114 Resurfacing, Restoration and Rehabilitation (RRR)

Modification for Non-Conventional Projects:
Delete ***FDM 114*** and see the RFP for requirements.

114.1 General

Resurfacing, restoration and rehabilitation (RRR) work is defined as work undertaken to extend the service life of an existing highway and enhance highway safety. This includes the placement of additional surface materials and other work necessary to return an existing roadway to a condition of structural and functional adequacy. This chapter contains processes and requirements necessary to evaluate existing roadways for safety and performance.

This chapter does not apply to projects programmed as Maintenance Resurfacing projects or Ride Only (a.k.a., Ride Rehabilitation) projects.

114.1.1 Proposed Improvements (Type of Work)

The following items must be included in each RRR project unless written authorization to deviate from this policy is obtained at a Director level position in the District:

(1) Safety improvements needed to address crash problems.

(2) Pavement Resurfacing/Rehabilitation.

(3) Modifications necessary to Comply with the Americans with Disabilities Act (ADA).

(4) Paved Shoulders.

(5) Improvements to roadside barriers and guardrail necessary to meet minimum standards.

(6) Improvements to bridge rails necessary to meet minimum standards.

(7) Traffic Signal Mast Arms within the mast arm policy area (see ***FDM 232.8.1***) where existing strain poles require replacement/relocation.

Other improvements may be included with the RRR projects; e.g., lighting, safety and operational improvements, signalization, minor roadway widening.

114.1.2 SIS Facilities

Projects on controlled access SIS Corridor and Connector facilities should be designed using new construction criteria. RRR criteria may be applied on a project to the extent permitted by the Action Plan for that corridor, consistent with the schedule for phased improvements to bring the facility up to new construction criteria. For controlled SIS Corridors and Connectors with no Action Plan, RRR criteria may be applied if minimum design speed criteria shown in ***FDM 201*** are met, or a Design Variation or Design Exception for design speed is approved.

114.1.3 Interstate, Expressway, and Freeway Resurfacing

The processes and requirements contained in this chapter are applicable for Interstate, Expressway, and Freeway (i.e., LA Facility) resurfacing projects.

114.2 Planning and Programming RRR Projects

The principal objectives of a RRR project are:

(1) To preserve or extend the life of the existing pavement.

(2) Improve capacity (without adding continuous through lanes).

(3) Improve operating characteristics.

(4) Provide safety modifications.

RRR projects are typically identified and programmed based on projections of deficient pavement condition and are funded under the Department's Pavement Resurfacing program. Districts are tasked with meeting assigned lane mile resurfacing targets. Resurfacing funds are allocated annually to each District based on an estimated cost per lane mile. The amount allocated includes funds necessary for pavement resurfacing, rehabilitation, minor reconstruction, and pavement milling and recycling. Refer to ***Part III, Chapter 27, Resurfacing***, of the ***Work Program Instructions*** for funding resurfacing projects.

Due to limitations on resurfacing funds, improvements other than those necessary to address a safety need or to meet minimum design criteria must be carefully considered before inclusion in the project.

114.2.1 Right of Way (R/W) Acquisition

RRR projects do not typically involve R/W acquisition; however, review RRR projects to determine if additional R/W is required to meet project needs. Conditions that may warrant R/W acquisition include:

(1) Correcting substandard roadway elements,

(2) Need for transit stops,

(3) Access management requirements,

(4) New or improved drainage conveyance or treatment facilities, and

(5) Intersection improvements (see ***FDM 212*** for conventional intersection criteria and guidance, and ***FDM 213*** for roundabout criteria and guidance).

When R/W acquisition is warranted, the design should be expedited to determine actual R/W requirements. Coordinate the requirements with the District Right of Way Office.

114.2.2 Survey Guidelines

Types of survey work typically included in RRR Projects are as follows:

(1) Mill and resurface only, EOP to EOP, no other improvements [Level 1].

(2) Resurface with trench widening (Roadway only) [Level 1 if lump sum excavation].

(3) Resurface adding turn lanes (spot improvements) [Level 2].

(4) Resurface adding shoulder pavement [Level 2].

(5) Combination of numbers 2-4 [Level 2].

(6) Resurface with access management improvements [Level 2].

(7) Resurface with cross slope or superelevation correction [Level 2].

(8) Add shoulder pavement only [Level 2 or 3].

(9) (E) Extend drainage structures [Level 3].

(10) (E) Guardrail, end treatments, (safety) [Level 2].

(11) (E) Side drain closure; mitered ends [Level 3].

(12) Intersection improvements [Minor = Level 2; Major = Level 3].

(13) (E) Correct horizontal or vertical alignment [Level 3].

(14) (E) ADA compliance [Level 2].

(15) Approaches to structures [Level 4].

(16) RRR with R/W acquisition [Level 3].

(E) = Element of an item

114.2.2.1 Minimum Levels of Survey Effort

(1) **LEVEL 1**

Review by District Surveyor to check for Public Land Corners. Check sections for cross slope at 1000 feet in tangents. For curves, check 50 feet before PC, at PC, 50 and 100 feet after PC and at middle of curve or 300 foot intervals. (Reverse at PT). May use assumed datum if approved by the District Location Surveyor and the Project Manager/Designer. The cross sections will have a common bench mark elevation throughout the curve. In other words, do not assume an elevation at the centerline of the highway for each cross section. A minimum of two (2) bench marks should be set off of the highway near the R/W Line and may be on assumed elevations or NAVD 88 datum. If the surveyor elects to use temporary assumed bench marks, they must last throughout the life of construction and cannot be set in trees, power poles or concrete monuments. Establish begin and end points of project and reference.

(2) **LEVEL 2**

Minor spot improvements such as turn lane at existing crossover or turn lane on 2-lane. No additional R/W required. Where R/W is adequate, establish horizontal and vertical control in the improvement area. May use assumed vertical datum if approved by the District Location Surveyor and the Project Manager/Designer. The cross sections will have a common bench mark elevation throughout the curve. In other words, do not assume an elevation at the centerline of the highway for each cross section. A minimum of two (2) bench marks should be set off of the highway near the R/W Line and may be based on assumed elevations or NAVD 88 datum. If the surveyor elects to use temporary assumed bench marks, they must last throughout the life of construction and cannot be set in trees, power poles or concrete monuments. If R/W is constrained, re-establish existing R/W line. Level 1 required throughout other portions of project. Cross section level to be determined by Project Manager/Designer with input from the District Location Surveyor and Resident Engineer. TOPO with supplemental cross sections or elevations in area(s) of deficient criteria or proposed improvement(s). Reference control points outside R/W. Subsurface utility locates if required.

(3) **LEVEL 3**

Continuous improvements through length of project such as widening or paved shoulder; or major spot improvements (structure replacement; major intersection improvement). May require R/W purchase. Horizontal Control baseline, centerline or network. Vertical Control on NAVD 88. TOPO with supplemental elevations (limits to be determined). Digital Terrain Model (DTM) at specified locations. R/W Control Survey and Maps (if R/W purchased). Subsurface utility locates.

(4) **LEVEL 4**

Full Digital Terrain Model (DTM) and TOPO for entire project.

114.3 RRR Design Process

The RRR design process is a team effort that requires familiarity with criteria for design, safety, maintenance, and traffic operations. To assure that these issues are addressed, the following assessments should be performed:

(1) Current safety conditions and ADA deficiencies.

(2) Need for operational improvements.

(3) Drainage issues.

(4) Public involvement activities.

(5) Design Speed compliance with ***Table 201.4.1***.

(6) Compliance with Access Management requirements.

114.3.1 Assessment of Existing Conditions

Before beginning design of the project, perform office and field reviews to assess current conditions. The assessment includes both physical conditions and operating conditions.

114.3.1.1 Office Reviews

Review old plan sets, as-built drawings, Straight Line Diagrams, and other historical records to assess many of the existing conditions. This assessment should include:

(1) Geometrics.

(2) Radius, length, and superelevation of curves.

(3) Typical shoulder treatments.

(4) Cross drain and structure locations.

(5) Location and design of intersections.

(6) Existing cross slope and superelevation data.

(7) Operating Conditions, including:

(a) A summary of legal posted speeds on the project.

(b) District Drainage and Maintenance concerns of past, present or anticipated problems.

(c) Conditions attributable to current control of access.

(d) A summary of known operational issues on the corridor (e.g., signal timing, detection failure).

A review of historical crash and travel statistics should be performed by a qualified safety specialist. This safety assessment, with written recommendations, should include:

(1) Identification of significant crash locations, with:

(a) Determination of possible causes, and

(b) Suggested cost effective modifications or mitigation measures

(2) Review of correspondence files for letters of public concern.

114.3.1.2 Field Reviews

Perform a field review to observe physical, operational and safety conditions, and to verify office review findings.

(1) Verify geometric and physical conditions by observing the following:

(a) Pavement condition

(b) Alignment

(c) Cross slope and superelevation

(d) Lane width

(e) Traffic control markings and signs

(f) Side slopes and clear zones

(g) Shoulder type and width

(h) Intersection and bridge elements

(i) Sight distances

(j) Drainage (including erosion or siltation problems)

(k) Highway appurtenances

(l) ADA features

(m) Transit stops

(n) Pedestrian and bicycle features

(2) Verify the following operating conditions:

(a) Verify posted regulatory speeds and posted advisory speeds.

(b) Observe reported and suspected problem areas; e.g., signal timing, pedestrian detection, signal head placement.

(c) Evaluate access features.

(3) Verify safety conditions by observing the following:

(a) Known crash locations.

(b) Indicators of road departure or other unsafe operations; e.g., tire marks on walls or curb, tire tracks on front slope, guardrail repairs.

114.3.1.3 Identified Improvements

Coordinate with the District Project Manager identified improvements necessary to correct deficiencies. Possible improvements that may be included in the project include:

(1) Remove, relocate or make crashworthy roadside obstacles.

(2) Remove unwarranted guardrail.

(3) Upgrade or replace nonstandard guardrail, end treatments and crash cushions.

(4) Replace or retrofit obsolete bridge rails.

(5) Improve side slopes; slope flattening/stabilizing.

(6) Correct shoulder drop-off.

(7) Provide or widen paved shoulders.

(8) Correct pavement cross slope and superelevation.

(9) Provide side drain safety modifications.

(10) Increase sight distance at intersections.

(11) Improve pavement markings.

(12) Improve pavement drainage.

(13) Provide or upgrade sidewalks, transit stops and bikeways.

(14) Replace or upgrade railroad crossing.

(15) Provide or upgrade signalization.

(16) Provide or upgrade lighting.

(17) Upgrade signing and other traffic control devices.

(18) Provide or upgrade curb cuts, ramps and other disability access features.

(19) Reconstruct or close driveways to comply with Access Management standards.

114.3.1.4 Design Exceptions and Design Variations

RRR projects with existing features not meeting minimum criteria values require processing a Design Exception or Design Variation for the feature to remain. Refer to ***FDM 122*** for the Design Exception and Design Variation procedures.

114.3.1.5 Design Documentation

Include in the design file all documentation that substantiates the design process and decisions made. Documentation may include the following information:

(1) A short paragraph which states the overall project purpose. Factors such as principal reason for the project, anticipated project cost, principal work type, general R/W needs or provisions, and any special project priorities are appropriately addressed here.

(2) Documents that detail the existing conditions on the project. Findings of office reviews, field reviews and surveys are assembled here, to document existing geometric and roadside features, operating conditions, traffic volumes, posted speeds, existing pavement markings, signing, and safety. A brief overall summary of findings is recommended.

(3) Document the selected standards based on project intent and conditions. When RRR criteria cannot be met, a Design Exception/Design Variation is required.

(4) A summary of safety issues that have been identified for the project and the recommended solution of those issues.

(5) Reviews of the project design for safety improvements, documenting what was finally accomplished or ruled out of the project subsequent to the scope of work having been completed.

(6) Those items in the original scope of work for the project which cannot be reasonably accomplished and must be deleted or delayed.

114.3.2 Intersections

Evaluate intersections to determine if a traffic engineering study is needed. The following items should be considered:

(1) Traffic Signal Mast Arms or single point attachment span wires within the mast arm policy area where existing strain poles require replacement/relocation. See ***FDM 232.8.1*** for information on mast arm policy.

(2) Addition of right and left turning lanes.

(3) Realignment of intersection.

(4) Adequate turning radii for left and right turning lanes.

(5) Use of channelization to reduce excessive areas of conflict at large intersections.

(6) Placement of crosswalks as related to sidewalks and stop bars.

(7) Locations of pedestrian, bicycle, and transit facilities.

(8) Locations of utilities, signal poles, controller cabinets, lighting poles and drainage structures as related to sidewalks and curb ramps.

(9) Warrants for traffic control systems.

(10) Addition of signal backplates where it would not require structural modifications to mast arms or span wire systems.

(11) Addition of auxiliary heads where it would not require structural modifications to mast arms or span wire systems.

(12) Installation of buried conduit for future traffic control systems.

(13) Lighting for intersection illumination.

(14) Adequate sight distance.

(15) ADA needs.

Include corrective measures in projects having T-intersections with significant crash histories (three or more crashes of a specific type within the most recent five years) or other evidence of safety or operational problems.

When there are proposed changes in intersection control, a roundabout alternative must be considered. See ***FDM 213*** for additional information.

The additional cost associated with improvements requested by local governments that exceed the Department's criteria should be paid for by the local government making the request; e.g., installation of mast arm signal supports in areas beyond the mast arm policy area.

114.3.3 Drainage

Evaluate the hydraulic, safety, and physical adequacies of the existing drainage system to determine if improvements are needed. Examine the existing drainage in the field and coordinate with district maintenance personnel. If there are apparent problems with the existing drainage system, determine the most cost effective improvements necessary to repair the system. The ***Drainage Manual (Topic No. 625-040-002)*** contains design criteria and methods which provide guidance in formulating suitable drainage features, either through modification or replacement.

See ***FDM 215*** for roadside safety requirements of drainage features.

Consult with drainage and environmental permitting specialists when the roadway modifications may reduce storage and infiltration or increase discharge rates and volumes. Stormwater retention or detention for quality, rate, and volume may be required. Theoretical evaluation of proposed changes to existing and new drainage features necessary to correct operational deficiencies should be referred to a drainage specialist. The drainage specialist will provide the necessary drainage design, flood data information, drainage related information for the Stormwater Pollution Prevention Plan (SWPPP) and any stormwater permit computations.

When siltation is noted during field review, coordinate with District Maintenance Office to determine if desiltation of existing pipes should be included in the project.

114.3.4 Pedestrian, Bicyclist, and Transit

Pedestrian and bicycle features must meet the requirements contained in ***FDM 222, 223,*** and ***224***.

Transit features must meet the requirements contained in ***FDM 225***.

Coordinate with the District Pedestrian/Bicycle Coordinator and the District Modal Development Office when deficiencies in these features are identified during the field review.

114.3.5 At-grade Railroad Crossing

Federal-aid projects must be reviewed to determine if a railroad-highway grade crossing is in or near the limits of the project. If such railroad-highway grade crossing exists, see ***FDM 220*** for requirements.

Review physical and operational characteristics of at-grade railroad crossings for compliance with minimum standards. Discuss identified deficiencies with the District Railroad Coordinator. Resurfacing funds must not be used where the primary purpose is to improve an at-grade railroad crossing.

114.3.6 Lighting

Lighting features must meet the requirements contained in ***FDM 231***.

Lighting may be installed at specific locations to reduce the effects of ambient light conditions or to improve safety at the following locations:

(1) Busy or high crash intersections

(2) Transit stops.

(3) Channelized intersections.

(4) Car pool parking lots.

(5) Pedestrian and bicycle crossings.

(6) Ramp terminals.

Coordinate project needs with the District Lighting Engineer.

114.3.7 Signals, Signing, and Pavement Markings

Signal features must meet the requirements contained in ***FDM 212*** and ***FDM 232***.

Signing and Pavement Marking features must meet the requirements contained in ***FDM 230***.

Coordinate project needs with the District Traffic Operations Engineer.

114.3.8 Bridge Structures

See ***FDM 260.9*** for information on evaluating existing bridge structures.

Review bridges in sufficient detail to clearly establish cost effective and appropriate improvements to be included in the project. RRR program funds can be used only for minor bridge improvements; e.g., rail retrofits, ADA improvements.

Bridges that require substantial improvements, or replacement, should be programmed with the appropriate bridge program funds.

114.3.8.1 Pier Protection

The requirements for Pier Protection are outlined in ***FDM 215.***

114.3.9 Roadside Safety Hardware

See ***FDM 215*** for RRR requirements of Roadside Safety Hardware.

114.3.10 Sign, Signal, Lighting, and ITS Support Structures

See ***FDM 261.7*** for information on evaluating ancillary structures.