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70.10 WHO IS RESPONSIBLE?

The LPA and/or their consultant must complete all necessary steps to meet federal requirements for design of the project. This includes determining design speed, levels of service, typical sections, pavement types and depths, alignment, drainage, ROW needs, environmental impacts, etc. Traffic signals must be warranted by MUTCD. Geotechnical testing may be needed to design items such as retaining walls or bridges.

The State of Nebraska Roadway Design Manual can be used as a guideline in the design process. This manual can be found online at www.nebraskatransportation.org/roadway-design/

70.20 DESIGN STANDARDS

Construction plans must be developed which provide construction details necessary to bid and construct the project. In general, the plans must meet the requirements of the NDOR and the FHWA. All construction should conform to the current edition of the State of Nebraska Department of Standard Specifications for Highway Construction. LPA's may use their own standard construction specifications **providing those** specifications have been approved by the Board of Public Roads Classifications and Standards.

Documents that must be complied with during design include the following current:

- Minimum Design Standards of the Board of Public Roads Classifications and Standards
- ADA – Americans with Disabilities Act
- AASHTO Policy on Geometric Design of Highways and Streets
- Manual on Uniform Traffic Control Devices (MUTCD)
- Policy for Accommodating Utilities on State Highway Right-of-Way
- NDOR Instructions for Acquiring ROW on Federal Aid Projects

Design guidelines available from NDOR that may be of assistance to project designers include:

- The current State of Nebraska Standard Specifications for Highway Construction
- The State of Nebraska Standard Plans
- The State of Nebraska Road Design Manual
- The Nebraska Department of Roads Material and Test Guide

The NDOR Urban Off-System Coordinator can assist the LPA in obtaining copies of applicable guidelines and standards upon request. In general, projects must be designed according to the guidelines listed above. Any variances to these guidelines must be approved by the NDOR prior to preparation of final plans. If you will be requesting a variance, please contact our Urban Engineer or NDOR Urban Off-System Coordinator.

70.30 PLAN-IN-HAND

A plan-in-hand is a field inspection and/or meeting that must be conducted on every project that receives federal aid. This inspection typically takes place when the project plans are approximately 30 percent complete. Since NDOR has full oversight on all Federal-Aid projects, the NDOR Urban Engineer, the NDOR Urban Off-System Coordinator assigned to your City and the NDOR District representative must be notified and invited.

This inspection should identify substantive issues of concern and serve as a check of the progression of a project. The issues that should be discussed and examined are additional survey needs, roadway alignment, environmental, ROW, utility issues, phasing, constructability issues, surfacing types and specific design questions.

Following the plan-in-hand inspection, a report must be completed and submitted to the NDOR Urban Engineer. Below is an outline of items that need a brief but descriptive statement.

- Cover page with NDOR project and control numbers and a location map
- Scope of Work
- Traffic Count
- Accommodation of Traffic
- Design Standard to be used
- Design Exceptions
- Accident History
- Funding
- Bridges
- Right-of-Way
- Utilities
- Railroad
- Balance Factor
- Material Needed
- Safety Enhancements
- Miscellaneous Items

70.40 DESIGN EXCEPTION

Design policies and standards generally represent minimum values. Higher standards should be used within reasonable economic limits. If minimum design standards and the Americans with Disabilities Act (ADA) standards are not met, a design relaxation must be requested unless the project is classified as a minimum maintenance project. The request for design relaxation approval must be documented and must include accident rate analysis, collision diagrams, accident spot location maps, plans showing the area of the relaxation and cost comparisons. NDOR has approval authority for the departure from standards for Federal-aid projects.

Requests for design relaxation of the Nebraska Minimum Design Standards shall go through the NDOR Urban Engineer which requires approval of the Deputy Director-Engineering. After this is obtained, a letter shall be sent to the Secretary of the Board of Public Roads Classifications and Standards at least ten working days prior to the board meeting where it shall be presented to the Board of Public Roads Classifications and Standards for their approval.

A design relaxation request letter should contain the following items:

- Project design: basic design parameters for the project (current and design traffic volumes, design speed, posted speed, percent trucks, etc.)
- Degree of reduction in the standard
- Design exception anticipated effect on the safety and operation of the facility
- Accident history analysis
- Cost of attaining full standards
- Mitigation features
- Future improvements
- Resultant environmental impacts
- Other factors that could affect the decision
- The following attachments: existing typical section, proposed typical section and the typical section required by the Nebraska Minimum Design Standards

An example of a design relaxation letter can be obtained through the NDOR Urban Off-System Coordinator assigned to your City.

70.50 STANDARD PLANS

Standard Plans are engineering drawings showing standard details of various construction items, representing the current policies of the NDOR, and approved for repetitive use where appropriate. The drawings are produced for statewide use by

the Department, counties, and cities are used in conjunction with the Standard Specifications for Construction and other applicable specifications, policies, and manuals. These plans are prepared by the NDOR Standard Plans Committee which are approved by FHWA, and signed by the Roadway Design Engineer. These Standard Plans are available to the City upon request or can be downloaded from the State of Nebraska website at www.nebraskatransportation.org/roadway-design/

70.60 PLANS, SPECIFICATIONS & ESTIMATES (PS&E)

“Plans, specifications and estimates” are documents used to award and administer a construction contract. These documents must be approved by NDOR before the project can be advertised for construction. According to Nebraska State Statutes (Architects and Engineers Regulation Act), all contract documents must be signed and sealed by a Professional Engineer registered in the State of Nebraska. Each sheet of the construction drawings must be signed and sealed with the exception of cross-sections. Plans and specifications must be prepared in such a manner that payment in the contract will be made on the basis of units of work and materials.



70.70 DESIGN SUBMITTALS TO NDOR

If projects undertaken by an LPA impact (cross or intersect) the state highway system, the LPA must submit preliminary or functional design plans (50% to 60% complete) to the Urban Engineer for review. The submittal should consist of plan/profile sheets with existing conditions, proposed horizontal alignment stationing and geometrics, proposed vertical alignment and geometrics, limits of construction, preliminary proposed drainage and cross-sections. If the project does not impact the state highway system, submit only the final PS&E documents. The content of each submittal is discussed in the chart on the following page.

	Use this Column for Projects involving State Highways Only 1st Submittal Preliminary/Functional Design	Final PS&E Submittal
% Complete	Plans must be 50% to 60% complete.	Plans must be 100% complete.
Project	Project design must conform to the most recent NDOR, ADA, and AASHTO requirements.	Project design must conform to the most recent NDOR, ADA, and AASHTO requirements.
Plan Submittal Requirements	Three sets of plans and attachments. A "plan-in-hand" field check of the project site may be required as part of the functional design review.	One set of plans and attachments. Plans and calculations must be sealed and signed by professional engineer registered in Nebraska.
Plans Detail Required	Plans generally must include Plan/Profile sheets with: existing conditions (topographic features, drainage way, utilities, profiles, ROW, property lines), proposed horizontal alignment stationing and geometrics, proposed vertical alignment, limits of construction, preliminary proposed roadway and drainage	Plans must include the same items required for Preliminary/Functional Design submittal, plus: all constructions and removal notes, all details and special designs revisions as per preliminary design review.
Quantities & Cost Estimates	Preliminary quantity tabulation and construction cost estimate (separate from plans).	Revised and updated tabulation of quantities and estimated costs.
Standard Plans	List of Standard Plans that are applicable.	Updated list of Standard Plans.
Utilities Report	Preliminary Status of Utilities Report.	Final Status of Utilities Report.
Environmental & Property Issues	Letter on status of environmental, ROW/easements and railroad agreements, if any.	Copies of ROW Certificate, and all required agreements and permits.
Special Provisions	List of special design/details to be added during final design.	Any special provision that may be required.

70.80 PERMITS

Copies of all approved permits must be included with the PS&E submittal. If permits are not included, you must submit an explanation of the circumstances and describe when permits will be issued. The NDOR will not issue approval to advertise for construction bids if all necessary permits, agreements, easements, etc. are not complete. This includes a ROW Certificate from the LPA certifying that all ROW has been acquired in accordance with federal and state laws.

70.90 SPECIFICATIONS AND REQUIRED FEDERAL-AID CONTRACT PROVISIONS***Construction Specifications***

All construction should conform to the current edition of the “Nebraska Department of Roads Standard Specifications for Highway Construction”. LPA’s may use their own standard specifications for construction **providing those specifications have been approved by the Board of Public Roads Classifications and Standards.**

Form 1273

Each set of contract documents must include Form FHWA-1273, “Required Contract Provisions, FHWA Construction Contracts”. Copies of the FHWA-1273 Form are available from the NDOR Urban Off-System Coordinator.

Wage Rates

Federal wage rates must be included in contracts for all FHWA projects advertised by an LPA. The Federal Davis-Bacon Act predetermined minimum wage must be paid to all covered workers on federal aid projects exceeding \$2,000 **that are located on a federal-aid highway**. If a project is not located on a federal-aid highway, the contract is **not** subject to the federal wage rate requirement. In addition, Davis-Bacon requirements do not apply to “force account” work performed by LPA forces. Federal-aid highway is defined as all roads other than those functionally classified as local roads or rural minor collectors.

Affirmative Action EEO

To effectively assure Equal Employment Opportunity (EEO), it is the policy of FHWA to require that all federal-aid highway construction contracts include specific requirements to implement civil rights laws and regulations. These requirements apply to contractors and all their subcontractors holding subcontracts (not including material suppliers) of \$10,000 or more. To be eligible for federal-aid funds, the LPA must comply with the civil rights requirements.

Disadvantaged Business Enterprise (DBE)

As part of FHWA efforts to increase DBE participation in federal projects, the NDOR manages a goal-setting process for DBE participation. If NDOR deems necessary, a “DBE goal” will be assigned to your project and NDOR will provide information on requirements to meet the goal.

Buy America

LPA’s must include a provision containing the “Buy America” requirement in each construction contract. The Buy America rule requires that steel products brought to the construction site and permanently incorporated into the completed project must be produced domestically. A “domestic product” is a manufactured steel construction material that was produced in one of the 50 states, the District of Columbia, Puerto Rico, or in the territories and possessions of the United States.

Noncollusion Declaration

The LPA must include a Noncollusion Declaration in each construction contract. The Noncollusion Declaration provides for the bidder, under penalty of perjury to certify that they or any person in their company did not knowingly participate in collusion to cause the bidding on a project to be fraudulent and illegal under law.

70.100 ESTIMATES

The engineer’s estimate of a project’s proposed cost must include the estimated quantity and estimated unit price for each biddable plan item. The estimate must be organized according to the groups of work involved in the project. For example, bridge items must be separated from roadway items. If more than one bridge is involved, the estimate must tabulate the items for each bridge separately. The estimate must also break out the costs of nonparticipating items and local agency force work.

70.110 DESIGN CONSIDERATIONS***Utility Relocation***

The LPA should identify existing utility locations and determine if any adjustments will be required. No utility agreements can be executed until approval and environmental clearance has been granted from the FHWA if reimbursement is desired. Any utility rehabilitations or installations made within the project ROW must be in accordance with the provisions of the following policy guides:

- FHWA Policy Guide, 23 CFR 645A, “Utility Relocations, Adjustments and Reimbursement”
- FHWA Policy Guide, 23 CFR 645B, “Accommodation of Utilities”

- NDOR “Policy for Accommodating Utilities on State Highway Right-of-Way”

ROW Plans

Prior to starting any ROW appraisal or acquisition activities, the environmental documents associated with the proposed project must first be approved. After this is done, the LPA must submit one set of completed ROW plans to NDOR for review. This will enable NDOR to issue the necessary acquisition authority. This is required even if federal funding is not involved with right of way costs. For more information on ROW requirements, see Section 80.

Traffic Control

1. Traffic Control Devices

Any permanent or temporary traffic control device installed with the project, must meet the applicable standards of the current “Manual on Uniform Traffic Control Devices” (MUTCD).



2. Work Zone Traffic Control

If the project will affect vehicle, bicycle, or pedestrian traffic, a work zone traffic control plan must be provided. The work zone traffic control plan (TCP) must comply with the requirements of the current MUTCD. TCP's must be completed, signed, and sealed by a professional engineer and submitted as a part of the package.

Railroad Contract Provisions

LPA's should be aware of the need to include “Railroad Contract Provisions” in the construction documents if a railroad exists within the project limits (either parallel to or crossing the roadway). Examples of these provisions include: required “Rail Safety Training” class; flagging protection (including costs and conditions); protection of rail utilities; protection of railroad property; temporary crossings; required contractor insurance; and final clean-up procedures.

For projects impacting railroad ROW or operations, railroad companies will require LPA's to obtain easements and enter into a construction agreement for the work. The LPA must notify the railroad company involved in the event that an easement or construction agreement will be necessary. These negotiations require an extensive amount of time and early contact with the railroad company will minimize delays to the project.

70.120 DESIGN PROCESS OUTLINE

The following outline is provided for your use in developing construction plans, specifications, estimates and contract documents. It assumes that preliminary ground, utility & ROW surveys are done.

1. Review any As-Built plans and surveys.
2. Look for safety hazards, utility discrepancies, posted speeds, school and pedestrian crossings, environmental issues, etc. that could affect the project design.
3. Review the scope of the proposed project and environmental document.
4. Determine preliminary design standard and typical sections. Refer to the Board of Public Roads Classifications and Standards, Nebraska Minimum Design Standards. If an exception is needed for some reason, then you must apply to the Board for that exception.
5. Begin design of the project's vertical and horizontal alignment and geometry for intersecting and frontage roads.
6. Begin bridge design, if bridge is required. Produce bridge data sheet with "H" and "HS" rating for bridges to remaining in place and prepare a structural analysis of box culverts.
7. Prepare design year traffic data forecast (year of initial construction plus 20 years).
8. Plan-in-Hand and prepare Plan-in-Hand Report.
9. Prepare pavement determination.
10. Drainage
 - Determine if drainage crosses Federal Emergency Management Administration (FEMA) floodplain.
 - Prepare drainage map.
 - Determine Q values and size drainage structures.
 - Prepare preliminary erosion plan.

11. Initiate Special Investigations as needed. Suggested topics:
 - Permits (waterway, utilities, etc.)
 - Traffic signals
 - Lighting
 - Signing
 - Construction and Traffic
 - Phasing (traffic/construction)
 - Erosion control
 - Drainage structures
 - Railroad agreements and information
 - Soils
 - Retaining walls, etc.
 - Detours/Shoo-flies

12. Begin to design and prepare special plans and special provisions

13. Begin to put together standard plans and specifications, bidding contract documents. NOTE: LPA standards have to be approved with the Board of Public Roads Classifications and Standards.

14. Prepare ROW plans

15. Prepare cost estimate update as needed

16. Upon completion of 90% plans, advertise and conduct public meeting or hearing (if required)

17. Prepare agreements, such as:
 - Railroad (should be started ASAP)
 - NRD
 - City/City
 - City/County
 - Utility
 - Misc.

18. Final plans should include the following:
 - Earthwork quantities
 - ROW plan sheets *
 - Design details **
 - Standard and special design sheets
 - Cross-section sheets
 - Bridge Plans
 - Quantity sheets

- Typical Section Plan sheet
- Detailed Plan Sheet Notes
- Soils Information sheet
- Title plan sheet
- Quantity plan sheet

* Must include property lines, ownerships, takings, etc.

** Alignment and stationing, existing and new grade elevations, culverts, storm sewers, utilities, removals, new construction, pavement design, driveways, sidewalks, geometry, street lights, traffic signals, traffic control signs, traffic striping, etc.

Plans should be signed as per Engineer and Architect Registration Act, State Statute 81-3401 to 81-3455

19. Prepare final plans package, which should include.

- Plan sheets
- Specifications
- Engineers estimate
- ROW Certificate
- Copies of signed agreements
- Special provisions
- Quantity sheets
- Contract bidding documents
- ROW plan sheets
- Permits

20. Submit all applicable items to NDOR for review and comments prior to letting the project.