# Trenching Repair
## Akron Rd from Quanicassee Rd to Bradleyville Rd &
## Sheridan Rd from Akron Rd to the North ½ mile
## Letting Date – April 9th, 2026, 8:45 am

Contractor: _____

Address: _____

_____

Sign & Print: _____

Date: _____

Phone: _____

Email: _____

**Akron Road (Primary Road) from Quanicassee Rd to Bradleyville Road**
**Sheridan Rd (Local Road) from Akron Rd to the North ½ mile**

**Pay Items**

| Quantity/Units | Items | Price/Unit | Cost |
|---|---|---|---|
| 550 Tons | 4EL Bit Mix | _____ | _____ |
| 850 Tons | 2EL Bit Mix | _____ | _____ |
| 400 Tons | Agg Base | _____ | _____ |
| 93 Stations | Trenching | _____ | _____ |

Total _____

**COMPLETION DATE: All work must be complete by May 18th, 2026**
**Signed Insurance, Agreement, and ROW Permit 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 (Cb) prequalification with the Michigan Department of Transportation. All work will be done in accordance with the requirements of Section 501 of 2020 MDOT Standard Specifications for Construction and as modified herein.

**General:**
All work shall be in accordance with the attached Project Log. All local road work is subject to approval by the Township. This work shall include all necessary labor, equipment, and material to perform the trenching repair at the locations specified and in accordance with the plans and specifications. Quantities shown are estimates and are subject to increase or decrease by the Engineer. Changes in quantities will not change the as bid unit prices.

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

**Schedule:**
- Contractor shall provide the Tuscola County Road Commission 14 days advance notice prior to mobilization. All work must be completed by May 18th, 2026 or as approved by the Engineer. Liquidated damages shall be assessed at the Engineers discretion of $100.00 per calendar day starting May 19th, 2026.
- All work shall be completed Monday through Friday with Engineer's approval needed for Saturday work, and Board of Road Commissioner's approval needed for Sunday work.

**Coordination Clause:**
The Contractor shall cooperate and coordinate construction activities with other Contractors within the immediate vicinity of the project as stated in Section 104.07 of the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction.

The Contractor shall be responsible for coordinating work efforts with Tuscola County Road Commission, and any other necessary parties to avoid conflicts.

The Contractor shall take due account of all such work and shall arrange his methods of cooperation and storage or materials and equipment so as to cause a minimum of interference with the work to be performed by others.

No claims for extra compensation or adjustment will be allowed due to delay or failure of others to complete work as scheduled due to coordination of work.

**Construction:**
The Contractor shall follow the construction methods as described in Section 501 of the 2020 MDOT Standard Specifications for Construction except as modified herein:

1. **__ Bit Mix -** Shall be placed in accordance with the MDOT Specifications. It shall include all labor, equipment, and material to place the HMA whether by hand or by other methods, and compacting the material.
2. **Compaction** - The Nuclear Gauge Method for testing compaction will be used on Primary roads.
3. **Pavement Removal** - Shall be completed according to Section 204.04B of the 2020 MDOT Standard Specifications for Construction. All HMA material removed shall be disposed of at the Tuscola County Road Commission Akron Garage 4387 Beach St, Akron, MI 48701.
4. **Temporary Pavement Marking Tape** - Shall be required on Michigan Department of Transportation projects and all Primary Road projects only. 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.
5. **Bond Coat** – Shall be applied at a uniform rate of application between 0.05 to 0.15 gallons per square yard. A bond coat shall be applied between multiple lifts of asphalt. Bond Coat will not be paid for separately but included in the cost of other bid items.
6. **Monument Box Rings** – If present the Contractor shall adjust all existing monument boxes within the proposed pavement surface to the proper height utilizing adjustment rings provided by the Tuscola County Road Commission to provide a smooth ride, whether noted on the bid or not.

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

1. **Bituminous Materials** – Bituminous Mixture shall be 4EL for top lift and 2EL for base.
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** – 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. 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.
6. **Shoulders** – Tuscola County Road Commission will cut the shoulders back prior to trenching and will wing them in after HMA paving is complete.

**Traffic Control:**
The Road Commission will install “Road Work Ahead” signs on each project. Traffic must be maintained to local traffic during construction. Primary Road work will be performed via a single lane closure. Local Road work will be performed via temporary road closure.

1. Lane Closure – The contractor shall maintain traffic as per the Tuscola County Road Commission Maintaining Traffic Special Provision attached.

2. Temporary Road Closure – Will be allowed if approved by the Engineer on a site-specific basis. Type III barricades or arrow boards will be required at each end of the project along with a traffic regulator for re-routing traffic. 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.

3. Warning 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.

4. 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.

**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.

| **Pay Item** | **Pay Unit** |
|---|---|
| 4EL Bit Mix | Ton |
| 2EL Bit Mix | Ton |
| Aggregate Base | Ton |
| Trenching | Station |

Contract items shall be invoiced by location. 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 TCRC 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 in accordance with *Tuscola County Road Commission Policies and Procedures Manual Section 9.7 Insurance Requirements,* to ensure 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.

**NON-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. Project Log – Akron Rd and Sheridan Rd Trenching
2. Akron Road Core Report
3. Title IV and VI Compliance
4. Agreement
5. Tuscola County Right of Way Permit
6. Traffic Control Policy
7. Section 9.7 Insurance
8. Special Provision 20SP-501A-01 – Sampling Asphalt Binder on LAP
9. Special Provision 20SP-501F-01 – Recycled Hot Mix Asphalt Mixture on LAP
10. Special Provision 20SP-501I-01 – Acceptance of Hot Mix Asphalt Mixture on LAP

# TUSCOLA COUNTY ROAD COMMISSION

ROUTE:
AKRON ROAD: QUANICASSEE TO BRADLEYVILLE
SHERIDAN ROAD: DUTCHER TO NORTH 1/2 MILE
FAIRGROVE & AKRON TOWNSHIPS

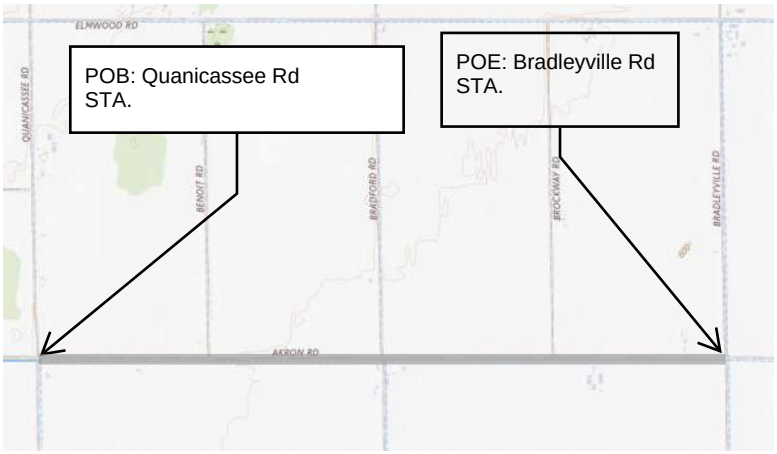
COUNTY KEY

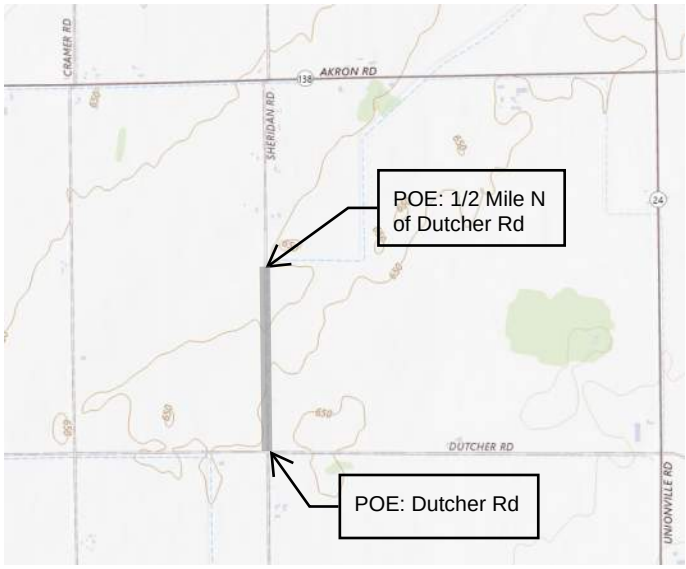
| SECTION | CONTROL SEC | JOB NO. | FED AID PROJECT |
|---|---|---|---|
| Akron Rd | 79000 | 459-489 | |

TRAFFIC DATA

SPEED DATA

| ROAD | YEAR | ADT | DHV | COMM | DESIGN | POSTED | LIMITS |
|---|---|---|---|---|---|---|---|
| AKRON | 2008 | 414 | | | | | QUANICASSEE RD TO BRADLEYVILLE RD |
| SHERIDAN | 2003 | 214 | | | | | DUTCHER RD TO M-138 |




THE IMPROVEMENTS COVERED BY THESE PLANS SHALL BE DONE IN ACCORDANCE WITH THE MICHIGAN DEPARTMENT OF TRANSPORTATION 2020 STANDARD SPECIFICATIONS FOR CONSTRUCTION.

MILES: 2.5

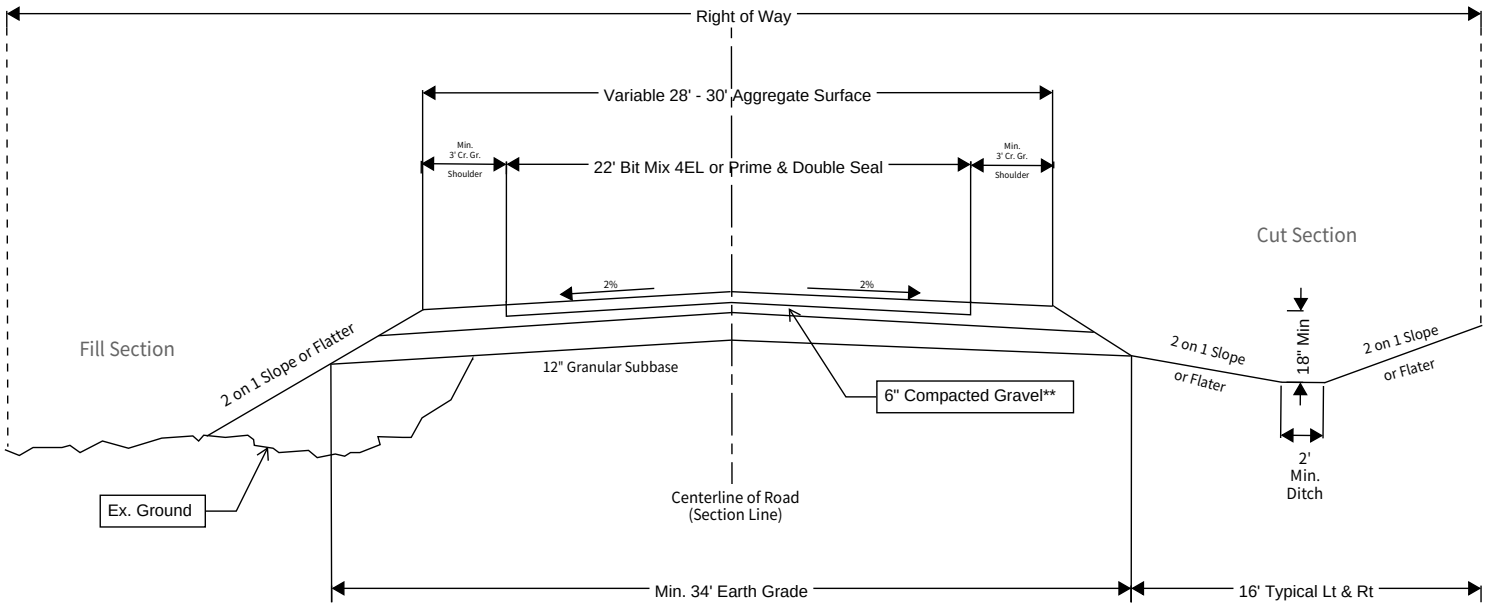
CONTRACT FOR: Trenching

| FINAL PLAN REVISIONS | | | |
|---|---|---|---|
| NO. | DATE | AUTH | DESCRIPTION |
| | | | |
| | | | |

Tuscola County Road Commission
1733 Mertz
Caro, MI 48723
Phone: 989 673-2128
Fax: 989 673-3294

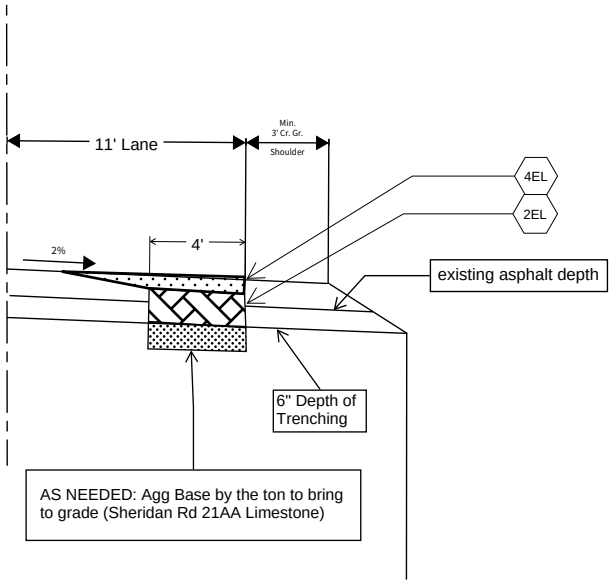
| | | |
|---|---|---|
| TITLE SHEET: Akron Rd Trenching | | SHEET |
| TCRC PROJECT NO: 459-489 | | 1 |
| Drafted By: MBH | Date: 3/17/26 | |
| Approved By: BJD | Date: 3/17/26 | |

# STANDARD CROSS SECTION




*Or approved equal by Highway Engineer
**MDOT Spec 21A, 22A, 23A, or Crushed Limestone or approved equal by Highway Engineer

# PROPOSED TRENCHING




## HMA APPLICATION ESTIMATE

| IDEN. NO. | ITEM | RATE LBS PER SYD | PERFORMANCE GRADE | REMARKS |
|---|---|---|---|---|
| 4EL | HMA, 4EL | 220 | PG 58-28 | TOP COURSE Akron Rd |
| 2EL | HMA, 2EL | 435/330 | PG 58-28 | BASE COURSE |
| 4EL | HMA, 4EL | 165 | PG 58-28 | TOP COURSE Sheridan Rd |

PLACE HMA BOND COAT AT 0.05-0.15 GAL/SYD BETWEEN LAYERS AS DIRECTED BY THE ENGINEER (INCLUDED IN PAYMENT FOR HMA PAVING)
THE AGGREGATE WEAR INDEX (AWI) FOR THE TOP COURSE SHALL BE 220 MINIMUM. APPLICATION RATE IS LESS THAN THE MINIMUM SHOW IN THE 2020 MDOT SPEC BOOK BUT ACCEPTABLE PER LAP GUIDELINES.

| FINAL PLAN REVISIONS | | | |
|---|---|---|---|
| NO. | DATE | AUTH | DESCRIPTION |
| | | | |
| | | | |


Tuscola County Road Commission
1733 Mertz
Caro, MI 48723
Phone: 989 673-2128
Fax: 989 673-3294


| | | |
|---|---|---|
| TITLE SHEET: Akron Rd Trenching | | SHEET |
| TCRC PROJECT NO: 459-489 | | 2 |
| Created By: MBH | Date: 3/17/26 | |
| Approved By: BJD | Date: 3/17/26 | |

## Location

| Mile | Length | Width |
|---|---|---|
| Akron Rd: Quanicassee to Bradford | 2750 | 4' |
| Akron Rd: Bradford to Bradleyville | 3875 | 4' |
| Sheridan Rd: Dutcher to N 1/2 mi | 2640 | 4' |
| | Total | |
| | 9265 | |

DESCRIPTION OF WORK.
Project consists of Trenching repair on 2 miles of Akron Road from Quanicassee Road to Bradleyville Road and .5 miles of Sheridan Road from Dutcher Road to the North totaling 2.5 miles for the full project. Existing pavement cross section consists of HMA ranging from 5" to 7" over an asphalt stabilized base course on Akron Road. Sheridan Road existing pavement cross section estimated at 3" HMA. The following items apply throughout the project and are not detailed elsewhere:

Repair joints at locations as directed by the engineer.

| Quantity | Unit | Pay Items |
|---|---|---|
| 400 | Ton | 220# 4EL Akron |
| 650 | Ton | 435# 2EL Bit Mix Akron |
| 200 | Ton | 330# 2EL Bit Mix Sheridan |
| 150 | Ton | 165# 4EL Sheridan |
| 400 | Ton | Aggregate Base, 4 inch |
| 9265 | Ft | Trenching |

PAVEMENT MARKINGS
Pavement markings are not included in this project.

MAINTAINING TRAFFIC
Maintain traffic per the TCRC Traffic Control Policy. All costs for maintaining traffic shall be included in the price per foot of "

Standard Plans

| FINAL PLAN REVISIONS | | | |
|---|---|---|---|
| NO. | DATE | AUTH | DESCRIPTION |
| | | | |
| | | | |

Tuscola County Road Commission
1733 Mertz
Caro, MI 48723
Phone: 989 673-2128
Fax: 989 673-3294

| | | |
|---|---|---|
| TITLE SHEET: Akron Rd Trenching | | SHEET |
| TCRC PROJECT NO: 459-489 | | 3 |
| Created By: MBH | Date: 3/17/26 | |
| Approved By: BJD | Date: 3/17/26 | |

# CORE SAMPLING/SOIL BORING

| | |
|---|---|
| **PROJECT NAME:** TCRC Akron Rd. Cores | **SGI WORK NO.** 137947SG2025 |
| **CLIENT:** TCRC | **DATE:** 2/5/2025 |
| **PROJECT MANAGER:** Brent Dankert | **SPICER'S TECHNICIAN:** Abe Ritz/ Kevin Allen |
| **WEATHER (clear, cloudy, rain, snow):** 2/4 Sunny. 2/5 Sunny | **TEMPERATURE:** 2/4 and 2/5 18-26 F |

**DESCRIPTION OF WORK PERFORMED: (note sketch on back of sheet)**

2/4

Arrived to site and began cutting the cores on Akron Rd. Drilled down with 6" bit to remove core. Then drilled down with 4" bit and extension to remove base materials due to being frozen. Then augered remaining few inches to get to full depth of 3' . All cores were kept and able to be viewed. A total of 4 of the 10 core were cut.

2/5

Arrived to site and began cutting the cores on Akron Rd. Drilled down with 6" bit to remove core. Then drilled down with 4" bit and extension to remove base materials due to being frozen. Then augered remaining few inches to get to full depth of 3'. All cores were kept and able to be viewed. All cores were completed.

**EQUIPMENT USED:**

Core trailer, Core Drill, 1- Spicer Trucks, Hammer Drill

**VISITORS TO WORK SITE:**

N/A

**REMARKS/NOTES:**

TCRC was on site preforming traffic control when cores were being cut

All cores are at the Saginaw Spicer office, and will be held onto for a period of one month if not wanted by the client.

**Hours on the Project:**

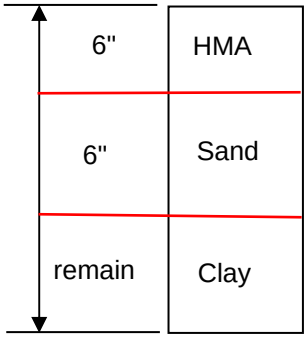
**NOTE:** To be completed and turn in to the Project Manager at the end of each Day.

**BY:** Abe Ritz/ Kevin Allen **Date:** 2/5/2025

**LOCATION SKETCH:**

See Below

#1

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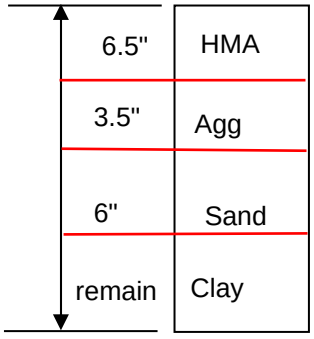


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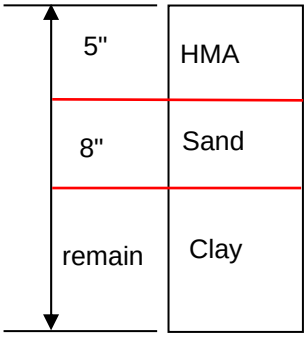


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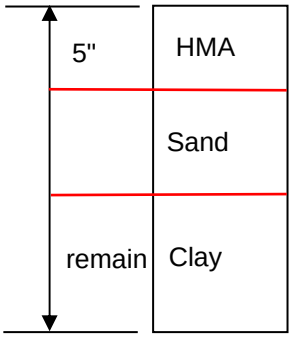
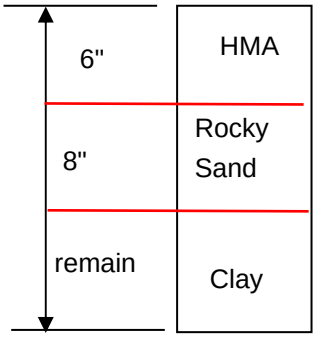



Core Diameter 6"

#5

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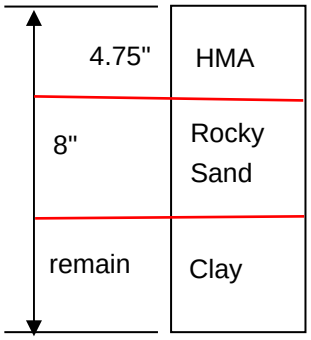


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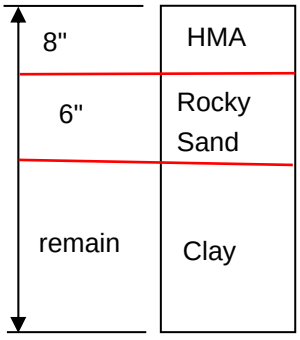
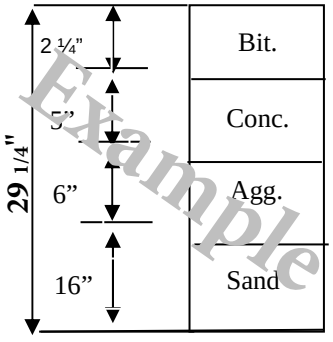


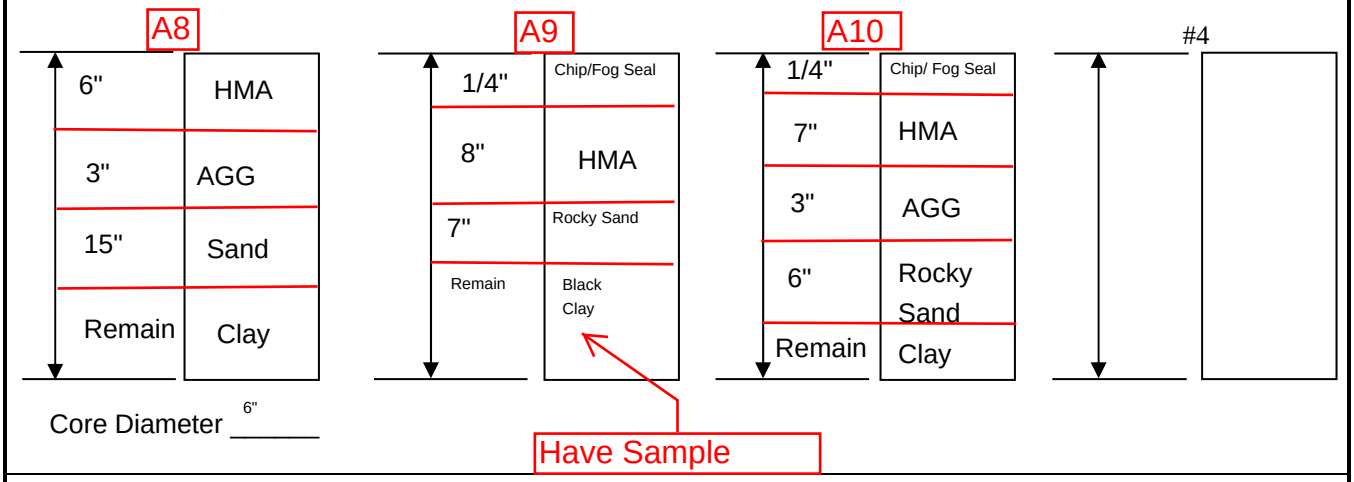

**Example**

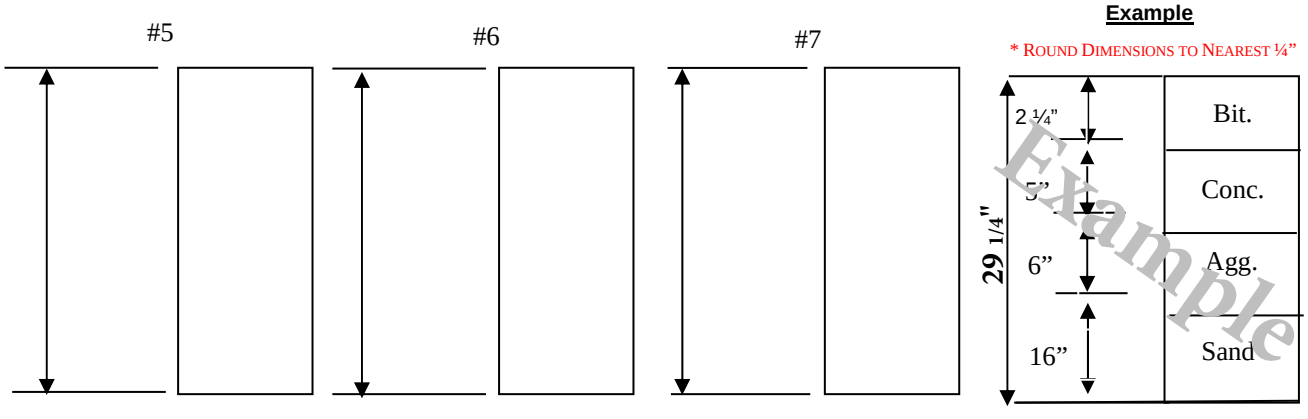
* Round Dimensions to Nearest ¼"



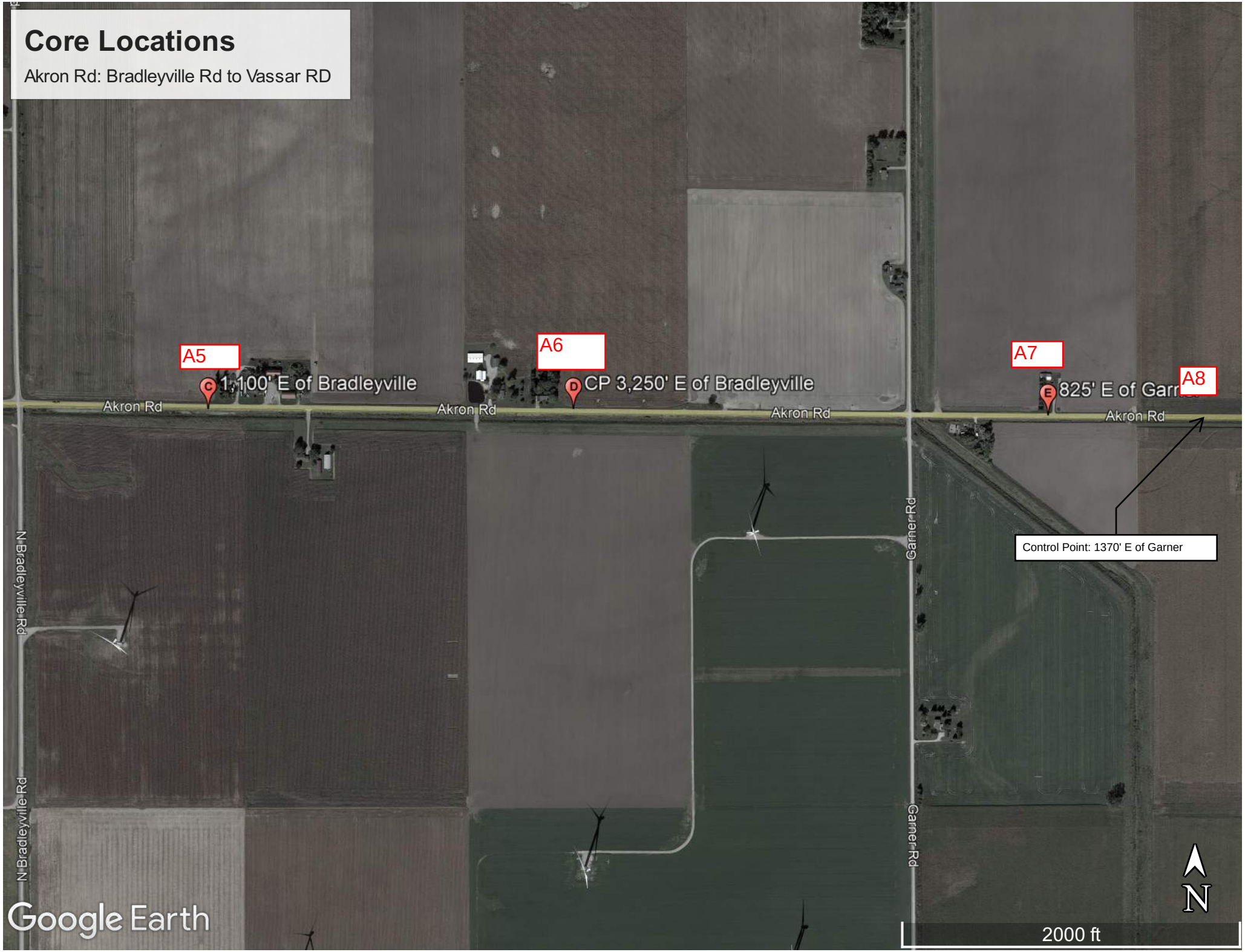

Core Diameter 6"

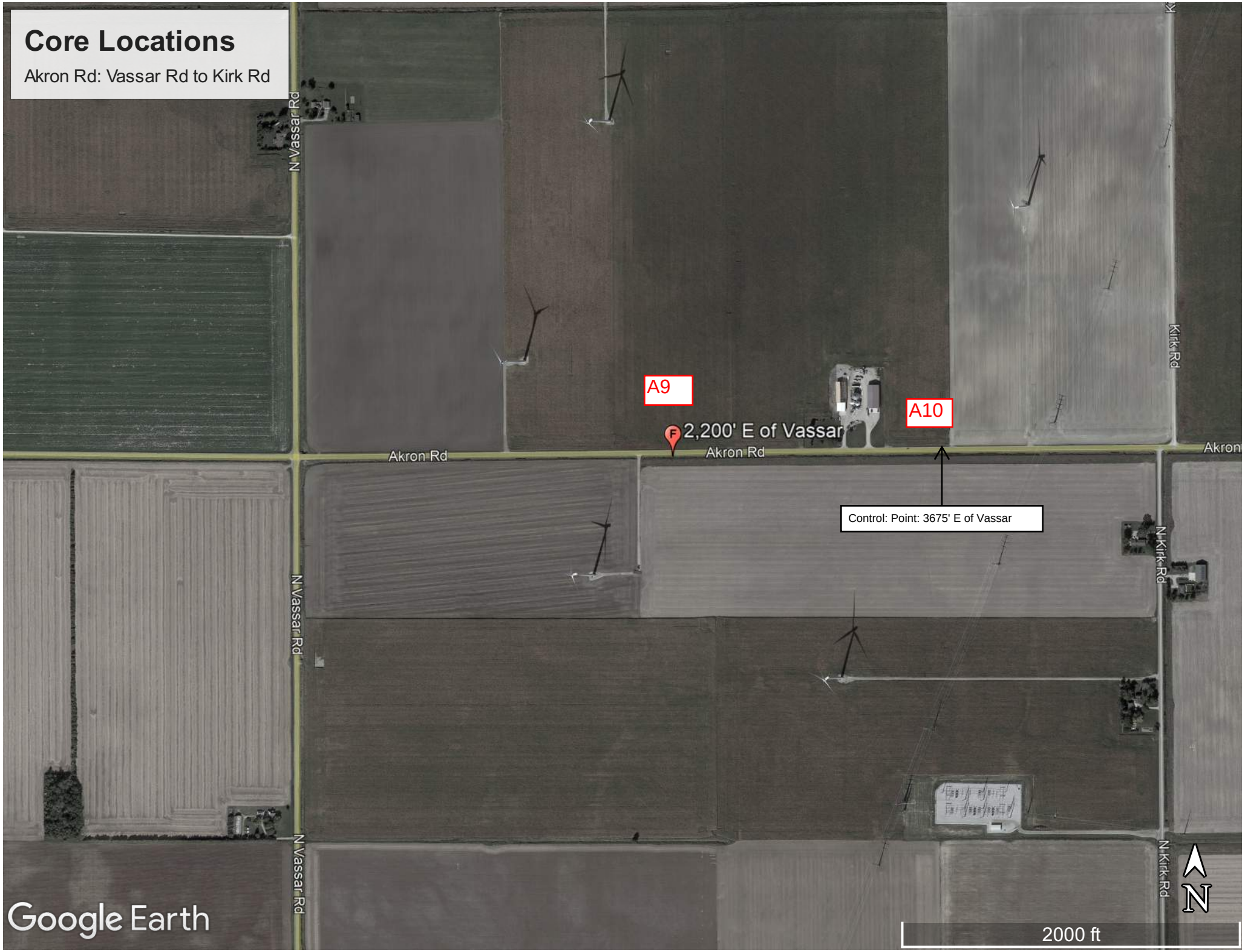
**LOCATION SKETCH:** See Below




Core Locations
Akron Rd: Quanicassee Rd to Bradleyville Rd
Underwater Specialists, Inc
A1
750' E of Quanicassee
Akron Rd
A2
Control point: 4275' E of Quanicassee
A3
1,365' E of Bradford
Akron Rd
A4
Akron Rd
Control Point: 3550' E of Bradford
Quanicassee Rd
Bradford Rd
Bradford Rd
Dutcher Rd
Dutcher Rd
Google Earth
4000 ft
N


Core Locations
Akron Rd: Bradleyville Rd to Vassar RD
A5
A6
A7
A8
C 1,100' E of Bradleyville
D CP 3,250' E of Bradleyville
E 825' E of Garn
Akron Rd
Akron Rd
Akron Rd
Akron Rd
N Bradleyville Rd
N Bradleyville Rd
Garner Rd
Garner Rd
Control Point: 1370' E of Garner
N
2000 ft
Google Earth


Core Locations
Akron Rd: Vassar Rd to Kirk Rd
N Vassar Rd
Kirk Rd
A9
A10
2,200' E of Vassar
Akron Rd
Akron Rd
Akron
Control: Point: 3675' E of Vassar
N Kirk Rd
N Vassar Rd
N Vassar Rd
N Kirk Rd
Google Earth
N
2000 ft

**AGREEMENT**

TUSCOLA COUNTY ROAD COMMISSION – 1733 S. MERTZ ROAD, CARO, MI 48723
PAGE **1** OF **1**

This agreement made this _____day of_____, 20_____
by and between the Board of Tuscola County Road Commissioners and _____
_____.

1. _____hereby agrees to undertake the following work in the status of an independent contractor performing the following job:
   _____
   _____
   _____.

2. Said contractor, _____, shall at all times exercise extreme care and shall assume any and all liability for property damage or bodily injury resulting from the above operation by this employees, agents, assigns, sub-contractors and anyone else acting under his control or direction; and will indemnify, hold harmless and defend the Tuscola County Road Commission, its Commissioners or employees from any and all claims for property damage or bodily injury arising out of this Agreement.

3. Said contractor, _____, while engaged in said job shall maintain and furnish certificates of insurance, naming the Tuscola County Road Commission and Commissioners as an additional insured under the policy, evidence of insurance coverage in accordance with *Tuscola County Road Commission Policies and Procedures Manual Section 9.7 Insurance Requirements,* and shall furnish the Tuscola County Road Commission copies of said certificates of insurance prior to commencing any work on said project.
   Additionally, said contractor, _____, shall furnish prior to start of said job with the Board of Tuscola County Road Commissioners, a policy of insurance certifying he carries and has in effect worker's compensation insurance on all those required to be covered under Michigan law.

4. The address of the Board of Tuscola County Road Commissioners is 1733 S, Mertz Rd., Caro, MI 48723.

Witnessed:

_____ _____
Board of Tuscola County Road Commissioners

_____ _____
Contractor

**Contractor bid will not be accepted unless the enclosed Agreement is Signed and Returned with your bid.**

# TUSCOLA COUNTY ROAD COMMISSION

Right - of - Way Permit Worksheet

*Permit Fees & Proof of Insurance are required prior to review of the permit application*

**Date:** _____

## Applicant/Property Owner:

Name: _____

Address: _____

_____

Phone: _____

Email: _____

Signature: _____

## Contractor:

Name: _____

Adddress: _____

_____

Phone: _____

Email: _____

Signature: _____

## Project Locations:

Address: _____

Road: _____

Between: _____

And: _____

Township: _____ Section: _____

## Project Description:

_____

_____

_____

_____

_____

## Type of Work:

Driveway: *Commercial ☐ Residential/Farm ☐

Special Use: Utility ☐ Yard Enclosure ☐

Road Crossing: Bore ☐ Open Cut ☐

Misc.: ☐ _____

## Material: *(If Known)*

**Pipe/Culvert Material: _____

Pipe/Culvert Diameter: _____

Pipe/Culvert Length: _____

***Backfill Material: _____

## Reviewer's Recommendations:

_____

_____

_____

_____

***Additonal Permit Standards & Policies apply, availible upon Request***

Reviewer's Signature: _____

****Plastic, Concrete, or CMP (CMP may be purchased thru TCRC if placed in R-O-W)***

Flagged: _____

*****A Copy of the Certified Mechanical Analysis & the Density Report are required for material placed under roadway***

# 8. TRAFFIC CONTROL POLICY

PURPOSE

The Tuscola County Road Commission manages traffic operations throughout the county and local road network to minimize vehicle crashes and maximize mobility.

POLICY

Traffic shall be maintained in accordance with Sections 812 and 922 of the 2020 Michigan Department of Transportation (MDOT) Standard Specifications for Construction, including any Supplemental Specifications, and as herein specified.

LOCATION OF WORK

A. **Work outside of the shoulder** – occurs when equipment, personnel, and/or material "is confined to an area 5 feet or more from the edge of the traveled way"
B. **Work on the shoulder**– when equipment, personnel, and/or material is confined to the shoulder without reducing any width of the traveled way. Edge of pavement to 5 feet.
C. **Work within the traveled way** – work that exceeds the definition of any work previously described in parts A through B.

Location A. signing for work outside of the shoulder shall be according to the MDOT Maintaining Traffic typical 4000-M-SHL-OUT. Additional signage maybe required at Engineers discretion depending on number of personal & equipment in the ROW.

Location B. signing for a shoulder closure shall be according to attached MDOT Maintaining Traffic Typical 122-NFW-SHL-(R).

Location C. work that exceeds the boundaries set by Parts A and B shall be completed in a single lane closure detailed according to a MDOT typical 110-TR-NFW-2L. Any alterations to this typical must be approved by the engineer prior to implementation of the TTC plan.

CONSTRUCTION INFLUENCE AREA

The construction influence area (CIA) shall consist of the width of the project right-of-way from 3,500 feet before the project P.O.B. to 3,500 feet beyond the project P.O.E. and 1,500 feet in all directions along all crossroads.

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TRAFFIC CONTROL DEVICES

All traffic control devices and their usage shall conform to the Michigan Manual on Uniform Traffic Control Devices (MMUTCD), 2011 edition as amended, and as herein specified.

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

Arrow boards are to be placed and used in a manner that allows for the signal board to be "clearly legible at distances from 2500 feet to 200 feet, from all traffic lanes and roadway entrances. Do not place the lighted arrow on a horizontal or vertical curve that might interfere with this legibility requirement" – MDOT typical Sheet 104-GEN-AB.

Reflective sheeting must meet or exceed the requirements of ASTM D4956 for Type VIII reflective sheeting on rigid signs. Reflective sheeting must meet or exceed the requirements of ASTM D4956 for Type VI reflective sheeting on flexible, roll-up signs. Orange sheeting must be fluorescent orange reflective sheeting.

FLAGGER/TRAFFIC REGULATORS

Traffic regulators are required to have completed the Michigan Traffic Regulator training within 12 months prior to performing any traffic regulating duties.

Traffic regulators and workers must conform with paragraph 4 of Section 6D.03 (MMUTCD) as quoted below.

Traffic Control for a one-lane, two-way traffic control shall be conducted in accordance with Section 6C.11 of the MMUTCD and as herein modified.

"Traffic should be controlled by a traffic regulator at each end of a constricted section of roadway. One of the traffic regulators should be designated as the coordinator. To provide coordination of the control of the traffic, traffic regulators should be able to communicate with each other orally, electronically, or with manual signs. These manual signals should not be mistaken for traffic regulating signals. Any alternative options must be approved by the engineer."

Alternatively, traffic control may be conducted via an automated flagger assistance device or pilot car as stated by the MMUTCD, except as modified herein w/ prior approval from the Engineer.

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ALL WORKERS IN ROW

"All workers, including emergency responders, within the right-of-way who are exposed either to traffic (vehicles using the highway for purposes of travel) or to work vehicles and construction equipment with the Temporary Traffic Control (TTC) zone shall wear high-visibility safety apparel that meets the Performance Class 2 or 3 requirements of the ANSI/ISEA 107-2004 publication entitled "American National Standard for High-Visibility Safety Apparel and Headwear" (see Section 1A.11), or equivalent revisions, and labeled as meeting the ANSI 107-2004 standard performance for Class 2 or 3 risk exposure, except as provided in Paragraph 5 (MMUTCD). A person designated by the employer to be responsible for worker safety shall make the selection of the appropriate class of garment."

WORK DURATION

Work duration is a major factor in determining the number and types of devices used in TTC zones. The duration of a TTC zone is defined relative to the length of time a work operation occupies a spot location.

**Standard**

The four categories of work duration and their time at a location shall be:

A. Intermediate-term stationary is work that occupies a location more than one daylight period up to 3 days or more.
B. Short-term stationary is daytime work that occupies a location for more than 1 hour within a single daylight period.
C. Short duration is work that occupies a location up to 1 hour.
D. Mobile is work that moves intermittently or continuously."

In addition, work shall be conducted during daylight hours only. No work shall be conducted on Sundays unless approved by the Engineer. The maximum distance between the traffic regulators shall be no more than 2 miles in length. All sequences of more than 2 miles in length will require written permission from the Engineer before proceeding.

Traffic Control for work conducted on the shoulder shall be in accordance with section 6H.01 of the MMUTCD as modified herein.

a. **Short duration or mobile operations on the shoulder** – "Stationary warning signs may be omitted if the work vehicle displays high-intensity rotating, flashing, oscillating, or strobe lights. If an arrow board is used, the caution mode shall be used. Vehicle-mounted signs shall be mounted in a manner such that they are not obscured by equipment or supplies. Sign legends on vehicle-mounted signs shall be covered or turned from view when work is not in progress."
b. **Short-term or intermediate-term work on the shoulder without encroachment** – "When paved shoulders having a width of 8 feet or more are closed, at least one advance warning sign shall be used. In addition, channelizing devices shall be used to close the shoulder in advance to delineate the beginning of the work space and direct vehicular traffic to remain

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within the traveled way. Alternatively, traffic regulation shall be in accordance with MDOT typical 122-NFW-SHL-(R)."

c. **Work on the shoulder with encroachment** – "Where the opposite shoulder is suitable for carrying vehicular traffic and of an adequate width, lanes may be shifted by use of closely-spaced channelizing devices, provided that the minimum lane width of 10 feet is maintained. Otherwise, a lane closure shall be employed in accordance with MDOT typical 110-TR-NFW-2L."
d. Work extending beyond the criteria above shall have traffic control in accordance with MDOT typical 110-TR-NFW-2L or result in a full road closure.

ATTACHMENTS


| **MDOT TYPICAL** | **Pg.** |
|---|---|
| 101-GEN-SPACING-CHARTS | 33 |
| 102-GEN-NOTES | 36 |
| 103-GEN-SIGN | 38 |
| 104-GEN-AB | 43 |
| 110-TR-NFW-2L | 44 |
| 122-NFW-SHL-(R) | 45 |
| 4000-M-SHL-OUT | 46 |


Maintaining Traffic Typicals can also be found on MDOT's website: https://mdotjboss.state.mi.us/TSSD/tssdHome.htm.

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## 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

| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL | "B", "D" AND "L" TABLES CHANNELIZING DEVICE SPACING, SIGN BORDER KEY, AND ROLL-AHEAD SPACING | DATE: MAY 2021 |
|---|---|---|---|---|
| FILE: 101-GEN-SPACING-CHARTS.dgn | | NO: 101-GEN-SPACING-CHARTS | | SHEET: 1 OF 3 |

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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

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL | "B", "D" AND "L" TABLES CHANNELIZING DEVICE SPACING SIGN BORDER KEY AND ROLL-AHEAD SPACING | DATE: MAY 2021 |
| FILE: 101-GEN-SPACING-CHARTS.dgn | | NO: 101-GEN-SPACING-CHARTS | | SHEET: 2 OF 3 |

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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.

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL | "B", "D" AND "L" TABLES<br>CHANNELIZING DEVICE SPACING<br>SIGN BORDER KEY AND ROLL AHEAD SPACING | DATE: MAY 2021 |
| FILE: 101-GEN-SPACING-CHARTS.dgn | | NO: 101-GEN-SPACING-CHARTS | | SHEET: 3 OF 3 |

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# 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(R0)(L)
SHIFTS 5FT TO 12FT, PLACE TWO W1-6(R10)(L)
SHIFTS MORE THAN 12FT, PLACE THREE OR MORE W1-6(R0)(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.

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL<br>NO: 102-GEN-NOTES | TRAFFIC TYPICALS<br>NOTE SHEET | DATE: MAY 2022<br>SHEET: 1 OF 2 |
| FILE: 102-GEN-NOTES.dgn | | | | |

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## 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.

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL<br>NO: 102-GEN-NOTES | TRAFFIC TYPICALS<br>NOTE SHEET | DATE: MAY 2022<br>SHEET: 2 OF 2 |
| FILE: 102-GEN-NOTES.dgn | | | | |

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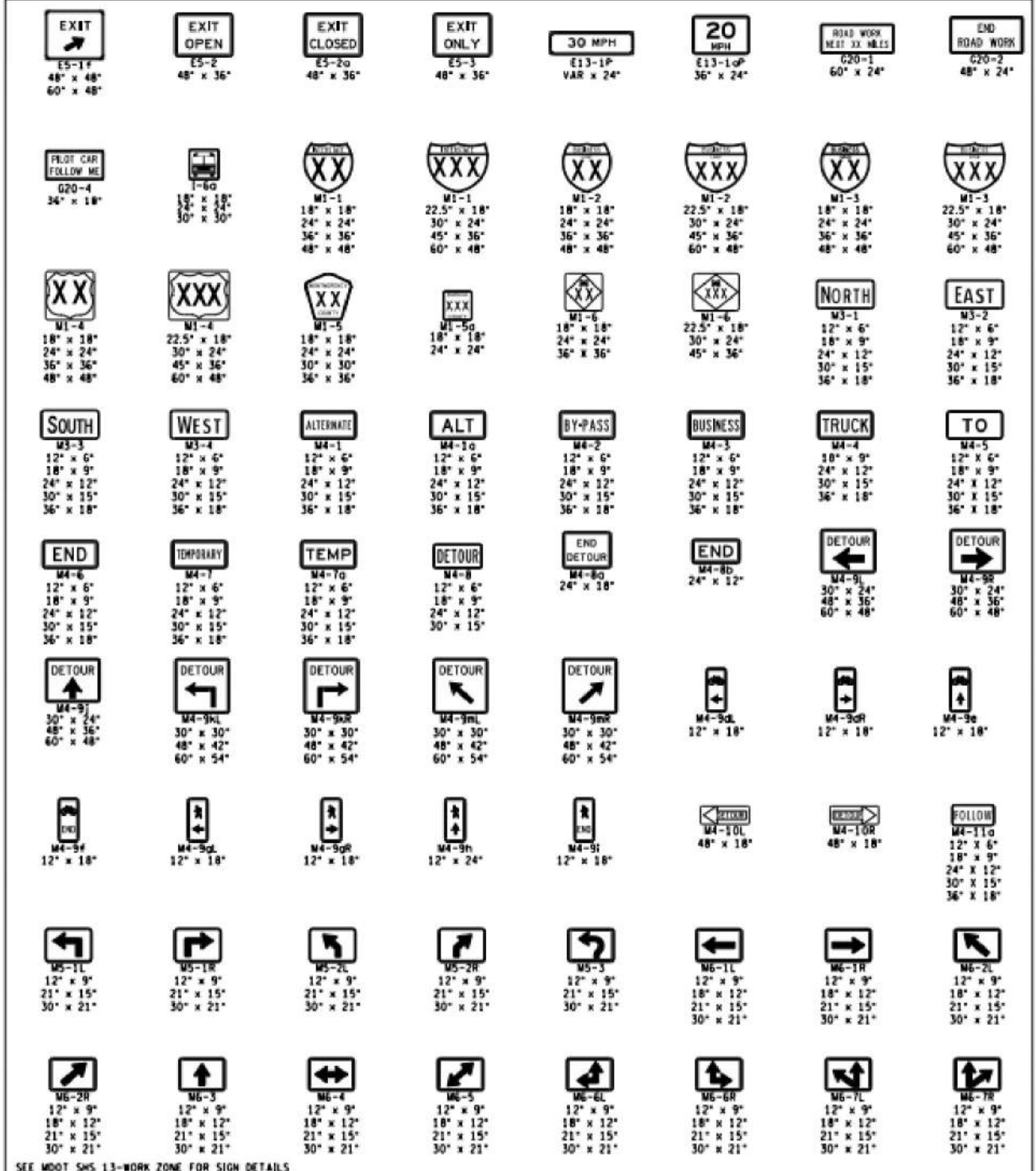
# SIGN NUMBER KEY




SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL<br>NO: 103-GEN-SIGN | TRAFFIC TYPICALS<br>SIGN SHEET | DATE: JUNE 2021<br>SHEET: 1 OF 5 |
| FILE: 103-GEN-SIGN.dgn | | | | |

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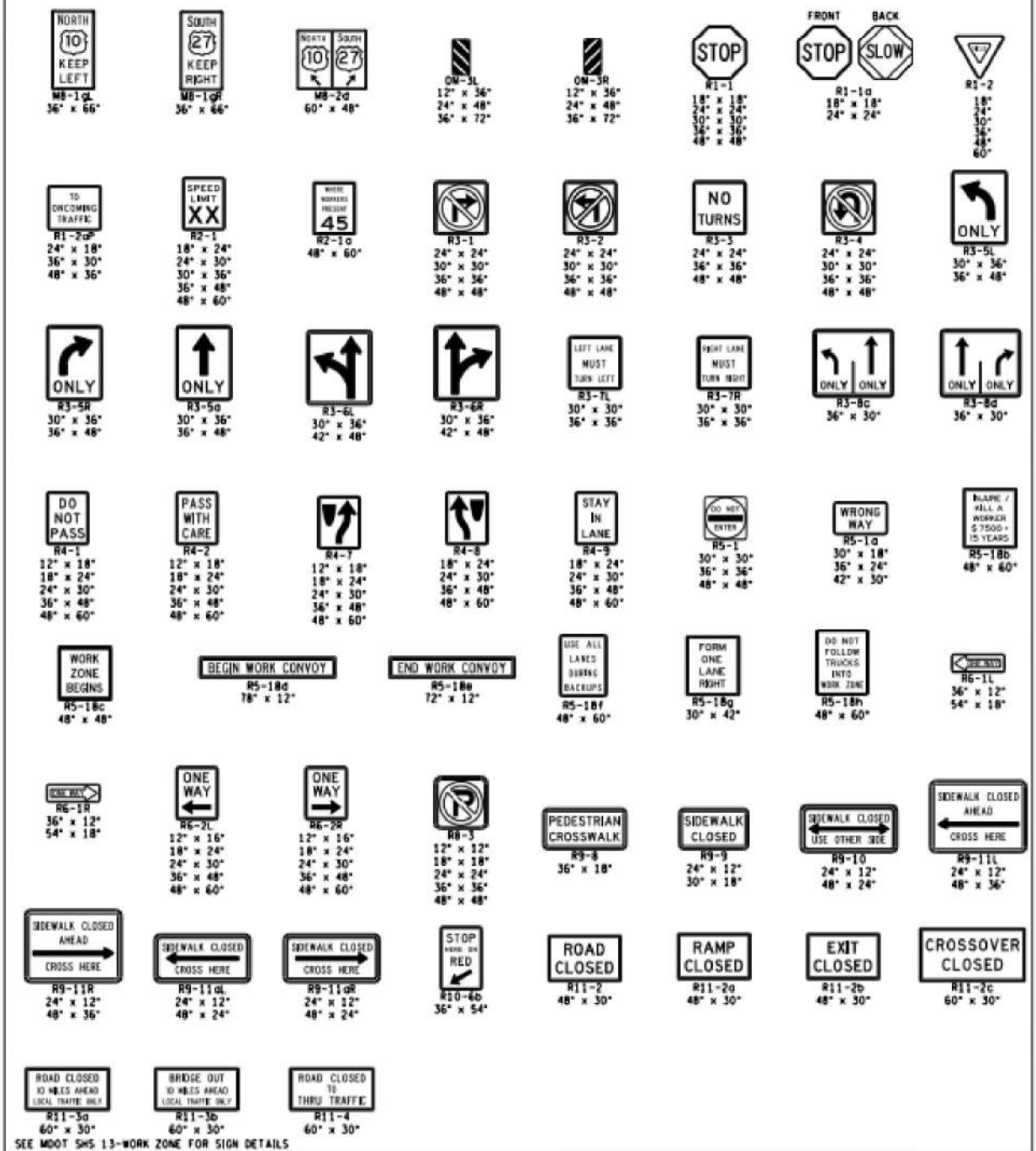
## SIGN NUMBER KEY




SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL<br>NO: 103-GEN-SIGN | TRAFFIC TYPICALS<br>SIGN SHEET | DATE: JUNE 2021<br>SHEET: 2 OF 5 |
| FILE: 103-GEN-SIGN.dgn | | | | |

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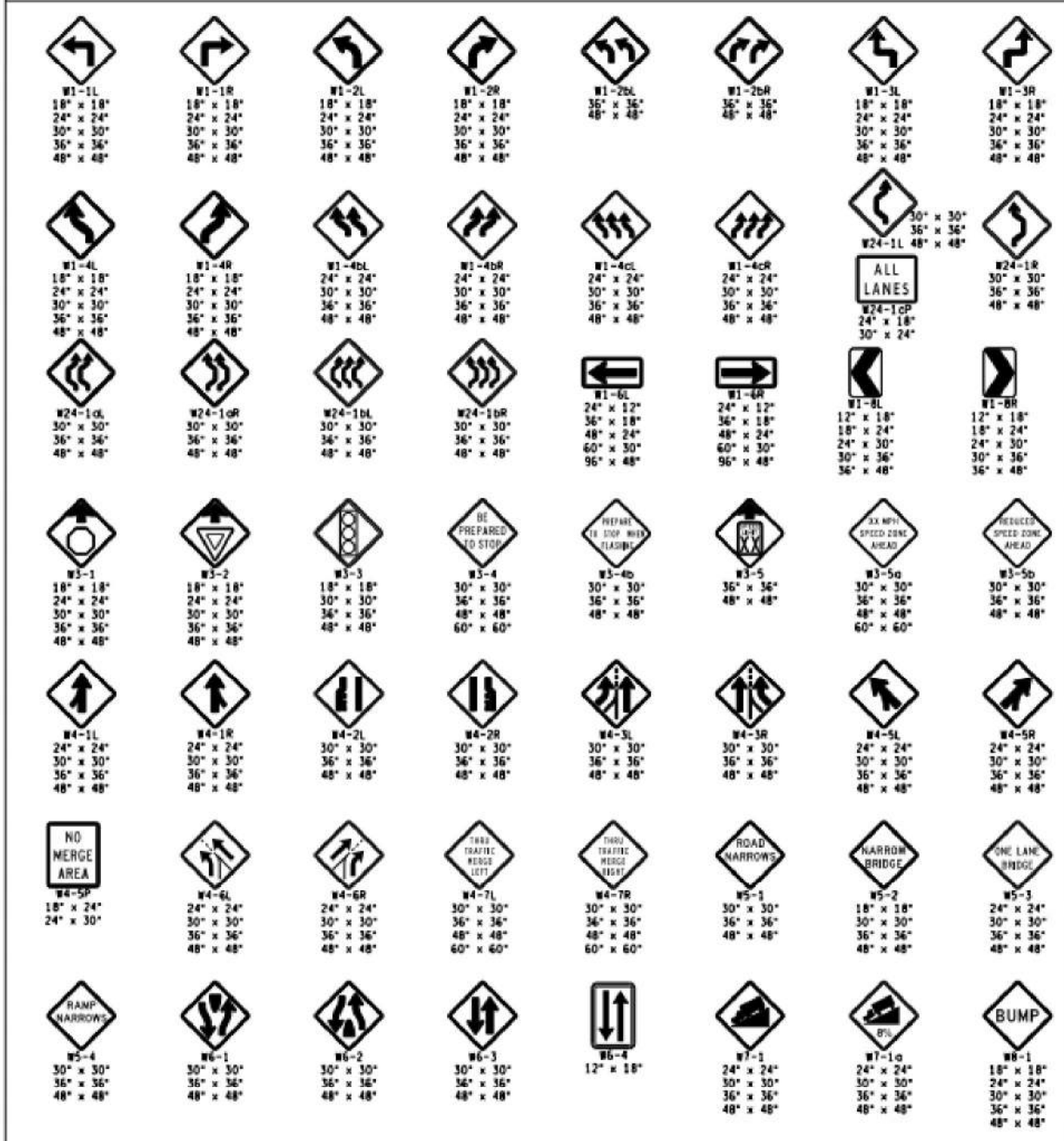
## SIGN NUMBER KEY




SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL<br>NO: 103-GEN-SIGN | TRAFFIC TYPICALS<br>SIGN SHEET | DATE: JUNE 2021<br>SHEET: 3 OF 5 |
| FILE: 103-GEN-SIGN.dgn | | | | |

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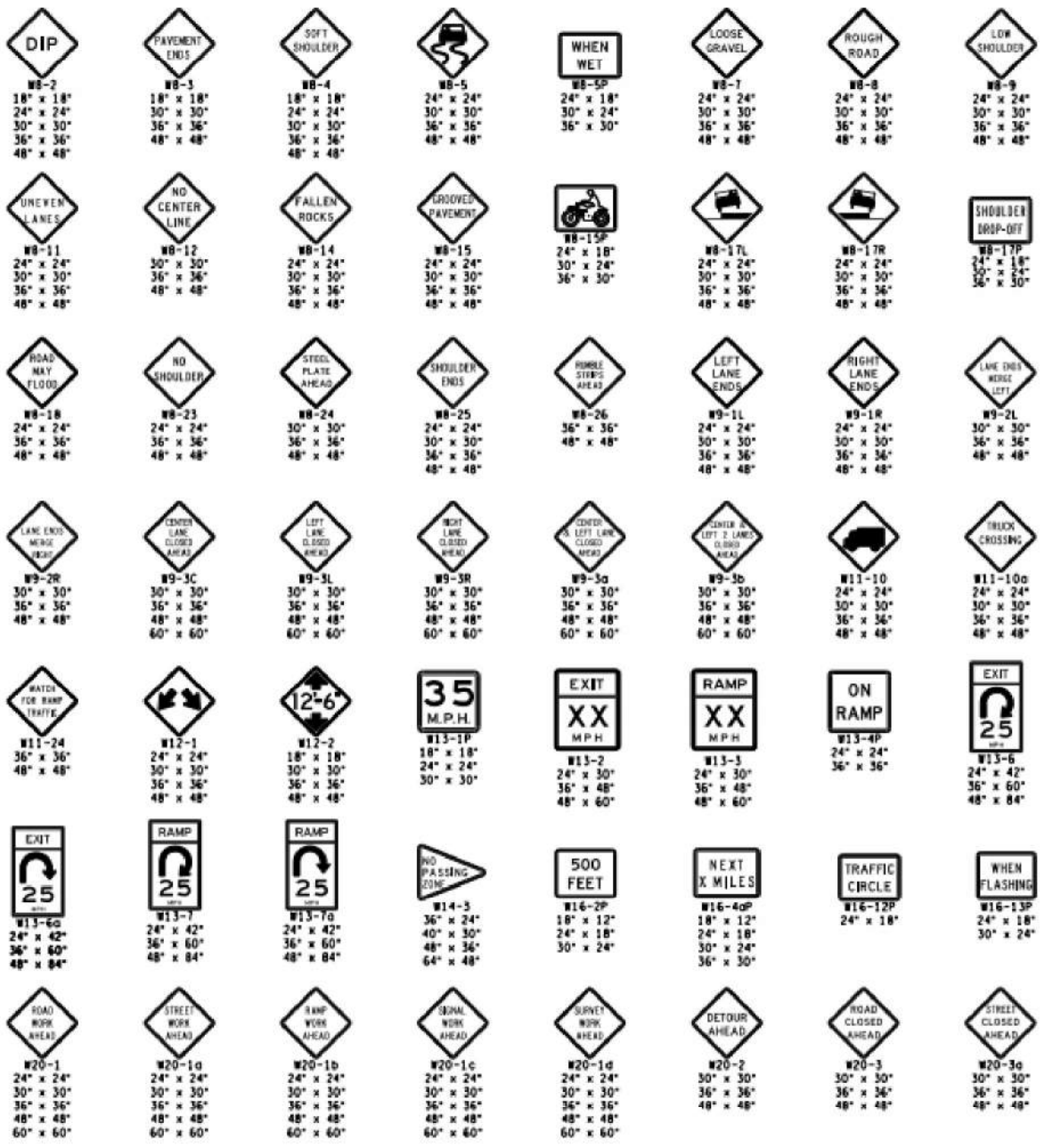
# SIGN NUMBER KEY




SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS

| | | | | |
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| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL<br>NO: 103-GEN-SIGN | TRAFFIC TYPICALS<br>SIGN SHEET | DATE: JUNE 2021<br>SHEET: 4 OF 5 |
| FILE: 103-GEN-SIGN.dgn | | | | |

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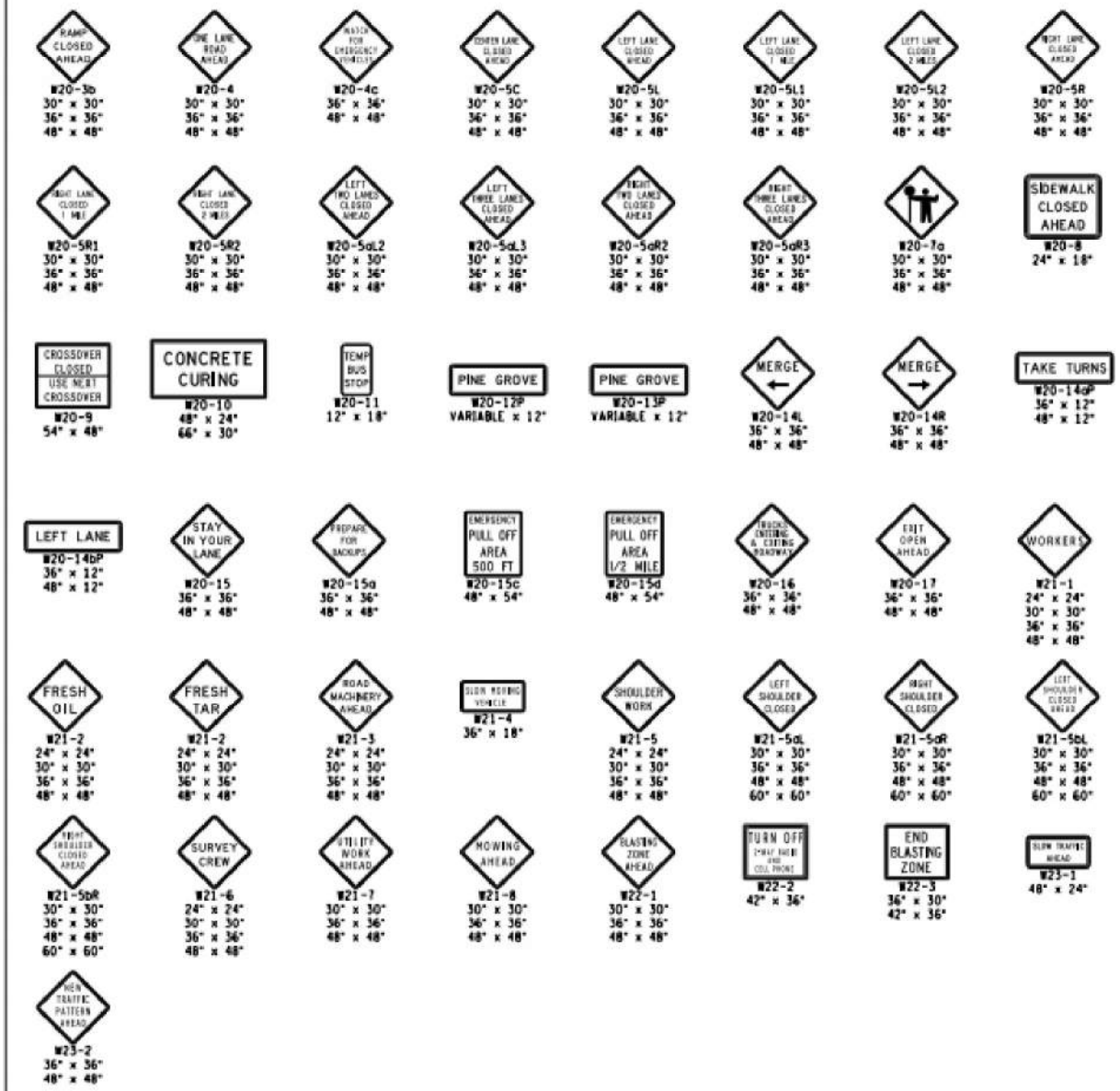
## SIGN NUMBER KEY




SEE MDOT SHS 13-WORK ZONE FOR SIGN DETAILS

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL<br>NO: 103-GEN-SIGN | TRAFFIC TYPICALS<br>SIGN SHEET | DATE: JUNE 2021<br>SHEET: 5 OF 5 |
| FILE: 103-GEN-SIGN.dgn | | | | |

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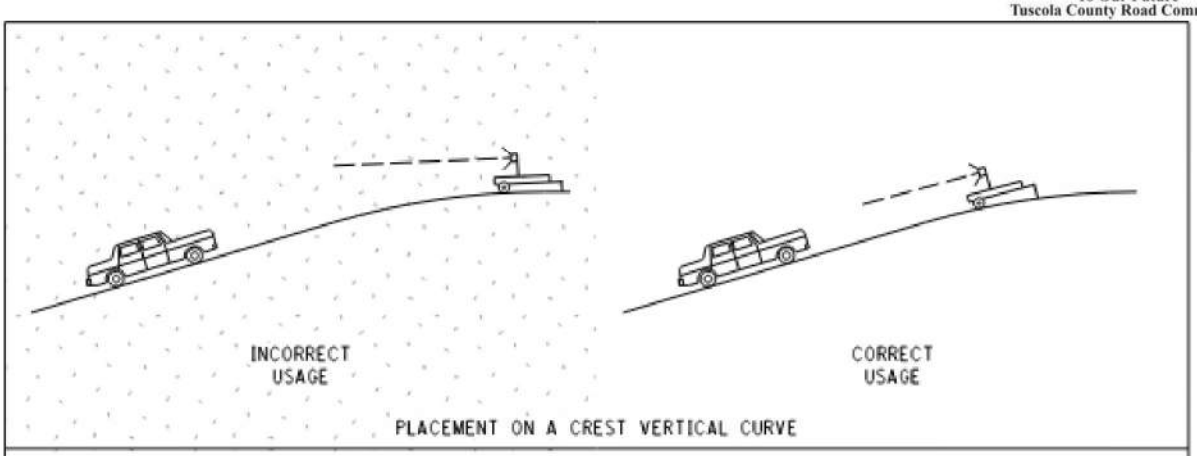
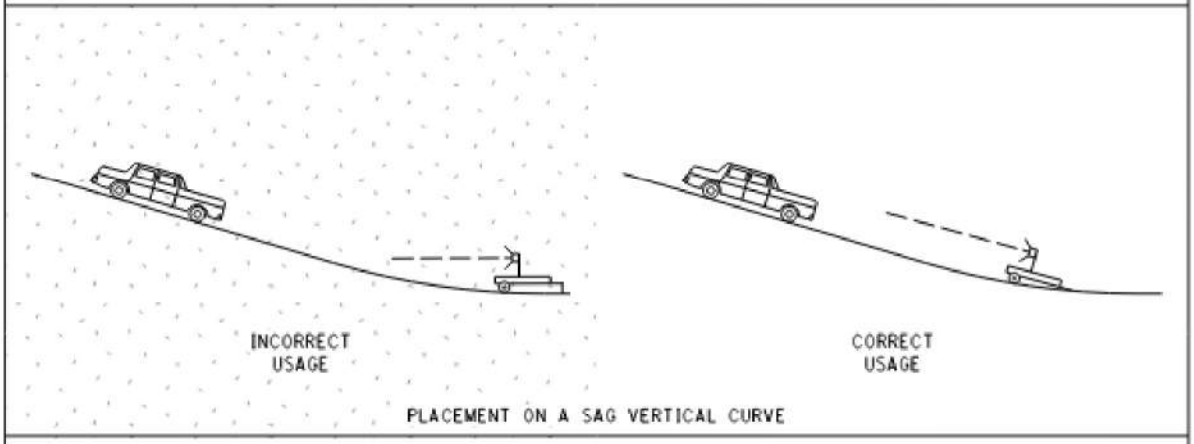
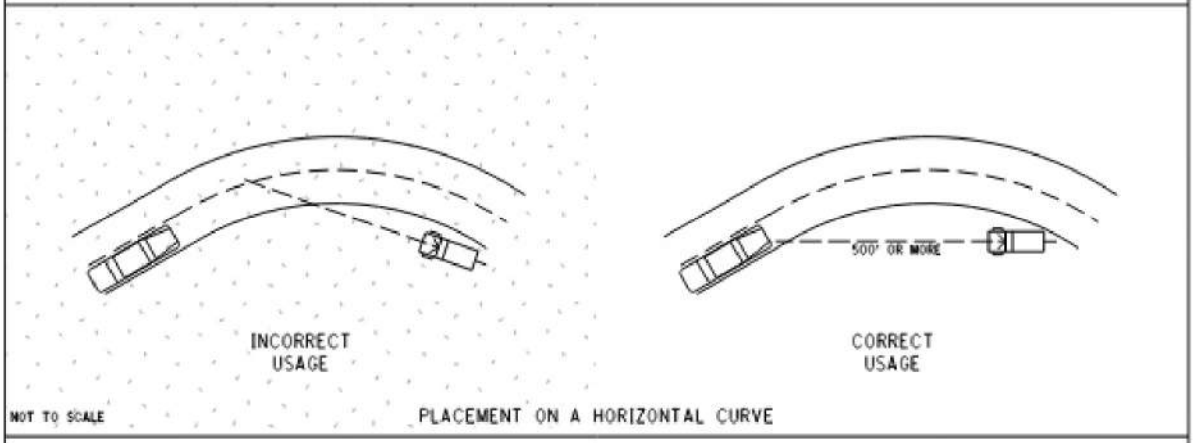



PLACEMENT ON A CREST VERTICAL CURVE




PLACEMENT ON A SAG VERTICAL CURVE




NOT TO SCALE

PLACEMENT ON A HORIZONTAL CURVE

NOTE:
ENSURE THE ARROW REMAINS CLEARLY LEGIBLE AT DISTANCES FROM 2,500 FEET TO 200 FEET, FROM ALL TRAFFIC LANES AND ROADWAY ENTRANCES. DO NOT PLACE THE LIGHTED ARROW ON A HORIZONTAL OR VERTICAL CURVE THAT MIGHT INTERFERE WITH THIS LEGIBILITY REQUIREMENT.

| MDOT Michigan Department of Transportation | NOT TO SCALE | MAINTAINING TRAFFIC TYPICAL NO: 104-GEN-AB | USE OF ARROW BOARD ON HILL OR CURVE AND WORK ZONE LAYOUT | DATE: MAY 2021 SHEET: 1 OF 1 |
|---|---|---|---|---|
| FILE: 104-GEN-AB.dgn | | | | |

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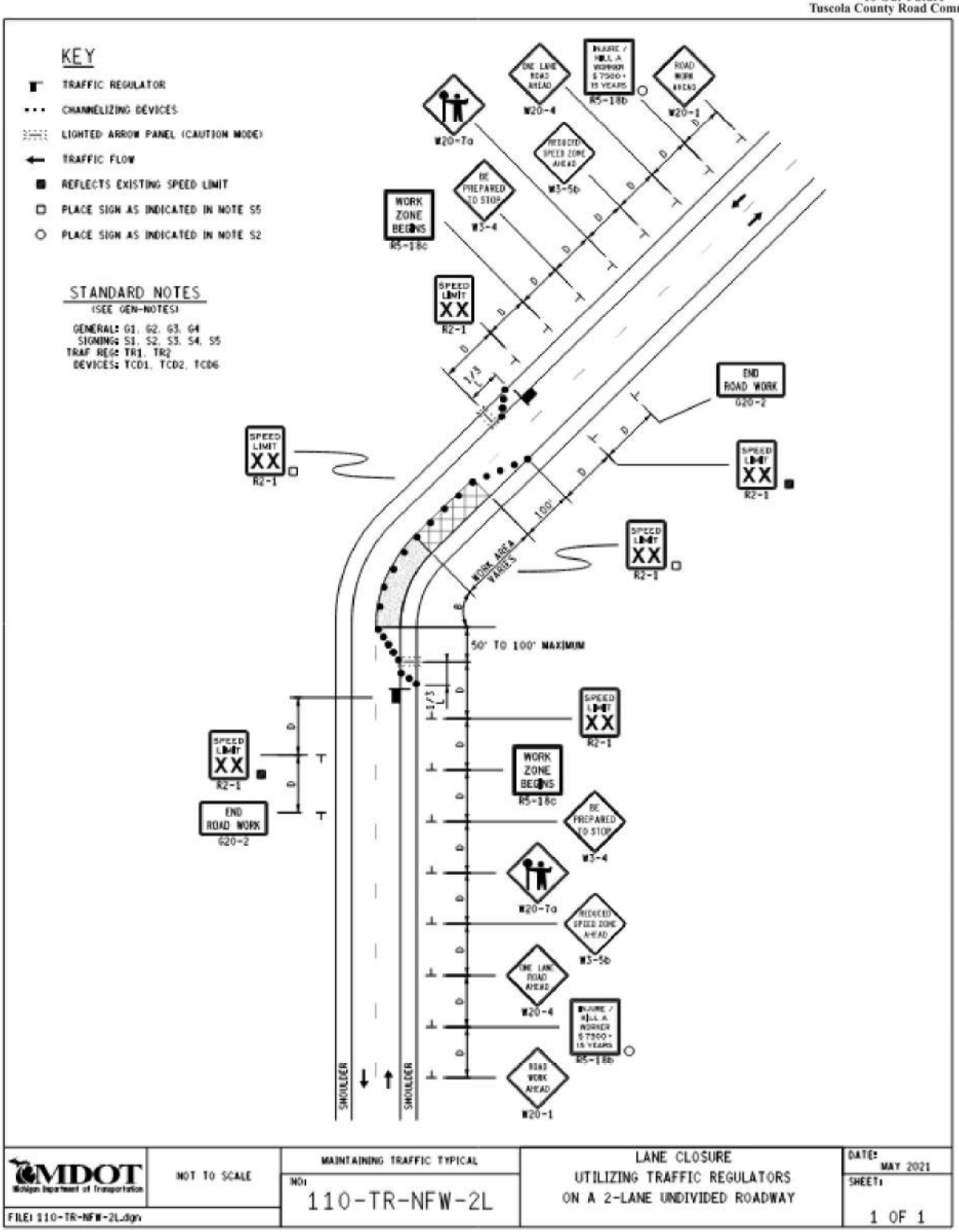
KEY
TRAFFIC REGULATOR
CHANNELIZING DEVICES
LIGHTED ARROW PANEL (CAUTION MODE)
TRAFFIC FLOW
REFLECTS EXISTING SPEED LIMIT
PLACE SIGN AS INDICATED IN NOTE S5
PLACE SIGN AS INDICATED IN NOTE S2
STANDARD NOTES
(SEE GEN-NOTES)
GENERAL: G1, G2, G3, G4
SIGNING: S1, S2, S3, S4, S5
TRAF REG: TR1, TR2
DEVICES: TCD1, TCD2, TCD6
ONE LANE ROAD AHEAD W20-4
INJURE / KILL A WORKER $7500+ 15 YEARS R5-18b
ROAD WORK AHEAD W20-1
W20-7a
REDUCED SPEED ZONE AHEAD W3-5b
BE PREPARED TO STOP W3-4
WORK ZONE BEGINS R5-18c
SPEED LIMIT XX R2-1
END ROAD WORK G20-2
100'
WORK AREA VARIES
50' TO 100' MAXIMUM
SHOULDER
SHOULDER
MDOT Michigan Department of Transportation
NOT TO SCALE
MAINTAINING TRAFFIC TYPICAL
NO: 110-TR-NFW-2L
LANE CLOSURE
UTILIZING TRAFFIC REGULATORS
ON A 2-LANE UNDIVIDED ROADWAY
DATE: MAY 2021
SHEET: 1 OF 1
FILE: 110-TR-NFW-2L.dgn

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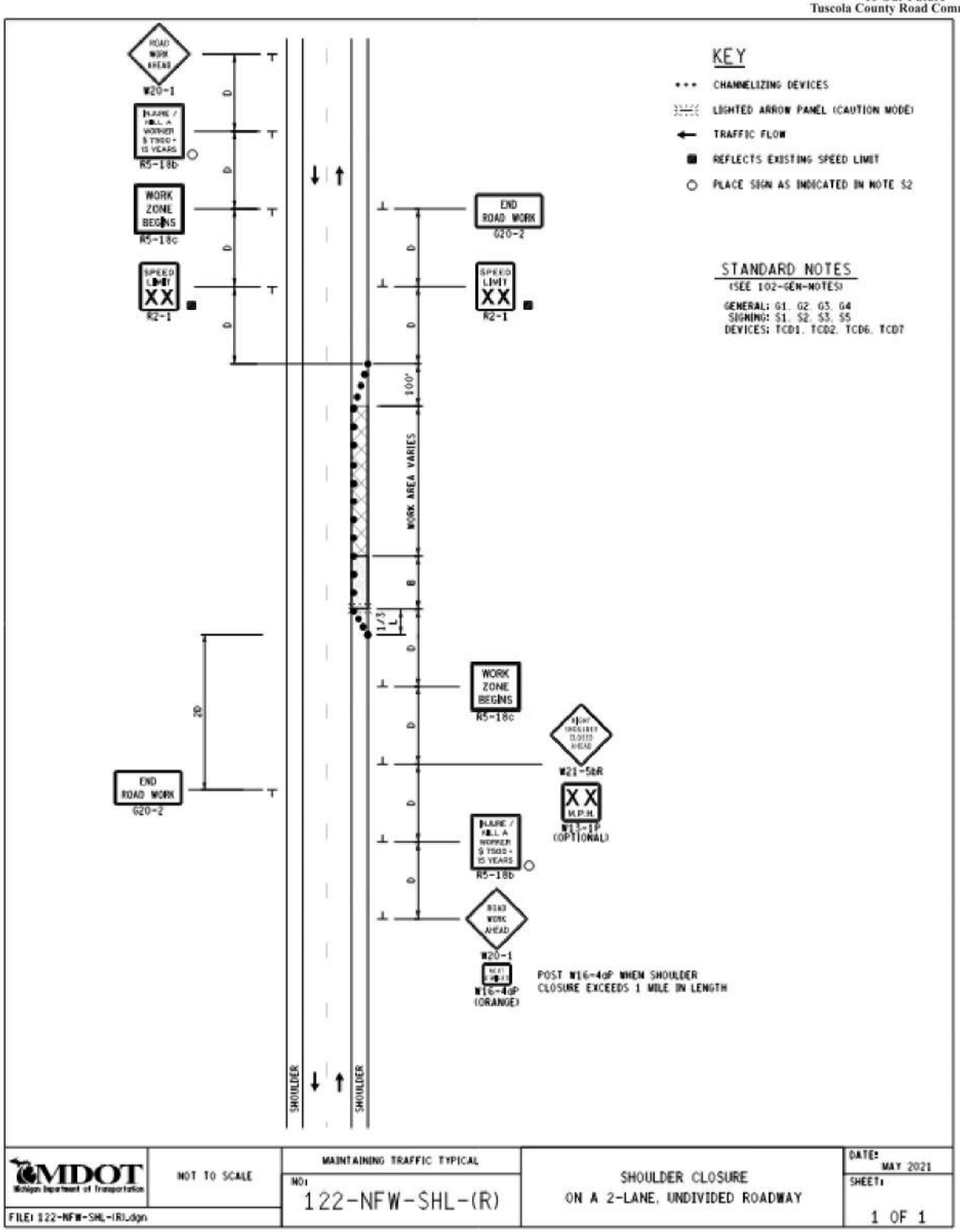
KEY
CHANNELIZING DEVICES
LIGHTED ARROW PANEL (CAUTION MODE)
TRAFFIC FLOW
REFLECTS EXISTING SPEED LIMIT
PLACE SIGN AS INDICATED IN NOTE S2
STANDARD NOTES
(SEE 102-GEN-NOTES)
GENERAL: G1, G2, G3, G4
SIGNING: S1, S2, S3, S5
DEVICES: TCD1, TCD2, TCD6, TCD7
W20-1
R5-18b
WORK ZONE BEGINS
R5-18c
SPEED LIMIT XX
R2-1
END ROAD WORK
G20-2
W21-5bR
XX M.P.H.
W13-1P
(OPTIONAL)
W16-4aP
(ORANGE)
POST W16-4aP WHEN SHOULDER CLOSURE EXCEEDS 1 MILE IN LENGTH
WORK AREA VARIES
100'
L/3
SHOULDER
SHOULDER
MDOT
Michigan Department of Transportation
NOT TO SCALE
MAINTAINING TRAFFIC TYPICAL
NO: 122-NFW-SHL-(R)
SHOULDER CLOSURE
ON A 2-LANE, UNDIVIDED ROADWAY
DATE: MAY 2021
SHEET: 1 OF 1
FILE: 122-NFW-SHL-(R).dgn

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## NOTES

1. FOR SHORT-DURATION OR MOBILE OPERATIONS, NO SIGNS ARE REQUIRED IF APPROPRIATELY EQUIPPED VEHICLES ARE USED.
2. IF THE OPERATION HAS VEHICLE(S) PARKED ON THE SHOULDER OR VEHICLES ACCESSING THE WORK SITE VIA THE HIGHWAY OR CROSSING THE HIGHWAY TO PERFORM OPERATIONS, A "ROAD WORK AHEAD" SIGN OR AN ARROW BOARD IN CAUTION MODE SHALL BE USED.
3. WORK VEHICLES SHOULD BE PARKED AS FAR OFF THE TRAVELED WAY AS PRACTICAL.
4. IF THE WORK SPACE IS IN THE MEDIAN OF A DIVIDED ROADWAY, ADVANCE WARNING SIGNS SHALL BE PLACED IN BOTH DIRECTIONS OF TRAVEL.
5. VEHICLES AND PERSONNEL SHOULD ALL BE LOCATED AND PARKED ON THE SAME SIDE OF THE ROADWAY TO THE EXTENT PRACTICAL.

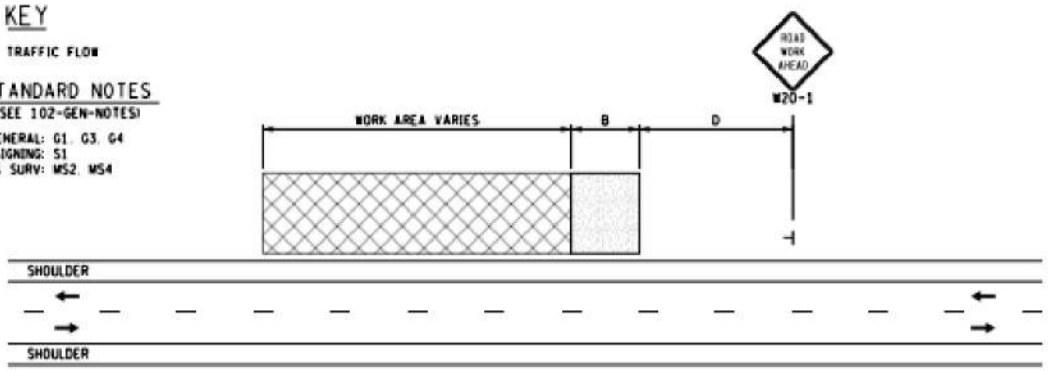
## KEY

← TRAFFIC FLOW

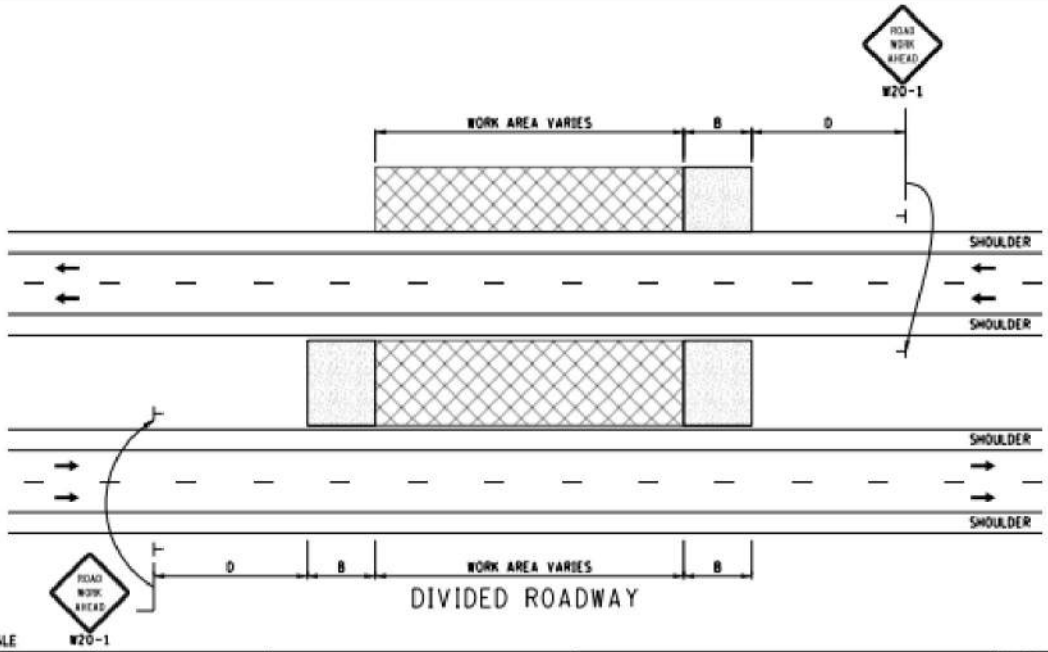
### STANDARD NOTES

(SEE 102-GEN-NOTES)

GENERAL: G1, G3, G4
SIGNING: S1
MAINT & SURV: MS2, MS4




TWO LANE, TWO WAY ROADWAY




DIVIDED ROADWAY

NOT TO SCALE

| | | | | |
|---|---|---|---|---|
| MDOT Michigan Department of Transportation | MAINTENANCE MAINTAINING TRAFFIC TYPICAL | DURATION: ALL | WORK OUTSIDE SHOULDER | DATE: MAY 2021 |
| | | | | NO: 4000-M-SHL-OUT |
| FILE: 4000-M-SHL-OUT.dgn | | | | SHEET: 1 OF 1 |

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## 9.7. INSURANCE REQUIREMENTS

| Agriculture Hauling Permit | |
|---|---|
| **Type of Insurance** | **Notes** |
| None | As required by Statute per the Attorney General Opinion |

| Oversize / Overweight Permits | | | | | | |
|---|---|---|---|---|---|---|
| **Type of Insurance** | **Coverage Limits** | **Addl. Insured** | **Waiver of Subrogation** | **Primary/Non Contributory** | **Claims Made** | **Indemnification** |
| Auto Liability | Michigan No Fault Coverage/Property Protection (PPI) $1M Statutory Limit | No | No | No | No | Yes |

**Driveway Permit**

**Individual Homeowner Permit Holder - Residential Driveway**

| Type of Insurance | Notes |
|---|---|
| None | Advise homeowner they will be responsible for any damage done to the ROW |
| | Advise homeowner they will be responsible for any injuries as a result of the work in the ROW |
| | Advise homeowner they will be required to indemnify the RC as outlined in the ROW permit |

**Contractor Permit Holder - Commercial or Residential Driveway**

| Type of Insurance | Coverage Limits | | Addl. Insured | Waiver of Subrogation | Primary/Non Contributory | Claims Made | Indemnification |
|---|---|---|---|---|---|---|---|
| Commercial General Liability (CGL) | Each Occurrence | $2,000,000 | No | No | No | No | Yes |
| | Products Comp/Op Aggregate | $3,000,000 | | | | | |
| | General Aggregate | $3,000,000 | | | | | |

| Special Event / Parade Permits | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Type of Insurance** | **Coverage Limits** | | **Addl. Insured** | **Waiver of Subrogation** | **Primary/Non Contributory** | **Claims Made** | **Indemnification** |
| Commercial General Liability (CGL) | Each Occurrence | $2,000,000 | Yes | Yes | Yes | No | Yes |
| | General Aggregate | $2,000,000 | | | | | |
| | Notes | | | | | | |
| | For special events requiring participant waivers - Endeavor to have the RC added to the waiver. If alcohol is being served, host liquor liability is required. | | | | | | |

**General Right of Way Permit**

**Individual Homeowner Permit Holder**

| Type of Insurance | Notes |
|---|---|
| None | Advise homeowner they will be responsible for any damage done to the ROW |
| | Advise homeowner they will be responsible for any injuries as a result of the work in the ROW |
| | Advise homeowner they will be required to indemnify the RC as outlined in the ROW permit |

**Contractor Permit Holder**

| Type of Insurance | Coverage Limits | | Addl. Insured | Waiver of Subrogation | Primary/Non Contributory | Claims Made | Indemnification |
|---|---|---|---|---|---|---|---|
| Commercial General Liability (CGL) | Each Occurrence | $2,000,000 | Yes | Yes | Yes | No | Yes |
| | Products Comp/Op Aggregate | $3,000,000 | | | | | |
| | General Aggregate | $3,000,000 | | | | | |
| Auto Liability | Michigan No Fault Coverage/Property Protection (PPI) $1M Statutory Limit | | No | No | No | No | Yes |
| Professional Liability, as required | Each Occurrence & Aggregate | $2,000,000 | N/A | N/A | N/A | Yes | Yes |

Umbrella may be used to meet limit requirements: Commercial General Liability & Auto Liability
Retro Date for Professional Liability must be prior to issuing permit date.
It is recommended the Self Insured Retention (SIR) for CGL be no greater than $25,000.

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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: _____

_____

_____

_____

_____