Guide for Interpreting Short Duration Traffic Count Reports

May 2020

Washington State
Department of Transportation

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Introduction

The Washington State Department of Transportation's (WSDOT) Transportation Data, GIS, and Modeling Office (TDGMO) is charged with collecting, maintaining and reporting traffic data on the state's highways. The data is used to meet federal reporting requirements and to inform decision makers as WSDOT fulfills its mission of operating and improving the state's transportation systems.

A major component of TDGMO's data collection program is the more than 2,000 short-duration traffic counts it performs each year. A short-duration traffic count is one that is conducted over a relatively limited period of time, usually one week or less. Some of these counts are done manually, as hand-tallies of visually observed vehicles. However, most are conducted mechanically using pneumatic tubes stretched across the roadway and connected to a computer capable of detecting the pulse of air produced as a vehicle passes over each tube. Some of these mechanical counts break traffic volumes out by vehicle category (e.g., cars, buses, tractor-trailer combinations), but the majority are limited to a tallying of axle passes divided by two.

For both types of mechanical counts, reports showing the data collected over the duration of the counts are produced. Because these reports are available to the public, this document was created to help individuals decipher their contents.

The document is divided in to four sections. The first discusses field sheets, which are produced for each traffic count and indicate where the count was performed, how accurately the equipment functioned over its duration, and what type of traffic data was collected. The second provides instruction on reading a report produced from a count of axles divided by two (referred to as a volume or two-axle-equivalent count). The third section provides instruction on reading a report produced from a count of vehicles by category (referred to as a classification count). Finally, the fourth section is composed of appendices that provide more detailed information on topics related to these reports.

The Field Sheet

The TDGMO personnel responsible for performing short duration traffic counts fill out a form (referred to as the field sheet) for each mechanical traffic count conducted. The field sheet identifies the type of count performed (volume or classification), the particular count equipment used, the location the equipment was placed on the roadway, and the status of the equipment during daily checks. This information is used by the TDGMO staff responsible for processing the data collected as they verify the data's accuracy and confirm its validity for reporting purposes.

On the following page is an example of a field sheet. Because its component sections lack headings, they have been highlighted in various colors for the purposes of this document. On the pages that follow, each colored area is addressed in turn as the sheet's fields are explained.

Note however that because traffic data collection for a single roadway location (often referred to as a traffic study) may require multiple traffic counters to be set in order to capture all lanes of travel, one study may contain multiple field sheets.

The Field Sheet

Washington State Department of Transportation

See the following page for the descriptions, uses and/or defintions of the highlighted fields below.

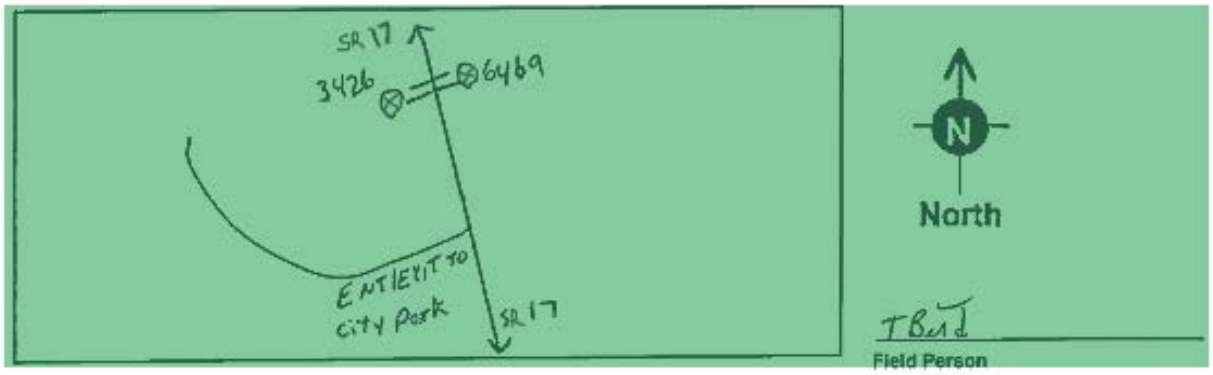
Interval ☒ 60 min. ☐ 15 min.
☐ Count(volume) ☐ Speed
☒ Binned(CL/SP) ☐ Raw

Lane No ☐ 1 ☐ 2
Direction Channel 1 _____
Direction Channel 2 _____
Data Hog # 7063

Counter No. 3426-33 Count ID ATR
SR 17 RRT/RRQ _____ MP ~~77.93~~ 76.12
Leg 2 Direction SB OSID _____

Station Description _ ON ~~SR 17 N/O ENT/EXIT TO CITY PARK~~
On SR 17 N/o Ent/Exit to Soap Lake City Park

Date	Day	Time	Comments
8/8/5	2	16:05	Manual (1) 1 (2) / Counter (1) 1 (2) — SET CNTR CHECK OK TB 6.3V
8/9	3	09:55	Manual (1) 8 (2) / Counter (1) 8 (2) — CNTR CHECK OK TB 6.3V
8/10	4	09:20	Manual (1) 4 (2) / Counter (1) 4 (2) — CNTR CHECK OK TB 6.3V
8/11	5	09:42	Manual (1) 9 (2) / Counter (1) 9 (2) — CNTR CHECK OK TB 6.3V
8/12	6	09:11	Manual (1) (2) / Counter (1) (2) — P/U CNTR CHECK OK TB 6.3 ✓



TBud
Field Person

Blue Fields

Interval

The 15 or 60 minute box is checked to indicate the period of time that traffic data was summarized by during the count. As a general rule, classification counts are summarized in 60 minute intervals and volume counts are summarized in 15 minute intervals. However, in rare instances a volume count can be summarized in 60 minute increments.

Count Type

The Count, Binned, Speed or Raw box is checked to specify the type of traffic data that was collected. Count (volume) indicates a two-axle-equivalent count was performed. Binned (CL/SP) indicates a classification count was performed. Speed indicates a count in which vehicles were tallied by speed category was performed. Raw indicates a count in which data is not summarized by 15 or 60 minute intervals, but is instead one in which the passage of each axle over the pneumatic tube is time-stamped and individually recorded.

TDGMO only performs short-duration speed counts in extremely rare circumstances, and never performs short-duration raw counts. For this reason, only volume and classification counts are addressed in this document.

Lane Number

These boxes are only used in relation to classification counts, and only when the count is performed on a roadway where at least one of the directions of travel has more than one lane. If these criteria are met then one of the boxes will be checked to indicate which travel lane the count was performed on in the given direction of travel (see the Yellow Fields section below) for the count location shown in the sketch (see the Green Fields section below). Within a classification count, Lane 1 is designated as the one adjacent to the outside shoulder, while Lane 2 is adjacent to the median shoulder or centerline. Additional lane designations are not required because classifications counts using pneumatic tubes are not performed by TDGMO on roadways where there are more than two lanes per direction of travel.

Direction Channel

These fields are only used in relation to volume counts, and usually only when two tubes (as opposed to just one) are connected to the counter. They indicate to the processing staff what traffic was captured by each of the tubes at the count location shown on the sketch. Typically, the abbreviations BW, NB, SB, EB, and WB (for bothways, northbound, southbound, eastbound, and westbound) are used. However, if the tubes are set to capture data on two distinct roadways (such as a mainline and an intersecting ramp) Direction Channel 1 will provide a description of the roadway one tube was set on and Direction Channel 2 will provide a description of the other.

If one tube is set to capture directional data, and the other set to capture data for both directions of travel combined, the former will be subtracted from the latter during count processing in order to provide data for the opposite direction.

Handwritten Lane # of # Notes

Data from multiple counters or multiple direction channels must sometimes be combined by the processing staff in order to create data reflective of all traffic for the given direction of travel at the study location described in the Station Description field (see the Yellow fields section below). In this situation, they will write a note in the form “Lane # of #” next to the Lane Number or Direction Channel used in part to do so. When writing the note, the latter pound sign is replaced by the number of lanes (when working with classification counts) or number of channels (when working with volume counts) that require merging in order to create data representing total traffic in the given direction. The former pound sign is replaced with a number simply indicating the order that the data from the Lane Number or Direction Channel is provided in the given direction’s portion of the report section of the study. In contrast to the Lane Number field, the “Lane #...” note does not reflect a specific lane of the roadway, and may even reflect multiple lanes of travel.

Data Hog Number

This field is used for internal purposes only.

Yellow Fields

Counter Number

This field identifies the serial number of the counter used and the week of the year the data was collected in (usually separated by a dash).

Count ID

This field contains a code indicating the reason the count was conducted. The code is for internal administrative purposes only.

SR and RRT/RRQ

If the traffic study represents a location on the state highway system, these fields indicate the state route number (SR), Related Route Type (RRT) and Related Route Qualifier (RRQ) of that location. If the study represents a location on a local roadway, these fields indicate the SR, RRT and RRQ of the nearest state route.

See the WSDOT Linear Referencing System appendix for detailed information on RRT and RRQ codes.

MP

If the traffic study represents a location on the state highway system, this field indicates the State Route Mile Post (SRMP) and back milepost indicator (if applicable) of a significant roadway feature near the location the data reflects (usually an intersection, undercrossing or bridge seat). If the study represents a location on a local roadway, this field is simply the SRMP and back milepost indicator (if applicable) of the nearest significant roadway feature on the nearest state route.

See the WSDOT Linear Referencing System appendix for detailed information on state route mileposting, including ahead/back indicators.

Leg

If the OSID field (see below) is blank, this field further identifies the location the study represents in relation to the SRMP to which it is coded. The leg codes, which are defined in terms of the increasing direction of mileposting, are as follows.

- Leg 1 identifies a count taken before a feature where traffic changes.
- Leg 2 identifies a count taken after a feature where traffic changes.
- A blank leg identifies a count taken at a location where traffic does not change.
- Leg L identifies a count taken on the local side road to the left.
- Leg L2 identifies a count taken on the second local side road to the left.
- Leg R identifies a count taken on the local side road to the right.
- Leg R2 identifies a count taken on the second local side road to the right.

If the OSID field is *not* blank, this field identifies whether the study represents north, south, east or west of the intersection noted in the Station Description field (see below).

Direction

This field indicates the direction of travel the count reflects. BW refers to both ways, while NB, SB, EB and WB refer to northbound, southbound, eastbound and westbound respectively. The latter are in relation to compass direction at the location of the count, not the ultimate direction of the roadway. Counts conducted on ramps are coded in relation to the direction of travel of the mainline state route that the ramp provides egress from or ingress to.

OSID

If the study represents a location on a local roadway, and the study location is not adjacent to an intersection with a state route, then an Off System ID code is placed in this field. The code itself is for internal purposes only.

Station Description

This field contains a description of the study location in relation to a physical feature of the roadway (usually an intersection, undercrossing or bridge seat).

Orange Fields

This section of the field sheet is used by the technician performing the traffic count to record the dates and times that the count was begun and concluded. It is also used to record information about the state of the counter and its operation at both these times and at equipment checks on the intervening days.

Date, Day, and Time

The first and last entries are the date, day of week and time the count was begun and ended. Other entries are the date, day of week and time of daily equipment checks. Military time and numeric day of week are used. Sunday is 1; Saturday is 7.

Comments

This section is used to document equipment performance at the time of installation, daily checks, and pickup. It is also sometimes used by the field technician to note sources of atypical traffic in the area at the time of the count, such as a local event.

At the left of this section is an area for recording the field technician's visual tally of vehicles or two-axle equivalents (i.e., "Manual") compared to the equipment's count of vehicles or two-axle equivalents (i.e., "Counter") over the same time period. The 1 and 2 contained within the parentheses are used to indicate which channel of the counter this comparison was performed for. If, when the field technician attempts to perform this comparison, no vehicles pass the count location within the first five minutes (which is possible in some rural locations) then the technician will drive his or her vehicle across the tube(s) to verify the counter's operation. This will be noted by an "SV" next to the appropriate channel field.

The cause of any discrepancy between the numbers in this comparison will be noted on the right side of the comments section, as well as an indication of what action was taken to rectify the issue (if any). The right side is also used to note an equipment problem apparent prior to the manual count comparison, the action taken to rectify the issue, and the time this occurred. It is also used to note the voltage of the counter's battery[1] and the initials of the technician who performed the equipment check ("TB" in the example).

[1] A valid voltage range is from 6.1 to 7.5. Voltages outside of this range are an indicator to the field technician that the counter needs additional checking to verify it is operating properly.

Typical notes in this section (which are often abbreviated) include:

- *Simultaneous Passing* (*SP*) - Multiple vehicles are crossing the tube at the same time, resulting in an undercount of traffic.
- *Double Counting* (*DC*) – Vehicles are crossing over the tube at other than a right angle. This can happen when a counter is set close to a traffic generator such as a business entrance or exit, and results in an overcount of traffic.
- *Angle Crossing* (*AC*) – See Double Counting.
- *Roll Over* (*RO*) – Vehicles are crossing over the tube at a very low speed. This can be due to congestion, accidents or traffic control such as stop lights. It results in an undercount of traffic.
- *Tube Up* – A tube has come free from its fixed position on the roadway. This precludes the equipment from collecting valid data.
- *Tube Slap*/*Tube Bounce* – A tube bounces noticeably after a vehicle passes over it. This is caused by insufficient tension on the tube, and results in an overcount of traffic.
- *Water in Tube* – Water has entered the tube in some manner. This prevents the air pulse from activating the air switch in the counter, and results in an undercount of traffic.
- *Bad Tube* – A tube is no longer useable due to damage or wear.
- *Damaged Counter* – The counter has been obviously damaged in some way, such as by being struck by a vehicle.
- *Missing Counter* – The counter is missing due to theft or some other cause.
- *Bad Counter*/*Screen Won't Come Up*/*Screen Frozen* – There is a technical problem with the counter that precludes its use.

In the case of the latter three notes, the field technician will also write the time the missing or inoperative counter was replaced. He or she will also write the serial number of the counter it was replaced with in the comments section or, alternately, above the Counter Number field and in the count sketch (see below).

Green Fields

This section is used by the field technicians to draw a sketch of the area in which the count was performed, including where the counter or counters were placed in relation to nearby roadway features such as intersections. The sketch is used by the processing staff to validate the SR, RRT/RRQ, MP, Leg and Direction information provided by the field technician.

An “X” marked in the field sketch denotes a counter set to collect volume data. An “X” contained within a circle denotes a counter set to collect classification data. The number adjacent to the “X” is the serial number of the counter.

Handwritten Changes

The count location information provided by the field technicians in the yellow fields section is sometimes revised by the processing staff. This is done periodically when information is determined to be in error. More commonly however, the information is simply changed to reflect an equally valid location that studies have been coded to in the past. In addition, because data collected by a traffic count can often be used to create traffic studies for multiple distinct roadway locations, location and Direction Channel information is revised as needed to reflect the study being created.

Historically, revisions were written in red to distinguish them from the information provided originally by the field technicians. However in 2004, when TDGMO began maintaining its traffic studies as black and white electronic images, this procedure ceased to be viable. Now, the original also has a line placed through it.

The Volume Report

Each volume study includes a report containing the two-axle equivalent data collected, as well as summary statistics for the study. The following pages explain the fields contained in this report. In doing so, the header, detail data and summary data sections of the report are discussed in turn. Following the page on which each is first addressed, an example is provided.

Volume Report Header Information

The topmost three lines of each page of the report provide, from left to right, a WSDOT mainframe report number (i.e., DOT-RNB515A-B), a report description, the date and time the report was generated by the count processing staff, and a page number. The following two lines replicate the information provided on the study's field sheet(s), with the following exceptions.

SR

This field contains both the SR and RRT/RRQ information from the field sheet(s).

Direction of Traffic

This field indicates the direction of travel the data on the page reflects. Because multiple counts may be combined to produce data representing both directions of travel, the study may not have a field sheet with "BW" in the Direction field.

Lane

If this field contains "Lane # of #", with single-digit numbers in the place of the pound signs, then the data on the page reflects the given counter's Direction Channel with the same "Lane # of #" note written by it on the field sheet. Alternately, the data on the page reflects all lanes of travel for the given direction when the field contains either "Lane All Of" or "Lane 12 of 2", "Lane 123 of 3", et cetera.

DOT-RNB515A-B

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
T R I P S S Y S T E M
15 MINUTE TRAFFIC COUNT SUMMARY

DATE 05/08/06
TIME 07:56:09
PAGE 6

SR 169 MP 025.12 OFF SYSTEM ID. LEG 1 DIRECTION OF TRAFFIC BOTH WAYS LANE ALL OF

COUNT IDENTIFIER HPMS COUNTER NUMBER 146467 DESCRIPTION: ON SR 169 E/O ENT/EXIT TO CITY PARK/BUSINESS

04/06/06 THURSDAY

	AM HOURS												PM HOURS											
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	DAILY
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
00-15	65	38	30	112	361	822	728	838	793	956	957	910	710	734	903	795	817	769	627	467	385	330	205	131	
15-30	55	49	64	183	549	817	764	876	689	1092	931	1221	753	832	830	791	849	757	555	508	403	317	178	92	
30-45	60	50	84	270	716	838	703	742	734	1006	773	1118	797	825	802	812	798	686	523	509	415	282	133	82	
45-00	46	48	99	273	717	778	753	732	993	990	893	1057	716	842	827	819	843	644	533	459	366	251	101	66	
HOUR TOT	226	185	277	838	2343	3255	2948	3188	3209	4044	3554	4306	2976	3233	3362	3217	3307	2856	2238	1943	1569	1180	617	371	55242

AM PEAK HOUR 1100 TO 1200 VOLUME 4306 — AM TOTAL 28373
PM PEAK HOUR 0115 TO 0215 VOLUME 3402 — PM TOTAL 26869

04/07/06 FRIDAY

	AM HOURS												PM HOURS											
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	DAILY
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
00-15	68	48	47	100	296	648	668	750	831	997															
15-30	72	51	47	133	434	697	763	763	779	1169															
30-45	46	45	59	219	615	742	718	927	1018	1239															
45-00	66	49	70	215	637	718	768	905	976																
HOUR TOT	252	193	223	667	1982	2805	2917	3345	3604	3405															19393

AM PEAK HOUR 0845 TO 0945 VOLUME 4381 — AM TOTAL 19393
PM PEAK HOUR 0000 TO 0000 VOLUME 0 — PM TOTAL 0

04/03/06 THRU 04/07/06
TOTAL HOURS FOR COUNT 92

1 DAY WB
3 DAYS EB 51623 FACTOR GROUP GR-02 48009 FACTOR GROUP GR-C2 43755

AVG WEEKDAY VOL 59456 X SEASONAL ADJ. FACTOR 0.9300 = 55294 X AXLE CORR FACTOR 0.9114 = ESTIMATED AVG DAILY TRAFFIC 50395

13.68

PEAK HOUR PERCENTAGES: K = 11.88 D = 92.03
PEAK HOUR LOCATION : VOLUME = 7064 DATE: 04/04/06 TIME: 04:45 AM

NOTE: ONE DAY WB

Counter Number

If a single counter was used to collect the data provided on the page, then this field contains its Counter Number. However, if data from multiple counters were summed in order to produce the data on the page, then this field only contains the number from one of those counters

Volume Report Detail Data

For each Interval that count data was summarized by (see the Field Sheet section of this document), the total number of axles divided by two recorded for the given Direction of Traffic and Lane is provided. For each Direction of Traffic and Lane combination, totals are also given for each 12-hour AM period, 12-hour PM period and day, as well as for the highest 60-minute AM and 60-minute PM periods of each day. The highlighted example shows two-axle equivalent volumes collected for both directions of travel combined from 12:00 AM through 11:59 PM on Thursday, 04/06/06.

If the data from a portion of the day are determined by the processing staff to be invalid, they will place brackets around the invalid data and write a note describing the issue or indicating its cause. If the data from an entire day are invalid, a note is placed next to the daily total volume. If the data from all days shown on the page are invalid, a diagonal line is placed across the page.

DOT-RNB515A-B

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
T R I P S S Y S T E M
15 MINUTE TRAFFIC COUNT SUMMARY

DATE 05/08/06
TIME 07:56:09
PAGE 6

SR 169 MP 025.12 OFF SYSTEM ID. LEG 1 DIRECTION OF TRAFFIC BOTH WAYS LANE ALL OF

COUNT IDENTIFIER HPMS COUNTER NUMBER 146467 DESCRIPTION: ON SR 169 E/O ENT/EXIT TO CITY PARK/BUSINESS

04/06/06 THURSDAY — AM HOURS | PM HOURS

	12 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	DAILY TOTAL
00-15	65	38	30	112	361	822	728	838	793	956	957	910	710	734	903	795	817	769	627	467	385	330	205	131	
15-30	55	49	64	183	549	817	764	876	689	1092	931	1221	753	832	830	791	849	757	555	508	403	317	178	92	
30-45	60	50	84	270	716	838	703	742	734	1006	773	1118	797	825	802	812	798	686	523	509	415	282	133	82	
45-00	46	48	99	273	717	778	753	732	993	990	893	1057	716	842	827	819	843	644	533	459	366	251	101	66	
HOUR																									
TOT	226	185	277	838	2343	3255	2948	3188	3209	4044	3554	4306	2976	3233	3362	3217	3307	2856	2238	1943	1569	1180	617	371	55242

AM PEAK HOUR 1100 TO 1200 VOLUME 4306 — AM TOTAL 28373
PM PEAK HOUR 0115 TO 0215 VOLUME 3402 — PM TOTAL 26869

04/07/06 FRIDAY — AM HOURS | PM HOURS

	12 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	12 1	1 2	2 3	3 4	4 5	5 6	6 7	7 8	8 9	9 10	10 11	11 12	DAILY TOTAL
00-15	68	48	47	100	296	648	668	750	831	997															
15-30	72	51	47	133	434	697	763	763	779	1169															
30-45	46	45	59	219	615	742	718	927	1018	1239															
45-00	66	49	70	215	637	718	768	905	976																
HOUR																									
TOT	252	193	223	667	1982	2805	2917	3345	3604	3405															19393

AM PEAK HOUR 0845 TO 0945 VOLUME 4381 — AM TOTAL 19393
PM PEAK HOUR 0000 TO 0000 VOLUME 0 — PM TOTAL 0

04/03/06 THRU 04/07/06
TOTAL HOURS FOR COUNT 92
1 DAY WB
3 DAYS EB 51623 FACTOR GROUP GR-02 48009 FACTOR GROUP GR-C2 43755
AVG WEEKDAY VOL 59456 X SEASONAL ADJ. FACTOR 0.9300 = 55294 X AXLE CORR FACTOR 0.9114 = ESTIMATED AVG DAILY TRAFFIC 50395
13.68
PEAK HOUR PERCENTAGES: K = 11.88 D = 92.03
PEAK HOUR LOCATION : VOLUME = 7064 DATE: 04/04/06 TIME: 04:45 AM

NOTE: ONE DAY WB

Volume Report Summary Data

The page of the report that provides the study's last day of data for a given Direction of Traffic also, at the bottom, provides summary data for that direction. The fields composing this section of the report are discussed below.

Duration

At the top left of the summary section, the beginning and end dates of the count used to produce the summary data are shown. Below this, the field Total Hours For Count provides the number of hours that elapsed during the count. If multiple counts were used to produce the summary data, the fields will reflect the one with the shortest duration.

Days

Below the duration information, the number of 24-hour periods (not the number of days of the week) used in calculating the average weekday volume (see below) is shown. This will usually reflect less time than the number of hours elapsed during the study. One reason for this is that while short-duration mechanical traffic counts conducted by TDGMO are usually begun on Monday and ended on Friday, the average weekday volumes are intended to reflect average Tuesday through Thursday traffic flows (and calculated accordingly). Another reason is that equipment problems or atypical traffic may result in the processing staff determining that the impacted data is not valid for use, and subsequently excluding it from the calculation of average weekday volume.

Avg Weekday Vol

The average weekday volume field provides the estimated average daily Tuesday through Thursday two-axle equivalent volume calculated for the given direction of travel. As noted above, equipment problems or atypical traffic may result in this figure being computed from other than 72 hours of Tuesday through Thursday data.[2] In doing so, data collected in the PM hours of Monday or the AM hours of Friday may be used in

[2] If the entirety of the data collected is deemed to reflect atypical traffic for the study location, the data will nonetheless be used to calculate an average weekday volume. However, in such a situation, the fact that data reflecting atypical traffic was used will be noted on the last page of the study.

DOT-RNB515A-B

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
T R I P S S Y S T E M
15 MINUTE TRAFFIC COUNT SUMMARY

DATE 05/08/06
TIME 07:56:09
PAGE 6

SR 169 MP 025.12 OFF SYSTEM ID. LEG 1 DIRECTION OF TRAFFIC BOTH WAYS LANE ALL OF

COUNT IDENTIFIER HPMS COUNTER NUMBER 146467 DESCRIPTION: ON SR 169 E/O ENT/EXIT TO CITY PARK/BUSINESS

04/06/06 THURSDAY

	AM HOURS										PM HOURS													
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	DAILY
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
00-15	65	38	30	112	361	822	728	838	793	956	957	910	710	734	903	795	817	769	627	467	385	330	205	131	
15-30	55	49	64	183	549	817	764	876	689	1092	931	1221	753	832	830	791	849	757	555	508	403	317	178	92	
30-45	60	50	84	270	716	838	703	742	734	1006	773	1118	797	825	802	812	798	686	523	509	415	282	133	82	
45-00	46	48	99	273	717	778	753	732	993	990	893	1057	716	842	827	819	843	644	533	459	366	251	101	66	
HOUR																									
TOT	226	185	277	838	2343	3255	2948	3188	3209	4044	3554	4306	2976	3233	3362	3217	3307	2856	2238	1943	1569	1180	617	371	55242

AM PEAK HOUR 1100 TO 1200 VOLUME 4306 AM TOTAL 28373
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04/07/06 FRIDAY

	AM HOURS										PM HOURS													
	12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	DAILY
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12	TOTAL
00-15	68	48	47	100	296	648	668	750	831	997															
15-30	72	51	47	133	434	697	763	763	779	1169															
30-45	46	45	59	219	615	742	718	927	1018	1239															
45-00	66	49	70	215	637	718	768	905	976																
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TOT	252	193	223	667	1982	2805	2917	3345	3604	3405															19393

AM PEAK HOUR 0845 TO 0945 VOLUME 4381 AM TOTAL 19393
PM PEAK HOUR 0000 TO 0000 VOLUME 0 PM TOTAL 0

04/03/06 THRU 04/07/06
TOTAL HOURS FOR COUNT 92
1 DAY WB
3 DAYS EB 51623 FACTOR GROUP GR-02 48009 FACTOR GROUP GR-C2 43755
AVG WEEKDAY VOL 59456 X SEASONAL ADJ. FACTOR 0.9300 = 55294 X AXLE CORR FACTOR 0.9114 = ESTIMATED AVG DAILY TRAFFIC 50395
13.68
PEAK HOUR PERCENTAGES: K = 11.88 D = 92.03
PEAK HOUR LOCATION : VOLUME = 7064 DATE: 04/04/06 TIME: 04:45 AM

NOTE: ONE DAY WB

place of missing or invalid traffic volume data for the same hours on Tuesday, Wednesday or Thursday.

Seasonal Adj. Factor and Axle Corr Factor

To the right of the average weekday volume are numeric seasonal adjustment and axle correction factors. The two-axle equivalent average weekday volume is multiplied by these figures in order to compensate for (a) day of week and month of year traffic fluctuation and (b) the occurrence of vehicles in the traffic stream with more than two axles. This produces an estimated annual average daily traffic volume (see below) for the given direction of travel.

These factors tend to produce inaccurate estimates of annual average daily traffic when multiplied by average weekday volumes reflecting atypical traffic. This is the reason data reflecting atypical traffic is precluded from use if possible when calculating the study's average weekday volume.

See the Short Count Factoring appendix for detailed information on WSDOT's temporal and axle-correction factoring of its short-duration traffic count data.

Factor Group

Above each factor is a Factor Group field that contains a code indicating the data-source from which the factor was derived. See the Short Count Factoring appendix for more information on these codes.

Estimated Avg Daily Traffic

This field contains the estimated annual average daily traffic volume (in terms of vehicles, not two-axle equivalents) for the given study location and direction of travel. Note however that the estimate is produced using the most recent year's factors available at the time of count processing. If these factors are from a year prior to when the count was performed, which is usually the case, the estimate will be recalculated in WSDOT's database when factors from the year in which count was conducted are available. While the updated estimate is used in WSDOT publications such as the Annual Traffic Report, no update is made to the original study.

Peak Hour Information

The final page of a volume report also provides the volume of the highest 60-minute period of valid data that occurred during the study between noon on Monday and noon on Friday ("7064" in the example). To the right of this are the date this period occurred on and the time it began ("04/04/06" and "04:45 AM" in the example). Above these are the K and D factors. The K factor is the peak hour volume represented as a percentage of the average weekday volume. The D factor is the volume of the peak hour's highest volume direction represented as a percentage of total peak hour volume.

Handwritten Changes and Notes

If the count processing staff deem a portion of the detail data to be inaccurate or otherwise invalid, they will if possible manually recalculate the summary data. In doing so, they will exclude the invalid data from the calculation. Alternately, they will sometimes recalculate the summary data from more hours than were used by the mainframe program that produced the report. This occurs when the study reflects an extremely low volume location, and the program inaccurately determines that hours with no traffic reflect problems with the count equipment.

The processing staff will write the recomputed summary data above the figures produced by the program. If, in recalculating the data, the processing staff use a different number of 24-hour periods than were used by the program, the number of periods they used will be written above the Days field. In the example, 24 hours of westbound data and 72 hours of eastbound data were used.

At the bottom of the final page of a volume report, the processing staff will write notes regarding the validity of the detail data used in calculating the summary data on that page.[3] An overview of these notes, which are relatively formalized but abbreviated, is provided in the Standard Count Processing Notes appendix of this document.

[3] In the rare instance that a study is intended to reflect two directions of travel, but all data for one direction (not both) is deemed invalid, these notes will be placed on the page of the report containing summary data for the valid direction.

The Classification Report

Each classification study includes a report containing the vehicle volume data collected, as well as summary statistics for the study. The following pages explain the fields contained in this report. In doing so, the header, detail data and summary data sections of the report are discussed in turn. Following the page on which each is first addressed, an example is provided.

Classification Report Header Information

The topmost three lines of each page of the report provide, from left to right, a WSDOT mainframe report number (i.e., DOT-RNB505A-B), a report description, the date and time the report was generated by the count processing staff, and a page number. The following two lines replicate the information provided on the study's field sheet(s), with the following exceptions.

SR

This field contains both the SR and RRT/RRQ information from the field sheet(s).

Direction of Traffic

This field indicates the direction of travel the data on the page reflects. Because multiple counts may be combined to produce data representing both directions of travel, the study may not have a field sheet with "BW" in the Direction field.

Lane

If this field contains "Lane # of #", with single-digit numbers in the place of the pound signs, then the data on the page reflects the checked Lane Number box with the same "Lane # of #" note written by it on the field sheet for the given counter. Alternately, the data on the page reflects all lanes of travel for the given direction when the field contains either "Lane All Of" or "Lane 12 of 2", "Lane 123 of 3", et cetera.

DOT-RNB505A-B STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION DATE 05/24/06
T R I P S S Y S T E M TIME 11:32:53
HOURLY TRAFFIC CLASSIFICATION SUMMARY PAGE 75

SR 092 MP 006.02 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC BOTH WAYS LANE ALL OF

COUNT IDENTIFIER HPMS COUNTER NUMBER 188691 DESCRIPTION: ON SR 92 E/O 84TH ST NE

05-05-06

FRIDAY AM HOURS	CARS PICKUPS	SINGLE UNITS BUS	MED	HVY	4+	SINGLE UNIT %	DOUBLE UNITS 4-	5	6+	DOUBLE UNIT %	TRAINS 5-	6	7+	TRAIN %	TRUCK %	CLASS UNKNOWN	TOTAL VEHICLES
12 - 1	83		5			5.7									5.7		88
1 - 2	67		2			2.9									2.9		69
2 - 3	56		5			7.9	1			1.6			1	1.6	11.1		63
3 - 4	83	2	7	4		13.5									13.5		96
4 - 5	284	3	18	3		7.7	1			.3	1		1	.6	8.7	1	312
5 - 6	514	5	59	4	2	11.6	3	2	5	1.7	1	1	2	.7	13.9	5	603
6 - 7	764	4	58	15	5	8.8	3	13	61	8.3			9	1.0	18.0	1	933
7 - 8	770	4	67	9	6	8.8	6	10	72	9.0	1	3	15	2.0	19.8	10	973
8 - 9																	
9 - 10																	
10 - 11																	
11 - 12																	
PM HOURS																	
12 - 1																	
1 - 2																	
2 - 3																	
3 - 4																	
4 - 5																	
5 - 6																	
6 - 7																	
7 - 8																	
8 - 9																	
9 - 10																	
10 - 11																	
11 - 12																	
AM TOTAL	2621	18	221	35	13	9.1	14	25	138	5.6	3	4	28	1.1	15.9	17	3137
PM TOTAL																	
DAY TOTAL	2621	18	221	35	13	9.1	14	25	138	5.6	3	4	28	1.1	15.9	17	3137
															2-AXLE EQUIVALENT		3578

05-01-06 THRU 05-05-06

AVERAGE WEEKDAY CLASSIFICATION VOLUMES

	CARS PICKUPS	SINGLE UNITS BUS	MED	HVY	4+	SINGLE UNIT %	DOUBLE UNITS 4-	5	6+	DOUBLE UNIT %	TRAINS 5-	6	7+	TRAIN %	TRUCK %	CLASS UNKNOWN	TOTAL VEHICLES
AVG WEEKDAY VOLUME	13692	66	986	187	73	8.2	51	104	625	4.9	8	13	135	1.0	14.0	75	16015
														AWD 2-AXLE EQUIVALENT			18014

TOTAL HOURS FOR COUNT 89
3 DAYS FACTOR GROUP GR-02
AVG WEEKDAY VOL 16015 X SEASONAL ADJ. FACTOR 0.9100 = ESTIMATED AVG DAILY TRAFFIC 14574

0.8890

PEAK HOUR PERCENTAGES: K = 8.12 D = 62.64 T = 9.99
PEAK HOUR LOCATION : VOLUME = 1301 DATE: 05/01/06 TIME: 04:00 PM

Counter Number

If a single counter was used to collect the data provided on the page, then this field contains its Counter Number. However, if data from multiple counters were summed in order to produce the data on the page, then this field only contains the number from one of those counters

Classification Report Detail Data

For each hour of the study, the total number of vehicles recorded for the given Direction of Traffic, Lane and vehicle category is provided. The twelve vehicle categories employed are labeled in the report as Cars/Pickups, Bus, Med, Hvy, 4+, 4-, 5, 6+, 5-, 6, 7+ and Class Unknown. Each is discussed in detail in the Vehicle Classification appendix of this report.

The ten bus and large truck categories are also rolled in to three broader categories (i.e., Single Units, Double Units, and Trains) and the percentage of total vehicle volume that each of the three represents during the given hour is provided. Also provided, in the Truck % column, is the percentage of total volume that all three categories combined represent during the given hour.

For each column, AM, PM, and daily summaries are provided. Below these on the right is the estimated two-axle equivalent volume for the day, which is primarily reported for internal purposes.

If the data from a portion of the day are determined by the processing staff to be invalid, they will place brackets around the hours of invalid data and write a note describing the issue or indicating its cause. If the data from an entire day are invalid, a note is placed next to the daily total volume.

DOT-RNB505A-B

STATE OF WASHINGTON - DEPARTMENT OF TRANSPORTATION
T R I P S S Y S T E M
HOURLY TRAFFIC CLASSIFICATION SUMMARY

DATE 05/24/06
TIME 11:32:53
PAGE 75

SR 092 MP 006.02 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC BOTH WAYS LANE ALL OF

COUNT IDENTIFIER HPMS COUNTER NUMBER 188691 DESCRIPTION: ON SR 92 E/O 84TH ST NE

05-05-06

FRIDAY AM HOURS	CARS PICKUPS	SINGLE UNITS BUS	MED	HVY	4+	SINGLE UNIT %	DOUBLE UNITS 4-	5	6+	DOUBLE UNIT %	TRAINS 5-	6	7+	TRAIN %	TRUCK %	CLASS UNKNOWN	TOTAL VEHICLES
12 - 1	83		5			5.7									5.7		88
1 - 2	67		2			2.9									2.9		69
2 - 3	56		5			7.9	1			1.6			1	1.6	11.1		63
3 - 4	83	2	7	4		13.5									13.5		96
4 - 5	284	3	18	3		7.7	1			.3	1		1	.6	8.7	1	312
5 - 6	514	5	59	4	2	11.6	3	2	5	1.7	1	1	2	.7	13.9	5	603
6 - 7	764	4	58	15	5	8.8	3	13	61	8.3			9	1.0	18.0	1	933
7 - 8	770	4	67	9	6	8.8	6	10	72	9.0	1	3	15	2.0	19.8	10	973
8 - 9																	
9 - 10																	
10 - 11																	
11 - 12																	
PM HOURS																	
12 - 1																	
1 - 2																	
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PM TOTAL																	
DAY TOTAL	2621	18	221	35	13	9.1	14	25	138	5.6	3	4	28	1.1	15.9	17	3137
															2-AXLE EQUIVALENT		3578

05-01-06 THRU 05-05-06

AVERAGE WEEKDAY CLASSIFICATION VOLUMES

	CARS PICKUPS	SINGLE UNITS BUS	MED	HVY	4+	SINGLE UNIT %	DOUBLE UNITS 4-	5	6+	DOUBLE UNIT %	TRAINS 5-	6	7+	TRAIN %	TRUCK %	CLASS UNKNOWN	TOTAL VEHICLES
AVG WEEKDAY VOLUME	13692	66	986	187	73	8.2	51	104	625	4.9	8	13	135	1.0	14.0	75	16015
															AWD 2-AXLE EQUIVALENT		18014

TOTAL HOURS FOR COUNT 89
3 DAYS FACTOR GROUP GR-02
AVG WEEKDAY VOL 16015 X SEASONAL ADJ. FACTOR 0.9100 = ESTIMATED AVG DAILY TRAFFIC 14574

0.8890

PEAK HOUR PERCENTAGES: K = 8.12 D = 62.64 T = 9.99
PEAK HOUR LOCATION : VOLUME = 1301 DATE: 05/01/06 TIME: 04:00 PM

Classification Report Summary Data

The page of the report that provides the study's last day of data for a given Direction of Traffic also, at the bottom, provides summary data for that direction. The fields composing this section of the report are discussed below.

Avg Weekday Volume

The topmost row of data contained in the summary data section of the report provides the estimated average daily Tuesday through Thursday volume calculated for each vehicle category for the given direction of travel. Average Single Unit, Double Unit and Train volumes are also provided as percentages of total vehicle volume, as well the percentage of total vehicle volume represented by all three categories combined (under the Truck % heading).

AWD 2-Axle Equivalent

This field contains the estimated average daily Tuesday through Thursday two-axle equivalent volume, which is primarily reported for internal purposes.

Duration

Below the average weekday volumes, on the left side of the page, the beginning and ending dates of the count used to produce the summary data are shown. Below this, the field Total Hours For Count provides the number of hours that elapsed during the count. If multiple counts were used to produce the summary data, the fields will reflect the one with the shortest duration.

Days

Below the duration information, the number of 24-hour periods (not the number of days of the week) used in calculating the average weekday volumes is shown. This will usually reflect less time than the number of hours elapsed during the study. One reason for this is that while short-duration mechanical traffic counts conducted by TDGMO are usually begun on Monday and ended on Friday, the average weekday volumes are intended to reflect average Tuesday through Thursday traffic flows (and are calculated accordingly. Another reason is that equipment problems or atypical traffic may result in

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T R I P S S Y S T E M
HOURLY TRAFFIC CLASSIFICATION SUMMARY

DATE 05/24/06
TIME 11:32:53
PAGE 75

SR 092 MP 006.02 OFF SYSTEM ID. LEG 2 DIRECTION OF TRAFFIC BOTH WAYS LANE ALL OF

COUNT IDENTIFIER HPMS COUNTER NUMBER 188691 DESCRIPTION: ON SR 92 E/O 84TH ST NE

05-05-06

FRIDAY AM HOURS	CARS PICKUPS	SINGLE UNITS BUS	MED	HVY	4+	SINGLE UNIT %	DOUBLE UNITS 4-	5	6+	DOUBLE UNIT %	TRAINS 5-	6	7+	TRAIN %	TRUCK %	CLASS UNKNOWN	TOTAL VEHICLES
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DAY TOTAL	2621	18	221	35	13	9.1	14	25	138	5.6	3	4	28	1.1	15.9	17	3137
															2-AXLE EQUIVALENT		3578

05-01-06 THRU 05-05-06

AVERAGE WEEKDAY CLASSIFICATION VOLUMES ********** ********** **********

	CARS PICKUPS	SINGLE UNITS BUS	MED	HVY	4+	SINGLE UNIT %	DOUBLE UNITS 4-	5	6+	DOUBLE UNIT %	TRAINS 5-	6	7+	TRAIN %	TRUCK %	CLASS UNKNOWN	TOTAL VEHICLES
AVG WEEKDAY VOLUME	13692	66	986	187	73	8.2	51	104	625	4.9	8	13	135	1.0	14.0	75	16015
															AWD 2-AXLE EQUIVALENT		18014

TOTAL HOURS FOR COUNT 89
3 DAYS FACTOR GROUP GR-02
AVG WEEKDAY VOL 16015 X SEASONAL ADJ. FACTOR 0.9100 = ESTIMATED AVG DAILY TRAFFIC 14574

0.8890

PEAK HOUR PERCENTAGES: K = 8.12 D = 62.64 T = 9.99
PEAK HOUR LOCATION : VOLUME = 1301 DATE: 05/01/06 TIME: 04:00 PM

the processing staff determining that the impacted data is not valid for use, and subsequently excluding it from the calculation of average weekday volume.

Avg Weekday Vol

This field simply reproduces the Total Vehicles average weekday volume provided above it on the right side of the page.

Seasonal Adj. Factor

To the right of the Avg Weekday Vol field is a numeric seasonal adjustment factor. The average weekday volume is multiplied by this figure in order to compensate for day of week and month of year traffic fluctuation. This produces an estimated annual average daily traffic volume (see below) for the given direction of travel.

Adjustment factors tend to produce inaccurate estimates of annual average daily traffic when multiplied by average weekday volumes reflecting atypical traffic. This is the reason data reflecting atypical traffic is precluded from use if possible when calculating the study's average weekday volume.

See the Short Count Factoring appendix for detailed information on WSDOT's temporal factoring of its short-duration traffic count data.

Factor Group

Above the factor is the Factor Group field. It contains a code indicating the data-source the factor was derived from. See the Short Count Factoring appendix for more information on these codes.

Estimated Avg Daily Traffic

This field contains the estimated annual average daily traffic volume for the given study location and direction of travel. Note however that the estimate is produced using a factor from the most recent year for which they are available at the time of count processing. If the factor is from a year prior to when the count was performed, which is usually the case, the estimate will be recalculated in WSDOT's database when factors from the year the count was conducted in are available. While the updated estimate is used in WSDOT publications such as the Annual Traffic Report, no update is made to the original study.

Peak Hour Information

The final page of a classification report also provides the volume of the highest 60-minute period of valid data that occurred during the study between noon on Monday and noon on Friday ("1301" in the example). To the right of this are the date this period occurred on and the time it began ("05/01/06" and "04:00 PM" in the example). Above these are the K, D and T factors. The K factor is the peak hour volume represented as a percentage of the average weekday volume. The D factor is the volume of the peak hour's highest volume direction represented as a percentage of total peak hour volume. The T factor is the combined peak hour Single Unit, Double Unit and Train volume represented as a percentage of total vehicle peak hour volume.

Handwritten Notes

If the count processing staff deem a portion of the detail data to be inaccurate or otherwise invalid, they will if possible manually recalculate the summary data. In doing so, they will exclude the invalid data from the calculation. Alternately, they will sometimes recalculate the summary data from more hours than were used by the mainframe program that produced the report. This occurs when the study reflects an extremely low volume location, and the program inaccurately determines that hours with no traffic reflect problems with the count equipment.

The processing staff will write the recomputed summary data above the figures produced by the program. If in recalculating the data, the processing staff use a different number of 24-hour periods than were used by the program, the number of periods they used will be written above the Days field. In the example, 24 hours of westbound data and 72 hours of eastbound data were used.

At the bottom of the final page of a volume report, the processing staff will write notes regarding the validity of the detail data used in calculating the summary data on that page.[4] An overview of these notes, which are relatively formalized but abbreviated, is provided in the Standard Count Processing Notes appendix of this document.

[4] In the rare instance that a study is intended to reflect two directions of travel, but all data for one direction (not both) is deemed invalid, these notes will be placed on the page of the report containing summary data for the valid direction.

Finally, at the bottom right of the final page, the processing staff will sometimes write the quotient produced by dividing the average weekday vehicle volume by the estimated average weekday two-axle equivalent volume ("0.8890" in the example). However, this figure is generally for internal purposes only.

Appendices

WSDOT's Linear Referencing System

The Washington State Department of Transportation's Linear Referencing System (LRS) is a one-dimensional referencing system used to uniquely identify each state route and to locate features along a route by their distance in miles from its beginning. The following is an overview of the primary aspects of this LRS.

SRID

Each state route in Washington State is identified using a unique alpha-numeric State Route ID (SRID). This, in turn, is composed of a State Route number (SR), Related Route Type (RRT) code, and a Related Route Qualifier (RRQ).

SR and RRT

Each Interstate, U.S. Highway, and Washington State Highway is identified by a one to three digit State Route number (SR). Non-mainline portions of these (such as ramps) are also given a two character RRT code. RRT codes include:

Code	Route Type Description
AR	Alternate Route
CO	Couplet
RL	Reversible Lane(s)
SP	Spur
HI	Grade Separated HOV Lane(s) where traffic flows in the increasing direction of mainline mileposting
HD	Grade Separated HOV Lane(s) where traffic flows in the decreasing direction of mainline mileposting
FI	Frontage Road where traffic is adjacent to the increasing direction of mainline mileposting
FD	Frontage Road where traffic is adjacent to the decreasing direction of mainline mileposting
CI	Collector Distributor where traffic flows in the increasing direction of mainline mileposting

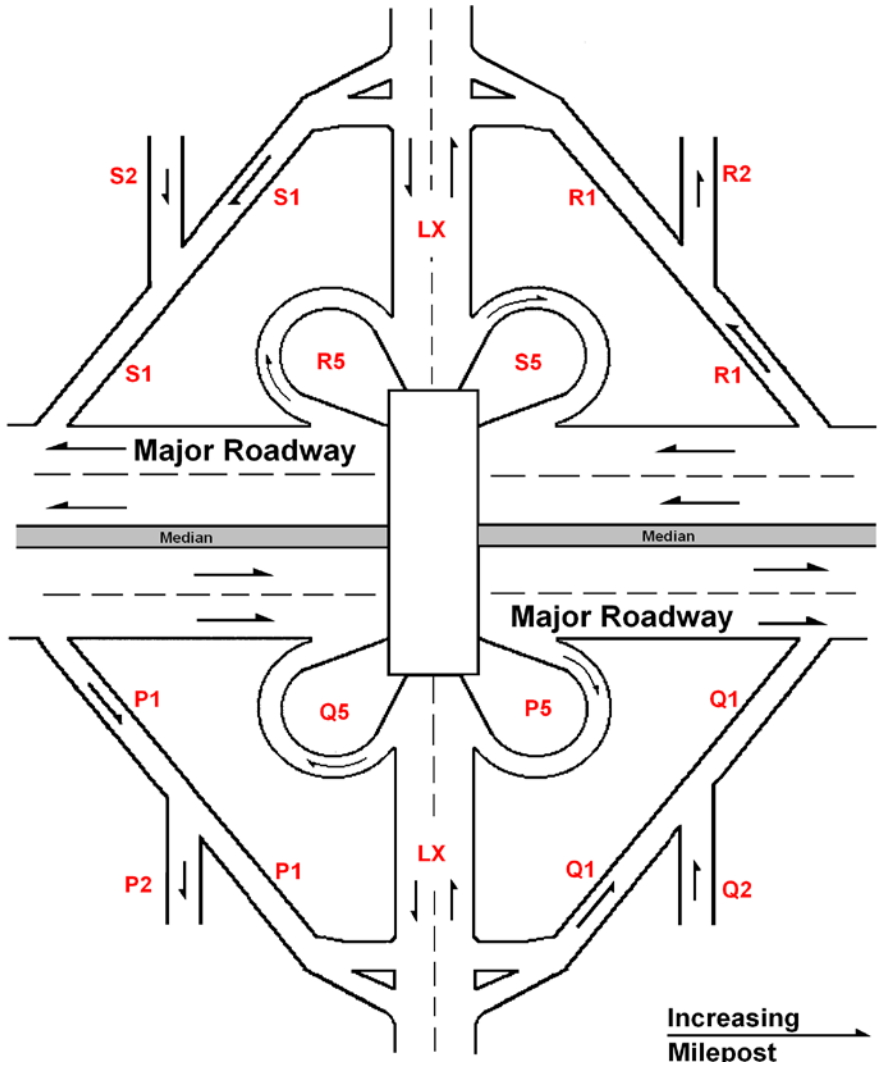
Code	Route Type Description
CD	Collector Distributor where traffic flows in the decreasing direction of mainline mileposting
LX	Crossroad within an interchange if the crossroad is not part of a mainline state route

Ramp RRTs are:

Code	Route Type Description
P1	Standard off-ramp from the side of the route carrying traffic in the increasing direction of mileposting
P2-P4	Consecutive numbering of off-ramps from the P1
P5	Cloverleaf off-ramp from the side of the route carrying traffic in the increasing direction of mileposting
P6-P9	Consecutive numbering of off-ramps from the P5
Q1	Standard on-ramp to the side of the route carrying traffic in the increasing direction of mileposting
Q2-Q4	Consecutive numbering of on-ramps to the Q1
Q5	Cloverleaf on-ramp to the side of the route carrying traffic in the increasing direction of mileposting
Q6-Q9	Consecutive numbering of on-ramps to the Q5
R1	Standard off-ramp from the side of the route carrying traffic in the decreasing direction of mileposting
R2-R4	Consecutive numbering of off-ramps from the R1
R5	Cloverleaf off-ramp from the side of the route carrying traffic in the decreasing direction of mileposting
R6-R9	Consecutive numbering of off-ramps from the R5
S1	Standard on-ramp to the side of the route carrying traffic in the decreasing direction of mileposting
S2-S4	Consecutive numbering of on-ramps to the S1
S5	Cloverleaf on-ramp to the side of the route carrying traffic in the decreasing direction of mileposting
S6-S9	Consecutive numbering of on-ramps to the S5
U1	Weigh station ramp to and from the side of the route carrying traffic in the increasing direction of mileposting

Code	Route Type Description
U2-U9	Consecutive numbering of ramps to and from the U1
W1	Weigh station ramp to and from the side of the route carrying traffic in the decreasing direction of mileposting
W2-W9	Consecutive numbering of ramps to and from the W1
X1	Safety Rest Area ramp to and from the side of the route carrying traffic in the increasing direction of mileposting
X2-X9	Consecutive numbering of ramps to and from the X1
Y1	Safety Rest Area ramp to and from the side of the route carrying traffic in the decreasing direction of mileposting
Y2-Y9	Consecutive numbering of ramps to and from the Y1

Examples of some of these are shown below:



RRQ

Because multiple distinct roadways can often be defined by the same SR and RRT, an RRQ of up to six characters is used to further define portions of the state route system other than mainlines and alternate routes. In the case of couplets, spurs and reversible lanes, the RRQ is descriptive of the route (such as the city it is in or its local street name). In the case of collector distributors, frontage roads, grade separated HOV lanes and ramps that meet the mainline, the RRQ is the state route milepost (discussed below) of the point where the route meets the mainline (except that the decimal in the SRMP is dropped in creating the RRQ).[5, 6] For a ramp that does not meet the mainline, but instead meets another ramp, the RRQ of the ramp it meets is used. For other ramps and frontage roads, the RRQ is the state route milepost (without the decimal) of the point on the mainline nearest to where the ramp or frontage road begins (in the case of R ramps, P ramps and FIs) or ends (in the case of Q ramps, S ramps and FDs). For LXs, the RRQ is the state route milepost (without the decimal) of the point on the mainline where the LX crosses it.

ARM and SRMP

ARM

Within the system discussed above, each SRID is considered a route unto itself. Features of a route are coded in terms of their linear distance from the start of that route. These features include:

- physical features such as bridge seats, undercrossings and intersecting roads;
- jurisdictional boundaries such as city limits and county lines; and
- changes in the number of lanes, pavement type, et cetera.

The distances, to the nearest 100th of a mile, of these features from the beginning of the route are their Accumulate Route Mileage (ARM) values.

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[5] Although the term “mainline” is used in this sentence and those that follow, technically the RRQ of one of these types of routes is defined in terms of the state route milepost value of whatever major roadway it is associated with. This is usually a mainline, but can also be an alternate route, spur, couplet or reversible lane.

[6] Ramps associated with reversible lanes, couplets, spurs or alternate routes are distinct in that their RRQs contain an “R”, “C”, “S” or “A” (respectively) after the milepost-based numeric string.

SRMP

Because the distance from the beginning of the route is marked with milepost paddles, a roadway feature is often described not in terms of its ARM value, but in terms of the State Route Milepost (SRMP) value associated with that ARM. At route inception, a feature's ARM and SRMP (which is also maintained to the nearest 100th of a mile) are the same.[7] However, it would be too costly and confusing to the public to redo the paddles on a route every time construction changed the route's length. So, while ARM values are adjusted as needed to accurately reflect the current physical length of a highway, SRMP values are usually not.[8]

If the middle of a route is *shortened* through realignment or transfer of roadway to a local government, the resulting discontinuity in mileposting is reconciled through an equation at the end of the realignment or transfer. If the beginning or middle of a route is *lengthened* through realignment or jurisdictional transfer:

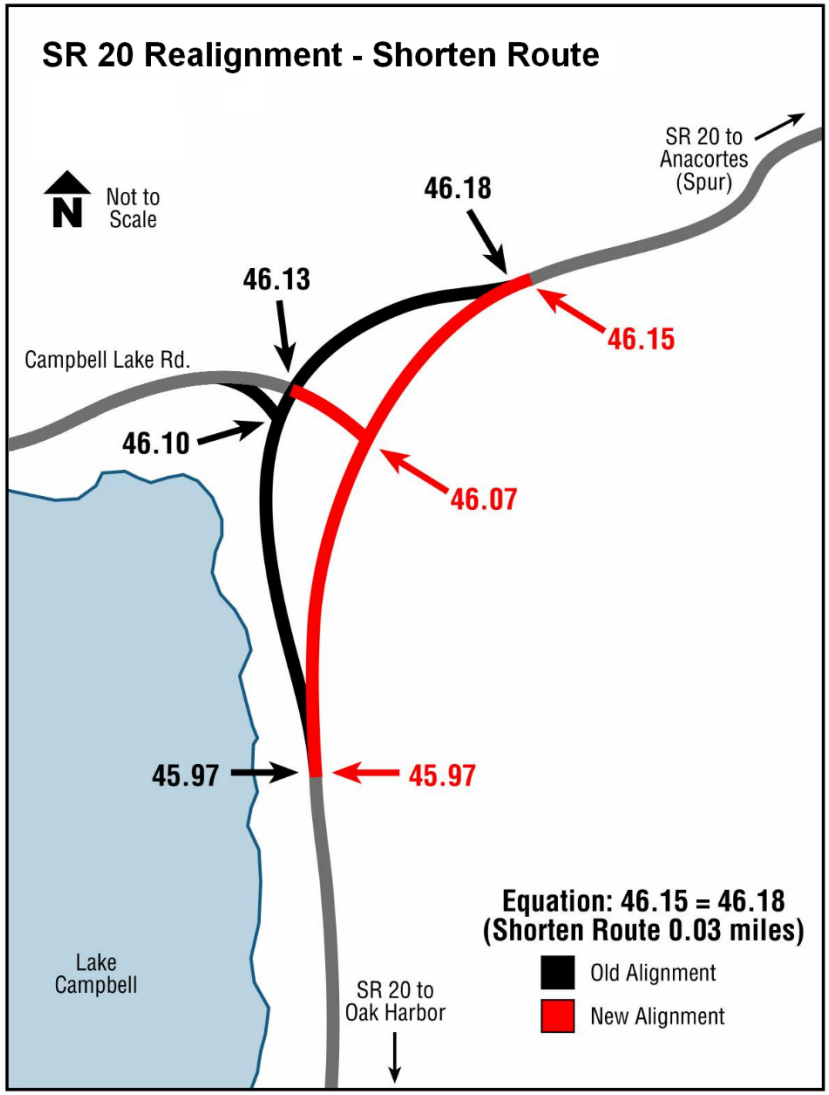
- SRMP values are provided for the new alignment sequentially from the SRMP where the realignment began;
- these SRMP values are given an Ahead/Back Indicator of "B" from the point at which they reach the SRMP value equal to that of the end of the realignment; and
- the resulting discontinuity in mileposting is reconciled through an equation at the end of the realignment or transfer.

Examples of a route shortening and lengthening are shown on the left and right of the next page respectively.

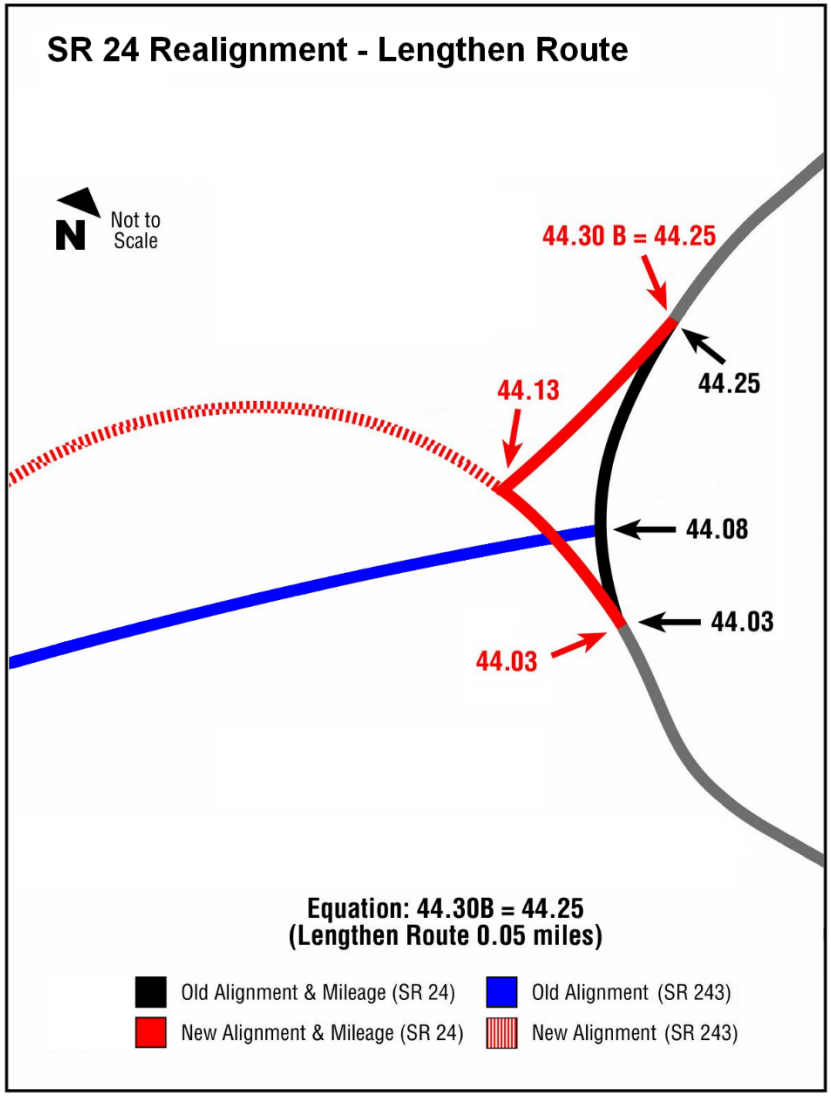
[7] Alternate routes, spurs, couplets and reversible lanes are an exception to this. The beginning of these routes are given an ARM of 0.00, but an SRMP equal to that of the point on the associated mainline where they intersect with it. I-205 is the sole mainline exception, having been mileposted continuously from Oregon through Washington.

[8] Features on ramps, frontage roads, collector distributors, LXs and grade separated HOV lanes have their SRMPs revised when the routes they are on change length. In extremely rare instances, this will occur on other types of routes as well.

Equation Example: SR 20 SRMP 46.15 = SRMP 46.18



Equation Example: SR 24 SRMP 44.30B = SRMP 44.25

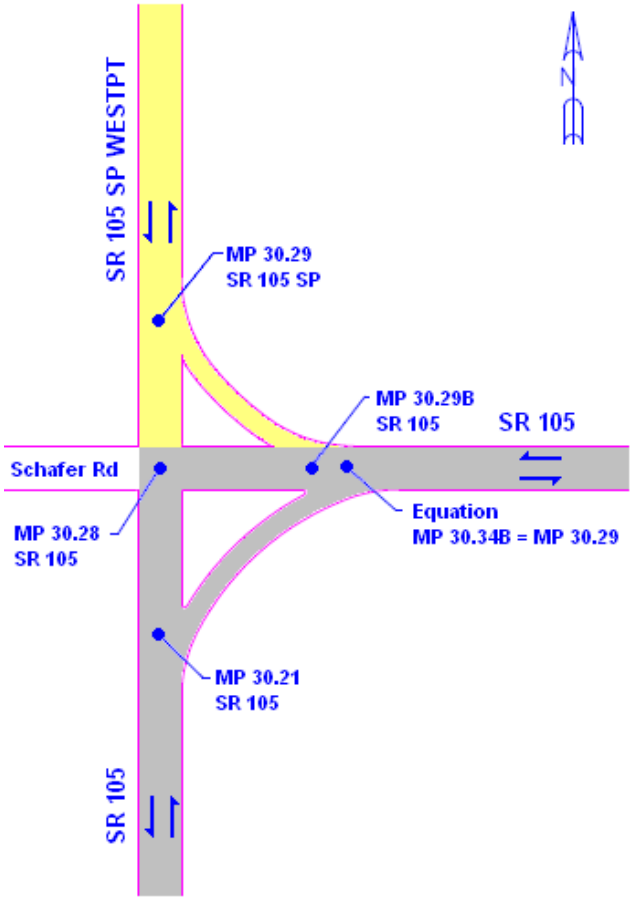


Example

Several aspects of WSDOT's LRS are exemplified in this illustration of a junction between SR 105 and one of its spurs.

One is route naming conventions. The SRID of the spur is derived from the SR number of the mainline it is associated with (i.e., 105), the RRT code used to identify spurs (i.e., SP), and a descriptive RRQ (in this case WESTPT because the spur is located in the City of Westport).

Another is feature mileposting. For example, the state route milepost at which SR 105 intersects with the spur is 30.28. Consistent with how all routes with an RRT of SP, AR, RL or CO are mileposted, the same SRMP (i.e., 30.28) is given to the beginning of the spur (even though its ARM is 0.00). A 100th of a mile north on the spur, the intersection with the y-connection from mainline SR 105 is given an SRMP of 30.29.



Finally, the illustration also shows an equation resulting from a historic lengthening of SR 105. Because of this historic lengthening, the SRMPs of features on SR 105 are given an Ahead/Back Indicator of "B" from the intersection with the y-connection to the spur (at 30.29B) through the intersection with the y-connection from itself (at 30.34B).

Additional Resources

Diagrams of all couplets and interchanges on the state highway system, including SRID labels for the roadways shown in each, are available through WSDOT's Interchange Web Viewer: http://www.wsdot.wa.gov/mapsdata/tools/InterchangeViewer/default.htm

Additional information on state highway realignments and SRMP equations is provided in the Washington State Highway Log:
http://www.wsdot.wa.gov/mapsdata/roadway/statehighwaylog.htm

Vehicle Classification

The short duration classification counts performed by TDGMO categorize vehicles within a modified version of the Federal Highway Administration (FHWA) 13-bin vehicle classification scheme. TDGMO's classification scheme mirrors that of FHWA, except that (a) vehicles falling in to the first three FHWA bins are placed in a single category and (b) an additional Class Unknown category is used to tally vehicles that the count equipment fails to classify. The FHWA scheme is below, with the heading used in the short duration classification count report for each bin shown in red.

1. ***Motorcycles*** (included in CARS PICKUPS category) - All two or three-wheeled motorized vehicles. Typical vehicles in this category have saddle type seats and are steered by handlebars rather than steering wheels. This category includes motorcycles, motor scooters, mopeds, motor-powered bicycles, and three-wheel motorcycles.

2. ***Passenger Cars*** (included in CARS PICKUPS category) - All sedans, coupes, and station wagons manufactured primarily for the purpose of carrying passengers and including those passenger cars pulling recreational or other light trailers.

3. ***Other Two-Axle, Four-Tire Single Unit Vehicles*** (included in CARS PICKUPS category) - All two-axle, four-tire, vehicles, other than passenger cars. Included in this classification are pickups, panels, vans, and other vehicles such as campers, motor homes, ambulances, hearses, carryalls, and minibuses. Other two-axle, four-tire single-unit vehicles pulling recreational or other light trailers are included in this classification.

4. ***Buses*** (Bus) - All vehicles manufactured as traditional passenger-carrying buses with two axles and six tires or three or more axles. This category includes only traditional buses (including school buses) functioning as passenger-carrying vehicles. Modified buses should be considered to be a truck and should be appropriately classified.

5. ***Two-Axle, Six-Tire, Single-Unit Trucks*** (MED) - All vehicles on a single frame including trucks, camping and recreational vehicles, motor homes, etc., with two axles and dual rear wheels.

6. ***Three-Axle Single-Unit Trucks*** (HVY) - All vehicles on a single frame including trucks, camping and recreational vehicles, motor homes, etc., with three axles.
7. ***Four or More Axle Single-Unit Trucks*** (4+) - All trucks on a single frame with four or more axles.

8. ***Four or Fewer Axle Single-Trailer Trucks*** (4-) - All vehicles with four or fewer axles consisting of two units, one of which is a tractor or straight truck power unit.

9. ***Five-Axle Single-Trailer Trucks*** (5) - All five-axle vehicles consisting of two units, one of which is a tractor or straight truck power unit.

10. ***Six or More Axle Single-Trailer Trucks*** (6+) - All vehicles with six or more axles consisting of two units, one of which is a tractor or straight truck power unit.

11. ***Five or fewer Axle Multi-Trailer Trucks*** (5-) - All vehicles with five or fewer axles consisting of three or more units, one of which is a tractor or straight truck power unit.

12. ***Six-Axle Multi-Trailer Trucks*** (6) - All six-axle vehicles consisting of three or more units, one of which is a tractor or straight truck power unit.

13. ***Seven or More Axle Multi-Trailer Trucks*** (7+) - All vehicles with seven or more axles consisting of three or more units, one of which is a tractor or straight truck power unit.

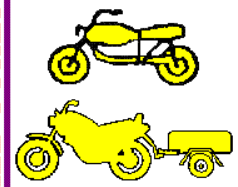
NOTE: In reporting information on trucks the following criteria is used:

A. Truck tractor units traveling without a trailer are considered single-unit trucks.
B. A truck tractor unit pulling other such units in a "saddle mount" configuration is considered one single-unit truck and is defined only by the axles on the pulling unit.
C. Vehicles are defined by the number of axles in contact with the road. Therefore, "floating" axles are counted only when in the down position.
D. The term "trailer" includes both semi- and full trailers.

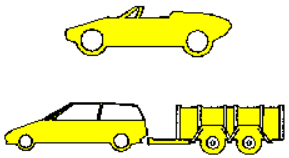
The short duration classification count reports also summarize these bins in to five broad categories. The first contains bins 1 through 3, and is labeled CARS PICKUPS on the report. The second contains bins 4 through 7, and is labeled SINGLE UNITS. The third contains bins 8 through 10, and is labeled DOUBLE UNITS. The fourth contains bins 11 through 13, and is labeled TRAINS (although labeled TRIPLE UNITS on the following page). The fifth contains unclassified vehicles, and is labeled CLASS UNKNOWN.

TRIPLE UNITS DOUBLE UNITS SINGLE UNITS ALL OTHER

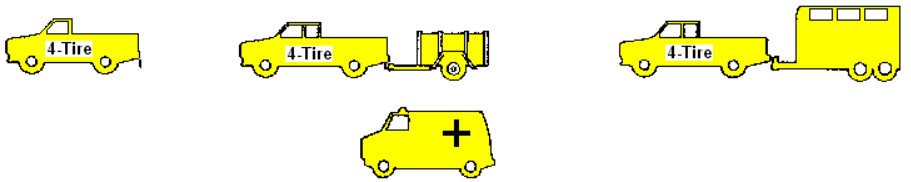
1 Motorcycles



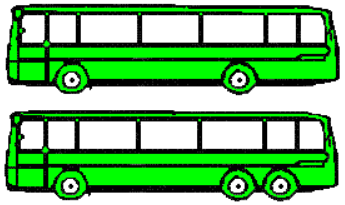
2 Passenger Cars



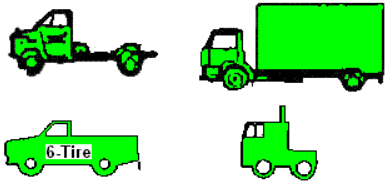
3 Two Axle, 4 Tire Single Units



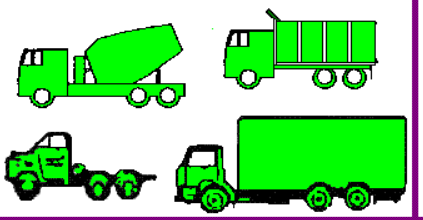
4 Buses



5 Two Axle, 6 Tire Units

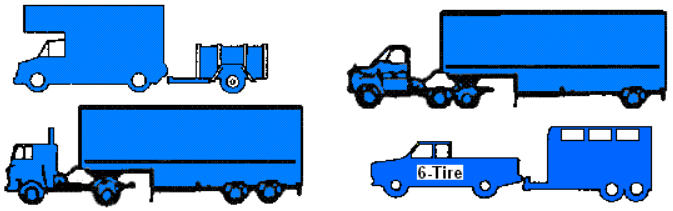


6 Three Axle Single Units

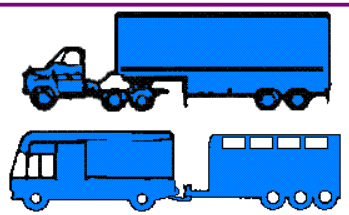


7 Four or More Axle Single Units

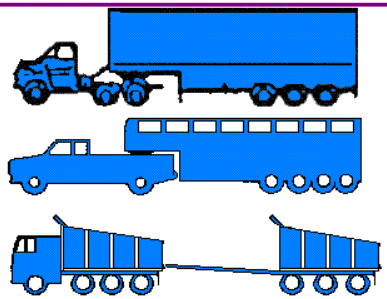
8 Four or Less Axle Single Trailers



9 Five Axle Single Trailers



10 Six or More Axle Single Trailers



11 Five or Less Axle Multi-Trailers

12 Six Axle Multi-Trailers

13 Seven or More Axle Multi-Trailers

Standard Count Processing Notes

If the short count processing staff determine that there is an issue with the validity of that portion of the study used to generate the average weekday traffic volume, then a note describing the issue is written on the last page of the study. The following is an overview of typical notes.

Atypical Traffic

If it is determined that the study is likely to not reflect traffic volumes or vehicle-class distributions typical for the area, then a note describing the cause of this is provided. Common notes are

1. CONSTRUCTION IN AREA or CONST IN AREA
2. WEEK OF HOLIDAY/EVENT (e.g., WEEK OF COUNTY FAIR)

COUNT HIGH and COUNT LOW are also used if traffic volumes are much higher or lower than would be expected from historic trends, but no reason for this can be determined. However, these notes may also reflect over- and under-counting by the equipment due to an undetermined cause.

Factors Hindering Accurate Counting

If it is determined that traffic characteristics are negatively impacting the traffic counter's accuracy in a specific way, a note describing the problem is provided. Typical notes indicating that the reported volumes are unrealistically low are

1. PARKING ON TUBE
2. ROLLOVERS or ROLLOVER TRAFFIC
3. SIMULTANEOUS PASSING

Typical notes indicating that the reported volumes are unrealistically high are

1. ANGLE CROSSING or ANGLE XING
2. DOUBLE COUNTING

If tailgating is negatively impacting the accuracy with which the counter classifies vehicles, the note TAILGATING is used.

Poor Classification of Vehicles

If the accuracy with which vehicles were classified is questionable, then a note such as CLASS QUESTIONABLE, CLASSIFICATION ?ABLE or BIN DISTRIBUTION ?ABLE is used.

If the processing staff are more confident that the classification of vehicles was poor, the note CLASS BAD is sometimes used. However, more descriptive notes are the norm. These include general statements, such as

1. TRUCK % HIGH or TRUCK PERCENTAGE HI
2. TRUCK % LOW or TRUCK PERCENTAGE LOW

as well as notes describing which specific vehicle categories are inaccurate. These include notes on specific vehicle types, such as

1. BUSES HIGH
2. BUSES LOW

as well as notes on one of the three broad truck and bus categories, such as

1. SINGLES HIGH
2. SINGLES LOW

Importantly however, a note indicating that one or more categories of vehicle are high or low can be used to document atypical traffic composition as well as misclassification. The

only exception to this is the note CLASS UNKNOWN HIGH, which always signifies that classification data is poor.

Validity of Traffic Statistics

Two notes are used that relate only to the accuracy of the traffic statistics calculated for the study (i.e., average daily traffic volumes, truck percentages, and peak hour percentages).

ONE DAY indicates that the average weekday volume is based off of only 24 hours of data. This means that the average weekday volume, peak hour percentages and truck percentages are likely to not accurately reflect the Tuesday through Thursday period they are intended to. This also means that the estimated annual average daily traffic figure is likely to have a higher degree of error than is normal. The negative impact of having only 24 hours of data is usually stronger in rural areas than urban.

FACTORS QUESTIONABLE indicates that the seasonal-adjustment and axle-correction factors used to estimate the annual average daily traffic figure may not accurately reflect traffic characteristics at the count location. When this is the case, the estimated annual average daily traffic volume may have an abnormally high degree of error.

Manual Count Notes

Manual tallies of visually observed vehicles are often performed for four or more hours at some point during a mechanical count. If the volumes captured by the manual count are significantly different from the volumes captured by the mechanical count over the same period, the note MC DOES NOT REFLECT MECH is used. The discrepancy may result from error in the mechanical and/or manual count. More often however, the discrepancy is primarily due to the counts being performed at slightly different locations, and these locations having a minor traffic generator such as a business entrance or exit between them.

If the manual and mechanical counts are for a ramp, LX, collector-distributor or frontage road, or if they are for the Leg L, L2, R or R2 of an intersection, the percentage of the manual count's highest volume hour represented by trucks and buses is written at the top of the mechanical count study's field sheet. If the highest volume hour was prior to noon, the note T FROM AM MANUAL is used.

Miscellaneous Notes

ERRATIC DAILY TOTALS indicates that the total daily traffic volumes do not reflect a typical day-to-day pattern. This can be because (a) the count was inaccurate, (b) the week counted was atypical for the location, or (c) the typical daily traffic pattern at the counted location is simply atypical in relation to the majority of other state highway locations (and the processing staff do not have enough historic data to determine this).

EQUIPMENT MALFUNCTION indicates that there was a problem with the count equipment, and that the problem was significant enough to result in less than 24 hours of data from the study being useable.

QUESTIONABLE LOCATION indicates that it is questionable whether the study was actually performed at the location to which it is coded.

QUESTIONABLE COUNT is a generic note indicating that something about the study's locational coding or data appears suspect, but a specific issue cannot be determined.

NO DIRECTIONAL DATA is only used for traffic studies done at a location with two directions of travel. It indicates that only data reflecting both directions of travel combined were captured.

DIRECTIONAL SPLIT QUESTIONABLE is also only used for traffic studies done at a location with two directions of travel. It indicates that while the data reflecting both directions of travel combined may be accurate, the directional data (and therefore the peak hour directional split percentage) is suspect.

SET TO DOUBLE COUNT is only used for volume, not classification, studies. The note indicates the counter was intentionally set to double-count each axle pass. This overcounting will be reflected in the 15-minute volumes reported in the study. However, the traffic statistics (i.e., average daily traffic volumes, truck percentages, and peak hour percentages) will be manually corrected by the processing staff to adjust for this overcounting.

Short Count Factoring

A primary goal of most short-duration traffic studies performed by WSDOT's Transportation Data, GIS, and Modeling Office (TDGMO) is to provide an Annual Average Daily Traffic (AADT) volume for the study location. However, the majority of short-duration mechanical counts conducted by TDGMO simply tally the number of axles divided by two passing the count equipment. Due to the occurrence of vehicles with more than two axles in the traffic stream, these two-axle equivalent volumes represent an overestimation of actual vehicle volumes. In addition, even if actual vehicle volumes are captured by a study, because traffic streams vary over time the average daily volume during the study period will usually be significantly different from the study location's AADT.

The following pages provide a brief overview of these issues and how TDGMO addresses them within its count program. In doing so, temporal variation and the occurrence of vehicles with more than two axles are discussed in turn. A more detailed discussion of these topics is available in the WSDOT Short Count Factor Guide, which can be accessed from:
https://www.wsdot.wa.gov/mapsdata/travel/shortcountfactoringguide.htm

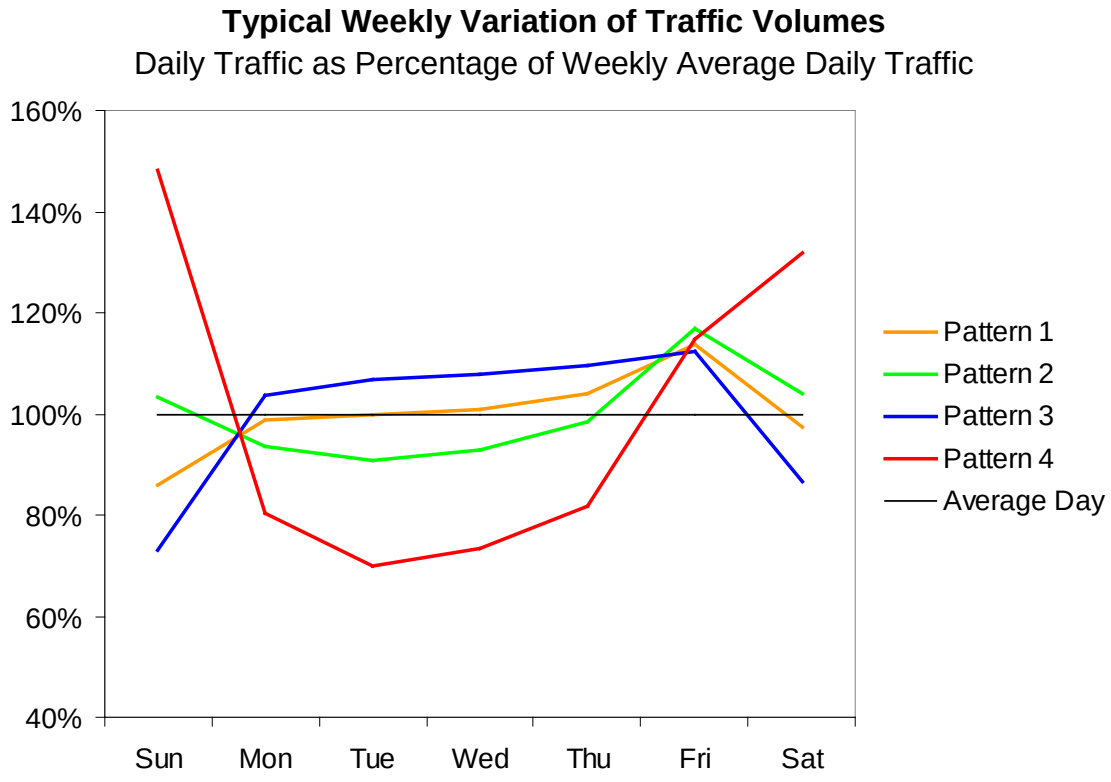
Temporal Variation

This section addresses two types of temporal variation inherent to traffic streams (seasonal and day of week). Also discussed are the methods employed by TDGMO to compensate for these variations when estimating AADT.

Day of Week Variation

One systematic way in which traffic streams vary is in relation to the different days of the week. The characteristics of weekend and weekday traffic flows are generally different, with extreme changes being observable on some roadways. This is illustrated by the graph on the following page, which displays daily traffic volume as a percentage of weekly average daily traffic for four typical weekly traffic patterns found on the Washington State Highway System.

Pattern 1 is reflective of many urban and rural highway locations that display a Friday traffic volume peak and a Sunday low. Pattern 2 represents a large number of other rural locations where weekend traffic is slightly higher than average due to a modest weekend recreational travel influence. Pattern 3 reflects many other urban locations where job-related weekday traffic is a particularly large component of total weekly volume, resulting in Saturday and Sunday having distinctly low traffic volumes in relation to other days of the week. Finally, Pattern 4 characterizes mountain passes and other locations that are significantly influenced by recreational travel, resulting in a large proportion of weekly traffic occurring on Friday through Sunday.



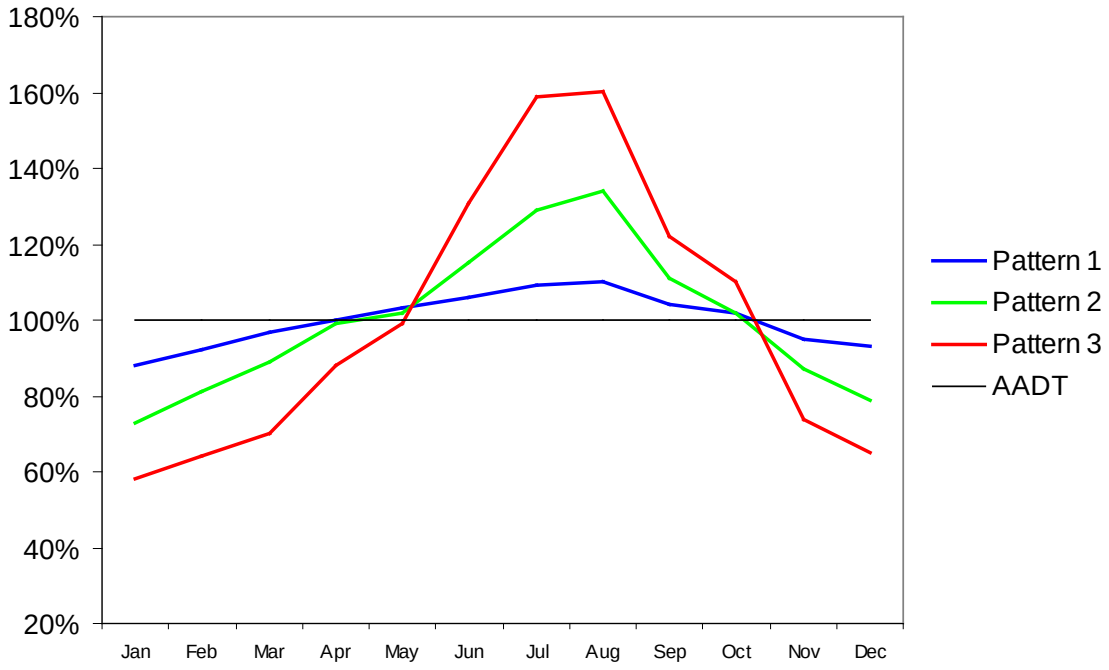
Seasonal Variation

The seasons of the year also have a systematic effect on traffic flow. Traffic is typically depressed below average in the winter months, and elevated above average in the summer. Mid-August is generally the time of peak travel, and mid-January is commonly near the lowest period of flow. Some locations in Washington have a harvest influence in early autumn.

The graph below displays Monthly Average Daily Traffic (MADT) as a percentage of AADT for three typical seasonal traffic patterns found on the Washington State Highway System. Pattern 1 reflects the normally modest seasonal curve of urban and urbanized areas. Pattern 2, with a stronger seasonal curve, reflects non-urbanized rural areas lacking a significant recreational traffic influence. Pattern 3 reflects rural central mountain locations heavily affected by summer recreational travel.

Typical Seasonal Variation of Traffic Volumes

MADT as Percentage of AADT



Temporal Factoring Procedures

A standard TDGMO short-duration mechanical count is performed from midday on Monday to midday on the following Friday. The data collected is used to estimate an average daily Tuesday through Thursday volume for the study period (labeled as the average weekday volume in the mechanical count reports). However, as the graphs above suggest, this figure will usually reflect a poor estimation of average daily volume for the year.

To address this, traffic volumes recorded at the approximately 160 Permanent Traffic Recorder (PTR) sites monitored by TDGMO are employed. These sites collect data continuously over the course of the year. Because of this, each month's average weekday (Tuesday through Thursday) traffic volume can be computed and then divided into the AADT for the year in which the month occurred. This produces 12 average-weekday to annual-average-day conversion factors (labeled seasonal adjustment factors in the count reports) for each PTR site and year. A seasonal adjustment factor calculated for the month in which a study occurred is then multiplied by the study's average weekday volume in order to estimate AADT for the study location.

The determination of which PTR site's factors to use for the short-duration counts on a given section of roadway is based on the apparent degree to which the traffic patterns at the site mirror those of the section of roadway under consideration. Proximity to the PTR site, as well as similarities in traffic volumes and roadway type, are used in identifying locations that should display similar patterns. In some instances however, a section of roadway cannot reliably be assigned to the factors from an individual PTR site. In such cases, assignment is often made to one of several factor groups that reflect generalized patterns for broad geographic and roadway-type categories through the use of averaged factors from multiple, representative PTR sites. Alternately, assignment is made to a "transition group", which provides averaged factors from a combination of two PTR sites and/or factor groups. These are used to provide factors for locations with traffic patterns that are only partially reflected by an individual site or factor group.

The Factor Group Field

Above the seasonal adjustment factor in the count report is a Factor Group field. This field contains a code indicating the data-source the factor was derived from. Often this

will be the code for a particular PTR site[9]. However, if the code begins with "GR" then the source is one of the factor groups reflecting generalized patterns discussed above. If the code begins with "CB" then the source is a transition group.

Axle Correction

Short duration counts often do not count vehicles, but are restricted to a tally of axle passages divided by two. This is problematic because two-axle equivalent volumes represent an overestimation of actual vehicle volumes, particularly in areas where large trucks represent a significant portion of total traffic.

To compensate for this when estimating AADT, two-axle equivalent average weekday volumes are multiplied by an "axle correction factor". These factors are produced from PTR sites and short duration classification counts by dividing average weekday (Tuesday through Thursday) vehicle volumes by average weekday (Tuesday through Thursday) two-axle equivalent volumes. In the case of PTR sites, factors are calculated separately for each month of the year.

The axle correction factor applied to a two-axle equivalent count is usually one derived from PTR site data. The determination of which site's factors to use for the short-duration counts on a given section of roadway is based on vicinity and the historic degree of similarity between factors derived from the PTR site and those derived from short duration classification counts conducted within the section. If no applicable PTR sites are available then a section is assigned to a factor group or transition group. As with seasonal factor groups, axle factor groups provide averaged factors from PTR sites with similar factors and definable commonalities in relation to roadway type, geographic area and traffic characteristics. The transition groups provide averaged factors from a combination of two PTR sites and/or factor groups, and are used to provide factors for locations with traffic patterns that are only partially reflected by an individual PTR site or factor group

[9] A map containing PTR site locations operated by the TDGMO and producing sufficient data during the previous calendar year is available through WSDOT's Traffic Data Geoportal (http://www.wsdot.wa.gov/mapsdata/tools/trafficplanningtrends.htm).

The Factor Group Field

Above the axle correction factor in the count report is a Factor Group field. This field contains a code indicating the data-source the factor was derived from. Often this will be the code for a particular PTR site. However, if the code begins with “GR” then the source is a factor group. If the code begins with “CB” then the source is a transition group. Finally, if the code begins with “A” then a more atypical factor source was used; generally this means that a combination of PTR site and short duration classification count data was used to develop the monthly axle correction factors for the stretch of roadway the two-axle equivalent count was performed in.