

Pavement Marking Decision Tree – Project Level

For a new surface or replacing existing markings with a different material



START →



Prepared by the:

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How to use the Tool:

This Tool serves as a guide to assist agencies in understanding their options and determining which pavement marking material may be considered for a new surface or when replacing existing markings with a different material. That said, no one size fits all. Engineers should use their engineering judgment and seek expert advice when necessary.

Questions on pavement markings may be forwarded to MnDOT's Pavement Markings and Crashworthy Devices Engineer.

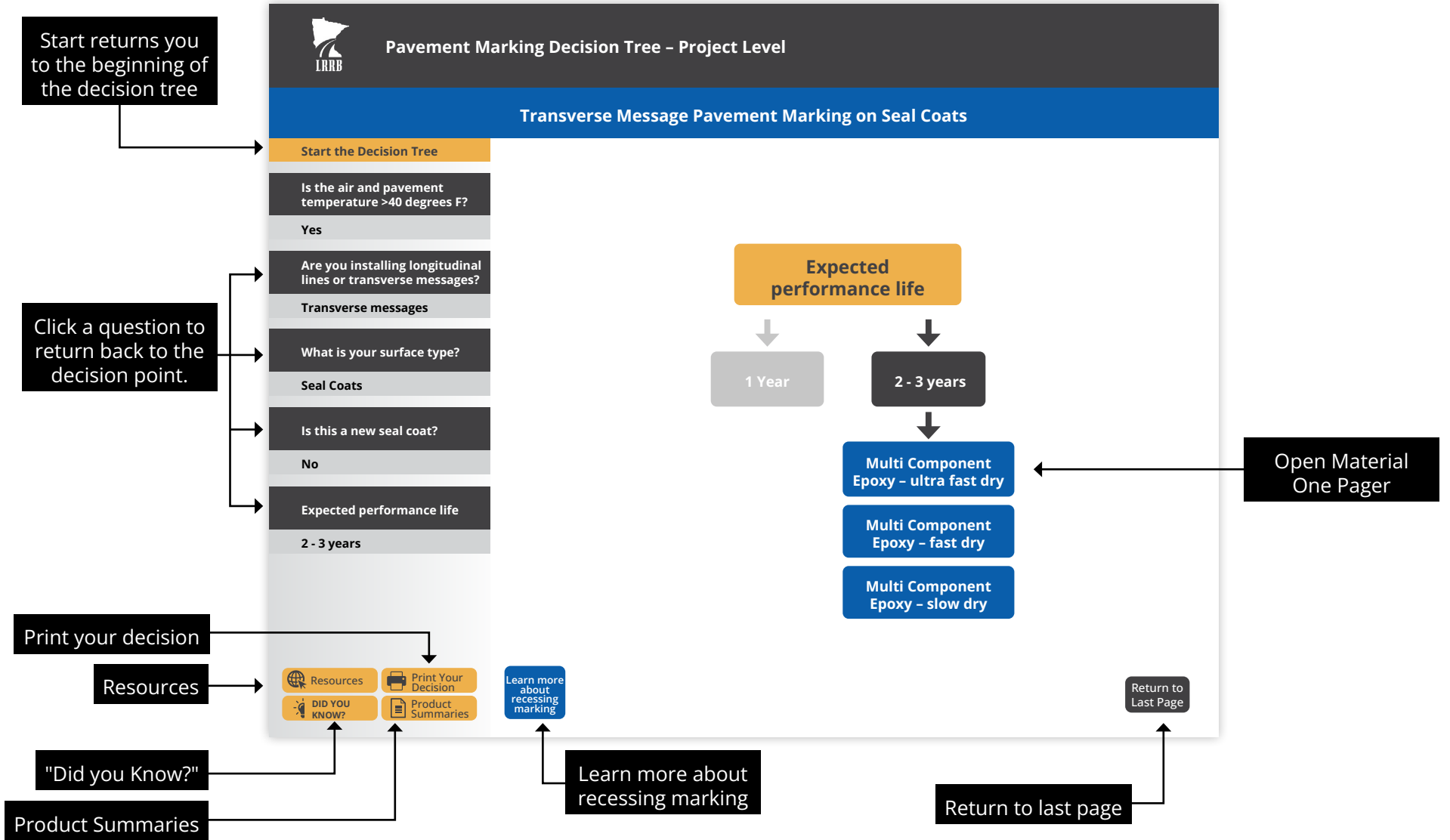
Phone: 651-234-7380

www.dot.state.mn.us/trafficeng/contacts.html



Pavement Marking Decision Tree - Project Level

How to Navigate the Tool





START



Is the air and pavement temperature >40 degrees F?



Yes



No

(Click "yes" or "no")



Pavement Marking Decision Tree – Project Level

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

No

MnDOT QPL approved?




Yes



No

 Resources

 DID YOU KNOW?

 Product Summaries



Pavement Marking Decision Tree – Project Level

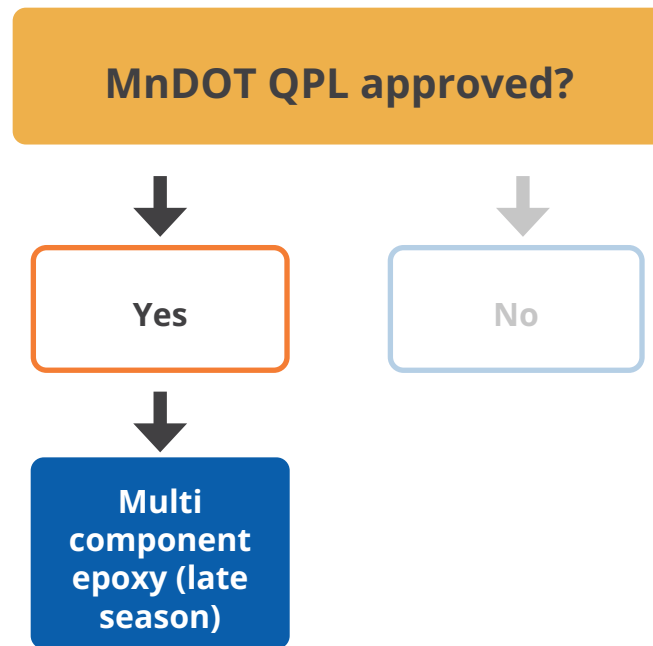
Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

No


MnDOT QPL approved?

Yes



 Resources

 Print Your Decision

 DID YOU KNOW?

 Product Summaries



Pavement Marking Decision Tree – Project Level

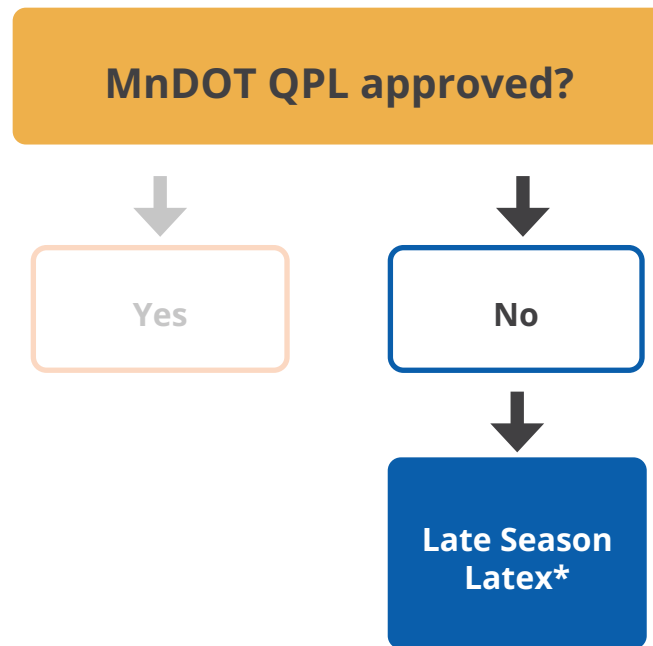
Start the Decision Tree


Is the air and pavement temperature >40 degrees F?

No


MnDOT QPL approved?


No



 Resources

 Print Your Decision

 DID YOU KNOW?

 Product Summaries

*Late Season Latex has not been accepted by MnDOT



Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

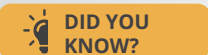
Are you installing longitudinal lines or transverse messages?



Longitudinal Lines



Transverse Messages





Longitudinal Pavement Marking

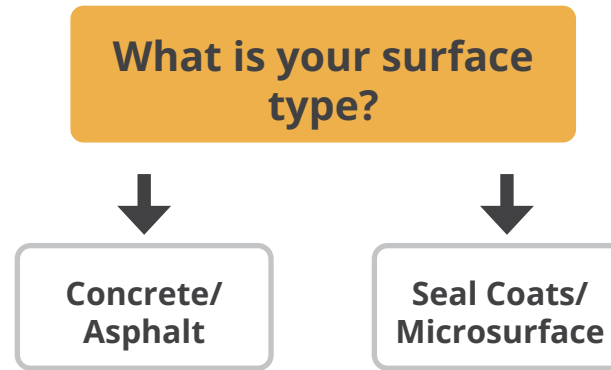
Start the Decision Tree


Is the air and pavement temperature >40 degrees F?


Yes


Are you installing longitudinal lines or transverse messages?

Longitudinal Lines



 Resources

 DID YOU KNOW?

 Product Summaries



Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?





Yes
(recessed
marking)



No

 Resources

 DID YOU KNOW?

 Product Summaries

Learn more about recessing marking

For more information on wet recoverable, see Q5 under "[Did you Know](#)"



Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

No

Do you want enhanced service life by recessing?




Yes
(recessed marking)



No

 Resources

 DID YOU KNOW?

 Product Summaries

Learn more about recessing marking

Recessing pavement marking materials below the surface of the roadway provides protection from snow plowing operations and traffic wear, which extends the life and improves performance of all pavement marking materials.



Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?


No

Do you want enhanced service life by recessing?

No



 Resources

 DID YOU KNOW?

 Product Summaries



Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

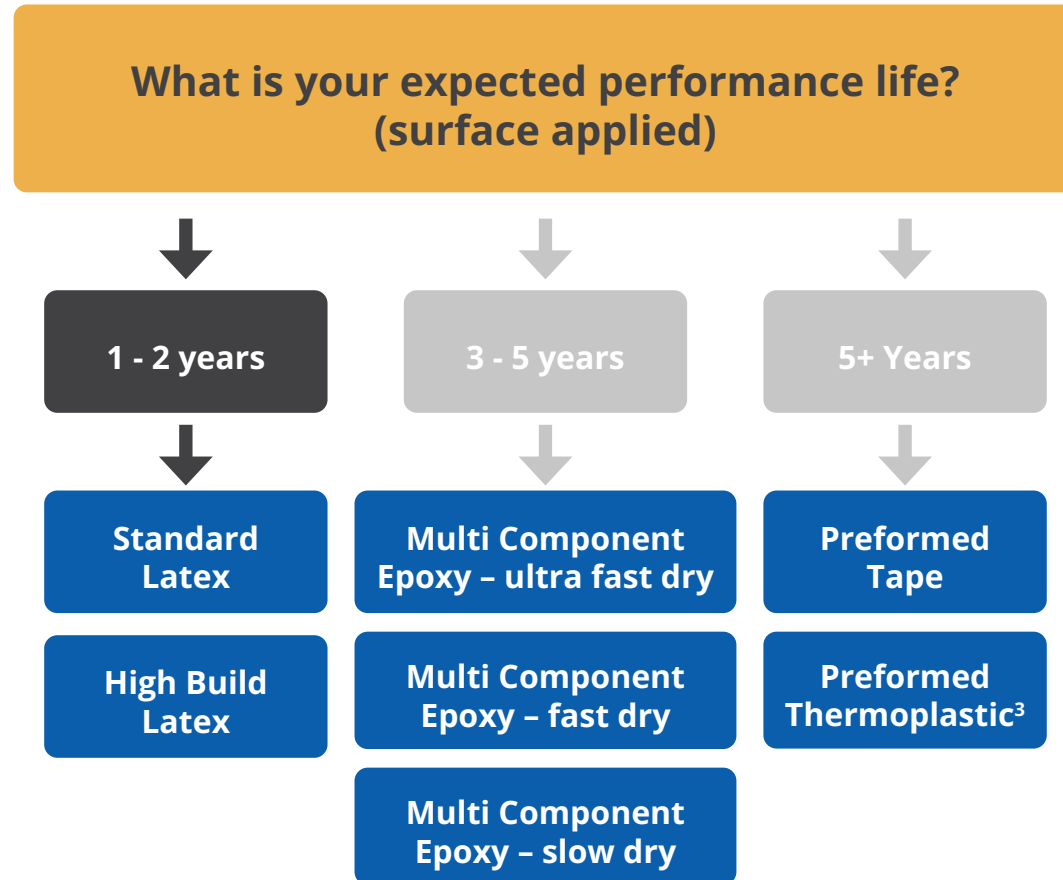
No

Do you want enhanced service life by recessing?

No

What is your expected performance life? (recessed application)

1 - 2 years



³ Preformed Thermoplastic has reflective elements in material. Thermoplastics are not considered to be wet reflective or wet recoverable markings.



Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

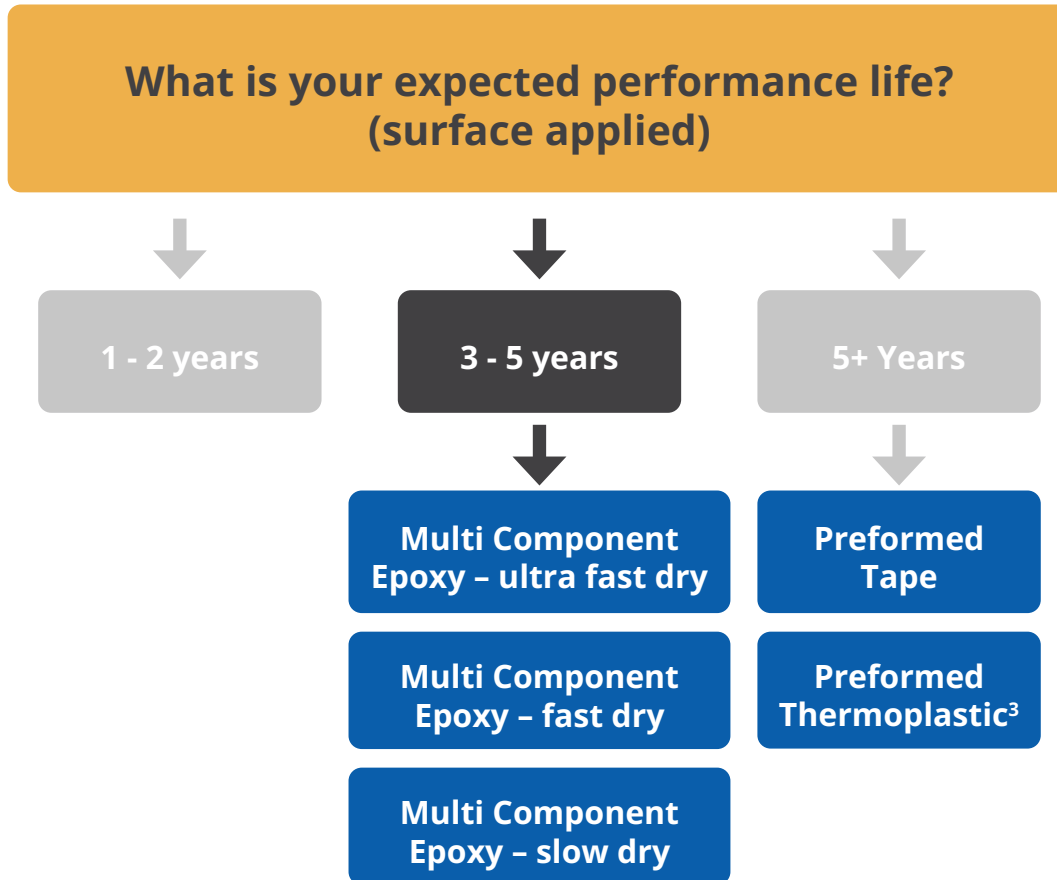
No

Do you want enhanced service life by recessing?

No

What is your expected performance life? (recessed application)

3 - 5 years



Resources

Print Your Decision

DID YOU KNOW?

Product Summaries

³ Preformed Thermoplastic has reflective elements in material. Thermoplastics are not considered to be wet reflective or wet recoverable markings.



Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

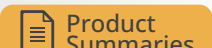
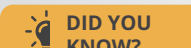
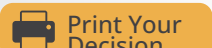
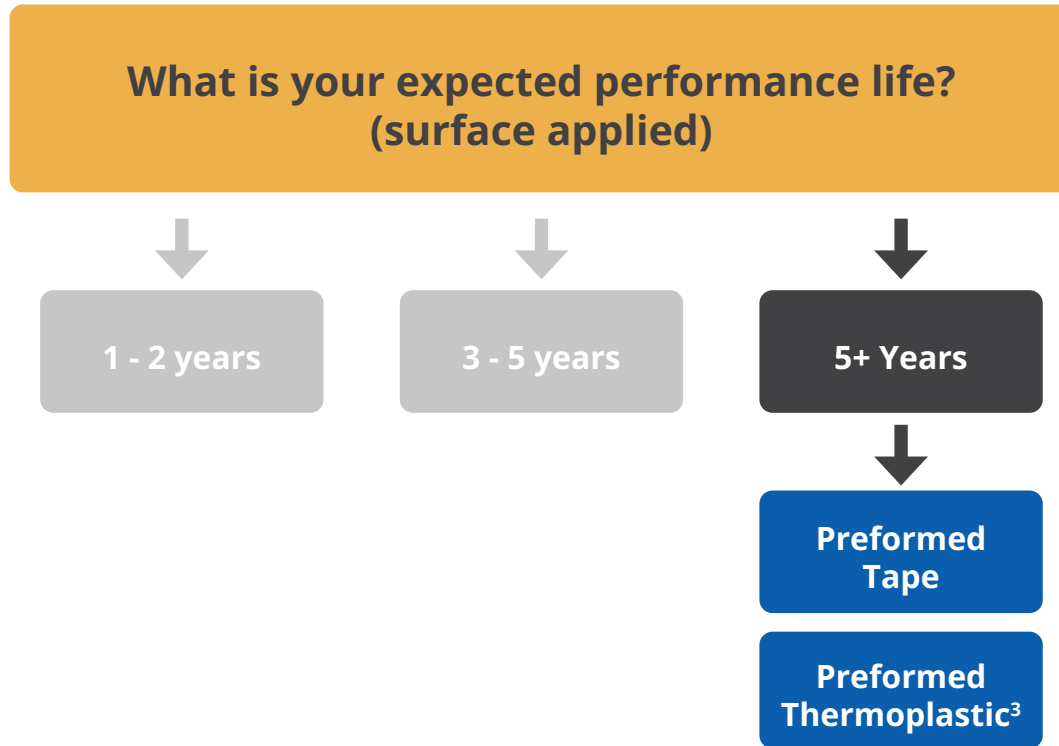
No

Do you want enhanced service life by recessing?

No

What is your expected performance life? (recessed application)

5+ years



³ Preformed Thermoplastic has reflective elements in material. Thermoplastics are not considered to be wet reflective or wet recoverable markings.



Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

No

Do you want enhanced service life by recessing?

Yes

What is your expected performance life?
(recessed application)



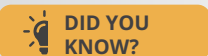
1- 3 years



4 - 7 years



7+ Years





Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

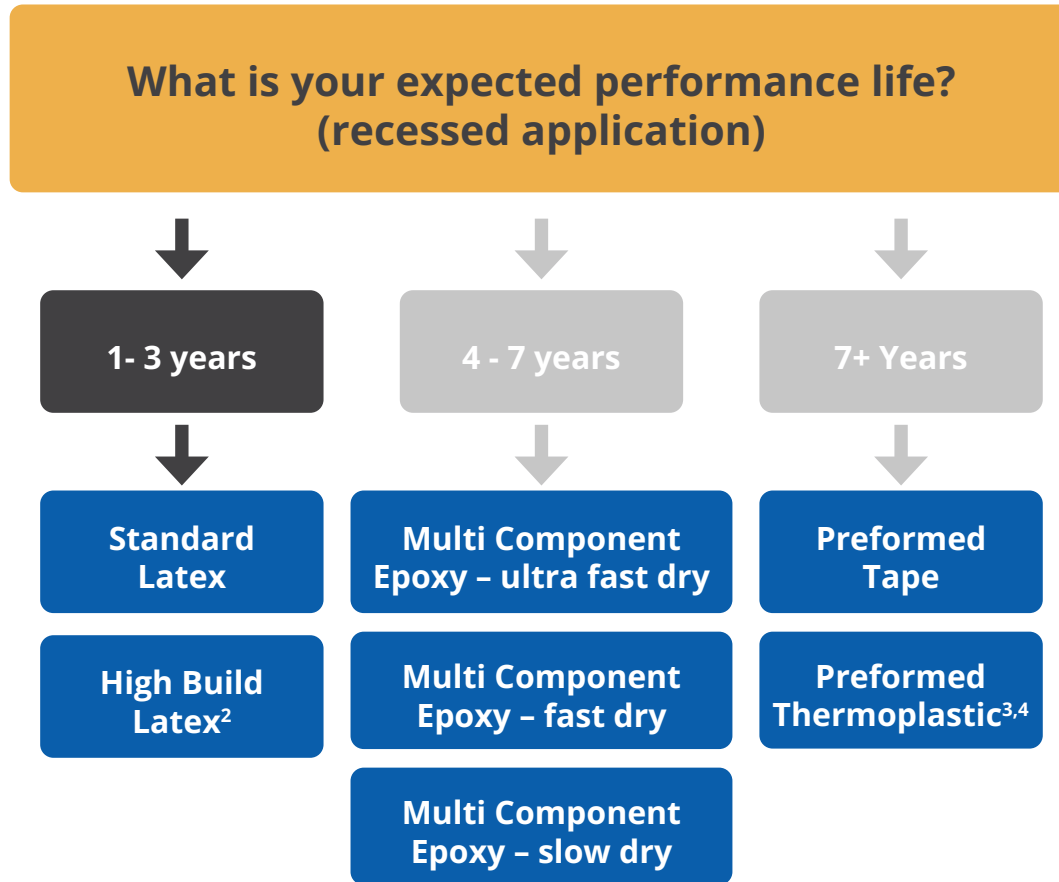
No

Do you want enhanced service life by recessing?

Yes

What is your expected performance life? (recessed application)

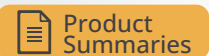
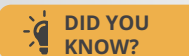
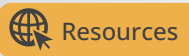
1- 3 years



² High Build Latex paint can include wet reflective or recoverable elements.

³ Preformed Thermoplastic has reflective elements in material. Thermoplastics are not considered to be wet reflective or wet recoverable markings.

⁴ Preformed thermoplastic is not typically used on longitudinal lines due to intensive application process. Short lengths may be considered.





Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

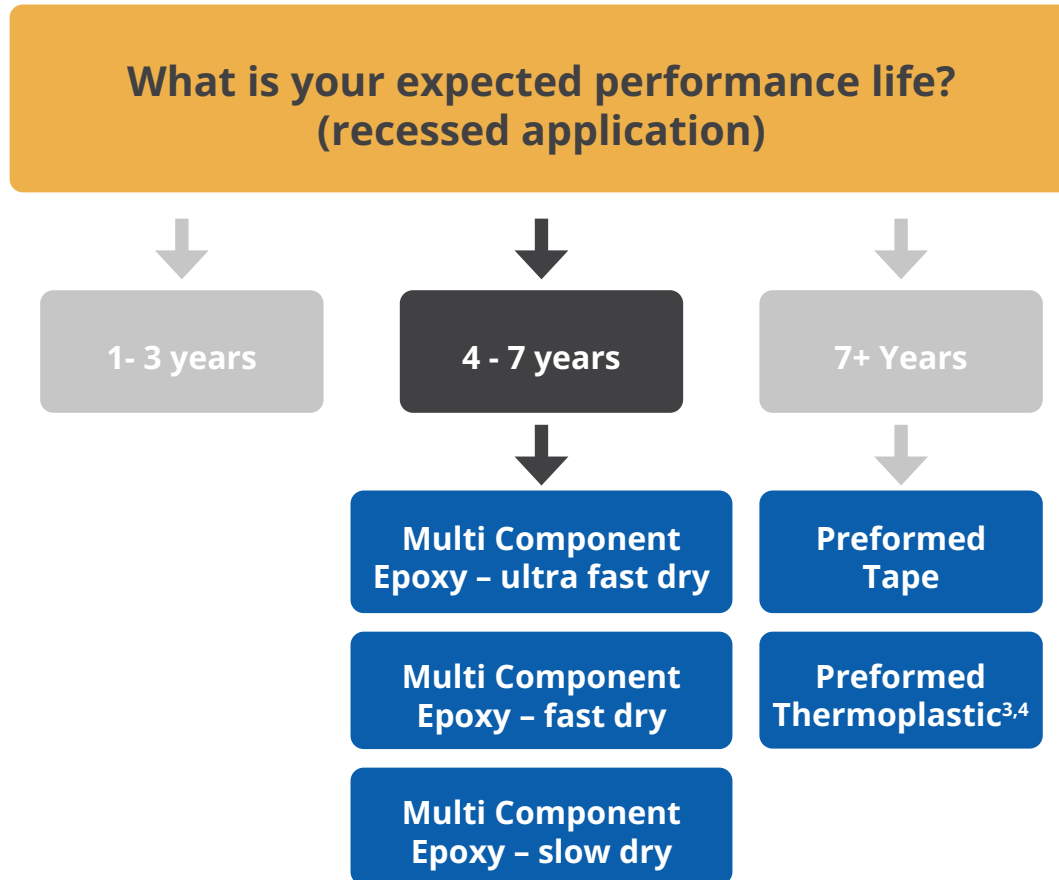
No

Do you want enhanced service life by recessing?

Yes

What is your expected performance life? (recessed application)

4 - 7 years



Resources

Print Your Decision

DID YOU KNOW?

Product Summaries

³ Preformed Thermoplastic has reflective elements in material. Thermoplastics are not considered to be wet reflective or wet recoverable markings.

⁴ Preformed thermoplastic is not typically used on longitudinal lines due to intensive application process. Short lengths may be considered.



Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

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Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

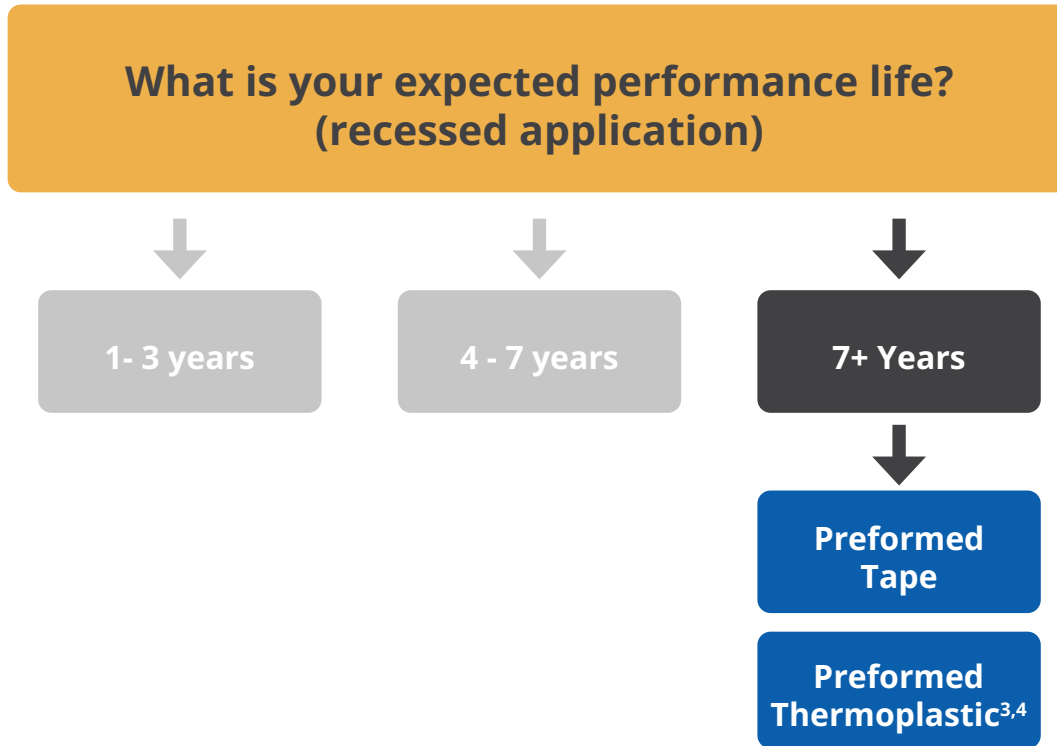
No

Do you want enhanced service life by recessing?

Yes

What is your expected performance life? (recessed application)

7+ years



Resources

Print Your Decision

³ Preformed Thermoplastic has reflective elements in material. Thermoplastics are not considered to be wet reflective or wet recoverable markings.

⁴ Preformed thermoplastic is not typically used on longitudinal lines due to intensive application process. Short lengths may be considered.

DID YOU KNOW?

Product Summaries



Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

Yes

What is your expected performance life?
(recessed application)



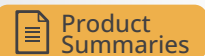
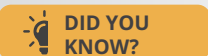
1- 3 years



4 - 7 years



7+ Years





Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

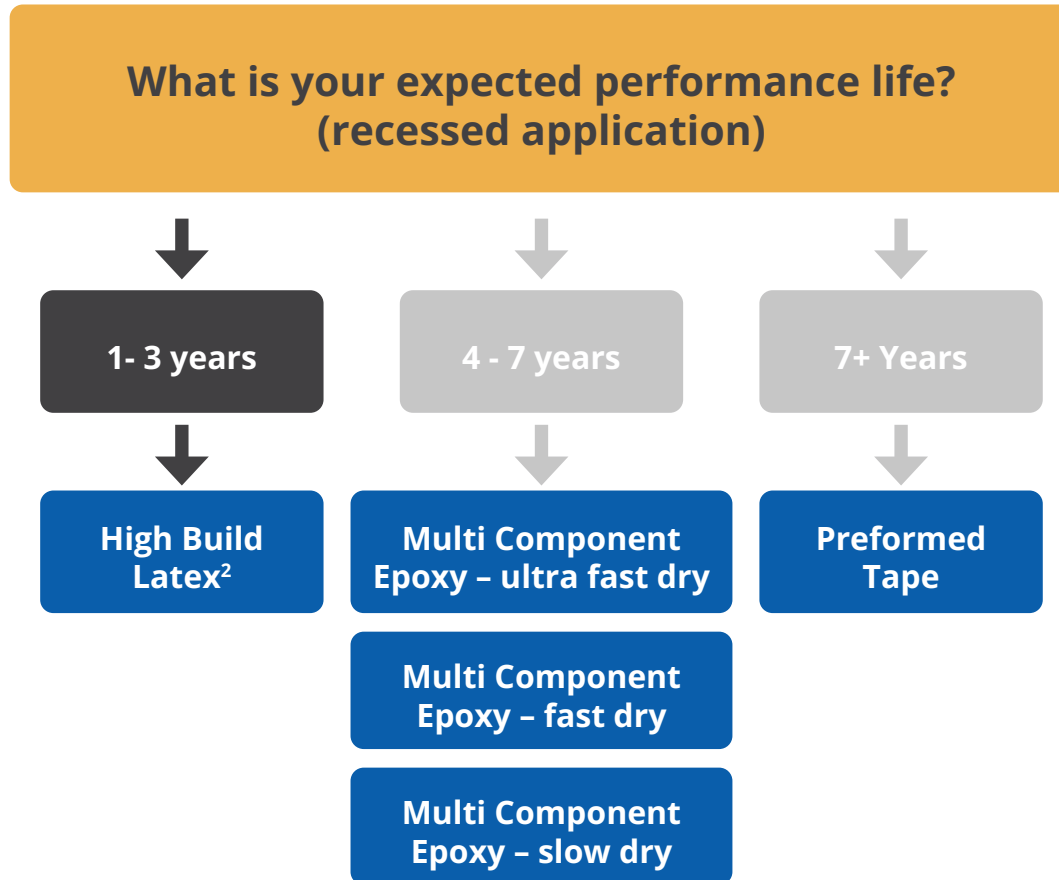
Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

Yes

What is your expected performance life? (recessed application)

1- 3 years



Resources

Print Your Decision

DID YOU KNOW?

Product Summaries

²High Build Latex paint can include wet reflective or recoverable elements.



Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

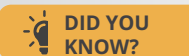
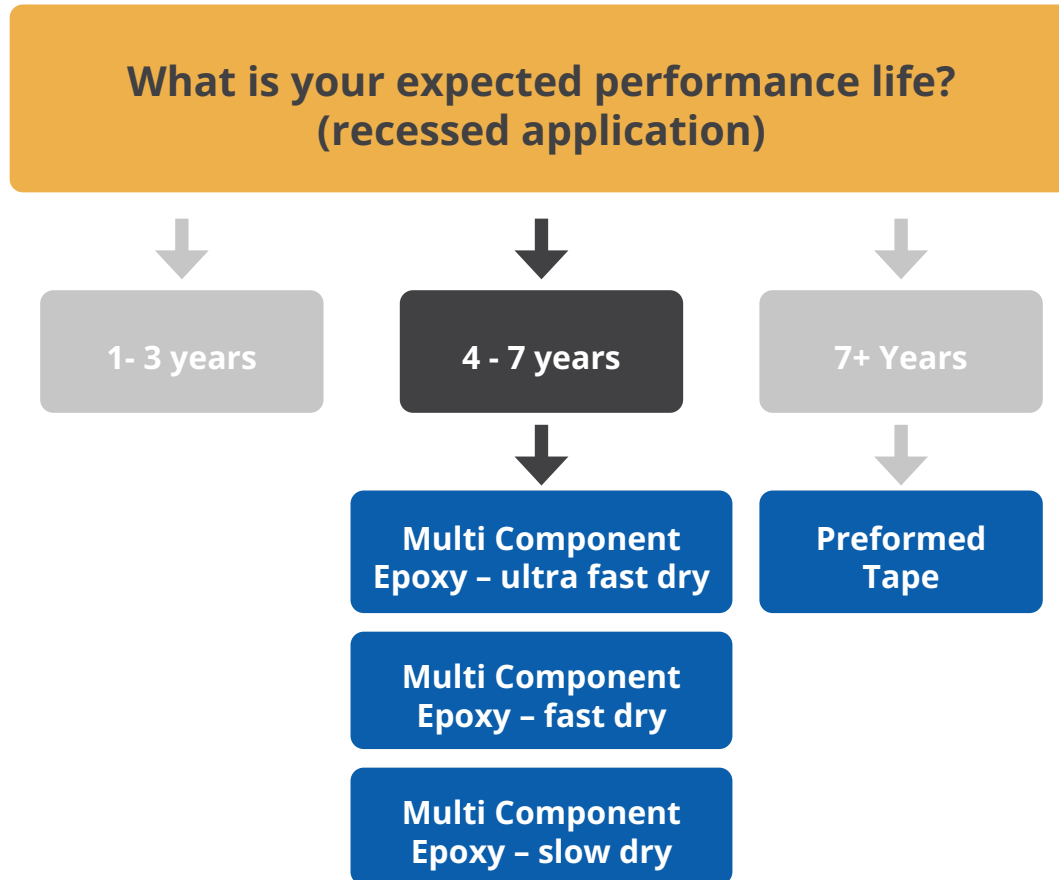
Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

Yes

What is your expected performance life? (recessed application)

4 - 7 years





Longitudinal Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Concrete/Asphalt

Do you want wet recoverable or wet reflective markings?

Yes

What is your expected performance life? (recessed application)

7+ years

What is your expected performance life?
(recessed application)

1- 3 years

4 - 7 years

7+ Years

Preformed
Tape

 Resources

 Print Your Decision

 DID YOU KNOW?

 Product Summaries



Longitudinal Pavement Marking on Seal Coats/Microsurface

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Seal Coats/Microsurface

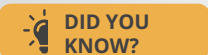
Is this a new seal coat/
microsurface?



Yes



No





Longitudinal Pavement Marking on Seal Coats/Microsurface

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Seal Coats/Microsurface

Is this a new seal coat/microsurface?

Yes

Expected performance life

1 year life

Expected performance life

1 year life

Standard Latex

High Build Latex



Resources



Print Your Decision



DID YOU KNOW?



Product Summaries



Longitudinal Pavement Marking on Seal Coats/Microsurface

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Seal Coats/Microsurface

Is this a new seal coat/microsurface?

No

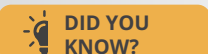
Expected performance life



1 year



2 - 3 years





Longitudinal Pavement Marking on Seal Coats/Microsurface

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Seal Coats/Microsurface

Is this a new seal coat/microsurface?

No

Expected performance life

1 year

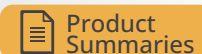
Expected performance life

1 year

2 - 3 years

Standard Latex

High Build Latex





Longitudinal Pavement Marking on Seal Coats/Microsurface

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Longitudinal Lines

What is your surface type?

Seal Coats/Microsurface

Is this a new seal coat/microsurface?

No

Expected performance life

2 - 3 years

Expected performance life

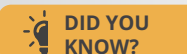
1 year

2 - 3 years

Multi Component Epoxy - ultra fast dry

Multi Component Epoxy - fast dry

Multi Component Epoxy - slow dry





Transverse Message Pavement Marking

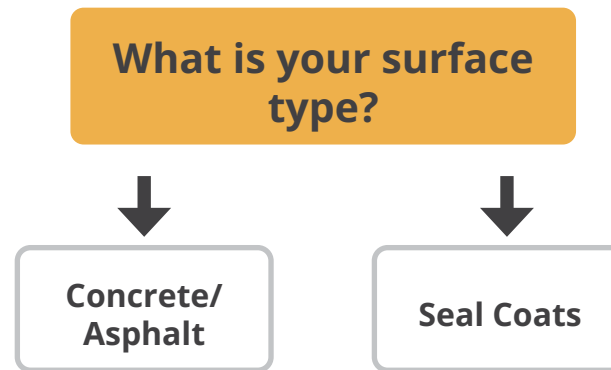
Start the Decision Tree


Is the air and pavement temperature >40 degrees F?


Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages



 Resources

 DID YOU KNOW?

 Product Summaries



Transverse Message Pavement Marking on Seal Coats

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes


Are you installing longitudinal lines or transverse messages?


Transverse messages

What is your surface type?

Seal Coats



 Resources

 DID YOU KNOW?

 Product Summaries

*Seal coats include chip seals and microsurfacing.



Transverse Message Pavement Marking on Seal Coats

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

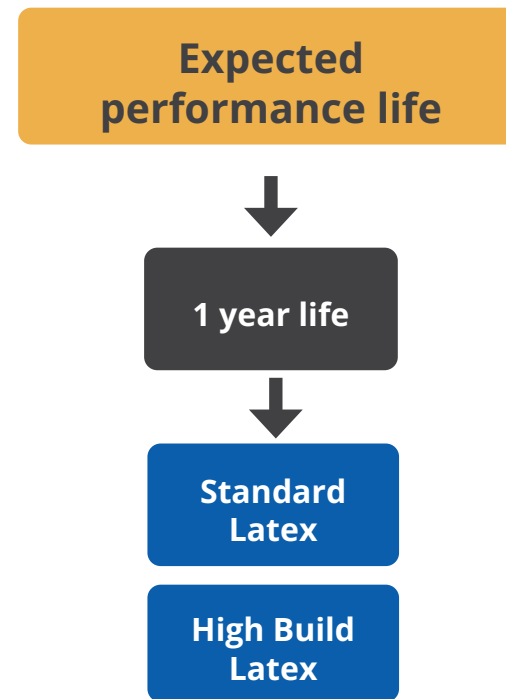
Seal Coats

Is this a new seal coat?

Yes

Expected performance life

1 year life



Print Your Decision



DID YOU KNOW?



Product Summaries



Transverse Message Pavement Marking on Seal Coats

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

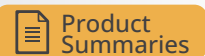
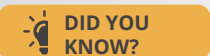
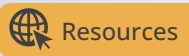
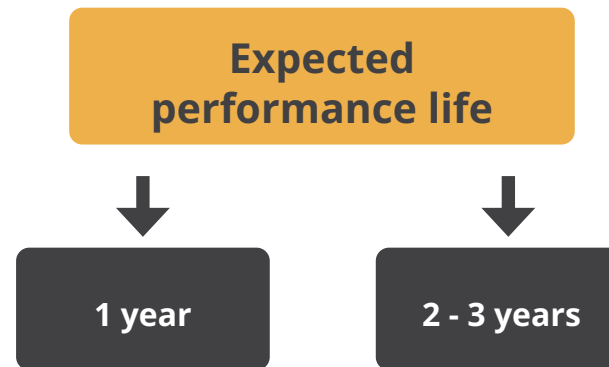
Transverse messages

What is your surface type?

Seal Coats

Is this a new seal coat?

No





Transverse Message Pavement Marking on Seal Coats

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

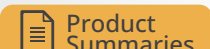
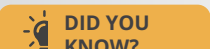
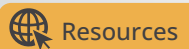
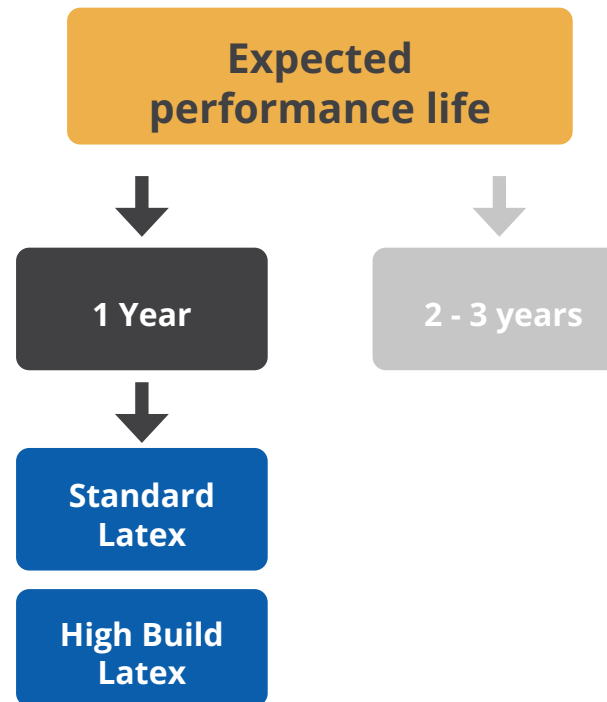
Seal Coats

Is this a new seal coat?

No

Expected performance life

1 year





Transverse Message Pavement Marking on Seal Coats

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

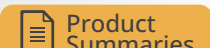
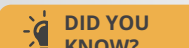
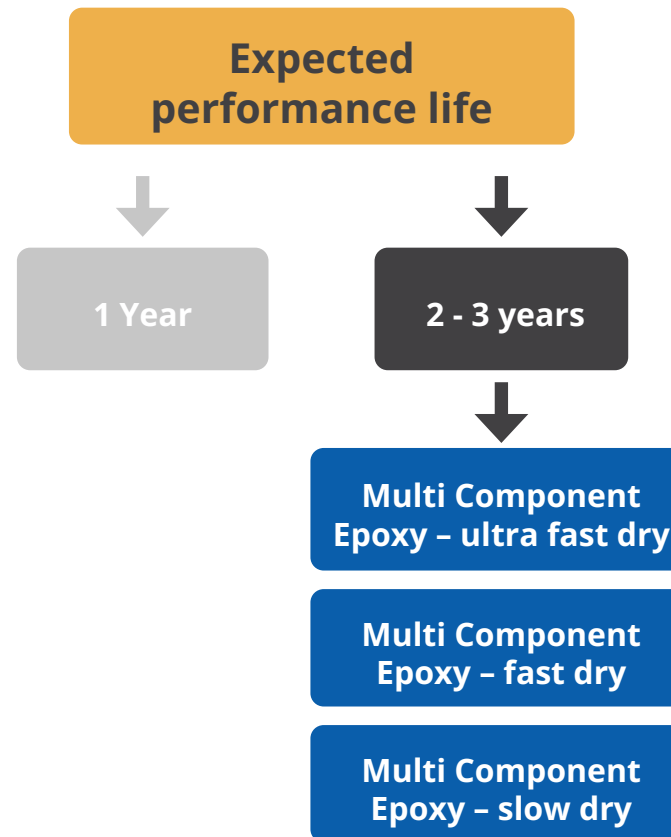
Seal Coats

Is this a new seal coat?

No

Expected performance life

2 - 3 years





Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

Concrete/Asphalt

Do you want wet reflective markings?




Yes
(recessed
marking)



No

 Resources

 DID YOU KNOW?

 Product Summaries

Learn more about recessing marking



Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

Concrete/Asphalt

Do you want wet reflective markings?

Yes

What is your expected performance life?
(recessed application)



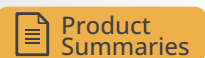
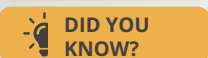
1 - 2 years



3 - 5 years



5+ Years





Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

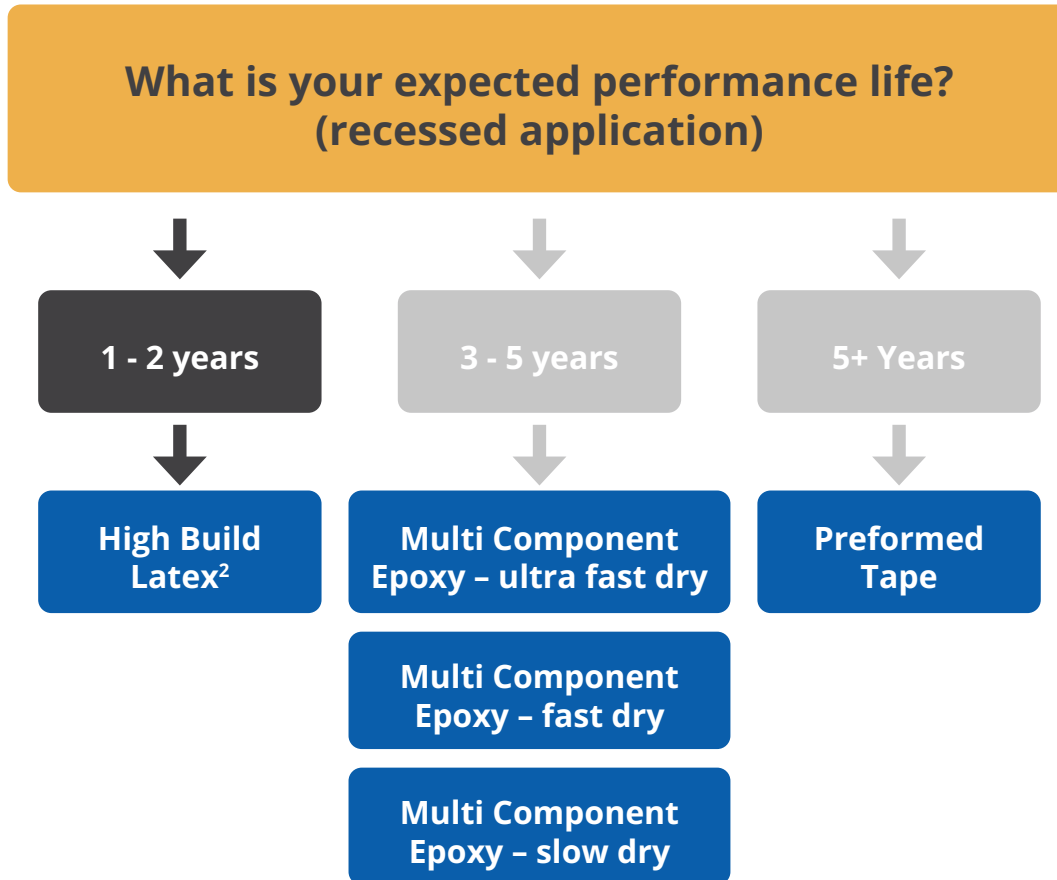
Concrete/Asphalt

Do you want wet reflective markings?

Yes

What is your expected performance life? (recessed application)

1 - 2 Years

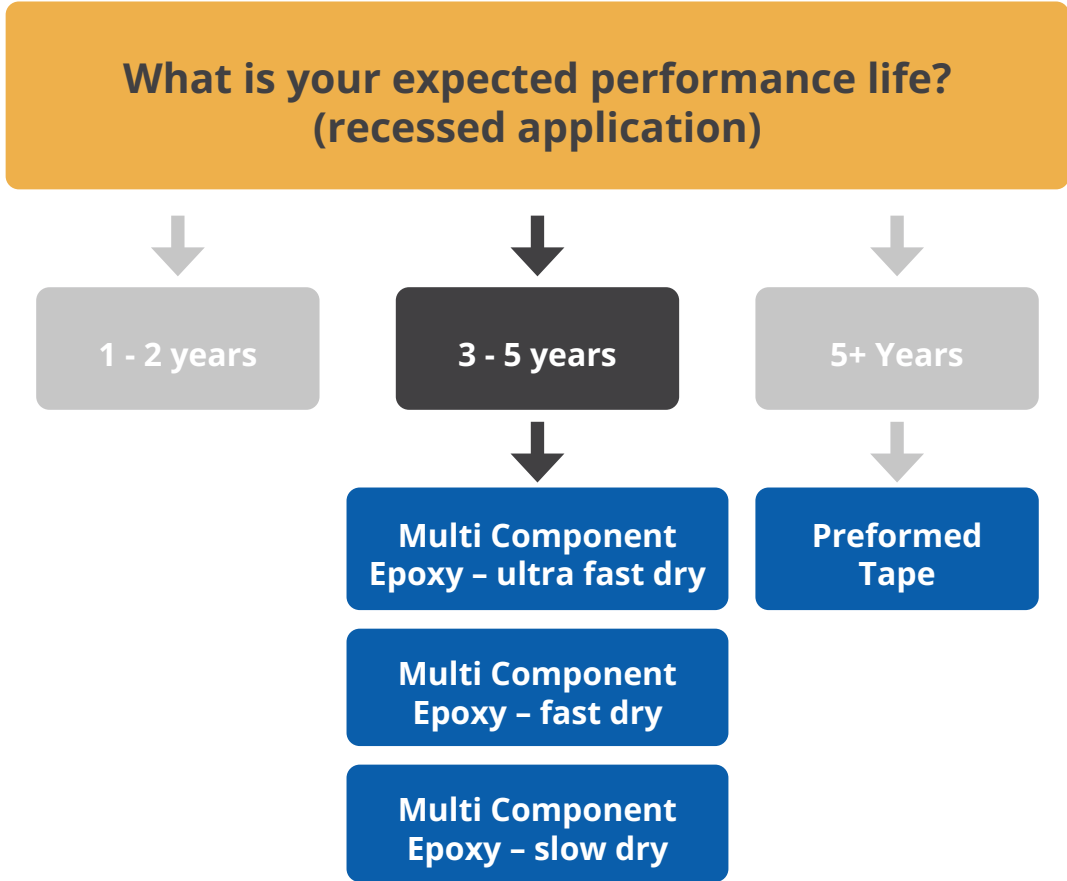


²High Build Latex paint can include wet reflective or recoverable elements.



Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree
Is the air and pavement temperature >40 degrees F?
Yes
Are you installing longitudinal lines or transverse messages?
Transverse messages
What is your surface type?
Concrete/Asphalt
Do you want wet reflective markings?
Yes
What is your expected performance life? (recessed application)
3 - 5 Years





Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

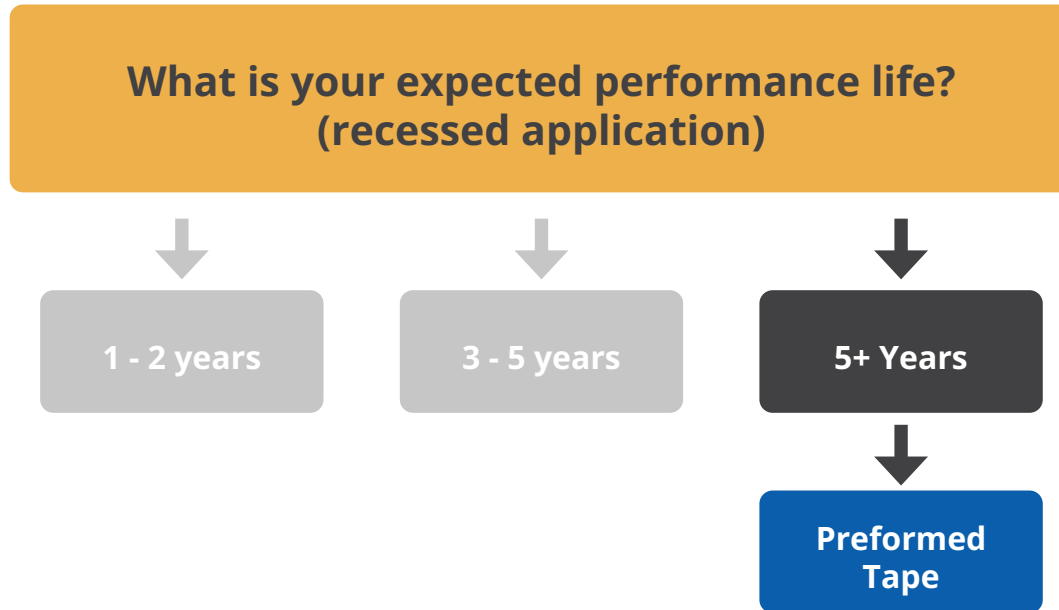
Concrete/Asphalt

Do you want wet reflective markings?

Yes

What is your expected performance life? (recessed application)

5+ Years



Resources

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Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

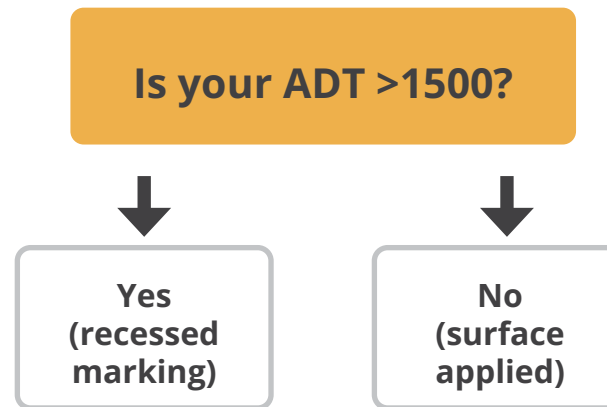
Transverse messages


What is your surface type?


Concrete/Asphalt


Do you want wet reflective markings?

No



 Resources

 DID YOU KNOW?

 Product Summaries

Learn more about recessing marking



Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

Concrete/Asphalt

Do you want wet reflective markings?

No

Is your ADT >1500?

Yes



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Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

Concrete/Asphalt

Do you want wet reflective markings?

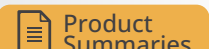
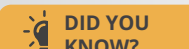
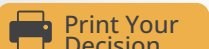
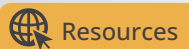
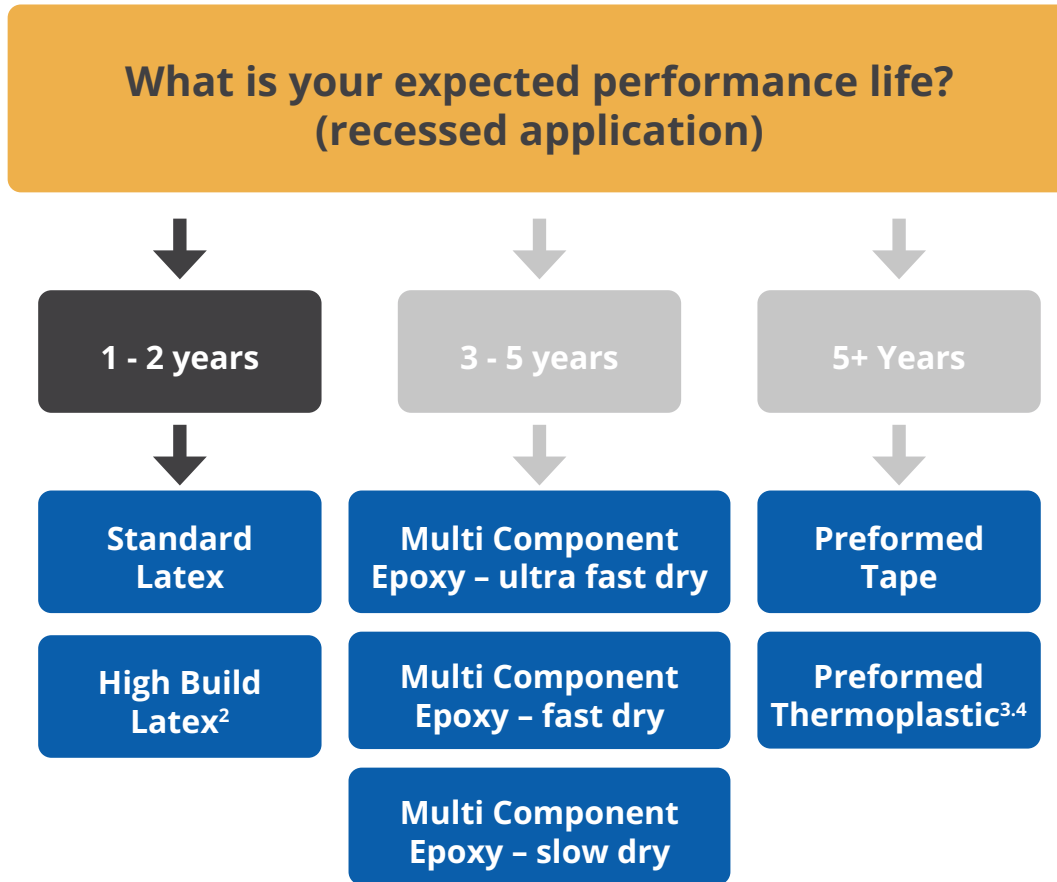
No

Is your ADT >1500?

Yes

What is your expected performance life? (recessed application)

1 - 2 Years



² High Build Latex paint can include wet reflective or recoverable elements.

³ Preformed Thermoplastic has reflective elements in material. However, these do not provide wet reflective or wet recoverable properties.

⁴ Preformed thermoplastic is not typically used on longitudinal lines.



Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

Concrete/Asphalt

Do you want wet reflective markings?

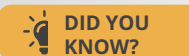
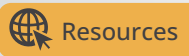
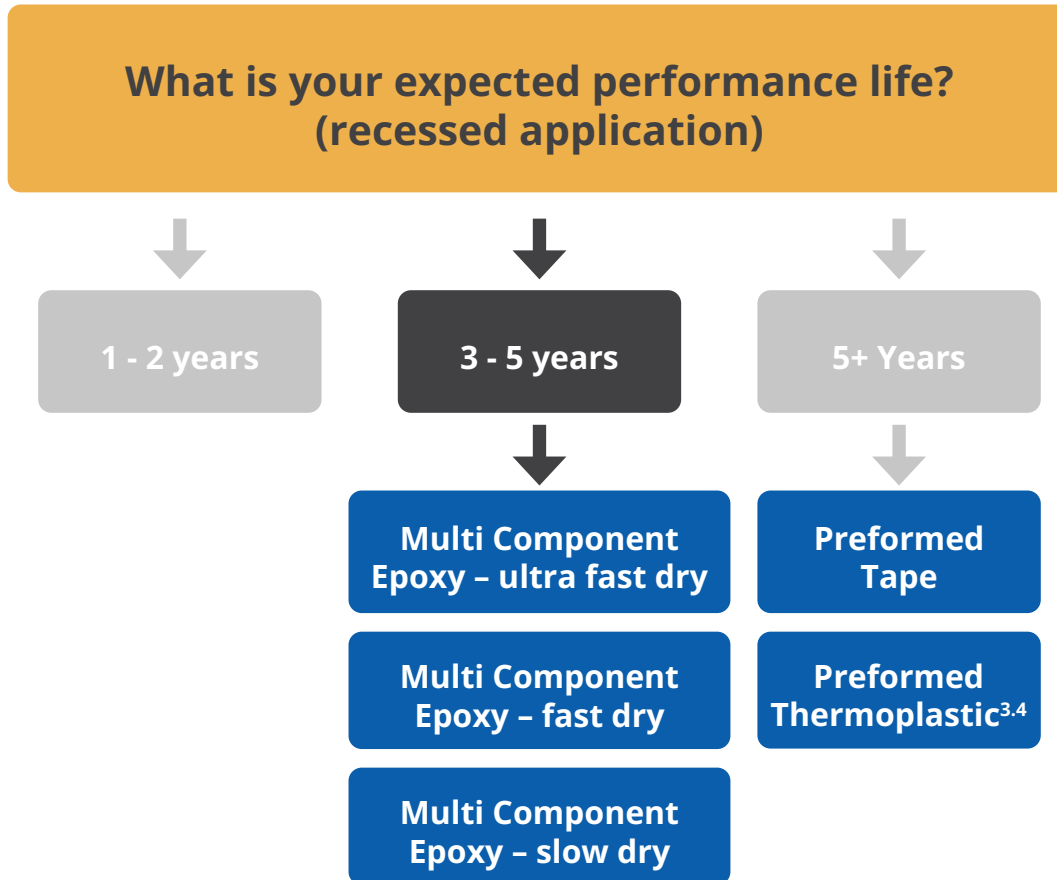
No

Is your ADT >1500?

Yes

What is your expected performance life? (recessed application)

3 - 5 Years



³ Preformed Thermoplastic has reflective elements in material. However, these do not provide wet reflective or wet recoverable properties.

⁴ Preformed thermoplastic is not typically used on longitudinal lines.



Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

Concrete/Asphalt

Do you want wet reflective markings?

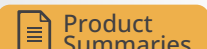
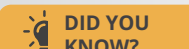
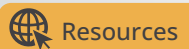
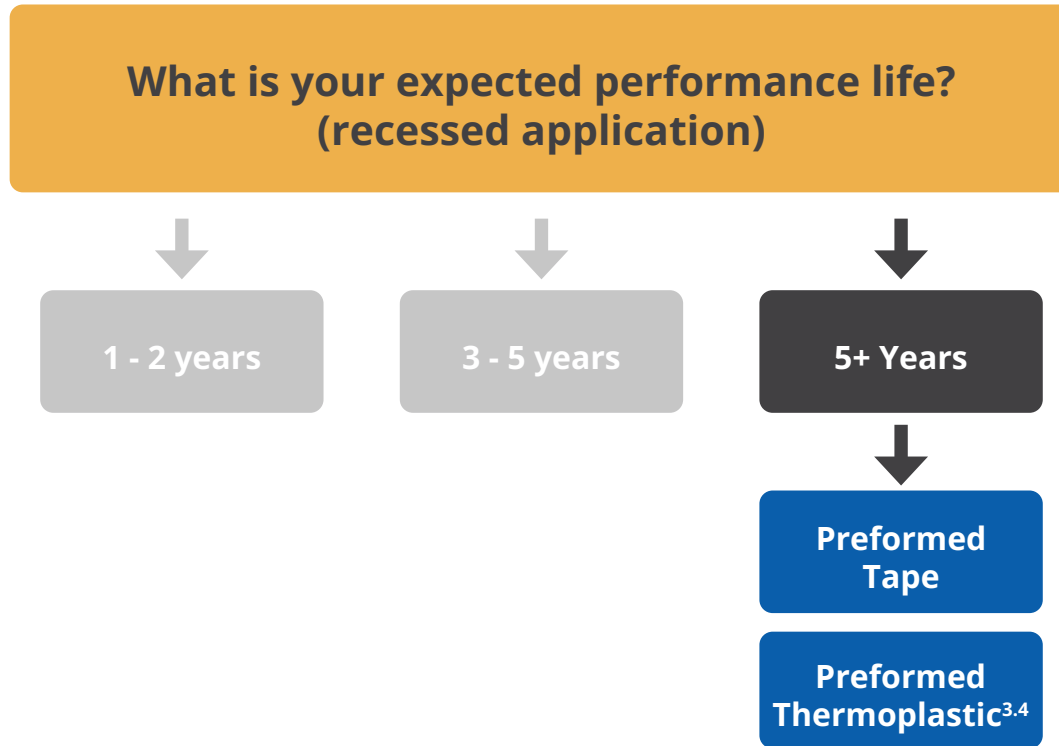
No

Is your ADT >1500?

Yes

What is your expected performance life? (recessed application)

5+ Years



³ Preformed Thermoplastic has reflective elements in material. However, these do not provide wet reflective or wet recoverable properties.

⁴ Preformed thermoplastic is not typically used on longitudinal lines.



Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

Concrete/Asphalt


Do you want wet reflective markings?


No

Is your ADT >1500?

No



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Transverse Message Pavement Marking on Concrete/Asphalt

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Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

Concrete/Asphalt

Do you want wet reflective markings?

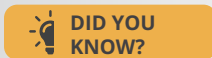
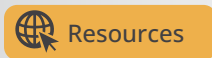
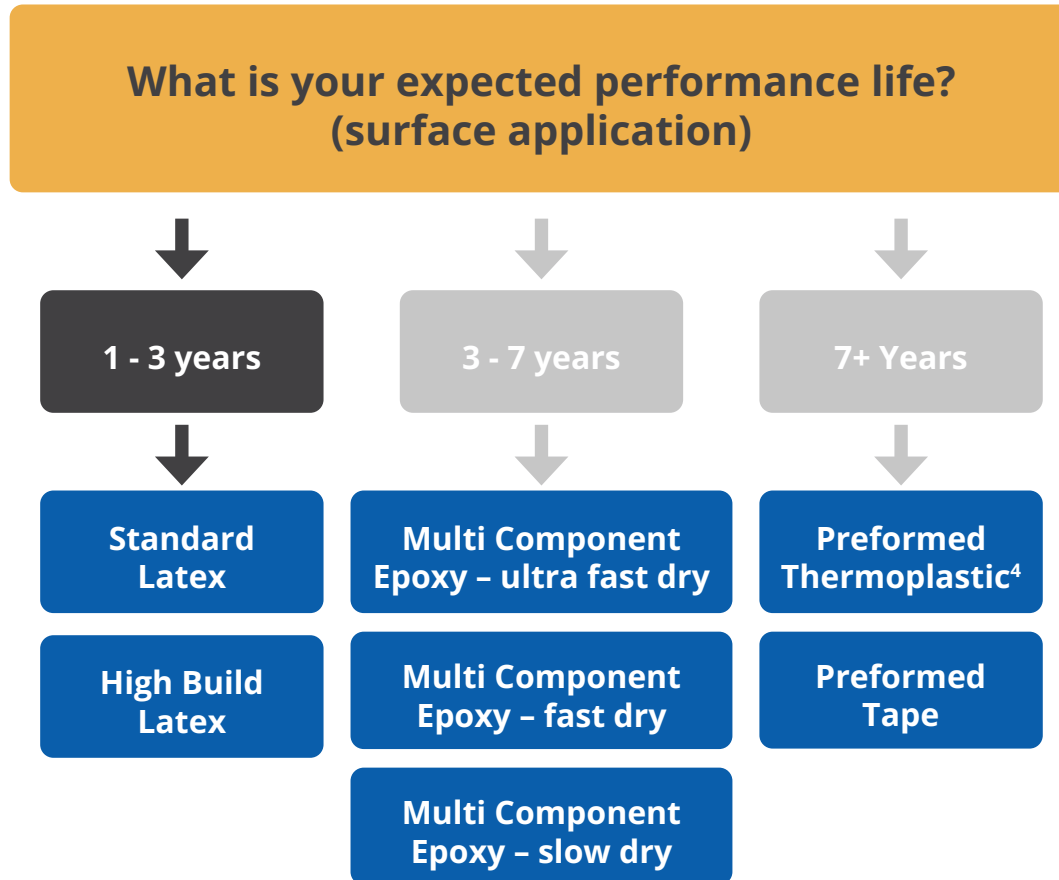
No

Is your ADT >1500?

No

What is your expected performance life? (recessed application)

1 - 3 years



⁴ Preformed thermoplastic is not typically used on longitudinal lines.



Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree

Is the air and pavement temperature >40 degrees F?

Yes

Are you installing longitudinal lines or transverse messages?

Transverse messages

What is your surface type?

Concrete/Asphalt

Do you want wet reflective markings?

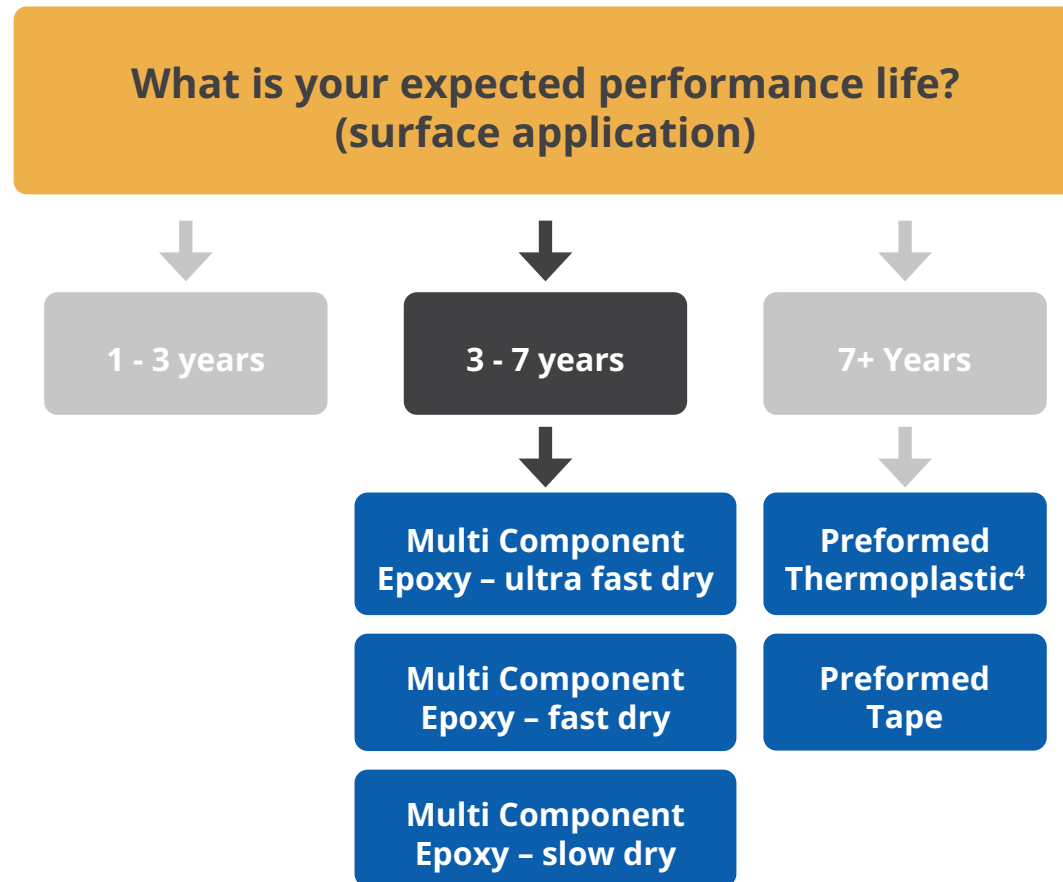
No

Is your ADT >1500?

No

What is your expected performance life? (recessed application)

3 - 7 years



Resources

Print Your Decision

DID YOU KNOW?

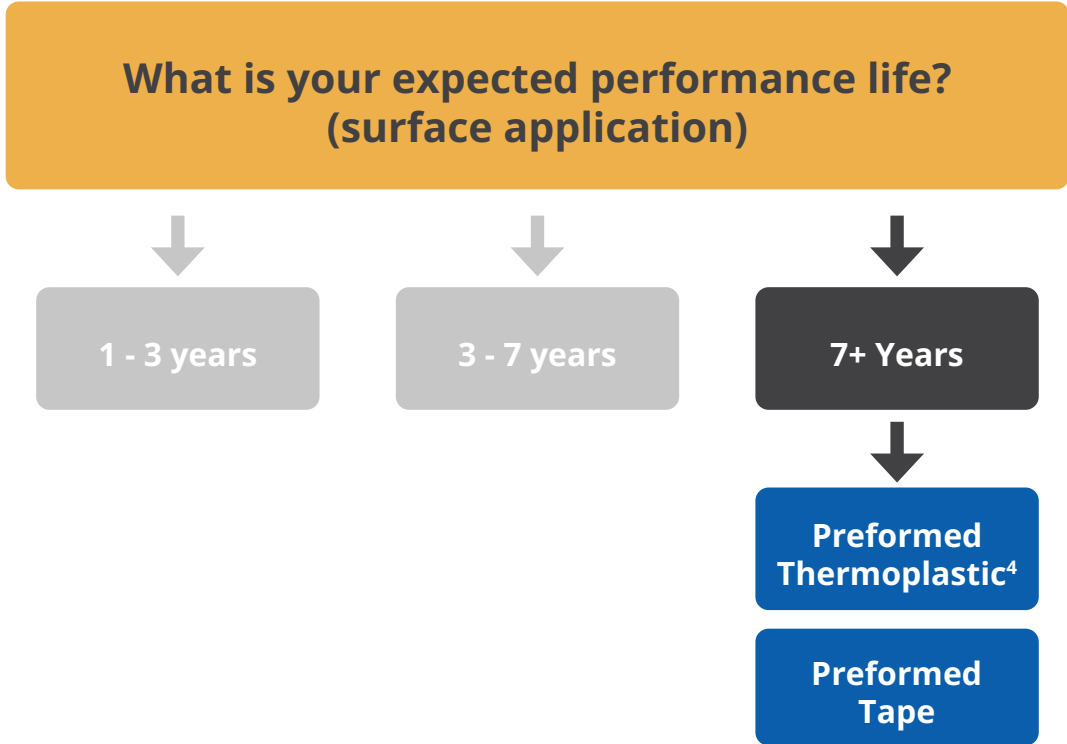
Product Summaries

⁴ Preformed thermoplastic is not typically used on longitudinal lines.



Transverse Message Pavement Marking on Concrete/Asphalt

Start the Decision Tree
Is the air and pavement temperature >40 degrees F?
Yes
Are you installing longitudinal lines or transverse messages?
Transverse messages
What is your surface type?
Concrete/Asphalt
Do you want wet reflective markings?
No
Is your ADT >1500?
No
What is your expected performance life? (recessed application)
7+ Years



Resources Print Your Decision DID YOU KNOW? Product Summaries

⁴Preformed thermoplastic is not typically used on longitudinal lines.



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Pavement Markings - Wet Retroreflectivity Standards Final Report

MnDOT Pavement Marking Field Guide

Minnesota Department of Transportation, June 2015

The Guide is the go-to resource for MN local agencies looking for entry level guidance on products to consider and their definitions, application equipment needed, standard practices on pavement preparation, paint removal, and remediation recommendations. The Guide is easy to navigate via the hyperlinked Table of Contents to quickly identify what an agency may need to get started. It also offers the fundamentals of reflectivity and glass beads for those who are interested in learning more. The section on remediation recommendations includes potential solutions encountered with painting and troubleshooting for equipment and application. The high-level Guide can serve as an outline for training and contains information on how to conduct an inspection.

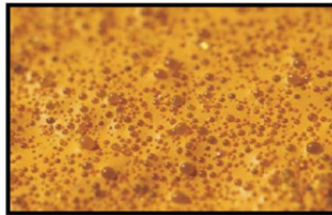


Figure E-4: Reflective Bead at Proper Embedment Depth

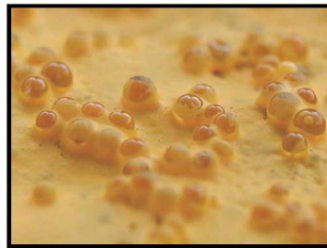


Figure E-5: Improper Bead Embedment

Field guide: <http://www.dot.state.mn.us/trafficeng/pavement/doc-storage/mndotpavementmarkingfieldguide.pdf>

MnDOT Pavement Marking Field Guide



June 2015

Chart E-1 Retroreflective Bead Trouble Shooting Guide

PROBLEM	CAUSE	EFFECT	REMEDY
Beads on one side	<ul style="list-style-type: none"> Bead gun out of alignment. Clogged bead gun. 	Poor night visibility.	Adjust alignment of gun cap.
Excessive Bead Use	<ul style="list-style-type: none"> Worn gun needle, seat and orifice. Excessive glass bead pressure. 	Supply problems.	<ul style="list-style-type: none"> Rebuild gun. Decrease pressure.
Beads in Middle of Line	<ul style="list-style-type: none"> Bead tank pressure too low. Bead gun "off" and "on" control screw not adjusted. Bead gun cap out of alignment. Too big of a bead gun tip. 	Poor night visibility.	<ul style="list-style-type: none"> Increase pressure. Adjust control screw. Align cap deflector. Change to a smaller tip.



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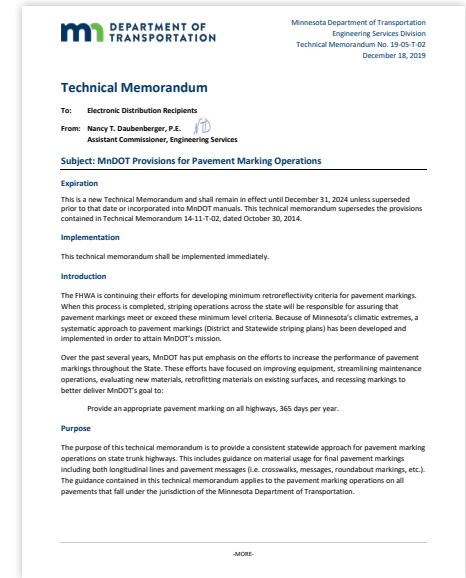
MnDOT Provisions for Pavement Marking Operations Technical Memorandum

January 5, 2022

The purpose of this technical memorandum is to provide a consistent statewide approach for pavement marking operations on state trunk highways. This includes guidance on material usage for final pavement markings including both longitudinal lines and pavement messages (i.e. crosswalks, messages, roundabout markings, etc.). The guidance contained in this technical memorandum applies to the pavement marking operations on all pavements that fall under the jurisdiction of the Minnesota Department of Transportation.

It contains information related to performance of markings and life expectancy of various markings and processes.

Memo: <https://www.dot.state.mn.us/trafficeng/publ/techmemo.html>



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Prioritizing Pavement Markings on Low-Volume Roads

The Local Road Research Board, August 2018

The research products serve as a resource for agencies ready to establish a pavement marking plan. The research products include a report on the approach to establish a pavement marking plan along with a spreadsheet based decision-making Tool. The products provide guidance on how to evaluate the cost effectiveness of pavement marking for both installation and maintenance to help agencies determine which roads to stripe and when. The report includes current practices and management approaches while the Tool calculates costs and the how far costs can stretch (Note, material costs are in 2018 dollars and must be updated). Further the report, includes details on crash reduction factors for various treatments to help determine safety benefits.

Pavement Marking Prioritization Tool

Enter data into highlighted boxes and under the highlighted sections.

1.) Enter total marking budget: \$150,000.00

2.) Enter total marking cost estimates (per foot):
(i.e. cost for two edgelines on a roadway, not individual.)

Centerlines	Edgelines	Centerlines & Edgelines	Enhanced Visibility	Milled Markings
\$0.05	\$0.08	\$0.13	\$0.17	\$0.54

3.) Enter project data in cells below:

Site	Route Prioritization						Marking Type Prioritization					
	Project/Roadway	Length (miles)	Road Type	# of CRSP Sites (# of CRSP projects)	Roadway Functional Class	Pavement Condition	Traffic Volume	Current marking age	Total pavement width (ft)	Marking Cost Preference	Marking Durability	Crash Reduction Potential
1	393-46-1-640-10	10	THRUWAY TO 3 MI W	1 (1) CRSP	5 (1) Local	2 (1) Fair	620	2-2 years				
2	394-47-1-647-15	15	THRUWAY TO 0.5 MI W	1 (1) CRSP	0 (0) Min. Coll.	2 (1) Fair	940	1-1 year				
3	395-47-1-647-21	21	0.5 MI W TO 0.5 MI W	1 (1) CRSP	0 (0) Min. Coll.	2 (1) Fair	940	1-1 year				
4												
5												
6												

Report: <https://mdl.mndot.gov/items/201821>

Pavement Marking Prioritization Tool:
<https://mdl.mndot.gov/items/201821S>

Technical Summary: <https://mdl.mndot.gov/items/201821TS>



Investigating the Necessity and Prioritizing Pavement Markings on Low-Volume Roads

David Veneziano, Principal Investigator
Institute for Transportation
Iowa State University

June 2018

Research Project
Final Report 2018-21



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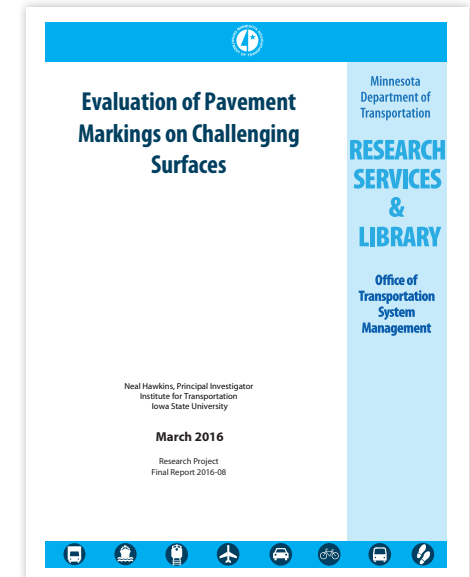
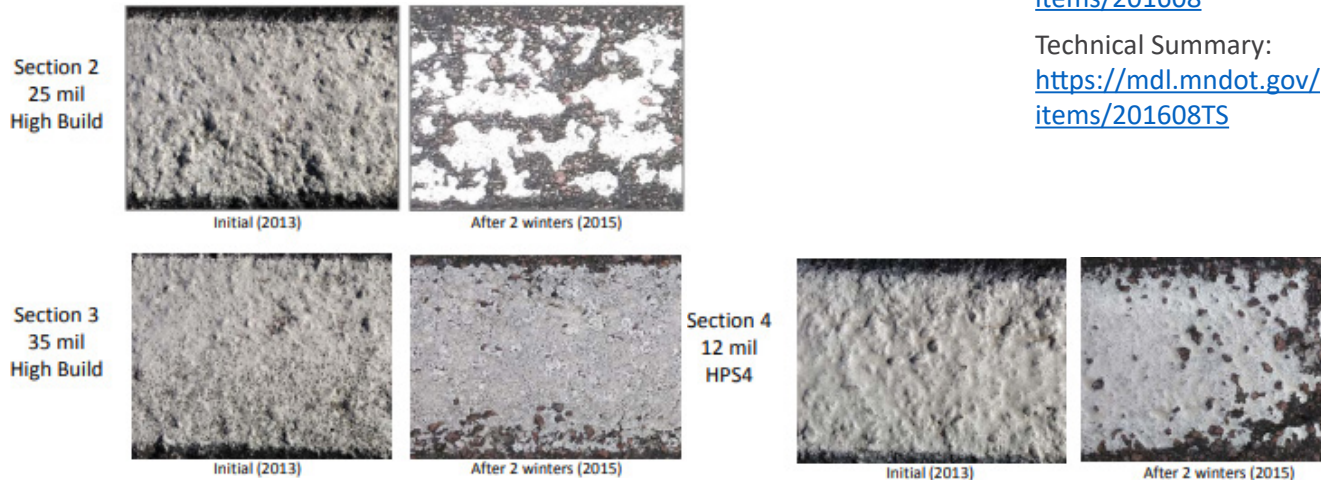
Product Summaries

Pavement Markings: Epoxy Paints and Thick Coats Perform Best on Challenging Asphalt Surfaces

The Local Road Research Board, June 2016

The report provides a detailed account on which pavement markings approaches perform best on chip seals and/or microsurfacing practices. Agencies who practice these techniques and want to learn more and understand how to overcome challenges they face may want to review the report further. The report goes in-depth on the best practices for application and what to keep in mind when considering chip seal or microsurfacing. The report reviews existing practices and compares them to the performance of various pavement marking test sections to identify which held up the best. The report includes many images and graphs of the product results for easy digestion.

For those interested in a higher-level summary, review the key findings at the end of the report.



Report: <https://mdl.mndot.gov/items/201608>

Technical Summary: <https://mdl.mndot.gov/items/201608TS>

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Using a National Database to Develop Performance Metrics for Local Pavement Markings

The Local Road Research Board, January 2018

The report includes highly detailed information derived from national pavement markings metrics for agencies to use as a guide for choosing pavement marking product types. The results are technical and cater to agencies who are interested in diving in deeper as a pavement marking expert.

Report: <https://mdl.mndot.gov/items/201743>

Technical Summary: <https://mdl.mndot.gov/items/201743TS>





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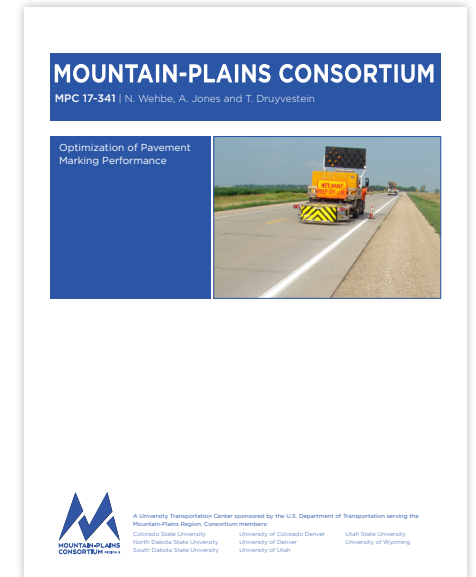
Optimization of Pavement Marking Performance

Nadim I. Wehbe, PhD, PE Allen Jones, PhD, PE Department of Civil and Environmental Engineering South Dakota State University Brookings; Thomas Druyvestein South Dakota Department of Transportation, December 2017

The South Dakota report provides a detailed account on constructability, durability, and visibility of alternative pavement marking materials and application practices specific for South Dakota. Agencies who are interested in diving deeper as a pavement marking expert and understanding what other states are doing may consider reviewing the report further. Agencies should note that the report uses different product names, material thickness, and includes details not applicable to agencies in Minnesota. It should not be considered as the South Dakota version of the Minnesota Pavement Marking Field Guide. That said, the report includes interesting tables and images for reference (Table 2-1 and Figure 2-10). Figure 2-10 shows graphically the difference between recessed and how it increases the life in South Dakota. No other resource listed talked about this “scientifically.” The report also references a cost analysis tool, which is specific for South Dakota. However, with some manipulation it may be used for MN agencies.

For those interested in a high-level summary, review the conclusions at the end of the report.

Report: <https://www.ugpti.org/resources/reports/downloads/mpc17-341.pdf>





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Pavement Marking Selection, Installation and Inspection Manual

Illinois Department of Transportation, August 2015

The Manual is similar to the Minnesota Pavement Marking Field Guide (MN Field Guide) and applicable for agencies who are desiring a high-level understanding of inspecting and installation of markings. However, MN agencies should note that the performance results are not as applicable due to differing climates (snow/ice). The Manual covers the same pavement materials as in the MN Field Guide and provides additional guidance on proper inspection processes.

Manual: <https://idot.illinois.gov/Assets/uploads/files/Doing-Business/Manuals-Guides-&-Handbooks/Highways/Operations/Pavement%20Marking%20Selection,%20Installation%20and%20Inspection%20Manual.pdf>





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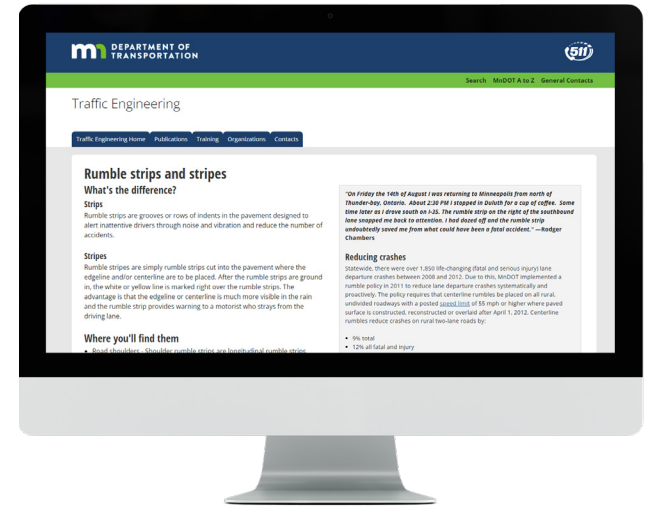
MnDOT Rumble Strips and Stripes

MnDOT

The webpage provides a thorough introduction to the differences between rumble strips and stripes and their application for agencies exploring this pavement marking strategy. The webpage also includes basic safety reduction statistics and noise level data on shoulder rumble strips with additional links to noise studies.

Website:

<http://www.dot.state.mn.us/trafficeng/safety/rumble/index.html>



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Pavement Markings - Wet Retroreflectivity Standards Final Report

Pavement Markings—Wet Retroreflectivity Standards Final Report

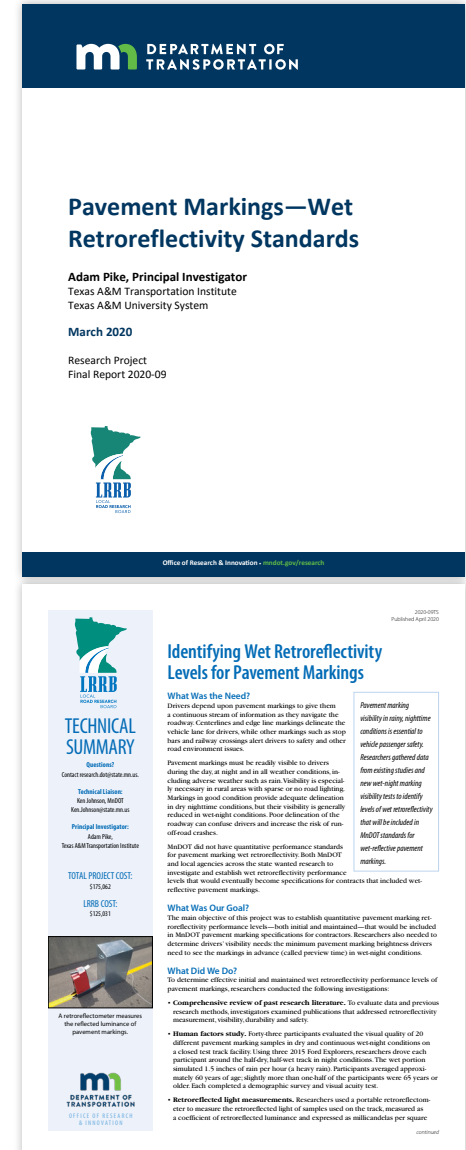
Adam Pike, P.E.; Timothy Barrette, Ph.D., P.E.
Texas A&M Transportation Institute; Texas A&M University System
March 2020

This LRRB research project provides a detailed comprehensive review of past research, an analysis of available data sources, and a human factors study to establish minimum levels of continuous wet retroreflectivity of pavement markings. The results indicate that a minimum maintained continuous wet retroreflectivity level of 50 millicandelas per meter squared per lux (mcd/m² /lux) will provide adequate visibility to most drivers. A new installation value of 200 mcd/m² /lux is recommended. The recommended new install value is based on anticipated continuous wet retroreflectivity degradation using literature and MnDOT-supplied continuous wet retroreflectivity degradation levels, a desired four-year service life, and the recommended minimum-maintained value. These recommendations are width and color dependent.

For those interested in a high-level summary, review the Executive Summary. Those interested in diving deeper as a pavement marking expert and understanding what research has been conducted to develop driver needs for wet retroreflectivity levels may consider reviewing the [Report](#) in detail.

Report: <https://mdl.mndot.gov/items/202009>

Technical Summary: <https://mdl.mndot.gov/items/202009TS>



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Pavement Marking Decision Tree – Project Level

Start the Decision Tree

Standard Latex Paint



- + Low cost
- Short life (1-2 yrs)

Full Product Details


High Build Latex Paint



- + Same equip as standard latex
- + Longer life vs. standard latex
- Longer cure time vs. standard latex

Full Product Details

Multi-Component Liquid Markings (epoxy)



- + Med life (3-7 yrs); wider range of temps
- Cannot be applied over latex markings
- More complex installation process
- Can become slippery in cold weather

Full Product Details

Preformed Tape



- + Longer life (5+ yrs)
- + Most reflective marking available
- Higher cost
- Lower durability with high turning movements
- Cannot be applied over other markings

Full Product Details

Preformed Thermoplastic



- + Longer life (5+ yrs)
- + Most durable marking commonly used in Minnesota
- Higher cost
- Hand applied, generally used for messages in high traffic volume areas

Full Product Details

Late Season Pavement Markings – multi-component liquids (epoxy)



- + Late season marking
- May require longer cure time/traffic control
- Can have a short life if installed during particularly cold weather (1-2 yrs)

Full Product Details

Recessing Markings to Enhance Performance



- + Lengthens life
- Additional cost

Full Product Details

Note: refer to MnDOT Pavement Marking Field Guide for more detailed attributes of all pavement marking materials.
[MnDOT Pavement Marking Field Guide](#)

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