



MONROE COUNTY  
**R O A D**  
**COMMISSION**

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840 S. Telegraph Road • Monroe, Michigan 48161 • Phone: (734) 240-5102 • Fax: (734) 240-5101

**PROPOSAL**  
  
**FOR**  
  
**2016 MICROSURFACING PROGRAM**

**BID OPENING:**

Tuesday, May 17, 2016 at 10:00 a.m.

**BOARD OF COUNTY ROAD COMMISSIONERS  
OF THE COUNTY OF MONROE**

Paul Iacoangeli, Chairman  
Dan Minton, Vice Chairman  
Bruce R. Stammer, Jr., Member  
Stephen J. Pace, Member  
Charles A. Londo, Member

**MONROE COUNTY ROAD COMMISSION  
INVITATION TO BID**

Sealed bids will be received by the Board of County Road Commissioners of the County of Monroe until **10:00 a.m.** local time on **Tuesday, May 17, 2016** at their office located at 840 South Telegraph Road, Monroe, Michigan, 48161 for the following:

- 2016 Monroe Township HMA Paving Program
- 2016 Microsurfacing Program
- Asphalt Rejuvenators
- Milan Township Berm Removal

Bids will be publicly opened and read aloud by the Bid Committee at 10:00 a.m. Proposals may be downloaded from the Road Commission's website at [www.mcrc-mi.org/bids.html](http://www.mcrc-mi.org/bids.html) .

BOARD OF COUNTY ROAD COMMISSIONERS  
OF THE COUNTY OF MONROE, MICHIGAN

**MONROE COUNTY ROAD COMMISSION  
PROPOSAL  
2016 MICROSURFACING PROGRAM**

TO: The Board of County Road Commissioners of the County of Monroe, Michigan

FOR: 2016 Microsurfacing Program

Ladies and Gentlemen:

The undersigned bidder hereby affirms that:

1. The proposal is in all respects fair and without any collusion or fraud.
2. The undersigned have examined the site of the proposed project and have made a personal investigation and estimate of quantities.
3. The undersigned will contract to furnish all labor, equipment, tools, material and traffic control devices necessary at the unit prices stated on the attached bid forms and to complete the work in the time specified to the satisfaction of the Board of County Road Commissioners of the County of Monroe, Michigan.

Company: \_\_\_\_\_

Address: \_\_\_\_\_

City, State, ZIP: \_\_\_\_\_

Telephone: \_\_\_\_\_

By: \_\_\_\_\_

Title: \_\_\_\_\_

Date: \_\_\_\_\_

Notes:

1. If the bidder is a partnership, each member must sign the proposal.
2. Corporations must execute the proposal by duly authorized officers in accordance with the Articles of Incorporation.

INSTRUCTIONS TO BIDDERS  
and  
GENERAL CONDITIONS

The Michigan Department of Transportation 2012 Standard Specifications for Construction are incorporated as part of these bidding documents and shall govern except as provided in the Invitation to Bid, Instructions to Bidders and General Conditions, and Proposal. Reference to the Department or Commission in the Michigan Department of Transportation 2012 Standard Specifications for Construction shall for this project mean the Board of County Road Commissioners of the County of Monroe, hereinafter referred to as "Board", unless otherwise specified.

OWNER

The owner of the project is the Board of County Road Commissioners of the County of Monroe, also referred to as the "Board."

ENGINEER

The Engineer is the Director of Operations or the individual assigned by the Director of Operations to be in charge of the Contract. The person assigned as the Engineer may be an employee of the Board, a consultant or an outside contractor hired by the Board.

BIDDER

The Bidder is one who submits a signed bid with the required documentation directly to the Board at the time and place specified.

BID FORMS

Sealed proposals must be submitted on the bid forms furnished by the Board. The proposal shall be submitted in its entirety (pages 1 through 11) with no modifications or changes except as authorized by an addendum and with no pages removed. All proposals must be filled out in ink or typewritten and shall be legibly signed, giving the complete name and address of the Bidder.

All bids must be in a sealed envelope and clearly marked "**Bid for 2016 Microsurfacing Program.**"

BIDDER'S SURETY

The proposal must be accompanied by a cashier's check, certified check or a bid bond made payable to the Board of County Road Commissioners of Monroe County, Michigan in the sum of five percent (5%) of the amount of the bid. Upon awarding and signing of a contract, or in the event of bid rejection, such bid surety will be returned to the Bidder. Bids may be held for a period of forty (40) days.

INTERPRETATION AND ADDENDA

All questions about the meaning or intent of the Bidding Documents are to be directed to the Engineer. Interpretation or clarification considered necessary by the Engineer to such questions will be issued by Addenda delivered to all parties recorded by the Engineer as having received the Bidding Documents. Questions received less than seven days prior to the date for opening the bids may not be answered. Only questions answered by formal written Addenda are binding. Oral and other interpretations or clarifications will be without legal effect.

OPENING OF BIDS

Bids will be received by the Board at 840 S. Telegraph Road, Monroe, Michigan, 48161 until **10:00 a.m.** local time on **Tuesday, May 17, 2016** at which time they will be publicly opened and read aloud.

ACCEPTANCE AND REJECTION OF BIDS

The Board reserves the right to accept, reject and/or modify any or all bids received, to waive any irregularities therein and to make the award in any manner deemed to be in the best interest of the Monroe County Road Commission.

#### TITLE VI ASSURANCE

The Monroe County Road Commission, in accordance with Title VI of the Civil Rights Act of 1964 (78 Stat. 252, 42 USC 2000d to 2000d-4) and Title 49, Code of Federal Regulations, Part 21, as they may be amended from time to time, hereby notifies all bidders that it assures that in any contract entered into pursuant to this advertisement, minority business enterprises will be afforded full opportunity to submit bids in response to this invitation and will not be discriminated against on the grounds of race, color, national origin, gender, age, or disability in consideration for an award.

#### PROHIBITION OF DISCRIMINATION

In accordance with Act No. 453, Public Acts of 1976, the Contractor and subcontractors hereby agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex, height, weight, or marital status. Further, in accordance with Act No. 220, Public Acts of 1976 as amended by Act No. 478, Public Acts of 1980, the Contractor and subcontractors hereby agree not to discriminate against an employee or applicant for employment tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of a disability that is unrelated to the individual's ability to perform the duties of a particular job or position. A breach of the above covenants shall be regarded as a material breach of this contract.

#### CONTRACT EXECUTION

The Bidder to whom the Contract is awarded shall, within ten (10) calendar days after notice of award, enter into a written contract with the Board and furnish proof of insurance as hereinafter specified. Failure to execute the contract or furnish satisfactory proof of insurance will be considered cause for annulment of award.

#### PERFORMANCE AND LIEN BONDS

The successful Bidder to whom the contract is awarded shall furnish two (2) surety bonds as follows:

Performance Bond - To the Board of County Road Commissioners of the County of Monroe, Michigan for the faithful fulfillment of the terms of the contract in the amount of one-hundred (100) percent of the contract amount

Lien Bond - To the Board of County Road Commissioners of the County of Monroe, Michigan for the payment of all labor and materials used in the work in the amount of one-hundred (100) percent of the contract amount

#### INCREASED OR DECREASED QUANTITIES

The Board reserves the right to increase or decrease quantities from those originally estimated and such changes will be paid for at the unit price bid so long as the total contract amount is not changed more than twenty-five (25) percent. Changes in excess of that amount will be individually negotiated.

#### PROGRESS SCHEDULE

In no case shall any work be commenced prior to receipt of formal notice of award by the Board.

The low Bidder for the work covered by this proposal will be required to meet with the Board's representative to review the Contractor's proposed work schedule. The schedule for this meeting will be set within one (1) week after the low bidder is determined.

The Board's representative will arrange the time and place for the meeting.

#### TIME OF COMPLETION

All work shall be completed on or before **October 1, 2016**.

#### FAILURE TO COMPLETE ON TIME

Liquidated damages in the amount of **\$400** per day will be assessed for each calendar day the work remains incomplete beyond the completion date.

PAYMENTS TO CONTRACTOR

The Contractor shall invoice the Monroe County Road Commission for their work on the contract. The invoice shall contain, at a minimum, the following information: road name and limits, items of work, quantities of work completed for each segment of road, and the contract unit prices.

ASSIGNMENT CLAUSE

The contract between the Board and the Contractor may not be assigned to a third party without the written consent of the Board.

FINAL INSPECTION, ACCEPTANCE AND FINAL PAYMENT

The Engineer or their designated representative will make an inspection of all work included in the contract and notify the Contractor of defects to be remedied prior to acceptance and payment.

DISPUTES

The Engineer’s written decision on any question arising under the contract between the Board and Contractor shall be final and binding upon both the Board and the Contractor in the absence of fraud, bad faith, or abuse of discretion.

TAXES

The Contractor shall include, and will be deemed to have included, in its base bid and contract price all applicable Michigan Sales and Use taxes which have been enacted into law as of the date the bid is submitted.

BOARD RESPONSIBILITY

The Board shall not supervise, direct or have control or authority over, nor be responsible for, the Contractor’s means, methods, techniques, sequences or procedures of construction or the safety precautions and programs incident thereto, or for any failure of Contractor to comply with laws and regulations applicable to the furnishing or performance of the work unless otherwise specified in the Special Provisions. The Board will not be responsible for the Contractor’s failure to perform or furnish the work in accordance with the Contract Documents.

INDEMNIFICATION, DAMAGE LIABILITY AND INSURANCE

1. Indemnification. The Contractor must hold harmless, indemnify, defend and represent the Board and its officers, agents and employees against any and all claims for bodily injury or property damage, or any other claim arising out of performance of the work on this contract. The Contractor will not be responsible for claims that result from the sole negligence or willful acts of said indemnitee.
2. Workers’ Compensation Insurance. The Contractor must carry the necessary Workers’ Compensation Insurance and submit a certification that it carries Workers’ Compensation to the Board.
3. Bodily Injury and Property Damage. The Contractor must carry adequate insurance, satisfactory to the Board, to afford protection against all claims for damage to public or private property and injuries to persons arising out of performance of the work. Copies of completed certificates must be submitted to the Board.

1. General Liability, Bodily Injury and Property Damage. The Contractor must provide the following minimum limits of property damage and bodily injury liability:

Bodily Injury and Property Damage Liability:

Each Occurrence	\$1,000,000
Aggregate	\$2,000,000

2. Automobile Liability, Bodily Injury and Property Damage. The Contractor must provide the following minimum limits of property damage and bodily injury liability:

Bodily Injury Liability:	
Each Person	\$500,000
Each Occurrence	\$1,000,000
Property Damage Liability:	
Each Occurrence	\$1,000,000
Combined Single Limit for Bodily Injury and Property Damage Liability:	
Each Occurrence	\$2,000,000

3. Umbrella Policy. The Contractor may meet the requirements of above minimum limits of bodily injury and property damage liability through an umbrella policy.
4. Additional Insured. The Bodily Injury and Property Damage Policy must include the following endorsements, verbatim:
 

“Additional Insured: The Board of County Road Commissioners of the County of Monroe, the Monroe County Road Commission and its officers, agents and employees.”

“Provide written notice ten (10) days prior to cancellation, expiration, termination or reduction in coverage for nonpayment of the premium and written notice thirty (30) days prior to cancellation, expiration, termination or reduction in coverage for all other reasons.”
5. Notice. The Contractor must ensure that all insurance policies and binders include an endorsement by which the insurer agrees to notify the Department in writing at least 30 days before there is a cancellation or material change in coverage. The Contractor must stop operations if any insurance is canceled or reduced, and must not resume operations until new issuance is in force.
6. Reports. The Contractor or insurance carrier shall report to the Board any claims received, inspections made and the disposition of claims. The Board will withhold final payment release until either the Contractor pays the claim or until final disposition of the claim by the Contractor's insurance company has been received by the Board.

MAINTENANCE OF TRAFFIC

Maintain traffic in accordance with sections 104.07, 104.11, 812 and 922 of the Michigan Department of Transportation 2012 Standard Specifications for Construction and the Michigan Manual of Uniform Traffic Control Devices (MMUTCD).

The Contractor shall be responsible for the protection of vehicular and pedestrian traffic, work in progress and construction workers in the work zone through the implementation of procedures as described in this proposal, the MMUTCD, the Standard Specifications for Construction, and other applicable state and federal requirements.

The Contractor shall coordinate this work with any other contractors or maintenance agencies performing work within the work zone or adjoining areas to avoid conflicts in the maintenance of traffic, construction signing and the orderly progress of contract work.

The Contractor shall coordinate the microsurfacing work on Dunbar Road with Kuhlman Concrete (Mike Robie, Office: 734-241-8692) to minimize the disruption to their plant operations.

Two-way traffic, with a minimum of one lane of traffic, shall be maintained at all times utilizing lane closures, traffic shifts and/or traffic regulators.

Advance warning signs for lane closures utilizing traffic regulators shall be in accordance with MDOT Maintaining Traffic Typical M0140a except that Work Zone Begins (R5-18c), End Road Work (G20-2), and Speed Limit (R2-1) signs will not be required.

Advance warning signs for closing one lane of a three lane roadway shall be in accordance with MDOT Maintaining Traffic Typical M0231a and M330a except that Work Zone Begins (R5-18c), End Road Work (G20-2), and Speed Limit (R2-1) signs will not be required.

Channelizing devices for lane closures shall be 28 inch traffic cones.

All work shall be conducted during normal daytime hours unless otherwise approved by the Engineer. Normal daytime hours are considered to be Monday through Sunday from 7 a.m. to 7 p.m.

No work shall be performed during the Memorial Day, Independence Day or Labor Day holiday weekends as defined by the Engineer.

Temporary pavement markings shall be Type R temporary tape. If the temporary tape will not adhere to the surface at the end of the day, 28 inch traffic cones shall be used to delineate the center left turn lanes until the temporary tape will adhere to the surface or until the permanent pavement markings are installed.

All labor, equipment, temporary signs and channelizing devices required for maintaining traffic will not be paid for separately and are included in the unit price for **Micro-Surface, Single Cse, Modified**.

#### SPECIFICATIONS

All work not otherwise specified shall be done in accordance with the Michigan Department of Transportation 2012 Standard Specifications for Construction. Within these specifications all references to the Michigan Department of Transportation shall mean the Board.

#### MATERIALS

All materials shall be in accordance with sections 504, 901, 902, 904 and 911 of the Michigan Department of Transportation 2012 Standard Specifications for Construction.

#### ITEMS OF WORK

Following is a description of the items of work on this contract:

**Overband Crack Fill, Lane (Lnmi)** – The Overband Crack Fill, Lane item of work shall be in accordance with section 502 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for overband crack filling the existing cracks prior to the placement of the single course microsurfacing. The section of North Dixie Highway between Grand Boulevard and Monrona Drive was overband crack filled in the spring of 2015, and this section of North Dixie Highway is not included in the quantity for Overband Crack Fill, Lane.

**Micro-Surface, Single Cse, Modified (Syd)** – The Micro-Surface, Single Cse, Modified item of work shall be in accordance with section 504 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for the application of a single course using 2FA mix at an average minimum application rate of 22 pounds per square yard  $\pm$ 2 pounds per square yard, by weight of dry aggregate, to the pavement surface.

**Pavt Mrkg, Waterborne, 4 inch, White (Ft)** – The Pavt Mrkg, Waterborne, 4 inch, White item of work shall be in accordance with section 811 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for the installation of the longitudinal permanent pavement markings. The Monroe County Road Commission will perform the layout of the permanent pavement markings.

**Pavt Mrkg, Waterborne, 4 inch, Yellow (Ft)** – The Pavt Mrkg, Waterborne, 4 inch, Yellow item of work shall be in accordance with section 811 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for the installation of the longitudinal permanent pavement markings. The Monroe County Road Commission will perform the layout of the permanent pavement markings.



**Rem Spec Mrkg (Sft)** – The Rem Spec Mrkg item of work shall be in accordance with section 811 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for the removal of existing cold plastic pavement markings prior to the placement of the microsurfacing. The existing cold plastic pavement markings consist of one (1) turn arrow on North Dixie Highway at Monrona Drive and one (1) stop bar on Dunbar Road at M-125. All of the other existing special pavement markings are latex paint.

**Pavt Mrkg, Type R, 4 inch, Yellow, Temp (Ft)** – The Pavt Mrkg, Type R, 4 inch, Yellow, Temp item of work shall be in accordance with section 812 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. This item of work will be used for the placement of temporary pavement markings on the micro-surface. The markings shall be a single 2 foot line spaced at 50 feet center-to-center of marking. If the temporary tape will not adhere to the surface at the end of the day, 28 inch traffic cones shall be used to delineate the center left turn lanes until the temporary tape will adhere to the surface or until the permanent pavement markings are installed.

MEASUREMENT AND PAYMENT

The Engineer will measure and pay for **Overband Crack Fill, Lane** in accordance with section 502 of the Michigan Department of Transportation 2012 Standard Specifications for Construction.

The Engineer will measure **Micro-Surface, Single Cse, Modified** in accordance with section 504 of the Michigan Department of Transportation 2012 Standard Specifications for Construction. The unit price for **Micro-Surface, Single Cse, Modified** includes the cost of:

1. Cleaning and preparing the existing pavement surface;
2. Applying a single course micro-surfacing mix at an average minimum application rate of 22 pounds per square yard ±2 pounds per square yard; and
3. Providing temporary signs, channelizing devices and traffic regulators for maintaining traffic.

The Engineer will measure and pay for **Pavt Mrkg, Waterborne, 4 inch, White** and **Pavt Mrkg, Waterborne, 4 inch, Yellow** in accordance with section 811 of the Michigan Department of Transportation 2012 Standard Specifications for Construction.

The Engineer will measure and pay for **Rem Spec Mrkg** in accordance with section 811 of the Michigan Department of Transportation 2012 Standard Specifications for Construction.

The Engineer will measure and pay for **Pavt Mrkg, Type R, 4 inch, Yellow, Temp** in accordance with section 812 of the Michigan Department of Transportation 2012 Standard Specifications for Construction.

LIST OF ROADS

Township	Road	From	To	Existing Surface	Length (Ft)	Width (Ft)	Area (Syd)
Frenchtown	North Dixie	500' S of Grand	Monrona	Microsurface & HMA	970	Varies 44 - 50	5,050
Monroe	Dunbar	M-125	LaPlaisance	HMA	4,560	Varies 24 - 36	17,500
<b>Total =</b>							<b>22,050</b>

COMMUNICATIONS

Any questions regarding this bid shall be directed to the person listed below:

Name: Michael Smith  
 Phone: 734-240-5103  
 Email: MSmith@mcrc-mi.org

**MONROE COUNTY ROAD COMMISSION  
UNIT PRICE CONTRACT  
2016 MICROSURFACING PROGRAM**

TO: Board of County Road Commissioners of Monroe County, Michigan

The undersigned, having full knowledge of the proposal and specifications for the **2016 Microsurfacing Program** including Bidders' Addenda \_\_\_\_\_ and the conditions of these Contract Documents, hereby agrees to furnish all labor, equipment, materials, transportation and incidentals necessary to perform the Work as specified in the Instructions to Bidders and General Provisions at the unit prices named below:

<b>Category 1 – North Dixie Highway from 500' South of Grand Boulevard to Monrona Drive</b>					
<b>Item Code</b>	<b>Item Description</b>	<b>Estimated Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Bid Amount</b>
5020003	Overband Crack Fill, Lane	0.40	Lnmi	\$	\$
5047011	Micro-Surface, Single Cse, Modified	5,050.00	Syd	\$	\$
8110231	Pavt Mrkg, Waterborne, 4 inch, White	2,100.00	Ft	\$	\$
8110232	Pavt Mrkg, Waterborne, 4 inch, Yellow	2,400.00	Ft	\$	\$
8110343	Rem Spec Mrkg	16.00	Sft	\$	\$
8120241	Pavt Mrkg, Type R, 4 inch, Yellow, Temp	80.00	Ft	\$	\$
<b>Category 1 Subtotal =</b>					<b>\$</b>
<b>Category 2 – Dunbar Road from M-125 to LaPlaisance Road</b>					
<b>Item Code</b>	<b>Item Description</b>	<b>Estimated Quantity</b>	<b>Unit</b>	<b>Unit Price</b>	<b>Bid Amount</b>
5020003	Overband Crack Fill, Lane	2.47	Lnmi	\$	\$
5047011	Micro-Surface, Single Cse, Modified	17,500.00	Syd	\$	\$
8110231	Pavt Mrkg, Waterborne, 4 inch, White	1,850.00	Ft	\$	\$
8110232	Pavt Mrkg, Waterborne, 4 inch, Yellow	10,750.00	Ft	\$	\$
8110343	Rem Spec Mrkg	66.00	Sft	\$	\$
8120241	Pavt Mrkg, Type R, 4 inch, Yellow, Temp	322.00	Ft	\$	\$
<b>Category 2 Subtotal =</b>					<b>\$</b>
<b>Total Bid (Category 1 + Category 2) =</b>					<b>\$</b>

Contractor Signature: \_\_\_\_\_

Printed Name and Title: \_\_\_\_\_

Quantities are not guaranteed. Final payment will be based on actual quantities.

Bidder agrees that the work will be completed and ready for final payment in accordance with the General Conditions. Work on the **2016 Microsufacing Program** is to be completed by **October 1, 2016** as detailed in the Time of Completion section above.

Bidder accepts the provisions of the Agreement as to liquidated damages in the event of failure to complete the work on time.

Communications concerning this Bid shall be addressed to the Bidder's representative.

Name of Representative: \_\_\_\_\_

Company: \_\_\_\_\_

Address: \_\_\_\_\_

City, State, ZIP: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Fax Number: \_\_\_\_\_

E-Mail Address: \_\_\_\_\_

The terms used in this Bid, which are defined in subsection 101.03 of the Michigan Department of Transportation 2012 Standard Specifications of the Construction, have the meanings assigned to them in the Standard Specifications for Construction.

SUBMITTED on: \_\_\_\_\_, 2016

If Bidder is:

An Individual

By: \_\_\_\_\_ (SEAL)  
Individual's Name

Doing Business As: \_\_\_\_\_

Business Address: \_\_\_\_\_  
\_\_\_\_\_

Phone No: \_\_\_\_\_

A Partnership

By: \_\_\_\_\_ (SEAL)  
Firm Name  
\_\_\_\_\_  
General Partner

Business Address: \_\_\_\_\_  
\_\_\_\_\_

Phone No.: \_\_\_\_\_

A Corporation

By: \_\_\_\_\_ (Corporate SEAL)  
Corporate Seal

\_\_\_\_\_  
State of Incorporation

By: \_\_\_\_\_  
Name of Person Authorized to Sign

\_\_\_\_\_  
Title

Business Address: \_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_

A Joint Venture

By: \_\_\_\_\_  
Name

Business Address: \_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_

By: \_\_\_\_\_  
Name

Business Address: \_\_\_\_\_

\_\_\_\_\_

Phone No.: \_\_\_\_\_

(Each joint venture must sign. The manner of signing for each individual, partnership and corporation that is a party to the joint venture should be in the manner indicated above.)

# **2016 MICROSURFACING PROGRAM PROPOSAL**

## **ATTACHMENTS**

1. Maintaining Traffic Typicals

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

TAPER LENGTH "L" IN FEET

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

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

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

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

#### TYPES OF TAPERS

##### UPSTREAM TAPERS


- MERGING TAPER
- SHIFTING TAPER
- SHOULDER TAPER
- TWO-WAY TRAFFIC TAPER

##### DOWNSTREAM TAPERS

(USE IS OPTIONAL)

#### TAPER LENGTH

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

 TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL	TABLES FOR "L", "D" AND "B" VALUES		
	DRAWN BY: CON:AE:djf	JUNE 2006	SHEET
CHECKED BY: BMM	PLAN DATE:	M0020a	1 OF 2
FILE: K:/DGN/TSR/STDS/ENGLISH/MNTTRF/M0020a.dgn		REV.	08/21/2006

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


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

GUIDELINES FOR LENGTH OF  
LONGITUDINAL BUFFER SPACE "B"

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

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

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

 Michigan Department of Transportation TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL	TABLES FOR "L", "D" AND "B" VALUES		
	DRAWN BY: CON:AE:djf CHECKED BY: BMM	JUNE 2006 PLAN DATE:	M0020a
FILE: K:/DGN/TSR/STDS/ENGLISH/MNTTRF/M0020a.dgn      REV. 08/21/2006			








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

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

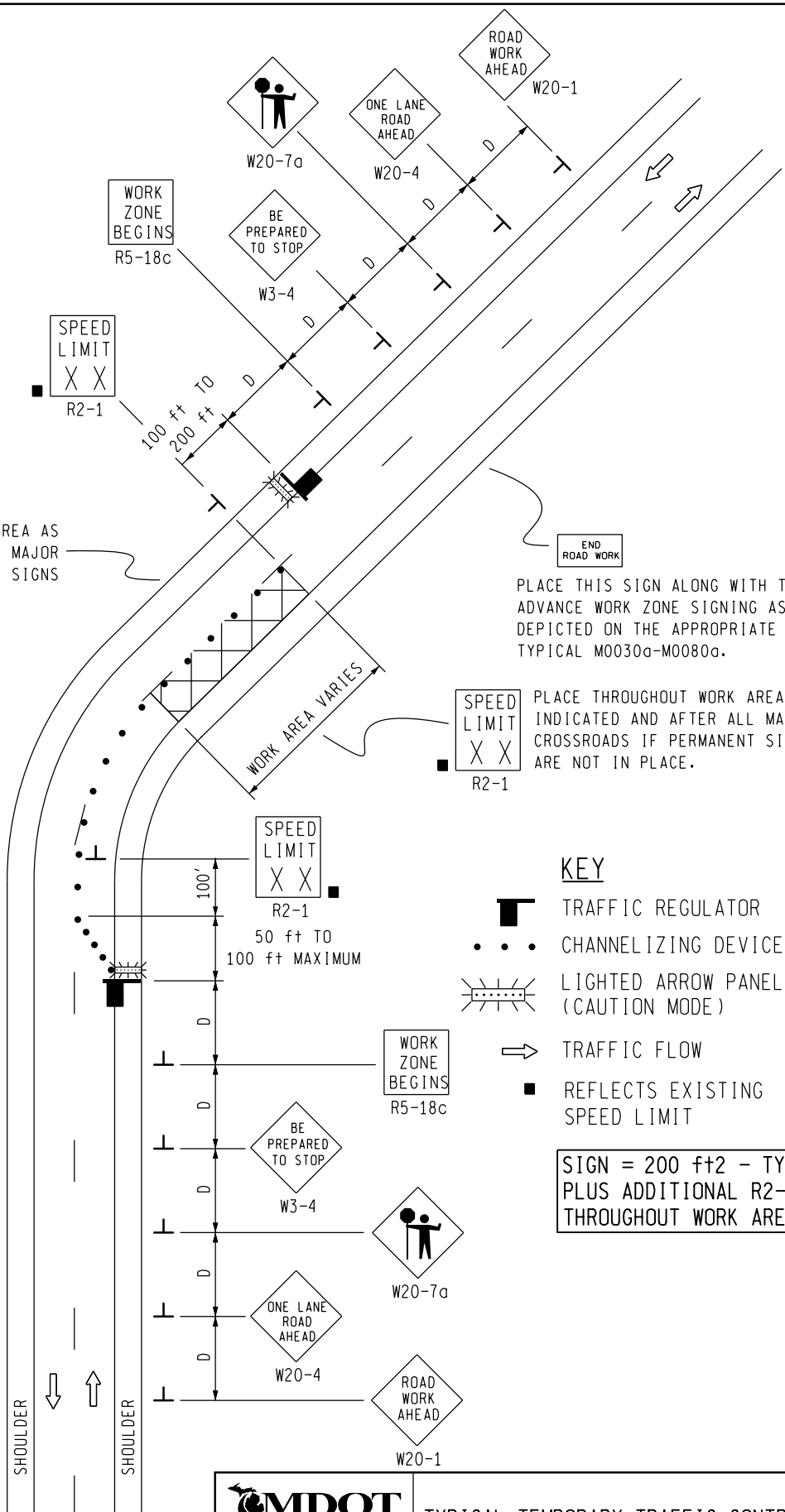
PLACE THROUGHOUT WORK AREA AS INDICATED AND AFTER ALL MAJOR CROSSROADS IF PERMANENT SIGNS ARE NOT IN PLACE.

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


**KEY**

-  TRAFFIC REGULATOR
-  CHANNELIZING DEVICES
-  LIGHTED ARROW PANEL (CAUTION MODE)
-  TRAFFIC FLOW
-  REFLECTS EXISTING SPEED LIMIT

SIGN = 200 ft± - TYPE B PLUS ADDITIONAL R2-1's THROUGHOUT WORK AREA



NOT TO SCALE

 Michigan Department of Transportation TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL		TYPICAL TEMPORARY TRAFFIC CONTROL FOR A TWO-LANE TWO-WAY ROADWAY WHERE ONE LANE IS CLOSED UTILIZING TRAFFIC REGULATORS, NO SPEED REDUCTION	
DRAWN BY: CON:AE:djf CHECKED BY: BMM:CRB	OCTOBER 2011 PLAN DATE:	M0140a	SHEET 1 OF 2
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0140a.dgn REV. 10/04/2011			


## NOTES

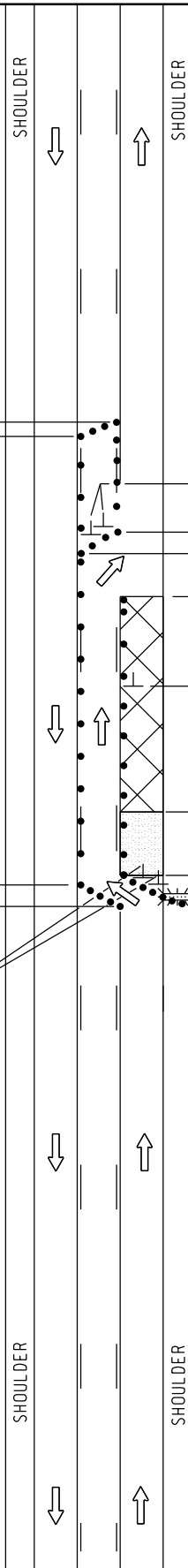
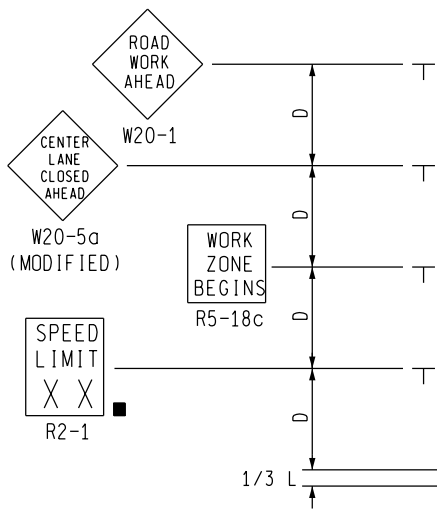
- 1H. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES AND LENGTH OF LONGITUDINAL BUFFERS  
SEE **M0020a** FOR "D" VALUES.
2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.
3. DISTANCES BETWEEN SIGNS, THE VALUES FOR WHICH ARE SHOWN IN TABLE D, ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.
- 3A. THE "WORK ZONE BEGINS" (R5-18c) SIGN SHALL BE USED ONLY IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE SHALL OMIT THIS SIGN AND THE QUANTITIES SHALL BE ADJUSTED APPROPRIATELY.
- 4A. THE MAXIMUM RECOMMENDED DISTANCE(S) BETWEEN CHANNELIZING DEVICES IN THE TAPER AREA(S) SHOULD BE 15 FEET AND SHOULD BE EQUAL IN FEET TO TWICE THE POSTED SPEED IN MILES PER HOUR IN THE PARALLEL AREA(S).
5. FOR OVERNIGHT CLOSURES, TYPE III BARRICADES SHALL BE LIGHTED.
6. WHEN CALLED FOR IN THE FHWA ACCEPTANCE LETTER FOR THE SIGN SYSTEM SELECTED, THE TYPE A WARNING FLASHER, SHOWN ON THE WARNING SIGNS, SHALL BE POSITIONED ON THE SIDE OF THE SIGN NEAREST THE ROADWAY.
7. ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING REQUIREMENTS SHALL MEET NCHRP 350 CRASHWORTHLY REQUIREMENTS STIPULATED IN THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.
9. ALL TRAFFIC REGULATORS SHALL BE PROPERLY TRAINED AND SUPERVISED.
- 9A. IN ANY OPERATION INVOLVING MORE THAN ONE TRAFFIC REGULATOR, ONE PERSON SHOULD BE DESIGNATED AS HEAD TRAFFIC REGULATOR.
10. ALL TRAFFIC REGULATORS' CONDUCT, THEIR EQUIPMENT, AND TRAFFIC REGULATING PROCEDURES SHALL CONFORM TO THE CURRENT EDITION OF THE MICHIGAN MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES (MMUTCD) AND THE CURRENT EDITION OF THE MDOT HANDBOOK ENTITLED "TRAFFIC REGULATORS INSTRUCTION MANUAL."
11. WHEN TRAFFIC REGULATING IS ALLOWED DURING THE HOURS OF DARKNESS, APPROPRIATE LIGHTING SHALL BE PROVIDED TO SUFFICIENTLY ILLUMINATE THE TRAFFIC REGULATOR'S STATIONS.
- 12E. THE MAXIMUM DISTANCE BETWEEN THE TRAFFIC REGULATORS SHALL BE NO MORE THAN 2 MILES IN LENGTH UNLESS RESTRICTED FURTHER IN THE SPECIAL PROVISIONS FOR MAINTAINING TRAFFIC. ALL SEQUENCES OF MORE THAN 2 MILES IN LENGTH WILL REQUIRE WRITTEN PERMISSION FROM THE ENGINEER BEFORE PROCEEDING.
13. WHEN INTERSECTING ROADS OR SIGNIFICANT TRAFFIC GENERATORS (SHOPPING CENTERS, MOBILE HOME PARKS, ETC.) OCCUR WITHIN THE ONE-LANE TWO-WAY OPERATION, INTERMEDIATE TRAFFIC REGULATORS AND APPROPRIATE SIGNING SHALL BE PLACED AT THESE LOCATIONS.
14. ADDITIONAL SIGNING AND/OR ELONGATED SIGNING SEQUENCES SHOULD BE USED WHEN TRAFFIC VOLUMES ARE SIGNIFICANT ENOUGH TO CREATE BACKUPS BEYOND THE W3-4 SIGNS.
15. THE HAND HELD (PADDLE) SIGNS REQUIRED BY THE MMUTCD TO CONTROL TRAFFIC WILL BE PAID FOR AS PART OF FLAG CONTROL.
- 28E. THE TRAFFIC REGULATORS SHOULD BE POSITIONED AT OR NEAR THE SIDE OF THE ROAD SO THAT THEY ARE SEEN CLEARLY AT A MINIMUM DISTANCE OF 500 FEET. THIS MAY REQUIRE EXTENDING THE BEGINNING OF THE LANE CLOSURE TO OVERCOME VIEWING PROBLEMS CAUSED BY HILLS AND CURVES.

### SIGN SIZES

DIAMOND WARNING - 48" x 48"  
R2-1 REGULATORY - 48" x 60"  
R5-18c REGULATORY - 48" x 48"

NOT TO SCALE

 <b>MDOT</b> Michigan Department of Transportation TRAFFIC AND SAFETY <b>MAINTAINING TRAFFIC</b> TYPICAL	<b>TYPICAL TEMPORARY TRAFFIC CONTROL FOR  A TWO-LANE TWO-WAY ROADWAY WHERE ONE  LANE IS CLOSED UTILIZING TRAFFIC  REGULATORS, NO SPEED REDUCTION</b>		
DRAWN BY: CON:AE:djf	OCTOBER 2011	<b>M0140a</b>	SHEET
CHECKED BY: BMM:CRB	PLAN DATE:		2 OF 2
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0140a.dgn REV. 10/04/2011			

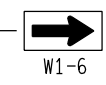


END ROAD WORK

PLACE THIS SIGN ALONG WITH THE ADVANCE WORK ZONE SIGNING AS DEPICTED ON THE APPROPRIATE TYPICAL M0030a-M0050a.

SPEED LIMIT XX (R2-1)

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

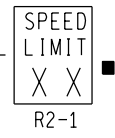


1/2 L  
1/2 D

WORK AREA VARIES



W1-4



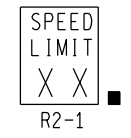
R2-1

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

1/2 L



W1-6



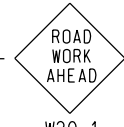
R2-1



R5-18c



W1-4



W20-1

END ROAD WORK

PLACE THIS SIGN ALONG WITH THE ADVANCE WORK ZONE SIGNING AS DEPICTED ON THE APPROPRIATE TYPICAL M0030a-M0050a.

**KEY**

- • • CHANNELIZING DEVICES
- ⚡ LIGHTED ARROW PANEL (CAUTION MODE)
- ➡ TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT

SIGN = 184 ft± - TYPE B PLUS ADDITIONAL R2-1's THROUGHOUT WORK AREA

NOT TO SCALE

**MDOT**  
Michigan Department of Transportation

TRAFFIC AND SAFETY  
MAINTAINING TRAFFIC  
TYPICAL

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

TYPICAL TEMPORARY TRAFFIC CONTROL FOR CLOSING ONE LANE OF A THREE LANE ROADWAY WITH CLFLTO AND SHIFTING ONE THROUGH LANE INTO THE CLFLTO NO SPEED REDUCTION

OCTOBER 2011	M0231a	SHEET 1 OF 2
PLAN DATE:		
FILE: PW: RD/T&S/Typicals/Signs/MT/MT nonFwy/M0231a REV. 10/18/2011		


## NOTES

- 1F. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES  
 $1/2 L$ , AND  $1/3 L$  = MINIMUM LENGTH OF TAPER  
 B = LENGTH OF LONGITUDINAL BUFFER  
 SEE M0020a FOR "D," "L," AND "B" VALUES
2. ALL NON-APPLICABLE SIGNING WITHIN THE CIA SHALL BE MODIFIED TO FIT CONDITIONS, COVERED OR REMOVED.
3. DISTANCES BETWEEN SIGNS, THE VALUES FOR WHICH ARE SHOWN IN TABLE D, ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.
- 3A. THE "WORK ZONE BEGINS" (R5-18c) SIGN SHALL BE USED ONLY IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE SHALL OMIT THIS SIGN AND THE QUANTITIES SHALL BE ADJUSTED APPROPRIATELY.
- 4E. THE MAXIMUM RECOMMENDED DISTANCE(S) BETWEEN CHANNELIZING DEVICES SHOULD BE EQUAL IN FEET TO THE POSTED SPEED IN MILES PER HOUR ON TAPER(S) AND TWICE THE POSTED SPEED IN THE PARALLEL AREA(S).
5. FOR OVERNIGHT CLOSURES, TYPE III BARRICADES SHALL BE LIGHTED.
6. THE TYPE A WARNING FLASHER SHOWN ON THE WARNING SIGNS SHALL BE POSITIONED ON THE SIDE OF THE SIGN NEAREST THE ROADWAY.
7. ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING REQUIREMENTS SHALL MEET NCHRP 350 CRASHWORTHY REQUIREMENTS STIPULATED IN THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.
8. WHEN BUFFER AREAS ARE ESTABLISHED, THERE SHALL BE NO EQUIPMENT OR MATERIALS STORED OR WORK CONDUCTED IN THE BUFFER AREA.
21. ALL EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH EITHER PROPOSED CHANGES IN TRAFFIC PATTERNS OR PROPOSED TEMPORARY TRAFFIC MARKINGS, SHALL BE REMOVED BEFORE ANY CHANGE IS MADE IN THE TRAFFIC PATTERN. EXCEPTION WILL BE MADE FOR DAYTIME-ONLY TRAFFIC PATTERNS THAT ARE ADEQUATELY DELINEATED BY OTHER TRAFFIC CONTROL DEVICES.

### SIGN SIZES

DIAMOND WARNING	- 48" x 48"
W1-6 WARNING	- 48" x 24"
R2-1 REGULATORY	- 48" x 60"
R5-18c REGULATORY	- 48" x 48"

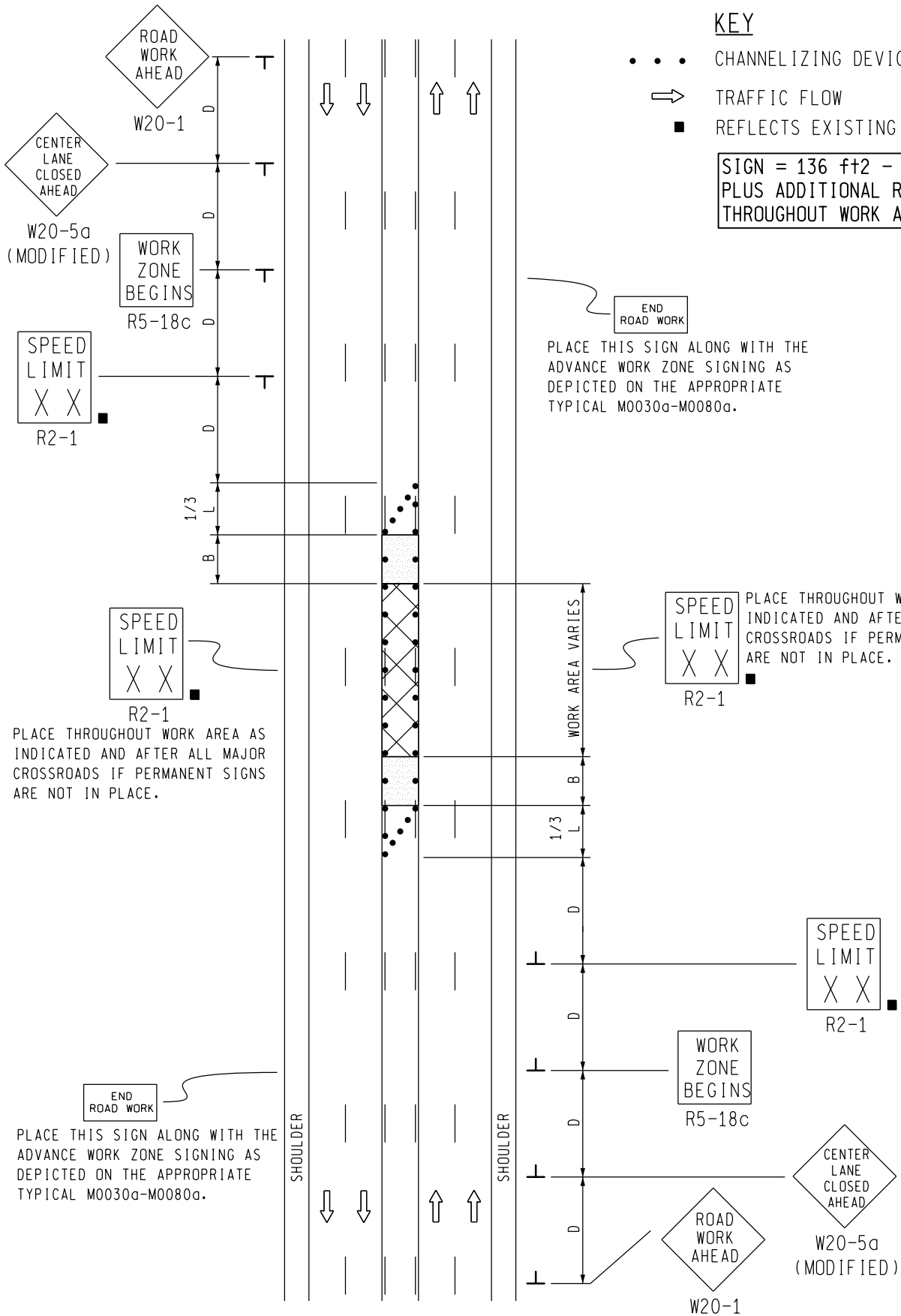
NOT TO SCALE

 <b>MDOT</b> Michigan Department of Transportation TRAFFIC AND SAFETY <b>MAINTAINING TRAFFIC</b> TYPICAL	TYPICAL TEMPORARY TRAFFIC CONTROL FOR CLOSING ONE LANE OF A THREE LANE ROADWAY WITH CLFLTO AND SHIFTING ONE THROUGH LANE INTO THE CLFLTO NO SPEED REDUCTION		
DRAWN BY: CON:AE:DJF	OCTOBER 2011	<b>M0231a</b>	SHEET
CHECKED BY: BMM:CRB	PLAN DATE:		2 OF 2
FILE: PW: RD/T&S/Typicals/Signs/MT/MT nonFwy/M0231a REV. 10/18/2011			

**KEY**

- • • CHANNELIZING DEVICES
- ⇒ TRAFFIC FLOW
- REFLECTS EXISTING SPEED LIMIT

SIGN = 136 f+2 - TYPE B PLUS ADDITIONAL R2-1's THROUGHOUT WORK AREA



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

SPEED LIMIT XX R2-1  
PLACE THROUGHOUT WORK AREA AS INDICATED AND AFTER ALL MAJOR CROSSROADS IF PERMANENT SIGNS ARE NOT IN PLACE.

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

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

<p>TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL</p>	<p>TYPICAL TEMPORARY TRAFFIC CONTROL FOR A CENTER-LANE FOR LEFT TURN ONLY CLOSURE ON A MULTI-LANE UNDIVIDED ROADWAY, WORKERS NOT PRESENT NO SPEED REDUCTION</p>	
	<p>DRAWN BY: CON:AE:djf CHECKED BY: BMM:CRB</p>	<p>OCTOBER 2011 PLAN DATE:</p>
<p>FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0330a.dgn REV. 10/18/2011</p>		

NOT TO SCALE


## NOTES

1. D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES  
 $1/3 L$  = MINIMUM LENGTH OF TAPER  
 B = LENGTH OF LONGITUDINAL BUFFER  
 SEE M0020a FOR "D," "L," AND "B" VALUES
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8. WHEN BUFFER AREAS ARE ESTABLISHED, THERE SHALL BE NO EQUIPMENT OR MATERIALS STORED OR WORK CONDUCTED IN THE BUFFER AREA.
- 25A. THIS SEQUENCE SHOULD ONLY BE USED WHEN WORKERS ARE NOT PRESENT, E.G., FOR CURING CONCRETE OVERNIGHT, ETC. WHEN WORK IS BEING CONDUCTED IN THE CENTER LANE, AN ADJACENT LANE (IN ONE OR BOTH DIRECTIONS) SHOULD ALSO BE CLOSED UTILIZING THE APPROPRIATE TYPICAL SIGNING SEQUENCE.

### SIGN SIZES

DIAMOND WARNING - 48" x 48"  
 R2-1 REGULATORY - 48" x 60"  
 R5-18c REGULATORY - 48" x 48"

NOT TO SCALE

 TRAFFIC AND SAFETY MAINTAINING TRAFFIC TYPICAL	TYPICAL TEMPORARY TRAFFIC CONTROL FOR A CENTER-LANE FOR LEFT TURN ONLY CLOSURE ON A MULTI-LANE UNDIVIDED ROADWAY, WORKERS NOT PRESENT NO SPEED REDUCTION		
DRAWN BY: CON:AE:djf CHECKED BY: BMM:CRB	OCTOBER 2011 PLAN DATE:	M0330a	SHEET 2 OF 2
FILE: PW RD/TS/Typicals/Signs/MT NON FWY/M0330a.dgn REV. 10/18/2011			