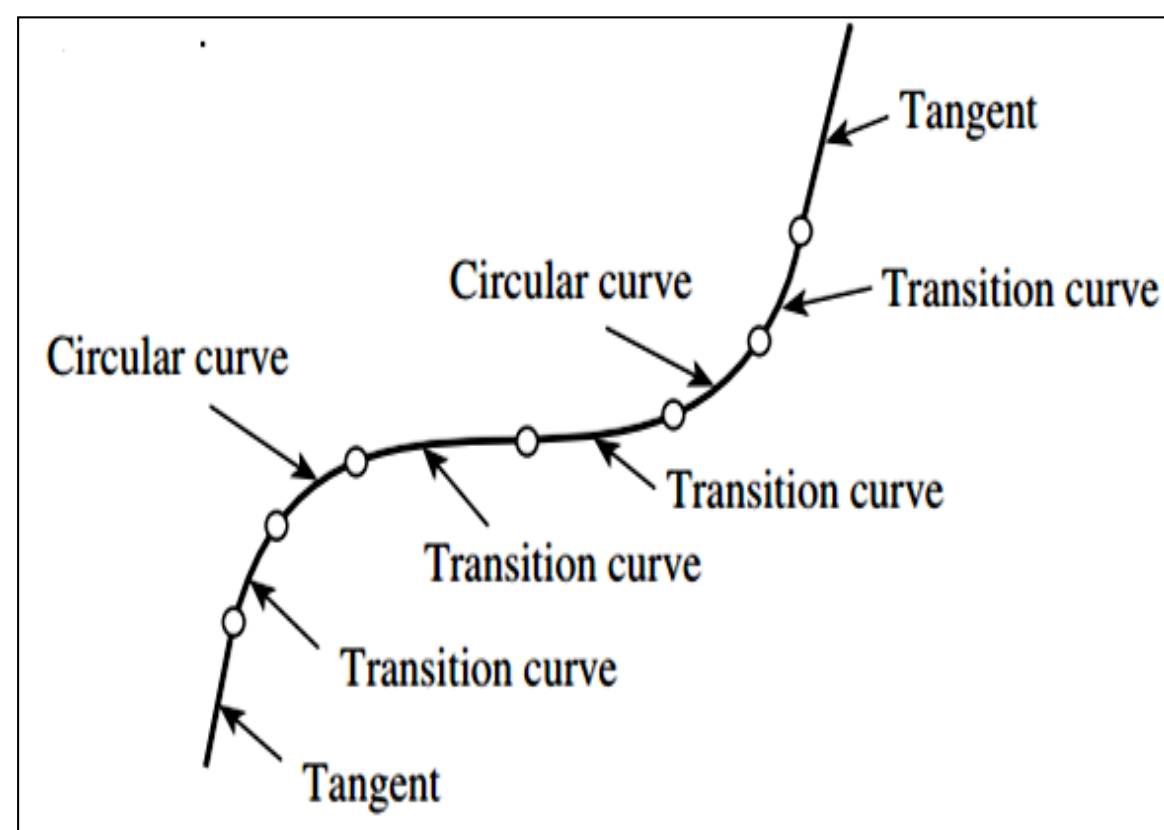


MOTIVATION

Traffic safety considerations based on **design consistency** is recognized as the underlying principle of highway design. quantify the association between safety and design characteristics. Past studies provided attention to the segment of interest than to the preceding and succeeding segments of the segment under study.



Study location



Horizontal elements of a highway

Study evaluates how **contiguous elements** (curve and tangent) affect the safety performance of the transportation system under heterogeneous traffic flow condition in rural divided highway in India.

DATA DESCRIPTION

Study period: 5 years (2009 – 2013)

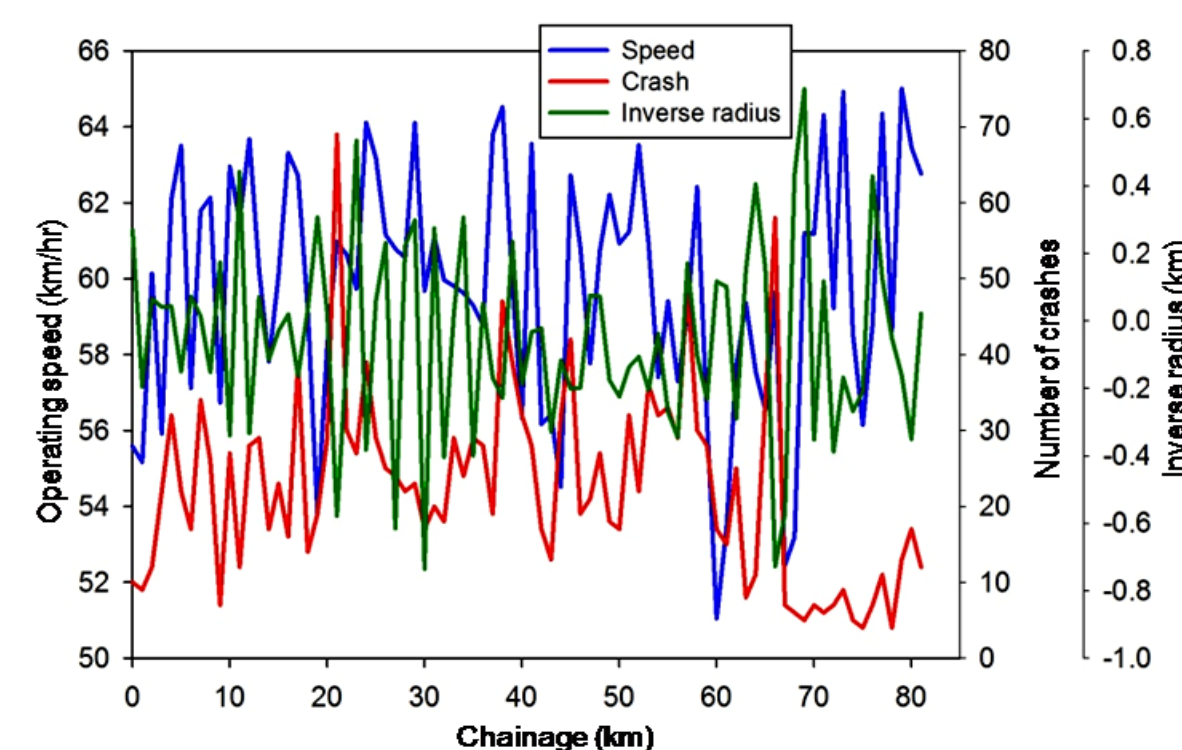
Data: Highway infrastructure and collision

Population group: Rural

Highway group: Four-lane divided

Descriptive statistics of variables

Variables	Mean	Minimum	Maximum	Standard Deviation
Tangent length (Km)	0.26	0.02	1.10	0.23
Million vehicle kilometer travelled	0.63	0.03	4.02	0.65
Log annual average daily traffic (Veh./day)	8.72	8.10	9.40	0.45
Upward gradient (%)	0.43	0.00	2.97	0.67
Downward gradient (%)	-0.57	-3.36	0.00	0.81
Square of gradient	1.63	0.00	11.28	2.33
Cross slope (%)	-2.10	-3.70	5.51	1.82
Rise and fall (mm/km)	10.16	0.21	33.62	7.79
Horizontal curvature (1/km)	0.26	0.00	1.26	0.26
Operating speed (Km/hr)	57.5	36.4	75.1	5.79
Horizontal curvature and operating speed	15.29	0.00	73.33	15.08

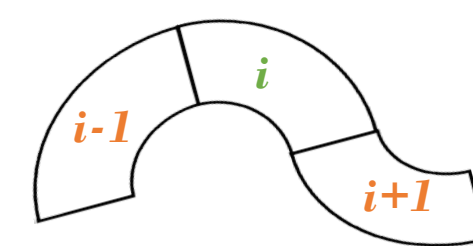


Number of crashes versus operating speed

SEGMENT UNDER STUDY (i^{th}) - CURVE ELEMENT

Graphical representation, Observations and Significant Variables

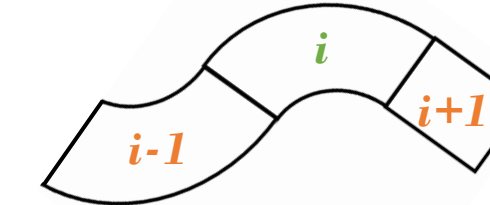
Preceding ($i+1^{th}$) and succeeding segments ($i-1^{th}$) are also curves elements



110 observations

Operating Speed

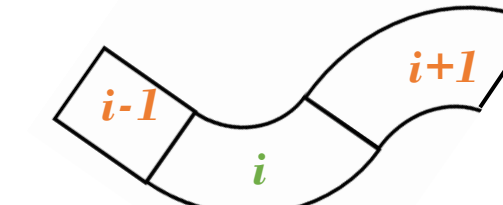
Preceding segment ($i+1^{th}$) is also a curve element and succeeding segment ($i-1^{th}$) is a tangent element



100 observations

Operating Speed

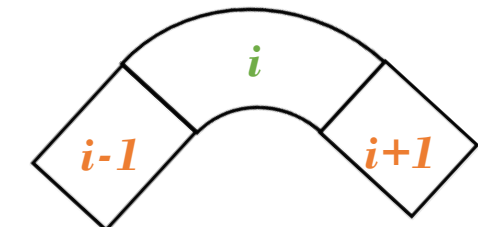
Preceding segment ($i+1^{th}$) is a tangent element and succeeding segment ($i-1^{th}$) is also a curve element



100 observations

Operating Speed

Preceding ($i+1^{th}$) and succeeding segments ($i-1^{th}$) are tangent elements



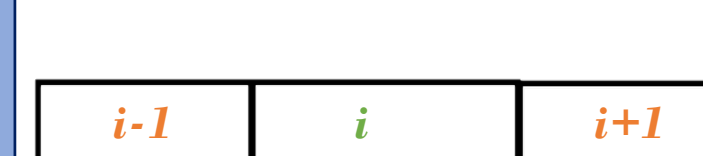
880 observations

Operating Speed, Vertical Curve

SEGMENT UNDER STUDY (i^{th}) - TANGENT ELEMENT

Graphical representation, Observations and Significant Variables

Preceding ($i+1^{th}$) and succeeding segments ($i-1^{th}$) are also tangent elements



152 observations

Operating Speed

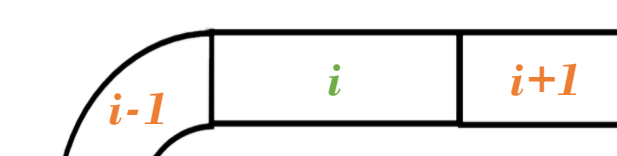
Preceding segment ($i+1^{th}$) is also a tangent element and succeeding segment ($i-1^{th}$) is a curve element



132 observations

Operating Speed

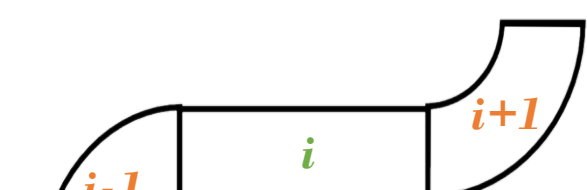
Preceding segment ($i+1^{th}$) is a curve element and succeeding segment ($i-1^{th}$) is also a tangent element



136 observations

Operating Speed

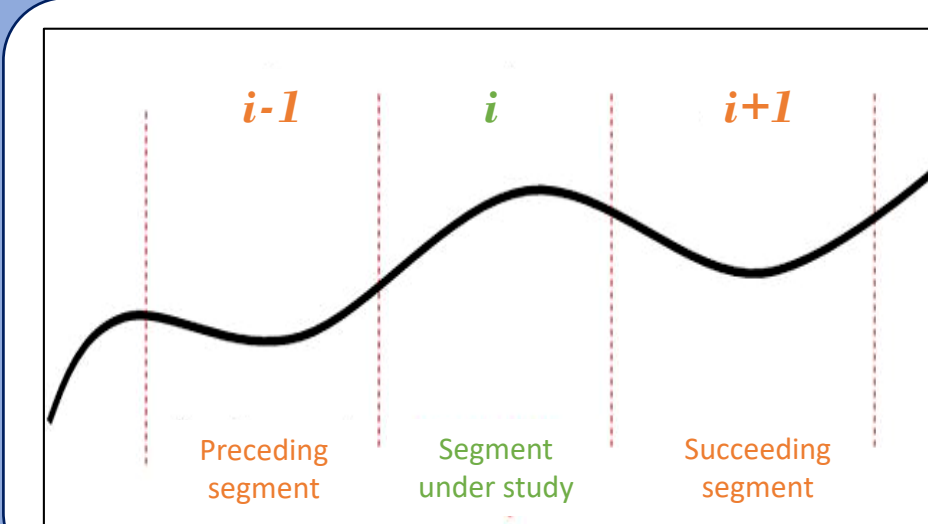
Preceding ($i+1^{th}$) and succeeding segments ($i-1^{th}$) are curve elements



650 observations

Operating Speed, Cross Slope

RESULTS AND DISCUSSION



- ✓ Analysis conducted using preceding and succeeding segments, in addition to the current segment, ($i+1^{th}$ & $i-1^{th}$), with the negative binomial regression provides a better results.
- ✓ Characteristics of the preceding and succeeding segments also influence the crash occurrence, in addition to the effect of the segment under study.
- ✓ Operating speed on curve is influenced by the operating speed along preceding tangent segment and *vice versa*, explains the role of geometric design parameters on safety.