SOUTH DAKOTA DEPARTMENT OF TRANSPORTATION

SECONDARY ROAD PLAN

SECTION I - COUNTY SPONSORED PROJECTS

SECTION II - CITY SPONSORED PROJECTS

REVISED: 1997

INTRODUCTION

The Secondary Road Plan is an agreement between the South Dakota Department of Transportation, through its office of Local Government Assistance, and the counties and cities throughout South Dakota. The Secondary Road Plan is a guideline for use in planning, designing, and constructing roads and bridges on local government highway systems. The guidelines have a great deal of flexibility with modifications or design exceptions based on local need, traffic, and accident history. One option is to trade federal funds for state funds at a 90:10 ratio in order to allow more local control over individual projects and to better fit local needs. The ultimate goal is to provide a product that will fit local needs and safety considerations at the most reasonable cost possible. The office of Local Government Assistance is ready and willing to assist in any transportation endeavor at the local level. If there are any questions concerning current or future project needs, please call (605) 773-4831 to speak with any of its staff members.

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GLOSSARY

ADT - Average Daily Traffic. The average volume of traffic per day, per year.

Backslope - The ditch slope from the bottom of the ditch to the natural ground level, opposite from the roadway.

Clear Zone - The unobstructed, relatively flat area provided beyond the edge of the traveled way for the recovery of errant vehicles.

Corner Radius - (Also known as the edge radius.) The radius of the corner, between two legs of an intersection, creating a rounded transition between the legs. Corner radii are also found on the transitions of driveways, etc.

Cross Slope - The slope of the roadway, perpendicular to the direction of traffic, from the centerline to the beginning of the shoulder.

Curb-Cut Ramps - Ramps formed by sloped curb and a sloped section of pavement allowing for a smooth transition from the roadway to the sidewalk or driveway for bicycles, wheelchairs, and vehicles.

DHV - Design Hourly Volume. The 30th highest hourly volume for the design year.

Design Speed - "The speed selected and used for correlation of the physical features of a highway that influence vehicle operation. It is the maximum safe speed that can be maintained over a specified section of highway when conditions are so favorable that the design features of the highway govern." **RDG**

Design Traffic Volumes - The volume of traffic for which the road is designed to accommodate.

Edge Radius - (Also known as the corner radius.) The radius of the corner, between two legs of an intersection, creating a rounded transition between the legs. Edge radii are also found on the transitions of driveways, etc.

Grade - The slope of the roadway in the direction of traffic. Grade is usually shown as a percentage of the ratio of the vertical change in height per 100 feet.

Inslope - The ditch slope from the edge of the shoulder to the bottom of the ditch.

Intersection Legs - The roadways which meet at the intersection.

Local Rural Roads - These roads provide access to land adjacent to Rural Collectors and mainly serve travel over short distances. These roads are under the jurisdiction of the counties but not on the Federal-aid System.

Passing Sight Distance - The distance needed for a vehicle to return to the proper lane, from the passing position, once an oncoming vehicle is spotted.

Pavement Crown - The top of the road showing the lanes sloping away from the centerline, perpendicular to the direction of travel, with equal cross slopes.

Rural Collector Roads and Streets - These roads and streets mainly provide for travel within a county between larger towns, consolidated schools, important mining and agricultural areas, etc. They also link these places with routes that carry larger amounts of traffic. These roads are under the jurisdiction of the counties and are on the Federal-aid System.

Sight Distance - (The length of roadway ahead that is visible to a driver.) In terms of transportation, sight distance is the visual length needed to safely complete vehicle activities such as passing on a two lane roadway, stopping to avoid a collision with something on the road, left and right turns at an intersection, crossing an intersection, etc.

Stopping Sight Distance - The distance needed to stop a vehicle once an object on the road is spotted.

Superelevation - When a vehicle travels around a horizontal curve, centrifugal force pushes the vehicle to the outer edge of the curve. This can result in discomfort to the driver which in turn may cause him to reduce his speed. Superelevation is basically the raising of the pavement through a horizontal curve, with the outer edge of the road being higher than the inner edge. This counteracts the force and allows for constant speed and comfort throughout the curve.

Surface Types

High - This surface type consists of pavements which are smooth and skid-resistant. They retain their shape and provide for higher safe operating speeds than other surface types. High type surfaces are used on roads with a high volume of traffic.

Intermediate - This surface type ranges from surface treatments to surfaces with slightly less strict standards than the high type surfaces.

Low - This surface type ranges from surface treated earth roads and stabilized materials to earth, crushed stone, and gravel. These surfaces tend to ravel, reducing the width and making steering a greater effort. Low type surfaces are used when the traffic volume is light.

Urban Arterials - Urban Arterials serve the major centers of activity of urban areas carrying the highest traffic volumes. The purposes of their use are movements in and out of the urban area, bypassing of the urban area, and movements from the center to the outer

edges of the urban area. These roads are under the jurisdiction of the cities and are on the Federal-aid System.

Urban Collectors - Urban Collectors collect traffic from residential areas and move it to Urban Arterials. They provide land access and traffic circulation in residential neighborhoods and commercial and industrial areas. These roads are under the jurisdiction of the cities and are on the Federal-aid System.

SECONDARY ROAD PLAN
SECTION I - COUNTY SPONSORED PROJECTS

1. AUTHORITY AND APPLICABILITY

Section I of the "Secondary Road Plan" (hereinafter referred to as the "Plan") is a written statement setting forth the standards and procedures to be followed in location, design, construction, and administration of work on the Federal-aid System, under the jurisdiction of the counties (Federal-aid Secondary System), and on applicable roads not on the Federal-aid System. The policy of the South Dakota Department of Transportation (SDDOT) will be to permit maximum flexibility and encourage local initiative and cooperation in selecting, developing and constructing projects under the Plan.

The SDDOT will administer projects financed with Statewide Transportation Program (STP) funds on the Federal-aid Secondary System under the provisions of this Plan. Where Federal-aid is made available for projects not on the Federal-aid System, the SDDOT will administer those projects under this Plan when Federal regulation permits. All phases of project activity will be accomplished in accordance with this Plan; and applicable Federal requirements.

Authority under the Plan extended from FHWA to the SDDOT does not include FHWA responsibilities under the National Environmental Policy Act of 1969, Section 138 of Title 23, Title VI of the Civil Rights Act of 1964, Title VIII of the Civil Rights Act of 1968 as amended in 1974, and the Uniform Relocation Assistance and Land Acquisition Policies Act of 1970 (as amended) and 49 CFR Part 24.

Provisions of Section I of the Plan are applicable only to projects sponsored by the counties or other local political subdivisions in cooperation with the applicable county.

Projects not included under this Plan are railroad crossing projects not on the Federal-aid System and projects in cities of populations greater than 5000, not on the Federal-aid System.

Legal authority creating the SDDOT, permitting compliance with Title 23 USC, establishing the Federal-aid Secondary System and providing standards, specifications and assistance to the counties is contained in SDCL, Chapter 31-1, 31-2, 31-5 and 31-6.

2. DEPARTMENT OF TRANSPORTATION, LOCAL GOVERNMENT ASSISTANCE PROGRAM, SECONDARY ROADS SECTION

The Secondary Roads Engineer within the Secondary Roads Section of the Local Government Assistance Program, SDDOT, will be responsible for administration of projects under Section I of the Plan. Advice, consultation and recommendations are available from all sections within the SDDOT and will be requested and coordinated by the Secondary Roads Engineer.

The primary function of the Secondary Roads Section is to provide the counties with information and guidance on all phases of the Plan on a continuous basis and assure compliance with all Federal and State requirements. Cooperation with local government officials will be continuous during project selection, development and construction.

The Region Engineer will be responsible for the construction administration of the projects.

3. ALLOTMENT OF FUNDS

STP funds are allocated to the 66 counties based on the following formula: $1 per person in a Class I city (population over 5,000) within a county will be distributed to that county with that amount deducted from the total of the STP funds allocated to the 66

counties, of the remaining funds one-third is distributed based on a county's highway system miles compared to the total county system miles statewide, one-third is distributed based on a county's rural population (including cities under 5,000) compared to the total state rural population, and one-third is distributed based on a county's land area compared to the total state land area. Authority for apportionment of funds is by action of the SDDOT Transportation Commission. STP Funds remaining unobligated in a county for a three year period, or in accordance with future federal requirements, will be reallocated to all other counties on the same formulas as above. County officials will be advised of their STP Fund balance twice a year, using a computer print out indicating obligations by project and allocations.

4. PROJECT SELECTION AND PUBLIC INVOLVEMENT

Projects will be selected by the Board of County Commissioners in cooperation with the SDDOT and other appropriate local officials. The county (or city for bridge replacement projects in cities with populations of 5000 or less) is the political entity who will be held responsible by SDDOT for all required documents, actions and functions during project development, construction and for required future project maintenance.

Public and interagency involvement and consideration of social, economic and environmental effects will be processed in accordance with SDDOT Public Involvement/Public Hearing Process, Paragraph E Section I and applicable portions of Section II, III and IV and with 23 CFR 771. SDDOT will provide assistance to the counties in assuring compliance with Public Involvement Procedures. The environmental classification will be submitted at the time of program submission for concurrence by the FHWA except for projects that require significant right-of-way, 404 permits, wetland

findings, 4(f) statements, Environmental Assessments or Environmental Impact Statements. These projects will require an individual environmental classification approved by FHWA prior to advertising for bids.

All projects requiring acquisition of significant amounts of right-of-way, temporary easements or that substantially change the layout or function of connecting roads or have a significant adverse impact on abutting property or have significant environmental impact will require a public hearing, or public meeting providing a Notice of Opportunity for Public Hearing in accordance with the SDDOT Public Involvement/Public Hearing Process.

When proposed elements of design to be used on a project have been approved by the Secondary Roads Section, a copy of the approved Environmental Classification will be sent to the county as a notification.

5. PROGRAMMING, AUTHORIZATION AND SYSTEM REVISION

The annual statewide program of county sponsored projects will be submitted as part of the Statewide Transportation Improvement Program (STIP) to the FHWA for approval before the first of October. Project requests in resolution form should be submitted by the Board of County Commissioners prior to the first of May each year for consideration and approval by the SDDOT and inclusion in the annual program. A supplemental program or programs may be submitted if required, depending on need.

Selection of the Federal-aid Secondary System shall be accomplished cooperatively by the SDDOT and appropriate local officials. Revision of the county portion of the Federal-aid Secondary System shall be by request of the Board of County Commissioners in resolution form subject to approval of the SDDOT and the FHWA. System revision will be accomplished in accordance with 23 CFR.

6. DESIGN CRITERIA

Design criteria will be in accordance with the 1994 edition of the AASHTO publication, "A Policy on Geometric Design of Highways and Streets." (Any reference to this publication will be noted by 'AASHTO Policy on Geometric Design'.) Projects on the Federal-aid System under the jurisdiction of the counties will be designed to meet the criteria found in Chapter VI, Collector Roads and Streets. Projects not on the Federal-aid System will be designed to meet the criteria found in Chapter V, Local Roads and Streets. Most of this information is reproduced within the following paragraphs and tables. The tables in the body of the Plan are in English units. To maintain uniformity, most are reproduced from the 1990 Edition of the AASHTO Policy on Geometric Design and are denoted by ‘1990 AASHTO’ and the applicable page numbers. Some of the English unit tables had to be converted directly from the 1994 edition and are noted by '1994 AASHTO (English Conversion)' and the applicable page numbers. Other tables are combined from the 1990 and 1994 editions and are noted as such. Metric versions of all the tables, based on the 1994 edition, can be found in Appendix 1.

The best possible design should be selected considering safety, existing and future needs, economy, reasonable maintenance costs and available funding. In restricted areas, or where there are other unusual considerations, it may not be possible to meet all minimum design values. Exceptions to applicable design criteria will be considered upon request by the county on a project by project basis when in the public interest and subject to approval by the SDDOT.

Local Rural Roads, Rural Collector Roads and Streets

Design Traffic Volumes

Roads should be designed for the amount of traffic they carry and for their type of use. A projected traffic count of 20 years is normally used for design. Use the Average Daily Traffic (ADT) for design.

Design Speed

The minimum design speed depends on the type of terrain as well as the environment where the road is located. The minimum design speed can be determined from the tables shown below.

Local Rural Roads
Minimum Design Speeds 1994 AASHTO 419 (English Conversion)

Design Volumes	Type of Terrain		
	Level	Rolling	Mountainous
	Speeds (mph)		
ADT Under 50	30	20	20
ADT 50-250	30	30	20
ADT 250-400	40	30	20
ADT 400-1500	50	40	30
ADT 1500-2000	50	40	30
ADT 2000 & Over	50	40	30

Rural Collector Roads and Streets
Minimum design speeds (rural conditions).
1994 AASHTO 461 (English Conversion)

Minimum Design Speeds (mph) for Design Volumes of:			
Type of Terrain	ADT 0-400	ADT 400-2000	ADT Over 2000
Level	40	50	60
Rolling	30	40	50
Mountainous	20	30	40

Regulatory Speed

The regulatory speed of the completed roadway shall be at or below the project design speed for projects on Rural Collector Roads and Streets and Local Rural Roads with ADT's greater than 100. In those instances where an isolated segment cannot be reasonably or economically designed to meet the regulatory speed, advisory signing (curve sign or turn sign with speed plate as appropriate) will be acceptable mitigation for speed differences up to 15 mph (25 km/h) for horizontal curves.

Sight Distance

This is important for the safety of motorists entering and exiting the road as well as for those passing other motorists. There are two categories of sight distances, stopping and passing. For stopping sight distance, the data in the corresponding table below is based on an eye height of 3.5 feet (1070 mm) for the person who will be stopping and an object height of 0.5 feet (150 mm). For passing sight distance, the data in the corresponding table below is based on an eye height of 3.5 feet (1070 mm) for the person in the passing vehicle and an object height (i.e. the oncoming vehicle) of 4.25 feet (1300 mm).

Local Rural Roads

Minimum Stopping Sight Distance (Wet Pavements) 1990 AASHTO 421

Design Speed (mph)	Assumed Speed for Condition (mph)	Stopping Sight Distance (Rounded for Design) (ft)	K Value[a] for Crest Vertical Curves (Rounded)	K Value[a] for Sag Vertical Curves (Rounded)
20	20-20	125-125	10-10	20-20
25	24-25	150-150	20-20	30-30
30	28-30	200-200	30-30	40-40
35	32-35	225-250	40-50	50-50
40	36-40	275-325	60-80	60-70
45	40-45	325-400	80-120	70-90
50	44-50	400-475	110-160	90-110
55	48-55	450-550	150-220	100-130
60	52-60	525-650	190-310	120-160

[a]K value is a coefficient by which the algebraic difference in grade is multiplied to determine the length in feet of the vertical curve which will provide minimum sight distance.

Local Rural Roads

Minimum Passing Sight Distance 1990 AASHTO 422

Design Speed (mph)	Minimum Passing Sight Distance (Rounded) (ft)	K Value[a] for Crest Vertical Curves (Rounded)
20	800	210
25	950	300
30	1,100	400
35	1,300	550
40	1,500	730
45	1,650	890
50	1,800	1,050
55	1,950	1,230
60	2,100	1,430

[a]K value is a coefficient by which the algebraic difference in grade is multiplied to determine the length in feet of the vertical curve which will provide minimum sight distance.

Rural Collector Roads and Streets

Minimum stopping sight distance (wet pavements). 1990 AASHTO 470

Design Speed (mph)	Assumed Speed for Condition (mph)	Stopping Sight Distance (Rounded) (ft)	K Value[a] for Crest Vertical Curves (Rounded)	K Value[a] for Sag Vertical Curves (Rounded)
20	20-20	125-125	10-10	20-20
25	24-25	150-150	20-20	30-30
30	28-30	200-200	30-30	40-40
35	32-35	225-250	40-50	50-50
40	36-40	275-325	60-80	60-70
45	40-45	325-400	80-120	70-90
50	44-50	400-475	110-160	90-110
55	48-55	450-550	150-220	100-130
60	52-60	525-650	190-310	120-160
65	55-65	550-725	230-400	130-180
70	58-70	625-850	290-540	150-220

[a]K value is a coefficient by which the algebraic difference in grade is multiplied to determine the length in feet of the vertical curve which will provide minimum sight distance.

Rural Collector Roads and Streets
Minimum passing sight distance. 1990 AASHTO 471

Design Speed (mph)	Minimum Passing Sight Distance (Rounded) (mph)	K Value[a] for Crest Vertical Curves (Rounded)
20	800	210
25	950	300
30	1,100	400
35	1,300	550
40	1,500	730
45	1,650	890
50	1,800	1,050
55	1,950	1,230
60	2,100	1,430
65	2,300	1,720
70	2,500	2,030

[a]K value is a coefficient by which the algebraic difference in grade is multiplied to determine the length in feet of the vertical curve which will provide minimum sight distance.

Rural Collector Roads and Streets
Relation of sight distance to design speed. 1990 AASHTO 500

Design Speed (mph)	Minimum Stopping Sight Distance (ft)	Minimum Passing Sight Distance (ft) (two-lane, two-way)
30	200-200	1,100
40	275-325	1,500
50	400-475	1,800
60	525-650	2,100
65	550-725	2,300
70	625-850	2,500

Grades

This item is considered in design in order to keep the vehicle speeds as uniform as possible. Suggested grades are shown in the following tables.

Local Rural Roads
Maximum Grades (%) 1990 AASHTO 423

	Design Speed (mph)				
Type of Terrain	20	30	40	50	60
Level	8	7	7	6	5
Rolling	11	10	10	8	6
Mountainous	16	14	13	10	-

Rural Collector Roads and Streets
Maximum Grades[a] 1990 AASHTO 472

	Design Speed (mph)					
Type of Terrain	20	30	40	50	60	70
	Grades (Percent)					
Level	7	7	7	6	5	4
Rolling	10	9	8	7	6	5
Mountainous	12	10	10	9	8	6

[a]Maximum grades shown for rural conditions of short lengths (less than 500 ft), on one-way down grades and on low-volume rural collectors may be 2% steeper.

Roadway Crown

Good drainage of the roadway surface is dependent upon the cross slopes. The values in the tables below are typically used.

Local Rural Roads
Normal Cross Slopes 1990 AASHTO 423 & 1994 AASHTO 421

Surface Type[a]	Range in Rate of Cross Slope (%)
High	1.5 to 2.0
Intermediate	1.5 to 3.0
Low	2.0 to 6.0

[a]See the Glossary on pages 6-8 for pavement surface types description.

Rural Collector Roads and Streets
Normal Cross Slopes 1990 AASHTO 471

Surface Type[a]	Range in Rate of Cross Slope (%)
High	1.5 to 2.0
Intermediate	1.5 to 3.0
Low	3.0
[a]See the Glossary on pages 6-8 for pavement surface types description.	

Surfacing

Surfacing design will be in accordance with the 1984 FHWA, South Dakota Division Report, "Surfacing Selection and Design on Low Volume County Roads." For current ADT under 400, a 6 inch (150 mm) base course with asphalt surface treatment will be considered adequate for a 20 year life cycle. For current ADT from 400 to 750, a 6 inch (150 mm) base course plus 1 1/2 inches to 2 1/2 inches (38mm to 62 mm) of asphalt concrete (staged) will be considered adequate for a 20 year life cycle. For current ADT greater than 750, surfacing sections will be based on the 1986 AASHTO Guide for Design of Pavement Structures.

For highways with gravel surfacing, the minimum thickness shall be 3 inches (75 mm).

Resurfacing

Resurfacing projects are considered to be Resurfacing, Restoration, and Rehabilitation (RRR) projects and will be designed according to standards specified by, "Standards For Resurfacing, Restoration, and Rehabilitation of Streets and Highways Other Than Freeways." The applicable portion of these standards is shown in the table following this section.

Signing and marking will be in conformance with the Manual On Uniform Traffic Control Devices (MUTCD). Particular attention will be given to the use of traffic control devices to assist in mitigating problems associated with substandard geometric features where the deficiency cannot be economically corrected.

At least three years of accident records will be evaluated by the Secondary Roads Section prior to proceeding with a resurfacing project under the resurfacing criteria. Accident experience will be used to identify hazardous sites or point out situations where reconstruction to full standards should be considered. Resurfacing projects shall be constructed to preserve and extend the service life of existing highways, enhance highway safety, and provide an appropriate skid resistant surface.

GEOMETRIC DESIGN CRITERIA FOR RRR PROJECTS
COUNTY SECONDARY HIGHWAYS

CURRENT ADT	0-400	400-750	>750
Design Speed			
Flat	40	50	50
Rolling	30	40	40
Mountainous	20	30	30
Lane Width (1)	10	10*	11
Shoulder Width	2	2	2
Inside Shoulder Width	2	2	2
Clear Zone	10	15	20
Slopes	3:1	3:1	3:1
Bridges to remain in place			
Structural Capacity	H-15	H-15	H-15
Minimum Width	24	24	24
Minimum Vertical Clearance	14'	14'	14'

	DESIGN SPEED (MPH)			
	20	30	40	50
Stopping Sight Distance	125	200	275	400
K (Crest Vertical Curves)	10	30	60	110
K (Sag Vertical Curves)	20	40	60	90
Passing Sight Distance	800	1100	1500	1800
Crest Vertical Curves K:	210	400	730	1050
Maximum Degree of Curvature				
(e_{max}0.06=)	49°15'	21°	11°15'	6°45'
Maximum Grade(%)				
Flat	NA	NA	7	6
Rolling	NA	9	8	NA
Mountainous	12	11	NA	NA

NOTES:

The clear zone, on county sponsored secondary projects for approach slope flattening and approach culvert safety end treatments, shall be determined from this table.

(1) Minimum desirable lane width is 11 feet. If feasible, 12 feet is preferable.

* Where truck volumes exceed 15%, a minimum of 11 foot lanes are to be used.

Superelevation

For Rural Collector Roads and Streets maximum superelevation should be ≤12%. When ice and snow are common the maximum should be ≤8%.

For Local Rural Roads maximum superelevation on high and intermediate type surfaces should be ≤10%. When ice and snow are common the maximum should be ≤8%. The maximum superelevation on aggregate roads should be ≤12%. Additional design information is shown in the tables below. See the Glossary on pages 6-8 for descriptions of the pavement surface types.

Local Rural Roads

Maximum degree of curve and minimum radius for different values of maximum superelevation. 1990 AASHTO 424

Design Speed (mph)	Maximum e	Maximum Degree of Curve Rounded	Minimum Radius (ft)
20	.04	45.0	127
30	.04	19.0	302
40	.04	10.0	573
50	.04	6.0	955
55	.04	4.75	1,186
60	.04	3.75	1,528
20	.06	49.25	116
30	.06	21.0	273
40	.06	11.25	509
50	.06	6.75	849
55	.06	5.5	1,061
60	.06	4.25	1,348
20	.08	53.5	107
30	.08	22.75	252
40	.08	12.25	468
50	.08	7.5	764
55	.08	6.0	960
60	.08	4.75	1,206
20	.10	58.0	99
30	.10	24.75	231
40	.10	13.25	432
50	.10	8.25	694
55	.10	6.5	871
60	.10	5.25	1,091
20	.12	62.0	92
30	.12	26.75	214
40	.12	14.5	395
50	.12	9.0	637
55	.12	7.0	807
60	.12	5.75	966

NOTE: With design speeds of 30 mph or less, conditions may warrant elimination of superelevation.

Local Rural Roads
Minimum length for superelevation runoff for 2-12 ft lanes of pavement.
1990 AASHTO 425

	Length of Runoff, L (ft) for Design Speed (mph)					
Superelevation Rate, e	20	30	40	50	55	60
Reverse Crown	50	100	125	150	160	175
.04	60	100	125	150	160	175
.06	95	110	125	150	160	175
.08	125	145	170	190	205	215
.10	160	180	210	240	255	270
.12	190	215	250	290	305	320
NOTE: Length of runoff on 10- and 11-ft lanes may be reduced proportionately but no shorter than the minimum length shown for reverse crown at the respective speed.						

Number of Lanes

Two lanes should be sufficient to handle the traffic. More lanes can be added if the traffic volume is excessive.

Roadway Width

The minimum driving lane width should be 10 feet (3 m) and minimum shoulder width should be 2 feet (0.6 m). Under very restricted conditions in a resurfacing job the shoulders can be eliminated. On Rural Collector Roads and Streets, when roadside barriers are present, add 2 feet (0.6 m) to the shoulder width while maintaining a minimum offset, from the edge of the traveled way, of 4 feet (1.2 m).

The following tables show widths based on design speed and traffic volume.

Local Rural Roads

Minimum width of traveled way and graded shoulder.

1990 AASHTO 426 & 1994 AASHTO 422

Design Traffic Volumes				
Design Speed (mph)	ADT Less than 400	ADT 400-1500	ADT 1500-2000	ADT Over 2000
	Width of Traveled Way (ft)[c]			
20	18	20[a]	22	24
30	18	20[a]	22	24
40	18	20[a]	22	24
50	20	22	22	24
60	22	22	24	24
	Width of Graded Shoulder Each Side (ft)[c]			
All Speeds	2	5[a,b]	6	8

[a] Mountainous Terrain - ADT 400-600 - 18 ft width and 2 ft shoulders.

[b] May be adjusted to achieve a minimum roadway width of 30 ft for design speed of 40 mph or less.

[c] Where the width of traveled way is shown to be 24 ft, the width of the traveled way may remain at 22 ft on reconstructed highways where alignment and safety results are satisfactory.

Rural Collector Roads and Streets
Minimum width of traveled way and graded shoulder.
1990 AASHTO 474 & 1994 AASHTO 465

Design Traffic Volumes				
Design Speed (mph)	ADT Under 400	ADT 400-1500	ADT 1500-2000	ADT Over 2000
	Width of Traveled Way (ft)[a]			
20	20[b]	20	22	24
30	20[b]	20	22	24
40	20[b]	22	22	24
50	20[b]	22	22	24
60	22	22	24	24
70	22	22	24	24
	Width of Graded Shoulder - Each Side (ft)			
All Speeds	2	5[c]	6	8

[a] Where the width of the traveled way is shown to be 24 ft, the width of traveled way may remain at 22 ft on reconstructed highways where alignment and safety records are satisfactory.

[b] 18 ft minimum for ADT under 250.

[c] May be adjusted to achieve a minimum roadway width of 30 ft for design speeds of 30 mph or less.

Structures

A structure is considered a bridge when its length, measured along the center of the roadway, is more than 20 feet (6.1 m) from abutment to abutment, or extreme ends of openings for multiple boxes and pipes where the clear distance between the openings is less than half of the smaller opening. A structure is a culvert when it cannot be classified as a bridge and provides an opening under a roadway. (SDCL 31-14-1) Culverts shall be no less than 24 feet (7.3 m) in length. (SDCL 31-12-18)

New and Reconstructed Bridges

The design loading for new and reconstructed bridges should be HS 20 (MS 18). The minimum roadway widths are shown in the tables below.

Flood plain evaluation will be in accordance with 23 CFR 650A. Hydraulic design will normally be for the 10 year storm on Local Rural Road bridge replacement projects with an overflow section in the approach grade. Bridge replacement projects on Rural Collector Roads and Streets will normally be designed to pass the 25 year storm. If the ADT is less than 100, use the 10 year storm. Low water crossings will be designed with report #FHWA/RD-83/015, Design and Construction of Low Water Stream Crossings, as a guide. Typically the low water crossings are designed using a 2 year design frequency with 1.5 feet of overtopping depth. Scour design will be in accordance with HEC-18 and riprap design will be in accordance with HEC-11.

Local Rural Roads

Minimum clear roadway widths and design loadings for new and reconstructed bridges. 1994 AASHTO 423 (English Conversion)

Traffic	Minimum Clear Roadway Width of Bridge	Design Loading Structural Capacity
ADT-400 & under	Traveled Way + 2ft (each side)	HS 20
ADT 400-2000	Traveled Way + 3ft (each side)	HS 20
ADT Over 2000	Approach Roadway (Width)	HS 20

Rural Collector Roads and Streets
Minimum roadway widths for new and reconstructed bridges.[b]
1994 AASHTO 467 (English Conversion)

Current Traffic ADT	Minimum Roadway Width of Bridge	Design Loading Structural Capacity
Under 400	Width of traveled way plus 2 ft each side	HS 20
400 -1500	Width of traveled way plus 3 ft each side	HS 20
1500-2000	Width of traveled way[a] plus 4 ft each side	HS 20
Over 2000	Approach roadway width[a]	HS 20

[a] For bridges in excess of 100 ft in length the minimum width of traveled way plus 3 ft on each side will be acceptable.

[b] Where the approach roadway width (traveled way plus shoulder) is surfaced, that surfaced width shall be carried across all structures

Bridges to Remain in Place

Due to high costs it may not always be possible to replace old bridges. If a bridge is in reasonably good shape and it meets the minimum criteria it may remain in place. If it does not meet the design loading, it shall be posted at its safe loading. Information on design load and roadway width is shown below. If a structure is >100 feet (30 m) it should be analyzed separately due to the many variables that become more critical as the size of the structure increases.

Local Rural Roads

Minimum structural capacities and minimum roadway widths for bridges to remain in place. 1994 AASHTO 424 (English Conversion)

Traffic	Design Loading Structural Capacity Minimum[d]	Roadway Clear Width (ft)[a] Minimum[b,d]
ADT 0-50	H-10	20[c]
ADT 50-250	H-15	20
ADT 250-1500	H-15	22
ADT 1500-2000	H-15	24
ADT Over 2000	H-15	28

[a] Clear width between curbs or rails, whichever is the lesser.

[b] Minimum clear widths that are 2 ft narrower may be less than the approach traveled way width.

[c] For one-lane bridges use 18 ft.

[d] Does not apply to structures with total length greater than 100 ft.

Rural Collector Roads and Streets

Minimum structural capacities and minimum roadway widths for bridges to remain in place. 1994 AASHTO 467 (English Conversion)

Traffic ADT	Design Loading Structural Capacity	Roadway Clear Width (ft)[a]
Under 400	HS-15	22
400-1500	HS-15	22
1500-2000	HS-15	24
Over 2000	HS-15	28

[a]Clear width between curbs or rails, whichever is the lesser, is considered to be at least the same as the approach traveled way width.

Bridge Rail

Bridge rail end protection and bridge rail systems that have been crash tested in accordance with NCHRP 350 will be provided on Rural Collector Roads and Streets and Local Rural Roads with ADT's greater than 150. Local Rural Roads with ADT's

less than 150 may have rail end treatments turned down 15° or flatter and rail systems designed in accordance with NCHRP 350 Test Level 2 or better design criteria.

Vertical Clearance

The vertical clearance over the entire roadway surface should be ≥14 feet (4.3 m). If future plans include resurfacing, an additional depth should be added.

Right-of-Way Width

The right-of-way width should be sufficient to include all elements of the roadway, required clear zone distance, and any additional width for future widening.

Inslopes and Backslopes

On Local Rural Roads, inslopes should be no steeper than 2:1 without guardrail protection. The backslopes should be no greater than the maximum needed for stability.

On Rural Collector Roads and Streets, inslopes should be no steeper than 3:1 without guardrail protection. The backslopes should be no greater than 2:1.

Clear Zone

The minimum clear zone width from the edge of the traveled way is 10 feet (3 m) on Local Rural Roads. On Rural Collector Roads and Streets, the minimum clear zone width from the edge of the traveled way is 10 feet (3m) when the design speed is ≤40 mph (60 km/h). Greater distances are desirable for safety purposes especially around the outside of horizontal curves where the clear zone should be extended, as a maximum, to the right-of-way line. Distances less than this should be shielded from the roadway by guardrail. Minimum clear zone widths for resurfacing projects (RRR) can

be found in the table on sheet 22. Roadside obstacles within the clear zone shall be protected or removed unless an economic analysis shows this to not be feasible.

Cross pipes 30 inches (750 mm) in diameter or less may be within clear zones when the pipe ends (not flared ends) are slope beveled to match the inslope. Pipes 36 inches (900 mm) in diameter or larger shall be protected when within the clear zones.

Additional clear zone information, such as for different ADTs, for design speeds over 40 mph (60 km/h), and for around a horizontal curve where more recovery area may be needed, is shown in the following tables and figures.

K_{cz} (Curve Correction Factor)

DEGREE OF CURVE	DESIGN SPEED						
	40	45	50	55	60	65	70
2.0	1.08	1.10	1.12	1.15	1.19	1.22	1.27
2.5	1.10	1.12	1.15	1.19	1.23	1.28	1.33
3.0	1.11	1.15	1.18	1.23	1.28	1.33	1.40
3.5	1.13	1.17	1.22	1.26	1.32	1.39	1.46
4.0	1.15	1.19	1.25	1.30	1.37	1.44	
4.5	1.17	1.22	1.28	1.34	1.41	1.49	
5.0	1.19	1.24	1.31	1.37	1.46		
6.0	1.23	1.29	1.36	1.45	1.54		
7.0	1.26	1.34	1.42	1.52			
8.0	1.30	1.38	1.48				
9.0	1.34	1.43	1.53				
10.0	1.37	1.47					
15.0	1.54						

$$CZ_c = (L_c)\,(K_{cz})$$

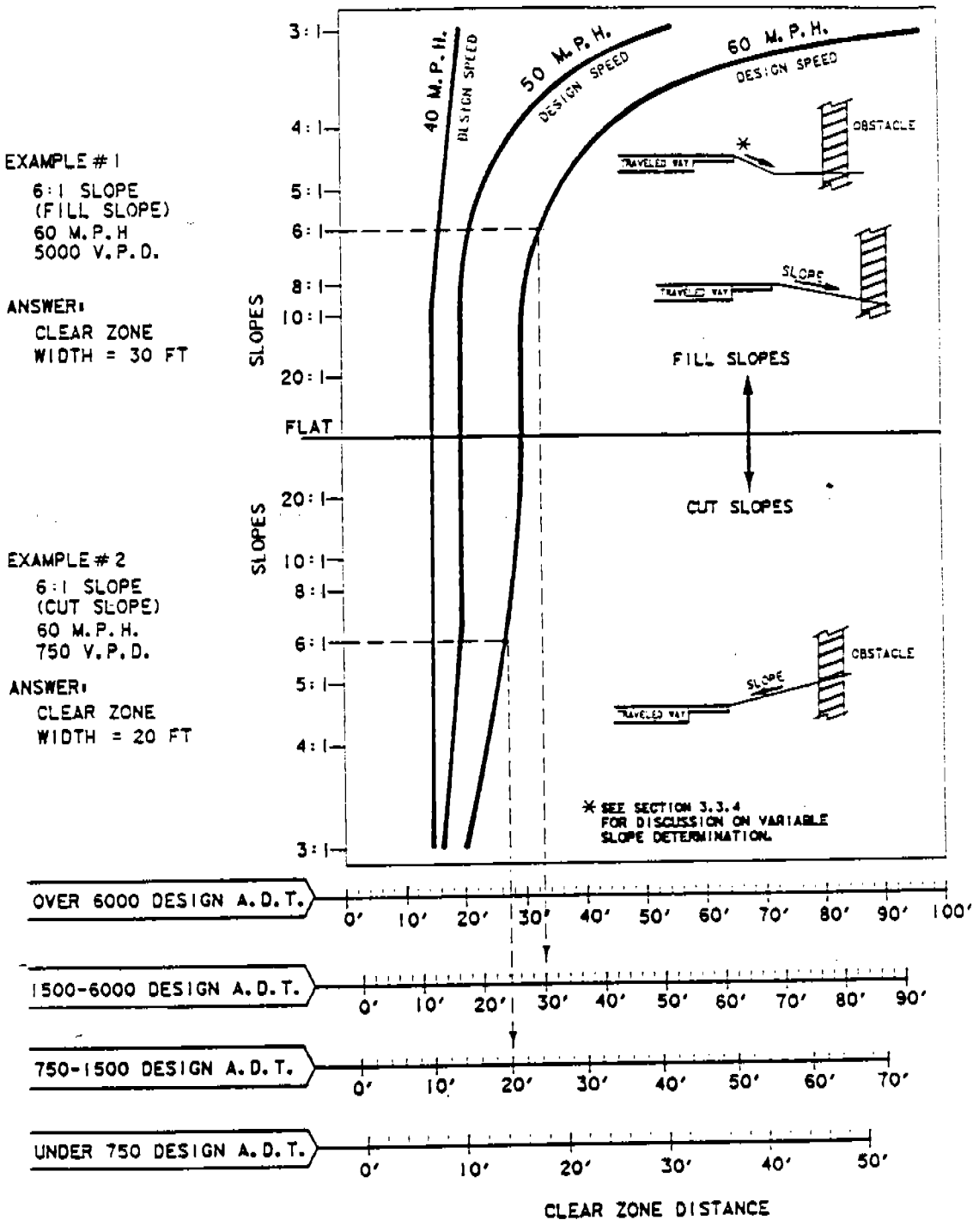
Where: CZ_c = clear zone on outside of curvature, ft.

L_c = clear zone distance, ft., Figure 3.1 or Table 3.1

K_{cz} = curve correction factor

Note: Clear zone correction factor is applied to outside of curves only. Curves flatter than 2.0° do not require an adjusted clear zone.

Clear Zone Distance Curves RDG



Curb & Gutter

Curb may be used on Local Rural Roads if urban conditions are present and the operating speed of the roadway is between 40 mph (60 km/h) and 50 mph (80 km/h).

Intersections

Many factors should influence the design of an intersection. A few items to consider are corner radius, the minimum degree of intersection legs, and corner sight distance. Complete details of intersection design can be found in the AASHTO Policy on Geometric Design.

On Rural Collector Roads and Streets, adequate approach sight distance should be provided. The edge radius should be a minimum of 50 feet (15.2 m). Intersection legs should be 90°, but no less than 30° where practical, when traffic is required to stop at the intersection.

On Local Rural Roads, the corner radius should be able to accommodate the largest vehicle anticipated to use the intersection. Intersection legs should be 90°, but no less than 60°, when traffic is required to stop at the intersection. The following table shows corner sight distances for various design speeds.

Local Rural Roads

Corner sight distances at rural intersections. 1990 AASHTO 432

Design Speed (mph)	Corner Intersection Sight Distance (ft)[a]
60	650[b]
50	515
40	415
30	310
20	210

[a] Corner sight distance measured from a point on the minor road at least 15 ft from the edge of the major traveled way and measured from a height of eye at 3.50 ft on the minor road to a height of object at 4.25 ft on the major road.

[b] At 60 mph stopping sight distance governs.

Utilities

All utility lines crossing a roadway shall be at least 18 feet (5.5 m) in height measured from the highest point of the roadway crown. (SDCL 31-26-19)

Railroad Crossings

Plenty of sight distance is necessary at railroad crossings as well as proper warning devices based on the MUTCD. The roadway width at a crossing should be the same as the approach roadway.

Mailboxes

Mailboxes will be installed and mailbox turnouts will be constructed in accordance with current SDDOT policy. When the ADT is less than 100, and the sight distance is determined to be adequate, turnouts can be eliminated.

Signing

Construction signing, traffic signing, railroad crossing protection and pavement marking will be provided on all projects in accordance with the Manual on Uniform Traffic Control Devices (MUTCD) and South Dakota State Law.

Erosion Control

Whenever necessary, seeding, mulching, sodding, etc., are needed to protect the soil conditions.

7. PRELIMINARY ENGINEERING

Survey, design and plan preparation will be accomplished by the county, consulting engineering firms, or the SDDOT. Agreements for engineering services by consultants with Federal participation will be in accordance with 23 CFR 172 and the approved Consultant Selection Procedure.

Project plans will be reviewed by the county, Secondary Roads Section, Region Engineer, Area Engineer and applicable central offices within the SDDOT.

Hydraulics, foundations, materials, surfacing, construction and permanent traffic signing recommendations as applicable will be provided by the SDDOT on all projects. Economic studies will be provided by the SDDOT if required, or upon request on all projects.

When required, Section 404 permits will be obtained by the SDDOT and required contract provisions included in the contract proposal.

Where projects include unusual or complex bridges, bridges that are estimated to cost over $5 million or have other unusual features, preliminary plans will be submitted to FHWA for review and technical guidance.

Project plans will be approved by the Secondary Roads Engineer prior to scheduling for letting.

The South Dakota Standard Specifications for Roads and Bridges (latest edition), Supplemental Specifications, and required contract provisions as applicable, will be made a part of the contract documents on all projects. Standard title and typical plan sheets for most all types of work are available and will be used to the maximum extent practicable to provide uniformity and economy.

8. CONSTRUCTION - CONTRACT AND FORCE ACCOUNT

Projects will be let to contract by the SDDOT in accordance with 23 CFR 635 and South Dakota State Law. Contract award will be made by the State Transportation Commission subject to concurrence by the Board of County Commissioners.

Adequate justification will be formally documented and retained in the project file when bids are substantially higher than the engineers estimate, are unusual or have substantial variations. The criteria included in paragraph 4a of FHWA Technical Advisory T5080.4 will be used to evaluate bids received. Where the low bid does not meet the criteria of this paragraph and the county desires to award the contract as bid, justification will be submitted to SDDOT. Where the low bid does meet the criteria of this paragraph and the county desires to reject all bids, justification will be submitted to SDDOT.

Construction engineering will be provided on all projects in accordance with current operating policy as defined by policy letters and procedures issued by the Operations Division. Project supervision will be at the direction of the SDDOT Area Engineer. All projects will be constructed in accordance with current South Dakota Standard Specifications for Roads and Bridges. Quality control, sampling, testing and material certification in accordance with the SDDOT Materials Manual, will provide control and assure the project is constructed in accordance with the plans and specifications.

Approval authority for routine construction change orders rests with the Region Engineer and the County Highway Superintendent. Construction change orders shall be prepared and processed in accordance with the Division of Operation's current policies concerning construction change orders.

Construction change orders that involve a change in the scope of the work or substantial cost increase, as determined by the Region Engineer and the County Highway Superintendent, will be reviewed and approved with the Secondary Roads Section.

Projects may be constructed under a negotiated "Force Account" agreement using county equipment and personnel when it can be shown the county is adequately equipped and staffed to do the work and that it is cost effective. Based upon a county's request, the Secondary Roads Engineer will make the determination that the force account method is cost effective. Construction engineering and quality control by SDDOT will be the same as on contract projects.

9. RIGHT-OF-WAY

Appraisals will be the responsibility of the county and may be accomplished by the Director of Equalization, staff appraisers or fee appraisers. The Secondary Roads Section, as assisted by Right-of-Way Program personnel, will review the appraisals and supervise right-of-way acquisition procedures. The negotiation process will be the responsibility of a qualified individual within the county. Relocation Assistance, if required, will be accomplished by Right-of-Way Program personnel within the SDDOT upon request by the Secondary Roads Section. Prior to advertising of contracts the FHWA Division Administrator will be furnished a Right-of-Way Certification on all projects to assure compliance with applicable provisions of Right-of-Way Directives and approved procedures.

Appendix 2 contains a detailed description of the right-of-way acquisition procedure. Forms can be requested from the Secondary Roads Section at any time.

10. UTILITY ADJUSTMENTS

Adjustment of Utilities and Railroads will be in accordance with South Dakota State Law, SDDOT Utility Accommodation Policy and 23 CFR 645A. Coordination with the utility company and preparation of agreements are the responsibility of the Utility Section of the Project Development Program. Agreement approval is the responsibility of the Secondary Roads Engineer.

Utility facilities will be adjusted or removed from the right-of-way in cases where they constitute a safety hazard. Minimum lateral clearances as shown on page 31, as

applicable, may be allowed on a project by project basis considering traffic volume, right-of-way width, removal cost and location. Exceptions to these criteria shall be approved by the Secondary Roads Engineer.

11. SAFETY PROGRAM

A continuing safety improvement effort will be provided to local officials by all elements of the SDDOT using Safety Funds and normal Federal-aid Funds. Areas receiving priority and emphasis are design standards, individual project design, permanent traffic signing, construction signing, pavement marking, removal of roadside obstacles and elimination of deficient bridges.

The Traffic Safety Engineer, assigned to the Local Government Assistance Program, is available to provide safety related services to local agencies upon request. Typical services available include traffic control signing recommendations, intersection geometrics recommendations, and cost-benefit studies for proposed safety projects.

12. ACCOUNTING PROCEDURES AND GUIDE COMPLIANCE

Accounting control and current billing will be in accordance with procedures contained in the "Memorandum of Understanding" between the SDDOT and the FHWA and the SDDOT Finance Manual under control of the Division of Fiscal and Public Assistance.

Audits and Internal Review will evaluate selected projects and activities for Plan compliance. Reports of review, deficiencies and corrective actions will be furnished to Office Supervisors, Division Directors, Region Engineers, applicable Program Managers, Area Engineers, FHWA and local officials.

Assurance of compliance by local officials with existing and subsequent Federal or State Laws and requirements will be provided by the Secondary Road Section by

continuous review of all phases of each project. Changes in the current Plan or policy will be provided by the Secondary Roads Section by direct mailing and will be discussed at various State and Area meetings.

13. USE OF STANDARD FORMS, AGREEMENTS AND CERTIFICATES

The following standard forms will be used on all projects as applicable. Forms will be revised as necessary to comply with future changes in Federal or State Laws and regulations.

Program Resolution; Design Sheets; Utilities Certificate;

Public Hearing Standard Forms; Right-of-Way Certificate;

Maintenance Agreement and Letting Authorization.

All forms are available from the Secondary Roads Section.

14. FINAL INSPECTION AND ACCEPTANCE

A final inspection will be made of each completed project by a representative of the applicable local authority and the Region Engineer. The Region Engineer will furnish notification of final inspection and acceptance to the Division of Operations.

The Area Engineer shall prepare and process the Secondary Completion Form (DOT-240). The Division of Operations will furnish the notification of project completion to the FHWA. All project records and documents will be available for review and inspection by FHWA officials at all times during project development and construction,

and will be retained and available as per 23 CFR 17 for review and inspection for a three year period after submission of the final voucher for the project.

15. EVALUATION AND REVISION

The Plan will be revised as required by changes in SDDOT operation, where review has shown change to be desirable, where oversight is discovered or by subsequent Federal and State Laws, orders and directives. Revisions of the Plan will be numbered, dated and issued to local officials. Changes of the Plan may be initiated by the counties or the South Dakota Department of Transportation, through the Local Government Assistance Program.

The State will periodically review the counties' maintenance of previous Federal-aid projects in accordance with the approved Maintenance Review Policy.

16. ADMINISTRATION OF HIGHWAY BRIDGE REPLACEMENT AND REHABILITATION PROGRAM

23 CFR 650D (Highway Bridge Replacement Program) provides for administration of bridge replacement projects under provisions of the approved Plan.

Bridge replacement projects, both on and off the Federal-aid System, sponsored by a county or other local political subdivision including cities with populations of 5000 or less, will be administered in accordance with Section I of this Plan. Design standards will be in accordance with Part 6 of Section I. Bridge replacement projects in cities with populations greater than 5000, will be handled by the Urban Systems Engineer in accordance with Section II of this Plan.

Special Bridge Replacement Funds apportioned to the State of South Dakota are divided as follows: fifty percent (50%) is made available to the cities and counties and fifty

Special Bridge Replacement Funds apportioned to the State of South Dakota are divided as follows: fifty percent (50%) is made available to the cities and counties and fifty percent (50%) is retained by the State. The 50% made available to cities and counties is available for eligible projects on a statewide basis with sufficiency rating of the structure a significant consideration in prioritizing project requests that are submitted. Not less than 30% nor more than 70% of the funds made available to the cities and counties shall be expended for projects located on public roads other than those on the Federal-aid System.

17. OMAD PROJECTS

Operation Access Air Defense (OMAD) Missile road projects will be administered under Part I of this Plan. OMAD projects will be selected by the United States Department of Defense, Air Force, and approved by FHWA. Coordination with the Secondary Roads Engineer and the Region Engineer will be continuous through all phases of project review, evaluation and selection.

New construction projects will be developed in accordance with applicable on or off Federal-aid System design criteria. Resurfacing projects will be developed in accordance with OMAD Criteria.

SECONDARY ROAD PLAN
SECTION II - CITY SPONSORED PROJECTS

1. AUTHORITY AND APPLICABILITY

Section II of the "Secondary Road Plan" (hereinafter referred to as the "Plan") is a written statement setting forth the standards and procedures to be followed in location, design, construction, and administration of work on the Federal-aid System, under the jurisdiction of the cities (Federal-aid Urban System). The policy of the South Dakota Department of Transportation (SDDOT) will be to permit maximum flexibility and encourage local initiative and cooperation in selecting, developing and constructing projects under the Plan.

The SDDOT will administer projects financed with Surface Transportation Program (STP) funds on the Federal-aid Urban System under the provisions of this Plan. Where Federal-aid is made available for bridge projects not on the Federal-aid System, the SDDOT will administer those projects under this Plan when Federal regulation permits. All phases of project activity will be accomplished in accordance with this Plan; and applicable Federal requirements.

Authority under the Plan extended from FHWA to the SDDOT does not include FHWA responsibilities under the National Environmental Policy Act of 1969, Section 138 of Title 23, Title VI of the Civil Rights Act of 1964, Title VIII of the Civil Rights Act of 1968 as amended in 1974, and the Uniform Relocation Assistance and Land Acquisition Policies Act of 1970 (as amended) and 49 CFR Part 24.

Provisions of Section II of the Plan are applicable only to projects sponsored by the cities.

2. DEPARTMENT OF TRANSPORTATION, LOCAL GOVERNMENT ASSISTANCE PROGRAM, URBAN SYSTEMS SECTION

The Urban Systems Engineer within the Urban Systems Section of the Local Government Assistance Program, SDDOT, will be responsible for administration of projects under Section II of the Plan. Advice, consultation and recommendations are available from all sections within the SDDOT and will be requested and coordinated by the Urban Systems Engineer.

The primary function of the Urban Systems Section is providing the cities information and guidance on all phases of the Plan on a continuous basis and assuring compliance with all Federal and State requirements. Cooperation with local government officials will be continuous during project selection, development and construction.

The Region Engineer will be responsible for the construction administration of the projects.

3. ALLOTMENT OF FUNDS

STP Funds are sub-allocated to the cities, and are divided, based on population, among cities greater than 5000 in population. Authority for apportionment of funds is by action of the SDDOT Transportation Commission of October 8, 1965. City officials will be advised of their STP Fund balance bi-annually, using a computer print out indicating obligations by project and allocations.

4. PROJECT SELECTION AND PUBLIC INVOLVEMENT

Projects will be selected by the City Councils in cooperation with the SDDOT and other appropriate local officials. The city is the political entity who will be held responsible by SDDOT for all required documents, actions and functions during project development, construction and for required future project maintenance.

Public and interagency involvement and consideration of social, economic and environmental effects will be processed in accordance with SDDOT Public Involvement/Public Hearing Process, Paragraph E Section I and applicable portions of Section II, III and IV and with 23 CFR 771. SDDOT will provide assistance to the cities in assuring compliance with Public Involvement Procedures. The environmental classification will be submitted at the time of program submission and batched for concurrence by the FHWA except for projects that require significant right-of-way, 404 permits, wetland findings, 4(f) statements, Environmental Assessments or Environmental Impact Statements. These projects will require an individual environmental classification approved by FHWA prior to advertising for bids.

All projects requiring acquisition of significant amounts of right-of-way, temporary easements or that substantially change the layout or function of connecting roads or have a significant adverse impact on abutting property or have significant environmental impact will require a public hearing, public meeting or provide a Notice of Opportunity for Public Hearing in accordance with the SDDOT Public Involvement/Public Hearing Process.

When proposed elements of design, to be used on a project, have been approved, a copy of the approved Environmental Classification will be sent to the city as a notification.

5. PROGRAMMING, AUTHORIZATION AND SYSTEM REVISION

The annual statewide program of city sponsored projects will be submitted as part of the Statewide Transportation Improvement Program (STIP) to the FHWA for approval before the first of October. Project requests in resolution form should be submitted by the City Councils prior to the first of April each year for consideration and approval by the SDDOT and inclusion in the annual program. A supplemental program or programs may be submitted if required, depending on need.

Federal aid routes are based on functional classification. Any urban route classified above a Local Street, (Collector, Arterial, and Principal Arterials) are eligible for federal funds.

Selection of the Federal-aid Urban System shall be accomplished cooperatively by the SDDOT and appropriate local officials. Revision of the city street portion of the Federal-aid Urban System shall be by request of the City Councils in resolution form subject to approval of the SDDOT and the FHWA. System revision will be accomplished in accordance with 23 CFR.

6. DESIGN CRITERIA

Design criteria will be in accordance with the 1994 edition of the AASHTO publication, “A Policy on Geometric Design of Highways and Streets.” (Any reference to this publication will be noted by ‘AASHTO Policy on Geometric Design’.) Projects on the Federal-aid System under the jurisdiction of the cities will be designed to meet the criteria found in Chapter VI, Collector Roads and Streets, and in Chapter VII, Rural and Urban Arterials. Most of this information is reproduced within the following paragraphs and

tables. The tables in the body of the Plan are in English units. To maintain uniformity, most are reproduced from the 1990 Edition of the AASHTO Policy on Geometric Design and are denoted by '1990 AASHTO' and the applicable page numbers. Some of the English unit tables had to be converted directly from the 1994 edition and are noted by '1994 AASHTO (English Conversion)' and the applicable page numbers. Other tables are combined from the 1990 and 1994 editions and are noted as such. Metric versions of all the tables, based on the 1994 edition, can be found in Appendix 1.

The best possible design should be selected considering safety, existing and future needs, economy, reasonable maintenance costs and available funding. In restricted areas, or where there are other unusual considerations, it may not be possible to meet all minimum design values. Exceptions to applicable design criteria will be considered upon request by a city on a project by project basis when in the public interest and subject to approval by the SDDOT.

Urban Collectors

Design Traffic Volumes

Roads should be designed for the amount of traffic they carry and for their type of use. A projected traffic count of 10 to 20 years is normally used for design.

Design Speed

The minimum design speed depends on the type of terrain as well as the environment where the road is located. The minimum for Urban Collectors should be 30 mph (50 km/h). Other values can be found in the table shown below.

Minimum design speeds (rural conditions).
1994 AASHTO 461 (English Conversion)

Minimum Design Speeds (mph) for Design Volumes of:			
Type of Terrain	ADT 0-400	ADT 400-2000	ADT Over 2000
Level	40	50	60
Rolling	30	40	50
Mountainous	20	30	40

Sight Distance

This is important for the safety of motorists entering and exiting the road as well as for those passing other motorists. There are two categories of sight distances, stopping and passing. For stopping sight distance, the data in the corresponding table below is based on an eye height of 3.5 feet (1070 mm) for the person who will be stopping and an object height of 0.5 feet (150 mm). For passing sight distance, the data in the corresponding table below is based on an eye height of 3.5 feet (1070 mm) for the person in the passing vehicle and an object height (i.e. the oncoming vehicle) of 4.25 feet (1300 mm).

Stopping sight distance for Urban Collectors should range from 200 to 475 feet (60 to 140 m). Passing sight distance is rarely applicable.

Minimum stopping sight distance (wet pavements). 1990 AASHTO 470

Design Speed (mph)	Assumed Speed for Condition (mph)	Stopping Sight Distance (Rounded for Design) (ft)	K Value[a] for Crest Vertical Curves (Rounded)	K Value[a] for Sag Vertical Curves (Rounded)
20	20-20	125-125	10-10	20-20
25	24-25	150-150	20-20	30-30
30	28-30	200-200	30-30	40-40
35	32-35	225-250	40-50	50-50
40	36-40	275-325	60-80	60-70
45	40-45	325-400	80-120	70-90
50	44-50	400-475	110-160	90-110
55	48-55	450-550	150-220	100-130
60	52-60	525-650	190-310	120-160
65	55-65	550-725	230-400	130-180
70	58-70	625-850	290-540	150-220

[a]K value is a coefficient by which the algebraic difference in grade is multiplied to determine the length in feet of the vertical curve which will provide minimum sight distance.

Minimum passing sight distance. 1990 AASHTO 471

Design Speed (mph)	Minimum Passing Sight Distance (ft)	K Value[a] for Crest Vertical Curves (Rounded)
20	800	210
25	950	300
30	1,100	400
35	1,300	550
40	1,500	730
45	1,650	890
50	1,800	1,050
55	1,950	1,230
60	2,100	1,430
65	2,300	1,720
70	2,500	2,030

[a]K value is a coefficient by which the algebraic difference in grade is multiplied to determine the length in feet of the vertical curve which will provide minimum sight distance.

Roadway Crown (Cross Slope)

Good drainage of the roadway surface is dependent upon the cross slopes. Where there are flush shoulders adjacent to the traveled way or where there are outer curbs, 1.5% to 3% cross slopes should be used.

Grades

The grades should be as level as the surrounding terrain. At least 0.30% is needed for drainage with ≥0.50% being preferred. Urban street grades are generally depressed below the surrounding terrain to accommodate adjacent property drainage to the curb area and accumulation in the storm drain system. Maximum urban street grades are shown in the table below.

Maximum Grades[a] 1990 AASHTO 472

	Design Speed (mph)					
Type of Terrain	20	30	40	50	60	70
	Grades (Percent)					
Level	9	9	9	7	6	5
Rolling	12	11	10	8	7	6
Mountainous	14	12	12	10	9	7

[a]Maximum grades shown for urban conditions of short lengths, (less than 500 ft), on one-way down grades and on low-volume rural collectors may be 2% steeper.

Superelevation

Superelevation may be necessary in some areas but its use is rare. When the traffic speed is ≤40 mph (60 km/h) the absence of superelevation is not detrimental to the driver. Warping or partial removal of the tangent pavement crown can take care of any slight discomfort in this case.

The maximum superelevation when used should be 6%.

Number of Lanes

Two traffic lanes, shoulders, and parking space are necessary on Urban Collectors. When developing a road in stages, a rural section with shoulders can be provided with enough of a cross section to provide for future development into an urban section. High traffic volumes will require more research to determine the number of lanes required. See the AASHTO Policy on Geometric Design and the Highway Capacity Manual for more information.

Roadway Width

The minimum roadway width is the width needed to accommodate moving traffic lanes, parking lanes, and the median width when applicable. Traffic lanes should be a minimum of 10 feet (3.0 m) in residential areas and 12 feet (3.6 m) in industrial areas. With severe right-of-way restrictions 11 feet (3.3 m) lanes can be used. Turning lanes at intersections should range from 10 feet (3.0 m) to 12 feet (3.6 m) depending on the percentage of trucks. When rural shoulders are used refer to the table on page 27.

Parking Lanes

Parking lanes disturb the traffic flow thereby creating a safety problem. Their use is acceptable where there is sufficient width to minimize the safety risks. Parking lane width in residential areas should range between 7 feet and 10 feet (2.1 m and 3.0 m) on one or both sides of the road. The range of parking lane widths in industrial and commercial areas should be between 8 feet and 10 feet (2.4 m and 3.0 m) on one or both sides of the road. When curb and gutter is present the gutter pan width can be included as part of the minimum width of the parking lane, although it is better to count

it in addition to the lane width. Diagonal or angle parking should only be used under special conditions. Transition out the parking lanes a minimum of 20 feet (65 m) in advance of intersections.

Medians

When four or more lanes are used on an Urban Collector a median should be included as a part of the roadway.

There are several different kinds of medians that can be used depending on what the conditions warrant. Four main types with their corresponding widths are listed as follows: paint-striped separations (2 feet - 4 feet, 0.6 m - 1.2 m), narrow raised or curbed sections (2 feet - 6 feet, 0.6 m - 1.8 m), paint-striped or curbed sections providing space for separate left-turn lanes (10 feet - 16 feet, 3.0 m - 4.8 m), and curbed sections providing space for shielding protection of vehicles crossing at intersections and space for parkway landscape treatment (16 feet - 40 feet, 4.8 m - 12.0 m).

When using raised medians, openings should only be at intersections and reasonably spaced driveways of major traffic generators. Design them with left-turn lanes whenever practical. Adequate sight distance is required. The shape and length of the medians depends on their width and the vehicle types to be accommodated. The minimum length of openings should equal the projected roadway width of the intersecting cross street or driveway. It is desirable to have room for a 50 feet (15 m) turning control radius or for the design vehicle between the inner edge of the lane adjacent to the median and the centerline of the intersection roadway. Raised medians

may be impractical in some areas so a continuous left-turn lane, flush with the adjoining traffic lanes and painted, is acceptable.

Curbs

Streets are normally designed with curbs for high utilization of available width, control of drainage, protection of pedestrians, and delineation. The use of the SDDOT Type BL curb is recommended.

Curb to the right of traffic should be 6 inches (150 mm) high. On lightly traveled residential streets with less than a 2% grade, a lower curb not requiring modification at entrances may be used. The minimum curb slope is 6:1.

Median curb has different criteria. When left turns are permitted and the median width is less than 10 feet (3.0 m), a well-delineated, flush or rounded curb, 2 inches - 4 inches (50 mm - 100 mm) in height, should be used. Flush or bordered curb, 1 inch - 2 inches (25 mm - 50 mm) in height, should be used on traversable wider medians. On narrow to intermediate width medians with no cross median movements allowed, the curb height should be 6 inches - 8 inches (150 mm - 225 mm). Barrier 6 inches (150 mm) or greater, next to moving traffic, should be offset 1 feet - 2 feet (0.3 m - 0.6 m). The gutter pan can be counted as the offset.

Drainage of Gutter

The gutter grade should be 0.30%, but 0.50% should be used whenever possible.

Sidewalks

Sidewalks should be provided along both sides of Urban Collectors in all commercial areas and areas containing schools, parks, shopping areas and transit stops. In residential areas it is desirable to have them on both sides but only one is required.

Sidewalks should be kept as far from the traveled way as possible, preferably along the right-of-way line. This provides protection for the pedestrian and room for snow storage. Sidewalk widths should be a minimum of 4 feet (1.2 m) in residential areas and 4 feet - 8 feet (1.2 m - 2.4 m) in commercial areas.

Driveways

The following items should be regulated when dealing with driveways: width, placement in terms of property lines and intersecting streets, angle of entry, vertical alignment, and the number of entrances to a single property.

Curb-Cut Ramps

These ramps should be provided at all crosswalks and intersections in order to comply with the Americans with Disabilities Act.

Roadway Widths for Bridges

The minimum clear width for new bridges with curbed approaches is the same as the curb-to-curb width of the approaches. If no sidewalk is provided, place bridge rail right beyond the curb to prevent vaulting. The minimum clear width for streets with shoulders and no curbs is equal to the full approach roadway width across the bridge.

Sidewalks should extend across the bridge. It is desirable to have at least one sidewalk on each bridge. The table on page 29 also applies to urban collector bridge widths.

Vertical Clearance

The vertical clearance over the entire roadway surface should be ≥14 feet (4.3 m). If future plans include resurfacing, an additional width should be added.

Clear Zone

The minimum clear zone width from the edge of the traveled way on roads with curb but no shoulders is 1.5 feet (0.5 m) or wider beyond the curb face. When the outer lane is a continuous parking lane no clear zone width is required, but a minimum of 2 feet (0.6 m) is recommended for the opening of car doors. Urban Collectors with shoulders and no curb have the same clear zone requirements as Rural Collectors.

Remove obstacles such as trees only if necessary along Urban Collectors since these are part of the urban environment. It is best to provide wide and level border areas but consider the environment that is being altered. The use of barriers is rare on these types of roadways.

Right-of-Way Width

The right-of-way width should be sufficient to include all elements of the roadway such as the roadway, median, shoulders, sidewalks, public utility facilities, outer slopes except where on obtained easements, and required clear zone distances. The right-of-way width for a 2 lane roadway should be 60 feet - 80 feet (12m - 18 m) which should be inclusive of the items listed above.

Utilities

Utilities may be placed within the right-of-way providing that their placement is determined after all vehicle movements have been accommodated. They should be set back as far as possible with breakaway bases.

Border Area

The border area is found between the traveled way and the right-of-way line. It provides for a buffer zone, a place for utilities, and adds to the esthetics of the roadway areas. The border width should range from 8 feet - 11 feet (2.4 m - 3.3 m), including the sidewalk width.

Intersection Design

Many factors need to be considered when designing an intersection such as peak traffic periods, the types of vehicles using the intersection (passenger or commercial), the approach speeds, bus stops in the area, and the number of approach roadways and their locations.

Two of the more important considerations of intersection design are the geometric design of the intersection, including capacity analysis, and the location and type of traffic control devices. An attempt should be made to include as many factors in the design as possible although existing conditions often restrict what can and cannot be done. See the AASHTO Policy on Geometric Design for a complete discussion on intersection design.

Railroad Crossings

Plenty of sight distance is necessary at railroad crossings as well as proper warning devices based on the MUTCD. If the roadway has curb, the roadway width at the crossing should be the same as the curb to curb distance of the approaches. If the roadway does not have curb, the roadway width at the crossing should be the same as the approach roadway width plus the shoulder widths. If sidewalks are present they should be carried through the crossing.

Roadway Lighting

It is important in urban areas to provide for good visibility both during the day and the night. This provides for safe traveling conditions as well as a discouragement to crime.

Signing

Construction signing, traffic signing, railroad crossing protection and pavement marking will be provided on all projects in accordance with the Manual On Uniform Traffic Control Devices (MUTCD) and South Dakota State Law.

Erosion Control

Whenever necessary, seeding, mulching, sodding, etc., are needed to protect the soil conditions.

Landscaping

Landscaping is provided for aesthetic and erosion control purposes in urban areas, but sight distance and safety must be the primary considerations in the planning.

Urban Arterials

Design Traffic Volumes

Roads should be designed for the amount of traffic they carry and for their type of use. A projected traffic count of 20 years or less is normally used for design. Use the Design Hourly Volume (DHV) to determine design requirements.

Design Speed

Urban Arterials should be designed for 40 mph to 60 mph (60 km/h to 100 km/h) with the more built up areas having the lower speeds and the outlying areas having the greater speeds. Occasionally 30 mph (50 km/h) can be used.

Sight Distance

Adequate sight distance is very important for safety as well as for the efficiency of the roadway. The table below shows values applicable to Urban Arterials.

Relation of sight distance to design speed. 1990 AASHTO 500

Design Speed (mph)	Minimum Stopping Sight Distance (ft)	Minimum Passing Sight Distance
30	200-200	1,100
40	275-325	1,500
50	400-475	1,800
60	525-650	2,100
65	550-725	2,300
70	625-850	2,500

Grades

The grade of Urban Arterials should be kept as flat as possible. Steep grades affect the overall traveling speed of the vehicles by either slowing them down while going uphill or speeding them up when going downhill. The safety of intersections can be

greatly affected if vehicles are unable to slow down in time. Under adverse weather conditions this problem will be magnified. Maximum grades are shown in the table below.

Maximum grades for urban arterials. 1990 AASHTO 525

	Design Speed (mph)			
Type of Terrain	30	40	50	60
	Maximum Grade (percent)			
Level	8	7	6	5
Rolling	9	8	7	6
Mountainous	11	10	9	8

Alignment

It is important to use the highest alignment design possible when designing Urban Arterials, especially when they are in the low speed range since they are rarely superelevated.

Cross Slope

Proper cross slope is needed to diminish problems such as hydroplaning and splashing which result from rutting. Cross slopes should range from 1.5-3%, with the lower values in the center lanes increasing by 1% for each additional lane until 3% is reached. Higher rates are used for parking lanes.

Superelevation

This is normally not used on low-speed curbed arterials due to the many factors that would have to be addressed, such as driveways, ice formation, drainage, and developed property.

Vertical Clearances

The vertical clearance over the entire roadway surface should be 16 feet (4.9 m). If future plans include resurfacing, additional clearance should be provided. In areas where there are existing structures or where conditions are restricted, a 14 feet (4.3 m) clearance can be used if allowed by local statute. In highly urbanized areas if there is one route with a 16 foot (4.9 m) clearance, a minimum of 14 feet (4.3 m) can be used on other routes.

Lane Widths

Different conditions warrant different lane widths. Judgment should be used along with the guidelines. In areas with heavy truck traffic, an additional 1 foot (0.6 m) should be added to the lane width. Conversely, if trucks are restricted, the lane width can be decreased by 1 foot (0.6 m).

Lanes should range from 10 feet to 12 feet (3.0 m to 3.6 m). In highly restricted areas with little or no trucks, 10 feet (3.0 m) lanes are sufficient. A width of 11 feet (3.3 m) is the most common on Urban Arterial streets. The most desirable width is 12 feet (3.6 m). This width is required on all higher speed, free-flowing principal arterials. Narrower lanes can be used in areas with speeds of ≤40 mph (60 km/h), especially where the right-of-way is limited. For through lanes, continuous two-way left-turn lanes, and lanes adjacent to painted medians, 11 feet (3.3 m) is adequate. Left-turn lanes and combination lanes, which provide for parking during off times and traffic during peak times, should be 10 feet (3.0 m).

Number of Lanes

The number of lanes will depend on the volume and type of traffic that is expected. Normally 4 to 8 lanes are used. Pavements are sometimes widened through intersections by the addition of turn lanes.

Roadway Width

The minimum roadway width is the width needed to accommodate moving traffic lanes, parking lanes, curbs, and the median width when applicable. The use of parking lanes should be rare. If used they should be wide enough to double as traffic lanes. These can be used initially as right-turn lanes at intersections.

Medians

Medians are very beneficial to Urban Arterials. When a median is used, its width should be a minimum of 4 feet (1.2 m). Every additional foot makes it safer. Left-turn lanes should be a minimum of 12 feet (3.6 m) in width. It is best to have an 18 foot (5.4 m) lane, with 12 feet (3.6 m) for the turning lane and 6 feet (1.8 m) for a separator. Under restricted conditions a 10 foot (3.0 m) turning lane and 2 foot (0.6 m) separator is acceptable. When using raised medians, openings should only be at intersections and major traffic generators making sure that these openings do not interfere with signal loops and left-turn lanes. When there are an odd number of lanes it is helpful to use one for left-turning vehicle storage. Left-turn only lanes throughout, work well when traffic speeds range between 25 and 45 mph (40 and 70 km/h) and there are no heavy concentrations of left-turn traffic.

Curbs and Shoulders

There are many advantages to using shoulders but this is rarely possible due to right-of-way restrictions. If shoulders are used, they are generally reinforced because they will be used as additional speed change lanes. When shoulders are curbed with barrier curb, the shoulder width should be wide enough to accommodate a disabled vehicle and be at least 6 feet (1.8 m) wide. Normally curb is not necessary when shoulders are used unless it is needed for drainage purposes.

Drainage

Several guidelines should be followed when dealing with drainage. All inlets should be safe for bicycles. When a parking lane is present, its full width can be used for drainage. When there is no parking lane, one-half of the outside travel lane can be used for drainage provided that two or more travel lanes exist in each direction. When three or more travel lanes exist in each direction, the full width of the outside lane can be used. Keep ponding at low points to a minimum. The width of water that spreads out on the pavement should not be greater than the width that spreads out on continuous grades.

Borders and Sidewalks

In residential areas the minimum border should be the sidewalk plus a buffer area between the sidewalk and the curb. In fully developed areas the border normally is all sidewalk. The minimum width is 8 feet (2.4 m), with ≥12 feet (3.6 m) being desired.

Railroad Crossings

Plenty of sight distance is necessary at railroad crossings as well as proper warning devices based on the MUTCD. If railroad traffic is common during off-peak times then a high type, at-grade crossing should be provided with flashing signals. If railroad traffic occurs during peak times a separation crossing is effective.

Parking Lanes

Parallel parking is permissible with 3 feet - 5 feet (1 m - 2 m) provided from the edge of the through lane to the vehicles. Cars parked adjacent to the curb generally need 7 feet (2.1 m) of space so a 10 foot - 12 foot (3.0 m - 3.6 m) lane width should be provided. This will also be adequate for occasional commercial vehicle parking. Parking lanes of 10 feet - 12 feet (3.0 m - 3.6 m) can be converted to additional traffic lanes on a full or part time basis and can also be used as a storage lane for turning vehicles. A lane less than 10 feet (3.0 m) is substandard for use as a traffic lane although 9 feet (2.7 m) may be used when the speed is ≤40 mph (60 km/h). If the parking lane is not anticipated to ever be used as another traffic lane, an 8 foot (2.4 m) width is acceptable.

Marking parking lanes is beneficial to maintain order. In downtown areas parking turnouts can be used.

Roadway Widths for Bridges

The minimum width for bridges should equal the curb-to-curb width of the street. Bridges greater than 200 feet (60 m) in length can have a lesser width but should be analyzed separately. On long bridges, offsets from the edge of the travel lane to the parapet, rail, or barrier can be the same as the offset from the traveled way to the curb on the approach street, if less than 4 feet (1.2 m). If the offset to the curb or shoulder line is

greater than 4 feet (1.2 m) on the approach street, then the offset on the bridge should be at least 4 feet (1.2 m) on both sides from the edges of the traveled way.

Clear Zone

The minimum clear zone width is 1.5 feet (0.5 m) from the curb to the face of objects. The desirable width is 3 feet (1.0 m) especially near the turning radii of intersection and driveways. When pedestrians are not a factor, move obstructions back as far as possible and protect them with breakaway bases.

Right-of-Way and Cross Section

There are many factors involved when designing Urban Arterials. Right-of-way should not be a fixed width based on just one critical factor. Instead, every opportunity should be taken to provide a desirable width along most, if not all, of the facility.

Traffic Barriers

Standard application of barriers should be followed. Ends of barriers should be protected.

Access Control

Maintaining the desired level of service of Urban Arterials can be done be statute, zoning, driveway regulation, and geometric design.

A statute limits the access to cross streets and major traffic generators. Zoning will control property development influencing the type and volume of traffic that is generated. Developers of major traffic generators should be required to provide a suitable connection to the arterial comparable to the design of an intersection serving a similar traffic volume.

Driveway regulations control the number of permits for curb cuts. Through geometric design, frontage roads and grade separations can be developed to aid in maintaining the level of service.

Pedestrian Facilities

The construction of sidewalks should always be anticipated even if they are not included in the original design of a roadway. Grade separations for pedestrian crossings can be used but are rare.

Curb-Cut Ramps

These ramps should be provided at all crosswalks in order to comply with the Americans with Disabilities Act.

Utilities

Utilities may be placed within the right-of-way providing that their placement is determined after all vehicle movements have been accommodated. They should be set back as far as possible with breakaway bases.

Intersection Design

Each intersection needs to be carefully designed. Several factors that are important in the design are sight distance, capacity, grades, and room for turning movements making sure they do not encroach on adjacent lanes. See the AASHTO Policy on Geometric Design for a complete discussion on intersection design.

Operational Controls and Regulations

The efficiency of an Urban Arterial can be greatly increased with good operational controls and regulations. A street with only moderately good design standards can become

a major traffic artery with the aid of the following control measures: traffic control devices, regulatory measures, and directional lane usage.

Traffic control devices aid in several ways to the efficiency of arterials. Smooth progression of traffic through an arterial is one of the best ways to improve operations on the arterial and the cross streets. As a result, traffic control is very important. Systems should be sensitive to traffic needs. Good pavement markings and overhead signs are also very helpful.

Regulatory measures is another factor that aids in the efficiency of an arterial. Controlling turning movements, and prohibiting parking, stopping, or standing at the curbside help in maintaining a smooth flow of traffic and a high level of service on the arterial. As an example, if parking is provided, the first stall should be ≥20 feet (6.0 m) from the crosswalk.

Directional lane usage is another way to increase the efficiency of arterials by the use of one way streets, or in rare cases reverse flow operation.

Frontage (Service) Roads and Outer Separations

These are used to maintain the efficiency and a high level of service of arterials. They are used to control access, aid operations on thru-traffic lanes, and provide access to abutting properties.

Grade Separations and Interchanges

These are not common on Urban Arterials but may be the only means to provide sufficient capacity. If a grade separation is used it is desirable to carry all traffic lanes, parking lanes, and shoulder widths plus 2 feet (0.6 m) on each side through the separation.

If this is not possible, the full traffic lane widths plus 2 feet (0.6 m) on each side should be provided. Interchange loops should have radii ≥150 feet (45 m).

Erosion Control

When open ditches are present, seed, mulch, and sod as if in a rural section. When curb is present a more extreme level of erosion control is needed to prevent damage to adjacent property and drainage systems. Landscaping is generally included as a part of the erosion control.

Roadway Lighting

It is important in urban areas to provide for good visibility both during the day and the night. This provides for safe traveling conditions as well as a discouragement to crime. If possible, lighting should be continuous and energy efficient.

Bikeways

Bikeways are helpful to bicycle traffic. See the AASHTO Policy on Geometric Design for their design.

Public Transit Facilities

Public transit facilities are common in many urban areas. An effort should be made to minimize their affect on the arterials. When planning locations for bus stops, convenience should be the primary consideration. Design characteristics and operational considerations of the highway should also be noted. Bus turnouts considerably reduce the interference of traffic lanes. The use of these however, is rare due to right-of-way limitations. Reserved bus lanes have limited benefits but occasionally do work well. When dealing with traffic control measures, the primary consideration should be toward passenger cars and the secondary consideration to public transit. There are many options

to consider and therefore, investigation and planning of public transit facilities should be done by those with the necessary technical skills.

7. PRELIMINARY ENGINEERING

Survey, design and plan preparation will be accomplished by the city, consulting engineering firms, or the SDDOT. Agreements for engineering services by consultants with Federal participation will be in accordance with 23 CFR 172 and the approved Consultant Selection Procedure.

Project plans will be reviewed by the city, Urban Systems Section, Region Engineer, Area Engineer and applicable central offices within the SDDOT.

Hydraulics, foundations, materials, surfacing, construction and permanent traffic signing recommendations as applicable will be provided by the SDDOT on all projects. Economic studies will be provided by the SDDOT if required, or upon request on all projects.

When required, Section 404 permits will be obtained by the SDDOT and required contract provisions included in the contract proposal.

Where projects include unusual or complex bridges, bridges that are estimated to cost over $5 million or have other unusual features, preliminary plans will be submitted to FHWA for review and technical guidance.

Project plans will be approved by the Urban Systems Engineer prior to scheduling for letting.

The South Dakota Standard Specifications for Roads and Bridges (latest edition), Supplemental Specifications, and required contract provisions as applicable, will be made a part of the contract documents on all projects. Standard title and typical plan sheets for most all types of work are available and will be used to the maximum extent practicable to provide uniformity and economy.

8. CONSTRUCTION - CONTRACT AND FORCE ACCOUNT

Projects will be let to contract by the SDDOT in accordance with 23 CFR 635 and South Dakota State Law. Contract award will be made by the State Transportation Commission subject to concurrence by the City Councils.

Adequate justification will be formally documented and retained in the project file when bids are substantially higher than the engineers estimate, are unusual or have substantial variations. The criteria included in paragraph 4a of FHWA Technical Advisory T5080.4 will be used to evaluate bids received. Where the low bid does not meet the criteria of this paragraph and the city desires to award the contract as bid, justification will be submitted to SDDOT. Where the low bid does meet the criteria of this paragraph and the city desires to reject all bids, justification will be submitted to SDDOT.

Construction engineering will be provided on all projects in accordance with current operating policy as defined by policy letters and procedures issued by the Operations Division. Project supervision will be at the direction of the SDDOT Area Engineer. All projects will be constructed in accordance with current South Dakota Standard Specifications for Roads and Bridges. Quality control, sampling, testing and material

certification in accordance with the SDDOT Materials Manual, will provide control and assure the project is constructed in accordance with the plans and specifications.

Approval authority for routine construction change orders rests with the Region Engineer and the City Engineer. Construction change orders shall be prepared and processed in accordance with the Division of Operations current policies concerning construction change orders.

Projects may be constructed under a negotiated "Force Account" agreement using city equipment and personnel when it can be shown the city is adequately equipped and staffed to do the work and that it is cost effective. Based upon a city's request, the Urban Systems Engineer will make the determination that the force account method is cost effective. Construction engineering and quality control by SDDOT will be the same as on contract projects.

9. RIGHT-OF-WAY

The city may request the SDDOT Right-of-Way Office to perform appraisals, review appraisals, negotiations, and acquisitions on behalf of the city. The SDDOT will send the city an agreement checklist, and then a formal agreement. Condemnation proceedings are handled by the city. Relocation Assistance, if required, will be accomplished by Right-of-Way Program personnel within the SDDOT upon request by the city. Prior to advertising of contracts the FHWA Division Administrator will be furnished a Right-of-Way Certification on all projects to assure compliance with applicable provisions of Right-of-Way Directives and approved procedures.

10. UTILITY ADJUSTMENTS

Adjustment of Utilities and Railroads will be in accordance with South Dakota State Law, SDDOT Utility Accommodation Policy and 23 CFR 645A. The city is responsible for utility notification and coordinating any utility relocation work. Assistance can be requested of the Utility Section of the Project Development Program.

Utility facilities will be adjusted or removed from the right-of-way in cases where they constitute a safety hazard. Minimum lateral clearances as shown on pages 57 and 66, as applicable, may be allowed on a project by project basis considering traffic volume, right-of-way width, removal cost and location. Exceptions to these criteria shall be approved by the Urban Systems Engineer.

11. SAFETY PROGRAM

A continuing safety improvement effort will be provided to local officials by all elements of the SDDOT using Safety Funds and normal Federal-aid Funds. Areas receiving priority and emphasis are design standards, individual project design, permanent traffic signing, construction signing, pavement marking, removal of roadside obstacles and elimination of deficient bridges.

The Traffic Safety Engineer, assigned to the Local Government Assistance Program, is available to provide safety related services to local agencies upon request. Typical services available include traffic control signing recommendations, intersection geometrics recommendations, and cost-benefit studies for proposed safety projects.

12. ACCOUNTING PROCEDURES AND GUIDE COMPLIANCE

Accounting control and current billing will be in accordance with procedures contained in the "Memorandum of Understanding" between the SDDOT and the FHWA and the SDDOT Finance Manual under control of the Division of Fiscal and Public Assistance.

Audits and FHWA will evaluate selected projects and activities for Plan compliance. Reports of review, deficiencies and corrective actions will be furnished to Office Supervisors, Division Directors, Region Engineers, applicable Program Managers, Area Engineers, FHWA and local officials.

Assurance of compliance by local officials with existing and subsequent Federal or State Laws and requirements will be provided by the Urban Systems Section by continuous review of all phases of each project. Changes in the current Plan or policy will be provided by the Urban Systems Section by direct mailing and will be discussed at various State and Area meetings.

13. USE OF STANDARD FORMS, AGREEMENTS AND CERTIFICATES

The following standard forms will be used on all projects as applicable. Forms will be revised as necessary to comply with future changes in Federal or State Laws and regulations.

Design Summary Sheets; Utilities Certificate; Public Hearing Standard

Forms; Right-of-Way Certificate; and Maintenance Agreement.

14. FINAL INSPECTION AND ACCEPTANCE

A final inspection will be made of each completed project by a representative of the applicable local authority and the Region Engineer. The Region Engineer will furnish notification of final inspection and acceptance to the Division of Operations.

The Area Engineer shall prepare and process the Secondary Completion Form (DOT-240). The Division of Operations will furnish the notification of project completion to the FHWA. All project records and documents will be available for review and inspection by FHWA officials at all times during project development and construction, and will be retained and available as per 23 CFR 17 for review and inspection for a three year period after submission of the final voucher for the project.

15. EVALUATION AND REVISION

The Plan will be revised as required by changes in SDDOT operation, where review has shown change to be desirable, where oversight is discovered or by subsequent Federal and State Laws, orders and directives. Revisions of the Plan will be numbered, dated and issued to local officials. Changes of the Plan may be initiated by the cities, counties or the SDDOT, through the office of Local Government Assistance.

The State will periodically review the cities' maintenance of previous Federal-aid projects in accordance with the approved Maintenance Review Policy.

16. ADMINISTRATION OF HIGHWAY BRIDGE REPLACEMENT AND REHABILITATION PROGRAM

23 CFR 650D (Highway Bridge Replacement Program) provides for administration of bridge replacement projects under provisions of an approved Plan.

Bridge replacement projects both on and off the Federal-aid System sponsored by a county or other local political subdivision including cities with populations of 5000 or less,

will be administered in accordance with Section I of this Plan. Design standards will be in accordance with Part 6 of Section II. Bridge replacement projects in cities, with populations greater than 5000, will be handled by the Urban Systems Engineer in accordance with Section II of this Plan.

Special Bridge Replacement Funds apportioned to the State of South Dakota are divided as follows: fifty percent (50%) is made available to the cities and counties and fifty percent (50%) is retained by the State. The 50% made available to cities and counties is available for eligible projects on a statewide basis with sufficiency rating of the structure a significant consideration in prioritizing project requests that are submitted. Not less than 30% nor more than 70% of the funds made available to the cities and counties shall be expended for projects located on public roads other than those on the Federal-aid system.

APPENDIX 1

AASHTO TABLES IN METRIC

Local Rural Roads, Rural Collector Roads & Streets

Local Rural Roads
Minimum Design Speeds 1994 AASHTO 419

Design Volumes	Type of Terrain		
	Level	Rolling	Mountainous
	Speeds (km/h)		
ADT Under 50	50	30	30
ADT 50-250	50	50	30
ADT 250-400	60	50	30
ADT 400-1500	80	60	50
ADT 1500-2000	80	60	50
ADT 2000 & Over	80	60	50

Rural Collector Roads and Streets
Minimum design speeds (rural conditions). 1994 AASHTO 461

	Minimum Design Speeds (km/h) for Design Volumes of:		
Type of Terrain	ADT 0-400	ADT 400-2000	ADT Over 2000
Level	60	80	100
Rolling	50	60	80
Mountainous	30	50	60

Local Rural Roads

Minimum Stopping Sight Distance (Wet Pavements) 1994 AASHTO 419

Design Speed (km/h)	Assumed Speed for Condition (km/h)	Stopping Sight Distance for Design (m)	K Value[a] for Crest Vertical Curves (Rounded)	K Value[a] for Sag Vertical Curves (Rounded)
30	30-30	29.6-29.6	3-3	4-4
40	40-40	44.4-44.4	5-5	8-8
50	47-50	57.4-62.8	9-10	11-12
60	55-60	74.3-84.6	14-18	15-18
70	63-70	94.1-110.8	22-31	20-25
80	70-80	112.8-139.4	32-49	25-32
90	77-90	131.2-168.7	43-71	30-40
100	85-100	157.0-205.0	62-105	37-51

[a]K value is a coefficient by which the algebraic difference in grade is multiplied to determine the length in meters of the vertical curve which will provide minimum sight distance.

Local Rural Roads

Minimum Passing Sight Distance 1994 AASHTO 420

Design Speed (km/h)	Minimum Passing Sight Distance for Design (m)	K Value[a] for Crest Vertical Curves (Rounded)
30	217	50
40	285	90
50	345	130
60	407	180
70	482	250
80	541	310
90	605	390
100	670	480

[a]K value is a coefficient by which the algebraic difference in grade is multiplied to determine the length in meters of the vertical curve which will provide minimum sight distance.

Rural Collector Roads and Streets
Minimum stopping sight distance (wet pavements). 1994 AASHTO 462

Design Speed (km/h)	Assumed Speed for Condition (km/h)	Stopping Sight Distance for Design (m)	K Value[a] for Crest Vertical Curves (Rounded)	K Value[a] for Sag Vertical Curves (Rounded)
30	30-30	29.6-29.6	3-3	4-4
40	40-40	44.4-44.4	5-5	8-8
50	47-50	57.4-62.8	9-10	11-12
60	55-60	74.3-84.6	14-18	15-18
70	63-70	94.1-110.8	22-31	20-25
80	70-80	112.8-139.4	32-49	25-32
90	77-90	131.2-168.7	43-71	30-40
100	85-100	157.0-205.0	62-105	37-51
110	91-110	179.5-246.4	80-151	43-62

[a]K value is a coefficient by which the algebraic difference in grade is multiplied to determine the length in meters of the vertical curve which will provide minimum sight distance.

Rural Collector Roads and Streets
Minimum passing sight distance. 1994 AASHTO 462

Design Speed (km/h)	Minimum Passing Sight Distance for Design (m)	K Value[a] for Crest Vertical Curves (Rounded)
30	217	50
40	285	90
50	345	130
60	407	180
70	482	250
80	541	310
90	605	390
100	670	480
110	728	570

[a]K value is a coefficient by which the algebraic difference in grade is multiplied to determine the length in meters of the vertical curve which will provide minimum sight distance.

Rural Collector Roads and Streets

Relation of sight distance to design speed. 1994 AASHTO 490

Design Speed (km/h)	Minimum stopping sight distance (m)	Minimum passing sight distance (m) (two-lane, two-way)
50	57.4-62.8	345
60	74.3-84.6	407
70	94.1-110.8	482
80	112.8-139.4	541
90	131.2-168.7	605
100	157.0-205.0	670
110	179.5-246.4	728
120	202.9-285.6	792

Local Rural Roads

Maximum Grades (%) 1994 AASHTO 421

	Design Speed (km/h)							
Type of Terrain	30	40	50	60	70	80	90	100
Level	8	7	7	7	7	6	6	5
Rolling	11	11	10	10	9	8	7	6
Mountainous	16	15	14	13	12	10	10	-

Rural Collector Roads and Streets

Maximum Grades[a] 1994 AASHTO 463

Rural Collectors									
	Design Speed (km/h)								
Type of Terrain	30	40	50	60	70	80	90	100	110
	Grades (Percent)								
Level	7	7	7	7	7	6	6	5	4
Rolling	10	10	9	8	8	7	7	6	5
Mountainous	12	11	10	10	10	9	9	8	6

[a]Maximum grades shown for rural conditions of short lengths (less than 150 m), on one-way down grades and on low-volume rural collectors may be 2% steeper.

Local Rural Roads

Normal Cross Slopes 1994 AASHTO 421

Surface Type[a]	Range in Rate of Cross Slope (%)
High	1.5 to 2.0
Intermediate	1.5 to 3.0
Low	2.0 to 6.0
[a]See the Glossary on pages 6-8 for pavement surface types description.	

Rural Collector Roads and Streets

Normal Cross Slopes 1994 AASHTO 464 (In paragraph format.)

Surface Type[a]	Range in Rate of Cross Slope (%)
High	1.5 to 2.0
Intermediate	1.5 to 3.0
Low	3.0
[a]See the Glossary on pages 6-8 for pavement surface types description.	