

VERMONT TRAFFIC MONITORING STANDARDS

FOR

CONTRACTUAL AGREEMENTS



**Vermont Agency of Transportation
Traffic Research**

January 2001

Introduction

This document presents the traffic monitoring standards in effect for all Vermont short-term count traffic monitoring activities undertaken through contractual agreements for planning and/or project development. These standards will be reviewed and/or revised annually or as deemed necessary by the Vermont Agency of Transportation (VTrans), Technical Services Division, Traffic Research Unit.

Scope

The primary purpose of these standards is to ensure that the raw data from traffic monitoring activities undertaken pursuant to, or as part of, any contractual agreements involving funds administered and/or provided by Vermont, is in conformance with Vermont standards established for traffic count data collected on federal, state and selected local roadways and that it reaches the traffic count library maintained by the VTrans Traffic Research Unit in the appropriate data format. This ensures that the data is available for use within and outside the Agency.

Applicability

These standards shall apply to all traffic monitoring activities undertaken by private consulting engineering firms or non-VTrans organizations, in support of any project or study for which funds administered and/or provided by Vermont have been or will be used. The contractor will be expected to follow VTrans personnel safety standards as outlined in “The State of Vermont Agency of Transportation Safety Manual”. The Agency’s Occupational Safety Coordinator, Jim Blakeslee, may be contacted at (802) 828-2585 for more information.

Requests to Conduct Counts

Prior to undertaking any traffic count, the contractor is directed to contact the Traffic Research Unit, at the address below, to coordinate their activity and obtain information necessary to identify the count sites as described below. The Traffic Research Unit will review all locations submitted and respond to the contractor within seven business days as to their acceptability. When the Traffic Research Unit has approved the count locations, the contractor will be authorized to conduct the counts.

Traffic Research Engineer
Technical Services Division
Vermont Agency of Transportation
1 National Life Drive, Drawer 33
Montpelier, VT 05633

Phone: (802) 828-2685
Fax: (802) 828-5742
Web Site: www.aot.state.vt.us/techservices

Submitting Count Data

Contractors shall submit all count data to the Project Manager, Planning Coordinator, and/or other person, as appropriate. The Project Manager or appropriate person will forward the traffic count data within 10 days of receipt to the Traffic Research Unit for acceptance.

Any Regional Planning Commission under contract with VTrans may choose to submit count data collected during the current count season to VTrans at the end of the season. All data collected in a calendar year must be submitted to VTrans no later than the end of the same calendar year.

Count Acceptance

The Traffic Research Unit will review all counts submitted and counts will be considered acceptable 15 days after receipt by the Traffic Research Unit unless the contractor is notified otherwise. All accepted counts will be added to the VTrans count library and be made available to the public.

Automatic Traffic Recorder (ATR) Counts

Site Identification

Traffic count locations are identified by a VTrans reference code. The reference code consists of a county code letter and a unique traffic station number. Maps containing these reference codes may be obtained from the Traffic Research Unit.

Any contractor seeking to conduct a count at a location not currently identified by a VTrans reference code shall provide the Traffic Research Unit with a map identifying the location so that a reference code may be assigned. In addition to the map, the new count location shall be described by the route name and number, and by the distance to the nearest public road intersection.

Accuracy

The Vermont Agency of Transportation, through the Traffic Research Unit, maintains the coverage and continuous count elements of the VTrans Traffic Monitoring Program.

Both of these elements are conducted in compliance with the FHWA Traffic Monitoring Guide (Third Edition, February 1995, Reprinted October 1996). The program is designed to utilize, at a minimum, 48-hour short counts to produce AADTs with a confidence level of 95% within an interval of $\pm 10\%$ of the mean statistic as the criterion of the coverage count program. The VTrans preference is that all counts be of a seven-day duration.

The devices used to monitor traffic will accurately measure existing traffic. The contractor will maintain records that describe:

1. The type and model of device used to collect the data
2. The accuracy of the device as stated by the manufacturer's documentation
3. Maintenance performed on the equipment

The contractor will provide these records to the Traffic Research Unit upon request.

Minimum Short count Traffic Monitoring Standards

Standards defined in this section apply to volume, classification, and speed monitoring, including screen line or cordon line counts and any and all other site specific counts.

- All counts must have a data recording interval of 15 or 60 minutes. Use of recording intervals other than 15 or 60 minutes requires approval from the Traffic Research Unit. In the event that intervals of less than 60 minutes are collected, the contractor will provide the Traffic Research Unit with count summaries in 60 minute intervals.
- All counts will be taken for each direction separately except when not feasible.
- Counts used for estimating AADTs must be taken for a minimum of 48-hours within the workweek; 6:00 AM Monday to 12:00 PM Friday. Counts taken over a 7-day period are preferable. In the event that the valid hours of a 48-hour count are not continuous, each hour of the day will be counted at least twice.
- No portion of a count used for estimating AADTs may contain data collected within 36-hours of any extended weekend formed by a federal, state or local holiday.
- No portion of a count used for estimating AADTs should contain data collected during any known event which does not represent “normal” conditions, including severe weather.
- Estimated AADTs should be reported with the following rounding conventions to eliminate the appearance of greater precision than is actually possible: Volumes below 1000 should be rounded to the nearest 10 and volumes above 1000 should be rounded to the nearest 100.
- Special counts including special event counts, holiday counts and weekend counts should be at least 24 hours in length and should be clearly marked as not for AADT estimation. The weekend period is acceptable only for the purpose of identifying or monitoring recreational or retail traffic.
- Volume counts must be adjusted to actual volumes from passenger car equivalents (PCE). Tube correction factors (TCF) may be found in the VTrans Automatic Vehicle Classification Report available from the Traffic Research Unit or on the VTrans web site.
- All counts must be adjusted for seasonal variations. Adjustment factors may be found in the VTrans Continuous Traffic Counter Grouping Study and Regression Analysis publication, a.k.a., the Red Book, available from the Traffic Research Unit or on the VTrans web site.

Vehicle Classification Counts

All vehicle classification counts will be based on the 13 FHWA vehicle classification categories (Figure 1). ATR counts will be conducted for a minimum of 48-hours and will be directional. Free-flow conditions are required for effective machine classification.

Where conditions are not free-flow or speeds are lower than 25 mph, a minimum of one-hour of manual vehicle classification is required to verify the accuracy of the machine classification. The number of incorrectly classified vehicles must be # 10% for the electronic data to be considered acceptable.

In the event that the electronic data is not acceptable or a machine count is not possible, a manual count must be conducted. Typically, manual counts are conducted during peak traffic conditions, i.e., from 7:00 AM to 10:00 AM, from 11:00 AM to 2:00 PM, and from 3:00 PM to 6:00 PM, or during another period specified by the Traffic Research Unit. This provides three periods, each of a three-hour duration, for a total of nine hours of data collected by travel direction.

Data Reporting Format

All electronic short count data, regardless of the equipment being used, must be reported in an electronic format. The processed file formats generated by the Traffic Analysis Software (TAS) and the Traffic Analysis Software Plus (TAS+), written by Jamar Technologies, Inc., are the preferred formats, but other formats are acceptable with approval from the Traffic Research Engineer. The TAS and TAS+ formats are detailed in the Appendix.

Manual short counts may be reported in hard copy format on 8½ x 11-inch paper. All counts must include hourly summaries. The count location code should be clearly labeled.

All short counts submitted shall include a field sketch identifying the count location code and showing street and route names, lane configurations, pavement markings and traffic control devices (signs and signals) as appropriate. For ATR counts, the sketch should include the sensor layout.

FHWA VEHICLE CLASSIFICATIONS





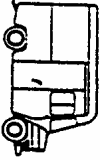


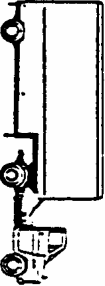
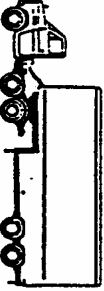




<p>1 Motorcycles</p> 	<p>2 Passenger Cars</p> 	<p>3 Two Axle, 4 Tire Single Units</p> 	<p>4 Buses</p> 
<p>5 Two Axle, 6 Tire Single Units</p> 	<p>6 Three Axle Single Units</p> 	<p>7 Four or More Axle Single Units</p> 	<p>8 Four or Less Axle Single Trailers</p> 
<p>9 Five Axle Single Trailers</p> 	<p>10 Six or More Axle Single Trailers</p> 	<p>11 Five or Less Axle Multi-Trailers</p> 	
<p>12 Six Axle Multi-Trailers</p> 	<p>13 Seven or More Axle Multi-Trailers</p> 		
<p>NOTE: "TRUCKS" in the following report include CLASS 4 and larger.</p>			

Figure 1

Turning Movement Counts

Site Identification

Turning movement locations will be identified by the unique intersection code assigned by the Traffic Research Unit. The VTrans Turning Movement Database, available from the Traffic Research Unit or on the VTrans web site, lists the turning movement codes and locations. For intersections not listed, contact the Traffic Research Unit to have a code assigned.

Count Duration

When conducting turning movement counts, it is VTrans practice to collect data over a 12-hour period between 6:00 AM and 6:00 PM. For signal warrant analysis, this practice deviates from the MUTCD recommendation of using 16-hour turning movements.

The VTrans 12-hour period is typically split at 12:00 PM into two, 6-hour sessions, and both sessions are conducted on the same day or over two consecutive days. This practice is strongly recommended by all contractors working for VTrans. Any contractor wishing to deviate from the 12-hour standard practice should contact the Traffic Research Engineer.

Data Reporting Format

Turning movement counts shall be submitted in hard copy format on 8½ x 11-inch paper. All counts must include 15-minute and hourly summaries. Street names and route numbers shall be clearly labeled and the VTrans intersection location code should be part of the location information.

Any turning movement counts collected using an electronic counter board should be provided to VTrans in electronic format as well as hard copy. The file format generated by Petra software written by JAMAR Technologies, Inc. is preferred, but other data formats are acceptable with approval from the Traffic Research Engineer.

All turning movement counts submitted shall include a field sketch showing street and route names, lane configurations, pavement markings and traffic control devices (signs and signals).

APPENDIX

TAS – Volume File Format

Type 1:

```
"MHD6083"
"MHD6083"
08,31,92
12,00
14,60,2,2
"BAKER ROAD","West of Dighton Town Line","SWANSEA"
" EB "
" WB "
""
""
20
18 26
31 21
24 21
23 27
35 28
35 43
34 50
42 32
17 13
22 10
```

Type 2:

```
"MHD6083"
"MHD6083"
08,31,92
12,00
14,60,2,2
"BAKER ROAD","West of Dighton Town Line","SWANSEA"
" EB "
" WB "
""
""
136
18 26 31 21 24 21 23 27 35 28 35 43
34 50 42 32 17 13 22 10 8 7 3 7
2 4 0 0 0 1 2 0 2 1 4 3
20 11 22 19 28 27 17 16 14 35 28 28
28 30 27 41 27 31 23 27 29 33 39 32
30 53 24 23 25 19 24 14 5 11 5 4
1 2 0 0 0 1 4 1 2 1 7 5
16 13 23 22 21 20 19 26 21 25 33 26
33 29 26 21 29 27 31 36 27 48 43 30
25 41 38 34 24 24 23 11 6 7 6 5
2 4 2 2 0 0 4 0 0 1 5 4
23 18 22 14
```

TAS – Vehicle Class File Format

```

"A010CC"
"000023456700"
09,21,98
13,00
44,60,1,13
"MIDDLEBURY    US 7", "T97  15 MIN", "FRED GROUT"
" "
"      Bikes  "
"Cars &Trlrs "
"2 AxleLong  "
"      Buses  "
"2 Axle6 Tire"
"3 AxleSingle"
"4 AxleSingle"
"<5 AxlDouble"
"5 AxleDouble"
">5 AxlDouble"
"<6 AxlMulti "
"6 AxleMulti "
">6 AxlMulti "
260
0 480 102 3 30 5 1 9 31 2 0 0 0
2 483 147 8 29 5 1 13 23 1 0 0 0
5 691 177 12 29 7 0 13 12 0 0 0 0
4 635 208 3 22 10 0 6 9 1 0 0 0
0 706 156 7 23 4 0 2 10 2 0 0 0
0 386 108 3 14 2 0 3 8 0 0 0 0
2 281 71 1 4 1 0 2 4 0 0 0 0
1 182 40 0 4 2 0 1 4 0 0 0 0
0 145 23 1 5 1 0 3 5 0 0 0 0
0 96 21 1 2 0 0 2 9 0 0 0 0
0 54 5 2 0 2 0 2 3 0 0 0 0
0 26 7 0 0 0 0 0 4 0 0 0 0
0 13 1 3 0 0 0 2 6 1 0 0 0
0 7 2 0 1 0 0 0 3 0 0 0 0
0 7 5 1 2 0 0 3 3 0 0 0 0
0 37 7 2 7 0 0 1 1 0 0 0 0
0 82 37 2 4 1 0 0 5 2 0 0 0
0 247 120 3 21 4 1 5 33 1 0 0 0
1 513 164 15 27 5 1 5 27 1 0 0 0
0 489 158 12 25 8 1 10 34 1 0 0 1

```

TASPLUS – Volume File Format

```

"C:\TASPLUS\DATAFILE\1996CNTS\7149.TDF","VOLUME"
"08/14/96","12:00"," 15"
"7149","",""
30,1,3,1
""
"Location : PROVINCE LAND RD S OR RACE"
"Weather : CLEAR"
"Counter : JL/MR"
"JANUS File: 7149"
","100000000000000000","Totl","100000000000000000"," pf EI9044.EXP "
","011000000000000000","sb","010000000000000000","U0100000000000000"
","000000000000000000","nb","001000000000000000","U0010000000000000"
29, 14, 15
28, 12, 16
31, 13, 18
20, 10, 10
35, 19, 16
40, 12, 28
26, 4, 22
49, 9, 40
34, 12, 22
44, 14, 30
50, 16, 34
43, 18, 25
45, 23, 22
25, 9, 16
49, 22, 27
40, 16, 24
25, 10, 15
31, 15, 16
41, 21, 20
33, 13, 20
24, 8, 16
27, 13, 14
31, 15, 16
18, 4, 14
29, 17, 12
19, 9, 10
16, 5, 11
18, 7, 11
20, 11, 9
14, 6, 8

```

TASPLUS – Vehicle Class File

```

"A:\PORTAB~2\1999\ORIENT\C0405536.TDF", "CLASS"
"06/02/99", "14:00", "15"
"030349044001", "", ""
20,1,14,1
"NB"
"ORIENT"
"AROOSTOOK"
"US 1 (NB) N/O IR 1001 (OLD RT 1)(NO JCT)"
""
"" , "" , "" , "" , "S0111111111111100"
"" , "" , "" , "" , "U0100000000000000"
"" , "" , "" , "" , "U0010000000000000"
"" , "" , "" , "" , "U0001000000000000"
"" , "" , "" , "" , "U0000100000000000"
"" , "" , "" , "" , "U0000010000000000"
"" , "" , "" , "" , "U0000001000000000"
"" , "" , "" , "" , "U0000000100000000"
"" , "" , "" , "" , "U0000000010000000"
"" , "" , "" , "" , "000000", "U0000000010000000"
"" , "" , "Double", "0000000001000000", "U0000000001000000"
"" , "" , "Double", "0000000000100000", "U0000000000100000"
"" , "" , "Multi", "0000000000010000", "U0000000000010000"
"" , "" , "Multi", "0000000000001000", "U0000000000001000"
"" , "" , "Multi", "00000000000000100", "U00000000000000100"
14, 0, 5, 8, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0
9, 0, 3, 3, 0, 0, 0, 0, 2, 0, 0, 1, 0, 0
15, 0, 9, 5, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0
14, 0, 7, 5, 0, 2, 0, 0, 0, 0, 0, 0, 0, 0
17, 0, 11, 6, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
8, 0, 4, 3, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0
13, 0, 8, 4, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0
15, 0, 7, 6, 0, 2, 0, 0, 0, 0, 0, 0, 0, 0
16, 0, 6, 9, 0, 1, 0, 0, 0, 0, 0, 0, 0, 0
12, 0, 3, 5, 0, 2, 0, 0, 0, 0, 1, 1, 0, 0
12, 0, 5, 6, 0, 0, 0, 0, 0, 0, 0, 1, 0, 0
10, 0, 6, 3, 0, 0, 0, 0, 1, 0, 0, 0, 0, 0
5, 0, 3, 2, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
10, 0, 5, 3, 0, 0, 0, 0, 0, 0, 0, 2, 0, 0
13, 0, 6, 5, 0, 0, 0, 0, 0, 0, 0, 2, 0, 0
4, 0, 4, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
6, 0, 2, 4, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
4, 0, 3, 1, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0
7, 0, 1, 3, 0, 0, 0, 0, 2, 0, 0, 1, 0, 0
7, 0, 4, 3, 0, 0, 0, 0, 0, 0, 0, 0, 0, 0

```