Data-Driven Safety Training
Freeway Segment Safety Analysis

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Outline

1 Safety analysis methodology and segmentation

2 Data requirements

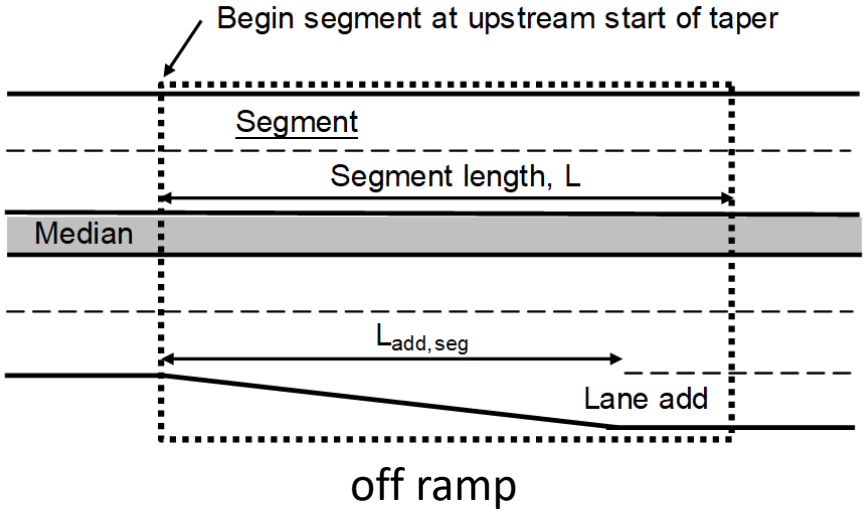
3 Laclede I-44 example

4 Laclede I-44 solution

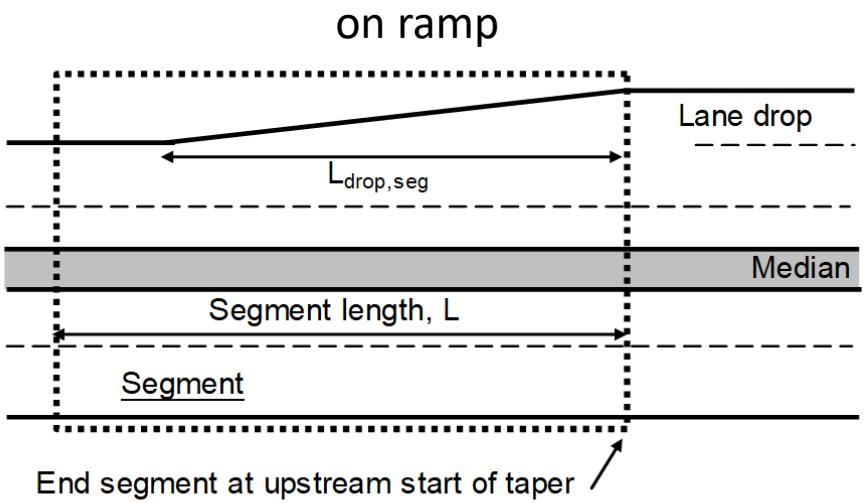
Area Type

- Classification of areas depends on the roadway characteristics, surrounding population, and land use
- FHWA/HSM/MoDOT - urban areas as regions with population greater than 5,000 people
  - if fewer, than rural
  - metropolitan, urbanized, or suburban refer to urban subcategories, not used in HSM

Through Lane # - Mainline



Number of through lanes: 5 (= downstream lane count)



Number of through lanes: 4 (= downstream lane count)

Do not include the speed-change lane that is associated with a ramp that merges with (or diverges from) the freeway, unless its length exceeds 0.30 mi (1,600 ft)

Through Lane # - Speed Change

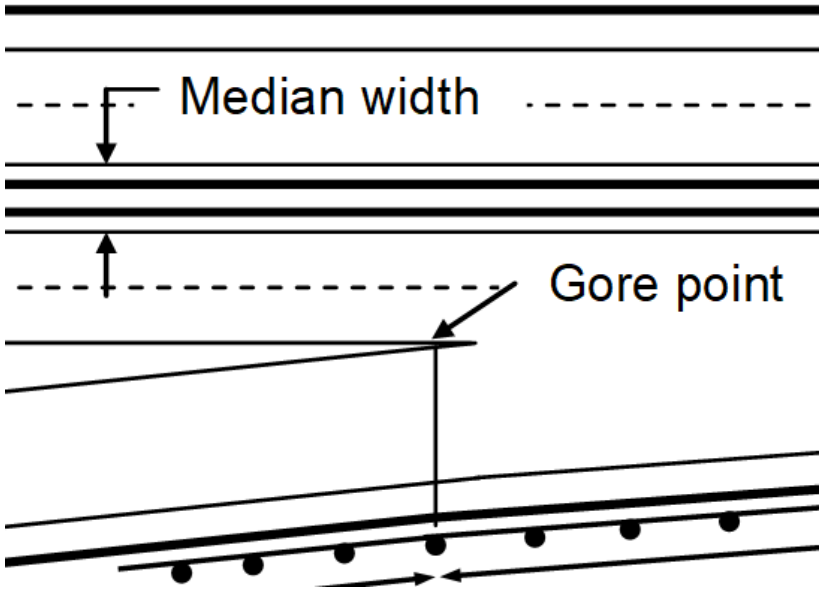
- The number of through lanes in the portion of freeway adjacent to the speed-change lane plus those freeway lanes in the opposing travel direction
- Speed change lanes are typically part of an on- or off-ramp
- Lane is measured from gore to taper for on-ramp and taper to gore for off-ramp

Average Lane Width

- measure lane width at different points throughout the freeway segment to compute the average
- round to nearest 0.5 ft

Effective Median Width

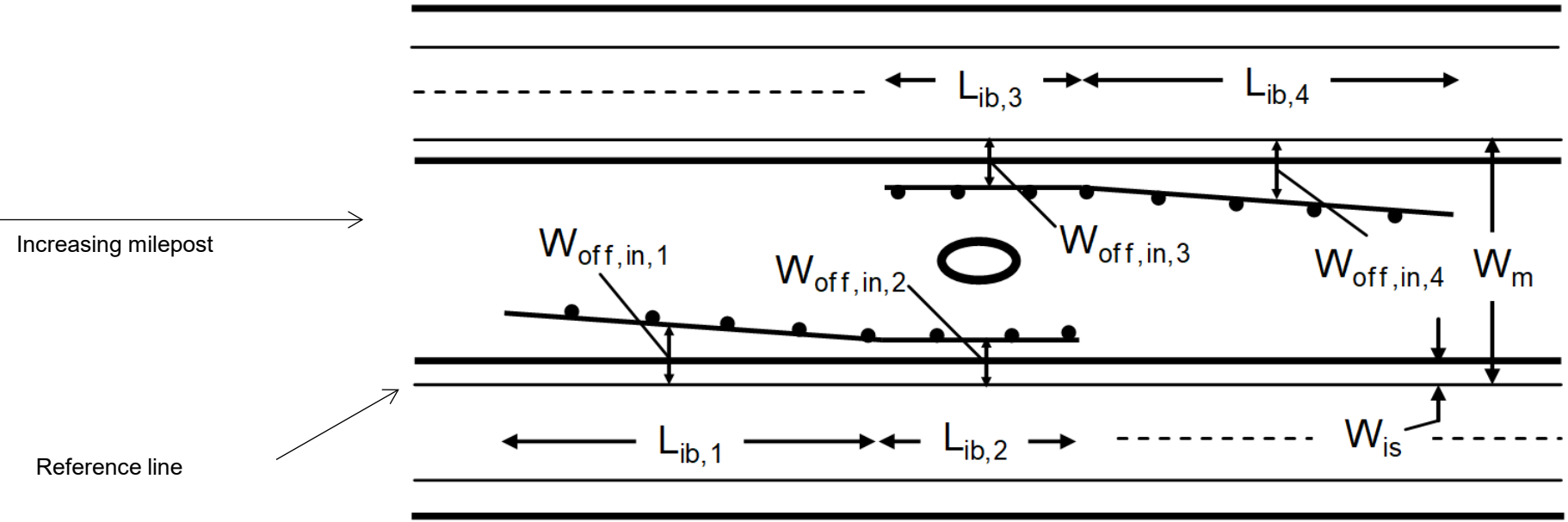
- Effective median width - distance between the inside edges of the travelway in both directions (in ft)
- Includes the inside shoulder



Proportion of Segment Length with Median Barrier

- median barrier length/total segment length
- value between 0 and 1
  - 0 = no median barrier
  - 1 = barrier on entire segment

Average Median Barrier Offset



Proportion of Segment Length with Outside Barrier

- outside barrier length/total segment length
- e.g. guardrails
- value between 0 and 1
  - 0 = no barrier
  - 1 = barrier on entire segment

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Proportion of Inside/Outside Rumble Strips

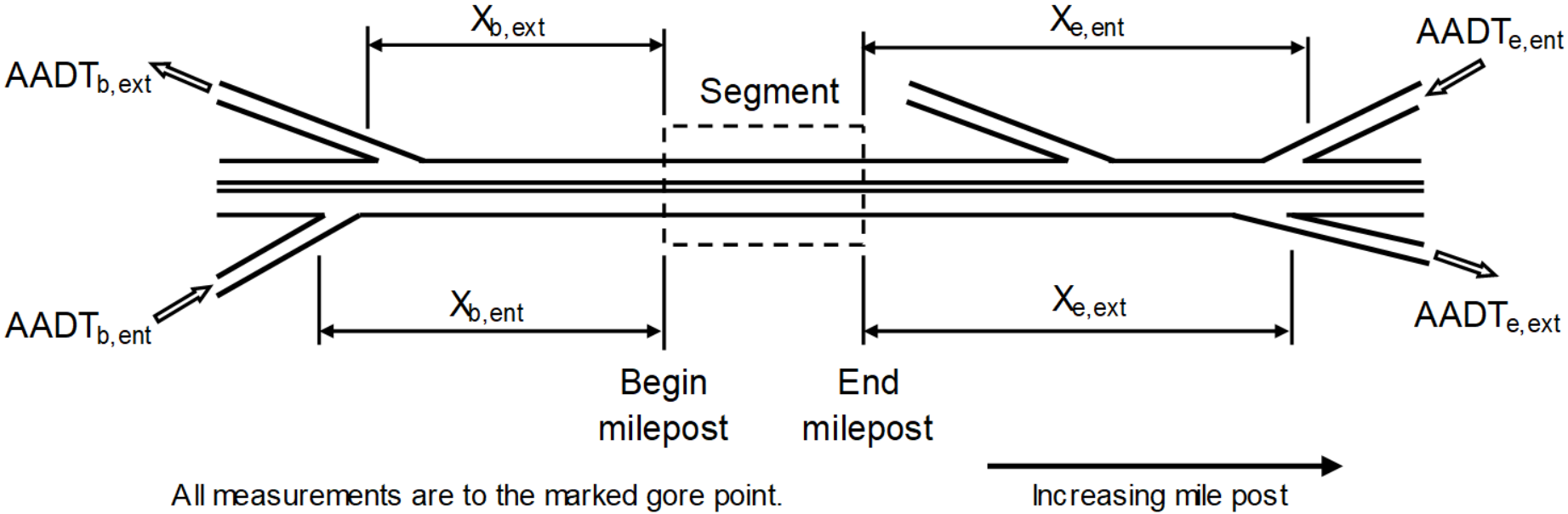
- inside and outside rumble strip length/segment length per side
  - i.e. for each side – inside and outside
- value between 0 and 1

MoDOT 2020

Average Inside/Outside Shoulder Width

- Include both inside and outside shoulder widths
- Only paved shoulders (inside and outside) in both directions should be considered

Distance from Segment Beginning/End to Ramps



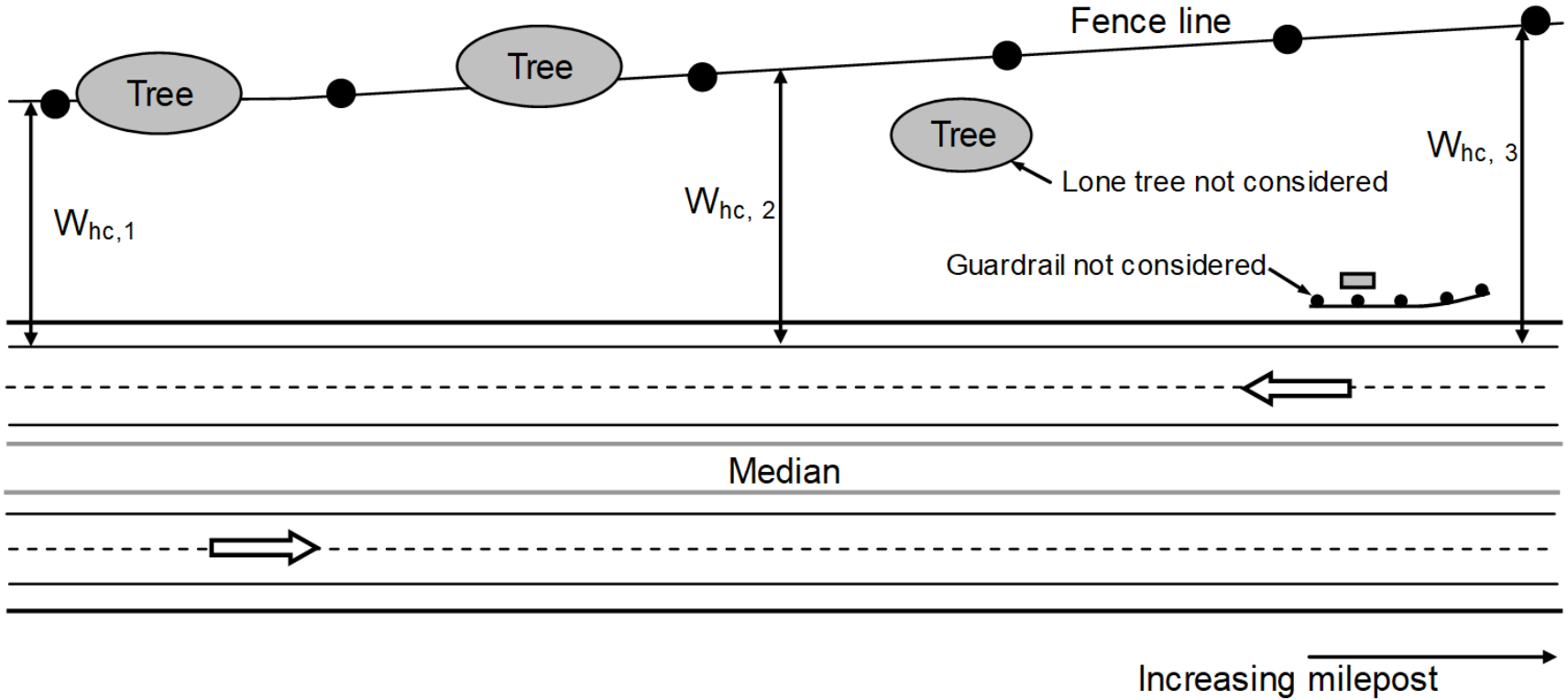
Traffic Volumes

- total mainline AADT in both directions should be collected for all years of analysis
- ramp AADT

Proportion of High Volume

- Proportion of AADT during hours where volume exceeds 1,000 veh/h/ln
  - 0 if threshold is never exceeded
  - 1 if threshold if always exceeded
- As volume nears capacity, average speed decreases and headway is reduced

Outside Clear Zone Width



Curve Radius & Length

- Measured (ft) along inside edge of curved travelway
- If curved in both directions, equivalent radius of curve (R^*) computed using:

$$R^* = \left[\left(\frac{0.5}{{R_i}^2}\right) + \left(\frac{0.5}{{R_j}^2}\right)\right]^{-0.5}$$

- where *i* and *j* represent the two directions

Base Conditions for Freeway Segments

Description	MV Base Condition	SV Base Condition
Horizontal Curve	Not Present	Not Present
Lane Width	12 ft	12 ft
Inside Paved Shoulder Width	6 ft	6 ft
Median Width	60 ft	60 ft
Median Barrier	Not Present	Not Present
Proportion AADT > 1000veh/h	None	None
Upstream Ramp Entrances	> 0.5 mi from segment	n/a
Downstream Ramp Exits	> 0.5 mi from segment	n/a
Outside Shoulder Width	n/a	10 ft
Shoulder Rumble Strip	n/a	Not Present
Outside Clearance	n/a	30 ft Clear Zone
Outside Barrier	n/a	Not Present