

# Road Building in Michigan

April 17, 2019

Tony Kratofil, PE  
Chief Engineer & Chief Operating Officer  
Michigan Department of Transportation

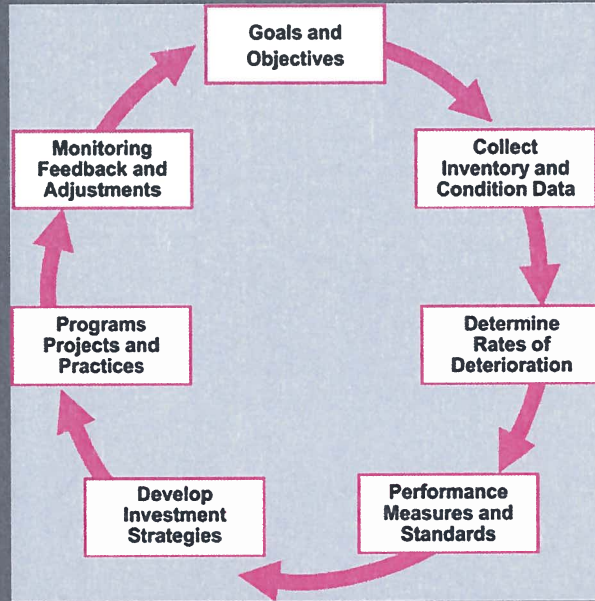
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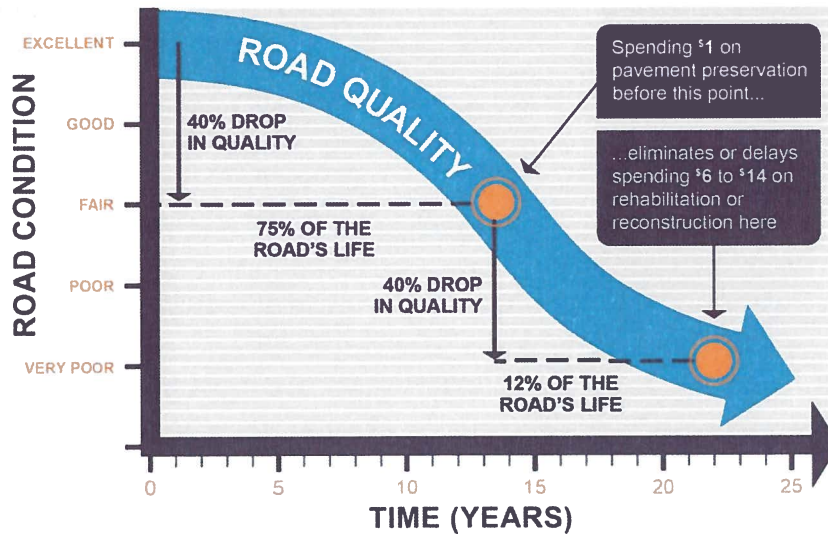
-  Asset Management
-  Program Development
-  Design Process
-  Construction Process
-  Standards and Warranties
-  Maintaining Roads
-  Concluding Thoughts

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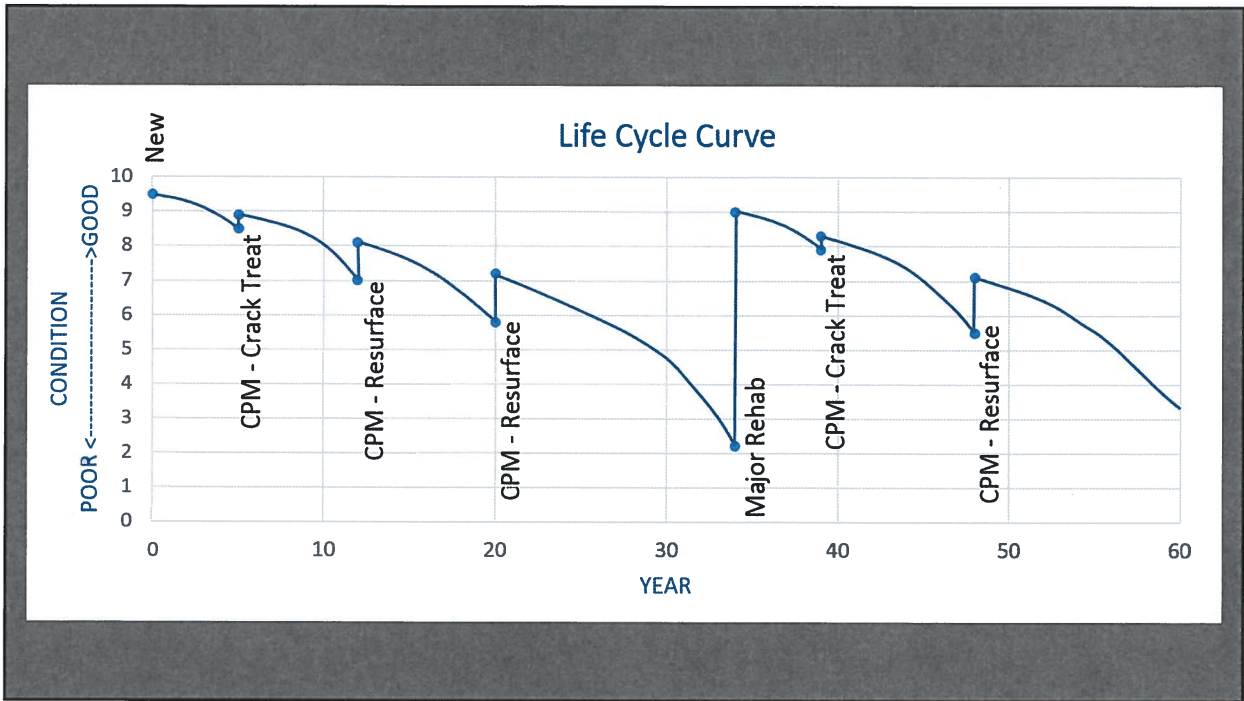
# Asset Management Cycle



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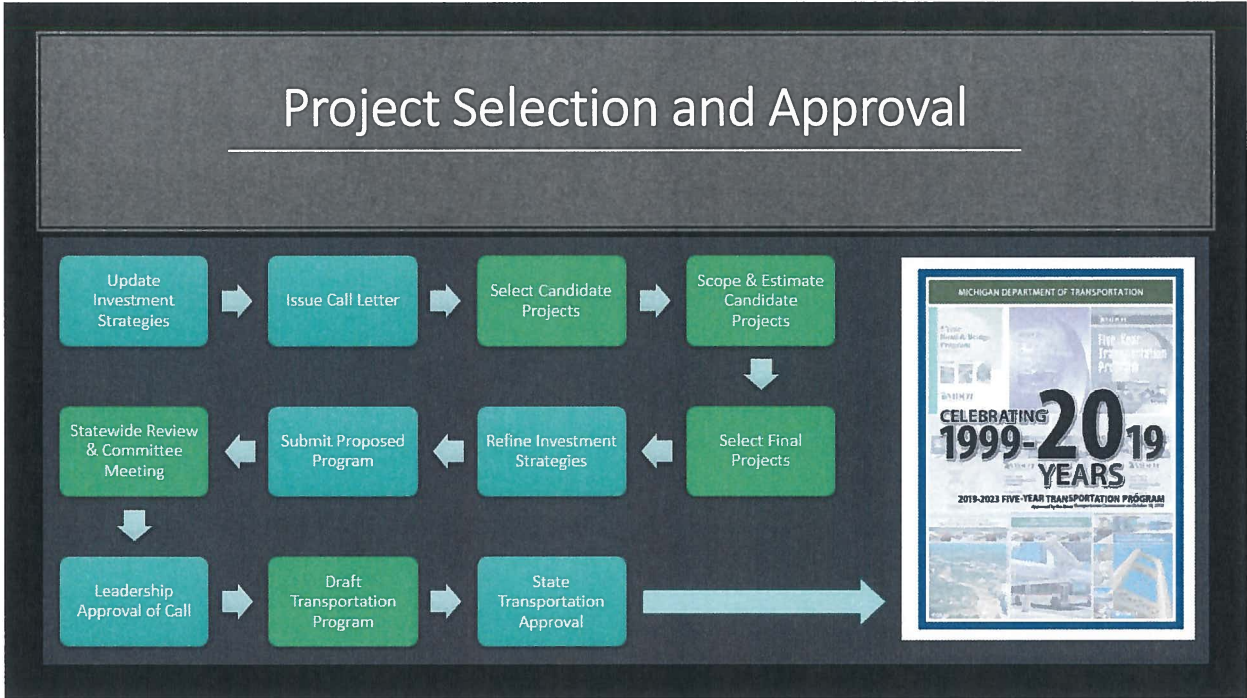
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## Fix Types

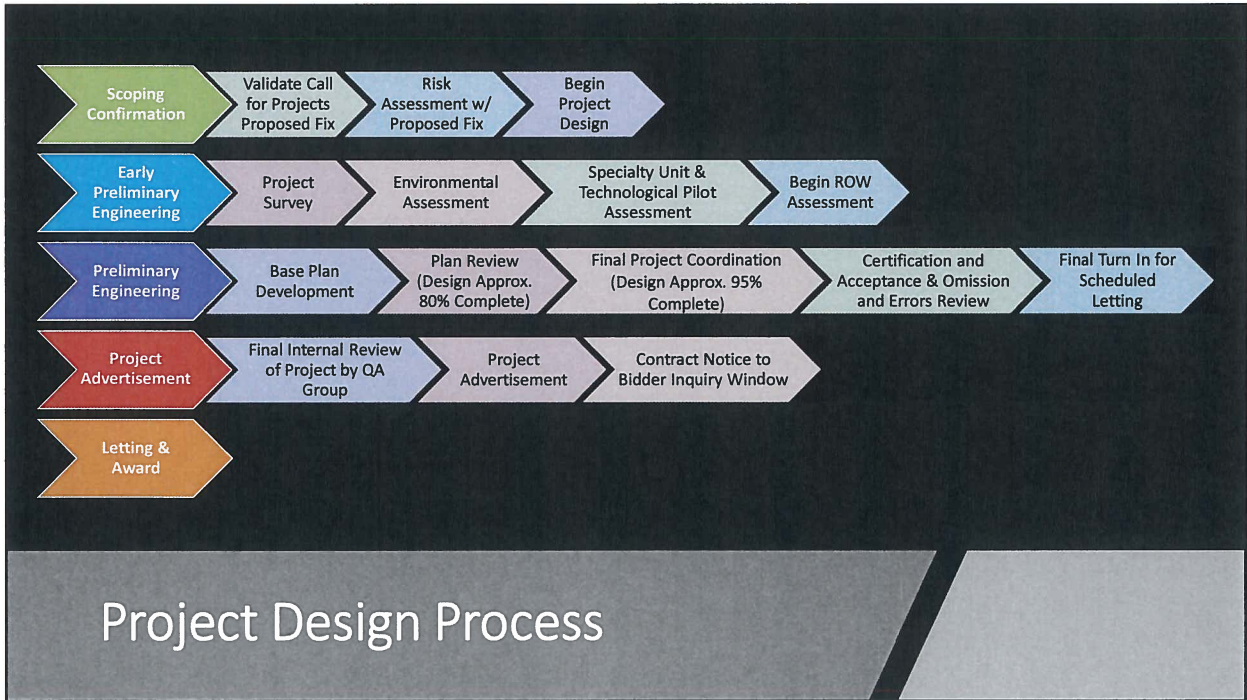
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Reconstruction	Major Rehabilitation	Minor Rehabilitation	Capital Preventive Maintenance
<ul style="list-style-type: none"> <li>Jointed Plan Concrete</li> <li>Hot Mix Asphalt (HMA)</li> </ul>	<ul style="list-style-type: none"> <li>Unbonded Concrete Overlay</li> <li>Rubblize &amp; HMA Overlay</li> <li>Crush &amp; Shape &amp; HMA Overlay</li> </ul>	<ul style="list-style-type: none"> <li>Pavement Repair &amp; HMA Resurfacing (Milling as Needed)</li> <li>Ultra-thin Concrete Overlay</li> </ul>	<ul style="list-style-type: none"> <li>Single Course HMA Mill &amp; Overlay</li> <li>Ultra-thin HMA</li> <li>Microsurface</li> <li>Chip Seals</li> <li>Concrete Repair</li> <li>Crack Sealing</li> </ul>

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## Design Project Scheduling & Resources

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- Pre-Construction Project Management Tool (Planisware)
  - Project Level Critical Path Schedules
  - Task Level Resource Allocation Planning
  - Monitor and Analyze Both Program and Individual Project Status



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## Design Related Work

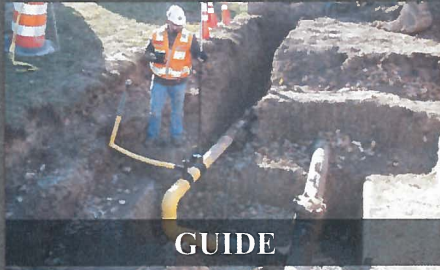
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- Real Estate
- Environmental Clearance
- Utility Coordination & Relocation
- Maintaining Traffic
- Public & Stakeholder Engagement



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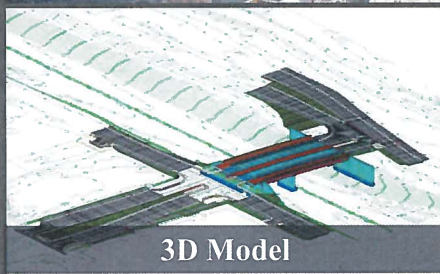
## Design Technology Innovations



GUIDE



LiDAR



3D Model

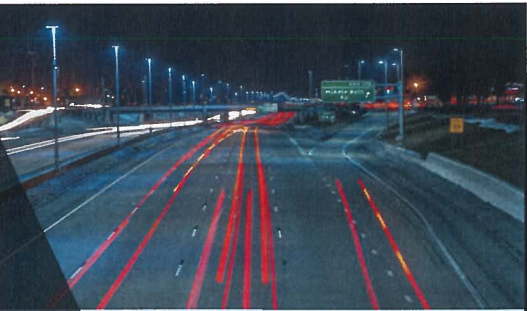


Automated Machine Guidance

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## Innovative Contracting

- Construction Manager/General Contractor (CMGC)
- Design-Build
- Job Order Contracting
- Fixed Price/Variable Scope (FPVS)
- Alternate Pavement Bidding
- Alternate Technical Concepts
- Public Private Partnerships



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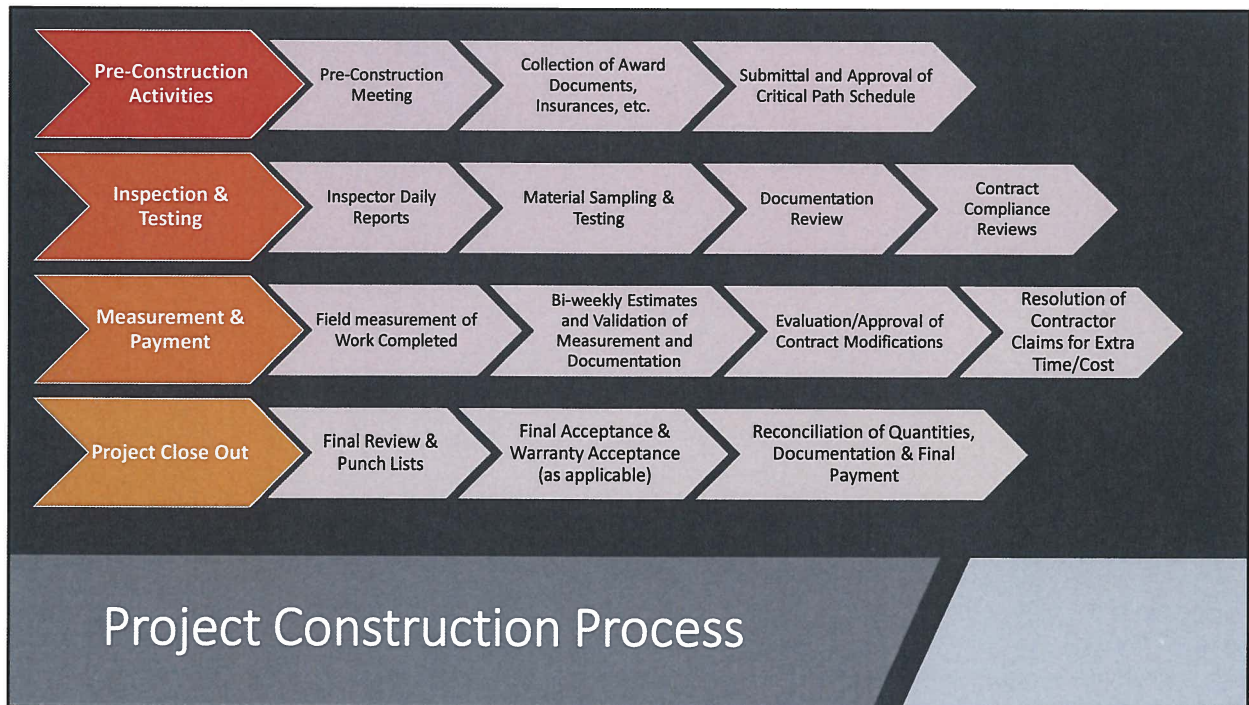
FY 2018 Program	Program Value	Variance
Engineer's Estimate	\$594,494,554.48	
As-Bid Cost	\$580,389,620.66	-2.4%
As-Built Final Cost	\$573,368,069.71	-1.2%

Section 613 Reporting	Design Projects	Design Costs
MDOT Performed	117 (64%)	\$20,670,437.34 (36%)
Consultant Performed	67 (36%)	\$36,490,717.47 (64%)
Total	184 (100%)	\$57,161,154.81 (100%)

## Design Effectiveness

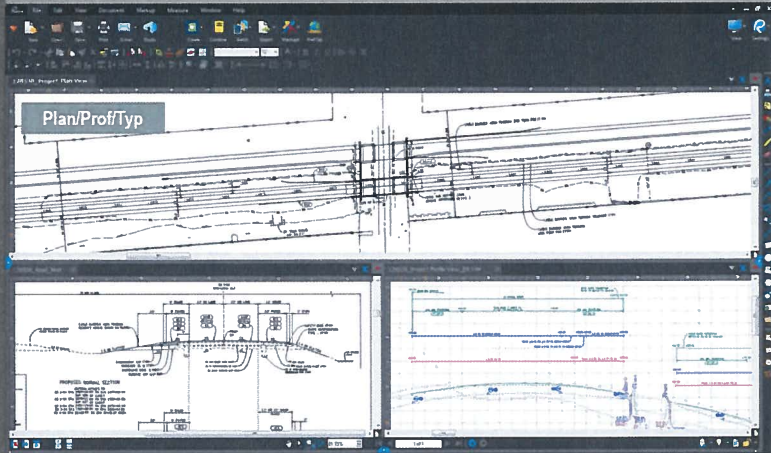
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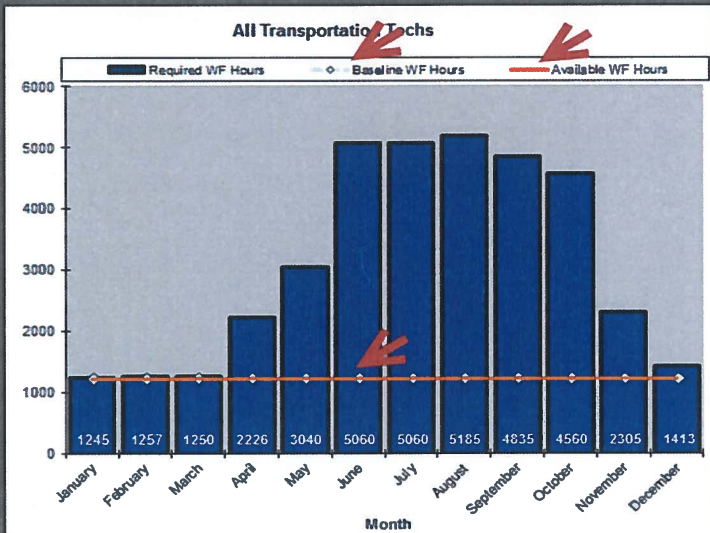
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## Construction Process Innovations

- E-Construction
- Value Engineering Change Proposals
- Dispute Review Boards
- Collaborative Environment (Bluebeam Reviews)
- Incentives and Disincentives



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## Construction Engineering and Inspection Oversight

MDOT validates project staffing needs through the use of an in-house work force planning tool which includes consultant staffing support.

CEI Resource	Portion of Program
MDOT Only	30%
Consultant Only	20%
MDOT & Consultant	50%

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## Construction Engineering and Inspection Performance

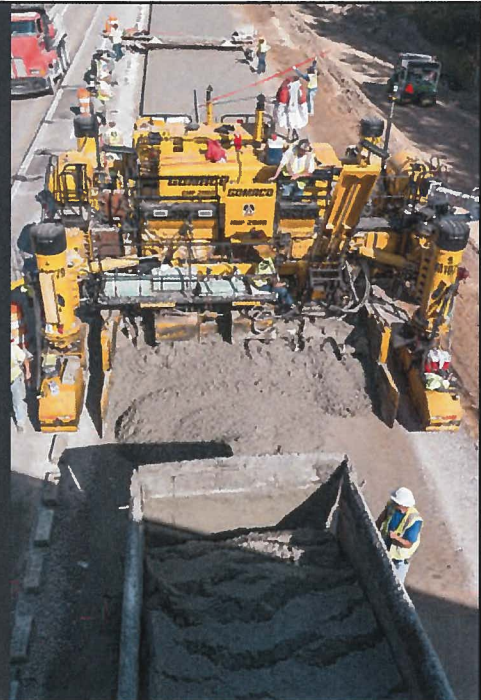
### Five Year Summary of MDOT Projects

Calendar Year	Original Contract Cost	Final Contract Cost	Percent Difference
2014	\$645,898,553.12	\$649,413,716.71	0.54%
2015	\$709,329,893.84	\$712,559,685.99	0.46%
2016	\$690,303,760.44	\$704,409,643.58	2.04%
2017	\$865,144,563.78	\$862,462,531.03	-0.31%
2018	\$625,072,360.55	\$634,821,481.36	1.56%

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## Pavement and Material Standards

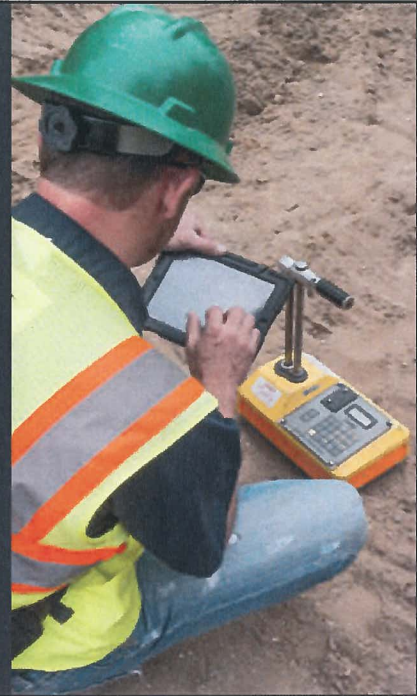
- MDOT's Standard Specifications are based on National Standards – AASHTO
- MDOT includes warranty requirements on most of its pavement projects.
- MDOT uses Quality Materials that are Locally and Regionally Supplied
- Specifications Require Materials to be Tested for Various Properties
- MDOT Innovations and Research



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# Pavement and Material Testing

- Aggregate Gradation & Quality
- Density of Compacted Materials
- Qualified Materials List
- Paving (HMA & Concrete)
  - Contractor QC, Owner QA
  - Percent Within Limits (PWL)
- Training & Certification of Testers
- Certification of Laboratories



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Hot Mix Asphalt	Portland Cement Concrete
Warm Mix Asphalt	Alkali Silica Reactivity (ASR) Mitigation Measures
Recycled Rubber	Rapid Set & Precast Concrete Repairs
Recycled Shingles	Super Air Meter
Longitudinal Joint Density Specification	Resistivity Testing
	Stringless Paving

## Paving and Material Innovations

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# Warranties

Distress thresholds for the specifications are based on Michigan pavement performance data  
 Contractor must carry a Warranty Bond for the life of the warranty  
 Contractor may add risk cost to their unit bid prices

4,235 Warranties since 1997  
 533 Active Warranties  
 13.4% have required corrective action



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## 2 Year Warranties

- Chip Seals
- Micro-Surfacing
- Ultra-Thin Overlays
- Hot Mix Asphalt Crack Treatment
- Bridge Painting
- Concrete Surface Coating



## 3 Year Warranties

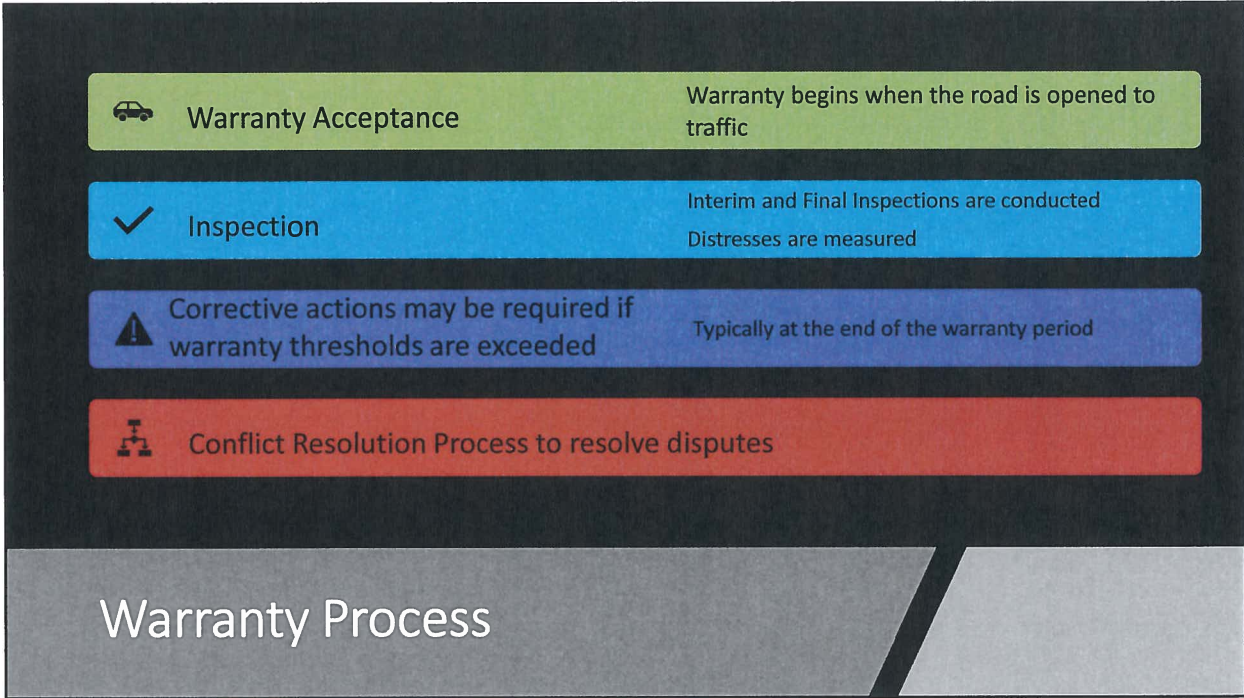
- Non-Structural Hot Mix Asphalt Overlays
- Cold Mill and Hot Mix Asphalt Resurfacing
- Paver Placed Surface Seal



## 5 Year Warranties

- New Pavement
- Rubblize & Overlay
- Crush & Shape & Overlay
- Multiple Course Hot Mix Asphalt Overlay
- Cold Mill and Multiple Course Hot Mix Asphalt Overlay
- Bridge Deck Overlays

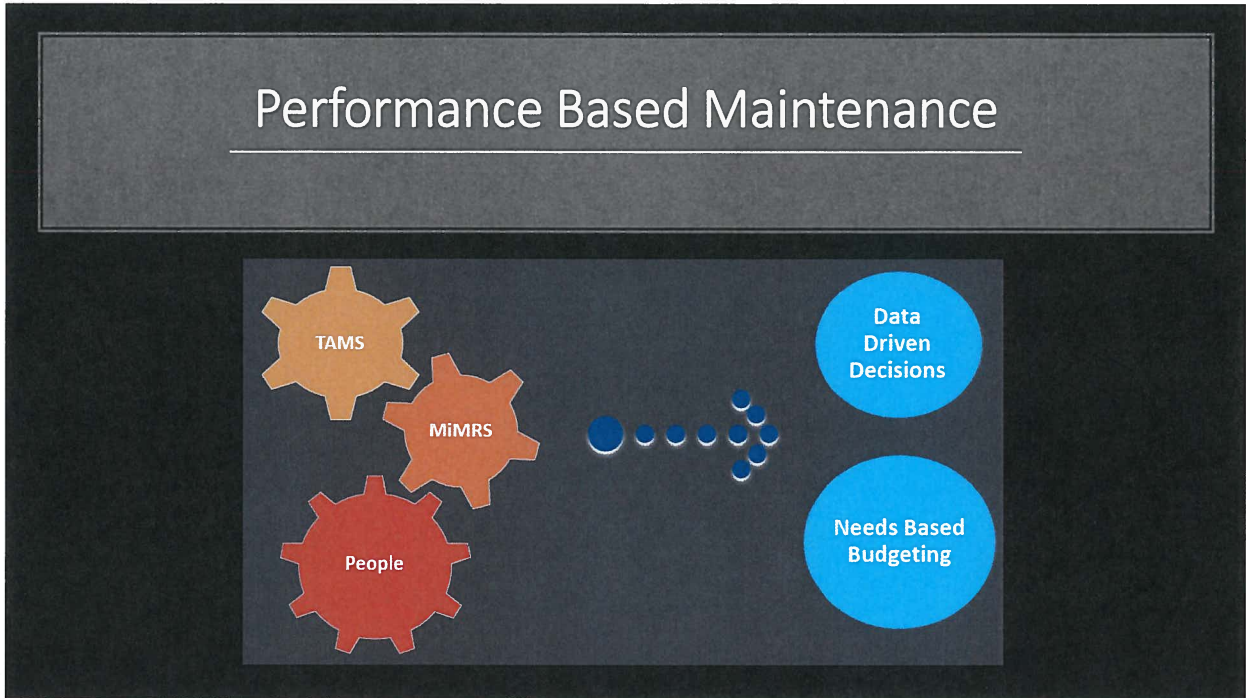
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Questions?

Tony Kratofil, PE  
Chief Engineer & Chief Operating Officer

The slide features a large white circle on a dark grey background. Inside the circle, the word 'Questions?' is written in a large, bold, black font. Below it, the name 'Tony Kratofil, PE' and title 'Chief Engineer & Chief Operating Officer' are listed. At the bottom of the circle is the MDOT logo, which includes a green outline of Michigan and the text 'MDOT Michigan Department of Transportation'.

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