NS 540 Improve Default Annual Average Daily Traffic, AADT: Literature Search
July 3, 2018

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Resources searched: Transport Database, TRB RiP, MnDOT Library Catalog

Summary: This literature search reflects results on “Improving the Default Annual Average Daily Traffic” counts. Results are compiled from the databases named above. Most of the results mention various adjustment factors and methods of data collection.

Most Relevant Results
Title: Evaluating the Highway Capacity Manual’s Adjustment Factor for Annual Weekday to Annual Average Daily Traffic: Applying a Consistent Traffic Data Methodology.
Author: Lewis Martin; Albright David Preston
Publisher: Transportation Research Board, 500 Fifth Street, NW, Washington, DC, 20001, USA
Citation: Transportation Research Record: Journal of the Transportation Research Board. 2007. (1993) pp 117-123(7 Refs., 3 Tabs.)
Abstract: The Bernalillo County Public Works Division, New Mexico, developed a methodology to understand and assess traffic monitoring data. The methodology was applied to a national default value used to adjust traffic field measurements. This paper describes research on improving the traffic monitoring process and product. The proposed methodology identifies seven steps to understanding traffic data. The steps can be implemented by an individual analyst, but are recommended for discussion by all stakeholders in the traffic monitoring process including field personnel, office personnel who summarize and report the data, and data users. The methodology was applied to a national default value presented in the 2000 Highway Capacity Manual (HCM) that has been widely implemented, including by Bernalillo County. The factor adjusts traffic summary statistics to represent annual average daily traffic. The factor is used by local governments to adjust short-term traffic counts taken during the workweek so that the summary statistic can be used in a variety of applications including accident exposure rates. Accident exposure rates, for example, are based on traffic for all days, not the workweek. The result of the application of the methodology is that the national default value was found to be inappropriate. Modification to the HCM is recommended. Research to improve further the traffic monitoring process will develop, train, and exercise a team approach to understanding traffic data. Research to further improve the traffic monitoring product will be to identify local data collection sites and compare national, state, and local adjustment factors.

Title: Effects of State-Specific SPFs, AADT Estimations, and Overdispersion Parameters on Crash Predictions Using SafetyAnalyst.
Author: Alluri Priyanka; Ogle Jennifer
Citation: Conference Title: 91st Annual Meeting. Location: Washington. Sponsored by: Transportation Research Board. Held: 20120122-20120126. 2012. 22p(Figs., Refs., Tabs.)
Abstract: SafetyAnalyst performs network screening using empirical Bayes approach which requires safety performance functions (SPFs) in addition to roadway characteristics, traffic, and crash data. Simple SPFs (i.e. crashes are predicted as a function of traffic alone) are used within SafetyAnalyst. These simple SPFs were generated using CA, MN, NC, OH, and WA data. Within the software, these default SPFs are calibrated to represent the agency’s data. How well these calibrated default SPFs fit another state’s data is a question yet to be answered. This research aims at comparing the fit of Georgia specific SPFs and the default SPFs calibrated to Georgia data. As hypothesized, it was found that state specific SPFs fit the data well, however, the accuracy
Title: Estimation of Crossing Conflict at Signalized Intersection Using High-Resolution Traffic Data
Author: Henry X. Liu, Gary A. Davis, Shengyin Shen, Xuan Di, and Indrajit Chatterjee.
Publisher: Minnesota Department of Transportation; Research Services & Library
Publication Year: 2017

Title: Review of Traffic Monitoring Factor Groupings and the Determination of Seasonal Adjustment Factors for Cars and Trucks.
Author: Schneider William H; Tsapakis Ioannis
Citation: 2009/11. 299p(9 Apps., 59 Refs.)
Abstract: One of the most common traffic volume parameters reported by statewide traffic monitoring programs is annual average daily traffic (AADT). Departments of Transportation (DOTs) and other state agencies use a series of continuous vehicle detection devices in association with smaller more mobile short-term counts. Once the short-term counts are recorded a series of adjustment factors (time of day, day of week, month of year, or seasonal) are applied to the short-term counts. The end result is an estimated AADT for a particular segment of roadway. Traditionally, as defined in section two of the Traffic Monitoring Guide (TMG), there are three methodologies, geographic/functional assignment of roads to groups, cluster analysis and the same road application factor. In each case, there are advantages and disadvantages and currently there is not a final peer reviewed nationally suggested method. The benefits associated with this research include an improved method for estimating AADT throughout Ohio.

Title: TRAFFIC VOLUME MONITORING RELATED RESEARCH.
Author: French L J; Iskander W; Jaraiedi M
Citation: 2001/5/4. 76 p.(2 Apps.)
Abstract: The goal of this research project was to investigate two short-term issues currently faced by the Pennsylvania Department of Transportation (PennDOT) relative to its statewide traffic counting program. PennDOT operates 63 Automatic Traffic Recorders (ATR) that are used to calculate adjustment factors to estimate Annual Average Daily Traffic (AADT) from short-term counts. Monthly adjustment factors calculated from 1998 and 1999 data were tested using statistical analysis to determine (1) their statistical significance and (2) short term strategies to improve effectiveness of the program. PennDOT also uses the ATR data along with other short-term counts to calculate annual growth factors for various functional classes and regions across the state. Statistical analysis of this program was conducted to determine its overall quality and to recommend short-term improvements. A second phase of this overall research is anticipated in which longer-term issues with the two programs will be investigated. The study found that there are a number of deficiencies in the current process of estimating growth factors in Pennsylvania. Growth factors were calculated for only 35 of the 42 categories since 7 of them do not contain any sites. If groups that have either a sample size of three or less or precision levels greater than 10% are considered to be inadequate, then only 14 of the groups, or 40% of the 35 groups having at least one site are adequate. In general, the counting program that supports the estimation of growth factors will require some long-range and deep-reaching changes. The program should be reviewed in detail to determine if a different general approach should be adopted. Currently, significant effort is expended taking longer-duration counts at fewer locations. The approach puts more emphasis on "temporal" rather than "spatial" aspects that would have shorter count durations and more locations. The Traffic Monitoring Guide (TMG) recommends more emphasis on the spatial aspects. This approach should be investigated in greater detail to determine if it might yield better results relative to growth factor estimation.

Title: Improving Seasonal Adjustment Factors for Better AADT Estimation using Network
Abstract: Annual average daily traffic (AADT) values play an important role in transportation design, operation, and planning. Each year, transportation agencies spend a significant amount of resources collecting this...
information. However, AADT values are mostly rough estimates based on the closest short-period traffic counts, factored up using adjustment factors derived from permanent continuous count stations. For example, in New York State, the unadjusted AADT obtained from the short period traffic counter is adjusted by the seasonal adjustment factors and the axle adjustment factor. Thus the accuracy of AADT relies heavily on the precision of adjustment factors. New York State calculates the seasonal adjustment factors using the average of three years’ continuous count data. The factors are then grouped into three categories based on road segment locations and functions: urban, suburban and recreational. (NYSDOT, 2010) Although convenient to use, such factor categorization leads to aggregate and arbitrary estimates. For example, in the transitional areas between suburban and recreational sites, it is often difficult to determine which group of factors should be used. Different land use types and demographic distribution in the surrounding neighborhood may also lead to different temporal fluctuation. For example, though both in "urban" areas, roads along commercial development tend to have peak volume during weekends of holiday seasons while those within residential development normally have lower volume in the same time period. This research develops a method that will generate site-specific seasonal adjustment factors based on (1) site conditions such as the number of lanes, road functional classification and surrounding neighborhood information, and (2) the spatial dependence of traffic flows over road network. That is, in addition to the consideration of various site-specific variables, each road segment will also obtain its unique adjustment factor based on its spatial connections to the surrounding permanent continuous count stations. The theoretical foundation of such method is Tobler's first law of geography: "Everything is related to everything else, but near things are more related than distant things." The proposed model is built on the Kriging method, which presumes spatial autocorrelation in unobserved factors as a function of distance. This study further advances the standard Kriging approach by utilizing network connectivity indicators instead of Euclidean distance. The indicators to be evaluated include network distance, network topology and equilibrium flow sensitivity. The validated model will be applied to the whole road network in the State of New York and yields a continuous adjustment factor map. The proposed research is of significant importance to the region. With the proposed method and the resulted adjustment factor map, the New York State will get more reliable AADT estimates, which are crucial to the planning and management of transportation systems. The approach also provides a promising way to explore spatial relationships across a wide variety of network-based data sets, including, for example, pavement conditions, traffic speeds, percentages of trucks, land values, and trip generation rates. All of these are critical components of the transportation system. In short, the proposed research will provide means to utilize the geographic information, develop new directions to solve traditional problems, and lead to significant impact on the efficient management of transportation systems in New York State.

Record URL: http://www.utrc2.org/research/projects/improving-seasonal-adjustment-factors
Contract Numbers: 49111-24-23
Status: Active
Funding Amount: 67913.00
Sponsor Organizations: Research and Innovative Technology Administration
University Transportation Centers Program
1200 New Jersey Avenue, SE
Washington, DC 20590 United States
Project Managers: Mooney, Deborah
Performing Organizations: Rensselaer Polytechnic Institute
Department of Civil & Environmental Engineering
110 8th Street
Troy, NY 12180 United States
Principal Investigators: Wang, Xiaokun Cara
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Start Date: 2012-01-01
Actual Completion Date: 2013-11-30
Source Data: RiP Project 29284
Title: Assessing Roadway Traffic Count Duration and Frequency Impacts on AADT Estimations

Abstract. The objectives of this research project are to gain a quantitative understanding on: (1) How various short term traffic count durations affect and relate to estimated annual average daily traffic (AADT) as compared with long term continuous counting program estimations. The ultimate goal is to enable the Federal Highway Administration (FHWA) to provide the most feasible and technically sound guidance to States and other agencies on this issue. (2) How missing data from long term traffic monitoring data affects the AADT estimation and establish the critical threshold in terms of data usability. In other words, how much data can be missing and what type of data patterns missing can be tolerated in AADT estimation without any special consideration such these steps used in converting short term counts to AADT. (3) Traffic monitoring methods from a given segment on an annual basis with a 24 hour traffic count program (counted on a frequency of every year) vs. monitoring the same segment on a once every three year (with every 2nd and 3rd year factored to bring them to current year) basis but with a minimum 48 or 72 hour hour count and how these three different methods can effect AADT data on an annual basis.

Record URL: http://www.pooledfund.org/Details/Study/534

Contract Numbers: TPF-5(292)

Status: Completed

Funding Amount: 308000

Sponsor Organizations: Alaska Department of Transportation and Public Facilities
Research & Technology Transfer
2301 Peger Road
Fairbanks, AK 99709-5399 United States
Wisconsin Department of Transportation
4802 Sheboygan Avenue
Madison, WI 53707 United States
Texas Department of Transportation
125 E. 11th Street
Austin, TX 78701-2483 United States
Pennsylvania Department of Transportation
Keystone Building
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Harrisburg, PA 17120 United States
Minnesota Department of Transportation
395 John Ireland Boulevard
St Paul, MN 55155 United States
Illinois Department of Transportation
2300 S. Dirksen Parkway
Springfield, IL 62764 United States
Georgia Department of Transportation
No. 2 Capitol Sqaure
Atlanta, GA 30334-1002 United States
Federal Highway Administration
1200 New Jersey Avenue, SE
Washington, DC 20590 United States

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Start Date: 2013-11-21
Title: Cost Effective Strategies for Estimating Statewide AADT

Abstract. The objectives of this research are to: (1) review current statewide data collection programs in the U.S. for obtaining, maintaining and estimating annual average daily traffic (AADT) data, and identify best practices; (2) review current data collection practices for obtaining, maintaining, and estimating AADT on different functional classes of roads in South Carolina; and (3) develop and pilot test methods and procedures to improve the statewide AADT data collection program in South Carolina, which includes county and city roads in the state.

Record URL: http://www.scdot.scltap.org/projects/current/

Contract Numbers: SPR 717

Status: Active

Funding Amount: 370,027.00

Sponsor Organizations: South Carolina Department of Transportation
955 Park Street
P.O. Box 191
Columbia, SC 29202-0191 United States

Federal Highway Administration
1200 New Jersey Avenue, SE
Washington, DC 20590 United States

Performing Organizations: Clemson University
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Start Date: 2015-03-01

Expected Completion Date: 2017-02-28

Title: Improve Traffic Volume Estimates from Regional Transportation Management Center (RTMC)

Abstract. Minnesota Department of Transportation (MnDOT) uses a large number of sensors in the freeway network to produce estimates of daily traffic for over 500 locations. Managing so many sensors to ensure correct functioning is a huge challenge. Thorough sensor screening is critical to ensure traffic data accuracy. While the Regional Transportation Management Center (RTMC) uses detector data to measure operational characteristics, MnDOT needs to expand the use of the collected data to support the accurate estimation of Annual Average Daily Traffic (AADT) using well researched methodologies to screen out suspicious or invalid data. Implementing previously identified methods or enhancing the algorithms and methods with additional research should lead to a more efficient and transparent means of determining AADTs, and should enhance the ability of RTMC to strategically target sensor testing and repair. The objective of this project is to quickly identify loop problems from a large pool of loops in order to obtain more accurate data. A software tool will be developed to detect bad or suspicious sensor from the daily archived data and RTMC repair log data. Another application of this software is in identification of specific types of loop problems for maintenance operation.

Contract Numbers: 99008 WO#251
Title: Method to Estimate Annual Average Daily Traffic for Minor Facilities for MAP-21 Reporting and Statewide Safety Analysis

Abstract. Accurately determining Annual Average Daily Traffic (AADT) is critical to many transportation planning, operational, and design decisions. AADT is a key input to geometric design of highways, design of pavements, safety analysis, emissions and air quality studies, and validation of traffic forecasting models. The most accurate way to determine AADT is from long term traffic counts obtained from Automatic Traffic Recorders (ATR) which count traffic volumes throughout the year. The state of Oregon has 177 ATR sites. The AADT at other roadway segments is estimated from short term traffic counts which are then scaled up using daily, weekly, or monthly adjustment factors. Traffic counts are expensive and labor intensive; extending short-term counts to cover all highway links will not be economical or practical.
**Start Date:** 2016-09-07  
**Expected Completion Date:** 2018-03-01  
**Source Agency:** Oregon Department of Transportation  
555 13th Street NE  
Salem, OR 97301 United States  

**Title:** Using mobile device samples to estimate traffic volumes  
**Author:** Turner, Shawn. : / prepared by Shawn Turner, Pete Koeneman. St. Paul, Minn.  
**Publisher:** Minnesota Department of Transportation, Research Services & Library, 2017.  
**Citation:** Mn/DOT Library Main Collection - MNDOT HE336.T7 T87 2017  
**URL:** [http://www.dot.state.mn.us/research/reports/2017/201749.pdf](http://www.dot.state.mn.us/research/reports/2017/201749.pdf)  

### Least Relevant Results

**Title:** Statewide Traffic Data Collection, Processing and Quality Control  
**Abstract.** The New Mexico Department of Transportation currently utilizes the "AASHTO Guide for the Design of Pavement Structures", combined with its own probabilistic design procedure for the design of all flexible pavement structures. These guidelines are used for the design of rigid and composite pavement structures. The Department plans to continue to utilize AASHTO conventions until the Mechanistic-Empirical Pavement Design Guide (MEPDG) is fully implemented. MEPDG provides a more realistic and cost-effective basis for pavement design through better understanding of local conditions. One of the four primary factors for input into the MEPDG process is accurate traffic data. The Department uses several methods to collect traffic data throughout the state. These include nineteen stationary Weigh-In-Motion (WIM) stations, 129 Automatic Traffic Recorders (ATRs), and Automatic Vehicle Classifiers (AVCs) which are used in addition to short duration counts to calculate Average Annual Daily Traffic (AADT) and to estimate projected growth.  
**Contract Numbers:** CO5339; NM10PLN-01  
**Status:** Active  
**Funding Amount:** 150000.00  
**Sponsor Organizations:** New Mexico Department of Transportation Research Bureau  
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**Principal Investigators:** Daniell, Keli  
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**Start Date:** 2010-03-04  
**Expected Completion Date:** --  
**Actual Completion Date:** 2011-12-03  
**Source Data:** RiP Project 28787  
**Source Agency:** New Mexico Department of Transportation  
State Highway Department Building  
1120 Cerrillos Road  
Sante Fe, NM 87504-1149 United States