GUIDANCE ON TRAFFIC COUNT DATA

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massDOT
Massachusetts Department of Transportation
Highway Division

Introduction

Traffic counts are currently at historic lows and may underrepresent a realistic existing condition. Current MassDOT guidelines, however, require the use of existing count data for the purposes of planning and designing projects. The purpose of this document is to provide guidance for alternative methods that may be used to supplement or replace existing traffic count data.

Use of Historical Counts

MassDOT will accept the use of historical count data in lieu of new traffic counts taken after March 13, 2020. As long as the procedures found in this document are followed, counts taken between January 1, 2014 and March 13, 2020 will be accepted without any additional approval required. Counts take prior to January 1, 2014 will need to be approved by the State Traffic Engineer prior to submitting the functional design report or other traffic engineering study.

How MassDOT Determines Growth Rates

MassDOT oversees approximately 500 permanent counting stations across the Commonwealth that are constantly taking volume data. In addition, MassDOT supplements these permanent count stations with spot counts taken at various locations. All of the count data is geolocated and, when processed, has the following metadata tagged to it:

- Geographic Area Type
  - U = Urban
  - R = Rural
- Functional Class
  - 1 = Interstate
  - 2 = Freeways & Expressways
  - 3 = Other Principal Arterial
  - 4 = Minor Arterial
  - 5 = Major Collector
  - 6 = Minor Collector
  - 7 = Local Road or Street
- Region
  - Boston = Middlesex, Suffolk, and Norfolk Counties
  - Essex = Essex County
  - *Southeast = Bristol, Plymouth, Barnstable, Nantucket, and Dukes Counties
  - *West = Berkshire, Franklin, Hampshire, and Hampden Counties
  - Worcester = Worcester County

This combination of Geographic Area Type, Functional Class, and Region is referred to as Factor Group. Based upon the aggregated count data for each Factor Group, MassDOT establishes day of week, monthly, yearly, and axle correction adjustment factors. These factors are published into reports that can be used to determine historical growth rates.

*Note that beginning in 2016, MassDOT has further refined some of the Factor Groups for portions of the Commonwealth that experience significant seasonal fluctuations in traffic. These Factor Groups supersede Geographic Area Type, Functional Class, and Region and may be applied to

counts taken in 2016 or later anywhere within their boundaries. These Factor Groups are defined as:

- REC East: all towns on Cape Cod, the Town of Plymouth south of Route 3A, all towns on Martha's Vineyard, and Nantucket.
- REC West: roadways with a Functional Class of 3-5 in the towns of Becket, Great Barrington, Lee, Lenox, Stockbridge, and West Stockbridge.

Procedures for Estimating Average Annual Daily Traffic (AADT)

To estimate existing AADT from an historical count, the count location should be classified by Geographic Area Type, Functional Class, and Region per the descriptions from the previous section. Once the classification has been completed, the following steps are required.

1. Axle Correction

(Please note this step is required only if the original count did not include vehicle classification data, typically a single pneumatic tube. If classification data has been included, please proceed directly to Step 2.)

- Identify the year the count was taken.
- Open the Weekday Seasonal Axle Correction file for the year that corresponds to the raw count data.
- Multiply the average daily traffic (ADT) taken from the raw count data by the Axle Factor for the corresponding Factor Group.

2. Seasonal Factor

- Identify the month and year the count was taken.
- Open the Weekday Seasonal Axle Correction file for the year that corresponds to the raw count data.
- Multiply the number obtained in Step 1 (or the raw count data if it contains vehicle classification data) by the Monthly Factor for the corresponding Factor Group.

3. Yearly Growth

- Identify the year the count was taken.
- Open the Yearly Growth Rate file. Note that MassDOT considers 2019 data to be existing.
- The Growth Factors are set up to factor count data to the year shown in the header column from the previous year. Therefore, using the appropriate Factor Group, multiply the number obtained in Step 2 by the growth factor for the year after it was taken. Repeat the factoring until it is grown to 2019.
    - A count taken in 2018 will only need the 2019 factor applied to it.
    - A count taken in 2015 will need to go through four steps of factoring: the 2016 factor, then the 2017 factor, then the 2018 factor, and finally the 2019 factor.

Once these steps have been completed, the existing AADT may be estimated.

Procedures for Estimating Turning Movement Counts (TMCs)

In cases where historic TMCs are available for an intersection, those volumes may be adjusted based upon these procedures in order to estimate existing traffic volumes.

1. Seasonal Factor

- Identify the day, month, and year the count was taken.
- Open the Seasonal Factors Report file for the corresponding year.
- Using the appropriate Factor Group, identify the Seasonal Factor by month and day. If that number is equal to or less than 1, then no Seasonal Factor needs to be applied. If that number is greater than one then the TMC should be multiplied by that number.

2. Yearly Growth

- Using the seasonally factored count data, follow the steps found in Part 3 of Procedures for Estimating AADT.

If no historic TMC can be obtained, consultation with MassDOT's Traffic and Safety Engineering Section is strongly encouraged prior to estimating existing volumes. Failure to do so may result in rejection of the submittal to MassDOT.

Non-Motorized Users

MassDOT does not currently have any methodologies for estimating non-motorized users from historical count data. Based upon mode share and employment data, it can be assumed that non-motorized volumes have increased on a yearly basis. However, without access to data from permanent count stations, it is difficult to provide any type of regional growth or seasonal factors compared to what is available for motorized traffic.

Capturing bicycle and pedestrian data in 2020 in areas that are typically designed to accommodate peaked volumes that are associated with commuting may not be realistic. However, there are many third-party sensor and/or probe data aggregators that may provide good baseline information from 2019. This data is acceptable for use in design and operational analysis.

For recreational facilities, taking new bicycle and pedestrian counts after March 13, 2020 will likely be acceptable, though any adjacent generators of bicycle and pedestrian traffic that are temporarily closed should be taken into consideration prior to taking new counts. Comparing historic third-party sensor or probe data to 2020 data may add additional confidence and, in addition, provide practical future growth rates.

Future Growth Rates

MassDOT recommends that 2019 counts be grown to the build year using growth rates obtained from the Regional Planning Agency (RPA), if available. If specific, known future traffic generators are identified, they may be added to the count either in addition to the growth rate or while partially discounting the growth rate. In all cases, the methodology used for growing the traffic to the build year shall be documented and shall conform to planning and engineering principles.

Traffic Signal Warrant Analysis

Traffic Signal Warrants may be estimated using historic TMC count data that is factored to 2019 using the methodology presented in this document. It is understood that many TMCs will not have 8 hours of data, so it will be acceptable to use Warrant 2 (Four-Hour Vehicular Volume) in place of the typical Warrant 1 (Eight-Hour Vehicular Volume) that MassDOT typically recommends as justification. Warrant 3 (Peak Hour) alone is still not recommended as justification for installation of a traffic signal unless very unusual circumstances exist, per MUTCD standards.

Where no TMCs exist, Traffic Signal Warrants may be estimated using third-party sensor or probe data, estimates based upon ATRs, or combinations thereof, upon authorization from the State Traffic Engineer. The methodology for estimating TMCs shall be presented to MassDOT as part of any request for approval.