE CROSSING STRUCTURE INCLUDING UNDERDRAIN, GEOTEXTILE MATERIAL, BALLAST, WOOD TIES, RAILS, CROSSING SURFACE, AND HEADERS.

THE EDGES OF THE PAVEMENT GUTTERS AND THE CROWN ON EITHER SIDE OF THE CROSSING SHALL BE SMOOTHLY TRANSITIONED TO MEET THE PROPOSED GRADE OF THE RAILROAD TRACK. THE CROSSING SHOULD BE INSTALLED APPROXIMATELY $\frac{1}{2}$″ ABOVE THE PROPOSED PLAN GRADE TO ALLOW FOR SETTLEMENT AT ACTIVE MAIN LINE TRACKS, UNLESS THE RAILROAD CONSOLIDATES (VIBRATES) BALLAST AS DETERMINED BY THE ENGINEER. TEMPORARY BITUMINOUS WEDGING MAY BE REQUIRED.

THE HEIGHT OF ANY CURB ADJACENT TO THE RAILROAD TRACKS SHALL BE REDUCED TO 1″ AT A POINT 8′-6″ FROM THE CENTERLINE OF THE TRACK, NORMAL TO THE TRACK, BY STANDARD TRANSITIONS SPECIFIED ON STANDARD PLAN R-30-SERIES, UNLESS OTHERWISE SPECIFIED ON THE PLANS.

UNDERDRAINS WRAPPED IN GEOTEXTILE SHALL BE PLACED WHERE DRAINAGE IS NEEDED AND A POSITIVE OUTLET CAN BE PROVIDED.

PAVEMENT HEADERS FORMED BY THICKENING THE ENDS OF THE CONCRETE PAVEMENT OR THE BASE COURSE FOR THE BITUMINOUS OVERLAY WILL BE INCLUDED IN THE ITEMS OF CONCRETE PAVEMENT, CONCRETE BASE COURSE, BITUMINOUS BASE COURSE, OR AGGREGATE BASE COURSE-BITUMINOUS.

EXPANSION JOINTS AT THE RAILROAD CROSSING SHALL BE CONSTRUCTED AS SPECIFIED ON THIS PLAN. THE ADDITIONAL JOINTS IN THE PAVEMENT SHALL BE LOCATED AS SPECIFIED ON STANDARD PLAN R-43-SERIES AND CONSTRUCTED ACCORDING TO STANDARD PLAN R-39-SERIES.

PAVEMENTS ILLUSTRATED ON THIS PLAN ARE TYPICAL TREATMENTS ONLY, THE TYPE OF PAVEMENT USED WILL BE AS SPECIFIED ON THE PLANS.

BLEND THE APPROACH GRADES TO MATCH THE PLANE OF THE RAILS, USE FLAT VERTICAL CURVES IN ORDER TO ELIMINATE UNNECESSARY UNDULATION OF THE VEHICULAR TRAFFIC.

THE FULL WIDTH OF SHOULDERS SHOULD BE PAVED WITH BITUMINOUS AT THE CROSSING TO MEET THE CROSSING SURFACE MATERIAL. THE SHOULDER WIDTH SHALL NOT BE GREATER THAN 10′-0″ EVEN IF THE TRACKS INTERSECT THE ROADWAY AT A SKEWED ANGLE. SHORT TAPERS WILL EXTEND BACK TO THE PAVED PORTION OF THE SHOULDER.

WHEN A RAILROAD CROSSING STRUCTURE IS RAISED, THE PAVEMENT TAPER TO MEET THE RAISED CROSSING STRUCTURE SHOULD BE 0.25% OR AS DIRECTED BY THE ENGINEER. THE PROPOSED TRANSITION LENGTH SHOULD BE SPECIFIED ON THE PLANS. THE EXISTING PAVEMENT SHOULD BE REMOVED OR MILLED TO PROVIDE A STRAIGHT AND VERTICAL BUTT JOINT.

TREATED TIMBER AND/OR RUBBER HEADER BOARDS WILL BE USED WHEN SPECIFIED AND SHALL BE INSTALLED BY THE RAILROAD COMPANY.

IF COLD PATCH MATERIAL OR GRAVEL IS USED AS TEMPORARY FILL IN THE GAP BETWEEN THE CROSSING AND THE PAVEMENT, IT SHALL BE REMOVED PRIOR TO REPLACEMENT WITH A PLANT MIX. THE BITUMINOUS MATERIAL ADJACENT TO THE CROSSING SHALL BE COMPACTED WITH A ROLLER ACCORDING TO THE CURRENT STANDARD SPECIFICATIONS.

SIDEWALK CROSSINGS WILL NORMALLY BE CONSTRUCTED OF BITUMINOUS, TIMBER, OR RUBBER PADS SIMILAR TO THE CROSSING, EXCEPT THAT THE FIBER FILLER AND TREATED TIMBER HEADER MAY BE OMITTED.

THE OPEN ROADWAY AREA BETWEEN THE SAWED PAVEMENT EDGE AND THE NEWLY INSTALLED CROSSING SHALL BE ROLLER COMPACTED PRIOR TO THE PAVEMENT CONTRACTOR FILLING THIS AREA WITH CONCRETE OR BITUMINOUS.

PROPRIETARY CROSSINGS SHALL BE INSTALLED ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS.

SIGNAL WIRE CONDUIT IS TO BE PLACED BY THE RAILROAD AS NEEDED.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR

TRACK CROSSINGS

9-14-2001 F.H.W.A. APPROVAL	3-20-2001 PLAN DATE	R-121-B	SHEET 4 OF 4

M-81 Railroad Crossing Reconstruction

Projectwide Pay Items	Quantity	Unit	Unit Price	Cost
Mobilization, Max	1.00	LSUM		
Removal Pay Items	**Quantity**	**Unit**		
Curb and Gutter, Rem	55	Ft		
Pavt, Rem	77	Syd		
Sidewalk, Rem	30	Syd		
Excavation, Earth	15	Cyd		
Cold Milling HMA Surface	210	Syd		
Sidewalk, Clay Brick Pavers, Rem	200	Sft		
Construction Pay Items	**Quantity**	**Unit**		
Aggregate Base	30	Ton		
Hand Patching	88	Ton		
HMA Approach	22	Ton		
Curb and Gutter, Conc, Det C2	55	Ft		
Detectable Warning Surface	40	Ft		
Curb Ramp, Conc, 6 inch	450	Sft		
Pavt Mrkg, Ovly Cold Plastic, 24 inch, Stop Bar	60	Ft		
Slope Restoration, Non-Freeway, Type B	10	Syd		
Maintenance of Traffic Pay Items	**Quantity**	**Unit**		
Barricade, Type III, High Intensity, Double Sided, Lighted, Furn	20	Ea		
Barricade, Type III, High Intensity, Double Sided, Lighted, Oper	20	Ea		
Pedestrian Type II Barricade, Temp	12	Ea		
Pedestrian Type II Channelizer, Temp	150	Ft		
Channelizing Device, 42 inch, Fluorescent, Furn	50	Ea		
Channelizing Device, 42 inch, Fluorescent, Oper	50	Ea		
Minor Traf Devices	1.00	LSUM		
Plastic Drum, Fluorescent, Furn	25	Ea		
Plastic Drum, Fluorescent, Oper	25	Ea		
Sign, Portable, Changeable Message, NTCIP-Compliant, Furn	4	Ea		
Sign, Portable, Changeable Message, NTCIP-Compliant, Oper	4	Ea		
Sign, Type B, Temp, Prismatic, Furn	650	Ea		
Sign, Type B, Temp, Prismatic, Oper	650	Ea		
			Total	

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
SAMPLING ASPHALT BINDER ON LOCAL AGENCY PROJECTS

CFS:TRC 1 of 1 APPR:JWB:KPK:02-19-20
FHWA:APPR:02-19-20

a. Description. This work consists of the Contractor taking samples of the asphalt binder and delivering the samples to the Engineer prior to incorporation into the hot mix asphalt mixture.

b. Materials. For informational purposes, original samples of asphalt binder will be taken by the Contractor and delivered to the Engineer prior to incorporation into the mixture. The frequency of sampling will be determined by the Engineer.

The Contractor must certify in writing that the materials used in the HMA mixture are from the same source as the materials used in developing the HMA mixture design and the bond coat is from an approved supplier as stated in the *Material Quality Assurance Procedures Manual*.

c. Construction. None specified.

d. Measurement and Payment. The cost of obtaining and delivering the samples to the Engineer will be included in the hot mix asphalt (HMA) pay items in the contract.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
RECYCLED HOT MIX ASPHALT MIXTURE ON LOCAL AGENCY PROJECTS

CFS:KPK 1 of 2 APPR:JWB:CJB:02-26-20
FHWA:APPR:03-02-20

Add the following subsection to subsection 501.02.A.2 of the Standard Specifications for Construction.

c. **Reclaimed Asphalt Pavement (RAP) and Binder Grade Selection**. The method for determining the binder grade in HMA mixtures incorporating RAP is divided into three categories designated Tier 1, Tier 2 and Tier 3. Each tier has a range of percentages that represent the contribution of the RAP binder toward the total binder, by weight. The tiers identified below apply to HMA mixtures with the following exception: Superpave mixture types EML, EML High Stress, EMH, EMH High Stress, and EH, EH High Stress used as leveling or top course must be limited to a maximum of 27 percent RAP binder by weight of the total binder in the mixture.

Recycled materials may be used as a substitute for a portion of the new materials required to produce HMA mixtures in accordance with contract.

- **Tier 1 (0% to 17% RAP binder by weight of the total binder in the mixture).** No binder grade adjustment is made to compensate for the stiffness of the asphalt binder in RAP.

- **Tier 2 (18% to 27% RAP binder by weight of the total binder in the mixture).** For all mixtures no binder grade change will occur in Tier 2 for all shoulder and temporary road mixtures.

  Ensure the required asphalt binder grade is at least one grade lower for the low temperature than the design binder grade required for the specified project mixture type. Lowering the high temperature of the binder one grade is optional. For example, if the design binder grade for the mixture type is PG 58-22, the required grade for the binder in the HMA mixture containing RAP would be a PG 52-28 or a PG 58-28.

  For Marshall Mixes, no binder grade change will be required when Average Daily Traffic (ADT) is above 7000 or Commercial Average Daily Traffic (CADT) is above 700. No binder grade change will occur for EL mixtures used as leveling or top course.

  The asphalt binder grade can also be selected using a blending chart for high and low temperatures. Supply the blending chart and the RAP test data used in determining the binder selection according to *AASHTO M323*.

- **Tier 3 (≥ 28% RAP binder by weight of the total binder in the mixture).** The binder grade for the asphalt binder is selected using a blending chart for high and low temperatures per *AASHTO M323*. Supply the blending chart and the RAP test data

used in determining the binder selection.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
ACCEPTANCE OF HOT MIX ASPHALT MIXTURE ON LOCAL AGENCY PROJECTS

CFS:KPK 1 of 7 APPR:CJB:JWB:02-26-20
FHWA:APPR:03-13-20

a. Description. This special provision provides sampling and testing requirements for local agency projects using the roller method and the nuclear density gauge testing. Provide the hot mix asphalt (HMA) mixture in accordance with the requirements of the standard specifications, except where modified herein.

b. Materials. Provide aggregates, mineral filler (if required), and asphalt binder to produce a mixture proportioned within the master gradation limits shown in the contract, and meeting the uniformity tolerance limits in Table 1.

Table 1: Uniformity Tolerance Limits for HMA Mixtures

Parameter			Top and Leveling Course		Base Course	
Number	Description		Range 1 (a)	Range 2	Range 1 (a)	Range 2
1	% Binder Content		-0.30 to +0.40	±0.50	-0.30 to +0.40	±0.50
2	% Passing	# 8 and Larger Sieves	±5.0	±8.0	±7.0	±9.0
		# 30 Sieve	±4.0	±6.0	±6.0	±9.0
		# 200 Sieve	±1.0	±2.0	±2.0	±3.0
3	Crushed Particle Content (b)		Below 10%	Below 15%	Below 10%	Below 15%

a. This range allows for normal mixture and testing variations. The mixture must be proportioned to test as closely as possible to the Job-Mix-Formula (JMF).
b. Deviation from JMF.

Parameter number 2 as shown in Table 1 is aggregate gradation. Each sieve will be evaluated on one of the three gradation tolerance categories. If more than one sieve is exceeding Range 1 or Range 2 tolerances, only the one with the largest exceedance will be counted as the gradation parameter.

The master gradation should be maintained throughout production; however, price adjustments will be based on Table 1. Aggregates which are to be used in plant-mixed HMA mixtures must not contain topsoil, clay, or loam.

c. Construction. Submit a Mix Design and a JMF to the Engineer. Do not begin production and placement of the HMA until receipt of the Engineer's approval of the JMF. Maintain the binder content, aggregate gradation, and the crushed particle content of the HMA mixture within the Range 1 uniformity tolerance limits in Table 1. For mixtures meeting the definition of top or leveling course, field regress air void content to 3.5 percent with liquid asphalt cement unless specified otherwise on HMA application estimate. For mixtures meeting the definition of base course, field regress air void content to 3.0 percent with liquid asphalt cement unless specified

otherwise on HMA application estimate.

Ensure all persons performing Quality Control (QC) and Quality Assurance (QA) HMA field sampling are "Local Agency HMA Sampling Qualified" samplers. At the pre-production or preconstruction meeting, the Engineer will determine the method of sampling to be used. Ensure all sampling is done in accordance with *MTM 313 (Sampling HMA Paving Mixtures)* or *MTM 324 (Sampling HMA Paving Mixtures Behind the Paver)*. Samples are to be taken from separate hauling loads.

For production/mainline type paving, obtain a minimum of two samples, each being 20,000 grams, each day of production, for each mix type. The Engineer will sample and maintain possession of the sample. Sampling from the paver hopper is prohibited. Each sample will be divided into two 10,000 gram parts with one part being for initial testing and the other part being held for possible dispute resolution testing. Obtain a minimum of three samples for each mix type regardless of the number of days of production.

Obtain samples that are representative of the day's paving. Sample collection is to be spaced throughout the planned tonnage. One sample will be obtained in the first half of the tonnage and the second sample will be obtained in the second half of the tonnage. If planned paving is reduced or suspended, when paving resumes, the remaining sampling must be representative of the original intended sampling timing.

Ensure all persons performing testing are Bit Level One certified or Bit QA/QC Technician certified.

Ensure daily test samples are obtained, except, if the first test results show that the HMA mixture is in specification, the Engineer has the option of not testing additional samples from that day.

At the pre-production or preconstruction meeting, the Engineer and Contractor will collectively determine the test method for measuring asphalt content (AC) using *MTM 319 (Determination of Asphalt Content from Asphalt Paving Mixtures by the Ignition Method)* or *MTM 325 (Quantitative Extraction of Bitumen from HMA Paving Mixtures)*. Back calculation will not be allowed for determining asphalt content.

Ensure all labs performing local agency acceptance testing are qualified labs per the *HMA Production Manual and the Michigan Quality Assurance Procedures Manual,* and participate in the MDOT round robin process, or they must be *AASHTO Materials Reference Laboratory* (AMRL) accredited for *AASHTO T30* or *T27*, and *AASHTO T164* or *T308*. Ensure on non-National Highway System (NHS) routes, Contractor labs are made available, and may be used, but they must be qualified labs as previously stated. Contractor labs may not be used on NHS routes. Material acceptance testing will be completed by the Engineer within 14 calendar days, except holidays and Sundays, for projects with less than 5,000 tons (plan quantity) of HMA and within 7 calendars days, except holidays and Sundays, for projects with 5,000 tons (plan quantity) or more of HMA, after the Engineer has obtained the samples. QA test results will be provided to the Contractor after the Engineer receives the QC test results. Failure on the part of the Engineer or the laboratory to provide QA test results within the specified time frame does not relieve the Contractor of their responsibility to provide an asphalt mix within specifications.

The correlation procedure for ignition oven will be established as follows. Asphalt binder content based on ignition method from MTM 319. Gradation (*ASTM D5444*) and Crushed particle content *(MTM 117)* based on aggregate from *MTM 319*. The incineration temperature will be established

at the pre-production meeting. The Contractor will provide a laboratory mixture sample to the acceptance laboratory to establish the correction factor for each mix. Ensure this sample is provided to the Engineer a minimum of 14 calendar days prior to production.

For production/mainline type paving, the mixture may be accepted by visual inspection up to a quantity of 500 tons per mixture type, per project (not per day). For non-production type paving defined as driveways, approaches, and patching, visual inspection may be allowed regardless of the tonnage.

The mixture will be considered out-of-specification, as determined by the acceptance tests, if for any one mixture, two consecutive tests per parameter, (for Parameter 2, two consecutive aggregate gradations on one sieve) are outside Range 1 or Range 2 tolerance limits. If a parameter is outside of Range 1 tolerance limits and the second consecutive test shows that the parameter is outside of Range 2, then it will be considered to be a Range 1 out-of-specification. Consecutive refers to the production order and not necessarily the testing order. Out-of-specification mixtures are subject to a price adjustment per the Measurement and Payment section of this special provision.

Contractor operations will be suspended when the mixture is determined to be out-of-specification, but contract time will continue to run. The Engineer may issue a Notice of Non-Compliance with Contract Requirements (Form 1165), if the Contractor has not suspended operations and taken corrective action. Submit a revised JMF or proposed alterations to the plant and/or materials to achieve the JMF to the Engineer. Effects on the Aggregate Wear Index (AWI) and mix design properties will be taken into consideration. Production and placement cannot resume until receipt of the Engineer's approval to proceed.

Pavement in-place density will be measured using one of two approved methods. The method used for measuring in-place density will be agreed upon at a pre-production or preconstruction meeting.

Pavement in-place density tests will be completed by the Engineer during paving operations and prior to traffic staging changes. Pavement in-place density acceptance testing will be completed by the Engineer prior to paving of subsequent lifts and being open to traffic.

Option 1 - Direct Density Method

Use of a nuclear density gauge requires measuring the pavement density using the Gmm from the JMF for the density control target. The required in-place density of the HMA mixture must be 92.0 to 98.0 percent of the density control target. Nuclear density testing and frequency will be in accordance with the *MDOT Density Testing and Inspection Manual*.

Option 2 - Roller Method

The Engineer may use the Roller Method with a nuclear or non-nuclear density gauge to document achieving optimal density as discussed below.

Use of the density gauge requires establishing a rolling pattern that will achieve the required in-place density. The Engineer will measure pavement density with a density gauge using the Gmm from the JMF for the density control target.

Use of the Roller Method requires developing and establishing density frequency curves, and

meeting the requirements of Table 2. A density frequency curve is defined as the measurement and documentation of each pass of the finished roller until the in-place density results indicate a decrease in value. The previous recording will be deemed the optimal density. The Contractor is responsible for establishing and documenting an initial or QC rolling pattern that achieves the optimal in-place density. When the density frequency curve is used, the Engineer will run and document the density frequency curve for each half day of production to determine the number of passes to achieve the maximum density. Table 5, located at the end of this special provision, can be used as an aid in developing the density frequency curve. The Engineer will perform density tests using an approved nuclear or non-nuclear gauge per the manufacturer's recommended procedures.

Table 2: Minimum Number of Rollers Recommended Based on Placement Rate

Average Laydown Rate, Square Yards per Hour	Number of Rollers Required (a)	
	Compaction	Finish
Less than 600	1	1 (b)
601 - 1200	1	1
1201 - 2400	2	1
2401 - 3600	3	1
3601 and More	4	1

a. Number of rollers may increase based on density frequency curve.
b. The compaction roller may be used as the finish roller also.

After placement, roll the HMA mixture as soon after placement as the roller is able to bear without undue displacement or cracking. Start rolling longitudinally at the sides of the lanes and proceed toward the center of the pavement, overlapping on successive trips by at least half the width of the drum. Ensure each required roller is 8 tons minimum in weight unless otherwise approved by the Engineer.

Ensure the initial breakdown roller is capable of vibratory compaction and is a maximum of 500 feet behind the paving operations. The maximum allowable speed of each roller is 3 miles per hour (mph) or 4.5 feet per second. Ensure all compaction rollers complete a minimum of two complete rolling cycles prior to the mat temperature cooling to 180 degrees Fahrenheit (F). Continue finish rolling until all roller marks are eliminated and no further compaction is possible. The Engineer will verify and document that the roller pattern has been adhered to. The Engineer can stop production when the roller pattern is not adhered to.

d. Measurement and Payment. The completed work, as described, will be measured and paid for using applicable pay items as described in subsection 501.04 of the Standard Specifications for Construction, or the contract, except as modified below.

Base Price. Price established by the Department to be used in calculating incentives and adjustments to pay items and shown in the contract.

If acceptance tests, as described in section c. of this special provision, show that a Table 1 mixture parameter exceeds the Range 1, but not the Range 2, tolerance limits, that mixture parameter will be subject to a 10 percent penalty. The 10 percent penalty will be assessed based on the acceptance tests only unless the Contractor requests that the 10,000 gram sample part retained for possible dispute resolution testing be tested. The Contractor has 4 calendar days from receipt

of the acceptance test results to notify the Engineer, in writing, that dispute resolution testing is requested. The Contractors QC test results for the corresponding QA test results must result in an overall payment greater than QA test results otherwise the QA tests will not be allowed to be disputed. The Engineer has 4 calendar days to send the dispute resolution sample to the lab once dispute resolution testing is requested. The dispute resolution sample will be sent to an independent lab selected by the Local Agency, and the resultant dispute test results will be used to determine the penalty per parameter, if any. Ensure the independent lab is a MDOT QA/QC qualified lab or an AMRL HMA qualified lab. The independent lab must not have conflicts of interest with the Contractor or Local Agency. If the dispute testing results show that the mixture parameter is out-of-specification, the Contractor will pay for the cost of the dispute resolution testing and the contract base price for the material will be adjusted, based on all test result parameters from the dispute tests, as shown in Table 3 and Table 4. If the dispute test results do not confirm the mixture parameter is out-of-specification, then the Local Agency will pay for the cost of the dispute resolution testing and no price adjustment is required.

If acceptance tests, as described in section c. of this special provision, show that a Table 1 mixture parameter exceeds the Range 2 tolerance limits, the 10,000 gram sample part retained for possible dispute resolution testing will be sent, within 4 calendar days, to the MDOT Central Laboratory for further testing. The MDOT Central Laboratory's test results will be used to determine the penalty per mixture parameter, if any. If the MDOT Central Laboratory's results do not confirm the mixture parameter is out-of-specification, then no price adjustment is required. If the MDOT Central Laboratory's results show that the mixture is out-of-specification and the Engineer approves leaving the out-of-specification mixture in place, the contract base price for the material will be adjusted, based on all parameters, as shown in Table 3 and Table 4.

In the case that the Contractor disputes the results of the test of the second sample obtained for a particular day of production, the test turn-around time frames given would apply to the second test and there would be no time frame on the first test.

The laboratory (MDOT Central Laboratory or independent lab) will complete all Dispute Resolution testing and return test results to the Engineer, who will provide them to the Contractor, within 13 calendar days upon receiving the Dispute Resolution samples.

In all cases, when penalties are assessed, the penalty applies to each parameter, up to two parameters, that is out of specification.

Table 3: Penalty Per Parameter

Mixture Parameter out-of-Specification per Acceptance Tests	Mixture Parameter out-of-Specification per Dispute Resolution Test Lab	Price Adjustment per Parameter
No	N/A	None
Yes	No	None
	Yes	Outside Range 1 but not Range 2: decrease by 10%
		Outside Range 2: decrease by 25%

The quantity of material receiving a price adjustment is defined as the material produced from the time the first out-of-specification sample was taken until the time the sample leading to the first in-specification test was taken.

Each parameter of Table 1 is evaluated with the total price adjustment applied to the contract base price based on a sum of the two parameter penalties resulting in the highest total price adjustment as per Table 4. For example, if three parameters are out-of-specification, with two parameters outside Range 1 of Table 1 tolerance limits, but within Range 2 of Table 1 limits and one parameter outside of Range 2 of Table 1 tolerance limits and the Engineer approves leaving the mixture in place, the total price adjustment for that quantity of material is 35 percent.

Table 4: Calculating Total Price Adjustment

Cost Adjustment as a Sum of the Two Highest Parameter Penalties		
Number of Parameters Out-of-Specification	Range(s) Outside of Tolerance Limits of Table 1 per Parameter	Total Price Adjustment
One	Range 1	10%
	Range 2	25%
Two	Range 1 and Range 1	20%
	Range 1 and Range 2	35%
	Range 2 and Range 2	50%
Three	Range 1, Range 1 and Range 1	20%
	Range 1, Range 1 and Range 2	35%
	Range 1, Range 2 and Range 2	50%
	Range 2, Range 2 and Range 2	50%

Table 5: Density Frequency Curve Development

Tested by: _____ Date/Time: _____

Route/Location:		Air Temp:
Control Section/Job Number:		Weather:
Mix Type:	Tonnage:	Gauge:
Producer:	Depth:	Gmm:

Roller #1 Type:

Pass No.	Density	Temperature	Comments
1			
2			
3			
4			
5			
6			
7			
8			
Optimum			

Roller #2 Type:

Pass No.	Density	Temperature	Comments
1			
2			
3			
4			
5			
6			
7			
8			
Optimum			

Roller #3 Type:

Pass No.	Density	Temperature	Comments
1			
2			
3			
4			
5			
6			
7			
8			
Optimum			

Summary: _____

_____

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