

TO: Distribution

SUBJECT: REHABILITATION PROJECTS, DESIGN CRITERIA SHEET

REFERENCE:

Interim Guidelines for Geometric Improvements for Rehabilitation of Existing Highways and Roads.

BACKGROUND:

The use of the Design Criteria Sheet was officially introduced as Ministry Policy in the Technical Circular T-2/94, as part of the process for Roadway Design Quality Management. A Design Criteria Sheet must be completed for all highway design projects, as described on the Technical Circular on Quality Management. The purpose of **this** Technical Circular is to confirm that the Design Criteria Sheet is for all Ministry design projects. This circular introduces a Design Criteria Sheet to be used specifically for geometric improvements on rehabilitation projects.

Decisions on design improvements as part of highway rehabilitation projects are often based on local traffic and site conditions. It is important that the decision making process be well documented, to ensure a consistent Ministry wide approach to design improvements. Furthermore, a well documented Ministry wide procedure for design improvements is required for the implementation of a Quality Assurance Review program.

GENERAL DISCUSSION:

A quote from a TRB paper to AASHTO on 3R rehabilitation projects;

"In RRR work the costs of making incremental geometric improvements are large relative to other project costs. For reconstruction and new construction projects, on the other hand, where highways are being constructed from the bottom up on newly acquired rights-of-way, the added costs of building to more demanding standards are relatively low."

A balance is needed between improving a greater length to a safe standard which may not quite match the current standards (but in accordance with the design improvement guidelines) and improving a shorter section to the full standards when funding levels are restricted. The goal is to maximize the length of roadway considered for design improvements while getting optimum benefits in highway safety, operation and maintenance within the budgetary constraints.

A great deal of experience and care is required to judiciously assign adequate standards for highway rehabilitation that provides equal or better safety and efficiency than the existing road, while being in character, or consistent in character, with the adjacent sections of highways.

The Rehabilitation Geometric Design Criteria Sheet is an attempt to formalize the process of Rehabilitation Design approvals in this complex area.

Desirably, the geometric Design Criteria would be preceded by a concise scope statement defining the project. This would also be of value as part of a tender document..

For capital projects the designer strives to maximize the alignment to meet full normal standards. Rehabilitation, in the context of this report, consists of those projects whose main identified deficiency is pavement deterioration. Geometric deficiencies may not be defined as a problem but modest improvements in geometry could enhance safety and/or efficiency.

REVIEW OF THE REHABILITATION DESIGN CRITERIA SHEET

The Sheet is included at the end of this T.C.

- 1. Page 1 Title Section
HIGHWAY ROUTE NAME/NUMBER:
LKI. INVENTORY SEGMENT: From km: To km:
This is meant to define the location and limits of the work by relating the assignment to the LKI with the km limits being the LKI km.

- 2. CORRIDOR UPGRADING PROJECT: YES: No:
This asks the designer if the long term plans are for continued upgrading of this segment of road.

A rehabilitation project should reflect the character of the surrounding or adjacent roads. There may be added risk if a short section of full standard highway is developed within a segment of very poor highway. Highway consistency is related to highway safety. An exception would be if a corridor was slated for continuous staged upgrading. Then, it may be wise to build to full standards, starting at one end; unless there were identified bottlenecks that required priority upgrading within the segment. An example would be a 100 km segment that is to be upgraded within 5 years. One would not want to have to reconstruct a recently rehabilitated highway.

- 3. TOPOGRAPHY (Mountainous, Rolling,etc...):
This requires a general definition of the topography the road falls in.

Driver expectations are related to what is within the cone of vision and what information can be processed in advance by the driver. When a driver is entering into an obviously mountainous area with massive outcroppings, the probability of lower speeds is apparent

and high design speeds not anticipated. The converse is true if the topography is less demanding from rolling to level. In the latter instance one would want to push the higher range of the Rehabilitation Guidelines ranges, while in the former the lower ranges may be acceptable.

4. DITCH TEMPLATE MATERIAL: TYPE:

This information is meant to convey the relative cost expectancy of widening for new ditches or wider shoulders. A design reviewer can then perceive some of the constraints under which the designer is working (i.e.: organic material as opposed to rock).

5. PROJECT DESCRIPTION:

This is a general description of the major work involved on the project.

6. COLUMN A

Defines the typical geometric elements and traffic conditions that the designer must consider and present to the approving authority that is required for this specific project.

7. COLUMNS B, C and D

Define the existing operational parameters for the road segment. This is qualified by the information provided on line three, in the title section, if the road is planned for upgrading in the near future.

8. COLUMN E

This is self explanatory from the Design Manual.

9. COLUMN F

This column takes major judgment to fill out. The Rehabilitation Design Guidelines (contained in the Manual, entitled: "Interim Guidelines for Geometric Improvements for Rehabilitation of Existing Highways and Roads") provide basic principles upon which to base a decision and a check list of what to consider. For example: they do not provide a precise numeric value for shoulder width, but rather describe what considerations should be made in arriving at a reasonable value. It is suggested that after columns A through E are completed, the manager of design and the designer sit down to review the available documentation and, using their experienced judgment, fill in column F. The project management team should then review the design criteria selected.

Once column F has been developed, this becomes the target design criteria for the team carrying out the design of the project.

10. COLUMN G

This column must show what has generally been achieved in the design, with exceptions supported by footnotes referring to the justifying documentation and attached explanations. For example; the design speed achieved may have been 90 km/h, with the exception of a curve lying between km "x" and km "y", which has a design speed of only 63 km/h, and it is proposed that it be posted with an advisory speed of 60 km/h to

mitigate the deviation from the selected criteria. Note that this is not a deviation from Standard nor the Guideline.

11. APPROVALS, Page 2 in sample Design Criteria Sheet provided.

The intent is for approvals to be carried out in the Region at varying levels related to complexity. This is not a clear cut process. The design criteria have been set up to provide the base line for the designer to work toward and attempt to exceed, where the cost differential is minimal. The design criteria have been set by a qualified group within the Region and thus the approving authority should lie within the Region.

When all the normal Geometric Standards can be met without exorbitant costs, then the Designer can recommend approval of the achieved design for the review and approval of the Regional Manager of Design.

For projects that do not meet the normal geometric standards, but do meet the agreed to rehabilitation design criteria in column F of the table, then the design is reviewed and recommended by the Manager of Design to the Regional Manager of Professional Services, for further review and approval.

Where a design fails to meet the Rehabilitation Criteria in column F, it is suggested that the design be reviewed and recommended at two levels in the Region, for consideration and approval of the Chief Highway Engineer.



Jon L.S. Buckle P.Eng.
A/Chief Highway Engineer

CONTACT

R. Voyer, A/Manager, Geometric Standards & Design, Highway Eng. Br. (387-7761)

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HIGHWAY REHABILITATION PROJECT

DESIGN CRITERIA

HIGHWAY ROUTE NAME/NUMBER : _____

L.K.I. INVENTORY SEGMENT: _____ From km: _____ To km: _____

CORRIDOR UPGRADING PROJECT: Yes: No:

TOPOGRAPHY (Mountainous, Rolling, etc.) : _____

DITCH TEMPLATE MATERIAL : TYPE : _____

PROJECT DESCRIPTION : _____

	GEOMETRIC DESIGN ELEMENTS	EXISTING GEOMETRIC ELEMENTS			DESIGN GEOMETRIC ELEMENTS		
		PRIOR TO PROJECT LIMITS	WITHIN PROJECT LIMITS	BEYOND PROJECT LIMITS	NORMAL STANDARD VALUE	REHAB. CRITERIA VALUE	ACHIEVED CRITERIA VALUE
		B	C	D	E	F	G
1	Functional Classification :						
2	Design Speed :						
3	Posted Speed :						
4	Minimum Horizontal Curve Radius :						
5	Minimum Stopping Sight Distance :						
6	Min. "K" Factor : Sag V.C. :						
7	Min. "K" Factor : Crest V.C. :						
8	Maximum Superelevation :						
9	Maximum Gradient (%) :						
10	Lane Width(s) :						
11	Shoulder Width :						
12	Clear Zone Width :						
13	Right of Way Width :						
14	Current Traffic Volume : SADT :						
15	Design SADT/Design Hourly Volume :						
16	Truck Volume % :						
17	Accident Rate :						
18	Level of Service :						
19	Etc. :						
20							
21							
22							
23							

RECOMMENDED BY : _____
DESIGNER
DATE

(See overleaf)

HIGHWAY REHABILITATION PROJECT**DESIGN CRITERIA (Cont'd)**

HIGHWAY ROUTE NAME/NUMBER : _____
 L.K.I. INVENTORY SEGMENT: _____ From Km: _____ To Km: _____

FOR PROJECTS MEETING DESIGN MANUAL STANDARDS (See note below) :

APPROVED BY : _____
 MANAGER OF DESIGN DATE

FOR PROJECTS EXCEEDING GUIDELINES BUT BELOW STANDARDS :

RECOMMENDED BY : _____
 MANAGER OF DESIGN DATE

APPROVED BY : _____
 MANAGER OF PROF. SERVICES DATE

FOR PROJECTS BELOW REHABILITATION GUIDELINES :

RECOMMENDED BY : _____
 MANAGER OF DESIGN DATE

RECOMMENDED BY : _____
 MANAGER OF PROF. SERVICES DATE

APPROVED BY : _____
 CHIEF HIGHWAY ENGINEER DATE

Note : The designer is encouraged to use optimum, cost effective values for design elements which will often exceed the minimum criteria specified in the Ministry Design Manual. This applies mostly to sight distances, curve radii, "K" values for vertical curves and spiral lengths. In the case of side slopes, ditch widths, lane and shoulder widths, right-of-way widths, median width and clear zone distances, the designer must document reasons for exceeding values specified in the Ministry Design Manual for the specific class of road. In this case, the Design Criteria sheet must be signed by the Manager of Design as well as the Regional Manager of Professional Services.