RESURFACING, RESTORATION AND REHABILITATION (3R) PROJECTS

3R projects are generally undertaken to extend the life of the existing surfacing and to enhance highway safety. These projects may include the improvement of shoulders, the roadside, and appurtenances such as guardrail. 3R projects may also include the upgrading of the roadway geometry, such as minor roadway widening at intersections, curb ramps, improving sight distance, and other incidental improvements related to safety or traffic operations. 3R projects may include bridge work of all types. 3R projects may also include the restoration or rehabilitation of the Interstate on the existing alignment. 3R projects usually require very little grading and are generally constructed within the existing right-of-way. A project which is designated as 3R may include short segments designed to new and reconstructed standards.

3R Design Guidelines

Before beginning the design process, the roadway designer shall determine whether the project is on the National Highway System (NHS) (a map showing the NHS routes in Nebraska may be found at http://www.fhwa.dot.gov/planning/nhs/maps/ne/ne_nebraska.pdf). This will affect the design standards and guidance to be used on the project.

National Highway System:

1. **Interstate NHS Projects**
   - Interstate projects will be designated as Interstate 3R and shall conform to the 3R requirements and standards presented in **AASHTO's** A Policy on Design Standards Interstate System. Additional guidance includes:
     1. A 35 ft. (10.7 m) fixed obstacle clear zone should be used on rural Interstate 3R projects; a 30 ft. clear zone should be used on urban Interstate 3R projects.
     2. A 20 ft. (6.1 m) fixed obstacle clearance should be used on exit and entrance ramps.
     3. Fill slopes on Interstate projects shall meet or exceed the **AASHTO** Interstate standards which were in effect at the time of the original construction.
     4. Earth dikes within the fixed obstacle clearance which are perpendicular to the traffic shall have a 10:1 slope facing the traffic. A 6:1 slope is acceptable for the offside (downstream) face of the dike. Dikes in the median shall have 10:1 slopes on both faces of the dike. If a dike must be reconstructed to the required slope, the designer shall ensure that existing drainage patterns are maintained.
     5. All headwalls which are inside of the fixed obstacle clearance should be replaced with the appropriate safety slope flared end sections.
     6. The designer may evaluate the acceleration and deceleration lengths of interchange and rest area ramps to see if they are compatible with the posted speed limit if a problem is indicated by the crash history. See Chapter 10 of A Policy on Geometric Design of Highways and Streets (the *Green Book)*. Coordinate with the **Traffic Engineering Division** as required.
     7. Shoulder rumble strips shall be constructed on the shoulders for all rural Interstate 3R projects.

2. **Non-Interstate Freeway NHS Projects**
   - There are no 3R design criteria for non-Interstate freeways. Any 3R work on non-Interstate freeways on the NHS must conform to the new and reconstructed standards and guidelines presented in the *Green Book* or a design exception from **FHWA** will be required. See Appendix C of the Roadway Design Manual (*RDM*).

3. **Non-Interstate Non-Freeway NHS Projects**
   - Any 3R work on NHS highways which are not designated as either Interstate or freeway must conform to the standards and guidelines presented in TRB-214: Designing Safer Roads-Practices for Resurfacing, Restoration, and Rehabilitation as cited in the *Green Book*. Deviations from this requirement will require a design exception from **FHWA** (See the Appendix C of the *RDM*) and shall be documented in the project file in accordance with the FHWA Technical Advisory T 5040.28, Developing Geometric Design Criteria and Processes for Non-Freeway 3R Projects (http://www.fhwa.dot.gov/legsregs/directives/techadvs/t504028.htm) (dated October 17, 1988) and the guidance provided in FHWA Report FHWA-SA-07-011, Mitigation Strategies for Design Exceptions (http://safety.fhwa.dot.gov/geometric/mitigationstrategies/fhwa_sa_07011.pdf)(dated July 2007).

     After obtaining **FHWA** approval, if the project does not meet the standards found in the Nebraska Minimum Design Standards, the procedure for the relaxation of the minimum design standards shall be followed (See Chapter One, Section 6 of the *RDM*).

4. **All NHS Projects**
   - All projects on the NHS shall have a plan-in-hand field inspection.
   - For guardrail design on the National Highway System (NHS) the designer shall use the runout length (L_r) values from the Roadside Design Guide. The use of a different L_r will require a design exception from the **FHWA** (See Appendix C of the *RDM*).

State Highway System:

The minimum design standards for 3R projects on State highways have been issued by the **Board of Public Roads Classifications and Standards** in the Nebraska Minimum Design Standards. If these standards cannot be met, the procedure for the relaxation of the minimum design standards should be followed (See Chapter One, Section 6 of the *RDM*).

Design Year:

- The design year for 3R projects is the year of initial construction plus the life expectancy of the surfacing. In order to minimize the number of design year traffic and history models that will be needed, **NDOR** has established an average surface life of 10 years for 3R projects constructed with hot-mixed asphalt pavement and 20 years for 3R projects constructed with Portland Cement Concrete pavement.

Design Speed:

- The designer should use the anticipated posted speed limit when evaluating the horizontal and vertical alignments and for guardrail design.
- For any segments designed to new and reconstructed standards, the design speed of the segment should be the appropriate new and reconstructed project design speed.
- For low-speed urban projects (≤ 45 mph (70 km/h)) the designer should use the anticipated posted speed limit.

Safety Improvements:

- Shoulder rumble strips shall be constructed on the shoulders for all expressway 3R projects.
- Shoulder rumble strips should be constructed on all 6 ft. (1.8 m) wide or wider surfaced shoulders for all 3R projects on rural high-speed highways (V > 45 mph (70 km/h)).
- Centerline rumble strips may be placed concurrently with the shoulder rumble strips on all 3R projects on rural high-speed highways (V > 45 mph (70 km/h)) if recommended by the **Traffic Engineering Division**.
- For additional information on rumble strips, see Chapter Eight, Section 6 of the *RDM*.
- The **Traffic Engineering Division** will review and, if appropriate, recommend mitigation measures for the project based on the crash history (vertical alignment, horizontal alignment, climbing lanes, intersection geometry, lane configuration, etc.) which may be considered for inclusion on the project.
- On the plan-in-hand field inspection the designer should note any obstacles which are on a traversable, non-recoverable slope but are beyond the fixed obstacle clearance distance and discuss their treatment with the **District** representatives (i.e., remove, make break-away, shield, delineate, or do nothing).
- Guardrail connections and bridge rail on the project shall be evaluated and upgraded to current standards. For additional information see **Guardrail** in this section.

Typical Sections:

- As a minimum condition, the designer shall maintain either the lateral obstacle clearance distance which was built on a previous new and reconstructed project or provide the 3R fixed obstacle clearance distance, whichever is greater. This distance should be shown and labeled on the main typical section for the project.
- The designer should use a 4:1 slope when blending shoulder construction to an existing 6:1 or flatter side slope. A 3:1 slope should be used to blend the shoulder construction to an existing side slope which is steeper than 6:1.
- If dictated by the existing conditions, an auxiliary lane may be added to a 3R project without grading to new and reconstructed standards as long as the existing conditions are not diminished (i.e. maintain the existing shoulder and side slopes).
- Lane configuration changes may be accomplished by re-striping the roadway, based on recommendations by the **Traffic Engineering Division**.
- See Chapter Six of the *RDM* for additional information.

Plan-in-hands:

- The designer shall transmit plan-in-hand plans and the "Plan-In-Hand Checklist For 3R Projects" (Exhibit K of the Design Process Outline (*DPO*) to the **District**. The need for **Design** participation on a plan-in-hand will be determined on a project-by-project basis by the **Unit Head** in conjunction with the **District**. The roadway designer is responsible for writing the plan-in-hand report.
- If the **District Engineer** and the **Roadway Design Engineer** agree to change a projects' status from 3R to Maintenance Resurfacing, the **Unit Head** will write a decision document detailing this change. This document will be filed as a supplement to the DR Form 73 and copies of the decision document will be transmitted to the **Materials and Research Engineer**, the **Project Scheduling and Program Management Engineer**, and the **District Engineer**.
- Before the plan-in-hand the designer should review any raised medians on high speed through roadways (> 45mph (70 km/h)) with the **Traffic Engineering Division** to determine if they should remain in place (See **Raised Medians** in this section).
- All median removals or modifications should be noted on the plan-in-hand report.
- For projects in the Sandhills, before the plan-in-hand field inspection the roadway designer should list all segments of the roadway which:
  1. Are on the low side of superelevated curves and/or which have grades between 2% and 3½% and evaluate erosion control techniques with the **Roadside Stabilization Manager** in **Planning and Project Development**;
  2. Have grades over 3½% for the inclusion of curb and flume.
- Any project located within the corporate limits of a municipality should be reviewed for any cost sharing, ADA work, or lighting before the plan-in-hand. **City/Village** representatives should be invited to the plan-in-hand and be informed of the estimated cost. For additional information see **ADA** and **Lighting** in this section and DOR-OI 60-11, "Municipal Cost Sharing".
- Discuss handicapped accessible routes and known accessibility needs with the **City/Village** representatives on the plan-in-hand. For further guidance see **ADA** in this section.
- The designer should review the project with the **Utility Coordinator** in the **Planning and Project Development Division** before the plan-in-hand for possible utility conflicts and after the plan-in-hand to determine if additional survey for utilities is required.
- The condition of any railroad crossing, the width of the crossing, and the distance to the center of any signals should be noted.
- Guardrail connections and bridge rail on the project shall be evaluated and upgraded to current standards. The designer should request a determination of the bridge rail by the **Bridge Division** prior to the plan-in-hand field inspection.
- Any work beyond pavement preservation on a 3R project (i.e. added turn lanes or spot safety segments designed to new and reconstructed standards) which was not included on the DR Form 73 (Highway Improvement Planning Request Form) requires the approval of the **Roadway Design Engineer** and should be noted in the plan-in-hand report.

Lighting:

- The designer should review all state highway junctions for lighting warrants with the **Lighting Unit** before the plan-in-hand.
- Refer to DOR-OI 60-11, "Municipal Cost Sharing" for cost sharing information.
- See Chapter Ten, Section 13 of the *RDM* for additional information.

Vertical Alignment Design:

- The designer shall check the existing vertical alignment against the 3R standards in the Nebraska Minimum Design Standards.
- If the existing alignment does not meet 3R standards, the designer shall:
    1. Review the crash history of the curve,
    2. Perform a cost-effectiveness analysis comparing reconstructing the curve vs. leaving in place,
    3. Reconstruct the curve to the criteria for new and reconstructed projects in Chapter Three, Section 3 of the *RDM*,
       Or
       Request a design relaxation of the minimum design standards.
- If a vertical curve is perpetuated at less than the posted speed limit, the **District** and the **Traffic Engineering Division** shall be advised of the allowable speed.
- The addition of auxiliary climbing lanes may be considered on 3R projects if recommended by the **Traffic Engineering Division**. The auxiliary climbing lane should be designed using the criteria presented in Chapter Three, Section 4.F of the *RDM*.

Horizontal Alignment Design:

- **Radius of Curve:** It is often impractical and unnecessary to correct horizontal curves on 3R projects. If the decision *is* made to reconstruct a curve (based on a recommendation from the **Traffic Engineering Division** and a cost-effectiveness analysis) the criteria presented for new and reconstructed projects in Chapter Three, Section 3 of the *RDM* should be used.
- **Pavement Widening on Curves:** The policy for pavement widening on curves (presented in Chapter Three, Section 3.D of the *RDM*) also applies for 3R projects.
- If a horizontal curve is designed or perpetuated at less than the posted speed limit, the **District** and the **Traffic Engineering Division** shall be advised of the allowable speed so that the curve may be signed accordingly.

Superelevation:

The superelevation for 3R projects shall be designed in accordance with Chapter Three, Section 3.B of the *RDM* except as follows:

- The designer should check the existing superelevation using the e_{max} = 6% table (**EXHIBIT 3-26** of the *Green Book*) and, if necessary, correct the existing superelevation to match the table. If the existing superelevation rate is over 6%, check the existing superelevation using the e_{max} = 8% table (**EXHIBIT 3-23** of the *Green Book*). An 8% superelevation shall not be exceeded.
- For low-speed urban applications (≤ 45 mph (70 km/h)) the designer should check the superelevation using the e_{max} = 4% table (**EXHIBIT 3-16** of the *Green Book*).
- The rate of superelevation (e) should be listed on the plans for all curves; do not put “Use Existing Superelevation” on the plans.
- Existing spiral transitions should be retained on 3R projects.

Temporary Roads:

- See Chapter Ten, Section 11 of the *RDM*.

Fill Slopes:

- The designer shall run a cost-effectiveness analysis (RSAP) on existing unprotected fill slopes which are steeper than 3:1 for barrier warrants.
- If the project includes grading, small slivers of fill slope should be avoided.
- See Chapter Six, Section 2 of the *RDM* for additional information.

Curb and Flumes:

- See Chapter Two, Section 7.E of the Drainage Design and Erosion Control Manual.

Earthwork/Shoulder Construction:

- For projects without a survey: pay for shoulder construction (See Chapter Eight, Section 3.C of the *RDM*). Add roadway grading as required by the project (i.e. at guardrail and culvert locations). Show the required roadway grading details on the typical sections or on the 2N Sheet.
- If paying for embankment: use a balance factor of 1.0 and use "Earthwork Measured in Embankment (EQ)" as the pay item.
- When using "Earthwork Measured in Embankment (EQ)" as the pay item: multiply the embankment quantity by a balance factor of 1.5 when calculating the pay item "Water Applied".
- The designer should provide design data and earthwork quantity plan sheets for all projects with surveys.
- All grading should be shown on the cross-sections, the culvert sections, etc. (e.g. for culverts, guardrail grading, etc.).
- See Chapter Seven of the *RDM* for additional information.

Raised Medians:

- Remove raised medians with 6 in. (150 mm) curb on 2-lane high-speed through roadways (> 45 mph (70 km/h)). If the **Traffic Engineering Division** determines that they should be retained, the median height shall be reduced to 4 in. (100 mm) (See **Plan-in-Hands** in this Section).
- All median removals/modifications should be noted on the plan-in-hand report.
- Raised medians on the cross-roads are not usually removed but should be reviewed by the **Traffic Engineering Division**. If the raised medians are retained, they should be located outside of the mainline shoulder width and the intersection should be checked with the appropriate design vehicle turning template (See Chapter Four, **EXHIBIT 4.8** of the *RDM*).
- See Chapter Four, Section 5.B of the *RDM* for further information.

Driveways and Intersections:

- Review the crash history for intersections and driveways and, if necessary, identify remediation methods for safety issues.
- The adequacy of all intersections/driveways should be reviewed and discussed on the plan-in-hand. If adequate, match the existing intersection/driveway geometry.
- The existing skew of an intersection will not be changed unless justified by the crash history and a cost-effectiveness analysis or by a request from the **District Engineer**.
- The appropriate intersection/driveway surfacing material should be decided on the plan-in-hand.
- If recommended by the **Traffic Engineering Division**, based on the crash history, intersections and driveways on 3R projects should be evaluated using departure sight triangles for Case B1 (left turn from a minor road) found in Chapter 9 of the *Green Book*. If the existing conditions do not meet the required sight distance, the designer should either adjust the design or inform the **District** and the **Traffic Engineering Division** so that the intersection or driveway may be signed accordingly.
- Intersection sight distance is a desirable condition on 3R projects.
- The intersection sight distance should be evaluated if indicated by the crash history. A cost effectiveness analysis (RSAP) should be run if the intersection sight distance is deficient.
- If the resurfacing of an existing intersection/driveway surface is not tapered to the end of the return, place either crushed rock or gravel behind the intersection/driveway surfacing. Use an estimate of 10 CY for intersections and 5 CY for driveways (10 tons and 5 tons respectively in **Districts 1 & 2**).
- Driveways and intersections with steep side slopes inside the fixed obstacle clearance should be considered for corrective action (i.e. grading the driveway side slopes to 10:1). See Chapter Four, **EXHIBITS 4.14 and 4.15**, for grading examples.
- Any work on railroad right-of-way must conform to Title 415, Nebraska Administrative Code, Chapter 6 (Highway-Rail Crossings – Construction, Repair and Maintenance) and requires a special provision prepared by the **Railroad Liaison Office**. Chapter 6 may be found at (http://www.nebraskatransportation.org/rpt/pdfs/415NAC4-7Rail%20Xings.pdf).
- See Chapter Four, Section 2 of the *RDM* for additional information.

Guardrail Design:

- The designer shall run an approved cost-effectiveness analysis (RSAP) on existing unprotected fill slopes which are steeper than 3:1 for guardrail warrants.
- Existing guardrail which is required **will not** be removed without mitigating the hazard.
- Existing guardrail which RSAP indicates is not required **shall not** be removed without the approval of the **Roadway Design Engineer**.
- The designer shall use the anticipated posted speed limit for guardrail analysis and design.
- For guardrail analysis and design the designer shall use either the lateral obstacle clear distance from the previous new and reconstructed project or the fixed obstacle clearance from the Nebraska Minimum Design Standards, whichever is greater.
- When it is not possible to install sufficient guardrail length to shield the lateral obstacle clear distance (e.g. a railroad access drive which cannot be relocated and is within the development length of the guardrail), the designer shall document the reason in the project file.

- For projects which are not on the NHS, the designer should use the tables found in Chapter Nine, **EXHIBIT 9.4** of the *RDM* for runout length (L_r) values. Interpolate L_r values for speeds not listed in the table.
- A Type I Guardrail End Treatment (See Chapter Nine, Section 1.E.1 of the *RDM*) should be installed when there is minimal or no earthwork on the project to avoid buying right-of-way.
- The area behind the guardrail shall be evaluated for the required barrier deflection (See Chapter Nine, **EXHIBIT 9.13** of the *RDM*) and cleared as necessary.
- Whenever possible cable guardrail should be installed at all locations that warrant guardrail, including culvert locations.
- See Chapter Nine, **EXHIBITS 9.6 THROUGH 9.9**, and Appendix B, **EXHIBITS B.18 THROUGH B.21** of the *RDM* for typical guardrail designs.
- See Chapter Nine of the *RDM* for additional information.

ADA:

- ADA compliant curb ramps ***are required*** at all crosswalks (marked or unmarked), at any intersection having curb or other barriers to entry from a walkway, and where accessible on-street parking is provided. Build new sidewalk only as required to match into the existing sidewalk.
- A crosswalk is defined in the Americans with Disabilities Act Accessibility Guidelines (Reference 1.10) as a pedestrian crossing of a roadway delineated by pavement markings and/or surfacing materials or the connection of the lateral lines of sidewalks on opposite sides of a roadway, whether marked or not.
- **City/Village** representatives should be invited to attend the plan-in-hand to discuss handicapped accessible routes and known accessibility needs.
- ADA compliant curb ramps will be built where required when a total surfacing overlay thickness of 1½" (38 mm) or greater is placed on the project. ADA compliant curb ramps will be a part of the project whenever surfacing of 1½" (38 mm) or greater is placed on a crosswalk, whether the crosswalk is on the project mainline, on a side street, or at a signalized driveway or alley. Curb ramps may be built on any project with the concurrence of the **District Engineer** and the **Roadway Design Engineer**.
- If the project changes the grade at the gutterline of an existing roadway through a crosswalk with existing curb ramps by ¼" (6 mm) or less, no adjustment is required.
- If the project changes the grade at the gutterline of an existing roadway through a crosswalk with existing curb ramps by ¼" (6 mm) to ½" (13 mm), the grade change should be beveled at a maximum 2:1 ratio.
- If the project changes the grade of the existing roadway at the gutterline through a crosswalk with existing curb ramps by more than ½" (13 mm), either match the grade at the gutterline through the crosswalk or reconstruct the curb ramp to current ADA standards.
- Existing curb ramps at intersections and crosswalks that are on the project shall be reviewed for compliance with the following ADA accessibility guidelines:

    1. A minimum ramp running slope (in the direction of pedestrian travel) of 5% and a maximum running slope of 8.3%.
    2. A maximum ramp cross slope (perpendicular to the direction of pedestrian travel) of 2%.
    3. A minimum ramp width of 4 ft. (1.2 m).

4. A maximum curb ramp length of 15 ft. (4.6 m).
5. A landing area at the top of the curb ramp which is a minimum of 4 ft. x 4 ft. (1.2 m x 1.2 m). A 5 ft. (1.5 m) landing area width is required if the landing area is adjacent to a vertical obstruction. The landing area shall have maximum running and cross slopes of 2%.
6. The presence and correct installation of detectable warnings (truncated domes). The detectable warnings shall contrast visually with the adjacent gutter, street, or sidewalk (either darker or lighter in color).
7. A transition of the curb ramp to the sidewalk, gutter, and street which is free of abrupt changes in height, (i.e. no vertical changes over 0.25 in. (0.06 mm)).
8. A maximum gutter slope, parallel to the curb ramp, of 5%.

Non-compliant curb ramps shall be upgraded/reconstructed to current ADA standards.

- Exceptions to the above requirements for ADA compliant curb ramps may be granted if:
    a. It is technically infeasible to construct a curb ramp which meets ADA standards, **and**
    b. There is an accessible alternate route approved by the municipality.
- An exception to the construction of a curb ramp requires the **Roadway Design Engineer's** written approval in the project file (in Falcon).
- If curb ramps are not provided, the designer ***must*** document in the plan-in-hand report or in a decision document saved in the project file that there is not a current need (i.e. there are no existing sidewalks or crosswalks).
- The designer shall ensure that any raised medians in the urban section of a project adhere to ADA standards, providing pedestrian access across the street from curb ramp to curb ramp.
- The designer shall coordinate the provision of accessible pedestrian signals at crosswalks with the **Traffic Engineering Division**.
- If the project includes the resurfacing of on-street parking, handicapped accessible stalls must be provided (See Chapter Ten, Section 14.A of the *RDM*).
- For ADA cost sharing information see DOR-OI 60-11, "Municipal Cost Sharing".
- For ADA access during construction see Chapter Ten, Section 10.B.7 of the *RDM*.
- For additional information, see the Nebraska Department of Roads Operating Instruction 60-10, "ADA Accessibility Requirements in Transportation Projects".

Culverts and Environmental Considerations:

- 3R projects do not require a hydraulic analysis of culverts unless there is a known hydraulic problem.
- For bridges in a floodway which include a grade raise on the roadway or bridge the designer shall ask the **Bridge Hydraulics Unit** if a Floodway Permit is required. If a permit is required, the response shall be forwarded to the **Environmental Permits Manager**.
- Culverts 36 in. (900 mm) or less in diameter and round-equivalent culverts 36 in. (900 mm) or less in width which have flared end sections and are perpendicular to the direction of travel may be included within the fixed obstacle clearance if they meet 3:1 or flatter side slopes.
- The designer shall run a cost-effectiveness analysis (RSAP) for culverts which are greater than 36 in. (900 mm) in diameter and for round equivalent culverts which are

greater than 36 in. (900 mm) in width which are within the fixed obstacle clearance and are perpendicular to the direction of travel. Extend the culvert to the 3R fixed obstacle clearance, install new guardrail, or perpetuate the existing guardrail as indicated by the analysis.

- If a culvert does not meet the 3R fixed obstacle clearance and RSAP indicates that the culvert should be used in place without shielding, a note should be placed in the project file (in Falcon) stating: "Use in Place – Not cost effective to extend to fixed obstacle clearance or shield" (include the RSAP data in the project file).
- When extending culverts the designer should look at the project as a whole, trying to be consistent with all culvert treatments (i.e. be consistent in extending to either the fixed obstacle clearance or to the lateral obstacle clearance).
- To reduce channel impacts, a 3 ft. (900 mm) or less increase in earthwork elevation on a concrete box culvert can generally be handled by raising the parapet and wing heights rather than by extending the box.
- When extending a culvert the designer should review the existing right-of-way and try to provide 10 ft. (3 m) of cleanout space beyond the ends of all culverts.
- Concrete box culverts with a span of 3 ft. (900 mm) or less may be extended with culvert pipes (the designer shall request special plans from the **Special Projects Unit** in the **Bridge Division**).
- When box culverts are extended:
    a. In **District 5**, all box culverts should be removed to the parapet line and doweled.
    b. In all other **Districts**, the wings and 2 ft. (600 mm) of the culvert barrel should be removed before extending the culvert.
- All headwalls within the fixed obstacle clearance should be removed and replaced with flared end sections.
- Culvert pipes should be extended in kind; a minimum of 2 ft. (600 mm) for metal pipes and 4 ft. (1.2 m) for concrete pipes. Culvert pipes should be extended in 2 ft. (600 mm) increments.
- When a metal culvert pipe is extended that does not have an existing end treatment or which is on a skew, a minimum of 2 ft. (600 mm) should be removed from the end of the culvert before extending.
- If a corrugated metal pipe is shortened and then extended, a concrete collar shall be used.
- When metal arch pipes are extended concrete collars shall be used instead of a connecting band.
- A pipe culvert extension may be skewed by 3 degrees or less without an elbow.
- See Chapter One, Section 8, of the Drainage Design and Erosion Control Manual for additional information.

Bridges:

- Guardrail connections and bridge rail on the project shall be evaluated and, if necessary, upgraded to current standards. The designer should request a determination of the bridge rail by the **Bridge Division** prior to the plan-in-hand field inspection.
- If the project includes an overlay of the bridge deck, the bridge rail shall be updated to current standards.
- See Chapter Ten, Section 2 of the *RDM* for additional information.

Railroads:

- Any work on railroad right-of-way must conform to Title 415, Nebraska Administrative Code, Chapter 6 (Highway-Rail Crossings – Construction, Repair and Maintenance) and requires a special provision prepared by the **Railroad Liaison Office**.
- The designer should provide the **Rail and Public Transportation Division** with a completed "Railroad Project Information Sheet" (DR Form 95) after the plan-in-hand.
- For PS&E turn-in, the designer should compute separate quantities for all work which is on railroad right-of–way (See Chapter One, Section 22 of the *RDM*).
- See Chapter Ten, Section 1 of the *RDM* for further information.

Wetland Impacts and Environmental Permits:

- The designer shall provide sufficient information to the **Environmental Program Manager** in the **Planning and Project Development Division** to determine if wetland delineation is required (i.e. culvert extensions or grading).
- See Chapter Thirteen, Section 4 of the *RDM* for further information.

NEBRASKA DEPARTMENT OF ROADS DESIGN GUIDANCE PUBLICATIONS

Minimum Design Standards
http://www.nebraskatransportation.org/gov-aff/pdfs-docs/MinDesStds.pdf

Roadway Design Manual
Drainage Design & Erosion Control Manual
Design Process Outline
http://www.nebraskatransportation.org/roadway-design/downloads.htm