



STATE OF MICHIGAN PROCUREMENT

Michigan Department of Transportation

425 W. Ottawa St., Lansing, MI 48913
P.O. Box 30050, Lansing, MI 48933

CONTRACT CHANGE NOTICE

Change Notice Number 1
to
Contract Number 591M190000001000

CONTRACTOR	Ferrovial Services Infrastructure, Inc.
	10814 Jollyville Rd., Bldg. 4, Suite 160
	Austin, TX 78759
	Daniel J. Filer
	(713) 964-2822
	Bidding.fsna@ferrovialservices.com

STATE	Program Manager	Doug Lynch	MDOT
		(810) 217-1729	
	Contract Administrator	LynchD@michigan.gov	
		Terry Harris	MDOT
		(517) 335-2507	
		HarrisT@michigan.gov	

CONTRACT SUMMARY				
DESCRIPTION: Performance based flexible asset maintenance for State Trunklines in Monroe County; Michigan Department of Transportation (MDOT)				
INITIAL EFFECTIVE DATE	INITIAL EXPIRATION DATE	INITIAL AVAILABLE OPTIONS	EXPIRATION DATE BEFORE CHANGE(S) NOTED BELOW	
October 1, 2019	September 30, 2022	3 one- year options		
PAYMENT TERMS		DELIVERY TIMEFRAME		
Net 45 Days		N/A		
ALTERNATE PAYMENT OPTIONS			EXTENDED PURCHASING	
<input type="checkbox"/> P-card <input type="checkbox"/> Direct Voucher (DV) <input type="checkbox"/> Other			<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
MINIMUM DELIVERY REQUIREMENTS				
N/A				
DESCRIPTION OF CHANGE NOTICE				
OPTION	LENGTH OF OPTION	EXTENSION	LENGTH OF EXTENSION	REVISED EXP. DATE
<input type="checkbox"/>		<input checked="" type="checkbox"/>		
CURRENT VALUE	VALUE OF CHANGE NOTICE		ESTIMATED AGGREGATE CONTRACT VALUE	
\$9,029,314.80	\$0.00		\$9,029,314.80	
DESCRIPTION: Change Notice 1 amends the Contract to modify the Standard Contract terms in Section 26 (General Indemnification) and Section 50 (Schedules) which were included in the RFP but inadvertently omitted from the Contract. In addition, Change Notice 1 amends the Contract to incorporate the Fixed Asset Maintenance Services (FAMS) Attachments (A-T) that were included with the RFP but inadvertently omitted from the Contract.				

FOR THE CONTRACTOR:

Ferrovial Services Infrastructure, Inc.
Company Name

Authorized Agent Signature

Daniel J. Filer
Authorized Agent (Print or Type)

10/7/2019
Date

FOR THE STATE:

Signature

Carol Rademacher
Name & Title

Department of Transportation
Agency

10/8/2019
Date



STATE OF MICHIGAN

STANDARD CONTRACT TERMS

This STANDARD CONTRACT ("**Contract**") is agreed to between the State of Michigan (the "**State**") and Ferrovial Services Infrastructure, Inc. ("**Contractor**"), a Texas company. This Contract is effective on 10/1/2019 ("**Effective Date**"), and unless terminated, expires on 9/30/2022.

This Contract may be renewed for up to three (3) additional one (1) year period(s). Renewal is at the sole discretion of the State and will automatically extend the Term of this Contract. The State will document its exercise of renewal options via Contract Change Notice.

The parties agree as follows:

1. **Duties of Contractor.** Contractor must perform the services and provide the deliverables described in **Schedule A – Statement of Work** (the "**Contract Activities**"). An obligation to provide delivery of any commodity is considered a service and is a Contract Activity.

Contractor must furnish all labor, equipment, materials, and supplies necessary for the performance of the Contract Activities, and meet operational standards, unless otherwise specified in Schedule A.

Contractor must: (a) perform the Contract Activities in a timely, professional, safe, and workmanlike manner consistent with standards in the trade, profession, or industry; (b) meet or exceed the performance and operational standards, and specifications of the Contract; (c) provide all Contract Activities in good quality, with no material defects; (d) not interfere with the State's operations; (e) obtain and maintain all necessary licenses, permits or other authorizations necessary for the performance of the Contract; (f) cooperate with the State, including the State's quality assurance personnel, and any third party to achieve the objectives of the Contract; (g) return to the State any State-furnished equipment or other resources in the same condition as when provided when no longer required for the Contract; (h) not make any media releases without prior written authorization from the State; (i) assign to the State any claims resulting from state or federal antitrust violations to the extent that those violations concern materials or services supplied by third parties toward fulfillment of the Contract; (j) comply with all State physical and IT security policies and standards which will be made available upon request; and (k) provide the State priority in performance of the Contract except as mandated by federal disaster response requirements. Any breach under this paragraph is considered a material breach.

Contractor must also be clearly identifiable while on State property by wearing identification issued by the State, and clearly identify themselves whenever making contact with the State.

2. **Notices.** All notices and other communications required or permitted under this Contract must be in writing and will be considered given and received: (a) when verified by written receipt if sent by courier; (b) when actually received if sent by mail without verification of receipt; or (c) when verified by automated receipt or electronic logs if sent by facsimile or email.

If to State:	If to Contractor:
Terry Harris 425 W. Ottawa Street Lansing, MI. 48909 Email: harrist@michigan.gov Phone: (517) 335-2507	David Fenton 10814 Jollyville Rd. Bldg. 4, Suite 160 Austin, TX. 78759 David.Fenton@ferrovialservices.com (737)529-7480

3. **Contract Administrator.** The Contract Administrator for each party is the only person authorized to modify any terms of this Contract, and approve and execute any change under this Contract (each a “**Contract Administrator**”):

State:	Contractor:
Terry Harris 425 W. Ottawa Street Lansing, MI. 48909 Email: harrist@michigan.gov Phone: (517) 335-2507	David Fenton 10814 Jollyville Rd. Bldg. 4, Suite 160 Austin, TX. 78759 David.Fenton@ferrovialservices.com (737)529-7480

4. **Program Manager.** The Program Manager for each party will monitor and coordinate the day-to-day activities of the Contract (each a “**Program Manager**”):

State:	Contractor:
Doug Lynch Brighton Transportation Service Center (TSC) 10321 E. Grand River Suite 500 Brighton, MI 48116 lynchD@michigan.gov (810) 217-1729	David Fenton 10814 Jollyville Rd. Bldg. 4, Suite 160 Austin, TX. 78759 David.Fenton@ferrovialservices.com (737)529-7480

5. **Performance Guarantee.** Contractor must at all times have financial resources sufficient, in the opinion of the State, to ensure performance of the Contract and must provide proof upon request. The State may require a performance bond (as specified in Schedule A) if, in the opinion of the State, it will ensure performance of the Contract.
6. **Insurance Requirements.** Contractor must maintain the insurances identified below and is responsible for all deductibles. All required insurance must: (a) protect the State from claims that may arise out of, are alleged to arise out of, or result from Contractor's or a subcontractor's performance; (b) be primary and non-contributing to any comparable liability insurance (including self-insurance) carried by the State; and (c) be provided by a company with an A.M. Best rating of "A-" or better, and a financial size of VII or better.

Required Limits	Additional Requirements
Commercial General Liability Insurance	
<u>Minimum Limits:</u> \$1,000,000 Each Occurrence Limit \$1,000,000 Personal & Advertising Injury Limit \$2,000,000 General Aggregate Limit \$2,000,000 Products/Completed Operations <u>Deductible Maximum:</u> \$50,000 Each Occurrence	Contractor must have their policy endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds using endorsement CG 20 10 11 85, or both CG 2010 07 04 and CG 2037 07 04. Coverage must not have exclusions or limitations related to sexual abuse and molestation liability.

Umbrella or Excess Liability Insurance	
<u>Minimum Limits:</u> \$5,000,000 General Aggregate	Contractor must have their policy follow form.
Automobile Liability Insurance	
<u>Minimum Limits:</u> \$1,000,000 Per Accident	Contractor must have their policy: (1) endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds; and (2) include Hired and Non-Owned Automobile coverage.
Workers' Compensation Insurance	
<u>Minimum Limits:</u> Coverage according to applicable laws governing work activities.	Waiver of subrogation, except where waiver is prohibited by law.
Employers Liability Insurance	
<u>Minimum Limits:</u>	

\$500,000 Each Accident \$500,000 Each Employee by Disease \$500,000 Aggregate Disease.	
Property Insurance	
Environmental and Pollution Liability (Errors and Omissions)	
<u>Minimum Limits:</u> \$1,000,000 Each Occurrence \$2,000,000 Annual Aggregate	Contractor must have their policy: (1) be applicable to the work being performed, including completed operations equal to or exceeding statute of repose; (2) not have exclusions or limitations related to Transportation (upset overturn, spills during loading or unloading, Hazardous Materials Handling, and Non Owned disposal site liability; and (3) endorsed to add "the State of Michigan, its departments, division, agencies, offices, commissions, officers, employees, and agents" as additional insured.

If any of the required policies provide **claims-made** coverage, the Contractor must: (a) provide coverage with a retroactive date before the effective date of the contract or the beginning of Contract Activities; (b) maintain coverage and provide evidence of coverage for at least three (3) years after completion of the Contract Activities; and (c) if coverage is cancelled or not renewed, and not replaced with another claims-made policy form with a retroactive date prior to the contract effective date, Contractor must purchase extended reporting coverage for a minimum of three (3) years after completion of work.

Contractor must: (a) provide insurance certificates to the Contract Administrator, containing the agreement or delivery order number, at Contract formation and within 20 calendar days of the expiration date of the applicable policies; (b) require that subcontractors maintain the required insurances contained in this Section; (c) notify the Contract Administrator within 5 business days if any insurance is cancelled; and (d) waive all rights against the State for damages covered by insurance. Failure to maintain the required insurance does not limit this waiver.

This Section is not intended to and is not to be construed in any manner as waiving, restricting or limiting the liability of either party for any obligations under this Contract (including any provisions hereof requiring Contractor to indemnify, defend and hold harmless the State).

7. **Reserved.**

8. **Reserved.**

9. **Independent Contractor.** Contractor is an independent contractor and assumes all rights, obligations and liabilities set forth in this Contract. Contractor, its employees, and agents will not be considered employees of the State. No partnership or joint venture relationship is created by virtue of this Contract. Contractor, and not the State, is responsible for the payment of wages, benefits and taxes of Contractor's employees and any subcontractors. Prior performance does not modify Contractor's status as an independent contractor.

10. **Subcontracting.** Contractor may not delegate any of its obligations under the Contract without the prior written approval of the State. Contractor must notify the State at least 90 calendar days before the proposed delegation

and provide the State any information it requests to determine whether the delegation is in its best interest. If approved, Contractor must: (a) be the sole point of contact regarding all contractual matters, including payment and charges for all Contract Activities; (b) make all payments to the subcontractor; and (c) incorporate the terms and conditions contained in this Contract in any subcontract with a subcontractor. Contractor remains responsible for the completion of the Contract Activities, compliance with the terms of this Contract, and the acts and omissions of the subcontractor. The State, in its sole discretion, may require the replacement of any subcontractor.

11. **Staffing.** The State's Contract Administrator may require Contractor to remove or reassign personnel by providing a notice to Contractor.
12. **Background Checks.** Pursuant to Michigan law, all agencies subject to IRS Pub. 1075 are required to ask the Michigan State Police to perform fingerprint background checks on all employees, including Contractor and Subcontractor employees, who may have access to any database of information maintained by the federal government that contains confidential or personal information, including, but not limited to, federal tax information. Further, pursuant to Michigan law, any agency described above is prohibited from providing Contractors or Subcontractors with the result of such background check. For more information, please see Michigan Public Act 427 of 2018. Upon request, Contractor must perform background checks on all employees and subcontractors and its employees prior to their assignment. The scope is at the discretion of the State and documentation must be provided as requested. Contractor is responsible for all costs associated with the requested background checks. The State, in its sole discretion, may also perform background checks.
13. **Assignment.** Contractor may not assign this Contract to any other party without the prior approval of the State. Upon notice to Contractor, the State, in its sole discretion, may assign in whole or in part, its rights or responsibilities under this Contract to any other party. If the State determines that a novation of the Contract to a third party is necessary, Contractor will agree to the novation and provide all necessary documentation and signatures.
14. **Change of Control.** Contractor will notify within 30 days of any public announcement or otherwise once legally permitted to do so, the State of a change in Contractor's organizational structure or ownership. For purposes of this Contract, a change in control means any of the following: (a) a sale of more than 50% of Contractor's stock; (b) a sale of substantially all of Contractor's assets; (c) a change in a majority of Contractor's board members; (d) consummation of a merger or consolidation of Contractor with any other entity; (e) a change in ownership through a transaction or series of transactions; (f) or the board (or the stockholders) approves a plan of complete liquidation. A change of control does not include any consolidation or merger effected exclusively to change the domicile of Contractor, or any transaction or series of transactions principally for bona fide equity financing purposes.

In the event of a change of control, Contractor must require the successor to assume this Contract and all of its obligations under this Contract.

15. **Ordering.** Contractor is not authorized to begin performance until receipt of authorization as identified in Schedule A.
16. **Acceptance.** Contract Activities are subject to inspection and testing by the State within 30 calendar days of the State's receipt of them ("**State Review Period**"), unless otherwise provided in Schedule A. If the Contract Activities are not fully accepted by the State, the State will notify Contractor by the end of the State Review Period that either: (a) the Contract Activities are accepted, but noted deficiencies must be corrected; or (b) the Contract Activities are rejected. If the State finds material deficiencies, it may: (i) reject the Contract Activities without performing any further inspections; (ii) demand performance at no additional cost; or (iii) terminate this Contract in accordance with Section 23, Termination for Cause.

Within 10 business days from the date of Contractor's receipt of notification of acceptance with deficiencies or rejection of any Contract Activities, Contractor must cure, at no additional cost, the deficiency and deliver unequivocally acceptable Contract Activities to the State. If acceptance with deficiencies or rejection of the Contract Activities impacts the content or delivery of other non-completed Contract Activities, the parties' respective Program Managers must determine an agreed to number of days for re-submission that minimizes the overall impact to the Contract. However, nothing herein affects, alters, or relieves Contractor of its obligations to correct deficiencies in accordance with the time response standards set forth in this Contract.

If Contractor is unable or refuses to correct the deficiency within the time response standards set forth in this Contract, the State may cancel the order in whole or in part. The State, or a third party identified by the State, may perform the Contract Activities and recover the difference between the cost to cure and the Contract price plus an additional 10% administrative fee.

17. **Reserved.**

- 18. Risk of Loss and Title.** Until final acceptance, title and risk of loss or damage to Contract Activities remains with Contractor. Contractor is responsible for filing, processing, and collecting all damage claims. The State will record and report to Contractor any evidence of visible damage. If the State rejects the Contract Activities, Contractor must remove them from the premises within 10 calendar days after notification of rejection. The risk of loss of rejected or non-conforming Contract Activities remains with Contractor. Rejected Contract Activities not removed by Contractor within 10 calendar days will be deemed abandoned by Contractor, and the State will have the right to dispose of it as its own property. Contractor must reimburse the State for costs and expenses incurred in storing or effecting removal or disposition of rejected Contract Activities.
- 19. Warranty Period.** The warranty period, if applicable, for Contract Activities is a fixed period commencing on the date specified in Schedule A. If the Contract Activities do not function as warranted during the warranty period, the State may return such non-conforming Contract Activities to the Contractor for a full refund.
- 20. Terms of Payment.** Invoices must conform to the requirements communicated from time-to-time by the State. All undisputed amounts are payable within 45 days of the State's receipt. Contractor may only charge for Contract Activities performed as specified in Schedule A. Invoices must include an itemized statement of all charges. The State is exempt from State sales tax for direct purchases and may be exempt from federal excise tax, if Services purchased under this Agreement are for the State's exclusive use. All prices are exclusive of taxes, and Contractor is responsible for all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any federal, state, or local governmental entity on any amounts payable by the State under this Contract.

The State has the right to withhold payment of any disputed amounts until the parties agree as to the validity of the disputed amount. The State will notify Contractor of any dispute within a reasonable time. Payment by the State will not constitute a waiver of any rights as to Contractor's continuing obligations, including claims for deficiencies or substandard Contract Activities. Contractor's acceptance of final payment by the State constitutes a waiver of all claims by Contractor against the State for payment under this Contract, other than those claims previously filed in writing on a timely basis and still disputed.

The State will only disburse payments under this Contract through Electronic Funds Transfer (EFT). Contractor must register with the State at <http://www.michigan.gov/SIGMAVSS> to receive electronic fund transfer payments. If Contractor does not register, the State is not liable for failure to provide payment. Without prejudice to any other right or remedy it may have, the State reserves the right to set off at any time any amount then due and owing to it by Contractor against any amount payable by the State to Contractor under this Contract.

- 21. Liquidated Damages.** Liquidated damages, if applicable, will be assessed as described in Schedule A.
- 22. Stop Work Order.** The State may suspend any or all activities under the Contract at any time. The State will provide Contractor a written stop work order detailing the suspension. Contractor must comply with the stop work order upon receipt. Within 90 calendar days, or any longer period agreed to by Contractor, the State will either: (a) issue a notice authorizing Contractor to resume work, or (b) terminate the Contract or delivery order. The State will not pay for Contract Activities, Contractor's lost profits, or any additional compensation during a stop work period.
- 23. Termination for Cause.** The State may terminate this Contract for cause, in whole or in part, if Contractor, as determined by the State: (a) endangers the value, integrity, or security of any location, data, or personnel; (b) becomes insolvent, petitions for bankruptcy court proceedings, or has an involuntary bankruptcy proceeding filed against it by any creditor; (c) engages in any conduct that may expose the State to liability; (d) breaches any of its material duties or obligations; or (e) fails to cure a breach within the time stated in a notice of breach. Any reference to specific breaches being material breaches within this Contract will not be construed to mean that other breaches are not material.

If the State terminates this Contract under this Section, the State will issue a termination notice specifying whether Contractor must: (a) cease performance immediately, or (b) continue to perform for a specified period. If it is later determined that Contractor was not in breach of the Contract, the termination will be deemed to have been a Termination for Convenience, effective as of the same date, and the rights and obligations of the parties will be limited to those provided in Section 24, Termination for Convenience.

The State will only pay for amounts due to Contractor for Contract Activities accepted by the State on or before the date of termination, subject to the State's right to set off any amounts owed by the Contractor for the State's reasonable costs in terminating this Contract. The Contractor must pay all reasonable costs incurred by the State

in terminating this Contract for cause, including administrative costs, attorneys' fees, court costs, transition costs, and any costs the State incurs to procure the Contract Activities from other sources.

- 24. Termination for Convenience.** The State may immediately terminate this Contract in whole or in part without penalty and for any reason, including but not limited to, appropriation or budget shortfalls. The termination notice will specify whether Contractor must: (a) cease performance of the Contract Activities immediately, or (b) continue to perform the Contract Activities in accordance with Section 25, Transition Responsibilities. If the State terminates this Contract for convenience, the State will pay all reasonable costs, as determined by the State, for State approved Transition Responsibilities.
- 25. Transition Responsibilities.** Upon termination or expiration of this Contract for any reason, Contractor must, for a period of time specified by the State (not to exceed 90 calendar days), provide all reasonable transition assistance requested by the State, to allow for the expired or terminated portion of the Contract Activities to continue without interruption or adverse effect, and to facilitate the orderly transfer of such Contract Activities to the State or its designees. Such transition assistance may include, but is not limited to: (a) continuing to perform the Contract Activities at the established Contract rates; (b) taking all reasonable and necessary measures to transition performance of the work, including all applicable Contract Activities, training, equipment, software, leases, reports and other documentation, to the State or the State's designee; (c) taking all necessary and appropriate steps, or such other action as the State may direct, to preserve, maintain, protect, or return to the State all materials, data, property, and confidential information provided directly or indirectly to Contractor by any entity, agent, vendor, or employee of the State; (d) transferring title in and delivering to the State, at the State's discretion, all completed or partially completed deliverables prepared under this Contract as of the Contract termination date; and (e) preparing an accurate accounting from which the State and Contractor may reconcile all outstanding accounts (collectively, "**Transition Responsibilities**"). This Contract will automatically be extended through the end of the transition period.
- 26. General Indemnification.** Contractor must defend, indemnify and hold the State, its departments, divisions, agencies, offices, commissions, officers, and employees harmless, as well as Monroe County Road Commission and its employees without limitation, from and against any and all actions, claims, losses, liabilities, damages, costs, attorney fees, and expenses (including those required to establish the right to indemnification), arising out of or relating to: (a) any breach by Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable) of any of the promises, agreements, representations, warranties, or insurance requirements contained in this Contract; (b) any infringement, misappropriation, or other violation of any intellectual property right or other right of any third party; (c) any bodily injury, death, or damage to real or tangible personal property occurring wholly or in part due to action or inaction by Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable); and (d) any acts or omissions of Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable).

The State will notify Contractor in writing if indemnification is sought; however, failure to do so will not relieve Contractor, except to the extent that Contractor is materially prejudiced. Contractor must, to the satisfaction of the State, demonstrate its financial ability to carry out these obligations.

The State is entitled to: (i) regular updates on proceeding status; (ii) participate in the defense of the proceeding; (iii) employ its own counsel; and to (iv) retain control of the defense if the State deems necessary. Contractor will not, without the State's written consent (not to be unreasonably withheld), settle, compromise, or consent to the entry of any judgment in or otherwise seek to terminate any claim, action, or proceeding. To the extent that any State employee, official, or law may be involved or challenged, the State may, at its own expense, control the defense of that portion of the claim.

Any litigation activity on behalf of the State, or any of its subdivisions under this Section, must be coordinated with the Department of Attorney General. An attorney designated to represent the State may not do so until approved by the Michigan Attorney General and appointed as a Special Assistant Attorney General.

- 27. Infringement Remedies.** If, in either party's opinion, any piece of equipment, software, commodity, or service supplied by Contractor or its subcontractors, or its operation, use or reproduction, is likely to become the subject of a copyright, patent, trademark, or trade secret infringement claim, Contractor must, at its expense: (a) procure for the State the right to continue using the equipment, software, commodity, or service, or if this option is not reasonably available to Contractor, (b) replace or modify the same so that it becomes non-infringing; or (c) accept its return by the State with appropriate credits to the State against Contractor's charges and reimburse the State for any losses or costs incurred as a consequence of the State ceasing its use and returning it.

28. **Limitation of Liability and Disclaimer of Damages.** IN NO EVENT WILL THE STATE'S AGGREGATE LIABILITY TO CONTRACTOR UNDER THIS CONTRACT, REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR BY STATUTE OR OTHERWISE, FOR ANY CLAIM RELATED TO OR ARISING UNDER THIS CONTRACT, EXCEED THE MAXIMUM AMOUNT OF FEES PAYABLE UNDER THIS CONTRACT. The State is not liable for consequential, incidental, indirect, or special damages, regardless of the nature of the action.
29. **Disclosure of Litigation, or Other Proceeding.** Contractor must notify the State within 14 calendar days of receiving notice of any litigation, investigation, arbitration, or other proceeding (collectively, "**Proceeding**") involving Contractor, a subcontractor, or an officer or director of Contractor or subcontractor, that arises during the term of the Contract, including: (a) a criminal Proceeding; (b) a parole or probation Proceeding; (c) a Proceeding under the Sarbanes-Oxley Act; (d) a civil Proceeding involving: (1) a claim that might reasonably be expected to adversely affect Contractor's viability or financial stability; or (2) a governmental or public entity's claim or written allegation of fraud; or (e) a Proceeding involving any license that Contractor is required to possess in order to perform under this Contract.
30. **State Data.** All data and information provided to Contractor by or on behalf of the State, and all data and information derived therefrom, is the exclusive property of the State ("**State Data**"); this definition is to be construed as broadly as possible. Upon request, Contractor must provide to the State, or a third party designated by the State, all State Data within 10 calendar days of the request and in the format requested by the State. Contractor will assume all costs incurred in compiling and supplying State Data. No State Data may be used for any marketing purposes.
31. **Reserved.**
32. **Non-Disclosure of Confidential Information.** The parties acknowledge that each party may be exposed to or acquire communication or data of the other party that is confidential, privileged communication not intended to be disclosed to third parties. The provisions of this Section survive the termination of this Contract.
- a. Meaning of Confidential Information. For the purposes of this Contract, the term "**Confidential Information**" means all information and documentation of a party that: (a) has been marked "confidential" or with words of similar meaning, at the time of disclosure by such party; (b) if disclosed orally or not marked "confidential" or with words of similar meaning, was subsequently summarized in writing by the disclosing party and marked "confidential" or with words of similar meaning; and, (c) should reasonably be recognized as confidential information of the disclosing party. The term "Confidential Information" does not include any information or documentation that was: (a) subject to disclosure under the Michigan Freedom of Information Act (FOIA); (b) already in the possession of the receiving party without an obligation of confidentiality; (c) developed independently by the receiving party, as demonstrated by the receiving party, without violating the disclosing party's proprietary rights; (d) obtained from a source other than the disclosing party without an obligation of confidentiality; or, (e) publicly available when received, or thereafter became publicly available (other than through any unauthorized disclosure by, through, or on behalf of, the receiving party). For purposes of this Contract, in all cases and for all matters, State Data is deemed to be Confidential Information.
- b. Obligation of Confidentiality. The parties agree to hold all Confidential Information in strict confidence and not to copy, reproduce, sell, transfer, or otherwise dispose of, give or disclose such Confidential Information to third parties other than employees, agents, or subcontractors of a party who have a need to know in connection with this Contract or to use such Confidential Information for any purposes whatsoever other than the performance of this Contract. The parties agree to advise and require their respective employees, agents, and subcontractors of their obligations to keep all Confidential Information confidential. Disclosure to a subcontractor is permissible where: (a) use of a subcontractor is authorized under this Contract; (b) the disclosure is necessary or otherwise naturally occurs in connection with work that is within the subcontractor's responsibilities; and (c) Contractor obligates the subcontractor in a written contract to maintain the State's Confidential Information in confidence. At the State's request, any employee of Contractor or any subcontractor may be required to execute a separate agreement to be bound by the provisions of this Section.
- c. Cooperation to Prevent Disclosure of Confidential Information. Each party must use its best efforts to assist the other party in identifying and preventing any unauthorized use or disclosure of any Confidential Information. Without limiting the foregoing, each party must advise the other party immediately in the event either party learns or has reason to believe that any person who has had access to Confidential Information has violated or intends to violate the terms of this Contract and each party will cooperate with the other party in seeking injunctive or other equitable relief against any such person.
- d. Remedies for Breach of Obligation of Confidentiality. Each party acknowledges that breach of its obligation of confidentiality may give rise to irreparable injury to the other party, which damage may be inadequately compensable in the form of monetary damages. Accordingly, a party may seek and obtain injunctive relief against the breach or threatened breach of the foregoing undertakings, in addition to any other legal remedies which may be available, to include, in the case of the State, at the sole election of the State, the immediate

termination, without liability to the State, of this Contract or any Statement of Work corresponding to the breach or threatened breach.

- e. **Surrender of Confidential Information upon Termination.** Upon termination of this Contract or a Statement of Work, in whole or in part, each party must, within 5 calendar days from the date of termination, return to the other party any and all Confidential Information received from the other party, or created or received by a party on behalf of the other party, which are in such party's possession, custody, or control; provided, however, that Contractor must return State Data to the State following the timeframe and procedure described further in this Contract. Should Contractor or the State determine that the return of any Confidential Information is not feasible, such party must destroy the Confidential Information and must certify the same in writing within 5 calendar days from the date of termination to the other party. However, the State's legal ability to destroy Contractor data may be restricted by its retention and disposal schedule, in which case Contractor's Confidential Information will be destroyed after the retention period expires.

33. **Reserved.**

34. **Reserved.**

35. **Reserved.**

36. **Records Maintenance, Inspection, Examination, and Audit.** The State or its designee may audit Contractor to verify compliance with this Contract. Contractor must retain and provide to the State or its designee and the auditor general upon request, all financial and accounting records related to the Contract through the term of the Contract and for 4 years after the latter of termination, expiration, or final payment under this Contract or any extension ("**Audit Period**"). If an audit, litigation, or other action involving the records is initiated before the end of the Audit Period, Contractor must retain the records until all issues are resolved.

Within 10 calendar days of providing notice, the State and its authorized representatives or designees have the right to enter and inspect Contractor's premises or any other places where Contract Activities are being performed, and examine, copy, and audit all records related to this Contract. Contractor must cooperate and provide reasonable assistance. If any financial errors are revealed, the amount in error must be reflected as a credit or debit on subsequent invoices until the amount is paid or refunded. Any remaining balance at the end of the Contract must be paid or refunded within 45 calendar days.

This Section applies to Contractor, any parent, affiliate, or subsidiary organization of Contractor, and any subcontractor that performs Contract Activities in connection with this Contract.

37. **Warranties and Representations.** Contractor represents and warrants: (a) Contractor is the owner or licensee of any Contract Activities that it licenses, sells, or develops and Contractor has the rights necessary to convey title, ownership rights, or licensed use; (b) all Contract Activities are delivered free from any security interest, lien, or encumbrance and will continue in that respect; (c) the Contract Activities will not infringe the patent, trademark, copyright, trade secret, or other proprietary rights of any third party; (d) Contractor must assign or otherwise transfer to the State or its designee any manufacturer's warranty for the Contract Activities; (e) the Contract Activities are merchantable and fit for the specific purposes identified in the Contract; (f) the Contract signatory has the authority to enter into this Contract; (g) all information furnished by Contractor in connection with the Contract fairly and accurately represents Contractor's business, properties, finances, and operations as of the dates covered by the information, and Contractor will inform the State of any material adverse changes; (h) all information furnished and representations made in connection with the award of this Contract is true, accurate, and complete, and contains no false statements or omits any fact that would make the information misleading; and that (i) Contractor is neither currently engaged in nor will engage in the boycott of a person based in or doing business with a strategic partner as described in 22 USC 8601 to 8606. A breach of this Section is considered a material breach of this Contract, which entitles the State to terminate this Contract under Section 23, Termination for Cause.

38. **Conflicts and Ethics.** Contractor will uphold high ethical standards and is prohibited from: (a) holding or acquiring an interest that would conflict with this Contract; (b) doing anything that creates an appearance of impropriety with respect to the award or performance of the Contract; (c) attempting to influence or appearing to influence any State employee by the direct or indirect offer of anything of value; or (d) paying or agreeing to pay any person, other than employees and consultants working for Contractor, any consideration contingent upon the award of the Contract. Contractor must immediately notify the State of any violation or potential violation of these standards. This Section applies to Contractor, any parent, affiliate, or subsidiary organization of Contractor, and any subcontractor that performs Contract Activities in connection with this Contract.

39. **Compliance with Laws.** Contractor must comply with all federal, state and local laws, rules and regulations.
40. **Prevailing Wage.** Contractor must comply with prevailing wage requirements, to the extent applicable to this Contract.
41. **Reserved.**
42. **Nondiscrimination.** Under the Elliott-Larsen Civil Rights Act, 1976 PA 453, MCL 37.2101, *et seq.*, the Persons with Disabilities Civil Rights Act, 1976 PA 220, MCL 37.1101, *et seq.*, and [Executive Directive 2019-09](#). Contractor and its subcontractors agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex (as defined in Executive Directive 2019-09), height, weight, marital status, partisan considerations, any mental or physical disability, or genetic information that is unrelated to the person's ability to perform the duties of a particular job or position. Breach of this covenant is a material breach of this Contract.
43. **Unfair Labor Practice.** Under MCL 423.324, the State may void any Contract with a Contractor or subcontractor who appears on the Unfair Labor Practice register compiled under MCL 423.322.
44. **Governing Law.** This Contract is governed, construed, and enforced in accordance with Michigan law, excluding choice-of-law principles, and all claims relating to or arising out of this Contract are governed by Michigan law, excluding choice-of-law principles. Any dispute arising from this Contract must be resolved in Michigan Court of Claims. Contractor consents to venue in Ingham County, and waives any objections, such as lack of personal jurisdiction or *forum non conveniens*. Contractor must appoint agents in Michigan to receive service of process.
45. **Non-Exclusivity.** Nothing contained in this Contract is intended nor will be construed as creating any requirements contract with Contractor. This Contract does not restrict the State or its agencies from acquiring similar, equal, or like Contract Activities from other sources.
46. **Force Majeure.** Neither party will be in breach of this Contract because of any failure arising from any disaster or acts of god that are beyond their control and without their fault or negligence. Each party will use commercially reasonable efforts to resume performance. Contractor will not be relieved of a breach or delay caused by its subcontractors. If immediate performance is necessary to ensure public health and safety, the State may immediately contract with a third party.
47. **Dispute Resolution.** The parties will endeavor to resolve any Contract dispute in accordance with this provision. The dispute will be referred to the parties' respective Contract Administrators or Program Managers. Such referral must include a description of the issues and all supporting documentation. The parties must submit the dispute to a senior executive if unable to resolve the dispute within 15 business days. The parties will continue performing while a dispute is being resolved, unless the dispute precludes performance. A dispute involving payment does not preclude performance.
- Litigation to resolve the dispute will not be instituted until after the dispute has been elevated to the parties' senior executive and either concludes that resolution is unlikely or fails to respond within 15 business days. The parties are not prohibited from instituting formal proceedings: (a) to avoid the expiration of statute of limitations period; (b) to preserve a superior position with respect to creditors; or (c) where a party makes a determination that a temporary restraining order or other injunctive relief is the only adequate remedy. This Section does not limit the State's right to terminate the Contract.
48. **Media Releases.** News releases (including promotional literature and commercial advertisements) pertaining to the Contract or project to which it relates must not be made without prior written State approval, and then only in accordance with the explicit written instructions of the State.
49. **Website Incorporation.** The State is not bound by any content on Contractor's website unless expressly incorporated directly into this Contract.
50. **Schedules.** All Schedules and Exhibits that are referenced herein and attached hereto are hereby incorporated by reference. The following Schedules are attached hereto and incorporated herein:

Schedule A	Statement of Work
FAMS Attachment A	Service Area
FAMS Attachment B	Maintenance Activity Guides
FAMS Attachment C	MDOT PBM – MiMRS Handbook
FAMS Attachment D	MDOT Parsons AVL System
FAMS Attachment E	MDOT Viewworks Overview
FAMS Attachment F	Lane Closure Notification Request Form
FAMS Attachment G	Monroe County Historical PBM
FAMS Attachment H	Monroe County Winter LOS
FAMS Attachment I	Additional MDSS Requirements
FAMS Attachment J	MDOT – Iteris MDSS System
FAMS Attachment K	Monroe County Salt Facilities
FAMS Attachment L	Liquid Deicer Specifications
FAMS Attachment M	Ice Control Sand Specifications
FAMS Attachment N	MDOT Winter Maintenance Application Rates
FAMS Attachment O	Historical Data
FAMS Attachment P	Monroe County Historical Winter Materials Usage Data
FAMS Attachment Q	Monroe County Historical PDRP Data
FAMS Attachment R	MiLogin Third Party Access to MDOT Viewworks
FAMS Attachment S	Underground Electric Special Provisions
FAMS Attachment T	Monroe County 5 Year Plan

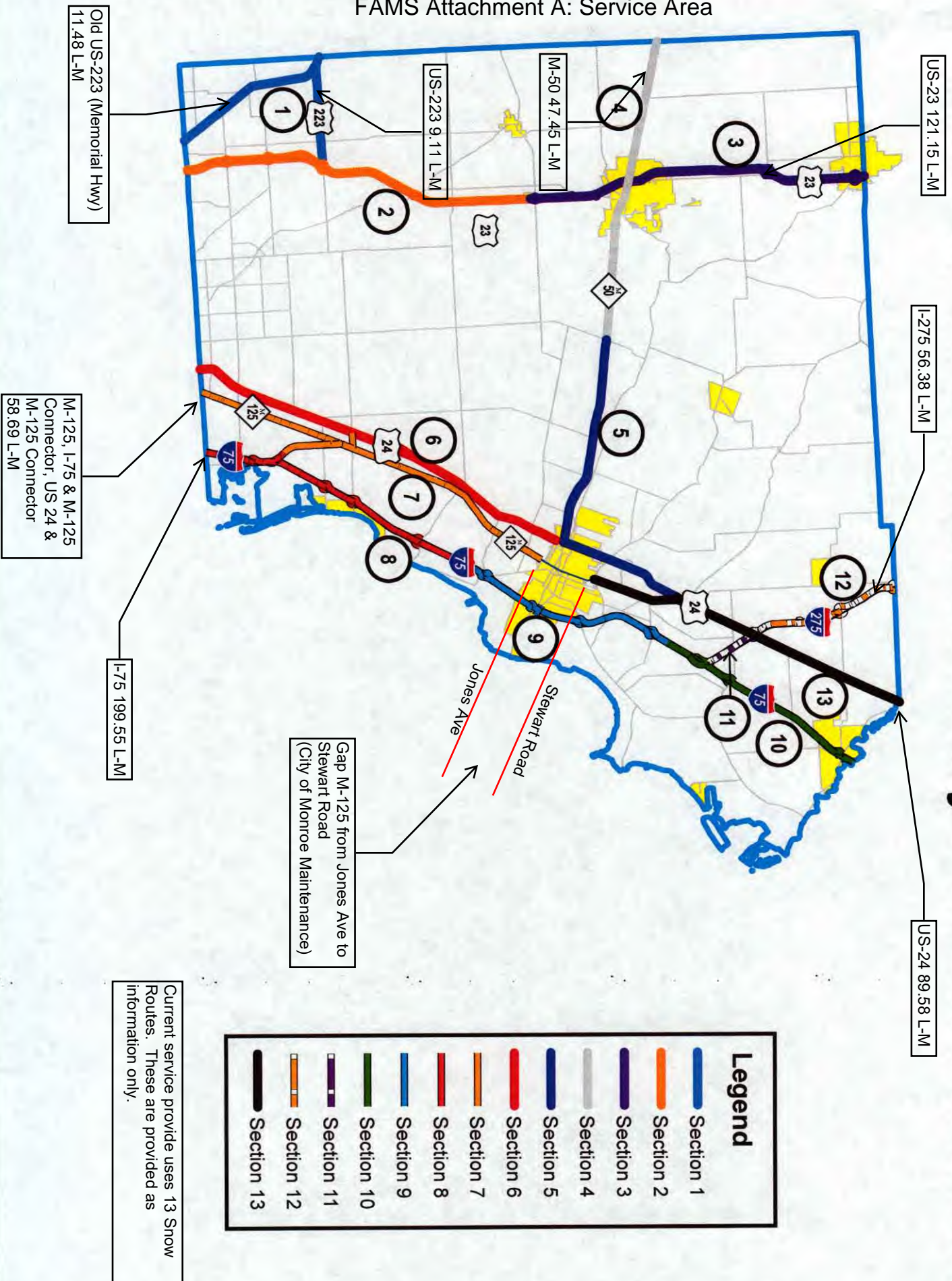
- 51. Entire Agreement and Order of Precedence.** This Contract, which includes Schedule A – Statement of Work, and schedules and exhibits which are hereby expressly incorporated, is the entire agreement of the parties related to the Contract Activities. This Contract supersedes and replaces all previous understandings and agreements between the parties for the Contract Activities. If there is a conflict between documents, the order of precedence is: (a) first, this Contract, excluding its schedules, exhibits, and Schedule A – Statement of Work; (b) second, Schedule A – Statement of Work as of the Effective Date; and (c) third, schedules expressly incorporated into this Contract as of the Effective Date. NO TERMS ON CONTRACTOR'S INVOICES, ORDERING DOCUMENTS, WEBSITE, BROWSE-WRAP, SHRINK-WRAP, CLICK-WRAP, CLICK-THROUGH OR OTHER NON-

NEGOTIATED TERMS AND CONDITIONS PROVIDED WITH ANY OF THE CONTRACT ACTIVITIES WILL CONSTITUTE A PART OR AMENDMENT OF THIS CONTRACT OR IS BINDING ON THE STATE FOR ANY PURPOSE. ALL SUCH OTHER TERMS AND CONDITIONS HAVE NO FORCE AND EFFECT AND ARE DEEMED REJECTED BY THE STATE, EVEN IF ACCESS TO OR USE OF THE CONTRACT ACTIVITIES REQUIRES AFFIRMATIVE ACCEPTANCE OF SUCH TERMS AND CONDITIONS.

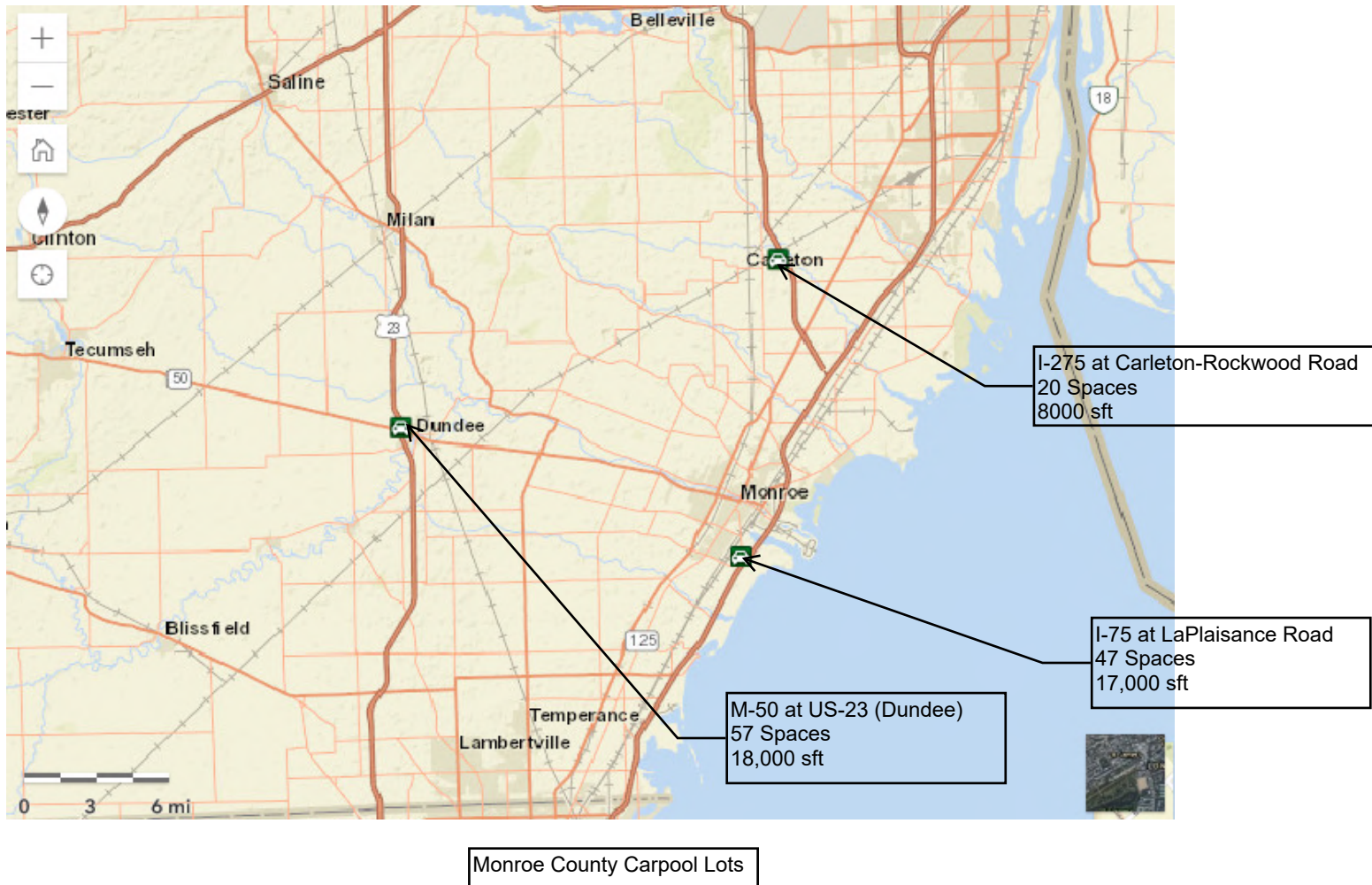
- 52. **Severability.** If any part of this Contract is held invalid or unenforceable, by any court of competent jurisdiction, that part will be deemed deleted from this Contract and the severed part will be replaced by agreed upon language that achieves the same or similar objectives. The remaining Contract will continue in full force and effect.
- 53. **Waiver.** Failure to enforce any provision of this Contract will not constitute a waiver.
- 54. **Survival.** The provisions of this Contract that impose continuing obligations, including warranties and representations, termination, transition, insurance coverage, indemnification, and confidentiality, will survive the expiration or termination of this Contract.
- 55. **Contract Modification.** This Contract may not be amended except by signed agreement between the parties (a "**Contract Change Notice**"). Notwithstanding the foregoing, no subsequent Statement of Work or Contract Change Notice executed after the Effective Date will be construed to amend this Contract unless it specifically states its intent to do so and cites the section or sections amended.

MDOT Monroe County Snow Routes

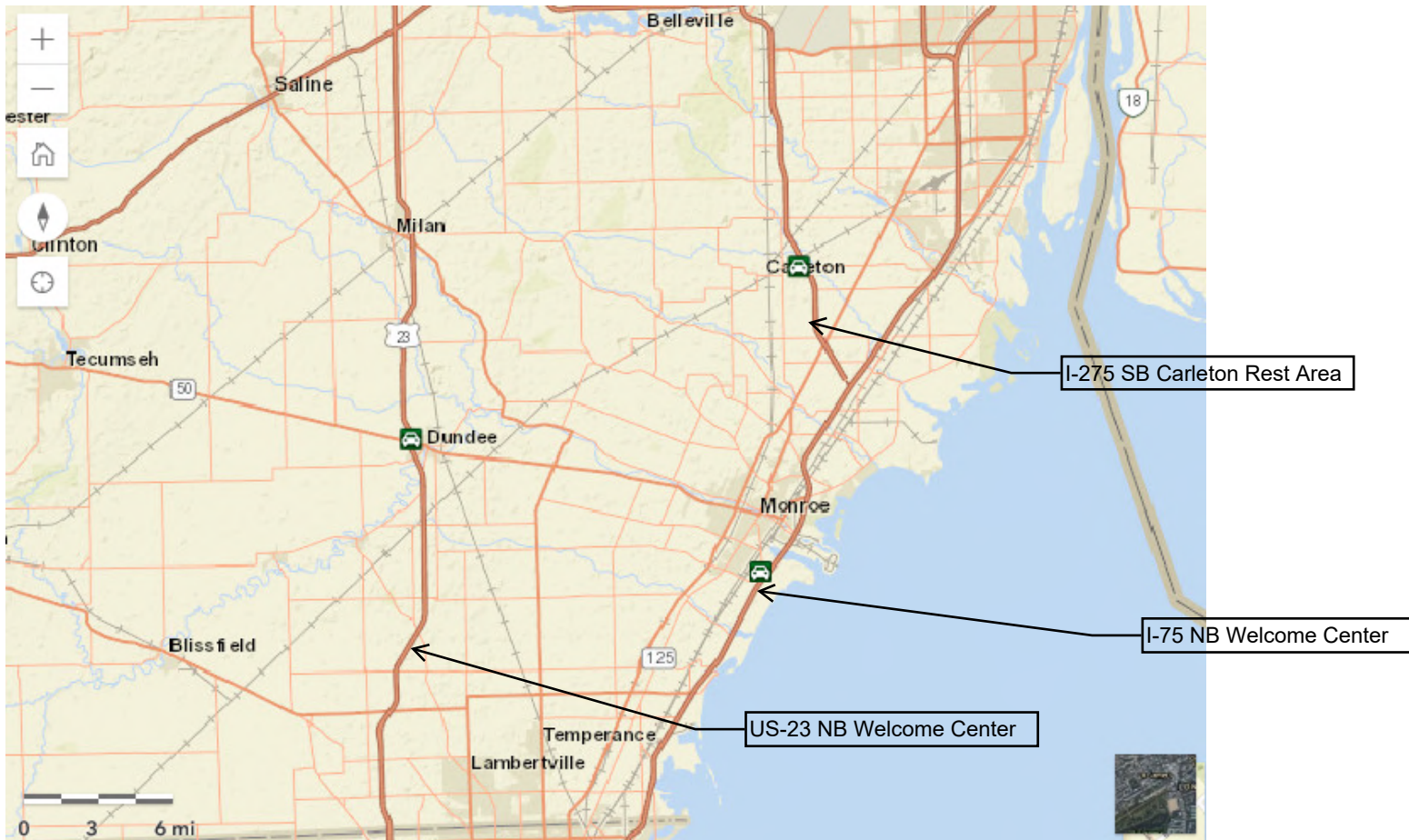
FAMS Attachment A: Service Area



FAMS Attachment A: Service Area

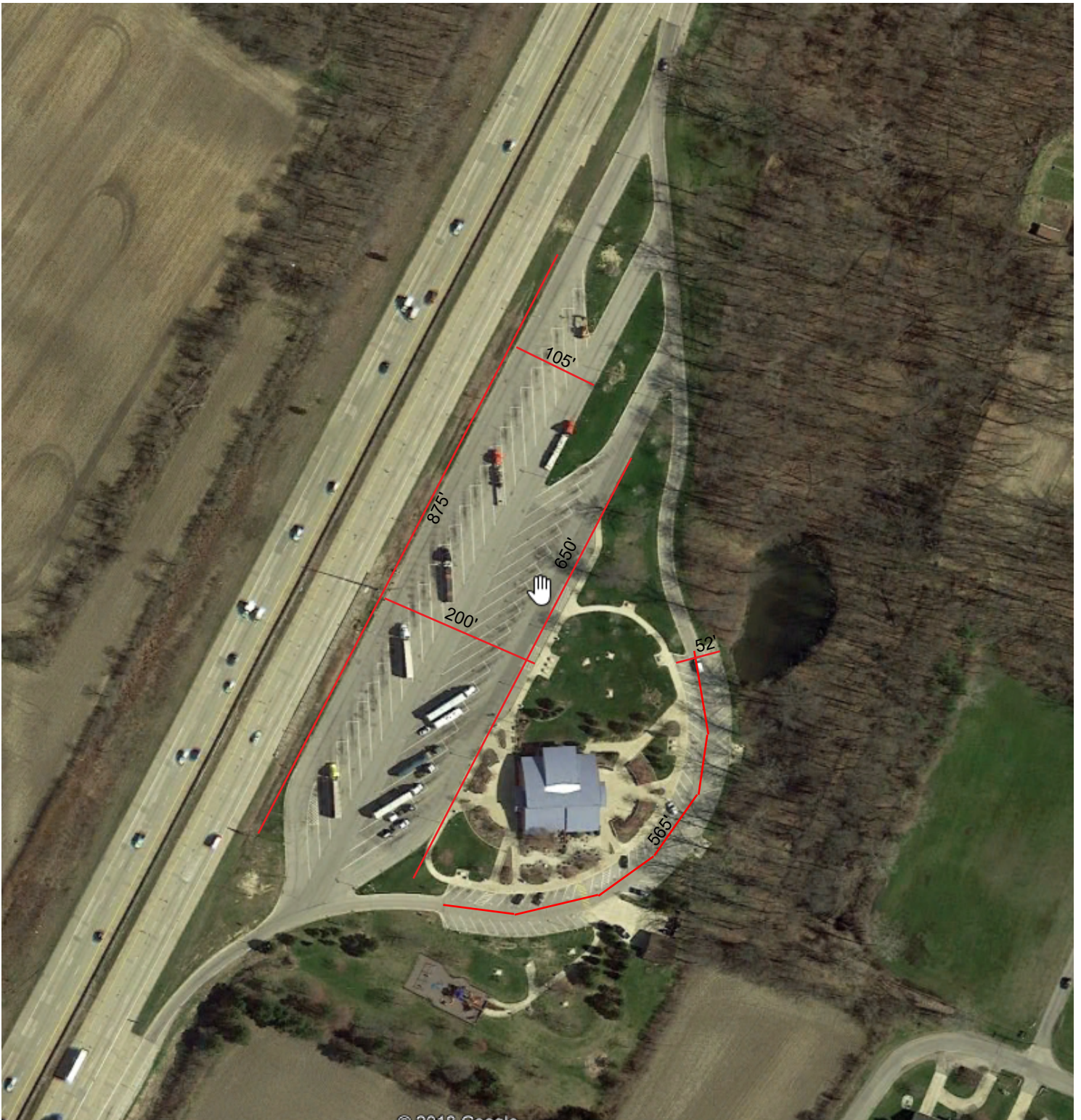


FAMS Attachment A: Service Area



Monroe County Welcome Centers and Rest Areas

FAMS Attachment A: Service Area



I-75 NB Monroe Welcome Center

FAMS Attachment A: Service Area

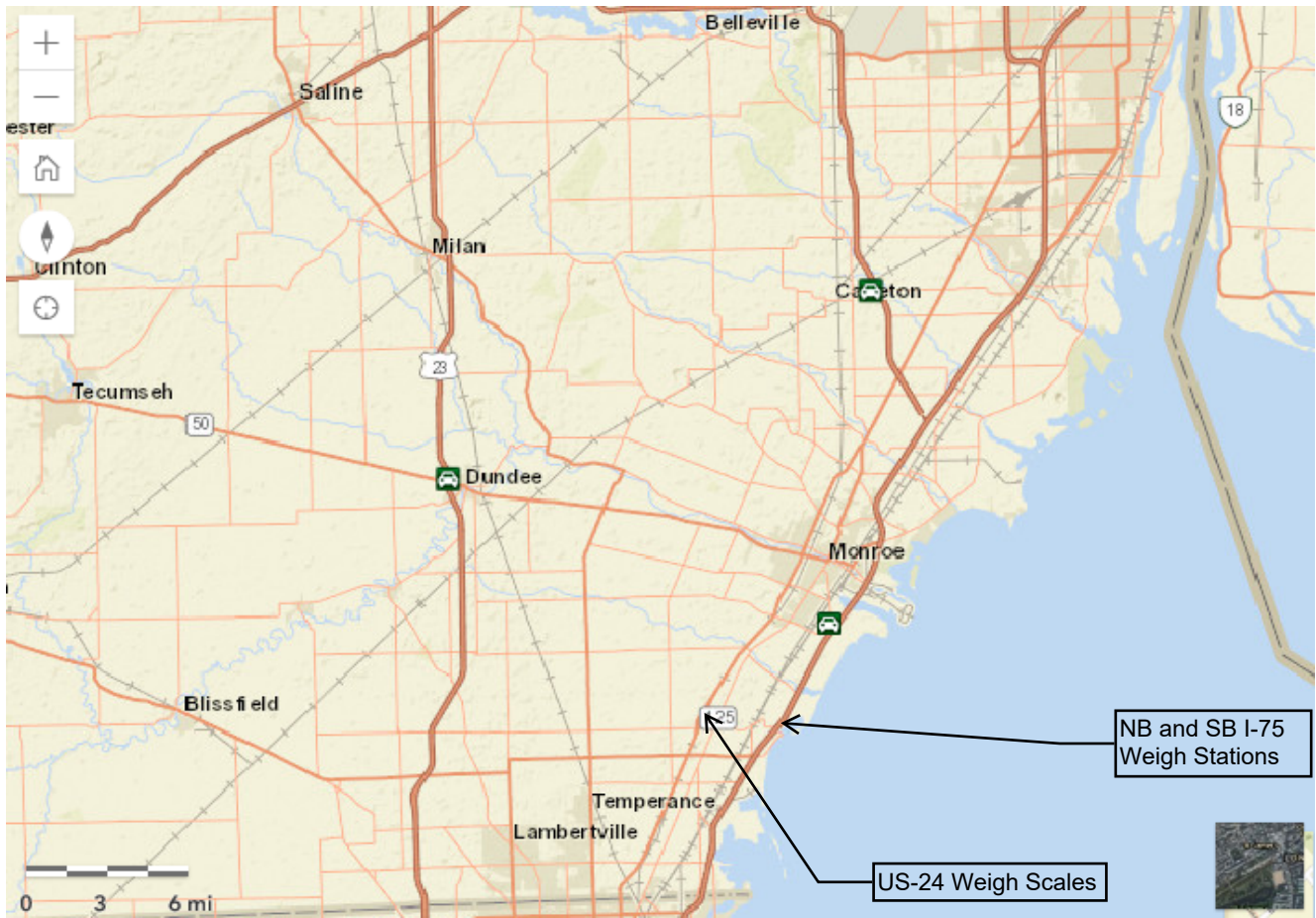


US-23 NB at Dundee Welcome Center

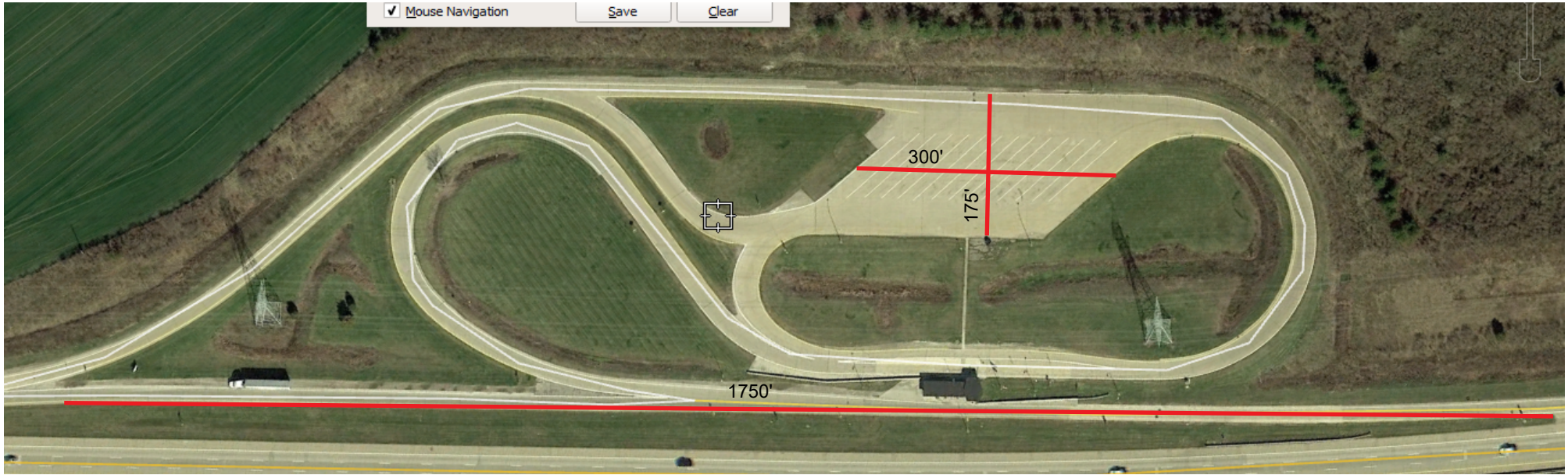
FAMS Attachment A: Service Area



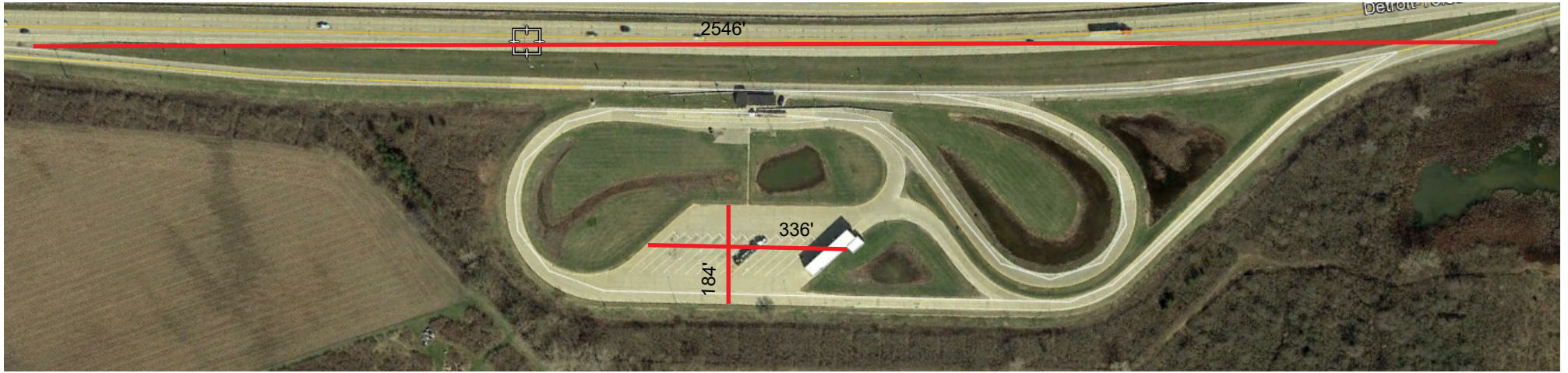
I-275 SB CARLETON REST AREA



Monroe County Weigh Stations



SB I-75 Weigh Station



NB I-75 Weigh Station



US-24 Weigh Scales

FAMS Attachment B: Maintenance Activity Guides

Maintenance Activity Guide Index

Last Updated September 2017

ACTIVITY CODE	ACTIVITY DESCRIPTION	ACTIVITY GROUP
1010	Joint & Crack Filling	SURFACE MAINTENANCE
1020	Remove/Replace Pavement (Fast Set Concrete)	SURFACE MAINTENANCE
1030	Patrol Patching	SURFACE MAINTENANCE
1042	Pavement Spall & Pot Hole Repair	SURFACE MAINTENANCE
1050	Bituminous Maintenance & Repair	SURFACE MAINTENANCE
1080	Bump Removal	SURFACE MAINTENANCE
1100	Routine Blading	SHOULDER MAINTENANCE
1120	Gravel Shoulder Maintenance	SHOULDER MAINTENANCE
1140	Paved Shoulder Maintenance	SHOULDER MAINTENANCE
1200	Tree Removal	ROADSIDE MAINTENANCE
1210	Stump Removal	ROADSIDE MAINTENANCE
1220	Catch Basin Cleanout	ROADSIDE MAINTENANCE
1230	Ditch Cleanout & Check Dam Maintenance	ROADSIDE MAINTENANCE
1240	Litter Pickup	ROADSIDE MAINTENANCE
1260	Area Mowing	ROADSIDE MAINTENANCE
1270	Brush Control	ROADSIDE MAINTENANCE
1280	Culvert Underdrain & Edge Drain Cleaning	ROADSIDE MAINTENANCE
1281	Culvert Underdrain & Edge Drain Maintenance	ROADSIDE MAINTENANCE
1290	Non-Motorized Trails	GENERAL MAINTENANCE
1300	Guardrail Repair Steel Beam	GENERAL MAINTENANCE
1301	Guardrail Ending Repair Steel Beam	GENERAL MAINTENANCE
1310	Cable Barrier Repair	GENERAL MAINTENANCE
1320	Approach Sweeping	GENERAL MAINTENANCE
1330	Tourist Facility Maintenance	GENERAL MAINTENANCE
1340	Expressway Patrol *	GENERAL MAINTENANCE
1350	Freeway Lighting	GENERAL MAINTENANCE
1360	Curb Sweeping	GENERAL MAINTENANCE

* Completing work orders for these activities in Vueworks is optional.

FAMS Attachment B: Maintenance Activity Guides

Maintenance Activity Guide Index

Last Updated September 2017

ACTIVITY CODE	ACTIVITY DESCRIPTION	ACTIVITY GROUP
1370	Right-of-Way Fence Repair	GENERAL MAINTENANCE
1380	Maintaining-MITS	GENERAL MAINTENANCE
1390	Other Routine Maintenance	GENERAL MAINTENANCE
1391	Snowmobile Crossing or ORV Connector Repair	GENERAL MAINTENANCE
1410	Winter Maintenance	WINTER MAINTENANCE
1440	Winter Road Patrol *	WINTER MAINTENANCE
1490	Other Winter Maintenance	WINTER MAINTENANCE
1510	Bridge Maintenance Cubic Yards	STRUCTURE MAINTENANCE
1520	Bridge Maintenance Square Feet	STRUCTURE MAINTENANCE
1530	Pump Station Maintenance	STRUCTURE MAINTENANCE
1540	Moveable Spans	STRUCTURE MAINTENANCE
1560	Bridge Maintenance Lineal Feet	STRUCTURE MAINTENANCE
1561	Bridge Joint Replacement	STRUCTURE MAINTENANCE
1590	Other Bridge Maintenance	STRUCTURE MAINTENANCE
1591	Bridge Inspection	STRUCTURE MAINTENANCE
1600	Small Sign Maintenance	SIGN / SIGNAL MAINTENANCE
1602	Sign Fabrication Standard *	SIGN / SIGNAL MAINTENANCE
1605	Sign Fabrication Non-Standard (Aluminum Extruded)*	SIGN / SIGNAL MAINTENANCE
1606	Sign Fabrication Non-Standard (Screen Printing)*	SIGN / SIGNAL MAINTENANCE
1610	Signal Maintenance	SIGN / SIGNAL MAINTENANCE
1620	Special Markings Paint & Tape	SIGN / SIGNAL MAINTENANCE
1640	Delineator Maintenance	SIGN / SIGNAL MAINTENANCE
1650	Impact Attenuator Maintenance Roadway	SIGN / SIGNAL MAINTENANCE
1660	Non-Routine Traffic Control	SIGN / SIGNAL MAINTENANCE
1670	Large Sign Maintenance	SIGN / SIGNAL MAINTENANCE
1671	Hydraulic Tightening of Anchor Bolts	SIGN / SIGNAL MAINTENANCE

*-Completing work orders for these activities in Vueworks is optional.

FAMS Attachment B: Maintenance Activity Guides

Maintenance Activity Guide Index

Last Updated September 2017

ACTIVITY CODE	ACTIVITY DESCRIPTION	ACTIVITY GROUP
1690	Other Sign/Signal Maintenance	SIGN / SIGNAL MAINTENANCE
1691	Specialty Fabrication *	SIGN / SIGNAL MAINTENANCE
1710	Tree Trimming	ROADSIDE MAINTENANCE
1720	Vegetation Control	ROADSIDE MAINTENANCE
1742	Plant Trees	ROADSIDE MAINTENANCE
1750	Retention or Detention Basin Maintenance	ROADSIDE MAINTENANCE
1790	Other Forestry	ROADSIDE MAINTENANCE
1860	Roadway Inspection *	ADMINISTRATIVE
1880	Permits *	ADMINISTRATIVE
1900	Inspection & Oversight of Maintenance Contract Work *	ADMINISTRATIVE
1940	Weigh Station Maintenance	GENERAL MAINTENANCE
1960	Training (Maintenance) *	ADMINISTRATIVE
1970	Emergency Response	GENERAL MAINTENANCE
2070	Fleet Repairs (Including Parts) *	FACILITIES, AUTOMOTIVE & EQUIPMENT
2071	Equipment Repair Administration *	FACILITIES, AUTOMOTIVE & EQUIPMENT
2190	New/Major Equipment Renovation *	FACILITIES, AUTOMOTIVE & EQUIPMENT
2510	Facility Operations *	FACILITIES, AUTOMOTIVE & EQUIPMENT
2520	Facility/Building Maintenance (Non-Rest Area) Statewide Crews Only *	FACILITIES, AUTOMOTIVE & EQUIPMENT
3861	System Maintenance *	ADMINISTRATIVE
7950	Adopt-A-Highway *	ADMINISTRATIVE
7990	Overhead/Administration *	ADMINISTRATIVE

* Completing work orders for these activities in Vueworks is optional.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Joint & Crack Filling

Activity #: 1010

Report Joint and Crack Filling using the methods listed below to activity 1010.

- Methods:
- 1) Joint and Crack Filling
 - 2) Rubber Sealant– BITUMINOUS SURFACE ONLY
 - 3) Hot Poured Joint Sealant- Crack Filling
 - 4) Hot Poured Joint Sealant- Joint Filling

Work may be performed using any of the above methods. All work performed using any of these methods should be reported to activity number 1010. Activity guides for all of these methods are provided on the following page(s).

Note: Pavement Spot Seal Patching (Kettle and Pavement Repair Machine methods) should be reported to activity 1042 Pavement Spall & Pot Hole Repair.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Joint & Crack Filling		Activity #: 1010																																														
		Method: Joint and Crack Filling																																														
Description/Purpose: Cleaning and filling of joints, random open cracks, and edge joint sealing with liquid sealant to prevent passage of water to the base or sub-grade and permit pavement joints to contract and expand properly.																																																
<div><div><div>Recommended Crew Size</div><div>7</div><div>Conditions may warrant additional crew members</div></div><div><div>Material</div><div>Emulsion</div><div>Sand</div><div>Aggregate</div><div>Type 2 crack sealant</div><div>Backer Rod (Rated for hot materials)</div></div><div><div>Average Daily Production</div><div>250 gallons</div><div>(10 lbs. of rubber sealant is equivalent to one gallon.)</div><div>Average crack size is ½" x 1"=38.5 lin ft / gal</div></div></div>		<div><div><div>Equipment</div><table><thead><tr><th>Qty</th><th>Code</th><th>Description</th></tr></thead><tbody><tr><td>1</td><td>02/03</td><td>Pickup</td></tr><tr><td>3</td><td>04</td><td>Trucks, dump</td></tr><tr><td>1</td><td>12</td><td>Flashing arrow</td></tr><tr><td>1</td><td>19</td><td>Compressor</td></tr><tr><td>1</td><td>36</td><td>Kettle</td></tr></tbody></table><div><div>Optional</div><table><tbody><tr><td>1</td><td>12</td><td>Flashing arrow</td></tr><tr><td>1</td><td>04</td><td>Shadow vehicle and attenuator</td></tr></tbody></table><div><div>Alternate Equipment:</div><div>Mechanical Squeegee Machine</div><table><tbody><tr><td>1</td><td>02/03</td><td>Pickup</td></tr><tr><td>3</td><td>04</td><td>Trucks, dump</td></tr><tr><td>1</td><td>12</td><td>Flashing arrow</td></tr></tbody></table><div><div>Optional for Alternate:</div><table><tbody><tr><td>1</td><td>04</td><td>Shadow vehicle and attenuator</td></tr><tr><td>1</td><td>04</td><td>Truck, dump (stone)</td></tr><tr><td>1</td><td>02/03</td><td>Broom truck</td></tr><tr><td>1</td><td>12</td><td>Flashing arrow</td></tr></tbody></table></div></div></div></div></div>		Qty	Code	Description	1	02/03	Pickup	3	04	Trucks, dump	1	12	Flashing arrow	1	19	Compressor	1	36	Kettle	1	12	Flashing arrow	1	04	Shadow vehicle and attenuator	1	02/03	Pickup	3	04	Trucks, dump	1	12	Flashing arrow	1	04	Shadow vehicle and attenuator	1	04	Truck, dump (stone)	1	02/03	Broom truck	1	12	Flashing arrow
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1	12	Flashing arrow																																														
		<div>Equipment may vary depending on availability and operational need.</div> <div>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</div> <div>Additional equipment and personnel will increase the cost to perform this activity.</div>																																														

FAMS Attachment B: Maintenance Activity Guides

Measurement

Lineal Feet

Calculations

Total Lineal Feet Sealed = Total Gallons X 38.5 lineal ft / gallon.

Average Feet Sealed / Day = (Total Hours ÷ Hours worked / Day) ÷ Total Gallons Used

Recommended Work Method (Joint and Crack Filling)

1. [Review environmental, training, and safety precautions.](#)
2. Best results are achieved when joints and cracks are sealed when the pavement is contracted and the average temperature is not over 50°F.
3. **BEFORE FILLING, CLEAN CRACKS WITH FORCED AIR.**
4. Apply sealant heated to the manufacturer's specified application temperature.
5. Fill cracks to within 1/4" of the top of the surface to allow for slab expansion. Squeegee excess sealant, if necessary.
6. **Bituminous only:** 3/8" stone may be used in wide cracks. **DO NOT USE STONE WHEN SEALING CRACKS ON CONCRETE.**
7. Sand or other approved materials may be sprinkled lightly on top to prevent tracking.

Note: Do not fill joints having neoprene filler material.

Criteria: Only cracks greater than 1/4" (diameter of a pencil) will be filled. Fill joints only when joint filler is broken, brittle or missing and allows dirt and water to enter.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Joint & Crack Filling		Activity #: 1010	
Method: Rubber Sealant – BITUMINOUS SURFACE ONLY			
Description/Purpose: Cleaning and filling of random open cracks with rubber sealant. This is done to prevent passage of water to the base or sub-grade and permit pavement joints to contract and expand properly. Can be used to seal traffic signal loops.			
<u>Recommended Crew Size</u> 6 (2 traffic regulators included)	<u>Equipment</u>		
<u>Material</u> Rubber sealant (e.g. Prizmo)	<u>Qty</u>	<u>Code</u>	<u>Description</u>
<u>Average Daily Production</u> 1 - 2 lane miles	1	02/03	Dump truck
	2	04	Heavy trucks
	1	12	Flashing arrow
	1	19	Portable compressor
	1	36	Rubber sealant machine (e.g. Prizmo)
			<u>Optional</u>
	1	12	Flashing arrow
	1	04	Shadow vehicle and attenuator
<u>Recommended Work Method (Rubber Sealant – BITUMINOUS SURFACE ONLY)</u>			
<div>1. Review environmental, training, and safety precautions.</div> <div>2. Best results are achieved when cracks are sealed when the average temperature is below 50°F.</div> <div>3. Before filling, clean cracks with a hot air lance. Use caution to avoid overheating.</div> <div>4. Apply sealant heated to the specified application temperature, using the applicator before the crack cools.</div> <div>5. Allow material to set before opening to traffic.</div>			

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Joint & Crack Filling		Activity #: 1010	
Method: Hot Poured Joint Sealant			
Description/Purpose: Cleaning and filling of joints and random open cracks with hot poured joint sealant. This is done to prevent the passage of water to the sub-grade and permit pavement joints to expand and contract properly by not allowing non-compressing material, such as sand and stone, into the joint.			
<div>Recommended Crew Size</div> <div>6 (2 traffic regulators included)</div>		<div>Equipment</div>	
<div>Material</div> <div>Hot Joint Sealant (Crafco Asphalt Rubber, Type II, or an approved alternative*)</div> <div>Backer Rod (type used for hot materials)</div>	<div>Qty</div>	<div>Code</div>	<div>Description</div>
	1	02/03	Pickup
	2	04	Heavy trucks
	1	12	Flashing arrow
	1	19	Portable compressor
	1	53	Sandblaster
	1	36	Hot poured rubber machine
	1	33	Router or
	1	54	Random crack saw
	1	67	Trailer
<div>Average Daily Production</div> <div>1 - 2 lane miles</div>		<div>Optional</div>	
	1	04	Shadow vehicle and attenuator
	1	12	Flashing arrow

Recommended Work Method (Hot Poured Joint Sealant- Crack Filling)

Note: To maintain the quality of the product, avoid heating sealant for prolonged periods of time or reheating more than once without adding new material.

CRACK FILLING

1. [Review environmental, training, and safety precautions.](#)

2. Pavement must be clean, dry, and at an air temperature of 45°F or above.

3. Optional: Cracks 3/8" wide or less may be routed to provide a sealant reservoir. Rout to expose sound material. Generally rout to approximately 1/2" wide by 3/4" deep. Rout only what will be sealed for this project.

4. Crack or routed area should be cleaned by sandblasting and then blown out with compressed air.

5. Install hot backer rod, sized 25% larger than the width of the crack, in cracks 3/8" wide or larger.

6. Fill crack flush with pavement surface. Pour sealant at 380°-400°F, or per sealant specification.

*Contact Andy Bennett at C&T (517/322-5043) for approved alternative.

Work Method, continued <

Activity Name: Joint & Crack Filling

Activity #: 1010

Method: Hot Poured Joint Sealant (continued)

Recommended Work Method ((Hot Poured Joint Sealant- Joint Filling))

JOINT FILLING

1. [Review environmental, training, and safety precautions.](#)
2. Pavement must be clean, dry, and at an air temperature of 45°F or above.
3. Re-saw joint if necessary to remove old joint material.
4. Clean joint out by sandblasting and then blowing out with compressed air.
5. For expansion joints and all joints constructed with neoprene seals, place backer rod to a depth that would form a nearly square reservoir. For other contraction joints use a bond breaker.
6. Fill joint with hot poured joint sealant level with pavement surface to 1/8" below pavement surface.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Remove Replace Pavement (Fast Set Concrete)

Activity #: 1020

Description/Purpose: Full depth removal of concrete slab and replacement with "Fast Set" concrete material to eliminate shattered joints due to blow-ups or deterioration and to achieve a smooth riding surface.

Notes: Emergency patching of blow-ups is also reported to activity 1020. Sawing should be performed at least one day prior to any Fast Set concrete work.

Recommended Crew Size

6 - (2 traffic regulators included)

(Larger crew size may be used during first 4 hours for production type operation. Leave 3 to re-open.)

Material

Concrete (9 sack mix)

Concrete accelerator

Curing compound

Grout

Dowel bars (deformed and/or smooth)

Mesh chairs (as required)

Expansion material

Expansion caps

Miscellaneous materials

Average Daily Production

10 cubic yards

Each concrete patch required 2 cubic yards.

Average repair is 5 patches per day.

Measurement

Number of patches repaired.

Calculation

Total Patches Repaired = (Total Hours ÷ 8) x 5

Equipment

Qty

Code

Description

1

02/03

Dump truck

3

04

Heavy trucks

1

12

Flashing arrow

1

19

Air compressor

1

38

Loader

1

67

Trailer

1

05

Tractor drills

Pin drill

Rock drill

Optional

1

04

Shadow vehicle and attenuator

1

12

Flashing arrow

1

67

Trailer

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

Recommended Work Method

Review audio-visual training materials for this activity.

Perform repairs in accordance with Standard Plans R-44 series

<http://mdotcf.state.mi.us/public/design/englishstandardplans/> .

NOTE: The use of accelerators as described in the following methods enables the roadway to be opened to traffic in as short a time as possible, but greatly reduces the patch's strength and performance. If the roadway can be closed for an extended period, follow the procedures in the current Standard Specifications for Construction.

1. [Review environmental, training, and safety precautions](#)
2. Consider calling in a 2-man crew approximately one hour before the main crew to sign area and close lane.
3. Remove full depth concrete.
 - A. Drill holes for lift pins. (Day before the Fast Set pour.)
 - B. Place lift pins and remove slab with front end loader.
 - C. Loose material must be removed by hand. **DO NOT DISTURB BASE MATERIAL.**

Work Method, continued <

Activity Name: Remove Replace Pavement (Fast Set Concrete) Activity #: 1020
Continued

Recommended Work Method, continued

4. Place necessary forms.
5. Bore dowel holes.
6. Clean bored holes thoroughly using compressed air.
7. If using filler material, install hole locating bars, pointed end out. With filler material resting on the base, press filler material against locating bar points for hole-locating.
8. Use hole saw or drill to cut 1 3/8" diameter holes in filler material.
9. Clean out the drilled hole with compressed air. Inject enough grout at the back of the dowel hole so that when fully inserted, some grout will ooze out around the dowel.
10. Place wire reinforcement mesh (use bar chairs when required) and hook bolt lane ties (patches 20' or longer). For repairs up to 8' in length, the wire mesh shall be positioned so that the large diameter wires are perpendicular to the centerline of the road.
11. Lay sealant reservoir form 1" wide x 1½" deep on top of the expansion material flush with adjacent surface. Remove when concrete is firm.
12. Use cone test to check for slump.
13. Lightly wet down the area to be patched.
14. Add accelerator to concrete, mix thoroughly 30 (minimum) revolutions of the drum, and pour concrete into formed opening immediately. (Prepare concrete test beam(s) at this time. Do not add water after accelerator has been added.) NOTE: Non-chloride accelerators are only usable above 60 F. See the attached specification for non-chloride accelerators. If you use a non-chloride accelerator, please call Construction and Technology at 322-1222 and ask for assistance in mix design.
15. Consolidate concrete by using an immiscible vibrator with emphasis on dowel areas and along forms. Do not drag vibrator through concrete.
16. Strike off excess concrete with vibrating screed. Make at least two passes with screed parallel to centerline if patch is 12' long or less. If patch is longer than 12' screed perpendicular to centerline. (Do not remove excess concrete with hand float.) Patch must be flush with adjacent pavement as determined by using a straight edge.
17. Finish surface of patch with hand float, dress patch edges with a hand edger. When required, hand trowel a groove 1" wide by 1½" deep at the joint with the expansion material. Place the 1" x 1½" form in groove and press it down until flush with the surface of the pavement. (Remove the form when patch is firm.) Lightly broom patch surface at right angles to the centerline. If a concrete hammer is to be used for strength testing, trowel smooth a spot approximately 2" in diameter at any corner of the patch.
18. Spray the surface of the patch with a uniform covering of curing compound.
19. When concrete has reached specified strength remove all forms.
20. If air temperature is 65 FE or lower, cover patch with insulating blankets for heat retention. (At this point read the testing procedures described in the rest of the activity performance guide.)

Work Method, continued <

Activity Name: Remove Replace Pavement (Fast Set Concrete) Activity #: 1020
Continued

Recommended Work Method, continued

21. Replace bituminous shoulder removed for patch with hot mix and restore to existing line and grade (cold patch may be used temporarily).
22. After at least 48 hours, sandblast all joints and cuts into the existing pavement and blow clear with compressed air.
23. Place bond breaker tape on the bottom of the sealant groove at the end of the patch without the filler. Fill grooves to within ½" of the pavement surface with hot poured rubber. Seal overcuts if patch is only one lane wide.
24. Read the following pages for further information on testing and Fast Set instructions.

Work Method, continued <

Activity Name: Remove Replace Pavement (Fast Set Concrete)

Activity #: 1020

Concrete Test Beam Procedure

Molding

1. Equipment required: shovel, mason trowel, wood float, 5/8" tamping rod and 6" x 21" beam mold.
2. Concrete is to be placed in mold in two equal layers. (Use a representative sample after accelerator has been added.)
3. Rod each layer with the tamping rod sixty times. Penetrate the first layer only slightly when rodding the second layer.
4. Spade along the sides with trowel and tap the sides of the mold, after rodding, to remove air bubbles and voids.
5. Strike off the beam flush at top with wood float.
6. Spray beam surface with curing compound. (If insulating blankets are used for patch, place test beam under blankets also.)

Testing

First test may be taken 4½ hours after pour.

1. Place test machine on level surface.
2. Open both valves on machine to release any pressure.
3. Push jack head down and close both valves.
4. Place the test beam into the machine on its side with the end 13" from the center of the clamping bar.
5. Raise the jack head until the beam just clears the frame of the machine and rests on the roller and jack head bearing block.
6. Adjust the clamping bar to bear lightly on the beam. Make sure the non-tested end does not touch the frame.
7. Apply a constant uniform rate of pressure at 400 pounds per minute (100 pounds per fifteen seconds) until the beam breaks. It is helpful to have someone call out fifteen second intervals to keep the pressure constant.
8. After the beam breaks, read the pressure dial. If the breaking pressure is 900 pounds on the dial or more (900 pounds divided by three equals 300 PSI *), the patch can be opened to traffic. If the breaking pressure is less than (900 pounds), wait until 5 ½ hours have elapsed and repeat the procedure above using the end of beam which is not broken, or a second beam. (Caution: 300 pounds on the dial is not equal to 300 PSI.)

* See table for forms not 6" x 6". Multiply breaking pressure by factor at breadth-depth point.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Remove Replace Pavement (Fast Set Concrete) Activity #: 1020 Continued

Fast Set Concrete Instructions

Air Temperature	Accelerator	Maximum Slump	Beam Tests		
			6 Hours	5 ½ Hours	4 ½ Hours
Below 45E F	45 lbs./CY See Qualified Product List	1 - 3 in.	Open	300 PSI (900 on beam scale) Open	300 PSI (900 on beam scale) Open
45E - 60E F	36 lbs./CY See Qualified Product List	1 - 3 in.	Open	300 PSI (900 on beam scale) Open	300 PSI (900 on beam scale) Open
60E - 70E F	27 lbs./CY See Qualified Product List	1 - 3 in.	Open	300 PSI (900 on beam scale) Open	300 PSI (900 on beam scale) Open
Above 75E F	18 lbs./CY See Qualified Product List	1 - 3 in.	Open	300 PSI (900 on beam scale) Open	300 PSI (900 on beam scale) Open

1. The concrete temperature is to be at a minimum of 60E F.
2. Slump is to be measured before adding accelerator (cone test).
3. After adding calcium chloride accelerator, use no more than 2 gallons of water to wash off the mixing fines.

NOTE: Adding too much water to the concrete mixture will result in increased cure time, shrinkage cracks and weak concrete.

Activity Name: Remove Replace Pavement (Fast Set Concrete) Activity #: 1020
Continued

CONCRETE TEST - SWISS HAMMER PROCEDURE

Each concrete test hammer must be correlated with concrete test beam results to establish a minimum hammer reading for a given strength requirement. Once this minimum is established, the concrete test hammer can be used in lieu of the beam test for the remainder of the season with some exceptions. The exceptions are:

At the beginning of the joint repair season.

A change in the concrete supplier (or if regular supplier changes aggregate).

Correlate concrete test hammer and beam tester as follows:

1. Mold two test beams in accordance with the procedure in Activity 1020, page.
2. First test may be taken 4 ½ hours after pour.

3. Remove mold.
4. A light pressure on the tip of the test hammer plunger will release it from the locked position.
5. Place plunger tip against the surface of the concrete test beam, keeping the hammer perpendicular to the test surface and at least 1" in from the edge.
6. Apply gradually increasing pressure until hammer impacts.
7. Hold the hammer firmly against the concrete. Set the reading by pushing the locking button on the side of the hammer. Read the scale and note it to two significant figures.
8. Repeat steps 5 through 7 in at least 16 locations around the edge and across the beam.
9. Disregard the 3 highest and the 3 lowest readings. Average the remaining 10 readings and record that number.
10. Break one beam (see testing, Activity 10200, page) and note the reading on the gauge.
11. If the beam breaks at or above the required pressure of 300 PSI (900 on the beam gauge), go to step 12. If not, wait one hour and repeat steps 5 through 10, using the other test beam.
12. When an average of the 10 readings is more than the required pressure as obtained using the test beam machine (see Activity 1020, page), record the average and the date. Place this record in the case with the test hammer.

NOTE:

The swiss hammer must be sent to Lansing Construction and Technology for calibration at least once a year.

Continued >

Activity Name: Remove Replace Pavement (Fast Set Concrete) Activity #: 1020
Continued

CONCRETE TEST - SWISS HAMMER PROCEDURE, continued

Testing (After correlation with test beam)

First test may be taken 4 ½ hours after pour.

1. Release the plunger on the concrete hammer.
2. At one troweled (corner) test area press the plunger against the surface of the concrete, keeping the concrete hammer perpendicular to the surface.
3. Apply a gradual increase in pressure until hammer impacts. Hold the concrete hammer firmly against the concrete and set the reading by using the button on the side of the hammer. Read the scale. Take at least one reading at each corner and at the center, front, and rear of the patch and note.
4. Average the readings. If the average is equal to or exceeds the required reading of the swiss hammer as correlated with the record in the hammer case, the road may be opened.
5. If criteria in step 4 are not met, wait one hour and repeat steps 1 through 4. Take second readings ½" to 1" away from depressions made during first readings.
6. In the event the second reading is less than the required reading (the equivalent of 300 PSI), see Activity 1020, testing page), wait one-half hour and then open the road.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Remove Replace Pavement (Fast Set Concrete) Activity #: 1020 Continued

Michigan Department of Transportation
Special Provision
For Early-Open-to-Traffic
Portland Cement Concrete
Using Non-Chloride Set Accelerators

C&T:JFS

REVISED:01-13-0
C&T:APPR:JAR:01-13-0

- A. **Description.**-The Portland cement concrete repair mixtures included in this Special Provision are intended for use in full-depth pavement repairs in critical vehicular traffic locations requiring the opening-to-traffic flexural strengths specified below within 12 to 72 hours after concrete placement. The use of these concrete mixtures will be based on the maximum permitted cure times prior to opening-to-traffic as determined by Maintaining Traffic requirements, or as authorized by the Engineer. Full-depth pavement repair concrete mixtures requiring opening-to-traffic less than 12 hours are not covered by this Special Provision. The Contractor shall not be granted the option to use these concrete mixtures in lieu of other concrete Grades or Types specified on the plans. The 1996 Standard Specifications for Construction shall apply, except as modified herein.
- B. **Materials.**-Materials used in the Portland cement concrete mixtures shall be from MDOT approved sources. Coarse aggregate shall be MDOT Series 6AA, natural aggregate, and have a maximum of 2.5 percent absorption (24-hour soak method) according to ASTM C 127. Fine aggregate shall be Number 2NS. The Portland cement shall be Type I. Accelerating admixture shall be Type C (non-chloride) selected from the Qualified Products List. Calcium chloride is not permitted in the concrete mixture. No substitutions from approved mix designs will be permitted.
- C. **Mixture Requirements.**-A non-chloride accelerating admixture shall be used, according to the manufacturer's recommendations, in conjunction with the Portland cement contents specified in Table 1. The minimum specified concrete flexural strengths shall be 2.0-MPa for opening-to-traffic times up to 18 hours, and 3.5-MPa for opening-to-traffic times greater than 18 hours. The concrete mix design shall include the minimum quantities of Portland cement and non-chloride accelerator necessary to achieve the minimum strengths required at the specified opening-to-traffic time.

Anticipated Air Temperature versus Portland Cement Concrete

Anticipated Air Temperature at Jobsite	15° C and below	Above 15° C
Portland Cement Content, kg/m ³ :	446	390

The combined bulk volume (dry loose) of coarse aggregate per unit volume of concrete shall be between 0.65 and 0.75. The consistency (slump) of the freshly mixed concrete shall be 25- to 75-mm and the air content shall be 5.5 +/- 1.5 percent.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Remove Replace Pavement (Fast Set Concrete) Activity #: 1020
Continued

C&T:JFS

REVISED:01-13-00
C&T:APPR:JAR:01-13-00

Trial batch verification mix designs shall be submitted by the Contractor to the Engineer at least 5 working days prior to commencement of concreting operations. The mix designs shall be produced by a testing laboratory conforming to ASTM C 1077 and shall be accompanied by their respective physical properties (slump, air content, unit weight, concrete temperatures at the time of batching, air temperatures at the time of batching and curing, and strength test results). Flexural strength laboratory test results shall be reported, corresponding to the anticipated opening-to-traffic times in the field, for each mix design.

The trial batch verification mixtures shall be batched, and the test specimens fabricated, at ambient temperatures comparable to those anticipated for the actual field concrete placement. The controlled air temperature and relative humidity of the laboratory test specimen curing chamber shall be predetermined, and regulated to replicate the ambient jobsite weather conditions anticipated for field curing during construction.

The trial batch verification mix designs and strength test data must be approved by the Engineer prior to concrete placement in the field.

f. Measurement and Payment.

Contract Item (Pay Item)

Pay Unit

Non-Chloride Accelerator Liters

Measurement and Payment for Concrete Pavement will be as specified in Subsection 602.04 of the Standard Specifications. Measurement and payment for Pavement Repair will be as specified in Subsection 603.04 of the Standard Specifications. In addition to the square meters of Concrete Pavement or Pavement Repair placed, the Contractor will be paid for the additional Cement over the amount (335 kg/m³) normally used for standard strength pavement concrete. An additional 55 kg/m³ of cement (for anticipated air temperatures above 15 C), and 111 kg/m³ of cement (for anticipated air temperatures of 15 C and below), is included in the Portland cement contents shown in Table 1.

Measurement and payment for **Non-Chloride Accelerator** will be based on the actual dosage per unit of in-situ concrete, as determined by automated batch ticket printout; however, not to exceed the approved trial batch verification quantities.

Deductions will be made for all materials wasted or rejected. No additional payment will be made for mix design trial batch verifications.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Patrol Patching

Activity #: 1030

Description/Purpose: Emergency hand tool patching with cold patch bituminous mixture to temporarily correct widely scattered potholes, edge failures, etc.

NOTE: Use the method described in Activity 1050, Bituminous Maintenance & Repair, whenever possible.

Recommended Crew Size

2 Rural

3-7 Urban

Conditions may warrant additional crew members

Material

Cold patch material

Average Daily Production

2 tons bituminous patch material

Average pothole requires 25 lbs. of material.

Approximately 80 potholes filled per ton.

Equipment

Qty

Code

Description

1

02

Dump truck

Or

1

04

Heavy truck

Optional

1

36

Heater box

1

02

Pickup (1 ton) and

1

12

Flashing arrow as needed

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

Measurement

Number of Potholes Filled.

Calculation

Potholes Filled = (Total Hours ÷ Hours Worked / Day) X ADP X 80

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Remove as much loose material and water from the hole or edge as possible.
3. Place the material into the hole and lute it into the corners.
4. Place material in layers no greater than 3" in depth.
5. Remove any excess material from the surrounding surface.
6. Final layer to be leveled flush with adjacent surface AFTER compaction. Compact with truck tires whenever possible.
7. Maintain the original alignment along the outside edge of pavement. Do not allow the patching material to protrude out onto the gravel shoulder.
8. Do not overheat material.

Activity Name: Pavement Spall & Pot Hole Repair

Activity #: 1042

- Methods:
- 1) Pavement Spot Seal Patching (Kettle)
 - 2) Pavement Spot Seal Patching (Pavement Repair Machine)

Pavement Spall and Pot Hole Repair work may be performed using either of the above methods. Performance guides for both of these methods are provided on the following page(s).

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Pavement Spall & Pot Hole Repair			Activity #: 1042		
Method: Pavement Spot Seal Patching (Kettle)					
Description/Purpose: Emulsion and aggregate is used to correct extensive cracking, raveling, spalling, and shallow surface failures. Emulsion-aggregate surface treatment is performed to restore the roadway surface and prevent further deterioration. Roads being considered for this activity must have adequate crown for surface drainage. This activity is not to be used for restoring the crown in a road or filling wheel track ruts.					
<u>Recommended Crew Size</u> 7 (2 traffic regulators included)			<u>Equipment</u>		
<u>Material</u> HFRS - 2 HFRS - 2M 32A			<u>Qty</u>	<u>Code</u>	<u>Description</u>
<u>Average Daily Production</u> 100 Gallons <i>Average patch requires 1.5 gallons of emulsion.</i> <i>Daily average is 65 spalls repaired.</i>			1	02/03	Pickup
<u>Measurement</u> Spalls Repaired			3	04	Trucks
<u>Calculation</u> Spalls Repaired = (Total Hours ÷ 8) x 65			1	12	Flashing arrow
			1	36	Kettle
			1	51	Roller (as required)
			1	19	Compressor (as required)
					<u>Optional</u>
			1	04	Shadow vehicle and attenuator
			1	12	Flashing arrow
			1	02/03	Broom truck
			Equipment may vary depending on availability and operational need.		
			All MDOT Traffic and Safety policies shall be followed for equipment and personnel.		
			Additional equipment and personnel will increase the cost to perform this activity.		

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Pavement Spot Seal Patching (Kettle))

1. [Review environmental, training, and safety precautions.](#)
2. Area to be repaired must be dry.
3. Clean and dry area to be treated with compressed air if necessary.
4. Apply the proper amount of emulsion using spray pressure to agitate dust or dirt so that the new material will bond.
5. Start pour at the high spot of the failure, usually at the sides or edge of the failure. The excess emulsion will flow to the low areas.
6. Guideline - Fill failure to approximately half its depth. Too much emulsion will cause the patch to bleed or push.
7. Allow emulsion time to level out and flow into any cracks, etc. Overlapping of the emulsion into the new aggregate results in a high spot (bump).
8. Drop aggregate over patch with a sifting motion.
9. Guideline - Cover wet emulsion with aggregate until the repair has a "salt and pepper" look with only occasional black between the stones. Then add a light cover, approximately one stone deep layer, to protect the repair from traffic. (Excess aggregate can chip windshields and headlights, or cause loss of traction at curves and intersections.)
10. Whenever possible, use smallest aggregate on top.
11. Completed repair should be flush with existing surface and bonded in place. Any edge should conform to existing pavement edges.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Pavement Spall & Pot Hole Repair			Activity #: 1042		
Method: Pavement Spot Seal Patching (Pavement Repair Machine)					
Description/Purpose: Emulsion and aggregate is used to correct extensive cracking, raveling, spalling, and shallow surface failures. Emulsion-aggregate surface treatment is performed to restore the roadway surface and prevent further deterioration. Roads being considered for this activity must have adequate crown for surface drainage. This activity is not to be used for restoring the crown in a road or filling wheel track ruts.					
<u>Recommended Crew Size</u> 4 (2 traffic regulators included)			<u>Equipment</u>		
<u>Material</u> HFRS - 2 HFRS - 2M 32A			<u>Qty</u>	<u>Code</u>	<u>Description</u>
			2	04	Heavy trucks
			1	36	Road surface maintenance machine, such as AMZ, Rosco, or Durapatcher
			1	12	Flashing arrow
<u>Average Daily Production</u> 1 - 2 lane miles					<u>Optional</u>
			1	04	Shadow vehicle and attenuator
			1	12	Flashing arrow
			1	02/03	Broom truck
<u>Recommended Work Method (Pavement Spot Seal Patching (Pavement Repair Machine))</u>					
1. Review environmental, training, and safety precautions.					
2. Area to be repaired must be dry.					
3. Clean and dry area to be treated with compressed air if necessary.					
4. Apply a thin tack coat.					
5. Fill area to be repaired with emulsion coated aggregate level with existing surface.					
6. Cover repair with light layer of aggregate, if necessary, to minimize tracking. (Excess aggregate can chip windshields and headlights, or cause loss of traction at curves and intersections.)					

Activity Name: Bituminous Maintenance & Repair

Activity #: 1050

Methods:

- 1) Bituminous Patching
- 2) Bituminous Leveling

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Bituminous Patching)

1. [Review environmental, training, and safety precautions.](#)
2. Chip the hole to sound pavement.
3. Concrete surfaces: remove all loose or weak concrete and/or water from the hole.
Bituminous surfaces: make all edges vertical for better bonding. Square the corners on all patches over one square foot for better compaction and appearance. Remove all loose material and water from the hole.
4. Clean the hole with compressed air and dry the surface of the hole with a torch if necessary.
5. Maintain the original alignment along the outside of pavement. Do not allow the patching material to protrude out onto the gravel shoulder. A wood 2x4 may be used as a form along the edge.
6. Tack the prepared hole. Use tack material sparingly so that ponding does not occur. Excessive tack material will dilute and weaken the patching mixture. Tack material must be compatible with the patch mixture.
7. Place bituminous material in 2" layers. Compact each layer separately.
8. Place loose material for the final lift into the hole and rake into corners and evenly over the hole. Remove any loose material from around the hole. The final lift should be approximately ½" above the adjacent surface before compaction.
9. For best results, compact the surface with a steel wheeled roller. A pneumatic roller or vibrating hand compactor may be used if a steel wheeled roller is not available. Do not roll material that is too hot.
10. The finished patch surface must be even with the surrounding surface because a high patch may be pulled out by underbody blades in the winter. Low patches collect moisture causing the patch to fail during freeze/thaw cycles or by a pumping action induced by traffic.

(Portland cement may be mixed with the top 2" to prevent pushing and for a more durable surface.)

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bituminous Maintenance & Repair		Activity #: 1050																																					
		Method: Bituminous Leveling																																					
Description/Purpose: Leveling of depressions, surface failures and irregularities including all preparation of the surface.																																							
<p><u>Recommended Crew Size</u></p> <p>7 - (2 traffic regulators included)</p> <p>Larger crew size may be used for production-type operations.</p> <p><u>Material</u></p> <p>Bituminous tack or bond coat (SS-1h)</p> <p>Bituminous mixture (hot mix)</p> <p><u>Average Daily Production</u></p> <p>3276 Square Feet</p> <p>410 x 12 x 1"</p> <p>273'x 12'x 1.5"</p> <p>1 Ton of Bit @ 1" = 110 lbs.</p> <p><u>Measurement</u></p> <p>Tons</p> <p><u>Calculation</u></p> <p>Tons = (Total Square Feet ÷ 9) x 110 lbs per 1" ÷ 2000</p> <p>Tons = (Total Square Feet ÷ 9) x 165 lbs per 1½" ÷ 2000</p> <p>Tons per Day = Total Tons / (Total Hours / 8 Hrs per day)</p>		<p><u>Equipment</u></p> <table><thead><tr><th><u>Qty</u></th><th><u>Code</u></th><th><u>Description</u></th></tr></thead><tbody><tr><td>1</td><td>02/03</td><td>Pickup</td></tr><tr><td>3</td><td>04</td><td>Trucks</td></tr><tr><td>1</td><td>12</td><td>Flashing arrow</td></tr><tr><td>1</td><td>51</td><td>Roller</td></tr><tr><td>1</td><td>60</td><td>Towed spreader</td></tr><tr><td>1</td><td>67</td><td>Trailer (as required)</td></tr><tr><td>1</td><td>62</td><td>Front end broom (as required)</td></tr><tr><td>1</td><td>32</td><td>Grader (as required)</td></tr><tr><td></td><td></td><td>(Include kettle as required)</td></tr><tr><td colspan="3"><u>Optional</u></td></tr><tr><td>1</td><td>04</td><td>Shadow vehicle and attenuator</td></tr></tbody></table> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>		<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	02/03	Pickup	3	04	Trucks	1	12	Flashing arrow	1	51	Roller	1	60	Towed spreader	1	67	Trailer (as required)	1	62	Front end broom (as required)	1	32	Grader (as required)			(Include kettle as required)	<u>Optional</u>			1	04	Shadow vehicle and attenuator
<u>Qty</u>	<u>Code</u>	<u>Description</u>																																					
1	02/03	Pickup																																					
3	04	Trucks																																					
1	12	Flashing arrow																																					
1	51	Roller																																					
1	60	Towed spreader																																					
1	67	Trailer (as required)																																					
1	62	Front end broom (as required)																																					
1	32	Grader (as required)																																					
		(Include kettle as required)																																					
<u>Optional</u>																																							
1	04	Shadow vehicle and attenuator																																					

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Bituminous Leveling)

1. [Review environmental, training, and safety precautions.](#)
2. Lay out patch and mark area.
3. Clean area to be surfaced and remove all loose material. Blade off high spots with grader or 04 when necessary.
4. Make an even application of bond coat at .05 gallons per square yard on existing paved surfaces and allow time for curing.
5. Spread hot mix bituminous material using mechanical means when possible on existing pavement.
6. Hand rake excess premix over butt joints and feather ends before rolling.

Additional trucks and workers may be added for long haul distances.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bump Removal				Activity#: 1080		
Description/Purpose: Smoothing of bumps at pavement joints to restore smooth pavement surfaces. Smooth bumps using one of these three removal methods: 1. Infra-red heater - heat and shave off excess asphalt material 2. Milling - mill off excess asphalt or concrete material 3. Grader/scarifying blade - shave off excess asphalt or concrete						
Recommended Crew Size 4 (2 traffic regulators included)				Equipment		
Material Milling Method: Use appropriate teeth for material being milled - concrete or bituminous.				Qty	Code	Description
Average Daily Production				For Infra-Red Heater Method		
Bump Removal – Bituminous				2	02/03	Dump
Bump Size	Bumps Removed Infrared	Bumps Removed Grader	Bumps Removed Milling	1	12	Flashing arrow
2”	50	100	30	1	38	Front-end loader
3”	40	80	20	1	36	Infra-red heater
4”	30	60	10	1	04	Heavy truck
Infrared: Average Bump takes approximately 5 minutes to remove.				1	67	Trailer
Grader: Average Bump takes approximately 2 ½ minutes to remove.				For Milling Method		
Milling: Average Bump takes approximately 25 minutes to remove.				1	02/03	Pickup
				1	04	Heavy truck
				1	12	Flashing arrow
				1	38	Surface grinder
				1	67	Trailer
				1	02/03	Broom truck
				1	38	Skid Loader
				For Grading Method		
				1	02/03	Pickup
				1	02/03	Broom truck
				1	12	Flashing arrow
				1	32	Grader
				Optional - Grading Method		
				1	04	Heavy truck
				Optional - All Methods		
				1	04	Shadow vehicle and attenuator
				1	12	Flashing arrow
				Equipment may vary depending on availability and operational need.		
				All MDOT Traffic and Safety policies shall be followed for equipment and personnel.		
				Additional equipment and personnel will increase the cost to perform this activity.		
Measurement Total Bumps Removed				Work Method on next page <		

Activity Name: Bump Removal

Activity#: 1080

Recommended Work Method

Bumps exceeding 1½" in height are subject to bump burning.

1. [Review environmental, training, and safety precautions.](#)
2. **For Infra-Red Heater Method:** Heat bump to the consistency that will allow it to be removed. OR
For Milling Method: Mill bump to the consistency that will allow it to be removed.
For Grading Method: Shave bump to the consistency that will allow it to be removed.
3. Remove excess material.
4. Seal area as required.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Routine Blading		Activity #: 1100	
Description/Purpose: Routine blading of gravel shoulders and crossovers to correct rutting or distortion of the shoulder and to maintain the shoulder slope and crossover grade.			
Note: The elimination of material build-up on the shoulder edge should be charged to Activity 1120, Gravel Shoulder Maintenance.			
<u>Recommended Crew Size</u> 1		<u>Equipment</u>	
<u>Material</u>		<u>Qty</u>	<u>Code</u>
		1	32
<u>Average Daily Production</u> 15 - 22 shoulder miles			<u>Description</u> Grader
			<u>Optional</u>
		1	Towed roller
		1	Strike-off blade
		1	02/03 Pickup broom
		Equipment may vary depending on availability and operational need.	
		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.	
		Additional equipment and personnel will increase the cost to perform this activity.	

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Schedule blading to take advantage of any natural shoulder moisture thus insuring better compaction.
3. Cut and pull gravel in from the shoulder, maintaining the proper slope of 3/4 of an inch per foot of fall to the outside of shoulder.
4. Keep the blade flush or slightly above the outside edge of the existing shoulder. Cutting too deep may create a secondary ditch and unnecessarily loosen the existing compacted shoulder gravel.
5. Adjust the pavement side end of the blade to carry forward ONLY enough gravel to fill the edge of the rut.
6. Set strike-off blade so that it removes material from the pavement surface and spreads the material without leaving a windrow.
7. Roll for final compaction to retain existing moisture, fines and slope.

FAMS Attachment B: Maintenance Activity Guides

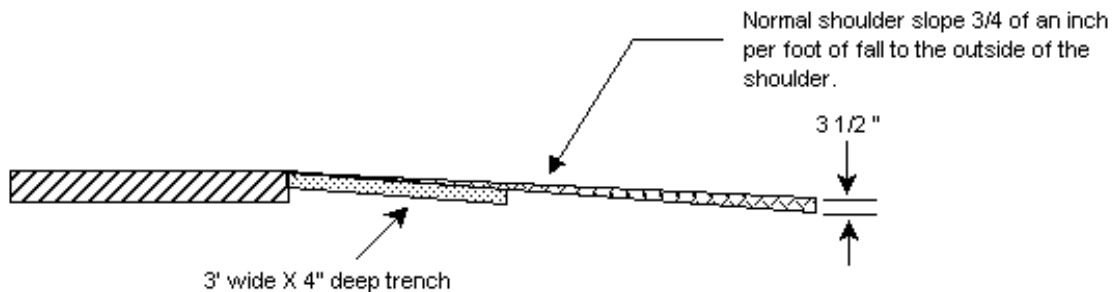
Activity Name: Gravel Shoulder Maintenance	Activity #: 1120
<p>Methods:</p> <ol style="list-style-type: none">1) Shoulder Rehabilitation2) Patching Gravel Shoulder3) Shoulder Windrow Removal4) Shoulder Windrow Removal and Hauling	

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Shoulder Rehabilitation)

1. [Review environmental, training, and safety precautions.](#)
2. With grader, key out gravel as shown in diagram and distribute on shoulder.
3. Spread gravel on depressed areas.
4. Grade shoulder to normal grade.
5. Compact using truck tires plus a roller (if roller is available).

Continued on following page >

Activity Name: Gravel Shoulder Maintenance continued**Activity #: 1120****Method: Shoulder Rehabilitation****Recommended Work Method(Shoulder Rehabilitation) , continued****Profile of Shoulder Trenching**

1. If shoulder material is no longer stable and slope is $3\frac{1}{2}$ " or more below normal slope, cut a 3' wide by 4" deep trench, placing loose material on the outside edge of the shoulder.
2. Place stabilized gravel in trench and compact with loaded truck tires.
3. Grade entire shoulder to normal slope (6%) and compact with rubber tired roller, if available.

Equipment Requirements

<u>Crew Size</u>	<u>Round Trip Distance Stockpile to Worksite</u>	<u>Additional Number of 04 Trucks Needed</u>
6	0 - 5 miles	1
7	0 - 5 miles	2
8	6 - 10 miles	3
9	11 - 15 miles	4
10	16 - 20 miles	5

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Patching Gravel Shoulder)

1. [Review environmental, training, and safety precautions.](#)
2. Place gravel in quantities to fill rut or hole only.
3. Level material with blade or by hand so that, when completed, it will be level with the adjacent surface.
4. Compact gravel by rolling with truck tires.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Gravel Shoulder Maintenance		Activity #: 1120																											
Method: Shoulder Windrow Removal																													
Description/Purpose: Removal of material build-up at the outside edge of the shoulder to improve shoulder drainage. (Spring removal of secondary ditch.) NOTE: The hand operation of scuffing under the guardrail is charged to Activity 1390, Other Routine Maintenance.																													
<p><u>Recommended Crew Size</u></p> <p>2</p> <p>(Note: Traffic control may be required)</p> <p><u>Material</u></p> <p><u>Average Daily Production</u></p> <p>5 - 10 shoulder miles</p>	<p><u>Equipment</u></p> <table border="1"> <thead> <tr> <th><u>Qty</u></th> <th><u>Code</u></th> <th><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>04</td> <td>Truck</td> </tr> <tr> <td>1</td> <td>32</td> <td>Grader</td> </tr> <tr> <td></td> <td></td> <td><u>Optional</u></td> </tr> <tr> <td>1</td> <td>12</td> <td>Flashing arrow</td> </tr> <tr> <td>1</td> <td></td> <td>Shoulder reclaimer (disc)</td> </tr> <tr> <td>1</td> <td>02/03</td> <td>Broom truck</td> </tr> <tr> <td>1</td> <td></td> <td>Rubber tire roller</td> </tr> <tr> <td>1</td> <td>02/03</td> <td>Pickup</td> </tr> </tbody> </table> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>		<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	04	Truck	1	32	Grader			<u>Optional</u>	1	12	Flashing arrow	1		Shoulder reclaimer (disc)	1	02/03	Broom truck	1		Rubber tire roller	1	02/03	Pickup
<u>Qty</u>	<u>Code</u>	<u>Description</u>																											
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1	02/03	Pickup																											

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Shoulder Windrow Removal)

NOTE: Schedule in the early spring when the frost is out of the ground, the surface is comparatively dry and the grass has not started to grow. This timing reduces the number and size of sod lumps and may eliminate an extra pass to shake out large pieces of sod.

1. [Review environmental, training, and safety precautions.](#)
2. On first pass, extend cutting edge beyond the edge of the shoulder to cut down excess material and pull this material back on the shoulder.
3. Adjust cutting edge to maintain proper slope.
4. **Gravel Shoulder and Shoulder with Paved Ribbons** - On the second pass move material to the edge of the pavement and compact as much as possible in the area adjacent to the pavement. (Use work method described in Activity 1100.)
Full Width Paved Shoulder - Necessitates the hauling away of the built-up material. Additional workers and equipment will be required for this type of operation. See Shoulder Windrow Removal and Hauling, on the following page.
5. Level material and clean the pavement using the shoulder maintainer strike-off blade, or truck blade.
6. Compact shoulder gravel by rolling with the final pass.

Note: Where necessary, remove delineators and re-install after windrow removal. This should be reported to activity 1640.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Gravel Shoulder Maintenance		Activity #: 1120																															
Method: Shoulder Windrow Removal and Hauling																																	
Description/Purpose: Removal of material build-up at the outside edge of the shoulder to improve shoulder drainage. (Spring removal of secondary ditch.) Includes hauling away sod. Note: The hand operation of scuffing under the guardrail is charged to activity 1390, Other Routine Maintenance.																																	
<u>Recommended Crew Size</u> 5 Note: Traffic control may be required <u>Material</u> <u>Average Daily Production</u> 1- 5 shoulder miles		<u>Equipment</u> <table><thead><tr><th>Qty</th><th>Code</th><th>Description</th></tr></thead><tbody><tr><td>3</td><td>04</td><td>Trucks with underbody blades</td></tr><tr><td>1</td><td>32</td><td>Grader</td></tr><tr><td>1</td><td>38</td><td>Loader</td></tr><tr><td>1</td><td>67</td><td>Trailer</td></tr><tr><td>1</td><td>02/03</td><td>Truck</td></tr><tr><td>1</td><td>12</td><td>Flashing arrow</td></tr><tr><td>1</td><td>02/03</td><td>Broom truck</td></tr><tr><td colspan="3"> <u>Optional</u></td></tr><tr><td>1</td><td></td><td>Rubber tire roller</td></tr></tbody></table> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>		Qty	Code	Description	3	04	Trucks with underbody blades	1	32	Grader	1	38	Loader	1	67	Trailer	1	02/03	Truck	1	12	Flashing arrow	1	02/03	Broom truck	 <u>Optional</u>			1		Rubber tire roller
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FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Shoulder Windrow Removal and Hauling)

NOTE: Schedule in the early spring when the frost is out of the ground, the surface is comparatively dry and the grass has not started to grow. This timing reduces the number and size of sod lumps and may eliminate an extra pass to shake out large pieces of sod.

1. [Review environmental, training, and safety precautions.](#)
2. On first pass, extend cutting edge beyond the edge of the shoulder to cut down excess material and pull this material back on the shoulder.
3. Adjust cutting edge to maintain proper slope.
4. **Gravel Shoulder and Shoulder with Paved Ribbons** - On the second pass move material to the edge of the pavement and compact as much as possible in the area adjacent to the pavement. (Use work method described for Routine Blading.)
Full Width Paved Shoulder - Necessitates the hauling away of the built-up material.
5. Level material and clean the pavement using the shoulder maintainer strike-off blade or truck blade.
6. Compact shoulder gravel by rolling with the final pass.

Note: Where necessary, remove delineators and re-install after windrow removal. This should be reported to activity 1640.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Paved Shoulder Maintenance	Activity #: 1140
Methods:	
1) Shoulder Spot Seal Patching (Kettle)	
2) Shoulder Spot Seal Patching (Pavement Repair Machine)	
3) Shoulder Seal Coating (Full Width)	
4) Shoulder Bituminous Patching	
5) Shoulder Bituminous Leveling	

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Paved Shoulder Maintenance

Activity #: 1140

Method: Shoulder Spot Seal Patching (Kettle)

Description/Purpose: Emulsion and aggregate patching used to correct extensive cracking, raveling or spalling on paved shoulder and crossovers. Seal patching is performed to restore the shoulder surface and to prevent further deterioration.

Recommended Crew Size

7

Conditions may warrant additional crew members

Material

Emulsion

Sand

Aggregate

Type 2 crack sealant

Backer Rod (Rated for hot materials)

Average Daily Production

250 gallons

(10 lbs. of rubber sealant is equivalent to one gallon.)

Average crack size is ½" x 1"=38.5 lin ft / g

Equipment

Qty

Code

Description

1

02/03

Pickup

2

04

Heavy trucks

1

12

Flashing arrow

1

36

Tar kettle

Optional

1

04

Shadow vehicle and attenuator

2

02/03

Broom truck

1

Air compressor

1

12

Flashing arrow

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

Measurement

Lineal Feet

Calculations

Total Lineal Feet Sealed = Total Gallons X 38.5 lineal ft / gallon.

Average Feet Sealed / Day = (Total Hours ÷ Hours worked / Day) ÷ Total Gallons Used

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Spot Seal Patching (Kettle))

1. [Review environmental, training, and safety precautions.](#)
2. Area to be treated should be relatively free of dust and dirt.
3. Apply the proper amount of emulsion using spray pressure to agitate dust or dirt so that the aggregate will bond.
4. Start pour at the high spot of the failure, usually the edge and sides of the failure. Any excess emulsion will flow to the low areas.
5. Guideline: Fill failure to approximately half its depth. Too much emulsion will cause the patch to bleed or push.
6. Allow time for the asphalt to level out and penetrate into any cracks, etc. This will also permit the hose-person time to plan the rest of the patch. Overlapping of the emulsion onto the new stones results in a high spot (bump).
7. Distribute the aggregate over patch with a sifting motion.
8. Guideline: Cover the emulsion with aggregate until the patch has a "salt and pepper" look with only occasional black between the stones. Then add a light cover, approximately one stone deep layer, to protect the patch from traffic. (Excess aggregate can chip windshields and headlights or cause loss of traction at curves and intersections.)
9. Completed patch should be flush with existing surface and bonded in place. Edge of patch should conform to existing pavement edges to maintain edge line.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Paved Shoulder Maintenance		Activity #: 1140	
Method: Shoulder Spot Seal Patching (Pavement Repair Machine)			
Description/Purpose: Emulsion and aggregate patching used to correct extensive cracking, raveling or spalling on paved shoulder and crossovers. Seal patching is performed to restore the shoulder surface and to prevent further deterioration.			
<u>Recommended Crew Size</u> 4 (2 traffic regulators included) or 2 (no traffic regulators)		<u>Equipment</u>	
<u>Material</u> HFRS-2 HFRS-2M 32FA		<u>Qty</u>	<u>Code</u>
			<u>Description</u>
		1	02/03 Pickup
		1	04 Heavy truck
		1	12 Flashing arrow
		1	36 Road surface maintenance machine
<u>Average Daily Production</u> 1 - 3 shoulder miles			<u>Optional</u>
		1	12 Flashing arrow
		1	04 Shadow vehicle and attenuator
Equipment may vary depending on availability and operational need.			
All MDOT Traffic and Safety policies shall be followed for equipment and personnel.			
Additional equipment and personnel will increase the cost to perform this activity.			

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Spot Seal Patching (Pavement Repair Machine))

1. [Review environmental, training, and safety precautions.](#)
2. Clean and dry area to be treated with compressed air if necessary.
3. Apply a thin tack coat.
4. Fill area to be repaired with emulsion coated aggregate level with existing surface.
5. Cover repair with light layer of aggregate to minimize tracking. (Excess aggregate can chip windshields and headlights, or cause loss of traction at curves and intersections.)

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Seal Coating (Full Width))

1. [Review environmental, training, and safety precautions.](#)
2. Correct distorted or settled areas before sealing.
3. Sweep all loose debris from shoulder surface.
4. Apply emulsion heated to proper temperature. Apply at the rate of 0.4 gallons per square yard. (Unless otherwise instructed.)
5. Apply cover material with mechanical spreader immediately with application rate of 22-25 pounds per square yard.
6. Roll entire sealed area.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Paved Shoulder Maintenance		Activity #: 1140																																									
Method: Shoulder Bituminous Patching																																											
Description/Purpose: Permanent patching of bituminous shoulder potholes, removal and replacement of short strips of deteriorated bituminous shoulder to repair shoulder failures.																																											
<p><u>Recommended Crew Size</u> 4 (traffic control may be required)</p> <p><u>Material</u> Bituminous bond as required (SS-1h) Bituminous mixture (hot mix)</p> <p><u>Average Daily Production</u> 10 Tons Patch = 6 x 12 x .33 2 ton per yard 1.25 ton per patch Average repair is 8 patches per day.</p> <p><u>Measurement</u> Tons</p>	<p><u>Equipment</u></p> <table><thead><tr><th><u>Qty</u></th><th><u>Code</u></th><th><u>Description</u></th></tr></thead><tbody><tr><td>1</td><td>02/03</td><td>Dump</td></tr><tr><td>2</td><td>04</td><td>Heavy trucks</td></tr><tr><td>1</td><td>12</td><td>Flashing arrow</td></tr><tr><td>1</td><td>19</td><td>Air compressor</td></tr><tr><td>1</td><td>36</td><td>Kettle</td></tr><tr><td>1</td><td>51</td><td>Steel roller and/or hand compactor</td></tr><tr><td>1</td><td>67</td><td>Trailer</td></tr><tr><td colspan="3"><u>Optional</u></td></tr><tr><td>1</td><td>12</td><td>Flashing arrow</td></tr><tr><td>1</td><td>04</td><td>Heavy truck</td></tr><tr><td>1</td><td></td><td>Front-end loader</td></tr><tr><td></td><td></td><td>OR</td></tr><tr><td>1</td><td></td><td>Tractor with bucket attachment</td></tr></tbody></table> <p>Note: Include roller with the second truck.</p> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>	<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	02/03	Dump	2	04	Heavy trucks	1	12	Flashing arrow	1	19	Air compressor	1	36	Kettle	1	51	Steel roller and/or hand compactor	1	67	Trailer	<u>Optional</u>			1	12	Flashing arrow	1	04	Heavy truck	1		Front-end loader			OR	1		Tractor with bucket attachment
<u>Qty</u>	<u>Code</u>	<u>Description</u>																																									
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FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Shoulder Bituminous Patching)

1. [Review environmental, training, and safety precautions.](#)
2. Chip the hole to sound pavement.
3. Concrete surfaces: remove all loose or weak concrete and/or water from the hole.
4. Bituminous surfaces: make all edges vertical for better bonding. Square the corners on all patches over one square foot for better compaction and appearance. Remove all loose material and water from the hole.
5. Clean the hole with compressed air and dry the surface of the hole with a torch if necessary.
6. Maintain the original alignment along the outside of pavement. Do not allow the patching material to protrude out onto the gravel shoulder. A wood 2x4 may be used as a form along the edge.
7. Tack the prepared hole. Use tack material sparingly so that ponding does not occur. Excessive tack material will dilute and weaken the patching mixture. Tack material must be compatible with the patch mixture.

Recommended Work Method continued on next page >

Method: Shoulder Bituminous Patching

Recommended Work Method, continued

1. Place bituminous material in 2" layers. Compact each layer separately.
2. Place loose material for the final lift into the hole and rake into corners and evenly over the hole. Remove any loose material from around the hole. The final lift should be approximately ½" above the adjacent surface before compaction.
3. For best results, compact the surface with a steel wheeled roller. A pneumatic roller or vibrating hand compactor may be used if a steel wheeled roller is not available.
4. The finished patch surface must be even with the surrounding surface because a high patch may be pulled out by underbody blades in the winter. Low patches collect moisture causing the patch to fail during freeze/thaw cycles or by a pumping action induced by traffic.

Note: Portland cement may be mixed with the top 2" to prevent pushing and for a more durable surface.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Paved Shoulder Maintenance		Activity #: 1140	
Method: Shoulder Bituminous Leveling			
Description/Purpose: Leveling of depressions, failures, irregularities and the placing of short strips of bituminous ribbons on existing gravel or bituminous shoulder.			
<u>Recommended Crew Size</u> 7 (traffic control may be required)		<u>Equipment</u>	
<u>Material</u> Bituminous bond as required (SS-1h) Bituminous mixture (hot mix)		<u>Qty</u>	<u>Code</u>
<u>Average Daily Production</u> 3276 Square Feet 410 x 12 x 1” 273’x 12’x 1.5” 1 Ton of Bit @ 1” = 110 lbs.		1	02/03
<u>Measurement</u> Tons		3	04
<u>Calculation</u> Tons = (Total Square Feet ÷ 9) x 110 lbs per 1” ÷ 2000 Tons = (Total Square Feet ÷ 9) x 165 lbs per 1½” ÷ 2000 Tons per Day = Total Tons / (Total Hours / 8 Hrs per day)		1	12
		1	19
		1	51
		1	60
		1	36
		1	
		<u>Optional</u>	
		1	02/03
		1	12
		Note: Additional trucks and workers may be needed for long haul distances.	

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method (Shoulder Bituminous Leveling)

1. [Review environmental, training, and safety precautions.](#)
2. Clean surface as required.
3. Make an even application of bond coat at .05 gallons per square yard on existing paved surfaces and allow time for curing.
4. Spread hot mix bituminous material using mechanical means when possible on existing pavement.
5. Hand rake hot mix from pavement and feather edges before rolling.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Tree Removal		Activity #: 1200	
Description/Purpose: Removal of trees (except stumps) including cleanup and ensuring that the remaining stump is not hazardous to cars that leave the roadway. This includes all trees 8" DBH (diameter breast high) and larger. The use of a bucket truck may be required. Note: All related stump chipping should be reported to activity 1210, Stump Removal.			
<u>Recommended Crew Size</u> 3 - 5 (2 traffic regulators included)	<u>Equipment</u>		
<u>Material</u>	<u>Qty</u>	<u>Code</u>	<u>Description</u>
<u>Average Daily Production</u> 5 - 20 trees (8" - 18" DBH) 1 - 5 trees (19" - 36" DBH) 1 or less (37" DBH or larger)	1	02/03	Pickup
	1	04	Truck
	1	12	Flashing arrow
	1	10	Aerial tower
	1	03	Truck
			<u>Optional</u>
	1	17	Brush chipper
	1	67	Trailer
	1	38	Skid steer loader OR
	1	04	Crane truck if skid steer loader unavailable
	1	12	Flashing arrow
	1	22	Hydraulic crane
			<u>Optional for trees > 18" DBH</u>
	1	04	Truck with attachment
<u>Recommended Work Method</u>			
<ol style="list-style-type: none">Review environmental, training, and safety precautions.Do not cut or trim Oak trees between April 1st and October 1st.Remove branches (using the aerial tower) before felling tree, if necessary.Use ropes as necessary to lower large limbs.Attach a line to ensure proper direction of fall if necessary.Cut and fell the tree.Cut and fell stub.Cut wood into 8' log lengths.Clear the area of debris - chip.Spread chips out evenly. Dispose of wood as required.Re-cut the stump as close to the ground as possible.Rake lawn and pick-up debris (in residential areas).IMPORTANT: clean all equipment used for cutting before moving to next area to prevent the spread of noxious and invasive species.			

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Stump Removal

Activity #: 1210

Description/Purpose: Removal of tree stumps to eliminate roadside obstacles and improve the appearance of the roadside.

Recommended Crew Size

2

Material

Top soil

Grass Seed

Mulch

Average Daily Production

5 - 7 stumps

Equipment

Qty

Code

Description

1

02/03

Pickup

1

17

Stump grinder

Optional

1

05

Tractor

1

04

Truck

1

67

Trailer

Note:

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Remove stump with stump chipper to 6" below ground elevation.
3. Remove stump chips.
4. Backfill area with suitable top soil.
5. Lightly compact soil.
6. Seed and mulch area.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Catch Basin Cleanout

Activity #: 1220

Description/Purpose: Cleaning the inside of catch basins, manholes or inlets by removal of accumulated dirt and debris to ensure proper drainage. Some Catch Basin Cleanout work may be performed by contractors. Contract Catch Basin Cleanout is also reported to 1220. Please indicate contract work by using the appropriate object code when reporting.

NOTE: The removal of snow and ice from drainage structures is charged to Activity 1490, Other Winter Maintenance. The cleaning of culverts is charged to Activity 1280, Culvert, Underdrain and Edge Drain Cleaning. The repair, removal, and/or replacement of culverts, catch basins, and underdrains is charged to Activity 1281, Culvert, Underdrain, and Edge Drain Maintenance.

Recommended Crew Size **4 (2 Traffic Regulators Included)**

Material

Use contract specs

Average Daily Production

Cleaning: 40 structures

Repair: 5 structures

Measurement

Cleaning: Number of Structures Cleaned

Repair: Number of Structures Repaired

Calculations

**Total Structures Cleaned = (Total Hours ÷ 8 or 10) x
ADP**

**Total Structures Repaired = (Total Hours ÷ 8 or 10) x
ADP**

Equipment

<u>Qty</u>	<u>Code</u>	<u>Description</u>
1	04	Vac All Truck
1	68	Attenuator
1	12	Flashing Arrow

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

Activity Out of Scope

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Review DEQ Catch Basin Cleaning Activities Guidance Document:
http://www.michigan.gov/documents/deq/wrd-stormwater-catch-basin-guidance_579858_7.pdf
3. After removing and cleaning cover, check depth of solid debris to determine what cleaning is necessary. (Show accomplishment for both checking and cleaning.)
4. Check interior for sewer gas and then check the condition of the structure.
5. As required, loosen solids with water pressure (agitator).
6. Carefully clean ring seat before replacing cover.
7. **See disposal of material below. Consult with the region resource specialist for the proper procedures to follow for disposal of solid and liquid waste.** If a private contractor is doing this work, they must be licensed industrial waste transporters.
8. All structures and catch basins containing 2 inches or more of material shall be cleaned.
9. An inspection log shall be kept and identify each drainage structure and catch basin inspected and cleaned. The log must include the route number, trunk line name and direction of travel, the name of the nearest intersection, the catch basins distance from the intersection, the nearest street address, the depth of contents and remarks describing any repairs they may be needed and any blocked outlets.

NOTE: For further details on compliance with environmental regulations, see Standard Specification 107.15. In addition, state regulations that are applicable to the environmental compliance include Part 31 of 1994 PA 451, Section 3109; State Rule R323.1050 of Michigan Administrative Code; and Part 121 of 1994 PA 451, Section 12113.

CAUTION: Do not attempt to enter beyond the portal of the manhole or catch basin without contacting the MDOT supervisor in charge of your facility. Such actions are classified as Permit Required Confined Space entries and a special permit and training must be obtained by the entrant(s). Permit Required Confined Spaces may require use of the following:

- Gas detector
- Air fed respirators if in-house rescue procedures are to be used
- Lifeline and body harness
- Outside attendant
- Tripod and winch
- Ventilation device

Disposal of Material

FAMS Attachment B: Maintenance Activity Guides

MDOT Staff (or Contractor) is responsible for disposal of all material as follows:

Disposal Alternate A

Solid Waste Phase: The solid waste generated shall be disposed of at a Type II landfill. Solid is defined as having no releasable liquids. The landfill may require testing before accepting the waste. The TSC Maintenance Coordinator/Supervisor (or Contract Administrator) shall be provided disposal documentation from the Type II landfill.

Liquid Waste Phase:

- Option 1 - This waste may be evaporated by use of drying beds, decanting stations or similar systems that contain the solids during evaporation; or
 - Option 2 - This waste may be placed in a sanitary sewer system with the approval of the owner of the system. A copy of the owner's approval shall be provided to the TSC Maintenance Coordinator/Supervisor (or Contract Administrator); or
 - Option 3 - This waste may be collected by pumping the majority of clear liquid from the catch basin without disturbing the solids. A small pump not connected to the Vactor Truck's holding tank such as a sump pump shall be used. The clear water may then be discharged to one of the following:
 - Sanitary system (with prior approval see Option 2)
 - Curb and gutter
 - Back into the storm sewer system as long as it is contained within the system and does not directly enter surface water.
 - Applied to the ground at a distribution rate of 250 gallons/acre/year.
- The remaining solid/liquid phase is to be managed as waste and disposed of using Disposal Alternate B or using Disposal Alternate A with Options 1 or 2.

Disposal Alternate B

The waste generated shall be transported and disposed of by a Licensed Liquid Industrial Waste Hauler in accordance with Part 121, Liquid Industrial Waste of the Natural Resources and Environmental Protection Act, Act 451, PA 1994. The TSC Maintenance Coordinator/Supervisor (or Contract Administrator) shall be provided a copy of the manifest with every invoice submitted.

If at any time the material is suspected of being hazardous, the TSC Maintenance Coordinator/Supervisor (or Contract Administrator) shall be notified.

Drainage structures to be cleaned shall be measured as Drainage Structure Lead, Cleaning each.

For contracts: the completed work will be paid for at the contract unit price each, which price includes all equipment and labor to clean basin or manhole and hauling, testing if required for disposal, and disposing of all waste. If material tests hazardous as defined by Part 111 of the Natural Resources and Environmental Act, Act 451, P.A. 1994, the Contract Administrator shall be notified immediately. Payment for disposal of hazardous material shall be as per Subsection 109.07 Extra and Force Account Work.

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Activity Name: Ditch Cleanout & Check Dam Maintenance		Activity #: 1230																																							
Methods: <ol style="list-style-type: none"> 1) Ditch Clean-Out 2) Check Dam Maintenance 																																									
Description/Purpose: Roadside Ditch Clean-Out includes the removal and disposal of debris to ensure proper drainage. Check Dam Maintenance consists of inspecting and removing accumulated sedimentation to maintain proper functioning of permanent structures.																																									
<p><u>Recommended Crew Size</u> 5 (2 traffic regulators included)</p> <p><u>Material</u> Follow SESC Manual</p> <p><u>Average Daily Production</u> 2000 lineal feet (gradall/excavator) 500 lineal feet (tractor/backhoe) 2000 lineal feet (grader/dozer)</p> <p><u>Measurement</u> Lineal Feet Cleaned</p> <p><u>Calculation</u> Lineal Feet Cleaned = (Total Hours ÷ 8) x ADP</p>	<table> <thead> <tr> <th colspan="3"><u>Equipment</u></th></tr> <tr> <th><u>Qty</u></th><th><u>Code</u></th><th><u>Description</u></th></tr> </thead> <tbody> <tr> <td>1</td><td>02/03</td><td>Pickup</td></tr> <tr> <td>3</td><td>04</td><td>Trucks (see table below)</td></tr> <tr> <td>1</td><td>12</td><td>Flashing arrow</td></tr> <tr> <td>1</td><td>26</td><td>Gradall (if available) or</td></tr> <tr> <td>1</td><td>05</td><td>Tractor/backhoe/extendahoe (alternate)</td></tr> <tr> <th colspan="3"><u>Optional</u></th></tr> <tr> <td>1</td><td>32</td><td>Grader</td></tr> <tr> <td>1</td><td>05</td><td>Bulldozer</td></tr> <tr> <td>1</td><td>12</td><td>Flashing Arrow</td></tr> <tr> <td>1</td><td>38</td><td>Loader</td></tr> <tr> <td>1</td><td>67</td><td>Trailer</td></tr> </tbody> </table> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>	<u>Equipment</u>			<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	02/03	Pickup	3	04	Trucks (see table below)	1	12	Flashing arrow	1	26	Gradall (if available) or	1	05	Tractor/backhoe/extendahoe (alternate)	<u>Optional</u>			1	32	Grader	1	05	Bulldozer	1	12	Flashing Arrow	1	38	Loader	1	67	Trailer	
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1	67	Trailer																																							

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Recommended Work Method: Ditch Clean-Out

Caution: Check with utility companies for buried gas lines, telephone or electric cables, etc. Call MISS DIG.

Contact your resource staff or appointed region representative if questions arise regarding storm water or soil erosion control and to determine if any permits are required. (Act 451, specifically, disturbing land area of one acre or more or within 500 feet of a lake or stream.) Note: When performing this operation, follow the procedure in the appendix of the Soil Erosion and Sedimentation Control (SESC) Manual.

Complete MDOT forms 1126 (National Pollutant Discharge Elimination System Inspection Report) and 0408 (Work Schedule) when performing this operation ([MDOT Forms Repository](#)).

1. [Review environmental, training, and safety precautions](#). Also see 1a: Notifications, 1b: Inspections, and 1c: SESC Plan below.
2. Establish the ditch flow line (use appropriate measuring device).
3. Determine the location the water will outlet to.
4. If the spoils are taken off-site, provide a dump site for the spoils to be removed to (i.e., use spoils to flatten slopes behind guardrails that will be removed in the future).
5. If spoils are left on site, remove all debris, grade properly, and prepare spoils for seeding.
6. Remove spoils and load into trucks with minimum interference with traffic.
7. Avoid creating a "V" bottom ditch; a 2 foot round-bottom ditch is the minimum requirement. 3 feet or wider ditches are desirable for drainage and snow storage.
8. As required, dress, mulch and seed and/or sod slopes to prevent erosion. See sections 816 and 917 of the standard specifications.

Equipment Requirements

Crew Size	Round Trip Distance Stockpile to Dumpsite	Number of 04 Trucks Needed
4	0 - 5 miles	2
5	6 - 10 miles	3
6	11 - 15 miles	4

Recommended Work Method: Ditch Clean-Out (continued)

1a. Notifications: If the operation disturbs more than one acre of earth and is to restore the ditch to original ditch grades (match inlet and outlet grades) a National Pollutant Discharge Elimination System (NPDES) Notice of Coverage (NOC) is not required. If the project disturbs five acres or more of earth and is to alter the original ditch grade (new outlet or inlet grade) an NOC and notification of the municipal enforcing agency (MEA) or county enforcing agency (CEA) is required.

1b. Inspections: For earth disturbances greater than one acre, a certified storm water operator (SWO) will inspect the project once per week and within 24-hours after each precipitation event, that results in a discharge from the right-of-way. NPDES Inspection Report (Form 1126) will be used to document these inspections. Any deficiencies or corrective actions will be recorded on the form and will be brought to the attention of the Contractor or maintenance staff performing the work. The SWO is responsible for ensuring that corrective actions are completed within the time allotted. A log of the inspections will be maintained on file for review and retained for a period of three years from the date of the inspection or the date corrective actions were complete, whichever is longer.

Non-emergency corrective actions will be completed by those doing the ditch clean out, or by others if necessary, within five calendar days. If the Maintenance Coordinator determines that an emergency condition exists, corrective actions will be completed by those doing the work within 24 hours of the inspection. Emergency conditions include sediment entering drainage structures or the waters of the state and erosion that affects the support of the roadbed or the safety of the public. Emergency action will be documented as such on Form 1126.

FAMS Attachment B: Maintenance Activity Guides

1c. SESC Plan: The following soil erosion and sedimentation control (SESC) procedure has been reviewed by MDEQ and is approved for this activity. This procedure is intended to minimize soil erosion and off right-of-way sedimentation during ditch clean out activities. If this procedure is not followed, a site-specific SESC plan meeting the requirements of rule R323.1703, promulgated in accordance with Part 91 of Act 451, is required.

If spoils are taken to an off right-of-way location, the Standard Specifications for Construction controls the disposal of the surplus material. The property owner or easement holder where the material is to be placed must obtain a SESC permit from the appropriate enforcing agency if the placement covers one acre or more or if the material is placed within 500 feet of the waters of the state. If excess materials will be transported off the right-of-way for disposal, notify the maintenance coordinator or region resource staff prior to beginning the ditch clean out operation and request that they contact the enforcing agency to determine if a permit is required. If a permit is required, the permit must be obtained prior to beginning this work.

- If the ditch slope is one percent or more, install sediment traps (E&S-20) in the ditch bottom, spaced approximately 300 feet apart (\pm 50 feet).
- Maintain a vegetative buffer (E&S-6) between the lower limit of the ditch clean out operation and the outfall to the watercourse. If the vegetative buffer cannot be left in place while the disturbed area upstream stabilizes, place high velocity mulch blanket (E&S-33) on the ditch bottom a minimum of 150 feet upstream from the lower limit of the ditch clean out operation.
- If the ditch carries water continuously, install a check dam (E&S-37) and sediment trap (E&S - 20) at the downstream end of the ditch.
- Begin ditching operation at the highest elevation and progress downstream.
- Remove the vegetative buffer only after the disturbed area has been stabilized. After removing the vegetative buffer, stabilize that area with high velocity mulch blanket.
- Within five days of completing the work, seed and mulch (E&S-3; E&S-28) all exposed areas resulting from the ditch cleanout activities. If the work is completed outside of the seasonal limitations for seeding, place high velocity mulch blanket over the entire disturbed area. Contact appropriate region resource staff for alternative restoration recommendations.

Recommended Work Method: Check Dam Maintenance

Contact your resource staff or appointed region representative if questions arise regarding storm water or soil erosion control and to determine if any permits are required.

1. Review environmental, training, and safety precautions.
2. Inspect check dams for piping under structure or around banks. Correct all damage. If severe erosion is evident consider other stabilization options.
3. Sedimentation should be removed when built up to one-half the height of the check dam. This allows water to flow through check dam properly in the event of large flows.
4. Spoils may be left on site. Remove all debris and grade properly.
5. As required, dress mulch and seed slopes to prevent erosion. See sections 816 and 917 of the standard specifications.
6. Inspect culverts and other structures below the check dams for damage or blockage due to displaced stones.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Area Mowing		Activity #: 1260	
Description/Purpose: Machine mowing to accomplish neat, uniform grassy roadside area.			
<u>Recommended Crew Size</u> 2		<u>Equipment</u>	
<u>Material</u>		<u>Qty</u>	<u>Code</u> <u>Description</u>
		2	05 Tractor
		2	42 Mower
			OR
<u>Average Daily Production</u> 18 acres (with 8' or smaller mower) 30 acres (with 15' mower)		2	05 Tractor with flail
<u>Measurement</u> Acres Mowed		Equipment may vary depending on availability and operational need.	
<u>Calculation</u> Total Acres Mowed = (Total Hours ÷ 8) x ADP		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.	
		Additional equipment and personnel will increase the cost to perform this activity.	

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Check mower for safety items (deflector chains, etc.).
3. Designate a specific area of work for each type of mower on any section so as to reduce turning, unnecessary passes and mower congestion. Each mower should work independently, but should remain within visual contact. When making assignments consider the following:
 - 15' rotary mowers (single unit with bat wings) work best on the wider areas where few obstructions exist. Assign these mowers where they can mow one, three, five or other odd number passes.
 - Single unit rotary mowers, 8' and under, work best on wide shoulders and foreslopes and for mowing around signs, ramps, etc.
 - Sickle bar mowers basically are less productive and work best for mowing around obstructions, on narrow shoulders, "V" ditches, etc.
4. Make mowing assignments so that no more than three mowers are working close together. The following teams of mowers have proven effective:
 - On wide right-of-ways: a team of one single unit rotary mower and one 15' rotary mower.
 - On narrow right-of-ways, urban or sparse growth areas: a team of two single unit rotary mowers.
5. Have operators start mowers immediately after checking their mowers at the storage site. As necessary, each mower will be stopped and serviced individually on the job site or a service truck may be spotted at roadside with spare parts and fuel. The time used for roadside servicing and minor repairs will be absorbed in activity 1260.
6. The mower should be set to cut to approximately 5" in height.
7. ***IMPORTANT: clean all equipment used for cutting before moving to next area to prevent the spread of noxious and invasive species.***
8. Follow additional requirements detailed below.

Activity
Out of Scope

Activity Name: Area Mowing continued**Activity #: 1260****Recommended Work Method, (additional requirements)****Mowing Schedule**

1. Trunklines in Superior and North Regions: Two cycles per calendar year
 - First Cycle - Complete between June 1 and June 30.
 - Second Cycle - Begin mowing after September 1 and complete by October 15.
2. Trunklines in Grand, Bay, University, Southwest and Metro Regions: Three cycles per calendar year will be permitted, with second cycle optional.
 - First Cycle – Complete between May 1 and June 30.
 - Second Cycle - Mow as needed between August 1 and August 31.
 - Third Cycle - Begin mowing after October 1 and complete by November 1.

First Mowing:**Highways without medians:**

- Mow 5' to 12' swath, depending on the cross-section of the highway adjacent to the shoulder of the highway.
- Mow clear vision areas at crossroads, inside of curves and railroad crossings where vegetation obstructs vision. If vegetation does not obstruct vision, do not mow.

Highways with medians:

- Mow 12' adjacent to outside shoulder.
- Mow 12' adjacent to both sides of ramp.
- Mow clear vision areas at crossroads, inside of curves and railroad crossings where vegetation obstructs vision. If vegetation does not obstruct vision, do not mow.

Medians:

- Medians less than 50' in width - Mow entire median.
- Medians more than 50' in width - Mow 12' adjacent to the median shoulder. Do not mow parallel to cross-overs.

Second Mowing - Superior and North Regions:

Mow all areas described in the first mowing on an as needed basis.

Second Mowing - Grand, Bay, University, Southwest and Metro Regions:

Mow all areas described in the first mowing on an as needed basis.

Third Mowing - Grand, Bay, University, Southwest and Metro Regions:

Mow all areas described in the first mowing on an as needed basis.

Activity Name: Area Mowing continued

Activity #: 1260

Recommended Work Method, (additional requirements)

Special Urban Mowing

Within Federal Aid urban boundaries, some parkway boulevard medians, channelized islands and fully depressed urban freeways may be maintained to higher standards than the normal highway roadsides. All areas which have not been historically mowed to higher standards will require initial approval by the Maintenance Engineer.

General Guidelines

All roadside mowing must conform to PA 51, Act No. 174 of 1999, Sec. 15b.

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Area Mowing continued

Activity #: 1260

Recommended Work Method, (additional requirements)

Grass Mowing Acreage Chart

Width in feet	Length in Miles																		
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1	2	3	4	5	6	7	8	9	10
1	.0	.0	.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2
2	.0	0.1	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.5	0.7	1.0	1.2	1.5	1.7	1.9	2.2	2.4
3	.0	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.7	1.1	1.5	1.8	2.2	2.6	2.9	3.3	3.6
4	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.4	0.4	0.5	1.0	1.5	1.9	2.4	2.9	3.4	3.9	4.4	4.9
5	0.1	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.5	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.9	5.5	6.1
6	0.1	0.2	0.2	0.3	0.4	0.4	0.5	0.6	0.7	0.7	1.5	2.2	2.9	3.6	4.4	5.1	5.8	6.5	7.3
7	0.1	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.7	2.6	3.4	4.2	5.1	5.9	6.8	7.6	8.5
8	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9	1.0	1.9	2.9	3.9	4.9	5.8	6.8	7.8	8.7	9.7
9	0.1	0.2	0.3	0.4	0.6	0.7	0.8	0.9	1.0	1.1	2.2	3.3	4.4	5.5	6.5	7.6	8.7	9.8	10.9
10	0.1	0.2	0.4	0.5	0.6	0.7	0.9	1.0	1.1	1.2	2.4	3.6	4.9	6.1	7.3	8.5	9.7	10.9	12.1
20	0.2	0.5	0.7	1.0	1.2	1.5	1.7	1.9	2.2	2.4	4.9	7.3	9.7	12.1	14.6	17.0	19.4	21.8	24.2
30	0.4	0.7	1.1	1.5	1.9	2.2	2.6	2.9	3.3	3.6	7.3	10.9	14.6	18.2	21.8	25.5	29.1	32.7	36.4
40	0.5	1.0	1.5	1.9	2.4	2.9	3.4	3.9	4.4	4.9	9.7	14.6	19.4	24.2	29.1	33.9	38.8	43.6	48.5
50	0.6	1.2	1.8	2.4	3.0	3.6	4.2	4.9	5.5	6.1	12.1	18.2	24.2	30.3	36.4	42.4	48.5	54.6	60.6
60	0.7	1.5	2.2	2.9	3.6	4.4	5.1	5.8	6.6	7.3	14.6	21.8	29.1	36.4	43.6	50.9	58.2	65.5	72.7
70	0.9	1.7	2.6	3.4	4.2	5.1	5.9	6.8	7.6	8.5	17.0	25.5	33.9	42.4	50.9	59.4	67.9	76.4	84.9
80	1.0	1.9	2.9	3.9	4.9	5.8	6.8	7.8	8.7	9.7	19.4	29.1	38.8	48.5	58.2	67.9	77.6	87.3	97.0
90	1.1	2.2	3.3	4.4	5.5	6.6	7.6	8.7	9.8	10.9	21.8	32.7	43.6	54.6	65.5	76.4	87.3	98.2	109.1
100	1.2	2.4	3.6	4.9	6.1	7.3	8.5	9.7	10.9	12.1	24.2	36.4	48.5	60.6	72.7	84.9	97.0	109.1	121.2

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Brush Control

Activity #: 1270

Description/Purpose: Mechanical and manual brush cutting of undesirable brush, tree growth and shrubs to maintain drainage, clear vision and clear zones (errant vehicle recovery areas) while keeping the natural characteristics of the highway right of ways.

Methods:

- 1) Manual Brush and Tree Cutting
- 2) Mechanical Brush Mowing

Notes: 1) All Brush Control operations should be coordinated with the regional resource specialist.
2) Brush mowing may only be completed between July 16 and March 1 outside of Federal Aid Urban Boundary areas.

Recommended Crew Size

2 - 3

Material

Chainsaw, Power Pole Pruner

Average Daily Production

Manually: 1 acre

Mechanically: 8 acres

Measurement

Acres Cut

Calculation

Total Acres Cut = (Total Hours ÷ 8) X ADP

Equipment

Qty	Code	Description
1	03	Pickup
1	04	Heavy truck
Mechanical Brush Mowing		
1	05	Tractor / Hydro-mower
1	42	Mower
1	67	Trailer (as required)
1	17	Brush Chipper
1	12	Arrow board
1	04	Heavy truck
Small Road Tools		

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

The situations described below determine the scope of Brush Control for a particular area.

Manual Brush and Tree Cutting

1. [Review environmental, training, and safety precautions.](#)
2. Trees too large to cut with mechanical equipment, i.e. Hydro Ax, Excavator/Fecon head, etc. or trees and brush in areas not accessible using large equipment.
3. Scattered areas of trees and brush within clear zones including removing vegetation which obstructs motorist's vision of traffic signs.
4. Trees and brush in ditch bottoms where ditches are more than 50 ft. from edge of metal or lane edge line and the terrain is not suitable for mechanical equipment.
5. Large overgrown limbs that block signs or clear vision areas must be cut using either a chain saw or a pole pruner.
6. **IMPORTANT: clean all equipment used for cutting before moving to next area to prevent the spread of noxious and invasive species.**
7. Follow vegetation removal considerations below.

Mechanical Brush Mowing

1. [Review environmental, training, and safety precautions.](#)
2. Mow areas of brush to a point 4 ft. past the flow line of the ditch where ditches are less than 50 ft. from the edge of metal (lane edge line).
3. When the natural tree line is less than 50 ft. from the edge of metal or lane edge line, mow to the natural tree line.
4. If there is not a ditch or tree line within 50 ft., mow to a line 50 ft. from the edge of metal or lane edge line, then clear ditch line to a point of 4 ft. past the flow line on the front and back slopes.
5. Only areas of special considerations such as outside curves, clear vision areas and other safety concerns should be cut wider than the recommended 50 ft. These areas must be justifiable and approved by the Region Resource Specialist.
6. Meander cut line, where possible, to provide a natural appearance to roadside vegetation growth. Reduce "straight line" cutting practices to preserve the natural characteristics of the roadside.
7. **IMPORTANT: clean all equipment used for cutting before moving to next area to prevent the spread of noxious and invasive species.**
8. Follow equipment specific recommendations below.
9. Follow vegetation removal considerations below.

Work method continued on next page >

Equipment Specific Recommendations

The situations described below determine the scope of equipment for mechanical Brush Control for a particular area.

Small tractor brush hog/side arm mower

1. Where ditch is less than 50 ft. from the edge of metal or lane edge line, cut to the natural tree line.
2. Where the natural tree line is less than 50 ft. from the edge of metal or lane edge, cut to the natural tree line.
3. Where there is not a ditch or tree line within 50 ft., mow to a line 50 ft. from the edge of metal or lane edge line, then clear ditch line to a point of 4 ft. past the flow line on the front and back slopes.
4. Cut only stems less than 2 inches in diameter.
5. Do not side trim branches of desirable trees that will remain on the roadside.

Skid Steer With Fecon Attachment

1. Where ditch is less than 50 ft. from the edge of metal or lane edge line, cut to the natural tree line.
2. Where the natural tree line is less than 50 ft. from the edge of metal or lane edge, cut to the natural tree line.
3. Where there is not a ditch or tree line within 50 ft., mow to a line 50 ft. from the edge of metal or lane edge line, then clear ditch line to a point of 4 ft. past the flow line on the front and back slopes.
4. Cut only stems less than 6 inches in diameter. (Based on normal large area cutting, can cut larger)
5. Do not side trim branches of desirable trees that will remain on the roadside.

Hydro Ax With Fecon Attachment

1. Where ditch is less than 50 ft. from the edge of metal or lane edge line, cut to the natural tree line.
2. Where the natural tree line is less than 50 ft. from the edge of metal or lane edge, cut to the natural tree line.
3. Where there is not a ditch or tree line within 50 ft., mow to a line 50 ft. from the edge of metal or lane edge line, then clear ditch line to a point of 4 ft. past the flow line on the front and back slopes.
4. Cut only stems less than 8 inches in diameter. (Based on normal large area cutting, can cut larger)

Work method continued on next page >

Vegetation Removal Considerations

Check highway Right-of-way maps for the area before cutting. Consider whether the ROW is a Protected Area, Federal Forest Permit Area, or any other special area that may require a permit to perform ROW activities.

Check with Region Resource Specialist for information on areas below:

Where the following conditions exist, it may be necessary to retain trees that otherwise would be considered for removal: (source: MDOT, ROAD DESIGN MANUAL- 7.01.11 (10-20-2008))

1. At landscaped areas, parks, recreation or residential areas or where the function and/or aesthetic values would be lost.
2. Exceptional or unique trees (because of their size, species, or historic value).
3. Designated heritage routes and low speed roads (including low speed urban areas)
4. At locations where cumulative loss of trees would result in a significant change in character of the roadside landscape.
5. Behind nontraversable back slopes.
6. Behind barrier curbs, particularly in low speed areas.
7. Where shrubs and/or ornamental trees exist that would have a mature diameter of 4" or less at 4-6' above ground line.
8. Where removal would adversely affect endangered/threatened species, wetland, water quality or result in significant erosion/sedimentation problems.

Tree removal will be selective and generally "fit" conditions within the existing right-of-way and character of the road. Trees within the clear zone should be considered for removal subject to the following criteria: (source: MDOT, ROAD DESIGN MANUAL- 3.09.03 (revised 2006))

1. Crash Frequency – Where there is evidence of vehicle-tree crashes either from actual crash reports or scarring of the trees.
2. Outside of Horizontal Curves – Trees in target position on the outside of curves with a radius of 3,000 feet or less.
3. Intersections and Railroad – Trees that are obstructing adequate sight distance or are particularly vulnerable to being hit.
4. Volunteer Tree growth – Consider removal of undesirable volunteer trees within the originally intended tree line. Undesirable volunteer trees are those that have naturally occurred since original construction of the road that include Chinese elm, mulberry, box elder, etc.
5. Maintain Consistent Tree Line – Where a generally established tree line exists, consider removing trees that break the continuity of this line within the clear zone.
6. Clear Zone – See Section 7.01.11B of the Michigan Road Design Manual for more info.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Culvert Underdrain & Edge Drain Cleaning		Activity #: 1280	
Description/Purpose: Cleaning of pipe culverts, box culverts, headwalls, underdrain tiles, and edge drains to keep culverts and tiles in a serviceable condition. This includes removing material within 10' of culvert ends.			
Note: Clearing ice or snow from culverts is reported to Activity 1490, Other Winter Maintenance.			
<u>Recommended Crew Size</u> 4		<u>Equipment</u>	
<u>Material</u>		<u>Qty</u>	<u>Code</u>
		1	04
		1	05
		1	56
<u>Average Daily Production</u> Cleaning Culverts: 10 Cleaning Edge Drains: 25			<u>Description</u>
			Truck
			Tractor/loader/backhoe
			Water rodder or jetter
<u>Measurement</u> Culverts / Drains Cleaned			<u>Optional</u>
		1	02/03
		1	12
		1	67
			Pickup
			Flashing arrow
			Trailer
		Equipment may vary depending on availability and operational need.	
		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.	
		Additional equipment and personnel will increase the cost to perform this activity.	

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions](#). See additional criteria and caution below.
2. Review maintenance advisory MA 2009-06: ([MDOT Maintenance Advisories](#))
3. The method and procedure will vary depending on the type of cleaning performed.
4. Coordinate with regional resource specialist with regard to erosion control.
5. All of the sediment/debris that was removed must also be removed from the ROW to prevent washing back into the ditch or culvert ending.

Criteria:

Periodic inspection of drainage facilities should be made immediately following periods of heavy rainfall.

Edge drains should be inspected and cleaned on a two year cycle. All drains should be located and a marker post installed or a paint mark should be placed on the shoulder in the rumble stripe at the drain location. (Good quality paint should be used to assure longevity.)

When inspecting and cleaning the drains, all debris should be removed from in front of and inside the tube. Make sure there is a clear open path away from the opening of the tube to the ditch bottom. The area from the tube opening to the edge of the paved shoulder should also be inspected for any dips or depressions that may indicate a separation in the tube.

In some cases, a water jetter may be needed to clean the drain. To prevent any damage to the plastic drain tube when using a jetter, DO NOT exceed 700 PSI of pressure.

Caution:

Do not attempt to enter beyond the portal of a culvert without contacting the MDOT supervisor in charge of your facility. Such actions are classified as Permit Required Confined Space entries, and a special permit and training must be obtained by the entrant(s).

Permit Required Confined Spaces may require use of the following:

- Gas detector
- Lifeline and body harness
- Tripod and winch
- Air fed respirators if in-house rescue procedures are to be used.
- Outside attendant
- Ventilation device

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Culvert Underdrain & Edge Drain Maintenance		Activity #: 1281	
Description/Purpose: Repairing, removing or replacing of catch basins, pipe culverts, box culverts, headwalls and underdrain tiles to keep culverts and tiles in a serviceable condition.			
<u>Recommended Crew Size</u> 4		<u>Equipment</u>	
<u>Material</u>	<u>Qty</u>	<u>Code</u>	<u>Description</u>
	1	04	Truck
	1	05	Tractor/loader/backhoe
<u>Average Daily Production</u>			<u>Optional</u>
Culverts:	1	56	Water rodder or jetter
Repair: 2	1	02/03	Pickup
Replace: 1	1	12	Flashing arrow
Edge Drains:	1	67	Trailer
Repair: 2	1	04	Truck with attenuators
Replace: 1	Equipment may vary depending on availability and operational need.		
<u>Measurement</u>	All MDOT Traffic and Safety policies shall be followed for equipment and personnel.		
Each (No. of Culverts / Drains)	Additional equipment and personnel will increase the cost to perform this activity.		

Activity Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

Criteria:

Periodic inspection of drainage facilities should be made immediately following periods of heavy rainfall.

1. [Review environmental, training, and safety precautions.](#) See Caution below.
2. The method and procedure will vary depending on the type of maintenance performed.
3. Coordinate with regional resource specialist with regard to erosion control.

Caution:

Do not attempt to enter beyond the portal of a culvert without contacting the MDOT supervisor in charge of your facility. Such actions are classified as Permit Required Confined Space entries and a special permit and training must be obtained by the entrant(s).

Permit Required Confined Spaces may require use of the following:

- Gas detector
- Lifeline and body harness
- Tripod and winch
- Air fed respirators if in-house rescue procedures are to be used.
- Outside attendant
- Ventilation device

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Non-Motorized Trails		Activity Number: 1290	
Description/Purpose: All repair and maintenance of bicycle paths independent of shoulder to eliminate obstacles to non-motorized traffic including patching potholes, sweeping, and mowing.			
<u>Recommended Crew Size</u> 2		<u>Equipment</u>	
<u>Material</u> As required for type of repair or maintenance		<u>Qty</u>	<u>Code</u> <u>Description</u>
<u>Average Daily Production</u> 8 hours per crew member			<u>Optional</u>
<u>Measurement</u> Hours		1 05	Tractor
		1 62	Broom
		1 42	Mower
		1 02/03	Pickup
		1 38	Skid steer loader
Equipment may vary depending on availability and operational need.			
All MDOT Traffic and Safety policies shall be followed for equipment and personnel.			
Additional equipment and personnel will increase the cost to perform this activity.			

Activity Out of Scope

Recommended Work Method

[Review environmental, training, and safety precautions.](#)

Surface Maintenance: Refer to activities 1030 (Patrol Patching) and 1050 (Bituminous Maintenance and Repair) for work method.

Sweeping: Sweep with a front end broom or by hand as required to remove loose material.

Mowing: Mow one swath on each side of path twice a year. When path is included in the normal roadside mowing area, report to activity 1260, Area Mowing.

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Guardrail Repair Steel Beam

Activity #: 1300

Description/Purpose: Routine repair or replacement of steel beam guardrail damaged as a result of traffic accidents or deteriorated due to age; guardrail nuts or triangle reflectors tightened or replaced; guardrail removal and slope flattening (if not covered by work order or minor construction).

Note: Upgrading of existing guardrail should be approved by a TSC engineer and charged to a Transportation Work Authorization. When an existing, older-type ending is damaged by traffic, it shall be replaced with a standard ending per current Department Standard Plans.

Note: Ending replacements should be reported to activity 1301, Guardrail Ending Repair: Steel Beam.

<u>Recommended Crew Size</u>		<u>Equipment</u>		
3 - 4		<u>Qty</u>	<u>Code</u>	<u>Description</u>
<u>Material</u>		1	02/03	Pickup
Steel beam sections:		2	04	Heavy trucks
<ul style="list-style-type: none"> Straight Curved Departing end sections 		1	12	Flashing arrow
Posts:		1	05	Backhoe
<ul style="list-style-type: none"> Steel w150 x 14 or treated wood Offset blocks 		1	67	Trailer
Hardware as needed		1	38	Skid steer loader
			<u>Optional</u>	
		1	19	Compressor
		1	05	Tractor with auger
<u>Average Daily Production</u>		Equipment may vary depending on availability and operational need.		
No frost: 63 linear feet of thrie beam		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.		
100 linear feet W-beam		Additional equipment and personnel will increase the cost to perform this activity.		
Frost: 50 linear feet W-beam				
<u>Measurement</u>				
Lineal Feet of Guardrail Repaired				
<u>Calculation</u>				
Lineal Feet = (Total Hours ÷ 8) x ADP				

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Survey damage and obtain necessary repair materials.
3. Consult Standard Plans, R-60 series. You can view the Standard Plans on the Web at: <http://mdotcf.state.mi.us/public/design/englishstandardplans/>
4. After removing parts damaged beyond repair, replace parts:
 - Re-align loose posts and compact earth around them.
 - Install new posts to depth shown on standard plan.
 - Install rail and hardware according to standard plan.
 - Trim tops of new wood posts.
 - Wood and steel posts should not be mixed within a guardrail run. Guardrail approaching end treatments have their own requirements.
5. Clean up debris and re-grade shoulders as necessary.

Note:

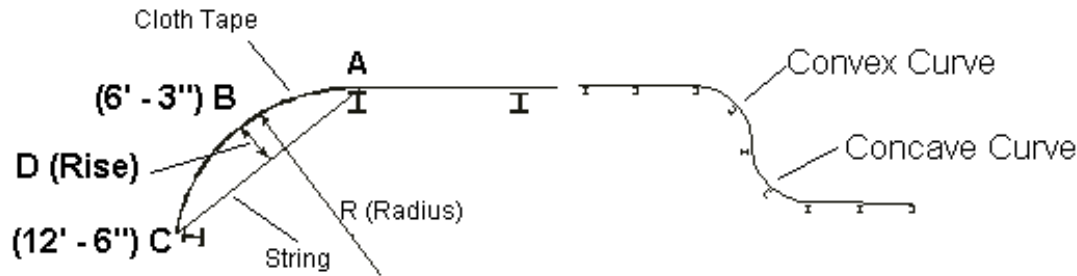
Accomplishment is in lineal feet of steel rail repaired. Therefore, report 2x length of steel rail per lineal foot of double guardrail or thrie beam; 4x length of steel rail per lineal foot of double-double guardrail or thrie beam.

Work method continued on next page >

Activity Name: Guardrail Repair Steel Beam (continued)

Activity #: 1300

If you are creating your own breakaway posts, remember that there are two holes, one at ground level and one 16" below the first.



Calculation of the Radius of Curved Guard Rail

1. Starting at the last post in the straight run (point A), lay a cloth tape along the path that the curved guardrail will follow.
2. Mark off two points along the curved cloth tape: one at 6'-3" (point B), and the second at 12'-6" (point C).
3. Pull a string directly from starting point (point A) to the second mark-off point (point C).
4. Measure from the first mark-off point (point B) over to the mid-point of the taut string. This measurement (D) is the rise.
5. Check the chart to find the radius given the rise (D). Example: A rise of 4 inches would result in a radius of 60 feet.

Note: Follow the steps above for each piece of rail section in the curved run. The arc may not be consistent and each consecutive piece of rail may differ in radius from the previous one.

Note: Please refer to MDOT Standard Plans R-60 for more information. You can view the standard plans on the Web at: <http://mdotcf.state.mi.us/public/design/englishstandardplans/>

Rise (D) Inches	Radius (R) Feet
41	5
36	6
28	8
26	9
22	10
20	12
18	13
16	15
14	16
11 5/8	20
9 1/2	25
7 3/4	30
6 3/4	35
6	40
5 1/4	45
4 5/8	50
4 1/4	55
4	60
3 5/8	65
3 3/8	70
3 1/4	75
3	80
2 3/4	85
2 5/8	90
2 1/2	95
2 3/8	100
2 1/8	110
2	120
1 3/4	130
1 5/8	140
1 1/2	150

Activity Name: Gaurdrail Ending Repair Steel Beam**Activity #: 1301**

Description/Purpose: Routine repair or replacement of steel guardrail endings damaged as a result of traffic accidents or deterioration due to age.

Time should be reported to this activity for the replacement of the first three panels (37 ½ feet) of SRT-350 (proprietary to Trinity Industries) and FLEAT-350 (proprietary to Road Systems Incorporated); and the first four panels (50 feet) of either ET-2000 (ET-350) or SKT-350 regardless of whether the method outlined below or those outlined in the performance guide for activity 1300 (Guardrail Repair: Steel Beam) are used. Replacement of lengths beyond those specified above should be reported to activity 1300, Guardrail Repair: Steel Beam.

Any curved portion of this system should be considered the ending. (See Special Detail.) See Note² below. Work on other portions of this system should be charged to activity 1300, Guardrail Repair: Steel Beam.

Time should be reported to this activity for replacement of the type three endings at the ends of the new standard plan R-56 series (Median Object Protection). Portions beyond the type three endings should be charged to activity 1300, Guardrail Repair: Steel Beam. See Note², below.

Activity Name: Gaurdail Ending Repair Steel Beam

Activity #: 1301

Recommended Crew Size

3 - 4

Material

Varies - see below

Average Daily Production

2 each (complete ending repair)

Measurement

Endings Repaired

Calculation**Endings Repaired = (Total Hours ÷ 8) x ADP****Equipment****Qty****Code****Description**

1

02/03

Pickup

2

04

Heavy trucks

1

12

Flashing arrow

1

05

Backhoe

1

67

Trailer

Optional

1

19

Compressor

1

05

Tractor with auger

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Survey damage and obtain necessary repair materials. When you order parts, if you do not already have a copy of the CURRENT manufacturer's installation instructions for this ending, REQUEST ONE.
3. Consult Standard Plans for Construction, R-61 Series for the SRT 350 and FLEAT-350 or R-62 Series for the ET-2000 (ET- 350) and SKT-350. You can view the standard plans on the Web at:
<http://mdotcf.state.mi.us/public/design/englishstandardplans/>
4. Some garages have whole endings in inventory. If so, take the needed parts from these endings and order replacement parts from the vendor. If you do not have replacement parts available at your garage, order the needed parts from the vendor. Expect a week or so turn-around time for parts delivery. Parts for the different endings are not interchangeable.

Work method continued on next page >

Recommended Work Method (cont.)

5. When replacing any ending FOLLOW THE MANUFACTURER'S INSTALLATION INSTRUCTIONS.
 - When applicable, to remove the extruder or impact heads, if reusable, cut the extruded rail with a torch or other method as close to the head as possible. Pull the head from the rail using a chain attached to a backhoe or other device. DO NOT DISASSEMBLE RAIL BEFORE REMOVING HEAD. The head becomes much harder to remove once the rail is disassembled.
 - Remove remaining damaged parts.
 - Re-align loose posts and compact earth around them.
 - Install new posts to depth shown on MDOT Standard Plans R61 and R62. You can view the standard plans on the Web at: <http://mdotcf.state.mi.us/public/design/englishstandardplans/>
 - Install rail and hardware according to the manufacturer's installation instructions.
 - Different endings attach at different posts. Be sure you consult the current manufacturer's installation instructions before attaching rail to posts.
6. Clean up debris and re-grade shoulders as necessary.
7. The SRT-350 and FLEAT-350 are gating terminals and the area behind the rail end should remain clear.

IF YOU ARE CREATING YOUR OWN BREAKAWAY POSTS REMEMBER THAT THERE ARE TWO HOLES, ONE AT GROUND LEVEL AND ONE 16" BELOW THE FIRST.

Note:

Please refer to MDOT Standard Plans Series R-61 for additional information.

Note²:

Repair to damaged bullnose sections should follow the special detail for Guardrail Bullnose Repair.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Cable Barrier Repair

Activity #: 1310

Description/Purpose: Routine repair or replacement of cable barrier damaged as a result of traffic accidents or deteriorated due to age. Incorporate weekly inspections into the cable maintenance process to check for any damaged parts between end terminals and at each end terminal section. Replace damaged line/terminal posts and hardware, reposition cables, splice or replace damaged cables, re-tension cables, replace reflectors, replace excluder caps and repair end terminals as needed.

Note: Damage from impact should be repaired as soon as possible.

Recommended Crew Size

1 - 3

Material

- Intermediate line post
- Misc. hardware for Intermediate line post
- Modified line post and hardware
- Socket for intermediate line post
- Turnbuckle
- Reflector
- Excluder cap
- Wedge lock fitting
- Cable splice kit
- Terminal, materials

Average Daily Production

No ice: 20 – 25 line post per hour

Ice: 10 – 15 line post per hour

Equipment

Qty

Code

Description

1	02/03	Pickup truck
1	12	Flashing arrow
1		Post puller/lift
1		Pry bar
1		Cable puller
2		Cable grips
1		Infrared thermometer
1		Tension chart (specific to cable system)
1		Tension meter
2		Pipe wrenches
1		Adjustable (crescent) wrench
1		Flathead screwdriver
1		Hammer
1		Duct tape
1		Marine-grade anti-seize lubricant

Optional

1	56	Quick saw
1	36	Heater
1	68	Attenuator
1	04	Heavy truck

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Survey damage and obtain necessary repair materials:
 - It is preferable to have an inventory of parts in stock for each cable system in your area to expedite repairs. A general rule of thumb is to have 2% - 4% of the total project requirement for each specific part in inventory. Use parts from the current inventory to complete the repair work and replenish stock with new material from the manufacturer.
 - Salvage parts whenever possible.
 - When ordering parts utilize a current copy of the manufacturer's installation instructions or parts listing to verify correct components are purchased. It may require several weeks for parts delivery.

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method, continued

3. Intermixing components that are proprietary and unique to different cable systems (line/terminal posts and hardware, foundation sockets, cable splices not approved by the cable system manufacturer, and other components) is prohibited.
4. Consult manufacturer's maintenance, installation manuals at OFS Maintenance Page:
https://stateofmichigan.sharepoint.com/sites/mdot/Organizational/field_services/ops/maintenance/mmm/SitePages/Cable_Guardrail.aspx
and/or specific project plans prior to starting work.
5. Always check cable tension after a severe impact and as part of the routine annual maintenance process. Cable system reliability is related to cable height and tension. Tension is a function of actual cable surface temperature and not ambient air temperature.
6. Delineate end terminals with green object markers, end of cable runs with square end plates and by painting the turnbuckle.
7. Check to ensure that the maximum number of cable splices and wedge lock fittings per run (between and anchor foundations) is not exceeded.
8. Check for cracks in concrete line post foundations in the vicinity of an impact and at end terminals.
9. Check end terminals for proper sitting of cable anchors.
10. Cut the cable only as a last resort. A preferred alternative to cutting the cable is cutting in the middle of the turnbuckle. When cutting a turnbuckle, it's advisable to cut between two undamaged posts and remove posts adjacent to the turnbuckle. Before cutting the turnbuckle, loosen the turnbuckle until the end of each threaded terminal is visible in the inspection hole. Make sure all personnel are clear of the cable and cut the cable, away from the impact area.
11. Consult with maintenance supervisory staff before cutting other than a turnbuckle.
12. Complete cable system as soon as possible after notification, April through October, between November and March weather permitting.
13. Employ appropriate work zone safety procedures (lane closure, attenuator or other traffic control measures as required).
14. Remove hazardous debris from roadway and shoulder that may damage or reduce cable system's effectiveness and/or interfere with motorist safety.
15. Re-grade slope and/or shoulder as necessary.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Approach Sweeping		Activity #: 1320	
Description/Purpose: Routine mechanical sweeping with a broom to remove loose material from approaches.			
Note: Emergency sweeping of debris caused by accidents or storms should be reported to activity 1970, Emergency Response.			
<u>Recommended Crew Size</u> 1		<u>Equipment</u>	
<u>Material</u> Broom replacement (optional)		<u>Qty</u>	<u>Code</u> <u>Description</u>
		1	02/03 Truck
		1	62 Front end broom
		1	12 Flashing arrow
<u>Average Daily Production</u> 36 Approaches			
<u>Measurement</u> Approaches Swept		1	<u>Optional</u> 05 Tractor Additional operator and truck with underbody blade
<u>Calculation</u> Approaches Swept = (Total Hours ÷ 8) x ADP			
		Equipment may vary depending on availability and operational need.	
		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.	
		Additional equipment and personnel will increase the cost to perform this activity.	

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

[Review environmental, training, and safety precautions.](#)

When possible, pre-wet or sweep after a rain to minimize dust.

Loosen heavily built-up material with other equipment if necessary.

Remove bulk of debris with truck mounted front end rotary broom.

All loose material should be disposed of in a manner so that it will not be carried back onto the intersection or roadway.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Tourist Facility Maintenance		Activity #: 1330	
Description/Purpose: Perform routine, preventive, and emergency maintenance at Rest Areas, Welcome Centers, and Roadside Parks. Work may consist of a variety of plumbing, electrical, mechanical, painting and carpentry tasks. Preventive maintenance may include work on water wells, sanitary system, outdoor lighting, interior plumbing, electrical, mechanical and structural components at building.			
<u>Recommended Crew Size</u> 1 - 3		<u>Equipment</u>	
<u>Material</u>	<u>Qty</u>	<u>Code</u>	<u>Description</u>
Plumbing material		<u>Optional</u>	
Electrical material	1	02/03	Pickup
Mechanical material	1	42	Mower
Painting supplies	1	04	Truck
Wood products	1	05	Tractor
Solid surface materials	1	67	Trailer
Melamine products	1 – 2	02/03	Trucks or vans
Roofing materials	1	04	Bucket truck
	1		Scissor lift
	1		Enclosed shop trailer
			Hand tools
			Power tools
<u>Average Daily Production</u> 8 hours per crew member			
<u>Measurement</u> <u>Total Hours</u>			Equipment may vary depending on availability and operational need. All MDOT Traffic and Safety policies shall be followed for equipment and personnel. Additional equipment and personnel will increase the cost to perform this activity.

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Review and complete form 2113 (Facility Maintenance Work Request [MDOT Forms Repository](#)) as necessary
3. Shut down rest area if necessary. (Notify TSC/Region prior to shutting down rest area.)
4. Lock out energy source if applicable.
5. Repair or replace components.
6. Refinish as necessary.
7. Re-energize energy source.
8. Test for proper operation.
9. Reopen rest area. (Notify TSC/Region.)

Note: When entering confined spaces, entrance must be guarded and certified to do so. A permit may be required.

Continued >

Activity
Out of Scope

Recommended Work Method, continued

Examples:

1. Cleaning, painting and re-stocking lavatories.
2. Mowing and lawn care, including shrubs and trees.
3. Emptying and hauling facility rubbish to dumpsite.
4. All maintenance of walks and guardrail.
5. Refinishing and branding picnic tables.
6. Making minor repairs.
7. Painting barrels.
8. Unplugging plugged drains.

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Expressway Patrol		Activity #: 1340							
Description/Purpose: Patrolling the expressways to identify hazards and other maintenance needs.									
<u>Recommended Crew Size</u> 1 <u>Material</u> <u>Average Daily Production</u> 8 hours per crew member <u>Measurement</u> Total Hours		<u>Equipment</u> <table border="1"> <thead> <tr> <th><u>Qty</u></th> <th><u>Code</u></th> <th><u>Description</u></th> </tr> </thead> <tbody> <tr> <td>1</td> <td>02/03</td> <td>Pickup</td> </tr> </tbody> </table> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>		<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	02/03	Pickup
<u>Qty</u>	<u>Code</u>	<u>Description</u>							
1	02/03	Pickup							
<u>Recommended Work Method</u> <ol style="list-style-type: none"> Review environmental, training, and safety precautions Drive truck along expressway looking for any maintenance issues including but not limited to: <ul style="list-style-type: none"> Traffic obstructions Damaged signs Damaged right of way fence Dead animals Damaged barrier wall Pavement/shoulder problems Record problems and inform pertinent people to schedule necessary maintenance operations. 									

Activity Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity: Freeway Lighting

Activity #: 1350

Description/Purpose: Maintaining freeway lighting on state trunklines. All energy bills for freeway lighting are reported to this activity number.

Recommended Crew Size

2 - 6

Material

Anchor bolts
Forms
Hardware
Steel Reinforcement
Electrical Wire and cable
Poles
Mass arm
Luminaires
Grade S2 Concrete

Average Daily Production

8 hours per crew member

Measurement

Total Hours

Equipment

Qty

Code

Description

1	02/03	Pick up
1		Concrete Saw
1		Jack/Chipping Hammer
1		Generator

Optional

1	04	Dump truck
1	12	Flashing arrow
1	04	Attenuator with arrow
1	04	Aerial device
1	05	Backhoe
1	67	Utility trailer
1	19	Air compressor
1	04	Large crane with auger

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

[Review environmental, training, and safety precautions.](#)

Freeway lighting maintenance

1. Traffic control is usually conducted as a moving operation according to the Department's traffic regulation guide.
2. Electricians replace blown bulbs and repair broken fixtures while working from an aerial platform.
3. There is a 3 year group re-lamping program that requires that each light bulb on the freeway lighting system be replaced every three years.

Light pole installation

1. Replace light poles that have been knocked down by the motoring public. The large crane is used for placement of the new pole.
2. Saw cut accordingly (full depth)
3. Apply proper amount of water
4. Keep appropriate records of saw blade wear
5. Chip out broken concrete
6. Tie in new reinforcing steel in barrier wall and foundation
7. Install conduit and anchor bolts before pouring concrete
8. Properly build and/or set forms to pour concrete
9. Finish concrete upon removal of forms (achieve cure time)
10. Install pole and luminaire
11. Replace aluminum or concrete bases by either pouring and pouring bases or exchanging aluminum base with new one.

Electrical problems trouble shooting

1. Locate and replace damaged electrical wire/cable by trouble shooting with various electrical devices.
2. Replace damaged electrical boxes, meters, and fuses. A backhoe is often used to access buried electrical wires/cable.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Curb Sweeping		Activity #: 1360																
Description/Purpose: Routine mechanical sweeping of curbs and gutters. Some curb sweeping may be performed by contractors. Contract curb sweeping is also reported to 1360. Please indicate contract work by using the appropriate object code when reporting.																		
<u>Recommended Crew Size</u> 1 - Rural 2 - Urban <u>Average Daily Production</u> Rural: 2 miles of curb Urban: 10 miles of curb 25 miles of barrier wall <u>Measurement</u> Curb Miles <u>Calculation</u> Curb Miles Swept = (Total Hours ÷ 8) x ADP		<u>Equipment</u> <table><tr><th><u>Qty</u></th><th><u>Code</u></th><th><u>Description</u></th></tr><tr><td>1</td><td>62</td><td>Street sweeper</td></tr><tr><td colspan="3"><u>Optional</u></td></tr><tr><td>1</td><td>02/03</td><td>Pickup</td></tr><tr><td>1</td><td>12</td><td>Flashing arrow</td></tr></table> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>		<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	62	Street sweeper	<u>Optional</u>			1	02/03	Pickup	1	12	Flashing arrow
<u>Qty</u>	<u>Code</u>	<u>Description</u>																
1	62	Street sweeper																
<u>Optional</u>																		
1	02/03	Pickup																
1	12	Flashing arrow																

Activity
Out of Scope

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Water may be used to control dust hazard.
3. Pick up material with sweeper.
4. **See disposal of material below. Consult with the region resource specialist for the proper procedures to follow for disposal of solid and liquid waste.**

MDOT Staff (or Contractor) is responsible for disposal of all material as follows:

Solid Waste Phase:

The solid waste generated shall be disposed of at a Type II landfill. Solid is defined as having no releasable liquids. The landfill may require testing before accepting the waste. The TSC Maintenance Coordinator/Supervisor (or Contract Administrator) shall be provided disposal documentation from the Type II landfill.

If water is used for dust control, the following disposal of the liquid phase shall be used:

Liquid Waste Phase:

This waste may be evaporated by use of drying beds, decanting stations, or similar systems that contain the solids during evaporation. The remaining solids shall then be disposed of according to Solid Waste Phase above.

If at any time the material is suspected of being hazardous, the TSC Maintenance Coordinator/Supervisor (or Contract Administrator) shall be notified.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Right-of-Way Fence Repair		Activity #: 1370		
Description/Purpose: Repair or replacement of right of way fence. May be woven wire, high tensile, and chain link fence.				
<u>Recommended Crew Size</u> 2 (Repair) 3 (Replacement)		<u>Equipment</u>		
<u>Material</u> Woven, high tensile, or chain link R.O.W. fence R.O.W. fence posts Ties		<u>Qty</u> 1	<u>Code</u> 02/03 <u>Optional</u> 05 38 67 04	<u>Description</u> Pickup Tractor Loader Trailer Heavy truck
<u>Average Daily Production</u> Repair: 110 feet Replacement: 330		Equipment may vary depending on availability and operational need.		
<u>Measurement</u> Lineal Feet		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.		
<u>Calculation</u> Lineal Feet = (Total Hours ÷ 8) x ADP		Additional equipment and personnel will increase the cost to perform this activity.		

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Refer to MDOT Standard Plans for complete information about erecting R.O.W. fence.
3. Straighten or replace posts.
4. Check alignment and height.
5. Install and stretch fence to proper tension.
6. Space line posts 16 ½' apart and 2 ½' in the ground.
 - Posts adjacent to end, corner, gate or intermediate braced posts shall be placed 10' apart in concrete 18" in diameter and 3 ½' in the ground.
 - Metal braces will be encased in a 18" cube of concrete.
 - Wood posts adjacent to end, corner or intermediate shall be placed 3 ½' in the ground.
7. Align posts, stretch fence taut and fasten to each post with the bottom of the fence approximately 2" above the ground.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Other Routine Maintenance		Activity #: 1390
Description/Purpose: Routine maintenance activities not covered by other activities. This may include (but is not limited to) surface, shoulder, and other maintenance activities. Examples for each category are provided below.		
<div><div><div><div>Recommended Crew Size</div><div>As needed</div></div><div><div>Material</div><div>As needed</div></div><div><div>Average Daily Production</div><div>8 hours per crew member</div></div><div><div>Measurement</div><div>Total Hours</div></div></div></div>	<div><div><div>Equipment</div><div>As needed for type of work being performed.</div></div><div>Equipment may vary depending on availability and operational need.</div><div>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</div><div>Additional equipment and personnel will increase the cost to perform this activity.</div></div>	
<div><div>Recommended Work Method</div><div>Examples of maintenance tasks that should be reported to this activity are provided below.</div><div>Review environmental, training, and safety precautions.</div></div>		
<div><div><div>Surface Examples</div><div><div><div>▪ Installing relief joints</div><div>▪ Hauling, weighing and preparing road maintenance materials NOT placed into Stockpiles. (Stockpiling and cleanup of salt, sand and mixtures reported to activity 1490, Other Winter Maintenance)</div><div>▪ Repairing curb and gutter</div></div></div></div><div><div><div>Shoulder Examples</div><div><div>▪ Topsoiling</div></div></div></div><div><div><div>Roadside Examples (see notes 1 and 2)</div></div></div><div><div><div>Other Examples (see note 3)</div><div><div><div>▪ Guardrail scuffing</div><div>▪ Concrete barrier maintenance</div><div>▪ Erosion control</div><div>▪ Repair wheel tracks in medians</div><div>▪ Work on carpool lots</div><div>▪ Sound wall maintenance</div><div>▪ Replace drainage markers or mailbox posts (see note 4)</div></div></div></div></div></div>	<div><div><div>Notes</div><div><div><div>1. Charge disposal of dead animals to activity 1240 Litter Pickup</div><div>2. Charge building and yard cleaning as a result of roadside maintenance activities to 2510 if can't be charged to other activity.</div><div>3. Charge to 1300 Guardrail Repair: Guardrail nuts or triangle reflectors tightened or replaced; Guardrail removal and slope flattening (if not covered by work order or minor construction).</div><div>4. The Department is obligated to replace mailboxes and mailbox posts when damaged by state forces. Mailbox posts should NOT be repainted on a routine basis (replacements resulting from winter operations, charge to activity 1490).</div><div>5. Charge Emergency Cleanup from Accidents or Storms to activity 1970 Emergency Response.</div></div></div></div></div>	

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Snowmobile Crossing or ORV Connector Repair

Activity #: 1391

Description/Purpose: Apply a liquid sealant to pavement surface to prevent pavement deterioration from snowmobile trail crossings.

Recommended Crew Size
5 (2 traffic regulators included)

Material
Liquid sealant from MDOT's
qualified products list

Thermoplastic markings from contract

Average Daily Production
600 Square feet

Equipment

<u>Qty</u>	<u>Code</u>	<u>Description</u>
1	04	Heavy truck
1	53	Sand blaster
1	03	Dump truck
2	12	Flashing arrow
1	19	Air compressor
1		Small concrete saw

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

**Activity
Out of Scope**

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Determine whether the crossing is a good candidate for coating. Do not coat crossings that have deteriorated to the point that the asphalt is cracking and breaking up.
3. Thoroughly sandblast the lane to be coated, taking care to remove any paint stripes. The sandblasting should pit the road surface and expose and clean the course aggregate. Try to expose an inch or two of asphalt at the shoulder so the coating will run over the edge to help protect that area from damage. A good sandblast will turn the pavement a grey to white color. Blow the entire area clean with oil free compressed air.
4. Apply duct tape at the leading and trailing edges of the crossing in the lane to be coated, taking care to keep the edges as straight as possible. After the edges have been defined with tape, apply two or three more widths of duct tape away from the sandblasted area, slightly overlapping the first, until the tape is about six inches wide. This is done for two reasons:
 - to keep good, straight, leading and trailing edges on the coated area, and
 - to keep any excess coating material from inadvertently running outside the coated area and possibly causing cracking of the road surface
5. Mix the liquid. Always pre-mix each component (Part A and Part B) before combining. Always use the proper size and type of mixer. Do not use mixers that are made for one gallon cans to try to mix larger quantities. The proper size and type of mixer can be recommended by the manufacturer, and can usually be purchased from the coating supplier. Always be sure to mix the liquid components in the proper ratio (1:1, 2:1, etc.) by using spatulas to scrape all of the liquid out of the cans. Always mix the liquid for the amount of time recommended by the manufacturer, making sure to work the mixer through the entire container of liquid and up and down the sides of the container. The mixing of the liquid and good sandblasting are critical to the success of the installation. Do not shortcut steps 3 and

Work method continued <

Activity Name: Snowmobile Crossing or ORV Connector Repair cont. Activity #: 1391

6. Apply the liquid to the road surface and spread the aggregate. Use notched squeegees that are in good condition. Once the squeegee shows wear, throw it out and use a new one. Proper liquid depth must be maintained. As soon as enough area has been coated with liquid, begin applying the aggregate. Use a spreading technique that will drop the aggregate into the liquid and do not push the liquid around. Apply aggregate to excess. After the area is covered, apply more aggregate to wet spots as they show up. Pull up and dispose of the duct tape before the coating cures.
7. After the first layer has cured to the point that the aggregate cannot be pulled out, the second layer can be applied. The excess aggregate from the first layer should be swept off to the sides and kept clean and dry so that it can be used in the top layer. Compressed air should be used to blow away any excess aggregate that did not get swept off. Once the first layer has been cleaned off, duct tape should be put down at the leading and trailing edges again. This tape should be on the newly placed coating edge and should be extended back into the new coating three to four inches. This setback will ensure a bevel at the leading and trailing edges to help minimize snowplow damage. The liquid should be mixed and placed as before and the aggregate broadcast to excess. The tape should be pulled up and disposed of before the coating cures. An overnight cure is ideal before opening to traffic.
8. As soon as the coating has cured enough that the aggregate won't pull out from brooming, the excess aggregate can be broomed off. At this point, a one inch deep saw cut must be sawn at the leading and trailing edges of the coated area where the duct tape was pulled up from the road surface to delineate the edge. The saw cut should be made in the asphalt at the leading and trailing edges of the coated area, blown clean with compressed air and then sealed with a silicone sealant. Always make this saw cut the same day that the coating is applied or an uncontrolled crack will develop within twenty four hours of application.
9. The adjacent lane should be coated in the same manner as above. The second layer should be applied to overlap three to six inches into the first lane at the centerline. Do not apply aggregate into this centerline overlap to the point that a large hump is built up.

Activity Out of Scope

Activity Name: Winter Maintenance

Activity #: 1410

Description/Purpose: Clearing of snow, ice, or slush from roadway surfaces or shoulders; applying salt on troublesome spot locations such as hills, curves, stops or drifting locations - blading may be included; applying sand at spot locations or over continuous sections of highway to increase traction on slippery surfaces; applying salt on continuous stretches of highways to eliminate general slippery conditions.

Recommended Crew Size

1

Material

Cutting edges
Ice control sand (as required)
Salt (as required)
Chloride (as required)
Liquid De-Icer
DOW-Flake

Average Daily Production

8 hours per crew member

Measurement

Total Hours

Equipment

Qty

Code

Description

1

04

Heavy truck with underbody blade

1

60

Hopper box (calibrated)

1

38

Grader

Optional

1

38

Loader (as needed)

1

57

Front-end plow (as needed)

1 or 2

57

Wing Plow (as needed)

1

57

Tow Plow (as needed)

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

[Review environmental, training, and safety precautions.](#)

Blading:

1. Clear the centerline on the first pass.
2. Use the minimum blade pressure required to effectively clean the surface.
3. Avoid excessive pressure on seal coated surfaces.
4. Maintain appropriate speed for conditions.
5. Use truck ballast (salt/sand) to maintain traction.
6. Use a plow when more than 8" of snow builds up on shoulders.
7. Before using a wing plow review MDOT's wing plow safety video. Review MA 2014-01 Wing Plow
8. Before using the tow plow you need to have gone through MDOT's tow plow safety training and reviewed the Tow Plow Training Guide.

Plowing:

1. Maintain adequate speed to remove snow from the roadway without damaging signs, mailboxes, store fronts etc.
2. Stop occasionally to allow traffic to pass.
3. Be careful of obstacles, soft shoulders, and turn-arounds too tight for a truck and plow.
4. Grease plow wheels before unhooking each time.
5. When storing plows, block up so wheels do not touch ground.

Blading or Plowing:

1. At railroad crossings, raise blade or plow and remove snow accumulated on the crossing. Review MA 2009-11 Snow Plowing Near Railroad Crossings
2. Do not leave a windrow of snow on the crossing or across tracks.
3. Do not blade gravel from shoulders and use caution plowing soft shoulders.
4. Use caution when plowing overpasses - **do not throw snow over bridge railings or parapets.**

Recommended work method, continued >

Activity Name: Winter Maintenance (continued)

Activity #: 1410

Recommended Work Method, continued

Spot Salting/Blading:

1. Blade any accumulated snow while spot salting.
2. Apply salt-sand per MDOT Winter Maintenance Application Rate (solids) updated 2013, rates shown account for a 25 mph truck operating speed, but also apply for trucks properly equipped with a zero velocity or slurry generator, operating up to 35 mph. Ground speed control units should be used whenever possible.
3. Use AVL/MDSS to help you determine the best course of action to take.
4. Consider general temperature and weather conditions in deciding to spot salt:
 - Below 15° F > spot sanding is preferred
 - 15° to 20° F > spot salting or sanding
 - Above 20° F > spot salting is preferred
 - For changing conditions refer to the Winter Operations Guide
5. Avoid salting too early during extreme cold and falling temperatures. Salt brine may re-freeze causing icy conditions. Allow snow to blow off the pavement until conditions warrant salting.

Sanding/Blading:

1. Blade loose snow from the surface before applying sand. Blading performed at the same time as sanding is part of this activity.
2. Apply sand per MDOT Winter Maintenance Application Rate (solids) updated 2013, rates shown account for a 25 mph truck operating speed, but also apply for trucks properly equipped with a zero velocity or slurry generator, operating up to 35 mph. Ground speed control units should be used whenever possible.
3. Sand is most effective to provide traction under severe temperature conditions below 20° F but will not melt ice and snow.

Sand used for Winter Maintenance clogs storm drains and has been shown to harm aquatic life by filling stream beds, thus, it is recommended that sand only be used when temperatures dictate.

For the most effective use of sand refer to the Winter Operations Guide.

Continuous Salting/Blading:

1. Blade accumulated snow from the surface before applying salt. Blading performed at the same time as salting is part of this activity.
2. Apply salt-sand per MDOT Winter Maintenance Application Rate (solids) updated 2013, rates shown account for a 25 mph truck operating speed, but also apply for trucks properly equipped with a zero velocity or slurry generator, operating up to 35 mph. Ground speed control units should be used whenever possible and need to be calibrated yearly or if there has been any changes done to the hydraulic system.
3. Consider general temperature and weather conditions in deciding to Continuous Salt.
 - Below 10° F > continuous sanding is preferred
 - 10° to 20° F > continuous salting or sanding
 - Above 20° F > continuous salting is preferred
4. For changing conditions refer to the Winter Operations Guide.
5. Avoid salting too early during extreme cold and falling temperatures. Salt brine may re-freeze causing icy conditions.
6. Place chemicals on the centerline of the roadway and on the high sides of super-elevated curves and ramps.
7. All salt should be pre wet with 7–10 gallons of liquid chloride product per ton of untreated salt.

Activity Name: Winter Maintenance (continued)

Activity #: 1410

Recommended Work Method, continued

Continuous Salting/Blading (cont):

8. After salting it is good practice to allow time for melting before blading again (longer as the temperature drops below 20°F) unless the storm has ended.

Anti-icing

1. Operations should be performed prior to a predicted storm event
2. Anti-icing with salt brine may be performed at any time but those anti-icing with magnesium or calcium based products must refer to MDOT's Anti-icing guidelines.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Winter Road Patrol		Activity #: 1440	
Description/Purpose: Winter patrol of roads to determine the development of winter conditions requiring attention by maintenance forces.			
<div><u>Recommended Crew Size</u> 1</div> <div><u>Material</u></div> <div><u>Average Daily Production</u> 8 hours per crew member</div> <div><u>Measurement</u> Total Hours</div>	<u>Equipment</u>		
	<u>Qty</u>	<u>Code</u>	<u>Description</u>
	1	02/03	Pickup
			<u>Optional</u>
	1	04	Heavy truck with underbody blade
	1	57	Wing (as needed)
	1	60	Hopper box (calibrated)
	1	38	Loader
	Equipment may vary depending on availability and operational need.		
	All MDOT Traffic and Safety policies shall be followed for equipment and personnel.		
Additional equipment and personnel will increase the cost to perform this activity.			

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Use AVL/MDSS to help you determine the best course of action to take.
3. Patrol assigned highways for need of winter maintenance operations.
4. When conditions arise requiring attention by maintenance forces, make notification through established channels of communications.
5. Complete the Winter Road Patrol log (Form 0452D in [MDOT Forms Repository](#)) each night including:
 - Routes traveled and road condition
 - Action taken to call out crews to perform maintenance
 - Maintenance performed
 - Noted deficiencies for the foreman's attention
 - Other incidents or observations pertaining to the night patrol
6. Record the location of damaged or missing signs, delineators, guardrail reflectors, etc., for the day or night crew to repair.
7. Maintenance Garage and/or Maintenance Supervisor/Coordinator shall retain these logs in a notebook for three years pending any related law suits.

Note: If 2 hours or more are spent on ice and snow control, report this time to Activity 1410, Winter Maintenance. For less than 2 hours, absorb this time in Activity 1440, Winter Road Patrol.

Work Method, continued <

Activity Name: Winter Road Patrol continued**Activity #: 1440****Recommended Work Method, continued****Additional Highway Patrol to Observe
and Treat Icy Bridge Decks
(Preferential Icing)**

Maintenance garages which have chronic icy bridge problems should provide additional highway patrol prior to the morning traffic peak on those days when the weather forecast indicates a potential of icy bridge conditions. Research on the prediction of frost forming on bridge decks concludes that the following conditions are needed for frost to form on bridge decks:

1. Air temperatures below 32°F.
2. Weather calm and clear.
3. The dew point is greater than 32°F, or the humidity at 32°F is greater than 80 percent.
4. The bridge deck surface becomes 5°F below the air temperature.

These conditions usually come together during the early morning hours. Frost that is formed on bridge decks is quickly iced over by the early morning commuter traffic.

In most cases the additional patrol period would be from 5:00 a.m. to 7:00 a.m. and on selected days two weeks prior to and following scheduled night crew dates.

The patrol person may need to drive a chemical or sand-spreading unit to respond immediately to the sudden formation of frost on the bridge decks.

This additional patrol shall be restricted to those days when there is a potential of an icy bridge deck condition in the weather forecast.

Activity Name: Other Winter Maintenance**Activity #: 1490**

Description/Purpose: Winter maintenance not covered by Activities 1410 and 1440. See list below for examples of work included in 1490, Other Winter Maintenance.

Note: 04 Truck Washing should be charged to Activity 1490 and the route it is used on.

Recommended Crew Size

1 - 2

Additional crew members as need

Material**Average Daily Production**

8 hours per crew member

Measurement**Total Hours****Equipment**

Equipment as required

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

Recommended Work Method

[Review environmental, training, and safety precautions.](#)

Note: Some of the work items included in this performance guide take place after a storm subsides and allows time for crews to rest and for a return to normal operations. Other operations take place as needed.

- Clean shoulders within the bounds of the white shoulder policy.
- Ensure that drainage systems are operating properly.
- Clean ice and snow away from attenuators.
- Clear sight distance areas at intersections and ramp gore areas.
- Snow removal and cut backs. **See Note 1.**
- Snow removal and/or hauling (municipal streets, intersections, snow storage areas, bridges, car pool lots, attenuator sites, etc.) **See Note 2.**
- Erection and removal of snow guides.
- Replace/repair mailboxes damaged by our equipment (not snow) during winter operations. Refer to MM 1996-01 Guidance for repairing of Damaged Mailboxes.
- Read frost tubes (see recommended work method included in this guide).
- Maintain frost tubes (see recommended work method included in this guide).

The following tasks are charged to the facility rather than to a route. When you code these in DCDS, use the facility number/00 for the grant/phase.

- Stockpiling and cleanup of salt, sand and mixtures for winter maintenance.
- Constructing salt hopper racks or tailgate hangers not covered by a work order.
- Installing and removing hopper boxes or plows.
- Calibrating chemical spreading equipment.
- Transferring winter equipment due to a major winter storm or strike.
- Salt storage shed painting, repair or other maintenance.

Activity Name: Other Winter Maintenance continued**Activity #: 1490****Recommended Work Method. continued**

Note 1: Snow accumulations should be removed or cut back when conditions exist that may lead to ramping over safety barriers. Once notified, maintenance supervision (direct or contract agency) will determine when and if removal or cut back operations are required. Things to be considered are the density of the pack (powdery, wet or ice), the height of the pack in relation to the guardrail or barrier, and the clear distance between the traveled way and the accumulated snow. The benefits of removing or cutting back the snow must be weighed against the inconvenience to the public created by the lane or ramp closure.

Note 2: Use caution when cleaning snow from bridge decks with a front-end loader. A tilted bucket under down-pressure will damage expansion joint material.

FROST TUBES – READING AND MAINTAINING**Reading Frost Tubes**

Statewide or region boring crews have installed frost tubes around the state to help determine when frost laws should be imposed. Frost tubes are clear plastic tubes 8 feet long installed in a waterproof casing in the pavement. Reading frost tubes requires measuring and recording the depth of frost and the depth of thaw under a pavement. **Recommended measurement interval is weekly during mid-winter and Monday, Wednesday, and Fridays during spring thaw. This may vary by Region.**

Recommended Crew Size: 1 plus flagger/spotter if needed.

Equipment: 1 02/03 Pickup
 1 Wrench for frost tube cap (Note: Different caps styles have been used over the years which require different wrenches. Wrenches are available from plumbing supply companies or from the C&T machine shop.)
 1 Tape measure
 1 Propane torch
 1 Wire brush
 1 Grease gun
 1 MDOT Form 0399 (Frost Tube Readings)
 rags/paper towels and large sponge

1. Establish traffic control as needed based on traffic volumes and frost tube location.
2. Remove frost tube cap using wrench. If needed, gently warm the outside steel ring of the cap with a propane torch, using care not to melt the cap if it is plastic.
3. Using MDOT Form 0399 ([MDOT Forms Repository](#)), record the following measurements to the nearest half of an inch.
 - a. Measure and record distance from pavement surface to top of frost tube in ground.
 - b. Remove frost tube from ground. Blue areas inside the tube indicate thawed soil while white areas indicate frozen soil. Measure length from top of the tube to:
 - 1) deepest frozen zone,
 - 2) thaw zone if any, and
 - 3) refreeze zone if any.

Activity Name: Other Winter Maintenance continued**Activity #: 1490****Recommended Work Method. continued**

4. Calculate the frost depth, thaw depth and refreeze depth by adding measurement from step 3.a. to the measurements taken in steps 3.b.1, 3.b.2, and 3.b.3.
5. Record location, date and time.
6. Remove any standing water in the access hole with a sponge and clean threads on steel collar and cap with a wire brush.
7. Wipe off any moisture on frost tube and reinstall into ground.
8. Grease cap threads if needed and reinstall cap, making sure the cap sits below the surface of the pavement.

Maintaining Frost Tubes

Frost tubes should be serviced each fall to insure that they are operable and will be readable during the spring thaw.

Recommended Crew Size: 2

Equipment: 1 02/03 Pickup
 1 Generator
 1 Wrench for frost tube cap
 1 Propane torch
 1 Grease gun
 1 Wet/dry shop vac
 Duct tape
 Rags/paper towels and large sponge
 Frost tube parts (details listed below)
 Methyl blue solution
 Squirt bottle, eye dropper or syringe for adding methyl blue solution.
 Needle nose pliers
 Knife or metal shears to cut flexible inner tubing

Access to the tube is provided by a sewer clean out plug. The tube contains a solution of methyl blue, a dye that is blue in color when it is a liquid (thawed). When methyl blue freezes, the solution will appear almost white. The depth of frost is determined by pulling the tube out of the ground and measuring how much of the tube is frozen (or white in color). Since the plastic tubing used in frost tubes changes color over time, annual replacement of the flexible Tygon tubing is recommended.

Replaceable parts - All parts and supplies are available through the C&T machine shop in Lansing or through the suppliers listed below:

Sewer clean out plug - one needed. 4 inch PVC slotted (toe saver) floor plug available from plumbing supply companies.

Rigid frost indicator tube- one needed. 8' x 5/8" OD x 1/2" ID polycarbonate hollow rod available from McMaster Carr or other machine shop supply houses.

Flexible inner tubing – 8 feet needed. Tygon brand R-3603 formulation chemical grade PVC tubing 1/4" ID 7/16" OD. Available from McMaster Carr, Cole Palmer or other machine shop and laboratory supply houses.

Activity Name: Other Winter Maintenance continued**Activity #: 1490****Recommended Work Method. continued**

Tapered plastic tubing plugs – two needed. Custom machined by C&T machine shop. Reuse if possible.

Methyl blue solution - The methyl blue solution is made by diluting methyl blue powder (Sigma Chemical Company Catalog # M5528, Phaltz and Bauer, Inc # 42780 or equivalent) in tap water. Mix to produce a light blue solution. Each batch of methyl blue solution should be checked by filling a small length of Tygon tubing and placing in a freezer. Dilute the solution with additional tap water if it doesn't turn mostly white when frozen. Add more powder if the solution remains clear or white after thawing. **Premixed solution is available from the C&T lab.** Note: Methylene blue, which is a similar blue dye, may also be used but the amount needed may be different than for methyl blue.

Yearly maintenance – Each fall it is recommended that the following work be done:

1. Set up traffic control as required by traffic conditions and frost tube location.
2. Remove access plug and remove any standing water in the access hole using a sponge or a wet/dry shop vac.
3. Inspect the access plug and replace if cracked or the threads are stripped.
4. Grease the threads of the access plug.
5. Remove frost tube from ground.
6. Check for wetness on the outside of the tube that may indicate that the outer casing has water in it. If there is water in the outer casing it can be removed with a wet-dry shop vac.
 - a. Insert an old 8 foot long rigid frost indicator tube (the rigid outer tube only) into the casing and attach the top to a wet/dry vac nozzle using duct tape.
 - b. Suck any water out of the bottom of the casing.
 - c. Raise and lower the tube as needed to remove all standing water.
 - d. If the casing continues to fill with water, it will have to be replaced by a soils boring crew.
7. Replace Tygon tubing and methyl blue solution. (This step can be done back at the garage. If preferred, the C&T lab in Lansing can provide ready to install, pre-assembled new tubes.)
 - a. Remove one end plug and drain out any solution. Note: the methyl blue solution is not hazardous, but it can stain skin and clothing.
 - b. Remove the other plug and the old Tygon tubing.
 - c. Inspect the rigid frost indicator tube. Replace the rigid frost indicator tube if it is cracked or has a permanent blue tint to it.
 - d. Make sure the new Tygon tubing is cut squarely on one end. Insert this end into the rigid frost indicator tube and thread to the other end. Gently tapping on the rigid tube helps the flexible tube thread through.
 - e. Once the flexible tubing is threaded through, install a plug into the squarely cut end.
 - f. Gently pull the tubing back through the other direction to seat the plug, and to slightly stretch the flexible inner tube.
 - g. Grip the flexible inner tube with needle nose pliers so it remains stretched and squarely cut the other end of the Tygon tubing.
8. Fill the tube with methyl blue solution. Two methods are used. Option A puts the solution inside the flexible inner tubing. Option B puts the solution between the rigid frost indicator tube and the flexible inner tubing. Option A is less prone to leaks but is somewhat harder to read. Option B is easier to read, but is more prone to leaks.

Recommended Work Method, continued

Option A: Continue to hold the flexible inner tubing with needle nose pliers. Add methyl blue solution into the flexible rubber tubing with a squirt bottle, eye dropper or syringe. Tap the tube to remove air bubbles. Fill the flexible inner tubing to the top with solution and then install the top plug. Release tension on pliers. Gently tap both end plugs and check for leaks.

Option B: While stretching the flexible inner tubing, install the second plug. Gently tap the bottom plug on the ground to make sure it is seated. Pull the top plug and flexible inner tubing out of the top of the tube using needle nose pliers. Add methyl blue solution between the two tubes using a squirt bottle, eye dropper or syringe. Tap the tube to remove air bubbles. Add solution to top of tube and then release tension on flexible inner tube. Gently tap both end plugs and check for leaks.

9. Reinstall the frost tube into the ground.
10. Reinstall access cap and make sure the cap is below the surface of the pavement so that it won't get struck by snowplows.
11. Check the condition of any signs or pavement markings installed to locate the frost tube.
12. It is desirable to get GPS latitude and longitude coordinates once for each frost tube location. Region survey crews can assist with this task.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bridge Maintenance Cubic Yards

Activity #: 1510

Description/Purpose: Removal and replacement of existing concrete with new concrete or other materials. This activity includes both bridge structure repair (railings, abutments, piers, beams, or pier caps) and bridge deck repair (sidewalks, joints and decks). All preparatory work (e.g., sawing, signing, false decking, travel time and traffic regulation) is also reported to this activity.

Note: Related long term traffic control should be reported to activity 1660, Non-Routine Traffic Control.

<u>Recommended Crew Size</u>		<u>Equipment</u>		
5 (1 traffic regulator included)		<u>Qty</u>	<u>Code</u>	<u>Description</u>
<u>Material</u>		1	02/03	Dump truck
Concrete		1	03	Bridge/tool truck
Miscellaneous bridge supplies		1	04	Truck
Bridge fascia (for bridge structure repair)		1	12	Flashing arrow
		1	19	Compressor
<u>Average Daily Production</u>		1	04	Shadow vehicle
1 cubic yard		1	04	Crane truck (bridge deck repair)
				<u>Optional</u>
		1	38	Skid loader
		1	67	Trailer
		1	04	Shadow vehicle and attenuator

Recommended Work Method - Repair Bridge Deck

1. [Review environmental, training, and safety precautions.](#)
2. Sound deck.
3. Mark bad spots.
4. Saw around bad spots on good concrete leaving 3/4" vertical.
5. Remove bad concrete to below first mat of rebar.
6. Replace bad rebar.
7. Sandblast to create anchor pattern and remove rust from steel.
8. Slurry edges to create bond.
9. Replace concrete
10. Cover patch to contain moisture during cure.
11. Sandblast patch and seal with sealer 28 days later.

Work Method continued <

Activity Name: Bridge Maintenance Cubic Yards

Activity #: 1510

Recommended Work Method - Repair Bridge Structure

1. [Review environmental, training, and safety precautions.](#)
2. Inspect to assess damage.
3. Remove bad concrete.
4. Saw around patch to get 1/2" to 3/4" clean edge to pour to.
5. Replace or add rebar.
6. Sandblast to clean rusty rebar and create anchor pattern.
7. Slurry to create bond.
8. Form.
9. Replace concrete.
10. Insulate forms if below freezing.
11. Loosen williams rods on the next day.
12. Remove forms and stone on the second day after pour.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: **Bridge Maintenance Square Feet**

Activity #: 1520

During fiscal year 2001, this activity was revised. It now includes all of the following previously used activity numbers:

1512	Bridge Flood Coating
1520	Bridge Painting
1521	Bridge Painting (Lead Paint)
1522	Bridge Spot Painting
1580	Protect Bridge Slopes

Work may still be performed using the above methods. However, all work performed on any of these activities should now be reported to the activity number shown in bold at the top of this page. Performance guides for all of these methods are provided on the following pages.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bridge Maintenance Square Feet		Activity #: 1520	
Method: Bridge Flood Coating		Previous Activity #: 15120	
Description/Purpose: Sealing bridge deck surface with waterproofing (epoxy) sealant and aggregate material (for traction). Including all sandblasting and cleaning. Traffic control and travel should be reported to this activity for routine daily operations.			
Note: Long term traffic control should be reported to activity 1660, Non-Routine Traffic Control.			
<u>Recommended Crew Size</u> 4		<u>Equipment</u>	
<u>Material</u>		<u>Qty</u>	<u>Code</u> <u>Description</u>
Abrasive		1	02/03 Pickup
Epoxy		1	03 Bridge/tool truck
Aggregate		1	04 Truck
		1	12 Flashing arrow
		1	19 Compressor
<u>Average Daily Production</u> 1,000 square feet		<u>Optional</u>	
		1	04 Shadow vehicle and attenuator

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Close one lane of bridge.
3. Blast and blow clean work area.
4. Mix and apply one coat epoxy and allow for manufacturer's cure time.
5. Mix and apply second coat epoxy and broadcast aggregate to the point of rejection.
6. Remove excess aggregate.
7. Shift traffic.
8. Repeat process until bridge deck is completed.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bridge Maintenance Square Feet		Activity #: 1520	
Method: Bridge Painting		Previous Activity #: 1520	
Description/Purpose: Application of all paint and protective coatings (excluding lead paint and railing galvanizing) to bridge structures. All cleaning, sandblasting, scaffolding, signing, travel time and traffic regulation should be reported to this activity.			
Note: Long term traffic control should be reported to activity 1660, Non-Routine Traffic Control.			
<u>Recommended Crew Size</u> 4 (1 traffic regulator included)		<u>Equipment</u>	
<u>Material</u>		<u>Qty</u>	<u>Code</u>
Blast abrasive		1	02/03
Paint		1	04
		1	04
		1	12
		1	19
		1	53
<u>Average Daily Production</u> 200 - 300 square feet			
			<u>Optional</u>
		1	Decontamination trailer
		1	04 Shadow vehicle and attenuator

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

Note: Before starting any bridge painting, a paint sample must be taken to identify what kind of paint is on the bridge so the proper method of removal can be determined.

Note: When working over water, pontoons, boat and floating boom may be needed.

Note: For complete details, see Standard Specifications for Construction, Section 715. - Cleaning and Coating Existing Structural Steel, with the following modification: the area shall be contained according to 715.03.C.2 except that negative pressure within the containment is not required.

1. [Review environmental, training, and safety precautions.](#)
2. Erect scaffold.
3. Erect total enclosure with ventilation; or vacu blast.
4. Blast clean old paint and rust.
5. Spray on primer and allow time to dry as per instructions. Check thickness in mils.
6. Spray on top coat and allow time to dry as per instructions. Check thickness in mils.
7. Seal cracks and joints.
8. Remove enclosure and clean area.
9. Test spent abrasive to see if hazardous.
10. Store and dispose of spent abrasive in manner specified in the "Standard Specifications for Construction".

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bridge Maintenance Square Feet		Activity #: 1520																																		
Method: Bridge Painting (Lead Paint)		Previous Activity #: 15210																																		
Description/Purpose: Application of all paint and protective coatings (excluding railing galvanizing) to bridge structures. All cleaning, sandblasting, scaffolding, signing, travel time and traffic regulation should be reported to this activity.																																				
Note: Long term traffic control should be reported to activity 1660, Non-Routine Traffic Control.																																				
<p style="text-align: center;"><u>Recommended Crew Size</u> 4 (1 traffic regulator included)</p> <p style="text-align: center;"><u>Material</u> Blast abrasive Paint</p> <p style="text-align: center;"><u>Average Daily Production</u> 200 - 300 square feet</p>	<p style="text-align: center;"><u>Equipment</u></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 10%;"><u>Qty</u></th> <th style="text-align: left; width: 15%;"><u>Code</u></th> <th style="text-align: left;"><u>Description</u></th> </tr> </thead> <tbody> <tr><td>1</td><td>02/03</td><td>Crew van</td></tr> <tr><td>1</td><td>04</td><td>Truck</td></tr> <tr><td>1</td><td>04</td><td>Scissor bed/crane truck</td></tr> <tr><td>1</td><td>12</td><td>Flashing arrow</td></tr> <tr><td>2</td><td>19</td><td>Compressors</td></tr> <tr><td>2</td><td>53</td><td>Sandblasters</td></tr> <tr><td>1</td><td>67</td><td>Decontamination trailer</td></tr> <tr><td>1</td><td></td><td>Negative pressure total enclosure (bag house)</td></tr> <tr><td colspan="3" style="padding-top: 10px;"><u>Optional</u></td></tr> <tr><td>1</td><td>04</td><td>Shadow vehicle and attenuator</td></tr> </tbody> </table>			<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	02/03	Crew van	1	04	Truck	1	04	Scissor bed/crane truck	1	12	Flashing arrow	2	19	Compressors	2	53	Sandblasters	1	67	Decontamination trailer	1		Negative pressure total enclosure (bag house)	<u>Optional</u>			1	04	Shadow vehicle and attenuator
<u>Qty</u>	<u>Code</u>	<u>Description</u>																																		
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Note: For complete detail, see Standard Specifications for Construction, Section 715 - Cleaning and Coating Existing Structural Steel.																																				
Required Testing and Training: Prior to performing this activity all employees must have passed a pulmonary function test and have had a blood test to check for lead and zinc protoporphyrin (ZPP) levels. All employees must have passed lead abatement training. At least one employee must have competent person's training. All employees must be trained and fitted on a half-mask and full face respirator.																																				
<ol style="list-style-type: none"> 1. Review environmental, training, and safety precautions. 2. Erect scaffold. 3. Erect negative pressure total enclosure (bag house). 4. Blast clean old paint and rust. 																																				
Work Method continued on next page <																																				

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bridge Maintenance Square Feet	Activity #: 1520
Method: Bridge Painting (Lead Paint)	Previous Activity #: 15210
<p style="text-align: center;"><u>Recommended Work Method, continued</u></p> <ol style="list-style-type: none">5. Blow down spent abrasive and vacuum (Hepa-vac).6. Clean-up spent abrasive and store in manner specified in the "Standard Specifications for Construction".7. Spray on primer and allow time to dry as per instructions. Check the thickness in mils.8. Spray on intermediate coat and allow time to dry as per instructions. Check the thickness in mils.9. Spray on top coat and allow time to dry as per instructions. Check the thickness in mils.10. Seal cracks and joints.11. Remove enclosure and clean area.12. Test all waste to see if hazardous:<ul style="list-style-type: none">▪ Spent abrasive▪ Dust from enclosure▪ Water from decontamination trailer▪ Air sample from air monitoring equipment.1. Dispose of waste in manner specified in the "Standard Specifications for Construction."	

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bridge Maintenance Square Feet		Activity #: 1520																						
Method: Bridge Spot Painting		Previous Activity #: 15220																						
Description/Purpose: Spot painting to make small repairs on newly painted zinc bridges.																								
<p style="text-align: center;"><u>Recommended Crew Size</u> 3 (1 traffic regulator included)</p> <p style="text-align: center;"><u>Material</u></p> <p>Paint</p> <p>Cleaning strip disc</p> <p style="text-align: center;"><u>Average Daily Production</u> 50 square feet</p>	<p style="text-align: center;"><u>Equipment</u></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; width: 10%;"><u>Qty</u></th> <th style="text-align: center; width: 15%;"><u>Code</u></th> <th style="text-align: left; width: 75%;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">02/03</td> <td>Crew van</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">04</td> <td>Sign truck</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">30</td> <td>Generator</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">12</td> <td>Flashing Arrow</td> </tr> <tr> <td colspan="3" style="padding-top: 10px;"> <p style="text-align: center;"><u>Optional</u></p> </td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">04</td> <td>Shadow vehicle and attenuator</td> </tr> </tbody> </table>			<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	02/03	Crew van	1	04	Sign truck	1	30	Generator	1	12	Flashing Arrow	<p style="text-align: center;"><u>Optional</u></p>			1	04	Shadow vehicle and attenuator
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1	04	Shadow vehicle and attenuator																						
<p style="text-align: center;"><u>Recommended Work Method</u></p> <p>Note: Before starting any bridge painting, a paint sample must be taken to identify what kind of paint is on the bridge so the proper method of removal can be determined.</p> <p>Note: When working over water, pontoons, boat and floating boom may be needed.</p> <p>Note: For complete detail, see Standard Specifications for Construction, Section 715 - Cleaning and Coating Existing Structural Steel.</p> <p>Review environmental, training, and safety precautions.</p> <ol style="list-style-type: none"> 1. Use cleaning strip disc to remove damaged paint. Wipe clean. 2. Paint on primer and allow time to dry as per instructions. Check the thickness in mils. 3. Paint on intermediate coat and allow time to dry as per instructions. Check thickness in mils. 4. Paint on top coat and allow time to dry as per instructions. Check thickness in mils. 																								

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bridge Maintenance Square Feet		Activity #: 1520																											
Method: Protect Bridge Slopes		Previous Activity #: 15800																											
Description/Purpose: All slope repair operations such as filling voids, laying stone, grouting, pouring toewalls and key ways, paving, precast concrete blocks, embankment erosion repair, scour repair and all preparatory work. All travel time and traffic control will be reported to this activity.																													
Note: Long term traffic control should be reported to activity 1660, Non-Routine Traffic Control.																													
<p style="text-align: center;"><u>Recommended Crew Size</u> 4 (1 traffic regulator included)</p> <p style="text-align: center;"><u>Material</u> Concrete and/or stone Miscellaneous slope repair materials</p> <p style="text-align: center;"><u>Average Daily Production</u> 150 square feet</p>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;"><u>Equipment</u></th> </tr> <tr> <th style="text-align: center; width: 10%;"><u>Qty</u></th> <th style="text-align: center; width: 15%;"><u>Code</u></th> <th style="text-align: left; width: 75%;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">04</td> <td>Dump</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">03</td> <td>Bridge/tool truck</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">04</td> <td>Crane truck</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">12</td> <td>Flashing arrow</td> </tr> <tr> <td colspan="3" style="padding-top: 10px;"><u>Optional</u></td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">19</td> <td>Compressor</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">04</td> <td>Shadow vehicle and attenuator</td> </tr> </tbody> </table>			<u>Equipment</u>		<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	04	Dump	1	03	Bridge/tool truck	1	04	Crane truck	1	12	Flashing arrow	<u>Optional</u>			1	19	Compressor	1	04	Shadow vehicle and attenuator
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1	19	Compressor																											
1	04	Shadow vehicle and attenuator																											
<u>Recommended Work Method</u>																													
Note: Coordinate with Regional Resource Specialist on erosion control.																													
<u>Review environmental, training, and safety precautions.</u>																													
<ol style="list-style-type: none"> 1. Remove caved in slope material. 2. Fill in void with approved compactible material. 3. Compact fill material. 4. Replace slope protective material. 																													

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Pump Station Maintenance				Activity #: 1530	
Description/Purpose: Perform routine, reactive, preventive, and emergency maintenance and repairs to storm water pump stations alongside interstate highways and state trunklines. May include pit cleaning using vacuum truck to remove sand, silt and debris from lowest pits of storm water pump stations. This activity prevents premature wear on pumping components. Pump Station Maintenance is generally performed by statewide or special crews.					
<u>Recommended Crew Size</u> 1 - 6		<u>Equipment</u>			
<u>Material</u>		<u>Qty</u>	<u>Code</u>	<u>Description</u>	
Pump repair parts	Light bulbs	1-3	02/03	<u>Optional</u> Truck or van	
Electrical repair parts	Rags	1	04	Vactor truck	
Concrete and block	Gasoline			Hand tools	
Aluminum and steel	Cleaning solvent			Power tools	
Roof materials	Duct tape	1-4		Atmosphere gas detectors	
Oil and grease		1		Confined space rescue equipment	
<u>Average Daily Production</u>		1		Rotary lawn mower	
8 hours per crew member		1		String trimmer	
<u>Recommended Work Method</u>					
<u>All Methods</u>					
1. Review environmental, training, and safety precautions.					
2. Region/TSC should be notified in advance if lane/shoulder closure is required.					
3. Test interior for safe atmosphere before entering.					
NOTE: All pump stations are considered confined spaces. A permit is required to enter the lower levels. Personnel must be trained and certified to enter "permit required confined spaces," as per MIOSHA and MDOT regulations.					
NOTE: Some equipment may be required to be Locked Out and Tagged prior to being worked on.					
<u>Maintenance Work Method</u>					
1. Repair defective components.					
2. Replace or update existing components.					
3. Test system for operations.					
4. Restore system to working order.					
5. Secure from confined space operations.					
Work Method continued <					

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Pump Station Maintenance

Activity #: 1530

Recommended Work Method, continued

Preventive Maintenance Work Method

1. Grease or oil pumps and equipment, clean equipment as necessary.
2. Test run pumps.
3. Check trash rack for debris, clean if necessary.
4. Re-lamp if needed.
5. Sweep interior area.
6. Cut grass and weeds.
7. Pick up trash around pump house.

Pit Cleaning

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Check interior for sewer gas and then check the condition of the structure.
3. Run pump until water level is just below the level of the inlet pipe. Remove all debris on surface that passes through initial garbage racks before removing the remaining water.
4. As required, loosen solids with water pressure (agitator) and remove.
5. **See disposal of material below. Consult with the region resource specialist for questions regarding the proper procedures to follow for disposal of solid and liquid waste.** If a private contractor is doing this work, they must be licensed industrial waste transporters.

NOTE: For further details on compliance with environmental regulations see Standard Specification 107.15. In addition, state regulations that are applicable to the environmental compliance include Part 31 of 1994 PA 451, Section 3109; State Rule R323.1050 of Michigan Administrative Code; and Part 121 of 1994 PA 45, Section 12113.

CAUTION: Do not attempt to enter beyond the portal of the manhole, catch basin or pump station without contacting the MDOT supervisor in charge of your facility. Such actions may be classified as Permit Required Confined Space entries and a special permit and training must be obtained by the entrant(s). Permit Required Confined Spaces may require use of the following:

- Gas detector
- Air fed respirators if in-house rescue procedures are to be used
- Lifeline and body harness
- Outside attendant
- Tripod and winch
- Ventilation device
-

Activity Name: Pump Station Maintenance**Activity #: 1530****Disposal of Material**

MDOT Staff (or Contractor) is responsible for disposal of all material as follows:

Disposal Alternate A

Solid Waste Phase: The solid waste generated shall be disposed of at a Type II landfill. Solid is defined as having no releasable liquids. The landfill may require testing before accepting the waste. The TSC Maintenance Coordinator/Supervisor (or Contract Administrator) shall be provided disposal documentation from the Type II landfill.

Liquid Waste Phase:

- Option 1 - This waste may be evaporated by use of drying beds, decanting stations or similar systems that contain the solids during evaporation; or
- Option 2 - This waste may be placed in a sanitary sewer system with the approval of the owner of the system. A copy of the owner's approval shall be provided to the TSC Maintenance Coordinator/Supervisor (or Contract Administrator); or
- Option 3 - This waste may be collected by pumping the majority of clear liquid from the catch basin without disturbing the solids. A small pump not connected to the Vactor Truck's holding tank such as a sump pump shall be used. The clear water may then be discharged to one of the following:
 - Sanitary system (with prior approval see Option 2)
 - Curb and gutter
 - Back into the storm sewer system as long as it is contained within the system and does not directly enter surface water.
 - Applied to the ground at a distribution rate of 250 gallons/acre/year.

The remaining solid/liquid phase is to be managed as a waste and disposed of using Disposal Alternate B or using Disposal Alternate A with Options 1 or 2.

Disposal Alternate B

The waste generated shall be transported and disposed of by a Licensed Liquid Industrial Waste Hauler in accordance with Part 121, Liquid Industrial Waste, of the Natural Resources and Environmental Protection Act, Act 451, PA 1994. The TSC Maintenance Coordinator/Supervisor (or Contract Administrator) shall be provided a copy of the manifest with every invoice submitted.

If at any time the material is suspected of being hazardous, the TSC Maintenance Coordinator/Supervisor (or Contract Administrator) shall be notified.

Drainage structures to be cleaned shall be measured as Drainage Structure Lead, Cleaning each.

For contracts: the completed work will be paid for at the contract unit price each, which price includes all equipment and labor to clean basin, manhole or pump station and hauling, testing if required for disposal, and disposing of all waste. If material tests hazardous as defined by Part 111 of the Natural Resources and Environmental Act, Act 451, P.A. 1994, the Contract Administrator shall be notified immediately. Payment for disposal of hazardous material shall be as per Subsection 109.07 Extra and Force Account Work.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Moveable Spans			Activity #: 1540		
Description/Purpose: Repair, maintenance, and preventive maintenance of mechanical and electrical equipment and systems on movable bridges, including emergency generators. All prep work, signing, traffic control, inspecting and repair should be reported to this activity. Preventive maintenance reduces the number of emergency repairs required.					
<u>Recommended Crew Size</u> 2 - 6		<u>Equipment</u>			
<u>Material</u> Electrical: switches, wire, conduit, etc. Mechanical: steel, welding rods, Miscellaneous bridge supplies, cleaners, oil, grease, abrasives, wiping cloths		<u>Qty</u> 2	<u>Code</u> 02/03	<u>Description</u> Utility van	
				<u>Optional</u>	
		1	12	Flashing arrow	
		1	70	Welder	
		1	04	Truck/crane	
<u>Average Daily Production</u> 8 hours per crew member					
<u>Recommended Work Method</u>					
1. Review environmental, training, and safety precautions.					
2. Inspect to assess what repair or maintenance is needed.					
3. Use proper lock-out, tag-out procedures.					
4. Perform maintenance and/or repair equipment identified during assessment. <ul style="list-style-type: none">Electrician - inspect and clean electrical equipment; check for proper operation.Maintenance mechanic - inspect, clean, grease mechanical equipment.					
5. Check bridge for proper operation.					
6. Document work performed in log book and on work order form.					

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bridge Maintenance Lineal Feet

Activity #: 1560

Description/Purpose: All bridge maintenance operations that are measured in lineal feet are reported to this activity. This includes all operations involved in sealing bridge joints (except concrete work), such as cleaning, sandblasting, repair of steel components, priming, and placing backup material or damming. The activity also includes repair and replacement of all metal bridge railings, and epoxy injection. All related travel time and traffic control should be reported to this activity.

Note: Long term traffic control should be reported to activity 1660, Non-Routine Traffic Control.

<u>Recommended Crew Size</u>		<u>Equipment</u>		
4 (1 traffic regulator included)		<u>Qty</u>	<u>Code</u>	<u>Description</u>
<u>Material - Seal Bridge Joints</u>		1	03	Bridge/tool truck
Joint sealant		1	12	Flashing arrow
Joint repair material		1	19	Compressor
Epoxy		1	04	Truck (seal bridge joints only)
<u>Material - Maintain Bridge Railing</u>		1	04	Crane truck (maintain bridge railings only)
Miscellaneous bridge rail supplies				
<u>Average Daily Production</u>				<u>Optional</u>
80 lineal feet (seal bridge joints)		1	04	Shadow vehicle and attenuator
50 lineal feet (maintain bridge railing)		1		Epoxy pump

Recommended Work Method - Seal Bridge Joints

[Review environmental, training, and safety precautions.](#)

1. Clean dirt from joint with blow tube.
2. Sandblast to create anchor pattern.
3. Install backer rod.
4. Fill with joint sealant or specified material to manufacturer's specifications at the top of the backer rod.
5. Shift traffic.
6. Repeat the process for remaining lanes.
7. Make sure the joint sealant is 1/4" below surface.

Recommended Work Method - Maintain Bridge Railing

Review environmental, training, and safety precautions.

1. Remove damaged section.
2. Straighten or replace bent or broken bolts.
3. Fabricate railing to specific situation.
4. Install railing.
5. Cover bare metal with cold galvanize as needed.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bridge Joint Replacement - Lineal Feet			Activity #: 1561
Description/Purpose: Removal and replacement of malfunctioning bridge joints. All bridge joint operations expansion and construction are measured in lineal feet and reported to this activity. This includes all work involved in joint replacement such as cleaning, sandblasting, repairing steel components, priming, and placing backup material. All preparatory work, except long term traffic control, (e.g., sawing, signing, false decking, forming, travel time and traffic regulation) is also reported to this activity.			
Note: Long term traffic control should be reported to activity 1660, Non-Routine Traffic Control. (See the “Maintenance Work Zone Traffic Control Guidelines” or the “Michigan Manual of Uniform Traffic Control Devices” for definitions of duration of work and more information on traffic control in work zones.)			
Recommended Crew Size 4-7 Depending on time allotted (1 traffic regulator included)	Qty	Code	Equipment Description
Material -Replace Bridge Joint Miscellaneous bridge supplies Expansion joint (Flex steel)	1	03/04	Dump truck
	1	03/04	Tool truck
	1	12	Flashing arrow
	1	19	Compressor
	1	67	Trailer
	1	04	Scissor bed or Aerial truck
	1	38	Skid loader
Average Daily Production 5-9 lineal feet (depending on crew size)			Optional
Accomplishment Reporting Report removal/replacement of a bridge joint as one operation (i.e., remove/replace 12 lineal feet of bridge joint and record accomplishment as 12 lineal feet)	1	04	Shadow vehicle and attenuator
	1	67	Tool Trailer
	1	02/03	Pickup
	1	12	Portable message board
	1		Portable traffic lights
Recommended Work Method			
1. Review environmental, training, and safety precautions.			
2. Contact Miss Dig.			
3. Measure opening and saw to depth.			
4. Remove old expansion joint with jack hammer using one of the following methods:			
▪ Method 1 The step down method is 2’ at the top of the joint and 18" at the bottom a small hammer is required (30#) to minimize fracturing the surrounding concrete.			
▪ Method 2 The concrete is removed full depth. Clean and replace rebar as necessary			
5. Form up the bottom.			
6. Install expansion joint device per manufacturer’s instructions.			
7. Shift traffic.			
8. Repeat the process for remaining lanes.			

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Other Bridge Maintenance

Activity # 1590

Description/Purpose: All bridge maintenance operations not covered by activities 1510-1561 and measured in hours are reported to this activity.

Note: Long-term traffic control should be charged to activity 16600 Non-Routine Traffic Control.

<u>Recommended Crew Size</u>		<u>Equipment</u>		
2		<u>Qty</u>	<u>Code</u>	<u>Description</u>
<u>Material</u>		1	03	Bridge/tool truck
Miscellaneous bridge supplies		1	04	Crane truck (optional)
		1	12	Flashing Arrow
<u>Average Daily Production</u>		1	19	Compressor (optional)
Hours				
				<u>Optional</u>
		1	04	Shadow vehicle & attenuator

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Consult traffic control guidelines and use appropriate traffic control.
3. The method and procedure will vary depending on the type of maintenance being performed.

Work Examples:

Hand sweeping structures

Bridge scaling

False decking on bridge

Drain extensions

Removing debris from bridge

Channel work

Bridge washing (include bridge number)

Equipment and material preparation not chargeable to a job.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Bridge Inspection

Activity #: 1591

Description/Purpose: Inspection of bridges to meet state and federal requirements. Bridge inspection is generally conducted by a bridge engineer and team at the TSC level. Personnel must have NBI (National Bridge Inspection) certification to complete this activity.

Recommended Crew Size

2 - 3

Material

Average Daily Production

8 hours per crew member

Equipment

Qty

Code

Description

1

03

Pickup truck

1

Ladder

Optional

1

04

Bucket truck

1

12

Flashing arrow

1

Boat

Recommended Work Method

[Review environmental, training, and safety precautions.](#)

The results of the bridge inspection are generally recorded using the following software:

Pontis Database program used to record inspection data

Word Word processing program used to label and print inspection pictures

Excel Spreadsheet program used to create Request for Action (RFA) forms and other forms

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Small Sign Maintenance		Activity #: 1600	
Description/Purpose: Repair or replacement of all damaged or worn-out traffic control signs. Includes:			
<ul style="list-style-type: none">• Steel post (post sizes up to and including 3 pounds per foot.)• Wood post (post sizes up to and including 4" x 6"). Refer to activity 1670 for work with 6 x 8 wood posts.			
Note: Call Miss Dig if installing new or relocating existing post, and contact local maintaining agency (for signal and freeway lighting, etc.).			
<u>Recommended Crew Size</u> 2		<u>Equipment</u>	
<u>Material</u> Steel or wood sign posts Signs Miscellaneous sign material Steel sleeves Concrete (for wood posts only)		<u>Qty Code</u> 1 04	<u>Description</u> Sign truck with aerial tower
<u>Average Daily Production</u> 5 Sign Locations			<u>Optional</u> 1 10 Aerial tower (for older units) 1 19 Compressor 1 04 Crane truck 1 12 Flashing arrow 1 Concrete mixer 1 03 Dump / Pickup
<i>A sign location is defined as all supports, sign placards, and foundations at one location.</i>		Equipment may vary depending on availability and operational need.	
<i>The straightening, removal, or replacement of each post, sign, or sleeve is considered a sign location.</i>		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.	
<u>Measurement</u> Sign Locations		Additional equipment and personnel will increase the cost to perform this activity.	
<u>Calculation</u> Sign Locations / Day = (Total Hours ÷ 8) ÷ Total Sign Locations			

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

Note: Priority guidelines are general and recommended for when a sign has been knocked down or severely damaged.

Priority Guidelines

1. Call out crew as soon as notified for the following signs:
 - "STOP" Signs
 - "YIELD" Signs
 - Signs and/or supports whose damaged condition interferes with traffic.
2. Assign a crew on the first working day for the following signs:
 - Target arrows
 - Curve and turn signs
 - Advisory speed panels
 - "DO NOT ENTER" and "WRONG WAY" signs
 - "STOP AHEAD" signs
 - One way arrows
 - "KEEP RIGHT" and "KEEP LEFT" signs

>

Activity Name: Small Sign Maintenance

Activity #: 1600

Recommended Work Method, continued

1. [Review environmental, training, and safety precautions.](#)
2. Metal sign posts should be driven a minimum of 3½' into the ground.
Wood sign posts should be installed per specifications for direct burial or sleeve installation.
3. It is recommended that each facility stock a minimum supply of first and second priority signs and any other regulatory or warning signs used within their area of responsibility.
4. Routine maintenance of worn out signs should be approved bi-weekly by the Regional Special Crew Supervisor or other approved personnel.
5. Repair and replacement of posts and signs shall follow current MDOT standards, specifications and typicals.
6. Night inspection should be performed annually for reflectivity, positioning and clear vision.
7. Apply new date stickers to replacement signs.

Activity Name: Sign Fabrication Standard**Activity #: 1602****Description/Purpose:** This activity includes the following type of sign fabrication:

- Signs fabricated using Type II (HDO) plywood. These are typically between the sizes of 4' x 4' and 12' x 4'.
- Signs fabricated using Type III aluminum sheet. These are typically between the sizes of 12" x 12" and 3' x 4'.
- Type IV Aluminum sheet overlay, which is typically used to change the message on large guide signs.

Recommended Crew Size

2

Material**Type II Plywood**

(HDO) plywood
Edge sealer
Tack cloth
Reflective sheeting

Type III and IV Aluminum

Type III aluminum sheet
OR
Type IV aluminum overlay
Reflective sheeting

Average Daily Production

Aluminum: 75 square feet
Plywood: 12 square feet

Equipment - Type II Plywood

Table saw
Hand saw
Drill
Sander
Paint roller
Squeeze roller applicator
Heat lamp applicator
Die cutter

Equipment - Type III and IV Aluminum

Power shear
Power hole punch
Power corner punch
Etch and rinse tanks
Hand roller
Squeeze roller applicator
Heat lamp applicator
(CAD) Software and hardware
Layout table

Recommended Work Method

[Review environmental, training, and safety precautions.](#)

Type II Plywood Signs

1. Cut plywood to proper size.
2. Sand and drill support holes.
3. Seal edges.
4. Tack the face of the sign blank.
5. Apply reflective sheeting.
6. Apply legend and border.
7. Apply heat using heat lamp applicator.
8. Package signs.

Type III and IV Aluminum Signs

1. Shear Type III or Type IV aluminum signs to proper size.
2. Etch and rinse signs.
3. Corner signs and punch support holes.
4. Apply legend and border.
5. Apply heat using heat lamp applicator.
6. Package signs.

Activity Name: Sign Fabrication Non-Standard (Aluminum Extruded)

Activity #: 1605

Description/Purpose: This activity includes the following type of sign fabrication:

- Signs fabricated using a combination of extrusions. Typically used in 6" and 12" widths. Signs fabricated with extruded sign panels are usually larger than 48 sq. ft.

Recommended Crew Size

2 - 4

Material - Aluminum Extruded, Type I

Aluminum extruded panels, angle, I-beam, H-beam
Reflective sheeting
Layout patterns
Miscellaneous sign fabricating materials

Average Daily Production

Aluminum extruded, Type I: 150 square feet

Equipment - Aluminum Extruded, Type I

CAD software and hardware
Drill press
Drill
Air ratchet
Squeeze roller applicator
Overhead hoist

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

Work methods provided on the following page <

Activity Out of Scope

Activity Name: Sign Fabrication Non-Standard (Aluminum Extruded) continued

Activity #: 1605

Recommended Work Method

[Review environmental, training, and safety precautions.](#)

Aluminum Extruded, Type I

1. Layout.
2. Cut aluminum extruded sign panels.
3. Cover aluminum extruded sign panels with reflective sheeting.
4. Bolt aluminum extruded sign panels together.
5. Fabricate and install sign supports.
6. Turn sign over by use of overhead hoist.
7. Place paper patterns on the sign face.
8. Apply legend and border.

Activity
Out of Scope

Activity Name: Sign Fabrication Non-Standard (Screen Printing)

Activity #: 1606

Description/Purpose: This activity includes the following type of sign fabrication:

- Signs fabricated using screen printing, a method of applying sign legend to reflective sheeting.

Recommended Crew Size

2 - 4

Material - Screen Printing

Substrate
Screen printing ink
Thinner
Polyester monofilament
Reflective sheeting
Rubylith
Slip sheeting
Fabric abrader and degreaser
Direct emulsion
Ghost and haze remover

Average Daily Production

Screen print: 1,500 square feet

Equipment - Screen Printing

Drafting equipment
Reproduction equipment
Silk screen machine
Silk screen frames
Drying racks
Drying equipment
(CAD) Software and hardware
Emulsion tray

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety practices shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

Work methods provided on the following page <

Activity Name: Sign Fabrication Non-Standard (Screen Printing) continued

Activity #: 1606

Recommended Work Method

[Review environmental, training, and safety precautions.](#)

Screen Printing

1. Prepare substrate.
2. Fabricate silk screen frame.
3. Stretch polyester monofilament.
4. Clean polyester monofilament and dry.
5. Coat polyester monofilament with emulsion and dry.
6. Fabricate positive.
7. Expose positive with reproduction equipment.
8. Wash out image and dry.
9. Check image for pin holes and tape edges of the screen frame.
10. Register image of the silk screen frame to the sign blank on the silk screen machine.
11. Install squeegee and flood bar.
12. Screen slip sheeting before screening sign blanks to make sure the registration is accurate.

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Signal Maintenance		Activity #: 1610																						
Description/Purpose: Scheduled routine maintenance of electrical traffic control devices plus emergency service to keep signals in serviceable condition.																								
<u>Recommended Crew Size</u> 1-2 <u>Material</u> Signal maintenance and repair materials <u>Average Daily Production</u> 8 hours per crew member <u>Measurement</u> <u>Total Hours</u>		<u>Equipment</u> <table><thead><tr><th>Qty</th><th>Code</th><th>Description</th></tr></thead><tbody><tr><td>1</td><td>04</td><td>Truck with aerial tower</td></tr><tr><td colspan="3"><u>Optional</u></td></tr><tr><td>1</td><td>03</td><td>Truck with aerial tower</td></tr><tr><td>1</td><td>10</td><td>Aerial tower (for older units)</td></tr><tr><td>1</td><td>12</td><td>Flashing arrow</td></tr><tr><td>1</td><td>04</td><td>Shadow vehicle and attenuator</td></tr></tbody></table> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>		Qty	Code	Description	1	04	Truck with aerial tower	<u>Optional</u>			1	03	Truck with aerial tower	1	10	Aerial tower (for older units)	1	12	Flashing arrow	1	04	Shadow vehicle and attenuator
Qty	Code	Description																						
1	04	Truck with aerial tower																						
<u>Optional</u>																								
1	03	Truck with aerial tower																						
1	10	Aerial tower (for older units)																						
1	12	Flashing arrow																						
1	04	Shadow vehicle and attenuator																						
<u>Recommended Work Method</u> 1. Review environmental, training, and safety precautions. 2. Maintain controller, flashers, signals and pedestrian devices. 3. Check signal timing. 4. All trouble calls concerning traffic signals are to be immediately investigated, repaired and logged. 5. Perform on site preventative maintenance every 12 months.																								

Activity Name: Special Markings Paint & Tape**Activity #: 1620**

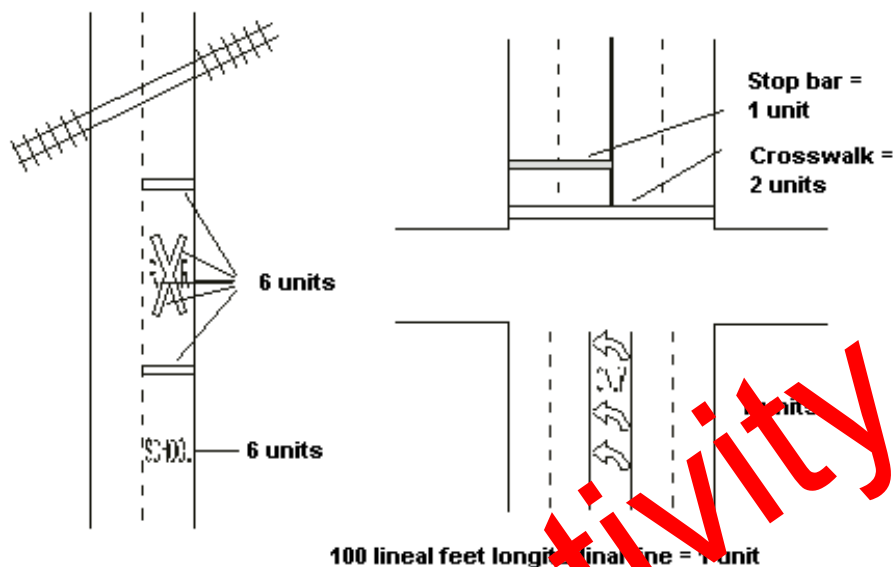
Description/Purpose: Use of paint or tape for replacement of traffic control markings. The application of tape shall be for temporary overnight lane closures. Paint and tape are used for legends, crosswalks and stop bars.

All travel time and traffic control for this activity should be reported to this activity.

<u>Recommended Crew Size</u>	<u>Equipment</u>		
3 (2 traffic regulators included)	<u>Qty</u>	<u>Code</u>	<u>Description</u>
<u>Material</u>	2	03	Pickups
<u>Paint</u>	1	12	Flashing arrow
Pavement marking paint	1	46	Paint machine (painting only)
<u>Tape</u>	1	61	Grinder
Pavement marking tape	1	12	Flashing arrow
Preformed pavement marking tape	1	19	Air Compressor
Miscellaneous application materials	Small Road Tools		
Plastic/Cold/Thermal	Equipment may vary depending on availability and operational need.		
<u>Average Daily Production</u>	All MDOT Traffic and Safety policies shall be followed for equipment and personnel.		
Tape Symbols: 3 units	Additional equipment and personnel will increase the cost to perform this activity.		
Tape Crossbars / Crosswalks: 100 lineal feet			
Paint Symbols: 15 units			
Paint Lines: 2000 lineal feet			

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Clean and prepare area for application.
3. Follow manufacturer's recommended procedures.
4. All markings will conform to the MMUTCD.



Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Delineator Maintenance		Activity #: 1640															
Description/Purpose: Repair or replace delineators (including either posts or reflectors) to properly align for maximum reflection. (Erection and removal of snow guides should be reported to activity 1490, Other Winter Maintenance.)																	
<p><u>Recommended Crew Size</u></p> <p>2</p> <p><u>Material</u></p> <p>Delineator buttons</p> <p>Delineator posts</p> <p>4x6 reflective plate</p> <p>Flexible delineators</p> <p>Huck pins</p> <p>Huck collars</p> <p><u>Average Daily Production</u></p> <p>100 each</p> <p><i>All work completed at each location is considered one accomplishment unit.</i></p> <p><u>Measurement</u></p> <p>Total Delineators Repaired / Installed</p> <p><u>Planning Calculation</u></p> <p>Delineators Repaired per Day =</p> <p>Total Delineators ÷ (Total Hours ÷ 8)</p>	<p><u>Equipment</u></p> <table> <tr> <th><u>Qty</u></th><th><u>Code</u></th><th><u>Description</u></th></tr> <tr> <td>1</td><td>02/03</td><td>Dump or pickup</td></tr> <tr> <td>1</td><td>19</td><td>Compressor</td></tr> <tr> <td colspan="3"><u>Optional</u></td></tr> <tr> <td>1</td><td>04</td><td>Sign truck</td></tr> </table> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>	<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	02/03	Dump or pickup	1	19	Compressor	<u>Optional</u>			1	04	Sign truck	
<u>Qty</u>	<u>Code</u>	<u>Description</u>															
1	02/03	Dump or pickup															
1	19	Compressor															
<u>Optional</u>																	
1	04	Sign truck															

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

How

1. [Review environmental, training, and safety precautions.](#)
2. Follow Standard R-127 series for color and placement.
3. Replace post if necessary so that it is plumb and the reflector is at a right angle to the road.
4. Replace posts at the same location as the original installation. Use the same hole when the ground is frozen.
5. Alignment and height should conform to balance of section.
6. Remove stub of broken post or cut off 12" below ground surface.

When

1. Maintain delineators as needed on sharp curves, interchange ramps, acceleration and deceleration lanes and any others essential to safety of traveling public.
2. Replace delineators on straight sections of highway when there are a sufficient number to warrant at least a half-day of work.
3. Each spring and fall the night crew should make an inspection and replace all damaged delineators.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Impact Attenuator Maintenance Roadway

Activity #: 1650

Description/Purpose: Inspection and repair of impact attenuators. Inspection should be done on a weekly and annual basis. Annual inspection is to be performed two times per year (spring and fall). Weekly drive-by inspection is necessary. Repair impact attenuators from vehicle accidents or deterioration as necessary.

Notes:

- Damage from impact should be repaired as soon as possible.
- During winter, clean snow and ice from in front of, around, and within attenuator site, and report to activity 1490, Other Winter Maintenance.

Recommended Crew Size

1 (inspection)
3 (maintenance)

Material

Miscellaneous, as required

Average Daily Production

8 hours per crew member

Measurement

Total Hours

Equipment

<u>Qty</u>	<u>Code</u>	<u>Description</u>
1	02/03	Pickup

Optional

1-2	04	Heavy trucks
1	19	Skid compressor
1	38	Loader
1	67	Trailer
1	12	Flashing arrow
1	04	Shadow vehicle and attenuator

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies shall be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Check for evidence of hit or vandalism.
3. Check for and remove any debris or traffic control devices on top of, beside, or in front of attenuator.
Remove hazardous debris from roadway and shoulders that may damage or reduce the unit effectiveness.
4. Repair and reposition per manufacturer's instructions.
5. Report finding, upon review - if any damages.
6. See attachments for detailed information about specific attenuator types.

Work method continued <

Activity Name: Impact Attenuator Maintenance Roadway continued

Activity #: 1650

Recommended Work Method, continued

G.R.E.A.T. SYSTEM

1. Review manufacturer's maintenance recommendations before performing inspection.
2. Check for evidence of a hit or vandalism.
3. Restraining chains must be in place on leg pins.
4. Nose cover and object marker panel must be securely in place and in good condition.
5. All bolts and nuts must be tight. Bolts requiring specific torques must be loosened and re-torqued.
6. Concrete anchor bolts, front, slide strap and bracket must be tight and firmly anchored.
7. Diaphragm legs must be straight and unbent.
8. Mushroom washers and washer bolts must be properly aligned and positioned in the thrie-beam panel.
9. Check general condition of cartridges and proper positioning on support tabs or proper position in support brackets (Hex-Foam).
10. Clean dirt and debris from under and around system. Use compressed air when necessary.
11. Remove any debris or traffic control devices from the top, sides or front of the attenuator.

HEX-FOAM SANDWICH UNIT

1. Review manufacturer's maintenance recommendations before performing inspection.
2. Check for evidence of a hit or vandalism.
3. Secondary cables must be attached.
4. All bolts and nuts must be tight. Bolts requiring specific torques must be loosened and re-torqued.
5. Restraining cables must be tight (torque wrench reading to be 400 - 450 ft. lbs.).
6. Concrete anchor bolts, front and backup, firmly anchored and tight.
7. Pull-out cable clamp must be tight.
8. Cartridges must be in place and tight.
9. Diaphragms must be vertical and parallel.
10. Diaphragm hardware must be in workable condition.
11. All fender panels must be secure and tight.
12. Nose cover and object marker panel must be in place, secure and undamaged.
13. Clean debris from around and under attenuator. Use compressed air when necessary.
14. Remove any debris or traffic control devices from the top, sides or front of the attenuator.

Work Method continued <

Activity Name: Impact Attenuator Maintenance Roadway continued**Activity #: 1650**

Recommended Work Method, continued

INERTIA BARRIER SYSTEM (SAND BARREL)

1. Review manufacturer's maintenance recommendations before performing inspection.
2. Check for evidence of a hit or vandalism.
3. Object marker must be in place and undamaged.
4. Check for proper weight, location and alignment of barrels.
5. Move barrels to designated position if necessary.
6. Barrels must be level and not tipped.
7. Barrels must not be cracked or otherwise damaged.
8. Lids must be firmly seated and not dished.
9. Clean debris from attenuator site.
10. Remove any debris or traffic control devices from the top, sides or front of the attenuator.

STANDARD ATTENUATOR

- Quadguard & Quadguard II (manufactured by Trinity Highway Products/Energy Absorption Systems)
- Quadguard M10 (manufactured by Trinity Highway Products/Energy Absorption Systems)
- TAU-II (manufactured by Lindsay Transportation Solutions/Barrier Systems)

LOW MAINTENANCE ATTENUATOR

1. Review manufacturer's maintenance recommendations before performing inspection.
 2. Check for evidence of a hit or vandalism.
 3. Nose cover and object marker panel must be in place, secure and undamaged.
 4. All fender panels must be secure and tight.
 5. Check for damage to cartridges or parts.
 6. All nuts and bolts must be tight. Bolts requiring specific torques must be loosened and re-torqued.
 7. Clean dirt and debris from under and around system. Use compressed air when necessary.
 8. Remove any debris or traffic control devices from the top, sides or front of the attenuator.
- Quadguard Elite (manufactured by Trinity Highway Products/Energy Absorption Systems)
 - Quadguard Elite M10 (manufactured by Trinity Highway Products/Energy Absorption Systems)
 - Quadguard LMC (manufactured by Trinity Highway Products/Energy Absorption Systems)
 - REACT 350 & REACT 350 II (manufactured by Trinity Highway Products/Energy Absorption Systems)
 - TAU-II-R (manufactured by Lindsay Transportation Solutions/Barrier Systems)
 - SCI 100 GM & SCI 70 GM (manufactured by SCI Products/Work Area Protection Corporation)

CELL CLUSTER

1. Review manufacturer's maintenance recommendations before performing inspection.
2. All cell cartridge covers must be down. If not, check for evidence of a hit or vandalism.
3. All nuts and bolts must be tight. Bolts requiring specific torques must be loosened and re-torqued.
4. Nose cover and object marker panel must be undamaged and in place.
5. Outer wrap/cover must be in place - if not, check condition of exposed cells.
6. Check cells for leaks and replace if necessary.
7. Check cell caps for breaks and correct size.
8. Concrete anchor bolts must be tight and firmly anchored.
9. Clean debris from under and around attenuator. Use compressed air when necessary.
10. Remove any debris or traffic control devices from the top, sides or front of the attenuator.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Non-Routine Traffic Control			Activity #: 1660		
Description/Purpose: Traffic control and lane closures for overnight and longer, or special operations. Activity 1970 should be used for incident traffic control.					
<u>Recommended Crew Size</u> 2-6			<u>Equipment</u>		
<u>Material</u> Type III barricades Temporary concrete or water-filled barriers Pavement marking tape Temporary signing Channelizing devices (drums, cones)			<u>Optional</u>		
<u>Average Daily Production</u> 8 hours per crew member			<u>Qty</u>	<u>Code</u>	<u>Description</u>
			1	04	Crane truck
			2	04	Trucks
			2	02/03	Pick-ups
			2	12	Flashing arrows
			2	67	Trailer mounted signals
			1	67	Trailer
			1		Message board
			1		Truck mounted water tank
<u>Measurement</u> Total Hours			Equipment may vary depending on availability and operational need.		
			All MDOT Traffic and Safety policies shall be followed for equipment and personnel.		
			Additional equipment and personnel will increase the cost to perform this activity.		
<u>Recommended Work Method</u>					
1. Review environmental, training, and safety precautions.					
2. Refer to “Maintenance Work Zone Traffic Control Guidelines.” Questions should be directed to the Region/TSC Traffic and Safety Engineer.					
3. Transport equipment to job site and set-up as directed.					
4. Remove control devices and equipment when work is completed.					

Activity Name: Large Sign Maintenance

Activity #: 1670

1670 includes repairs on the following:

Sign Maintenance - Cantilevers

Sign Maintenance - Truss

Sign Maintenance - Bridge Mount

Sign Maintenance - Span Poles

Sign Maintenance - Steel Breakaway Supports

Sign Maintenance - 6" X 8" Wood Post

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Large Sign Maintenance

Activity #: 1670

Method: Sign Maintenance - Cantilevers

Description/Purpose: Remove or install cantilever base, upright, arms and sign due to accident or maintenance. This activity should be used when an accident has occurred or maintenance is needed and no TWA has been received.

Note: Call Miss Dig if base is to be replaced.

Recommended Crew Size

4 - 5

Material

Cantilever upright and arms

Sign

Arm connection bolts

Sign U-bolts

Anchor bolt nuts and washers

Average Daily Production

1 base OR

1 structure with sign

Equipment

Qty

Code

Description

1

04

Truck mounted crane

1

67

Sign trailer

1

04

Truck mounted aerial device

1

04

Semi tractor

1

67

Semi trailer

1

02

Pickup

1

12

Flashing arrow

Hytorc machine

Optional

1

04

Shadow vehicle with attenuator

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Sign and support installation shall be done in accordance with MDOT Standard Specification for Construction and MDOT Traffic and Safety Division Sign Support Typical Plans.
3. Survey damage site and make recommendations. If needed, inform Region. Region/TSC should be notified in advance if lane/shoulder closure is required.
4. Remove accident-damaged materials.
5. Remove and replace base if required.
6. Install upright and arms.
7. Erect sign.
8. Do hytorc procedure set by Construction and Technology Division.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Large Sign Maintenance

Activity #: 1670

Method: Sign Maintenance - Truss

Description/Purpose: Remove or install truss end supports, boxes and signs due to accident or maintenance. This activity should be used when an accident has occurred or maintenance is needed and no TWA has been received.

Note: Call Miss Dig if base(s) are to be replaced.

<u>Recommended Crew Size</u>		<u>Equipment</u>	
5 - 6		<u>Qty</u>	<u>Code</u>
<u>Material</u>			<u>Description</u>
Anchor bolts		1	04
Re-rod cages		1	67
Concrete		2	04
End supports		2	04
Truss box sections		2	67
New signs		1	02
Stainless steel sign erection hardware		2	12
<u>Average Daily Production</u>			
2 bases OR			
1 structure			
		1	04
			Shadow vehicle with attenuator
<u>Recommended Work Method</u>			
<ol style="list-style-type: none"> 1. Review environmental, training, and safety precautions. 2. Survey damage site and make recommendations. If needed, inform Region. Region/TSC should be notified in advance if lane/shoulder closure is required. 3. Remove signs from truss. 4. Attach spreader bar and hook slings to secure box sections. 5. Detach connecting U-bolts from end supports and lower box sections to ground. 6. Remove end supports. 7. Remove base if required. 8. Reinstall base, supports, truss and signs as needed. 			

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Large Sign Maintenance			Activity #: 1670		
Method: Sign Maintenance - Bridge Mount					
Description/Purpose: Remove or install signs and bridge mount connections from bridges due to accident damage or needed maintenance. This activity should be used when an accident has occurred or maintenance is needed and no TWA has been received.					
<u>Recommended Crew Size</u> 4 - 5		<u>Equipment</u>			
<u>Material</u> Bridge connections New or existing sign Miscellaneous sign hardware		<u>Qty</u>	<u>Code</u>	<u>Description</u>	
		1	04	Truck mounted crane	
		1	67	Sign trailer	
		1	04	Truck mounted aerial device	
		1	02	Pickup	
		1	12	Flashing arrow	
<u>Average Daily Production</u> 1		<u>Optional</u>			
		1	04	Shadow vehicle with attenuator	
<u>Recommended Work Method</u>					
1. Review environmental, training, and safety precautions.					
2. Survey damage site and make recommendations. If needed, inform Region. Region TSC should be notified in advance if lane/shoulder closure is required.					
3. Fabricate (report to appropriate activity).					
4. Remove accident-damaged materials.					
5. Measure and lay out beam for new connections.					
6. Install beam connections.					
7. Install sign.					

Activity Name: Large Sign Maintenance**Activity #: 1670****Method: Sign Maintenance - Span Poles**

Description/Purpose: Remove or install signs and/or poles damaged by accident or in need of maintenance. This activity should be used when an accident has occurred or maintenance is needed and no TWA has been received.

Note: For new installations, Miss Dig should be contacted.

Recommended Crew Size

4 - 5

Equipment**Material**

3/8" span cable

Span erection hardware

Form

Reinforcement rod

Anchor bolts

Concrete

Poles

Qty**Code****Description**

1

04

Truck mounted crane and auger

1

67

Sign trailer

1

04

Semi tractor

1

67

Semi trailer

1

04

Truck mounted aerial device

1

02

Pickup

1

12

Flashing arrow

Optional

1

04

Shadow vehicle with attenuator

Average Daily Production

Installation: 1 - 2

Removal: 3 - 4

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Survey damage site and make recommendations. If needed, inform Region. Region/TSC should be notified in advance if lane/shoulder closure is required.
3. Remove accident-damaged materials.
4. Auger hole.
5. Insert pole or anchor bolt assembly and reinforcement rod cage.
6. Form bolts.
7. Pour concrete.
8. Install poles, spans and signs.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Large Sign Maintenance

Activity #: 1670

Method: Sign Maintenance - Steel Breakaway Supports

Description/Purpose: Installation, removal, maintenance or repair of steel breakaway supports due to accident or needed maintenance. This activity should be used when an accident has occurred or maintenance is needed and no TWA has been received.

Note: For new installations, Miss Dig should be contacted.

Recommended Crew Size

4 - 5

Material

Steel columns
Sonotube
Erection hardware
Steel breakaway stubs
Forms
Reinforcement rod cages
Concrete
Sign
Sign clips

Average Daily Production

4 each for installation
6 each for removal

Equipment

Qty	Code	Description
1	04	Truck mounted crane and auger
1	67	Sign trailer
1	04	Truck mounted aerial device
1	04	Supply truck
1	02	Pickup
1	12	Flashing arrow

Optional

Shadow vehicle with attenuator

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Survey damage site and make recommendations. If needed, inform Region. Region/TSC should be notified in advance if lane/shoulder closure is required.
3. Remove accident damaged materials.
4. Install steel columns; erect sign.
5. For new installations, make proper measurements for stub placement.
6. Auger holes.
7. Insert reinforcement rod cages.
8. Form and set stubs.
9. Pour concrete.
10. Install steel columns and erect sign.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Large Sign Maintenance			Activity #: 1670		
Method: Sign Maintenance - 6" X 8" Wood Post					
Description/Purpose: Installation and maintenance of 6" x 8" wood timbers due to accident or general maintenance. Erection of sign on timbers. This activity should be used when an accident has occurred or maintenance is needed and no TWA has been received.					
Note: For new installations, Miss Dig should be contacted.					
<u>Recommended Crew Size</u> 4		<u>Equipment</u>			
<u>Material</u>		<u>Qty</u>	<u>Code</u>	<u>Description</u>	
6" x 8" timbers and/or sleeves		1	04	Sign truck with aerial tower	
Redi-mix concrete		1	02/03	Pickup truck	
Wood wedges				<u>Optional</u>	
Tar - new/existing sign		1	10	Aerial tower (older units)	
Erection hardware		1	19	Compressor	
Signs		1	04	Crane truck	
Miscellaneous sign material		1	12	Flashing arrow	
		1	04	Truck mounted crane with auger	
<u>Average Daily Production</u>		1	04	Shadow vehicle with attenuator	
Sleeves: 2 - 3 sets					
Post with sign: 2 -3					
<u>Recommended Work Method</u>					
1. Review environmental, timing, and safety precautions.					
2. Region/TSC should be notified in advance if lane/shoulder closure is required.					
3. Remove debris from damaged timbers.					
4. Install new timbers.					
5. Measure for correct bottom height.					
6. Trim timbers.					
7. Erect sign.					
8. Make breakaway cuts 6" below sign.					
9. Wedge timbers for plumb.					
10. Apply tar around sleeve and timber.					
11. Clean area of all debris.					

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Hydraulic Tightening of Anchor Bolts

Activity #: 1671

Description/Purpose: Tighten anchor bolt nuts on cantilever or high mast luminaire using the procedure developed by Construction and Technology.

Recommended Crew Size

2 to 3

Material

Average Daily Production

6 - 9 structures

Equipment

<u>Qty</u>	<u>Code</u>	<u>Description</u>
1	02/03	Pickup or Suburban
1	30	Generator
1	67	Trailer
1	04	Aerial truck
1	12	Flashing arrow
1		Hytorc machine
		Various size links

Equipment may vary depending on availability and operational need.

All MDOT Traffic and Safety policies must be followed for equipment and personnel.

Additional equipment and personnel will increase the cost to perform this activity.

Activity Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Plan work to be done when major traffic flow is on opposite side of the road.
3. At job site, carry htorc machine, link and hand tools to structure.
4. Perform procedure as described by Construction and Technology.
5. Record nut pressure achieved on report.
6. Inspect arm connections for cracked flanges; tighten arm connections.
7. Re-stencil structure.
8. Move on to the next structure and repeat process.
9. Complete all structures on trunkline, ramps, and service roads in the county.
10. Proceed to next county

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Other Sign/Signal Maintenance			Activity # 1690											
Description/Purpose: Other traffic signal maintenance that will not be billed back to the locals. All travel time for this activity should be charged to this activity.														
<u>Recommended Crew Size</u> Varies <u>Material</u> Varies according to task <u>Average Daily Production</u> 8 hours per crew member <u>Measurement</u> <u>Total Hours</u>			<u>Equipment</u> <table><tr><th>Qty</th><th>Code</th><th>Description</th></tr><tr><td>1</td><td>02</td><td>Pick-up</td></tr><tr><td>1</td><td>04</td><td>Bucket and/or cage truck</td></tr></table> <u>Optional</u> Equipment may vary depending on availability and operational need. All MDOT Traffic and Safety policies shall be followed for equipment and personnel. Additional equipment and personnel will increase the cost to perform this activity.			Qty	Code	Description	1	02	Pick-up	1	04	Bucket and/or cage truck
Qty	Code	Description												
1	02	Pick-up												
1	04	Bucket and/or cage truck												
<u>Recommended Work Method</u> <ol style="list-style-type: none">Review environmental, training, and safety precautions.Consult traffic control guidelines and use appropriate traffic control.The method and procedure will vary depending on the type of maintenance being performed. <u>Work Examples:</u> Marking cables at the intersection for a power company for road construction. Reviewing timing permits and plans prior to going out to the intersection to verify correct operation. Perform sign reflectivity inspection. Perform sign support inspection. Photograph, stencil, or inventory signs and sign structures. Building sign brackets not being charged to a job. Equipment and material preparation not chargeable to a job.														

Activity Name: Specialty Fabrication

Activity #: 1691

Activity 1691 includes the following:

Fabrication - Specialty Welding

Fabrication: Re-Rod Cages

Fabrication: Bridge-Mount Supports

Fabrication: Steel Breakaway Supports

Fabrication: Glare Screen Brackets

Flexible Safety Sign Maintenance/Build Up

Activity
Out of Scope

Activity Name: Specialty Fabrication			Activity #: 1691		
Method: Fabrication - Specialty Welding					
Description/Purpose: Fabricate aluminum sign louvers: sheer, band, weld, and paint sheet aluminum. OR Special welding and fabrication for Overhead Signs, Sign Fabrication, Statewide Signal, Construction and Technology, State Police, Motor Carrier Division, Department of Natural Resources and County entities. This activity should be used when an accident has occurred or maintenance is needed and no TWA has been received.					
<u>Recommended Crew Size</u> 1		<u>Equipment</u>			
<u>Material</u> Miscellaneous steel, aluminum or plastic Aluminum filler rod Flat black paint		<u>Qty</u> 1	<u>Code</u>	<u>Description</u> Tig welder Metal shear Metal brake Drill press Various hand tools	
<u>Average Daily Production</u> 8 hours per crew member					
<u>Recommended Work Method</u>					
Review environmental, training, and safety precautions.					
<u>Stop Sign Louvers</u> 1. Cut and bend aluminum to specified size. 2. Shape STOP and YIELD signs to fit per MMUTCL guide book specifications. 3. Weld any pieces. 4. Acid dip/etch pieces after welding. 5. Paint louver flat black.					
<u>Miscellaneous</u> 1. Inspect and finalize needs 2. Set up and lay out for production or single special items or repair of structures. 3. Installation should be done by others or reported to the appropriate activity code for the job.					

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Specialty Fabrication			Activity #: 1691		
Method: Fabrication: Re-Rod Cages					
Description/Purpose: Fabricate re-rod cages for anchor bolt assembly and steel breakaway stubs. Cutting re-rod to specific length and assemble with preformed re-rod spirals by use of templates and tie wire. This activity should be used when an accident has occurred or maintenance is needed and no TWA has been received.					
<u>Recommended Crew Size</u> 1 - 2			<u>Equipment</u>		
<u>Material</u> #6 Re-rod #3 Preformed re-rod spirals Tie wire			<u>Qty</u>	<u>Code</u>	<u>Description</u> Re-rod template Re-rod lengths Spirals Tie wire Various hand tools
<u>Average Daily Production</u> 8 hours per crew member					
<u>Recommended Work Method</u>					
1. Review environmental, training, and safety precautions.					
2. Using plywood templates, form re-rod cages.					
3. Insert pre-formed spirals; tie re-rod with tie wire.					
4. Installation should be done by others or charged to the appropriate activity code for the job.					

Activity Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Specialty Fabrication			Activity #: 1691		
Method: Fabrication: Bridge-Mount Supports					
Description/Purpose: Fabricate bridge mount supports for erecting large and small signs on steel or concrete bridges. Connections are fabricated from either aluminum or steel. This activity should be used when an accident has occurred or maintenance is needed and no TWA has been received.					
<u>Recommended Crew Size</u> 1 - 2			<u>Equipment</u>		
<u>Material</u> Steel angle, various sizes Steel I-beam, various sizes Steel channel, various sizes Aluminum channel, various sizes Aluminum angle, various sizes Welding rod, aluminum and steel			<u>Qty</u>	<u>Code</u>	<u>Description</u> Welders, mig, tig and arc Acetylene torch Drill press Angle grinder Hougan hole punch Various hand tools
<u>Average Daily Production</u> 8 hours per crew member					
<u>Recommended Work Method</u>					
1. Review environmental, training, and safety precautions.					
2. Make field inspection to determine bridge angle of crossing and length of supports needed. Supply this information to the fabricator.					
3. Fabricate connections in accordance with Traffic and Safety Sign Typical Plans.					
4. Fabricated connections are sent to be galvanized.					
5. Completed connections are bolted to bridge, sign is then installed.					

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Specialty Fabrication			Activity #: 1691		
Method: Fabrication: Steel Breakaway Supports					
Description/Purpose: Fabrication of steel breakaway stubs and vertical supports which involves cutting to length and drilling holes for fuse plates, also including welding of slip plates and gussets on verticals and stubs. This activity should be used when an accident has occurred or maintenance is needed and no TWA has been received.					
Note: All steel supports are galvanized by private contractor.					
<u>Recommended Crew Size</u> 1 - 2		<u>Equipment</u>			
<u>Material</u> 8WF13 galvanized steel I-beam 8WF18 galvanized steel I-beam 3/4" x 5" steel flat stock Miscellaneous hardware		<u>Qty</u>	<u>Code</u>	<u>Description</u> Arc welder Plasma cutter Torch set Drill press Band saw Magnetic drill	
<u>Average Daily Production</u> 8 hours per crew member					
<u>Recommended Work Method</u>					
1. Review environmental, training, and safety precautions.					
2. Complete field measurement.					
3. Cut steel to size and shape.					
4. Weld.					
5. Send out to be galvanized.					
6. Installation should be done by others, or reported to the appropriate activity code for the job.					

Activity Name: Specialty Fabrication			Activity #: 1691		
Method: Fabrication: Glare Screen Brackets					
Description/Purpose: Fabrication of connections designed to be placed on top of glare screens or barrier walls to hold small Type I or II signs. This activity should be reported to when an accident has occurred or maintenance is needed and no TWA has been received.					
Note: All steel connections and supports are galvanized by private contractor.					
<u>Recommended Crew Size</u> 1 - 2		<u>Equipment</u>			
<u>Material</u> 1/4" x 10' steel flat stock 3/8" x 6" steel flat stock 2" pipe 2" pipe connectors 2" pipe caps		<u>Qty</u> 1 1 1 1 1	<u>Code</u>	<u>Description</u> Arc welder Plasma cutter Torch set Drill press Band saw	
<u>Average Daily Production</u> 8 hours per crew member					
<u>Recommended Work Method</u>					
1. Review environmental, training, and safety precautions.					
2. Cut, bend and drill steel flat stock to pre-determined shape and size.					
3. Weld pipe connections to flat stock.					
4. Cut and drill sign holes into pipe.					
5. Send out for galvanizing.					
6. Clean threads on pipe for installation in pipe connectors and pipe caps.					
7. Installation should be done by others or charged to the appropriate activity code for the job.					

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Specialty Fabrication			Activity #: 1691								
Method: Flexible Safety Sign Maintenance/Build Up											
Description/Purpose: Repair/maintenance or build up of roll up safety signs and bases.											
<u>Recommended Crew Size</u> 1 - 2 <u>Material</u> Stainless steel pop rivets Various stainless steel bolts, nuts and washers Fiberglass battens <u>Average Daily Production</u> 8 hours per crew member			<u>Equipment</u> <table><tr><td><u>Qty</u></td><td><u>Code</u></td><td><u>Description</u></td></tr><tr><td></td><td></td><td>Various hand tools</td></tr></table>			<u>Qty</u>	<u>Code</u>	<u>Description</u>			Various hand tools
<u>Qty</u>	<u>Code</u>	<u>Description</u>									
		Various hand tools									
<u>Recommended Work Method</u> 1. Review environmental, training, and safety precautions. 2. Fabricate or repair anything that requires it. 3. Assemble parts to be installed on sign on base. 4. Ship finished product.											

Activity Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Tree Trimming		Activity #: 1710	
Description/Purpose: Trimming street or roadside trees for the purpose of removing dead wood, providing clearance and clear vision. All travel time and traffic control for this activity should be charged to this activity.			
<u>Recommended Crew Size</u> 3 - 4 (2 traffic regulators included)		<u>Equipment</u>	
<u>Material</u>		<u>Qty</u>	<u>Code</u>
<u>Average Daily Production</u> 8 hours per person		1	02/03
<u>Measurement</u>		1	12
<u>Total Hours</u>		1	04
		1	10
		1	03
		1	17
		<u>Optional</u>	
		1	12
			Flashing arrow
		Equipment may vary depending on availability and operational need.	
		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.	
		Additional equipment and personnel will increase the cost to perform this activity.	

Activity Out of Scope

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Follow guidelines for tree trimming - see Roadside Operations Study Guide.
3. Check with Region Resource Specialist.
4. Remove dead branches as necessary.
5. Use ropes as necessary to lower large limbs.
6. Chip all brush.
7. Dispose of wood as required.
8. Rake area beneath tree and pick up debris in urban and residential areas.
9. Do not trim oak trees between April 1st and October 1st.

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Vegetation Control		Activity #: 1720	
Description/Purpose: Apply pesticide to control unwanted vegetation. Spray herbicide to cracks along bituminous shoulders.			
Includes these methods:			
A. Guardrail method			
B. Miscellaneous method			
C. Roadside method			
D. Brush Method			
Note: Some Vegetation Control work may be performed by contractors. Contract Vegetation Control is also reported to 1720. Please indicate this by using the appropriate object code when reporting.			
<u>Recommended Crew Size - All Methods</u> 1 - 2 Optional second crew member for traffic regulation		<u>Equipment - All Methods</u>	
<u>Materials - All Methods</u> Spray chemicals		<u>Qty</u>	<u>Code</u>
<u>Average Daily Production</u> 4 acres, walking 50 acres, truck <i>One Acre = 43,560 Sq ft</i> 208.7 x 208.7		1	02/03
<u>Outcome</u> Total Acres		1	59
<u>Calculation</u> Acres per Day = Total Acres ÷ (Total Hours ÷ 8)		<u>Description</u> Truck Sprayer	
		<u>Optional - Guardrail Method</u> 05 Tractor	
		<u>Optional - Roadside Method</u> 1 12 Flattening barrow 1 04 Shadow vehicle and attenuator	
		Equipment may vary depending on availability and operational needs.	
		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.	
		Additional equipment and personnel will increase the cost to perform this activity.	

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. Only applicators certified by the Michigan Department of Agriculture in the proper category may spray.
3. Complete Roadside Spray Log daily.
4. Keep equipment properly calibrated.
5. **A) Guardrail method:**
Spray a 3 to 4 foot swath on vegetation in front of guardrail.
B) Miscellaneous method:
Spray per instructions, i.e. rest areas, shoulders, traffic control islands and any other spray application not covered by another 1720 method.
C) Roadside method:
Spray per instructions, i.e. mowed ROW for selective weed control.
D) Brush Method:
Spray per instructions, i.e. woody vegetation, usually following mechanical cutting.

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Plant Trees

Activity #: 1742

Description/Purpose: Planting balled and burlapped or container-grown trees on the right-of-way including fertilizing, mulching, pruning and staking. All travel time and traffic control for this activity should be reported to this activity.

<u>Recommended Crew Size</u>		<u>Equipment</u>	
3		<u>Qty</u>	<u>Code</u>
<u>Material</u>			<u>Description</u>
Fertilizer		1	04
Mulch		1	22
Staking equipment		1	03
Soil amendments		1	05
<u>Average Daily Production</u>			<u>Optional</u>
-10-20 each (1" - 2" trees)		1	67
5-10 each (2" trees)			Trailer
		Equipment may vary depending on availability and operational need.	
		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.	
		Additional equipment and personnel will increase the cost to perform this activity.	
<u>Recommended Work Method</u>			
1. Review environmental, training, and safety precautions.			
2. Caution: Check with utility companies for buried gas lines, telephone or electric cables, etc. Call Miss Dig			
3. Plant trees as specified in Sections 813 and 917 of the Standard Specifications Manual.			
4. Contact Region Resource Specialist for procedures for planting bare root trees.			

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Retention or Detention Basin Maintenance		Activity #: 1750	
Description/Purpose: Retention/Detention Basin Maintenance consists of inspecting and removing accumulated sedimentation to maintain proper functioning.			
Note: Mowing of retention/detention basin should be charged to activity 1750.			
<u>Recommended Crew Size</u> 2-3	<u>Equipment</u>		
<u>Material</u>	<u>Qty</u> 1	<u>Code</u> 02/03	<u>Description</u> Pickup
<u>Average Daily Production</u> 8 hours per crew member	1	32	Grader
	1	05	Tractor/Backhoe
	1		Mower
	Equipment may vary depending on availability and operational need.		
	All MDOT Traffic and Safety policies shall be followed for equipment and personnel.		
	Additional equipment and personnel will increase the cost to perform this activity.		

Activity Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

Contact your resource staff or appointed region representative if questions arise regarding storm water or soil erosion control and to determine if any permits are required.

1. [Review environmental, training, and safety precautions.](#)
2. Inspect embankments around basin for piping, seepage and settling. Replace eroded material and repair if necessary.
3. Mowing should be conducted annually unless deemed unnecessary upon inspection. Remove all woody growth established on embankments.
4. Check debris racks for litter/debris and clean appropriately.
5. Inspect inlets and outlets for proper functioning and clean or replace as needed.
6. Sedimentation should be removed when built up to one-half the volume of the basin. This allows water to flow through the basin properly in the event of large flows.
7. Spoils may be left on site. Remove all debris from spoils and grade properly in an upland area where the spoils will not enter the basin in the event of a large flow.
8. As required, dress, mulch and seed repaired areas and spoils to prevent erosion. See sections 816 and 917 of the standard specifications.

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Other Forestry		Activity # 1790																		
Description/Purpose: All forestry activities not covered by activities 1200, 1210, 1260, 1270, 1710, 1720, and 1742. All travel time for this activity should be charged to this activity.																				
<p><u>Recommended Crew Size</u> Varies</p> <p><u>Material</u> Varies according to task</p> <p><u>Average Daily Production</u> 8 hours per crew member</p> <p><u>Outcome</u> Total Hours</p>	<p><u>Equipment</u></p> <table> <tr> <th>Qty</th><th>Code</th><th>Description</th></tr> <tr> <td colspan="3">Varies according to task</td></tr> <tr> <th colspan="3">Optional</th></tr> <tr> <td colspan="3">Equipment may vary depending on availability and operational need.</td></tr> <tr> <td colspan="3">All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</td></tr> <tr> <td colspan="3">Additional equipment and personnel will increase the cost to perform this activity.</td></tr> </table>	Qty	Code	Description	Varies according to task			Optional			Equipment may vary depending on availability and operational need.			All MDOT Traffic and Safety policies shall be followed for equipment and personnel.			Additional equipment and personnel will increase the cost to perform this activity.			
Qty	Code	Description																		
Varies according to task																				
Optional																				
Equipment may vary depending on availability and operational need.																				
All MDOT Traffic and Safety policies shall be followed for equipment and personnel.																				
Additional equipment and personnel will increase the cost to perform this activity.																				
<p><u>Recommended Work Method</u></p> <ol style="list-style-type: none"> 1. Review environmental, training, and safety precautions. 2. Consult traffic control guidelines and use appropriate traffic control. 3. The method and procedure will vary depending on the type of maintenance being performed. <p><u>Work Examples:</u> Hand trimming Marking dead trees for cutting Equipment and material preparation not chargeable to a job.</p>																				

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Roadway Inspection		Activity #: 1860							
Description/Purpose: Visual inspection of all state trunklines to locate any potential hazards and/or ensure that none exist.									
Note: Equipment and employee time (including time for preparation of a report) should be reported to this activity.									
<p style="text-align: center;"><u>Recommended Crew Size</u> 1</p> <p style="text-align: center;"><u>Material</u></p> <p style="text-align: center;"><u>Average Daily Production</u> 8 hours per crew member</p> <p style="text-align: center;"><u>Measurement</u> Total Hours</p>	<p style="text-align: center;"><u>Equipment</u></p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; width: 10%;"><u>Qty</u></th> <th style="text-align: center; width: 15%;"><u>Code</u></th> <th style="text-align: left; width: 75%;"><u>Description</u></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">02/03</td> <td>Pickup</td> </tr> </tbody> </table> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>			<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	02/03	Pickup
<u>Qty</u>	<u>Code</u>	<u>Description</u>							
1	02/03	Pickup							
<p style="text-align: center;"><u>Recommended Work Method</u></p> <ol style="list-style-type: none"> 1. Review environmental, training, and safety precautions. 2. Use of the Highway Condition Report (form 415) to record road inspection is recommended. Do not list routine maintenance work that needs to be scheduled. Refer to form 415 for checklist of inspection items. 3. Check county roads intersecting state trunklines for "Stop Ahead" signs screened by brush, foliage, or tree branches. 									

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Permits		Activity #: 1880							
Description/Purpose: All time and equipment used by personnel while performing any permit inspection or logging of permits.									
<div><div><u>Recommended Crew Size</u></div><div>1</div><div><u>Material</u></div><div><u>Average Daily Production</u></div><div>8 hours per crew member</div><div><u>Measurement</u></div><div>Total Hours</div></div>		<div><div><u>Equipment</u></div><table><tr><th><u>Qty</u></th><th><u>Code</u></th><th><u>Description</u></th></tr><tr><td>1</td><td>02/03</td><td>Pickup</td></tr></table><div>Equipment may vary depending on availability and operational need.</div><div>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</div><div>Additional equipment and personnel will increase the cost to perform this activity.</div></div>		<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	02/03	Pickup
<u>Qty</u>	<u>Code</u>	<u>Description</u>							
1	02/03	Pickup							
<div><div><u>Recommended Work Method</u></div><div>Review environmental, training, and safety precaution.</div><div>Examples of work to be reported to activity 1880, Permits:</div><div><div>1. Observing work done at a permit site.</div><div>2. Filling out and filing inspection reports.</div></div></div>									

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Inspection & Oversight of Maintenance Contract Work		Activity #: 1900							
Description/Purpose: Work performed by a highway maintenance employee to inspect and oversee contracted maintenance work done by a local government agency and/or vendor. Note: Inspection and oversight of projects by maintenance should be recorded under activity 5313 with a project number.									
<u>Recommended Crew Size</u> Varies <u>Material</u> <u>Average Daily Production</u> 8 hours per crew member <u>Measurement</u> Total Hours		<u>Equipment</u> <table><tr><td><u>Qty</u></td><td><u>Code</u></td><td><u>Description</u></td></tr><tr><td>1</td><td>02/03</td><td>Pickup</td></tr></table> <u>Optional</u> Equipment may vary depending on availability and operational need. All MDOT Traffic and Safety policies shall be followed for equipment and personnel. Additional equipment and personnel will increase the cost to perform this activity.		<u>Qty</u>	<u>Code</u>	<u>Description</u>	1	02/03	Pickup
<u>Qty</u>	<u>Code</u>	<u>Description</u>							
1	02/03	Pickup							
<u>Recommended Work Method</u> <u>Review environmental, training, and safety precautions.</u> Examples of work that could be reported as inspection/oversight of maintenance contract work: <ol style="list-style-type: none">1. Roadside mowing2. Curb sweeping3. Catch basin clean out4. Rest area janitorial and lawn maintenance5. Guardrail6. Any sub-contracted maintenance projects.7. Local government agency contracts8. Brush and Tree Cutting Tasks: <ol style="list-style-type: none">1. Review contract language, i.e. progress report, specifications, location of work.2. Review requirements of contract, i.e., safety, equipment, maintaining traffic.3. Document contractor/vendor work progress.4. Report to supervisor/team leader.									



FAMS Attachment B: Maintenance Activity Guides

Activity Name: Weigh Station Maintenance		Activity #: 1940	
Description/Purpose: Perform routine, reactive, preventive, and emergency maintenance and repairs to weigh stations. MDOT is responsible for maintaining all weigh station areas <u>outside</u> of the building footing line. All maintenance <u>inside</u> the building footing line is performed by the Michigan State Police. Some weigh station maintenance activities (e.g. electrical sign or high overhead parking light maintenance/repair) may be performed by special crews.			
<u>Recommended Crew Size</u> 1 - 6			<u>Equipment</u>
<u>Material</u>	<u>Qty</u>	<u>Code</u>	<u>Description</u>
<u>Average Daily Production</u> 8 hours per crew member	1-3	02/03	<u>Optional</u> Truck or van and tools Power tools Rotary lawn mower String trimmer
<u>Outcome</u> Total Hours	1 1		
Equipment may vary depending on availability and operational need.			
All MDOT Traffic and Safety policies shall be followed for equipment and personnel.			
Additional equipment and personnel will increase the cost to perform this activity.			

Activity Out of Scope

Recommended Work Method

[Review environmental, training, and safety precautions.](#)

Examples of work that should be reported to activity 1940, Weigh Station Maintenance include:

1. Footing drain outlets
2. Installing new water lines
3. Installing septic fields
4. Signal and light repair
5. "Open/Closed" sign repair
6. Sign replacement
7. Guardrail maintenance/repair
8. Shoulder maintenance
9. Re-paving
10. Concrete patching
11. Joint repair
12. Mowing
13. Tree maintenance
14. Ice and snow removal
15. High overhead parking lights
16. Electrical signs

Activity
Out of Scope

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Training (Maintenance)		Activity #: 1960																													
Description/Purpose: To obtain knowledge and skills to enhance job performance (competencies). Charge time and equipment to this activity.																															
<div style="text-align: center;"><u>Recommended Crew Size</u></div> <div style="text-align: center;">1</div> <div style="text-align: center;"><u>Material</u></div> <div style="text-align: center;"><u>Average Daily Production</u></div> <div style="text-align: center;">8 hours per crew member</div> <div style="text-align: center;"><u>Measurement</u></div> <div style="text-align: center;"><u>Total Hours</u></div>	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;"><u>Equipment</u></th> </tr> <tr> <th style="text-align: center;"><u>Qty</u></th> <th style="text-align: center;"><u>Code</u></th> </tr> </thead> <tbody> <tr> <td></td> <td style="text-align: center;"><u>Description</u></td> </tr> <tr> <td></td> <td style="text-align: center;"><u>Optional</u></td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">03</td> </tr> <tr> <td></td> <td style="text-align: center;">pickup truck</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">04</td> </tr> <tr> <td></td> <td style="text-align: center;">Salt truck</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">67</td> </tr> <tr> <td></td> <td style="text-align: center;">Trailer</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">05</td> </tr> <tr> <td></td> <td style="text-align: center;">Tractor</td> </tr> <tr> <td style="text-align: center;">1</td> <td style="text-align: center;">38</td> </tr> <tr> <td></td> <td style="text-align: center;">Loader</td> </tr> </tbody> </table> <p>Equipment may vary depending on availability and operational need.</p> <p>All MDOT Traffic and Safety policies shall be followed for equipment and personnel.</p> <p>Additional equipment and personnel will increase the cost to perform this activity.</p>			<u>Equipment</u>		<u>Qty</u>	<u>Code</u>		<u>Description</u>		<u>Optional</u>	1	03		pickup truck	1	04		Salt truck	1	67		Trailer	1	05		Tractor	1	38		Loader
<u>Equipment</u>																															
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1	05																														
	Tractor																														
1	38																														
	Loader																														
<div style="text-align: center;"><u>Recommended Work Method</u></div> <ol style="list-style-type: none"> 1. Review environmental, training, and safety precautions. 2. Training is usually conducted in a formal classroom setting. However, it is not limited to the classroom only. 3. Includes all training to improve employee performance (competencies) and development. <p>Note: Charge all time spent at truck driving school and other similar training activities to this activity.</p>																															

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Emergency Response		Activity #: 1970	
Description/Purpose: Non-routine maintenance activities provided in initial response to situations caused by non-MDOT entities and “acts-of-God.” This response is needed to ensure the safety of the motoring public and uninterrupted highway operations.			
<u>Recommended Crew Size</u> As needed		<u>Equipment</u>	
<u>Material</u> As needed		<u>Qty</u>	<u>Code</u>
<u>Average Daily Production</u> As needed		<u>Description</u> As needed	
<u>Outcome</u> Total Hours		<u>Optional</u> As needed	
		Equipment may vary depending on availability and operational need.	
		All MDOT Traffic and Safety policies shall be followed for equipment and personnel.	
		Additional equipment and personnel will increase the cost to perform this activity.	

FAMS Attachment B: Maintenance Activity Guides

Recommended Work Method

1. [Review environmental, training, and safety precautions.](#)
2. When practical, set up needed traffic control per the MDOT Maintenance Guidelines for Work Zone Traffic Control.
3. Transport needed labor, equipment and material to incident site and set up as directed. Perform initial response as needed. Follow-up work should be charged to appropriate activity.
4. Ensure proper notification and communication per Region Emergency Response Plan.
5. Remove all equipment and material, as needed, when incident response is completed.
6. Complete all reports/forms per Region Emergency Response Plan.

Work Examples

INITIAL RESPONSE TO:

High load hits

Release of hazardous materials

Emergency cleanup from accidents or storms (see note below)

Emergency sweeping of debris caused by accidents or storms (see note below)

Local or region wide power outages

Terrorist attacks

Fatality investigation conducted by law enforcement agencies

Note: Keep appropriate documentation for worker and equipment time expended as a result of severe storm or accident damage in case of insurance claim or emergency federal fund requests.

FAMS Attachment B: Maintenance Activity Guides

Activity Name: Adopt-A-Highway		Activity #: 7950	
Description/Purpose: Any activity supporting the Adopt-A-Highway program should be reported to activity 7950. Examples for activities to be reported to this activity are listed below.			
Note: Litter pickup and disposal which is not part of Adopt-A-Highway must be coded to activity 1240, Litter Pickup.			
<u>Recommended Crew Size</u> Varies depending on task	<u>Equipment</u>		
<u>Material</u> Varies depending on task	<u>Qty</u>	<u>Code</u>	<u>Description</u>
	1	04	Truck
			<u>Optional for Metropolitan areas</u>
<u>Average Daily Production</u> Varies depending on task	1	02/03	Dump
	1	12	Flashing arrow
	1	04	Truck with attenuators
<u>Recommended Work Method</u>			
Review environmental, training, and safety precautions. -			
Examples of Adopt-A-Highway activities include, but are not limited to:			
<div>1. Labor and equipment to remove Adopt-A-Highway litter bags and items retrieved from the roadside during Adopt-A-Highway pickup dates. Follow work methods listed in activity 1240, Litter Pickup.</div> <div>2. Landfill charges to dispose of Adopt-A-Highway litter bags and items retrieved from the roadside during Adopt-A-Highway pickup dates.</div> <div>3. Sign fabrication labor, equipment, and materials for Adopt-A-Highway signs.</div> <div>4. Sign installation labor, equipment, and materials required for Adopt-A-Highway signs.</div> <div>5. Administrative costs relating directly to the Adopt-A-Highway program, including printing and materials.</div>			

Performance Based Maintenance

Michigan Maintenance Rating System Handbook



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1. INTRODUCTION

The Michigan Department of Transportation (MDOT) is in the process of implementing Performance Based Maintenance (PBM) for managing and maintaining highways to improve efficiency in the preservation the State of Michigan's (or "the State") roads and bridges.

PBM is a proven method employed to make maintenance decisions by focusing on performance outcomes rather than a traditional focus on time and material inputs. PBM helps optimize resource allocation for the management, operation, preservation, and enhancement of transportation infrastructure. A performance based approach will also leverage the strengths of the different maintenance Service Providers – including MDOT direct forces, contract agencies (i.e., municipalities/counties) and private contractors – to increase efficiency, improve performance, and better manage costs of maintenance activities.

Benefits of PBM

Implementing PBM has been demonstrated to provide many benefits through the realization of improved, sustainable maintenance outcomes that are important to both citizens at large as well as the users of the highway system. PBM is inherently structured to help optimize the value achieved for the money spent on maintaining infrastructure over the long-term as well as providing consistent service levels. Through the implementation of PBM, the public should be able to benefit from:

- More consistent levels of service related to highway network performance and travel reliability;
- Routine achievement of highway condition and desired "outcomes";
- Enhanced transparency and accountability from both MDOT and Service Providers; and
- Improved value for money of tax dollars through time and/or cost savings.

The Role of the Michigan Maintenance Rating System in PBM

In the move to a PBM environment, it is important to understand the Level of Service (LOS) currently being delivered. When reporting the LOS and employing it as the basis for maintenance decision-making, there needs to be comparability at a State, Region, or County level. The introduction of a maintenance rating system will provide this comparable and consistent LOS measure. It will then enable those responsible for maintenance service delivery to:

- Help ensure that maintenance is targeting the right areas and that a road user is receiving a consistent LOS;
- Identify opportunities for innovation, where maintenance teams can learn from their peers when leading practice is identified; and
- Form the basis for discussions about performance, and the identification of opportunities to increase efficiency.



2. OVERVIEW

The development of a Statewide Maintenance Rating System for highway maintenance activities is intended to support the consistent assessment and reporting of performance measures and Levels of Service (LOS). It is an important aspect of MDOT's PBM development, implementation, and, ultimately, overall success, as it provides an outcome focus for highway maintenance activities.

The Michigan Maintenance Rating System process does not replace existing Quality Assurance / Quality Control (QA/QC) procedures – which are intended to verify the quality of work undertaken and compliance with specifications – but is intended to work in concert and in parallel with the QA/QC procedures. As an example of the separation between the two functions, the Michigan Maintenance Rating System process is designed to detect the scale and nature of defects present on the network. The QA process, by contrast, will verify that the defect repairs have been undertaken appropriately as defined by the specified and recommended work methods, appropriate processes were followed, and the correct materials were used in performing the repair work.

This process is designed to assess and compare the maintenance effectiveness of Service Providers responsible for the State Trunkline Network by providing a snapshot of the system using a random sample. This is not intended to provide a detailed review of the condition or a complete picture of the functionality of the various assets, but the results can be used to report the general change in maintenance effectiveness based on a road user's perspective and in line with the maintenance priorities of the Department.

This document defines the Michigan Maintenance Rating System and is divided into sections regarding:

- a) an overview
- b) procedures
- c) the measures themselves.

Please Note:

The Maintenance Rating System excludes winter maintenance, bridge maintenance, and response time – driven performance measures.



3. RATING SURVEY PROCEDURES

3.1. Planning

Planning the survey includes establishing the frequency, timing, scope, segmentation, and sample size based on desired level of confidence of survey results.

3.1.1 Timing

The rating survey will be carried out during the non-winter period only (i.e., between April and October), which provides a period of seven months for rating surveys. Two surveys are planned for this period a post-winter and a pre-winter survey (approximately May and October). The post-winter survey will be important for benchmarking the network performance following winter.

3.1.2 Frequency

Scheduled Sample Period

A period of five days per survey for a two person rating team operating within a Transportation Service Center (TSC) is the expected level of effort required.

As Required

Occasionally, a survey of a particular section of roadway (e.g., a roadway adjacent or leading to a popular tourist attraction) will be requested. Other occasions will require surveys for a particular facility type (e.g., Urban Limited Access), by individual section, by a grouping of sections, by County, by maintenance area or any combination of facility types by sections, counties, maintenance areas, districts or Statewide. In most instances, priorities and completion dates will be assigned to these additional requests, possibly requiring some adjustment to existing and other workloads.

3.1.3 Scope and Consistency

It is important to maintain consistency in delivery of the rating survey. While there are differences (in size, population, traffic, etc.) between Regions, TSCs, and Counties, the survey scope itself will be consistent across MDOT. The same performance measures (which number just over 20) will be employed across MDOT and are grouped into three categories: Roadway, Roadside, and Traffic Safety Services. Operational areas that are not covered in the survey are winter maintenance, routine bridge maintenance, or any measures that include response times. The current format of the rating survey means that response times are not able to be monitored. This may change through future development of the system.

Each measure should be evaluated on its own merits, and as such, each segment will be given a score based on the average of passing measures. For example, a newly rehabilitated pavement may score perfectly in the pavement categories, but could still have a damaged sign or blocked culvert, thus bringing the overall score down. Note that the average segment score does not include any measures that did not occur within the segment (marked as N/A on the survey rating).

3.1.4 Segment Size

The 0.5 mile section has been selected for the maintenance rating survey in order to be consistent with previous MDOT processes.

3.1.5 Level of Confidence

A confidence level (a measure of the reliability of an estimate) refers to the percentage of all possible samples that can be expected to accurately reflect the population. Based on these procedures, the expected level of confidence was set at approximately 90 percent at the TSC level for each rating period. This will give a greater level of confidence (≈95 percent) at the Regional level, and about 75 percent at the County level (assuming ≈45 segments per County). The level of confidence could be increased as surveys are conducted more efficiently, allowing a greater number of segments to be completed during the same period of time.

3.1.6 Sample Size

Each TSC should rate 135 segments per rating period (approximately 45 segments per County, assuming three counties per TSC). Except for Taylor and Detroit TSC, which will have 135 segments total for Wayne County per rating period.

3.2 Survey Resources

Each TSC will undertake a monitoring survey of approximately five days (five days for a team of two people) two times over the non-winter period. This level of effort is based on wanting to help ensure that each County is sampled at least once in each season. Applying a consistent amount of monitoring within each TSC will provide a consistent confidence level in the results provided at the TSC level and above. This will enable a fair performance comparison at each of the TSC and Regional levels.

TSC sizing and the proportion of Counties and their characteristics differs significantly within Michigan. Metro Region has three Counties, four TSCs, and a high intensity urban network whereas Superior Region has three TSCs with five Counties in each and a lower intensity of traffic. Each of these differing profiles with respect to TSCs, Counties, and traffic will mean that the reporting level of confidence will vary while the rating survey setup and required level of input and effort will not. One way to neutralize these differences would be to establish and support survey resources on a regionwide basis such that rating at a County level is carried out and reported at a consistent frequency across the State.

3.3 Survey Sample Selection

The Michigan Maintenance Rating System utilizes the Michigan Geographic Framework to segment the State trunkline network into discrete, 0.5 mile lengths; this list will need to be periodically regenerated based on changes to the Framework. The samples are developed by applying a random number generator to produce the locations to be surveyed.

3.4 Survey Sample List

A list of 135 segments will be sampled in each TSC, per rating period, with approximately 45 segments per County sampled. A minimum number of segments will be generated based on the

percentage of centerline miles in a county within a region. This will ensure an adequate representation of each of the counties during a survey.

3.5 Data Collection

3.5.1 Crew Organization and Responsibilities

A Michigan Maintenance Rating System survey team will be composed of a minimum of two persons. Each TSC will be responsible for implementing and maintaining the Maintenance Rating Program.

It is mandatory that the Michigan Maintenance Rating System survey team's first responsibility be safety – the safety of both the pedestrian and motoring public as well as themselves. On occasion, it may be necessary to schedule the survey of those samples with high traffic density during low traffic periods to provide proper safety. It may become necessary to request a safety crew (flag persons, cones, signs, arrow board) from the maintenance area in which the survey is taking place, though this rating program is generally intended to be conducted as a windshield survey. As required, the survey team shall walk together, facing traffic, as they evaluate each sample. Facing traffic is for safety of the survey team, and walking together is to prevent missing items that might be overlooked by one person and to permit accurate measurements.

In general, static traffic control should not be required for the Michigan Maintenance Rating System as the team should not be stopped in place for more than a few minutes. When given the list of sample segments, and prior to leaving for the field, the rating crew should plan their route as efficiently as possible.

3.5.2 Training

Initial training for the implementation of the Michigan Maintenance Rating System occurred during 2015 for all staff identified by the regions. Additional training for new staff or refresher training can be provided for future rating periods. These trainings can be set up formally with statewide staff or provided through peer-to-peer training from experienced staff within a region who have previously been and trained on performing the survey ratings. These opportunities for training and refreshers will help ensure consistent ratings across all classes of roadway and in all areas of the State.

3.5.3 Equipment and Supplies

The following is a list of equipment and supplies for the efficient and safe collection of the survey data:

- Copy of *Michigan Maintenance Rating System* handbook and quick sheet
- MDOT-approved personal protective equipment
- Flashing amber lights for vehicle roof
- Mobile device with ESRI Collector for ArcGIS app
- Mobile device chargers
- Probe/Survey rod for measuring depth.
- Tape measure for measuring
- Back-up paper copies of the rating sheet

3.5.4 General Notes

- Rate all features that have a corresponding performance measure.
- Rate from right-of-way (ROW) to ROW or ROW to center of median/drainage ditch/barrier wall as appropriate for divided roadways.
- Both directions of an undivided roadway may need to be driven unless all measures have been successfully rated.
- Special rating areas (e.g., gore areas, rest areas, weigh stations, median crossovers, or turnarounds) may be required at the request of the TSC or Region.
- Do not rate items owned by private interests (e.g., advertising signs).
- A sample segment is 0.5 miles or 2,640 feet in length.
- Rating of segments should be performed at a maximum driving speed of 25 mph.

3.6 Coding Instructions

3.6.1 General Information

ESRI Collector for ArcGIS is an application for mobile devices that will be used for this Performance Rating program. For detailed instructions on how to collect MiMRS data, see the resource document **“Using ArcGIS to Collect MiMRS Data May 2015”** located on the PBM SharePoint site.

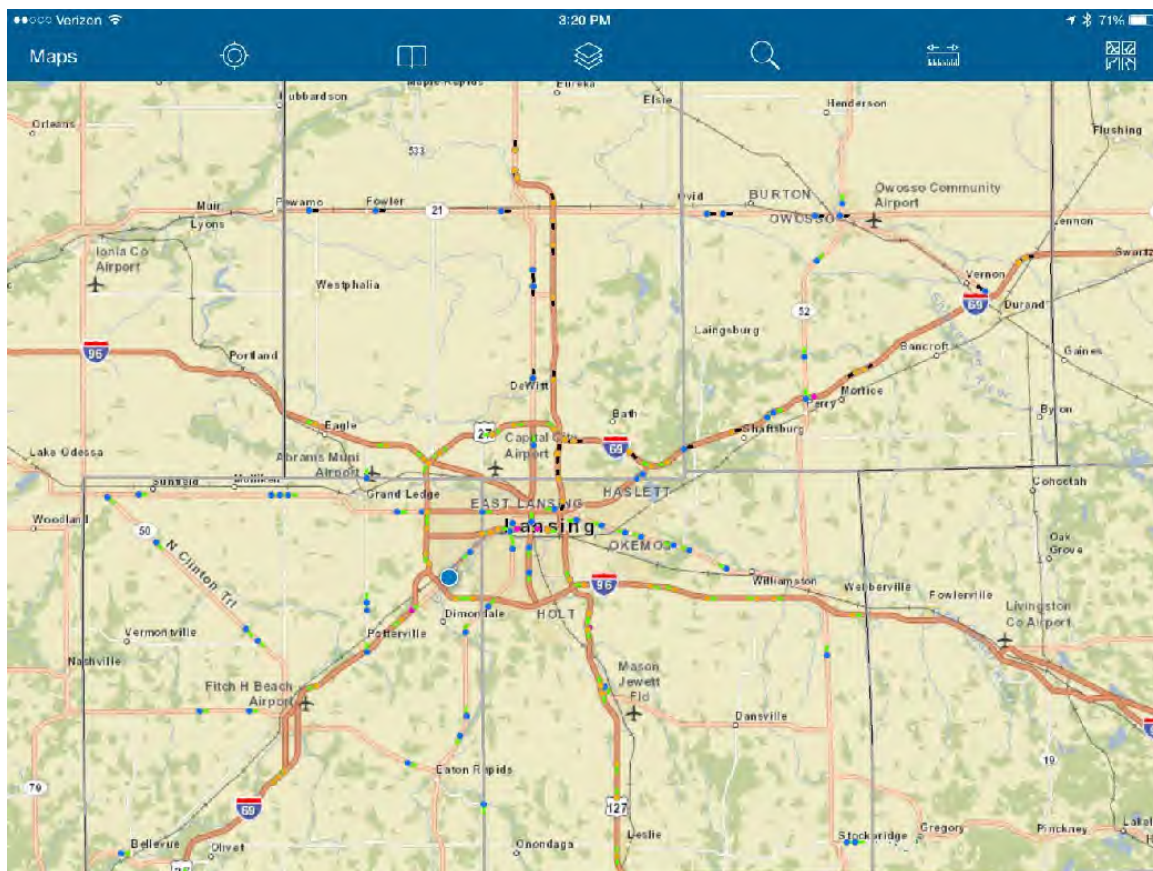


Figure 1 – ESRI Collector: Segment Overview

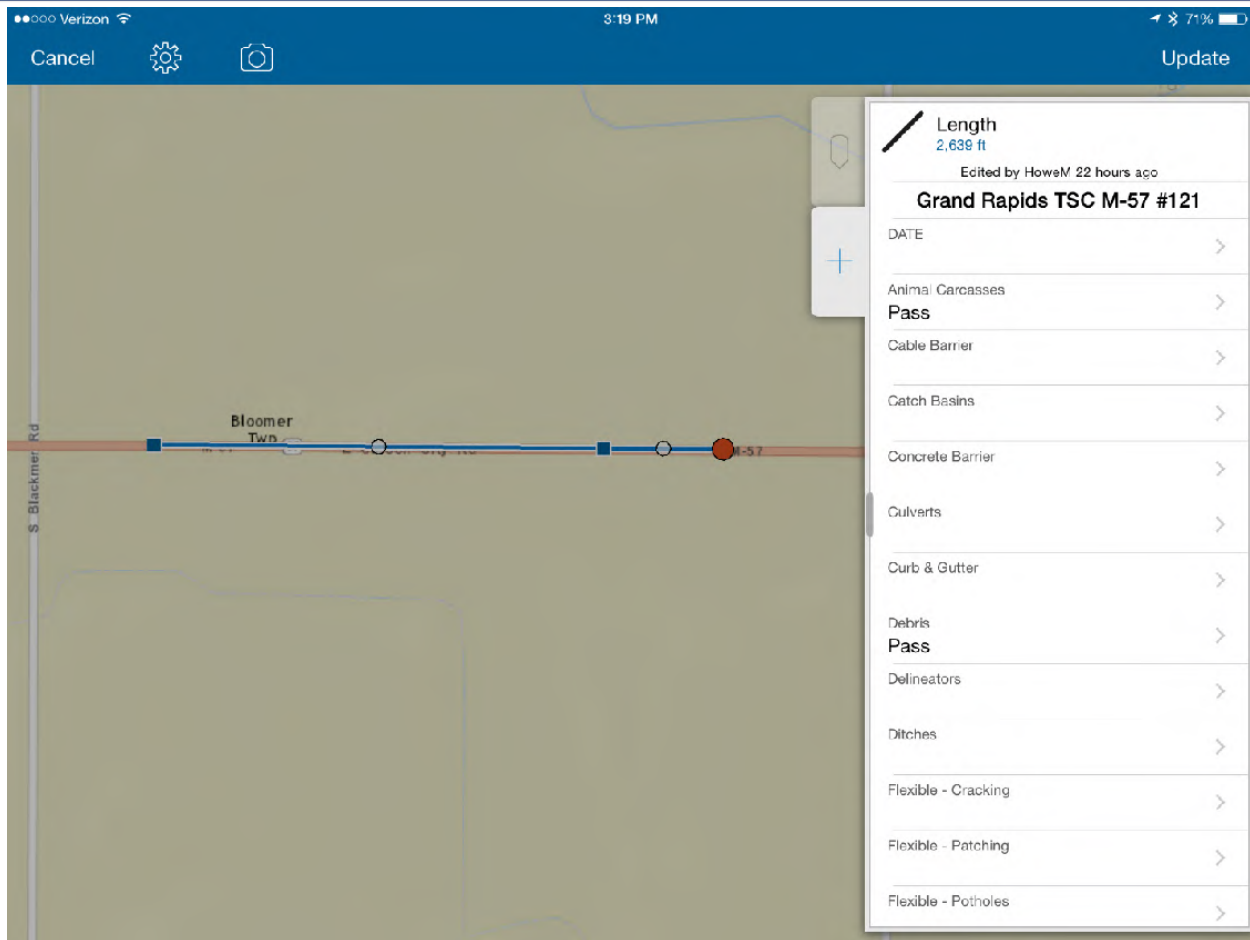


Figure 2 – ESRI Collector: Segment Ratings

3.6.2 Coding Instructions

Each performance measure may be rated as Pass, Fail, or No Value (blank) with No Value as the default option¹. Refer to the guide to Using ArcGIS to Collect MiMRS for step by step instructions on rating segments. Some **Coding Tips** based on feedback from 2015 surveys include:

- Apply a rating to each measure the first time it is encountered in the segment and update only if/when the subsequent assets change from Pass to Fail.
 - Example: the signing measure would remain No Value (Blank) until the first sign is encountered and given a Pass or Fail rating. If the first sign fails the measure, then subsequent signs would not change the measure. If the first sign passes, the rating would stay at Pass until the first failing sign (if present within a segment) at which time the measure would be changed to Fail.
- If a generated segment lands in an area currently under construction do not rate any of the measures and mark the segment as **"Work Zone"**

¹ Certain performance measures, such as *Debris*, *Litter*, *Sweeping*, or *Animal Carcasses*, can only **Pass** or **Fail**. Their default is **Pass**.

- Make sure at least one of the members of the survey team can see the entire length of the segment on the GIS map. This may require zooming to the extent of the segment prior to selecting the segment for rating.
- For areas with known cell connectivity issues it is recommended to download the map to the mobile collection device prior to the survey rating day. Detailed instructions can be found in the guidance document “ArcGIS Downloading Map to Device” located in the MiMRS Resources section of the PBM SharePoint Site.

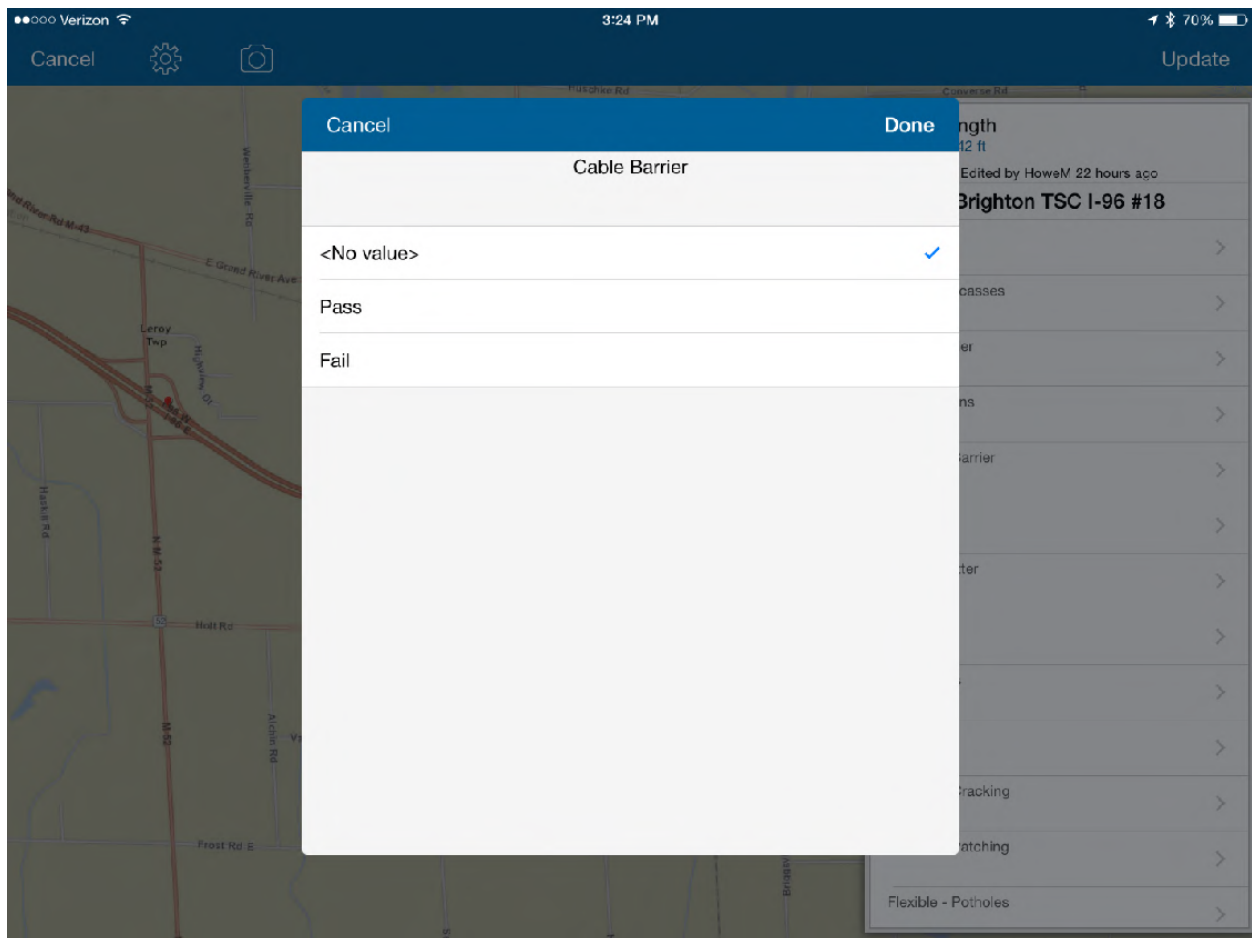


Figure 3 – ESRI Collector: Performance Measure Rating Selection

3.6.3. Performance Measures Coding Notes

Pass/Fail Only Measures

There are some performance measures that are required to be evaluated for all survey segments regardless of other factors. These measures are automatically populated with only Pass/Fail as rating options and the default is Pass; No Value is not an option.

The Pass/Fail Only measures include:

- Animal Carcasses
- Debris
- Litter
- Sweeping

Pavement Measures

When rating any of the pavement performance measures (either Rigid or Flexible) all measures for the type of pavement within a survey segment should be evaluated. This means that if pavement type is Flexible in a segment, then Cracking, Patching and Potholes all need to have either a Pass or Fail rating. The same goes for Rigid pavement. If a segment contains both Flexible and Rigid pavement then all six pavement measures need to be rated with either a Pass or Fail rating. There should never be a No Value rating within a pavement measure if it occurs in a segment.

Segment Rating Completion

Once the survey team has reached the end of a segment and rated all of the measures present in the segment the rating can be completed in the ESRI Collector app. Prior to selecting the Mark Complete option for the segment, the survey team should pause to verify the validity of each of the ratings. Once there is agreeance within the team, the segment can be completed.

3.7 Rating Consistency QA/QC Process

3.7.1 Quality Assurance (QA)

Statewide Quality Assurance checks of the regions' MiMRS rating will be performed for each of the rating periods. At least 5% of the segments rated by a TSC/Region will be selected for an independent rating review. The results of the QA review will be compiled, analyzed and shared with the respective regions for discussion. This statewide level QA review will enabled continued improvements in consistency of measure ratings across the state.

3.7.2 Quality Control (QC)

Each of the regions must develop a Quality Control process for evaluating the consistency of measure ratings within their region area. The details of the QC process may vary by region, but it is recommended that the process be discussed with the Statewide Performance Based Maintenance Engineer to ensure an adequate review occurs. The region QC process will help align each of the TSC areas within a region and ensure further consistency with the statewide view on rating measures.

4. ROADWAY MEASURES

4.1 Flexible/Composite Pavement

Flexible pavements are composed of Hot Mix Asphalt (HMA); composite pavements are generally HMA over concrete. The following measures are to be assessed:

- a) Flexible – Cracking
- b) Flexible – Patching
- c) Flexible – Potholes.

Evaluation Considerations:

- Determine the general condition of the pavement. A flexible pavement in good condition would be stable, with no cracking, no patching, no deformation, and have excellent riding qualities.
- All flexible and composite pavements within the limits of the rating section should be evaluated, excluding crossovers; ramps are to be rated separately (if a section is generated).
- Ramp gore areas should be included to the outside edge of the gore. Driveways abutting a rating section should be excluded.
- Cracks with isolated areas wide enough for patching (more than just sealing with rubber) would fail both cracking and pothole measures.
- If no longitudinal joint is present at the edgeline, then rate the narrow paved area outside of the lane as pavement and not shoulder.
- A delamination of a microsurfaced (or other thin) overlay, which could not be patched using traditional methods, should not be counted as a pothole.

Performance Measures:

Measure	MiMRS Non-Compliance
Flexible – Cracking	Greater than one (1) inch in width.
Flexible – Patching	Broken up areas larger than 30 square feet.
	Broken up areas greater than (or equal to) than one-half (1/2) of a travel lane.
Flexible – Potholes	Potholes greater than two (2) inches in depth.
	Potholes greater than 0.5 sq. ft. in area.
	Potholes exceeding the top lift of HMA.
	Any base material is exposed in any pothole, regardless of depth or area.

Cracking Examples

This pavement has significant cracking, but has been patched and should meet the performance measure.



This pavement has a wide crack which is improperly patched.

Patching Examples

This pavement has a large broken up area where the patch is failing.



This pavement has a large broken up area.

Pothole Examples

This pothole is greater than 2 inches in depth and more than 0.5 sq. ft in area.



This micro surface delamination is greater than 0.5 sq. ft in area, but is not fixable by traditional means and is therefore not a failure.

4.2 Rigid Pavement

Rigid pavement is composed of Portland Cement Concrete (PCC).

- a) Rigid – Cracking
- b) Rigid – Patching
- c) Rigid – Potholes

Evaluation Considerations:

- Determine the general condition of the pavement. A rigid pavement in good condition has good ride qualities with the original surface texture evident. Jointed reinforced pavements should have no mid-slab cracks. Continuously reinforced pavements may have tight transverse cracks with no evidence of spalling. No faulting should be evident.
- All rigid pavement within the limits of the rating section should be evaluated, excluding crossovers; ramps are to be rated separately.
- Rigid pavement overlaid with asphalt should be rated under the flexible pavement characteristics.
- Ramp gore areas should be included to the outside edge of the gore. Driveways abutting a rating section should be excluded.
- Bridge surface is included in the rigid pavement rating
- Cracks with isolated areas wide enough for patching (more than just sealing with rubber) would fail both cracking and pothole measures.
- If no longitudinal joint is present at the edge line then rate the narrow paved area outside of the lane as pavement and not shoulder.

Measure	MiMRS Non-Compliance
Rigid – Cracking	Greater than one (1) inch in width.
Rigid – Patching	Broken up areas larger than 30 square feet.
	Broken up areas greater than (or equal to) than one-half (1/2) of a travel lane.
Rigid – Potholes	Potholes greater than two (2) inches in depth.
	Potholes greater than 0.5 sq. ft. in area.
	Any base material is exposed in any pothole, regardless of depth or area.

Cracking Examples

This crack in this pavement is several inches in width.



This longitudinal crack is greater than one inch wide and could pose a significant hazard.

Patching Examples

This pavement has a large broken up area.



This pavement has a large broken up area where the patch has failed.

Pothole Examples

This pothole is greater than 0.5 sq. ft and greater than 2 inches in depth.



This pothole has been properly filled.

4.3 Shoulders

Shoulders may be made of HMA, PCC, aggregate, or a combination of materials.

- Washouts
- Drainage
- Drop-offs
- Edge loss

Evaluation Considerations: Determine the general condition of the shoulder.

- Paved shoulders less than two (2) feet in width should be included in the adjacent pavement rating if no joint separates this area from the travel lane. Pavement under a guardrail, but contiguous to the adjacent shoulder, should be rated as part of the shoulder evaluation.
- A berm of soil or grass (greater than two inches) which prevents proper drainage is a preventable condition that would result in a non-compliance. A berm under guardrail is a shoulder non-compliance, and should not be counted against guardrail.
- Pavement between the edge line and a parking lane or curb & gutter is considered shoulder if greater than 2 feet
- Any drop-off outside the edge line should be considered a shoulder failure.
- Raised pavement behind the curb and gutter (maintenance strip) should be rated as a shoulder
- When determining if the length of edge loss or edge drop constitutes a failing measure ask the following questions:
 - Does the issue initiate maintenance action?
 - Is it a safety issue?
 - Is the occurrence so small that it would not be considered an issue?

Measure	MiMRS Non-Compliance
Shoulders	Any washout greater than two (2) inches in depth or greater than ten (10) sq. ft. in area.
	Any preventable condition either high or low by two (2) inches or more that impede the shoulder drainage to function as designed i.e. the free flow of water off the pavement.
	Edge loss greater than six (6) inches inward, or comprising more than ten (10) percent of the length of the segment.
	Any drop-off exceeding two (2) inches in depth.
	Any base material is exposed in any pothole, regardless of depth or area (in paved shoulders).

Shoulder Examples



This edge drop is greater than two inches in depth.



The overburden behind this shoulder would prevent runoff from reaching the ditch.



This shoulder has washed out, resulting in a severe drop off.



This shoulder shows significant edge loss over the length of the segment.



Shoulder berm under guardrail



This shoulder has washed out resulting in edge loss and a severe drop off.



This shoulder has a significant berm affecting drainage.

4.4 Catch Basins

Collect water from the roadway and shoulders for transport to the storm water drainage system. These are typically constructed with concrete, steel, or plastic; routine maintenance typically required:

- Repair damaged sections
- Cleanout.

Evaluation: Determine the general effectiveness of the catch basins.

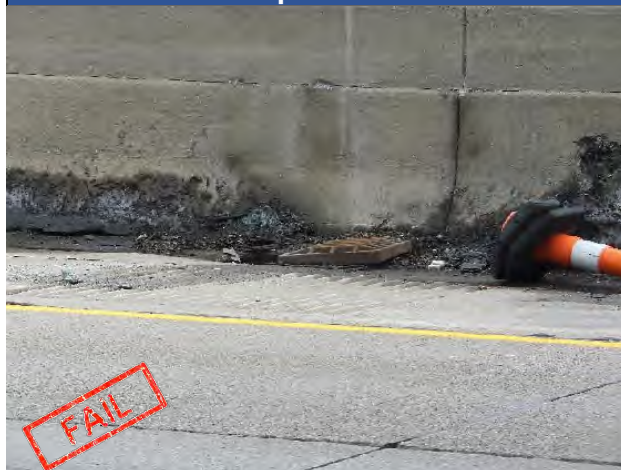
What to look for:

- Catch basins, manholes, and inlets under MDOT jurisdiction should be evaluated for their effectiveness.

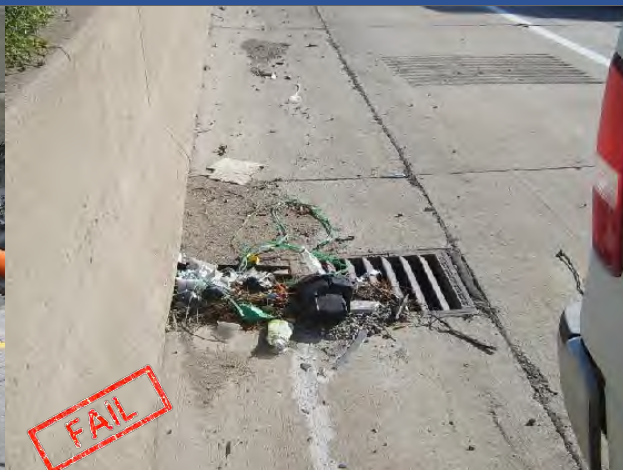
If a catch basin cover has not been raised during a pavement overlay extending into the gutter pan, then a non-compliance should be issued only if it poses a hazard to a cyclist or pedestrian (i.e. an overlay on a freeway should not pose a hazard to a cyclist or pedestrian if adjacent to a barrier wall).

Measure	MiMRS Non-Compliance
Catch Basins	Any casting or cover is damaged, loose, improperly installed, or oriented such to pose a hazard (over a two (2) inch drop) to a vehicle, pedestrian, or cyclist.
	Visual inspection notices any portion of piping or cover that is significantly blocked reducing effectiveness).

Catch Basin Examples



This catch basin cover has been dislodged from its casting and poses a hazard to a driver.



There is litter and debris blocking the inflow of this catch basin which likely reduces its effectiveness.



Overlay causing a low catch basin



The frame on this curb box has been damaged.

4.5 Curb and Gutter

Curbs and Gutters channelize storm runoff along pavements and shoulders as part of the storm water drainage system. Typically concrete either pre-cast or in situ, maintenance often required to address:

- Obstructions
- Gaps/Separation.

Evaluation: Determine the general effectiveness of the curb and gutter.

What to look for:

- The free passage of water as intended is either blocked or impeded.
- Broken channel or open joints allowing the intrusion of water.
- Overlays extending through the gutter pan to the face of curb should not be considered an obstruction.
- Valley gutters and curb & gutter on bridges are included in the rating
- Curb & gutter at a cross street is included in the rating
- Curb & gutter for a private drive or business is not included in the rating

****Sand, gravel and small debris in the gutter that could be cleared with a sweeper would not fail the Curb & Gutter measure, but possibly the Sweeping measure.**

Measure	MiMRS Non-Compliance
Curb and Gutter	Any obstruction impeding proper drainage. This may include, for example, a height difference between curb and gutter and an adjacent catch basin.
	Any gap or vertical face between the curb and gutter and pavement surface exceeds two (2) inches.
	Erosion damage to the shoulder and embankment behind the curb where water may flow over the curb.
	Differential settlement exceeds two (2) inches.

Curb and Gutter Basin Examples

This gutter is obstructed by sediment, forcing the flow to encroach into the travel lanes.



This curb and gutter has been damaged, allowing water to flow through the curb back and causing it to sink below the level of the pavement.



This curb has been struck and damaged.



This curb and gutter has been damaged, allowing water to flow through the curb back.

4.6 Debris

Removal of large-sized litter for safety purposes. Differentiated as greater than 0.5 cubic feet or shoebox sized.

- Within the paved area of the roadway
- This includes small animal carcasses meeting the size requirement (e.g. raccoons or opossums, but not squirrels) – larger animals have a separate measure.

Evaluation: Determine the general effectiveness of debris removal. (What to look for)

Measure	MiMRS Non-Compliance
Debris	No litter measuring more than 0.5 cubic feet (approximately shoebox sized) within the paved area.

Debris Examples



This shoulder has several large pieces of debris.



This item is smaller than 0.5 cubic feet.

5. TRAFFIC SAFETY SERVICE MEASURES

5.1 Sweeping

Sweeping removes loose debris that creates a safety hazard on paved driving surfaces and/or intersection aprons. Sweeping should be checked on paved surfaces including travel lanes, shoulders, curbs and gutters, valley gutters, barrier walls, and intersections.

Evaluation: Determine the general effectiveness or need for sweeping.

What to look for:

- Sand or gravel accumulation resulting from a shoulder washout should not be considered a sweeping non-compliance.

Measure	MiMRS Non-Compliance
Sweeping	An accumulation of gravel or material on paved surfaces including: travel lanes, shoulders, curb and gutters, barrier walls and intersections.

Sweeping Examples



Sand and gravel has been tracked onto the roadway, potentially causing a hazard.



Sand has accumulated in the gutter and turning path of this intersection.

Sweeping Examples



This shoulder has some litter, but does not have a significant accumulation of sand/gravel that can be swept.



Sand and gravel has accumulated in the gutter

5.2 Guardrail

Steel beam guardrail is installed to guide a vehicle away from various hazards in and adjacent to the ROW.

Evaluation: Determine the general functionality of the guardrail with respect to damaged or out of alignment rail, missing or damaged posts, blocks, or end sections.

A berm under a guardrail would be classified as a shoulder non-compliance, not a guardrail non-compliance.

Measure	MiMRS Non-Compliance
Guardrail	Any damage that could cause the guardrail to not function as intended.

Guardrail Examples



This beam has been sliced and poses the hazard of snagging on an errant vehicle.



This guardrail has been hit and is likely unable to stop a vehicle as intended.



This guardrail has been hit multiple times and is likely unable to stop a vehicle as intended.



This guardrail appears to be in good condition.

Guardrail Examples



This guardrail has been hit, separating the post from the rail.



This Type TD guardrail shows evidence of minor scrapes, but is generally in good condition and would likely perform as intended.



This end section has been hit and would likely not stop a vehicle.

5.3 Concrete Barrier

Concrete barriers are installed to guide a vehicle away from various hazards in and adjacent to the ROW and are generally utilized when deflection of the barrier is unwanted or not physically possible.

Evaluation: Determine the general functionality of concrete barriers with respect to misaligned, separated, holed or damaged sections. Damage includes broken out areas and areas showing exposed steel reinforcing.

- Concrete barrier on bridges is included in the rating

Measure	MiMRS Non-Compliance
Concrete Barrier	Any damage which could cause the barrier to not function as intended.

Concrete Barrier Examples



This concrete median barrier has a damaged glare screen, but the barrier itself is in good condition and would likely perform as intended.



This concrete median barrier has a large portion missing and may be incapable of stopping an errant vehicle.



This concrete median barrier has several large portions missing.



This concrete barrier is showing signs of distress but is structurally sound. Future monitoring may be appropriate.



This concrete median barrier has a portion missing from the glare screen, but the barrier is in good condition and would likely perform as intended.



This concrete barrier is severely spalling/crumbling and is less likely to perform as intended.

5.4 Cable Barriers

Cable barriers are installed to prevent a vehicle from errantly crossing the median into opposing travel lanes.

Evaluation: Determine the general functionality of the cable, supports, splices, and anchors.

Measure	MiMRS Non-Compliance
Cable Barriers	Cables that are frayed, broken or sagging.
	More than 4 consecutive broken or missing posts.

Cable Barrier Examples



This cable barrier is in good condition.



This cable barrier is in good condition.



While only one post appears damaged, the cables are sagging and would not likely stop an errant vehicle.



More than four consecutive posts have been damaged in the cable barrier run.

5.5 Impact Attenuators

Impact attenuators reduce the damage to structures, vehicles, and motorists in the event of a vehicle crash. Static (not vehicle mounted) energy absorbing device usually placed in front of fixed structures near freeways, such as gore points, jersey barrier introductions, or overpass supports. Maintenance required includes:

- Repair and Replacement.

Evaluation: Determine the general effectiveness of the impact attenuators.

What to look for:

- Obvious damage or misalignment resulting from vehicle impact if noticed during drive-by.

Measure	MiMRS Non-Compliance
Impact Attenuator	Any damaged energy absorbing system that may compromise the integrity and effectiveness of the system.

Impact Attenuator Examples



This attenuator has been damaged and requires repair.



This attenuator has been damaged and requires repair.

5.6 Signs

Signs are intended to give instructions or provide information to road users by delivering information through a variety of color, shape and wording. Types include:

- Regulatory
- Guide
- Services.

Evaluation: Determine the general effectiveness of the signage.

What to look for:

- An inability to understand the information that signs are intended to convey. This situation may be due to a number of reasons as detailed below.
- Only signs normally visible during the drive-by should be rated (e.g., a “STOP AHEAD” sign on a cross street does not need to be visibly checked and rated).
- Signs at crossovers should be included in the rating

Measure	MiMRS Non-Compliance
Signs	The entire sign is missing or any portion of the sign or posts is missing.
	Damage such that the message may be misconstrued or illegible.
	Unreadable, obscured, twisted, or deflected.

Signage Examples



The sign on the left is badly faded



While there is a crack in the lower right portion of the sign face, the message is not illegible or easily misconstrued.

Signage Examples



This sign is obscured by vegetation (vegetation failure) but is not damaged, and otherwise properly located.

5.7 Delineators

Delineators are intended to give guidance information to road users by indicating the relative edge of roadways.

Evaluation: Determine the general effectiveness of the delineators.

What to look for:

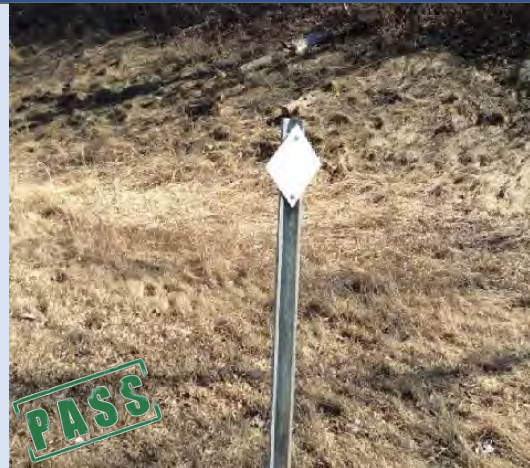
- Delineators that do not indicate the roadway alignment (e.g., drainage marker delineators) should not be evaluated. (Only yellow and white delineators)

Measure	MiMRS Non-Compliance
Delineators	Missing.
	Damage such that the color or reflectivity may be misconstrued or unknown.

Delineator Examples



These delineators have been hit and damaged.



This is a unique delineator, but still functioning as intended

6. ROADSIDE MEASURES

6.1 Ditches

Ditches transport storm runoff from the pavement and shoulder as part of the storm water drainage system and are commonly earthen or of hard material construction within the highway ROW. Examples of common required activities are:

- Erosion / slope protection
- Removal of obstructions.

Evaluation: Determine the general effectiveness of the ditches.

What to look for:

The free passage of water as intended is either blocked or impeded.

- If the ditch is causing the culvert to fail and needs to be cleaned out then the ditch fails

Measure	MiMRS Non-Compliance
Ditches	Greater than 50 percent obstruction(s) resulting in ponding or preventing free flow of water (e.g. debris or brush/branches in ditch bottom).
	Any trees (diameter larger than 3 inches) growing in the ditch bottom.
	Inlets or outlets are obstructed or eroded.

Ditch Examples



This paved ditch shows evidence of ponding as full-width growth has caused sediment to accumulate to a significant depth.



This ditch is filled with rubble, which would reduce its ability to carry storm runoff.



Large tree growing in the ditch causing a hazard



One small tree in the ditch which is obstructing less than 50% of the ditch



Cattails and other weedy vegetation are not a failure unless there is sediment build up impeding the flow of the the ditch



Vegetation has built up on check dam within the ditch causing sediment build up.

6.2 Culverts

Culverts transport storm runoff under pavements and driveways as part of the storm water drainage system. A culvert is defined as greater than 12 inches in diameter (less than 12" is considered an edge drain and is not to be rated at this time). Typically culverts are constructed from steel, plastic or concrete. Maintenance activities commonly associated with culverts include:

- Debris
- Washouts / erosion
- Under / sub drains
- Ditch bottom catch basins

Evaluation: Determine the general effectiveness of the culverts.

Culverts 12 inches or larger should be visually inspected from outside the vehicle. If a culvert is issued a non-compliance, then subsequent culverts do not need to be inspected from outside of the vehicle within the same rating section.

What to look for:

- The free passage of water as intended is either blocked or impeded.
- Driveway culverts should be included in the evaluation via a drive-by review.
- If you cannot find a culvert where there should be one then rate as a fail.
- Determined what maintenance action would be required: If a culvert needs to be jetted but the ditch does not need to be cleaned out then the culvert fails but the ditch passes.
- Catch basins in the roadside (e.g. beehives and ditch bottom basins) are rated in the culvert measure.

Measure	MiMRS Non-Compliance
Culverts	Any debris or culvert damage that obstructs the water flow through the culvert.
	More than 50 percent of a culvert opening is obstructed. More than a half of the culvert cannot pass water.
	Washouts of culvert backfill and erosion damage under or around the culverts (e.g., perched).

Culvert Examples

This culvert's end section is damaged, but the culvert can still pass water and function as intended.



The metal grate on this culvert is damaged, but the culvert can still pass water and function as intended.



This culvert is more than half filled with debris.



The end of this culvert is almost completely buried, both the culvert and ditch would fail.



Culvert has some leaves, but they are not obstructing the flow of water



Culvert is filled with sediment obstructing more than 50% of the water flow



Ditch catch basin slightly covered with leaves but water can still pass.



Ditch catch basin surrounded by leaves but not obstructed more than 50%.

6.3 Grass

Controlling grass improves the aesthetics of a roadway and reduces the chances that wildlife or an object that could pose a safety hazard could be undiscovered in the vicinity of the roadway. It helps to control the erosion of soil on slopes.

Actions taken to control the growth of natural grasses and vegetation include mowing and growth retardants.

- Mowing – Shoulder
- Mowing – Designated Areas
- Spraying - Growth retardant

Evaluation: Determine the general effectiveness or need for grass control.

What to look for:

- The height of vegetation in the area within 12 feet of the edge of the roadway or shoulder should be evaluated. This area may be expanded in specified, designated areas such as landscaped areas or urban medians.
- The acceptable height of vegetation in an urban environment may be lower than in a rural area.
- No mowing in areas with approved mowing prohibitions or areas of naturally occurring or designated wildflower planting areas.

Measure	MiMRS Non-Compliance
Grass	Any grass greater than 18 inches in height within 12 feet of the edge of roadway or shoulder.
	Any grass in specified, designated areas (e.g. landscaped areas) greater than 8 inches in height.
	Mowing operations that strip or remove the grass such that bare patches of soil more than 50 sq. ft. are exposed.

6.4 Vegetation Control

Vegetation Control provides clearance and clear vision, manages drainage, and reduces any hazards presented by plant growth in clear zone areas.

Actions taken to control the growth or protuberance of vegetation include:

- Tree trimming
- Tree removal
- Brush clearing
- Weed spraying

Evaluation: Determine the general effectiveness or need for vegetation control.

What to look for:

- Plant beds with decorative sedges or flowers may be allowed to grow to their natural height, provided they do not impair or obstruct visibility as noted below.
- Designated Heritage Routes may have different vegetation criteria which should be taken into consideration when rating. (i.e. Tunnel of Trees (M-119))
- Trees with diameter greater than 3 inches in the clear zone are considered obstructions
- If weeds are obstructing vision or presenting a safety hazard then the vegetation control measure would fail.

Measure	MiMRS Non-Compliance
Vegetation Control	Any vegetation, trees, or branches that impede traffic, impair or obstruct sight visibility (hills, curves, intersections, railway crossings, etc.), or obstruct signs.
	Any trees (diameter larger than 3 inches) within the clear zone ² .
	Any tree limbs lower than eight (8) feet above the ground within the clear zone.
	Any dead or damaged trees or limbs within the ROW that could fall in the clear zone, across the ROW fence, or present a hazard to vehicles, adjacent property owners, or pedestrians.

²The clear zone is generally defined to be 30 feet from the edge of the travel lane (e.g. lane line) for 45 mph zones (and above). This area should be free of obstructions.

Vegetation Control Examples



Fallen tree is on the backside of the ditch therefore it is outside of the clear zone



This fallen tree compromises shoulder and clear zone safety



Vegetation should be cleared so sign is visible

6.5 Litter

Litter – Control of litter for aesthetic purposes. Differentiated as fist-sized or less.

- Paved areas and ROW

Evaluation: Determine the general effectiveness of litter removal. Shoebox-sized or larger within the paved areas would fall under “debris”.

Measure	MiMRS Non-Compliance
Litter	No more than 15 fist-sized or larger pieces of litter per 1/10 th mile stretch.

Litter Examples



This area has minimal litter and is not representative of the entire segment

This area has significant litter accumulation.

6.6 Animal Carcasses

Large animal carcasses posing a safety hazard and aesthetic nuisance. Differentiated as deer-sized or larger (e.g. deer, elk, bear, moose, etc.)

- Within the paved surface or shoulders.

Evaluation: Determine if large animal carcasses are present (even if flattened).

Measure	MiMRS Non-Compliance
Animal Carcasses	Any large animal carcass (deer size or larger) within the paved surface or shoulder.

Animal Carcasses Examples

	
Large animal carcass in the shoulder	Large animal carcass, but outside of the paved surface and shoulder

7 APPENDIX – LIST OF MEASURES

Measure	MiMRS Non-Compliance
Roadway Measures	
Flexible – Cracking	Greater than one (1) inch in width.
Flexible – Patching	Broken up areas larger than 30 square feet.
	Broken up areas greater than (or equal to) one-half (1/2) of a travel lane.
Flexible – Potholes	Potholes greater than two (2) inches in depth.
	Potholes greater than 0.5 sq. ft. in area.
	Potholes exceeding the top lift of HMA
	Any base material is exposed in any pothole, regardless of depth or area.
Rigid – Cracking	Greater than one (1) inch in width.
Rigid – Patching	Broken up areas larger than 30 square feet.
	Broken up areas greater than (or equal to) one-half (1/2) of a travel lane.
Rigid – Potholes	Potholes greater than two (2) inches in depth.
	Potholes greater than 0.5 sq. ft. in area.
	Any base material is exposed in any pothole, regardless of depth or area.
Shoulders	Any washout greater than two (2) inches in depth or greater than ten (10) sq. ft. in area.
	Any preventable condition either high or low by two (2) inches or more that impede the shoulder drainage to function as designed i.e. the free flow of water off the pavement.
	Edge loss greater than six (6) inches inward, or comprising more than ten (10) percent of the length of the segment.
	Any drop-off exceeding two (2) inches in depth.
	Any base material is exposed in any pothole, regardless of depth or area (in paved shoulders).
Catch Basins	Any casting or cover is damaged, loose, improperly installed, or oriented such to pose a hazard (over 2 inch drop) to a vehicle, pedestrian, or cyclist.
	Visual inspection notices any portion of piping or cover that is significantly blocked reducing effectiveness.
Curb and Gutter	Any obstruction impeding proper drainage. This may include, for example, a height difference between curb and gutter and an adjacent catch basin.
	Any gap or vertical face between the curb and gutter and pavement surface exceeds two (2) inches.
	Erosion damage to the shoulder and embankment behind the curb where water may flow over the curb.
	Differential settlement exceeds two (2) inches.
Debris	No litter measuring more than 0.5 cubic feet (approximately shoebox sized) within the paved area.
Traffic Safety Service Measures	
Sweeping	An accumulation of gravel or material on paved surfaces including: travel lanes, shoulders, curb and gutters, barrier walls and intersections.
Guardrail	Any damage that could cause the guardrail to not function as intended.
Concrete Barrier	Any damage that could cause the barrier to not function as intended.
Cable Barriers	Cables that are frayed, broken or sagging.
	More than 4 consecutive broken or missing posts.
Impact Attenuator	Any damaged energy absorbing system that may compromise the integrity and effectiveness of the system.
Signs	The entire sign is missing or any portion of the sign or posts is missing.
	Damage such that the message may be misconstrued or illegible.
	Unreadable, obscured, twisted, or deflected.
Delineators	Missing (yellow and white delineators only).
	Damage such that the color or reflectivity may be misconstrued or unknown (yellow and white delineators only).
Roadside Measures	
Ditches	Greater than 50 percent obstruction(s) resulting in ponding or preventing free flow of water (e.g. debris or brush/branches in ditch bottom).
	Any trees (diameter larger than 3 inches) growing in the ditch bottom.
	Inlets or outlets are obstructed or eroded.
Culverts	Any debris or culvert damage that obstructs the water flow through the culvert or ditch basin
	More than 50 percent of a culvert opening is obstructed. More than a half of the culvert cannot pass water.
	Washouts of culvert backfill and erosion damage under or around the culverts e.g. perched.
Grass	Any grass greater than 18 inches in height within 12 feet of the edge of roadway or shoulder.
	Any grass in specified, designated areas (e.g. landscaped areas) greater than 8 inches in height.
	Mowing operations that strip or remove the grass such that bare patches of soil more than 50 sq. ft. are exposed.
Vegetation Control	Any vegetation, trees, or branches that impede traffic, impair or obstruct sight visibility or obstruct signs.
	Any trees (diameter larger than 3 inches) within the clear zone.
	Any tree limbs lower than eight (8) feet above the ground within the clear zone.
	Any dead or damaged trees or limbs within the right-of-way that could fall in the clear zone, across the right-of-way fence, or present a hazard to vehicles, adjacent property owners, or pedestrians.
Litter	No more than 15 fist-sized or larger pieces of litter per 1/10 th mile stretch.
Animal Carcasses	Any large animal carcass (deer sized or larger) within the paved surface or shoulder.





MDC-004



One of the most expensive and labor-intensive operations performed by many states during the winter months is snow removal and roadway treatment. Having current information about road and weather conditions can improve the overall efficiency of the operation, reduce the amount of applied materials, and decrease overall cost. The DTI Snow Plow Monitor is a critical part of a program for collecting real-time information on weather and roadway conditions, and can provide operators and supervisors with recommendations as weather conditions change.

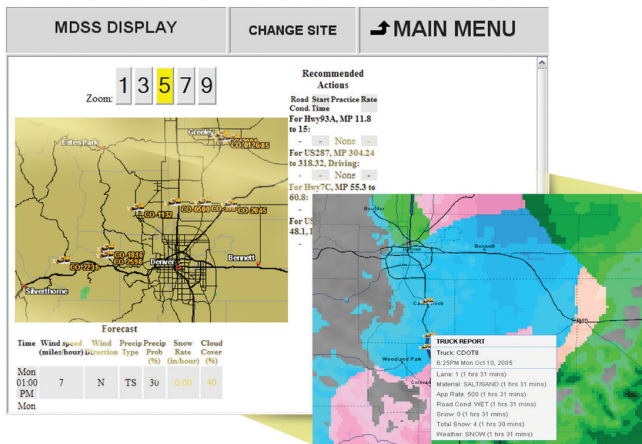
The controller in each snow plow receives information from the operator, spreader controller, GPS receiver and plow blade sensors. This information is made available via an integrated cellular data modem to a central system. Forecasting and application recommendations are then provided to each individual snow plow by means of customized web pages, which even include local weather radar information!

MDC-004 Features:

- > Touch screen user interface for operator input of driving conditions and lane treatment information.
- > Interface to existing spreader controllers to monitor dispensing rates and road and air temperature.
- > GPS monitoring of snow plow location, speed and direction.
- > Automatic detection of plow blade position.
- > Integrated on-board web interface allows Road Maintenance Decision information (including local radar, weather forecasts and recommended material application rates) to be communicated to the snow plow operator.
- > All vehicles are monitored by a central system which allows access by multiple users via a web-based interface.
- > All features are integrated into a single rugged unit



HARDWARE CONFIGURATION

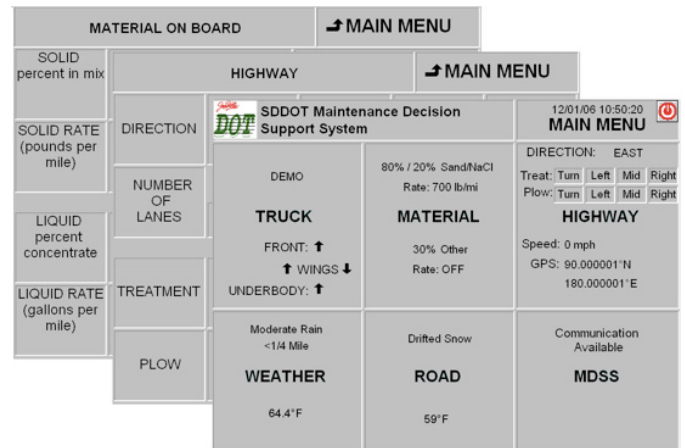


COMMUNICATION

Wireless Cellular WEB enabled for Central Software and WEB Access, via wireless Ethernet. Local Serial Port for Diagnostics and Local Control.

PORTS INCLUDE:

- 4x USB 2.0
- DVI & VGA Output
- 3x Serial
- 2x Ethernet
- GPS Antenna
- Wireless Antenna
- Digital IO
- PS/2 Mouse & Keyboard
- Microphone In
- Audio Out



SPECIFICATIONS

Dimensions: Enclosure: 11.42" x 6.52" x 2.36" (290mm x 165.5mm x 60mm), Monitor: 7.87" x 1.44" x 6.42" (199.89mm x 35.58mm x 163.07mm)

Weight: Enclosure: 6lbs (2.721kg), Monitor: 1.81lbs (0.821kg)

Operating Temperature: 0-60°C

Humidity: 5-95% non-condensing

Vibration: 17 to 500Hz, 3G peak to peak

Shock: 20G / peak (11m sec)

Degree of Protection: IP65 Touch Screen

Power Requirement: 12V DC nominal @ 7.5A

1.6 Ghz Processor

4 GB SSD Harddrive

1GB Ram

Rugged Linux Operating System

**Specification Subject to Change

SOFTWARE SPECIFICATION

SUPPORTS REPOSITORY OF:

- Latitude and longitude
- Speed and direction
- Engine codes
- Plowblades
- Spreader data
- Road and air temperature

INTERFACES TO:

- Various spreader controllers
- Road Watch
- J-1939, J-1708, OBD-II

ALLOWS OPERATOR INPUT OF:

- Spreader material
- Plow blades
- Roadway conditions
- Weather conditions

OPTIONS

- Training
- Application Assistance
- Telephone Support
- Upgrades and Enhancements

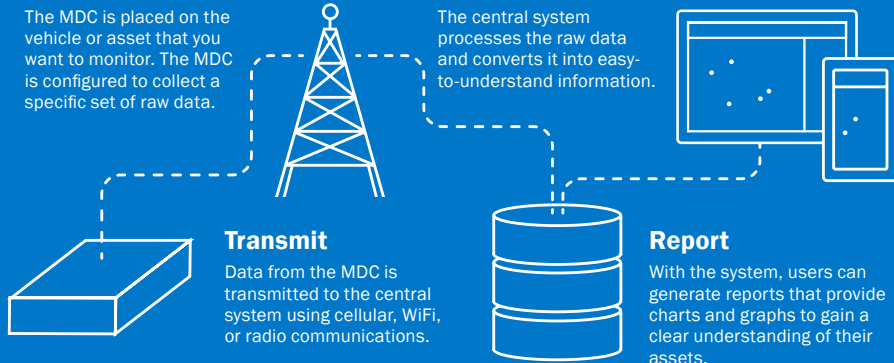
WITH CAPTION MDSS, PROVIDES:

- Real-time weather radar
- Reclaimed application rates

How It Works

Collect

The MDC is placed on the vehicle or asset that you want to monitor. The MDC is configured to collect a specific set of raw data.



Convert

The central system processes the raw data and converts it into easy-to-understand information.

Transmit

Data from the MDC is transmitted to the central system using cellular, WiFi, or radio communications.

Report

With the system, users can generate reports that provide charts and graphs to gain a clear understanding of their assets.

Features of the Winter Road Management System:

- Touchscreen user interface for operator input of driving conditions and lane treatment information.
- Interface to existing spreader controllers to monitor dispensing rates and road and air temperature.
- GPS monitoring of snow plow location, speed, and direction.
- Automatic detection of plow blade position.
- ATMS interface enables plow information to directly populate ATMS operator screens.
- Create, customize, and automate reports for quick and clear understanding of fleet activities.
- Integrated onboard web interface allows road maintenance decision information (MDSS), including local radar, weather forecasts, and recommended material application rates, to be communicated to the snow plow operator.

PARSONS

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IntelligentTransportation.Parsons@parsons.com


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PARSONS

Integrate. Transform. Deliver.

Winter Road Management



Parsons PLUS envision more  SM

Connect. Track. Manage.

Mobile Data Tracking, Monitoring, and Collection

Save money and increase safety by connecting, tracking, and measuring your winter road management equipment.

Seventeen percent* of weather-related highway accidents are caused by snow and ice. Integrating traffic management systems into snow operations vehicles increases driver awareness of road conditions and reduces weather-related accidents. Parsons' mobile data collector (MDC) enables snow plows to communicate directly to the advanced traffic management system (ATMS).



System Features Include:

- GPS Monitoring with Breadcrumb Reporting
- Report Application Rates and Engine Codes
- Road and Air Temperature Monitoring
- Browser-Based Map Display
- Licensed or Hosted Central System
- Multiple Wireless Interfaces

The MDC in each snow plow consolidates information from the operator, spreader controller, GPS receivers, plow blade sensors, and other components. From this data, forecasting and application recommendations are provided to each snow plow through a customized web interface. This interface can include local weather radar and other time-critical information regarding current and upcoming conditions. Utilizing current and forecasted road and weather conditions can improve the overall efficiency of the operation by applying the proper material at the proper time, in the proper amount.

The Technology



Data Collector



In-Cab Display



Central System

Data Collector

Data collectors are configured to interface with multiple components on the plow, as well as the vehicle itself. The MDC collects raw data from data collection points on the plow, the vehicle, the engine bus, and any ancillary weather sensors. If equipped with a camera, the unit collects a screenshot of road conditions. This data is sent via wireless technology to the central software.

Central Software

Once a data collector is properly installed and capturing information, the next step is to move that raw data into the central software. The central software is what you use to view and manage what the data collectors are capturing. The Intelligent NETworks® snow plow module powers the central system and provides the rich information to report, track, and manage your winter road management fleet.

FAMS Attachment E: MDOT-Vueworks Overview

Maintenance Management System (MMS): Tools Overview



The Transportation Asset Management System (TAMS) is a combination of vendor tools, spatial asset information, and integrations to MDOT business systems. MMS is a component of TAMS with a focus on enhancing maintenance operations and functions. MMS tools can be used to alert, schedule, track, and report maintenance operations on network assets. There are three primary MMS tools supported by TAMS vendor Data Transfer Solutions: Vueworks, Service Request Portal, and Mobilevue.

Vueworks

Vueworks is the central MMS tool which communicates with both service request portal and mobilevue. Vueworks is where all MMS data is stored. It also integrates with other MDOT business systems. Vueworks contains a report engine where data entered in the system, or registered to it, can be filtered and generated in reports. Vueworks is loaded on a DTMB server and is accessed through a secure SOM computer connection.

There are two types of records stored in vueworks; service requests and work orders. *Service Requests* (S) note locations that require maintenance review. If it is determined that repairs and resources are needed, then a maintenance work order is created. Service requests can be created within vueworks, or from the service request portal site.

Work Orders (W) are registered and completed by maintenance leads, within a maintenance area, when resources (labor, equipment, materials) are needed to make a maintenance repair. Work order templates have been set up to reflect the MDOT maintenance activity guide structure. Each work order must note the activity type, location of work, and resources required (labor, equipment, and materials). Associated assets for the work activity must also be attached to the work order record. Work orders can be created in response to a service request, or on their own merit. Work orders can be completed within vueworks, or with mobilevue.

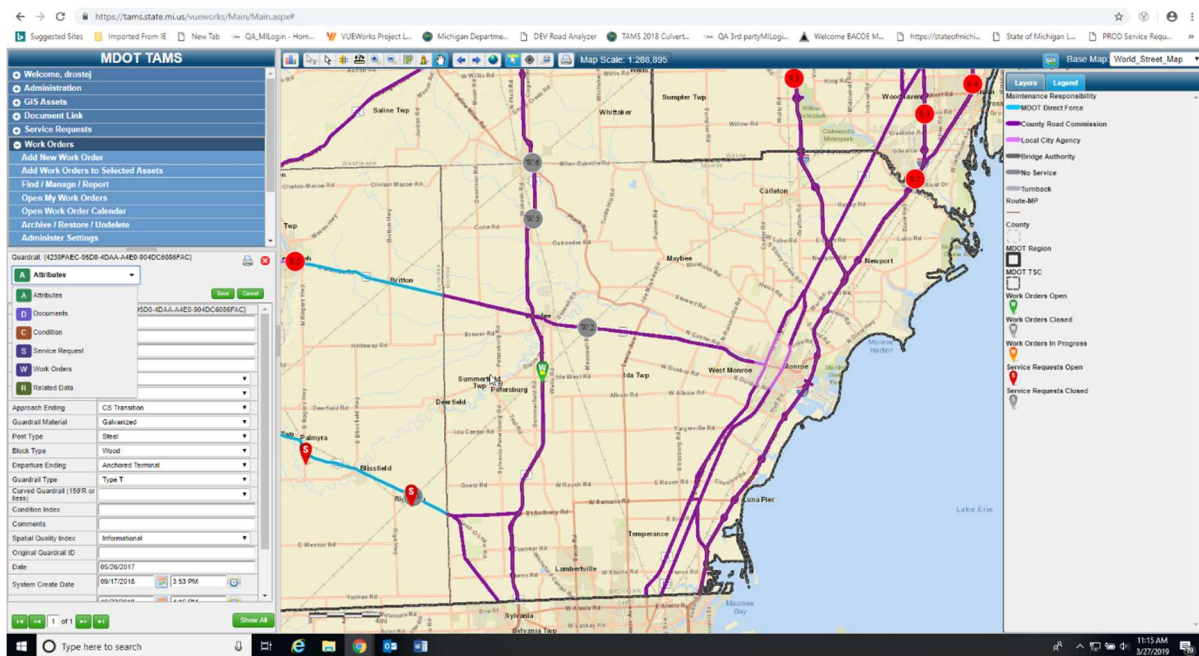


Figure 1: Vueworks map displaying work order and service request locations, along with maintenance responsibility layer.

FAMS Attachment E: MDOT-Vueworks Overview

Maintenance Management System (MMS): Tools Overview

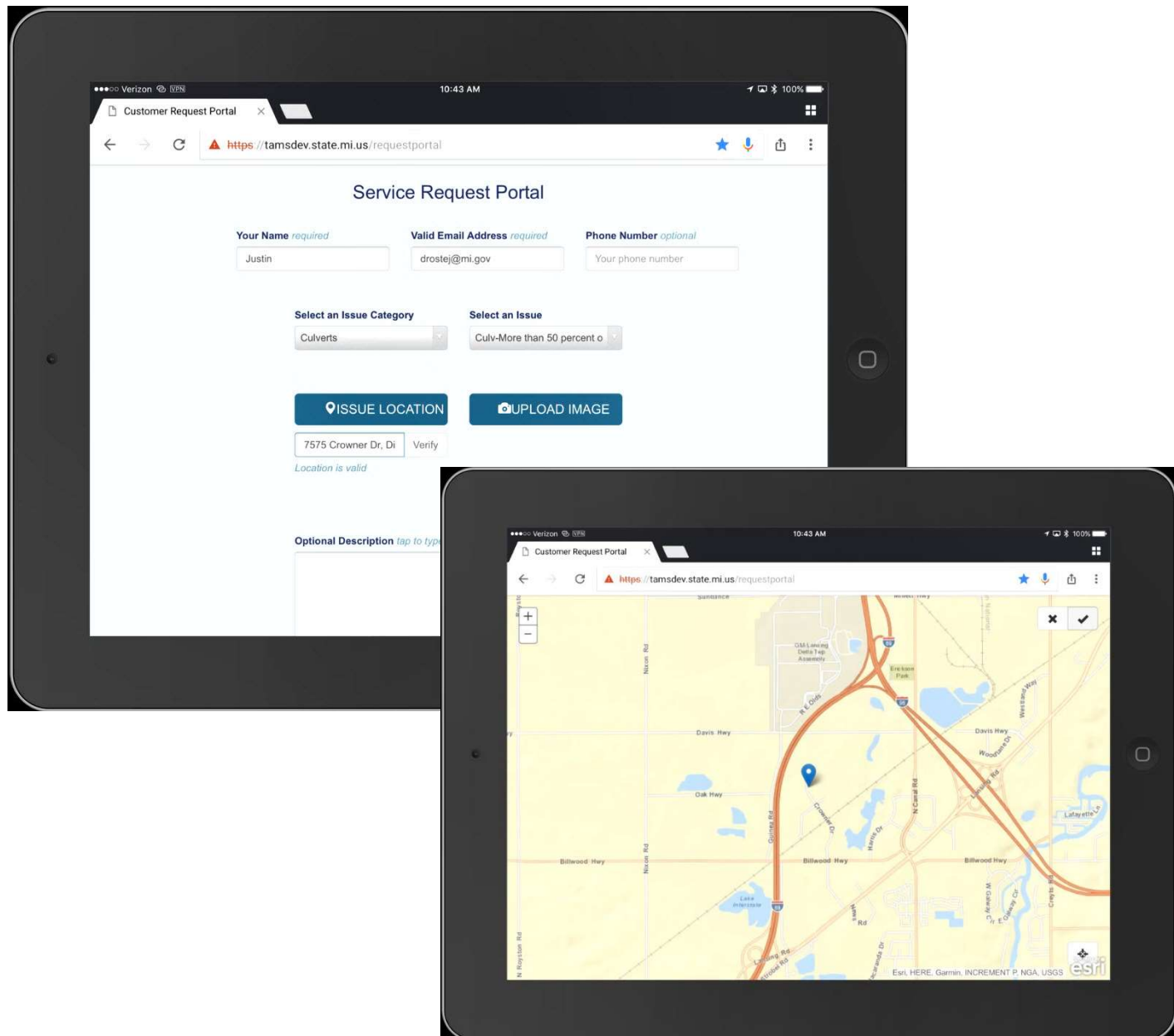


Figure 2: Vueworks service request form.

Figure 3: Vueworks work order form.

Service Request Portal

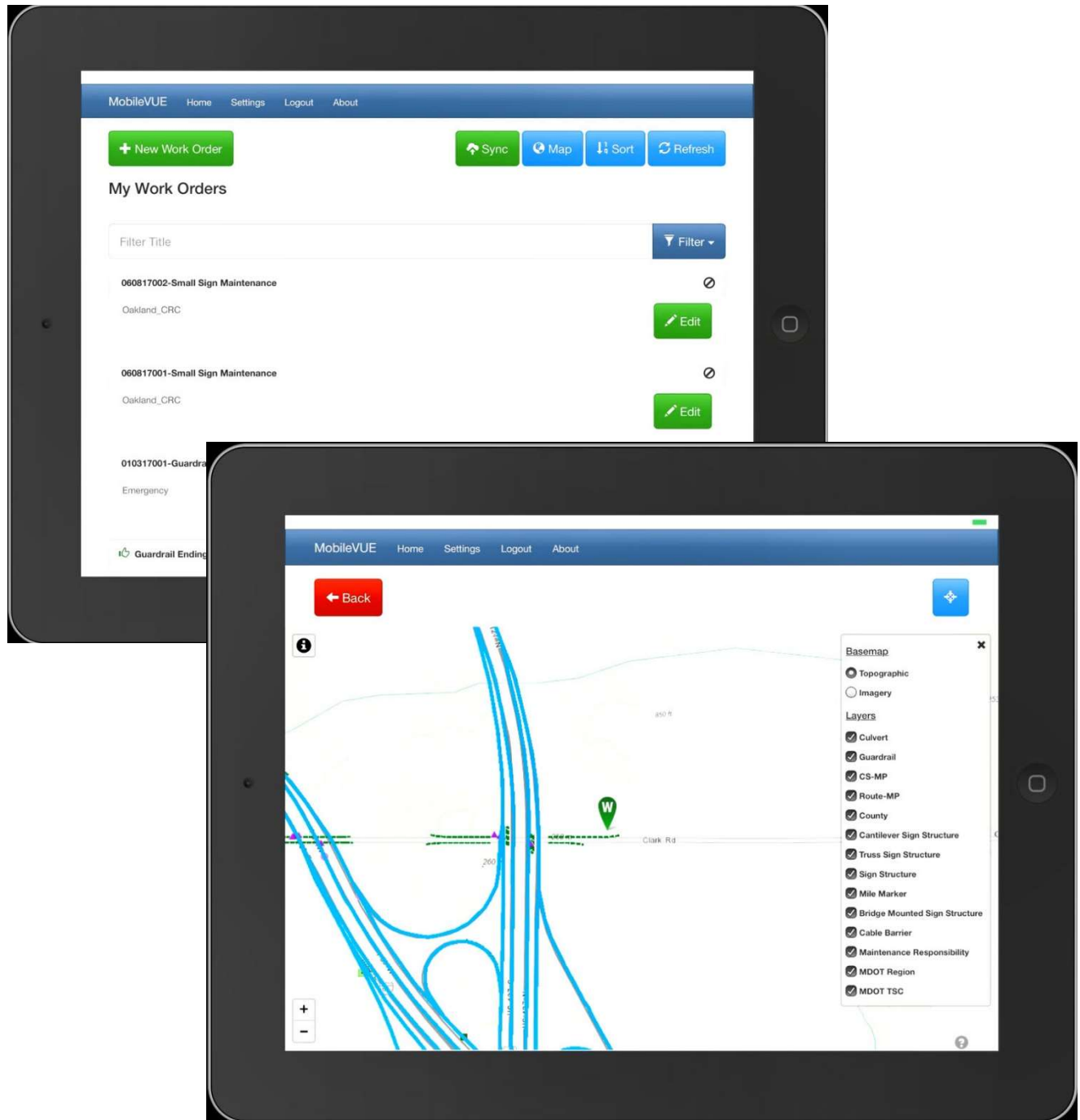
Service Request Portal is a website where authorized users can document Issues (including photo and location) for maintenance to review in vueworks. Service Request Portal is intended to be used on mobile devices in the field.



Figures 4 & 5: Service Request Portal request screen and map screen.

Mobilevue

Mobilevue is an app used to create and manage work order activities on mobile devices in the field. Work order and asset data can be synced from the device to vueworks, and from vueworks to the device.



Figures 6 & 7: Mobilevue assigned work order screen and map screen.

FAMS Attachment F: Lane Closure Notification Request Form

LANE CLOSURE NOTIFICATION/REQUEST FORM

(FOR SHIFTS, LANE, SHOULDER AND RAMP CLOSURES)

MDOT BRIGHTON TSC

Contract ID (CS-JN): _____

Contract Description: _____

Prime Contractor: _____

24 Hour Contact: _____

Phone Number: _____

Submittal Date: _____

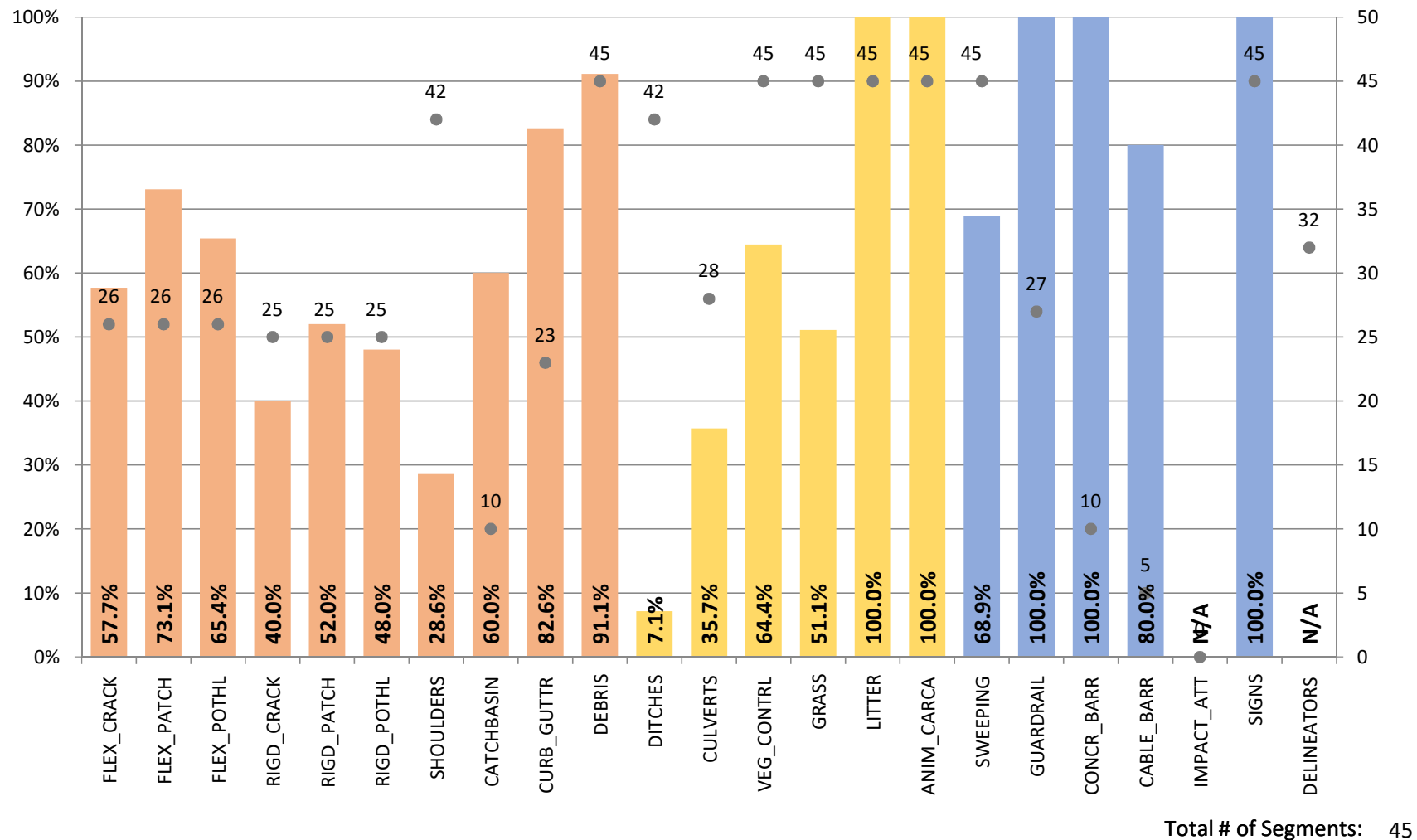
ROUTE	DIR.	LOCATION OF CLOSURE (CROSS STREETS)	WORK DESCRIPTION	EXISTING # OF LANES	CLOSURE TYPE (SINGLE LANE, SHOULDER, ECT)	SIDE OF THE ROAD	DURATION OF CLOSURE			DURATION TYPE	RESTRICT.	PER MOT (YES/NO)	VERIFIED (MDOT INITIALS)
							DATE		TIME				
						<input type="checkbox"/> Left <input type="checkbox"/> Center <input type="checkbox"/> Right	CLOSE			<input type="checkbox"/> Full Time <input type="checkbox"/> Re-occurring <input type="checkbox"/> Intermittent	<input type="checkbox"/> Height <input type="checkbox"/> Weight <input type="checkbox"/> Width		
						<input type="checkbox"/> Left <input type="checkbox"/> Center <input type="checkbox"/> Right	OPEN			<input type="checkbox"/> Full Time <input type="checkbox"/> Re-occurring <input type="checkbox"/> Intermittent	<input type="checkbox"/> Height <input type="checkbox"/> Weight <input type="checkbox"/> Width		
						<input type="checkbox"/> Left <input type="checkbox"/> Center <input type="checkbox"/> Right	CLOSE			<input type="checkbox"/> Full Time <input type="checkbox"/> Re-occurring <input type="checkbox"/> Intermittent	<input type="checkbox"/> Height <input type="checkbox"/> Weight <input type="checkbox"/> Width		
						<input type="checkbox"/> Left <input type="checkbox"/> Center <input type="checkbox"/> Right	OPEN			<input type="checkbox"/> Full Time <input type="checkbox"/> Re-occurring <input type="checkbox"/> Intermittent	<input type="checkbox"/> Height <input type="checkbox"/> Weight <input type="checkbox"/> Width		
						<input type="checkbox"/> Left <input type="checkbox"/> Center <input type="checkbox"/> Right	CLOSE			<input type="checkbox"/> Full Time <input type="checkbox"/> Re-occurring <input type="checkbox"/> Intermittent	<input type="checkbox"/> Height <input type="checkbox"/> Weight <input type="checkbox"/> Width		
						<input type="checkbox"/> Left <input type="checkbox"/> Center <input type="checkbox"/> Right	OPEN			<input type="checkbox"/> Full Time <input type="checkbox"/> Re-occurring <input type="checkbox"/> Intermittent	<input type="checkbox"/> Height <input type="checkbox"/> Weight <input type="checkbox"/> Width		

Additional Notes: _____

1. If the request is not per the MOT (Maintenance of Traffic), please submit to the Engineer 7 calendar days in advance of the lane closure for approval. Explain why the work can't be done per the MOT under Additional Notes.
2. If the notification is per the MOT, please submit to the Engineer 3 calendar days in advance of the lane closure for advance notice. Does not apply to permits.
3. Resubmit if the date and/or times change.
4. Contact the Engineer if the lane restriction is opened early.
5. If there is a detour proposed, please describe under Additional Notes

Monroe County Michigan Maintenance Rating System (MiMRS) Results

All Measures - Rating Period: Fall_2018

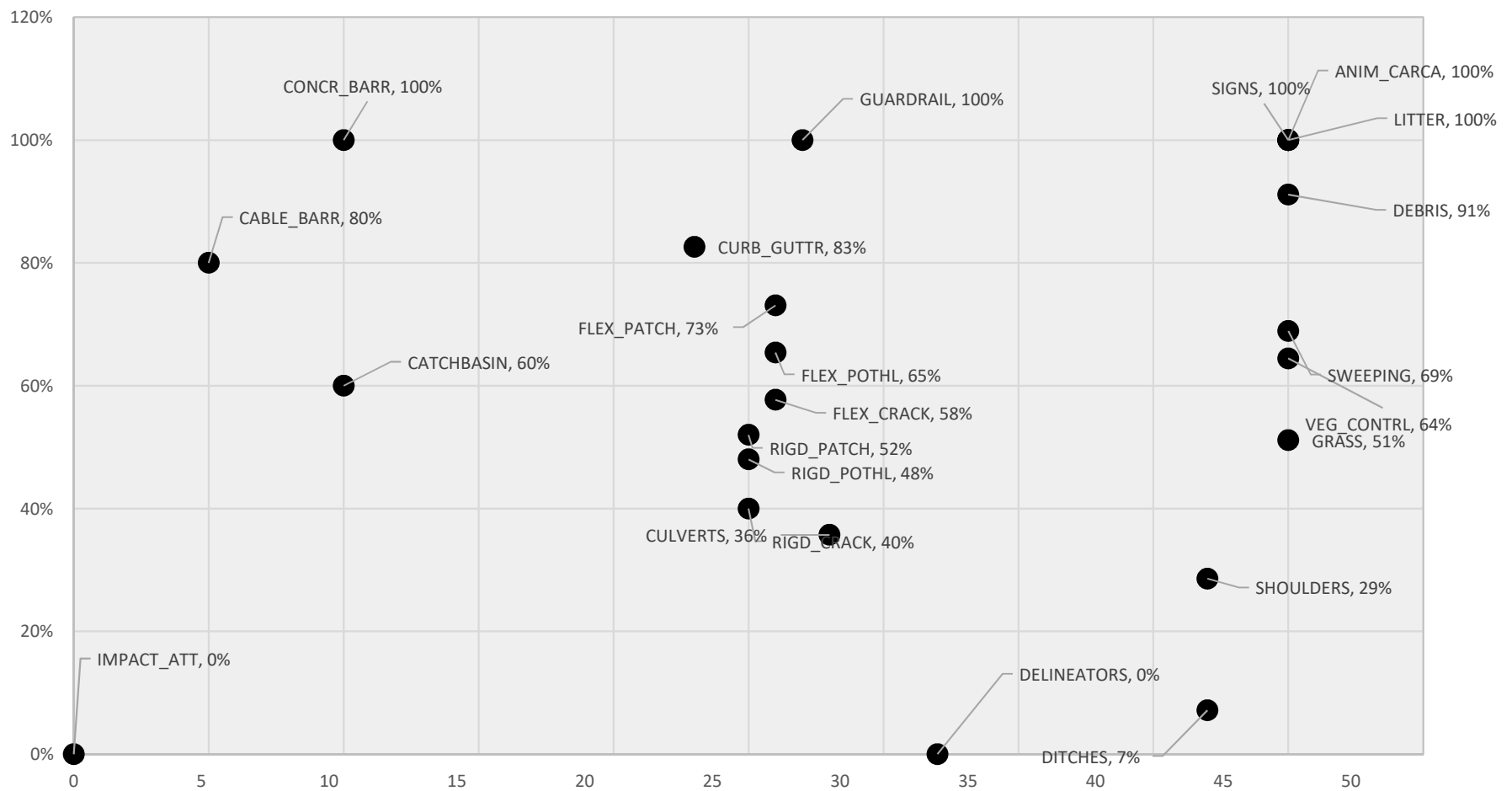


Location: Monroe County
Rating Period: Fall_2018
Report Generated: March 18, 2019

Measures	Performance Rating
Roadway - All	66.75%
Roadside	71.82%
Traffic Safety Services	75.83%
Composite	70.71%

Monroe County Michigan Maintenance Rating System (MiMRS) Results

Percent Passing vs. # of Segments - Rating Period: Fall_2018



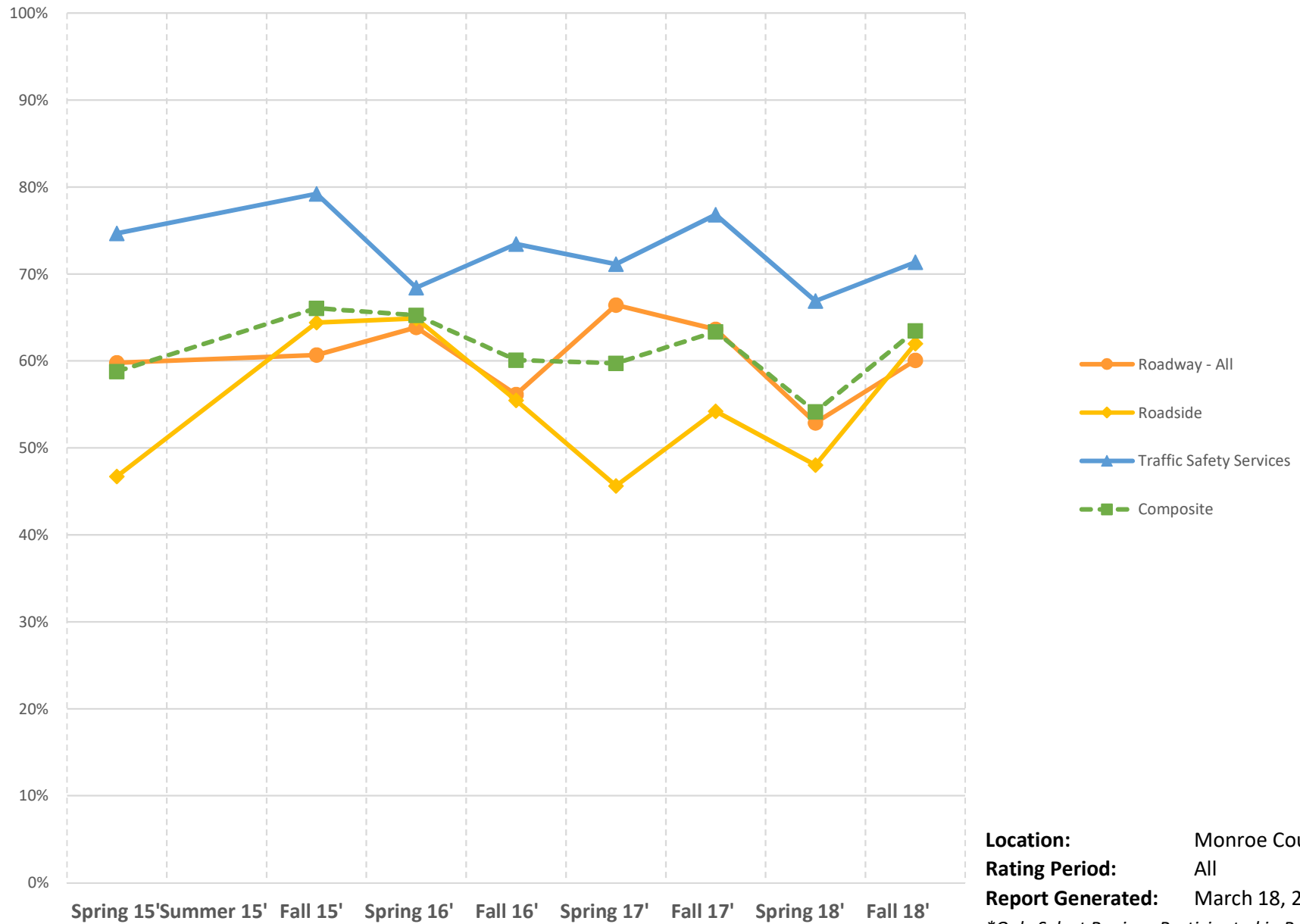
Total # of Segments: 45

Location: Monroe County
Rating Period: Fall_2018
Report Generated: March 18, 2019

Measures	Performance Rating
Roadway - All	66.75%
Roadside	71.82%
Traffic Safety Services	75.83%
Composite	70.71%

FAMS Attachment G: Monroe County Historical Performance Based Maintenance

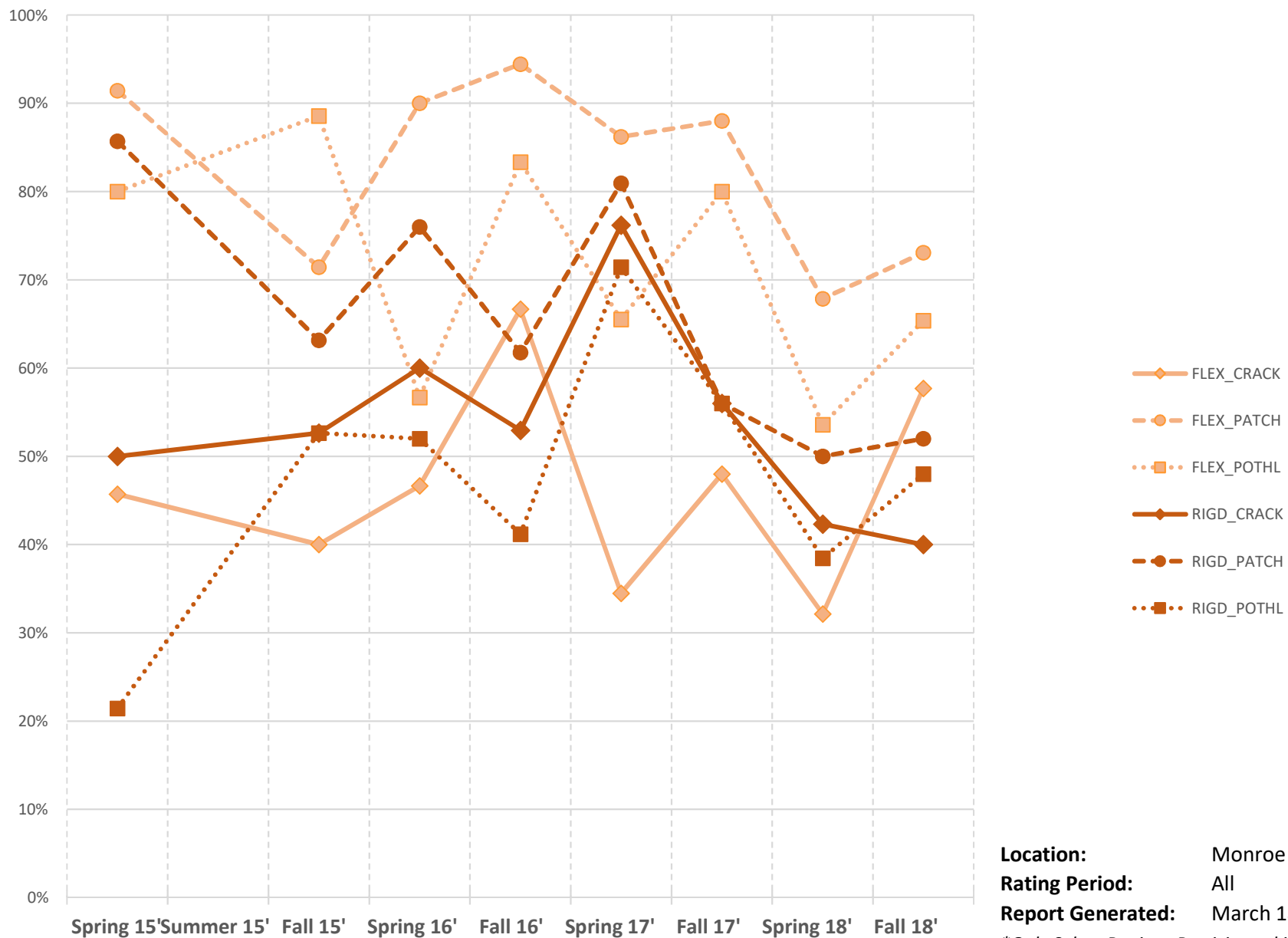
Monroe County Michigan Maintenance Rating System (MiMRS) Results Rating Trends - All Periods thru Fall 2018



Location: Monroe County
Rating Period: All
Report Generated: March 18, 2019
**Only Select Regions Participated in Period 2*

FAMS Attachment G: Monroe County Historical Performance Based Maintenance

Monroe County Michigan Maintenance Rating System (MiMRS) Results Rating Trends - All Periods thru Fall 2018

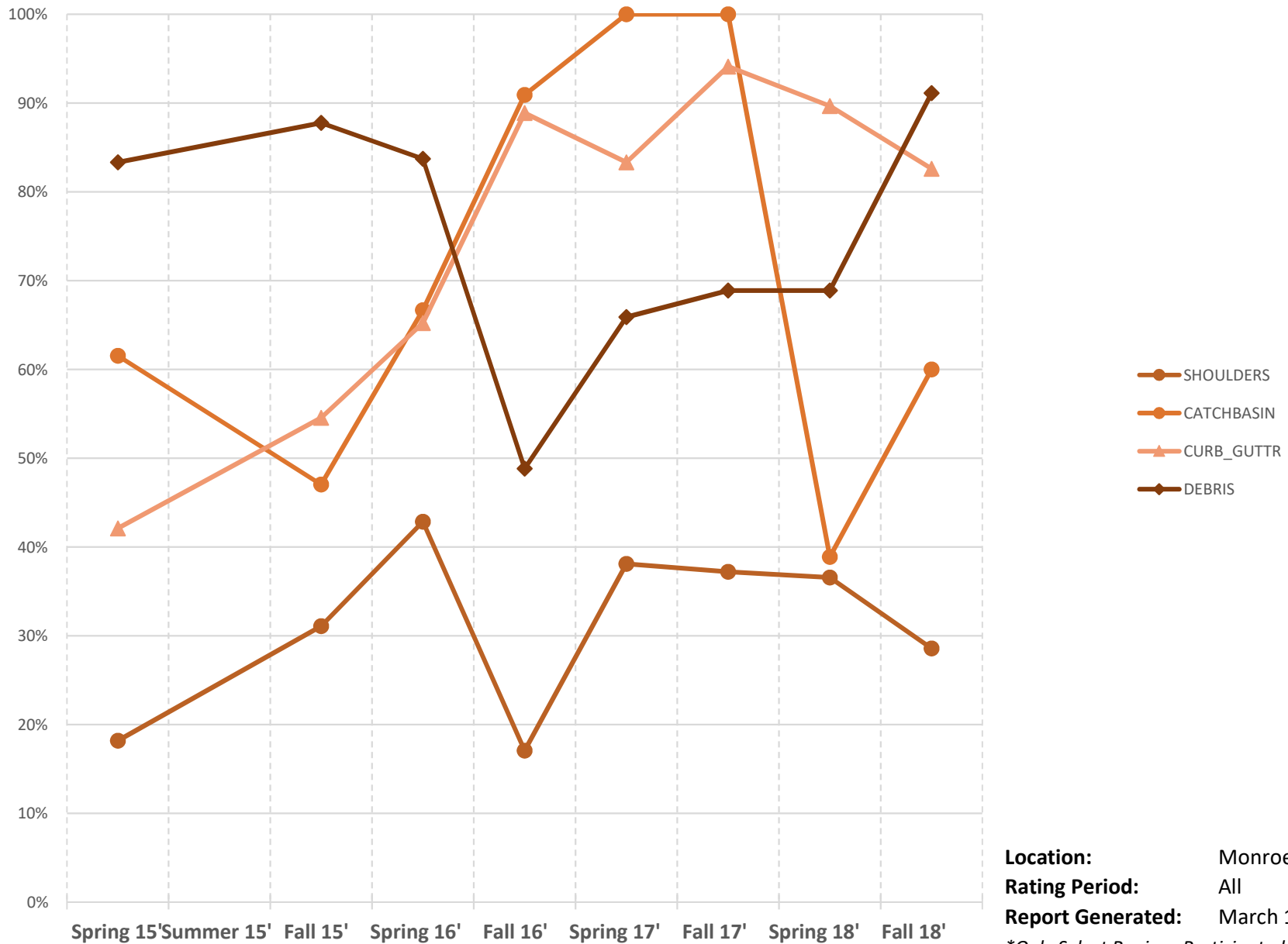


Location: Monroe County
Rating Period: All
Report Generated: March 18, 2019
**Only Select Regions Participated in Period 2*

FAMS Attachment G: Monroe County Historical Performance Based Maintenance

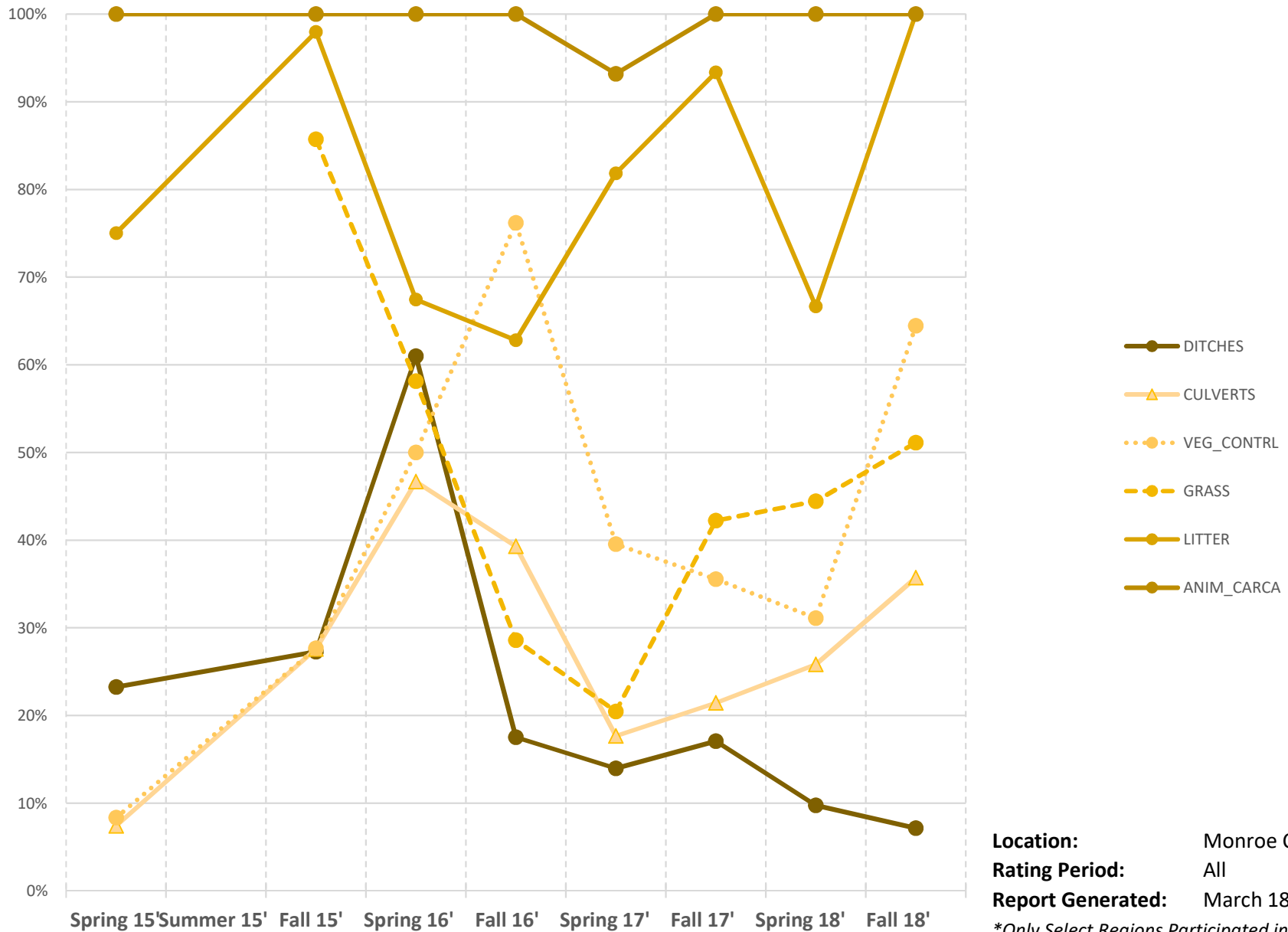
Monroe COUNTY Michigan Maintenance Rating System (MiMRS) Results

Rating Trends - All Periods thru Fall 2018



FAMS Attachment G: Monroe County Historical Performance Based Maintenance

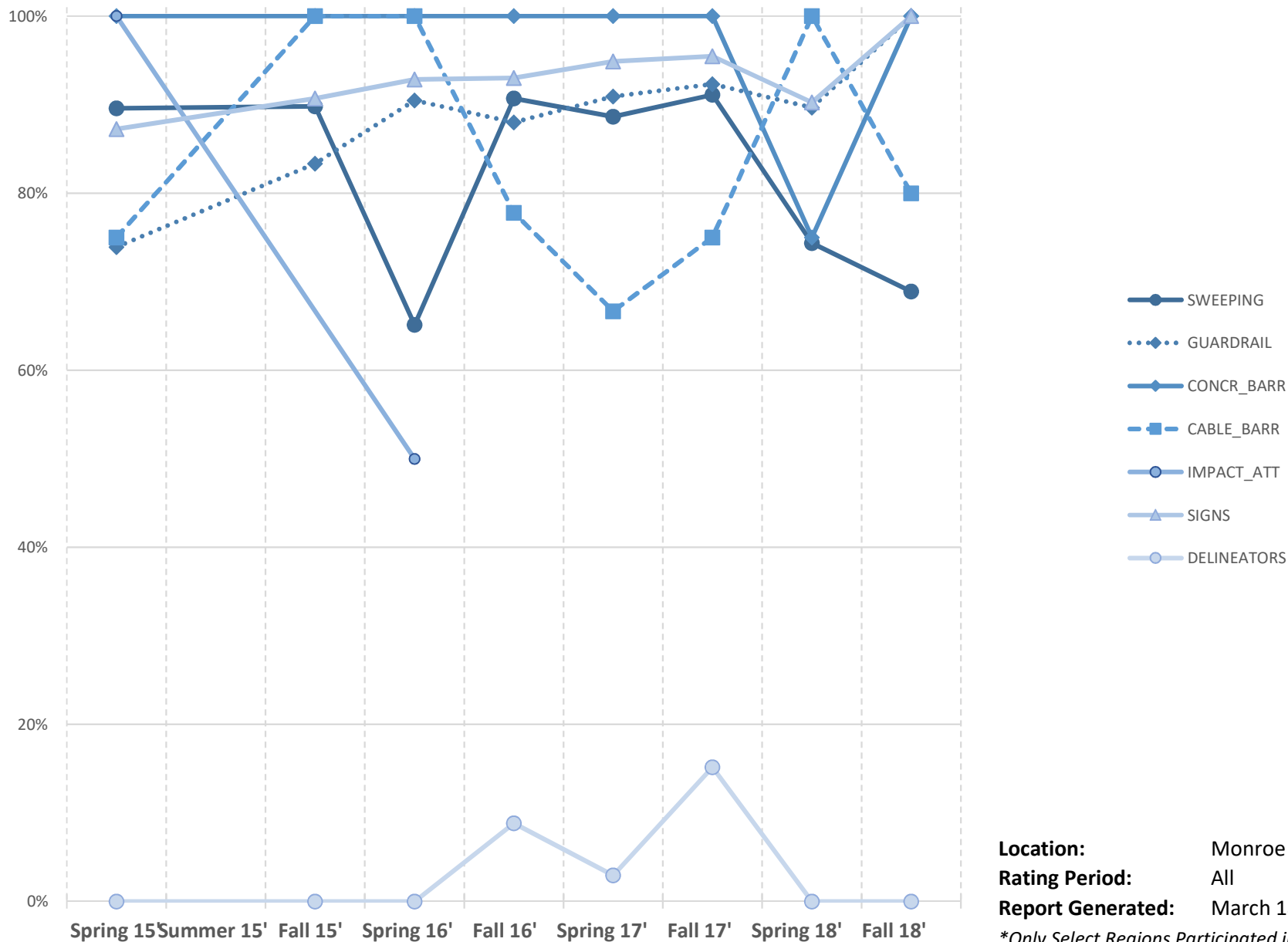
Monroe COUNTY Michigan Maintenance Rating System (MiMRS) Results Rating Trends - All Periods thru Fall 2018



Location: Monroe County
Rating Period: All
Report Generated: March 18, 2019
**Only Select Regions Participated in Period 2*
*** Grass Measure added Summer 15'*

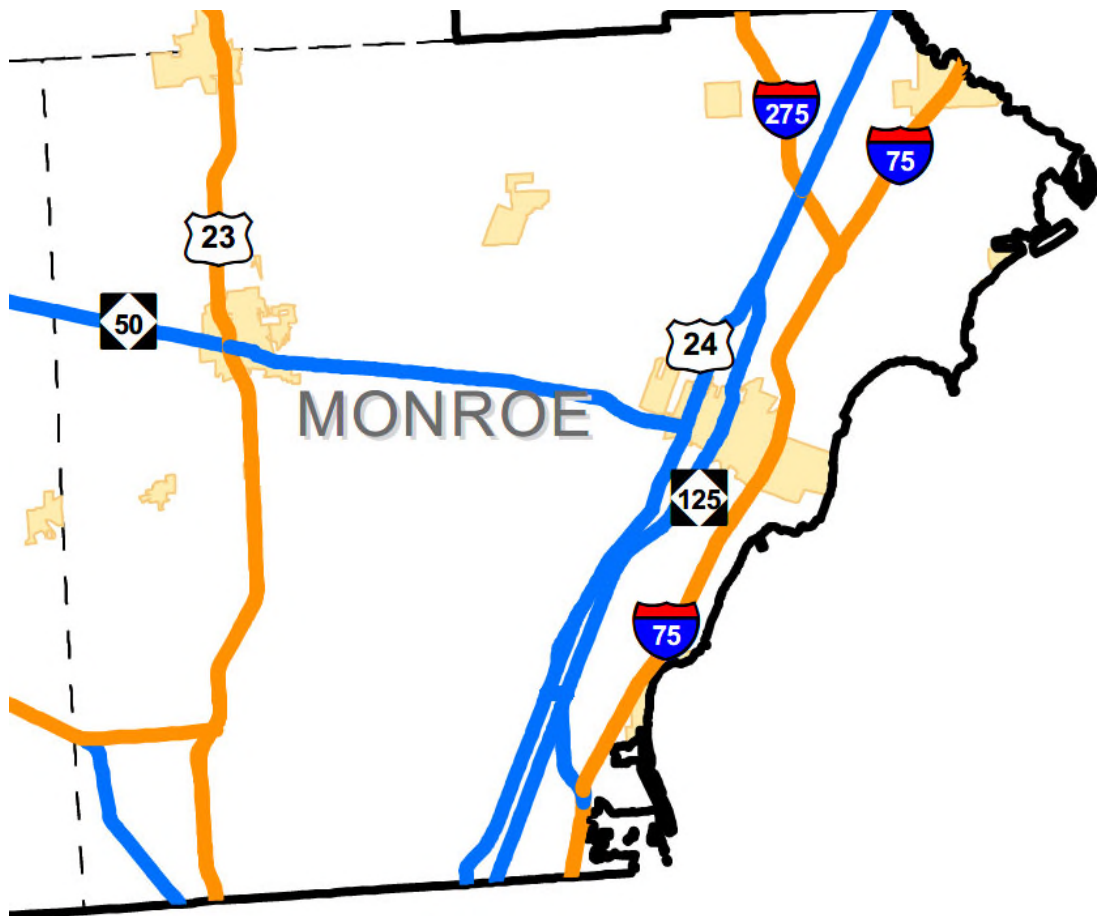
FAMS Attachment G: Monroe County Historical Performance Based Maintenance

Monroe COUNTY Michigan Maintenance Rating System (MiMRS) Results Rating Trends - All Periods thru Fall 2018



Location: Monroe County
Rating Period: All
Report Generated: March 18, 2019
**Only Select Regions Participated in Period 2*

Monroe County Winter Level of Service



Guide for Snow and Ice Control

Priority Level I (ORANGE ROUTE)

Provide maintenance service as appropriate under prevailing weather conditions with a goal of providing a pavement surface over its entire width generally bare of ice and snow. This work may be accomplished using overtime as necessary.

Clearing the pavement bare of ice and snow over its entire width will be a continuous process during and after the snow event using overtime as necessary.

Priority Level II (BLUE ROUTE)

Provide maintenance service as appropriate under prevailing weather conditions with a goal of providing a pavement surface generally bare of ice and snow in the center portion wide enough for one-wheel track in each direction. This work may be

Clearing the pavement bare of ice and snow over its entire width will be accomplished as soon as reasonably possible after the winter



Winter Level of Service Definitions



Priority #1- Orange Route

Provide maintenance service as appropriate under prevailing weather conditions, with a goal of providing a pavement surface over its entire width *generally bare of ice and snow.* This work may be accomplished using overtime as necessary.

Clearing the pavement bare of ice and snow over its entire width will be a continuous process during and after the snow event using overtime as necessary.

Priority #2- Blue Route

Provide maintenance service as appropriate under prevailing weather conditions, with a goal of providing a pavement surface *generally bare of ice and snow* wide enough for one-wheel track in each direction. This work may be accomplished using overtime as necessary during a winter storm event.

Clearing the pavement bare of ice and snow over its entire width will be accomplished as soon as reasonably possible after the winter storm event, without working overtime.



A *generally bare of ice and snow* pavement is defined as a travel lane surface that is free from drifts, snow ridges, and as much ice and snow pack as practical.

FAMS Attachment I: Additional Maintenance Decision Support System (MDSS) Requirements

The MDSS (“System”) shall detect, diagnose, forecast, and display surface transportation weather phenomena, road condition information, and winter maintenance treatment recommendations (described herein) for supporting winter road maintenance operations (e.g., snow plowing, deicing, anti-icing, etc.).

The System shall include the capability to selectively archive data and display archived data and products. The System shall include the capability to routinely monitor the system status. The System shall be fault tolerant with high reliability. The System shall be designed in accordance with standard commercial practices for software development. The System shall be designed to make reasonable allowance for expansion of computing power. The System software shall be designed to ensure that it can run on commercial-off-the-shelf hardware commonly available; that is, no special hardware development will be necessary. The System shall be designed to ensure that it can incorporate weather and road data from disparate sources (e.g., National Weather Service (NWS), Department AVL/GPS, Department Connected Vehicle projects, mesonetworks, RWIS, AWOS, etc.). The System (including all servers and displays) shall be synchronized using a time standard. The System shall include the capability to playback historical data for demonstration, training, and analysis purposes. The System shall use Local Time (LT) for all displays.

The System displays shall be implemented in English with English units as the default setting. The System shall integrate environmental (weather), road condition and transportation operational data in a manner that allows it to provide predictions of pavement conditions (e.g., pavement temperature, precipitation accumulation, anti-icing chemical effectiveness, etc.) associated with winter road maintenance.

Using the pavement condition and environmental prediction information, the System shall provide decision support guidance to winter road maintenance practitioners and the guidance shall include information related to treatment options (e.g., plow, deice, anti-ice, etc.), timing of application, location of application, and amount of application) based on current and predicted weather conditions. The System shall notify users when data updates (e.g., new forecasts) are available and the updates shall be loaded when the user selects to do so.

MDSS Coverage Area

The System shall be designed to operate (via configurable files) in any user-defined region (e.g., state, city, county, etc.) that has input data necessary to support its operations. The System shall generate weather forecasts for zones or regions around the State as identified by the user (e.g., forecast zones, maintenance zones, etc.). The System shall provide weather and road condition products (via configurable files) for road routes (maintenance routes) identified by the user. The System shall be configured to provide weather and road condition products for user identified road maintenance routes.

Weather Forecast Products

Weather forecast products refer to weather elements above the ground. Weather forecast products shall be provided out to at least 48 hours. Weather forecast products shall have a temporal resolution of at least one hour. Weather forecast products shall be updated no less than every three hours; that is, a new 48-hour forecast shall be provided every three hours.

The following weather forecast products shall be provided 2 meters above ground level (AGL), unless otherwise noted:

- a) Surface air temperature
- b) Surface dew point
- c) Surface relative humidity
- d) Surface wind speed & direction
- e) Surface wind gust
- f) Precipitation type
- g) Precipitation rate
- h) Snowfall accumulation (e.g., 3-hr total, 6-hr total, and total accumulation during the forecast period)
- i) NWS watches, warnings and advisories

The weather forecast products shall be geo-referenced to the DOT domain using map overlays that include roads, road designators, political boundaries, etc.

Surface Air Temperature Forecast Product

The output (content) of the Surface Air Temperature Forecast Product on the display shall have the following characteristics:

- a) The surface air temperature shall be provided in degrees Fahrenheit
- b) Time series information (text and graphical formats) of the surface air temperature shall be provided.
- c). Reference lines (configurable) associated with frequent thresholds (e.g., freezing) shall be provided.

Surface Dew Point Temperature Forecast Product

The output (content) of the Surface Dew Point Temperature Forecast Product on the display shall have the following characteristics: a) The surface dew point temperature shall be provided in degrees Fahrenheit b) Time series information (text and graphical formats) of the surface dew point temperature shall be provided.

Surface Wind Speed & Direction Forecast Product

The output (content) of the Surface Wind Speed & Direction Forecast Product on the display shall have the following characteristics:

- a) The wind speed shall be provided in statute miles per hour by default
- b) The wind direction shall be provided in degrees with respect to true north.
- c) Time series information (text and graphical formats) of the wind speed and direction

Surface Wind Gust Forecast Product

The output (content) of the Surface Wind Gust Forecast Product on the display shall have the following characteristics: a) The wind gust speed shall be provided in statute miles per hour. c) Time series information (text and graphical formats) of the wind gust speed shall be provided.

Conditional Probability of Precipitation Type Forecast Product

The conditional probability of precipitation type is a product that describes the probability that a particular precipitation type (e.g., rain, snow, freezing rain, etc.) will occur if there is any precipitation at all.

The Precipitation Type Forecast Product shall include the conditional probability of precipitation type. That is, the user shall be able to view the probability of each type of precipitation as well as the predominant type.

- a. The precipitation type shall be provided for at least the following:
 - a. Rain
 - b. Snow
 - c. Ice
 - d. Mixed (rain, snow, ice)
- b. The predominant precipitation type (the type that the model selects as the most likely kind that will occur) shall be identified.
- c. Time series information (text and graphical formats) of the predominant precipitation type shall be provided.

Precipitation Rate Forecast Product

The output (content) of the Precipitation Rate Forecast Product on the display shall have the following characteristics:

- a. The liquid equivalent precipitation rate shall be provided in inches per hour (to a precision of a hundredth of an inch).
- b. The snowfall precipitation rate shall be provided in inches per hour (to a precision of a tenth of an inch).
- c. Time series information (text and graphical formats) of the precipitation rate shall be provided.

Snowfall Accumulation Forecast Product

The Snowfall Accumulation Product shall indicate the amount of snow that is expected to reach the surface (ground) over a specified period. Melting of precipitation due to warm surface conditions is not considered in this product.

The output (content) of the Snowfall Accumulation Forecast Product on the display shall have the following characteristics:

- a. The snowfall accumulation shall be provided in inches (to a precision of a tenth of an inch).
- b. Time series information (text and graphical formats) of the snowfall accumulation shall be provided.
- c. Snowfall accumulation shall be provided at user-defined temporal increments out to 48 hours (e.g., 3-hour, 6-hour, 12-hour accumulation, etc.).

Weather Observation Products

Weather observation products shall be provided by the System. The weather observations products shall be geo-referenced to the DOT domain using map overlays that include roads, road designators, political boundaries, etc.

Weather observation products shall include, but not be limited to, observations from the following sources: NWS, DOT, FAA, and other sources as available.

Weather observation products shall include the following parameters, where available:

- a. Air temperature (degrees F)
- b. Relative humidity (percent)
- c. Dew point (degrees F)
- d. Wind speed & wind direction (miles per hour & degrees with respect to true north)
- e. Radar Imagery

The weather observation products shall update as new data arrive. The output (content) of the weather observation products on the display shall have the following characteristics:

- a. The surface observation data shall expire off the screen after a configurable number of minutes.
- b. The expiration time shall be independently configurable for each observation product.
- c. Time series (text and graphical formats) shall be provided.
- d. Animation of the observations shall be provided.

Radar Product

The radar product shall be based on data provided by NOAA. Other radar data sources may be used if applicable (e.g., FAA Terminal Doppler Weather Radar, local media owned radars). The radar product shall be based on the reflectivity (intensity) field. The radar product shall update as new data arrive.

The output (content) of the radar product on the display shall have the following characteristics:

- The radar reflectivity (intensity) field shall be displayed (plus color legend).
- Radar products shall be provided for user-defined domains.

NWS Watch, Warnings and Advisories Product

NWS watch, warnings and advisories for the DOT domain shall be provided.

The NWS watch, warnings and advisories shall include, but not limited to:

- a. Winter storm watches and warnings
- b. Flood watches and warnings
- c. Flash flood watches and warnings
- d. Severe thunderstorm watches and warnings
- e. Tornado watches and warnings
- f. High wind watches and warnings
- g. Special weather statement
- h. Freeze watches and warnings
- i. Winter weather advisories
- j. Dense fog advisories
- k. Snow advisories

The NWS watch, warning and advisory product shall be provided in text format. Graphical depictions of NWS watches and warnings may be provided, where applicable.

When an NWS watch, warning or advisory is in effect for an area (configurable) that covers the DOT domain, the display shall provide an indicator (e.g., highlighted button).

Road Condition Observation Products

Road condition observation products shall be provided and shown on the display.

Road condition observation products may include, but not be limited to, observations or measurements from the following sources:

- a. Environmental Surface Stations (ESS)
- b. Road Weather Information Systems (RWIS)
- c. GPS/AVL data and Connected Vehicle data from Department fleet

(The CCI will decide which sources are used, and how).

Road condition observation products shall include the following parameters, where available

- a. Road temperature (degrees F)
- b. Subsurface temperature (degrees F)
- c. Chemical concentration on road (percent by weight)
- d. Freeze point temperature (degrees F)
- e. Pavement condition as: Wet, Dry, or Chemically Wet
- f. Snow, frost, and ice depth (inches)

- g. Blowing snow (yes/no)
- h. Visibility (miles or fractions of miles)

The road condition observation products shall update as new data arrive. The output (content) of the road condition observation products on the display shall have the following characteristics:

- a. The surface observation data shall expire off the screen after a configurable number of minutes
- b. The expiration time shall be independently configurable for each observation product.
- c. Viewing of the product shall be user selectable.
- d. Time series (text or graphical formats) of the observations shall be provided.
- e. Animations of the road condition products shall be provided.

Road Condition Prediction Products

The road condition prediction products shall be provided out to at least 48 hours. The road condition prediction products shall have a temporal resolution of at least one hour. The road condition prediction products shall be updated every three hours; that is, a new 48-hour forecast shall be provided no less than every three hours.

The following road condition prediction products shall be provided:

- a. Road temperature
- b. Road chemical concentration
- c. Snow depth on road
- d. Blowing snow potential
- e. Pavement frost potential
- f. Pavement condition

Road Temperature Prediction Product

The Road Temperature Prediction Product shall be provided at predefined (configurable) locations associated with each DOT maintenance route. The Road Temperature Prediction Product shall be based on a thermal energy balance model and/or empirically based model.

The output (content) of the Road Temperature Prediction Product on the display shall have the following characteristics:

- a. The road temperature shall be provided in degrees F
- b. The road temperature shall be presented graphically at each forecast location within the chosen (configurable) maintenance routes.
- c. Time series information (text and graphical formats) shall be provided.

Road Snow Depth Prediction Product

The Road Snow Depth Prediction Product shall provide information that describes the amount of snow that is predicted to accumulate on a road surface without traffic and for specific winter maintenance treatments

Calculation of the Road Snow Depth Prediction Product shall take into account (at a minimum) the forecasted precipitation type and rate, and road temperature to estimate the amount of snow that will accumulate on the road surface.

The Snow Depth Prediction Product shall be provided at predefined (configurable) locations within each DOT maintenance route.

Calculation of the Snow Depth Prediction Product shall take into account treatment options including the amount of snow expected to accumulate on the road when; a) no treatment is performed, b) the recommended treatment is performed, and c) a user-defined treatment is performed.

The output (content) of the Snow Depth Product on the display shall have the following characteristics:

- a. The snow/ice amount shall be given in inches by default (to a tenth of an inch)
- b. The snow depth shall be shown for various treatment options including: no treatment, recommended treatment, and user-defined treatment.
- c. The road snow depth shall be presented graphically at each forecast location associated with the chosen (configurable) maintenance routes.
- d. Time series information (text and graphical formats) of the road contamination accumulation shall be provided.

Blowing Snow Potential Product

The Blowing Snow Potential Product shall provide information that describes the likelihood for blowing snow (e.g., low, medium, high). Calculation of the Blowing Snow Potential Product shall take into account (at a minimum) recent snowfall characteristics, the forecasted precipitation type and rate, predicted wind speed, local topography, and predicted air temperature. The Blowing Snow Potential Product shall be provided at predefined (configurable) locations within each DOT maintenance route.

The output (content) of the Blowing Snow Potential Product on the display shall have the following characteristics:

- a. The likelihood value for blowing snow (e.g., low, medium, high or as a percentage)
- b. Likelihood values shall be provided at hourly increments.
- c. Likelihood values shall be provided at hourly increments.
- d. Time series information (text and graphical formats) shall be provided

Pavement Frost Potential Product

The Pavement Frost Potential Product shall provide information that describes the likelihood for frost on the pavement surface (road and/or bridges) (e.g., low, medium, high or as a percentage).

Calculation of the Pavement Frost Potential Product shall take into account (at a minimum) predicted pavement temperature, predicted precipitation type and rate, predicted wind speed, predicted relative humidity (considerations of dew point/frost point), and predicted air temperature. The Pavement Frost Potential Product shall be provided at predefined (configurable) locations within each DOT maintenance route.

The output (content) of the Pavement Frost Potential Product on the display shall have the following characteristics:

- a. The likelihood value for pavement frost (e.g., low, medium, high or as a percentage)
- b. Likelihood values shall be provided at hourly increments
- c. Likelihood values shall be provided for each road forecast segment (e.g., plow route).
- d. Time series information (text and graphical formats) shall be provided.

Pavement Condition Prediction Product

The Pavement Condition Prediction Product shall provide information on the predicted state of the pavement and include:

- a. Wet
- b. Dry
- c. Chemical wet
- d. Percent coverage of snow and
- e. Snow, frost, and ice depth (inches)

The output (content) of the Pavement Condition Prediction Product on the display shall have the following characteristics:

- a. The pavement condition shall be presented in text format indicating the pavement condition (e.g., wet, dry, chemical wet, etc.) for each road forecast location (e.g., plow routes).
- b. Time series information (text and graphical formats) shall be provided.

Calculation of the Pavement Condition Prediction Product shall take into account the pavement condition when; a) no treatment is performed, b) the recommended treatment is performed, and c) a user-defined treatment is performed.

Forecast Confidence Product

A measure of confidence shall be provided for the following weather forecast and road condition prediction products:

- a. Snow accumulation
- b. Precipitation type
- c. Road temperature

The calculation of prediction confidence shall take into account recent statistical performance of each parameter and other appropriate metrics.

The output (content) of the Prediction Confidence Product on the display shall have the following

characteristics:

- a. The prediction confidence shall be given as a percentage, and shall be able to be displayed graphically.
- b. Error statistics shall be calculated that reflect recent skill.
- c. Time series information of the prediction confidence or error statistics shall be provided for the above-mentioned products.

Generation of Treatment Recommendation Predictions

The System shall provide treatment recommendation predictions for winter road maintenance at user defined (configurable) locations (e.g., plow routes).

The System shall provide treatment recommendation predictions out to no less than 24 hours into the future.

The winter maintenance rules of practice used in the System shall be based on the Manual of Practice for Effective Anti-Icing Program and NCHRP report #526 - Snow & Ice Control: Guidelines for Materials and Methods, and be configurable, as necessary, to reflect local DOT practices.

Treatment recommendations shall include the following for each user defined route:

- a. Recommended initial treatment start time
- b. Recommended subsequent treatment start time
- c. Recommended treatment type (e.g., chemical, abrasives, plow)
- d. Recommended chemical type based on available chemicals as identified by the Department
- e. Recommended material rate (e.g., amount per lane mile)
- f. Recommended pre-treatment type (solid or liquid), where applicable

The System shall have a capability to incorporate constraints (configurable) for each route so that irrelevant treatment recommendations are not provided. For example, the use of NaCl should not be recommended if the user does not use that chemical. Constraints may include:

- a. Available materials (e.g., NaCl, MgCl₂, CaCl₂, abrasives etc.)
- b. Application rate limits (based on truck spreading limits)
- c. Route cycle limits (minimum turn around time to repeat treatments)

Treatment recommendations shall be calculated, to the greatest extent possible, using a combination of current observational data on the state of the roadway and predicted weather and road conditions.

Treatment recommendation calculations should consider, to the greatest extent possible, factors that impact treatment effectiveness (e.g., chemical scatter, splatter, traffic impacts, spreader characteristics, etc.).

System Alert Function

The System shall provide a capability to alert the user when specific data thresholds (configurable) have been exceeded. Users shall be able to query the System and view the information related to an alert.

The System shall indicate that an alert is active by one or more of the following methods: a) Highlighting an alert button b) Changing the color of an alert button c) Flashing an alert button d) Audible alert (finite series of beeps or tones) The System shall include a capability to send e-mail or text message notices or cell phone calls (to a configurable list of aliases) when specific alerts (configurable) are generated.

Display

The display shall have the following general capabilities:

- a. Ability to view plan-view graphics
- b. Ability to view time-series information
- c. Animation
- d. Time selection whereby the user can select the time period for data viewing
- e. Print function
- f. Alert function
- g. Ability to review historical data
- h. Ability to select viewing area
- i. Ability to select products for viewing
- j. Help function
- k. Ability to combine data on time series plots
- l. Ability to configure data ranges (scale) for each time series plot
- m. Ability to overlay and combine graphical products

In vehicle display:

- a. Ability to view plan view graphics
- b. Ability to view local radar
- c. Ability to view route specific treatment recommendations
- d. Ability to view route specific weather and pavement forecast

Map Overlays

The System shall make it straightforward (e.g., via configuration files) to incorporate new map data.

Map overlays shall be available for the following:

- a. Roads (State and local highways and secondary roads)
- b. Road designators (e.g., route numbers, etc.)
- c. Road Control section and mile marker identification.
- d. Political boundaries (e.g., States, counties, maintenance zones, MDOT region and TSC area, etc.)
- e. Cities
- f. Weather and road condition observation sites

Data Archive and Historical Data Review

The System shall include a short and long-term data storage capability. The process of saving data shall not interfere with the normal operation of the System.

Short-Term Archive

The short-term archive shall consist of the latest fourteen (14) days of data. The oldest stored data shall be routinely (scrubbed) overwritten by new incoming data, such that the integrity of incoming data is preserved. Data within the short-term archive shall be viewable by selecting the date and time of interest from the display interface.

Long-Term Archive

The long-term archive shall consist of data sets specifically saved by the user. The System shall not delete (scrub) data within the long-term archive. The user shall have the capability to select the date, time, and filename for the long-term archive. The System shall provide a capability for the user to review data from the long-term archive. This review shall not interfere with the operation of the real-time system. This requirement could be met by having a separate System available to view data from the historical archive.

Historical Data Viewer

The system shall have a capability to view (recent) historical weather and road condition prediction products together with actual observational data to give the user an indication of the performance of the weather and road condition predictions.

Users shall have the ability to select any of the forecasts from the previous 24-hour period. For example, the user shall be able to select a forecast 6 hours previous and compare the predicted conditions to the actual conditions.

Security

Means shall be provided to prevent the unauthorized use or misuse of the facilities provided in the System. This particularly applies to those functions that can be used to reconfigure or change the operating status of the System or subsystems.

Security shall be provided (e.g., password protection) to ensure that the System cannot be accidentally disabled from any display device or network system.



WebMDSS™

For



Welcome to WebMDSS! This is the web version of the Maintenance Decision Support System (MDSS) that has been utilized by state DOTs for over a decade. Iteris' MDSS is the source for weather/pavement forecasts for effectively managing winter weather road issues before, during, and after weather events. The downloadable desktop version of the MDSS GUI remains operational for all users. WebMDSS can be accessed on these browsers: Google Chrome, Firefox, and IE 11 or higher. Users who have previously accessed Iteris' ClearPath Weather, another web-based MDSS product provided by Iteris, will notice similar features. However, WebMDSS was developed through the MDSS Pooled Fund Study and contains several enhanced features.

This guide will show you how to set-up your password, access pavement forecasts, and navigate the map to view weather radar and other important weather observations. To access the WebMDSS interface please visit:

www.WebMDSS.com

If you are logging in to WebMDSS for the first time, please click "Forgot Password". Next, type in your username, which is usually your agency issued email address (jdoe@mdot.gov). Click on "OK, email me". Follow the directions in that email to establish your password. The email should look like this:

This message was sent by Iteris, Inc. to
verify your identity. Please follow the link below to set your password.

http://www.webmdss.com/login/index.pl?action_code=...

If you received this message in error, please disregard it. Someone else may have mistakenly entered your email address.

If you have any questions or encounter any difficulties, please
email Iteris at wxsupport@iteris.com.

iteris®

FAMS Attachment J: MDOT - Iteris MDSS System

Accessing Pavement Forecast

Step 1: Click on the Checkbox next to “Forecast Sites/Routes” and select the parameter you’d like to view on the map from the drop-down menu.

☐ MDSS Weather Alerts
☐ MDSS Road Alerts
☐ MDSS Blowing Snow Alerts
☐ MDSS Maintenance Alerts
☐ NWS Alerts
☐ Overlay
Radar
Opacity
☒ Forecast Sites / Routes
MDSS Road Condition
☐ RWIS
Dew Point

Step 2: Click on a route you’d like to view from the map.



Step 3: After selecting a route, the route specific information such as treatment recommendations, Current Weather, Accumulation, Pavement information is displayed

Treatment Recommendations:

- Mix Prewet Salt (w/ Boost) 225 lbs @ Sat Jan 19 08:20 am
- Mix Prewet Salt (w/ Boost) 150 lbs @ Sat Jan 19 09:40 am
- Patrol & Plow (PREFERRED OPTION) @ Sat Jan 19 11:00 am
- Patrol & Plow (PREFERRED OPTION) @ Sat Jan 19 12:20 pm

Weather (Saturday, Jan 19th 2019: 8:20 am)

Air Temp	20 °F
Dew Pt	17 °F
Humidity	88 %
Visibility	1.00 mi
Winds	NE 10 mph

Accumulation

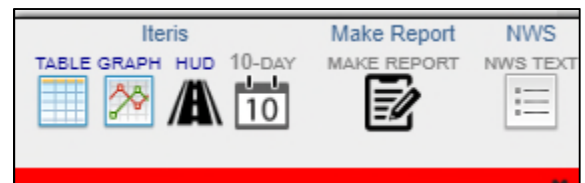
	- 24 Hrs	+ 24 Hrs
Liquid (in):	0.00	0.00
Ice (in):	0.00	0.00
Snow (in):	2.10	2.60

Pavement

Pvmt Temp	22 °F
Percent Ice	10 %
Mobility Index	52

Status: Snowcovered

Step 4: Select Graph or Table View

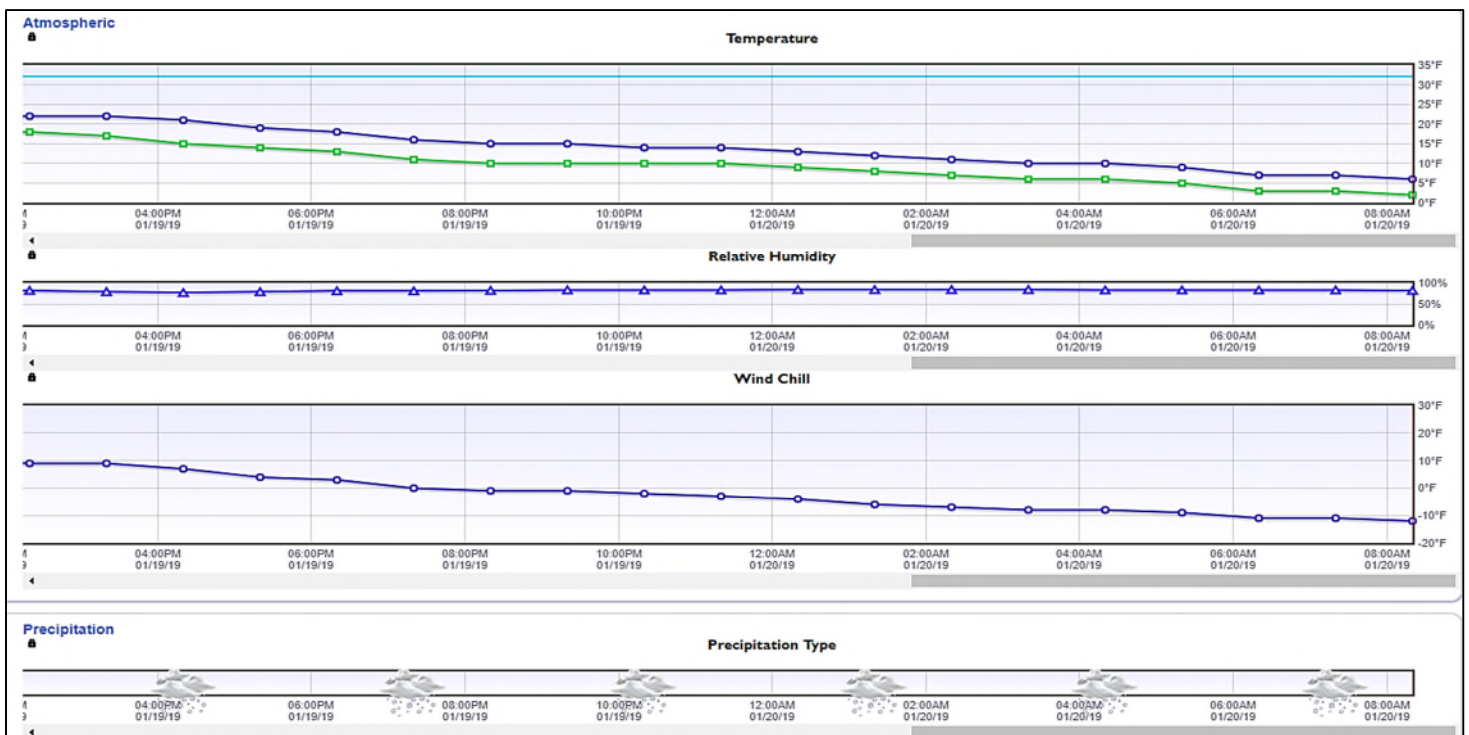


FAMS Attachment J: MDOT - Iteris MDSS System

Table View

Time (GMT-0400)	Temp	Pvmt Cond	Frost Prob	Maintenance	Rate	Temp	Pvmt Cond	Frost Prob	Maintenance	Rate	Air Temp	Dew Pt	Humidity	Wind Direction	Wind Speed (mph)	Gust (mph)	Wind Chill (°F)	Type	Precip Prob (%)	Sn Rate (in/hr)	Sn Accum (in)
Sat 2am	25	SN	5	---	---	25	SN	5	---	---	23	19	83	NE	7	---	15	SN	---	0.22	0.4
Sat 3am	25	SN	5	🚚	---	25	SN	5	🚚	---	22	19	86	NNE	7	---	13	SN	---	0.32	0.6
Sat 4am	24	SN	5	🚚	---	24	SN	5	🚚	---	21	18	87	NE	8	---	11	SN	---	0.24	1.0
Sat 5am	23	SN	5	🚚	---	23	SN	5	🚚	---	20	17	87	NNE	9	---	10	SN	---	0.26	1.2
Sat 6am	23	SN	5	🚚	---	23	SN	5	🚚	---	20	16	87	NNE	8	---	10	SN	---	0.31	1.5
Sat 7am	22	SN	5	🚚	---	22	SN	5	🚚	---	20	16	87	NE	10	---	9	SN	---	0.31	1.8
Sat 8am	22	SN	10	🚚 Mix	225 lbs	22	SN	10	🚚 Mix	225 lbs	20	17	88	NE	10	---	9	SN	100	0.43	2.1
Sat 9am	22	Slush	15	---	---	22	Slush	15	---	---	20	17	89	NE	11	---	8	SN	100	0.45	2.5
Sat 10am	22	Slush	15	🚚 Mix	150 lbs	22	Slush	15	🚚 Mix	150 lbs	21	18	88	NE	12	---	9	SN	100	0.42	3.0
Sat 11am	23	Slush	10	🚚	---	23	Slush	10	🚚	---	21	18	87	NE	13	---	8	SN	100	0.28	3.4
Sat 12pm	24	Slush	10	🚚	---	24	Slush	10	🚚	---	22	19	87	NE	13	---	10	SN	97	0.28	3.7

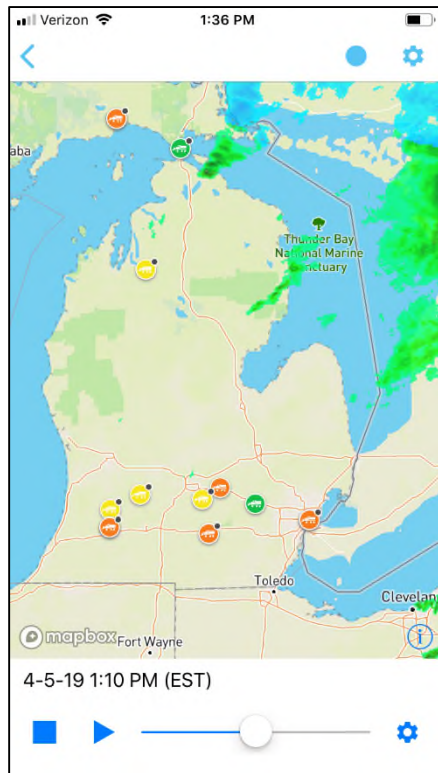
Graph View



FAMS Attachment J: MDOT - Iteris MDSS System

IOS and Android Application

Up to date Radar Layer



Detailed Route specific Information

	Air Temp	Dew Pt	Humidity	Wind Direction	Wind Sp
Fri 05 3:00 AM (EST)	34	24	68	SSW	
Fri 05 4:00 AM (EST)	34	25	72	ESE	
Fri 05 5:00 AM (EST)	33	25	72	ESE	
Fri 05 6:00 AM (EST)	33	25	73	NE	
Fri 05 7:00 AM (EST)	32	27	80	E	
Fri 05 8:00 AM (EST)	31	28	88	ENE	
Fri 05 9:00 AM (EST)	31	29	90	ESE	
Fri 05 10:00 AM (EST)	32	30	91	ESE	
Fri 05 11:00 AM (EST)	33	31	92	SE	
Fri 05 12:00 PM (EST)	35	32	90	SSE	
Fri 05 1:00 PM (EST)	35	32	89	S	
Fri 05 2:00 PM (EST)	39	32	74	S	
Fri 05 3:00 PM (EST)	41	33	70	SSW	
Fri 05 4:00 PM (EST)	44	34	67	SW	
Fri 05 5:00 PM (EST)	45	34	65	WSW	
Fri 05 6:00 PM (EST)	46	35	66	WSW	
Fri 05 7:00 PM (EST)	45	35	68	WSW	

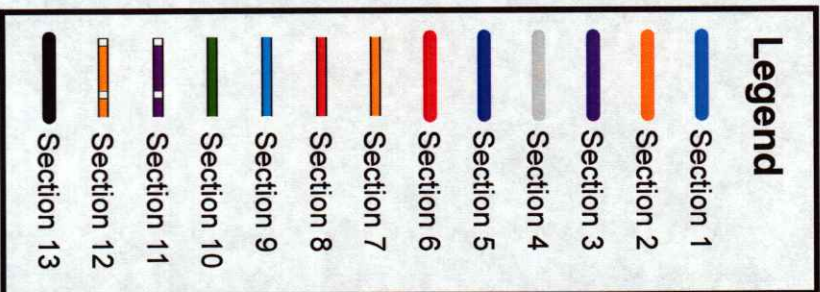
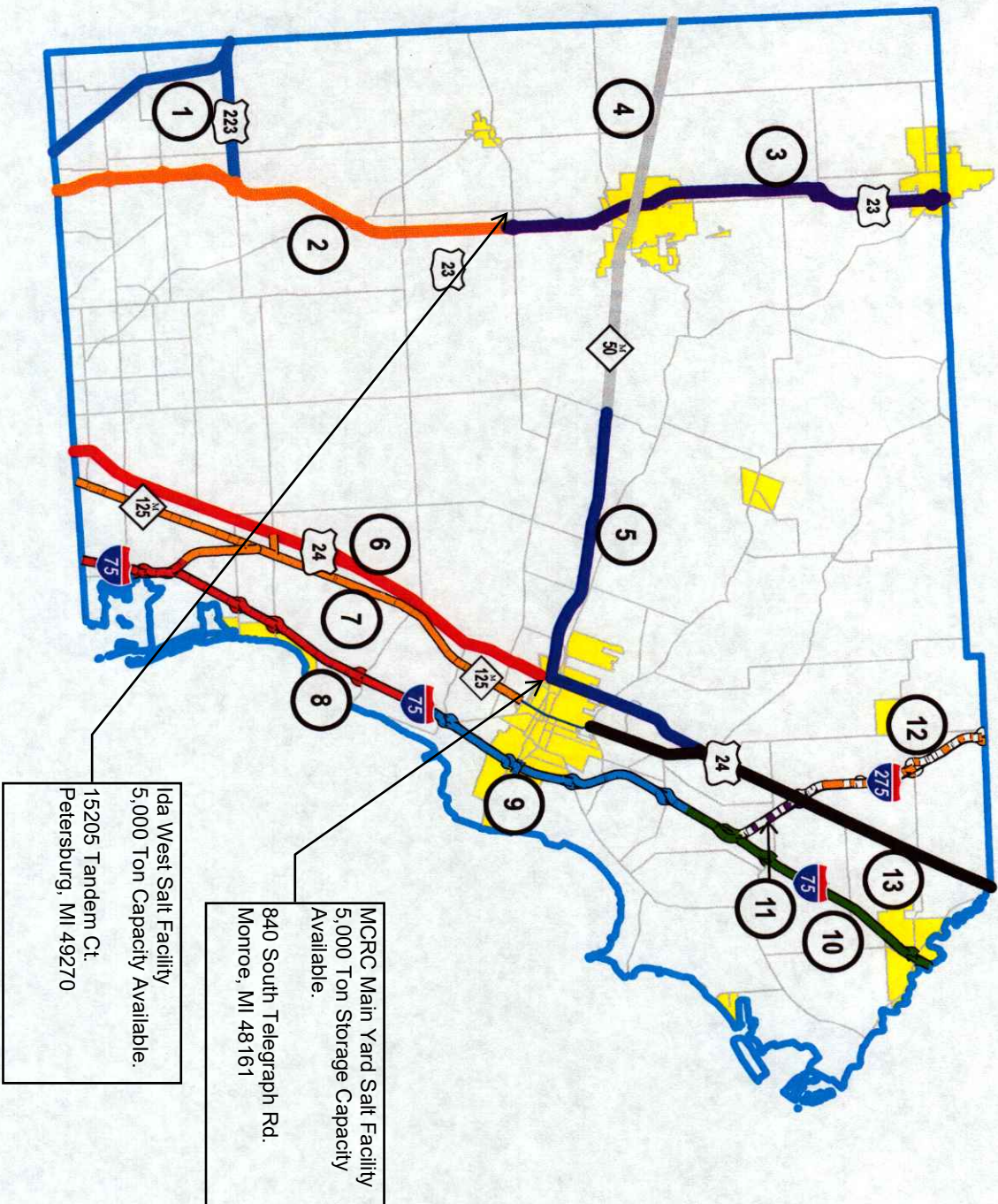
Route Alerts, Conditions, Maintenance

M-33: M-32 south to Fairview	
Alerts	Conditions
M-33: M-32 south to Fairview, Roadway	
4-5-19 1:00 PM (EST)	
Atmospheric	
Air Temperature	35 °F
Dew Point	32 °F
Relative Humidity	89 %
Visibility	5.00 miles
Winds	S 7 miles/hr

10 Day Forecast Information

Apr 5 Friday	Apr 6 Saturday
45 °F	54 °F
0 % Wintry Mix Likely	70 % Light Rain Likely
SSE @ 6 mph	SW @ 4 mph
Total Snow: 0.3 in	Total Precip: 0.01 in
36 °F	45 °F
0 % Slight Chance of Sprinkles	70 % Light Rain Likely
W @ 4 mph	Becoming SE @ 4 mph
	Total Precip: 0.04 in

MDOT Monroe County Snow Routes



FAMS Attachment L: Liquid Deicer Specifications

Deicer with ABP Specification

a. Description. Agricultural Byproducts (ABP) for anti-icing use are the concentrated liquid residues from the processing of grains and other agricultural products. They are derived from the processing of agricultural raw materials, primarily corn. The liquid residues are typically combined with salt brines, and the resulting mixture is sprayed onto roads and bridges for anti-icing use.

b. Materials. All materials shall meet the requirements as specified herein.

1. No products will be accepted that contain constituents in excess of the following established total concentration limits as tested in accordance with the methods listed in the Appendix. Test results from an independent laboratory shall be submitted. The material tested shall be of the same composition as the material submitted.

Table 1. Hazardous constituent concentration limits.

Hazardous Constituent	Maximum Concentration Limit, parts per million
Arsenic	5.00
Barium	100.0
Cadmium	0.20
Chromium	1.0
Copper	1.0
Cyanide	0.20
Lead	1.00
Mercury	0.05
Total Phosphorus	2500.0
Selenium	5.00
Zinc	10.0

2. pH - The pH of liquid chemical products shall be within the limits of 6 to 9.

3. The product shall not contain greater than 1.0% (V/V) Total Settleable Solids and shall have ninety-nine percent (99.0%) of the Solids Passing through a Number 10 sieve after being stored at 0° F +/- 2° F for 168 hours (Test Method Number 11). The product shall have a minimum storage life of one year, without degradation or addition of stabilizers or inhibitors. The product shall have a freeze point of - 20 F or below.

4. The contractor shall be responsible for all clean up expenses of any product delivered and/or applied that is found to be contaminated. This includes, but is not limited to, clean up measures as needed for the following: storage facility, yard, equipment, and roadside. In addition, the contractor shall be liable, as determined by MDOT, for causing any unanticipated extraordinary damages to equipment used in the storage or distribution of the chemical products.

5. MDOT has the right to accept or reject products based upon material composition. Each product will be assessed for the potential of causing a decrease in the public safety. Acceptance or rejection of a product based on composition shall be final and in the best interest of MDOT.

6. Concentration of as delivered product ingredient(s) shall not exceed 1.5 % of product formulation as specified in bid form.

7. Odor/Residual Effect - The anti-icing liquid shall not have a disagreeable odor, as determined by MDOT personnel. A mild, sweet odor, typical of anti-icing products formulated with ABP's, is not cause for rejection. However, if sprayed on a hot surface, the ABP anti-icing liquid will not burn or otherwise generate disagreeable odors.

8. Mixing of different ABP formulations - The product will be examined for the formation of solids and the ability of the chemical product to maintain a non-stratified suspension without agitation, when mixed with other types of ABP residues.

9. In addition to the general specifications, the following requirements a-c below also applies to category products. An independent certified analysis showing compliance with the requirements listed below must be submitted with the bid along with an intended use statement for the product. Exceptions to the requirements must be stated and MDOT reserves the right to reject the product. All products submitted for consideration shall fit into one of these categories; however, a contract will be awarded to only one Contractor and not to one Contractor in each category.

a. Liquid Magnesium Chloride with ABP

Product must contain no less than 18.0% magnesium chloride by weight as $MgCl_2$. Bid evaluations will consider only the portion that is magnesium chloride. Weight per gallon will be established according to the specific gravity and percentage of processing residue, product, and additive contained in the product bid as indicated by the Contractor.

b. Liquid Calcium Chloride with ABP

Product must contain no less than 18.0% calcium chloride by weight as $CaCl_2$. Bid evaluations will consider only the portion that is calcium chloride. Weight per gallon will be established according to the specific gravity and percentage of processing residue, product, and additive contained in the product bid as indicated by the Contractor.

c. Liquid Calcium/Magnesium/Sodium Chloride with ABP

Product must contain no less than 18.0% total sodium chloride, calcium chloride, and magnesium chloride by weight as $NaCl$, $CaCl_2$ and $MgCl_2$. Bid evaluations will consider only the portion that is sodium chloride, calcium chloride, and magnesium chloride. The concentration of each of these chlorides shall remain consistent in the product throughout the contract period. Weight per gallon will be established according to the specific gravity and percentage of processing residue, product, and additive contained in the product bid as indicated by the Contractor.

Salt Brine Specification

Description:

Bulk Salt Brine is rock salt (mineral sodium chloride) that has been dissolved to produce saturated sodium chloride brine.

Chemical & Physical Properties:

Properties

Freezing Point

Solution shall not freeze above -1.0 F

PH Range

6 - 9

Table 1. Hazardous constituent concentration limits.

Hazardous Constituent	Maximum Concentration Limit, parts per million
Arsenic	5.00
Barium	100.0
Cadmium	0.20
Chromium	1.0
Copper	1.0
Cyanide	0.20
Lead	1.00
Mercury	0.05
Total Phosphorus	2500.0
Selenium	5.00
Zinc	10.0

**MICHIGAN
DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAYS**

**SPECIFICATIONS
FOR
ICE CONTROL SAND**

M:TJC

1 of 1







Dated: 4/2/07

- 1.0 DESCRIPTION** - This special provision consists of defining the gradation requirements for Ice Control Sand.
- 2.0 MATERIALS** - The Ice Control Sand shall meet the following gradation requirements.

**ICE CONTROL SAND
Sieve Analysis (MTM 109)**

Sieve Size	Percent Passing
3/8"	100
#4	95-100
#8	65-90
#30	20-65
#200	0-5

MDOT WINTER MAINTENANCE APPLICATION RATES: (SOLIDS)

Recommended Treatment Parameters	AIR TEMP	PAVEMENT TEMPERATURE	WEATHER CONDITION	POUNDS PER 2 LANE MILE		ACTIONS & APPLICATION RECOMMENDED
				PRE WET SALT *	SAND	
	RISING	 — ABOVE 30° —	SNOW	150	NOT RECOMMENDED	PLOW, TREAT HAZARDS ONLY
			FREEZING RAIN	150	NOT RECOMMENDED	APPLY AS NEEDED
	DROPPING		SNOW	150-300	NOT RECOMMENDED	PLOW & APPLY AS NEEDED
			FREEZING RAIN	150-300	NOT RECOMMENDED	APPLY AS NEEDED
	RISING	 — 25° to 30° —	SNOW	150-300	NOT RECOMMENDED	PLOW & APPLY AS NEEDED
			FREEZING RAIN	150-300	NOT RECOMMENDED	APPLY AS NEEDED
	DROPPING		SNOW	150-300	NOT RECOMMENDED	PLOW & APPLY AS NEEDED
			FREEZING RAIN	300-350	400	APPLY AS NEEDED
RISING	 — 20° to 25° —	SNOW / FREEZING RAIN	150-300	400	PLOW & APPLY AS NEEDED	
DROPPING		SNOW	225-300	NOT RECOMMENDED	PLOW & APPLY AS NEEDED	
		FREEZING RAIN	300-350	400	APPLY AS NEEDED	
RISING	 — 15° to 20° —	SNOW	225-300	NOT RECOMMENDED	PLOW & APPLY AS NEEDED	
DROPPING		FREEZING RAIN	300-350	500-750	APPLY AS NEEDED	
		SNOW / FREEZING RAIN	350	500-750	PLOW & APPLY AS NEEDED	
	BELOW 15°	SNOW	NOT RECOMMENDED	NOT RECOMMENDED	PLOW, TREAT HAZARDS AS NEEDED	
FROST: 15° & RISING: TREAT BY ANTI-ICING (BRINE 20-40 GAL/LnMi) OR 15° & FALLING: PRE WET SALT @ 150#/LnMi.						
WIND CONDITION: PLOW, TREAT (TROUBLE SPOTS ONLY) @ 200-400#/LnMi.						

* Note: Pre wet with 7-10 gallons of a liquid chloride product per ton of untreated salt. Rates shown account for a 25 mph truck operating speed, but also apply for trucks properly equipped with a Zero Velocity or Slurry Generator, operating up to 35 mph.

Monroe County Winter Weather Events

October 1 2015 to March 21 2019

Date	Location	Hours of Blowing Snow	Hours of Cold Precipitation (below 32°F)	Hours of Snowfall	Maintenance Events - Freezing Rain	Maintenance Events - Frost	Maintenance Events - Snow	Snow Accumulation (in)
Oct 1 2015 To April 30 2016	Monroe County	4	168	158	2	14	22	33.2633
Oct 1 2016 To April 30 2017	Monroe County	0	151	140	2	19	16	34.3795
Oct 1 2017 To April 30 2018	Monroe County	0	244	233	3	13	26	59.2393
Oct 1 2018 To March 21 2019	Monroe County	1	186	144	5	24	22	33.6857
4 year Average		1.25	187.25	168.75	3	17.5	21.5	40.14195

This chart is for informational purposes only. The information within it has been gathered from MDOT's Maintenance Decision Support System

FAMS Attachment O: Historical Data

MDOT Expenditures by Maintenance Activity for Existing Service Provider

Activity	FY 2016				FY 2017				FY 2018				Three Year Average			
	Expenditure	Benefits	Overhead	Total	Expenditure	Benefits	Overhead	Total	Expenditure	Benefits	Overhead	Total	Expenditure	Benefits	Overhead	Total
Surface Maintenance	\$329,232	\$128,284	\$61,765	\$519,281	\$302,998	\$107,129	\$55,366	\$465,493	\$287,717	\$118,986	\$52,872	\$459,575	\$306,649	\$118,133	\$56,668	\$481,450
Shoulder Maintenance	\$27,367	\$6,895	\$4,625	\$38,888	\$17,432	\$5,818	\$3,139	\$26,388	\$7,604	\$2,529	\$1,317	\$11,450	\$17,468	\$5,081	\$3,027	\$25,575
Tree/shrub removal	\$6,894	\$4,236	\$1,503	\$12,632	\$6,087	\$3,998	\$1,362	\$11,447	\$5,832	\$2,726	\$1,112	\$9,670	\$6,271	\$3,653	\$1,326	\$11,250
Cleaning Drainage Structures	\$22,074	\$10,880	\$4,449	\$37,402	\$38,646	\$21,818	\$8,162	\$68,626	\$36,190	\$20,361	\$7,351	\$63,902	\$32,303	\$17,686	\$6,654	\$56,644
Ditch Cleanout	\$10,175	\$5,032	\$2,053	\$17,260	\$14,602	\$7,375	\$2,967	\$24,944	\$2,600	\$1,485	\$531	\$4,616	\$9,125	\$4,631	\$1,850	\$15,607
Litter Pickup	\$64,923	\$34,494	\$13,421	\$112,838	\$69,388	\$33,958	\$13,952	\$117,298	\$73,773	\$38,825	\$14,638	\$127,235	\$69,361	\$35,759	\$14,004	\$119,124
Grass and Weed Control	\$62,574	\$8,851	\$9,643	\$81,068	\$71,701	\$200	\$9,707	\$81,607	\$85,965	\$261	\$11,209	\$97,436	\$73,413	\$3,104	\$10,186	\$86,704
Culvert/Underdrain Maint.	\$8,147	\$4,389	\$1,692	\$14,229	\$12,835	\$5,530	\$2,479	\$20,844	\$4,651	\$2,333	\$908	\$7,892	\$8,544	\$4,084	\$1,693	\$14,322
Guardrail Repair	\$94,301	\$30,290	\$16,820	\$141,411	\$146,755	\$51,263	\$26,732	\$224,750	\$113,543	\$38,022	\$19,703	\$171,269	\$118,200	\$39,858	\$21,085	\$179,143
Cable Guardrail Repair	\$21,265	\$5,852	\$3,661	\$30,777	\$63,914	\$15,210	\$10,682	\$89,806	\$68,163	\$10,784	\$10,263	\$89,210	\$51,114	\$10,615	\$8,202	\$69,931
Sweeping	\$5,220	\$0	\$705	\$5,925					\$497	\$200	\$91	\$788	\$2,859	\$100	\$398	\$3,356
Tourist Facility Maint.	\$37,591	\$1,245	\$5,243	\$44,080	\$37,359	\$260	\$5,079	\$42,697	\$45,912	\$2,799	\$6,333	\$55,044	\$40,287	\$1,435	\$5,551	\$47,273
Right-of-way Fence Repair	\$1,495	\$626	\$286	\$2,407	\$518	\$386	\$122	\$1,026					\$1,006	\$506	\$204	\$1,716
Other Maintenance	\$397	\$395	\$107	\$900					\$1,703	\$1,073	\$361	\$3,136	\$1,050	\$734	\$234	\$2,018
Winter Maintenance	\$714,705	\$95,861	\$109,428	\$919,994	\$675,673	\$100,713	\$104,813	\$881,198	\$1,073,157	\$155,378	\$159,710	\$1,388,244	\$821,178	\$117,317	\$124,650	\$1,063,146
Winter Road Patrol	\$20,853	\$18,181	\$5,271	\$44,305	\$20,125	\$17,366	\$5,061	\$42,551	\$18,113	\$15,389	\$4,355	\$37,856	\$19,697	\$16,978	\$4,896	\$41,571
Other Winter Maint	\$21,562	\$0	\$2,911	\$24,473	\$28,066	\$0	\$3,789	\$31,855	\$40,089	\$0	\$5,212	\$45,301	\$29,906	\$0	\$3,970	\$33,876
Structure Maintenance	\$4,380	\$2,855	\$977	\$8,211									\$4,380	\$2,855	\$977	\$8,211
Other Bridge Maintenance	\$89	\$94	\$25	\$207	\$255	\$173	\$58	\$485					\$172	\$133	\$41	\$346
Sign Maintenance	\$24,727	\$15,956	\$5,492	\$46,175	\$29,024	\$20,625	\$6,703	\$56,351	\$34,635	\$20,668	\$7,189	\$62,493	\$29,462	\$19,083	\$6,461	\$55,006
Signal Maintenance	\$97	\$117	\$29	\$243	\$172	\$136	\$42	\$349	\$85	\$59	\$19	\$162	\$118	\$104	\$30	\$251
Signal Energy	\$211	\$0	\$28	\$239	\$233	\$0	\$31	\$264	\$246	\$0	\$32	\$278	\$230	\$0	\$31	\$261
Field Supervision	\$82,344	\$74,451	\$21,168	\$177,964	\$70,796	\$65,630	\$18,419	\$154,846	\$75,491	\$69,819	\$18,889	\$164,200	\$76,211	\$69,967	\$19,492	\$165,670
Liability Insurance	\$66,375	\$0	\$8,961	\$75,336	-\$20,765	\$0	-\$2,803	-\$23,568	\$20,489	\$0	\$2,664	\$23,153	\$22,033	\$0	\$2,940	\$24,973
Emergency Response	\$27,860	\$12,674	\$5,472	\$46,007	\$19,985	\$14,388	\$4,640	\$39,014	\$22,664	\$17,305	\$5,196	\$45,165	\$23,503	\$14,789	\$5,103	\$43,395
Adopt-A-Highway Program	\$2,758	\$1,950	\$636	\$5,344	\$3,270	\$2,073	\$721	\$6,064	\$796	\$563	\$177	\$1,536	\$2,275	\$1,529	\$511	\$4,315
Totals	\$1,657,616	\$463,609	\$286,369	\$2,407,594	\$1,609,067	\$474,046	\$281,222	\$2,364,334	\$2,019,913	\$519,565	\$330,131	\$2,869,609	\$1,766,814	\$488,134	\$300,184	\$2,555,132

For Informational Purposes Only

FAMS Attachment O: Historical Data

FY 2018 Hours Worked per Activity Summary in Monroe County

Activity	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total Hours
Surface Maintenance	302	187	288	303	705	876	361	442	509	181	177	116	4,447
Shoulder Maintenance	10	17	8	3	1		12	3		10	22	6	92
Tree/Shrub Removal	10			32		2		19	10	4	27	8	112
Cleaning Drainage Structures	40	86	2	9	13	166	113	204	96	5	3	4	741
Ditch Cleanout									4	61			65
Litter Pickup	165	149	373	158	132	47	52	111	196	261	132	24	1,800
Grass and Weed Control	5								4				9
Culvert/Underdrain Maint		15			20	11	15	8					69
Guardrail Repair	327	98	122	54	37	182	467	149	13				1,449
Cable Guardrail Repair													0
Sweeping & Flushing	3		4										7
Tourist Facility Maint										1		93	94
Right of Way Fence Repair													0
Other Routine Maint				20	8	7	5						40
Winter Operations		89	1,385	973	1,380	408	53						4,288
Winter Road Patrol		32	96	147	118	80							473
Other Winter Maint													0
1510 Structure Maint													0
1530 Pump House													0
Other Bridge Maint													0
Sign Maint	73	49	55	64	51	101	60	59	79	84	5	30	710
Signal Maint						2							2
Impact Attenuator Maint													0
Traffic Signal Energy													0
Overhead													0
Field Supervision	172	140	152	151	193	193	274	159	187	108	55	60	1,844
Emergency Response	9	10	3	1	117	30	50	38	8	66		125	457
Adopt-A-Hwy													0
Totals	1,116	872	2,488	1,915	2,775	2,105	1,462	1,192	1,106	781	421	466	16,699

For Informational Purposes Only

FAMS Attachment O: Historical Data

FY 2017 Hours Worked per Activity Summary in Monroe County

Activity	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total Hours
Surface Maintenance	513	115	64	245	308	582	1,033	458	412	68	331	18	4,147
Shoulder Maintenance	16	4	8	34		12	4	44	10	31	6	54	223
Tree/Shrub Removal	11		2	6		34	14	12		15	68		162
Cleaning Drainage Structures	154			64	9	35	180	251	14	66	41	4	818
Ditch Cleanout		100	37				39	104			12		292
Litter Pickup	73	11	45	181	46	189	175	210	120	218	229	5	1,502
Grass and Weed Control		5										2	7
Culvert/Underdrain Maint	15	60	2	9	15	32	15	37		4	3		192
Guardrail Repair	237	194	57	242	142	264	72	352	333	111	97	18	2,119
Cable Guardrail Repair													0
Sweeping & Flushing													0
Tourist Facility Maint					4						8		12
Right of Way Fence Repair								10	10				20
Other Routine Maint													0
Winter Operations		119	1,230	757	155	508							2,769
Winter Road Patrol		24	128	154	141	87							534
Other Winter Maint													0
1510 Structure Maint		6											6
1530 Pump House													0
Other Bridge Maint													0
Sign Maint	42	6	68	69	54	84	116	21	40	99	49	55	703
Signal Maint						5							5
Impact Attenuator Maint													0
Traffic Signal Energy													0
Overhead													0
Field Supervision	148	90	110	177	177	134	257	196	145	116	183	52	1,785
Emergency Response	14	14	49	61	8	23	38		5	60	18	158	448
Adopt-A-Hwy													0
Totals	1,223	748	1,800	1,999	1,059	1,989	1,943	1,695	1,089	788	1,045	366	15,744

For Informational Purposes Only

FAMS Attachment O: Historical Data

FY 2016 Hours Worked per Activity Summary in Monroe County

Activity	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total Hours
Surface Maintenance	523	603	576	240	383	250	848	707	249	251	37	18	4,685
Shoulder Maintenance	96	3		81	14	5	11	17	16	12		2	257
Tree/Shrub Removal	8		18	12		4	83			6	14	13	158
Cleaning Drainage Structures	93	27	3	56	38	86	1	17	63	2	7		393
Ditch Cleanout	188	12											200
Litter Pickup	112	109	219	245	87	181	168	186	91	62	8	26	1,494
Grass and Weed Control									285	18	6		309
Culvert/Underdrain Maint	40	35	12	21	21	8	11	2					150
Guardrail Repair	212	1	16	31	8	283	175	367	198		2		1,293
Cable Guardrail Repair													0
Sweeping & Flushing													0
Tourist Facility Maint	27	9		1			8						45
Right of Way Fence Repair									30				30
Other Routine Maint		2	2		12								16
Winter Operations		85	133	900	837	525	136						2,616
Winter Road Patrol		32	136	136	149	93							546
Other Winter Maint													0
1510 Structure Maint	12	4	84										100
1530 Pump House													0
Other Bridge Maint	3												3
Sign Maint	28	22	81	102	73	58	66	93	44	18	2	1	588
Signal Maint				2		3							5
Impact Attenuator Maint													0
Traffic Signal Energy													0
Overhead													0
Field Supervision	244	170	361	198	212	189	164	133	104	118	116	5	2,014
Emergency Response	15	2			7	3	14	2	90	75	66	78	352
Adopt-A-Hwy													0
Totals	1,601	1,116	1,641	2,025	1,841	1,688	1,685	1,524	1,170	562	258	143	15,254

For Informational Purposes Only

FAMS Attachment O: Historical Data

Average Cost per Hour and per Lane Mile by Maintenance Activity

Activity	Activity Description	FY 2016 Cost per Hour	FY 2017 Cost per Hour	FY 2018 Cost per Hour	Three Year Average Cost per Hour	FY 2016 Cost per Lane Mile	FY 2017 Cost per Lane Mile	FY 2018 Cost per Lane Mile	Three Year Average Cost Per Lane Mile
1090	Surface Maintenance	\$110.93	\$112.35	\$103.38	\$108.89	\$878.08	\$784.46	\$774.49	\$812.35
1190	Shoulder Maintenance	\$152.80	\$120.22	\$127.23	\$133.41	\$65.76	\$44.47	\$19.30	\$43.17
1210	Tree/Shrub Removal	\$80.46	\$70.88	\$87.51	\$79.62	\$21.36	\$19.29	\$16.30	\$18.98
1220	Cleaning Drainage Structures	\$95.41	\$84.10	\$86.44	\$86.65	\$63.25	\$115.65	\$107.69	\$95.53
1230	Ditch Clean-out	\$86.52	\$85.54	\$71.02	\$81.02	\$29.19	\$42.04	\$7.78	\$26.33
1240	Litter Pickup	\$75.70	\$78.15	\$70.76	\$74.87	\$190.80	\$197.67	\$214.42	\$200.97
1260	Grass & weed control	\$262.78	\$11,658.18	\$10,826.18	\$7,582.38	\$137.08	\$137.53	\$164.20	\$146.27
1280	Culvert/Underdrain Maint	\$94.86	\$109.13	\$96.83	\$100.27	\$24.06	\$35.13	\$13.30	\$24.16
1300	Guardrail Repair	\$109.52	\$106.69	\$119.43	\$111.88	\$239.12	\$378.76	\$288.63	\$302.17
1310	Cable Guardrail Repair	\$0.00	\$0.00	\$0.00	\$0.00	\$52.04	\$151.34	\$150.34	\$117.91
1320	Sweeping & Flushing	\$0.00		\$112.51	\$56.25	\$10.02		\$1.33	\$5.67
1330	Tourist Facility Maintenance	\$977.37	\$3,558.09	\$588.70	\$1,708.06	\$74.54	\$71.95	\$92.76	\$79.75
1370	Right-of-Way Fence Repair	\$80.23	\$51.28		\$65.76	\$4.07	\$1.73		\$2.90
1390	Other routine maintenance	\$56.24		\$81.45	\$68.84	\$1.52		\$5.28	\$3.40
1410	Winter Operations	\$351.85	\$318.29	\$323.83	\$331.33	\$1,555.67	\$1,485.02	\$2,339.51	\$1,793.40
1440	Winter Road Patrol	\$81.22	\$79.83	\$80.12	\$80.39	\$74.92	\$71.71	\$63.80	\$70.14
1490	Other winter maintenance	\$0.00	\$0.00	\$0.00	\$0.00	\$41.38	\$53.68	\$76.34	\$57.14
1510	Structure Maintenance	\$82.53			\$82.53	\$13.89			\$13.89
1590	Other Bridge Maintenance	\$69.06	\$80.87		\$74.96	\$0.35	\$0.82		\$0.58
1600	Sign Maintenance	\$79.00	\$80.39	\$88.35	\$82.58	\$78.08	\$94.96	\$105.31	\$92.79
1610	Signal Maintenance	\$60.65	\$77.59	\$81.11	\$73.11	\$0.41	\$0.59	\$0.27	\$0.42
1680	Traffic Signal Energy	\$0.00	\$0.00	\$0.00	\$0.00	\$0.40	\$0.45	\$0.47	\$0.44
1850	Field Supervision	\$88.64	\$86.93	\$89.19	\$88.25	\$300.93	\$260.95	\$276.71	\$279.53
1950	Liability Insurance	\$0.00	\$0.00	\$0.00	\$0.00	\$127.39	-\$39.72	\$39.02	\$42.23
1970	Emergency Response	\$131.22	\$87.73	\$94.57	\$104.51	\$77.80	\$65.75	\$76.11	\$73.22
7950	Adopt-A-Hwy	\$0.00	\$0.00	\$0.00	\$0.00	\$9.04	\$10.22	\$2.59	\$7.28
	Totals	\$3,126.99	\$16,846.25	\$13,128.60	\$11,177.57	\$4,071.15	\$3,984.45	\$4,835.96	\$4,310.63

For Information Purposes Only

**FAMS Attachment P: Monroe County Historical Winter Materials
Usage Data**

FY	Salt (Tons)	Sand (Tons)	Liquid (Gallons)
* 2019	11,291.64	0.00	3,695.50
2018	16,239.96	0.00	18,892.38
2017	8,517.50	0.00	4,592.00
2016	7,997.50	0.00	15,391.00
2015	11,762.50	0.00	70,505.50
2014	16,404.50	993.00	30,706.00

* Avg 15-19	11,161.82	0.00	22,615.28
Avg 14-18	12,184.39	198.60	28,017.38

** Material usage figures for 2018/2019 winter season have not been finalized.*

FAMS Attachment Q: Monroe County: Historical Property Damage Reclamation Process (PDRP) Data

			Damage Claims Cost Per Object								
Fiscal Year	Total Claims	# of Claims with cost	Bridges	Guardrail	Cable Barrier	Signs/ Signals	Attenuator	Barrier/ Wall	Combination	Other	Total
14	287	188	\$ 8,523.77	\$ 179,337.45	\$ 26,897.65	\$ 18,920.91	\$ -	\$ 312.80	\$ 726.98	\$ 2,002.01	\$ 236,721.57
15	201	111	\$ -	\$ 128,352.56	\$ 30,078.60	\$ 7,400.64	\$ -	\$ 2,582.69	\$ -	\$ 994.14	\$ 169,408.63
16	149	68	\$ 1,608.53	\$ 80,050.22	\$ 14,691.43	\$ 6,934.81	\$ -	\$ -	\$ 2,320.98	\$ -	\$ 105,605.97
17	192	112	\$ -	\$ 128,484.34	\$ 55,995.45	\$ 6,185.22	\$ -	\$ 617.64	\$ 1,416.90	\$ -	\$ 192,699.55
18	174	95	\$ 2,000.00	\$ 81,795.40	\$ 50,700.03	\$ 155.89	\$ -	\$ 12,500.75	\$ -	\$ -	\$ 147,152.07
5 Year Avg	201	115	\$ 2,426.46	\$ 119,603.99	\$ 35,672.63	\$ 7,919.49	\$ -	\$ 3,202.78	\$ 892.97	\$ 599.23	\$ 170,317.56

"Total Claims" indicates the number of damage reports submitted for maintenance review.

"# of Claims with Cost" indicates occurrences where damage costs were submitted to insurance

FAMS Attachment R:

MiLogin Third Party Access to MDOT TAMS Vueworks

(revised 5-28-2019)

- 1) Go to MiLogin Third Party Site: <https://milogintp.michigan.gov>

The screenshot shows a web browser window with the URL <https://milogintp.michigan.gov/ea/tplogin/authenticate?URL=/>. The page features the Michigan.gov logo at the top left and navigation links for HELP and CONTACT US at the top right. The main heading is "MiLogin for Third Party". Below this, there are input fields for "User ID" and "Password", followed by a blue "LOGIN" button. A link for "Don't have an account?" leads to a blue "SIGN UP" button. At the bottom, there are links for "Forgot your User ID?", "Need Help?", and "Forgot your password?". The footer indicates "Copyright 2015-2019 State of Michigan".

- 2) If you do not have an account, sign up and set up your profile.
- 3) Once Logged in, Request Access to **"TAMS-Vueworks"** (It can also be found under agency **"Michigan Department of Transportation (MDOT)"**)

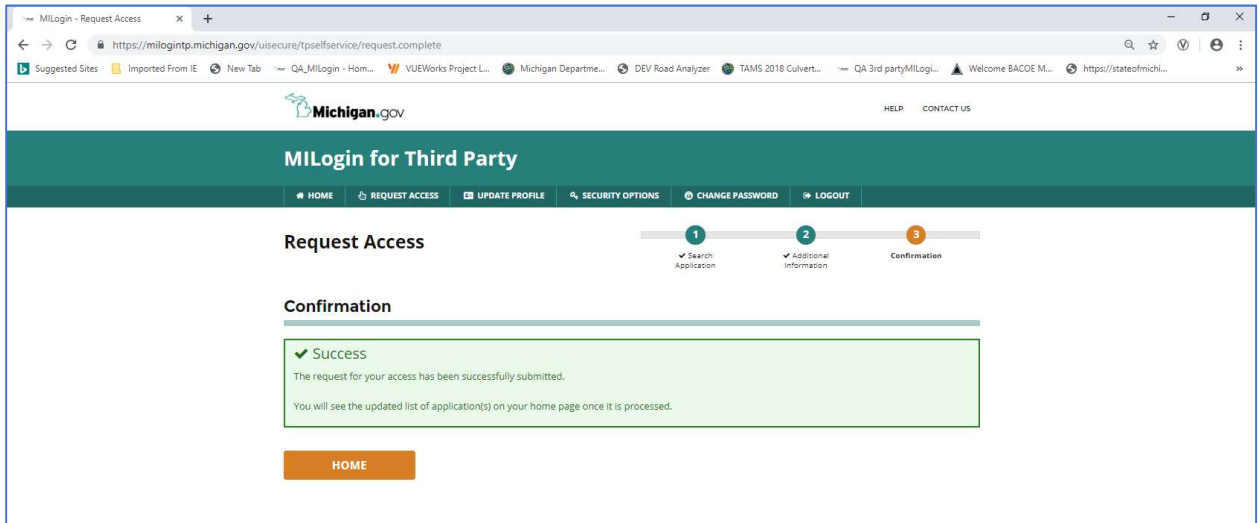
The screenshot shows the "Request Access" page in the MiLogin system. The page has a green header with the Michigan.gov logo and navigation links. Below the header, there is a "Request Access" section with a progress bar showing three steps: 1. Search Application, 2. Additional Information, and 3. Confirmation. The "Search Application" section is active, displaying a search bar with the text "TAMS-VueWorks" and a dropdown menu showing "TAMS-VueWorks" as a result. There is also a "Select Agencies" dropdown menu.

FAMS Attachment R:

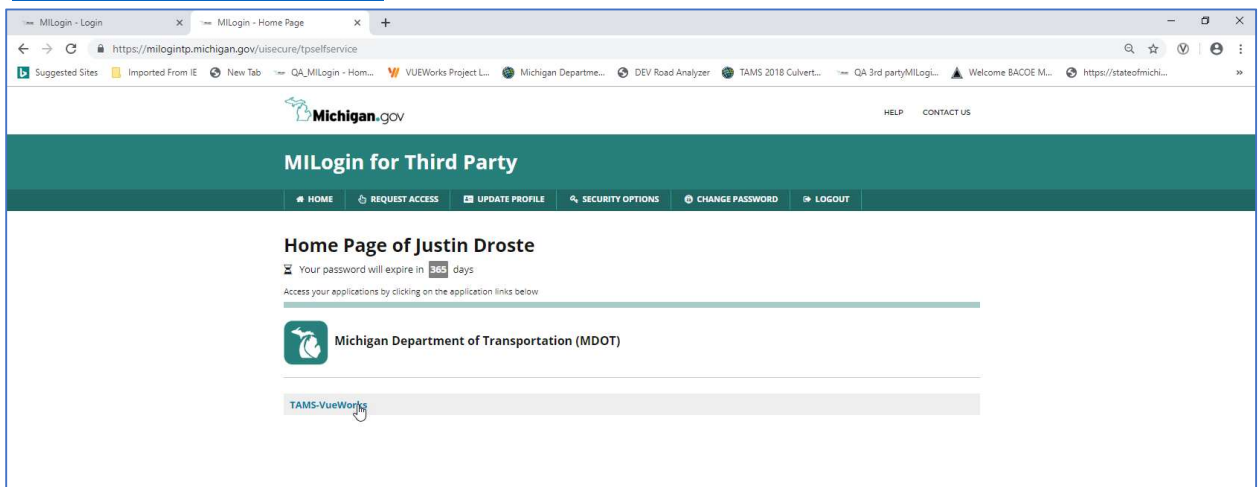
MiLogin Third Party Access to MDOT TAMS Vueworks

(revised 5-28-2019)

- 4) After requesting access, approval must be granted before you can access vueworks. You should receive notification at the email account listed in your account profile.



- 5) Once approved for use, log back into your MiLogin Third Party account (<https://milogintp.michigan.gov>) and select "TAMS-Vueworks".

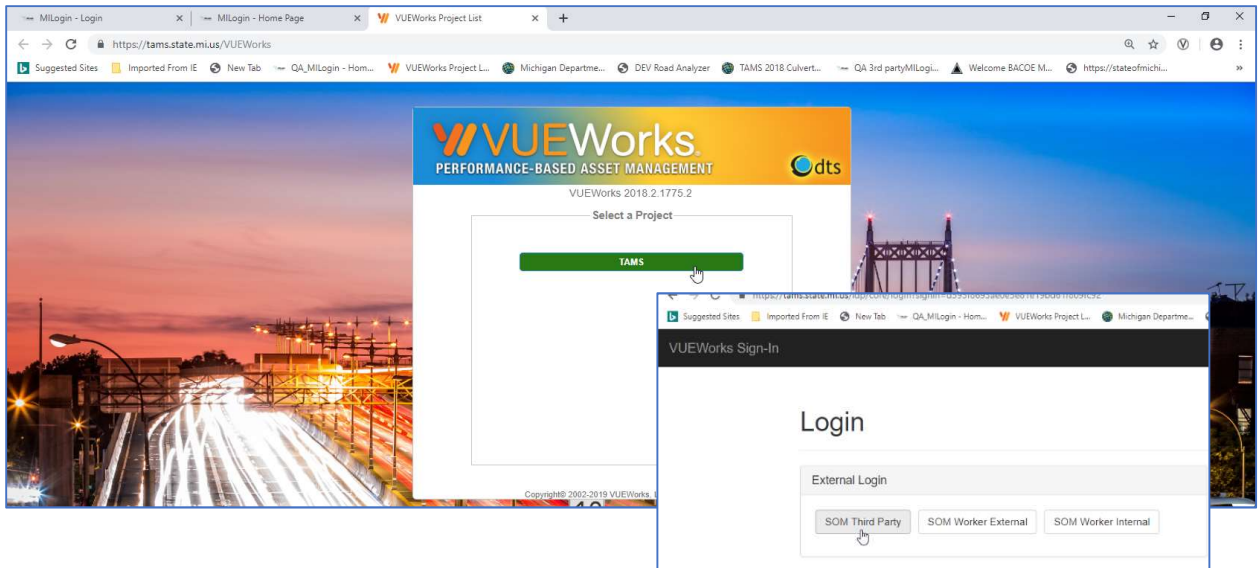


FAMS Attachment R:

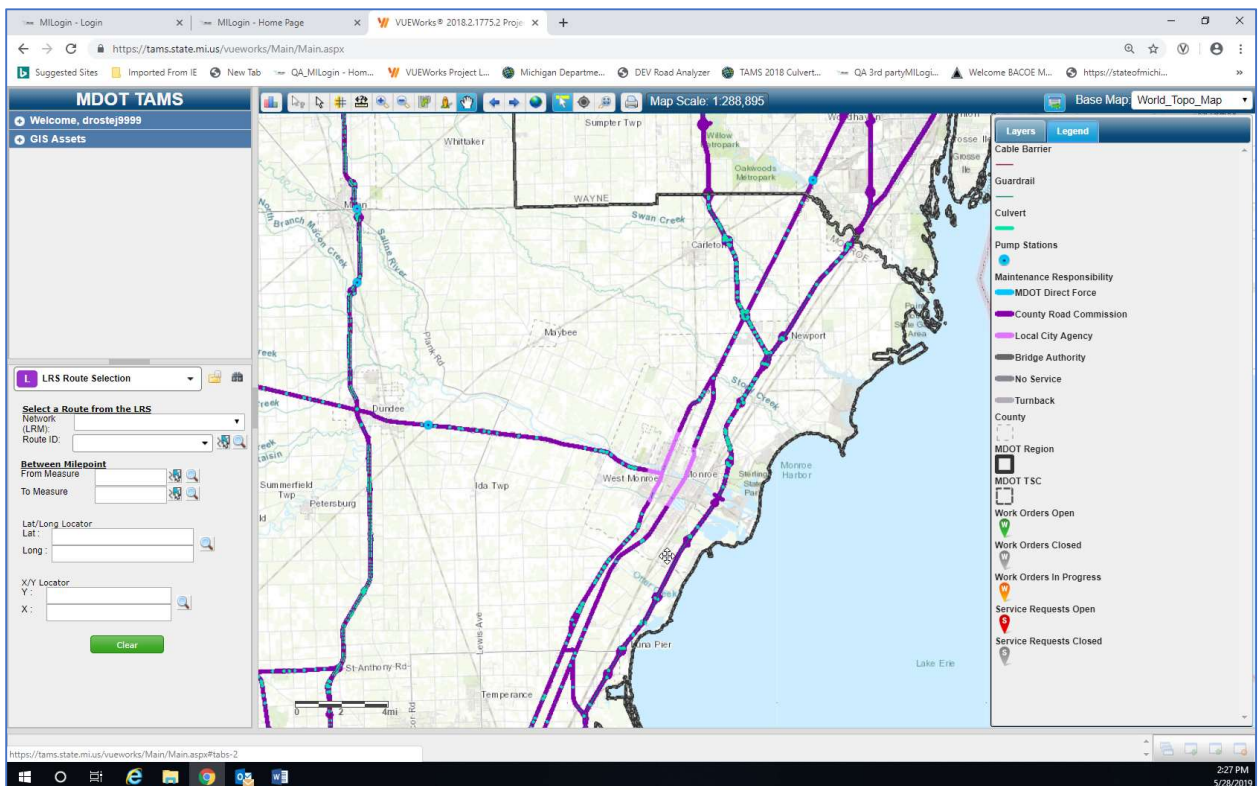
MiLogin Third Party Access to MDOT TAMS Vueworks

(revised 5-28-2019)

- 6) Select the TAMS bar on the Vueworks home screen. If an additional login screen displays, select the option “SOM Third Party”



- 7) In Vueworks, base third party users will have the ability to view map and asset information. Additional data access and functional use will need to be authorized by the TAMS Vueworks Administrator.



MICHIGAN
DEPARTMENT OF TRANSPORTATIONSPECIAL PROVISION
FOR
PROTECT INTELLIGENT TRANSPORTATION SYSTEM INFRASTRUCTURE

DET:SN

1 of 1

APPR:JVG:MDW:03-06-19

a. Description. This work consists of all labor, equipment, and materials necessary to protect existing and newly installed MDOT ITS infrastructure during construction activities to ensure the safety of the construction workers and the general public.

b. Materials. None specified.

c. Construction. Any damage to MDOT ITS infrastructure will be repaired immediately by the Contractor causing the damage, or by another Contractor, at the sole discretion of the MDOT Engineer. Contacting MISS DIG is not sufficient to protect MDOT ITS infrastructure.

1. Underground Infrastructure Staking Request. Download and complete MDOT Form 5300, *MDOT Underground Infrastructure Staking Request Form* (<http://mdotcf.state.mi.us/public/webforms/public/5300.pdf>). Provide location information for the staking request including: route number, direction, mile marker, major cross street, city, and county. Include only pertinent construction drawings or a detailed sketch. Do not include full plan sets. Electronically submit the completed form and any attachments to the appropriate region email listed on the form at least 5 work days (excludes weekends and state holidays) prior to the anticipated digging start date. Digging work is prohibited until the staking request has been approved.

2. Hand Digging. Hand dig to confirm the location of MDOT ITS infrastructure whenever the proposed work is within 10 feet of the marked location, or when directed by the Engineer.

3. Protection. Where indicated on the plans or by the Engineer, provide rectangular steel cover plates of at least 8 feet by 8 feet by 1 inch thick to serve as a buffer and shield between traffic loads or demolition and the critical infrastructure. Use these plates to cover handholes that will be driven over by traffic during construction, to protect conduit runs from bridge demolition activities and debris, and wherever indicated by the Engineer.

4. Renewing Markings. When construction activities obliterate facility staking markings, place a subsequent request to MDOT to refresh the facility staking markings. The Contractor is responsible for ensuring they know where all MDOT facilities are after the initial staking at each site.

d. Measurement and Payment. All costs associated for this work will not be paid for separately, but are included in the applicable pay items, such as, but not limited to: guardrail installation, fence installation, pavement placement, etc. All costs of any emergency repairs will be paid by the Contractor responsible for the damage regardless of who completes the repair.

MICHIGAN
DEPARTMENT OF TRANSPORTATION

SPECIAL PROVISION
FOR
**STAKING MICHIGAN DEPARTMENT OF TRANSPORTATION UNDERGROUND
ELECTRICAL INFRASTRUCTURE AND ITS FACILITIES**

ITS:EG

1 of 1

APPR:NAL:BMB:04-03-19

a. Description. This work consists of filling out the herein identified forms and contacting the appropriate people to ensure the proper staking of MDOT electric infrastructure and ITS facilities.

Complete MDOT Underground Infrastructure Staking Request Form (Form 5300) with a minimum of 5 work days prior to start date of excavation activities, excluding weekends and holidays. Electronically submit ITS staking to MDOT-ITS-staking-metro@michigan.gov, freeway lighting staking to MDOT-FLP-Staking-Metro@Michigan.gov, and traffic signals and other electronics staking to MDOT-Electrical-Staking-Metro@Michigan.gov. Telephone inquiries can be made to the following contact point:

Jennifer Farrell
Metro Operations Analyst
Metro Region Office
18101 W. Nine Mile Rd.
Southfield, MI 48075
Cell:(248)-331-6728

Note: Per MCL 460.727(9) et seq, MDOT is exempt from marking underground facilities.

b. Materials. None specified.

c. Construction. None specified.

d. Measurement and Payment. This work to contact various people for Staking Electrical Infrastructure will not be paid for separately but will be considered included in other items of work.

FAMS Attachment T-5 Year Plan

MONROE COUNTY PROJECT SCHEDULE

4/22/19

2019 Projects									
Control Section	JN	Route	Location	Work Type	Construction Cost	Plan Completion	Let Date	Designer	PM
58053	116351	US-24	2900 feet north of Buhl to Newport	Construct center left turn lane	\$1,481,239	Jul-18	Nov-18	OHM	Kirby
58053	132581	US-24	Buhl to Ready Rd	Single course mill & HMA Overlay	\$2,400,000	Jul-18	Nov-18	OHM	Kirby
58033	204464	US-23	Dundee Carpool lot	New lighting-DTE does installation	\$10,000	N/A	N/A	DTE	Kirby
58041	132582	M-50	Lenawee County Line to Wilcox	Multiple Course Microsurface	\$550,000	Nov-18	Jan-19	BTSC	Kirby
58021	203285	US-223	Just east of High Street to west of Jefferson Street in the village of Blissfield, in Lenawee County and from the Lenawee/Monroe County line to approximately 2,220 feet west of US-23 in Monroe County.	Concrete Pavement Repairs in Blissfield. HMA joint repairs, shoulder trenching and paving, and single course HMA overlay in Monroe County.	\$3,636,364	Nov-18	Feb-19	Region	Pittman
58151	119803, 203033	I-75	State Line to Erie Rd	Reconstruct	\$80,000,000	Sep-18	Mar-19	AECOM	Kirby
58151	126924	I-75	9 Bridges B01-1 & -2, Halfway Creek; B02-1 and -2, Bay Creek; R01-1 and -2, Power Co. RR spur; S05, Erie Rd; S04-1 and -2, Bay Creek Rd.	7 bridge replacements and 2 superstructure replacements	\$21,109,000	Sep-18	Mar-19	Occhiuto	Occhiuto
58151	128876	I-75	S13 & S14 M-125NB & SB Connector over I-75	Deep overlay	\$1,350,000	Sep-18	Mar-19	Occhiuto	Occhiuto
58034	200982	US-23	School to Ida Center	Concrete Pavt Repairs	\$600,000	Jan-19	Mar-19	TBD	Kirby
58151	128058	I-75	over Raisin River	Epoxy overlay, joints, pin & hanger replace, steel repair, substructure repair, scour countermeasures, slope protection, approach work	\$8,400,000	Nov-19	May-19	Kopper, AECOM(MOT)	Kopper
84926	201069	Various	Livingston, Washtenaw & Monroe Counties	Crack sealing	\$302,000	Jan-19	Mar-19	BTSC	Kirby
58052	205957, 205959	US-24	Weigh Station ramps	Minor widening, paving	\$78,000	Jun-19	Aug-19	BTSC	Kirby
58052	201875	US-24	South Otter Creek/Yargerville intersection	Realign S Otter Crk Rd	\$240,419	May-19	Sep-19	Region	Kirby
58171	201573	I-275	I-275 bike path	Bridge removal(N01 & N02)	\$213,444	Jun-19	Nov-19	Feuerstein	Feuerstein
58032	202997	M-50	Over Sotor Drain	Cuvert Replacement- Construction let by MCDC	TBD	permit	permit	Consultant	MCDC
				TOTAL	\$120,370,466				
2020 Projects									
Control Section	JN	Route	Location	Work Type	Construction Cost	Plan Completion	Let Date	Designer	PM
58151, 58152	203994	I-75	Erie to North County Line	Concrete Pavt Repairs	\$1,000,000	Nov-19	Jan-20	BTSC	Kirby
58171	204001	I-275	I-75 to US-24	Double micro	\$935,000	Jan-20	Mar-20	Region	Kirby
							Mar-20	BTSC	Kirby
84926	204091	Various	Livingston, Washtenaw & Monroe Counties	Crack sealing	\$225,000	Jan-20			
58053	201013	US-24	Labo to Wayne County Line	NFRP:Single course mill & HMA Overlay	\$1,406,000	Jun-20	Sep-20	BTSC	Kirby
				TOTAL	\$3,566,000				

FAMS Attachment T-5 Year Plan

2021 Projects									
Control Section	JN	Route	Location	Work Type	Construction Cost	Plan Completion	Let Date	Designer	PM
58151	125868	I-75	Erie Rd to Otter Crk Rd	Reconstruct	\$65,000,000	Jun-20	Dec-20	WSP	Kirby
58151	126916	I-75	4 bridges on I-75 in Monroe County. B03-1 and -2 of 58151, Muddy Creek, and B04-1 and -2 of	Bridge replacement	\$14,800,000	Jun-20	Dec-20	Nadjarian	Nadjarian
58151	132974	I-75	S06 Luna Pier Rd ov I-75; & S08 , Otter Creek Rd ov I-75	Bridge CPM	\$1,800,000	Jun-20	Dec-20	Nadjarian	Nadjarian
58151	203664	I-75	S07 Alen Cove(Gaynier) Rd ov I-75	Bridge CPM	\$700,000	Jun-20	Dec-20	Nadjarian	Nadjarian
58053	129145	US-24	Kimberly Estates to Buhl	Construct new sidewalk & HAWK signal	\$323,404	Jun-20	Dec-20	TBD	Kirby
58151	129661	I-75	under LaPlaisance Rd	Bridge replacement	\$8,900,000	Jun-20	Jan-21	Feuerstain	Feuerstain
58032	201009	M-50	Wilcox to East Village Limits of Dundee	CPM: single course mill & fill	\$1,150,000	Nov-20	Jan-21	TBD	Kirby
				TOTAL	\$92,673,404				
2022 Projects									
Control Section	JN	Route	Location	Work Type	Construction Cost	Plan Completion	Let Date	Designer	PM
58033	205508	US-23	Plank Rd over US-23	Epoxy Overlay, full depth deck patching, joint replacement, reseal end joints, approach curb and gutter work, approach slab patching, rail patching, high load hit repairs, steel repairs, bearing stiffener replacements, partial painting, substructure patching	\$736,373	Jun-21	Dec-21	J. Garcia	J. Garcia
				TOTAL	\$736,373				
2023 Projects									
Control Section	JN	Route	Location	Work Type	Construction Cost	Plan Completion	Let Date	Designer	PM
58000	204204	I-275	Carpool lot Exit 5 at Carleton-Rockwood Road, SW quadrant, Carleton CPL Lot #858003	Single course mill and resurface	\$75,000	Jun-22	Dec-22	TBD	Kirby
84926	201168	Various	Livingston, Washtenaw & Monroe Counties	ITS Devices	\$2,000,000	Feb-22	Aug-23	TBD	Palmer
58034	205511	US-23	Sterns Road over US-23, Consear Road over US-23 and Ida West Road over US-23	Bridge replacement	\$16,292,359	Jun-22	Dec-22	Occhiuto	Occhiuto
				TOTAL	\$18,367,359				

2024 Projects									
Control Section	JN	Route	Location	Work Type	Construction Cost	Plan Completion	Let Date	Designer	PM
58151	204085	I-75	Otter Crk Rd to LaPlaisance.; S09(Mortar Crk Rd), B051&2(LaPlaisance Crk; B08(I-75NB	Reconstruct; Bridge CPM(B05), Deep Overlay(B08), Deck replacement (S09), bridge replacement (S10)	\$67,000,000	Jun-23	Dec-23	TBD	Kirby
58152	205623, 205628	I-75	I-75 NB and SB over Swan Creek (B03) , Nadeau Rd over I-75 (S03), rady Rd ov I-75	Deck replacement (B03), bridge replacement (S03), CPM (S07)	\$8,781,022	Jun-23	Dec-23	Mahdavia	Mahdavia
84916	120363	Various	Washtenaw & Monroe Counties	CMAQ: Traffic signal modernizations, radio interconnect, detection	\$2,000,000	Sep-23	Mar-24	Unassigned	Kirby
				TOTAL	\$77,781,022				



STATE OF MICHIGAN
Purchasing Unit
 Department of Transportation
 425 W. Ottawa. St., Lansing, Michigan 48913
 P.O. Box 30050, Lansing, Michigan 48933

NOTICE OF CONTRACT

NOTICE OF CONTRACT NO. **591M190000001000**

between
 THE STATE OF MICHIGAN
 and

CONTRACTOR	Ferrovial Services Infrastructure, Inc.
	10814 Jollyville Road, Bldg. 4 Suite 160
	Austin, TX. 78759
	Daniel J. Filer
	(713) 964-2822
	Bidding.fsna@ferrovialservices.com

STATE	Program Manager	Doug Lynch	MDOT
		(810) 217-1729	
		lynchD@michigan.gov	
	Contract Administrator	Terry Harris	MDOT
		(517) 335-2507	
		Harrist@michigan.gov	

CONTRACT SUMMARY			
DESCRIPTION: Performance based flexible asset maintenance services, for State Trunklines in Monroe County; Michigan Department of Transportation (MDOT)			
INITIAL EFFECTIVE DATE	INITIAL EXPIRATION DATE	INITIAL AVAILABLE OPTIONS	EXPIRATION DATE BEFORE CHANGE(S) NOTED BELOW
October 1, 2019	September 30, 2022	3 one-year options	
PAYMENT TERMS		DELIVERY TIMEFRAME	
Net 45 Days		N/A	
ALTERNATE PAYMENT OPTIONS			EXTENDED PURCHASING
<input type="checkbox"/> P-card <input type="checkbox"/> Direct Voucher (DV) <input type="checkbox"/> Other			<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
MINIMUM DELIVERY REQUIREMENTS			
N/A			
MISCELLANEOUS INFORMATION			
ESTIMATED CONTRACT VALUE AT TIME OF EXECUTION			\$9,029,314.80

FOR THE CONTRACTOR:

Ferrovial Services Infrastructure, Inc.

Company Name

Authorized Agent Signature

Daniel J. Filer

Authorized Agent (Print or Type)

7/12/19

Date

FOR THE STATE:

Signature

Carol Rademacher

Name & Title

Department of Transportation

Agency

7/17/19

Date



STATE OF MICHIGAN

STANDARD CONTRACT TERMS

This STANDARD CONTRACT ("**Contract**") is agreed to between the State of Michigan (the "**State**") and Ferrovial Services Infrastructure, Inc. ("**Contractor**"), a Texas company. This Contract is effective on 10/1/2019 ("**Effective Date**"), and unless terminated, expires on 9/30/2022.

This Contract may be renewed for up to three (3) additional one (1) year period(s). Renewal is at the sole discretion of the State and will automatically extend the Term of this Contract. The State will document its exercise of renewal options via Contract Change Notice.

The parties agree as follows:

- 1. Duties of Contractor.** Contractor must perform the services and provide the deliverables described in **Schedule A – Statement of Work** (the "**Contract Activities**"). An obligation to provide delivery of any commodity is considered a service and is a Contract Activity.

Contractor must furnish all labor, equipment, materials, and supplies necessary for the performance of the Contract Activities, and meet operational standards, unless otherwise specified in Schedule A.

Contractor must: (a) perform the Contract Activities in a timely, professional, safe, and workmanlike manner consistent with standards in the trade, profession, or industry; (b) meet or exceed the performance and operational standards, and specifications of the Contract; (c) provide all Contract Activities in good quality, with no material defects; (d) not interfere with the State's operations; (e) obtain and maintain all necessary licenses, permits or other authorizations necessary for the performance of the Contract; (f) cooperate with the State, including the State's quality assurance personnel, and any third party to achieve the objectives of the Contract; (g) return to the State any State-furnished equipment or other resources in the same condition as when provided when no longer required for the Contract; (h) not make any media releases without prior written authorization from the State; (i) assign to the State any claims resulting from state or federal antitrust violations to the extent that those violations concern materials or services supplied by third parties toward fulfillment of the Contract; (j) comply with all State physical and IT security policies and standards which will be made available upon request; and (k) provide the State priority in performance of the Contract except as mandated by federal disaster response requirements. Any breach under this paragraph is considered a material breach.

Contractor must also be clearly identifiable while on State property by wearing identification issued by the State, and clearly identify themselves whenever making contact with the State.

- 2. Notices.** All notices and other communications required or permitted under this Contract must be in writing and will be considered given and received: (a) when verified by written receipt if sent by courier; (b) when actually received if sent by mail without verification of receipt; or (c) when verified by automated receipt or electronic logs if sent by facsimile or email.

If to State:	If to Contractor:
Terry Harris 425 W. Ottawa Street Lansing, MI. 48909 Email: harrist@michigan.gov Phone: (517) 335-2507	David Fenton 10814 Jollyville Rd. Bldg. 4, Suite 160 Austin, TX. 78759 David.Fenton@ferrovialservices.com (737)529-7480

- 3. Contract Administrator.** The Contract Administrator for each party is the only person authorized to modify any terms of this Contract, and approve and execute any change under this Contract (each a "**Contract Administrator**"):

State:	Contractor:
Terry Harris 425 W. Ottawa Street Lansing, MI. 48909 Email: harrist@michigan.gov Phone: (517) 335-2507	David Fenton 10814 Jollyville Rd. Bldg. 4, Suite 160 Austin, TX. 78759 David.Fenton@ferrovialservices.com (737)529-7480

4. **Program Manager.** The Program Manager for each party will monitor and coordinate the day-to-day activities of the Contract (each a "**Program Manager**"):

State:	Contractor:
Doug Lynch Brighton Transportation Service Center (TSC) 10321 E. Grand River Suite 500 Brighton, MI 48116 lynchD@michigan.gov (810) 217-1729	David Fenton 10814 Jollyville Rd. Bldg. 4, Suite 160 Austin, TX. 78759 David.Fenton@ferrovialservices.com (737)529-7480

5. **Performance Guarantee.** Contractor must at all times have financial resources sufficient, in the opinion of the State, to ensure performance of the Contract and must provide proof upon request. The State may require a performance bond (as specified in Schedule A) if, in the opinion of the State, it will ensure performance of the Contract.
6. **Insurance Requirements.** Contractor must maintain the insurances identified below and is responsible for all deductibles. All required insurance must: (a) protect the State from claims that may arise out of, are alleged to arise out of, or result from Contractor's or a subcontractor's performance; (b) be primary and non-contributing to any comparable liability insurance (including self-insurance) carried by the State; and (c) be provided by a company with an A.M. Best rating of "A-" or better, and a financial size of VII or better.

Required Limits	Additional Requirements
Commercial General Liability Insurance	
<u>Minimum Limits:</u> \$1,000,000 Each Occurrence Limit \$1,000,000 Personal & Advertising Injury Limit \$2,000,000 General Aggregate Limit \$2,000,000 Products/Completed Operations <u>Deductible Maximum:</u> \$50,000 Each Occurrence	Contractor must have their policy endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds using endorsement CG 20 10 11 85, or both CG 2010 07 04 and CG 2037 07 04. Coverage must not have exclusions or limitations related to sexual abuse and molestation liability.
Umbrella or Excess Liability Insurance	
<u>Minimum Limits:</u> \$5,000,000 General Aggregate	Contractor must have their policy follow form.
Automobile Liability Insurance	
<u>Minimum Limits:</u> \$1,000,000 Per Accident	Contractor must have their policy: (1) endorsed to add "the State of Michigan, its departments, divisions, agencies, offices, commissions, officers, employees, and agents" as additional insureds; and (2) include Hired and Non-Owned Automobile coverage.
Workers' Compensation Insurance	

<u>Minimum Limits:</u> Coverage according to applicable laws governing work activities.	Waiver of subrogation, except where waiver is prohibited by law.
Employers Liability Insurance	
<u>Minimum Limits:</u> \$500,000 Each Accident \$500,000 Each Employee by Disease \$500,000 Aggregate Disease.	
Property Insurance	
Environmental and Pollution Liability (Errors and Omissions)	
<u>Minimum Limits:</u> \$1,000,000 Each Occurrence \$2,000,000 Annual Aggregate	Contractor must have their policy: (1) be applicable to the work being performed, including completed operations equal to or exceeding statute of repose; (2) not have exclusions or limitations related to Transportation (upset overturn, spills during loading or unloading, Hazardous Materials Handling, and Non Owned disposal site liability; and (3) endorsed to add "the State of Michigan, its departments, division, agencies, offices, commissions, officers, employees, and agents" as additional insured.

If any of the required policies provide **claims-made** coverage, the Contractor must: (a) provide coverage with a retroactive date before the effective date of the contract or the beginning of Contract Activities; (b) maintain coverage and provide evidence of coverage for at least three (3) years after completion of the Contract Activities; and (c) if coverage is cancelled or not renewed, and not replaced with another claims-made policy form with a retroactive date prior to the contract effective date, Contractor must purchase extended reporting coverage for a minimum of three (3) years after completion of work.

Contractor must: (a) provide insurance certificates to the Contract Administrator, containing the agreement or delivery order number, at Contract formation and within 20 calendar days of the expiration date of the applicable policies; (b) require that subcontractors maintain the required insurances contained in this Section; (c) notify the Contract Administrator within 5 business days if any insurance is cancelled; and (d) waive all rights against the State for damages covered by insurance. Failure to maintain the required insurance does not limit this waiver.

This Section is not intended to and is not to be construed in any manner as waiving, restricting or limiting the liability of either party for any obligations under this Contract (including any provisions hereof requiring Contractor to indemnify, defend and hold harmless the State).

7. **Reserved.**

8. **Reserved.**

9. **Independent Contractor.** Contractor is an independent contractor and assumes all rights, obligations and liabilities set forth in this Contract. Contractor, its employees, and agents will not be considered employees of the State. No partnership or joint venture relationship is created by virtue of this Contract. Contractor, and not the State, is responsible for the payment of wages, benefits and taxes of Contractor's employees and any subcontractors. Prior performance does not modify Contractor's status as an independent contractor.

10. **Subcontracting.** Contractor may not delegate any of its obligations under the Contract without the prior written approval of the State. Contractor must notify the State at least 90 calendar days before the proposed delegation and provide the State any information it requests to determine whether the delegation is in its best interest. If approved, Contractor must: (a) be the sole point of contact regarding all contractual matters, including payment and charges for all Contract Activities; (b) make all payments to the subcontractor; and (c) incorporate the terms and conditions contained in this Contract in any subcontract with a subcontractor.

Contractor remains responsible for the completion of the Contract Activities, compliance with the terms of this Contract, and the acts and omissions of the subcontractor. The State, in its sole discretion, may require the replacement of any subcontractor.

11. **Staffing.** The State's Contract Administrator may require Contractor to remove or reassign personnel by providing a notice to Contractor.
12. **Background Checks.** Pursuant to Michigan law, all agencies subject to IRS Pub. 1075 are required to ask the Michigan State Police to perform fingerprint background checks on all employees, including Contractor and Subcontractor employees, who may have access to any database of information maintained by the federal government that contains confidential or personal information, including, but not limited to, federal tax information. Further, pursuant to Michigan law, any agency described above is prohibited from providing Contractors or Subcontractors with the result of such background check. For more information, please see Michigan Public Act 427 of 2018. Upon request, Contractor must perform background checks on all employees and subcontractors and its employees prior to their assignment. The scope is at the discretion of the State and documentation must be provided as requested. Contractor is responsible for all costs associated with the requested background checks. The State, in its sole discretion, may also perform background checks.
13. **Assignment.** Contractor may not assign this Contract to any other party without the prior approval of the State. Upon notice to Contractor, the State, in its sole discretion, may assign in whole or in part, its rights or responsibilities under this Contract to any other party. If the State determines that a novation of the Contract to a third party is necessary, Contractor will agree to the novation and provide all necessary documentation and signatures.
14. **Change of Control.** Contractor will notify within 30 days of any public announcement or otherwise once legally permitted to do so, the State of a change in Contractor's organizational structure or ownership. For purposes of this Contract, a change in control means any of the following: (a) a sale of more than 50% of Contractor's stock; (b) a sale of substantially all of Contractor's assets; (c) a change in a majority of Contractor's board members; (d) consummation of a merger or consolidation of Contractor with any other entity; (e) a change in ownership through a transaction or series of transactions; (f) or the board (or the stockholders) approves a plan of complete liquidation. A change of control does not include any consolidation or merger effected exclusively to change the domicile of Contractor, or any transaction or series of transactions principally for bona fide equity financing purposes.

In the event of a change of control, Contractor must require the successor to assume this Contract and all of its obligations under this Contract.

15. **Ordering.** Contractor is not authorized to begin performance until receipt of authorization as identified in Schedule A.
16. **Acceptance.** Contract Activities are subject to inspection and testing by the State within 30 calendar days of the State's receipt of them ("**State Review Period**"), unless otherwise provided in Schedule A. If the Contract Activities are not fully accepted by the State, the State will notify Contractor by the end of the State Review Period that either: (a) the Contract Activities are accepted, but noted deficiencies must be corrected; or (b) the Contract Activities are rejected. If the State finds material deficiencies, it may: (i) reject the Contract Activities without performing any further inspections; (ii) demand performance at no additional cost; or (iii) terminate this Contract in accordance with Section 23, Termination for Cause.

Within 10 business days from the date of Contractor's receipt of notification of acceptance with deficiencies or rejection of any Contract Activities, Contractor must cure, at no additional cost, the deficiency and deliver unequivocally acceptable Contract Activities to the State. If acceptance with deficiencies or rejection of the Contract Activities impacts the content or delivery of other non-completed Contract Activities, the parties' respective Program Managers must determine an agreed to number of days for re-submission that minimizes the overall impact to the Contract. However, nothing herein affects, alters, or relieves Contractor of its obligations to correct deficiencies in accordance with the time response standards set forth in this Contract.

If Contractor is unable or refuses to correct the deficiency within the time response standards set forth in this Contract, the State may cancel the order in whole or in part. The State, or a third party identified by the State, may perform the Contract Activities and recover the difference between the cost to cure and the Contract price plus an additional 10% administrative fee.

17. **Reserved.**

- 18. Risk of Loss and Title.** Until final acceptance, title and risk of loss or damage to Contract Activities remains with Contractor. Contractor is responsible for filing, processing, and collecting all damage claims. The State will record and report to Contractor any evidence of visible damage. If the State rejects the Contract Activities, Contractor must remove them from the premises within 10 calendar days after notification of rejection. The risk of loss of rejected or non-conforming Contract Activities remains with Contractor. Rejected Contract Activities not removed by Contractor within 10 calendar days will be deemed abandoned by Contractor, and the State will have the right to dispose of it as its own property. Contractor must reimburse the State for costs and expenses incurred in storing or effecting removal or disposition of rejected Contract Activities.
- 19. Warranty Period.** The warranty period, if applicable, for Contract Activities is a fixed period commencing on the date specified in Schedule A. If the Contract Activities do not function as warranted during the warranty period, the State may return such non-conforming Contract Activities to the Contractor for a full refund.
- 20. Terms of Payment.** Invoices must conform to the requirements communicated from time-to-time by the State. All undisputed amounts are payable within 45 days of the State's receipt. Contractor may only charge for Contract Activities performed as specified in Schedule A. Invoices must include an itemized statement of all charges. The State is exempt from State sales tax for direct purchases and may be exempt from federal excise tax, if Services purchased under this Agreement are for the State's exclusive use. All prices are exclusive of taxes, and Contractor is responsible for all sales, use and excise taxes, and any other similar taxes, duties and charges of any kind imposed by any federal, state, or local governmental entity on any amounts payable by the State under this Contract.

The State has the right to withhold payment of any disputed amounts until the parties agree as to the validity of the disputed amount. The State will notify Contractor of any dispute within a reasonable time. Payment by the State will not constitute a waiver of any rights as to Contractor's continuing obligations, including claims for deficiencies or substandard Contract Activities. Contractor's acceptance of final payment by the State constitutes a waiver of all claims by Contractor against the State for payment under this Contract, other than those claims previously filed in writing on a timely basis and still disputed.

The State will only disburse payments under this Contract through Electronic Funds Transfer (EFT). Contractor must register with the State at <http://www.michigan.gov/SIGMAVSS> to receive electronic fund transfer payments. If Contractor does not register, the State is not liable for failure to provide payment. Without prejudice to any other right or remedy it may have, the State reserves the right to set off at any time any amount then due and owing to it by Contractor against any amount payable by the State to Contractor under this Contract.

- 21. Liquidated Damages.** Liquidated damages, if applicable, will be assessed as described in Schedule A.
- 22. Stop Work Order.** The State may suspend any or all activities under the Contract at any time. The State will provide Contractor a written stop work order detailing the suspension. Contractor must comply with the stop work order upon receipt. Within 90 calendar days, or any longer period agreed to by Contractor, the State will either: (a) issue a notice authorizing Contractor to resume work, or (b) terminate the Contract or delivery order. The State will not pay for Contract Activities, Contractor's lost profits, or any additional compensation during a stop work period.
- 23. Termination for Cause.** The State may terminate this Contract for cause, in whole or in part, if Contractor, as determined by the State: (a) endangers the value, integrity, or security of any location, data, or personnel; (b) becomes insolvent, petitions for bankruptcy court proceedings, or has an involuntary bankruptcy proceeding filed against it by any creditor; (c) engages in any conduct that may expose the State to liability; (d) breaches any of its material duties or obligations; or (e) fails to cure a breach within the time stated in a notice of breach. Any reference to specific breaches being material breaches within this Contract will not be construed to mean that other breaches are not material.

If the State terminates this Contract under this Section, the State will issue a termination notice specifying whether Contractor must: (a) cease performance immediately, or (b) continue to perform for a specified period. If it is later determined that Contractor was not in breach of the Contract, the termination will be deemed to have been a Termination for Convenience, effective as of the same date, and the rights and obligations of the parties will be limited to those provided in Section 24, Termination for Convenience.

The State will only pay for amounts due to Contractor for Contract Activities accepted by the State on or before the date of termination, subject to the State's right to set off any amounts owed by the Contractor for the State's reasonable costs in terminating this Contract. The Contractor must pay all reasonable costs incurred

by the State in terminating this Contract for cause, including administrative costs, attorneys' fees, court costs, transition costs, and any costs the State incurs to procure the Contract Activities from other sources.

- 24. Termination for Convenience.** The State may immediately terminate this Contract in whole or in part without penalty and for any reason, including but not limited to, appropriation or budget shortfalls. The termination notice will specify whether Contractor must: (a) cease performance of the Contract Activities immediately, or (b) continue to perform the Contract Activities in accordance with Section 25, Transition Responsibilities. If the State terminates this Contract for convenience, the State will pay all reasonable costs, as determined by the State, for State approved Transition Responsibilities.
- 25. Transition Responsibilities.** Upon termination or expiration of this Contract for any reason, Contractor must, for a period of time specified by the State (not to exceed 90 calendar days), provide all reasonable transition assistance requested by the State, to allow for the expired or terminated portion of the Contract Activities to continue without interruption or adverse effect, and to facilitate the orderly transfer of such Contract Activities to the State or its designees. Such transition assistance may include, but is not limited to: (a) continuing to perform the Contract Activities at the established Contract rates; (b) taking all reasonable and necessary measures to transition performance of the work, including all applicable Contract Activities, training, equipment, software, leases, reports and other documentation, to the State or the State's designee; (c) taking all necessary and appropriate steps, or such other action as the State may direct, to preserve, maintain, protect, or return to the State all materials, data, property, and confidential information provided directly or indirectly to Contractor by any entity, agent, vendor, or employee of the State; (d) transferring title in and delivering to the State, at the State's discretion, all completed or partially completed deliverables prepared under this Contract as of the Contract termination date; and (e) preparing an accurate accounting from which the State and Contractor may reconcile all outstanding accounts (collectively, "**Transition Responsibilities**"). This Contract will automatically be extended through the end of the transition period.
- 26. General Indemnification.** Contractor must defend, indemnify and hold the State, its departments, divisions, agencies, offices, commissions, officers, and employees harmless, without limitation, from and against any and all actions, claims, losses, liabilities, damages, costs, attorney fees, and expenses (including those required to establish the right to indemnification), arising out of or relating to: (a) any breach by Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable) of any of the promises, agreements, representations, warranties, or insurance requirements contained in this Contract; (b) any infringement, misappropriation, or other violation of any intellectual property right or other right of any third party; (c) any bodily injury, death, or damage to real or tangible personal property occurring wholly or in part due to action or inaction by Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable); and (d) any acts or omissions of Contractor (or any of Contractor's employees, agents, subcontractors, or by anyone else for whose acts any of them may be liable).

The State will notify Contractor in writing if indemnification is sought; however, failure to do so will not relieve Contractor, except to the extent that Contractor is materially prejudiced. Contractor must, to the satisfaction of the State, demonstrate its financial ability to carry out these obligations.

The State is entitled to: (i) regular updates on proceeding status; (ii) participate in the defense of the proceeding; (iii) employ its own counsel; and to (iv) retain control of the defense if the State deems necessary. Contractor will not, without the State's written consent (not to be unreasonably withheld), settle, compromise, or consent to the entry of any judgment in or otherwise seek to terminate any claim, action, or proceeding. To the extent that any State employee, official, or law may be involved or challenged, the State may, at its own expense, control the defense of that portion of the claim.

Any litigation activity on behalf of the State, or any of its subdivisions under this Section, must be coordinated with the Department of Attorney General. An attorney designated to represent the State may not do so until approved by the Michigan Attorney General and appointed as a Special Assistant Attorney General.

- 27. Infringement Remedies.** If, in either party's opinion, any piece of equipment, software, commodity, or service supplied by Contractor or its subcontractors, or its operation, use or reproduction, is likely to become the subject of a copyright, patent, trademark, or trade secret infringement claim, Contractor must, at its expense: (a) procure for the State the right to continue using the equipment, software, commodity, or service, or if this option is not reasonably available to Contractor, (b) replace or modify the same so that it becomes non-infringing; or (c) accept its return by the State with appropriate credits to the State against Contractor's charges and reimburse the State for any losses or costs incurred as a consequence of the State ceasing its use and returning it.

28. **Limitation of Liability and Disclaimer of Damages.** IN NO EVENT WILL THE STATE'S AGGREGATE LIABILITY TO CONTRACTOR UNDER THIS CONTRACT, REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR BY STATUTE OR OTHERWISE, FOR ANY CLAIM RELATED TO OR ARISING UNDER THIS CONTRACT, EXCEED THE MAXIMUM AMOUNT OF FEES PAYABLE UNDER THIS CONTRACT. The State is not liable for consequential, incidental, indirect, or special damages, regardless of the nature of the action.
29. **Disclosure of Litigation, or Other Proceeding.** Contractor must notify the State within 14 calendar days of receiving notice of any litigation, investigation, arbitration, or other proceeding (collectively, "**Proceeding**") involving Contractor, a subcontractor, or an officer or director of Contractor or subcontractor, that arises during the term of the Contract, including: (a) a criminal Proceeding; (b) a parole or probation Proceeding; (c) a Proceeding under the Sarbanes-Oxley Act; (d) a civil Proceeding involving: (1) a claim that might reasonably be expected to adversely affect Contractor's viability or financial stability; or (2) a governmental or public entity's claim or written allegation of fraud; or (e) a Proceeding involving any license that Contractor is required to possess in order to perform under this Contract.
30. **State Data.** All data and information provided to Contractor by or on behalf of the State, and all data and information derived therefrom, is the exclusive property of the State ("**State Data**"); this definition is to be construed as broadly as possible. Upon request, Contractor must provide to the State, or a third party designated by the State, all State Data within 10 calendar days of the request and in the format requested by the State. Contractor will assume all costs incurred in compiling and supplying State Data. No State Data may be used for any marketing purposes.
31. **Reserved.**
32. **Non-Disclosure of Confidential Information.** The parties acknowledge that each party may be exposed to or acquire communication or data of the other party that is confidential, privileged communication not intended to be disclosed to third parties. The provisions of this Section survive the termination of this Contract.
- a. Meaning of Confidential Information. For the purposes of this Contract, the term "**Confidential Information**" means all information and documentation of a party that: (a) has been marked "confidential" or with words of similar meaning, at the time of disclosure by such party; (b) if disclosed orally or not marked "confidential" or with words of similar meaning, was subsequently summarized in writing by the disclosing party and marked "confidential" or with words of similar meaning; and, (c) should reasonably be recognized as confidential information of the disclosing party. The term "Confidential Information" does not include any information or documentation that was: (a) subject to disclosure under the Michigan Freedom of Information Act (FOIA); (b) already in the possession of the receiving party without an obligation of confidentiality; (c) developed independently by the receiving party, as demonstrated by the receiving party, without violating the disclosing party's proprietary rights; (d) obtained from a source other than the disclosing party without an obligation of confidentiality; or, (e) publicly available when received, or thereafter became publicly available (other than through any unauthorized disclosure by, through, or on behalf of, the receiving party). For purposes of this Contract, in all cases and for all matters, State Data is deemed to be Confidential Information.
- b. Obligation of Confidentiality. The parties agree to hold all Confidential Information in strict confidence and not to copy, reproduce, sell, transfer, or otherwise dispose of, give or disclose such Confidential Information to third parties other than employees, agents, or subcontractors of a party who have a need to know in connection with this Contract or to use such Confidential Information for any purposes whatsoever other than the performance of this Contract. The parties agree to advise and require their respective employees, agents, and subcontractors of their obligations to keep all Confidential Information confidential. Disclosure to a subcontractor is permissible where: (a) use of a subcontractor is authorized under this Contract; (b) the disclosure is necessary or otherwise naturally occurs in connection with work that is within the subcontractor's responsibilities; and (c) Contractor obligates the subcontractor in a written contract to maintain the State's Confidential Information in confidence. At the State's request, any employee of Contractor or any subcontractor may be required to execute a separate agreement to be bound by the provisions of this Section.
- c. Cooperation to Prevent Disclosure of Confidential Information. Each party must use its best efforts to assist the other party in identifying and preventing any unauthorized use or disclosure of any Confidential Information. Without limiting the foregoing, each party must advise the other party immediately in the event either party learns or has reason to believe that any person who has had access to Confidential

Information has violated or intends to violate the terms of this Contract and each party will cooperate with the other party in seeking injunctive or other equitable relief against any such person.

- d. Remedies for Breach of Obligation of Confidentiality. Each party acknowledges that breach of its obligation of confidentiality may give rise to irreparable injury to the other party, which damage may be inadequately compensable in the form of monetary damages. Accordingly, a party may seek and obtain injunctive relief against the breach or threatened breach of the foregoing undertakings, in addition to any other legal remedies which may be available, to include, in the case of the State, at the sole election of the State, the immediate termination, without liability to the State, of this Contract or any Statement of Work corresponding to the breach or threatened breach.
- e. Surrender of Confidential Information upon Termination. Upon termination of this Contract or a Statement of Work, in whole or in part, each party must, within 5 calendar days from the date of termination, return to the other party any and all Confidential Information received from the other party, or created or received by a party on behalf of the other party, which are in such party's possession, custody, or control; provided, however, that Contractor must return State Data to the State following the timeframe and procedure described further in this Contract. Should Contractor or the State determine that the return of any Confidential Information is not feasible, such party must destroy the Confidential Information and must certify the same in writing within 5 calendar days from the date of termination to the other party. However, the State's legal ability to destroy Contractor data may be restricted by its retention and disposal schedule, in which case Contractor's Confidential Information will be destroyed after the retention period expires.

33. Reserved.

34. Reserved.

35. Reserved.

36. Records Maintenance, Inspection, Examination, and Audit. The State or its designee may audit Contractor to verify compliance with this Contract. Contractor must retain and provide to the State or its designee and the auditor general upon request, all financial and accounting records related to the Contract through the term of the Contract and for 4 years after the latter of termination, expiration, or final payment under this Contract or any extension ("**Audit Period**"). If an audit, litigation, or other action involving the records is initiated before the end of the Audit Period, Contractor must retain the records until all issues are resolved.

Within 10 calendar days of providing notice, the State and its authorized representatives or designees have the right to enter and inspect Contractor's premises or any other places where Contract Activities are being performed, and examine, copy, and audit all records related to this Contract. Contractor must cooperate and provide reasonable assistance. If any financial errors are revealed, the amount in error must be reflected as a credit or debit on subsequent invoices until the amount is paid or refunded. Any remaining balance at the end of the Contract must be paid or refunded within 45 calendar days.

This Section applies to Contractor, any parent, affiliate, or subsidiary organization of Contractor, and any subcontractor that performs Contract Activities in connection with this Contract.

37. Warranties and Representations. Contractor represents and warrants: (a) Contractor is the owner or licensee of any Contract Activities that it licenses, sells, or develops and Contractor has the rights necessary to convey title, ownership rights, or licensed use; (b) all Contract Activities are delivered free from any security interest, lien, or encumbrance and will continue in that respect; (c) the Contract Activities will not infringe the patent, trademark, copyright, trade secret, or other proprietary rights of any third party; (d) Contractor must assign or otherwise transfer to the State or its designee any manufacturer's warranty for the Contract Activities; (e) the Contract Activities are merchantable and fit for the specific purposes identified in the Contract; (f) the Contract signatory has the authority to enter into this Contract; (g) all information furnished by Contractor in connection with the Contract fairly and accurately represents Contractor's business, properties, finances, and operations as of the dates covered by the information, and Contractor will inform the State of any material adverse changes; (h) all information furnished and representations made in connection with the award of this Contract is true, accurate, and complete, and contains no false statements or omits any fact that would make the information misleading; and that (i) Contractor is neither currently engaged in nor will engage in the boycott of a person based in or doing business with a strategic partner as described in 22 USC 8601 to 8606. A breach of this Section is considered a material breach of this Contract, which entitles the State to terminate this Contract under Section 23, Termination for Cause.

38. **Conflicts and Ethics.** Contractor will uphold high ethical standards and is prohibited from: (a) holding or acquiring an interest that would conflict with this Contract; (b) doing anything that creates an appearance of impropriety with respect to the award or performance of the Contract; (c) attempting to influence or appearing to influence any State employee by the direct or indirect offer of anything of value; or (d) paying or agreeing to pay any person, other than employees and consultants working for Contractor, any consideration contingent upon the award of the Contract. Contractor must immediately notify the State of any violation or potential violation of these standards. This Section applies to Contractor, any parent, affiliate, or subsidiary organization of Contractor, and any subcontractor that performs Contract Activities in connection with this Contract.
39. **Compliance with Laws.** Contractor must comply with all federal, state and local laws, rules and regulations.
40. **Prevailing Wage.** Contractor must comply with prevailing wage requirements, to the extent applicable to this Contract.
41. **Reserved.**
42. **Nondiscrimination.** Under the Elliott-Larsen Civil Rights Act, 1976 PA 453, MCL 37.2101, *et seq.*, the Persons with Disabilities Civil Rights Act, 1976 PA 220, MCL 37.1101, *et seq.*, and [Executive Directive 2019-09](#), Contractor and its subcontractors agree not to discriminate against an employee or applicant for employment with respect to hire, tenure, terms, conditions, or privileges of employment, or a matter directly or indirectly related to employment, because of race, color, religion, national origin, age, sex (as defined in Executive Directive 2019-09), height, weight, marital status, partisan considerations, any mental or physical disability, or genetic information that is unrelated to the person's ability to perform the duties of a particular job or position. Breach of this covenant is a material breach of this Contract.
43. **Unfair Labor Practice.** Under MCL 423.324, the State may void any Contract with a Contractor or subcontractor who appears on the Unfair Labor Practice register compiled under MCL 423.322.
44. **Governing Law.** This Contract is governed, construed, and enforced in accordance with Michigan law, excluding choice-of-law principles, and all claims relating to or arising out of this Contract are governed by Michigan law, excluding choice-of-law principles. Any dispute arising from this Contract must be resolved in Michigan Court of Claims. Contractor consents to venue in Ingham County, and waives any objections, such as lack of personal jurisdiction or *forum non conveniens*. Contractor must appoint agents in Michigan to receive service of process.
45. **Non-Exclusivity.** Nothing contained in this Contract is intended nor will be construed as creating any requirements contract with Contractor. This Contract does not restrict the State or its agencies from acquiring similar, equal, or like Contract Activities from other sources.
46. **Force Majeure.** Neither party will be in breach of this Contract because of any failure arising from any disaster or acts of god that are beyond their control and without their fault or negligence. Each party will use commercially reasonable efforts to resume performance. Contractor will not be relieved of a breach or delay caused by its subcontractors. If immediate performance is necessary to ensure public health and safety, the State may immediately contract with a third party.
47. **Dispute Resolution.** The parties will endeavor to resolve any Contract dispute in accordance with this provision. The dispute will be referred to the parties' respective Contract Administrators or Program Managers. Such referral must include a description of the issues and all supporting documentation. The parties must submit the dispute to a senior executive if unable to resolve the dispute within 15 business days. The parties will continue performing while a dispute is being resolved, unless the dispute precludes performance. A dispute involving payment does not preclude performance.
- Litigation to resolve the dispute will not be instituted until after the dispute has been elevated to the parties' senior executive and either concludes that resolution is unlikely or fails to respond within 15 business days. The parties are not prohibited from instituting formal proceedings: (a) to avoid the expiration of statute of limitations period; (b) to preserve a superior position with respect to creditors; or (c) where a party makes a determination that a temporary restraining order or other injunctive relief is the only adequate remedy. This Section does not limit the State's right to terminate the Contract.
48. **Media Releases.** News releases (including promotional literature and commercial advertisements) pertaining to the Contract or project to which it relates must not be made without prior written State approval, and then only in accordance with the explicit written instructions of the State.

49. **Website Incorporation.** The State is not bound by any content on Contractor's website unless expressly incorporated directly into this Contract.
50. **Schedules.** All Schedules and Exhibits that are referenced herein and attached hereto are hereby incorporated by reference. The following Schedules are attached hereto and incorporated herein:
51. **Entire Agreement and Order of Precedence.** This Contract, which includes Schedule A – Statement of Work, and schedules and exhibits which are hereby expressly incorporated, is the entire agreement of the parties related to the Contract Activities. This Contract supersedes and replaces all previous understandings and agreements between the parties for the Contract Activities. If there is a conflict between documents, the order of precedence is: (a) first, this Contract, excluding its schedules, exhibits, and Schedule A – Statement of Work; (b) second, Schedule A – Statement of Work as of the Effective Date; and (c) third, schedules expressly incorporated into this Contract as of the Effective Date. NO TERMS ON CONTRACTOR'S INVOICES, ORDERING DOCUMENTS, WEBSITE, BROWSE-WRAP, SHRINK-WRAP, CLICK-WRAP, CLICK-THROUGH OR OTHER NON-NEGOTIATED TERMS AND CONDITIONS PROVIDED WITH ANY OF THE CONTRACT ACTIVITIES WILL CONSTITUTE A PART OR AMENDMENT OF THIS CONTRACT OR IS BINDING ON THE STATE FOR ANY PURPOSE. ALL SUCH OTHER TERMS AND CONDITIONS HAVE NO FORCE AND EFFECT AND ARE DEEMED REJECTED BY THE STATE, EVEN IF ACCESS TO OR USE OF THE CONTRACT ACTIVITIES REQUIRES AFFIRMATIVE ACCEPTANCE OF SUCH TERMS AND CONDITIONS.
52. **Severability.** If any part of this Contract is held invalid or unenforceable, by any court of competent jurisdiction, that part will be deemed deleted from this Contract and the severed part will be replaced by agreed upon language that achieves the same or similar objectives. The remaining Contract will continue in full force and effect.
53. **Waiver.** Failure to enforce any provision of this Contract will not constitute a waiver.
54. **Survival.** The provisions of this Contract that impose continuing obligations, including warranties and representations, termination, transition, insurance coverage, indemnification, and confidentiality, will survive the expiration or termination of this Contract.
55. **Contract Modification.** This Contract may not be amended except by signed agreement between the parties (a "**Contract Change Notice**"). Notwithstanding the foregoing, no subsequent Statement of Work or Contract Change Notice executed after the Effective Date will be construed to amend this Contract unless it specifically states its intent to do so and cites the section or sections amended.

STATE OF MICHIGAN

Asset Maintenance Contract on MDOT Trunklines within Monroe County

SCHEDULE A STATEMENT OF WORK CONTRACT ACTIVITIES

BACKGROUND

The Michigan Department of Transportation (MDOT) performance based flexible asset maintenance service Contract consisting of nearly 600 lane miles of MDOT trunklines including ramps (all Interstate, US Routes, "M" Routes, and unnumbered MDOT trunkline) within Monroe County, in the state of Michigan (See Attachment A: Service Area).

SCOPE

MDOT desires to pursue a three-year Contract with three, one-year optional extensions for the above-mentioned asset maintenance services. The requirements of this Contract apply to MDOT owned transportation assets within the existing right of way of the Interstate system and State of Michigan highways as defined by MDOT. The Contractor will manage and perform maintenance activities on these assets in order to meet or exceed the established performance benchmarks as described herein. Included assets and maintenance activities are associated with roadways, drainage, winter maintenance, emergency response and as otherwise contained herein.

Monroe County Routes	
Route	Lane Miles
I-75	199.55
I-275	56.38
US-23	121.15
US-223	9.11
US-24	89.58
M-50	47.45
M-125	58.69
Old US-223	11.48
Total	593.39

Refer to Table 1.2 - 1 below for specific maintenance activities that are considered "in scope", note that activities listed as "out of scope" (refer to Table 1.2 - 2) are performed by MDOT statewide and region maintenance crews or are already contracted for under an existing service contract and will not be the responsibility of the Contractor. The Contractor shall be responsible for personnel, equipment, materials and services necessary to adhere to all requirements and meet or exceed performance benchmarks and outcome measures. The Contractor must comply with all state and federal laws. Only one Contractor will be selected for this Contract.

REQUIREMENTS

1 General Requirements

1.1 Requirements

The Contractor will manage and perform all maintenance activities on the roadway and within the right-of-way as described in this Contract and meet all performance targets/benchmarks on an ongoing basis. These activities shall include providing all personnel, equipment, materials and services necessary to adhere to all requirements and comply with all state and federal laws. These activities will be performed on the assets at a frequency that ensures uniform, consistent, and timely compliance with the performance measures and requirements specified herein at all times. MDOT will monitor the Contractor's performance using established performance criteria identified in the Michigan Maintenance Rating System (MiMRS), unless otherwise stated herein. Minimum performance benchmarks have been established for each MiMRS rating element and further described herein.

The Contractor is responsible for proactively monitoring all routes and associated assets to identify, document, report, plan, and repair deficiencies to continuously achieve Contract outcome targets/benchmarks and criteria specified in this CONTRACT. The Contractor is responsible for promptly and proactively addressing and repairing any noted deficiencies on the assets located within the right of way and the limits of this Contract to include taking actions to prevent deficiencies from occurring and providing notification and documentation to MDOT.

1.2 Maintenance Activities and General Requirements

1.2.1 In Scope Activities

- A. The following activities in Table 1.2 – 1 are considered in scope of this CONTRACT and are either part of the monthly lump sum performance line item for winter maintenance (paid in 6 equal monthly payments), non-winter maintenance monthly lump sum (paid in 12 equal monthly payments), or as unit price pay items (payment based on unit price * quantity). Refer to Schedule B Pricing for proposal pricing sheet.
- B. Lump Sum activities are considered as “Routine Maintenance” and will be initiated based on the Contractor's daily work plan or emergency situations.
- C. The MDOT Program Manager must authorize any activity with a pay item as a unit price prior to Contractor commencing work on these activities.
- D. Additional information regarding activities listed in Table 1.2 – 1 is provided in Sections 1.2 and 1.3, as well as Attachment B - Maintenance Activity Guides.

Table 1.2 - 1: FAMS In Scope Activity Guide Index

ACTIVITY CODE	ACTIVITY DESCRIPTION	PAY ITEM	PERFORMANCE MEASURE(S)
1410	Winter Maintenance	Winter Lump Sum (Activities 1410, 1440, and 1490 are to be included in Winter Lump Sum pay item)	<i>Per Section 1.3.2</i>
1440	Winter Road Patrol		<i>Per Section 1.3.2</i>
1490	Other Winter Maintenance		<i>Per Section 1.3.2</i>
1020	Remove Replace Pavement (Fast Set Concrete)	Non-Winter Lump Sum (all Activities Codes in this section are to be included in the Non-Winter Lump Sum pay item)	Rigid - Patching
1030	Patrol Patching		Flexible - Patching; Rigid - Patching
1042	Pavement Spall & Pothole Repair		Flexible - Potholes; Rigid - Potholes
1050	Bituminous Maintenance & Repair		Flexible - Patching
1080	Bump Removal		<i>Per Section 1.3.4</i>
1100	Routine Blading		Shoulders

1120	Gravel Shoulder Maintenance		Shoulders
1140	Paved Shoulder Maintenance		Shoulders
1240	Litter Pickup		Litter
1280	Culvert Underdrain & Edge Drain Cleaning		Culverts
1300	Guardrail Repair Steel Beam		Guardrail
1301	Guardrail Ending Repair Steel Beam		Guardrail
1310	Cable Barrier Repair		Cable Barrier
1600	Small Sign Maintenance		Signs
1640	Delineator Maintenance		Delineators
1650	Impact Attenuator Maintenance Roadway		Impact Attenuator
1660	Non-Routine Traffic Control		<i>Per Section 1.3.8</i>
1960	Training (Maintenance)		<i>Per Section 1.3.9</i>
1970	Emergency Response		<i>Per Section 1.3.10</i>
7950	Adopt-A-Highway		<i>Per Section 1.3.11</i>
1010	Joint & Crack Filling	Unit Price (Lane Mile)	<i>Per Section 1.3.12</i>
1230	Ditch Cleanout & Check Dam Maintenance	Unit Price (Lineal Foot)	<i>Per Section 1.3.14</i>
1320	Approach Sweeping	Unit Price (hour)	<i>Per Section 1.3.15</i>
1370	Right-of-Way Fence Repair	Unit Price (Lineal Foot)	<i>Per Section 1.3.13</i>

- 1.2.2 The following assets and/or work activities are specifically excluded from this CONTRACT as these activities are currently under an existing contract with a service provider or are routinely performed by MDOT Regionwide or Statewide crews.

Table 1.2 - 2: FAMS Out of Scope Activity Guide Index		
Activity Code	ACTIVITY DESCRIPTION (Out of Scope)	
1200	Tree Removal	Out of Scope
1210	Stump Removal	Out of Scope
1220	Catch Basin Cleanout	Out of Scope
1260	Area Mowing	Out of Scope
1270	Brush Control	Out of Scope
1281	Culvert Underdrain & Edge Drain Maintenance	Out of Scope
1290	Non-Motorized Trails	Out of Scope
1330	Tourist Facility Maintenance	Out of Scope
1340	Expressway Patrol	Out of Scope
1350	Freeway Lighting	Out of Scope
1360	Curb Sweeping	Out of Scope
1380	Maintaining MITS	Out of Scope
1390	Other Routine Maintenance	Out of Scope

1391	Snowmobile Crossing or ORV Connector Repair	Out of Scope
1510	Bridge Maintenance Cubic Yards	Out of Scope
1520	Bridge Maintenance Square Feet	Out of Scope
1530	Pump Station Maintenance	Out of Scope
1540	Moveable Spans	Out of Scope
1560	Bridge Maintenance Lineal Feet	Out of Scope
1561	Bridge Joint Replacement	Out of Scope
1590	Other Bridge Maintenance	Out of Scope
1591	Bridge Inspection	Out of Scope
1602	Sign Fabrication Standard	Out of Scope
1605	Sign Fabrication Non-Standard (Aluminum Extruded)	Out of Scope
1606	Sign Fabrication Non-Standard (Screen Printing)	Out of Scope
1610	Signal Maintenance	Out of Scope
1620	Special Markings Paint & Tape	Out of Scope
1670	Large Sign Maintenance	Out of Scope
1671	Hydraulic Tightening of Anchor Bolts	Out of Scope
1690	Other Sign/Signal Maintenance	Out of Scope
1691	Specialty Fabrication	Out of Scope
1710	Tree Trimming	Out of Scope
1720	Vegetation Control	Out of Scope
1742	Plant Trees	Out of Scope
1750	Retention or Detention Basin Maintenance	Out of Scope
1790	Other Forestry	Out of Scope
1860	Roadway Inspection	Out of Scope
1880	Permits	Out of Scope
1900	Inspection & Oversight of Maintenance Contract Work	Out of Scope
1940	Weigh Station Maintenance	Out of Scope

1.2.3 Summary of Referenced Sites/Sources

- A. Table 1.2 - 3 provides a summary of sites and sources referenced in this CONTRACT. Information contained in these sites/sources must be followed unless otherwise directed in the Contract. If there is a conflict between information between the reference and the Contract, the Contract prevails.
- B. This summary list of references is for information only. All source information presented in sections 1.2.4 – entirety of section 1.3 prevail over information in Table 1.2 – 3.

Table 1.2 - 3: Summary of Referenced Sources *		
Section Reference	Source	Site/Link (if applicable)
1.2.4.C	MDOT Standard Specifications for Construction, Standard Plans, Maintenance Advisories, Maintenance Memos	www.michigan.gov/mdot/
1.2.4.D.1	MDOT Maintenance Advisories:	https://www.michigan.gov/mdot/0,4616,7-151-9622_11044_58172---,00.html
1.2.4.D.2	MDOT Maintenance Memos:	https://www.michigan.gov/mdot/0,4616,7-151-9622_11044_47942---,00.html
1.2.4.J.3.c	Work suspensions including removal of all lane closures for the Memorial Day, Independence Day, and Labor Day holidays are defined on the following site	http://mdotwiki.state.mi.us/construction/index.php/Holiday_Traffic_Safety_Provisions
1.2.4.P.4.a	For protection of underground utilities and in conformance with Public Act 174 of 2013,	
1.2.4.P.4.b.i	Special Provision for Protect Intelligent Transportation System Infrastructure	Protect Intelligent Transportation System Infrastructure-12IT800(B595)-5-4-17.pdf
1.2.4.P.4.b.ii	Special Provision for Staking Michigan Department of Transportation Underground Electrical Infrastructure and ITS Facilities	Staking MDOT Electrical Infrastructure-12DS819(P125).docx
1.2.9.A	The Contractor must use qualified products (materials) that are compliant with the MDOT Materials Source Guide	https://www.michigan.gov/documents/mdot/MDOT-MaterialSourceGuideComplete_Linked_181739_7.pdf
Table 1.2 - 4	Current MDOT Materials Procurement Contracts (Reference Only)	
1.2.11.B	MA 2012-03 Capturing Revenue Through the Property Damage Reclamation Process:	https://www.michigan.gov/documents/mdot/MA_2012-03_PDRP_394151_7.pdf
1.2.17.A	The Michigan Manual on Uniform Traffic Control Devices (MMUTCD)	https://mdotcf.state.mi.us/public/tandis/Details/Web/mmucdcompleteinteractive.pdf
1.2.17.A	MDOT Maintenance Work Zone Traffic Control Guidelines	https://www.michigan.gov/documents/zonecontrol_112912_7.pdf
1.2.18.A	MDOTs 5 year plan	https://mdotnetpublic.state.mi.us/fyp/default.aspx?display
1.3.2.F.7	maintenance advisory for <i>Calibration of Salt Trucks</i>	https://www.michigan.gov/documents/mdot/mdot_ma_2009-02_calibration_of_salt_trucks_349377_7.pdf
1.3.2.F.9	<i>Best practices for applying Deicing Materials</i> is located on the MDOT maintenance advisory site:	https://www.michigan.gov/documents/mdot/MA_2013-01_Best_Practices_for_Applying_Deicing_Materials_432480_7.pdf

1.3.8.A.1	The Michigan Manual on Uniform Traffic Control Devices (MMUTCD)	https://mdotcf.state.mi.us/public/tand s/Details Web/mmutcdcompleteinteractive.pdf
1.3.8.A.1	MDOT Maintenance Work Zone Traffic Control Guidelines	https://www.michigan.gov/documents /zonecontrol_112912_7.pdf
1.3.11.C	Adopt-A-Highway program schedule (pickup dates)	https://www.michigan.gov/mdot/0,461 6,7-151-9621_11041_14408---,00.html
<p>* Note: Information in this table is for reference only. Contract notation in sections 1.2 and 1.3 prevail.</p>		

1.2.4 General Criteria (Applies to all in Scope Activities)

- A. The Contractor shall comply with all federal, state and local laws and regulations, including those governing environmental protection and the furnishing and use of all safeguards, safety devices and protective equipment. The Contractor shall take any other actions, on either his/her own initiative or as directed by the MDOT Program Manager, reasonably necessary to protect the safety and health of employees on the job and the public and to protect property during the performance of the project. All employees of Contractor, while performing their duties, shall wear appropriate safety gear as required by state and federal law, including but not limited to: safety vest, hard hat, hearing and eye protection, and appropriate footwear.
- B. The Contractor shall provide all personnel, equipment, tools, supplies/materials, supervision, training and other items and services necessary to provide the deliverables/service as described within the Contract. The exception is MDOT will provide Road Salt.
- C. All asset maintenance and repairs shall be made in accordance with the most current MDOT Maintenance Activity Guides, MDOT Standard Specifications for Construction, Standard Plans, MDOT Maintenance Advisories, and Maintenance Memos.
- D. The Contractor must adhere to MDOT maintenance policies detailed on the following sites.
 1. MDOT Maintenance Advisories: (https://www.michigan.gov/mdot/0,4616,7-151-9622_11044_58172---,00.html)
 2. MDOT Maintenance Memos: https://www.michigan.gov/mdot/0,4616,7-151-9622_11044_47942---,00.html
 3. The Contractor is responsible for notifying local Municipalities before starting work in their area. The MDOT Program Manager will provide a Directory of Municipal Offices and County Directory at the Pre-Award Meeting.
 4. Any misrepresentation by the Contractor of its ability to perform the work described in this Contract will be grounds for immediate termination. In such case, this Contract will be awarded to the next bidder who can demonstrate the ability to perform the work.
- E. In the case of inclement weather and/or hazardous road conditions, the Contractor may not be allowed to perform certain work activities along the roadway (exceptions to this include winter maintenance and emergency response activities). It shall be up to the discretion of the MDOT Program Manager whether to allow the Contractor to work in that area under such conditions.

- F. The Contractor must maintain at least one physical address within the Service Area, where the Contractor can be reached during business hours.
- G. The Contractor must provide MDOT addresses and access to all offices and facilities the Contractor maintains in the Service Area.
- H. The MDOT Program Manager will have the right to inspect all equipment and materials which are to be used in carrying out the terms of this Contract. Any such equipment or materials which do not comply with local, state, and federal regulations or with this Contract may be rejected by the MDOT Program Manager.
- I. All data collected by the Contractor for documenting work activities (including, but not limited to: Work Orders, equipment, and asset inventory data) is the property of MDOT and shall be turned over to MDOT at the end of the Contract term, or when requested by MDOT during the Contract term.
- J. **Hours of Operation:** Hours of operation for maintenance operations within this Contract are as follows:
 - 1. **Winter activities** shall be performed 24 hours a day, seven days a week, when required to maintain provided levels of service per route.
 - 2. All **emergency and incident response activities** shall be conducted on an as needed 24/7/365 basis.
 - 3. All **non-emergency, non-winter and unit price activities** may be performed during standard business hours Monday through Friday, unless otherwise directed by MDOT.
 - a. Certain activities may be allowed outside standard business hours as approved by the MDOT Program Manager (This may include daylight hours, weekends, etc)
 - b. Work is not permitted during holiday periods, except for winter operations and emergency response in accordance with the current MDOT Standard Specifications for Construction. Recognized MDOT holidays are: New Year's Day, Martin Luther King Day, Presidents Day, Memorial Day, Independence Day, Labor Day, Veterans Day, Thanksgiving Day, and the day after Thanksgiving Day, Christmas Eve, Christmas Day, and New Year's Eve. The MDOT Program Manager must approve any scheduled work for each Holiday.
- K. All conditions that are considered, or causing, a hazard shall be addressed immediately by the Contractor upon detection or when notification from MDOT, Michigan State Police (MSP), Statewide Transportation Operations Center (STOC) or others is received.
- L. The Contractor must notify the STOC immediately to report crashes and incidents that impact lanes and traffic flow, and to report scheduled lane closures for scheduled work and other activities that impact traffic operations. The Contractor also needs to provide STOC a 24/7 contact number for a maintenance supervisor. STOC is staffed 24/7 and can be contacted at (517) 241-4000.

- M. Any crash involving the Contractors vehicles or equipment shall be reported immediately by telephone to the MDOT Program Manager at (810) 217-1729 and STOC at (517)-241-4000. In addition, the Contractor must promptly report, in writing, within 48 hours to MDOT Program Manager, all crashes arising out of or in connection with the performance of the work, whether on or adjacent to the work zone, which cause death, personal injury, or property damage, giving full details and statements of witnesses.
- N. The Contractor shall be solely responsible for payment of any citations, fines or tickets received in connection with its performance of this Contract.
- O. Protection of Public and Private Property:
1. The Contractor shall be responsible for protecting and preserving from damage any and all facilities, public and private, which are adjacent to the areas where work is being performed. All repairs shall be made in accordance with the current MDOT Standard Specifications for Construction section 107.
 2. Protection of Roadway and Roadside Property:
 - a. The Contractor must exercise due caution and care not to damage roadside assets (including adjacent fences, vegetation, poles, hydrants, mailboxes, etc.)
 - b. The Contractor will be billed for all costs incurred by the MDOT due to property damages caused by Contractor's operation, and will be required to repair the property damages as directed by the MDOT Program Manager or receive a deduction **penalty from the monthly non-winter lump sum payment** owed to the Contractor as determined by the Program Manager.
 - c. All landscape plant material damaged by the Contractor shall be replaced in kind according to the current MDOT Standard Specifications for Construction. Planting may only be done in the spring and prior to May 10. All replacement plants must be maintained during the specified establishment period. Contractor will have 30 days to make repairs once notified by the MDOT Program Manager or repairs may be performed by MDOT staff. If repairs are made by MDOT, the actual replacement costs including all labor, equipment, materials, and fringe benefits shall be taken as a **deduction penalty to the Contractor's monthly non-winter lump sum payment.**
 - d. All turf damage repairs shall be made by the Contractor in accordance with Sections 815 and 917 of the 2012 MDOT Standard Specifications for Construction for Construction and as herein specified. Only friable topsoil shall be used to fill any depressions, ruts, etc., prior to seeding. Seeding will only be allowed during the seasonal limitation periods outlined in the current MDOT Standard Specifications for Construction.
 3. **Protection of above ground utilities:** The Contractor shall use caution and make proper arrangements when work activities are conducted in areas where overhead electric, telephone, and cable television facilities, as well as other visible utility components, exist. The Contractor shall protect all utilities from damage, shall immediately contact the appropriate utility if damage should occur, and shall be responsible for all claims for damage due to their operations.

The Contractor shall make arrangement with the utility for all work activities (including removal of all necessary vegetation) which may conflict with or create a personal injury hazard in conducting the operations of this Contract.

4. **The protection of the underground utilities:** The Contractor will be responsible for contacting the appropriate utility for location of any underground electric services which are in the work area and which can be damaged by the Contractor's operation.
 - a. For protection of underground utilities and in conformance with Public Act 174 of 2013, the Contractor will call Miss Dig at 1-800-482-7171 a minimum of three full working days, excluding Saturdays, Sundays, and holidays prior to beginning each excavation in areas where public utilities have not been previously located. 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.
 - b. MDOT's freeway lighting system, Intelligent Transportation Systems (ITS) and other miscellaneous electrical systems are not a part of Miss Dig. The Contractor will follow the included referenced special provisions at no additional cost to MDOT. See FAMS Attachment S: Underground Electric Special Provisions.
 - i. Special Provision for Protect Intelligent Transportation System Infrastructure
 - ii. Special Provision for Staking Michigan Department of Transportation Underground Electrical Infrastructure and ITS Facilities

1.2.5 Activity Specific Criteria

- A. Attachment B - Maintenance Activity Guides includes recommended work methods for completing each activity. MDOT reserves the right to update content of these guides and will provide notice to the Contractor upon update. MDOT also reserves the right to request input from the Contractor regarding content of any or all activity guides listed in Attachment B. If there is a discrepancy between attachment B and Schedule A, the content in schedule A prevails.
- B. The Contractor shall adhere to activity specific criteria discussed in Section 1.3, in addition to criteria discussed in Section 1.2.

1.2.6 Equipment (All Activities)

- A. The Contractor will provide new equipment that's listed in their implementation plan to comply with the Contract terms and conditions. Equipment will be of sufficient size, quantity and in such mechanical condition as comply with the requirements of the work and produce a satisfactory quality of work. Equipment will be such that no damage to the highway, adjacent property, other highways or danger to the public will result from its use. MDOT may order the removal and require replacement of any unsatisfactory equipment that may be unsafe or damaging to assets, employees, and public.
- B. The Contractor will provide a list of all equipment to the MDOT Program Manager that will be dedicated to this Contract, both owned and leased. If equipment is leased, a letter from the leasing company indicating the ability to provide the equipment will be required. MDOT reserves the right to determine if the equipment proposed is sufficient to provide the necessary service to the MDOT. The MDOT Program Manager will determine if the equipment meets specifications prior to any work being started.

- C. All Contractor Equipment used for work activities will be approved by MDOT. The MDOT Program Manager may request demonstrations of equipment prior to approval. Demonstrations will be at no cost to MDOT.
- D. The Contractor is responsible to make sure all equipment meets all federal, state and local safety requirements.
- E. All vehicles and Heavy Equipment in work zones, parked on the shoulder for work activities, or involved in mobile operations (including winter maintenance operations) shall have 360 degree amber and/or green auxiliary lighting. Lights shall be SAE Class 1 or equivalent.
- F. Under no circumstances shall MDOT be responsible for any damage to the Contractor's equipment.
- G. All drivers, operators, and supervisors are required to have in their possession an appropriate communication device between the driver, operator, supervisors and MDOT Program Manager or designee. Appropriate communication devices are defined as a functioning cellular phone or radio communications (other than citizen band).
- H. MDOT will provide up to three (3) 800 MHz Radios for foreman and/or supervisors to ensure continuous communication between the Contractor's supervisor and MDOT Program Manager or designee. Contractor will be responsible for lost or damaged radios and will be required to pay the cost of repair and/or replacement cost at the current market price. The radios shall be returned to MDOT at the end of the Contract.
- I. Communications devices are required to be hands free while operating vehicles and equipment on and along MDOT roadways.

1.2.7 Asset GIS inventories - ArcGIS Software (Certain Activities)

- A. The Contractor will use ArcGIS Software for the purposes of assisting with updating MDOT asset GIS data as asset maintenance is performed, to ensure updated and accurate asset inventories are being kept.
- B. The Contractor will be solely responsible for any and all costs associated with maintaining MDOT GIS inventories.
- C. The Contractor will validate and update asset inventory data (including location, attribution, and condition), at locations where the Contractor performs maintenance work activities.
- D. Instrumentation used to collect asset location data must provide sub-meter (mapping grade) accuracy.
- E. MDOT will provide access to required GIS asset layer inventories. Current asset inventories include:
 - 1. Guardrail
 - 2. Cable Barrier
 - 3. Culverts (1'-10' span cross culverts). Includes Culvert Barrels, and related end sections.
 - 4. Bridges
- F. The MDOT Program Manager will provide the Contractor with required MDOT asset collection and condition guides, which define the attribution and condition format prescribed by MDOT. MDOT reserves the right to alter the format and criteria for any asset inventory.
- G. **Asset Inventory System Management**

1. The Contractor is required to use ArcGIS software to track and monitor the MDOT asset databases in conjunction with MDOT. The database is portrayed in the form of a map that can be accessed on desktop computers via ArcGIS Online (AGO) or the Collector Application (aka Collector App) via smart phones and tablets, which is available to download for free. MDOT will provide log on credentials to the Contractor for access to the asset databases.
 2. Interactions with asset inventories is also possible via MDOT's workflow management system (Vueworks). These interactions include attribute editing, condition reporting, photos, and Work Order association.
- H. MDOT staff and Contractor representatives will share the same database. The database will be backed up by MDOT periodically to monitor any changes. Data points from the map can be extracted and used for reporting purposes. There will be limitations on what information MDOT and/or the Contractor can modify in the ArcGIS database.
- I. The Contractor is encouraged to check the Collector App or AGO multiple times a week to monitor asset inventories for updates.
- J. The Contractor is required to have mobile devices with cellular connections. Any costs associated with mobile devices are the responsibility of the Contractor. ArcGIS applications are available on iOS, Android and Windows devices. If the Contractor already has an AGO organizational account, credentials can be associated with the databases for this Contract.
- K. **Device Requirements:** Collector is supported on Android, iOS, and Windows devices:
- Android**
1. Android 4.1 (Jelly Bean) or later
 2. ARMv7 or x86 processor
 3. OpenGL ES 2.0 support
 4. Precise location (GPS and network-based) support
- iOS**
5. iOS 8 or later
 6. iPhone, iPad, iPod touch
- Windows**
- Windows 10.0.586 or later (tablet and PC; excluding LTSB)

1.2.8 Automated Vehicle Location (AVL) Requirements (Certain Activities)

- A. The Contractor will incorporate automated vehicle location (AVL) capabilities on Heavy Equipment used for maintenance activities, including winter operations and as specified in this Contract.
- B. The Contractor will be solely responsible for any and all costs associated with AVL.
- C. If required AVL and associated sensory data are not reporting after the allowed remedy timeframe of 3 business days, then a **penalty of \$100.00 per calendar day, per vehicle**, will be applied until all requested data is reporting again.
- D. System Data Storage - The system must support at least 1 GB flash memory for storage of data over extended periods of power loss or 48 hours of observations whichever is greater.
- E. Delayed Data Transmission - The system must provide Store and Forward capabilities capable of storing over 1 GB of information while out of cellular communications coverage and automatically forwarding the same when back in coverage. (System collects vehicle activity data and geo-stamp data and stores onboard until data can be securely transmitted to provide a detailed historical record of activity while in the field.)

- F. GPS unit shall be satellite based GPS with WAAS enhanced accuracy. There will be a 12-parallel channel, Wide Area Augmentation System (WAAS) enabled GPS receiver.
- G. GPS receiver must be accurate to less than 2 meters.
- H. The in-vehicle AVL unit shall be configured to start collecting data when the ignition is in the on position; continue throughout the work activity and terminate ten minutes after the ignition is returned to the off position.
- I. The data transmitted by the AVL unit to the database must include the following near real- time as well as recorded historical information:
 - 1. Vehicle speed, direction and location,
 - 2. Time and distance by each monitored sensor,
 - 3. Stop time data.
- J. The AVL control unit must be able to communicate with on-board equipment sensors installed on the vehicle to report their present status and changes to their status in real-time. The sensors, such as proximity switches, infrared, magnetic read switches, micro limit switches or equivalent must be able to communicate their present status to the equipment with necessary cabling connected to onboard equipment when required.
- K. Cellular communications – Devices must always be able to retain cellular connection and transmit data across the entire county.
- L. **Website** – AVL Data Management and Access – The AVL information collection, storage, and mapping website shall be designed, owned and operated by the Contractor at a location of the Contractor's choice, outside of MDOT network and accessible to MDOT and other agencies via the internet, using a standard web-browser.
 - 1. The AVL website must have the ability to be in continuous operation 24 hours per day, 365 days per year and must be capable of handling year-end changes and daylight savings changes with no impact to the system. Data must be on-line at all times. Contractor must take precautions to prevent downtime.
 - 2. MDOT shall be able to view the position of the Contractor's fleet vehicles at any point of time via a standard web browser on from a computer, tablet, and/or smartphone. The primary display shall be a map view of fleet vehicles and indicate the status of vehicles on when it last reported.
 - 3. Each vehicle on the map should have a unique identifier, such as license plate.
 - 4. The website must provide a minimum of the following mapping and reporting information:
 - a) Last known asset location map view – fleet wide view. Location information should be provided in the form of a GPS latitude and longitude associated with the vehicle's location at the time of the report. Three or more decimals of accuracy are required.
 - b) Vehicle Identifier - This should be an identifier that is unique to the organization from which the data is being collected.
 - c) Dispatch map (full screen "live" view)
 - d) Asset last location relative to home (pre-determined address)

- e) Last time asset reported in (e.g., "12/20/2013 3:43 AM EST" or "1-20-2005 9:43 UTC)
 - f) Last known location (individual asset map view)
 - g) Historical trip report (individual asset map view)
 - h) Raw data report showing exact data string as it was sent from spreader control (required for analyzing reports)
 - i) Speed
 - j) Operating during "off" hours
 - k) Geo fence (in/out)
 - l) View Maintenance History/Update Maintenance Record
5. The map display shall be such that vehicle position and status automatically update on screen without any input from the end-user, additionally, end-users shall be able to view the status of monitored on-board vehicle equipment.
 6. The website shall allow viewing of a vehicle in motion leaving tracks or "breadcrumbs" as it travels with arrow indicators for direction and showing all operations (GPS & Telematic data) as they occur including exact street location. Users shall be able to view the above-mentioned data for their entire fleet or select a specific vehicle(s) for a login session using a Filter Tool.
 7. The website must have the capability to create, edit, and delete landmarks and/or geofences to be displayed on the map. In addition, the landmark/geofence shall be identified in the reports.
 8. The website must have an easy 'intuitive' navigation sequence (i.e. navigator bar and/or tabs for easy access to various functional screens). Tools shall include but not be limited to:
 - a. Map navigational tools (zoom in/out, center, pan, etc.);
 - b. Automatic Vehicle Location Tool;
 - c. Breadcrumbs;
 - d. Filter Tool;
 - e. Historical Data; and Reports.
 9. System will have ability to report data collected from the AVL unit and all sensory inputs.
 10. Reports shall be configured to select either a single vehicle or group of vehicles.
 - M. At no additional cost, the Contractor shall provide training related to the usage of the Contractor provided website for displaying AVL data and reporting functionality.
 - N. The Contractor will provide server space for all data collected as part of this Contract. Data older than 2 years may be archived; however, archived data must be available to MDOT within 2 business days of a request for the data.
 - O. All AVL data collected is the property of MDOT and shall be turned over to MDOT at the end of the Contract term.

- P. **The Contractor is encouraged to utilize MDOT's AVL system.** Training on installation and use of this system will be offered by MDOT. The Contractor will need to contact MDOT's AVL vendor directly for equipment and pricing. The Contractor would still be responsible for installation of the AVL equipment. Information regarding that system can be found in Attachment D – MDOT-Parsons AVL System.

1.2.9 Materials

- A. The Contractor will provide all materials necessary to comply with the terms and conditions of this CONTRACT unless otherwise specified. The Contractor's use of any/all materials shall be in accordance with MDOT's Material Source Guide, or meet MDOT's approved specifications, or be approved by the MDOT Program Manager. MDOT's Material Source Guide is available: https://www.michigan.gov/documents/mdot/MDOT-MaterialSourceGuideComplete_Linked_181739_7.pdf
- B. The Contractor will be responsible for maintaining records of all materials used. The Contractor shall obtain approval from the MDOT Program Manager for any proposed new materials prior to their use.
- C. **MDOT will provide road salt, however, the Contractor is required to keep detailed records of salt used and provide information in accordance with MDOT's biweekly salt reporting schedule or as requested by the MDOT Program Manager.** MDOT's biweekly salt reporting schedule will be provided to the Contractor prior to each winter season.
- D. A Safety Data Sheet (SDS) for each material must be available at the Contractor's maintenance facility(s) and in each vehicle at all times.
- E. MDOT reserves the right to accept or reject any items listed on the complete list of materials. Contractor must immediately furnish an acceptable substitute for any item rejected by the MDOT.
- F. Additional material specifications are incorporated in section 1.3 of this Contract.
- G. The Contractor, at their discretion, is authorized to contact MDOT procurement vendors for materials and pricing. The Contractor is not allowed to procure materials through MDOT procurement contracts. Table 1.2 - 4 lists the materials MDOT has under existing Contracts (for reference only):

Table 1.2 - 4: Current MDOT Materials Procurement Contracts (Reference Only)

Material	Vendor Name	Ref Contract Number
Joint and Crack sealant	National Highway Maintenance System LTD	591B4300074
Non-Chloride Liquid Bridge Deicer	SynTech Products Corporation	071B6600105
CMA Bridge Deicer	Cryotech Deicing Technology	071B6600100
Ice Control Sand (SW, Bay, Univ Regions)	E2 ENTERPRISES, LLC	071B5500083
Cutting Edges (Underbody 6" Curved)	Truck & Trailer Specialties	591B7700379
Cutting Edges (Straight underbody plow blades)	Chemung Supply Inc.	071B4300154

Cutting Edges (Straight underbody plow blades)	Kennametal	071B4300153
Cutting Edges (9' wing/shoe combo)	St. Regis	180000000019
Guardrail - General Parts	Soelch Group, LLC	180000001269
Guardrail - Trinity Proprietary Parts	Soelch Group, LLC	190000000007
Guardrail - RSI Proprietary Parts	Soelch Group, LLC	190000000003
Guardrail - Lindsey Proprietary Parts	Lakeshore Signs and Safety Equipment, LLC	190000000006
Aggregate	E2 ENTERPRISES, LLC	591B7700136
Aggregate	Great Lakes Mineral Works	591B7700135
Agricultural Byproducts and Salt Brine	Great Lakes Chloride	180000000159
AVL/GPS/MDSS	Delcan Corp.	591B3200466

1.2.10 Work Orders and Reporting (All Activities)

- A.** The Contractor will be required to submit work activity accomplishments via MDOT's workflow management system. The commercial system MDOT utilizes is Vueworks. See Attachment E – MDOT Vueworks Overview for additional information.
- B.** The Contractor will be solely responsible for any and all costs associated with work orders.
- C.** The Contractor must document all routine work activities (non-MDOT directed) by location in Vueworks.
- D.** MDOT's Vueworks environment allows entry for all maintenance activities listed in section 1.2.1 and 1.2.2 and includes relevant GIS asset inventories for Work Order reporting.
- E.** Generally, a Work Order will be completed for each relevant Work Order activity included in Table 1.2 - 1 (and attachment B), for work performed on a unique roadbed. Work Orders must document beginning and end miles points for work activities that measure accomplishments per mile.
- F.** For every Work Order, the Contractor must document work activity and Activity Code, work locations (limits), asset locations (as required for GIS inventory), and all resources (labor, equipment, and materials) used to complete the Work Order.
- G.** The MDOT Vueworks environment also provides workflow documentation for locating items in the field that might warrant a Work Order. These are referred to as service requests. Service requests can be generated from MDOT's Property Damage Reclamation System (PDRP), or from MDOT staff directly. The Contractor will be required to review and respond to all service requests generated in Vueworks for Monroe County.
- H.** **The term "Work Order" in this Contract refers to both Work Orders and service requests submitted in Vueworks.**

- I. The Contractor must review and respond to all service requests and Work Orders generated for Monroe County in Vueworks.
 - J. Use of Vueworks software will be required for the use of tracking all work activities along roadway facilities. All necessary information concerning the specific site will be on each Work Order. Each Work Order will have a unique number automatically created by the Vueworks system.
 - K. All work must be completed by the expiration date of each Work Order for Work Orders (or service requests) submitted by MDOT. The Contractor will be required to periodically check Vueworks for new assignments or to update the status of previous Work Orders.
 - L. The Contractor must complete all Work Orders in accordance with terms of this Contract, and as directed by the MDOT Program Manager.
 - M. Failure to monitor Vueworks for MDOT issued Work Orders will not constitute reprieve from the repair due date documented.
 - N. MDOT will provide Vueworks access and training to key staff identified by the Contractor. Access instructions for Vueworks are included in FAMS Attachment R: Milogin Third Party Access to MDOT Vueworks.
 - O. The MDOT Program Manager and key members of the Contractor's staff will be able to register information (service requests and Work Orders) in the MDOT Vuework's environment. Work Orders will be location based and will not combine locations in a single Work Order unless approved by MDOT.
 - P. When the work is complete, the Work Order shall be updated in Vueworks by the Contractor and status appropriately updated for MDOT review and acceptance.
 - Q. **Work Order Penalty for Unit Price Activities:** No payment will be made for work performed by the Contractor without appropriate documentation of Work Order activities in the MDOT Vueworks environment, and approval by MDOT.
 - R. **Work Order Penalty for Lump Sum Activities:** Failure of the Contractor to submit complete Work Orders in Vueworks for activities that are part of a Lump Sum item will result in a **penalty of \$100.00 per occurrence.** A Work Order should be submitted for each activity performed along a unique roadbed, for a given work operation.
 - S. Other methods can be used for issuing Work Orders in lieu of Vueworks if mutually agreed upon by the MDOT Program Manager and the Contractor in writing. Unless otherwise agreed upon by both parties, Work Orders in Vueworks are considered written approval to proceed.
- 1.2.11 Property Damage Reclamation Process (PDRP) (Certain Activities)**
- A. MDOT utilizes a Property Damage Reclamation Process (PDRP) software application that allows MDOT to track cost recoveries for damage to MDOT property (such as traffic signs or signals, guardrail, or bridges) that occur as a result of crashes.
 - B. Additional information regarding PDRP can be found in MA 2012-03 Capturing Revenue Through the Property Damage Reclamation Process:
https://www.michigan.gov/documents/mdot/MA_2012-03_PDRP_394151_7.pdf
 - C. The PDRP software assigns a reclamation id, which is associated with other crash related information provided by law enforcement. Crash information is logged by law enforcement in a UD-10 report.

- D. New Reclamation data from PDRP will be provided to the Contractor in MDOT's workflow management system (Vueworks) for Monroe County on a nightly basis. Vueworks will document PDRP information as a service request.
 - E. The Contractor must review PDRP service requests for Monroe County in Vueworks to determine whether the damaged MDOT property requires repair. If the Contractor determines that the MDOT property does not require repair, the Contractor must note this determination in the service request and close the request (work order not required). If the Contractor determines that the MDOT property requires repair, the Contractor must link the service request to a work order. When associated work order is completed and closed, confirm that the associated PDRP service request is also closed. For historical PDRP data see FAMS Attachment Q: Monroe County Historical PDRP Data,
 - F. The ratio of warranted Work Orders to PDRP reclamation service requests shall be 1 to 1 (do not associate a Work Order with multiple repair locations to a PDRP service request).
 - G. The Contractor must submit a work order associated to each PDRP service request that includes MDOT property needing repair.
 - H. Each work order associated to a PDRP service request must document actual repair costs for the location. The Contractor must prepare an invoice detailing the reclamation location and itemized charges (including labor, equipment and materials, or a combination thereof, as applicable).
 - I. Unless otherwise directed, the MDOT Program Manager will be responsible for logging Contractor Vueworks data into the PDRP system.
 - J. **PDRP Penalties:**
 - 1. If the Contractor fails to close a PDRP service request and submit required information in Vueworks (as describe herein) within 30 days of notice, then a **penalty of \$100.00 per reclamation service request, per day beyond shall apply.**
 - 2. If MDOT determines that the Contractor has misrepresented costs or falsified documentation regarding PDRP reclamation service requests, including, but not limited to determining that a repair is unnecessary, a **penalty of \$1000.00 per reclamation will be assessed.**
- 1.2.12 Incident/Emergency Response**
- A. See section 1.3.10: Activity 1970 – Emergency Response (Non-Winter Lump Sum)
- 1.2.13 Permits**
- A. The Contractor is responsible for preparing all documents and obtaining any and all permits necessary to complete the work required.
- 1.2.14 Storing or Stockpiling on Right-of-Way**
- A. The Contractor will not be allowed to store or stockpile any material or equipment within the right of way, including MDOT owned facilities (rest areas, weigh stations, carpool lots, and welcome centers, etc).
 - B. Equipment may be temporarily parked behind a barrier or other locations, if approved by the MDOT Program Manager.
- 1.2.15 Non-Hazardous and Hazardous Waste Removal**
- A. **Non-Hazardous Waste**

1. The Contractor shall properly dispose of all waste including, dead animals, residue, debris, and supplies, foliage clippings, as well as other non-hazardous waste materials produced or generated by the Contractor
2. All disposals shall be off the right of way and in accordance with all applicable Federal, State, and Local Laws, Regulations, and Ordinances.

B. Hazardous Waste

1. The Contractor shall use, contain, store and dispose of all hazardous substances, to include but not limited to, paints, herbicides and chemicals in accordance with all applicable Federal, State and Local Laws, Regulations and Ordinances.
2. All disposals shall be off the right of way and in accordance with all applicable Federal, State, and Local Laws, Regulations, and Ordinances.

- C.** The Contractor will be solely responsible for any and all costs associated with Non-Hazardous and Hazardous Waste Removal.

1.2.16 Mobilization

- A.** All costs associated with mobilization will be included as part of the activity.

1.2.17 Traffic Control

- A.** The Contractor must maintain traffic in accordance with the most current version of the MDOT Standard Specifications for Construction, The Michigan Manual on Uniform Traffic Control Devices (MMUTCD) https://mdotcf.state.mi.us/public/tands/Details_Web/mmutcdcompleteinteractive.pdf , the MDOT Maintenance Work Zone Traffic Control Guidelines https://www.michigan.gov/documents/zonecontrol_112912_7.pdf , and the following provisions:

1. One week prior to commencing an activity that will restrict or divert traffic, including lane closures, the Contractor shall prepare, and furnish a lane closure notification request form (see Attachment F) to MDOT for review and approval.
2. Lane Closures will not be allowed during peak hours as determined by the MDOT Program Manager. Each route is unique, and hours of permissible lane closures vary. Certain routes may require night work or weekend work.
3. At least one lane of traffic in each direction shall be maintained at all times.
4. Work suspensions including removal of all lane closures for the Memorial Day, Independence Day, and Labor Day holidays are defined on the following site: http://mdotwiki.state.mi.us/construction/index.php/Holiday_Traffic_Safety_Provisions
5. Any lane closures must be requested and approved by the PM, using the lane closure request form. Lane closures will not be allowed during peak hours as determined by the MDOT Brighton TSC. Each road is unique, and times may vary. Certain roadways may require night work or weekend work, depending on the work involved.
6. Work will not be allowed on US-23 the day of home University of Michigan football games. Work will not be permitted on US-23 on gameday for the University of Michigan vs. Ohio State University football games regardless of game location. Work will not be allowed on US-23, US-223 and M-50 on weekends of Michigan International Speedway races.

- B. **Non-Routine Traffic Control:** See section 1.3.9, Activity 1660 – Non-Routine Traffic Control and section 1.3.10 Activity 1970 - Emergency Response for additional traffic control criteria.
- C. The Contractor will be solely responsible for any and all costs associated with traffic control operations.

1.2.18 Cooperation/Coordination with other Projects and Contracts

- A. The Contractor is responsible for monitoring MDOTs 5-year plan for current and upcoming projects that may exist within the limits of this Contract. In addition to reviewing Attachment T- Monroe County 5 Year Plan. (<https://mdotnetpublic.state.mi.us/fyp/default.aspx?display>).
- B. The Contractor will cooperate with additional maintenance projects that are not included in the MDOT 5-year plan.
- C. The Contractor will cooperate with other contractors and public agencies working within or adjacent to the limits of this Contract to the extent that the work can be carried out to the best advantage of all concerned. Other contractors and MDOT maintenance forces will be performing maintenance activities within the limits of this Contract (refer to section 1.2.2 for “Out of Scope” for a listing of activities that will be performed by others), the Contractor will cooperate to the fullest extent possible.

1.3 Performance Measures & Activity Specific Criteria

1.3.1 Michigan Maintenance Rating System (Non-winter)

- A. Contractor performance for the maintenance activities included in the non-winter lump sum payment (see table 1.2-1) will be evaluated by the process known as the Michigan Maintenance Rating System (MiMRS). Specific evaluation criteria for each MiMRS measure is specified in Attachment C: Michigan Maintenance Rating System (MiMRS) Handbook, unless otherwise stated herein. Table 1.3-1 ties together the applicable MiMRS measure to the related Maintenance (Work Order) Activity Codes as well as the corresponding performance benchmark that the Contractor is required to meet or exceed.

Table 1.3 - 1: Michigan Maintenance Rating System (MiMRS) Performance Metrics				
MiMRS Measure (Attachment C)	Activity Code(s) (from Table 1.2 - 1)	Performance Benchmark	Penalty	
			(0 - 5% below Performance Benchmark)	Each Additional 10% Tier below
Roadway Measures				
Flexible – Cracking	1010	60%	NA	NA
Flexible – Patching	1030, 1050	70%	1% of Non-Winter Lump Sum	1.5%
Flexible – Potholes	1042,	65%	2% of Non-Winter Lump Sum	3.0%
Rigid – Cracking	1010,	50%	NA	NA
Rigid – Patching	1020	50%	1% of Non-Winter Lump Sum	1.5%
Rigid – Potholes	1042	45%	1% of Non-Winter Lump Sum	1.5%

Shoulders	1100, 1120, 1140	25%	2% of Non-Winter Lump Sum	3.0%
Catch Basins	Out of Scope	NA	Out of Scope	Out of Scope
Curb and Gutter	Out of Scope	80%	Out of Scope	Out of Scope
Debris	per section 1.3.6 (activity 1240)	90%	1% of Non-Winter Lump Sum	NA
Traffic Safety Service Measures				
Sweeping	1320	70%	NA	NA
Guardrail	1300, 1301	90%	2% of Non-Winter Lump Sum	3.0%
Concrete Barrier	Out of Scope	NA	Out of Scope	Out of Scope
Cable Barriers	1310	80%	1% of Non-Winter Lump Sum	NA
Impact Attenuator	1650	90%	1% of Non-Winter Lump Sum	NA
Signs	1600	90%	1% of Non-Winter Lump Sum	1.5%
Delineators	1640	50%	0.5% of Non-Winter Lump Sum	NA
Roadside Measures				
Ditches	1230	25%	NA	NA
Culverts	1280	35%	2% of Non-Winter Lump Sum	3.0%
Grass	Out of Scope	60%	Out of Scope	Out of Scope
Vegetation Control	Out of Scope	NA	Out of Scope	Out of Scope
Litter	1240	75%	1% of Non-Winter Lump Sum	NA
Animal Carcasses	1240	75%	1% of Non-Winter Lump Sum	NA

- B. Performance measures in Table 1.3 - 1 are associated with corresponding maintenance activities of the Contract. Certain activities (such as 1410 Winter maintenance), are not accounted for in Table 1.3 - 1. Performance measures for these activities are discussed in the activity specific portion of this Contract (section 1.3).
- C. Criteria for performance measure evaluation can be found in Attachment C. A summary list of measures with non-compliance criteria is in the appendix of the MiMRS handbook (Attachment C).
- D. Performance benchmark percentages for each measure in Table 1.3 – 1 are based on historical values. Detailed information regarding historical measure performance can be found in Attachment G – Monroe County Historical Performance Based Maintenance.
- E. Performance benchmarks may be adjusted on an annual basis if mutually agreeable by MDOT and Contractor.
- F. **Timing:** MiMRS Performance ratings will be conducted at least once per quarter (3-month period) and no more than once per month at MDOT's discretion. If ratings are conducted more than once

in a given quarter the Contractor will be assessed based on the average of all performance ratings for a 3-month quarter. Penalties assessed from the previous quarter performance period will be deducted from the first lump sum payment after the quarter closes.

For rating purposes, a quarter is defined as follows:

1. Q1: January 1st – March 31st
 2. Q2: April 1st – June 30th
 3. Q3: July 1st – September 30th
 4. Q4: October 1st – December 31st
- G.** During winter months, only MiMRS measures for: Guardrail, Cable Barriers, Impact Attenuators, Signs, and debris, and animal carcasses will be rated.
- H.** Penalty means that a deduction will be taken from the Contractor's payment.
- I.** Penalties identified in Table 1.3 - 1 will be enforced when overall performance for a measure falls below its benchmark. Penalties will be assessed based on an average of the previous quarter's monthly ratings for performance.
- J.** The initial penalty tier will be assessed when performance falls 0 – 5% below the benchmark. Subsequent penalties will be assessed for each 10 percent tier below (*example: benchmark = 80%, average quarter performance = 69%, penalty = 2% (75-80, tier 1) + 3% (65-75, tier 2) = 5% Penalty*)
- K.** Penalties listed in Table 1.3 – 1 are noted for measures associated with work activities that are part of the Non-Winter Lump Sum item.
- L.** Performance for measures in Table 1.3 – 1 for Flexible – Cracking; Rigid – Cracking; and Ditches are associated with maintenance activities (codes) that are paid for by unit price. The Contractor will perform these work activities as directed by the MDOT Program Manager. These measures in Table 1.3 -1 may be rated, but penalties will not be assessed if benchmark is not met.
- M.** Performance for measures in Table 1.3 – 1 for Catch Basins; Curb and Gutter; Sweeping; Concrete Barrier; Grass; and Vegetation Control are associated with maintenance activities (codes) that are out of scope for this Contract. These measures in Table 1.3 -1 may be rated, but penalties will not be assessed if benchmark is not met.
- N.** The rating team will consist of Brighton TSC staff and other staff identified by MDOT. The Contractor may request to observe (but not participate in) the rating assessment (as scheduled by MDOT with a minimum of a one-week notice).
- O.** **Frequency:** Each rating period should consist of one to three full days of rating in the county.
- P.** **Sample Size:** A minimum of 50 one-half-mile segments and maximum of 100 one-half-mile segments will be used for each quarterly performance period in the county.
- Q.** The one-half-mile segments will be computer generated randomly for each rating period. The Contractor will not be provided the specific rating segments selected for each rating period until after the rating.
- R.** MDOT will use ESRI Collector app for ArcGIS to log ratings for measures identified in Table 1.3 - 1.
- S.** MDOT will provide a report to the Contractor regarding ratings and performance based on the previous rating period.
- T.** When a measure is failed for a segment, MDOT will document with a photograph and comments in collector app. This documentation will capture date, location and rating segment.

- U. **QA/QC:** Quality Assurance and Quality Control of ratings, for measures in Table 1.3 -1, will be done by MDOT Performance Based maintenance (PBM) Engineer (or other qualified MDOT staff) if the Contactor has a dispute for a rating period.
- V. MDOT may use the rating review to document Work Order needs in areas inside or outside of rating segments. Observed Work Order needs outside of the rating segments will not impact ratings for the current rating period.
- W. Penalties for timeliness and other items not identified in Table 1.3-1 will be assessed as noted. A summary of additional penalties is provided in Table 1.3 – 2. If there is a discrepancy between Table 1.3 – 2 and language contained in sections 1.2, and 1.3, the section language prevails.

Table 1.3 - 2: Summary of Penalties (does not include 1.3-1)*		
Section Reference	Measure	Penalty
1.2.8. D	If required AVL and associated sensory data are not reporting after the allowed remedy timeframe of 3 business days	\$100.00 per calendar day, per vehicle , will be applied until all requested data is reporting again
1.2.10. Q	Failure to complete Work Order for Unit price activities.	No payment for Work Order item until compliant.
1.2.10. R	Failure to complete Work Order for Lump Sum activities.	penalty of \$100.00 per occurrence.
1.2.11. J.1	If the Contractor fails to close a PDRP service request and submit required information in Vueworks (as describe herein) within 30 days of notice,	penalty of \$100.00 per reclamation service request, per day beyond shall apply
1.2.11. J.2	If MDOT determines that the Contractor has misrepresented costs or falsified documentation regarding PDRP reclamation service requests,	penalty of \$1000.00 per reclamation will be assessed.
1.2.17. C.1	Failure to follow MDOT policies and direction regarding work zones for maintenance operations	penalty of \$500.00 per work zone, per hour.
1.3.2. B.8	Failure by the Contractor to provide MDOT with MDSS data for their winter routes	penalty of \$100.00 per winter route, per day during the winter season.
1.3.2. G.2	If the Contractor does not meet the level of service goals	penalty of \$500.00 per route, per hour
1.3.2. G.3	Failure to deploy the full complement of winter maintenance trucks operating on all Plow Routes within one (1) hour of the start of a Winter Event	\$500 per route per occurrence (Initial)
1.3.2, Table 1.3 - 3	Isolated Slippery Conditions	\$200 per occurrence, per hour
1.3.2, Table 1.3 - 3	AVL/MDSS Reporting requirements	\$100 per occurrence of information not being Timely, Accurate and Complete, per day
1.3.2, Table 1.3 - 3	Work Order - Materials Reporting	\$100 per occurrence of information not being Timely, Accurate and Complete, per day
1.3.2, Table 1.3 - 3	MDSS Routes	\$100 per missing winter route, per day, during winter season.
1.3.2, Table 1.3 - 3	Deployment for deicing operations.	\$500 per route, per hour
1.3.2, Table 1.3 - 3	Deployment for plowing operations	\$500 per route, per hour

1.3.2, Table 1.3 - 3	Level of Service (Orange and Blue Routes) during event	\$500 per route, per hour deficient
1.3.2, Table 1.3 - 3	Salt application rates	\$500 per route, per occurrence
1.3.2, Table 1.3 - 3	Level of service after event	\$200 per route, per hour beyond 8 hours
1.3.2, Table 1.3 - 3	Initial Response (other facilities)	\$100 per occurrence, per hour
1.3.2, Table 1.3 - 3	Level of service (other facilities)	\$100 per occurrence, per hour beyond
1.3.3. A.3	Failure by the Contractor to make requested patrol patching repairs, and complete a Work Order, within 24 hours' notice	penalty of \$500.00 per day, per occurrence
1.3.4. A.2.a	If the Contractor's operations for bump removal causes undo damage to the pavement (or surrounding) surface	Penalty of \$1000.00 per bump, per instance
1.3.4. A.2.b	If the Contractor does not adequately remove and dispose of the byproducts from the operation	Penalty of \$200.00 per bump, per instance
1.3.5.F; Table 1.3 - 4	If Guardrail repair is not complete in 30 calendar days.	\$1000.00 per Ending and/or Run, per day
1.3.5.F; Table 1.3 - 4	If Cable Barrier is not complete in 15 calendar days.	\$500.00 per Run, per day
1.3.5.F; Table 1.3 - 4	If Guardrail Ending or Cable Barrier end terminal is not complete in 7 calendar days.	\$500.00 per terminal, per day
1.3.6. B.1	The Contractor will have one hour from discovery or notification of debris in the travel lanes to remove the item	A penalty of \$200/hour
1.3.6. B.2	The Contractor will have 24 hours from discovery or notification of debris on the shoulder to remove item	A penalty of \$200/day
1.3.7. B.1	Failure to respond to Priority 1 signs within 24 hours	penalty of \$500 per hour.
1.3.7. B.2	Failure to respond to Priority 2 signs within 1 business day	penalty of \$500 per calendar day
1.3.7. B.3	Failure to respond to Priority 3 signs within 5 business days	penalty of \$200 per calendar day
1.3.7. B.4	Failure to respond to Priority 4 signs within 10 business days	penalty of \$200 per calendar day
1.3.8. C.2	Failure to follow MDOT policies and direction regarding work zones for maintenance operations	penalty of \$500.00 per work zone, per hour
1.3.9. A.4	Failure of the Contractor to participate in a requested training	penalty of \$500.00 per occurrence
1.3.10. F.8	Failure to be on scene within 1 hour of notification to the 24/7 contact	\$500 penalty per Occurrence
1.3.10. F.8	Leaving the emergency location prior to MDOT Program Manager authorization	\$500 penalty per Occurrence
1.3.11. E	Failure by the Contractor to collect and dispose of Adopt-A-Highway items within 3 business days	penalty of \$200.00 per calendar day, per Adopt-A-Highway segment

*** Note: Information in this table is for reference only. Contract notation in sections 1.2 and 1.3 prevail.**

1.3.2 Winter Maintenance Criteria & Measures: (Winter Lump Sum) Activities 1410 – Winter Maintenance; 1440 – Winter Road Patrol; 1490 – Other Winter Maintenance

A. General (Winter)

- 1 The Contractor will perform winter maintenance services on MDOT trunklines and the following other facilities (rest areas, welcome centers weigh stations, and carpool lots) within Monroe County as identified in Attachment A: Service Area. The purpose of this Contract is

to maintain the MDOT trunklines and the other facilities per MDOT specifications and standards as set forth in the Contract.

- 2 The required objective is to maintain the roadways and other facilities in a manner that works towards bare pavement for the motoring public at all times during a Winter Event.
- 3 The Contractor must meet requirements for winter levels of service (LOS) established by MDOT. Information regarding MDOT policy regarding Orange and Blue LOS, as well as LOS route identification can be found in Attachment H – Monroe County Winter LOS.
- 4 Contractor must establish Plow Routes that allow for Cycle Times of 90 minutes or less. Each Plow Route must have a minimum of one snowplow assigned to it.
- 5 The Contractor must follow the following MDOT winter maintenance policies regarding winter maintenance including: https://www.michigan.gov/mdot/0,4616,7-151-9622_11044_58172---,00.html https://www.michigan.gov/mdot/0,4616,7-151-9622_11044_47942---,00.html
 - a) MA 2018-04: Guidance on Using Wing plows
 - b) MA 2013-01: Best practices for Applying Deicing Materials
 - c) MA 2009-11: Snowplowing Near Railroad Crossings
 - d) MA 2009-10: Abrasives in Winter Operations
 - e) MA 2009-02: Calibration of Salt Trucks
 - f) MA 2009-01: White Shoulder Policy
 - g) MA 2009-01: Liquid Deicing
 - h) MM 1996-01 Guidance for Repair of Damaged Mailboxes
- 6 The Contractor is required to patrol, perform a physical evaluation of, and document the condition of the roadway during the Winter Season and Winter Events on all MDOT trunkline networks identified in Attachment A: Service Area by field observation. The Contractor should Patrol with the following frequency:
 - a) No indication of a winter event with ambient temperatures above 32 degrees: once per week.
 - b) No indication a winter event with ambient temperatures 32 degrees and below: once per day.
 - c) At the start and during a winter event: patrol once per hour.
- 7 The Contractor will provide a continuous operation during a Winter Event once work has commenced, with the exception of interruptions authorized by the MDOT Program Manager or designee. Performing maintenance or repairs to the Contractor's equipment shall not cause interruptions.
- 8 The following dates identify the median for the first and last snowfall of 1 inch or more.
DATE: October 15 to April 15
The Contractor is responsible to meet all winter LOS needs for all Winter Events regardless of the calendar date.
- 9 **Winter Response:** The Contractor must have personnel and equipment available to respond to Winter Events including but not limited to frost, freezing precipitation and/or snow accumulation, regardless of the time of day or the day of the week the emergency occurs. The responder(s) and equipment shall have all personnel and equipment actively engaged in winter operations within an hour of the start of a Winter Event. The Contractor's submittal as bid shall be payment in full for all supervision, labor, equipment, materials (minus road salt), transportation, mobilization and costs to operate equipment including fuel and repairs. Liquid deicer applied is included in the Contract's bid price and will not be paid separately.

- 10 Contractor must always use continuous care and caution while performing snow plowing, and rock salt/and or ice melt services, especially when operating heavy machinery near parked vehicles and pedestrians in order to avoid damages to private property and MDOT property or cause personal bodily injury.
- 11 **Winter Work Order Reporting:** The Contractor will need to complete winter maintenance Work Order activities on a set two-week basis determined by MDOT, for each winter route. Work Order will include all resources used (materials, equipment, resources) for the period, per day.

B. Maintenance Decision Support System (MDSS)

1. The Contractor is required to use a maintenance decision support system (MDSS) to aid with winter treatment decisions. The Contractor must also provide MDOT access to the Contractor's system and reports regarding MDSS recommendations.
2. The Contractor will be solely responsible for any and all costs associated with MDSS.
3. The MDSS will forecast, and display surface transportation weather events, road condition information, and winter maintenance treatment recommendations for supporting winter road maintenance operations.
4. Using the pavement condition and environmental prediction information, the MDSS shall provide decision support guidance to winter road maintenance practitioners and the guidance shall include information related to treatment options (e.g., plow, deice, anti-ice, etc.), timing of application, location of application, and amount of application) based on current and predicted weather conditions.
5. The MDSS will also have the capability provide decision support guidance for non-winter maintenance activities.
6. Additional Specifications for MDSS parameters can be found in Attachment I: Additional MDSS Requirements.
7. The Contractor must provide information regarding Contractor's planned Plow Routes within the county, in the MDSS.
8. Failure by the Contractor to provide MDOT with MDSS data for their winter routes will result in a **penalty of \$100.00 per winter route, per day** during the winter season.
9. **The Contractor will be allowed to use MDOT's MDSS system** (see Attachment J: MDOT-Iteris MDSS System). MDOT will provide setup, access, and training to the Contractor at no cost. The Contractor must provide their planned Plow Route information to MDOT by October 8th, 2019 in order to utilize MDOT's MDSS. The Contractor may request adjustments to their Plow Routes in MDSS on an annual basis, or as approved by MDOT. The Contractor must provide at least two-weeks-notice to MDOT regarding requested changes to Contractor's Plow Routes in MDSS. The Contractor must abide by their prescribed Plow Routes displayed in MDSS.
10. The Contractor is responsible to use all available resources to assess weather conditions and make decisions and direct actions that maintain the highways and carpool lots as safe as possible during and after Winter Events.

C. Other Facilities (Rest areas, Welcome Centers, Weigh Stations, and Carpool Lots)

1. The Contractor will provide snow plowing and deicing services, as required, to keep other facilities safe and serviceable.
2. The Contractor will not be allowed to store equipment or materials anywhere on the property of these facilities.
3. The Contractor is responsible for clearing ramps and through paths at these facilities.
4. The Contractor must use equipment of sufficient size and type to ensure snow plowing is done in a timely and efficient manner to achieve the outcome benchmarks.
5. Contractor must plow snow from all parking lots and apply de-icing salt so that all parking spaces are continuously available.
6. Any and all damage to parking lot, curbs, pavements, shrubs, fences, etc. caused by snow plowing services will be repaired and/or replaced the following Spring by the Contractor, at no cost to MDOT.
7. Parking curbs or bumper blocks located in parking areas must not be moved or damaged. Upon completion of the plowing season, if these curbs have been moved or damaged, the Contractor will be responsible for returning them to their original positions or replacing the damaged structure as approved by the MDOT Program Manager, at no cost to MDOT.

D. Equipment (Winter)

In addition to section 1.2.6, the following equipment requirements apply for winter operations:

1. The Contractor must schedule in October, on an annual basis, an inspection of all winter equipment. This inspection will be on site at the Contractor's maintenance facility (s) in the Service Area, and all equipment will be available for inspection at this time. The MDOT Program Manager will be invited to this meeting and provided summary records as requested.
2. All spreaders will be equipped with an electronic control material spreading device. All liquid and granular spreaders shall be calibrated according to the manufacturer's recommendations on an annual basis. Each chemical spreader shall be equipped with appropriate flashing lights. The Contractor shall calibrate all spreaders to the manufacturer's recommendations prior to use on MDOT trunk lines. The Contractor shall provide verification to MDOT Program Manager that all equipment has been calibrated correctly and provide a calibration sheet for each spreader prior to start of each Winter Season.
3. The Contractor will have a minimum of one winter maintenance truck per Plow Route and one contingency truck for every five (5) Plow Routes identified. The use of Towplow(s) is encouraged for use as approved by the MDOT Program Manager.
4. Trunkline plowing operations in Michigan are done predominately with hydraulic underbody plows. Front plows may be used for significant weather events. The Contractor shall obtain MDOT Program Manager approval prior to using front plows for winter operations.
5. The plow trucks for use in MDOT Trunklines shall meet or exceed the following specifications:

Tandem Axle with A/R Suspension

- a) Minimum 400 hp
- b) 12,000 pounds front axle
- c) 23000-40,000 pounds rear axles
- d) 160 inches maximum wheelbase
- e) Minimum 11-12 feet wide hydraulic underbody blade with optional front plow.
- f) Minimum 10 yards capacity salter/spreader

- g) Computerized in-Ground Speed Controlled Salt Control

Single axle WMT

- h) 6cyl Diesel 310hp
- i) 11' Dump body
- j) 11' Slide-in Hopper
- k) Rear cross auger/spinner
- l) Ground speed-based salt delivery system
- m) Front Axle GVW 18000
- n) Rear axle GVW 23000
- o) GVWR Capacity 41000
- p) 187" wheelbase
- q) Minimum 6 yards capacity salter/spreader

- 6. **All equipment shall be in proper operating condition for use and shall be less than 10 years old.** It is understood that any and all repairs and/or replacement of parts to said equipment are the responsibility of the Contractor. When equipment and an operator, or a service, is furnished by the Contractor, the Contractor is responsible for all maintenance, labor, materials and other expenses involved.

E. AVL/GPS Requirements for Winter Operations

In addition to section 1.2.8, the following AVL/GPS requirements apply for winter operations:

- 1. The Contractor is required to have Global Positioning System (GPS) units in each of the Contractor's salter/plow trucks for use in MDOT trunk lines and carpool lots. These units shall be equipped and operational prior to the beginning of snow removal operations.
- 2. The AVL system will include sensors able to collect data from the spreader controller or other supplemental equipment for the following data:
 - a) Spreader Controller (Material(s) (including solid and on-board liquid), Application rate and unit.
 - b) Plow Sensor (front plow, wing, underbody, tow plow)
 - c) Pavement Temperature and Ambient Sensor
 - d) Auger Feedback Sensor
 - e) Hydraulic Flow Meter Sensor
 - f) Material Flow Meter Sensor (to monitor if material is dispensing from WMT and to verify spreader controller).
- 3. For all salt spreader controls, the data should be collected, stored and reported whenever a change to any of the following fields occurs: solid material type (eg salt/sand), solid material spread rate, solid material spread width, gate setting, blast on/off, pause on/off, liquid material spread rate, prewet on/off, and error status – depending on the availability for the particular spreader controller.
- 4. **AVL Reporting for Winter Operations:**
 - a) System must provide material usage reports to accurately track the amount of granular material, pre-wet and/or direct liquid that was applied to a predefined section of roadway, or "zone".
 - b) Contractor must be able to provide data from all salt spreader controllers into one report. Users shall be able to select all, multiple, or individual vehicles and date(s) and timeframe for each report. Report shall output at a minimum vehicle ID, date/time, vehicle spreading time/distance, deadheading time/distance, vehicle total travel time/distance, dry material usage (pounds / lane mile), liquid material usage, avg. application rate.

- c) The system must provide a custom input usage report with user selectable date ranges showing usage of monitored auxiliary equipment such as underbody blades, temperature sensors, and additional components. Report must be able to show all activity or be run on a single auxiliary equipment input such as plow position.
- d) The system must provide an easy to use reporting tool to provide vehicle and material information such as date, time started, time completed, total miles traveled, total miles spread, total dead head miles, material usage (Ton), application rate, Liquid usage (gal), liquid application rate, and totals of the above information per snow event/storm.

F. Winter Materials

In addition to section 1.2.9, the following material requirements apply for winter operations:

1. **MDOT will pay for up to 19,600 tons of road salt for winter operations.** Historical Salt usage in Monroe County is included in FAMS Attachment P.
2. A List of salt storage facilities, with allowable storage limits for Monroe county for trunkline use, can be found in Attachment K: Monroe County Salt Facilities. These salt storage facilities are owned by the Monroe County Road Commission and the Contractor will only have access to the site to obtain salt purchased by MDOT. The following applies for the salt storage facilities:
 - a. The Contractor is responsible for providing equipment at the sites for loading salt into their trucks.
 - b. The Contractor is responsible for proper housekeeping practices and keeping all salt contained within the appropriate facilities.
 - c. Any salt spilled while loading trucks is to be cleaned up immediately.
 - d. The Contractor is not able to use the salt storage facilities for any other purpose than to obtain salt.
 - e. Stockpiles at these facilities do not contain prewetting capabilities. The Contractor will not be allowed to prewet salt on these premises.
 - f. Contractor staff are not authorized to enter any other building or facility at these locations.
 - g. **Salt may be commingled with another agency's stockpile and accurate record keeping and reporting of salt removed from each location is the Contractor's responsibility.**
 - h. Salt usage will be documented via AVL reports from calibrated equipment spreaders as well as a digital, on-site load tracking system. The digital on-site load tracking system could include a loader scale, or system that weighs or scans salt volume per truck. The Contract must obtain MDOT Program Manager approval for the on-site salt usage system and demonstrate its viability.
3. If using liquid for anti-icing operations or for pre-wetting salt the liquid must meet the MDOT specifications for Deicer with Agricultural Bi-Products (ABP) or Salt Brine or alternate as approved by the MDOT Program Manager. Contractor will not have access to liquid deicers at the identified salt storage facilities. (see Attachment L: Liquid Deicer Specifications).
4. In extreme cold temperatures, it may be necessary to apply ice control abrasives to roadway surfaces. The Contractor shall obtain approval by the MDOT Program Manager prior to applying ice control abrasives. Material specifications for ice control abrasives can be found in Attachment M: Ice Control Sand Specification.
5. The Contractor must provide all winter material usage (salt, liquid, abrasives) on a set two-week reporting period as defined by MDOT prior to each winter season.

6. Road salt is to be applied at a maximum of 450 pounds/ 2 lane miles.
 7. Material spreaders must follow calibration guidelines detailed in maintenance advisory for *Calibration of Salt Trucks*, for each material used for winter operations:
https://www.michigan.gov/documents/mdot/mdot_ma_2009-02_calibration_of_salt_trucks_349377_7.pdf
 8. To improve salting efficiencies and reduce the amount of salt bounce and scatter, MDOT recommends pre-wetting salt and applying at truck speeds of 25 mph, or as conditions allow for safe operations. The Contractor shall operate equipment speeds as directed by the MDOT Program Manager for different winter operations.
 9. *Best practices for applying Deicing Materials* is located on the MDOT maintenance advisory site: https://www.michigan.gov/documents/mdot/MA_2013-01_Best_Practices_for_Applying_Deicing_Materials_432480_7.pdf
 10. The Contractor must follow application rates prescribed in Attachment N: MDOT Winter Maintenance Application Rates (Solids), unless otherwise directed or approved by the MDOT Program Manager.
 11. MDOT will coordinate with the Contractor to estimate annual salt usage prior to each winter season.
- G. Winter Performance Metrics:**
1. The Contractor will ensure that the work performed under this Performance Requirement, meets or exceeds the benchmarks specified in this Performance Requirement.
 2. If the Contractor does not meet the level of service goals identified in Attachment H: Monroe County Winter LOS, then a **penalty of \$500.00 per route, per hour** will be assessed.
 3. Table 1.3 - 3 Lists performance metrics for winter lump sum activities

Table 1.3 - 3: Winter Performance Metrics		
Measure	Benchmark	Penalty
General		
Isolated Slippery Conditions	Isolated Slippery Conditions Addressed Immediately 100% of the time	\$200 per occurrence, per hour
AVL/MDSS Reporting requirements	All AVL and MDSS reporting requirements of this Contract is required to be submitted no later than 3 business days after each snow/ice events	\$100 per occurrence of information not being Timely, Accurate and Complete, per day
Work Order - Materials Reporting	Provide 100% material usages per Plow Route per MDOT bi-weekly period.	\$100 per occurrence of information not being Timely, Accurate and Complete, per day
MDSS Routes	Information/Access provided for all Contractor MDSS Routes	\$100 per missing winter route, per day, during winter season.
Trunkline Winter Event Activities		

Deployment for deicing operations.	100% of the full winter complement of the assigned equipment by Plow Route shall be deployed no later than 1 hour after the start of a Winter Event on all Plow Routes as measured by the MDSS and AVL units on trucks. In the event the MDSS does not accurately predict winter weather or slippery road conditions it is still the Contractor's responsibility to maintain all Plow Routes in accordance with the outcome targets.	\$500 per route, per hour
Deployment for plowing operations	100% of the full winter complement of the assigned Winter Vehicles excluding Spreaders by patrol location shall be deployed upon any accumulation of frost, snow, or slush on the road surface on all Plow Routes.	\$500 per route, per hour
Level of Service (Orange and Blue Routes)	<ul style="list-style-type: none"> Providing continuous winter operations utilizing all Winter Vehicles assigned to each route until prescribed level of service has been achieved on the all Plow Routes 	\$500 per route, per hour deficient
Salt application rates	<ul style="list-style-type: none"> Applications of salt at or over the prescribed minimum application rates specified in this performance requirement 100% of the time, but not exceed the maximum application rate 	\$500 per route, per occurrence
Trunkline After the Winter Event		
Level of service	<ul style="list-style-type: none"> Achieve Bare Pavement on all Plow Routes within 8 hours after the End of the Winter Event. 	\$200 per route, per hour beyond 8 hours
Other Facilities (Rest Areas, Welcome Centers, Weigh Stations, & Carpool Lots)		
Initial Response	<ul style="list-style-type: none"> 100% of the full winter complement of the assigned spreaders by patrol location shall be deployed within 1 hour after the start of a Winter Event 	\$100 per occurrence, per hour
Level of service	<ul style="list-style-type: none"> Plow/clear pavement on all MDOT car pool lots, weigh stations, park and rides, welcome centers within 8 hours after the End of the Winter Event. 	\$100 per occurrence, per hour beyond

1.3.3 Activity 1030 – Patrol Patching (Non-Winter Lump Sum)

A. Patrol Patching Performance Metrics

- At any time, the MDOT Program Manager may contact the Contractor via Work Order, or otherwise to perform patrol patching at a specific location(s).
- Upon notification, the Contractor will have 24 hours to make the patrol patching repair(s) and complete a Work Order.
- Failure by the Contractor to make requested patrol patching repairs, and complete a Work Order, within 24 hours' notice will result in a **penalty of \$500.00 per day, per occurrence.**

1.3.4 Activity 1080 – Bump Removal (Non-Winter Lump Sum)

A. Bump Removal Performance Metrics

- MDOT will coordinate with the Contractor and approve locations where bump removal activity will occur.

2. If the Contractor's operations for bump removal causes undo damage to the pavement (or surrounding) surface, or if the Contractor does not adequately remove and dispose of the byproducts from the operation, then the following penalties apply:

- a. **Penalty of \$1000.00 per bump, per instance of undo pavement damage.**
- b. **Penalty of \$200.00 per bump, per instance of improper material disposal.**

1.3.5 (Non-Winter Lump Sum) Activities 1300 – Guardrail Repair Steel Beam; 1301 – Guardrail Ending Repair Steel Beam; 1310 – Cable Barrier Repair

A. Guardrail & Cable Barrier General

1. The Contractor will provide as-needed maintenance of guardrail (including endings), and high-tension cable barrier (including endings). As defined here, these will be collectively referred to as "appurtenances" unless otherwise referenced individually.
2. Service will either be Standard, or Emergency as referenced herein.
3. All repair work made under this Contract shall be done in accordance with the currently published MDOT Standard Specifications for Construction, Special Provisions, Standard Plans and Special Details included herein.

4. Standard Plans, Special Details and Special Provisions Requirements

The Contractor will complete all work according to the applicable standards listed below:

- | | | |
|----|---|------------|
| a) | Guardrail Median Object Protection | R-56-F* |
| b) | Guardrail at Bridges and Embankments | R-59-E |
| c) | Guardrail Types A, B, BD, T, TD, MGS-8, & MGS-8D | R-60-J* |
| d) | Guardrail Approach Terminal Types 2M | R-62-H* |
| e) | Guardrail Approach Terminal Type 3B & 3T | R-63-C* |
| f) | Guardrail Departing Terminal Types B, T & MGS | R-66-E* |
| g) | Guardrail Anchorage, Bridge, Details | R-67-G* |
| h) | Low Tension 3-Cable Barrier | R-70-C |
| i) | Guardrail Anchorage, Median | R-71-C* |
| j) | W-Beam Backed Guardrail & Guardrail Long Span Installations | R-72-D* |
| k) | Guardrail Over Box or Slab Culverts | R-73-F* |
| l) | Soil Erosion and Sedimentation Control Measures | R-96-E |
| m) | Ground Driven Sign Supports for Temp Signs | WZD-100-A* |
| n) | Temporary Traffic Control Devices | WZD-125-E* |
| o) | Bridge Railing, Thrie Beam Retrofit (R4 Type Bridge Railing) | B-22-E* |
| p) | Bridge Railing, Thrie Beam Retrofit (Open Parapet Type Bridge Railing) | B-23-F* |
| q) | Guardrail At Intersections | 21* |
| r) | Guardrail Anchored in Backslope Types 4B, 4T & 4MGS-8 | 24* |
| s) | *Denotes Special Detail | |
| t) | <u>Special Provisions</u> | |
| a. | Galvanized Beam Guardrail | |
| b. | Maintenance and Repair of High-Tension Cable Barrier After Construction | |
| c. | Steel Guardrail Post, Furnish and Install | |
| d. | Guardrail Anchored in Backslope (Type 4B and Type 4T) | |
| u) | <u>Additional Drawings (other detail)</u> | |
| a. | Driven Socket Detail | |
| b. | Gibraltar End Terminal Foundation Detail | |
| c. | Cass End Terminal Foundation Detail | |
| d. | Line Post Foundation Detail | |

5. Posts placed within 3 feet of existing culverts shall be in drilled holes and shall not be driven. All post holes shall be back filled and compacted as directed by the Engineer.
- A. **Guardrail Transitions**
 1. Transition sections from guardrail types MGS-8 and MGS-8D to other guardrail types (e.g. Types B, BD, T and TD), will be included as part of the pay item associated with guardrail types MGS-8 and MGS-8D.
- B. **Curved Guardrail:** Shop bent curved guardrail shall not be ordered until the radius has been field verified by the Contractor.
- C. **Guardrail at Bridges:** Guardrail shall be extended parallel to the existing bridge railing until past downspouts before flaring to shoulder.
- D. **Grading and Drainage:** Before constructing beam guardrail, grade the shoulder and berm to provide drainage. For approach guardrail terminals, grade to Class A slope tolerances. Remove all excess material and dispose of according to subsections (ref. 2012 publication section 205.03.P), of the currently published MDOT Standard Specifications for Construction.
- E. **Guardrail & Cable Barrier Work Orders and Reporting**
 1. The proposed work methods for Standard Service will be as follows:
 - a. MDOT will survey damage to the appurtenance, remove debris from the road surface if necessary.
 - b. Starting from the issuance of the service request or Work Order, the Contractor will have the following number of calendar days noted in Table 1.3 – 4 below to complete the work without penalty:
 - c. The Contractor will be responsible to remove damaged portions of the existing appurtenance, debris, snow, and ice, as needed, to complete the installation of the new appurtenance. The Contractor will set up the required traffic control in accordance with the Special Provision for Maintaining Traffic.
 - d. For steel beam guardrail and high-tension cable barrier, the Contractor, after removing damaged parts, will install new parts and perform the following related tasks if necessary:
 - i. Realign loose posts and compact earth around them.
 - ii. Install new-posts and parts “in kind” (i.e. if a steel post is removed, it must be replaced with a steel post). The same length posts shall be installed at the proper depth.
 - iii. Install hardware.
 - iv. Salvage and replace guardrail run tag from damaged post to a new post.
 2. The Contractor will complete all work items in accordance with the currently published MDOT Standard Specifications for Construction, Special Provisions, Standard Plans and Special Details.

3. The Contractor will clean up debris and litter in a 20' radius of the damaged appurtenance (from guardrail and high-tension cable barrier systems, car parts and other roadside litter and junk. This work shall be included in other items of work.

F. Guardrail & Cable Barrier Performance Metrics: If the Contractor fails to complete repairs in time prescribed in Table 1.3 - 4, then the following penalties will be enforced:

Table 1.3 - 4. – Appurtenance Completion Time Requirements, and Penalties

	Galvanized steel beam guardrail (activity 1300)	High tension cable barrier (excluding end terminals) (activity 1310)	High tension cable barrier end terminals, and Galvanized steel beam ending repair (activities 1310, 1301)
Number of calendar days to complete work	Less than 30 days	Less than 15 days	5-7 days (steel and cable endings)
Penalty assessed if repair is not complete in allowed timeframe:	\$1000.00 per Ending and/or Run, per day	\$500.00 per Run, per day	\$500.00 per terminal, per day

1.3.6 Activity 1240 – Litter/Debris Pickup (Non-Winter Lump Sum)

A. Work Methods for Debris Performance Measure: The Contractor will follow work methods for Activity 1240 – Litter Pickup for removing debris (as defined by Debris performance measure) within the paved roadway/shoulder.

B. Timeframes

1. The Contractor will have one hour from discovery or notification of debris in the travel lanes to remove the item. **A penalty of \$200/hour will be assessed.**

2. The Contractor will have 24 hours from discovery or notification of debris on the shoulder to remove item. **A penalty of \$200/day will be assessed.**

1.3.7 Activity 1600 Small Sign Repair (Non-Winter Lump Sum)

A. Sign Maintenance Priority and Response Time

1. Priority 1 Signs – Immediate Service – Respond within 24 Hours.

- a) Stop and Yield Signs
- b) Signs and Supports that are damaged and interfere with traffic
- c) Overhead signs and Structures requiring immediate removal because of damage

2. Priority 2 Signs – Complete within 1 business day.

- d) Target Arrow Signs
- e) Curve and Turn Signs
- f) Do Not Enter and Wrong Way Signs
- g) One Way Signs
- h) Keep Right Signs

3. Priority 3 Signs – Complete within 5 business days.

- i) All other Warning and Regulatory Signs (Except Parking Prohibition)
- j) Priority 2 signs that do not interfere with traffic and are still readable.

4. **Priority 4 Signs – Complete within 10 business days.**

- k) Guide Signs
- l) Parking Prohibition Signs
- m) All other Signs

B. **Small Sign Repair Performance Metrics**

1. Failure to respond to Priority 1 signs within 24 hours will result in a **penalty of \$500 per hour.**
2. Failure to respond to Priority 2 signs within 1 business day will result in a **penalty of \$500 per calendar day**
3. Failure to respond to Priority 3 signs within 5 business days will result in a **penalty of \$200 per calendar day.**
4. Failure to respond to Priority 4 signs within 10 business days will result in a **penalty of \$200 per calendar day.**

1.3.8 **Activity 1660 – Non-Routine Traffic Control (Non-Winter Lump Sum)**

- A. Non-Routine traffic control applies to lane closures for overnight or longer, or for special operations.
- B. Activity 1970: Emergency Response should be used for incident traffic control.
- C. **Non-Routine Traffic Control Performance Metrics**
 1. The Contractor will maintain traffic in accordance with the most current version of the MDOT Standard Specifications for Construction, The Michigan Manual on Uniform Traffic Control Devices (MMUTCD) https://mdotcf.MDOT.mi.us/public/tands/Details_Web/mmutcdcompleteinteractive.pdf , and the MDOT Maintenance Work Zone Traffic Control Guidelines https://www.michigan.gov/documents/zonecontrol_112912_7.pdf
 2. Failure to follow MDOT policies and direction regarding work zones for maintenance operations will warrant a **penalty of \$500.00 per work zone, per hour.** The contractor will also be liable for any incidents that result from improper work zones.

1.3.9 **Activity 1960 – Training (Maintenance) (Non-Winter Lump Sum)**

- A. **Training Performance Metrics**
 1. The Contractor is required to attend trainings as prescribed by MDOT.
 2. The Contractor will provide trainings to key MDOT staff as requested.
 3. The Contractor is responsible for making sure individuals performing maintenance activities are adequately trained.
 4. Failure by the Contractor to participate in a requested training will result in a **penalty of \$500.00 per occurrence.**

1.3.10 **Activity 1970 – Emergency Response (Non-Winter Lump Sum)**

- A. The Contractor will be responsible for non-routine maintenance activities provided in initial response to situations caused by non-MDOT entities and “acts-of-God.” This response is needed to ensure the safety of the motoring public and uninterrupted highway operations.
- B. The Contractor will be responsible for responding 24 hours a day, 7 days a week to both weather and non-weather emergency related highway hazards and any other emergency incidents that are within the right of way or otherwise effect traffic operations which shall include crashes, road debris, chemical spills, flooding, fires, etc.
- C. The Contractor will provide qualified personnel and assist with traffic control and other resources that will be utilized to remove or mitigate the emergency incident.
- D. The Contractor will be prepared to conduct an on-scene assessment, develop an incident response plan to support quick clearance, and participate in the on-scene incident management team.
- E. The Contractor is responsible for notifying the MDOT Program Manager and STOC of any impact to traffic operations as a result of the incident/emergency or the response.
- F. **Emergency Response Performance Metrics**
 - 1. The MDOT will contact the 24/7 contact as designated by the Contractor. Emergency Service will not require written approval from MDOT and will be entered in Viewworks within one business day.
 - 2. Starting from initial call from MDOT to the 24/7 Contractor contact, the Contractor will have 1 hour to be on site without penalty.

Penalty of Emergency Services: The following penalties will apply per emergency request.

\$500 penalty per Occurrence	\$500 penalty per Occurrence
Failure to be on scene within 1 hour of notification to the 24/7 contact	Leaving the emergency location prior to MDOT Program Manager authorization

1.3.11 Activity 7950 – Adopt-A-Highway (Non-Winter Lump Sum)

- A. MDOT maintains an Adopt-A-Highway program, where authorized groups clear litter along trunkline roadsides.
- B. Adopt-A-Highway program occurs during non-winter months and is conducted over three time periods each season.
- C. The Adopt-A-Highway program schedule (pickup dates) can be found on the following site: https://www.michigan.gov/mdot/0,4616,7-151-9621_11041_14408---,00.html
- D. Upon the conclusion of each pickup cycle, the Contractor will have 3 business days to collect and dispose of all litter bags and items retrieved and stored along the roadside, according to activity guide 7950 Adopt-A-Highway.
- E. Failure by the Contractor to collect and dispose of Adopt-A-Highway items within 3 business days will result in a **penalty of \$200.00 per calendar day, per Adopt-A-Highway segment.**

1.3.12 Activity 1010 – Joint and Crack Filling (Unit Price)-Optional Use

- A. This work consists of treating cracks in hot mix asphalt surfaces using either a saw or rout and seal process or an overband process.
- B. **Materials:** Provide an asphalt rubber product selected from the Qualified Product List.
- C. **Construction.**
 - 1. Provide and use a compressed air system that produces a continuous, high volume, high-pressure stream of clean, dry air to prepare cracks. Equip air compressor with a moisture separator to remove oil and water from the air supply. Provide a compressor capable of producing at least 100 psi at a continuous air flow of 150 cfm.
 - 2. Provide a melter applicator consisting of a boiler kettle equipped with pressure pump, hose, and applicator wand and equip with the following:
 - a) Shutoff control on the applicator hose
 - b) Mechanical full-sweep agitator in the kettle to provide continuous blending
 - c) Thermometers to monitor the material temperature
 - d) Thermostatic controls that allow the operator to regulate material temperatures.
 - 3. Apply material using a wand followed by squeegee or round application head with a concave underside.
 - 4. Clean and dry cracks using compressed air and other tools to remove loose dirt, vegetation, and deleterious material. Clean cracks no more than 10 minutes before filling
 - 5. Crack Treatment Methods-Saw or Route and Seal. Treat visible working cracks no greater than 1¼ inches wide in the pavement surface using the saw or rout and seal process. Treat working cracks in shoulders unless otherwise required. Create a reservoir by sawing or routing along the crack. Create the reservoir to a volume of at least 7.5 cubic inches per foot of crack and with a 1:1 width to depth ratio. Ensure the finished reservoir walls are vertical and the reservoir bottom is flat. Place sealant flush or no greater than 1/8 inch below the pavement surface.
 - 6. Overband. The Contractor may treat non-working cracks with material placed in an overband configuration. MDOT defines non-working cracks as cracks that experience relatively little horizontal or vertical movement. The Contractor may increase the maximum application width to 6 inches for coverage of multiple cracks.
 - 7. Payment will be mile as measured along the centerline.
 - 8. Price will include traffic control.

1.3.13 Activity 1370 – Right-of-Way Fence Repair (Unit Price)-Optional Use

- A. **Right-of-Way Fence Repair Performance Metrics**
 - 1. Repair right-of-way fence in kind, or as directed by the MDOT Program Manager.
 - 2. Follow section 907 of standard specifications for construction, and standard plans.

1.3.14 Activity 1230 Ditch Clean Out and Check Dam Maintenance (Unit Price)-Optional Use

- A. This work consists of all labor, materials and equipment necessary to complete earth excavation and embankment required to reshape or move a ditch or grade a new ditch to restore positive drainage. This work also includes disposing of excess material.
- B. General work process includes:
 - 1. Removing brush and miscellaneous debris
 - 2. Removing trees with a diameter less than 6 inches

3. Blending ditch profiles to match existing ditch
 4. Dress, mulch and seed slopes to prevent erosion
- C. Complete work in accordance with section 205 of the MDOT Standard Specifications for Construction.
 - D. Work will be paid by the foot as measured along the ditch centerline

1.3.15 Activity 1320 Approach Sweeping (Unit Price)-Optional Use

- A. This work consists of all labor, materials and equipment necessary to mechanically sweep loose gravel and material from approaches and intersection of state trunkline and gravel roads.
- B. All loose gravel and material should be disposed of in a manner so that it will not be carried back onto the intersection or roadway.
- C. Work will be performed when requested by the MDOT Program Manager and paid by the hour.

1.4. Warranties

The Contractor vehicles are covered under the Navistar warranties agreement.

The MDOT reserves the right to require additional warranties other than those identified by the Contractor in its response to this Contract.

1.5. Recall Requirements and Procedures

The Contractor will immediately contact a dealer to arrange repair, also monitoring the process through to repair completion. A process will be put in place that minimizes impact the Contract and aim towards continued operations.

1.6. Quality Assurance Program

The Contractor has a robust Quality Assurance Program to ensure that processes and procedures yield consistent quality performance across contract functions and ensure that completed Quality Control reviews are performed in alignment with the Quality Assurance.

1.7. Incentives

The Contractor has a few incentives. Quantity Discount – Our North American footprint and ongoing working relationship with Navistar has allowed us to work out special discounting for this fleet. Service incentives – Our firm qualifies for web-based training from Navistar. This training covers equipment components, safety, engine maintenance, and more. Additionally, our firm qualifies for Navistar Fleet Charge, which provides us with standard pricing on parts and services for repairs across all dealerships. Trade in program – Navistar offers a trade-in program for used vehicles.

1.8. Contractor Requested Plans

A. Implementation Plan-The Contractor provide as an attachment to their proposal a detailed plan on how they will assemble and establish the resources necessary to meet the requirements of this CONTRACT starting on the first day of Contract execution, which will be October 1, 2019. The plan addresses the Contractors available resources as well as planned activities to obtain the necessary resources including, but not limited to equipment, materials, staffing, and facilities needed to successfully meet all Contract requirements. Included in the implement plan section specifically addressing winter maintenance resources including equipment, materials, staffing, and facilities. **See Attachment 1.**

B. Maintenance and Operations Plan-The Contractor provide as an attachment to their proposal a detailed maintenance and operations plan that serves as the overall work plan for the Contractor to meet the performance requirements for all assets and all activities. The winter maintenance portion of the plan specifically address at a minimum, the number of Plow Routes and staff and number and type of equipment dedicated to winter maintenance. The plan provides a detailed self-inspection/internal control plan to ensure all Contract performance measures are met or exceeded. The plan also demonstrates the Contractors understanding and acceptance to the penalties for performance benchmarks as evaluated by MDOT through the MiMRS program, Winter Maintenance performance benchmarks, and other penalties including timeliness requirements. **See Attachment 2.**

2. Service Levels

2.1. Time Frames

All Contract Activities must be performed starting from the day of Contract execution through the end of the Contract period.

2.2. Training

The Contractor will provide a robust training and development program for employees that includes Standard Operating Procedures (SOP's), role competencies, safety culture and risk awareness. Also, site personnel which includes MDOT staff on specific training needs.

2.3. Reporting

The Contractor will submit to the MDOT Program Manager the following reports at various times during the Contract period.

1. Monthly Report

No later than the tenth (10th) of each month, the Consultant shall deliver to MDOT a Monthly Report covering the prior month's activities and accomplishments, including any responses to incidents. The Monthly Report will describe all completed work for each specific asset type, reported by GPS location. The information will also include unit of measure, mile marker, direction, length, size, type and resulting condition. This report will be delivered in an electronic format compatible with the MDOT Maintenance Management System or entered directly into the MDOT Maintenance Management System.

2. Weekly Work Plan

The Contractor will provide a Work Plan every Wednesday, no later than 5 pm eastern standard time (EST) to the MDOT Program Manager. The Work Plan will designate the intended work to be performed for the following week. The Contractor will include any planned lane closures in this Work Plan. The Contractor will provide a list of weekly work accomplishments from the previous week every Tuesday, no later than 5 pm EST, to the MDOT Program Manager. The list of weekly work accomplishments will include the asset item, activity, description, location of work and date completed.

3. Emergency Response Plan

The Contractor will prepare and furnish to MDOT for its review and approval an Emergency Response Plan within thirty (30) days after receipt of the executed Agreement. This plan will outline the Contractor's response procedures in the event of an emergency, collision damage, and inclement weather conditions including snow and ice, crashes, debris removal, rain, flooding, fog and other natural or manmade disasters. The plan will address the Contractor's coordination procedures with MDOT, the Michigan State Police (MSP) and other emergency personnel during emergency events.

4. Safety Plan

Plan to include a description of the safety program and safety training offered by the Contractor and a listing of trainings that have been satisfactorily completed by each employee of the Contractor. The safety plan will also include a traffic control plan, plan for worker safety when working near traffic, and plan for ensuring staff wear proper PPE. Plan will be furnished within thirty (30) days after receipt of executed agreement. An updated plan will be submitted at least annually or upon request.

2.4. Meetings

The Contractor will attend the following meetings:

Contractor Key Staff will meet with the MDOT Program Manager and other MDOT project-leads on a monthly basis, unless a different schedule is mutually agreed upon, for the purpose of reviewing progress, scheduling work, and discussing Contractor performance.

The Contractor will also attend the following meetings:

- a) Pre-Award Meeting and Equipment Inspection
 - i. Prior to award, the successful low bidder is required to meet with the MDOT Program Manager and/or designee. The purpose of this meeting will be to discuss the scope of the Contract and for the bidder to submit an equipment list indicating description, age, manufacturer, model, and serial number of each piece that will be used on the Contract. MDOT reserves the right to inspect the Contractor's equipment prior to the Contract start date and at any time throughout the duration of the Contract.
- b) Kick Off Meeting
 - i. Prior to commencement of work the successful bidder is required to meet with MDOT program staff
- c) Monthly Work Planning and Work Quality Review Meetings

The MDOT may request other meetings as it deems appropriate.

3. Staffing

3.1. Contractor Representative

Once award the contract is awarded a highly trained and skilled human resource team will source and recruit, with the assistance of headhunter. The Contractor will appoint at least 2 individuals, specifically assigned to State of Michigan accounts, that will respond to State inquiries regarding the Contract Activities. (the "Contractor Representative").

The Contractor will notify the Contract Administrator at least 10 calendar days before removing or assigning a new Contractor Representative.

3.2. Key Personnel

The Contractor will appoint the following individuals who will be directly responsible for the day to day operations of the Contract ("Key Personnel"). Key Personnel will be specifically assigned to the State account, be knowledgeable on the Contractual requirements, and respond to State inquiries within 1 hour.

Project Manager

The Contractor will designate one Project Manager once the Contract starts. The Contractor's Project Manager will be knowledgeable of highway maintenance principles and practices and have a minimum of five (5) years' experience in highway maintenance. The Project Manager will have supervisor experience demonstrating excellent leadership, management, planning, administration, budgeting and supervisory authority with similar projects.

This position will be MDOT's primary point of contact for written and verbal communication. This position will supervise all activities in the Contract, will be assigned exclusively to the Contract on a full-time basis. This position will have full management and financial authority to develop plans, adjust plans, execute orders and directions without delay and supply promptly material, equipment, tools, labor, incidentals and subcontracts as required to comply with the Contract at all times. This position will be the lead point of contact for the planning, delivery and quality of maintenance work and services and the response and resolution of any and all Contract deficiencies throughout the Contract term. The Project Manager will be available 24 hours a day, 7 days a week for immediate contact and response to MDOT for all issues and concerns, which cannot be resolved by the supervisor.

Crew Supervisor/Manager

There will be a Supervisor(s) designated by the Contractor that is responsible for ensuring that all Contract requirements and performance-based outcomes are met. The Supervisor will have direct oversight of all daily Contractor activities.

The Contractor will also identify substitute or back up Supervisors. Supervisors will maintain consistent daily presence along the corridor reporting deficiencies for repair. The Supervisor will be knowledgeable of transportation maintenance and have a minimum of two years' experience in highway maintenance or construction as a Supervisor demonstrating leadership and management with similar size projects. The Supervisor will be responsible for written and verbal communication with MDOT designated personnel as necessary to plan and accomplish daily work. The Supervisor will have completed training courses that are applicable to this CONTRACT.

Safety Officer

The Contractor will designate a Safety Officer who is responsible for ensuring that all health and safety requirements are met at all times. The Safety Officer will be exclusive to this Contract but can service other functional roles on this Contract. The Safety Officer must be knowledgeable of the Michigan Occupational Safety and Health (MiOSHA) regulations as well as the Occupational Safety and Health regulations (OSHA), incident management, hazardous and non-hazardous material spills and any other type of related activities.

The Contractor may not remove or assign Key Personnel without the prior consent of the State. Prior consent is not required for reassignment for reasons beyond the Contractor's control, including illness, disability, death, leave of absence, personal emergency circumstances, resignation, or termination for cause. The State may request a résumé and conduct an interview before approving a change. The State may require a 30-calendar day training period for replacement personnel.

The Contractor must identify the Key Personnel, indicate where they will be physically located, describe the functions they will perform, and provide current chronological résumés.

3.3. Non-Key Personnel

Contractor will provide a list of Non-Key personnel to MDOT Program Manager on a quarterly basis.

3.4. Organizational Chart

The Contractor will provide an overall organizational chart that details staff members, by name and title, and subcontractors at the time of signing of the contract.

3.5. Customer Service Toll-Free Number

The Contractor will specify its toll-free number for the State to make contact with the Contractor Representative. The Contractor Representative will be available for calls 24/7

3.6. Technical Support, Repairs and Maintenance

The Contractor will specify its toll-free number for the State to make contact with the Contractor for technical support, repairs and maintenance. The Contractor will be available for calls and service 24/7

3.7. Disclosure of Subcontractors

The Contractor intends to utilize subcontractors, the Contractor disclose the following:

Legal business name: Progressive Sweeping Contractors, Inc.

Address: 12564 N. Inkster Road, Redford Charter Township, MI 48239

Telephone: (313) 937-7933

Description of organization: Progressive Sweeping Contractors, Inc. (ProSweep) is a privately held corporation founded in 1978. ProSweep is a premier provider of street and highway sweeping services throughout Southeast Michigan and Northwest Ohio including Monroe County and has provided services to MDOT for over 20 years.

Ability to provide the contract activities: ProSweep has sweeping equipment and personnel already in place in Michigan for seamless mobilization to begin providing services for this contract.

Previous working relationship: None

Description of contract activities to be performed: Sweeping services

3.8. Security

The contract activities require interaction with State personnel at State facilities and/or designated State trunk lines or highways.

Upon request by the State, the Contractor will provide the results of all security background checks of any employee that performs contract activities.

The State may decide to also perform a security background check. If so, the Contractor will be required to provide to the State a list of all delivery people that will service State of Michigan facilities, including name, date of birth and social security number.

4. Pricing

4.1. Price Term

Pricing is firm for the entire length of the Contract.

5. Ordering

5.1. Authorizing Document

The appropriate authorizing document for the Contract will be a master agreement

6.2. Packaging and Palletizing

Packaging will be optimized to permit the lowest freight rate. Shipments must be palletized whenever possible using manufacturer's standard 4-way shipping pallets.

7. Acceptance

7.1. Acceptance, Inspection and Testing

Acceptance of work will be in accordance to Schedule A and the Final Acceptance procedures identified below.

The State will use the following criteria to determine acceptance of the Contract Activities:

7.2. Final Acceptance

Contractor performance will be continuously achieved by meeting the outcomes, performance benchmarks, and timeliness requirements specified in Schedule A. The Contractor's failure to meet any of the outcomes, performance benchmarks, and timeliness requirements may result in penalties being assessed in the form of deductions taken from the Contractors monthly lump sum payments as specified. Such penalties are considered non-payment for work not accomplished as required by the Contract. MDOT reserves the right not to assess any or all penalties if in MDOTs discretion the circumstances warrant that such penalty be waived. The waiver of any penalty shall not affect MDOTs right to enforce future penalties or take any other necessary Contract actions.

The Contractors performance will be assessed and accepted by these means:

Maintenance activities that are included in the monthly non-winter lump sum will be evaluated by MDOT on a not more than monthly and not less than quarterly basis by using the MiMRS program as defined in Section 1.3. The Contractor is to meet or exceed all performance benchmarks, or penalties may be assessed. Penalties for not meeting performance benchmarks for a given quarter will be assessed on the next month's invoice following the end of the quarter as defined in Section 1.3. Additionally, the Contractor will meet all other Contract requirements and timeliness requirements as defined in Schedule A, or penalties may be assessed.

Activities that are included in the monthly winter lump sum will be assessed and accepted based on Outcome Benchmarks and timeliness requirements as defined in Section 1.3.3 Winter Maintenance Criteria & Measures. The Contractor is to meet or exceed all Outcome Benchmarks and timeliness requirements, or penalties may occur.

Activities that are identified as unit price activities will be assessed and accepted based on the identified criteria and timeliness requirements as defined in the applicable sections of Schedule A.

8. Invoice and Payment

8.1. Invoice Requirements

All invoices submitted to the State must include: (a) date; (b) purchase order; (c) quantity; (d) description of the Contract Activities; (e) unit price; (f) shipping cost (if any); and (g) total price.

8.2. Payment Methods

The State will make payment for Contract Activities via EFT

8.3. Procedure

Monthly invoices will be emailed to the identified MDOT Program Manager.

9. Project Plan

The Contractor will carry out this project under the direction and control of the MDOT Program Manager. Within 30 calendar days of the Effective Date, the Contractor will submit a project plan to the MDOT Program Manager for final approval. The plan must include: (a) the Contractor's organizational chart with names and title of personnel assigned to the project, which must align with the staffing stated in accepted proposals; and (b) the project breakdown showing sub-projects, tasks, and resources required.

10. Licensing Agreement

The Contractor must provide a copy of any applicable licensing agreement.

11. Liquidated Damages

MDOT may assess liquidated damages against Contractor as defined in Schedule A.

12. Additional Requirements

12.1. Environmental and Energy Efficient Products

The Contractor must identify any energy efficient, bio-based, or otherwise environmentally friendly products used in the materials. Contractor must include any relevant third-party certification, including the verification of a United States department of agriculture certified bio-based product label.

12.2. Hazardous Chemical Identification

In accordance with the federal Emergency Planning and Community Right-to-Know Act, 42 USC 11001, *et seq.*, as amended, the Contractor must provide a Material Safety Data Sheet listing any hazardous chemicals, as defined in 40 CFR §370.2, to be delivered. Each hazardous chemical must be properly identified, including any applicable identification number, such as a National Stock Number or Special Item Number.

The Contractor must identify any hazardous chemicals that will be provided under any resulting Contract.

12.3. Mercury Content

Pursuant to MCL 18.1261d, mercury-free materials must be procured when possible. The Contractor must explain if it intends to provide materials containing mercury, the amount or concentration of mercury, and whether cost competitive alternatives exist. If a cost competitive alternative does exist, the Contractor must provide justification as to why the particular product is essential. All materials containing mercury must be labeled as containing mercury.

12.4. Brominated Flame Retardants

The State prefers to purchase materials that do not contain brominated flame retardants (BFRs) whenever possible. The Contractor must disclose whether the materials contain BFRs.

STATE OF MICHIGAN

Asset Maintenance Services for state Trunkline in Monroe County

SCHEDULE B PRICING

PERFORMANCE BASED ASSET MAINTENANCE SERVICES FOR STATE TRUNKLINE IN MONROE COUNTY
STATE OF MICHIGAN DEPARTMENT OF TRANSPORTATION

1. The Contractor is encouraged to offer quick payment terms. The number of days must not include processing time for payment to be received by the Contractor's financial institution.

Quick payment terms: 0.1 % discount off invoice if paid within 10 days after receipt of invoice.

The prices for the service Asset Maintenance Services for State Trunkline in Monroe County are the following:

Item	Unit	Annual Quantity	Unit Price
<i>Winter Lump Sum (only paid October-March)</i>	Month	6	\$152,640.60
<i>Non-Winter Lump Sum</i>	Month	12	\$168,363.04
<i>Joint and Crack Filling*</i>	Lane Mile	10*	\$1,293.75
<i>Ditch Clean out and Check Dam Maintenance*</i>	Lineal Foot	5000*	\$6.25
<i>Right of Way Fence Repair*</i>	Lineal Foot	100*	\$40.63
<i>Sweeping*</i>	Hours	150*	\$168.75

****Quantities provided for these items are estimates only. There is no guarantee that MDOT will utilize these pay items.***

Attachment 1

Implementation plan

Ferrovial Services Infrastructure, Inc (Ferrovial Services) is a world class highway asset maintenance provider, currently providing services on twenty-three tunnels, forty-three moveable bridges, and over 10,000 lane miles in the U.S. alone, with long term Public-Private Partnership (PPP) contracts running through 2044. We have been directly involved in the infrastructure maintenance industry for more than sixty (60) years and have current contracts in place in Canada, Colorado, Florida, Alaska, California, and Washington D.C. Currently, we leverage our knowledge and experience from contracts throughout North America to **self-perform** winter and summer maintenance operations

along our managed roadways. We will leverage our knowledge and experience from mobilizing existing projects of similar scope and size for the proposed contract.

We utilize tailored mobilization plans that focus on the specific skill sets needed to assemble and establish the resources necessary to meet contract requirements starting Day 1 of operations.

Within our mobilization plans, we invest in the creation of dedicated teams to focus on the mobilization and on-going development of new contracts and defined change programs within our business. Our devoted teams draw on Regional and Corporate resources such as human resources, safety, quality, accounting, procurement, and public relations to provide the administrative support and expertise necessary to ensure the successful delivery of our projects. Our mobilization plans the following key outcomes:

- Understanding of client standard specifications, plans, guidelines, advisories, memos, and best practices
- Understanding of required milestones and deliverables
- Timely and effective procurement of facilities, yards, and mechanic bays of size, location, and standard necessary to harbor equipment and staff for Day 1 of operations
- Timely and effective procurement of equipment and materials to ensure these resources are readily available for Day 1 of operations
- Ensuring equipment and materials are consistent with contract requirements having size, power, capacity, and necessary components to maximize operations and meet performance requirements
- Recruitment from local talent pools
- Thorough training of all staff so that they are safe and productive on Day 1
- Coordination of hands on operational system training
- Seamless transition that maximizes availability and safety for road users while minimizing journey times and delays

Ferrovial Services understands the importance of setting up operations correctly. The goal of successfully mobilizing to deliver excellence in all elements of services for this project is a significant task that needs careful planning, a structured process, and skilled resources.

We know that transition periods can vary in duration and complexity, but all transitions are related in the following factors, they are all short periods of intense workloads, driven by milestone achievements, delivered by people who normally do not work together - which requires expertise in resource management.

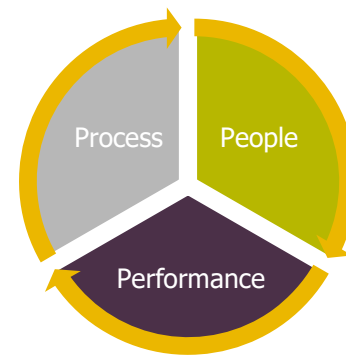


Figure 1: Critical Interlinked Implementation Activities

For the proposed contract, Ferrovial Services has assembled a fully dedicated transition team of highly knowledgeable and skilled personnel with several years of experience in resource management. Our dedicated transition team will consist of a Project Manager, Winter Maintenance Supervisor, Summer Maintenance Supervisor, a Regional Manager, and our Denver Turnpike Project Manager.

We will begin mobilization as soon as we are awarded the contract, which begins with our Business Director and HR team interviewing candidates. We will source and retain a Project Manager, Summer Maintenance Supervisor, and Winter Maintenance Supervisor with local working knowledge of the project area, state regulations, and standards, **two months** in advance of service commencement.

It is important that our dedicated transition team is set-up early, with clear roles and accountabilities for each team member including active engagement and communication with the client, other stakeholders as well as internal support functions.

KEY INDIVIDUALS

Our transition team will include Key Individuals from projects of similar scope and size to assist in the mobilization phase. Our Key Individuals have over 40 years of experience in asset maintenance and will be key to the successful assembly and establishment of appropriate and adequate resources in compliance with contract requirements for Day 1 of operations. A brief introduction to our Key Individuals is as follows:

Name	Position
Justin Doles	Project Manager (Denver/Boulder Turnpike/ US36 Express Lanes Project)
Edward Baran	Regional Manager (Ontario)
Kevin McDonnell	Project Manager (Sault Ste. Marie)

Table 1: Key Individuals

Justin Doles, Project Manager – US36 Express Lanes Project – Denver, Colorado

Justin Doles has 15 plus years of roadway engineering and asset maintenance experience. He has been a registered Professional Engineer (PE) in the State of Colorado since June of 2010 and has managed the US36 Express Lanes asset management contract since January of 2014 including the mobilization, management, and support of the winter and summer operations and maintenance for this network. He was instrumental in the development of the Snow and Ice Plan, staffing, sourcing and selection of equipment, implementation of communications and spreader technology, and the ongoing use and management of de-icing materials. Mr. Doles has helped facilitate coordination and communication between the Colorado Department of Transportation (CDOT), local agencies, and Ferrovial Services to maximize efficiency for each group and ultimately provide the best service possible for the traveling public. This includes providing additional support and service for the US36 Express Lanes where a high level of service is expected. The Project has received praise from the clients (Plenary and CDOT/HPTE), stakeholders, and the public.

Edward Baran, Regional Manager – Ontario, Canada

Edward Baran has a Bachelor of Architecture with a focus in Landscape Architecture from the University of Toronto. He has five plus years of experience managing the Ministry of Transportation's (MTO) North Bay asset maintenance contract in Northeast Ontario and over 15 plus years of experience in heavy civil construction. He is currently mobilizing three large-scale summer and winter road maintenance projects in Ontario for the MTO. He has proven experience in the maintenance of roadways in severe winter conditions, and is highly experienced in snow and ice control, incident and emergency response, maintenance of electrical systems including highway illumination, flashing beacons, and traffic signals.

Kevin McDonnell, Project Manager – Sault Ste. Marie, Canada

Kevin McDonnell is the Project Manager of our Sault Ste. Marie (SSM) asset maintenance contract, where he oversees the maintenance of summer and winter operations including the management of snow removal and ice control for severe winter weather conditions in Canada. Mr. McDonnell has 10 plus years of experience in managing asset maintenance contracts of up to 3,000 miles staffed with over two hundred employees and over four hundred pieces of equipment. He specializes in leading efficiency improvements for manpower utilization, maintenance and subcontractor costs, fleet utilization and replacement, budget implementation, and adherence to stringent performance requirements for asset maintenance contracts. As the Project Manager for SSM, he is responsible for managing the day-to-day operations to ensure the standards of the contract are met in a cost effective, safe and efficient manner. He prepares and implements asset management and maintenance programs in accordance with approved operating guidelines and budget. Mr. McDonnell is well versed and trained in Operational Health & Safety, excavation sloping & shoring, erosion and sediment control, incident response, safe and early return to work program, and Road Weather Information System (RWIS) utilized to study and analyze forecasted weather data to ensure preparations and readiness is achieved.

MOBILIZATION TEAM

Our Project Manager, alongside our Key Individuals listed above, will lead the mobilization process to ensure effective communication and appropriate orientation and induction of all personnel throughout the mobilization and operational phases.

The Mobilization Team will be responsible for delivering a successful mobilization on time and within budget.

Mobilization Team Accountabilities	Mobilization Team Responsibilities
<ul style="list-style-type: none">Completed mobilization on time and within budget, with all services being delivered on Day 1 of the Full-Service Commencement DateMaintaining adequate resourcing to support the mobilization plan and program to meet all major milestones	<ul style="list-style-type: none">Establishing all required resources, systems, processes and accommodations to achieve the requirements of this programProviding positive and clear leadership and program management to achieve all contract transition objectivesEffective stakeholder communication that focuses on meeting business continuity while ensuring seamless introduction of business systems, procedures and documentation

<ul style="list-style-type: none"> • Completion and implementation of all contract documentation • Zero impact on MDOT project operations (i.e., ensuring business as usual) throughout mobilization phase • Zero notifiable safety or environmental incidents • Zero injuries and LTIs • Zero unresolved disputes or issues 	<ul style="list-style-type: none"> • Facilitating key meetings and joint workshops including, but not limited to: relationship building, risk management, transition work stream team progress and issue/dispute resolution • Completing transition progress reports for Contract Review Group and Management Team meetings • Maintaining a mobilization issues and risk register • Managing and tracking the mobilization budget • Ensuring the appropriate level of support and resources are available to the service management team and MDOT • Focusing on safety so that there are no incidents, near misses or LTIs during the mobilization period
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Table 2: Transition Team Accountabilities and Responsibilities

RECRUITMENT

Ferrovia Services prides itself on attracting and retaining high quality personnel globally. Successful contract delivery is reliant upon having qualified people in all positions, from contract management to field operations staff.

Lessons learned on projects worldwide are useful only when paired with understanding and experience specific to local and regional nuances. This is why we are committed to staffing with local hires and partnering with area subcontractors for this contract.

Ferrovia Services understands how challenging it is to find dependable and skilled staff, so we implement a range of techniques within our recruitment processes to ensure we attract and retain high quality personnel. These techniques include planning in advance, conducting job fairs and hiring campaigns, and offering good benefit packages.

We begin our recruitment process as soon as we receive notification that we have been named as preferred proponent on a bid. While there is no intent to hire staff prior to receiving notice that we have been officially awarded a contract, there is significant work that can occur on a low-cost basis in the interim. This work includes the further development of position descriptions and advertisement for staffing needs on internet employment sites. This process is facilitated by our recruitment team and coordinated by the nominated HR Mobilization Management Team Leader.

Based on the responses to postings that we receive, we interview for positions and progress through the process to the point of selecting preferred applicants. These preferred applicants are then given pre-employment medical examinations and are subjected to reference checks. Once applicants pass this stage, there is a final stage of recruitment consisting of a Letter of Offer.

Utilizing this approach allows us to have a substantial portion of the team in place at the start of the formal Mobilization Phase, hence maximizing the value that can be obtained during that period.

We begin mobilization as soon as we are awarded the contract, which begins with our Business Director and HR team interviewing candidates. Afterwards, the Project Manager is hired (from our pool of internal resources or from external sources) as soon as possible. We have management personnel in place well in advance, ideally three (3) months prior to the start date of the project.

As part of the process, we consider incumbent staff members on the existing contract who may desire to transfer to the Ferrovial Services team under the new contract. We also have seasonal employees who only want to work for a particular season or seasons and the same considerations apply. We understand that seasonal talent can be retained by renewing employment opportunities with key employees from season to season or year to year. We support these employees' return each year as part of our employee retention program by giving them first option for each season's employment opportunities and by giving credit for prior years worked in our pay and benefits programs.

Given the short turnaround time between being awarded the proposed project and the commencement date, we will begin recruiting all management personnel as soon as we are given notice we have been selected as the preferred proponent. With the exception of project management staff, who are hired earlier, we will source and hire all field staff **one month** prior to the commencement date of the contract. This allows them to be on site to complete the prerequisite training, site familiarization and prepare for Day 1 of operations.

Our approach to attracting and retaining qualified and dedicated individuals includes:

- The ability and willingness to offer competitive employment packages
- Provision of opportunity for long term employment, training, development, and professional growth
- A strong safety culture at all levels of the organization

With regard to Michigan area staffing resources, we have major firms that are on file and approved vendors, that will support us as necessary including:

- JSG Inc.
- Randstad Engineering
- Robert Half
- GQRGM Staffing

Additionally, we will engage local community resources such as:

Monroe County YMCA Locations

- Michigan Department of Labor and Employment

MANAGEMENT & STAFFING PLAN

Ferrovial Services has been directly involved in the asset management industry for more than sixty (60) years. Our in-depth experience has resulted in a well-defined organizational structure that is equipped to meet the challenges of our summer and winter asset maintenance contracts. Ferrovial Services will provide well-trained and experienced personnel who understand the challenges of responding to winter weather events and effectively delivering complex winter and summer maintenance projects.

Our approach to designing our management structure to successfully deliver the proposed contract took a number of factors into consideration including scope, geographic spread, unique area features, and a focus on consistent delivery of high-quality services. Our goal is to provide the Department with a highly qualified and experienced team along with ample quality support to ensure that we maintain the levels of performance that the Department will be proud of.

To ensure the successful delivery of the proposed contract all work will be performed in-house (with the exception of approach sweeping) by highly trained and skilled personnel described herein.

Our project management team including our Business Director, Project Manager, and Winter Maintenance Supervisor will guide the overall strategy for the contract and will serve as our contract representatives, responding to State inquiries regarding all contract activities.

Our in-house summer and winter asset maintenance crews will perform day-to-day operations including winter maintenance, patrolling, traffic control, waste removal, asset repairs, and emergency response. All contract activities will be performed in accordance with the most current MDOT Maintenance Activity Guides, MDOT standard specifications for construction, standard plans, MDOT maintenance advisories, and maintenance memos. All staff will be trained in safety best practices, and incident and emergency response. Training will continue throughout the term of the contract to ensure continued delivery of high quality service.

Leadership

Daniel Filer, Business Director (Available as necessary)

Daniel Filer joined Ferrovial Services in 2018 with more than 20 years of design and construction experience as a professional civil engineer, including seven years with Ferrovial Agroman Corp US in North America. Also included in that tenure is an 11-year career as a Reserve Engineer Officer with the Louisiana Army National Guard, where he supervised heavy construction projects stateside and in hostile environments abroad. Concurrently, Mr. Filer worked 11 years as a consultant in a variety of roles including Design Engineer, Project Manager, Project Sponsor, Client Service Leader, and Business Development Manager. Daniel holds a B.S. in Civil Engineering from Louisiana Tech University and an M.S. in Engineering Management from Southern Methodist University. He has also completed a Mergers & Acquisitions Program from Wharton School, University of Pennsylvania.

At Ferrovial Agroman Corp US, Mr. Filer served as Vice President of Business Development where he was responsible for strategic planning, new business identification, deal assessment and partnering for infrastructure projects. Most of these projects involved the finance, design, construction, operations and maintenance of major infrastructure assets such as highways, airports, rail, and water treatment plants. Projects were typically greater than \$300M in value and involved multiple partners and subcontractors. In 2018, Mr. Filer joined Ferrovial Services International as the Executive Vice President of Strategy, Development and Innovation, but soon transitioned into the Executive Vice President of Infrastructure (President) for North America. In this role, he is responsible for and leads all infrastructure business in the United States and Canada. This portfolio includes four Public Private Partnership (P3) projects in addition to more than 20 roadway maintenance contracts. These contracts span the continent

including the states and provinces of Florida, Alaska, California, Washington D.C., Colorado, and Ontario.

Our Business Director will be responsible for all aspects of contract performance including safety, operational, and financial components. He will help guide and motivate the team to ensure we are striving for excellence at all times while maintaining a strong safety culture. Our Business Director will be available for client interaction as necessary. He is committed to the successful delivery of this Contract.

Project Manager (100% Commitment)

We will staff a full-time, fully-dedicated Project Manager with a minimum of 5 to 10 years of experience managing and operating asset maintenance roadway contracts of similar scope and size. He or she will be well versed in project management concepts, related processes, principles and their application. He or she will be a self-directed individual with the ability to provide strong leadership and to manage and organize multiple priorities. He or she will possess a high level of skill in providing structure, support, administrative systems and methodologies to meet contract obligations in relation to quality, safety, contractor agreements, procurement, cost control, scheduling and estimating management processes and procedures.

Our Project Manager will serve as the lead point of contact for the planning, delivery, and quality of maintenance work and services. Responsibilities will include:

- Day-to-day responsibility for running the project, implementing the work plan, providing direction to project staff, and interacting with the State and other stakeholders.
- Providing all safety, operational, and financial components to ensure we deliver on all fronts of this contract.
- Serving as our contractor representative with a responsibility of responding to State inquiries within one hour regarding all contract activities including appropriate and adequate responses and resolutions of any and all Contract deficiencies 24/7/365.
- Development of the project plan including the Snow and Ice Plan, staffing, sourcing and selection of equipment, materials, tools, incidentals, and subcontractors.
- Implementation of communications and technology.
- Facilitating coordination and communication between MDOT, local agencies, and Ferrovial Services to maximize efficiency for each group and ultimately provide the best service possible for the traveling public.

Project Administrator, (100% Commitment)

We will hire a Project Administrator with a minimum of 3 to 5 years of experience in office administration and customer relations. He or she will be well versed in providing administrative, clerical, financial, procurement, and 3rd party claims support to asset maintenance contracts. Responsibilities will include:

- Processing new hires including completion of new hire paperwork
- Payroll setup and processing, benefit enrollment, on-boarding, new hire orientation, and record keeping
- Preparing monthly reports in a timely, accurate manner including but not limited to client required reports, overtime, payroll and SAP reports

- Issuing purchase order for equipment, materials, and supplies
- Inventory tracking
- Accountability for the intake and management of all inquiries including recording and tracking all customer service requests to ensure acceptable response times. This includes dispatching employees to accidents, repairs, and other concerns of client or public.

David Sheaffer, Corporate Quality Manager (Mobilization)

Mr. Sheaffer has been with Ferrovial Services since 2008 and has 30 years of experience in Quality Management and 46 years of experience in highway maintenance and highway maintenance management for the Florida Department of Transportation (FDOT), Virginia Department of Transportation (VDOT), and Pennsylvania Department of Transportation (PennDOT). Mr. Sheaffer has designed and implemented Quality Management Plans (QMP) for 15 of our contracts since 2009.

He will refine and implement Ferrovial Services policies and procedures to ensure streamlined, efficient and contract-compliant operations, and will train and support project staff to ensure that the policies set forth are executed properly.

Bruce Delgrasso, Health, Safety, Environment, and Quality Manager (Mobilization)

Bruce Delgrasso began his career with Ferrovial Services in 2013 as the Health, Safety, Environment, and Quality (HSEQ) Manager. As the HSEQ manager, Mr. Delgrasso has designed, implemented, and managed HSE policies and programs to ensure employees are trained and educated in the application of occupational safety, health, and environmental systems and processes. He currently assists with project-level monitoring, reporting, and compliance related to the QMP and the Safety Plan. His other responsibilities include onsite HSEQ reviews, evaluating operational procedures, developing methods to improve HSEQ, and monitoring job site facilities and audits to ensure compliance with OSHA, federal and state requirements, client and project operational policies. Mr. Delgrasso brings over 20 years of experience Risk and Safety Management and Project Management to the Ferrovial Services team.

Mr. Delgrasso will assist in the refinement and implementation of Ferrovial Services policies and procedures to ensure streamlined, efficient, and contract-compliant operations. He will also assist in the development, submittal, and oversight of an acceptable Safety Plan to ensure employees, subcontractors, and vendors are in compliance with all laws, rules, and regulations of federal, state, and local health officials, and contract requirements at all times during the term of the contract.

Summer Maintenance Supervisor (100% Commitment)

We will staff a Summer Maintenance Supervisor with a minimum of 5 years of experience managing and operating asset maintenance roadway contracts of similar scope and size. This individual will be key to the successful delivery of the day-to-day operations. Required skills and responsibilities include:

- The ability to identify opportunities for changes and improvements in work methods, processes, efficiency and cost reduction
- Experience in selecting, developing, and performing management of in-house and subcontracted maintenance crews

- Management of services provided including ensuring compliance with contractual requirements, and management of schedules of field staff and subcontractor work
- In collaboration with our Project Manager, organize the development, implementation, and evaluation of the summer maintenance plan consistent with the identified needs of the State and contract.
- Inspection of in-process and completed work to ensure that all contract and performance requirements are being met
- Highly trained and skilled in all knowledge bases necessary to successfully deliver this contract, including technology, Traffic Control, safety best practices, incident response, and interagency coordination

This individual will serve as the backup to the Winter Maintenance Supervisor.

Lead Technicians (100% Commitment)

Our Lead Technicians will be well versed in directing and supervising work crews and providing day-to-day oversight of the maintenance work plans. They will lead and assist Technicians in the performance of routine maintenance activities such as patrol patching, bump removal, waste removal, guardrail repairs, cable barrier repairs, litter/debris pickup, small sign repairs, traffic control, Adopt-A-Highway, joint and crack filling, right-of-way fence repairs, ditch clean outs, check dam maintenance, and 24/7/365 emergency/incident response, within their identified zones of operation or across zones as needed. They will be trained in applicable technology, traffic control, safety best practices, incident response, and interagency coordination. They will be directly involved in delivering asset maintenance services in compliance with contract requirements and ensuring performance outcomes are met.

Technicians (100% Commitment)

Technicians will be skilled and trained personnel responsible for performing routine maintenance activities such as patrol patching, bump removal, waste removal, guardrail repairs, cable barrier repairs, litter/debris pickup, small sign repairs, traffic control, Adopt-A-Highway, joint and crack filling, right-of-way fence repairs, ditch clean outs, check dam maintenance, and 24/7/365 emergency/incident response, within their identified zones of operation or across zones as needed. All technicians will be trained in applicable technology, traffic control, safety best practices, incident response, and interagency coordination.

Heavy Equipment Mechanic (100% Commitment)

Our Heavy Equipment Mechanic will be highly skilled with more than 5 years of experience as a maintenance mechanic. Required skills and responsibilities include:

- Expertise in repairing all mechanical equipment through inspection and servicing
- The ability to understand technical service manuals, detect malfunctions, and to know what repair tools, equipment, and testing machinery is necessary to ensure equipment is safe and readily available for continued operations
- A good understanding of current principles, techniques, and practices used in repairing and maintaining equipment as well as electrical support systems
- Responsibility for diagnosing, maintaining, and upkeep of heavy equipment
- Ensuring the timely procurement of equipment and inventory

- Day-to-day duties will include preventative maintenance, changing plow blades to plow trucks and snow removal equipment, and keeping plow trucks and snow removal equipment clean and in good working order.

Other Resources

Other **Regional and Corporate resources** include human resources, safety, quality, accounting, procurement, and public relations teams to provide administrative support and expertise to complement our field operations. The Project Manager is able to draw on these resources at his or her convenience to ensure contract success.

The project staff will be empowered to assume responsibility for daily and routine tasks, implementing work plans, inspecting work, tracking budgets, monitoring compliance, and ensuring project expectations and requirements are systematically met. All staff will be required to pass a drug screen, motor vehicle records checked, and physically examined as required by the Department of Transportation.

Ferrovia Services commits to providing qualified, trained, and experienced people who understand the challenges of this project and who have demonstrated the ability to effectively manage complex projects previously while meeting performance requirements. In addition to the schedules and staffing listed below, we have taken into account the need for dedicated day and night shifts to address surges in winter and summer work needs.

Summer Staffing Allocation

We will be staffing four (4) dedicated maintenance crews for various routine and non-routine asset maintenance services, including but not limited to:

- Proactively patrolling all routes
- Asphalt Repairs
- Litter Pick Up
- Culvert Underdrain & Edge Drain Cleaning
- Traffic Control
- Emergency Response
- Adopt-A-Highway
- Joint & Crack Filling
- Ditch Cleanout & Check Dam Maintenance
- Right-of-Way Fence Repair
- Work Orders
- Property Damage Reclamation Process (PDRP) Service Requests
- Non-hazardous and hazardous waste removal

Cornerstones of our approach to summer staffing include the following:

- Maintenance crews will be comprised of a Lead Technician and General Technician based out of our centralized patrol yard and dedicated to distinct zones of operations. This allows for attention to detail and in-depth knowledge of the assets within the zone and creates a greater sense of ownership for the infrastructure, as well as ensuring response times are met 24/7/365. Crews will operate across zones as needed.

- During the summer season, our maintenance crews will work eight-hour shifts Monday through Friday. Upon request by the State, maintenance crews will be available as needed on evenings, weekends, and holidays.
- One Lead Technician and one General Technician will transition to winter equipment operators in the winter. The remaining four (4) operational staff will continue performing routine and non-routine asset maintenance services such as guardrail repairs, cable barriers, impact attenuators, signs, debris, and animal carcasses.
- Maintenance crews will be skilled and trained in emergency response and respond to emergencies and incidents 24/7/365 as needed to ensure coverage and response throughout the pertinent State highway network.
- Our patrol yard will be fully equipped to allow maintenance crews to complete all routine and non-routine summer maintenance.
- Our maintenance crews will be supplemented with the specialized subcontractor identified for roadway sweeping

HIGH PERFORMANCE FLEET

Ferrovia Services is committed to ensuring we provide the best fleet and equipment available to the State and its customers. Our approach to equipment acquisition includes purchasing fleet and equipment, ordered specifically for each contract, directly from the manufacturer. Ferrovia Services has a corporate team in place who routinely provides these services.

Our fleet management team, who is responsible for executing fleet and equipment initiatives, consists of seasoned professionals with extensive backgrounds in equipment management and operations. They routinely conduct research and evaluations of original equipment manufacturers to identify the best value equipment on the market. These evaluations consider product safety, availability, quality, service support, warranty and cost, and are revisited regularly to ensure quality and value is continually being obtained.

In preparation for project mobilization, we conduct a rigorous procurement process carried out in the manner described below:

- Understanding local specifications and performance measures
- Developing equipment solutions and programs to meet requirements and ensure compliance
- Sourcing fleet and equipment in time for contract start date
- Limiting equipment operational down time

Ferrovia Services' aim is consistent with the end goal of delivering maximum value to the State. To achieve this, we will supplement our strong operational team with a fleet of **brand-new** vehicles and equipment as specified in the proposed contract for Day 1 of operations. This will ensure that all equipment complies with regulatory requirements and State specific policies.

With our wide North American footprint, we have long standing relationships with internationally proven suppliers that can ensure shorter lead times and confidence in operational delivery. In preparation for developing a solution to deliver asset maintenance services, a rigorous procurement process was carried out, the results of which included:

Standardizing our heavy and light duty needs, we considered offerings from Ford, General Motors, Ram, and Toyota, selecting **Ford as our preferred provider**. We believe that standardization is a best practice and helps our operators be safe and proficient regardless of the unit they are using. It also provides the ability for us to ensure coverage not only on a contract basis but also from a State standpoint. Additionally, standardization offers efficiencies on the maintenance front. As a result, there is no need to stock duplicate parts for each original equipment manufacturer, thus increasing availability of needed parts; and our mechanics become more proficient with the equipment and service needs, reducing down time.

Our heavy and light duty trucks have specialized up-fits that have been standardized for the functions for which the units perform. Our light duty up-fit is unique to us and was designed by our fleet management team. Each truck contains an auxiliary power system that powers all accessory lighting including strobes, beacons, and work lights that allows the truck engine to be shut off while still providing the safety protection of the accessories. This feature, an optimized original equipment manufacturer chassis including an 8-speed transmission, has reduced fuel consumption by 25% thus allowing our trucks to spend more time on the road and less time refueling.

These units will be factory ordered and shipped directly to the up fitter/local dealer for preparation. Factory ordering gives us access to the “ship through” network allowing the unit to be drop shipped to the up fitter, saving weeks of additional transportation time.

For our heavy equipment, we have established both **CAT and John Deere** as our preferred providers.

Below is a list of major vehicles, consumables, equipment that we will provide to successfully deliver summer operations:

Description	Quantity
1/2 Ton Single Cab Truck– 2wd - Light Bar & Arrow board	3
3/4 Ton Pick-up 4x4 - with Light Bar and Arrow Board (regular)	3
Mechanic Truck	1
Equip. trailer (tractor) – (7x20 Tandem axle)	1
Arrow Board Trailer Mounted	1
Compressor	1
Kettle	1
Skid Steer with Brush Cutter, Milling Head, Fork attachments	1
TMA Truck Full up-fit	1

Table 3: Major equipment necessary to successfully deliver summer operations.

Ferrovia Services is well versed in providing and operating asset maintenance equipment and does so for all of our contracts. All vehicles will have appropriate safety equipment required by the Department of Transportation Manual on Uniform Traffic Control Devices (MUTCD), our Safety Plan, and as otherwise determined to be necessary. Equipment specifications will be reviewed with the State for approval prior to final procurement to ensure equipment is consistent with State

specific requirements and have the size, power, capacity, and necessary components to maximize operations.

MATERIALS

Ferrovia Services proposes to utilize current MDOT material suppliers to ensure materials are in compliance with contractual terms and are available on Day 1 of operations. During mobilization, we will work closely with suppliers to develop new contracts and facilitate progressive replacement of existing purchase orders with those raised by MDOT. This will allow for the continuous upkeep of records of materials used.

As Ferrovia Services is committed to performing the majority of the asset maintenance services identified in the scope of services in-house, we will establish strong relationships with locally proven suppliers within efficient proximities to the prospective contract for materials for maintenance activities. These maintenance activities include but are not limited to:

- Right-Of-Way Fence Repair
- Remove & Replace pavement
- Patrol Patching
- Pavement Spall & Pothole Repairs
- Bituminous Maintenance & Repair
- Bump Removal
- Routine Blading
- Cable Barrier Repair
- Delineator Maintenance
- Impact Attenuator Maintenance Roadway
- Ditch Clean Out & Check Dam Maintenance
- Adopt-A-Highway

Our Project Administrator will be responsible for keeping a comprehensive list of materials, detailed records of material usage, and Safety Data Sheets for each material. Safety Data Sheets for each material will be available at our facility and in each vehicle at all times.

Ferrovia Services is highly experienced in furnishing and keeping track of materials necessary to successfully deliver asset maintenance contracts as we typically perform approximately 80% of any contract's asset maintenance services in-house. We will seek approval from the State prior to the procurement of materials.

Upon receiving approval, our mobilization team will ensure the timely and effective procurement of the above-mentioned materials to ensure these resources are readily available for Day 1 of operations.

WINTER RESOURCES

Management & Staffing Plan

Winter Maintenance Supervisor (100% Commitment)

We will staff a Winter Maintenance Supervisor with a minimum of 5 years of experience managing asset maintenance roadway contracts of similar scope and size. Our Winter Maintenance

Supervisor will be key to the successful delivery of our day-to-day winter maintenance services on MDOT trunklines and other facilities such as rest areas, welcome centers, weigh stations, and carpool lots. Required skills, experience, and responsibilities include:

- Knowledge of and experience with Michigan area storms, winter maintenance equipment and materials, and best practices for snow removal and ice control
- Ability to identify opportunities for changes and improvements in work methods, processes, efficiency and cost reduction
- Experience in selecting specially fitted equipment
- Experience in managing equipment operators, winter patrollers, and full time and part time seasonal plow drivers
- Meeting contractual requirements at the winter levels of service established by the State
- Maintaining a consistent presence along the corridor and reporting deficiencies for repair or replacement
- Management of services provided including ensuring compliance with contractual requirements, and management of schedules of field staff and subcontractor work
- Ensuring compliance with MDOT policies specific to winter maintenance
- Development of the weekly work plan
- Oversight of equipment operators, plow drivers, and subcontractors
- Management of de-icing materials and snow removal
- Oversight of emergency response 24/7/365
- Monitoring financial aspects of the program

The Winter Maintenance Supervisor will serve as a contractor representative and will be specifically assigned to State of Michigan accounts to respond to State inquiries within one hour regarding all contract activities. He or she will coordinate appropriate and adequate responses and resolutions of any and all contract deficiencies 24/7/365.

Our Winter Maintenance Supervisor will also serve as the Health, Safety, and Quality Control Officer and ensure that all health, safety, and performance requirements are met at all times. He or she will be knowledgeable of the Michigan Occupational Safety and Health (MIOSHA) regulations as well as Occupational Safety and Health regulations (OSHA), incident management, hazardous and non-hazardous material spills and any other safety related tasks. Responsibilities and requirements related to this role include:

- Routine inspection of in-process and completed work for conformance with contract specifications
- Development, submittal, and oversight of an acceptable Safety Plan to ensure employees, subcontractors, and vendors are in compliance with all laws, rules, and regulations of federal, state, and local health officials, and contract requirements at all times during the term of the contract
- Training and certification in all courses necessary to successfully fulfill this role, including OSHA, Traffic Control, Safety Best Practices, incident response, and interagency coordination.

This individual will serve as a backup to the Summer Maintenance Supervisor.

Lead Equipment Operators 100% Commitment)

Our Lead Equipment Operators will be highly trained personnel who specialize in operating snow removal equipment such as specially upfitted snow plows with either single axle or tandem axles, loaders, and other machinery. They will lead Snow Plow Operators in the removal of snow and ice control on MDOT trunklines, rest areas, welcome centers, weight stations, and carpool lots in compliance with MDOT winter maintenance policies during precipitation events, snow storms, and storm cleanup. They will perform winter maintenance pre-trip and post-trip inspections of snow removal equipment. Outside of plowing and removing snow from roadways, parking lots, ramps, facilities, welcome centers weight stations, and carpool lots, our Lead Equipment Operators will also apply solid and liquid deicers, stockpile materials, and load materials from salt storage facilities. All staff will be trained in MDOT winter maintenance policies, applicable technology such as AVL, ArcGIS, Vuwoks, MDSS, PDRP, safety best practices, incident and emergency response. They will be readily available for winter operations and emergency response rotations as needed 24/7/365.

Snow Plow Operators (100% Commitment)

Our Snow Plow Operators will be highly skilled personnel responsible for operating specially upfitted snow plows with either single or tandem axles during precipitation events, snow storms, and storm cleanup. These crews will perform the day-to-day winter operations including winter road patrolling in a manner that works towards achieving bare pavement for the traveling public. Outside of plowing and removing snow from roadways, parking lots, sidewalks, and trails, our specialized crews will also apply solid and liquid de-icers, stockpile materials, and load materials from salt storage facilities on trucks. All staff will be trained in MDOT winter maintenance policies, applicable technology, safety best practices, incident and emergency response. They will be readily available for winter operations and emergency response rotations as needed 24/7/365.

Winter Staffing Allocation

During the winter season, we propose to maintain availability of winter vehicle operators to ensure roadways are continuously open and safe for the traveling public especially when hazardous conditions are forecasted as a result of a winter snow or ice event.

Ferrovia Services will supplement our Year-Round Operators with Seasonal Operators to not only ensure compliant levels of operators per winter vehicle, but also to allow critical coverage on any critical routes or locations that we identify including facilities, rest areas, welcome centers, weigh stations, and carpool lots. Winter activities will be performed 24/7/365, when required to maintain required levels of service per route. Ferrovia Services will maintain an “on call” schedule for Operators to respond to winter events and incidents during non-scheduled work hours and during Winter Transition Periods. We have meticulously examined the contract documents and actual site conditions, as well as the provided route maps, and have built up Operator staffing by routes based on the number of plow units, the total miles to plow, and the average plow and reload times, and have concluded the following:

- During the winter season, each plow route will have a minimum of one snow plow assigned to it and staffed with two operators that will ensure adequate coverage of each route.
- During the winter season, the Year-Round Operators and Seasonal Operators will work on a rotating schedule that will allow 24-hour coverage for each plow unit

- Each Operator will cover a 12-hour shift schedule that will consist of “operating time” and “on call” time
- Two primary Operators will be scheduled for each plow unit
- Additional Operator coverage has been considered to allow for shift rotations, coverage on sick days, and scheduled leave.

Plow Operators	
Transition Period	13
Winter	26

Table 4: Number of primary and seasonal operators

Our Summer and Winter Maintenance Supervisors will patrol, perform a physical evaluation of, and document the condition of assets during the winter season.

Proposed Operator staffing levels detailed above allow for expanded coverage on critical routes or locations should we identify the need through our patrolling services or if conditions warrant.

Training

Ferrovia Services’ field staff attend a comprehensive winter maintenance training program, prior to winter operations each year. The classroom sessions introduce personnel to the fundamentals of snow and ice control. This includes safety, driver preparedness, weather forecasting, plowing and spreading techniques, echelon plowing, winter material use (including effects of temperature, humidity or precipitation), safety data sheets for these products, and safe equipment operation. In addition, spreaders are calibrated, and equipment is checked for proper operation.

In addition to this, staff participate in “Dry Runs” to become familiar with the equipment, the route, (including turn around points and alternates), facilities, and their truck’s placement in the plowing/spreading in echelon (if applicable). This helps ensure better organization, efficiency, and safety during actual events.

Training will continue throughout the term of the contract, with the goal of ensuring all employees understand the project expectations and objectives, their responsibilities, their roles in contributing to the quality of service, and their impact on safety and environmental aspects of the work. The training program employs a range of training resources selected to meet the particular skill area, the number of training candidates, and the impact of training on project operations.

High Performance Fleet for Winter Operations

Ferrovia Services is committed to ensuring we have the best fleet available to offer the State and its customers. To achieve this, we will provide our operational team with a fleet of **brand-new** vehicles and equipment; ensuring that all equipment complies with regulatory requirements and State specific policies. In preparation for developing a solution to delivering winter maintenance services, our fleet management team conducted research and evaluations of original equipment manufacturers to identify the best value equipment on the market, the results of this process resulted in the following findings:

For our heavy truck needs and plow body configurations, our fleet team worked with several dealers and factory engineers to develop the optimal chassis specifications and specialized up-fits that comply with regulatory requirements and State specific policies. We reviewed and evaluated

products, technical specifications, and past performance offerings from each dealer including Navistar, Mack, International, Western Star and Freightliner, **selecting International as our preferred provider**. International provides the highest quality product and the most support. International has over 700 dealers, 8,000 technicians, 7,000 bays, and provide support 7 days a week.

We've considered a minimum of one winter maintenance truck per plow route and one contingency truck for every five (5) plow routes identified. Our snow plow trucks exceed contractual requirements and contain the following specifications:

- 410HP @ 1700 RPM, 1450 lb-ft. Torque @ 1000 RPM, 2100 RPM Governed Speed
- 40,000-lb Capacity, 55" Axle Spacing, 9.5" Ride Height, with Shock Absorbers, Mounted Inboard A/R Suspension Tandem
- 40,000-lb Capacity tandem rear axle
- 12,000-lb Capacity front axle
- 160 Wheelbase
- 12 feet wide hydraulic underbody blade with Front Plow
- Minimum 10-yard capacity salter/spreader
- Galvanized screens, Dual auger, Spinner assembly
- Ground speed oriented computerized spreader controller
- Hydraulic computer-controlled material pre-wet with 450-gallon capacity
- 12 power reverse underbody scrapers
- Plow & DOT compliant emergency warning lights
- Toolbox
- FMVS 108 lighting
- Data link connector for vehicle Programming and Diagnostics
- 2-WAY RADIO Wiring Effects

Given the need to build the up fit of these vehicles, we have identified multiple body manufacturers for components to mitigate risks associated with longer and unpredictable lead times.

These units will be factory ordered and shipped directly to the up fitter/local dealer for preparation. Factory ordering gives us access to the "ship through" network allowing the unit to be drop shipped to the up fitter, saving weeks of additional transportation time.

Below is a list of major vehicles, consumables, equipment in addition to our high-performance summer fleet necessary to successfully deliver winter operations:

Description	Quantity
1/2 Ton Single Cab Truck – 2wd - Light Bar & Arrow board	1
Snow Blower	1
Snow Plow Truck	10
Loader	2
Snow Plow Truck (Spare Units)	2
Tow Plows	3

Table 5: Winter Equipment List

After approval from the State, our mobilization team will ensure the timely and effective procurement of this above-mentioned equipment and materials to ensure these resources are readily available for Day 1 of operations.

Materials

Effective winter maintenance is heavily reliant on having suitable materials to improve efficiency. For the proposed contract, Ferrovial Services commits to utilizing MDOT-approved road salt to ensure winter materials are in compliance with contract requirements and readily available for Day 1 of operations.

We will identify and establish relationships with locally proven sand suppliers in close proximity to the network to ensure we have additional agreements in place by Day 1 of operations in the event we need to apply ice control abrasives in severe weather conditions. These suppliers will offer top priority delivery services. From experience, we know that establishing multiple relationships with other local winter material providers ensures we have the adequate supply of materials should an unforeseen or un-forecasted winter events arise.

Figure 2: Monroe Cony
Proposed Office with Mechanic
Bay and Yard Locations

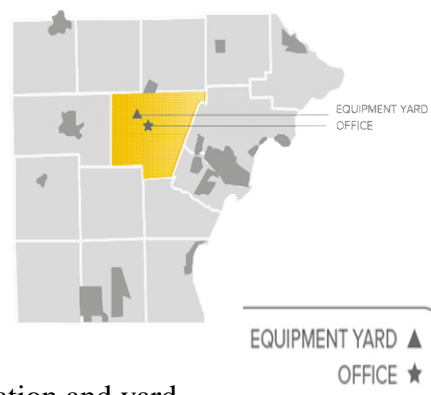
We understand that it is not only the reliable and consistent supply of stocked materials that ensures an effective and efficient operation, but also the management of the material. Ferrovial Services has 9 years of similar winter maintenance experience through multiple current contracts throughout the United States and Canada where we properly store, manage, and load up to 70,000 tons of salt a year. Through best practices we've learned that go housekeeping and handling goes a long way when it comes to ensuring the quality of material.

Our Lead Equipment Operators will load and unload materials cautiously to such that material quality is optimal for a winter event. They will be responsible for inspecting the immediate area for spillage prior to departing to the plow route to keep load areas clean.

FACILITIES LOCATIONS AND CAPABILITIES

When bringing our best practices and global experience to a new region, we study incidents, patterns, trends, and benefits of the location to determine the best location of our office, mechanic bay, and yard. Most importantly, we study the distance and accessibility to major highway plow routes as this will be key in our operational team meeting performance outcomes and contract requirements.

For the proposed contract, we've selected an office location in Monroe County, with mechanic bay and yard, that is central to the identified plow routes as illustrated. Our office location and yard will be of size and capacity to house specially designed fleet.



Maintenance crews will be assigned to distinct zones of operations, this allows for quick accessibility to all assets, which is especially important in emergency situations.

Successfully delivering contracts is paramount to the ongoing success of our operations and is the key objective of mobilization. It is therefore important to understand, monitor, and revisit performance and contract outcomes that we will be working towards during the mobilization phase. We know how important it is to achieve the key outcomes of this contract and if we ever determine that we are not on track to achieve contract deliverables, action will be quickly taken to resolve the situation through communication, corporate support, and whatever avenues are necessary for success.

Attachment 2

Maintenance Operation Plan

Ferrovia Services Infrastructure, Inc (Ferrovia Services) is a world class highway Operations & Maintenance (O&M) provider, currently providing a full range of asset maintenance services on over 25,000 lane miles in North America and has long term Public-Private Partnership (PPP) contracts running through 2044 in places such as Colorado, Alaska, California, Florida, Texas, Washington D.C., and Canada.

Ferrovia Services has been a leader in the development of asset management solutions for roads and highways since 1995, when our company established the first Performance Specified Maintenance Contract in the United States, and since has continuously developed our asset management approach through a range of contracts.

Through 24 years of experience comes a thorough understanding of the importance of efficient and effective asset management. Proper management is instrumental in meeting the goal of providing the traveling public a safe transportation system while providing the Michigan Department of Transportation (MDOT) asset maintenance services that meet or exceed performance requirements and quality standards. We will focus on the safety and integrity of the total asset with a goal of keeping lanes open and ready for safe passage.

Our approach to maintenance is founded on continuous improvement with the goal of achieving full compliance and zero deductions, while maintaining a strong safety culture. Based on our knowledge, extensive experience, and best practices, we have developed an effective Maintenance and Operation Plan (M&OP) for the proposed contract.

Our Maintenance & Operation Plan, consistent with our Quality Management Plan, is designed to ensure delivery of exceptional services in line with the contract performance requirements. Within our M&OP, we monitor performance of asset maintenance activities and proactively identify areas in need of improvement. The M&OP incorporates the following key elements:

- Task identification
- Planning
- Scheduling
- Execution
- Record service history and costs

The M&OP provides MDOT with a plan to ensure that maintenance activities are completed timely, efficiently, and with safety as a priority. The M&OP supports a proactive maintenance environment whereby the majority of maintenance activities performed is planned, scheduled, and recorded. Our systematic approach to delivering asset maintenance services will allow project staff to constantly analyze maintenance work while identifying trends in the Record Service Phase. If deficiencies within our process to complete maintenance activities arises, the Maintenance Supervisor and Project Manager will reevaluate our processes and implement an improved method for completing this maintenance task in the future.

- **Task Identification**

Identified maintenance activities are analyzed and scheduled by the project Maintenance Supervisor. Prior to scheduling, the Maintenance Supervisor investigates the priority and work required to be completed before adding it to the schedule for final review. The major maintenance categories are:

Maintenance: The performance of routine, ordinary, preventive work to maintain the highway system and its assets. Day-to-day maintenance activities are designed to preserve and correct defects on the State trunklines within Monroe County, which otherwise contributes to the safety and comfort of the traveling public. Maintenance is performed to care for and maintain the highway and associated highway assets so that it retains its original intended use and function. This includes maintenance work on any assets exhibiting wear from weather, or work designed to prevent any further deterioration and damage.

Preventive Maintenance– A planned strategy for an existing roadway and its appurtenances that preserves the system, retards future deterioration, and maintains the functional condition of the roadway and its assets by adding longer life to the roadway surface and assets without increasing the structural capacity of the roadway.

Routine/Ordinary Maintenance – Work that is planned to be performed on a routine basis to maintain and preserve the condition of the roadway, highway system, and its assets or to respond to specific conditions and events to restore the roadway, highway system and its assets to an adequate level of service.

- **Planning**

The planning cycle is an integrated process that combines costs, forecasting, and execution of work to ensure that the project objectives, such as major maintenance activities, will be met.

The Project Manager will be responsible for gathering the necessary information in preparation for upcoming maintenance activities including reserving materials, determining labor quantities, equipment requirements, and lane closure consideration. All relevant information (including scope of work, resourcing requirements, materials, etc.) is organized into a work plan by the Project Manager, in collaboration with the Maintenance Supervisor. The Maintenance Supervisor will utilize the work plan to direct field Maintenance Technicians. All maintenance activities will be completed in accordance with contractual requirements and MDOT specifications.

Work plans include:

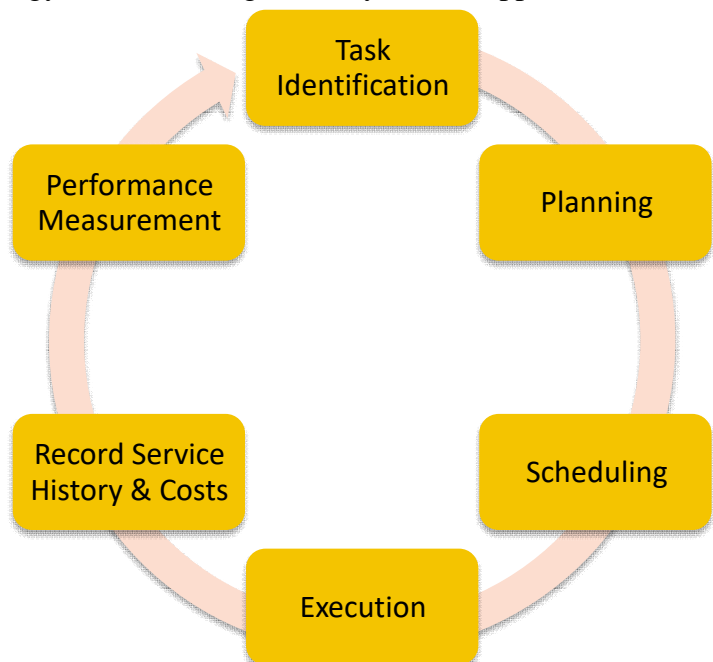


Figure 1: Our proactive approach from task identification to resolution

- Asset
- Activity
- Date, time, & location
- Lane closures (if necessary)

Ferrovial Services will obtain any permits and licenses that we currently do not hold and will comply with all laws, ordinances, specifications, rules and regulations for this service established by local agencies, State of Michigan, State Board of Health, U.S. Labor Law, and any other applicable federal, state, or local government provision prevailing, as well as the terms of this RFP prior to commencement of work during planning and scheduling.

- **Scheduling**

Scheduling is the placement of planned maintenance tasks into a timeline so that they may be resourced and completed efficiently. The Project Manager will collaborate with the Maintenance Supervisor to create a prominent weekly work plan.

Project management will meet with the MDOT Program Manager and other MDOT project leads on a monthly basis, unless a different schedule is mutually agreed upon, for Monthly Work Planning and Work Quality Review Meetings for reviewing progress, scheduling work, and discussing contractor performance.

- **Execution**

Weekly work plans are implemented by the Maintenance Supervisor, who is responsible for the day-to-day scheduling and execution of both planned maintenance and corrective actions detailed on the weekly work plan. The work plan includes the necessary information to safely complete the task such as:

- General work instructions compliant with MDOT standard specifications, plans, guidelines, advisories, memos, and best practices
- Job hazard analyses to proactively implement safety measures
- Traffic control procedures (if required)
- Necessary parts and material details

Maintenance Crews, comprised of a lead technician and general technician, will perform maintenance activities in accordance to the work plan

- **Record Service History & Costs**

As the asset maintenance services are performed, Maintenance Crews will utilize the ArcGIS Platform and VUEworks to keep track of work completed on the asset. The ArcGIS system is a smart management tool that ensures updated and accurate asset inventories, which includes location, attribution, and condition, are being kept. VUEworks is a flow management system that ensures that work is

identified and completed in an appropriate and timely manner. VUEworks is compatible with the ArcGIS in the sense that it can incorporate information generated from the ArcGIS system. In collaboration, these smart tools assign the closest staff person to each maintenance activity, and allows for visibility into personnel locations, daily progress, outstanding needs, as well as validation of completed work. As these tools are utilized by MDOT, MDOT can monitor the asset in real time. These systems will aid in the development of reports, statistical analyses, and improvements that increase efficiency on applicable future maintenance activities.

Asset Maintenance, Repair and Replacement

Ferrovial Services understand that it is our responsibility to manage and perform all maintenance activities on the right of way as described in the Contract. These activities will be performed on the assets at a frequency that ensures uniform, consistent, and timely compliance at all times with the performance measures and requirements specified in the Contract. We will perform maintenance (including preventive maintenance), repair, and replacement of all Contract assets due to deterioration, incident or damage.

We will proactively monitor all routes and Contract asset on a daily basis to identify, document, report, plan and repair deficiencies to continuously achieve Contract Outcomes, Tolerances, and Criteria specified in the Contract Performance Criteria and general maintenance activities. We will refine our work plans based on periodic condition assessments, MiMRS results, and input from Maintenance crews and MDOT; continually adapting operations to provide the best services possible. This will ensure that the contract MiMRS and performance requirements are continually met, that work is performed safely in accordance with applicable policies and procedures and reflects positively on MDOT.

The general maintenance activities for this Contract include but are not limited to the following: Surface Maintenance.

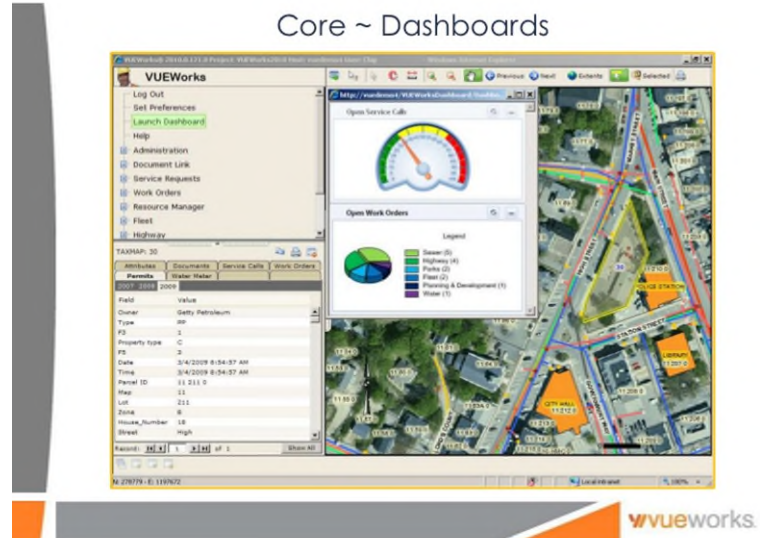


Figure 2: VUEworks Flow Management System

- Repairing, patching, filling, removing and other preventive maintenance activities necessary to decrease the deterioration rate and extend the life of pavements, Roadways, etc.
- Pavement repairs and replacements are defined as removing all unsuitable and distressed rigid and/or flexible materials, to include the surface, the intermediate and base mixes, the granular or stabilized base/sub-base, and the adjacent competent materials as necessary, by milling, grading, saw cutting or other means, and replacing such materials with adequate, or in-kind materials, in a manner that meets the Contract performance requirements to include, but not be limited to, being safe, durable and smooth.
- Roadway specific repairs/replacements will be performed in house in accordance with MDOT standard specifications, plans, guidelines, advisories, memos, and best practices.
- Noted deficiencies on the corridor will be reported to MDOT including any of those outside the scope of the Contract.
- Activities for surface maintenance include:
 - Remove Replace Pavement (Fast Set Concrete)
 - Patrol Patching
 - Pavement Spall & Pothole Repair
 - Bituminous Maintenance Repair
 - Bump Removal
 - Joint & Crack Filling

Shoulder Maintenance

We will performance activities for shoulder maintenance in house in accordance with MDOT standard specifications, plans, guidelines, advisories, memos, and best practices including:

- Routine Blading
- Gravel Shoulder Maintenance
- Paved Shoulder Maintenance

Roadside Maintenance

We will perform maintenance activities for roadside maintenance in house (fill slopes, cut slopes, ditch front slope, etc.) including:

- Roadside Ditch Clean-Out.
- Check Dam Maintenance
- Removal of litter within the Right-of-Way
- Culvert Underdrain & Edge Drain Cleaning

General Maintenance

We will perform maintenance activities for general maintenance in house to include:

- Routine repair or replacement of steel beam guardrail damaged as a result of traffic accidents or deteriorated due to age
- Tighten or replacement of guardrail nuts or triangle reflectors
- Guardrail removal and slope flattening
- Routine repair or replacement of steel guardrail endings damaged as a result of traffic accidents or deterioration due to age.
- Routine repair or replacement of cable barrier damaged as a result of traffic accidents or deteriorated due to age.
- Weekly inspections of cable barriers for any damaged parts between end terminals and at each end terminal section.
- Replace damaged line/terminal posts and hardware, reposition cables, splice or replace damaged cables, re-tension cables, replace reflectors,
- Replace excluder caps and repair end terminals as needed.
- Repair or replacement of Right of Way fence to include woven wire, high tensile, and chain link fences.
- Provide in initial response to situations caused by non-MDOT entities and “acts-of-God”

Approach Sweeping

Approach Sweeping includes routine mechanical sweeping to remove loose material from approaches. This will be subcontracted for the duration of this contract. We’ve selected Progressive Sweeping as our Subcontractor. Progressive Sweeping is a premier provider of street and highway sweeping services throughout Southeast Michigan and Northwest Ohio including Monroe County and has provided services to MDOT for over 20 years. Prosweep has sweeping equipment and personnel already in place in Michigan and are skilled and trained in MDOT best practices.

Signal Maintenance

We will perform maintenance activities for signal maintenance in house to include:

- Repair or replacement of all damaged or worn-out traffic control signs. Includes:
 - Steel post (post sizes up to and including 3 pounds per foot.)
 - Wood post (post sizes up to and including 4" x 6") Delineator maintenance
- Repair or replace delineators (including either posts or reflectors)
- Traffic control and lane closures for overnight and longer, or special operations

Adopt – A – Highway

We will actively participate in MDOT’s Adopt-A- Highway Program and perform services such as:

- Remove Adopt-A-Highway litter bags and items from the roadside during Adopt-A-Highway pickup dates.
- Dispose of Adopt-A-Highway litter bags and items from the roadside during Adopt-A-Highway pickup dates in Landfills

- Fabricate Adopt-A-Highway signs.
- Install required Adopt-A-Highway signs.

Ferrovia Services has well over 20 years of experience providing services under very similar criteria and will leverage our proven management processes for this contract. Our approach to services will include robust and ongoing communications with MDOT and full operational transparency, providing any operational data to MDOT upon request.

Based on the results from inspections of services performed above, as well as visual inspections performed by Maintenance Crews, deficiencies within our process for completing maintenance activities will be reported to the Maintenance Supervisor and Project Manager. The Project Manager will work with Maintenance Supervisors to investigate root causes to issues and provide solutions which address the underlying factors. Thus, providing permanent answers not just temporary solutions. Solutions will be added to future weekly work plans. The Maintenance Supervisor will work closely with Lead Technicians and General Technicians to obtain feedback on the work plan before final approval by the Project Manager. Weekly work plans will be created based on the following criteria:

- Routine/scheduled maintenance
- Previously discovered deficiencies
- Contract Timeliness Requirements
- Resource Capacity

Using the criteria above, the Project Manager will be able to assign a priority to the work task and adjust the work plan accordingly.

Any noted deficiencies on the corridor will be reported to MDOT including any of those outside the scope for instructions on actions to be taken to remedy the situation.

Asset deficiencies discovered during routine patrolling and visual inspections by Maintenance Crews will be recorded and reported to Maintenance Supervisor to be scheduled according to the project timeliness requirements. If an asset is discovered that either 1) presents an immediate safety hazard, or 2) contains a 24 hour or less response and repair time requirement, the Work Crew will immediately notify the Maintenance Supervisor, who will notify MDOT for approval to remedy the situation.

We understand that work needs, and priorities can change. Our designated contract representatives will meet monthly with the MDOT Program Manager and other MDOT project leads to discuss and adjust the weekly work plan, monthly work planning, and work quality review to ensure that the goals set forth in the Weekly Work Plan are still in alignment with MDOT's expectations.

Safety Training

As a leader in the field of operating and maintaining transportation infrastructure, safety is at the forefront of how we approach every single contract. "Safety first" describes our attitude, represents our culture, and the importance of our strategies for safety. We have a comprehensive Health, Safety,

and Environment strategy that focuses on employee training and education, application of occupational safety, health systems, and processes, management leadership, and investigations.

Safety for any operation commences with in-depth planning, before any labor, equipment, or materials are deployed into operation. We design a Safety Plan for each project based on the following:

- Determining and annotating all activities within the scope of the operation.
- Performing a risks and hazards condition analysis to determine risks to personnel, environment, motorists, equipment, materials, and adjacent property owners.
- Determining methods and procedures to mitigate each identified risk or hazard.
- Developing and conducting mandatory safety orientations and training programs that incorporate these fundamentals for all project staff.
- Preparing operational procedures and policies to conduct the activity in conformance with the above risk mitigating methods.
- Developing a written Snow and Ice Control Plan that incorporates all of the above (if applicable).
- Monitoring all works for compliance with all safety protocols. Non-compliance by a worker will require retraining or may result in dismissal.

Our corporate safety program consists of mandatory Safety Rules and our START card program which requires all workers to plan their work, recognize any hazards, and create a Job Hazard analysis before starting any work activity. This is also incorporated into all training and operations plans.

Our designated Safety Officer is committed to, and responsible for, assuring compliance with applicable regulatory codes and fostering a spirit of safe conduct and performance among our employees and subcontractors. Understanding that safety starts from the bottom up, we've also empowered every Ferrovial Services employee with the ability to make safety a focus.

Typical training topics addressed in the Ferrovial Services Safety Program include:

- Work zone safety elements
- Introduction to the Occupational Safety and Health Administration (OSHA)
- Personal Protective Equipment (PPE) training
- Hazard Communication (HAZCOM) Program
- Hazardous Materials Awareness Training
- Ergonomics & Back Injury Prevention
- Defensive Driving Practices using the Smith Driving Program
- Five Part Drug & Alcohol-Free Workplace Program
- Seasonal safety (warm/cold)
- Other specialized training as required by project exposures



Figure 3: Ferrovial Services' START program

Within 30 days after receipt of executed agreement, Ferrovia Services will furnish a detailed description of our safety program as well as a comprehensive list of safety training offered. In addition to presenting this detailed safety training program at the start of the project, Our Safety Officer will regularly revisit various program aspects. For example, Safe Driving and Hazmat Procedures, as well as when updates or conditions change in OSHA, MiOSH, or other safety requirements. We hold mandatory pre-work sessions with subcontractors in which traffic management and employee safety are integral parts of discussions.

We aggressively manage each aspect of its Health, Safety, and Environment Program, including the uniform use of approved Personal Protective Equipment (PPE) by employees and contractor personnel. PPE and safety equipment must meet current industry accepted standards. For example, our field staffs are equipped with American National Standards Institute (ANSI) or National Institute for Occupational Safety and Health (NIOSH) approved high visibility garments. Ferrovia Services has adopted the most recent ANSI High Visibility Garment Standard (ANSI/ISEA 107-1999) as its guide for protecting employees exposed to traffic. Beyond this program, Ferrovia Services offers specialized training relevant to a particular project's regional needs or equipment requirements. We have a proven Health, Safety, and Environment program utilized to address both the regulatory and practical applications of safety on any given project. Throughout the life of a project, we adapt to the ever-changing health and safety landscape. This goal is achieved through a rigorous safety program that includes formalized weekly safety meetings, informal weekly "Toolbox Talks," and additional safety conversations that occur ad hoc. Attendance at the formal and weekly meetings is mandatory for all Ferrovia Services project personnel. Customer representatives and subcontractors are invited and encouraged to attend.

Ferrovia Services understands that the geographic project location has an impact on the standards and regulations to which a project is required to adhere. For the proposed contract, all Ferrovia Services personnel will be required to read and understand the project specific rules and regulations on safety. Having a thorough understanding of these standards will allow our project staff to comply with the state safety requirements.

Ferrovia Services places a strong focus on safety and takes pride in ensuring employees, clients, and their customers are safe at all times. Training is continued throughout the term of each contract, with the goal to ensure all employees understand their impact on safety and environmental aspects of the work. Throughout the project term, Ferrovia Services conducts audits to verify that the management team is conducting training, providing safe work instructions, and identifying and closing issues.

Ideal Annual Work Plan (including the first year)

This section outlines an ideal annual work plan that Ferrovia Services project staff would implement along MDOT's network. This plan provides an overview of the work to be performed on the network to remain in compliance with the performance requirements. Ferrovia Services understands that additional performance requirements may arise than those listed below, as describe in the RFP, and agrees to repair all work made under this Contract in accordance with the currently published MDOT Standard Specifications for Construction, Special Provisions, Standard Plans and Special Details included herein.

For the first year Annual Work Plan, Ferrovial Services intends to incorporate an accelerated inspection schedule. Project staff will perform all inspections outlined on the inspection schedule (located in the Quality Management Plan) within the first 90 days of project start. Using these initial inspection reports will serve to create the weekly work plans for the first year of the project. Following the first year, the Project Manager will work with the Maintenance Supervisor to ensure that the inspection schedule is adhered to and all preventive maintenance is scheduled in accordance with the plan detailed below:

SURFACE ASSET GROUP	
ASSET ASSESSED	TOLERANCE & CRITERIA
Flexible/Composite Pavement <ul style="list-style-type: none"> Flexible – Cracking Flexible – Patching Flexible – Potholes 	<p>Evaluation Considerations:</p> <ul style="list-style-type: none"> Determine the general condition of the pavement. A flexible pavement in good condition would be stable, with no cracking, no patching, no deformation, and have excellent riding qualities. All flexible and composite pavements within the limits of the rating section should be evaluated, excluding crossovers; ramps are to be rated separately (if a section is generated). Ramp gore areas should be included to the outside edge of the gore. Driveways abutting a rating section should be excluded. Cracks with isolated areas wide enough for patching (more than just sealing with rubber) would fail both cracking and pothole measures. If no longitudinal joint is present at the edge line, then rate the narrow-paved area outside of the lane as pavement and not shoulder. A delamination of a micro surfaced (or other thin) overlay, which could not be patched using traditional methods, should not be counted as a pothole. <p>MiMRS Performance measures:</p> <p>Flexible – Cracking</p> <ul style="list-style-type: none"> Greater than one (1) inch in width. <p>Flexible – Patching</p> <ul style="list-style-type: none"> Broken up areas larger than 30 square feet. Broken up areas greater than (or equal to) than one-half (1/2) of a travel lane. <p>Flexible – Potholes</p>

	<ul style="list-style-type: none"> • Potholes greater than two (2) inches in depth. • Potholes greater than 0.5 sq. ft. in area. • Potholes exceeding the top lift of HMA. • Any base material is exposed in any pothole, regardless of depth or area. <p>Time Requirements:</p> <ul style="list-style-type: none"> • Patching – Must be completed within 24 hours of notice
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- **Inspection Frequency:**

- Visual inspections will be performed daily by patrolling Maintenance Crews. Deficiencies noted during daily visual inspections will be communicated to MDOT's Program Manager.

- **Performance Methods**

- Flexible – Cracking
 - Maintenance Crews will clean and fill random open cracks on flexible surfaces immediately upon notification of discovery to prevent passage of water to the base or subgrade and permit pavement joints to contract and expand properly.
- Flexible - Patching
 - Maintenance crews will temporarily patch widely scattered potholes, edge failures, etc. within 24 hours upon notification of discovery.
- Flexible – Potholes
 - Maintenance Crews will utilize Emulsion and aggregate to correct extensive cracking, raveling, spalling, and shallow surface failures on flexible pavements. This treatment will aid in restoring the roadway surface and preventing further deterioration.

- **Preventive Methods:**

- Permanent repairs will be added to the weekly work plan by the project Maintenance Supervisor and scheduled for repair based on priority and as required turnaround time after notification or discovery.

- **Goal**

- Our goal is to achieve a safe, durable, smooth surface for continued operations and traveling public safety.

SURFACE ASSET GROUP	
ASSET ASSESSED	TOLERANCE & CRITERIA
Rigid Pavement <ul style="list-style-type: none"> • Rigid Cracking – • Rigid Patching – • Rigid Potholes – 	<p>Evaluation Considerations:</p> <ul style="list-style-type: none"> • Determine the general condition of the pavement. A rigid pavement in good condition has good ride qualities with the original surface texture evident. Jointed reinforced pavements should have no mid-slab cracks. Continuously reinforced pavements may have tight transverse cracks with no evidence of spalling. No faulting should be evident. • All rigid pavement within the limits of the rating section should be evaluated, excluding crossovers; ramps are to be rated separately. • Rigid pavement overlaid with asphalt should be rated under the flexible pavement characteristics. • Ramp gore areas should be included to the outside edge of the gore. Driveways abutting a rating section should be excluded. • Bridge surface is included in the rigid pavement rating • Cracks with isolated areas wide enough for patching (more than just sealing with rubber) • would fail both cracking and pothole measures. • If no longitudinal joint is present at the edge line then rate the narrow-paved area outside of the lane as pavement and not shoulder. <p>MiMRS Performance measures:</p> <p>Rigid – Cracking</p> <ul style="list-style-type: none"> • Greater than one (1) inch in width. <p>Rigid – Patching</p> <ul style="list-style-type: none"> • Broken up areas larger than 30 square feet. • Broken up areas greater than (or equal to) than one-half (1/2) of a travel lane. <p>Rigid – Potholes</p> <ul style="list-style-type: none"> • Potholes greater than two (2) inches in depth. • Potholes greater than 0.5 sq. ft. in area. • Any base material is exposed in any pothole, regardless of depth or area. <p>Time Requirements:</p> <ul style="list-style-type: none"> • Patching – Must be completed within 24 hours of notice

- **Inspection Frequency:**

- Maintenance Crews will perform daily visual inspections of Rigid Pavements (Portland Cement Concrete) during routine patrolling. Deficiencies noted during daily visual inspections will be communicated to MDOT's Program Manager.

- **Performance Methods**

- Rigid – Cracking
 - Maintenance Crews will clean and fill random open cracks on rigid surfaces immediately upon notification of discovery to prevent passage of water to the base or subgrade and permit pavement joints to contract and expand properly.
- Rigid - Patching
 - Maintenance Crews will fully remove concrete slabs and replace it with "Fast Set" concrete material to eliminate shattered joints due to blow-ups or deterioration and to achieve a smooth riding surface. One day in advance, Maintenance crews will saw concrete to prep for Fast Set Concrete Work. The Maintenance Supervisor will take into consideration time needed to make repairs when scheduling this permanent repair.
 - Maintenance crews will temporarily patch joints due to blow ups when possible immediately upon notification of discovery.
- Rigid – Potholes
 - Maintenance Crews will utilize Emulsion and aggregate to correct extensive cracking, raveling, spalling, and shallow surface failures on Rigid Pavements. This treatment will aid in restoring the roadway surface and preventing further deterioration.

- **Preventive Methods:**

- Permanent repairs will be added to the weekly work plan by the project Maintenance Supervisor and scheduled for repair based on priority and as required turnaround time after notification or discovery.

- **Goal**

- Our goal is to achieve a safe, durable, smooth surface for continued operations and traveling public safety.

SHOULDER ASSET GROUP

ASSET	TOLERANCE & CRITERIA
<p>Shoulders</p> <ul style="list-style-type: none"> • Washouts • Drainage • Drop-offs • Edge loss 	<p>Evaluation Considerations:</p> <ul style="list-style-type: none"> • Paved shoulders less than two (2) feet in width should be included in the adjacent pavement rating if no joint separates this area from the travel lane. Pavement under a guardrail, but contiguous to the adjacent shoulder, should be rated as part of the shoulder evaluation. • A berm of soil or grass (greater than two inches) which prevents proper drainage is a preventable condition that would result in a non-compliance. A berm under guardrail is a shoulder non-compliance and should not be counted against guardrail. • Pavement between the edge line and a parking lane or curb & gutter is considered shoulder if greater than 2 feet • Any drop-off outside the edge line should be considered a shoulder failure. • Raised pavement behind the curb and gutter (maintenance strip) should be rated as a shoulder • When determining if the length of edge loss or edge drop constitutes a failing measure ask • the following questions: • Does the issue initiate maintenance action? • Is it a safety issue? • Is the occurrence so small that it would not be considered an issue? <p>MiMRS Performance measures:</p> <ul style="list-style-type: none"> • Any washout greater than two (2) inches in depth or greater than ten (10) sq. ft. in area. • Any preventable condition either high or low by two (2) inches or more that impede the shoulder drainage to function as designed i.e. the free flow of water off the pavement. • Edge loss greater than six (6) inches inward or comprising more than ten (10) percent of the length of the segment. • Any drop-off exceeding two (2) inches in depth. • Any base material is exposed in any pothole, regardless of depth or area (in paved shoulders).

- **Inspection Frequency:**

- Maintenance Crews will perform daily visual inspections of Shoulders during routine patrolling. Deficiencies noted during daily visual inspections will be communicated to MDOT's Program Manager.

- **Performance Methods**

- Routine Blading
 - Maintenance Crews will perform routine blading of gravel shoulders and crossovers to correct rutting or distortion of the shoulder and maintain the shoulder slope and crossover grade upon notification or discovery.
 - Maintenance Crews will work to replace shoulder gravel over extended lengths of shoulder to restore normal shoulder grade and stabilize shoulder.
 - Maintenance Crews will repair ruts and holes on hills, curves, mailboxes, driveways radii, crossovers and intersections in means of patching gravel shoulders upon notification or discovery.
 - Maintenance Crews will regularly remove material build up from outside of the edge of the shoulder to improve shoulder drainage upon notification or discovery.
 - Maintenance Crews will utilize Emulsion and aggregate to correct extensive cracking, raveling, and spalling on paved shoulder and crossovers.
 - Seal Patching will be conduct by Maintenance Supervisors to restore the shoulder surface and to prevent further deterioration.

- **Preventive Methods:**

- Permanent repairs will be added to the weekly work plan by the project Maintenance Supervisor and scheduled for repair based on priority and as required turnaround time after notification or discovery.

- **Goal**

- Our goal is to achieve a safe, durable, smooth surface for continued operations and traveling public safety.

ROADWAY ASSET GROUP	
ASSET	TOLERANCE & CRITERIA
Debris	<p>Evaluation Considerations:</p> <ul style="list-style-type: none"> Determine the general effectiveness of debris removal. (What to look for) <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> No litter measuring more than 0.5 cubic feet (approximately shoebox sized) within the paved area. <p>Time Requirements:</p> <ul style="list-style-type: none"> Contractor will have one hour from discovery or notification of debris in the travel lanes to remove item. Contractor will have 24 hours from discover or notification of debris in shoulder to remove item.
Litter	<p>Evaluation Considerations:</p> <ul style="list-style-type: none"> Determine the general effectiveness of litter removal. Shoebox-sized or larger within the paved areas would fall under “debris” <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> No more than 15 fist-sized or larger pieces of litter per 1/10th mile stretch.
Animal Carcasses	<p>Evaluation Considerations:</p> <ul style="list-style-type: none"> Determine if large animal carcasses are present (even if flattened). <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> Any large animal carcass (deer size or larger) within the paved surface or shoulder.

- **Inspection Frequency:**
 - Visual inspections are performed daily by patrolling Maintenance Crews.
- **Performance Methods:**

- Maintenance Crews will locate and properly dispose of dead animal waste, roadkill, and debris from the project roadways in compliance with environmental and safety precautions upon notification or discovery. If discovered by any members of our staff, animal carcasses and debris will be properly disposed of immediately.
- Litter pickup will be scheduled and incorporated as a key component of our maintenance work program. Litter cycles will occur at a minimum of once a month, and additional cycles will be issued on specific sections of roadway where litter is found to be more prevalent.
- We supplement the litter cycles with personnel available to respond quickly to remove large litter items, animal carcasses, and debris. Maintenance Technicians will remove and dispose of animal carcasses and debris within 24 hours of notification or discovery.
- **Goal**
 - Our goal is to keep roadways free of debris and roadkill for continued operations and traveling public safety.

GENERAL MAINTENANCE ASSET GROUP	
ASSET	TOLERANCE & CRITERIA
Roadway Sweeping	<p>Evaluation Considerations: Determine the general effectiveness or need for sweeping.</p> <ul style="list-style-type: none"> ● <i>What to look for:</i> Sand or gravel accumulation resulting from a shoulder washout should not be considered a sweeping non-compliance. <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> ● An accumulation of gravel or material on paved surfaces including travel lanes, shoulders, curb and gutters, barrier walls and intersections.

- **Inspection Frequency:**
 - Visual inspections will be performed daily by patrolling Maintenance Technicians and Maintenance Supervisor.
- **Performance Methods:**
 - The Maintenance Supervisor will schedule Progressive Sweeping to remove loose materials from approaches upon notification or discovery. Prosweep has 20 years of experience providing sweeping services for MDOT and is skilled in MDOT best practices.

- **Goal**

- Through a trusted partnership, our goal is kept roadways safe, clean, and free of debris to eliminate disruptions in operations and keep the traveling public safe.

GENERAL MAINTENANCE ASSET GROUP	
ASSET	TOLERANCE & CRITERIA
Guardrail	<p>Evaluation Considerations: Determine the general functionality of the guardrail with respect to damaged or out of alignment rail, missing or damaged posts, blocks, or end sections.</p> <p>A berm under a guardrail would be classified as a shoulder non-compliance, not a guardrail non-compliance.</p> <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> ○ Any damage that could cause the guardrail to not function as intended. <p>Time Requirements:</p> <ul style="list-style-type: none"> • Contractor will have less than 30 days from discovery or notification to complete steel beam guardrail repairs. • Contractor will have 5-7 days from discovery or notification to complete steel beam ending guardrail repairs.
Cable Barrier	<p>Evaluation Considerations: Determine the general functionality of the cable, supports, splices, and anchors.</p> <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> ○ Cables that are frayed, broken or sagging. ○ More than 4 consecutive broken or missing posts. <p>Time Requirements:</p> <ul style="list-style-type: none"> • Contractor will have less than 15 days from discovery or notification to complete high-tension cable barrier repairs. • Contractor will have 5-7 days from discovery or notification to complete high-tension barrier end terminals repairs.

- **Inspection Frequency:**

- Visual inspections will be performed weekly by patrolling Maintenance Technicians, Lead Technicians, and Maintenance Supervisors. Deficiencies will be noted on the inspection report and communicated to the Project Supervisor. Due to the importance and strict timeliness requirements of the project's guardrails, The Maintenance Supervisor will schedule guardrail repairs for repair immediately following the inspection.

- **Performance Methods:**

- MDOT roadway's safety is largely dependent on the guardrails and Cable Barriers that support it. It is imperative that guardrails and cable barriers are maintained in accordance with the State of Michigan and MDOT's requirements to ensure maximum safety for the traveling motorist. Routine visual inspections will be performed by patrolling Maintenance Technicians, Lead Technicians, and Maintenance Supervisors. Including weekly inspections of the cable maintenance process to check for any damaged parts. Damaged parts will be mitigated immediately upon notification or discovery. If deficiencies are noted that would require extensive repairing, they will be communicated to the Maintenance Supervisor immediately. The Maintenance Supervisor will schedule a timely repair of the guardrail or cable barrier asset, making these repairs top priority.
- Our in-house maintenance crews will repair damages to cable barriers and guardrails as follows:
 - Damaged to guardrail or cable barrier will be mitigated immediately if possible, upon notification or discovery as mentioned above.
 - High-tension barrier end terminals shall be repaired or replaced within seven (7) days of notification or discovery
 - Steel beam ending guardrail repairs will be completed within seven (7) days of notification or discovery
 - High tension steel beam guardrail repairs shall be repaired or replaced within 15 days of notification or discovery.
 - Steel Beam guardrail repairs will be replaced permanently within 30 days of notification or discovery
- All repairs and replacements will be carried out in compliance to MDOT's standard plans, Special Details, and Special Provisions.
- Weekly guardrail inspections will address asset deficiencies in regard to MiMRS requirements. Asset deficiencies uncovered during these inspections will be added to

the work plan and repaired in accordance with the timeliness requirements listed above. Routine inspections will check for the following issues:

- Damage to rail beams (torn, separated, or rusted)
- Broken posts
- Posts separated from rail
- Damaged rail beams more than 12 inches
- Loose cables
- High tension cable integrity and post damages

- **Preventive Methods:**

- Permanent repairs will be added to the weekly work plan by the project Maintenance Supervisor and scheduled for immediate repair.

- **Goal**

- Our goal is to continuously rectify guardrail and cable barrier damages to keep them functional and undamaged for continued operations so that lanes are kept open and ready for safe passage.

ASSET	TOLERANCE & CRITERIA
Impact Attenuators	<p>Evaluation Considerations: Determine the general effectiveness of the impact attenuators.</p> <p><i>What to look for:</i></p> <ul style="list-style-type: none"> • Obvious damage or misalignment resulting from vehicle impact if noticed during drive-by. <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> ○ Any damaged energy absorbing system that may compromise the integrity and effectiveness of the system. <p>Time Requirements:</p> <ul style="list-style-type: none"> • Contractor will have less than 15 days from discovery or notification to complete high-tension cable barrier repairs. • Contractor will have 5-7 days from discovery or notification to complete high-tension barrier end terminals repairs.

- **Inspection Frequency:**

- Due to the importance and strict timeliness requirements of the project's guardrail network, visual inspections of Impact Attenuators will be performed weekly by patrolling Maintenance Technicians, Lead Technicians, and Maintenance Supervisors when possible. Annual inspections will be performed two times per year by the Project Manager in conjunction with the guardrail inspection.

- **Performance Methods:**

- As mentioned above in the guardrail performance methods section, Impact Attenuators will be visually inspected weekly. Our Maintenance Crews will mitigate damaged attenuators immediately upon notification or discovery.

Weekly guardrail inspections will include inspecting Impact Attenuators and will address asset deficiencies in regard to MRP requirements. Asset deficiencies uncovered during these inspections will be added to the work plan and repaired in accordance with the timeliness requirements listed above.

- **Preventive Methods:**

- Permanent repairs will be added to the weekly work plan by the project Maintenance Supervisor and scheduled for immediate repair.

- **Goal**

- Our goal is to continuously rectify impact attenuators damages to keep them functional and undamaged for continued operations and focus on the safety and integrity of the total asset with a goal of keeping lanes open and ready for safe passage.

SIGNAL ASSET GROUP	
ASSET	TOLERANCE & CRITERIA
Signs <ul style="list-style-type: none"> • Regulatory • Guide • Services 	<p>Evaluation Considerations: Determine the general effectiveness of the signage.</p> <p><i>What to look for:</i></p> <ul style="list-style-type: none"> • An inability to understand the information that signs are intended to convey. This situation may be due to a number of reasons as detailed below. • Only signs normally visible during the drive-by should be rated (e.g., a "STOP AHEAD" sign on a cross street does not need to be visibly checked and rated). • Signs at crossovers should be included in the rating.

	<p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> ○ The entire sign is missing, or any portion of the sign or posts is missing. ○ Damage such that the message may be misconstrued or illegible. Unreadable, obscured, twisted, or deflected. <p>Time Requirements:</p> <ul style="list-style-type: none"> • Contractor will have less than 24 hours from discovery or notification to repair priority 1 signs. • Contractor will have 1 day from discovery or notification to repair signs priority 2 signs. • Contractor will have 5 days from discovery or notification to repair signs priority 3 signs. • Contractor will have 10 days from discovery or notification to repair signs priority 4 signs.
Delineators	<p>Evaluation Considerations: Determine the general effectiveness of the delineators.</p> <p><i>What to look for:</i></p> <p>Delineators that do not indicate the roadway alignment (e.g., drainage marker delineators) should not be evaluated. (Only yellow and white delineators)</p> <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> ○ Missing ○ Damage such that the color or reflectivity may be misconstrued or unknown <p>Time Requirements:</p> <ul style="list-style-type: none"> • Contractor will have less than 15 days from discovery or notification to complete high-tension cable barrier repairs. • Contractor will have 5-7 days from discovery or notification to complete high-tension barrier end terminals repairs.

- **Inspection Frequency:**

- Due to the importance and strict timeliness requirements of Signs and Delineators that could interfere with traffic and cause unsafe disruptions in the transportation system, visual inspections of Small Signs will be performed daily by patrolling Maintenance Technicians, Lead Technicians, and Maintenance Supervisors when possible. Any Deficiencies will be noted in the inspection report and incorporated into weekly work plans.
- **Performance Methods:**
 - Maintenance crews will perform daily visual inspections of Signs and Delineators to determine if Signs and Delineators are clean & legible, missing, damaged, or down. As signs are important in ensuring the traveling public is kept safe, Signs will be repaired or replaced by our in-house maintenance crews immediately in accordance to the priority level below:
 - Stop Signs, Yield Signs, Overhead Signs, Structures, and Signs that interfere with traffic or require immediate removal will be repaired or replaced within 24 hours of notification or discovery.
 - Target Arrow Signs, Curve and Turn Signs, Do Not Enter Signs, Wrong Way Signs, One Way Signs, Keep Right Signs will be repaired or replaced within one (1) business day of notification or discovery.
 - All other Warning and Regulatory Signs and Signs that do not interfere with traffic and are still legible except Parking Prohibition will be repaired within 5 business days.
 - Guide Signs, Parking Prohibitions Signs, and all other signs will be mitigated within 10 business days.
 - All repairs and replacements will be carried out in compliance to MDOT's standard plans, Special Details, and Special Provisions.
- **Preventive Methods:**
 - Permanent repairs will be added to the weekly work plan by the project Maintenance Supervisor and scheduled for immediate repair.
- **Goal**
 - Our Goal is to return signs to original standards within a timely fashion to eliminate disruptions in operations and keep the traveling public safe.

DRAINAGE ASSET GROUP	
ASSET	TOLERANCE & CRITERIA
Ditches <ul style="list-style-type: none"> Erosion / slope protection Removal of obstructions 	<p>Evaluation Considerations: Determine the general effectiveness of the ditches.</p> <p><i>What to look for:</i></p> <p>The free passage of water as intended is either blocked or impeded.</p> <p>If the ditch is causing the culvert to fail and needs to be cleaned out, then the ditch fails</p> <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> Greater than 50 percent obstruction(s) resulting in ponding or preventing free flow of water (e.g. debris or brush/branches in ditch bottom). Any trees (diameter larger than 3 inches) growing in the ditch bottom. Inlets or outlets are obstructed or eroded.
Culverts <p>Culverts include:</p> <ul style="list-style-type: none"> Debris Washouts / erosion Under / sub drains Ditch bottom catch basins 	<p>Evaluation Considerations: Determine the general effectiveness of the culverts.</p> <p>Culverts 12 inches or larger should be visually inspected from outside the vehicle. If a culvert is issued a non-compliance, then subsequent culverts do not need to be inspected from outside of the vehicle within the same rating section.</p> <p><i>What to look for:</i></p> <ul style="list-style-type: none"> The free passage of water as intended is either blocked or impeded. Driveway culverts should be included in the evaluation via a drive-by review. If you cannot find a culvert where there should be one, then rate as a fail. Determined what maintenance action would be required: If a culvert needs to be jetted but the ditch does not need to be cleaned out then the culvert fails but the ditch passes.

	<ul style="list-style-type: none"> • Catch basins in the roadside (e.g. beehives and ditch bottom basins) are rated in the culvert measure. <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none"> ○ Any debris or culvert damage that obstructs the water flow through the culvert. ○ More than 50 percent of a culvert opening is obstructed. More than a half of the culvert cannot pass water. ○ Washouts of culvert backfill and erosion damage under or around the culverts (e.g., perched).
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- **Inspection Frequency:**

- Routine visual inspections will be performed regularly on all Ditches, Dams, and Culverts by our Maintenance Crews. All permits required for storm water and soil erosion control will be acquired prior to commencement of any work. Deficiencies will be noted in the inspection report and incorporated into the weekly work plan to be remedied.

- **Performance Methods**

- Ditch Clean -Out
 - Maintenance Crews will perform roadside ditch clean out in accordance with MDOT's Standard Specifications for Construction upon notification or discovery. Work will be comprised of the following activities:
 - Removing brush and miscellaneous debris
 - Removing trees with a diameter less than 6 inches
 - Blending ditch profiles to match existing ditches
 - Dress, mulch, and seed slopes to prevent erosion.
- Check Dam Maintenance
 - Maintenance Crews will inspect and immediately remove accumulated sediments from Dams upon notification or discovery.
- Culvert Underdrain & Edge Drain Cleaning
 - Maintenance Crews will clean pipe culverts, box culverts, headwalls, underdrain tiles, and edge drains routinely, upon notification or discovery to

keep culverts and tiles in a serviceable condition. This includes removing material within 10 inches of culvert ends.

- All work will be performed within agreed upon days of notification or discovery.
- **Preventive Methods:**
 - Permanent repairs will be added to the weekly work plan by the project Maintenance Supervisor and scheduled for repair based on priority and as required turnaround time after notification or discovery.
- **Goal**
 - Our goal is to restore positive drainage and maintain proper functioning of permanent structures.

ADMINISTRATION ASSET GROUP	
ASSET	TOLERANCE & CRITERIA
Adopt-A-Highway	<p>Evaluation Considerations:</p> <p>Upon the conclusion of each pickup cycle, the Contractor will have 3 business days to collect and dispose of all litter bags and items retrieved and stored along the roadside, according to activity guide 7950 Adopt-A-Highway.</p> <p>MiMRS Performance Requirements:</p> <ul style="list-style-type: none">○ Failure by the Contractor to collect and dispose of Adopt-A-Highway items within 3 business days.

- **Inspection Frequency:**
 - Our Maintenance Crews will perform daily visual inspections
- **Performance Methods:**
 - Ferrovial Services is experienced in facilitating the Adopt-A-Highway program and we ensure the person(s) or organization responsible for the section of highway is correctly designated and equipped to complete the services safely. We will coordinate with the person(s) or organization on their litter pick up events schedule to ensure we are ready to remove the litter stationed at their signs post-pickup within 3 business days.
 - We will perform daily patrols of the network and as illegal and/or non-permitted signs are identified they will be removed. If we see a trend where particular signs are

reappearing consistently, we will refer the sign to code enforcement for escalation and action.

- We will install and maintain signs for the program as well as Commemorative/Legislatively Designated Highway Signs and ensure that Michigan State Line signs are maintained, operational, and functioning.

- **Goal**

- Our goal is to keep the integrity of the total asset in great conditions including making sure appearances are kept up.

Additional activities within the required scope of services not identified above will be performed in accordance with currently published MDOT Standard Specifications for Construction, Special Provisions, Standard Plans and Special Details. This section simply outlines an ideal annual work plan. This plan provides an overview of some works to be performed on the network to remain in compliance with the performance requirements. We will produce a finalized annual work plan after meeting with MDOT to discuss the scope and we've conducted an in-depth network assessment. Ferrovia Services accepts all performance outcomes, performance benchmarks, and timeliness requirements specified in Schedule A and penalties associated with noncompliance. We understand that failure to meet any of the outcomes, performance benchmarks, and timeliness requirements may result in penalties being assessed in the form of deductions taken from the monthly lump sum payments as specified. Such penalties will be considered as non-payment for work not accomplished as required by the Contract. MDOT reserves the right not to assess any or all penalties if in MDOT's discretion the circumstances.

Preventive Maintenance Schedule

As outlined in the sections above, Ferrovia Services understands the value and importance of preventive maintenance to protect the integrity of MDOT's total asset. Strong preventive maintenance is a cornerstone to a successful asset maintenance program. Along with the performance requirements listed above, and in conjunction with routine inspections, we will implement a preventive maintenance schedule that will serve as the basis for how project plans are developed. Preventive maintenance will be incorporated into work plans and executed by maintenance technicians under the direction of the project supervisor and project manager. By implementing a strong preventive maintenance program, our contract delivery team will ensure that MDOT is able to extract maximum use out of their assets. After our initial assessment of the roadways, we will develop a schedule to perform preventive maintenance activities on various assets within the Project boundaries.

Our finalized M&OP will be designed with the knowledge that unforeseen trends are a possibility. The M&OP, Annual Work Plan, and Weekly Work Plans will be available for adjustments when new and unforeseen maintenance trends are identified. The following is a list of items designed to keep project staff up to date on unforeseen trends:

- **Inspections** - By performing various routine inspections on all project assets, project staff are able to detect and identify asset deficiencies before they are irrevocable.

- **Routine Maintenance & Preventive Maintenance** – Routine and preventive maintenance tasks performed by the project Maintenance Crews will help to uncover and identify new trends as similar tasks are repeated on a scheduled basis. Maintenance Supervisors processing field paperwork can identify trends and adjust accordingly.
- **ArcGIS & VueWorks Trend Analysis** – All maintenance related issues are input into the ArcGIS and VueWorks as they occur; the software will analyze the data to predict maintenance trends – allowing project staff to be *proactive* in their maintenance approach, rather than *reactive*.
- **Weekly Meetings** – the Project Manager and project Supervisors meet weekly to discuss the prior week's Work Plan; these meetings also serve to discuss the following week's work plan. This gives the management staff an opportunity to identify trends based on what's been reported and recorded.
- **Monthly Meetings** – Each quarter, project management staff will meet to discuss and adjust the Monthly Work Plan and Work Quality Review. Trends that have been identified using the methods described above can be incorporated into the Monthly Work Plan – allowing project staff to adjust resources to accommodate the new maintenance trends.

Snow and Ice Operations

Background & Experience

Ferrovia Services has nine (9) years of similar winter maintenance experience through multiple current contracts throughout the United States and Canada. Currently, we leverage our knowledge and experience from various contracts to **self-perform** anti-icing and snow removal operations along our managed roadways.

We understand the importance of maintaining open and safe roadways especially when hazardous conditions are forecasted as a result of a winter snow or ice event. Ferrovia Services has extensive experience delivering winter maintenance services on contracts where winter conditions and snow and ice events are prevalent; examples include:

- North Bay and Sault Ste Marie Area Maintenance Contracts in Ontario, Canada
- Peel Halton East, Ottawa, and York CDMC Area Maintenance contracts in Ontario, Canada
- US36 Express Lanes in Denver, Colorado
- The Pocahontas Parkway (Route 895) in Richmond, Virginia
- Anton Anderson Memorial Tunnel in Whittier, Alaska



Figure 4: Our team performing snow removal operations in Colorado

- Recent positive experiences partnering with Florida Department of Transportation (FDOT) Districts 2 and 3 to respond and treat road networks throughout the Florida Panhandle.

The following are projects in which Ferrovial Services is currently undertaking a Prime Contractor role:

Owner	Contract	Base Value	Contract Start	Contract End
Plenary Roads Denver	Denver Turnpike O&M	Confidential	2013	2035
MTO	AMC 2009-03 North Bay Area Maintenance	Confidential	2010	2022
MTO	AMC 2010-06 Sault Ste. Marie Area Maintenance	Confidential	2011	2023
MTO	CDMC 2017-06 Peel Halton East Area Maintenance	Confidential	2019	2026
MTO	CDMC 2018-01 Ottawa Area Maintenance	Confidential	2019	2026
MTO	CDMC 2018-02 York Area Maintenance	Confidential	2019	2026
AKDOT&PF	2515H027 Anton Anderson Memorial Tunnel (AAMT) O&M	\$20M	2017	2019
District Department of Transportation (DDOT)	DCKA-2015-R-0080 DC Tunnels AM	\$13M	2017	2020
Golden Link Concessionaire	Presidio Parkway Project O&M	Confidential	2013	2045
MAT-Concessionaire	Port of Miami Tunnel and Access Improvement Project O&M	Confidential	2009	2044
FDOT	E1F88 Polk County Asset Maintenance (AM)	\$11M	2014	2021
FDOT	E1L59 Collier County AM	\$9M	2012	2019
FDOT	E2R44 Madison County AM	\$6M	2013	2020
FDOT	E2V97 Duval County Primary Roadways AM	\$89M	2018	2029
FDOT	E3G97 Escambia County AM	\$41M	2016	2022
FDOT	E3J21 Okaloosa County/Walton County AM	\$21M	2018	2025
FDOT	E3O40 Five Counties AM	\$31M	2015	2022
FDOT	E3P16 Seven Counties Structural AM	\$18M	2016	2023
FDOT	E4H52 D4 Structures and Roadways AM	\$88M	2012	2019
FDOT	E5U43 D5 Moveable Bridges AM	\$15M	2017	2024
FDOT	E7I95 Pinellas County AM	\$30M	2014	2020

Owner	Contract	Base Value	Contract Start	Contract End
FDOT	E8Q56 First Coast Parkway AM	\$12M	2019	2024
FDOT	E8Q86 Turnpike Bold Landscape Maintenance	\$4M	2019	2021
Tampa-Hillsborough Expressway Authority (THEA)	O-00617 Expressway System AM Services	\$8M	2017	2022
Osceola County	West 192 Corridor AM Services	\$10M	2018	2023

Table 1: Current Ferrovial Services Full Maintenance Service Contracts in North America

Our experience extends across many sectors some similar geographically and functionally to the State's highways. We apply our experience, lessons learned, and resources across our contract portfolios to increase performance metrics exponentially. Outline in the figure below is Ferrovial Services plethora of resources closest to the State of Michigan.

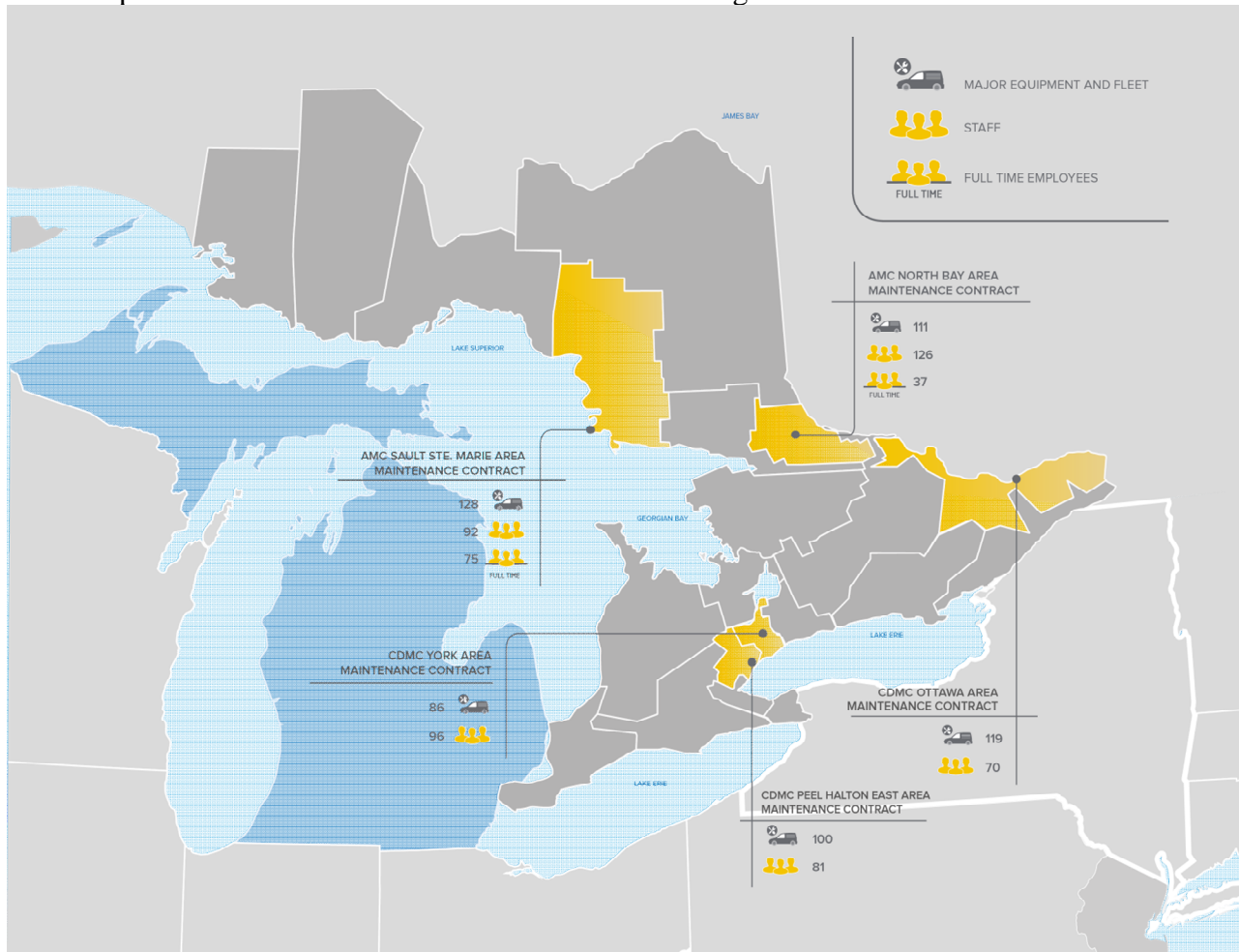


Figure 5: An Outline of Resources on our Canadian Projects

The subsequent project descriptions provide a representative illustration of Ferrovia Services' projects similar in scope and size as the proposed contract.

MTO - NORTH BAY ASSET MAINTENANCE CONTRACT

Project Overview



Ferrovial Services has been delivering this 12-year Area Maintenance Contract for summer and winter maintenance for the North Bay Area of Ontario, Canada since June 2010. The project area covers **1,178 kilometers (732 miles)** of urban and rural roadways, including sections of Highway 11 and Highway 17, part of the Trans-Canada Highway. The project was Ferrovial Services' first transport services project in Canada.

For this project, we provide summer and winter maintenance, including road surface, shoulders, roadside features, **snow removal and ice control**, emergency and incident response, electrical systems maintenance, line painting, including special markings, data collection of selected pavement distresses, traffic, culverts, selected capital improvements, and facilities maintenance.

Ferrovial delivers winter maintenance and snow removal services over 2,700 centerline miles throughout North America

Client Project Manager

Greg Follett

Phone: (705) 497-5254

Project Manager

Edward Baran

Project Owner



*Ontario Ministry of
Transportation (MTO)*

Project Start Date

June 2010

Project Term

12 years

Number of Snow Plows

50

Snow Days last year

69

Seasonal Employees

100+ for Winter Operations

MTO - SAULT STE. MARIE ASSET MAINTENANCE CONTRACT

Project Overview



Ferrovial Services has been delivering the Sault Ste. Marie (SSM) Area Maintenance Contract including summer and winter maintenance since June 2010. The contract area covers **1,772 kilometers (1,101 miles)** of urban and rural roadways, including sections of Highway 17, part of the Trans-Canada Highway.

Ferrovial Services provides summer and winter maintenance, including road surface, shoulders, roadside features, **snow removal and ice control**, emergency and incident response, electrical systems maintenance, line painting, including special markings, data collection of selected pavement distresses, traffic, culverts, selected capital improvements, and facilities maintenance.

“Ferrovial’s cooperation and support is appreciated by the Ministry.”

**MTO Contractor Performance Report,
April 2017-April 2018**

Client Project Manager

Tony Rota

Phone: (705) 945-6650

Project Manager

Kevin McDonnell

Project Owner



*Ontario Ministry of
Transportation (MTO)*

Project Start Date

June 2010

Project Term

12 years

Number of Snow Plows

51

Snow Days last year

84

Seasonal Employees

100+ for Winter Operations

US 36 EXPRESS LANES PROJECT

Project Overview



Ferrovia Services is the lead O&M Contractor for the US 36 Managed Lanes Project, CDOT's first Public Private Partnership (P3). Plenary Roads Denver is the concessionaire selected for the P3 project. Ferrovia Services has been delivering the maintenance and operation services for Plenary and CDOT/HPTE since March 2014. We provide O&M services for the Express Lanes (Toll/HOV), General Purpose Lanes, and associated roadside.

Services provided include maintenance of pavement, bridges, lighting, and roadside facilities, **snow removal and ice control**, incident response, traffic operations, and courtesy patrol, on the entire US Corridor between I-25 and Baseline Road and on the I-25 Express Lanes between downtown Denver and US 36. The contract area covers approximately 200 miles of roadways.

"I'm on highway 36 ...[and] it's plowed down to the pavement. I took the HOV lane home [and it was] plowed down to the pavement. ... It was only \$1.50 on the HOV but you can take out double that or triple that because it was worth it. ... This contract is working, again because [Ferrovia Services] is plowing down to the pavement ... speaking well of [Ferrovia Services]"

Colorado State Representative Tracy Kraft- Tharp,
February 2019

Client Project Manager

Anthony Meneghetti

Phone: (303) 512-5915

Project Manager

Justin Doles

Project Owner

*Colorado Department of
Transportation's High Performance
Transportation Enterprise & Plenary
Roads Denver*

Project Start Date

March 2014

Project Term

20 years plus renewal option

Number of Snow Plows

14

Snow Days last year

20

Seasonal Employees

30

ANTON ANDERSON MEMORIAL TUNNEL

Project Overview

Ferrovial Services operates and maintains the 2.6-mile Anton Anderson Memorial Tunnel, a single-bore combination train and vehicle tunnel near Anchorage, Alaska. We have provided O&M services for the tunnel since it opened in June 2000, which now sees approximately 250K vehicles per year.

Services performed for AKDOT&PF include **the removal of snow and ice in areas outside the tunnel**, toll collection and administration, bi-directional train/vehicle passage control, computer controlled system and vehicle management, maintenance operations for railway and roadway systems, including programming, calibrating, repair and installation of SCADA communication loops to include fiber optics, PLCs, digital and analog telephony, and environmental control systems. Ferrovia Services repairs industrial mechanical and electrical equipment such as diesel-powered heavy equipment, firefighting apparatus, emergency power, electrical distribution, and tunnel ventilation equipment.

We established a NFPA/OSHA compliance-driven Fire Department for this project, including fire and EMS certification to include structural firefighting, response to terrorism, hazardous materials training at the operations level, and advanced vehicle extrication.



Client Project Manager

Gordon Burton

Phone: (907) 441-6268

Project Manager

David McCourtney

Project Owner

*Alaska Department of
Transportation and Public
Facilities*

Project Start Date

*June 2000 (Original)
September 2015 (Current)*

Project Term

*5 years (plus 4)
1-year renewals*

Number of Snow Plows

3

Snow Days last year

48

Snow Operations Plan

Ferrovia Services' main objective in regard to snow and ice control operations is to provide a high level of service for the continuous safe movement of traffic during and following winter events. We manage roadway maintenance and snow removal contracts around the world and have the ability and expertise within our team to implement the high level of service the State is seeking. We have the vision, processes, and resources to ensure our goals become reality.

We tailor a Snow Operations Plan for each of our projects for which we provide these services. Plans include a combination of anti-icing and de-icing procedures, using appropriate equipment and materials.

We provide the necessary spreading, plowing, and snow removal operations throughout any snow/ice event to maintain safe traffic mobility without service delay. The plowing of snow and the control of ice during winter conditions are obviously critical activities in the success of a snow removal contract. Optimization of services depends upon detailed preseason and pre-winter equipment and stockpile preparation, event planning, equipment operator training, monitoring of weather forecasts, execution of the plan commencing as soon as a winter event is forecast, immediate and widespread implementation of snow and ice control response procedures, the deployment of sufficient numbers of specialized snow/ice control equipment to meet the performance standards, and optimal use of anti-icing, de-icing, and traction control materials in order to perform a high level of services.

Our tailored Snow Operations Plan is developed with safety in mind and is integrated into our Quality Management Plan to provide a feedback loop to continually improve operations. Our Snow Operations Plan is designed to determine and annotate all activities within the scope of the operation. The plan also has a system in place to perform a risk and hazardous condition analysis, pertaining to all activities:

- Risks to personnel (in-house, contracted or VDOT)
- Risks to the environment
- Risks to roadway users (traveling public)
- Risks related to equipment
- Risks related to materials
- Risks to RMTA assets or facilities
- Risks to adjacent property owners

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Figure 6: An outline of a typical Ferrovia Services' Snow Operations Plan

The Snow Operations Plan is also designed to identify all risk areas to be protected per OSHA, National Electric Safety Code, Americans' with Disabilities Act, equipment manufacturer recommendations, Material Safety Data Sheets, and other Federal and State requirements. Using the plan, project staff will be able to determine methods and procedures to mitigate each identified risk or hazard.

Our Snow Operations Plan ensures that workers are properly trained in the use of equipment, handling of materials, and proper procedures. The Snow Operations Plan will allow project staff to prepare operational procedures in conjunction with contract requirements and implement policies to conduct winter maintenance activities in conformance with the above risk mitigation methods.



Figure 7: Loading salt from salt domes

Operational Procedures

Ferrovial Services understands that major events encompass incident and emergency response. We believe that effective and efficient emergency response and management is achieved through the identification of foreseeable events and implementation of appropriate plans to ensure adequate procedures, equipment, and trained personnel are in place. Ferrovia Services' strategic management of forecasting winter weather events to ensure timely response typically relies on the following:

- Winter staff with extensive experience and knowledge of network conditions
- Demonstrated and proven ability to utilize specific tools and equipment available such as weather gauges
- Capability to study and analyze forecasted weather data of future atmospheric and road conditions as well as displaying current conditions to ensure preparations and readiness is achieved

Upon detecting hazardous conditions, Ferrovia Services Patrollers will initiate a response immediately. Patrollers will verbally communicate via company-issued mobile phones or two-way radios directly with Equipment Operators in order to schedule a response to the identified hazardous condition. Applicable equipment will be deployed immediately to treat the identified area within 1 hour of the start of the winter event. Application will depend on the conditions and the recommendations from the Department. Recommended treatments in the FAMS Attachment N include:

MDOT WINTER MAINTENANCE APPLICATION RATES: (SOLIDS)

	AIR TEMP	PAVEMENT TEMPERATURE	WEATHER CONDITION	POUNDS PER 2 LANE MILE		ACTIONS & APPLICATION RECOMMENDED
				PRE WET SALT *	SAND	
Recommended Treatment Parameters	RISING	↑ ABOVE 30°	SNOW	150	NOT RECOMMENDED	PLOW, TREAT HAZARDS ONLY
			FREEZING RAIN	150	NOT RECOMMENDED	APPLY AS NEEDED
	DROPPING	↓	SNOW	150-300	NOT RECOMMENDED	PLOW & APPLY AS NEEDED
			FREEZING RAIN	150-300	NOT RECOMMENDED	APPLY AS NEEDED
	RISING	↑ 25° to 30°	SNOW	150-300	NOT RECOMMENDED	PLOW & APPLY AS NEEDED
			FREEZING RAIN	150-300	NOT RECOMMENDED	APPLY AS NEEDED
	DROPPING	↓	SNOW	150-300	NOT RECOMMENDED	PLOW & APPLY AS NEEDED
			FREEZING RAIN	300-350	400	APPLY AS NEEDED
	RISING	↑ 20° to 25°	SNOW / FREEZING RAIN	150-300	400	PLOW & APPLY AS NEEDED
			SNOW	225-300	NOT RECOMMENDED	PLOW & APPLY AS NEEDED
	DROPPING	↓	FREEZING RAIN	300-350	400	APPLY AS NEEDED
			SNOW	225-300	NOT RECOMMENDED	PLOW & APPLY AS NEEDED
	RISING	↑ 15° to 20°	FREEZING RAIN	300-350	500-750	APPLY AS NEEDED
			SNOW / FREEZING RAIN	350	500-750	PLOW & APPLY AS NEEDED
	DROPPING	↓	SNOW	NOT RECOMMENDED	NOT RECOMMENDED	PLOW, TREAT HAZARDS AS NEEDED
FROST: 15° & RISING: TREAT BY ANTI-ICING (BRINE 20-40 GAL/LnMi) OR 15° & FALLING: PRE WET SALT @ 150#/LnMi.						
WIND CONDITION: PLOW, TREAT (TROUBLE SPOTS ONLY) @ 200-400#/LnMi.						

* Note: Pre wet with 7-10 gallons of a liquid chloride product per ton of untreated salt. Rates shown account for a 25 mph truck operating speed, but also apply for trucks properly equipped with a Zero Velocity or Slurry Generator, operating up to 35 mph.

Updated October 2013

Figure 8: MDOT Winter Maintenance Application Rates (Solids)

Our Patrollers are responsible for consistently and routinely patrolling the network utilizing a variety of tools to understand, analyze, and predict snow and ice conditions. Each patrolling vehicle is fitted with an on-board weather gauge to determine road surface temperatures and detect ice conditions. This is accomplished using laser sensors mounted on the outside of the cabin that detect temperatures and relay data into the cabin through the gauge display. The Patrollers will communicate regularly with Equipment Operators through two-way radio systems to ensure rapid response to treat the hazardous areas with required materials. This ensures safe conditions for the traveling public.

It is our standard operating practice to have Equipment Operators arrive for duty one (1) hour prior to the anticipated beginning of a winter event to allow completion of pre-shift procedures, such as Winter Vehicle Inspection, ensuring readiness for operations. Our onsite day-to-day operations workforce will assist MDOT where possible to ensure accurate planning and forecasting of potential winter events.

We are experienced using data systems, such as the Maintenance Decision Support System (MDSS) as a source for forecasts to effectively manage winter weather road issues prior, during, and after events for our projects. Our North America Projects currently utilizes such tools to successfully deliver winter maintenance in some of the most severe weather conditions. We understand the importance of utilizing tools to identify foreseeable events and plan an efficient emergency response such that we are committed to investing over **40k** in Delcan Technology's DTI Snowplow Motor. The DTI Snowplow Operator will be instrumental in Ferrovial Services achieving our goal of providing the Motorist of Michigan a pavement surface bare of ice and snow.

Ferrovial Services implements a proactive strategy in our Snow Operations Plan that focuses on the commitment and discipline to have all winter equipment ready for deployment as soon as possible after the completion of a winter event. This process will ensure readiness if an unexpected winter event occurs. Furthermore, we ensure plow operators on call are readily available in order to minimize and remove delays in deployment gaining additional time for pre-shift procedures and vehicle inspections.

SNOW EVENT MANAGEMENT MATRIX													
ENVIRONMENTAL CONDITIONS							ACTIONS						
PRE-EVENT FORECAST			DURING EVENT				Notes: Sunshine will raise temperatures and reduce salt need. The Snow Manager must prepare for falling temperatures as night approaches.						
Precipitation	Temperature		Accumulation	Wind/Drifting	Precipitation	Actual Temperature	ANTI-ICING DLA	FLOWING ONLY	SPREADING ONLY		COMBINATION PLOW/SPREADING	DE-ICING DLA	SNOW REMOVAL
	F	C				F	C		SAND	SALT (including Pre-wetting)	SAND	SALT (including Pre-wetting)	
Rain	> 32°F	> 0°C						NO		X			NO
Sleet	> 32°F	> 0°C						NO		X			NO
Slush	> 32°F	> 0°C	X					NO		X		X Flowing as accumulation increases	NO
Slush	< 32°F	< 0°C						YES*				X Flowing as accumulation increases	NO
Freezing Rain	28°F : +35°F	-2°C : +2°C						YES*		X			NO
Snow	> 32°F	> 0°C						YES*				X	
Snow	18°F : 32°F	-8°C : 0°C						YES*					
					Sleet	28°F : +35°F	-2°C : +2°C			X			NO
					Slush	28°F : +35°F	-2°C : +2°C			X			NO
					Freezing Rain	28°F : +35°F	-2°C : +2°C			X			NO
					Snow	28°F : +35°F	-2°C : +2°C					X	If Needed
					Freezing Rain	18°F : 32°F	-8°C : 0°C			X			NO
					Snow	18°F : 32°F	-8°C : 0°C					X	If Needed
					Snow	< 18°F	< -8°C				X		NO
					Ice	< 18°F	< -8°C			X			NO
					Slippery Conditions	< 18°F	< -8°C			X			NO
				Drifting					X				As Needed
			Accumulation against barrier walls						X				As Needed
			Bridges Parapets						X				As Needed

* Action is dependent upon the storm fighting strategy for each particular storm

Figure 9: Ferrovial's Snow Management Matrix

It is Ferrovial Services' intent that for each winter weather event, all roads will be maintained in a manner so that all pavement travel lanes for mainline pavement, ramps, through paths, turn lanes, crossovers, intersections, interchange and bridges are kept free and clear of snow and ice so that traffic can proceed in a safe and orderly manner throughout the weather event. We will provide attention to issues such as freeze backs and loss of travel lanes even after clearing roads. We will perform snow plowing and apply deicing materials as required on other facilities such as rest areas, welcome centers, weigh stations, parking lots and carpool lots.

Echelon Plowing

Ferrovial Services recommends and intends to utilize echelon plowing as a solution to winter operations. Echelon plowing is defined as a grouping of plow-equipped winter vehicles used to plow a multi-lane roadway, with each plow assigned to one lane, all plowing to the right, and in close enough proximity that traffic is prevented from traveling in between the winter vehicles. The winter vehicle servicing the far-left lane shall be the lead vehicle, followed by the vehicle in the next lane to the right and continuing in sequence from left to right for all lanes. When the far-left lane is plowed to the left, the winter vehicle servicing that lane is not considered to be part of the echelon plowing group.



Figure 10: Ferrovia's echelon formation on US-36 in Colorado

The States roadways predominantly consist of interstates and highways and as such echelon plowing is a critical operation in the safe removal of snow and ice. Putting the safety of Michigan motorists first is our top priority in the execution of echelon plowing and we will be drawing on our extensive experience deploying echelon plowing formations through 2,627 two-lane equivalent kilometers throughout North America. This experience has allowed us to refine our approach and understand exactly the conditions in which echelon plowing is most efficient.

Through a thorough review of the Michigan's network and the multi-lane highways, we will ensure that our Winter Vehicles operate at a spacing of **15 to 30 meters to discourage motorists from passing plows or crossing through the windrows**, resulting from the movement of snow from the left lanes to the shoulder area. We adopt this spacing to discourage this behavior from motorists specifically when the plow operator's judgement determines:

- The passing maneuver is too hazardous due to the lead plow leaving a heavy windrow of snow;
- The road ahead is known to be in hazardous condition due to conditions such as heavy drifts, slipperiness and accidents;
- Visibility is limited, rendering passing hazardous; and/or
- Heavy traffic volumes dictate that, even if passing were permitted, only a small percentage of the overtaking vehicles could make their way through the primary passing route available.

We've developed new plow routes for the proposed contract that will allow for Cycle Times of 90 minutes or less. As such for all plow routes we will be utilizing tandem axle

and single axle combination units, plows, spreaders, and tow plows, as well as two (2) spare pieces of winter maintenance equipment, if required. If conditions warrant, we will amend or change pieces of fleet equipment to ensure compliance with performance measures and will ensure the State is advised and agrees with any change strategy ahead of implementation. Detailed snow routes can be found in the Section titled Snow Routes below.

Winter Staffing Allocation

During the winter season, we propose to maintain availability of winter vehicle operators to ensure roadways are continuously open and safe for the traveling public especially when hazardous conditions are forecasted as a result of a winter snow or ice event.

Ferrovial Services will supplement our Year-Round Operators with Seasonal Operators to not only ensure compliant levels of operators per winter vehicle, but also to allow critical coverage on any critical routes or locations that we identify including facilities, rest areas, welcome centers, weigh stations, and carpool lots. Winter activities will be performed 24/7/365, when required to maintain required levels of service per route. Ferrovial Services will maintain an “on call” schedule for Operators to respond to winter events and incidents during non-scheduled work hours and during Winter Transition Periods. We have meticulously examined the contract documents and actual site conditions, as well as the provided route maps, and have built up Operator staffing by routes based on the number of plow units, the total miles to plow, and the average plow and reload times, and have concluded the following:

During the winter season, each plow route will have a minimum of one snow plow assigned to it and staffed with two operators that will ensure adequate coverage of each route.

During the winter season, the Year-Round Operators and Seasonal Operators will work on a rotating schedule that will allow 24-hour coverage for each plow unit.

Each Operator will cover a 12-hour shift schedule that will consist of “operating time” and “on call” time.

Two primary Operators will be scheduled for each plow unit.

Additional Operator coverage has been considered to allow for shift rotations, coverage on sick days, and scheduled leave.

Plow Operators	
Transition Period	13
Winter	26

Table 2: Number of primary and seasonal operators

Our Summer and Winter Maintenance Supervisors will patrol, perform a physical evaluation of, and document the condition of assets during the winter season.

Proposed Operator staffing levels detailed above allow for expanded coverage on critical routes or locations should we identify the need through our patrolling services or if conditions warrant.

Equipment

As mentioned, **all fleet deployed on State Trunklines within Monroe County, including spare trucks, shall be new at the start of the contract.** We've considered a minimum of one winter maintenance truck per plow route and one contingency truck for every five (5) plow routes identified. Our snow plow trucks exceed contractual requirements and contain the following specifications:

- 410HP @ 1700 RPM, 1450 lb-ft. Torque @ 1000 RPM, 2100 RPM Governed Speed
- 40,000-lb Capacity, 55" Axle Spacing, 9.5" Ride Height, with Shock Absorbers, Mounted Inboard A/R Suspension Tandem
- 40,000-lb Capacity tandem rear axle
- 12,000-lb Capacity front axle
- 160 Wheelbase
- 12 feet wide hydraulic underbody blade with Front Plow
- Minimum 10-yard capacity salter/spreader
- Galvanized screens, Dual auger, Spinner assembly
- Ground speed oriented computerized spreader controller
- Hydraulic computer-controlled material pre-wet with 450-gallon capacity
- 12 power reverse underbody scrapers
- Plow & DOT compliant emergency warning lights
- Toolbox
- FMVS 108 lighting
- Data link connector for vehicle Programming and Diagnostics
- 2-WAY RADIO Wiring Effects

In addition to our Summer Maintenance Equipment we will supplement our Winter Maintenance Operational team with the below equipment for day one of operations for the proposed Contract:

Description	Quantity
1/2 Ton Single Cab Truck – 2wd - Light Bar & Arrow board	1
Snow Blower	1
Snow Plow Truck	10
Loader	2

Spare Units	2
Tow Plows	3

Table 3: Winter Maintenance Equipment to be mobilized for the contract

Our Snowplow Drivers and Lead Equipment Operators will be supplemented with the necessary snow equipment, brand new fleet, and materials for day 1 of operations to successfully deliver winter maintenance services in accordance with the Contract specifications, seven (7) days a week, twenty-four (24) hours a day.

As mentioned in our Implementation Plan, our fully dedicated and highly experienced heavy equipment Mechanic will be on site and devoted to ensuring equipment is readily available. This will decrease downtime resulting from equipment breakdowns. In the event a breakdown does occur, and a repair cannot be remedied within ample time, the winter vehicle will be replaced with a spare unit.

With fully dedicated staff, fleet, and materials in close proximity to the network, we can ensure adherence to one-hour response times.

Anti-Icing

Liquid anti-icing operations for snow and ice control will be performed upon MDOT's approval and in accordance with MDOT's specifications for Deicer with Agriculture Bi-Products (ABP) or Salt Brine or alternate in anticipation of a winter weather event. Ferrovia Services understands the importance of pre-treating MDOT's roadways prior to a snow event with a liquid solution – typically of salted brine – to lower the freezing temperature of moistures, thus preventing or delaying roads from freezing and causing hazardous conditions. We are experienced with anti-icing applications, as our Roadways in Colorado are pre-treated with salt brine prior to a winter weather event.

Ferrovia Services has utilized over 450,000 tons of salt on our Canadian Maintenance Contracts in the last 5 years

The salt brine concentration for each batch will be verified with hydrometer readings and ABP to verify the proper mixture. Improper concentrations will not only affect the effective eutectic temperature of the solution on the roadway but can also damage tanker equipment.

Roadway Treatments

Snow will be plowed off the roadway using Ferrovia Services owned snow plowing equipment.

During and after the storm, bulk road salt will be applied to the roadway to melt snowpack or ice that has adhered to the roadway and to also provide additional traction. Salt/sand mixture will also be on hand for applying when additional traction is warranted.

Ferrovia Services has experienced improved results with either stockpiled treated salt or using onboard pre-wetting. Treated salt is created by taking regular road salt and mixing it with a small percentage of liquid dicer. This can be completed by Maintenance crews prior to storm and creating a stockpile of treated salt; or this can be completed onboard the trucks with a pre-wetting setup. Treated salt is particularly useful when temperatures fall below 16 degrees Fahrenheit because it reacts quicker and thus begins melting on the roadway sooner. Treated salt also helps to maintain the salt within the roadway and reduces bounce or blowing of the salt to the shoulders.

AVL

Ferrovia Services' snow removal experience throughout North America lends to the understanding that equipment be locatable in the event of a snowstorm or emergency. Similar, to our other contracts where we deliver winter maintenance, our snow removal fleet for MDOT will be equipped with Delcan Corp's Automatic Vehicle Location (AVL) devices that utilize GPS to track geographic location for the fleet. The snow fleet for MDOT will be outfitted with AVL devices that utilize an "always on internet" connection to provide live updates for the fleet, even when equipment is off. MDOT will have full access to the AVL's dashboard – providing live location tracking for the snow removal equipment.

Communications

Based on our experience with snow removal, we believe that two-way radios provide the most efficient and safest method for communications between plow operators. We will utilize two-way radios and mobile cell phones for clear and effective communications between operators. In addition to two-way radios, all project personnel will be accessible via mobile cell phone devices while they are not driving or operating equipment. This is critical for a safe operation and effective snow removal along the network. Our Contract Representatives will utilize MDOT's radios to ensure proper flow of communication at all times. MDOT will be supplied with a customer service and technical support, repair, and maintenance phone numbers operational 24/7.

Fueling

Prior to the start of winter, fuel stations in close proximity to the snow routes will be identified and assessed based on their availability of fuel and their space to fit dump trucks. Snow plow operators will keep a log of fueling stops; recording the date, time in, fuel, price, current miles, and time out. These records will be kept both in the truck during snow events and in the office.

Calibration of Equipment

Calibration is critical to effective and efficient maintenance and delivery of products, as well as monitoring our fleet. We understand that is our responsibility to provide properly calibrated snow and ice control spreader units for the winter maintenance and shall submit certification to MDOT that our spreader units are in compliance with the levels of variance as specified in the contract documents.

Fall calibrations will be performed to prepare equipment for the upcoming winter season. Every individual spreader will be calibrated to distribute the correct amount of material per lane mile in accordance with MDOT's guidelines and requirements. A record will be kept for each truck, both at the operations office and in the truck. This record will indicate date of calibration, inspector performing the calibration, gate level, conveyor speed, spreader number, and spreader control computer settings.

Every spray truck or trailer will also be calibrated for correct spray rates. Records will be kept indicating date of calibration, inspector performing the calibration, nozzle size, number of nozzles on spray bar, pump pressure, type of brine this calibration pertains to, sprayer number, and any control settings. During the winter, based on our standard application rates and miles serviced, we will complete an ongoing analysis of the application rates of each unit, evaluate the results, and then make adjustments as required.

Ferrovia Services' approach to calibration of winter equipment is an integral part of our Winter Operations Strategy and as such, we continually monitor spreader calibration and adjust as necessary throughout the winter season and winter transition periods. Ferrovia Services follows spreader manufacturer detailed calibration procedures and MDOT requirements.

Snow Removal Timeframes and Performance Standards

In addition to responding quickly and efficiently to winter weather events, Ferrovia Services understands the importance of ensuring the Trunklines in Monroe County are free from snow accumulation on the network after an event has ended. Snow trucks will remain on-site to remove accumulated snow.

It is Ferrovia Services' intent that for each winter weather event, all roads will be maintained in a manner so that all pavement travel lanes for mainline pavement, ramps, through paths, turn lanes, intersections, interchange and bridges are kept free and clear of snow and ice so that traffic can proceed in a safe and orderly manner throughout the weather event. We will provide attention to issues such as freeze backs and loss of travel lanes even after clearing roads. We will perform snow plowing and apply deicing materials as required on other facilities such as rest areas, welcome centers, weigh stations, parking lots and carpool lots.

Snow Routes

Ferrovia Services has established new plow routes that will provide the quickest, safest, and most efficient response to snow control and ice removal. Ferrovia Services' history in delivering winter maintenance services on projects of similar size provides us the knowledge necessary to create snow routes that will best serve MDOT and its traveling customers. On existing projects, we've work closely with our clients to run routes to determine how long a circuit would take for chemical applications (for anti-icing operations) and plowing times.

We've constructed new plow routes that allow for will allow for Cycle Times of 90 minutes or less. Since services will be performed in house, we will be able to be on site to MDOT's salt shed in anticipation of a snow event. Loaders will be on standby to begin loading salt

into the plow trucks at MDOT's discretion. Trucks will remain on standby until further direction is given by MDOT. Once authorization is received, they will begin operations immediately.

Below is a map of our proposed snow routes that will allow for Cycle Times of 90 minutes or less. These routes provide a continuous loop of the network, with the ending location simply becoming the next starting location. Not only does this provide quick coverage of the entire network, but it ensures that no individual portions of the network are left untouched. Prior the commencement of the winter season, Ferrovial Services will review the routes with MDOT and adapt them if needed.

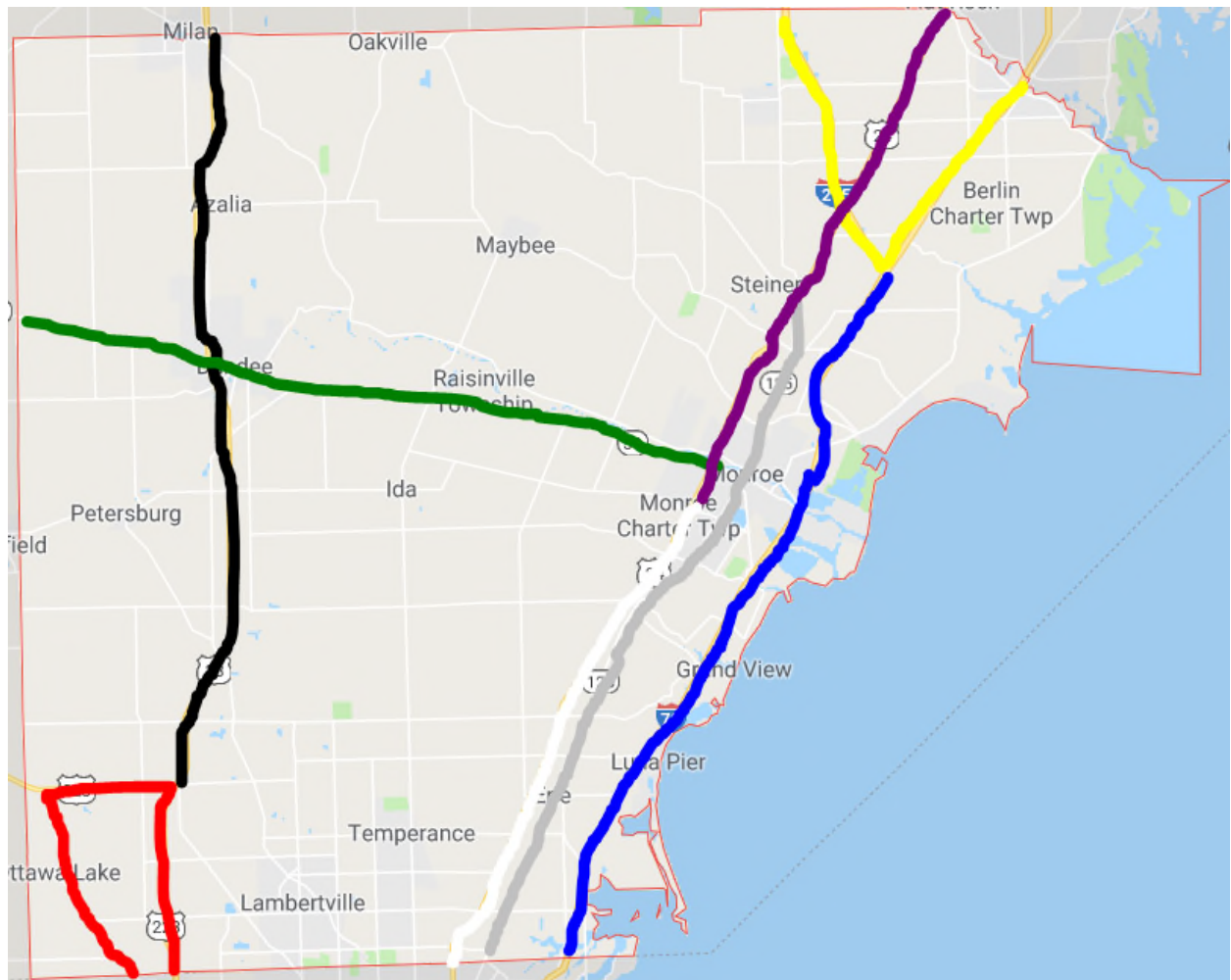






Figure 11: Map of Intended Snow Routes

Ramp	Route	Ramp	Route
Route 1		Route 5	
Route 2		Route 6	





Route 3		Route 7	
Route 4		Route 8	

Table 4: On and Off Ramp route description

Detailed Self-Inspection Plan

Ferrovial Services' Quality Management Plan serves the function of a detailed self-inspection plan, designed to ensure all functions of the contract are being performed at the standard the State expects. The Quality system is deployed simultaneously with our Maintenance Operations Plan, which guarantees the timely delivery of contractual requirements in a way that demonstrates our clear understanding of the performance requirements and quality standards for this Contract.

The following sections contain a summary description of the components of our Quality Management Plan wherein we provide expanded Quality Assurance/Quality Control (QA/QC) measures to ensure all contractual requirements are delivered. The system, processes, and functions related to the topic areas of QA enable the development of a prioritized, logistically based, resource-balanced Maintenance Operations Plan and provides a clear approach to comprehensively address this important contract. Our QA/QC program is designed to support the following outcomes:

- The work performed meets or exceeds the Authority's performance measures
- The work is performed safely and efficiently
- The work is performed in its entirety, and that the work site is left in a clean and orderly manor
- The work and program is self-inspected and audited to ensure effectiveness and continual improvement

The QA/QC program headed up by our Quality Control Manager consists of two complementary self-monitoring components:

- **Quality Assurance (QA):** Ensures that processes and procedures yield consistent quality performance across project functions
- **Quality Control (QC):** Includes the execution of individual project work elements to quality standards

Quality Control Manager (QCM)

Our dedicated Quality Control Manager on this contract will ensure the policies set forth are executed properly. Quality Control is achieved through sound execution of work tasks and subsequent inspections. These inspections are conducted by the QC Manager and the quality of completed work is evaluated based on the extent to which related processes, procedures, and timeliness issues were found to be in alignment with contractual requirements. Findings identified in these inspection reports reflecting pass/fail are

communicated to the Project Manager and Zone Superintendents. The completed QC reviews are then subject to further review by our Regional Quality Assurance Manager. The QA and QC components function collectively as described below.

Quality Assurance

Ferrovia Services' has developed a Quality Assurance (QA) Plan that embraces the philosophy that the QA process must be infinite, dynamic, and structured with the flexibility to address the ongoing change and improvement demanded by the discipline of infrastructure maintenance and the ever-changing environment in which that discipline is conducted. In the words of our Regional Quality Assurance Manager, Mr. David Sheaffer, "Our QA/QC process is based and structured on our philosophy of Quality Assurance as: **Doing the Right Thing**; and **Doing the Thing Right**; while **Providing an Environment That is Conducive and Receptive to Change and Improvement.**"

Our Regional Quality Assurance Manager is our corporate oversight and support of the onsite QCM and functions independently of the contract project management and personnel. The Regional Quality Assurance Manager has the authority to initiate changes to the Maintenance Operations Plan, which may take the form of:

- Retraining personnel in performance standards
- Adjustments to maintenance crew size
- Changes in equipment or materials
- Retraining in traffic control operations
- Personal safety
- Reassignment of personnel

The QA Plan, at a minimum, features the following essential components:

- Description of each contract deliverable
- Targeted levels of performance
- Quality standards for all components of contractual deliverables identified in the scope of the contract and supported by established the RMTA's policies and procedures
- Non-Performance penalties and deductions by areas of performance and MRP non-performance deductions
- Frequency of reviews, sample sizes, and selection criteria for each deliverable
- Determination of timeliness satisfaction

Quality Control Plan

Ferrovial Services' Quality Control process provides assurance that reviews and inspections are thorough and consistent. This is accomplished by structuring and tailoring each review to meet the specific client-defined processes, procedures, and performance standards for every contract deliverable targeted for review, based on the frequency, sample size, and selection criteria of scheduled reviews as identified in our Quality Assurance Plan. A consistent level of reviews is executed, assuring that items of concern are detected and corrected at the earliest possible time.

Each review also is structured to capture the nature of any failure(s), identify required corrective action, communicate the failed item(s), and advance the item for re-inspection. Ferrovia Services recognizes the dynamics of Quality Control in the infrastructure maintenance services environment. Our review processes are structured to react to, meet, and reflect changes associated with revisions in client-defined processes and standards, the introduction of new best management practices, and historic deliverable performance data. When deployed congruently with the review components of our QA process, the quality of operational services delivered will be improved by efficiently and effectively dealing with the root causes of identified failures.

Results of the review are used by Ferrovia Services managers to realign operations as necessary and rate efficiency and effectiveness to improve crew and office functions, increasing productivity and function.

Ferrovia Services has thoroughly reviewed and understands the project requirements with regard to non-performance on timeliness evaluations and the value/impact of possible deductions. Utilizing the Quality Management Plan outlined above, the Project Manager, Quality Control Manager, and Supervisor will make dynamic work plan adjustments in the event that an asset group is evaluated and rated below the specified minimum. At any time, characteristic group performance ratings fail to meet a performance level equal to five percentage points greater than the minimum, action plans will be created with resources being allocated to provide corrective action where necessary. This written action plan will be incorporated into the weekly work plans until the corrective action is completed and the asset group meets the minimum requirements. We commit to self-evaluations based on monthly random 10-point interim evaluations which will help validate our maintenance work plan as well as help to proactively identify any negative trends.

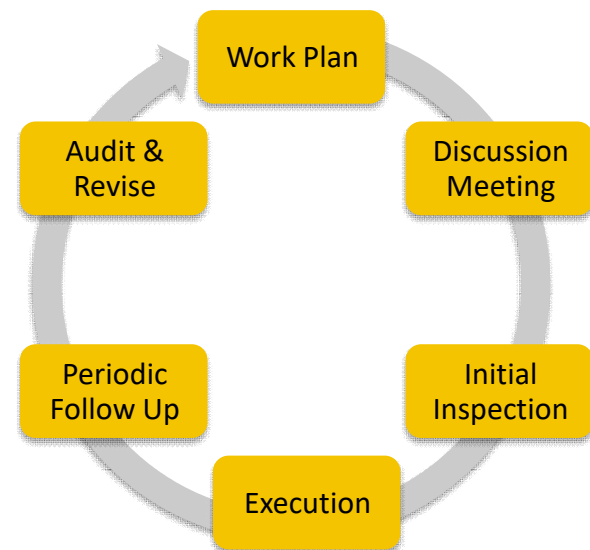


Figure 12: Our Quality Management Plan – at a glance

Onvia Road Computerized Maintenance Management System (CMMS) Platform

We will increase the level of maintenance management and QA/QC of the assets through the implementation and utilization of Onvia Road – a web based Computerized Maintenance Management System (CMMS). It uses Geographical Information System (GIS) to store and locate highway asset inventory and a dynamic platform from which to

manage, monitor and maintain. Onvia Road is a software for total asset management in order to follow the lifecycle and maintenance of assets within the network. Its functionalities are divided into 6 modules:

- **Inventory management:** Data and location of assets during their whole life cycle.
- **Status agenda management:** Knowledge of infrastructure state in real time with standardized protocol of activities.
- **Work management:** Reporting of corrective and preventive maintenance within the contract term as well as time tracking, and resources planned and assigned for each of them.
- **Incident management:** For incidents that occur on the road including accidents, incident, and emergencies, and assigning resources and services.
- **Inspection management:** Management of inspections and their status.
- **Accident management:** Data captured specific to root cause of accidents, performed or pending actions and their assessment.



Figure 13: An overview of Onvia's capabilities

The Onvia tool not only provides more certainty in the way the contract assets are maintained, but it also provides further clarity and data to allow greater management of the assets, allows performance measuring against inputted maintenance plan, timeliness tracking, schedule based work order generation, and ultimately ensures we remain accountable for our deliverables on this contract.

We will utilize this system and the many functions it has to drive increased asset performance through robust preventive maintenance programs and promote lane availability and safe passage.

Quality Management Documents & Reporting

The Quality Management Plan interfaces directly with the Maintenance and Operations Plan, weekly work plans, and appropriate supporting documents. The Maintenance and Operations Plan ensures that timeliness and performance requirements are being met. Furthermore, the self-reporting structure of our Quality Management Plan establishes a clear path in direct alignment with the MDOT's requirements.

Quality Management Documents include:

- Review of randomly generated Monitoring Points
- Review of Operational QC inspections

- Review of Safety Performance
- Review of Operational Delivery
- Self-Assessed Performance Compliance

Ferrovia Services is a company founded on a culture of innovative thinking coordinated with practical application. Many of our programs have been developed and implemented over multiple years in our operations and maintenance business that we have been able to capture and share across projects. We encourage this environment and value at every level of the organization including our subcontractors. Our approach draws on our winter and summer road maintenance experience in similar geographies and conditions, established record of success in North America and around the globe as well as our successful project management methodology.

Proven past innovations:

Within our current operations, Ferrovia Services has identified areas for improved innovative approaches to improve performance, safety and reliability, these include:

Transmission Mounted Power Take Off

The standard engine driven Power Take Off (PTO) and components are prone to failure due to ineffective design of the driveshaft that attaches the pump to the engine. The driveshaft requires daily operator maintenance; however, this design makes it difficult to access. When a failure of this driveshaft does occur, it frequently damages ancillary components, including the radiator, air cooler and grill. Additionally, anytime there is a hydraulic component failure (i.e., coupler, hose, fitting), this system cannot be disconnected by the operator resulting in the unit being out of service. When there is a failure in the PTO system, the truck is left inoperable and often leaking hydraulic fluid. To correct this issue, we saw an opportunity to improve and switched to a transmission mounted PTO starting with model year 2016. To date, we have not had a failure with this system; however, should we experience a failure, this system can be disengaged by the operator with the flip of a switch and the hydraulics isolated to prevent leaks allowing the unit to be driven to a shop for repair. Subsequently, the entire truck is not out of service thereby reducing downtime by up to 10%. Example of this is that we have installed these on 14 units. Estimated operator time savings 20-30 minutes per shift.

Control Box Locations

Historically, all spreader and pre-wet controls have been located along the frame, behind the spinners or under the material box. This leaves them prone to excessive corrosion and increased failures. On all new units, Ferrovia Services has relocated the control boxes to behind the cab (except those that are gravity fed), where they are exposed to less corrosion. This has resulted in fewer electrical, hydra solenoid and valve bank failures annually along with reduction in labor repair time, equipment down time and component cost.

Automated Mobile Data Collection System (AMDSCS)

We are experienced in utilizing programs such as the PreCise MRM system such that we have implemented this solution in our Sault Ste. Marie and North Bay AMC's with positive results. This system includes.

- Electronic real-time Winter Operations Records (WOR) management and reporting
- Measure vehicle and asset utilization and report performance against established KPI's driving greater ability to analyze and determine actions moving forward.
- Automated Hours of Service (HOS) tracked and easily analyzed to allow increased safety performance by ensuring Operators work within defined parameters. We are already seeing positive improvements to our Commercial Vehicle Operator's Registration (CVOR) due to a reduction in safety violations.
- Custom dynamic mapping to monitor and track live service level compliance
- Continuous performance improvement and implemented advancements in efficiency and sustainability through technical innovation

Behavioral Based Safety Investment

Ferrovia Services commits to and invests in our people. An example is the implementation to behavioral safety programs focused on moving people towards intrinsically motivated safety and strengthening relationships which help improve productivity and lead to safer workplaces.

Sentis: Zero Incident Process (ZIP) Training

ZIP is a process that gives Ferrovia Services an opportunity to reach our objective of zero incidents. It is based on psychology and is a safety process that moves people from extrinsically driven safety to intrinsically motivated safety. It does this by focusing on the "person" component of the safety culture model. ZIP gives individuals an understanding into the way their brain works by driving awareness into their thinking and their attitudes, and how this drives their behavior. Employees are taught to take control of their thoughts, feelings and their safety. The outcome is a reduction in incident and injury rates and the associated costs incurred when someone is injured in the workplace. This is accompanied by a positive shift in employee safety attitudes and the safety culture of the organization. ZIP has also demonstrated positive well-being outcomes for our internal forces and clients, in terms of improving stress levels and psychological health as reported by attendees.

Everything DiSC Personality Assessment Workshops

Everything DiSC is a personality assessment based on a model of four basic styles: Everyone is a unique blend of the different styles and that is extremely valuable in creating healthier organizations. Each year, more than one million people worldwide use these researched validated tools to inspire, energize, empower and transform their workplaces. Ferrovia Services has implemented this training for every employee at three of our contract sites so far, including the Sault Ste Marie AMC, and invited our clients to attend with good success.

New innovations:

We are always looking for ways to improve operational performance as well as the safety of our people and those around us while increasing the value we bring to our clients. We have identified real and innovative items that are at various stages along the implementation curve, but we are committed to bringing these added value items to our North America operations.

A Holistic Collaborative Approach

Our delivery model has a dual approach. We channel innovation and best practice sharing through our global Centers of Excellence located in Madrid, London and Sydney, which define the areas of focus and new technologies, while our contract delivery teams are responsible for the implementation of operation efficiencies where we can provide benefit and value to our clients. We commit to using the Centers of Excellence to strive to generate efficiencies and best practices throughout the full seven (7) year term.

Management and Monitoring of Incident Trends

Ferrovial Services proposes to take a lead role in monitoring incidents on the E470 Express Tollway to identify trends and partner with the Authority to develop methods to assist in predicting and reducing incident frequencies. We commit to doing all that we can to improve the safety of motorists on the York network.

Defibrillators – It May Save a Life

Incident Response Crews will be equipped with and trained to use defibrillators to treat life-threatening cardiac issues affecting motorists or staff during performance of the contract.

Smart Workwear - Sensors to Measure Workers' Exposure to Health Risks

Driven by our number one focus, health and safety, staff will be equipped with a smart device to monitor heart rate, respiration, pace, posture and stress levels, all factors that help indicate factors affecting their wellbeing.

Continued Innovations Through the Centers of Excellence:

Within the Ferrovial Group we have the objective of developing knowledge and delivering new capabilities to our clients. Multidisciplinary teams specializing in their respective areas have been created as a key instrument for present and future development – these are called the Centers of Excellence (COE). Each COE working group is dedicated to study and knowledge in one of the following key spheres for the company's overall development and target of adding further value for our clients:

- Asset Management – concentrates knowledge in the design and management of infrastructure assets. Managing assets in a structured and predictable manner allows us to provide our customers with quantifiable added value
- Cities – the Center of Excellence for Cities develops and implements innovative service delivery programs, solutions and models

- Environment – focusing on the development of capabilities in this sector. The Center maintains its current innovative activity in waste management, studying trends and new solutions and identifying environmental and industrial risks
- Energy and Facility Management – focuses its activities on innovations in Energy and Facility Management
- Natural Resources – focuses on the development of new business models and solutions for the oil, gas and mining sectors

Motorists rely on the organization entrusted to maintain the States' highways to keep the roadways open by removing snow and controlling ice formation. We would like to take this opportunity to express our sincere interest in building a trusted partnership with the State. Ferrovia Services has the experience and expertise to meet the specific needs of our clients and their customers in the delivery of operations and maintenance services. Snow and ice control operations are a hallmark of our proven performance. Based on our experience, highways are kept safe and clear during winter events, without closures, through the combination of experience, solid planning, and a dedicated team of staff, and contractors. By applying our knowledge gained from our experience throughout North America, we provide top notch snow and ice removal services to benefit our client and their traveling customers in a safe, timely, and cost-efficient manner. We hope to extend our operations to the State and its customers; bringing our history, experience, and best practices to you.