# Organized Chain-Up and VSL

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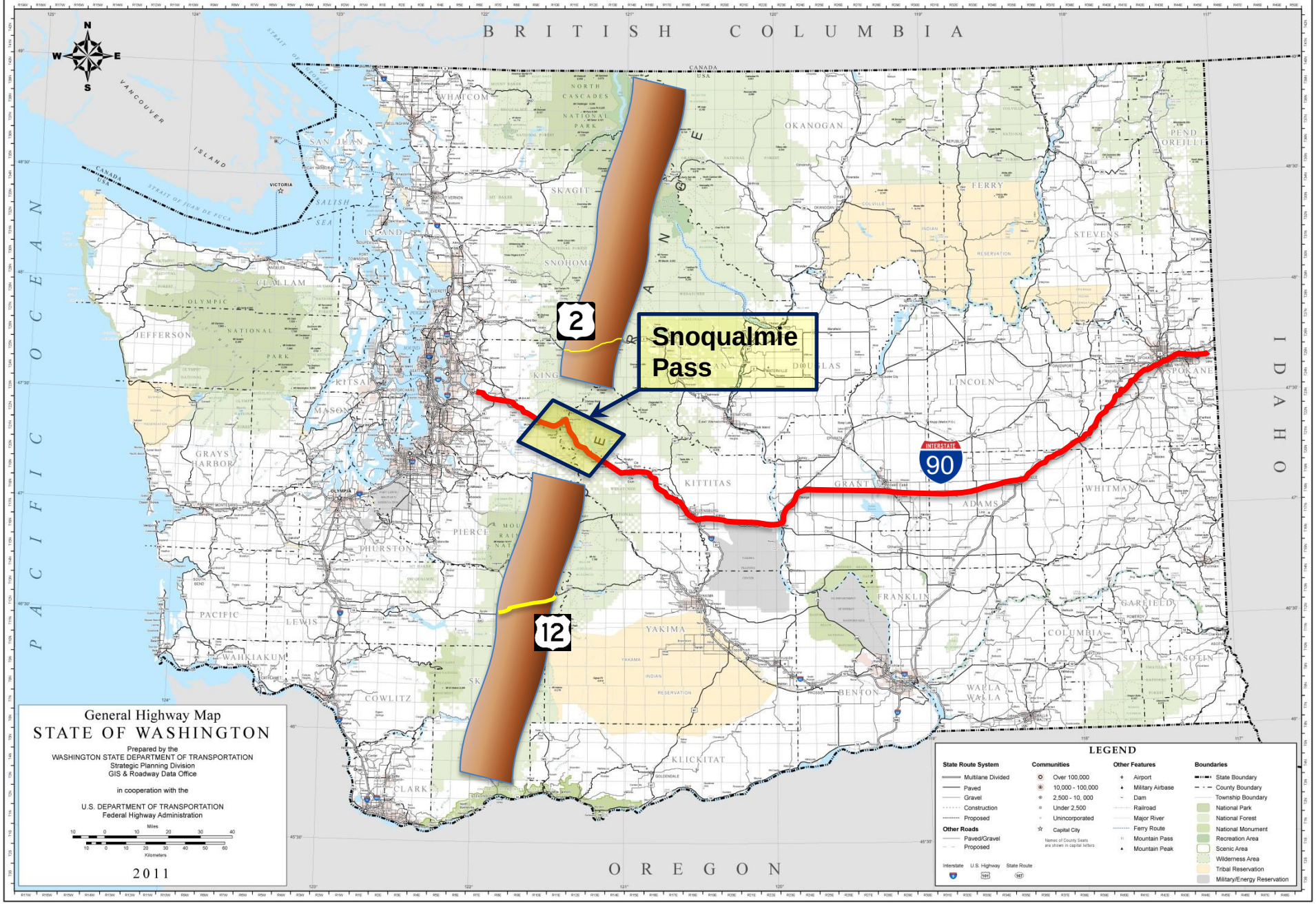
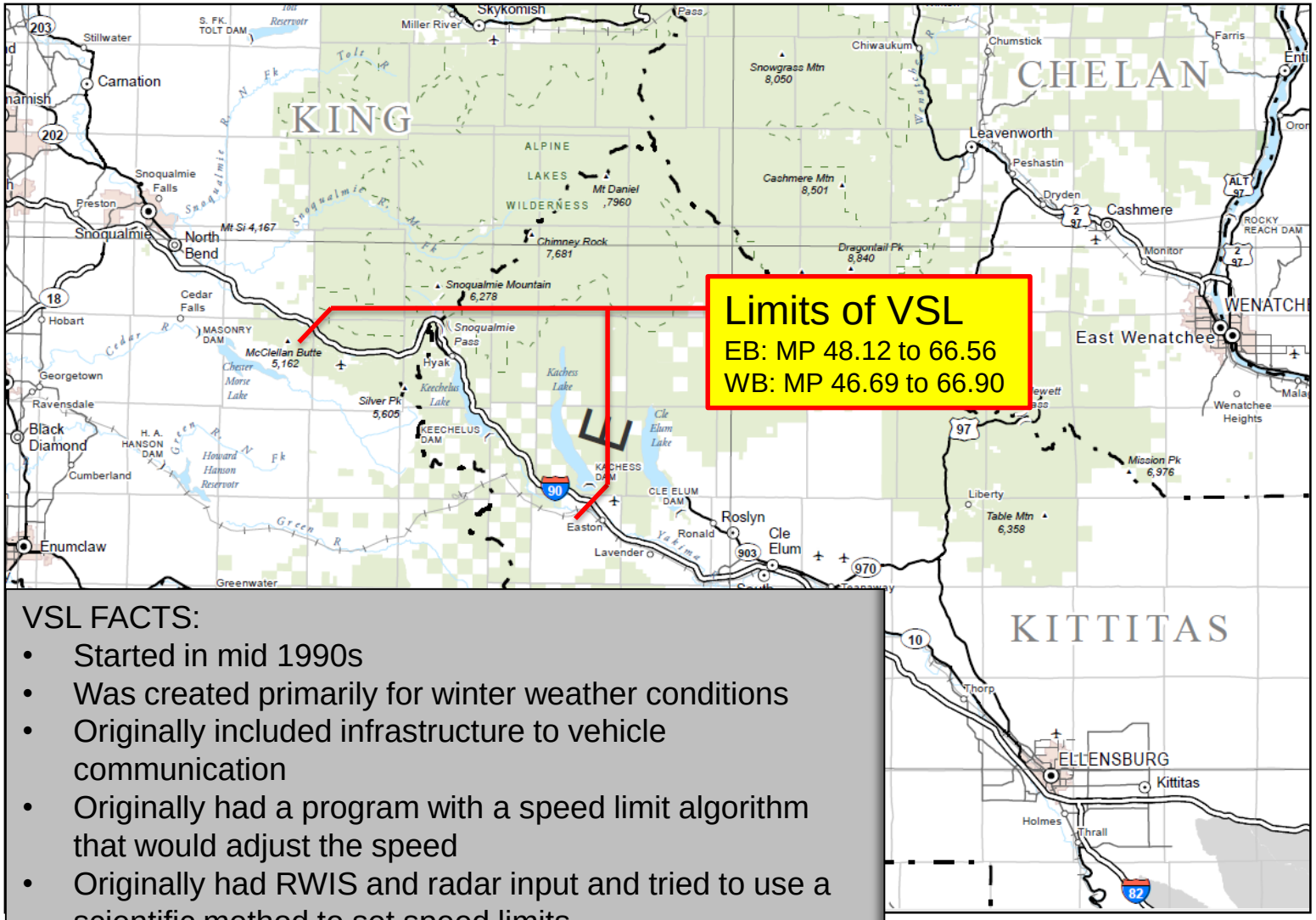
WSDOT SC Region Traffic Engineer

**North/West Passage VSL Peer Exchange**

January 28, 2015

Washington State Department of Transportation


BRITISH COLUMBIA
OREGON
PACIFIC OCEAN
IDAHO
Snoqualmie Pass
2
12
90
INTERSTATE
General Highway Map
STATE OF WASHINGTON
Prepared by the
WASHINGTON STATE DEPARTMENT OF TRANSPORTATION
Strategic Planning Division
GIS & Roadway Data Office
in cooperation with the
U.S. DEPARTMENT OF TRANSPORTATION
Federal Highway Administration
Miles
Kilometers
2011
LEGEND
State Route System
Multilane Divided
Paved
Gravel
Construction
Proposed
Other Roads
Paved/Gravel
Proposed
Communities
Over 100,000
10,000 - 100,000
2,500 - 10, 000
Under 2,500
Unincorporated
Capital City
Names of County Seats are shown in capital letters
Other Features
Airport
Military Airbase
Dam
Railroad
Major River
Ferry Route
Mountain Pass
Mountain Peak
Boundaries
State Boundary
County Boundary
Township Boundary
National Park
National Forest
National Monument
Recreation Area
Scenic Area
Wilderness Area
Tribal Reservation
Military/Energy Reservation
Interstate
U.S. Highway
State Route

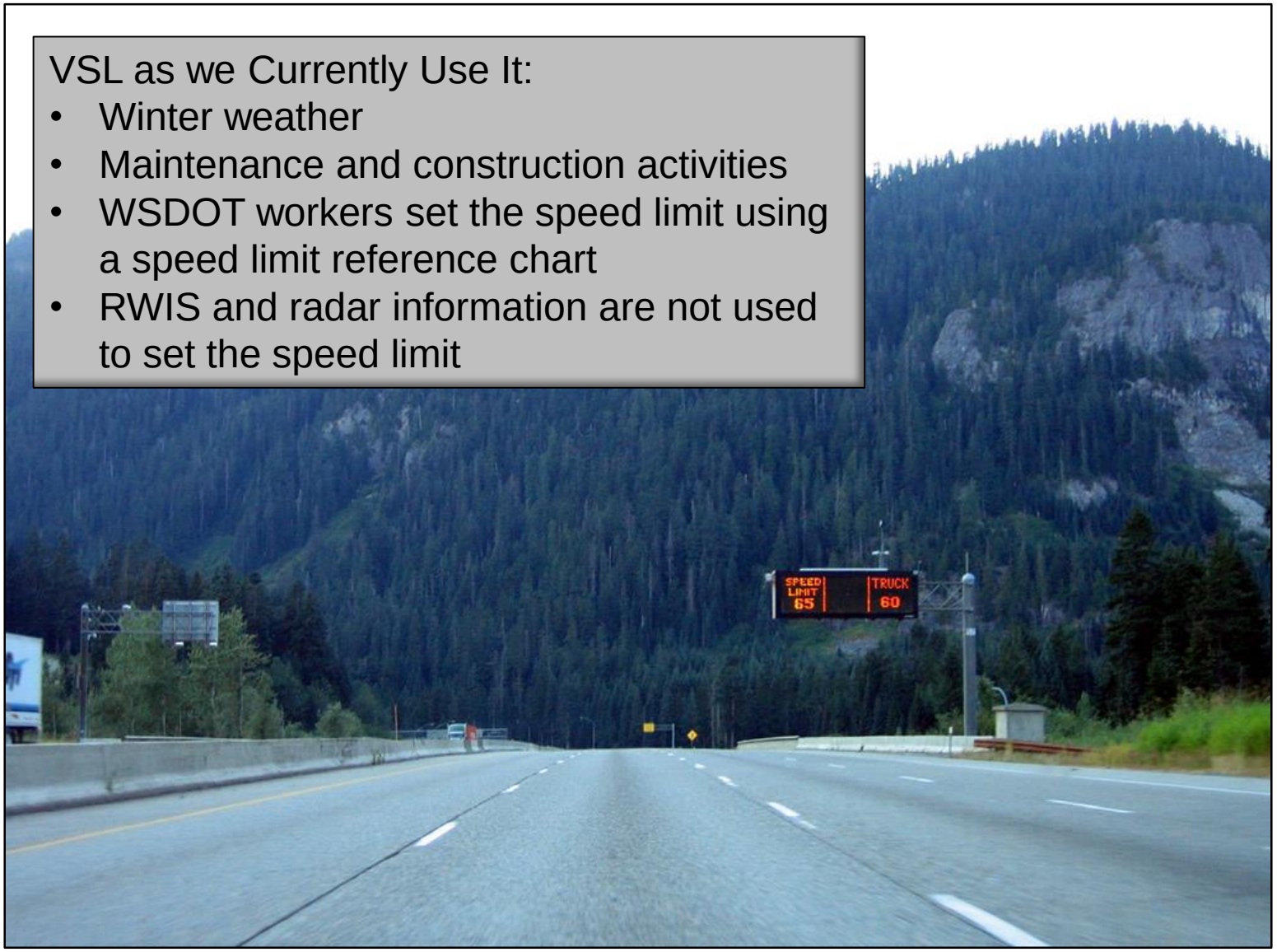



VSL FACTS:

- Started in mid 1990s
- Was created primarily for winter weather conditions
- Originally included infrastructure to vehicle communication
- Originally had a program with a speed limit algorithm that would adjust the speed
- Originally had RWIS and radar input and tried to use a scientific method to set speed limits

VSL as we Currently Use It:

- Winter weather
- Maintenance and construction activities
- WSDOT workers set the speed limit using a speed limit reference chart
- RWIS and radar information are not used to set the speed limit




Source: www.aaroads.com/west/washington090/i-090_wb_exit_047_02.jpg

# SPEED LIMIT REFERENCE

| TRACTION REQUIREMENTS | SPEED LIMIT | PAVEMENT CONDITIONS | VISIBILITY | WEATHER | BLOCKING INCIDENTS |
|---|---|---|---|---|---|
| NONE | 65 | DRY OR BARE / WET | GOOD: CLEAR>0.5 MILES | FAIR TO MODERATE RAIN | INCIDENT ON SHOULDER |
| Traction Tires Advised | 55 | LIGHT SNOW, SLUSH, OR ICE IN PLACES | MODERATE: FOG<0.2 MILES | HARD RAIN | INCIDENT ON SHOULDER |
| Vehicles Over 10,000 Pounds Chains Rq'd | 45 | COMP. SNOW/ICE, DEEP SLUSH, SHALLOW WATER | POOR: BLOWING SNOW<0.1 MILES | HEAVY RAIN OR SNOWFALL | LANES BLOCKED TRAFFIC MOVING |
| Chains Rq'd on All Vehicles | 35 | SEVERE FREEZING RAIN, DEEP SNOW, SLUSH OR STANDING WATER | POOR: BLOWING SNOW<0.1 MILES | HEAVY RAIN OR SNOWFALL | LANES BLOCKED TRAFFIC STOPPED AHEAD |
| EMERGENCIES or EXTREME CONDITIONS ONLY | 25 | USE THIS SPEED FOR SEVERE CONDITIONS AS REQUESTED BY CREWS ON THE SCENE. CONFIRM WITH SUPV., WHEN AVAILABLE. POOREST POSSIBLE ROAD CONDITIONS AND HUMAN LIFE ENDANGERED. Conditions should be well documented. Return to higher speed limit as soon as possible. | | | |

# DRAFT – Speed Limit Reference Table – DRAFT

| Speed Limit | Traction Requirements | Pavement Condition | Weather | Incidents | Maintenance or Construction Activity |
|---|---|---|---|---|---|
| **70/65*** | None | Dry or bare/wet | Fair to moderate rain | Incident on shoulder not impeding the flow of traffic | Workers are off the highway or on the shoulder and not immediately adjacent to an active lane |
| | | | | | Very short duration work zone |
| | | | | | Mobile operations on the shoulder |
| **60** | None | N/A | N/A | N/A | Rolling slowdowns. Use the right two-thirds of the VSL to message that rolling slowdowns are taking place. |
| **55** | Traction Tires Advised<br>Oversize Loads Prohibited | Light snow, slush, or ice in places | Heavy Fog, hard rain or moderate snowfall | Incident on shoulder and fire/ambulance are present | Workers are adjacent to an active lane separated from adjacent traffic only by cones |
| | | | | | Work zone with traffic control devices deployed |
| | | | | | Mainline down to one lane |
| | | | | | Mobile operations in the lane |
| | | | | | Narrow lanes and shoulders with barrier separation |
| **45** | Traction Tires Required<br>Vehicles over 10,000 Must Chain Up | Compact snow, deep slush, areas of shallow water | Heavy rain or heavy snowfall | Lane(s) blocked but traffic is still moving | Not allowed. Maintenance or construction activity that requires a greater than 10 mph reduction in speed limit must be approved by the State Traffic Engineer per Directive 1060 |
| **35** | Chains Required On All Vehicles except 4WD | Severe freezing rain, deep snow, slush or standing water | Heavy snowfall | Lanes blocked and traffic stopped ahead | |

* 60 mph maximum for trucks. EB between MP 48.12 & 66.56 and WB between MP 46.69 and 66.90 the maximum allowable speed limit is 65 mph with 60 mph for trucks

# Variable Speed Limits and Organized Chain-Up

How we use variable speed limits and organized chain-up to improve flow

# I-90 Organize Chain-up (OCU)

**The Problem**:

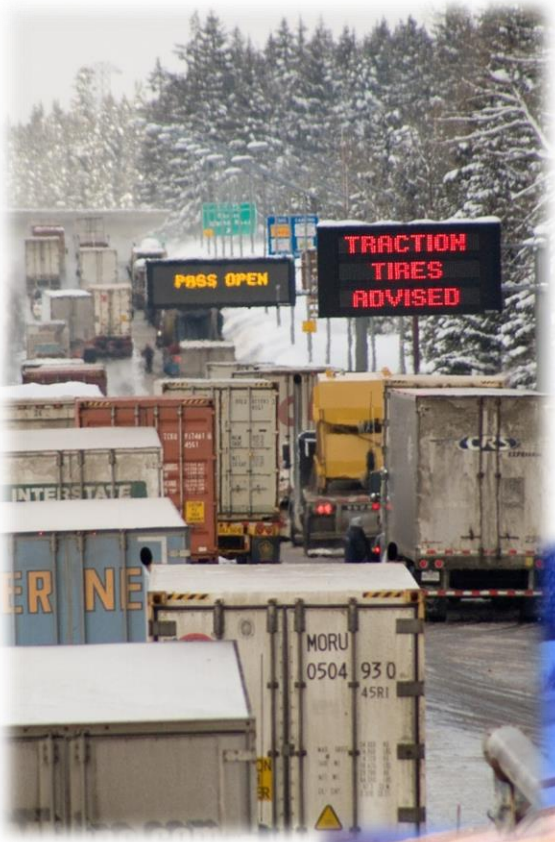
70 times a year snow and ice cover I-90 requiring chains. Around 300 trucks per hour (plus cars) in a disorganized fashion overwhelm the space creating conditions that have been described as utter chaos.


Source: WSDOT

# I-90 Chain-up
# The Problems

Several problems converge to create the congestion:

- **Chain-up areas were designed in the early 70's and are too small to accommodate today's traffic volumes.**
- **Some trucks park waiting for the conditions to improve (rest and "go off the books"), thereby reducing the space available.**
- **Lane stripes are effectively eliminated.**
- **The right-hand "lane(s)" become part of the chain-up area.**




Washington State Department of Transportation

Source: WSDOT

# I-90 Organized Chain-up "The beginning"

- 2005: Funding approved to expand 5 miles of I-90 near the summit of Snoqualmie Pass to three lanes.
- October 2007: A cross sectional group of WSDOT staff and consultants began discussing the problems and objectives for chain-up operations.


A world wide search found that no one was attempting to facilitate a technological solution for chain-up operations.



Source: WSDOT

# Organized Chain-Up Goals

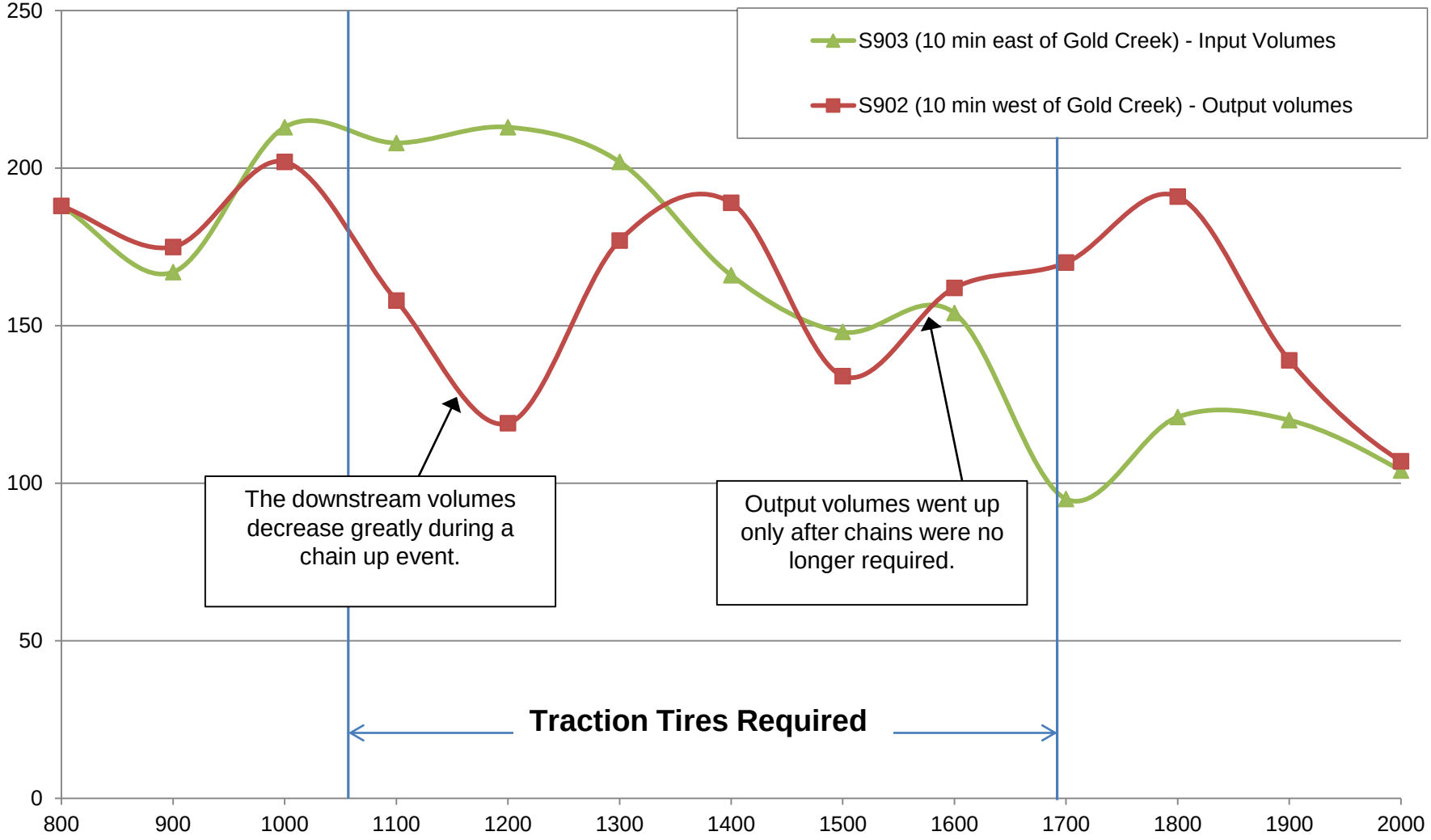
If we can get the chain-up area organized, we will:

- **Improve safety by providing:**
  - **Buffer area between moving traffic and those chaining up**
  - **Defined paths for vehicle movement**
- **Keep vehicles from being locked in by double parking**
- **Reduce freight delays**
- **Increase thru-put**
- **Keep traffic moving**
- **Allow for plowing**



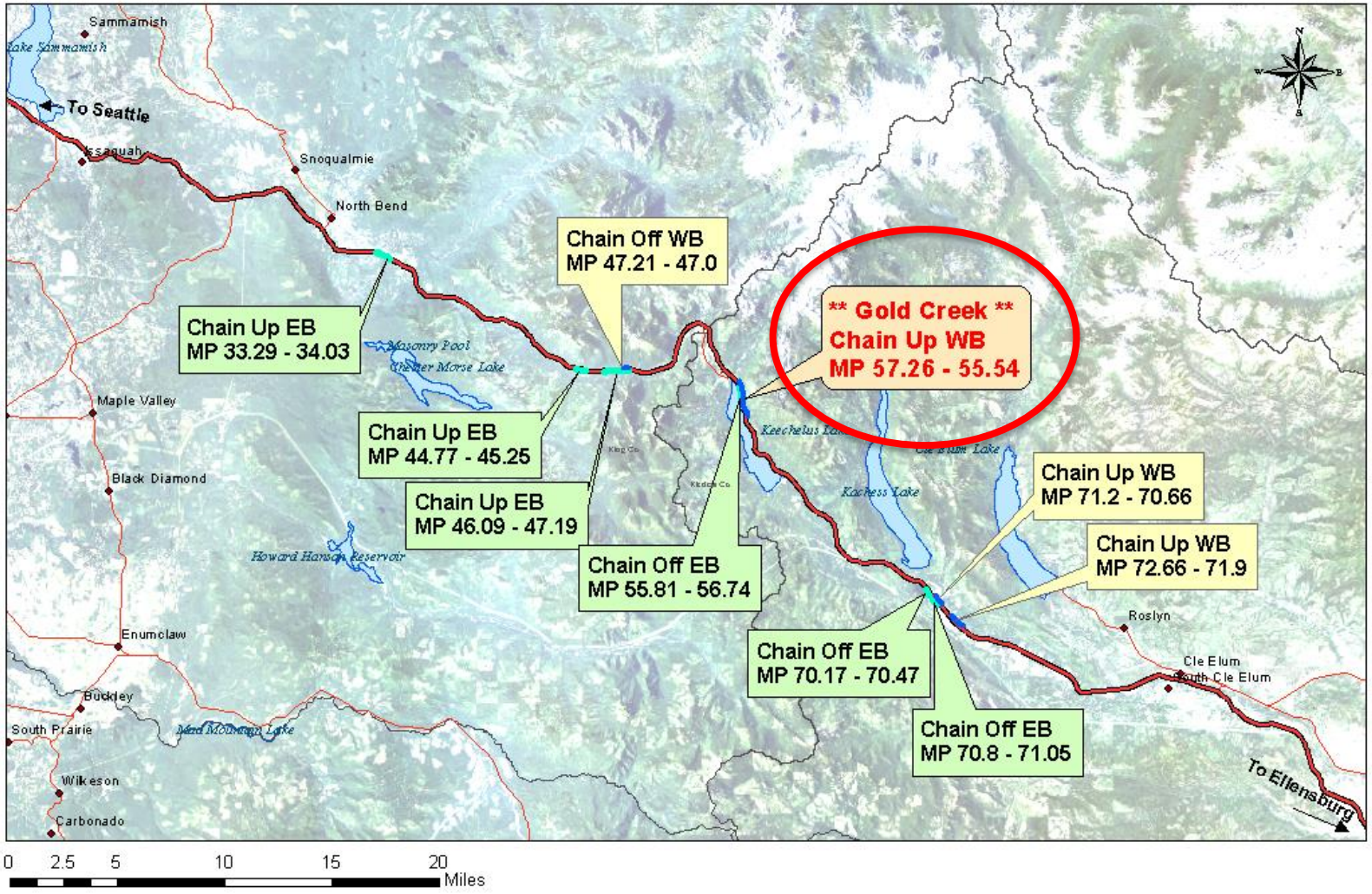
Source: WSDOT

# Truck Volumes during the 12/6/12 Snow Event



# I-90 Snoqualmie Pass

## Chain Up Facilities

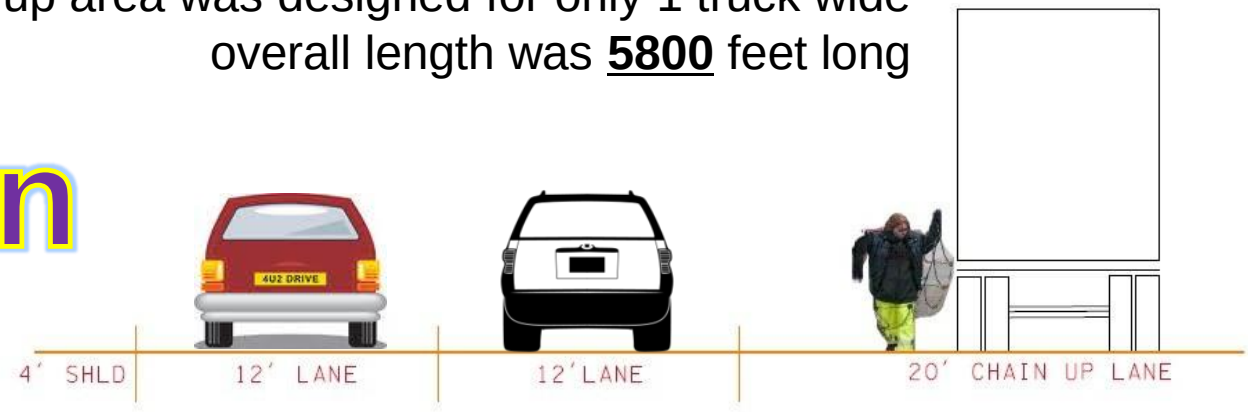



Date, time and names of last edit

# I-90 Gold Creek Geometrics

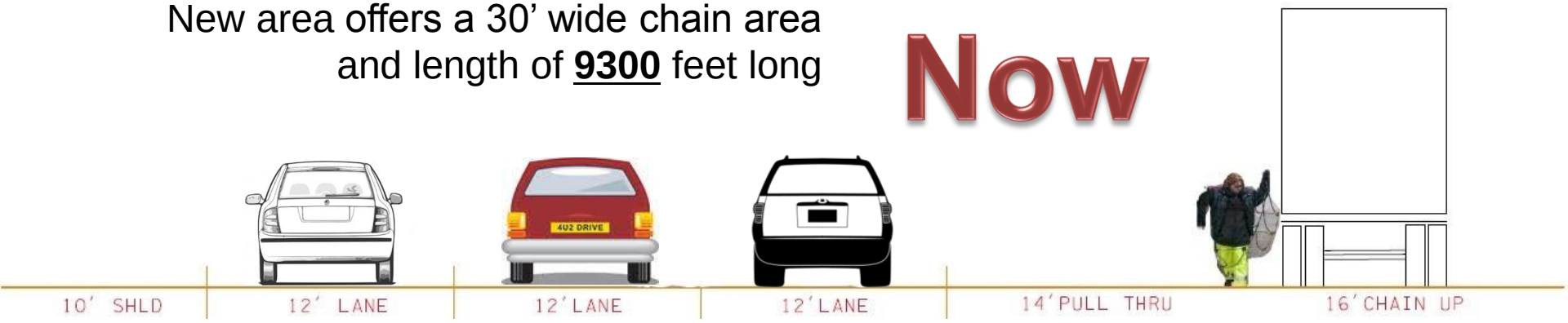
Former chain up area was designed for only 1 truck wide overall length was **5800** feet long

**Then**




New area offers a 30' wide chain area and length of **9300** feet long

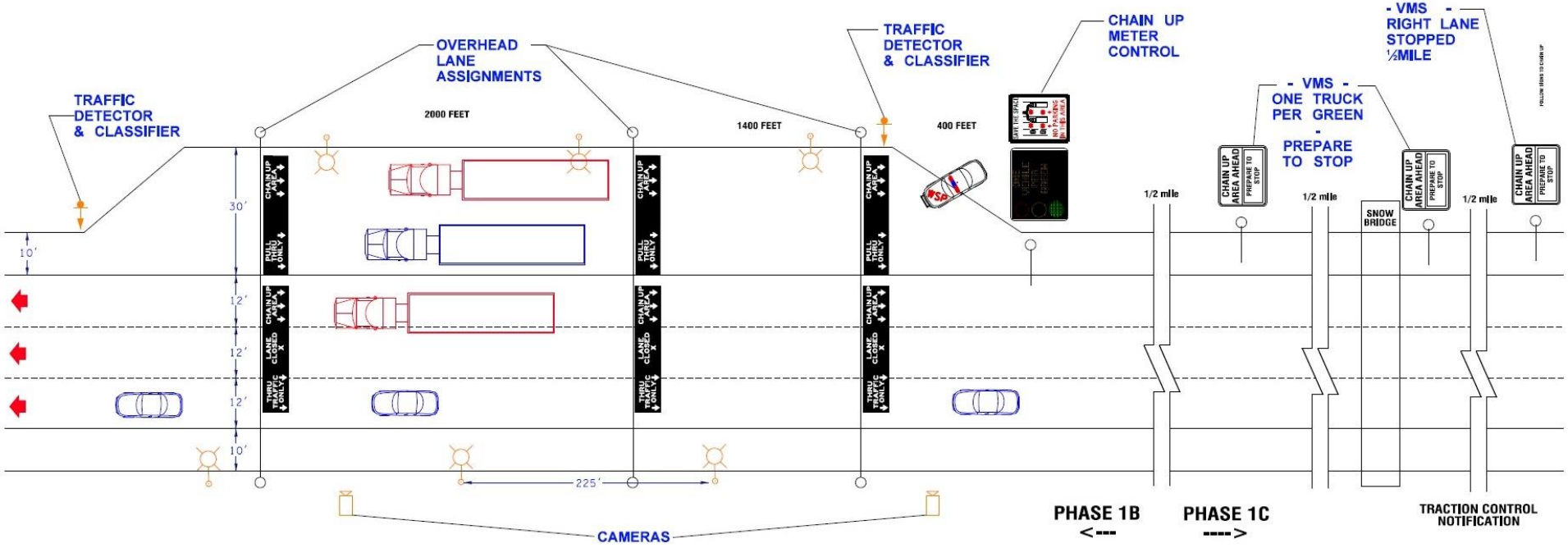
**Now**



# Increased Geometrics & no ITS, Same old problems

# Organized Chain-Up: Final Design

## An overview of the Gold Creek organized chain-up System

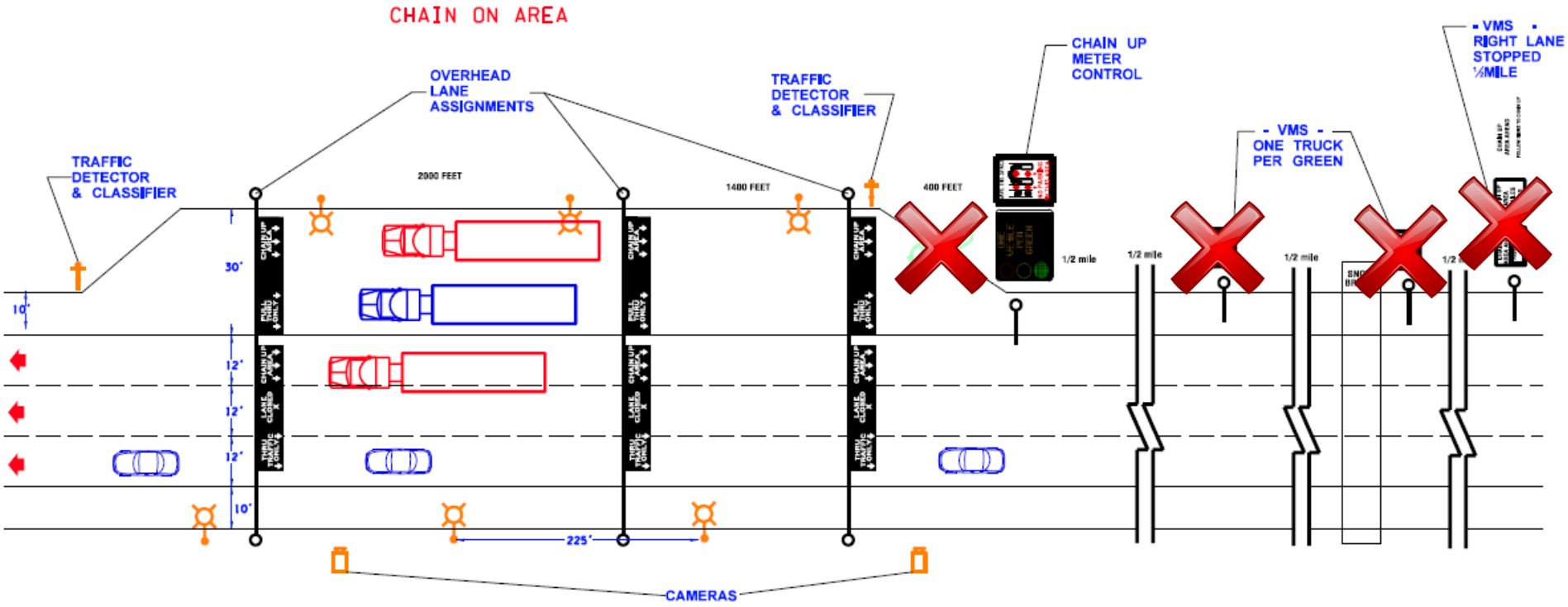



Washington State Department of Transportation

Source: WSDOT

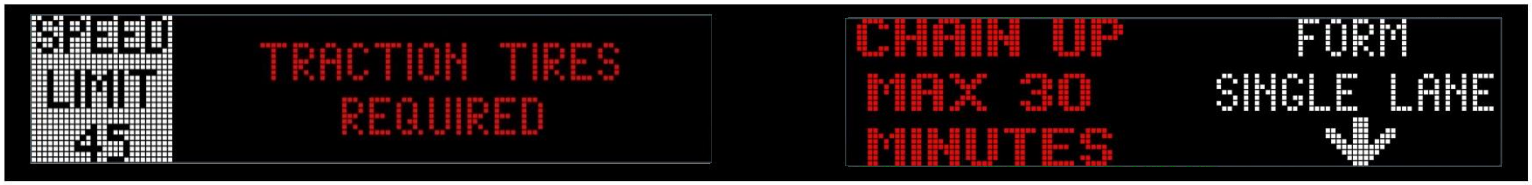
# Organized Chain-up: Temporary Configuration

**Parts of the Gold Creek OCU system not available winter 13-14**



# Organized Chain-Up: Temporary Configuration

Signing will direct trucks to form a single lane guide you to open spaces along the 9000’ stretch.





Washington State Department of Transportation

Source: WSDOT

# Temporary Configuration Advanced Messaging

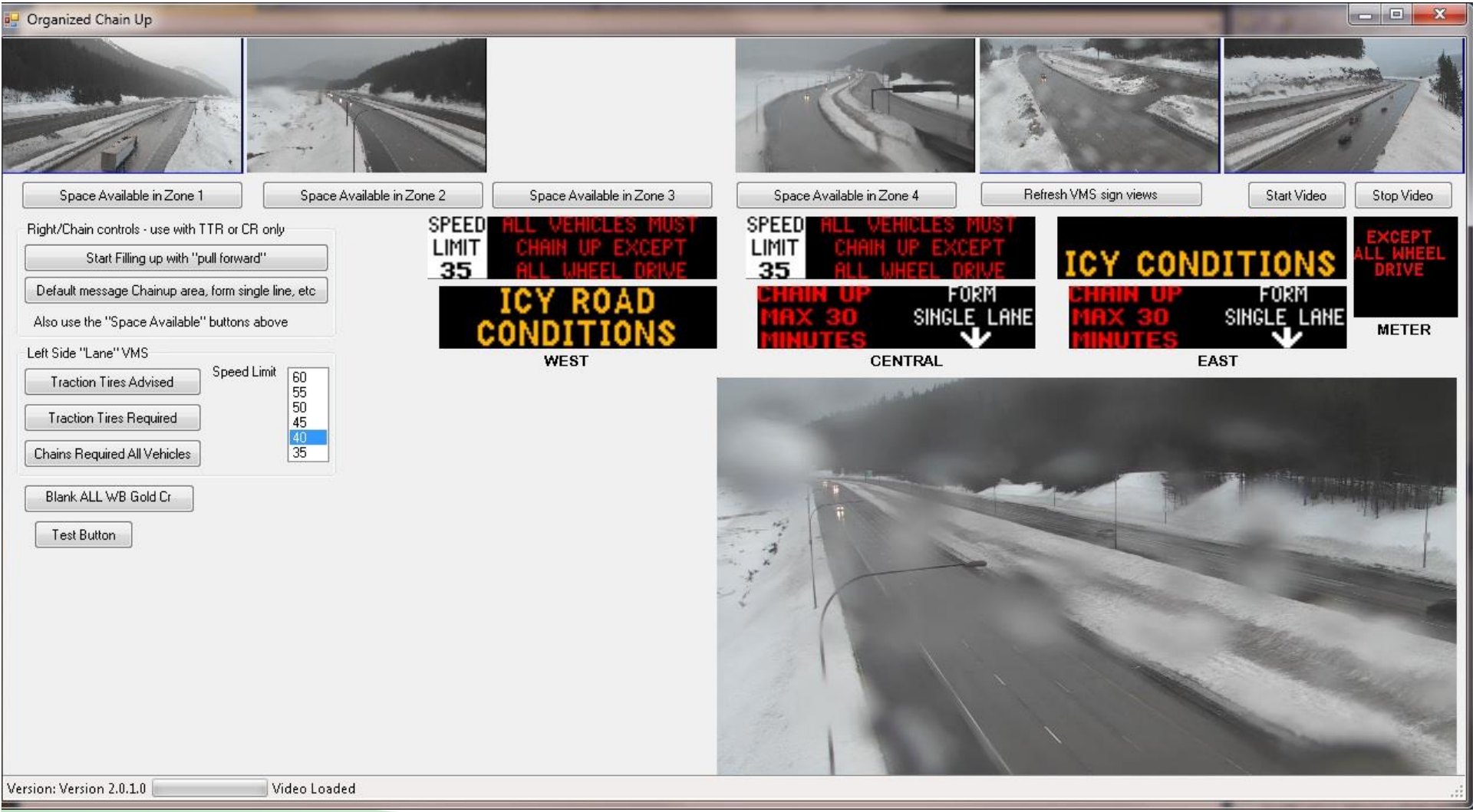

**Advanced VMS 3.75 mi**


**Advance Meter VMS 400’**

When Traction Tires Required become required advanced messaging will be used to usher passenger vehicles to the left lane and trucks over 10,000 GVW to use the right lane

Once I-90 phase 1C is completed three full size VMS in ½ mile spacing will provide more enhanced messaging.

# Organized Chain-Up Software Interface



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Date, time and limits of last edit

# Operational Pictures


090vc05688 - Gold Creek #4 SCR_ITS
8 Jan 1970 02:34:59 Pacific Standard Time


# Sometimes hard to see anything!

# What Obstacles Are We Overcoming

Misconceptions and educational opportunities along the way:

- ***Learning curve may take several seasons***
- ***Adjustments may be required as we gain "experience"***
- ***This process is one of a kind, therefore new to everyone***
- ***Worse case, we shut it off and we return to how it was***

We will have phases for special cases including:

- ***Pass closures***
- ***Stuck vehicles and more***

With support and effort we will move closer to accomplishing our goals of increased flow, reduced congestion, greater safety and less delays …

# Public Outreach Efforts

Information on the organized chain-up system and how it works at:

- Truck Stops
- Weigh Stations
- Rest Areas
- Presentations

Web site and portfolios information

WSP joint participation

Washington State Department of Transportation

Traffic & Cameras | Projects | Business | Environment | Maps & Data

You are here: Home > Winter Travel > Organized Chain-Up

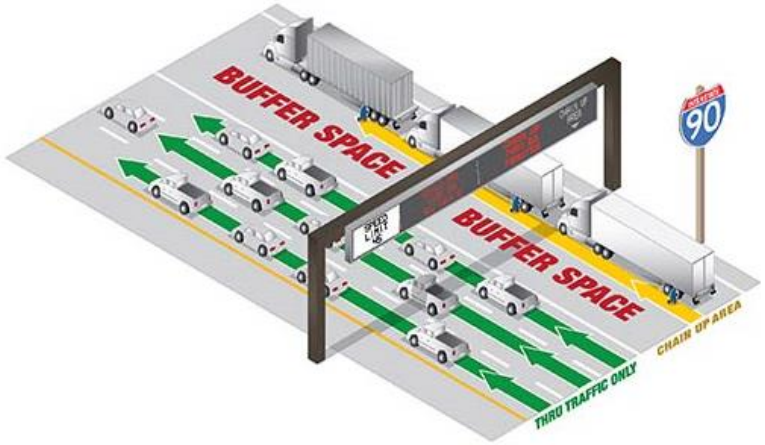
**More Information**

- Organized Chain-Up on Snoqualmie Pass
- Información en español

## Organized Chain-Up on Snoqualmie Pass

The Washington State Department of Transportation is implementing a project to try and solve westbound chain-up woes this winter. The system is used throughout the winter when traction tires are required for trucks traveling westbound and are over 10,000 pounds. Passenger vehicles traveling westbound with four wheel and all wheel drive are not required to chain up.

Recent improvements to I-90 nearly doubled the length and width of the westbound chain-up area. Overhead message signs help guide trucks in the westbound chain-up area, streamlining the process and helping improve safety for all drivers on I-90.



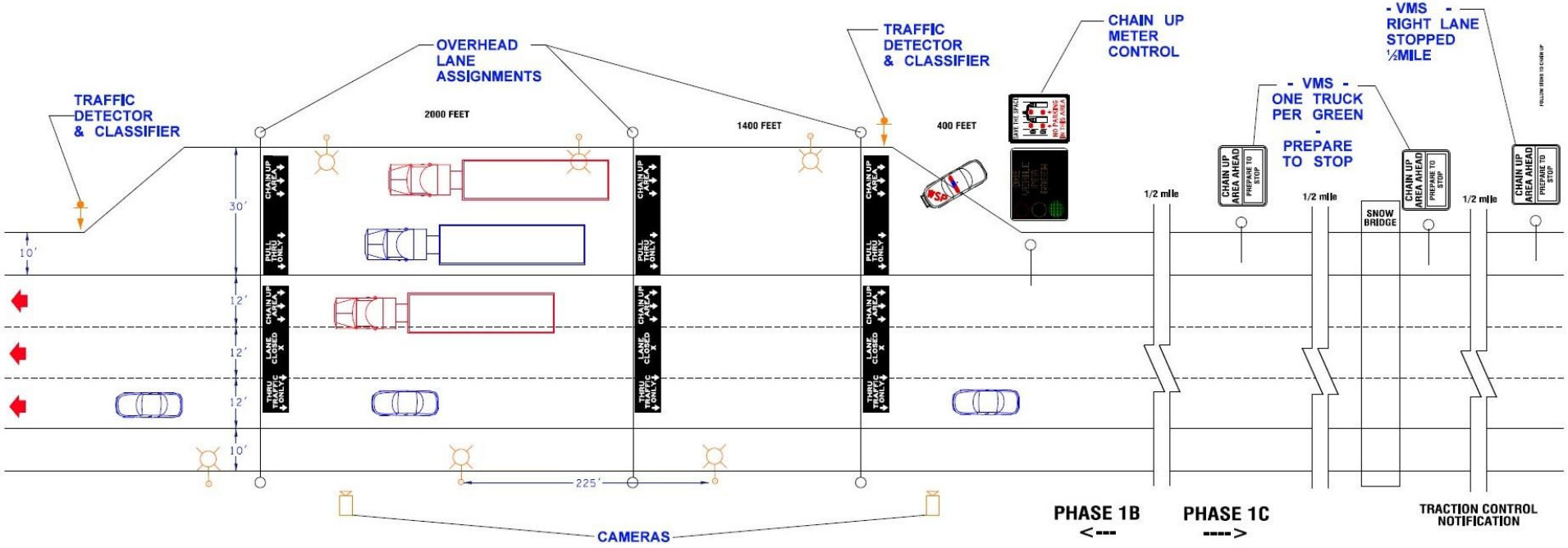

http://www.wsdot.wa.gov/winter/chainup.

# Organized Chain-Up

What does the future hold?

# Organized Chain-Up: Future

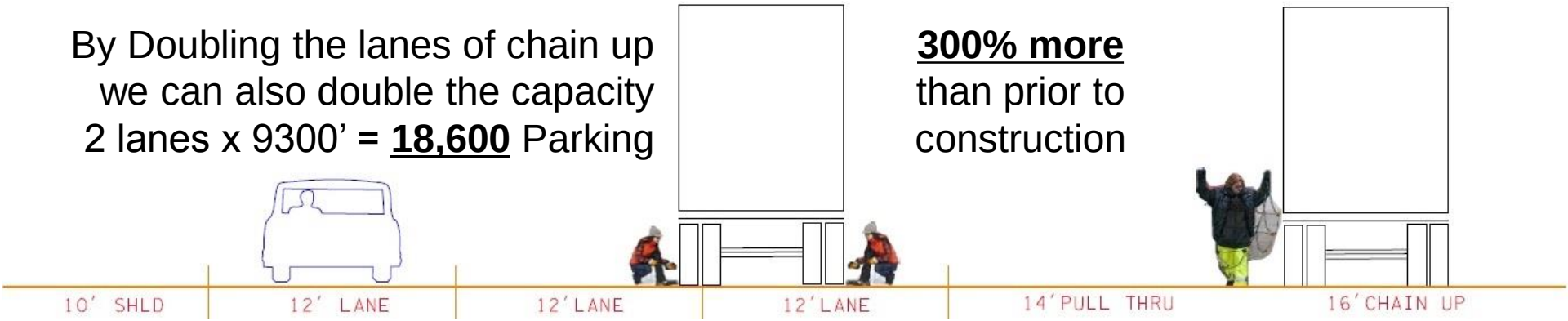
## An overview of the Gold Creek organized chain-up System



# Organized Chain-Up: Future

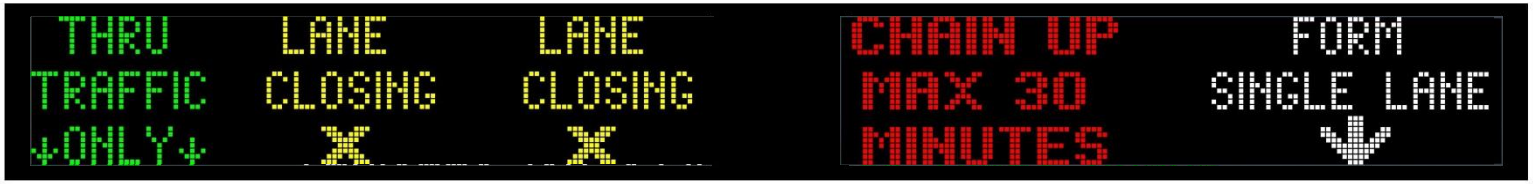
By Doubling the lanes of chain up we can also double the capacity
2 lanes x 9300' = **18,600** Parking

**300% more** than prior to construction

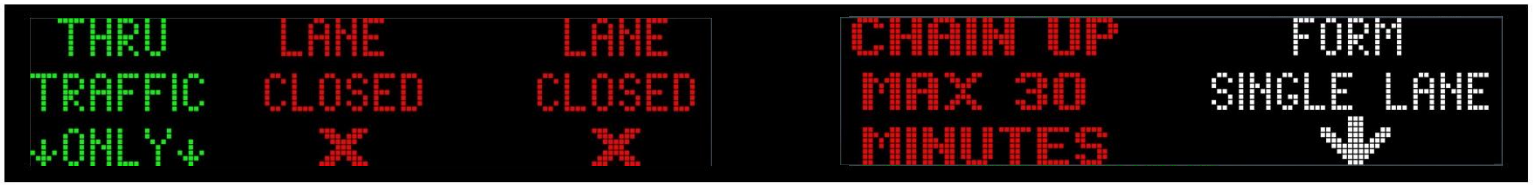


# Organized Chain-Up: Future

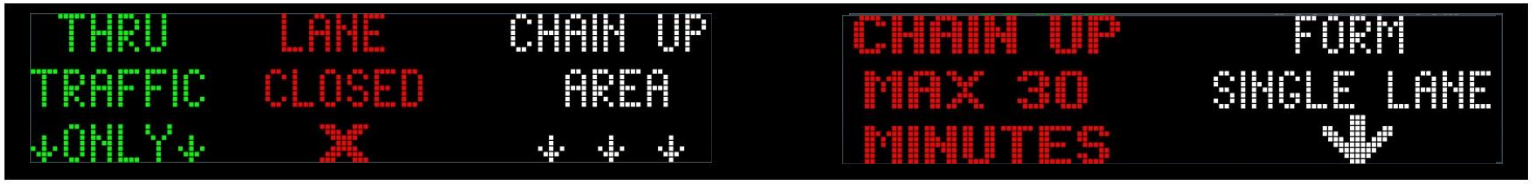
**Phase 1**

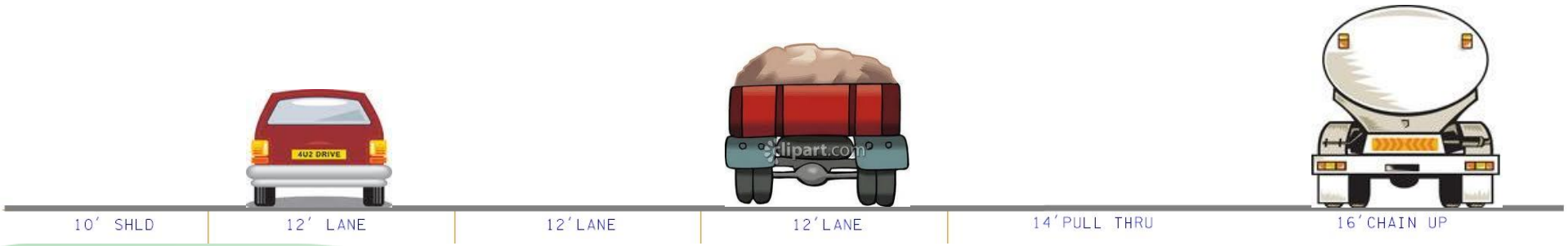



**Phase 2**




**Phase 3**




Washington State Department of Transportation

Source: WSDOT

# Organized Chain-Up:  Pull Thru Lane

- Filling the spaces while ensuring space is available is key to the operation
- Trucks may queue up in right lane to enter the area waiting for an available space
- Trucks enter on green once space is available for them
- Keeping a pull through lane open is key to avoid trapping vehicles and allow new vehicles to enter the chain-up area


# Organized Chain-Up: Concerns

Concerns with implementation

- ***Pull through lane***
- ***Liability***
- ***Closing active travel lane for chain up parking***
- ***Safety***
- ***Enforcement***
- ***Not having full system in place***

# Enforcement will be Important

Enforcement will require coordination between Washington State Patrol (WSP) and the TMC operators.

Keeping the pull thru lane open and cleared of vehicles. People behave better when the blue lights are present.

*Source: http://media.bonnint.net/seattle/7/709/70938.jpg*

# Lessons Learned

- Be ready for the phone calls
- Get stakeholders on board early (WSP & Truckers)
  - Failure resulted in curtailed deployment & results.
- Have advanced VMS installed for messaging. We will not have a complete system for about 3 years.
- Don’t count on construction project timelines. Write it into contract specifications if you must have certain items installed at certain times.
- Have a programmer on staff
- Plan on the “Engineers” running the “new” system a few times before handing over to the TMC operators.
- Try to eliminate human opinion of an appropriate speed limit
- Train the operators on appropriate speed limits
- Have a VMS at the very end of the Chain-Up area

# Lessons Learned

- Max 30 minutes parking is key
- Use VMS approaching the area to warn truckers of the max 30 minutes parking
- Make presentations at your local trucking association
- Give handouts to the Commercial Vehicle Enforcement Officers
- Put handouts in weight stations
- Educate law enforcement

If you have a long chain-up area, do not activate the whole system at the beginning of the storm. Activate it in sections.  The downstream section first and then move upstream.

# For more information

http://www.wsdot.wa.gov/winter/chainup.

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