

# **Maine Department of Transportation**

## **Highway Program**

### **Design Guidance**

Title: Superelevation Transition

Issue Date: January 17, 2019

Discipline: Highway Engineering

Revised Date: February 11, 2019  
October 29, 2021

Originator: Highway Program

Reference: [EI C6 - Superelevation Rate](#)

Approved By: Bradford Foley, P.E.

### **Background:**

A superelevation transition for a curve consists of superelevation runoff and tangent runout sections. Those sections are defined in Chapter 3 of the *AASHTO Green Book* as follows:

*“The superelevation runoff section consists of the length of roadway needed to accomplish a change in outside lane cross slope rate from zero (flat) to full superelevation, or vice-versa. The tangent runout consists of the length of roadway needed to accomplish a change in crossslope from the normal cross slope rate to zero (flat), or vice-versa.”*

### **Guidance:**

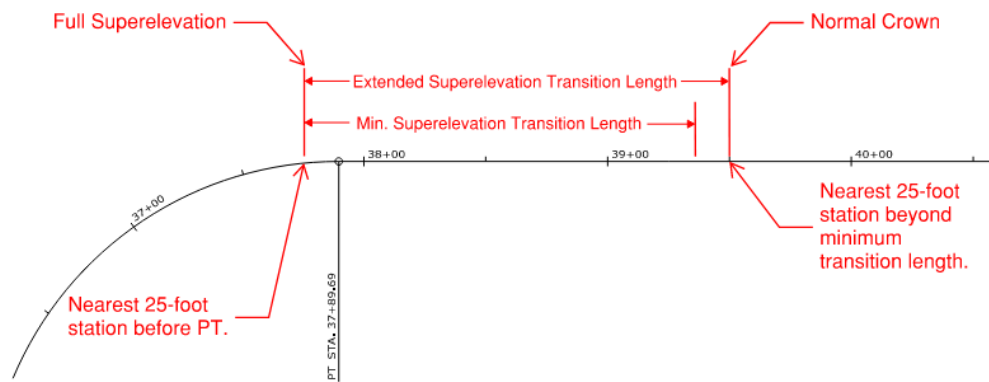
#### **General:**

Use the table titled “Superelevation Runoff  $L_r$  (ft) for Horizontal Curves” in Chapter 3 of the *AASHTO Green Book* to determine the proper runoff length for the design superelevation ( $e$ ) and speed.

To determine tangent runout length, choose the appropriate row in the table for the normal crossslope rate.

The minimum superelevation transition length will be the sum of the superelevation runoff length and the tangent runout length.

Full superelevation shall generally be achieved from the first 25-foot station after the PC to the last 25-foot station before the PT. Normal crown on each side of the curve shall be achieved after applying the minimum superelevation transition length and extending to the nearest 25-foot station. See Figure 1.



**Figure 1. Superelevation Transition Length – Basic Curve**

### Reverse, Broken-Back and Compound Curves

There may be situations when closely spaced curves do not allow a full transition between full superelevation and normal crown.

#### *Reverse Curves*

Transition to a normal crown section between closely spaced curves deflecting in the opposite direction using the procedures described above for each individual curve may not be possible. In this case, the distance required to transition between full superelevation locations will be greater than or equal to the sum of both superelevation runoff lengths, beginning and ending at even 25-foot stations.

Determine the beginning even 25-foot station by first locating the PRC or the point midway between the PC and PT. Apply half the sum of the runoffs toward the sharper curve and locate the nearest 25-foot station toward the flatter curve. If the nearest 25-foot station falls outside the curve, locate the PC/PT station instead. Apply the full sum of the runoffs from that station toward the flatter curve and extend to the nearest 25-foot station beyond this point to determine the ending 25-foot station. See Figure 2.

When one curve is significantly sharper than the other, the full superelevation location can be further shifted to provide additional full superelevation on the sharper curve.

#### *Broken-Back Curves*

Transition to a normal crown section between closely spaced curves deflecting in the same direction using the procedures described above for each individual curve may not be possible. If the normal crown section cannot be maintained for a minimum of 50 feet, attempt to transition to a remove crown section. If the remove crown section cannot be maintained for a minimum of 50 feet, the distance required to transition between full superelevation locations will be greater than or equal to the difference between the superelevation runoff lengths for each curve, beginning and ending at even 25-foot stations

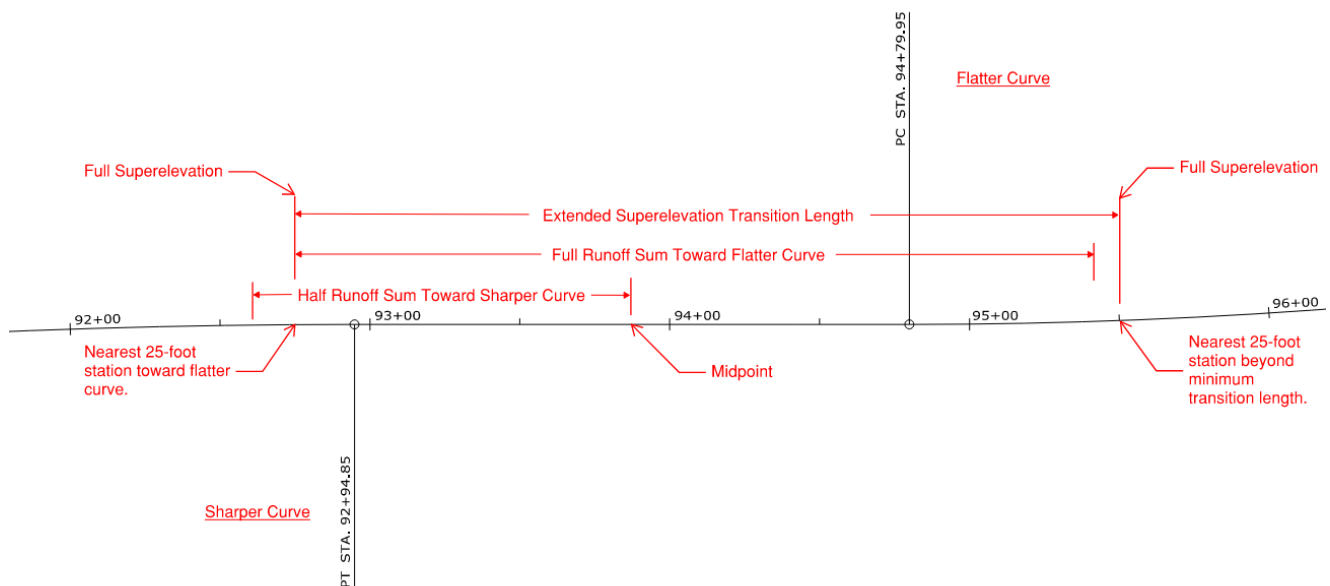
Determine the beginning even 25-foot station by first locating the PC or PT of the sharpest curve. Locate the nearest 25-foot station inside of the sharper curve. Apply the full difference between the runoffs from that station toward the flatter curve and locate the nearest 25-foot station beyond this point to determine the ending 25-foot station. See Figure 3.

## Compound Curves

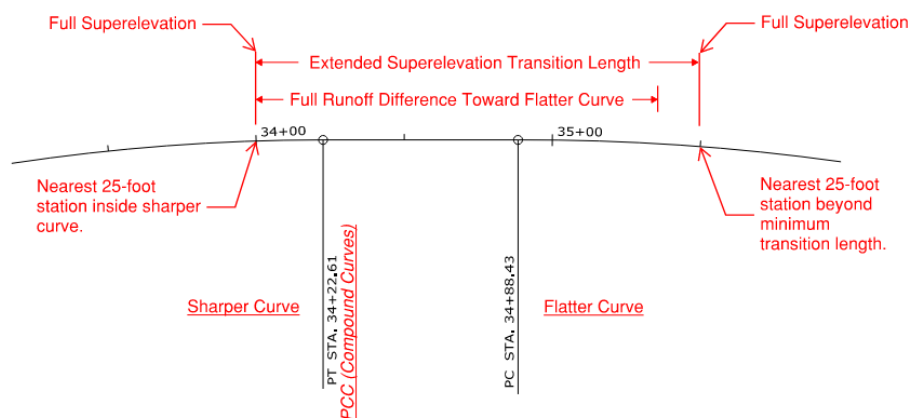
Transition to a normal crown section between curves deflecting in the same direction, not separated by a tangent, will not be possible. In this case, the distance required to transition between full superelevation locations will be greater than or equal to the difference between the superelevation runoff lengths for each curve, beginning and ending at even 25-foot stations.

Determine the beginning even 25-foot station by first locating the PCC. Locate the nearest 25-foot station inside the sharper curve. Apply the full difference between the runoffs from that station toward the flatter curve and locate the nearest 25-foot station beyond this point to determine the ending 25-foot station. See Figure 3.

Care should be taken not to exceed the maximum relative gradient as determined in Section 3.3.8.2.1 Minimum Length of Superelevation Runoff in the *AASHTO Green Book*.



**Figure 2. Reverse Curves**



**Figure 3. Broken Back and Compound Curves**

## Superelevation Tables

Superelevation tables shall be provided in the contract documents for each curve that contain the location and superelevation values of the following: last normal crown (beginning of transition), 0% cross slope and remove crown before the PC, the first full superelevation, last full superelevation, and remove crown, zero cross slope and first normal crown (end of transition) after the PT. For reverse, broken-back or compound curves, the zero cross slope and/or remove crown locations may not be applicable. In addition, superelevation values should be provided for every 50-foot or 25-foot station depending on the interval chosen for the project.

### **Reference:**

For more details about superelevation transitions, see Section 3.3.8 Transition Design Controls in the *AASHTO Green Book*.