COMPREHENSIVE PAVEMENT DESIGN MANUAL

CHANGES TO CHAPTER 3

<table>
<thead>
<tr>
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<th>Changes</th>
</tr>
</thead>
</table>
| All   | • Converted file to MS Word.  
|       | • Added US customary units with metric units in parentheses.  
|       | • Updated references from the Scoping Procedure Manual (SPM) and Design Procedure Manual (DPM) to the Project Development Manual (PDM).  
|       | • Updated the report formats to be consistent with the PDM.  
|       | • Updated the references to 1R, 2R and 3R to Highway Design Manual (HDM) Chapter 7.  
|       | • Replaced references to the Preliminary Estimating Program (PEP) and the Price Estimating System (PES) with Estimator.  
|       | • Incorporated professional seals per EI 08-001.  
|       | • Streamlined the pavement evaluation and treatment selection process.  
|       | • Updated Table 3-1 per the Capital Program Update Instructions.  
|       | • Updated the maintenance projects to comply with ADA.  
|       | • Revised the projects that require a Life Cycle Cost Analysis (LCCA).  
|       | • Eliminated references to the superseded materials.  
|       | • Updated the chapter references. |

Appendix 3A Eliminated the Rigid and Multicourse Pavement Work Over 1.5 km appendix. Replaced with a simplified table and process in the chapter text. Replaced Appendix A with the Pavement Evaluation and Treatment Selection Report (PETSIR) form.

Appendix 3B Eliminated the Programmatic Quality Assurance Pavement Rehabilitation Treatment Selection Process, August, 1994, which has been replaced by Section 3.3.

Appendix 3C Eliminated this vacant appendix.

Appendix 3D Eliminated the 1R Requirements - Federal-Aid Single Course Overlay Maintenance Paving Projects, which was superseded by HDM Chapter 7 and deleted the “Pavement Preventive Maintenance Projects - Second Working” from Appendix 3D.

Appendix 3E Eliminated the Safety Appurtenance Program (SAFETAP) Guidelines, which was superseded by HDM Chapter 7.

11/15/2013
CHAPTER 3
PAVEMENT EVALUATION AND TREATMENT TYPE SELECTION PROCESS

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APPENDICES

A - Pavement Evaluation and Treatment Selection Report (PETSР) Format

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<th>Page</th>
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</thead>
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</tr>
</tbody>
</table>
3.1 INTRODUCTION

This chapter includes the project-level pavement evaluation and treatment type selection process, which describes specific procedures and identifies when further documentation is required (e.g., a Pavement Evaluation, a Treatment Selection Report, a Life Cycle Cost Analysis). This chapter also discusses the requirements for single course overlays/inlays, pavement maintenance work, and multicourse pavement work.

This chapter references the manuals that contain the required procedures and documentation for the design of NYSDOT projects containing pavement work. Table 3-1, “NYSDOT Pavement Project Processing Summary,” shows the relationships among pavement treatments, funding, processing, and implementation.

The Project Development Manual (PDM) describes the overall steps to progress a project from Scoping through Plans, Specifications, and Estimate (PS&E). Exhibit 1-1 of the Project Development Manual (PDM) illustrates the basic NYSDOT project development process. This process consists of four stages: Initiation, Scoping, Design, and Construction. Brief descriptions of these stages are given in Chapter 2 of the PDM with more detailed information in Chapter 3 and 4 of the PDM.

Note that a project may include several pavement treatments and types. Therefore, multiple sections of this chapter and manual as well as the Highway Design Manual (HDM) may apply. Even though a project may include multiple pavement treatments, a single design approval document should be used. Appendix 7 of the PDM discusses the various types of design approval documents and their applicability.

3.2 PAVEMENT EVALUATION AND TREATMENT TYPE SELECTION PROCESS

Table 3-1 “NYSDOT Pavement Project Processing Summary” shows the relationships among pavement treatment (with the pertinent CPDM chapter), funding, processing and implementation. It can be used as a guide or signpost to point the designer in the right direction to find the applicable pavement treatment guidance (CPDM chapter), design process (PDM and CPDM), design standards (HDM and others) and implementation procedures.
<table>
<thead>
<tr>
<th>Pavement Treatment</th>
<th>Federal-Aid or 100% State Funds</th>
<th>Project Must Address or Mitigate Safety Problem?</th>
<th>Design Project Type</th>
<th>Work Type from Capital Program Update</th>
<th>Process/Procedures In Addition to CPDM Chapter 3</th>
<th>Primary Standards</th>
<th>Implementation (1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preventive Treatments (2) (e.g., Joint filling/Crack Sealing, diamond grinding)</td>
<td>Federal-Aid or 100% State</td>
<td>No</td>
<td>Preventive Maintenance</td>
<td>Preservation</td>
<td>Element-Specific PDM Appendix 7</td>
<td>CPDM</td>
<td>Proposal Only Contract (see HDM Chap 21), State Forces, or Vendor Placed Paving (VPP)</td>
</tr>
<tr>
<td>Preventive and Corrective Treatments (2) (e.g., ¾” (19 mm) inlay/overlay, up to 4” (100 mm) CIPR with 2” (50 mm) overlay on non-freeways (3))</td>
<td>Federal-Aid or 100% State</td>
<td>Address with low-cost measures only. Can also develop future 2R, 3R, or Reconstruction (4R) project</td>
<td>1R (4)</td>
<td>Preservation</td>
<td>Element-Specific HDM Ch 7, PDM Appendix 7</td>
<td>HDM Chapter 7</td>
<td>Proposal Only Contract (see HDM Chap 21), or VPP</td>
</tr>
<tr>
<td>Rehabilitation Treatments (e.g., Multicourse Overlay (5))</td>
<td>Federal-Aid or 100% State</td>
<td>Yes</td>
<td>2R or 3R</td>
<td>Rehabilitation</td>
<td>PDM and HDM Ch 7</td>
<td>HDM Chapter 7</td>
<td>Contract with Plans (see HDM Chap 21)</td>
</tr>
<tr>
<td>Reconstruction Treatments (e.g., 4R or New Construction)</td>
<td>Federal-Aid or 100% State</td>
<td>Yes</td>
<td>New Construction or 4R</td>
<td>New Construction and Reconstruction</td>
<td>PDM</td>
<td>HDM Chapter 2</td>
<td>Contract with Plans (see HDM Chap 21)</td>
</tr>
</tbody>
</table>

Notes:
1. State Forces can perform safety work (e.g., guide rail, signing, delineation, pavement markings, etc.). However, State Force work is not eligible for Federal-aid.
2. See HDM Chapter 7 to determine maintenance treatments that must be progressed as 1R.
3. The up to 4” (100 mm) cold in-place recycling (CIPR) applies to non-freeways. For freeways, up to 4” (100 mm) of pavement plus truing and leveling is permitted provided the maximum elevation change is 2” (50 mm) except at isolated truing and leveling and superelevation locations. Truing and leveling may not exceed 50% of the top course volume. See HDM Chapter 7 for additional restrictions.
4. Where ADA compliance does not require ROW acquisition. See HDM Chapter 7 for additional restrictions.
5. “Mill and fill”, hot/cold in-place recycling may also apply. See HDM Chapter 7 for additional restrictions.
3.2.1 Applicability for Minimum Service Life, Treatment Selection and Life Cycle Cost Analysis

Table 3-2 provides the requirements for the minimum service lives, pavement evaluation, treatment selection, and life cycle cost analysis for all projects on the State System and all Federal Aid projects (regardless of jurisdiction).

New/Reconstruction Arterial pavement projects must include the consideration of two or more feasible treatments and a Life Cycle Cost Analysis (LCCA) to determine the best value design. Different pavement type designs will have different construction sequences, traffic control schemes, estimated initial costs, and future maintenance needs. Analysis of these differences and their current and future costs is necessary to arrive at the best value design choice.
Table 3-2  State System and All Federal Aid Project Requirements

<table>
<thead>
<tr>
<th>Project Type¹</th>
<th>Functional Class²</th>
<th>Length of Treatment³</th>
<th>Min Service Life⁴</th>
<th>Pavement Evaluation⁵</th>
<th>Treatment Selection Report⁶</th>
<th>Number of Feasible Treatments⁷</th>
<th>LCCA⁸</th>
</tr>
</thead>
<tbody>
<tr>
<td>1R and below</td>
<td>All</td>
<td>All</td>
<td>5 years</td>
<td>Simplified</td>
<td>Simplified</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2R/3R</td>
<td>Arterial (incl. Interstates and other freeways)</td>
<td>1 mile (1.5 km) or more</td>
<td>8 years for 2R/3R, 20 years for new or 4R</td>
<td>Full or simplified based on Pavement Designer recommendation</td>
<td>Full</td>
<td>2 minimum</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>&lt;1 mile (1.5 km)</td>
<td></td>
<td></td>
<td>Simplified</td>
<td>Simplified</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>4R/New Const.</td>
<td>Arterial (incl. Interstates and other freeways)</td>
<td>1 mile (1.5 km) or more</td>
<td>20 years for new or 4R</td>
<td>Full or simplified based on Pavement Designer recommendation</td>
<td>Full</td>
<td>2 minimum</td>
<td>Yes</td>
</tr>
<tr>
<td></td>
<td>&lt;1 mile (1.5 km)</td>
<td></td>
<td></td>
<td>Simplified</td>
<td>Simplified</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>2R/3R/4R and New Const.</td>
<td>Collector, Local and Ramps</td>
<td>1 mile (1.5 km) or more</td>
<td>8 years for 2R/3R, 20 years for new or 4R</td>
<td>Full or simplified based on Pavement Designer recommendation</td>
<td>Full</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td>&lt;1 mile (1.5 km)</td>
<td></td>
<td></td>
<td>Simplified</td>
<td>Simplified</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Notes:
1. Refer to Table 3-1 for a guide to project types.
2. Refer to HDM Ch 2, Exhibit 2-1 for the route functional classifications.
3. The 1 mile (1.5 km) length excludes bridge length. For Intersection/interchange projects, the length is the greater of the centerline length along either roadway (not combined), excluding ramps.
4. The minimum 8-year rehabilitation service life is required unless an exception is approved by the Regional Director to use a MSL of 5 years. There are NO exceptions to 5 year MSL. These minimum service lives do not override other Department policies that require a longer design life for a particular type of project. For example, the anticipated service lives given in PDM Appendix 5, Design Year Traffic Forecast, or the requirement given in Article 7, Section 12 of the State Constitution, that the period of a bond (currently 10 years) not exceed the probable life of the project being bonded, are not affected by this section.
5. Refer to Chapter 2 of this manual for the full pavement evaluation process and report. A simplified pavement evaluation is an abbreviated evaluation for pavements in either good condition (6 or better), very poor condition (4 or worse) with easily identifiable distress, or as agreed to by the pavement designer. Refer to Appendix A of this chapter for the Pavement Evaluation Treatment Selection Report (PETSR). The first two pages are the simplified pavement evaluation form.
6. The treatment includes the type of pavement as well. Refer to Appendix A of this chapter for the PETSR. The last page represents the treatment selection portion of the report. An analysis is not required for new/reconstructed ramps with design speeds less than 50 mph (80 km/h) using conventional pavement design, since the ramp paving material is specified in Chapter 4, Section 4.4 of this manual.
7. Treatments Requiring Alternatives are New/Reconstruction (PCC vs HMA), Thick overlays/inlays (defined as >6” (150 mm)), treatments whose future work strategies require frequent maintenance and future rehabilitation work.
8. Refer to Chapter 5 of this manual for guidance on performing a Life Cycle Cost Analysis (LCCA). A discount rate of 3% should be used.
3.2.2 **Process Steps**

This section describes the steps in a pavement project from the project scoping stage through to PS&E. The intent of this section is to show where these pavement process steps fit into the project development process. The Capital Program Update Instructions provide guidance on the selection of pavement projects.

The pavement designer may reside in Planning, Construction, Design, Operations, etc. The actual assignment of this and other job responsibilities are left to the Regional Director.

### A. Scoping/Preliminary Design

1. **Project Designer** - Using the sufficiency manual and VisiData, reviews the site and requests a pavement evaluation.

2. **Pavement Evaluator** - Prepares a full pavement evaluation in accordance with Chapter 2 of this manual or a simplified pavement evaluation, as appropriate. A simplified pavement evaluation is an abbreviated evaluation for:
   - Pavements in good condition (6 or better),
   - Pavements in very poor condition (4 or worse) with easily identifiable distress,
   - Segments <1 mile (1.5 km), or
   - As determined by the Pavement Designer.

   Sends the pavement evaluation to the Project Designer. Contact the Pavement Designer if there are any questions regarding the pavement evaluation technique.

3. **Pavement Designer** - Analyzes, compiles and interprets the distress data. The appropriate treatment(s) are then chosen from this manual. The traffic is checked, service lives determined, and a written statement is prepared containing the recommended treatment(s) and the rationale behind the recommendation. Estimate(s) are prepared. A life cycle cost analysis is prepared as required. (See Chapter 5 for the procedure which will include a future work strategy for each treatment.)

**Note:** The Expected Service Lives (ESLs) given in Chapter 5 are appropriate for highways with Average Annual Daily Traffic (AADT) counts of 12,000 to 35,000 with about 5% trucks. The ESL needs to be adjusted for highways with traffic outside these limits. Chapter 5 provides guidance on the adjustment of the ESL. If the adjusted ESL is less than the minimum shown in Table 3-2 (requiring an exception approval in process Step 8), a different treatment with an adjusted ESL greater than, or equal to, the minimum should be considered.

Completes draft of the "Pavement Evaluation and Treatment Selection Report" (PETSRR) in accordance with this manual incorporating:
- The pavement evaluation
- Any alternative treatments considered
- The recommended treatment
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- If required, the LCCA and time line(s) showing the future work strategy for all viable treatment/pavement type alternatives;
- Other factors that may influence the decision (e.g., guide rail height, subbase problems, drainage problems, bridge clearance, constructability, work zone traffic control, nighttime construction, pavement problems related to geometrics (e.g., grades, intersections), etc.);

Places a copy of the PETSR in the project’s ProjectWise folder.

4. Project Designer - Performs preliminary design including field review and additional data collection to determine actual quantities. Refines the cost estimate for the recommended pavement strategy.

5. Pavement Designer - Revises the PETSR if necessary to account for major changes, such as: quantity/cost changes that cause other alternatives to be viable, a different treatment is proposed, the pavement surface score has changed substantially or the PETSR requires updating based on Table 3-3.

Table 3-3 Maximum PETSR Age

<table>
<thead>
<tr>
<th>Project Type</th>
<th>Maximum PETSR Age Before Updating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1R or less</td>
<td>Lesser of 2 years or the surface score drops below 6</td>
</tr>
<tr>
<td>2R to 3R</td>
<td>Lesser of 4 years or the surface score drops.</td>
</tr>
<tr>
<td>4R/New Construction</td>
<td>Unlimited unless substantial changes in material costs or new technologies need to be considered</td>
</tr>
</tbody>
</table>

Place a copy of the approved PETSR in ProjectWise. For 2R or higher project types, finalizes PETSR with their professional engineering seal and signature or the seal and signature from their supervisor/group director.

6. Project Designer - Inserts the summary in the Design Approval Document and a copy of the PETSR into the appendix per PDM Appendix 7. Obtains/resolves comments on the design approval document in accordance with the PDM and Regional QC/QA plan.

Prior to, or concurrent with requesting Design Approval, obtains approval for the use of a rehabilitation treatment with a service life between 5 and 8 years. The need for this approval hinges on the functional class of the road as outlined in Table 3-1.

Requests Design Approval per Project Development Manual Chapter 4.

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B. Final Design

Steps

1. Pavilion Designer – Sends pavement specification item numbers to the project designer.

2. Project Designer - Finalizes design and refines item costs/quantities. Obtains/resolves comments on the Advance Detail Plans in accordance with current design procedures. (See the Project Development Manual and Highway Design Manual Chapter 21.)

Checks back to the PETSR (from the Design Approval phase) to determine if revisions are necessary to account for major changes, such as: quantity/cost changes that cause other alternatives to be viable, a different treatment is proposed, the pavement surface score has changed substantially or the PETSR requires updating based on Table 3-3.

Obtains updated final PETSR as needed (with a signature and licensed professional engineer seal from the pavement designer or their supervisor/group director).

Sends out Advanced Detail Plans (ADPs) for review.

Note: For OGS let VPP projects, ADP’s are not prepared. Quality control reviews are performed by the Main Office, Office of Transportation Maintenance (OTM). Skip steps 3 and 4.

3. Pavilion Designer – Reviews ADPs and provides comments to the project designer.

3.3 PAVEMENT EVALUATION AND TREATMENT TYPE SELECTION QUALITY CONTROL AND QUALITY ASSURANCE

3.3.1 Quality Control

Compliance with appropriate standards, policies, and procedures (i.e., quality control) is the responsibility of the Region. Quality control reviews of the pavement treatment occur during the scoping/design document reviews and ADP with the exception of OGS let VPP projects. For OGS let VPP projects, ADP’s are not prepared. Quality control reviews are performed by the Main Office, Office of Transportation Maintenance (OTM).

3.3.2 Quality Assurance

FHWA - Quality assurance by FHWA is accomplished by statewide programmatic reviews as well as day-to-day project reviews when FHWA design-related approvals are required.

NYSDOT - Generally, the quality assurance role of the Main Office is to revise pavement policies (such as the CPDM), standard sheets, and specifications, as needed. Additionally, quality is assured by:

- The scope/design approval documents include the PETSR, when required, in the appendix and a summary of the existing pavement condition and the recommended pavement treatment in the body of the report.

- The Regional Director must approve treatments with 5-year to 8-year service lives for 2R and above projects.

- For 2R and higher project types, the final PETSR shall be sealed by a licensed professional engineer to certify that the treatment(s) will last at least 5 years.
3.4 REFERENCES


5. *NYSDOT Capital Program Update (CPU) Instructions*, Policy and Planning Division, New York State Department of Transportation, 50 Wolf Road, Albany, NY 12232.
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Chapter 3: Appendix A

PETSIR
General
Region: Select  County:  Route No.:  PIN:
Project Description:
Begin RM:  End RM:  Total Length:
Latest Pavement Rehabilitation/Treatment Date(s):
Original Contract Date(s):

Related Pavement Data:
Traffic AADT (Range):  Date:  % Trucks:
Sufficiency Rating Surface Score:  Date:

Roadway Features
Roadway: Divided  Non-Divided
Median: Flush  Raised  Concrete Median Barrier
Curbs: Mountable  Non-Mountable  HMA  PCC  Stone
Gutter: None  Present  Location:
MIARDS/CARDS: None  Present  Location:

Travel Lanes:
Number: Select  Width(s):
Type: Reinforced PCC  Non-Reinforced PCC  HMA  HMA over PCC
Thickness (normal): Total:  (HMA:  PCC:  )
Reinforced and Non-Reinforced PCC Pavements only:
Slab Length:
Load Transfer Type: Dowels  2 Component
Transverse Joints: Contraction  Expansion
Subbase: Type: Thickness (nominal):
Shoulders:
Type: HMA  PCC  Gravel  Thickness:
Surface Treatment/Stabilized Gravel  Thickness:
Width: Left:  Right:
Drainage Type: Open System  Closed System
## PAVEMENT DISTRESS

<table>
<thead>
<tr>
<th>Distress</th>
<th>Severity – Typical for Length of Project</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wheelpath Cracking</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Transverse Cracking</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Longitudinal Cracking</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Edge Cracking</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Raveling</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Rutting</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Corrugations</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Settlements/Heaves</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
</tbody>
</table>

## SHOULDER DISTRESS

<table>
<thead>
<tr>
<th>Distress</th>
<th>Severity – Typical for Length of Project</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cracking</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Separation</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Drop Off</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
<tr>
<td>Deformation</td>
<td>[ ] None [ ] Low [ ] Medium [ ] High</td>
<td></td>
</tr>
</tbody>
</table>

## EXISTING PAVEMENT CONDITION REMARKS:

## EXISTING SHOULDER REMARKS:

## REMARKS AND PAVEMENT RECOMMENDATIONS:

## GEOTECHNICAL REMARKS AND RECOMMENDATIONS:
Treatment Options:

1.

2.

3.

Results of Life Cycle Cost Analysis:

Recommendations:

If you have any questions regarding this report, please contact [Contact Information] at [Contact Information].

Prepared by: [Name]
Date: [Date]

Approved by: [Name]
Date: [Date]

Professional Engineering Seal for Recommendations to Use Beyond Preservation Treatments: