pennsylvania
DEPARTMENT OF TRANSPORTATION

494-21-06

DATE: April 14, 2021

SUBJECT: FREEVAL-PA Assessment Tool

TO: District Executives

FROM: T Jay Cunningham, P.E., Acting Director
Bureau of Maintenance and Operations

This Strike-off Letter is time and resource neutral and replaces use of the Delay Analysis Workbook identified PennDOT's Publication 46: *Traffic Engineering Manual*.

FREEVAL-PA provides a simplified simple and accurate way of evaluating road user delays and queuing due to work zone restrictions on limited access highways. FREEVAL-PA uses the latest version of the Highway Capacity Manual 6th edition and provides simulation and modeling capabilities for maintenance, construction, and permit projects.

Beginning July 1, 2021, FREEVAL-PA should be used to evaluate work zone impacts on limited access roadways as follows:

- Department force maintenance projects – Prior to conducting field activity, an evaluation should be performed by District Traffic and/or Maintenance personnel and submitted to the District Traffic Engineer for approval. Districts may use the same evaluation to assess multiple activities, if the same general work zone set-up is being considered.
- Department Construction Projects – Prior to the Design Field View submission, District Design staff should perform an evaluation and submit to the District Traffic Engineer for approval. If a Delay Analysis Workbook submission has been completed prior to July 1st, the District Traffic Engineer may accept that analysis.
- Business Partner maintenance, construction, or permit projects – Prior to conducting field activity, an evaluation should be performed by the Business Partner and submitted to the District Traffic Engineer for approval.

Information on FREEVAL-PA is available at the following hyperlink:
http://www.dot.state.pa.us/Portal%20Information/Traffic%20Signal%20Portal/FREEVALPA.html

This website includes information on training, contact information, a user's forum, user's manuals, frequently asked questions, and troubleshooting information. It is recommended that virtual training be completed prior to using the FREEVAL-PA Tool. PennDOT staff can download the FREEVAL-PA software by logging into PennDOT's Virtual Private Network (VPN) and utilizing the Software Center located on your desktop. Outside partners can download the software from the website provided above.

Changes to Publication 46 are attached for use on July 1, 2021. These changes replace references to the Delay Analysis Workbook with references for FREEVAL-PA. Additionally, the Bureau of Maintenance and Operations is working on enhancements to the Work Zone Safety and Mobility Policy, and FREEVAL-PA will be part of a future Temporary Traffic Control Chapter in Publication 13M: *Design Manual Part 2 Highway Design*.

Should you any questions or require additional information, please contact Brian Crossley, Manager, Temporary Traffic Control Unit, at 717.265.7562.

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cc: Jason Wagner, Director, Policy and Government Relations, APC
Charles Goodhart, Executive Director, PAPA
John Becker, President, ACPA
Leeann Sherman, MPS, CAE, Executive Director, ACEC
Clint Beck, P.E., Director, Programs and Performance Management Division, FHWA
William Houpt, P.E., Safety Engineer, FHWA
Timothy Scanlon, P.E., Director, Traffic Engineering and Operations, PTC
Thomas Macchione, P.E., Traffic Engineering Manager, PTC
Assistant District Executives-Construction
Assistant District Executives-Design
Assistant District Executives-Maintenance
Louis Belmonte, P.E., Assistant District Executive-Operations, District 6-0
Maintenance Services Executives
District Planning and Programming Managers
District Plan Engineers
District Construction Mangers
District Traffic Engineers
District Work Zone Managers
County Maintenance Managers
Assistant County Maintenance Managers
Sarah Clark, Director, Legislative Affairs
Natasha Fackler, Director, Policy Office
Daryl St.Clair, P.E., Special Assistant, Highway Administration
Andrew Firment, Director, Operations and Performance Office
T Jay Cunningham, P.E., Acting Director, BOMO
Brian Thompson, P.E., Director, Bureau of Project Delivery
Jonathan Fleming, Chief, Maintenance Technical Leadership Division, BOMO
Douglas Tomlinson, P.E., Chief, Highway Safety and Traffic Operations Division, BOMO
Christine Norris, P.E., Chief, Construction and Materials Division, BOPD
Christine Spangler, P.E., Chief, Highway Delivery Division, BOPD
Nina Ertel, P.E., Acting Chief, Highway Design and Technology Section
Daniel Farley, P.E., Chief, TSMO Operations and Performance Section, BOMO
Stephen Gault, P.E., PTOE, Chief, TSMO Arterials and Planning Section, BOMO
Robert Pento, P.E., Chief, Traffic Engineering and Permits Section, BOMO
Gavin Gray, P.E., Chief, Highway Safety Section, BOMO
Brian Crossley, Manager, Temporary Traffic Control Unit, BOMO
MCK Read File

Exhibit 6-2 Determination of Significant Projects - Flow Chart Step Descriptions

Step	Process Title	Comments
1	Scope Project	Refer to Design Manual (DM) 1C, Chapter 2
2	Project Location	Is the project located on an interstate (including the PA Turnpike) or a freeway with fully-controlled, limited access?
3	Project lane Closures	Will the project have either intermittent or continuous lane closures (including detours) for more than 3 days?
4	WZ Alternatives Analysis & Impacts	WZ Alternative Analysis - identify ***potential, practical (viable)*** WZ alternative setups which fit the nature of the project and will minimize traffic impacts to motorists (could be 1 or more). • Conduct WZ impacts analysis for these viable WZ alternatives as indicated below. WZ Impacts - use FREEVAL-PA or other similar computer modeling programs. • Note: Prior analysis (≤3 yrs old) done for a recent similar project may be used to estimate impacts in lieu of new model development, if project characteristics are similar (WZ setups, location, traffic volumes, grades, access, etc.); if this prior analysis & impacts meets acceptable delays, there is no need for additional impact analysis.
5	Traffic Delay Thresholds	Acceptable Project Delay Impacts (Project is Non-Significant) • Additional (project-related) travel time through the project area (includes detours) is ≤ 20 minutes. Unacceptable Project Delay Impacts (Project is Significant) • Additional (project-related) travel time through the project area (includes detours) is > 20 minutes for time periods of 2 or more consecutive hours. *Note: Added travel time shall be determined as per Step 4 (under WZ Impacts).*
6	Non-Significant Project	Project does not meet policy parameters for being a Significant Project • For selected WZ approach, request approval as a Non-Significant Project. **(See Exhibit 6-3).** ○ Traffic delay analysis and preliminary project mitigation strategies (for the selected WZ approach) must be submitted & approved as part of **the Non-Significant** determination process.
7	Significant Project	Project meets policy parameters for being a Significant Project • For selected WZ approach, request approval as a Significant Project. **(See Exhibit 6-3).** ○ Work zone alternative analysis and preliminary project mitigation strategies (for the selected WZ approach) must be submitted & approved as part of the Significant Project determination process.

Applying WZSM in Project Development Process

Engineering District offices shall address transportation management and congestion mitigation issues in all phases of project delivery from the project planning stage throughout the life of the project to improve work zone safety and mobility, refer to Exhibit 6-4.

Exhibit 6-4 WZSM in Project Development Process - Key Items

Project Development Stage	Key Items Due
Planning	• Potentially Significant Projects shall be identified as early in the project development process as possible so that work zone impacts may be fully evaluated, appropriate funding allocated and overall network & region-wide impacts considered. • Districts shall work with MPOs and RPOs in the programming of projects to consider minimization of road user impacts and appropriate sequencing of projects. The cumulative impacts of multiple projects in the region's TIP shall be considered.
Scoping Field View (SFV)	Preliminary considerations shall be given to potential work zone alternatives & impacts and to what degree those considerations may influence the evaluation and selection of a build alternative. Additional studies and information needs shall be identified that will assist in determining whether the project is significant. Determine the status of the project as: • Non-Significant • Significant • To be determined (TBD)
Preliminary Engineering	• An analysis of work zone alternatives & impacts is required prior to the Design Field View, this analysis shall be conducted using prior analysis or prior documented delays for another project through use of FREEVAL-PA or other similar computer modeling programs.
Prior to Design Field View (DFV)	Make final determination of the project as: • Non-Significant • Significant Note: Approval of either the delay analysis or work zone alternatives analysis must occur prior to the DFV. Attach final approvals to the ECMS project development checklist.
Design Field View (DFV) Submission	• Non-Significant Projects – provide a DFV level TCP. • Significant Projects – provide a draft TMP, including DFV level TCP
Final Design Office Meeting (FDOM) Submission	• Non-Significant Projects – provide a Final TCP. • Significant Projects – provide a Final TMP, including a Final TCP.

Exhibit 10-7 Pennsylvania Traffic Analysis Tool Categories, Planning Context

Project Analysis and/or Study Type	Relevant Department Publication(s)	Planning Context Tool Category		Notes
		Sketch Planning Tools	HCM-Based Tools	
• NEPA Alternatives Analysis *	PennDOT Publication 10A Chapter 7	✓	✓	Sketch planning tools as well as planning-level applications of the HCM methods may be appropriate, including the HCM generalized service volume tables and the signalized intersection quick estimation method.
• Planning or Long-Range Feasibility Study	PennDOT Publication 10 Chapter 5	✓	✓	Sketch planning tools as well as planning-level applications of the HCM methods may be appropriate, including the HCM generalized service volume tables.
• Point of Access Study *	PennDOT Publication 10X Appendix Q	✓	✓	Sketch planning tools as well as planning-level applications of the HCM methods may be appropriate, including the HCM generalized service volume tables.
• Safety Study	PennDOT Publication 46 Chapter 11.1	✓	**NA**	Some sketch planning tools may be helpful in quantifying the implications on safety; however, HCM-based tools in the planning context are not appropriate for the safety-related analysis work in some traffic engineering and/or safety studies.
• Work Zone Assessment *	PennDOT Publication 46 Chapter 6.3	✓	**NA**	In a planning context, some sketch planning tools, including PennDOT's current version of FREEVAL-PA tool will be used to provide an order of magnitude for performance measures by which to identify and evaluate longer-range work zone impacts.

Legend:

NA = Not Applicable
✓ = This particular analysis or study type would be appropriately supported by the tool category.
* May also have an operations-focused context, where more detailed design decisions or operational conditions are required.

Exhibit 10-8 provides a checklist of analysis tool categories which are relevant to several common traffic analysis or study projects, which typically have an operational-level focus. Most traffic study projects reviewed or required by the Department would have operational-level contexts such that detailed design decisions, impact assessments, mitigation identification, and other performance measures are required. Typically, HCM-based tools that successfully implement the HCM2010 methods are used to quantify project-specific performance measures. When an HCM methodological limitation is encountered, or supplemental information is required, a microsimulation tool may also be used. It should be noted that some of these traffic analysis or study projects may also be conducted within a higher-level planning level context. In addition to the guidance previously given in this section, Exhibit 10-8 should be used to identify the likely tool category types for projects with an operations context.

Traffic analysis projects should recognize and account for the methodological limitations of the HCM2010 urban street methods. Consequently, limitations of the individual intersection methods should also be considered limitations of the urban street methods. For urban street facilities that do not fit within the analytical framework of the HCM2010, including but not limited to cases involving interactions between adjacent intersections, turn-lane spillover, impacts due to mid-block parking maneuvers, or capacity constraints between intersections, the analyst should use an alternative analysis tool in accordance with the HCM2010 Alternative Tool Analysis procedure.

Freeway Facilities

The Department accepts the use of the HCM2010 Chapter 10 methods for the analysis of a combined freeway facility, including the component off-ramp and on-ramp segments, freeway sections, and weaving sections. These methods should be used to assess uninterrupted flow facilities that are generally restricted access, higher-speed roadways through rural, suburban, and urban areas. That facility may be comprised of any combination of merge and diverge points (on and off ramp sections), weaving segments, and basic freeway segments. The methods prescribed by the HCM2010 Chapter 10 and the supporting chapters should be used by traffic analysis projects assessing the performance of freeways and limited access highways. PennDOT has developed the FREEVAL-PA tool which allows for various types of freeway analysis using the current HCM methodology while providing an effective way of calibrating third party data.

In cases where off-ramp or surface street conditions impact the performance of the freeway, the freeway facilities methods do not work. In those cases, alternative analysis tools should be used (i.e. simulation).

12. TRAFFIC ENGINEERING SOFTWARE

12.1 General

Purpose

Various software packages are available for use by traffic engineers. Traffic analysis software packages are used to optimize traffic flows and capacity, or to simulate traffic flow. In general, the definition of simulation is the *"dynamic representation of some part of the real world achieved by building a computer model and moving it through time."*

The purpose of this chapter is to summarize the Department's position on the use of traffic engineering software.

Traffic Resources, Education, and Computing Support (TRECS) Group

The Department established the Traffic Resources, Education, and Computing Support (TRECS) Group to address computer hardware, software, and training issues as they pertain to the District Traffic Units and the Bureau of Maintenance and Operations (BOMO). In addition, the TRECS Group procures needed traffic engineering reference materials. The TRECS Group is comprised of representatives of every District Traffic Unit and BOMO. The Group meets on a regular basis, and it has dedicated funding within BOMO's budget to fulfill its responsibilities.

One of the TRECS Group's objectives is the review and evaluation of traffic engineering software packages to determine which software will be used and supported by the Department. Supported software means that the Department will continually purchase software upgrades for use by the Engineering Districts and Central Office, and that training has been, and will continue to be provided for appropriate Department personnel.

12.2 Specific Software

Supported Software

The Department supports the following traffic analysis tools, methods, and commercial software packages, which are organized according to traffic analysis tool category:

Tools / Software	**Traffic Tool Category**
HCM2010 Generalized Service Volume Tables	• Sketch-Planning Tool
ICU (Intersection Capacity Utilization)	• Sketch-Planning Tool
QuickZone	• Sketch-Planning Tool
PennDOT's current version of FREEVAL-PA tool	• Sketch-Planning Tool
FREEPLAN, ARTPLAN, and LOSPLAN	• Sketch-Planning Tool
Highway Capacity Software, 2010 (HCS2010)	• HCM-Based Tool
TRANSYT7-F	• Optimization Tool