Predecessor research

NCHRP Project 15-25  →  NCHRP Project 15-47
NCHRP Project 15-25: Alternatives to Design Speed for Selection of Roadway Design Criteria

Questioned whether speed should be considered an input into the design process (traditional design speed approach) or an output of the design process (target speed concept)

- Speed → Design
- Design → Speed
Third International Symposium on Highway Geometric Design:

New Design Guidelines – A Step Toward Self-Explaining Roads

• Standardized, self-explaining roads are desired

• Separate treatment of alignment, cross section, and intersection design is undesirable
  • In past practice, design speed is a key element in determining the minimum dimensions of horizontal and vertical curves but not the many other features of a roadway design that should be coordinated

• The variety of current road types is too large

*Standardized roads* means that there should be as few road types as possible, and each road type should be as uniform as possible, while being distinctly different from other types.

*Self-explaining roads* should be designed in such a way that the driver acts correctly even by intuition.
German experience

Third International Symposium on Highway Geometric Design:

New Design Guidelines – A Step Toward Self-Explaining Roads

“Therefore, the new German design guidelines have eliminated design speed as a design control and replaced it with design class.”

Design class selection based on two factors: trip length and environmental restrictions/demands.
German “Design Class” Concept

<table>
<thead>
<tr>
<th>Category group</th>
<th>Motorways</th>
<th>Rural roads</th>
<th>Non built-up main roads</th>
<th>Built-up main roads</th>
<th>Access roads</th>
</tr>
</thead>
<tbody>
<tr>
<td>continental 0</td>
<td>AS 0</td>
<td>LS</td>
<td>VS</td>
<td>HS</td>
<td>ES</td>
</tr>
<tr>
<td>long distance I</td>
<td>AS I</td>
<td>LS I</td>
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<td>overregional II</td>
<td>AS II</td>
<td>LS II</td>
<td>VS II</td>
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<td>HS III</td>
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<td>-</td>
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<td>VS IV</td>
<td>HS IV</td>
<td>ES IV</td>
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<tr>
<td>local V</td>
<td>-</td>
<td>LS V</td>
<td>-</td>
<td>-</td>
<td>ES V</td>
</tr>
</tbody>
</table>

**RAA** | **RAL** | **RAS**
## German “Design Class” Concept

<table>
<thead>
<tr>
<th>Design Class</th>
<th>Traffic Mode on Road</th>
</tr>
</thead>
<tbody>
<tr>
<td>EKL 1</td>
<td>![Car Icon]</td>
</tr>
<tr>
<td>EKL 2</td>
<td>![Bicycle Icon]</td>
</tr>
<tr>
<td>EKL 3</td>
<td>![Pedestrian and Bicycle Icons]</td>
</tr>
<tr>
<td>EKL 4</td>
<td>![Car, Bicycle, and Pedestrian Icons]</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Design Class</th>
<th>Cross Section Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>EKL 1</td>
<td>![EKL 1 Cross Section]</td>
</tr>
<tr>
<td>EKL 2</td>
<td>![EKL 2 Cross Section]</td>
</tr>
<tr>
<td>EKL 3</td>
<td>![EKL 3 Cross Section]</td>
</tr>
<tr>
<td>EKL 4</td>
<td>![EKL 4 Cross Section]</td>
</tr>
</tbody>
</table>
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New Design Guidelines – A Step Toward Self-Explaining Roads

Summary of high level concepts

• Distinct, standardized road classes

• Design class selection determines physical features (not just the speed-dependent ones)

• Each design class would be associated with an intended speed outcome
NCHRP Project 15-25: Alternatives to Design Speed for Selection of Roadway Design Criteria

Alternative concepts for the design process:

• Concepts based on single speed value
• Concepts that are not based on speed
• Concepts based on speed ranges or categories
• Final choice may be a combination of concepts
NCHRP Project 15-25: Alternatives to Design Speed for Selection of Roadway Design Criteria

Concepts based on a single speed value:

1. Revise the process for selecting a design speed
2. Revise the Green Book text to clarify the role of design speed
3. Incorporate a strong traffic calming approach
4. Introduce design consistency features
NCHRP Project 15-25: Alternatives to Design Speed for Selection of Roadway Design Criteria

Concepts that are not based on speed:

5. Eliminate design speed

6. Replace design speed with speed ranges or categories
NCHRP Project 15-47: Developing an Improved Highway Geometric Design Process

• In light of 15-25 investigation, fundamentally questioned the validity of the design speed concept

• Determined that design speed is indeed useful for high-speed facilities
  • Dovetails with Report 783 finding that speed-dependent elements are important on high-speed roads

• At one point was set to recommend elimination of design speed altogether for low-speed facilities (!)
  • Still would need a speed basis for speed-dependent elements
NCHRP Report 839: A Performance-Based Highway Geometric Design Process

“The current design speed model is vehicle centric... Criteria for selection of lower speeds as being consistent with a multimodal and pedestrian-centric context are needed.”

“The majority of design elements are context insensitive... The prevailing variable in many of these is design speed, which presumably reflects the context. However, as noted above the design speed process itself does not satisfy all urban contexts.”
Potential approach: urban and suburban non-freeways

Drawing upon...

• “Design class” concept
• NCHRP Project 15-47 idea of deemphasizing design speed
• “Target speed” approach
• 10 mph increments to create distinctive classes
  • ...although 5 mph increments for hybrid facilities, transitional zones, and ramps/loops are valid
Potential approach: urban and suburban non-freeways

Design classes for urban and suburban non-freeways:

• 20 mph class
  • Urban core / central business district main street
  • Local residential street
Design classes for urban and suburban non-freeways:

- 30 mph class
  - Generally urban context and development density
  - Suburban collectors
  - Frequent driveway access
  - Non-motorized traffic moderate or high
Design classes for urban and suburban non-freeways:

• 40 mph class
  • Generally suburban arterials
  • Access typically only at public streets; little to no driveway access
  • Non-motorized traffic low to moderate
Design classes for urban and suburban non-freeways:

• 50 mph class
  • Relatively rare
  • Regionally-significant routes including some principal arterials
  • Access robustly managed
  • Non-motorized users often buffered and/or grade separated