pennsylvania
DEPARTMENT OF TRANSPORTATION

470-12-10

DATE: August 16, 2012

SUBJECT: 2010 Highway Capacity Manual and Software

TO: District Executives

FROM: Charles C. Goodhart, Director */s/ Charles C. Goodhart*
Bureau of Maintenance and Operations

This Strike-off Letter (SOL) is time and resource neutral and will result in the Department's acceptance of the 2010 Highway Capacity Manual (HCM2010).

Background

In April 2011, the Transportation Research Board released the latest update to the Highway Capacity Manual. The HCM2010 is the fifth edition incorporating the latest in national research and best practices. It also contains concepts, guidelines and computational procedures for computing the capacity and quality of service of various highway facilities.

The HCM2010 includes several major changes and enhancements as compared with the year 2000 version, such as new procedures for the multimodal analysis of urban streets and intersections, guidance on the appropriate use of simulation and an online component located at http://www.hcm2010.org/.

Publication 46, Chapter 10 and 12 Update

The Bureau of Maintenance and Operations (BOMO) has completed a detailed review of the HCM2010 changes and will provide guidance within PennDOT Publication 46 (Traffic Engineering Manual), Chapter 10 – Highway Capacity Manual and Data Collection Parameters and Chapter 12 – Traffic Engineering Software that will be released in September. BOMO has carefully considered additional data collection requirements, evaluation limitations, commercial software, reporting results and changes in how level of service is derived in relation to the project delivery process and Highway Occupancy Permits.

PennDOT Software Availability

The following software is available to Department personnel and should be considered by other Department stakeholders:

- Highway Capacity Software (HCS2010™) is available to all Department staff at each Engineering District and Central Office.
- Synchro/SimTraffic Version 8 software is limited by the number of licenses purchased by BOMO. Therefore, BOMO requests that Department staff should request access to Synchro/SimTraffic Version 8 by filling out the Synchro License Request Form attached and also located at: P:\bhste_shared\Synchro_License_Form\Synchro_License_Form.pdf. BOMO will provide the licensing information to appropriate District staff that need this as part of their daily work functions.
- If other alternative analytical or simulation software is desirable on a particular project, then the following steps should be used to obtain Department approval:

Step 1: A written request should be sent to the appropriate District Traffic Engineer for consideration. Within the request, indicate the reasons why an alternative analytical or simulation software should be used along with the added benefits of using the alternative software compared to the Department supported software platforms.

Step 2: The appropriate District Traffic Engineer will evaluate each request and determine whether it is acceptable to use the alternative analytical or simulation software for the requested project.

Step 3: If the District Traffic Engineer concurs with the request then coordination with the BOMO, Traffic Operations Section is needed to ensure that the appropriate requirements and parameters are identifed.

Step 4: The appropriate District Traffic Engineer will provide a written response to the request clearly indicating all of the evaluation material determined within Step 3.

Step 5: Analysis utilizing the alternative analytical or simulation software will occur after receiving the written response in Step 4. All analysis data and results will be submitted to the District Traffic Engineer for review.

HCM2010 Adoption

The Department is formally adopting the HCM2010 in its entirety, and will promulgate the application of its methods, where applicable, for studies submitted under the Department's Project Delivery and Highway Occupancy Permit programs. References to the Highway Capacity Manual (HCM) throughout the Department's policies, various guidance documents, and publications should be understood as being the latest HCM2010. The adoption and use of the HCM2010 is subject to the following timetable:

- Starting September 1, 2012, studies may begin use of the new HCM2010
- By October 1, 2012, studies without previously-established scopes of work must be based on the procedures of the new HCM2010
- By December 31, 2012, all studies must be based on the procedures of the new HCM2010

Should you have any questions regarding this matter, please contact Daniel Farley, Traffic Signal and Operational Analysis Manager, at (717) 783-0333.

Attachment

cc: FHWA Pennsylvania Division Office
American Council of Engineering Companies of Pennsylvania (ACEC/PA)
Pennsylvania State Association of Township Supervisors
Pennsylvania State Association of Township Commissioners
Pennsylvania State Association of Boroughs
Pennsylvania League of Cities and Municipalities
Pennsylvania Turnpike Commission
Assistant District Executives –Maintenance
Assistant District Executives – Design
Assistant District Executives – Construction
Scott Fletcher, P.E., Assistant District Executive – Services, District 6-0
District Traffic Engineers
District Permit Managers
District Plans Engineers
Bryan Kendro, Director, Policy Office
Charles C. Goodhart, Director, BOMO
R. Wayne Willey, P.E., BOPD
Laine Heltebridle, Director, Bureau of Planning and Research
Bureau of Project Delivery, Division Chiefs
Douglas Tomlinson, P.E., Chief, Traffic Operations Section, BOMO
Glenn Rowe, P.E., Chief, Traffic Engineering and Permits Section, BOMO
Daniel Farley, Traffic Signal and Operational Analysis Manager, BOMO
Michael Dzurko, HOP Permit Manager, BOMO
Matthew DePaoli, Traffic Signal Project Manager, BOMO

Attachment A – Draft of Publication 46, Chapter 12

CHAPTER 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 composed 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 and commercial software, which are organized according to traffic analysis tool category:

Tools / Software	Availability and Version	Traffic Tool Category
HCM2010 Generalized Service Volume Tables	**Included** with the HCM2010.	• Sketch-Planning Tool
ICU (Intersection Capacity Utilization)	Published in 2003. **Free** to the public, available on Trafficware's website.	• Sketch-Planning Tool
QuickZone	The latest Version 2.0 is available for purchase from McTrans.	• Sketch-Planning Tool
PennDOT Delay Analysis Workbook (DAWB)	**Free** to the public. Available from PennDOT.	• Sketch-Planning Tool

Highway Capacity Software, 2010 (HCS2010) (includes TRANSYT 7-F)	Version 6.3 is available for purchase from McTrans	• Sketch-Planning Tool (FREEPLAN, ARTPLAN, LOSPLAN) • HCM-Based Tool (HCS2010) • Planning and Optimization Tool (TRANSYT 7-F)
TRANSYT 7-F	Version 11.3 is available for purchase from McTrans	• Planning and Optimization Tool
Synchro Version 7.0	Build 773 is available for purchase from Trafficware.	• Planning and Optimization Tool
Synchro Version 8.0	Build 664 is available for purchase from Trafficware.	• Planning and Optimization Tool
SimTraffic Version 7.0	Build 773 is available for purchase from Trafficware.	• Microscopic Simulation Tool
SimTraffic Version 8.0	Build 664 is available for purchase from Trafficware.	• Microscopic Simulation Tool
SignCAD	Version 8	• Sketch-Planning Tool
Trip Generation Software	Version 6	• Sketch-Planning Tool

Based on the recommended traffic analysis tool category or categories identified in Chapter 10.3, the process identified below should be used to identify the candidate software package(s) to be used when evaluating traffic capacity.

If the desired analytical or simulation software is not found within Chapter 12.2:

1) A written request should be sent to the appropriate Engineering District Office for consideration.

2) Within the request, the reasons why an alternative analytical or simulation software should be clearly identified along with the added benefits of using the alternative software compared to the Department supported software platforms.

3) The Engineering District Office will evaluate each request and the District Traffic Engineer should provide a written response as to whether the alternative analytical or simulation software could be used on a particular project.

4) Note that an alternative analytical or simulation software analysis should not be submitted to the Department until a written response has been received by the District Traffic Engineer.

5) If an Engineering District Office receives an alternative analytical or simulation software then coordination with the Bureau of Maintenance and Operations, Traffic Operations Section is recommended to ensure that an appropriate way of evaluating the accuracy of the model has been determined.

Required Use by Department and Consultants

Applicable work done by the Department, or by engineering consultants making submissions for Department review and approval for design, operational projects or Highway Occupancy Permit (HOP)projects, should use the 2010 Highway Capacity Manual (5th Edition) and supporting software packages as directed in Chapter 10 and this chapter, unless directed otherwise in writing by the Department.

Level-of-service (LOS) calculations and results should be completed using the standards established in Chapter 10 the 2010 Highway Capacity Manual (HCM). This means that LOS calculations should be completed and reported using HCS2010.

12.3 Calibrating a Simulation Model

Calibration is the process of adjusting input data and model parameters in order to ensure that the simulation results from the models match observed traffic performance in the field. Calibration is an important step in a signal timing project because the development of optimal timing plans depends on how closely the model represents the existing conditions. Calibration should be based on the knowledge of the existing conditions in the network and correct interpretation of the model outputs.

Calibration really serves two purposes:

- It is a "final" check on the quality of the general input data, and
- It involves the "fine-tuning" of the traffic parameters to ensure that the modeling is realistic.

The following general steps should be taken, at a minimum, once all base data have been coded in the model and initial runs have been made to clear up obvious coding problems:

- Before continuing any further, double check the base input data.
- Compare the following measures of effectiveness (MOE's) to ensure that the values are consistent with the way you know the system operates:
    - Degrees of saturation
    - Delay and average travel times; and
    - Maximum queue length, or maximum back of queue, depending on the model.
    - For traffic signal projects please review Chapter 4
- If you are not certain of the actual system operation, or if any of the above MOEs do not "measure up" as expected, conduct field studies to verify field conditions.
- For the more sophisticated models, conduct field studies for the significant advanced modeling features (i.e., such as the linked flow movements within CORSIM).
- Vary the appropriate model parameters to bring the simulated or estimated results into better agreement with the field data.
- Always, continually look for overlooked data errors.

This process demands a thorough understanding of the results and outputs of the various models. Recall that the same MOE may be calculated differently by several programs, and may not even include the same basis of measure.

Attachment B – Synchro Software License Request Form

Synchro Software License Request Form (7-12)

pennsylvania
DEPARTMENT OF TRANSPORTATION

Date: 07/27/2012

EMPLOYEE INFORMATION

First Name:		Job Title:	
Last Name:		Work Phone:	
Personnel Number:		E-mail:	

Engineering District:

Address:
City:
State/Province:
Zip/Postal Code:

Workstation Type:

LICENSE REQUEST *(Select "1" out of the following "3" Request Items)*

- ◯ (1) New License
- ◯ (2) Transfer License
- ◯ (3) Deactivate or Remove License

Please indicate your current/intended use of the software license:

☐ I understand that in requesting this software all manufacturer license agreements must be followed. I agree that I will install this software on only the machine for which I have received a license.

Supervisor Signature:

Submit