



WYDOT DESIGN GUIDES



Non-NHS
State Highways

2021

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GUIDE FOR Non-NATIONAL HIGHWAY SYSTEM (Non-NHS) STATE HIGHWAYS

PRESERVATION – REHABILITATION – RECONSTRUCTION

INTRODUCTION

This Guide is directed to developing transportation projects on the Wyoming Non-NHS State Highway System functionally classified as Minor Arterials, Collectors Highways, and Local Highways. The Guide outlines project development criteria and procedures, within three project types – Preservation, Rehabilitation, and Reconstruction – to address major Program areas. These Program areas are: Highway Pavements, Highway and Roadside Geometrics, Highway Structures, Highway and Roadside Safety, Highway Capacity, Highway Intersections, and Highway Corridor Evaluations.

PROJECT AND PROGRAM DIRECTION

Developing each transportation project, from early scoping through design and construction, must recognize that the Department continues to operate with increasing transportation needs, higher construction costs, and limited funding. As a result, project scopes and designs should be developed with an understanding of those objectives that best meet the Department’s goals to take care of all physical aspects of the State Transportation System and to exercise good stewardship of resources.

Every project scope and design must be specifically directed to the highway corridor proposed for improvement, rather than applying historical standards or practices based on the highway system. Preservation projects should first review the highway corridor to identify existing deficiencies in pavements, bridge structures, safety, capacity, and highway operations including interchanges and intersections; Rehabilitation and Reconstruction projects should evaluate the highway corridor to identify existing deficiencies in pavements, bridge structures, safety, capacity, and highway operations including interchanges and intersections. Early consideration of the existing physical condition of the highway/roadside, and the safety, operational, and maintenance history of the corridor should be used to establish a needs-based justification for any proposed improvement, included in the project scope. Project scopes would then guide development of cost-effective designs.

To further support the above goals and objectives directed to narrowly defined project scopes and cost-effective designs, the criteria and procedures presented in this Guide are developed as recommended practice. The criteria and procedures may be modified, as needed, to meet an individual project or location-specific situation. As a result, the use of words such as ‘may or should’ versus ‘shall, will, or must’ is intended to support presentation of the criteria, and is not intended to present a permissive condition versus a required condition.

GENERAL DEFINITIONS

1. **Functional Classification:** Classification of the system of public highways by the character of service they provide. The Non-NHS State Highway System is functionally classified as Minor Arterials, Collector Highways, and Local Highways. This System of highways provides mobility to regional and local travel and access to adjacent land use.
2. **Controlling Design Criteria:** Controlling design criteria are Design Speed (DS), Lane Width, Shoulder Width, Horizontal Curve Radius, Cross-Slope, Superelevation Rate, Maximum Grades, Stopping Sight Distance, Structure Vertical Clearance, and Bridge Structure Capacity (loading).
3. **Highway Design, Highway and Roadside Safety, and Bridge Structure Design Criteria and Values:** The criteria and values current with development of this Guide are listed as References. All References used in this Guide are to the most current adopted editions.
4. **Highway Capacity Analysis:** This analysis, applicable to Reconstruction projects and to those Rehabilitation projects with bridge replacement, will be completed for a selected design year using procedures from the Transportation Research Board (TRB) *Highway Capacity Manual*, or an adopted State analysis method. A Level-of-Service (LOS) D has been selected as the appropriate LOS to warrant capacity improvements for Non-NHS State Highway rural mainline and urban sections.
5. **Project Scope and Funding:** Project scopes will be determined at an early planning stage using established management systems for Pavements, Bridges, and Safety. Early project scoping will develop the project purpose, project type, project limits, and location-specific major elements.
Projects meeting the criteria presented in this Guide are eligible for State and Federal funding categories (STP, HSIP, TAP, State Construction, State Safety).
6. **Preservation Project Type:** Preservation of the highway corridor to allow for the construction of a) a range of pavement design strategies that extend the service life or serviceability of the roadway pavement structure as identified in the Pavement Management System, b) bridge structure preservation or maintenance strategies identified in the Bridge Management System, and c) selected location-specific roadway and roadside safety improvements supported by the Safety Management System and including location-specific roadway geometric improvements. This project type may also address corridor needs for (a) operational improvements including auxiliary lanes and intersections improvements, (b) roadway traffic control device upgrades including signs, signals, and markings and (c) areas of isolated reconstruction or rehabilitation to meet identified highway needs.

7. Rehabilitation Project Type: Rehabilitation of existing highways to allow for the construction of selected improvements including (a) pavement design strategies identified in the Pavement Management System, (b) highway geometric upgrades, (c) bridge structure replacement or rehabilitation strategies identified in the Bridge Management System, (d) roadway and roadside safety improvements supported by the Safety Management System, (e) operational improvements including auxiliary lanes, modifications to existing interchanges and intersections, and upgrades to roadway traffic control devices including signs, signals, and markings. This project type could include isolated areas of reconstruction to meet identified highway needs.
8. Reconstruction Project Type: New construction or reconstruction of existing highways to provide for (a) the full range of pavement design strategies identified in the Pavement Management System, (b) highway geometric criteria upgrades, (c) bridge structure replacement or rehabilitation strategies identified in the Bridge Management System, (d) a full range of roadway and roadside safety improvements supported by the Safety Management System, (e) added capacity for design year traffic including additional travel lanes and auxiliary lanes, new intersections and modifications to existing intersections, and (f) roadway traffic control devices.

APPLICATION CRITERIA – Non-NHS STATE HIGHWAY
PRESERVATION PROJECTS

Project Direction

These application criteria, as stated in the Introduction, are directed to each Preservation project scope and design. Each project should first review the highway corridor (defined as the project limits) to identify existing deficiencies in pavements, bridge structures, safety, capacity, and highway operations including interchanges and intersections. Early consideration of the existing physical condition of the highway/roadside, and the safety, operational, and maintenance history of the corridor should be used to establish a needs-based justification for any proposed improvement, included in the project scope. Project scopes would then guide development of cost-effective designs.

Highway Pavements

Non-NHS State Highway Preservation projects provide for a range of pavement design strategies to extend the service life of existing plant-mix asphalt pavements and Portland cement concrete pavements. Strategies for plant-mix asphalt pavements include, but are not limited to, surface preparations (mill, level, full-depth reclamation, other), overlays, wearing surfaces, chip seals, micro-surfacing, and seal coats. Strategies for Portland cement concrete pavements include, but are not limited to, isolated slab replacement, dowel bar retrofit, grind and texture, and joint seals. Preservation projects will construct these strategies or other pavement treatment types as identified in the Pavement Management System and further outlined in the Pavement Condition and Project Candidates manual developed and administered through the Materials Program. This project type could include isolated areas of reconstruction or rehabilitation to meet identified pavement structure needs.

Highway and Roadside Geometrics

Non-NHS State Highway Preservation projects are not intended to improve highway geometric design or roadside elements; these would typically be evaluated as part of a Rehabilitation or Reconstruction type project. Auxiliary lanes, including acceleration/deceleration lanes, can be constructed with a Preservation project, when justified.

Highway Structures

Non-NHS State Highway Preservation projects will provide for the preservation or maintenance of existing bridge structures, consistent with improvements identified in the Bridge Management System.

Highway and Roadside Safety

Project planning for Non-NHS State Highway Preservation will require a highway safety screening to determine the safety improvements/countermeasures recommended on each project. By entering the project limits into the Safety Management System (SMS) administered by the Highway Safety Program, a Highway Safety (HWS) Segment Report is generated. The HWS Segment Report will show the Safety Index (SI) rating for the project limits.

The use of the SMS to obtain an SI rating constitutes a highway safety screening and supports the Department's effort to reduce the frequency and severity of highway crashes, and directs attention and funding to 1) those highway sections that have a history of more severe or frequent crashes and 2) those highway sections where construction of safety improvements/countermeasures have the potential to significantly reduce the crash frequency and/or severity.

Highway sections with an SI Rating of 1 or 2 do not have a history of frequent or severe crashes. Although safety improvements/countermeasures may be constructed on these highway sections, the highway safety screening does not require any additional safety work to be added to preservation projects.

Highway sections with an SI Rating of 3 or 4 show a history of frequent or severe crashes and requires the project planning team to evaluate the need to add safety improvements/countermeasures to the project. This evaluation will reveal the potential to reduce the frequency or severity of specific crash types/locations and is the joint responsibility of Highway Safety, Planning, Traffic, District, and Highway Development.

The safety evaluation will consist of adding multiple safety treatments to the road sections within the SMS prior to the recon or kick-off meeting. At the recon or kick-off meeting, the design team will review all of the treatments suggested, review the benefit to cost ratios, and determine what safety treatments should be added to the project. Proposed safety improvements will be available for inclusion in the project scope.

Preservation projects do not require additional safety improvements to be added to the project. If no safety improvements are recommended for the project after the design team evaluation has been completed, a note will be placed in the project file by the lead designer stating why safety improvements were not added to the project.

Safety improvements, if selected for inclusion in the project scope, will meet applicable geometric and safety design criteria and design values as presented in this Guide for Non-NHS State Highway Rehabilitation Projects, *WYDOT Road Design Manual*, *AASHTO Roadside Design Guide (RDG)*, *AASHTO Manual for Assessing Safety Hardware (MASH)*, *NCHRP Report 350 Recommended Procedures for the Safety Performance of Highway Features*, and *FHWA Manual on Uniform Traffic Control Devices (MUTCD)*.

Highway Capacity

Non-NHS State Highway Preservation projects are not intended to provide for additional travel lanes; future year Non-NHS State Highway capacity needs would typically be evaluated as part of a Reconstruction type project. Auxiliary lanes, including truck climbing lanes, and acceleration/deceleration lanes can be constructed with a Preservation project, when justified.

Highway Intersections and Interchanges

Intersections within the limits of a Non-NHS State Highway Preservation project can be modified, as needed, to construct auxiliary lanes, including turn lanes.

Non-NHS Preservation projects are not intended to improve interchange ramp or crossroad geometric design or roadside elements; these would typically be evaluated as part of an Interstate or NHS Rehabilitation or Reconstruction type project.

Highway Corridor Reviews and Evaluations

Non-NHS State Highway Preservation projects should review all physical aspects of the highway corridor to identify existing deficiencies and/or other highway and roadside elements that may require continued maintenance, and address WYDOT direction for Americans with Disabilities Act (ADA) requirements from the WYDOT, *Road Design Manual*. For this Non-NHS project type, the highway corridor to be reviewed is the project limits.

This project type may include an operational evaluation of all roadside hardware, including bridge curb and rail, guardrail barriers and terminals, bridge rail to guardrail connections, sign support breakaway hardware, sign legend and retroreflection, and highway and interchange lighting. These installations may be upgraded, if needed, to meet design standards according to the AASHTO *Manual for Assessing Safety Hardware* (MASH), NCHRP *Report 350 Recommended Procedures for the Safety Performance of Highway Features*, FHWA *Manual on Uniform Traffic Control Devices* (MUTCD), and WYDOT *Operating Policy 25-1 Traffic Control and Roadway Lighting Devices*.

All Preservation project designs should avoid right-of-way acquisitions and/or construction easements; these projects should also avoid or minimize environmental impacts and resultant cost of mitigation.

The Design Phase should evaluate alternative contracting including, but not limited to, Lane Rental, and Incentive/Disincentive provisions.

APPLICATION CRITERIA – Non-NHS STATE HIGHWAY SYSTEM
REHABILITATION PROJECTS

Project Direction

These application criteria, as stated in the Introduction, are directed to each Rehabilitation project scope and design. Each project should first evaluate the highway corridor (arterial highway corridor to be evaluated is project limits for roadside elements and both the project limits and adjacent sections for highway (roadway) geometric elements; the collector and local highway corridor to be evaluated is the project limits) to identify existing deficiencies in pavements, bridge structures, safety, capacity, and highway operations including interchanges and intersections. Early consideration of the existing physical condition of the highway/roadside, and the safety, operational, and maintenance history of the corridor should be used to establish a needs-based justification for any proposed improvement, included in the project scope. Project scopes would then guide development of cost-effective designs.

Highway Pavements

Non-NHS State Highway Rehabilitation projects provide for a broad range of pavement design strategies. Strategies for plant-mix asphalt pavements include, but are not limited to, removal and replacement, widening, surface preparations (mill, level, full-depth reclamation, other), overlays and seal coats. Strategies for Portland cement concrete pavements include, but are not limited to, crack and seat, grind (level), overlay and seal coats. Rehabilitation projects will construct these strategies or other pavement treatment types as identified in the Pavement Management System and further outlined in the Pavement Condition and Project Candidates manual developed and administered through the Materials Program. This project type could include isolated areas of reconstruction to meet identified pavement structure needs.

Non-NHS State Highways will be designed to meet the following criteria for the paved width of travel lanes, shoulders, and auxiliary lanes.

Travel Lanes: For Arterial and Collector Highways, travel lanes will be designed to a full-depth pavement structure for the full width. For Local Highways, travel lanes will typically be designed to a full-depth pavement structure for the full width, but a gravel surface can be constructed rather than a paved surface.

Shoulders: For Non-NHS State Highways classified as Arterials, shoulders will be evaluated for a reduced-depth pavement structure for the inside 2 feet, with the remainder of the shoulder width extending the plant mix or constructed with a consolidated and drain-able material. For Non-NHS State Highways classified as Collector Highways and Local Highways, shoulders will be evaluated for a reduced-depth plant-mix pavement structure or constructed with a consolidated and drain-able material.

Auxiliary Lanes: All auxiliary lanes, including passing, climbing, turning, parking and bicycle lanes, will be evaluated for a reduced-depth pavement structure as they carry a differing volume and mix of traffic.

Highway and Roadside Geometrics

Project planning for Non-NHS State Highway Rehabilitation projects will include an evaluation of existing highway elements against design values for Controlling Design Criteria and selected non-controlling design criteria that are below Tolerable Controls. Tolerable Controls are generally defined as the design values for highway elements in effect at the time of original construction of the Non-NHS State Highway section proposed for improvement, or the design values for existing highway elements if the highway section has been improved since original construction. The evaluation will be used to select the highway elements that will be improved and included in the Rehabilitation project scope.

Design values have been developed, within this Guide, to establish a relationship between the selected Design Speed and posted speed limit for rural Non-NHS State Highways improved with a Rehabilitation project type. These procedures assure that, on rural highways, the posted speed limit does not exceed 10 MPH over the Design Speed and related design values; urban highways, using an urban section, will require that the Design Speed meet the posted speed.

Tables 1 and 2 present the minimum design values, by functional classification, for Tolerable Controls for the Controlling Design Criteria relating to highway design. Design values for Tolerable Controls for the Controlling Design Criteria relating to bridge structures are presented in Tables 4 and 5 located in a following section, Highway Structures. These minimum design values are applicable to mainline Non-NHS State Highway sections and are not intended to control the design of auxiliary lanes.

For Non-NHS State Highway Rehabilitation projects, highway and bridge structure designs for proposed improvements will be based on the minimum design values for Tolerable Controls as presented in this Guide. Higher design values, taken from this Guide and the *WYDOT Road Design Manual*, are available for use when justified due to higher traffic volumes, higher truck traffic volumes, identified safety concerns including higher frequency or more severe crash types, or other identified highway needs.

**Table 1. Non-NHS Arterial State Highways - Rehabilitation Project Type:
Controlling Design Criteria and Tolerable Controls (Design Values)**

Controlling Design Criteria	Rural Design Values 70 MPH Posted Speed	Rural Design Values 65 MPH or less Posted Speed	Urban Design Values	Footnote
Design Speed (DS)	60 MPH	55 MPH	Existing Posted Speed	1, 2
Lane Width	11 Feet	11 Feet	11 Feet	
Shoulder Width	Existing	Existing	Existing	3, 4
Horizontal Curve Radius	60 MPH DS	55 MPH DS	DS	
Cross Slope	1.5%	1.5%	1.5%	
Superelevation Rate	Consistent with Horizontal Alignment	Consistent with Horizontal Alignment	Consistent with Horizontal Alignment	5
Maximum Grade	Existing	Existing	Existing	
Stopping Sight Distance	570 Feet	495 Feet	DS	

Footnote 1 – The Urban Design Values are presented for a curb and gutter section; if a ditch section is constructed, use Rural Design Values 65 MPH or less Posted Speed.

Footnote 2 – The selected Design Speed, for rural sections, can be reduced based on posted speed or terrain type to a minimum 40 MPH (posted speed limit does not exceed 10 MPH over the DS). Design values for Controlling Design Criteria should match the selected DS and can be taken from the WYDOT *Road Design Manual*.

Footnote 3 – On rural sections, wider shoulder widths and/or paved widths may be selected in consideration of WYDOT *Operating Policy 7-4, Bicycle Accommodation and Multiple-Use Transportation Facilities*. On urban sections, the shoulder widths may be increased to provide for parking lanes, bicycle lanes, and/or turn lanes. Selected shoulder widths include the gutter pan width, measured to face of curb.

Footnote 4 – For those highway sections where the existing shoulder widths exceed the design values presented in Table 6, the shoulder widths may be reduced to meet the design values in Table 6.

Footnote 5 – The Superelevation Table $e_{max} = 6\%$ may be used in mountainous terrain; the Superelevation Table $e_{max} = 4\%$ may be used in low-speed urban areas. In low-speed urban areas, superelevation may be adjusted/evaluated as described in the Road Design Manual.

**Table 2. Non-NHS Collector and Local State Highways - Rehabilitation Project Type:
Controlling Design Criteria and Tolerable Controls (Design Values)**

Controlling Design Criteria	Rural Design Values 70 MPH Posted Speed	Rural Design Values 65 MPH or less Posted Speed	Urban Design Values	Footnote
Design Speed (DS)	60 MPH	55 MPH	Existing Posted Speed	1, 2
Lane Width	11 Feet	11 Feet	11 Feet	3
Shoulder Width	Existing	Existing	Existing	4, 5
Horizontal Curve Radius	60 MPH DS	55 MPH DS	DS	
Cross Slope	1.5%	1.5%	1.5%	
Superelevation Rate	Consistent with Horizontal Alignment	Consistent with Horizontal Alignment	Consistent with Horizontal Alignment	6
Maximum Grade	Existing	Existing	Existing	
Stopping Sight Distance	570 Feet	495 Feet	DS	

Footnote 1 – The Urban Design Values are presented for a curb and gutter section; if a ditch section is constructed, use Rural Design Values 65 MPH or less Posted Speed.

Footnote 2 – The selected Design Speed, for rural sections, can be reduced based on posted speed or terrain type to a minimum 30 MPH for Collectors and 20 MPH for Local State Highways (posted speed limit does not exceed 10 MPH over the DS). Design values for Controlling Design Criteria should match the selected DS and can be taken from the *WYDOT Road Design Manual*.

Footnote 3 – For Urban sections (curb and gutter) Lane Widths can be reduced to 10 feet.

Footnote 4 – On rural sections, wider shoulder widths and/or paved widths may be selected in consideration of *WYDOT Operating Policy 7-4, Bicycle Accommodation and Multiple-Use Transportation Facilities*. On urban sections, the shoulder widths may be increased to provide for parking lanes, bicycle lanes, and/or turn lanes. Selected shoulder widths include the gutter pan width, measured to face of curb.

Footnote 5 – For those Collector Highway sections where the existing shoulder widths exceed the design values presented in Table 7, the shoulder width may be reduced to meet the design values in Table 7. For those Local Highway sections where the existing shoulder widths exceed the design values presented in Table 8, the shoulder widths may be reduced to meet the design values in Table 8.

Footnote 6 – The Superelevation Table $e_{max} = 6\%$ may be used in mountainous terrain; the Superelevation Table $e_{max} = 4\%$ rate may be used in low-speed urban areas. In low-speed urban areas, superelevation may be adjusted/evaluated as described in the Road Design Manual.

WYDOT has also identified minimum design values for non-controlling design criteria on Non-NHS State Highways, all functional classifications. Selected criteria and design values are presented in Table 3 for non-controlling design criteria relating to highway and roadside geometric design.

**Table 3. Non-NHS State Highways - Rehabilitation Project Type:
Non-Controlling Design Criteria and Design Values**

Non-Controlling Design Criteria	Rural Design Values	Urban Design Values	Footnote
Fore Slope Rate	1V:4H to 1V:6H, including Surfacing Taper	Existing	1
Clear Zone Width	See Road Design Manual	4 Feet Minimum	
Slope Rate –beyond Clear Zone	See Road Design Manual	Existing	1
Median Width	Existing	Selected Value	1
Sag Vertical Curve – Headlight Sight Distance	570 Feet, 60 MPH DS 495 Feet, 55 MPH DS	DS	2
Lateral Offset to Obstruction	Existing Shoulder Width	1.5 Feet (From Curb Face)	

Footnote 1 – Selection of slope rates and median widths should avoid right-of-way acquisitions and/or construction easements; should also consider avoidance or minimization of environmental impacts and resultant cost of mitigation.

Footnote 2 - Sag vertical curves are normally designed to not restrict the distance of roadway illuminated by vehicle headlights, which would reduce stopping sight distance at night.

Highway Structures

Project planning for Non-NHS State Highway Rehabilitation projects will evaluate existing bridge structure elements against design values for Controlling Design Criteria. This evaluation will assist in selecting those bridge structure elements, related to controlling design criteria that are below Tolerable Controls, which will be improved as part of the Rehabilitation project scope. Tolerable Controls are generally defined as the design values, for bridge structure elements, in effect at the time of original construction of the bridge structure proposed for improvement, or the design values for existing bridge structure elements if the bridge structure has been improved since original construction.

Non-NHS State Highway Rehabilitation projects will also evaluate bridge structures to determine elements in an advanced state of deterioration. Work needed to extend the functional life of the structure, including structure replacement, widening, or reconstruction of any element, may be addressed with a Rehabilitation project. Any bridge structure replaced or proposed for rehabilitation of major elements will be evaluated for structure type, length, and width requirements, with a highway capacity analysis based on a selected future-year design life. The location of abutments and piers will consider design values for Lateral Offset to Obstructions, which may vary by highway system crossed (Interstate, NHS Arterial, Non-NHS State Highway, Public Highway).

For Non-NHS State Highway Rehabilitation projects, Tables 4 and 5 present the minimum design values for Tolerable Controls for the Controlling Design Criteria relating to bridge rehabilitation designs. These minimum design values are applicable to mainline bridge structures and are not intended to control the design of structures serving auxiliary lanes. The use of higher design values, from the referenced WYDOT or AASHTO manuals, are available for use when justified due to higher traffic volumes, higher truck traffic volumes, identified safety concerns including higher frequency or more severe crash types, or other identified highway needs.

For Non-NHS State Highway Rehabilitation projects, bridge structure design for replacement of an existing structure will be based on the minimum AASHTO design values identified in Table 6, Table 7, Table 8, and Table 10 of this Guide, by Functional Classification. Long structures for Non-NHS Arterial State Highways, defined as length in excess of 200 feet, may have a lesser roadway width to accommodate the traveled way plus 4 feet offsets (left and right side) to curb barrier or rail. Long structures for Non-NHS Collector and Local State Highways, defined as length in excess of 100 feet, may have a lesser roadway width to accommodate the traveled way plus 3 feet offsets (left and right side) to curb barrier or rail.

**Table 4. Non-NHS Arterial State Highways - Rehabilitation Project Type:
Structure Controlling Design Criteria and Tolerable Controls (Design Values)**

Controlling Design Criteria	Rural or Urban Design Values	Footnote
Vertical Clearance – Highway Structures Structure over Interstate Highway Structure over NHS Arterial Structure over Non-NHS Arterial Structure over Non-NHS Collector Structure over Non-NHS Local Vertical Clearance – Sign Structures All Highway Systems	Existing, Minimum @ 14 Feet Existing Existing Existing Existing Existing	1
Structural Capacity	HS-20, Inventory Rating ≥ 0.8	

Footnote 1 – Vertical Clearance design values are minimums, and may be < existing clearances. Rehabilitation projects will maintain existing clearances. Raising structures or reconstructing mainline grades to meet a minimum design value would typically be addressed as a Reconstruction project type.

**Table 5. Non-NHS Collector and Local State Highways Rehabilitation Project Type:
Structure Controlling Design Criteria and Tolerable Controls (Design Values)**

Controlling Design Criteria	Rural or Urban Design Values	Footnote
Vertical Clearance – Highway Structures Structure over Interstate Highway Structure over NHS Arterial Structure over Non-NHS Arterial Structure over Non-NHS Collector Structure over Non-NHS Local Vertical Clearance – Sign Structures All Highway Systems	Existing Existing Existing Existing Existing Existing	1
Structural Capacity	HS-20, Inventory Rating ≥ 0.8	

Footnote 1 – Rehabilitation projects will maintain existing clearances. Raising structures or reconstructing mainline grades to meet a minimum design value would typically be addressed as a Reconstruction project type.

Highway and Roadside Safety

Project planning for Non-NHS State Highway Rehabilitation will require a highway safety screening to determine the safety improvements/countermeasures recommended on each project. By entering the project limits into the Safety Management System (SMS) administered by the Highway Safety Program, a Highway Safety (HWS) Segment Report is generated. The HWS Segment Report will show the Safety Index (SI) rating for the project limits

The use of the SMS to obtain an SI rating constitutes a highway safety screening and supports the Department’s effort to reduce the frequency and severity of highway crashes and directs attention and funding to 1) those highway sections that have a history of more severe or frequent crashes and 2) those highway sections where construction of safety improvements/countermeasures have the potential to significantly reduce the crash frequency and/or severity.

Highway sections with an SI Rating of 1 or 2 do not have a history of frequent or severe crashes. Although safety improvements/countermeasures may be constructed on these highway sections, the highway safety screening does not require any additional safety work to be added to rehabilitation projects.

Highway sections with an SI Rating of 3 or 4 show a history of frequent or severe crashes and requires the project planning team to evaluate the need to add safety improvements/countermeasures to the project. This evaluation will reveal the potential to reduce the frequency or severity of specific crash types/locations, and is the joint responsibility of Highway Safety, Planning, Traffic, District, and Highway Development.

The safety evaluation will consist of adding multiple safety treatments to the road sections within the SMS prior to the recon or kick-off meeting. At the recon or kick-off meeting, the design team will review all of the treatments suggested, review the benefit to cost ratios, and determine what safety treatments should be added to the project. Proposed safety improvements will be available for inclusion in the project scope.

Rehabilitation projects do not require additional safety improvements to be added to the project. If no safety improvements are recommended for the project after the design team evaluation has been completed, a note will be placed in the project file by the lead designer stating why safety improvements were not added to the project.

Safety improvements, if selected for inclusion in the project scope, will meet applicable geometric and safety design criteria and design values as presented in this Guide for Non-NHS State Highway Rehabilitation Projects, WYDOT *Road Design Manual*, AASHTO *Roadside Design Guide* (RDG), AASHTO *Manual for Assessing Safety Hardware* (MASH), NCHRP *Report 350 Recommended Procedures for the Safety Performance of Highway Features*, and FHWA *Manual on Uniform Traffic Control Devices* (MUTCD).

Highway Capacity

Non-NHS State Highway Rehabilitation projects are not intended to provide for additional travel lanes. Future year Non-NHS State Highway capacity needs would typically be evaluated as part of a Reconstruction type project. Auxiliary lanes, including truck climbing lanes, acceleration/deceleration lanes, and turn lanes can be constructed with a Rehabilitation project, when justified.

Highway Intersections and Interchanges

Non-NHS State Highway Rehabilitation projects will evaluate the geometric design, capacity, and safety needs for major intersections, including the intersecting road; improvements can be included in the project scope. Capacity improvements to the intersection may be delayed, if not justified within the first ten years of the design life selected for the highway capacity analysis.

A Non-NHS State Highway Rehabilitation project can also include the evaluation of geometric design, capacity and safety needs for interchange ramp connections to the Interstate system. Improvements needed to correct identified deficiencies or meet future-year projected travel demands can be included in the project scope, or delayed and programmed with a future Interstate project type. Design criteria and values are presented in the *WYDOT Road Design Manual* and supplemented by *AASHTO A Policy on Geometric Design of Highways and Streets*.

Highway Corridor Evaluations

Non-NHS State Highway Rehabilitation projects should evaluate all physical aspects of the highway corridor to identify existing deficiencies and/or other highway and roadside elements that may require continued maintenance, and address WYDOT direction for Americans with Disabilities Act (ADA) requirements from the *WYDOT Road Design Manual*. For this Non-NHS project type, the Arterial highway corridor to be evaluated is the project limits for roadside elements and both the project limits and adjacent sections for highway (roadway) geometric elements; the Collector and Local highway corridor to be evaluated is the project limits.

This project type will include an operational evaluation of all roadside hardware, including bridge curb and rail, guardrail barriers and terminals, bridge rail to guardrail connections, sign support breakaway hardware, sign legend and retroreflection, and highway and interchange lighting. These installations may be upgraded, if needed, to meet design standards according to the *AASHTO Manual for Assessing Safety Hardware (MASH)*, *NCHRP Report 350 Recommended Procedures for the Safety Performance of Highway Features*, *FHWA Manual on Uniform Traffic Control Devices (MUTCD)*, and *WYDOT Operating Policy 25-1 Traffic Control and Roadway Lighting Devices*.

Non-NHS State Highway Rehabilitation projects may require a hydraulic analysis. The scope of the hydraulic analysis and resultant design work will vary depending on project improvements being undertaken.

All Rehabilitation project designs should be evaluated to avoid right-of-way acquisitions and/or construction easements; this evaluation should also consider avoidance or minimization of environmental impacts and resultant cost of mitigation.

Project planning for Non-NHS Urban Rehabilitation projects should include a corridor review of adopted State or Local Government plans, such as Transportation Alternatives Program (TAP) or bicycle and pedestrian plans, and determine if any identified improvements should be included in the project scope.

Cost reduction evaluations should be considered during the Design Phase, including Life Cycle Costing, Value Engineering, and Constructability Reviews. The Design Phase should evaluate alternative contracting including, but not limited to, Cost plus Time, Lane Rental, and Incentive /Disincentive provisions.

APPLICATION CRITERIA – Non-NHS STATE HIGHWAY SYSTEM
RECONSTRUCTION PROJECTS

Project Direction

These application criteria, as stated in the Introduction, are directed to each Reconstruction project scope and design. Each project should first evaluate the highway corridor (arterial highway corridor to be evaluated is the project limits for roadside elements and both the project limits and adjacent sections for highway (roadway) geometric elements; the collector and local highway corridor to be evaluated is the project limits) to identify existing deficiencies in pavements, bridge structures, safety, capacity, and highway operations including interchanges and intersections. Early consideration of the existing physical condition of the highway/roadside, and the safety, operational, and maintenance history of the corridor should be used to establish a needs-based justification for any proposed improvement, included in the project scope. Project scopes would then guide development of cost-effective designs.

Highway Pavements

Non-NHS State Highway new construction or reconstruction projects provide for the full range of pavement design strategies for the new construction or the removal and replacement of existing plant-mix asphalt pavements and Portland cement concrete pavements. These designs will provide for a selected structure design life.

Non-NHS State Highways will be designed to meet the following criteria for the paved width of travel lanes, shoulders, and auxiliary lanes.

Travel Lanes: For Arterial and Collector Highways, travel lanes will be designed to a full-depth pavement structure for the full width. For Local Highways, travel lanes will typically be designed to a full-depth pavement structure for the full width, but a gravel surface can be constructed rather than a paved surface.

Shoulders: For Non-NHS State Highways classified as Arterials, shoulders will be evaluated for a reduced-depth pavement structure for the inside 2 feet, with the remainder of the shoulder width extending the plant mix or constructed with a consolidated and drain-able material. For Non-NHS State Highways classified as Collector Highways and Local Highways, shoulders will be evaluated for a reduced-depth plant-mix pavement structure or constructed with a consolidated and drain-able material.

Auxiliary Lanes: All auxiliary lanes, including passing, climbing, turning, parking and bicycle lanes, will be evaluated for a reduced-depth pavement structure as they carry a differing volume and mix of traffic.

Highway and Roadside Geometrics

Non-NHS State Highway reconstruction projects will be designed to meet WYDOT design values for Controlling Design Criteria and for selected non-controlling geometric and safety elements. These design values have been developed consistent with Wyoming laws, regulations, operating policies, and procedures. Supplemental geometric design information is available from WYDOT *Road Design Manual*, AASHTO *A Policy on Geometric Design of Highways and Streets*, and AASHTO *Roadside Design Guide* (RDG). For the limited number of multi-lane Non-NHS State Highways, supplemental geometric design information is available from WYDOT *Operating Policy 7-5, Standards for Non-Interstate Multilane Highways*.

Tables 6, 7, and 8 present eight Controlling Design Criteria and related design values for highway geometric design. WYDOT design values for the two Controlling Design Criteria relating to bridge structures are presented in Table 10 located in a following section, Highway Structures.

Design values have been developed, within this Guide, to establish a relationship between the selected Design Speed and the posted speed limit for rural Non-NHS State Highways being improved with a Reconstruction project type. These procedures assure that, on rural highways, the posted speed limit does not exceed 10 MPH over the Design Speed and related design values; urban highways, using an urban section, will require that the Design Speed meet the posted speed.

Highway and bridge structure designs will be based on the minimum design values presented in this Guide. These minimum design values are applicable to mainline Non-NHS State Highway sections and are not intended to control the design of auxiliary lanes. The use of higher design values, from the referenced WYDOT or AASHTO manuals, are available for use when justified due to higher traffic volumes, higher truck traffic volumes, identified safety concerns including higher frequency or more severe crash types, or other identified highway needs.

**Table 6. Arterial State Highways - Reconstruction Project Type:
Controlling Design Criteria and Design Values**

Controlling Design Criteria	Wyoming Standard Rural Design Values 70 MPH Posted Speed	Wyoming Standard Rural Design Values 65 MPH or less Posted Speed	Wyoming Standard Urban Design Values	Footnote
Design Speed (DS)	70 MPH	65 MPH	45-30 MPH	1, 2
Lane Width	12 Feet	12 Feet	11 Feet	3
Shoulder Width 2-Lane or Undivided Vehicles/day, < 400 Vehicles/day, 400-2000 Vehicles/day, > 2000 Multi-Lane Divided Outside Shoulder Inside Shoulder	4 Feet 6 Feet 8 Feet 8 Feet 4 Feet	4 Feet 6 Feet 8 Feet 8 Feet 4 Feet	Gutter Pan Gutter Pan Gutter Pan Gutter Pan Gutter Pan	4
Horizontal Curve Radius	70 MPH DS	65 MPH DS	45-30 MPH DS	
Cross Slope	2.0%	2.0%	2.0%	
Superelevation Rate	Superelevation Table $e_{max} = 8\%$	Superelevation Table $e_{max} = 8\%$	Superelevation Table $e_{max} = 8\%$	5
Maximum Grade (Range) Level Terrain Rolling Terrain Mountainous Terrain	3% 4% 5%	3% 4% 5%	6-7% 7-9% 9-11%	
Stopping Sight Distance	730 Feet	645 Feet	360 Feet (45 MPH) 200 Feet (30 MPH)	

Footnote 1 – The Urban Design Values are presented for a curb and gutter section; if a ditch section is constructed, use Rural Design Values 65 MPH or less Posted Speed.

Footnote 2 – The selected Design Speed, for rural sections, can be reduced based on terrain type to a minimum 40 MPH (posted speed limit does not exceed 10 MPH over the DS). Design values for Controlling Design Criteria should match the selected DS and can be taken from the WYDOT Road Design Manual.

Footnote 3 – For Rural Design Values, 11 feet travel lanes may be used on those arterials with volumes below 400 ADT, or a combination of lower design speeds, ≤ 50 MPH, and lower design volumes, ≤ 2000 vehicles/day.

Footnote 4 – On rural sections, wider shoulder widths and/or paved widths may be selected in consideration of WYDOT *Operating Policy 7-4, Bicycle Accommodation and Multiple-Use Transportation Facilities*. On urban sections, the shoulder width may be increased to provide for parking lanes, bicycle lanes, and/or turn lanes. Selected shoulder widths include the gutter pan width, measured to face of curb.

Footnote 5 – The Superelevation Table $e_{max} = 6\%$ may be used in mountainous terrain; the Superelevation Table $e_{max} = 4\%$ rate may be used in low-speed urban areas. In low-speed urban areas, superelevation may be adjusted/evaluated as described in the Road Design Manual.

**Table 7. Collector State Highways - Reconstruction Project Type:
Controlling Design Criteria and Design Values**

Controlling Design Criteria	Wyoming Standard Rural Design Values 70 MPH Posted Speed	Wyoming Standard Rural Design Values 65 MPH or less Posted Speed	Wyoming Standard Urban Design Values	Footnote
Design Speed (DS)	60 MPH	55 MPH	40-30 MPH	1, 2
Lane Width	11 Feet	11 Feet	11 Feet	
Shoulder Width				3
2-Lane or Undivided Vehicles/day, < 400	2 Feet	2 Feet	Gutter Pan	
Vehicles/day, 400-2000	4 Feet	4 Feet	Gutter Pan	
Vehicles/day, > 2000	6 Feet	6 Feet	Gutter Pan	
Multi-Lane Divided Outside Shoulder	6 Feet	6 Feet	Gutter Pan	
Inside Shoulder	2 Feet	2 Feet	Gutter Pan	
Horizontal Curve Radius	60 MPH DS	55 MPH DS	40-30 MPH DS	
Cross Slope	2.0%	2.0%	2.0%	
Superelevation Rate	Superelevation Table $e_{max} = 8\%$	Superelevation Table $e_{max} = 8\%$	Superelevation Table $e_{max} = 8\%$	4
Maximum Grade (Range)				
Level Terrain	5%	6%	9%	
Rolling Terrain	6%	7%	10-11%	
Mountainous Terrain	8%	9%	12%	
Stopping Sight Distance	570 Feet	495 Feet	305 Feet (40 MPH) 200 Feet (30 MPH)	

Footnote 1 – The Urban Design Values are presented for a curb and gutter section; if a ditch section is constructed, use Rural Design Values 65 MPH or less Posted Speed.

Footnote 2 – The selected Design Speed, for rural sections, can be reduced based on posted speed or terrain type to a minimum 30 MPH (posted speed limit does not exceed 10 MPH over the DS). Design values for Controlling Design Criteria should match the selected DS and can be taken from the WYDOT *Road Design Manual*.

Footnote 3 – On rural sections, wider shoulder widths and/or paved widths may be selected in consideration of WYDOT *Operating Policy 7-4, Bicycle Accommodation and Multiple-Use Transportation Facilities*. On urban sections, the shoulder width may be increased to provide for parking lanes, bicycle lanes, and/or turn lanes. Selected shoulder widths include the gutter pan width, measured to face of curb.

Footnote 4 – The Superelevation Table $e_{max} = 6\%$ may be used in mountainous terrain; Superelevation Table $e_{max} = 4\%$ rate may be used in low-speed urban areas. In low-speed urban areas, superelevation may be adjusted/evaluated as described in the Road Design Manual.

**Table 8. Local State Highways - Reconstruction Project Type:
Controlling Design Criteria and Design Values**

Controlling Design Criteria	Wyoming Standard Rural Design Values 70 MPH Posted Speed	Wyoming Standard Rural Design Values 65 MPH or less Posted Speed	Wyoming Standard Urban Design Values	Footnote
Design Speed (DS)	60 MPH	55 MPH	30 MPH	1, 2
Lane Width	11 Feet	11 Feet	11 Feet	
Shoulder Width				3
2-Lane or Undivided				
Vehicles/day, < 400	0 Feet	0 Feet	Gutter Pan	
Vehicles/day, 400-2000	2 Feet	2 Feet	Gutter Pan	
Vehicles/day, > 2000	4 Feet	4 Feet	Gutter Pan	
Horizontal Curve Radius	60 MPH DS	55 MPH DS	30 MPH DS	
Cross Slope	2.0%	2.0%	2.0%	
Superelevation Rate	Superelevation Table $e_{max} = 8\%$	Superelevation Table $e_{max} = 8\%$	Superelevation Table $e_{max} = 8\%$	4
Maximum Grade				
Level Terrain	5%	6%	7%	
Rolling Terrain	6%	7%	10%	
Mountainous Terrain	9%	10%	14%	
Stopping Sight Distance	570 Feet	495 Feet	200 Feet	

Footnote 1 – The Urban Design Values are presented for a curb and gutter section; if a ditch section is constructed, use Rural Design Values 65 MPH or less Posted Speed.

Footnote 2 – The selected Design Speed, for rural sections, can be reduced based on posted speed or terrain type to a minimum 20 MPH (posted speed limit does not exceed 10 MPH over the DS). Design values for Controlling Design Criteria should match the selected DS and can be taken from the WYDOT *Road Design Manual*.

Footnote 3 – On rural sections, wider shoulder widths and/or paved widths may be selected in consideration of WYDOT *Operating Policy 7-4, Bicycle Accommodation and Multiple-Use Transportation Facilities*. On urban sections, the shoulder width may be increased to provide for parking lanes, bicycle lanes, and/or turn lanes. Selected shoulder widths include the gutter pan width, measured to face of curb.

Footnote 4 – The Superelevation Table $e_{max} = 6\%$ may be used in mountainous terrain; Superelevation Table $e_{max} = 4\%$ may be used in low-speed urban areas. In low-speed urban areas, superelevation may be adjusted/evaluated as described in the Road Design Manual.

WYDOT has also identified minimum design values for non-controlling design criteria on Non-NHS State Highways, all functional classifications. Selected criteria and design values are presented in Table 9 for non-controlling design criteria relating to highway and roadside geometric design.

**Table 9. Non-NHS State Highways - Reconstruction Project Type:
Non-Controlling Design Criteria and Design Values**

Non-Controlling Design Criteria	Rural Design Values	Urban Design Values	Footnote
Fore Slope Rate	1V:4H to 1V:6H, including Surfacing Taper	Existing	1
Clear Zone Width	See Road Design Manual	4 Feet (From Curb Face)	
Slope Rate – beyond Clear Zone	See Road Design Manual	Existing	1
Median Width	Widths from Operating Policy 7-5	Selected Value	1
Sag Vertical Curve – Headlight Sight Distance	730 Feet, 70 MPH DS (Arterial) 645 Feet, 65 MPH DS (Arterial)	360 Feet, 45 MPH DS (Arterial) 200 Feet, 30 MPH DS (Arterial)	2
	570 Feet, 60 MPH DS (Collector) 495 Feet, 55 MPH DS (Collector)	305 Feet, 40 MPH DS (Collector) 200 Feet, 30 MPH DS (Collector)	
	570 Feet, 60 MPH DS (Local) 495 Feet, 55 MPH DS (Local)	305 Feet, 40 MPH DS (Local) 200 Feet, 30 MPH DS (Local)	
Lateral Offset to Obstruction	See Roadside Design Guide (Arterial & Collector)	1.5 Feet (From Curb Face)	
	10 Feet (Local)		

Footnote 1 – Selection of slope rates and median widths should avoid right-of-way acquisitions and/or construction easements; should also consider avoidance or minimization of environmental impacts and resultant cost of mitigation.

Footnote 2 - Sag vertical curves are normally designed to not restrict the distance of roadway illuminated by vehicle headlights, which would reduce stopping sight distance at night.

Highway Structures

Non-NHS State Highway Reconstruction projects, for all functional classifications, will provide for the construction of new bridge structures, or the reconstruction or rehabilitation of existing bridge structures, consistent with improvements identified in the Bridge Management System. These projects, relating to bridge structure design, will be designed to meet minimum WYDOT design values for Controlling Design Criteria presented in Table 10. Supplemental design values are from *AASHTO A Policy on Geometric Design of Highways and Streets*, *AASHTO LRFD Bridge Design Specifications*, *AASHTO Standard Specifications for Highway Bridges*, and the *WYDOT Bridge Design Manual*.

Highway and bridge structure designs will be based on the minimum design values presented in this Guide. The use of other design values, from the referenced WYDOT or AASHTO manuals, are available for use when justified due to higher traffic volumes, higher truck traffic volumes, identified safety concerns including higher frequency or more severe crash types, or other identified highway needs.

Table 10. Non-NHS State Highways (SH) - Reconstruction Project Type: Structure Controlling Design Criteria and Design Values

Controlling Design Criteria	Arterial Design Values	Collector Design Values	Local Design Values	Footnote
Structure Vertical Clearance Over State Highway (SH)	16 Feet	14 Feet	14 Feet	1, 2
SH Over Interstate	16 Feet	16 Feet	16 Feet	
SH Over NHS Arterial	16 Feet	16 Feet	16 Feet	
Vertical Clearance Sign Structures	19 Feet	19 Feet	19 Feet	
Structure Capacity	HL-93	HL-93	HL-93	

Footnote 1 - For new Highway Structures, consider an additional 0.5 Feet of Vertical Clearance to allow for future pavement surfacing.

Footnote 2 - Bridge replacement to meet Vertical Clearance is not required. The determination to replace an existing bridge overpass to meet vertical clearance will also include a functional and structural evaluation of the bridge.

Any new, reconstructed, or rehabilitated bridge structure will be evaluated for structure type, including the location of abutments and piers and length and width requirements. This evaluation will address future capacity needs of the Non-NHS State Highway corridor, using a highway capacity analysis based on a selected future-year design life, and will address all Controlling Design Criteria design values.

Highway and Roadside Safety

Project planning for Non-NHS State Highway Reconstruction will require a highway safety screening to determine the safety improvements/countermeasures recommended on each project. By entering the project limits into the Safety Management System (SMS) administered by the Highway Safety Program, a Highway Safety (HWS) Segment Report is generated. The HWS Segment Report will show the Safety Index (SI) rating for the project limits.

The use of the SMS to obtain an SI rating constitutes a highway safety screening and supports the Department's effort to reduce the frequency and severity of highway crashes and directs attention and funding to 1) those highway sections that have a history of more severe or frequent crashes and 2) those highway sections where construction of safety improvements/countermeasures have the potential to significantly reduce the crash frequency and/or severity.

Highway sections with an SI Rating of 1 or 2 do not have a history of frequent or severe crashes. Although safety improvements/countermeasures may be constructed on these highway sections, the highway safety screening does not require any additional safety work to be added to rehabilitation projects.

Highway sections with an SI Rating of 3 or 4 show a history of frequent or severe crashes and requires the project planning team to evaluate the project and determine the best areas to add safety improvements/countermeasures to the project to reduce the frequency or severity of specific crash types/locations. This evaluation is the joint responsibility of Highway Safety, Planning, Traffic, District, and Highway Development.

The safety evaluation will consist of adding multiple safety treatments to the road sections within the SMS prior to the recon or kick-off meeting. At the recon or kick-off meeting, the design team will review all of the treatments suggested, review the benefit to cost ratios, and determine what safety treatments will be added to the project. Proposed safety improvements will be available for inclusion in the project scope.

Safety improvements selected for inclusion in the project scope will meet applicable geometric and safety design criteria and design values as presented in this Guide for Non-NHS State Highway Reconstruction Projects, WYDOT *Road Design Manual*, AASHTO *Roadside Design Guide* (RDG), AASHTO *Manual for Assessing Safety Hardware* (MASH), NCHRP *Report 350 Recommended Procedures for the Safety Performance of Highway Features*, and FHWA *Manual on Uniform Traffic Control Devices* (MUTCD).

Highway Capacity

Non-NHS State Highway Reconstruction projects, including new construction, will provide for additional continuous travel lanes needed to meet a future-year projected travel demand. Auxiliary lanes, including truck climbing lanes and continuous acceleration/deceleration lanes, will be constructed when justified.

Capacity improvements to add additional travel lanes may be delayed if not justified within the first ten years of the selected future-year design life.

Highway Intersections and Interchanges

Non-NHS State Highway Reconstruction projects will evaluate the geometric design, capacity, and safety needs for major intersections, including the intersecting road. All improvements will be included in the project scope. Capacity improvements to the intersection may be delayed, if not justified within the first ten years of the design life selected for the highway capacity analysis.

A Non-NHS State Highway Reconstruction project can also include the evaluation of geometric design, capacity and safety needs for interchange ramp connections to the Interstate system. Improvements needed to correct identified deficiencies or meet future-year projected travel demands can be included in the project scope, or delayed and programmed with a future Interstate project type. Design criteria and values are presented in the *WYDOT Road Design Manual* and supplemented by *AASHTO A Policy on Geometric Design of Highways and Streets*.

Highway Corridor Evaluations

Non-NHS State Highway Reconstruction projects should evaluate all physical aspects of the highway corridor to identify existing deficiencies and/or other highway and roadside elements that may require continued maintenance. For this Non-NHS project type, the Arterial highway corridor to be evaluated is the project limits for roadside elements and both the project limits and adjacent sections for highway (roadway) geometric elements; the Collector and Local highway corridor to be evaluated is the project limits.

This project type will include an operational evaluation of all roadside hardware, including bridge curb and rail, guardrail barriers and terminals, bridge rail to guardrail connections, sign support breakaway hardware, sign legend and retroreflection, and highway and interchange lighting. These installations will be upgraded, if needed, to meet design standards according to the *AASHTO Manual for Assessing Safety Hardware (MASH)*, *NCHRP Report 350 Recommended Procedures for the Safety Performance of Highway Features*, *FHWA Manual on Uniform Traffic Control Devices (MUTCD)*, and *WYDOT Operating Policy 25-1 Traffic Control and Roadway Lighting Devices*.

Non-NHS State Highway Reconstruction projects will typically require a hydraulic analysis. The scope of hydraulic analysis and resultant design work will vary depending on project improvements being undertaken.

All Reconstruction project designs should be evaluated to avoid right-of-way acquisitions and/or construction easements; this evaluation should also consider avoidance or minimization of environmental impacts and resultant cost of mitigation.

Project planning for Non-NHS Urban Reconstruction projects should include a corridor review of adopted State or Local Government plans, such as Safe Routes to School or bicycle and pedestrian plans, and determine if any identified improvements should be included in the project scope.

Cost reduction evaluations should be considered during the Design Phase, including Life Cycle Costing, Value Engineering, and Constructability Reviews. The Design Phase should evaluate alternative contracting including, but not limited to, Cost plus Time, Lane Rental, and Incentive /Disincentive provisions.

REFERENCES

The References presented in this Guide are intended to refer to the most current and adopted editions.

Transportation Research Board (TRB):

Highway Capacity Manual

American Association of State Highway and Transportation Officials (AASHTO):

A Policy on Geometric Design of Highways and Streets

LRFD Bridge Design Specifications

Standard Specifications for Highway Bridges

Roadside Design Guide (RDG)

Roadway Lighting Design Guide

Manual for Assessing Safety Hardware (MASH)

Wyoming Department of Transportation (WYDOT):

Operating Policy

7-4, Bicycle Accommodation and Multiple-Use Transportation Facilities

7-5, Standards for Non-Interstate Multilane Highway

25-1, Traffic Control and Roadway Lighting Devices

Traffic Studies Manual

Road Design Manual

Bridge Design Manual

Hydraulics Manual

National Cooperative Highway Research Program (NCHRP):

Report 350 Recommended Procedures for the Safety Performance of Highway Features

Federal Highway Administration (FHWA):

Manual on Uniform Traffic Control Devices (MUTCD)