

**CHAPTER 3**  
**DESIGN PROCESS**

<b>Introduction</b>	3-2
<b>Project Authorization and Scope</b>	3-3
<b>Design Process</b>	3-4
<b>Field Surveys</b>	3-5
<b>Preliminary Design Plans</b>	3-6
<b>Final Design Plans</b>	3-10
<b>Final Plans</b>	3-11
<b>Checklists</b>	3-12
<b>Project Coordination</b>	3-13
Division of Planning & Engineering	3-13
Division of Operations	3-17
State Offices	3-18
Federal Offices	3-19
Other Agencies	3-20
<b>Region Design Plan Coordination</b>	3-21
Projects Involving Road Design	3-22
Projects Involving Bridge Rehabilitation and Repair	3-24
Projects Involving Scour Work Only at Structure Sites	3-25
Projects Involving New Structures	3-26
Projects Involving Hydraulic Considerations	3-28

## **INTRODUCTION**

The Office of Road Design is responsible for design, coordination and preparation of plans for assigned highway construction projects administered by the SDDOT. The different areas of responsibilities involved are handled by several groups and are listed below. The Office of Local Transportation Programs of the Division of Finance & Management administers the design of local roads and streets.

### **Photogrammetry Survey**

Road Design staff is responsible for coordinating aerial surveys and right of way photo contracts. The level of detail required on projects depends on the type of improvement. A new location or major reconstruction project requires a very detailed survey including alignment, digital terrain model, complete topographic data, drainage surveys, property and land ties. A resurfacing project might require only a pavement condition survey with all other information taken from the underlying plans for the existing facility.

### **Right of Way (ROW)**

Road Design staff is responsible for establishing the existing right of way (ROW) and developing the ROW plats and plans necessary for the acquisition of ROW parcels. The ROW plans and plats are then furnished to the Office of Right Of Way for use in appraising and negotiating the needed ROW for highway purposes.

### **Grading Design**

Road Design staff is responsible for design and plan preparation of construction projects. Responsibilities include preparing preliminary and final plans for the grading, drainage (storm sewers and rural culverts), erosion control, landscaping and roadside development of rural and urban projects. Layouts, profiles and design cross sections are prepared and assembled along with final quantities into a complete set of contract plans for the purpose of letting construction projects. The Grading Design Squad supervisors are also responsible for design consultation for the Region Design sections and private consultant firms.

## **Traffic Design**

Road Design staff is responsible for the capacity analysis, number of lanes determination, design, development and coordination of traffic signals, roadway lighting and pavement marking projects for intersections, highways and interchanges.

## **Quality Control**

Road Design staff is responsible for the maintenance of standard plates and notes, providing quality control reviews of plans to help resolve design and drafting issues, providing computer support, providing expertise and/or assistance with specific design issues that may be either general or specific to projects and the State-wide review of plans for bid letting.

## **PROJECT AUTHORIZATION AND SCOPE**

**3005 Authorization:** The first step in project development is the authorization of the project. Once the project is programmed and included in the Department's construction program, the Office of Project Development authorizes work to commence. To determine the authorization status for a project you can access the [C2C Proj./Work Auth./Microfilm/Plans](#) application at the SDDOT Intranet site. No work should be started on surveys or design until the authorization has been received from Project Development.

**3023 Scope Roadway Projects:** See Chapter 2 – Scope Process for information about the establishment of the scope of work for construction projects.

## DESIGN PROCESS

The Road Design process is explained in the remainder of this chapter.

The design process follows a specified path utilizing a numbering system to describe each portion of the design phase. These numbered activities for Road Design are described below in the sequence of occurrence. The numbered activities correlate to the Department's current project scheduling system (© Primavera) and are also the function numbers used for coding purposes in the South Dakota Time Keeping System (TKS).

All design projects will be managed through the project scheduling system to meet the established Ready Date. The system defines the major preconstruction activities and the sequence in which they should be performed to ensure effective use of resources. Critical decision points such as preliminary design inspection or final design inspection are identified. To prevent rework, work should not be done out of sequence or until the required decisions are made.

The system provides time and man-hour standards for completing major activities. All staff involved with the preconstruction process must meet these standards so the scheduled letting date can be attained within the planned budget.

### Design Scope Activity

**3053 Review/Update Scope:** Prior to beginning field surveys and preliminary design the project is assigned to a design squad and the Design Engineer will review the Recommended Scope for any change of needs and recommended improvement types. The surveyors will use the Recommended Scope to determine the type and limits of survey necessary. The Design Engineer will use the parameters as identified in the Recommended Scope to establish the design.

## FIELD SURVEYS

Once the Recommended Scope is reviewed and updated as necessary with an identified route, project limits, and the type of improvement(s) selected, the preconstruction survey can be completed. Refer to the Survey Manual for more information on how the surveys are performed and the responsibilities of each office.

### Field Survey Activities

**3077 Conduct Control Survey:** The control survey, provided by the Region Land Surveyor, consists of establishing the horizontal survey control for the project and referencing it to the South Dakota state plane coordinate system. The control survey enables the field office to perform the ground survey.

**3136 Conduct Aerial Survey Preparation:** If an aerial survey is chosen as the method of survey, the Road Design Land Surveyor will place panels and establish the horizontal and vertical coordinates of the panels for the aerial photogrammetric consultant.

**3137 Perform Preliminary Survey:** The Area Office survey staff will use the control points to perform the ground survey. The ground survey will include all level notes, drainage maps for urban projects, data collector files, topography graphics files and digital terrain model.

The Area Office's survey staff will process all field data from these files for use by Designer Engineer and CAD Technician. Upon completion of processing these electronic files and placing them in the appropriate network folder, staff from the Area Office will send an e-mail to the Grading Design Squad Supervisor who is the Responsible Manager for the project.

**3139 Perform Land Ties Survey:** The Region Land Surveyor will use the control points to reference the project to the public lands system. Land ties are used by the Road Design ROW Transportation Analyst to establish the existing ROW.

**3078 Review Aerial Survey:** The Road Design Land Surveyor will order, receive and review all aerial surveys and right of way photos. This activity includes all processing of photos to obtain data for the project's design completion. When aerial surveys are used, the Area Office survey staff will provide the underground survey under activity 3137.

## PRELIMINARY DESIGN PLANS

The Recommended Scope sets the parameters the Design Engineer will use and enable him/her to establish the preliminary gradeline. Upon receiving crucial information from the other internal engineering offices, the preliminary design plans are completed in conjunction with the surfacing selection, field soils survey and preliminary hydraulic design. The preliminary design plans include such items as the centerline, gradeline, preliminary pipe designs and topography. The preliminary plans are prepared for use at the preliminary design inspection. See Chapter 18 – Plans Assembly for the Preliminary Design Inspection Checklist.

### **Preliminary Design Plans Activities:**

**3080 Develop ROW Strip Map:** If it is necessary to purchase right of way, the assigned Road Design ROW Transportation Analyst will receive from the CAD Technician a layout showing general construction limits and property locations once these construction limits are established. The strip map will be sent to the Office of Right of Way who in turn submits it to the County Abstractor or Title Examiner for their use to furnish within 30 to 60 days to the Office of Road Design right of way plats, property descriptions and property owners. This information is used as a foundation to establish existing right of way lines and enable right of way plats and plans to be prepared for property acquisition.

**3081 Establish Existing ROW:** The Road Design ROW Transportation Analyst will research existing ROW documents and land ties while preparing a graphics file showing the existing right of way lines, landowner names, and property description information. This information is then provided to the design squads for their use in designing a project.

**3055 Develop Preliminary Gradeline:** The Design Engineer will establish a tentative gradeline based on the parameters established in the Recommended Scope. Included in this activity are the establishment of horizontal alignment, vertical alignment, typical sections, designed cross sections and preliminary earthwork computations. Information that is available at this time is the type of surfacing as selected by the Office of Materials & Surfacing.

When the Design Engineer completes the preliminary gradeline a set of plans which includes title sheet, typical sections, plan sheets (showing topography, existing ROW, horizontal alignment and data, entrance locations, work limits, take out pipe notes), profile sheets (showing vertical alignment and data, entrance locations labeled) and cross sections are distributed to the Office of Bridge Design and the Office of Materials & Surfacing for their use in obtaining the hydraulic data and soils survey.

A preliminary soils report will be provided by the Office of Materials & Surfacing based on the preliminary gradeline. Information in the soils report will include shrinkage, undercut and other special soil recommendations.

**3065 Develop Base Roadway Plans:** Based on the establishment of the horizontal and vertical alignment the CAD Technician will produce base roadway plans for developing construction plans. The base roadway plans include the title sheet, typical sections, plan sheets and profile sheets which are initially used for distribution of the Preliminary Gradeline as noted in activity 3055.

A Plan Checklist as provided at the Road Design Downloadable Files web page will be performed prior to submitting the Preliminary Gradeline (PG) with revisions to the plans made as necessary. The Plan Checklist should be used throughout the various stages of plans as noted on the checklist.

**3070 Develop Preliminary Traffic Design:** If not already done in concurrence with Activity 3023 – Scope Roadway Projects, the Traffic Engineer will obtain traffic projections and existing turning counts to compute and make a traffic capacity analysis, determine traffic signal and lighting warrants, prepare cost estimates and make recommendations with regards to number of lanes, added lanes, turn warrants, queue required, etc. which is used in the development of the preliminary roadway design.

**3056 Develop Preliminary Roadway Design and Conduct Inspection:** The preliminary roadway design is a next step upon completion of the preliminary gradeline where design of the following occurs and is placed on plans:

- Revise gradeline per recommendations from the Office of Bridge Design and the Office of Materials & Surfacing from Preliminary Gradeline
- Type, size and location of pipes for drainage areas under 1000 acres
- Storm sewer
- Size and location of entrances
- Intersecting roads and/or streets
- Ramp(s)
- Curb and Gutter
- Sidewalk
- Retaining wall, erosion control, drainage channel and other special needs that require other office involvement
- Development of proposed ROW

Upon completion of the preliminary roadway design, the plans are created as noted under Activity 3066 – Develop Preliminary Roadway Plans.

A Plan and Design Checklist as provided at the Road Design Downloadable Files web page will be performed prior to the Preliminary Design Inspection (PDI) with revisions to the plans and design made as necessary.

The PDI is scheduled by the Road Design Grading Squad responsible for coordinating the project and is held at the project site. The preliminary roadway plans are distributed to the designated Region Office, Area Office, Environmental Office and Office of Right of Way & Utilities so they may review the plans and attend an on-site inspection. Selected central office and field DOT office staff should attend the PDI as determined necessary. Following the PDI, a summary letter will be written by the Design Engineer with suggested design/plan revisions and distributed accordingly.

**3066 Develop Preliminary Roadway Plans:** The preliminary roadway plans consist of revising the title sheet, typical sections, plan sheets and profile sheets based on information developed under Activity 3056 – Develop Preliminary Roadway Design. All items as shown on the ‘Plan Checklist For Inspections’ in Chapter 18 – Plans Assembly should be completed for the PDI. These plans are for use at the PDI.

**3082 Develop ROW Photos:** Design and ROW staff prepares the aerial photo ROW plans for the public hearing/meeting and landowner meetings. If no aerial photos are available for a project then the construction plans become the ROW plans too. The ROW plans should include the existing & proposed right of way lines, proposed highway centerline, proposed work limits, ownership names/legal descriptions, curb and gutter locations, entrance locations/size and other items as noted on the Plan Checklist as provided at the Road Design Downloadable Files web page.

**3057 Revise Preliminary Roadway Design and Conduct Hearing:** Following the PDI, the Design Engineer will make revisions to the preliminary design, establish the final gradeline and calculate preliminary earthwork quantities.

If required, borrow material is requested from the Office of Materials & Surfacing and Region Materials Engineer to properly balance the earthwork on the project. Two items to keep in mind regarding borrow are:

1. As early as possible (public hearing/meeting or preliminary inspection time), identify the need for borrow on a project and explain what methods are commonly used to landowners. We can make it a much easier task if the landowners are notified as early as possible. It may even identify how the project’s schedule will be affected.
2. Consider any borrow less than 25,000 CY to be obtained by the Contractor. Verify with the Region Materials Engineer before making that determination.

Next, when needed, a public hearing/meeting is held (per Public Involvement policy) to inform the public of the proposed construction project and to receive their input into the project. This public hearing/meeting is also a time to inform the adjacent landowners of the upcoming individual meetings with them and how their input is needed to complete the design.



**3067 Revise Preliminary Roadway Plans:** From the PDI, preliminary roadway plans are revised for use at the public hearing/meeting (PH) and landowner meetings (LO). All items as shown on the 'Plan Checklist For Inspections' for construction plans in Chapter 18 – Plans Assembly should be completed for the PH and LO.

**3058 Make Public Hearing Revisions and Conduct Landowner Meetings:** This period includes revising the preliminary roadway design based on comments received from the public hearing/meeting.

Upon completion of the revisions, landowner meeting notes are prepared. Meetings are scheduled and conducted with the adjacent landowners individually to discuss project impacts such as entrance locations and size, fence location and type, right of way taking and other pertinent items to be included in the completed plans. The Design Engineer will submit the lists of adjacent landowners to the Area Office (per Public Involvement policy). The Area Office will notify the owners of the date of the individual landowner meetings. Normally this notification will take 2-3 weeks. The landowner meeting is held in a neutral location close to the project site and is attended by staff from the Area Office, Office of Right of Way & Utilities and Office of Road Design. If borrow material is needed the Region Materials Engineer may attend also.

The purpose of the landowner meeting is to gather data from the owners for possible inclusion into the plans and will be summarized in the landowner meeting notes and sent to each adjacent landowner.

**3085 Develop Erosion Control Plans:** Based on the preliminary roadway design and plans, erosion control plans sheets will be prepared. Preliminary topsoil quantities and a determination of the amount/type of erosion control procedures to be implemented will be developed. Any erosion control needed outside the existing ROW is identified to determine any new ROW requirements.

**3071 Develop Roadway Lighting, Pavement Marking, and Traffic Signal Design:** The Traffic Design Squad will design and prepare the roadway lighting, pavement marking and traffic signal plans as part of this set of plans or as separate project plans. The design layout for lighting and traffic signals are needed during the 'Final Design Plan' phase to determine any new ROW requirements. This activity also includes a traffic design inspection. Early coordination with the Road Design Grading Squad is necessary to ensure proper lane configurations and to ensure adequate right of way widths are provided for traffic design treatments.

## FINAL DESIGN PLANS

Final design plans cover the design of all phases of the project. They are used for the final design inspection.

### Final Design Plans Activities:

**3083 Develop Preliminary ROW Plats and Photos:** The CAD Technician will show all needed existing right of way data on the construction plans, right-of-way plans (photos) and right-of-way plats in accordance with SDDOT practices. They will also draw on all proposed new right of way lines as determined by the design engineer. The ROW Plat Checklist is in Chapter 9 – Right of Way.

**3059 Develop Final Roadway Design and Conduct Inspection:** This final roadway design is a continuation of preparing the final design of the project with consideration of additional input including the landowner meeting letter/notes. This activity includes all detailed work such as final pipe design for drainage areas under 1000 acres, finalize access locations, finalize proposed ROW, establish temporary easements and balance earthwork quantities.

Upon completion of the final roadway design, the plans are created as noted under Activity 3068 – Develop Final Roadway Plans. The plans now include all the necessary revisions made from landowner meeting requests plus the required fence, entrance revisions, temporary easements & right of way data including the corresponding acreage, balance notes locations, drainage arrows, etc.

A Plan and Design Checklist as provided at the Road Design Downloadable Files web page will be completed prior to the Final Design Inspection (FDI) with revisions to the plans and design made as necessary.

The FDI is scheduled by the Road Design Grading Squad responsible for coordinating the project and is held at the project site. The final roadway plans are distributed to the designated Region Office, Area Office, Environmental Office and Office of Right of Way & Utilities so they may review the plans and attend an on-site inspection. Selected central office and field DOT office staff should attend the FDI as determined necessary. Following the FDI, a summery letter will be written by the Design Engineer with suggested design/plan revisions and distributed accordingly.

**3068 Develop Final Roadway Plans:** The final roadway plans consist of revising the title sheet, typical sections, plan sheets and profile sheets based on information developed under Activity 3056 – Develop Final Roadway Design. All items as shown on the ‘Plan Checklist For Inspections’ in Chapter 18 – Plans Assembly should be completed for the FDI. These plans are for use at the FDI. This activity is also used during the ‘Final Plans’ phase to make corrections to the construction plans from the Office of Right of Way & Utilities review comments.

**3060 Revise Final Roadway Design:** Following the FDI, the Design Engineer will make revisions to the final roadway design. During this activity the Grading Design Squad Supervisor will also submit construction plans, ROW plans and ROW plats to the Office of Right of Way for their review as well as request final plans for other required sections of plans that are to be prepared for Bid Letting.

## **FINAL PLANS**

Any revisions identified at the final design inspection are incorporated into the final design plans to produce the final plans. Final plans are to be completed and sent to the Office of Right of Way & Utilities for right of way acquisition and utility notification. When the complete set of plans are assembled, reviewed, revised and finalized for bidding purposes, the Office of Project Development is notified.

### **Final Plans Activities:**

**3084 Revise and Finalize ROW Plats and Photos:** From the Office of Right of Way review comments, the CAD Technician will revise the right of way plans (photos) and right of way plats. Once finalized, these documents will be released by the Design Squad Supervisor to the Right of Way Program and the Utilities Engineer for their use. The ROW Plan Checklist and Plat Checklist are in Chapter 9 – Right of Way.

**3061 Complete Roadway Plans:** Upon completion of the final design plans, the design squad will complete and assemble the final roadway plans. Final roadway plans should include plan changes that may occur from requests by the Office of Right of Way based on negotiations with landowners and impacts to their property. The Design Engineer and CAD Technician will complete quantity computations, estimate of quantities sheets, composition and the assembly of plan notes, and prepare layout sheets (i.e. curb & gutter, guardrail, drop inlet and manholes, etc.).

The Grading Design Squad Supervisor will submit the complete set of plans which will include estimate of quantities with corresponding bid item number, surfacing design, traffic control, plan notes, standard plates, cross sections, pipe sections, curb and gutter layout, etc. and Special Provision Checklist to the pertinent DOT offices and FHWA (if necessary) for review.

**3072 Complete Lighting and Signal Plans:** Traffic Design will complete and assemble the final lighting and signal plans. Final lighting and signal plans should include plan changes that may occur from the traffic design inspection. The Traffic Design Engineer and CAD Technician will complete quantity computations, estimate of quantities sheets, composition and the assembly of plan notes, and prepare layout sheets (i.e. signal, lighting, wiring diagram, etc.).

**3075 Complete Pavement Marking Plans:** Traffic Design will complete and assemble the final pavement marking plans (when traffic signals are involved) as part of this set of plans or as separate project plans. For all other projects the pavement marking plans may be prepared by the Region Traffic Engineer.

**3086 Complete Erosion Control Plans:** The Roadside Development staff will determine the top soil quantities and the amount/type of erosion control procedures to be implemented. Landscape plans may also be created based on need and scope of project.

**3074 Review Final Plans:** A plans review engineer will review the final construction plans for all projects let to contract by the SDDOT. This also includes preparation of a final plans review letter sent to the responsible Design Engineer.

**3062 Revise Roadway Plans:** The design squad will make any plan revisions that Road Design is responsible from the SDDOT and FHWA (if necessary) review.

**3073 Revise Lighting and Signal Plans:** The design squad will make any plan revisions that Road Design is responsible from the SDDOT and FHWA (if necessary) review.

**3076 Revise Pavement Marking Plans:** The design squad will make any plan revisions that Road Design is responsible from the SDDOT and FHWA (if necessary) review.

**3087 Revise Erosion Control Plans:** The design squad will make any plan revisions that Road Design is responsible from the SDDOT and FHWA (if necessary) review.

## CHECKLISTS

The following checklists are provided in the Road Design Manual and/or on the Road Design webpage:

- Grading Projects Checklist and Traffic Projects Checklist (includes Project, Plans and Design Checklist), Road Design Home Web Page at [Downloadable Files](#)
- ROW Plan Checklist, Chapter 9 – Right of Way
- Plat Checklist, Chapter 9 – Right of Way

## PROJECT COORDINATION

Various offices within as well as outside the Department are coordinated/consulted with by the Office of Road Design during the design stage. This coordination is described below.

### **Division of Planning & Engineering**

#### **Transportation Inventory Management**

Office includes:

- Traffic Monitoring
- GIS
- Public Road Inventory
- CAD Mapping
- Pavement Condition Monitoring

The Office of Transportation Inventory Management is responsible for but not limited to

- Monitor vehicle travel activity within the state
- Developing and maintaining the state's geographically referenced road network and accessing spatial data to develop maps used throughout the Department to assist in day to day decision-making processes
- Maintain a detailed inventory of all non-state public accessible roads in the state
- Develop and maintain state, county, and city source maps
- Inventory of physical information from annual highway construction and maintenance projects with updates made to the inventory databases as needed

## Project Development

Office includes:

- Planning
- Utilities
- Environmental
- Traffic Safety
- Bid Letting
- Railroad Safety

The Office of Project Development is responsible for but not limited to:

- Scoping and monitoring projects
- Managing the Statewide Transportation Improvement Program (STIP)
- Advanced utility coordination
- Preparing and coordinating all environmental responsibilities
- Monitoring the SDDOT scheduling software (Primavera)
- Conducting Roadway Safety Inspections (RSI) and coordinating safety funds for projects
- Preparing maintenance and encroachment agreements
- Advertising projects for bids and conducting the “Formal” bid lettings
- Managing railroad crossings and safety improvements where they intersect public roadways

## Materials & Surfacing

Office includes:

- Surfacing Plans
- Geotechnical
- Materials
- Certification and Accreditation

The Office of Materials and Surfacing is responsible for but not limited to:

- Design of subsurface drainage
- Foundation investigations and recommendations
- Soil investigations and recommendations
- Preparation of Surfacing plans

## Bridge Design

Office includes:

- Hydraulics
- Structure Design
- Maintenance Design
- Construction

The Office of Bridge Design is responsible for but not limited to:

- All state highway system structure design including bridges, box culverts, retaining walls, signal and light pole footings and other highway related structures and foundations
- Providing other offices with drainage basin sizes, characteristics and related investigations other than for storm sewers
- Hydraulic design for structures with drainage areas in excess of 1000 acres. The Hydraulics Section is also available to consult with and provide guidance for any unusual drainage design problems (including those for drainage areas < 1000 acres)
- Preparation and application for Section 404 Permits and compliance with FEMA on flood plain permitting/revisions
- Preparation of Structure plans (new construction and rehabilitation/repair)
- Bridge Management activities for SDDOT owned structures (NBI)
- Bridge construction support activities

## Right Of Way

Office includes:

- ROW Engineering
- Utilities
- Appraisals
- Negotiation and Relocation
- Excess Property Management
- Land Transfers, Exchanges & Abandonments

The Office of Right of Way is responsible for but not limited to:

- Reviewing ROW plats, ROW plans and construction plans for potential right of way acquisition problems and make recommendations to minimize right of way problems

- Acquiring the necessary additional right of way and/or easements in accordance with the SDDOT Right of Way Manual
- Acquiring borrow pits when it is determined they are to be purchased
- Managing agreements between the State and Utility Companies resulting from project impacts and coordinating correspondence and meetings with Utility companies after the Preliminary Design Inspection
- Managing lands determined to be excess or surplus for lease, sale, trade or transfer. Sell or abandon right-of-way determined unnecessary from the State inventory.

## Research

Office includes:

- Research administration
- Intelligent Transportation Systems Coordination
- SD Local Transportation Assistance Program (SDLTAP)

The Office of Research is responsible for but not limited to:

- Management and conduct of research projects and contracts in all disciplines
- Coordinating the incorporation of experimental features in SDDOT construction and maintenance projects
- Development and maintenance of South Dakota's Statewide Intelligent Transportation Systems Architecture
- Coordination with Metropolitan Planning Districts for development and maintenance of their regional Intelligent Transportation Systems Architectures
- Coordinating systems engineering through project scoping, design, and deployment for Intelligent Transportation Systems projects and features in highway and commercial vehicle applications



## **Division of Operations**

### **Operations Support**

Offices include:

- Construction
- Maintenance
- Traffic Operations
- DBE Compliance

The Office of Operations Support is responsible for but not limited to:

- Maintaining and updating the SD Standard Specifications for Roads and Bridges
- Preparation of Special Provisions and Supplemental Specifications

### **Region and Area Offices**

The Region and Area Office boundaries are shown on the map located [here](#).

Offices include:

- Area Offices
- Region Traffic
- Region Materials
- Region Design

The Area Office and Region Office are responsible for but not limited to:

- Obtaining field surveys
- Design of construction zone signing, sequence of operations, contract time, permanent signing and, occasionally, permanent pavement marking
- Providing Borrow Pit information for construction/reconstruction plans when needed
- Preparation of Maintenance and 3R plans
- Preparation of Traffic Control plans
- Advertising projects for bids and conducting the “Informal” bid lettings

## **State Offices**

### **Game Fish and Parks (GF&P)**

Coordination consists of mitigating wetlands, parks, refuges, etc. when the highway project encroaches on property under the jurisdiction of the GF&P. Other items such as ensuring water quality standards, applying for certain permits, possible conflicts with endangered species, etc. are also coordinated between our two agencies.

### **Department of Environment and Natural Resources (DENR)**

Coordination includes the same items as described under the GF&P except the property falls under the jurisdiction of DENR. Other items include disposal of hazardous waste and underground storage tanks.

### **South Dakota Highway Patrol**

Coordination includes providing plans for weigh scales constructed within or adjacent to the highway and obtaining input regarding crashes and/or safety of a highway.

### **Bureau of Administration - Office of Facility**

Coordination includes administering contracts for designing certain items included in construction plans for the purpose of constructing buildings under the jurisdiction of the DOT such as maintenance buildings, region buildings, etc.

### **Department of Tourism**

Coordination includes items which promote tourism such as rest areas and visitor centers.

### **School and Public Lands**

Coordination includes purchase of right of way needed for highway construction when school and public land is adjacent to a project.

### **State Historic Preservation Office (SDSHPO)**

Coordination includes assistance with obtaining construction clearances for projects involving historically significant sites/items.

## **Federal Offices**

### **United States Fish and Wildlife (USFW)**

Coordination includes mitigating wetlands, USF&W easements and title lands, avoiding threatened or endangered species, etc.

### **United States Forest Service (USFS)**

Coordination includes acquiring easements, abiding by water quality standards and general grading items that need to be resolved when a highway is adjacent to forest service property. Contact the SDDOT Environment Office for additional information regarding the 'Memorandum of Understanding' document between the USFS/SDDOT/FHWA.

### **Federal Highway Administration (FHWA)**

The FHWA is responsible for reviewing designs of Federal-Aid (FA) projects for conformance with Federal requirements. As noted in the current FHWA Stewardship and Oversight Agreement, FHWA and SDDOT will meet annually to determine the projects that will receive full FHWA oversight. The following FA projects are subject to selection for full oversight:

- a. Interstate projects over \$3 million.
- b. Non-Interstate National Highway System (NHS) project over \$5 million.
- c. Any project over \$15 million.
- d. A limited number of projects dispersed geographically to ensure there is one full-oversight project in each SDDOT Area Office every three years.
- e. A limited number of projects featuring significant environment commitments, unique features, or congressional earmarks.

FHWA staff is also available to answer technical questions that may arise. See the current [FHWA Stewardship and Oversight Agreement](#) at the SDDOT Intranet site.

### **United States Corp of Engineers (USCE)**

Coordination includes acquiring certain water permits and any mitigation and/or coordination for Corp property.

### **Bureau of Land Management (BLM)**

Coordination includes acquiring right of way when the highway is adjacent to BLM property and coordinating any requests they may have into the design.

### National Park Service (NPS)

Coordination includes acquiring right of way when the highway is adjacent to NPS property and coordinating any requests they may have into the design.

### **Other Agencies**

#### City Officials/Offices

Coordination includes actively providing and coordinating all city design and/or planning items into the design plans.

#### Utility Companies

Coordination includes acknowledging utilities at the design stage and possibly modifying the design to work with relocating/adjusting utility company facilities.

#### Railroads

Coordination includes working with railroads companies to ensure all requirements for highways and railroads are satisfied. Highways crossing railroads typically require railroad insurance.

#### Contractors

Members and non-members of Associated General Contractor (AGC) are worked with annually during round table meetings. The purpose of the meetings is to create better working relationship between contractors and the DOT by working out problem areas. Constructability reviews may be held on projects to incorporate effective design on a project by project basis.

#### Consultants

Consultants are employed for design to supplement Department design staff in handling peak work loads in design and surveys, and when special expertise is needed that is not available within the Department.

#### Public

The public is contacted during different phases of a project. Some examples are public meetings/hearings and landowner meetings.

## **REGION DESIGN PLAN COORDINATION**

The following information provides guidance on the process for design work done by the Region Design offices which include involvement with various Central Office Programs. The intent for Region designed projects is for the Office of Road Design to assist as needed, not to supervise the specific design tasks. Communication and plan uniformity are the overall goals.

Note that the Surfacing Plans Engineering Supervisor is the contact for resurfacing projects and Local Transportation Programs Manager for the County System projects. Other project specific coordination is noted on the following pages.

The following services and information are available from the Central Office:

- Scope (Description of Proposed Design)
- Location Survey (Coordinate values and Bearings to use)
- Furnish Aerial Photos for Right of Way Plans
- Environmental Statements and Permits
- Surfacing Design Section Selection
- Drainage Area and Hydraulics Determination
- Soils Survey and Report
- Geological Survey and Report
- Foundations Investigation and Report
- Title Search Submittal
- Borrow Acquisition
- Conduction of Landowner Meeting (Region Designer participation)
- Conduction of Inspections (Region Designer participation)
- Erosion Control Recommendations
- Design & Plans for Structures
- Hydraulic design for drainage basins with areas over 1000 Acres
- Guardrail Design
- Roadway Lighting & Traffic Signals
- Footing recommendations for Roadway Lighting, Traffic Signals and Overhead Signs
- Standard Plates
- Standard Bid Item Numbers
- Utility Notification and Certification
- Right of Way Appraisal and Acquisition
- Maintenance & Encroachment Agreements

The Region Designer must use the current design software used by SDDOT.

## **Projects Involving Road Design**

The following is intended to provide guidance regarding coordination between the Region Design Section and the Office of Road Design during the course of Region plan preparation for Resurfacing and Emergency Relief projects.

Projects that fall in this category include those that require the following items listed.

- Geometric Design
- Design for ADA upgrades
- Traffic Signals
- Roadway Lighting
- Erosion and Sediment Control
- Right of Way (ROW) Needs (permanent take and/or temporary easements)

Sequence and coordination as follows:

Any questions pertaining to the required work described shall be directed to the Office of Road Design Engineering Supervisors.

For Region Design projects that include the previous mentioned items, the information under the **Road Design Process** section can be referenced outlining the process and activities to ensure adequate time and communication is made between various offices.

In general for Region designed plans, the Office of Road Design will be responsible for preparation of Traffic Signal, Roadway Lighting and Erosion and Sediment Control sections of plans. There may be a few instances when [Region Design](#) may be responsible for these sections with adequate review during the design phase by the Road Design Traffic or Landscape Architect staff.

During the scope process it shall be determined who will be the Responsible Manager (i.e. project coordinator) for all project types. On occasion there are some projects that may be unclear as who will be the Responsible Manager, especially if the design requires ROW needs. Here are some projects with the typical Responsible Managers listed:

## Rural Resurfacing

The **Region Design Section** will coordinate rural resurfacing projects, even those that require ROW resulting from pipe or box culvert extensions. The Region Design Section is responsible for contacting the Office of Road Design and Office of Bridge Design when work will be needed by these offices. The following office responsibilities are as follows, but not limited to:

- **Region Design** will be the Responsible Manager
- **Region Design** will coordinate schedule and if there is a deviation from the schedule, when work is needed
- Region Surveyor will establish control and set land ties (for those areas with ROW needs) as per scheduled in Primavera
- **Region Design** will provide plan sheets for those locations of temporary easement only
- **Road Design** will provide existing ROW (strip map and order names/descriptions), plats and permanent easement exhibits
- **Road Design** will provide plan sheets for those locations of permanent take & will provide for temporary easements (if needed)
  - **Region Design** will provide plan sheets for those locations of temporary easements only
- **Road Design** will review plats/plans before release to ROW
- **Region Design** will submit to ROW for review
- **Region Design** will submit Release to ROW (use Primavera for date (end of activity 3084) when plans/plats need to be released to ROW Office)
- Bridge Design will provide structure plans for box extensions, bridge repair and other structure related needs

## Urban Resurfacing

The **Office of Road Design** will typically coordinate urban resurfacing projects that require ROW needs resulting from design of ADA upgrades. The Region Design Section may coordinate these projects when ADA upgrades are minimal, and if so the Office of Road Design will only be responsible for the ROW tasks as outlined under Rural resurfacing. The office responsibilities are as follows, but not limited to:

- **Road Design** will be the Responsible Manager
- **Road Design** will coordinate schedule and if there is a deviation from the schedule, when work is needed
- Region Surveyor will establish control and set land ties (for those areas with ROW needs) as per scheduled in Primavera
- **Road Design** will provide existing ROW (strip map and order names/descriptions), plats and permanent easement exhibits
- **Road Design** will provide plan sheets for those locations of permanent take &/or temporary easements
- **Road Design** will review plats/plans before release to ROW
- **Road Design** will submit to ROW for review

- **Road Design** will submit Release to ROW (use Primavera for date (end of activity 3084) when plans/plats need to be released to ROW Office)
- **Region Design** prepares plans for resurfacing Section
- Bridge Design will provide structure plans for box extensions, bridge repair and other structure related needs

### **Emergency Relief**

**Region Design** will coordinate emergency relief projects. When requested, the Office of Road Design may provide assistance with respect to geometric design, ROW needs, etc.

### **Projects Involving Bridge Rehabilitation and Repair**

The following is intended to provide guidance regarding coordination between the Bridge Maintenance Unit-Office of Bridge Design-Division of Planning/Engineering and the Region Design Engineer during the course of a Bridge Repair Project.

Projects falling into this category include all projects involving bridge rehabilitation and repair. The Office of Bridge Design will provide any assistance needed through the Bridge Maintenance Engineer, Bridge Management Engineer or Squad Leaders.

#### **Preliminary Site Inspection**

This inspection is conducted by the Bridge Maintenance Engineer and/or Squad Leaders and Region Design Engineer. Region Bridge Maintenance Supervisor also participates in this inspection. The intent of the inspection is to verify the proposed scope of work and identify any changes in the scope that may be needed.

#### **Plans Preparation**

Bridge Maintenance Unit will be responsible for all structure design work. However, the responsibility for design and plan preparation of Deck Overlays will be coordinated between the Bridge Maintenance Engineer and the Region Design Engineer.

Region Design Engineer will be responsible for design and plan preparation of approach guardrail and approach work other than approach slabs (including joints) and bridge end backfill.

Region Traffic Engineer will be responsible for Traffic Control design and plans preparation.



## **Plans Assembly and Review**

The Region Design Engineer is generally responsible for project coordination and plans assembly when there are significant approach work items to be performed by the Region Design Office.

The Bridge Maintenance Unit is generally responsible for project coordination and plans assembly when Region involvement is limited to work performed by the Region Traffic Office.

The assembled plans are processed by the responsible coordinator for Field and Office Review and final submittal to Bid Letting.

## **Projects Involving Scour Work Only at Structure Sites**

The following is intended to provide guidance regarding coordination of all the various offices involved with Scour Work at structure sites.

Drainage surveys are identified thru the scoping process. Any additional survey requirements are coordinated thru the Office of Bridge Design. Bridge Hydraulics Unit will provide recommendations for scour repair details thru Hydraulic Design Report (HDR). Bridge Maintenance Unit and Region Design Engineer will coordinate responsibility for design and plans preparation. Responsibilities include details for rip rap, x-sections, fencing, erosion control, ROW (permanent & temporary easements), utility conflicts and notes for environmental commitments and SWPP, etc. Office of Bridge Design will work with Region Design in identifying projects that will need ROW. Unless handled by Region Design, Road Design will submit Release to ROW when plans/plats need to be released to ROW Office.

## **Projects Involving New Structures**

The following is intended to provide guidance regarding coordination between the Office of Bridge Design (OBD), the Region Design Section, and the Office of Road Design during the course of Region plan preparation that involves new structure needs.

Projects that fall in this category include those that require:

- Drainage structures (Drainage areas of 1000 Acres or more)
- Special drainage structures on smaller acreage sites (Diversion structures, stilling basins, water control structures, special storm sewer structures, energy dissipators, etc.)
- Extension/Repair of existing Reinforced Concrete Box Culverts
- Bridge widening
- Grade separation structures
- Light tower, lighting pole, signal pole, and sign bridge footings
- Retaining walls not covered by Type C standard plate
- Pedestrian bridges
- Permanent Concrete barrier
- Noise/Sound Barrier walls
- Miscellaneous non-standard structures

As with plans prepared by the Office of Road Design, the OBD is responsible for the structural design and preparation of the structure portions of these plans. The only exceptions are plans incorporating signal pole, lighting pole, sign bridge pole, and sign post footings; and typical sign posts. On plans including signal, lighting, and/or sign bridge pole footings, the size of the required footings must be obtained from the OBD or Materials and Surfacing to incorporate into the plans/standards assembled by the Region. On signing plans, the Region performs the calculations necessary for selecting sign support and footing sizes (through procedures furnished by the OBD) and prepares the corresponding plans.

Sequence and coordination as follows:

1. **Preliminary Structural Data** – For the purpose of preliminary office determination of structure type, size, and location; the OBD requires the following data to be provided through the Region Design Coordinator:
  - Project Design Summary
  - Preliminary roadway alignment and gradeline
  - Typical roadway sections
  - Preliminary cross sections through structure areas.

This data is to be provided by written correspondence and transmitted as soon as possible following official establishment.

2. **Preliminary Site Inspection** – Upon completion of the office determination of structure T.S. & L., a field site inspection will be conducted to evaluate/verify the Preliminary Structural Data and gather additional information necessary. The Bridge Design Engineer and/or a Bridge Design Squad Leader will conduct the inspection with representatives present from the respective Area Office, Hydraulics Section, FHWA, City, and other Department staff (including Region Design) as necessary depending on nature and scope of structure needs. A Preliminary Site Inspection Report summarizing the inspection will be written to the Chief Bridge Engineer with copies distributed to all involved parties including the Region Plans Coordinator.
3. **Preliminary Bridge Design** – Following the site inspection, the next step in structure plans preparation is the generation of Preliminary Structure Layouts reflecting proposed structure type, size, and location. These layouts will be transmitted under cover letter to the Chief Bridge Engineer with copies to involved parties and are essential to the progress of other Departmental entities (R/W, Materials & Surfacing, Utilities, etc.) relative to the project. It is imperative that any comments on the Preliminary Layouts be submitted to the OBD at this time (prior to start of final design) through written correspondence. The OBD requires the following data to be provided through the Region Design Coordinator in order to prepare the Preliminary Layouts:
  - Final roadway alignment and gradeline
  - Final cross sections through structure areas

This data is to be provided by written correspondence and transmitted as soon as possible following official establishment. Any revisions to this data following the original submittal, shall be immediately transmitted to the OBD.

4. **Final Bridge Design and Plans** – Following the transmittal of the Preliminary Layouts and approval by FHWA (when required), final structure design is initiated. Upon completion of the structure design, drafting, plans assembly, and internal OBD review; the structure plans are to be made available to the responsible Road Design or Region Design Coordinator for inclusion into the full set of plans

The assembled plans are processed by the responsible coordinator for SDDOT and FHWA (if necessary) review and final submittal to Bid Letting.

5. **Bridge Review Revisions** – Upon receipt of all Departmental and FHWA review letters, the OBD will make any structure plan revisions as deemed necessary and generate final structure plans.

## **Projects Involving Hydraulic Considerations**

The following is intended to provide guidance regarding coordination between the Office of Bridge Design (OBD), the Region Design Section, and the Office of Road Design during the course of Region plan preparation which involves drainage, drainage structures and 404 permits.

Projects that fall into these categories include:

- Drainage structure replacement, extension or repair;
- Placement of materials into the waters of the United States.

Sequence and coordination as follows:

1. When drainage crossings are a part of the project, the office responsible for the survey should contact the Hydraulics Section prior to beginning the survey to determine what data will be required. This can be accomplished by a phone call to Hydraulics with the scope and limits of the project to determine if drainage areas of 1000 acres or larger are involved.
2. For each drainage area of 1000 acres or larger, the Region/Area will prepare a drainage survey in accordance with the Survey Manual and covering any additional limits as determined in No. 1 above.
3. For grading projects that require determination of drainage areas, the areas will be determined upon receipt of the proposed alignment and gradeline (the existing groundline is usable if the proposed gradeline is not available). The field inspection of the drainage areas can be performed in conjunction with the profile inspection (for smaller grading projects), or conducted separately. Upon completion of the inspection, a memo of drainage areas will be prepared and distributed by the Hydraulics staff.
4. When the OBD is to provide drainage structure sizing recommendations (generally for the crossings with contributing areas of 1000 acres or larger), hydraulic studies will begin upon receipt of a roadway alignment and established gradeline, and typical cross sections.
5. After the preliminary hydraulic recommendations have been distributed and Preliminary Structure Data is complete, the preliminary site inspection will be conducted with hydraulics, bridge design and Region/Area staff. After the inspection, the final hydraulic recommendation will then be prepared.

6. When any construction/reconstruction/repair is located in the waters of the United States and the project is not listed in the construction program or in the Departments scheduling software system (Primavera), the scope and limits of the project must be brought to the attention of the hydraulics and/or environmental staff to assure that early project coordination with environmental agencies can be accomplished. This will aid in obtaining 404 permits in a shorter time once project plans are available.
7. When the project plans are complete, copies of the plans will be provided to the hydraulics staff for the submittal of the 404 permit application.
8. For state highway project drainage crossings falling under FEMA jurisdiction, the OBD will provide sizing recommendations in compliance with associated guidelines and coordinate as necessary with FEMA for any related permitting or mapping revisions.