Detector Location and Layout (Design)

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WSDOT Eastern Region

Rural Uncoordinated

- Objectives / Rationale
- Considerations
- Methodology / Practice
- Discussion

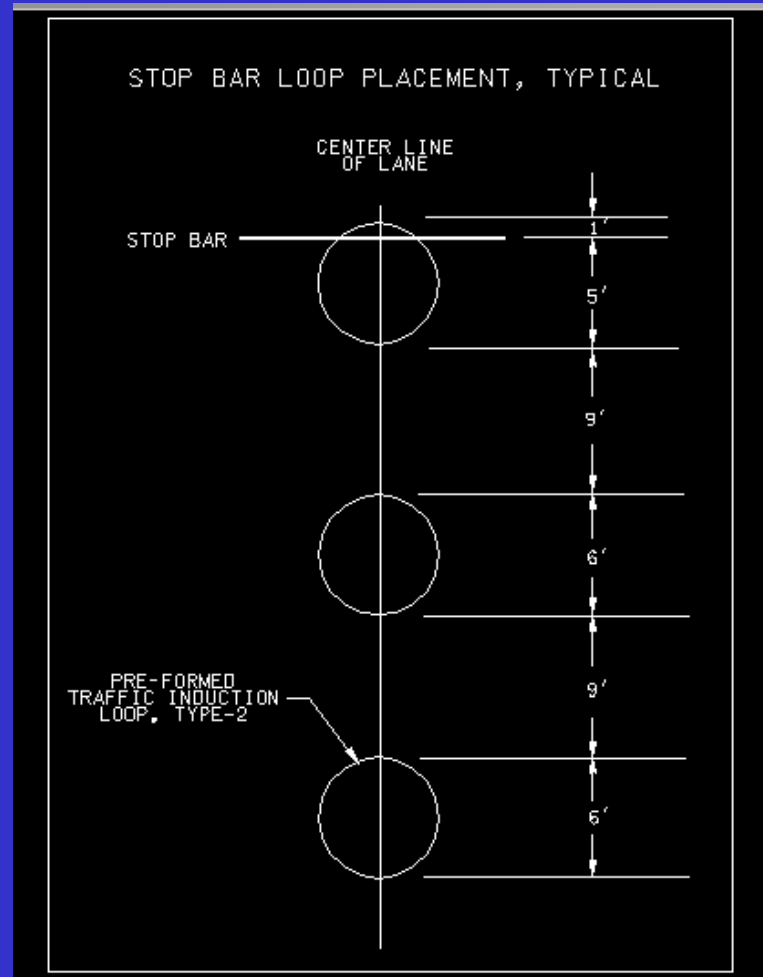# Objectives / Rationale

- Safety
- Efficiency
- Data collection

Considerations

- Volumes
- Speeds
- Movements
- Agency standards / Acceptable practice

Detector Location and Layout (Design)

Methodology / Practice

Detector Location and Layout (Design)

Methodology / Practice

Where: V_{90} = 90th pecentile speed in feet per second

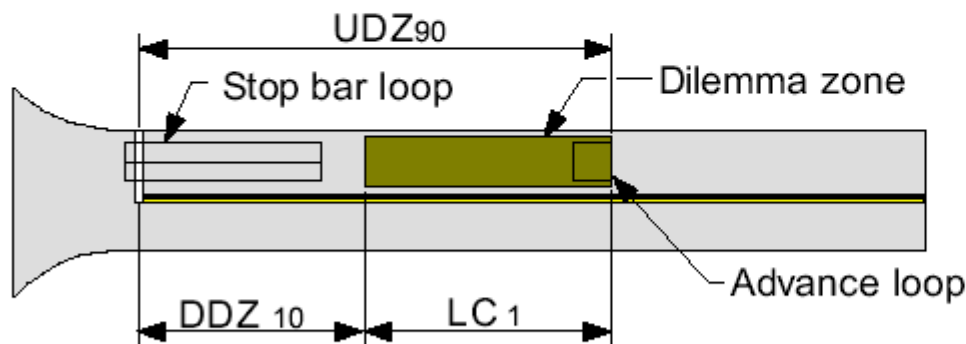V_{10} = 10th percentile speed in feet per second

UDZ_{90} = Upstream end of dilemma zone for 90th percentile speed

DDZ_{10} = Downstream end of dilemma zone for 10th percentile speed

LC_1 = V_{10} travel time to downstream DDZ_{10}

LC_2 = V_{10} travel time from 1st loop to 2nd loop

LC_3 = V_{10} travel time from 3rd loop to DDZ_{10}

UDZ90

Stop bar loop

Dilemma zone

Advance loop
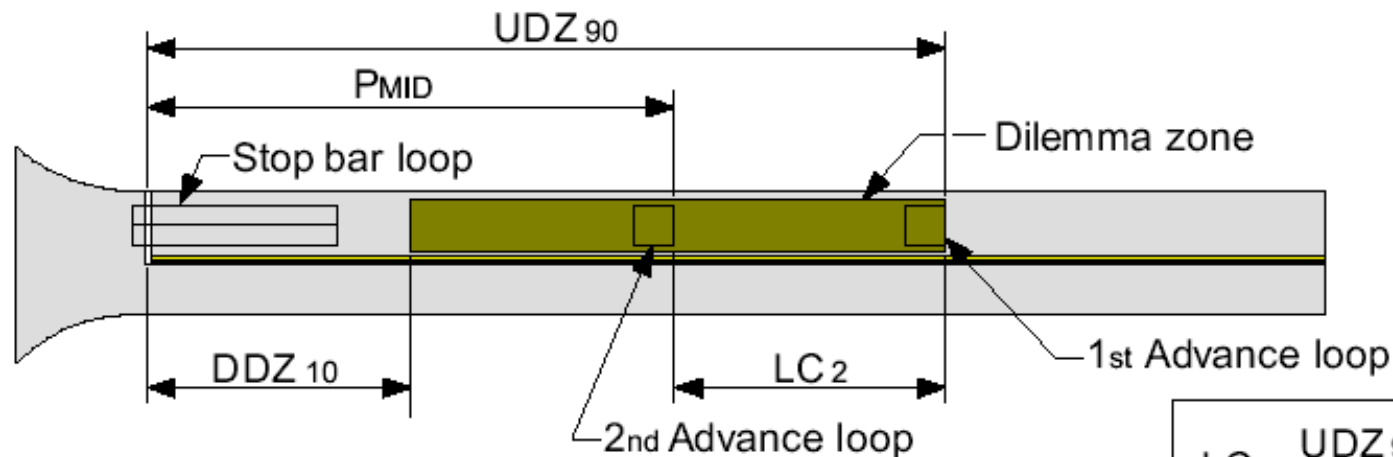
DDZ 10

LC 1

Single Advance Loop Design

When LC_1 is equal to or less than 3 seconds

$$UDZ_{90} = \frac{V_{90}^2}{16} + V_{90}$$

$$DDZ_{10} = \frac{V_{10}^2}{40} + V_{10}$$

$$LC_1 = \frac{UDZ_{90} - DDZ_{10}}{V_{10}}$$

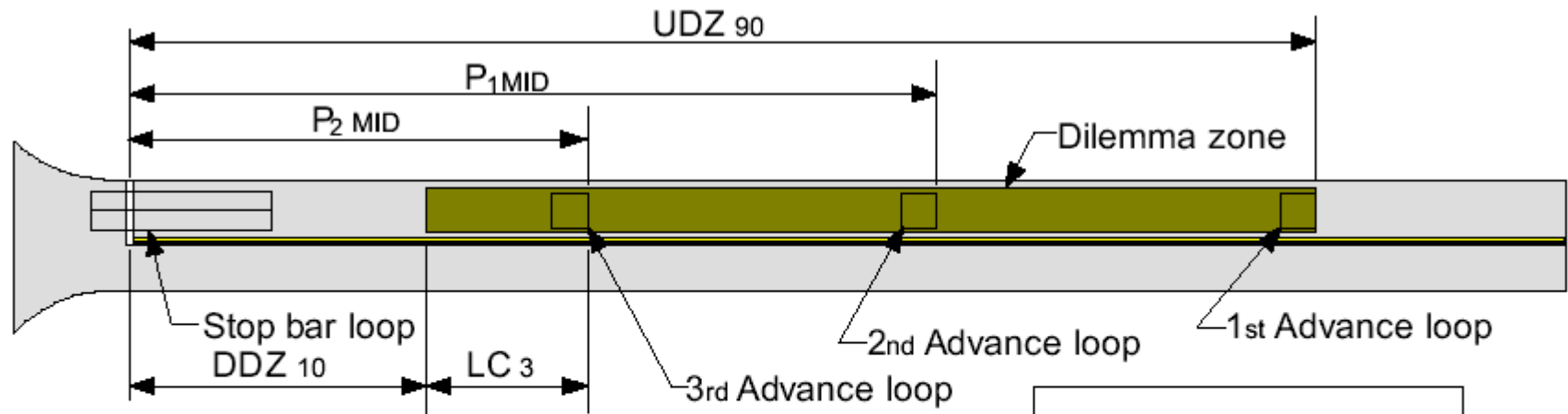Detector Location and Layout (Design)

Methodology / Practice

Double Advance Loop Design

When LC_2 is equal to or less than 3 seconds

$$LC_2 = \frac{UDZ_{90} - P_{MID}}{V_{10}}$$

$$P_{MID} = \frac{UDZ_{90} + DDZ_{10}}{2}$$

Methodology / Practice

UDZ $_{90}$

P_{1MID}

$P_{2\ MID}$

Dilemma zone

Stop bar loop
DDZ $_{10}$

LC $_3$

3rd Advance loop

2nd Advance loop

1st Advance loop

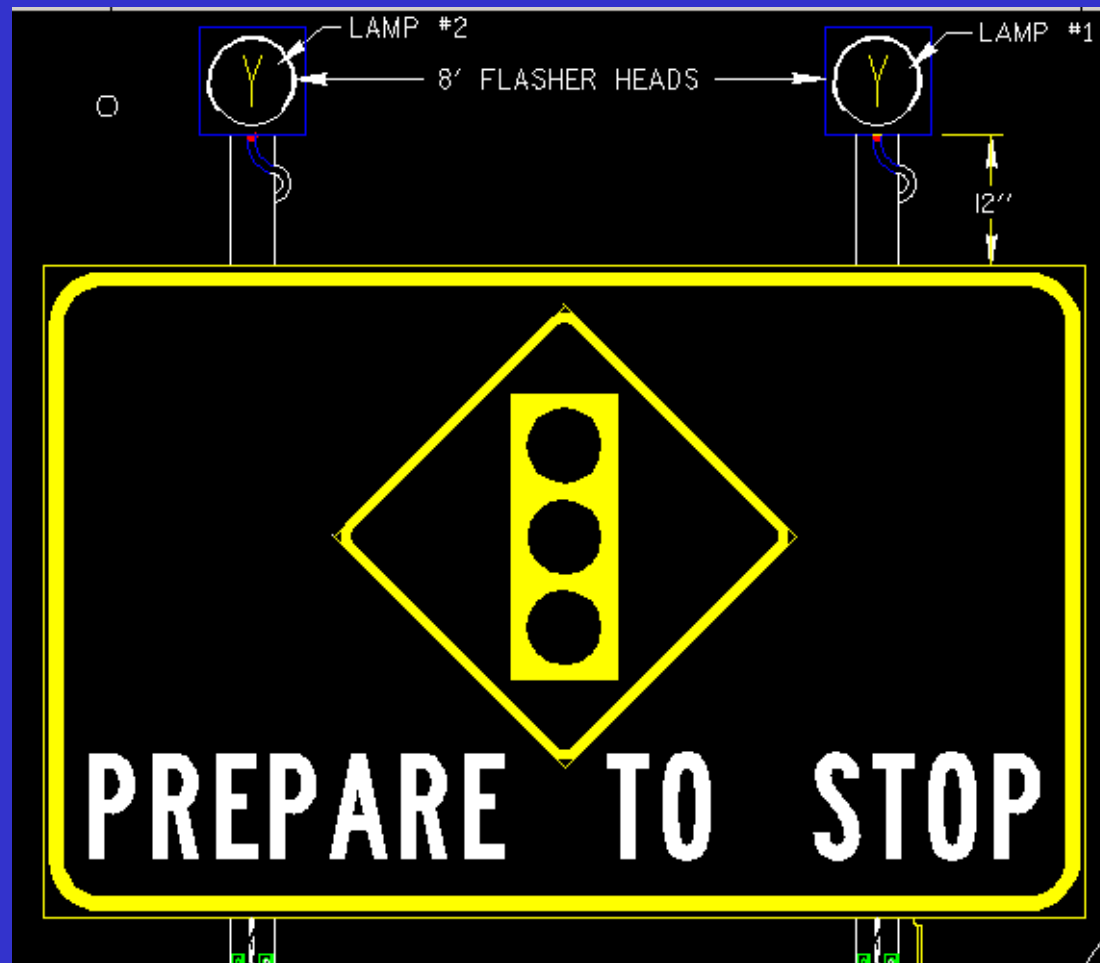**Triple Advance Loop Design**

When LC$_2$ is greater than 3 seconds

$$LC_3 = \frac{P_{2MID} - DDZ_{10}}{V_{10}}$$

$$P_{1MID} = UDZ_{90} - 3V_{10}$$

$$P_{2MID} = UDZ_{90} - 6V_{10}$$

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Discussion

Comments, questions, suggestions?