5.0 ROAD DESIGN

5.0 Road Design

5.1 Introduction

The road design section of this manual is intended to assist the LPA and the designer through the preliminary engineering phase of project development. Information in this section should also be considered during the project planning and programming phase so that the project scope can be as accurate as possible from the beginning.

5.2 Design References

Project design shall be in accordance with accepted engineering practices and all applicable state, AASHTO and federal criteria. These criteria include, but are not limited to the following references:

1. "A Policy on Geometric Design of Highways and Streets", AASHTO, current edition (Green Book).
2. "Guidelines for Geometric Design of Very Low-Volume Local Roads", AASHTO, current edition.
3. "Roadside Design Guide", AASHTO, current edition.
4. "Design Manual, Volume I, Road Section", KDOT, current edition
5. BLP Bridge Design Manual, current edition
6. "Standard Specifications for Highway Bridges", AASHTO, current edition.
7. "Bridge Guide Specifications", AASHTO, current edition.
8. "LRFD Bridge Design Specifications", AASHTO, current edition.
9. "Design Manual, Volume III, Bridge Section", KDOT, current edition.
10. "Policies for the Rehabilitation of Highways and Bridges for Other than Interstate and Freeways on the State Highway System of Kansas", KDOT, dated February 14, 1990, for bridge rails on remain-in-place bridges. Bridge rails for remain-in-place bridges may remain in place if the rail is one of the types listed for remain-in-place. Those bridges identified with a "N/Y' will be considered for upgrading or retrofitting on a case-by-case basis if the current AADT is greater than 750 vpd.
11. "Guide for the Development of Bicycle Facilities", AASHTO, current edition.
12. "Manual on Uniform Traffic Control Devices", (MUTCD), current edition.
13. "Highway Capacity Manual", (HCM), current edition.
14. "Traffic Engineering Guidelines", KDOT Bureau of Transportation Safety & Technology.
15. "Standard Specifications for State Road and Bridge Construction", (including "Special Provisions to the Standard Specifications"), KDOT current edition.
16. "Corridor Management Policy – KDOT", latest version.

17. "Pavement Marking Policy", KDOT, latest version.
18. "KDOT Utility Accommodation Policy", latest version.
19. "A Guide for Accommodating Utilities Within Highway Right of Way", AASHTO, current edition.
20. "Guide in Evaluation and Abatement of Traffic Noise", AASHTO, current edition.
21. "KDOT Temporary Erosion Control Manual", latest version.
22. "Guide for Design of Pavement Structures", AASHTO, current edition.
23. "Guidance on Traffic Control Devices at Highway-Rail Grade Crossings", FHWA, November 2002.
24. All current applicable BLP memos.

If not otherwise covered in this manual, the procedures used shall conform to Federal law, Kansas law, and KDOT's Standard Operating Manual (S.O.M.).

5.2.1 AASHTO, FHWA and TRB Design Criteria

The American Association of State Highway and Transportation Officials (AASHTO), Federal Highway Administration and Transportation Research Board publish nationally recognized design criteria that are required for use in developing federal aid projects.

5.2.1.1 A Policy on Geometric Design of Highways and Streets (AASHTO Green Book)

Geometric design for new or completely reconstructed county roads and city streets shall be based on the design criteria included in the AASHTO Green Book (Green Book) or Guidelines for Geometric Design of Very Low-Volume Local Roads, as appropriate, and as noted on the KDOT Form 883.

5.2.1.1.1 Design Speed

The design speed is a selected value that is used to determine the design features of a roadway. For a particular facility the design speed is based on the functional classification of the road, the topography, adjacent land uses, expected traffic volumes, and anticipated operating speed. The Green Book recommends every effort should be made to use a design speed as high as practicable to attain safety, mobility, and efficiency while under the constraints of environmental quality, economics, aesthetics, and social or political impacts. Once selected, all pertinent features of the roadway, e.g. sight distance, horizontal or vertical curvature, should be designed in accordance with the design speed.

For county projects, the design speed selected should be at least equal to the regulatory or posted speed unless justification exists for a lesser design speed. When the design speed used satisfies the applicable Design Guideline Table in this manual but is less than the regulatory speed, mitigation measure(s) should be considered. As an alternative, the use of an operating speed may be considered in a request for an exception.

5.2.1.1.2 Design Exception/Allowance

If, during the development of plans for a proposed project, the LPA determines that there are circumstances that may make it impracticable to meet the applicable design guidelines, the LPA shall

make a written request to BLP for a "design exception" using a summary format similar to the form in Figure 5.1. All supporting documentation should be included with the submittal as attachments to the summary form. Supporting documentation should be consistent with Section 2.4.3 of the KDOT Design Manual, Volume 1, Road Section.

A request for a design exception may be made at any time in the design process when sufficient information is available to adequately evaluate the alternative solutions. All design exceptions are subject to approval by the Bureau Chief of BLP. The request may involve one or more of the following controlling criteria:

1. Design speed
2. Lane width
3. Shoulder width
4. Bridge width
5. Horizontal alignment
6. Vertical alignment
7. Grades
8. Stopping sight distances
9. Pavement cross slope
10. Superelevation
11. Vertical clearances
12. Horizontal clearance
13. Structural capacity

Justification for the request shall be included along with cost estimates for reasonable alternates. For guidance on information to be included in a design exception, see KDOT Design Manual, Volume I, Road Section, Section 2.4.3.

A design allowance may be requested for necessary deviations from criteria or policy not included in the thirteen controlling criteria requiring a design exception. Requests for design allowances should be submitted and documented in the same manner as a design exception request.

BLP will respond by letter to the LPA approving or denying the design exception/allowance request. Requests made prior to field check will be addressed as a part of the field check discussions. When the request is made after or as a result of field check the approval may be made prior to office check plans review if sufficient details are available on the field check plans or if additional details are submitted with the request. Otherwise, the response will be made after office check plan review. Approved exceptions will be reflected in the Design Summary Document.

KANSAS DEPARTMENT OF TRANSPORTATION
DESIGN EXCEPTION REQUEST

GENERAL INFORMATION		
Project Number:	County/ City:	Route No or Name:
Project Description:		
PROJECT INFORMATION		
Functional Class:	Traffic Volume:	Traffic Volume Yr:
Current Estimate:	Additional Cost to Meet Criteria:	Funding:
Design Life:		Letting Date:

DESIGN EXCEPTIONS (CHECK ALL THAT APPLY)			
☐	Design Speed	☐	Stopping Sight Distance
☐	Lane Width	☐	Pavement Cross Slope
☐	Shoulder Width	☐	Superelevation
☐	Bridge Width	☐	Vertical Clearance
☐	Horizontal Alignment	☐	Horizontal Clearance
☐	Vertical Alignment	☐	Structural Capacity
☐	Grade	☐	Other: _____

Description of Existing Conditions:

Proposed design values for the exception element (state resource):

Relationship of proposed to adjoining sections:

Crash History and Potential Safety Impacts:

Reasons for not attaining criteria: (such as cost/benefit, crash history, environmental, etc.)

Proposed Mitigation:

PREPARED BY:

DESIGNER SIGNATURE: _____ DATE: _____

CONCURRENCE BY:

OWNER (CITY/COUNTY) SIGNATURE: _____ DATE: _____

CONCURRENCE BY:

KDOT PROJECT MANAGER SIGNATURE: _____ DATE: _____

APPROVED BY:

KDOT BUREAU CHIEF SIGNATURE: _____ DATE: _____

Attach all supporting documention (plan details, studies, reports, etc.)

Figure 5.1: Example Design Exception Request Summary Form

5.2.1.2 AASHTO Roadside Design Guide (Roadside Safety)

Aspects of location, design, roadside appurtenances, and traffic control, including the traffic control plan, shall be given due consideration. This enables the designer to fully evaluate roadside conflicts arising from vehicles leaving the roadway out of control. AASHTO presents a hierarchy of design options for the treatment of fixed objects on the roadside. In order of preference they are:

- Remove the fixed object
- Redesign the fixed object so it can be safely traversed
- Relocate the fixed object to a point where it is less likely to be struck
- Reduce the impact severity by making the object breakaway
- Shield the object with a barrier or impact attenuator
- Delineate the object if none of the above options is appropriate

The AASHTO "Roadside Design Guide", current edition and AASHTO "Guidelines for Geometric Design of Very Low-Volume Local Roads" (where appropriate) shall be used in determining the clear zone width for new or completely reconstructed rural roads. Deviations from the clear zone width shall be based on engineering judgment and accident experience. The Roadside Safety Analysis Program (RSAP) is one tool available to designers to evaluate design features on a benefit/cost basis.

Curbs have very limited redirectional capability except at very low speeds. A clear zone free of fixed objects should be provided at all locations regardless of whether a curb is present. For curb and gutter sections, every effort will be made to clear the roadside of obstacles (e.g., non breakaway above ground utilities) for a minimum of six feet behind the curb. If, in a very restricted environment, provision of the six foot clear zone is not practical, a lesser value will be considered with appropriate documentation.

Where feasible, the length of guard rail through fill sections shall be held to a minimum by the use of 3:1 or flatter slopes. Culverts with an opening height of eight feet or more within the clear zone shall normally have guard rail. The need for protection at lower height openings will be based on engineering judgment.

The guard rail design criteria for span bridges and bridge length boxes shall be consistent in determining protection for the area of concern. For county projects utilizing the tables in this manual, the minimum length of protection needed for an open-span bridge rail shall be determined with consideration given to the bridge rail as being the hazard. Other considerations of prevailing conditions, e.g., non-traversable slopes, fixed object in clear-zone, etc., will be addressed as needing protection on a project-by-project basis. The minimum length of protection needed for a bridge length box should be determined with consideration given to the far wing or near wing (special case for multiple boxes) as being the area of concern. Other considerations should be addressed on a project-by-project basis using prevailing conditions.

5.2.1.3 AASHTO Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT≤ 400)

On roadways that are ineligible for Surface Transportation Program (STP) funding, AASHTO's Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400) may be used to establish criteria for projects that meet the very low-volume definition. The LPA, or the designer, should notify the BLP project manager of the intent to use these guidelines at the site review/field check meeting and to document their use.

5.2.1.4 FHWA Manual on Uniform Traffic Control Devices for Streets and Highways (MUTCD)

The Manual on Uniform Traffic Control Devices for Streets and Highways shall be used to establish minimum criteria for permanent and temporary traffic control items incorporated into projects developed through BLP. This includes items such as warrant analyses for traffic signals as required to determine if the work can be included in the project.

5.2.1.5 TRB Highway Capacity Manual (HCM)

The Highway Capacity Manual shall be used for roadway segment and intersection operational analysis. Use of micro simulation software for operational analysis may be requested by the designer and will be approved for use by KDOT on a case by case basis.

5.2.2 KDOT Design Manuals

The most current editions of manuals, guidelines and policies published by KDOT should be used during project development and design. This includes, but is not limited to the following:

- Design Manual, Vol 1, Road Section
- BLP Bridge Design Manual
- Design Manual, Vol 3, Bridge Section
- Traffic Engineering Guidelines
- Corridor Management Policy
- Pavement Marking Policy
- KDOT Utility Accommodation Policy
- KDOT Temporary Erosion Control Manual
-

5.2.2.1 Policy & Informational Memos

Project development should also be consistent with the most current and applicable KDOT policy and informational memos.

5.2.2.2 Non-bridge Structures

All non-standard structures, including drainage structures, walls and other miscellaneous structures, should be designed and reviewed by a structural engineer. Retaining walls less than three feet in height are not required to be designed or reviewed by a structural engineer. Retaining walls greater than six feet in height and on KDOT R/W are required to have a serial number. The LPA or the designer should request a serial number in accordance with the BLP Bridge Manual.

5.2.3 Design Criteria Tables

The tables of design criteria in this section were developed in compliance with all applicable AASHTO criteria and, where applicable, KDOT Design Manuals. When a conflict exists between the criteria tables and other KDOT references, the information contained herein shall control except as supplemented by BLP Memos.

VI.1A COUNTY DESIGN GUIDELINES - NEW OR COMPLETELY RECONSTRUCTED
MAJOR COLLECTOR ROADS (English Units)

[1] DESIGN ELEMENT																				
[2] AADT		0 - 100			101 - 250			251 - 400			401 - 1500			1501 - 2000			OVER 2000		
[3] TERRAIN ###		F	R	H	F	R	H	F	R	H	F	R	H	F	R	H	F	R	H
DESIGN SPEED (MIN.)	mph	40	30	25	40	30	25	40	30	25	50	40	30	50	40	30	60	50	40
STOPPING SIGHT DISTANCE	ft.	305	200	155	305	200	155	305	200	155	425	305	200	425	305	200	570	425	305
RATE OF CURVATURE (K)-CREST	--	44	19	12	44	19	12	44	19	12	84	44	19	84	44	19	151	84	44
RATE OF CURVATURE (K)-SAG	--	64	37	26	64	37	26	64	37	26	96	64	37	96	64	37	136	96	64
[4] ROADBED/RCB CULVERT WIDTH	ft.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
[5] WIDTH OF TRAVELED WAY	ft.	20	20	20	20	20	20	20	20	20	22	22	20	22	22	22	24	24	24
[6] SHOULDER WIDTH	ft.	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	2.0	5.0[13]	5.0[13]	5.0[13]	6.0	6.0	6.0	8.0	8.0	8.0
[14] PAVEMENT CROWN (HIGH TYPE SURF)	%	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0
[14] PAVEMENT CROWN (LOW TYPE SURF)	%	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0
[7] FORESLOPE	--	1V:3H	1V:3H	1V:3H	1V:3H	1V:3H	1V:3H	1V:3H	1V:3H	1V:3H	1V:4H	1V:4H	1V:3H	1V:4H	1V:4H	1V:3H	1V:4H	1V:4H	1V:3H
[8] BACKSLOPE	--	1V:2H	1V:2H	1V:2H	1V:2H	1V:2H	1V:2H	1V:3H	1V:3H	1V:2H	1V:3H	1V:3H	1V:2H	1V:3H	1V:3H	1V:2H	1V:3H	1V:3H	1V:2H
[9] MAXIMUM GRADE	%	7	9	10	7	9	10	7	9	10	6	8	9	6	8	9	5	7	8
[10] BRIDGE WIDTH - NEW & < 100 ft.	ft.	24	24	24	24	24	24	24	24	24	28	28	26	30	30	30	40	40	40
[10] BRIDGE WIDTH - NEW & ≥ 100 ft.	ft.	24	24	24	24	24	24	24	24	24	28	28	26	28	28	28	30	30	30
[11] BRIDGE WIDTH - EXISTING	ft.	22	22	22	22	22	22	22	22	22	22	22	22	24	24	24	28	28	28
[12] CLEAR ZONE	ft.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

F=Flat, R=Rolling, H=Hilly

References:
"A Policy on Geometric Design of Highways and Streets", AASHTO, 2004

"Roadside Design Guide", AASHTO, 2006

NOTES:
[1]Design elements common to all roadways:
Maximum superelevation = 8%
Normal ditch is 8 ft. x 2 ft. or as needed to accommodate the drainage.
Bridge loading -- New - HS-20, Existing - H-15
R/W width shall be sufficient to accommodate the grading section.
[2]Use design year AADT. Design year is typically 20 years from the time of design/construction.
[3]Prevailing slopes of natural ground are: Flat--3% or less, Rolling--between 3% and 9%, Hilly--9% or greater.
[4]Roadbed/culvert width shall be sufficient to accommodate proposed surface, shoulders, planned future base and, if necessary, guardrail. An approximate clear zone should also be provided in accordance with the AASHTO "Roadside Design Guide".
[5]Roadway may be surfaced full roadway width which includes shoulders.
[6]Minimum width of shoulder is 4 ft. if roadside barrier is used.
[7]For paved roads, when the fill exceeds 6 ft., the slope may be 1V:3H regardless of terrain or traffic volumes.
[8]For paved roads, when the ditch cut exceeds 5 ft., the back slope may be steepened.
[9]Maximum grade may be increased by one percent (1%) for short distances (less than 500 ft.).
[10]a. Where the approach roadway is surfaced for the full width, that surfaced width shall be carried across the structure.
b. RCB bridge width shall not be less than the roadway.
[11]a. Structures over 100 ft. in length will be analyzed individually considering clear width provided, crash history, traffic volumes, remaining structure life, design speed, and other factors.
b. Clear width between curbs or railings, whichever is less, should be equal to or greater than the approach traveled way width, wherever practical.
[12]Clear zone shall be determined in accordance with the latest version of the AASHTO "Roadside Design Guide".
[13]Shoulder width may be reduced for design speeds greater than 30 mph as long as a minimum roadway width of 30 ft. is maintained.
[14]High types surfaces are generally concrete or bituminous surfaced. Low type surfaces include earth, crushed stone, or other similar material.

General Comment:
Each design element should reflect the most practicable and economically justified value. Values below the design criteria set out in the current edition of AASHTO "A Policy on Geometric Design of Highways and Streets" (Green Book), Chapter 6 will only be considered on a project-by-project basis, provided that a design exception is justified to KDOT. Under favorable conditions, the use of more liberal design criteria is encouraged.

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Figure 5.2: Design Guidelines for New or Completely Reconstructed Major Collector Roads

VI.2A COUNTY DESIGN GUIDELINES - NEW OR COMPLETELY RECONSTRUCTED
MINOR COLLECTOR ROADS (English Units)

(1) DESIGN ELEMENT																				
(2) AADT		0 - 100			101 - 250			251 - 400			401 - 1500			1501 - 2000			OVER 2000		
(3) TERRAIN ###		F	R	H	F	R	H	F	R	H	F	R	H	F	R	H	F	R	H
DESIGN SPEED (MIN.)	mph	40	30	25	40	30	25	40	30	25	50	40	30	50	40	30	60	50	40
STOPPING SIGHT DISTANCE	ft.	215	135	115	215-250 (13)	135-165 (13)	115-125 (13)	250	165	125	425	305	200	425	305	200	570	425	305
RATE OF CURVATURE (K)-CREST	--	22	9	7	22-29 (13)	9-13 (13)	7-8 (13)	29	13	8	84	44	19	84	44	19	151	84	44
RATE OF CURVATURE (K)-SAG	--	64	37	26	64	37	26	64	37	26	96	64	37	96	64	37	136	96	64
(4) ROADBED/RCB CULVERT WIDTH	ft.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(5) WIDTH OF TRAVELED WAY	ft.	20	20	20	20	20	20	20	20	20	22	22	20	22	22	22	24	24	24
(6) SHOULDER WIDTH	ft.	2	2	2	2	2	2	2	2	2	5 (14)	5 (14)	5 (14)	6	6	6	8	8	8
(15) PAVEMENT CROWN (HIGH TYPE SURF)	%	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0
(15) PAVEMENT CROWN (LOW TYPE SURF)	%	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0
(7) FORESLOPE	--	1V:3H	1V:3H	1V:3H	1V:3H	1V:3H	1V:3H	1V:3H	1V:3H	1V:3H	1V:4H	1V:4H	1V:3H	1V:4H	1V:4H	1V:3H	1V:4H	1V:4H	1V:3H
(8) BACKSLOPE	--	1V:2H	1V:2H	1V:2H	1V:2H	1V:2H	1V:2H	1V:3H	1V:3H	1V:2H	1V:3H	1V:3H	1V:2H	1V:3H	1V:3H	1V:2H	1V:3H	1V:3H	1V:2H
(9) MAXIMUM GRADE	%	7	9	10	7	9	10	7	9	10	6	8	9	6	8	9	5	7	8
(10) BRIDGE WIDTH - NEW & < 100 ft.	ft.	24	24	24	24	24	24	24	24	24	28	28	26	30	30	30	40	40	40
(10) BRIDGE WIDTH - NEW & ≥ 100 ft.	ft.	24	24	24	24	24	24	24	24	24	28	28	26	28	28	28	30	30	30
(11) BRIDGE WIDTH - EXISTING	ft.	22	22	22	22	22	22	22	22	22	22	22	22	24	24	24	28	28	28
(12) CLEAR ZONE	m	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

F=Flat, R=Rolling, H=Hilly

NOTES:

(1) Design elements common to all roadways:
Maximum superelevation = 8%
Normal ditch is 8 ft. x 2 ft. or as needed to accommodate the drainage.
Bridge loading -- New - HS-20, Existing - H-15
R/W width shall be sufficient to accommodate the grading section.

(2) Use design year AADT. Design year is typically 20 years from the time of design/construction.

(3) Prevailing slopes of natural ground are: Flat--3% or less, Rolling--between 3% and 9%, Hilly--9% or greater.

(4) Roadbed/culvert width shall be sufficient to accommodate proposed surface, shoulders, planned future base and, if necessary, guardrail. An approximate clear zone should also be provided in accordance with the AASHTO "Roadside Design Guide".

(5) Roadway may be surfaced full roadway width which includes shoulders.

(6) Minimum width of shoulder is 4 ft. if roadside barrier is used.

(7) For paved roads, when the fill exceeds 6 ft., the slope may be 1V:3H regardless of terrain or traffic volumes.

(8) For paved roads, when the ditch cut exceeds 5 ft., the back slope may be steepened.

(9) Maximum grade may be increased by one percent (1%) for short distances (less than 500 ft.).

(10) a. Where the approach roadway is surfaced for the full width, that surfaced width shall be carried across the structure.
b. RCB bridge width shall not be less than the roadway.
c. For AADT<400, bridges greater than 100 ft. in length should be evaluated individually to determine the appropriate bridge width.

(11) a. Structures over 100 ft. in length will be analyzed individually considering clear width provided, crash history, traffic volumes, remaining structure life, design speed, and other factors.
b. Clear width between curbs or railings, whichever is less, should be equal to or greater than the approach traveled way width, wherever practical.
c. For AADT <400, existing bridges can remain in place without widening unless there is evidence of a site-specific safety problem related to the width of the bridge.

(12) Clear zone shall be determined in accordance with the latest version of the AASHTO "Roadside Design Guide" or AASHTO "Guidelines for Geometric Design for Very Low-Volume Local Roads".

(13) Use low end of range for lower risk locations, e.g., **away from** intersections, narrow bridges, railroad-highway grade crossings, sharp curves, and steep downgrades.
Use high end of range for higher risk locations, e.g., **near** intersections, narrow bridges, railroad-highway grade crossings, sharp curves, and steep downgrades.

(14) Shoulder width may be reduced for design speeds greater than 30 mph as long as a minimum roadway width of 30 ft. is maintained.

(15) High types surfaces are generally concrete or bituminous surfaced. Low type surfaces include earth, crushed stone, or other similar material.

General Comments:

Design values in this table for AADT less than 400 vpd are based on the AASHTO "Guidelines for Geometric Design of Very Low-Volume Local Roads". These values are considered minimums for application on roads driven primarily by familiar drivers. An important component of these guidelines is the incorporation of substantial design flexibility based on a knowledge of highway design principles, traffic engineering, safety engineering and specific knowledge of local conditions. This flexibility is intended to be exercised only by a qualified professional engineer. In all other cases, the design should be based on the criteria contained in the AASHTO "A Policy on Geometric Design of Highways and Streets".

Each design element should reflect the most practicable and economically justified value. Values below the design criteria set out in the current edition of AASHTO "A Policy on Geometric Design of Highways and Streets" (Green Book), Chapter 5 or AASHTO "Guidelines for Geometric Design of Very Low-Volume Local Roads" will only be considered on a project-by-project basis, provided that a design exception is justified to KDOT. Under favorable conditions, the use of more liberal design criteria is encouraged.

References:

"A Policy on Geometric Design of Highways and Streets", AASHTO, 2004

"Guidelines for Geometric Design of Very Low Volume Local Roads (ADT≤400)", AASHTO, 2001

"Roadside Design Guide", AASHTO, 2006

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Figure 5.3: Design guidelines for New or Completely Reconstructed Minor Collector Roads

VI.3A COUNTY DESIGN GUIDELINES - NEW OR COMPLETELY RECONSTRUCTED LOCAL ROADS (English Units)

(1) DESIGN ELEMENT																				
(2) AADT		0 - 50			51 - 250			251 - 400			401 - 1500			1501 - 2000			OVER 2000		
(3) TERRAIN ###		F	R	H	F	R	H	F	R	H	F	R	H	F	R	H	F	R	H
DESIGN SPEED (MIN.)	mph	30	20	20	30	30	20	40	30	20	50	40	30	50	40	30	50	40	30
STOPPING SIGHT DISTANCE	ft.	135	90	90	135-165(13)	135-165(13)	90-95 (13)	250	165	95	425	305	200	425	305	200	425	305	200
RATE OF CURVATURE (K)-CREST	--	9	4	4	9-13(13)	9-13(13)	4-5(13)	29	13	5	84	44	19	84	44	19	84	44	19
RATE OF CURVATURE (K)-SAG	--	37	17	17	37	37	17	64	37	17	96	64	37	96	64	37	96	64	37
(4) ROADBED/RCB CULVERT WIDTH	ft.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
(5) WIDTH OF TRAVELED WAY	ft.	20	20	20	20	20	20	20	20	20	22	20	20	22	22	22	24(15)	24(15)	24(15)
(6) SHOULDER WIDTH	ft.	2	2	2	2	2	2	2	2	2	5(14)	5(14)	5(14)	6	6	6	8	8	8
(16) PAVEMENT CROWN (HIGH TYPE SURF)	%	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0	1.5-2.0
(16) PAVEMENT CROWN (LOW TYPE SURF)	%	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0	2.0-6.0
(7) FORESLOPE	--	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1	3:1	4:1	4:1	3:1	4:1	4:1	3:1	4:1	4:1	3:1
(8) BACKSLOPE	--	2:1	2:1	2:1	2:1	2:1	2:1	3:1	3:1	2:1	3:1	3:1	2:1	3:1	3:1	2:1	3:1	3:1	2:1
(9) MAXIMUM GRADE	%	7	11	11	7	10	11	7	10	11	6	10	10	6	10	10	6	10	10
(10) BRIDGE WIDTH - NEW & < 100 ft.	ft.	24	24	24	24	24	24	24	24	24	28	26	26	28	28	28	40	40	40
(10) BRIDGE WIDTH - NEW & ≥ 100 ft.	ft.	24	24	24	24	24	24	24	24	24	28	26	26	28	28	28	30	30	30
(11) BRIDGE WIDTH - EXISTING	ft.	20	20	20	20	20	20	22	22	22	22	22	22	24	24	24	28	28	28
(12) CLEAR ZONE	ft.	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NORMAL DITCH		2 ft. x 2 ft.			4 ft. x 2 ft.			6 ft. x 2 ft.			8 ft. x 2 ft.			8 ft. x 2 ft.			8 ft. x 2 ft.		

F=Flat, R=Rolling, H=Hilly

NOTES:

(1) Design elements common to all roadways:
Maximum superelevation = 8%
Bridge loading -- New - HS-20, Existing - H-15
R/W width shall be sufficient to accommodate the grading section.

(2) Use design year AADT. Design year is typically 20 years from the time of design/construction.

(3) Prevailing slopes of natural ground are: Flat--3% or less, Rolling--between 3% and 9%, Hilly--9% or greater.

(4) Roadbed/culvert width shall be sufficient to accommodate proposed surface, shoulders, planned future base and, if necessary, guardrail. An approximate clear zone should also be provided in accordance with the AASHTO "Roadside Design Guide".

(5) Roadway may be surfaced full roadway width which includes shoulders.

(6) Minimum width of shoulder is 4 ft. if roadside barrier is used.

(7) For paved roads, when the fill exceeds 6 ft., the slope may be 3:1 regardless of terrain or traffic volumes.

(8) For paved roads, when the ditch cut exceeds 5 ft., the back slope may be steepened.

(9) Maximum grade may be increased by one percent (1%) for short distances (less than 500 ft.).

(10) a. Where the approach roadway is surfaced for the full width, that surfaced width shall be carried across the structure.
b. RCB bridge width shall not be less than the roadway.
c. For AADT<400, bridges greater than 100 ft. in length should be evaluated individually to determine the appropriate bridge width.

(11) a. Structures over 100 ft. in length will be analyzed individually considering clear width provided, crash history, traffic volumes, remaining structure life, design speed, and other factors.
b. Clear width between curbs or railings, whichever is less, should be equal to or greater than the approach traveled way width, wherever practical.
c. For AADT <400, existing bridges can remain in place without widening unless there is evidence of a site-specific safety problem related to the width of the bridge.

(12) Clear zone shall be determined in accordance with the latest version of the AASHTO "Roadside Design Guide".

(13) Use low end of range for lower risk locations, e.g., **away from** intersections, narrow bridges, railroad-highway grade crossings, sharp curves, and steep downgrades.
Use high end of range for higher risk locations, e.g., **near** intersections, narrow bridges, railroad-highway grade crossings, sharp curves, and steep downgrades.

(14) Shoulder width may be adjusted to achieve a minimum roadway width of 30 ft. for design speeds greater than 40 mph.

(15) Where the width of the traveled way is shown as 24 ft., the width may remain at 22 ft. on reconstructed roadways where alignment and safety records are satisfactory.

(16) High types surfaces are generally concrete or bituminous surfaced. Low type surfaces include earth, crushed stone, or other similar material.

General Comments:

Design values in this table for AADT less than 400 vpd are based on the AASHTO "Guidelines for Geometric Design of Very Low-Volume Local Roads". These values are considered minimums for application on roads driven primarily by familiar drivers. An important component of these guidelines is the incorporation of substantial design flexibility based on a knowledge of highway design principles, traffic engineering, safety engineering and specific knowledge of local conditions. This flexibility is intended to be exercised only by a qualified professional engineer. In all other cases, the design should be based on the criteria contained in the AASHTO "A Policy on Geometric Design of Highways and Streets".

The subclass used for the criteria is the agricultural access road. If the designer determines a different subclass is appropriate for a specific site, the criteria should be modified accordingly.

Each design element should reflect the most practicable and economically justified value. Values below the design criteria set out in the current edition of AASHTO "A Policy on Geometric Design of Highways and Streets" (Green Book), Chapter 5 or AASHTO "Guidelines for Geometric Design of Very Low-Volume Local Roads" will only be considered on a project-by-project basis, provided that a design exception is justified to KDOT. Under favorable conditions, the use of more liberal design criteria is encouraged.

References:

"A Policy on Geometric Design of Highways and Streets", AASHTO, 2004

"Guidelines for Geometric Design of Very Low Volume Local Roads", AASHTO, 2001

"Roadside Design Guide", AASHTO, 2006

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Figure 5.4: Design guidelines for New or Completely Reconstructed Local Roads

VII.1A COUNTY AND NON URBAN (CITIES LESS THAN 5,000 POPULATION)
DESIGN GUIDELINES - NEW OR COMPLETELY RECONSTRUCTED
MAJOR COLLECTOR, MINOR COLLECTOR, OR LOCAL
CURB AND GUTTER ROADS AND STREETS (English Units)

DESIGN ELEMENT		COLLECTOR	LOCAL
(1) AADT/DESIGN TRAFFIC VOLUME		10 - 20 YR. VOLUME	10 - 20 YR. VOLUME
(2) DESIGN SPEED (MIN.)	mph	--	--
(11) PAVEMENT CROWN	%	1.5 TO 2.0	1.5 TO 2.0
(2) SUPERELEVATION -- MAXIMUM	%	4	4
(3) NUMBER OF LANES		2	2
(4) LANE WIDTH	ft.	10 TO 12	10 TO 12
(5) PARKING LANE	ft.	7 TO 10	7 TO 10
CURB CUT RAMPS		YES	YES
(6) SHOULDERS/CURB & GUTTER		--	--
(7) HORIZONTAL CLEARANCE -- CURB	ft.	--	--
(7) HORIZONTAL CLEARANCE -- SHO.	ft.	SAME AS RURAL	SAME AS RURAL
(8) MAXIMUM GRADE	%	9	11
BRIDGE WIDTH -- NEW (CURB)	ft.	FACE OF CURBS	FACE OF CURBS
BRIDGE WIDTH -- NEW (SHOULDER)	ft.	SAME AS RURAL	SAME AS RURAL
(9) BRIDGE WIDTH -- EXISTING	ft.	EXISTING ROADWAY	EXISTING ROADWAY
BRIDGE LOADING -- NEW		HS-20	HS-20
BRIDGE LOADING -- EXISTING		SAME AS RURAL	SAME AS RURAL
CURBS, DRAINAGE, SIDEWALK, ETC.		SEE GREEN BOOK	SEE GREEN BOOK
(10) RIGHT OF WAY	ft.	--	--
(12) CLEAR ZONE	ft.	--	--

References:
"A Policy on Geometric Design of Highways and Streets", AASHTO, 2004

"Roadside Design Guide", AASHTO, 2006

NOTES:
(1) Use current AADT for low traffic volumes (less than 600 AADT/100 DHV)
(2) Design speed should be equal to or greater than the posted or regulatory speed. Adjustments in the design speed may be considered to be consistent with the roadway cross-section, available right of way, terrain, adjacent development or other area controls.
(3) Provide two through-traffic lanes. Additional lanes may be considered if traffic volumes warrant. Refer to Green Book for adding additional lanes.
(4) Desirable traffic lane width in industrial areas or locations with high volumes of trucks is 12 ft. where feasible; use 11 ft. minimum width for these locations. Turning lane widths should range from 10 to 12 ft.
(5) Parking lanes are to be provided where necessary, however federal aid may not pay for this item.
(6) The width of the shoulder or curb & gutter should be consistent with the remainder of the cross section.
(7) A minimum operational clearance of 1.5 ft. should be provided beyond the face of curb to any obstruction. An effort should be made to provide greater distance, up to the appropriate clear zone, where practicable.
(8) Maximum grades may be increased by one percent (1%) for short distances.
(9) a. Structures over 100 ft. long will be evaluated individually.
b. The existing structure width should fit the proposed alignment, profile, and cross section. The clear width between curbs or handrails shall not be less than the approach traveled way.
(10) Right of way width shall be sufficient to accommodate the grading section.
(11) Pavement cross slopes may be increased if necessary to limit inundation to about one-half of a traffic lane for an appropriate design storm.
(12) Clear zone recommendations should be evaulated from the AASHTO "Roadside Design Guide".

General Comment:
Each design element should reflect the most practical and economically justified value. Values below the design criteria set out in the current edition of the AASHTO "A Policy on Geometric Design of Highways and Streets" (Green Book), Chapters 5 and 6, will only be considered on a project-by-project basis, provided that a design exception is justified to KDOT. Where conditions permit, the use of higher design criteria is encouraged.

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Figure 5.5: Design Guidelines for New or Completely Reconstructed Major Collector, Minor Collector, and Local Curb and Gutter Roads and Streets

5.2.4 3R –KDOT Policy

The goal of Rehabilitation, Restoration and Resurfacing (3R) projects is to preserve and extend the service life of existing highways, streets or bridges. Available funding is insufficient to improve existing roads to geometric requirements desirable for new construction. Many bridges may continue to function with only bridge painting or minor deck repair. Road constructed to previous design criteria are still capable of performing a useful transportation service. The guidelines contained in this section (including the criteria tables) are provided to assist in the design of 3R projects on county roads and streets.

The three R's are defined as follows:

REHABILITATION: - - The traffic service improvement and safety needs may be of equal importance to the need for improving the riding quality. Projects may involve intersection reconstruction, pavement widening, pavement replacement, shoulder widening, flattening foreslopes, drainage improvement and reconstruction of substandard grades, curves or sight distance. Some additional right-of-way may be necessary.

RESTORATION: -- This category is primarily for major resurfacing or overlays, which add a considerable amount of structure to the existing pavement. Usually resurfacing or overlays of a nominal four inches or more are included. In addition, some pavement widening, short sections of pavement reconstruction, shoulder widening, flattening or slopes in high fills and intersection reconstruction or an isolated bridge improving isolated grades, curves, or sight distance by construction or traffic control measure. In some cases minor ROW acquisitions or easements may be required. Normal bridge painting only projects will be considered maintenance type work and minimum effort to consider other upgrade features will be necessary.

RESURFACING: -- Pavement resurfacing or overlays of less than a nominal four inches fall within this category. Other types of work such as pavement patching or short areas of reconstruction, joint replacement or repair, and shouldering may be included. Usually no additional right-of-way is required.

Safety enhancement is a consideration in most 3R projects. Criteria for consideration and/or to be addressed in project development are as follows:

1. All bridge ends which presently do not have advance traffic barriers (guardrail) should be analyzed according to the current version of the AASHTO "Roadside Design Guide".
2. Signing and marking should be in conformance with the current MUTCD.
3. The accident history should be analyzed with respect to number, rate, location, type and severity of crashes in order to identify safety considerations that should be addressed.
4. Bridges narrower than traveled way width (as defined by AASHTO) must have prior approval from KDOT to remain in place. If a bridge narrower than the traveled way is approved, a guardrail transition should be constructed and object markers installed to delineate the end of the bridge rail. Also, the narrow bridge signs should be installed in accordance with the current MUTCD.
5. Bridge rails and guardrails on existing bridges should be reviewed for structural adequacy and conformance with current crash tested designs. If the bridge rails and/or guardrails are found to be structurally inadequate or functionally obsolete such that they cannot adequately contain

and redirect vehicles without snagging, penetrating or vaulting, they should be considered for upgrading. Projects that include only bridge painting may be considered maintenance and do not require upgrading of bridge rails or guardrails.

6. When the scope of the project is limited to a 3R type road or highway improvement, the conditions and criteria noted in the following paragraph will apply for determining design speed. It is not considered appropriate to use regulatory speed limit signs at isolated locations where the design speed is approximately the operating speed as determined with consideration of the environmental conditions and terrain. The use of warning signs and advisory speed plates at horizontal curves (latest version of the MUTCD to be used as guide) should provide the traveling public adequate information to negotiate a roadway constructed to a 3R design of less than the regulatory speed limit; therefore, a design exception is not necessary. A design exception will only be required when the design speed for a vertical curve is more than 20 mph less than the regulatory speed. A design exception will not be required at locations where warning and advisory speed plate signs have been installed for a horizontal curve(s). These recommendations are supported by Transportation Research Board, National Research Council, Special Report 214 “Designing Safer Roads”.
7. Obstructions within the clear zone for 3R projects should be reviewed for removal or relocation of the obstacle, installation of a traffic barrier, or do-nothing as determined by a cost-effective evaluation.

VI.4A COUNTY DESIGN GUIDELINES - RESURFACING, RESTORATION AND REHABILITATION (3R) OF MAJOR COLLECTOR ROADS (English Units)

DESIGN ELEMENT											
AADT -- CURRENT YEAR		Under 400		400 - 749		750 - 1499		1500 - 2000		Over 2000	
[1]TERRAIN ###		F	R&H	F	R&H	F	R&H	F	R&H	F	R&H
[2]DESIGN SPEED (MIN.)	mph	--	--	--	--	--	--	--	--	--	--
[3]STOPPING SIGHT DISTANCE	ft.	--	--	--	--	--	--	--	--	--	--
[4]MINIMUM HORIZ. CURVE RADIUS	ft.	--	--	--	--	--	--	--	--	--	--
[5]MAXIMUM GRADE	%	--	--	--	--	--	--	--	--	--	--
[6]PAVEMENT WIDTH	ft.	20	20	20	20	22	22	22	22	22	22
SHOULDER WIDTH	ft.	2	2	2	2	2	2	2	2	4	4
[7]BRIDGE WIDTH -- EXISTING	ft.	20	20	20	20	24	24	24	24	26	26
[8]BRIDGE LOADING -- EXISTING	--	--	--	--	--	--	--	--	--	--	--
[9]FORESLOPES	--	2:1	2:1	2:1	2:1	3:1	3:1	3:1	3:1	3:1	3:1
[10]CLEAR ZONE	ft.	10	10	10	10	10	10	10	10	10	10

F = FLAT, R = ROLLING, H = HILLY

NOTES:

[1]Prevailing (over 50%) slopes of natural ground are: Flat - 3% or less, Rolling & Hilly - over 3%.

[2]Design speed shall be equal to the posted or regulatory speed limit.

[3]Crest vertical curves should be evaluated for reconstruction when: (a.) the design speed of the hill crest (based on minimum stopping sight distance provided) is more than 20 mph below the posted or regulatory speed limit; (b.) the AADT is greater than 1500 vpd; and (c.) the hill crest hides an intersection, sharp horizontal curve, narrow bridge, or other feature that requires a specific driver response.

[4]Improvements to horizontal curves should be considered under the following conditions:

(a.) Superelevation should be increased when the design speed of the curve is below the posted or regulatory speed limit and the existing superelevation is below the maximum allowable specified in the Greenbook.

(b.) Reconstruction of the curve should be considered when the design speed of the existing curve is more than 15 mph below the posted or regulatory speed limit and the AADT is greater than 750 vpd.

[5]The existing grade may remain unless there is a specific history of accidents that are related to the steep grade.

[6]Wider lane and shoulder widths should be considered at locations where trucks make up more than 10% of the total traffic volume.

[7]Narrower bridge widths may be considered acceptable to remain in place if they are equal to the approach pavement width. See BLP Memo 03-05 for guidance on requirements for bridge redeck projects. Whether or not bridge widening is warranted, installation of transition guardrails, rehabilitated or new bridge rails, and warning signs should be considered.

[8]Legal load limit and not posted.

[9]Flatter slopes should be used if there is a history of run-off-road accidents or at locations where run-off-road accidents are likely to occur (e.g., on the outside of sharp horizontal curves).

[10]Distance measured from edge of through traffic lane.

General Comment:

These guidelines are provided to assist in the 3R design of rural secondary roads. Each project must be considered individually to determine what improvements are feasible to extend the useful life of the existing roads. Bridge painting only projects should be considered as maintenance and upgrading of other features would not be required. Values below those shown in this table will be considered on a project-by-project basis provided that a design exception is justified to KDOT.

References:

"A Policy on Geometric Design of Highways and Streets", AASHTO, 2004

Special Report 214, "Designing Safer Roads Practices for Resurfacing, Restoration and Rehabilitation", TRB, 1987

"Policies for the Rehabilitation of Highways and Bridges for Other than Interstate and Freeways on the State Highway System in Kansas", KDOT, 1990

"Roadside Design Guide", AASHTO, 2006

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Figure 5.6: Design Guidelines for Rehabilitation, Restoration, and Resurfacing (3R) of Major Collector Roads

5.2.5 1R—KDOT BLP Policy

The primary goal of 1R projects is to maintain and extend the serviceable life of an existing pavement. These projects will typically consist of asphalt overlays and seals and do not generally add significant structural strength to the existing pavement system.

Routes eligible for 1R treatments are the same as routes eligible for STP funding. Also, 1R projects are eligible for federal funding only if the LPA is operating a 1R program under the guidance of an asset management system (pavement management system) approved by BLP.

In general, the existing roadway alignment is considered to be acceptable and improvements beyond the roadway surface will normally be outside of the scope of a 1R activity, although consideration should be given to include any safety improvement that can be accomplished within the proposed project's budget.

All edge drop off conditions (existing or created by the 1R action) within the project limits shall be addressed as part of the proposed improvement.

Projects to be developed using 1R criteria must receive approval from the appropriate BLP project manager prior to the LPA submitting Form 1302.

1R projects will not typically require a large plan set and may be submitted (with approval from BLP) as 402 style projects consisting of a title sheet, typical section, general notes and bid items/quantities.

1R projects can typically be developed in a shorter time frame than projects of larger scope due to reduced environmental impact, lower preliminary engineering requirements and little to no effect on existing utilities and ROW.

5.3 Preliminary Scoping/Site Review

On most projects it is BLP's intent to conduct a preliminary project scoping site review. Some preliminary engineering work should be performed to arrive at least at a concept with or without alternatives. The LPA should coordinate or have the designer coordinate an onsite meeting with BLP and other appropriate reviewing agencies (DWR, KDWPT, COE, etc...). The meeting will include discussion of project scope and limits and should include design alternatives that have been considered. The intent of the meeting is to select the best alternative for which to develop plans. If a preliminary project scoping site review is conducted, there may not be a need for a subsequent site review at the field check stage. For projects on a short or accelerated schedule it is advantageous to submit preliminary plans indicating the limits of proposed work as soon as possible so that the environmental investigations may commence. These plans may be submitted prior to formal submittal of field check plans but should be conservative enough to include all potential areas of work that will be shown on future plan submittals.

5.4 Field Check

5.4.1 Introduction

The development of field check plans by the LPA shall be performed in accordance with accepted engineering practices and all applicable state, AASHTO, and federal criteria. A summary of the various guidelines that may apply to a project is given in this manual. KDOT's Design Manual, Volume I, Road Section, Section 2.4, FIELD CHECK PLANS, is the guide for developing the plans to field check stage. In addition, geometric design guidelines, based on design traffic volume, design speed, functional classification and other pertinent criteria, are given in this manual.

5.4.2 Plan Requirements

Once plans have been developed to field check stage by the LPA, the plans should be submitted to the BLP in accordance with BLP E-Plan Requirements. The LPA shall provide a project cost estimate to the BLP along with the submitted plans.

5.4.3 Plan Review

The LPA and/or its consultant has the responsibility to ensure the completeness and accuracy of the plans. Plans that are not considered to be adequately complete or accurate for field check may be returned to the LPA and/or its consultant for additional development or revision. BLP's (and others as deemed necessary by the BLP project manager) review of field check plans will be for general compliance with the prevailing KDOT, AASHTO and federal criteria for purposes of maintaining federal funding eligibility and ensuring sufficient information is available for a contractor to develop a fair and reasonable bid. This review is not a thorough design review and does not relieve the LPA and/or its consultant of the duty to provide a design that is well conceived and plans that are complete and accurate.

Field check plans will be reviewed by BLP and other appropriate KDOT Sections, comments will be made, and the review comments will be made available upon return to the LPA.

5.4.4 Railroad Agreements

During the site review/field check it should be determined if the proposed project will have a potential impact on rail facilities. If it appears that work will be near or on railroad right-of-way the LPA should submit electronic plans detailing the work on or near railroad R/W to the BLP project manager. The BLP project manager will make the plans available to KDOT Coordinating Section for distribution to the affected railroad for review. This submittal would occur after all site review/field check comments have been addressed and can be coordinated with the office check submittal. KDOT Coordinating will work with the railroad to determine the need for flagging, liability insurance, and agreements. The LPA will be responsible for providing railroad liability insurance quantities if they are required. Railroad liability insurance quantities should be developed in accordance with section 2.6.16 of the KDOT Road Design Manual.

5.4.5 Field Check (Preliminary Scoping/Site Review) Report

The field check is an on-site and/or office review of the plans for the proposed improvement to assess project eligibility, appropriateness of scope of work, constructability, safety, and other issues relevant to the project. If the preliminary scoping/site review is deemed sufficient for on-site review, a field check meeting may not be required by BLP. Otherwise, the BLP project manager will schedule a field check meeting after plans have been reviewed and determined to be at an appropriate level of detail. Plan submittal will be required at this stage regardless of whether or not an on-site review is conducted. Plans at this stage must contain sufficient detail for the environmental resource agencies to understand what the impacts of the project are. Electronic plans may be distributed by the BLP project manager to other participants who do not already have them. Participants may include, but are not limited to, BLP Local Road Engineer or Associate Road Engineer, BLP Local Bridge Engineer or Associate Bridge Engineer, LPA representative, design consultant, KDOT District personnel, and other KDOT headquarters staff as appropriate. Plan submittal/distribution will be in accordance with BLP E-Plans Requirements.

After the site review/field check has been conducted, the BLP project manager will complete a field check report to document the meeting. The report will be distributed to the LPA, designer, and KDOT District and Area offices.

5.5 Office Check

Plans should be submitted for office check after the designer has addressed all plan issues, developed all details, and computed all the quantities. At this stage, the designer should consider the plans to be complete and, in his/her opinion, ready for construction letting. Quality control checks should have been performed by the LPA and/or its consultant in order to ensure the completeness and accuracy of the plans.

5.5.1 Required Documents

Required documents to be submitted with office check plans include the following:

Office Check Plans

Updated Cost Estimate

KDOT Form 1307, List of Permits and Status of Same

Traffic Warrants or Studies (if required)

Design Exception/Variance Request (if required)

Geology/Soils Reports (if available)

HAC (on applicable projects)

Any other applicable project/exploratory reports

5.5.2 Plan Requirements

Field Check revisions shall be made in accordance with KDOT's Design Manual, Volume I, Road Section, Section 2.5 "Field Check Revisions". More detailed design guidelines and references are included in this Manual. The plans at office check stage are considered complete. Prior to submittal for office check all details and quantities should be completed by the designer, and the plans should have undergone a thorough review by the engineer in charge to assure that the information shown is accurate and complete prior to submittal for office check. The designer should not submit plans for office check until the designer is of the opinion that the plans are ready for letting.

5.5.2.1 General Requirements

Guidance on items to be included in office check plans is in the KDOT Design Manual, Volume I, Road Section, Section 2.7.

If environmental mitigation is involved, the BLP project manager may forward electronic plans to the ESS so that copies can be sent to the appropriate regulatory and resource agencies. If the project involves construction near a railroad, office check submittal may be used by the KDOT Coordinating Section to determine railroad requirements for the project.

Plans are received and reviewed for general compliance to design guidelines and bid letting requirements by BLP. Detailed review of the plans to ensure that all applicable criteria are met and that the plans have been developed in accordance with KDOT procedures is the responsibility of the project design engineer, whether designed by LPA or consultant. Plans marked for revision are returned to the LPA or the designer for necessary plan revisions and continuation of the project development process. On some occasions the plan review indicates that the plans are, in fact, not completed to the office check stage due to errors or omissions. When this occurs, the plans will be returned to the designer with a notification that a subsequent office check will be required. The designer will need to address the comments made on the plans and perform additional quality control checks to ensure that the plans have met the expectations of office check for the next submittal. It is important that these checks be performed prior to the initial office check in order to avoid the risk of impacting project schedules.

5.5.2.1.1 KDOT Bid Items

All bid items for pay included in the project plans shall be standard KDOT bid items whenever possible.

5.5.2.1.2 Non-Standard KDOT Bid Items

If an item is required to be part of the project and cannot be covered by a standard KDOT bid item, then the designer shall be responsible for writing a specification that fully addresses the non-standard item. The specification will be incorporated into a project special provision for inclusion in the contract. Proposed project special provisions should be submitted to the BLP project manager as soon as possible to enable adequate time for the BOCM to review and approve. Project special provisions will be required to be submitted no later than the PS&E stage of project development.

Proprietary items should not be specified unless absolutely necessary on the project. Inclusion of proprietary items (or processes) may be included if the LPA provides a public interest finding documenting that the use of the proprietary item or process is in the best interest of the public. Public interest findings should be completed as early as possible to allow for BLP review and concurrence as outlined in this manual.

5.5.2.2 Design Exception/Allowance

Need for a Design Exception/Allowance should be determined no later than the office check stage of project development. Design Exceptions/Allowances should be documented and requested in accordance with the guidance given in this manual.

5.5.2.3 Railroad Agreement

If work on the project will encroach on railroad rights of way, an agreement with the affected company may be required. In some cases where temporary or permanent easement is required, the railroad may require a legal description of the needed tract. This requirement should be anticipated when the LPA scopes the project for design since additional survey work may be required.

In some cases the proposed work may cause the need for a railroad flagger to be present during portions of the construction.

Quantities for railroad protective liability insurance may also be required if work is done within certain limits of the track(s). For more information regarding railroad protective liability insurance reference Section 2.6.16 of the KDOT Design Manual Volume I, Road Section.

The need for an agreement, flagger and liability insurance will be determined with the assistance of the KDOT Coordinating Section during the project development process.

5.5.2.4 Design Summary

KDOT's Bureau of Design, Environmental Services Section (ESS) issues a "Status of Environmental Concerns – Final" after all environmental clearances have been obtained and all necessary documentation has been completed. This document will also indicate which permits may be required for the project. For additional information on the environmental requirements and documentation for a project see Section 4 of this manual.

Once ESS has issued the final environmental memo, the BLP will issue a Design Summary Document that confirms the final determination of the project's design, criteria, environmental classification and indicates that all clearances and approvals have been obtained. The Design Summary Document will also indicate if any Design Exceptions have been approved for the project and confirm that the project is programmed on the STIP and/or MPO TIP. The Design Summary Document is transmitted to the FHWA for concurrence. Acquisition of project right of way may begin after the FHWA has concurred with the Design Summary Document.

5.5.2.5 Traffic Signal Warrants

An engineering study is required to demonstrate warrants are satisfied for modification or new construction of traffic signals to be eligible as a participating item. A copy of the study should be submitted as early as possible in the plan development process to the BLP project manager. Work proposed for traffic signals that do not satisfy warrants will not be eligible for inclusion in the project.

5.5.2.6 Operational Analysis

An operational analysis will be required when a proposed project modifies an existing condition on or adjacent to a state or federal highway. Operational analysis may also be required to validate preferred design alternatives and/or justify expenditure of federal or state funds on the local system. A copy of the operational analysis should be submitted as early as possible in the plan development process to the BLP project manager for review.

5.5.2.7 Public Interest Findings

The LPA shall be responsible for providing a public interest finding to BLP when it is necessary to specify proprietary products, use public equipment or materials, or award contracts on a basis other than competitive low bid.

The request contained in the public interest finding will be reviewed by BLP and if there is concurrence, notification will be made by letter to the LPA.

5.6 Final Check

The purpose of final check is to ensure that all office check comments have been addressed and the plans are ready for PS&E. If design changes have occurred since the previous office check, the submittal is considered to be a subsequent office check.

5.6.1 Required Documents

Required documents to be submitted with final check plans include the following:

Final Check Plans

Updated Cost Estimate

KDOT Form 1307, List of Permits and Status of Same

Electronic copies of all permits obtained to date

Drafts or final versions of required project special provisions

Any other reports or project documentation not previously submitted

5.6.2 Plan Requirements

The LPA and/or its consultant will address all comments made during the office check of the project. When the designer has addressed all comments from office check and considers the plans to be complete, the plans and other required documentation should be submitted to BLP for final check. Submittal of any project and exploratory reports that have not been previously submitted should also occur at this time. A draft of any project special provisions needed, including any environmental restrictions, on the project should also be submitted to BLP at final check to allow for KDOT review and finalization prior to PS&E.