



1

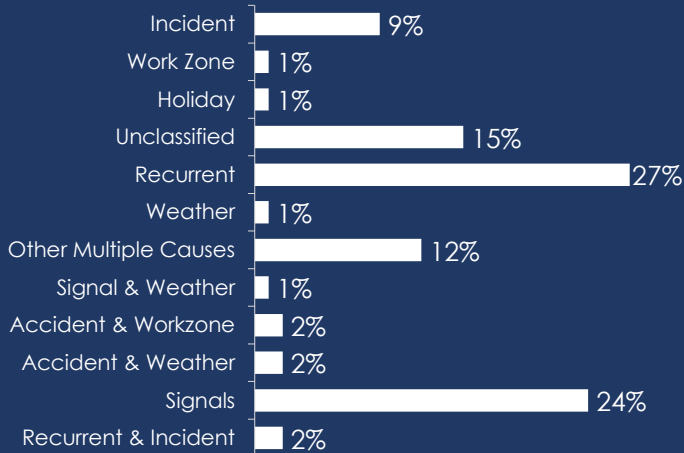
## Congestion Management Process



1. Develop Regional Objectives
2. Define CMP Network
3. Develop Multimodal Performance Measures
4. Collect Data / Monitor System Performance
5. Analyze Congestion Problems and Needs
6. Identify and Assess Strategies
7. Program and Implement Strategies
8. Evaluate Strategy Effectiveness

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# 2019 Congestion Causes for the National Highway System in Southern Nevada



**\$231.29 M**

User Delay Cost (79.0% of NV)

**8.84 M**

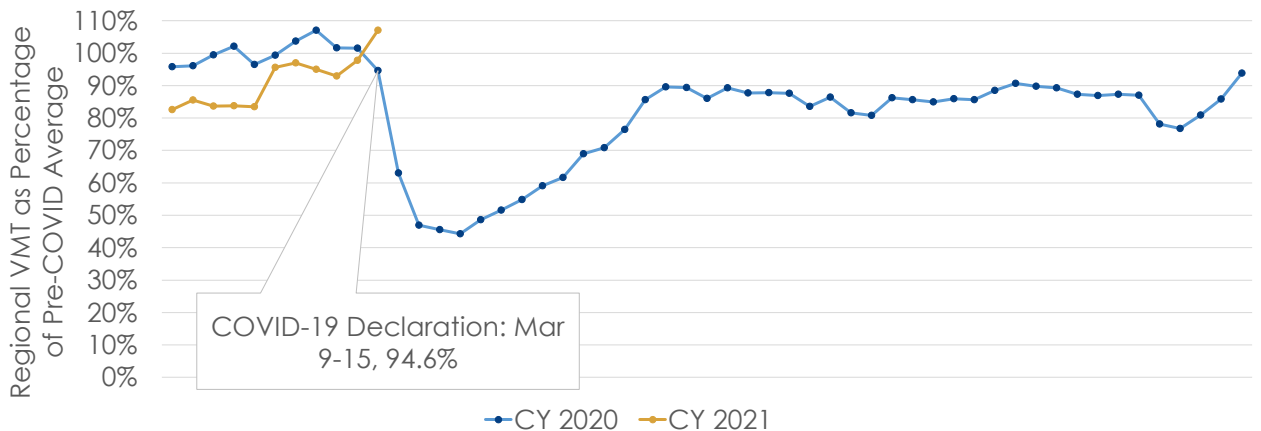
Vehicle Hours of Delay

Source: University of Maryland CATT Lab

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# Pandemic Impact on VMT

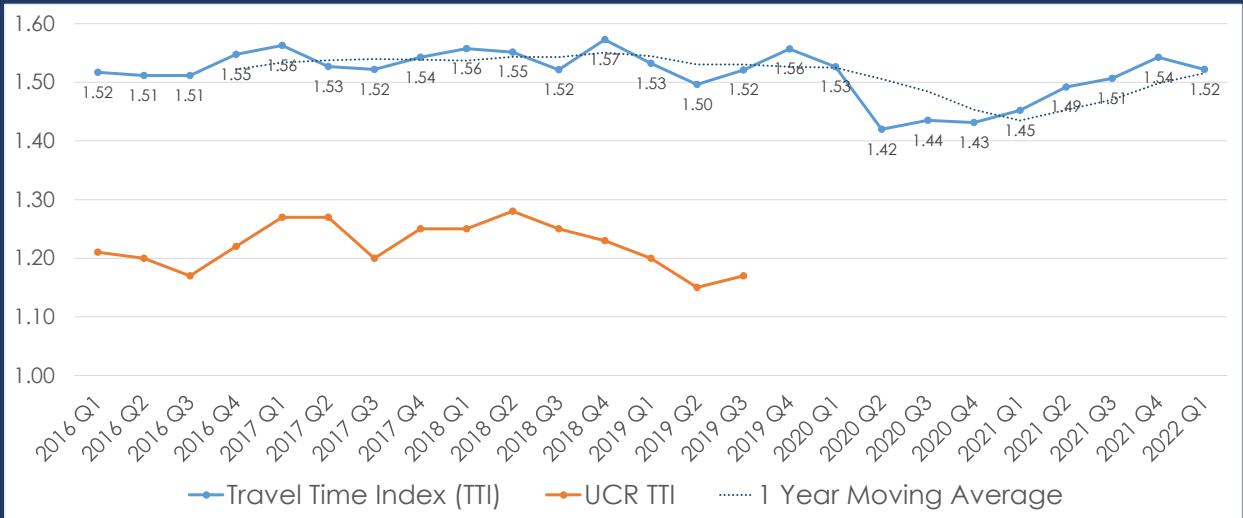
Total Regional Passenger Vehicle Miles (VMT)  
(Seasonally-Adjusted)



Source: INRIX Trip Trends

4

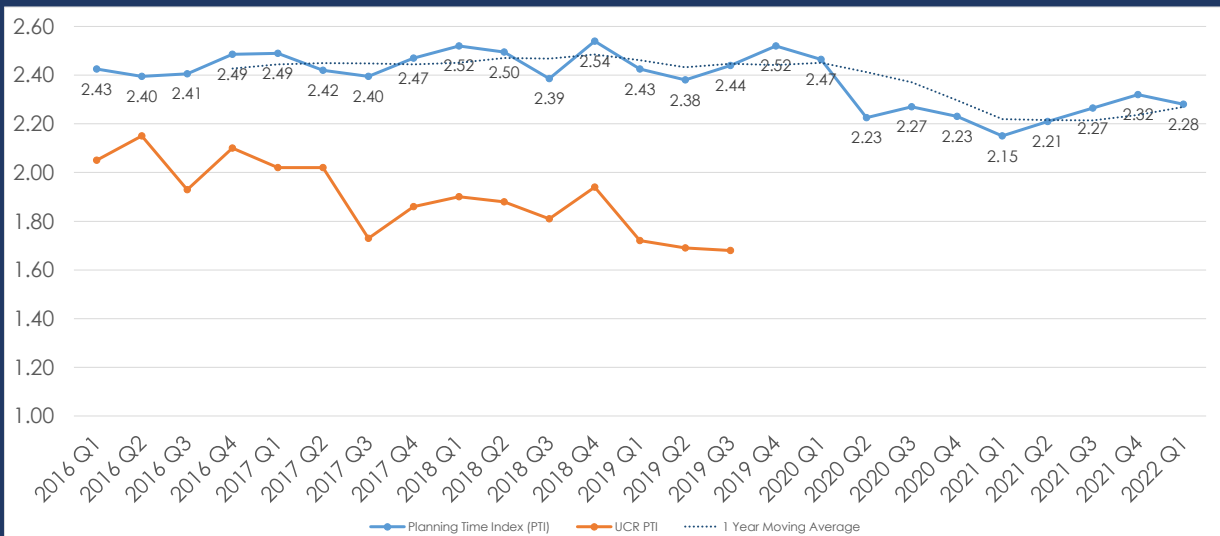
## Typical Congestion Trend (Peak vs Off-peak)



Source: [Federal Highway Administration Urban Congestion Report](#) / RITIS

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## Unreliability Trend (95% Peak vs Off-peak)



Source: [Federal Highway Administration Urban Congestion Report](#) / RITIS

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# Congestion Management Strategies



Tier 01

Strategies to Reduce Trips or Vehicle Miles Traveled



Tier 02

Strategies to Shift Vehicle Trips to Other Modes



Tier 03

Strategies to Improve Roadway Operations

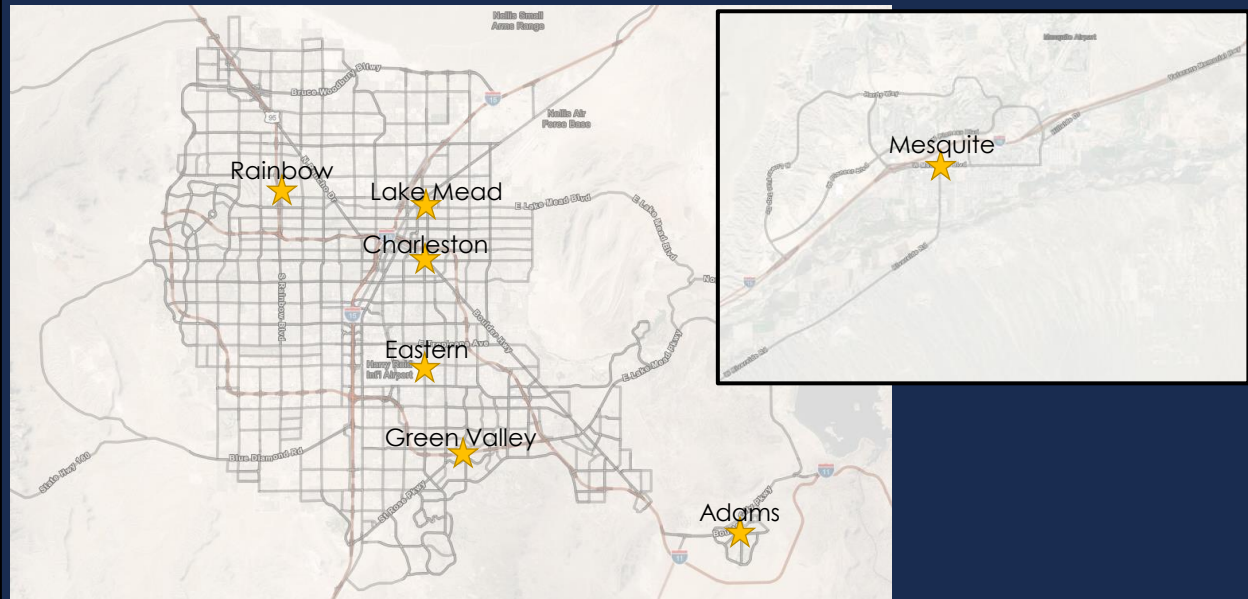


Tier 04

Strategies to Add Roadway Capacity

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## Arterial Analyses in Report



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# Congestion Performance Measure

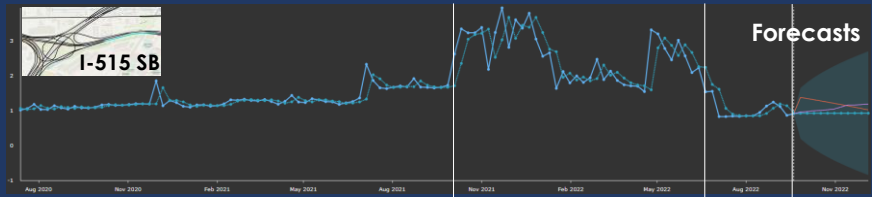
$$\text{Travel Time Index} = \text{Observed Travel Time} / \text{Free-flow Travel Time}$$

Interrupted Flow †

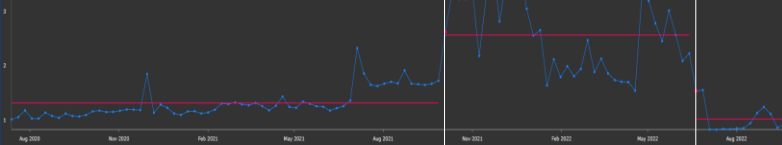
- LOS A = 0.00 - 1.25
- LOS B = 1.25 - 1.49
- LOS C = 1.49 - 1.97
- LOS D = 1.97 - 2.50
- LOS E = 2.50 - 3.25
- LOS F = 3.25 - ∞

Uninterrupted Flow ‡

- LOS A = 0.000 - 1.083
- LOS B = 1.083 - 1.300
- LOS C = 1.300 - 1.444
- LOS D = 1.444 - 1.625
- LOS E = 1.625 - 1.857
- LOS F = 1.857 - ∞



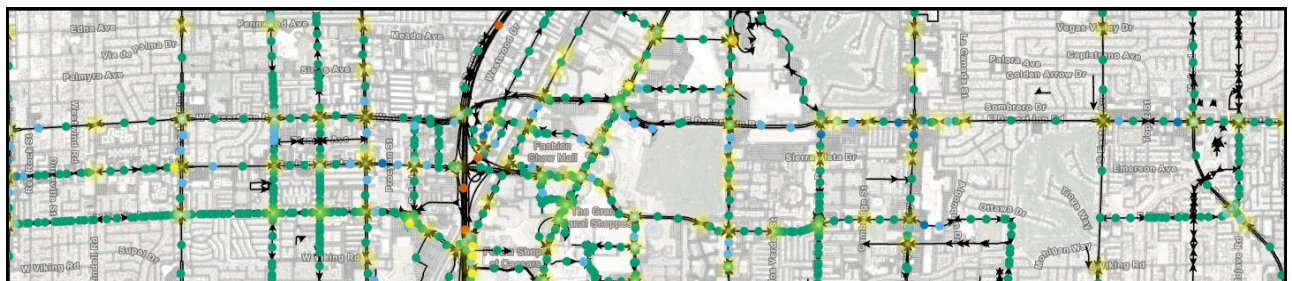
Change Point Detection: Mean Shift



†Interrupted Flow (Highway Capacity Manual, 6th Ed.): Roadways with traffic signals and stop signs.

‡Uninterrupted Flow (SHRP 2 L08): Roadways with no fixed causes of delay external to the traffic stream.

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## Congestion Patterns Dashboard Demo:

[LINK](#)



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