

Tues, 4/12/18

NCHRP Geometric Design Committee

Design Flexibility Guidance Update (Performance-Based Practical Design)

by: Jim Roserow, MnDOT Design Flexibility Engineer

- This presentation is based on presentation done at MN County Engineers Conference
- This is about a transition from standards-based approach ~~and~~ to an evidenced-, data-based, design approach (i.e. Highway Safety Manual)
 - more flexible, less "code-based", more practical/economical
- Road design is not like building design
- Standards-based design often costs more than needed
- This is applicable to sports and other industries
- Why are there standards? Mostly consistency, which is important
 - Also convenience, and to some degree a minimum extent of performance, but not as much as ~~it~~ generally thought
- First ~~and~~ standards were developed in early 1900's and research that went into these is still applicable today
- * Jim recommends reading NCHRP Research Report 839, also "Divided Highways" for recreational reading
- The thought was that as long as you meet the design standard, it'll be safe
 - This is true, but fatalities went way up in 1960's after the interstates were built, because vehicles weren't built to that degree of safety and other non-road-design factors
 - But FHWA "Blue Book" (1965) encouraged designing to a high design speed to accommodate "need for speed"
- So with increasingly expensive costs in road building and decreasing ~~revenue~~ revenue ... Today's road designers know 1 way to design, and were out of it
- NCHRP 839 found that the same criteria applied in different situations produce different outcomes
 - ⇒ Dimensional criteria should be based on known and proven measurable performance effects
 - ⇒ Replace w/ direct performance guidance
- Also see NCHRP 785 ~~as a good~~ as a great read about Performance Based Analysis
- It's fun to discuss performance-based applications on projects!
- Need to understand desired outcomes, rather than output
- Two primary facets:
 1. Disciplined focus on needs, problems, and objectives
 2. Use of performance-based tools, methods, to address problems & need objectives

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- existing or proposed
- * Just because something doesn't meet standards doesn't mean it's a problem
 - Whether it's a problem depends on performance
 - What are some difficulties?
 - Misidentified problems/needs, or missing problems
 - Non-issues hijacking the project
 - Good resources now are:
 1. Highway Safety Manual
 2. Highway Capacity
 3. NCHRP Rep. 687 is a good example
 - Yes, this takes more time & effort but will get better as it
 - There is practically no correlation between design speed and safety
 - What about urban & suburban design? arterial design?
 - Read NCHRP 783 (Evolution of 13 controlling criteria)
 - From it: None of the criteria matter for urban & suburban
 - Then FHWA retained only 2 of them for low-speed facilities: 1) structural capacity and 2) design speed, but design speed doesn't directly affect performance
 - NCHRP said ~~it~~ intersections & access management are most important, esp. related to pedestrian crashes
 - Beware of "rules of thumb"
 - Roundabouts are very helpful, have good crash modification factors
 - A note on cross-sections:
 - ~~lane width~~ There is no indication that lanes less than 12 ft were less safe, actually lower lane widths lead to safer roads
 - MDOT had 2013 research w/ David Noyce on some narrowing of sections projects \Rightarrow safety was improved
 - So now, the thought is to devote as little space to motor vehicles as needed to maintain functionality
 - ~~lane width is a design measure, not~~
 - Note that LOS is a performance measure, not a design standard
 - Now, rightsize & balance things, esp. between users, esp. design speed
 - Urban ~~is not~~ ~~are~~, suburban & rural are quite different