

Defining and Quantifying Rural Congestion

Mandar Khanal

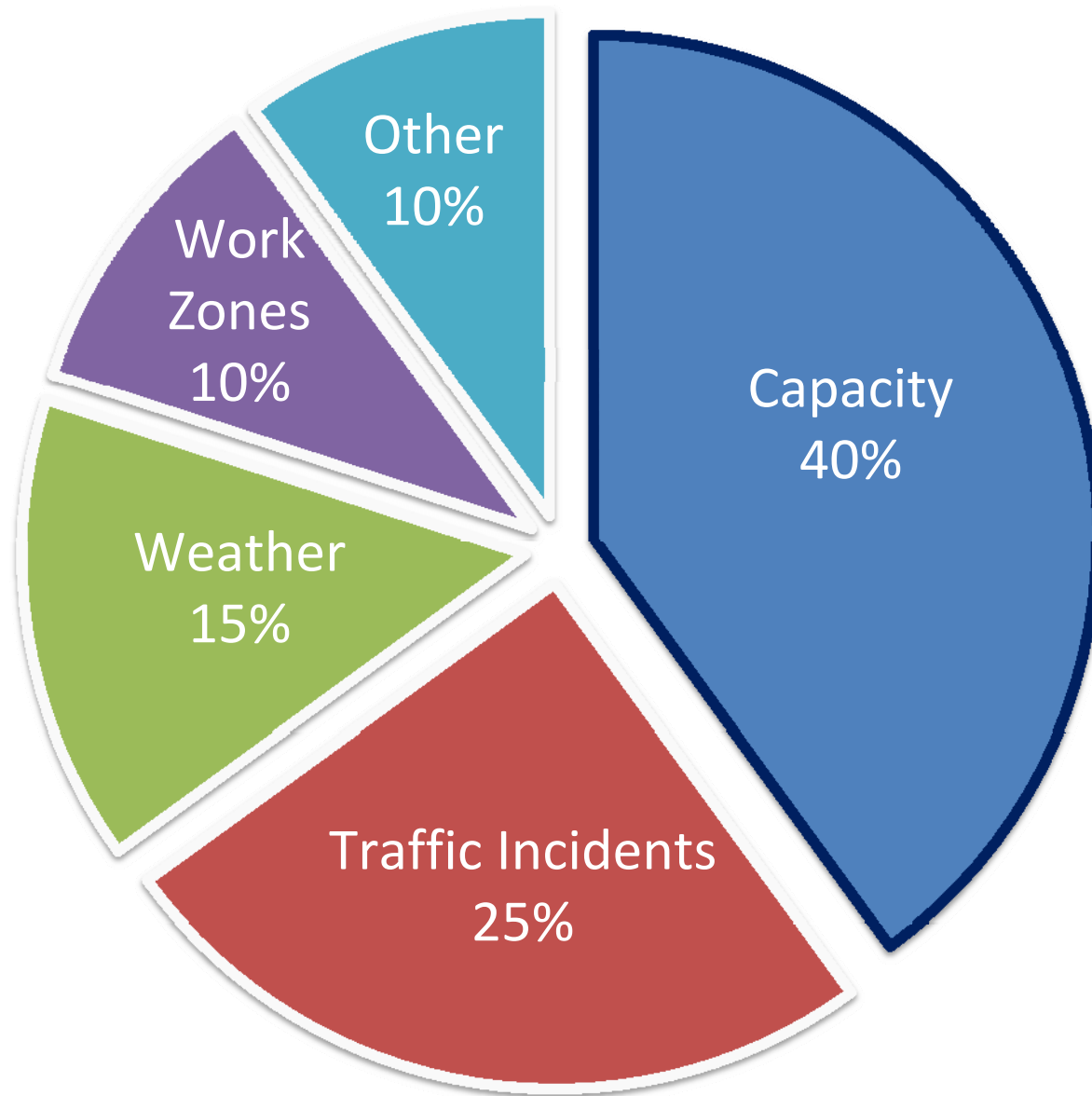


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Congestion Sources



Study Focus

Two-lane roads away from intersections

Operating
Characteristics

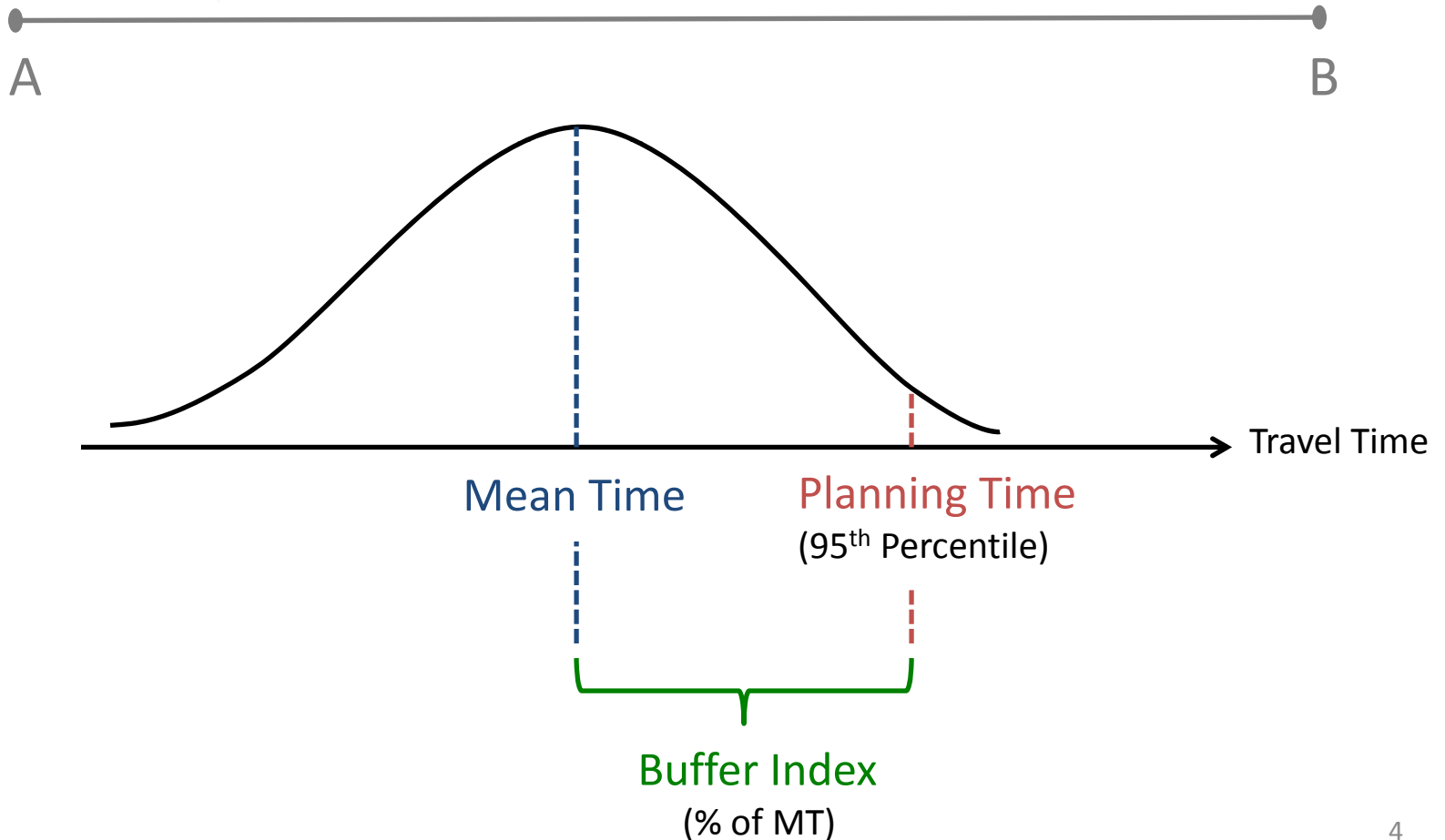
1. Volume
2. Traffic Mix
3. Speed Limit

Roadway Geometry

Access Density

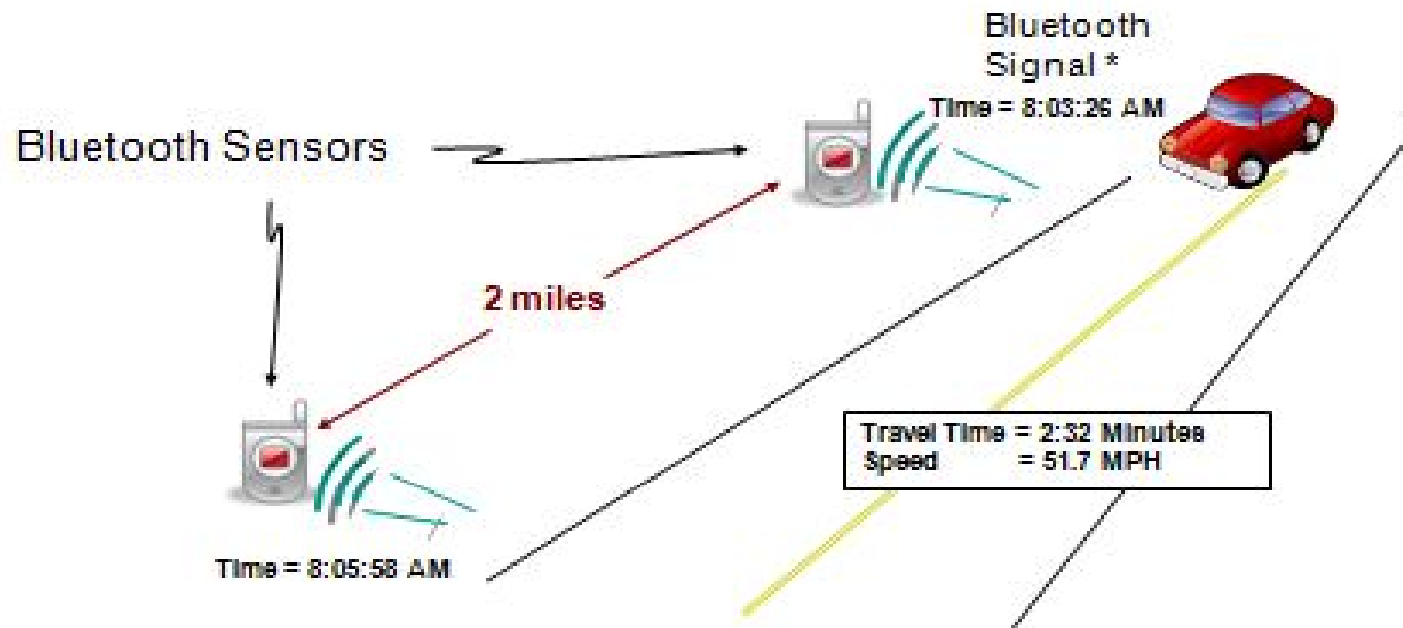


Measuring Congestion



Data Collection Technology

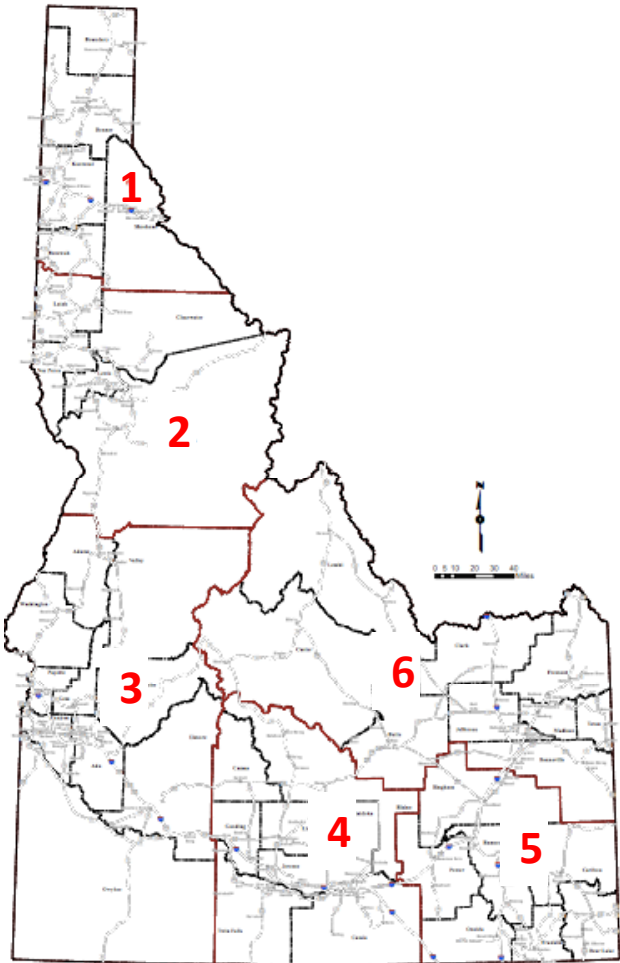
Bluetooth Technology by Traffax Inc.



- * Bluetooth signals come from cell phones, PDAs, laptops, GPS, car radios...
- ** Provisional patent received

Segment Selection

1 Road In Each District



2 Consecutive Segments

Control environment, land use, traffic

Short Segments

Control of Geometry

Close to ITD's ATRs
(Automatic Traffic Recorders)

US 20

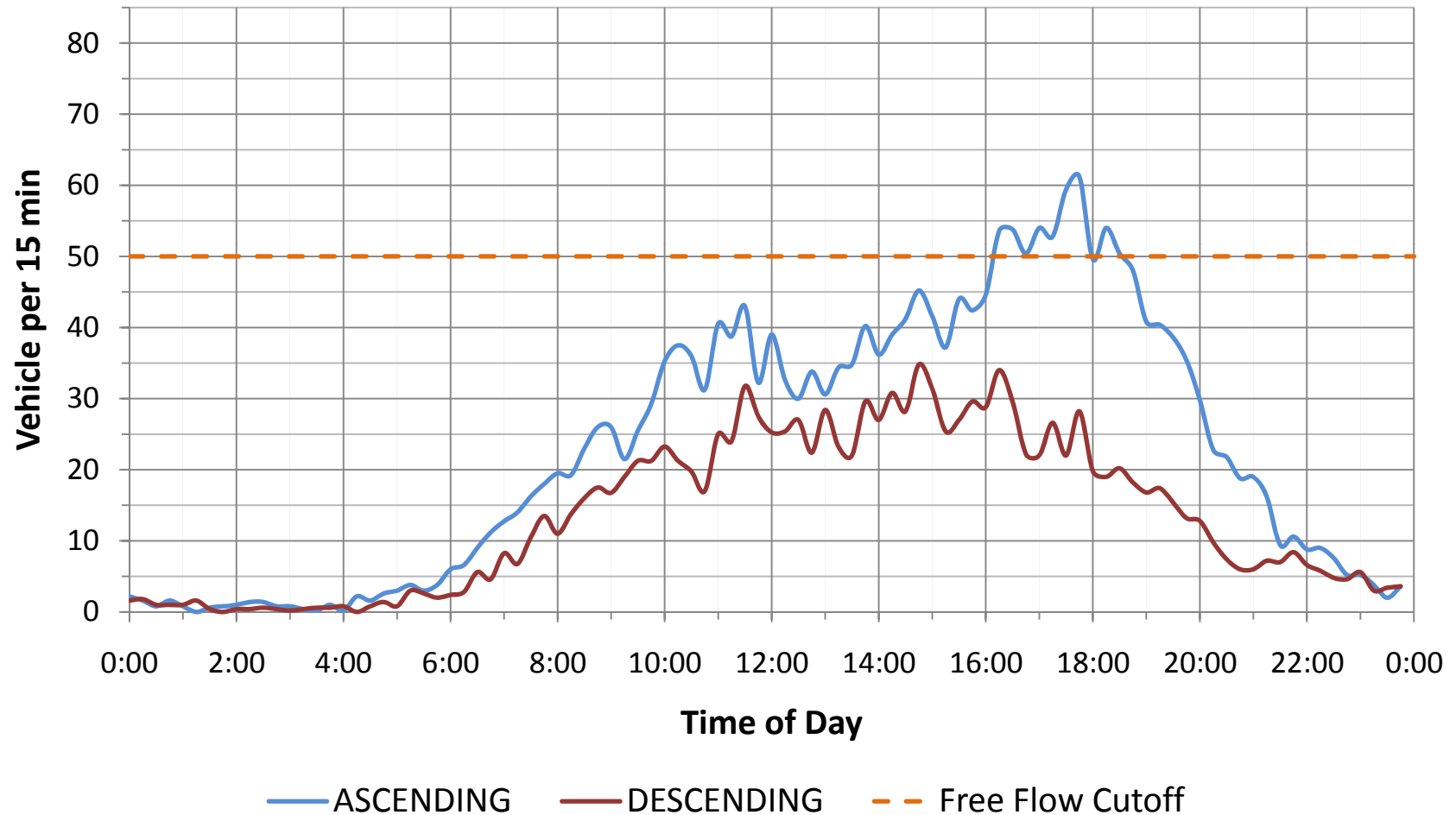


State Hwy 55

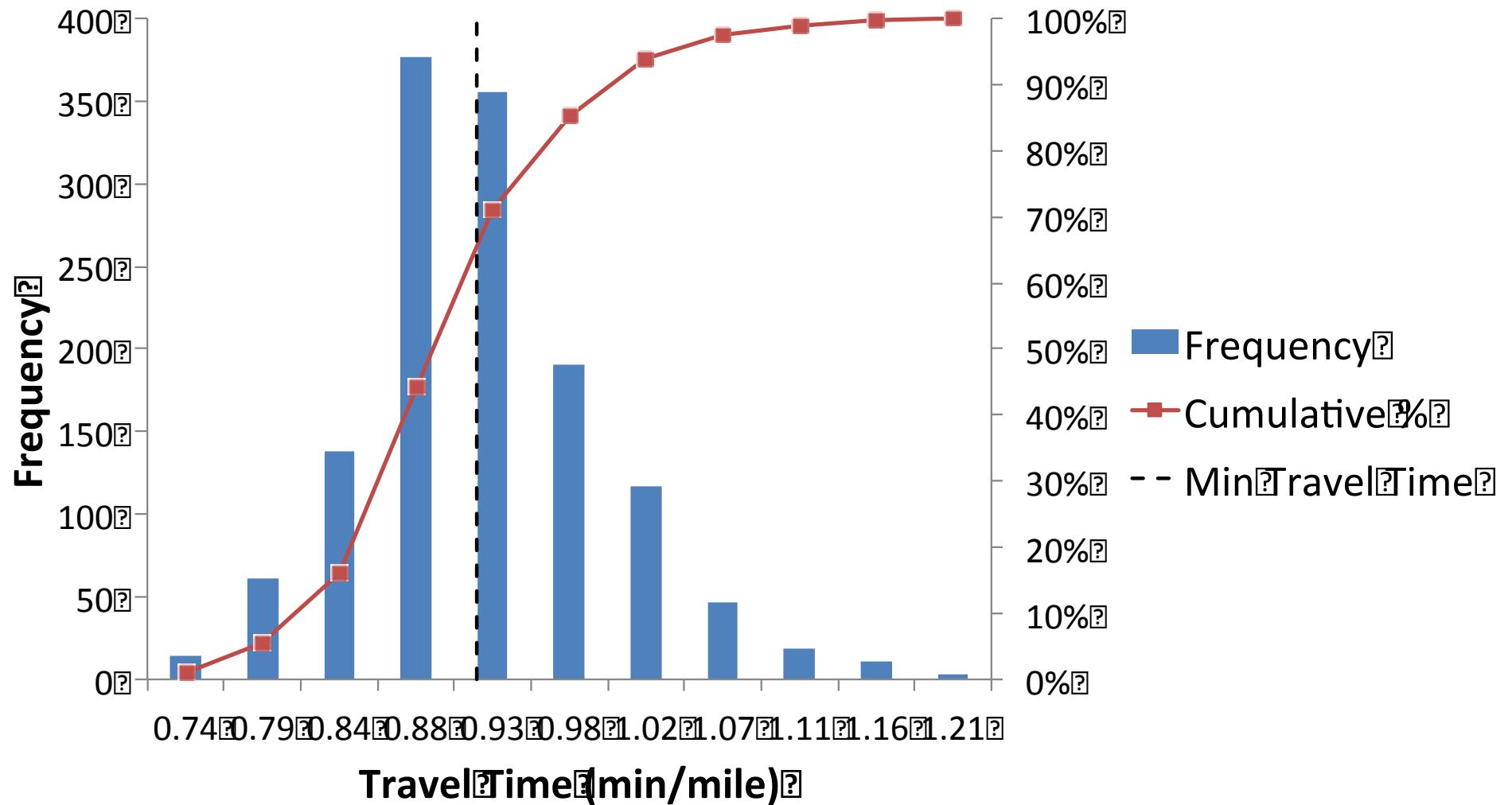


Weekday Volume – US 20

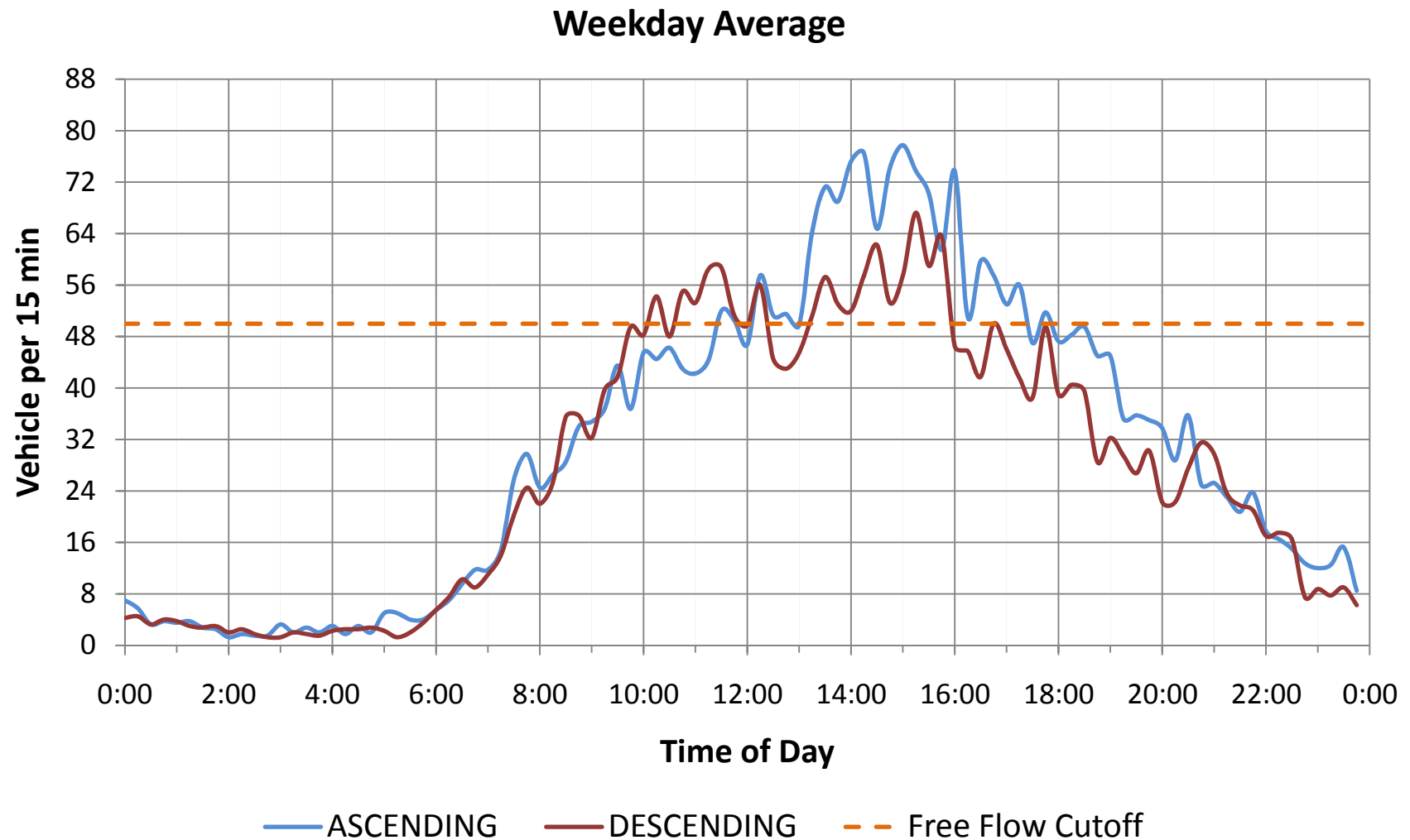
Weekday Average



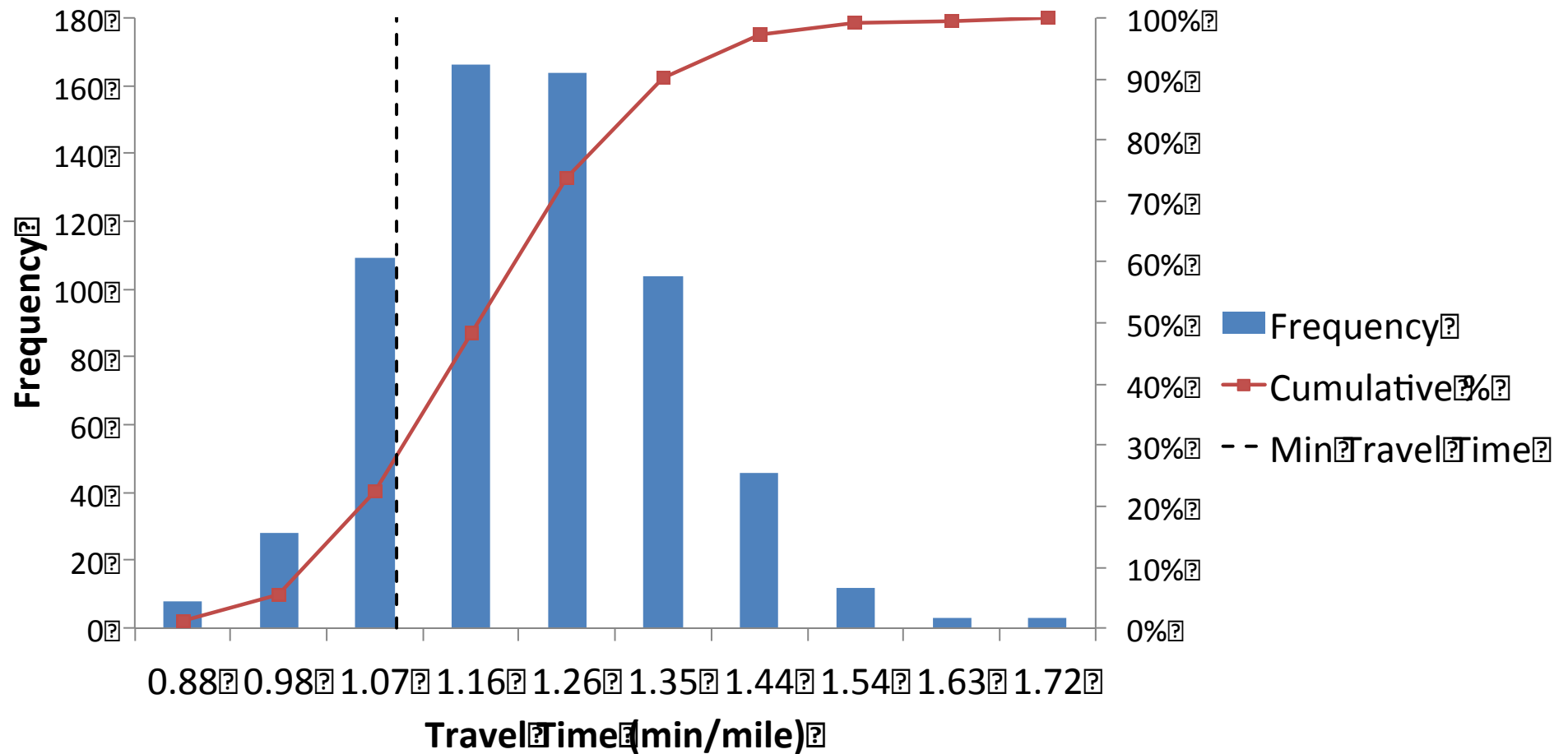
Travel Times – US 20



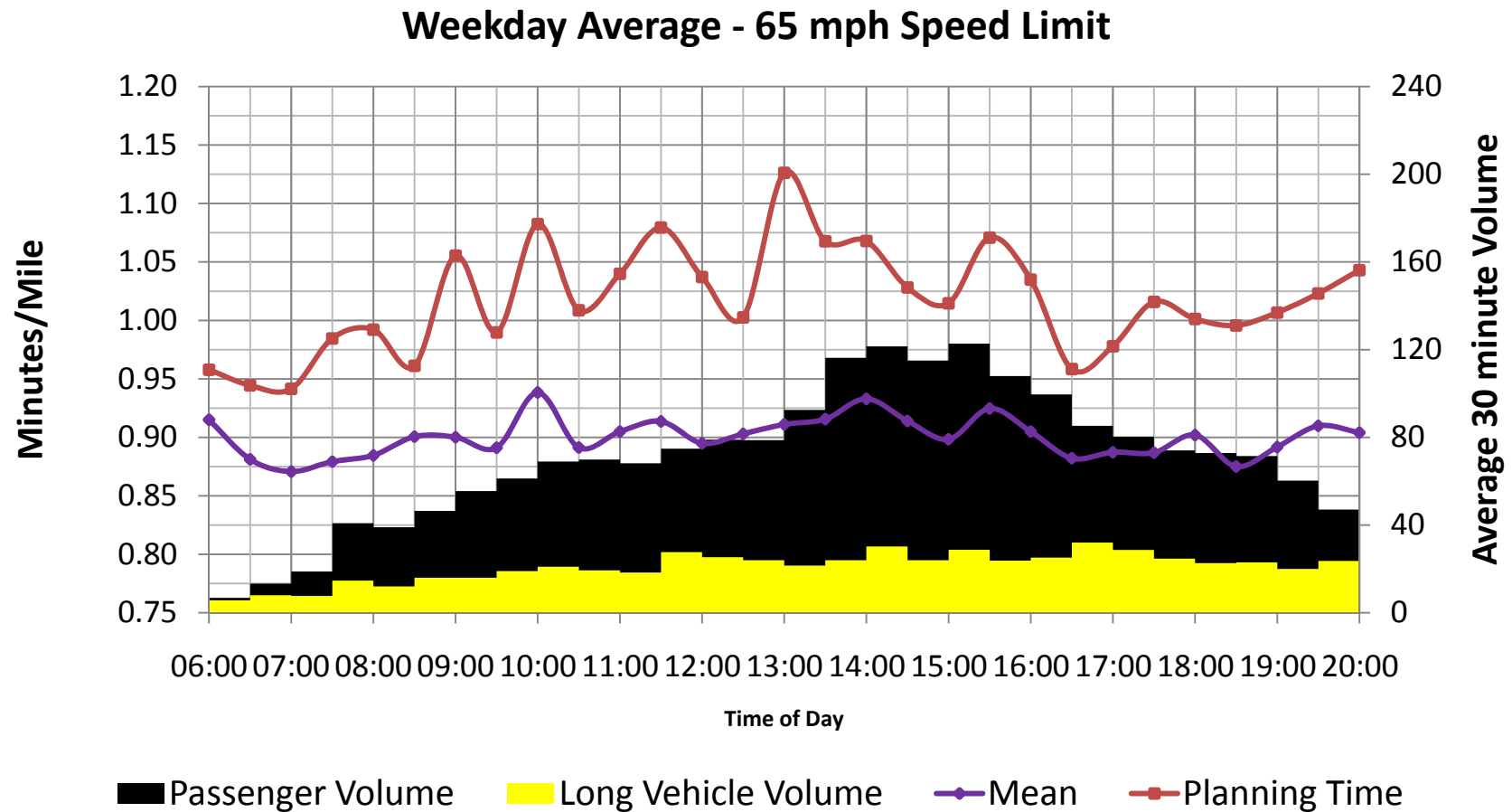
Weekday Volume – SH 55



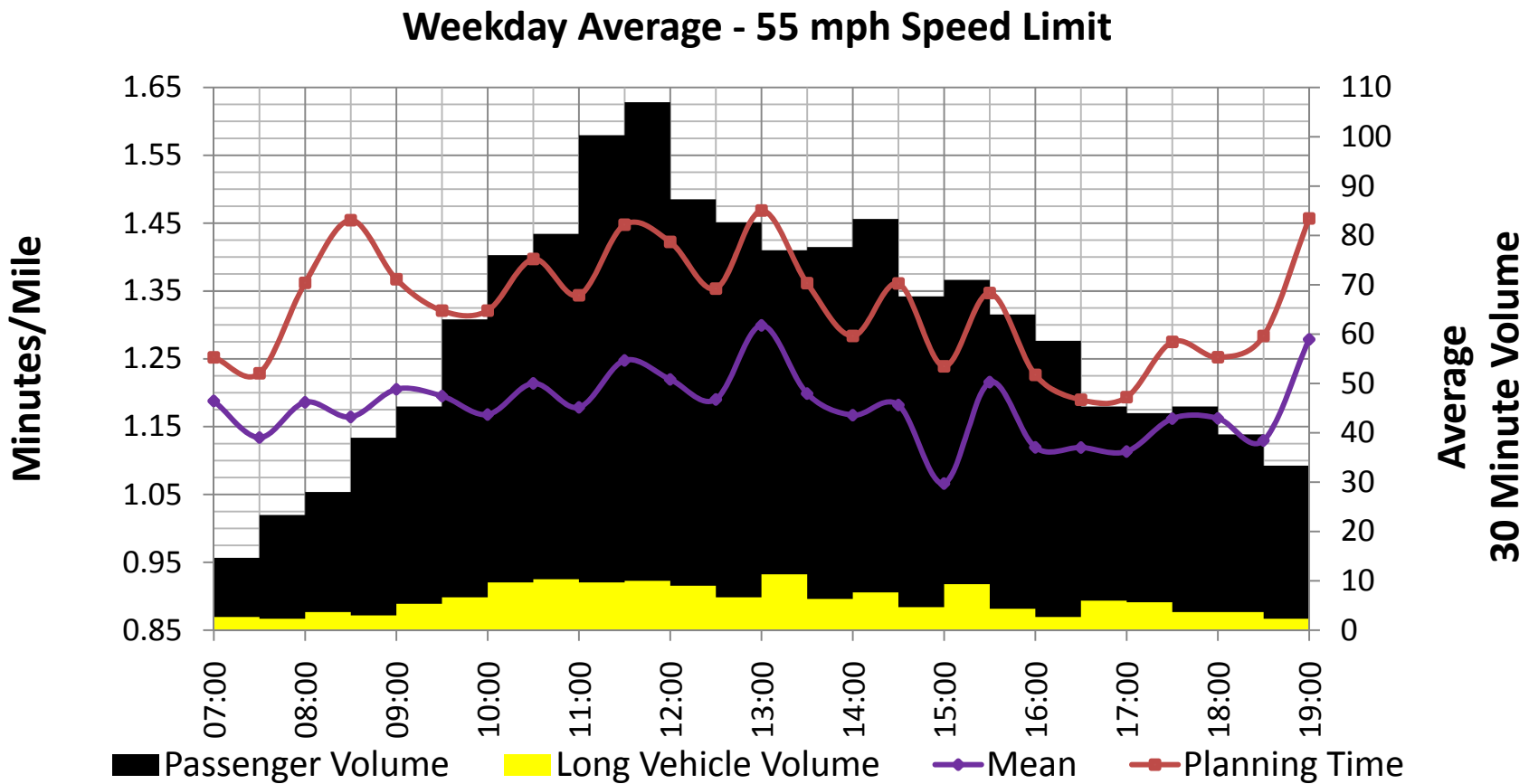
Travel Times – SH 55



Congestion Measures – US 20

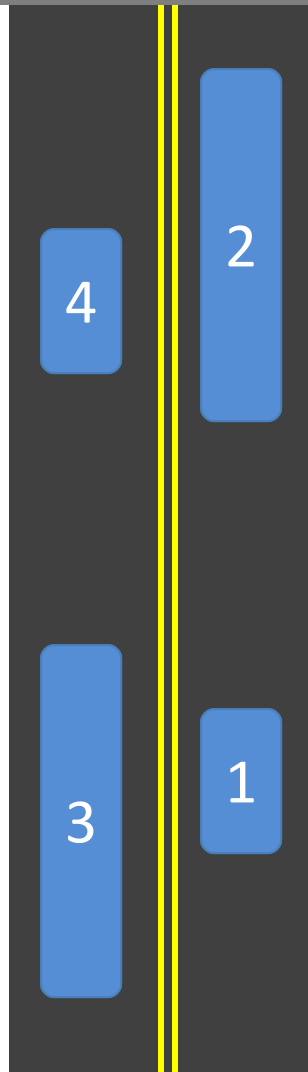


Congestion Measures – SH 55



Traffic Model – US 20 (DC)

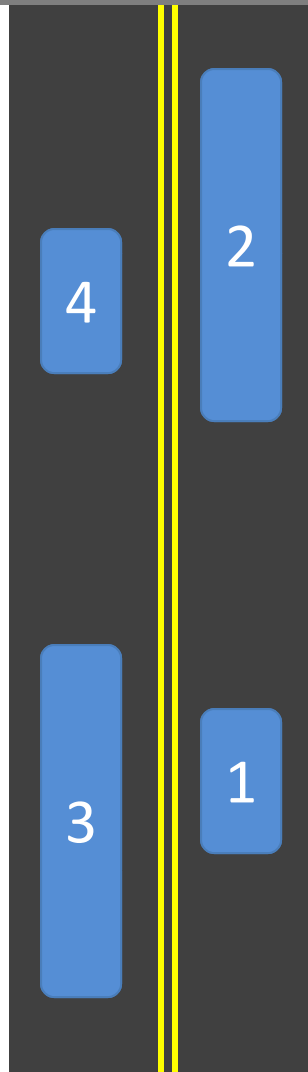
Model attempts fits to PT with 4 variables



- **None** of the 4 variables were significant predictors of PT
- Likely reasons:
 - Volumes are too low
 - PT variations are minimal
- Using data from nearby Automated Traffic Recorders can give misleading results

Traffic Model – SH 55 (AB)

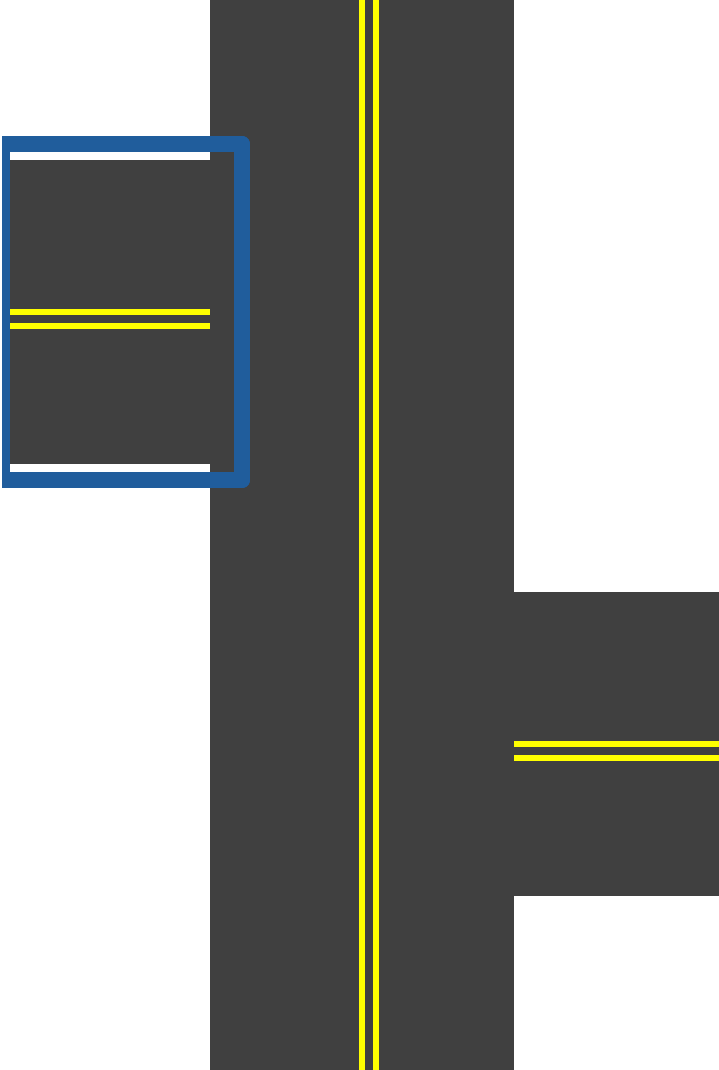
Model attempts fits to Congestion Measures with 4 variables



- Largest predictor of MT is **1** (cars on your side), but explains only 16.4%
- Largest predictor of PT is **2** (large vehicles on your side), but only 6.5%
- So there must be other more influential factors

Geometric Model – US 20

8 Geometric Variables

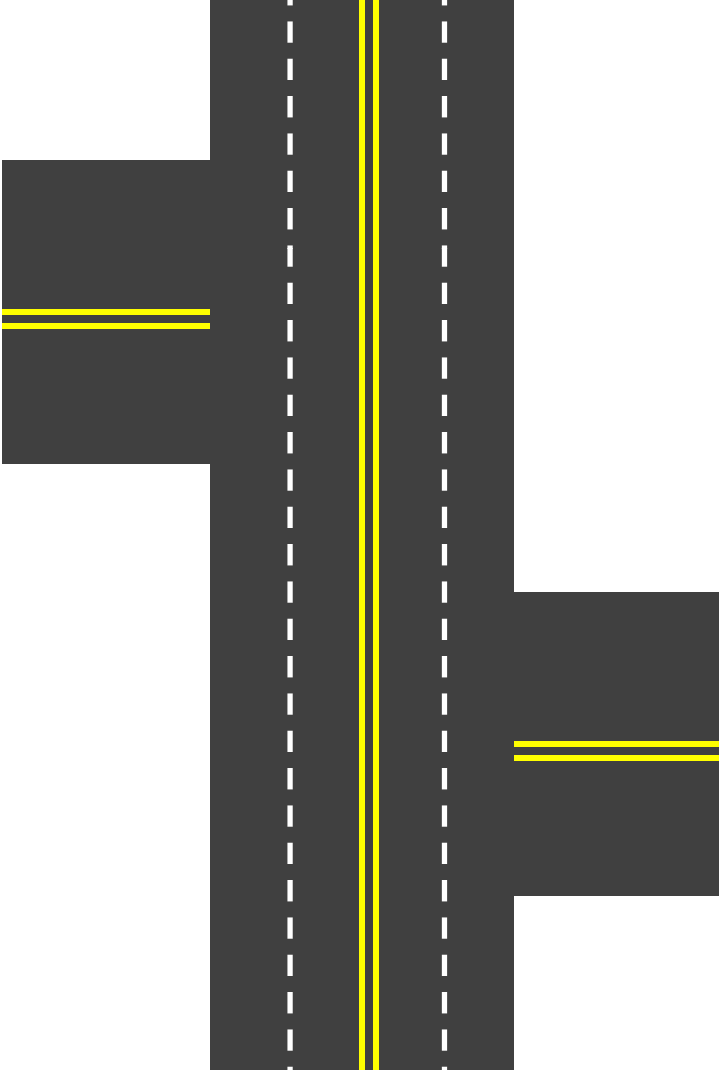
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- 3 Grade Variables
 - 2 Curve Variables (# right, # left)
 - # of right access points
 - # of left access points
 - Presence of extra lane

Results

- MT **89%** inversely dependent on # of left access points
- PT **96%** inversely dependent on # of left access points
- Interaction of Extra lane and left access points

Geometric Model – SH 55

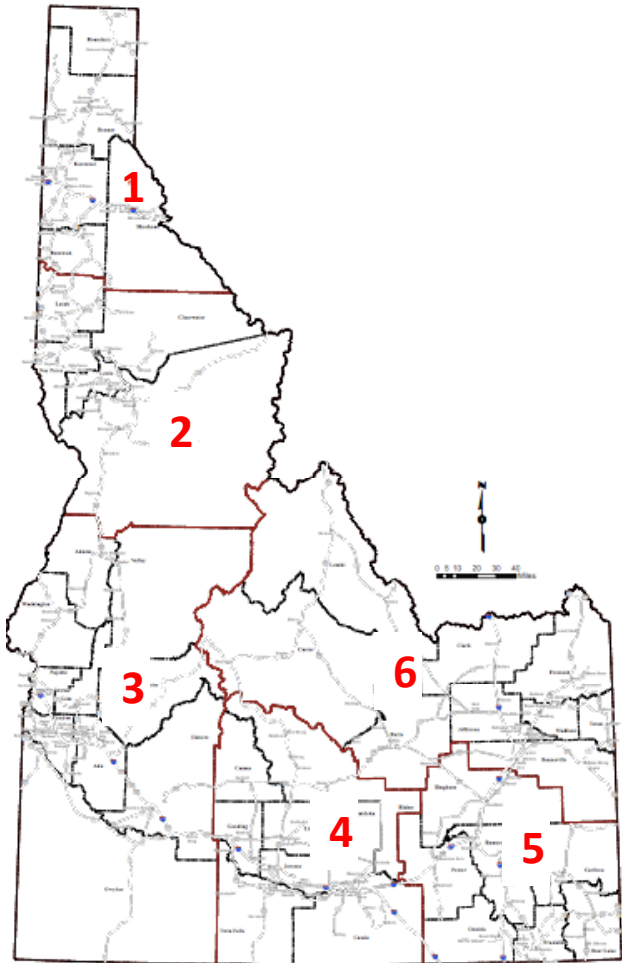
8 Geometric Variables

- 
- 3 Grade Variables
 - 2 Curve Variables (# right, # left)
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 - Presence of extra lane

Results

- PT **75%** dependent on extra lane
- BI **86%** dependent on extra lane
- Both PT and BI are reduced

Geometric Model – Statewide



Results

- MT **83%** dependent on speed limits and # of right access points
- 60 mph and 65 mph **reduced** MT
- # of right access points **increased** MT but the increase was very small
- 2 segments on US89: variable speed limits
- 6 segments: 60 mph
- 14 segments: 65 mph & 55 mph

Take Aways

Thorough modeling of congestion sources allows the state to make more **quantitative decisions** on highway **design improvements**.

Current volumes on Idaho rural roads have less effect on travel times relative to **geometric characteristics and speed limits**

Portable **Bluetooth** readers are an **effective tool** to collect travel time data on rural roads

Volume data must be taken **in the study segment** for accurate modeling.

Acknowledgements

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