Data Set Description and Dictionary

OR-217 SB Freeway Data

Schema: loop
Schema: incidents
Schema: weather

October 12, 2012

Table of Contents

1 Data Description

The schema *loop* in the class database contains data obtained from inductive loop sensors on OR-217 SB at 5-minute aggregations for calendar year 2009. The loop sensors collect volume, speed, occupany and metrics on vehicle-miles-traveled, vehicle-hours-traveled, delay and information about bad detector readings in table *loop.loopdata_5min_217sb_2009.* The loop schema also contains tables *highways*, *detectors*, *ramps*, and *stations*. Detectors are related to ramps and stations.

.

1.1 Freeway Loop Detector

The *Loop Detector Data* consists of 20-second speed, volume and occupancy data collected from dual-loop detectors installed in the main line lanes and on-ramps on the Portland-area freeways. Figure 1 visualizes the physical layout of the detector installations. Most mainline detectors are placed near on-ramps with most placed just upstream of the on-ramp as shown in Figure 1.

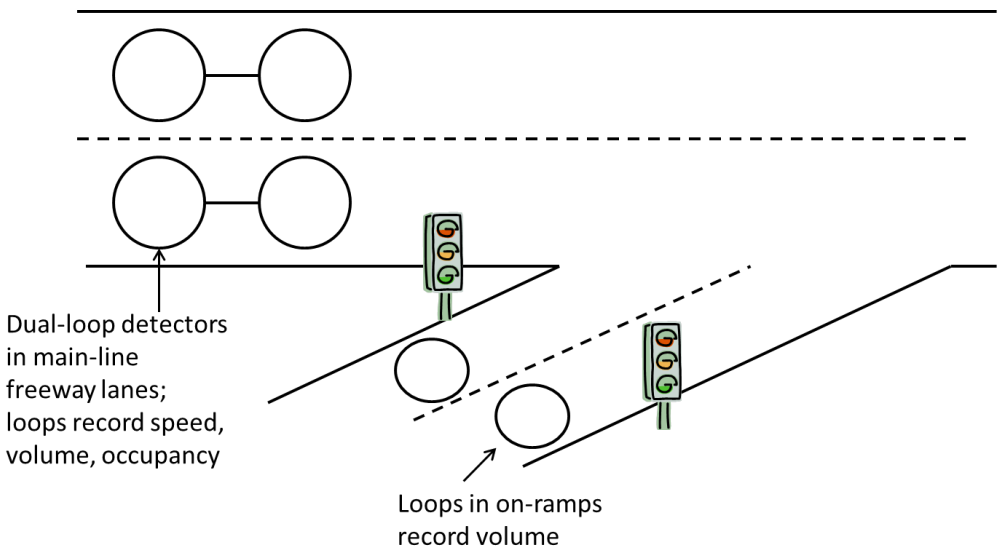

Figure 1 Loop Detector Physical Layout

1.1.1 Meta-Data (Detectors, Stations, Highways)

The freeway loop detectors are classified in a hierarchical organization consisting of detectors, stations and highways. Figure 2 shows a picture of the detector and station organization. A Detector refers to an individual loop detector. A station is a set of related loop detectors. Detectors are contained in Stations. In Portland, all installations use dual loop detectors (speed traps). Thus, a detector row in the detectors meta-data file refers to a single dual-loop detector. Each such dual-loop detector covers one lane and all lanes are covered by a detector. Two types of stations exist: one station for the mainline detectors (in the highway lanes) and one station for the detectors on the on-ramp itself. Figure 3 shows the location of the loop detectors on I-205.

1.1.2 Start and End Mileposts

The section of OR-217 SB covered by this test data set is 6.7 miles long

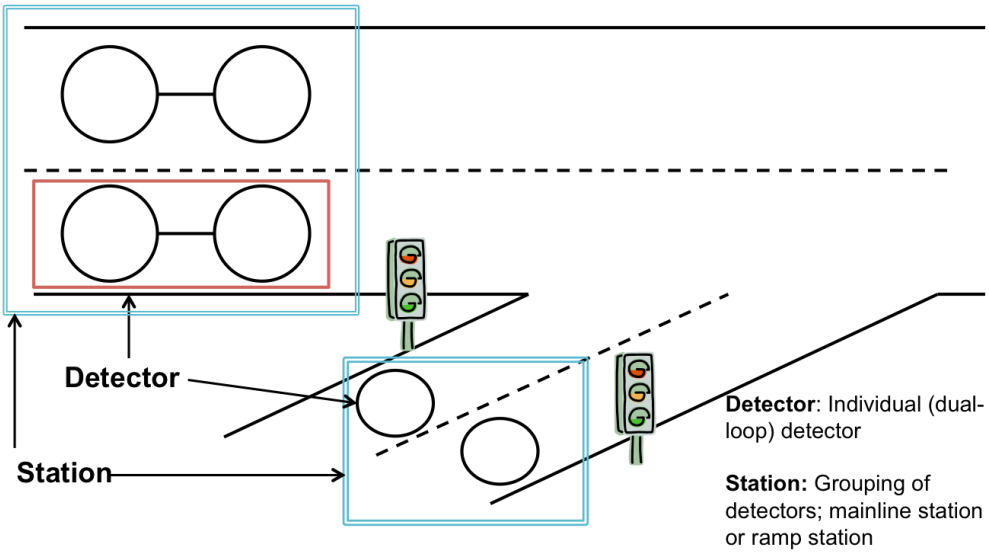

Figure 2 Detector, Station Hierarchy

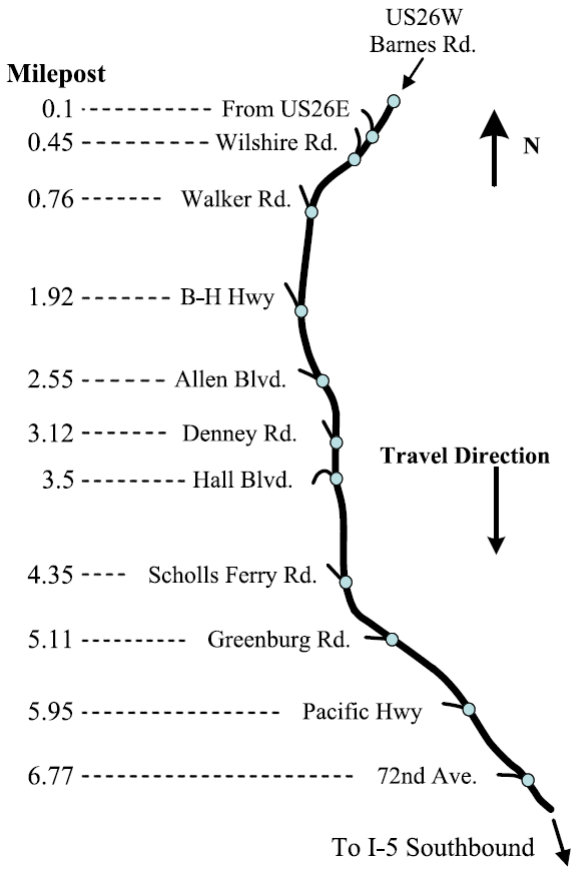

Figure 3 Freeway Loop Detector Locations

1.1.3 Data Quality Flags

Data quality flags in PORTAL are assigned using a set of tests developed at the Texas Transportation Institute. These tests are listed in Table 1. The tests apply to 20-second aggregated data. Each test includes a condition; data samples that satisfy that condition are considered improbable and may indicate a malfunction. For example, a report of a 20-second count greater than 17, which corresponds to a flow of over 3000 vehicles/hour, is considered improbable.

The data quality flags appear as an integer field in each 20-second data record. The flags are represented using the bits of an integer. If a condition is true, the appropriate bit of the data quality flags value is set. The dqflags values can be computed by looking at the integer value and determining what bits in the integer are set to create that integer value and then mapping those bits to the appropriate DQ flag value. For example, if the integer value is 5, then bits 1 and 3 must be set, meaning that the DQ_MAXVOL and DQ_MAXSPD flags are set.

Table 1 Detector Configuration Tests: Conditions

Condition	Condition Name	Bit Position (Value)
Count > 17	DQ_MAXVOL	1 (1)
Occupancy > 95%	DQ_MAXOCC	2 (2)
Speed > 100 MPH	DQ_MAXSPD	3 (4)
Speed < 5 MPH	DQ_MINSPD	4 (8)
Speed = 0; Volume > 0	DQ_MVC_S0VGT0	5 (16)
Speed > 0; Volume = 0	DQ_MVC_SGT0V0	6 (32)
Occupancy > 0; Volume = 0	DQ_MVC_OGT0V0	7 (64)

1.1.4 Aggregation Calculations

Aggregation calculations are described a separate file AggregationAnalysis.pdf. To create length-based measures such as VMT, VHT, Delay, and Traveltime for an individual detector, a length is associated with each detector, as provided in the detectors.csv file . This length is used to calculate VMT, VHT, Delay and Traveltime. The length is calculated using the midpoint method and is the length from halfway to the nearest upstream detector to halfway to the nearest downstream detector.

1.2 Incident

The PORTAL incident data consists of two types of data: Incident data from the ODOT ATMS database and planned event data from the ODOT Trip-Check Traveler Information Portal (TTIP) information web site.

1.2.1 ODOT Incident Data

Incident data is received from the ODOT Advanced Transportation Management System (ATMS). Incident data is entered into the ATMS database by operators at the ODOT Traffic Management Operations Center (TMOC); several entries are created for each incident – an incident report, incident status changes and incident clearing. The incident data set provided is the result of processing the incident entries received from the ODOT ATMS; multiple incident entries created

by the TMOC operators are processed and condensed into a single incident record. Thus, this processed data set contains one incident record per incident.

The processing of this data set to combine multiple entries for an incident into one incident record is now described. The processing adds three fields: duration, an 'unable to locate' flag, and a highway identifier and combines information from multiple incident entries. Some incident information changes from entry to entry—for example, the number of lanes affected by an incident may change as an incident is cleared from the mainline highway lanes to the shoulder.

The duration of an incident is defined as the difference between the incident confirm time and the "last update time" of the final entry for the incident. This determination of duration is subject to error as the final entry for an incident can be created after the incident is cleared; however, the final entry for an incident is almost always at the time of the clearing of the incident. An Unable To Locate ("UTL") flag is added to incident records based on the occurrence of the text "UTL" in the incident comment field. Finally, the highway id is added to incidents that occur on a major highway in the Portland area.

In addition to adding these three fields, fields such as incident lane information are combined from the multiple incident entries. Typically the processed data contains the 'most severe' information in any of the incident entries. The incident record contains the highest impact level from the multiple incident entries, the most severe lane impact, and the highest number of lanes affected. Flag fields in the incident record are marked true if the flag field is true for any incident entry.

1.2.2 TTIP Planned Event Data

The data in the Planned Event data set is defined as planned ODOT activities along a roadway. Typically these planned events are road construction or road maintenance. The entries may indicate delays and closures of roadway sections or may be informational only. Information for events in the Portland area is provided. Planned Event data is obtained from the TripCheck Traveler Information Portal web site (http://www.tripcheck.com/TTIPv2/).

1.3 Weather

The weather data comes from two sources: NOAA QCLCD data and RWIS station data.

1.3.1 NOAA QCLCD Data

The NOAA QCLCD data is obtained from the NOAA web site. Data for three locations are provided: KHIO (Portland-Hillsboro Airport), KPDX (Portland International Airport) and KTTD (Portland-Troutdale Airport). Data provided includes windspeed, temperature, humidity and visibility.

2 Data Dictionaries

2.1 Freeway Loop Detector

In the loopdata_5min_217sb_2009 dates and times are represented with a timestamp with time zone. The timestamp is the timestamp of the local (Portland) time and includes an indicator of

time zone. An example timestamp is: 2011-09-01 04:39:40-07. The -07 at the end of this timestamp indicates UTC-07 or Pacific Daylight Time (PDT). Time zones in the data set are -07 for UTC-07 (PDT) and -08 (Pacific Standard Time (PST))..

Table 2 ODOT ATMS Status Flag Descriptions

Value	Status	Data	Description
0	Inhibited	None	A higher level failure (controller, comm) is inhibiting the detector from providing data
1	Disabled	None	The detector has been disabled by the Operator
2	OK	OK	The detector has passed all of the threshold tests.
3	Suspect	OK	The detector has failed the threshold test less than a predetermined number of consecutive periods and is deemed "suspect". Data is considered "good" from suspect detectors.
4	Soft Failed	None	The detector has failed the threshold test a predetermined number of consecutive periods. A "Soft Failed" detector must pass the threshold test a predetermined consecutive number of times to automatically be deemed "OK".
5	Hard Failed	None	The detector has either been "Soft Failed" for a set number of consecutive periods or has failed the threshold test a set number of times during the day. "Hard Failed" detectors will automatically recover but only after a significant number of consecutive "good" data conditions. Typically this is set to what amounts to 15 minutes.

Table 3 Data Dictionary for PORTAL Detectors Table

Attribute Name	Attribute Type	Description
detectorid	smallint	Id of the detector (key)
highwayid	smallint	Id of the highway on which the detector resides.
milepost	real	Detector location milepost.
locationtext	text	Textual description of the detector location.
detectorclass	smallint	Detector class: 1 – Mainline; 2 – HOV; 3 – Unknown; 5 - On Ramp
lanenumber	smallint	Lane in which the detector resides. In this data set, Lane 1 indicates the left-hand (high-speed) lane.
stationid	smallint	Id of the station associated with this detector.

Table 4 Data Dictionary for PORTAL stations Table

Attribute Name	Attribute Type	Description
stationid	smallint	Id of the station (key). Station Id Naming Conventions: 1000's mainline stations; 2000s HOV lanes; 5000's on-ramp stations
highwayid	smallint	Id of the highway on which the station resides.
milepost	real	Station location milepost.
locationtext	text	Textual description of the station location.

upstream	smallint	Id of the closest upstream station; 0 if no upstream station.
downstream	smallint	Id of the closest downstream station; 0 if no downstream station.
stationclass	smallint	Detector class: 1 – Mainline; 2 – HOV; 3 – Unknown; 5 - On Ramp
numberlanes	smallint	Number of lanes at this station. (One Detector for each lane.)
latlon	text	Latitude/longitude of station location separated by commas.
length_mid	real	Length associated with this station using the midpoint method. Length used for aggregate calculations. (Stations associated with ramps do not have lengths associated with them.) (miles)

Table 5 Data Dictionary for PORTAL highways Table

Attribute Name	Attribute Type	Description
highwayid	smallint	Id of the highway (key)
shortdirection	character (1)	One character representing the direction of the highway
direction	text	Direction of this highway segment.
highwayname	text	Name of the highway (does not include direction)

Table 6 Data Dictionary for loopdata_5min_217sb_2009

Attribute Name	Attribute Type	Description
detectorid	smallint	Id of the detector (key)
starttime	timestamp with time zone	Start time of the time interval represented by this data. (key)
volume	smallint	5-minute volume for this detector.
speed	real	5-minute r average speed for this detector. (mph)
occupancy	real	5-minute average occupancy for this detector. (percent)
countreadings	smallint	Count of readings for this detector in the 5-minute, 15-minute, 1-hour interval. This field represents the number of readings received from this detector during the time interval. We expect 15 readings in a 5-minute period; however, countreadings could be less than 15 due to communication errors.
vmt	double precision	5-minute vehicle miles travelled for this detector. (miles)
vht	double precision	5-minute vehicle hours travelled for this detector. (hours)
delay	double precision	5-minute delay for this detector. (minutes)

traveltime	double precision	5-minute travel time for this detector. (minutes)
count_bad_speed		
count_bad_volu		
count_bad_occu		

2.2 Incident

Table 7 Data Dictionary for incidents_217_2009

Note these lookup tables include the codes listed in the description column so are not specifed

- atms_atms_cities
- atms_atms_counties
- atms_atms_jurisdictions
- atms_affectedlanetypes
- atms_detectiontypes
- atms_impacttypes
- atms_incidenttypes
- atms_locationtypes

Attribute Name	Attribute Type	Description
incidentid	integer	Incident Id
incidenttypeid	smallint	Incident type: 0 Unknown; 1 Accident; 2 Stall; 3 Debris; 4 Tow; 5 Construct Congestion; 7 Other Closure; 8 Other Incident; 9 Tag
detectiontypeid	smallint	Detection type: 0 Unknown; 1 Call Report; 2 Operator Detected; 3 All Purp Incident Detection (APID) algorithm Detected; 4 Double Exponential Smoo Detected; 5 Other. APID and DES are routines used to detect incidents fro collected from field devices.
impacttypeid	smallint	Impact type: 0 No Impact; 1 Low Impact; 2 Medium Impact, 3 High Impact, Unknown
incidentlevel	integer	Incident level. 1 An incident with no injuries and no lanes blocked; 2 an inc minor injuries and/or one lane blocked; 3 an incident or incident with or w serious injuries that blocks two or more lanes but does not shut down the interstate; 4 an incident or incident that completely blocks the freeway or for more than two hours
starttime	timestamp without time zone	Confirmed time of the incident.
cometresponseflag	smallint	Indicates if ODOT incident response trucks dispatched. COMET is a legacy

		ODOT's incident response unit. (0=false, 1=true) (0=false, 1=true)
policeresponseflag	smallint	Indicates if police responded to incident. (0=false, 1=true)
fireresponseflag	smallint	Indicates if fire responded to incident. (0=false, 1=true)
hazmatresponseflag	smallint	Indicates if hazardous materials team responded to incident. (0=false, 1=tr
maintresponseflag	smallint	Indicates if maintenance responded. (0=false, 1=true)
regionmaintresponseflag	smallint	Indicates if regional maintenance responded. (0=false, 1=true)
sec2amaintresponseflag	smallint	Indicates if Section 2a maintenance responded. (0=false, 1=true) ODOT has Oregon into regions and districts (sections). A map is available here: http://www.oregon.gov/ODOT/TD/TDATA/gis/odotmaps.shtml#ODOT_Re
sec2bmaintresponseflag	smallint	Indicates if Section 2b maintenance responded. (0=false, 1=true)
sec2cmaintresponseflag	smallint	Indicates if Section 2c maintenance responded. (0=false, 1=true)
diversionflag	smallint	Flag to indicate diversion routes are used in the response plan. (0=false, 1=
countycodeid	integer	Indicates county id: 3 Clackamas, 26 Multnomah, 34 Washington
citycodeid	integer	Indicates city id (see City Ids and Names table below)
primaryroute	character varying(40)	Textual description of primary route on which the incident occurred.
primarymilepost	real	Milepost on primary route where incident occurred.
secondaryroute	character varying(40)	Textual description of secondary route on which incident occurred.
secondarymilepost	real	Milepost on secondary route where incident occurred. If milepost 0, indica milepost for secondary route provided.
directiontypeid	integer	Direction of roadway on which incident occurred: 0 Unknown; 1 Northbou Southbound; 3 Eastbound; 4 Westbound
locationtypeid	smallint	Location of incident: 0 Unknown; 1 Freeway; 2 Connector; 3 Collector/Distr Entrance Ramp; 5 Exit Ramp; 6 Arterial; 7 Intersection; 8 Bridge; 9 Tunnel;
locationtext	character varying(140)	Textual description of incident location.
numlanesaffected	smallint	Maximum number of lanes affected by the incident.
affectedlanetypeid	smallint	Type of lanes affected: 0 None; 1 Left Lanes; 2 Right Lanes; 3 Center Lanes; Lanes; 5 Off Road Left; 6 Off Road Right; 7 Left Shoulder; 8 Right Shoulder; area (left); 10 Gore area (right)
guardraildamage	smallint	Flag indicating if guardrail was damaged. (0=false, 1=true)
pavementdamage	smallint	Flag indicating if pavement was damaged. (0=false, 1=true)
signdamage	smallint	Flag indicating if sign damage occurred. (0=false, 1=true)
signaldamage	smallint	Flag indicating if signal damage occurred. (0=false, 1=true)
lightpoledamage	smallint	Flag indicating if light pole damage occurred. (0=false, 1=true)
structuredamage	smallint	Flag to indicate structure damage at incident(0=false, 1=true)
otherdamage	smallint	Flag to indicate other type of damage at incident. (0=false, 1=true)
fatalcount	smallint	Count of fatalities in incident.
pedestriancount	smallint	Count of number of pedestrians involved in incident.
railroadcount	smallint	Count of rail
automobilecount	smallint	Count of number of automobiles involved in incident.
motorcyclecount	smallint	Count of number of motorcycles involved in incident.

pickupvancount	smallint	Count of number of pickup trucks and vans involved in incident.
dotvehiclecount	smallint	Count of number of DOT vehicles involved in incident.
constvehiclecount	smallint	Count of number of construction vehicles involved in incident.
motorhomebuscount	smallint	Count of number of motor homes and busses involved in incident.
lighttruckcount	smallint	Count of number of light trucks involved in incident.
tractortrailercount	smallint	Count of number of tractor trailers involved in incident.
othervehiclecount	smallint	Count of number of other vehicles involved in incident.
estimatedend	timestamp without time zone	Estimated end time of the incident as determined by ODOT ATMS staff.
hazardvehicleflag	smallint	0 = No hazardous material present, 1 = Hazardous material present
geolocatedflag	smallint	Flag to indicate that the incident has been located on the map. (0=false, 1=
lastupdatetime	timestamp without time zone	Last update time of the incident.
xposition	integer	Latitude
yposition	integer	Longitude
duration	time without time zone	Estimated duration of the incident. Duration is calculated as length of time incident confirmed time (starttime) and last update time.
utlflag	smallint	Unable to locate flag.
highwayid	smallint	9 = OR-217 NB, 10 = OR-217SB

City Ids and Names

City Id	City Name	City Id	City Name
18	Beaverton	2	North Plains
26	Canby	160	Oregon City
41	Cornelius	167	Portland
63	Estacada	183	Sandy
65	Fairview	192	Sherwood
68	ForestGrove	211	Tigard
75	Gladstone	214	Troutdale
83	Gresham	215	Tualatin
92	Hillsboro	229	West Linn
115	Lake Oswego	234	Wilsonville
130	Maywood Park	236	Wood Village
138	Milwaukie	270	Damascus
140	Molalla		

2.3 Weather

Table 8 Data Dictionary for PDX weather Table (pdx_weather.csv)

Attribute Name	Attribute Type	Description
stationid	character(4)	Id of the weather station (KHIO, KPDX, KTTD)
reporttime	timestamp	Time of the report
windspeed	float	Wind Speed (miles per hour)
tempf	float	Temperature (Fahrenheit)
humiditypercent	integer	Relative Humidity (Percent)
weathertext	character(20)	Text describing the weather
skytext	character(20)	Text describing the sky conditions
precip	integer	Hourly precipitation totals (hundredths of an inch)