Design Guidelines

LOUISIANA DEPARTMENT OF TRANSPORTATION & DEVELOPMENT

Traffic Engineers Meeting July 19, 2017

Goals

- Why, When and How ?
- Major differences between old and new guidelines
- Exceptions vs Waivers
- Acceptable vs Preferable
- Design Reports

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Why Have Guidelines?

- Laws
  - Louisiana Revised Statute 48:35
  - Title 23 CFR 625
- Consistency
- Learn from the past
- Evolve to meet new expectations
- Meet AASHTO 13 (maybe 10 soon) Controlling Criteria

Louisiana Revised Statute 48:35
Code Federal Regulations Title 23 Part 625

"The Department of Transportation and Development shall adopt minimum safety guidelines with respect to highway and bridge design, construction, and maintenance. These safety guidelines shall correlate with and, so far as possible, conform to the system then current as approved by the American Association of State Highway and Transportation Officials allowing the flexibilities incorporated therein" - Louisiana Revised Statute 48:35

"Applicable standards. (1) Design and construction standards for new construction, reconstruction, resurfacing (except for maintenance resurfacing), restoration, or rehabilitation of a highway on the NHS (other than a highway also on the Interstate System or other freeway) shall be those approved by the Secretary in cooperation with the State highway departments -§ 625.3

Revisions over the years…

July 1955	July 1980	January 1992
October 1955	October 1982	October 1993
July 1969	June 1983	March 2003
March 1971	April 1984	December 2008
June 1972	April 1985	December 2009
April 1977	December 1987	March 2017
June 1977	November 1988	

23 CFR 625 adopted 2011 GB effective Nov. 12, 2015

PRR/3R Guidelines

- 3R – Resurfacing/Restoration/Rehabilitation
- PRR – Preservation/Rehabilitation/Replacement
- Project is primarily for improvement of ride quality
  - Non Interstate Replacement and Major Rehab
  - Routine preventive maintenance
  - Addition of isolated turn lanes
- Minor Rehabilitation and Preservation
  - Match Existing

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When to use:

- Interstate – Replacement and Major Rehabilitation
- Reconstruction
  - New pavement structure (base and sub base)
  - Addition of through travel lanes
  - Extensive changes in horizontal and vertical geometry (typically involving right of way)
  - New alignment
- Bridge Replacements
  - Official/unofficial DOTD policy to investigate bringing up to current standards
  - Use design exception as documentation process

Which Guidelines to Use?

http://wwwsp.dotd.la.gov/Inside_LaDOTD/Divisions/Engineering/Road_Design/Systems_Preservation/Documents/Guidance%20for%20Preservation_Rehabilitation_Replacement%20(PRR)%20Projects%2009_30_10.pdf

GUIDANCE FOR PRESERVATION/REHABILITATION/REPLACEMENT (PRR) PROJECTS

System	Classification	Type of Work	Design Guidelines	PRR Report	Evaluation of Safety Improvements (Note 1)		Design Exception Approval
					Baseline Countermeasures (Note 2)	Overrepresented/Abnormal Countermeasures	
NHS	Interstate	Replacement and Major Rehabilitation	DOTD Minimum Design Guidelines, AASHTO Green Book, & Interstate Corridor Guidelines (Note 3)	Interstate Report	Required	Required	FHWA(Note 4)/DOTD
		Minor Rehabilitation	Match Existing	Interstate Report	Required	Required	Not Applicable
		Preservation	Match Existing	Interstate Report	Not Required (Note 5)	Required	Not Applicable
	Non- Interstate	Replacement and Major Rehabilitation	DOTD Pavement PRR Minimum Design Guidelines (required) 3R Minimum Design Guidelines (desirable)	YES	Required	Required	FHWA(Note 4)/DOTD
		Minor Rehabilitation	Match Existing	YES	Required	Required	Not Applicable
		Preservation	Match Existing	YES	Not Required (Note 5)	Required	Not Applicable
Non-NHS	All Roads	Replacement and Major Rehabilitation	DOTD Pavement PRR Minimum Design Guidelines	YES	Required	Required	DOTD
		Minor Rehabilitation	Match Existing	YES	Required	Required	Not Applicable
		Preservation	Match Existing	YES	Not Required (Note 5)	Required	Not Applicable

Note 1: Refer to "Guidance for Safety Improvements for PPR Projects"
Note 2: "Required" in this column means a baseline of safety improvements is required to be considered regardless of the project limit's crash history
Note 3: Interstate Corridor Guidelines - Consult with Traffic Engineering Development Section (Section 27) for guidelines and reviews.
Note 4: FHWA approval required for full oversight (full fed review) projects: NHS- Interstate > $1M and NHS Non-Interstate > $10M
Note 5: Baseline safety improvements are required to be considered on Single Lift AC Overlays (≥ 1.5 to ≤ 2")

APPROVED: Richard L Savoie 9/30/10
DOTD Chief Engineer Date

09/2010

Purpose of New Guidelines

- Less Cookbook
- Versatility
- More Discretion/ leeway to designers
- What “makes sense”
- Context Sensitive
- Become a “living document”
- Addition of **Complete Streets**

Practical Design

FHWA 13 Controlling Criteria

- Design Speed
- Lane Width
- Superelevation
- Shoulder Width
- Vertical Alignment*
- Bridge Width*
- Lateral Offset to Obstruction*
- Horizontal Alignment
- Stopping Sight Distance
- Grade
- Cross Slope
- Vertical Clearance
- Structural Capacity

*** Proposed removed**

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13 Controlling Criteria vs DOTD Guidelines

- Controlling Criteria – not in guidelines
  - Ramps
  - Auxiliary lanes
  - Cross over crown
  - Minimum grades
  - Lateral Offset
- In DOTD guidelines and not 13 criteria
  - Medians
  - Shoulder Type
  - Foreslopes
  - Sidewalks
  - ClearZones
  - N/C and R/C Curves
  - Backslopes
  - Parking

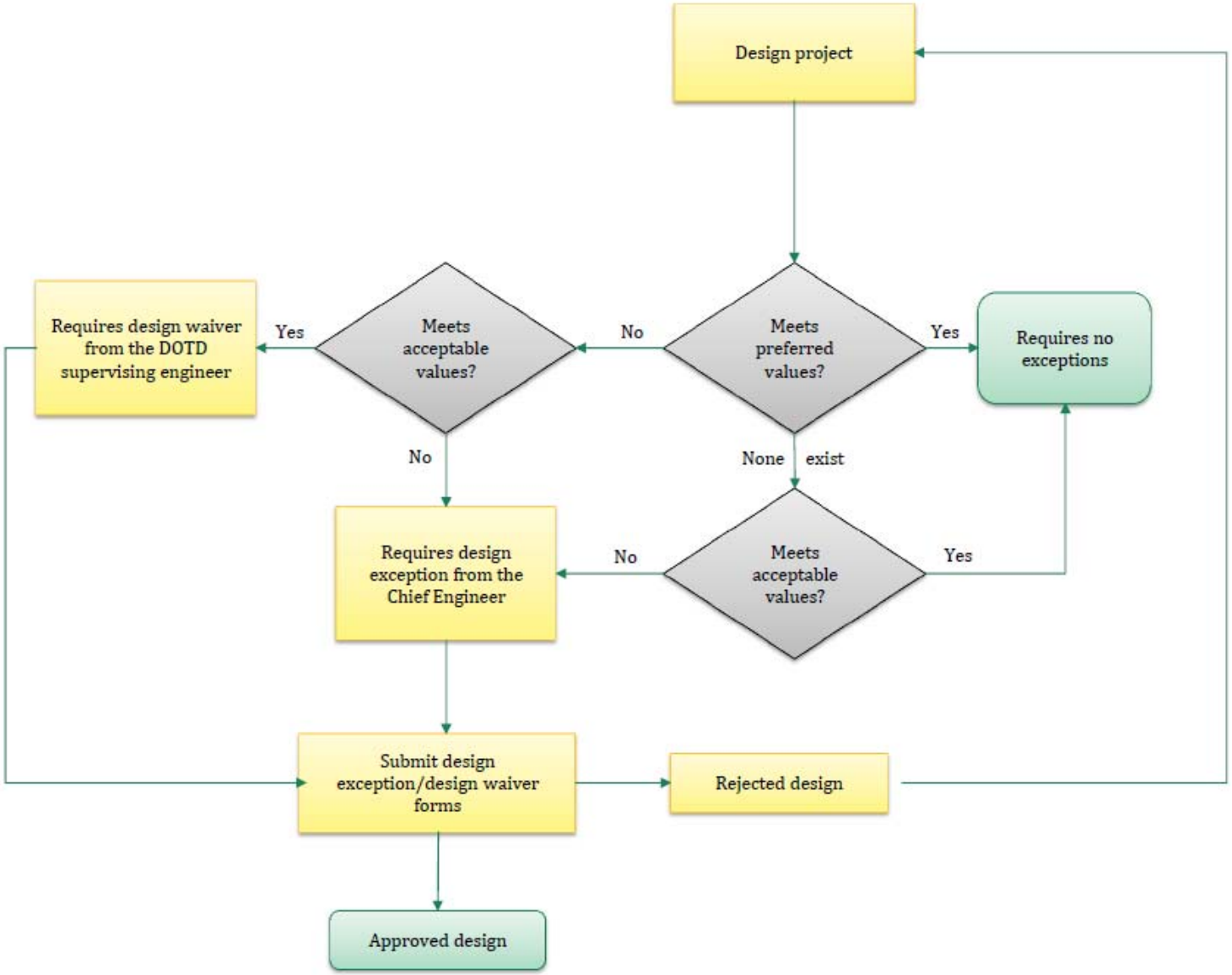
Preferable and Acceptable

- Preferable
  - Does not require sign-off
  - Designer's decision
- Acceptable
  - Requires a waiver from supervising engineer
  - Not necessarily AASHTO or FHWA minimums
- Below Acceptable
  - Requires Chief's approval

Waiver vs Exception

- Exception
  - Consider Alternatives
  - Safety review
  - Cost Analysis
  - Impacts
  - Mitigation Strategies
- Waiver
  - Describe project, situation and problem
  - Deviation from Standard value

Louisiana Department of Transportation and Development
Design Exception Flow Chart



Page	Element
1	Design Speed
2	Lane Width
3	Shoulder Width/Type
4	Bridge Width/Clearance
5	Offset
6	Superelevation/Cross Slope
7	Longitudinal Grade
8	Slopes/Median
9	Stopping Sight Distance
10	Complete Streets

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Design Speed

- Greater range then previous guidelines
- No preferable is given, so no waiver if within range given.
- Justify decision – Logical with respect to anticipated operating speed, topography, land use and classification.
- Previous Guidelines had some Design Speed based on ADT
- Ramps – Table 10-1 2011 AASHTO GB "Guide Values for Ramp Design Speed as Related to Highway Design Speed"

Page 2 – Lane Width

- Not just through travel lanes
- Includes:
  - Auxiliary lanes
  - Ramps
- Ramps – Table 3-29 and page 10-102 of 2011 AASHTO GB

Page 3 – Shoulder Width/Type

- Auxiliary lane shoulders may have lessor width
- Complete Streets may require a wider or different type of shoulder

Page 4 – Bridge and Vertical Clearance

- Allowable to use a narrower width on Bridges
- Don’t have to match roadway or carry the shoulder
- Vertical clearance varies for item (Rail Road, Sign, pedestrian bridges). Was previously in Bridge Design Manual
- Even though a minimum vertical clearance is listed, someone else on your project may dictate a different height:
  - Railroads, plants, etc

Page 5 – Lateral Offset and Clear Zones

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- Lateral Offset
  - Operational offset ex: open car door
  - The lateral offset to obstruction is defined as the distance from the edge of traveled way, shoulder, or other designated point to a vertical roadside element
  - Values taken from Chapter 10 of Roadside Design Guide. FHWA and AASHTO requires 1.5 ft. all roadways
- Clear Zone
  - Safety Features – run off road and get back on
  - Requires a recoverable foreslope
  - Only required for rural areas and freeways
  - Curb has little effect on clear zone

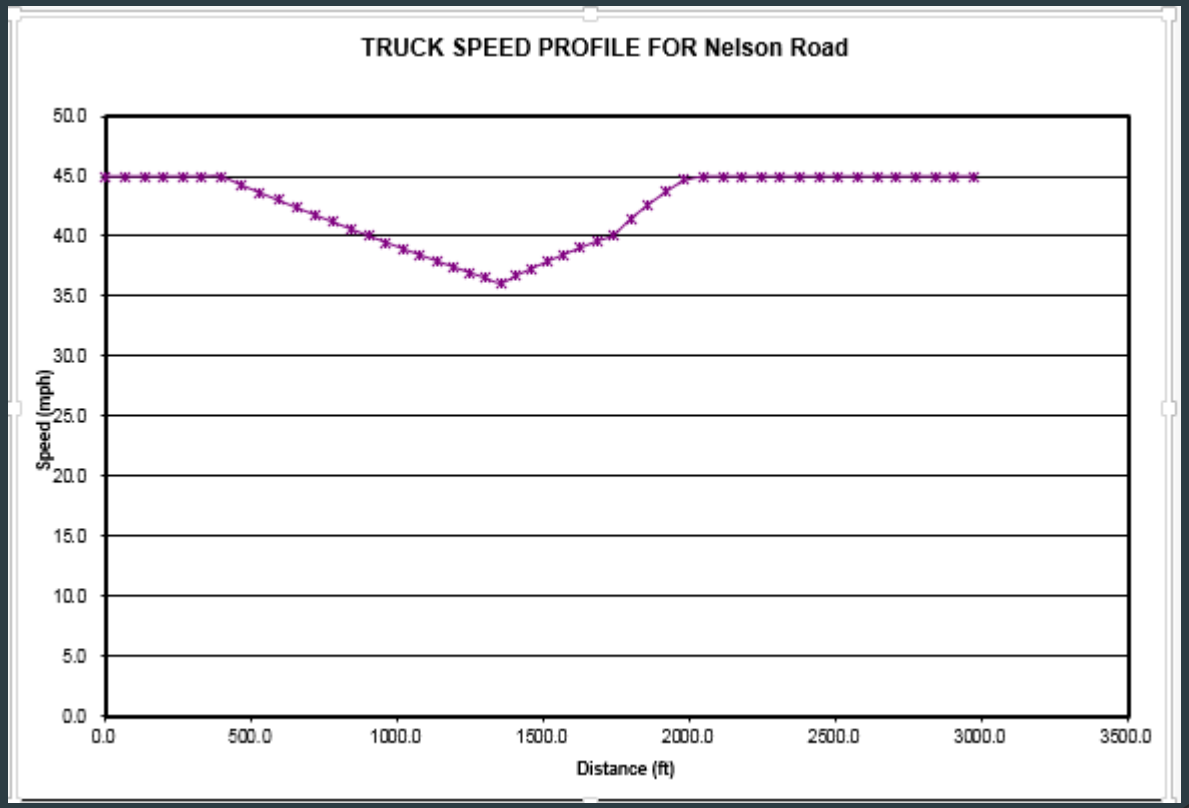
Page 6 – Superelevation and Cross Slope

- E_{max} = 8% instead of 10%
  - Slightly flatter curve at max super
  - Greater effect on how superelveation is distributed curves flatter than min. radius
- Sharper Curves for normal crown
- Added shoulders and crown breaks

Page 7 – Longitudinal Grade

- Probably most restrictive
- Previous guidelines allowed up to 12% (UL-1 rolling)
- New guidelines 3-5%
- There is a minimum
- 3% grade through functional area of intersection
- Critical length of grade (Section 3.4.2 of 2011 GB)
  - 10 mph Speed differential
  - Truck Speed Profile Model

TRUCK SPEED PROFILE MODEL



Page 8 – Slope and Median Width

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Slopes

- Designer weigh the cost/benefit of slope rate and corresponding clearzone requirements

Medians

- 6t. minimum for access control
- NO freeway minimum median width !
- Design Speed ≥ 60 mph and median < 64 ft require barrier. Barrier doesn't have to be concrete

Page 9 – Stopping Sight Distance

- See AASHTO

Page 10 – Complete Streets

1. Accommodates bicycles on the roadway
2. Accommodates pedestrians either on or off the roadway.

	Bike	Pedestrian
Sidewalk		X
Shoulder (4ft min paved)	X	X
Bike Lane	X	
Cycle Track	X	
Sidepath		X
Wider Outside Travel Lane (15 ft)	X	

Design Report

- Includes all documented design decisions
- Includes any waivers or exceptions
- May reference other material, with justification
- Standard form on Road Design

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