114 Resurfacing, Restoration, and Rehabilitation (RRR)

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 for all modes of travel. 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 specific to RRR projects necessary to evaluate existing roadways for safety and performance.

The District Safety Engineer (DSE) and District Safety Administrator (DSA) must be involved in determining safety needs. Target Speed must be established early in the design process to assist with meeting safety objectives.

114.1.1 Improvements in RRR Projects

RRR projects must meet ***FDM Part 2*** criteria and requirements. In addition, the following must be included in the scope for each RRR project:

(1) Provide improvements recommended by the safety assessment described in FDM 114.3.2.2.

(2) Pavement resurfacing/rehabilitation.

(3) Modifications necessary to comply with the ***FDM*** requirements associated with the Americans with Disabilities Act (ADA).

(4) Provide 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) Provide traffic signal mast arms within the mast arm policy area (see ***FDM 232.8***) where existing strain poles require replacement/relocation.

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.

114.1.4 Pavement Only Projects and Ride Only Projects

Pavement Only Projects (POPs) are also known as “Maintenance Resurfacing Projects.” They include milling and resurfacing to restore the functional condition of the pavement but are not intended to increase the structural capacity. For POP pavement design requirements, refer to Chapter 7 of the ***Flexible Pavement Design Manual***.

Ride Only Projects are those where the existing pavement is in good structural condition but is deficient in ride due to the presence of irregularities such as manholes, utility valves, or utility tie-in patches in the wheel path. These projects may entail either an entire resurfacing of the project limits, or spot resurfacing of damaged areas. The intent of Ride Only Projects is to correct the ride deficiency rating.

This chapter does not apply to projects programmed as POPs or Ride Only Projects other than meeting ADA curb ramp and detectable warning requirements. Work Program Instructions, Chapter 27, states that POP projects cannot be on the “high crash list.”

114.2 Planning and Programming RRR Projects

The principal objectives of a RRR project are intended to extend the service life and provide for the needs of the roadway through the next resurfacing cycle, which include:

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

(2) To improve multi-modal capacity (without adding continuous through lanes).

(3) To improve multi-modal operating characteristics.

(4) To provide safety modifications that support the Safe System approach (see ***FDM 102*** for definition.)

(5) To provide, to the extent practicable, for expected transportation needs in the corridor based on context classification changes over time.

RRR projects are typically identified and programmed based on projections of deficient pavement conditions 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 design criteria must be carefully considered before inclusion in the project scope. To ensure that the safety needs of the project are addressed, to the extent feasible, coordination with the District Safety Engineer and District Safety Administrator should be done at the time of scoping. Coordinate early with the DSE and DSA to balance the safety needs and available time and resources to accomplish the RRR and safety needs objectives.

Identify potential modifications to meet anticipated future conditions during the context classification review as part of scoping. This will typically include reviewing local and District plans (e.g., bicycle facilities plan, corridor studies, sector plans, etc.) for desired pedestrian, bicycle, and transit facilities along the project corridor to identify opportunities for improvement as part of the RRR 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) Providing pedestrian, bicycle, or transit facilities

(2) Speed management countermeasures

(3) Correcting substandard roadway elements

(4) Meeting access management requirements

(5) Providing new or improved drainage conveyance or treatment facilities

(6) Making 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 R/W 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 [Level 2]

(7) Resurface with pedestrian, bicycle, and transit facility improvements [Level 2].

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

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

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

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

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

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

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

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

(16) Approaches to structures [Level 4].

(17) 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 benchmark 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) benchmarks 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 benchmarks, 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 benchmark 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) benchmarks 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 benchmarks, 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 lines. 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 the R/W. Subsurface utility locates if required.

(3) **LEVEL 3**

Continuous improvements through the length of the 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.

114.2.3 Public Involvement

Contact the District Public Information Office for information regarding public involvement on RRR projects.

114.3 RRR Design Process

The RRR design process is a team effort that requires familiarity with processes, guidance, criteria, and standards for planning, design, safety, traffic engineering, traffic operations, and maintenance. To ensure all needs are addressed, perform the assessments described in ***FDM 114.3.1*** through ***114.3.11*** below.

114.3.1 Assessment of Design Controls

Set design controls in accordance with ***FDM 201***. Target Speed must be established early in the project development to set the design controls.

114.3.2 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, operating conditions, and related local plans and projects.

114.3.2.1 Office Reviews

Review old plan sets, as-built drawings, Straight Line Diagrams, and other historical records to assess many of the existing conditions. Review and identify the project-level context classification for any related plans or conditions that could affect the goals of the project.

The existing conditions assessment should include:

(1) Horizontal and vertical geometrics, including intersections.

(2) Existing typical section elements.

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

(4) Shoulder treatments and side slopes.

(5) Drainage features, including cross drains and drainage structures. Evaluate District Drainage and Maintenance reported drainage issues.

(6) Clear zone or lateral offset, and shielding devices.

(7) Location and design of intersections including opportunities for alternative intersection designs where they may improve bicycle and pedestrian safety.

(8) Pavement cross slope and superelevation data.

(9) Pedestrian, bicycle, and transit facilities.

(10) ADA compliant features.

(11) Operating conditions, including:

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

  (b) Conditions attributable to current control of access.

  (c) Operational issues along the corridor (e.g., signal timing, detection failure, red light running, queue build-up, speeding, and split failures).

(12) Planning Office review of district and local plans, major permits or projects relating to the project area.

114.3.2.2 Safety Assessment

Perform a safety assessment, resulting in written recommendations. The safety assessment should include:

(1) Evaluation of safety needs identified and documented through the ***Safety Assessment Dashboard***. The Safety Assessment Dashboard is an internal FDOT application accessible only to specific FDOT positions. Coordinate with the District Traffic Safety Engineer to obtain information from the dashboard.

(2) Evaluation of proactive safety countermeasures supporting the Safe System approach.

(3) Identification of significant crash locations, with:

  (a) Determination of possible causes, and

  (b) Recommended modifications, mitigation measures, implementation of speed management techniques, or other safety countermeasures.

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

(5) Review of historic crash and travel statistics.

(6) Identification of safety and mobility measures such as filling pedestrian facility gaps, providing adequate crossing opportunities, correcting deficiencies of bicycle facilities, and improving connectivity of bicycle facilities.

The safety assessment along with written recommendations must be submitted to the District Safety Engineer and District Safety Administrator.

114.3.2.3 Field Reviews

Perform a field review to observe and verify physical, operational and safety conditions including those identified during the office review and safety assessment.

The field review must:

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

  (a) Pavement conditions including distressed pavement or depressions that may indicate pavement or base failure.

  (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 issues).

(k) Highway appurtenances.

(l) ADA features.

(m) Transit stops.

(n) Pedestrian facility connectivity and identification of pedestrian facility gaps and substandard conditions.

(o) Pedestrian and bicycle crossing locations.

(p) Bicycle facility connectivity and identification of bicycle facility gaps and substandard conditions.

(q) Nighttime review to observe lighting along corridor, intersections, and mid-block crosswalks.

(r) Signalization.

(s) No-passing zones (see ***FDM 230***).

(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 lane departure or other unsafe operations (e.g., tire marks on walls or curb, tire tracks on front slope, tire marks encroaching on pedestrian areas, damaged drainage inlet tops within curb returns, guardrail repairs).

(c) Evidence of informal pedestrian movement paths or improper crossings.

114.3.2.4 Identified Improvements

Coordinate with the District Project Manager, District Design Engineer, District Safety Engineer, and District Safety Administrator for safety related issues with identified improvements necessary to correct deficiencies. Crash analysis should include an examination of needs identified through the Safety Assessment Dashboard and the identification of proactive countermeasures in support of the Safe System approach.

Identified improvements may 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-offs.

(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 new or replace deficient sidewalks.

(14) Provide transit stops.

(15) Provide new or upgrade existing pedestrian crossings (e.g., midblock crossings, bulb-outs, raised crosswalks, refuge islands).

(16) Provide new or upgrade existing bicycle facilities (e.g., keyholes, conflict markings).

(17) Upgrade railroad crossing approaches.

(18) Provide or upgrade signalization (e.g., leading pedestrian intervals, pedestrian signals, automatic recall, push-button locations, midblock pedestrian signals).

(19) Provide or upgrade lighting.

(20) Upgrade signing and other traffic control devices (e.g., Rapid Rectangular Flashing Beacons, Pedestrian Hybrid Beacons).

(21) Provide or upgrade curb cuts, ramps, and other ADA features.

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

(23) Adjust corridor speeds to reflect changing development conditions or safety needs (see ***FDM 201.5.1*** for Target Speed on RRR projects).

114.3.2.5 Design Exceptions and Design Variations

Existing features not meeting RRR criteria require the processing of a Design Exception or Design Variation for the feature to remain. Refer to ***FDM 122*** for Design Exception and Design Variation procedures. See also, ***FDM 114.1.1***.

114.3.2.6 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.

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

(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 removed or delayed.

114.3.3 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*** 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) Need and potential for protected intersection.

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

(10) Warrants for traffic control systems.

(11) Addition of signal backplates where it would not require structural modifications to mast arms or span wire systems. See ***Traffic Engineering Manual (TEM)***, ***Section 3.9*** for use of flexible backplates where needed.

(12) History of angle crashes or observed red-light running.

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

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

(15) Lighting for intersection illumination.

(16) Adequate line of sight.

(17) ADA needs.

Include corrective measures in projects having T-intersections with overrepresented crash histories 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).

114.3.4 Drainage

Conduct a site visit to evaluate the physical condition of the existing drainage system and to determine if hydraulic and/or safety improvements are needed. In addition to the site visit, contact the local maintenance office to coordinate these findings and to discuss the drainage history along the section of roadway to be resurfaced. If drainage improvements are warranted, perform the required hydraulic analysis to determine the most cost-effective repair strategy to restore the design intent of the existing drainage system. When siltation is noted during site review, follow the pipe inspection criteria in the ***Drainage Manual***, Chapter 3. 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 permit specialists when the roadway modifications impact existing ditch cross sectional area, storage and infiltration or increase discharge rates and volumes. Stormwater management, using retention or detention storage, may be required to mitigate for water quality, rate, and volume changes associated with the proposed roadway improvements. The drainage specialist must perform the drainage analysis to determine if improvements are required and must provide the necessary drainage design, flood data information, and all information required to obtain the necessary environmental permits.

114.3.5 Pedestrian, Bicyclist, and Transit

Coordinate with the District Pedestrian/Bicycle Coordinator, the District Modal Development Office, and, as needed, the District Safety Engineer and/or District Safety Administrator when deficiencies in bicycle, pedestrian, or transit facilities are identified during the field review or project development.

114.3.6 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 the 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.

114.3.7 Lighting

Lighting features must meet the requirements of ***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 or areas.

(2) Transit stops.

(3) Channelized intersections.

(4) Carpool parking lots.

(5) Pedestrian and bicycle crossings.

(6) Ramp terminals.

(7) Roundabouts.

(8) Midblock Crossings.

Coordinate project needs with the District Lighting Engineer.

114.3.8 Signals, Signing, and Pavement Markings

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

Signing and Pavement Marking features must meet the requirements contained in ***FDM 230***. Review and adjust no-passing zone locations as needed on 2-lane roadways in accordance with ***Manual on Uniform Traffic Studies (MUTS)*****, Chapter 11**.

Coordinate project needs with the District Traffic Operations Engineer.

114.3.9 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.

114.3.9.1 Pier Protection

The requirements for pier protection are outlined in ***FDM 215.***

114.3.10 Roadside Safety Hardware

See ***FDM 215*** for RRR requirements of roadside safety hardware.

114.3.11 Sign, Signal, Lighting, and ITS Support Structures

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