



# Variable Speed Limit System (VSL)

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# Variable Speed Limit System (VSLS)

## Rural Highway Safety and Speed Review (2014)

- Highway 99: Sea to Sky Hwy
- Highway 5: Coquihalla Hwy
- Highway 1: Revelstoke Area

## Fraser Valley Systems (Live Nov. 2020)

- Highway 3
- Highway 1

# Initial Rural Highway System



Highway 99: Sea to Sky Hwy

Highway 5: Coquihalla Hwy

Highway 1: Revelstoke Area

## Selection Criteria

- More than one climatic zone
- Significant changes in elevation
- Maximum speed limits

**VSLs will improve safety  
in adverse weather conditions**

# Fraser Valley Systems



## Highway 1

- Road Weather (Heavy Rain) and Traffic
- 4 lane cross section

## Highway 3

- Rural System

# Jurisdictional Reviews

- Global Jurisdictional Review (2014 and 2017)
- Study Concept of Operations
- Assess Ministry's existing systems
- Speed harmonization (Urban Areas - 2017)
  - Reduce the risk to motorists
  - Predictable travel times

# Jurisdictional Review

Aspect	WSDOT	ODOT	VDOT	Highways England	B.C. MoTI
Location	Washington, USA	Oregon, USA	Virginia, USA	Great Britain, UK	BC, Canada
Deployment	I5, I90	OR217	I66	M25, M42	Hwy 1, 5, 99
Description	Lanes: 1 - 4 Length: 7 miles	Lanes: 2 - 3 Length: 8 miles	Lanes: 2 - 3 Length: 12 miles	Lanes: 3 - 4 Length: 23km, 17 km	Lanes: 2 - 3 Length: 43km, 30km, 41km
Deployment Types	Interstate highway VSLs: Traffic responsive	Urban freeway VSLs: Weather & Traffic responsive	Interstate highway VSLs: Traffic responsive	Suburban freeway VSLs: Traffic responsive	Rural highway VSLs: Weather and Traffic responsive
Speed Limits	Regulatory	Advisory	Advisory	Regulatory	Regulatory

# Concept of Operations



## Road Weather Subsystem

- Pavement Condition (Grip Factor)
- Visibility

## Traffic Subsystem

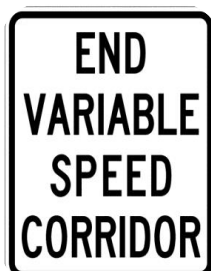
- 85th% Traffic Speed
- Traffic Density

## RTMC Operator Input

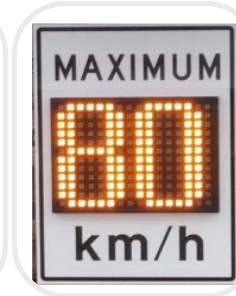
## Lowest Speed Selected

# Concept of Operations

## Supporting Signage



## Dynamic Message Signs



## Regulatory Hybrid LED Sign



## Flashing Beacon

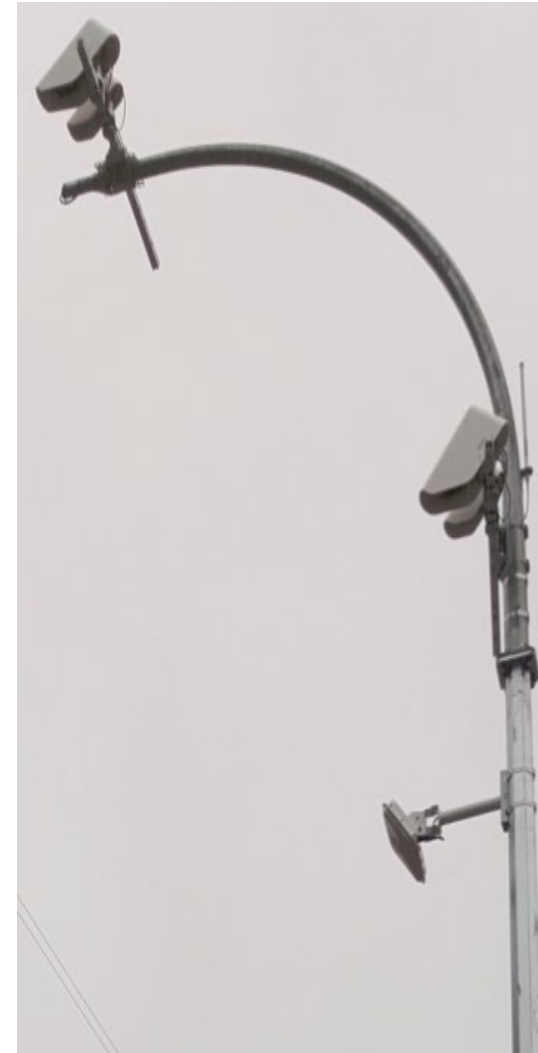
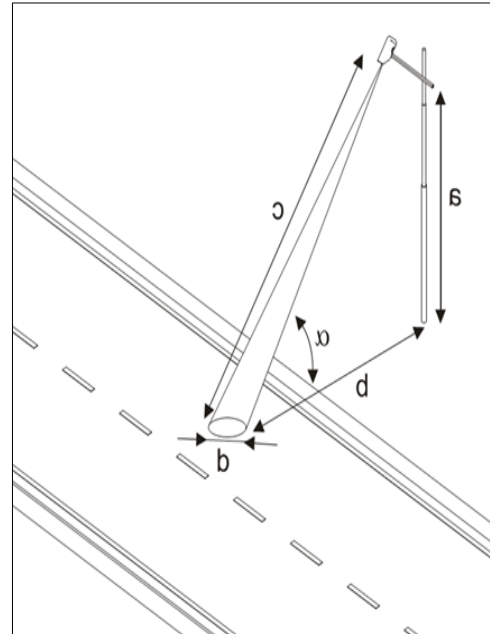


Spacing ~5km (Rural)  
Spacing ~1km (Urban)



# Road Weather Information

- Infrared Light
  - *Pavement Temperature*
  - *Pavement Condition*
- Grip Factor
- Visibility
- Both Directions of Travel
- Present Weather (2017)



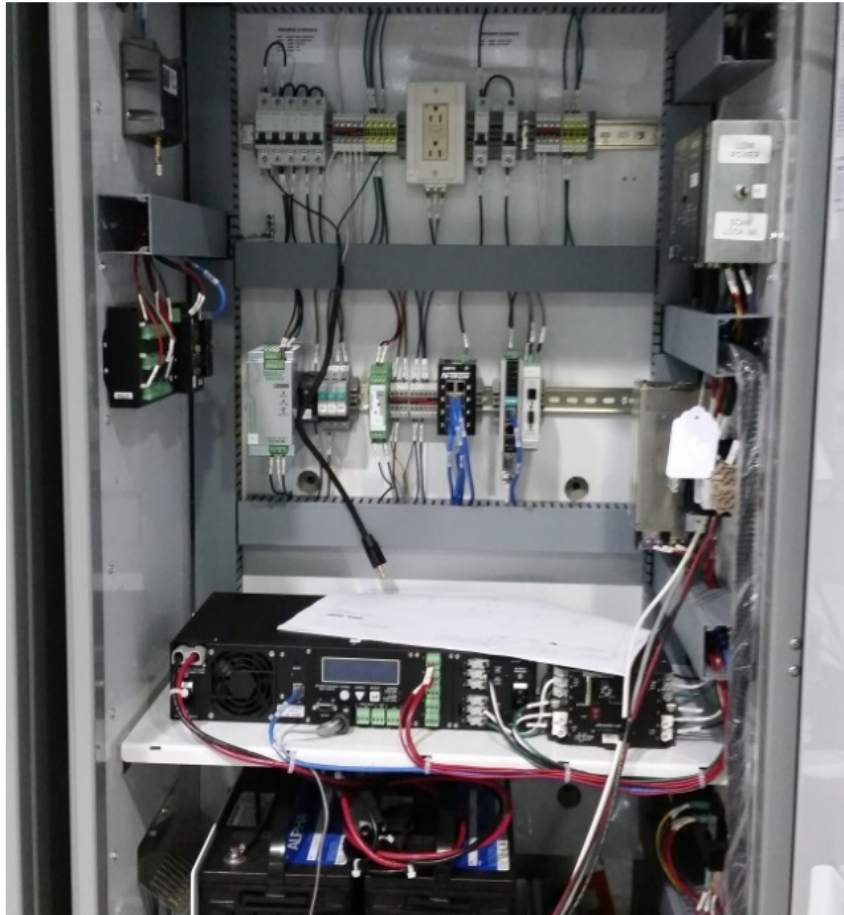
# Traffic Data

- Per-vehicle real-time data for VSLS logic
- Historical volume, speed, occupancy and classification by length and speed



# Field Control Cabinets

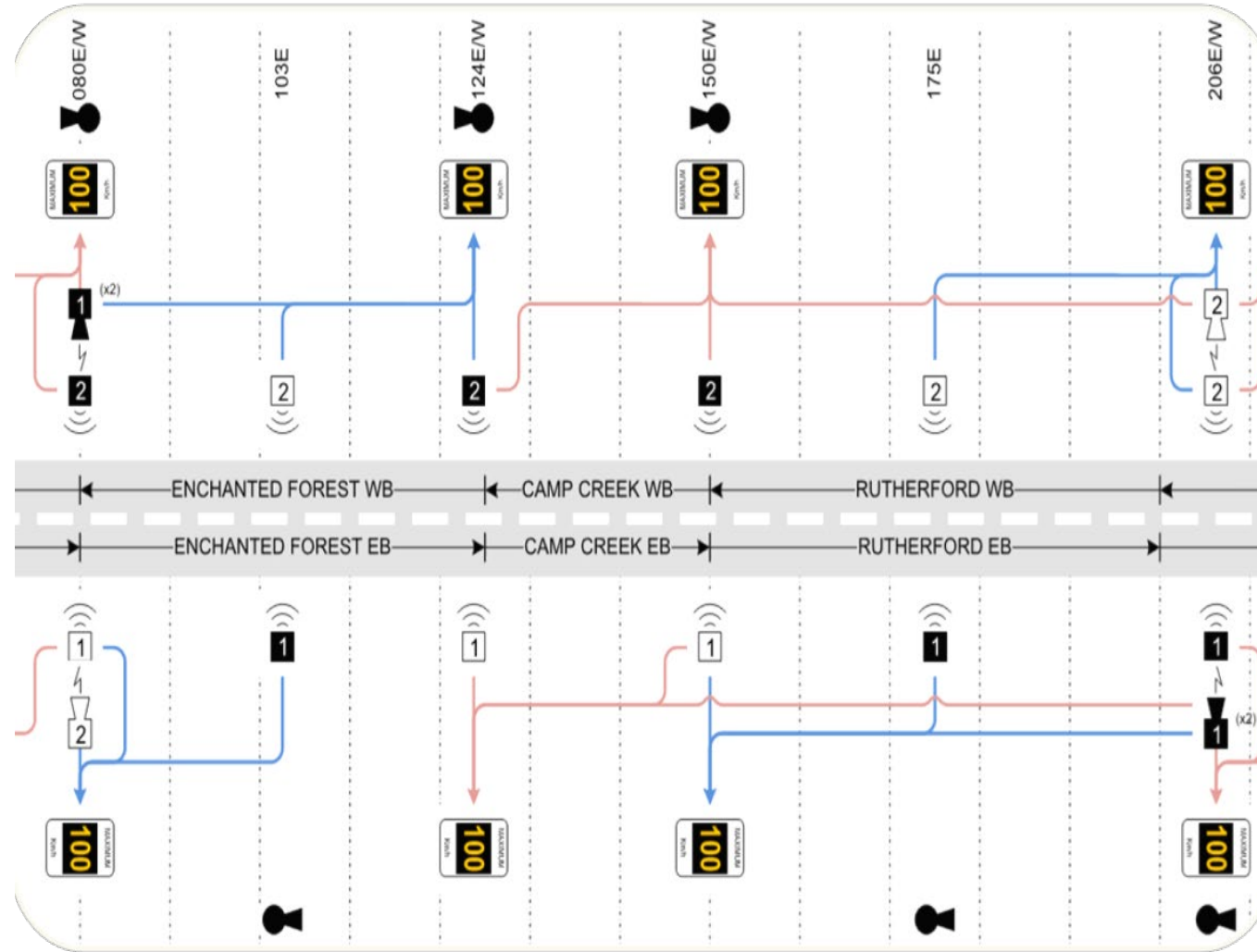
- Power Distribution
- Cellular Modem
- Data Logger
- Sign Control
- UPS



# Device Placement - Rural



# Device Placement – Device Grouping



# ATMS – Rural Deployment

HWY 99 - SEA-TO-SKY

VLS Speed Posting Operator Acceptance: Required  
DMS Message Posting Operator Acceptance: Required

[View Detail](#)

Testable Corridor

VLS Speed Posting Operator Acceptance: Required  
DMS Message Posting Operator Acceptance: Required


[View Detail](#)

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**Testable Corridor > Test Segment**


**Speeds**

ACCEPTED




⇌

PROPOSED



**Operator Speed**

OPERATOR




**Recommended mode.**

Expires in 0 hours 22 minutes.

[+ Edit Speed](#)

[View Extra Information](#)

**Currently Posted Speed Bitmap**



Last Updated: Feb 26, 2016 9:59:56 AM

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**Subsystem Data**


**Road / Weather: 100 km/h**

Location	Grip	Visibility (m)	Air Temp (C)	Surface Temp (C)	Reported Date
Testable RDP	0.81	2,200	2.7	3.0	Feb-01 16:07
Testable RDP	0.81	2,200	2.7	3.0	Feb-01 16:07

**Traffic: 75 km/h**

Location	Speed 85th (km/h)	Volume	Occupancy	Reported Date
Testable RDP	85	15	50.00	Feb-01 16:07
Testable RDP	75	12	60.00	Feb-01 16:07

**Cameras** [Select Camera](#)



DriveBC.ca Feb 1, 2016 3:30:06 PM

# Jurisdictional Review

- Fraser Valley System
- Global Jurisdictional Review (2017)
- Assess Ministry's existing system
- Speed harmonization
  - Reduce the risk to motorists
  - Predictable travel times

# Jurisdictional Review - Signage

VSL Signage	WSDOT	ODOT	VDOT	Highways England	B.C. MoTI
Sign Dimensions (mm)	1524 x 1524	Not Available	1219 x 1219	Not Available	1219 x 900
Placement	Above each lane	Above each lane	Above each lane	Above each lane	Single sign
Structure	Gantry	Gantry/ Overpass	Gantry	Gantry	Davit Pole
Spacing (m)	533 – 800	1600	800	500 - 1000	2000 - 7000



# VSLS in Other Jurisdictions



WASHINGTON STATE DOT

# VSLS in Other Jurisdictions

## OREGON DOT



# VSLS in Other Jurisdictions

## VIRGINIA DOT



# Fraser Valley System (Live Nov. 2020)

- Changes Considered for the Fraser Valley
- Dynamic Message Signs
- Sign size and placement
- Congestion - Occupancy threshold
- Speed smoothing / Cascading
- ATMS user interface
- Autonomous operation

# Dynamic Message Signs

- Reason for speed reduction not immediately apparent to motorist
- Greater compliance - complements the speed sign
- Prioritized messaging
- Strategic placement
  - Major interchanges
  - Gateway



Priority	Phase 1	Phase 2	Conditions
1	BLACK ICE		Black ice
2	ICY SECTIONS	DENSE FOG	Ice, Fog
3	ICY SECTIONS		Ice
4	HEAVY SNOW	LOW VISIBILITY	Heavy snow, low visibility

# Sign Size & Placement

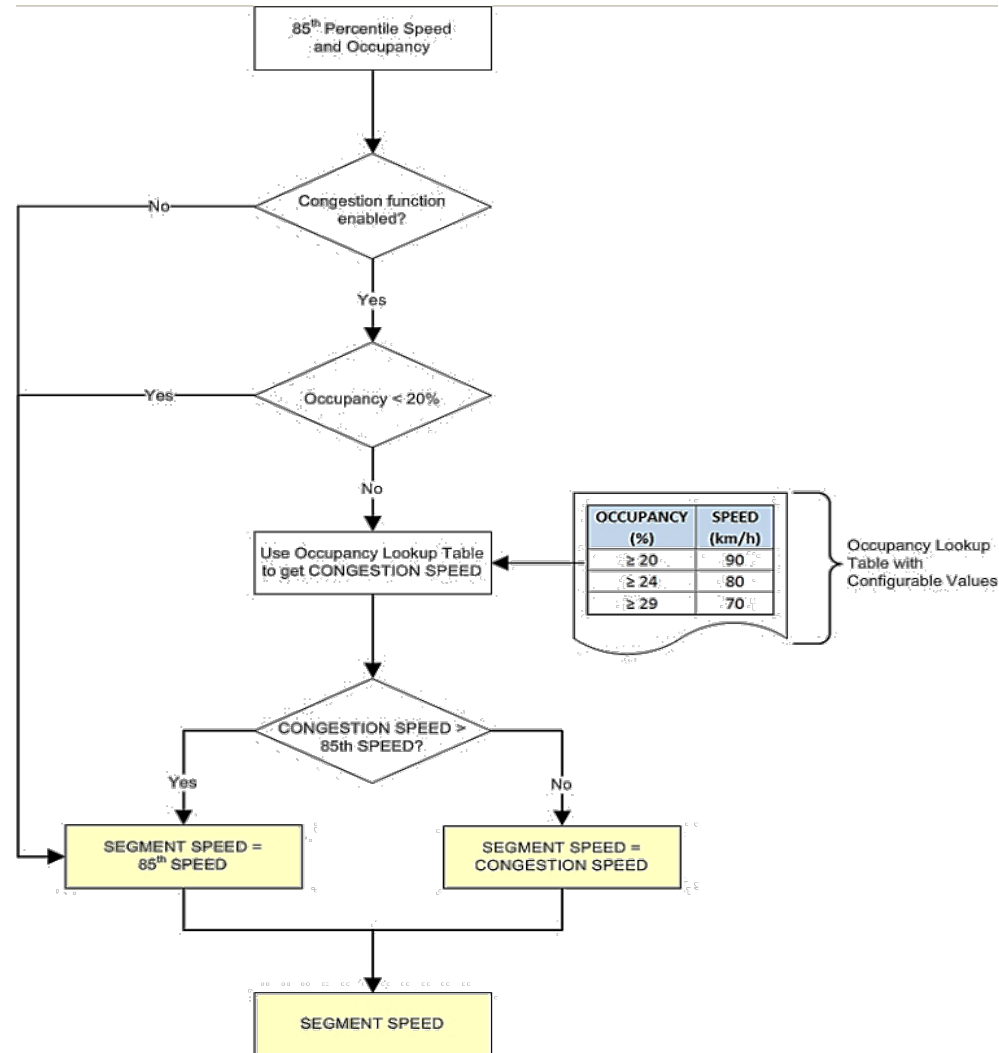
- Larger Sign
- Overhead
- Shoulder



# Signs FAT Testing



# Congestion Based





# Speed Smoothing

- Compact design
- 10 corridors
- Schematic views removed
- Text-based scrollable interface
- Higher density viewable on a single page

Hwy 99 (Sea-to-Sky)	Hwy 5 (Coquihalla)	Hwy 1 Trans-Canada	Hwy 3 (Fraser Valley)	Hwy 93
Hwy 45	Hwy 76	Hwy 32	Hwy 85	Hwy 12

<b>Highway 1 (Trans-Canada)</b> <small>VLSL Speed Posting Operator Acceptance: Not Required</small> <small>DMS Message Posting Operator Acceptance: Not Required</small>					<small>Congestion-based operation: Enabled</small> <small>Speed-smoothing operation: Disabled</small>					<input type="button" value="Select"/>		
Segment	Accepted	Proposed	Posted	Status	Co-located	Segment	Accepted	Proposed	Posted	Status	Co-located	RDP
Avoca Rd EB	90 M	60 W	90	OK	✓ DMS-99-000N OK	Avoca Rd WB	80 T	60 S	80	OK	⊘ DMS-99-000N Disabled	✓ ITS-99-000N OK
Taft Rd EB	70 W	60	Warn	None	None	Taft Rd WB	60 W	60	OK	None	⊘ DMS-99-300N Warn	✗ ITS-99-001N Battery
Enchanted Forest EB	B M	B	Error	✗ DMS-99-200N Error	None	Enchanted Forest WB	80 O	80	OK	None	⊘ DMS-99-300N Warn	✓ ITS-99-002N Error
Camp Creek EB	90 M	B	Disabled	None	None	Camp Creek WB	90 M	80	Error	None	None	✓ ITS-99-003N OK
Rutherford EB	80 T	60 S	80	OK	⊘ DMS-99-000N Disabled	Rutherford WB	90 M	90	OK	None	None	✓ ITS-99-004N OK
Three Valley EB	60 W	60	OK	None	None	Three Valley WB	90 M	60 W	90	OK	None	✗ ITS-99-005N Battery
Summit Lake EB	80 O	80	OK	None	⊘ DMS-99-300N Warn	Summit Lake WB	70 W	60	Warn	None	None	✗ ITS-99-006N Error
Clanwilliam EB	90 M	80	Error	None	None	Clanwilliam WB	B M	B	Error	None	None	✗ ITS-99-007N Error
Revelstoke-Boulder EB	90 M	90	OK	None	None	Revelstoke-Boulder WB	90 M	B	Disabled	None	None	✗ ITS-99-008N Error

Gateway DMS

✓ DMS-99-000N OK	⊘ DMS-99-300N Warn
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Segment	Accepted	Proposed	Posted	Status	Co-located	Segment	Accepted	Proposed	Posted	Status	Co-located	RDP
Alice Lake NB	90 M	60 W	90	OK	✓ DMS-99-000N OK	Alice Lake SB	80 T	60 S	80	OK	⊘ DMS-99-000N Disabled	✓ ITS-99-000N OK
Brohm Lake NB	70 W	60	Warn	None	None	Brohm Lake SB	60 W	60	OK	None	None	✗ ITS-99-001N Battery
Tantalus NB	B M	B	Error	✗ DMS-99-200N Error	None	Tantalus SB	80 O	80	OK	None	⊘ DMS-99-300N Warn	✓ ITS-99-002N Error

<b>Highway 99 (Sea-to-Sky)</b> <small>VLSL Speed Posting Operator Acceptance: Not Required</small> <small>DMS Message Posting Operator Acceptance: Not Required</small>					<small>Congestion-based operation: Enabled</small> <small>Speed-smoothing operation: Disabled</small>					<input type="button" value="Select"/>		
Segment	Accepted	Proposed	Posted	Status	Co-located	Segment	Accepted	Proposed	Posted	Status	Co-located	RDP
Alice Lake NB	90 M	60 W	90	OK	✓ DMS-99-000N OK	Alice Lake SB	80 T	60 S	80	OK	⊘ DMS-99-000N Disabled	✓ ITS-99-003N OK
Brohm Lake NB	70 W	60	Warn	None	None	Brohm Lake SB	60 W	60	OK	None	None	✓ ITS-99-004N OK
Tantalus NB	B M	B	Error	✗ DMS-99-200N Error	None	Tantalus SB	80 O	80	OK	None	None	✗ ITS-99-005N Battery

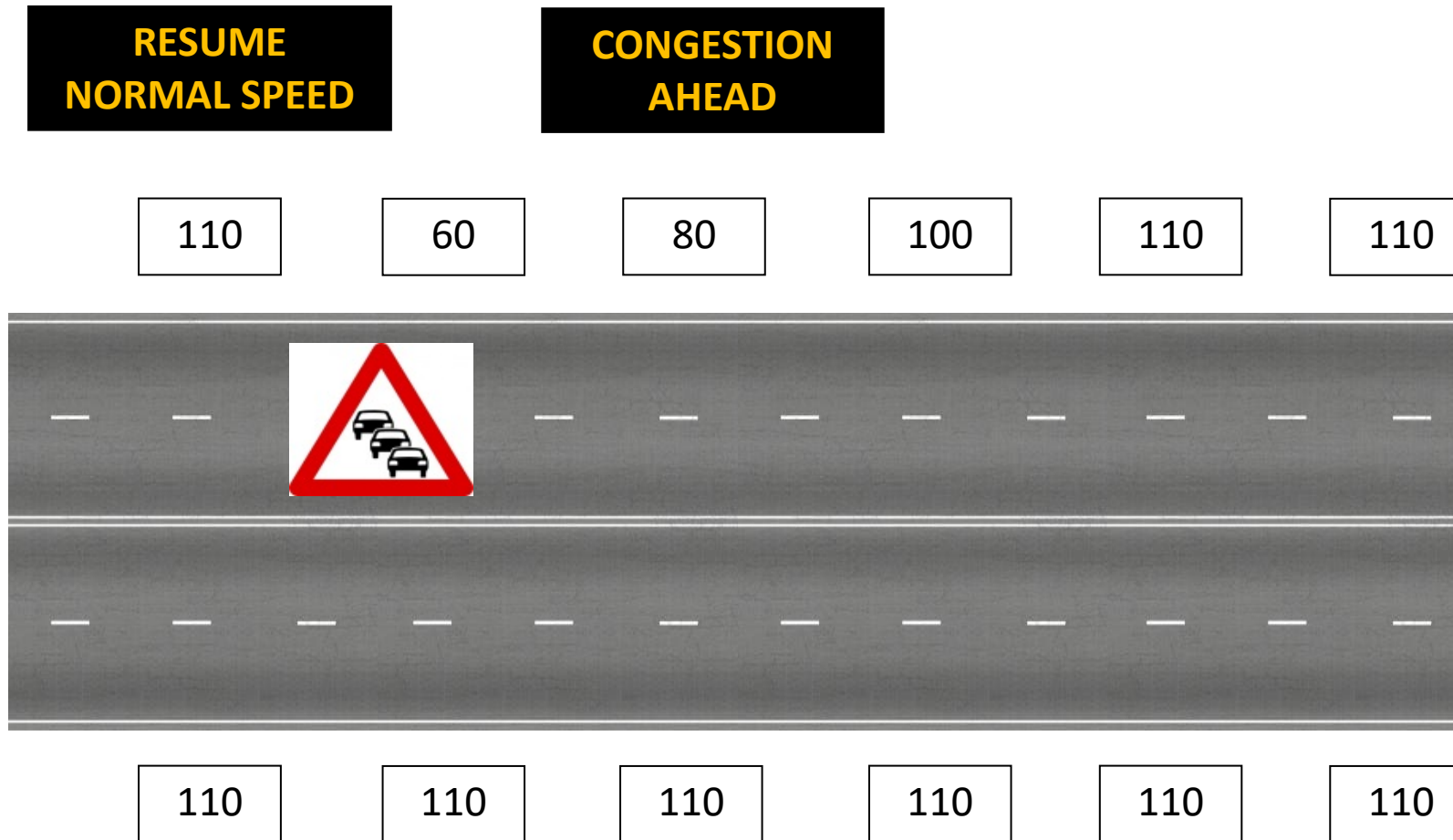
2021 Annual Meeting

6/24/2021

#ITE2021 – 2021 ITE VIRTUAL ANNUAL MEETING

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# Speed Smoothing



SLIPPERY SECTIONS  
REDUCED SPEED AHEAD

# Q&A

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