DEPARTMENT OF TRANSPORTATION

Development of a Road Condition Recovery Time Estimation System for Winter Snow Events

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16. Abstract (Limit: 250 words)

This research develops a Normal Condition Regain Time (NCRT) estimation system, which automatically determines the NCRT at detector stations on the metro-freeway network for given snow events. The NCRT process is based on the findings that the speed level during the recovery process reaches a stable free-flow-speed (FFS), whose value is generally lower than the pre-snow FFS at a same location. Further, the speed-density (U-K) relationship of the traffic flow after snow is cleared exhibits a similar but shifted-down pattern of the normal-day U-K relationship at a given location. In this study, the after-snow traffic condition with a stable but shifted-sown pattern of the normal-day U-K relationship is defined as the 'wet-normal' condition, and the NCRT is defined as the time when the U-K data during a snow event starts to follow the wet-normal U-K pattern at a given station. The NCRT estimation system first collects the traffic and weather data for the metro-freeway network and determines the normal-day U-K relationships for the detector stations whose traffic data include both uncongested and congested regions. The normal-day U-K relationships are then applied to calibrate the wet-normal U-K patterns at given locations using the traffic data collected during snow events. Finally, the NCRTs are determined for each station by comparing the U-K data trajectory during a given event with the wet-normal U-K pattern at given locations. The NCRT estimation system has been applied to a set of the sample snow events.

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DEVELOPMENT OF A ROAD CONDITION RECOVERY TIME ESTIMATION SYSTEM FOR WINTER SNOW EVENTS

FINAL REPORT

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EXECUTIVE SUMMARY

Assessing the efficiency of the winter snow operations requires the capability to accurately determine the status of the traffic conditions during snow events. Currently, most state agencies rely on the visual inspections of the field crew to determine the time to bare pavement (TBP), one of the most widely used performance measures for winter maintenance operations. However, the issues with the subjectivity and inconsistencies inherent with human-based measurements restrict the effectiveness of such visually determined TBPs in assessing the performance of snow-management strategies. The previous phases of this research analyzed the traffic-flow patterns under snow conditions and developed a prototype process to determine the traffic data-based alternative measures for winter snow operations. The current research expanded the previous research efforts and develops a system that can automatically estimate the normal condition regain times (NCRTs) at the detector stations on the metro-freeway network for given snow events. The NCRT estimation process developed in this study is based on the findings that the speed level during the recovery process reaches a stable free-flow-speed (FFS), whose value is generally lower than the pre-snow FFS at a same location. Further, the speed-density (U-K) relationship of the traffic flow after snow is cleared exhibits a similar but shifted-down pattern of the normal-day U-K relationship at a same location. In this study, the after-snow traffic condition with a stable but shifted-sown pattern of the normal-day U-K relationship is defined as the 'wet-normal' condition and the NCRT is defined as the time the U-K data during a snow event starts to follow the wet-normal U-K pattern at a given location. The NCRT estimation system developed in this study first collects the traffic and weather data for the metro-freeway network and determines the normal-day U-K relationships for the detector stations whose traffic data are available. The normal-day U-K relationships are then applied to calibrate the wet-normal U-K patterns at given locations for given events and the NCRTs are determined for each station. The NCRT estimation system has been applied to a set of the sample snow events and the NCRT for each detector station are determined for each event.

CHAPTER 1: INTRODUCTION

1.1 BACKGROUND AND RESEARCH OBJECTIVES

Efficient recovery of the normal traffic conditions during snow events is one of the key objectives for winter road-maintenance operations. To achieve such an efficient recovery operation, the capability to accurately determine the road-traffic conditions responding to snow-management strategies is of critical importance. While the "time to bare pavement (TBP)" has been commonly used to measure the efficiency of winter snow operations, most state DOTs have been relying on the visual inspections of the field crew, whose inherent subjectivity and inconsistency limit the applicability of TBP in assessing the effectiveness of snow-management strategies (1-5).

The previous phases of this research analyzed the traffic-flow patterns under normal and snow conditions. Based on the analysis results, a prototype process was developed to determine traffic data-based alternative measures for winter snow operations (6-7). The current research expands the previous research efforts and develops a system that can automatically estimate the road condition recovery times at the detector stations on the metro-freeway network for given snow events. The specific objectives of the Normal Condition Regain Time (NCRT) Estimation System include:

- Collection and management of large amount of traffic, weather and incident data for the metro-freeway network from external databases.
- Identification of target detector stations and calibration of normal speed-recovery functions using traffic-flow data under normal-weather conditions.
- Estimation of normal condition-regain times at detector stations for snow events.

The rest of this report describes the details of the NCRT estimation system developed in this research and its example application results.

1.2 REPORT ORGANIZATION

Chapter 2 includes the detailed description of the structure and the internal designs of the main modules in the NCRT estimation system, which uses the traffic data collected from the traffic detectors under both normal and snow conditions. The development of the user interface is described in Chapter 3 including the data input and output generation modules with sample output graphs. Chapter 4 discusses the results from an example application of the NCRT estimation system for the past snow events. Finally, Chapter 5 includes the conclusions and future research needs.

CHAPTER 2: DEVELOPMENT OF STRUCTURE AND MAIN MODULES OF THE NCRT ESTIMATION SYSTEM

2.1 OVERVIEW OF NCRT ESTIMATION SYSTEM ARCHITECTURE

The Normal Condition Recovery Time Estimation System (NCRTES) developed in this study adopts the server-client architecture whose main modules are shown in Figure 2.1. As noted in this figure, the data input-output procedures are handled by the client module, while the server module performs the data management, normal condition regain time (NCRT) estimation and report generation. In this study, the graphical user-interface of the client module is developed in Java and all the computation/processing modules are written in Python along with the SQLite, which is used to develop the internal data-repository to store all the data needed for NCRT estimation. The specific types of the input data required for NCRTES and its output information are as follows:

User Input Data

- Truck route configuration, i.e., list of the detector stations on each snow-truck route.
- Snow-event information, e.g., snow start/end times for a given event.
- Time period for collecting data to calibrate the normal speed-recovery function at each detector station.

Input Data from External Sources

- Freeway geometry and traffic detector data from the IRIS server at Regional Transportation Management Center (RTMC), MnDOT.
- Weather data from NOAA ISD archive and RTMC weather sensors.

Output information

- Normal-condition regain times for target detector stations on given corridors for given snow events.
- Posted speed-limit and free-flow speed recovery times at non-target stations.
- Speed levels at each target station during snow event.

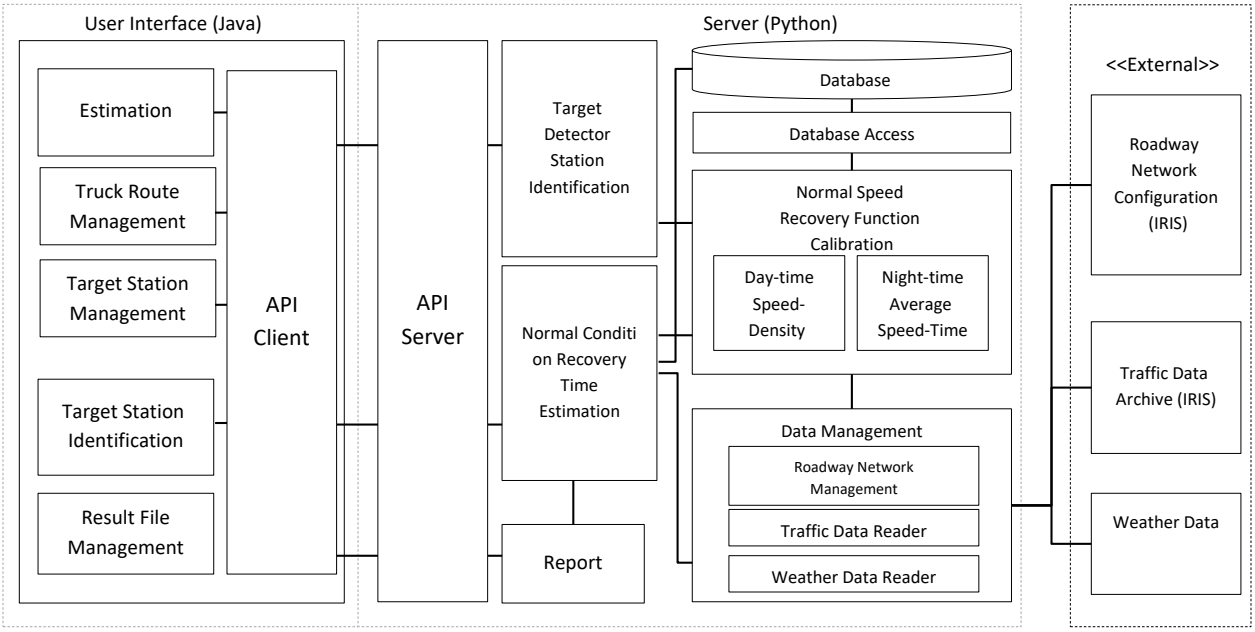


Figure 2.1 Architecture of the NCRT Estimation System

2.2 DEVELOPMENT OF DATA MANAGEMENT MODULE

Figure 2.2 shows the structure of the *Data Management Module* (DMM) interacting with the other main modules and the external data sources. As shown in this figure, three types of the external data are used for the NCRT estimation system, i.e., roadway-infrastructure configuration data, traffic-flow data from the detectors and the weather-data from NOAA. In this study, three submodules have been developed to read and manage those different types of the external data, i.e., *Roadway Infrastructure Configuration*, *Traffic Data Management* and *Weather Data Management* submodules.

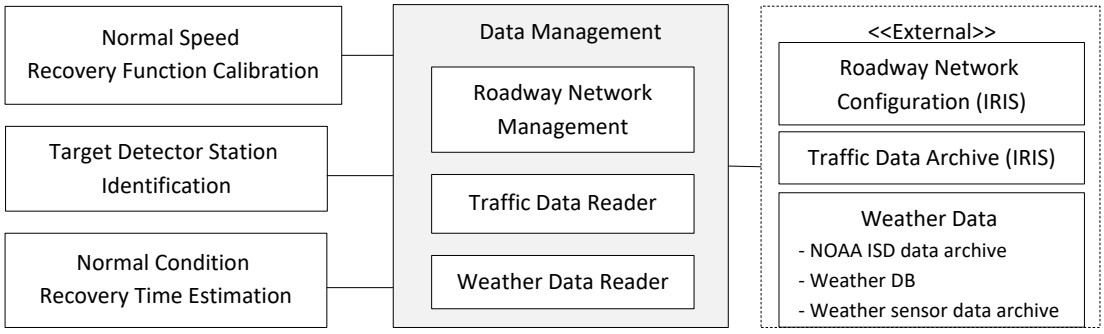


Figure 2.2 Relationship among Data Management Module and other Modules

The *Roadway-Infrastructure Configuration* (RIC) module imports the freeway-network configuration data, provided by IRIS in a XML format, and organizes them in specific formats appropriate for estimating the NCRT values for given snow events. The network-configuration data includes the IDs/locations of the

detectors/stations, entrance/exit ramps and their association information to individual freeway corridors. In this study, a set of the objects were created to represent the roadway-infrastructure of the metro freeways and the imported information are stored in a hierarchical manner.

The *Traffic Data Management* (TDM) module remotely accesses the traffic-data archive, managed by IRIS, and reads the traffic-flow data, such as flow rate, speed and density, from the individual detectors on the metro freeways. The traffic-flow data are then stored in the format to be used by other modules, such as the recovery-speed calibration module and the NCRT-estimation module.

The *Weather Data Management* (WDM) module is developed to read four different types of the road-weather data sources depending on their availability for given snow events. They include:

- NOAA (http://www.noaa.gov),
- SCANWeb site (http://rwis.dot.state.mn.us),
- RWIS database locally stored at MnDOT,
- The weather-sensor data archived by IRIS/RTMC.

2.2.1 Roadway Network Management Module

Figure 2.3 shows the internal structure of the *Roadway-Infrastructure Configuration* (RIC) module that consists of the *Infra-Data Loader* and *Infra-Data* modules. The *Infra Data Loader* reads a XML file containing the roadway-infrastructure information provided by IRIS. The infrastructure data available from a XML file includes the location/association information of detector stations, ramps, meters, DMSs and cameras on each freeway corridor in the Twin Cities' metro-freeway network. Figure 2.4 shows a sample XML file, where all the infrastructure data are organized in a structured manner. Tables 2.1-2.3 include the data types, i.e., classes, used in the RIC module. These data types are defined in the *Data-Type* module, which includes all the data types for the *Data Management Module* developed in this study. The infrastructure data loaded and organized by the *Infra-Data Loader* module are sent to the *Infra-Data* module, where all the infrastructure data can be accessed by other modules in the NCRTES.

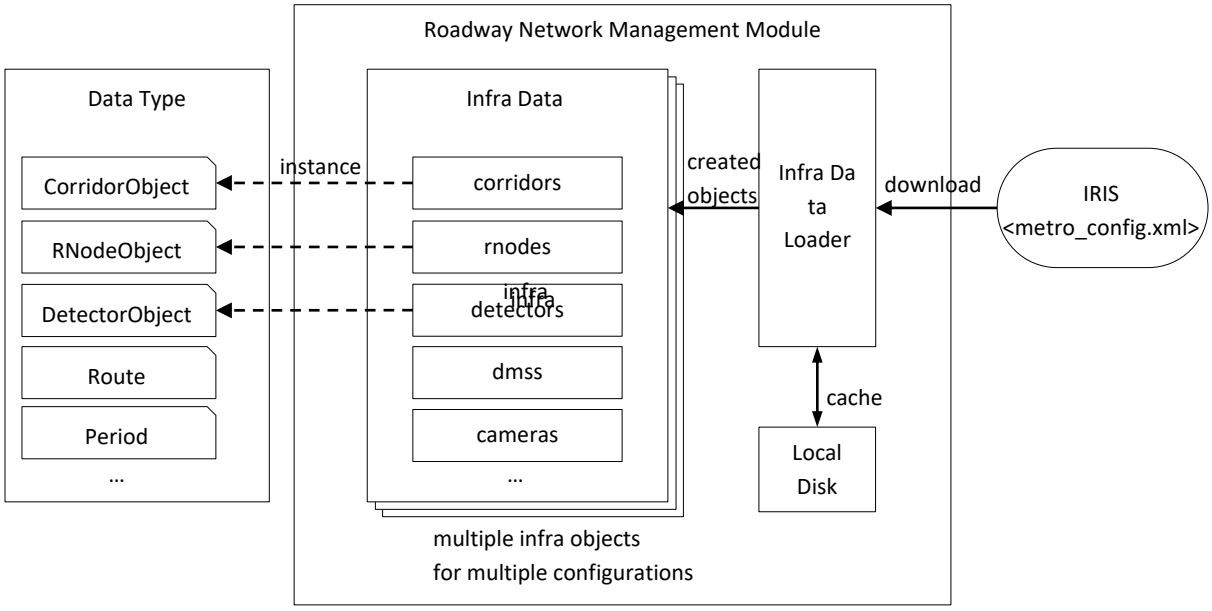


Figure 2.3 Structure of Roadway Infrastructure Configuration Module

```
<?xml version='1.0' encoding='UTF-8'?>
<tms_config time_stamp='Sun Jan 24 20:00:07 CST 2016'>
<corridor route='I-35' dir='NB'>
  <r_node name='rnd_1534' label='S of 210th St' lon='-93.29622' lat='44.64328' lanes='2' shift='6' s_limi
  <r_node name='rnd_95767' n_type='Entrance' transition='Loop' label='210th St EB' lon='-93.29595' lat='4
    <detector name='6743' label='35/EB210StNM' category='M' controller='35-81.84'/>
  </r_node>
  <r_node name='rnd_95210' station_id='S1585' label='210th St' lon='-93.29594' lat='44.64501' lanes='2' s
    <detector name='6741' label='35/210StN1' lane='1' field='40.0' controller='35-81.84'/>
    <detector name='6742' label='35/210StN2' lane='2' field='27.5' controller='35-81.84'/>
  </r_node>
  <r_node name='rnd_95021' n_type='Entrance' transition='Leg' label='210th St WB' lon='-93.29569' lat='44
    <detector name='6744' label='35/WB210StNM' category='M' controller='35-81.84'/>
  </r_node>
  <r_node name='rnd_95039' station_id='S1586' label='205th St' lon='-93.29447' lat='44.6534' lanes='2' sh
    <detector name='6745' label='35/205StN1' lane='1' field='39.0' controller='35-82.38'/>
    <detector name='6747' label='35/205StN2' lane='2' field='29.0' controller='35-82.38'/>
  </r_node>
  <r_node name='rnd_95023' station_id='S1587' label='205th St' lon='-93.29442' lat='44.65369' lanes='2' s
    <detector name='6746' label='35/205StNV1' category='V' lane='1' field='35.0' controller='35-82.38'/>
    <detector name='6748' label='35/205StNV2' category='V' lane='2' field='29.0' controller='35-82.38'/>
  </r_node>
  <r_node name='rnd_95027' station_id='S1588' label='195th St' lon='-93.29389' lat='44.66636' lanes='2' s
    <detector name='6749' label='35/195StN1' lane='1' field='35.0' controller='35-83.36'/>
    <detector name='6750' label='35/195StN2' lane='2' field='27.0' controller='35-83.36'/>
  </r_node>
  <r_node name='rnd_1650' label='N of 195th St' lon='-93.29391' lat='44.67153' lanes='2' shift='6' s_limi
  <r_node name='rnd_95025' n_type='Exit' transition='Leg' label='Co Rd 60' lon='-93.29353' lat='44.67717'
    <detector name='6751' label='35/CR60NX' category='X' controller='ctl_60984'/>
  </r_node>
  <r_node name='rnd_95037' n_type='Entrance' transition='Loop' label='Co Rd 60 EB' lon='-93.2933' lat='44
```

Figure 2.4 A sample XML file

Table 2.1 Member variables of CorridorObject in Data-Type module

Name	Type	Description
name	str	corridor name (e.g. I-35 (NB))
route	str	route of corridor (e.g. I-35)
dir	str	direction (e.g. NB, EB, SB, WB)
rnodes	list[*RNodeObject*]	list of rnode in a corridor
stations	list[*RNodeObject*]	list of stations in a corridor
entrances	list[*RNodeObject*]	list of entrances in a corridor
exits	list[*RNodeObject*]	list of exits in a corridor

Table 2.2 Member variables and functions of RNodeObject in Data-Type Module

Variables		
Name	Type	Description
name	str	name of rnode
corridor	*CorridorObject*	the corridor that the rnode is located on
station_id	str	station id of the rnode if it exists
n_type	str	node type e.g. Station, Entrance, Exit, Intersection, Interchange, Access
transition	str	transition of the ramp e.g. Leg, Loop, CD
label	str	label

lon	float	longitude
lat	float	latitude
lanes	int	number of lanes
shift	int	lane shift offset
s_limit	int	speed limit
forks	list[str]	connected rnodes in the other corridor
up_rnode	*RNodeObject*	rnode in the upstream
down_rnode	*RNodeObject*	rnode in the downstream
up_station	*RNodeObject*	station in the upstream
down_station	*RNodeObject*	station in the downstream
up_entrance	*RNodeObject*	entrance in the upstream
down_entrance	*RNodeObject*	entrance in the downstream
up_exit	*RNodeObject*	exit in the upstream
down_exit	*RNodeObject*	exit in the downstream
detectors	list[*DetectorObject*]	list of the detectors in the rnode
active	bool	activation status
connected_to	dict[str, *RNodeObject*]	connected entrance and corridor, if it is exit
connected_from	dict[str, *RNodeObject*]	connected exit and corridor, if it is entrance
Functions		

Name	Return Type	Description
get_detectors(dc=None)	list[*DetectorObject*]	returns detector list (*dc*: function to filter detector)
get_green_detectors(dc=None)	list[*DetectorObject*]	returns detector list that type is a green detector
get_queue_detectors(dc=None)	list[*DetectorObject*]	returns detector list that type is a queue detector
get_bypass_detectors(dc=None)	list[*DetectorObject*]	returns detector list that type is a bypass detector
get_passage_detectors(dc=None)	list[*DetectorObject*]	returns detector list that type is a passage detector
get_merge_detectors(dc=None)	list[*DetectorObject*]	returns detector list that type is a merge detector
is_station()	bool	returns true if it is a station
is_exit()	bool	returns true if it is an exit ramp
is_CD_exit()	bool	returns true if it is an exit ramp on CD
is_entrance()	bool	returns true if it is an entrance ramp
is_CD_entrance()	bool	returns true if it is an entrance ramp on CD
is_ramp()	bool	returns true if it is a ramp
is_wavetronics()	bool	returns true if it is a station with wavetronics detectors
is_radar_station()	bool	returns true if it is a station with radar detectors
is_temp_station()	bool	returns true if it is a temporary station
is_abandoned()	bool	returns true if it is an abandoned rnode

Table 2.3 Member variables and functions of DetectorObject in Data-Type Module

Variables		
Name	Type	Description
name	str	name of detector
rnode	*RNodeObject*	rnode that it is located on
label	str	label
category	str	category of detector, it can be A(Auxiliary), CD(CD), R(Reversible), M(Merge), Q(Queue), X(Exit), B(Bypass), P(Passage), V(Velocity), O(Omnibus), G(Green), Y(Wrongway), H(HOV), HT(HOT) and D(Shoulder)
lane	int	lane that it is located on
field	float	assumed field length
abandoned	bool	true if it is abandoned detector
shift	int	lane shift offset
Functions		
Name	Return Type	Description
get_field_length()	float	returns field length
is_wavetronics()	bool	returns true if it is a wavetronics detector
is_abandoned()	bool	returns true if it is an abandoned detector
is_temporary()	bool	returns true if it is a temporary detector
lane_type()	str	returns lane type string according to category
is_mainline()	bool	returns true if it is on mainline

is_auxiliary_lane()	bool	returns true if it is on auxiliary lane
is_HOV_lane()	bool	returns true if it is on HOV lane
is_HOT_lane()	bool	returns true if it is on HOT lane
is_merge_lane()	bool	returns true if it is on merging point of entrance ramp
is_green_lane()	bool	returns true if it is detector to support metering
is_passage_lane()	bool	returns true if it is a passage detector
is_queue_lane()	bool	returns true if it is a queue detector
is_bypass_lane()	bool	returns true if it is a bypass detector
is_CD_lane()	bool	returns true if it is on CD
is_exit_lane()	bool	returns true if it is on exit ramp
is_shoulder_lane()	bool	returns true if it is on shoulder

Infra-Data Loader Module

Figure 2.5 shows the sequential process to load the infrastructure data in the *Infra-Data Loader* module for the Twin Cities' metro-freeway network. The step-by-step process for loading the infrastructure data can be described as follows:

1) The data loading process starts when the *load()* function in the *Infra-Data Loader* is called by the *Infra-Data* module.
2) *Infra-Data Loader* module starts the preparation for configuring the 'infrastructure-configuration file' by examining the 'configuration date' information in a XML file.
    - If a configuration date of a XML file is given to the Infra-Data Loader module, the cached configuration file of the given date is used.
    - If the cached file does not exist or the *load()* function is called without a configuration date, the *Infra-Data Loader* downloads the configuration file from IRIS and saves it to a local disk for future use.

- Once the configuration-date information is examined, the infrastructure-configuration file is loaded with the data from a XML file and a set of the roadway-network element objects are created. Figure 2.6 shows the connection of roadway elements that have the following features:
    - A corridor has a list of RNodes ordered from upstream to downstream.
    - Each RNode has its references to upstream and downstream RNnodes.
    - Each RNode has a list of detectors and each detector has a reference to an RNode.

3) The infrastructure objects created by the *Infra-Data Loader* are returned to the *Infra-Data* module.

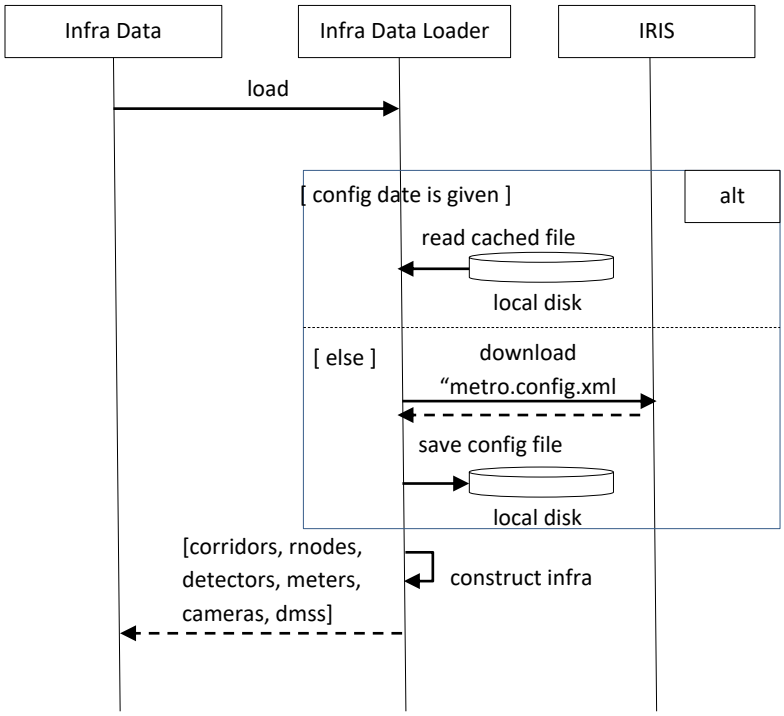


Figure 2.5 Sequence Diagram for Loading Roadway-Infrastructure Configuration data

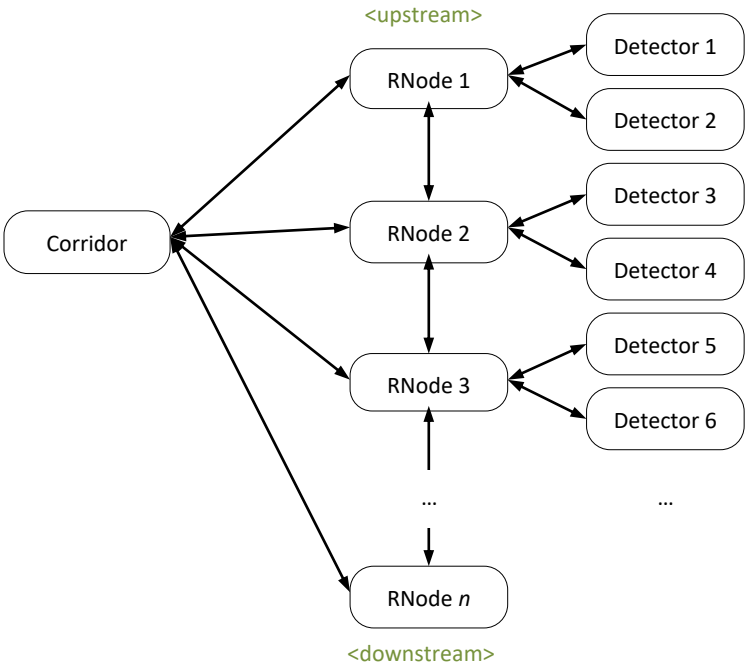


Figure 2.6 Connection of Roadway Network Elements

Infra-Data Module

All the infrastructure data loaded and organized by the *Infra-Data Loader* are contained in the *Infra-Data* module, which manages the access of the infrastructure data by the other modules in the NCRTES. Table 2.4 includes the variables and the access functions in the *Infra-Data* module, which stores all the infrastructure data in 'dictionary type' with 'keys', so that any object can be searched directly with a given key.

Table 2.4 Member variables and functions of Infra-Data Module

Variable	Type	Data Access Function	Note
corridors	*dict[str, CorridorObject]*	*get_corridors()* *get_corridor(route, dir)* *get_corridor_by_name(name)*	*CorridorObject* has *route* and *dir* field. *route* means the freeway name i.e., I-35E, I-494 and I-694. *dir* indicates direction of the freeway i.e., EB, WB, NB and SB. Corridor name is defined as "*route* (*dir*)" such as "I-35E (NB)" and "I-494 (EB)"
rnodes	*dict[str, RNodeObject]*	*get_rnode(rnode_name)* *get_rnode(station_name)*	*RNodeObject* represents detector station, entrance and exit. *RNodeObject* has *name* field as an ID. This name of RNode is used when finding RNode object. Station id i.e., S42 and S905 can be used as parameter instead of *rnode_name* for *get_rnode* function
detectors	*dict[str, DetectorObject]*	*get_detector(detector_name)*	
dmss	*dict[str, DMSObject]*	*get_dms(dms_name)*	
cameras	*dict[str, CameraObject]*	*get_camera(camera_name)*	
meters	*dict[str, MeterObject]*	*get_meter (meter_name)*	

Class Functions	Description
initialize(data_path)	initialize data path to be used as repository to cache and save configurations
get_path(sub_dir)	returns sub directory path in the data directory
get_infra(cfg_date='')	return the instance of Infra module according to the given configuration date

load_infra_from_config_file(file_path)	returns the instance of Infra module crated from the given XML file

Operation Process of Road-Infrastructure Configuration Module

1) Initializing and Loading Roadway-Infrastructure Information

Figure 2.7 illustrates the initialization process consisted with the following operations:

- Prior to activating the *Road-Infrastructure Configuration* module, *initialize*() function must be called to set the data directory to cache.
- *get_infra*() function calls *load*() in the *Infra-Data Loader* module and returns an instance of the *Infra-Data* module

```
# import module
from pyticas.infra import Infra

# set data directory
Infra.initialize('./data')

# load roadway network information
infra = Infra.get_infra()
```

Figure 2.7 Example Script for Initializing and Loading Roadway-Infrastructure Configurations

2) Accessing Corridor information

- After initialization, the infrastructure data for each corridor can be accessed via *get_corridors()* function.
- A corridor object can be obtained by *get_corridor_by_name()* and *get_corridor()* functions.
- The data for all the stations, entrance and exit ramps are accessible from a corridor object.
- Figure 2.8 shows a sample script illustrating the process to obtain a corridor object and to access stations, entrance/exit ramps in a corridor.

```
# print all corridor names
print('--- Corridors ---')
for corr in infra.get_corridors():
    print('  ', corr.name)
""" output:
--- Corridors ---
  I-35 (NB)
  I-35 (SB)
  I-35E (NB)
  I-35E (SB)
  ...
"""
# two way to get corridor object named "I-35E (NB)"
corr_i35e_nb_1 = infra.get_corridor_by_name('I-35E (NB)')
corr_i35e_nb_2 = infra.get_corridor('I-35E', 'NB')
# print station id, label, lanes, coordinates and speed limit of all stations in "I-35E (NB)" corridor
# it will be printed from upstream to downstream of the corridor
print('--- Stations of I-35E (NB) ---')
for station in corr_i35e_nb_1.stations:
    print('  ', station.station_id, station.label, station.lanes, station.lat, station.lon, station.s_limit)
""" output:
--- Stations of I-35E (NB) ---
  S870 Southcross Dr 2 44.73862 -93.28267 70
  S871 Co Rd 42 2 44.74554 -93.27374 70
  S872 McAndrews Rd 2 44.75311 -93.26185 70
  S873 S of Co Rd 11 2 44.75754 -93.25151 70
  S874 Co Rd 11 2 44.76091 -93.24488 70
  S875 N of Co Rd 11 2 44.76595 -93.23678 70
  S876 S of T.H.77 2 44.77579 -93.2211 70
  ...
"""
# print rnode name, label and coordinates of all entrances of the corridor
print('--- Entrances of I-35E (NB) ---')
for ent in corr_i35e_nb_1.entrances:
    print('  ', ent.name, ent.label, ent.lat, ent.lon)
""" output:
--- Entrances of I-35E (NB) ---
  rnd_91017 I-35 NB 44.73688 -93.28318
  rnd_87579 Co Rd 42 44.74623 -93.27265
  rnd_87589 Co Rd 11 44.76192 -93.24327
  ...
"""
# print rnode name, label and coordinates of all exits of the corridor
print('--- Exits of I-35E (NB) ---')
for ext in corr_i35e_nb_1.exits:
    print('  ', ext.name, ext.label, ext.lat, ext.lon)
""" output:
--- Exits of I-35E (NB) ---
  rnd_87575 Co Rd 42 44.74109 -93.28071
  rnd_87583 Co Rd 11 44.75685 -93.25318
  ...
"""
```

Figure 2.8 Example Script for Accessing Corridor Information

3) Accessing RNode (Station) and Ramp information

- A RNode is obtained by *get_rnode()* function.
- A RNode has its reference variables to upstream/downstream stations, entrances and exits
- The name of RNode or station can be used as a parameter.
- Figure 2.9 shows an example script illustrating:
  - how to access stations, entrances and exits directly by name without corridor information,
  - how to iterate from upstream to downstream,
  - how to access individual detectors in stations and entrance/exit ramps.

```
# two ways to get station "S870" on "I-35E (NB)" corridor
#  (rnode name of "S870" is "rnd_87573")
st_1 = infra.get_rnode("S870")
st_2 = infra.get_rnode("rnd_87573")
print('--- Station S870 ---')
print('  ', st_1.station_id, st_1.label, st_1.lanes, st_1.lat, st_1.lon, st_1.s_limit)


""" output:
--- Station S870 ---
  S870 Southcross Dr 2 44.73862 -93.28267 70
"""

# print name, label and lane of the detectors in the station
print('--- Detectors in S870 ---')
for det in st_1.detectors:
    print('  ', det.name, det.label, det.lane)


""" output:
--- Detectors in S870 ---
  3700 35E/SouthCN1 1
  3701 35E/SouthCN2 2
"""

# iterate "S870" to "S876" (split of I-35E and I-35W to TH77)
print('--- Stations from S870 to S876 ---')
cursor = st_1
while cursor.down_station:
    print('  ', cursor.station_id, cursor.label)
    cursor = cursor.down_station
    if cursor.station_id == 'S876':
        break


""" output:
--- Stations from S870 to S876 ---
  S870 Southcross Dr
  S871 Co Rd 42
  S872 McAndrews Rd
  S873 S of Co Rd 11
  S874 Co Rd 11
  S875 N of Co Rd 11
"""
    if cursor.station_id == 'S876':
        break
```

```
""" output:
--- Stations and Ramps from S870 to S876 ---
  Station S870 Southcross Dr
  Exit rnd_87575 Co Rd 42
  Station S871 Co Rd 42
  Entrance rnd_87579 Co Rd 42
  Station S872 McAndrews Rd
  Exit rnd_87583 Co Rd 11
  Station S873 S of Co Rd 11
  Station S874 Co Rd 11
  Entrance rnd_87589 Co Rd 11
  Station S875 N of Co Rd 11
  Exit rnd_90763 I-35E CD NB
"""
# get entrance at Co Rd 42 on "I-35E (NB)"
ent = infra.get_rnode('rnd_87579')
print('--- Entrance at Co Rd 42 ---')
print('  ', ent.name, ent.label)


""" output:
--- Entrance at Co Rd 42 ---
  rnd_87579 Co Rd 42
"""
corr = ent.corridor
print('-- Corridor that the entrance is located on')
print(corr.name, corr.route, corr.dir)
""" output:
-- Corridor that the entrance is located on
I-35E (NB) I-35E NB
"""
# print detectors on the entrance
# category meaning
#   P : passage detector
#   G : green detector (it is used in ramp metering)
#   Q : queue detector
print('--- Detectors on Entrance Co Rd 42 ---')
for det in ent.detectors:
    print('  ', det.name, det.label, det.category)


""" output:
--- Detectors on Entrance Co Rd 42 ---
  3705 35E/CR42NP P
  4559 35E/CR42NG G
  3706 35E/CR42NQ1 Q
  5833 35E/CR42NQ2 Q
"""



# iterate all RNodes "S870" to "S876" (split of I-35E and I-35W to TH77)
print('--- Stations and Ramps from S870 to S876 ---')
cursor = st_1
while cursor.down_rnode:
    print('  ', cursor.n_type, cursor.station_id if cursor.station_id else cursor.name, cursor.label)
    cursor = cursor.down_rnode
```

Figure 2.9 Example Script to Access RNode Information

4) Accessing Detector information

- Individual detector information (*DetectorObject*) can be obtained by *get_detector()* function.
- *DetectorObject* has a reference variable to *RNodeObject.*
- Figure 2.10 shows a sample script illustrating the following operations:
    - how to access detector information by detector name,
    - how to access a RNode containing a specific detector.

```
# get detector on the Entrance at Co Rd 42 of I-35E (NB)
print('--- Detector 3706 on Etrance Co Rd 42')
det = infra.get_detector('3706')
print('  ', det.name, det.label, det.category)
""" output:
--- Detector 3706 on Etrance Co Rd 42
   3706 35E/CR42NQ1 Q
"""
# reference to rnode
print('--- Etrance Co Rd 42 that Detector 3706 is located on')
ent = det.rnode
print('  ', ent.name, ent.label)
""" output:
--- Etrance Co Rd 42 that Detector 3706 is located on
   rnd_87579 Co Rd 42
"""
```

Figure 2.10 Example Script for Accessing Detector Information

2.2.2 Traffic-Data Management Module

Figure 2.11 shows the internal structure of the Traffic-Data Management module, which consists of the *RNode- Data Reader* and the *Detector-Data Reader* modules. The *RNode-Data Reader* reads the traffic data of RNodes, i.e., stations, while the *Detector-Data Reader* imports the traffic data of individual detectors. Further, the *Infra-Data* module has the references to each of these modules, i.e., *rdr* and *ddr*, for an easy access by the other modules in the NCRTES. Tables 2.5-2.6 include the data types developed for the Traffic-Data Management module. These data types are defined in the *Data-Type* module.

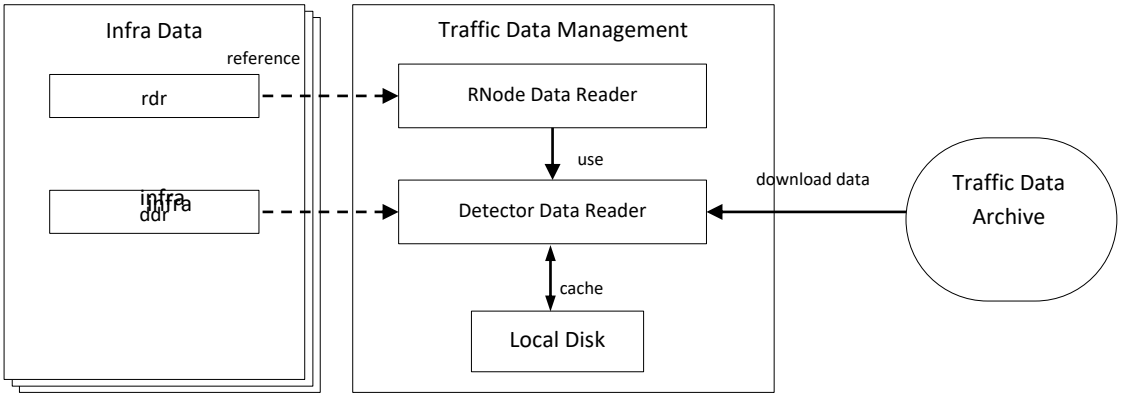


Figure 2.11 Structure of Traffic-Data Management Module

Table 2.5 Member variables RNodeData in Data-Type Module

Name	Type	Description
rnode	*RNodeObject*	target rnode of the data
prd	*Period*	time period information
traffic_type	str	traffic type information such as speed, density, total flow, average lane flow, volume, occupancy and scan
data	list[float]	aggregated data list
detector_data	list[float]	data list of each detector
detector_names	list[str]	list of detector names
lanes	int	number of lanes
missing_lanes	list[int]	list of missing lanes

Table 2.6 Member variables and functions Period in Data-Type module

Variables		
Name	Type	Description
start_date	datetime	target rnode of the data
end_date	datetime	time period information
interval	int	traffic type information such as speed, density, total flow, average lane flow, volume, occupancy and scan
Functions		
Name	Parameter /Return Type	Description
days()	int	returns number of dates in the time period
get_dates()	list[datetime]	returns list of dates in the time period
get_timeline()	list[str]	returns time string for every time interval
extend_start_hour(h)	h: int (hours)	extend start date time
extend_end_hour(h)	h: int (hours)	extend end date time
shrink(sidx, eidx)	sidx: start index eidx: end index	shrink time period according to the given indices

RNode-Data Reader Module

The *RNode-Data Reader* module loads the station-traffic data from the Traffic-Data Archive managed by IRIS. The traffic data of the individual detectors in a station are aggregated differently depending on the data type. For example, the speed data of an RNode for a specific-time interval is the average of all the speed values from each detector in that station, while the total-flow rate of a RNode is the sum of the flow rates of the individual detectors located in a given station. Table 2.7 includes the names of the access functions in the *Traffic Data Management* module for each type of traffic data. The traffic data are

packaged as an instance of the *RNodeData* class, defined in the *Data-Type* module. The data stored in *RNodeData* includes requested traffic data/type, time-period, target RNode information, and missing-data lanes.

Table 2.7 Detector Data Aggregation Method and Access functions

Data Type	Integration Method	Access Function	Parameters
speed	average	*get_speed(rnode, period, dc=None)*	**rnode** - target rnode - type: types.RNodeObject **period** - time period information - type: types.Period **dc** - function to select detector to use - type: function
density	average	*get_density(rnode, period, dc=None)*	
lane average flow	average	*get_average_flow(rnode, period, dc=None)*	
total flow	sum	*get_total_flow(rnode, period, dc=None)*	
volume	sum	*get_volume(rnode, period, dc=None)*	
occupancy	average	*get_occupancy(rnode, period, dc=None)*	
scan	average	*get_scan(rnode, period, dc=None)*	

Detector-Data Reader Module

The *Detector-Data Reader* module downloads the raw data from each detector in the binary format from the Traffic-Data Archive, managed by IRIS, and converts them into a normal number-format data. Table 2.8 shows the access functions developed in this study for different types of detector data. The flow chart showing the internal process for accessing individual detector data is included in Figure 2.12.

Table 2.8 Data Processing Functions of Detector Data Reader module

Data Type	Access Function	Parameters
speed	*get_speed(detector, period)*	**detector** - target detector object - type: types.RNodeObject **period** - time period information - type: types.Period
density	*get_density(detector, period)*	
lane average flow	*get_average_flow(detector, period)*	
total flow	*get_total_flow(detector, period)*	
volume	*get_volume(detector, period)*	
occupancy	*get_occupancy(detector, period)*	
scan	*get_scan(detector, period)*	

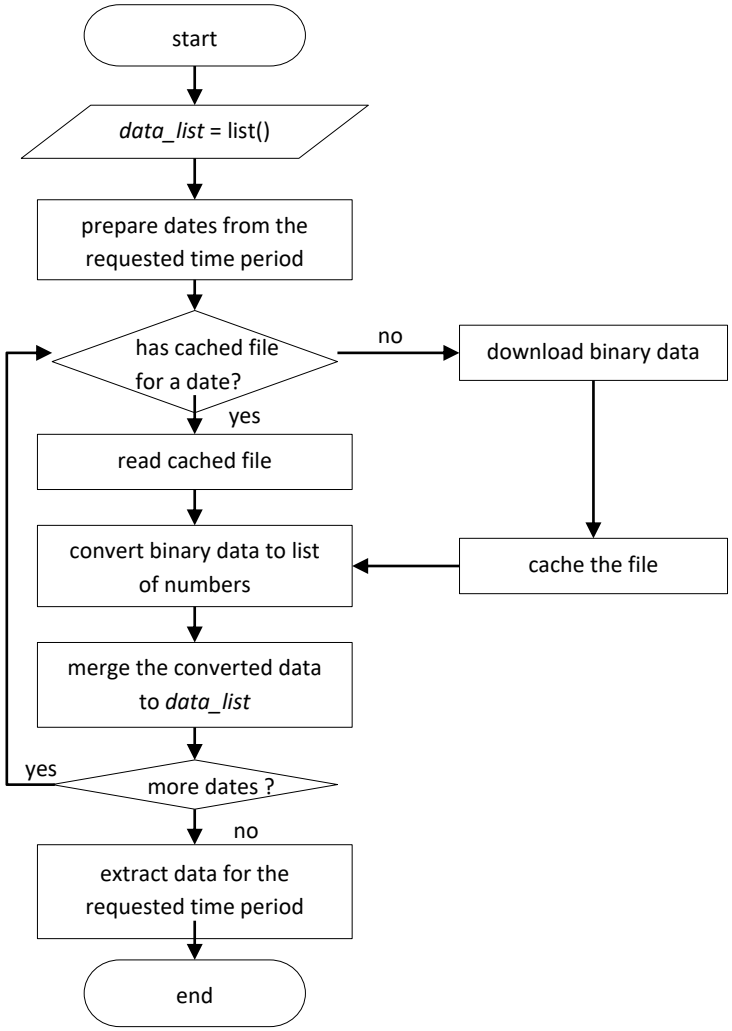


Figure 2.12 Flow Chart of Data-Processing Function in Detector Data Reader module

Operation Process of Traffic Data Management Module

1) Reading Detector Data

- *initialize*() function in *Infra-Data* module needs to be called to set *data directory* to cache before operating the Traffic-Data Management module.
- Figure 2.13 includes an example script showing how to read traffic data such as speed, density, volume and flow rate of a detector with the following sample parameters:
    - detector id : 3700 (on lane 1 of S870 around Southcross Dr in I-35E NB)
    - time period : 6AM to 7AM on 1st Feb 2016
    - data interval : 5 minutes (300 seconds)

```
# import modules
from pyticas.infra import Infra
from pyticas import period as prd_helper

# set data directory
Infra.initialize('./data')

# load roadway network information
infra = Infra.get_infra()

# make time period information
prd = prd_helper.create_period_from_string('2016-02-01 06:00:00', '2016-02-01 07:00:00', interval=300)
times = prd.get_timeline()

# get detector on lane 1 of the S870 around Southcross Dr in I-35E (NB)
det = infra.get_detector('3700')

# get traffic data
speeds = infra.ddr.get_speed(det, prd)
volumes = infra.ddr.get_volume(det, prd)
densities = infra.ddr.get_density(det, prd)
flows = infra.ddr.get_flow(det, prd)

# print results
for idx, u in enumerate(speeds):
    t = times[idx]
    k = densities[idx]
    q = flows[idx]
    v = volumes[idx]
    print('time=%s, u=%f, k=%f, q=%d, v=%d' % (t, u, k, q, v))

""" output:
time=06:05:00, u=92.494596, k=7.654501, q=708, v=59
time=06:10:00, u=69.582393, k=9.485158, q=660, v=55
time=06:15:00, u=82.452557, k=10.769830, q=888, v=74
time=06:20:00, u=77.233990, k=11.808273, q=912, v=76
time=06:25:00, u=82.532690, k=12.504136, q=1032, v=86
time=06:30:00, u=69.436846, k=14.516788, q=1008, v=84
time=06:35:00, u=75.240275, k=14.035036, q=1056, v=88
time=06:40:00, u=71.208724, k=14.324088, q=1020, v=85
time=06:45:00, u=79.202863, k=15.908516, q=1260, v=105
time=06:50:00, u=71.872752, k=15.694404, q=1128, v=94
time=06:55:00, u=83.877551, k=15.737226, q=1320, v=110
time=07:00:00, u=78.372506, k=13.167883, q=1032, v=86
"""
```

Figure 2.13 Example Script for Operating Detector-Data Reader

2) Reading RNode Data

Figure 2.14 shows a sample script showing the data-extraction process for the following example case:

- station name : S870 (detector station around Southcross Dr in I-35E NB)
- time period : 6AM to 7AM on 1st Feb 2016
- data interval : 5 minutes (300 seconds)

```
# import modules
from pyticas.infra import Infra
from pyticas import period as prd_helper

# set data directory
Infra.initialize('./data')

# load roadway network information
infra = Infra.get_infra()

# make time period information
prd = prd_helper.create_period_from_string('2016-02-01 06:00:00', '2016-02-01 07:00:00', interval=300)
times = prd.get_timeline()

# get station S870 around Southcross Dr in I-35E (NB)
rnode = infra.get_rnode('S870')

# get traffic data
speeds = infra.rdr.get_speed(rnode, prd)
volumes = infra.rdr.get_volume(rnode, prd)
densities = infra.rdr.get_density(rnode, prd)
flows = infra.rdr.get_total_flow(rnode, prd)
det_names = ','.join(speeds.detector_names)

print('Used detectors : %s' % det_names)

# print results
for idx, u in enumerate(speeds.data):
    t = times[idx]
    k = densities.data[idx]
    q = flows.data[idx]
    v = volumes.data[idx]
    print('time=%s, u=%f, k=%f, q=%d, v=%d' % (t, u, k, q, v))

""" output:
Used detectors : 3700,3701
time=06:05:00, u=84.274033, k=6.834846, q=1152, v=96
time=06:10:00, u=70.714597, k=8.399963, q=1188, v=99
time=06:15:00, u=78.726800, k=9.221764, q=1452, v=121
time=06:20:00, u=76.175863, k=9.530578, q=1452, v=121
time=06:25:00, u=78.016136, k=10.843911, q=1692, v=141
time=06:30:00, u=69.427996, k=12.530968, q=1740, v=145
time=06:35:00, u=72.196224, k=12.382919, q=1788, v=149
time=06:40:00, u=68.633812, k=12.675968, q=1740, v=145
time=06:45:00, u=74.262982, k=15.027676, q=2232, v=186
time=06:50:00, u=71.710836, k=14.642139, q=2100, v=175
time=06:55:00, u=75.533781, k=15.251454, q=2304, v=192
time=07:00:00, u=75.351917, k=13.217978, q=1992, v=166
"""
```

Figure 2.14 A Sample Script to Operate RNode-Data Reader

2.2.3 Weather-Data Management Module

Figure 2.15 shows the internal structure of the Weather-Data Management module, which consists of four modules: *NOAA Data Reader*, *RWIS-SCANWeb Reader*, *RWIS-DB Reader* and *Weather-Sensor Data Reader*. Both *RWIS-SCANWeb Reader* and *RWIS-DB Reader* modules read the weather data from the RWIS stations in the metro-freeway network and pack them into an instance of the *RWISData* class defined in the *Data-Type* module. Further, the *Weather-Sensor Data Reader* imports the weather-sensor data, archived by IRIS in a binary format, and pack them into an instance of *WeatherSensorData* class.

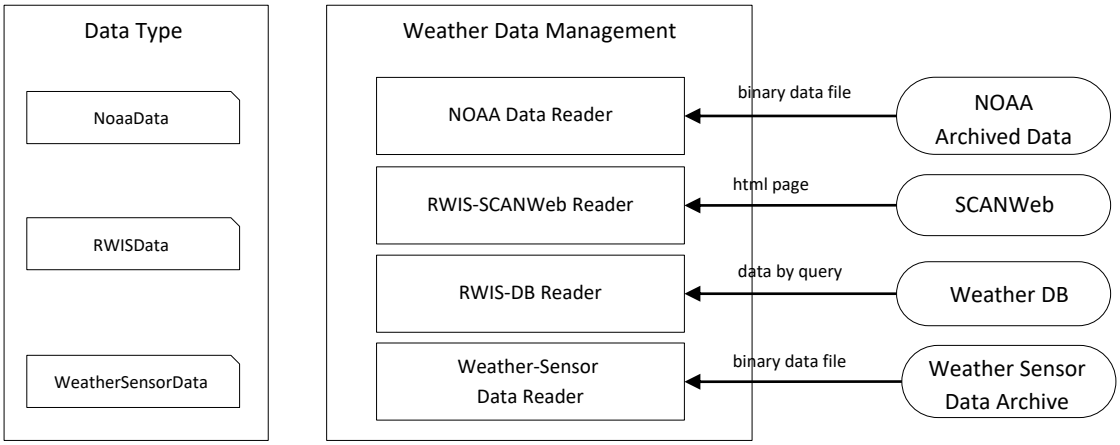


Figure 2.15 Structure of Weather-Data Management Module

***NOAA-Data Reader* Module**

The *NOAA-Data Reader* module collects the weather data from the NOAA's Integrated-Surface Data (ISD) archive. The weather data from NOAA has the following features:

- The format of the weather data archived since 1901 is consistent and well documented.
- One year's worth of all the weather data from one weather station is archived in a single file, whose data include weather type, precipitation amount, temperature, visibility and wind speed. Therefore, a whole-year data can be downloaded by one internet connection and it can save substantial amount of time to load the weather data for the operation of the NCRTES.
- Currently seven weather stations are available in the Twin Cities' metro area from 2006, as shown in Figure 2.16.

The sub-modules in the *NOAA-Data Reader* module are as follows:

ISD Station Information Reader module reads the weather-station information such as station name, location, and time periods during which the weather data are available.

- *ISD Data Reader* module reads yearly-archived data and extracts the weather data for a given time duration.
- *NOAA Weather Data Read Interface* module provides the following functions, which are used for accessing weather station information and data:
    - Getting weather station information,
    - Finding near-by weather stations for given coordinates,
    - Reading weather data with weather station information and time period,
    - Interpolate the parsed, hourly-weather data to given time-interval data such as 5 or 15-minute interval weather data.

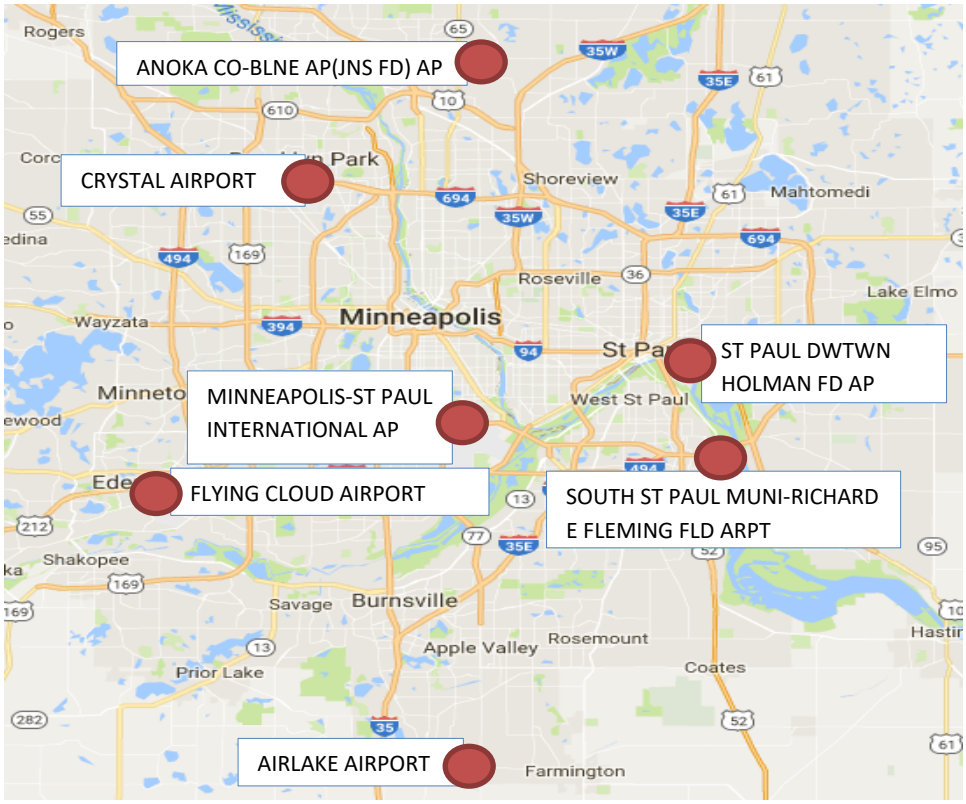


Figure 2.16 Weather Stations in the Twin Cities Metro Area

Table 2.9 Functions of NOAA Data Reader module

Function	Description	Params
get_station_list (state, station_filter, redownload)	- retrieve ISD station list	*state:* abbr of state (str) *station_filter:* filter function (callable) *redownload:* flag to download station list (bool)
find_nearby_station(lat, lon, dt, station_list)	- find nearby station to the given coordinate and date from the given station list	*lat* : latitude (float) *lon* : longitude (float) *dt*: date (datetime) station_list: station list (list[*ISDStation*])
get_station_by_wban(wban)	- retrieve station information by WBAN (Weather Bureau Army Navy)	*wban:* WBAN id (str)
get_data(isd_station, prd)	- retrieve weather data for the given ISD station and time period	*isd_station:* station info (*ISDStation*) *prd* : time period (*Period*)
get_day_data(isd_station, year, month, day)	- retrieve daily weather data for the given ISD station and date	*isd_station:* station info (*ISDStation*) *year*: year (int) *month*: month (int) *day*: day (int)
get_year_data(isd_station, year)	- retrieve yearly weather data for the given ISD station and date	*isd_station:* station info (*ISDStation*) *year*: year (int)
apply_interval(isddata_list, prd)	- convert weather data interval to the given time period	*isddata:* station info (*ISDData*) *prd* : time period (*Period*)

RWIS-SCANWeb Reader Module

This module directly reads the weather data from the 'exported' pages from the SCANWeb site, which manages the RWIS station data in Minnesota. Table 2.10 includes the functions developed in this study to directly read the weather data from the SCANWeb site. The resulting weather data is packed into an instance of the *RWISData* class, whose functions are shown in Table 2.11.

Table 2.10 Functions of RWIS SCANWeb Reader module

Function	Description	Params
find_nearby_sites(lat, lon)	- finds nearby RWIS sites to the given coordinates - returns RWIS site list ordered by distance	*lat* : latitude (float) *lon* : longitude (float)
get_site_by_id(site_id)	- returns site information (*RWISSiteInfo*)	*site_id* : site id (integer)
get_weather(site, period)	- returns weather data (*RWISData*) of the given site for the time period	*site* : site info (*RWISSiteInfo*) *period* : time period (*Period*)

Table 2.11 Functions of RWISData class

Function	Description
get_datetimes()	- returns list of date times - datetime format : "yyyy-mm-dd hh:ii:ss"
get_surface_statuses()	- returns list of surface status - codes: Snow/Ice Warning, Ice Warning, Snow Warning, Wet Below Freezing, Ice Watch, Snow/IceWatch, Snow Watch, Frost, Chemical Wet, Wet, Damp, Trace Moisture, Absorption at Dew Point, Absorption, Dew, Dry, Other, No Report, Error
get_precip_types()	- returns list of precipitation types - codes: None, Yes, Rain, Snow, Mixed, Upper, Lower, Both, Light, Light Freezing, Freezing Rain, Sleet, Hail, Lens Dirty, Fault, Other, Unknown, Frozen, No Data
get_precip_accumulations()	- returns precipitation accumulations (inch)

get_precip_accumulations_3h()	- returns precipitation accumulations for 3 hours (inch)
get_precip_accumulations_6h()	- returns precipitation accumulations for 6 hours (inch)
get_precip_accumulations_12h()	- returns precipitation accumulations for 12 hours (inch)
get_precip_accumulations_24h()	- returns precipitation accumulations for 24 hours (inch)
get_precip_start_times()	- returns date times at which the most recent precipitation event began
get_precip_end_times()	- returns date times at which the most recent precipitation event ended
get_precip_rates()	- returns average precipitation rate computed every minute (iph)
get_surface_temperatures()	- returns temperatures of the pavement surface (F)
get_wind_speeds()	- returns average speed of the wind
get_wind_directions()	- returns average wind directions - codes: N, NE, E, SE, S, SW, W, NW
get_humidities()	- returns percent of moisture in the air (%)
is_dry()	- returns where it is dry or not

***RWIS-DB Reader* Module**

The *RWIS-DB Reader* module is developed to import the weather data archived in the local RWIS database, which is populated with the same SCANWeb RWIS data. This module can be used as an off-line option in accessing the weather data, since the use of the *RWIS- SCANWeb Reader* can be dependent upon the availability of an external networking service. The same functions in Tables 2.10 and 2.11 are used for this module, which also has the same type of return as in the previous module.

***Weather-Sensor Data Reader* Module**

The Weather-Sensor Data Reader is developed to read the weather-sensor data archived and managed by IRIS with the sensors installed on the metro freeway network. The types of data available include precipitation types and amount. Table 2.12 includes the sensor-access functions developed for this

module, which returns an instance of the *WeatherSensorData* class. The list of the functions to collect specific types of weather data are shown in Table 2.13.

Table 2.12 Functions of Weather Sensor Data Reader module

Function	Description	Parameters
nearby_sensors(lat, lon)	- returns weather sensor list ordered by distance	lat : latitude (float) lon : longitude (float)
get_weather(sensor_name, period)	- returns site information (*WeatherSensorData*)	sensor_name: sensor name (str) period: time period (*Period*)

Table 2.13 Functions of WeatherSensorData class

Function	Description
is_dry()	- returns where it is dry or not
get_dry_rate()	- returns dry data rate (dry rate = number of dry status / total data count)
get_total_rain_fall()	- returns total precipitation amount (mm)
get_avg_rain_fall()	- returns average precipitation amount (avg rain fall = total rain fall / number of rain status)
get_accuracy()	- returns accuracy of data (%, 1 - error data rate)

Operation Process of Weather Data Management Module

1) *NOAA Data Reader module*

Figure 2.17 shows an example script using the *NOAA Data Reader* to find a nearby-weather station for a given detector station and extract the weather data.

```
# import modules

Import datetime

from pyticas.infra import Infra
from pyticas import period
from pyticas_noaa.isd import isdstations, isd


if __name__ == '__main__':
    # initialize pyticas
    Infra.initialize(common.data_path)
    infra = Infra.get_infra()

    # retrieve station list of Minnesota

    isd_stations = isd.get_station_list('MN')

    # detector station information

    s = infra.get_rnode('S885')

    # find nearby weather station available in Jan 2017

    nearby_isd_stations = isd.find_nearby_station(s.lat, s.lon, datetime.date(2017, 1, 1), isd_stations)


    tst = None
    for st in nearby_isd_stations:
        if st[1].wban == '94960':
            tst = st[1]
        # print weather stations

        print(st[0], st[1])

    # setting target time period
    prd = period.create_period_from_string_with_duration('2017-02-07 00:00:00', 24*60, 300)


    # retrieve weather data

    isd_data_list = isd.get_data(tst, prd)


    # print data list

    print('#Weather Data: ')

    for isd_data in isd_data_list:
        print(isd_data)
```

```
"""output:
4.7647590413734155 <ISDStation usaf="726580" wban="14922" name="MINNEAPOLIS-ST PAUL INTERNATIONAL AP" begin="1945-01-01" end="2017-02-08" lat="+44.883" lon="-093.229">

6.895873848678238 <ISDStation usaf="726603" wban="04974" name="SOUTH ST PAUL MUNI-RICHARD E FLEMING FLD ARPT" begin="2006-01-01" end="2017-02-08" lat="+44.857" lon="-093.033">

8.980741371688813 <ISDStation usaf="726584" wban="14927" name="ST PAUL DWTWN HOLMAN FD AP" begin="1983-11-03" end="2017-02-08" lat="+44.932" lon="-093.056">

14.187857767328005 <ISDStation usaf="726562" wban="04943" name="AIRLAKE AIRPORT" begin="2006-01-01" end="2017-02-08" lat="+44.628"lon="-093.228">
…
# Weather Data:

<ISDData time="2017-02-07 00:48" precip="None" precip_type="Missing" precip_intensity="Missing" humidity="53.9 %"visibility="10.0 mile" air_temp="26.6 F" dew_point="12.2 F" wind_dir="(40, 'NE')" wind_speed="6.93 mph" wind_gust="None">

<ISDData time="2017-02-07 00:53" precip="0.0 inch" precip_type="Missing" precip_intensity="Missing" humidity="57.5 %"visibility="10.0 mile" air_temp="26.96 F" dew_point="14.0 F" wind_dir="(60, 'ENE')" wind_speed="5.82 mph" wind_gust="None">

<ISDData time="2017-02-07 01:27" precip="None" precip_type="Missing" precip_intensity="Missing" humidity="57.7 %"visibility="10.0 mile" air_temp="28.04 F" dew_point="15.08 F" wind_dir="(30, 'NNE')" wind_speed="4.7 mph" wind_gust="None">

<ISDData time="2017-02-07 01:53" precip="0.0 inch" precip_type="Missing" precip_intensity="Missing" humidity="60.0 %"visibility="10.0 mile" air_temp="28.04 F" dew_point="15.98 F" wind_dir="(360, 'N')" wind_speed="4.7 mph" wind_gust="None">

….

"""
```

Figure 2.17 An Example Script showing Operation Process of NOAA Data Reader Module

2) *RWIS-SCANWeb and DB Reader Modules*

Figure 2.18 shows an example script to run both RWIS-SCANWeb and DB Reader modules 1) to locate the nearby-RWIS stations for given coordinates, and 2) to extract the weather data from those RWIS stations.

```
# import modules
from pyticas.infra import Infra
from pyticas import period as prd_helper


# import RWIS SCANWeb Reader module

from pyticas.dr import rwis_scanweb as rwis


# use below import code if RWIS DB Reader is available

#from pyticas.dr import rwis_db as rwis


# set data directory

Infra.initialize('./data')

# load roadway network information
infra = Infra.get_infra()

# make time period information
prd = prd_helper.create_period_from_string('2016-01-31 06:00:00', '2016-01-31 07:00:00', interval=300)

# get detector on lane 1 of the S870 around Southcross Dr in I-35E (NB)
station = infra.get_rnode('S870')

sites = rwis.find_nearby_sites(station.lat, station.lon)
nearby_site = sites[0]

print('--- Nearby Site --')
print('site_id=%d, lat=%f, lon=%f, distance=%f'
    % (nearby_site.site_id, nearby_site.lat, nearby_site.lon, nearby_site.distance_to_target))


""" output:
--- Nearby Site --
site_id=330085, lat=44.830363, lon=-93.243372, distance=6.620194
"""

wd = rwis.get_weather(nearby_site, prd)
times = wd.get_datetimes()

sf_statuses = wd.get_surface_statuses()
temps = wd.get_surface_temperatures()
air_temps = wd.get_air_temperatures()
wind_dirs = wd.get_wind_directions()
precip_types = wd.get_precip_types()
precip_rate = wd.get_precip_rates()
rhs = wd.get_humidities()

print('--- Weather Data Sample --')
# print results
for idx, temp in enumerate(temps):
   print('time=%s, surface[status=%s, temp=%.1f], '
       'air[temp=%.1f, wind dir=%s, humidity=%s], '
       'precip[type=%s, rate=%s]'
       % (times[idx], sf_statuses[idx], temp,
          air_temps[idx], wind_dirs[idx], rhs[idx],
          precip_types[idx], precip_rate[idx]))
```

```
""" output:
--- Weather Data Sample --
time=2016-01-31 06:05:00, surface[status=Wet, temp=32.7], air[temp=38.0, wind dir=W, humidity=93], precip[type=None, rate=0]
time=2016-01-31 06:10:00, surface[status=Wet, temp=32.9], air[temp=38.0, wind dir=W, humidity=93], precip[type=None, rate=0]
time=2016-01-31 06:15:00, surface[status=Wet, temp=32.9], air[temp=38.0, wind dir=SW, humidity=93], precip[type=None, rate=0]
time=2016-01-31 06:20:00, surface[status=Wet, temp=32.9], air[temp=38.0, wind dir=S, humidity=93], precip[type=None, rate=0]
time=2016-01-31 06:25:00, surface[status=Wet, temp=33.1], air[temp=38.0, wind dir=W, humidity=93], precip[type=None, rate=0]
time=2016-01-31 06:30:00, surface[status=Wet, temp=32.9], air[temp=38.0, wind dir=SW, humidity=93], precip[type=None, rate=0]
time=2016-01-31 06:35:00, surface[status=Wet, temp=32.9], air[temp=38.0, wind dir=SW, humidity=93], precip[type=None, rate=0]
time=2016-01-31 06:40:00, surface[status=Wet, temp=32.9], air[temp=38.0, wind dir=SW, humidity=93], precip[type=None, rate=0]
time=2016-01-31 06:45:00, surface[status=Wet, temp=32.9], air[temp=38.0, wind dir=SW, humidity=94], precip[type=None, rate=0]
time=2016-01-31 06:50:00, surface[status=Wet, temp=32.9], air[temp=38.0, wind dir=SW, humidity=94], precip[type=None, rate=0]
time=2016-01-31 06:55:00, surface[status=Wet, temp=32.9], air[temp=38.0, wind dir=SW, humidity=93], precip[type=None, rate=0]
time=2016-01-31 07:00:00, surface[status=Wet, temp=32.9], air[temp=38.0, wind dir=W, humidity=94], precip[type=None, rate=0]

"""
```

Figure 2.18 An Example Script to Operate RWIS-SCANWeb and -DB Reader Modules

3) *Weather-Sensor Data Reader*

Figure 2.19 shows a sample script using the *Weather-Sensor Data Reader* to find nearby-weather sensors for given coordinates and also extract the weather data from those sensors.

```
# import modules
from pyticas.infra import Infra
from pyticas import period as prd_helper

# import Weather Sensor Data Reader module
from pyticas.dr import weather_sensor

# set data directory
Infra.initialize('./data')

# load roadway network information
infra = Infra.get_infra()

# make time period information
prd = prd_helper.create_period_from_string('2016-01-31 06:00:00', '2016-01-31 07:00:00', interval=300)

# get detector on lane 1 of the S870 around Southcross Dr in I-35E (NB)
station = infra.get_rnode('S870')

wsensors, distances = weather_sensor.nearby_sensors(station.lat, station.lon)
nearby_sensor = wsensors[0]

print('--- Nearby Site --')
print('name=%s, lat=%f, lon=%f, distance=%f'
    % (nearby_sensor.get_name(), nearby_sensor.get_lat(), nearby_sensor.get_lon(), distances[0]))

""" output:
--- Nearby Site --
name=WS35W25, lat=44.801303, lon=-93.290072, distance=4.342822
"""

# make time period information
periods = [
   prd_helper.create_period_from_string('2016-01-30 06:00:00', '2016-01-30 12:00:00', interval=300),
   prd_helper.create_period_from_string('2016-01-31 06:00:00', '2016-01-31 12:00:00', interval=300),
   prd_helper.create_period_from_string('2016-02-01 06:00:00', '2016-02-01 12:00:00', interval=300),
   prd_helper.create_period_from_string('2016-02-02 06:00:00', '2016-02-02 12:00:00', interval=300),
]

print('--- Weather Data --')
for prd in periods:
   wd = weather_sensor.get_weather(nearby_sensor.get_name(), prd)
   print('date=%s, dry_rate=%.1f, avg_rain=%.1f, total_rain=%.1f, accuracy=%.1f'
       % (prd.get_date_string(), wd.get_dry_rate(), wd.get_avg_rain_fall(), wd.get_total_rain_fall(), wd.get_accuracy()))

""" output:
--- Weather Data --
date=2016-01-30, dry_rate=0.6, avg_rain=4.7, total_rain=714.0, accuracy=99.7
date=2016-01-31, dry_rate=0.5, avg_rain=4.6, total_rain=893.0, accuracy=100.0
date=2016-02-01, dry_rate=1.0, avg_rain=0.0, total_rain=0.0, accuracy=100.0
date=2016-02-02, dry_rate=0.9, avg_rain=11.1, total_rain=256.0, accuracy=100.0
"""
```

Figure 2.19 An Example Script for Operating Weather Sensor Data Reader

2.3 DEVELOPMENT OF NORMAL SPEED-RECOVERY FUNCTION CALIBRATION MODULE

Figure 2.20 shows the structure of the Normal Speed-Recovery (NSR) function module consisted with the following sub-modules:

- *NSR Data* module retrieves a stored speed-density data and/or collects the traffic data under normal weather conditions from each detector station in the metro-freeway network.
- *Daytime Data Collector* module collects the speed-density data during the speed-recovery and reduction periods from each detector station under normal-weather conditions.
- *Nighttime Data Collector* module collects the nighttime-speed data from each station for normal-dry days.
- *Dry Day Finder* module finds normal-dry days in a given time period.
- *NSR Function* module retrieves a stored NSR function and/or creates NSR functions for each station.
- *Daytime Speed-Density Function* module calibrates NSR functions for daytime with collected speed-density data from each station.
- *Nighttime Average Speed-Time Function* module calibrates the time-variant normal-speed function for each station during nighttime period.

Figure 2.21 illustrates the sequential process to calibrate NSR functions using ‘get’ and ‘create’ functions provided by the NSR function module. The NSR functions calibrated for each station are stored in the database.

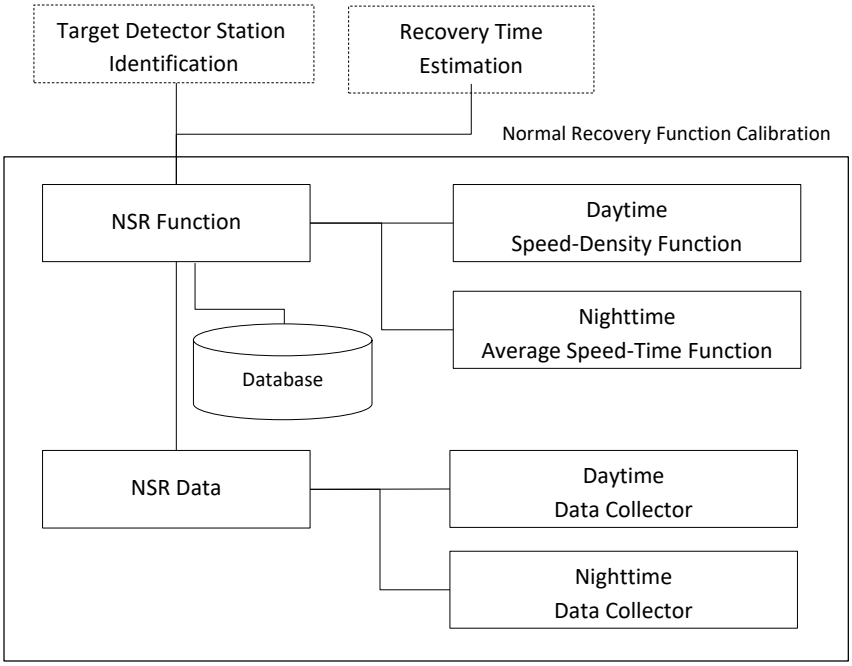


Figure 2.20 Structure of Normal Speed-Recovery Function Module

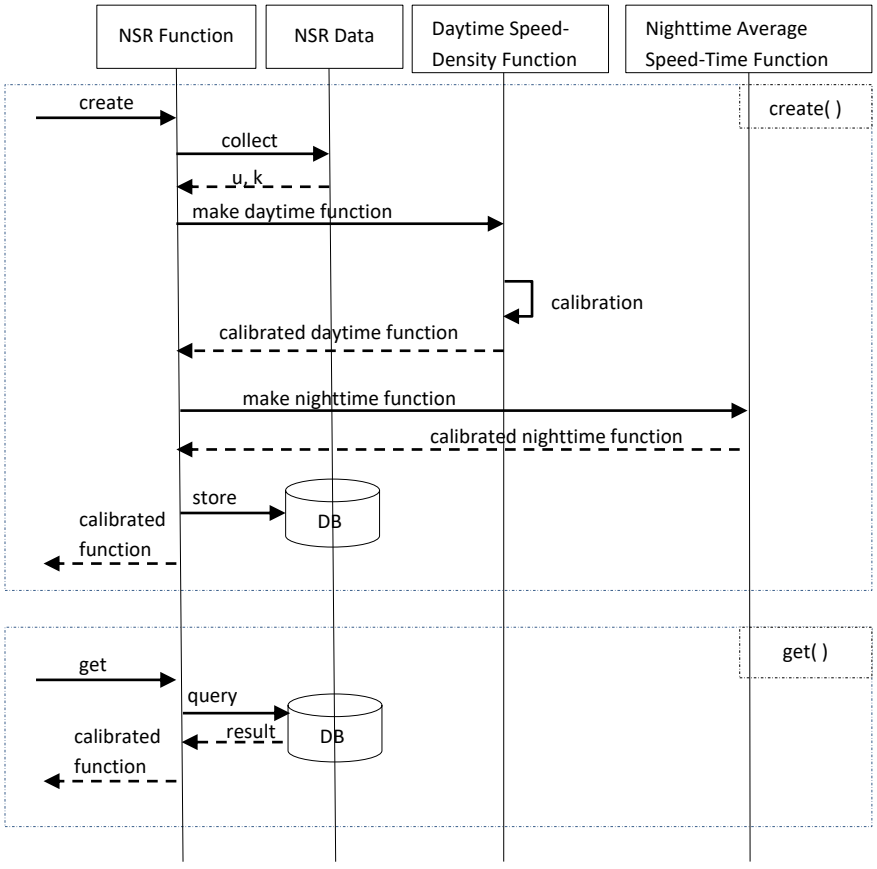


Figure 2.21 Sequence of NSR- Function Creation/Storage Process

2.3.1 Development of NSR Data module

The *NSR Data* module collects the traffic data from each detector station under normal-weather condition using the *Daytime/Nighttime Data Collector* modules. Figure 2.22 shows a portion of the source code for the *NSR Data* module which performs the following steps:

- Identify normal-dry days during given periods (months),
- Collects speed-density data during daytime and nighttime periods for each normal weather day,
- Pack the collected data to *NSRData* class and store them in the local disk for caching.

```
def get(target_station, normal_months, **kwargs):
    """ get normal function and data using cache

    :type target_station: pyticas.ttypes.RNodeObject
    :type normal_months: list[(int, int)]
    :rtype: pyticas_ncrtes.core.etypes.NSRData
    """
    cache_file = nsr_cache.cache_file_path(target_station.station_id, normal_months)
    if os.path.exists(cache_file):
        nd = nsr_cache.loads_data(target_station.station_id, normal_months)
else:
        nd = collect(target_station, normal_months, **kwargs)
        if nd:
            nsr_cache.dumps_data(nd, normal_months)
        else:
            cache_path = nsr_cache.cache_file_path(target_station.station_id, normal_months)
            with open(cache_path, 'w') as f:
                f.write('')
    return nd

def collect(target_station, months, **kwargs):
    """ collects normal dryday nsr_data

    :type target_station: pyticas.ttypes.RNodeObject
    :type months: list[(int, int)]
    :rtype: pyticas_ncrtes.core.etypes.NSRData
    """
    # collecting daytime data
    normal_periods, weather_source = dryday_finder.drydays_for_daytime(target_station, months)
    if not normal_periods:
        return None

    (used_periods, recovery_patterns uss, kss, rd_uss, rd_kss, valid_detectors, not_congested_periods,
not_congested_patterns) = daytime.collect(target_station, normal_periods, **kwargs)

    if not valid_detectors:
        return None

    # collecting nighttime data
    nt_normal_periods, nt_weather_source = dryday_finder.drydays_for_nighttime(target_station, months)
    avg_nt_us, avg_nt_ks, nt_uss, nt_kss, nt_periods = nighttime.collect(target_station, nt_normal_periods, **kwargs)

    # valid detector names for the given station
    det_names = [det.name for det in valid_detectors]

    data = NSRData(target_station, months,
                   DaytimeData(target_station, used_periods, recovery_patterns,
                               not_congested_periods, not_congested_patterns),
                   NighttimeData(target_station, avg_nt_us, avg_nt_ks, nt_periods),
                   det_names)

    return data
```

Figure 2.22 NSR Data module

2.3.2 Development of Daytime Data Collector module

The *Daytime Data Collector* module collects the daytime-traffic data, e.g., from 5 a.m. to 9 p.m., under normal weather condition. Figure 2.23 shows the source code for *Daytime Data Collector* module whose main functions are as follows:

- Check if detectors are malfunctioned in a given target station,
- Iterate the following steps for all normal-weather days during a given period.
- collect traffic data for each day,
- identify speed recovery periods, store speed-density data collected during speed recovery periods.

```
def collect(target_station, periods, **kwargs):
    """ return recovery and reduction pattern UK data set

    :type target_station: pyticas.ttypes.RNodeObject
    :type periods: list[pyticas.ttypes.Period]

    :rtype: (list[pyticas.ttypes.Period],
             dict[float, float],
             list[list[float]], list[list[float]],
             list[pyticas.ttypes.RNodeData], list[pyticas.ttypes.RNodeData],
             list[pyticas.ttypes.DetectorObject,
             list[pyticas.ttypes.Period],
            dict[float, float])
    """
    # Procedure
    # 1. check malfunctioned detector in a given target station
    # 2. iterate for all time periods
    #    2.1 call _collect_data_a_data with a time period
    #    2.2 save the daily data from 2.1
    logger = getLogger(__name__)

      # prepare detector checker to select a proper lane
    dc, valid_detectors = kwargs.get('dc', None), kwargs.get('valid_detectors', None)
    if not dc:
        dc, valid_detectors = lane.get_detector_checker(target_station)

    if not dc:
        return None, None, None, None, None, None, None, None, None


   # prepare variables
    n_count = 0
    uss, kss, rnode_data_ks, rnode_data_us, used_periods, all_hills = ([] for _ in range(6))
    all_patterns, recovery_patterns, reduction_patterns = {}, {}, {}
    not_congested_periods, not_congested_patterns = [], {}
```

```
# iterate data collection routine for each day
for prd in periods:
    recovery_uk, u_all, k_all, us, ks, is_not_congested = _collect_data_a_day(target_station, prd, dc)

    if not recovery_uk:
        continue


    # save to other variable for alternative u-function calibration
    if is_not_congested:
        not_congested_periods.append(prd)
        for rk in recovery_uk.keys():
            _tk = rk if rk in not_congested_patterns else _unique_key(rk, list(not_congested_patterns.keys()))
            if not _tk:
                continue
            not_congested_patterns[_tk] = recovery_uk[rk]
        continue

    if recovery_uk:
        uss.append(u_all)
        kss.append(k_all)
        rnode_data_us.append(us)
        rnode_data_ks.append(ks)

    n_count += 1

    for rk in recovery_uk.keys():
        _tk = rk if rk in recovery_patterns else _unique_key(rk, list(recovery_patterns.keys()))
        if not _tk:
            continue
        recovery_patterns[_tk] = recovery_uk[rk]

    used_periods.append(prd)


ks = list(recovery_patterns.keys())
us = [ recovery_patterns[_k] for _k in ks ]


# check if free flow speed is too high than speed limit (checking detector calibration problem)
if has_abnormal_ffs(target_station, recovery_patterns):
    all_uk = dict(not_congested_patterns)
    all_uk.update(recovery_patterns)

    ks = list(all_uk.keys())
    us = [ all_uk[_k] for _k in ks ]


    return None, None, None, None, None, None, None, None, None
```

```
    # data filtering
    ks, us = filter_abnormal_data(target_station, ks, us)
    recovery_patterns = { _k : us[idx] for idx, _k in enumerate(ks) }
    reduction_patterns = recovery_patterns
    all_patterns = recovery_patterns

    return (used_periods, recovery_patterns,
            uss, kss, rnode_data_us, rnode_data_ks, valid_detectors,
            not_congested_periods, not_congested_patterns)




def _collect_data_a_day(target_station, prd, dc):
    """ returns k,u data during speed recovery section on a day

    :type target_station: pyticas.ttypes.RNodeObject
    :type prd: pyticas.ttypes.Period
    :type dc: function
    :rtype: (dict[float, float], list[float], list[float],
             RNodeData,RNodeData, bool)
    """

    U_DROP_THRESHOLD= 5

    _us, _ks, _qs = _station_data(target_station, prd, dc)

    if not _us:
        return None, None, None, None, None, False

    sw = SW_1HOUR
    us = np.array(_us.data)
    ks = np.array(_ks.data)
    qs = np.array(_qs.data)

    sks = data_util.smooth(ks, sw)
    sus = data_util.smooth(us, sw)
    sqs = data_util.smooth(qs, sw)

    recovery_uk, reduction_uk, all_uk = {}, {}, {}


   # find recovery-interval from congestion

    dranges = _data_collecting_interval(target_station, ks, us, qs, sks, sus, sqs)
    is_not_congested = False
    if not dranges:
        minu_idx = np.argmin(sus).item()
        toidx = None
        maxu = sus[minu_idx]
        for idx in range(minu_idx, len(sus)-1):
```

```
            if sus[idx] > sus[idx+1] and maxu - sus[idx+1] > U_DROP_THRESHOLD:
                toidx = idx
                break
            maxu = sus[idx] if sus[idx] > maxu else maxu
        if not toidx:
            toidx = min(minu_idx + setting.INTV1HOUR, len(sus)-1)
        toidx = min(toidx, minu_idx + setting.INTV2HOUR)
        if toidx < len(sus)-1 or sus[toidx] > target_station.s_limit:
            dranges = [(minu_idx, toidx)]
        is_not_congested = True

    if not dranges:
        return None, None, None, None, None, None, False


    # save data to u-k dictionary
    sks2, sus2 = data_util.smooth(ks, sw), data_util.smooth(us, sw)
    already = []
    for (sidx, eidx) in dranges:
        for idx in range(sidx, eidx+1):
            if idx in already:
                continue
            _tk = (sks2[idx] if sks2[idx] not in recovery_uk
                   else _unique_key(sks2[idx], list(recovery_uk.keys())))
            recovery_uk[_tk] = sus2[idx]
            already.append(idx)
    return recovery_uk, us, ks, _us, _ks, is_not_congested
```

Figure 2.23 Daytime-Data Collector Module

2.3.3 Development of Nighttime-Data Collector module

The *Nighttime Data Collector* module collects the nighttime-traffic data from each detector station under normal-weather condition. In this study, the nighttime is defined as the period from 9:00 p.m. until 7:00 a.m. Figure 2.24 shows the source code for the *Nighttime Data Collector* module, which iterates the following steps for all time periods.

- check if the weather on a given day is dry or not,

- collect traffic data for a given day.

```
def collect(target_station, periods, **kwargs):
    """ returns nighttime traffic data
    :type target_station: pyticas.ttypes.RNodeObject
    :type periods: list[pyticas.ttypes.Period]
    :rtype: (list[float], list[float], list[list[float]], list[list[float]], list[pyticas.ttypes.Period])
    """
    rdr = ncrtes.get_infra().rdr


    # detector checker and valid detectors (lane2 detector)
    dc, valid_detectors = kwargs.get('dc', None), kwargs.get('valid_detectors', None)
    if not dc:
        dc, valid_detectors = lane.get_detector_checker(target_station)
    if not dc:
        return None, None, None, None, None
    uss, kss, used_periods = [], [], []



    # iterate to collect data for all time periods
    for prd in periods:
        us = rdr.get_speed(target_station, prd, dc)
        if not ncrtes.get_infra().is_missing(us.data):
            ks = rdr.get_density(target_station, prd, dc)
            uss.append(us.data)
            kss.append(ks.data)
            used_periods.append(prd)
    if not uss:
        return None, None, None, None, None
    # make average data
    avg_us = data_util.avg_multi(uss, only_positive=True)
    avg_ks = data_util.avg_multi(kss, only_positive=True)

    return avg_us, avg_ks, uss, kss, used_periods
```

Figure 2.24 Nighttime-Data Collector Module

2.3.4 Development of Daytime Speed-Density Function module

Figure 2.25 shows the typical patterns of the speed-density (U-K) and flow-density (Q-K) data points under normal weather conditions before and after breakdown, which is generally defined as the sudden speed drop below 25% of free-flow-speed level. As indicated in these plots, the speed-density data points exhibit different trajectories during the recovery period compared to those before the breakdown. This type of phenomena has been shown consistently from station to station on freeway corridors.

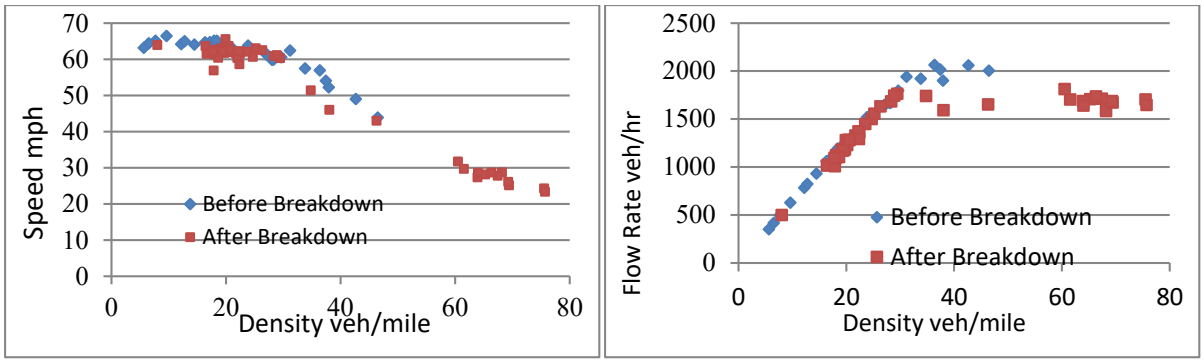


Figure 2.25 U-K and Q-K relationships at Station 636 (35E NB) under Normal Weather

In this task, the procedure to determine the recovery U-K function under normal-weather condition has been developed by calibrating the U-K function at each target station with the data collected only after the breakdown happened. Figure 2.26 illustrates the process to identify the data-collection period on the speed-time plot and also the process to determine the free-flow-speed (FFS) level for a given station. The data collection period is defined as the time period during which the speed level at a station recovers to its FFS level from the breakdown point. The step-by-step process to determine FFS and the data-collection interval is described as follows:

1) Using the daily traffic data at each target station, identify the lowest-speed time during each peak period.

2) Determine the FFS from the flow-density (Q-K) plot for each target station as follows:

i) collect Q-K data during the recovery period from breakdown

ii) determine K_m, the maximum density under Free-Flow Speed (FFS), as shown in Figure 2.26 (b)

iii) determine FFS by conducting a linear regression with the Q-K data points whose density range from 0 to K_m.

3) After FFS is determined, identify the time when FFS was reached by examining the Speed-Time plot.

4) The data collection interval is determined as the time duration during which FFS is reached from the breakdown point.

(a) Data-collection time Period (b) Q-K data range to determine FFS

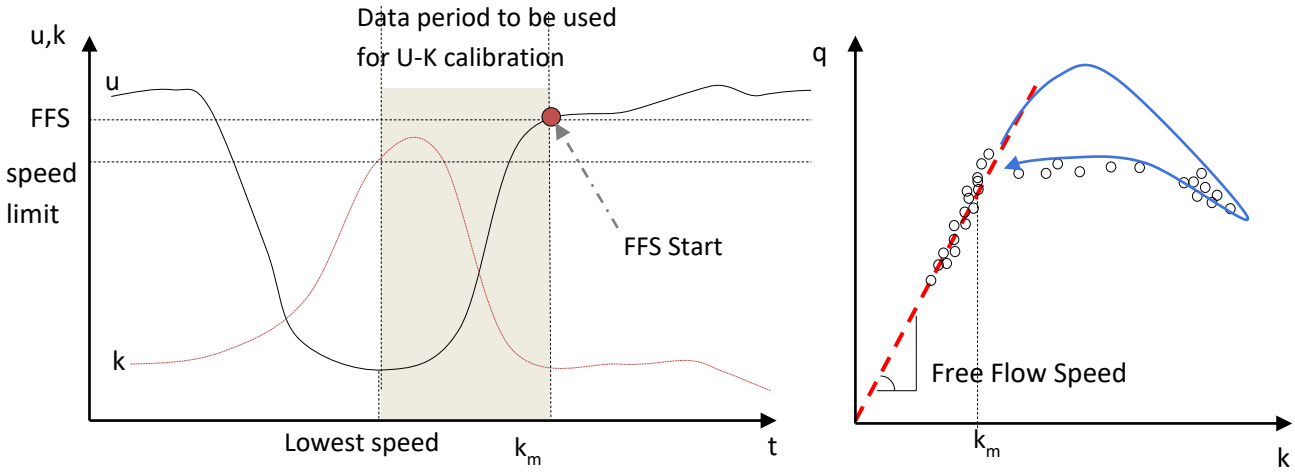


Figure 2.26 Data Range for Calibrating U-K Relationship under Normal Weather

Once FFS is determined at each station with the above process, the recovery U-K relationship under normal weather condition can be calibrated. In this study, the U-K plane is divided into three sections: Free-Flow-Speed (0-K_f), Transition ($K_f - K_l$), and Congested sections ($K_l - K_{jam}$). Further, the U-K relationship in the transition section is modeled with multi-linear functions, while a logarithm function is used for the congested section as indicated in Figure 2.26 (b). Figure 2.27 (a) shows the shape of the U-K function combining multiple, linear U-K functions and a logarithm function. As indicated, the multi-linear U-K functions connect the free-flow-speed and the congested regions. The process to determine the density ranges of each section, illustrated in Figure 2.27 (b), can be summarized as follows:

1) Find K_t, which is the maximum density above which the speed level is greater than free flow speed.

2) Calibrate a non-linear logarithm function with the U-K data after K_t.

3) Make average speed data at each density.

4) Find K_l, which is the intersecting point between the logarithm function and average speed data.

Figures 2.28 and 2.29 include the simplified top-level code of the normal U-K function calibration process and an example of the normal U-K function calibrated with this procedure.

(a) U-K function

(b) Identification of K_l

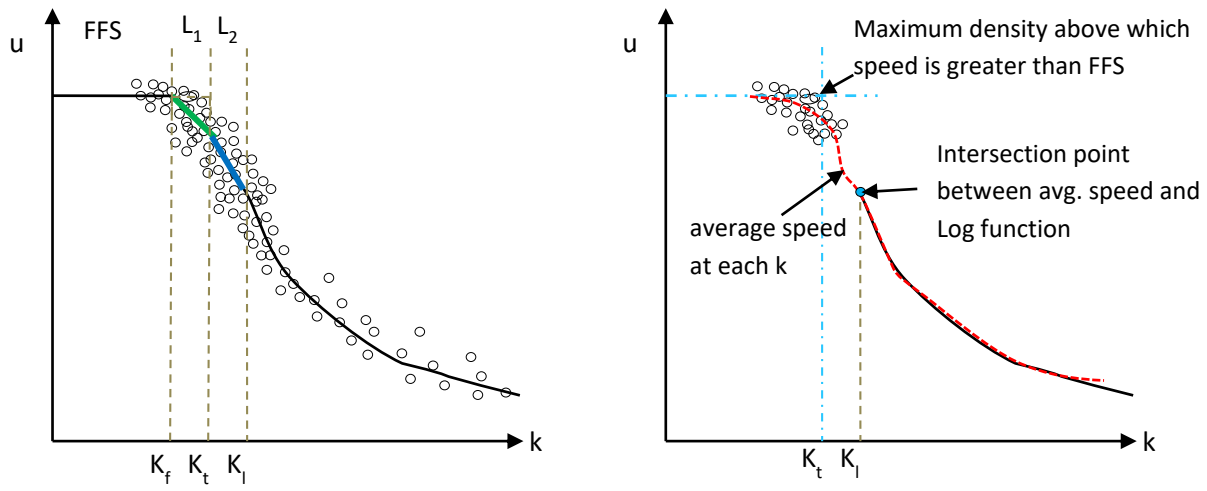


Figure 2.27 U-K Model combining Multiple-Linear and None-Linear Log Functions

```
def normal_uk _function(ddata, uk):
    """

    :type ddata: pyticas_ncrtes.core.etypes.DaytimeData
    :type uk: dict[float, float]
    :rtype: etypes.SegmentedFunction
    """
    # estimate FFS
    ffs, Kf = ncr_ffs.estimate(uk, smoothing_window_size=smoothing_window_size)


    # data filtering
    filtered_uk = data_util.filter_uk(uk, m=setting.UK_FILTER_STDDEV_MULTIPLIER, debug=False)
    filtered_us, filtered_ks = data_util.dict2sorted_list(filtered_uk)

    # max_k with FFS
    margink = 1
    Kt = max(filtered_target_ks[np.where(filtered_target_us >= ffs)])
    wh_around_maxk = np.where( (filtered_target_ks <= Kt + margink) & (filtered_target_ks >= Kt - margink))
    median_u_at_kt = np.median(filtered_target_us[wh_around_maxk])

    # prepare avg u-k data
    _ks, _us = [], []
    for _k in range(10, 100):
        avg, stddev, arounds = data_util.avg_y_of_around_x(filtered_target_ks, filtered_target_us, _k, 2)
        if avg:
            _ks.append(_k)
            _us.append(avg)
    _ks = np.array(_ks)
    _us = np.array(_us)
    kth, uth = Kt, median_u_at_kt


    # log-function calibration
    logfunc = _after_kt(ddata.station, filtered_target_uk, kth)
```

```
# find Kt from average u-k data and calibrated function
Kl = _find_func_matching_point(logfunc, kth, _ks, _sus)
for _ in range(10):
    kth2 = kth2 + 5
    Kl = _find_func_matching_point(logfunc, kth, _ks, _sus)
    if Kl is not None:
        break

# result segmented functions ([0] = FFS function)
lfunc = etypes.LineFunction((0, ffs), 0, Kf)
funcs = [ lfunc ]

# funcs[1] = FFS to Kt
u_at_kt, _, _ = data_util.avg_y_of_around_x(filtered_target_ks, filtered_target_us, Kt, 2)
popts = _line_func(lfunc.x2, lfunc.get_speed(lfunc.x2), Kt, u_at_kt)
lfunc = etypes.LineFunction(popts, lfunc.x2, Kt)
funcs.append(lfunc)

# funcs[2] = Kt to Kl
u_at_kl = logfunc.get_speed(Kl)
popts = _line_func(lfunc.x2, lfunc.get_speed(lfunc.x2), Kl, u_at_kl)
lfunc = etypes.LineFunction(popts, lfunc.x2, Kl)
funcs.append(lfunc)

# func[3] = logfunc
logfunc.x1 = Kl
logfunc.x2 = 9999
funcs.append(logfunc)


return etypes.SegmentedFunction(funcs, Kf, Kt, ffs)
```

Figure 2.28 Simplified U-K Function Calibration Procedure

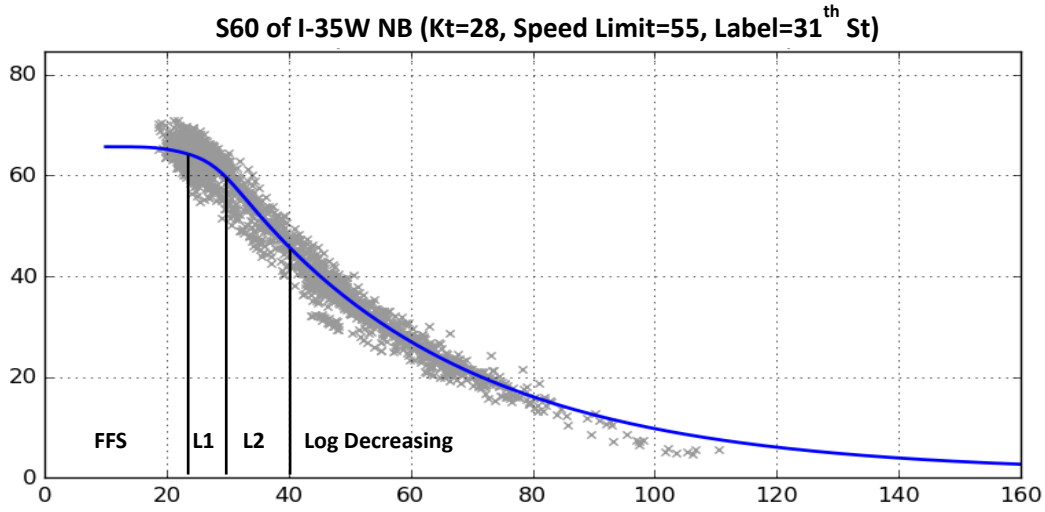


Figure 2.29 Example Calibrated Normal Recovery U-K Function

Data Collection Location U-K function Calibration

Figure 2.30 shows the lane-by-lane speed distribution at Station 43 on I-35W NB on a typical-weekday under normal-weather condition. This station is located right upstream of an on-ramp to I-494 and, as shown in this figure, the right-most lane (lane 1) speed shows substantially lower values during peak periods than those in other lanes. I.e., the speed levels on lane 1 are significantly affected by the merging traffic from the downstream onramp and the magnitude of those effects can vary depending on the amount of the merging flow. To minimize the effects of such conflicts on the U-K relationships, in this study, the target-station identification process is refined to use only the data from Lane 2 at all the stations as shown in Figure 2.31. Figure 2.32 shows the source code to select a target detector for a detector station. The refined procedure returns Lane 2 detector if it is not HOV(T) lane or temporary detector. In case if Lane 1 is an auxiliary lane, the procedure returns Lane 3 detector data. Further, a user can designate certain detectors for data collection regardless of their locations in the Target Station Management module.

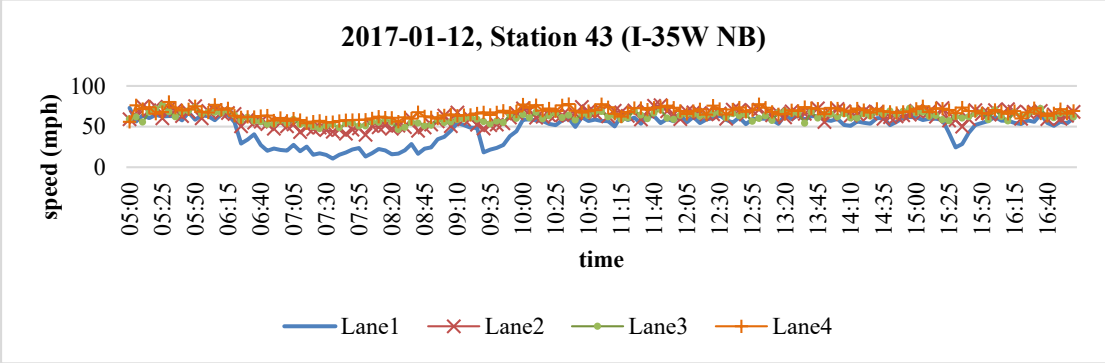


Figure 2.30 Lane-by-Lane Speed Distribution at a Station Upstream Onramp

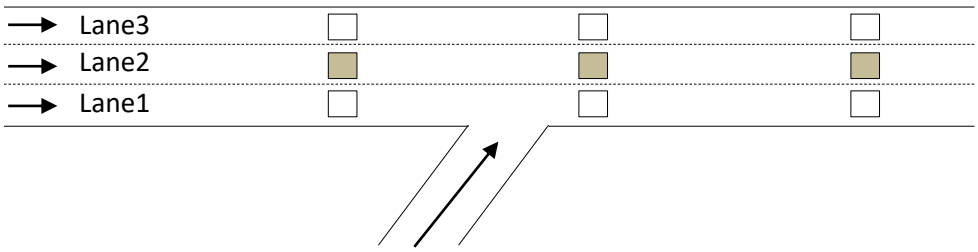


Figure 2.31 Lane 2 Detectors used for U-K Data Collection

```
def get_target_detectors(target_station):
    """ return detector list to be used in collecting normal-day data
    :type target_station: pyticas.ttypes.RNodeObject
    :rtype: list[pyticas.ttypes.DetectorObject]
    """
    lane1_det = _lane1_detector(target_station)
    # if lane 1 is auxiliary lane
    # then use lane 3
    target_lane = 2
    if lane1_det.is_auxiliary_lane():
        target_lane = 3 if target_station.lanes > 2 else -1
    # find detectors on the target lane
    for det in target_station.detectors:
        if (det.lane == target_lane
                and not det.is_HOVT_lane()
                and not det.is_velocity_lane()
                and not det.is_temporary()):
            return [det]
    return []
def _lane1_detector(target_station):
    """ return lane-1 detector
    :type target_station: pyticas.ttypes.RNodeObject
    :rtype: pyticas.ttypes.DetectorObject
    """
    for det in target_station.detectors:
        if det.lane == 1 and not det.is_velocity_lane() and not det.is_temporary():
            return det
    return None
```

Figure 2.32 Procedure for Target-Detector Selection

2.3.5 Development of Nighttime Average Speed-Time Function module

The Nighttime Average Speed-Time Function module calibrates the time-variant speed function for each detector station with average-speed data from nighttime periods, where a stable speed-density relationship cannot be defined because of low traffic volumes. In this study, the average speed data at each time interval during the nighttime period at a given station is used to calibrate the time-variant speed function, which is used to estimate the normal condition recovery time at each station during nighttime periods. Figure 2.33 shows a portion of the source code for the *Nighttime Average Speed-Time Function* module and the *Nighttime Average Speed-Time Function* class. As indicated in Figure 2.33, the *Nighttime Average Speed-Time Function* module calculates average speed data for each time interval during nighttime periods and packs the average-speed data to the *NightTimeFunction* class, which has a set of the functions to find speed-reduction/recovery periods and determine the time-variant functions with the average-speed data for both speed reduction and recovery periods.

```
def make(night_data):
    """ makes time-variant speed function object with nighttime speed data

    :type night_data: pyticas_ncrtes.core.etypes.NighttimeData
    :rtype: NighttimeFunction
    """
    if not night_data.avg_us:
        return etypes.NighttimeFunction([], [], None, None, 300)
    start_time = night_data.periods[0].start_date.time()
    end_time = night_data.periods[0].end_date.time()
    interval = night_data.periods[0].interval
    return etypes.NighttimeFunction(night_data.avg_us, night_data.avg_ks, start_time, end_time, interval)

class NighttimeFunction(Serializable):
    def __init__(self, avg_us, avg_ks, start_time, end_time, interval): # constructor
    def is_valid(self): # return True if function is valid, else False
    def get_timeline(self): # return time duration of nighttime

    def get_curve_depth(self): # return difference between maximum speed and minimum speed in the function

    def get_night_speeds(self): # speed data list generated by the function during nighttime
    def prepare_function(self): # prepare the function to return speed by time
    def nighttime_index(self, dt): # return corresponding index of the given time in the average speed data
    def speed(self, dt): # return speed value by the function
    def speeds(self, dts): # return speed value list by the function
    def density(self, dt): # return density value by the function
    def densities(self, dts): # return density value list by the function
```

Figure 2.33 Nighttime Average Speed-Time Function Module

2.4 DEVELOPMENT OF TARGET DETECTOR-STATION IDENTIFICATION MODULE

The *Target Detector Station Identification* (TDSI) module examines the availability of normal speed-recovery (NSR) functions for each detector station and identifies those with valid NSR functions as target detector- stations, whose normal-condition recovery times are determined with the speed-density data for given snow events. Figure 2.34 shows the structure of the TDSI module, which uses multiple processes to improve the computational performance. The main functions of each submodule in TDSI are as follows:

- *TSI Service module* creates the processes to identify target-detector stations for each corridor.

- *TSIMain* module identifies the stations whose normal U-K functions have been calibrated for normal weather.

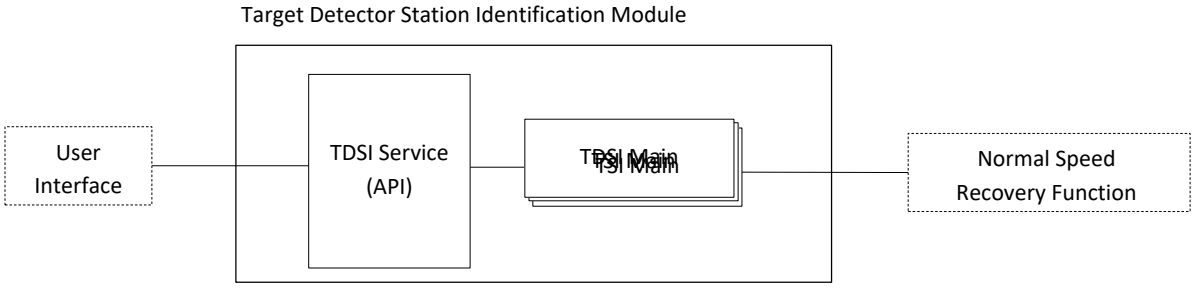


Figure 2.34 Structure of TDSI Module

2.4.1 Development of TDSI Service module

The *TDSI-Service* module shown in Figure 2.34 handles the requests from the user client. The internal process of the TDSI-service module can be summarized as follows:

- "Year" data is passed as a parameter to the TDSI-service module, which makes a station list for multiple processes.
- The multiple processes required for the *TSI Main* module with a given station list are created.
- The TDSI-service module executes the TDSI-Main module.
- After all the processes are performed by the TDSI-Main module, the calibrated U-K functions stored in the Database and the truck- route information are linked in the Database.

Figure 2.35 includes the source code of the TDSI-service module.

```
# TDSI API register function to server

def register_api(app):
    @app.route(api_urls.TSI, methods = ['POST'])
    def ncrtes_target_station_identification():
        year = int(request.form.get('year'))
        months = get_normal_months_from_year(year)
        infra = ncrtes.get_infra()
        # load or create winter season information
        ws = WinterSeasonDataAccess()
        wsi = ws.get_by_months(months)
        if not wsi:
            wsi = itypes.WinterSeasonInfo()
            wsi.set_months(months)
            wsi.name = 'WinterSeason %s-%s' % (months[0][0], months[-1][0])
            ws.insert(wsi, autocommit=True)
        ws.close()
        data_path = ticas._TICAS_.data_path
        n_process = 5
        stations = []
        for n in range(n_process):
            stations.append([])
        # creates station list

        for cidx, corr in enumerate(infra.get_corridors()):
            if not corr.dir or corr.is_CD() or corr.is_Rev() or corr.is_RTMC():
                continue
            for sidx, st in enumerate(corr.stations):
                if not st.is_normal_station() or not st.detectors:
                    continue
                stations[sidx % n_process].append(st.station_id)
        # execute process to run TSI main
        procs = []
        for idx in range(n_process):
            p = Process(target=tsi_main.run, args=(idx + 1, stations[idx], months, data_path, NCRTESApp.DB_INFO))
            p.start()
            procs.append(p)
        for p in procs:
            p.join()
        # make links among target stations and truck-route information in database

        target_station_and_snowroute_info(year)
        return jsonify( {'code' : 1, 'message' : 'success'} )
```

Figure 2.35 TDSI-Service Module

2.4.2 Development of TDSI-Main module

Figure 2.36 shows the *TDSI-Main* module, which identifies target-detector stations and calibrates the normal U-K functions for all target stations using the *Normal Speed Recovery Function Calibration* module. This module is executed by the *TDSI Service* module.

```
def run(pid, stations, months, data_path, db_info):
    """ target station identification main process
    Parameters
    ===========
        - pid : process identification for multi-processing
        - stations : station list
        - months : month list
        - data_path : TICAS data path
    :type pid: int
    :type stations: list[str]
    :type months: list[(int, int)]
    :type data_path : str
    :type db_info: dict
    :return:
    """
  # initialize py-ticas
   Infra.initialize(data_path)
   infra = Infra.get_infra()
    # DB connection

   conn.connect(db_info)
     # iterate normal U-K calibration functions for the given stations
   n_stations = len(stations)
    for sidx, st in enumerate(stations):
       station = infra.get_rnode(st)
       try:
          nf = nsrf.get_normal_function(station, months)
       except Exception as ex:
          logger.warning(tb.traceback(ex, False))
```

Figure 2.36 TDSI Main module

2.5 DEVELOPMENT OF NORMAL CONDITION RECOVERY TIME ESTIMATION MODULE

2.5.1 Overview of NCRT Estimation Process

Figure 2.37 shows the typical speed-variation pattern on a roadway through time during a snow event. As noted in this figure, after the snow is cleared on a given location, the speed level reaches a stable free-flow-speed (FFS) before it is recovered to its before-snow FFS. I.e., there is a FFS under snow-free, but still-wet surface condition and its value is generally lower than the before-snow FFS at a same location. Further, the speed-density (U-K) relationship of the traffic flow after snow is cleared exhibits a shifted-down pattern of the normal-day U-K relationship at a same location, as illustrated in 2.38. In this study, the after-snow FFS is called as wet-normal FFS and the after-snow roadway condition, where the traffic flow follows a stable but shifted-down pattern of the normal-day U-K relationship at a given location, is defined as the 'wet-normal' condition. Further, the normal condition regain time (NCRT) is defined as the time when the traffic-flow pattern at a given location in terms of the U-K trajectory starts to follow the wet-normal U-K relationship as shown in Figure 2.38.

The NCRT estimation process developed in this study for a target station with normal U-K pattern can be summarized as follows:

(1) Identify the wet-normal FFS at a given station for a given snow event after snow is cleared.

(2) Determine the wet-normal U-K function for a given station by adjusting the normal U-K function with the wet-normal FFS at a same location.

(3) Determine NCRT by comparing the U-K trajectory during a snow event with its wet-normal U-K relationship.

For those stations, whose normal U-K patterns cannot be determined because of the lack of congested traffic data, the NCRT is defined as the time the speed level reaches the wet-normal FFS at each station. Figure 2.39 shows the simplified process to determine NCRTs at the target/non-target detector stations in the metro-freeway network for a given snow event. Figure 2.40 shows the simplified structure of the NCRT module and its relationship with other main modules in the NCRT system. The procedure of the main NCRT estimation module is included in Figure 2.41.

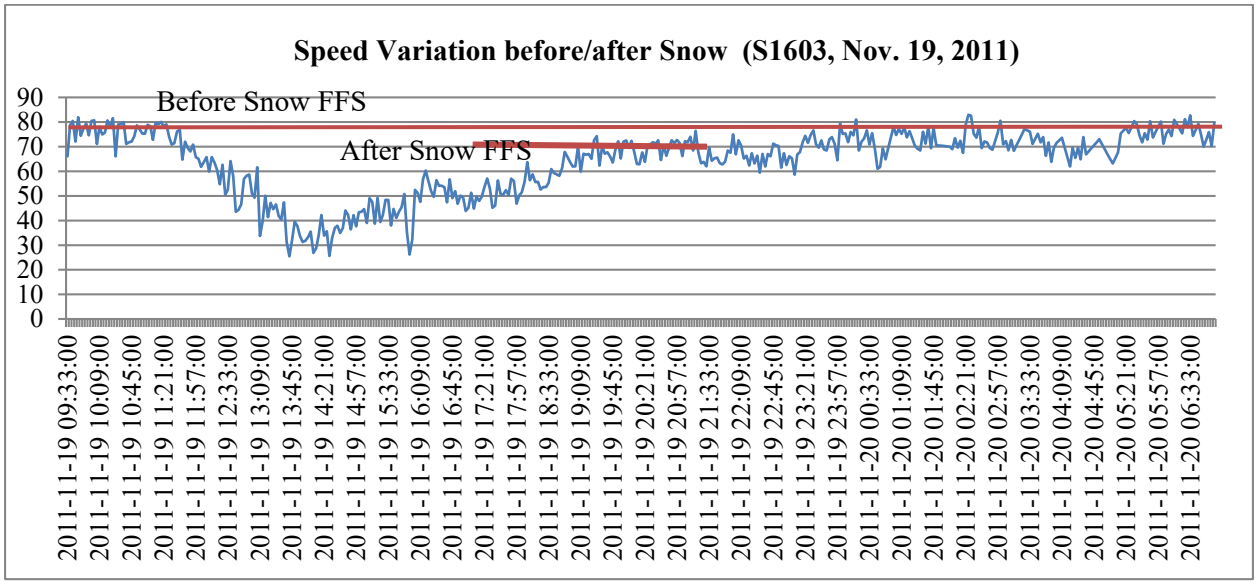


Figure 2.37 Speed Variation through Time at Station 1603 on a Snow Day

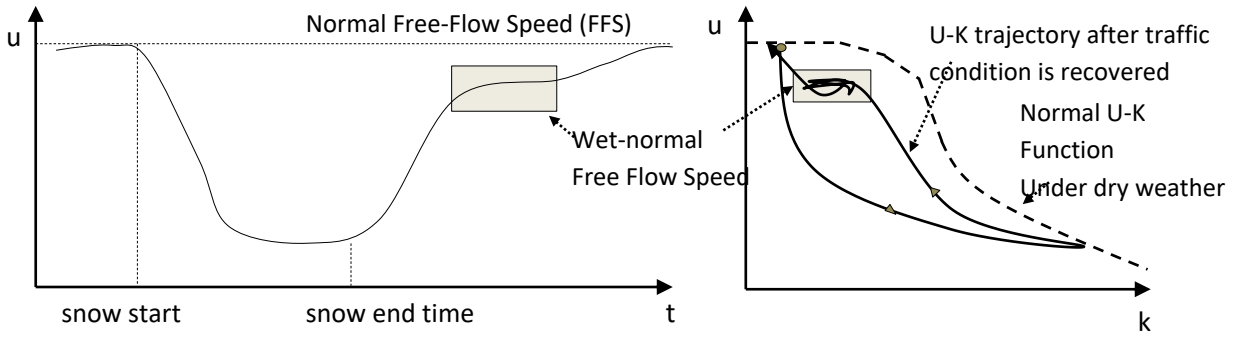


Figure 2.38 Typical Speed Changes and U-K Trajectory during a Snow Event

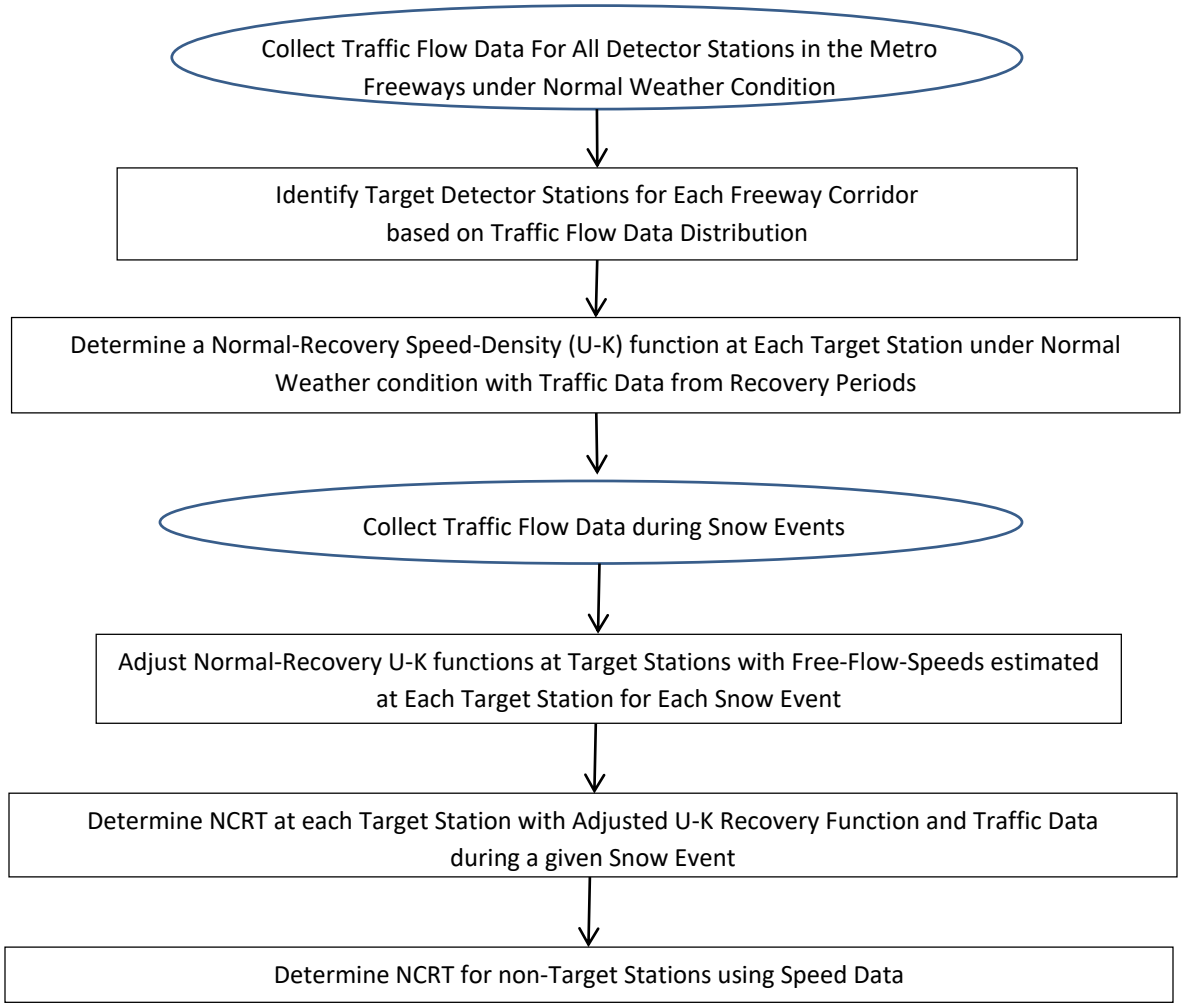


Figure 2.39 Simplified Process for NCRT Estimation

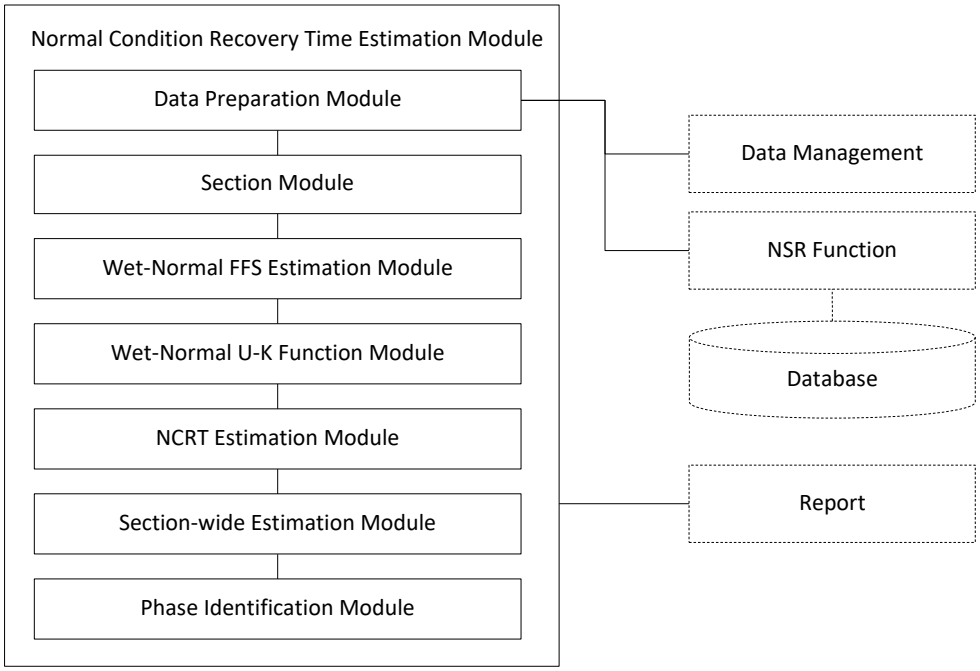


Figure 2.40 Structure of NCRT Estimation Module

The functionalities of each sub module in the NCRT Estimation module are as follows.

Data Preparation module downloads the traffic flow data for each target station from the RTMC traffic database for given snow events. It also retrieves the normal speed-density functions and the time-variant nighttime-average speed values archived in the NCRT system database for each target station.

Section module determines a set of sections within a truck route considering natural geometric boundaries, such as freeway interchanges, and speed limit values. A section consists of adjacent detector stations and used to adjust the NCRTs in a same section after the NCRT at each station is determined.

Wet-Normal FFS Estimation module identifies the wet-normal FFS for each target station.

Wet-Normal U-K Function module determines the wet-normal U-K function for a given station by adjusting its normal-day U-K function with the estimated wet-normal-FFS for a given snow event for that station.

NCRT Estimation module determines the NCRT of a given station using the calibrated wet-normal U-K function.

Phase Identification module determines the other phase change times, such as SRST, LST and SIST, for a given snow event using the results from the above submodules at each station.

```
def estimate(request_param, **kwargs):
    """
    :type request_param: pyticas_ncrtes.itypes.EstimationRequestInfo
    :rtype: list[pyticas_ncrtes.est.etypes.ESTData]
    """
    # prepare reported events
    reported_events = _reported_events(request_param)
    # prepare time period and route information
    year = _get_year(request_param.snow_start_time)
    snow_routes, snri_list = _snow_routes(year)
    prd = _snow_event(request_param)
    # make station groups by corridor or truck route  to run by the the group
    est_groups = _est_groups(year, request_param, snow_routes, snri_list, from_station, to_station)
    # run estimation process for each station group
    for case_name, stations in est_groups.items():
        # prepare ESTData lits which contains snow day data, normal function, station info, truck route info and
snow event info
        edata_list, tsi_list, sidx_list = _prepare_est_data(stations,  snow_routes=snow_routes)

        # make sections

        sections = section.sections(edata_list)
        for idx, edata in enumerate(edata_list):

            # Run NCRT estimation process using Wet-normal U-K function
            est.estimate(sidx_list[idx], tsi_list[idx], edata)
        # adjust NCRT of individual stations
        ncrt_sectionwide.adjust_ncrts(edata_list, sections)
        # determine phase change points
        for idx, edata in enumerate(edata_list):
            phase.determine(edata)
```

Figure 2.41 Main Procedure of Normal Condition Recovery Time Estimation Module

2.5.2 Determination of Wet-Normal Free Flow Speed for Given Snow Events

Figure 2.42 (a) shows the example speed regions, where the wet-normal Free-Flow-Speed (WN-FFS) can be identified for a given station on a snow event. The WN-FFS is defined as the speed level under free-flow condition right after snow is cleared at a given location, i.e., the road surface is snow-free, but has not completely recovered to its before-snow condition. Further, the WN-FFS can vary depending on the

amount and intensity of the snow at a same location. In this section, a process is developed to determine the WN-FFS at a detector station for a given event using the traffic-flow data. The WN-FFS will be used to determine the wet-normal U-K relationship for a given station. The process is shown in Figure 2.42 (b) and summarized as follows:

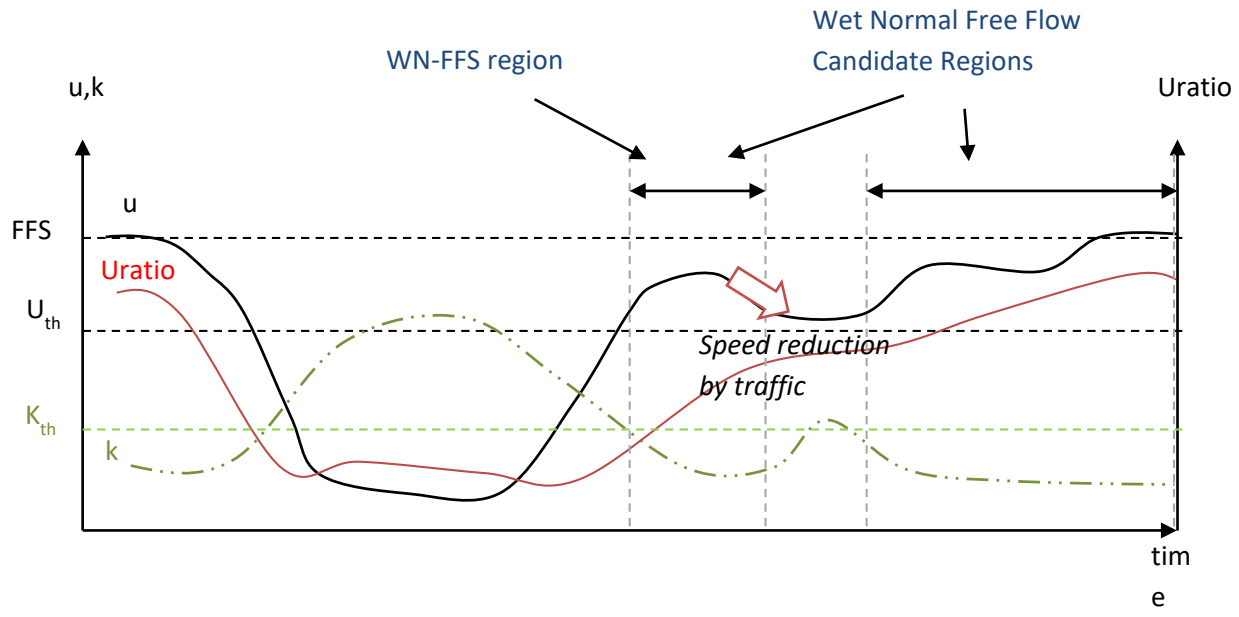
1) Determine the candidate regions for WN-FFS by selecting the time intervals whose speed and density values through time meet the following conditions:

   *Speed > U_{th}, where Uth = 0.7 * Normal-Dry Day FFS at a same location*

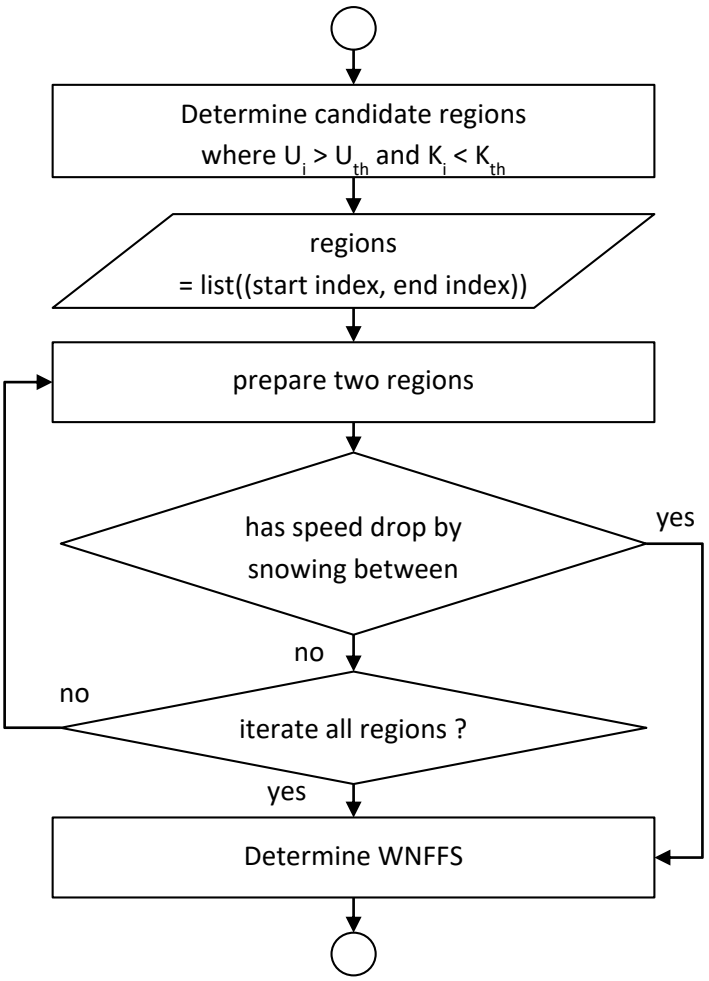
   Density < K_{th}, where K_{th} = 30 veh/mile/lane

2) When multiple candidate regions satisfying the above conditions are found, select the first region after which the traffic-flow pattern is not affected by snow by examining the Uratio, Snow-Day Speed at K/ Dry-Day Speed at K, during the time interval between two candidate regions.
3) Determine WN-FFS from the selected region as described in the next section.

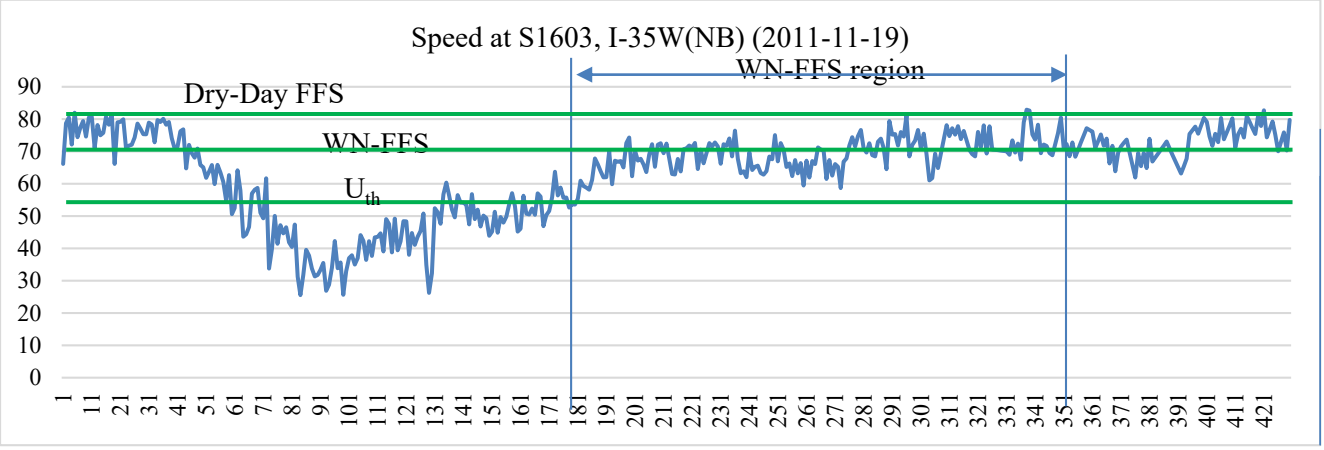
Figure 2.42 (c) illustrates the above process with a real example case.



(a) WN-FFS candidate regions



(b) WNFFS Identification Procedure



(c) Speed-Time data to estimate WN-FFS at S1603

Figure 2.42 WN-FFS Identification Process

Determination of WN-FFS from the selected region

After the WN-FFS region is identified from the speed-time plot for a given station, the WN-FFS can be determined depending on the speed-recovery patterns within the selected time interval. Figures 2.43 (a) - 2.43 (c) show three types of speed-recovery patterns to normal free-flow-speed at the example stations. Figure 2.43 (d) illustrates the data-collection period to determine the WN-FFS, which is defined as the first stable FFS within 70-90 % of the normal-day FFS, i.e., before-snow FFS, at each location.

- *Type1 (Figure 2.43 (a), 2.44 (a)): the speed recovered to U_r directly, where $U_t \geq 0.9$*Normal FFS. In this case, the WN-FFS is determined as the speed level at the time U_r is reached, i.e., T_t.*
- *Type 2 (Figure 2.43 (b), 2.44 (b)): there is a stable free-flow-speed region between T_s and T_r, where T_s is the time the speed at a given location reached U_{th}, i.e., 60% of normal FFS. The speed at the start time of the stable FFS region is defined as the WN-FFS for a given location in this pattern.*
- *Type 3 (Figure 2.43(c), 2.44 (c)): the speed recovered to U_r gradually. In this situation, the time with the maximum speed increase, i.e., the speed at the vertex point between T_s and T_r, is determined as the WN-FFS at a given location.*

For those stations with any of the above 3 recovery patterns, the NCRT can be also determined as the time when WN-FFS is reached at a given station. The step-by-step process to determine the NCRTs for these stations can be summarized as follows:

1) Collect quantized speed data for the time period from T_s to T_e at each station for a given snow event.

where, T_s= the start time of the WN-FFS candidate region,

T_e = Max [T_s + 6 hours, Snow End Time + 4 hours]

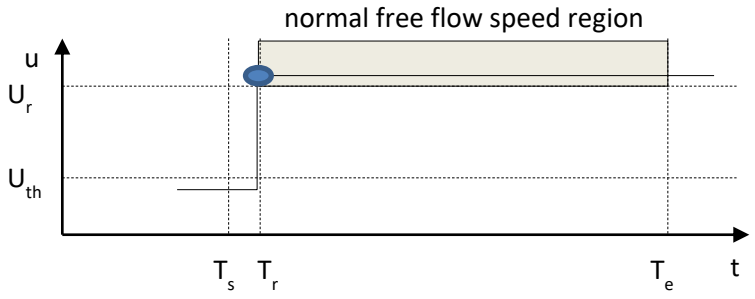
2) Identify T_r, as the time the speed level reaches to U_r

3) Check if the speed level is recovered to normal free-flow-speed directly using the following condition:

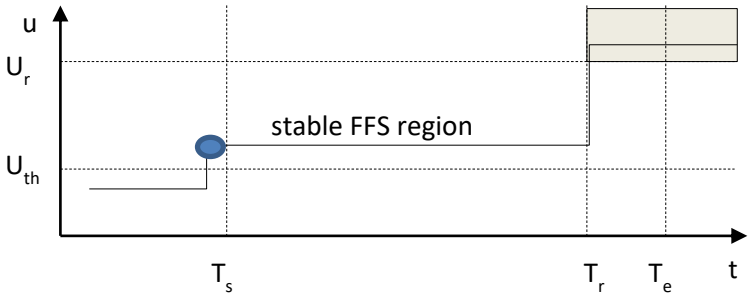
$-(T_e - T_r) / (T_e - T_s) > 0.6$, i.e., % of normal FFS region is greater than 60%.

4) If WN-FFS is not found in step 3, check if there is a stable FFS region, defined as the region whose duration is greater than 0.6 * (T_e-T_s).

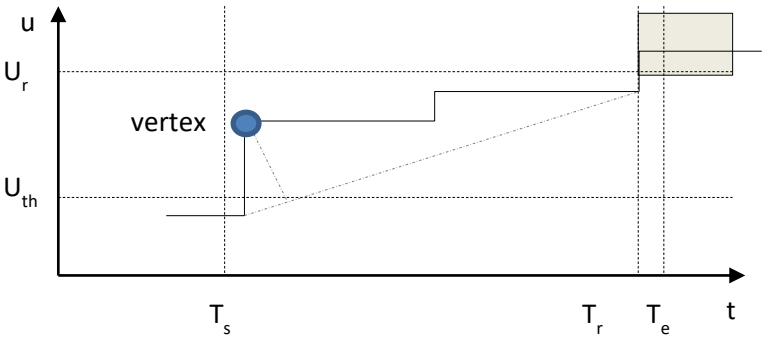
5) If WN-FFS is not found in step 4, identify the speed at the vertex point between T_s to T_r as the WN-FFS.



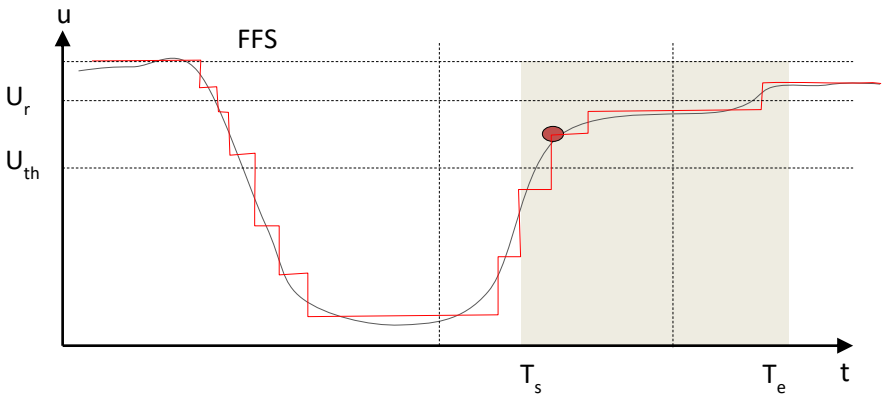
(a) Type 1: Speed recovered to normal free-flow-speed directly



(b) Type 2: Speed reaches a stable FFS before normal free-flow-speed

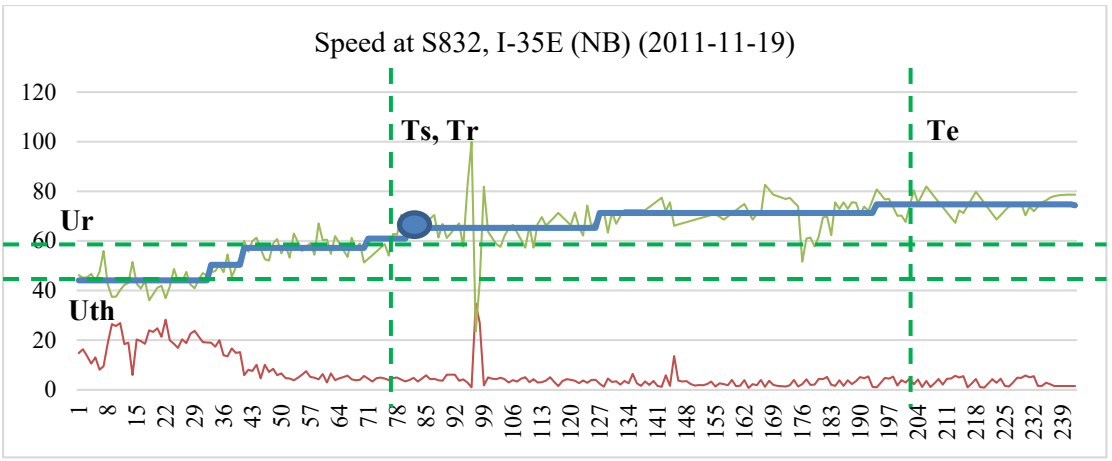


(c) Type 3: The speed gradually recovers to normal FFS

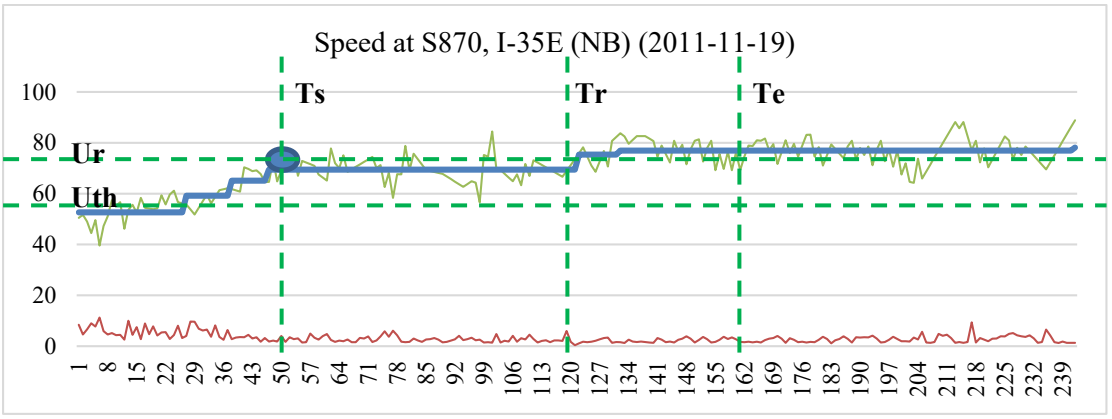


(d) Data collection period

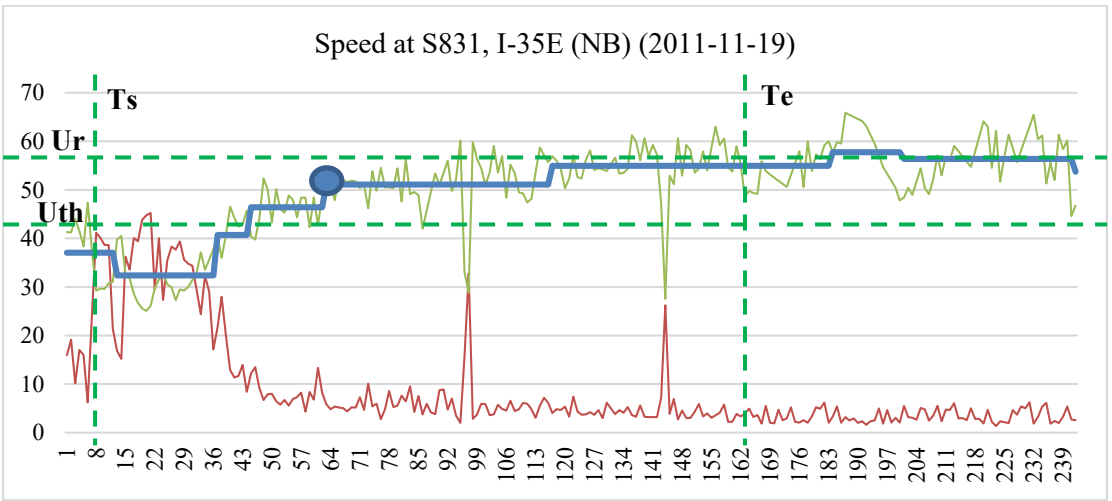
Figure 2.43 WN-FFS Identification Process



(a) Example of the recovery pattern type 1



(b) Example of the recovery pattern type 2



(c) Example of the recovery pattern type 3

Figure 2.44 Examples for WN-FFS Identification Process

2.5.3 Determination of Wet-Normal U-K Relationship

With WN-FFS

Figure 2.45 shows the process to determine a Wet-Normal U-K relationship by adjusting the normal U-K function at a given station by using the difference between the normal speed at K_{wn} and WN-FFS, where K_{wn} is the maximum density at WN-FFS for a given snow event. The process to determine the wet-normal U-K trajectory is summarized as follows:

(1) $K <= K_{wn}$: Wet-Normal Speed at K = WN-FFS

(2) $K_{wn} < K <= K_x$: Wet-Normal Speed at K_i = Normal-Day speed at $(K_i + S_i)$,

$$\text{where, } S_i = S_0 - (K_i - K_{wn})*r, \quad r = S_0 / (K_x - K_{wn})$$

(3) $K_x < K$: Wet-Normal Speed at K = Normal-Day speed at K, i.e., S_i is 0.

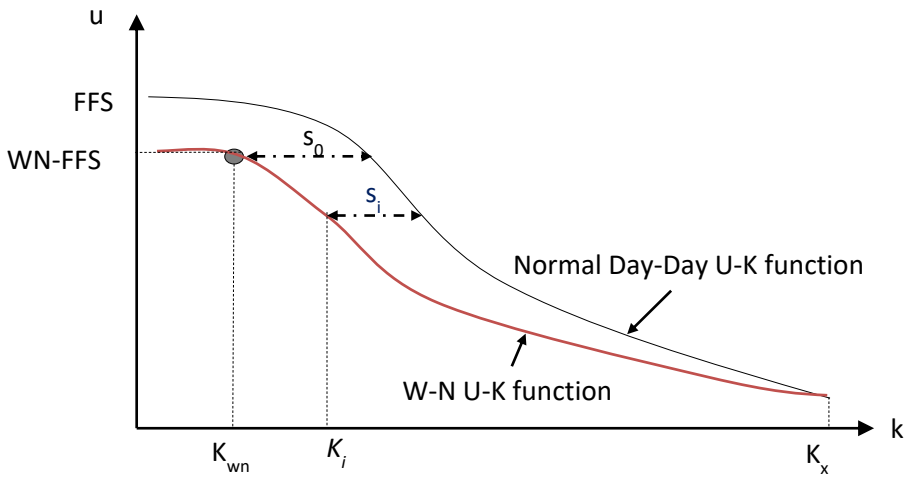


Figure 2.45 Determination of Wet-Normal U-K Relationship

Without WN-FFS

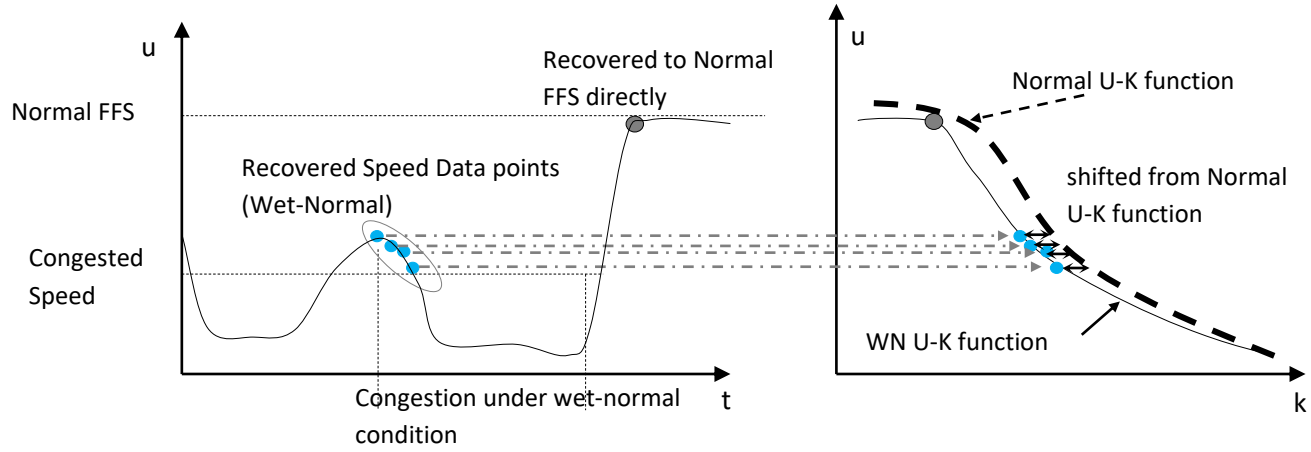
Figure 2.46 shows the speed variation through time for a snow event, where the speed level during the recovery period did not reach the WN-FFS level because of traffic congestion. I.e., at this location, the traffic condition was recovered to the wet-normal state during the congested period and after the congestion was cleared the speed directly went back to the pre-snow FFS level. In this case, the wet-normal U-K relationship was determined as follows:

(1) Check if the final-recovered speed is close, i.e., within 90%, to the normal FFS at this location and if there was a congested period before the speed was recovered (Figure 2.46 (a)).

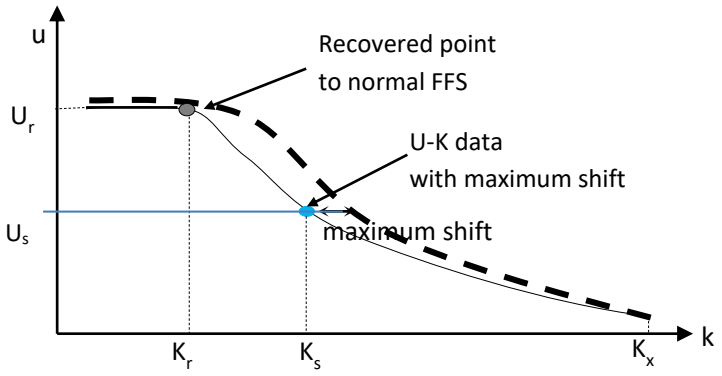
(2) Identify the speed-recovery interval right before the congested period and also determine the maximum speed and its time before the speed decreased because of the congestion (Figure 2.46 (a)).

(3) Collect the U-K data points during the speed-reduction period, i.e., from the maxim recovered-speed time to the congested-speed time (Figure 2.46 (a)). Also identify the maximum speed and its density values (U_s, K_s) before the speed started to decrease.

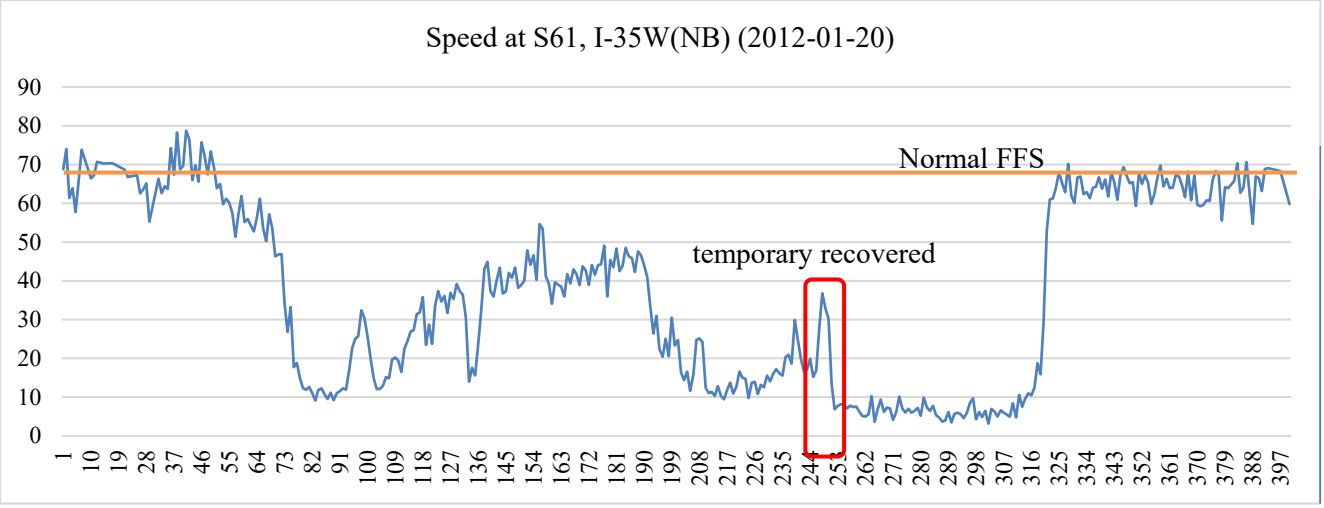
(4) Determine the Wet-Normal U-K relationship at this location by gradually shifting the normal U-K function with the calculated-shift value at each speed level as shown in Figure 2.46 (b). The maximum shift happens at K_s.



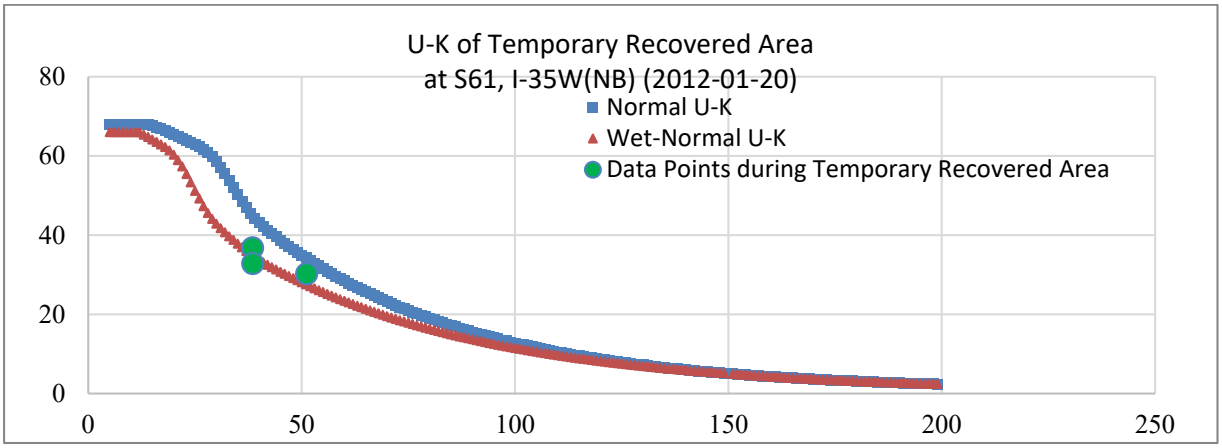
(a) Wet-Normal U-K pattern during Congestion



(b) Wet-Normal U-K Calibration



(c) Temporary Recovered Area during Congestion



(d) Wet-Normal U-K Relationship calibrated from Temporary Recovery Data

Figure 2.46 Determination of Wet-Normal U-K Relationship without WN-FFS

2.5.4 Determination of Normal Condition Regain Time with WN-UK Pattern

As described previously, the NCRT is defined as the time when the U-K pattern during a given snow event starts to follow the wet-normal U-K relationship at a given location. The wet-normal U-K relationship calibrated in the previous section is used to determine the NCRT at a given station using the U-K data collected during a given event. The NCRT-determination process with WN-UK pattern is summarized as follows:

(1) Determine the *U Ratio*, R_t, the ratio between the speed level at time t during a snow event and the speed value from the Wet-Normal U-K function at a same-density level at time t.

(2) Identify the time, T_N, when U Ratio starts to be equal to or greater than 1.0 and determine the speed level, U_N, at that time as shown in Figure 2.46 (c).

(3) Check if there is the time prior to T_N with the same speed level as U_N. If there is, that time will be identified as NCRT. Otherwise, T_N will be NCRT.

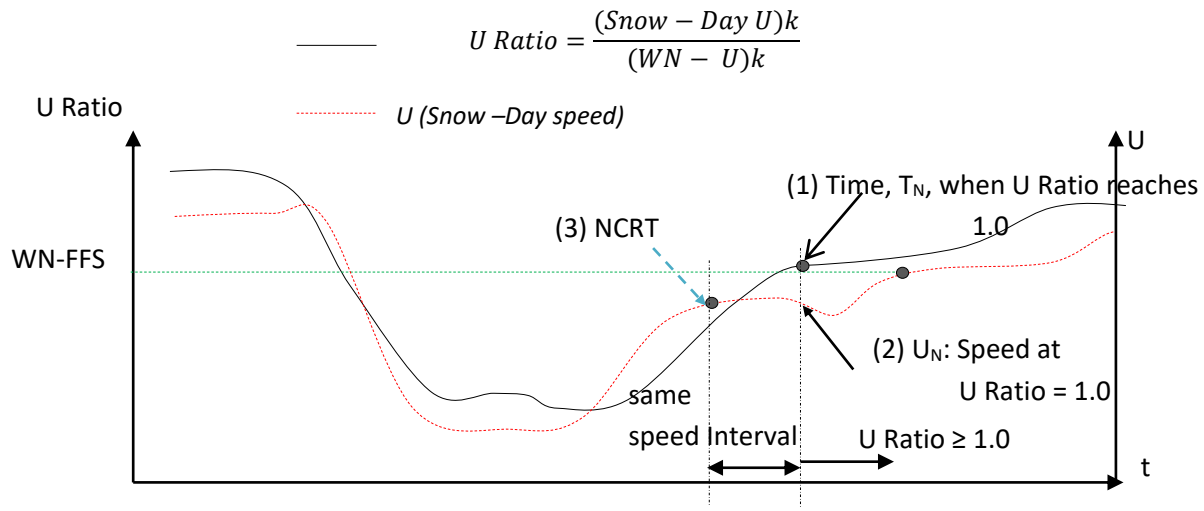


Figure 2.47 Process to Determine NCRT

Figure 2.48 shows a possible situation, where the estimated NCRTs for each station in a same truck route can be slightly different because of the potential calibration issues with the 'effective vehicle length' assumed for each detector to estimate speed from occupancy measurements. To address this issue, the following adjustments are performed for the stations in a sub-section of a same route after the initial estimation of NCRTs. Figure 2.49 shows the configuration of the subsections in a given route.

(1) Using the Speed-time plot, compare the NCRTs of each station, e.g., $NCRT_i$' in Figure 2.48, in a same truck-route and identify one NCRT after which there is no *U-Ratio* drop below R_{th} at all other stations.

(2) Find the speed level of that station as NCRT-U_i, e.g., the speed level of each station at NCRT is found to be NCRT-U_i in the example in Figure 2.48.

(3) Set NCRT at each station as the time when the speed at that station reaches NCRT-U_i as illustrated in Figure 2.48.

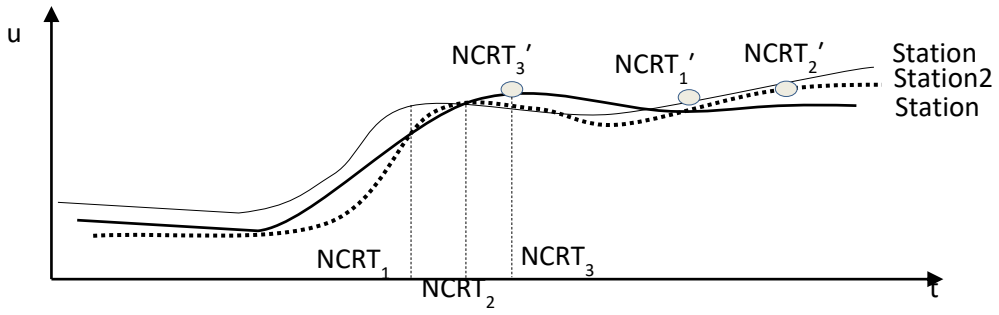


Figure 2.48 Adjustments of NCRTs in a Same Truck Route

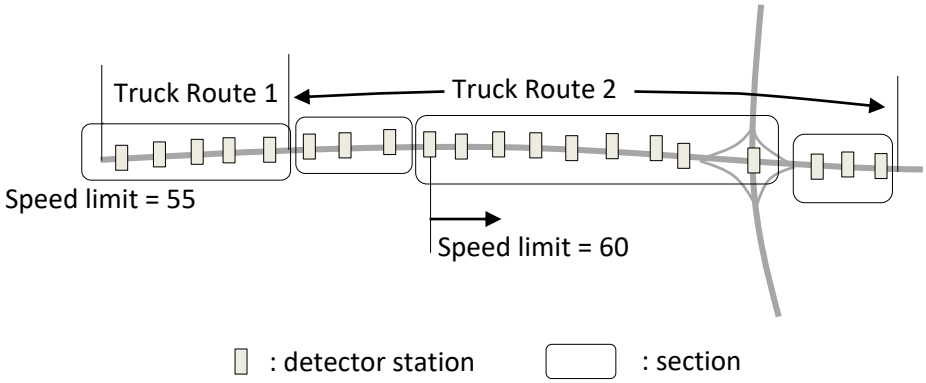


Figure 2.49 Subsection Configuration in a Truck Route

2.5.5 Determination of Phase Change Times

In this section, a set of the phase-change times for a given snow event are determined in addition to NCRT at each station. Figure 2.50 illustrates those phase change times in a speed-time plane. The definition of those phase-change times and their identification process are briefly described as follows:

1) Speed Reduction Starting Time (SRST):

i) Find the time when the speed ratio, R_t, starts to drop more than 10% after snow started,

where R_t = (Speed at t during a given snow event)/(Speed at the corresponding density under normal condition)

ii) Identify the speed-reduction start time backward from the time found in step 1.

2) Lowest Speed Time (LST)

: LST is determined as the lowest speed time between SRST and NCRT.

3) Speed Increase Start Time (SIST):

i) Using the quantized speed-time plot, identify the speed-increase start time, T1, between LST and NCRT.

ii) In a smoothed-speed-time plane, determine the minimum-speed time after T1 found in step 1 as SIST.

4) Posted Speed Limit Time (PST)

: PST is defined as the time the speed reached the posted speed limit at a given location after SIST. Specifically, it's identified as the time, U_t, when the speed level at a given location becomes continuously greater than its posted speed limit, i.e.,

Average (U_t,U_{t+1}…$U_{t+1hour}$) > Posted Speed Limit

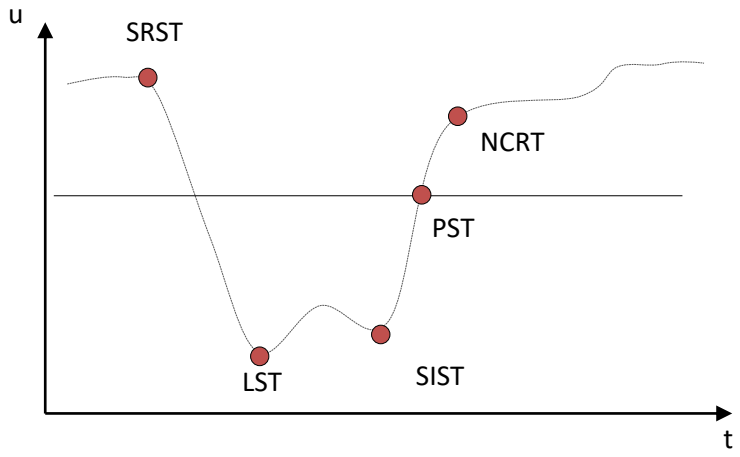


Figure 2.50 Phase-change times during a snow event

CHAPTER 3: DEVELOPMENT OF USER INTERFACE MODULE

3.1 OVERVIEW OF USER INTERFACE STRUCTURE

The User-Interface (UI) module manages the input process for the user-specified parameters necessary to determine the normal condition regain times (NCRT) for given snow events. The output files generated by the NCRT estimation modules are also managed by the UI module. Figure 2.49 shows the simplified structure of the UI module and its relationship with the other modules in the NCRT estimation system.

The main functions of the UI module are as follows:

- Entering and editing user-defined parameters required for estimating normal condition regain times
- Managing truck route configurations
- Facilitating target station identification process
- Managing target station information
- Managing output files

Figure 3.1 shows the simplified structure of the *User-Interface* module, which consists of the following submodules:

- ***Snow-Event Data Input/Edit Panel*** for entering the user-defined parameters, which include snow start/end time/dates, target corridor/truck routes and reported bare-lane regain time (optional).
- ***Truck-Route Configuration Panel*** for managing snow-route information, such as route ID, region/sub-region and route-designation year.
- ***Target Station Management Panel*** for managing target station information, such as truck route information and target lane to collect traffic data.
- ***Target Station Identification Dialog*** for facilitating the process to identify target detector stations used for determining NCRTs for given snow events.
- ***Output List/Selection Dialog*** for managing the access to the output files.

In this research, the above modules in the *User-Interface* were developed in Java, while the other functional modules in the NCRT Estimation system were written in Python. The communication between the Java-based *User-Interface* modules and the Python-based server modules is done through the API.

3.2 DEVELOPMENT OF SNOW-EVENT DATA INPUT AND EDIT PANEL

Figure 3.2 shows the *Snow-Event Data Input/Edit Panel*, where a user can enter the data required for the estimation of the NCRTs of a given snow event. Specifically, the following information can be entered in this *Panel*:

- Start and end times/dates of a given snow event

- Target corridors or truck routes whose NCRTs to be estimated

- Reported bare-lane regain times for given target corridors or truck routes (optional)

Figure 3.3 shows the class diagram of the *Snow-Event Data Input/Edit Panel* consisted with the following which sub modules:

- *Target Corridor Select Dialog:* Dialog to select target corridors for NCRT estimation.

- *Target Truck Route Select Dialog:* Dialog to select the truck routes whose NCRTs to be estimated.

- *Reported Bare-lane Regain Time Input Dialog:* Dialog to enter reported bare-lane regain times (optional)

In the current version of the Graphical User Interface, all the data entered by user through the above submodules are packed into the *EstimationRequestInfo* object shown in Figure 3.3. Further, the packed user-specified parameter information is then sent to the server through the API in a JSON format, which is included in Figure 3.4. Upon receiving the packed data, the server starts the NCRT estimation process.

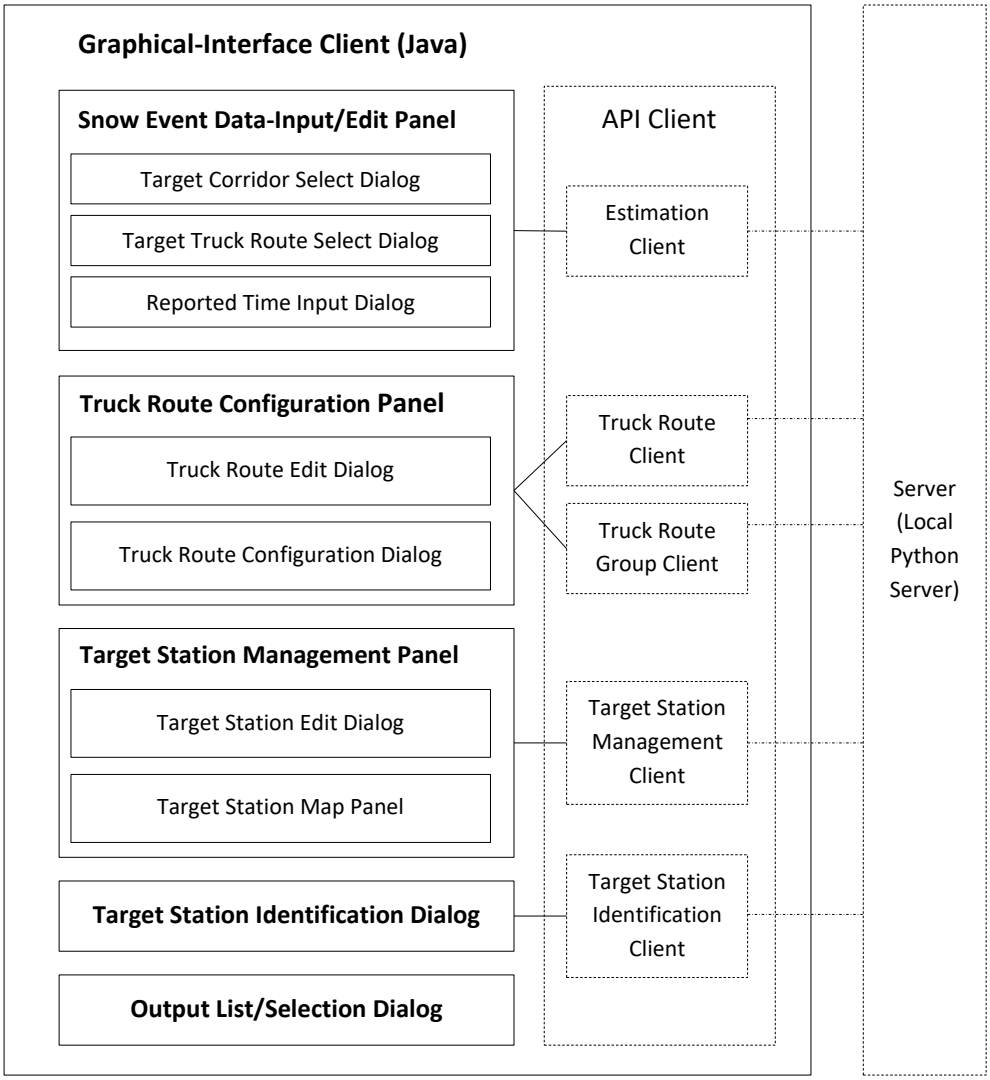


Figure 3.1 Sub Modules of Graphical-Interface Module

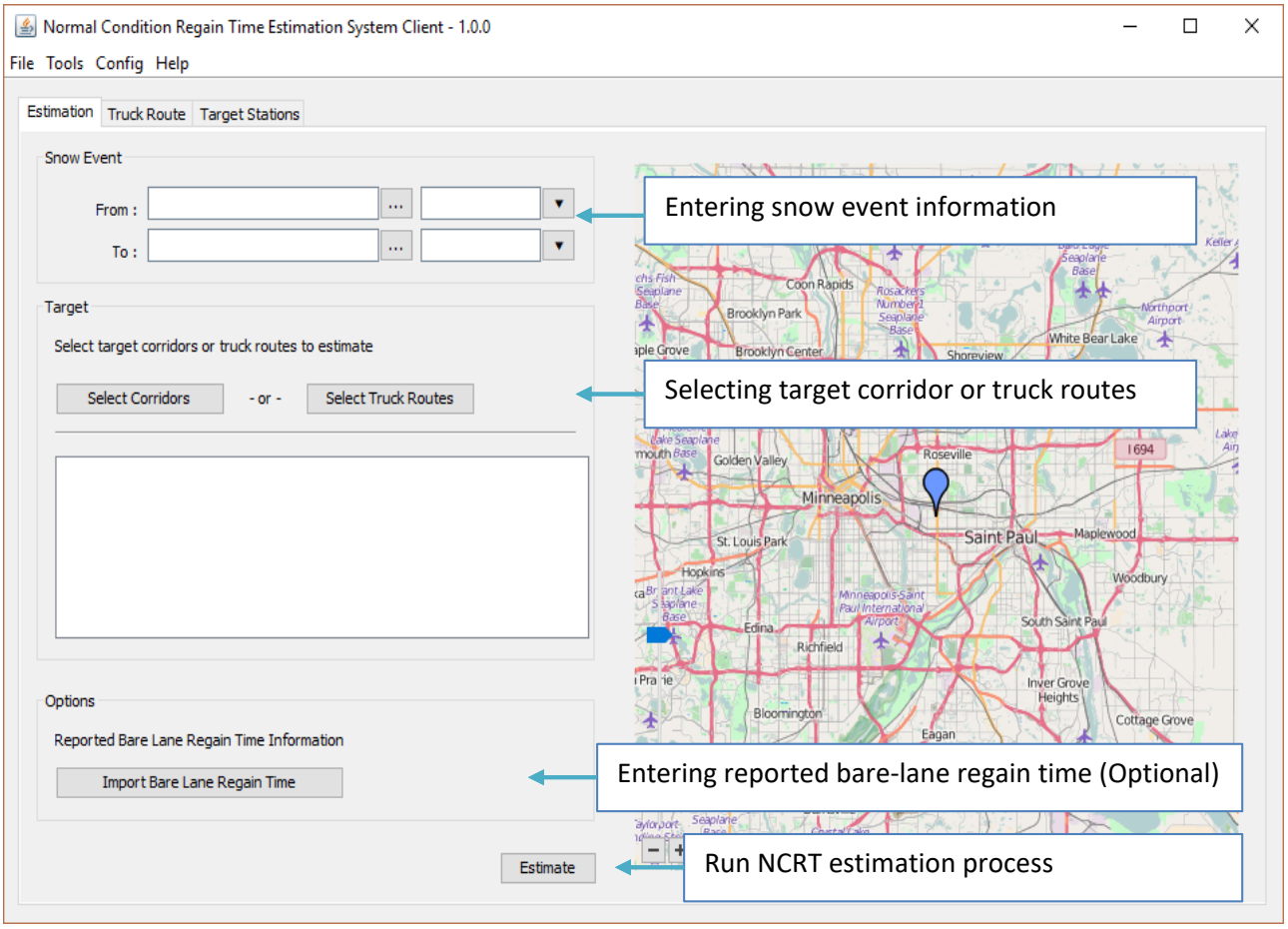


Figure 3.2 Snow-Event Data Input/Edit Panel

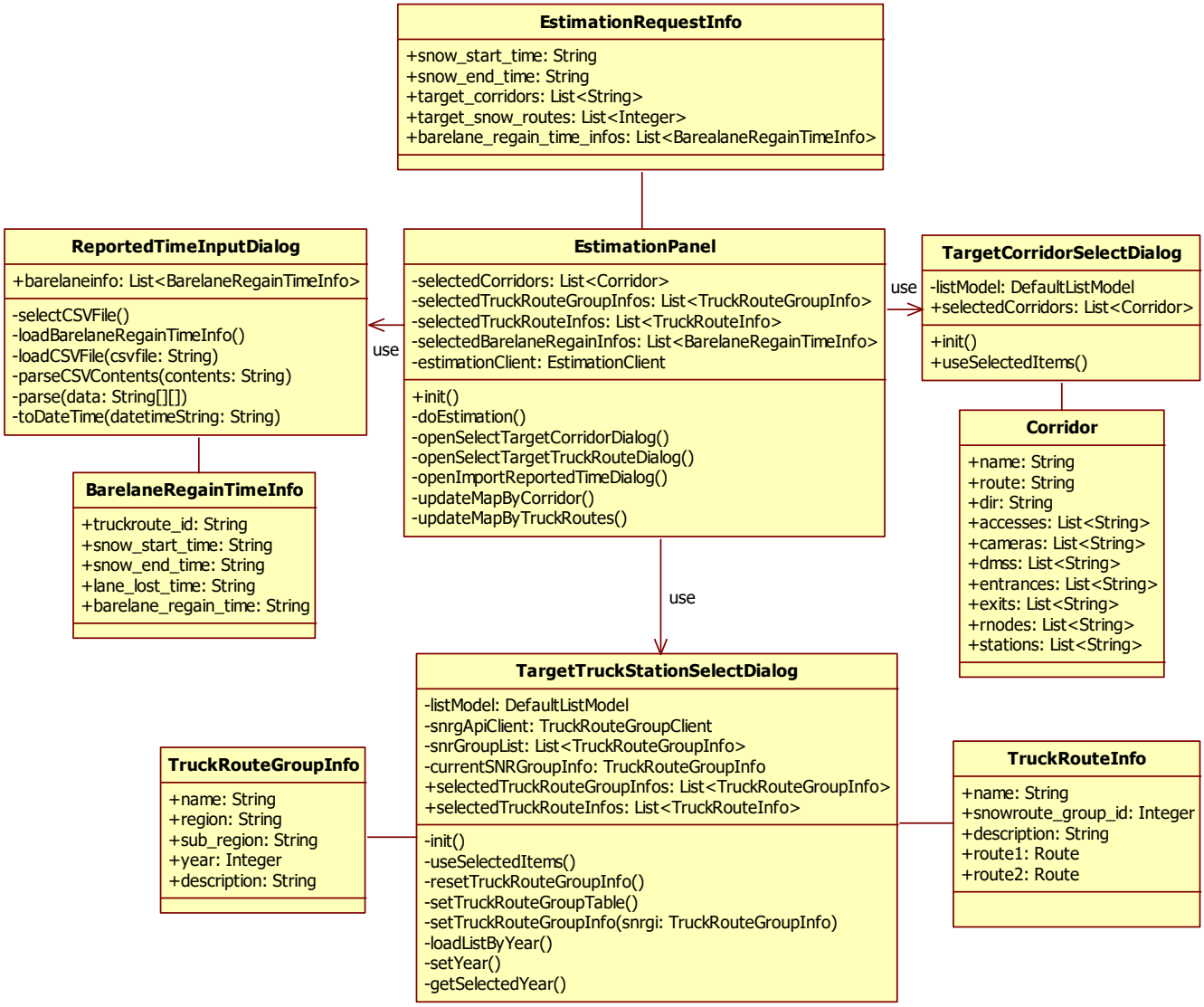


Figure 3.3 Class Diagram of Snow-Event Data Input/Edit Panel

```
{
  "target_corridors":[
    "I-35W (NB)"
  ],
  "snow_end_time":"1/20/2012 15:30",
  "target_snow_routes":null,
  "barelane_regain_time_infos":[
    {
      "snow_end_time":"1/20/2012 14:00",
      "truckroute_id":"TP5D2651",
      "barelane_regain_time":"1/20/2012 9:00",
      "snow_start_time":"1/20/2012 6:15",
      "__class__":"BarelaneRegainTimeInfo",
      "lane_lost_time":"1/20/2012 9:00",
      "__module__":"pyticas_ncrtes.itypes"
    },
    {
      "snow_end_time":"1/20/2012 14:00",
      "truckroute_id":"TP5D2653",
      "barelane_regain_time":"1/20/2012 9:00",
      "snow_start_time":"1/20/2012 6:15",
      "__class__":"BarelaneRegainTimeInfo",
      "lane_lost_time":"1/20/2012 9:00",
      "__module__":"pyticas_ncrtes.itypes"
    },
```

```
    ....
  ],
  "__class__":"EstimationRequestInfo",
  "snow_start_time":"1/20/2012 5:30",
  "target_stations":null,
  "__module__":"pyticas_ncrtes.itypes"
}
```

Figure 3.4 An Example JSON format for the EstimationRequestInfo object

Snow-Event Information Dialog

Figure 3.5 shows the snow event information dialog, developed with the calendar/time selector for entering the time/date information.

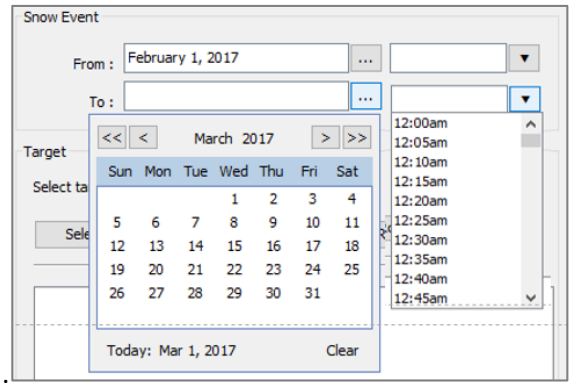


Figure 3.5 Snow Event Information Input Dialog

Corridor and Truck Route Selection Panel

Figure 3.6 shows two dialogs developed for selecting the corridors or truck routes, whose NCRTs need to be estimated for given snow events. The NCRTs are determined at the target detector stations on the selected corridors or truck routes.

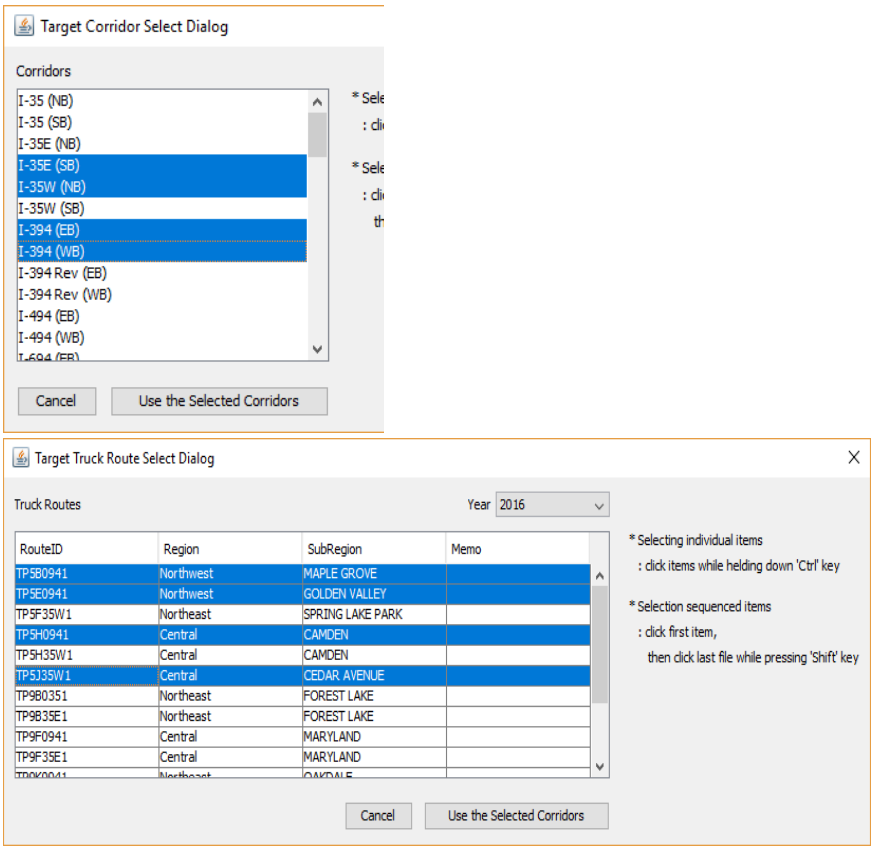


Figure 3.6 Target Corridor and Truck Route Selection Dialogs

Reported Bare-lane Regain Time Input Dialog (Optional)

Figure 3.7 shows the dialog developed for entering the optional 'reported bare-lane regain times' for the selected truck routes. The bare-lane regain time data can be directly imported in a csv format or entered manually by user.

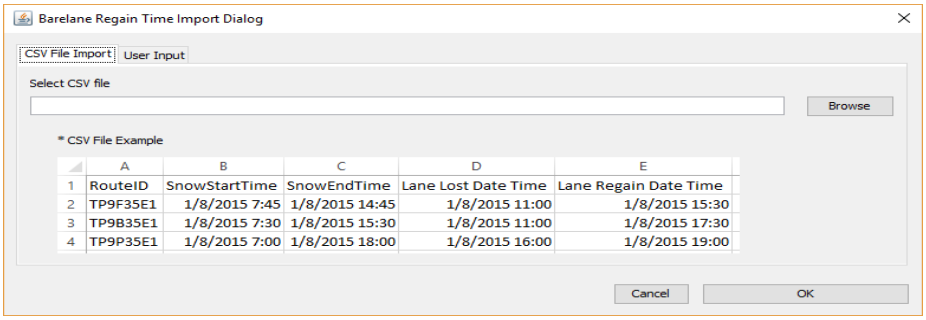


Figure 3.7 Reported Bare-lane Regain Time Input Dialog

3.3 DEVELOPMENT OF TRUCK-ROUTE CONFIGURATION PANEL

Figure 3.8 shows the *Truck-Route Configuration Panel*, developed to facilitate the configuration of the truck routes in terms of the list of the detector stations associated with each route. In this panel, a user can add, edit or delete a truck-route data. In particular, this panel has been designed to address the changes in the existing routes or the creation of new routes through time in the metro freeway network. As shown in Figure 3.8, the panel consists of three sections, i.e., truck-route list, route configuration list and freeway map. The truck-route list table shows the list of the existing truck routes. For each selected route, a user can select the associated freeway corridors, and, using the digital-freeway map, specify the detector stations located at the both upstream and downstream boundaries of a given route. A truck route with multiple freeways can be configured using the freeway map, which shows the locations of all the detector stations on the selected freeways.

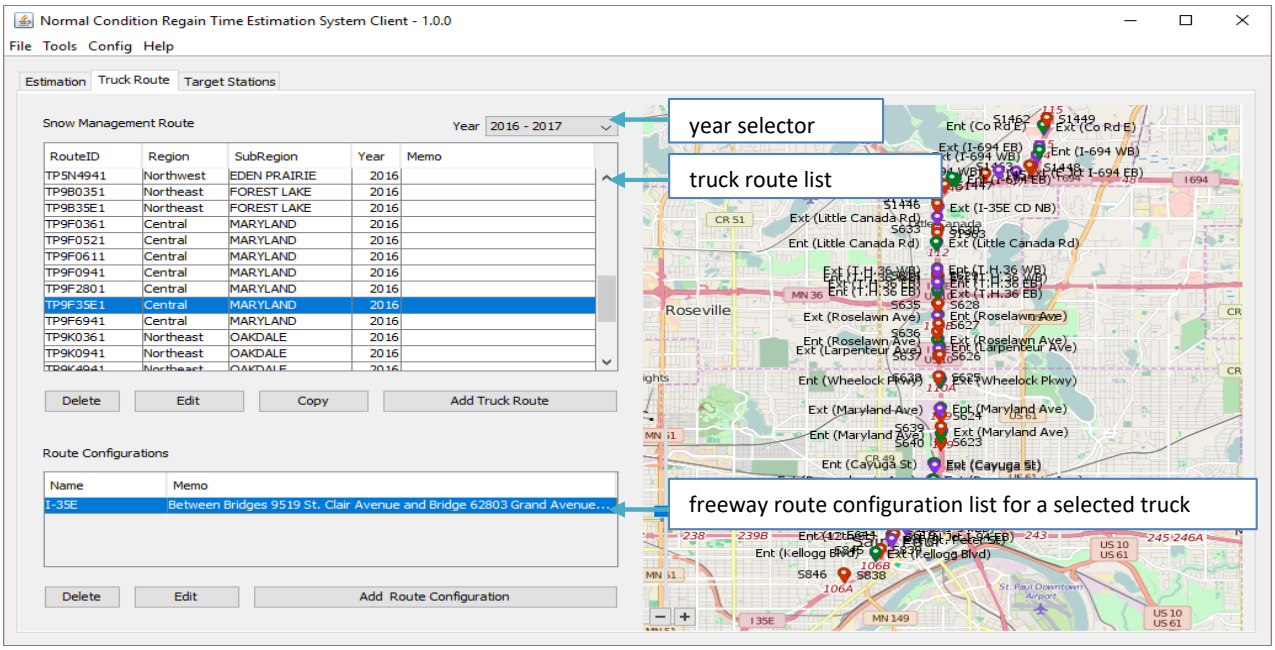


Figure 3.8 Track-Route Configuration Panel

Figure 3.9 shows the class diagram of the *Truck Route Configuration Panel*, which consists of the following sub modules:

- *Region Setting Dialog* for configuring *regions and sub-regions* of the metro freeway network. The data entered through this dialog are stored in the preference file so that it will be loaded whenever the main program starts.

- *Truck Route Edit Dialog* for entering the basic information of each truck route, such as truck route ID, region, sub-region and year.
- *Truck Route Configuration Dialog* for configuring freeway corridors associated with each truck route, i.e. detector station IDs.

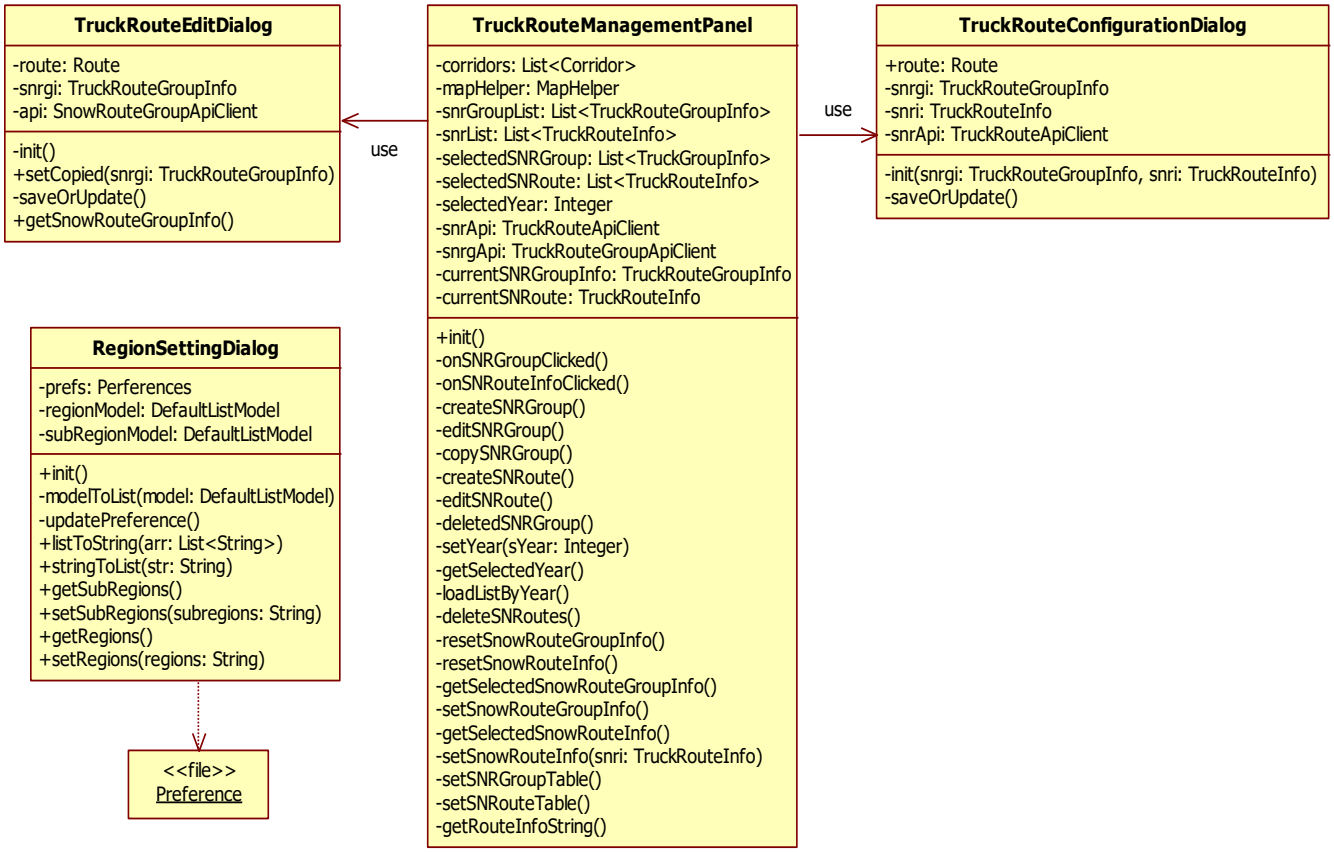


Figure 3.9 Class Diagram of Truck Route Configuration Panel

Figure 3.10 shows a sequence diagram of the process to configure the truck routes in the metro freeway network using the *Truck Route Configuration Panel.*

- First, *init*() function of the *Truck Route Configuration Panel* initializes all the variables and registered event handlers to update the User Interface, such as truck route table and freeway map (step 1).

- When user selects a target year, the event handler registered in *init*() function requests the truck route list for the selected year through *TruckRouteGroupClient* to *Server* and the list of the truck routes for the selected year appears in the truck-route list table. (step 2~4)
- The *Sever* extracts the data from the database and returns to the *User-Interface* client and the panel updates the data table (step 5~7).
- User can add truck routes in *SNRouteGroupEditDialog*, which sends the entered data through *TruckRouteGroupApiClient* to *Server* (step 8~12).
- The inserted truck route data is sent back to the User-Interface client with an additional status code. The panel updates the User Interface according to the status code (step 13~15).
- After adding a truck route, user configures each truck route using *SNRouteEditDialog,* which sends the configuration data to the Server through *TruckRouteApiClient* (step 16~20)
- The route-configuration data is sent back to the User-Interface client with additional status code and the panel updates the User Interface (step 21~23).

The sequence diagram, shown in Figure 3.10, illustrates the route-addition process, however, the processes for editing and deleting truck routes are similar to this process.

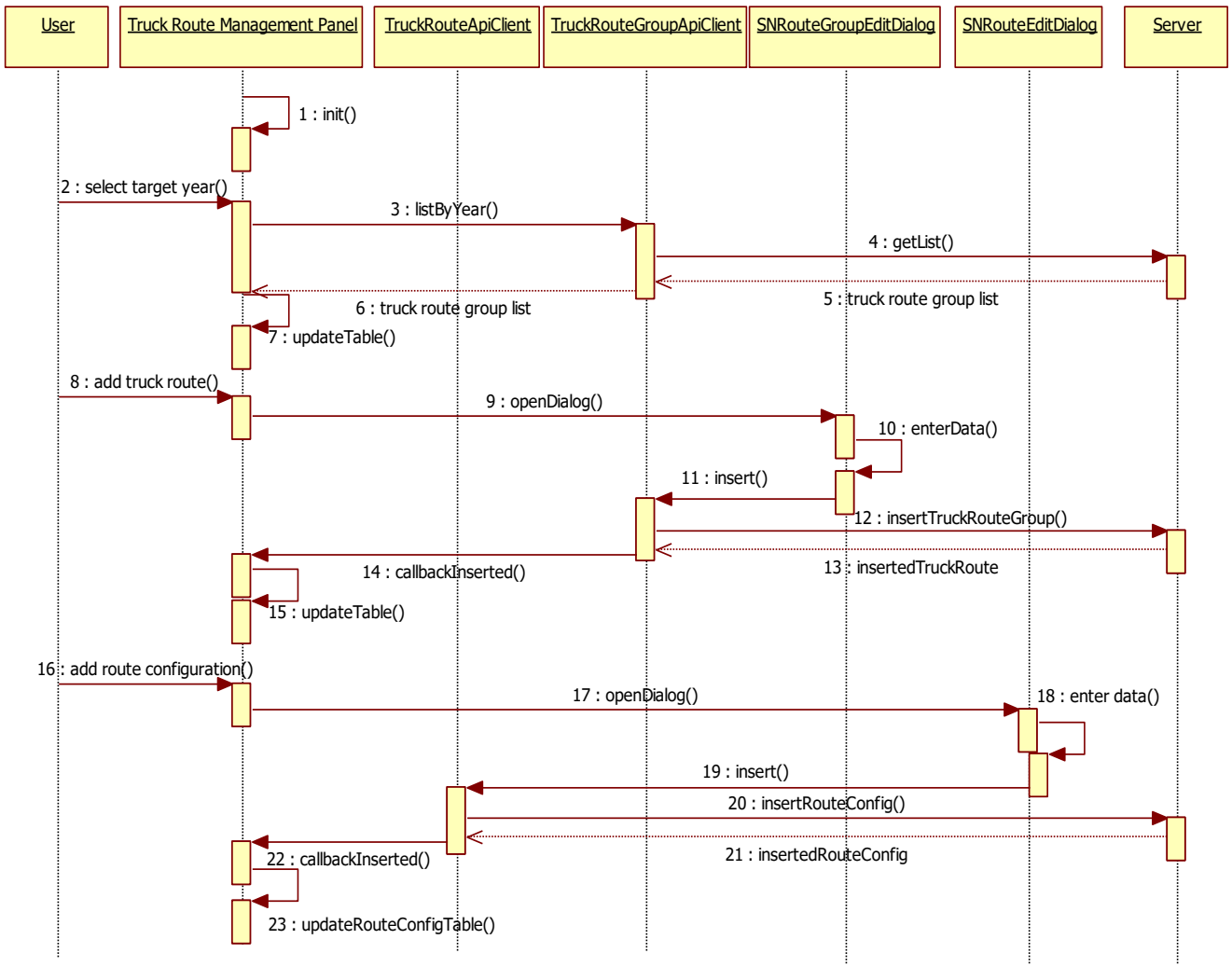


Figure 3.10 Sequence Diagram of Truck Route Configuration Panel

Truck Route Information Dialog

Figure 3.11 shows the “Truck Route Edit Dialog” and “Regions and Sub Region Edit Dialog”, developed to enter and manage the basic information of each truck route, including Truck route id, region, sub-region, year and user memo. Further, the lists of the region and sub-regions are managed in the Region Setting Dialog, located in the Config -> Region Setting menu.

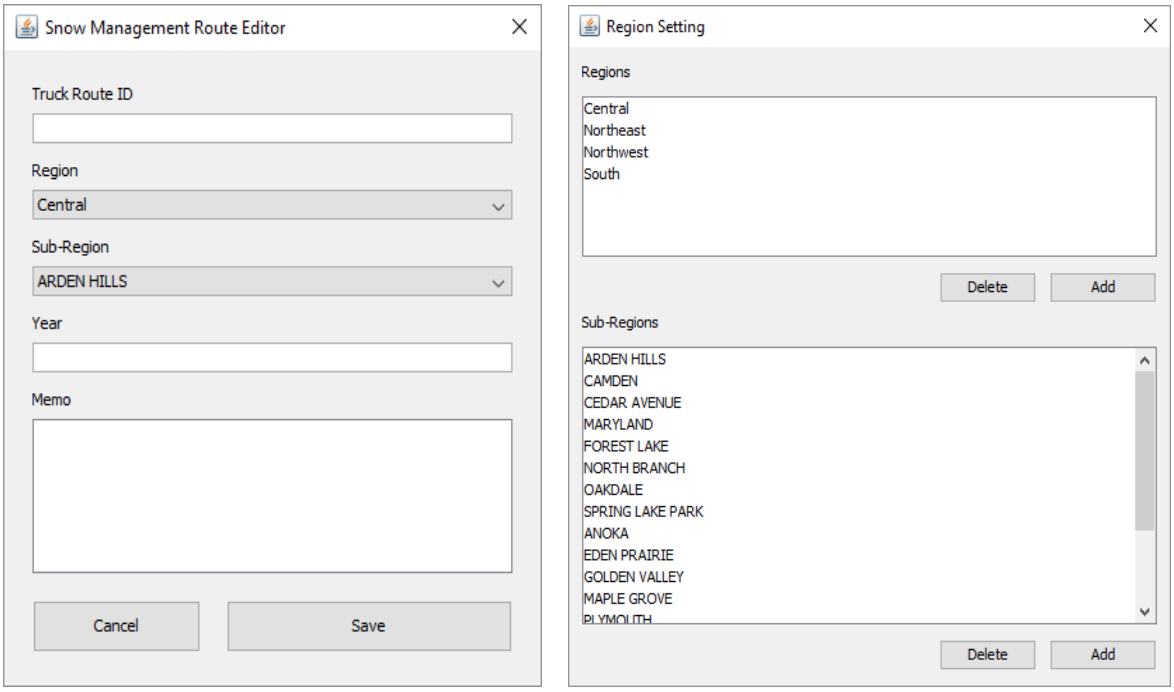


Figure 3.11 Truck Route Edit Dialog and Region Setting Dialog

Freeway-Route Configuration Dialog

Figure 3.12 shows the *Freeway-Route Configuration* dialog, where user can designate a set of the traffic detector stations associated with a given truck route. It can be noted that the original truck-route information does not contain the information regarding the freeway corridors included in each truck route. Using the dialog, a freeway route for a given truck-route can be configured as follows:

- Enter basic information such as name and memo.
- Select the starting freeway corridor for a given truck route. All the detector stations in the selected corridor appear in the freeway map.
- Right-click on the first station of the route to be configured and click “Route start from here”.
- Right-click on the last station of a given truck route and click “Route end to here”.

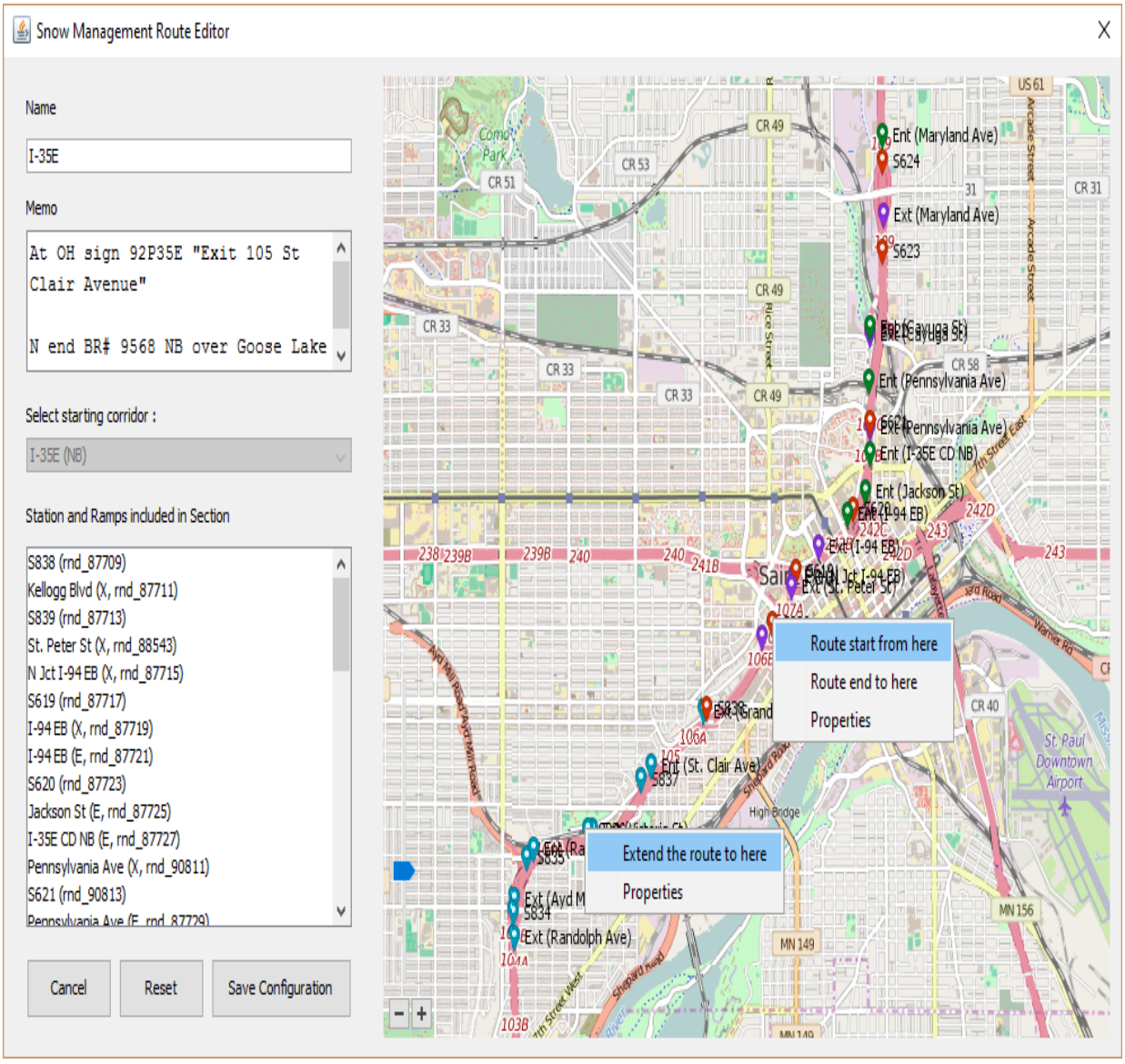


Figure 3.12 Freeway Route Configuration Edit Dialog

3.4 TARGET STATION IDENTIFICATION AND OUTPUT MANAGEMENT DIALOGS

Target Station Identification Dialog

Target stations are those detector stations whose NCRTs are to be estimated for given snow events. The process to identify those target detector stations has been developed in the previous task. Figure 3.13 shows the *Target Station Identification* dialog, which initiates the target-station identification process for a specific year given by user. Since the target-detector stations in each freeway corridor can vary through time depending on the existence of geometry changes, the current version of the User Interface enables a user to identify a set of the detector stations for different years.

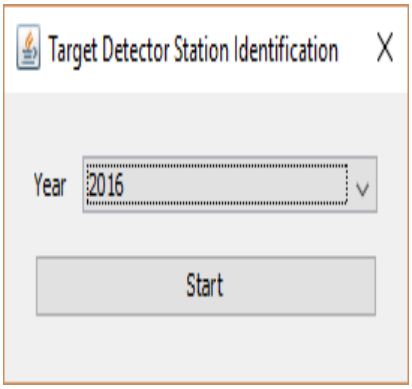


Figure 3.13 Target Station Identification Dialog

Target Station Management Module

In this task, a new module to facilitate the target station management (TSM) process is developed and the user interface of the NCRT estimation system is updated. With the new TSM module, user can manually update the truck routes and target station list. Figure 3.14 shows the screen shot of the updated graphical user interface with the new TSM module. The major features of the updated user interface include:

- Target Station Edit Dialog module shows general information of a target station such as speed limit, label and detector IDs with lane information. User can update truck routes and target detectors in this dialog.
- Target Station Map panel shows the list of the target detector stations for the selected year and corridor
- Light blue marker indicates target stations, while red maker shows non-target stations.

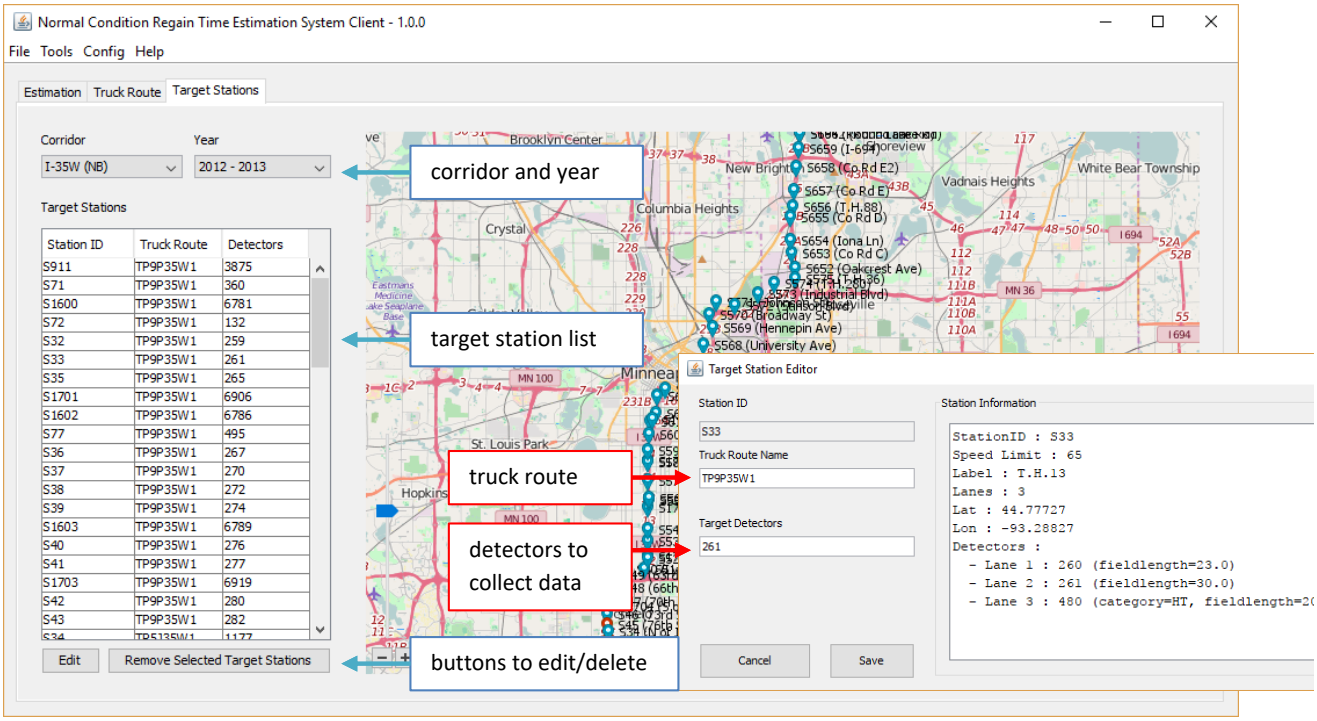


Figure 3.14 Target Station Management User Interface

Output Management Dialog

Figure 3.15 shows the *Output Management Dialog,* developed for managing the output files generated by the *Report* module. Using this dialog, any output file can be downloaded or deleted by user.

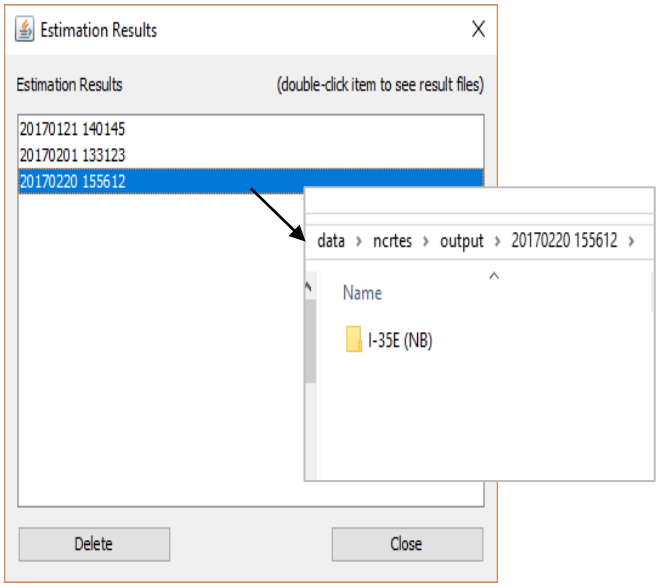


Figure 3.15 Output Management Dialog

3.5 DEVELOPMENT OF THE REPORT MODULE

3.5.1 Overview of the Report Module Structure

The *Report module* generates the NCRT estimation results for each station in both graphical and spread-sheet formats. The traffic data associated with the NCRT at each detector station for given snow events can also be downloaded through the Report module. Figure 3.16 shows the simplified structure of the Report module and its sequential relationship with the other modules in the NCRT estimation system. The main functions of *Report module* are as follows:

- Generating spread-sheet files with NCRT estimation results and traffic data for given snow events and corridors.
- Generating NCRT-contour plots with corridor- or truck route-wide estimation results.
- Generating traffic data graphs for each target detector station.

The sequential process of the Report module can be summarized as follows:

1) User requests the estimation of NCRTs by entering the required data described in the previous chapter.
2) The *Estimation Request Handler* in *API* module accepts the request.
3) The request handler conducts the estimation process by calling *NCRT Estimation* module.
4) After the estimation process is completed, the Report module is called by the request handler.
5) The *Report* module runs its sub-modules, i.e., *Summary Writer*, *Contour Writer* and *Station Data Chart Writer* by passing the estimation results and traffic data used in estimation process.

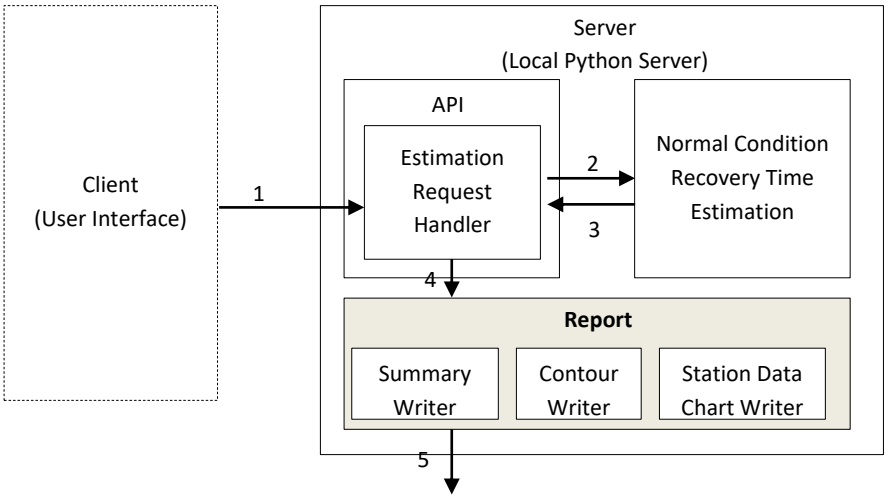


Figure 3.16 Sequential Relationship between Report and other Modules

Figure 3.17 includes the source code of the *Report* module, whose main function, *report,* requires case name, estimation data list and output directory path as the parameters. The writing of the output results for a given event is performed by each sub-module as follows:

- *Summary Writer* module creates spread sheet file containing the estimation results for all the target stations in a corridor or a truck route. Also, the traffic data at each target station is saved in the separate sheets of the same spread sheet file for further use by user.
- *Contour Writer* module generates the contour chart files of speed and speed level compared with normal speed level with the estimation results for selected freeway corridors.
- *Station Data Chart Writer* module makes the traffic data graphs for each target station, so that user can view the speed and density variations through time in a graphical format.

```
def report(case_name, edata_list, output_path):
    """
    :type case_name: str
    :type edata_list: list[pyticas_ncrtes.est.est_data.ESTData]
    :type output_path: str
    """


    # preparing output folder

    case_dir = os.path.join(output_path, case_name)
    if not os.path.exists(case_dir):
        os.makedirs(case_dir)

    chart_path = os.path.join(case_dir, 'charts')
    if not os.path.exists(chart_path):
        os.makedirs(chart_path)


    # write results : station data chart, summary spread sheet and contour charts
    station_chart.write(chart_path, case_name, edata_list)

    summary_file = os.path.join(case_dir, '%s.xlsx' % case_name)
    summary.write(summary_file, case_name, edata_list)

    speed_countour_file = os.path.join(case_dir, '%s-speed.png' % case_name)
    speed_contour.write(speed_countour_file, case_name, edata_list)
```

Figure 3.17 Main Source Code of the Report Module

Figure 3.18 shows the definition of the data type, *ESTData*, used in the NCRT estimation process and also in the *Report* module. The *ESTData* class contains all the information used in generating the output files, which include the following information:

- target station, snow event, truck route and reported bare-lane information
- normal u-k relationships and average speed for night time
- traffic data for each target station, such as speed, density, smoothed speed and smoothed density.

```
class ESTData(object):
    def __init__(self, target_station, sevent, snow_routes, reported, normal_func):
        """
        :type target_station: pyticas.ttypes.RNodeObject
        :type sevent: pyticas_ncrtes.core.etypes.SnowEvent
        :type snow_routes: list[pyticas_ncrtes.core.etypes.SnowRoute]
        :type reported: dict[str, list[pyticas_ncrtes.core.etypes.ReportedEvent]]
        :type normal_func: pyticas_ncrtes.core.etypes.NSRFunction
        """
        self.target_station = target_station
        self.snow_event = sevent
        self.normal_func = normal_func
        self.months = normal_func.months
        self.snow_route = self._get_snow_route(snow_routes)
        self.timeline = sevent.data_period.get_timeline(as_datetime=True)

        # Turning Point K at U-K relationship
        self.kt = self.normal_func.daytime_func.get_Kt()

        # Reported Barelane Regain Times
        self.rps = self._reported_regain_times(reported)
        """:type: list[int]"""

        # Traffic Data
        self.ks = None
        """:type: numpy.ndarray"""
        self.us = None
        """:type: numpy.ndarray"""
        self.sus = None
        """:type: numpy.ndarray"""
        self.sks = None
        """:type: numpy.ndarray"""
        self.night_ratios = None
        """:type: numpy.ndarray"""
        self.night_us = None
        """:type: numpy.ndarray"""
        self.ratios_trend = []
        """:type: list[float]"""

        # Results
        self.recovered_speed_threshold = -1
        self.srst = None
        """:type: int"""
        self.lst = None
        """:type: int"""
```

```
        self.sist = None
        """:type: int"""

        self.pst = None
        """:type: int"""
        self.ncrt = None
        """:type: int"""

        self.wn_ffs = None
        """:type: float"""

        self.wn_ffs_idx = None
        """:type: int"""


        # Results for internal use
        self.reduction_by_snow = []

        """:type: list[int] """
        self.uk_change_point= []

        """:type: list[int] """
        self.estimated_nighttime_snowing = []
        """:type: list[int] """
        self.is_nighttime = []
        """:type: list[bool]"""

        # flags
        self.is_loaded = False
        self.is_finished = False
```

Figure 3.18 Data type used in NCRT estimation process and Report module

3.5.2 Output File Structure and Examples

Structure of the Output Directory

The *Report* module creates an output folder containing the spreadsheet and graph output flies for each freeway corridor and target detector station. Further, the output graphs for each target station with the associated traffic data are stored in the 'Charts' subfolder. Figure 3.19 shows an example output folder for I-35E (NB) corridor.

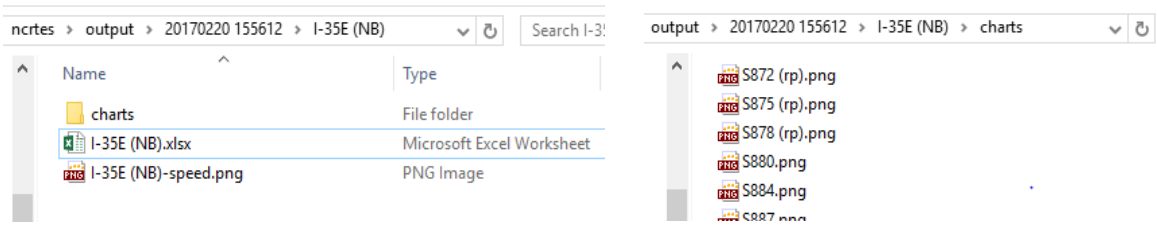


Figure 3.19 Output directory and files

Summary Spreadsheet and Station Traffic-Data Sheets

Figure 3.20 shows an example summary spreadsheet of the NCRT estimation results, which include corridor, truck route information, detector station information, snow event information and NCRT estimation results

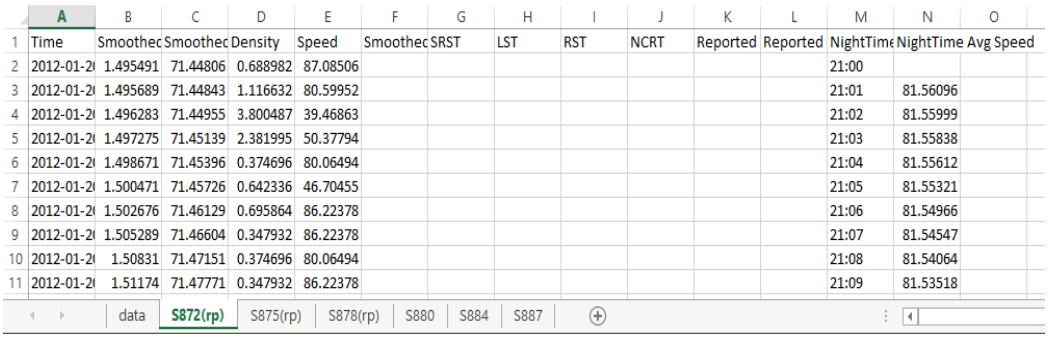
In addition, it shows the reported bare-lane regain times if they were entered by user.

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	
1	Corridor	Region	SubRegion	TruckRoute ID	Station ID	Label	Speed Limit	Date	Snow Start Time	Snow End Time	SRST	LST	RST	NCRT	Report
2	I-35E (NB)	South	LAKEVILLE	TP9P0346	S872	McAndrews Rd	70	01/20/2012	2012-01-20 05:30	2012-01-20 16:30	2012-01-2	2012-01-2	2012-01-2	2012-01-2	2012-0
3	I-35E (NB)	South	LAKEVILLE	TP9P0346	S875	N of Co Rd 11	70	01/20/2012	2012-01-20 05:30	2012-01-20 16:30	2012-01-2	2012-01-2	2012-01-2	2012-01-2	2012-0
4	I-35E (NB)	South	LAKEVILLE	TP9P0346	S878	S of Cliff Rd	70	01/20/2012	2012-01-20 05:30	2012-01-20 16:30	2012-01-2	2012-01-2	2012-01-2	2012-01-2	2012-0
5	I-35E (NB)	South	MENDOTA HEIGHTS	TP9M0326	S880	Blackhawk Rd	70	01/20/2012	2012-01-20 05:30	2012-01-20 16:30	2012-01-2	2012-01-2	2012-01-2	2012-01-2	-
6	I-35E (NB)	South	MENDOTA HEIGHTS	TP9M0326	S884	S of Pilot Knob Rd	70	01/20/2012	2012-01-20 05:30	2012-01-20 16:30	2012-01-2	2012-01-2	2012-01-2	2012-01-2	-
7	I-35E (NB)	South	MENDOTA HEIGHTS	TP9M0326	S887	N of Yankee Doodle Rd	70	01/20/2012	2012-01-20 05:30	2012-01-20 16:30	2012-01-2	2012-01-2	2012-01-2	2012-01-2	-
8															
9															
10															
11															

data | S872(rp) | S875(rp) | S878(rp) | S880 | S884 | S887

Figure 3.20 Output summary spreadsheet

The traffic data associated from each target station is also stored in a spreadsheet, whose example is shown in Figure 3.21. It contains time intervals, speed and density data, night time average speed data and NCRT estimation results



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	Time	Smoothec	Smoothec	Density	Speed	Smoothec	SRST	LST	RST	NCRT	Reported	Reported	NightTime	NightTime	Avg Speed
2	2012-01-2(	1.495491	71.44806	0.688982	87.08506								21:00		
3	2012-01-2(	1.495689	71.44843	1.116632	80.59952								21:01	81.56096	
4	2012-01-2(	1.496283	71.44955	3.800487	39.46863								21:02	81.55999	
5	2012-01-2(	1.497275	71.45139	2.381995	50.37794								21:03	81.55838	
6	2012-01-2(	1.498671	71.45396	0.374696	80.06494								21:04	81.55612	
7	2012-01-2(	1.500471	71.45726	0.642336	46.70455								21:05	81.55321	
8	2012-01-2(	1.502676	71.46129	0.695864	86.22378								21:06	81.54966	
9	2012-01-2(	1.505289	71.46604	0.347932	86.22378								21:07	81.54547	
10	2012-01-2(	1.50831	71.47151	0.374696	80.06494								21:08	81.54064	
11	2012-01-2(	1.51174	71.47771	0.347932	86.22378								21:09	81.53518	

data | S872(rp) | S875(rp) | S878(rp) | S880 | S884 | S887

Figure 3.21 Detector station data sheet

Speed Level Contour

Figure 3.22 shows an example speed contour map in a time-space format generated by the *Report* module for a selected freeway corridor. The y axis in the contour map shows the detector stations with truck station id and the accumulated distance from upstream boundary of the given corridor. The contour map displays the speed level at each location through time with different colors and also shows the NCRTs along the corridor.

Station Traffic Data Graphs

Figure 3.23 shows a set of example output graphs generated by the *Report* module to show the traffic data variations through time at a target station for a given snow event. The output graphs available in the current version of the *Report* module include:

- A Line graph showing variations of the speed and density, every 3-minute interval, at each station.
- The smoothed, flow-density and speed-density data plots. In both plots, the normal day speed-density data points at given stations are also included as references.

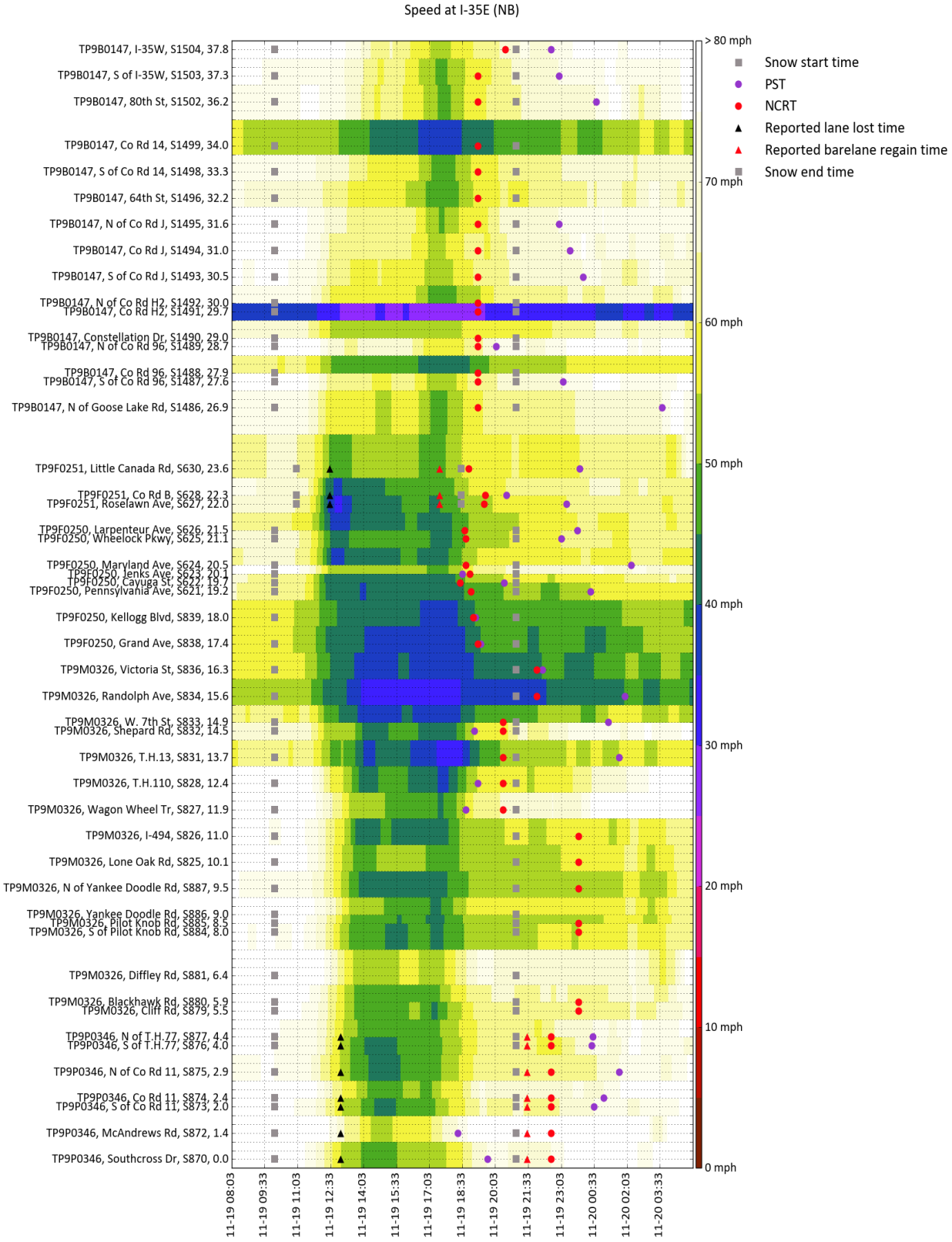


Figure 3.22 Speed contour map

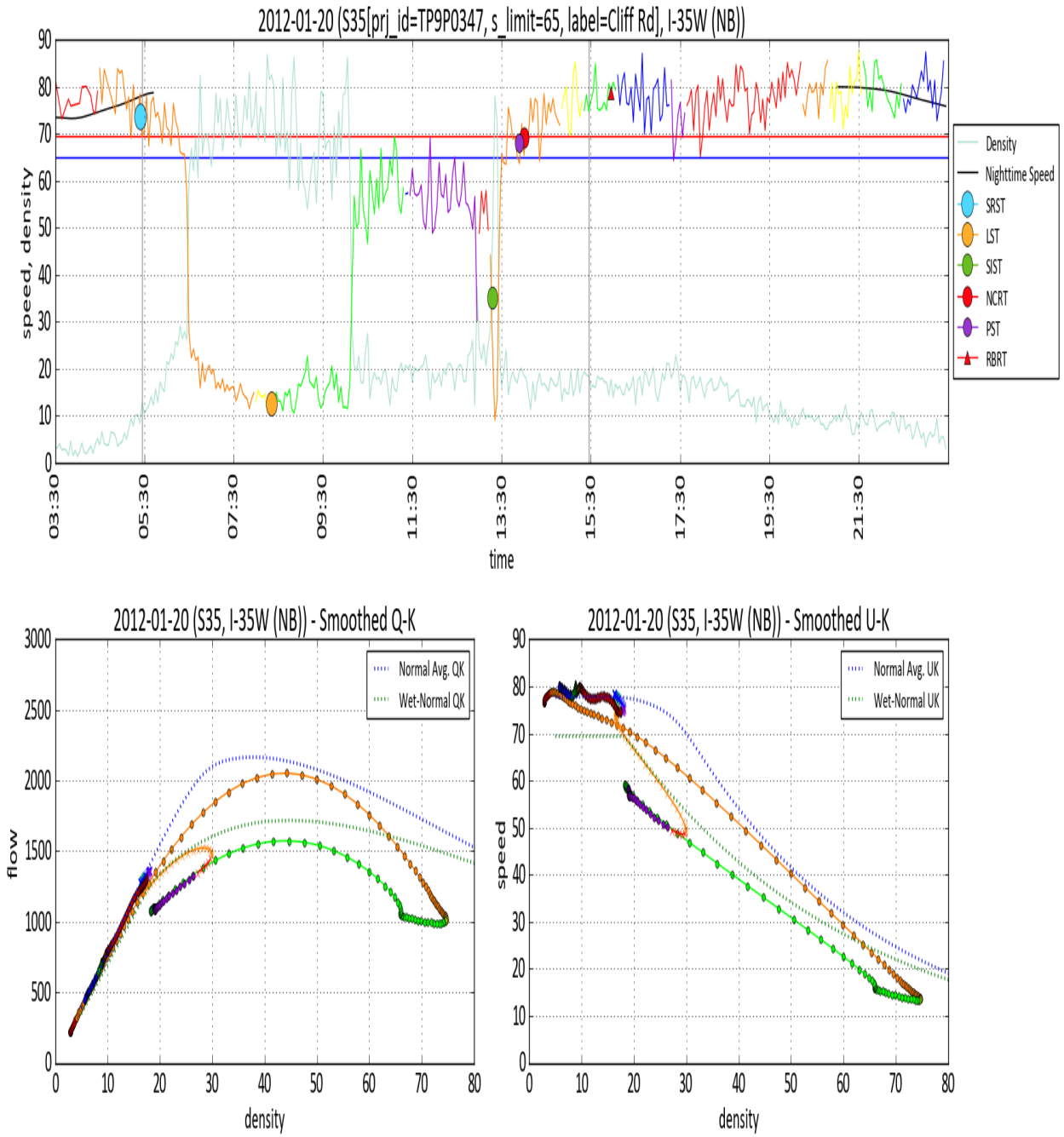


Figure 3.23 Example Output Graphs with Station Traffic Data

CHAPTER 4: EXAMPLE APPLICATION OF THE NCRT ESTIMATION SYSTEM

4.1 OVERVIEW OF EXAMPLE APPLICATION

The NCRT estimation system developed in the previous chapters has been applied to a set of the past snow events from November 2011 to March 2016 and the NCRTs were estimated for each station using the traffic data collected from each event. Specifically the following events and corridors were used for this example application:

- Snow Event Date: 2011-11-19, 2012-01-20, 2013-02-01, 2014-11-10, 2015-02-20, 2016-02-02
- Test Corridors: I-35E, I-35W, I-94, I-494 and I-694.

It needs to be noted that, since the NCRT-estimation process uses the traffic detector data, the list of the target stations can change from year to year depending on the availability of the traffic-flow data. Figure 4.1 shows the locations of the 2011 target stations whose normal-day speed-density relationships could be calibrated with the traffic data from those stations. Further, the normal speed-density relationship of each target station was used to determine the wet-normal speed-density pattern that was used to estimate the NCRTs at a given station. For those non-target stations, whose speed-density patterns could not be determined because of the insufficient traffic data, the NCRTs were estimated by determining the time the speed at each location reaches its wet-normal free-flow-speed level. The rest of this chapter includes the NCRT estimation results for the snow event on November 19th, 2011. The results are summarized in a table as well as in a contour-graph format. The NCRT estimation results for other snow events are included in the appendix.

Figure 4.1 Target Stations on the Test Corridors for Snow Events in 2011

4.2 EXAMPLE APPLICATION RESULTS

This section includes the summary results from the example application of the NCRT estimation System for the snow event on November 19, 2011. Specifically, the contour graphs and summary tables, which include the NCRTs and the phase-change times at each station on each corridor in the metro-freeway network, are presented. The application results for the other snow events are included in the Appendix.

I-35E (NB)

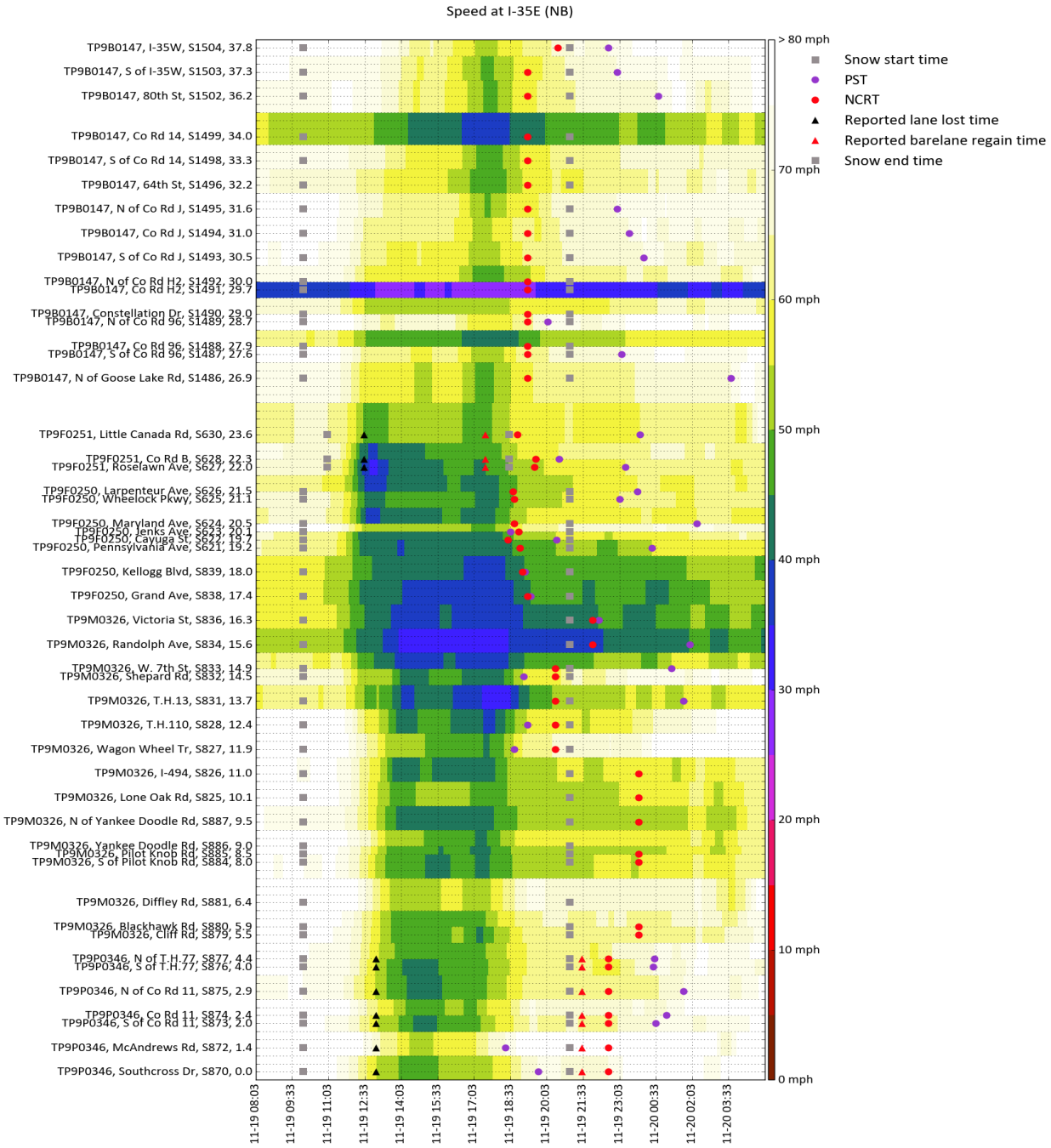


Figure 4.2 Speed Contour of I-35E(NB) on 2011-11-19

Table 4.1 I-35E(NB) Summary Results for 2011-11-19 Snow Event

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S870		14:39	17:03	19:42	22:36	21:30	70.08823	67.49742
S872		14:51	16:51	18:21	22:36	21:30	79.58004	78.05238
S873	11:33	15:06	17:06	00:33	22:36	21:30	62.86804	64.42155
S874	11:30	15:03	17:03	01:00	22:36	21:30	65.79507	67.44863
S875	11:33	15:21	17:12	01:42	22:36	21:30	60.98179	62.21858
S876	11:48	14:45	17:03	00:27	22:36	21:30	59.08195	61.18589
S877	11:36	15:15	17:39	00:30	22:36	21:30	63.42011	61.20624
S879	11:39	17:15	17:24		23:51		63.01975	
S880	11:30	14:57	17:12		23:51		63.75908	
S884	11:30	17:21	18:12		23:51		55.06321	
S885	11:33	17:21	23:48		23:51		51.15195	
S887	11:30	17:21	18:06		23:51		51.65998	
S825	11:42	17:27	22:45		23:51		57.37341	
S826	11:45	14:06	17:39		23:51		58.02649	
S827	10:06	17:33	18:03	18:42	20:24		65.48169	
S828	11:42	17:42	18:00	19:15	20:24		59.39751	
S831	11:48	18:00	18:09	01:42	20:24		50.40927	

S832	11:36	14:27	17:57	19:06	20:24		58.34402	
S833	11:42	14:18	18:42	01:12	20:24		49.65723	
S834	11:42	17:33	21:48	01:57	21:57		38.49817	
S836	11:24	14:24	21:48	22:12	21:57		43.50634	
S838	11:36	17:03	18:42	19:24	19:15		44.37682	
S839	11:36	17:27	18:30	19:09	19:03		44.54435	
S621	11:24	14:00	18:24	00:24	18:57		47.0746	
S622	11:21	15:33	17:54	20:27	18:27		47.55972	
S623	11:21	17:33	17:48	18:33	18:54		58.73208	
S624	11:24	12:51	17:33	02:15	18:42		51.48667	
S625	11:24	12:54	18:09	23:03	18:42		50.13164	
S626	11:30	12:57	15:18	23:48	18:39		48.87545	
S627	11:24	12:54	12:54	23:18	19:33	17:30	54.77983	44.88076
S628	11:24	12:51	15:12	20:33	19:36	17:30	58.33003	47.08535
S630	11:27	13:00	16:42	23:54	18:51	17:30	57.99996	49.81834
S1486	11:39	17:27	18:15	03:39	19:15		59.03211	
S1487	11:36	17:36	18:09	23:09	19:15		62.62588	
S1488	11:45	18:00	19:12		19:15		46.5095	
S1489	11:42	17:30	18:36	20:06	19:15		63.26413	

S1490	11:39	16:57	18:42		19:15		57.56657	
S1492	11:45	17:36	18:09		19:15		54.42396	
S1493	11:42	17:30	18:42	00:03	19:15		60.85085	
S1494	11:48	17:24	18:12	23:27	19:15		61.26838	
S1495		17:36		22:57	19:15		57.10602	
S1496	12:03	17:36	18:03		19:15		55.73389	
S1498		17:36	18:15		19:15		55.64396	
S1499		17:27	18:42		19:15		43.0804	
S1502		17:45	18:18	00:39	19:15		58.39811	
S1503		17:36	18:42	22:57	19:15		58.0819	
S1504		17:36	19:39	22:36	20:30		66.93905	

I-35E (SB)

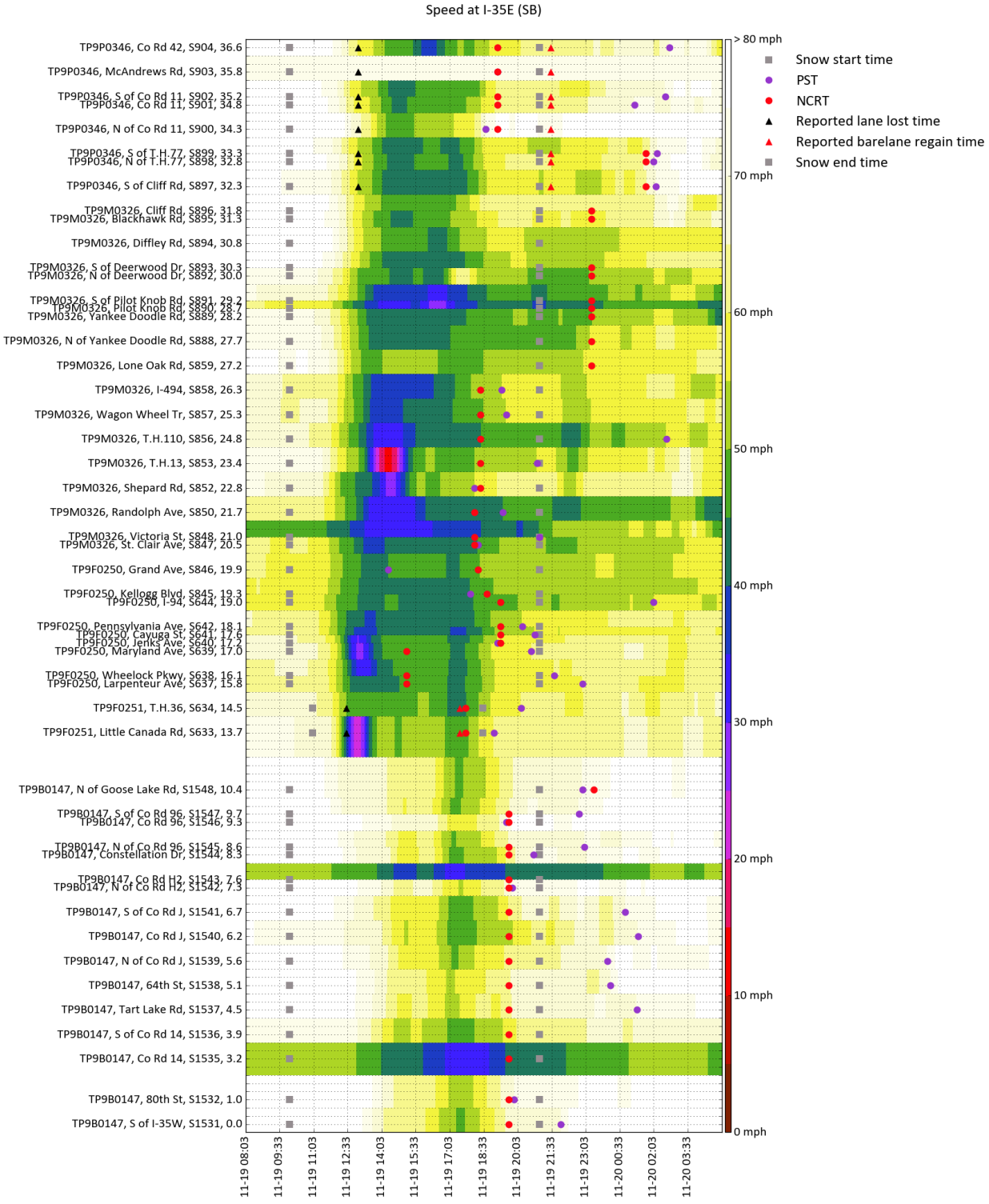


Figure 4.3 Speed Contour of I-35E(SB) on 2011-11-19

Table 4.2 I-35E(SB) Summary Results for 2011-11-19 Snow Event

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1531	12:57	17:30	18:18	21:57	19:39		66.72419	
S1532		17:30	17:54	19:54	19:39		68.70742	
S1535	13:18	17:39	18:51		19:39		41.24445	
S1536	13:03	17:33	19:06		19:39		57.60128	
S1537	12:51	17:09	19:06	01:18	19:39		63.72619	
S1538	12:51	17:03	19:03	00:09	19:39		64.23387	
S1539	12:27	17:18	17:51	00:00	19:39		62.03939	
S1540	12:15	17:24	19:06	01:21	19:39		54.17665	
S1541	12:09	17:27	19:00	00:48	19:39		60.08101	
S1542	11:48	17:33	19:06	19:48	19:39		68.09696	
S1543		17:12	19:06		19:39		40.8491	
S1544	12:12	17:18	19:03	20:45	19:39		61.82971	
S1545	12:03	17:15	17:57	23:00	19:39		65.07291	
S1546	11:24	17:18	18:15	19:33	19:39		72.32007	
S1547	11:39	17:15	17:45	22:45	19:39		64.96646	
S1548	11:36	17:27	18:06	22:54	23:24		70.75292	
S633	11:42	12:57	17:21	19:00	17:45	17:30	49.02097	47.67048

S634	11:33	17:24	17:24	20:12	17:45	17:30	44.79884	43.7935
S637	11:33	13:12	14:36	22:54	15:09		46.10681	
S638	11:21	13:15	13:15	21:39	15:09		46.8819	
S639	11:27	13:03	13:03	20:39	15:09		47.02974	
S640	11:18	13:00	13:00	19:09	19:18		55.90843	
S641	11:12	13:18	13:33	20:48	19:18		51.88282	
S642	11:18	13:33	17:33	20:15	19:18		52.74489	
S644	11:30	17:09	19:03	02:03	19:18		47.95063	
S845	11:30	13:36	18:09	17:57	18:42		49.0039	
S846	11:33	13:36	17:45	14:21	18:18		49.49972	
S847	11:30	13:36	17:36	18:18	18:09		44.19529	
S848	11:57	13:48	17:36	21:00	18:09		38.90492	
S850	11:33	15:06	15:18	19:24	18:09		42.87718	
S852	11:21	14:27	14:30	18:09	18:24		56.81133	
S853	11:18	14:21	14:21	20:54	18:24		51.83851	
S856	11:27	14:18	15:00	02:36	18:24		44.99975	
S857	11:45	14:06	16:33	19:33	18:24		49.10294	
S858	11:54	14:06	16:27	19:21	18:24		52.16379	
S859	11:27	17:24	22:30		23:18		57.36015	

S888	11:27	14:51	22:36		23:18		55.74617	
S889	11:27	14:48	22:42		23:18		49.91273	
S890	11:42	16:30	16:39		23:18		42.95458	
S891	11:36	16:27	16:54		23:18		47.28605	
S892	11:15	16:24	22:51		23:18		50.76545	
S893	11:18	16:30	17:42		23:18		52.99683	
S895	11:42	15:00	16:57		23:18		58.83705	
S896	11:39	15:00	17:36		23:18		63.15411	
S897	11:30	15:03	17:42	02:09	01:42	21:30	64.74649	57.04924
S898	11:33	14:48	17:39	02:03	01:42	21:30	66.13083	60.01159
S899	11:33	14:48	21:27	02:12	01:42	21:30	62.29676	50.96031
S900	11:24	15:06	16:51	18:39	19:09	21:30	75.19623	73.55921
S901	11:27	14:48	17:36	01:12	19:09	21:30	60.93962	62.38161
S902	11:24	14:51	18:00	02:33	19:09	21:30	60.58987	60.84508
S903		19:09		19:09	19:09	21:30	71.61926	72.49187
S904	11:21	16:06	16:15	02:45	19:09	21:30	56.60156	61.36135

I-35W (NB)

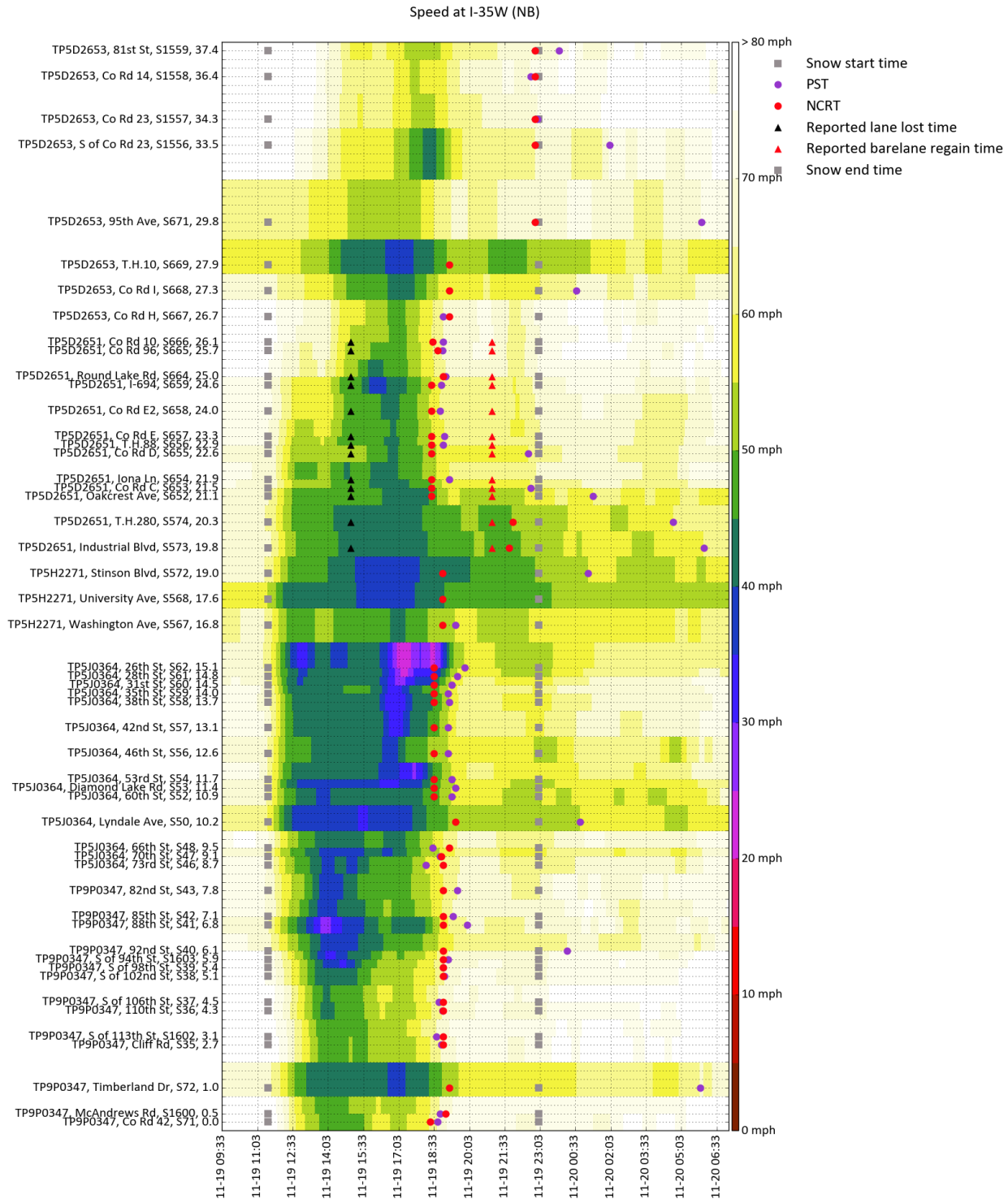


Figure 4.4 Speed Contour of I-35W(NB) on 2011-11-19

Table 4.3 I-35W(NB) Summary Results for 2011-11-19 Snow Event

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S71	11:30	14:21	15:30	18:42	18:24		60.57964	
S1600	11:33	14:09	15:30	18:48	19:03		68.27526	
S72	11:42	16:54	18:03	05:51	19:12		52.62975	
S35	11:48	14:06	15:42	18:51	18:57		66.38031	
S1602	11:48	14:06	15:39	18:39	18:57		67.94084	
S36	11:33	14:00	15:12	18:54	18:57		65.97517	
S37	11:27	14:00	15:03	18:45	18:57		67.21367	
S38	11:33	13:57	14:57	19:00	18:57		64.54034	
S39	11:24	14:42	14:48	18:57	18:57		65.0282	
S1603	11:27	14:09	15:00	19:09	18:57		62.98815	
S40	11:24	14:21	15:51	00:12	18:57		57.30463	
S41	11:24	13:57	14:09	19:57	18:57		57.83961	
S42	11:27	13:57	15:18	19:21	18:57		61.05024	
S43	11:27	14:06	14:42	19:33	18:57		60.30014	
S46	11:21	14:00	16:33	18:12	18:57		61.30201	
S47	11:27	15:12	16:54	18:48	18:51		55.76585	
S48	11:21	14:03	17:27	18:30	19:12		62.54633	

S50	11:24	15:30	17:33	00:45	19:27		51.75622	
S52	11:18	13:51	17:48	19:18	18:33		48.27024	
S53	11:27	16:39	17:45	19:27	18:33		47.23237	
S54	11:09	17:42	17:48	19:18	18:33		45.85571	
S56	11:27	16:42	16:51	19:09	18:33		50.67311	
S57	11:21	16:57	17:00	19:09	18:33		47.27426	
S58	11:24	16:54	16:54	19:12	18:33		45.60194	
S59	11:21	16:51	16:51	19:09	18:33		47.57488	
S60	11:24	17:06	18:15	19:18	18:33		40.61838	
S61	11:21	17:15	17:21	19:33	18:33		34.70806	
S62	11:21	17:15		19:51	18:33		24.5349	
S567	11:27	17:00	18:21	19:27	18:54		52.83528	
S568	11:27	16:54	18:21		18:54		44.85009	
S572	11:30	17:00	18:21	01:06	18:54		42.9403	
S573	11:36	17:06	21:06	06:00	21:45	21:00	48.47392	47.90782
S574	11:36	17:09	17:36	04:42	21:54	21:00	50.3176	47.02401
S652	11:39	17:12	18:09	01:18	18:27	21:00	46.45515	51.98079
S653	11:39	16:36	17:42	22:39	18:27	21:00	50.28417	55.80912
S654	11:39	16:30	17:30	19:12	18:27	21:00	53.16161	60.51336

S655	11:45	16:48	17:51	22:33	18:27	21:00	53.05474	59.25796
S656	11:42	16:45	17:24	18:57	18:27	21:00	55.55667	60.49647
S657	11:45	16:48	17:30	19:00	18:27	21:00	55.20177	62.00033
S658	11:45	16:42	17:15	18:48	18:27	21:00	56.21853	63.35777
S659	11:39	16:06	16:51	18:51	18:27	21:00	55.28761	63.48495
S664	11:39	16:00	16:51	19:03	18:57	21:00	64.4506	68.62693
S665	11:30	16:42	17:09	18:54	18:42	21:00	62.86753	69.03564
S666	11:45	17:00	17:27	18:57	18:30	21:00	60.52367	70.21019
S667	11:33	16:57	17:33	18:57	19:12		67.15493	
S668	11:45	17:12	17:33	00:36	19:12		57.98361	
S669	12:48	17:06	17:48		19:12		50.57907	
S671		17:18	17:54	05:54	22:51		66.05445	
S1556	13:00	18:21	18:24	02:00	22:51		65.33356	
S1557		18:12	18:36	22:57	22:51		69.65591	
S1558		17:42	18:57	22:39	22:51		70.66471	
S1559		17:48	18:45	23:51	22:51		69.42738	

I-35W (SB)

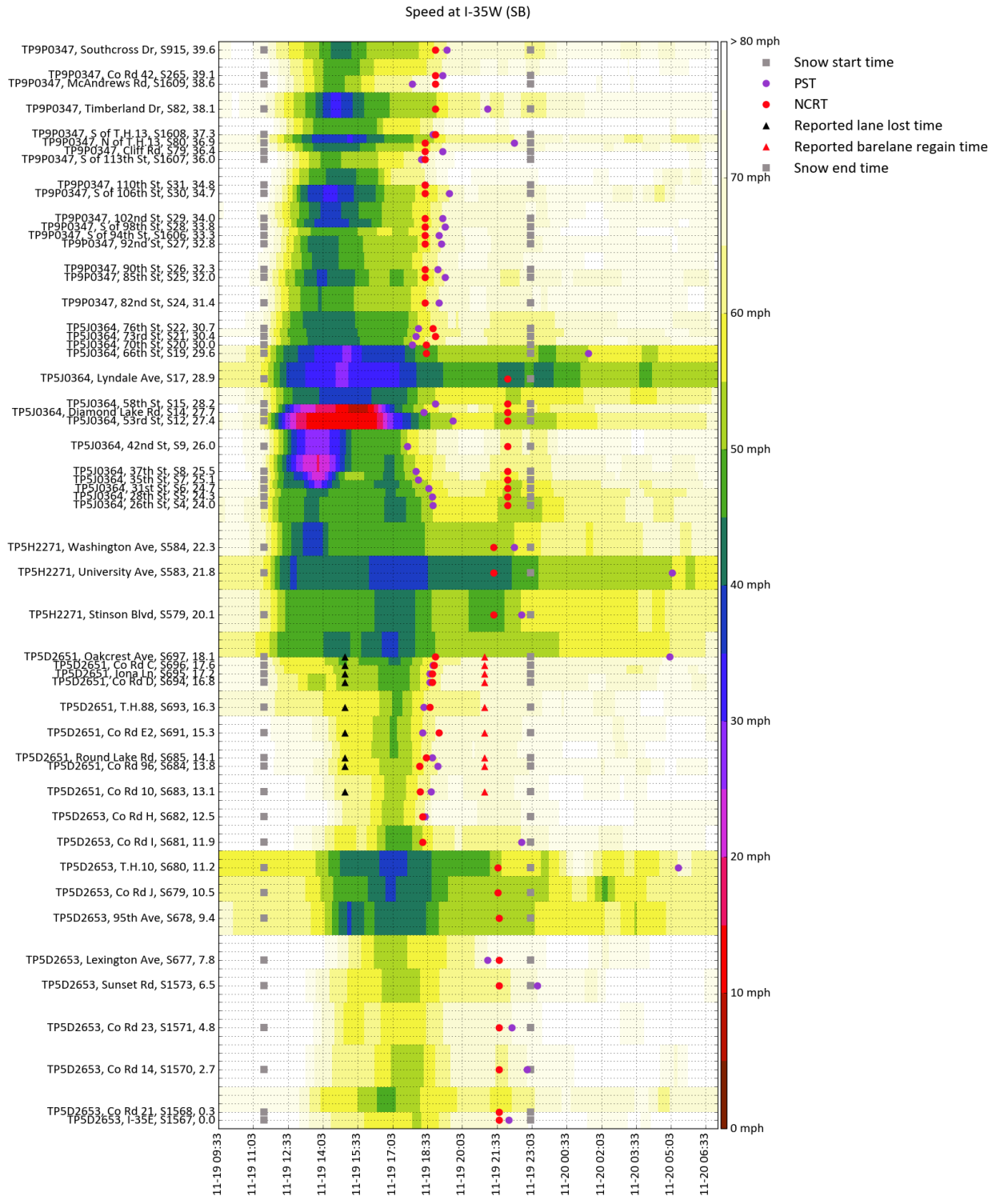


Figure 4.5 Speed Contour of I-35W(SB) on 2011-11-19

Table 4.4 I-35W(SB) Summary Results for 2011-11-19 Snow Event

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1567		18:06	18:30	22:03	21:39		66.76919	
S1568	13:00	16:45	19:09		21:39		57.6782	
S1570	13:00	17:48	18:12	22:51	21:39		64.21596	
S1571	13:06	17:51	18:39	22:12	21:39		67.76948	
S1573	13:03	17:15	18:45	23:18	21:39		64.29842	
S677	12:57	17:00	18:36	21:09	21:39		72.629	
S678	13:27	15:09	18:18		21:39		51.66044	
S679	13:09	16:57	18:39		21:36		51.05516	
S680	13:36	17:03	18:06	05:21	21:36		54.05788	
S681	13:00	17:12	17:45	22:36	18:21		55.11	
S682	11:42	17:06	17:24	18:27	18:21		64.19716	
S683	11:42	17:09	17:39	18:42	18:15	21:00	60.98853	68.1224
S684	11:45	17:12	17:33	19:00	18:12	21:00	58.25612	66.77745
S685	11:36	17:06	17:39	18:45	18:30	21:00	62.41582	69.33554
S691	11:45	17:06	17:21	18:21	19:03	21:00	66.32793	68.48918
S693	11:45	17:15	17:27	18:24	18:39	21:00	61.92166	66.07715
S694	11:39	17:12	17:45	18:39	18:45	21:00	61.2892	65.25901

S695	11:39	17:09	17:18	18:39	18:45	21:00	61.33343	65.59252
S696	11:36	17:09	17:21	18:48	18:51	21:00	60.72766	65.22925
S697	11:33	17:00	17:30	05:00	18:54	21:00	50.04016	52.14287
S579	11:36	17:06	21:21	22:36	21:24		46.21805	
S583	11:27	17:39	18:42	05:06	21:24		44.24605	
S584	11:24	13:39	13:45	22:18	21:24		53.14301	
S4	11:18	17:06	17:54	18:48	22:00		52.70573	
S5	11:18	13:48	17:00	18:45	22:00		54.35927	
S6	11:15	13:51		18:36	22:00		54.66827	
S7	11:18	13:51	17:06	18:09	22:00		59.06564	
S8	11:18	13:51	14:06	18:03	22:00		61.16201	
S9	11:24	13:48	14:12	17:42	22:00		63.65092	
S12	11:18	15:42		19:39	22:00		51.15553	
S14	11:27	15:36	15:42	18:24	22:00		56.86741	
S15	11:18	14:15	17:18	18:54	22:00		54.80953	
S17	11:18	14:51	17:21		22:00		43.66219	
S19	11:24	15:06	15:06	01:30	18:30		47.74799	
S20	11:21	15:06	17:21	17:54	18:30		60.48679	
S21	11:21	15:03	15:06	18:03	18:54		61.84361	

S22	11:27	13:51	17:24	18:09	18:48		60.98266	
S24	11:27	13:54	17:24	19:03	18:27		59.69803	
S25	11:24	14:00	15:12	19:18	18:27		56.90738	
S26	11:30	14:03	17:24	19:00	18:27		60.81121	
S27	11:33	13:57	15:09	19:09	18:27		57.85734	
S1606	11:36	14:21	15:06	19:03	18:27		59.81951	
S28	11:33	14:21	15:15	19:18	18:27		57.9609	
S29	11:27	14:18	16:12	19:12	18:27		58.62683	
S30	11:30	14:24	16:18	19:30	18:27		58.18748	
S31	11:36	14:39	16:18	18:27	18:27		65.11051	
S1607	11:42	14:18	16:24	18:18	18:27		65.96661	
S79	11:30	14:15	15:39	19:12	18:27		58.66731	
S80	11:30	15:12	15:24	22:18	18:27		52.16545	
S1608	11:36	14:15	16:03	18:48	18:54		66.37374	
S82	11:33	14:33	14:54	21:09	18:54		54.73219	
S1609	11:42	14:27	15:15	17:54	18:54		71.81501	
S265	11:27	15:00	15:21	19:12	18:54		62.05394	
S915	11:27	14:42	16:30	19:24	18:54		60.79159	

I-494 (EB)

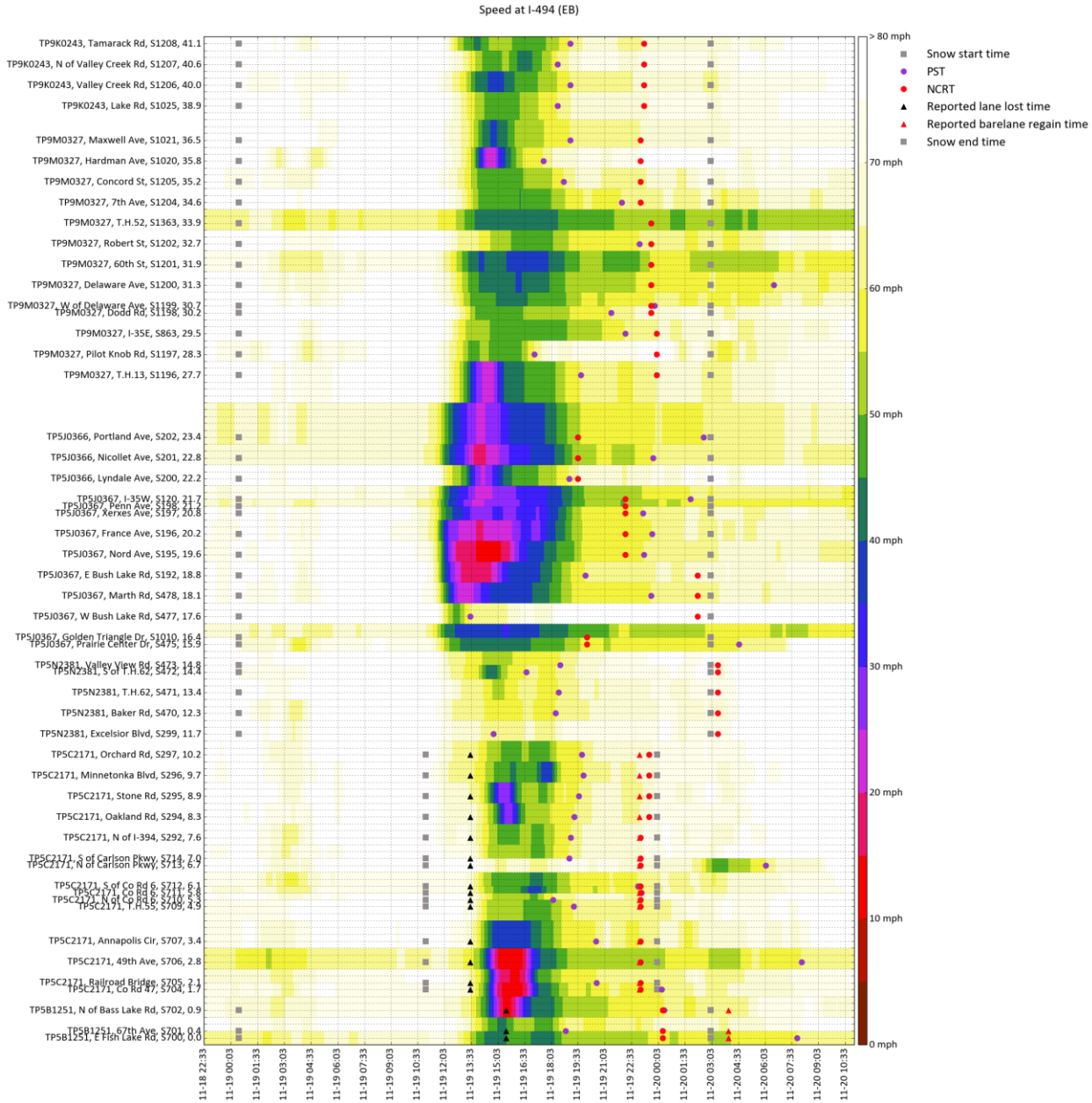


Figure 4.6 Speed Contour of I-494(EB) on 2011-11-19

Table 4.5 I-494(EB) Summary Results for 2011-11-19 Snow Event

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S700	12:30	14:48	18:12	07:51	00:18	04:00	55.65724	53.72175
S701	12:42	15:15	15:36	18:51	00:18	04:00	67.07129	65.21974
S702	12:06	15:33	15:39	00:24	00:18	04:00	59.38925	64.17375
S704	12:30	15:42	16:27	00:15	23:03	23:00	58.09309	57.97207
S705	12:42	16:03	16:27	20:36	23:03	23:00	60.916	60.86221
S706	12:42	15:57	16:12	08:06	23:03	23:00	51.85931	51.88884
S707	12:30	15:06	17:06	20:33	23:03	23:00	60.35213	60.10437
S709	05:33	17:15	17:39	19:18	23:03	23:00	63.59874	63.265
S710	10:18	17:03	17:03	18:09	23:03	23:00	65.35551	65.08266
S711	13:03	17:06	17:06	23:06	23:03	23:00	59.81686	59.5805
S712	13:03	17:12	17:42	22:54	23:03	23:00	60.52238	60.37523
S713	12:54	17:18	23:00	06:06	23:03	23:00	66.58612	66.35526
S714	11:24	17:18	17:24	19:03	23:03	23:00	68.78485	68.52715
S292	11:18	15:42	17:39	19:09	23:03	23:00	69.52286	69.37204
S294	11:21	15:39	22:42	19:21	23:33	23:00	69.64053	64.44077
S295	11:18	15:24	15:30	19:36	23:33	23:00	68.31993	63.65397
S296	11:12	17:48	17:54	19:51	23:33	23:00	67.79877	65.80876

S297	11:12	17:30	17:51	19:45	23:33	23:00	69.23722	67.04178
S299	11:09	14:48	17:57	14:48	03:24		72.047	
S470	11:09	15:06	19:24	18:18	03:24		68.10171	
S471	11:12	15:06	18:15	18:27	03:24		72.60954	
S472	08:48	14:39		16:39	03:24		68.81015	
S473	11:15	14:48		18:33	03:24		73.00316	
S475	00:00	14:39	18:09	04:36	20:03		56.116	
S1010	11:09	15:30	18:18		20:03		47.63066	
S477	11:12	12:42	12:51	13:30	02:15		94.99167	
S478	11:12	13:09	13:30	23:39	02:15		63.86566	
S192	11:09	14:03	14:24	19:57	02:15		67.15946	
S195	06:57	14:21	15:03	23:15	22:12		57.59997	
S196	09:09	14:03	15:45	23:42	22:12		56.44983	
S197	10:21	13:57	17:21	23:12	22:12		55.97574	
S198	10:27	13:54	16:03		22:12		50.06487	
S120	06:45	14:15	14:21	01:51	22:12		50.20671	
S200	11:12	14:12	14:12	19:03	19:33		65.57115	
S201	10:48	14:00	14:54	23:45	19:33		52.53005	
S202	11:09	14:03	14:57	02:36	19:33		54.30695	

S1196	11:30	14:33	14:39	19:42	23:57		64.99706	
S1197	09:06	15:00	16:09	17:06	23:57		80.45747	
S863	09:03	16:06	19:15	22:12	23:57		64.65538	
S1198	11:36	15:12	18:45	21:24	23:39		66.72705	
S1199	11:39	16:00	18:12	23:51	23:39		59.42485	
S1200	11:27	16:12	17:24	06:33	23:39		57.12795	
S1201	11:30	17:24	22:42		23:39		55.29566	
S1202	10:12	17:18	18:18	23:00	23:39		60.98272	
S1363	02:33	16:18	18:57		23:39		52.17092	
S1204	11:39	16:18	17:33	22:00	23:03		61.89327	
S1205	09:12	14:33	22:33	18:45	23:03		63.77752	
S1020	00:27	14:36	14:36	17:36	23:03		75.37595	
S1021	04:21	14:48	15:00	19:06	23:03		65.16076	
S1025	11:45	14:57	16:30	18:24	23:15		69.14296	
S1206	11:42	15:03	15:18	19:06	23:15		65.45413	
S1207	11:42	16:33	17:45	18:24	23:15		70.63709	
S1208	11:42	13:54	13:57	19:06	23:15		65.5278	

I-494 (WB)

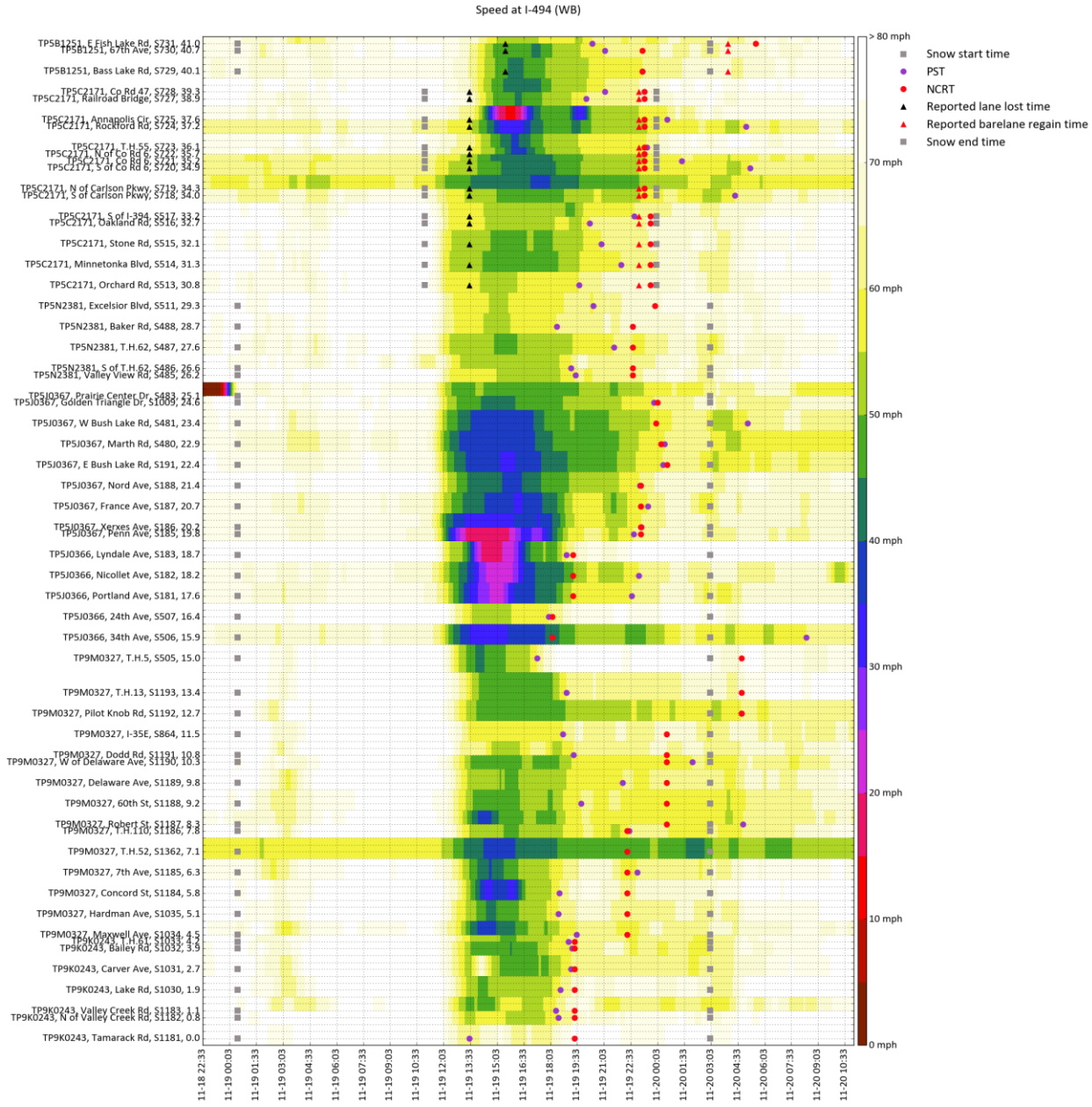


Figure 4.7 Speed Contour of I-494(WB) on 2011-11-19

Table 4.6 I-494(WB) Summary Results for 2011-11-19 Snow Event

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1181	11:39	13:30	18:06	13:30	19:24		75.95634	
S1182	08:45	16:30	17:42	18:30	19:24		65.74159	
S1183	10:12	14:30	14:39	18:21	19:24		69.10015	
S1030	08:39	14:18	17:54	18:36	19:24		66.44766	
S1031	05:15	15:51	18:12	19:12	19:24		61.42851	
S1032	11:12	15:51	16:54	19:15	19:24		61.01672	
S1033	08:30	15:42	17:48	19:03	19:24		61.5117	
S1034	11:18	14:27	15:42	19:30	22:21		57.96038	
S1035	11:24	14:39	16:48	18:30	22:21		61.96109	
S1184	11:24	14:33	15:57	18:33	22:21		63.00015	
S1185	08:51	14:39	22:09	22:54	22:21		58.56328	
S1362	01:12	14:45	18:00		22:21		46.7559	
S1186	09:12	15:54	18:18	22:27	22:21		58.9356	
S1187	11:33	14:21	14:21	04:51	00:33		59.3659	
S1188	11:15	14:15	18:09	19:45	00:33		57.87435	
S1189	11:18	15:57	21:36	22:06	00:33		60.49423	
S1190	09:15	15:00	18:24	02:00	00:33		58.08168	

S1191	08:54	15:12	18:42	19:21	00:33		65.034	
S864	08:15	16:03	18:18	18:45	00:33		66.47646	
S1192	08:27	18:09	20:27	04:45	04:45		60.08318	
S1193	11:36	16:06	18:03	18:57	04:45		68.20386	
S505	08:18	14:03	04:30	17:18	04:45		71.52083	
S506	11:21	14:24	17:21	08:24	18:09		42.78293	
S507	11:24	14:54	16:48	17:57	18:09		60.75948	
S181	11:09	15:03	15:06	22:36	19:18		55.72002	
S182	10:18	15:00	15:30	23:00	19:18		49.82622	
S183	11:03	14:36	15:06	18:57	19:18		64.55274	
S185	03:15	14:15	22:09	22:42	23:06		61.13221	
S186	10:24	14:06	17:24	23:09	23:06		59.82803	
S187	09:33	16:12	21:45	23:30	23:06		59.23903	
S188	11:09	15:42	17:24	23:03	23:06		60.53959	
S191	11:12	15:36	17:00	00:21	00:36		60.75276	
S480	07:39	15:27	17:18	00:27	00:15		59.04021	
S481	09:27	15:54	17:15	05:06	23:57		56.96403	
S1009	10:39	14:33	18:36	23:51	00:03		61.32975	
S485	10:48	16:27	18:36	19:27	22:39		63.80887	

S486	08:12	17:12	18:33	19:12	22:39		60.23389	
S487	11:18	15:30	15:48	21:36	22:39		59.82566	
S488	11:24	15:15	17:48	18:24	22:39		67.2296	
S511	11:21	15:12	20:24	20:27	23:54		68.56014	
S513	11:21	14:48	17:54	19:39	23:39	23:00	69.89905	67.73147
S514	11:15	17:48	18:15	22:00	23:39	23:00	63.99747	62.78566
S515	11:18	15:42	19:27	20:54	23:39	23:00	65.83053	62.65352
S516	10:45	19:27	19:27	20:15	23:39	23:00	65.95355	62.46319
S517	11:21	19:12	19:30	22:45	23:39	23:00	61.68451	60.25563
S718	10:48	16:21	18:54	04:24	23:18	23:00	56.40429	54.71203
S719	11:24	17:30	19:15		23:18	23:00	50.70372	49.98139
S720	11:27	16:06	18:54	05:15	23:18	23:00	56.12548	54.7713
S721	11:33	16:06	19:09	01:24	23:18	23:00	54.98669	53.85949
S722	11:21	16:09	16:51	23:18	23:18	23:00	60.10856	58.90378
S723	08:57	16:03	16:51	23:27	23:18	23:00	59.41675	58.20598
S724	10:06	15:45	16:27	05:00	23:18	23:00	53.74035	52.22438
S725	11:30	15:48	19:45	00:36	23:18	23:00	56.27378	55.09295
S727	12:18	16:12	17:15	20:03	23:18	23:00	66.84763	64.89031
S728	11:45	16:57	17:24	21:06	23:18	23:00	67.91239	64.8961

S729	12:36	16:03	17:12	23:12	23:12	04:00	60.31257	66.25534
S730	12:30	17:15	18:42	21:06	23:12	04:00	63.19978	69.05275
S731	12:30	16:03	19:51	20:24	05:33	04:00	69.36755	64.92783

I-694 (EB)

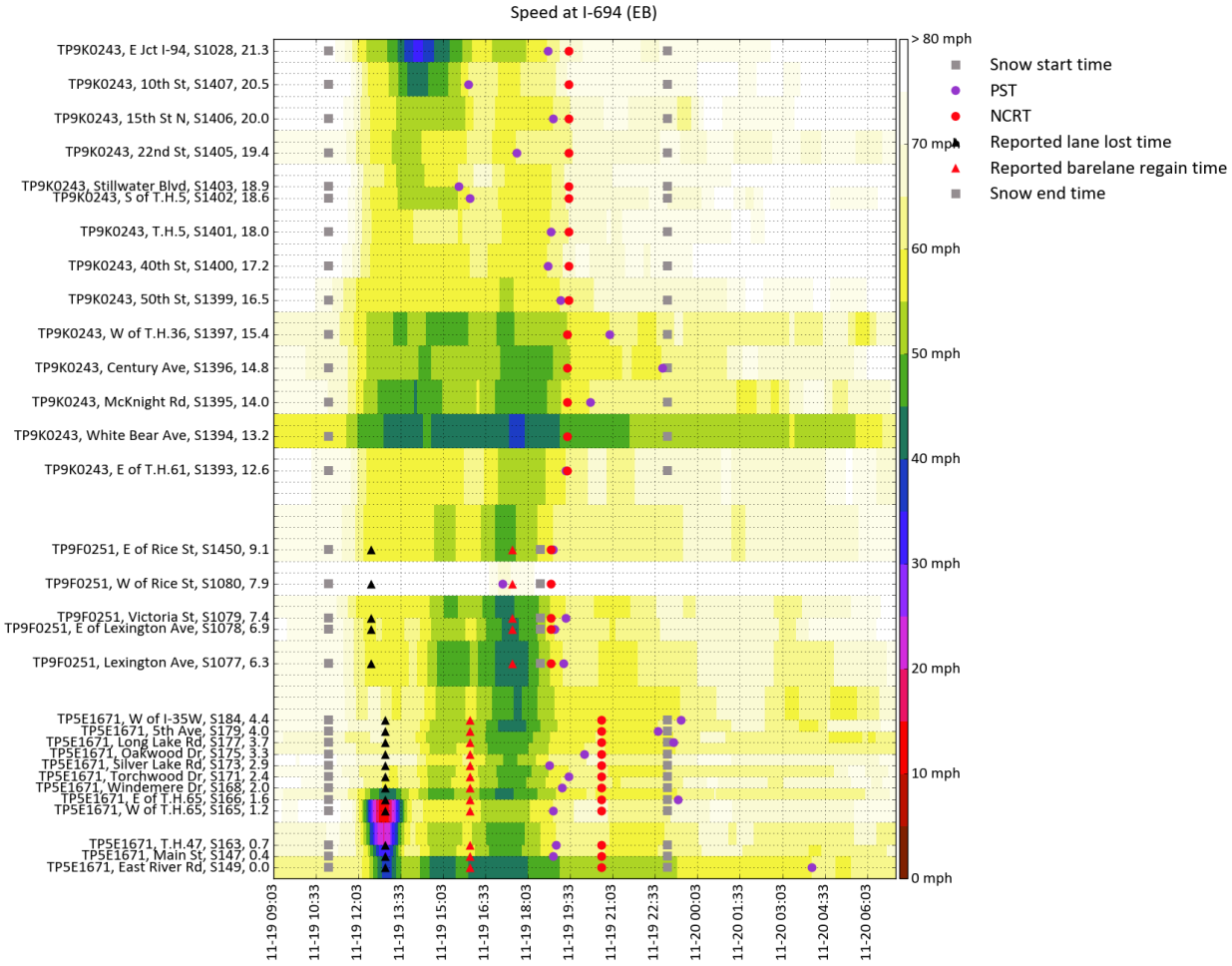


Figure 4.8 Speed Contour of I-694(EB) on 2011-11-19

Table 4.7 I-694(EB) Summary Results for 2011-11-19 Snow Event

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S149	12:15	13:03	18:00	04:06	20:39	16:00	52.98087	44.68584
S147	11:36	12:57	17:54	18:57	20:39	16:00	60.44586	56.13768
S163	11:33	12:57	17:39	19:03	20:39	16:00	61.44353	55.22389
S165	11:30	12:57	18:06	18:57	20:39	16:00	66.08226	57.92437
S166	11:30	13:06	17:45	23:21	20:39	16:00	59.03557	51.89908
S168	11:30	17:30	18:00	19:15	20:39	16:00	62.04378	56.85981
S171	11:30	17:33	17:54	19:30	20:39	16:00	61.4618	56.56447
S173	11:30	17:24	17:45	18:48	20:39	16:00	65.34823	59.98748
S175	11:36	17:15	18:00	20:03	20:39	16:00	60.30373	55.58965
S177	11:30	17:24	18:18	23:12	20:39	16:00	60.03664	54.64834
S179	11:42	17:27	17:42	22:39	20:39	16:00	58.29705	54.33088
S184	11:33	17:42	18:18	23:27	20:39	16:00	59.77535	55.5817
S1077	11:36	17:39	17:54	19:18	18:51	17:30	55.61413	43.02571
S1078	11:30	17:18	18:00	19:00	18:51	17:30	57.9272	44.8081
S1079	11:30	17:09	17:57	19:24	18:51	17:30	55.52138	44.82635
S1080	11:33	17:09	17:57	17:09	18:51	17:30	85.26661	70.50633
S1450	11:39	17:12	17:51	18:57	18:51	17:30	59.28282	49.33336

S1393	11:39	17:36	18:45	19:24	19:27		60.45059	
S1394	11:42	17:39	18:54		19:27		46.95099	
S1395	11:30	14:03	18:12	20:15	19:27		56.74788	
S1396	11:36	18:21	18:54	22:48	19:27		54.2777	
S1397	11:15	17:15	18:45	20:57	19:27		55.0694	
S1399	10:57	17:15	18:36	19:12	19:30		62.9335	
S1400	11:24	17:30	18:42	18:45	19:30		67.68635	
S1401	11:24	13:39	18:45	18:51	19:30		65.43215	
S1402	11:24	13:57	15:30	16:00	19:30		66.31776	
S1403	11:27	13:51	13:57	15:36	19:30		66.68819	
S1405	11:27	13:39	17:06	17:39	19:30		63.9039	
S1406	11:21	13:57	18:42	18:57	19:30		64.86105	
S1407	11:24	14:06	14:42	15:57	19:30		70.77719	
S1028	11:21	14:09	14:21	18:45	19:30		67.82271	

I-694 (WB)

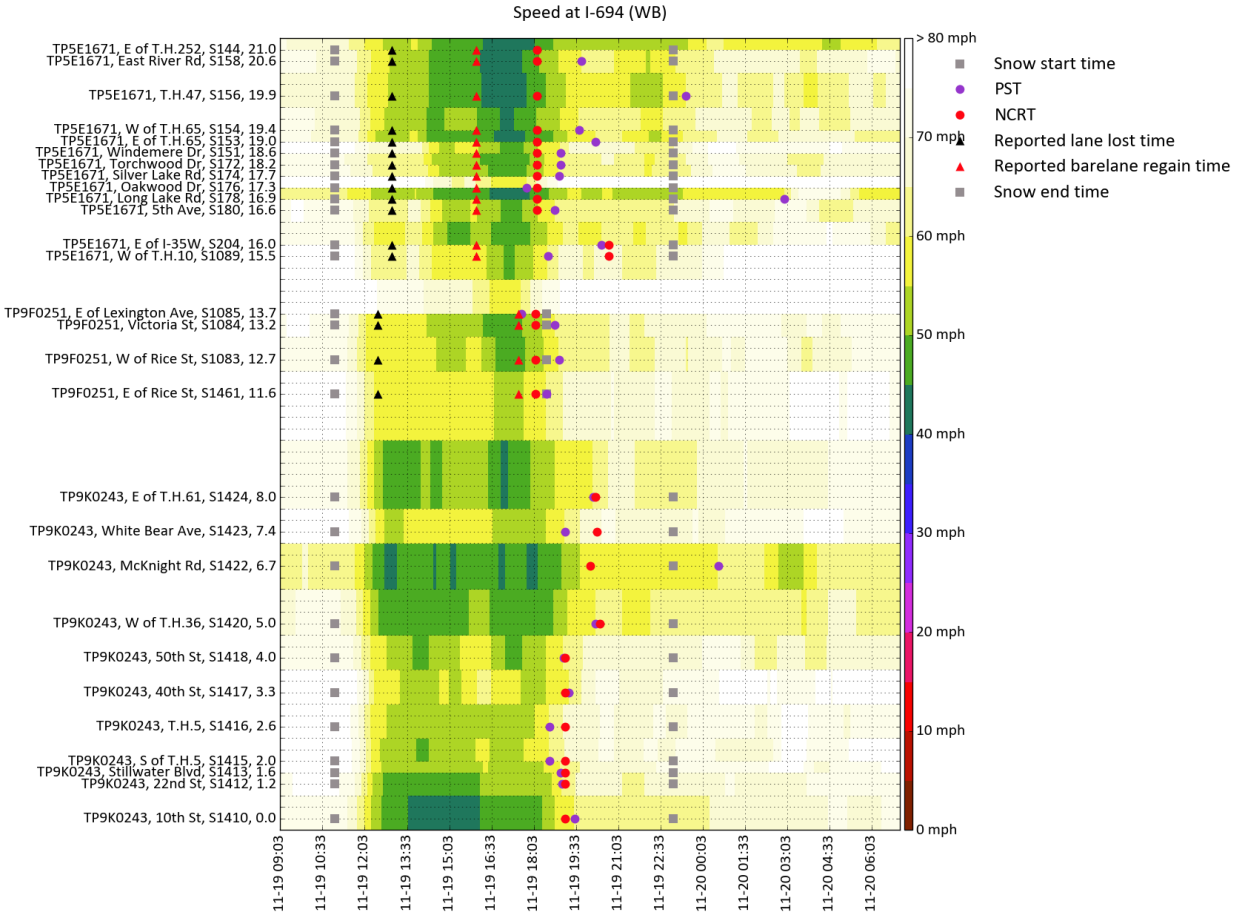


Figure 4.9 Speed Contour of I-694(WB) on 2011-11-19

Table 4.8 I-694(WB) Summary Results for 2011-11-19 Snow Event

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1410	11:30	15:18	17:57	19:30	19:09		58.40623	
S1412	11:33	15:21	15:51	19:03	19:09		61.31612	
S1413	11:36	15:24	18:00	19:00	19:09		61.71562	
S1415	11:36	14:06	17:39	18:36	19:09		65.39522	
S1416	11:33	15:21	17:54	18:36	19:09		65.40107	
S1417	11:36	14:03	18:06	19:18	19:09		58.8364	
S1418	11:36	17:18	17:57	19:06	19:09		60.68643	
S1420	11:30	17:00	18:45	20:15	20:24		60.88945	
S1422	11:39	12:54	18:42	00:36	20:03		57.21171	
S1423	11:39	17:54	18:24	19:09	20:18		69.33122	
S1424	11:36	17:00	17:45	20:09	20:15		61.24408	
S1461	11:33	17:06	17:33	18:30	18:06	17:30	57.70999	53.58716
S1083	11:24	17:09	17:33	18:57	18:06	17:30	52.44719	48.35382
S1084	11:24	16:54	17:33	18:48	18:06	17:30	53.40828	48.76865
S1085	11:24	17:06	17:27	17:36	18:06	17:30	67.18789	59.04037
S1089	11:33	17:09	17:39	18:33	20:42	16:00	67.60066	56.77011
S204	11:36	17:15	18:09	20:27	20:42	16:00	61.83907	50.84883

S180	11:42	17:15	17:30	18:48	18:09	16:00	54.63367	55.07584
S178	11:48	17:12	17:36	02:57	18:09	16:00	47.3912	46.88025
S176	11:57	17:12	17:30	17:48	18:09	16:00	65.31389	64.90305
S174	11:36	17:18	17:36	18:57	18:09	16:00	53.41508	52.51949
S172	11:39	17:15	17:27	19:00	18:09	16:00	52.8496	50.75285
S151	11:33	17:18	17:30	19:00	18:09	16:00	54.97473	55.3354
S153	11:36	17:12	17:36	20:15	18:09	16:00	48.52585	48.83377
S154	11:39	17:03	17:33	19:39	18:09	16:00	50.1329	50.08189
S156	11:30	16:51	17:33	23:27	18:09	16:00	48.18216	46.52208
S158	11:33	16:51	17:36	19:45	18:09	16:00	49.61811	45.68887
S144	11:27	17:15	17:36		18:09	16:00	45.52898	46.7916

I-94 (EB)

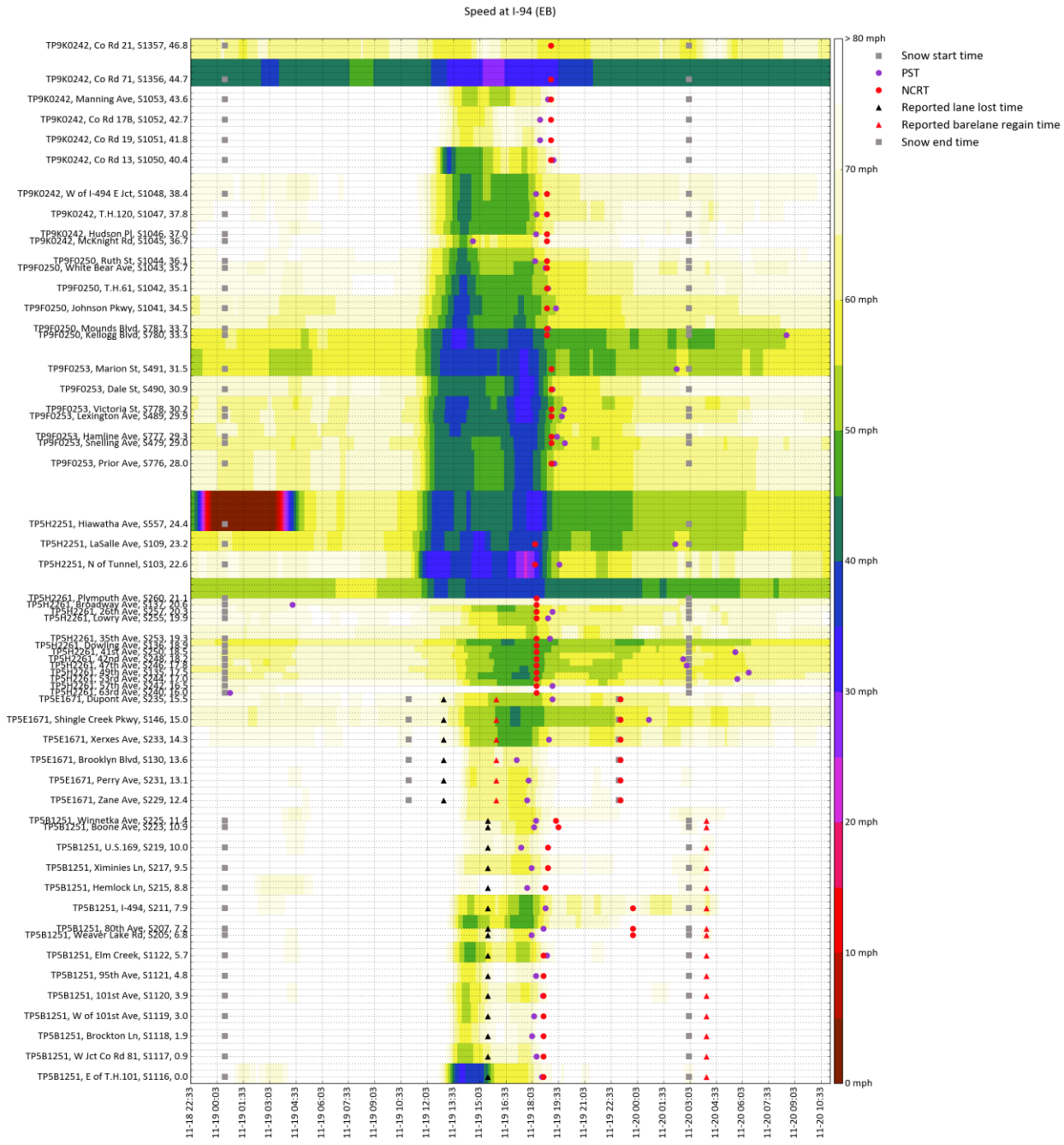


Figure 4.10 Speed Contour of I-94(EB) on 2011-11-19

Table 4.9 I-94(EB) Summary Results for 2011-11-19 Snow Event

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1116	12:18	14:00	15:15	18:36	18:42	04:00	71.22765	76.73799
S1117	12:30	14:12	17:54	18:18	18:42	04:00	76.06281	83.37443
S1118	12:33	14:12	17:54	18:03	18:42	04:00	84.15207	81.45385
S1119	12:30	14:15	17:54	18:09	18:42	04:00	79.92779	80.57685
S1120	12:18	14:15	17:57	18:39	18:42	04:00	71.07225	79.94836
S1121	12:39	14:21	18:00	18:15	18:42	04:00	78.46814	79.93599
S1122	12:33	14:27	18:00	18:54	18:42	04:00	67.54836	79.38427
S205	12:27	14:24	17:39	18:00	23:48	04:00	85.90702	73.78595
S207	10:33	17:36	18:00	18:42	23:48	04:00	79.29664	85.35748
S211	10:45	17:45	18:03	18:48	23:48	04:00	72.05396	64.61463
S215	11:30	17:45	17:57	17:45	18:48	04:00	78.70066	73.32266
S217	13:06	17:24	17:54	18:00	18:57	04:00	69.43167	72.24833
S219	13:27	17:24	18:12	17:24	18:57	04:00	78.02384	73.11712
S223	13:09	17:51	18:06	18:09	19:33	04:00	76.74705	80.61117
S225	13:21	17:27	18:09	18:15	19:24	04:00	71.5171	72.85279
S229	13:24	17:12	22:33	17:45	23:06	16:00	78.14853	61.32043
S231	13:15	17:12	17:54	17:51	23:06	16:00	76.145	62.09369

S130	13:06	17:09	17:39	17:09	23:06	16:00	80.03672	65.27352
S233	10:24	17:00	17:57	19:00	23:06	16:00	61.24132	50.36763
S146	12:45	17:03	18:33	00:42	23:06	16:00	55.56203	49.5685
S235	12:30	17:15	18:15	19:12	23:06	16:00	62.83701	52.7662
S240		00:48	17:15	00:48	18:18		79.76197	
S242	11:39	17:18	17:45	19:12	18:18		52.12557	
S244	11:42	17:30	17:45	05:45	18:18		47.11968	
S135	11:57	17:36	17:45	06:24	18:18		47.32552	
S246	11:57	17:51	17:51	02:51	18:18		46.65439	
S248	11:39	16:48	18:00	02:39	18:18		47.85947	
S250	11:42	17:09	17:45	05:39	18:18		47.40635	
S136	11:48	16:42	18:09		18:18		48.01475	
S253	08:42	17:57	17:57	19:03	18:18		54.84461	
S255		16:54	17:48	18:57	18:18		55.29907	
S257	11:30	16:27	17:45	19:12	18:18		54.41656	
S137		04:21	18:06	04:21	18:18		65.96314	
S260	11:24	15:06	17:48		18:18		38.18161	
S103	08:12	17:42	17:42	19:36	18:12		30.73351	
S109	09:57	15:03	17:54	02:12	18:12		37.06057	

S776	06:42	17:36	17:54	19:18	19:09		53.41314	
S479	06:48	17:48	17:54	19:54	19:09		49.72032	
S777	11:18	17:39	18:18	19:27	19:09		51.34596	
S489	11:15	17:36	17:45	19:45	19:09		49.34601	
S778	11:18	17:27	18:09	19:51	19:09		48.26772	
S490	10:12	17:45	17:51	19:12	19:09		54.29826	
S491	11:30	17:33	18:09	02:18	19:09		48.33888	
S780	11:18	13:51	17:30	08:33	18:54		45.66284	
S781	11:21	13:57	14:06	18:57	18:54		54.85925	
S1041	11:27	14:00	14:15	19:24	18:54		52.14236	
S1042	10:36	14:06	15:36	18:57	18:54		54.96278	
S1043	10:36	14:03	14:15	18:48	18:54		55.74159	
S1044	10:36	14:03	17:36	18:12	18:54		60.75694	
S1045	10:18	14:06	14:18	14:39	18:54		70.17051	
S1046	11:27	14:12	17:36	18:15	18:54		62.47306	
S1047	10:21	14:12	14:15	18:18	18:54		61.41274	
S1048	11:27	14:15	17:27	18:15	18:54		62.5111	
S1050	11:03	13:18	13:18	19:15	19:06		68.20598	
S1051	11:27	14:18	17:54	18:30	19:06		77.64721	

S1052	11:30	14:36	18:06	18:30	19:06		78.19065	
S1053	10:39	16:24	16:39	18:57	19:06		72.18152	
S1356	11:57	15:54	18:33		19:06		33.89794	
S1357	11:39	13:36	18:33		19:06		59.63511	

I-94 (WB)

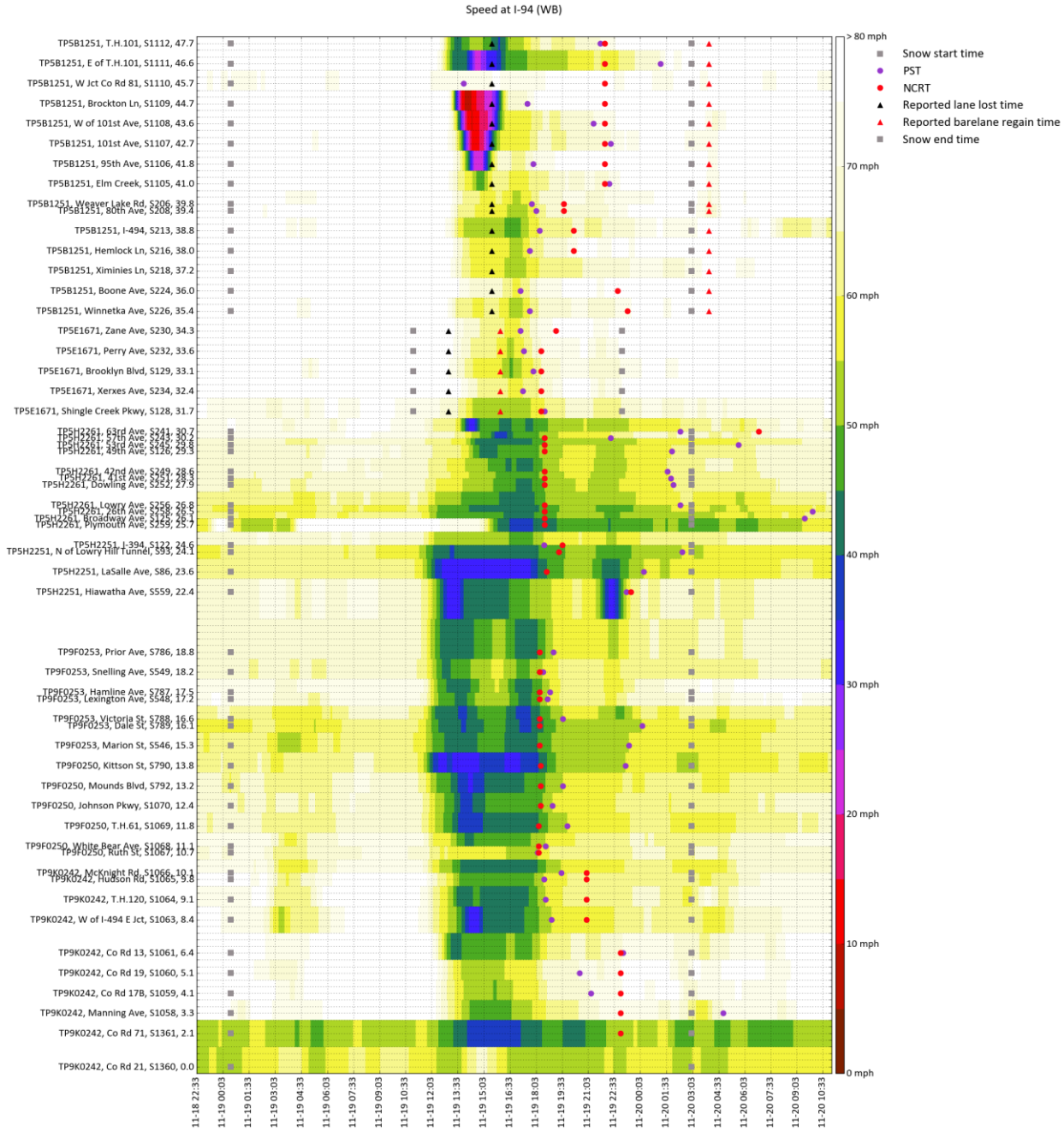


Figure 4.11 Speed Contour of I-94(WB) on 2011-11-19

Table 4.10 I-94(WB) Summary Results for 2011-11-19 Snow Event

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1361	12:03	15:12	20:27		22:54		51.2293	
S1058	10:12	15:51	17:09	04:48	22:54		74.14379	
S1059	08:45	15:39	17:36	21:12	22:54		74.13516	
S1060	08:06	14:30	17:30	20:33	22:54		74.89689	
S1061	08:57	13:24	17:33	23:03	22:54		69.36129	
S1063	11:24	14:27	14:27	18:57	20:57		59.71067	
S1064	11:27	13:51	17:15	18:36	20:57		61.35738	
S1065	11:30	14:30	17:48	18:30	20:57		62.78738	
S1066	11:27	17:15	17:51	19:30	20:57		57.01474	
S1067	11:39	17:12	17:39	18:09	18:12		55.54561	
S1068	11:30	14:09	17:39	18:36	18:12		51.94383	
S1069	11:30	14:21	17:39	19:51	18:12		45.32502	
S1070	11:24	14:00	14:42	19:00	18:18		48.83268	
S792	10:33	14:15	14:45	19:36	18:18		48.2905	
S790	10:18	13:54	16:33	23:12	18:18		41.09361	
S546	11:12	13:48	17:42	23:24	18:15		45.61394	
S789	11:30	17:27	17:42	00:09	18:15		42.91616	
S788	11:15	17:18	17:42	19:36	18:15		44.75601	

S548	02:45	13:45	17:39	18:42	18:15		49.79755	
S787	11:27	13:48	17:42	18:51	18:15		48.92415	
S549	11:33	12:51	17:42	18:27	18:15		53.74377	
S786	05:06	13:39	17:42	19:03	18:15		46.1945	
S559	09:33	13:18	22:30	23:15	23:30		60.53866	
S86	11:06	15:42	17:36	00:15	18:39		44.90494	
S93	10:33	13:12	18:48	02:27	19:21		48.96856	
S122	02:57	17:15	17:36	18:30	19:33		57.90926	
S259	11:30	17:12	18:00		18:33		42.28281	
S125	11:39	17:09	18:00	09:30	18:33		47.47938	
S258	06:54	17:18	18:00	09:57	18:33		46.73561	
S256	11:39	17:21	17:48	02:21	18:33		49.76543	
S252	11:39	17:27	18:00	01:57	18:33		50.0686	
S251	11:27	17:30	18:00	01:48	18:33		52.52085	
S249	11:27	17:30	18:00	01:36	18:33		50.84155	
S126	11:36	15:18	17:33	01:51	18:33		51.83489	
S245	11:36	15:06	17:48	05:42	18:33		49.94723	
S243	11:30	16:00	16:00	22:21	18:33		52.30013	
S241	11:24	14:21	14:21	02:21	06:51		66.14881	

S128	10:21	16:48	17:12	18:33	18:21	16:00	59.39224	53.17384
S234	11:09	16:48	17:42	17:18	18:21	16:00	65.78868	62.80798
S129	09:45	16:36	16:39	17:54	18:21	16:00	65.0514	55.92422
S232	09:45	16:36	17:03	17:21	18:21	16:00	70.3448	58.06859
S230	08:51	16:39	17:09	17:09	19:12	16:00	75.70564	62.21513
S226	10:45	16:54	16:57	17:42	23:18	04:00	73.68834	81.14691
S224	10:48	16:54	17:06	17:09	22:45	04:00	80.72265	81.07135
S216	12:30	16:54	16:57	17:42	20:12	04:00	72.72568	78.11204
S213	09:27	16:45	16:48	18:15	20:12	04:00	65.31651	75.57307
S208	08:51	16:57	17:03	18:03	19:39	04:00	67.4489	68.13354
S206	09:12	16:54	17:12	17:48	19:39	04:00	70.15931	69.78124
S1105	10:57	14:51	17:18	22:15	22:00	04:00	69.10546	73.67204
S1106	12:42	14:42	14:42	17:54	22:00	04:00	78.16002	74.01554
S1107	12:12	14:33	14:33	22:21	22:00	04:00	68.34943	70.41944
S1108	08:51	14:21	14:27	21:21	22:00	04:00	72.99316	71.79065
S1109	12:36	14:06	14:06	17:33	22:00	04:00	78.75802	83.28921
S1110		13:54		13:54	22:00	04:00	75.21481	75.08667
S1111	11:54	14:42	14:42	01:12	22:00	04:00	59.14753	79.50971
S1112	06:12	15:54	16:00	21:45	22:00	04:00	71.69051	89.33704

CHAPTER 5: CONCLUSIONS

The capability to accurately determine the status of the traffic conditions during snow events is of critical importance for effective management of winter maintenance operations. While the time to bare pavement (TBP) has been widely used as one of the key performance measures for winter snow operations, currently most state agencies rely on the visual inspections of the field crew in determining the TBPs for a given event. Such visually measured TBPs by snow-truck drivers can have inherent limitations in terms of the consistency and reliability because of human subjectivity in assessing road conditions.

The previous phases of this research analyzed the traffic-flow patterns under snow conditions and developed a prototype process to determine the traffic data-based alternative measures for winter snow operations. The current research expanded the previous research efforts and developed a system that can automatically estimate the normal condition regain times (NCRTs) at the detector stations on the metro-freeway network for given snow events. The NCRT estimation process developed in this study is based on the findings that the speed level during the recovery process reaches a stable free-flow-speed (FFS), whose value is generally lower than the pre-snow FFS at a same location. Further, the speed-density (U-K) relationship of the traffic flow after snow is cleared exhibits a similar but shifted-down pattern of the normal-day U-K relationship at a same location.

In this study, the after-snow traffic condition with a stable but shifted-sown pattern of the normal-day U-K relationship is defined as the 'wet-normal' condition and the NCRT is defined as the time the U-K data during a snow event starts to follow the wet-normal U-K pattern at a given location. The NCRT estimation system developed in this study first collects the traffic and weather data for the metro-freeway network and determines the normal-day U-K relationships for the detector stations whose traffic data include both uncongested and congested regions. The normal-day U-K relationships are then applied to calibrate the wet-normal U-K patterns at given locations using the traffic data collected from given snow events. Finally the NCRTs are determined for each station as the time when the U-K data during a snow event starts to follow the wet-normal U-K pattern at a given location. The NCRT estimation system has been applied to a set of the sample snow events and the NCRTs at the detector stations in the metro-freeway corridors are determined for each event.

Future work needs to identify the casual relationship between the NCRT estimates and the specific types of snow-management strategies applied to given corridors on given events. The results from this correlation analysis can be a basis for developing the optimal snow-management strategies, e.g., the timing and amount of the chemicals, depending on the scope of a given snow event. Improving the efficiency of the NCRT estimation system needs to be pursued with the incorporation of the big-data tools.

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6. E. Kwon, S. Hong, S. Kim, S. Jeon, 2012, Estimation of Winter Snow Maintenance Operation Performance Measures with Traffic Data, Phase 1, Final Report for Minnesota Department of Transportation, St. Paul, MN

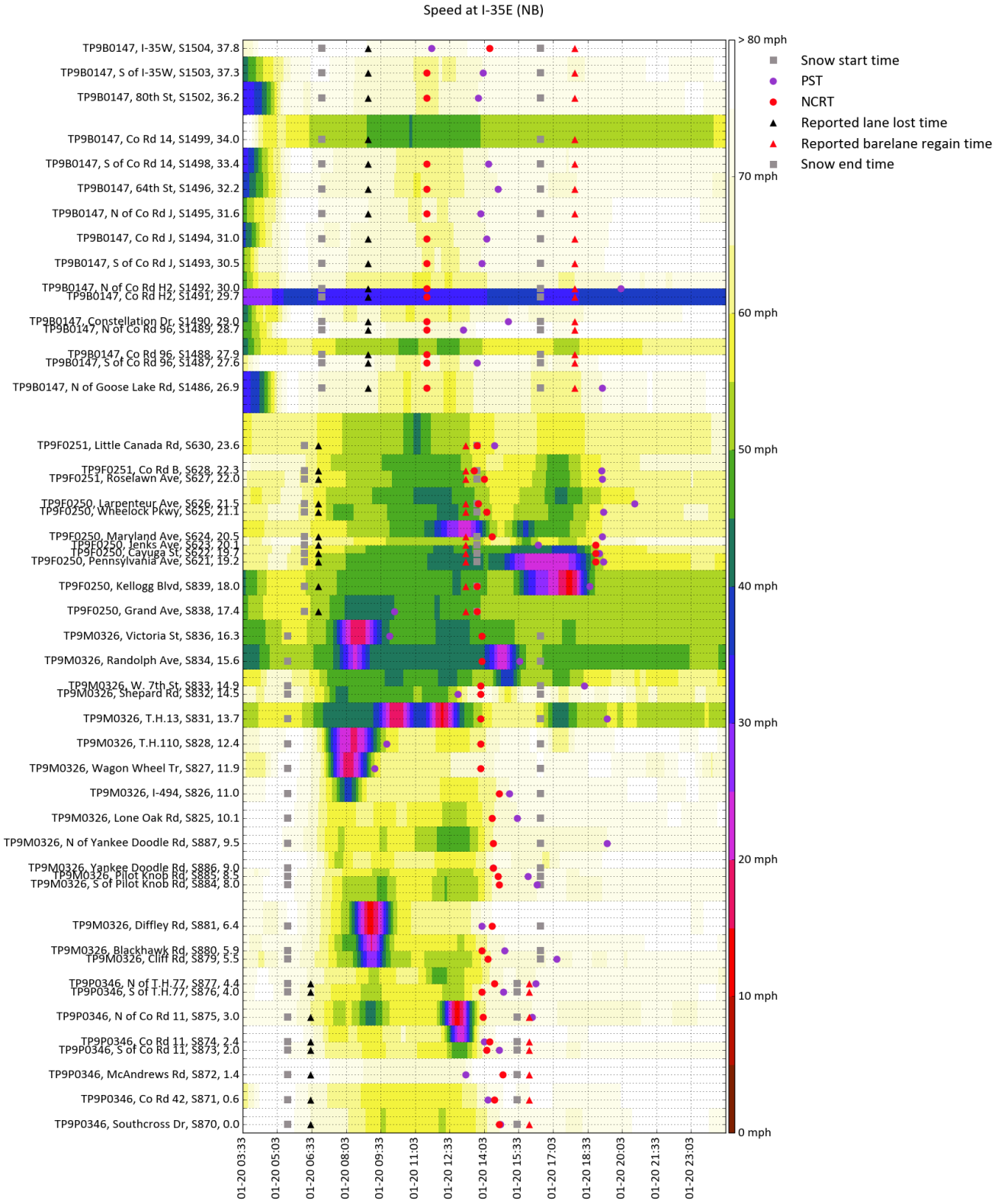
7. E. Kwon, C. Park, S. Hong, S. Jeon, 2015, Estimation of Winter Snow Maintenance Operation Performance Measures with Traffic Data, Phase 2, Final Report for Minnesota Department of Transportation, St. Paul, MN

APPENDIX A
SUMMARY RESULTS FROM EXAMPLE APPLICATION OF THE NCRT ESTIMATION SYSTEM

- **2012-01-20**
- **2013-02-01**
- **2014-11-10**
- **2015-02-20**
- **2016-02-02**

Snow Event: 1-20-2012

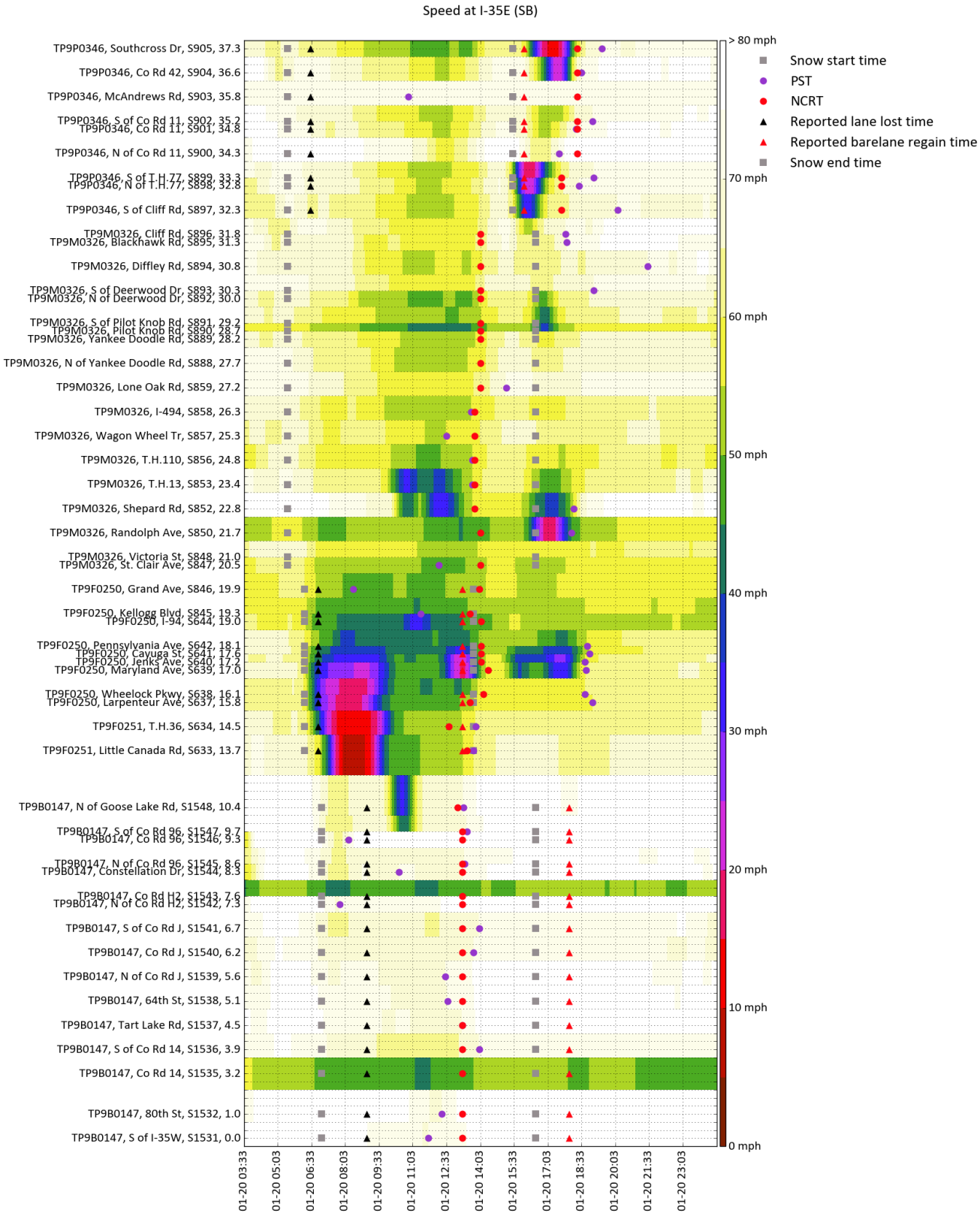
I-35E (NB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S870	05:27	09:39	13:39	14:45	14:42	16:00	69.9957	73.56731
S871	05:21	10:51	12:51	14:12	14:30	16:00	73.09808	74.99098
S872	05:54	12:45	12:51	13:15	14:51	16:00	83.84659	84.63693
S873	05:48	13:00	13:00	14:42	14:09	16:00	66.80578	71.83454
S874	06:03	13:00	13:03	14:03	14:18	16:00	73.61812	76.97471
S875	05:45	12:54	12:54	16:09	14:00	16:00	63.332	69.60281
S876	05:51	12:45	12:57	14:54	13:57	16:00	65.04892	71.72832
S877	06:09	12:03	13:45	16:18	14:30	16:00	67.67077	68.98139
S879	06:00	09:09	09:09	17:12	14:12		63.82376	
S880	06:24	09:09	09:09	14:57	13:57		62.99391	
S881	05:57	09:06	09:06	13:57	14:24		75.17052	
S884	06:06	09:36	13:36	16:21	14:42		68.50495	
S885	06:00	12:27	13:39	15:57	14:39		67.6385	
S886	06:00	07:45	07:48	14:27	14:27		70.08995	
S887	05:48	13:09	13:18	19:24	14:27		65.03567	
S825	05:57	12:39	13:21	15:30	14:24		64.37182	
S826	06:00	08:09	08:09	15:09	14:42		66.20574	
S827	05:57	08:09	08:12	09:18	13:54		67.40527	
S828	06:12	08:24	08:45	09:48	13:54		62.91511	
S831	05:51	12:12	12:12	19:24	13:54		54.18607	
S832	05:51	07:51	11:48	12:54	13:54		70.59914	
S833	05:48	10:06	13:00	18:24	13:54		52.6999	
S834	06:30	08:24	08:27	15:36	13:57		41.63792	
S836	06:36	08:33	08:33	09:57	13:57		47.35238	
S838	06:36	08:57	13:12	10:09	13:45	13:15	49.14774	46.35402
S839	06:15	12:54	13:12	18:39	13:45	13:15	47.91584	45.42627
S621	05:54	17:12	17:24	19:15	18:54	13:15	50.31641	42.02972
S622	05:57	17:33	17:42	19:03	18:54	13:15	53.3516	45.01502
S623	06:03	15:51	15:54	16:24	18:54	13:15	62.22096	53.34666
S624		13:15	13:18	19:12	14:24	13:15	52.73203	23.82728
S625	06:00	12:33	13:36	19:15	14:09	13:15	53.35671	46.32068
S626	06:12	11:36	13:15	20:36	13:48	13:15	51.15999	48.14109
S627	06:36	11:39	13:45	19:12	14:03	13:15	54.49966	50.39142
S628	06:18	11:33	13:03	19:09	13:36	13:15	55.49206	52.32767
S630	06:21	11:06	11:27	14:30	13:45	13:15	57.08951	54.14845
S1486	05:54	10:42	11:00	19:12	11:33	18:00	61.50368	62.85017
S1487	06:18	10:39	11:00	13:45	11:33	18:00	66.32581	69.01457
S1488	06:30	10:45	11:00		11:33	18:00	50.78395	54.15588
S1489	06:27	10:39	11:00	13:09	11:33	18:00	68.87935	74.65585
S1490	06:24	10:48	11:00	15:06	11:33	18:00	61.61856	68.00998
S1491	00:30	11:06	11:06		11:33	18:00	31.856	34.67972
S1492	06:33	11:18	11:27	20:00	11:33	18:00	59.83128	65.12229

S1493	06:36	11:33		13:57	11:33	18:00	64.85298	72.05076
S1494	06:36	11:33		14:09	11:33	18:00	63.85472	73.11925
S1495	06:33	11:00	11:00	13:54	11:33	18:00	65.29651	72.76185
S1496	08:33	11:06	11:15	14:39	11:33	18:00	61.2827	69.80998
S1498	06:18	10:54	11:00	14:15	11:33	18:00	63.2429	70.67027
S1502	05:45	11:33		13:48	11:33	18:00	63.93579	71.46039
S1503	07:33	11:24	11:24	14:00	11:33	18:00	64.34333	67.98912
S1504	07:39	11:45	13:06	11:45	14:18	18:00	80.06385	79.69613

I-35E (SB)


Speed at I-35E (SB)
TP9P0346, Southcross Dr, S905, 37.3
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TP9P0346, McAndrews Rd, S903, 35.8
TP9P0346, S of Co Rd 11, S902, 35.2
TP9P0346, Co Rd 11, S901, 34.8
TP9P0346, N of Co Rd 11, S900, 34.3
TP9P0346, S of T.H.77, S899, 33.3
TP9P0346, N of T.H.77, S898, 32.8
TP9P0346, S of Cliff Rd, S897, 32.3
TP9M0326, Cliff Rd, S896, 31.8
TP9M0326, Blackhawk Rd, S895, 31.3
TP9M0326, Diffley Rd, S894, 30.8
TP9M0326, S of Deerwood Dr, S893, 30.3
TP9M0326, N of Deerwood Dr, S892, 30.0
TP9M0326, S of Pilot Knob Rd, S891, 29.2
TP9M0326, Pilot Knob Rd, S890, 28.7
TP9M0326, Yankee Doodle Rd, S889, 28.2
TP9M0326, N of Yankee Doodle Rd, S888, 27.7
TP9M0326, Lone Oak Rd, S859, 27.2
TP9M0326, I-494, S858, 26.3
TP9M0326, Wagon Wheel Tr, S857, 25.3
TP9M0326, T.H.110, S856, 24.8
TP9M0326, T.H.13, S853, 23.4
TP9M0326, Shepard Rd, S852, 22.8
TP9M0326, Randolph Ave, S850, 21.7
TP9M0326, Victoria St, S848, 21.0
TP9M0326, St. Clair Ave, S847, 20.5
TP9F0250, Grand Ave, S846, 19.9
TP9F0250, Kellogg Blvd, S845, 19.3
TP9F0250, I-94, S644, 19.0
TP9F0250, Pennsylvania Ave, S642, 18.1
TP9F0250, Cayuga St, S641, 17.6
TP9F0250, Jerks Ave, S640, 17.2
TP9F0250, Maryland Ave, S639, 17.0
TP9F0250, Wheelock Pkwy, S638, 16.1
TP9F0250, Larpenteur Ave, S637, 15.8
TP9F0251, T.H.36, S634, 14.5
TP9F0251, Little Canada Rd, S633, 13.7
TP9B0147, N of Goose Lake Rd, S1548, 10.4
TP9B0147, S of Co Rd 96, S1547, 9.7
TP9B0147, Co Rd 96, S1546, 9.3
TP9B0147, N of Co Rd 96, S1545, 8.6
TP9B0147, Constellation Dr, S1544, 8.3
TP9B0147, Co Rd H2, S1543, 7.6
TP9B0147, N of Co Rd H2, S1542, 7.3
TP9B0147, S of Co Rd J, S1541, 6.7
TP9B0147, Co Rd J, S1540, 6.2
TP9B0147, N of Co Rd J, S1539, 5.6
TP9B0147, 64th St, S1538, 5.1
TP9B0147, Tart Lake Rd, S1537, 4.5
TP9B0147, S of Co Rd 14, S1536, 3.9
TP9B0147, Co Rd 14, S1535, 3.2
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TP9B0147, S of I-35W, S1531, 0.0
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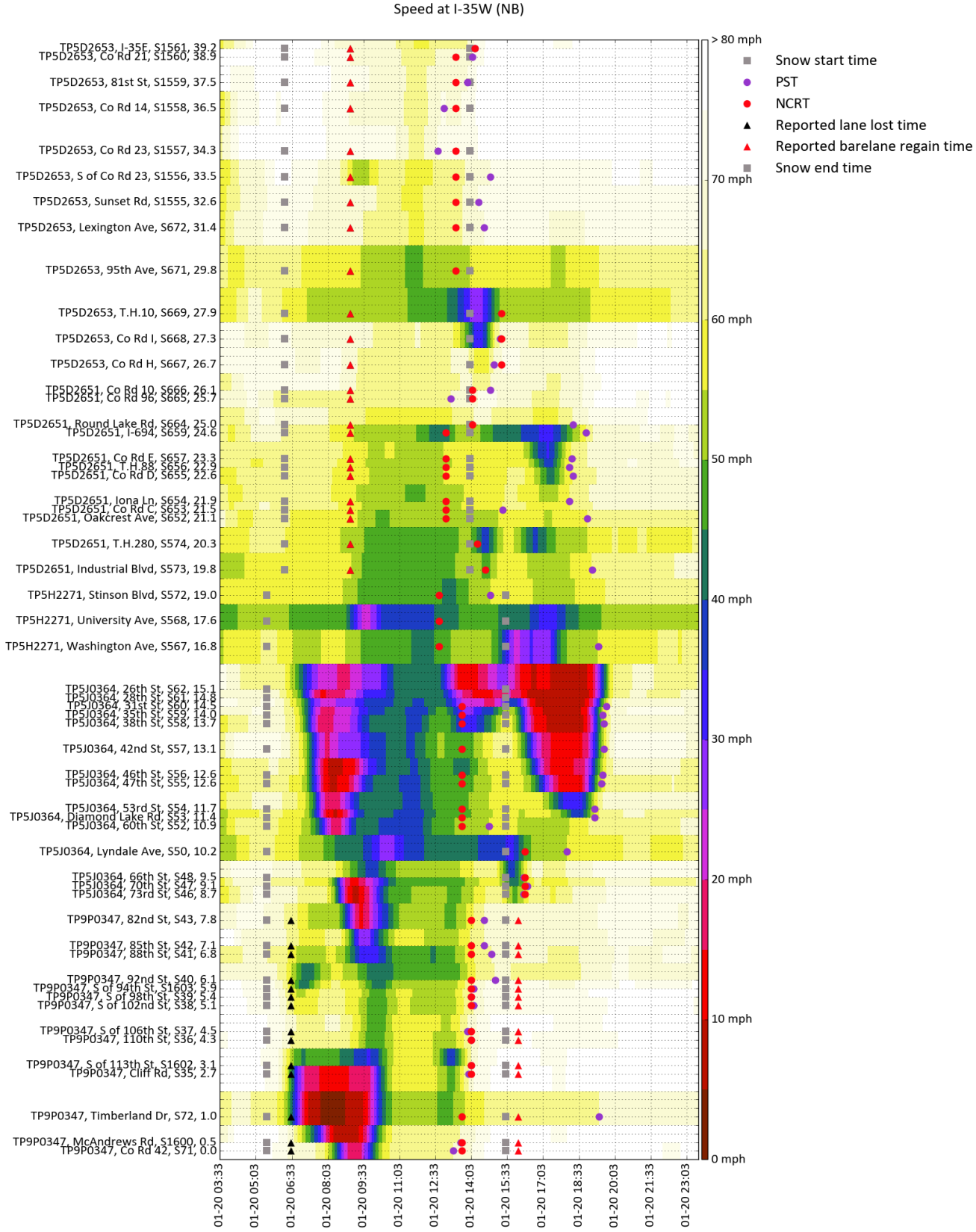
01-20 05:03
01-20 06:33
01-20 08:03
01-20 09:33
01-20 11:03
01-20 12:33
01-20 14:03
01-20 15:33
01-20 17:03
01-20 18:33
01-20 20:03
01-20 21:33
01-20 23:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1531		11:36	13:00	11:45	13:15	18:00	73.58559	79.76632
S1532		12:03	12:39	12:21	13:15	18:00	76.76599	81.98974
S1535		11:27	12:42		13:15	18:00	47.56678	49.86026
S1536	06:57	11:57	12:42	14:00	13:15	18:00	65.80803	70.35619
S1537	06:54	11:27		13:15	13:15	18:00	70.14345	77.09733
S1538		11:51		12:36	13:15	18:00	71.01396	76.82795
S1539	06:33	11:00	12:42	12:30	13:15	18:00	73.01339	76.27627
S1540	06:36	07:36	12:42	13:45	13:15	18:00	68.14753	72.16131
S1541	06:12	07:39		14:00	13:15	18:00	65.9997	71.74655
S1542	06:30	07:39	12:48	07:48	13:15	18:00	76.37999	81.69754
S1543	06:39	07:42	12:42		13:15	18:00	46.6714	50.23963
S1544	06:09	07:42	07:42	10:27	13:15	18:00	69.96077	76.79265
S1545	06:03	07:45	07:48	13:21	13:15	18:00	69.83815	75.6471
S1546	06:12	07:42	07:45	08:12	13:15	18:00	81.69815	88.30763
S1547	06:15	10:39	10:39	13:27	13:15	18:00	69.16775	75.70111
S1548	06:15	10:33	10:36	13:18	13:03	18:00	69.02817	73.91513
S633	06:18	08:18	08:39	13:45	13:27	13:15	57.24676	54.97418
S634	06:09	08:09	09:12	13:51	12:39	13:15	51.51544	55.01818
S637	06:06	08:06	08:18	19:03	13:36	13:15	53.56493	50.72404
S638	06:06	08:15	08:51	18:42	14:12	13:15	57.96236	45.27058
S639	06:00	13:15	13:21	18:45	14:24	13:15	57.02114	19.06577
S640	06:00	13:09	13:18	18:42	14:06	13:15	50.81049	21.25351
S641	05:57	13:09	13:12	18:54	14:06	13:15	50.33773	34.17417
S642	06:00	08:06	13:03	18:48	14:06	13:15	51.30599	42.32324
S644	06:09	11:12	11:27		14:06	13:15	48.44486	44.89477
S845	06:12	11:12	13:03	11:24	13:36	13:15	50.44359	49.25422
S846	06:15	08:24	13:27	08:24	14:00	13:15	53.92026	50.79706
S847	06:15	12:12	13:30	12:12	14:03		53.89218	
S850		13:12	13:30	18:06	14:03		48.21874	
S852	06:18	12:15	12:18	18:12	13:48		55.78882	
S853	06:24	10:48	10:51	13:42	13:48		56.31439	
S856	06:24	11:57	13:27	13:42	13:48		55.98298	
S857	06:30	12:06	13:36	12:33	13:48		58.42806	
S858	05:57	13:03	13:15	13:39	13:48		56.49772	
S859		11:45	13:30	15:12	14:03		62.17497	
S888		11:33	13:30		14:03		58.10185	
S889	06:48	11:48	13:30		14:03		57.46663	
S890		11:51	13:30		14:03		47.93274	
S891	05:45	12:45	13:30		14:03		54.91967	
S892	06:18	11:18	13:30		14:03		56.07489	
S893	06:45	11:15	13:30	19:06	14:03		62.83959	
S894	07:15	11:18	13:36	21:30	14:03		59.02615	
S895	08:21	12:24	13:33	17:54	14:03		62.09966	

S896	07:15	10:51	13:30	17:51	14:03		61.38118	
S897	05:51	16:09	16:09	20:09	17:39	16:00	63.10049	34.48513
S898	06:00	16:12	16:12	18:27	17:39	16:00	64.30923	25.04394
S899	05:57	16:12	16:12	19:06	17:39	16:00	60.4855	19.77885
S900	05:48	12:27	17:15	17:33	18:21	16:00	81.78348	70.46121
S901	05:00	12:18	17:00	18:18	18:21	16:00	70.45216	66.75982
S902		16:57	17:39	19:03	18:21	16:00	66.7838	66.1511
S903		10:51		10:51	18:21	16:00	71.96528	71.74317
S904		17:30	17:33	18:33	18:21	16:00	65.1047	70.41193
S905	05:51	17:18	17:24	19:27	18:21	16:00	56.24036	57.44182

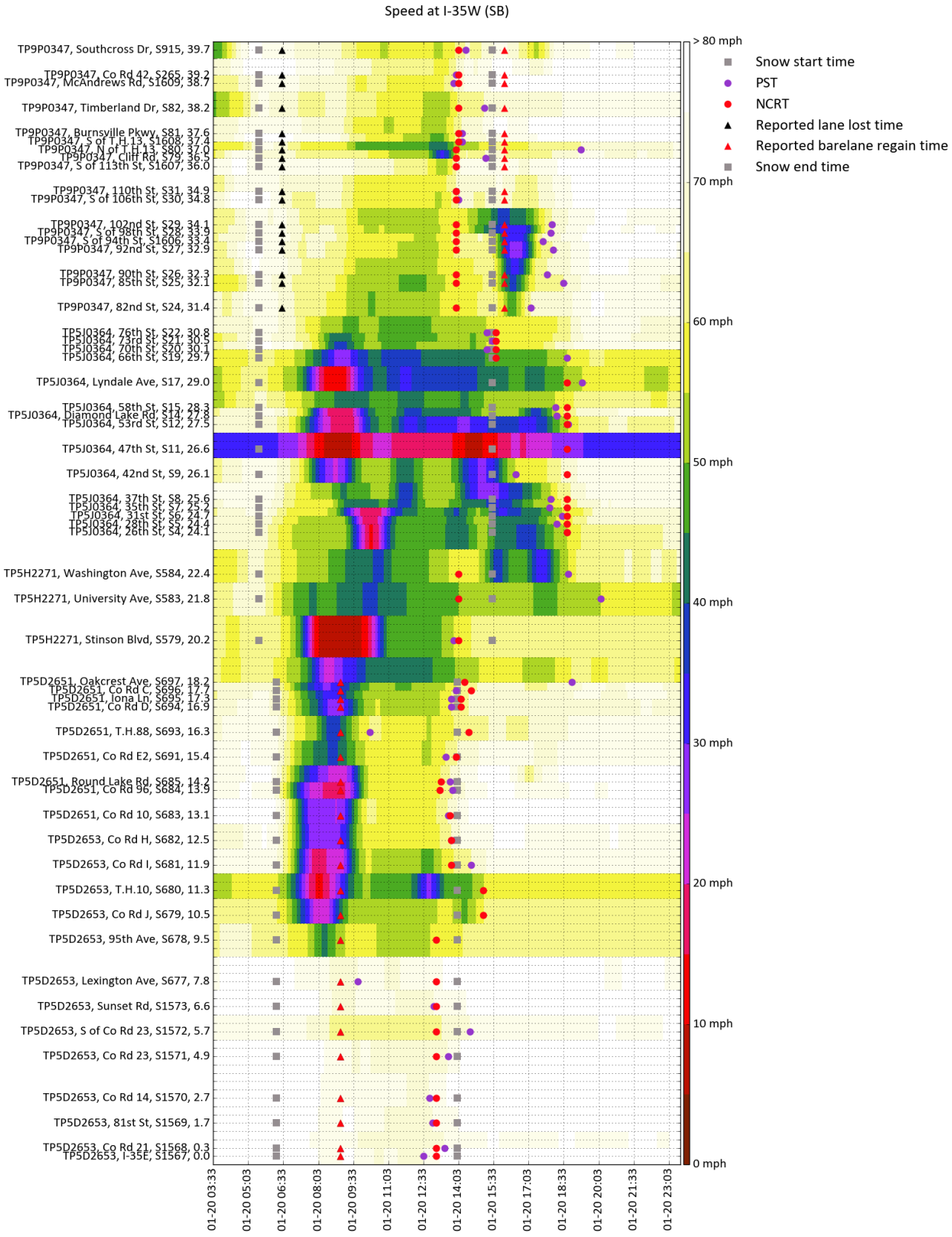
I-35W (NB)


Speed at I-35W (NB)
TP5D2653, I-35E, S1561, 39.2
TP5D2653, Co Rd 21, S1560, 38.9
TP5D2653, 81st St, S1559, 37.5
TP5D2653, Co Rd 14, S1558, 36.5
TP5D2653, Co Rd 23, S1557, 34.3
TP5D2653, S of Co Rd 23, S1556, 33.5
TP5D2653, Sunset Rd, S1555, 32.6
TP5D2653, Lexington Ave, S672, 31.4
TP5D2653, 95th Ave, S671, 29.8
TP5D2653, T.H.10, S669, 27.9
TP5D2653, Co Rd I, S668, 27.3
TP5D2653, Co Rd H, S667, 26.7
TP5D2651, Co Rd 10, S666, 26.1
TP5D2651, Co Rd 96, S665, 25.7
TP5D2651, Round Lake Rd, S664, 25.0
TP5D2651, I-694, S659, 24.6
TP5D2651, Co Rd E, S657, 23.3
TP5D2651, T.H.88, S656, 22.9
TP5D2651, Co Rd D, S655, 22.6
TP5D2651, Iona Ln, S654, 21.9
TP5D2651, Co Rd C, S653, 21.5
TP5D2651, Oakcrest Ave, S652, 21.1
TP5D2651, T.H.280, S574, 20.3
TP5D2651, Industrial Blvd, S573, 19.8
TP5H2271, Stinson Blvd, S572, 19.0
TP5H2271, University Ave, S568, 17.6
TP5H2271, Washington Ave, S567, 16.8
TP5J0364, 26th St, S62, 15.1
TP5J0364, 28th St, S61, 14.8
TP5J0364, 31st St, S60, 14.5
TP5J0364, 35th St, S59, 14.0
TP5J0364, 38th St, S58, 13.7
TP5J0364, 42nd St, S57, 13.1
TP5J0364, 46th St, S56, 12.6
TP5J0364, 47th St, S55, 12.6
TP5J0364, 53rd St, S54, 11.7
TP5J0364, Diamond Lake Rd, S53, 11.4
TP5J0364, 60th St, S52, 10.9
TP5J0364, Lyndale Ave, S50, 10.2
TP5J0364, 66th St, S48, 9.5
TP5J0364, 70th St, S47, 9.1
TP5J0364, 73rd St, S46, 8.7
TP9P0347, 82nd St, S43, 7.8
TP9P0347, 85th St, S42, 7.1
TP9P0347, 88th St, S41, 6.8
TP9P0347, 92nd St, S40, 6.1
TP9P0347, S of 94th St, S1603, 5.9
TP9P0347, S of 98th St, S39, 5.4
TP9P0347, S of 102nd St, S38, 5.1
TP9P0347, S of 106th St, S37, 4.5
TP9P0347, 110th St, S36, 4.3
TP9P0347, S of 113th St, S1602, 3.1
TP9P0347, Cliff Rd, S35, 2.7
TP9P0347, Timberland Dr, S72, 1.0
TP9P0347, McAndrews Rd, S1600, 0.5
TP9P0347, Co Rd 42, S71, 0.0
01-20 03:33
01-20 05:03
01-20 06:33
01-20 08:03
01-20 09:33
01-20 11:03
01-20 12:33
01-20 14:03
01-20 15:33
01-20 17:03
01-20 18:33
01-20 20:03
01-20 21:33
01-20 23:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S71	05:39	09:12	09:15	13:18	13:39	16:00	66.80157	79.86408
S1600	05:54	08:42	08:54	13:36	13:39	16:00	65.49934	78.65101
S72	05:51	08:15	09:06	19:24	13:39	16:00	54.01211	63.78899
S35	05:27	08:24	13:21	13:57	14:03	16:00	68.46762	78.3012
S1602	05:51	09:45	13:15	14:03	14:03	16:00	65.06514	77.27761
S36	05:48	10:00	13:00	14:03	14:03	16:00	65.25896	74.80122
S37	06:06	10:03	10:09	13:54	14:03	16:00	67.22	76.80783
S38	06:09	10:06	10:18	14:09	14:03	16:00	64.26141	71.36297
S39	06:12	10:09	10:09	14:03	14:03	16:00	65.18772	71.22421
S1603	06:09	10:12	10:12	14:09	14:03	16:00	64.07378	70.98439
S40	05:54	10:12	10:27	15:03	14:03	16:00	57.72195	64.53082
S41	05:54	09:42	09:42	14:54	14:03	16:00	58.68262	68.36688
S42	06:18	09:33	13:06	14:36	14:03	16:00	60.51968	68.17339
S43	05:42	09:27	09:27	14:36	14:03	16:00	58.77251	66.6597
S46	05:42	09:12	15:54	16:15	16:18		56.9231	
S47	05:33	09:09	15:51	16:24	16:18		53.07123	
S48	05:33	15:45	15:45	16:15	16:18		57.81503	
S50	05:36	10:33	15:36	18:03	16:18		46.55734	
S52	06:00	08:24	11:30	14:48	13:39		51.04306	
S53	06:42	08:21	08:21	19:12	13:39		47.23244	
S54	05:54	08:15	08:15	19:12	13:39		48.25233	
S55	06:03	08:15	11:27	19:30	13:39		47.05807	
S56	06:51	08:18	09:03	19:33	13:39		43.27497	
S57	06:03	08:00	09:09	19:36	13:39		46.89164	
S58	06:12	07:54		19:36	13:39		34.21772	
S59	05:36	07:57		19:33	13:39		30.23331	
S60	05:57	08:00		19:42	13:39		24.89164	
S61	05:51							
S62	06:03							
S567	06:03	12:00	12:12	19:21	12:42		46.93588	
S568	06:42	09:39	09:39		12:42		41.08088	
S572	06:03	12:27	12:27	14:51	12:42		45.08808	
S573	08:51	10:15	14:36	19:06	14:39	09:00	49.15686	55.37653
S574	06:06	14:18			14:18	09:00	43.92021	53.22443
S652	06:15	10:15	12:30	18:54	13:00	09:00	51.876	56.1229
S653	05:42	11:30	12:36	15:21	13:00	09:00	53.0318	56.7283
S654	06:33	11:39	12:39	18:09	13:00	09:00	51.47353	56.08737
S655		11:27	12:39	18:18	13:00	09:00	55.12796	56.26444
S656	08:36	11:33	12:42	18:09	13:00	09:00	54.5602	56.74925
S657		11:39	12:39	18:15	13:00	09:00	55.07622	58.6183
S659		12:45	12:48	18:51	13:00	09:00	43.07439	55.46265
S664		10:06	13:27	18:18	14:06	09:00	64.85923	62.3715
S665		12:06	13:33	13:12	14:06	09:00	68.13035	63.01695

S666	08:24	10:00		14:51	14:06	09:00	64.94439	66.39237
S667	07:00	14:30	14:30	15:00	15:18	09:00	69.69502	66.73476
S668		14:21	14:24	15:15	15:18	09:00	66.47444	66.96497
S669	05:12	14:15	14:27		15:18	09:00	51.11753	52.94178
S671	06:42	11:36	13:00		13:24	09:00	51.39286	56.41405
S672	07:09	11:45	12:57	14:36	13:24	09:00	63.53029	67.81972
S1555	07:15	11:36	13:21	14:21	13:24	09:00	63.15652	67.07315
S1556	06:54	09:24	09:33	14:51	13:24	09:00	62.66371	56.59143
S1557	06:42	11:45	12:06	12:39	13:24	09:00	70.40331	71.77658
S1558	07:21	11:45	12:03	12:54	13:24	09:00	69.46115	69.68273
S1559	07:15	11:45	11:51	13:54	13:24	09:00	67.06967	70.9995
S1560	07:15	11:48		14:06	13:24	09:00	66.25986	69.92589
S1561	07:33	11:57	13:36	14:12	14:12	09:00	70.49121	68.23703

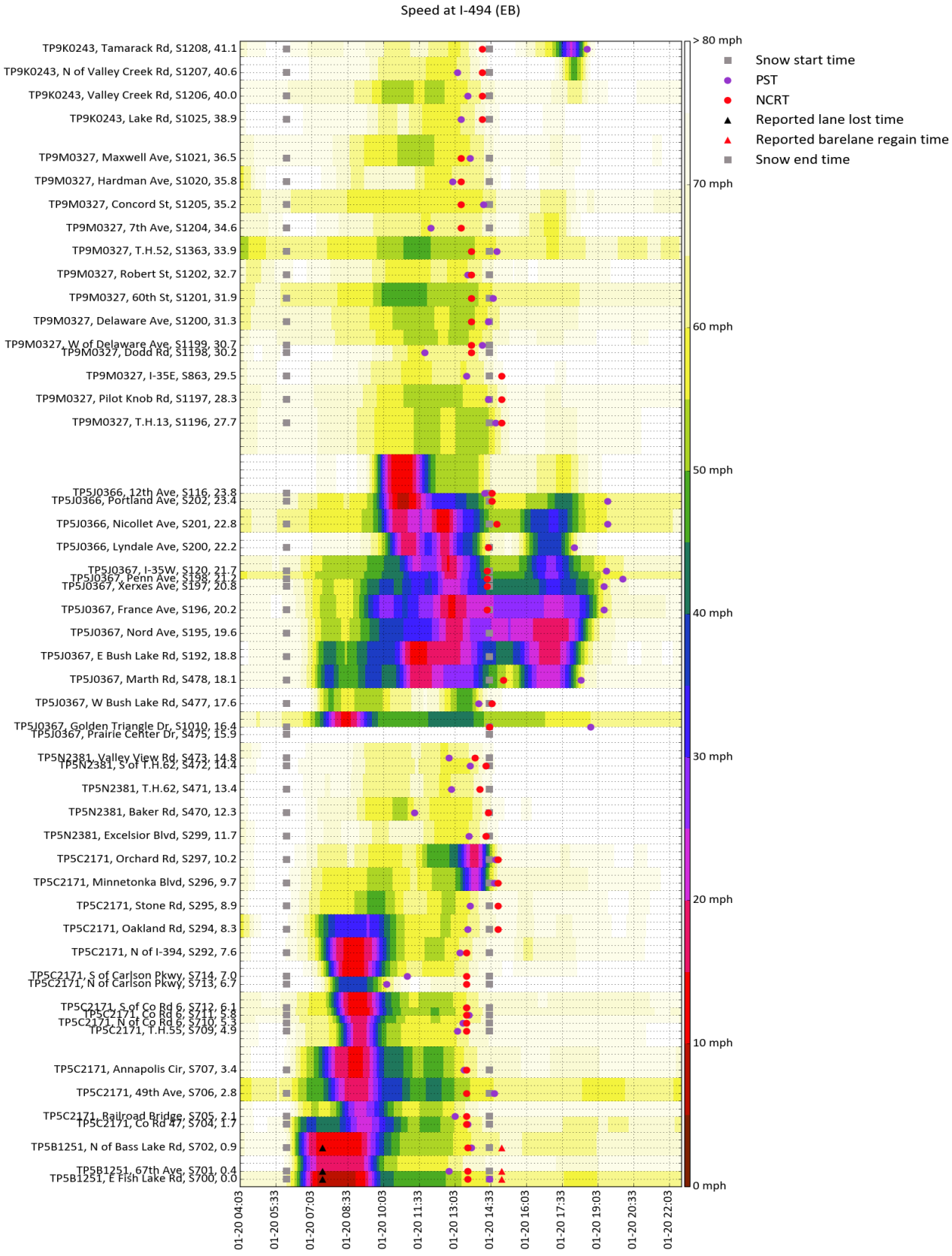
I-35W (SB)


Speed at I-35W (SB)
TP9P0347, Southcross Dr, S915, 39.7
TP9P0347, Co Rd 42, S265, 39.2
TP9P0347, McAndrews Rd, S1609, 38.7
TP9P0347, Timberland Dr, S82, 38.2
TP9P0347, Burnsville Pkwy, S81, 37.6
TP9P0347, S of T.H.13, S1608, 37.4
TP9P0347, N of T.H.13, S80, 37.0
TP9P0347, Cliff Rd, S79, 36.5
TP9P0347, S of 113th St, S1607, 36.0
TP9P0347, 110th St, S31, 34.9
TP9P0347, S of 106th St, S30, 34.8
TP9P0347, 102nd St, S29, 34.1
TP9P0347, S of 98th St, S28, 33.9
TP9P0347, S of 94th St, S1606, 33.4
TP9P0347, 92nd St, S27, 32.9
TP9P0347, 90th St, S26, 32.3
TP9P0347, 85th St, S25, 32.1
TP9P0347, 82nd St, S24, 31.4
TP5J0364, 76th St, S22, 30.8
TP5J0364, 73rd St, S21, 30.5
TP5J0364, 70th St, S20, 30.1
TP5J0364, 66th St, S19, 29.7
TP5J0364, Lyndale Ave, S17, 29.0
TP5J0364, 58th St, S15, 28.3
TP5J0364, Diamond Lake Rd, S14, 27.8
TP5J0364, 53rd St, S12, 27.5
TP5J0364, 47th St, S11, 26.6
TP5J0364, 42nd St, S9, 26.1
TP5J0364, 37th St, S8, 25.6
TP5J0364, 35th St, S7, 25.2
TP5J0364, 31st St, S6, 24.7
TP5J0364, 28th St, S5, 24.4
TP5J0364, 26th St, S4, 24.1
TP5H2271, Washington Ave, S584, 22.4
TP5H2271, University Ave, S583, 21.8
TP5H2271, Stinson Blvd, S579, 20.2
TP5D2651, Oakcrest Ave, S697, 18.2
TP5D2651, Co Rd C, S696, 17.7
TP5D2651, Iona Ln, S695, 17.3
TP5D2651, Co Rd D, S694, 16.9
TP5D2651, T.H.88, S693, 16.3
TP5D2651, Co Rd E2, S691, 15.4
TP5D2651, Round Lake Rd, S685, 14.2
TP5D2651, Co Rd 96, S684, 13.9
TP5D2651, Co Rd 10, S683, 13.1
TP5D2653, Co Rd H, S682, 12.5
TP5D2653, Co Rd I, S681, 11.9
TP5D2653, T.H.10, S680, 11.3
TP5D2653, Co Rd J, S679, 10.5
TP5D2653, 95th Ave, S678, 9.5
TP5D2653, Lexington Ave, S677, 7.8
TP5D2653, Sunset Rd, S1573, 6.6
TP5D2653, S of Co Rd 23, S1572, 5.7
TP5D2653, Co Rd 23, S1571, 4.9
TP5D2653, Co Rd 14, S1570, 2.7
TP5D2653, 81st St, S1569, 1.7
TP5D2653, Co Rd 21, S1568, 0.3
TP5D2653, I-35E, S1567, 0.0
01-20 03:33
01-20 05:03
01-20 06:33
01-20 08:03
01-20 09:33
01-20 11:03
01-20 12:33
01-20 14:03
01-20 15:33
01-20 17:03
01-20 18:33
01-20 20:03
01-20 21:33
01-20 23:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1567	07:30	11:57	12:36	12:33	13:06	09:00	74.238	74.68617
S1568		11:30	12:48	13:27	13:06	09:00	68.93312	71.46325
S1569	07:39	12:27	12:42	12:57	13:06	09:00	71.63986	74.76724
S1570	07:42	12:18	12:33	12:48	13:06	09:00	73.21924	71.84292
S1571		12:12	12:33	13:36	13:06	09:00	69.80218	71.3858
S1572	07:30	11:45	12:33	14:33	13:06	09:00	64.22781	62.0306
S1573		12:27	12:45	13:00	13:06	09:00	70.87985	68.48018
S677	06:36	08:54	12:30	09:45	13:06	09:00	73.91436	68.75421
S678	06:30	08:18	08:27		13:06	09:00	56.83829	53.39
S679	06:09	08:12	08:12		15:06	09:00	59.71262	42.24537
S680	06:15	08:03	12:51		15:06	09:00	54.80226	30.85645
S681	06:03	08:03	12:51	14:36	13:45	09:00	59.49734	22.92569
S682	06:06	07:57	08:57	13:45	13:45	09:00	65.36822	30.04473
S683	06:03	08:48	08:51	13:36	13:42	09:00	66.41054	26.61368
S684	06:03	08:51	08:51	13:48	13:15	09:00	60.33619	18.64348
S685	06:03	08:54	08:54	13:42	13:18	09:00	60.41481	21.78912
S691	06:06	08:39	08:39	13:30	13:57	09:00	64.79575	41.29261
S693	06:12	08:39	08:39	10:15	14:30	09:00	62.24981	40.33149
S694	06:06	08:45	08:45	13:45	14:09	09:00	63.19632	27.77152
S695	06:12	08:33	08:33	13:45	14:09	09:00	63.57743	36.02156
S696	06:09	08:24	08:39	13:57	14:36	09:00	64.34595	35.67067
S697	06:03	08:30	08:42	18:54	14:18	09:00	52.34083	28.8877
S579	06:12	08:21	10:00	13:51	14:03		57.12404	
S583	05:45	10:18	11:33	20:09	14:03		50.04919	
S584	06:03	10:36	10:42	18:45	14:03		58.29311	
S4	05:54	10:18	17:09	18:42	18:42		55.03674	
S5	06:00	10:15	17:15	18:15	18:42		58.25064	
S6	06:00	10:18	16:36	18:30	18:42		55.44976	
S7	06:06	15:42	16:03	17:57	18:42		61.98735	
S8	06:09	15:24	15:36	18:00	18:42		63.95427	
S9	06:27	08:48	15:06	16:30	18:42		67.08979	
S11	06:57	08:51			18:42		28.53859	
S12	06:09	09:15	17:24	18:45	18:42		54.55913	
S14	06:27	09:06	17:21	18:15	18:42		61.83073	
S15	06:27	09:30	11:42	18:12	18:42		58.4068	
S17	05:51	08:51	09:06	19:21	18:42		51.22359	
S19	06:30	09:03	09:06	18:42	15:39		45.58539	
S20	06:42	09:00	09:06	15:15	15:39		56.16178	
S21	06:42	08:54	09:03	15:30	15:39		55.18653	
S22	06:42	11:18	14:39	15:15	15:39		56.60105	
S24	06:06	10:21	12:39	17:09	13:57	16:00	59.37944	53.69265
S25	06:36	12:03	12:57	18:33	13:57	16:00	57.62919	46.15462

S26	05:33	12:21	13:09	17:51	13:57	16:00	59.62923	43.7532
S27	05:27	12:27	13:00	18:06	13:57	16:00	60.74525	37.9666
S1606	06:36	12:39	13:06	17:39	13:57	16:00	62.11332	37.31151
S28	06:30	12:24	13:24	18:00	13:57	16:00	59.71103	33.1781
S29	05:30	12:39	13:24	18:03	13:57	16:00	59.22484	38.57503
S30	05:00	13:12	13:21	14:03	13:57	16:00	64.24632	66.7801
S31	05:45	11:57	13:21	13:57	13:57	16:00	65.26278	69.62108
S1607		13:21	13:27	13:57	13:57	16:00	65.76808	73.93631
S79		13:21	13:24	15:12	13:57	16:00	56.01407	66.02764
S80	06:03	13:15	13:21	19:18	13:57	16:00	52.08629	60.24691
S1608	06:57	13:09	13:15	14:12	14:03	16:00	63.67152	72.89732
S81	07:03	13:03	13:15	14:12	14:03	16:00	63.69711	75.65969
S82	06:54	13:15	13:27	15:09	14:03	16:00	60.9291	68.03571
S1609	06:00	12:48	13:00	13:51	14:03	16:00	67.99147	78.9715
S265	06:48	13:21	13:30	13:57	14:03	16:00	67.23873	76.46086
S915	05:51	10:51	13:30	14:21	14:03	16:00	62.75425	71.02795

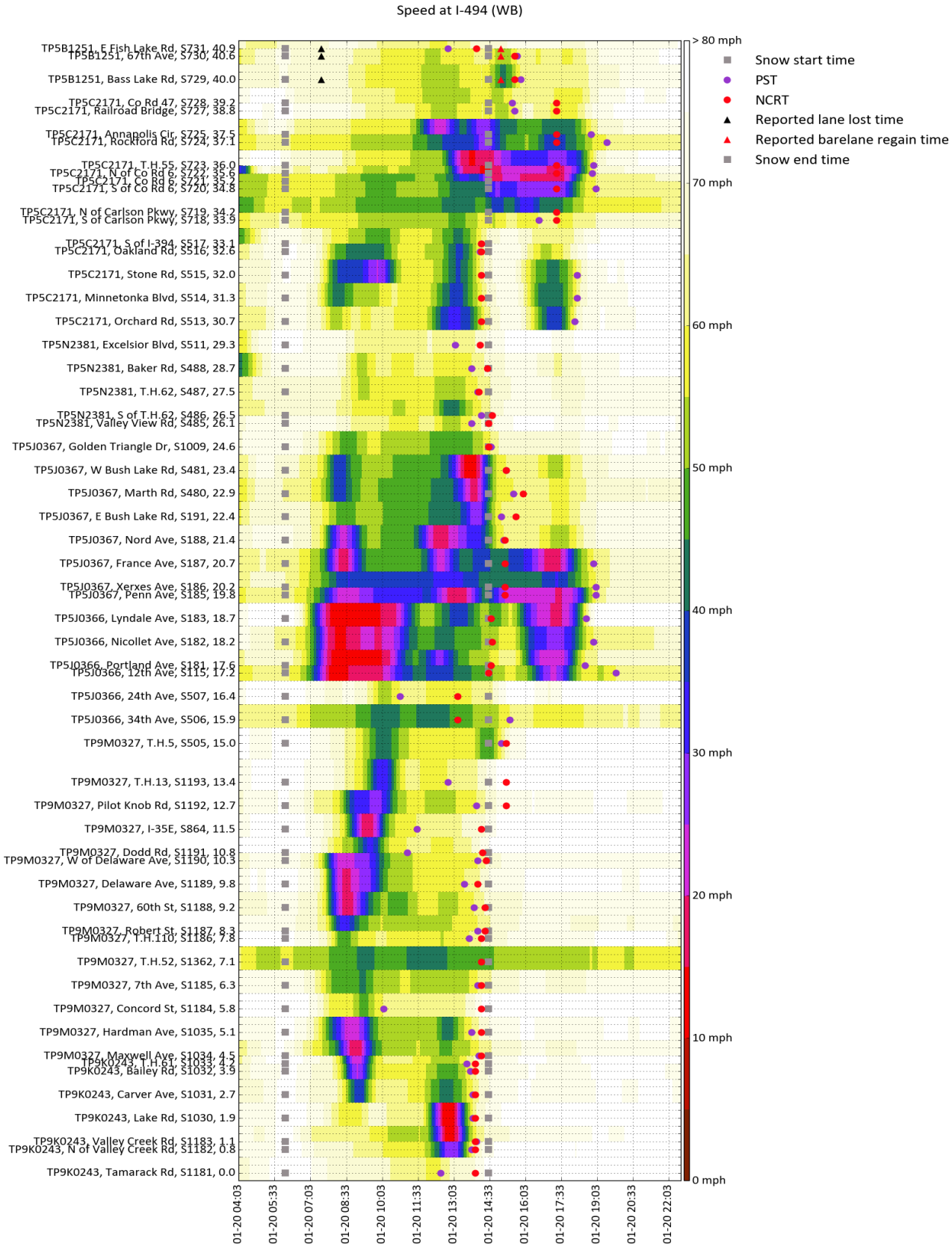
I-494 (EB)


Speed at I-494 (EB)
TP9K0243, Tamarack Rd, S1208, 41.1
TP9K0243, N of Valley Creek Rd, S1207, 40.6
TP9K0243, Valley Creek Rd, S1206, 40.0
TP9K0243, Lake Rd, S1025, 38.9
TP9M0327, Maxwell Ave, S1021, 36.5
TP9M0327, Hardman Ave, S1020, 35.8
TP9M0327, Concord St, S1205, 35.2
TP9M0327, 7th Ave, S1204, 34.6
TP9M0327, T.H.52, S1363, 33.9
TP9M0327, Robert St, S1202, 32.7
TP9M0327, 60th St, S1201, 31.9
TP9M0327, Delaware Ave, S1200, 31.3
TP9M0327, W of Delaware Ave, S1199, 30.7
TP9M0327, Dodd Rd, S1198, 30.2
TP9M0327, I-35E, S863, 29.5
TP9M0327, Pilot Knob Rd, S1197, 28.3
TP9M0327, T.H.13, S1196, 27.7
TP5J0366, 12th Ave, S116, 23.8
TP5J0366, Portland Ave, S202, 23.4
TP5J0366, Nicollet Ave, S201, 22.8
TP5J0366, Lyndale Ave, S200, 22.2
TP5J0367, I-35W, S120, 21.7
TP5J0367, Penn Ave, S198, 21.2
TP5J0367, Xerxes Ave, S197, 20.8
TP5J0367, France Ave, S196, 20.2
TP5J0367, Nord Ave, S195, 19.6
TP5J0367, E Bush Lake Rd, S192, 18.8
TP5J0367, Marth Rd, S478, 18.1
TP5J0367, W Bush Lake Rd, S477, 17.6
TP5J0367, Golden Triangle Dr, S1010, 16.4
TP5J0367, Prairie Center Dr, S475, 15.9
TP5N2381, Valley View Rd, S473, 14.8
TP5N2381, S of T.H.62, S472, 14.4
TP5N2381, T.H.62, S471, 13.4
TP5N2381, Baker Rd, S470, 12.3
TP5N2381, Excelsior Blvd, S299, 11.7
TP5C2171, Orchard Rd, S297, 10.2
TP5C2171, Minnetonka Blvd, S296, 9.7
TP5C2171, Stone Rd, S295, 8.9
TP5C2171, Oakland Rd, S294, 8.3
TP5C2171, N of I-394, S292, 7.6
TP5C2171, S of Carlson Pkwy, S714, 7.0
TP5C2171, N of Carlson Pkwy, S713, 6.7
TP5C2171, S of Co Rd 6, S712, 6.1
TP5C2171, Co Rd 6, S711, 5.8
TP5C2171, N of Co Rd 6, S710, 5.3
TP5C2171, T.H.55, S709, 4.9
TP5C2171, Annapolis Cir, S707, 3.4
TP5C2171, 49th Ave, S706, 2.8
TP5C2171, Railroad Bridge, S705, 2.1
TP5C2171, Co Rd 47, S704, 1.7
TP5B1251, N of Bass Lake Rd, S702, 0.9
TP5B1251, 67th Ave, S701, 0.4
TP5B1251, E Fish Lake Rd, S700, 0.0
01-20 04:03
01-20 05:33
01-20 07:03
01-20 08:33
01-20 10:03
01-20 11:33
01-20 13:03
01-20 14:33
01-20 16:03
01-20 17:33
01-20 19:03
01-20 20:33
01-20 22:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S700	06:00	07:51	09:12	14:30	13:36	15:00	56.80012	62.83591
S701	05:57	08:09	09:12	12:48	13:36	15:00	66.51147	73.24293
S702	05:57	08:36	09:03	13:45	13:36	15:00	59.15401	65.34628
S704	05:51	09:15	09:42	13:36	13:33		59.68361	
S705	06:00	09:03	09:39	13:03	13:33		65.89468	
S706	06:03	08:54	09:00	14:42	13:33		54.17866	
S707	05:51	08:57	09:00	13:27	13:33		61.23885	
S709	06:00	09:03	09:03	13:09	13:33		64.29159	
S710	06:00	09:00	09:00	13:24	13:33		61.72126	
S711	06:12	09:00	09:09	13:39	13:33		59.4226	
S712	06:15	08:57	09:09	13:33	13:33		60.49697	
S713	06:39	08:39	13:30	10:12	13:33		69.69276	
S714	06:18	08:45	09:03	11:03	13:33		63.98809	
S292	05:54	08:51	08:57	13:15	13:33		62.38693	
S294	06:00	09:24	09:33	13:36	14:51		70.68613	
S295	06:03	09:45	13:27	13:42	14:51		70.93736	
S296	06:09	13:54	13:54	14:42	14:51		66.17578	
S297	06:15	13:51	13:51	14:45	14:51		65.7711	
S299	06:45	12:48	13:36	13:39	14:21		68.72939	
S470	06:45	10:48	10:51	11:21	14:27		68.62085	
S471	06:45	12:36	13:33	12:54	14:06		68.80384	
S472	06:45	13:12	13:33	13:42	14:21		70.01483	
S473	06:54	12:36	13:21	12:48	13:54		67.07585	
S475								
S1010	06:30	08:27	08:27	18:45	14:30		51.73145	
S477	06:33	13:27	13:33	14:03	14:36		71.80351	
S478	06:24	11:33	11:45	18:21	15:06		54.18412	
S192	06:27							
S195	06:27							
S196	06:09	12:57		19:18	14:24		24.41033	
S197	06:18	12:54	12:54	19:18	14:24		40.29894	
S198	06:33	12:51	12:51	20:06	14:24		45.12924	
S120	06:15	12:45	12:45	19:24	14:24		48.23272	
S200	06:42	11:06	12:36	18:03	14:27		63.34527	
S201	06:39	12:33	12:33	19:27	14:48		52.6391	
S202		10:51	10:51	19:27	14:36		54.51539	
S116	06:36	10:45	10:45	14:18	14:36		66.09539	
S1196	08:18	11:57	14:15	14:45	15:00		65.61098	
S1197	07:27	11:45	14:15	14:27	15:00		67.38641	
S863	06:51	11:21	13:30	13:33	15:00		73.78131	
S1198	06:42	11:27	13:12	11:48	13:45		62.71609	
S1199	07:39	11:36	13:12	14:12	13:45		55.93726	

S1200	07:45	11:18	13:12	14:27	13:45		54.3337	
S1201		10:39	13:12	14:39	13:45		53.77094	
S1202	07:03	11:12	13:12	13:36	13:45		61.3644	
S1363	07:42	11:36	13:12	14:48	13:45		54.43498	
S1204	07:36	11:48	13:06	12:03	13:18		61.58688	
S1205	06:06	11:54	13:15	14:15	13:18		58.33058	
S1020	07:27	12:15	12:45	12:57	13:18		60.63413	
S1021	08:06	11:30	12:45	13:42	13:18		59.17358	
S1025	06:12	12:24	13:09	13:18	14:12		68.49386	
S1206	06:12	10:24	13:03	13:36	14:12		65.72219	
S1207	06:12	12:45	13:09	13:09	14:12		72.12916	
S1208	06:27	13:03	13:15	18:36	14:12		73.89431	

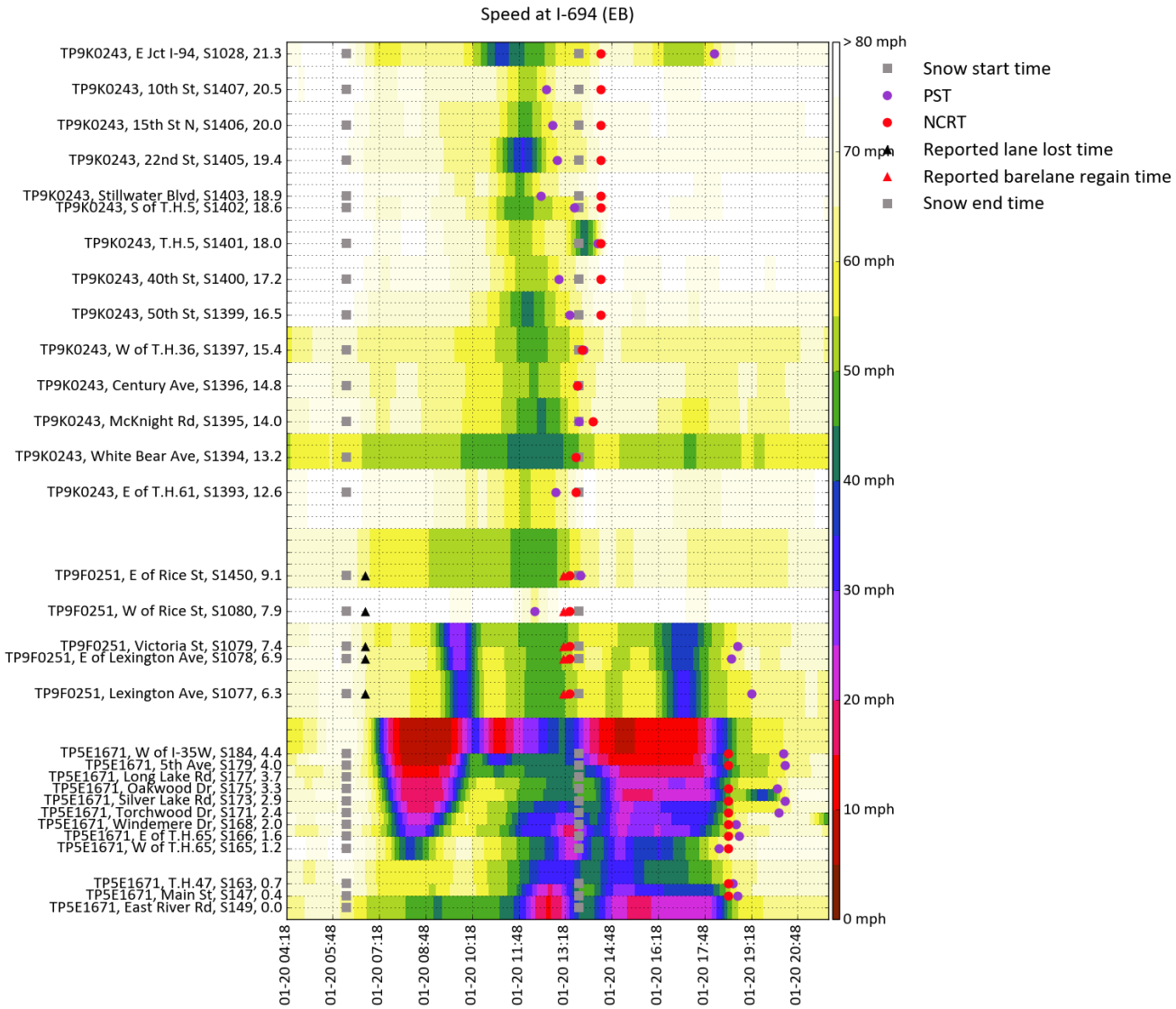
I-494 (WB)


Speed at I-494 (WB)
TP5B1251, E Fish Lake Rd, S731, 40.9
TP5B1251, 67th Ave, S730, 40.6
TP5B1251, Bass Lake Rd, S729, 40.0
TP5C2171, Co Rd 47, S728, 39.2
TP5C2171, Railroad Bridge, S727, 38.8
TP5C2171, Annapolis Cir, S725, 37.5
TP5C2171, Rockford Rd, S724, 37.1
TP5C2171, T.H.55, S723, 36.0
TP5C2171, N of Co Rd 6, S722, 35.6
TP5C2171, Co Rd 6, S721, 35.2
TP5C2171, S of Co Rd 6, S720, 34.8
TP5C2171, N of Carlson Pkwy, S719, 34.2
TP5C2171, S of Carlson Pkwy, S718, 33.9
TP5C2171, S of I-394, S517, 33.1
TP5C2171, Oakland Rd, S516, 32.6
TP5C2171, Stone Rd, S515, 32.0
TP5C2171, Minnetonka Blvd, S514, 31.3
TP5C2171, Orchard Rd, S513, 30.7
TP5N2381, Excelsior Blvd, S511, 29.3
TP5N2381, Baker Rd, S488, 28.7
TP5N2381, T.H.62, S487, 27.5
TP5N2381, S of T.H.62, S486, 26.5
TP5N2381, Valley View Rd, S485, 26.1
TP5J0367, Golden Triangle Dr, S1009, 24.6
TP5J0367, W Bush Lake Rd, S481, 23.4
TP5J0367, Marth Rd, S480, 22.9
TP5J0367, E Bush Lake Rd, S191, 22.4
TP5J0367, Nord Ave, S188, 21.4
TP5J0367, France Ave, S187, 20.7
TP5J0367, Xerxes Ave, S186, 20.2
TP5J0367, Penn Ave, S185, 19.8
TP5J0366, Lyndale Ave, S183, 18.7
TP5J0366, Nicollet Ave, S182, 18.2
TP5J0366, Portland Ave, S181, 17.6
TP5J0366, 12th Ave, S115, 17.2
TP5J0366, 24th Ave, S507, 16.4
TP5J0366, 34th Ave, S506, 15.9
TP9M0327, T.H.5, S505, 15.0
TP9M0327, T.H.13, S1193, 13.4
TP9M0327, Pilot Knob Rd, S1192, 12.7
TP9M0327, I-35E, S864, 11.5
TP9M0327, Dodd Rd, S1191, 10.8
TP9M0327, W of Delaware Ave, S1190, 10.3
TP9M0327, Delaware Ave, S1189, 9.8
TP9M0327, 60th St, S1188, 9.2
TP9M0327, Robert St, S1187, 8.3
TP9M0327, T.H.110, S1186, 7.8
TP9M0327, T.H.52, S1362, 7.1
TP9M0327, 7th Ave, S1185, 6.3
TP9M0327, Concord St, S1184, 5.8
TP9M0327, Hardman Ave, S1035, 5.1
TP9M0327, Maxwell Ave, S1034, 4.5
TP9K0243, T.H.61, S1033, 4.2
TP9K0243, Bailey Rd, S1032, 3.9
TP9K0243, Carver Ave, S1031, 2.7
TP9K0243, Lake Rd, S1030, 1.9
TP9K0243, Valley Creek Rd, S1183, 1.1
TP9K0243, N of Valley Creek Rd, S1182, 0.8
TP9K0243, Tamarack Rd, S1181, 0.0
01-20 04:03
01-20 05:33
01-20 07:03
01-20 08:33
01-20 10:03
01-20 11:33
01-20 13:03
01-20 14:33
01-20 16:03
01-20 17:33
01-20 19:03
01-20 20:33
01-20 22:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1181	06:42	12:12	13:33	12:30	13:57		70.23161	
S1182	06:33	12:57	13:03	13:48	13:57		65.07526	
S1183	06:15	12:54	12:57	14:00	13:57		59.53393	
S1030	06:48	12:48	12:57	13:51	13:57		63.9009	
S1031	06:30	09:03	12:51	13:51	13:57		62.84232	
S1032	06:36	09:00	13:12	13:45	13:57		64.68551	
S1033	06:39	09:00	13:15	13:36	13:57		65.9211	
S1034	06:03	08:54	08:54	14:06	14:12		61.12973	
S1035	06:18	08:48	12:45	13:48	14:12		66.48557	
S1184	06:18	09:15	09:15	10:06	14:12		74.98786	
S1185	06:42	09:15	09:15	14:03	14:12		62.35857	
S1362	07:42	09:21	14:09		14:12		47.41737	
S1186	06:33	08:27	13:30	13:42	14:12		65.1842	
S1187	06:18	08:27	08:27	14:03	14:21		62.93238	
S1188	06:36	08:33	10:42	13:54	14:21		65.33976	
S1189	06:27	08:33	08:39	13:30	14:03		63.80804	
S1190	06:36	08:30	08:30	14:03	14:24		65.36337	
S1191	06:24	09:33	09:39	11:06	14:15		71.58767	
S864	05:57	09:27	09:33	11:30	14:12		68.78663	
S1192	06:36	09:48	09:54	14:00	15:15		72.08739	
S1193	06:42	10:03	10:06	12:48	15:15		77.63029	
S505	06:54	10:06	14:27	15:03	15:15		67.25976	
S506	06:33	10:06		15:24	13:12		45.70714	
S507	06:09	10:09	10:21	10:48	13:12		58.26823	
S115	06:18	08:09	09:27	19:51	14:30		48.00836	
S181	06:18	08:30	12:27	18:33	14:36		55.6008	
S182	06:09	08:18	10:03	18:54	14:39		52.03778	
S183	06:06	08:42	13:39	18:36	14:36		49.16706	
S185	06:24	13:09		19:00	15:12		24.91553	
S186	06:18	12:42	13:00	19:00	15:12		41.70561	
S187	06:21	08:24	14:15	18:54	15:12		41.89871	
S188	06:24	12:27	12:30	15:09	15:12		60.54714	
S191	06:42	14:00	14:03	15:03	15:39		62.0123	
S480	06:42	13:54	13:54	15:33	15:57		61.30213	
S481	05:51	13:45	13:45	15:15	15:15		60.07762	
S1009	06:42	08:36	13:36	14:36	14:30		58.6308	
S485	08:03	12:57	13:00	13:48	14:30		68.17788	
S486	08:03	12:57	12:57	14:12	14:39		65.87313	
S487	08:09	12:54	13:03	14:03	14:06		60.58114	
S488	08:12	09:09	13:39	13:48	14:27		66.03058	
S511	08:06	13:06	13:39	13:06	14:09		67.43178	
S513	06:33	13:03	13:24	18:06	14:12		55.35036	

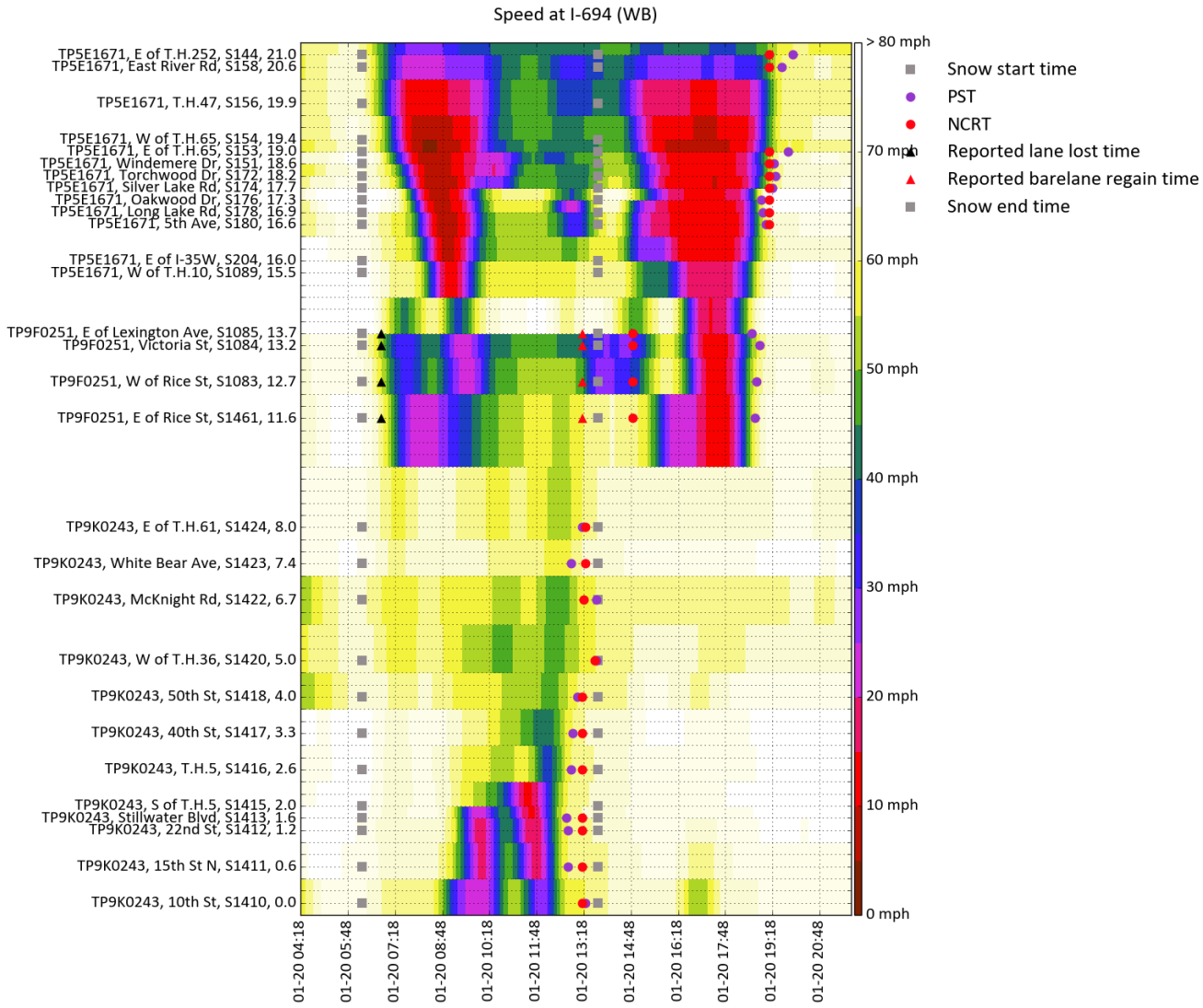
S514	06:45	13:09	13:09	18:12	14:12		59.74671	
S515	07:00	09:51	13:12	18:12	14:12		61.6094	
S516	07:12	13:15	13:15	14:09	14:12		62.07548	
S517	06:21	13:12	13:12	14:12	14:12		60.72666	
S718	06:15	13:12	13:18	16:36	17:21		60.03295	
S719	07:39	16:06	16:06		17:21		44.59074	
S720	07:45	16:12		19:00	17:21		26.64253	
S721	07:57							
S722	06:03	14:24		18:51	17:21		18.89119	
S723	05:51	13:48		18:54	17:21		28.24241	
S724	06:00	14:21	17:15	19:27	17:21		36.82695	
S725	05:54	12:27	17:09	18:48	17:21		40.7489	
S727	06:09	15:03		15:36	17:21		58.19313	
S728	06:00	12:51	14:51	15:30	17:21		59.06171	
S729	06:54	15:06	15:06	15:51	15:36	15:00	54.56228	44.80564
S730	06:15	15:06	15:06	15:42	15:36	15:00	58.5055	51.42503
S731	09:00	12:24	13:27	12:48	14:00	15:00	66.07025	68.37361

I-694 (EB)


Speed at I-694 (EB)
TP9K0243, E Jct I-94, S1028, 21.3
TP9K0243, 10th St, S1407, 20.5
TP9K0243, 15th St N, S1406, 20.0
TP9K0243, 22nd St, S1405, 19.4
TP9K0243, Stillwater Blvd, S1403, 18.9
TP9K0243, S of T.H.5, S1402, 18.6
TP9K0243, T.H.5, S1401, 18.0
TP9K0243, 40th St, S1400, 17.2
TP9K0243, 50th St, S1399, 16.5
TP9K0243, W of T.H.36, S1397, 15.4
TP9K0243, Century Ave, S1396, 14.8
TP9K0243, McKnight Rd, S1395, 14.0
TP9K0243, White Bear Ave, S1394, 13.2
TP9K0243, E of T.H.61, S1393, 12.6
TP9F0251, E of Rice St, S1450, 9.1
TP9F0251, W of Rice St, S1080, 7.9
TP9F0251, Victoria St, S1079, 7.4
TP9F0251, E of Lexington Ave, S1078, 6.9
TP9F0251, Lexington Ave, S1077, 6.3
TP5E1671, W of I-35W, S184, 4.4
TP5E1671, 5th Ave, S179, 4.0
TP5E1671, Long Lake Rd, S177, 3.7
TP5E1671, Oakwood Dr, S175, 3.3
TP5E1671, Silver Lake Rd, S173, 2.9
TP5E1671, Torchwood Dr, S171, 2.4
TP5E1671, Windemere Dr, S168, 2.0
TP5E1671, E of T.H.65, S166, 1.6
TP5E1671, W of T.H.65, S165, 1.2
TP5E1671, T.H.47, S163, 0.7
TP5E1671, Main St, S147, 0.4
TP5E1671, East River Rd, S149, 0.0
01-20 04:18
01-20 05:48
01-20 07:18
01-20 08:48
01-20 10:18
01-20 11:48
01-20 13:18
01-20 14:48
01-20 16:18
01-20 17:48
01-20 19:18
01-20 20:48
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

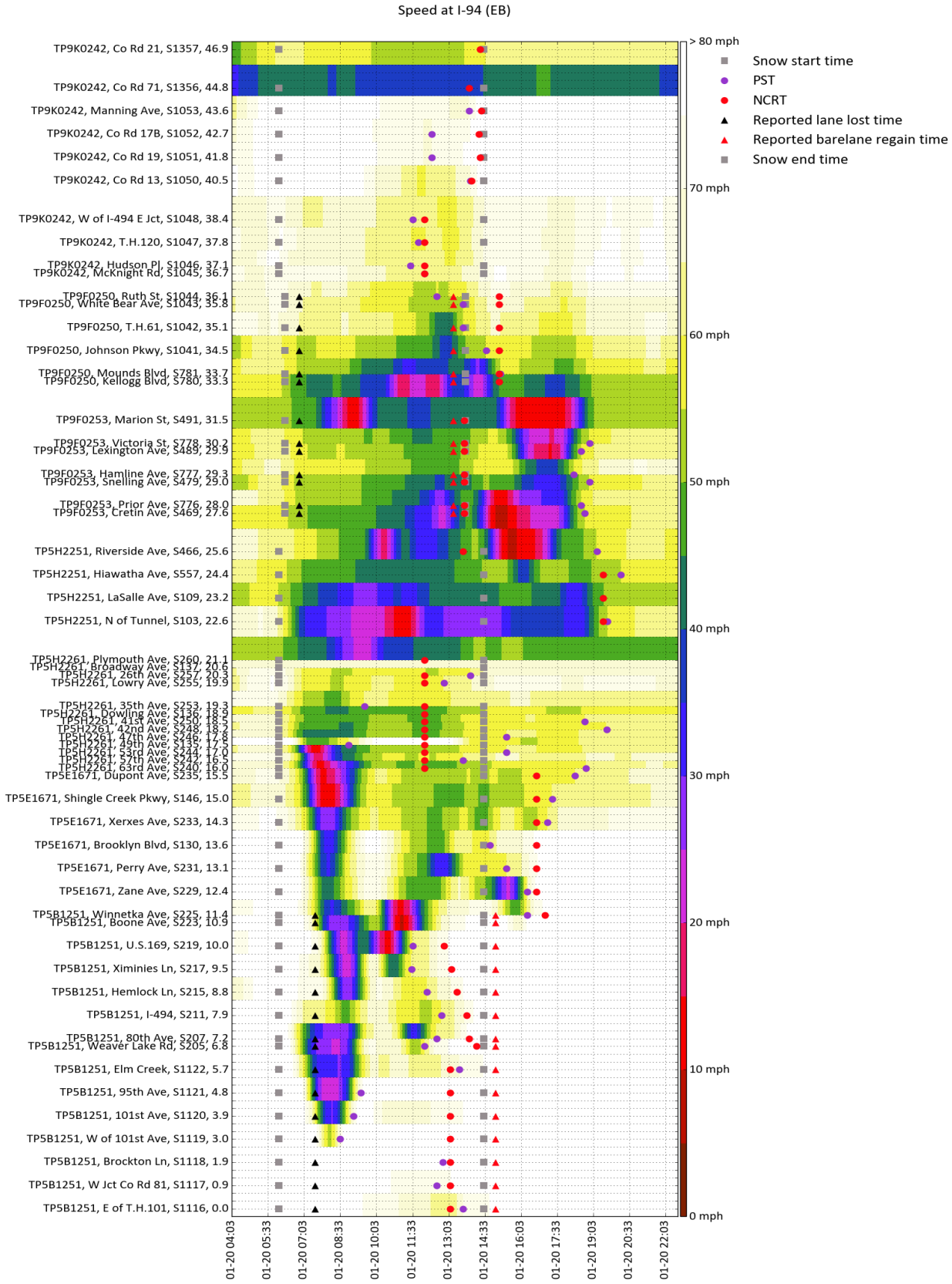
Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S149	06:06							
S147	06:39	12:48	15:30	18:51	18:33		52.97307	
S163	06:27	13:03	15:03	18:42	18:33		58.34793	
S165	06:30	13:30	15:06	18:15	18:33		64.88092	
S166	06:24	13:27	17:21	18:54	18:33		55.51031	
S168	06:33	08:30	16:12	18:48	18:33		55.06639	
S171	06:45	08:33	17:42	20:12	18:33		50.70679	
S173	06:42	08:33	17:42	20:24	18:33		47.00086	
S175	06:48	08:33	17:39	20:09	18:33		48.55895	
S177	06:42							
S179	06:18	08:48	17:27	20:24	18:33		44.02065	
S184	06:24	09:18	17:27	20:21	18:33		41.14525	
S1077	06:27	10:00	12:54	19:18	13:27	13:15	51.98087	49.6885
S1078	06:21	09:51	12:54	18:39	13:27	13:15	53.6836	50.79367
S1079	06:21	09:48	12:57	18:51	13:27	13:15	51.14616	48.60599
S1080	06:36	12:18	12:24	12:18	13:27	13:15	80.67947	77.70204
S1450	06:30	12:33	12:48	13:48	13:27	13:15	55.55763	52.65368
S1393	06:24	12:00	13:00	13:00	13:39		71.12433	
S1394		12:03	13:06		13:39		49.0769	
S1395	06:36	12:33	12:42	13:45	14:12		65.65957	
S1396		12:15	12:36	13:42	13:42		60.29675	
S1397	06:39	12:09	12:51	13:54	13:51		59.9678	
S1399	06:27	12:06	12:06	13:27	14:27		72.50447	
S1400	06:30	12:09	12:15	13:06	14:27		75.81256	
S1401	06:30	13:54	13:57	14:21	14:27		66.42285	
S1402	06:27	11:45	11:57	13:36	14:27		72.08972	
S1403	06:33	11:51	11:57	12:30	14:27		76.10328	
S1405	06:21	11:57	11:57	13:03	14:27		70.73381	
S1406	06:24	12:00	12:03	12:54	14:27		72.99823	
S1407	06:24	12:06	12:09	12:42	14:27		76.22745	
S1028	06:09	11:15	11:15	18:06	14:27		66.29537	

I-694 (WB)


Speed at I-694 (WB)
TP5E1671, E of T.H.252, S144, 21.0
TP5E1671, East River Rd, S158, 20.6
TP5E1671, T.H.47, S156, 19.9
TP5E1671, W of T.H.65, S154, 19.4
TP5E1671, E of T.H.65, S153, 19.0
TP5E1671, Windemere Dr, S151, 18.6
TP5E1671, Torchwood Dr, S172, 18.2
TP5E1671, Silver Lake Rd, S174, 17.7
TP5E1671, Oakwood Dr, S176, 17.3
TP5E1671, Long Lake Rd, S178, 16.9
TP5E1671, 5th Ave, S180, 16.6
TP5E1671, E of I-35W, S204, 16.0
TP5E1671, W of T.H.10, S1089, 15.5
TP9F0251, E of Lexington Ave, S1085, 13.7
TP9F0251, Victoria St, S1084, 13.2
TP9F0251, W of Rice St, S1083, 12.7
TP9F0251, E of Rice St, S1461, 11.6
TP9K0243, E of T.H.61, S1424, 8.0
TP9K0243, White Bear Ave, S1423, 7.4
TP9K0243, McKnight Rd, S1422, 6.7
TP9K0243, W of T.H.36, S1420, 5.0
TP9K0243, 50th St, S1418, 4.0
TP9K0243, 40th St, S1417, 3.3
TP9K0243, T.H.5, S1416, 2.6
TP9K0243, S of T.H.5, S1415, 2.0
TP9K0243, Stillwater Blvd, S1413, 1.6
TP9K0243, 22nd St, S1412, 1.2
TP9K0243, 15th St N, S1411, 0.6
TP9K0243, 10th St, S1410, 0.0
01-20 04:18
01-20 05:48
01-20 07:18
01-20 08:48
01-20 10:18
01-20 11:48
01-20 13:18
01-20 14:48
01-20 16:18
01-20 17:48
01-20 19:18
01-20 20:48
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1410	06:27	10:00	11:57	13:21	13:15		59.75494	
S1411	06:30	11:48	11:48	12:48	13:15		61.93416	
S1412	06:24	11:42	11:42	12:48	13:15		63.1838	
S1413	06:21	11:36	11:36	12:45	13:15		65.1348	
S1416	06:24	12:09	12:09	12:54	13:15		63.18702	
S1417	06:33	12:03	12:15	12:57	13:15		64.28511	
S1418	07:09	12:15	12:24	13:06	13:15		61.93273	
S1420	06:30	12:21	12:30	13:42	13:39		59.75246	
S1422	06:30	12:27	12:27	13:42	13:18		57.52952	
S1423	06:24	12:27	12:27	12:54	13:21		66.26525	
S1424	06:27	12:30	12:30	13:15	13:21		61.37408	
S1461	06:18	08:12	08:39	18:45	14:51	13:15	61.73262	59.69637
S1083	06:15	09:33	13:57	18:48	14:51	13:15	35.52893	45.27004
S1084	06:06	09:27		18:54	14:51	13:15	30.20036	39.79327
S1085	06:06	09:18		18:39	14:51	13:15	47.71106	69.40162
S180	06:21	08:54	17:42	19:06	19:12		64.77138	
S178	06:30	08:45	17:48	19:00	19:12		72.77254	
S176	06:33	08:39	17:45	18:57	19:12		78.21059	
S174	06:27	08:36	17:54	19:18	19:12		56.47312	
S172	06:30	08:33	17:51	19:24	19:12		52.71877	
S151	06:24	08:27	17:51	19:21	19:12		54.55036	
S153	06:24	08:21	17:57	19:48	19:12		46.21074	
S158	06:18	08:00	18:15	19:36	19:12		48.54597	
S144	06:06	08:00	18:15	19:57	19:12		51.41261	

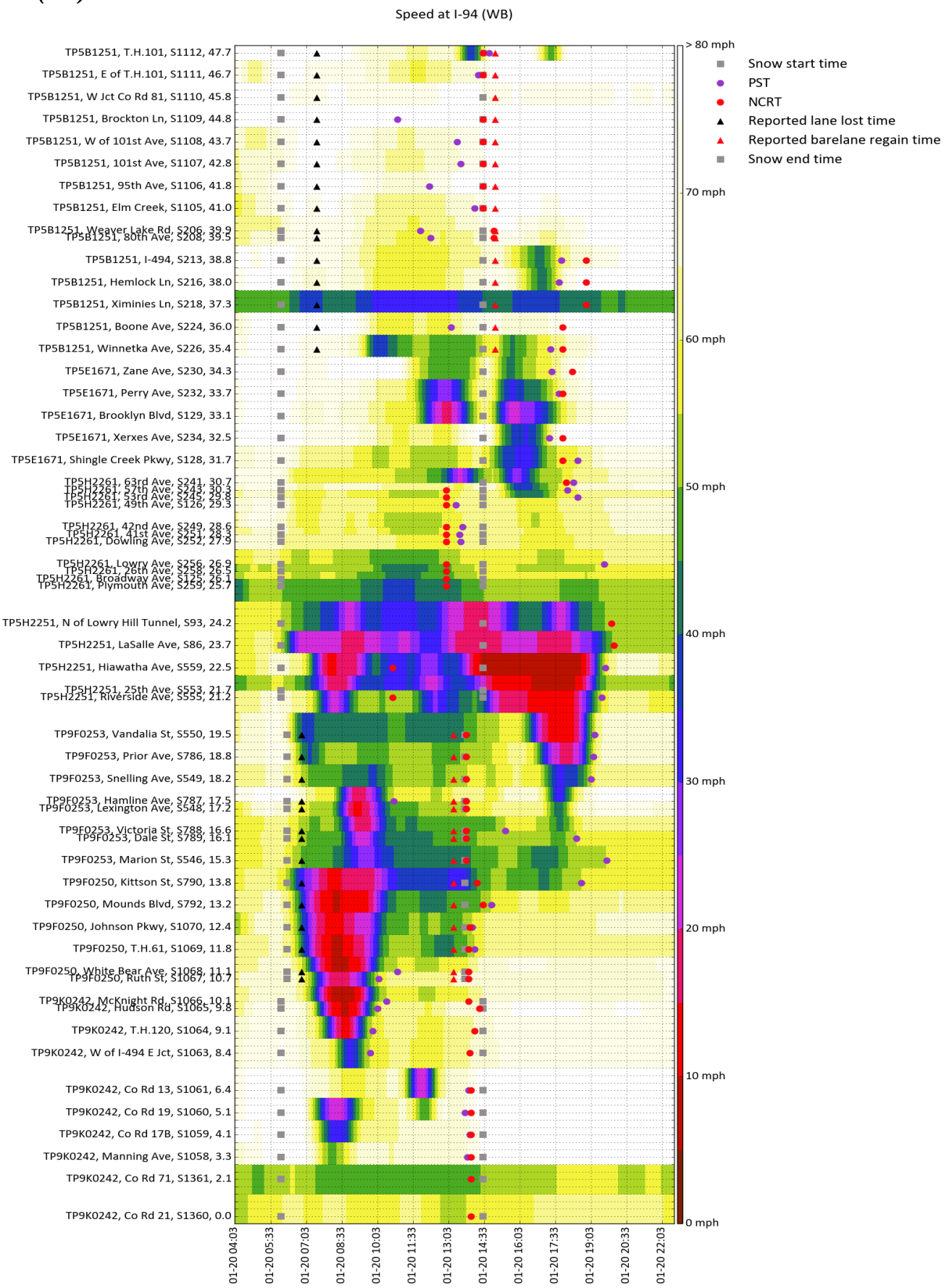
I-94 (EB)


Speed at I-94 (EB)
TP9K0242, Co Rd 21, S1357, 46.9
TP9K0242, Co Rd 71, S1356, 44.8
TP9K0242, Manning Ave, S1053, 43.6
TP9K0242, Co Rd 17B, S1052, 42.7
TP9K0242, Co Rd 19, S1051, 41.8
TP9K0242, Co Rd 13, S1050, 40.5
TP9K0242, W of I-494 E Jct, S1048, 38.4
TP9K0242, T.H.120, S1047, 37.8
TP9K0242, Hudson Pl, S1046, 37.1
TP9K0242, McKnight Rd, S1045, 36.7
TP9F0250, Ruth St, S1044, 36.1
TP9F0250, White Bear Ave, S1043, 35.8
TP9F0250, T.H.61, S1042, 35.1
TP9F0250, Johnson Pkwy, S1041, 34.5
TP9F0250, Mounds Blvd, S781, 33.7
TP9F0250, Kellogg Blvd, S780, 33.3
TP9F0253, Marion St, S491, 31.5
TP9F0253, Victoria St, S778, 30.2
TP9F0253, Lexington Ave, S489, 29.9
TP9F0253, Hamline Ave, S777, 29.3
TP9F0253, Snelling Ave, S479, 29.0
TP9F0253, Prior Ave, S776, 28.0
TP9F0253, Cretin Ave, S469, 27.6
TP5H2251, Riverside Ave, S466, 25.6
TP5H2251, Hiawatha Ave, S557, 24.4
TP5H2251, LaSalle Ave, S109, 23.2
TP5H2251, N of Tunnel, S103, 22.6
TP5H2261, Plymouth Ave, S260, 21.1
TP5H2261, Broadway Ave, S137, 20.6
TP5H2261, 26th Ave, S257, 20.3
TP5H2261, Lowry Ave, S255, 19.9
TP5H2261, 35th Ave, S253, 19.3
TP5H2261, Dowling Ave, S136, 18.9
TP5H2261, 41st Ave, S250, 18.5
TP5H2261, 42nd Ave, S248, 18.2
TP5H2261, 47th Ave, S246, 17.8
TP5H2261, 49th Ave, S135, 17.5
TP5H2261, 53rd Ave, S244, 17.0
TP5H2261, 57th Ave, S242, 16.5
TP5H2261, 63rd Ave, S240, 16.0
TP5E1671, Dupont Ave, S235, 15.5
TP5E1671, Shingle Creek Pkwy, S146, 15.0
TP5E1671, Xerxes Ave, S233, 14.3
TP5E1671, Brooklyn Blvd, S130, 13.6
TP5E1671, Perry Ave, S231, 13.1
TP5E1671, Zane Ave, S229, 12.4
TP5B1251, Winnetka Ave, S225, 11.4
TP5B1251, Boone Ave, S223, 10.9
TP5B1251, U.S.169, S219, 10.0
TP5B1251, Ximinies Ln, S217, 9.5
TP5B1251, Hemlock Ln, S215, 8.8
TP5B1251, I-494, S211, 7.9
TP5B1251, 80th Ave, S207, 7.2
TP5B1251, Weaver Lake Rd, S205, 6.8
TP5B1251, Elm Creek, S1122, 5.7
TP5B1251, 95th Ave, S1121, 4.8
TP5B1251, 101st Ave, S1120, 3.9
TP5B1251, W of 101st Ave, S1119, 3.0
TP5B1251, Brockton Ln, S1118, 1.9
TP5B1251, W Jct Co Rd 81, S1117, 0.9
TP5B1251, E of T.H.101, S1116, 0.0
01-20 04:03
01-20 05:33
01-20 07:03
01-20 08:33
01-20 10:03
01-20 11:33
01-20 13:03
01-20 14:33
01-20 16:03
01-20 17:33
01-20 19:03
01-20 20:33
01-20 22:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1116	06:21	12:54		13:39	13:06	15:00	61.19212	77.50375
S1117	06:21	12:33	12:48	12:33	13:06	15:00	74.93953	86.24891
S1118	06:24	12:48	12:48	12:48	13:06	15:00	76.83316	88.56248
S1119	06:36	08:06	12:51	08:33	13:06	15:00	78.23616	88.70323
S1120	06:21	08:12	12:57	09:06	13:06	15:00	70.87719	83.0472
S1121	06:24	08:09	08:27	09:24	13:06	15:00	80.58167	87.66564
S1122	06:06	08:30	08:30	13:30	13:06	15:00	67.07223	78.74556
S205	06:06	08:24	11:39	12:03	14:12	15:00	81.72176	86.12412
S207	06:00	08:30	11:36	12:33	13:54	15:00	76.65436	77.71035
S211	06:00	08:45	12:18	12:45	13:48	15:00	71.92797	76.734
S215	06:09	08:48	11:45	12:09	13:24	15:00	72.11288	84.14305
S217	06:15	08:48	10:39	11:30	13:09	15:00	75.99701	82.24283
S219	06:18	10:30	10:30	11:33	12:51	15:00	73.78256	86.18407
S223	06:24					15:00		79.73831
S225	06:15	11:03	15:54	16:18	17:03	15:00	75.46761	67.3257
S229	06:21	15:30	15:36	16:18	16:42		76.56598	
S231	06:27	12:45	12:45	15:27	16:42		74.53907	
S130	06:24	08:06	14:18	14:45	16:42		77.00165	
S233	06:09	08:00	16:15	17:09	16:42		54.98672	
S146	06:18	08:00	15:57	17:21	16:42		58.42047	
S235	06:06	07:51	16:27	18:18	16:42		55.14923	
S240	06:03	07:42	07:42	18:45	12:03		49.65393	
S242	06:09	07:36	07:36	13:39	12:03		55.13191	
S244	06:15	07:30	07:30	15:27	12:03		50.31183	
S135	06:09	07:33	07:33	08:54	12:03		75.00296	
S246	06:12	07:21	09:00	15:27	12:03		49.31031	
S248	06:09	08:51	09:24	19:36	12:03		48.52596	
S250	06:12	08:57	09:24	18:42	12:03		48.48092	
S136	06:15	08:21			12:03		47.28104	
S253	06:03	08:15	08:15	09:33	12:03		57.23075	
S255	06:12	08:24	11:15	12:51	12:03		58.36528	
S257	06:18	08:30		13:57	12:03		55.05291	
S137								
S260	06:21	09:30	09:45		12:03		42.58804	
S103	05:54	11:09	18:21	19:39	19:27		52.64602	
S109	06:03	09:36	18:18		19:27		49.71584	
S557	06:06	16:09	16:09	20:12	19:27		52.51683	
S466	06:21	10:21	12:24	19:12	13:39		46.35937	
S469	06:09	12:48	12:48	18:42	13:42	13:15	44.81021	33.57377
S776	06:03	12:39	12:42	18:33	13:42	13:15	46.3326	39.73489
S479	06:06	12:39	13:39	18:54	13:42	13:15	41.49732	40.49149
S777	06:06	12:51	13:09	18:15	13:42	13:15	51.99307	48.55805

S489	06:15	11:57	13:09	18:33	13:42	13:15	51.11729	48.28987
S778	06:18	11:54	13:09	18:54	13:42	13:15	48.09636	45.68745
S491	06:27	09:06	09:06		13:42	13:15	40.25666	40.56268
S780	05:57	12:24	14:18		15:09	13:15	45.45089	36.46936
S781	06:00	14:15	14:18	15:12	15:09	13:15	54.70223	41.48729
S1041	06:12	12:57	12:57	14:36	15:09	13:15	57.01164	41.29956
S1042	06:30	12:51	12:54	13:39	15:09	13:15	65.01718	46.25084
S1043	06:30	12:57	13:33	13:39	15:09	13:15	66.48999	52.73522
S1044	06:27	11:57	13:30	12:33	15:09	13:15	70.91445	55.91541
S1045		12:03		12:03	12:03		60.06433	
S1046	05:57	11:27	11:39	11:27	12:03		61.78321	
S1047	06:30	11:48	11:48	11:48	12:03		59.89199	
S1048		11:33	11:51	11:33	12:03		60.2253	
S1050	06:33	11:54	13:21	13:57	14:00		71.00338	
S1051	08:18	12:09	13:18	12:21	14:21		81.82698	
S1052		12:09	13:27	12:21	14:18		79.7751	
S1053	08:57	13:33	13:33	13:54	14:24		79.15239	
S1356		11:42	11:42		13:54		36.24963	
S1357	22:30	11:18	13:48		14:21		58.48934	

I-94 (WB)


Speed at I-94 (WB)
TP5B1251, T.H.101, S1112, 47.7
TP5B1251, E of T.H.101, S1111, 46.7
TP5B1251, W Jct Co Rd 81, S1110, 45.8
TP5B1251, Brockton Ln, S1109, 44.8
TP5B1251, W of 101st Ave, S1108, 43.7
TP5B1251, 101st Ave, S1107, 42.8
TP5B1251, 95th Ave, S1106, 41.8
TP5B1251, Elm Creek, S1105, 41.0
TP5B1251, Weaver Lake Rd, S206, 39.9
TP5B1251, 80th Ave, S208, 39.5
TP5B1251, I-494, S213, 38.8
TP5B1251, Hemlock Ln, S216, 38.0
TP5B1251, Ximinies Ln, S218, 37.3
TP5B1251, Boone Ave, S224, 36.0
TP5B1251, Winnetka Ave, S226, 35.4
TP5E1671, Zane Ave, S230, 34.3
TP5E1671, Perry Ave, S232, 33.7
TP5E1671, Brooklyn Blvd, S129, 33.1
TP5E1671, Xerxes Ave, S234, 32.5
TP5E1671, Shingle Creek Pkwy, S128, 31.7
TP5H2261, 63rd Ave, S241, 30.7
TP5H2261, 57th Ave, S243, 30.3
TP5H2261, 53rd Ave, S245, 29.8
TP5H2261, 49th Ave, S126, 29.3
TP5H2261, 42nd Ave, S249, 28.6
TP5H2261, 41st Ave, S251, 28.3
TP5H2261, Dowling Ave, S252, 27.9
TP5H2261, Lowry Ave, S256, 26.9
TP5H2261, 26th Ave, S258, 26.5
TP5H2261, Broadway Ave, S125, 26.1
TP5H2261, Plymouth Ave, S259, 25.7
TP5H2251, N of Lowry Hill Tunnel, S93, 24.2
TP5H2251, LaSalle Ave, S86, 23.7
TP5H2251, Hiawatha Ave, S559, 22.5
TP5H2251, 25th Ave, S553, 21.7
TP5H2251, Riverside Ave, S555, 21.2
TP9F0253, Vandalia St, S550, 19.5
TP9F0253, Prior Ave, S786, 18.8
TP9F0253, Snelling Ave, S549, 18.2
TP9F0253, Hamline Ave, S787, 17.5
TP9F0253, Lexington Ave, S548, 17.2
TP9F0253, Victoria St, S788, 16.6
TP9F0253, Dale St, S789, 16.1
TP9F0253, Marion St, S546, 15.3
TP9F0250, Kittson St, S790, 13.8
TP9F0250, Mounds Blvd, S792, 13.2
TP9F0250, Johnson Pkwy, S1070, 12.4
TP9F0250, T.H.61, S1069, 11.8
TP9F0250, White Bear Ave, S1068, 11.1
TP9F0250, Ruth St, S1067, 10.7
TP9K0242, McKnight Rd, S1066, 10.1
TP9K0242, Hudson Rd, S1065, 9.8
TP9K0242, T.H.120, S1064, 9.1
TP9K0242, W of I-494 E Jct, S1063, 8.4
TP9K0242, Co Rd 13, S1061, 6.4
TP9K0242, Co Rd 19, S1060, 5.1
TP9K0242, Co Rd 17B, S1059, 4.1
TP9K0242, Manning Ave, S1058, 3.3
TP9K0242, Co Rd 71, S1361, 2.1
TP9K0242, Co Rd 21, S1360, 0.0
01-20 04:03
01-20 05:33
01-20 07:03
01-20 08:33
01-20 10:03
01-20 11:33
01-20 13:03
01-20 14:33
01-20 16:03
01-20 17:33
01-20 19:03
01-20 20:33
01-20 22:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1360	08:51	13:15	13:27		14:00		55.85125	
S1361	06:54	12:06	13:27		14:00		48.13808	
S1058	06:36	08:09	08:30	13:51	14:00		72.213	
S1059	06:33	08:24	08:39	13:57	14:00		70.72905	
S1060	06:30	08:21	12:03	13:45	14:00		73.32961	
S1061	06:27	11:54	11:54	13:54	14:00		72.1092	
S1063	06:33	08:54	12:21	09:45	13:57		65.26456	
S1064	06:27	08:42	13:30	09:51	14:09		65.75821	
S1065	06:33	08:39	08:42	10:03	14:21		69.93454	
S1066	06:27	08:36	08:45	10:27	13:54		60.13467	
S1067	06:33	08:27	08:39	10:06	13:54	13:15	65.9934	64.98842
S1068	06:15	08:27	08:42	10:54	13:54	13:15	60.38247	56.4984
S1069	06:15	08:21	13:39	14:09	13:54	13:15	51.03989	44.77751
S1070	06:03	08:15	09:42	14:03	13:57	13:15	54.15813	47.61162
S792	06:03	08:18	09:27	14:51	14:30	13:15	51.3398	45.31458
S790	06:00	08:12	13:30	18:39	14:15	13:15	45.5226	31.29735
S546	06:12	09:33	09:42	19:42	13:48	13:15	44.58369	44.07354
S789	06:18	09:24	09:24	18:27	13:48	13:15	48.24017	46.66753
S788	06:27	09:24	09:24	15:27	13:48	13:15	48.68959	47.50596
S548	06:03	09:12	09:12	13:48	13:48	13:15	55.07153	53.10411
S787	06:12	09:15	09:15	10:45	13:48	13:15	62.36286	60.23193
S549	06:21	09:51	09:54	19:03	13:48	13:15	54.91294	52.26557
S786	06:12	07:12	13:15	19:09	13:48	13:15	52.41625	48.48704
S550	06:03	07:03	08:42	19:12	13:48	13:15	46.04147	42.38194
S555	06:00	08:15	08:15	19:30	10:42		52.22891	
S559	06:45	08:06		19:39	10:42		31.59425	
S86	05:54	14:00	18:00		20:00		51.02561	
S93	05:51	14:15	17:54		19:54		52.52948	
S259	05:48	10:57	12:48		12:57		43.99931	
S125	08:36	11:06			12:57		48.96101	
S258	06:15	10:57	12:24		12:57		48.95293	
S256	05:54	10:54	12:18	19:36	12:57		51.91706	
S252	06:09	12:39	12:39	13:33	12:57		57.61139	
S251	06:18	11:09	12:39	13:30	12:57		56.45457	
S249	05:48	10:54	12:45	13:39	12:57		55.54084	
S126	06:06	07:06	12:42	13:21	12:57		57.85971	
S245	06:15	11:09	12:24	18:30	12:57		56.07158	
S243	05:57	12:24	12:27	18:03	12:57		61.39749	
S241	06:00	13:33	15:45	18:18	18:00		57.13323	
S128	06:15	16:18	16:21	18:30	17:51		56.46576	
S234	06:30	16:18	16:18	17:18	17:51		75.1251	
S232	06:06	12:54	15:45	17:42	17:51		63.11311	
S230	05:57	15:39	15:39	17:24	18:15		71.74842	

S226	06:30	10:09	16:03	17:21	17:51	15:00	63.71957	58.48951
S224	06:42	11:00	17:00	13:09	17:51	15:00	74.43706	73.74778
S218		12:15	17:09		18:51	15:00	42.6538	42.55241
S216	06:12	17:00	17:00	17:42	18:51	15:00	76.76092	74.13842
S213	06:09	16:54	16:54	17:48	18:51	15:00	68.49501	68.22191
S208	08:45	11:27	13:06	12:18	14:57	15:00	72.24718	72.46767
S206	08:57	11:33	13:03	11:51	14:57	15:00	75.6432	75.87684
S1105	08:33	11:33	13:57	14:09	14:30	15:00	73.24545	76.56035
S1106	08:54	11:39	12:57	12:15	14:30	15:00	81.07936	84.04574
S1107	08:36	11:15	13:06	13:33	14:30	15:00	74.84589	78.79621
S1108	08:33	11:18	13:09	13:24	14:30	15:00	76.22888	81.71485
S1109	08:39	10:54	14:09	10:54	14:30	15:00	88.18986	92.98668
S1111	06:36	11:45	12:51	14:18	14:30	15:00	71.85667	77.47311
S1112	06:21	14:00	14:00	14:45	14:30	15:00	58.27017	79.94954

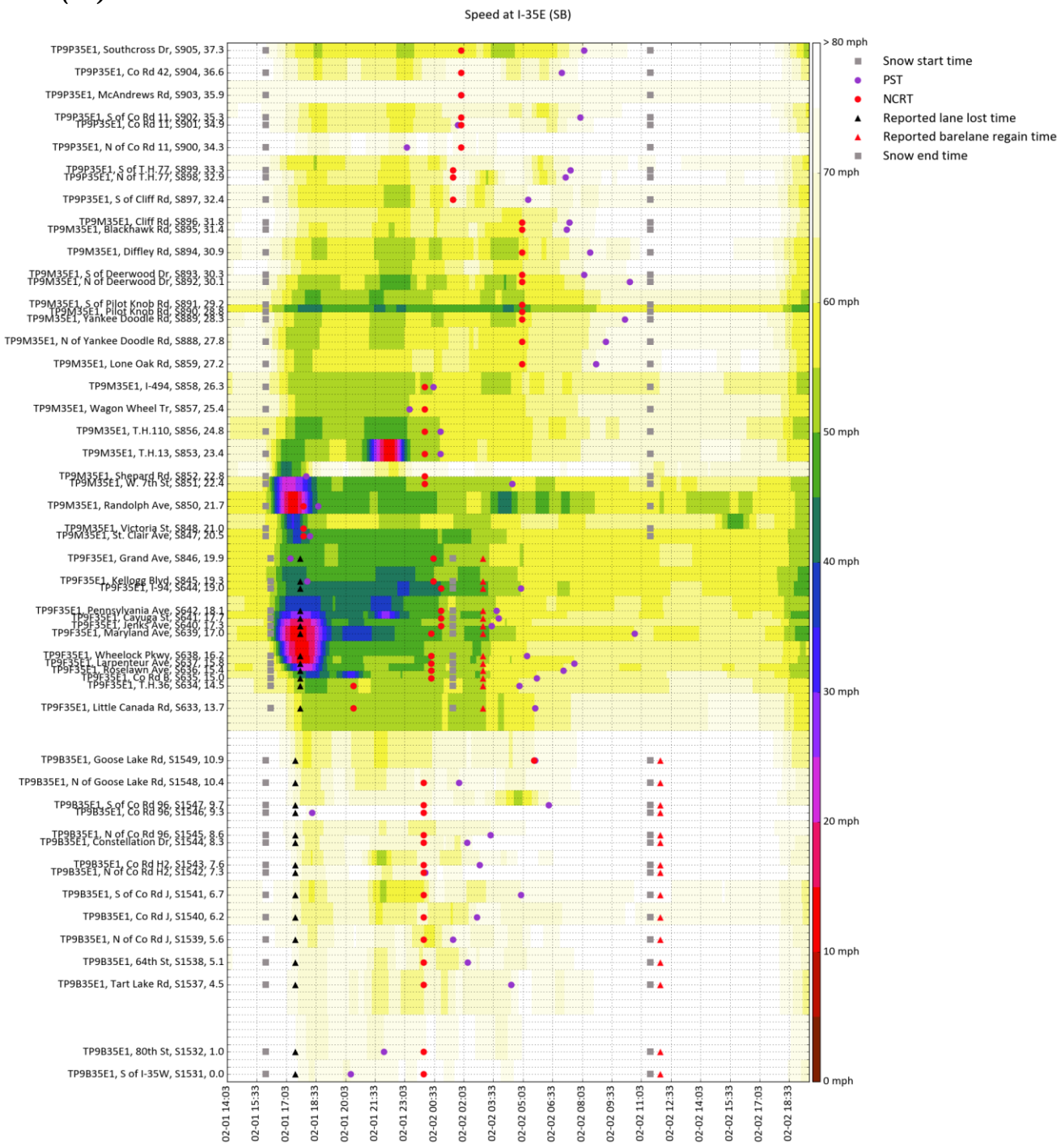
Snow Event: 2-1-2013

I-35E (NB)

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S870		22:39	22:54	23:48	05:30		83.89208	
S872	16:48	00:21	00:27	00:21	05:30		80.25696	
S873	16:54	03:24	04:54	05:36	05:30		69.19093	
S874	16:51	01:18	01:24	03:42	05:30		74.32562	
S875	17:03	00:33	00:57	07:33	05:30		64.84935	
S876	17:00	18:57	04:48	07:12	05:30		68.4103	
S877	17:09	00:24	01:45	05:33	02:18		66.50945	
S879	16:33	01:57	03:00	07:30	03:51		63.43872	
S880	16:39	02:06	03:18	07:03	03:51		64.7917	
S881	16:33	19:36	02:33	05:09	03:51		66.93895	
S882	16:33	01:03	03:18	07:27	03:51		63.1703	
S883	17:00	22:42	23:03	07:12	03:51		65.19034	
S884	16:42	23:12	00:36	07:24	03:51		65.83721	
S885	16:03	23:03	00:51	07:09	03:51		65.15859	
S886	16:39	22:42	01:15	05:12	03:51		68.68207	
S887	16:09	22:30	03:21	07:24	03:51		62.26181	
S825	16:03	22:27	01:18	07:24	03:51		66.62474	
S826	16:12	17:42		08:36	03:51		60.63469	
S827	16:00	17:39	09:24	20:18	10:15		79.91653	
S831	16:15	18:15	21:54	09:42	10:15		60.85027	
S832	15:57	18:15	07:00	19:09	10:15		81.31867	
S833	16:09	18:03	05:00	05:24	10:15		63.42325	
S834	16:30	23:24	01:15	01:36	01:45		45.35914	
S836	16:30	18:06	01:18	08:30	01:45		48.47095	
S837	16:12	18:09	18:21	19:36	01:45		47.64345	
S838	16:18	18:06	02:42	18:48	03:18	03:00	50.93185	49.78998
S839	16:27	17:21	17:21	19:57	02:57	03:00	49.16305	49.49945
S621	15:33	17:24	18:21	03:54	00:12	03:00	49.65896	53.43302
S622	16:09	22:54	22:57	03:15	00:12	03:00	46.88062	54.63348
S623	16:12	22:57	23:00	00:12	00:12	03:00	55.47673	66.3878
S625	16:18	17:33	21:09	05:36	01:45	03:00	55.1261	59.19219
S626	16:24	17:42	17:57	05:33	01:45	03:00	53.333	54.53413
S627	15:39	17:36	17:51	05:27	01:45	03:00	52.37355	55.4026
S628	15:33	20:06	20:33	05:15	01:45	03:00	52.12592	51.77201
S630	16:39	18:00	04:24	05:12	04:45	03:00	58.43187	54.57156
S1485	15:03	21:15	21:30	05:27	01:36	12:00	65.39606	77.99079
S1486		20:24	01:03	05:33	01:36	12:00	64.98423	79.97933
S1487	16:54	20:48	21:18	07:36	01:36	12:00	65.65943	82.47504
S1488	16:54	18:00	22:45	08:39	01:36	12:00	56.55134	73.31467
S1489	16:48	18:00	01:06	18:00	01:36	12:00	76.9578	95.97563
S1490	16:45	18:03	22:51	07:15	01:36	12:00	66.89644	82.55109
S1491	16:51	18:09	18:39	07:36	01:36	12:00	53.19979	76.39345
S1492	16:54	18:09	18:30	03:27	01:36	12:00	64.11733	78.04766

S1493	16:57	18:09	18:27	19:09	01:36	12:00	75.04229	86.58813
S1494	16:57	18:09	23:24	18:21	01:36	12:00	77.96879	86.99713
S1495	16:57	18:15	18:39	06:36	01:36	12:00	70.09258	82.53768
S1496	16:54	18:15	18:24	01:00	01:36	12:00	71.88561	80.37149
S1497	17:00	21:45	00:06	00:09	01:36	12:00	76.53057	85.90927
S1498	17:03	18:15	00:15	00:48	01:36	12:00	71.78943	80.73521
S1499	16:57	21:45	22:48	22:51	01:36	12:00	87.33649	88.43401
S1502	17:03	18:24	00:03	00:30	01:36	12:00	75.01476	81.38074
S1503	17:12	21:39	00:21	07:27	01:36	12:00	64.60194	74.88246
S1504	17:09	18:12	01:06	18:57	01:24	12:00	73.81107	86.29761

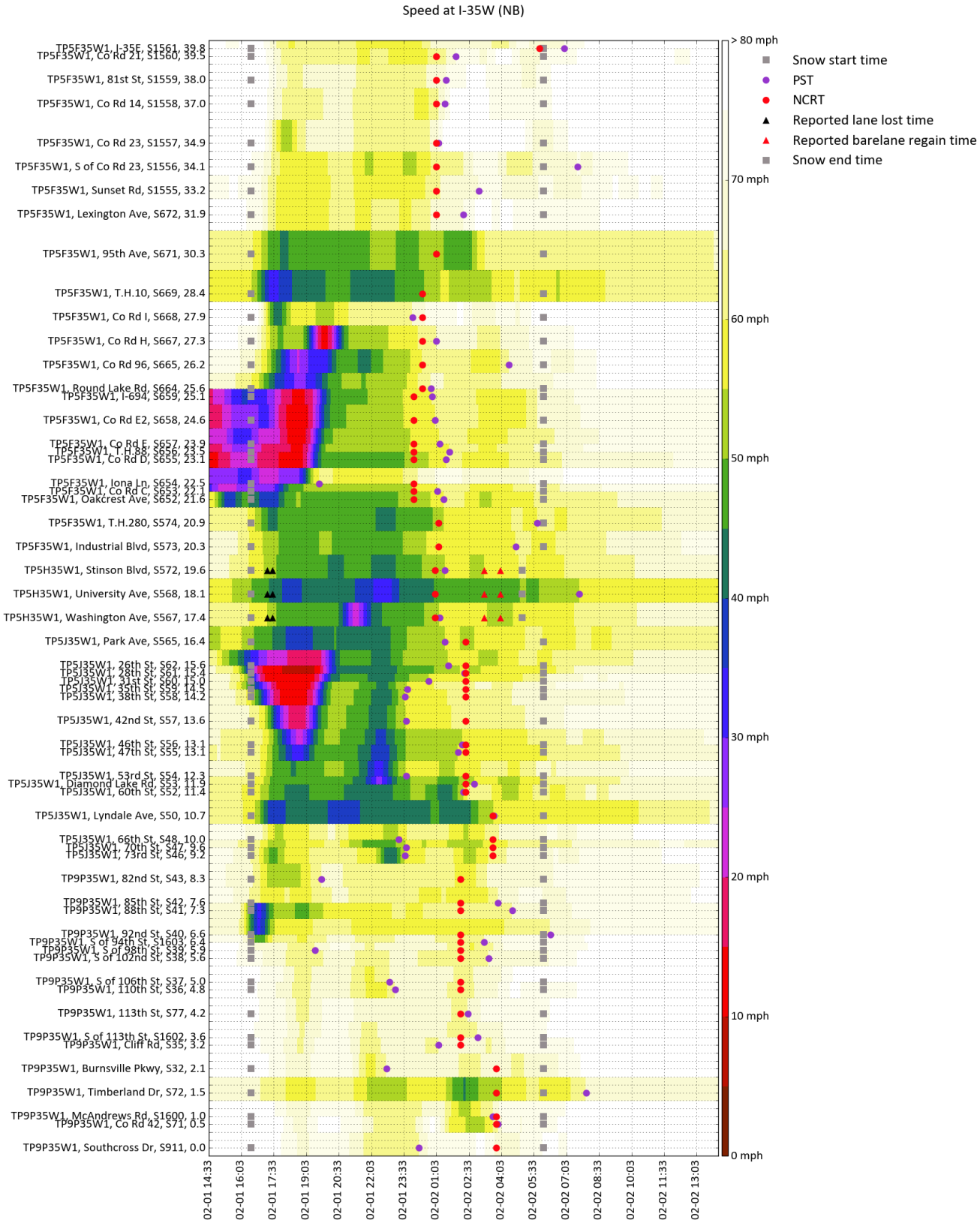
I-35E (SB)


Speed at I-35E (SB)
TP9P35E1, Southcross Dr, S905, 37.3
TP9P35E1, Co Rd 42, S904, 36.6
TP9P35E1, McAndrews Rd, S903, 35.9
TP9P35E1, S of Co Rd 11, S902, 35.3
TP9P35E1, Co Rd 11, S901, 34.9
TP9P35E1, N of Co Rd 11, S900, 34.3
TP9P35E1, S of T.H.77, S899, 33.3
TP9P35E1, N of T.H.77, S898, 32.9
TP9P35E1, S of Cliff Rd, S897, 32.4
TP9M35E1, Cliff Rd, S896, 31.8
TP9M35E1, Blackhawk Rd, S895, 31.4
TP9M35E1, Diffley Rd, S894, 30.9
TP9M35E1, S of Deerwood Dr, S893, 30.3
TP9M35E1, N of Deerwood Dr, S892, 30.1
TP9M35E1, S of Pilot Knob Rd, S891, 29.2
TP9M35E1, Pilot Knob Rd, S890, 28.8
TP9M35E1, Yankee Doodle Rd, S889, 28.3
TP9M35E1, N of Yankee Doodle Rd, S888, 27.8
TP9M35E1, Lone Oak Rd, S859, 27.2
TP9M35E1, I-494, S858, 26.3
TP9M35E1, Wagon Wheel Tr, S857, 25.4
TP9M35E1, T.H.110, S856, 24.8
TP9M35E1, T.H.13, S853, 23.4
TP9M35E1, Shepard Rd, S852, 22.8
TP9M35E1, W. 7th St, S851, 22.4
TP9M35E1, Randolph Ave, S850, 21.7
TP9M35E1, Victoria St, S848, 21.0
TP9M35E1, St. Clair Ave, S847, 20.5
TP9F35E1, Grand Ave, S846, 19.9
TP9F35E1, Kellogg Blvd, S845, 19.3
TP9F35E1, I-94, S644, 19.0
TP9F35E1, Pennsylvania Ave, S642, 18.1
TP9F35E1, Cayuga St, S641, 17.7
TP9F35E1, Jenks Ave, S640, 17.5
TP9F35E1, Maryland Ave, S639, 17.0
TP9F35E1, Wheelock Pkwy, S638, 16.2
TP9F35E1, Larpenteur Ave, S637, 15.8
TP9F35E1, Roselawn Ave, S636, 15.4
TP9F35E1, Co Rd B, S635, 15.0
TP9F35E1, T.H.36, S634, 14.5
TP9F35E1, Little Canada Rd, S633, 13.7
TP9B35E1, Goose Lake Rd, S1549, 10.9
TP9B35E1, N of Goose Lake Rd, S1548, 10.4
TP9B35E1, S of Co Rd 96, S1547, 9.7
TP9B35E1, Co Rd 96, S1546, 9.3
TP9B35E1, N of Co Rd 96, S1545, 8.6
TP9B35E1, Constellation Dr, S1544, 8.3
TP9B35E1, Co Rd H2, S1543, 7.6
TP9B35E1, N of Co Rd H2, S1542, 7.3
TP9B35E1, S of Co Rd J, S1541, 6.7
TP9B35E1, Co Rd J, S1540, 6.2
TP9B35E1, N of Co Rd J, S1539, 5.6
TP9B35E1, 64th St, S1538, 5.1
TP9B35E1, Tart Lake Rd, S1537, 4.5
TP9B35E1, 80th St, S1532, 1.0
TP9B35E1, S of I-35W, S1531, 0.0
02-01 14:03
02-01 15:33
02-01 17:03
02-01 18:33
02-01 20:03
02-01 21:33
02-01 23:03
02-02 00:33
02-02 02:03
02-02 03:33
02-02 05:03
02-02 06:33
02-02 08:03
02-02 09:33
02-02 11:03
02-02 12:33
02-02 14:03
02-02 15:33
02-02 17:03
02-02 18:33
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1531		20:06	22:12	20:18	00:00	12:00	78.43084	80.3205
S1532		21:33	23:30	22:00	00:00	12:00	73.94749	81.53923
S1537		23:33	23:36	04:27	00:00	12:00	64.8136	77.50197
S1538		21:51	21:57	02:15	00:00	12:00	65.04372	77.36876
S1539		00:00		01:30	00:00	12:00	60.15642	78.78635
S1540		21:45	23:18	02:42	00:00	12:00	66.07472	74.54069
S1541	17:12	21:57	23:39	04:57	00:00	12:00	59.32143	75.83379
S1542	17:00	22:06	23:33	00:06	00:00	12:00	69.53322	82.23689
S1543	17:00	21:51	21:54	02:51	00:00	12:00	68.47288	80.79296
S1544	16:54	18:18	21:45	02:12	00:00	12:00	66.2083	78.07763
S1545	17:09	18:21		03:24	00:00	12:00	63.51965	77.67131
S1546		18:21	18:36	18:21	00:00	12:00	75.08953	90.37678
S1547	17:00	18:15		06:21	00:00	12:00	67.44243	78.20021
S1548	17:03	21:33	21:51	01:48	00:00	12:00	69.49954	77.89199
S1549	16:57	21:48	05:06	05:39	05:36	12:00	69.97954	76.66217
S633	17:03	18:24	19:54	05:39	20:27	03:00	54.77196	54.26887
S634	16:54	18:42	19:57	04:51	20:27	03:00	53.88668	53.18203
S635	16:57	20:18	20:24	05:45	00:24	03:00	53.24673	50.64684
S636	16:30	18:03	18:09	07:06	00:24	03:00	51.76782	54.61215
S637	16:24	17:54	18:03	07:39	00:24	03:00	50.18191	51.95046
S638	16:18	17:54	18:09	05:15	00:24	03:00	51.08754	50.58895
S639	16:03	17:36	18:00	10:42	00:24	03:00	48.91105	48.19307
S640	16:06	17:54	18:03	03:27	00:54	03:00	51.76532	53.0366
S641	16:06	22:06	22:06	03:48	00:54	03:00	49.56657	50.3449
S642	16:09	17:57	22:09	03:42	00:54	03:00	51.45807	52.39015
S644	16:12	23:00	00:36	04:57	00:54	03:00	45.08117	47.72943
S845	16:21	17:06	23:57	18:06	00:30	03:00	49.96229	50.49784
S846	16:21	17:15		17:15	00:30	03:00	48.34693	52.8524
S847	16:27	17:36	17:36	18:15	17:54		41.18797	
S848		17:24	17:24	17:54	17:54		45.23184	
S850	16:09	17:21		18:39	17:54		22.09738	
S851	15:57	17:09	17:15	04:30	00:03		50.74038	
S852		17:00	22:33	18:03	00:03		72.54748	
S853	16:00	22:15	22:30	00:51	00:03		53.38594	
S856	16:27	22:30		00:51	00:03		53.66104	
S857	16:33	21:30		23:18	00:03		56.3406	
S858	16:15	21:30		00:30	00:03		54.66026	
S859	16:03	17:54	04:27	08:45	05:00		59.10666	
S888	16:00	17:57	23:00	09:15	05:00		57.27481	
S889	16:12	04:09	04:24	10:12	05:00		58.32449	
S890	16:18	18:15	04:27		05:00		47.48847	
S891	16:15	18:24	04:30		05:00		53.68479	
S892	16:18	22:48	04:27	10:27	05:00		58.50483	

S893	16:24	22:48	04:27	08:09	05:00		59.56991	
S894	16:21	22:24	04:27	08:27	05:00		57.27677	
S895	16:42	22:21	04:27	07:15	05:00		59.26821	
S896	16:45	22:27	04:33	07:24	05:00		60.16698	
S897	16:21	22:51	23:03	05:18	01:30		66.81159	
S898	16:36	22:21	00:30	07:12	01:30		70.25251	
S899	16:03	18:30	00:33	07:27	01:30		68.7179	
S900	16:18	18:36	23:00	23:09	01:54		72.49139	
S901	16:24	23:03	01:18	01:45	01:54		71.92063	
S902	16:45	23:06	00:24	07:57	01:54		68.22864	
S903		01:54		01:54	01:54		71.70189	
S904	16:24	23:06	00:33	07:00	01:54		71.1051	
S905	16:06	23:09		08:09	01:54		57.70759	

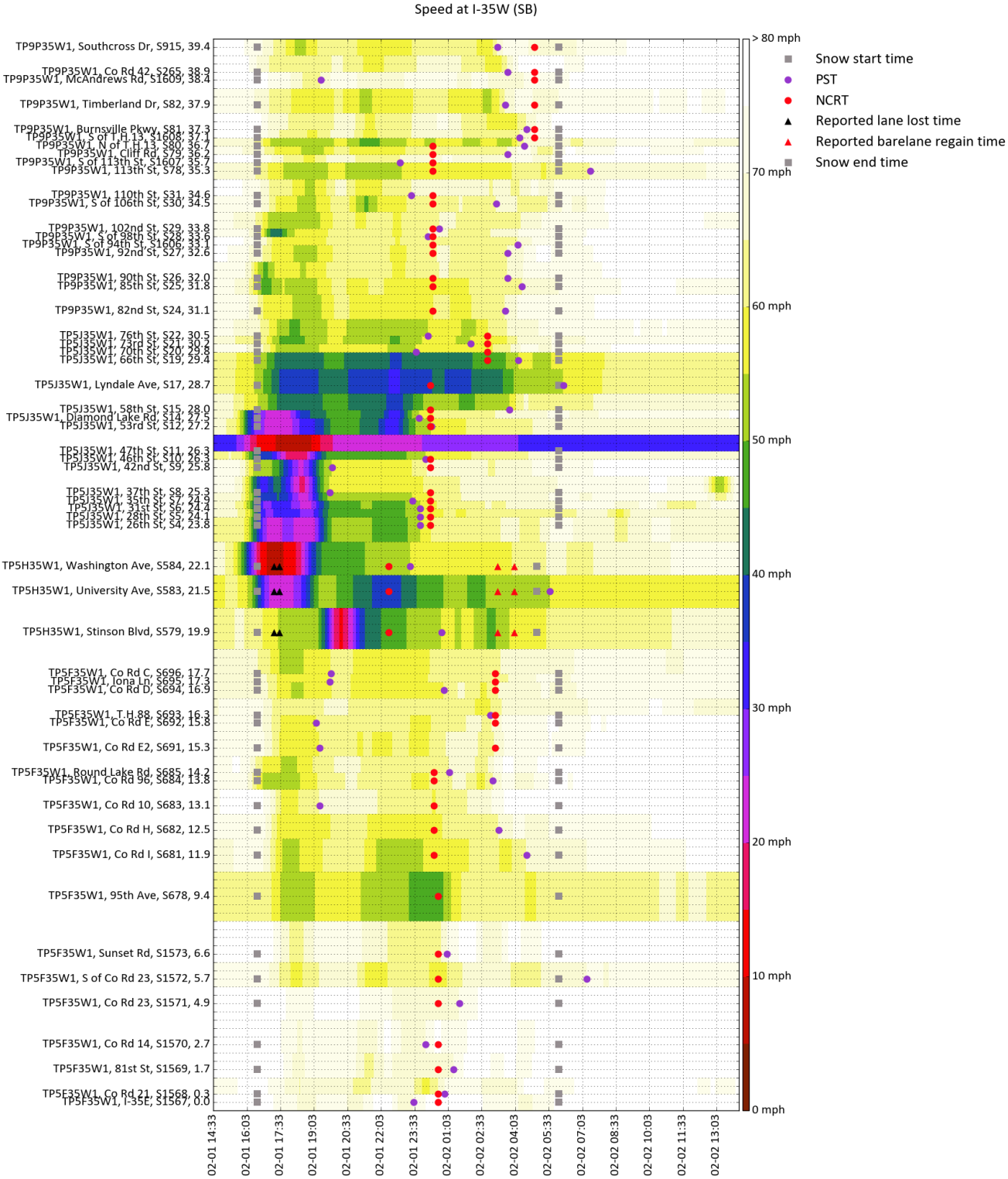
I-35W (NB)


Speed at I-35W (NB)
TP5F35W1, I-35E, S1561, 39.8
TP5F35W1, Co Rd 21, S1560, 39.5
TP5F35W1, 81st St, S1559, 38.0
TP5F35W1, Co Rd 14, S1558, 37.0
TP5F35W1, Co Rd 23, S1557, 34.9
TP5F35W1, S of Co Rd 23, S1556, 34.1
TP5F35W1, Sunset Rd, S1555, 33.2
TP5F35W1, Lexington Ave, S672, 31.9
TP5F35W1, 95th Ave, S671, 30.3
TP5F35W1, T.H.10, S669, 28.4
TP5F35W1, Co Rd I, S668, 27.9
TP5F35W1, Co Rd H, S667, 27.3
TP5F35W1, Co Rd 96, S665, 26.2
TP5F35W1, Round Lake Rd, S664, 25.6
TP5F35W1, I-694, S659, 25.1
TP5F35W1, Co Rd E2, S658, 24.6
TP5F35W1, Co Rd E, S657, 23.9
TP5F35W1, T.H.88, S656, 23.5
TP5F35W1, Co Rd D, S655, 23.1
TP5F35W1, Iona Ln, S654, 22.5
TP5F35W1, Co Rd C, S653, 22.1
TP5F35W1, Oakcrest Ave, S652, 21.6
TP5F35W1, T.H.280, S574, 20.9
TP5F35W1, Industrial Blvd, S573, 20.3
TP5H35W1, Stinson Blvd, S572, 19.6
TP5H35W1, University Ave, S568, 18.1
TP5H35W1, Washington Ave, S567, 17.4
TP5J35W1, Park Ave, S565, 16.4
TP5J35W1, 26th St, S62, 15.6
TP5J35W1, 28th St, S61, 15.4
TP5J35W1, 31st St, S60, 15.0
TP5J35W1, 35th St, S59, 14.5
TP5J35W1, 38th St, S58, 14.2
TP5J35W1, 42nd St, S57, 13.6
TP5J35W1, 46th St, S56, 13.1
TP5J35W1, 47th St, S55, 13.1
TP5J35W1, 53rd St, S54, 12.3
TP5J35W1, Diamond Lake Rd, S53, 11.9
TP5J35W1, 60th St, S52, 11.4
TP5J35W1, Lyndale Ave, S50, 10.7
TP5J35W1, 66th St, S48, 10.0
TP5J35W1, 70th St, S47, 9.6
TP5J35W1, 73rd St, S46, 9.2
TP9P35W1, 82nd St, S43, 8.3
TP9P35W1, 85th St, S42, 7.6
TP9P35W1, 88th St, S41, 7.3
TP9P35W1, 92nd St, S40, 6.6
TP9P35W1, S of 94th St, S1603, 6.4
TP9P35W1, S of 98th St, S39, 5.9
TP9P35W1, S of 102nd St, S38, 5.6
TP9P35W1, S of 106th St, S37, 5.0
TP9P35W1, 110th St, S36, 4.8
TP9P35W1, 113th St, S77, 4.2
TP9P35W1, S of 113th St, S1602, 3.6
TP9P35W1, Cliff Rd, S35, 3.2
TP9P35W1, Burnsville Pkwy, S32, 2.1
TP9P35W1, Timberland Dr, S72, 1.5
TP9P35W1, McAndrews Rd, S1600, 1.0
TP9P35W1, Co Rd 42, S71, 0.5
TP9P35W1, Southcross Dr, S911, 0.0
02-01 14:33
02-01 16:03
02-01 17:33
02-01 19:03
02-01 20:33
02-01 22:03
02-01 23:33
02-02 01:03
02-02 02:33
02-02 04:03
02-02 05:33
02-02 07:03
02-02 08:33
02-02 10:03
02-02 11:33
02-02 13:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S911	17:30	23:06	00:09	00:15	03:48		69.52716	
S71	17:36	02:54	03:09	03:54	03:48		63.53308	
S1600	16:36	02:18	02:51	03:39	03:48		68.0098	
S72	17:39	02:18		07:57	03:48		53.24967	
S32	16:45	22:00	03:06	22:45	03:48		68.62605	
S35	16:27	21:57	01:00	01:09	02:09		68.36088	
S1602	17:00	02:09		02:57	02:09		61.05518	
S77	16:54	18:51	01:57	02:30	02:09		63.97663	
S36	17:12	22:21		23:09	02:09		61.17947	
S37	16:57	21:57		22:54	02:09		63.47687	
S38	17:00	18:51	00:51	03:27	02:09		63.42665	
S39	16:24	18:51		19:27	02:09		61.6165	
S1603	16:12	16:54	01:39	03:15	02:09		63.04848	
S40	16:09	16:51	16:51	06:18	02:09		55.43111	
S41	16:06	16:54	16:54	04:33	02:09		63.91618	
S42	16:21	02:09		03:54	02:09		56.7195	
S43	16:36	17:42	18:48	19:45	02:09		58.20579	
S46	16:42	22:57	02:54	23:36	03:39		62.08607	
S47	16:48	22:54	23:03	23:39	03:39		57.57151	
S48	16:48	22:57	22:57	23:18	03:39		63.28111	
S50	16:33	17:36	02:27	03:42	03:39		54.99064	
S52	16:45	22:21	01:36	02:18	02:24		58.44093	
S53	16:45	22:24	22:27	02:48	02:24		52.23346	
S54	16:42	22:24	22:27	23:39	02:24		57.58286	
S55	16:51	18:39	22:33	02:03	02:24		56.64375	
S56	16:54	18:42	22:54	02:15	02:24		55.63204	
S57	16:39	18:39	18:39	23:39	02:24		62.46059	
S58	16:15	18:24	22:39	23:36	02:24		60.49985	
S59	16:06	18:27	18:54	23:42	02:24		61.4508	
S60	16:06	17:54	19:03	00:42	02:24		59.20942	
S61	16:00	19:09	19:27	02:21	02:24		55.10617	
S62	15:54	19:21	22:36	01:36	02:24		56.66374	
S565	16:18	18:39	19:24	01:27	02:24		54.13718	
S567	16:51	21:21	21:21	01:12	01:00	03:15	53.45344	55.35903
S568	16:21	22:33	22:36	07:39	01:00	03:15	45.61158	49.02347
S572	16:18	22:36	23:39	01:27	01:00	03:15	53.29613	55.00634
S573	16:12	22:36	23:03	04:42	01:09		57.7276	
S574	16:21	22:42	00:36	05:42	01:09		52.28267	
S652	16:21	17:24	17:30	01:24	00:00		52.25332	
S653	14:00	17:12	17:24	01:06	00:00		55.2027	
S654		17:21	17:30	19:39	00:00		63.91417	
S655	16:33	18:30	18:36	01:30	00:00		51.36907	
S656	16:30	18:39	18:39	01:39	00:00		56.04834	

S657	16:27	18:39	19:00	01:12	00:00		55.7759	
S658	17:15	18:42	18:45	01:00	00:00		57.3721	
S659	17:00	18:42	18:45	00:51	00:00		57.38508	
S664	16:33	18:45	19:00	00:48	00:24		62.2959	
S665	16:30	18:39	19:48	04:24	00:24		60.2114	
S667	16:39	19:54	19:54	01:03	00:24		61.60546	
S668	16:39	17:42	17:42	23:57	00:24		68.92727	
S669	16:36	17:33	19:00		00:24		49.39721	
S671	16:42	18:00			01:03		51.69133	
S672	16:48	18:09		02:18	01:03		65.27058	
S1555	16:48	21:42	00:24	03:00	01:03		63.68882	
S1556	16:51	23:48	00:03	07:33	01:03		60.80806	
S1557	16:51	18:06	18:09	01:09	01:03		69.07014	
S1558	16:54	00:21	00:30	01:27	01:03		63.7752	
S1559	16:57	23:48	00:21	01:30	01:03		67.53061	
S1560	17:09	23:45	00:54	01:57	01:03		61.4214	
S1561	16:54	23:48	00:15	06:57	05:48		68.06318	

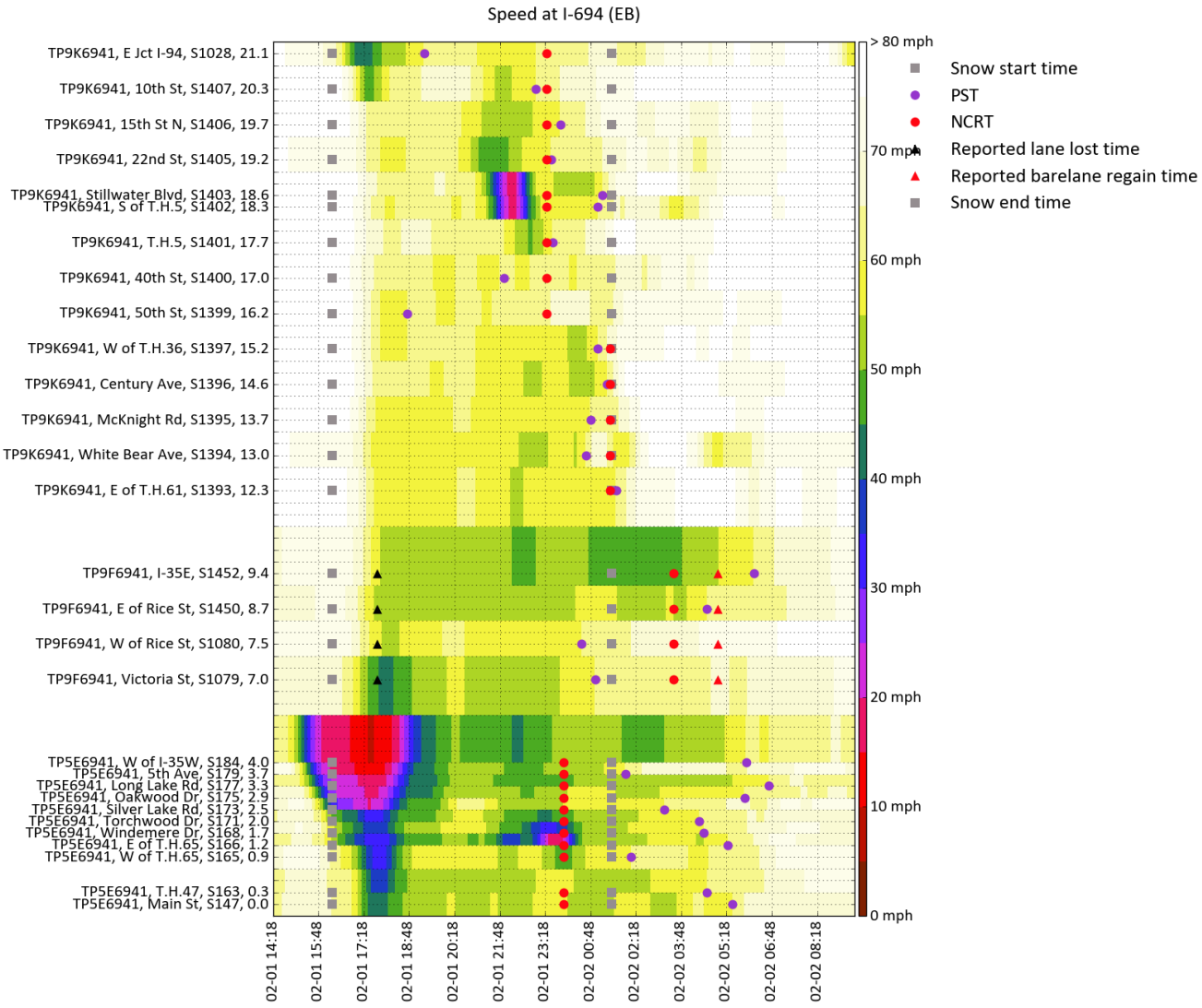
I-35W (SB)


Speed at I-35W (SB)
TP9P35W1, Southcross Dr, S915, 39.4
TP9P35W1, Co Rd 42, S265, 38.9
TP9P35W1, McAndrews Rd, S1609, 38.4
TP9P35W1, Timberland Dr, S82, 37.9
TP9P35W1, Burnsville Pkwy, S81, 37.3
TP9P35W1, S of T.H.13, S1608, 37.1
TP9P35W1, N of T.H.13, S80, 36.7
TP9P35W1, Cliff Rd, S79, 36.2
TP9P35W1, S of 113th St, S1607, 35.7
TP9P35W1, 113th St, S78, 35.3
TP9P35W1, 110th St, S31, 34.6
TP9P35W1, S of 106th St, S30, 34.5
TP9P35W1, 102nd St, S29, 33.8
TP9P35W1, S of 98th St, S28, 33.6
TP9P35W1, S of 94th St, S1606, 33.1
TP9P35W1, 92nd St, S27, 32.6
TP9P35W1, 90th St, S26, 32.0
TP9P35W1, 85th St, S25, 31.8
TP9P35W1, 82nd St, S24, 31.1
TP5J35W1, 76th St, S22, 30.5
TP5J35W1, 73rd St, S21, 30.2
TP5J35W1, 70th St, S20, 29.8
TP5J35W1, 66th St, S19, 29.4
TP5J35W1, Lyndale Ave, S17, 28.7
TP5J35W1, 58th St, S15, 28.0
TP5J35W1, Diamond Lake Rd, S14, 27.5
TP5J35W1, 53rd St, S12, 27.2
TP5J35W1, 47th St, S11, 26.3
TP5J35W1, 46th St, S10, 26.3
TP5J35W1, 42nd St, S9, 25.8
TP5J35W1, 37th St, S8, 25.3
TP5J35W1, 35th St, S7, 24.9
TP5J35W1, 31st St, S6, 24.4
TP5J35W1, 28th St, S5, 24.1
TP5J35W1, 26th St, S4, 23.8
TP5H35W1, Washington Ave, S584, 22.1
TP5H35W1, University Ave, S583, 21.5
TP5H35W1, Stinson Blvd, S579, 19.9
TP5F35W1, Co Rd C, S696, 17.7
TP5F35W1, Iona Ln, S695, 17.3
TP5F35W1, Co Rd D, S694, 16.9
TP5F35W1, T.H.88, S693, 16.3
TP5F35W1, Co Rd E, S692, 15.8
TP5F35W1, Co Rd E2, S691, 15.3
TP5F35W1, Round Lake Rd, S685, 14.2
TP5F35W1, Co Rd 96, S684, 13.8
TP5F35W1, Co Rd 10, S683, 13.1
TP5F35W1, Co Rd H, S682, 12.5
TP5F35W1, Co Rd I, S681, 11.9
TP5F35W1, 95th Ave, S678, 9.4
TP5F35W1, Sunset Rd, S1573, 6.6
TP5F35W1, S of Co Rd 23, S1572, 5.7
TP5F35W1, Co Rd 23, S1571, 4.9
TP5F35W1, Co Rd 14, S1570, 2.7
TP5F35W1, 81st St, S1569, 1.7
TP5E35W1, Co Rd 21, S1568, 0.3
TP5F35W1, I-35E, S1567, 0.0
02-01 14:33
02-01 16:03
02-01 17:33
02-01 19:03
02-01 20:33
02-01 22:03
02-01 23:33
02-02 01:03
02-02 02:33
02-02 04:03
02-02 05:33
02-02 07:03
02-02 08:33
02-02 10:03
02-02 11:33
02-02 13:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1567		23:06	23:06	23:30	00:36		77.54745	
S1568		00:03	00:03	00:54	00:36		65.77774	
S1569		21:30		01:18	00:36		66.23765	
S1570		21:27	23:45	00:03	00:36		75.49522	
S1571		23:36		01:33	00:36		67.72565	
S1572		21:45	00:33	07:15	00:36		57.78178	
S1573		00:21	00:24	01:00	00:36		63.1029	
S678	17:03	00:27	00:30		00:36		48.41999	
S681	16:45	22:18	23:51	04:33	00:24		57.52638	
S682	16:48	17:51	23:51	03:18	00:24		58.97544	
S683	16:48	17:54		19:18	00:24		59.96969	
S684	16:00	17:54	23:45	03:03	00:24		61.11713	
S685	16:03	17:54	23:54	01:06	00:24		62.69748	
S691	16:42	18:03	19:00	19:18	03:09		66.06396	
S692	16:39	18:15	02:45	19:09	03:09		66.62215	
S693	16:42	02:36	02:42	02:57	03:09		62.09662	
S694	16:51	18:09	00:33	00:51	03:09		63.40072	
S695	16:48	18:03	02:39	19:45	03:09		62.61798	
S696		17:51	18:57	19:48	03:09		63.71933	
S579	16:21	20:15	20:15	00:45	22:24	03:15	47.36995	50.26458
S583	16:03	17:27	21:57	05:36	22:24	03:15	38.23729	51.09806
S584	15:12	17:09	17:48	23:21	22:24	03:15	50.39974	55.63798
S4	16:00	18:42	22:57	23:48	00:15		59.95902	
S5	16:00	18:45	18:45	23:48	00:15		56.98971	
S6	16:00	18:39	18:42	23:48	00:15		57.91419	
S7	16:00	18:33	18:39	23:27	00:15		59.6311	
S8	16:00	18:30	18:33	19:45	00:15		61.78378	
S9	16:00	18:27	18:27	19:51	00:15		66.43393	
S10	16:00	18:18	18:24	00:03	00:15		56.51549	
S12		17:33	22:30	00:18	00:15		54.80246	
S14		17:21	22:33	23:45	00:15		58.84758	
S15	16:12	22:39	23:00	03:48	00:15		52.48649	
S17	16:18	22:36	23:51	06:12	00:15		39.82132	
S19	16:21	22:42	01:33	04:12	02:48		47.73718	
S20	16:33	17:45	22:48	23:36	02:48		58.77744	
S21	16:48	17:51	01:51	02:03	02:48		58.58072	
S22	16:36	18:09	21:00	00:09	02:48		59.79602	
S24	16:21	18:54	00:03	03:36	00:21		59.74924	
S25	16:12	16:54	16:54	04:21	00:21		59.77294	
S26	16:09	16:51	16:51	03:42	00:21		63.26761	
S27	16:27	18:36	19:15	03:42	00:21		63.77621	
S1606	16:30	17:39	00:03	04:09	00:21		63.65083	
S28	16:21	17:21	17:21	00:09	00:21		65.93932	

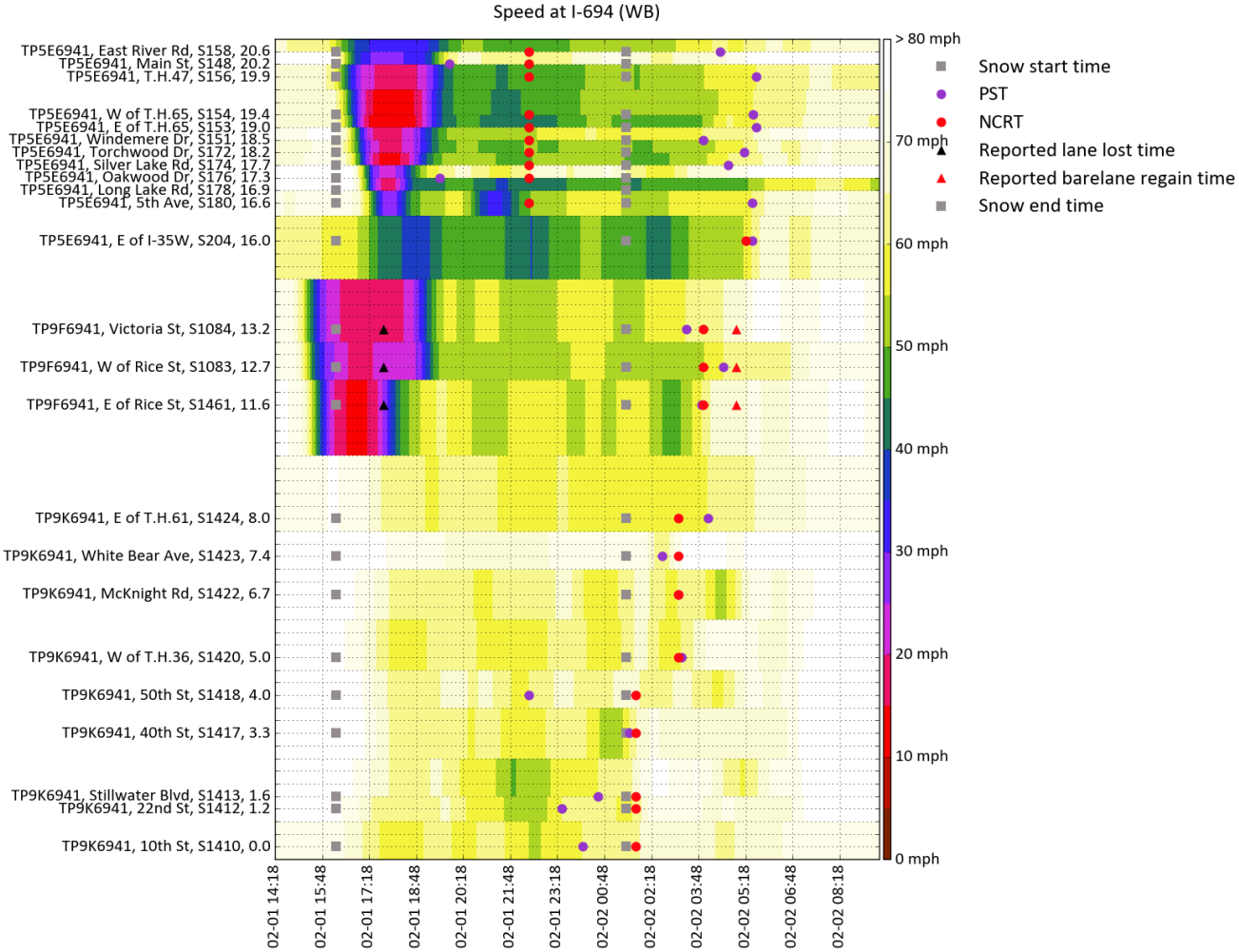
S29	16:27	17:24	18:48	00:39	00:21		63.02553	
S30	16:36	21:24	22:54	03:12	00:21		64.75083	
S31	16:33	18:51	19:06	23:24	00:21		66.93769	
S78	16:39	21:06	22:36	07:24	00:21		57.70651	
S1607	16:45	18:48	22:39	22:54	00:21		68.87952	
S79	16:36	19:00	19:15	03:42	00:21		63.15856	
S80	16:24	21:30	00:15	04:27	00:21		54.65639	
S1608	16:33	21:33	03:51	04:15	04:54		70.84875	
S81	16:30	03:33	03:54	04:33	04:54		69.04045	
S82	16:36	21:21	02:51	03:36	04:54		69.60169	
S1609	16:45	18:54	04:33	19:21	04:54		70.79938	
S265	16:00	21:39	03:27	03:42	04:54		77.00432	
S915	16:36	18:27	02:42	03:15	04:54		69.24463	

I-694 (EB)


Speed at I-694 (EB)
TP9K6941, E Jct I-94, S1028, 21.1
TP9K6941, 10th St, S1407, 20.3
TP9K6941, 15th St N, S1406, 19.7
TP9K6941, 22nd St, S1405, 19.2
TP9K6941, Stillwater Blvd, S1403, 18.6
TP9K6941, S of T.H.5, S1402, 18.3
TP9K6941, T.H.5, S1401, 17.7
TP9K6941, 40th St, S1400, 17.0
TP9K6941, 50th St, S1399, 16.2
TP9K6941, W of T.H.36, S1397, 15.2
TP9K6941, Century Ave, S1396, 14.6
TP9K6941, McKnight Rd, S1395, 13.7
TP9K6941, White Bear Ave, S1394, 13.0
TP9K6941, E of T.H.61, S1393, 12.3
TP9F6941, I-35E, S1452, 9.4
TP9F6941, E of Rice St, S1450, 8.7
TP9F6941, W of Rice St, S1080, 7.5
TP9F6941, Victoria St, S1079, 7.0
TP5E6941, W of I-35W, S184, 4.0
TP5E6941, 5th Ave, S179, 3.7
TP5E6941, Long Lake Rd, S177, 3.3
TP5E6941, Oakwood Dr, S175, 2.9
TP5E6941, Silver Lake Rd, S173, 2.5
TP5E6941, Torchwood Dr, S171, 2.0
TP5E6941, Windemere Dr, S168, 1.7
TP5E6941, E of T.H.65, S166, 1.2
TP5E6941, W of T.H.65, S165, 0.9
TP5E6941, T.H.47, S163, 0.3
TP5E6941, Main St, S147, 0.0
02-01 14:18
02-01 15:48
02-01 17:18
02-01 18:48
02-01 20:18
02-01 21:48
02-01 23:18
02-02 00:48
02-02 02:18
02-02 03:48
02-02 05:18
02-02 06:48
02-02 08:18
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

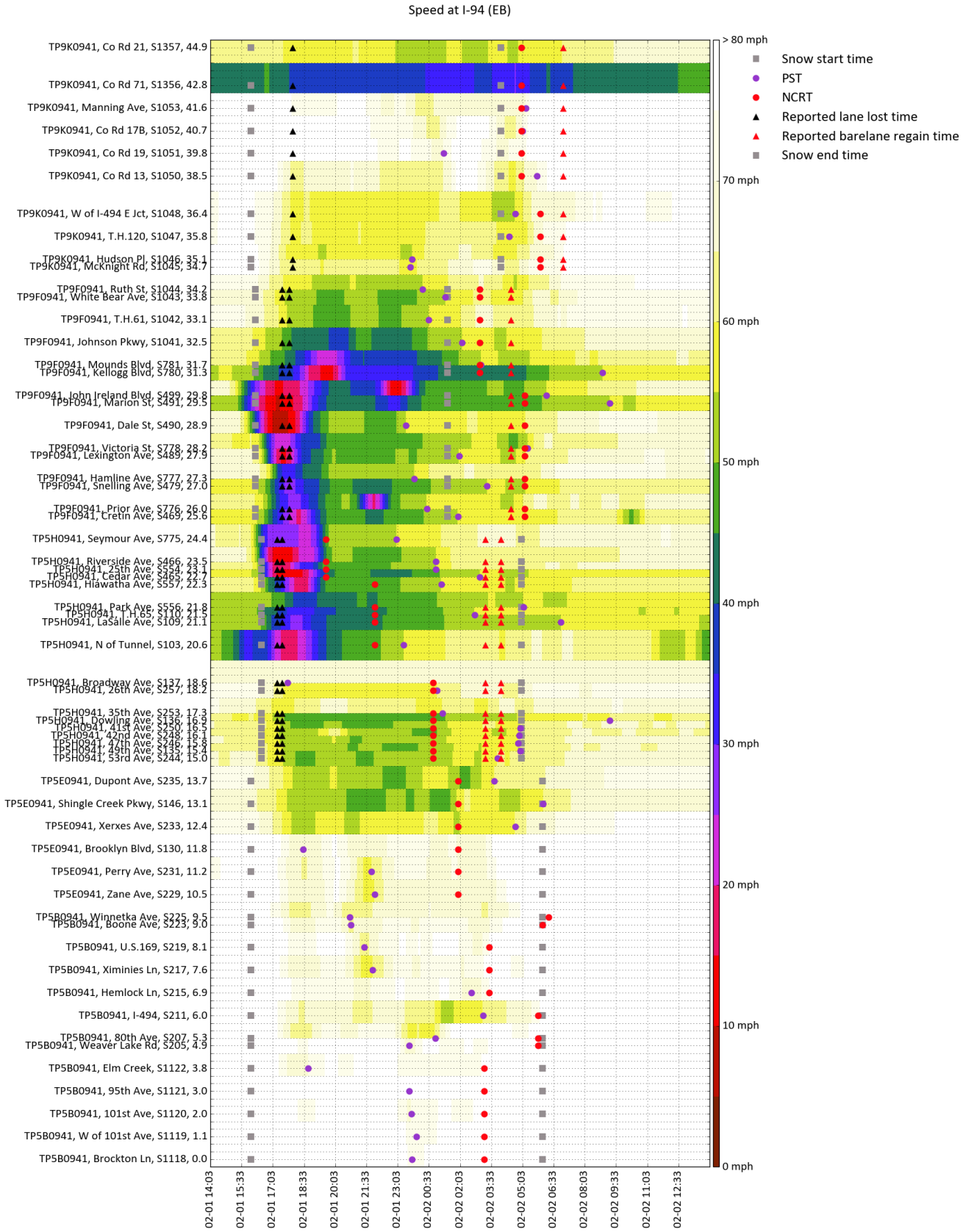
Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S147	16:42	17:42	18:36	05:30	23:54		55.35322	
S163	16:42	17:48	17:48	04:39	23:54		56.25319	
S165	15:57	17:48		02:09	23:54		48.30259	
S166	15:54	23:36		05:21	23:54		21.44205	
S168	15:51	23:24	23:24	04:33	23:54		37.93577	
S171	15:48	17:39	23:21	04:24	23:54		47.0243	
S173	15:45	17:30	23:21	03:15	23:54		55.2099	
S175	15:45	17:33	17:36	05:54	23:54		54.53577	
S177	15:45	17:36	17:36	06:42	23:54		49.41627	
S179	15:45	17:33	17:45	01:57	23:54		54.702	
S184	15:45	17:33	17:51	05:57	23:54		53.40896	
S1079	16:39	18:00	21:06	00:57	03:33	05:00	63.47852	66.41093
S1080	16:45	18:06	00:24	00:30	03:33	05:00	67.1624	74.26524
S1450	16:51	18:21		04:39	03:33	05:00	54.91808	62.93531
S1452	16:57	03:21	03:21	06:12	03:33	05:00	47.10721	54.95121
S1393	16:27	22:21	01:00	01:39	01:27		58.74539	
S1394	16:54	23:00	00:27	00:39	01:27		61.69729	
S1395	16:42	00:09	01:18	00:48	01:27		61.90785	
S1396	16:39	00:30	00:39	01:21	01:27		62.73509	
S1397	16:48	00:21	00:36	01:03	01:27		67.25459	
S1399	16:51	18:12	23:09	18:45	23:21		63.79637	
S1400	16:36	21:21	22:57	21:57	23:21		62.8675	
S1401	16:33	22:48	22:57	23:33	23:21		56.92587	
S1402	16:51	22:12	22:15	01:03	23:21		58.17519	
S1403	16:57	22:09	22:15	01:12	23:21		57.40985	
S1405	16:51	21:33	21:51	23:30	23:21		59.24184	
S1406	16:54	21:51	23:00	23:48	23:21		57.76965	
S1407	16:33	17:30	22:48	23:00	23:21		62.73982	
S1028	16:15	17:15	17:15	19:18	23:21		62.34039	

I-694 (WB)


Speed at I-694 (WB)
TP5E6941, East River Rd, S158, 20.6
TP5E6941, Main St, S148, 20.2
TP5E6941, T.H.47, S156, 19.9
TP5E6941, W of T.H.65, S154, 19.4
TP5E6941, E of T.H.65, S153, 19.0
TP5E6941, Windemere Dr, S151, 18.5
TP5E6941, Torchwood Dr, S172, 18.2
TP5E6941, Silver Lake Rd, S174, 17.7
TP5E6941, Oakwood Dr, S176, 17.3
TP5E6941, Long Lake Rd, S178, 16.9
TP5E6941, 5th Ave, S180, 16.6
TP5E6941, E of I-35W, S204, 16.0
TP9F6941, Victoria St, S1084, 13.2
TP9F6941, W of Rice St, S1083, 12.7
TP9F6941, E of Rice St, S1461, 11.6
TP9K6941, E of T.H.61, S1424, 8.0
TP9K6941, White Bear Ave, S1423, 7.4
TP9K6941, McKnight Rd, S1422, 6.7
TP9K6941, W of T.H.36, S1420, 5.0
TP9K6941, 50th St, S1418, 4.0
TP9K6941, 40th St, S1417, 3.3
TP9K6941, Stillwater Blvd, S1413, 1.6
TP9K6941, 22nd St, S1412, 1.2
TP9K6941, 10th St, S1410, 0.0
02-01 14:18
02-01 15:48
02-01 17:18
02-01 18:48
02-01 20:18
02-01 21:48
02-01 23:18
02-02 00:48
02-02 02:18
02-02 03:48
02-02 05:18
02-02 06:48
02-02 08:18
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1410	16:27	22:33	23:57	00:06	01:48		64.32349	
S1412	16:45	22:27	22:33	23:27	01:48		61.9091	
S1413	16:54	21:54	22:42	00:36	01:48		67.30467	
S1417	16:48	01:00	01:06	01:36	01:48		64.43733	
S1418	16:45	22:03		22:24	01:48		66.9991	
S1420	16:51	00:51	02:48	03:15	03:09		59.19907	
S1422	17:00	00:30	02:51	03:09	03:09		60.06065	
S1423	17:00	02:39	02:39	02:39	03:09		72.716	
S1424	17:03	00:30		04:06	03:09		57.90276	
S1461	15:45	16:57	03:03	03:54	03:57	05:00	61.30314	68.56477
S1083	15:45	16:57	18:18	04:36	03:57	05:00	54.8085	61.47377
S1084	09:30	17:00	18:00	03:24	03:57	05:00	62.69221	65.59255
S204	16:42	18:51	22:36	05:30	05:18		56.13145	
S180	16:42	17:57	21:12	05:30	22:24		49.81654	
S176	16:36	17:51	17:51	19:33	22:24		64.93352	
S174	16:33	17:54	17:57	04:45	22:24		49.83996	
S172	16:24	17:51	18:12	05:15	22:24		50.37417	
S151	16:24	17:42	18:03	03:57	22:24		53.66482	
S153	16:18	18:09	18:27	05:39	22:24		44.19704	
S154	16:12	18:12	18:36	05:33	22:24		46.16992	
S156	16:03	18:00	18:33	05:39	22:24		46.65485	
S148	16:00	17:48	19:00	19:51	22:24		63.61562	
S158	15:54	18:27	19:06	04:30	22:24		49.65478	

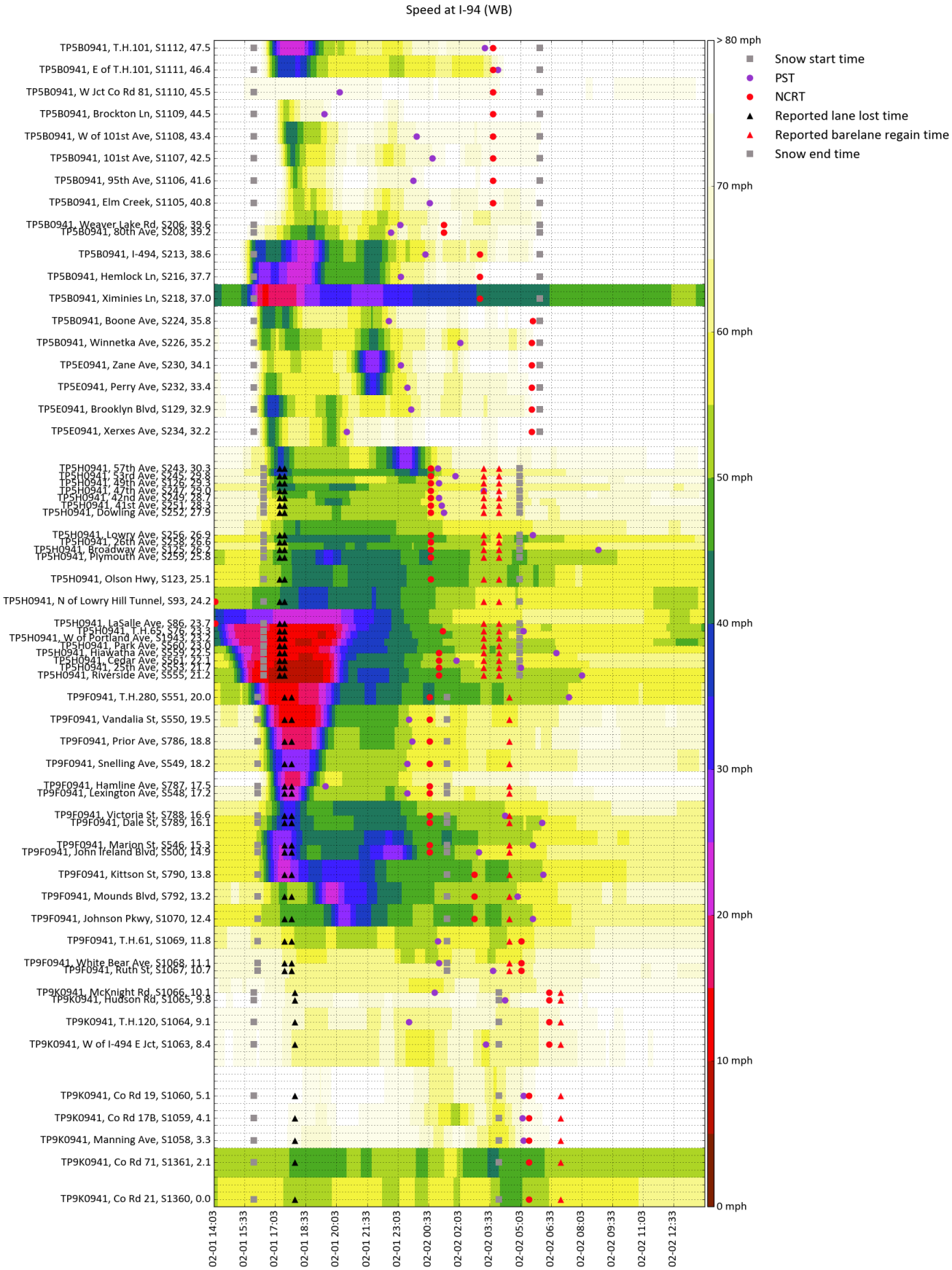
I-94 (EB)


Speed at I-94 (EB)
TP9K0941, Co Rd 21, S1357, 44.9
TP9K0941, Co Rd 71, S1356, 42.8
TP9K0941, Manning Ave, S1053, 41.6
TP9K0941, Co Rd 17B, S1052, 40.7
TP9K0941, Co Rd 19, S1051, 39.8
TP9K0941, Co Rd 13, S1050, 38.5
TP9K0941, W of I-494 E Jct, S1048, 36.4
TP9K0941, T.H.120, S1047, 35.8
TP9K0941, Hudson Pl, S1046, 35.1
TP9K0941, McKnight Rd, S1045, 34.7
TP9F0941, Ruth St, S1044, 34.2
TP9F0941, White Bear Ave, S1043, 33.8
TP9F0941, T.H.61, S1042, 33.1
TP9F0941, Johnson Pkwy, S1041, 32.5
TP9F0941, Mounds Blvd, S781, 31.7
TP9F0941, Kellogg Blvd, S780, 31.3
TP9F0941, John Ireland Blvd, S499, 29.8
TP9F0941, Marion St, S491, 29.5
TP9F0941, Dale St, S490, 28.9
TP9F0941, Victoria St, S778, 28.2
TP9F0941, Lexington Ave, S489, 27.9
TP9F0941, Hamline Ave, S777, 27.3
TP9F0941, Snelling Ave, S479, 27.0
TP9F0941, Prior Ave, S776, 26.0
TP9F0941, Cretin Ave, S469, 25.6
TP5H0941, Seymour Ave, S775, 24.4
TP5H0941, Riverside Ave, S466, 23.5
TP5H0941, 25th Ave, S554, 23.1
TP5H0941, Cedar Ave, S465, 22.7
TP5H0941, Hiawatha Ave, S557, 22.3
TP5H0941, Park Ave, S556, 21.8
TP5H0941, T.H.65, S110, 21.5
TP5H0941, LaSalle Ave, S109, 21.1
TP5H0941, N of Tunnel, S103, 20.6
TP5H0941, Broadway Ave, S137, 18.6
TP5H0941, 26th Ave, S257, 18.2
TP5H0941, 35th Ave, S253, 17.3
TP5H0941, Dowling Ave, S136, 16.9
TP5H0941, 41st Ave, S250, 16.5
TP5H0941, 42nd Ave, S248, 16.1
TP5H0941, 47th Ave, S246, 15.8
TP5H0941, 49th Ave, S135, 15.4
TP5H0941, 53rd Ave, S244, 15.0
TP5E0941, Dupont Ave, S235, 13.7
TP5E0941, Shingle Creek Pkwy, S146, 13.1
TP5E0941, Xerxes Ave, S233, 12.4
TP5E0941, Brooklyn Blvd, S130, 11.8
TP5E0941, Perry Ave, S231, 11.2
TP5E0941, Zane Ave, S229, 10.5
TP5B0941, Winnetka Ave, S225, 9.5
TP5B0941, Boone Ave, S223, 9.0
TP5B0941, U.S.169, S219, 8.1
TP5B0941, Ximinies Ln, S217, 7.6
TP5B0941, Hemlock Ln, S215, 6.9
TP5B0941, I-494, S211, 6.0
TP5B0941, 80th Ave, S207, 5.3
TP5B0941, Weaver Lake Rd, S205, 4.9
TP5B0941, Elm Creek, S1122, 3.8
TP5B0941, 95th Ave, S1121, 3.0
TP5B0941, 101st Ave, S1120, 2.0
TP5B0941, W of 101st Ave, S1119, 1.1
TP5B0941, Brockton Ln, S1118, 0.0
02-01 14:03
02-01 15:33
02-01 17:03
02-01 18:33
02-01 20:03
02-01 21:33
02-01 23:03
02-02 00:33
02-02 02:03
02-02 03:33
02-02 05:03
02-02 06:33
02-02 08:03
02-02 09:33
02-02 11:03
02-02 12:33
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1118	17:00	23:45	02:54	23:45	03:12		82.51524	
S1119	16:03	23:57	02:57	23:57	03:12		78.27386	
S1120	17:15	23:33	02:18	23:42	03:12		79.10721	
S1121	17:27	23:36	02:57	23:36	03:12		80.64755	
S1122	16:33	18:09	02:39	18:45	03:12		75.87011	
S205	17:09	23:36	03:03	23:36	05:48		82.0193	
S207	16:24	00:33	05:00	00:51	05:48		84.35695	
S211	16:03	01:24	01:30	03:09	05:48		73.79614	
S215	17:15	02:36	03:00	02:36	03:27		75.1702	
S217	16:57	21:33	22:03	21:51	03:27		77.92132	
S219	17:12	21:27	03:03	21:27	03:27		75.37597	
S223	16:42	20:48	03:27	20:48	06:00		81.97602	
S225	16:24	20:45	04:30	20:45	06:18		80.6367	
S229	16:21	21:39	21:54	21:57	01:57		67.47764	
S231	17:03	21:33	01:00	21:48	01:57		69.90198	
S130	16:54	18:30		18:30	01:57		69.42776	
S233	16:12	20:48	01:54	04:42	01:57		54.77316	
S146	16:15	01:06	01:06	06:03	01:57		56.58096	
S235	16:12	22:51	23:48	03:42	01:57		50.65234	
S244	16:21	21:30		03:51	00:45	03:15	51.69107	55.8351
S135	16:33	20:54	00:12	04:57	00:45	03:15	52.81532	55.4303
S246	16:21	20:57	00:39	04:51	00:45	03:15	51.71761	55.95864
S248	16:33	00:30	00:42	04:54	00:45	03:15	49.03125	56.04472
S250	16:33	20:57	00:12	04:57	00:45	03:15	51.23387	60.98963
S136	16:39	22:21	00:12	09:15	00:45	03:15	48.80131	52.84993
S253	16:15	00:27	00:27	01:12	00:45	03:15	57.60337	59.25061
S257	16:36	18:57	00:21	00:57	00:45	03:15	59.3655	65.47056
S137		17:45		17:45	00:45	03:15	66.51342	65.65861
S103	16:36	17:48	18:06	23:21	21:57	03:15	47.70446	63.06238
S109	16:24	18:12	18:30	06:54	21:57	03:15	43.18025	53.96599
S110	16:09	18:15	18:45	02:45	21:57	03:15	41.52794	55.94026
S556	16:30	18:36	18:57	05:06	21:57	03:15	44.70839	54.35509
S557	16:21	18:27	18:33	01:09	21:57	03:15	46.76686	58.16017
S465	16:15	17:42	18:21	03:00	19:36	03:15	41.18486	56.25819
S554	16:06	17:27	17:36	00:54	19:36	03:15	47.71559	63.05008
S466	15:57	17:30	17:39	00:54	19:36	03:15	44.06421	63.46346
S775	15:57	18:36	18:36	23:00	19:36	03:15	45.97433	66.59847
S469	16:09	18:15	18:15	01:57	05:09	04:30	55.83492	56.14208
S776	16:12	21:54	21:57	00:27	05:09	04:30	60.77096	54.25629
S479	16:06	17:51	17:54	03:21	05:09	04:30	54.98507	53.97846
S777	16:30	17:45	17:48	23:51	05:09	04:30	62.32416	63.36075
S489	16:21	17:33	17:42	02:00	05:09	04:30	59.93341	53.33498
S778	16:18	17:30	04:39	05:18	05:09	04:30	53.33204	49.48522

S490	15:30	17:21	22:30	23:27	05:09	04:30	59.77902	55.56593
S491	15:30	17:15	23:00	09:15	05:09	04:30	47.18978	45.18043
S499	15:30	22:57	22:57	06:12	05:09	04:30	50.2097	48.33019
S780	16:06	19:42	19:51	08:54	03:00	04:30	43.10894	42.35901
S781	16:03	19:39	20:03	03:03	03:00	04:30	54.72312	51.02122
S1041	16:15	20:18	20:33	02:09	03:00	04:30	57.88869	55.40159
S1042	16:18	20:15	00:00	00:33	03:00	04:30	65.93417	60.9831
S1043	16:21	23:24	23:48	01:21	03:00	04:30	61.17885	56.25404
S1044	16:21	21:42	00:30	00:15	03:00	04:30	65.08926	55.5376
S1045	16:24	23:39	04:33	23:39	05:54	07:00	71.81798	75.54482
S1046	16:27	23:27	05:03	23:45	05:54	07:00	69.61054	74.7268
S1047	16:36	04:24	05:03	04:24	05:54	07:00	69.11237	74.25424
S1048	16:36	04:09	04:24	04:42	05:54	07:00	66.93092	65.68495
S1050	16:30	04:33	04:36	05:45	05:00	07:00	63.12774	79.19154
S1051	17:06	00:57	04:27	01:15	05:00	07:00	73.08957	86.14047
S1052	17:06	00:48	04:36	05:03	05:00	07:00	69.74724	82.25007
S1053	17:06	00:15	04:54	05:12	05:00	07:00	67.21765	81.77071
S1356	17:33	04:42	04:45		05:00	07:00	31.23396	38.88404
S1357		00:42	04:39		05:00	07:00	55.96129	60.17839

I-94 (WB)

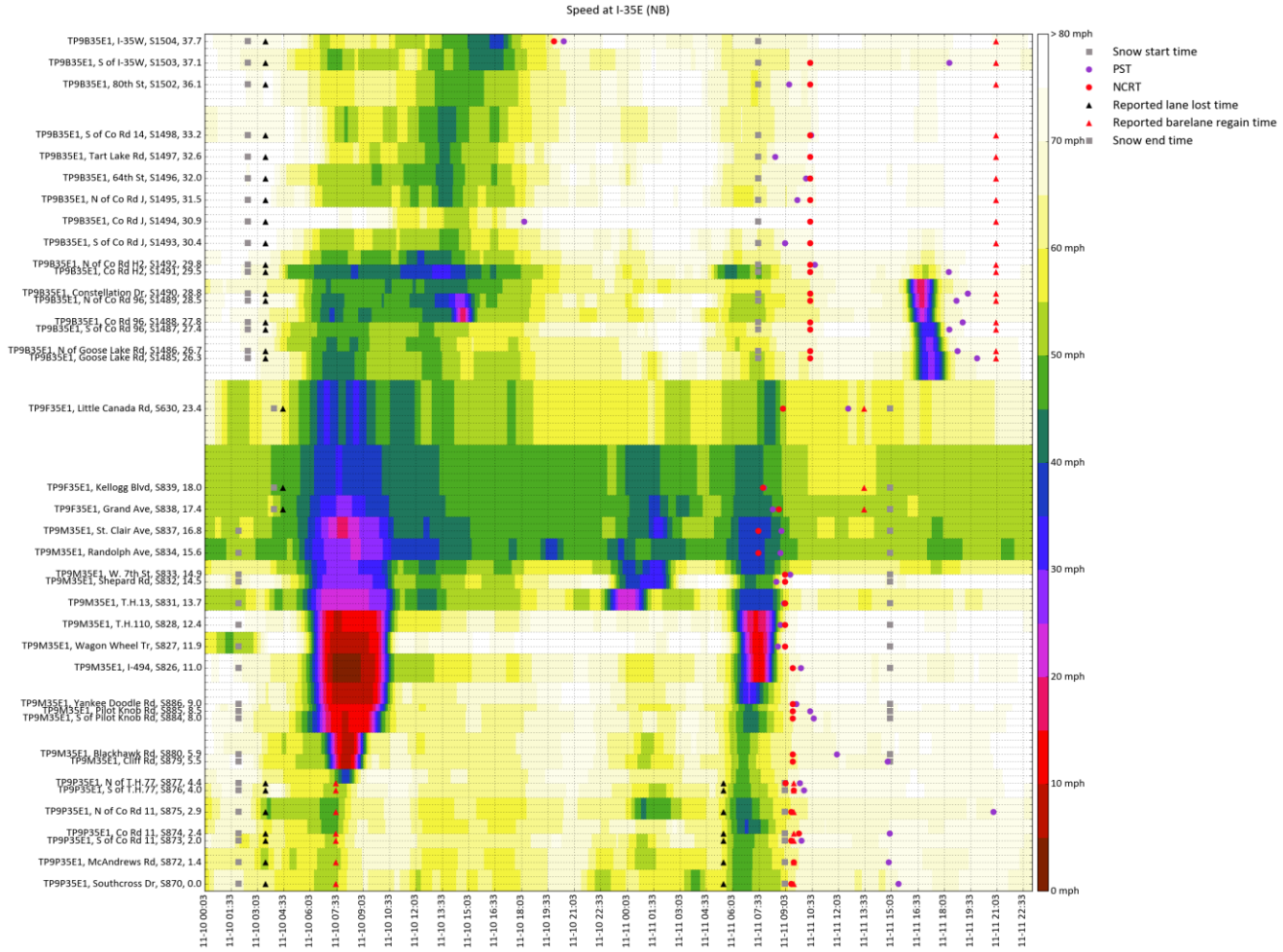

Speed at I-94 (WB)
TP5B0941, T.H.101, S1112, 47.5
TP5B0941, E of T.H.101, S1111, 46.4
TP5B0941, W Jct Co Rd 81, S1110, 45.5
TP5B0941, Brockton Ln, S1109, 44.5
TP5B0941, W of 101st Ave, S1108, 43.4
TP5B0941, 101st Ave, S1107, 42.5
TP5B0941, 95th Ave, S1106, 41.6
TP5B0941, Elm Creek, S1105, 40.8
TP5B0941, Weaver Lake Rd, S206, 39.6
TP5B0941, 80th Ave, S208, 39.2
TP5B0941, I-494, S213, 38.6
TP5B0941, Hemlock Ln, S216, 37.7
TP5B0941, Ximinies Ln, S218, 37.0
TP5B0941, Boone Ave, S224, 35.8
TP5B0941, Winnetka Ave, S226, 35.2
TP5E0941, Zane Ave, S230, 34.1
TP5E0941, Perry Ave, S232, 33.4
TP5E0941, Brooklyn Blvd, S129, 32.9
TP5E0941, Xerxes Ave, S234, 32.2
TP5H0941, 57th Ave, S243, 30.3
TP5H0941, 53rd Ave, S245, 29.8
TP5H0941, 49th Ave, S126, 29.3
TP5H0941, 47th Ave, S247, 29.0
TP5H0941, 42nd Ave, S249, 28.7
TP5H0941, 41st Ave, S251, 28.3
TP5H0941, Dowling Ave, S252, 27.9
TP5H0941, Lowry Ave, S256, 26.9
TP5H0941, 26th Ave, S258, 26.6
TP5H0941, Broadway Ave, S125, 26.2
TP5H0941, Plymouth Ave, S259, 25.8
TP5H0941, Olson Hwy, S123, 25.1
TP5H0941, N of Lowry Hill Tunnel, S93, 24.2
TP5H0941, LaSalle Ave, S86, 23.7
TP5H0941, T.H.65, S76, 23.3
TP5H0941, W of Portland Ave, S1943, 23.2
TP5H0941, Park Ave, S560, 23.0
TP5H0941, Hiawatha Ave, S559, 22.5
TP5H0941, Cedar Ave, S561, 22.1
TP5H0941, 25th Ave, S553, 21.7
TP5H0941, Riverside Ave, S555, 21.2
TP9F0941, T.H.280, S551, 20.0
TP9F0941, Vandalia St, S550, 19.5
TP9F0941, Prior Ave, S786, 18.8
TP9F0941, Snelling Ave, S549, 18.2
TP9F0941, Hamline Ave, S787, 17.5
TP9F0941, Lexington Ave, S548, 17.2
TP9F0941, Victoria St, S788, 16.6
TP9F0941, Dale St, S789, 16.1
TP9F0941, Marion St, S546, 15.3
TP9F0941, John Ireland Blvd, S500, 14.9
TP9F0941, Kittson St, S790, 13.8
TP9F0941, Mounds Blvd, S792, 13.2
TP9F0941, Johnson Pkwy, S1070, 12.4
TP9F0941, T.H.61, S1069, 11.8
TP9F0941, White Bear Ave, S1068, 11.1
TP9F0941, Ruth St, S1067, 10.7
TP9K0941, McKnight Rd, S1066, 10.1
TP9K0941, Hudson Rd, S1065, 9.8
TP9K0941, T.H.120, S1064, 9.1
TP9K0941, W of I-494 E Jct, S1063, 8.4
TP9K0941, Co Rd 19, S1060, 5.1
TP9K0941, Co Rd 17B, S1059, 4.1
TP9K0941, Manning Ave, S1058, 3.3
TP9K0941, Co Rd 71, S1361, 2.1
TP9K0941, Co Rd 21, S1360, 0.0
02-01 14:03
02-01 15:33
02-01 17:03
02-01 18:33
02-01 20:03
02-01 21:33
02-01 23:03
02-02 00:33
02-02 02:03
02-02 03:33
02-02 05:03
02-02 06:33
02-02 08:03
02-02 09:33
02-02 11:03
02-02 12:33
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1360		04:24	04:57		05:27	07:00	51.37114	56.78985
S1361		03:45	04:54		05:27	07:00	49.27624	52.96701
S1058	17:24	03:57	04:03	05:12	05:27	07:00	71.79666	77.61163
S1059	17:21	01:51	04:00	05:09	05:27	07:00	72.69291	80.74109
S1060	17:30	03:48	04:33	05:12	05:27	07:00	71.62468	84.30682
S1063	17:12	03:21	05:54	03:21	06:27	07:00	67.32708	68.16942
S1064	17:21	23:36	05:54	23:36	06:27	07:00	68.12024	70.06276
S1065	17:15	04:18	04:36	04:18	06:27	07:00	72.52691	72.59976
S1066	17:15	00:51	04:21	00:51	06:27	07:00	66.9373	66.19788
S1067		03:42		03:42	05:06	04:30	63.29074	62.40903
S1068	17:18	23:30	04:48	01:03	05:06	04:30	59.91171	58.04257
S1069	17:15	23:39	04:48	01:00	05:06	04:30	57.98634	55.6595
S1070	16:15	20:27	20:27	05:39	02:48	04:30	50.27057	52.50231
S792	16:18	19:48	19:51	04:54	02:48	04:30	54.32306	51.99655
S790	16:12	17:27	17:33	06:09	02:48	04:30	50.31798	50.0645
S500	16:15	17:18	23:15	03:00	00:36	04:30	48.08969	58.31467
S546	16:09	17:18	22:45	05:39	00:36	04:30	46.34661	51.33753
S789	16:15	17:42	17:42	06:06	00:36	04:30	48.11737	52.53862
S788	16:03	17:45	17:45	04:18	00:36	04:30	50.95992	56.23569
S548	16:15	17:48	18:06	23:30	00:36	04:30	59.51652	63.7971
S787	16:09	17:54	18:03	19:30	00:36	04:30	60.9468	68.94768
S549	16:15	17:51	18:48	23:30	00:36	04:30	59.00498	59.80189
S786	16:12	17:54	18:48	23:45	00:36	04:30	58.61812	62.26524
S550	16:06	17:54	18:48	23:36	00:36	04:30	59.09357	57.78659
S551	15:30	17:30	17:45	07:24	00:36	04:30	44.60444	51.71971
S555	15:30	18:39	19:12	08:03	01:03	03:15	49.44566	52.87035
S553	15:30	18:33	19:12	05:03	01:03	03:15	53.21391	55.17267
S561	15:33	18:30	19:18	01:54	01:03	03:15	51.97735	55.08837
S559	15:51	17:12	19:21	06:48	01:03	03:15	49.2831	50.52073
S560						03:15		52.44693
S1943						03:15		54.42238
S76		19:21	19:39	05:12	01:15	03:15	50.01434	52.23249
S86	15:42				14:06	03:15	40.17147	57.55494
S93	16:51				14:06	03:15	50.80616	56.32965
S123	17:09	22:45			00:39	03:15	47.40278	52.84912
S259	16:15	19:39	20:06		00:39	03:15	44.7838	50.48888
S125	16:18	19:57	00:21	08:51	00:39	03:15	50.32586	55.01587
S258	16:15	20:00	22:36		00:39	03:15	48.45681	53.95163
S256	16:15	18:09	00:06	05:39	00:39	03:15	52.95819	57.31288
S252	16:15	20:03	00:18	01:18	00:39	03:15	56.15333	61.67373
S251	16:15	19:54	19:57	01:12	00:39	03:15	57.39084	63.00331
S249	16:09	19:51	00:15	01:03	00:39	03:15	56.89043	63.48706
S247	16:18	17:27	20:48	03:15	00:39	03:15	55.19414	60.12054

S126	16:18	17:21	00:15	01:03	00:39	03:15	55.21376	64.4794
S245	16:18	17:15	23:54	01:51	00:39	03:15	47.17575	61.64456
S243	15:33	23:27	23:30	01:00	00:39	03:15	54.96472	67.78318
S234	16:03	16:54	19:48	20:33	05:36		86.31524	
S129	16:00	16:54	19:48	23:42	05:36		75.51093	
S232	15:57	21:51	01:51	23:30	05:36		76.52683	
S230	15:54	21:48	01:48	23:12	05:36		82.0254	
S226	15:48	21:51	01:45	02:06	05:36		73.95747	
S224	15:48	16:42	21:51	22:36	05:39		83.6263	
S218	15:36	16:33	22:12		03:03		40.31617	
S216	15:30	18:18	21:42	23:12	03:03		73.02605	
S213	15:30	18:36	22:15	00:24	03:03		62.15438	
S208	15:30	18:51	22:21	22:42	01:18		72.42169	
S206	16:03	19:00	22:27	23:09	01:18		72.03689	
S1105	16:15	18:06	23:15	00:36	03:42		72.44654	
S1106	17:00	18:03	23:24	23:48	03:42		76.92239	
S1107	16:18	17:54		00:45	03:42		72.18147	
S1108	16:21	17:48	22:54	23:57	03:42		73.76114	
S1109	16:39	17:36	02:00	19:27	03:42		83.98967	
S1110		20:12		20:12	03:42		74.88397	
S1111	16:12	18:09	18:15	03:57	03:42		65.94517	
S1112	16:09	17:57	23:03	03:18	03:42		81.11814	

Snow Event: 11-10-2014

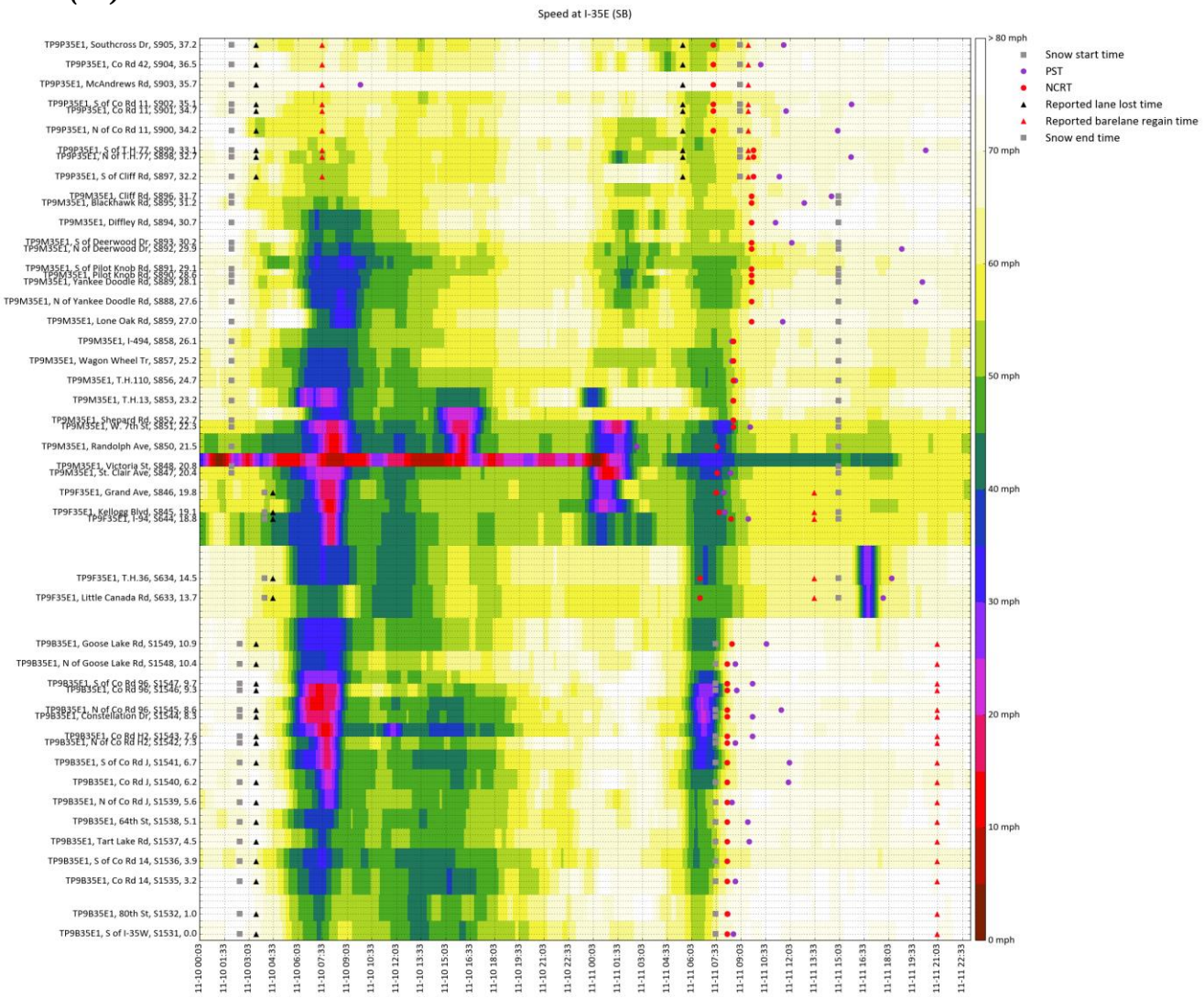
I-35E (NB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S870	02:42	06:30	08:24	15:27	09:21	09:30	62.21448	63.70038
S872	02:03	06:30	07:36	14:54	09:30	09:30	63.21673	63.21673
S873	04:15	06:36	07:30	09:57	09:21	09:30	65.33302	66.62851
S874	02:54	06:48	07:30	14:57	09:48	09:30	64.86595	63.12363
S875	02:45	06:39	07:00	20:51	09:21	09:30	60.18307	61.39518
S876	04:12	06:33	07:42	10:06	09:30	09:30	67.07198	67.07198
S877	02:54	08:03	06:51	09:51	09:03	09:30	64.17849	67.87096
S879	02:42	08:06	06:48	14:51	09:27		63.8777	
S880	03:00	08:12	06:48	11:57	09:27		65.44345	
S884	02:21	08:00	07:06	10:39	09:27		64.81231	
S885	02:33	07:51	07:00	10:27	09:27		66.85767	
S886	02:21	08:00	07:00	09:39	09:27		68.59046	

S826	01:51	07:51	07:33	09:54	09:27		67.23586	
S827		07:51	07:24	08:36	09:00		69.38125	
S828	01:54	07:33	07:33	08:45	09:00		64.43177	
S831	03:30	08:06	07:57	08:57	09:00		56.26669	
S832	04:00	08:00	08:00	08:30	09:00		68.46608	
S833	03:33	07:24	07:57	09:18	09:00		52.75716	
S834	05:09	08:36	06:57	08:45	07:30		39.02437	
S837	03:27	07:51	06:57	08:48	07:30		37.39432	
S838	04:00	08:00	08:06	08:18	08:39	13:30	47.94397	53.94134
S839	03:36	07:39	07:12	07:48	07:45	13:30	44.85505	56.23218
S630	04:18	07:00	08:12	12:36	08:54	13:30	52.76026	59.98166
S1485	01:42	08:18	08:06	19:54	10:27	21:00	65.36634	73.07313
S1486	01:51	07:15	07:42	18:48	10:27	21:00	66.43253	74.3794
S1487	01:30	08:45	07:36	18:21	10:27	21:00	68.9311	77.37219
S1488	02:15	14:42	07:39	19:06	10:27	21:00	61.70756	70.37629
S1489	03:36	14:36	07:42	18:45	10:27	21:00	64.29348	72.93422
S1490	01:33	13:51	08:48	19:24	10:27	21:00	65.12759	72.7786
S1491	01:45	13:27	07:42	18:18	10:27	21:00	65.60396	75.79519
S1492	02:27	12:18	09:30	10:42	10:27	21:00	68.96421	76.08963
S1493	03:27	14:03	07:57	09:00	10:27	21:00	73.04794	80.01535
S1494	03:09	14:30	09:48	18:12	10:27	21:00	87.80893	86.65006
S1495	01:30	13:39	07:21	09:42	10:27	21:00	74.4097	80.32529
S1496	02:00	13:39	07:12	10:12	10:27	21:00	72.40076	78.85023
S1497	03:42	13:39	07:54	08:27	10:27	21:00	75.9922	84.59752
S1498	05:03	13:48	10:06	10:30	10:27	21:00	69.62394	81.45714
S1502	03:51	13:51	07:36	09:15	10:27	21:00	70.99444	79.72739
S1503	04:30	16:00	09:00	18:21	10:27	21:00	68.00563	71.59117
S1504	02:21	16:42	16:51	20:27	19:54	21:00	65.61583	74.52588

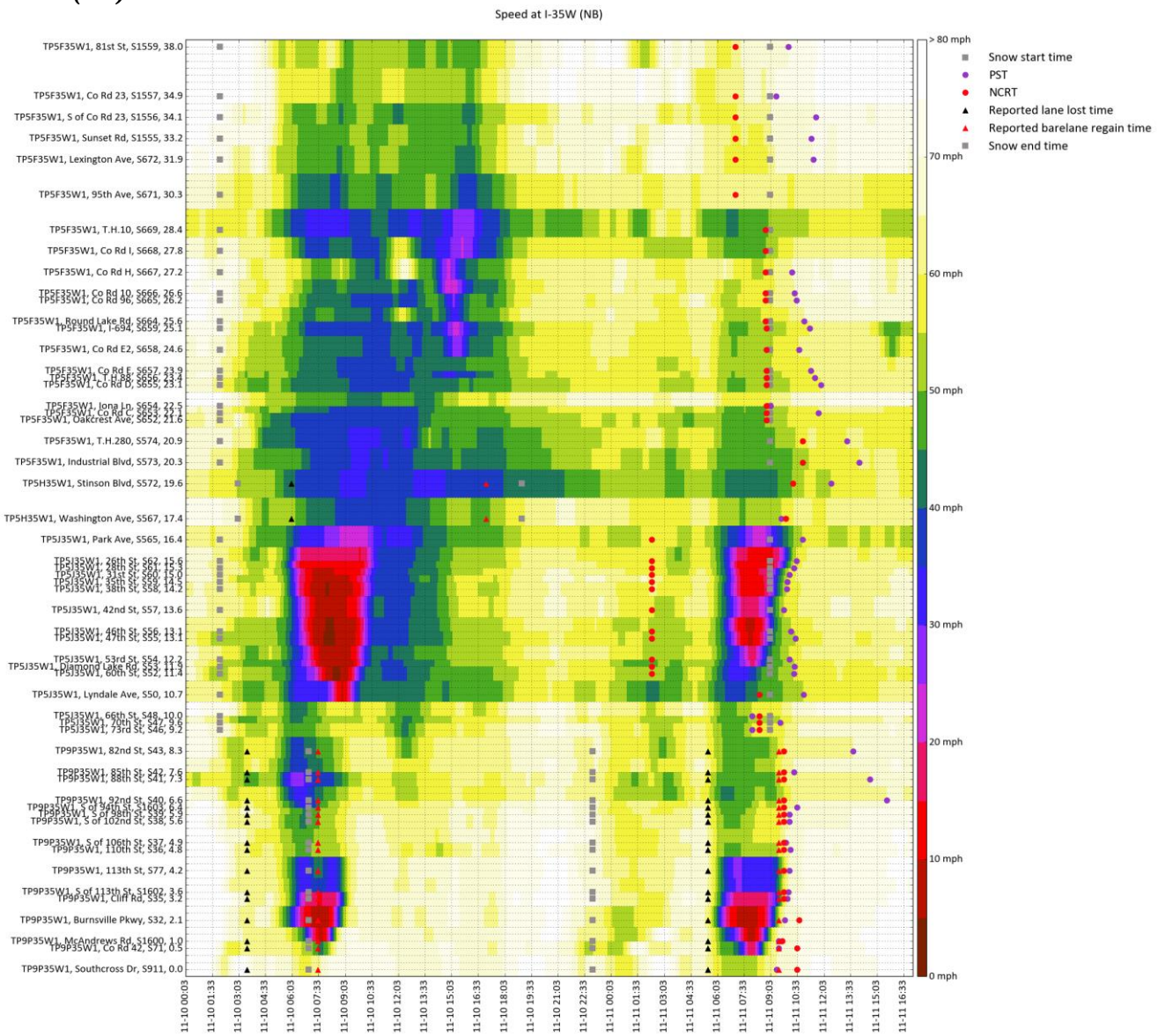
I-35E (SB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1531	02:42	13:33	06:57	08:36	08:12	21:00	67.60565	75.06863
S1532	01:42	13:27	07:00	08:15	08:12	21:00	69.63637	77.32257
S1535	02:57	07:21	07:03	08:42	08:12	21:00	65.55161	75.14489
S1536	03:30	07:30	07:15		08:12	21:00	60.28206	67.43757
S1537	03:48	07:30	07:15	09:33	08:12	21:00	65.83553	74.28884
S1538	03:45	07:39	07:15	09:27	08:12	21:00	65.65073	74.01223
S1539	03:42	07:57	06:36	08:30	08:12	21:00	68.21031	72.20019
S1540	03:57	07:54	07:18	11:57	08:12	21:00	60.71878	66.57394
S1541	03:48	07:51	07:24	12:00	08:12	21:00	57.24147	71.54926
S1542	03:54	07:48	06:42	08:42	08:12	21:00	64.91019	81.32054
S1543	03:21	07:45	06:51	09:45	08:12	21:00	60.86519	80.4347
S1544	03:27	07:18	06:45	09:45	08:12	21:00	61.54533	75.82135
S1545	03:27	07:12	06:39	11:30	08:12	21:00	59.20222	72.71741

S1546	02:18	07:21	07:30	08:48	08:12	21:00	58.97135	83.34321
S1547	03:12	06:51	07:03	09:45	08:12	21:00	61.65025	75.12343
S1548	01:45	08:12	07:00	08:42	08:12	21:00	64.97165	77.7616
S1549	02:30	08:12	07:21	10:36	08:30	21:00	64.04999	73.13635
S633	03:12	07:12		17:42	06:33	13:30	46.20871	61.8333
S634	03:18	07:33		18:15	06:33	13:30	40.98124	62.68203
S644	01:33	08:03	07:54	09:30	08:27	13:30	47.60038	57.98938
S845	05:00	08:00	07:12	08:03	07:42	13:30	42.99291	57.56509
S846	02:48	07:51	07:00	08:00	07:33	13:30	42.84157	58.14565
S847	03:27	00:51	07:12	08:24	07:36		38.30796	
S850	02:21	08:12		02:42	07:36		40.08643	
S851	03:57	15:54	08:03	09:36	08:36		44.5093	
S852	04:33	15:36	08:03	08:33	08:36		55.9173	
S853	03:27	07:48	07:48	08:33	08:36		55.73523	
S856	02:15	07:03	08:03	08:42	08:36		54.29249	
S857	03:24	07:12	07:36	08:30	08:36		56.6782	
S858	02:09	08:30	07:54	08:30	08:36		56.26	
S859	05:51	08:45	08:09	11:36	09:42		65.90324	
S888	02:27	08:39	08:42	19:42	09:42		60.91252	
S889	02:33	08:45	08:30	20:06	09:42		58.71595	
S890	02:15	08:39	08:30		09:42		60.41376	
S891	02:33	08:57	08:27		09:42		55.42869	
S892	02:12	08:51	08:51	18:51	09:42		57.29169	
S893	02:24	07:03	08:48	12:09	09:42		63.60081	
S894	02:15	07:12	08:33	11:09	09:42		65.30379	
S895	02:24	07:21	08:27	12:54	09:42		62.63911	
S896	01:30	02:33	07:57	14:33	09:42		63.97371	
S897	02:27	06:42	08:27	11:24	09:48	09:30	65.47371	64.55914
S898	02:21	01:36	06:57	15:45	09:48	09:30	63.52752	62.42061
S899	03:06	06:27	07:51	20:18	09:48	09:30	62.86598	61.47575
S900	01:36	06:12	06:48	14:57	07:21	09:30	59.13343	64.67007
S901	03:15	06:30	06:48	11:48	07:21	09:30	59.5163	65.03445
S902	03:21	06:24	06:39	15:48	07:21	09:30	56.24912	62.85173
S903		09:51		09:51	07:21	09:30	72.02121	72.45221
S904	02:36	04:36	06:33	10:15	07:21	09:30	58.34456	65.73844
S905	01:42	04:03	06:48	11:39	07:21	09:30	52.91495	64.77641

I-35W (NB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
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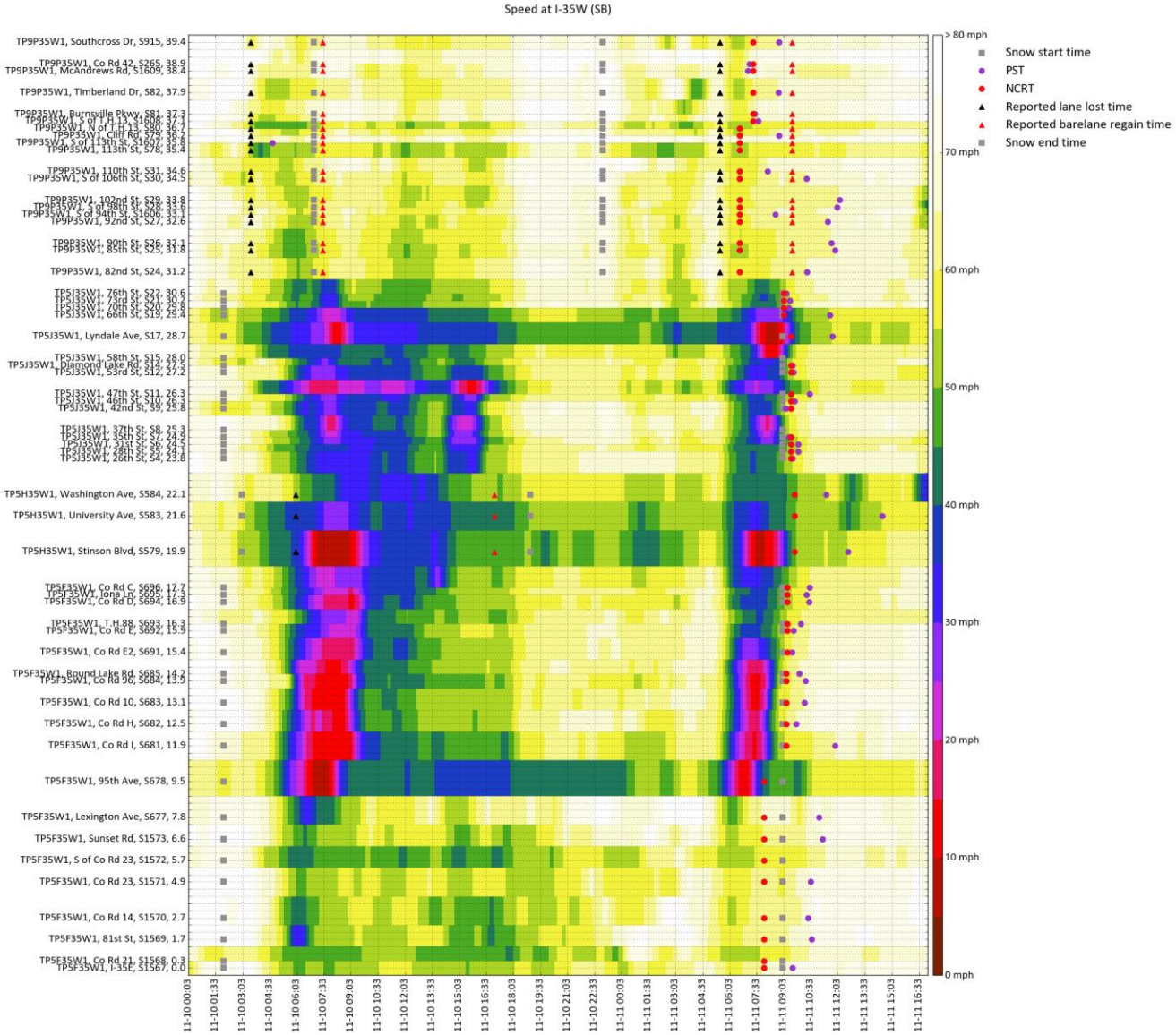
S71	01:45	07:57	08:00	09:30	10:33	07:30	70.54337	45.36627
S1600	01:39	07:57	07:57	09:30	09:42	07:30	68.27975	11.23935
S32	02:00	07:36	08:12	09:51	10:39	07:30	69.46653	8.118642
S35	02:12	07:36	08:27	10:00	09:48	07:30	57.87065	14.98241
S1602	02:03	07:15	09:12	10:03	09:48	07:30	57.80724	38.05248
S77	02:06	07:09	09:12	10:06	09:48	07:30	56.13702	42.11371
S36	02:03	06:42	09:03	10:09	09:48	07:30	60.70621	53.25083
S37	01:48	06:45	09:00	09:54	09:48	07:30	63.64102	52.76186
S38	02:00	06:42	07:45	10:06	09:48	07:30	62.28643	49.34381
S39	01:48	06:45	08:57	10:06	09:48	07:30	61.74714	49.06452
S1603	01:57	06:45	07:39	10:33	09:48	07:30	60.32161	42.5753

S40	01:57	06:33	09:06	15:36	09:48	07:30	55.1444	41.77892
S41	02:48	06:21	09:00	14:39	09:48	07:30	58.407	36.76604
S42	02:06	06:24	09:00	10:21	09:48	07:30	61.69272	43.33052
S43	01:39	06:18	08:51	13:42	09:48	07:30	60.03784	45.33338
S46	02:27	12:24	07:30	08:00	08:24		56.81385	
S47	02:03	06:12	07:48	09:36	08:24		53.14359	
S48	02:21	06:24	07:51	08:00	08:24		57.57864	
S50	02:24	08:54	07:51	10:54	08:24		45.14368	
S52	03:15	08:30	02:09	10:21	02:21		52.38375	
S53	01:42	08:15	02:15	10:24	02:21		48.33913	
S54	02:54	08:12		10:06	02:21		52.72194	
S55		08:06	09:12	10:27	02:21		54.97881	
S56	02:06	08:09		10:12	02:21		53.38448	
S57	04:54	08:06		09:48	02:21		56.00694	
S58	03:00	08:03	09:15	09:57	02:21		60.74794	
S59	01:45	08:03	09:12	10:00	02:21		63.70952	
S60	02:12	07:39	09:57	10:06	02:21		58.62243	
S61	02:57	07:15	10:03	10:21	02:21		56.96145	
S62	01:36	09:54	01:57	10:30	02:21		57.94873	
S565	03:00	09:54	10:09	10:51	02:21		59.32642	
S567	02:39	10:09	09:21	09:39	09:54	17:00	57.30316	49.51512
S572	02:42	13:45	09:45	12:27	10:18	17:00	50.5476	37.73649
S573	01:39	10:00	10:00	14:03	10:51		53.90104	
S574	02:24	10:03	09:42	13:21	10:51		58.20919	
S652	03:12	12:33	08:15		08:48		50.26375	
S653	01:57	10:27	08:15	11:45	08:48		50.18429	
S654	01:54	13:39	08:15	09:03	08:48		58.7543	
S655	01:45	10:36	08:39	11:54	08:48		51.68353	
S656	02:03	14:57	08:39	11:33	08:48		52.18907	
S657	02:06	09:27	08:15	11:18	08:48		53.33802	
S658	02:09	15:21	08:15	10:39	08:48		54.04513	
S659	02:12	15:18		11:15	08:48		51.33886	
S664	02:00	15:12	08:12	10:57	08:45		56.07633	
S665	02:30	15:09	08:12	10:30	08:45		57.30224	
S666	02:27	15:00		10:24	08:45		55.80823	
S667	03:12	14:51	08:12	10:15	08:45		55.64507	
S668	02:48	15:39	08:33		08:45		49.95781	
S669	04:15	15:48	08:27		08:45		48.74329	
S671	04:36	16:00	16:18		07:03		63.26298	
S672	02:09	15:57	06:54	11:27	07:03		56.02858	
S1555	04:30	16:03	06:51	11:21	07:03		59.45749	
S1556	02:24	16:03	06:45	11:36	07:03		59.31414	
S1557	03:21	08:57	06:54	09:21	07:03		62.5203	
S1559	02:48	16:00	06:30	10:03	07:03		62.0061	

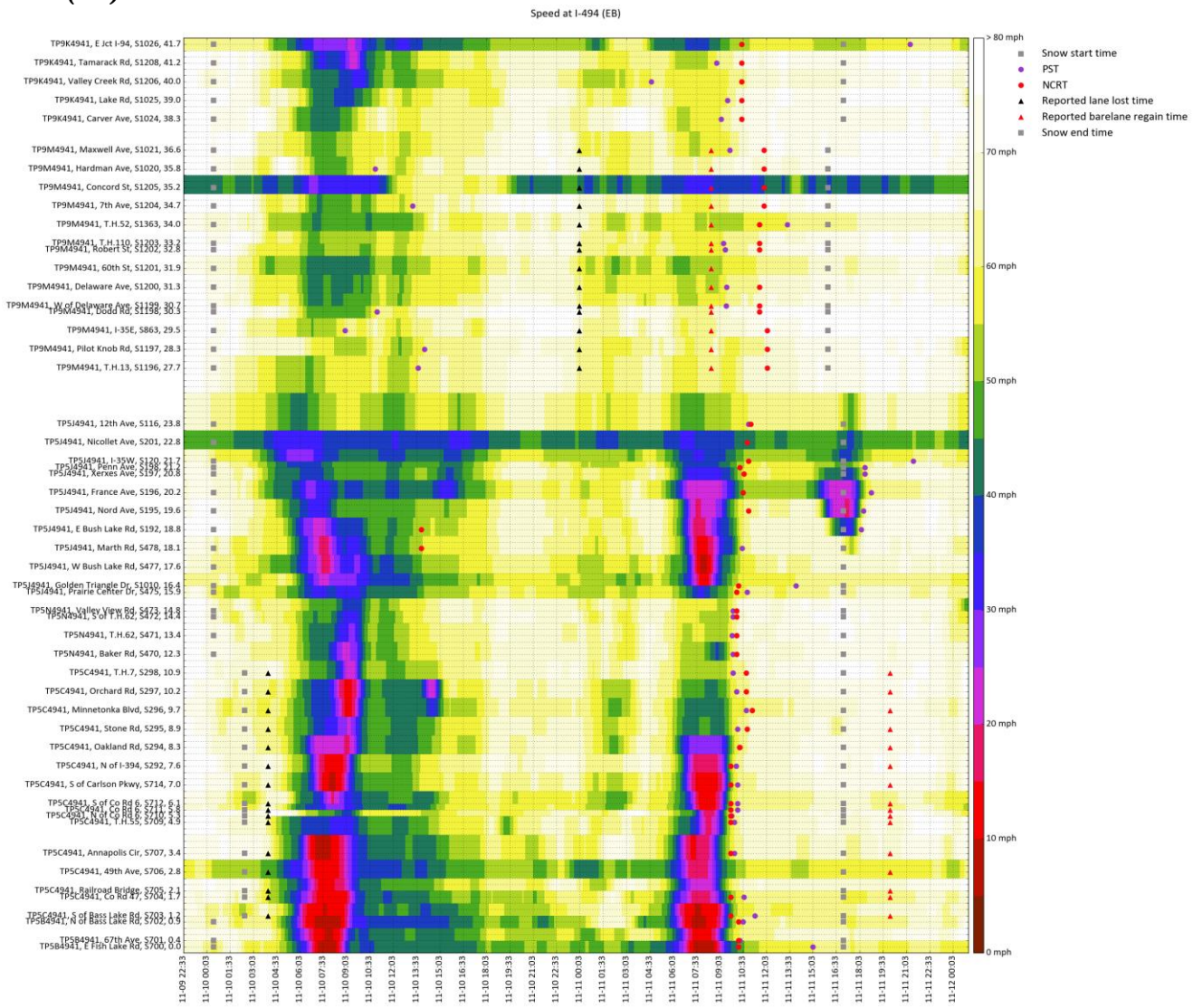
I-35W (SB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1567	03:27	06:12	07:24	09:33	07:57		65.63042	
S1568	03:51	17:51	07:24		07:57		56.47557	
S1569	01:30	06:09	07:36	10:36	07:57		63.98548	
S1570	02:00	06:12	07:18	10:24	07:57		62.73487	
S1571	02:48	06:21	07:51	10:33	07:57		60.60228	
S1572	02:57	06:24	07:24		07:57		56.51482	
S1573	03:30	06:30	07:45	11:12	07:57		60.40895	
S677	04:00	06:36	06:24	11:00	07:57		65.99526	
S678	03:45	07:24	06:57		07:57		41.63353	
S681	02:45	08:39	07:27	11:54	09:12		56.49949	
S682	01:33	08:24	07:27	09:45	09:12		60.57512	
S683	02:24	08:15	07:24	10:12	09:12		58.9912	
S684	02:21	08:15	07:33	10:15	09:12		58.16974	

S685	03:42	08:06	07:30	09:54	09:12		59.12961	
S691	02:21	08:09	07:21	09:30	09:15		57.51742	
S692	01:45	08:09	07:51	09:36	09:15		56.86149	
S693	04:06	09:12	07:54	10:00	09:15		55.4177	
S694	02:30	09:06	08:03	10:27	09:15		52.32187	
S695	02:27	09:03	08:09	10:18	09:15		52.28613	
S696	02:36	07:36	08:15	10:30	09:15		48.94597	
S579	02:24	07:57	07:54	12:36	09:39	17:00	48.97079	47.04865
S583	02:48	08:15	07:36	14:30	09:39	17:00	49.43612	44.34278
S584	02:09	09:03	09:06	11:24	09:39	17:00	48.94469	50.70221
S4	02:39	09:03	08:21	09:33	09:27		54.20989	
S5	02:24	15:45	08:42	09:51	09:27		51.94294	
S6	02:45	15:06	08:09	09:51	09:27		51.46327	
S7	02:57	07:57	08:09	09:21	09:27		56.51061	
S9	04:06	07:51	08:03	09:09	09:27		58.82657	
S10	03:21	15:42	08:06	09:39	09:27		54.02205	
S11	02:48	15:45	08:09	10:30	09:27		45.91568	
S12	02:45	07:39	08:45	09:36	09:27		53.36238	
S14	04:24	07:36	08:18	09:33	09:27		54.07948	
S17	02:36	08:24	08:33	11:45	09:27		32.90471	
S19	03:21	07:57	08:30	11:36	09:03		31.10012	
S20	02:18	07:51	08:18	09:21	09:03		50.84665	
S21	02:45	07:51	08:12	09:24	09:03		51.39856	
S22	03:03	07:51	08:15	09:12	09:03		53.46742	
S24	03:00	06:09	06:30	10:21	06:36	07:30	56.5015	58.50853
S25	03:06	06:06	06:33	11:54	06:36	07:30	52.27821	56.27533
S26	02:45	05:54		11:42	06:36	07:30	55.0079	57.19462
S27	02:12	06:15	06:33	11:30	06:36	07:30	55.98574	59.4685
S1606	02:30	06:12	06:30	08:36	06:36	07:30	57.74506	61.57583
S28	02:45	15:54		12:00	06:36	07:30	55.79874	59.91929
S29	02:12	15:57		12:09	06:36	07:30	56.2142	58.46082
S30	01:33	05:18	06:33	10:18	06:36	07:30	57.12941	62.41823
S31	02:42	16:03	06:06	08:09	06:36	07:30	58.78373	65.167
S78	02:48	04:03			06:36	07:30	52.57682	56.62278
S1607	03:09	04:09	06:09	04:42	06:36	07:30	65.48907	66.87334
S79	02:33	05:42		08:48	06:36	07:30	54.13954	60.20298
S80	02:27	05:39	06:33		06:36	07:30	51.49255	55.81766
S1608	02:42	04:24	06:54	07:39	07:21	07:30	60.354	68.4795
S81	01:51	03:33	06:48	07:27	07:21	07:30	64.22316	68.66487
S82	03:09	04:12	06:48	08:45	07:21	07:30	60.13028	60.67894
S1609	03:12	12:18	06:33	07:03	07:21	07:30	68.73991	70.01293
S265	03:27	06:30	06:39	07:09	07:21	07:30	68.41393	71.63102
S915	02:36	06:33	06:42	08:48	07:21	07:30	61.26603	65.01322

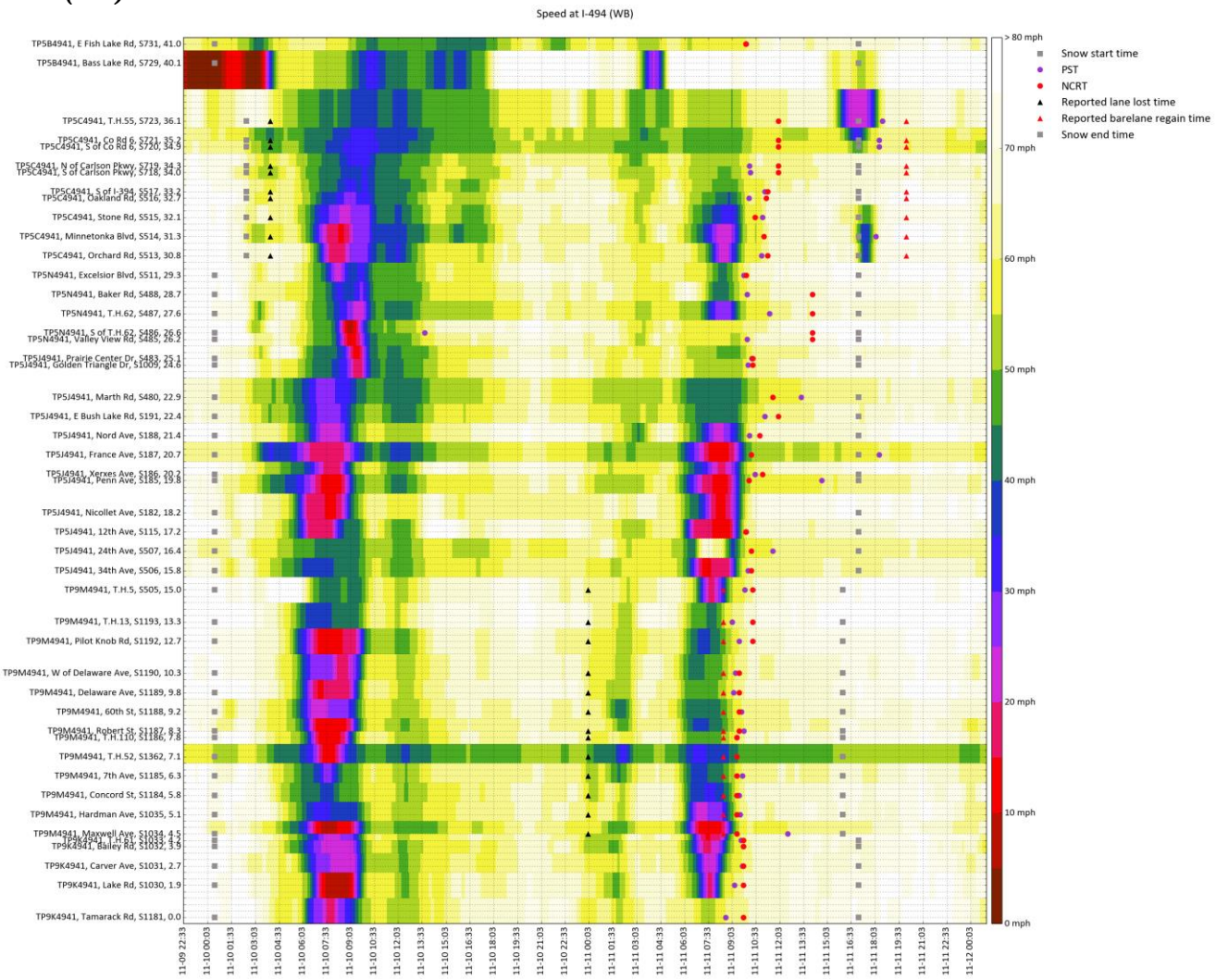
I-494 (EB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S700	02:03	07:54	08:15	15:03	10:15		46.1392	
S701	01:57	07:54	08:09	10:21	10:15		59.08849	
S702	01:12	08:03	08:39	10:33	10:15		57.51103	
S703	04:15	07:36	08:36	11:18	09:45	20:00	44.64916	67.62938
S704	01:15	08:33	08:33	10:36	09:45	20:00	49.48731	63.15007
S707	03:03	07:24	08:18	10:00	09:45	20:00	56.44373	68.4199
S709	00:30	08:21	08:21	10:00	09:45	20:00	55.5905	69.24402
S710	05:00	08:18	08:18	09:48	09:45	20:00	59.57656	70.63712
S711	04:27	08:09	08:18	10:12	09:45	20:00	53.1231	62.58468
S712	05:06	08:03	08:30	10:12	09:45	20:00	52.37196	64.43779
S714	01:15	08:06	08:30	10:12	09:45	20:00	47.93455	70.3159
S292	00:30	08:21	08:30	10:06	09:45	20:00	50.20775	73.89273

S294	00:09	09:03	09:06	10:18	10:21	20:00	60.76152	72.36073
S295	00:18	09:12	09:18	10:12	10:48	20:00	64.19845	73.20224
S296	00:30	09:09	09:21	10:45	11:09	20:00	63.09396	71.39217
S297	01:12	09:09	09:24	10:09	10:45	20:00	63.08824	72.46028
S298	04:33	09:18	09:24	09:54	10:45	20:00	65.39858	72.15999
S470	01:21	09:00	08:48	09:54	10:09		64.35544	
S471	00:09	09:24	09:27	09:51	10:09		65.48842	
S472	00:00	09:27	09:27	09:54	10:09		64.28209	
S473	02:33	09:36	09:30	09:54	10:09		66.1017	
S475	00:00	09:12	08:00	10:48	10:09		57.57573	
S1010	01:30	08:03	08:03	13:57	10:15		55.23025	
S478	00:12	07:36	07:36	10:30	13:51		54.51422	
S192	01:18	07:21	07:39	18:09	13:51		53.06581	
S195	00:33	07:39	08:18	18:18	10:54		62.95218	
S196	00:15	07:21	08:51	18:48	10:33		49.67346	
S197	00:24	07:39	09:27	18:24	10:36		56.97213	
S198	00:21	06:39	09:21	18:24	10:21		52.42776	
S120	00:12	06:30	09:18	21:30	10:54		51.93715	
S201	01:30	05:27	10:33		10:48		43.09623	
S116	00:12	05:54	09:54	10:54	11:03		60.89825	
S1196	00:33	06:39	10:54	13:39	12:06	08:30	68.81062	63.18865
S1197	01:54	12:30	11:33	14:03	12:06	08:30	65.71394	64.41613
S863	01:57	06:51	08:24	08:57	12:06	08:30	75.31074	64.21452
S1198	00:42	06:54	09:09	11:00	11:36	08:30	75.79735	64.62732
S1199	00:48	06:57	09:09	09:27	11:36	08:30	66.42339	56.58076
S1200	00:45	08:45	09:06	09:30	11:36	08:30	65.5091	54.56811
S1202	01:45	07:00	09:09	09:24	11:36	08:30	67.3336	56.41317
S1203	02:39	06:54	08:51	09:18	11:36	08:30	65.11372	56.17095
S1363	01:57	07:06	10:12	13:24	11:36	08:30	57.35128	54.65997
S1204	02:45	07:15	08:45	13:18	11:54	08:30	72.1555	60.04781
S1205	01:33	06:51	11:18		11:54	08:30	39.6805	34.23133
S1020	05:21	08:24	04:21	10:54	11:54	08:30	68.0345	64.63943
S1021	01:39	07:33	09:21	09:42	11:54	08:30	72.18634	57.84806
S1024	03:54	08:03	09:03	09:09	10:27		68.74524	
S1025	01:27	08:48	09:30	09:33	10:27		67.8615	
S1206	01:51	09:51	03:03	04:39	10:27		62.36642	
S1208	01:51	09:27	08:18	08:51	10:27		69.11796	
S1026	03:39	09:21	08:36	21:18	10:27		52.46109	

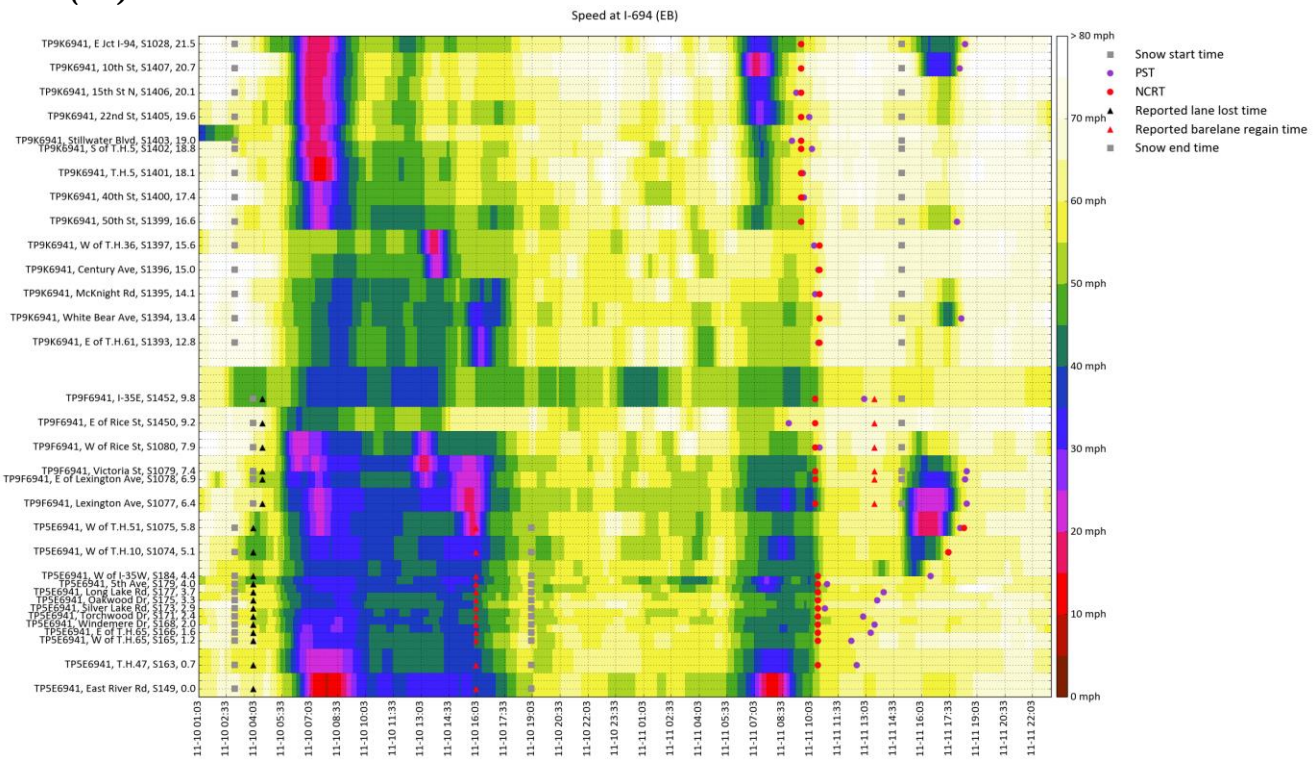
I-494 (WB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1181	02:48	07:48	08:09	08:39	09:45		62.89291	
S1030	02:18	08:36	07:39	09:12	09:45		64.92839	
S1031	01:00	08:54	07:42	09:42	09:45		60.63404	
S1032	01:00	07:24	08:15	09:45	09:45		60.25792	
S1033	02:27	07:30	08:18	09:36	09:45		61.67515	
S1034	01:57	07:36	08:06	12:33	09:21	08:30	51.88794	17.23158
S1035	00:06	07:00	07:57	09:33	09:21	08:30	56.55779	32.01294
S1184	02:24	07:42	08:03	09:30	09:21	08:30	57.49299	39.66018
S1185	02:24	07:36	08:09	09:42	09:21	08:30	56.49982	45.42035
S1362	03:06	07:39	08:18		09:21	08:30	44.45864	37.46812
S1186	02:21	07:24	08:12	09:21	09:21	08:30	60.00628	50.94048
S1187	02:27	07:18	08:06	09:48	09:30	08:30	58.02861	46.01768
S1188	03:03	07:00	08:15	09:39	09:30	08:30	59.005	46.72319
S1189	01:30	07:09	08:09	09:09	09:30	08:30	62.80769	52.59917

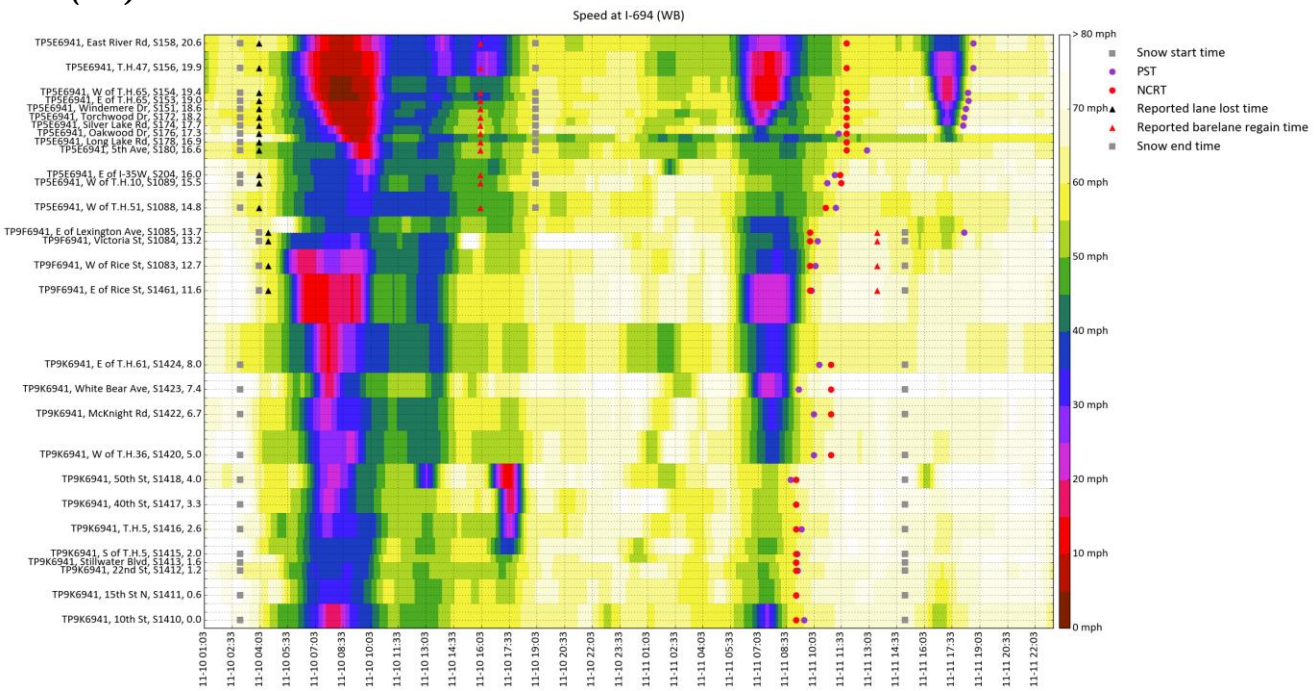
S1190	01:00	08:30	08:09	09:15	09:30	08:30	61.72174	51.21916
S1192	00:45	07:18	07:45	09:30	10:21	08:30	66.66749	48.03045
S1193	02:36	07:00	07:51	09:03	10:21	08:30	69.26483	53.14724
S505	05:33	07:45	07:45	09:51	10:21	08:30	64.87978	35.55362
S506	00:39	07:24	08:51	10:03	10:15		60.95365	
S507	02:30	09:06	09:06	11:36	10:15		57.32387	
S115	00:51	08:30	08:33	09:57	09:54		58.99123	
S185	00:33	07:48	08:33	14:42	10:06		54.06353	
S186	00:45	07:51	08:33	10:30	10:57		61.8481	
S187	02:09	08:00	08:42	18:18	10:15		49.98102	
S188	01:00	07:42	08:21	10:09	10:48		65.61824	
S191	01:48	07:21	09:06	11:06	11:57		63.39675	
S480	00:48	07:15	09:15	13:24	11:36		58.01516	
S1009	02:24	09:30	09:21	10:03	10:21		63.77656	
S483	05:24	09:27	09:21	10:18	10:21		60.46045	
S485	02:15	09:06	09:39	10:00	14:06		70.70959	
S486	02:03	09:00	10:54	13:42	14:06		73.06765	
S487	00:30	09:36	08:51	11:24	14:06		65.53016	
S488	00:30	09:42	08:27	10:00	14:06		67.55134	
S511	01:09	08:15	08:39	09:48	09:57		62.47539	
S513	01:09	08:09	08:30	10:54	11:18	20:00	64.65705	72.20994
S514	00:09	08:27	08:36	18:06	11:03	20:00	61.09889	75.21385
S515	01:12	08:45	09:03	10:57	10:30	20:00	57.79413	72.05857
S516	01:15	08:57	09:00	10:06	11:12	20:00	64.84795	75.80696
S517	01:21	09:00	09:03	11:06	11:18	20:00	63.42436	75.26754
S718	01:09	09:57	09:18	10:12	11:57	20:00	61.87269	69.31957
S719	02:09	09:54	09:18	10:09	11:57	20:00	64.82087	71.28631
S720	02:18	10:06	09:21	18:18	11:57	20:00	55.98926	60.16993
S721	01:15	10:06	09:36	18:18	11:57	20:00	55.57343	60.71637
S723	03:15	10:09	09:15	18:30	11:57	20:00	63.93912	67.21486
S731		15:51	09:30	09:57	09:54		59.59619	

I-694 (EB)


Speed at I-694 (EB)
TP9K6941, E Jct I-94, S1028, 21.5
TP9K6941, 10th St, S1407, 20.7
TP9K6941, 15th St N, S1406, 20.1
TP9K6941, 22nd St, S1405, 19.6
TP9K6941, Stillwater Blvd, S1403, 19.0
TP9K6941, S of T.H.5, S1402, 18.8
TP9K6941, T.H.5, S1401, 18.1
TP9K6941, 40th St, S1400, 17.4
TP9K6941, 50th St, S1399, 16.6
TP9K6941, W of T.H.36, S1397, 15.6
TP9K6941, Century Ave, S1396, 15.0
TP9K6941, McKnight Rd, S1395, 14.1
TP9K6941, White Bear Ave, S1394, 13.4
TP9K6941, E of T.H.61, S1393, 12.8
TP9F6941, I-35E, S1452, 9.8
TP9F6941, E of Rice St, S1450, 9.2
TP9F6941, W of Rice St, S1080, 7.9
TP9F6941, Victoria St, S1079, 7.4
TP9F6941, E of Lexington Ave, S1078, 6.9
TP9F6941, Lexington Ave, S1077, 6.4
TP5E6941, W of T.H.51, S1075, 5.8
TP5E6941, W of T.H.10, S1074, 5.1
TP5E6941, W of I-35W, S184, 4.4
TP5E6941, 5th Ave, S179, 4.0
TP5E6941, Long Lake Rd, S177, 3.7
TP5E6941, Oakwood Dr, S175, 3.3
TP5E6941, Silver Lake Rd, S173, 2.9
TP5E6941, Torchwood Dr, S171, 2.4
TP5E6941, Windemere Dr, S168, 2.0
TP5E6941, E of T.H.65, S166, 1.6
TP5E6941, W of T.H.65, S165, 1.2
TP5E6941, T.H.47, S163, 0.7
TP5E6941, East River Rd, S149, 0.0
11-10 01:03
11-10 02:33
11-10 04:03
11-10 05:33
11-10 07:03
11-10 08:33
11-10 10:03
11-10 11:33
11-10 13:03
11-10 14:33
11-10 16:03
11-10 17:33
11-10 19:03
11-10 20:33
11-10 22:03
11-10 23:33
11-11 01:03
11-11 02:33
11-11 04:03
11-11 05:33
11-11 07:03
11-11 08:33
11-11 10:03
11-11 11:33
11-11 13:03
11-11 14:33
11-11 16:03
11-11 17:33
11-11 19:03
11-11 20:33
11-11 22:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S149	04:57					16:00		35.30544
S163	05:00	07:54	08:36	12:33	10:27	16:00	53.41231	38.874
S165	02:30	06:48	09:57	12:15	10:27	16:00	53.66647	40.64085
S166	02:33	06:51	09:51	13:18	10:27	16:00	52.87263	38.79148
S168	02:30	08:36	09:57	13:30	10:27	16:00	51.80345	40.52877
S171	02:33	08:42	09:57	12:54	10:27	16:00	53.03695	41.60227
S173	02:39	08:51	10:03	10:51	10:27	16:00	54.31017	40.70289
S175	03:18	08:45	10:06	13:39	10:27	16:00	52.08909	42.97011
S177	02:30	07:45	07:54	14:00	10:27	16:00	47.41896	40.04981
S179	03:06	07:42	07:48	10:57	10:27	16:00	49.386	36.27837
S184	05:12	08:36	10:12	16:33	10:27	16:00	48.3736	37.26427
S1074	02:45	15:00	16:33	17:30	17:30	16:00	60.17555	31.35927
S1075	03:18	16:30	16:42	18:09	18:21	16:00	62.72237	20.2174
S1077	02:57	15:39	09:57	18:30	10:18	13:30	41.56357	60.63526
S1078	03:18	15:27	10:15	18:24	10:18	13:30	46.31831	63.98371
S1079	02:48	13:15	09:54	18:30	10:18	13:30	48.41148	60.6695
S1080	03:30	06:24	09:48	10:33	10:18	13:30	55.9127	67.49161
S1450	02:57	06:30	08:24	08:54	10:18	13:30	61.85913	66.24425
S1452	02:30	09:03	10:09	12:57	10:18	13:30	47.61134	62.0351
S1393	03:24	16:18	09:57	10:30	10:33		61.60056	
S1394	03:21	16:03	09:57	18:12	10:33		59.95114	
S1395	03:24	08:51	10:03	10:18	10:33		63.73752	
S1396	03:51	13:54	10:24	10:30	10:33		60.89312	
S1397	03:00	13:45	10:03	10:15	10:33		62.9064	
S1399	02:42	07:36	09:12	17:57	09:33		54.2593	
S1400	03:27	07:27	07:39	09:42	09:33		58.5808	
S1401	02:45	07:33	07:33	09:39	09:33		58.76933	
S1402	04:42	07:21	07:30	10:09	09:33		57.66283	
S1403	05:45	07:18	07:24	09:03	09:33		63.03989	
S1405	03:30	07:18	07:18	10:00	09:33		57.86154	
S1406	02:33	07:09	07:24	09:18	09:33		62.27441	
S1407	04:09	07:15	07:06	18:06	09:33		62.71667	
S1028	02:51	07:42	07:21	18:24	09:33		52.62922	

I-694 (WB)


Speed at I-694 (WB)
TP5E6941, East River Rd, S158, 20.6
TP5E6941, T.H.47, S156, 19.9
TP5E6941, W of T.H.65, S154, 19.4
TP5E6941, E of T.H.65, S153, 19.0
TP5E6941, Windemere Dr, S151, 18.6
TP5E6941, Torchwood Dr, S172, 18.2
TP5E6941, Silver Lake Rd, S174, 17.7
TP5E6941, Oakwood Dr, S176, 17.3
TP5E6941, Long Lake Rd, S178, 16.9
TP5E6941, 5th Ave, S180, 16.6
TP5E6941, E of I-35W, S204, 16.0
TP5E6941, W of T.H.10, S1089, 15.5
TP5E6941, W of T.H.51, S1088, 14.8
TP9F6941, E of Lexington Ave, S1085, 13.7
TP9F6941, Victoria St, S1084, 13.2
TP9F6941, W of Rice St, S1083, 12.7
TP9F6941, E of Rice St, S1461, 11.6
TP9K6941, E of T.H.61, S1424, 8.0
TP9K6941, White Bear Ave, S1423, 7.4
TP9K6941, McKnight Rd, S1422, 6.7
TP9K6941, W of T.H.36, S1420, 5.0
TP9K6941, 50th St, S1418, 4.0
TP9K6941, 40th St, S1417, 3.3
TP9K6941, T.H.5, S1416, 2.6
TP9K6941, S of T.H.5, S1415, 2.0
TP9K6941, Stillwater Blvd, S1413, 1.6
TP9K6941, 22nd St, S1412, 1.2
TP9K6941, 15th St N, S1411, 0.6
TP9K6941, 10th St, S1410, 0.0
11-10 01:03
11-10 02:33
11-10 04:03
11-10 05:33
11-10 07:03
11-10 08:33
11-10 10:03
11-10 11:33
11-10 13:03
11-10 14:33
11-10 16:03
11-10 17:33
11-10 19:03
11-10 20:33
11-10 22:03
11-10 23:33
11-11 01:03
11-11 02:33
11-11 04:03
11-11 05:33
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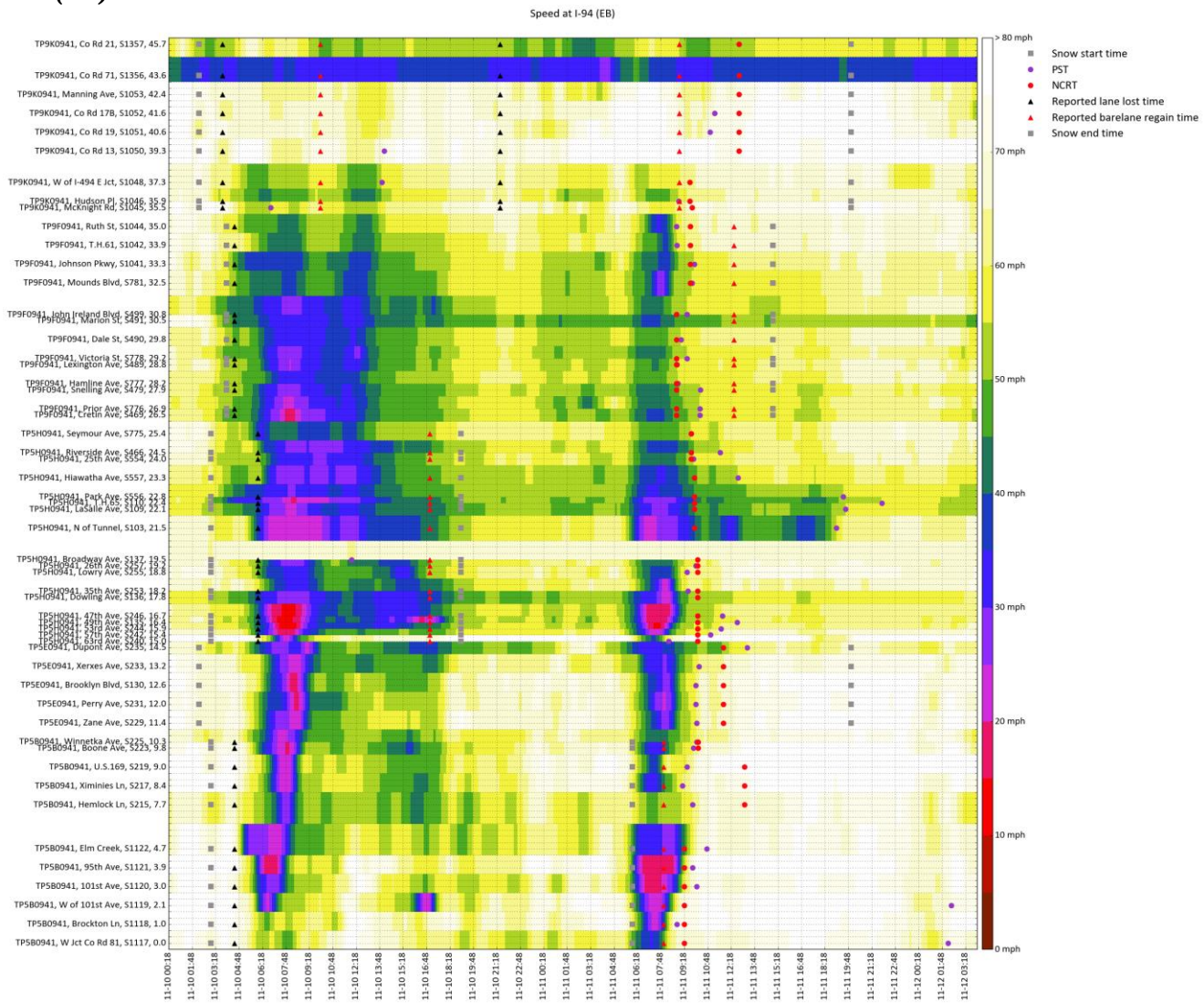
11-11 08:33
11-11 10:03
11-11 11:33
11-11 13:03
11-11 14:33
11-11 16:03
11-11 17:33
11-11 19:03
11-11 20:33
11-11 22:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1410	03:00	08:03	07:33	09:33	09:06		57.46917	
S1411	03:15	07:54	07:51	09:06	09:06		60.24598	
S1412	03:06	08:48	07:36	09:12	09:06		59.53239	
S1413	02:57	08:51	08:33	09:06	09:06		60.12448	
S1415	02:54	08:45	07:48	09:09	09:06		59.73131	
S1416	02:30	17:36	08:33	09:24	09:06		58.95326	
S1417	03:21	17:39	07:45	09:06	09:06		60.04312	
S1418	03:51	17:27	08:03	08:48	09:06		63.55535	
S1420	03:00	08:57	08:03	10:03	11:00		67.41573	
S1422	03:15	07:39	08:00	10:03	11:00		64.20972	
S1423	02:54	07:48	07:48	09:15	11:00		75.19089	
S1424	02:54	07:45	07:57	10:21	11:00		61.78096	
S1461	02:54	06:57	08:09	09:57	09:51	13:30	58.65848	70.88859
S1083	03:00	06:36	08:54	10:09	09:51	13:30	55.57461	66.53691
S1084	02:30	09:15	08:33	10:15	09:51	13:30	54.93677	66.75781
S1085	05:30	09:21	08:33	18:12	09:51	13:30	55.84023	64.17559
S1088	03:06	09:30	09:24	11:15	10:42	16:00	56.12517	46.48199
S1089	03:48	09:48	09:30	10:48	11:33	16:00	65.48028	47.34415
S204	03:09	09:51	09:09	11:12	11:30	16:00	62.57301	46.22279
S180	02:45	09:42	10:21	12:57	11:51	16:00	58.11632	53.29136
S178	02:57	09:15	09:03		11:51	16:00	51.00123	46.57931
S176	02:42	09:03	07:12	11:24	11:51	16:00	61.02717	55.40554
S174	03:36	09:03	07:12	18:09	11:51	16:00	59.23115	53.14947
S172	04:39	09:03	07:06	18:12	11:51	16:00	58.54485	52.09919
S151	03:45	08:27	07:42	18:18	11:51	16:00	60.40373	47.56234
S153	04:21	08:27	07:48	18:27	11:51	16:00	58.38881	38.48717
S154	03:42	08:21	07:42	18:24	11:51	16:00	58.30936	41.06341
S156	03:42	08:21	07:54	18:42	11:51	16:00	56.64748	27.11037
S158	04:51	08:24	08:06	18:42	11:51	16:00	56.76448	31.95231

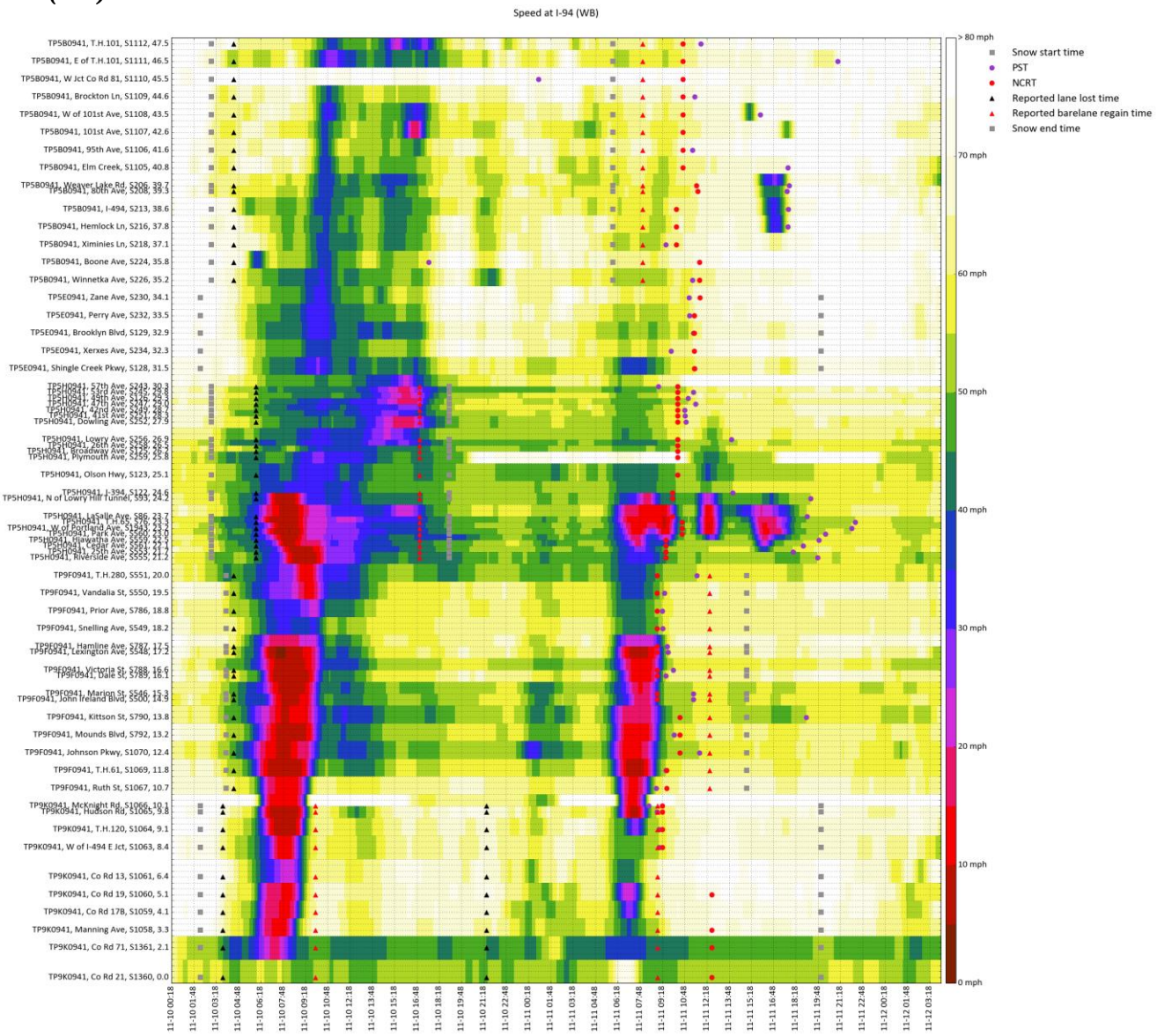
I-94 (EB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1117	04:27	07:12	07:12	02:12	09:18	08:00	66.60729	47.69927
S1118	04:21	07:24	07:39	08:51	09:18	08:00	72.40548	38.49335
S1119	04:24	16:48	07:36	02:24	09:18	08:00	69.77495	27.64463
S1120	02:21	07:15	07:27	10:06	09:18	08:00	57.1935	22.4448
S1121	04:33	06:57	08:30	09:51	09:18	08:00	53.08434	16.7009
S1122	04:27	07:06	08:24	10:45	09:18	08:00	44.85022	28.43196
S215	04:45	07:51	08:54	09:51	13:09	08:00	69.10699	51.1422
S217	02:33	07:45	07:12	09:12	13:09	08:00	73.3599	43.34465
S219	01:45	07:45		09:30	13:09	08:00	75.51626	55.10783
S223	02:21	07:54	07:33	09:54	10:12	08:00	65.46081	37.95955
S225	04:48	07:33	08:03	10:06	10:12	08:00	61.57596	43.32837
S229	04:42	08:27	08:12	10:06	11:48		66.11752	
S231	04:45	08:30	08:12	10:03	11:48		65.46942	

S130	04:45	08:21	08:12	10:03	11:48		67.14329	
S233	01:57	08:24	08:06	10:15	11:48		64.57196	
S235	02:00	09:09	07:45	13:21	11:48		51.15088	
S240	02:27	07:51	07:18	08:18	10:09	17:00	83.95431	67.38036
S242	02:51	07:48	07:24	11:00	10:09	17:00	59.40576	48.44034
S244	02:36	07:54	07:27	11:39	10:09	17:00	55.7062	44.23516
S135	03:03	07:36	07:48	12:42	10:09	17:00	54.28052	21.58874
S246	02:39	08:09	08:15	11:45	10:09	17:00	54.59638	39.68495
S136		08:09	08:12		10:09	17:00	52.10277	38.62134
S253	05:00	08:06	08:09	09:33	10:09	17:00	61.19537	42.17741
S255	03:00	08:39	08:21	09:30	10:09	17:00	64.21858	50.73832
S257	03:09	08:06	08:24	10:03	10:09	17:00	60.66141	49.66262
S137		12:00	09:36	12:00	10:09	17:00	66.31512	66.14608
S103	05:06	08:15	08:27	19:03	09:57	17:00	39.45074	44.38241
S109	02:36	08:09	08:45	19:39	09:57	17:00	44.72196	44.57723
S110	02:33	08:18	09:06	21:57	09:57	17:00	40.48595	43.85298
S556	03:27	08:12	08:42	19:30	09:57	17:00	45.34795	47.16228
S557	03:18	08:09	08:21	12:45	09:57	17:00	48.55782	49.27314
S554	02:39	10:00	08:45	09:54	09:45	17:00	53.70481	50.3522
S466	02:39	10:15	08:51	11:36	09:45	17:00	47.48462	44.31801
S775	02:39	06:15	08:51	09:45	09:45	17:00	55.27965	53.62183
S469	02:15	08:03	08:15	10:18	08:48	12:30	46.34945	56.67832
S776	02:00	07:57	08:15	10:18	08:48	12:30	47.37418	56.87881
S479	01:57	08:03	08:00	10:21	08:48	12:30	48.66567	55.50967
S777	03:06	08:06	07:54	08:54	08:48	12:30	54.63632	57.90028
S489	03:06	08:06	07:54	08:51	08:48	12:30	54.82977	57.93558
S778	02:06	08:09	07:54	09:30	08:48	12:30	52.46375	57.69218
S490	03:03	08:33	08:15	09:06	08:48	12:30	53.56547	60.51648
S499	01:54	07:57	07:33	09:30	08:48	12:30	51.74403	57.31114
S781	02:57	07:48	07:51	09:48	09:42	12:30	54.83063	58.72437
S1041	02:54	08:06	08:12	09:57	09:42	12:30	53.42334	60.66923
S1042	03:03	08:06	08:12	08:51	09:42	12:30	61.58554	66.98794
S1044	02:42	07:39	07:42	08:48	09:42	12:30	62.96502	66.71698
S1045	03:24	06:00	08:36	06:51	09:48	09:00	68.48138	62.52221
S1046	02:39	13:06	08:33	08:57	09:39	09:00	61.77985	55.76302
S1048	02:42	13:09	09:21	13:57	09:39	09:00	62.31075	59.95626
S1050	06:15	07:18	12:39	14:06	12:48	09:00	73.25398	86.27046
S1051	03:45	13:09	10:33	10:57	12:48	09:00	72.56744	68.90025
S1052	01:45	13:48	12:24	11:15	12:48	09:00	71.8553	68.43644
S1053	02:06	03:54	10:39		12:48	09:00	70.59382	66.78058
S1356		04:15			12:48	09:00	36.08113	34.08732
S1357	05:51	02:51	12:21		12:48	09:00	52.44677	54.78032

I-94 (WB)



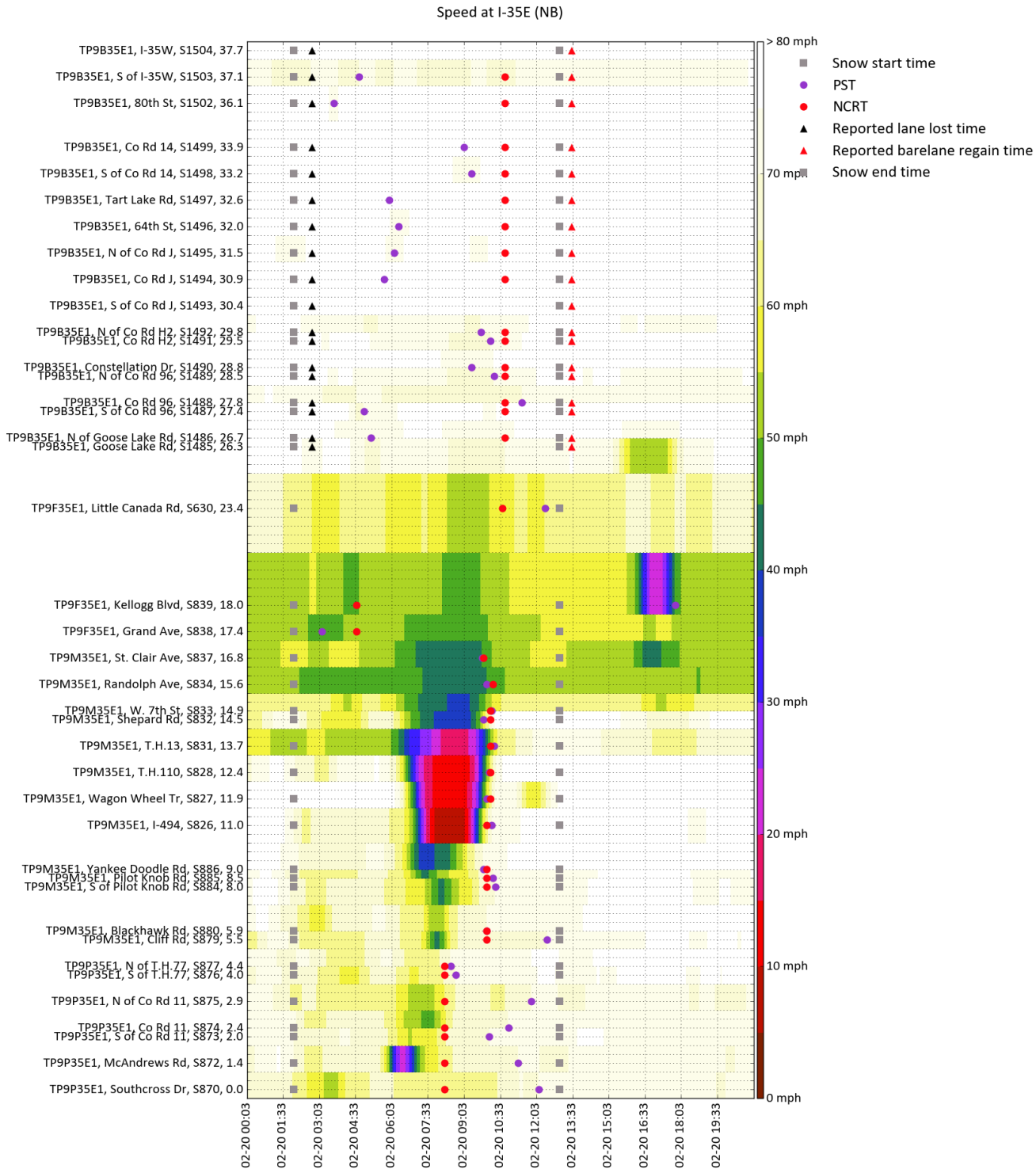
Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1360	02:18	02:51	12:06		12:39	09:00	53.80257	48.14072
S1361	02:09	07:15	10:54		12:39	09:00	47.00481	41.59667
S1058	01:51	07:42	07:09		12:39	09:00	71.08145	54.13336
S1060	02:00	08:09	07:00		12:39	09:00	72.17833	63.6507
S1063	03:06	07:57	08:54	09:06	09:18	09:00	57.01993	54.38034
S1064	02:18	08:15	07:30	09:06	09:18	09:00	57.3435	54.60062
S1065	03:18	08:12	07:18	08:57	09:18	09:00	58.12171	55.3521
S1066	03:57	08:03	07:12	08:24	09:18	09:00	86.58336	84.01559
S1067	03:33	08:09	07:27	08:54	09:36	12:30	62.09174	67.95655
S1069	03:15	08:09	07:42	09:33	09:36	12:30	55.78161	63.22223
S1070	02:51	07:51	07:45	11:48	10:30	12:30	52.48591	56.42178
S792	03:00	07:54	07:57	10:06	10:30	12:30	56.84431	62.93122

S790	02:54	07:54	08:15	19:00	10:30	12:30	52.44182	57.21653
S500	01:48	08:06	08:06	11:24	08:57	12:30	35.56665	56.8235
S546	02:57	07:54	08:03	11:24	08:57	12:30	34.96234	56.3365
S789	03:15	08:39		09:33	08:57	12:30	28.07945	63.98096
S788	02:42	08:33		10:03	08:57	12:30	23.8464	59.31738
S548	01:45	07:39		09:42	08:57	12:30	20.93723	63.93377
S787	04:03	08:09		09:39	08:57	12:30	30.01458	68.62306
S549	03:33	07:51	08:36	09:21	08:57	12:30	49.28118	62.66841
S786	03:33	09:51	08:12	09:18	08:57	12:30	51.42133	62.18268
S550	03:27	09:36	07:51	09:27	08:57	12:30	47.3145	65.21303
S551	02:12	09:21	08:18	11:39	08:57	12:30	46.47813	56.98739
S555	02:36	09:30	08:33	19:45	09:33	17:00	44.97603	41.08284
S553	02:36	09:03	07:51	18:06	09:33	17:00	48.57833	42.94896
S561	03:21	08:12	07:39	18:48	09:33	17:00	36.7687	43.25097
S559	02:24	08:15		19:51	09:33	17:00	20.50634	37.91756
S560	03:24	08:15	09:30	20:18	10:39	17:00	47.7041	39.1599
S1943	03:03	08:06	09:30	22:03	10:39	17:00	48.09219	39.23795
S76	02:36	08:03	09:33	22:18	10:39	17:00	46.46034	36.27931
S86	02:27	08:09		19:03	10:00	17:00	27.23849	32.38083
S93	03:30	07:54	08:21	19:18	10:00	17:00	44.33657	44.45104
S122	02:21	10:03	09:42	14:03	10:00	17:00	49.11026	47.98905
S123	03:18	10:33	08:54		10:21	17:00	51.19337	43.54084
S259	02:36	10:12	07:24		10:21	17:00	77.51094	42.52815
S125	02:42	10:18	09:33		10:21	17:00	53.27094	42.9954
S258	03:36	13:57	09:06		10:21	17:00	50.54144	36.02413
S256	03:06	14:48	09:00	13:57	10:21	17:00	58.79834	40.23014
S252	03:36	16:03	08:18	10:54	10:21	17:00	58.53303	26.44586
S251	03:30	15:00	09:00	10:51	10:21	17:00	57.08342	36.91215
S249	03:00	16:39	08:45	10:48	10:21	17:00	57.36223	31.17755
S247	03:36	16:24		11:33	10:21	17:00	50.2472	23.69994
S126	03:30	16:03	08:18	11:03	10:21	17:00	55.46792	25.27361
S245	03:39	15:57	08:48	11:24	10:21	17:00	51.08222	28.85688
S243	02:57	16:06	07:57	09:03	10:21	17:00	63.52256	38.11396
S128	04:33	10:09	07:51	11:30	11:27		59.86829	
S234	02:00	10:18	09:30	09:54	11:27		65.70889	
S129	03:12	10:24	10:48	11:24	11:27		61.10619	
S232	02:51	10:27	09:33	11:09	11:27		64.84698	
S230	02:00	10:24	10:51	11:06	11:51		68.73309	
S226	02:42	10:27	09:21	11:21	11:48	08:00	64.05717	51.80815
S224	02:00	06:03	09:30	17:36	11:48	08:00	72.62452	62.99365
S218	03:24	10:27	08:51	09:33	10:15	08:00	64.24475	53.80945
S216	02:00	10:42	09:21	17:45	10:15	08:00	63.8435	57.41996
S213	02:33	10:27	09:24	17:48	10:15	08:00	63.2615	56.87803
S208	02:27	10:39	11:00	17:42	11:42	08:00	65.7045	58.92176

S206	02:06	10:42	09:36	17:51	11:36	08:00	64.57491	60.22057
S1105	05:39	10:39	04:48	17:45	10:42	08:00	61.60407	60.71349
S1106	02:39	10:39	09:39	11:21	10:42	08:00	68.82331	67.53387
S1107	02:15	16:39	04:51		10:42	08:00	62.75639	62.56515
S1108	02:21	10:51	06:24	15:54	10:42	08:00	63.67958	64.07211
S1109	01:45	10:54	05:03	11:30	10:42	08:00	67.99804	69.30758
S1110		01:00	10:39	01:00	10:42	08:00	75.159	75.28369
S1111	01:54	11:03	06:39	21:06	10:42	08:00	60.40317	59.0729
S1112	02:09	15:27	10:21	11:54	10:42	08:00	62.82073	63.25077

Snow Event: 2-20-2015

I-35E (NB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S870	05:54	03:33	07:42	12:09	08:15		62.91672	
S872	01:42	06:30	06:30	11:18	08:15		62.71699	
S873		06:48	07:39	10:06	08:15		64.81671	
S874	02:00	07:36	07:42	10:54	08:15		59.77217	
S875	01:36	06:57	07:45	11:51	08:15		60.44401	
S876		04:18	07:48	08:42	08:15		65.95759	
S877		04:03	06:54	08:30	08:15		67.5594	
S879	06:21	07:54	07:57	12:30	10:00		68.45005	
S880	06:09	07:54	07:54	10:00	10:00		70.09059	
S884	04:27	08:06	08:09	10:21	10:00		68.49375	
S885	05:42	07:24	07:24	10:15	10:00		69.25241	
S886	05:48	07:27	07:33	09:51	10:00		72.04212	
S826	01:42	08:36	08:42	10:12	10:00		64.6767	
S827	06:00	08:33	08:48	10:00	10:09		63.773	
S828	05:42	08:33	08:54	10:06	10:09		60.49636	
S831	05:42	08:33	09:03	10:18	10:09		50.05108	
S832	02:03	08:39	08:57	09:51	10:09		68.9222	
S833	05:57	08:51	09:15	10:12	10:09		54.40192	
S834		09:09	09:42	10:00	10:15		47.69509	
S837	02:27	09:15	09:33	09:48	09:51		45.83515	
S838		03:09	04:03	03:09	04:36		51.20817	
S839		04:21	04:24	17:48	04:36		49.40657	
S630		09:09	10:21	12:24	10:39		57.88857	
S1486	03:12	05:12	10:39	05:12	10:45	13:30	73.90747	79.09448
S1487	03:54	04:42	06:00	04:54	10:45	13:30	76.73531	80.73649
S1488		03:54	10:42	11:27	10:45	13:30	66.46453	71.84874
S1489	03:03	09:30	10:21	10:18	10:45	13:30	71.23725	75.32234
S1490	04:03	09:21		09:21	10:45	13:30	76.17359	80.37533
S1491	02:21	09:09		10:09	10:45	13:30	71.6555	76.6227
S1492		09:27	10:36	09:45	10:45	13:30	73.86749	77.16777
S1494		05:45	10:15	05:45	10:45	13:30	81.62309	86.96984
S1495		06:09		06:09	10:45	13:30	76.55938	79.81244
S1496		06:21		06:21	10:45	13:30	77.69789	79.32417
S1497		05:57	10:18	05:57	10:45	13:30	82.99682	85.79222
S1498		09:21		09:21	10:45	13:30	79.37847	82.03383
S1499		09:03	09:57	09:03	10:45	13:30	85.73041	87.52104
S1502		03:39		03:39	10:45	13:30	78.2878	81.04369
S1503		02:09	04:15	04:42	10:45	13:30	69.90254	71.41422

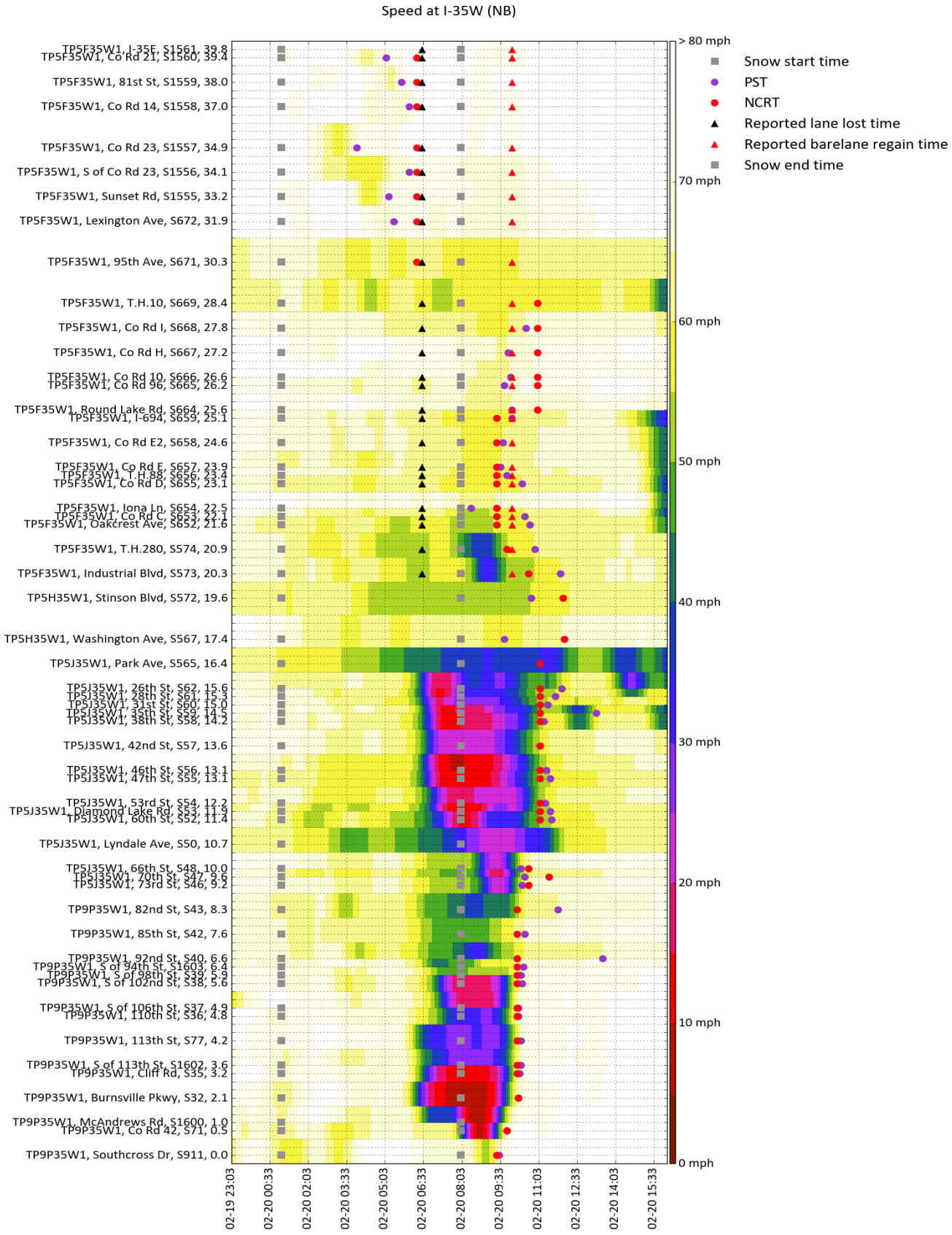
I-35E (SB)


Speed at I-35E (SB)
TP9P35E1, Southcross Dr, S905, 37.2
TP9P35E1, Co Rd 42, S904, 36.5
TP9P35E1, McAndrews Rd, S903, 35.7
TP9P35E1, S of Co Rd 11, S902, 35.1
TP9P35E1, Co Rd 11, S901, 34.7
TP9P35E1, N of Co Rd 11, S900, 34.2
TP9P35E1, S of T.H.77, S899, 33.1
TP9P35E1, N of T.H.77, S898, 32.7
TP9P35E1, S of Cliff Rd, S897, 32.2
TP9M35E1, Cliff Rd, S896, 31.7
TP9M35E1, Blackhawk Rd, S895, 31.2
TP9M35E1, Diffley Rd, S894, 30.7
TP9M35E1, S of Deerwood Dr, S893, 30.2
TP9M35E1, N of Deerwood Dr, S892, 29.9
TP9M35E1, S of Pilot Knob Rd, S891, 29.1
TP9M35E1, Pilot Knob Rd, S890, 28.6
TP9M35E1, Yankee Doodle Rd, S889, 28.1
TP9M35E1, N of Yankee Doodle Rd, S888, 27.6
TP9M35E1, Lone Oak Rd, S859, 27.0
TP9M35E1, I-494, S858, 26.1
TP9M35E1, Wagon Wheel Tr, S857, 25.2
TP9M35E1, T.H.110, S856, 24.7
TP9M35E1, T.H.13, S853, 23.2
TP9M35E1, Shepard Rd, S852, 22.7
TP9M35E1, W. 7th St, S851, 22.3
TP9M35E1, Randolph Ave, S850, 21.5
TP9M35E1, Victoria St, S848, 20.8
TP9M35E1, St. Clair Ave, S847, 20.4
TP9F35E1, Grand Ave, S846, 19.8
TP9F35E1, Kellogg Blvd, S845, 19.1
TP9F35E1, I-94, S644, 18.8
TP9F35E1, T.H.36, S634, 14.5
TP9F35E1, Little Canada Rd, S633, 13.7
TP9B35E1, Goose Lake Rd, S1549, 10.9
TP9B35E1, N of Goose Lake Rd, S1548, 10.4
TP9B35E1, S of Co Rd 96, S1547, 9.7
TP9B35E1, Co Rd 96, S1546, 9.3
TP9B35E1, N of Co Rd 96, S1545, 8.6
TP9B35E1, Constellation Dr, S1544, 8.3
TP9B35E1, Co Rd H2, S1543, 7.6
TP9B35E1, N of Co Rd H2, S1542, 7.3
TP9B35E1, S of Co Rd J, S1541, 6.7
TP9B35E1, Co Rd J, S1540, 6.2
TP9B35E1, N of Co Rd J, S1539, 5.6
TP9B35E1, 64th St, S1538, 5.1
TP9B35E1, Tart Lake Rd, S1537, 4.5
TP9B35E1, S of Co Rd 14, S1536, 3.9
TP9B35E1, Co Rd 14, S1535, 3.2
TP9B35E1, 80th St, S1532, 1.0
TP9B35E1, S of I-35W, S1531, 0.0
02-20 00:03
02-20 01:33
02-20 03:03
02-20 04:33
02-20 06:03
02-20 07:33
02-20 09:03
02-20 10:33
02-20 12:03
02-20 13:33
02-20 15:03
02-20 16:33
02-20 18:03
02-20 19:33
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1531		03:15	03:18	03:51	09:03	13:30	76.80744	79.792
S1535	02:30	03:18	03:21	04:12	09:03	13:30	77.42349	82.04868
S1536	06:15	09:03		10:39	09:03	13:30	55.3029	70.64981
S1537	21:00	03:15		04:21	09:03	13:30	67.81856	75.7872
S1538	04:12	02:15		02:48	09:03	13:30	68.74501	74.72221
S1539		06:48		07:51	09:03	13:30	71.49901	77.6025
S1540	05:03	07:21		09:21	09:03	13:30	69.38146	74.8419
S1541		07:30	08:30	10:09	09:03	13:30	62.87558	73.20964
S1542		07:33		08:06	09:03	13:30	71.80904	81.86784
S1543		06:45	08:00	09:15	09:03	13:30	69.66917	78.3428
S1544		06:51	08:00	09:36	09:03	13:30	67.3478	75.6485
S1545		06:48		09:48	09:03	13:30	67.11807	73.43314
S1546		06:51	06:51	07:36	09:03	13:30	78.74828	87.90113
S1547	05:30	06:45	06:51	10:03	09:03	13:30	64.13054	75.47798
S1548	05:30	06:39	06:39	09:21	09:03	13:30	68.894	76.99264
S1549	05:12	06:42	06:45	10:03	10:21	13:30	71.08857	74.75322
S633	06:18	07:51	07:54	10:15	10:27		60.66483	
S634		08:06	08:33	10:24	10:06		57.38634	
S644	04:27	09:39	09:39	12:03	11:03		37.449	
S845		08:15	11:00	08:15	11:12		53.30751	
S846	06:33	08:03	10:03	08:03	10:21		52.97044	
S847		07:45	08:54	07:45	09:27		49.88469	
S848		07:54		07:54	09:27		51.07732	
S850	01:30	08:21	08:21	17:36	09:27		46.74436	
S851	07:09	08:30	08:30	17:57	10:18		52.53218	
S852	06:03	08:36	08:57	17:45	10:18		67.67982	
S853	04:42	08:36	09:03	10:12	10:18		56.36048	
S856		08:45	09:24	10:06	10:18		57.02058	
S857		08:45	09:12	09:36	10:18		61.88068	
S858	01:51	08:18	08:24	09:27	10:18		61.44932	
S859	04:45	08:30	09:57	10:57	10:30		65.64247	
S888	07:15	08:15	09:57	12:54	10:30		63.96418	
S889	04:42	08:21	09:57	14:39	10:30		60.87433	
S890	06:12	09:12	10:15		10:30		60.1336	
S891		09:21	10:09		10:30		58.04336	
S892		09:15	09:45	14:48	10:30		58.97526	
S893	02:12	09:15	09:30	11:36	10:30		63.7441	
S894	01:42	09:24	09:57	11:51	10:30		60.08168	
S896	01:42	09:42	09:57	11:30	10:30		61.01265	
S897		09:15	10:24	11:51	10:54		67.24801	
S898		05:48	10:36	12:54	11:09		66.425	
S899		10:12	10:30	12:33	11:03		64.86812	
S900	01:51	03:09	10:12	11:57	11:45		69.68523	

S901		05:39	10:21	11:09	11:45		71.15343	
S902		04:33	04:51	11:57	11:45		69.6095	
S904		05:48	10:12	10:51	11:45		74.66914	
S905		04:42	10:30	11:09	11:45		74.51189	

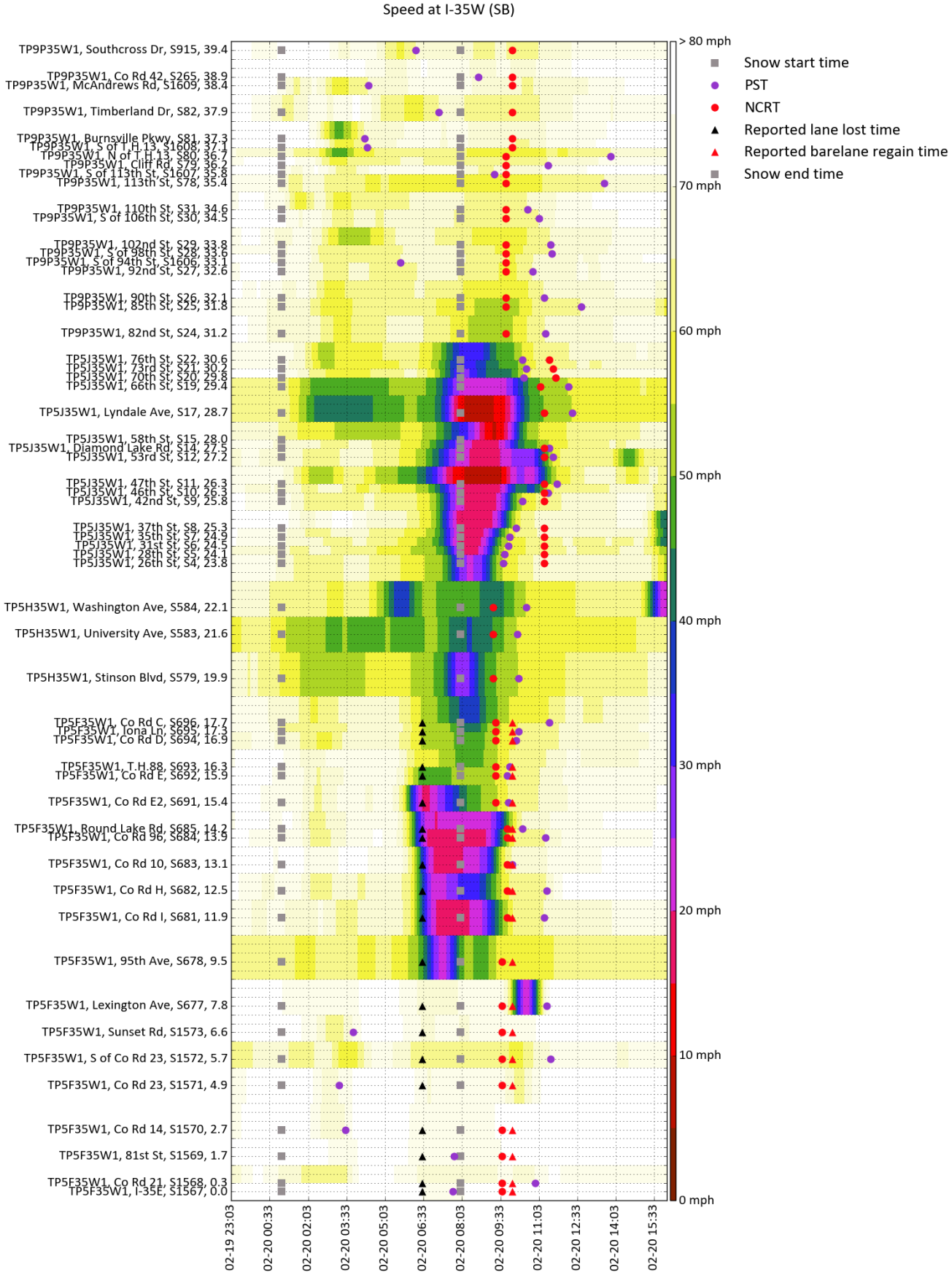
I-35W (NB)


Speed at I-35W (NB)
TP5F35W1, I-35E, S1561, 39.8
TP5F35W1, Co Rd 21, S1560, 39.4
TP5F35W1, 81st St, S1559, 38.0
TP5F35W1, Co Rd 14, S1558, 37.0
TP5F35W1, Co Rd 23, S1557, 34.9
TP5F35W1, S of Co Rd 23, S1556, 34.1
TP5F35W1, Sunset Rd, S1555, 33.2
TP5F35W1, Lexington Ave, S672, 31.9
TP5F35W1, 95th Ave, S671, 30.3
TP5F35W1, T.H.10, S669, 28.4
TP5F35W1, Co Rd I, S668, 27.8
TP5F35W1, Co Rd H, S667, 27.2
TP5F35W1, Co Rd 10, S666, 26.6
TP5F35W1, Co Rd 96, S665, 26.2
TP5F35W1, Round Lake Rd, S664, 25.6
TP5F35W1, I-694, S659, 25.1
TP5F35W1, Co Rd E2, S658, 24.6
TP5F35W1, Co Rd E, S657, 23.9
TP5F35W1, T.H.88, S656, 23.4
TP5F35W1, Co Rd D, S655, 23.1
TP5F35W1, Iona Ln, S654, 22.5
TP5F35W1, Co Rd C, S653, 22.1
TP5F35W1, Oakcrest Ave, S652, 21.6
TP5F35W1, T.H.280, S574, 20.9
TP5F35W1, Industrial Blvd, S573, 20.3
TP5H35W1, Stinson Blvd, S572, 19.6
TP5H35W1, Washington Ave, S567, 17.4
TP5J35W1, Park Ave, S565, 16.4
TP5J35W1, 26th St, S62, 15.6
TP5J35W1, 28th St, S61, 15.3
TP5J35W1, 31st St, S60, 15.0
TP5J35W1, 35th St, S59, 14.5
TP5J35W1, 38th St, S58, 14.2
TP5J35W1, 42nd St, S57, 13.6
TP5J35W1, 46th St, S56, 13.1
TP5J35W1, 47th St, S55, 13.1
TP5J35W1, 53rd St, S54, 12.2
TP5J35W1, Diamond Lake Rd, S53, 11.5
TP5J35W1, 60th St, S52, 11.4
TP5J35W1, Lyndale Ave, S50, 10.7
TP5J35W1, 66th St, S48, 10.0
TP5J35W1, 70th St, S47, 9.6
TP5J35W1, 73rd St, S46, 9.2
TP9P35W1, 82nd St, S43, 8.3
TP9P35W1, 85th St, S42, 7.6
TP9P35W1, 92nd St, S40, 6.6
TP9P35W1, S of 94th St, S1603, 6.4
TP9P35W1, S of 98th St, S39, 5.9
TP9P35W1, S of 102nd St, S38, 5.6
TP9P35W1, S of 106th St, S37, 4.9
TP9P35W1, 110th St, S36, 4.8
TP9P35W1, 113th St, S77, 4.2
TP9P35W1, S of 113th St, S1602, 3.6
TP9P35W1, Cliff Rd, S35, 3.2
TP9P35W1, Burnsville Pkwy, S32, 2.1
TP9P35W1, McAndrews Rd, S1600, 1.0
TP9P35W1, Co Rd 42, S71, 0.5
TP9P35W1, Southcross Dr, S911, 0.0
02-19 23:03
02-20 00:33
02-20 02:03
02-20 03:33
02-20 05:03
02-20 06:33
02-20 08:03
02-20 09:33
02-20 11:03
02-20 12:33
02-20 14:03
02-20 15:33
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S911	05:42	08:57	08:57	09:30	09:24		63.10586	
S71	02:33	08:45	08:48	09:48	09:48		66.41369	
S32	03:09	08:03	08:39	10:15	10:15		65.46155	
S35	02:57	08:27	08:45	10:18	10:12		60.62575	
S1602	02:48	08:12	08:57	10:21	10:12		60.7757	
S77	03:09	07:54	09:24	10:21	10:12		58.81207	
S36	03:00	09:03	09:09	10:15	10:12		63.50799	
S37	01:12	08:51	08:57	10:15	10:12		63.27239	
S38	02:39	08:00	08:51	10:24	10:12		59.48486	
S39	05:51	07:36	09:42	10:21	10:12		62.23275	
S1603	05:18	07:09	08:15	10:27	10:12		61.98323	
S40	03:12	08:39	08:39	13:33	10:12		56.533	
S42	01:18	08:18	08:39	10:30	10:12		61.88413	
S43	05:15	08:33	09:48	11:48	10:12		52.32729	
S46	01:12	09:30	09:30	10:24	10:39		63.25439	
S47	01:18	09:24	09:27	10:30	11:27		62.32139	
S48	01:27	09:21	09:21	10:21	10:39		63.65896	
S52	01:15	08:09	08:15	11:33	11:06		50.23876	
S53	00:54	08:09	08:30	11:30	11:06		50.92399	
S54	01:36	07:54	08:57	11:18	11:06		51.55557	
S55	02:21	07:48	08:54	11:30	11:06		50.89787	
S56	02:00	07:48	09:00	11:21	11:06		50.79319	
S57	01:48	07:27	09:03	11:06	11:06		55.87211	
S58	01:09	07:30	08:51	11:15	11:06		52.16853	
S59	00:48	07:27	08:42	13:18	11:06		48.34443	
S60	00:57	07:12	07:12	11:24	11:06		51.97699	
S61	02:30	07:12	07:12	11:42	11:06		51.40975	
S62	04:12	07:12	09:39	11:57	11:06		45.99097	
S565	00:48	09:03			11:06		34.74436	
S567	00:51	09:42	11:39	09:42	12:03		65.52386	
S572	00:57	06:33	11:39	10:45	12:00		59.18361	
S573	00:57	09:03	09:03	11:54	10:39	10:00	53.54107	52.53717
S574	01:39	08:51	09:03	10:54	09:48	10:00	54.91746	56.62744
S652	02:24	08:27	08:51	10:42	09:24	10:00	56.08338	58.40049
S653	01:00	08:18	09:18	10:30	09:24	10:00	56.23524	59.85772
S654	01:09	08:24	09:21	08:24	09:24	10:00	65.0004	67.59019
S655	02:39	08:18	09:21	10:24	09:24	10:00	58.27266	59.91383
S656	00:48	08:36	08:51	09:48	09:24	10:00	58.59177	60.52745
S657	00:45	09:03	09:21	09:33	09:24	10:00	58.99771	63.01807
S658	02:45	09:03		09:39	09:24	10:00	58.64571	61.66282
S659	02:09	09:09		10:00	09:24	10:00	56.22872	60.18746
S664	01:06	09:15	10:27	10:00	11:00	10:00	68.16624	65.23222
S665		09:21	10:27	09:42	11:00	10:00	72.28478	68.17513

S666	03:45	09:27	10:45	09:57	11:00	10:00	70.85847	65.63668
S667	04:39	09:36	10:24	09:51	11:00	10:00	71.03522	65.81357
S668	01:27	09:27	10:57	10:33	11:00	10:00	65.54346	61.27068
S669		04:27	10:27		11:00	10:00	58.44016	55.06396
S671		04:03	05:51		06:18	10:00	61.88165	57.99169
S672		05:00		05:24	06:18	10:00	72.45174	69.36613
S1555		04:24	04:24	05:12	06:18	10:00	72.50242	67.54361
S1556		04:24	04:39	06:00	06:18	10:00	71.25355	68.42803
S1557		03:12	03:27	03:57	06:18	10:00	77.56307	73.78246
S1558		05:39	05:45	06:00	06:18	10:00	75.01271	73.49656
S1559		05:18	05:24	05:42	06:18	10:00	80.65703	76.87861
S1560		04:18	05:00	05:06	06:18	10:00	77.96708	73.33561

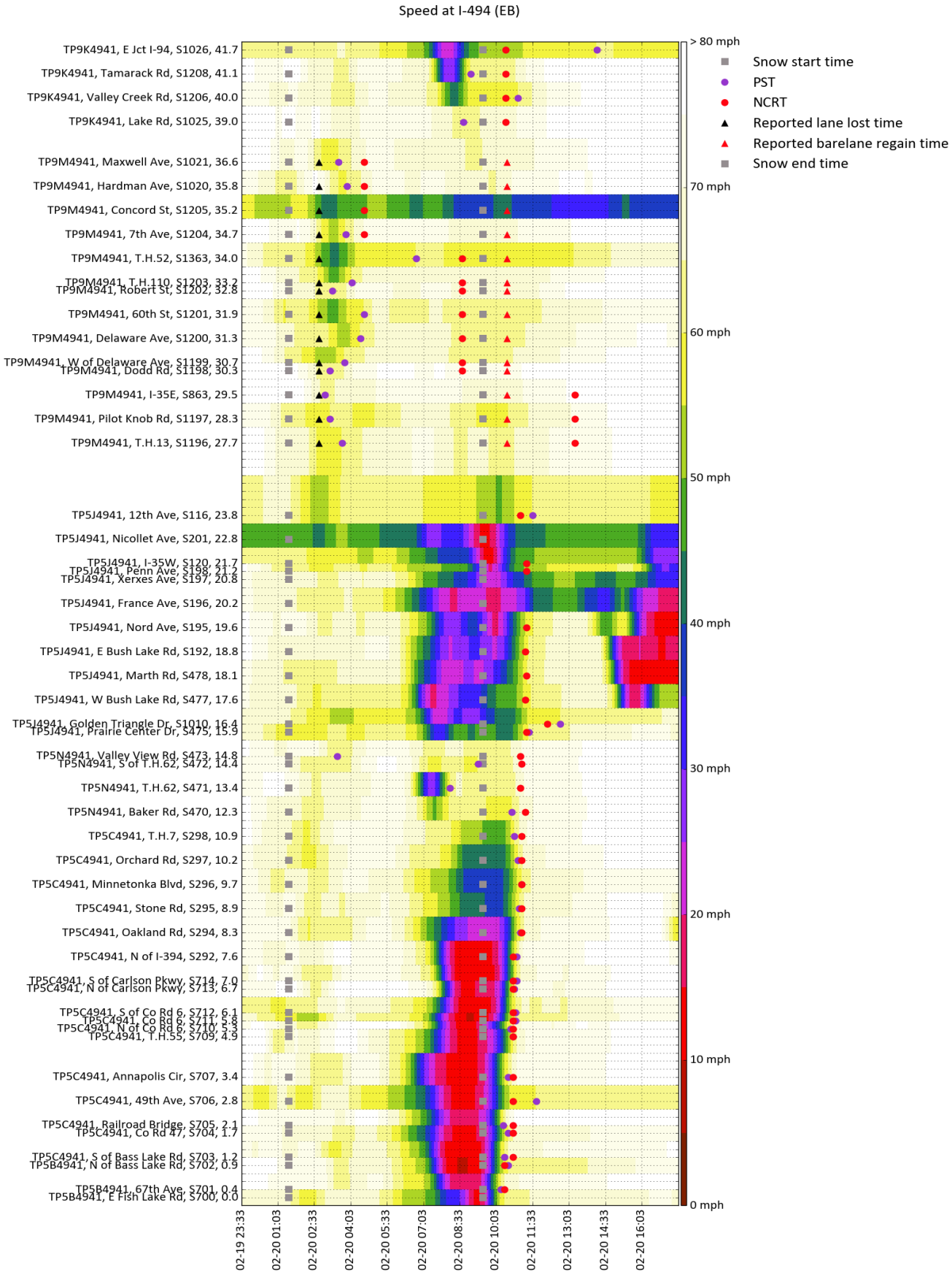
I-35W (SB)


Speed at I-35W (SB)
TP9P35W1, Southcross Dr, S915, 39.4
TP9P35W1, Co Rd 42, S265, 38.9
TP9P35W1, McAndrews Rd, S1609, 38.4
TP9P35W1, Timberland Dr, S82, 37.9
TP9P35W1, Burnsville Pkwy, S81, 37.3
TP9P35W1, S of T.H.13, S1608, 37.1
TP9P35W1, N of T.H.13, S80, 36.7
TP9P35W1, Cliff Rd, S79, 36.2
TP9P35W1, S of 113th St, S1607, 35.8
TP9P35W1, 113th St, S78, 35.4
TP9P35W1, 110th St, S31, 34.6
TP9P35W1, S of 106th St, S30, 34.5
TP9P35W1, 102nd St, S29, 33.8
TP9P35W1, S of 98th St, S28, 33.6
TP9P35W1, S of 94th St, S1606, 33.1
TP9P35W1, 92nd St, S27, 32.6
TP9P35W1, 90th St, S26, 32.1
TP9P35W1, 85th St, S25, 31.8
TP9P35W1, 82nd St, S24, 31.2
TP5J35W1, 76th St, S22, 30.6
TP5J35W1, 73rd St, S21, 30.2
TP5J35W1, 70th St, S20, 29.8
TP5J35W1, 66th St, S19, 29.4
TP5J35W1, Lyndale Ave, S17, 28.7
TP5J35W1, 58th St, S15, 28.0
TP5J35W1, Diamond Lake Rd, S14, 27.5
TP5J35W1, 53rd St, S12, 27.2
TP5J35W1, 47th St, S11, 26.3
TP5J35W1, 46th St, S10, 26.3
TP5J35W1, 42nd St, S9, 25.8
TP5J35W1, 37th St, S8, 25.3
TP5J35W1, 35th St, S7, 24.9
TP5J35W1, 31st St, S6, 24.5
TP5J35W1, 28th St, S5, 24.1
TP5J35W1, 26th St, S4, 23.8
TP5H35W1, Washington Ave, S584, 22.1
TP5H35W1, University Ave, S583, 21.6
TP5H35W1, Stinson Blvd, S579, 19.9
TP5F35W1, Co Rd C, S696, 17.7
TP5F35W1, Iona Ln, S695, 17.3
TP5F35W1, Co Rd D, S694, 16.9
TP5F35W1, T.H.88, S693, 16.3
TP5F35W1, Co Rd E, S692, 15.9
TP5F35W1, Co Rd E2, S691, 15.4
TP5F35W1, Round Lake Rd, S685, 14.2
TP5F35W1, Co Rd 96, S684, 13.9
TP5F35W1, Co Rd 10, S683, 13.1
TP5F35W1, Co Rd H, S682, 12.5
TP5F35W1, Co Rd I, S681, 11.9
TP5F35W1, 95th Ave, S678, 9.5
TP5F35W1, Lexington Ave, S677, 7.8
TP5F35W1, Sunset Rd, S1573, 6.6
TP5F35W1, S of Co Rd 23, S1572, 5.7
TP5F35W1, Co Rd 23, S1571, 4.9
TP5F35W1, Co Rd 14, S1570, 2.7
TP5F35W1, 81st St, S1569, 1.7
TP5F35W1, Co Rd 21, S1568, 0.3
TP5F35W1, I-35E, S1567, 0.0
02-19 23:03
02-20 00:33
02-20 02:03
02-20 03:33
02-20 05:03
02-20 06:33
02-20 08:03
02-20 09:33
02-20 11:03
02-20 12:33
02-20 14:03
02-20 15:33
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1567		07:42	09:12	07:42	09:36	10:00	79.46149	79.86243
S1568	05:24	03:12	09:03	10:54	09:36	10:00	70.5345	70.02624
S1569	01:00	07:45	09:03	07:45	09:36	10:00	75.19967	76.10739
S1570		03:00	09:06	03:30	09:36	10:00	77.35326	79.53089
S1571	06:03	02:54		03:15	09:36	10:00	71.741	65.95236
S1572	05:30	03:36		11:30	09:36	10:00	62.51488	58.97583
S1573	05:39	03:03		03:48	09:36	10:00	73.26867	71.96072
S677	05:24	06:39		11:21	09:36	10:00	71.75274	53.62599
S678	01:12	07:18	07:18		09:36	10:00	56.85742	56.57451
S681	01:09	07:15	08:18	11:15	09:48	10:00	54.97533	59.36007
S682	01:42	07:06	07:06	11:21	09:48	10:00	59.23179	61.27358
S683	01:48	07:12	07:57	10:00	09:48	10:00	62.24954	65.24887
S684	05:18	07:00	08:48	11:18	09:48	10:00	51.64313	58.26752
S685	05:30	07:00	08:48	10:24	09:48	10:00	45.58873	54.38309
S691		06:39	06:39	09:51	09:21	10:00	53.96896	61.96954
S692	05:33	06:42	09:06	09:48	09:21	10:00	55.11504	61.88049
S693	01:24	08:18	08:39	09:54	09:21	10:00	54.42783	61.05814
S694	05:33	08:24	08:36	10:09	09:21	10:00	54.51883	59.41487
S695	05:36	08:21	08:21	10:15	09:21	10:00	53.60724	59.00679
S696	01:27	08:21	08:27	11:27	09:21	10:00	49.54123	56.17055
S579	00:45	08:03	08:03	10:15	09:15		48.94733	
S583	00:54	08:21	08:42	10:12	09:15		45.16582	
S584	04:12	05:39	05:42	10:33	09:15		43.93152	
S4	04:06	08:21	08:39	09:39	11:15		66.61829	
S5	00:57	08:21	08:21	09:42	11:15		62.73211	
S6	01:03	08:18	08:30	09:51	11:15		63.98003	
S7	00:57	08:27	08:39	09:54	11:15		66.11972	
S8	04:00	08:33	08:51	10:09	11:15		66.73437	
S9	01:15	08:36	09:24	10:24	11:15		63.37724	
S10	01:30	09:00	09:09	11:24	11:15		51.12507	
S11	01:03	09:09	09:24	11:45	11:15		39.85672	
S12	04:18	08:57	09:33	11:36	11:15		43.56342	
S14	04:18	09:12	09:27	11:27	11:15		53.11882	
S17	01:09	08:30	09:15	12:21	11:15		50.10287	
S19	01:27	08:18	09:27	12:12	11:06		50.04049	
S20	01:06	08:09	08:09	10:27	11:42		65.56637	
S21	01:36	08:12	08:18	10:33	11:36		62.05501	
S22	01:00	08:24	08:33	10:24	11:27		61.5573	
S24		08:39	09:27	11:18	09:45		54.23819	
S25	01:48	09:15	09:24	12:42	09:45		53.71961	
S26	00:51	09:45		11:15	09:45		56.15639	
S27	01:00	09:45		10:48	09:45		59.33698	
S1606	00:51	03:06		05:39	09:45		60.33236	

S28		09:45		11:33	09:45		58.83167	
S29	00:33	03:33	09:33	11:30	09:45		58.24698	
S30		09:33	09:33	11:03	09:45		61.69546	
S31	01:03	01:45	09:30	10:36	09:45		62.74476	
S78	00:57	09:27	09:36	13:36	09:45		55.4972	
S1607		03:30	09:12	09:18	09:45		67.98616	
S79		03:12	09:36	11:24	09:45		60.45231	
S80	01:06	03:18	03:18	13:51	09:45		55.37266	
S1608		03:24		04:21	10:00		65.79874	
S81	01:00	03:15	03:18	04:15	10:00		66.70625	
S82		06:09		07:09	10:00		62.87983	
S1609		03:15	03:45	04:24	10:00		67.9568	
S265		08:42		08:42	10:00		69.81557	
S915		05:36	05:45	06:15	10:00		63.94354	

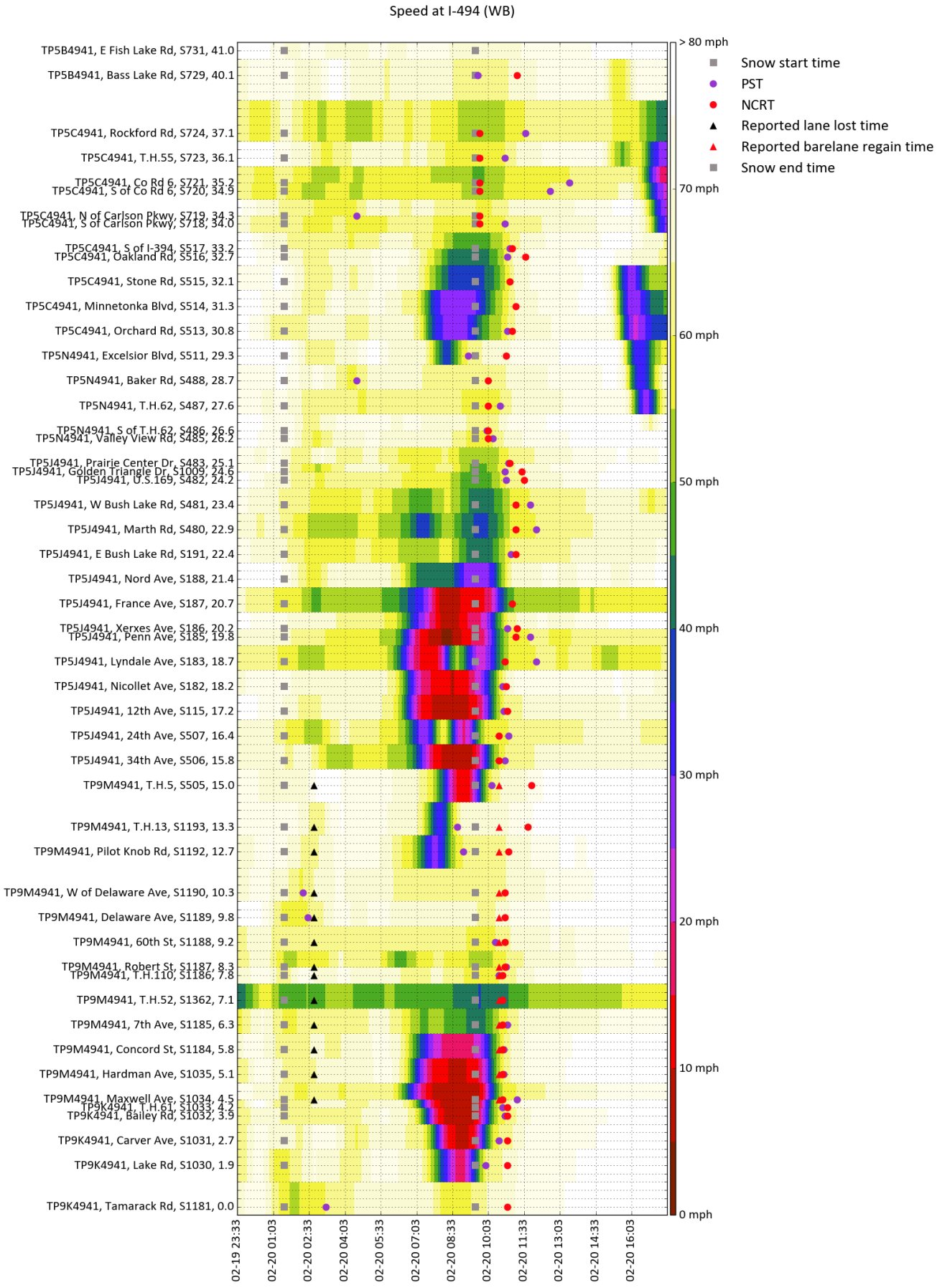
I-494 (EB)


Speed at I-494 (EB)
TP9K4941, E Jct I-94, S1026, 41.7
TP9K4941, Tamarack Rd, S1208, 41.1
TP9K4941, Valley Creek Rd, S1206, 40.0
TP9K4941, Lake Rd, S1025, 39.0
TP9M4941, Maxwell Ave, S1021, 36.6
TP9M4941, Hardman Ave, S1020, 35.8
TP9M4941, Concord St, S1205, 35.2
TP9M4941, 7th Ave, S1204, 34.7
TP9M4941, T.H.52, S1363, 34.0
TP9M4941, T.H.110, S1203, 33.2
TP9M4941, Robert St, S1202, 32.8
TP9M4941, 60th St, S1201, 31.9
TP9M4941, Delaware Ave, S1200, 31.3
TP9M4941, W of Delaware Ave, S1199, 30.7
TP9M4941, Dodd Rd, S1198, 30.3
TP9M4941, I-35E, S863, 29.5
TP9M4941, Pilot Knob Rd, S1197, 28.3
TP9M4941, T.H.13, S1196, 27.7
TP5J4941, 12th Ave, S116, 23.8
TP5J4941, Nicollet Ave, S201, 22.8
TP5J4941, I-35W, S120, 21.7
TP5J4941, Penn Ave, S198, 21.2
TP5J4941, Xerxes Ave, S197, 20.8
TP5J4941, France Ave, S196, 20.2
TP5J4941, Nord Ave, S195, 19.6
TP5J4941, E Bush Lake Rd, S192, 18.8
TP5J4941, Marth Rd, S478, 18.1
TP5J4941, W Bush Lake Rd, S477, 17.6
TP5J4941, Golden Triangle Dr, S1010, 16.4
TP5J4941, Prairie Center Dr, S475, 15.9
TP5N4941, Valley View Rd, S473, 14.8
TP5N4941, S of T.H.62, S472, 14.4
TP5N4941, T.H.62, S471, 13.4
TP5N4941, Baker Rd, S470, 12.3
TP5C4941, T.H.7, S298, 10.9
TP5C4941, Orchard Rd, S297, 10.2
TP5C4941, Minnetonka Blvd, S296, 9.7
TP5C4941, Stone Rd, S295, 8.9
TP5C4941, Oakland Rd, S294, 8.3
TP5C4941, N of I-394, S292, 7.6
TP5C4941, S of Carlson Pkwy, S714, 7.0
TP5C4941, N of Carlson Pkwy, S713, 6.7
TP5C4941, S of Co Rd 6, S712, 6.1
TP5C4941, Co Rd 6, S711, 5.8
TP5C4941, N of Co Rd 6, S710, 5.3
TP5C4941, T.H.55, S709, 4.9
TP5C4941, Annapolis Cir, S707, 3.4
TP5C4941, 49th Ave, S706, 2.8
TP5C4941, Railroad Bridge, S705, 2.1
TP5C4941, Co Rd 47, S704, 1.7
TP5C4941, S of Bass Lake Rd, S703, 1.2
TP5B4941, N of Bass Lake Rd, S702, 0.9
TP5B4941, 67th Ave, S701, 0.4
TP5B4941, E Fish Lake Rd, S700, 0.0
02-19 23:33
02-20 01:03
02-20 02:33
02-20 04:03
02-20 05:33
02-20 07:03
02-20 08:33
02-20 10:03
02-20 11:33
02-20 13:03
02-20 14:33
02-20 16:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S700	05:21							
S701	01:36	09:06	09:06	10:15	10:24		65.20381	
S702	01:36	08:39	08:54	10:33	10:24		57.8079	
S703	02:24	08:48	09:00	10:24	10:45		67.62665	
S704	01:36	08:45	09:03	10:33	10:45		65.40383	
S705	05:09	08:45	09:03	10:21	10:45		74.89813	
S706	03:51	08:39	09:06	11:42	10:45		57.19118	
S707	05:12	08:39	08:51	10:33	10:45		67.66395	
S709	04:09	08:51	09:03	10:45	10:45		60.94455	
S710	05:15	08:48	08:54	10:39	10:45		64.49021	
S711	03:54	08:57	09:09	10:51	10:45		58.11536	
S712	04:33	08:57	09:27	10:51	10:45		57.9521	
S713	06:00	08:51	09:30	10:48	10:45		59.37635	
S714	06:00	09:00	09:30	10:54	10:45		52.65577	
S292	03:54	09:18	09:36	10:54	10:45		53.47608	
S294	05:57	09:57	10:09	11:03	11:06		63.19767	
S295	06:09	10:03	10:15	11:00	11:06		63.47737	
S296	05:54	09:00	10:21	11:06	11:06		60.37709	
S297	05:57	09:09	10:21	10:57	11:06		64.18912	
S298	05:57	10:06	10:24	10:48	11:06		67.41785	
S470	06:18	07:30	10:24	10:42	11:15		68.33306	
S471	01:12	07:21	07:21	08:09	11:03		68.72759	
S472	06:24	09:00	10:24	09:18	11:06		70.1323	
S473	06:33	03:30	10:30	03:30	11:03		69.97773	
S475	03:36	07:42	07:42	11:24	11:18		59.13549	
S1010	01:36	07:42	07:42	12:42	12:09		57.73258	
S477	01:51	07:27	07:30		11:15		57.17082	
S478	06:06	08:09	09:21		11:18		59.24842	
S192	05:48	09:57	10:03		11:15		57.34966	
S195	05:51	10:00	10:03		11:18		56.77112	
S197	05:48							
S198	04:09	09:48	09:54		11:18		50.86013	
S120	02:54	09:45	09:48		11:18		48.74521	
S201	04:30							
S116	01:30	10:09	10:30	11:33	11:03		57.88711	
S1196		03:06	11:57	03:42	13:18	10:30	71.78626	63.20847
S1197		02:42	11:24	03:12	13:18	10:30	70.85744	59.99697
S863		03:00	11:48	03:00	13:18	10:30	76.7804	66.7838
S1198	17:30	03:12	03:33	03:12	08:39	10:30	71.94279	73.07932
S1199	17:30	03:03	03:09	03:48	08:39	10:30	62.23672	64.50827
S1200		03:45	04:09	04:27	08:39	10:30	63.58094	62.62017
S1201		03:18	03:24	04:36	08:39	10:30	62.82841	60.59668

S1202	17:30	03:18	03:24	03:18	08:39	10:30	67.13774	67.34791
S1203	17:30	03:21	03:21	04:06	08:39	10:30	65.28478	65.19361
S1363		03:21	03:21	06:45	08:39	10:30	55.27634	55.7214
S1204		03:18	03:27	03:51	04:36	10:30	70.20378	68.61936
S1205		03:09	04:24		04:36	10:30	49.03966	41.1087
S1020		03:42	04:06	03:54	04:36	10:30	66.67402	67.9894
S1021		03:09	03:27	03:33	04:36	10:30	69.39739	67.03104
S1025	07:06	08:42	10:24	08:42	10:27		67.6081	
S1206	05:42	08:18	08:18	10:57	10:27		58.26192	
S1208	06:12	08:06	08:06	09:00	10:27		62.05794	
S1026	05:00	08:00	08:00	14:12	10:27		52.14062	

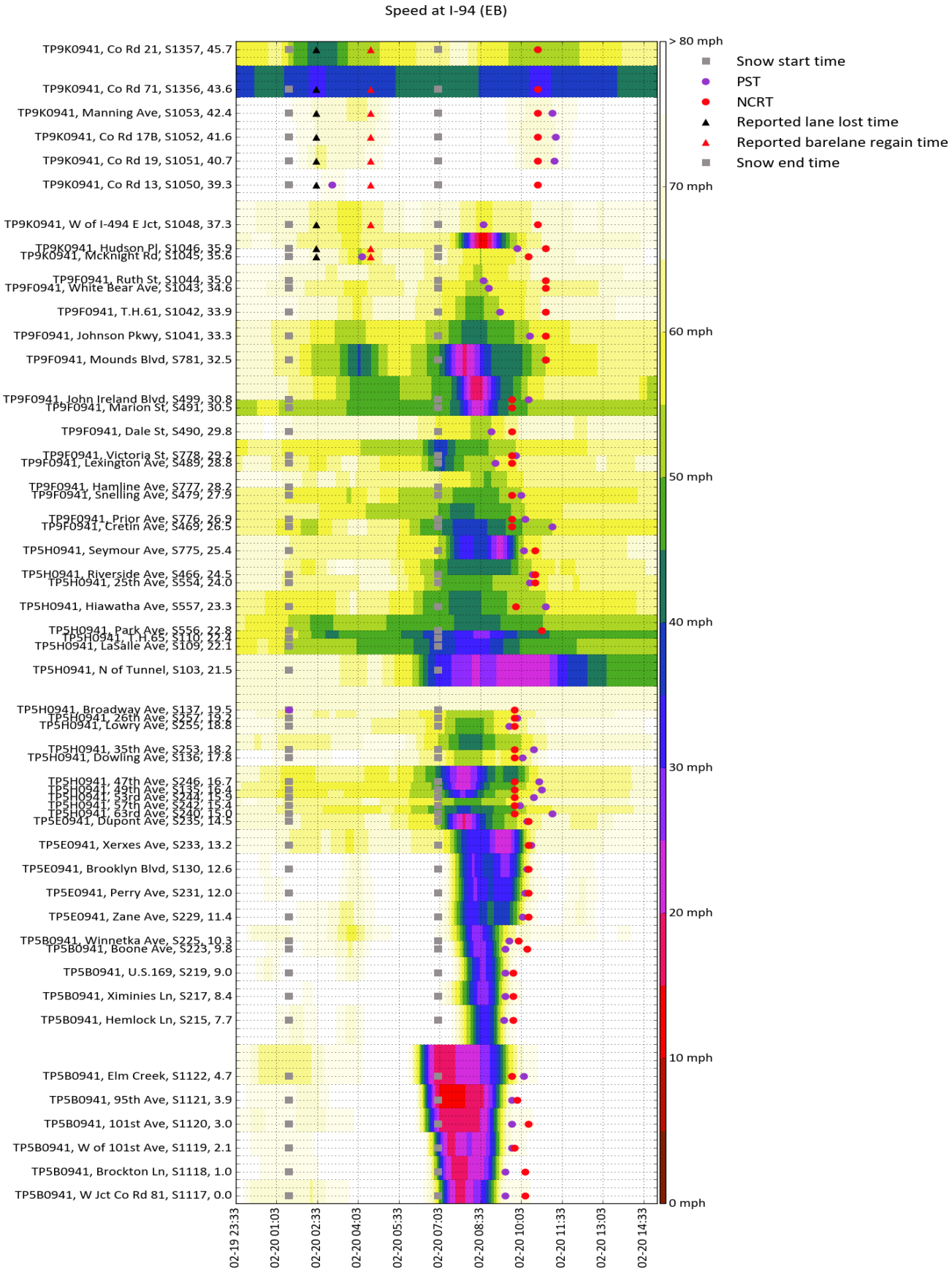
I-494 (WB)


Speed at I-494 (WB)
TP5B4941, E Fish Lake Rd, S731, 41.0
TP5B4941, Bass Lake Rd, S729, 40.1
TP5C4941, Rockford Rd, S724, 37.1
TP5C4941, T.H.55, S723, 36.1
TP5C4941, Co Rd 6, S721, 35.2
TP5C4941, S of Co Rd 6, S720, 34.9
TP5C4941, N of Carlson Pkwy, S719, 34.3
TP5C4941, S of Carlson Pkwy, S718, 34.0
TP5C4941, S of I-394, S517, 33.2
TP5C4941, Oakland Rd, S516, 32.7
TP5C4941, Stone Rd, S515, 32.1
TP5C4941, Minnetonka Blvd, S514, 31.3
TP5C4941, Orchard Rd, S513, 30.8
TP5N4941, Excelsior Blvd, S511, 29.3
TP5N4941, Baker Rd, S488, 28.7
TP5N4941, T.H.62, S487, 27.6
TP5N4941, S of T.H.62, S486, 26.6
TP5N4941, Valley View Rd, S485, 26.2
TP5J4941, Prairie Center Dr, S483, 25.1
TP5J4941, Golden Triangle Dr, S1009, 24.6
TP5J4941, U.S.169, S482, 24.2
TP5J4941, W Bush Lake Rd, S481, 23.4
TP5J4941, Marth Rd, S480, 22.9
TP5J4941, E Bush Lake Rd, S191, 22.4
TP5J4941, Nord Ave, S188, 21.4
TP5J4941, France Ave, S187, 20.7
TP5J4941, Xerxes Ave, S186, 20.2
TP5J4941, Penn Ave, S185, 19.8
TP5J4941, Lyndale Ave, S183, 18.7
TP5J4941, Nicollet Ave, S182, 18.2
TP5J4941, 12th Ave, S115, 17.2
TP5J4941, 24th Ave, S507, 16.4
TP5J4941, 34th Ave, S506, 15.8
TP9M4941, T.H.5, S505, 15.0
TP9M4941, T.H.13, S1193, 13.3
TP9M4941, Pilot Knob Rd, S1192, 12.7
TP9M4941, W of Delaware Ave, S1190, 10.3
TP9M4941, Delaware Ave, S1189, 9.8
TP9M4941, 60th St, S1188, 9.2
TP9M4941, Robert St, S1187, 8.3
TP9M4941, T.H.110, S1186, 7.8
TP9M4941, T.H.52, S1362, 7.1
TP9M4941, 7th Ave, S1185, 6.3
TP9M4941, Concord St, S1184, 5.8
TP9M4941, Hardman Ave, S1035, 5.1
TP9M4941, Maxwell Ave, S1034, 4.5
TP9K4941, T.H.61, S1033, 4.2
TP9K4941, Bailey Rd, S1032, 3.9
TP9K4941, Carver Ave, S1031, 2.7
TP9K4941, Lake Rd, S1030, 1.9
TP9K4941, Tamarack Rd, S1181, 0.0
02-19 23:33
02-20 01:03
02-20 02:33
02-20 04:03
02-20 05:33
02-20 07:03
02-20 08:33
02-20 10:03
02-20 11:33
02-20 13:03
02-20 14:33
02-20 16:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1181	07:33	01:54	10:27	03:15	10:51		66.83509	
S1030	07:12	08:54	09:00	09:57	10:51		66.58502	
S1031	03:36	08:57	09:06	10:30	10:51		62.99204	
S1032	06:21	09:03	09:06	10:45	10:51		61.3904	
S1033	06:24	09:09	09:30	10:39	10:51		63.34208	
S1034	01:27	09:06	09:24	11:15	10:39	10:30	55.80525	51.35201
S1035	06:09	08:48	09:06	10:42	10:39	10:30	59.1999	54.51838
S1184	06:12	08:54	09:03	10:42	10:39	10:30	59.03453	54.94481
S1185	06:09	09:36	09:51	10:51	10:39	10:30	57.67023	55.29627
S1362	03:57	09:42	10:06		10:39	10:30	44.0861	43.44356
S1186	04:15	09:48	10:06	10:30	10:39	10:30	60.98033	60.09151
S1187	04:00	06:21	06:39	10:48	10:45	10:30	59.70926	57.52523
S1188		09:51	10:03	10:21	10:45	10:30	63.62428	61.58123
S1189		01:54	10:12	02:30	10:45	10:30	68.65497	66.41255
S1190	04:03	02:12	10:12	02:18	10:45	10:30	64.9741	63.3937
S1192	05:33	07:48	07:54	09:00	10:54	10:30	65.81087	62.6865
S1193	05:33	08:00	08:03	08:45	11:42	10:30	73.26395	67.24928
S505	03:33	09:00	09:09	10:12	11:51	10:30	71.84475	64.7855
S506	01:18	08:51	09:03	10:45	10:30		56.08147	
S507	04:30	09:00	09:03	10:54	10:30		58.08661	
S115	01:12	08:45	09:03	10:42	10:51		62.73839	
S182	01:51	08:33	08:48	10:39	10:48		65.22074	
S183	05:42	07:39	09:54	12:03	10:45		52.46705	
S185	01:27	08:18	08:27	11:48	11:12		57.48829	
S186	01:30	08:24	08:30	10:51	11:15		65.21847	
S187	02:06	08:18	09:15		11:03		49.34702	
S191	01:57	09:42	09:57	11:00	11:12		61.81276	
S480	01:24	07:18	10:00	12:03	11:12		57.77153	
S481	02:21	09:48	10:03	11:48	11:12		58.22509	
S482	01:30	09:27	09:54	10:48	11:33		65.04832	
S1009	01:09	09:33	09:54	10:45	11:27		66.19717	
S483	03:18	09:27	10:15	10:54	10:57		60.9847	
S485		09:36	09:36	10:15	10:03		59.13514	
S486		10:00		10:00	10:03		62.3302	
S487	01:57	10:03		10:33	10:03		57.45236	
S488	01:48	04:21	09:30	04:33	10:03		61.29814	
S511	01:24	08:18	08:18	09:12	10:48		68.93162	
S513	07:00	08:51	08:57	10:51	11:03		63.37708	
S514	03:57	08:57	09:21		11:12		65.08626	
S515	01:30	09:03	09:27		10:57		61.26336	
S516	06:48	09:33	09:42	10:51	11:36		69.5373	
S517		09:30	10:33	10:57	11:03		61.89861	
S718		09:33	09:33	10:45	09:42		56.89607	

S719		03:24		04:33	09:42		58.9332	
S720		09:42		12:39	09:42		51.42762	
S721	01:48	09:39		13:27	09:42		49.20227	
S723	01:15	09:42		10:45	09:42		56.31664	
S724	01:54	04:39	09:30	11:36	09:42		52.09203	
S729	03:51	09:36	10:42	09:36	11:15		67.20052	

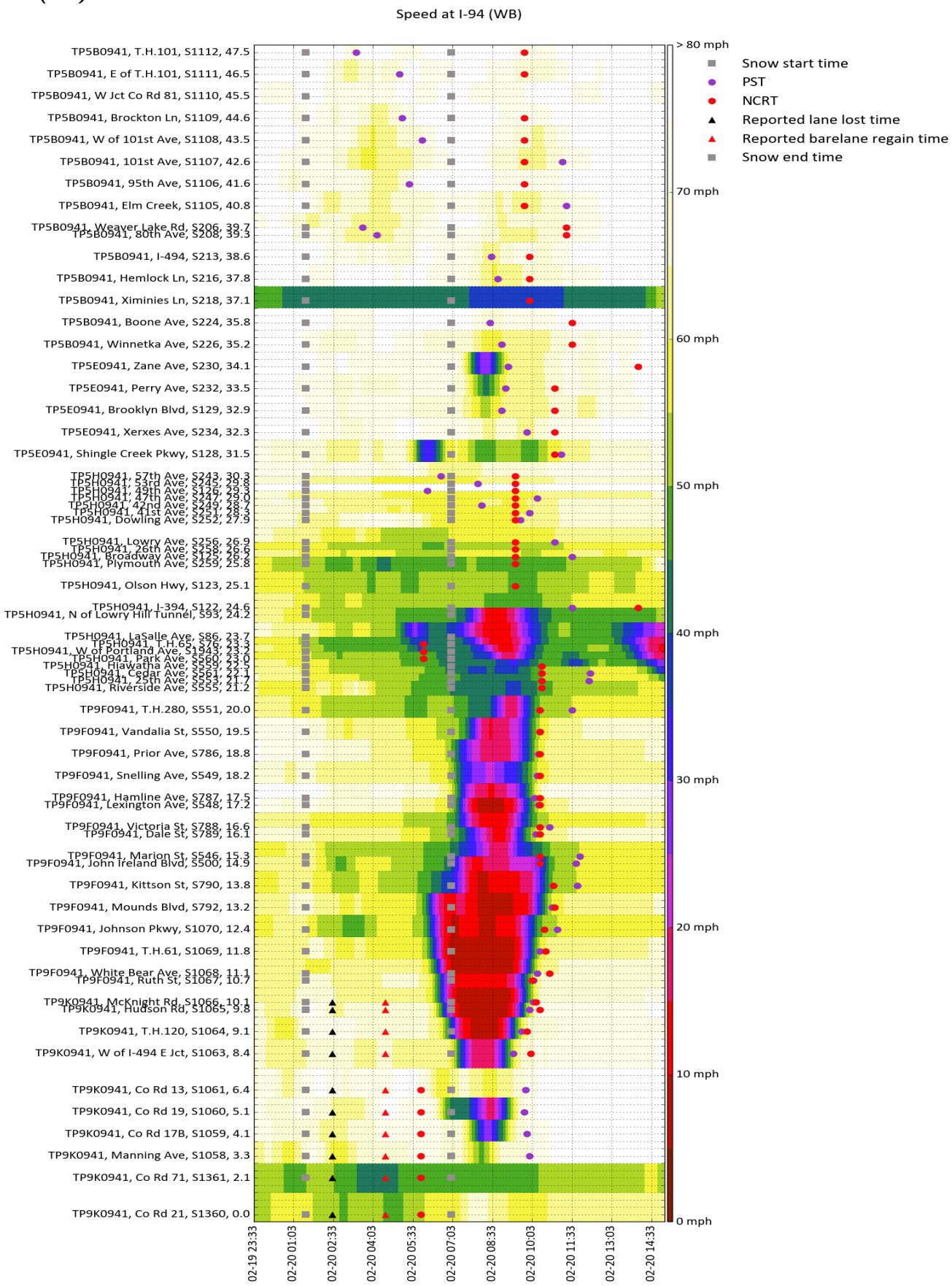
I-94 (EB)


Speed at I-94 (EB)
TP9K0941, Co Rd 21, S1357, 45.7
TP9K0941, Co Rd 71, S1356, 43.6
TP9K0941, Manning Ave, S1053, 42.4
TP9K0941, Co Rd 17B, S1052, 41.6
TP9K0941, Co Rd 19, S1051, 40.7
TP9K0941, Co Rd 13, S1050, 39.3
TP9K0941, W of I-494 E Jct, S1048, 37.3
TP9K0941, Hudson Pl, S1046, 35.9
TP9K0941, McKnight Rd, S1045, 35.6
TP9F0941, Ruth St, S1044, 35.0
TP9F0941, White Bear Ave, S1043, 34.6
TP9F0941, T.H.61, S1042, 33.9
TP9F0941, Johnson Pkwy, S1041, 33.3
TP9F0941, Mounds Blvd, S781, 32.5
TP9F0941, John Ireland Blvd, S499, 30.8
TP9F0941, Marion St, S491, 30.5
TP9F0941, Dale St, S490, 29.8
TP9F0941, Victoria St, S778, 29.2
TP9F0941, Lexington Ave, S489, 28.8
TP9F0941, Hamline Ave, S777, 28.2
TP9F0941, Snelling Ave, S479, 27.9
TP9F0941, Prior Ave, S776, 26.9
TP9F0941, Cretin Ave, S469, 26.5
TP5H0941, Seymour Ave, S775, 25.4
TP5H0941, Riverside Ave, S466, 24.5
TP5H0941, 25th Ave, S554, 24.0
TP5H0941, Hiawatha Ave, S557, 23.3
TP5H0941, Park Ave, S556, 22.8
TP5H0941, T.H.65, S110, 22.4
TP5H0941, LaSalle Ave, S109, 22.1
TP5H0941, N of Tunnel, S103, 21.5
TP5H0941, Broadway Ave, S137, 19.5
TP5H0941, 26th Ave, S257, 19.2
TP5H0941, Lowry Ave, S255, 18.8
TP5H0941, 35th Ave, S253, 18.2
TP5H0941, Dowling Ave, S136, 17.8
TP5H0941, 47th Ave, S246, 16.7
TP5H0941, 49th Ave, S135, 16.4
TP5H0941, 53rd Ave, S244, 15.9
TP5H0941, 57th Ave, S242, 15.4
TP5H0941, 63rd Ave, S240, 15.0
TP5E0941, Dupont Ave, S235, 14.5
TP5E0941, Xerxes Ave, S233, 13.2
TP5E0941, Brooklyn Blvd, S130, 12.6
TP5E0941, Perry Ave, S231, 12.0
TP5E0941, Zane Ave, S229, 11.4
TP5B0941, Winnetka Ave, S225, 10.3
TP5B0941, Boone Ave, S223, 9.8
TP5B0941, U.S.169, S219, 9.0
TP5B0941, Ximinies Ln, S217, 8.4
TP5B0941, Hemlock Ln, S215, 7.7
TP5B0941, Elm Creek, S1122, 4.7
TP5B0941, 95th Ave, S1121, 3.9
TP5B0941, 101st Ave, S1120, 3.0
TP5B0941, W of 101st Ave, S1119, 2.1
TP5B0941, Brockton Ln, S1118, 1.0
TP5B0941, W Jct Co Rd 81, S1117, 0.0
02-19 23:33
02-20 01:03
02-20 02:33
02-20 04:03
02-20 05:33
02-20 07:03
02-20 08:33
02-20 10:03
02-20 11:33
02-20 13:03
02-20 14:33
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1117	05:45	07:48	07:54	09:27	10:12		73.99283	
S1118	05:51	07:42	08:36	09:27	10:12		79.16495	
S1119		07:30	08:30	09:42	09:48		70.88509	
S1120	06:00	07:21	08:24	09:42	10:18		72.81038	
S1121	05:57	07:18	08:15	09:42	09:54		76.48307	
S1122		07:09	08:09	10:09	09:42		59.22895	
S215	06:51	08:42	08:45	09:24	09:45		73.82255	
S217	05:54	08:39	08:39	09:27	09:45		71.02845	
S219	06:51	08:36	08:36	09:27	09:45		71.92453	
S223	06:09	08:30	08:30	09:27	10:15		74.59296	
S225	05:57	08:27	08:27	09:36	09:57		66.98434	
S229	05:54	08:15	09:27	10:06	10:18		68.53597	
S231	05:57	08:21	09:27	10:12	10:18		64.28596	
S130	05:57	09:27	09:27	10:15	10:18		63.2162	
S233		09:24	09:24	10:24	10:18		57.46391	
S235	01:42	07:57	07:57	10:15	10:18		60.84921	
S240	01:15	07:57	08:21	11:12	09:48		49.53957	
S242	01:18	08:03	08:42	10:00	09:48		58.14172	
S244	05:33	07:54	07:54	10:30	09:48		54.21052	
S135	05:33	07:54	07:54	10:48	09:48		49.99153	
S246	04:06	07:57	07:57	10:42	09:48		43.05121	
S136	04:24	08:06	08:06	10:06	09:48		57.88985	
S253	05:48	08:12	08:51	10:30	09:48		53.64869	
S255	03:36	08:09	08:15	09:36	09:48		61.5377	
S257	05:57	08:15	08:36	09:54	09:48		59.40674	
S137		01:30		01:30	09:48		65.95841	
S556	01:48	08:27	10:15		10:48		49.82515	
S557	04:51	08:00	08:45	10:57	09:51		52.01432	
S554	05:18	07:57	08:48	10:21	10:33		56.57343	
S466	03:51	09:15	09:24	10:27	10:33		55.70685	
S775	01:27	09:15	09:15	10:09	10:33		58.77035	
S469	04:15	08:12	08:48	11:12	09:42		46.4007	
S776	02:30	07:48	09:30	10:12	09:42		50.23614	
S479	04:57	08:24	09:09	10:03	09:42		52.23009	
S489		07:09	07:09	09:06	09:42		58.12772	
S778		07:06	07:12	09:51	09:42		54.24547	
S490	01:18	08:33	09:00	08:57	09:42		62.69953	
S491	01:21	08:27	08:27		09:42		46.08821	
S499	01:18	08:24	08:24	10:18	09:42		44.35757	
S781	01:45	07:57	07:57	10:57	10:57		55.14582	
S1041	01:54	08:18	08:51	10:21	10:57		59.11523	
S1042	05:54	08:21	09:36	09:15	10:57		66.08072	
S1043	01:54	08:24	09:45	08:51	10:57		63.73104	

S1044	01:51	08:27	08:48	08:39	10:57		66.6535	
S1045	01:12	04:06	09:45	04:12	10:18	04:30	64.63435	59.04709
S1046	01:54	08:36	08:48	09:54	10:57	04:30	65.49529	61.82351
S1048		08:39	10:03	08:39	10:39	04:30	66.51044	61.2357
S1050		03:06	03:18	03:06	10:39	04:30	90.02332	89.13262
S1051		02:39	10:27	11:15	10:39	04:30	65.84685	71.92151
S1052		10:39		11:18	10:39	04:30	65.11366	69.13616
S1053		04:03	10:36	11:12	10:39	04:30	66.91193	65.96007
S1356	08:09	10:39			10:39	04:30	34.13792	35.74515
S1357		02:51	10:33		10:39	04:30	50.41815	52.04814

I-94 (WB)


Speed at I-94 (WB)
TP5B0941, T.H.101, S1112, 47.5
TP5B0941, E of T.H.101, S1111, 46.5
TP5B0941, W Jct Co Rd 81, S1110, 45.5
TP5B0941, Brockton Ln, S1109, 44.6
TP5B0941, W of 101st Ave, S1108, 43.5
TP5B0941, 101st Ave, S1107, 42.6
TP5B0941, 95th Ave, S1106, 41.6
TP5B0941, Elm Creek, S1105, 40.8
TP5B0941, Weaver Lake Rd, S206, 39.7
TP5B0941, 80th Ave, S208, 39.3
TP5B0941, I-494, S213, 38.6
TP5B0941, Hemlock Ln, S216, 37.8
TP5B0941, Ximinies Ln, S218, 37.1
TP5B0941, Boone Ave, S224, 35.8
TP5B0941, Winnetka Ave, S226, 35.2
TP5E0941, Zane Ave, S230, 34.1
TP5E0941, Perry Ave, S232, 33.5
TP5E0941, Brooklyn Blvd, S129, 32.9
TP5E0941, Xerxes Ave, S234, 32.3
TP5E0941, Shingle Creek Pkwy, S128, 31.5
TP5H0941, 57th Ave, S243, 30.3
TP5H0941, 53rd Ave, S245, 29.8
TP5H0941, 49th Ave, S126, 29.3
TP5H0941, 47th Ave, S247, 29.0
TP5H0941, 42nd Ave, S249, 28.7
TP5H0941, 41st Ave, S251, 28.3
TP5H0941, Dowling Ave, S252, 27.9
TP5H0941, Lowry Ave, S256, 26.9
TP5H0941, 26th Ave, S258, 26.6
TP5H0941, Broadway Ave, S125, 26.2
TP5H0941, Plymouth Ave, S259, 25.8
TP5H0941, Olson Hwy, S123, 25.1
TP5H0941, I-394, S122, 24.6
TP5H0941, N of Lowry Hill Tunnel, S93, 24.2
TP5H0941, LaSalle Ave, S86, 23.7
TP5H0941, T.H.65, S76, 23.3
TP5H0941, W of Portland Ave, S1543, 23.2
TP5H0941, Park Ave, S560, 23.0
TP5H0941, Hiawatha Ave, S559, 22.5
TP5H0941, Cedar Ave, S561, 22.1
TP5H0941, 25th Ave, S553, 21.7
TP5H0941, Riverside Ave, S555, 21.2
TP9F0941, T.H.280, S551, 20.0
TP9F0941, Vandalia St, S550, 19.5
TP9F0941, Prior Ave, S786, 18.8
TP9F0941, Snelling Ave, S549, 18.2
TP9F0941, Hamline Ave, S787, 17.5
TP9F0941, Lexington Ave, S548, 17.2
TP9F0941, Victoria St, S788, 16.6
TP9F0941, Dale St, S789, 16.1
TP9F0941, Marion St, S546, 15.3
TP9F0941, John Ireland Blvd, S500, 14.9
TP9F0941, Kittson St, S790, 13.8
TP9F0941, Mounds Blvd, S792, 13.2
TP9F0941, Johnson Pkwy, S1070, 12.4
TP9F0941, T.H.61, S1069, 11.8
TP9F0941, White Bear Ave, S1068, 11.1
TP9F0941, Ruth St, S1067, 10.7
TP9K0941, McKnight Rd, S1066, 10.1
TP9K0941, Hudson Rd, S1065, 9.8
TP9K0941, T.H.120, S1064, 9.1
TP9K0941, W of I-494 E Jct, S1063, 8.4
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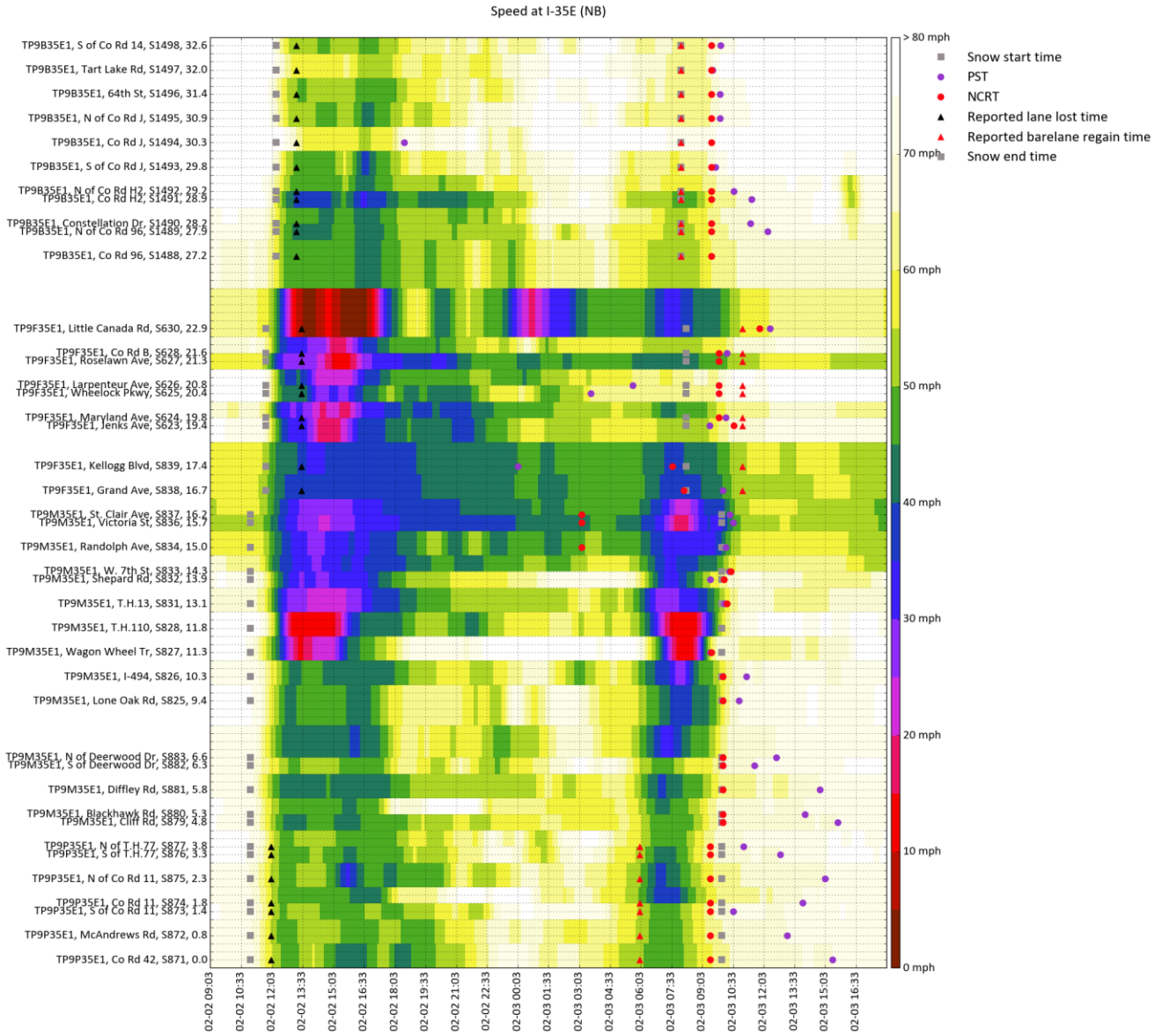
TP9K0941, Co Rd 19, S1060, 5.1
TP9K0941, Co Rd 17B, S1059, 4.1
TP9K0941, Manning Ave, S1058, 3.3
TP9K0941, Co Rd 71, S1361, 2.1
TP9K0941, Co Rd 21, S1360, 0.0
02-19 23:33
02-20 01:03
02-20 02:33
02-20 04:03
02-20 05:33
02-20 07:03
02-20 08:33
02-20 10:03
02-20 11:33
02-20 13:03
02-20 14:33
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1360		04:48	05:18		05:51	04:30	54.2105	49.72807
S1361	02:15	03:45			05:51	04:30	47.29236	44.63902
S1058	06:45	02:45	02:45	09:57	05:51	04:30	71.14693	66.32887
S1059	06:42	02:33	03:27	09:51	05:51	04:30	72.22987	71.47485
S1060	06:12	03:15	03:30	09:45	05:51	04:30	74.41738	75.66539
S1061	05:36	03:00	03:00	09:48	05:51	04:30	72.6741	73.49499
S1063	03:21	08:15	08:33	09:21	10:00	04:30	69.67178	65.6931
S1064	02:03	08:33	08:42	09:39	09:51	04:30	64.60655	67.62239
S1065	02:00	08:30	08:39	09:57	10:21	04:30	71.02813	65.74938
S1066	02:27	08:30	08:45	10:06	10:12	04:30	61.39211	62.5714
S1067	02:30	08:30	08:45	10:06	10:03		54.4005	
S1068	01:21	07:21	09:24	10:15	10:42		64.66665	
S1069	02:15	08:24	09:18	10:21	10:33		59.86534	
S1070		08:18	08:54	11:00	10:30		51.6837	
S792	02:21	08:15	09:18	10:48	10:54		57.62307	
S790	01:57	08:09	09:06	11:45	10:51		50.11897	
S500	01:54	07:57		11:42	10:21		31.8188	
S546	01:51	08:48	08:48	11:51	10:21		44.06978	
S789	02:27	08:48	08:48	10:12	10:21		58.41853	
S788	01:24	08:39	08:45	10:42	10:21		51.89208	
S548	01:51	08:27	08:48	10:18	10:21		56.5571	
S787	01:48	08:30	08:45	10:09	10:21		63.71512	
S549	02:18	08:27	08:42	10:15	10:21		56.86784	
S786	02:12	08:30	09:09	10:18	10:21		56.58451	
S550	02:03	08:27	09:06	10:21	10:21		55.13595	
S551	02:03	09:15	09:15	11:33	10:21		50.33478	
S555	03:36	09:18	09:36		10:24		46.83893	
S553	02:42	09:00	09:54	12:12	10:24		49.56205	
S561	01:30	09:09	09:33	12:15	10:24		49.91348	
S559	01:33	09:21	09:36		10:24		46.46372	
S560	01:33	05:57			05:57		47.28021	
S1943	01:30	05:48	05:48		05:57		40.56199	
S76	01:27	05:45	05:45		05:57		38.13701	
S122	01:45	09:36	11:00	11:33	14:03		57.70206	
S256		06:12		10:54	09:24		56.47295	
S252	04:45	06:39	08:51	09:36	09:24		59.69858	
S251	02:24	06:18	08:51	09:57	09:24		59.8663	
S249	02:15	06:12		08:09	09:24		59.11591	
S247	01:24	06:24		10:15	09:24		57.20862	
S126		06:06		06:06	09:24		99.11464	
S245	03:30	06:30		08:00	09:24		61.52397	
S243		06:36	08:51	06:36	09:24		67.73345	
S128	05:21	06:09	10:00	11:09	10:54		57.93573	

S234	01:15	09:51	10:09	09:51	10:54		70.80658	
S129	01:18	08:15	08:24	08:54	10:54		66.01029	
S232	06:42	08:18	08:18	09:03	10:54		67.39886	
S230	01:00	08:15	08:18	09:09	14:03		76.47693	
S226	05:00	08:27	08:33	08:54	11:33		71.44492	
S224	07:36	08:27	10:39	08:27	11:33		81.82891	
S218		08:33	09:24		09:57		37.71763	
S216	05:54	08:39		08:45	09:57		65.071	
S213		08:30	08:57	08:30	09:57		71.33143	
S208		04:12	10:48	04:12	11:21		71.29514	
S206	07:54	03:39	10:48	03:39	11:21		70.18877	
S1105		02:27	09:42	11:21	09:45		64.07563	
S1106		04:21	09:42	05:24	09:45		71.01539	
S1107		03:51		11:12	09:45		63.27227	
S1108		04:00		05:54	09:45		66.87206	
S1109		04:15	04:36	05:09	09:45		72.31505	
S1111		03:12		05:03	09:45		68.356	
S1112		03:18		03:24	09:45		73.25322	

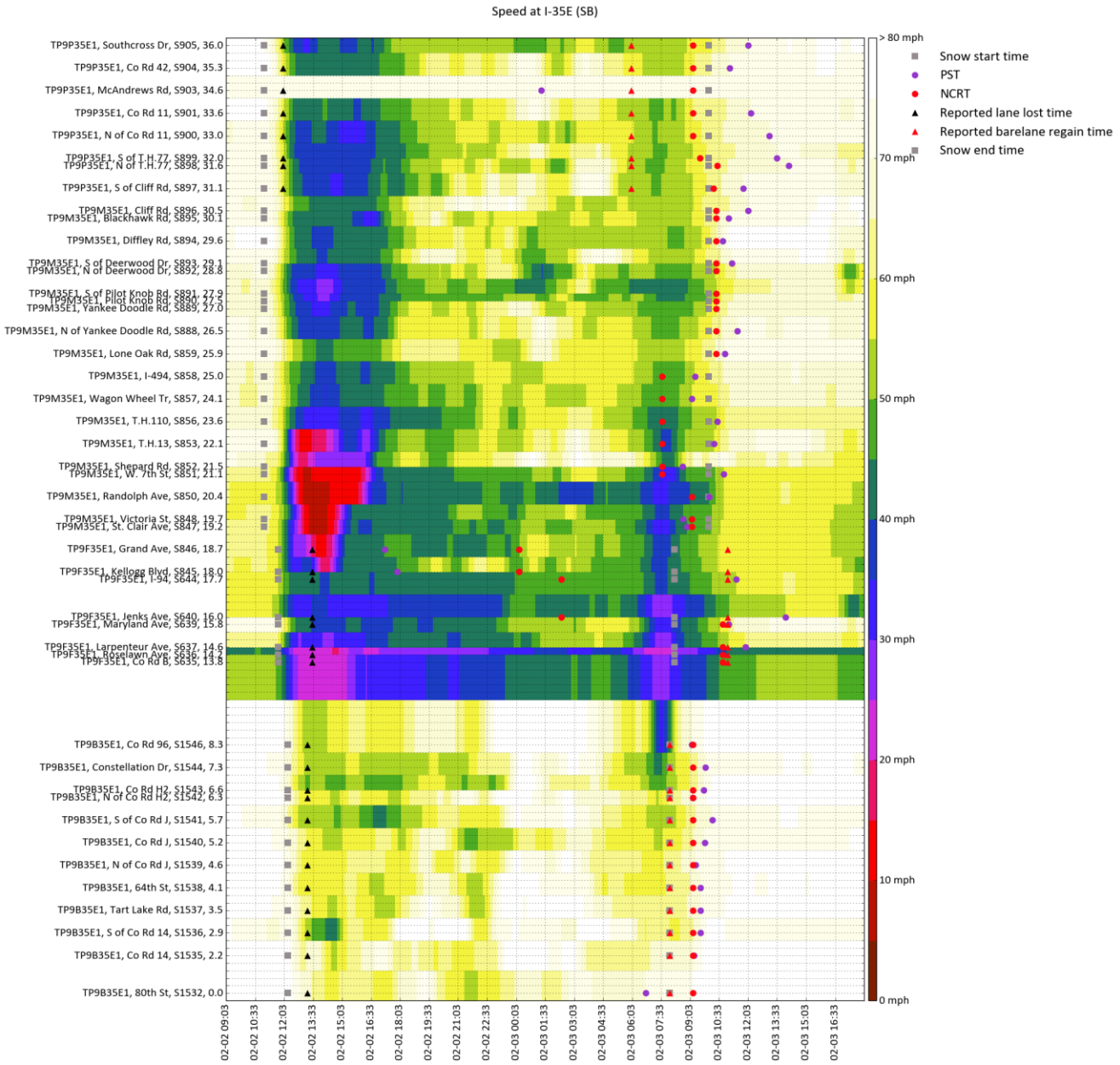
Snow Event: 2-2-2016

I-35E (NB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S871	11:06	18:24	08:12	15:24	09:27	06:00	59.5329	50.88329
S872	11:12	07:03	07:39	13:12	09:27	06:00	61.97398	53.81759
S873	11:15	15:54	07:54	10:33	09:27	06:00	63.06541	54.21761
S874	11:12	07:12	07:42	13:57	09:27	06:00	57.42974	49.25201
S875	11:06	15:45	07:24	15:03	09:27	06:00	59.0379	50.57845
S876	11:09	07:06	07:36	12:51	09:27	06:00	63.66043	53.32916
S877	11:12	15:57	08:09	11:03	09:27	06:00	63.1006	55.5601
S879	11:09	15:51	08:15	15:39	10:03		66.83612	
S880	11:06	07:03	07:48	14:03	10:03		68.2013	
S881	11:00	07:03	07:48	14:48	10:03		62.19069	
S882	11:09	17:00	07:30	11:36	10:03		66.74289	
S883	11:12	07:21	07:33	12:39	10:03		62.44813	
S825	11:15	08:00	08:42	10:51	10:03		58.39964	
S826	11:21	08:00	08:03	11:12	10:03		58.00148	
S827	10:54	08:15	08:30	09:27	09:30		58.67136	
S831	11:24	14:39	07:45	10:09	10:15		57.70154	
S832	11:21	14:30	07:30	09:27	10:06		62.49995	
S833	11:24	14:15	08:36	10:21	10:27		57.12717	
S834	11:33	14:15	02:54	10:12	03:09		49.45952	
S836	11:33	14:33	15:54	10:33	03:09		42.51973	
S837	11:36	14:33	15:57	10:24	03:09		45.62521	
S838	11:36	15:39	07:42	10:03	08:09	11:00	36.27965	53.11106
S839	11:39	14:09		00:03	07:36	11:00	38.84012	54.08088
S623	11:33	14:42	09:06	09:24	10:36	11:00	67.0471	68.24994
S624	11:36	15:36	09:06	10:12	09:51	11:00	56.53973	63.31904
S625	11:33	14:27	03:00	03:36	09:51	11:00	66.75873	74.26412
S626	11:30	15:33	15:33	05:39	09:51	11:00	65.23856	78.35622
S627	11:30	15:27	15:33		09:51	11:00	46.63272	54.48126
S628	11:30	15:15	09:42	10:15	09:51	11:00	55.72322	66.03938
S630	11:42	16:18	09:09	12:21	11:51	11:00	57.23309	55.30308
S1488	11:39	16:36	08:57		09:30	08:00	60.14872	53.2461
S1489	11:33	16:36	08:57	12:15	09:30	08:00	60.86367	53.83797
S1490	11:36	16:27	09:09	11:24	09:30	08:00	61.44056	53.99936
S1491	11:36	16:33	08:42	11:27	09:30	08:00	59.37891	49.71988
S1492	11:39	16:33	08:57	10:36	09:30	08:00	63.32265	56.70549
S1493	11:42	16:36	08:57	09:42	09:30	08:00	67.46963	60.31153
S1494	11:48	16:33	08:57	18:30	09:30	08:00	73.24197	71.14723
S1495	11:42	16:42	08:57	09:54	09:30	08:00	65.86017	60.30967
S1496	11:42	16:45	08:57	09:54	09:30	08:00	65.44017	62.59169
S1497	11:39	16:45	08:45	09:33	09:30	08:00	69.6571	61.52075
S1498	11:45	16:36	08:57	09:57	09:30	08:00	66.10185	61.70912

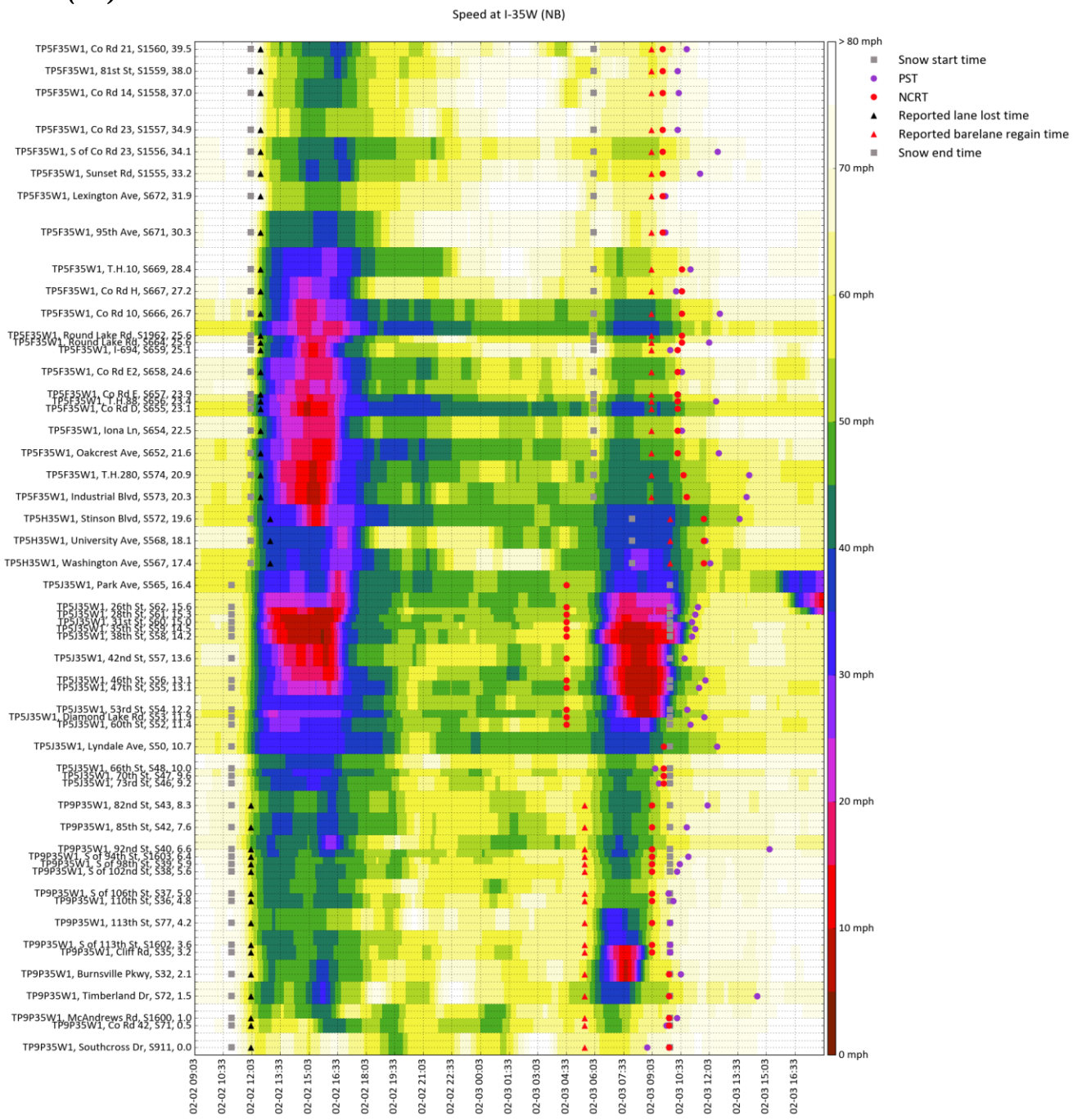
I-35E (SB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1532	12:12	21:42	06:36	06:45	09:12	08:00	75.13769	73.57757
S1535	11:36	14:36	09:03	09:15	09:12	08:00	69.6498	67.97765
S1536	10:51	14:30	08:39	09:36	09:12	08:00	64.9453	59.88295
S1537	11:39	22:00	08:57	09:36	09:12	08:00	66.88819	62.59285
S1538	11:57	21:51	08:09	09:36	09:12	08:00	66.68404	61.17734
S1539	11:48	14:33	08:18	09:21	09:12	08:00	69.26875	62.70005
S1540	11:51	21:42	08:27	09:48	09:12	08:00	65.078	56.28557
S1541	11:45	16:57	08:18	10:12	09:12	08:00	63.90557	53.33005
S1542	11:45	17:45	07:57	09:12	09:12	08:00	70.31868	60.43243
S1543	11:30	07:21	07:45	09:45	09:12	08:00	62.37925	52.17749

S1544	11:51	07:24	07:27	09:51	09:12	08:00	62.16573	51.65512
S1546	11:39	07:36	07:36	09:09	09:12	08:00	70.59844	44.98433
S635	11:42	13:48	07:54		10:45	11:00	46.85547	47.71014
S636	11:39	14:42	08:00		10:45	11:00	39.02331	40.23849
S637	11:33	07:39	07:42	11:54	10:45	11:00	52.72481	54.7919
S639	11:33	07:36	08:06	11:03	10:45	11:00	56.35071	59.6446
S640	11:30	16:33	02:12	14:00	02:24	11:00	42.16913	49.47941
S644	11:36	14:06	02:21	11:27	02:24	11:00	46.81017	52.7043
S845	11:33	14:12	23:54	17:54	00:12	11:00	47.76352	56.38953
S846	11:36	13:57	14:00	17:15	00:12	11:00	49.62867	56.85021
S847	11:33	13:42	07:42	08:54	09:09		46.29258	
S848	11:36	13:39	08:36	08:42	09:09		47.41768	
S850	11:36	13:24	08:36	10:03	09:09		40.26948	
S851	11:33	13:12		10:48	07:36		33.16812	
S852	11:27	13:00		08:39	07:36		44.20013	
S853	11:27	13:03		10:18	07:36		39.29788	
S856	11:27	14:09		10:27	07:36		40.78607	
S857	11:36	14:12		09:09	07:36		46.71227	
S858	11:33	14:12		09:18	07:36		47.54502	
S859	11:36	14:09	08:54	10:51	10:24		65.91396	
S888	11:24	13:42	09:12	11:30	10:24		62.24639	
S889	11:24	13:51	09:00		10:24		59.89308	
S890	11:18	14:06	08:54		10:24		55.7031	
S891	11:21	14:12	09:00		10:24		54.91019	
S892	11:18	14:24	09:36		10:24		55.6349	
S893	11:18	14:00	09:00	11:12	10:24		63.08268	
S894	11:18	14:03	09:06	10:45	10:24		64.78652	
S895	11:24	16:33	09:15	11:03	10:24		64.43844	
S896	11:27	16:09	09:00	12:03	10:24		62.27712	
S897	11:21	14:45	09:03	11:48	10:15	06:00	62.83323	53.23359
S898	11:18	15:54	08:12	14:09	10:27	06:00	64.47674	53.85452
S899	11:18	15:48	09:03	13:33	09:33	06:00	58.0861	54.00659
S900	11:18	15:39	08:27	13:09	09:12	06:00	58.32561	55.49006
S901	11:09	15:51	08:27	12:12	09:12	06:00	60.51577	53.09812
S903		01:21		01:21	09:12	06:00	72.2519	72.81735
S904	11:09	15:27	08:39	11:06	09:12	06:00	59.3529	57.3185
S905	11:09	13:12	02:33	12:03	09:12	06:00	57.6947	50.68564

I-35W (NB)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TP5F35W1, Co Rd 23, S1557, 34.9
TP5F35W1, S of Co Rd 23, S1556, 34.1
TP5F35W1, Sunset Rd, S1555, 33.2
TP5F35W1, Lexington Ave, S672, 31.9
TP5F35W1, 95th Ave, S671, 30.3
TP5F35W1, T.H.10, S669, 28.4
TP5F35W1, Co Rd H, S667, 27.2
TP5F35W1, Co Rd 10, S666, 26.7
TP5F35W1, Round Lake Rd, S1962, 25.6
TP5F35W1, Round Lake Rd, S664, 25.6
TP5F35W1, I-694, S659, 25.1
TP5F35W1, Co Rd E2, S658, 24.6
TP5F35W1, Co Rd F, S657, 23.9
TP5F35W1, T.H.88, S656, 23.4
TP5F35W1, Co Rd D, S655, 23.1
TP5F35W1, Iona Ln, S654, 22.5
TP5F35W1, Oakcrest Ave, S652, 21.6
TP5F35W1, T.H.280, S574, 20.9
TP5F35W1, Industrial Blvd, S573, 20.3
TP5H35W1, Stinson Blvd, S572, 19.6
TP5H35W1, University Ave, S568, 18.1
TP5H35W1, Washington Ave, S567, 17.4
TP5J35W1, Park Ave, S565, 16.4
TP5J35W1, 26th St, S62, 15.6
TP5J35W1, 28th St, S61, 15.3
TP5J35W1, 31st St, S60, 15.0
TP5J35W1, 35th St, S59, 14.5
TP5J35W1, 38th St, S58, 14.2
TP5J35W1, 42nd St, S57, 13.6
TP5J35W1, 46th St, S56, 13.1
TP5J35W1, 47th St, S55, 13.1
TP5J35W1, 53rd St, S54, 12.2
TP5J35W1, Diamond Lake Rd, S53, 11.9
TP5J35W1, 60th St, S52, 11.4
TP5J35W1, Lyndale Ave, S50, 10.7
TP5J35W1, 66th St, S48, 10.0
TP5J35W1, 70th St, S47, 9.6
TP5J35W1, 73rd St, S46, 9.2
TP9P35W1, 82nd St, S43, 8.3
TP9P35W1, 85th St, S42, 7.6
TP9P35W1, 92nd St, S40, 6.6
TP9P35W1, S of 94th St, S1603, 6.4
TP9P35W1, S of 98th St, S39, 5.9
TP9P35W1, S of 102nd St, S38, 5.6
TP9P35W1, S of 106th St, S37, 5.0
TP9P35W1, 110th St, S36, 4.8
TP9P35W1, 113th St, S77, 4.2
TP9P35W1, S of 113th St, S1602, 3.6
TP9P35W1, Cliff Rd, S35, 3.2
TP9P35W1, Burnsville Pkwy, S32, 2.1
TP9P35W1, Timberland Dr, S72, 1.5
TP9P35W1, McAndrews Rd, S1600, 1.0
TP9P35W1, Co Rd 42, S71, 0.5
TP9P35W1, Southcross Dr, S911, 0.0
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02-02 10:33
02-02 12:03
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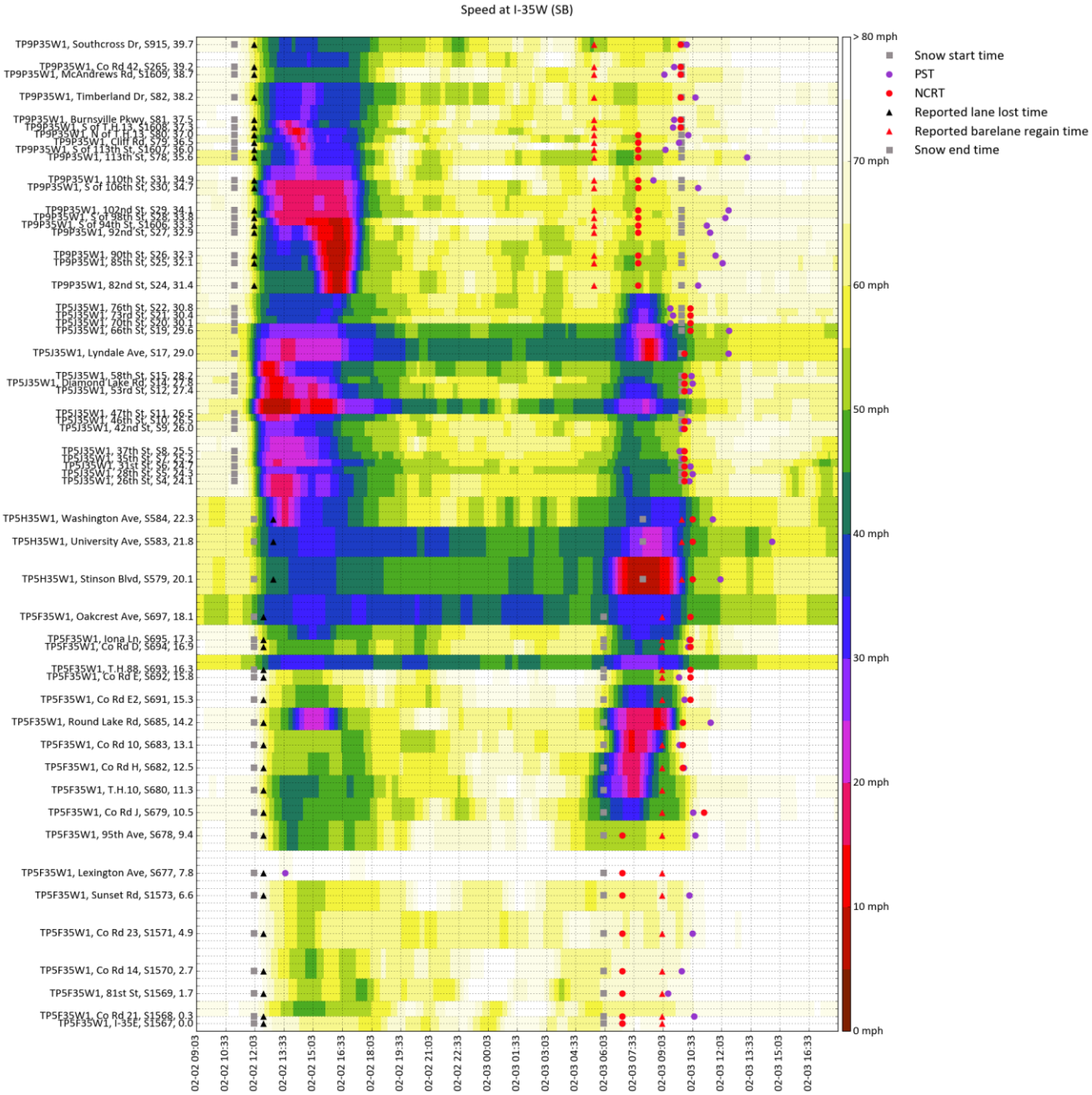
02-03 13:33
02-03 15:03
02-03 16:33
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S911	11:03	19:39	08:03	08:48	09:57	05:30	69.26936	64.10528
S71	11:03	16:12	07:09	09:48	09:57	05:30	66.16603	61.11576
S1600	11:09	15:48	07:27	10:21	09:57	05:30	61.9792	58.85291
S72	11:06	15:45	07:42	14:33	09:57	05:30	55.07555	52.56799
S32	11:12	07:42	07:42	10:33	09:57	05:30	58.45139	56.82206
S35	11:15	07:36	08:00	10:00	09:03	05:30	54.57343	61.75263
S1602	11:15	07:06	08:12	10:00	09:03	05:30	56.25282	61.04557
S77	11:18	07:03	07:15	10:00	09:03	05:30	54.72314	61.13906
S36	11:21	15:54	08:33	10:09	09:03	05:30	54.76404	61.56524
S37	11:15	13:09	08:33	09:54	09:03	05:30	57.39698	61.83173
S38	11:18	15:54	07:45	10:21	09:03	05:30	54.88389	60.38256
S39	11:12	13:03	07:48	10:30	09:03	05:30	54.16019	61.08282
S1603	11:15	15:57	07:33	10:57	09:03	05:30	53.17207	59.11658
S40	11:18	16:12	07:48	15:12	09:03	05:30	49.52212	55.58014
S42	11:18	16:00	08:21	10:51	09:03	05:30	51.29988	57.82444
S43	11:24	16:15	08:24	11:57	09:03	05:30	50.88518	57.19407
S46	11:21	15:18	08:39	09:24	09:39		58.02976	
S47	11:24	15:21	08:39	09:39	09:39		55.11865	
S48	11:24	15:54	08:42	09:12	09:39		60.31126	
S50	11:27	15:27	08:36	12:27	09:39		45.04221	
S52	11:18	13:24	04:09	11:03	04:33		52.14971	
S53	11:30	13:09	04:06	11:48	04:33		52.18175	
S54	11:30	13:24	16:33	10:54	04:33		56.41429	
S55	11:30	16:06	03:00	11:30	04:33		50.98012	
S56	11:33	16:06	01:51	11:51	04:33		55.18475	
S57	11:30	15:57	04:12	10:45	04:33		56.35725	
S58	11:30	15:45	15:51	11:09	04:33		59.59807	
S59	11:30	15:42	15:45	11:18	04:33		59.15622	
S60	11:27	15:45	15:54	11:09	04:33		52.56116	
S61	11:30	15:42	04:09	11:18	04:33		54.42164	
S62	11:33	16:36	16:42	11:27	04:33		53.15442	
S565	11:42	16:36	04:09		04:33		53.11918	
S567	11:51	08:21	09:15	12:06	11:45	10:00	53.28847	39.69049
S568	11:39	16:48	09:57	11:51	11:45	10:00	54.79601	38.95364
S572	11:45	15:27	10:21	13:39	11:45	10:00	48.70518	38.47024
S573	11:42	15:18	09:54	14:00	10:51	09:00	51.7569	45.1944
S574	11:39	15:18	10:09	14:09	10:42	09:00	51.65054	43.28855
S652	11:42	15:51	09:39	12:33	10:24	09:00	52.42434	45.94163
S654	11:45	16:06	09:42	10:36	10:24	09:00	58.10606	50.74319
S655	11:48	14:54	09:39		10:24	09:00	46.38946	40.32491
S656	11:45	15:06	09:54	12:24	10:24	09:00	53.10168	47.74257
S657	11:48	14:42	09:30	10:24	10:24	09:00	60.21716	50.70633
S658	11:48	15:51	10:03	10:36	10:24	09:00	57.30531	49.52856

S659	10:42	15:15	09:24	10:00	10:24	09:00	67.55506	55.95439
S664	11:51	15:33	09:48	12:03	10:36	09:00	58.8247	49.93202
S1962	11:54	16:24	09:33		10:36	09:00	50.15732	39.15783
S666	11:54	14:48	09:39	12:36	10:36	09:00	55.59966	44.64185
S667	11:54	14:45	09:24	10:18	10:36	09:00	66.11249	58.34976
S669	11:48	16:06	09:39	11:03	10:36	09:00	61.63913	55.28858
S671	11:51	16:00	09:03	09:45	09:36	09:00	68.8464	62.1808
S672	11:57	16:03	09:00	09:45	09:36	09:00	69.07025	63.93786
S1555	11:54	15:12	09:03	11:33	09:36	09:00	60.55653	57.77868
S1556	11:54	16:42	09:03	12:30	09:36	09:00	55.89212	53.34179
S1557	12:00	15:21	09:06	10:24	09:36	09:00	64.86897	63.39323
S1558	12:06	16:24	09:12	10:27	09:36	09:00	64.20183	61.9682
S1559	11:09	16:33	09:09	10:24	09:36	09:00	62.52118	59.16978
S1560	12:09	16:36	09:12	10:51	09:36	09:00	63.25851	58.76433

I-35W (SB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1567	12:18	00:06	06:24	06:57	06:57	09:00	70.31273	74.7367
S1568	12:06	15:06	06:51	10:39	06:57	09:00	61.87753	62.72727
S1569	11:21	17:33	03:51	09:18	06:57	09:00	68.1718	69.21266
S1570	12:09	14:57		10:00	06:57	09:00	66.0742	69.41622
S1571		14:48		10:33	06:57	09:00	65.06757	66.09934
S1573	12:09	15:03		10:24	06:57	09:00	62.8948	65.68126
S677	12:15	13:36		13:36	06:57	09:00	89.43157	89.67935
S678	12:03	13:57		10:42	06:57	09:00	51.38956	59.34041
S679	12:00	07:27	07:30	10:36	11:09	09:00	71.3092	46.54499
S682	11:57	07:24	07:24	10:06	10:03	09:00	64.82624	47.41475

S683	11:48	07:24	07:45	09:54	10:03	09:00	68.32952	39.14633
S685	11:54	08:48	09:00	11:30	10:03	09:00	55.36879	15.54365
S691	11:48	07:42	07:57	10:09	10:27	09:00	69.48121	44.55605
S692	11:42	07:39	08:48	09:51	10:27	09:00	75.80534	51.83528
S693	11:48	07:42	09:39		10:27	09:00	46.61381	30.82993
S694	11:45	07:48	09:09	10:21	10:27	09:00	61.95722	44.42107
S695	11:42	07:51	09:21	10:24	10:27	09:00	61.8626	37.87593
S697	11:42	07:42	09:30		10:27	09:00	46.81029	34.63697
S579	11:51	07:54	08:48	12:00	10:33	10:00	48.81506	34.35387
S583	11:39	08:21	09:12	14:39	10:33	10:00	46.14937	38.93925
S584	11:45	13:36	09:21	11:36	10:33	10:00	45.16999	36.49896
S4	11:33	13:15	09:18	10:24	10:09		51.73765	
S5	11:36	13:06	09:15	10:33	10:09		51.06159	
S6	11:33	13:09	09:24	10:27	10:09		51.627	
S7	11:33	12:57	08:21	10:03	10:09		56.3908	
S8	11:30	14:00	08:09	09:54	10:09		57.09116	
S12	11:24	13:06	08:18	10:24	10:09		52.55321	
S14	11:33	13:12	07:42	10:33	10:09		50.97086	
S15	11:33	12:45	09:27	10:30	10:09		50.95193	
S17	11:30	08:21	08:21	12:24	10:09		43.43116	
S19	11:30	08:06	08:12	12:27	10:27		48.43466	
S20	11:27	08:00	08:03	09:24	10:27		62.49233	
S21	11:30	08:00	08:06	09:33	10:27		59.93018	
S22	11:21	08:00	08:12	09:24	10:27		60.75346	
S24	11:33	16:18	07:12	10:51	07:45	05:30	53.94722	60.6934
S25	11:27	16:18	07:12	12:06	07:45	05:30	50.9676	58.13779
S26	11:30	16:21	07:06	11:45	07:45	05:30	53.97918	59.83318
S27	11:30	16:24	03:42	11:27	07:45	05:30	55.25876	62.9404
S1606	11:30	16:12	07:15	11:18	07:45	05:30	57.57095	62.6166
S28	11:27	16:21	07:12	12:15	07:45	05:30	55.88989	60.45122
S29	11:27	16:09	07:12	12:24	07:45	05:30	55.70945	59.27631
S30	11:24	15:51	07:15	10:51	07:45	05:30	55.53344	62.80131
S31	11:30	14:39	07:12	08:33	07:45	05:30	59.08554	66.62391
S78	11:33	14:36	07:12	13:21	07:45	05:30	51.25532	55.44262
S1607	11:33	14:30	07:12	09:09	07:45	05:30	58.804	66.5188
S79	11:27	14:21	07:12	09:51	07:45	05:30	53.67945	61.80001
S80	11:15	14:12	01:54	10:21	07:45	05:30	60.1205	61.57257
S1608	11:12	13:48	01:39	09:33	09:57	05:30	66.22215	58.55061
S81	11:06	14:42	03:12	09:36	09:57	05:30	65.68517	63.80194
S82	11:06	14:48	07:33	10:42	09:57	05:30	62.55271	56.0311
S1609	11:18	14:54	04:48	09:06	09:57	05:30	67.67988	64.26637
S265	11:00	14:51	08:51	09:36	09:57	05:30	67.64555	60.9955
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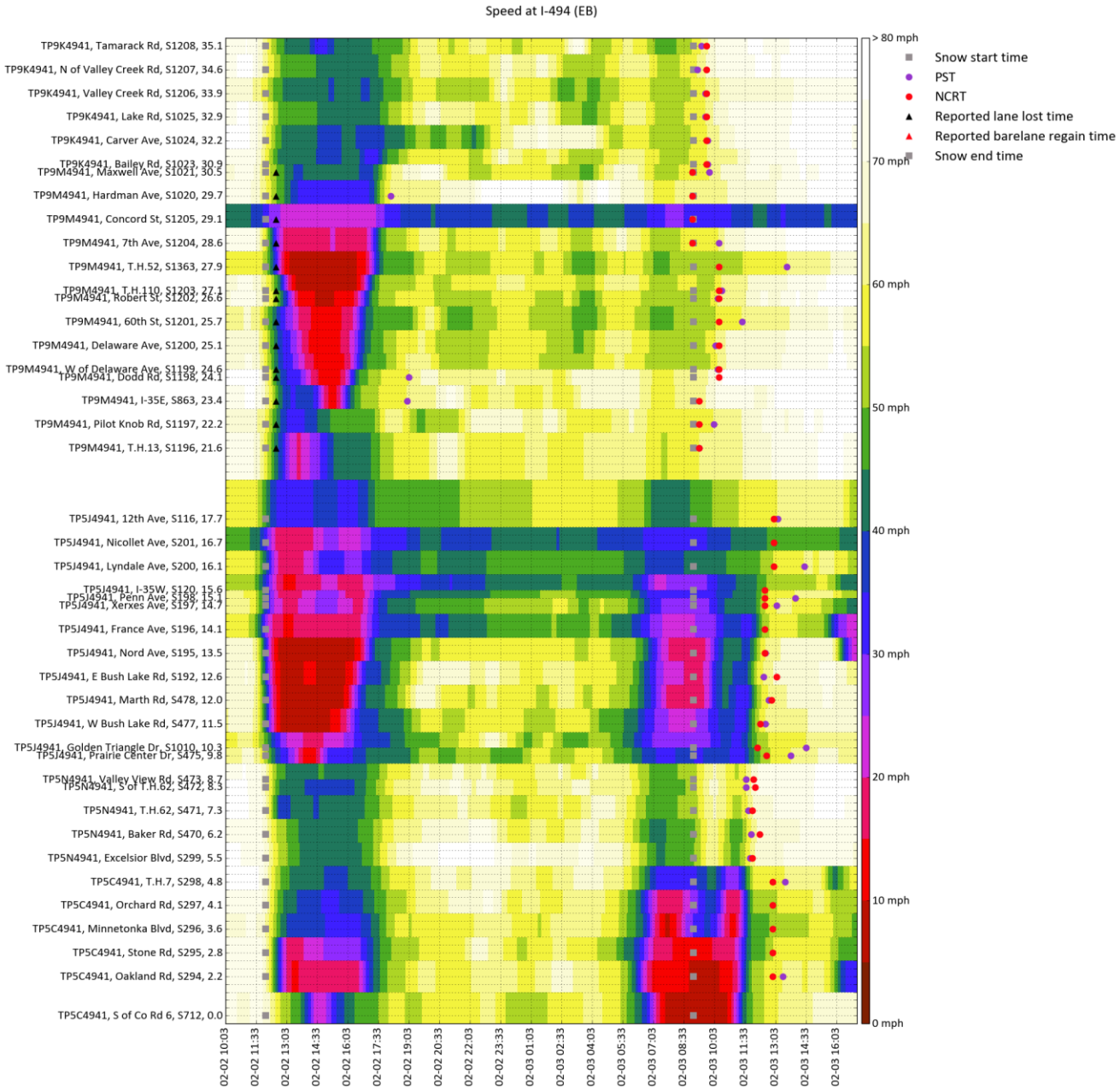
I-494 (EB)


Speed at I-494 (EB)
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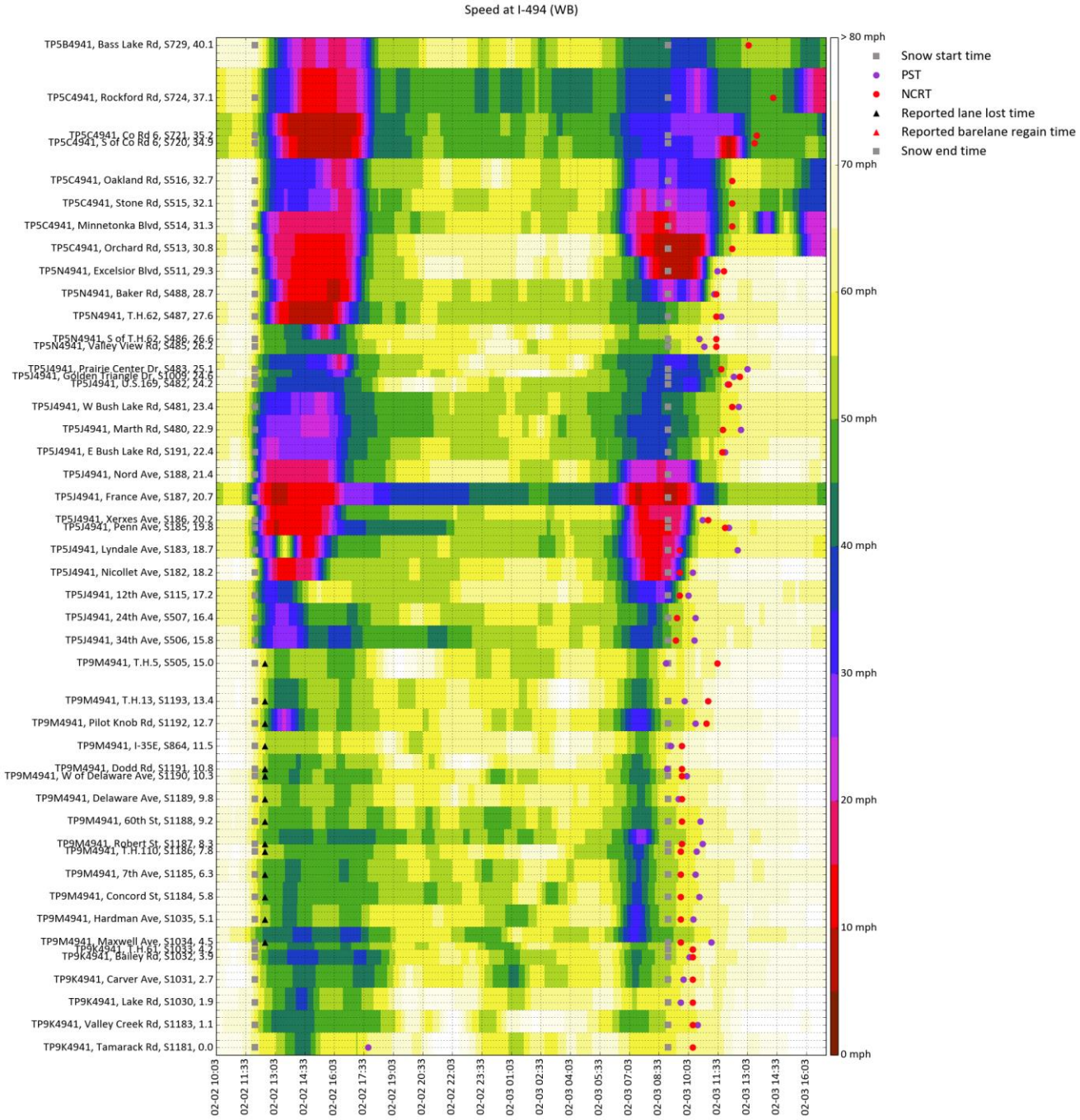
TP9K4941, Lake Rd, S1025, 32.9
TP9K4941, Carver Ave, S1024, 32.2
TP9K4941, Bailey Rd, S1023, 30.9
TP9M4941, Maxwell Ave, S1021, 30.5
TP9M4941, Hardman Ave, S1020, 29.7
TP9M4941, Concord St, S1205, 29.1
TP9M4941, 7th Ave, S1204, 28.6
TP9M4941, T.H.52, S1363, 27.9
TP9M4941, T.H.110, S1203, 27.1
TP9M4941, Robert St, S1202, 26.6
TP9M4941, 60th St, S1201, 25.7
TP9M4941, Delaware Ave, S1200, 25.1
TP9M4941, W of Delaware Ave, S1199, 24.6
TP9M4941, Dodd Rd, S1198, 24.1
TP9M4941, I-35E, S863, 23.4
TP9M4941, Pilot Knob Rd, S1197, 22.2
TP9M4941, T.H.13, S1196, 21.6
TP5J4941, 12th Ave, S116, 17.7
TP5J4941, Nicollet Ave, S201, 16.7
TP5J4941, Lyndale Ave, S200, 16.1
TP5J4941, I-35W, S120, 15.6
TP5J4941, Penn Ave, S198, 15.1
TP5J4941, Xerxes Ave, S197, 14.7
TP5J4941, France Ave, S196, 14.1
TP5J4941, Nord Ave, S195, 13.5
TP5J4941, E Bush Lake Rd, S192, 12.6
TP5J4941, Marth Rd, S478, 12.0
TP5J4941, W Bush Lake Rd, S477, 11.5
TP5J4941, Golden Triangle Dr, S1010, 10.3
TP5J4941, Prairie Center Dr, S475, 9.8
TP5N4941, Valley View Rd, S473, 8.7
TP5N4941, S of T.H.62, S472, 8.3
TP5N4941, T.H.62, S471, 7.3
TP5N4941, Baker Rd, S470, 6.2
TP5N4941, Excelsior Blvd, S299, 5.5
TP5C4941, T.H.7, S298, 4.8
TP5C4941, Orchard Rd, S297, 4.1
TP5C4941, Minnetonka Blvd, S296, 3.6
TP5C4941, Stone Rd, S295, 2.8
TP5C4941, Oakland Rd, S294, 2.2
TP5C4941, S of Co Rd 6, S712, 0.0
02-02 10:03
02-02 11:33
02-02 13:03
02-02 14:33
02-02 16:03
02-02 17:33
02-02 19:03
02-02 20:33
02-02 22:03
02-02 23:33
02-03 01:03
02-03 02:33
02-03 04:03
02-03 05:33
02-03 07:03
02-03 08:33
02-03 10:03
02-03 11:33
02-03 13:03
02-03 14:33
02-03 16:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S294	11:51	09:36	10:09	13:24	12:54		58.21855	
S295	11:48	08:36	10:51		12:54		54.46702	
S296	11:48	07:42	11:00		12:54		50.61585	
S297	11:45	10:57	11:00		12:54		53.8211	
S298	11:45	10:54	10:54	13:30	12:54		55.46963	
S299	11:48	15:15	11:18	11:48	11:54		63.21453	
S470	11:48	15:12	11:18	11:51	12:15		66.31231	
S471	11:45	12:54	11:21	11:42	11:54		64.83141	
S472	11:42	15:48	11:21	11:36	12:03		69.5389	
S473	11:42	15:36	11:21	11:36	11:57		67.42144	
S475	11:36	14:09	11:24	13:48	12:36		53.33142	
S1010	11:36	14:24	09:42	14:33	12:09		50.09206	
S477	11:30	13:21	09:09	12:33	12:18		57.06356	
S478	11:30	13:18	11:33	12:42	12:51		61.45163	
S192	11:30	13:09	09:27	12:27	13:06		66.21338	
S195	11:30	13:09	09:30	12:33	12:30		59.65647	
S196	11:27	13:06	11:45		12:30		52.41685	
S197	11:30	16:33	09:48	13:06	12:30		54.64592	
S198	11:33	16:27	10:00	14:00	12:30		52.71449	
S120	11:33	13:06	09:33		12:30		49.47155	
S200	11:33	13:06	10:03	14:27	12:57		55.16994	
S201	11:39	12:54	09:42		12:57		46.69792	
S116	11:33	13:21	08:57	13:09	12:57		59.55129	
S1196	11:33	13:36	08:45	09:18	09:18		60.13887	
S1197	11:45	13:27	09:03	10:00	09:18		58.81542	
S863	11:33	15:15	08:45	18:57	09:18		62.53119	
S1198	11:30	15:18	09:33	19:03	10:15		72.80627	
S1199	11:33	15:09	09:36	10:12	10:15		61.0245	
S1200	11:30	15:12	09:42	10:06	10:15		61.99337	
S1201	11:30	15:03	09:48	11:24	10:15		56.98664	
S1202	11:36	14:57	09:30	10:12	10:15		60.8348	
S1203	11:39	16:00	09:54	10:24	10:15		58.37597	
S1363	11:48	13:54	10:00	13:36	10:15		51.67095	
S1204	11:30	16:36	08:24	10:15	08:57		57.42757	
S1205	11:45	15:12	08:24		08:57		31.33599	
S1020	11:33	14:39	08:42	18:09	08:57		61.1158	
S1021	11:36	17:03	08:24	09:48	08:57		58.05886	
S1023	11:30	17:12	09:06	09:42	09:39		59.89034	
S1024	11:33	17:12	08:57	09:42	09:39		59.66118	
S1025	11:36	15:12	09:09	09:36	09:39		60.75385	
S1206	11:39	16:54	08:39	09:36	09:39		60.79325	
S1207	11:30	15:12	08:36	09:12	09:39		65.0596	
S1208	11:36	14:42	08:21	09:24	09:39		64.12651	

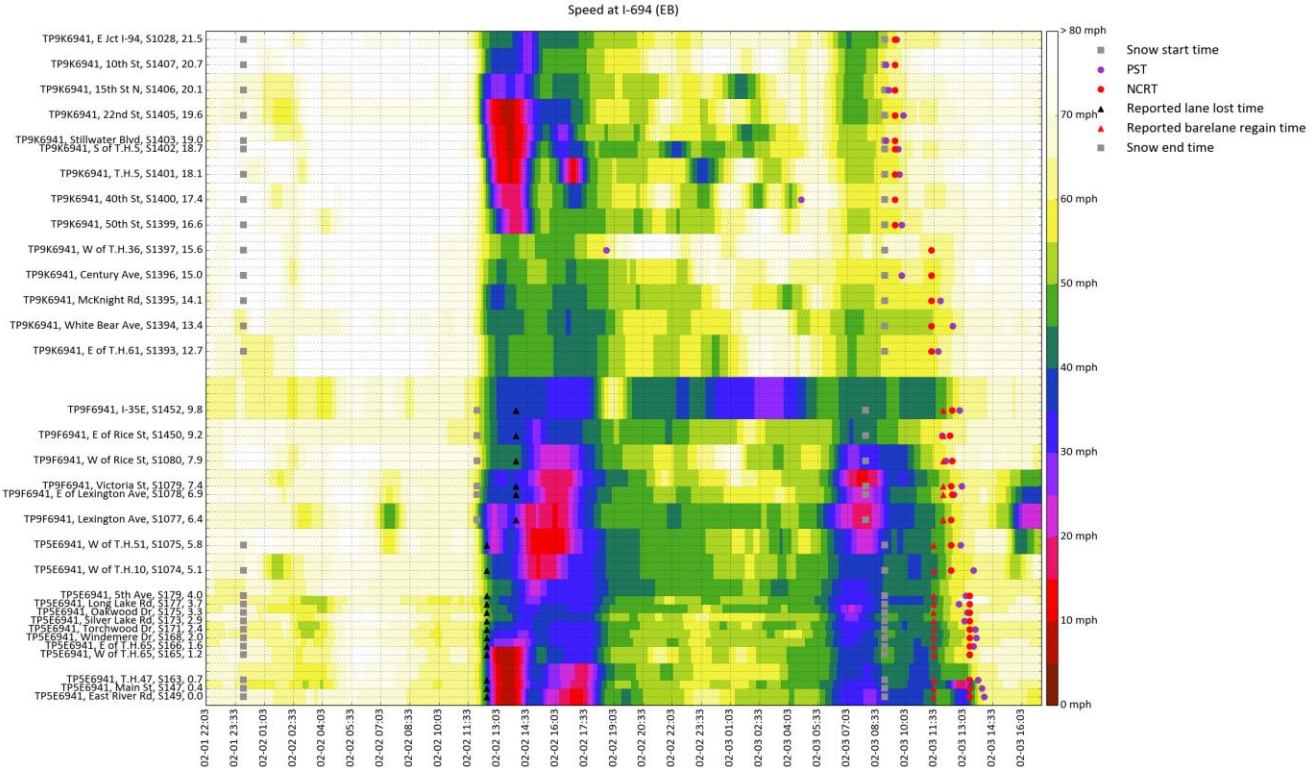
I-494 (WB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1181	11:42	14:30		17:45	10:15		63.05008	
S1183	11:39	14:30	08:24	10:30	10:15		58.22683	
S1030	11:42	14:24	09:15	09:39	10:15		63.78729	
S1031	11:30	14:36	08:03	09:48	10:15		61.86689	
S1032	11:36	14:36	07:57	10:06	10:15		61.16359	
S1033	11:36	14:24	09:21	10:15	10:15		60.30313	
S1034	11:33	07:15	07:21	11:12	09:39		53.47995	

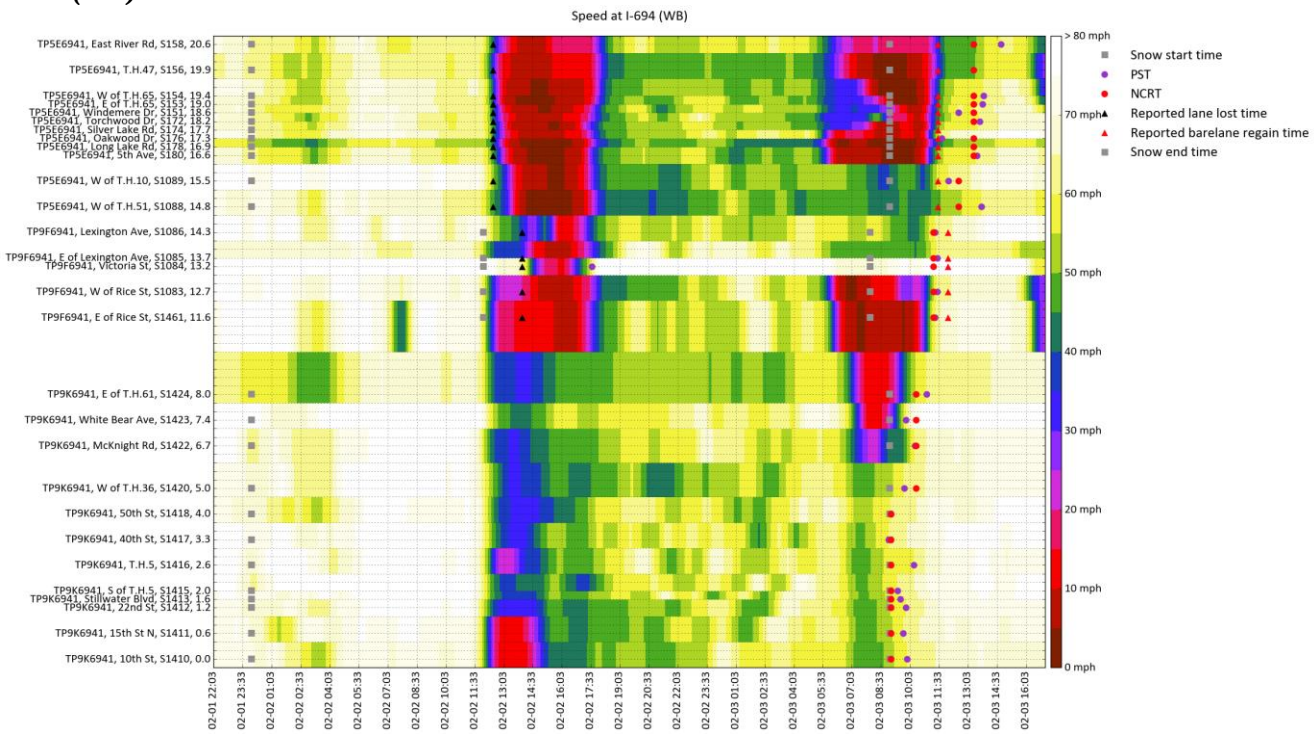
S1035	11:33	07:21	07:21	10:18	09:39		56.98122	
S1184	11:33	07:27	07:30	10:36	09:39		56.18143	
S1185	11:30	07:30	07:36	10:24	09:39		55.95415	
S1186	11:33	07:33	07:39	10:27	09:39		57.3537	
S1187	11:36	07:39	07:39	10:45	09:42		54.30737	
S1188	11:33	07:42	07:48	10:39	09:42		56.59188	
S1189	11:30	07:36	07:45	09:33	09:42		61.30204	
S1190	11:36	07:33	07:42	09:57	09:42		58.9287	
S1191	11:30	07:24	07:33	08:57	09:42		64.26995	
S864	11:42	07:42	08:00	09:09	09:42		64.4344	
S1192	11:36	13:30	07:33	10:24	10:57		62.74129	
S1193	11:39	07:30	07:45	09:51	11:03		67.09802	
S505	11:39	16:33	07:54	08:54	11:30		65.53784	
S506	11:33	13:27	08:21	10:21	09:24		51.91026	
S507	11:42	13:18	08:18	10:24	09:27		52.55908	
S115	11:39	08:39	08:54	10:03	09:36		52.27292	
S182	11:33	13:27	08:36	10:15	09:36		36.26079	
S183	11:33	14:42		12:33	09:36		28.0542	
S185	11:33	13:06	08:57	12:06	11:54		59.35093	
S186	11:33	13:15	09:09	10:45	11:03		60.3707	
S191	11:30	12:51	08:39	11:54	11:45		58.67686	
S480	11:30	14:45	09:39	12:42	11:48		56.37088	
S481	11:30	15:21	09:42	12:36	12:15		58.86262	
S482	11:36	10:12	10:21	12:03	12:06		60.74163	
S1009	11:33	16:18	10:15	12:21	12:39		63.31143	
S483	11:39	16:18	09:36	13:03	11:42		51.34876	
S485	11:42	15:36	09:00	10:51	11:27		63.91479	
S486	11:42	15:30	08:39	10:36	11:27		67.0912	
S487	11:42	15:24	10:15	11:42	11:27		59.06111	
S488	11:45	16:03	10:30	11:21	11:27		61.845	
S511	11:42	09:03	10:24	11:30	11:51		64.92325	
S513	11:48	10:00	10:12		12:15		55.40175	
S514	11:42	08:39	08:42		12:15		52.30993	
S515	11:45	16:33	09:12		12:15		51.84133	
S516	11:48	16:15	10:54		12:15		55.44484	
S720	11:51	15:18	12:15		13:24		47.51024	
S721	11:51	15:48	11:54		13:30		47.22633	
S724	11:51	14:54	10:27		14:21		47.76116	
S729	12:03	16:09	10:57		13:06		52.36411	

I-694 (EB)


Speed at I-694 (EB)
TP9K6941, E Jct I-94, S1028, 21.5
TP9K6941, 10th St, S1407, 20.7
TP9K6941, 15th St N, S1406, 20.1
TP9K6941, 22nd St, S1405, 19.6
TP9K6941, Stillwater Blvd, S1403, 19.0
TP9K6941, S of T.H.5, S1402, 18.7
TP9K6941, T.H.5, S1401, 18.1
TP9K6941, 40th St, S1400, 17.4
TP9K6941, 50th St, S1399, 16.6
TP9K6941, W of T.H.36, S1397, 15.6
TP9K6941, Century Ave, S1396, 15.0
TP9K6941, McKnight Rd, S1395, 14.1
TP9K6941, White Bear Ave, S1394, 13.4
TP9K6941, E of T.H.61, S1393, 12.7
TP9F6941, I-35E, S1452, 9.8
TP9F6941, E of Rice St, S1450, 9.2
TP9F6941, W of Rice St, S1080, 7.9
TP9F6941, Victoria St, S1079, 7.4
TP9F6941, E of Lexington Ave, S1078, 6.9
TP9F6941, Lexington Ave, S1077, 6.4
TP5E6941, W of T.H.51, S1075, 5.8
TP5E6941, W of T.H.10, S1074, 5.1
TP5E6941, 5th Ave, S179, 4.0
TP5E6941, Long Lake Rd, S177, 3.7
TP5E6941, Oakwood Dr, S175, 3.3
TP5E6941, Silver Lake Rd, S173, 2.9
TP5E6941, Torchwood Dr, S171, 2.4
TP5E6941, Windemere Dr, S168, 2.0
TP5E6941, E of T.H.65, S166, 1.6
TP5E6941, W of T.H.65, S165, 1.2
TP5E6941, T.H.47, S163, 0.7
TP5E6941, Main St, S147, 0.4
TP5E6941, East River Rd, S149, 0.0
02-01 22:03
02-01 23:33
02-02 01:03
02-02 02:33
02-02 04:03
02-02 05:33
02-02 07:03
02-02 08:33
02-02 10:03
02-02 11:33
02-02 13:03
02-02 14:33
02-02 16:03
02-02 17:33
02-02 19:03
02-02 20:33
02-02 22:03
02-02 23:33
02-03 01:03
02-03 02:33
02-03 04:03
02-03 05:33
02-03 07:03
02-03 08:33
02-03 10:03
02-03 11:33
02-03 13:03
02-03 14:33
02-03 16:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

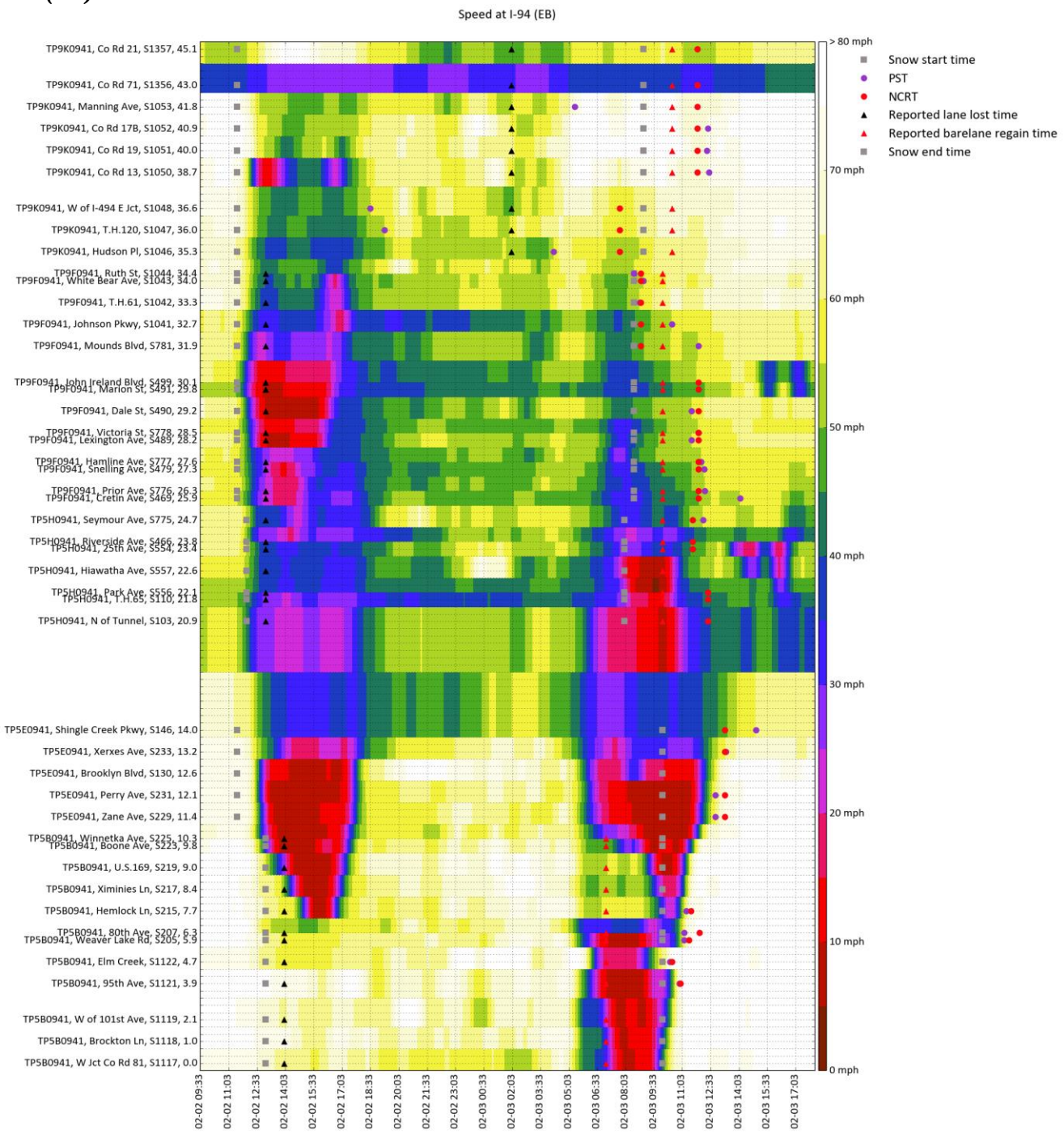
Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S149	07:03	13:33	13:00	14:06	13:21	11:30	38.92077	43.84803
S147	07:57	13:36		14:00	13:21	11:30	31.20859	40.53777
S163	07:45	13:33	08:24	13:48	13:21	11:30	51.84642	41.73695
S165	06:51	13:27	08:12	13:21	13:21	11:30	60.14163	42.16765
S166	07:54	14:15	08:12	13:33	13:21	11:30	58.43548	41.1415
S168	07:57	14:24	07:51	13:42	13:21	11:30	56.94994	41.67664
S171	07:51	17:27	08:06	13:39	13:21	11:30	57.8783	42.93533
S173	07:51	07:18	07:18	13:06	13:21	11:30	61.86535	46.93497
S175	07:54	07:15	07:18	13:15	13:21	11:30	60.59228	45.89096
S177	07:54	14:54	10:30	12:48	13:21	11:30	73.37656	42.63287
S179	08:57	15:00	08:12	13:09	13:21	11:30	60.2791	46.68165
S1074	06:39	15:09	11:09	13:33	12:24	11:30	54.37555	43.19095
S1075	06:30	15:48	08:00	12:54	12:24	11:30	53.99352	45.82407
S1077	06:33	16:03	08:09		12:24	12:00	54.33314	49.13145
S1078	06:06	16:00	08:36	12:33	12:27	12:00	59.33122	55.19632
S1079	06:21	07:51	08:09	12:57	12:24	12:00	55.8469	52.14915
S1080	06:42	16:18	08:30	12:09	12:27	12:00	63.44402	58.8033
S1450	02:30	15:06	08:15	11:57	12:21	12:00	61.35824	60.26595
S1452	06:03	02:39	03:45	12:51	12:27	12:00	54.28143	47.73286
S1393	04:45	16:39	11:00	11:45	11:24		57.97288	
S1394	08:57	16:42	11:03	12:30	11:24		54.50978	
S1395	09:03	13:03	08:00	11:51	11:24		57.32819	
S1396	09:30	13:15	07:18	09:51	11:24		57.93919	
S1397	09:24	16:12	11:21	18:39	11:24		60.67072	
S1399	10:51	14:03	09:09	09:51	09:30		58.63684	
S1400	08:15	13:57		04:42	09:30		61.53189	
S1401	09:51	13:45	08:09	09:45	09:30		58.53754	
S1402	00:51	13:45	08:24	09:42	09:30		59.32365	
S1403	10:12	13:45	07:36	09:03	09:30		62.45688	
S1405	04:36	13:39	07:48	09:57	09:30		57.97201	
S1406	09:51	13:00	07:54	09:12	09:30		61.91947	
S1407	09:51	14:36	07:57	09:03	09:30		62.49301	
S1028	04:30	14:36	08:30	09:36	09:30		59.38658	

I-694 (WB)


Speed at I-694 (WB)
TP5E6941, East River Rd, S158, 20.6
TP5E6941, T.H.47, S156, 19.9
TP5E6941, W of T.H.65, S154, 19.4
TP5E6941, E of T.H.65, S153, 19.0
TP5E6941, Windemere Dr, S151, 18.6
TP5E6941, Torchwood Dr, S172, 18.2
TP5E6941, Silver Lake Rd, S174, 17.7
TP5E6941, Oakwood Dr, S176, 17.3
TP5E6941, Long Lake Rd, S178, 16.9
TP5E6941, 5th Ave, S180, 16.6
TP5E6941, W of T.H.10, S1089, 15.5
TP5E6941, W of T.H.51, S1088, 14.8
TP9F6941, Lexington Ave, S1086, 14.3
TP9F6941, E of Lexington Ave, S1085, 13.7
TP9F6941, Victoria St, S1084, 13.2
TP9F6941, W of Rice St, S1083, 12.7
TP9F6941, E of Rice St, S1461, 11.6
TP9K6941, E of T.H.61, S1424, 8.0
TP9K6941, White Bear Ave, S1423, 7.4
TP9K6941, McKnight Rd, S1422, 6.7
TP9K6941, W of T.H.36, S1420, 5.0
TP9K6941, 50th St, S1418, 4.0
TP9K6941, 40th St, S1417, 3.3
TP9K6941, T.H.5, S1416, 2.6
TP9K6941, S of T.H.5, S1415, 2.0
TP9K6941, Stillwater Blvd, S1413, 1.6
TP9K6941, 22nd St, S1412, 1.2
TP9K6941, 15th St N, S1411, 0.6
TP9K6941, 10th St, S1410, 0.0
02-01 22:03
02-01 23:33
02-02 01:03
02-02 02:33
02-02 04:03
02-02 05:33
02-02 07:03
02-02 08:33
02-02 10:03
02-02 11:33
02-02 13:03
02-02 14:33
02-02 16:03
02-02 17:33
02-02 19:03
02-02 20:33
02-02 22:03
02-02 23:33
02-03 01:03
02-03 02:33
02-03 04:03
02-03 05:33
02-03 07:03
02-03 08:33
02-03 10:03
02-03 11:33
02-03 13:03
02-03 14:33
02-03 16:03
> 80 mph
70 mph
60 mph
50 mph
40 mph
30 mph
20 mph
10 mph
0 mph
Snow start time
PST
NCRT
Reported lane lost time
Reported barelane regain time
Snow end time

Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1410	11:24	13:33	08:24	09:54	09:03		53.18553	
S1411	23:36	13:33	08:33	09:42	09:03		54.47106	
S1412	09:39	13:18	07:57	09:51	09:03		55.00479	
S1413	11:18	13:24	08:36	09:33	09:03		56.57222	
S1415	11:15	13:12	07:54	09:24	09:03		57.94922	
S1416	09:57	13:06	08:12	10:15	09:03		56.59462	
S1417	09:36	13:51	07:54	08:57	09:03		60.79285	
S1418	07:33	14:21	08:51	09:03	09:03		60.14355	
S1420	09:57	13:36	08:06	09:45	10:21		62.61078	
S1422	10:03	08:09	08:18	10:18	10:21		60.98819	
S1423	10:03	08:09	08:15	09:51	10:21		71.74347	
S1424	08:27	08:06	09:03	10:54	10:21		55.33699	
S1461	01:51	07:30	09:45	11:21	11:15	12:00	57.09081	67.78054
S1083	06:15	07:00	10:21	11:27	11:15	12:00	53.94734	64.46553
S1084	11:54	16:00	08:57	17:36	11:15	12:00	92.17097	99.56203
S1085	06:12	15:57	10:30	11:27	11:15	12:00	57.46337	62.63015
S1086		16:09	10:21	11:21	11:15	12:00	58.8594	63.53794
S1088	08:33	15:48	10:54	13:45	12:33	11:30	54.27166	49.25426
S1089	08:42	15:48	10:51	12:03	12:33	11:30	63.3529	56.41224
S180	08:03	15:36	10:03	13:30	13:21	11:30	59.45296	50.5705
S178	08:36	09:00	10:06		13:21	11:30	51.16453	41.01511
S176	07:45	09:00	10:24	11:42	13:21	11:30	67.66556	54.90674
S172	07:54	15:15	10:21	13:39	13:21	11:30	58.72321	43.56873
S151	07:51	15:09	10:24	12:33	13:21	11:30	60.53435	43.65432
S153	08:42	09:39	10:12	13:48	13:21	11:30	57.32459	41.40726
S154	07:33	09:03	10:15	13:51	13:21	11:30	56.43155	39.40429
S156		09:18	10:15		13:21	11:30	49.32807	32.70029
S158	06:06	14:48	10:36	14:45	13:21	11:30	48.83661	34.69428

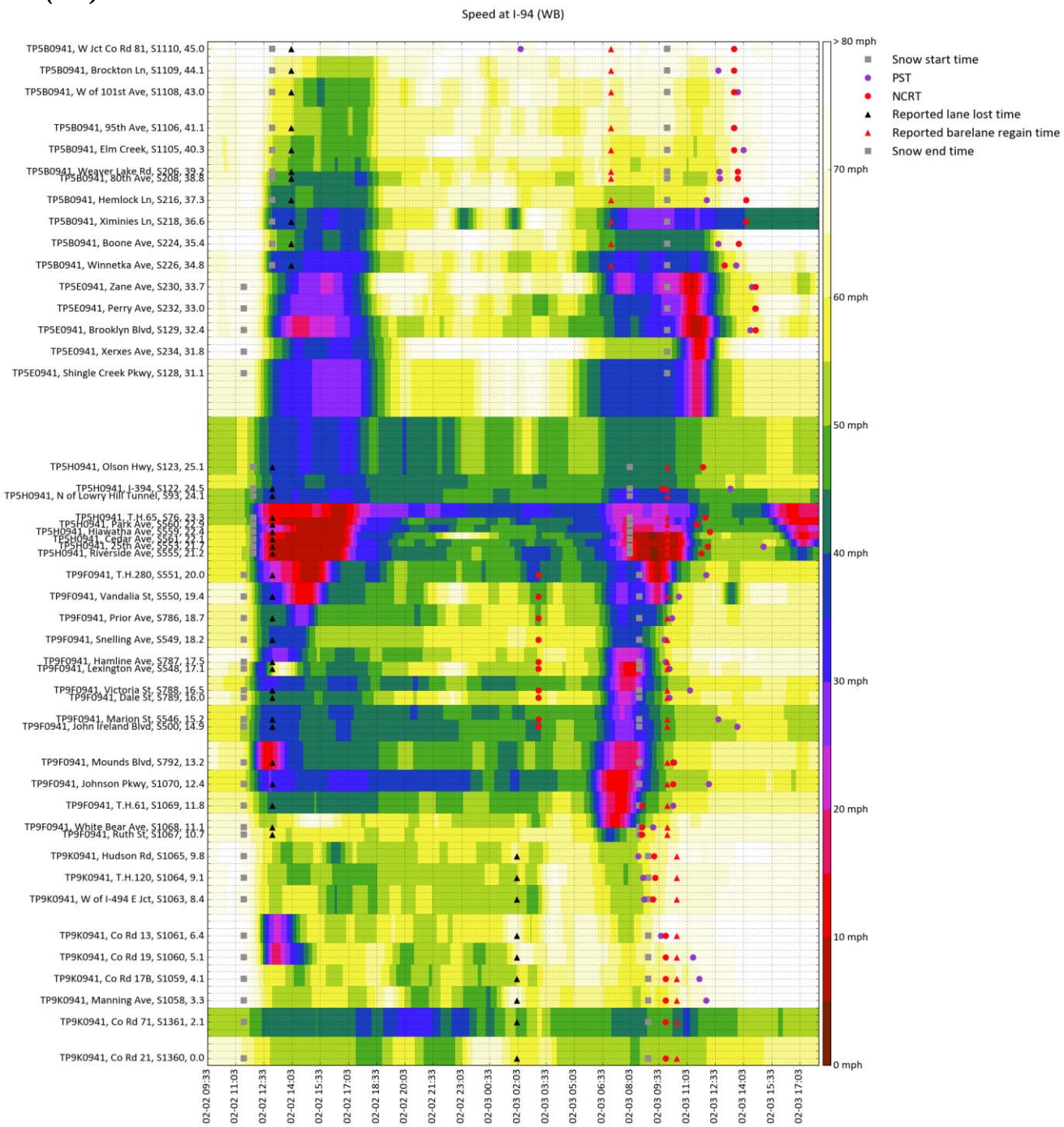
I-94 (EB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1121	12:12	08:39	08:39	10:54	10:57	07:00	72.44298	10.19389
S1122	12:00	07:18	08:18	10:24	10:30	07:00	75.35175	17.9348
S205	12:03	08:21	08:30	11:09	11:24	07:00	71.51788	10.78823
S207	12:03	09:30	09:30	11:09	11:57	07:00	77.37987	33.63661
S215	12:09	15:54	10:30	11:15	11:30	07:00	70.56748	57.04257

S229	12:03	14:36	11:24	12:48	13:18		71.38092	
S231	12:06	14:27	11:27	12:48	13:18		69.69644	
S233	11:57	14:57	07:42	13:21	13:18		59.86076	
S146	12:00	07:27	10:33	14:57	13:18		48.75303	
S103	11:33	10:03	10:24		12:24	10:00	38.92831	9.599629
S110	11:33	09:45	10:03		12:24	10:00	41.98911	14.37982
S556	11:45	09:39	09:42		12:24	10:00	44.61218	6.384248
S557	11:45					10:00		8.878952
S554	11:39	08:18	08:36		11:36	10:00	46.04597	35.86563
S466	11:36	14:21	10:30		11:36	10:00	39.06543	30.20447
S775	11:39	14:42	10:30	12:09	11:36	10:00	51.55497	40.71446
S469	11:33	13:51	08:51	14:06	11:54	10:00	49.9339	44.04466
S776	11:36	14:12	09:21	12:15	11:54	10:00	52.6832	43.44414
S479	11:36	13:57	08:39	12:12	11:54	10:00	53.02792	45.10207
S777	11:30	13:51	07:45	12:03	11:54	10:00	54.43922	51.78808
S489	11:30	13:51	08:06	11:33	11:54	10:00	56.65503	50.91709
S778	11:30	13:36	08:27	11:54	11:54	10:00	55.24666	48.78276
S490	11:33	13:30	08:51	11:33	11:54	10:00	58.09019	51.70746
S491	11:33	13:18	09:06		11:54	10:00	49.07785	42.60652
S499	11:27	13:12	08:48		11:54	10:00	55.64499	47.61743
S781	11:33	12:45	08:06	11:54	08:51	10:00	49.23963	53.11746
S1041	11:36	16:57	08:18	10:30	08:51	10:00	47.0419	52.50644
S1042	11:36	16:45	08:18	08:48	08:51	10:00	55.42447	63.06975
S1043	11:42	16:39	08:18	09:00	08:51	10:00	54.35377	59.39522
S1044	11:42	16:42	08:06	08:30	08:51	10:00	57.39492	62.03446
S1046	11:39	16:24		04:15	07:45	10:30	50.27181	62.29268
S1047	11:39	16:12		19:18	07:45	10:30	55.88841	68.41281
S1048	11:39	13:54		18:33	07:45	10:30	57.76915	67.81185
S1050	11:21	13:00	11:39	12:27	11:51	10:30	66.44845	72.51787
S1051	11:54	14:06	11:45	12:21	11:51	10:30	67.5082	77.04233
S1052	11:33	14:24	11:18	12:24	11:51	10:30	67.11795	78.71334
S1053	11:39	17:24		05:21	11:51	10:30	65.58971	76.79296
S1356		15:03	03:18		11:51	10:30	32.82355	36.72002
S1357	15:18	22:42	22:54		11:51	10:30	50.69034	58.07394

I-94 (WB)



Station ID	SRST	LST	SIST	PST	NCRT	Reported	U at NCRT	U at Reported
S1360	11:36	22:09	09:21		09:54	10:30	53.44041	54.04063
S1361	11:51	20:09	09:48		09:54	10:30	45.44323	43.18004
S1058	11:39	00:27	09:42	12:03	09:54	10:30	58.97147	64.19313
S1059	11:36	19:57	09:45	11:42	09:54	10:30	62.67688	65.1246
S1060	11:09	13:12	09:45	11:21	09:54	10:30	65.14129	66.50664
S1061	11:36	13:15	07:57	09:39	09:54	10:30	74.48093	75.0382

S1063	11:36	16:24	08:30	08:45	09:15	10:30	61.27663	68.1249
S1064	11:33	14:24	08:27	08:42	09:21	10:30	62.12859	68.95779
S1065	11:36	16:24	08:06	08:27	09:18	10:30	61.95873	69.60189
S1067	11:48	06:54	06:54	08:36	08:39	10:00	55.40454	61.29569
S1068	11:42	07:15	07:27	09:15	08:39	10:00	47.61212	59.00862
S1069	11:36	07:33	07:48	10:18	08:39	10:00	40.61447	53.03478
S1070	11:30	07:27	07:39	12:12	10:18	10:00	53.24378	50.77462
S792	11:33	12:45	08:21	10:21	10:18	10:00	54.65155	51.80207
S500	11:33	12:51	22:45	13:42	03:09	10:00	44.55569	47.86204
S546	11:36	12:54	16:15	12:42	03:09	10:00	46.68136	48.25267
S789	11:33	12:51		10:06	03:09	10:00	59.70552	53.83692
S788	11:36	12:48	20:39	11:12	03:09	10:00	48.41821	49.47059
S548	11:36	12:24	02:36	10:06	03:09	10:00	54.94983	54.15821
S787	11:33	13:24	03:00	09:54	03:09	10:00	55.86455	56.92901
S549	11:42	14:24	14:36	09:51	03:09	10:00	55.91988	56.40908
S786	11:36	14:36		10:15	03:09	10:00	49.36715	50.98099
S550	11:36	14:45		10:36	03:09	10:00	46.71736	35.1664
S551	11:36	15:00	02:39	12:03	03:09	10:00	39.71019	18.98636
S555	11:36	09:18	10:03		11:48	10:00	46.58865	5.735182
S553	11:42	16:18	10:36	15:06	12:09	10:00	48.11575	7.828152
S559	11:39	16:21	10:15		12:15	10:00	46.36649	22.33724
S560	11:42	16:15	09:36		11:33	10:00	41.04149	25.86662
S76	11:39	16:27	09:51		12:00	10:00	44.10853	24.5406
S122	11:51	17:15		13:21	09:45	10:00	40.10247	40.81658
S123	11:45	17:00	09:57		11:54	10:00	50.39868	42.12143
S129	11:57	11:30	11:30	14:24	14:42		62.68491	
S232	12:00	11:18	11:21	14:39	14:42		61.81867	
S230	12:06	11:18	11:18	14:30	14:42		62.62356	
S226	12:09	07:54	11:42	13:39	13:03	07:00	55.19686	35.66525
S224	12:03	17:09	11:42	12:42	13:48	07:00	72.33218	45.89314
S218	12:06	09:39	12:06		14:12	07:00	40.19184	39.28653
S216	12:09	17:18	11:45	12:06	14:12	07:00	74.26673	53.31613
S208	12:09	17:42	12:36	12:48	13:45	07:00	68.7808	61.60267
S206	12:15	17:33	12:30	12:45	13:45	07:00	69.20836	59.4035
S1105	12:15	16:15	12:33	14:03	13:33	07:00	67.56989	59.76461
S1106	12:21	16:27	12:33	13:33	13:33	07:00	70.00898	63.94504
S1108	12:27	15:33	12:36	13:45	13:33	07:00	68.45975	64.75613
S1109	12:27	17:51	11:57	12:42	13:33	07:00	73.72273	70.51752
S1110		02:12	13:24	02:12	13:33	07:00	75.09477	74.79919