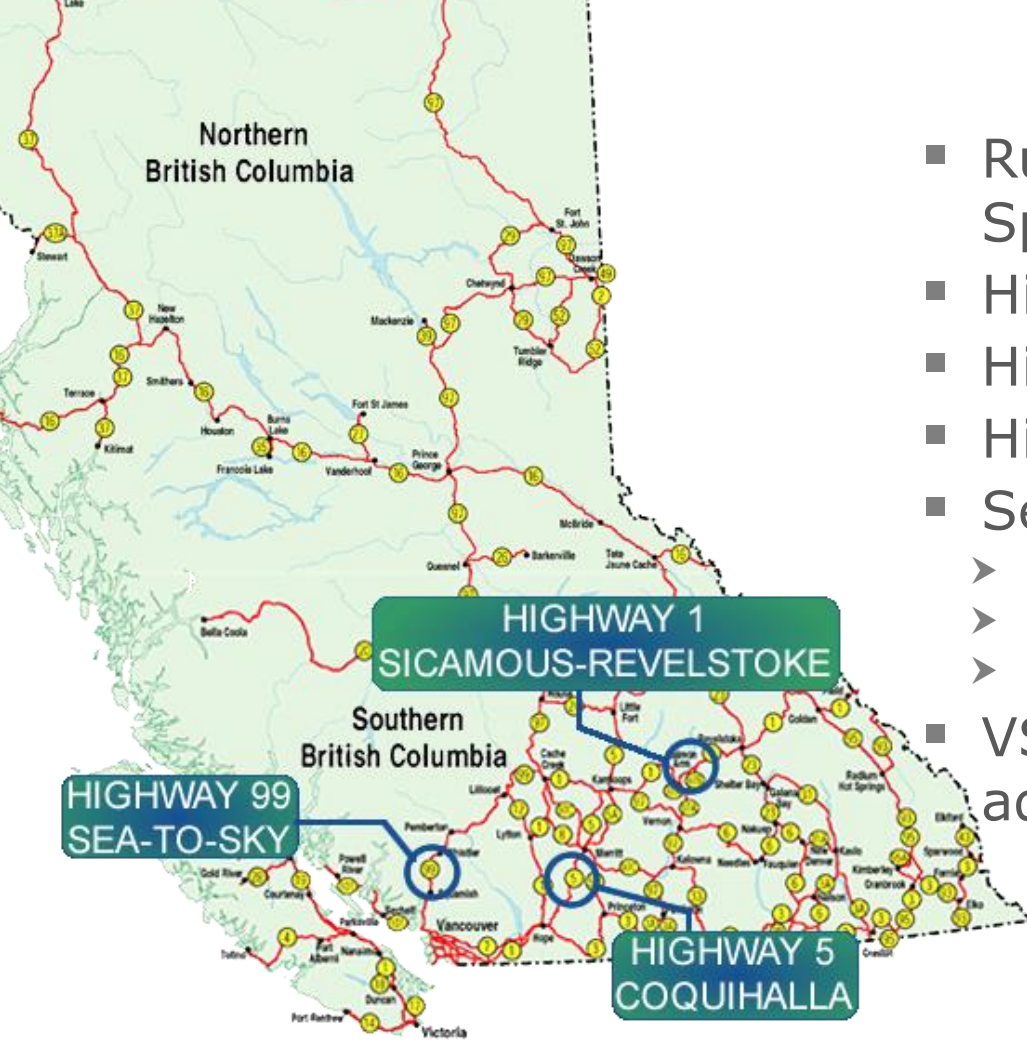


# **VARIABLE SPEED LIMIT SYSTEM**

**Cory Edgar P.Eng., PTOE, PE**  
Director & Senior Design Engineer  
PBX Engineering Ltd.

**COLLISION PREDICTION AND PREVENTION  
2019 CARSP CONFERENCE  
CALGARY, ALBERTA  
MAY 27, 2019**



- Rural Highway Safety and Speed Review (2014)
- 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
- VSLM will improve safety in adverse weather conditions

# Concept of Operations



## Road Weather Subsystem

- Pavement Condition (Grip Factor)
- Visibility



## Traffic Subsystem

- 85<sup>th</sup>% Traffic Speed
- Traffic Density



## Lowest Speed Selected



## RTMC Operator Input



→ Regulatory Hybrid LED Sign



→ Flashing Beacon



→ Spacing ~5km (Rural)



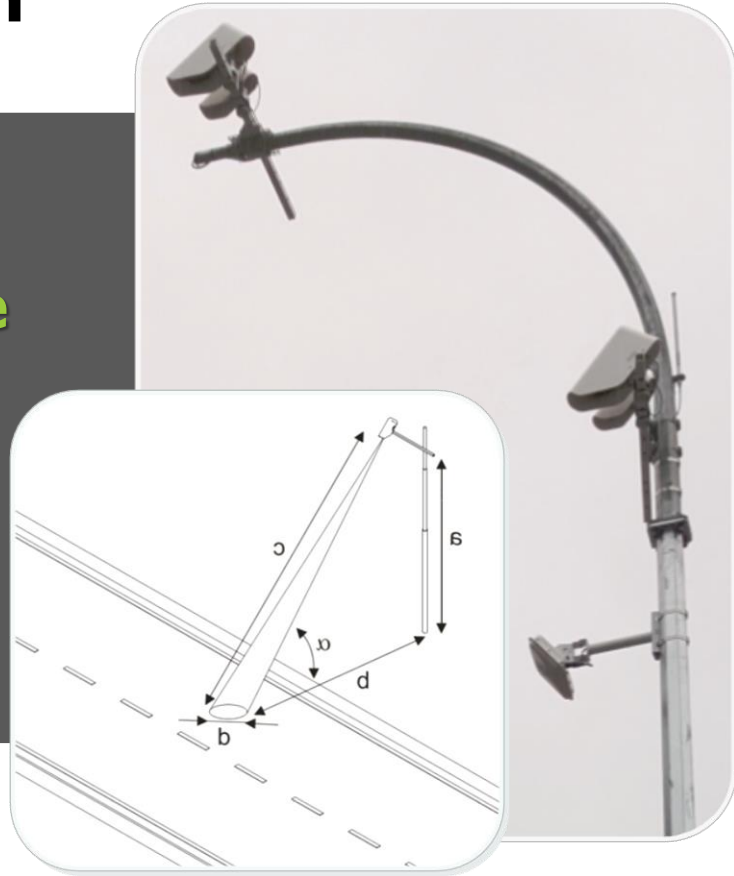
→ Sign Technology Review

**Variable Speed Limit System**

May 27<sup>th</sup>, 2019

# Road Weather Information

- Infrared Light
  - Pavement Temperature
  - Pavement Condition
- Grip Factor
- Visibility
- Both Directions of Travel



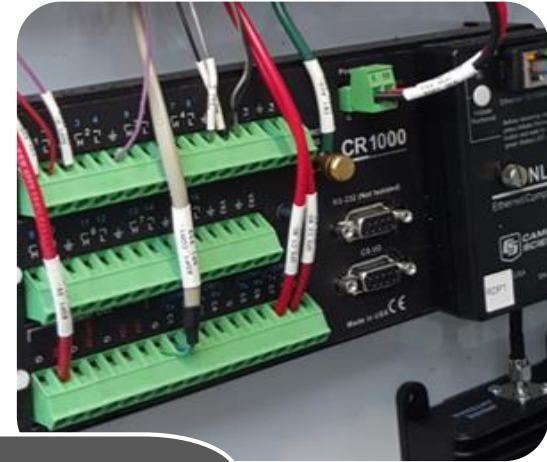
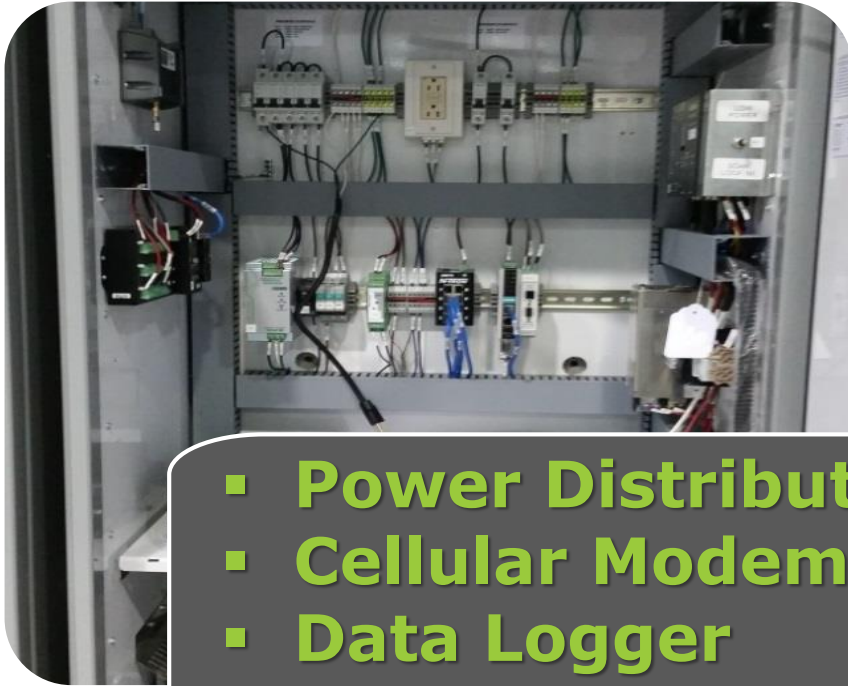
**Variable Speed Limit System**

May 27<sup>th</sup>, 2019



- **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

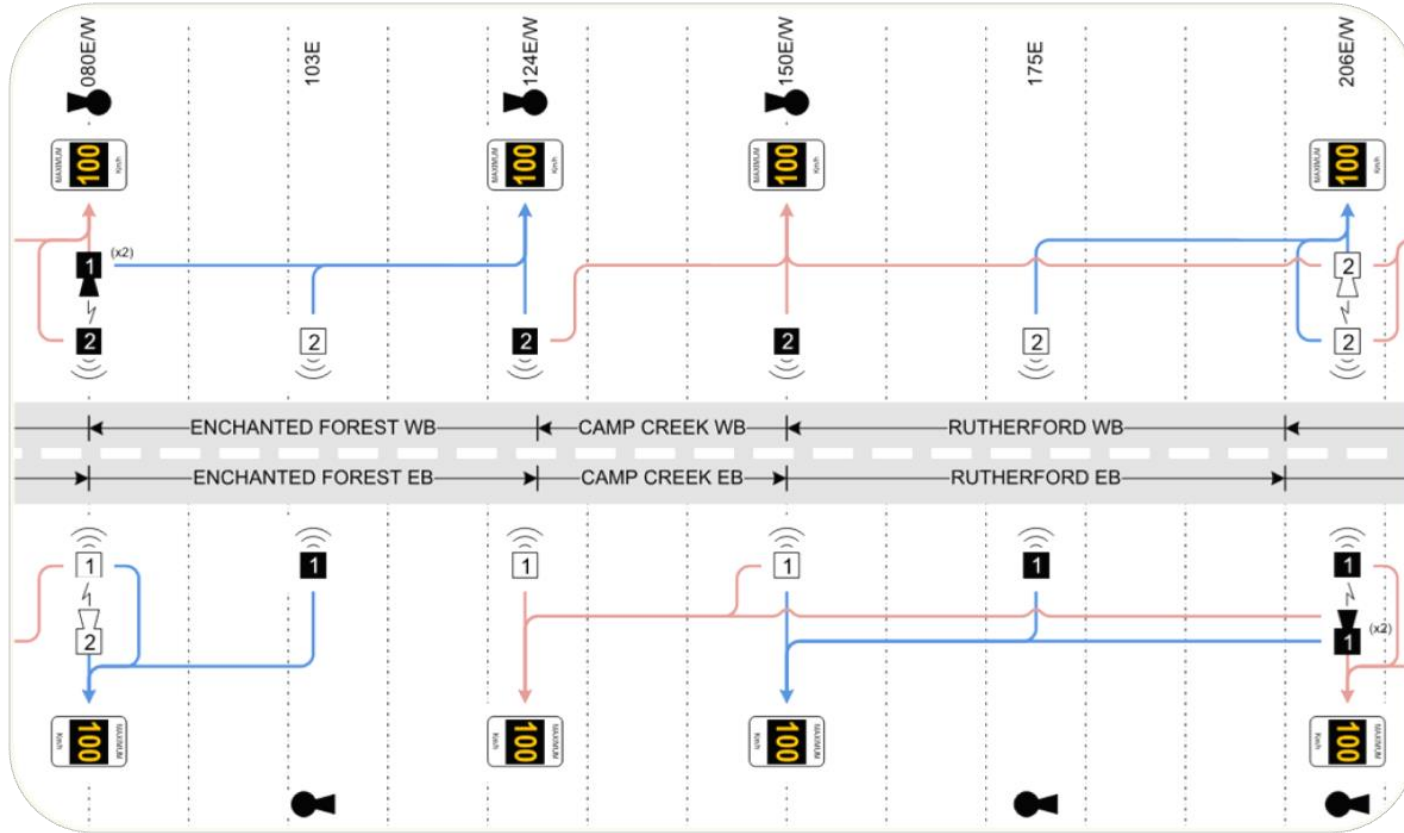
# Device Placement



**Variable Speed Limit System**

May 27<sup>th</sup>, 2019

# Device Placement – Device Grouping



Variable Speed Limit System

May 27<sup>th</sup>, 2019

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](#)

## Testable Corridor > Test Segment

Speeds

ACCEPTED

MAX

70

km/h

Traffic

↔

PROPOSED

MAX

60

km/h

Operator

Operator Speed

OPERATOR

MAX

60

km/h

**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

Subsystem Data

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

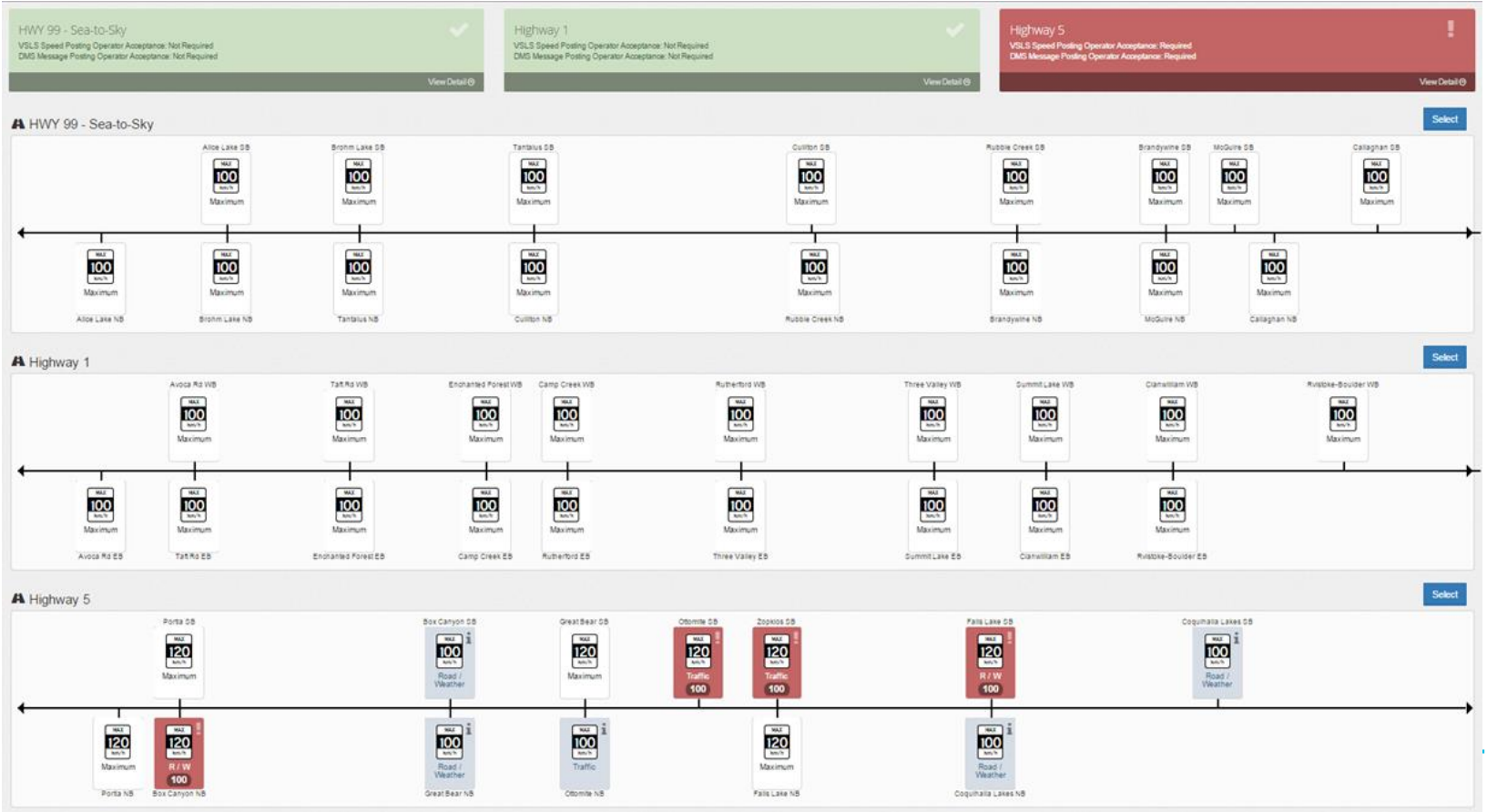
Location	Grip	Visibility (m)	Air Temp (C)	Surface Temp (C)	Reported Date
Testable RDP	0.81	2,200	2.7	3.0	Feb-01 16:07
Testable RDP	0.81	2,200	2.7	3.0	Feb-01 16:07

**Traffic:** 75 km/h

Location	Speed 85th (kmh)	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



# New Freeway System



- **Highway 1 – Fraser Valley**
  - Road Weather (Heavy Rain) and Traffic
  - 4 lane cross section

- Jurisdictional Review
- Assess Ministry's existing system
- Speed harmonization
  - reduce the risk to motorists
  - Predictable travel times
- Guide future design for Fraser Valley VSLs

# Jurisdictional Review

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

# 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	Hwy1, 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

# VSLs in Other Jurisdictions



Highways England

Variable Speed Limit System

May 27<sup>th</sup>, 2019

# Dynamic Message Signs

- Reason for speed reduction not immediately apparent to motorist
- Greater compliance
- Complements the speed sign
- “Resume Normal Speed Limit”
- Strategic placement
  - Major interchanges
  - Gateway

# Gradual Reduction

RESUME NORMAL  
SPEED

CONGESTION  
AHEAD

CONGESTION  
AHEAD

110

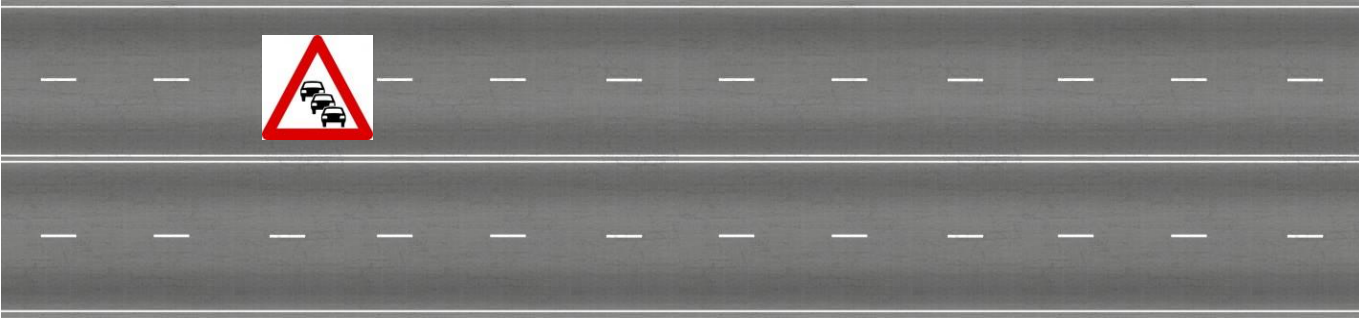
60

80

100

110

110



110

110

110

110

110

110

## ■ VSLs Signs

- Increased size
- Overhead and shoulder
- No individual lane control

## ■ DMS Sign

- Increased frequency
- Increased size
- Strategic placement
- Co-location?