

SUPERELEVATION TRANSITIONS

INDIANA DEPARTMENT OF
TRANSPORTATION



Introduction

- Description of Terms
 - **Superelevation Transition Length** is the distance required to transition the roadway from a normal crown section to full superelevation. Sperelevation transition length is the sum of the tangent runout (TR) and superelevation runoff (L) distances.
 - **Tangent Runout** is the distance needed to change from a normal crown section to a point where the adverse cross slope of the outside lane or lanes is removed (i.e., the outside lane(s) is level).
 - **Superelevation Runoff Length** is the distance needed to change the cross slope from the end of the tangent runout (adverse cross slope removed) to a section that is sloped at the design superelevation rate.



Introduction

- Description of Terms (Cont.)
 - **Superelevation Rate** is the amount of cross slope or “banking” provided on a horizontal curve to help counterbalance the centrifugal force of a vehicle traversing the curve.
 - **Relative Gradient or Relative Longitudinal Slope** – In superelevation transition sections on two-lane facilities, the relative gradient between the profile grade and edge of traveled way.
 - **Axis of Rotation** is the line about which the pavement is revolved to superelevate the roadway. This line will maintain the normal highway profile throughout the curve.
 - **Superelevation Rollover** is the algebraic difference (A) between the superelevated travel lane slope and shoulder slope on the outside of a horizontal curve.



Design Methodology

- Open Roadway Conditions
 - Open-roadway conditions apply to all rural facilities and all urban facilities where the design speed (V) >45 mph.
 - Use Figure 43-3A₃ ($e_{\max}=8\%$) to determine Superelevation rate and runoff length.
- Low Speed Urban Streets
 - Low-speed urban streets are defined as streets within an urban or urbanized area where the design speed (V) <45 mph.
 - Use Figure 43-3C to determine Superelevation rate.
 - Use Figure 43-3L to determine Runoff length.
- Turning Roadway Conditions
 - Turning roadway conditions apply to turning roadways at intersections at-grade.

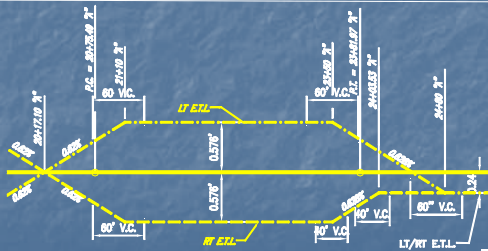
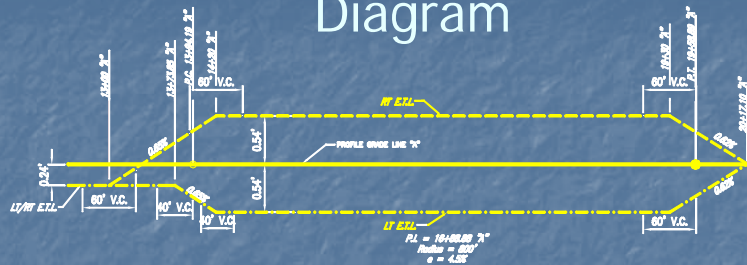


Common Mistakes, Errors, and Misconceptions

- Insufficient Gradient on Multi-Lane Roadways. Figures 43-3E & 43-3F



An Example Superelevation Diagram

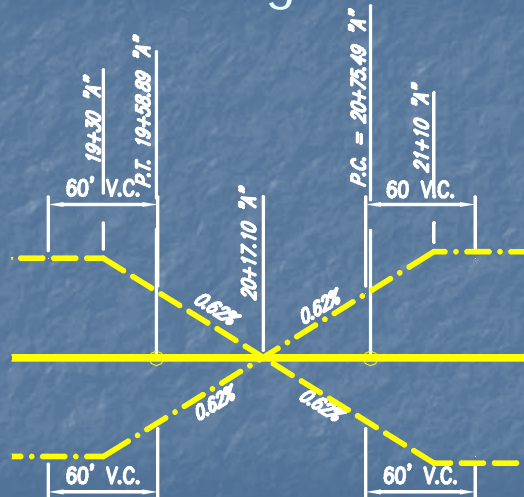


Common Mistakes, Errors, and Misconceptions

- Insufficient Transition between adjacent reverse curves.



An Example Superelevation Diagram

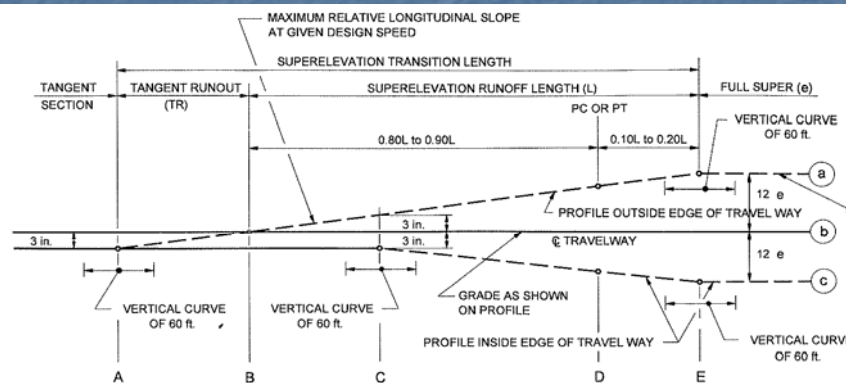


Common Mistakes, Errors, and Misconceptions (Cont'd.)

- Improper distribution of transition between curve and tangent.
 - 80/20 distribution is of "Runout" length only!!



Common Mistakes, Errors, and Misconceptions (Cont'd.)



- NOTES: 1. AXIS OF ROTATION ABOUT ϕ
 2. e = APPLICABLE SUPERELEVATION RATE



Common Mistakes, Errors, and Misconceptions (Cont'd.)

- Transitioning into an intersecting roadway.
- Design using AASHTO "Green Book" not Indiana Design Manual.
- Failing to show shoulder rollover detail.



Design Exceptions

If proper transition length cannot be met
➡ Prepare a Level 1 Design Exception

- Justifications
 - Low accident History
 - Excessive Construction Cost
 - Still meets AASHTO



Major Moves



Our Future's so bright We've Gotta
Wear Shades

- INDOT's 10 Year construction plan is fully funded
 - INDOT will be doubling its new construction budget
 - 9% annual increase



Major Moves



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- This will result in a 1st Class transportation system. Indiana's competitive advantage in the global economy.
 - Largest Biofuel plant in the world to be built in Indiana
 - Toyota to add 1,000 new jobs to build Camry's in Lafayette



Major Moves



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- Excerpt from *Business First* (a Louisville Business Magazine)

"The revenue from the toll road lease along with federal gas-tax receipts will enable the Hoosier state to pay for every project in its ambitious 10-year plan."

"That makes Indiana the envy of Kentucky and every other state that routinely develops 10-year road plans without knowing how they will be funded."



Major Moves



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- Major Move Highlights
 - \$3.85 billion up front payment for the lease of the Toll Road by Statewide Mobility Partners (SMP)
 - SMP will make more than \$4.4 billion in improvements to the Toll Road over the term of the lease.



Major Moves



- Major Moves Highlight (con't)
 - How will the proceeds be used?
 - \$2.52 billion to Major Moves Construction Fund
 - \$1.35 billion to Toll road Counties\$875 million for State projects in Toll Road Counties
 - \$225 million to pay off existing Toll Road Bonds
 - \$100 million for Northwest Indiana Regional Development Authority
 - \$100 million for Local Transportation Projects
 - \$150 million over the next 2 years to local communities for road and bridge needs

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