NEW YORK STATE OF OPPORTUNITY. Department of Transportation

HIGHWAY DESIGN MANUAL

Chapter 7

Resurfacing, Restoration, and Rehabilitation (1R, 2R and 3R)

Revision 100
(Limited Revision)

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Section		Changes
Section 7.2.1.2		Refers to Traffic & Safety for the appropriate level of crash analysis. Requires the Designer to be responsible for the field visit and checklist in Exhibit 7-1. Revised the text for ADA curb ramps and sidewalks. Limits practical cost-effective recommendations that must be documented to those within the project's scope.
Exhibit 7-1		Reorganized the list of items for 1R projects to meet federal and state laws and regulations and Department policies for paving and rumble strips.
Exhibit 7-2		A section has been added to cover nonmotorized users and other modes. Large culvert rehabilitation is permitted within a 2R project. The safety screening refers to HDM 5.3.
Exhibit 7-3		A section has been added to cover nonmotorized users and other modes. New and replacement large culverts are to use the 3R design criteria and are permitted within 3R projects. The safety screening refers to HDM 5.3.
Exhibits 7-4, 7-5, 7-8 and 7-9		The threshold for a 4' shoulder has been changed from a 50 mph to 40 mph design speed.
Exhibit 7-12		Modified the last category to note that work "may be done" in a future project to capture items of work that are not safety critical to reduce the reporting requirements.
Section 7.8		Revised the SAFETAP reporting to be a list of projects for federal audit instead of a tracking list of individual work elements, which was not practical.

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LIST OF EXHIBITS

7.1 INTRODUCTION

The deterioration of our transportation infrastructure in New York State has been well documented and the Department has a duty to maintain facilities constructed with federal funds per 23 USC §116(a). The State is faced with more service and safety needs than can be met with available funds. Extensively upgrading facilities, which perform at acceptable levels and do not have a documented safety deficiency, to current standards for new or reconstruction projects is not cost effective. Available dollars must be used to preserve and repair as many miles of highways and as many bridges as practicable. This goal can be achieved on a project by project basis using engineering skills to treat known and potential safety and operational problems. Resurfacing (1R) and restoration and rehabilitation (2R/3R) projects were developed to help extend the State's limited resources to achieve this goal.

Resurfacing is defined as all full width surface inlays and overlays including micro-surfacing and thin lift overlays, cape sealing (chip seal with a double microsurfacing), and in-place asphalt recycling techniques that place or replace top courses on non-freeways or top and binder pavement course(s) on freeways to extend or renew the existing pavement design life and to improve serviceability while not degrading safety. Restoration and rehabilitation are defined as the multicourse pavement structural work required to return the existing pavement to a suitable condition for resurfacing while enhancing highway safety. This includes work necessary to return the roadway, including the shoulder, roadside, bridges and appurtenances to a condition of structural or functional adequacy. Examples of restoration and rehabilitation include box out widenings, rubblizing, and crack & seat work.

Treatments that serve solely to seal and protect the road surface, improve friction, and control splash and spray are not 1R and do NOT require safety assessments (i.e., SAFETAP), ditch cleaning, superelevation, etc. Some examples of the types of treatments that would normally be considered maintenance are: painting or striping lanes, crack filling and sealing, surface sealing, chip seals, slurry seals, fog seals, scrub sealing, joint crack seals, joint repairs, dowel bar retrofit, spot high-friction treatments (<0.5 miles), diamond grinding, and pavement patching. In most cases, the combination of several maintenance treatments occurring at or near the same time may qualify as a 1R project.

The purpose of this chapter is to provide the basic scope of work and design criteria for 100% State funded and federally funded single and multiple course overlays and inlays **for both NYSDOT and OGS let projects**.

This chapter is not all inclusive. Other chapters and Engineering Instructions continue to provide requirements and guidance for design elements not modified by this chapter, such as asset management, pavement evaluation, pavement design, traffic control devices, guide rail, accommodation of pedestrians and bicyclists, drainage, utilities, landscaping, driveways, etc.

7.2 PROJECT DEVELOPMENT

One of the major decisions is to determine the appropriate type of project to address the needs and resulting objectives. Prematurely deciding on a resurfacing project or deciding not to gather needed data defeats the scoping process. This can lead to a failure to identify important problems that need treatment, selecting the wrong type of project, or designing an incomplete solution. Accordingly, it is essential that functional group representation on the scoping team be emphasized to reduce the possibility of this occurring. The NYSDOT Comprehensive Pavement Design Manual (CPDM) describes pavement evaluation, accepted treatment alternatives (ranging from preventive maintenance to reconstruction) and provides guidance on selection procedures.

The NYSDOT Project Development Manual (PDM) covers the project development procedures for maintenance, simple, moderate and complex projects that include 1R, 2R and 3R projects. The following sections help determine the appropriate standards for pavement resurfacing, restoration, and/or rehabilitation work.

7.2.1 Determining the Project Type

The following steps are necessary to determine the Project Type (1R, 2R or 3R):

1. Pavement Evaluation and Treatment Selection

   For any paving project, it is important to determine the primary types of deterioration and select the most appropriate treatment(s). The NYSDOT Comprehensive Pavement Design Manual (CPDM) describes accepted treatment alternatives (ranging from preventive maintenance to reconstruction) and provides guidance on selection procedures. That manual and other current Department pavement policy and instructions should be followed as appropriate. The Resident Engineer and Regional Materials Engineer are to be contacted for input on the pavement evaluation and treatment selection.

   2R and 3R projects may include segments (generally greater than 0.6 miles) of preventive maintenance, corrective maintenance or all types of rehabilitation pavement treatments (including rubblizing and cracking and seating). More extensive pavement treatments (i.e., reconstruction) may qualify as part of a 2R or 3R project if:

   - It does not include the construction of new highway segments
   - There is less than 0.6 miles of continuous pavement reconstruction
   - The reconstruction is less than 25% of the total project length

   On 1R projects, pavement repairs are limited to isolated pavement distress (e.g., joint failure, frost heave, pavement blow-up). The existing pavement must have a pavement surface condition rating of 6 or greater (5 for cold in-place recycling), or be approved on a case by case basis by the Regional Director when they approve the design approval document.

2. Americans with Disabilities Act (ADA) Compliance and Safety Assessment

The Safety Appurtenance Program (SAFETAP) ensures that safety considerations are incorporated into the Department's maintenance paving projects. The following process encourages the consideration of low-cost safety and other operational improvements.

During project initiation or early in project scoping, the designer will:

- Coordinate with the Regional Traffic and Safety Group to determine the appropriate level of crash analysis based on the type of project and improvement potential. Identify any opportunities for safety enhancements based on past operation or PIL studies. A copy of this request should be sent to the Residency to alert them of the project and solicit their input.
- Obtain feedback from the residency on the nighttime visibility of signs, delineators, condition of guide rail, and any observed safety or operational concerns.
- Review the GIS layer at P:\GIS\Planning\ADA, by Region, for locations within the project limits with identified noncompliant ADA curb ramps.
- Perform a field visit to assess elements in the Resurfacing ADA and Safety Assessment Form (Exhibit 7-1) which have not been evaluated through other means.
- Make recommendations for scope-appropriate safety work (refer to Exhibit 7-1) that is practical and cost-effective based on the crash analysis, safety assessment and the selected pavement treatment. Coordinate with Traffic and Safety; Maintenance; Planning and Program Management; Structures, etc, to ensure informed, practical recommendations and decisions on the project's scope.
- Confirm with the Regional Land Surveyor that all of the work can be accomplished without ROW acquisition (easements or fee takings) where curb ramps need to be installed or existing curb ramps need to be replaced. On 1R projects, the ROW procedures for curb ramps that are described in Section 7.3.2.1 and 7.3.2.2 shall be followed. ADA Reporting shall be completed by each Regional Office per Section 7.9 of this chapter.
- A key element in this process is the documentation of safety related work. The Resurfacing ADA and Safety Assessment and Recommendation Form should be completed by the designer with input from the appropriate functional groups and/or asset committees in the region. The form documents the assessment and recommendations for safety and ADA related items. For 1R and 2R projects, the form serves as part of the project documentation (Refer to Section 7.2.2 for project documentation).
    - For 1R projects, items that are outside the scope of a 1R project should not be documented as part of the 1R project DAD and may be provided to the appropriate program area for future consideration.
    - For 3R projects, the form helps identify basic safety improvements. Recommended safety work that will not be addressed is to be documented and explained in the Design Approval Document, in accordance with PDM Appendix 7.
- A list of 1R, 2R and 3R projects shall be completed by each Regional Office annually to allow for audits. See Section 7.8 of this chapter.

Exhibit 7-1 Resurfacing ADA & Safety Assessment Form (Page 1 of 2)

PIN:	Date:	High Crash Locations?	ADT:	Posted Speed:
Safety Assessment performed by:				

✓	Element	Guidance	Comments
Elements for All Single and Multicourse Resurfacing Projects (1R):			
	Dept of Justice and Title 6 (Consult Landscape Architect as needed)	**ADA Curb Ramps** - Curb ramps and crosswalks that were built or altered before March 15, 2012 must meet the standards of the 1991 ADA Accessibility Guidelines (ADAAG). Curb ramps built or altered on or after March 15, 2012, are required to meet the 2011 Proposed Accessibility Guidelines for Pedestrian Facilities in Public Rights-of-Way (PROWAG). A list of applicable values from the ADAAG and PROWAG is provided in the Critical Elements for the Design, Layout and Acceptance of Pedestrian Facilities table. Exceptions on 1R projects must be justified per HDM Ch 2, Section 2.8. Note that sidewalks and pedestrian signal upgrades are not required unless they are altered as part of the project.	
	National MUTCD – Federal Regulation (Consult Traffic Engineer as needed)	**Signing** • Regulatory and warning signs should be installed as needed, in accordance with the National MUTCD and NYS Supplement. Review signs for condition (obvious fading or graffiti), location, post type (breakaway or rigid), appropriateness (need). • Identify where the advisory speed, ball bank indicator, accelerometer, or record plans reveal superelevation that is less than recommended for the posted speed (using AASHTO Method 2 noted in HDM §5.7.3). • Immediately notify the Resident Engineer of any missing regulatory or warning signs. • Identify regulatory and warning signs obscured by vegetation for clearing and grubbing.	
		Pavement markings should be installed in accordance with the MUTCD. The adequacy of existing passing zones should be evaluated. Current EIs and specifications must be followed. Coordinate with the Traffic and Safety group to determine if a change to lane or shoulder widths are appropriate. **Allowable Lane and Shoulder Width Changes** See EI 13-021 to restripe 9' & 10' lane widths on high-speed highways to 11' where a 4' minimum shoulder can be retained for non-motorized traffic, or to restripe 12' and greater lane widths on low-speed highways with shoulders less than 4' to widen the shoulder for non-motorized traffic.	
		Delineation - Install per the National MUTCD and NYS Supplement.	
	Rumble Strips	Include CARDs as required by EI 13-021, and SHARDs in accordance with EI 16-014.	
	Roadside Safety	**Sight Distance** - Consult HDM Chapters 2 and 5 to identify the standard sight distances for the posted speed. Consider clearing and grubbing vegetation to improve clear zone and the following sight distances: Intersection sight distance for right on red at signalized intersections and for left, through and right turns at unsignalized intersections and major driveways. • Sag vertical curve SSD obscured by overhead trees. • Horizontal SSD. Consider intersection warning signs for segments with sight distances that are observed to be substantially less than the standard and will not be improved.	
		Fixed Objects Address obvious objects that are within the prevailing clear area and within the ROW based on engineering judgment from a field visit (e.g., tree removal on the outside of a curve or installation of traversable driveway culvert end sections within the prevailing clear zone). Poles, guy wires, sign posts, trees, and other obstructions should be 18" or more from the face of curb. In uncurbed areas, they should be 48" or more from the edge line.	
		Review the **guide rail** for: • Nonfunctioning or severely deteriorated rail (HDM §10.3.1.2 B) • Guide rail height (HDM Table 10-7 and current EIs) considering the proposed overlay thickness. • Deflection distance (HDM §10.2.2.3 and Table 10-3). • Point of need if the end section will be replaced (HDM §10.2.2.1). • Barrier Terminals/End Sections (HDM §10.2.5). Install median barrier per HDM §10.2.4. (72' criteria for interstates)	
		Bridge Rail Transitions - The Regional Structures Group, Regional Design Group, Main Office Structures, and Design Quality Assurance Bureau should be contacted, as needed, to help identify substandard connections to bridge rail and for the recommended treatment.	

Exhibit 7-1 Resurfacing ADA & Safety Assessment Form (Page 2 of 2)

✓	Element	Guidance	Comments
	NYS Railroad Law	**Railroad Crossing** - Contact Regional Rail Coordinator. Contact Office of Design if replacing crossing surface as required per HDM Ch 23.11.	
	Paving	**Edge drop-offs** are not permitted between the traveled way and shoulder. Shoulder edge drop offs >2" are to be addressed via the safety edge (EI 10-012) in the §402 items or shoulder backup material.	
		Shoulders - Unpaved, stabilized shoulders should be paved a minimum of 2' beyond the travelled way in uncurbed sections to reinforce the traveled way, for occasional bicyclists, and to improve safety. Design criteria for 2R/3R may require a wider width. A 1:10 pavement slope may be used to transition between the travel way paving and a paved shoulder that will not be resurfaced. Requires milling a longitudinal rebate and cannot exceed max rollover rate of 10% for ≤ 4' shoulders and 8% for wider shoulders. Compare current shoulder and lane width to record plans to determine if shoulder width has been reduced due to previous paving. Consider reestablishing original shoulder width to improve bike and/or pedestrian accommodation.	
		Super-elevation - Improve superelevation (up to the maximum rate as necessary using AASHTO Superelevation Distribution Method 2) to have the recommended speed equal to the posted speed. Where the maximum rate is insufficient, install advisory speed signs as needed and consider additional treatments (e.g., chevrons, roadside clearing), as needed. Note that transition lengths should be <½ the standard value before reducing superelevation.	
		Vertical drop-offs - Manholes, valves, frames and grates are to be adjusted in accordance with Sections 655 and 663 of the Standard Specifications. Vertical drops at grates or frames should be addressed if they exceed 1" and horizontal gaps parallel to the direction of traffic should be addressed if they exceed 5/8".	
Additional Elements for 2R and 3R Projects:			
	Sidewalks and Bicycle Facilities	**2R Projects:** all pedestrian facilities within the existing highway boundary must be in conformance with the acceptable values in the Critical Elements for the Design, Layout and Acceptance of Pedestrian Facilities table. **3R projects**: all pedestrian facilities must be in conformance with the acceptable values in the Critical Elements for the Design, Layout and Acceptance of Pedestrian Facilities table. **2R/ 3R projects** New or replacement pedestrian signals must be accessible. Separate bike facilities should be considered when along highways exceeding 2,000 vehicles/day with a speed limit of 30 mph or more. Minimum shoulder width of 4' if no curbing. Exceptions on 2R/3R projects must be justified per HDM Ch 2, Section 2.8.	
	Super-elevation	For Freeway projects, the superelevation is to be improved to meet the values in HDM Ch 2, Exhibits 2-13a or 2-14a (which utilizes AASHTO Superelevation Distribution Method 5).	
	Speed Δ Lanes	Speed change lanes should meet AASHTO "Green Book" Ch 10 standards. Shoulders for speed change lanes should meet HDM §2.7.5.2 and §2.7.5.3	
	Clear Zone(s)	Establish based on HDM §10.3.2.2 A for non-freeway and HDM §10.2.1 for freeways. Check all barrier points of need (HDM §10.2.2.1).	
	Fixed Objects	Reestablish the clear zone and remove, relocate, modify to make crash worthy, shield by guide rail/crash cushion, or delineate any fixed objects. For guidance on identifying fixed objects, refer to HDM §10.3.1.2 B.	
	Traffic Signals	Signal heads should be upgraded to meet current requirements per Regional Traffic and Safety, including backing plates, as needed. Detection systems should be evaluated for actuated signals and considered for fixed-time signals. New traffic signals that meet the signal warrants may be included.	
	Shoulder Widening	Shoulders should be widened to 2' min on local rural roads and low speed collectors. 4' min is used for other nonfreeway rural facilities with design speeds ≥40 mph for crash avoidance, bicyclists, and pedestrians. Shoulders width should be restored where the existing width is reduced from previous paving operations.	
	Lane Width	Non-freeway lanes may be widened or narrowed per HDM Exhibits 7-5 and 7-9. New through travel lanes are not permitted.	
	Design Vehicle	Intersections should accommodate the design vehicle w/o encroachment into other travel lanes or turning lanes. See HDM 5.7.1.	
	Driveways	Driveways shall meet the spirit and intent of the most recent "Policy and Standards for the Design of Entrances to State Highways" in HDM Chapter 5, Appendix 5A.	
	Turn Lanes	Turn lanes should meet the requirements of HDM §5.9.8.2	
	Curbing	Curbing must meet the requirements of HDM §10.2.2.4. For freeways, curbing that cannot be eliminated should be replaced with the 1:3 slope, 4" high traversable curb.	
	Drainage	Closed drainage work may include new closed drainage structures, culverts, and the cleaning and repair of existing systems. Subsurface utility exploration should be considered for closed drainage system modifications.	

3. Project Type Selection

The CPDM defines the process and technical considerations for selecting the recommended pavement treatment. Refer to Sections 7.3 through 7.6 to determine which project type fits the recommended pavement treatment.

7.2.2 Project Process and Design Approval Document

Process - 1R, 2R and 3R projects should follow the Project Development Manual (PDM) steps in Chapter 4, the Design Related Approvals Matrix, and Appendix 7. Section 7.7 of this chapter on project delivery applies to 1R, 2R and all 3R projects. 1R and 2R projects require the preparation of an annual SAFETAP reporting as discussed in Section 7.8 of this chapter.

Design Approval Documentation - Refer to PDM Appendix 7 for the format and content of the design approval document. PDM Appendix 7, Exhibit 7-11 lists the material that should be attached to the 1R, 2R and 3R project design approval documents. The Resurfacing ADA and Safety Assessment Form is to be attached as required by PDM Exhibit 7-11.

7.3 FREEWAY AND NON-FREEWAY 1R PROJECTS

7.3.1 Definition of 1R

1R projects are resurfacing projects that include the placement or replacement of the top and/or binder pavement course(s) to extend or renew the existing pavement design life and to improve serviceability while not degrading safety. 1R projects must meet the requirements in Section 7.3.2 of this chapter. Refer to the Comprehensive Pavement Design Manual to determine the recommended pavement treatment selection.

7.3.2 1R Requirements

1R projects must meet the following requirements:

- For freeways, pavement treatments cannot substantially impact the pavement elevation (2.5" maximum overlay) and are limited to binder and top treatments. Cold in place recycling (CIPR) is not permitted. Pavement work can include:
  - a 1 course overlay/inlay (2.5" max) with isolated slab repairs for PCC pavements and T&L (up to 50% of top course volume) via VPP or D contract.
  - a 2 course inlay (5" max mill and fill) via D contract only.
  - a 1 course inlay (2.5" max) with a 1 course overlay (2" max) to provide a 4" pavement treatment via D contract only.
- For non-freeway projects, work is limited to 1 course overlay or inlay (2.5" max) with optional 5" cold in place recycling (CIPR) via VPP or D contract.
- All other multiple course resurfacing projects shall be progressed as 2R or 3R projects in accordance with the PDM and this chapter.
- The existing pavement must have a pavement surface condition rating of 6 or better (5 if CIPR will be performed on non-freeway segments). Exceptions must follow the pavement treatment selection in Chapter 3 of the Comprehensive Pavement Design Manual and be approved on a case-by-case basis by the Regional Director when they approve the design approval document.
- The quantity of truing & leveling is to be less than 50% of the top course material. Truing & leveling is to be used at spot locations to remove irregularities in the old pavement, fill and patch holes, correct variations in banked pavement, establish pavement crowns and for the terminations of the overlay as noted in Section 3.3.1 of this manual. Truing and leveling is not to be used over substantial lengths of the project to effectively increase the overall maximum overlay thickness or add a second pavement course. Wheel ruts are to be filled with a shim course or top course material. The intent is to fill ruts to improve surface drainage and allow adequate compaction of the overlay without adding a second pavement course that would warrant a more in-depth evaluation. Milling may be used in place of truing and leveling.

- Milling may be performed for the traveled way or traveled way and full depth shoulders to maintain the existing surface elevation. Reasons for milling include: maintaining vertical clearances, maintaining proper barrier heights, maintaining curb height for drainage, and replacing a poor top course on a sound pavement structure. Spot locations may have more milling to obtain an acceptable cross slope and profile.
- The overlay must extend the full width of the paved roadway (travel lanes & paved shoulders) unless milling is performed as noted above and the paved shoulders, if any, are in satisfactory condition. Where shoulders are in good condition, the travel lane overlays may use a longitudinal milling rebate to create a (1:10) shoulder slope. The maximum rollover rate of 10% for ≤ 4' shoulders and 8% for wider shoulders cannot be exceeded. Lane and shoulder widening are not permitted except where narrow shoulders in uncurbed areas are restored to 2' wide.
- Where the travel lanes are in good condition (6 or greater) and the safety assessment does not recommend any work on the traveled-way, 1R projects may involve resurfacing of the shoulder only.
- Reconstruction of the shoulder, except where narrow shoulders in uncurbed areas are restored to 2' wide, is not permitted.
- Low-speed segments (≤40 MPH speed limit) with 12' lanes and shoulders less than 4', should be restriped to 11' travel lanes on non-qualifying highways to provide a wider shoulder and enhance mobility for non-motorized travel unless a non-conforming feature explanation is provided in accordance with HDM Section 5.1. Short segments, less than 0.6 miles in length, should only be restriped where they will help establish lane width consistency with adjacent segments.
- High-speed segments (≥45 MPH speed limit) with 9' or 10' lanes, should be restriped to 11' travel lanes provided a 4' minimum shoulder can be retained to enhance safety while maintaining mobility for non-motorized travel unless a non-conforming feature explanation is provided in accordance with HDM Section 5.1. Short segments, less than 0.6 miles in length, should only be restriped where they will help establish lane width consistency with adjacent segments. Note that 9' and 10' lanes have 1.25 to 1.45 times the crash rate of 11 foot lanes.
- Isolated slab repairs are permitted for pavement blow-ups, when milling reveals spot locations of rigid pavement distress, where isolated joints have failed.
- Where existing rumble strips (e.g., MIARDs, CARDs, SHARDs) are present, they may need to be shimmed or milled and filled prior to an overlay. The Regional Materials Engineer should be consulted for the appropriate method.
- The Safety Assessment Team must inspect each site and complete the Resurfacing ADA and Safety Assessment Form (Exhibit 7-1) as outlined in Section 7.2.1 of this chapter.
- The non-pavement work must be performed in accordance with Sections 7.7.1 of this chapter.
- A design approval document is prepared in accordance with Section 7.2.2 of this chapter.
- Element Specific Bridge Work recommended by the Regional Structures Management Team may be included in 1R projects. Element Specific Bridge Work eligible for inclusion in a 1R project is defined in the Project Development Manual (Appendix 7 Exhibit 7-5). There are no restrictions on the number of items in NYSDOT let D contracts.

- Safety work that meets the above criteria and either of the following criteria is to be implemented under the 1R Requirements (in accordance with Exhibit 7-12):
    - The safety treatments are necessary to avoid degrading safety, or
    - The safety treatments are practical and necessary to address existing or likely (i.e., a reasonable likelihood of occurrence) safety problems.

7.3.2.1 ADA Compliance for 1R Projects

1R projects are considered alterations per a technical advisory issued jointly by the USDOT and US Department of Justice in July 2013. This requires that 1R projects address the need for new curb ramps and crosswalks, and the adequacy of existing curb ramps and crosswalks. Curb ramps built or altered prior to March 15, 2012 must meet the standards of the 1991 *ADA Accessibility Guidelines* (ADAAG). Curb ramps built or altered on or after March 15, 2012, are required to meet the 2011 *Proposed Accessibility Guidelines for Pedestrian Facilities in Public Rights-of-Way* (PROWAG). A list of applicable values from the ADAAG and PROWAG is provided in the Critical Elements for the Design and Layout, and Acceptance of Pedestrian Facilities table.

When ADA criteria cannot be met, the reason should be documented in the DAD. Noncompliant pedestrian facilities must be justified and approved per HDM Chapter 2. Refer to Section 7.9 of this chapter for ADA Transition Plan reporting requirements for new or replacement pedestrian facilities. For more information on the ADA Transition Plan, contact the Regional ADA Coordinator or Office of Policy, Planning and Performance in the Main Office.

Corner curb ramps serving pedestrian paths that are parallel to the paving mainline should be addressed as part of the 1R project if they can be brought into full ADA compliance, or if a significant improvement in accessibility can be made. Paving may be extended as far as 30 feet from the edge of the mainline to correct deficiencies in the grade, cross slope, or counterslope of these ramps.

Curb ramp work may be done in a separate contract. Timing of curb ramp work should comply with Section 7.7.1 and Exhibit 7-12. It must be completed before or concurrent with the 1R project, except as provided in Section 7.3.2.2.

Crosswalks on 1R projects should meet the grade and cross slope criteria found in the Critical Elements for the Design and Layout, and Acceptance of Pedestrian Facilities table. However, extensive milling or reconstruction is not required to correct crosswalk slopes on 1R projects, as this would fall outside of the scope of the project.

7.3.2.2 Procedures for Addressing Curb Ramp Requirements on 1R Projects

Refer to Exhibit 7-1a, 1R Project Pavement Alteration Curb Ramp & ROW Logic, for a flow chart of these procedures.

Step 1. Inspect all existing curb ramps for compliance with the applicable standards (1991 ADAAG or 2011 PROWAG) using the Critical Elements for the Design and Layout, and Acceptance of Pedestrian Facilities table.

- 2011 PROWAG-compliant curb ramps are to be listed as such in a curb ramp table (Exhibit 7-13) to update the ADA Transition Plan.
- 1991 ADAAG-compliant curb ramps are to be listed as such in a curb ramp table (Exhibit 7-13) to update the ADA Transition Plan. This information will be used to ensure that these locations are brought up to current standards in future projects.

Step 2. For any curb ramp that is not compliant with the applicable accessibility guidelines, conduct ROW research. This work is to be performed under the supervision of a licensed Land Surveyor, and may include the review of record plans, orthoimagery, highway work permits, GIS databases, highway type, the 23 NYS Session Laws, and survey-grade tax maps. Where possible, the Land Surveyor will make Approximate Highway Boundary (AHB) or Highway Boundary (HB) determinations and provide a scaled CADD file with AHB/HB to Design. No full boundary survey or other field work is required. Design is to obtain any necessary terrain data and develop a proposed curb ramp design that is compliant or as close to compliance as practicable.

Step 3. Determine ROW category for curb ramp:

CATEGORY I – AHB/HB can be determined from ROW research. The proposed compliant curb ramp is inside the AHB/HB.

Deliver the PS&E with the curb ramp. In some cases, the curb ramp will be addressed as part of separate contract, but the curb ramp work must be completed prior to, or concurrent with, the 1R project. Show the AHB/HB and curb ramp in the contract documents.

CATEGORY II - AHB/HB cannot readily be determined from ROW research

A. The proposed compliant curb ramp can be built inside the existing concrete footprint Deliver the PS&E with the curb ramp. In some cases, the curb ramp will be addressed as part of separate contract, but the curb ramp work must be completed prior to, or concurrent with, the 1R project. Show the AHB at the edge of the existing concrete footprint in the contract documents. During design, notify adjacent property owners of anticipated work.

B. The proposed compliant curb ramp will extend beyond the existing concrete footprint

- Where an existing curb ramp is present

  Defer the curb ramp work to a follow-on project to allow time for ROW acquisitions. Regions are to program ADA follow-on projects on the STIP. Deferred curb ramp location improvements are to be **let within 3-years** of the pavement maintenance contract letting.

- Where no existing curb ramp is present (e.g., a street crossing with vertical faced curb and no ramp)

  Defer the entire 1R project until adequate ROW can be acquired. This will avoid the need to remove and replace newly constructed, but only partially compliant, curb ramps;

  OR

  If deferring the 1R project is not possible, deliver the PS&E with limited curb ramp improvements. Show the AHB at the edge of the existing concrete footprint in the contract documents. Curb ramps shall be constructed as close to compliance as practicable, and noncompliant ramps must be justified and approved per HDM Chapter 2.

  NOTE: This option may be acceptable for projects with a very small number of isolated curb ramps, but NOT where there are more than a few (3-8) curb ramp locations within the project.

  During design, notify adjacent property owners of the anticipated work. Fully compliant curb ramp work is to be included in a follow-on project. Regions are to program ADA follow-on projects on the STIP. Deferred curb ramp location improvements are to be **let within 3-years** of the pavement maintenance contract letting.

CATEGORY III – AHB/HB can be determined from ROW research. The proposed compliant curb ramp will extend beyond the AHB/HB

- Where an existing curb ramp is present

  Defer curb ramp work to a follow-on project to allow time for ROW acquisitions. Regions are to program ADA follow-on projects on the STIP. Deferred curb ramp location improvements are to be **let within 3-years** of the pavement maintenance contract letting.

- Where no existing curb ramp is present (e.g., street crossing with vertical faced curb and no ramp)

  Defer the entire 1R project until adequate ROW can be acquired. This will avoid the need to remove and replace newly constructed, but only partially compliant, curb ramps;

  OR

  If deferring the 1R project is not possible, deliver the PS&E with limited curb ramp improvements. Show the AHB/HB in the contract documents. Curb ramps shall be constructed as close to compliance as practicable, and noncompliant ramps must be justified and approved per HDM Chapter 2

  NOTE: This option may be acceptable for projects with a very small number of isolated curb ramps, but NOT where there are more than a few (3-8) curb ramp locations within the project.

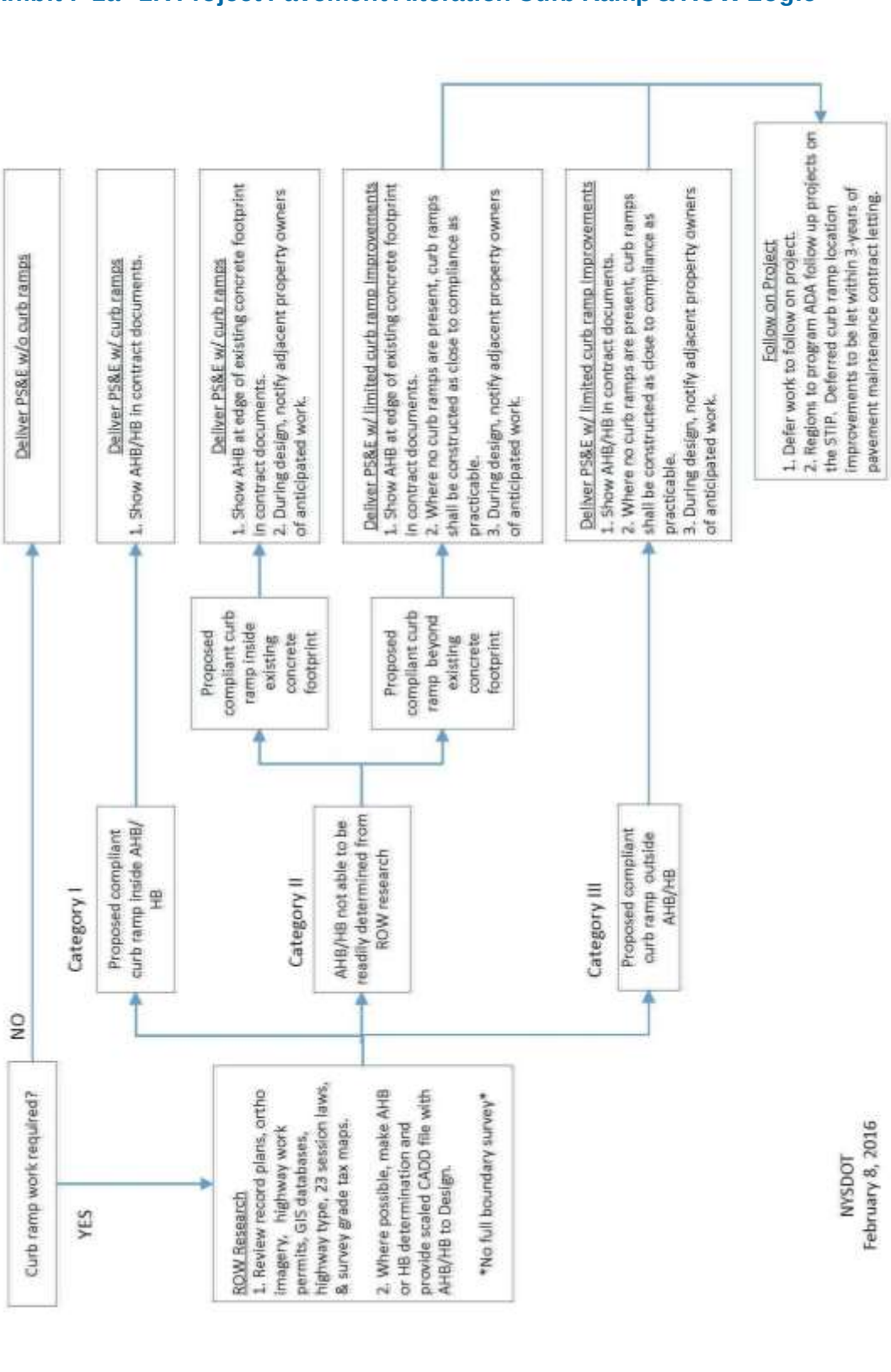
  During design, notify adjacent property owners of the anticipated work. Fully compliant curb ramp work is to be included in a follow-on project. Regions are to program ADA follow-on projects on the STIP. Deferred curb ramp location

improvements are to be **let within 3-years** of the pavement maintenance contract letting.

CATEGORY IV – The proposed curb ramp cannot be made compliant due to a design constraint other than ROW.

Include the best possible fit in the contract documents. The curb ramp shall be constructed as close to compliance as practicable, and noncompliant ramps must be justified and approved per HDM Chapter 2.

Exhibit 7-1a 1R Project Pavement Alteration Curb Ramp & ROW Logic



7.4 FREEWAY AND NON-FREEWAY 2R PROJECTS

7.4.1 Definition of 2R Projects

2R projects are applicable to all functional class roadways and typically include a multicourse resurfacing project that may include: milling, superelevation, traffic signals, turn lanes, driveway modifications, roadside work, minor safety work, lane and shoulder widening, shoulder reconstruction, drainage work, sidewalk curb ramps, etc. 2R projects use the 3R design criteria.

2R projects do not include:

- New through travel lanes
- New two-way left-turn lanes (TWLTL), auxiliary lanes or medians
- Extensive pavement reconstruction (e.g., 0.6 miles or more of continuous reconstruction or more than 25% of the total project length)
- Major Bridge Rehabilitations, New Bridges, or Bridge Replacements (as defined in Bridge Manual Section 19 and PDM Appendix 5)
- Substantial environmental impacts
- Anticipated controversy
- Formal public hearings
- Extensive (non-*de minimis*) right-of-way (ROW) acquisitions per the Eminent Domain Procedure Law (EDPL)

Refer to the CPDM to determine the recommended pavement work.

7.4.2 2R Requirements

The 2R requirements are contained in Exhibit 7-2. In general, where the 2R requirements are silent, the project should follow standard Department guidance and policies. Where policies and guidance have specific information for 3R projects, it should be used for 2R projects as well.

Exhibit 7-2 2R Screening/Scoping Checklist (Page 1 of 2)

PIN:	✓
1. PAVEMENT TREATMENT SCREENING • No full-depth replacement of travel lane pavement except in localized areas (i.e., must be 0.6 miles or less of continuous reconstruction and less than 25% of the project length). • At a minimum, shoulders, if any, must be restored to a satisfactory condition and be flush with the edge of traveled way. • Shoulder reconstruction is permitted.	
2. CAPACITY SCREENING Through Capacity - A Level of Service (LOS) analysis is performed in accordance with HDM §5.2. Note: secondary data may be used if approved by the RPPM or Regional Traffic Engineer. • The ETC+10 LOS is at least "D" or, the design approval documents that the LOS is non-conforming and "The RPPM does not anticipate capacity improvements within ten years." Non Freeway Intersection Capacity - Intersections with observed operational or safety problems due to lack of turn lane or insufficient length of turn lane are analyzed in accordance with HDM §5.2. Note: secondary data may be used if approved by the RPPM or Regional Traffic Engineer. New turn lanes needed at intersections (signalized and unsignalized) are to: • Meet the length required by HDM §5.9.8.2 or include an explanation for non-conforming lengths in the design approval document. • Meet the width requirement in 7.5.2.1 B for rural highways or 7.5.2.2 B for urban highways. • Meet the air quality requirements of Environmental Procedure Manual (EPM) §1.1.	
3. CONSIDERATION OF OTHER MODES AND VULNERABLE USERS • Document the consideration of vulnerable users and non-motorized traffic needs, particularly in underserved areas where walking and biking are the primary traffic mode for elderly, young and disadvantage populations. Evaluate existing marked and unmarked ped crossing locations, sidewalks, paths bike routes, bike lanes, etc. • Consider current and future transit users and discuss with Regional Planning to ensure the MPO and/or Regional Plans are considered. • Refer to HDM Chapter 24 on mobility. • Fill out the Complete Streets screening as discussed in HDM Chapters 17 and 18.	
4. GEOMETRIC DESIGN CRITERIA SCREENING • Non-freeway routes: 3R standards referenced in HDM §7.5. • Interstate System or other freeways: HDM §2.7.1.1 as modified by §7.6.3. • All non-standard geometric features are justified in accordance with HDM §2.8. • Non-conforming features (HDM §5.1) are listed in the design approval document with an explanation, as necessary.	

Exhibit 7-2 2R Screening/Scoping Checklist (Page 2 of 2)

5. GENERAL DESIGN SCREENING • Interstate System or other freeway routes meet the requirements of HDM §7.6. • Roadside design meets the requirements for 3R projects in HDM §10.3. • Element Specific Bridge Work and/or Minor Bridge Rehabilitation Work recommend by the Regional Structures Management Team may be included in 2R projects. Element Specific Bridge Work eligible for inclusion is defined in the Project Development Manual (see Appendix 7, Exhibit 7-5). Minor Bridge Rehabilitation Work eligible for inclusion is defined in the Bridge Manual (Chapter 19, Section 19.1) • Culvert rehabilitation is permitted as defined as any of the options stated in HDM Section 8.6.7.1 (including wingwall and slope repairs, inlet and outlet stream work as well as minor pavement and guiderail repairs as permitted under 2R work).	
6. SAFETY SCREENING A crash history review is required by HDM §5.3. The Regional Traffic Group will determine the level of detail required based on a review of the computerized crash data. The crash analysis and recommendations should be attached to the design approval document as an appendix. If, based on the crash analysis, it is decided to undertake a safety improvement that cannot be implemented in a 2R project (e.g., a new grade separation), a reconstruction or other type of project should be progressed. Where the crash rate is above the statewide average and the off-peak 85th percentile speed is 10 mph or more than the posted speed, verify the appropriateness of the posted speed and/or evaluate the inclusion of low-cost traffic calming measures (Ref. HDM Ch 25) restriping 12' lanes to 11', adding pedestrian refuge islands, etc.	
7. SAFETY ASSESSMENT Perform a road safety assessment (Exhibit 7-1) as discussed in Section 7.2 of this chapter. Safety work that meets either of the following criteria is to be implemented under the multi-course requirements: • The safety treatments are necessary to avoid degrading safety, or • The safety treatments are practical and necessary to address existing or potential safety problems.	
8. PUBLIC OUTREACH SCREENING • Appropriate public involvement is done (See PDM Appendix 2) and community concerns are satisfactorily addressed. • No formal public hearings are required or held.	
9. ENVIRONMENTAL SCREENING • SEQR (All projects): The project is determined to be a SEQR Type II (i.e., complies with 17 NYCRR 15.14(d) and 17 NYCRR 15.14(e)(37)). • NEPA (Federal-aid projects): Federal Environmental Approvals Worksheet is completed and the project is determined to be a Categorical Exclusion, (with FHWA approval concurrence obtained, if necessary).	
NOTE: Only segments that meet all of the requirements above can be progressed as 2R.	

7.5 NON-FREEWAY 3R PROJECTS

This section sets forth the design criteria and guidance for non-freeway 3R projects and highlights areas of particular importance to the scoping and design efforts. For the purposes of this chapter, the term non-freeway applies to all projects not on interstates and other freeways, expressways and multi-lane divided parkways as defined in Section 2.4.1.2 of this manual. The specific design requirements and guidance for the drainage, roadside, pavement, traffic control devices, etc., are in other sections of the Highway Design Manual, appropriate Engineering Instructions, etc. All Department policies, procedures, standards, rules and regulations are to be followed except as specifically modified by this section.

7.5.1 Definition of Non-Freeway 3R

Non-freeway 3R projects are designed to preserve and extend the service life of an existing highway, including any cost-effective safety improvements and other safety improvements. 3R projects are required to enhance safety. The scope of non-freeway 3R work cannot be arbitrarily limited to the surfaced roadway (i.e., the roadside must be considered in developing the scope of a non-freeway 3R project). Non-freeway 3R projects should generally provide a highway section that will require only routine maintenance work for many years after construction.

Changes to a highway's geometric elements, which are not required to meet minimum 3R standards or part of a low-cost safety enhancement or low-cost operational improvement, should be supported by an analysis demonstrating that the proposed work is cost-effective, (e.g., a non-freeway 3R project that proposes to widen a highway to the new or reconstruction minimum lane widths in Chapter 2, Section 2.7). Note that the safety and operational effects of the improvements should be considered together when calculating whether or not an improvement would be cost-effective.

Non-freeway 3R pavement treatments generally have a service life of 10 to 20 years. However, reconstruction of short segments may be necessary to meet the project objectives. For example, straightening of a horizontal curve, which increases the curve length, usually requires full reconstruction between the beginning and ending points of the curve. Reconstruction segments of 0.6 miles or more shall be designed in accordance with the standards for new and reconstruction projects, including separate design criteria from Chapter 2 of this manual. The future plans for the facility and the length of the reconstruction work are factors in the decision to widen the roadway to the Chapter 2 widths, or justify using widths that are consistent with the adjacent non-freeway 3R segments.

Some of the work may be accomplished more efficiently by separate contract. This is acceptable as long as the separate contracts are progressed in a timely manner (See Section 7.7 of this chapter). The conditions of each individual project should be evaluated to determine if work by a separate contract is a viable option. When work will be done by a separate contract within the limits of the non-freeway 3R project, the work is to be discussed in the Design Approval Document. This discussion is required since the approval of the non-freeway 3R project may be dependent on the scope and schedule of the work being done under a separate contract.

Refer to Exhibit 7-3 for requirements and guidance on the scope of work for a non-freeway 3R project.

Exhibit 7-3 Non-Freeway 3R Screening/Scoping Checklist (Page 1 of 2)

PIN:	✓
1. FUNCTIONAL CLASSIFICATION • Highway is not classified as an Interstate or other freeway as defined by Chapter 2, Section 2.4 of this manual.	
2. PAVEMENT TREATMENT SCREENING • Refer to the CPDM to determine the recommended pavement treatment. • No full-depth replacement of travel lane pavement except in localized areas (i.e., must be 0.6 miles or less of continuous reconstruction and less than 25% of the project length). • At a minimum, shoulders, if any, must be restored to a satisfactory condition and be flush with the edge of traveled way. • Shoulder reconstruction is permitted. • Pavement treatments are to be designed to a minimum expected service life (ESL) of 10 years and desirably 15 to 20 years. ESLs of 5 to 9 years are non-conforming features that require an explanation.	
3. CAPACITY SCREENING Through Capacity - A Level of Service (LOS) analysis is performed in accordance with HDM §5.2 Note: secondary data may be used if approved by the RPPM. The ETC+10 LOS will be at least "D" or, the design approval documents the LOS as non-conforming and that the "RPPM or Regional Traffic Engineer does not anticipate capacity improvements within ten years." • Additional through travel lanes cannot be created/constructed. This includes restriping an existing 4- lane highway to 6 lanes, with or without widening the existing pavement. • Intermittent climbing and passing lanes are allowed. • New or existing Two-Way Left-Turn Lanes (TWLTL) are to be a minimum of 11' wide with minimal reconstruction work (e.g., through restriping, minor widening, changing a 4 lane road to a 3 lane road). NOTE: Additional through travel lanes substantially change the operating characteristics of the highway and violate the basic premise of the non-freeway 3R standards. Additionally, added travel lanes may create safety and operational problems, not only for the project segment, but at other locations within the highway system. Significant social, economic, and environmental concerns may also result from increasing the number of travel lanes. Intersection Capacity - Intersections with observed operational or safety problems due to lack of turn lane or insufficient length of turn lane are analyzed in accordance with HDM §5.2. Note: secondary data may be used if approved by the RPPM or Regional Traffic Engineer. • New turn lanes needed at intersections (signalized and unsignalized) are to: • Meet the length required by HDM §5.9.8.2 or include an explanation for non-conforming lengths in the design approval document per HDM §5.1. • Meet the width requirement in 7.5.2.1 B for rural highways or 7.5.2.2 B for urban highways. • Meet the air quality requirements of Environmental Procedure Manual (EPM) §1.1. • New, longer, and/or wider auxiliary lanes through an intersection with minimal reconstruction work.	

Exhibit 7-3 Non Freeway 3R Screening/Scoping Checklist (Page 2 of 2)

4. CONSIDERATION OF OTHER MODES AND VULNERABLE USERS • Document the consideration of vulnerable users and non-motorized traffic needs, particularly in underserved areas where walking and biking are the primary traffic mode for elderly, young and disadvantage populations. Evaluate existing marked and unmarked ped crossing locations, sidewalks, paths bike routes, bike lanes, etc. • Consider current and future transit users and discuss with Regional Planning to ensure the MPO and/or Regional Plans are considered. • Refer to HDM Chapter 24 on mobility. • Fill out the Complete Streets screening as discussed in HDM Chapters 17 and 18.	
5. GEOMETRIC DESIGN CRITERIA SCREENING Non-freeway 3R standards in HDM §7.5.2 • All non-standard geometric features are justified in accordance with HDM §2.8. • Non-conforming features (HDM §5.1) are listed in the design approval document with an explanation, as necessary. • Bridge and highway approach design criteria for major bridge rehabilitations, new and replacement bridges shall follow HDM Chapter 2. Additionally, these projects must follow the PDM process for a bridge project, including the requirement for a full design report per PDM Appendix 7, and approvals in the Design Related Approval Matrix. • New and replacement large culverts are to use the 3R design criteria.	
6. GENERAL DESIGN SCREENING • Roadside design meets the requirements for 3R projects in HDM §10.3. • All bridge work recommended by the Regional Structures Management Team is permitted. • New and replacement large culverts are permitted. • Medians may be widened or created with minimal reconstruction work.	
7. SAFETY SCREENING A crash history review is required by HDM §5.3. The Regional Traffic Group will determine the level of detail required based on a review of the computerized crash data. The crash analysis and recommendations should be attached to the design approval document as an appendix. If, based on the crash analysis, it is decided to undertake a safety improvement that cannot be implemented in a 3R project (e.g., a new grade separation), a reconstruction or other type of project should be progressed. Where the crash rate is above the statewide average and the off-peak 85th percentile speed is 10 mph or more than the posted speed, verify the appropriateness of the posted speed and/or evaluate the inclusion of low-cost traffic calming measures (Ref. HDM Ch 25) restriping 12' lanes to 11', adding pedestrian refuge islands, etc.	
8. SAFETY ASSESSMENT Perform a road Safety Assessment as discussed in Section 7.2 of this chapter. Safety work that meets either of the following criteria is to be implemented under the multi-course requirements: • The safety treatments are necessary to avoid degrading safety, or • The safety treatments are practical and necessary to address existing or likely safety problems.	
9. PUBLIC OUTREACH SCREENING Appropriate public involvement is done (See PDM Appendix 2) and community concerns are satisfactorily addressed.	
10. ENVIRONMENTAL SCREENING A SEQR type and NEPA classification are required. There are no restrictions on the environmental processing for 3R projects.	
NOTE: Only segments that meet all of the requirements above can be progressed as 3R.	

7.5.2 Design Criteria (Critical Design Elements and Other Design Parameters)

1. General - Sections 7.5.2.1 and 7.5.2.2 list the critical design elements for rural and urban conditions and are similar to the critical design elements in Chapter 2, Section 2.7 of this manual. Although this section looks similar to Chapter 2, Section 2.7, the standard values and treatment of many of the critical design elements are vastly different.

2. Background - The values for the critical design elements and other design parameters are based on Department experience and the concepts in Transportation Research Board Special Report 214. The non-freeway 3R design criteria is calculated from the existing highway geometrics since the design and operational characteristics of the existing highway can be observed and measured. This approach allows the design criteria to be less stringent than that for new and reconstruction projects because there is an operational "model" to analyze for safety and operational characteristics. When substantial changes are proposed, such as curve realignment, the non-freeway 3R design criteria is no longer applicable because the design criteria can no longer be supported by an analysis of the existing conditions. Reconstruction segments over 0.6 miles are to use design criteria from Chapter 2 of this manual.

3. Engineering Judgment - The inclusion of specified design criteria in this section does not preclude the use of engineering judgment to consider alternative engineering values and does not necessarily mean that existing roadways which were designed and constructed using different criteria, are either substandard or unsafe. Many existing facilities are adequate to safely and efficiently accommodate current traffic demands and do not need resurfacing, restoration and rehabilitation solely to meet current design criteria.

4. Guidance - Elements which meet the design criteria should generally be retained unless improvement is warranted based on existing or anticipated operation or safety problems. Existing elements in excess of these non-freeway 3R values should likewise be retained unless there are factors evident that would justify otherwise (e.g., excessive lane width encouraging multilane operation). Reductions can alter the occurrence and severity of collisions.

5. Bridges - The selection of lane, shoulder and bridge roadway widths on bridges shall be determined from Section 2.3 of the Bridge Manual.

6. Segments with Different Design Criteria - For complex projects which encompass several highway types, there may be several sets of design criteria that apply to different portions of the project or to different alternatives. Separate criteria must be provided for side roads when they are being resurfaced by more than 2” for more than 500’.

7. Values Below the Design Criteria - While it is Department policy to at least meet the design criteria values, there may be some situations where lesser values are appropriate for a particular situation and may provide the most cost-effective, quality design (as discussed above under Engineering Judgment). When this occurs and the critical design element value is not attained, a formal justification must be prepared in accordance with Department policy for use of the non-standard feature as specified in Chapter 2, Section 2.8 of this manual.

A formal justification is not required for other design parameters that do not comply with the established values. However, they should be listed in the Design Approval Document with an explanation as needed or required. Refer to Chapter 5, Section 5.1 for a discussion on the degree of explanation needed for non-conforming features.

8. Stopping Sight Distances from Record Plans – The method used to determine stopping sight distance changed in the 2001 AASHTO policy. Record plan values for stopping sight distance should not be used and must be regenerated based on the profile and new sight-line measurements (See Section 7.5.2.1.F).

7.5.2.1 Critical Design Elements for Rural Highways

The following critical design elements apply to rural, non-freeway 3R projects. Descriptions of the critical design elements are included in Chapter 2, Section 2.6 of this manual.

A. Design Speed (Rural Highways)

Select a design speed in accordance with Chapter 2, Section 2.6.1 of this manual.

B. Lane Width (Rural Highways)

If the accident rate is at or below the statewide average, the travel lane, parking lane, and turning lane widths shall be the greater of the existing widths or the widths determined from Exhibit 7-4. If the accident rate is above the statewide average, the travel lane, parking lane, and turning lane widths shall be the greater of the existing widths, the widths determined from Exhibit 7-4, and the widths for Exhibit 7-5.

Where the existing lane widths are wider than necessary, they may be reduced to the minimum widths for the type of facility in Chapter 2, Section 2.7 of this manual. Note that wider lane widths may be necessary for large vehicles, at intersections for turning vehicles, etc. 11 ft and 12 ft travel lanes are desirable for high-speed highways with truck traffic.

C. Shoulder Width (Rural Highways)

If the accident rate is at or below the statewide average, the shoulder width shall be the greater of the existing width or the width determined from Exhibits 7-4. If the accident rate is above the statewide average, the shoulder widths shall be the greater of the existing width, the width determined from Exhibit 7-4, or the width from Exhibit 7-5.

Where the shoulder widths are wider than necessary, they may be reduced to the minimum widths for the type of facility in Chapter 2, Section 2.7 of this manual. Note that wider shoulder widths may be necessary for large vehicles, at intersections for turning vehicles, an added travel lane for emergency evacuation, bicyclists, occasional pedestrians, etc. For low-speed highways, consider narrowing 12' lanes to 11' to provide a 4' minimum shoulder.

Exhibit 7-4 Minimum Lane and Shoulder Widths for Rural Highways

Critical Design Elements	Local Roads & Low-Speed Collectors that are not Truck Access Routes[1]	Arterials, Truck Access Routes[1], and High-Speed Collectors	Qualifying Highways [2]
Travel Lane	9 ft	Low speed (<50 mph[5]) = 10 ft High speed (≥50 mph[5]) = 11 ft	12 ft
Shoulder [5]	2 ft for <40 mph[5] 4 ft for ≥40 mph[5]	4 ft	4 ft [3]
Parking Lane	7 ft	7 ft	7 ft
Two-Way Left-Turn Lane (TWLTL)	11 ft	11 ft	12 ft
Turning Lane	9 ft	10 ft[4]	10 ft

Notes:
1. Routes designated as Access Highways as identified in the Official Description of Designated Qualifying and Access Highways in New York State.
2. Routes designated as Qualifying Highways on the National Network (1982 STAA highways).
3. For Qualifying Highways on Rural Collectors, a 2 ft minimum shoulder width may be used if the current AADT is under 400 based on Chapter 2, Section 2.7.
4. 9 ft turn lanes may be used where design speed is less than 50 mph.
5. Design Speed
6. Refer to Chapter 2 of this manual for desirable widths.

Exhibit 7-5 Lane and Shoulder Widths for Widening Rural Highways

Design Year Volume (AADT)	Design Speed (mph)	Trucks[1] ≥ 10%		Trucks[1] < 10%	
		Lane Width [2] (ft)	Shoulder [3] Width (ft)	Lane Width [2] (ft)	Shoulder [3] Width (ft)
Two-Lane Rural Highways					
< 750	< 40	10	2	9	2
	≥ 40	11	4	10	2
750 - 2000	< 40	11	2	10	2
	≥ 40	12	5	11	5
> 2000	All	12	6	11	6
Multi-lane Rural Highways					
< 2000	< 40	11	2	10	2
	≥ 40	11	4	11	3
∃ 2000	All	12	6	11	6

Notes:
1. Trucks are defined as heavy vehicles with six or more wheels.
2. Refer to Chapter 2 of this manual for the turning and parking lane widths.
3. Minimum width shall not be less than Exhibit 7-4. Refer to Chapter 2 of this manual for desirable widths

D. Horizontal Curve Radius (Rural Highways)

The design criteria for retention of horizontal curves is to be determined from Exhibit 7-6. Individual curves shall be analyzed in accordance with Section 7.5.3 of this chapter.

Exhibit 7-6 Horizontal Curvature

ADT (vpd)	Design Speed (mph)	Design Speed[2] minus 15 mph (mph)	Minimum Radius (ft)		
			e = 4.0%	e = 6.0%	e = 8.0%
750 or less	All		45[1]		
over 750	20	5	45[1]	45[1]	45[1]
	25	10	45[1]	45[1]	45[1]
	30	15	45[1]	45[1]	45[1]
	35	20	86	81	76
	40	25	154	144	134
	45	30	250	231	214
	50	35	371	340	314
	55	40	533	485	444
	60	45	711	643	587

Notes:
1. The minimum curve radius for these low-speed highways is also governed by the minimum turning radius of the design vehicle.
2. The minimum curve radius is based on a speed 15 mph below the design speed and the maximum superelevation rate as determined from Section 7.5.2.1 E of this chapter. For both NHS and Non-NHS facilities, values are based on 15 mph below the values for NHS facilities.

E. Superelevation (Rural Highways)

8.0% maximum. A 6% maximum may be used in suburban areas to minimize the effect of negative side friction during peak periods with low travel speeds. In constrained locations, the transition lengths should be shortened to ½ before reducing the superelevation rate.

F. Stopping Sight Distance (Horizontal and Vertical for Rural Highways)

The minimum horizontal and vertical stopping sight distance (SSD) shall be determined from Exhibit 7-7. The minimum vertical SSD is based on the cost-effectiveness of curve reconstruction and the SSD from Chapter 2, Section 2.7 adjusted to 20 mph below the design speed. The minimum horizontal SSD is based on the lesser of the recommended speed or design speed of the improved facility. Refer to Section 5.2.4.1 B for information on recommended speed. Refer to Section 5.7.2.4 for additional information on horizontal SSD.

The SSD is to be evaluated for each horizontal and crest vertical curve. Sag vertical curves need not be considered unless there are underpasses, overhead trees or there is an associated operational or safety problem. Due to the limited correlation between crashes and areas with limited vertical sight distance, the effect of grades is not considered in the minimum SSD value.

Exhibit 7-7 Minimum Stopping Sight Distance (SSD)

Horizontal SSD			Vertical SSD		
Recommended Speed or Design Speed, whichever is lower (mph)	Minimum Horizontal SSD (ft)		Design Speed (mph)	Is there an operational or safety problem associated with poor sight distances, or is the AADT greater than 1500 vpd with major hazards hidden from view (e.g. intersections, sharp horizontal curves or narrow bridges)?	Minimum Vertical SSD based on Design Speed minus 20 mph (NHS Values) (ft) [1]
	NHS	Non-NHS			
20	115	97	All	NO	No Minimum Value
25	155	133	25	YES	21
30	200	175	30		46
35	250	220	35		80
40	305	271	40		115
45	360	327	45		155
50	425	387	50		200
55	495	452	55		250
60	570	522	60		305

Notes:

1. The minimum values are based on AASHTO's "A Policy on the Geometric Design of Highways and Streets," 2011.

G. Grade (Rural Highways)

There is no minimum or maximum grade required for non-freeway 3R projects. The existing grades should be retained unless they contribute to an accident or operational problem and it is cost effective to correct the grade. Note that a climbing lane may be installed as part of a 3R project to mitigate the effects of long, steep grades. Refer to Chapter 5, Section 5.7.5 and the Highway Capacity Manual for guidance on the warrants and design of climbing lanes.

H. Cross Slope (Rural Highways)

Travel lanes = 1.5% minimum to 3% maximum.
Shoulders = 2% minimum to 8% maximum.

I. Vertical Clearance (Rural Highways)

The minimum bridge vertical clearance shall be determined from Section 2.4 of the Bridge Manual.

J. Structural Capacity (Rural Highways)

Determine from the NYSDOT Bridge Manual, Section 2 and Section 19.

K. ADA Compliance (Rural Highways)

Standards for design of pedestrian facilities accessible to persons with disabilities are based on the United States Access Board's *Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way* (PROWAG). Refer to Chapter 18 of this manual for further guidance

7.5.2.2 Critical Design Elements for Urban Highways

The following critical design elements apply to urban, non-freeway 3R projects. Descriptions of the critical design elements are included in Chapter 2, Section 2.6 of this manual.

A. Design Speed (Urban Highways)

Select a design speed in accordance with Chapter 2, Section 2.6.1 of this manual.

B. Lane Width (Urban Highways)

If the accident rate is at or below the statewide average, the travel lane, parking lane, and turning lane widths shall be the greater of the existing widths or the widths determined from Exhibit 7-8. If the accident rate is above the statewide average, the travel lane, parking lane, and turning lane widths shall be the greater of the existing widths, the widths determined from Exhibit 7-8, and the widths for Exhibit 7-9.

Where the existing lane widths are wider than necessary, they may be reduced to the widths for the type of facility in Chapter 2, Section 2.7 of this manual. Note that wider lane widths may be necessary for large vehicles, at intersections for turning vehicles, etc. 11 ft and 12 ft travel lanes are desirable for high-speed highways with truck traffic.

C. Shoulder Width (Urban Highways)

Where the shoulder widths are wider than necessary, they may be reduced to the widths for the type of facility in Chapter 2, Section 2.7 of this manual. Note that wider shoulder

widths may be necessary for large vehicles, at intersections for turning vehicles, an added travel lane for emergency evacuation, bicyclists, occasional pedestrians, etc. For low-speed highways, consider narrowing 12' lanes to 11' to provide a 4' minimum shoulder.

1. **Curbed** – If the accident rate is at or below the statewide average, the minimum curb offset or shoulder is equal to the existing width. If the accident rate is above the statewide average, the shoulder widths shall be the greater of the existing widths and the widths from Exhibit 7-9.

2. **Uncurbed** - If the accident rate is at or below the statewide average in uncurbed sections of urban highways, the shoulder width shall be the greater of the existing width or the width determined from Exhibit 7-4. If the accident rate is above the statewide average in uncurbed sections of urban highways, the shoulder width shall be the greater of the existing width, the width determined from Exhibit 7-4, and the width for Exhibit 7-5.

Exhibit 7-8 Minimum Lane and Shoulder Widths for Urban Highways

Critical Design Elements	Local Streets	Collectors, Arterials & Truck Access Routes [1]	Qualifying Highways [2]
Travel Lane	9 ft [3,4]	Low speed (<50 mph [5]) = 10 ft [3] High speed (≥50 mph [5]) = 11 ft	12 ft
Curbed Shoulder With No Parking and <40 mph[5] or ‖Bike Path	0 ft	0 ft	0 ft
Curbed Shoulder With No Parking and ≥40 mph[5] and w/ no ‖Bike Path	0 ft	Low speed (<50 mph [5]) = 4 ft High speed (≥50 mph [5]) = 5 ft with 2ft buffer to traffic desirable	5 ft
Parking Lane	8 ft	8 ft	8 ft
Bike Lane	-	5 ft with 2ft buffer desirable to traffic and parking lanes where speeds ≥40 mph[5]	5 ft
Two-Way Left-Turn Lane (TWLTL)	11 ft	11 ft	11 ft
Turning Lane	9 ft [4]	9 ft [4]	10 ft

Notes:
1. Routes designated as Access Highways on the national network of Designated Truck Access Highways (1982 STAA highways).
2. Routes designated as Qualifying Highways on the national network of Designated Truck Access Highways (1982 STAA highways).
3. The minimum width of a wide curb lane specifically intended to accommodate bicycling in low speed (≤ 45 mph) is 13 ft.
4. For streets that do not have shoulders or at least a 1' curb offset and allow truck or bus traffic, a minimum lane width of 10' is required.
5. Design Speed

Exhibit 7-9 Lane and Shoulder Width for Widening Urban Highways

Design Year Volume (AADT)	Design Speed (mph)	Trucks[1] ≥10%		Trucks[1] < 10%	
		Lane Width[2] (ft)	Desirable[3] Shoulder or Curb Offset Width (ft)	Lane Width[2] (ft)	Desirable[3] Shoulder or Curb Offset Width (ft)
One Lane, One-Way or Two-Lane Urban Highways					
< 750	< 40	10	2	9	2
	≥ 40	11	4	10	2
750 - 2000	< 40	11	2	10	2
	≥ 40	11	4	11	4
> 2000	All	12	5	11	5
Multi-Lane Urban Highways					
< 2000	< 40	10	2	10	2
	≥ 40	11	4	11	3
≤ 2000	All	12	5	11	5

Notes:
1. Trucks are defined as heavy vehicles with six or more wheels.
2. Refer to Chapter 2 of this manual for turning lane and parking lane widths.
3. Minimum width shall not be less than Exhibit 7-8.

D. Horizontal Curve Radius (Urban Highways)

The design criteria for retention of horizontal curves is to be determined from Exhibit 7-6. Individual curves shall be analyzed in accordance with Section 7.5.3 of this chapter.

E. Superelevation (Urban Highways)

A maximum superelevation rate of 4.0% for urban areas is desirable due to parking, intersection and driveway constraints. A 6% maximum may be used in suburban areas, where existing, or to mitigate curve related crashes. In constrained locations, the transition lengths should be shortened to ½ before reducing the superelevation rate.

F. Stopping Sight Distance (Horizontal and Vertical) (Urban Highways)

The minimum horizontal and vertical stopping sight distance (SSD) shall be determined from Exhibit 7-7. The minimum vertical SSD is based on the cost-effectiveness of curve reconstruction and the SSD distances from Chapter 2, Section 2.7 adjusted to 20 mph below the design speed. The minimum horizontal SSD is based on the anticipated operating speed of the improved facility. Refer to Section 5.7.2.4 for additional guidance on horizontal SSD.

The SSD is to be evaluated for each horizontal and crest vertical curve. Sag vertical curves need not be considered unless there are underpasses, overhead trees or there is

an associated operational or safety problem. Due to the limited correlation between crashes and areas with limited vertical sight distance, the effect of grades is not considered in the minimum SSD value.

G. Grade (Urban Highways)

There is no minimum or maximum grade required for non-freeway 3R projects. The existing grades should be retained unless it is practical to improve a grade that contributes to an accident or operational problem. A minimum grade of 0.5% is desirable in curbed and cut sections for the operation of drainage systems. In uncurbed and fill sections, a level grade may provide adequate drainage.

H. Cross Slope (Urban Highways)

Travel lanes = 1.5% minimum to 3% maximum.
Parking lanes = 1.5% minimum to 5% maximum.
Shoulders = 2% minimum to 8% maximum.

I. Vertical Clearance (Urban Highways)

The minimum bridge vertical clearance shall be determined from Section 2.4 of the Bridge Manual

J. Structural Capacity (Rural Highways)

Determine from the NYSDOT Bridge Manual, Section 2 and Section 19.

K. ADA Compliance (Rural Highways)

Standards for design of pedestrian facilities accessible to persons with disabilities are based on the United States Access Board's *Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way* (PROWAG). Refer to Chapter 18 of this manual for further guidance

7.5.3 Horizontal Curve Evaluations

This section provides the requirements and guidance on horizontal curve evaluations, recommended treatments, and optional treatments such as spiral curve transitions and widening along sharp horizontal curves. Curves with recommended speeds that are below the design speed, or have unfavorable crash histories, should be evaluated using the following procedure.

1. Determine the existing recommended speed as described in Chapter 5, Section 5.7.3 of this manual.

2. The existing recommended speed should be compared to the design speed.

- If the existing superelevation rate does not permit recommended operating speeds equal to, or exceeding the design speed, the superelevation rate shall be increased, up to the maximum superelevation rate (4.0 %, 6.0 % or 8.0 %), as needed, to enable recommended speeds equal to, or exceeding the design speed using AASHTO superelevation distribution method 2, as discussed in Chapter 5, Section 5.7.3 of this manual. A nonstandard feature justification is needed if the curve superelevation cannot be reasonably increased and the proposed rate is below the maximum rate. The transition lengths should be shortened to ½ before reducing the superelevation rate.

- If the existing superelevation allows recommended operating speeds in excess of the design speed using method 2 and there is an accident problem associated with the horizontal curve, the existing superelevation rate should be considered for improvement up to the superelevation rate in Tables 2-11 through 2-14a of Chapter 2 (i.e., consider using Method 5 as discussed in Chapter 5, Section 5.7.3 of this manual). If the superelevation is at the maximum of 6% in suburban areas, consider using the rural criteria of 8% maximum.

3. After improving the superelevation rate, as needed, the recommended speed should be recalculated as stated in step 1. The recommended speed, based on the improved superelevation rate, should be compared with the design speed using the appropriate item below.

    - Speed difference is less than 15 mph or the speed difference is more than 15 mph and the design year AADT is 750 or less - The curvature meets the minimum design criteria and no special mitigation is required beyond signing and delineation, unless reconstruction is warranted due to safety and operational deficiencies.

    - Speed difference more than 15 mph and the design year AADT is more than 750 - The curvature does not meet the minimum design criteria. The curve shall be evaluated for reconstruction or other mitigation measures. If the existing curvature with the maximum superelevation rate will be retained, the curve shall be justified as a non-standard feature in accordance with Chapter 2, Section 2.8 and shall be evaluated for mitigation measures. Based on horizontal curve accident studies, the elements of horizontal alignment that could improve safety include:
        - Larger:
            - Radius/length
            - Superelevation
            - Pavement friction
            - Roadway width (up to 12')
            - Stopping Sight Distance
            - Distance to adjacent curves, intersections, bridges, etc.
        - Use of Spirals
        - Combine compound curves of similar radii and eliminate broken back curves
        - Fewer roadside conditions (development, driveways, fixed objects, etc.)
        - Flatter/straighter vertical alignment on horizontal curves
        - Traffic control devices (e.g., flashing curve warning signs)

7.6 FREEWAY 3R PROJECTS

There are no separate standards for freeway 3R projects. The standards for 3R projects on interstates and other freeways are the same as those that apply to new and reconstruction projects, except as specifically noted in Section 7.6.3 of this chapter. Consequently, the requirements and guidance in this section apply to all interstate and other multilane freeway 3R projects regardless of funding. Unless specifically modified by this chapter, all other Department policies, procedures, standards, rules, regulations and guidance must be followed as appropriate. A freeway resurfacing project must follow these freeway 3R requirements if the minimum overall thickness of the multiple course overlay exceeds 4". Truing and leveling shall not exceed 50% of the top course quantity.

7.6.1 Definition of Freeway Resurfacing, Restoration & Rehabilitation (3R)

7.6.1.1 Definition of the Term Freeway 3R

For the purposes of this chapter, the term freeway 3R applies to interstates and other freeways, expressways and multi-lane divided parkways. The following definitions are based on Chapter 2, Section 2.4.1:

1. Interstate highways are highways on the Interstate Highway System. Generally, they are interregional, high speed, divided, high volume facilities with complete control of access. All interstates in New York State are freeways.

2. Freeways are local, intraregional and interregional high speed, divided, high volume facilities with complete control of access. Historically, most freeways have been classified as principal arterials.

3. Expressways are divided highways for through traffic with full or partial control of access and generally with grade separations at major crossroads.

7.6.1.2 Freeway 3R Project Scope of Work

Freeway 3R projects are designed to extend the operational and service life, and to enhance the safety of an existing freeway. Since the standards for 3R projects on interstates and other freeways are the same as those that apply to new and reconstruction projects, except as specifically noted in Section 7.6.3 of this chapter, there are almost no limitations on the type of work that can be accomplished. All work is allowable except the extensive replacement of existing pavement (reconstruction of 0.6 miles or more or more than 25% of the project length) or the addition of new travel lanes. Projects with extensive full depth pavement replacement or the addition of new travel lanes cannot be classified as 3R type projects and shall follow the criteria in Chapter 2, Section 2.7 for new or reconstruction projects.

The general philosophy to follow when developing a freeway 3R project is to treat interstates and other freeways as what they are, our most important highway system. Consequently, extra effort should be exercised to maintain, restore, or improve them with particular emphasis placed on improving safety and operations.

There is a federal legislative requirement [see 23 Code of Federal Regulations (CFR) Section 106(b)(3) and Section 109(a)] as well as Federal Highway Administration (FHWA) policy requiring safety improvements in every freeway 3R project. Emphasis should be placed on maintaining, re-establishing, or, in the cases of some older freeways, creating a forgiving roadside for the high-speed traveler. Work to restore or upgrade existing safety provisions must be part of every freeway 3R project. Elements that affect safety, and which are not consistent with current standards or design guidelines, should be considered for upgrading as part of any freeway 3R project. The greater the deviation, the greater the need to consider improvement.

To ensure a freeway 3R project operates satisfactorily during its design life (which varies from about 10 years for a thin overlay to 15 years for crack and seat, rubblizing, or thick overlays), it is essential that the needs/deficiencies be identified during scoping and the resulting objectives identified and agreed to. How and to what extent the needs will be addressed must be discussed in the scoping documents and design reports. These documents must include the rationale for the decisions not to include work in the freeway 3R project that is needed to remediate identified deficiencies.

Freeway 3R projects should be designed to be compatible with future improvements. Transportation System Management (TSM) and Travel Demand Management (TDM), Intelligent Transportation System (ITS), as well as other mobility enhancing strategies, need to be considered and discussed in the scoping document(s) and Design Report when there are current or expected congestion/mobility problems. There should be a deliberate consideration of opportunities to better manage demand or traffic flow on the system, such as the use of park-and-ride lots, intermodal connection facilities, traffic signal system improvements at interchange crossroads, etc.

Opportunities for environmental improvements and mitigation should be considered during scoping. There may be many opportunities for landscaping, water pollution abatement, soil erosion control, pedestrian and bicyclist accommodations (at crossroads or along independent paths) and other appropriate work on freeway 3R projects. Contact the Regional Landscape Architect and/or Regional Environmental Contact for additional information on environmental enhancements during scoping.

7.6.2 Geometric Design Standards

There are no separate standards for freeway 3R projects. The standards for 3R projects on interstates and other freeways are the same as those that apply to new and reconstruction projects, except as specifically noted in Section 7.6.3 of this chapter. Federal law specifically prohibits separate interstate 3R standards. Consequently, there is no relationship between these freeway 3R projects and the Department's Non-Freeway 3R Standards in Section 7.5, which apply only to non-interstate and non-freeway resurfacing, restoration, and rehabilitation projects. It is helpful to visualize interstate and other freeway 3R projects as reconstruction projects on existing alignment in respect to everything except the pavement treatment.

The standards that apply are from AASHTO's *A Policy on Geometric Design of Highways and Streets* and AASHTO's *A Policy on Design Standards - Interstate System*. All standards used, including those reflected in the design criteria, must be consistent with the current design speed established in accordance with Chapter 2, Sections 2.7.1.1.A and 2.6.1.

7.6.3 Design Criteria

A list of design criteria must be developed in accordance with Chapter 2 for the mainline, ramps and any crossroads that have proposed work at ramp terminal intersections. Any critical design elements that do not comply with this section and Chapter 2, Section 2.7 (as referenced in this section), or the appropriate standards that were in effect at the time of construction or the time of inclusion in the interstate system shall be discussed as non-standard features in accordance with Chapter 2, Section 2.8.

Except as noted below, this section and Chapter 2, Section 2.7 (as referenced in this section), shall be used to determine the design criteria. The important exceptions are:

Standards of the Day: Freeway 3R projects on interstates may use the selected design criteria listed below from the AASHTO Interstate Standards in effect at the time of original construction or inclusion in the interstate system (Reference: page 1 of AASHTO's "A Policy on Design Standards - Interstate System," May 2016). Similarly, freeway 3R projects on other freeways may use the selected design criteria listed below, for existing elements, from the interstate standards that were in effect at the time of the freeway's construction.

Selected Design Criteria: As shown in Exhibits 7-10 and 7-11, only the standards for stopping sight distance, minimum radii, grade, and the widths of medians, mainline travel lanes, and mainline shoulders from the AASHTO interstate standards in effect at the time of the freeway's construction or inclusion in the interstate system may be used in place of the current standards for existing elements. Other features shall be designed or evaluated against the current standards and guidelines. For example, mainline design speed, horizontal clearance, maximum superelevation, vertical clearance, and ramp lane widths shall be based on current standards and guidelines and NOT the standards from the time of original construction or inclusion in the interstate system. Current standards must also be used for other parameters such as speed change lane lengths, clear zone, etc.

When the standards from the time of original construction or inclusion in the interstate system are used, the design criteria must be consistent with the current design speed. In other words, the original design criteria based on a design speed of, say, 60 mph cannot be used unless it will be consistent with the design speed as determined from Chapter 2, Sections 2.7.1.1.A and 2.6.1. The Design Approval Document should reference the appropriate standards that were used. Refer to Section 7.9 of this Chapter for a list of the various editions of the AASHTO "A Policy on Design Standards - Interstate System."

NOTE: The method used to determine stopping sight distance changed in the 2001 AASHTO policy. Projects using “standards of the day” may calculate the stopping sight distance using the method in effect at the time of the freeway's construction or inclusion in the Interstate System.

7.6.3.1 Guidance on Mainline Critical Design Elements

When "Standards of the Day" are used for existing features, refer to Exhibit 7-10 for the minimum values for the stopping sight distance, minimum radii, grade, and the widths of medians, mainline travel lanes, and mainline shoulders. Otherwise, the design criteria shall conform to Chapter 2, Section 2.7.1.1.

7.6.3.2 Guidance on Ramp Critical Design Elements

When "Standards of the Day" are used for existing features, refer to Exhibit 7-11 for the minimum values for the ramp design speed, maximum grade, horizontal curvature and stopping sight distance. Otherwise, ramps shall conform to Chapter 2, Sections 2.7.5.2 and 2.7.5.3, including lane width adequate to accommodate the design vehicle. This applies for rest areas and safety parking area ramps as well as interchange ramps. Note that the "Standards of the Day" do not apply to ramp lane widths.

Exhibit 7-10 Mainline Critical Design Elements Based on "Standards of the Day" [4,5]

Editions of AASHTO's "Green Book" & AASHO's "Blue Book"[6]	2001, 2004, 2011	1990 &1984	1965	1954
Versions of AASHO's & AASHTO's "A Policy on Design Standards - Interstate System"	1991, 2005, 2016	1991 & 1967	1967 & 1965	1963 & 1956
Lane Width	12 ft	12 ft	12 ft	12 ft
Shoulder Width - Right	10 ft	10 ft	10 ft	10 ft
Right (Mountainous Terrain)	6 ft	6 ft	6 ft	6 ft
Left, with 2 lanes in one direction	4 ft	4 ft[7]	4 ft[7]	4 ft[7]
Left, with 3 lanes in one direction	10 ft	10 ft	4 ft	4 ft
Grade[1] -	L R M	L R M	L R M	L R M
60 mph	3.0 4.0 6.0	3.0 4.0 6.0	3.0 4.0 6.0	4.0 5.0 6.0
65 mph	3.0 4.0 5.5	3.0 4.0 5.5	3.0 4.0 5.5	- - -
70 mph	3.0 4.0 5.0	3.0 4.0 5.0	3.0 4.0 5.0	3.0 4.0 5.0
75 mph	- - -	- - -	3.0 4.0 -	- - -
Minimum Radii at e_{max}[2,3] -	6.0% 8.0%	6.0% 8.0%	6.0% 8.0%	6.0% 8.0%
60 mph	1348 ft 1206 ft	1348 ft 1206 ft	1263 ft 1143 ft	1263 ft 1143 ft
65 mph	1638 ft 1528 ft	1638 ft 1528 ft	1483 ft 1341 ft	-
70 mph	2083 ft 1910 ft	2083 ft 1910 ft	1815 ft 1633 ft	1815 ft 1633 ft
75 mph	-	-	2206 ft 1974 ft	-
SSD[3] - 60 mph	570 ft	525 ft	475 ft	475 ft
65 mph	645 ft	550 ft	550 ft	-
70 mph	730 ft	625 ft	600 ft	600 ft
75 mph	820 ft	-	675 ft	-
Median Width - Rural Area	36 ft	36 ft	36 ft	36 ft
Mountainous Terrain	10 ft	16 ft	16 ft	16 ft
Urban Area	10 ft	4 ft [8]	4 ft	4 ft

Notes

1. Level, rolling and mountainous terrain are abbreviated L, R and M, respectively.
2. For curves with radii larger than the minimum radius, use Chapter 2, Exhibits 2-13 through 2-14a to determine the superelevation rate.
3. Refer to Section 2.8.2 for technical discrepancies.
4. "Standards of the day" refers to the standards in effect at the time of original construction or inclusion in the interstate system and only applies to existing features.
5. The design criteria must be consistent with the current design speed. Mainline critical design elements not listed in this Exhibit shall be determined from Chapter 2, Section 2.7.1.1 and Section 7.6.3.1 of this chapter.
6. "Green Book" and "Blue Book" refer to the AASHTO and AASHO Policies referenced in Section 7.9 of this Chapter.
7. The minimum 4' median consists of two 1' left shoulders and a 2' wide median barrier. FHWA must be consulted before using this standard of the day.
8. In 1991, the minimum urban median width was increased to 10'.

Exhibit 7-11 Ramp Critical Design Elements Based on "Standards of the Day" [3,5]

Editions of AASHTO's "Green Book" & AASHO's "Blue Book"[6]		2001, 2004, 2011	1990 &1984	1965	1954
Versions of the AASHO & AASHTO "A Policy on Design Standards - Interstate System"		1991 & 2005	1991 & 1967	1967 & 1965	1963 & 1956
Ramp Design Speed[4] -		Ramp Design Speed[7]	Ramp Design Speed[7]	Ramp Design Speed	Ramp Design Speed
Mainline Design Speed	50 mph	25 mph	25 mph	25 mph	25 mph
	55 mph	30 mph	-	-	-
	60 mph	30 mph	30 mph	30 mph	30 mph
	65 mph	30 mph	30 mph	30 mph	-
	70 mph	35 mph	35 mph	30 mph	30 mph
	75 mph	-	-	35 mph	-
Grade -	25 mph	7.0%	7.0%	7.0%	7.0%
	30 mph	7.0%	7.0%	7.0%	7.0%
	35 mph	-	6.0%	6.0%	6.0%
	40 mph	6.0%	6.0%	6.0%	6.0%
	45 mph	5.0%	5.0%	5.0%	5.0%
	50 mph	5.0%	5.0%	5.0%	5.0%
Minimum Radii at e_{max}[1,2] -		6.0% 8.0%	6.0% 8.0%	6.0% 8.0%	6.0% 8.0%
	25 mph	144 ft 134 ft	144 ft 134 ft	144 ft 134 ft	144 ft 134 ft
	30 mph	230 ft 214 ft	230 ft 214 ft	230 ft 214 ft	230 ft 214 ft
	35 mph	340 ft 310 ft	340 ft 310 ft	340 ft 310 ft	340 ft 310 ft
	40 mph	485 ft 444 ft	485 ft 444 ft	485 ft 444 ft	485 ft 444 ft
	45 mph	660 ft 500 ft	675 ft 613 ft	894 ft 600 ft	894 ft 600 ft
	50 mph	835 ft 760 ft	849 ft 764 ft	1104 ft 741 ft	1104 ft 741 ft
SSD[2] -	25 mph	155 ft	150 ft	160 ft	160 ft
	30 mph	200 ft	200 ft	200 ft	200 ft
	35 mph	250 ft	225 ft	240 ft	240 ft
	40 mph	305 ft	275 ft	275 ft	275 ft
	45 mph	360 ft	325 ft	-	-
	50 mph	425 ft	400 ft	350 ft	350 ft

Notes

1. For curves with radii larger than the minimum radius, use Chapter 2, Exhibits 2-13 through 2-14a to determine the superelevation rate.
2. Refer to Section 2.8.2 for technical discrepancies.
3. "Standards of the day" refers to the standards in effect at the time of original construction or inclusion in the interstate system and only applies to existing features.
4. Ramp design speed is based on mainline design speed. Therefore, the design criteria must be consistent with the current mainline design speed.
5. Ramp critical design elements not listed in this Exhibit shall be determined from Chapter 2, Section 2.7.5.2 and Section 7.6.3.2 of this chapter.
6. "Green Book" and "Blue Book" refer to the AASHTO and AASHO Policies referenced in Section 7.9 of this Chapter.
7. For loop ramps, a 25 mph design speed may be used based on Chapter 2 of this manual and the 1984 through 2011 AASHTO "Green Books".

7.7 PROJECT DELIVERY

7.7.1 Timing of Resurfacing ADA and Safety Work

Exhibit 7-12 includes a list of typical safety work with the time frames of when the work is to be accomplished. When warranted, curb ramps are to be constructed *before or during* the paving contract except as provided in Section 7.3.2.2. The objective is to minimize the public's exposure to existing or potential safety problems. However, it may be beneficial to use separate contracts or state forces to perform some of the work. Use engineering judgment to determine the appropriate time frame for addressing the safety concerns.

The PIN and/or D Contract number to complete the work listed as to be done before, during, or as soon as practicable following completion of the paving contract in Exhibit 7-12, is to be referenced in the DAD.

7.7.2 Preparation of Contract Documents & Implementation

Refer to the Project Development Manual steps in Chapter 4 and HDM Chapter 21 for the final design requirements for Department let projects. Note that plans are not required for 1R projects but are required for 2R and 3R projects per HDM Section 21.2.1. When work is performed by State forces, the Region is to develop plans for permanent construction activities (2R & 3R), consistent with HDM Chapter 21, to serve as a permanent record of the work.

The following are federal aid contract requirements:

- The project must be competitively let and the work by State forces cannot be an integral part of the contract for the paving work (e.g., State forces doing the work zone traffic control (WZTC) work for Vendor In-place Paving).
- The Office of General Service (OGS) let Vendor in Place Paving (VPP) projects meet Federal Highway Administration (FHWA) requirements and can be used on federal-aid projects complying with the requirements of this chapter.
- VPP may not be used for overlays or inlays thicker than 2". VPP can be used for CIPR with a subsequent 2" max overlay.
- Maintenance and construction work performed by State forces is not reimbursable with Federal funds and must be accomplished with 100% State funds only.
- All railroad and/or utility agreements and/or required permits must be obtained by NYSDOT prior to contract award. However, OGS let VPP projects with railroad involvement can be progressed without such agreement by terminating paving operations 25' from the centerline of the track in both directions.

Exhibit 7-12 Timing of ADA and Safety Related Work for Resurfacing Projects

PIN:		
Timing	**Work**	✓
To be done *before* the paving contract, as required	• Replace or install regulatory or warning signs as noted by regional forces. • Clean, repair or install any closed drainage system components.	
To be done *before or during* the paving contract, as required	• Superelevation. • Shoulders. • Treatment for edge of pavement drop-offs shall be provided in accordance with §402 of the NYSDOT "Standard Specifications." • Modify driveways to conform to the spirit and intent of the most recent "Policy and Standards for Entrances to State Highways." (Multi-course resurfacing only) • Modify curbing to conform to HDM §10.2.2.4. (Multi-course resurfacing only) • ADA curb ramps, except as provided in Section 7.3.2.2	

To be done *before, during,* or *as soon as practicable* following completion of the paving contract, as appropriate
 	
(i.e., The safety work should normally be completed within 12 months of the paving work, unless otherwise specified.)
	• Pavement markings (Pavement markings shall be in accordance with the Department Pavement Marking Policy. For temporary pavement markings, refer to specifications and current EBs and EIs for timing. In general, pavement markings are needed for all lanes opened to traffic at the end of the construction day/night.).
	• Centerline and Shoulder Rumble strips.
	• Additional/updated regulatory, advisory and warning signs not addressed above (generally within 12 months).
	• Brush removal, clearing and grubbing.
	• Fixed objects: remove, relocate, modify to make crash worthy, shield by guide rail/crash cushion, or delineate.
	• Guide rail:
	  ○ reset guide rail that is or will be at the improper height. (ref. HDM Table 10-7).
	  ○ replace severely deteriorated and non-functional guide rail (ref. HDM §10.3.1.2 B).
	  ○ replace severely substandard guide rail and connections to bridge rail (e.g., concrete post/cable or railroad rail post/cable) and transitions between different rail types. (ref. HDM §10.3.1.2 B).
	  ○ install guide rail if missing or not extending to the point of need if a serious hazard, such as a cliff, deep body of water or liquid fuel tank is exposed and there is a reasonable expectation that vehicles will reach the hazard (ref. HDM §10.2.2.1).
	  ○ restore guide rail deflection distance through clearing and grubbing. (Ref. HDM §10.2.2.3 & Table 10-3)
	• Delineation.	

May be done *before, during, or in* a future project.	• Guide rail not addressed under the "as soon as possible" work noted above (e.g., new runs of guide rail). • Replace any missing or damaged reference markers. • Fixed objects which cannot be practically addressed as soon as possible. • Install guide signs/route markers, if needed.	

7.7.3 Potential 2R and 3R Efficiencies

7.7.3.1 Project Initial Conditions

To make the most of design efficiencies, a project must have a well-defined scope. Any potential expansion of the scope needs to be identified and evaluated early in the process. Sudden change in scope, particularly without advance warning, can cause delays in the process and impact the project schedule. All parties should be aware of any potential changes and discussions should be held as early as possible so that everyone is aware of the impacts of making such alterations to the scope.

To advance a 2R or 3R project swiftly, the project needs simplicity. Some project tasks take longer to complete and can have a significant effect on the schedule despite the project's simplicity.

Conditions that make a project a good candidate for a streamlined 2R or 3R process are:

- No ROW to be acquired
- Minimal utility coordination for relocations (undisturbed overhead or underground utilities are allowable)
- No project stakeholders outside of NYSDOT
- Minimal additional design disciplines needed (Structures, Signals, etc.)
- Minimal public involvement
- Minimal labor-intensive modeling or detailing (retrofits, curb ramps, etc.)

Note that minimal in the above cases means that associated work can be completed within the project timeline.

7.7.3.2 Project Set-up Efficiencies

A 2R or 3R project can get an early start on the design process by using readily available data to begin setting up plan sheets and establish a baseline estimate statewide. This data may include ortho-images, GIS data to locate signs and guiderail runs, and existing alignments from record plan information. Designers should note that information from these sources is approximate and not meant to replace more accurate survey information.

The survey can then be phased as follows:

1. An ortho-mosaic compiled by Photogrammetry to fit the project area.
2. Statewide LiDAR incorporated for off roadway terrain.
3. Ground survey may be conducted for locations that need a higher degree of accuracy. This should be done while setting control for terrestrial LiDAR.
4. Terrestrial LiDAR may be used for the roadway surface of the project.

The early start also allows the designer to evaluate the project for potential non-standard and non-conforming features by using the ortho-imagery and record plans for comparison. This

may help expedite the evaluation of design alternatives and the completion of the Design Approval Document.

7.7.3.3 Plan Efficiencies

The streamlining process is best suited to projects that have long stretches of highway with repetitive work, where little context–specific detail is needed. To keep plans as concise as possible, the following recommendations can be used:

- Eliminate striping item callouts on the plans. Stripe code should be used, but the pay items should only be provided in a table created from the quantity workups.
- Eliminate curve boxes from plans. Assign each curve a number, label it on the plans, and provide the information in the Horizontal Control Table.
- Eliminate guiderail items on the plans by using run numbers in a unique call-out format that is referenced in the guiderail table. This applies to new runs or removal of existing runs.
- Use established details from other similar projects (detail library).

7.7.3.4 Quality Control and Submission Efficiencies

Project reviews are an important and necessary part of the design process. To help make the review process more efficient, the following practices are recommended:

- Biweekly or weekly progress meetings. These should include the Project Manager, Squad Leader, and Design Supervisor to discuss progress, action items, risk, and mitigation measures. These more frequent meetings should be limited to the core design team to increase productivity.
- Close collaboration and coordination with all workgroups to ensure the project is progressing as planned and any issues are discovered as early as possible.
- Early input from Construction to determine level of plan detail required and work-zone operations.
- Intermittent, informal reviews among various functional groups as information becomes available.
- Use short internal “squad reviews” prior to formal reviews to reduce the number of comments. Use the review resources available such, as the Squad Leader and section.
- Use software that enables concurrent reviews such as Bluebeam for all reviews so that Internal and external reviews can then take place simultaneously. This allows the designer to make real-time changes as comments are made and decreases conflicting or redundant comments from the different reviewers
- Eliminate the ADP submission and use the pre-PS&E submission only (90-95% complete plans with most PS&E materials complete).

A summary of these efficiencies can be found below in Exhibit 7-14.

Exhibit 7-14 Potential 2R and 3R Efficiencies

Action	Details	Responsible Group
Early Start Efficiencies		
Early start on guiderail	• Guiderail inventory in GIS	OITS GIS
Early start on signs	• Sign data available in GIS	OITS GIS
Early start on surface	• State-wide LiDAR available with +/- 6" accuracy	Photogrammetry
Early start on other base information	• Use state-wide Ortho Imagery along with record plans	Photogrammetry
Refine surface data, as necessary	• Survey and Terrestrial LiDAR • If outside the flight window, consider survey for where hard elevations are needed off the roadway and terrestrial LiDAR for highway surfaces.	Photogrammetry/Survey
Plan Efficiencies		
Reduce redundant information	• Use tables to convey stationing for longitudinal items such as guiderail and striping • Use a reference number to match item runs to tables • Helps to reduce clutter on plan sheets	Designer
Use standard details as much as possible	• Refer to standard sheets or use details from library • Avoid using Regional preferences that are not required by unique regional site conditions	Designer
Reuse of plan materials from similar jobs	• Typical Sections • Underdrain • WZTC	Designer
Quality Control Efficiencies		
Hold weekly or biweekly meetings	• Keep project on schedule • Discuss potential scope changes and impact • Set goals for next meeting	Project Manager, Squad Leader, Supervisor
Side meetings with other workgroups	• Early coordination with construction • Ensure progress is being made in critical areas • Catch issues early • Avoid single meetings with too many voices	Project Manager, Squad Leader, Supervisor, Functional group representative
Utilize Bluebeam software for reviews	• Hold small, frequent reviews internally • All groups review major plans concurrently • Skip over ADP plans with the PM's approval if prior group reviews have yielded sufficient quality	Project Manager, Squad Leader, Supervisor

7.8 SAFETAP REPORTING FOR 1R, 2R and 3R PROJECTS

A listing of 1R, 2R and 3R projects let each state fiscal year is to be completed by each Regional Office. **The listing is to be submitted to the Office of Traffic Safety and Mobility for FHWA's use in selecting projects for audits**. Contact the Office of Traffic Safety and Mobility for the form to be submitted. The following information is to be reported in the form:

- A listing of all 1R, 2R and 3R sites paved. This listing should include the beginning and ending reference marker for each site.
- The fund source used for the paving work.
- The year and month that the paving was done.
- The PIN numbers that can be used to find the Design Approval Documents (including design criteria, safety studies, nonstandard feature justifications, etc., as required by the project type and conditions).

7.9 ADA REPORTING FOR NONFREEWAY 1R, 2R & 3R PROJECTS

The Pedestrian Facility and ADA Reporting Tables (Exhibit 7-13) are required for all projects (with and without plans) that repair, replace or install sidewalk and/or curb ramps on the state system. Excel (.xls) templates for the tables can be found on the HDM Chapter 21 web page.

The table(s) should initially be completed during design, and furnished to the EIC by placing a copy of the .xls file in the project's ProjectWise folder. The EIC is to update the table(s) upon completion of construction, updating them with any changes made during construction. The EIC shall send the completed tables to the Regional ADA Coordinator to be filed on ProjectWise at pw:\\NYSDOT\Main Office\ADA Reporting.

The naming convention for tables filed in this directory is:

"PIN_dat_ada_cr.xls" for the curb ramp reporting table
"PIN_dat_ada_sw.xls" for the sidewalk reporting table

Both the Regional ADA Coordinator or Office of Policy, Planning and Performance will access the tables to update the department's ADA Transition Plan. The curb ramp table is also to be used to provide Regional Planning with the sidewalk curb ramps that shall be constructed *before or during* VPP paving.

Refer to Section 7.2.1 of this chapter for when curb ramps are required, and Section 7.7 for the timing of work performed by separate contracts.

Exhibit 7-13 ADA Reporting Tables (Page 1 of 2)

Curb Ramp Table							
Location					Type[4]	NSF[5]	Notes[6]
Roadway[1]	Station[2]	Side[2]	Coordinates (DD)[3]				
New Curb Ramps[7]							
Replacement Curb Ramps[7]							
Existing Curb Ramps to Remain[7]							

NOTES:

1 Roadway should be recorded as State Route Number. Curb ramp that are not on roadways (e.g., rest areas) require only coordinates for "Location"; the type of site and any critical information for locating the facility should be included in the "Notes" column.

2 Station and Side information is only required for tables included in plan sets.

3 Coordinates are required for the ADA Transition Plan and are to be furnished in Decimal Degrees, with latitude and longitude in separate columns. Portable GPS devices, Google Earth, Google Maps, GIS or CADD files may be used to identify the coordinates.

4 Ramp type should correspond with the numbered curb ramp types on Standard Sheet 608-01 (sidewalk and Curb Ramp details). Modifications to standard ramp types should be identified in the "notes" column.

5 NSF refers to "Nonstandard Feature." This column only requires a "Yes" or "No". The nature of the nonstandard feature does not need to be identified in this table. Nonstandard pedestrian facilities require a Nonstandard Feature Justification, per HDM Chapter 2, Section 2.8.

6 Notes may include clarifying information about the location of the facility, modifications to ramp type, etc. Existing ramps that will remain on 1R projects should be identified in the notes as "Compliant with ADAAG" or "Compliant with PROWAG". If a noncompliant curb ramp is built due to ROW constraints, per HDM 7.3.2.2, the notes should include "Noncompliant - Category II ROW restriction" or "Noncompliant - Category III ROW restriction"

7 If there was no existing facility at the location, the facility is "New". If there was an existing facility at the location, the facility is a "Replacement." "Existing" facilities are those that will remain in place.

Exhibit 7-13 ADA Reporting Tables (Page 2 of 2)

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Sidewalk Table												
Location							NSF [4]	Length (ft)	Width (ft)	Notes [5]		
Roadway [1]	Station [2]	to	Station	Side [3]	Coordinates at Start (DD) [3]	Coordinates at End (DD) [3]						
New Sidewalk [6]												
Replacement Sidewalk [6]												
Existing Sidewalk to Remain [6]												

NOTES:

1 Roadway should be recorded as State Route Number. Sidewalks that are not on roadways (e.g., rest areas) require only coordinates for "Location"; the type of site and any critical information for locating the facility should be included in the "Notes" column.

2 Station and Side information is only required for tables included in plan sets.

3 Coordinates are required for the ADA Transition Plan and are to be furnished in Decimal Degrees, with latitude and longitude in separate columns. Portable GPS devices, Google Earth, Google Maps, GIS or CADD files may be used to identify the coordinates. Sidewalk location does not need to account for driveways or intersections.

4 NSF refers to "Nonstandard Feature." This column only requires a "Yes" or "No". The nature of the nonstandard feature does not need to be identified in this table. Nonstandard pedestrian facilities require a Nonstandard Feature Justification, per HDM Chapter 2, Section 2.8.

5 Notes may include clarifying information about the location or condition of the facility.

6 If there was no existing facility at the location, the facility is "New". If there was an existing facility at the location, the facility is a "Replacement." "Existing" facilities are those that are compliant with the applicable standards and will remain in place.

7.10 REFERENCES

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2. *A Policy on Geometric Design of Highways and Streets*, 1984, 1990, 1994, 2001, 2004, 2011, and 2018, American Association of State Highway and Transportation Officials, Suite 225, 444 North Capitol Street, N.W., Washington, D.C. 20001.

3. *A Policy on Geometric Design of Rural Highways*, 1954 and 1965, American Association of State Highway Officials, Suite 225, 444 North Capitol Street, N.W., Washington, D.C. 20001.

4. *Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way,* 2011, United States Access Board, 1331 F Street NW, Suite 1000, Washington, DC 20004-1111 (www.access-board.gov)

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