

Price Quote for
Barnes Road Bridge Replacement #10630 over Perry Creek
Located 0.2 miles East of Vassar Road
Tuscola County
Board of County Road Commissioners
1733 S. Mertz Rd.
Caro, MI 48723

Letting Date – April 25, 2024, 9:15am

Contractor: _____

Address: _____

Sign & Print: _____

Date: _____

Phone & Fax _____

Email: _____

Barnes Road Bridge Replacement #10630 over the Perry Creek.

LSUM Price \$ _____

Project Completion Date: November 15th, 2025

Signed Insurance, Agreement, ROW Permit, and Complete Bid Tab shall be enclosed.

Tuscola County Road Commission
Price Quote For:
Barnes Road Bridge Replacement #10630 over Perry Creek
Bid Submittal

Bids are to be submitted on the Road Commission forms in a plainly marked and sealed envelope. No electronic or faxed bids will be 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 and included with the submittal of the bid.

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 receive any 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.

General:

This project includes the removal and replacement of the structure on Barnes Road 0.2 miles east of Vassar Road over the Perry Creek. The quantities on the plan sheets are estimated quantities and differing quantities will need to be discussed with the engineer before work begins.

The Contractor hereby proposed to furnish all necessary labor, equipment and materials to complete the work called out and shown on the plan sheets, for the lump sum price listed, herein described in strict accordance with the requirements of the Michigan Department of Transportation 2020 Standard Specifications for Construction, and/or such other special provisions and supplemental specifications as may be listed or attached to this proposal.

Construction:

Work Schedule:

Construction can start within 10 days of award. Contract completion is scheduled for November 15th, 2025, unless arranged with Engineer. Once work begins it must continue until the project is completed. Liquidated damages may be assessed at a rate of \$1,000.00 per day, starting November 16th, 2025, per the discretion of the Engineer.

Utility Coordination:

The Contractor is responsible for coordinating all utility relocations as needed. Attached is a list of the contact information for the utilities on site. **Note: Miss Dig must be contacted 72 hours prior to start of work.**

Staking and Material Testing:

Tuscola County Road Commission

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The Tuscola County Road Commission will provide construction staking, inspection, and material testing on the project. The contractor shall provide 48 hours advance notice prior to facility scheduling of the work.

Material Tickets and Certifications:

All material tickets for concrete, HMA, aggregate, and backfill shall be provided by the contractor to the Tuscola County Road Commission. Additionally, all certifications shall be provided for materials incorporated into the final product, similar to an MDOT project.

Crushed Concrete Near Water

The use of crushed concrete is prohibited on this project within 500 feet of any water course (stream, river, county drain, etc.) and lake, regardless of the application or location of the water course relative to the project limits.

Clearing:

Tree removal has been completed by the Tuscola County Road Commission. The contractor is responsible for all stump removal within the project limits and any minor brush removal necessary. All costs are to be included in other items of work.

Removals:

The following items shall become the property of the Tuscola County Road Commission upon removal from the project site and upon delivery to the Vassar Garage at 430 Kitelinger Rd, Vassar, MI 48768.

- Guardrail and all guardrail accessories
- HMA Surface and all millings
- Clean spoils and excavated material

All other materials removed from the project site shall become the property of the contractor and it is their responsibility to properly dispose of the material in accordance with current regulations. The contractor is responsible for properly disposing of all bridge materials from Barnes Road in accordance with all applicable environmental regulations. See attached asbestos and lead testing report by McDowell and Associates. Prior to demolition of the bridge it is the contractors responsibility to complete the EGLE Notification of intent to Renovate/Demolish.

HMA:

The HMA shall be placed in accordance with the plan sheets, the Michigan Department of Transportation 2020 Standard Specifications for Construction Section 501, and the attached *Special Provisions*. Contractor shall provide a quality control plan along with the appropriate JMFs.

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Concrete Work:

Contractor shall submit Job Mix Formula's, JMFs, and a quality control plan for review by the Engineer prior to placement. All mix designs and concrete work shall be in accordance with the MDOT 2020 Standard Specifications for Construction and the *attached Special Provision*. All form work shall be inspected and approved by the Engineering prior to placement of concrete.

Machine Grading, Modified:

The Machine Grading shall be executed in accordance with Section 205 of the Michigan Department of Transportation 2020 Standard Specifications for Construction and the *attached Special Provision*.

Aggregate Base, X inch and LM Modified:

The Aggregate Base shall be installed in accordance with the Michigan Department of Transportation 2020 Standard Specifications for Construction Section 3 and the *attached Special Provision*.

Shld, Cl II, 4 Inch:

Material and work shall meet requirements of Section 902 of MDOT 2020 Standard Specifications for Construction. Shoulder Gravel shall be 23A, placed in accordance with section 307. Shoulder, Cl II shall be placed at the widths and depths established in the proposed cross sections.

Riprap, Spec, CL II, SYD:

The Riprap material shall meet requirements of Section 916 of MDOT 2020 Standard Specifications for Construction and shall be installed in accordance with section 813, and the *attached Special Provision*. Riprap shall be installed as shown on the plans, to stabilize slopes and provide scour protection for the structure.

Slope Restoration Modified:

Slope Restoration should be completed in accordance with Section 816 Michigan Department of Transportation 2020 Standard Specifications for Construction, the *attached Special Provision*, and as modified here. The contractor is responsible for maintaining/repairing the site until permanent vegetation is established. A retainer of up to 10%, at the Engineer's discretion, of the project cost will be held until the project has permanent vegetation. The contractor is responsible to use the correct material in accordance with the special provision to stabilize the slopes no matter the grade of slope either Type A, B, C, D.

Tuscola County Road Commission

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Non Haz Contaminated Material Handling and Disposal, LM:

Shall be completed per Section 205 Michigan Department of Transportation 2020 Standard Specifications for Construction and as modified here. Includes all cost associated to removal, excavation, disposal, storage, trucking and testing of material deemed Non Haz Contaminated by the Engineer. If such materials are encountered all work shall stop immediately and the Engineer shall be notified. Work shall resume once a plan of action has been agreed to between the contractor and the Tuscola County Road Commission. The Plan of Action shall include defined limits, proposed solution, and proposed cost.

Subgrade Undercutting, Type II:

Material and work shall meet the requirements of Section 205 Michigan Department of Transportation 2020 Standard Specifications for Construction and as modified here. Subgrade Undercutting includes the excavation, disposal of the unsuitable material, backfill, and compaction of suitable material as indicated by the Engineer. If such materials are encountered all work shall stop immediately and the Engineer shall be notified. Work shall resume once a plan of action has been agreed to between the contractor and the Tuscola County Road Commission. The Plan of Action shall include defined limits, proposed solution, and proposed cost.

Guardrail

Includes Guardrail, Type XX, Guardrail, Curved, Type XX, Guardrail Anch, Bridge, Det XX and Guardrail Approach Terminal, Type XX. All materials shall meet the requirements Section 908, and Section 912 of the Michigan Department of Transportation 2020 Standard Specifications for Construction. All work shall be completed in accordance with the plan sheets, and Section 807 of Michigan Department of Transportation 2020 Standard Specifications for Construction and as modified here. Pay item includes all materials, equipment, and labor for a complete installation. Guardrail reflectors are incidental to the construction of the guardrail and shall be installed in accordance with MDOT standards and the cost is to be included in other items of work

Permanent and Existing Signs:

All permanent sign installation, salvage, removal shall be coordinate with and completed by the Tuscola County Road Commission.

Pavement Markings

All permanent pavement marking items shall be completed by the Tuscola County Road Commission.

Tuscola County Road Commission

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Soil Erosion and Sedimentation Control:

The contractor is responsible for all temporary and permanent control measures such as silt fence, check dams, sediment traps, riprap, temporary slope restoration, dust control, filter bags, and etc to prevent loss of soils from the road right-of-way or into the county drains. If bypass pumping is required the contractor shall submit a bypass pumping plan for review and approval prior to implantation. These items will not be paid for separately but shall be included in the work item Soil Erosion and Sedimentation Control.

Maintaining Traffic:

Traffic will be maintained according to the Tuscola County Road Commission Special Provision for Maintaining Traffic in accordance with the 2011 Michigan Manual on Uniform Traffic Control Devices or as directed by the Engineer. The project site will be closed to traffic during the duration of the project and traffic will be detoured in accordance with the attached detour route and MDOT permit. All work shall be completed in accordance with Section 812 and all materials shall meet the requirements of Section 922 of the Michigan Department of Transportation 2020 Standard Specifications for Construction and as modified here. The Pay Item "Traffic Control, Lump Sum" includes all work, materials and equipment necessary to maintain the traffic which includes but is not limited to Barricade, Type III, High Intensity, Double Sided, Lighted, Furn/Oper, Pedestrian Type II Barricade, Temp, Lighted Arrow, Type C, Furn/Oper, Plastic Drum, Fluorescent, Furn/Oper, Minor Traf Devices, Plastic Drum, Fluorescent, Furn/Oper, Sign Cover, Sign, Type XX, temp, Prismatic, Furn/Oper, and Traf Regulator Control.

The contractor is responsible for the project site and shall provide any additional measures needed to separate the public from the work zone. All costs for maintaining traffic control shall be included in the item minor traffic control devices.

Tuscola County Road Commission

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Barnes Road Bridge Replacement #10630 over Perry Creek

Documents Attached:

- Bid Tab
- Agreement
- ROW Permit Application
- Utility Coordination
- Coordination Clause
- Special Provision 205 – Machine Grading, Modified
- Special Provision 302 – Aggregate Base, Modified
- Special Provision 501 – Acceptance of Hot Mix Asphalt Mixture on LAP
- Special Provision 501 – Recycled Hot Mix Asphalt Mixture on LAP
- Special Provision 501 – Sampling Asphalt Binder on LAP
- Special Provision 604 – QAQC of Portland Cement Concrete for LAP
- Special Provision 710 – Silane Treatment for Bridge Concrete
- Special Provision 812 - TCRC Maintaining Traffic
- Special Provision 813 – Riprap, Special
- Special Provision 816 – Slope Restoration, Modified
- Barnes Road Detour Route
- EGEL Permit
- Asbestos Report
- Title IV Compliance
- Title VI Compliance

- Project Plans – Separate Document

Payment and Paperwork:

Liability:

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

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

The Contractor shall, prior to the start of work, file with the Tuscola County Road Commission a certificate that he carries worker's compensation insurance.

Tuscola County Road Commission
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Payment:

These projects are quoted on a "NOT TO EXCEED" total basis for all work necessary to complete each project. Payment shall be made by the Tuscola County Road Commission upon receipt of site-specific invoice. Invoice shall be accompanied by all necessary material tickets. The lump sum amount bid shall be payment in full for all labor, materials, and equipment needed to accomplish the work.

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 that, in their opinion, is in the best interest of Tuscola County.

Barnes Road Bridge Replacement #10630 over Perry Creek (western bridge)

Tuscola County, MI

Item No	Quantity	Unit	Description	Unit Price	Amount
Barnes Road Work					
1	1	LSUM	Mobilization, Max 10% (STR 10630)	_____	_____
2	200	LF	Guardrail, Rem	_____	_____
3	1	STA	Machine Grading, Modified	_____	_____
4	554	CYD	Backfill, Structure, CIP	_____	_____
5	861	CYD	Excavation, Fdn	_____	_____
6	51	CYD	Subbase, CIP	_____	_____
7	113	SYD	Aggregate Base, 6 inch	_____	_____
8	333	CYD	Aggregate Base, LM, Modified	_____	_____
9	31	SYD	Shld, Cl II, 4 inch	_____	_____
10	172	LF	Underdrain, Fdn, 6 inch	_____	_____
11	80	LF	Underdrain Outlet, 6 inch	_____	_____
12	6	EA	Underdrain, Outlet Ending, 6 inch	_____	_____
13	284	SYD	HMA Surface, Rem	_____	_____
14	30	TON	HMA, 4EL	_____	_____
15	2	EA	Guardrail Approach Terminal, Type 2M	_____	_____
16	4	EA	Guardrail Anch, Bridge, Det M4	_____	_____
17	25	FT	Guardrail, Curved, Type MGS-8, 72 inch Post	_____	_____
18	175	FT	Guardrail, Type MGS-8, 72 inch Post	_____	_____
19	1	LSUM	Slope Restoration Modified	_____	_____

20	1	LSUM	Soil Erosion Sediment Control		
21	1	LSUM	Traffic Control		

Barnes Road Structure Work

22	1	LSUM	Structures, Rem (STR 10630)		
23	32	LF	Joint, Expansion, E3		
24	1	LSUM	Cofferdams (STR 10630)		
25	1	LSUM	Pile Driving Equipment, Furn (STR 10630)		
26	1160	LF	Pile, Steel, Furn and Driven, 14 inch		
27	2	EA	Test Pile, Steel, 14 inch		
28	18	EA	Pile Point, Steel		
29	18	EA	Pile, Steel, Splice		
30	1	LSUM	Bridge Ltg, Furn and Rem (STR 10630)		
31	107	CYD	Bridge Ltg, Oper and Maintain		
32	32	LF	Expansion Joint Device		
33	1407	SFT	False Decking		
34	33539	Lb	Reinforcement, Steel, Epoxy Coated		
35	162	CYD	Substructure Conc		
36	14	CYD	Superstructure Conc		
37	1	LSUM	Superstructure Conc, Form, Finish, and Cure (STR 10630)		
38	1	LSUM	Superstructure Conc, Form, Finish, and Cure, Night Casting (STR 10630)		
39	107	CYD	Superstructure Conc, Night Casting		
40	1	LSUM	Structural Steel, Erect, Special (STR 10630)		

41	1	LSUM	Structural Steel, Furn and Fab, Special (STR 10630)	_____	_____
42	181	SFT	Joint Waterproofing	_____	_____
43	24	SYD	Substructure Horizontal Surface Sealer	_____	_____
44	493	SFT	Silane Treatment	_____	_____
45	59	LF	Bridge Railing, 2 Tube	_____	_____
46	115	LF	Curb and Gutter, Bridge Approach, Det 1	_____	_____
47	94	SYD	Riprap, Spec, Cl II	_____	_____
			TOTAL	Total	_____

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, with
policy limits of \$500,000/\$1,000,000 for property damage and bodily injury, 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 you 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: _____

Address: _____

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:

**Additional Permit Standards & Policies apply, available 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*

**NOTICE TO BIDDERS
UTILITY COORDINATION**

CON:SGI

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10-23-23

The contractor shall cooperate and coordinate construction activities with the owners of utilities as stated in Section 104.08 of the 2020 Michigan Department of Transportation (MDOT) Standard Specifications for Construction. In addition, for the protection of underground utilities, the contractor shall follow the requirements in Section 107.12 of the 2020 MDOT Standard Specifications for Construction. Contractor delay claims, resulting from a utility, will be determined based upon Section 108.09 of the 2020 MDOT Standard Specifications for Construction.

The following utilities have facilities located within the right-of-way.

UTILITY	OWNER	CONTACT
Owner	Tuscola County Road Commission 1733 Mertz Rd. Caro, MI 48723	Brent Dankert, P.E. 989-751-3873
Electric	Thumb Electric 2231 E Main St. Ubyly, MI 48475	Brandon Bruce 989-553-6582 BBruce@tecmi.coop
Gas	Consumers Energy 2400 Weiss St. Saginaw MI 48602	Benjamin Lewis 989-791-5918 Benjamin.Lewis@cmsenergy.com
Cable/Fiber	Wolverine Telephone 4712 Main St. Millington, MI 48746	William Bouman 989-971-5101 William.bouman@tdstelecom.com

For protection of underground utilities and in conformance with Public Act 53, the Contractor shall dial 1-800-482-7171 a minimum of three full working days, excluding Saturdays, Sundays and holidays, prior to excavating. Members will thus be routinely notified. This does not relieve the Contractor of the responsibility of notifying utility owners who may not be a part of the "Miss Dig" alert system.

The Contractor shall coordinate proposed work schedule with all affected utilities prior to starting work to ensure those utilities requiring temporary relocation will not affect the contractor's operations.

The Contractor shall coordinate with the utility owner in order to locate any affected utilities.

Emergency utility repairs may occur. The Contractor will be required to coordinate and schedule his work in conjunction with said utility improvements.

The owners of existing service facilities that are within grading or structure limits will move them to locations designated by the Engineer or will remove them entirely from the highway Right-of-Way as shown on the plans. Owners of Public Utilities will not be required by the County/City to move additional poles or structures in order to facilitate the operation of construction equipment unless it is determined by the Engineer that such poles or structure constitute a hazard to the public or are extraordinarily dangerous to the Contractor's operations. The Contractor is responsible for verifying utility requirements with the utility.

TUSCOLA COUNTY ROAD COMMISSION

NOTICE TO BIDDERS

COORDINATION CLAUSE

CON:SGI

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10-23-23

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 MDOT, 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 of 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 adjustments will be allowed due to delay or failure of others to complete work as scheduled due to coordination of work.

TUSCOLA COUNTY ROAD COMMISSION

SPECIAL PROVISION
FOR
MACHINE GRADING, MODIFIED

CON:SGI 205

1 of 2

10-29-23

a. Description. Machine Grading, Modified shall be in accordance with section 205 of the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction, except as outlined in this Special Provision. The work of Machine Grading, Modified shall consist of stripping, salvaging and stockpiling topsoil, all excavation, the utilization of all suitable material in constructing the adjacent fills and the furnishing, hauling, and placing of borrow and grading to achieve the typical cross sections shown on the plans and for the proposed intersections, driveway approaches, and approach replacements as shown on the plans.

Additional items included with the Pay Item of Machine Grading, Modified include the removal and disposal of trees and stumps less than three inches in diameter, removal of hedges, shrubs, and bushes. Removal of abandoned existing telephone facilities within the subgrade that are required are included in Machine Grading, Modified.

The Contractor shall locate, protect, and preserve all drainage structures, water shutoffs, gate valves, air relief valves, and blow off valves located within limits of the proposed Machine Grading, Modified. This work shall also be included with payment for Machine Grading, Modified.

b. Materials. All materials shall be in accordance with section 902 and subsection 205.02 of the MDOT 2020 Standard Specifications for Construction.

c. Construction Methods. Machine Grading, Modified shall include all necessary excavation, trenching, scarifying, plowing, disking, moving, hauling, shaping and compacting the earth to develop the cross section shown on the plans. Where undercuts below bottom of subbase for the purpose of removing additional objectionable material is ordered by the Engineer, the item of Subgrade Undercutting will apply.

The roadbed shall be finished to grade with a blade grader or equivalent equipment. All intersections, approaches, entrances, and driveways shall be graded as shown or as directed.

All items included under Machine Grading, Modified shall be constructed in accordance with section 205 of the MDOT 2020 Standard Specifications for Construction.

The disposal of surplus and unsuitable material shall be in accordance with subsection 205.03.P of the MDOT 2020 Standard Specifications for Construction. Disposal of surplus and unsuitable material will not be paid for separately, but shall be considered included with payment for Machine Grading, Modified.

Existing topsoil shall be salvaged within this project. Payment shall be included with this special provision.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item

Pay Unit

Machine Grading, Modified.....Station

Machine Grading, Modified will be measured in place by the 100 foot station as measured along the main road centerline where work is to be performed which shall include both sides of the road from right-of-way or easement to right-of-way or easement which shall be payment in full for all work specified herein.

Work at intersections will not be paid for separately, but shall be considered included with payment for **Machine Grading, Modified** as measured along the main road centerline.

TUSCOLA COUNTY ROAD COMMISSION

SPECIAL PROVISION
FOR
AGGREGATE BASE, MODIFIED

CON:SGI 302

1 of 1

10-29-23

a. Description. This work shall consist of placing and compacting an aggregate base course on a prepared subbase.

b. Materials. The material shall meet the gradation requirements of the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction, section 902, for 21AA aggregate, except all material shall be 100% crushed limestone.

c. Construction. Once the hot mix asphalt (HMA) surface is removed, the existing aggregate should be confirmed to be compacted to 98% of the maximum unit weight at a moisture content no greater than optimum for aggregate base under HMA. The new aggregate material shall be placed and compacted in accordance with the MDOT 2020 Standard Specifications for Construction, subsection 302.03 to a height to bring the approaches back to correct grade to receive the HMA layers.

d. Measurement and Payment. Aggregate Base, LM, Modified will be measured by the Cubic Yard. Depth measurements will be made in accordance with the following intervals and accuracy.

Random depth measurements will be taken at intervals not to exceed 100 lineal feet. Measured depth may be 1/2-inch less than specified provided that the average of all measurements taken at regular intervals shall be equal to or greater than the specified thickness.

Locations of the depth measurements will be as specified by the Engineer or their representative. Sections found deficient in the depth shall be corrected by the Contractor using methods approved by the Engineer or their representative.

The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	Pay Unit
Aggregate Base, _ inch, Modified	Square Yard
Aggregate Base, LM, Modified.....	Cubic Yard

Aggregate Base, _ inch, Modified will be measured in place by the square yard.

The maximum pay width will be as shown on the plans.

Aggregate Base, LM, Modified will be measured in place by the cubic yard.

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 calendar 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: _____

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 ($\geq 28\%$ 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
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
**QUALITY CONTROL AND ACCEPTANCE OF PORTLAND CEMENT CONCRETE
(FOR LOCAL AGENCY PROJECTS ONLY)**

CFS:JFS

1 of 21

APPR:TES:DBP:06-14-19
FHWA:APPR:06-14-19

a. Description. The Contractor must administer quality control (QC) and the Department will administer quality assurance (QA) procedures that will be used for acceptance of and payment for all Portland cement concrete (PCC) for the project. Except as explicitly modified by this special provision, all materials, test methods, and PCC mixture requirements of the standard specifications and the contract apply.

Do not place concrete until the Engineer's daily startup testing verifies that the fresh concrete properties have been met, in accordance with subsection d.2 of this special provision.

Provide the Engineer a minimum 24 hours notification prior to each concrete placement.

1. Terminology.

Air Content of Fresh Concrete. The recorded total air content of fresh concrete sampled and tested according to this special provision.

Air Content Test Results. The recorded air content of fresh concrete corresponding to the strength test specimens that were molded for acceptance.

Alkali-Silica Reactivity (ASR). A chemical reaction which occurs over time within concrete between high alkaline cement paste and reactive forms of silica found in some aggregates. In the presence of moisture, an expansive ASR gel is formed which can exert pressure within the concrete, causing random cracking and premature deterioration of the concrete. See subsection c.5.A of this special provision.

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

Concrete Mix Design. The process, by which the concrete mixture performance characteristics are defined, based on selected materials, performance requirements, environmental exposure considerations, placement methods, and other factors that control the plastic and hardened properties of the concrete in efforts to produce an economical and durable product.

Job Mix Formula (JMF). The actual batch quantities (mixture proportions) of each constituent included in the concrete mixture, based on adjustments to the target weights attained from the mix design process, necessary to optimize the concrete mixture properties.

Pay Factor (PF). The factor that is determined according to subsections d.3 of this special provision, used to calculate the price adjustment for a discrete quantity of concrete relative

to its respective level of quality. Pay factor will not exceed 1.00. Therefore, there will never be a positive pay adjustment.

Price Adjustment (ADJ). The price adjustment applied to the quantity of concrete represented by the respective quality index analysis described in subsections d.3 of this special provision.

Production Lot. A discrete cubic yard quantity of concrete containing the same JMF and used for the same application, as described in subsection d.2 of this special provision.

Quality Assurance (QA). Activities administered by the Engineer dealing with acceptance of the product, including, but not limited to, materials selection, sampling, testing, construction inspection, and review of Contractor QC documentation. All concrete QA sampling and testing will be administered by the Department. Department administered QA is described in section d of this special provision.

Quality Control (QC). All activities administered by the Contractor to monitor, assess, and adjust production and placement processes to ensure the final product will meet the specified levels of quality, including, but not limited to, training, materials selection, sampling, testing, project oversight and documentation. Contractor administered QC is described in section c of this special provision.

QC Action Limits. A range of values established by the Contractor in the QC plan that, if exceeded, requires that corrective action be taken by the Contractor to restore the continuity and uniformity of the mixture and methods in conformance with specification requirements. The QC action limits must not exceed the QC suspension limits.

QC Plan. The project-specific plan developed by the Contractor describing, in detail, all aspects of production and construction for the project to ensure consistent control of quality to meet specification requirements.

QC Plan Administrator. An employee of, or consultant engaged by the Contractor, responsible for developing and overseeing all aspects of QC for the project. This includes, but is not limited to preparing the QC plan, managing the Contractor QC personnel, communicating routinely with the production personnel to ensure quality, initiating corrective action and suspending operations when the process is found to be producing non-conforming materials, and preparing and submitting all necessary QC documentation to the Engineer within the specified time period.

QC Suspension Limits. A range of values defined in Table 1 that, if exceeded on a single QC test, requires that the Contractor suspend operations and determine, correct, and document the deficiencies before resuming production. The QC suspension limit must not exceed specification requirement thresholds.

Sample. A representative quantity of concrete taken during production which is used to measure the quality characteristics for the concrete.

Sampling Rate. The number of times the fresh concrete is sampled, as described in subsection d.2 of this special provision.

Small Incidental Quantity. A single day's placement of less than 20 cubic yards of concrete used for non-structural or non-pavement related applications, including, but not limited to:

curb and gutter, sidewalks and sidewalk ramps (excluding driveways and driveway ramps), installing sign or fence posts, guard rail or cable rail foundations (excluding end anchorage foundations), or other contract items where the small quantity of concrete is not paid for separately, as approved by the Engineer. Requirements for small incidental quantity consideration are described in subsections c.5.G, d.2.B and d.3 of this special provision. The corresponding weekly QA test results must meet specification limits defined in Table 3.

Specification Limits. The threshold values placed on a quality characteristic used to evaluate the quality of the material.

Strength Sample Test Result. The average of the two companion 28-day compressive strength test specimens taken from the same sample of concrete is considered a strength sample test result.

Strength Test Specimen. A strength test specimen is an individual 6-inch by 12-inch strength test cylinder or 4-inch by 8-inch strength test cylinder molded and cured according to *AASHTO T23/ASTM C 31* and tested according to *AASHTO T22/ASTM C 39*. All respective QC or QA strength test specimens must be the same nominal size. Strength test specimen cylinder size of 4-inch by 8-inch is permitted only if the nominal maximum coarse aggregate particle size, as specified for the coarse aggregate in the concrete mixture, is 1-inch, or less.

Sublot. A portion of a production lot, represented by a complete set of QA tests, as described in subsection d.2.A of this special provision. The Engineer and the Contractor may agree to reduce the typical subplot size based on project staging or other project conditions.

Supplementary Cementitious Materials (SCM). A mineral admixture (slag cement, fly ash) used to replace a portion of the Portland cement, either individually or as a blended cement, in the concrete mixture. SCM requirements are described in subsection c.5 of this special provision.

b. Materials. Mixture requirements must be in accordance with the contract.

c. Contractor Administered Quality Control (QC).

1. Contractor Quality Control Plan (QC plan). Prepare, implement, and maintain a QC plan specific to the project for concrete that will provide quality oversight for production, testing, and control of construction processes. The QC plan must be in conformance with the contract and must identify all procedures used to control production and placement including when to initiate corrective action necessary to maintain the quality and uniformity of the work.

Develop concrete mix designs and JMFs, as specified, and conduct QC sampling, testing, and inspection during all phases of the concrete work at the minimum frequency, or at an increased frequency sufficient to ensure that the work conforms to specification requirements.

Project-specific items required in the QC plan include (where applicable), but are not limited to the following:

A. Organization chart.

- B. QC Plan Administrator and contact information.
- C. The name(s) and credentials of the QC staff.
- D. Methods for interaction between production and QC personnel to engage timely corrective action, including suspension of work.
- E. Coordination of activities.
- F. Documentation, procedures, and submittals.
- G. Project and plant specifics.
- H. Concrete production facilities inspections and certifications.
- I. Current testing equipment calibration documentation including calibration factor.
- J. Testing and initial field curing facilities for QC and QA strength test specimens (AASHTO T23/ASTM C 31).
- K. Stockpile management plan.
- L. Corrective action plan.
- M. Mixing time and transportation, including time from batching to completion of delivery and batch placement rate (batches per hour), along with the manufacturer's documentation relative to the batching equipment's capabilities in terms of maximum mixing capacity and minimum mixing time (*ASTM C 94*).
- N. Placement and consolidation methods including monitoring of vibration, depth checks, and verification of pavement dowel bar alignment.
- O. Process for monitoring stability of air content of fresh concrete during concrete production and placement.
- P. Hot and cold weather protection considerations and methods.
- Q. Control charts with action and suspension limits.
- R. Verification for non-deleterious alkali-silica reactivity (see subsection c.5.A of this special provision).
- S. Mix design and JMFs.
- T. Proposed production lot size and location for use of each JMF on the project.
- U. The frequency of sampling, testing, and yield verification.
- V. Handling, protection, initial curing, and transporting of strength test specimens (*AASHTO T23/ASTM C31*).

- W. Methods to monitor construction equipment loading and open-to-traffic strengths.
- X. Finishing and curing procedure.
- Y. Ride quality control.
- Z. List of QC records to be submitted to the Engineer in accordance with subsection c.2 of this special provision.

Submit the QC plan, for the appropriate items of work, to the Engineer for review a minimum of 10 working days before the start of related work. The Engineer will notify the Contractor of any objections relative to the content of the QC plan within 5 working days of receipt of the QC plan. Do not begin concrete placement before acceptance of the QC plan by the Engineer. If the approved QC plan fails to provide acceptable work, or acceptable control of the work, the Engineer may require the Contractor to revise the QC plan. Revisions to the QC plan must be approved by the Engineer prior to resuming work.

2. QC Records. Maintain complete records of all QC tests and inspections. Document what action was taken to correct deficiencies. Include sufficient information to allow the test results to be correlated with the items of work represented.

Furnish one copy of all QC records, including test reports for the fresh concrete placement, to the Engineer within 24 hours after the date covered by the record in a format acceptable to the Engineer. The Engineer will withhold acceptance of the concrete for failure to provide properly documented and timely QC records and reports.

If the Engineer is performing QA sampling and testing at the same time the Contractor is performing QC sampling and testing, all associated QC records must include the appropriate production lot identification number that correlates with the Department's QA production lot identification number.

3. Personnel Requirements. The QC Plan Administrator must have full authority and responsibility to take all actions necessary for the successful implementation of the QC plan, including but not limited to, the following:

A. Monitoring and utilizing QC tests, control charts, and other QC practices to ensure that delivered materials and proportioning meets specification requirements.

B. Monitoring materials shipped to the project, prior to their use, to ensure their continued compatibility toward producing consistent quality.

C. Periodically inspecting all equipment utilized in transporting, proportioning, mixing, placing, consolidating, finishing, and curing to ensure proper operation.

D. Monitoring materials stockpile management, concrete batching, mixing, transporting, placement, consolidation, finishing, and curing to ensure conformance with specification requirements.

E. Maintaining and submitting all QC records and reports.

F. Directing the necessary corrective action to ensure continual conformance within

the QC action limits.

G. Suspending production for the project when suspension limits are exceeded.

H. Conducting or monitoring adjustments to the JMF.

Individuals performing QC tests must demonstrate that they are proficient and capable of sampling and testing concrete or aggregate, where applicable, in accordance with the associated test procedures and Department requirements prior to commencement of related work. Any adjustments to the JMF must be made by a certified concrete technician (Michigan Concrete Association (MCA) Michigan Level II).

4. QC Laboratory Requirements. Laboratories, including field laboratories and all associated testing equipment that prepare concrete mixes or perform QC testing, must demonstrate to the Engineer that they are equipped, staffed, calibrated, and managed so as to be capable of batching, and testing PCC in accordance with the applicable test methods and procedures. Mix designs and their accompanying JMFs must include a statement, signed by a certified concrete technician (MCA Michigan Level II), that all applicable standard test methods have been followed in verifying the mix design and JMF.

5. Mix Design and Documentation. Design concrete mixtures meeting the requirements specified in Table 1. Provide the grade of concrete for the section number reference application specified in Table 1, or as specified in the contract. Request variance in writing when proposing a mix design that exhibits temperature, slump or air content other than those specified. Include the proposed mix design, JMF, and associated trial batch verification test data. Do not use a grade of concrete with a lower specification limit (LSL) 28-day compressive strength greater than what is designated for the application.

Blended cement meeting the requirements of *ASTM C 595 Type II* is permitted.

Ensure supplementary cementitious materials are from an MDOT Approved Manufacturer. Slag cement must meet the requirements of subsection 901.06 of the Standard Specifications for Construction. Fly ash must meet the requirements of subsection 901.07 of the Standard Specifications for Construction.

Secure prior approval from the Engineer to use concrete intended for early opening to traffic to facilitate driveway gaps or other features necessary for required local access.

Unless otherwise specified in the contract, set accelerating admixtures are prohibited.

Optimized aggregate gradation is required for high performance concrete and concrete mixtures that are placed using a pump. Concrete mixtures for tremie and drilled shaft applications do not require optimized aggregate gradation. The physical requirements for coarse and intermediate aggregates specified in subsection 902.03.C of the Standard Specifications for Construction apply to high performance concrete pavement mixtures. The physical requirements for aggregates used in concrete mixtures for all other applications will be according to the contract.

Unless otherwise specified in the contract, provide either concrete Grade P1 or Grade D for bridge approach slab applications.

Unless otherwise specified in the contract, do not exceed 40 percent replacement of the Portland cement in the concrete mixture with a supplementary cementitious material. Do not exceed 40 percent total replacement of the Portland cement if more than one supplementary cementitious material is used in the concrete mixture.

Use the combined weight of all cementitious materials to determine compliance with the maximum water-cementitious ratio and cementitious material content requirements specified in Table 1.

For night casting, where applicable, a water-reducing admixture may be used in lieu of a water-reducing and retarding admixture, provided the concrete can be placed and finished in the sequence specified on the plans prior to initial set, is not subjected to residual vibration, or is not within the areas influenced by dead load deflections as a result of adjacent concrete placement operations. When the maximum air temperature is not forecast to exceed 60 degrees F for the day, the Contractor may use a water-reducing admixture or a water-reducing retarding admixture.

Table 1: Minimum Mix Design Requirements for Concrete

Mix Design Parameter	Grade of Concrete																												
	P1M (a,b,e)	P1 (a,b)	D,DM (a,b,e)	T	S1 (a)	S2,S2M (a,b,e)	S3/P2 (a)																						
Lower Specification Limit (LSL) (28-day compressive, psi)	3500	3500	4500	3500	4000	3500	3000																						
Rejection Limit for an Individual Strength Sample Test Result	3000	3000	4000	3000	3500	3000	2500																						
Maximum Water/Cementitious Ratio (lb/lb) (c)	0.45																												
Cementitious Material Content (lb/yd ³) (d)	470-564	517-611	517-658	517-611	517-611	517-611	489-517																						
Air Content (percent) (f)	5.5-8.5																												
Slump (inch) (max.)	(g)																												
Section Number Reference (h)	602, 603	602, 603, 801, 802, 803, 810	706, 711, 712	706, 718	705	401, 706, 712, 713, 718, 801, 802, 803, 810, 819	402, 403, 602, 803, 804, 806, 808, 810, 813, 814																						
<p>a. If the local average minimum temperature in the next 10 consecutive days is forecast to be below 40 degrees F, submit a revised QC plan for the Engineer's approval, addressing in detail changes in materials, concrete batching and mixing processes, construction methods, curing, and protection of the in situ concrete to ensure that the necessary quality characteristics of the hardened concrete product will not be compromised as a result of the cold weather. The revised QC plan must be approved by the Engineer prior to cold weather concrete placement. Do not remove supplementary cementitious material from the concrete mixture.</p> <p>b. Use aggregates from only geologically natural sources for pavement, shoulder, miscellaneous pavement (including ramps), concrete pavement overlay, bridge approach slab, structural concrete, drilled shaft, bridge railing, and bridge sidewalk applications.</p> <p>c. Use admixtures as listed in the Qualified Products Lists to reduce mixing water. Ensure concrete in concrete diaphragms contains a water-reducing admixture, or a water-reducing retarding admixture.</p> <p>d. Type III cement is not permitted.</p> <p>e. For grades of concrete requiring optimized gradation, aggregates must meet the physical requirements specified in subsection 902.03.C of the Standard Specifications for Construction.</p> <p>f. For action, suspension, and specification limits, see Tables 2 and 3, where applicable.</p> <p>g. The maximum slump for Grades P1, P1M, and P2 concrete is 3 inches or as documented on the approved JMF. All other grades of concrete will be according to Table 701-1 of the Standard Specifications for Construction.</p>																													
<p>h. Section Number Reference:</p> <table border="0"> <tr> <td>401 Pipe Culverts</td> <td>402 Storm Sewers</td> </tr> <tr> <td>403 Drainage Structures</td> <td>602 Concrete Pavement Construction</td> </tr> <tr> <td>603 Concrete Pavement Restoration</td> <td>705 Foundation Piling</td> </tr> <tr> <td>706 Structural Concrete Construction</td> <td>711 Bridge Railings</td> </tr> <tr> <td>712 Bridge Rehabilitation-Concrete</td> <td>713 Bridge Rehabilitation-Steel</td> </tr> <tr> <td>718 Drilled Shafts</td> <td>801 Concrete Driveways</td> </tr> <tr> <td>802 Concrete Curb, Gutter and Dividers</td> <td>803 Concrete Sidewalk, Sidewalk Ramps, and Steps</td> </tr> <tr> <td>804 Concrete Barriers and Glare Screens</td> <td>806 Shared Use Paths</td> </tr> <tr> <td>808 Fencing</td> <td>810 Permanent Traffic Signs and Supports</td> </tr> <tr> <td>813 Slope Protection</td> <td>814 Paved Ditches</td> </tr> <tr> <td>819 Electrical and Lighting</td> <td></td> </tr> </table>								401 Pipe Culverts	402 Storm Sewers	403 Drainage Structures	602 Concrete Pavement Construction	603 Concrete Pavement Restoration	705 Foundation Piling	706 Structural Concrete Construction	711 Bridge Railings	712 Bridge Rehabilitation-Concrete	713 Bridge Rehabilitation-Steel	718 Drilled Shafts	801 Concrete Driveways	802 Concrete Curb, Gutter and Dividers	803 Concrete Sidewalk, Sidewalk Ramps, and Steps	804 Concrete Barriers and Glare Screens	806 Shared Use Paths	808 Fencing	810 Permanent Traffic Signs and Supports	813 Slope Protection	814 Paved Ditches	819 Electrical and Lighting	
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A. Alkali-Silica Reactivity. Provide documentation to the Engineer that the concrete mixture does not present the potential for deleterious expansion caused by alkali-silica reactivity (ASR). Provide current ASR test results (valid for 2 years from completion of testing), for the fine aggregate that is proposed to be used in the concrete, from an independent testing laboratory proficient in ASR testing. The independent testing laboratory must certify in writing, including a signed statement that all testing was conducted in accordance with the designated standard test procedures, described herein. Test results must conform to the specified criterion for one of the following standard test methods. ASR testing is not required for concrete pavement repairs and temporary concrete pavements. Use the Rounding Method described in *ASTM E 29* when determining significant digits for reporting expansion test results.

(1) Method 1. *ASTM C 1293*. Concrete Prism Test. If the expansion of concrete prisms is not greater than 0.040 percent (rounded to the nearest 0.001 percent) after 1 year, the fine aggregate is considered non-deleterious to ASR and may be used in the JMF.

(2) Method 2. *ASTM C 1567*. Mortar Bar Test. If no previous test data are available for the fine aggregate that shows it is resistant to ASR using Method 1, above, replace 25 to 40 percent of the Portland cement in the concrete mixture with a supplementary cementitious material. A blended cement meeting the requirements of *ASTM C 595* containing the above Portland cement and supplementary cementitious material proportions may also be used.

Demonstrate the ability of the supplementary cementitious material to control the deleterious expansion caused by ASR by molding and testing mortar bars according to the standard test method described in *ASTM C 1567* using the mix proportions and constituent sources for both the aggregates and the cementitious materials that will be used for the project. Make at least three test specimens for each cementitious materials-aggregate combination. If the average of three mortar bars for a given cementitious materials-aggregate combination produces an expansion less than 0.10 percent (rounded to the nearest 0.01 percent) at 14 days of immersion, the JMF associated with that combination will be considered non-deleterious to ASR. If the average expansion is 0.10 percent (rounded to the nearest 0.01 percent) or greater, the JMF associated with that combination will be considered not sufficient to control the deleterious expansion caused by ASR and the JMF will be rejected.

(3) Method 3. *ASTM C 1260*. Mortar Bar Test. If the expansion of the mortar bars is less than 0.10 percent (rounded to the nearest 0.01 percent) at 14 days of immersion, the fine aggregate is considered non-deleterious to ASR and may be used in the concrete without the need for ASR mitigation.

The Engineer will not approve the use of the JMF if the expansion exceeds the respective threshold limits for the respective ASTM test method used.

B. Contractor Provided Mixes. Provide mix design and accompanying JMFs using the methods of verification included in this special provision. Include sufficient information on constituent materials and admixtures along with trial batch verified physical properties of the fresh concrete, mix proportions per cubic yard for all constituents and compressive strength test results necessary to allow the Engineer to

fully evaluate the expected performance of the concrete mixture.

(1) Mix Documentation. Prepare mix designs for each grade of concrete required on the project. Submit JMF for each mix design, including all required documentation, to the Engineer for review 10 working days before the anticipated date of placement. The Engineer will notify the Contractor of any objections within 5 working days of receipt of the mix documentation. Number or otherwise identify each JMF and reference all accompanying documentation to this identification. Reference each JMF to the appropriate method of verification. Mix design and JMF submittals that do not include all required documentation will be considered incomplete and the Engineer will return them without review.

Mix documentation is valid for 2 years provided the material characteristics have not deviated beyond the requirements specified in the contract.

All mix designs and accompanying JMFs must be traceable to a laboratory meeting the requirements of this special provision.

Submit mix design and JMF on the MDOT Job Mix Formula (JMF) Concrete Field Communication form (MDOT Form Number 1976); include accompanying documentation. List the source of materials, bulk density (unit weight) of coarse aggregate (rodding procedure or shoveling procedure), absorption of aggregates, relative density (specific gravity) of aggregates, aggregate correction factors, batch weights, and project specific or historical laboratory test data. Include the recorded air content of fresh concrete using the same admixture and cementitious material sources to be used in the production of the concrete for the project. A JMF will be approved only if all of the minimum mix design requirements specified in the contract have been met.

(2) Job Mix Formula (JMF). Select proportions for concrete mixtures according to *ACI Standard 211.1*. The volume (oven-dry-rodded) of coarse aggregate per unit volume of concrete must be 65 percent, minimum.

Four methods of verification of proposed JMF are acceptable.

(a) Method 1. Trial Batches. Verification of JMF is based on trial batches with the same materials and proportions proposed for use on the project. Prepare at least one trial batch for each mix design in sufficient time before starting concrete placement to allow for review according to subsection c.5.B.(1) of this special provision. Provide the results of temperature, slump, density (unit weight), air content of fresh concrete, 28-day compressive strength, and age of concrete at the time of strength testing, for a minimum of three independent samples. All samples may be taken from a single trial batch for a mix design provided the trial batch is at least four cubic yards in volume. For JMF trial batch verification purposes only, 7-day compressive strength test results which report at least 70 percent of the specified 28-day lower specification limit (LSL) will be sufficient documentation in lieu of 28-day compressive strengths. The average of at least two strength test specimens represents one compressive strength sample test result for each independent sample. Provide the necessary ASR documentation as described in subsection c.5.A of this special provision.

(b) Method 2. Same Mix. Verification of JMF is based on the concrete producer's experience with the same mix design, JMF, and the same materials. Provide the results of temperature, slump, density (unit weight), air content of fresh concrete, 28-day compressive strength, and age of concrete at the time of strength testing, for a minimum of three independent samples. The average of at least two strength test specimens represents one compressive strength sample test result for each independent sample. Do not substitute material types or sources, including admixtures or cementitious materials, nor change mix proportions in the JMF. Provide the necessary ASR documentation as described in subsection c.5.A of this special provision.

(c) Method 3. Similar Mix. Verification of JMF is based on requirements described in Method 2, in subsection c.5.B.(2).(b) of this special provision. Substitution of coarse aggregate source is permitted if the new source is of the same geologic type as the original aggregate, and conforms to the specification requirements for the application. Substitution of fine aggregate is permitted only if the new source has been tested for ASR. Provide the necessary ASR documentation as described in subsection c.5.A of this special provision.

Provide the supporting laboratory trial batch documentation and accompanying calculations showing how the mix proportions in the JMF were adjusted, based on the documented differences in relative density (specific gravity), bulk density (unit weight) and absorption of the substituted aggregate sources, to produce a theoretical yield of 100 percent and the required fresh concrete properties.

(d) Method 4. Annual Verification. At the Engineer's option, verification may be accepted annually for a concrete producer rather than on a project basis provided the sources and proportions of the constituent materials, including cementitious materials and source and types admixtures, do not change. If the project is the continuation of work in progress during the previous construction season and written certification is submitted to the Engineer that materials from the same source and with the same mixture properties are to be used, the Engineer may waive the requirement for annual renewal verification of the JMF for the project. Provide the necessary ASR documentation as described in subsection c.5.A of this special provision.

C. Department Provided Mixes. Unless otherwise specified in the contract or approved by the Engineer, the Engineer will provide the concrete JMF for the following types of concrete regardless of the total quantity for the project.

- (1) Structural concrete patching mixtures, mortar and grout.
- (2) Bridge deck overlay concrete mixtures.
- (3) Project-specific concrete mixtures and grades not defined in Table 1.

Provide all other mix designs and accompanying JMF's according to subsection c.5.B of this special provision.

The ASR documentation for the fine aggregate described in subsection c.5.A of this special provision must accompany the Contractor's request for the concrete JMF.

D. Changes in Materials and Proportions. Any changing from one approved JMF to another for the same grade of concrete must have prior approval by the Engineer.

Prior to batching, verify that the proposed JMF changes will not affect the properties of the fresh concrete (slump, temperature, air content, density (unit weight), workability), nor result in deleterious mortar bar expansion as a result of ASR, as described in subsection c.5.A of this special provision.

Record all changes to JMF in the QC records along with the rationale for the change.

E. QC Sampling and Testing. Conduct startup sampling and testing for temperature, slump, density (unit weight), and air content on the first load. Do not place concrete until testing verifies that the fresh concrete properties have not exceeded the QC action and suspension limit thresholds specified in Table 2 and the testing correlation requirements of subsection d.1.B of this special provision have been met. Continue testing subsequent loads as described in the QC plan, for each grade of concrete delivered to the work site each day. The QC sampling and testing must be random and independent from the Agencies QA sampling and testing.

Provide the curing facilities in accordance with subsection d.2.C of this special provision prior to start of concrete production.

Perform QC sampling and testing for air content of fresh concrete that is either slipformed or pumped, as described in the QC plan. Sample and test a representative haul unit of concrete immediately after its discharge but before the slipform paver or pump hopper, where applicable. Sample and test the concrete representing the same haul unit, again, after the slipform paver or after discharge from the pump (without interruption or alteration of the pumping operation), where applicable. If the difference in measured air content between the two test locations for the same concrete is greater than 1.5 percent air by volume of concrete, suspend operations and administer corrective action. Resume concrete placement only after taking the necessary corrective action to reduce the loss in air content of fresh concrete between the two test locations, as approved by the Engineer. Document the corrective action to be taken in the QC records and make the necessary changes to the QC plan, where applicable.

Concrete exceeding the maximum specification limits for slump or temperature must be rejected regardless of the total mixing time at the time of arrival to the project.

The Engineer may require the Contractor to administer additional QC sampling and testing if the Engineer determines the Contractor's current QC sampling and testing methodology is shown to be insufficient to ensure continual control of the quality of the concrete.

Take the appropriate corrective action, as described in the QC plan, when QC testing shows the QC action limits for any quality characteristic are exceeded. Suspend production if any of the QC suspension limits are exceeded or if the corrective action is not sufficient to restore the quality to acceptable levels.

Resume production only after making all necessary adjustments to bring the mixture into conformance with all applicable specifications and receiving approval to resume work

from the Engineer. Document these adjustments in the QC records.

Table 2: QC Action and Suspension Limits

Quality Characteristic	Action Limits	Suspension Limits
Air Content (percent)	See Note Below	< 5.0 or > 9.0
Air Content Loss (percent)	As Defined in the Contractor QC plan	Greater than 1.5
Conc. Temp. (Deg. F)		< 45 or > 90 at time of placement
Slump (max.) (inch)		See Table 1, footnote (g)
Density (unit weight)		N/A
Note: Action limits must be defined in the Contractor QC plan and cannot be < 5.5 or > 8.5. Suspend work if air content is < 5.0 or > 9.0 percent after pump or paver, regardless of the air content loss.		

F. Work Progress Test Specimens. Determine the strength of concrete for opening to construction traffic or regular traffic, for removing shoring and forms, or for similar purposes in accordance with subsections 104.11, 601.03.H and 701.03.D of the Standard Specifications for Construction, and as approved by the Engineer. Cure work progress test specimens in the same manner as the in-situ concrete. Allow the Engineer to witness testing of work progress test specimens.

The maturity method may be used to determine the in-place, opening-to-traffic flexural strength, provided the necessary preliminary flexural strength versus time-temperature factor correlation, using the same materials and JMF, is established according to Department procedures and approved by the Engineer before placing the concrete.

G. Reduced QC for Small Incidental Quantities. If approved by the Engineer, reduced levels of on-site QC testing for concrete may be considered for small incidental quantities defined in subsection a.1 of this special provision.

Unless approved by the Engineer, multiple small incidental quantities, including ones that are consecutively placed throughout the project on the same day, are not eligible for reduced QC consideration if the total plan quantity of concrete for the item exceeds 100 cubic yards in volume. Include details for reduced QC testing and oversight in the approved QC plan, and in accordance with following:

- (1) The small incidental quantity of concrete will be limited to a single day's concrete placement of a maximum 20 cubic yards in volume.
- (2) The small incidental quantity of concrete is not an integral part of a structural load bearing element.
- (3) The Engineer received written certification from the Contractor that the concrete supplier has a current QC plan in place and available for review upon request by the Engineer.
- (4) The concrete supplier employs a certified concrete technician (MCA Michigan Level II) available at the plant or on call during concrete placement to validate and authorize modifications to the concrete JMF, as necessary.
- (5) Prior to the first concreting operation, concrete representing the JMF for the small incidental quantity has been sampled and tested by a certified concrete technician (MCA Michigan Level I or II) to verify that, historically, the JMF produced a

concrete mixture meeting the minimum requirements for density (unit weight), slump, air content, and strength. Annual verification may be acceptable provided there are no changes to the material types or sources, including the cementitious materials and admixtures.

(6) The Engineer verified that the temperature, slump, and air content conform to specification requirements at the start of the day's concreting operation associated with the small incidental quantity.

(7) The Engineer is notified and provided sufficient opportunity to witness concrete placement.

d. Department Administered Quality Assurance (Acceptance).

1. Department Quality Assurance Plan (QA plan). The Engineer will be responsible for administering the quality-based acceptance and will institute any actions necessary toward its successful implementation.

Acceptance of concrete pavement repair mixtures and concrete mixtures not included in Table 1 will be in accordance with the contract.

The Engineer will develop and follow a QA plan. The Engineer will provide the QA plan to the QC Plan Administrator a minimum of 5 working days prior to the pre-production meeting. The QA plan will be reviewed at the pre-production meeting and any proposed changes will be documented.

The nominal QA strength test specimen size, defined in subsection a.1 of this special provision will be noted in the QA plan.

A. Personnel Requirements. The personnel responsible for field inspection and for obtaining QA samples will possess the required qualifications to collect QA samples. Sampling will be performed by a certified concrete technician (MCA Michigan Level I or II) or (MCAT) certified aggregate technician, where applicable.

B. Testing Correlation. Prior to initial concrete placement, the testing personnel for both the Engineer's QA and Contractor's QC will use the equipment they have assigned to the project to conduct side by side correlation testing of the same concrete used on the project to verify correlation of both the Department's and the Contractor's test results for temperature and air content of fresh concrete. Additional side by side correlation testing will be conducted whenever there is a change in QC or QA equipment and/or testing personnel for the project, or as directed by the Engineer. The temperature measuring devices used for QC and QA must correlate with each other within 2 degrees F. If the air content results of the side by side tests conducted by the QC and QA testers and equipment differ by more than 0.8 percent air by volume of concrete, a referee air content test of fresh concrete must be conducted by a third party, designated by the Engineer but independent of the project, prior to commencement or continuation of concrete placement in efforts to resolve issues associated with non-correlation.

C. Laboratory Facilities. The testing laboratory with responsibility for acceptance testing on this project is the Department testing laboratory, or a qualified facility under the authority of the Engineer.

2. QA Sampling and Testing. The Engineer will verify the Contractor's daily startup sampling and testing of temperature, slump, and air content of fresh concrete on the first load; conduct QA sampling and testing; monitor Contractor adherence to the QC plan; and inspect field placed materials in such a manner as to ensure that all concrete for the project is represented. The testing correlation requirements of subsection d.1.B of this special provision must be met prior to concrete placement.

The following *ASTM* test methods will apply. The Department's established procedures for sampling and testing are acceptable alternatives.

C 31 Practice for Making and Curing Concrete Test Specimens in the Field

C 39 Test Method for Compressive Strength of Cylindrical Concrete Specimens

C 78 Test Method for Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)

C 138 Test Method for Density (Unit Weight), Yield and Air Content (Gravimetric) of Concrete

C 143 Test Method for Slump of Hydraulic-Cement Concrete

C 172 Practice for Sampling Freshly Mixed Concrete

C 173 Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

C 231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

C 293 Test Method for Flexural Strength of Concrete (Using Simple Beam with Center-Point Loading)

A. Lot Size and Make Up. A production lot will not include more than one grade of concrete, concrete of the same grade having different specified slump or air content, or concrete of the same grade having different mix designs, or JMFs. Lot size and makeup will be determined by the Engineer, based on site conditions. A production lot may consist of a single day's production, individual concrete structural elements (eg. footing, column, pier cap, deck, bridge approach slab), or any combination thereof, provided they are of the same JMF. Each production lot will be divided into sublots of approximately equal size, as determined by the Engineer. The minimum number of sublots will be one per production lot, with the maximum number of sublots based on the anticipated total quantity of concrete to be placed and site conditions. A minimum of one subplot will be required for each day of production.

B. Sampling. QA sampling and testing will be conducted by the Engineer during concrete placement. Where practical, the random number method (as described in the "Random Sampling for Quality Control/Quality Assurance Projects" section of the Materials Quality Assurance Procedures Manual) will be used to determine the sampling locations. The sampling rate will be determined by the Engineer, based on the anticipated total quantity of concrete to be placed and site conditions, with a minimum of one sampling for each day of production.

At the option of the Engineer, small incidental quantities as defined in subsection a.1 of this special provision may be accepted (visually inspected and noted on the Inspector's Daily Report) without daily 28-day compressive strength QA test specimens provided there is a current acceptable strength test history of the JMF for the project prior to placement of the small incidental quantity. One set of compressive strength QA test specimens will then be molded for each small incidental quantity JMF at least once per week during production, thereafter, as determined by the Engineer (note the test results or identification number for the corresponding weekly QA compressive strength test result on the Inspector's Daily Report for each small incidental quantity). Quality control testing and daily QA testing for temperature, slump, and air content of fresh concrete are still required. Reduced QC for small incidental quantities, as described in subsection c.5.G of this special provision, may be considered.

The QA sampling rate and sample location will be based on cubic yard quantities.

Samples for acceptance will be taken at the point of discharge from the haul unit, at approximately the middle one-third of the load. Mix adjustments to the concrete contained within the haul unit selected for QA sampling and testing (beyond normal QC) will not be permitted prior to QA sampling and testing. QA sampling will be random and without prior notification.

The Engineer will perform QA sampling and testing for air content loss of fresh concrete that is either slipformed or pumped, (1) at least once during each day of production, (2) whenever the concrete pump is relocated, where applicable, or (3) whenever there is a significant change in the boom configuration or operation of the concrete pump, or there is a significant change in the characteristics of the paving operation during concrete placement. Concrete will be sampled from a representative haul unit immediately after its discharge but before the slipform paver or pump hopper, where applicable. The concrete representing the same haul unit will then be sampled and tested after the slipform paver or after discharge from the pump (without interruption or alteration of the pumping operation), where applicable. If the difference in measured air content between the two test locations for the same concrete is greater than 1.5 percent air by volume of concrete, the Engineer will issue a Notice of Non-Compliance with Contract Requirements (Form 1165), as described in subsection d.2.D of this special provision. The Contractor may resume concrete placement only after the necessary corrective action is taken to reduce the loss in air content of fresh concrete between the two test locations, as approved by the Engineer. Document the corrective action that was taken by the Contractor.

C. Testing. The location(s) within the project limits for QA testing of the fresh concrete and placement of curing facilities for initial curing of the 28-day compressive strength QA test cylinders will be determined by the Engineer in conformance with the following criteria:

(1) The elapsed time between obtaining the first and the final portion of the composite sample must not exceed 15 minutes.

(2) Testing for slump, temperature, and air content of fresh concrete must begin within 5 minutes after obtaining the final portion of the composite sample.

(3) Molding of the 28-day compressive strength QA test cylinders must begin within 15 minutes after obtaining the final portion of the composite sample.

(4) The concrete sample must be protected from the sun, wind, and other sources of rapid evaporation, and from contamination.

Two QA concrete strength test specimens per sample will be molded for 28-day compressive strength QA testing.

The Contractor will provide curing facilities equipped to ensure the proper environment for the Agencies QA concrete strength test specimens during initial cure. Each initial cure facility must provide ventilation or insulation, where applicable, to ensure the ambient temperature surrounding the specimens is maintained according to *AASHTO T23/ASTM C 31*. Failure by the Contractor to maintain the proper curing environment during initial cure will not be basis for rejection of samples or claims against the Department. Each initial curing facility must be capable of being locked, using an Department provided padlock. The Contractor will ensure that all initial curing facilities are accounted for at all time, and protected against theft and damage. The Contractor will place and secure each initial cure facility throughout the project limits in such a manner so as to minimize excessive transport of the test specimens prior to initial cure, as follows:

(5) Immediately after finishing molded specimens, the Engineer will move the QA concrete strength test specimens to the closest initial cure facility provided by the Contractor.

(6) Immediately after all QA concrete strength test specimens are placed into the cure facility and the proper initial curing conditions have been established, the Engineer will secure the facility using the Department provided padlock. Access to the QA concrete strength test specimens, thereafter, must be coordinated with the Engineer and will only be permitted in the presence of the Engineer.

(7) The Engineer will transport the QA concrete strength test specimens within 48 hours after molding, but not prior to 8 hours after final set of the concrete, from the initial curing facility to the Department's designated testing laboratory for final curing and strength testing. The specimens will be protected with a suitable cushioning material to prevent damage from jarring during transport. The total transportation time must not exceed 4 hours prior to commencement of final curing.

D. QA Stop Production Criteria. The Engineer will issue a Notice of Non-Compliance with Contract Requirements (Form 1165) and concrete production must stop when one or more of the following are observed.

(1) The QA testing shows that one or more of the suspension limits for quality characteristics defined in Table 2 are in non-compliance.

(2) The QC plan is not being followed.

(3) Segregation, excessive slumping of unsupported slipformed edges, or other notable changes in the fresh concrete properties is observed that may prevent proper placement, consolidation and finishing, or compromise the performance or long-term durability of the finished product.

(4) The required curing system is not being applied in a timely manner, as specified by the contract.

(5) If the measured air content loss between the two testing locations for the same concrete is greater than 1.5 percent air by volume of concrete as described in subsections c.5.E and d.2.B of this special provision.

(6) If the air content of fresh concrete is less than 5.0 or greater than 9.0 percent after pump or paver, regardless of the recorded QC or QA air content loss through the pump or paver.

The Engineer will issue a Notice to Resume Work (Form 1165) only after all necessary adjustments are made to restore conformance with all applicable specifications, and the appropriate documentation is made in the QC records.

E. QA Records. The Engineer will maintain a complete record of all QA tests and inspections. The records will contain, as a minimum, signed originals of all QA test results and raw data, random numbers used (where applicable) and resulting calculations. The QA test results will not be provided to the Contractor until the corresponding QC test results are received by the Engineer.

3. Quality Index Analysis. The Engineer's QA test results will be used to determine the pay factor (PF) and price adjustment (ADJ). The Contractor's QC test results will not be used for pay factor and price adjustment analysis. The Engineer will complete pay factor and price adjustment analysis within 7 working days after completion of all 28-day compressive strength testing for the representative production lot or quantity of concrete. The quality index parameter specification limits are defined in Table 3. Unless otherwise specified in the contract, concrete not conforming to the requirements specified in Table 3 is rejectable and subject to further evaluation. All values of PF and OLPF in these formulae are decimal, not percent. All values of PF and OLPF are rounded to two decimal places.

Price adjustment for 28-day compressive strength deficiencies will be based on test results for the corresponding weekly QA test specimens and the pay factor (PFs) calculated according to the formula defined in subsection d.3.A. The price adjustment (ADJ) = (PFs – 1)(Price).

Table 3: Quality Index Parameter Specification Limits

Quality Characteristic	Specification Limits
Air Content of Fresh Concrete (percent)	5.5 – 8.5
Rejection Limit (percent)	<5.0 or >9.0
Conc. Temp. (deg. F)	45 - 90 at time of placement
Slump (max.) (inch)	See Table 1, footnote (g)
28-day Compressive Strength (psi)	For LSL see Table 1
Rejection Limit - 28-day Compressive Strength	See Table 1

A. Pay Factor for 28-Day Compressive Strength (PFs).

$$PFs = \frac{\text{Tested Strength}}{\text{LSL}}$$

Where:

PFs = Pay Factor for 28-day compressive strength (not to exceed 1.00)

Tested Strength = QA 28-day compressive strength sample test result

LSL = Lower specification limit (see Table 1)

If the tested strength does not meet the rejection limit specified in Table 1, the Engineer will require additional evaluation as described in subsection d.4 of this special provision.

B. Pay Factor for Air Content of Fresh Concrete (PFac). The pay factor for air content of fresh concrete (PFac) will be according to Table 4.

Table 4: Air Content of Fresh Concrete Pay Factor (PFac)

Air Content of Fresh Concrete (percent)	Pay Factor (PFac)
5.5 – 8.5	1.00
5.0 – 5.4	0.50
Below 5.0	Rejection
8.6 – 9.0	0.75
Above 9.0	Rejection

If the air content of fresh concrete is below 5.0 or above 9.0 percent, the Engineer will elect to do one of the following.

(1) Require removal and replacement of the entire quantity of concrete represented by the test with new testing conducted on the replacement concrete and repeat the evaluation procedure.

(2) Allow submittal of a corrective action plan for the Engineer's approval. If the Engineer does not approve the plan for corrective action, subsection d.3.B.(1) of this special provision will be applied. All costs associated with plan submittal and corrective action under this subsection will be borne by the Contractor.

C. Overall Lot Pay Factor (OLPF). The following formulae are used to calculate the OLPF and ADJ. The OLPF will not exceed 1.00.

$$\text{OLPF} = (0.60 \times \text{PFs}) + (0.40 \times \text{PFac})$$

$$\text{ADJ} = (\text{OLPF} - 1)(\text{Price})$$

ADJ = Price adjustment per pay unit to be applied to the quantity represented by the QA test

Price = Base price established for the pay item

4. Evaluation of Rejectable Concrete. The Engineer will require additional evaluation to decide what further action may be warranted, as described below. Acceptance for air content of fresh concrete will be based on QA test results reported at the time of concrete placement.

If the Engineer determines that non-destructive testing (NDT) is appropriate, this work will be

done by the Contractor in the presence of the Engineer within 45 calendar days from concrete placement. All costs associated with this work will be borne by the Contractor. A complete set of non-destructive tests must be conducted (in accordance with the respective standard test method) at a minimum three randomly selected locations. If NDT is used to estimate the in-situ strength, a calibrated relationship between the project JMF under evaluation and the NDT apparatus must have been established prior to NDT testing according to its respective standard test method.

If the 28-day compressive strength QA test results show that the rejection limit (as specified in Table 1) has not been achieved, the quantity of concrete under evaluation will be rejected and the Engineer will require additional evaluation to decide what further action may be warranted.

Propose an evaluation plan and submit it to the Engineer for approval before proceeding. The results from NDT will be used only to decide what further action is required. This determination will be made by the Engineer, as follows:

A. For non-structural concrete. If no test result from non-destructive testing falls below the lower specification (LSL) 28-day compressive strength, the represented quantity of concrete under evaluation will remain in place and a pay factor for 28-day compressive strength (PFs) of 1.00 will be applied for overall lot pay factor (OLPF) and price adjustment (ADJ) determinations according to subsection d.3 of this special provision.

B. For structural concrete (including overhead sign foundations). If no test result from non-destructive testing falls below the lower specification limit 28-day compressive strength, the represented quantity of concrete under evaluation will remain in place and a pay factor for 28-day compressive strength (PFs) of 0.85 will be applied for overall lot pay factor (OLPF) and price adjustment (ADJ) determinations according to subsection d.3 of this special provision.

C. If one or more of the non-destructive test results fall below the lower specification limit (LSL) 28-day compressive strength, the Engineer may elect to do one of the following:

(1) Require removal and replacement of the entire rejected quantity of concrete, including new initial tests for pay factor (PF) determination and price adjustment conducted according to subsection d.3 of this special provision.

(2) Allow the Contractor to submit a plan for corrective action, for the Engineer's approval, to address the disposition of the rejected concrete. If the Engineer does not approve the plan for corrective action, subsection d.4.C.(1) of this special provision will be applied. All costs associated with plan submittal and corrective action under this subsection will be borne by the Contractor.

(3) Allow the in-situ quantity of concrete under evaluation to remain in place and a pay factor (PFs) of 0.50 will be applied for overall lot pay factor (OLPF) and price adjustment (ADJ) determinations according to subsection d.3 of this special provision.

e. Measurement and Payment. If a price adjustment is made for reasons included in this special provision, that adjustment will be made using the base price established for the specific item. If a contract unit price requires adjustment for other reasons not described in this special provision, the adjustments will be made using the unit price and the adjustments will be

cumulative.

Separate payment will not be made for providing, implementing, and maintaining an effective QC program. All costs associated with this work will be included in the applicable unit prices for the concrete items. Failure by the Contractor to maintain the proper curing environment during initial cure will not be basis for claim against the Department.

All costs associated with providing, locating, relocating, maintaining, and securing the adequate number of portable initial curing facilities for both the QC and QA strength test specimens will be included in the applicable unit prices for the concrete items. No additional payment will be permitted. The Contractor is responsible for damage, theft, subsequent replacement, and removal after completion of the work for each curing facility used on the project.

TUSCOLA COUNTY ROAD COMMISSION

SPECIAL PROVISION
FOR
STEEL PRESS-BRAKE-FORMED TUB GIRDER (PBFTG)

SGI:DPZ

1 OF 4

1/31/24

a. Description. Design, load rate, manufacture, and install steel press-brake-formed tub girders (PBFTG) in accordance with the plans, the Michigan Department of Transportation (MDOT) 2020 Standard Specifications for Construction, and as contained herein.

The PBFTG shall include bearing pads, sole plates, shear developers, & hardware as shown on the plans and as required.

b. Design. Certify that the design of the PBFTG is in accordance with AASHTO LRFD Bridge Design Specifications. The design live loading shall be MDOT's HL-93 Mod loading and must be indicated on the plans. The load rating shall pass for all Michigan legal loads and Unrestricted Class A for Overloads. As part of the certification, include the horizontal and vertical reactions at the bearing locations and design calculations. The design must be sealed by a Professional Engineer (PE) licensed in the State of Michigan, and checked and sealed by a PE.

c. Rating. Prior to manufacturing, perform load ratings of the PBFTG in accordance with the AASHTO Manual of Bridge Evaluation, the MDOT Bridge Analysis Guide, and the Michigan Structure Inventory and Appraisal Coding Guide. The following ratings should be calculated:

1. The Inventory Rating, National Bridge Inventory (NBI) Item 66
2. The Operating Rating, NBI Item 64
3. The Michigan Operating Rating, Department Item 64M
4. The Michigan Overload Class, Department Item 193

Perform the above Load Ratings using as-designed conditions and assuming a future wearing surface has been placed. Prior to manufacture, deliver to Department the following, in paper and *.pdf electronic format for each load rating case:

- Assumption Sheet - Any assumptions made in the analysis (material properties, section losses, etc.) shall be listed
- Program or Calculation Input and Output
- A completed Bridge Analysis Summary Form

After construction, review the load rating for as-constructed conditions. Perform the load ratings using as-constructed conditions and as-constructed with the future wearing surface in place. Deliver to Department the following, in paper and *.pdf electronic format for each load rating case:

- Assumption Sheet - Any assumptions made in the analysis (material properties, section losses, etc.) shall be listed.
- Program or Calculation Input and Output
- A completed Bridge Analysis Summary Form

All load ratings must be sealed by a licensed Professional Engineer registered in the State of Michigan and checked and sealed by a PE. The engineers performing the load rating analysis and reviewing the load rating analysis are required to have active MiBRIDGE user profiles and enter the load ratings into MiBRIDGE.

d. Shop Drawings. Furnish the Department with shop drawings of the PBFTG for approval. The shop drawings must be sealed by a Professional Engineer licensed in the State of Michigan. Do not begin fabrication until written approval of the shop drawings has been received from the Department. Submit shop drawings in accordance with subsections 707.03.A and 104.02 of the

MDOT 2020 Standard Specifications for Construction, except as modified herein:

1. Submit shop drawings in Adobe Portable Document Format (PDF) files.
2. Ensure shop drawings detail the following items:
 - a. Physical Dimensions
 - b. Structural Steel Dimensions
 - c. Bearing Pads
 - d. Structural Steel Material Properties
 - e. Method of Manufacture
 - f. Recommended Installation Procedures
 - g. Lifting and Erection Details
3. Submit shop drawings for the PBFTG to the Engineer for review and approval at least 21 calendar days prior to the start of fabrication. Allow a minimum of 5 working days for the Engineer to review and approve any revisions.

e. Materials. Provide all materials as shown on the plans and in accordance with the following subsections of the MDOT 2020 Standard Specifications for Construction including:

Structural Steel	906
Shear Connector Studs	906
Miscellaneous Metals	908
High Strength Steel Bolts, Nuts and Washers	906
Elastomeric Bearings.....	914

1. Structural Steel. Use AASHTO M270, ASTM A709 Grade 50 steel. All structural steel shall be hot-dipped galvanized, according to ASTM A123. In accordance with ASTM A709 and the AASHTO Design Specifications, the steel material used in the main girders, including all splice plates, shall be charpy v-notch tested for non-fracture critical components, zone 2. Structural steel material used to fabricate the bridge is required to be accepted based on "Fabrication Inspection" per subsection 3.06 of MDOT's Materials Quality Assurance Procedures Manual (MQAPM).
2. Shear Connectors. Conform to UNS G 1018. Weld shear studs to steel surfaces and perform preproduction and production tests as required in AASHTO/AWS D1.5. Shear connectors are to be installed prior to galvanization.
3. Galvanization. Coating weight, surface finish, appearance, and adhesion shall conform to requirements of ASTM A385 (Standard practice for Providing High Quality Zinc Coatings (Hot Dip)) and AASHTO M111 or AASHTO M232, as appropriate. Inspection and testing of hot-dip galvanized coatings shall follow the guidelines provided in the American Galvanizers Association publication "Inspection of Products Hot-dip Galvanized after Fabrication". Sampling, inspection, rejection and retesting for conformance with requirements shall be according to AASHTO M111 or AASHTO

M232 as applicable, with the target coating thickness of 152 microns (6 mils). Coating thickness shall be measured according to AASHTO M111, for magnetic thickness gage measurement and AASHTO M232 as appropriate.

All galvanized steel will be visually inspected for finish and appearance.

4. High Strength Bolts. Use A325 High Strength Bolts, nuts, and washers. Type 1 Galvanized bolts shall be used as described in AASHTO M164.

f. Fabrication. PBFTG shall be fabricated in accordance with the MDOT 2020 Standard Specifications for Construction, as shown on plans, and as specified herein.

1. **Galvanized Steel Press-Brake-Formed Steel Tub Girders & Misc. Steel Components:** Steel fabricator shall be certified per AISC Certified Bridge Fabricator – Simple (SBR). Source through the following manufacturer or approved equal: Valmont Industries, Inc. 28800 Ida St. Valley, NE 68064; 616-813-8514.
2. Shop Inspection and Prefabrication Meeting. Ensure shop inspection and prefabrication meeting requirements are in accordance with subsection 707.03.B of the MDOT 2020 Standard Specifications for Construction.
3. Concrete Forms. Use metal forms. Forms must meet the requirements of subsection 706.03.D of the MDOT 2020 Standard Specifications for Construction.
4. Any welding performed shall meet the requirements of AASHTO/AWS D1.5. No welding is allowed except where specifically shown on approved shop plans.
5. Provisions shall be made to ensure interior drainage of girders.
6. Handling. Handle the PBFTG by a method approved by the manufacturer and Engineer. Do not drill holes in the PBFTG for handling.
7. Repair of Hot-Dip Galvanizing. Surfaces with inadequate zinc thickness will be repaired using zinc-based solder in accordance to ASTM A780 (Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings) Section 4.2.1 and AASHTO M111. Any fins or slivers present after galvanizing will be removed and repaired ASTM A780 (Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings) Section 4.2.1 and AASHTO M111.

Surfaces of galvanized steel that are damaged after the galvanizing operation shall be repaired according to ASTM A780. Damage that occurs in the shop shall be repaired in the shop. Damage that occurs during transport or in the field shall be repaired in the field. Any drips or runs in the galvanizing will be removed by grinding to match the surrounding surface.

8. Product Marking. Clearly mark the interior of each PBFTG per sections 715.03.D.5 and 716.03.B.4 of the MDOT 2020 Standard Specifications for Construction.
9. Structural Steel Quality Assurance: Provide access for the Department for quality assurance inspection. Notify the Engineer a minimum of 2 weeks prior to start of fabrication. This inspection is not considered a substitute for the manufacturer's quality control requirements as stated herein.

g. Tolerances. All PBFTG must meet the tolerances specified by the MDOT 2020 Standard Specifications for Construction in addition to the tolerances listed below.

-Method		
Plasma/Ox	+/- 3/16" +/- 3/8"	Size Squareness
Laser	+/- 1/16"	Squareness
Drill	+/- 1/16"	Location
Shear	+/- 1/8" +/- 1/4"	Size Squareness
Press Brake	+/- 1 degree angle 1-2 bends +/- 1/8" from bend to next bend, up to 120" long +/- 3/16" on 120" - 600" long + 1/8" radius	
Camber	+ 3/8" up to 600" long + 3/8" + 1/8" for every 120" in excess of 600" long +/- 1 degree angle from square	

The department reserves the right to reject any beam that fails to meet visual inspection for straightness, twists, bends, etc. The Contractor/Manufacturer will bear all costs to provide a beam that passes all inspections.

i. Transportation, Handling, Erection, and Construction. Construct PBFTG in accordance with the MDOT 2020 Standard Specifications for Construction, as shown on plans, and as specified herein.

The Contractor is responsible for proper handling, lifting, storing, transporting and erection of all PBFTG so that they may be placed without damage.

j. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay items:

Pay Item	Pay Unit
Structural Steel, Furn and Fab, Special (Structure Number)	LSUM
Structural Steel, Erect, Special (Structure Number).....	LSUM

Structural Steel, Fun and Fab, Special and Structural Steel, Erect, Special shall include bearing pads, sole plates, shear developers, bolts, washers, welding, welding materials, and hardware as required.

The Contractor is responsible for ordering and obtaining position dowels in accordance with the details in the plans. Position dowels and installation are included in this pay item.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
SILANE TREATMENT FOR BRIDGE CONCRETE

STR:JAB

1 of 2

APPR:ARB:SCK:04-09-21

a. Description. This work consists of furnishing and application of spray-applied penetrating silane, including the preparation and cleaning of the concrete, to concrete parapets and beam fascias at locations and limits specified on the plans.

b. Materials. Deliver the silane sealer to the project in original, undamaged, and unopened containers with the manufacturer's label identifying the product and batch number. Use one of the following 100 percent silane materials:

1. Aquanil™ Plus 100, ChemMasters, Inc., Madison, OH
2. Baracade Silane 100C, The Euclid Chemical Company, Cleveland, OH
3. Certi-Vex® Penseal 244 100%, ChemMasters, Inc., Madison, OH
4. MasterProtect H 1000, BASF Construction Chemicals, LLC Building Systems, Shakopee, MN
5. Protectosil® BH-N, Evonik Degussa Corporation, Parsippany, NJ
6. Sikagard® 705L, Sika Corporation, Lyndhurst, NJ
7. SIL-ACT™ ATS-200, Advanced Chemical Technologies, Oklahoma City, OK

c. Construction. Perform this work in accordance with the plans, standard specifications, and this special provision. Follow the selected manufacturer's recommendations for surface preparation and application, except as modified by this special provision.

1. Surface Preparation. Ensure all concrete to be sealed is at least 28 days old. Ensure the surface to be sealed is dry, clean and free from all contamination including, but not limited to: old coatings, dirt, form release agents, oil, grease, laitance, loose material, and curing compounds. Abrasive blasting followed by oil-free compressed air cleaning is required. Water blasting or wire brushing is prohibited. Provide an airline for blowing prepared concrete surface clean with an in-line water trap and air free of oil and water as it leaves the air-line. Verify that the compressed air is free of moisture and oil contamination in accordance with the requirements of *ASTM D4285*. Conduct the test at least once per shift prior to the blowing operation. Ensure that the concrete surface profile (CSP) after abrasive blasting is a CSP 3 in accordance with the *International Concrete Repair Institute (ICRI) Guideline for Selecting and Specifying Concrete Surface Preparation for Sealers, Coatings, and Polymer Overlays, and Concrete Repair (Guideline No. 310.2R-2013)*.

When using light abrasive blasting to remove contaminants on concrete, be careful not to

remove excessive concrete material.

2. Application. Surfaces must dry for a minimum of 24 hours following rain or exposure to other sources of moisture before application of the silane sealant.

Do not apply the silane sealant when the ambient temperature or surface temperature are outside the range of 40 to 90 degrees Fahrenheit (F) or are forecasted to be outside that range within 12 hours after application.

Use low pressure airless spray equipment with a solvent resistant hose and gaskets. Apply silane sealant at a minimum rate of 1 gallon per 200 square feet of concrete surface. Do not apply silane sealant during inclement weather or when inclement weather is anticipated within 12 hours. Apply silane sealant in a single uniform application.

Do not dilute or alter silane sealant material.

Do not apply silane sealant if wind, rain, or other conditions prevent required application.

Protect all surrounding traffic, waterways, and structures from overspray and dripping.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	Pay Unit
Silane Treatment	Square Foot

Silane Treatment will be measured based on plan quantity. Payment includes furnishing, surface preparation, application, and cleanup of oversprayed areas. No compensation will be made to the Contractor for surplus materials.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
RIPRAP, SPECIAL

HYD:EJC

1 of 2

APPR:RWS:DMG:11-13-23

a. Description. This work consists of diverting stream flow, preparing channel grades, installing geotextile liner and furnishing and placing well-graded riprap on channel bottoms, side slopes, and adjacent to structures. Complete all work in accordance with the plans and the standard specifications.

b. Materials. Use sound durable rock for riprap that is quarried rock or waste mine rock, free from shale, spoil, and organic material, as well as seams, cracks, or other structural defects which may cause accelerated weathering. Ensure the rock is hard, angular, durable and resistant to weathering and water action, having 2.5 minimum bulk dry specific gravity and 2.5 percent maximum 24 hour soak absorption in accordance with *ASTM D6473*. The weight loss in 5 cycles by use of sulfate soundness testing must not exceed 10 percent in accordance with *ASTM D5240/D5240M*. The ratio of the greatest (axis A) to least (axis C) dimension must not exceed 3:1 for any individual rock for at least 80 percent of the material, as depicted in Figure 1 below. *ASTM D4992* provides guidance on evaluating and selecting rock from a source.

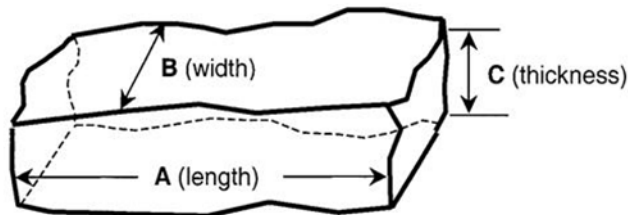


Figure 1: Riprap shape depicting A, B and C axis

Ensure the gradation meets the requirements specified in Table 1 herein.

The basis of acceptance of the riprap rock will be Test Data Certification in accordance with the *MQAP Manual for ASTM D6473 and ASTM D5240/D5240M* tests performed annually by an independent testing firm hired by the quarry.

The basis of acceptance of the riprap gradation will be by *Federal Lands Highways test FLH T 521-13 Determining Riprap Gradation by Wolman Count*. One Wolman count will be performed by the Engineer at the quarry for each 20,000 tons of riprap. Additional Wolman counts may be performed on each job site as determined by the Engineer.

Furnish geotextile liner and geotextile liner, heavy in accordance with section 910 of the Standard Specifications for Construction. Furnish geotextile liner for Class I riprap gradation and geotextile liner, heavy for Class II and Class III riprap gradations.

c. Construction. Place riprap in accordance with subsection 813.03 of the Standard Specifications for Construction, on prepared grades to the elevations, thickness, and lateral limits

as shown on the plans. Clear areas to be protected by riprap of brush, trees, stumps and debris. Shape and compact all grades to the required cross section, including excavation for toe and header plan details. Place geotextile liner and geotextile liner, heavy on prepared grades in accordance with the *Soil Erosion and Sedimentation Control Manual*. Ensure the riprap installation does not damage the geotextile liner. Ensure damaged geotextile liner is repaired or removed and replaced as directed by the Engineer at no cost to the contract.

Careful placement of riprap with a clam bucket or other approved method is required to assure that there is no damage to structure footings and no material loss around or under structure foundations. Use a skeleton bucket or similar equipment to minimize placement of fines. Repair any structure damage caused by the Contractor operations as directed by the Engineer at no cost to the contract.

On slopes, placement of riprap must start at the toe and proceed up the slope, with each rock firmly embedded into the slope and against adjoining rocks. Construct the riprap to minimize voids by select placement of optimum rock sizes from the gradation specified. If placed riprap contains large voids, the Engineer will direct the Contractor to place additional rocks of the appropriate gradation sizes to fill the voids. The finished surface of the riprap must present a tight, even surface.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	Pay Unit
Riprap, Spec, CI _____	Square Yard

Riprap, Spec, CI _____ includes diverting stream flow, clearing and preparing grades, excavation and disposal of surplus or unsuitable materials, furnishing and placing geotextile liner or heavy geotextile liner as applicable, and placing the riprap, including headers, in accordance with this special provision.

Table 1: Gradation Requirements for Riprap-Special, Individual Rocks

Nominal Riprap Class by Median Particle Width		15% passing (inches) (a)		50% passing (inches) (a)		85% passing (inches) (a)		100% passing (inches) (a)
Class	Size (a)	Min	Max	Min	Max	Min	Max	Max
I	9 inch	5	8	8	11	11	14	18
II	12 inch	7	11	11	14	15	19	24
III	24 inch	14	21	23	28	31	37	48

a. Corresponds to the intermediate axis (B) in Figure 1.

TUSCOLA COUNTY ROAD COMMISSION

SPECIAL PROVISION
FOR
SLOPE RESTORATION, NON-FREEWAY, MODIFIED

CON:SGI 816

1 of 5

02-15-22

a. Description. This work consists of preparing all lawns and slopes on non-freeway projects designated for slope restoration on the plans or as directed by the Engineer and applying topsoil, fertilizer, hydroseed, hydromulch, or mulch blanket, high velocity mulch blanket and permanent turf reinforcement mat to those areas. Turf establishment must be in accordance with section 816 of the Standard Specifications for Construction and Standard Plan R-100 Series, except as modified herein or otherwise directed by the Engineer.

b. Materials. The materials and application rates specified in sections 816 and 917 of the Standard Specifications for Construction apply unless modified by this special provision or otherwise directed by the Engineer. The following materials must be used on this project:

1. Seeding mixture as called for on the plans.
2. Fertilizer, Chemical Nutrient, Class A.
3. Topsoil Surface, Furnished or Salvaged, 4 inch. Remove any stones greater than 1 inch in diameter or other debris from all topsoil.
4. Mulch shall be straw with an applied Mulch Anchor tackifier.
5. Mulch Blanket and High Velocity Mulch Blanket.
6. Permanent Turf Reinforcement Mat (TRM) must be 100 percent synthetic and consist of 100 percent ultraviolet (UV) stabilized polyolefin fibers sewn between two layers of black UV stabilized polypropylene netting with polyolefin thread. The TRM must meet the "minimum average roll value" requirements in Table 1:

Table 1: Permanent Turf Reinforcement Mat requirements

Property	Test Method	Requirement
Mass/Unit Area	ASTM D 6566	10 oz/syd
Ultraviolet Stability @ 1000 hrs	ASTM D 4355	80 percent
Tensile Strength (MD)	ASTM D 6818	165 lbs/ft

Acceptance. Supply a Test Data Certification for the permanent TRM from one of the following manufacturers:

- Recyclex - American Excelsior Co., Arlington, TX (800) 777-7645
- P300 - North American Green, Poseyville, IN (800) 772-2040
- Landlok 450 - Propex, Inc., Chattanooga, TN (800) 621-1273
- PP5-10 - Western Excelsior, Mancos, CO (800) 833-8573

7. Hydromulch – Wood Fiber; shall be 100 percent wood fiber thermally refined with a premium tackifier (preblended high viscosity colloidal polysaccharide).

8. Hydromulch – BFM; Bonded Fiber Matrix (BFM), hydro applied mulch. ProMatrix EFM manufactured by Profile Products, LLC or an approved equal.

The Bonded Fiber Matrix shall conform to the typical property values in Table 2 when uniformly applied at a rate of 3,500 pounds per acre (3,900 kilograms/hectare) under laboratory conditions:

Table 2: Typical property values for Bonded Fiber Matrix

Property	Test Method	Tested Value (English)	Tested Value (SI)
Physical			
Mass Per Unit Area	ASTM D6566 ¹	≥ 11.6 oz/yd ²	≥ 390 g/m ²
Thickness	ASTM D6525 ¹	≥ 0.16 inch	≥ 4 mm
Ground Cover	ASTM D6567 ¹	≥ 98%	≥ 98%
Water Holding Capacity	ASTM D7367	≥ 1,400%	≥ 1,400%
Material Color	Observed	Green	Green
Performance			
Cover Factor ²	Large Scale Testing ⁴	≤ 0.05	≤ 0.05
% Effectiveness ³	Large Scale Testing ⁴	≥ 95%	≥ 95%
Cure time	Observed	4 – 24 hours	4 – 24 hours
Vegetation Establishment	ASTM D7322 ¹	≥ 600%	≥ 600%
Functional Longevity ⁵	Observed	≤ 12 months	≤ 12 months
Environmental			
Ecotoxicity	EPA 2021.0	48-hr LC ₅₀ > 100%	48-hr LC ₅₀ > 100%
Biodegradability	ASTM D5388	Yes	Yes

1. ASTM test methods developed for Rolled Erosion Control Products and have been modified to accommodate Hydraulically-Applied Erosion Control Products.
2. Cover Factor is calculated as soil loss ratio of treated surface versus an untreated control surface.
3. % Effectiveness = One minus Cover Factor multiplied by 100%.
4. Large scale testing conducted at Utah Water Research Laboratory. For specific testing information please contact a Manufacturer representative.
5. Functional Longevity is the estimated time period, based upon ASTM D5338 testing and field observations, that a material can be anticipated to provide erosion control and agronomic benefits as influenced by composition, as well as site-specific conditions, including; but not limited to – temperature, moisture, light conditions, soils, biological activity, vegetative establishment and other environmental factors.

All components of the BFM shall be pre-packaged by the Manufacturer to assure both material performance and compliance with the following values. Under no circumstances shall field mixing of components be permitted. No chemical additives with the exception of fertilizer, soil neutralizers and biostimulant materials should be added to this product.

1. Thermally Processed* (within a pressurized vessel) Virgin Wood Fibers – 77%
*Heated to a temperature greater than 380 degrees Fahrenheit (193 degrees Celsius) for 5 minutes at a pressure greater than 50 psi (345 kPa).
2. Wetting agents (including high-viscosity colloidal polysaccharides, cross-linked

biopolymers, and water absorbents) – 18 percent

3. Crimped Biodegradable Interlocking Fibers – 2.5 percent

4. Micro-Pore Granules – 2.5 percent

5. If multiple grades of the selected product are available, use the grade appropriate for the application as approved by the Engineer. Approved equal BFMs must consist of long strand, virgin wood fibers (90 percent by weight) bound together by a pre-blended, high strength polymer adhesive (10 percent by weight). The virgin wood fibers will be thermally refined from clean whole wood chips. Ensure the organic binders are a high viscosity colloidal polysaccharide tackifier with activating agents to render the resulting matrix insoluble upon drying.

c. Construction. Construction methods must be in accordance with subsection 816.03 of the Standard Specifications for Construction. Begin this work as soon as possible after final grading of the areas designated for slope restoration but no later than the maximum time frames stated in subsection 208.03 of the Standard Specifications for Construction. It may be necessary, as directed by the Engineer, to place materials by hand.

Shape, compact and assure all areas to be seeded are weed free prior to placing topsoil. Place topsoil to the minimum depth indicated above, to meet proposed finished grade. If the area being restored requires more than the minimum depth of topsoil to meet finished grade, this additional depth must be filled using topsoil or, at the Contractor's option, embankment. Furnishing and placing this additional material is included in this item of work.

Topsoil must be weed and weed seed free and friable prior to placing seed. Remove any stones greater than 1 inch in diameter or other debris. Apply seed mixture and fertilizer to prepared soil surface. If using hydroseeding equipment, incorporate the seed into the friable topsoil using the handgun/reel and spray directly into the seed bed. If using other methods of seed application, incorporate the seed into top 1/2 inch of topsoil.

Place Mulch and Mulch Anchoring over the mulch at a rate specified in subsection 816.03.F of the Standard Specifications for Construction. Mulch Blanket and High Velocity Mulch Blanket must be placed in accordance with subsection 816.03.G of the Standard Specifications for Construction and as shown on Standard Plan R-100 Series.

Place Hydromulch – Wood fiber applications: Add the seed mixture, fertilizer, wood fiber mulch with tackifier at a rate of 2500 pounds for each acre covered in accordance with the manufacturer's recommendations to the prepared topsoil surface at the specified rates for seed and fertilizer. Hydraulically apply the hydromulch to fully cover 100 percent of the soil surface.

Place Hydromulch - BFM applications: Apply the seed mixture and fertilizer to the prepared topsoil surface at the specified rates. Mix the BFM and organic binders thoroughly in the hydro seed machine at a rate of 40 pounds for each 100 gallons of water or as otherwise recommended by the manufacture. Hydraulically apply the BFM slurry in successive layers, from two or more directions, to fully cover 100 percent of the soil surface. Ensure the minimum application rate for the given gradient as specified in Table 3.

Table 3: Bonder Fiber Matrix (BFM) application rates

Install BFM at the following typical application rates	
Slope Gradient (ft/ft)	Application Rate
1 on 4 to 1 on 3	3000 lbs/ac
1 on 3 to 1 on 2	3500 lb/ac
Steeper than 1 on 2	4000 lb/ac

Do not apply the BFM product to saturated soils or immediately before, during or after a rainfall.

Do not apply fertilizer to frozen soil or soil saturated with water. Any fertilizer released onto a hard surface, such as a sidewalk or driveway must be cleaned up promptly. Maintain at least a 15 foot application buffer from surface water (lake, river, stream). If a spreader guard, deflector shield, or drop spreader is used, then maintain at least a 3 foot buffer. If a continuous natural vegetative buffer separates the turf and surface water, then maintain at least a 10 foot buffer from the water.

Turf or lawn areas that soil tests, performed within the past three years by the Michigan State University Extension Service or other qualified or recognized authority in the area of soil analysis, confirm are below phosphorus levels established by the Michigan State University Extension Service. The lawn fertilizer application shall not contain an amount of phosphorus exceeding the amount and rate of application recommended in the soil test evaluation.

Areas constructed with the TRM must be installed on prepared (seeded) grades as shown on the plans in strict accordance with the manufacturer's published installation guidelines. The top edge of the TRM must be anchored in a minimum 6-inch-deep trench. Operation of equipment on the slope will not be allowed after placement of the TRM. No credit for splices, overlaps, tucks or wasted material will be made.

If an area washes out after this work has been properly completed and approved by the Engineer, make the required corrections to prevent future washouts and replace the topsoil, fertilizer, seed and mulch. This replacement will be paid for as additional work using the applicable contract items.

If an area washes out for reasons attributable to the Contractor's activity or failure to take proper precautions, replacement will be at the Contractor's expense.

The Engineer will inspect the seeded turf to ensure the end product is well established, weed free, in a vigorous growing condition, and contains the species called for in the seeding mixture.

If the seeded turf is not well established at the end of the first growing season, the Contractor is responsible to re-seed until the turf is well established and approved by the Engineer at his own cost.

If weeds are determined by the Engineer to cover more than 10 percent of the total area of slope restoration, the Contractor must provide weed control in accordance with subsection 816.03.I of the Standard Specifications for Construction. Weed control will be at the Contractor's expense with no additional charges to the project.

d. Measurement and Payment. The completed work, as described, will be measured and paid for at the contract unit price using the following pay item:

Pay Item	Pay Unit
Slope Restoration, Modified	Lump Sum

1. Place **Slope Restoration, Type A, Modified** in all areas not described in the other types of slope restoration and will be measured by area in square yards in place. **Slope Restoration, Type A, Modified** includes all labor, equipment and materials required to install Topsoil Surface, Furnished or Salvaged; Fertilizer, Chemical Nutrient, Class A; Seeding Mixture; and Mulch mechanically crimped and sprayed with Much Anchor which will not be paid for separately but is included in the contract unit price for **Slope Restoration, Type A, Modified**.

2. Place **Slope Restoration, Type B, Modified** in areas that have a 1 on 4 up to 1 on 3 slope and in any ditch with a grade less than 1.5 percent, or as directed by the Engineer. **Slope Restoration, Type B, Modified** will be measured by area in square yards in place. **Slope Restoration, Type B, Modified** includes all labor, equipment and materials required to install Topsoil Surface, Furnished or Salvaged; Fertilizer, Chemical Nutrient, Class A; Seeding Mixture; Mulch with one of the following options:
 - a. Hydromulch – Wood Fiber and Mulch Blanket or
 - b. Hydromulch – BFM
 which will not be paid for separately but is included in the contract unit price for **Slope Restoration, Type B, Modified**.

3. Place **Slope Restoration, Type C, Modified** in areas that have a slope steeper than 1 on 3 or to a 1 on 2 slope, in any ditch with a grade of 1.5 percent to 3 percent, or as directed by the Engineer. **Slope Restoration, Type C, Modified** will be measured by area in square yards in place. **Slope Restoration, Type C, Modified** includes all labor, equipment and materials required to install Topsoil Surface, Furnished or Salvaged; Fertilizer, Chemical Nutrient, Class A; Seeding Mixture; Mulch with one of the following options:
 - a. Hydromulch – Wood Fiber and High Velocity Mulch Blanket or
 - b. Hydromulch – BFM
 which will not be paid for separately but is included in the contract unit price for **Slope Restoration, Type C, Modified**.

4. Place **Slope Restoration, Type D, Modified** in areas that have a slope steeper than 1 on 2, in any ditch with a grade steeper than 3 percent, or as directed by the Engineer. **Slope Restoration, Type, Modified D** will be measured by area in square yards in place. **Slope Restoration, Type D, Modified** includes all labor, equipment and materials required to install Topsoil Surface, Furnished or Salvaged; Fertilizer, Chemical Nutrient, Class A; Seeding Mixture; Mulch with one of the following options:
 - a. Hydromulch – Wood Fiber and Turf Reinforcement Mat (TRM) or
 - b. Hydromulch – BFM
 which will not be paid for separately but is included in the contract unit price for **Slope Restoration, Type D, Modified**.

Note: Areas where unsatisfactory grass growth is evident as determined by the Engineer prior to or during the Final Project Inspection, shall be re-worked, re-seeded, re-fertilized, and re-mulched to the satisfaction of the Engineer, at the Contractor’s expense. The end product shall be well established, weed free, in a growing and vigorous condition, and shall contain the species called for in the seeding mixture.

SPECIAL PROVISION FOR
MAINTAINING TRAFFIC

TUSCOLA COUNTY ROAD COMMISSION – 1733 S. MERTZ ROAD, CARO, MI 48723

PAGE 1 OF 1

GENERAL

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.

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 500 feet in all directions along all crossroads.

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.

Signing for a lane closure shall be according to attached MDOT Maintaining Traffic Typical Figure M0150a. The use of the speed limit signs, R 2-1, will be as needed.

Sheeting shall conform to section 922.02B of the 2020 Standard Specifications for Construction. Engineer grade reflective sheeting must meet the requirements for ASTM D 4956 Type I engineer grade sheeting.

TRAFFIC RESTRICTIONS

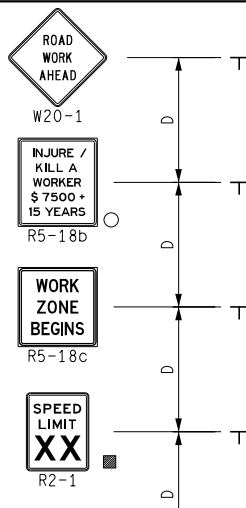
Work shall be conducted during daylight hours only. No work shall be conducted on Sundays unless approved by the Engineer.

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.

PAYMENT

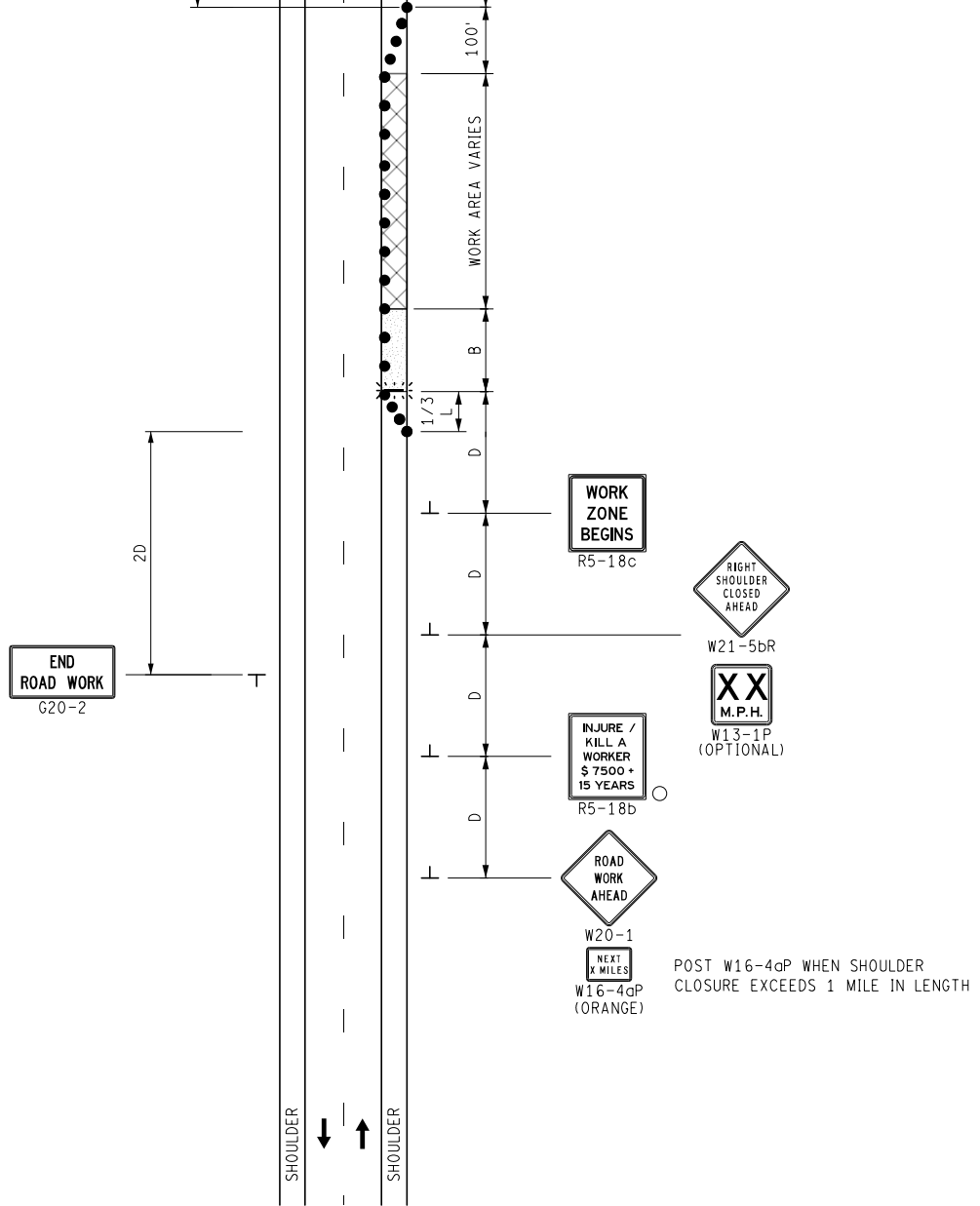
Payment for Maintaining Traffic shall be included in other Bid unit prices. There will be no separate payment for Maintaining Traffic.

Approved by Board 1/27/05 rev.1/17/07 rev.12/22/11 rev. 117/13



- 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



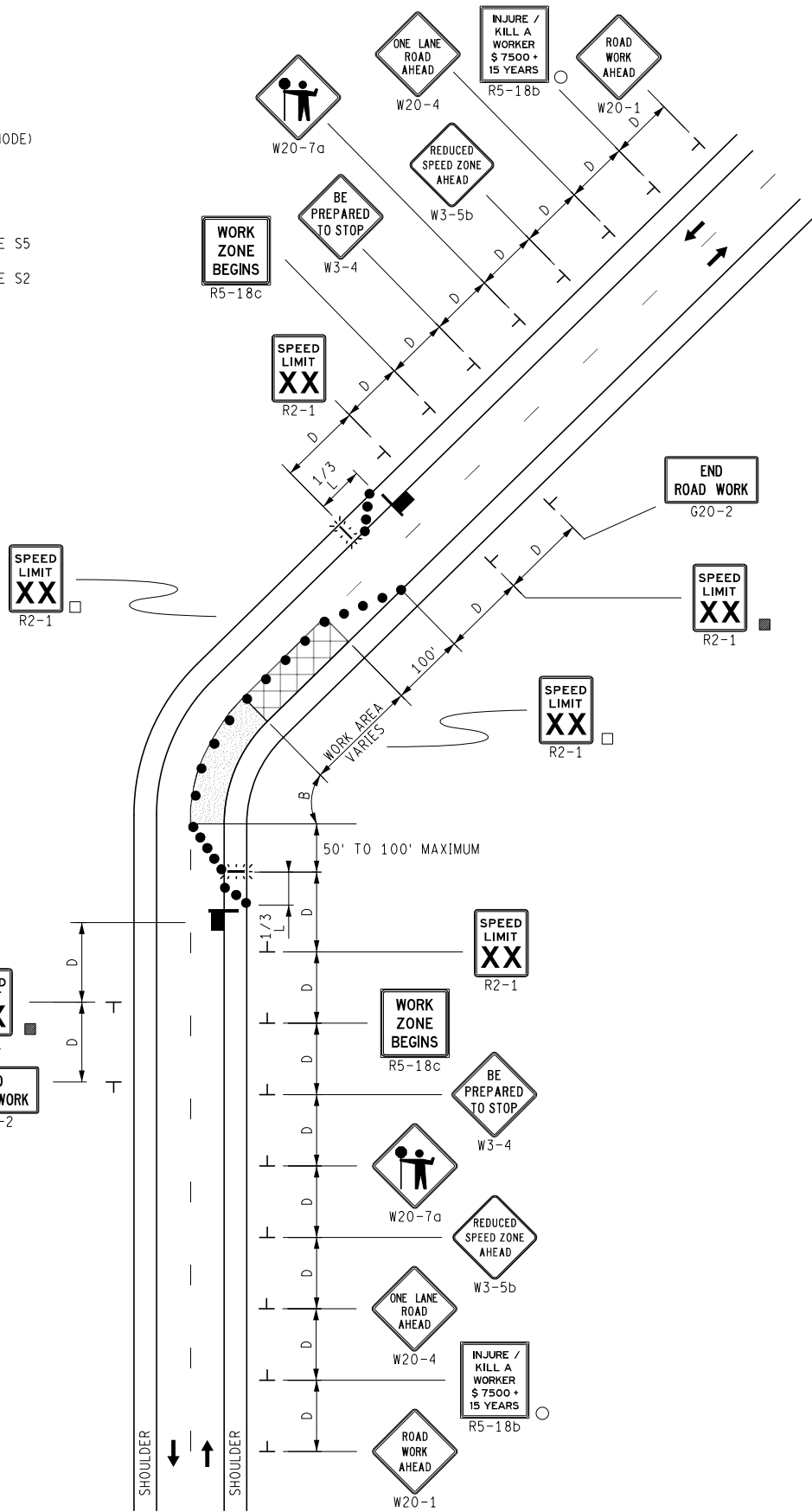
KEY

- 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

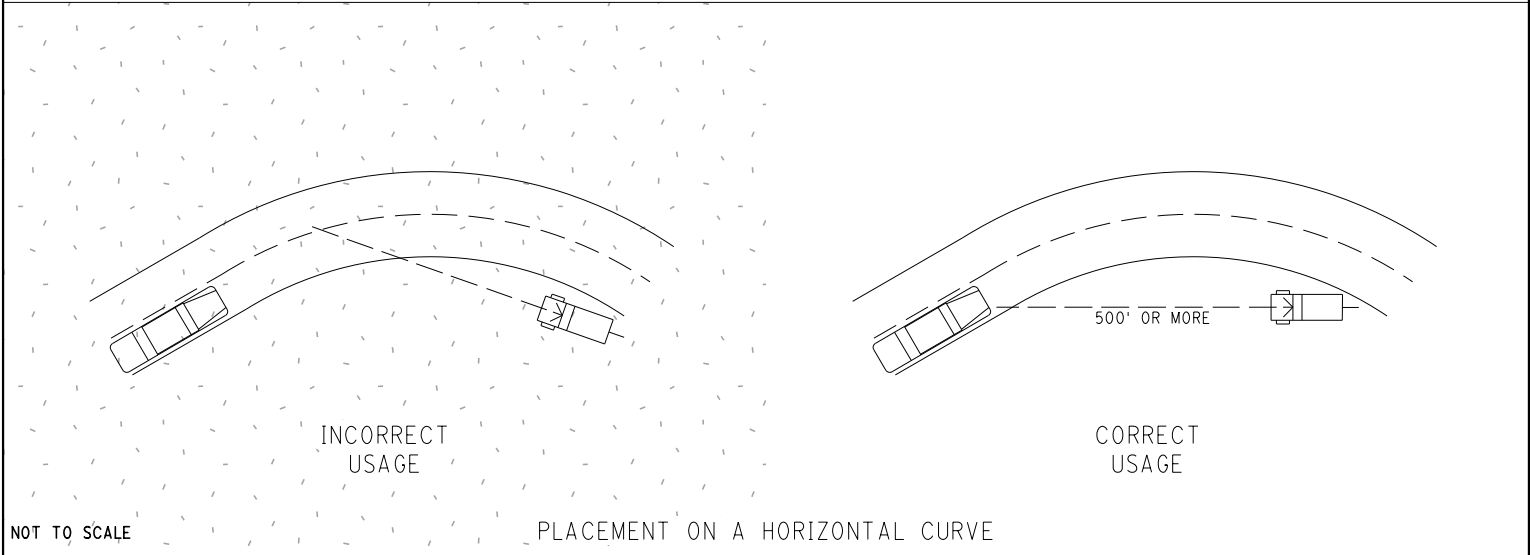
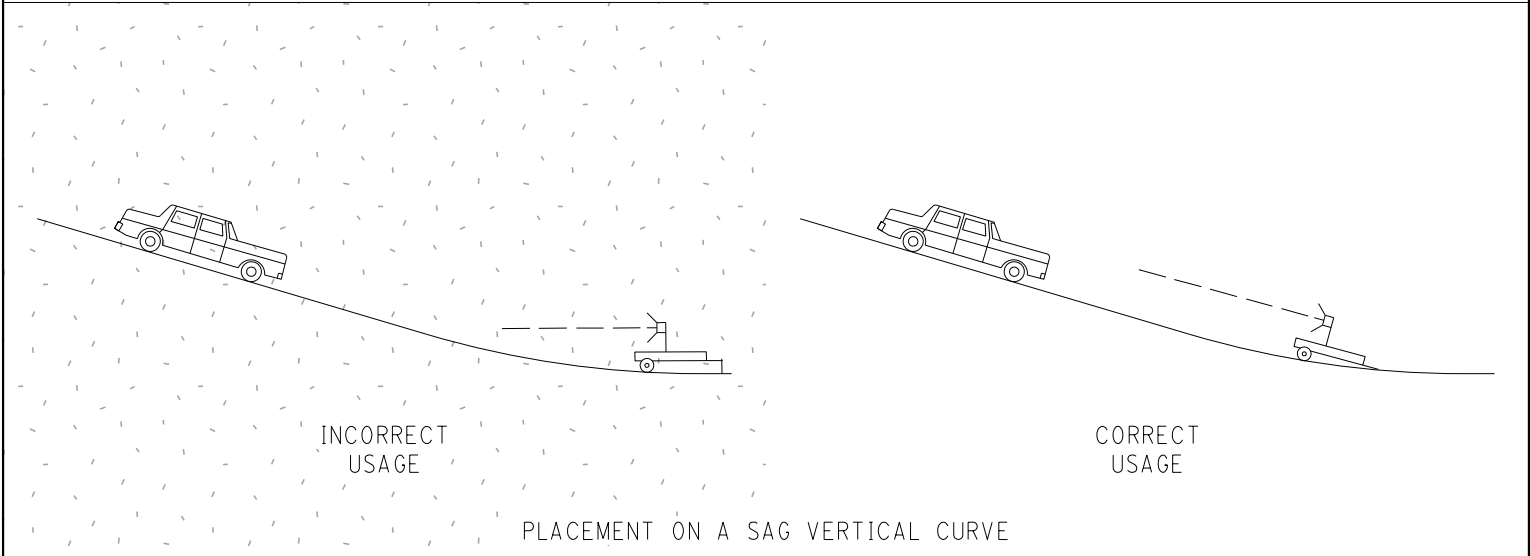
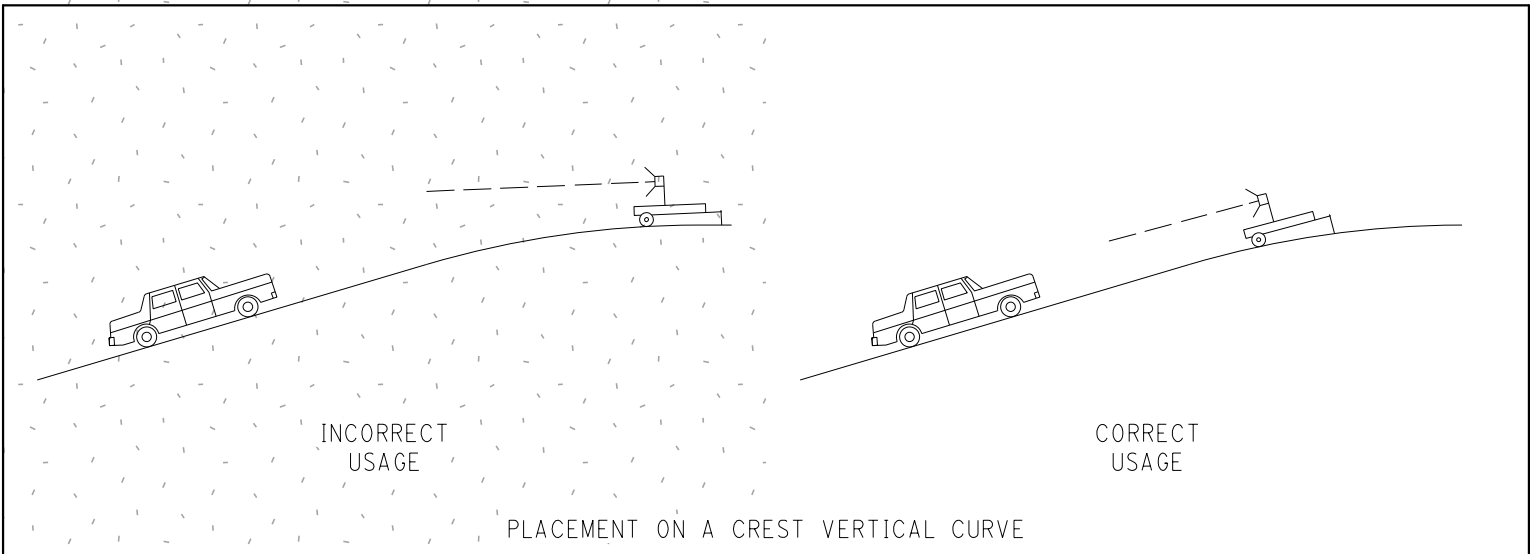
STANDARD NOTES

(SEE GEN-NOTES)

GENERAL: G1, G2, G3, G4
 SIGNING: S1, S2, S3, S4, S5
 TRAF REG: TR1, TR2
 DEVICES: TCD1, TCD2, TCD6



	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	LANE CLOSURE UTILIZING TRAFFIC REGULATORS ON A 2-LANE UNDIVIDED ROADWAY	DATE: MAY 2021
		NO: 110-TR-NFW-2L		SHEET: 1 OF 1



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.

	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	USE OF ARROW BOARD ON HILL OR CURVE AND WORK ZONE LAYOUT	DATE: MAY 2021
		NO: 104-GEN-AB		SHEET: 1 OF 1

THE FOLLOWING NOTES APPLY IF CALLED FOR ON THE TRAFFIC TYPICAL

GENERAL NOTES

- G1: SEE GEN-SPACING-CHARTS FOR COMMON VALUES INCLUDING:
 D = DISTANCE BETWEEN TRAFFIC CONTROL DEVICES
 L = MINIMUM LENGTH OF TAPER
 B = LENGTH OF LONGITUDINAL BUFFER
 ROLL AHEAD DISTANCE
- G2: DISTANCE BETWEEN SIGNS, "D", THE VALUES FOR WHICH ARE SHOWN IN TYPICAL GEN-KEY ARE APPROXIMATE AND MAY NEED ADJUSTING AS DIRECTED BY THE ENGINEER.
- G3: ALL TEMPORARY SIGNS, TYPE III BARRICADES, THEIR SUPPORT SYSTEMS AND LIGHTING MUST MEET NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM REPORT 350 (NCHRP 350) TEST LEVEL 3, OR MANUAL FOR ASSESSING SAFETY HARDWARE (MASH) TL-3 AS WELL AS THE CURRENT EDITION OF THE MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES, THE CURRENT EDITION OF THE STANDARD SPECIFICATIONS FOR CONSTRUCTION, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS. ONLY DESIGNS AND MATERIALS APPROVED BY MDOT WILL BE ALLOWED.
- G4: DO NOT STORE EQUIPMENT, MATERIALS OR PERFORM WORK IN ESTABLISHED BUFFER AREAS.
- G5: ALL EXISTING PAVEMENT MARKINGS WHICH ARE IN CONFLICT WITH EITHER PROPOSED CHANGES IN TRAFFIC PATTERNS OR PROPOSED TEMPORARY TRAFFIC MARKINGS SHALL BE REMOVED BEFORE ANY CHANGE IS MADE IN THE TRAFFIC PATTERN. EXCEPTION WILL BE MADE FOR TRAFFIC PATTERNS FOR WORK LESS THAN THREE DAYS THAT ARE ADEQUATELY DELINEATED BY OTHER TRAFFIC CONTROL DEVICES.

SIGN NOTES

- S1: ALL NON-APPLICABLE SIGNING WITHIN THE CIA MUST BE MODIFIED TO FIT CONDITIONS, COVERED, OR REMOVED. FOR GUIDANCE SEE THE WORK ZONE SAFETY AND MOBILITY MANUAL, SECTIONS 6.01.09 AND 6.01.10.
- S2: R5-18b SIGNS ARE ONLY REQUIRED ON FREEWAY PROJECTS WITH A DURATION OF 15 DAYS OR LONGER OR NON-FREEWAY PROJECTS WITH A DURATION OF 90 DAYS OR LONGER. TO APPLY THIS TYPICAL WITHOUT R5-18b SIGNS, REMOVE THE SIGNS AND CONSOLIDATE THE SEQUENCE AS APPROPRIATE.
- S3: R5-18c IS ONLY REQUIRED IN THE INITIAL SIGNING SEQUENCE IN THE WORK ZONE. OMIT THIS SIGN IN SUBSEQUENT SEQUENCES IN THE SAME WORK ZONE.
- S4: ADDITIONAL SIGNING AND/OR ELONGATED SIGNING SEQUENCES SHOULD BE USED WHEN TRAFFIC VOLUMES ARE SIGNIFICANT ENOUGH TO CREATE BACKUPS BEYOND THE W20-5 SIGNS.
- S5: PLACE ADDITIONAL SPEED LIMIT SIGNS REFLECTING THE WORK ZONE SPEED AFTER EACH MAJOR CROSSROAD THAT INTERSECTS THE WORK ZONE, OR AFTER EACH ENTRANCE RAMP THAT COMES ONTO THE FREEWAY WHERE THE REDUCED SPEED IS IN EFFECT. PLACE ADDITIONAL SPEED LIMIT SIGNS AT INTERVALS ALONG THE ROADWAY SUCH THAT NO SPEED LIMIT SIGNS ARE MORE THAN 2 MILES APART. WHEN REDUCED SPEED LIMITS ARE UTILIZED IN THE WORK AREA, PLACE ADDITIONAL SPEED LIMIT SIGNS RETURNING TRAFFIC TO ITS NORMAL SPEED BEYOND THE LIMITS OF THE WORK AREA AS INDICATED. IF PERMANENT SIGNS DISPLAYING THE CORRECT SPEED LIMIT ARE POSTED, OMIT ALL W3-5b AND R2-1 SIGNS AND REDUCE SPACING ACCORDINGLY.
- S6: FABRICATE SPECIAL SIGNS IN ACCORDANCE WITH CURRENT SIGNING DESIGN STANDARDS.
- S7: PLACE ADDITIONAL R8-3 SIGNS AT A MAXIMUM 500' SPACING THROUGHOUT THE WORK ZONE.
- S8: WHEN SPEED LIMIT SIGNS CANNOT BE PLACED SIDE BY SIDE AS SHOWN, PLACE THEM "D" DISTANCE APART.
- S9: STOP SIGNS NOT REQUIRED IF SIGNALS ARE ON 4-WAY FLASHING RED. STOP AHEAD SIGNS ARE NOT REQUIRED IF THERE IS ADEQUATE VISIBILITY OF THE STOP SIGN OR IF SIGNALS ARE BEING USED TO CONTROL TRAFFIC.
- S10: PLACE REDUCED SPEED ZONE AHEAD SIGN (W3-5b) HERE WHEN USING A SPEED REDUCTION IN THIS DIRECTION.
- S11: THE NUMBER OF W1-6 SHIFT SIGNS TO PLACE FOR A SHIFT IS AS FOLLOWS:
 SHIFTS 4FT OR LESS, PLACE ONE W1-6(R)(L)
 SHIFTS 5FT TO 12FT, PLACE TWO W1-6(R)(L)
 SHIFTS MORE THAN 12FT, PLACE THREE OR MORE W1-6(R)(L) SIGNS DEPENDING UPON LENGTH OF SHIFT AND AS PER THE ENGINEER.
- S12: PLACE R2-1 SIGNS AS DETAILED IN NOTE S5 WHEN THERE IS A SPEED REDUCTION IN THIS DIRECTION

TRAFFIC REGULATOR NOTES

- TR1: TRAFFIC REGULATORS MUST FOLLOW ALL THE REQUIREMENTS IN THE STANDARD SPECIFICATIONS, THE STANDARD PLANS AND APPLICABLE SPECIAL PROVISIONS, THE CURRENT VERSIONS OF THE TRAFFIC REGULATOR'S INSTRUCTION MANUAL AND THE VIDEO "HOW TO SAFELY REGULATE TRAFFIC IN MICHIGAN". THE MAXIMUM DISTANCE BETWEEN THE TRAFFIC REGULATORS IS DETERMINED BY THE ROADWAY ADT, GEOMETRICS, AND AS DIRECTED BY THE ENGINEER.
- TR2: PROVIDE APPROPRIATE BALLOON LIGHTING TO SUFFICIENTLY ILLUMINATE TRAFFIC REGULATOR'S STATIONS WHEN TRAFFIC REGULATING IS ALLOWED DURING THE HOURS OF DARKNESS.

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 RECOMMENDED 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 CHANNELIZING 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.

	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	TRAFFIC TYPICALS NOTE SHEET	DATE: APRIL 2022
		NO: 102-GEN-NOTES		SHEET: 1 OF 2
FILE: 102-GEN-NOTES.dgn				

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 PROCEED 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.



NOT TO SCALE

MAINTAINING TRAFFIC TYPICAL

NO: 102-GEN-NOTES

TRAFFIC TYPICALS
NOTE SHEET

DATE: APRIL 2022
SHEET:

2 OF 2

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

	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	"B", "D" AND "L" TABLES CHANNELIZING DEVICE SPACING, SIGN BORDER KEY, AND ROLL-AHEAD SPACING	DATE: MAY 2021
		NO: 101-GEN-SPACING-CHARTS		SHEET: 1 OF 3

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

UPSTREAM TAPERS

- MERGING TAPER
- SHIFTING TAPER
- SHOULDER TAPER
- 2 TO 1 LANE ROAD TAPER

TAPER LENGTH

- L - MINIMUM
- 1/2 L - MINIMUM
- 1/3 L - MINIMUM
- 100' - MAXIMUM

DOWNSTREAM TAPERS
 (USE IS RECOMMENDED)

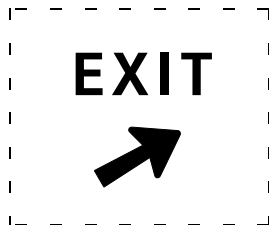
100' (PER LANE)

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

	NOT TO SCALE	MAINTAINING TRAFFIC TYPICAL	"B", "D" AND "L" TABLES CHANNELIZING DEVICE SPACING SIGN BORDER KEY AND ROLL-AHEAD SPACING	DATE: MAY 2021
		NO: 101-GEN-SPACING-CHARTS		SHEET: 2 OF 3

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.



NOT TO SCALE

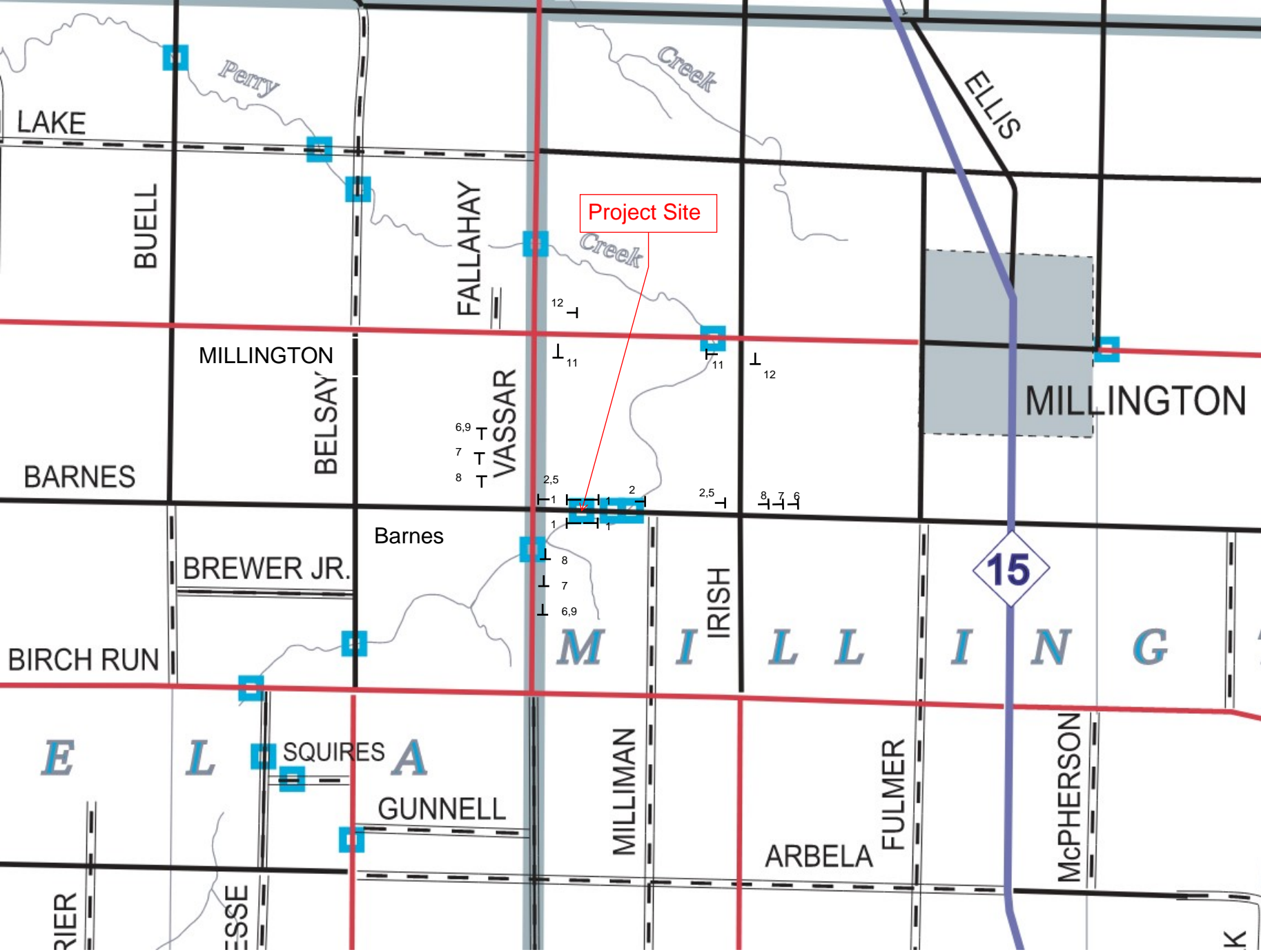
MAINTAINING TRAFFIC TYPICAL

NO: 101-GEN-SPACING-CHARTS

"B", "D" AND "L" TABLES
CHANNELIZING DEVICE SPACING
SIGN BORDER KEY AND ROLL AHEAD SPACING

DATE: MAY 2021
SHEET:

3 OF 3



ROAD
CLOSED

R11-2
48" x 30"



TYPE III - 8 FT
BARRICADE - DOUBLE SIDED, LIGHTED

① 4

ROAD CLOSED
TO
THRU TRAFFIC

R11-4
60" x 30"



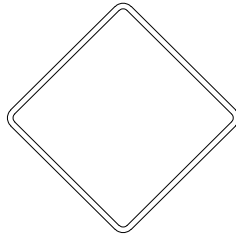
TYPE III - 8 FT
BARRICADE - DOUBLE SIDED, LIGHTED

② 3

ROAD CLOSED
FEET AHEAD
LOCAL TRAFFIC ONLY

R11-3
60 x 30"

③



④



M4-10
48" x 18"

⑤ 2



W20-1 6 REQ'D
48" x 48"

⑥ 3



W20-3 2 REQ'D
48" x 48"

⑦ 3

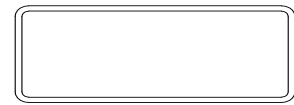


W20-2 2 REQ'D
48" x 48"

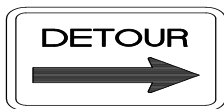
⑧ 3



⑨ 2



⑩



M4-9
RIGHT

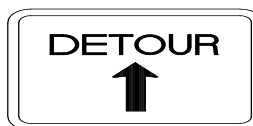
30" x 24"

⑪ 2



M4-9
LEFT

⑫ 2



M4-9
UP

⑬



M4-8a 2 REQ'D
24" x 18"

⑭



NOTICE OF AUTHORIZATION

Permit Number: WRP040384 v. 1
Site Name: 79 - Barnes Road over Perry Creek

Date Issued: March 15, 2024
Expiration Date: March 15, 2029

The Michigan Department of Environment, Great Lakes, and Energy (EGLE), Water Resources Division, P.O. Box 30458, Lansing, Michigan 48909-7958, under provisions of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended: specifically:

- Part 31, Floodplain Regulatory Authority of the Water Resources Protection.
- Part 301, Inland Lakes and Streams.
- Part 303, Wetlands Protection.
- Part 315, Dam Safety.
- Part 323, Shorelands Protection and Management.
- Part 325, Great Lakes Submerged Lands.
- Part 353, Sand Dunes Protection and Management.

Authorized activity:

Structure 10630

Remove the existing west-most structure of Barnes Road over Perry Creek and replace it with a 35-foot span by 35.17-foot long by 7.37-foot rise pre-tressed concrete beam bridge with wingwalls. Below the ordinary high-water mark (OHWM), dredge 567-cubic yards and fill 347-cubic yards. Within the 100-year floodplain, excavate 374-cubic yards and fill 285-cubic yards. Place 35-cubic yards of riprap.

Structure 10631

Remove the existing central structure of Barnes Road over Perry Creek and replace it with a 25-foot span by 42-foot long by 11-foot rise concrete box culvert with wingwalls. Below the OHWM, dredge 368-cubic yards and fill 246-cubic yards. Within the 100-year floodplain, excavate 183-cubic yards and fill 150-cubic yards. Place 15-cubic yards of riprap.

Structure 10632

Remove the existing east-most structure of Barnes Road over Perry Creek and replace it with a 25-foot diameter by 42-foot long by 11-foot rise concrete box culvert with wingwalls. Below the OHWM, dredge 288-cubic yards and fill 197-cubic yards. Within the 100-year floodplain, excavate 170-cubic yards and fill 145-cubic yards. Place 21-cubic yards of riprap.

*This notice must be displayed at the site of work.
Laminating this notice or utilizing sheet protectors is recommended.
Please refer to the above permit number with any questions or concerns.*

EGLE
WRP040384 v1.0
Approved
Issued On:03/15/2024
Expires On:03/15/2029



NOTICE OF AUTHORIZATION

To be conducted at property located in: Tuscola County, Waterbody: Perry Creek
Section 19, Town 10N, Range 08E, Millington Township

Permittee:

Brent Dankert
Tuscola County Road Commission
1733 Mertz Road
Caro, Michigan 48723

Issued By:

A handwritten signature in black ink that reads 'Rachel Matejewski'.

Rachel Matejewski
Transportation Review Unit
Water Resources Division
517-331-2913

*This notice must be displayed at the site of work.
Laminating this notice or utilizing sheet protectors is recommended.*
Please refer to the above permit number with any questions or concerns.

EGLE
WRP040384 v1.0
Approved
Issued On:03/15/2024
Expires On:03/15/2029



MICHIGAN DEPARTMENT OF ENVIRONMENT, GREAT LAKES, AND ENERGY
WATER RESOURCES DIVISION PERMIT

Issued To:

Brent Dankert
Tuscola County Road Commission
1733 Mertz Road
Caro, Michigan 48723

Permit No: WRP040384 v.1
Submission No.: HPX-314Z-3CDQN
Site Name: 79 - Barnes Road over Perry Creek
Issued: March 15, 2024
Revised:
Expires: March 15, 2029

This permit is being issued by the Michigan Department of Environment, Great Lakes, and Energy (EGLE), Water Resources Division (WRD), under the provisions of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA); specifically:

- Part 301, Inland Lakes and Streams
- Part 303, Wetlands Protection
- Part 315, Dam Safety
- Part 31, Water Resources Protection (Floodplain Regulatory Authority)
- Part 323, Shorelands Protection and Management
- Part 325, Great Lakes Submerged Lands
- Part 353, Sand Dunes Protection and Management

EGLE certifies that the activities authorized under this permit are in compliance with the State Coastal Zone Management Program and certifies without conditions under the Federal Clean Water Act, Section 401 that the discharge from the activities authorized under this permit will comply with Michigan’s water quality requirements in Part 31, Water Resources Protection, of the NREPA and associated administrative rules, where applicable.

Permission is hereby granted, based on permittee assurance of adherence to State of Michigan requirements and permit conditions, to:

Authorized Activity:

Structure 10630

Remove the existing west-most structure of Barnes Road over Perry Creek and replace it with a 35-foot span by 35.17-foot long by 7.37-foot rise pre-tressed concrete beam bridge with wingwalls. Below the ordinary high-water mark (OHWM), dredge 567-cubic yards and fill 347-cubic yards. Within the 100-year floodplain, excavate 374-cubic yards and fill 285-cubic yards. Place 35-cubic yards of riprap.

EGLE

WRP040384 v1.0
Approved
Issued On:03/15/2024
Expires On:03/15/2029

Structure 10631

Remove the existing central structure of Barnes Road over Perry Creek and replace it with a 25-foot span by 42-foot long by 11-foot rise concrete box culvert with wingwalls. Below the OHWM, dredge 368-cubic yards and fill 246-cubic yards. Within the 100-year floodplain, excavate 183-cubic yards and fill 150-cubic yards. Place 15-cubic yards of riprap.

Structure 10632

Remove the existing east-most structure of Barnes Road over Perry Creek and replace it with a 25-foot diameter by 42-foot long by 11-foot rise concrete box culvert with wingwalls. Below the OHWM, dredge 288-cubic yards and fill 197-cubic yards. Within the 100-year floodplain, excavate 170-cubic yards and fill 145-cubic yards. Place 21-cubic yards of riprap.

Waterbody Affected: Perry Creek

Property Location: Tuscola County, Millington Township, T10N, R08E, Sections 18/19

Property Tax ID - 017-019-000-0600-00, 017-018-000-2000-00, 017-018-000-1900-00,
017-018-000-2700-02, and 017-019-000-1800-00

Authority granted by this permit is subject to the following limitations:

- A. Initiation of any work on the permitted project confirms the permittee's acceptance and agreement to comply with all terms and conditions of this permit.
- B. The permittee, in exercising the authority granted by this permit, shall not cause unlawful pollution as defined by Part 31 of the NREPA.
- C. This permit shall be kept at the site of the work and available for inspection at all times during the duration of the project or until its date of expiration.
- D. All work shall be completed in accordance with the approved plans and specifications submitted with the application and/or plans and specifications attached to this permit.
- E. No attempt shall be made by the permittee to forbid the full and free use by the public of public waters at or adjacent to the structure or work approved.
- F. It is made a requirement of this permit that the permittee give notice to public utilities in accordance with 2013 PA 174 (Act 174) and comply with each of the requirements of Act 174.
- G. This permit does not convey property rights in either real estate or material, nor does it authorize any injury to private property or invasion of public or private rights, nor does it waive the necessity of seeking federal assent, all local permits, or complying with other state statutes.
- H. This permit does not prejudice or limit the right of a riparian owner or other person to institute proceedings in any circuit court of this state when necessary to protect his rights.
- I. Permittee shall notify EGLE within one week after the completion of the activity authorized by this permit by completing and forwarding the attached preaddressed postcard to the office addressed thereon.
- J. This permit shall not be assigned or transferred without the written approval of EGLE.
- K. Failure to comply with conditions of this permit may subject the permittee to revocation of permit and criminal and/or civil action as cited by the specific state act, federal act, and/or rule under which this permit is granted.

- L. All dredged or excavated materials shall be disposed of in an upland site (outside of floodplains, unless exempt under Part 31 of the NREPA, and wetlands).
- M. In issuing this permit, EGLE has relied on the information and data that the permittee has provided in connection with the submitted application for permit. If, subsequent to the issuance of a permit, such information and data prove to be false, incomplete, or inaccurate, EGLE may modify, revoke, or suspend the permit, in whole or in part, in accordance with the new information.
- N. The permittee shall indemnify and hold harmless the State of Michigan and its departments, agencies, officials, employees, agents, and representatives for any and all claims or causes of action arising from acts or omissions of the permittee, or employees, agents, or representative of the permittee, undertaken in connection with this permit. The permittee's obligation to indemnify the State of Michigan applies only if the state: (1) provides the permittee or its designated representative written notice of the claim or cause of action within 30 days after it is received by the state, and (2) consents to the permittee's participation in the proceeding on the claim or cause of action. It does not apply to contested case proceedings under the Administrative Procedures Act, 1969 PA 306, as amended, challenging the permit. This permit shall not be construed as an indemnity by the State of Michigan for the benefit of the permittee or any other person.
- O. Noncompliance with these terms and conditions and/or the initiation of other regulated activities not specifically authorized shall be cause for the modification, suspension, or revocation of this permit, in whole or in part. Further, EGLE may initiate criminal and/or civil proceedings as may be deemed necessary to correct project deficiencies, protect natural resource values, and secure compliance with statutes.
- P. If any change or deviation from the permitted activity becomes necessary, the permittee shall request, in writing, a revision of the permitted activity from EGLE. Such revision request shall include complete documentation supporting the modification and revised plans detailing the proposed modification. Proposed modifications must be approved, in writing, by EGLE prior to being implemented.
- Q. This permit may be transferred to another person upon written approval of EGLE. The permittee must submit a written request to EGLE to transfer the permit to the new owner. The new owner must also submit a written request to EGLE to accept transfer. The new owner must agree, in writing, to accept all conditions of the permit. A single letter signed by both parties that includes all the above information may be provided to EGLE. EGLE will review the request and, if approved, will provide written notification to the new owner.
- R. Prior to initiating permitted construction, the permittee is required to provide a copy of the permit to the contractor(s) for review. The property owner, contractor(s), and any agent involved in exercising the permit are held responsible to ensure that the project is constructed in accordance with all drawings and specifications. The contractor is required to provide a copy of the permit to all subcontractors doing work authorized by the permit.
- S. Construction must be undertaken and completed during the dry period of the wetland. If the area does not dry out, construction shall be done on equipment mats to prevent compaction of the soil.
- T. Authority granted by this permit does not waive permit requirements under Part 91, Soil Erosion and Sedimentation Control, of the NREPA, or the need to acquire applicable permits from the County Enforcing Agent (CEA).
- U. Authority granted by this permit does not waive permit requirements under the authority of Part 305, Natural Rivers, of the NREPA. A Natural Rivers Zoning Permit may be required for construction, land alteration, streambank stabilization, or vegetation removal along or near a natural river.

- V. The permittee is cautioned that grade changes resulting in increased runoff onto adjacent property is subject to civil damage litigation.
- W. Unless specifically stated in this permit, construction pads, haul roads, temporary structures, or other structural appurtenances to be placed in a wetland or on bottomland of the water body are not authorized and shall not be constructed unless authorized by a separate permit or permit revision granted in accordance with the applicable law.
- X. For projects with potential impacts to fish spawning or migration, no work shall occur within fish spawning or migration timelines (i.e., windows) unless otherwise approved in writing by the Michigan Department of Natural Resources (MDNR), Fisheries Division.
- Y. Work to be done under authority of this permit is further subject to the following special instructions and specifications:
1. Authority granted by this permit does not waive permit or program requirements under Part 91 of the NREPA or the need to acquire applicable permits from the CEA. To locate the Soil Erosion Program Administrator for your county, visit <https://www.michigan.gov/egle/about/organization/water-resources/soil-erosion/sesc-overview> and select "Soil Erosion and Sedimentation Control Agencies".
 2. The authority to conduct the activity as authorized by this permit is granted solely under the provisions of the governing act as identified above. This permit does not convey, provide, or otherwise imply approval of any other governing act, ordinance, or regulation, nor does it waive the permittee's obligation to acquire any local, county, state, or federal approval or authorization necessary to conduct the activity.
 3. No fill, excess soil, or other material shall be placed in any wetland, floodplain, or surface water area not specifically authorized by this permit, its plans, and specifications.
 4. This permit does not authorize or sanction work that has been completed in violation of applicable federal, state, or local statutes.
 5. The permit placard shall be kept posted at the work site in a prominent location at all times for the duration of the project or until permit expiration.
 6. This permit is being issued for the maximum time allowed and no extensions of this permit will be granted. Initiation of the construction work authorized by this permit indicates the permittee's acceptance of this condition. The permit, when signed by EGLE, will be for a five-year period beginning on the date of issuance. If the project is not completed by the expiration date, a new permit must be sought.
 7. Temporary soil erosion and sedimentation control measures shall be installed prior to earth changing activities and shall be maintained daily. Temporary soil erosion and sedimentation control measures shall be maintained until permanent soil erosion and sedimentation control measures are in place and the area is stabilized. Permanent soil erosion and sedimentation control measures for all slopes, channels, ditches, or any disturbed area shall be installed within five (5) calendar days after final grading, or the final earth change has been completed.
 8. Prior to the removal of the existing structures, cofferdams of steel sheet piling, gravel bags, clean stone, coarse aggregate, concrete, or other acceptable barriers shall be installed to isolate all construction activity from the water. The crest of the barrier shall be placed at an elevation that will not cause upstream flooding in the event of high flow conditions. It shall be less than two feet above the OHWM, or for barriers that require an elevation greater than two feet above the ordinary high-water mark, the maximum barrier width must be less than 1/3 of the stream width.

9. For cofferdams that are used to isolate flow from a pier or abutment, no more than 1/3 of the stream flow shall be blocked at any given time. For cofferdams that are used to block stream flow, water shall be pumped downstream. Water shall be discharged into the watercourse with appropriate treatments to remove suspended particles and to dissipate energy. An extra pump shall be kept on site in the event of failure.
10. All cofferdam and temporary steel sheet pile that blocks no more than 1/3 of the stream flow shall then be removed in its entirety immediately after use has been discontinued or within 90 days of initiation of the authorized activity, whichever is shorter. If the temporary structure is blocking more than 1/3 of the stream flow it must be removed immediately after use has been discontinued or within 14 days of initial installation, whichever is shorter.
11. The barriers shall be maintained in good working order throughout the duration of the project. Upon project completion, the accumulated materials shall be removed and disposed of at an upland site. Stream flow shall be reestablished if work is stopped for any length of time other than what may be encountered in a normal work week.
12. All fill/backfill shall consist of clean inert material that will not cause siltation nor contain soluble chemicals, organic matter, pollutants, or contaminants. All fills shall be contained in such a manner so as not to erode into any surface water, floodplain, or wetland. All raw areas associated with the permitted activity shall be stabilized with sod and/or seed and mulch, riprap, or other technically effective methods as necessary to prevent erosion.
13. All dredge/excavated spoils including organic and inorganic soils, vegetation, and other material removed shall be placed on upland (i.e., non-wetland, non-floodplain, and non-bottomland), prepared for stabilization, and stabilized with sod and/or seed and mulch in such a manner to prevent and ensure against erosion of any material into any waterbody, wetland, or floodplain.
14. The placement of riprap shall be limited to the minimum amount necessary to ensure proper scour protection in the immediate vicinity of the structure. Areas to be protected by riprap shall be cleared of brush and debris. All grades shall be shaped and compacted to the required cross section. Filter fabric shall be placed on the prepared grades prior to placing riprap. Riprap shall conform with the stream bank and be recessed below the channel invert (do not narrow the stream or interfere with stream flows). The riprap installation shall not damage the filter fabric.
15. Culverts shall be installed to align with the center line of the existing stream at both the inlet and outlet ends and must be buried below the stream bed to provide a natural channel substrate through the structure as shown on the approved plans.
16. The road fill side slopes shall not be steeper than 1-on-2 (1 vertical to 2 horizontal) except where headwalls of reinforced concrete, mortar masonry, dry masonry, or other acceptable methods are used.
17. Any change to the road grade elevations other than that shown by the plans will require prior approval by EGLE's, WRD.
18. If the project, or any portion of the project, is stopped and lies incomplete for any length of time (other than that encountered in a normal work week) every precaution shall be taken to protect the incomplete work from erosion, including the placement of temporary gravel bag riprap, temporary seeding and mulching, or other acceptable temporary protection.

19. No work shall be done in the stream during periods of above-normal flows except as necessary to prevent erosion.

Issued By: 
Rachel Matejewski
Transportation Review Unit
Water Resources Division
517-331-2913

THIS PERMIT MUST BE SIGNED BY THE PERMITTEE TO BE VALID.

I hereby assure that I have read, am familiar with, and agree to adhere to the terms and conditions of this permit.

Permittee Signature

Date

cc: Millington Township Clerk
Tuscola County Drain Commissioner
Tuscola County CEA
Joseph Robison, MDNR, Wildlife Division
Jason Gostiaux, MDNR, Fisheries Division
Kelsea Sutton, Spicer Group Inc.



Geotechnical, Environmental & Hydrogeological Services • Materials Testing & Inspection

August 15, 2023

Tuscola County Road Commission
1733 S Mertz Road
Caro, Michigan 48723

Job No. 23-66120

Attention: Mr. Brent Dankert, P.E.

Subject: Bridge Limited Asbestos and Lead Paint Survey
Bridge Structures 10630, 10631 & 10632
Barnes Road over Perry Creek
Millington Township, Tuscola County

Dear Mr. Dankert:

Pursuant to your request, McDowell & Associates has completed this Asbestos and Lead Survey for the three existing bridges located over Perry Creek on Barnes Road, east of Vassar Road, Millington Township, Tuscola County, Michigan. A Site Location Map, which shows the approximate location of the subject structures, accompanies this letter as Attachment I.

The purpose of this survey was to identify regulated asbestos-containing materials (ACM) in the structures prior to demolition/renovation, in accordance with the National Emissions Standard for Hazardous Air Pollutants (NESHAP) and the Michigan Department of Licensing and Regulatory Affairs (LARA) Part 602 - Asbestos Standards for Construction. Samples of paint were also collected to screen for possible lead-based paint. You have indicated the entire structures are intended to be replaced.

Bulk samples for asbestos testing were obtained from suspect materials on each bridge. Results of PLM testing show asbestos was not detected in any of the samples.

Paint chip samples were obtained from the steel beams on two of the bridges. Results of testing show detectable lead was shown in one of the samples.

Observations were made of the visible materials, from the accessible areas on and around the structure.

This survey was completed for the exclusive use of Tuscola County Road Commission, and they may rely on its contents.

The results of our investigation are presented below.

Structure Description

The subject structures are three consecutive concrete / steel structure bridges with steel guard rails and asphalt wear surfaces located on Barnes Road east of Vassar Road, Millington Township, Tuscola County, Michigan. The bridges span Perry Creek. Summarized below is information obtained from observations made during the site reconnaissance.

- Bridge 1 – Structure 10630
 - Single span deck approximately 30' x 40'
 - Concrete construction with steel beams below
 - Asphalt wear surface, steel guardrail, concrete bollards

- Bridge 2 – Structure 10631
 - Single span deck approximately 30' x 30'
 - Concrete construction with steel beams below
 - Asphalt wear surface, steel guardrail, concrete bollards

- Bridge 3 – Structure 10632
 - Single span deck approximately 30' x 30'
 - Concrete construction with steel beams below
 - Asphalt wear surface, steel guardrail, concrete bollards

Field Work

On August 3, 2023, a Certified Asbestos Building Inspector with McDowell & Associates observed the structures for the presence of suspect asbestos-containing materials.

As part of the asbestos testing, bulk samples were obtained from suspect materials from each bridge. Samples were collected in triplicate. The following table summarizes sample materials, designated 66120-1-1 A-C through 66120-1-8 A-C for the Barnes Road bridge (Structure 10630) (Bridge 1).

Sample ID	Material	Description	Location
66120-1-1 A-C	Abutment / Footing	Concrete	Footing/Abutment
66120-1-2 A-C	Upper Wall	Concrete	Wall / Top of Abutment
66120-1-3 A-C	Beams	Concrete	Beams
66120-1-4 A-C	Pad Material	Synthetic	Btwn. Beam and Abutment
66120-1-5 A-C	Deck	Concrete	Deck
66120-1-6 A-C	Curb/Wall	Concrete	Edge of Deck
66120-1-7 A-C	Aphalt Wear Surface	Asphalt	Deck
66120-1-8 A-C	Curb Wall Joint	Synthetic	Curb Wall

The following table summarizes sample materials, designated 66120-2-1 A-C through 66120-2-6 A-C for the Barnes Road bridge (Structure 10631) (Bridge 2).

Sample ID	Material	Description	Location
66120-2-1 A-C	Abutment	Concrete	Abutment
66120-2-2 A-C	Pad	Fiber Pad	Btwn. Deck and Abutment
66120-2-3 A-C	Deck	Concrete	Deck
66120-2-4 A-C	Bollards	Concrete	Edge of Deck
66120-2-5 A-C	Asphalt Wear Surface (bottom layer)	Asphalt	Deck
66120-2-6 A-C	Asphalt Wear Surface (top layer)	Asphalt	Deck

The following table summarizes sample materials, designated 66120-3-1 A-C through 66120-3-5 A-C for the Barnes Road bridge (Structure 10632) (Bridge 3).

Sample ID	Material	Description	Location
66120-3-1 A-C	Abutment	Concrete	Abutment
66120-3-2 A-C	Deck	Concrete	Deck
66120-3-3 A-C	Bollards	Concrete	Edge of Deck
66120-3-4 A-C	Asphalt Wear Surface (bottom layer)	Asphalt	Deck
66120-3-5 A-C	Asphalt Wear Surface (top layer)	Asphalt	Deck

Samples were submitted to EMSL Analytical, Inc. of Ann Arbor, Michigan for testing by polarized light microscopy (PLM, EPA Method 600/R-93/116).

One paint sample each was obtained from the paint on the beams on both Bridges 2 and 3. The paint appeared to be a grey color. No paint was visible on Bridge 1 on portions of the bridge/beams that were visible/accessible during the site visit.

PLM Results

According to the National Emission Standard for Hazardous Air Pollutants (NESHAP) definition, materials which contain greater than one percent asbestos are considered asbestos-containing materials.

Results of PLM testing show asbestos was not detected in any of the samples.

Lead Testing Results

Paint samples were submitted to EMSL Analytical, Inc. of Cinnaminson, New Jersey for flame atomic absorption testing to determine the presence of lead (Pb, Method 7000).

Results of testing show lead was detected at 0.0088 % by weight in the paint sample obtained from a beam on the Barnes Rd Bridge 2 (Structure 10631). Lead was not detected in the paint sample obtained from the beam on the Barnes Rd Bridge 3 (Structure 10631).

A copy of the PLM and lead results and chain-of-custody documentation are attached.

Limitations

Observations were made of the visible materials, from the accessible areas on and around the structure.

It is possible that additional materials will be encountered during demolition / renovation activities. In the event suspect materials are observed that were not identified in this assessment, the materials should be presumed to contain lead and/or asbestos and removed by a licensed abatement contractor or sampled and tested by a certified inspector.

Conclusions

McDowell & Associates has completed a limited Asbestos and Lead Survey to identify regulated asbestos-containing materials (ACM) and possible lead based paint in the structures prior to demolition/renovation.

Bulk samples were obtained from suspect materials for asbestos testing and lead testing.

Results of PLM testing show asbestos was not detected in any of the samples. Results of lead testing showed lead was detected at 0.0088 % by weight in the paint sample obtained from the beam of Barnes Rd Bridge 2 (Structure 10631).

OSHA/ MIOSHA Lead regulations would apply for materials containing lead at any concentration.

If you have any questions, or if we can be of further service, please do not hesitate to call.

Respectfully Submitted,

MCDOWELL & ASSOCIATES



Erik L. Johnson, B.S.
Environmental Scientist /
Midland Operations Manager
Michigan Asbestos Inspector # A29674



Douglas M. McDowell, M.S., P.E.
Vice President

Attachments:

- Site Location Map
- Laboratory Results

McDowell & Associates 23-66120

Barnes Road over Perry Creek





EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077

Tel/Fax: (800) 220-3675 / (856) 786-5974

<http://www.EMSL.com> / cinnasblab@EMSL.com

EMSL Order: 042319497

Customer ID: MCDO51

Customer PO: 23-66120

Project ID:

Attention: Erik Johnson
McDowell & Associates
3730 Jas. Savage Road
Midland, MI 48642

Phone: (989) 496-3610

Fax: (989) 496-3190

Received Date: 08/08/2023 9:40 AM

Analysis Date: 08/10/2023

Collected Date: 08/03/2023

Project: 23-66120 / MI

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
66120-1-1A <small>042319497-0001</small>	Abut / Footing - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-1B <small>042319497-0002</small>	Abut / Footing - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-1C <small>042319497-0003</small>	Abut / Footing - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-2A <small>042319497-0004</small>	Upper Wall - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-2B <small>042319497-0005</small>	Upper Wall - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-2C <small>042319497-0006</small>	Upper Wall - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-3A <small>042319497-0007</small>	Beams - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-3B <small>042319497-0008</small>	Beams - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-3C <small>042319497-0009</small>	Beams - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-4A <small>042319497-0010</small>	Pad Between Beam and Abut - Syn	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-4B <small>042319497-0011</small>	Pad Between Beam and Abut - Syn	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-4C <small>042319497-0012</small>	Pad Between Beam and Abut - Syn	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-5A <small>042319497-0013</small>	Deck - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-5B <small>042319497-0014</small>	Deck - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-5C <small>042319497-0015</small>	Deck - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-6A <small>042319497-0016</small>	Curb/Wall - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 08/10/2023 15:29:12



EMSL Analytical, Inc.

200 Route 130 North Cinnaminson, NJ 08077

Tel/Fax: (800) 220-3675 / (856) 786-5974

<http://www.EMSL.com> / cinnasblab@EMSL.com

EMSL Order: 042319497
Customer ID: MCDO51
Customer PO: 23-66120
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
66120-1-6B <i>042319497-0017</i>	Curb/Wall - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-6C <i>042319497-0018</i>	Curb/Wall - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-7A <i>042319497-0019</i>	Deck Overlay - Asphalt	Gray/Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-7B <i>042319497-0020</i>	Deck Overlay - Asphalt	Gray/Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-7C <i>042319497-0021</i>	Deck Overlay - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-8A <i>042319497-0022</i>	Curb Wall Joint - Syn	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-8B <i>042319497-0023</i>	Curb Wall Joint - Syn	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-1-8C <i>042319497-0024</i>	Curb Wall Joint - Syn	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-1A <i>042319497-0025</i>	Abut - Concrete	Gray/Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-1B <i>042319497-0026</i>	Abut - Concrete	Gray/Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-1C <i>042319497-0027</i>	Abut - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-2A <i>042319497-0028</i>	Pad	Black Non-Fibrous Homogeneous	85% Cellulose	15% Non-fibrous (Other)	None Detected
66120-2-2B <i>042319497-0029</i>	Pad	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-2C <i>042319497-0030</i>	Pad	Black Fibrous Homogeneous	45% Cellulose	55% Non-fibrous (Other)	None Detected
66120-2-3A <i>042319497-0031</i>	Deck - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-3B <i>042319497-0032</i>	Deck - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-3C <i>042319497-0033</i>	Deck - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-4A <i>042319497-0034</i>	Bollard - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-4B <i>042319497-0035</i>	Bollard - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 08/10/2023 15:29:12



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<http://www.EMSL.com> / cinnasblab@EMSL.com

EMSL Order: 042319497
Customer ID: MCDO51
Customer PO: 23-66120
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
66120-2-4C <small>042319497-0036</small>	Bollard - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-5A <small>042319497-0037</small>	Deck Overlay - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-5B <small>042319497-0038</small>	Deck Overlay - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-5C <small>042319497-0039</small>	Deck Overlay - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-6A <small>042319497-0040</small>	Deck Overlay Top - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-6B <small>042319497-0041</small>	Deck Overlay Top - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-2-6C <small>042319497-0042</small>	Deck Overlay Top - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-1A <small>042319497-0043</small>	Abut - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-1B <small>042319497-0044</small>	Abut - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-1C <small>042319497-0045</small>	Abut - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-2A <small>042319497-0046</small>	Deck - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-2B <small>042319497-0047</small>	Deck - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-2C <small>042319497-0048</small>	Deck - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-3A <small>042319497-0049</small>	Bollard - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-3B <small>042319497-0050</small>	Bollard - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-3C <small>042319497-0051</small>	Bollard - Concrete	Gray Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-4A <small>042319497-0052</small>	Deck Overlay - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-4B <small>042319497-0053</small>	Deck Overlay - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-4C <small>042319497-0054</small>	Deck Overlay - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Initial report from: 08/10/2023 15:29:12



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EMSL Order: 042319497
Customer ID: MCDO51
Customer PO: 23-66120
Project ID:

Test Report: Asbestos Analysis of Bulk Materials via AHERA Method 40CFR 763 Subpart E Appendix E supplemented with EPA 600/R-93/116 using Polarized Light Microscopy

Sample	Description	Appearance	Non-Asbestos		Asbestos
			% Fibrous	% Non-Fibrous	% Type
66120-3-5A 042319497-0055	Deck Overlay Top - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-5B 042319497-0056	Deck Overlay Top - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected
66120-3-5C 042319497-0057	Deck Overlay Top - Asphalt	Black Non-Fibrous Homogeneous		100% Non-fibrous (Other)	None Detected

Analyst(s)

Guillermo Hernandez (38)

Olivia Santiago (19)

Samantha Rundstrom, Laboratory Manager
or Other Approved Signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted. The above analyses were performed in general compliance with Appendix E to Subpart E of 40 CFR (previously EPA 600/M4-82-020 "Interim Method") but augmented with procedures outlined in the 1993 ("final") version of the method. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the federal government. Non-friable organically bound materials present a problem matrix and therefore EMSL recommends gravimetric reduction prior to analysis. Unless requested by the client, building materials manufactured with multiple layers (i.e. linoleum, wallboard, etc.) are reported as a single sample. Estimation of uncertainty is available on request.

Samples analyzed by LA Testing Ontario, CA NVLAP Lab Code 600239-0; CA ELAP 3053

Initial report from: 08/10/2023 15:29:12



EMSL ANALYTICAL, INC.
LABORATORY • PRODUCTS • TRAINING

Asbestos Bulk Building Materials - Chain of Custody

EMSL Order Number / Lab Use Only

042319497

EMSL Analytical, Inc.
200 Route 130 North

Cinnaminson, NJ 08077
PHONE: 1-800-220-3675
EMAIL: c@emsl.com

Customer Information Customer ID: Company Name: McDowell & Associates Contact Name: Erik Johnson Street Address: 3730 James Savage Rd City, State, Zip: MIDLAND MI 48642 Country: US Phone: 9894963610 Email(s) for Report: erik.johnson@mcdowasc.com	Billing Information Billing ID: Company Name: McDowell & Associates Billing Contact: Robert Korte Street Address: 21355 Hatcher Avenue City, State, Zip: Ferndale MI Country: US Phone: 248-399-2066 Email(s) for Invoice: bob.korte@mcdowasc.com
--	--

Project Information			
Project Name/No: 23-66120		Purchase Order: 23-66120	
EMSL LIMS Project ID: (If applicable, EMSL will provide)	US State where samples collected: MI	State of Connecticut (CT) must select project location: <input type="checkbox"/> Commercial (Taxable) <input type="checkbox"/> Residential (Non-Taxable)	
Sampled By Name: Erik Johnson	Sampled By Signature:	Date Sampled: 8/3/23	No. of Samples in Shipment: 57

Turn-Around-Time (TAT)

3 Hour
 6 Hour
 24 Hour
 32 Hour
 48 Hour
 72 Hour
 96 Hour
 1 Week
 2 Week

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

PLM - Bulk (reporting limit)	Test Selection	TEM - Bulk
<input checked="" type="checkbox"/> PLM EPA 600/R-93/116 (<1%) <input type="checkbox"/> PLM EPA NOB (<1%) <input type="checkbox"/> POINT COUNT <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1,000 (<0.1%) <input type="checkbox"/> POINT COUNT w/ GRAVIMETRIC <input type="checkbox"/> 400 (<0.25%) <input type="checkbox"/> 1,000 (<0.1%) <input type="checkbox"/> NIOSH 9002 (<1%) <input type="checkbox"/> NYS 198.1 (Friable - NY) <input type="checkbox"/> NYS 198.6 NOB (Non-Friable - NY) <input type="checkbox"/> NYS 198.8 (Vermiculite SM-V)	<input type="checkbox"/> TEM EPA NOB <input type="checkbox"/> NYS NOB 198.4 (Non-Friable - NY) <input type="checkbox"/> TEM EPA 600/R-93/116 w Milling Prep (<0.1%) Other Tests (please specify)	RECEIVED EMSL CINNAMINSON, NJ 2023 AUG - 8 AM 11:11
<input type="checkbox"/> Positive Stop - Clearly Identified Homogeneous Areas (HA)		

Sample Number	HA Number	Sample Location	Material Description
66120-1-1 (A-C)		Abut / Footing	Concrete
66120-1-2 (A-C)		Upper Wall	Concrete
66120-1-3 (A-C)		Beams	Concrete
66120-1-4 (A-C)		Pad Btwn Beam & Abut	Syn
66120-1-5 (A-C)		Deck	Concrete
66120-1-6 (A-C)		Curb/Wall	Concrete
66120-1-7 (A-C)		Deck Overlay	Asphalt
66120-1-8 (A-C)		Curb Wall Joint	Syn

Special Instructions and/or Regulatory Requirements (Sample Specifications, Processing Methods, Limits of Detection, etc.)

57E9

Method of Shipment:	Sample Condition Upon Receipt:
Relinquished by: Erik Johnson	Received by:
Date/Time: 8/4/23 1500	Date/Time: 8/8/23 940am
Relinquished by:	Received by:
Date/Time:	Date/Time:

Controlled Document - Asbestos Bulk R7 9/14/2021

AGREE TO ELECTRONIC SIGNATURE (By checking, I consent to signing this Chain of Custody document by electronic signature.)

EMSL Analytical, Inc.'s Laboratory Terms and Conditions are incorporated into this Chain of Custody by reference in their entirety. Submission of samples to EMSL Analytical, Inc. constitutes acceptance and acknowledgment of all terms and conditions by Customer.



EMSL Analytical, Inc.

200 Route 130 North, Cinnaminson, NJ 08077

Phone/Fax: (856) 303-2500 / (856) 786-5974

<http://www.EMSL.com>

cinnaminsonleadlab@emsl.com

EMSL Order:	202306485
CustomerID:	MCDO51
CustomerPO:	23-66120
ProjectID:	

Attn: **Erik Johnson**
McDowell & Associates
3730 Jas. Savage Road

Phone: (989) 496-3610
 Fax: (989) 496-3190
 Received: 8/8/2023 11:00 AM
 Collected: 8/3/2023

Midland, MI 48642

Project: **23-66120**

Test Report: Lead in Paint Chips by Flame AAS (SW 846 3050B/7000B)*

<i>Client Sample Description</i>	<i>Lab ID</i>	<i>Collected</i>	<i>Analyzed</i>	<i>Weight</i>	<i>Lead Concentration</i>
66120-2-7	202306485-0001	8/3/2023	8/8/2023	0.2689 g	0.0088 % wt
	Site: Beams				
66120-3-6	202306485-0002	8/3/2023	8/8/2023	0.2544 g	<0.0080 % wt
	Site: Beams				

Owen Mckenna, Lead Laboratory Director
or other approved signatory

EMSL maintains liability limited to cost of analysis. Interpretation and use of test results are the responsibility of the client. This report relates only to the samples reported above, and may not be reproduced, except in full, without written approval by EMSL. EMSL bears no responsibility for sample collection activities or analytical method limitations. The report reflects the samples as received. Results are generated from the field sampling data (sampling volumes and areas, locations, etc.) provided by the client on the Chain of Custody. Samples are within quality control criteria and met method specifications unless otherwise noted.

* Analysis following Lead in Paint by EMSL SOP/Determination of Environmental Lead by FLAA. Reporting limit is 0.008% wt based on the minimum sample weight per our SOP. "<" (less than) result signifies the analyte was not detected at or above the reporting limit. Measurement of uncertainty is available upon request. Definitions of modifications are available upon request.

Samples analyzed by EMSL Analytical, Inc. Cinnaminson, NJ NELAP Certifications: NJ 03036, NY 10872, PA 68-00367, AIHA LAP, LLC-ELLAP Accredited #100194, A2LA Accredited - Certificate #2845.01

Initial report from 08/09/2023 16:24:39



EMSL ANALYTICAL, INC.
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Lead Chain of Custody

EMSL Order Number / Lab Use Only

202306485

EMSL Analytical, Inc.
200 Route 130 North

Cinnaminson, NJ 08077
PHONE: 1-800-220-3675
EMAIL: c@emsl.com

Customer Information	Customer ID:	Billing ID:
	Company Name: McDowell & Associates	Company Name: McDowell & Associates
	Contact Name: Erik Johnson	Billing Contact: Robert Korte
	Street Address: 3730 James Savage Rd	Street Address: 21355 Hatcher Avenue
	City, State, Zip: MIDLAND MI 48642 Country: US	City, State, Zip: Ferndale MI 48820 Country: US
Phone: 9894963610	Phone: 248-399-2066	
Email(s) for Report: erik.johnson@mcdowasc.com	Email(s) for Invoice: bob.korte@mcdowasc.com	

Project Name/No: 23-66120		Purchase Order: 23-66120
EMSL LIMS Project ID: (If applicable, EMSL will provide)	US State where samples collected: MI	State of Connecticut (CT) must select project location: <input type="checkbox"/> Commercial (Taxable) <input type="checkbox"/> Residential (Non-Taxable)
Sampled By Name:	Sampled By Signature:	No. of Samples in Shipment: 2

Turn-Around-Time (TAT)

3 Hour
 6 Hour
 24 Hour
 32 Hour
 48 Hour
 72 Hour
 96 Hour
 1 Week
 2 Week

Please call ahead for large projects and/or turnaround times 6 Hours or Less. *32 Hour TAT available for select tests only; samples must be submitted by 11:30am.

MATRIX	METHOD	INSTRUMENT	REPORTING LIMIT	SELECTION
CHIPS <input checked="" type="checkbox"/> % by wt. <input type="checkbox"/> ppm (mg/kg) <input type="checkbox"/> mg/cm ²	SW 846-7000B	Flame Atomic Absorption	0.008% (80ppm)	<input checked="" type="checkbox"/>
Reporting Limit based on a minimum 0.25g sample weight	SW 846-6010D	ICP-OES	0.0004% (4ppm)	<input type="checkbox"/>
	NIOSH 7082	Flame Atomic Absorption	4µg/filter	<input type="checkbox"/>
AIR		ICP-OES	0.5µg/filter	<input type="checkbox"/>
WIPE <input type="checkbox"/> ASTM <input type="checkbox"/> NON-ASTM				<input type="checkbox"/>
*If no box is checked, non-ASTM assumed				<input type="checkbox"/>
TCLP				<input type="checkbox"/>
SPLP				<input type="checkbox"/>
TTLC				<input type="checkbox"/>
STLC				<input type="checkbox"/>
Soil				<input type="checkbox"/>
Wastewater				<input type="checkbox"/>
Unpreserved <input type="checkbox"/>				<input type="checkbox"/>
Preserved with HNO ₃ <input type="checkbox"/>				<input type="checkbox"/>
Drinking Water				<input type="checkbox"/>
Unpreserved <input type="checkbox"/>				<input type="checkbox"/>
Preserved with HNO ₃ <input type="checkbox"/>				<input type="checkbox"/>
TSP/SPM Filter				<input type="checkbox"/>
Other:				<input type="checkbox"/>

Looking for Lead % in paint only. Did best I could to get chips w/out too much metal.

Sample Number	Sample Location	Volume / Area	Date / Time Sampled
66120-2-7	Beams		8-3-23
66120-3-6	Beams		8-3-23

Method of Shipment:	Sample Condition Upon Receipt:
Relinquished by: Erik Johnson <i>[Signature]</i>	Date/Time: 8/4/2023 1500
Relinquished by:	Date/Time:
Received by: <i>[Signature]</i>	Date/Time: 8/11/23 11am
Received by:	Date/Time:

TUSCOLA COUNTY ROAD COMMISSION

TITLE IV COMPLIANCE

APPENDIX A

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

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

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