State Traffic Monitoring Standards

Prepared for
New Mexico Department of Transportation

June 2018
Prepared by
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Introduction

Purpose
The New Mexico State Traffic Monitoring Standards (NMSTMS) document provides comprehensive guidance that complies with federal regulation 23 CFR (Code of Federal Regulation) 500 Subpart B and the needs of the New Mexico Department of Transportation (NMDOT) Data Management Bureau Traffic Monitoring Program.

Federal regulations 23 CFR 500.202 states, “Traffic monitoring system (TMS) means a systematic process for the collection, analysis, summary, and retention of highway and transit related person and vehicular traffic data.” Federal regulations 23 CFR 500.203 mandates, “Each state shall develop, establish, and implement, on a continuing basis, a TMS to be used for obtaining highway traffic data…” This document is intended to record the current procedures and practices of the New Mexico Department of Transportation’s Data Management Bureau’s Traffic Monitoring Program.

The NMSTMS were first implemented on October 1, 1988. The standards are continuously reviewed and refined on a three-year basis, or as deemed necessary, by the Traffic Monitoring Standards Review Committee.

Standards review meetings are convened on a three-year basis, or as deemed necessary. Transportation planners, engineers, analysts, and other interested participants from a variety of public and private organizations take part in the review. Participating organizations include the NMDOT, Metropolitan Planning Organizations (MPOs), Regional Transportation Planning Organizations (RTPOs), Tribal/Local Public Agencies, Consulting Engineering and Planning firms, and Computer Software Development firms. The recommendations from the review meetings are evaluated and finalized as standard practice by the NMDOT, in cooperation with the Federal Highway Administration (FHWA).

MPOs, RTPOs, and county and municipal agencies programmed to receive state or federal funding are required to conduct Traffic Monitoring in compliance with the NMSTMS in order to use these funding sources.

It is the responsibility of the NMDOT in conjunction with the FHWA to provide the necessary resources to fulfill all requirements of the NMSTMS as approved.

For additional information, please call the Data Management Bureau Traffic Monitoring Program of the NMDOT at (505) 490-7202, or refer the contacts listed on the Program webpage at http://dot.state.nm.us/content/nmdot/en/Planning.html#Data.
Standards Review Procedures

Traffic monitoring by any public or private entity required to satisfy these standards, presented concerning a proposal for state or federal roadway funding, conducted in association with a project along a roadway administered by the NMDOT or FHWA, will comply with the current NMSTMS.

The national traffic monitoring standards, adopted by the American Association of State Highway and Transportation Officials (AASHTO) and the American Society for Testing and Materials (ASTM), as well as 23 CFR 500 Subpart B TMS/H requirements, Traffic Monitoring Guide (TMG), and the Highway Performance Monitoring System (HPMS) Field Manual Appendix Chapter 5.3, will be deferred to by the state of New Mexico if the national standards address issues which are not covered by the NMSTMS. The resolution of conflicts between the NMSTMS and national standards will be made by the New Mexico State Traffic Monitoring Review Committee upon review of the national standards or at the request of the NMDOT.

The NMSTMS will be reviewed on a three-year basis, or as deemed necessary. The review will be conducted prior to November 30 of that year. Participation in the review will be open to all New Mexico traffic monitoring professionals in both the public and private sectors. Recommended revisions to the standards will be presented for adoption to the NMDOT, in cooperation with the FHWA. The standards review will be hosted, scheduled and chaired by the NMDOT. The NMDOT will provide a recorder, who is responsible for taking and maintaining minutes of the meeting, which will guide the NMDOT in finalizing revisions to the NMSTMS.

Exceptions to the NMSTMS may be approved during a year by the NMDOT with the concurrence of the FHWA. Exceptions may only be based on conditions not specifically considered during the standards review process and not covered by the NMSTMS or otherwise prohibited. The requester must document all requests, with justification for either an exemption or an exception to the standards. If approved, an exception must comply fully with the principle of “Truth in Data for Traffic Monitoring” (Details on following pages: ASTM Standard E2759), noting in all data transmittals that the data are based on an exemption to the exceptions must be documented and transmitted to all participants in the standards review process. The exception must be specifically acted upon during the following standards review. If the exception is not supported during the standards review, the exception may not be used.

The most current edition of the TMG, the AASHTO, or ASTM Guideline should be used for any standard, definition, or calculation not specifically included in the NMSTMS. The most recent version of the Transportation Research Board’s Highway Capacity Manual should be used for any road or intersection capacity standard, definition, or calculation not specifically expressed in the AASHTO, ASTM, or NMSTMS.

References:

FHWA

FHWA’s Traffic Monitoring Guide
https://www.fhwa.dot.gov/policyinformation/tmguide/ (Updated June 2018)

FHWA’s Highway Performance Monitoring System Field Manual
https://www.fhwa.dot.gov/policyinformation/hpms/fieldmanual/ (Updated June 2018)
Traffic Monitoring Truth In Data

The following section is paraphrased from ASTM standard E2759 which is available at: https://www.astm.org/Standards/E2759.htm

“Truth in Data for Traffic Monitoring” (Truth in Data) describes how traffic data is handled and accurately reported. The purpose of truth in data is to ensure that all data is collected and stored with integrity. In short, truth in data states that:

- Any data collected for or by the traffic monitoring program should be unmodified and reported in an un-altered state.
- Any assumptions or adjustment factors should be disclosed.
- All processes and procedures used in any calculations associated with the collected traffic data should be disclosed.
- All summary statistics should be easily recalculated by all users.

The use of Truth in Data practices ensures that all traffic data is accurate, accessible and can be correctly interpreted. Truth in Data shall be practiced by all entities involved in the traffic monitoring program or using the NMSTMS.

NMDOT Truth In Data Requirements

To comply with Truth in Data standards, as quoted in the previous section, the following requirements are shown below, specific to the NMTMS:

- Precision levels for all data shall conform to HPMS reporting guidelines.
- Missing or inaccurate raw traffic data may not be completed, filled in, or replaced for any type of traffic count, at any location, under any circumstance. All raw data will be transmitted to the NMDOT Traffic Monitoring Program.
- Annual traffic volume summary statistics presented or reported by the NMDOT, MPOs, RTPOs, county and municipal governmental agencies and private consulting engineering and planning firms must include a 15-minute interval and must be one of the three standard units of annual traffic volume measurement:
  - Annual Average Daily Traffic (AADT),
  - Annual Average Weekday Traffic (AAWDT), or
  - Annual Average Weekend Traffic (AAWET)

More details on AADT, AAWDT and AAWET in the Traffic Data Summarization section of this document.

Traffic summary statistics defined by the NMSTMS and presented or recorded for other periods, such as monthly average days of the week, will be clearly labeled. Unadjusted raw traffic count data to which the NMSTMS apply must be counted in compliance with the NMSTMS and have the notation: "Unadjusted Count Data, Not for Use as Standard Traffic Volume Summary".
Traffic Monitoring Program

The NMDOT traffic monitoring program supports agencies and municipalities in assessing past roadway performance, predicting future performance, and supporting business development. The following presents guidelines and requirements for managing and maintaining an effective traffic monitoring program. Subsequent sections include guidelines and requirements on traffic monitoring hardware and software, traffic flow maps, traffic monitoring training, count cycles, and local routes.

Schedule

A summary of important “no later than” deadlines is as follows:

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>December 1</td>
<td>MPO/RTPO/ Tribal/Local Public Agencies request classification count priority meeting with NMDOT, if desired, via email/ phone/ letter addressed to the head of the Data Management Bureau.</td>
</tr>
<tr>
<td>December 31</td>
<td>Agencies provide upcoming year’s traffic count schedule to NMDOT. NMDOT shall review and provide feedback within one week of receipt.</td>
</tr>
<tr>
<td>February 15</td>
<td>NMDOT provides acceptance reports and analysis of permanent and short-term counts to MPO/RTPO/ Tribal/Local Public Agencies</td>
</tr>
<tr>
<td>May 1</td>
<td>MPO/RTPO/ Tribal/Local Public Agencies provide draft traffic flow maps to the NMDOT</td>
</tr>
<tr>
<td>June 1</td>
<td>NMDOT return traffic flow map comments to MPO/RTPO/ Tribal/Local Public Agencies</td>
</tr>
<tr>
<td>September 1</td>
<td>MPO/RTPO/ Tribal/Local Public Agencies provide final traffic flow maps to the NMDOT</td>
</tr>
<tr>
<td>November 30</td>
<td>Completion of 3-year NMSTMS review</td>
</tr>
</tbody>
</table>

It is noted that the above dates are to be treated as “no later than” deadlines. It is understood that agencies may have earlier deadlines than above and can submit/request/finish the above items prior to the dates listed.

Traffic Monitoring Hardware and Software

The devices used to monitor traffic shall accurately represent existing traffic. In addition to device type, model accuracy and precision documentation, an operation and maintenance record will be maintained for each individual device by the device owner.

The NMDOT’s NM Traffic Count Data System (TCDS) will handle and integrate all traffic data described in the NMSTMS, as well as electronically transmitted traffic data from other governmental agencies and private engineering consulting firms, based on a standard format identified by the department. The software will automatically produce all tables and statistics for the annual state traffic survey, and mean traffic statistics by factor groups, which are grouped by functional system.

Traffic Flow Maps

All traffic flow maps published by the NMDOT, MPOs, RTPOs and other public and private organizations, intended for distribution to the public or any other public or private entity, shall clearly indicate which data complies with the NMSTMS and which data does not (nonstandard data).

Traffic Flow Maps containing nonstandard data shall provide a legend distinguishing standard data and nonstandard data, and the following statement: "NMDOT recommends that nonstandard data be used with caution."
All entities, i.e. MPOs/RTPOs/Municipalities, that wish to publish a traffic flow map will provide a preliminary draft to the NMDOT by April 1st of each year. Comments and suggestions from the NMDOT will be returned to the MPO/RTPO/Municipality by June 1st of each year with final copies prepared by September 1st.

Urban areas, as defined by planning documents & maps, will use Annual Average Weekday Traffic (AAWDT) as the Traffic Flow Map summary statistic.

Rural areas, which are those areas outside of urban areas as defined above, will use AADT as the Traffic Flow Map summary statistic. In some cases, Traffic Flow Maps, may be generated for rural areas using AAWDT as the Traffic Flow Map summary statistic. This exception will be reserved for those rural areas that are adjacent to or heavily influenced by Urban traffic flows.

**Traffic Monitoring Training**

The NMDOT will, if requested, conduct a Standard Description and implementation workshop open to all interested persons from the public and private sectors.

The NMDOT will provide training and field manuals for correct setting and operation of traffic monitoring field equipment. Field training programs will be available to MPOs/RTPOs, Tribal/Local Public Agencies as requested. The NMDOT will be available to assist private firms in understanding the NMSTMS as necessary.

Traffic control for traffic data collection operations performed on public highways shall be done in accordance with the Manual on Uniform Traffic Control Devices (MUTCD).

**Highway Performance Monitoring System (HPMS) Count Cycles and Local Routes**

Minimum three-year count cycle – NMDOT’s traffic monitoring program shall cover all National Highway System (NHS) and Principal Arterial System (PAS) roadway sections (i.e., Interstates, Other Freeways and Expressways, and Other Principal Arterials, functional classifications 1, 2 and 3) on a three-year cycle or better; at least one-third of these roadway sections should be counted annually. For the remaining two-thirds of these roadway sections, counts must be estimated based on a documented process in accordance with the TMG and the HPMS Field Manual. NMDOT’s program shall cover all roads on these systems, not just State-owned roads, so data provided by MPOs, cities, or counties shall be included in the count cycle.

Minimum six-year count cycle – The State shall also have a traffic count program on a six-year cycle at a minimum for all non-NHS lower functionally classified roadway sections (i.e., minor arterials, major collectors, and urban minor collectors, functional classifications 4, 5 and urban 6). Traffic data for ramps are also collected on a six-year cycle at a minimum.

Local routes (FHWA Class 7) and rural minor collectors (FHWA class 6 and 7) shall be counted as part of the minimum 12-year count cycle unless stated otherwise in individual MPO Unified Planning Work Programs (UPWP), which may require all counts to be conducted on a three-year count cycle.
Compliant coverage data will be considered as standard based on the respective functional system and required three (3) or six (6) year count cycle, inclusive of the calendar year in which data collection occurred, except in the following case:

If capacity changes occur on any traffic section (defined as the addition of one or more through lanes or any lane reductions), any previous data collected on the unique traffic section will be considered non-standard and the traffic section must be recounted. Compliant data collected on the traffic section shall be considered as standard for the calendar year in which the capacity change was completed, provided the final lane(s) were open to traffic no less than six months prior to the end of the calendar year.

Procedures

Unique Traffic Sections & Traffic Monitoring Site Identification

Traffic Section identification shall be completed as a coordinated effort between State and MPO/RTPO/Tribal/Local Public Agencies. Each unique traffic section for state roads shall be determined by the NMDOT. The NMDOT will work with local agencies to obtain their respective roadway networks and traffic sections. The NMDOT will then work, using this data, to match NMDOT traffic sections to local agency roadway networks and traffic sections. All unique traffic sections shall be placed into All Road Network of Linear Referenced Data (ARNOLD) by the NMDOT.

NMDOT shall prepare a map of roadways accompanied by a listing of Roadway Inventory System unique traffic section identifiers will be prepared by the NMDOT and shall be provided on an annual basis (by no later than January 31 of each year) and distribute the map to the MPO’s and by request to the MPO/RTPO/Tribal/Local Public Agencies by request through the NMDOT Traffic Monitoring Program.

Global Positioning System (GPS) site identification devices shall be used for traffic monitoring activity and must not exceed an error of 30 feet. The NM TCDS is designed to accept counts based on latitude and longitude, using the NAD83 UTM13N Zone coordinate system reported in decimal degrees. Therefore, all agencies shall submit all GPS and Geographic Information System (GIS) information in the NAD83 UTM13N Zone coordinate system and report coordinates in decimal degrees.

Traffic Sections Segmentation

To maintain an efficient traffic section and traffic count network, it is crucial that network segmentation be maintained effectively and that excess be eliminated. The TMG provides guidance that is acceptable to the NMDOT regarding traffic section segmentation. Section 3.3 of the TMG “encourages highway agencies to continually evaluate traffic volumes to determine the most suitable way to segment their roadway networks. The NMDOT shall routinely evaluate the segmentation of the roadway network according to TMG section 3.3.

The division and combination of traffic segments shall be performed according to the criteria set forth in TMG section 3.3; TMG table 3-17 is reproduced below to detail segment combination and division criteria, included here:
### Table 1: TMG 2016 (Table 3-17) Estimating Spacing for Short-Duration Counts

<table>
<thead>
<tr>
<th>Beginning Segment AADT</th>
<th>Adjoining Segment AADT Within</th>
</tr>
</thead>
<tbody>
<tr>
<td>100,000 or more</td>
<td>+ 10%</td>
</tr>
<tr>
<td>50,000 – 99,999</td>
<td>+ 20%</td>
</tr>
<tr>
<td>10,000 – 49,999</td>
<td>+ 30%</td>
</tr>
<tr>
<td>5,000 – 9,999</td>
<td>+ 40%</td>
</tr>
<tr>
<td>1,000 – 4,999</td>
<td>+ 50%</td>
</tr>
<tr>
<td>Less than 1,000</td>
<td>+ 100%</td>
</tr>
</tbody>
</table>

### New Traffic Sections & Count Locations

New traffic sections, for any type of roadway, may be created to improve available traffic count data where new roads are constructed or traffic patterns change as per the provisions of the section “Unique Traffic Sections Segmentation”. If a new road is constructed or a roadway meets the requirements outlined in the section “Unique Traffic Sections”, agencies may request the creation of a new traffic section, combination of two sections, or a split of an existing section. Requests shall be submitted to the NMDOT Data Management Bureau for approval and integration.

Requests to combine or split traffic sections shall include the following information for each segment included in the request:

- Location ID: 1-6 digits, in conformance with FHWA regulations/guidance; must be unique to the Agency (Obtained from the NMDOT Data Management Bureau)
- County
- Community
- Functional Class
- Rural/Urban Designation
- Located On: (Description) i.e.; “From JCT NM 53, NORTH TO SOUTHSIDE RAMP OF I-40 IN GALLUP”
- Directions: NMDOT uses POS/NEG
  - For roadways that do not have assigned mileposts, the positive direction shall be assigned to north and east directions, and the negative direction shall be assigned to the south and west directions.
- Factor Group: required to calculate AADT
- Latitude/Longitude: required in decimal form for location on the Traffic Count Database System map.
- Reason for combination or split of each segment involved.
- Supporting count data for each segment (if applicable).

New Traffic IDs shall be obtained from the NMDOT Data Management Bureau. Requests for new segments shall be made directly to the Data Management Bureau. The following information, taken from Appendix A, shall be provided when making a request:

- Nearby traffic segments Location IDs.
- County
- Community
• Proposed Functional Class
• Proposed Rural/Urban Designation
• General description of new location i.e.; “From JCT NM 53, NORTH TO SOUTHIDE RAMP OF I-40 IN GALLUP” (Can be modified by the NMDOT)
• Reason for the creation of a new traffic section and any supporting data/information

Traffic Summary Statistics Reporting
Traffic summary statistics are to be reported by NMDOT and all other agencies & private firms by unique traffic sections, which have homogeneous traffic characteristics by unique intersection identification. Location identification for each report will be based on the NMDOT’s Roadway Inventory System and modified by the NMDOT Traffic Monitoring Program to conform with the NMDOT’s the roadway inventory. Roadway Inventory System identification is based on Traffic Section ID which includes:

• Route number,
• Direction,
• Cumulative mile point,
• Link,
• Termini,
• County,
• Community,
• Functional Class,
• Rural/Urban Designation,
• Location Description,
• Directions,
• Factor Group, and
• Latitude/Longitude.

NMDOT shall prepare a map of roadways accompanied by a listing of Roadway Inventory System unique traffic section identifiers on an annual basis (by no later than January 31 of each year) and distribute the map to the MPO/RTPO/Tribal/Local Public Agencies through the NMDOT Traffic Monitoring Program.

Refinement of Traffic Factor Groups
Traffic factor groups shall be reviewed a minimum of every three years. The review will be in accordance with the federal guidelines related to the factor groups. The NMDOT will conduct the review of factor groups for all roads excluding the non-Interstate roads within the Urban Area Boundaries of areas with populations of 50,000 or more. The NMDOT shall be responsible for the distribution of traffic factor groups when requested by an MPO/RTPO/Municipality.
Traffic Data Analysis

Traffic Data Summarization

The three standard units of traffic volume measurement and summarization are as follows:

- Annual Average Daily Traffic (AADT), which represents traffic over a seven-day week;
- Annual Average Weekday Traffic (AAWDT), which represents traffic over the typical work day period, Monday 00:00 through Friday 24:00 (coverage counts), Monday 00:00 through Thursday 24:00 (Continuous Count Stations); and
- Annual Average Weekend Traffic (AAWET), which represents traffic over the weekend period, Saturday 00:00 through Sunday, 24:00.

Where:

00:00 = Midnight to 12:15 A.M (Fifteen Minute Interval).

Traffic volume summary statistics for data collected by permanent traffic recording devices are as follows:

- **MADW** = Monthly Average Day of the Week = the sum of all daily volumes for each day of the week, Sunday through Saturday, over the course of a month divided by the number of days of standard compliant data for that day during the month. This will produce an average for each day of the week for that month.
- **AADW** = Annual Average Day of the Week = the sum of MADWs for a year, for each day of the week, Sunday through Saturday/12. This will produce an annual average for each day of the week.
- **MADT** = sum of MADWs/7
- **MAWDT** = sum of MADWs for Monday through Friday/the number of days of standard compliant data during the month
- **AAWDT** = sum of MAWDTs/12
- **MAWET** = sum of MADWs for Saturday through Sunday/2 AAWET = sum of MAWETs/12
- **MTR** = the monthly traffic ratio = average traffic volume/annual average traffic volume. This ratio may be calculated for each of the volume summary statistics. The sum of the MTR's taken over the twelve months divided by 12 equals 1.00
- **MAF** = the monthly adjustment factor = 1/MTR = the adjustment factor for a given month which will convert monthly data to annual average data
Monthly Traffic Adjustment Factors and Monthly Traffic Ratios for a factor group are calculated by NMDOT using data from the Continuous Count Stations (CCSs) within that factor group for a given count year.

The agency with jurisdiction may elect to use CCS data from additional factor groups, if necessary, due to insufficient data, based on professional judgment. The requirements for included devices are:

- For MADW, a minimum of 2 occurrences of each day of the week is required.
- For AADW, all 12 MADWs
- For MADT, all 7 MADWs
- For MAWDT, all 5 MADWs
- For MAWET, all 2 MADWs
- For AADT, all 12 MADTs
- For AAWDT, all 12 MAWDTs
- For AAWET, all 12 MAWETs

The process for developing factors is as follows:

Step 1. NMDOT provides the MPO/RTP/ Municipalities with monthly permanent counter (CCS) summary data (MAWDT) and Annual Loop Correction Factors (LCF) for all locations in the jurisdiction for the previous 3 years.

Step 2. The MPO/RTP/Municipalities will review the NMDOT-provided data and may elect to develop their own factor groups based on geographic area, local knowledge of land-use, community character, travel patterns, and statistical analysis of short-term count data, etc. In this manner, the MPO/RTP/Municipalities may develop their own Monthly Adjustment Factors (MAFs), Annual Growth Factors (AGFs), and LCFs.

Step 3. The draft factors and factor groups developed by the MPO/RTP/Municipalities will be reviewed by the NMDOT for final approval. Factors must be for the current year.

If a CCS is excluded from the computation of mean traffic characteristics by factor groups per the guidelines set forth above in this section, the available data will be used for all site-specific traffic volume summary statistics.

The default factor groups defined by the functional classification system of roads used in traffic monitoring, including monthly and annual traffic statistics summarized by functional classification system are as follows with each having a rural/urban designation:

<table>
<thead>
<tr>
<th>Code</th>
<th>Functional System</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Interstate</td>
</tr>
<tr>
<td>2</td>
<td>Principal Arterial (Other Freeways and Expressways)</td>
</tr>
<tr>
<td>3</td>
<td>Principal Arterials (All Other/Remaining)</td>
</tr>
<tr>
<td>4</td>
<td>Minor Arterial</td>
</tr>
<tr>
<td>5</td>
<td>Major Collector</td>
</tr>
<tr>
<td>6</td>
<td>Minor Collector</td>
</tr>
<tr>
<td>7</td>
<td>Local</td>
</tr>
</tbody>
</table>
All agencies involved in the NMDOT traffic count program shall submit data and related roadway segment information to the NMDOT using the functional system codes defined in the TMG and reproduced in the above table. The NMDOT factor groups, which are defined using the functional system, are based on the functional system in the TMG. Descriptions of the functional systems can be found online at (https://www.fhwa.dot.gov/policy/ohpi/hpms/fchguidance.cfm). (Note: Functional classes may change by future HPMS revisions.)

Other factor groups, which are grouped by functional system, may be derived from cluster analysis of monthly traffic volume characteristics. Recognizing that Urban Area Boundaries do not represent, in some cases, reasonable demarcations for the application of loop correction factors the following practices will be allowed until research can determine methods which define a more appropriate set of classification schemes:

1. The Director of the NMDOT Asset Management and Planning Division may designate "Urban areas of influence" which extend beyond the Urban area’s Boundary. For relevant applications, Urban adjustment factors may be applied to the raw data to derive summary statistics provided they are applied to the same factor groups which are grouped by functional system. Urban area of influence designations shall be limited to developing rural areas which represent logical extensions of the Urban area and where existing travel patterns demonstrate that there is considerable interaction between the two areas.

2. The Director of the NMDOT Asset Management and Planning Division may designate "rural areas of influence" which extend into the Urban Area Boundary of an Urban area. For relevant applications, rural adjustment factors may be applied to the raw data to derive summary statistics provided they are applied to the same factor groups, which are grouped by functional system. Rural areas of influence designations shall be limited to facilities which traverse an Urban area but where existing data suggest that the facility is minimally impacted by Urban travel patterns.

These sections will be replaced when factor groups are established.

The mean CCS annual traffic volume growth rate by factor groups, which are grouped by functional system, will be used as the default annual growth rate for non-count traffic sections in the same factor groups which are grouped by functional system. CCSs, within a factor group, which are grouped by functional system, and which have not been on-line for a minimum of three years, will not be used in computing growth rates. However, said CCSs may be used for computing other factors.

Automatic Vehicle Counters (AVCs) and Weigh in Motion (WIM) devices are CCSs or portable devices used to collect traffic volume and classification data. All data will be collected based on the FHWA specified vehicle classifications. Classification data will be summarized in the same manner as detailed for traffic volume summary statistics. Data will be summarized for each day, typical days of the week will be summarized by month, and monthly typical days of the week will be summarized for the annual traffic statistics. For a given site there will be typical daily vehicle classification based on a seven-day week, the work week, and the weekend. The NMDOT Traffic Monitoring Program will prepare monthly and annual vehicle classification reports.
The variability of vehicle classifications by factor groups, which are grouped by functional system of roadway will be reviewed. The review will determine if vehicle classification data may be grouped. If grouping of data is indicated, Monthly Classification Ratios (MCRs) will be calculated and used in a manner similar to Monthly Traffic Ratio (MTR) for adjusting coverage and project-related, special count activities.

MPOs may develop their own growth factors and loop correction factors based on historical short-term count data by factor group. The method and resulting factors MUST BE SUBMITTED to NMDOT for approval. NMDOT will review and approve/reject the methodologies and resulting factors within two weeks of receipt. NMDOT approval must be obtained in writing before the new growth factors may be used.

Weight data by vehicle classification will be summarized as per FHWA TMG. The NMDOT Traffic Monitoring Program will prepare monthly and annual reports.

The data from Automatic Weight and Classification System devices will be used to compute Monthly Weight Ratios (MWRs). MWRs will initially be standardized as unique, significant only at the site at which they are collected. The weight data will be reviewed to determine if weight data can be grouped among sites. The analysis will include vehicle classification weight by factor groups, which are grouped by functional system of road, seasonal variation, and region of the state.

Coverage and project-related special counts will be adjusted for seasonal variation using monthly adjustment factors.

Coverage and special traffic volume counts will be adjusted for multiple axle vehicles by a loop correction factor. If a vehicle classification count was taken in the current year, the site-specific vehicle classification based loop correction factor should be used to adjust recorded axle impulses to vehicles. Loop correction factors, for traffic sections on which vehicle classification counts were not taken in the current year shall be derived by the NMDOT.

Monthly adjustment factors will be derived from standard data by factor groups.

Vehicle classification-based seasonal loop correction factors will be derived by CCS and short-term counts. The current year average by factor groups, which are grouped by functional system, will be used as the adjustment factors.

**Vehicle Miles Traveled**

Daily Vehicle Miles Traveled (DVMT) will be calculated for each traffic section by multiplying the length of each unique traffic section by Annual Average Daily Traffic.

Annual Vehicle Miles Traveled (AVMT) will be calculated for each traffic section by multiplying the DVMT by 365.
Traffic Monitoring Period

All counts taken in an Urban area will have a data summarization period of 15-minute intervals. An Urban area is defined as any community with a population of 5,000 persons or more.

All counts taken in a rural area will have a data summarization period of 15-minute intervals. All roads in areas of the state in which there is not a population of 5,000 persons or more are rural roads.

There will be a minimum of 48 whole consecutive hours of data collected by direction reported from each coverage and special count site. This standard will apply for volume, classification, and weight, including screen line or cordon counts, and site-specific counts requested by the New Mexico State Legislature.

Indicated in Section 3.3.3 of the TMG, at a minimum the TMG recommends that State highway agencies initially aim to collect 25 to 30 percent of their short-duration counts with classification counting equipment. Agencies that can exceed this figure are encouraged to do so. When NMDOT provides funding for conducting short-duration counts, 30 percent of the short-duration counts shall be conducted using classification counting equipment. These counts shall be conducted on a 48-hour basis, adjusted, and documented in compliance with the NMSTMS. An agency may request a meeting to determine a specific breakdown of classification counts per roadway functional classification. This meeting request may be made on or after January 1 of the calendar year.

All short duration counts using funding provided by NMDOT collecting classification shall also collect speed data, there will be 24 CCS (48 whole short-term) consecutive hours of data collected for one direction for each speed coverage and special count site.

Interchange ramps, and ramp-freeway junctions, will be monitored by volume and classification procedures identified for coverage and special, project-related counts for traffic sections. Interchange ramp/street junctions will be monitored by traffic monitoring procedures identified for intersections. Interchange traffic monitoring includes analysis of traffic on the contiguous upstream and downstream Interstate unique traffic sections. If traffic counts were taken on the contiguous Interstate traffic sections in the same or prior calendar year, no additional count activity is required. If no traffic counts were taken on the contiguous upstream and downstream Interstate traffic sections, interchange traffic monitoring will include counts on the Interstate traffic sections, except as provided within “Ramp Balancing” section for ramp balancing. The Interstate traffic section counts will be 48 whole hour, weekday counts, conducted in the same seasonal adjustment period as the Interchange ramp monitoring.

Multilane, Divided & Interstate counts shall be collected for both directions within the same 548 whole hour period for the same Traffic Section ID or Traffic Segmentation.

Special count activities designed to monitor weekend traffic for identification of recreational route traffic characteristics require data collection for the entire weekend period (00:00 Saturday - 24:00 Sunday) and can be supplemented with a full 7-day count.

Traffic Report Period and Data Transmittal

The traffic-monitoring year will follow the calendar year, from January 1 through December 31.
Refer to “Standards Review Procedures” for Formats and Websites. For FHWA—3 Card (Volume), FHWA - C Card (Classification), and W Card (Weight) and other traffic monitoring formats refer to TMG Chapter 7.

Upon agreement with the NMDOT, the MPO’s/RTPO’s may perform a year end load of summary statistics rather than transmitting data periodically. Minimum prerequisites for such an agreement shall include:

1. MPO’s/RTPO’s must maintain the capability to transmit data to TMS.
2. MPO’s/RTPO’s must possess and maintain software which is capable of: applying all applicable state standards to the raw data; generating and storing all appropriate summary statistics; and all required reports under the same time constraints as those that apply to the NMDOT.
3. The MPO/RTPO must store and maintain all raw data in its original form.
4. The year-end load shall be done electronically and in compliance with the time, data and format requirements specified by the NMDOT.
5. The process must be tested and approved prior to implementation.
6. Upon request the MPO/RTPO will be required to submit hard copies of reports to the NMDOT or other interested parties within seven days of the request.
7. The end of each calendar year both the NMDOT and the MPO/RTPO will produce Vehicle Miles Traveled (VMT) data by factor groups, which are grouped by functional system, representing data from the area covered by the year end load. The acceptance requirements for this process shall be VMT data by factor groups, grouped by functional system that are within plus or minus one percent. The official VMT report (VM-2) is provided by FHWA in the Highway Statistics Reporting for each respective year in Section 5 Highway Travel Report 5.4.1 Vehicle-Miles of travel, by functional system, located at: https://www.fhwa.dot.gov/policyinformation/statistics.cfm
8. The coverage count reports for standard compliant data will be transmitted no later than one month after data acceptance by the Traffic Monitoring Program.

Metropolitan and Regional Planning Organizations, NMDOT Districts, county and municipal governmental agencies, and private consulting engineering firms will transmit raw traffic data to the Traffic Monitoring Program no later than one month after the data collection except for Calendar Year End. This data must be transmitted no later than December 31st of each year.

Metropolitan and Regional Planning Organizations, NMDOT Districts, County and Municipal agencies monitoring traffic on roads which either currently or are proposed for state or federal funding, will transmit the raw data to the Traffic Monitoring Program for data evaluation, data processing, and report generation. The data will be transmitted no later than one month after data collection except for Calendar Year End. This data must be submitted no later than December 31st of each year.

Metropolitan and Regional Planning Organizations, NMDOT Districts, County and Municipal agencies monitoring traffic on roads neither currently nor proposed for state or federal funding, shall transmit the
raw data, that is in a format compatible with NM TCDS, and to the Traffic Monitoring Program for data evaluation, data processing, and report generation.

Private consulting firms collecting New Mexico traffic data for a state or federally funded transportation project or study, will transmit the raw data (roadway & turning movement counts) to the Traffic Monitoring Program for data evaluation, data processing, and report generation. The data will be transmitted no later than one month after data collection except for calendar year end. This data must be submitted by no later than December 31st of each year. Data should conform to the NMSTMS.

Private consulting firms collecting New Mexico traffic data for a transportation project or study not funded by the state or federal government, are strongly encouraged to transmit the raw data that is in a format compatible with NM TCDS.

Traffic summary reports within the area of MPO’s/RTPO’s, and Municipalities processed by the Traffic Monitoring Program from data not collected by the MPO’s/RTPO’s/Municipalities, will be transmitted to the MPO/RTPO/Municipality either electronically or in hard copy format as processing capability permits. The reports will be transmitted monthly. This will ensure that the MPO’s/RTPO’s/Municipalities have all standard traffic data summary statistics for their metropolitan area.

Interim analysis and reporting of traffic summary statistics from special counts, will be provided to the county or municipal governmental agency or private firm collecting the data by the NMDOT.

Monthly traffic summary statistics from permanent traffic recording devices located within the area of MPO’s/RTPO’s and Municipalities will be transmitted to the MPO’s/RTPO’s/Municipalities monthly. During monthly NM TCDS data processing, the monthly traffic reports transmitted for state and federal use will also be transmitted to the MPO/RTPO/Municipality.

Final reporting and analysis for all counts, within an MPO/RPO/Municipality area, accepted by the Traffic Monitoring Program, will be provided to the MPO/RPO/Municipality by the NMDOT. These reports will be transmitted no later than February 15 of each year.
**Types of Counts**

The following details the types of traffic counts designated by this document. These types include:

- Permanent Counts
- Short Duration Counts
- Coverage and Special Counts
- Turning Movement Counts
- Non-Motorized Counts

Each count shall conform to the requirements of the Traffic Monitoring Guide unless otherwise stated. All counting devices shall perform at a 90% accuracy level.

**Continuous Count Stations (CCS)**

The purpose of a CCS device is to collect data each day of the year on a unique traffic section. CCS devices must be polled on a 24-hour basis to ensure data collection and device maintenance.

The NMDOT will be responsible for all CCS data collection and summarization, including those non-interstate CCS inside the Urban Area Boundaries of areas with populations of 50,000 or more.

MPO’s/RTPO’s and Municipalities may directly collect CCS data within the Urban Area Boundary of their individual areas. Polling times will be coordinated between the NMDOT, MPO’s/RTPO’s and Municipalities, including the operating times of system clocks on PC’s.

On traffic sections for which there is not full access control, the CCS must measure volume at a specific point crossing all lanes of travel. On traffic sections for which there is full access control, the CCS may measure volume at any point within the unique traffic sections, but must include all lanes of travel.

For application of the mean traffic volume summary statistics by factor groups, which are grouped by functional system, there must be a minimum of six CCSs for each factor group. If the minimum requirements is not met for a particular factor groups of a functional system, then mean traffic volume summary statistics for that factor group will be generated utilizing the CCSs of the factor group plus all permanent recorders from the next higher factor groups or if necessary from the next lower factor group.

When a CCS malfunctions, repairs shall commence within one week of the reported malfunction after site evaluation.

The number of CCSs included in calculation of mean traffic summary statistics will be provided, by factor groups, as part of annual Traffic Monitoring Program data processing and reporting.

The NMDOT will be responsible to annually summarize all MTR data by factor group or group of factor groups for a functional system and by MPO’s and Municipalities, both individually and as a group, and will provide mean statistics to all interested governmental agencies on or before February 15 of each year.

The CCS polling software must include verification of the microcomputer date and time.

If the clock on the CCS exceeds +/- 10 minutes of the verified counter clock, then all data for that day will be excluded from summarization and reporting.
If the clock on the CCS is less than +/- 10 minutes, but greater than +/- 5 minutes on the verified computer clock, a warning will be issued and the time will be adjusted on the field clock.

When the same-recorded traffic volume occurs at a CCS, other than zero, for four consecutive intervals a warning message will be displayed and the day’s data will be reviewed for optional purge.

When eight hours of recorded successive zeros occur at a CCS, a warning message will be displayed and the day's data will be reviewed for optional purge.

If the daily directional total volume at a CCS is within the range of 60% to 80% of the total traffic for that day, a data and device review message will be displayed.

If a daily directional total volume at a CCS exceeds 80% of the total traffic for that day, the data will not be included when computing site traffic summary statistics.

If the CCS records vehicle type information and the daily percentage of unidentified vehicles exceeds 10 percent of the total, the vehicle class information will be automatically purged from the summary file and may not be used under any circumstances to generate annual or monthly loop correction factors. Volume data for the day may be retained. If the daily percentage of unidentified vehicles exceeds 20 percent of the total, the day’s data, including volume summaries, will be automatically purged and device error message will be displayed. If the unidentified percentage exceeds 20 percent for three consecutive days, the device will temporarily be set to record volume information only until the site can be evaluated and repairs made as necessary.

To derive representative MADW volumes, when the daily directional traffic volume for a given day of the week in a month exceeds two standard deviations from the mean previous year’s same day of the week directional AADW, a data device review message will be displayed. If the daily directional traffic volume for a given day of the week in a month exceeds four standard deviations from the previous year’s same day of the week directional AADW it will be considered an outlier and stored in the NM TCDS. The mean volume will be recalculated excluding the outlier.

For CCSs that are not directly accessible to the NMDOT Data Management Bureau, agencies shall submit “PRN” or equivalent type files that are acceptable to the NM TCDS to the NMDOT Data Management Bureau.

All files shall be properly formatted for entry into the NM TCDS. Appendix A details the formatting requirements specific to the NMDOT’s system. Specific to the NMDOT, data headers shall conform as follows (taken from Appendix A):

- Location ID shall be contained in the first 12-character field of the header, padded with zeros as needed.
- Short duration counts must be numbered with 0001 for POS (Positive Direction) and 0002 for NEG (Negative Direction), even if the directions are captured in separate files. The positions of these numbers can be found in Appendix A.
- Start time between separate POS and NEG PRN files must match, even if the collection start time differs. Please use the counting device manufacturer’s software to synchronize start date and time.
Each new installation of a CCS, must comply with NMDOT Special Provision 730. Special Provision 730 requires that the installed device be tested and meet an accuracy level of:

A. +/- 2% of the CCS traffic count comparison to a manual traffic volume count.

B. +/- 10% of the CCS traffic classification comparison to a manual traffic classification count.

C. For weight data collection, the device must be within +/- 5% of five known vehicle weight passes.

Special Provision 730 also requires that the Contractor responsible for installation of the device be different than the agency/company/consultant that certifies the counter’s accuracy.

Special Provision 730 is available from the Data Management Bureau.

**Short Duration Counts**

All traffic data for HPMS shall be based on a minimum of 48 whole hours of continuous monitoring for volume and vehicle classification, which is referred to as short term monitoring.

Multilane, Divided and Interstate Interchange ramps will be counted for 48 whole hours, Monday 00:00 through Friday 13:00. All ramps within the same interchange will be counted within the same seasonal adjustment period. Any re-counts submitted should be for the same seasonal adjustment period and the same days of the week, if possible.

**Coverage and Special Counts**

The NMDOT will provide counts for all annual full extent coverage count on a three (3) year, six (6) year, or twelve (12) year count cycle based on functional system, other than the roads within the boundaries, which represent an MPO’s/RTPO’s/Municipalities planning, and data collection jurisdiction as agreed upon by the MPO/RTPO/Municipalities and the NMDOT.

The requirements of “Short Duration Counts” as detailed above shall apply to coverage and special counts.

Interstate mainline data may be combined with Interstate ramp data to produce an upstream or downstream volume under the following conditions:

1. The data for the two locations monitored are standard.

2. The same 48 whole hours of data are used.

3. The same interval is recorded.

4. The roadways, which access the controlled facility, allow travel in only one direction.

5. The process for adding the two files is electronic.

6. Data may only be produced for the mainline links immediately up-stream or down-stream from the point of access.

**Ramp Balancing for Estimation of Interstate Mainline Volumes**

The method of ramp balancing must be approved in writing by the NMDOT before the new technique can be used. The standardized technique, to provide the best reliable estimates, needs consistent reliable
data points. Intermediate ramp volumes would be factored to make them consistent with known upstream and downstream volumes.

An example of the procedures and calculations is provided in TMG section 6 beginning on TMB page 6-6. Publication of the resulting estimates would be allowed so long as the following conditions are met, pertaining to publication of nonstandard data.

In addition to situations where Interstate mainline counts may not be feasible, there will from time to time be other locations, which are missed due to scheduling, construction, weather, etc. It is suggested that the standards allow for more flexibility in the publication of such data.

Vehicle classification coverage counts will be based on electronic vehicle classification. Currently utilized classification devices in New Mexico accurately record axle impulses, but do not provide consistent, accurate interpretation of axle impulses into classification of vehicles when vehicles travel is not free flowing. Classification by length may also be used.

The manual urban traffic section counts, just as electronic vehicle classification counts, will be based on FHWA specified vehicle classification.

The vehicle classification manual count activity will follow one of the two procedures, designed to collect data manually when vehicle speeds prohibit the use of an electronic device.

1. Fixed Traffic Section Manual Count Period:

   Manual counts will be conducted within a given day from 07:00 to 10:00, 11:00 to 14:00, and 15:00 to 18:00. This provides three traffic-monitoring periods during the day, each of a three-hour duration, for a total of nine hours of data collection. Missing peak hour period can be counted within 7 days of the original count.

2. Flexible Traffic Section Manual Count Period:

   Manual counts will be conducted within a given day based on observed peak traffic conditions. The typical morning, noon, and evening peak hours will each be defined, using 15-minute intervals rather than the clock hour. One hour before, and one hour after the anticipated peak hour, will be defined. This will result in three traffic-monitoring periods during the day, each of three-hour duration, for a total of nine hours of data collection. Missing peak hour period can be counted within 7 days of the original count.
Intersection Turning Movement Counts

All manual turning movement counts will classify vehicles into two categories. The first category will include all vehicles in the FHWA's vehicle classification Bin 1-3 and the second Bin will include all vehicles in classes 4-13, or three Bins consisting of 1-3, 4-7, and 8-13. If more precise vehicle classification data is needed for the intersection, then the turning movement counts will be supplemented by electronic or manual vehicle classification counts.

The period of intersection manual turning movement counts will follow one of two procedures:

1) Fixed Intersection Count Period:

   Manual counts will be conducted from 07:00 to 10:00, 11:00 to 14:00, and 15:00 to 18:00. This provides three traffic-monitoring periods over a period of twenty-four hours, each of a three-hour duration, for a total of nine hours of data collection.

2) Flexible Intersection Count Period:

   Manual counts will be conducted based on observed peak traffic conditions from a standard 48 whole hour volume count conducted on the high-volume leg of the intersection within the same seasonal adjustment period. The typical morning, noon, and evening peak hours will each be defined using fifteen-minute intervals rather than the clock hour. At a minimum, one half hour before and one-half hour after each anticipated peak hour will be defined. This will result in three traffic-monitoring periods over a period of twenty-four hours, each of a minimum of two hours’ duration, for a total of a minimum of six hours of data collection.

Turning movement count shall be submitted in digital format. (CSV or XLS). Submittal of turning movement counts to the NMDOT shall include details regarding the date and periods of data collection as well as a site diagram.
Non-Motorized Counts
Future section. All non-motorized shall follow TMG guidelines.
Weigh-in-Motion Counters (WIMs)

A WIM is a type of CCS that is also capable of collecting vehicle weight data. The purpose of a WIM is to collect weight data each day of the year on a unique traffic section. WIMs must be polled on a 24-hour basis to ensure data collection and device maintenance. All WIMs provide accurate vehicle weight data on a per vehicle basis.
Appendix A: NM TCDS Data Requirements
NM TCDS Requirements: NMDOT PRN Headers

NMDOT specific header requirements:

- Location ID must be in the first 12 character field of the header, padded with zeros as needed.

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- Short Count Stations must be numbered with 0001 for POS direction and 0002 for NEG direction, even if the directions are captured in separate files.

POS

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- Start times between separate POS and NEG PRN files must match, even if the collection start time differs. Please use the manufacturer’s software to synchronize start date and time.
PRN File Format Descriptions

Field 1 Format:
12-character field:
Characters 1-8 = Zero-Filled Station ID.
Character 9 = First Direction of Travel Code
Character 10 = Number of lanes in First direction of travel
Character 11 = Second Direction of Travel Code
Character 12 = Number of lanes in Second direction of travel

Direction of Travel Codes:  Special Cases:
  0 = 2-Way
  1 = NB
  2 = SB
  3 = EB
  4 = GG
  5 = SB
  6 = SM
  7 = MB
  0 = MM

1. Combined directions (2-Way): chars 9-12 should be set to 0.
2. Directional file (NB, SB or EB, MB etc.): chars 10, 12 should be set to 0. Chars 9, 11 should contain the correct Direction of Travel Code.
3. By lanes file: chars 10, 12 should be set to be the number of lanes for the corresponding direction. Chars 9, 11 should contain the correct Direction of Travel Code.

Field 2 Format:
12-character field:
Characters 1-6 = 0 Filled.
Characters 7-12 = 6-digit Lane Configuration Code
(Only required if more than 1 lane of data is included in the file in either direction)

Lane Configuration Codes:
12321 = Curb Lane at beginning and end
123123 = Curb Lane at beginning and beginning
322321 = Curb Lane at end and end
323123 = Curb Lane at end and beginning

---

PRN Header

PRN Data
2-WAY PRN Example

Station ID = B328
2-WAY total only

Volume

Channel 1 = 2-WAY total

Class

Channel 1 = 2-WAY total

Field 1

Field 1
1 Direction PRN Example (Lanes Combined)

Station ID = B328
First Direction of Travel = Eastbound

Volume

Channel 1 = EB total

Class

Channel 1 = EB total

New Mexico Department of Transportation
A-4
State Traffic Monitoring Standards
# Direction PRN Example (Lanes Separated)

**Station ID = B328**  
*First Direction of Travel = Eastbound*

## Volume

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**Weather:** Nice

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**Weather:** Nice

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*New Mexico Department of Transportation*  
*A-5*  
*State Traffic Monitoring Standards*
### 2-Direction PRN Example (Lanes Combined)

Station ID = B328  
First Direction of Travel = Eastbound  
Second Direction of Travel = Westbound

#### Volume

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#### Class

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2-DIRECTION PRN EXAMPLE (LANES SEPARATED)

Station ID = B328
First Direction of Travel = Eastbound
Second Direction of Travel = Westbound

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