

ACTIVE TRAFFIC MANAGEMENT STANDARD OPERATING PROCEDURES I-5, SR-520, I-90 VERSION #6, August 7, 2009 Draft

I. DEFINITIONS

ASCII	American Standard Code for Information Interchange
Active Traffic Management (ATM)	Active Traffic Management is a component of Advanced Traffic (Transportation) Management Systems. ATM uses dynamic message signs to manage the transportation system. Dynamic message signs can include variable message signs, variable speed limit signs, or lane control signs.
Active Traffic Management Zone (ATM Zone)	The section of roadway that has ATM signage.
Advanced Traffic (Transportation) Management System (ATMS)	Advanced Traffic (Transportation) Management Systems (ATMS) are regional systems aimed at optimizing traffic flow for a set of roads or an entire region. Elements of ATMS include sensors to monitor traffic flow, centrally programmable traffic signals, automated highway signs, closed-circuit television cameras (CCTV), computers and telecommunications technology. ATMS allow transportation officials to manage the transportation system remotely and to track all information about the transportation system in one place.
Blank Message	A message that is devoid of information content and the sign face is clear.
Character	One symbol from a specific alphabet, font, or character set.
Character Height	The vertical pitch times the number of pixels in the column of pixels.
Character Width	The horizontal pitch times the number of pixels in the row of pixels.
Congested Area	A group of adjacent detection stations where the prevailing speed is less than 50 mph.
Congestion Point	The single detection station where the prevailing speed is less than 50 mph.
Default State	The resting state of the system.

Default Speed Limit	The speed limit for the corridor under non-congested conditions.
Display	Making the message visible to the public.
Display Group	A grouping of ATM Signs within one location that work together. In some locations instead of all being together on a sign bridge, gantry, or overpass structure, some of the signs may be on a separate post prior to the other signs or on an on-ramp.
Downstream	Downstream – Similar to water flowing downstream in a river, traffic is considered to be flowing downstream on a freeway. Therefore, an incident that occurs beyond the location of a variable message sign is said to be downstream from the sign.
Dynamic Message Sign (DMS)	Any sign system that can change the message presented to the viewer, such as VMS, LCS, SMS.
Failure	The inability of a component of the ATMS to function normally.
Full Matrix	A type of DMS with the entire display area containing pixels with the same horizontal pitch and the same vertical pitch without fixed lines or characters. Each pixel can be addressed and changed independently.
General Purpose Lane (GP)	A General Purpose Lane carries all types of vehicles. Contrast with Managed Lane.
High Occupancy Toll (HOT)	Managed Lane(s) which both carry vehicles with more than one occupant and carry vehicles which pay a toll.
High Occupancy Vehicle (HOV)	Managed Lane(s) which carry vehicles with more than one occupant.
Implementation Zone	The area that includes all the ATM Display Groups utilized together.
Lane Control Dynamic Message Sign (LCS)	Signs used to specify how underlying lane can be used. Lane Control Dynamic Message Signs can display symbols, messages, and speed values.
Managed Lane (ML)	Managed Lanes are reserved for special purposes, including HOV and HOT lanes. A managed lane will be treated separately for the purposes of determining a congestion point or congestion area and reducing speeds.
Manual Override	Procedure where the operator inputs the display

Occupancy	Percentage of time that vehicles occupied the detector over the specified interval expressed as a percentage of the total collection time period (1-100%)
Operator	A staff member who manages or controls the ATMS, including changing adjustable values or parameters.
Operator Interface	The graphical user interface used by the Operators to manage the ATM system.
Page	The information that can fit on a sign at one time, together with its message attributes.
Parameter (Basic Operational)	Procedures that cross all operational procedures and provide the basis for design and operations. <u>Parameters</u> <ul style="list-style-type: none"> ▪ Display Group maximum speed ▪ Corridor maximum speed
Pitch	The center-to-center distance between two adjacent pixels that is measured either horizontally or vertically.
Pixel	The smallest independently controllable visual element of a DMS.
Side-Mount Dynamic Message Sign (SMS)	Dynamic Message Signs mounted to the sides of the travel lanes which can be changed to provide information on speeds, traffic conditions, driver direction.
Speed	Calculated by using the measured volume and occupancy for the specified collection time period (miles/hr) The speed calculation is dependent upon an average detection zone length and average vehicle length.
Speed Limit	Regulatory maximum speed.
Speed Limit (Reduced Maximum)	A reduced regulatory speed limit which restricts the system from defaulting to corridor speed limit.
Traffic Management Center (TMC)	A central location where the transportation system is monitored and controlled.
Tunable	A parameter whose value may be changed by the operator in real-time via the Operator interface.

Upstream	Upstream – Similar to water flowing downstream in a river, traffic is considered to be flowing downstream on a freeway. Therefore, an incident that occurs ahead of the location of a variable message sign is said to be upstream from the sign.
Variable Dynamic Message Sign (VMS)	Signs mounted to the side of the travel lanes at a Display Group which can be changed to provide information on traffic conditions and driver direction.
Volume	Number of vehicle counts detected during the collection time period and expressed as an average number of vehicles per hour (vehicles/hour)

II. BACKGROUND

WSDOT has been a leader in the use of Advanced Traffic Management Systems (ATMS) to maximize the efficiency of the freeway operations. The Northwest Region currently uses ramp metering, closed circuit television cameras, highway advisory radio, variable message signs, variable speed limit signage, traffic detection, tunnel and bridge control systems, reversible express lanes, remote signal controls, and tolling. The ATMS is connected through a communications network which connects through communication hubs to the Northwest Region Traffic Management Center located at 15700 Dayton Avenue North, Shoreline, Washington.

WSDOT will be adding to the ATMS with the addition of Active Traffic Management (ATM), the use of dynamic message signs such as variable message signs and lane control signs along with traffic detection to manage traffic. The Active Traffic Management will work within the existing ATMS.

The NW Region TMC is staffed with both Radio Operators and FLOW Operators. The FLOW operators will monitor and control the ATM system.

III. NEED

Traffic conditions such as recurrent congestion, incidents, special events and weather cause traffic backups and abrupt queuing. Due to roadway geometry sight distances can be minimal and drivers can approach the end of queues unaware and at high speeds causing rear end accidents. Using Active Traffic Management techniques may reduce these incidents.

IV. ACTIVE TRAFFIC MANAGEMENT SYSTEM

The proposed Active Traffic Management (ATM) signs will be installed on I-5, SR-520, and I-90 as shown below. The ATM signs will be mounted on existing structures or new Gantries installed specifically for ATM. At each ATM Display Group a Lane Control Dynamic Message Sign (LCS) will be installed over each lane; and either a Variable Dynamic Message Sign (VMS) or Side-Mounted Dynamic Message Signs (SMS) will be installed to the side(s) of the lanes.

Static signage stating “Entering Variable Speed Limit Zone” will be placed prior to entering the ATM Zone and on freeway to freeway ramps entering the ATM Zone. Additional CCTV cameras and detection will be added to ensure the systems work as a whole. Detection data is obtained for volumes, speed, and occupancy.

Appendix A shows each of the following corridor’s sign configuration.

I-5 Corridor ATM Zone

Northbound from MP 157.23 to MP 164.46

Signs will be placed at approximately ½ mile intervals on new sign gantries.

At each sign location there will be a LCS over each lane and either SMS on both sides or a VMS overhead on the right side.

I-90 Corridor ATM Zone

Eastbound from MP 2.81 to MP 11.33

Westbound from MP 11.71 to MP 3.19

Signs will be placed at ½ to 1-1/2 mile intervals on both new sign gantries and existing structures.

At each sign location there will be a LCS over each lane. Where possible there will be either a SMS on both sides or a VMS overhead on the right side. At some locations due to site constraints there will only be a SMS on the right side.

SR-520 Corridor ATM Zone

Eastbound from MP 0.19 to MP 6.53

Westbound from MP 7.85 to MP 0.93

Signs will be placed at ½ to 3-1/2 mile intervals on new sign gantries, temporary gantries and existing structures. When SR-520 is rebuilt the temporary gantries will be replaced with permanent sign structures and the ATM signage redone to the permanent configuration.

At each sign location there will be a LCS over each lane. At the temporary gantries there will only be an SMS on the right side. On the existing structures there will either be an SMS on the right side or a VMS overhead on the left side. On the permanent gantries there will either be an SMS on both sides or a VMS overhead on the right side.

In some locations a SMS will be located on an access ramp where the merge is just beyond the main line sign installations. Some existing VMS located prior to an ATM sign location will be used as part of the ATM.

V. SIGN DISPLAY

A. All Signs

1. Hex 20 to 7E inclusive of the ASCII Character Set
2. Full Matrix
3. Character spacing and border depend on message
4. Capable of displaying graphics, symbols, and any font set.
5. Standard operation in static mode but capable of flashing.
6. Paged messages will be defined and stored as permanent messages in the sign.

7. Each controller will have its own default display configuration.

B. Lane Control Dynamic Message Sign (LCS)

1. 42 pixels x 42 pixels minimum at 1.4 inches maximum pitch.
2. 6 Characters per Line
3. 2 Lines of 9 inch characters + 1 Line of 18 inch characters
4. 4 Lines of 9 inch characters
5. Color Display: Red, Green, Yellow, and White on Black Background
6. ATM Messages
 - a. LCS will display ATM regulatory speed limits and lane control.
 - b. All LCS signs at one Display Group will page messages at the same time.
 - c. Lanes blocked with a red "X" will show a static symbol only. A flashing red "X" will not be allowed.
 - d. Lanes showing a yellow "X" will be show as a static symbol but a flashing yellow "X" could be allowed.
 - e. Typical Signage

MUTCD R2-1

SPEED LIMIT (Displayed between 35 to 60 in multiples of 5)



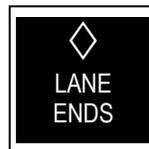
MUTCD R3-14
HOV 2+ (or 3+)
ONLY



MUTCD R3-15
HOV LANE
AHEAD



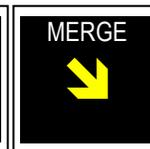
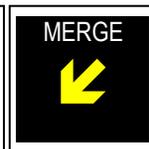
MUTCD R3-15a
HOV LANE
ENDS



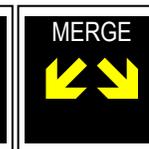
MUTCD W9-3
LANE CLOSED
AHEAD



MUTCD W9-2
LANE ENDS
MERGE LEFT (RIGHT)

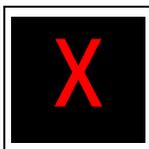
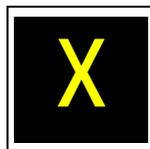
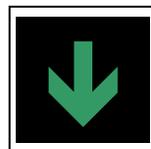


MUTCD W9-3a
CENTER LANE
CLOSED AHEAD



MUTCD 4J.02/03

LANE CONTROL SIGNS



B. Side-Mounted Dynamic Message Sign (SMS)

1. 52 pixels x 52 pixels minimum at 1.4 inches maximum pitch.
2. 3 Lines of 8-18" Characters per Line
3. Full Color
4. All SMS at a given Display Group display the same message unless there is an operator override.
5. ATM Messages
 - i. Speed Limit XX
 - ii. SMS will display the default speed limit at set spacing. The spacing between signs displaying the default speed limit will be determined by a tunable parameter.
 - iii. Slow Traffic Ahead
 - iv. Reduced Speed Zone
 - v. "X" Left, Right, or Center Lanes Blocked Ahead
 - vi. "X" Left, Right, or Center Lanes Blocked
 - vii. ◇ Lane Open to All
 - viii. ◇ Lane HOV Only

C. Variable Dynamic Message Sign (VMS)

1. Display
 - a. VMS Size is dependent on site conditions. Pixel matrix and the number of characters per line will vary dependent on location.
 - b. Pitch: 2.6 inches maximum
 - c. Color Display: Amber
 - d. 3 Lines of 12 to 21-18" Characters per Line
2. Messages
 - a. Message priority is:
 - 1st – Safety
 - 2nd – Incidents in order of severity
 - 3rd – Amber Alerts
 - 4th – Future Events
 - b. Tunnel and Express Lane VMS will operate separate from the ATM. At several locations ATM DMS will also be used for Tunnel messages. These DMS will be integrated into the Tunnel system. The Tunnel system messages will override ATM messages.
 - c. Message Types:
 - i. Within ATM Zones VMS will be used for congestion messages
 - ii. Accidents and disabled vehicles blocking or impeding traffic flow.
 - iii. Amber Alerts - In ATM Zones VMS in active ATM use will not show Amber Alerts. At other times they can be used for Amber Alerts.
 - iv. Emergency restrictions
 - v. I-90 Bridges – Closures and Openings
 - vi. SR-520 Bridge – Closures and Openings
 - vii. SR-520 Bridge – Wind Alerts

- viii. Tunnels – Flammable Material Restrictions
- ix. Supplement to construction activities
- x. Special Events – High Impacts
- xi. Advance notice for high impact closures
- d. ATM Messages (Message will need to be adjusted depending on VMS size.)
Appendix B shows a list of possible messages for the ATM corridors. Once the ATM sizes are identified these messages will be revised to fit within the actual VMS.

Typical messages

- i. Slow Traffic Ahead
- ii. Reduced Speed Zone
- iii. "X" Left, Right, or Center Lanes Blocked Ahead
- iv. "X" Left, Right, or Center Lanes Blocked
- v. ◇ Lane Open to All

VI. OPERATING CONDITIONS

A. General

1. Static signage stating "Entering Variable Speed Limit Zone" will be placed prior to entering the ATM Zone and on freeway to freeway ramps entering the ATM Zone.
2. All signs at one Display Group will be activated and de-activated at the same time.
3. All Display Groups in an implementation area will turn on sequentially from downstream to upstream.
4. Each lane will have a unique lane number within the ATM corridor.
5. Roadway geometrics in specific locations may require adjustment to the zone or data collection parameters.
6. All special operating cases will be approved by the NW Region Traffic Engineer.
7. Manual overrides occur when:
 - a. the automated system is not responding as it should;
 - b. conditions require an alternative display; or
 - c. WSP, WSDOT Maintenance, or WSDOT Northwest Region Traffic Engineer requests an alternative display.
8. All manual overrides are logged along with the reason for the override.
9. Lane control takes precedence over speed.
10. Speed
 - a. The maximum speed limit for an ATM zone is 60 mph.
 - b. The maximum and minimum speed limit can only be changed through a calendar action approved by the State Traffic Engineer.
 - c. The minimum automated speed limit display for an ATM zone is 35 mph.
 - d. The minimum manual speed limit display for an ATM zone is 30 mph.
 - e. All Speeds shown in an ATM Zone will be regulatory.
 - f. The speed shown will be in effect until either another set of signs show a different speed or the driver leaves the ATM zone.

- g. Speeds shown on SMS will be the same on both SMS at one Display Group.
- h. Speeds shown on the LCS will be the regulatory speed for that lane.
- i. Speed limits will generally be set near the 85th percentile speed which is derived from the average speed collected by detection and adjusted against a chart correlating 85th percentile speed with this average.
- j. The posted speed calculation will occur every minute.
- k. New speeds can be posted every minute.
- l. Speeds calculated within a congested area with a variance not exceeding 10 mph will be smoothed by posting an average speed through out the smoothed zone.
- m. Merging control zones: where 2 or more congested areas influence the same Display Group, the speeds displayed at the Display Group will be the lowest speed determined by any congested area.

B. Resting Condition

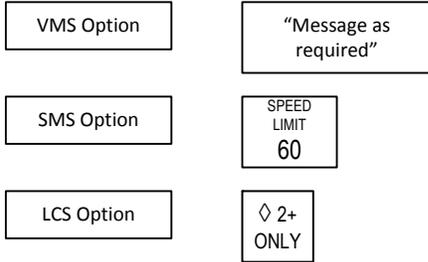
- 1. Selected SMS will display the default speed limit at a set spacing.
- 2. All other ATM signs will be blank, except:
 - a. DMS the operator has overridden
 - b. VMS being used for non-ATM messages.
 - c. LCS over a managed lane may show the HOV Lane Signage at a set spacing.
A list of signs with resting messages will be developed:
 - SMS showing default speed limit
 - LCS showing the HOV Lane Signage.

Resting Message Set & Gantry Layout

At set intervals: SMS - "Speed Limit" signage

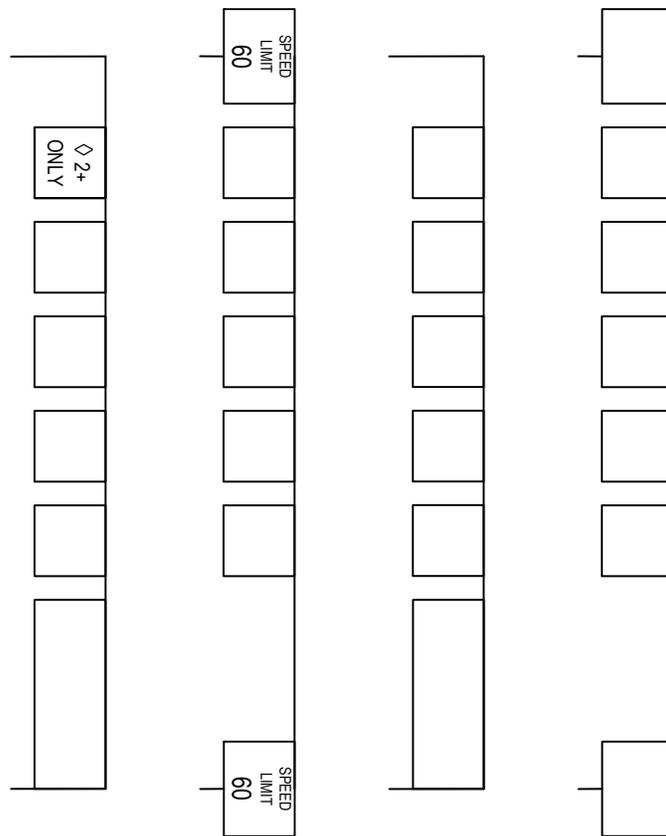
LCS "HOV" signage will be placed over the HOV lane(s), other lanes blank.

VMS - messaging as required



Direction of Travel →

Gantry Layout



C. Congestion

1. Congested Conditions – No Incident or Work Zone

- a. The speed reduction between Display Groups will be set using the ATM gradient strategy.
- b. The 1st Display Group upstream of the Congestion will show “Slow Traffic Ahead” on the SMS or VMS.
- c. If a full reduction step is not required:
 - i. the Display Group closest to the congestion point will show the full step
 - ii. the Display Group farther upstream from the congestion point will show the partial step.
- d. If the optimal number of Display Groups is not available, the available upstream Display Groups will be used, following the scenario rules.
- e. All LCS will be used in a congested area, according to the local conditions or in a step down (i.e. speeds will be shown at every Display Group in the congested area).
- f. LCS on the first Display Group downstream of the congested area will display the default speed limit. Display Groups downstream will follow the “Resting Condition” protocol.
- g. The system will use these rules to follow the congested point up and down the freeway.

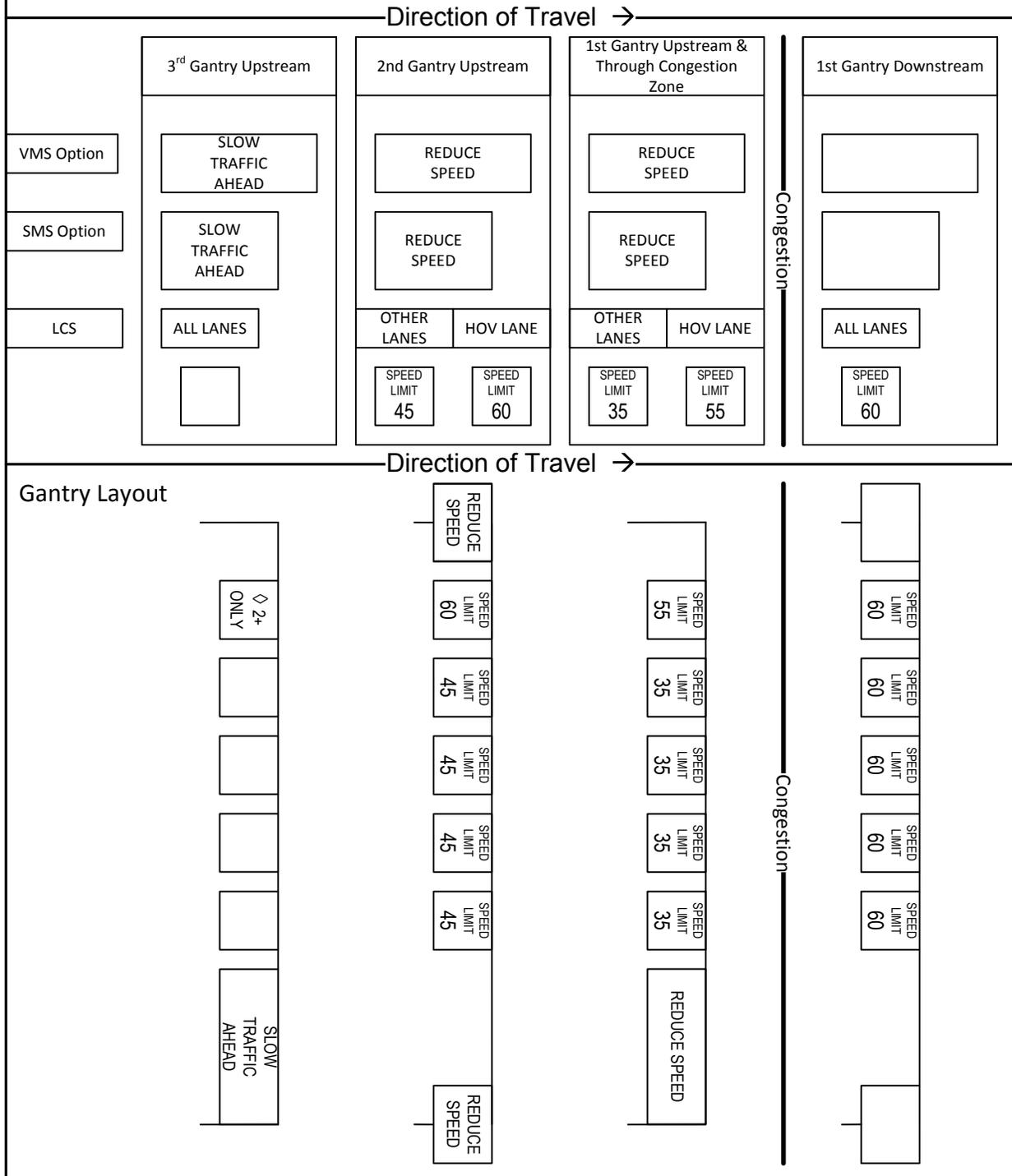
2. HOV Managed Lane – Speed Differential

- a. When speeds are reduced in a congested zone, the ML will show a speed equal to the speed on the adjacent (open) GP lane plus the adjustable ML speed differential value.

Congestion Message Set & Gantry Layout

Automatic: Congestion is detected
 Regulatory speeds are separately calculated for HOV lane and for other lanes.
 Messages are generated.

HOV Speed Differential: Speeds posted for HOV lane are never higher than 20 MPH + the displayed speed for the remainder of the lanes.



E. Incident

1. Single-Lane & Multi-Lane Closure – No Congestion

- a. Speeds will not be reduced.
- b. 1st Display Group upstream of the incident:
 - i. LCS over blocked lane(s) will display a Red "X".
 - ii. LCS over other lanes will display a Green "↓".
 - iii. SMS/VMS will display "x" (R), (L), (Center) "x" Lane(s) Blocked" message.
- c. 2nd Display Group upstream:
 - i. LCS over blocked lane(s) will display a Yellow "X".
 - ii. LCS over other lanes will display a Green "↓".
 - iii. SMS and/or VMS will display "'x" (R), (L), (Center) Lanes Blocked Ahead" message.
- d. 3rd Display Group upstream from a lane closure:
 - i. LCS over the blocked lane(s) will display "Merge with an arrow showing the lane(s) traffic should move into".
 - ii. LCS over other lanes will display a Green "↓".
 - iii. SMS/VMS will display "'x" (R), (L), (Center) Lanes Blocked Ahead" message.
- e. When multiple right (or left) lanes are blocked and there is an right (or left) exit ramp upstream of the incident, in order to allow traffic to exit the Operator can manually enter:
 - i. SMS adjacent to the exit lane to show "Right (Left) Lane Exit Only".
 - ii. LCS over the "exit only" lane on the two Display Groups upstream from the incident to show a yellow "X" and a red "X" between the exit ramp and the incident.

2. Single Lane & Multi-Lane Incident – With Congestion

- a. The ATM system will automatically detect the congestion and will use congested scenario rules to step down speeds approaching the congestion.
- b. When the incident is detected by an operator, the Operator will manually enter the blocked lane and the incident messages will automatically be generated on the first three Display Groups upstream of the incident.
- c. Lane control has priority over speed reduction.
- d. First Stage – ATM system detects incident generated congestion and automatically generates the following:
 - i) 1st Display Group upstream from incident generated congestion:
 - (1) LCS will show stepped down speed limit.
 - (2) SMS/VMS will display "Reduce Speed".
 - ii) 2nd Display Group upstream from incident generated congestion:
 - (1) LCS will show stepped down speed limit.
 - (2) SMS/VMS will display "Reduce Speed".
 - iii) 3rd Display Group upstream from a lane closure:
 - (1) LCS will be blank.
 - (2) SMS/VMS will display "Slow Traffic Ahead".

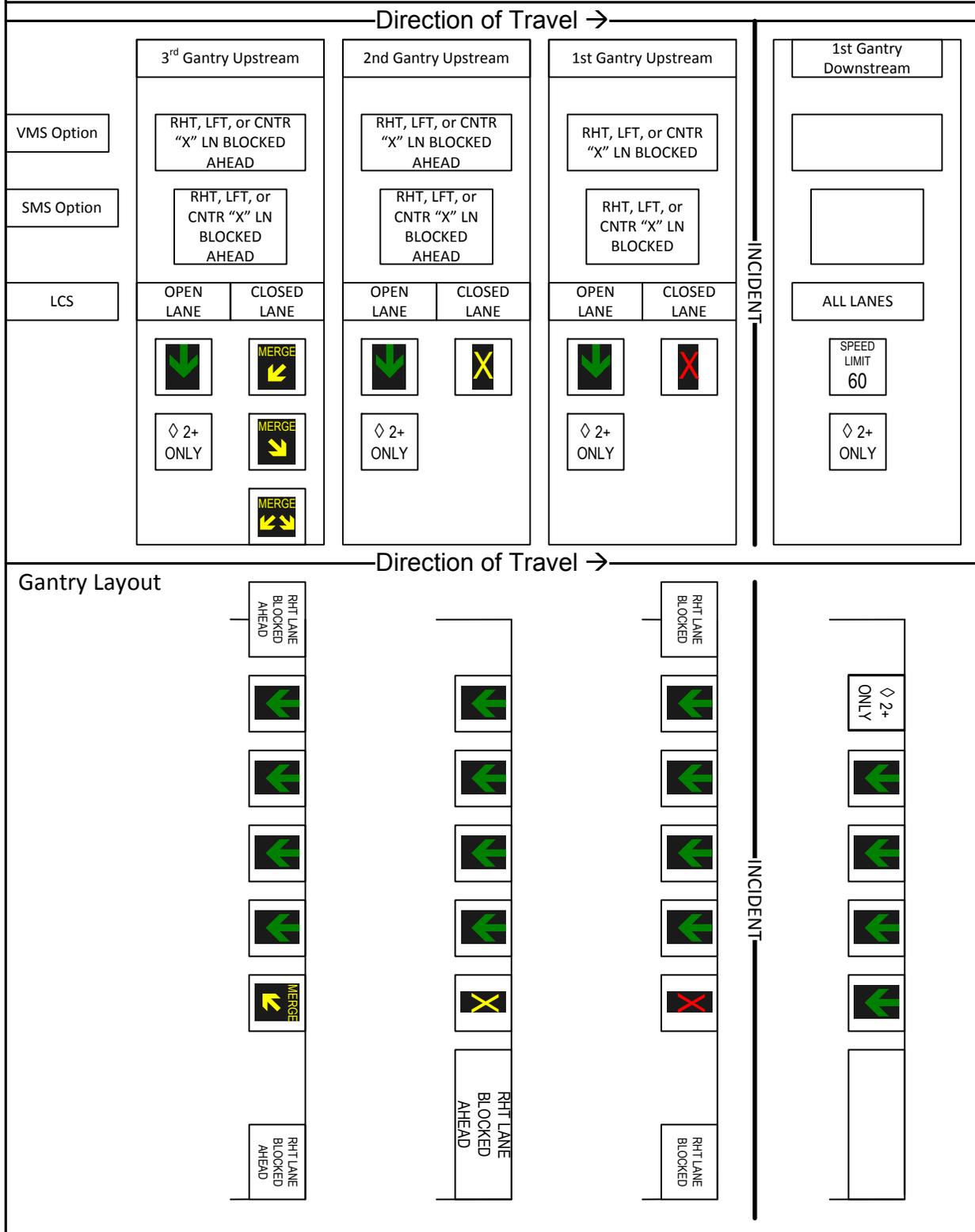
- e. Second Stage – the Operator identifies and enters blocked lanes into the ATM system:
 - i) 1st Display Group upstream from blocked lane(s):
 - (1) LCS over the blocked lane(s) will have a Red "X".
 - (2) LCS over open lane(s) will have a Green "↓".
 - (3) SMS/VMS will display "x" Right, Left, or Center Lane(s) Blocked "
 - ii) 2nd Display Group upstream from blocked lane(s):
 - (1) LCS over blocked lane(s) will have a Yellow "X".
 - (2) LCSs over lanes remaining open will have a Green "↓".
 - (3) SMS/VMS will display "x" Right, Left, or Center Lane(s) Blocked Ahead".
 - iii) 3rd Display Group upstream from a lane closure:
 - (1) LCS over blocked lane(s) will display "MERGE" with a yellow arrow pointing to the lane traffic should move into.
 - (2) SMS/VMS will display "x" (Right, Left, or Center Lane(s) Blocked Ahead".

- f. When multiple right lanes are blocked and there is a right-hand exit ramp upstream of the incident (or left lanes blocked with left hand exit open) in order to allow traffic to exit the Operator can manually enter:
 - i. "Right (Left) Lane Exit Only" on SMS adjacent to the exit lane.
 - ii. Yellow "X" over the "exit only" lane at the Display Groups from the Display Group with the first yellow symbol up to the exit ramp.
 - iii. Red "X" over the blocked "exit only" lane at Display Groups between the exit ramp and the incident.

Incident w/o Congestion Message Set & Gantry Layout

Manual: Operator identifies blocked lane(s) and sets time value

Automatically: Messages are generated.



Incident w/Congestion Message Set

Lane control takes precedence over speed displays

1st Stage

Automatically: Congestion is detected & Messages are generated.

2nd Stage

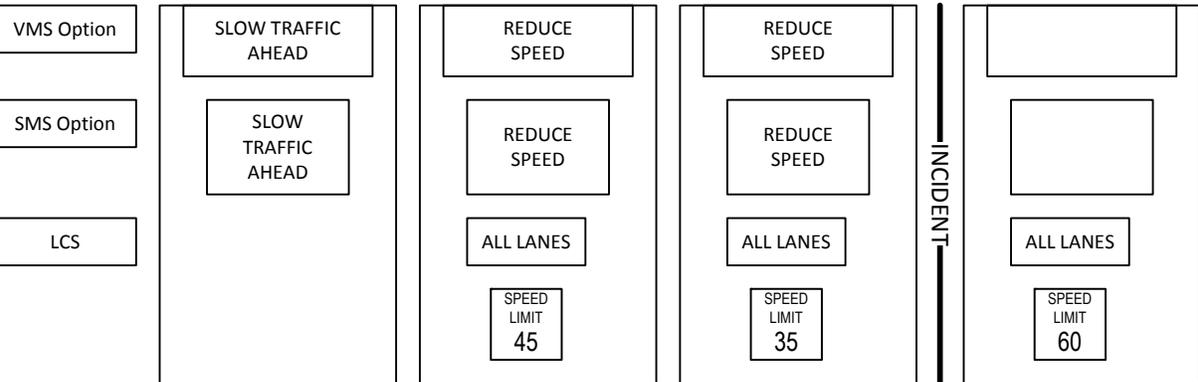
Manual: Operator identifies blocked lane(s) & sets time value w/option to extend

Gantry Layout

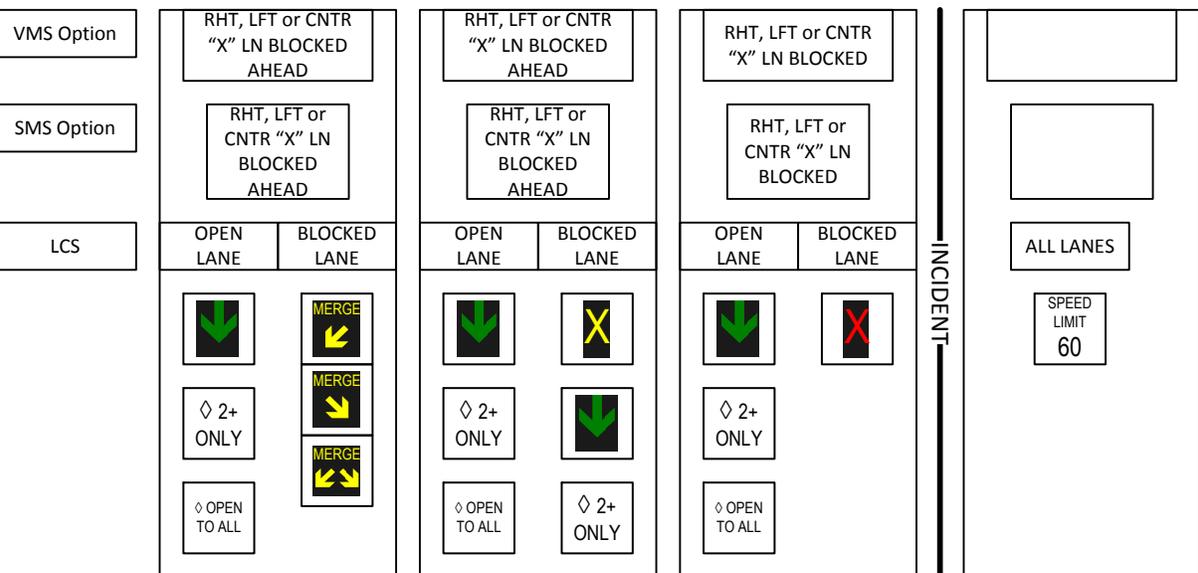
Direction of Travel →



1st Stage



2nd Stage



F. Work Zone (Maintenance and Construction) & Shoulder Closures

1. Assumptions

- a. ATM supplements positive work zone traffic control.
- b. All work zone speed reductions will be pre-approved and planned events.
- c. All Work Zone speed limits will be authorized by the Region Traffic Engineer and will be regulatory.
- d. Work Zone speed limits are entered in as maximum speed values. The ATM system will be restricted from posting speeds higher than the Work Zone speed limits.
- e. If congestion is detected within a Work Zone the ATM system will calculate and display lower speed limits based on the congestion rules.
- f. Work Zone Signage is the same as for Incident signage. The Operator will enter the lane(s) as blocked from the downstream end of the taper.
- g. The Operator will enter in the lanes which are blocked and the rest of the messages will be automatically generated.

2. Shoulder Closures

- a. Shoulders will be identified in the ATM system as right and left shoulders.
- b. Shoulder closures can occur when events such as: WSP pulls over a vehicle; an IRT vehicle is in the shoulder providing assistance; a disabled vehicle is in the shoulder; barrels have been left in the shoulder; or a maintenance activity is occurring in the shoulder such as sign maintenance; shoulder cleaning; or guard rail repair.
- c. When a shoulder is blocked the Operator will enter the start and end of the shoulder closure into the system and a set of shoulder closure messages will be shown.
- d. A decision will be made if differential speeds will be shown on the LCS over the lane adjacent to the closed shoulder. The Operator will enter the maximum reduced speed into the ATM system for the reduced speed limit lane.
- e. LCS over the reduced speed lane will show the maximum reduced speed.
- f. LCS over the other lanes will show the default corridor speed limit.
- g. VMS and/or SMS will show "Shoulder Closed" messages.
- h. If congestion is detected or an incident occurs the congestion or incident rules will take precedence.

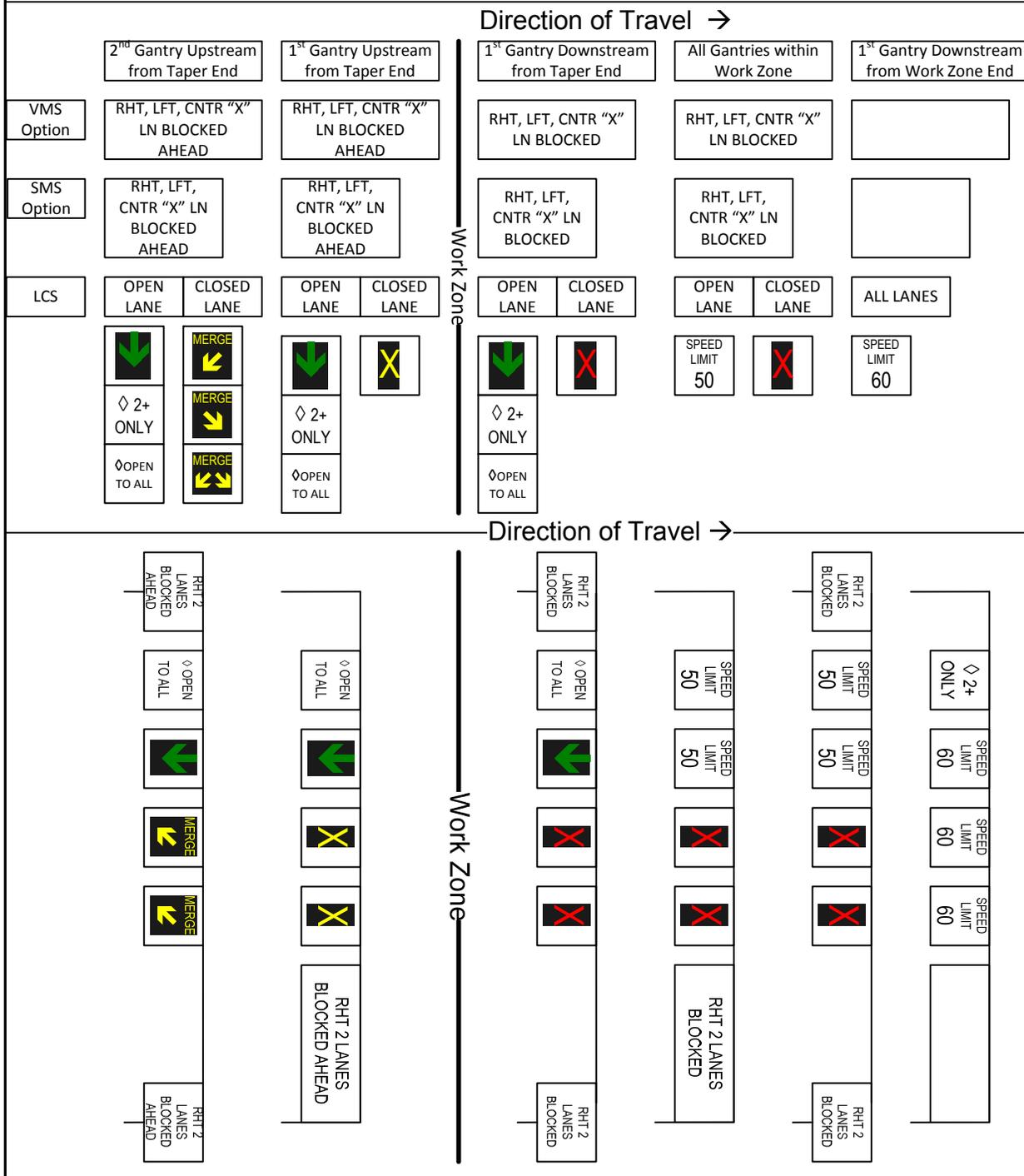
Work Zone Message Set & Gantry Layout

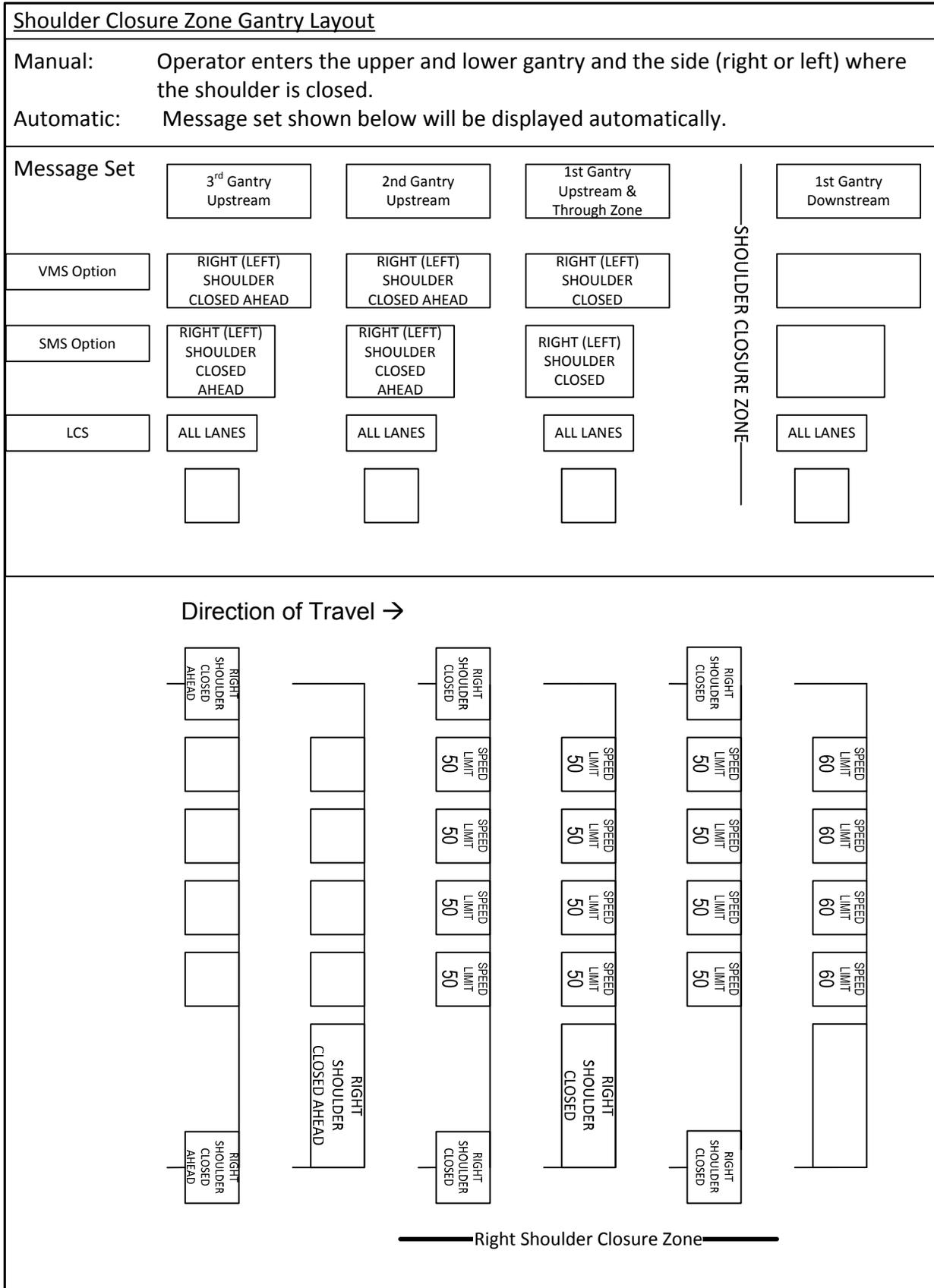
Supplements Work Zone Static Signing.

If Congestion is detected it will override Work Zone speeds.

If an Incident is detected the Operator will show the additional lanes as blocked.

Manual: Operator identifies blocked lane(s).
 Operator sets maximum speed limit value w/time value.
 Gantries after the gantries with red "X"s will show the Work Zone Speed Limit.





G. *Special Cases*

1. Situational Adjustments – Roadway geometrics (exit lanes backing up onto the freeway; curves; tunnels; bridges) in specific locations may require parameter adjustments specific to a given location. These locations will require adjustments to the software parameters within the automated module in the software. All "Situational Adjustments" will be pre-defined and approved by the NW Region Traffic Engineer.
2. Weather Speed Limit Reduction – WSP, WSDOT Maintenance, or the TMC supervisor may request a reduction in the maximum posted speed limit based on snow, ice, wind or other weather conditions. The request will be reviewed by the region Traffic Engineer or delegate during the winter weather event. If approved the signs will be posted with the reduced maximum speed limit. In a weather event, speed limits will not be posted below 30 mph. A weather speed reduction will be canceled when conditions improve with coordination with WSP and approval by the NW Region Traffic Engineer or delegate.

H. *Failure Scenarios*

Automated Failure Operations –are automated features built into the ATM software to deal with failure in equipment, loss of power, and loss of communications.

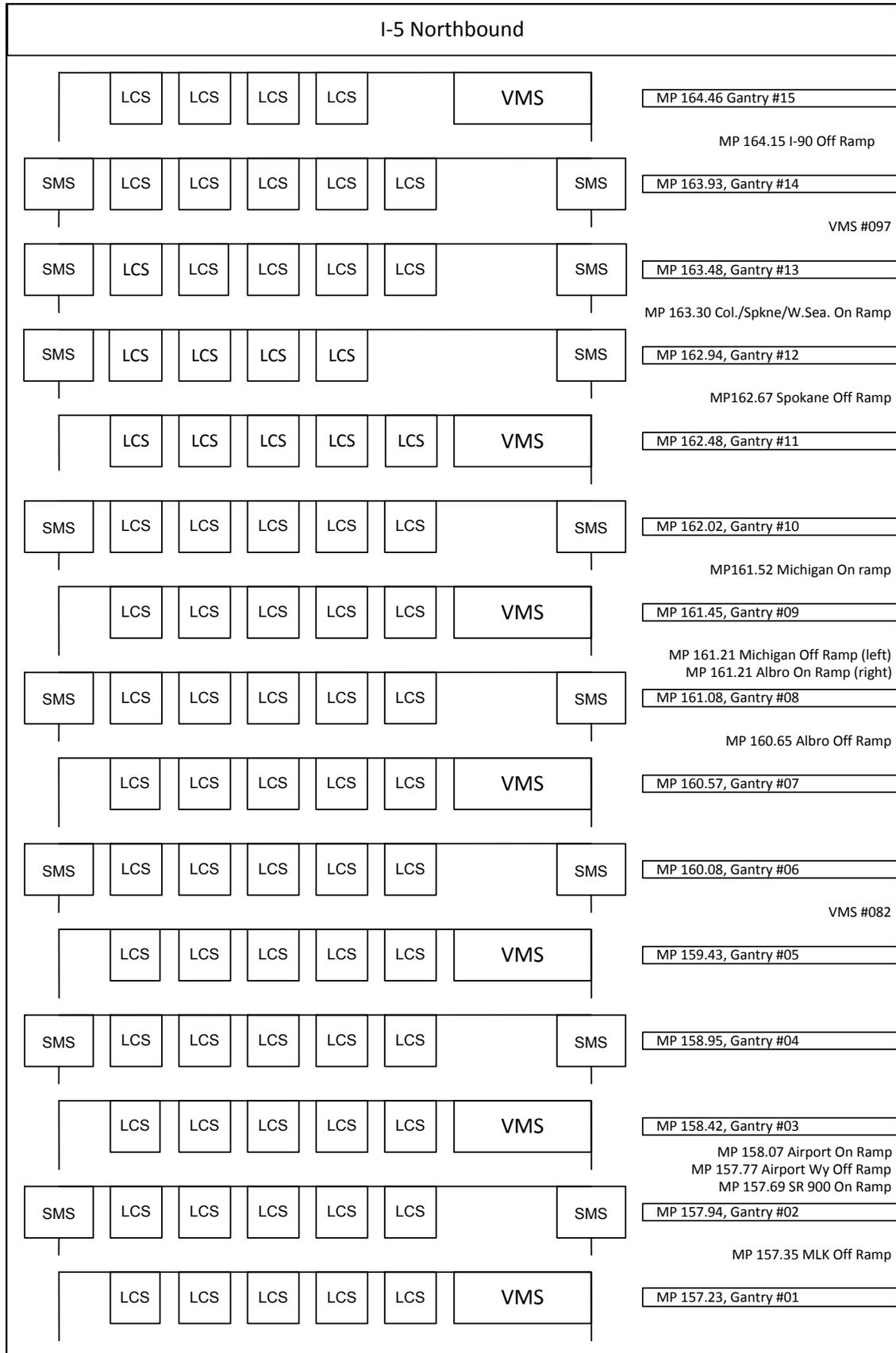
Scenario	Action
All DMS at a Display Group fail due to a localized failure:	The messages for that Display Group won't be shown.
All DMS at two or more adjacent Display Groups fail:	Continue using the remaining Display Groups in the system.
SMS at a Display Group fails:	The messages for that SMS won't be shown.
VMS fails at a Display Group:	The messages for that VMS won't be shown.
All LCS except one LCS at a Display Group fail:	Use operable LCS(s).
Communication from the TMC to a sign fails:	The sign(s) shall revert to the pre-programmed message after a adjustable interval of time.
Communications between controller and sign fail:	If the controller cannot control the sign the sign will remain as is until maintenance switches the power off.
Power Failure	All signs will go blank.

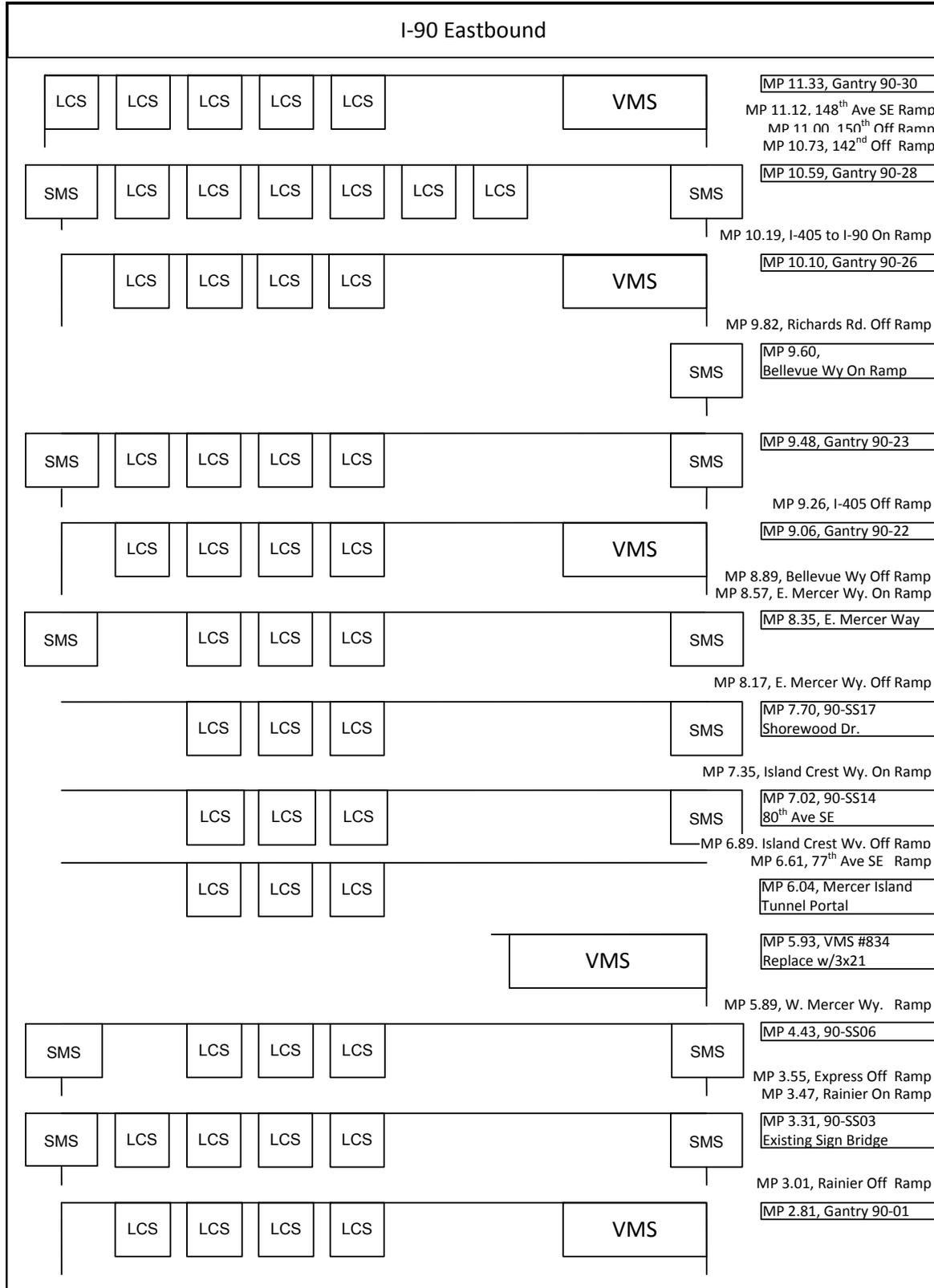
Speed Detection Failures

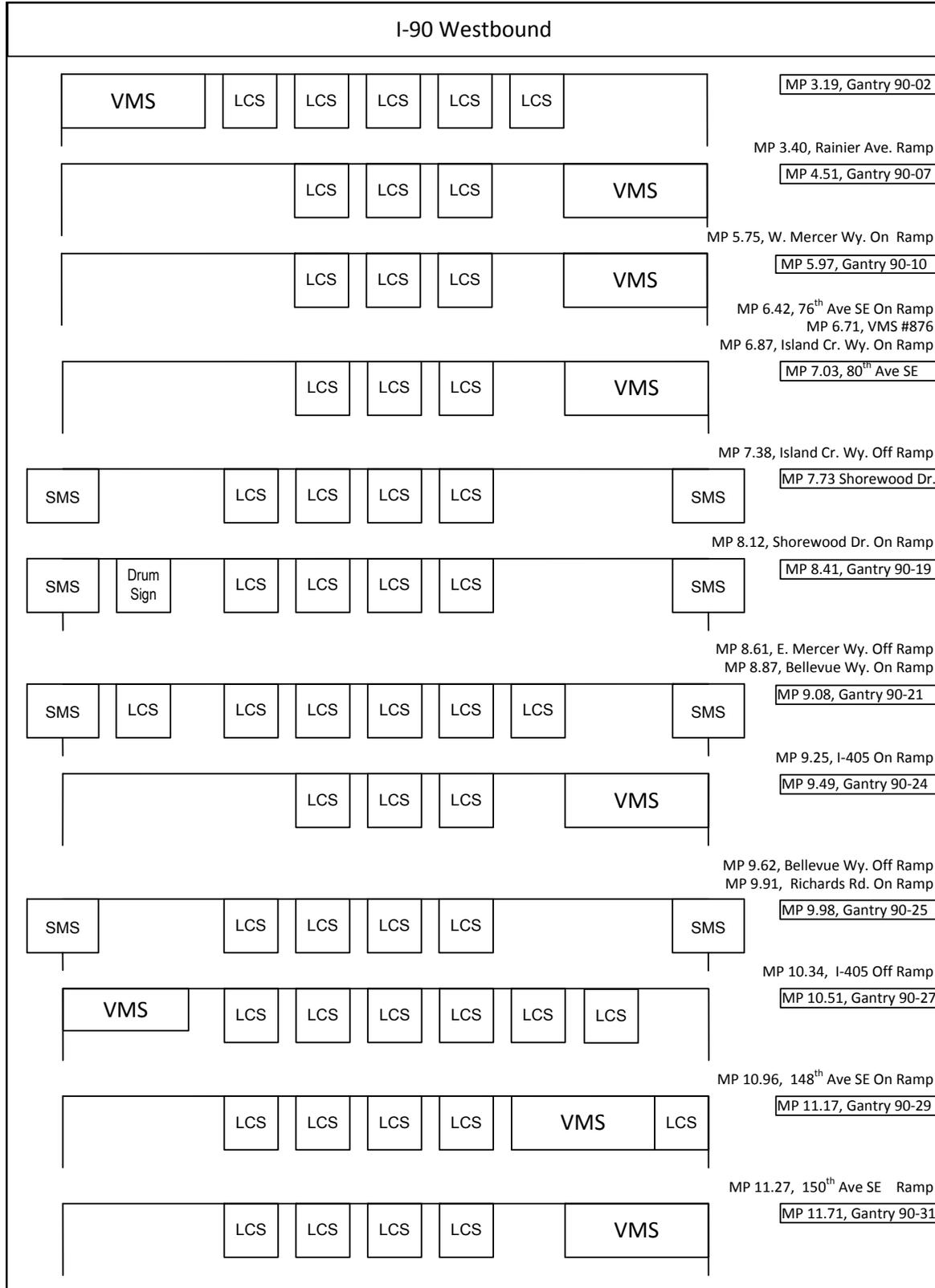
Scenario	Action
Speed Detection Failure – one or more detectors in a zone. (But not all.)	If any number of detectors in a zone fail the remaining detectors will be used to calculate the speed in the zone. This speed will be figured into the algorithm and appropriate speed displayed on the signs.
Speed Detection Failure – all detection in a zone.	The speed calculated will be the average between the next upstream and next downstream speed zone. This speed will be figured into the algorithm and the appropriate speed displayed on the LCS.
Speed Detection Failure - two or more zones.	The speed in these zones will be the default speed, 60 mph. unless adjusted lower based on downstream or upstream conditions. If 2 or more zones are failed for a long period of time a "Manual Override" speed may be put in place. This "Manual Override" will be preapproved by the NW Region Traffic Engineer or delegate.
Displayed speed is not relevant to the speeds observed on the roadway.	Operator will manually override the system and post a speed relevant to the observed speed on the roadway. The system will step up the speed upstream from the manual entry. The speed will supersede all speed protocols and will be in place until removed by the operator.

VII. SIGN LAYOUTS

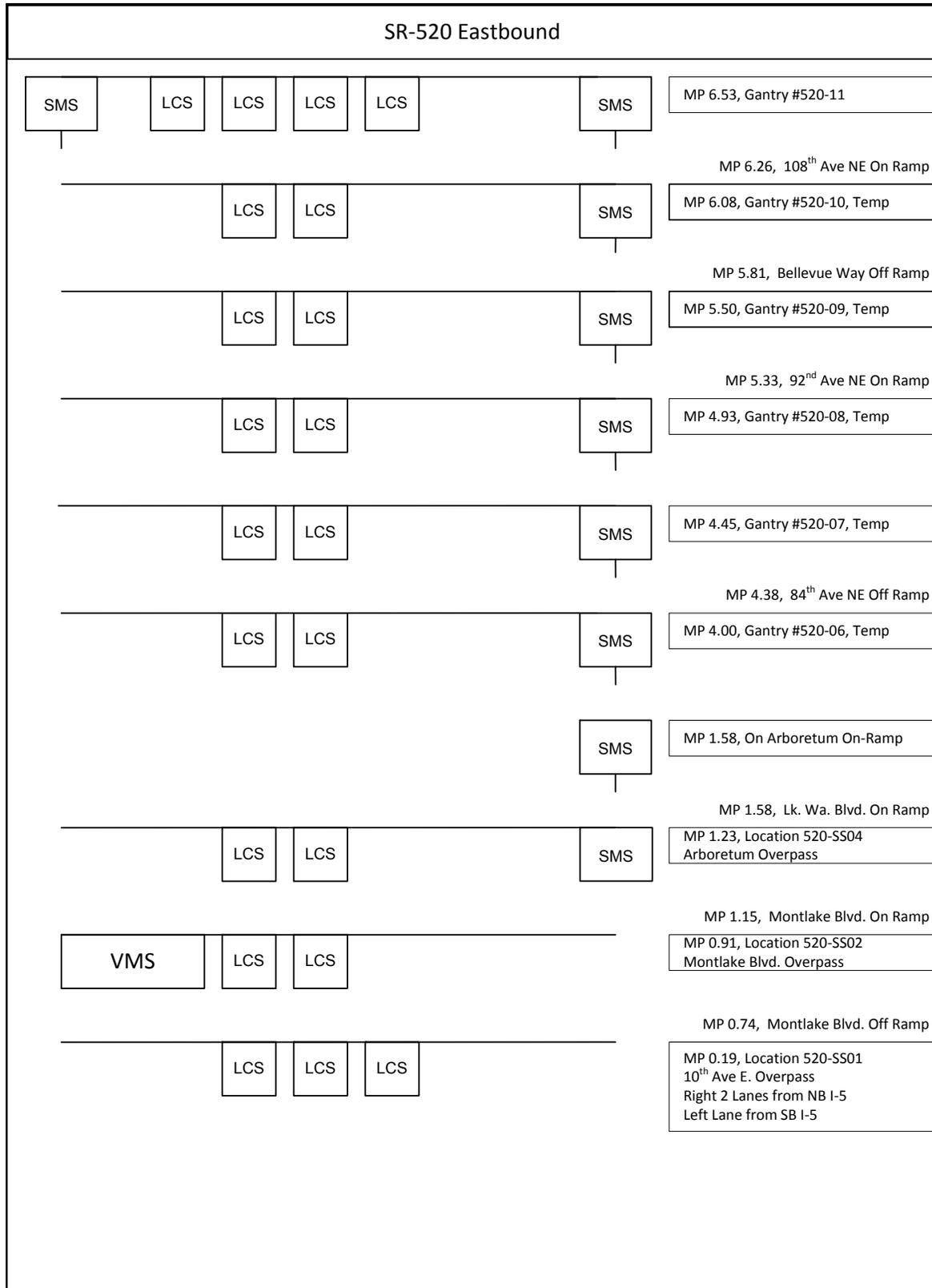
The following Sign Layouts will be updated to reflect the final configuration as the ATM system is designed and constructed.

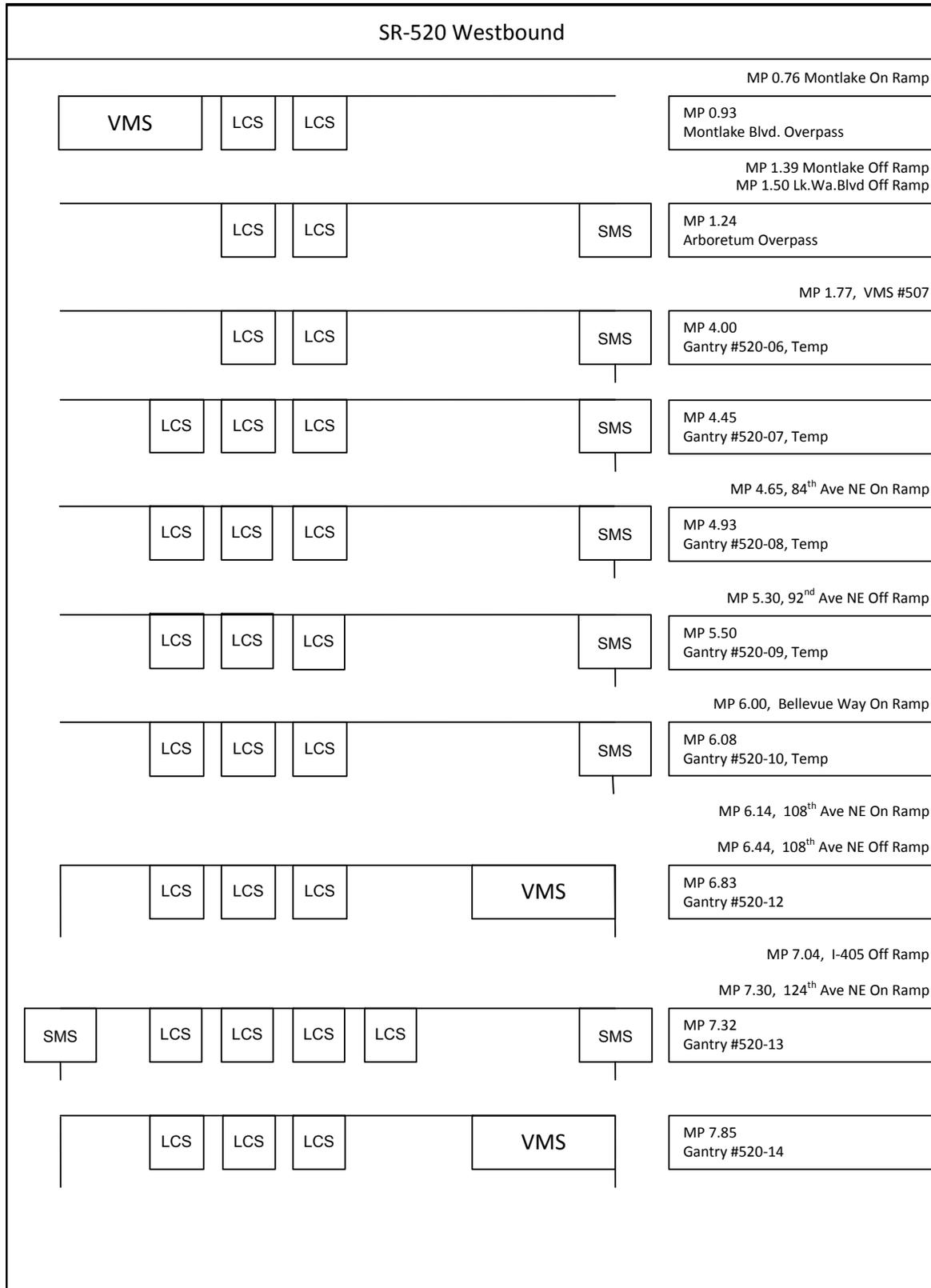






Direction of Travel →





Direction of Travel →

VIII. CONCLUSION

This document outlines the standard operating procedures for the ATM system. As with any operating procedure, emergency conditions may require adjustments or short term changes. If a change is necessary, coordination with the Region Traffic Engineer or NW Region EOC will be adequate assurance for safe operations of the ATM system.

This document is intended as an overview of specific ATM procedures. These ATM procedures will not be stand alone procedures, but will be integrated with existing TMC procedures. The ultimate procedural document will be the TMC procedures. These ATM procedures will be kept to provide guidance in design and deployment of the system but ultimately may no longer be kept when integrated into the TMC procedures.

IX. ACCEPTANCE AND APPROVALS

Approval History		
Version	Date	Approval - Signature