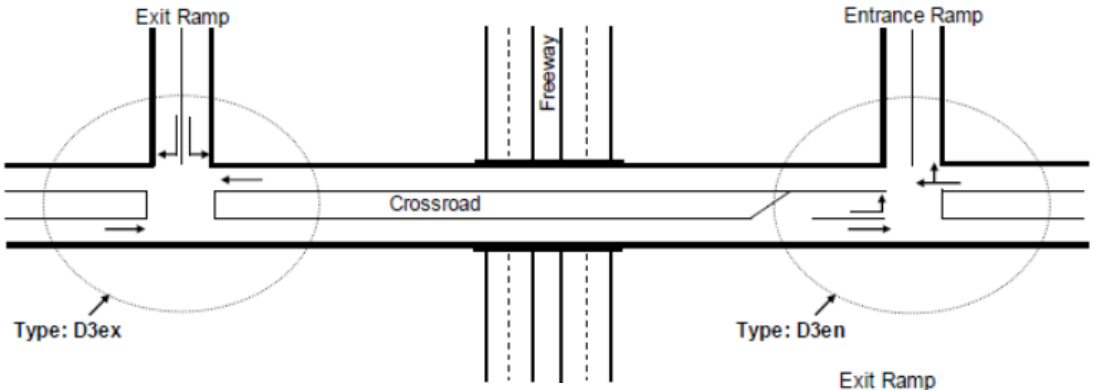
Modeling Ramp Terminals

Learning Outcomes

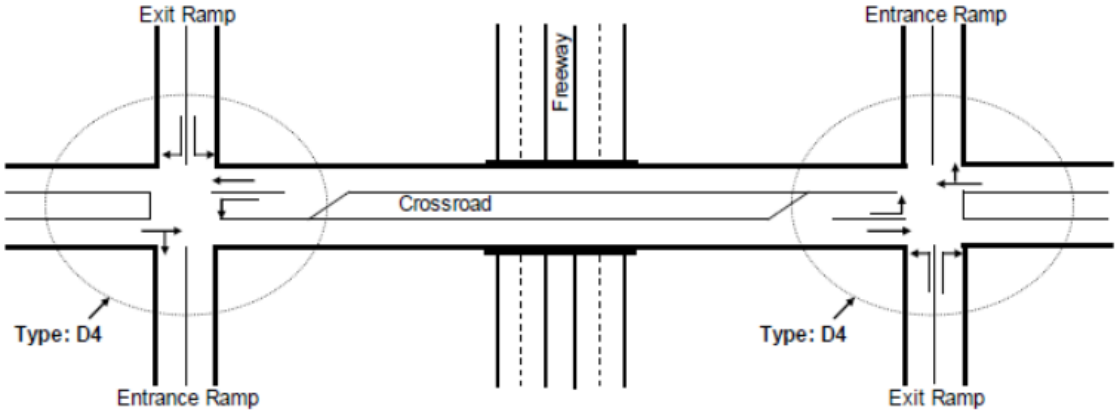
- **Describe types of terminals**
- **List needed data inputs**
- **Describe how to run the model**
- **Describe the depth and detail of results**

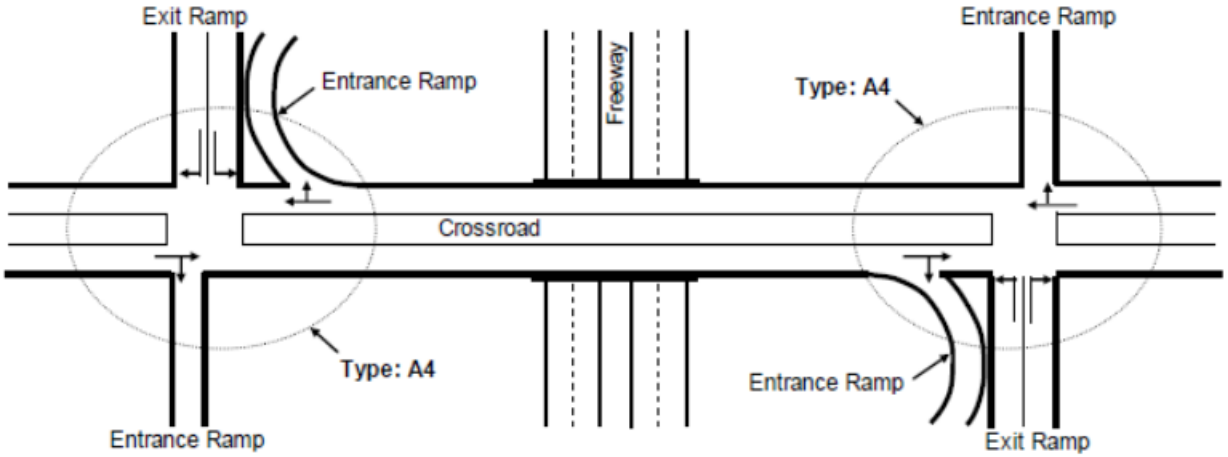
Ramp Terminal Configurations



Three Leg Diagonal, Exit or Entrance (**D3ex or D3en**)

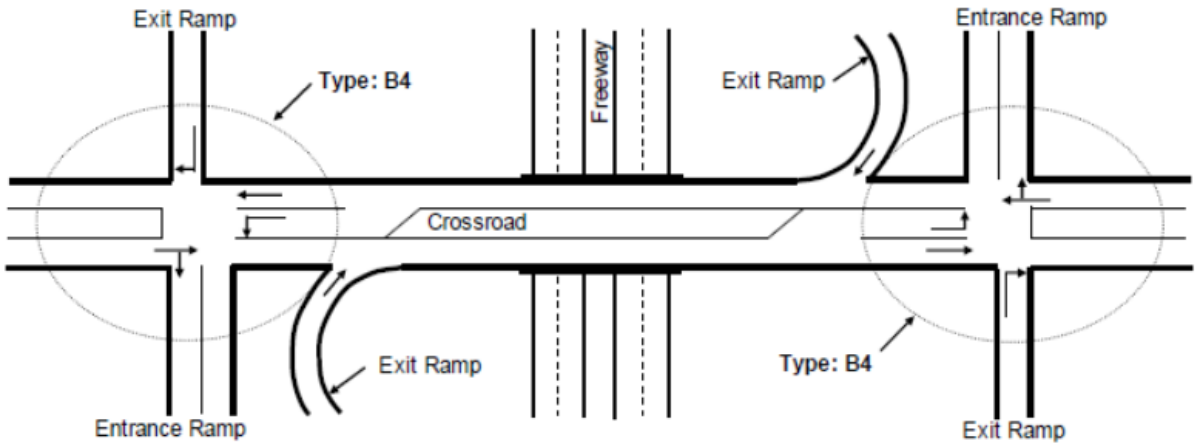
Four Leg Diagonal, Exit or Entrance (**D4ex or D4en**)





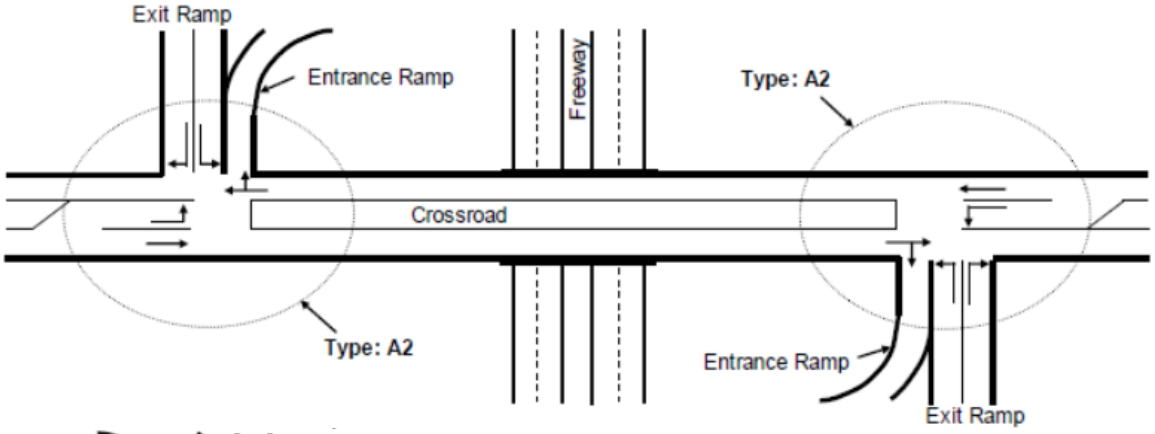
Four Leg, 4-quad Parclo A (**A4**)

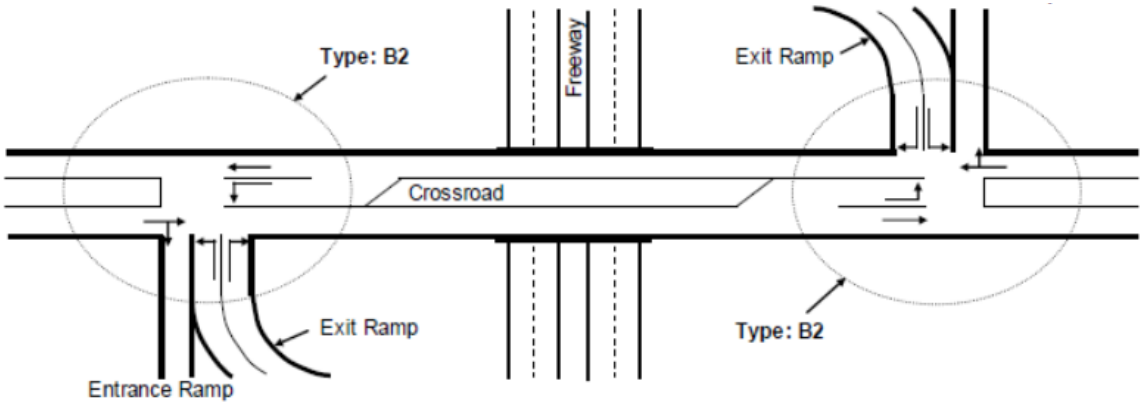
Ramp Terminal Configurations (cont'd)



Four-Leg Diagonal, Four-Quad Parclo B (**B4**)

Three-Leg Diagonal, Two-Quad Parclo A (**A2**)

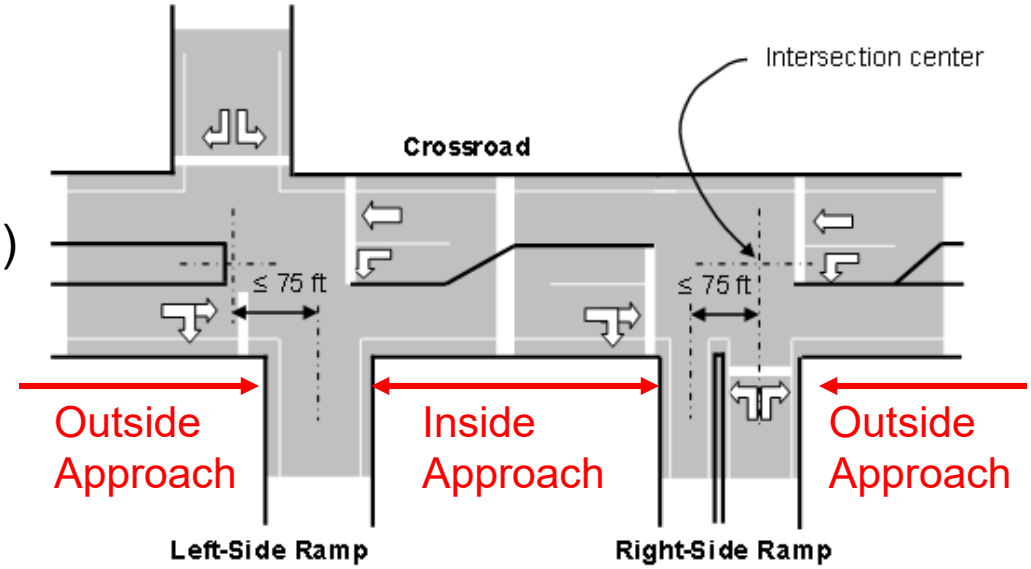




Three-Leg Diagonal, Two-Quad Parclo B (**B2**)

Safety Performance Function

- $N_{spf} = \exp(\mathbf{a} \times \mathbf{b} \ln[c \times AADT_{xrd}] + \mathbf{d} \times \ln[\mathbf{c} \times AADT_{ex} + \mathbf{c} \times AADT_{en}]$
- $AADT_{xrd}$ = crossroad traffic = $(AADT_{inside\ legs} + AADT_{outside\ legs})/2$
- $AADT_{en}$ = entrance ramp traffic
- $AADT_{ex}$ = exit ramp traffic
- Coefficients **a, b, c, d** by...
  - Configuration
  - Type of control (signal, stop)
  - Area type
  - Number of crossroad lanes
    - 2 to 6 through lanes
  - Crash Severity
    - F&I and PDO



If the centerlines of the two ramps are offset by 75 ft or less, then they are considered as one intersection.

If the two ramps are offset by more than 250 ft, then each ramp terminal is considered to form a separate intersection

Crash Modification Factors

CMFs in ISATe

- 11 available
- Most are functions of geometric design or traffic control variables
- Developed to work with SPF

Crash Modification Factors

Signal or Stop:

- Exit ramp capacity
  - Length of ramp available for deceleration*
- Crossroad turn lane
  - Left turn
  - Right turn
- Access point frequency
- Segment length
- Median width

Signal Only:

- Protected-only left-turn phase
- Channelized right turn
  - Crossroad
  - Exit ramp
- Non-ramp leg

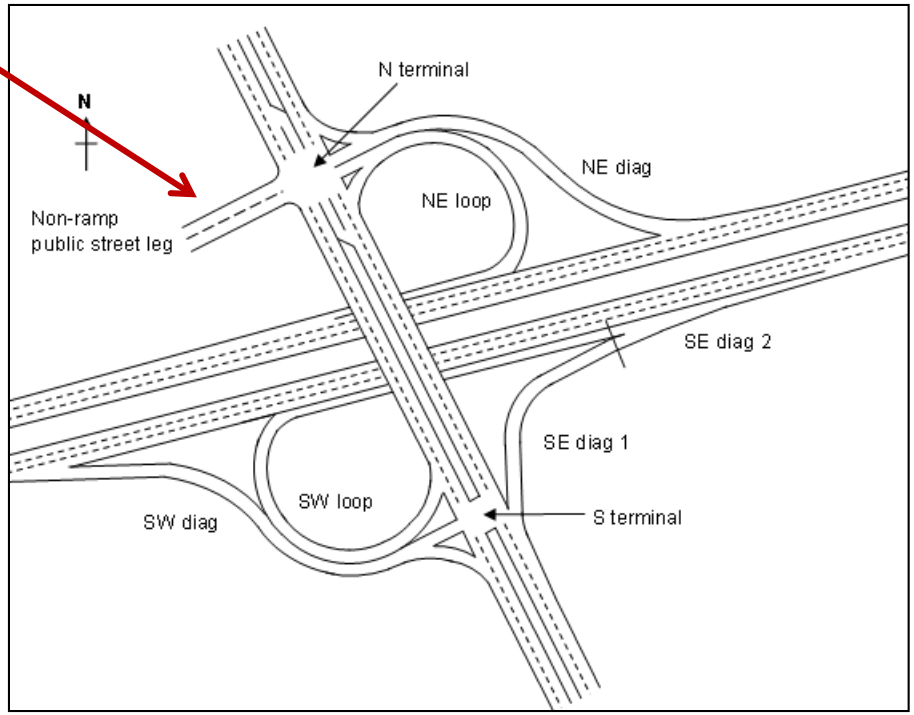
Stop Only:

- Skew angle

*Crash risk tends to increase as the length of ramp available for deceleration to the back of queue is reduced due to long queues

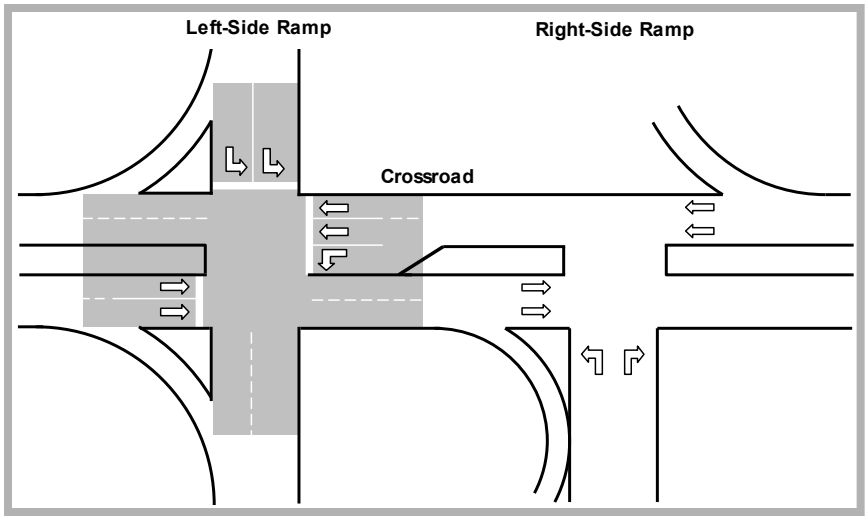
Ramp Terminal Input Data

- Terminal Configuration
- Traffic Control Type
- Presence of non-ramp Public Street at Terminal (signal only)
- Exit Ramp Skew Angle
- Distance to nearest Public Street (outside approach)
- Distance to adjacent ramp (inside approach)
- Presence of Protected Left Turn Operation
- Exit Ramp Right Turn Control Type
- Crossroad Median Width
- Crossroad Through Lanes
- Number of Lanes on Exit Approach



Ramp Terminal Input Data (continued)

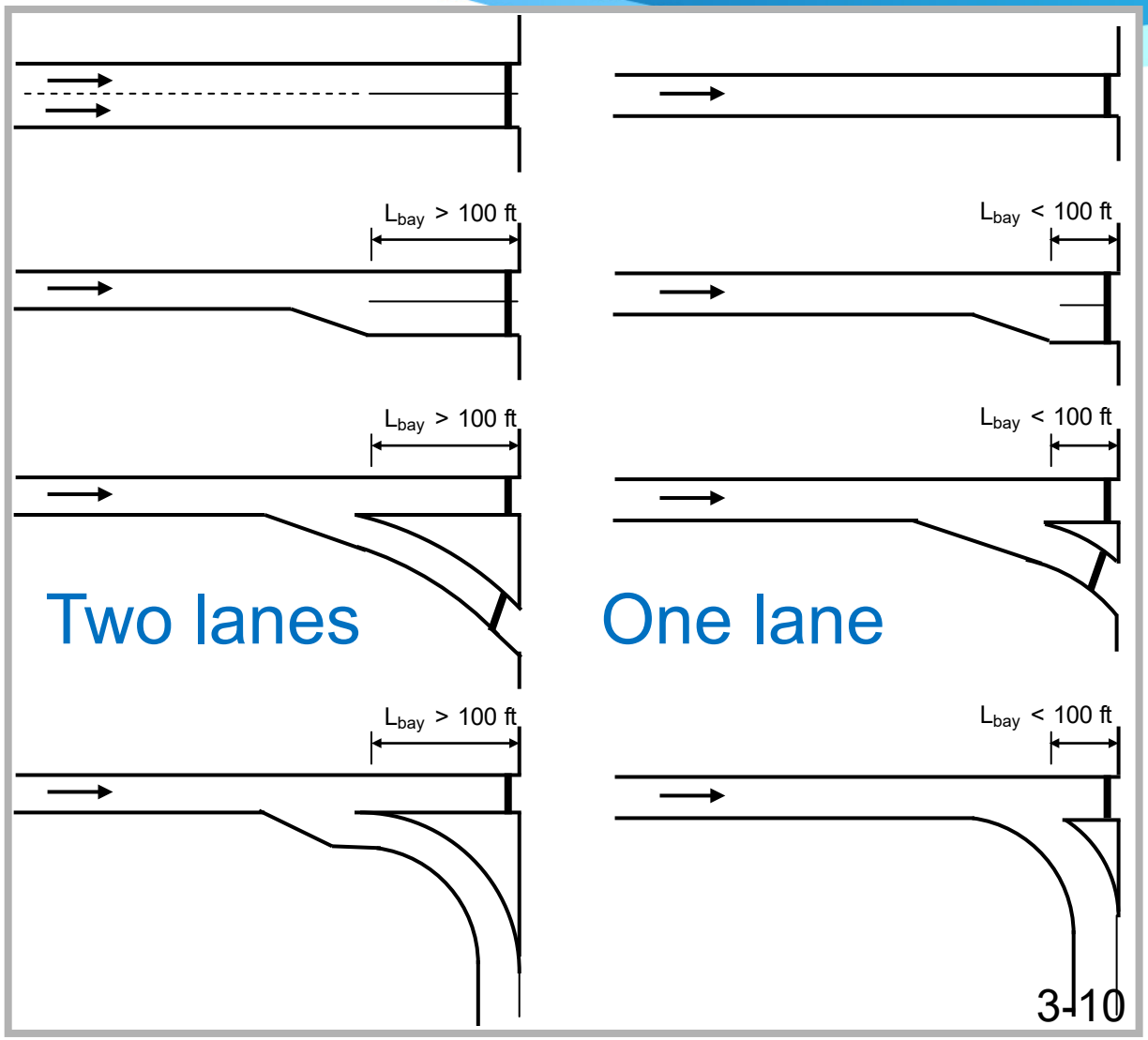
- Right Turn Channelization
- Left Turn Bays
- Width of Left Turn Bay
- Right Turn Bays
- Driveways and Public Streets near Terminal (within 250 ft)
- Traffic Volumes on Crossroad and Ramps



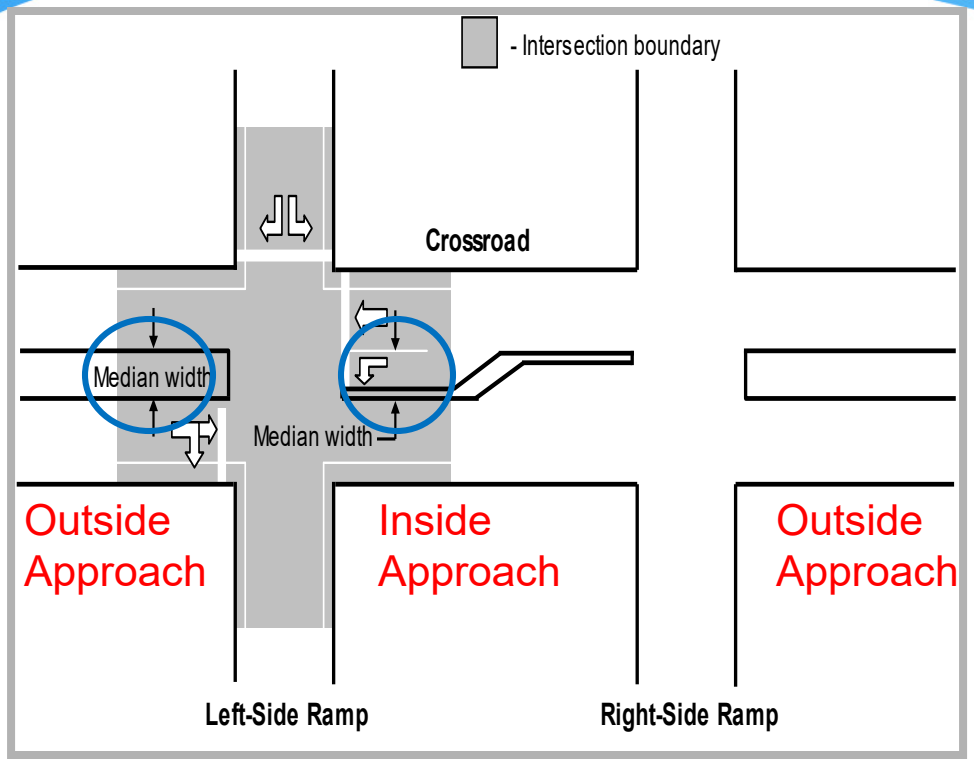
Input Data

Number of Fully Developed Lanes at exit

- Must be 100 ft or more in length



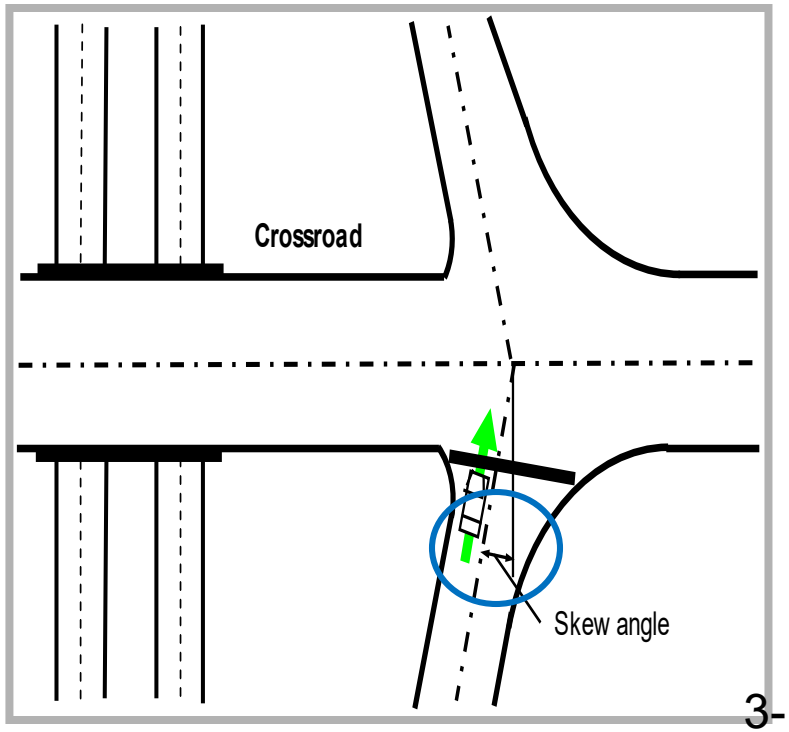
Input Data



Median Width

Intersection Skew Angle = the absolute value of the difference between 90 degrees and the actual intersection angle

Skew Angle



Questions – Comments?