5.0 Plan Development

The plan development 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.

Note: Use of the word "roadway" in this section applies to all transportation facilities.

5.1 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 Low-Volume Local Roads", AASHTO, 2019 edition.
3. "Roadside Design Guide", AASHTO, current edition.
4. "Road Design Manual, Volume I, Road Section, Parts A & B", KDOT, current edition
5. "Drainage Design Manual, Volume I, Road Section, Part C", KDOT, current edition
6. "LRFD Bridge Design Specifications", AASHTO, current edition.
7. "LRFD Guide Specifications for Design of Pedestrian Bridges", AASHTO, current edition.
8. "LRFD Bridge Design Manual, Volume III, Bridge Section", KDOT, current edition.
9. "Survey Manual, Volume II, Survey Section", KDOT, current edition.
10. "Kansas Regional Coordinate System Files", KDOT, current edition
11. "Policy for Non-Freeway Resurfacing, Restoration and Rehabilitation (3R) Projects", KDOT Road Memorandum 18-03, October 1, 2018 version.
12. "Guide for the Development of Bicycle Facilities", AASHTO, current edition.
13. "Guide for the Planning, Design and Operation of Pedestrian Facilities", AASHTO, current edition.
14. "Manual on Uniform Traffic Control Devices", (MUTCD), current edition.
15. Americans with Disabilities Act (ADA) guidelines and standards, various publications including PROWAG and ADAAG, United States Access Board, current edition
16. "Highway Capacity Manual", (HCM), current edition.
17. "Traffic Engineering Guidelines", KDOT Bureau of Transportation Safety & Technology.
18. "Standard Specifications for State Road and Bridge Construction", (including "Special Provisions to the Standard Specifications"), KDOT current edition.
19. "KDOT Access Management Policy", latest version.
20. "Pavement Marking Policy", KDOT, latest version.
21. "KDOT Utility Accommodation Policy", latest version.
22. "A Guide for Accommodating Utilities Within Highway Right-of-Way", AASHTO, current edition.
23. "Guide on Evaluation and Abatement of Traffic Noise", AASHTO, current edition.
24. "KDOT Temporary Erosion Control Manual", latest version.
25. "Guide for Design of Pavement Structures", AASHTO, current edition.

26. "Guidance on Traffic Control Devices at Highway-Rail Grade Crossings", FHWA, November 2002.
27. All current applicable BLP memos.
28. "Urban Street Design Guide", NACTO, current edition.

If not otherwise covered in this Manual, the procedures used shall conform to Federal and Kansas law.

5.2 Design Criteria

5.2.1 General Criteria

The Green Book addresses three types of projects:

- New construction projects are those that construct roads on new alignment where no existing roadway is present.
- Reconstruction projects are projects that utilize an existing roadway alignment (or make only minor changes to an existing alignment) but involve a change in the basic roadway type. Changes in the basic roadway type include widening a road to provide additional through lanes or adding a raised or depressed median where none currently exists, and where these changes cannot be accomplished within the existing roadway width (including shoulders).
- Construction projects on existing roads are those that keep the existing roadway alignment (except for minor changes) and do not change the basic roadway type.

Project development is broader than just geometric design and should consider many factors for all transportation modes. Construction of roads on new alignment and reconstruction projects that change the basic roadway type should utilize the design criteria in the Green Book to the extent practical. Less complex projects on existing roads that do not change the basic roadway type should focus on addressing the performance issues that prompted the project, as well as any other known performance issues within the project limits that are identified in the purpose and need statement (generally shown on the Request for Project form). If some aspects of the geometric design for a road or street do not fully comply with the geometric criteria in the Green Book, but the road or street is performing satisfactorily, there is no need to change those aspects of the existing geometric design for projects in which the basic roadway type will remain the same.

Projects need not address every aspect of poor performance. Designation of the performance issues to be addressed in any given project is an agency management decision, with due consideration of funding availability and the effect that improvements in some aspects of performance may have on other aspects of performance.

Roadway and intersection designs should consider expected pedestrian usage and provide pedestrian facilities and design elements where appropriate. Each of the transportation modes (automobiles, bicycles, pedestrians, transit, and trucks) should be considered in the design of every project on the road and street

network. The balance among transportation modes selected for each road and street should be a conscious decision arrived at after thorough consideration of the needs of each mode, local and regional transportation agency master plans, and community needs.

New construction projects typically utilize the design criteria presented in the Green Book. The Green Book should also be consulted for applicable geometric design guidance in reconstruction projects but, even more than for new construction, reconstruction projects need a flexible, performance-based approach to adapt the design to fit the roadway context and meet multimodal needs. While applying the design criteria for new construction in the Green Book to reconstruction projects is desirable, it may be impractical in many cases because of existing constraints in the corridor and the need to fit the roadway into the community context.

The approaches used to address design for projects on existing roads include:

- Poor infrastructure condition: use NCHRP Report 876, "Guidelines for Integrating Safety and Cost-Effectiveness Into 3R Projects", 2017, which indicates that 3R projects should retain their existing geometric design features unless one of the following applies:
    - Crash history
    - Low LOS
    - Benefit-cost analysis
- Congestion: use HCM. There is no reason for geometric design changes except for those that improve traffic operations or that meet another specific identified need.
- Crashes: use HSM. There is no reason for geometric design changes except for those that improve traffic operations or that meet another specific identified need.

Design flexibility is of critical importance because each project has a specific purpose and need, has specific context and constraints, serves a unique set of users, and fills a distinct position in the transportation network. Flexibility should be exercised to better meet specific project goals or to work within defined constraints. Documentation should be provided to explain why the proposed design is an appropriate solution for the project, how it serves the needs of each transportation mode, how it is expected to perform in the future, and how it fits within available funding.

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

Geometric design for new construction projects shall be based on the design criteria included in the AASHTO Green Book (Green Book) or Guidelines for Geometric Design of Low-Volume Local Roads, as appropriate, and as noted on the KDOT Project Authorization (KDOT Form 883). Reconstruction projects should use the Green Book to the extent practical.

5.2.2.1 Design Speed

The design speed is a selected value that is used to determine the design features of a roadway. The design speed is based on the functional classification of the road, the topography, adjacent land uses, expected traffic volumes, anticipated operating speed, and modal mix. The Green Book recommends every effort

should be made to attain a desired combination of safety, mobility, and efficiency while under the constraints of environmental quality, economics, aesthetics, and social or political impacts. Once the design speed is selected, all pertinent features of the roadway, e.g. sight distance or horizontal or vertical curvature, should be designed in accordance with the design speed.

The design speed selected should be consistent with the speeds that drivers are likely to travel on a given roadway. A low design speed should not be selected where the topography is such that drivers are likely to travel at high speeds. Lower speeds are desirable for streets in walkable, mixed-use urban areas and this desire for lower speeds should influence the selection of the design speed. For design of such streets, a target speed should be selected. The target speed is the highest speed at which vehicles should operate and is intended to be used as the posted speed limit. The selected design speed should reflect the needs of all transportation modes expected to use a roadway. It should be inclusive of nearly all the desired speeds of drivers where conditions are such that drivers can travel at their desired speed. It is important that the design speed used for horizontal curve design be a conservative reflection of the expected speed on the constructed facility.

5.2.2.2 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 like 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 2.3.4* of the *KDOT Design Manual, Volume 1, Bureau of Road Design*.

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. Horizontal curve radius *
5. Superelevation rate *
6. Stopping sight distance *
7. Maximum grade *
8. Cross slope *
9. Vertical clearance *
10. Design loading structural capacity

* Only for "high-speed" (Interstate, other freeways, and roadways with a design speed greater than or equal to 50 mph) NHS facilities.

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 *Section 2.3.4* of the *KDOT Design Manual, Volume 1, Bureau of Road Design*.

A design allowance may be requested for necessary deviations from criteria or policy not included in the 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 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 because of, the field check, the approval may be made prior to office check plan 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 (DSD) or a revised DSD if the DSD is completed prior to the design exception approval.

Figure 5.1: Example Design Exception Request Summary Form

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	☐	Maximum Grade*
☐	Lane Width*	☐	Cross Slope*
☐	Shoulder Width*	☐	Vertical Clearance*
☐	Horizontal Curve Radius*	☐	Design Loading Structural Capacity
☐	Superelevation Rate*	☐	Other: _____
☐	Stopping Sight Distance*	☐	

* Only for "high-speed" (Interstate, other freeways, and roadways with a design speed greater than or equal to 50 mph) NHS facilities.

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 documentation (plan details, studies, reports, etc.)

5.2.3 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, 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 crash experience. The Roadside Safety Analysis Program (RSAP) is one tool available to designers to evaluate design features on a benefit/cost basis.

The 4th edition of the "Roadside Design Guide" has expanded the discussion of roadside safety in urban or restricted environments. In an urban environment, there is a high density of development, numerous fixed objects (utility poles, fire hydrants, planters, etc.), and frequent intersections (entrances/sideroads) that result in roadways with lower design speeds. In these restricted environments, the application of the clear zone concept may not be practical.

In an urban environment, a clear zone should be provided, but where this is not practical, every effort will be made to clear the roadside of obstacles (e.g., non-breakaway above ground utilities) for a minimum of a six-foot lateral offset from the face of the curb. If, in a very restricted environment, provision of the six-foot lateral offset is not practical, a lesser value will be considered with appropriate documentation.

The presence of a curb alone does not signify an urban environment. Curbs have very limited re-directional capability except at very low speeds. In areas where urban characteristics are not present, regardless of whether the typical section includes curbing, a clear zone as described in Chapter 3 of the "Roadside Design Guide" shall be used.

On projects where a lateral offset is used in lieu of a clear zone do not show the lateral offset as the clear zone distance on the title sheet.

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. 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.

5.2.4 AASHTO Guidelines for Geometric Design of Low-Volume Roads

AASHTO's Guidelines for Geometric Design of Low-Volume Roads may be used to establish criteria for projects on local or minor collector roads with a design average daily traffic volume of 2000 vehicles per day or less. 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 to document their use.

5.2.5 AASHTO Guide for the Development of Bicycle Facilities

The Guide for the Development of Bicycle Facilities shall be used to develop projects that provide on-road bike lanes or other off-roadway facilities such as shared use paths or side paths (shared use paths adjacent to the roadway) that are used for multiple modes of non-vehicular transportation. The primary function of bike lanes and shared use paths is transportation as opposed to trails where the primary function is recreational. The primary function for all projects developed under federal Transportation Alternatives funding will be transportation. A facility used by bicycles must be designed for the expected speeds including considerations of horizontal and vertical alignment, path width, clear zone, intersection conflicts and other design considerations similar to what would be considered in the design of a vehicular roadway.

5.2.5.1 Design Speed

Unlike a roadway project where a single design speed is used, the design of a shared used path requires the designer to consider several factors including terrain, user abilities/age, context of the path, prevailing winds, path surface, and other path characteristics. The design speed should be selected based on the criteria in the "Guide for the Development of Bicycle Facilities" and should be shown in the traffic data on the title sheets. If the project includes roadway and shared use path construction, list separate vehicle and bicycle design speeds in the traffic data.

5.2.5.2 Clearances

Similar to a roadway clear zone, a shared use path should provide a 2' clear area beyond the path edge that is clear of fixed objects such as large rocks, utility poles, railings and bridge piers. Path bridges should also provide this clearance resulting in a typical minimum bridge width for a path of 14'-0". If necessary, due to site constrictions, clearances to smooth objects such as a railing may be reduced to 1'-0". When near downward slopes steeper than 3:1, or parallel to water bodies, a wider separation should be considered, and a physical barrier may be required if the separation between the slope and trail is less than 5'. A vertical

clearance of 10' is also required over a shared use path and adjacent clear areas which may require removal or trimming of trees and should be noted on the plans.

Separation between sidepaths and adjacent roadways should be reviewed. A sidepath immediately adjacent to the back of curb is not acceptable as it places a curb high drop-off immediately adjacent to the path. A minimum separation of 5' is desired. If concrete pavement is extended across the separation area to eliminate mowing, an edge line or change in texture should be considered so that the cyclist is aware that this is not additional path width. If parking is allowed on the street adjacent to a sidepath, the vehicle overhang and door swing should be considered in evaluation of clear areas and separation widths.

5.2.5.3 Design Exception/Allowance

Bicycle facilities shall be subject to the same Design Exception/Allowance categories and process as roadways. See *Section 5.2.2.2* above.

5.2.6 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.

5.2.7 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.

5.2.8 United States Access Board ADA Guidelines

The U.S. Department of Transportation (DOT) adopted the 2004 ADA Accessibility guideline in a Final Rule dated October 30, 2006 (ADAAG). These guidelines provide consistent usability for buildings and on-site facilities but do not address the public rights-of-way pedestrian environment.

The Public Rights-of-Way Accessibility Guidelines (PROWAG) were developed to specifically address designing new or altered public sidewalks, street crossings, and related pedestrian facilities. The PROWAG are not standards until the rule making process is complete but are the recommended best practices for areas not fully addressed by the present ADAAG standards. PROWAG is consistent with the ADA's requirement that all new facilities (and altered facilities to the maximum extent feasible) be designed and constructed to be accessible to and useable by people with disabilities. In this regard DOT (and KDOT) recognized PROWAG as an equivalent facilitation and is the recommended approach for providing consistent usability within public rights–of-way.

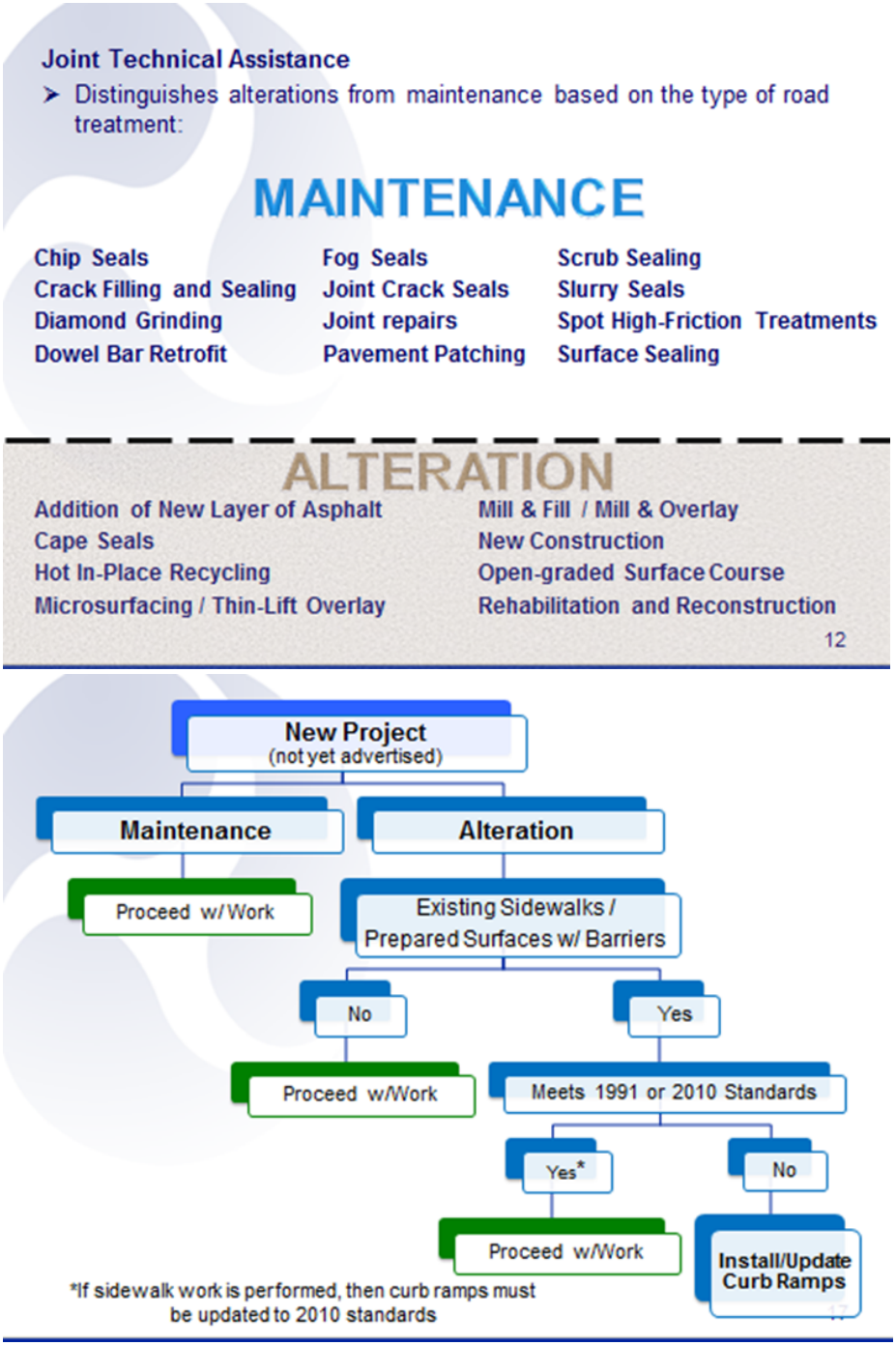
Consistency with ADA in the public rights-of-way can be achieved by agencies and designers in several ways.

- Follow the PROWAG.
- **Follow the ADAAG but supplement with PROWAG only where ADAAG is silent.
- **Follow the ADAAG but must have reasonable and consistent policies for accessibility for persons with disabilities where ADAAG is silent.

**Note: Specification section 824 requires the use of PROWAG criteria for ramp construction.

Additional guidance provided by the Department of Justice (DOJ) clearly defines alterations and action that must be taken due to alterations. That guidance is summarized in the following chart:

Curb Ramp Update Guidance Chart



It is important to note that these guidelines extend to temporary work zone conditions. The temporary traffic control plans must consider the ability of pedestrians, both able and disabled, to travel safely through or around the construction site. The temporary traffic control plans within the Design Plans shall include the designer's plan for handling multi-modal traffic during construction, including detour routes and road/sidewalk closings, if necessary, and installation of alternate or temporary pedestrian accessible paths to

pedestrian facilities in the public rights-of-way. The temporary traffic control plan, including the accessibility aspects, must be in conformance with the latest version of the MUTCD.

5.2.9 KDOT Design Manuals, Policies, & Informational Memos

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

5.2.9.1 Resurfacing, Restoration, and Rehabilitation (3R) Policy

Projects on existing non-freeway state highways will be designed to meet 3R standards. This policy establishes specific minimum design criteria which provide a balance between safety, service and cost. Existing geometric design features are acceptable if they are equal to or better than the minimum criteria established in this policy.

5.2.9.2 Pipe Materials

KDOT has developed a Pipe Policy to identify the materials that will be allowed in various situations and locations around the State.

5.2.9.3 Surveys

With the increasing availability of public domain GIS data, it is possible to generate a document that closely represents a set of design plans by overlaying several data sets over a common base. However, many of these sources were developed as administrative or planning tools. Although these overlays would suffice for concept plans or the delineation of drainage areas, BLP does not consider these data sets sufficiently precise for use as design plans, particularly where permanent or temporary land rights are being acquired or projects that require grading or surfacing.

Many of the KDOT standards bid items or tables used to summarize quantities are based on a traditional Station and Offset layout. For linear transportation projects, the use of coordinate only plans are discouraged.

Alignment control and ties to the public land system shall be provided on the project in accordance with the **"Survey Monument Guidelines for Project/Plan Development"** located in ***Appendix A*** below. Horizontal control points and benchmarks, including references for recovery, shall be provided on the project site. The establishment of the control points should be established with the same equipment limitations and accuracy requirements as would be required for the bid item "Contractor Construction Staking" to avoid issues in accuracy between the design and construction surveys. The bid item "Contractor Construction Staking" does not allow the use of GPS for the vertical component of control point, finish staking, or critical bridge member staking.

5.2.9.4 Bid Items

On State-let projects, standard KDOT bid items shall be used whenever possible including the proper use of bid item syntax as described in the specification. It is also helpful if the options allowed by the bid item are in a configuration that is currently listed in the KDOT Bid Item List. Where it is not possible to use an existing bid item, the designer will be required to prepare a Project Special Provision. See *Section 5.5.1.1.2* below.

5.2.9.5 Non-bridge Structures

All non-standard structures, including drainage structures, walls and other miscellaneous structures, should be designed and reviewed by a structural engineer.

The height of retaining walls in this section refers to the height from the top of footing or leveling pad to the top of the wall cap. Retaining walls less than three feet in height are not required to be designed or reviewed by a structural engineer. LRFD Design will be required for retaining walls greater than six feet in height. 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 *Section 6.0 Bridge Design* in this Manual.

Walls less than six feet in height may be bid as "Landscape Retaining Wall" and utilize the design criteria of the National Concrete Masonry Association Design Standards if they meet all geometric criteria in the Specification and are on the Bureau of Materials and Research list of approved systems (or alternatively, provide additional documentation as described in the specification). This landscape retaining wall specification is limited to MSEW and MBW systems. Walls less than 6 feet in height that are not MSEW or MBW systems shall be designed by LRFD criteria and may require preparation of a project special provision.

All cast-in-place concrete structures including conventional retaining walls, integral sidewalk retaining walls, new RCB structures, RCB modifications, wingwall extensions and other miscellaneous structures, will be bid by the individual quantities for concrete, reinforcing steel and excavation (and any other necessary pay items). Plans shall include the appropriate details and material schedules (Bill of Reinforcing Steel) to develop the appropriate quantities.

5.2.10 Design Criteria Tables

The design criteria tables below were developed in compliance with all applicable AASHTO criteria for new construction of all roads and streets except those local roads and minor collectors with a volume of less than 2000 vehicles per day and, where applicable, KDOT Design Manuals. When a conflict exists between the criteria table and other KDOT references, the information contained herein shall control except as supplemented by BLP Memos. For local roads and minor collectors with a volume less than 2000 vehicles per day, refer to the Guidelines for Geometric Design of Low-Volume Roads.

Figure 5.2: Design Guidelines

DESIGN GUIDELINES - RESURFACING, RESTORATION AND REHABILITATION (3R) OF MAJOR COLLECTOR ROADS

DESIGN ELEMENT					
AADT -- CURRENT YEAR	Under 400		400 - 2000		Over 2000
[1]Design Speed	50 mph or less	55 mph to 65 mph	30 mph or less	35 mph to 65 mph	All speeds
[2]PAVEMENT WIDTH (ft.)	20	22	20	22	22
SHOULDER WIDTH (ft.)	2	2	4	4	6
[3]BRIDGE WIDTH	Traveled way + 2 ft. (each side)		Traveled way + 4 ft. (each side)		Approach roadway width
[4]FORESLOPES	3:1	4:1	3:1	4:1	4:1
CLEAR ZONE	See AASHTO "Roadside Design Guide"				

Notes:

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

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

[3]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.

[4]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).

References:

"A Policy on Geometric Design of Highways and Streets", AASHTO, 2018

"Roadside Design Guide", AASHTO, 2011

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

5.3 Preliminary Scoping/Site Review

For projects with very short development schedules, or those that have unique aspects, it may be prudent to conduct a preliminary project scoping site review. Some preliminary engineering work should be performed to arrive at a concept with or without alternatives. The LPA should coordinate (or have their Consultant coordinate) an onsite meeting with BLP. The meeting will include a 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.

5.4 Field Check

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, Bureau of Road Design, Section 2.3, 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.

Required documents to be submitted at the Field Check Stage:

- Field Check Plans
- Project Cost Estimate
- Hydraulic Assessment Checklist (HAC) (on applicable projects)

The required documents shall be submitted to BLP in accordance with BLP E-Plan Requirements.

5.4.1 Plan Review

The LPA and/or its Consultant shall be responsible for 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 PM) review of field check plans will be for general compliance with the prevailing state, 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.

5.4.2 Railroad Coordination

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 PM. The PM will make the plans available to KDOT Coordinating Section for distribution to the affected railroad for their 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 Section will work with the railroad to determine the need for flagging, liability insurance, agreements, and a possible diagnostic review. 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 Design Manual, Volume 1, Bureau of Road Design*.

5.4.3 Field Check Meeting/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. The PM will schedule a field check meeting after plans have been reviewed and determined to be at an appropriate level of detail.

After the site review/field check has been conducted, the PM 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 quantities. All markups/comments which have been made by BLP on the Field Check submittal are made to improve the plans by suggesting or requiring changes. These do not override design decisions made by the designer or the owner. The designer's or owner's choice to disregard any BLP markups shall be discussed with the BLP PM and approved prior to Office Check plan submittal. At this stage, the designer should consider the plans to be complete and, in their opinion, ready for construction letting. Quality control checks should have been performed by the LPA and/or its Consultant to ensure the completeness and accuracy of the plans.

Required documents to be submitted at Office Check Stage:

- 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)
- Updated Hydraulic Assessment Checklist (HAC) (if applicable)

- Any other applicable project/exploratory reports

5.5.1 Plan Requirements

Field Check revisions made in accordance with the archived Field Check plans and Field Check Report will be reflected on the Office Check Plans. The plans at office check stage should be considered a complete checked set of plans. 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.

5.5.1.1 General Requirements

Guidance on items to be included in office check plans is in the *KDOT Design Manual, Volume 1, Bureau of Road Design, Section 2.6*.

If environmental mitigation is involved, the PM 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. If the plan review process reveals that the plans are not complete due to errors or omissions, 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 to avoid the risk of impacting project schedules.

5.5.1.1.1 KDOT Bid Items

All bid items for pay included in the project plans shall be standard KDOT bid items whenever possible. For the list of valid KDOT bid items, please see the list at: https://kdotapp.ksdot.org/BidItemList/BidItemList.aspx

5.5.1.1.2 Non-Standard Bid Items

Three classes of specifications are used in the development of a KDOT project. Theses specification classes are:

- Standard Specifications - The standard specifications are the current edition of KDOT's "Standard Specifications for State Road and Bridge Construction", current edition.

- Special Provisions – These are approved supplementary provisions, additions or revisions to the Standard Specification. Essentially these are interim updates to the Standard Specifications and are prepared by Bureau of Construction and Materials. There may be multiple revisions of a Special Provision active at any given time. Typically, the newest version will be included in the project when the Contract Proposal documents are assembled by the BOCM. The proposal documents will identify the specific revision used for the project. The older versions of the Special Provision will be kept active until construction is complete on all projects that have used the older version.
- Project Special Provisions – These are approved supplementary provisions, additions or revisions to the Standard Specifications that address conditions specific to an individual project.

If an item is required to be part of the project and cannot be covered by a standard KDOT bid item, the designer shall be responsible for preparing the project special provision. Proposed project special provisions should be submitted to the PM as soon as possible to enable adequate time for the BOCM to review, approve, and assign a special provision number. Project special provisions shall be submitted no later than the PS&E stage of project development.

In determining the need for a project special provision, the following approach should be considered:

1. Check existing specification. Verify that the standard specifications do not cover the information needed.
2. When possible, use notes on plans rather than creating a special provision.
3. If a new bid item is needed, there must be a project special provision to cover it.

If a project special provision is required, it shall conform to KDOT's format for special provisions. Information regarding the preparation of a project special provision can be found in the "Guidelines for Development, Review and Approval of: Standard Specifications for State Road and Bridge Construction and Special Provisions to the Standard Specifications for State Road and Bridge Construction".

5.5.2 Design Exception/Allowance

The 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.

5.5.3 Railroad Coordination

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 and project development time 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 1, Bureau of Road Design*.

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.

5.5.4 Design Summary

KDOT's ESS issues a "Status of Environmental Concerns – Final" memorandum 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 4.0 Environmental* of this Manual.

Once ESS has issued the final environmental memo, 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.

5.5.5 Traffic Signal Warrants

An engineering study may be required to demonstrate warrants are satisfied for modification of existing traffic signals. New traffic signals must meet warrants to be included in the project. Warrants should be submitted as early as possible in the plan development process to the PM. Work proposed for traffic signals that do not satisfy warrants will not be eligible for inclusion in the project.

5.5.6 Operational Analysis

An operational analysis may be required when a proposed project modifies an existing condition on or adjacent to a state or federal highway. An 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 PM for review.

5.5.7 Public-Interest Findings and KDOT Certifications

The LPA shall be responsible for providing a PIF to BLP when it is necessary to use public equipment or materials or award contracts on a basis other than competitive low bid. PIFs should be completed as early as possible to allow for BLP review and concurrence as outlined in this Manual.

FHWA guidance regarding PIFs can be found online at: https://www.fhwa.dot.gov/federal-aidessentials/catmod.cfm?id=43.

A specific form is not required for the PIF and the request may take the form of a letter documenting the request. BLP shall review the request and work with FHWA to approve or deny the PIF. The LPA will be notified of the approval or denial of the PIF request.

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. All markups/comments which have been made by BLP on previous submittals are made to improve the plans by suggesting or requiring changes. These do not override design decisions made by the designer or the owner. The designer's or owner's choice to disregard any BLP markups shall be discussed with the BLP PM and approved prior to Final Check plan submittal. If design changes have occurred since the previous office check, the submittal is a subsequent office check.

Required documents to be submitted at Final Check Stage:

- 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

5.6.1 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.

5.7 Plans, Specifications and Estimate (PS&E), KDOT—Administered

The designer will submit Preliminary Plans and documentation to the BLP. The BLP Plan File Manager will transmit the plans to the BOCM to approve the Plans, Specifications and Estimates (PS&E), and supporting documents for the advertising, letting and awarding of the project. BOCM determines the number of working days and prepares the Official Engineer's Estimate and Contract Bid Documents.

The PS&E Submittal should be made **four months prior to the programmed letting date**. Failure to meet the submittal schedule could cause the letting to be delayed and/or the project funding could be jeopardized.

5.7.1 PS&E Plans

After Final Check corrections have been made, the LPA will submit Preliminary (PS&E) Plans to BLP for estimating by BOCM. All markups/comments which have been made by BLP on previous submittals are made to improve the plans by suggesting or requiring changes. These do not override design decisions made by the designer or the owner. The designer's or owner's choice to disregard any BLP markups shall be discussed with the BLP PM and approved prior to PS&E submittal.

5.7.2 Engineer's Estimate

The LPA shall submit the Engineer's Estimate. It should be as detailed as possible showing estimated quantities and unit prices.

5.7.3 Permits

The permits required for the project will be acquired by the LPA or their representative. The List of Permits and Status of Same (KDOT Form 1307) shall be filled out and signed according to *Section 4.5* of this Manual. The LPA shall submit the signed Form 1307 and copies of all permits.

5.7.4 Right of way certification

Refer to *Section 7.0 Right of Way* in this Manual for Right of Way requirements. The LPA shall submit the signed Right of Way Clearance for Federal Aid Projects (KDOT Form 1306).

5.7.5 Utility adjustment certification

Refer to *Section 8.0 Status of Utilities* in this Manual for utility relocation information. The LPA shall submit the completed Status of Utilities (KDOT Form 1304).

5.7.6 Final Plans submitted to BLP

5.7.6.1 Plan requirements

Final Plans will be submitted for letting after PS&E review comments are addressed. The designer will submit an electronic copy in accordance with BLP E-Plans Requirements. The professional seal and signature of the engineer in charge of the design and designated local official must be affixed to the original title sheet at this time. A scanned copy of the title sheet with the original signatures and seal shall be submitted as part of the electronic copy.

Refer to the Specifications for Electronic Plans Submittal for procedures on how to submit plans to BLP.

5.7.6.2 Required Special Provisions/Conditions

The designer shall coordinate with the PM to provide any necessary special provisions/conditions.

5.7.6.3 Work Schedule Requirements

The LPA shall coordinate with the PM to determine work schedule requirements. Any special provisions needed to address schedule constraints should be discussed at this time.

5.7.7 Official Engineer's Estimate

During the PS&E stage, the plans will be reviewed by BOCM and they will prepare the Official Engineer's Estimate.

5.7.8 Working Days

Working days required to construct the project are determined by BOCM. This information is provided to BLP and the LPA to assist in the development of the Construction Engineering (CE) proposal and estimate. Early and late start dates are determined by the KDOT District Office and the LPA.

5.7.9 Estimate of LPA Funds Letter

Notification is sent to the LPA notifying them of the estimated dollar amount of matching funds required.

Appendix A

SURVEY MONUMENT GUIDELINES FOR PROJECT/PLAN DEVELOPMENT

The following guidelines will aid in the project/plan development of projects processed through the KDOT Bureau of Local Projects. These guidelines represent the minimum requirement for an engineered project and are intended to supplement sound engineering and surveying practice and standards of care. The intent of these guidelines is to provide a project that can be constructed independently by the information contained on the project plans and that it meets all Local, State, and Federal statutes and regulations, which is a requirement for federal aid eligibility. These guidelines should be reviewed by the consultant in developing a "Scope of Services" proposal for LPA's and by the LPA to determine if a sufficient "Scope of Services" is being provided by consultants during the Preliminary Engineering Consultant selection process.

The alignment defining the existing right-of-way corridor shall be researched, retraced, and monumented to accommodate the construction effort and/or right of way acquisition on projects meeting any one of the following conditions:

1. The project requires acquisition of new rights of way or easements.
2. The project includes grading or excavation.
3. A new permanent pavement (e.g., concrete or asphalt) is to be constructed.
4. The project includes installation or construction of drainage structures (e.g., bridges, concrete box culverts, roadway culverts, entrance pipes).

The manner of replicating and monumenting an existing corridor is detailed in the current *KDOT Bureau of Design, Survey Manual, Section 2.2*, and is incorporated into this guideline by reference. Research shall include original road records, subdivision plats, adjacent deeds, any available road plans, survey records, and land survey reference reports. The section corners and quarter section corners necessary to establish and write legal descriptions for the new rights-of-way shall be recovered or established by a professional land surveyor. This will afford the opportunity to reference the existing right of way to the proposed construction. Appropriate land survey monument ties, to be determined by the adjacent deeds and ownership, shall be made and noted on the plans. This will necessitate the recovery, or perpetuation of PLSS (Public Land Survey System) corners, and/or subdivision plat monuments along or adjacent to the project for the development of proposed right of way descriptions. All land survey activities associated with the project development shall conform to the Kansas Minimum Standards for Boundary Surveys as adopted by the Kansas State Board of Technical Professions.

Projects that are a planned improvement on an entirely new alignment shall be established/monumented in a manner as described in the current *KDOT Bureau of Design, Survey Manual, Section 2.2* as noted above. The project plan should include sufficient ties to the appropriate land survey monuments that control the new right of way descriptions as noted above. This will be determined based upon the adjacent ownership deeds that the acquisition will be based upon.

Survey Monument Guidelines (continued)

Projects that are limited to work within the roadbed and do not require section lines for project control, such as recycling, paving and overlays may still endanger PLSS corners. In order for the construction surveyor to follow the laws on endangered corners, the design consultant or the LPA is required to locate all endangered corners and file the Land Survey Reference Reports prior to submittal of the field check plans. If a PLSS corner cannot be located the Land Survey Reference Report should be filed describing the efforts made to locate the corner. On projects with plan sheets the location and ties to endangered corners shall be included in the plans.

Projects that include grading and/or drainage structures shall reflect the vertical datum for the project, the datum bench mark description and elevation, and shall reflect bench marks established for the project in accordance with the current *KDOT Bureau of Design, Survey Manual, Section 2.3* which is incorporated into this guideline by reference.

Project plans that do not meet the minimum criteria described above will be returned to the submitting firm/agency for corrective action.