Steven L. Beshear
Governor

TRANSPORTATION CABINET
Frankfort, Kentucky 40622
www.transportation.ky.gov/

Joseph W. Prather
Secretary

STATE HIGHWAY ENGINEER POLICY # 2008-07

MEMORANDUM

TO: Chuck Knowles
Ray Polly
Bill Gulick
Chief District Engineers
Division Directors

FROM: O. Gilbert Newman, P.E.
State Highway Engineer

DATE: April 25, 2008

SUBJECT: Guidance for the Use of "**Practical Solutions**" to Project Delivery

The Kentucky Transportation Cabinet (KYTC) is continually challenged with looking for ways to improve the way we conduct business. As a part of that continuous improvement process, efforts are underway to re-emphasize many of the fundamentals that go into the development and delivery of the KYTC's roadway projects. As many of you are aware, one of the main challenges we face today is to find a way to "**do more with less!**" While this phrase may begin to sound somewhat "worn out," this fundamental concept needs to be taken into consideration as an integral part of the decision-making process during all phases of project development and delivery. One of the first steps with any project is to identify the "purpose and need" and the subsequent project scope. It is at this early stage that we have been asked to focus our efforts to ensure that the project scope developed is appropriate and fulfills the initial purpose and need. This initiative, currently labeled "**Practical Solutions,**" is how the KYTC hopes to use the limited resources available to meet the transportation needs of this state.

The concepts of "**Practical Solutions**" is not something new to the KYTC. Components of the "Context-Sensitive Design" initiative emphasize the economics of projects and "right sizing" design parameters on projects that are compatible with other segments of the adjacent roadways and existing topography when appropriate.

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"Practical Solutions" is intended to take these fundamentals to the next level. The Project Team will be given the task of addressing the purpose and need, while at the same time refining the project scope and subsequent design such that the project remains within realistic fiscal parameters. A good example of ways the KYTC is already adapting this type of project approach is the typical rural bridge replacement project. By focusing on replacement of the bridge and limiting work on the approaches using the design exception process, the KYTC has been able to extend our abilities to replace more substandard bridges. It is hoped that through the use of **"Practical Solutions,"** the KYTC will be able to use our limited resources to adequately address the purpose and need for all projects for the whole roadway system.

The primary defining variable in the development and presentation of geometric design criteria is the "design speed" selected for the project. In general, the Project Team must correlate the selection of the "design speed" with the functional classification of the roadway, the actual and anticipated operating speeds, topography, anticipated land use, and the desirable degree of safety, mobility, and efficiency within the constraints of environmental quality, economics, aesthetics, and social or political impacts. In any event, the selected "design speed" should be consistent with both present and future driver expectations. For example, for routes with very little growth expected in the corridor, existing geometric features, as well as crash data, will prove beneficial in: (a) identifying locations and the scope for possible needed safety or capacity improvements, (b) selection of a "design speed" for the project that will provide a consistent approach in relation to driver expectations as well as "match" the appropriate "design speed" criteria to the project and existing conditions. In this example, the purpose and need and the scope of the project is to provide "betterment" to the overall route by identifying and correcting the major deficiencies, as well as working towards providing a corridor where the driver expectations are more consistent.

The selection of the traffic volumes to be used for design purposes is also a primary component of the design. Traditionally, 20-year forecasts are used for this. The Project Team has the flexibility to utilize intermediate years, such as a 10-year forecast, if it is consistent with the purpose and need for the project. Attached please find "Practical Solutions Geometrics" for the various functional classifications of roadways that will provide guidance to the Project Team as they use the **"Practical Solutions"** approach to meet the purpose and need for the project. In general, this provides the Project Team with the flexibility it needs to adapt critical design elements, such as pavement widths, shoulder widths, and horizontal and vertical alignments, to be consistent with the purpose and need for the project.

With the need for road safety and mobility improvements and, the relative availability of financial resources for such improvements diminishing, it is imperative to look at our road design approaches more critically. Some public decision makers and citizens have begun to question the over design/building of previously inadequate and unsafe facilities. This is a common theme throughout much of the United States. Developing a design that yields up to the maximum margin of return for the investment requires an approach that takes into account specific safety issues and the commensurate design elements for each roadway. It is essential that our basic premise must be to find the balance among operational efficiency, safety, and cost in order to design the suitable roadway to meet the transportation needs of Kentucky. It is the intent of this office that future guidance and training be developed to assist in achieving this goal. However, due to the importance of this endeavor, every effort is being made to keep all informed of the progress we have made and need to make in order to be successful and to make the most of the resources we have available.

I have assigned the development and coordination of this effort to Bill Gulick in the State Highway Engineer's Office.

OGN:BG:SLC

Attachment

PRACTICAL SOLUTIONS
GEOMETRICS:
TWO LANE RURAL ARTERIALS

<table>
<tr><th rowspan="2"></th><th>Design Speed (5)</th><th rowspan="2"></th><th colspan="8">Traffic Volume (ADT)</th></tr>
<tr><th></th><th colspan="2">Under 400</th><th colspan="2">400 to 1500</th><th colspan="2">1500 to 2000</th><th colspan="2">2000 to 5000</th></tr>
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<tr><td rowspan="15">Pavement Width and Graded Shoulder Width (Feet) (4)</td><td rowspan="3">30</td><td>Level</td><td rowspan="3">20</td><td rowspan="3">2 to 4</td><td rowspan="3">20</td><td rowspan="3">2 to 4</td><td>20 to 22</td><td rowspan="3">3 to 5</td><td rowspan="3">20 to 22</td><td>4 to 6</td></tr>
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PRACTICAL SOLUTIONS GEOMETRICS: TWO LANE RURAL ARTERIALS

	Design Speed		Traffic Volume (ADT) Under 400	400 to 1500	1500 to 2000	2000 to 5000
Maximum Grade (Percent)	30	Level	7	7	6	6
		Rolling	10	9	7	7
		Mountain	12	10	8	8
	35	Level	7	7	6	5
		Rolling	10	9	8	6
		Mountain	12	10	9	7
	40	Level	7	6	5	5
		Rolling	10	8	6	6
		Mountain	12	10	8	NA
	45	Level	7	6	5	5
		Rolling	10	8	6	NA
		Mountain	12	NA	NA	NA
	50	Level	7	6	5	NA
		Rolling	10	NA	NA	NA
		Mountain	NA	NA	NA	NA

	Design Speed	30	35	40	45	50
Minimum Stopping Sight Distance (1)	(Feet)	200	250	305	360	425
Minimum Passing Sight Distance (2)	(Feet)	1090	1280	1470	1625	1835

1) MINIMUM STOPPING SIGHT DISTANCES ARE BASED ON A HEIGHT OF EYE OF 3.5 FT AND HEIGHT OF OBJECT OF 2.0 FT. BOTH HORIZONTAL AND VERTICAL ALIGNMENTS ARE CONSIDERED.

(2) MINIMUM PASSING SIGHT DISTANCES ARE BASED ON A HEIGHT OF EYE OF 3.5 FT AND HEIGHT OF OBJECT OF 3.5 FT. BOTH HORIZONTAL AND VERTICAL ALIGNMENTS ARE CONSIDERED.

(3) NORMAL PAVEMENT CROSS SLOPES ON BRIDGES SHALL BE 2%

(4) WIDEN 3 FT FOR GUARDRAIL

(5) JUSTIFICATION FOR THE DESIGN SPEED SHALL BE BASED UPON COMPREHENSIVE ANALYSIS OF EXISTING ROADWAY GEOMETRICS, ADJACENT ROADWAY FEATURES, AND PURPOSE AND NEED FOR THE PROJECT. DOCUMENTATION SHALL BE INCLUDED IN THE DESIGN EXECUTIVE SUMMARY.

(6) "NA" REFERS TO "BETTERMENT STANDARDS ARE NOT APPLICABLE" WITHOUT ADDITIONAL ANALYSIS.

PRACTICAL SOLUTIONS
GEOMETRICS:
RURAL COLLECTORS

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PRACTICAL SOLUTIONS
GEOMETRICS:
RURAL COLLECTORS

	Design Speed (7)		Traffic Volume (ADT) Under 400	400 to 1500	1500 to 2000	2000 to 5000
Maximum Grade (Percent)	20	Level	10	8	7	7
		Rolling	12	10	10	9
		Mountain	14	12	12	10
	25	Level	8	7	7	7
		Rolling	10	10	10	8
		Mountain	12	12	11	9
	30	Level	7	7	7	7
		Rolling	10	9	9	7
		Mountain	12	10	10	8
	35	Level	7	7	7	7
		Rolling	10	9	8	7
		Mountain	12	10	10	NA
	40	Level	7	7	7	6
		Rolling	10	9	8	7
		Mountain	12	10	NA	NA
	45	Level	7	7	7	6
		Rolling	10	8	8	7
		Mountain	12	NA	NA	NA
	50	Level	7	6	6	NA
		Rolling	10	NA	NA	NA
		Mountain	NA	NA	NA	NA

	Design Speed (7)	20	25	30	35	40	45	50
Minimum Stopping Sight Distance (1)	(Feet)	115	155	200	250	305	360	425
Minimum Passing Sight Distance (2)	(Feet)	710	900	1090	1280	1470	1625	1835

1) MINIMUM STOPPING SIGHT DISTANCES ARE BASED ON A HEIGHT OF EYE OF 3.5 FT AND HEIGHT OF OBJECT OF 2.0 FT. BOTH HORIZONTAL AND VERTICAL ALIGNMENTS ARE CONSIDERED.

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(6) "NA" REFERS TO "BETTERMENT STANDARDS ARE NOT APPLICABLE" WITHOUT ADDITIONAL ANALYSIS.

(7) For Projects with an ADT of 400 or less, please refer to AASHTO's "Guidelines for Geometric Design of Very Low-Volume Local Roads" for additional guidance

PRACTICAL SOLUTIONS
GEOMETRICS:
RURAL LOCAL ROADS

	Design Speed (5) (7)		Traffic Volume (ADT) Under 50		50 to 250		250 TO 400		400 to 1500		1500 to 2000		2000 to 5000	
			Pavement Width	Graded Shoulder Width	Pavement Width	Graded Shoulder Width	Pavement Width	Graded Shoulder Width	Pavement Width	Graded Shoulder Width	Pavement Width	Graded Shoulder Width	Pavement Width	Graded Shoulder Width
Pavement Width and Graded Shoulder Width (Feet) (4)	15	Level Rolling Mountain	Match Exist.	2	Match Exist.	2	16 to 18	2 to 4	16 to 18	2 to 4	18 to 20	2 to 4	18 to 20	2 to 4
	20	Level Rolling Mountain	Match Exist.	2	Match Exist.	2	16 to 18	2 to 4	18 to 20	2 to 4	18 to 20	2 to 4	18 to 20	3 to 5
	25	Level Rolling Mountain	Match Exist.	2	16 to 18	2	16 to 18	2 to 4	18 to 20	2 to 4	18 to 20	2 to 4	18 to 20	4 to 6 3 to 5
	30	Level Rolling Mountain	16 to 18	2	16 to 18	2	16 to 18	2 to 4	18 to 20	2 to 4	18 to 20	2 to 4	18 to 20	4 to 6 3 to 5
	35	Level Rolling Mountain	16 to 18	2	16 to 18	2	18	2 to 4	18 to 20	2 to 4	18 to 20	3 to 5 2 to 4	18 to 20	4 to 6
	40	Level Rolling Mountain	16 to 18	2	16 to 18	2	18	2 to 4	18 to 20	3 to 5 2 to 4	18 to 20	3 to 5	20 to 22 18 to 20	4 to 6
	45	Level Rolling Mountain	16 to 18	2	18	2	18	2 to 4	18 to 20	3 to 5	18 to 20	4 to 6 3 to 5	20 to 22 NA	4 to 6 NA
	50	Level Rolling Mountain	16 to 18	2	18	2	18	2 to 4 NA	18 to 20 NA	3 to 5 NA	18 to 20 NA	4 to 6 NA	NA	NA
Min. Clear Roadway Width of New and Reconstructed Bridges (3)	All Speeds	Approach Roadway Width												

	Design Speed (7)	eMAX. 4%	eMAX. 6%	eMAX. 8%
Minimum Radius (Feet)	15 MPH	70	65	60
	20 MPH	125	115	105
	25 MPH	205	185	170
	30 MPH	300	275	250
	35 MPH	420	380	350
	40 MPH	565	510	465
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	50 MPH	930	835	760
Normal Pavement Cross Slopes	Rate of Cross Slope = 2%			
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PRACTICAL SOLUTIONS
GEOMETRICS:
RURAL LOCAL ROADS

			Traffic Volume (ADT)					
	Design Speed (7)		Under 50	50 to 250	250 TO 400	400 to 1500	1500 to 2000	2000 to 5000
Maximum Grade (Percent)	15	Level	10	10	10	9	7	7
		Rolling	12	12	12	12	10	9
		Mountain	16	16	16	14	12	10
	20	Level	10	10	10	8	7	7
		Rolling	12	12	12	11	10	9
		Mountain	16	16	14	13	12	10
	25	Level	8	8	8	7	7	7
		Rolling	11	11	11	10	10	8
		Mountain	15	15	14	13	11	9
	30	Level	8	8	7	7	7	7
		Rolling	10	10	10	10	9	7
		Mountain	14	14	14	13	10	8
	35	Level	8	8	7	7	7	7
		Rolling	10	10	10	10	8	7
		Mountain	14	14	12	12	10	NA
	40	Level	8	8	7	7	7	6
		Rolling	10	10	10	9	8	7
		Mountain	13	13	13	12	NA	NA
	45	Level	8	8	7	7	7	6
		Rolling	10	10	10	9	8	7
		Mountain	12	12	12	NA	NA	NA
	50	Level	8	8	7	6	6	NA
		Rolling	10	10	10	NA	NA	NA
		Mountain	12	12	NA	NA	NA	NA

	Design Speed (7)	15	20	25	30	35	40	45	50
Minimum Stopping Sight Distance (1)(7)	(Feet)	80	115	155	200	250	305	360	425
Minimum Passing Sight Distance (2)	(Feet)	NA	710	900	1090	1280	1470	1625	1835

1) MINIMUM STOPPING SIGHT DISTANCES ARE BASED ON A HEIGHT OF EYE OF 3.5 FT AND HEIGHT OF OBJECT OF 2.0 FT. BOTH HORIZONTAL AND VERTICAL ALIGNMENTS ARE CONSIDERED.

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