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McByte

traffic-flow theory

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Traffic-Flow Theory

by Henry Lieu
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Public Roads (FHWA)

Traffic-flow theories seek to describe in a precise mathematical way the interactions among vehicles, drivers, and the infrastructure. The infrastructure consists of the highway system and all its operational elements, including control devices, signage, and markings. These theories are an indispensable element of all traffic models and analysis tools that are being used in the design and operation of streets and highways.

The scientific study of traffic flow had its beginnings in the 1930s with the application of probability theory to the description of road traffic and with the pioneering studies conducted by Bruce D. Greenshields at the Yale Bureau of Highway Traffic on the study of models relating volume and speed and the investigation of performance of traffic at intersections. After World War II, with the tremendous increase in the use of automobiles and the expansion of the highway system, there was also a surge in the study of traffic characteristics and the development of traffic-flow theories.

In December 1959, the First International Symposium on the Theory of Traffic Flow was held at the General Motors Research Laboratories in Warren, Mich. This was the first of what has become a series of triennial symposia on the theory of traffic flow and transportation. A glance through the proceedings of these symposia will provide a good indication of the tremendous developments over the last 40 years in the understanding and the treatment of traffic-flow processes.

The field of traffic-flow theory and transportation has become too diffuse to be covered by any single type of meeting, and numerous other symposia and specialty conferences about a variety of traffic-related topics are held on a regular basis. Yet, even as traffic-flow theory is increasingly better understood and more easily characterized through advanced computation technology, the fundamentals are just as important today as in the early days. They form the foundation for all the theories, techniques, and procedures that are being applied in the design, operation, and development of advanced transportation systems.

This article outlines the revised *Monograph on Traffic Flow Theory*, which can be viewed on the Turner-Fairbank Highway Research Center Web site (@www.tfhrc.gov/its/tft/ tft.htm/). This report is an updated and expanded version of two previous works that were sponsored by the Transportation Research Board (TRB) and its predecessor, the Highway Research Board (HRB). The first monograph was published as HRB Special Report 79 in 1964. A completely rewritten monograph was published as TRB Special Report 165 in 1975. This volume is now out of print, and in 1987, the TRB Committee on Traffic Flow Theory and Characteristics recommended that a new monograph be prepared as a joint effort of committee members and other authors.

While many of the basic theories may not have changed much, the significant developments since 1975 merited the writing of a new version of the monograph. The Federal Highway Administration (FHWA) supported this effort through an interagency agreement with the Oak Ridge National Laboratory. TRB is currently reviewing the revised monograph provided by FHWA, and the monograph will be published as a formal TRB report some time in 1999.

The Revised Monograph

The general philosophy of the previous two reports was retained, but the text was completely rewritten and reorganized into 10 chapters. The primary reasons for such a major revision were: to bring the material up-to-date, to include new developments in traffic-flow theory (e.g., network models), to ensure consistency among chapters and topics, and to emphasize the applications or practical aspects of the theory.

The 10 chapter titles are: (1) Introduction, (2) Traffic Stream Characteristics, (3) Human Factors, (4) Car-Following Models, (5) Continuum Flow Models, (6) Macroscopic Flow Models (7) Traffic Impact Models, (8) Unsignalized Intersection Theory, (9) Traffic Flow at Signalized Intersections, and (10) Traffic Simulation.

Chapter 2 presents the various models that have been developed to characterize the relationships among the traffic stream variables: speed, flow, and concentration. Most of the relationships are concerned with uninterrupted traffic flow, primarily on freeways or expressways. The chapter stresses the link between theory and measurement capability because, to a large extent, development of the former depends on the latter.

Chapter 3, Human Factors, discusses salient performance aspects of the human element in the context of the person-machine system (i.e., the motor vehicle). The chapter describes discrete components of performance, including: perception-reaction time; control movement time; how different segments of the population differ in performance; and responses to traffic control devices, to the movement of other vehicles, and to hazards in the roadway. Next, the kind of control performance that underlies steering, braking, and speed control - the primary control functions - is described. Applications of open-loop and closed-loop vehicle control to specific maneuvers such as lane-keeping, car-following, overtaking, gap ac-

This article was adapted from the *Monograph on Traffic Flow Theory* (November 1997) edited by Nathan H. Gartner, Carroll J. Messer, and Ajay K. Ratbi.

Dr. Henry Lieu is a research highway engineer in the Intelligent Systems and Technology Division of FHWA's Office of Safety and Traffic Operations Research and Development. He has been working on FHWA's traffic simulation models since 1987. He received a bachelor's degree in civil engineering from National Taiwan University, a master's degree in transportation engineering from the University of Mississippi, and a doctorate from the University of Maryland.

ceptance, lane closures, and sight distances are also described. To round out the chapter, a few other performance aspects of the driver-vehicle system are covered, including speed limit changes, distractions on the highway, and responses to real-time driver information. The most obvious application of human factors is in the development of car-following models.

Chapter 4 on car-following models examines the manner in which individual vehicles (and their drivers) follow one another. In general, they are developed from a stimulus-response relationship, where the response of successive drivers in the traffic stream is to accelerate or decelerate in proportion to the magnitude of the stimulus at time t after a time lag T. Car-following models form a bridge between the microscopic behavior of individual vehicles and the macroscopic characteristics of a single-lane traffic stream with its corresponding flow and stability properties.

Chapter 5 deals with continuum flow models. Because traffic involves flows, concentrations, and speeds, there is a natural tendency to attempt to describe traffic in terms of fluid behavior. Car-following models recognize that traffic is made up of discrete particles and determine the interactions between these particles. Continuum models are concerned more with the overall statistical behavior of the traffic stream rather than with the interactions between the two particles.

In the fluid-flow analogy, the traffic stream is treated as a one-dimensional compressible fluid. This leads to two basic assumptions: (1) Traffic flow is conserved, and this leads to the conservation or continuity equation. (2) A one-to-one relationship exits between speed and density or between flow and density.

The simple continuum model consists of the conservation equation and the equation of state (speed-density or flow-density relationship). If these equations are solved together with the basic traffic-flow equation (flow equals density times speed), we can obtain the speed, flow, and density at any time and at any point in the roadway. By knowing these basic traffic-flow variables, we know the state of the traffic system and can derive measures of effectiveness, such as delays, stops, travel time, total travel, and other measures that allow the analysts to evaluate how well the traffic system is performing. In this chapter, both simple and high-order models are presented along with analytical and numerical methods for their implementation.

Chapter 6, Macroscopic Flow Models, discards the microscopic view of traffic in terms of individual vehicles or individual system components (such as links or intersections) and adopts instead a macroscopic view of traffic in a network. A variety of models are presented together with empirical evidence of their applicability. Variables that are being considered, for example, include the traffic intensity (the distance traveled per unit area), the road density (the length or area of roads per unit area of city), and the weighted space mean speed. The development of such models extends traffic-flow theory into the network level and can provide traffic engineers with the means to evaluate systemwide control strategies in urban areas. Furthermore, the quality of service provided to motorists can be monitored to assess the city's ability to manage growth. Network performance models could also be used to compare traffic conditions among different cities in order to determine the allocation of resources for transportation system improvements.

Chapter 7 addresses traffic impact models. Issues of traffic safety and environmental impacts, such as fuel consumption and air pollution, were not specifically addressed in the previous monographs. Traffic safety is always the number one issue when dealing with traffic operations and management, and since the Clean Air Act Amendments became law in 1990, fuel consumption and air quality have become critical issues when dealing with transportation and traffic management projects. The following models are specifically discussed: traffic and safety models, fuel-consumption models, and air-quality models.

Chapter 8 is on unsignalized intersection theory. Unsignalized intersections give neither positive indication nor control to the driver. The driver alone must decide when it is safe to enter the intersection. Typically, he looks for a safe opportunity or "gap" in the conflicting traffic. This model of driver behavior is called "gap acceptance." At unsignalized intersections, the driver must also respect the priority of other drivers. This chapter discusses in detail the gap-acceptance theory and the headway distributions used in gap-acceptance calculations. It also discusses the intersections among two or more streams and provides calculations of capacities and quality of traffic operations based on queuing modeling.

Chapter 9 discusses traffic flow at signalized intersections. The statistical theory of traffic flow is presented to provide estimates of delays and queues at isolated intersections, including the effect of upstream traffic signals. This leads to the discussion of traffic bunching, dispersion, and coordination at traffic signals. The fluid (shock-wave) approach to traffic signal analysis is not covered in this chapter; it is treated to some extent in chapter 5. Both pretimed and actuated signal-control theory are presented in some detail. Further, delay models that are founded on steady-state queue theory, as well as those using the so-called coordinate transform method, are covered. Adaptive signal control is discussed only in a qualitative manner because this topic pertains primarily to the development of optimal signal-control strategies, which is outside the scope of this chapter.

The last chapter, chapter 10, is on traffic simulation. Simulation modeling is an increasingly popular and effective tool for analyzing a wide variety of dynamic problems that are not amenable to study by other means. These problems are usually associated with complex processes that cannot readily be described in analytical terms. To provide an adequate test bed, the simulation model must reflect with fidelity the actual traffic-flow process. This chapter describes the traffic models that are embedded in simulation packages and the procedures that are being used to build traffic simulation models and conduct simulation experiments.

Conclusion

The revised monograph includes new developments in traffic-flow theory since 1975. Chapter 3 (Human Factors) and chapter 5 (Continuum Flow Models) are two completely new chapters in this report. All chapters deal with issues on a much broader basis than the previous reports. More importantly, issues of, and application to, intelligent transportation systems (ITS) are discussed in the chapters to the extent possible. For example, the Human Factors chapter includes three levels of driving tasks, including the knowledge-based behavior that becomes increasingly more important to traffic-flow theories as ITS mature. The Traffic Simulation chapter is expanded from the microscopic simulation model to the mesoscopic and macroscopic simulation models, and the simulation-based traffic assignment is expanded to address time-dependent traffic assignment issues.

To ensure the highest degree of reliability, accuracy, and quality in the content of this report, the collaboration of a large number of specialists was enlisted, and this report presents their cooperative efforts. A serious and commendable effort has been made by the contributing authors and reviewers of this report to present fundamental traffic-flow theories and information that will have enduring value. It is hoped that this report will be useful to the ITS community, graduate students, researchers. practitioners, and others in the transportation profession.

Federal Highway Administration

Restructuring

Kenneth R. Wykle, Federal Highway Administrator
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In keeping with President Clinton's priorities to create a government that works better and costs less, the Federal Highway Administration (FHWA) launched a comprehensive evaluation of the agency's organizational structure in May of 1997. We did this because our future depends on delivering quality services quickly, working with our transportation partners in the common goal of building the finest transportation system in the world.

Yet, as many companies and agencies across the nation have discovered, what were good business practices yesterday may no longer be effective today. Some changes were necessary.

In our review, we looked at ways to streamline FHWA's field organization and enhance the program delivery role of our division offices, which work directly with our partners and customers in each state, the District of Columbia, and Puerto Rico.

We eliminated a layer of decision making and empowered our division offices by giving them more authority and resources. We established resource centers to leverage our technical expertise in support of our partners and customers. Then, we looked at our headquarters organization. We identified five core businesses, which focused on our strategic goals and objectives. Technology delivery will be an integral part of each of these core businesses. We will have new units to provide agency wide leadership for professional development and corporate management.

Our strategic plan is the blueprint that will help us cross into the next millennium. Our new organization focuses resources, reduces duplication, provides efficient service, and improves collaboration throughout the organization.

FHWA's restructuring is still a work in progress. We have formally established the new field structure and have developed the outlines of our new headquarters organization, which will be complete, along with an implementation plan, by the end of calendar year 1998.

I firmly believe this framework will serve our partners well as we position ourselves to contribute to a unified transportation system for the 21st century.

A New Era of Public Service

The FHWA has served the needs of the American public for 105 years. Successfully meeting those needs has always required growth and change. The new millennium marks the beginning of a new era of public service for the Federal Highway Administration. As the 21st century approaches, we have made pivotal changes to our field organization and are planning additional changes to our headquarters structure to become a more efficient and responsive agency.

Resource centers have been established in Atlanta, Baltimore, Olympia Fields (near Chicago), and San Francisco, and the nine regional offices have been eliminated. The resource centers represent a significant step in our effort to strengthen partner/customer service and our commitment to technology delivery.

To improve partner/customer service and efficiency of operations, almost all program authorities have been delegated to the division offices. In addition, to enable the division offices to more effectively deliver the Federal-aid and Motor Carrier programs, the FHWA has allocated additional resources to these offices.

The proposed headquarters structure establishes core businesses aligned with the FHWA's strategic goals, promotes increased emphasis on operations, and provides for cross-cutting teams to focus on products.

More Focused

The four resource centers allow us to better focus our expertise in the field and enhance our ability to advance technology and best practices.

The FHWA's proposed headquarters structure is designed around five core business areas-Infrastructure, Operations, Environment and Planning, Motor Carrier and Highway Safety, and Federal Lands Highways. Technology delivery is integrated into each core business area. The new headquarters structure will also provide for the formation of a number of integrated product teams to address high priority agency needs, e.g., Intelligent Transportation Systems (ITS) and freight initiatives.

Better Service

The number of positions in our empowered division offices will increase to provide better service to our partners, particularly in areas that support our national goals, such as safety, intelligent transportation systems, environment, civil rights, and planning. The resource centers will be staffed with technical and program experts whose primary responsibility is to provide expert advice to the divisions and our partners.

Steamlined

Nearly all program and project authorities have been delegated to the division offices, and a layer of decision making between headquarters and the division offices has been eliminated outright.

In headquarters, motor carrier and highway safety will be integrated into a single core business area. ITS, traffic operations, and freight issues will be combined in the operations core business area to increase the agency's investment in this important transportation function.

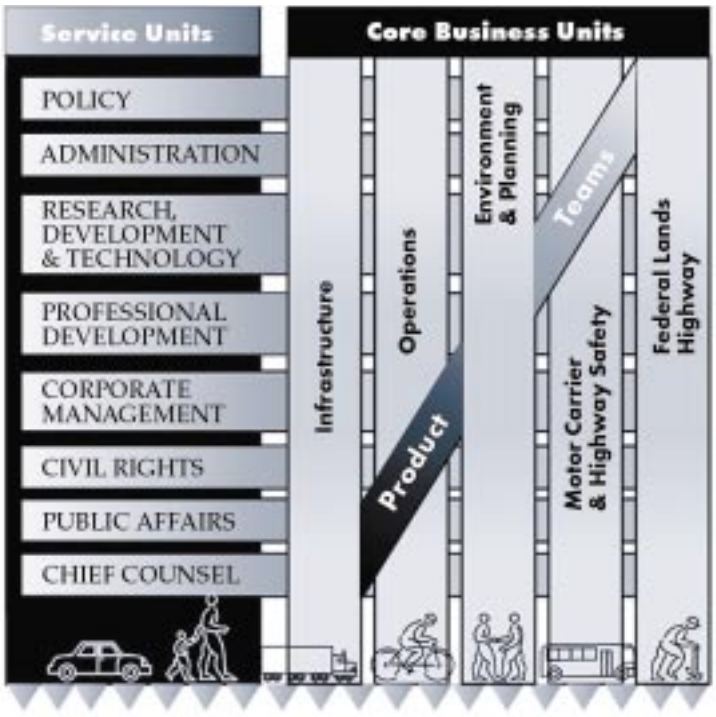
Strengthened Partnerships

The location of the resource centers allows for continued coordination with other USDOT modes and other federal agencies on broad program matters; division offices will carry out intermodal coordination on project- and location-specific matters.

The delegation of program authorities to the division offices will strengthen our partnerships with state and local governments. The establishment of the resource centers will facilitate closer affiliation with professional organizations and universities.

Looking Toward the Future

Flexibility is a key component of both the resource centers and headquarters to enable us to meet future needs. Clustering our expertise in the resource centers provides greater opportunities to grow our next generation of experts.



Headquarters Restructuring
Service units and core business units will operate independently but will also interact with one another by forming integrated product teams.

Announcements

McTrans
presents a
Highway Capacity Analysis Seminar
in Las Vegas, Nevada
including procedures in the
1997 Update to the Highway Capacity Manual
with software demonstrations using the
Highway Capacity Software
(Release 3 for Windows 95/NT)

July 28-30, 1999
co-sponsored by the ITE Student Chapter
of the University of Nevada, Las Vegas

Course Agenda
July 28: 8:30 a.m.-4:30 p.m.
Registration and Introductions
Introduction to the Highway Capacity Manual (HCM)
Principals of Capacity (Lecture)
Basic Freeway Segments (Lecture & HCS Demo)
Multilane Highways (Lecture & HCS Demo)
July 29: 8:30 a.m.-4:30 p.m.
Weaving Areas (Lecture & HCS Demo)
Ramps and Ramp Junctions (Lecture & HCS Demo)
Unsignalized Intersections (Lecture & HCS Demo)
Signalized Intersections (Lecture)
July 30: 8:30 a.m.-12 noon
Signalized Intersections (Lecture & HCS Demo)
Arterial Streets (Lecture & HCS Demo)
Summary and Evaluation (Lecture & HCS)

Objectives This Highway Capacity Analysis Seminar will provide lectures and software demonstrations on the application of several Highway Capacity Manual (HCM) procedures. The procedures to be covered represent those updated in the current version of the HCM including Chapters 3, 4, 5, 7, 9, 10 and 11, with detailed information on the 1997 Update to the HCM, scheduled to be published by TRB in July, 1998.

Release 3 of the Highway Capacity Software (HCS-3), implements the procedures defined in the HCM in a Windows 95/NT interface. Each lecture will be followed by a demonstration using the HCS module applying the HCM procedures. A comprehensive workbook will be provided with the course.
For course information contact
Bill Sampson at (352) 392-0378 ext. 241
For registration contact
Chris Wilson at (352) 392-0378 ext. 223

Institute of Transportation Engineers
69th Annual Meeting

August 1-4 1999
at the Las Vegas Hilton Hotel in Las Vegas, Nevada

The ITE Annual Meeting Professional Program is arranged along six tracks:
Traffic Engineering
Transportation Planning
Harmonization
Management & Operations
Transportation Safety
Major Transportation Issues

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Click on Meetings and Conferences

Don't forget to come by and visit McTrans at Booth #425!

Did you know?

HCS-3 Patch a is more than a patch.
The first patch (a) to HCS-3 provides enhanced features beyond just correcting some minor problems.
Signals now offers a Quick Jump feature that was added to allow users to position either the Input or Report screens to specific locations, such as the Phasing Design area or the Level of Service Worksheet.
Signals now also includes graphic representations of the phasing design which shows the movements allowed for each phase with color-coded designations for pretimed and actuated phases, as well as different lines for protected and permitted phases.
Freeways, Weaving, Ramps and Multilane modules can now accommodate composite grade calculations to consolidate several specific grades for a given analysis.
Arterials now imports the appropriate information from Signals files by specifying the file name for use in an Arterial analysis.
For more, check the HCS-3 web site (http://mctrans.ce.ufl.edu/techfaqs/history.htm) for a complete list.

TRANSYT-7F is a comprehensive signal timing tool, so it can take a long time for the average user to learn about the wide range of available program features.
Supplementary output ensures accurate modeling. Traffic flow diagrams are useful in calibrating the platoon dispersion model and verifying traffic counts, and the 132-column output format provides extra output statistics that are useful for diagnostic purposes.
Defining a link numbering scheme makes the output more readable. Movement names (i.e. NB LEFT) are written into the output file in place of the link numbers. When modeling more than 12 links, names are listed for the 12 standard movements, link numbers for the remaining links.
The actuated control model is useful in developing superior network-wide optimal signal timing. TRANSYT-7F is able to shift excessive green time away from the actuated movements, making that green time available for the coordinated movements prior to optimization.
Dual ring controllers can be modeled with phase overlaps as short as two seconds.
Numerous objective functions are available to specifically take aim at delay, stops, queuing, fuel consumption, progression, throughput, or combinations of these. Also, TRANSYT-7F can apply global, node-specific, and link-specific optimization weighting factors.
The step-wise simulation process available in release 8 provides enhanced modeling accuracy. For more information about program features within release 8, check the TRANSYT-7F web site (http://uftrc.ce.ufl.edu/bullmenu/updinfo/updt7f.htm).

FAQ

Frequently Asked Questions:

HCS-3 In HCS-3, why is there an asterisk (*), plus sign (+) or minus sign (-) appended to certain values (sometimes but not always) in the output pane and printed in the report?
If a calculated number is edited, an asterisk (*) will be shown by that field and an asterisk will appear in all results to indicate that an intermediate value was adjusted.
Result thresholds at decision points, such as density or delay, will have a plus (+) or minus (-) appended if the calculated value at full precision is greater (+) or less (-) than the rounded displayed value. The asterisk (*), plus (+), and minus (-) flags will appear when applicable in the report pane and in the printed reports.

In HCS-Signals, why are the delay and LOS values blank for some lane groups, approaches or the intersection?
If the analysis results in an estimate of greater than 999.9 seconds for a given lane group, delay and LOS values for that lane group, and subsequent approach and intersection values, are blank to indicate an out of range condition.

For more, check the HCS-3 web site (http://www.mctrans.ce.ufl.edu/hcs-3) for a complete and current list.

TRANSYT-7F
How can I make minor changes to the optimal signal timing design?
Request updated "punch" data files to be generated following an optimization run.

How can I model peaking traffic flows?
Use multi-period simulation to explicitly model peaking flows, or input peak-adjusted volumes.

How can I define complicated lane configurations and intersections?
Define more than 12 links. This is useful when modeling intersections with five or more approaches, or when modeling shared lanes that are adjacent to exclusive turn lanes.

For more, check the TRANSYT-7F FAQ page (http://uftrc.ce.ufl.edu/techfaqs/t7ffaq.htm).

new products

b-Node Model

This traffic assignment model converts the b-node of every zone centroid connector link into a subzone. The program reads a typical highway network and a zone trip table. It then subdivides the trip table into a subzonal trip table and finally loads part of it through the "mother" zone centroid connectors and the other part through the new subzone centroid connectors automatically. The user specifies which zones are to be subdivided, how they are to be subdivided, the split between the mother zone and the subzones, and what percent intra-zonal trips that become inter-subzonal trips should load onto the network. This allocation to subzones can be based on the reciprocal of the centroid connector time. It can be based on assignment of equal weights; i.e., each of 4 centroid connectors would be assigned 25%, each. Or, it can be based on user supplied subzone land activity. The results are far superior to traditional assignment algorithms. This process eliminates the lumpiness where centroid connectors tie into the highway network. This software reduces the need for the timely, cumbersome and prone-to-error process of Window Options and Focus Options involving renumbering of nodes and zones, updating the network, subdividing trips etc. All of this is done automatically with the b-node model. Options consist of capacity restraint, select link, turns, etc. Limitations are 2,250 zones; 16,400 nodes; and 24,750 subzones. The network for the Washington, DC region with 2,191 zones and 8,000 subzones (including mother zones) took 6 hours to run on a Pentium 300 MHZ.PC.

b-Node (#BNODE) Version 1.0 by W.W.Mann Assoc., is available at LOS 7 for $900.

Driven Version 1.0

DRIVEN is a program for determining ultimate vertical static pile capacity. It has been completely rewritten from the ground up, but its legacy lies in the SPILE program. Clearly, the most visible change is the move to a Windows based environment. The SPILE program was also developed by the FHWA and released in 1993. In SPILE, the user entered a soil profile to a planned pile toe depth and "ran" the program for the results of this input. When using the DRIVEN program., the user enters the entire sampled soil profile to the full depth of the profile. Based upon the input, DRIVEN will calculate pile capacities at predetermined depth intervals. This allows the user to five the pile capacity as a function of depth. There are many other new features that have been added. They are discussed in full detail in the user's manual.

Multiple Water Tables Support for three water tables is now included. One table at the time of sampling, another for restrike/driving considerations. And one for ultimate capacity considerations.

Soft Compressible Soils/Negative Skin Friction The user may specify the depth of a soft compressible soil layer at the top of the soil profile. For ultimate calculations, the shaft resistance from this layer can be considered in tow different ways, as soft compressible soil or as negative skin friction.

Scourable Soils There are two kinds of scour conditions that the DRIVEN program can consider: short term (local) and long term (Channel degradation and contraction) scour.

Open End Pipe Piles The program supports the used of open-end pipe piles in its static analyses.

Capacities The program computes three sets of capacities for three different conditions: restrike, driving and ultimate.

Output The program presents the output in both tabular and graphical format.

Units The program supports both English and SI units.

Driveability The program will prepare a partial driveablity file for use by the GRL-WEAP software.

The program operates in Windows 3.1 and Windows 95.

DRIVEN (#DRIVEN) by the FHWA is available at LOS 3 for $50. The manual (DRIVEN.D) is available for $10.

HEC-HMS Version 1.1

The Hydrologic Modeling System (HEC-HMS) version 1.1 supersedes HEC-1 and provides a similar variety of options for simulation precipitation-runoff processed. In addition to unit hydrograph and hydrologic routing options, capabilities include a linear distributed-runoff transformation that can be applied with gridded (e.g., radar) rainfall data, a simple "moisture depletion" option that can be used for simulations over extended time periods, and a versatile parameter optimization option. Future versions will have capability for continuous moisture accounting and snow accumulation/melt simulation.

HEC-HMS is comprised of a graphical user interface, integrated hydrologic analysis components, data storage and management capabilities, and graphics and reporting facilities. The DATA Storage System, HEC-DSS, is used for storage and retrieval of time series, paired-function, and gridded data, in a manner largely transparent to the user.

Computations are performed with SI (System International Units) units. You can, however, enter input and view output with units in the U.S. Customary system, and can readily convert input/results from one unit system to the other.

HEC-HMS (#HECHMS) by the US Army Corps of Engineers, Hydrological Engineering Center is available at LOS 2 for $75. The manual (HECHMS.D) is available for $20.

Indonesian Highway Capacity Manual and Software

The Indonesian Highway Capacity Manual (IHCM) covers urban/semi-urban traffic facilities as well as inter urban roads and motorways. It thus replaces the previous, interim manuals for urban traffic facilities (January 1993) and interurban roads (August 1994) which have been published earlier with the IHCM project. The software implements the procedures in the manual. The types of facilities covered and the traffic performance measures that can be calculated with the use of the manual are:

Signalized Intersections covering Signal Timing, Capacity, Proportion of Stopped Vehicles, Queue Length, and Average Delay.

Unsignalized Intersections covering Capacity Average Delay and Queue Probability.

Weaving Sections covering Capacity Speed in the Weaving Area and Travel Time.

Urban Roads covering Capacity, Free-flow Speed for Each Vehicle Type, and Speed at Actual Flow.

Interurban Roads covering Capacity Free-flow Speed for Each Vehicle Type, Speed at Actual Flow, Speed on Specific Grades, and Degree of Bunching.

Motorways covering Capacity, Free-Flow Speed for Each Vehicle Type, Speed at Actual Flow, Speed on Specific Grades, and Degree of Bunching.

The manual also included traffic engineering guidelines advising the user regarding selection of facility type and its design before the start of the detailed calculation procedures for determination of traffic performance. It can also be used to analyze routes or networks within urban areas by means of successive application of the relevant chapter for each traffic facility. The total travel time can then be obtained as the sum of the travel times and delays on each link and node along the route.

Indonesian Highway Capacity Software (#IHCM) by Directorate General of Highways, Indonesia is available at LOS 3 for $50. The manual (#IHCM.D) is available for $35.

Signal Timing Database

Introducing a new tool to help you quickly maintain and organize signal timing data. Signal Timing Database v1.0 (STDB) is a highly configurable Access 97-based signal timing database designed to keep traffic engineers abreast of signal timing and phasing. This easy to use package stores, sorts and reports the following information:

=> Signal phasing
=> Local detectors
=> Timing parameters
=> System detectors
=> Local coordination plans
=> Conflict monitor settings
=> Event scheduler
=> Telemetry/interconnect data
=> Signal timing operations
=> Signal timing complaints

STDB includes with an Access 97 runtime license (so you don't need to purchase Microsoft Access 97) and a comprehensive browser-based help system.

Save $100 off STDB until August 1999.

Signal Timing Database (#STDB) by John Thai is available at LOS 6 for $395.

Updated Products

TP/4-in-1

TP/ALL-in-1 runs the 4-step travel forecasting process, all in one execution on a PC. It is structured to execute the model for any size area, as large as Washington, DC region or as small as Fauquier County (population 55,000). The major advantage of this software over other software is that it is designed for the novice transportation planner who does not have time to learn all the bells and whistles of more sophisticated software like MINUTP©, TRANPLAN©, etc. Once a region's MPO model is streamlined to fit within the structure of TP/4-in-1, it could be executed by any suburban jurisdiction planner or it could be built from scratch for any new urbanized area. Running the model frequently or for only a few times per year is feasible for those unfamiliar with transportation modeling. Some of the features include:

- Trip generation for 4 trip purposes + P-Mods and A-Mods
- Trip distribution for 4 trip purposes + F-curves and K-factors
- Matrix compression and reporting by purpose
- Mode split for work trips only using a matrix of percents
- Capacity restraint assignment
- Multi-load assignment: loading another trip table over the same paths as the total trip table in capacity restraint
- Select link assignment and/or select link trip table compression
- Screenline analysis
- Turns
- And many more options

Limitations are 2,250 zones; 16,400 nodes; and 128,000 links

TP/4-in-1 (#TP4IN1) by W.W. Mann Assoc., is available at LOS 7 for $900. ■

Culvert Analysis (HY-8)

The Federal Highway Administration has just released Version 6.1 of HY-8, which fixes minor bugs to the software. This version of the software can be downloaded from their web site at: www.fhwa.dot.gov/bridge

If you are unable to download the update, registered users can request a set of disks from **McTrans** at no charge. ■

HYDRAIN

The Federal Highway Administration has just released Version 6.1 of HYDRAIN, which fixes minor bugs to the software and updates the User's Manual. This version of the software and documentation can be downloaded from their web site at: www.fhwa.dot.gov/bridge

If you are unable to download the update, registered users can request a set of disks from **McTrans** at no charge. The updated HYDRAIN Users Manual can be purchased for $50. ■

WSPRO (HY-7)

The Federal Highway Administration has just released Version 6.1 of WSPRO, which fixes minor bugs to the software and updates the User's Manual. This version of the software and documentation can be downloaded from their web site at: www.fhwa.dot.gov/bridge

If you are unable to download the update, registered users can request a set of disks from **McTrans** at no charge. The updated WSPRO Users Manual can be purchased for $25. ■

MVMACH and SURVEY

Both MVMACH and SURVEY now run under Windows 3.x/95/NT. MVMACH is a comprehensive liscense plate matching program for O-D or parking surveys. SURVEYS is a comprehensive survey analysis package including data editing, record manipulation, data correction, cross tabulation, and regression analysis. MVMACH and SURVEY (#MVMACH, SURVEY) by MVA Systematica are available at LOS 7 for $1,500 each. Call for public agency/educational user price schedules. ■

PASSER™ III-98

PASSER™ III (Progression Analysis and Signal System Evaluation Routine) is the only publicly available software for analysis and optimization of signalized diamond interchanges. It was developed by the Texas Transportation Institute (TTI) for the Texas Department of Transportation in 1978 and has been updated several times over the past 20 years. PASSER™ III-98 provides significant enhancements to this widely used software package. Enhancements include a user-friendly graphical user interface, an expanded easy-to-understand output, and a simulation/animation module. Enhancements were also made to the performance evaluation model by incorporating the 1997 Highway Capacity Manual (HCM) procedures.

PASSER™ III-98 for Windows 95/98 is a macroscopic traffic simulation model that can evaluate existing or proposed signalization strategies, or develop optimum signalization strategies for diamond interchanges. In terms of optimization, PASSER™ III can either minimize delay or internal queuing at the interchange. If delay minimization is selected, PASSER™ III allocates green times based on an equal-degree-of-saturation approach and uses the delay difference of offset methodology to optimize traffic flow through the two signalized intersections. If queue minimization is selected, PASSER™ III allocates green times and determines offsets based on the four-phase with two overlaps approach.

The Windows version of PASSER™ III-98 features a graphical user interface (GUI), which is organized in a hierarchical structure of folders and reference tabs. The GUI simplifies data entry and minimizes input errors. The presentation of the resultant system performance measures has been expanded and improved. Multiple performance measures are provided in tabular format for every timing plan evaluated. Alternative timing plans can be ranked by the performance measure most important to the user. Performance measures for multiple cycle lengths can also be displayed graphically. A rich text format (RTF) file can be generated for the timing plan selected for implementation. PASSER™ III-98 also has a user-friendly on-line help system and a tutorial for first time users. PASSER™ III-98's optimized signal timing plans can be evaluated visually using the microscopic simulation/animation module. Analysts can observe queuing behavior and system performance and if necessary, make adjustments to the recommended timing plan. As mentioned, PASSER™ III-98 provides more performance measures than in the past. Previously, only the performance measures for the optimum solution were provided. Now the performance measures for all the possible scenarios are presented to the user. These performance measures include control delay, degree of saturation, stop rate, maximum back of queue, fuel consumption, and cost. PASSER™ III-98 also provides signal-timing tables that are easier to interpret and implement.

PASSER III-98 (#P398) by Texas Transportation Institute is available at LOS 1 for $300. The manual (#P398.D) is available for $15. Upgrade from PASSER III-90 (#P398.UPG) is available for $170. ■

Section 15 Transit Agency Performance Data

Section 15 has now been updated to include 1996 and 1997 versions. The tables provide performance indicators for over 400 transit agencies in the United States, now collected from 1981 through 1997. The data sets include fiscal, ridership, safety, vehicle, mileage, and labor reports.

Section 15 (#SECT15) is available at LOS 3 for $20 per year dataset. ■

Update Watch

Package	Version	Status	Target	Distribution
HCS-3	3.1b	Under development	Summer	Patch file download
TRANSYT-7F	8.1	Complete	Available	Registered users may upgrade
TRANSYT-7F	W95	Under development	Summer	Automatic to registered users
TSIS	4.3	Under development	Summer	Automatic to registered users

Updated Products

Have you upgraded yet? Are you up-to-date? HCS is now RELEASE 3 and implements the procedures in the 1997 Update to the Highway Capacity Manual (HCM). It is available in a Windows 95/98/NT interface. Upgrade Today!

Traffic Operations System Software (TOSS)

This popular Traffic Management database package has been converted to take advantage of the Windows environment. TOSS has been known for its ease of use with a simple to follow menu-driven system. With the latest release of version 8, the program has again reached new heights by incorporating many new windows-based features, plus additional reports, add button for digital picture, accepts GPS coordinates, improved backup and validation routines and more. TOSS is a management tool designed to provide managerial information for maintenance activities, statistical and inventory data, job costing and budget control. This PC-based system has been successfully installed by many cities throughout North America and overseas. By using the standard .dbf format, it can interface with other commercially available software such as spreadsheet, database and GIS software. TOSS consists of eleven modules. Each module can be run independently or combined to achieve maximum power. A runtime version of Visual dBase is included to allow user to run TOSS without having to purchase any additional software. The modules include:

- Accident Information System
- Collision Diagram (AutoCD)
- Traffic Count Information System
- Road Marking Inventory System
- Sign Inventory System
- Traffic Signal Maintenance System
- Traffic Signal Inventory System
- Street Light maintenance System
- Street Light Inventory System
- Complaint Tracking System
- Street Furniture Inventory System

Traffic Operations System Software, Version 8 (#TOSS.P) by AI Technologies Ltd. is available at LOS 7 for $1,500 for the complete package. The upgrade (#TOSSUP) is available for $695. Individual modules are available for $295. See listing of modules in the Product List under Traffic Engineering, General Traffic, and ad on page 17.

Traffic Noise Model

As some TNM users have experienced, TNM is giving floating point errors for certain case runs. The new executable, TNM Version 1.0a, will correct these errors for the most common floating point error bug. This update has been sent to all registered users. Please read the readme file on the diskette for instructions. If you have any comments or questions, please contact:

Cynthia Lee
Volpe Center, Acoustics Facility
(617) 494-2372
(617) 494-3208 Fax
Lee@Volpe2.dot.gov

TRIPS/32

TRIPS/32 is a comprehensive transportation planning package which now runs under Windows NT. If provides a broad spectrum of modeling options. TRIPS modules will perform:

- Highway & Transit System Analysis
- Travel Demand & Forecasting
- Matrix Estimation & Manipulation
- Network Assignment
- Subarea Windowing for both matrices & networks.
- Select Link Analysis
- Network Plots of user defined windows
- Interactive Color Network & Presentation Graphics
- Transit model with multi-pathing, user specified fare structures & crowding constraint.
- Support for UNIX workstations & networks
- North American based distribution support & training
- Hierarchical node numbering with support for up to10,000 zones

Windows based project management tool TRIPS/32 (#TRIPS32) by MVA Systematica is available at LOS 7 for $8,715. Call for public agency/educational user price schedule.

VisualTraffic

VisualTraffic from VisualSoftware Co. is a traffic assignment program that works with Excel. If you know manual assignment methods, then you know how to use VisualTraffic.

Study networks can be drawn quickly with the mouse on spreadsheets using a matrix of node circles. These networks then become your graphic interface to input distribution, route selection and assignments, making it as simple to understand as manual techniques with the advantage of spreadsheets.

VisualTraffic is a tool-based program which gives you more control over the data and outputs than with process-based programs. Project workbooks can have more than one network sheet, allowing you to layer the data and assignments. You control of the level of detail shown on each network.

Create tabular reports of volumes, distribution and trips and easily transfer these into your word processor. Network graphics are also report quality. You can export the assignments into Highway Capacity Software or SIG/Cinema, for LOS analysis. Also includes a DXF translation into AutoCAD or other CAD software for faster network diagrams.

VisualTraffic (1,000 nodes) has been used for large traffic impact studies as well as regional planning.

VisualTraffic Lite (25 nodes) does not require licensing and can be used for small studies or as an educational tool.

If you don't have the time or data to use complex modeling software for your studies, then VisualTraffic might be just the tool you've been looking for.

VisualTraffic (#VTRAF.WIN) and (VTRAF.MAC) by Jeff Corpstein is available at LOS 7 for $150 each. VisualTraffic Lite (#VTRAFLT) is available at LOS 7 for $5. (See ad on page 18.)

The following products have been deleted:

ARCADY3
PICADY3
OSCADY3
TRAFICQ
TRANSYT/10

MVA Systematica

Links Menu

- About McTrans
- Newsletters
- Catalog
- Highway Capacity Software
- Update Information
- Technical Assistance
- McLink (FTP files)
- Other Transportation Topics
- Other Transportation Sites

Information Access

www: http://mctrans.ce.ufl.edu
E-mail: mctrans@ce.ufl.edu
Fax: (352) 392-3224
Messages: 1-800-226-1013
Telephone: (352) 392-0378

	Extension	General Responsibilities
Bill Sampson Assistant Director	**241**	Center & software information Website & technical assistance (HCS)
Bill Heitman Program Manager	**234**	Catalog & newsletter information Advertising & support services
Jesse Wolbert Program Assistant	**239**	Orders & new product status Contracts & licenses
Debbie Escalera Order Processing	**242**	Order & shipment status Software registration & invoices
David Hale Technical Assistant	**240**	Traffic software technical assistance TRANSYT-7F, PASSER, NETSIM
Ahmet Dogan Technical Assistant	**238**	Hydraulic software technical assistance HYDRAIN, HEC, HY-8, WSPRO

Calendar

Conferences

ITE 69th Annual Meeting Institute of Transportation Engineers, (202) 554-8050	Aug 1-4	Las Vegas, NV
6th ITS World Congress ITS America, VERTIS, ERTICO, ITS Canada, (202) 484-4542	Nov 8-12	Toronto, Canada

Training

Synchro/SimTraffic Training Course (Beginner/Intermediate) University of Nebraska (402) 472-2175	July 21	Lincoln, NE
Highway Capacity Analysis Seminar - 97 Update McTrans & University of Nevada, Chris Wilson (352) 392-0378 ext. 223	July 28-30	Las Vegas, Nevada
Timing Traffic Signals Using TEAPAC, PASSER, TRANSYT and NETSIM/CORSIM Workshop I University of Wisconsin-Madison, 800 462-0876	Sept 13-15	Orange County, CA
Advanced TEAPAC Application Techniques Workshop II University of Wisconsin-Madison, 800 462-0876	Sept 16-17	Orange County, CA
Introduction to CORSIM Training Course Odetics (703) 471-0838	Sept 15-17	Sterling, VA

McTrans Products

LOS

1 Full Technical and Maintenance Support

McTrans provides full technical support of the application and provides software maintenance, for which the cost of maintenance is user-supported. Our support at LOS 1 assures users of the following: Immediate notification of any serious bug discovered in a supported, maintained program; Free replacements of program modules (and documentation) which are updated to correct bugs; Periodic User Notes for useful information; Discounted upgrades when major new releases are issued. This software is maintained by McTrans or the developer, thus the mechanism for correcting bugs and implementing other enhancements is in place and responsive to immediate needs.

2 Technical and Update Support

This is software for which McTrans provides technical support and free updates (but not major upgrades).

3 Limited Technical Support

This is usually public domain software for which McTrans serves as the distributor. McTrans provides limited "first line" technical assistance in its use.

4 Freeware/Shareware/User Supported

This is generally copyrighted software offered by McTrans to the membership. It is referred to as "freeware," "shareware" or "user-supported" by various developers. McTrans offers no support for software in this category, but support usually can be obtained from the developer for a registration fee. Registration of shareware with the developer usually is required if the program is placed into actual use.

5 Unsupported

This is useful public-domain software that McTrans makes available at a nominal fee. However, no one, McTrans or the developer, provides any support. You're on your own.

6 Proprietary Software, McTrans Distributed

This is privately developed software distributed by McTrans, for which a royalty is paid to the developer. The developer provides the technical support.

7 Proprietary Software, Developer Distributed

This is privately developed software for which a royalty is paid to the developer. Software at this level is distributed by the developer and all support is provided by the developer.

new! New Products

update Updated Products

Since Spring 1999

Guide to Software Codes

ACAD	AutoCAD
dBn	dBASE n
EXC	Microsoft EXCEL
IB	Interpreted BASIC
L123	Lotus 1-2-3
MSTAT	MicroStation
(SI)	Source code included
WIN	Windows 3.x
W95	Windows95 & NT
PP	Microsoft PowerPoint

	Product Description	Release Date	Software Product No.	Price	Documentation Product No.	Price	Supporting Software	LOS
	Highway Engineering Construction Management							
	Daily Report System	1/92	DRS	$5	(On Disk)			5
	Easy Project, Ver. 3.6	1/90	EZPROJ	5	(On Disk)			4
	Estimax, Ver.1.0	12/96	ESTMAX.WIN	975	(Included)		WIN	7
	GANTT, Ver. 1.3	10/88	GANTT	5	(On Disk)			4
	North Dakota Materials Management System, Ver. 1.0	2/93	NDMMS	50	NDMMS.D	$5		3
	North Dakota Roadway Management System, Ver. 1.0	2/93	NDRMS	50	NDRMS.D	5		3
	PC Project, Ver. 1.1	4/88	PC PROJ	5	(On Disk)			4
	WINsched, Ver. 1.04c	3/97	WINSCH	195	(Included)			6
	Highway Engineering Highway Design							
	BAP	6/97	BAP	10	(On Disk)		W95/WIN	4
	BERM, Ver. 1.0	9/87	BERM	5	BERM.D	25		5
	BRCOM	6/88	BRCOM	50	BRCOM.D	10		3
	BRICK Package	6/91	BRICK	12,930	(Included)			7
	Individual modules are available. Refer to Catalog or call for details.							
	BRIDGE RM/LL, Ver. 1.0	6/89	BRIDGE	50	BRIDGE.D	5		3
	CBEAR	9/97	CBEAR	5	CBEAR.D	10		5
	COM624P, Ver. 2.0	10/93	COM624P	5	COM624P.D	25		5
	Datasets for Standardized Small Sign Support Hardware	6/97	GSSH	30				5
	DILLY, Ver. 1.1	8/88	DILLY	300[1]	(Included)			1
new!	DRIVEN	6/99	DRIVEN	50	DRIVEN.D	10		3
	ECSD11	11/91	ECSD	50	ECSD.D	5		3
	EMBANK, Ver. 2.0	5/93	EMBANK	50	EMBANK.D	10		3
	FLRDS, Ver. 4.04	2/94	FLRDS.GSS	100	FLRDS.D	15		3
	ICAHD, Ver. 3.0	4/98	ICAHD	2500	(Included)			7
	KwikSOFT Bridge Design Utilities-Series 1	6/96	KSBDS	75	(Included)			7
	PC-BRIDGE, Ver. 2.60	1/90	PCBRIDGE	5	(On Disk)			4
	PC-STRAN, Ver. 5.02	1/90	PCSTRAN	5	(On Disk)			4
	PIZER EARTH Earthwork Cut & Fill Calculator Ver. 5.0	9/97	PEARTH.W95	500	(Included)		W95	7
	PL-AID, Ver. 1.1	9/89	PLAID	500[1]	(Included)			1
	PPLAN-6R	4/92	PPLAN	75	(Included)			6
	Reinforced Slope Stability	9/97	RSS	5	RSS.D	10		5
	SET-SAND, Ver. 1.0	12/84	SETSAND	50[1]	(Included)		IB	1
	SHAFT, Ver. 1.0	7/89	SHAFT	200[1]	(Included)		L123	1
	SHAFTUF, Ver. 1.0	3/92	SHAFTUF	200[1]	(Included)		IB	1
	Single Point Urban Interchange	11/91	SPUI	50	(On Disk)		L123	3
	SPILE, Ver. 2.0	6/93	SPILE	50	SPILE.D	10		3
	SSD	11/90	SSD	50	SSD.D	10		3
	Traffic Barrier Hardware Datasets	9/95	TBHD	20	(Included)			5
	WEAP87		WEAP	5	WEAP.D	35		5
	Highway Engineering Hydraulics							
	ASHDRAIN, Ver. 2.0	3/92	ASHDRAIN	165	(Included)			6
	BASINOPT	4/98	BASINOPT	1,235	(Included)		W95	7
	BASINOPT SIMULATION ADD-IN	4/98	SIMULA	400	(Included)		W95	7
	BOSS RiverCAD™	9/97	bossrcad.w95	2,690	(Included)		W95	7
	BOXCAR, Ver. 1.0	11/88	BOXCAR	125	BOXCAR.D	25		1
	Supplemental Documentation				BOXCAR.DS	25		
	BRI-STARS, Ver.3.3	3/93	BRI-STARS	100	BRI-STARS.D	25		1
	CAHH DOS PROGRAMS	4/98	CAHH	485			W95	7
	CANDE89, Ver. 1.0	5/90	CANDE	5	CANDE.D	20		5
	Source Code, Ver. 1.0	5/90	CANDE.S	5			(SI)	5
	CANDE-POST¨, Ver. 1.1	9/94	CPOST	300	(Included)			7
	CANPRO, Ver. 1.2	8/89	CANPRO	80	(Included)			6
	CHANNEL	4/98	CHANNEL	585	(Included)		W95	7
	CODEH2, Ver. 3.59	6/89	CODEH2	695	(Included)			6
	Demo, Ver. 3.59	10/88	CODEH2.DEM	10				6
update	Culvert Analysis (HY-8), Ver. 6.1	6/99	HY8	125	HY8.D	40		2
	Upgrade to Ver. 6.0		HY8.UPG	25	(Included)			
	CULVERT2, Ver.1.0	11/92	CULVERT2	75	(Included)			2
	CULVERT3, Ver.1.0 (Metric)	4/94	CULVERT3	75	(Included)			2
	CULVERT4	5/98	CULVERT4	50	(Included)			6
	CulvertMaster	12/95	CULVMSTR.WIN	495			Win	7
	CYBERNET	12/95	CYBERNET	195			AutoCAD	7

	Product Description	Release Date	Software Product No.	Price	Documentation Product No.	Price	Supporting Software	LOS
	DBRM (Drainage Basin Runnoff)	4/96	DBRM	$175	(Included)			6
	Metric Ver.	4/96	DBRM.M	175	(Included)			6
	DAMP, Ver. 1.1	7/89	DAMP	50	DAMP.D	$10		3
	Drainage Requirements in Pavements	11/98	DRIP	50	DRIP.D	10		3
	EASy (Engineering Analysis System), Ver. 1.1	7/89	EASY	150	(Included)			6
	EPANET Modeling System	9/97	EPANET.W95		(Included)		W95	7
	Contact McTrans for quote.							
	FESWMS, Ver.1.0	3/89	FESWMS	70	FESWMS.D	25		3
	Supplemental Documentation				FESWMS.DS	25		
	FlowMaster PE for Windows	12/95	FLOWPE.WIN	195			Win	7
	FlowMaster I, Ver.3.4	7/93	FLOW	100	(On Disk)			7
	Formed in Place Pipe, Ver. 3.1	12/95	FIPP	225	Included		Win	6
	HEC-1, Ver. 4.0	8/90	HEC1.GSS	160	HEC1.D	45		2
	Spanish Documentation				HEC1.DS	45		2
	HEC-2, Ver. 4.6.2	6/91	HEC2	95	HEC2.D	30		2
	Spanish Documentation				HEC2.DS	30		
	HEC-12 (Pavement Drainage), Ver. 3.0	11/93	HEC12	350	(Included)			7
	Demo, Ver. 2.11		HEC12.DEM	5	(On Disk)			6
	HEC-RAS, Ver.2.0	5/97	HECRAS	125	HECRAS.D	25	W95/WIN	2
	HYDGEN for Windows	6/93	HYDGEN	5	(Included)		WIN	4
update	HYDRAIN, Ver. 6.1	4/99	HYD6	350	HYD6.D	50		1
	Ver. 6.0 Upgrade from Ver. 5.0		HYD6.UPG	50				1
	Supplemental Documentation				HYD.DS	25		
	Hydrogen Sulfide (HS), Ver.1.0	4/91	HS	45	HS.D	15		6
	Supplemental Documentation				HS.DS	20		
	HydroCAD, Ver.5.0	8/98	HCAD10	395	(Included)			7
			HCAD20	595	(Included)			7
			HCAD40	795	(Included)			7
			HCAD90	995	(Included)			7
			HCAD200	1195	(Included)			7
new!	Hydrological Modeling System, Ver.1.1	6/99	HECHMS	75	HECHMS.D	20		2
	Hydrology & Hydraulics for Stormwater Management Manual	6/96			HHSME.D	85		
	HYDROpac, Ver.2.1b		HPAC	95	(Included)			6
	HY-EDIT, Ver.1.1	11/91	HYEDIT	50	(On Disk)			6
	HYPERCALC, Ver.1.01	3/95	HYPERCALC	5	(On Disk)		WIN	4
	HYTB	3/99			HYTB.D	20		
	LCA, Ver. 1.0	12/90	LCA	35	LCA.D	15		6
	LCA Metric, Ver. 1.0	8/90	LCAM	35	LCAM.D	15		6
	LCAP, Ver.1.0	12/90	LCAP	40	LCAP.D	10		6
	MacCulvert, Ver.1.0	8/90	MACCULV.MAC	100	(Included)			7
	MacStorm Sewer, Ver. 3.1	8/90	MACSTORM.MAC	550	(Included)			7
	PIPECAR, Ver.2.1	3/95	PIPECAR	175	PIPECAR.D	25		1
	Upgrade		PIPECAR.UPG	50	PIPECAR.DS	25		6
	ASCE Standard 15-93	3/95			ASCE15.D	35		
	PLASTIC	1/88	PLASTIC	5				5
	PONDS	3/95	PONDS	700	(Included)			7
	Preliminary Analysis System	7/88	PAS	50	PAS.D	15		3
	PROfile	7/89	PFILE	275	(Included)			6
	QUICK PIPE, Ver.1.3	3/95	QPIPE	125	(Included)			6
	QUICK PIPE PRO, Ver. 1.0	12/95	QPP	375	(Included)			6
	RIMS	4/98	RIMS	105	(Included)		W95	7
	River Modeling System	9/97	BOSSRMS.W95	2,290	(Included)		W95	7
	SAMM, Ver.2.0	10/90	SAMM	50	SAMM.D	15		6
	Supplemental Documentation				SAMM.DS	40		
	Scour at Bridges (HY-9), Ver.5.0	9/94	SCOUR	50	SCOUR.D	20		3
	Supplemental Documentation (HEC-20)				SCOUR.DS	25		
	StormCAD (25 Inlet Version)	12/95	StormCAD.WIN	495			Win	7
	Storm Sewer Analysis	5/93	SSANAL	175	(Included)			6
	Ver. 3.0 Upgrade		SSANAL.UPG	40	(Included)			6
	Metric Ver.	5/93	SSANAL.M	175	(Included)			6
	Storm Sewer Hydrograph	9/93	SSHYD	175	(Included)			6
	Ver. 3.0 Upgrade		SSHYD.UPG	40	(Included)			6
	Metric Ver.	5/93	SSHYD.M	175	(Included)			6
	Stormwater Infiltration Structure Design	9/95	SISD	45				7
	Stormwater Management, Ver.4.0	1/94	SMANAG	225	(Included)		EXC,WIN	6
	Stormwater Management and Design Aid, Ver. 1.0	3/97	SMADA	5	(On Disk)		WIN	4
	Stormwater Pumping Stations, Ver.1.0	12/94	SPS	75	(Included)			6
	Street Flow	12/92	STFLOW	225	(Included)			7

Product Description	Release Date	Software Product No.	Price	Documentation Product No.	Price	Supporting Software	LOS
SWATER.WIN	2/94	SWATER	$5	(On Disk)		WIN	4
SWITCH, Ver.2.0	7/88	SWITCH	5	(On Disk)			5
Urban Drainage Design Program	4/98	HY-22	5	HY-22.D	$20	W95	5
Urban Stormwater Management	4/96	USMGT	200	(Included)		IB	6
Metric Ver.	4/96	USMGT.M	200	(Included)			6
VaMP, Ver. 2.0	9/90	VAMP	200	(Included)			7
Demo		VAMP.DEM	20				7
update WINPROfile, Ver. 102d	3/97	WINPRO	275	(Included)			6
update WSPRO (HY-7), Ver. 6.1	6/99	WSPRO	85	WSPRO.D	25		2
WSPRO Graph, Ver. 2.03	1/93	WSPRO.G	55	(On Disk)			6
Highway Engineering Pavements/Maintenance							
Carson City PMS	10/90	CCPMS	50	CCPMS.D	10	dB3	3
ELSYM 5	9/86	ELSYM	50	ELSYM.D	5		3
EXPEAR, Ver.1.4	2/92	EXPEAR	50	EXPEAR.D	20		3
Supplemental Documentation				EXPEAR.DS	25		
Highway Design & Maintenance Standards Model3	3/96						
(HDM-III and HDM-PC), Ver.3.0							
HDM-PC, Fully Suported		HDM	400	(Included)			1
EBM Alone, Fully Supported		EBM	60	(Included)			1
Upgrade to Supported		HDM.UPG	250				
HDM-PC, Unsupported		HDM.UN	150	(Included)			5
EBM Alone, Unsupported		EBM.UN	30	(Included)			5
HDM User's Manual (Extra Copies)				HDM.D	15		
HDM-Documentation, Vol.1 (Extra Copies)				HDM.DV1	20		
HDM-Documentation, Vol. 2 (Extra Copies)				HDM.DV2	25		
ILLI-BACK, Ver.2.0		ILBACK	225	(Included)			7
ILLI-PAVE Algorithms	7/86	ILLI	50	ILLI.D	5	(SI)	3
JCP-1	12/86	JCP	50	JCP.D	5		3
Long Beach PMS	6/81	LBPMS	50	LBPMS.D	10	dB3	3
MAPCON	4/87	MAPCON	100	MAPCON.D	65		3
Spanish Documentation				MapCON.DS	65		
MIX	1/80	MIX	5	(None)		IB	5
MODULUS, Ver.4.0	2/91	MODUL	50	(Included)			3
NULOAD	10/86	NULOAD	50	NULOAD.D	15		3
PASELS, Ver.1.0	7/88	PASEL	50	(Included)			3
Pavement Management Forecasting, Ver. 1.0	12/87	PMF	50	PMF.D	15	L123	3
Pavement Management System, Ver. 3.0	12/87	PMS	695	(Included)			7
GIS Ver. 1.0	12/87	PMS.GIS	2500	(Included)			7
PAVESPEC	12/96	PAVESPEC	50	(Included)		WIN	7
PMSPro Pavement Management System, Ver.5.2	3/95	PMSPRO	1000	(Included)			7
Road Manager, General Roadway	4/86	RMRD	495	(Included)			7
Individual modules are available, Refer to Catalog or call for details.							
Road Surface Management System	12/98	RSMS	75	RSMS.D	20		2
TAFFY, Ver. 1.1	2/88	TAFFY	5	(On Disk)			5
ZAPHERS	12/96	ZAPHERS	50	(Included)		WIN	7
Highway Engineering Surveying							
CC-SURVEYOR, Ver. 4.0	12/90	CCSURV	5	(On Disk)			4
COllier.GO, Ver. 3.47	5/89	COLLGO	5	(On Disk)		IB	4
EZVAL, Ver. 2.1		EZVAL	5				4
Easy Vertical Alignment, Ver. 2.0 (Windows)	12/96	EZVAL.WIN	70	(Included)		WIN	7
GEOH (Horizontal Geometry)	8/92	GEOH	165	(Included)			6
SURVpac, Ver. 4.51	2/94	SPAC	50	(Included)			6
WINcogo™	6/95	WINCOGO	145				6
Traffic Engineering Capacity Analysis							
AWSC	5/91	AWSC	50	AWSC.D	10	L123	3
CCG/CALC2	9/97	CALC2	225	(Included)			7
CINCH	2/90	CINCH	50	CINCH.D	5	IB	3
CIRCAP	7/88	CIRCAP	50	CIRCAP.D	5	IB	3
FAZWEAVE, Ver. 2.20	1/89	FAZWEAVE	50	FAZWEAVE.D	15	IB	3

Product Description	Release Date	Software Product No.	Price	Documentation Product No.	Price	Supporting Software	LOS
5 Leg Signalized Capacity	1/90	5LEG	$95	(Included)		L123	6
Florida LOS Worksheets, Ver. 2.2	9/96	FLLOS	50	(On Disk)			3
HCM/ Cinema, Ver. 3.0	10/93	HCMCIN	605[1]	(Included)			7
Highway Capacity Manual (HCM) with 1997 Update & CD ROM	8/98			HCM.D	$110		
HCM Update only & CD ROM	8/98			HCM97UPD.D	90		
Highway Capacity Software	11/98	HCS3	500[1]			W95	1
HCS release 3 complete upgrade (all modules)	11/98	HCS3.UPG	250			W95	1
new! Indonesian Highway Capacity Manual	6/99	IHCM	50	IHCM.D	35		3
IVHS Workshop Report	12/95	IVHSWS	5				
MAXVOL, Ver.1.0		MAXVOL	5	(On Disk)		EXC	4
MultiLeg, Ver. 2.4A	3/96	MLEG	85	(On Disk)			6
NCAP, Ver.2.04	11/86	NCAP	295	(Included)			7
Demo, Ver. 2.04	12/86	NCAP.DEM	10				6
Roadrunner, Ver. 5.2	7/97	RRUN.WIN	195	(Included)		WIN	6
Windows95 Ver.		RRUN.W95	195	(Included)		W95	6
Macintosh Ver.		RRUN.MAC	195	(Included)		EXC	6
SAT_ADJ	6/87	SATADJ	5	(On Disk)		L123	5
SATFLOW	3/95	SATFLOW	5	(Included)			4
SIDRA, Ver. 5.2	3/99	SIDRA	850	(Included)		W95/98/NT	6
Additional Copies		SIDRA.X	390	(Included)			6
Educational		SIDRA.E	390	(Included)			6
SIGCAP	2/87	SIGCAP	50	SIGCAP.D	5	(SI)	3
SIGEVAL, Ver. 1.0	5/94	SIGEVAL	55	SIGEVAL.D	10		3
SIGNAL85/TEAPAC Capacity Only, Ver. 2.62	2/95	TPCS85.1	295[1]	(Included)			7
Demo		TPCS85.0	5	(On Disk)			6
SIGNAL94/TEAPAC Capacity Only, Ver.1.23	8/98	TPCS94.1	295[1]	(Included)			7
Demo		TPCS94.0	5	(On Disk)			6
SIGNAL94/TEAPAC Capacity Only, Windows 3.1, Ver. 1.23	8/98	TPCS94.1.WIN	295[1]	(Included)		WIN	7
Demo, Windows 3.1		TPCS94.0.WIN	5	(On Disk)		WIN	6
SIGNAL94/TEAPAC Capacity Only, Windows 95, Ver. 1.23	8/98	TPCS94.1.W95	295[1]	(Included)		W95	7
Demo, Windows 95		TPCS94.0.W95	5	(On Disk)		W95	6
SIGNAL97/TEAPAC Capacity Only, Windows 95, Ver. 1.00	8/98	TPCS97.1.W95	295[1]	(Included)		W95	7
Demo, Windows 95		TPCS97.0.W95	5	(On Disk)		W95	6
SIGNAL97/TEAPAC Capacity Only, Windows 3.1, Ver. 1.00	8/98	TPCS97.1.WIN	295[1]	(Included)		WIN	7
Demo, Windows 3.1		TPCS97.0.WIN	5	(On Disk)		WIN	6
SIGNAL97/TEAPAC Capacity Only, Ver. 1.00	8/98	TPCS97.1	295[1]	(Included)			7
Demo		TPCS97.0	5	(On Disk)			6
SIPA, Ver. 2.0	2/88	SIPA	115	(Included)			6
SYNCHRO Light, Ver. 3.2		SYNCLT	585	(Included)		W95/WIN	7
UCB Planning Level Analysis	2/87	UCBPLA	5	(On Disk)			5
Unsig Mac, Ver. 1.1	5/89	UNSIG.Mac	5	(On Disk)			4
UNSIG10	3/87	UNSIG	50	UNSIG.D	5	(SI)	3
WINUNSIG, Ver. 2.1 (1985 HCM)	8/95	WINUNS21	50	(On Disk)		WIN	7
WINUNSIG, Ver. 3.0 (1994 HCM)	8/95	WINUNS30	75	(Included)		WIN	7
Demo	9/95	WINUNS.DEM	5	(On disk)		WIN	6
Traffic Engineering Data Processing							
DAITA	6/95	DAITA	80	(Included)		WIN	6
Demo		DAITA.DEM	10			WIN	6
FLOCOUNT	4/94	FLOCOUNT	190				6
Moving Vehicle Run Analysis Package, Ver. 2.3	10/93	MVRAP	150	(Included)			1
DMI Cable		MVRAP.C	20				
PCSPEED, Ver. 1.3	7/87	PCSPEED	5	(On Disk)			5
PEDCTS, Ver. 1.0	1/90	PEDCTS	5	PEDCTS.D	5	L123	5
SpeedPlot, Ver. 2.0	5/93	SPLOT	100	(Included)			6
SpeedPLOT (+), Ver. 4.0	4/98	SPLOTPL	200	(Included)			6
SUPERDET, Ver.2.0	9/86	SUPERDET	300	(Included)			6
TDIP, Ver. 3.0	3/91	TDIP	50	TDIP.D	10		3
TED/TEAPAC, Ver. 3.60	3/94	TPCTED.1	295[1]	(Included)			7
TGAP, Ver.1.0		TGAP	125	(Included)			7
TURNFLOW, Ver. 1.0	5/88	TURNFLOW	5	TURNFLOW.D	5	L123	4
TURNS	10/90	TURNS	50	(On Disk)			3
TURNS/TEAPAC Tabulator & Peak Hour, Ver. 3.40	8/98	TPCTRN.1	295[1]	(Included)			7
TURNS/TEAPAC plus Warrants, Ver. 3.40	8/98	TPCTRN.2	595[1]	(Included)			7
Demo		TPCTRN.0	5	(On Disk)			6
VEHCTS, Ver. 1.0	1/90	VEHCTS	5	VEHCTS.D	5	L123	5

	Product Description	Release Date	Software Product No.	Price	Documentation Product No.	Price	Supporting Software	LOS
	Traffic Engineering General Traffic							
	ARTS Compendium	9/97	ARTS	$5	ARTS.D	$10		4
	AUTOMUTS, Ver. 1.0	3/92	AUTOMUTS	50	(On Disk)			3
	Florida Manual on Uniform Traffic Studies (MUTS)				FLMUTS.D	15		
	Bottleneck Traffic Simulator (Bts), Ver. 1.1	8/91	BTS	75	BTS.D	10		2
	CADD Sign Library DWG Format	3/95	CADD.DWG	195				6
	CADD Sign Library DXF Format	3/95	CADD.DXF	195				6
	CADD Sign Library CEL Format	3/95	CADD.CEL	195				6
	Computer Aided Transportation Software	8/98	CATS	150				6
	CONDUFIL, Ver. 1.0	11/91	CONDUFIL	5	(On Disk)			4
	DELAYE, Ver. 1.0	3/99	DELAYE	50	(On Disk)		WIN	3
	dQUEUE, Ver. 1.2	10/90	DQ	50	DQ.D	5		3
	FREWAY, Ver. 1.01	9/87	FREWAY	50	FREWAY.D	5		3
	FRIOP, Ver. 3.1	4/89	FRIOP	75[1]	(Included)			1
	General Purpose Queueing Model	3/97	QUEUE_M	95	(Included)			7
	Integrated Queue Analysis Package (IQPAC), Ver. 1.0	1/94	IQPAC	175	(Included)			6
	Manual for Uniform Traffic Control Devices	3/98	MUTCD.CD	145	(Included)		WIN	6
	Professional Capacity Building	6/97	PCB	25	(Included)		WIN/PP	4
	Queue2	6/93	QUEUE2	35	(Included)			7
	QUICK-HOV	12/96	QUICKHOV	250	QUICKHOV.D	20		1
	SALLIE, Ver. 1.0.4	3/90	SALLIE	50	SALLIE.D	15		3
	SIGN DRAWINGS	10/86	SIGNDWG	165	(Included)			6
	SIGN SPACING	12/89	SIGNSPAC	45	(On Disk)		IB	3
	Sign Inventory Management System	3/99	SIMS	75				2
	SPANWIRE	7/90	SPANWIRE	1550	(Included)			7
	SPARKS, Ver.1.0	6/95	SPARKS	395	(Included)			6
	Demo	6/95	SPARKS.DEM	10				6
	TAPM		TAPM	50	TAPM.D	5		3
	TBASE		TBASE	5	(On Disk)			4
	TEAPAC Traffic Engineering Package	8/98	TPC*.*.1	3495[1]	(Included)		W95/WIN	7
update	TOSS Traffic Operations System Software, Ver. 8.0	3/99	TOSS.P	1500	(Included)		W95/WIN	7
	Upgrade (TOSS.P only)	3/99	TOSSUP	695	Included)		W95/WIN	7
	Accident Information System, Ver. 8.0	3/99	TOSSAIS	295	(Included)		W95/WIN	7
	Collision Diagram, Ver. 8.0	3/99	TOSSCD	295	(Included)		W95/WIN	7
	Traffic Count Information, Ver. 8.0	3/99	TOSSTCI	295	(Included)		W95/WIN	7
	Sign Inventory System, Ver. 8.0	3/99	TOSSSI	295	(Included)		W95/WIN	7
	Signal Maintenance System, Ver. 8.0	3/99	TOSSTSM	295	(Included)		W95/WIN	7
	Signal Inventory System, Ver. 8.0	3/99	TOSSTSI	295	(Included)		W95/WIN	7
	Street Light Maintenance System, Ver. 8.0	3/99	TOSSSLM	295	(Included)		W95/WIN	7
	Street Light Inventory System, Ver. 8.0	3/99	TOSSSLI	295	(Included)		W95/WIN	7
	Road Marking Inventory, Ver. 8.0	3/99	TOSSRMI	295	(Included)		W95/WIN	7
	Street Furniture Inventory System, Ver. 8.0	3/99	TOSSSFI	295	(Included)		W95/WIN	7
	Complaint Logging System, Ver. 8.0	3/99	TOSSCL	295	(Included)		W95/WIN	7
	Traffic Collision Diagram Library	9/93	ACCDWG	100	(On Disk)			6
	Traffic Control Plan Library	9/93	TCPDWG	100	(On Disk)			6
	Traffic Engineer's Toolbox	6/97	TET	250	(On Disk)		W95	6
	Traffic Information Program Series (TIPS)				TIPS	10		
	with Binder				TIPS.B	15		
update	Traffic Noise Model Ver. 1.0a	4/98	FHWATNM	695	(Included)		WIN	1
	Traffic Signal Design Library	9/93	TSDDWG	100	(On Disk)			6
	TUTOR/TEAPAC, Ver. 3.03	8/98	TPCTUT.1	95[1]	(Included)			7
	Demo		TPCTUT.0	5	(On Disk)			6
	Traffic Engineering Safety & Accident Records							
	Accident Records Summary and Diagrams	1/92	ACCI	95	(On Disk)			6
	Grade Severity Rating System	8/89	GSRS	50	GSRS.D	10		3
	HISAM	2/86	HISAM	50	HISAM.D	10		3
	KARS, Ver. 2.1	5/92	KARS	65	(Included)			3
	Demo		KARS.DEM	15	(On Disk)			3
	ROADSIDE, Ver. 5.0	1/96	ROADSIDE	50	(On Disk)			3
	SCARS, Ver. 4.1	6/89	SCARS	350[1]	(Included)			1
	Demo		SCARS.DEM	5	(On Disk)			5
	SCCOLD, Ver. 3.31	11/88	SCCOLD	75[1]	(On Disk)			1
	Safety Resource Allocation Program, Ver. 1.0	1/88	SRAP	50	SRAP.D	5		3

Product Description	Release Date	Software Product No.	Price	Documentation Product No.	Price	Supporting Software	LOS
Traffic Engineering Signal Timing & Warrants							
Advanced Traffic Analysis	3/95	TRAFFIC.CD	FREE				5
Arterial Analysis Package Executive, Release 4.2	2/94	AAPEX	$200[1]	AAPEX.D (MOST.V2)	$35		1
Demo		AAP.DEM	5				5
ATMS Conference Proceedings	10/93			ATMS93.D	20		
COUNTS PC	12/86	COUNTS	50	COUNTS.D	5		3
EZ-POSIT, Ver. 2.6	9/85	EZPOSIT	5	(On Disk)			4
Left-Turn Signal/Phase Warrant Program	6/96	LTPHASE	50				6
LINKFLO/INTCAP	1/87	LINKFLO	50	LINKFLO.D	5	L123	3
LTAP, Ver.2.1	12/87	LTAP	50	(On Disk)		IB	3
MAXBAND, Ver. 2.1		MAXBAND	50	MAXBAND.D	20		3
METS (Spanish Version of WEST)	12/96	METS	200	(Included)			6
M|O|S|T Volume 1, Reference Manual				MOST.V1	40		
M|O|S|T Volume 2, AAP Users Guide				MOST.V2	35		
M|O|S|T Volume 3, PASSER II-90 Users Guide				MOST.V3	15		
M|O|S|T Volume 4, TRANSYT-7F Users Guide				MOST.V4	40		
M|O|S|T Volume 5, WHICH Users Guide				MOST.V5	20		
M|O|S|T Binders				MOST.B	5		
NOSTOP/TEAPAC (12 Intersections), Ver. 4.30	8/98	TPCNST.1	395[1]	(Included)			7
NOSTOP/TEAPAC (25 Intersections), Ver. 4.30	8/98	TPCNST.2	495[1]	(Included)			7
Demo		TPCNST.0	5	(On Disk)			6
NOSTOP/TEAPAC (12 Intersections), Windows 3.1, Ver. 4.30	8/98	TPCNST.1.WIN	395[1]	(Included)		WIN	7
NOSTOP/TEAPAC (25 Intersections), Windows 3.1, Ver. 4.30	8/98	TPCNST.2.WIN	495[1]	(Included)		WIN	7
Demo, Windows 3.1		TPCNST.0.WIN	5	(On Disk)		WIN	6
NOSTOP/TEAPAC (12 Intersections), Windows 95, Ver. 4.30	8/98	TPCNST.1.W95	395[1]	(Included)		W95	7
NOSTOP/TEAPAC (25 Intersections), Windows 95, Ver. 4.30	8/98	TPCNST.2.W95	495[1]	(Included)		W95	7
Demo, Windows 95		TPCNST.0.W95	5	(On Disk)		W95	6
P2BAT	11/91	P2BAT	5	(On Disk)			4
PASSER II-90, Ver. 2	12/90	P290	150	P290.D	15		1
M|O|S|T Volume 3				MOST.V3	15		
update PASSER III-98	6/99	P398	300	P398.D	15		1
Upgrade from PASSER III-90		P398.UPG	170				1
PASSER IV-96, Ver.2.1	6/97	P496	250	P496.D	15		1
PREPASSR/TEAPAC (12 Intersections), Ver. 1.52	8/98	TPCPPS.1	395[1]	(Included)			7
PREPASSR/TEAPAC (100 Intersections), Ver. 1.52	8/98	TPCPPS.2	595[1]	(Included)			7
Demo		TPCPPS.0	5	(On Disk)			6
PREPASSR/TEAPAC (12 Intersections), Windows 3.1, Ver. 1.52	8/98	TPCPPS.1.WIN	395[1]	(Included)		WIN	7
PREPASSR/TEAPAC (100 Intersections), Windows 3.1, Ver. 1.52	8/98	TPCPPS.2.WIN	595[1]	(Included)		WIN	7
Demo, Windows 3.1		TPCPPS.0.WIN	5	(On Disk)		WIN	6
PREPASSR/TEAPAC (12 Intersections), Windows 95, Ver. 1.52	8/98	TPCPPS.1.W95	395[1]	(Included)		W95	7
PREPASSR/TEAPAC (100 Intersections), Windows 95, Ver. 1.52	8/98	TPCPPS.2.W95	595[1]	(Included)		W95	7
Demo, Windows 95		TPCPPS.0.W95	5	(On Disk)		W95	6
PRETRANSYT/TEAPAC (12 Intersections), Ver. 2.62	8/98	TPCPTR.1	495[1]	(Included)			7
PRETRANSYT/TEAPAC (100 Intersections), Ver. 2.62	8/98	TPCPTR.2	695[1]	(Included)			7
Demo		TPCPTR.0	5	(On Disk)			6
PRETRANSYT/TEAPAC (12 Intersections), Windows 3.1, Ver. 2.62	8/98	TPCPTR.1.WIN	495[1]	(Included)		WIN	7
PRETRANSYT/TEAPAC (100 Intersections), Windows 3.1, Ver. 2.62	8/98	TPCPTR.2.WIN	695[1]	(Included)		WIN	7
Demo, Windows 3.1		TPCPTR.0.WIN	5	(On Disk)		WIN	6
PRETRANSYT/TEAPAC (12 Intersections), Windows 95, Ver. 2.62	8/98	TPCPTR.1.W95	495[1]	(Included)		W95	7
PRETRANSYT/TEAPAC (100 Intersections), Windows 95, Ver. 2.62	8/98	TPCPTR.2.W95	695[1]	(Included)		W95	7
Demo, Windows 95		TPCPTR.0.W95	5	(On Disk)		W95	6
Progression Graphics and Optimization	9/91	PROGO	250	(Included)			6
Demo (Includes SNAG)	9/91	PROGO.DEM	5				6
Tutorial (Includes SNAG)	9/91	PROGO.SNAG	5				6
Progression Through a Series of Intersections with Actuated Controllers	10/88			PROG.D	10		
QUICK-7F, Ver. 7.2	2/94	QUICK7F	250	QUICK7F.D	20		1
Upgrade to Supported		QUICK7F.UPG	200				
SIG/CINEMA	3/96	SIGCIN	805	(Included)			7

	Product Description	Release Date	Software Product No.	Price	Documentation Product No.	Price	Supporting Software	LOS
	SIGNAL85/TEAPAC Capacity Plus Optimization, Ver. 2.62	2/95	TPCS85.2	$595[1]	(Included)			7
	Demo		TPCS85.0	5	(On Disk)			6
	SIGNAL94/TEAPAC Capacity Plus Optimization, Ver. 1.23	8/98	TPCS94.2	595[1]	(Included)			7
	Demo		TPCS94.0	5	(On Disk)			6
	SIGNAL94/TEAPAC Capacity Plus Optimization, Windows 3.1, Ver. 1.23	8/98	TPCS94.2.WIN	595[1]	(Included)		WIN	7
	Demo, Windows 3.1		TPCS94.0.WIN	5	(On Disk)		WIN	6
	SIGNAL94/TEAPAC Capacity Plus Optimization, Windows 95, Ver. 1.23	8/98	TPCS94.2.W95	595[1]	(Included)		W95	7
	Demo, Windows 95		TPCS94.0.W95	5	(On Disk)		W95	6
	SIGNAL97/TEAPAC Capacity plus Optimization, Windows 95, Ver. 1.00	8/98	TPCS97.2.W95	595[1]	(Included)		W95	7
	Demo, Windows 95		TPCS97.0.W95	5	(On Disk)		W95	6
	SIGNAL97/TEAPAC Capacity plus Optimization, Windows 3.1, Ver. 1.00	8/98	TPCS97.2.WIN	595[1]	(Included)		WIN	7
	Demo, Windows 3.1		TPCS97.0.WIN	5	(On Disk)		WIN	6
	SIGNAL97/TEAPAC Capacity plus Optimization, Ver. 1.00	8/98	TPCS97.2	595[1]	(Included)			7
	Demo		TPCS97.0	5	(On Disk)			6
	SIGPAK	3/87	SIGPAK	50	(On Disk)			3
	Signal Network Animated Graphics	9/91	SNAG	250	(Included)			6
	Demo (Includes PROGO)	9/91	SNAG.DEM	5				6
	Tutorial (Includes PROGO)	9/91	PROGO.SNAG	5				6
new!	Signal Timing Database	6/99	STDB	$395	(Included)		Access	6
	SOAP84, Ver. 84.04	12/88	SOAP	50[1]	SOAP.D	$30		1
	SYNCHRO, Ver. 3.2	4/98	SYNCRO	1095	(Included)		W95/WIN	7
	SYNCHRO PROF, Ver. 3.2	4/98	SYNCPRO	1695	(Included)		W95/WIN	7
	SYNCHRO Demo, Ver. 3.2	4/98	SYNCPRO.DEM	5			W95/WIN	7
	TEAPAC Signal Timing Analysis Package	8/98	TPC*.*.2	2495[1]	(Included)		W95/WIN	7
	TIMACS, Ver. 1.2	7/89	TIMACS	50	TIMACS.D	5		3
	Traffic Models Handbook	12/95			TMOH.D	20		
	TRANNET, Release 7.1	3/95	TRANNET	40	(Included)			3
	TRANSYT-7F, Release 8.1	3/98	MCT7F8	500[1]	T7F8.D (MOST.V4)	35		1
	Upgrade from Release 6		MCT7F8.UPG	250				1
	TRANSYT-7F Self Study Guide	7/89	T7FSSG	95	(Included)			3
	TS/PP-DRAFT, Ver. 2.0	9/94	TSDRFT	440	(Included)			7
	Demo	6/95	TSPP.DEM	5	(Included)			7
	WARRANT, Ver. 1.0	7/91	WARRANT	50	(On Disk)			3
	WARRANTS/TEAPAC Warrants Only, Ver. 1.20	8/98	TPCWAR.1	395[1]	(Included)			7
	WARRANTS/TEAPAC Plus Tabulation & Peak Hour, Ver. 1.20	8/98	TPCWAR.2	595[1]	(Included)			7
	Demo		TPCWAR.0	5	(On Disk)			6
	WEST, Ver. 2.20	2/95	WEST	200	(Included)			6
	WHICH	2/94	WHICH	250[1]	WHICH.D (MOST.V5)	20		1
	Traffic Engineering Simulation & Analysis							
	CORFLO, Ver. 5.0	3/95	CORFLO	350	TRAF.D	50		1
	Demo	8/92	CORFLO.DEM	5				5
	FLEXSYT-II	12/95	FLEXSYT	3000			Win	7
	INTEGRATION, Ver. 2.0	9/95	INTEG	395	(Included)			6
	ITRAF 2.7	3/99	ITRAF	75	(Included)		W95	2
	PRENETSIM/TEAPAC (12 Intersections) Ver.1.22	8/98	TPCPNT.1	495[1]	(Included)			7
	PRENETSIM/TEAPAC (100 Intersections) Ver.1.22	8/98	TPCPNT.2	695[1]	(Included)			7
	Demo		TPCPNT.0	5	(On Disk)			6
	PRENETSIM/TEAPAC (12 Intersections), Windows 3.1, Ver.1.22	8/98	TPCPNT.1.WIN	495[1]	(Included)		WIN	7
	PRENETSIM/TEAPAC (100 Intersections) Windows 3.1, Ver.1.22	8/98	TPCPNT.2.WIN	695[1]	(Included)		WIN	7
	Demo, Windows 3.1		TPCPNT.0.WIN	5	(On Disk)		WIN	6
	PRENETSIM/TEAPAC (12 Intersections), Windows 95, Ver.1.22	8/98	TPCPNT.1.W95	495[1]	(Included)		W95	7
	PRENETSIM/TEAPAC (100 Intersections), Windows 95, Ver.1.22	8/98	TPCPNT.2.W95	695[1]	(Included)		W95	7
	Demo, Windows 95		TPCPNT.0.W95	5	(On Disk)		W95	6
	SimTraffic Ver. 1.0	4/98	TRAFSIM	585	(Included)		W95	7
	TEXAS, Ver. 3.11	7/92	TEXAS	225	TEXAS.D	25		1
	Demo		TEXAS.DEM	5	(On Disk)			1
	TSIS, Ver.4.2 (Complete Package)	4/98	TSIS.W95	500	TSIS.D	20	W95	1
	Upgrade for TRAF-NETSIM and FRESIM	4/98	TSISNFU.W95	250			W95	1
	Upgrade for TRAF-NETSIM only	4/98	TSISNU.W95	250			W95	1
	Upgrade for FRESIM only	4/98	TSISFU.W95	250			W95	1

	Product Description	Release Date	Software Product No.	Price	Documentation Product No.	Price	Supporting Software	LOS
	Traffic Engineering Traffic Maintenance							
	Berkeley Traffic System III	10/88	BTS3	$200	BTS3.D	$20	dB3+	1
	KAR II, Ver. 7.0	11/93	KAR II	1500	(Included)			6
	North Dakota Sign Management System, Ver. 4.0	2/93	NDSMS	50	NDSMS.D	5		3
	QUEWZ		QUEWZ	5	QUEWZ.D	5		5
	Sign Inventory System	6/92	SIS	50	SIS.D	20		3
	SIGNS ^3	3/86	SIGNS3	50	SIGNS.D	15	dB3	3
	Transit Operations							
	Automated Transit Ridership Data	8/90	ATRDCS	50	ATRDCS	45		3
	Chapel Hill Scheduler Interactive Bus Scheduler	5/85	CHS	50	CHS.D	5		3
	Cost Allocation Applications	7/86	COST	50	COST.D	5	L123	3
	Days Off Calculator, Ver. 3.0 (DOS), Ver. 2.0 (WIN)	4/98	DAYS	5	(On Disk)		WIN	4
	Fixed Guideway Transit	7/92	FGT	50	FGT.D	10		3
	Fleetmax	7/94	FMX	995	(Included)			7
	Windows Version	7/94	FMX.WIN	995	(Included)			7
	Demo		FMX.DEM	5	(Included)			7
	GFI Farebox Software Utilities	3/97	FAREBOX	5	(Included)			4
	Inventory CTRL	7/92	ICTRL	1195	(Included)			7
	Demo	7/92	ICTRL.DEM	5				7
	Paratransit Vehicle Maintenance	7/91	PVM	50	PVM.D	20		3
update	Section 15 Transit Agency Performance Data							
	Section 15 Data, 1981-1997 (Specify Year)		SECT15	20	SECT15.D	15	L123	3
	SST3: Small Transit Management Software	12/87	SST3	50	SST3.D	5	DB3	3
	Statistical Sampling of Trip Data	8/83	SSTD	50	SSTD.D	5	IB	3
	TOPDOG: Transit Operations Planning, Diagnostics and Optimization Guidelines	8/87	TOPDOG	50	TOPDOG.D	20		3
	Transit Spreadsheet Applications	2/85	TSSAPP	50	(On Disk)		L123	3
	Vehicle CTRL	2/85	VCTRL	1295	(Included)			7
	Demo	2/85	VCTRL.DEM	10				7
	TransitPlanning							
	Bus Transit Garage Space Requirements Model		BBARN	695	(Included)			7
	CAM (Cost Allocation Model), Ver. 1.0	11/98	CAM	50	CAM.D	5	L123	3
	Disaggregate Elasticity Model, Ver. 1.0	12/84	DEL	50	DEL.D	5		3
	Macintosh Ver.		DEL.MAC	50			EXC	3
	RPT Spreadsheets	9/95	RPT	50	RPT.D	25		3
	Service Planning Case Studies	6/85	SPCS	50	SPCS.D	5	L123	3
	Transit Route Planning CAI Course	5/97	CAI	15	(Included)		WIN	5
	Transportation PlanningData Processing							
	Advanced General Network Editor, Ver. 6.0 for Windows	3/99	GNE.WIN	245	(Included)			7
	License Plate Data Analysis Package	6/96	LPLATE	775	(Included)			7
update	MVMACH, Ver. 5.4	6/99	MVMACH	1500[2]	(Included)		W95/WIN	7
update	Survey	6/99	SURV	1500[2]	(Included)		W95/WIN	7
	Traffic Interpolater & Extrapolater Software		TIES	150	(Included)			6
	URPDB, Ver. 1.9	3/90	URPDB	10	(On Disk)			5
	ZDATA, Ver. 1.3	9/89	ZDATA	50	(Included)			6
	Transportation PlanningDemand Modeling							
	HALLEY, Ver. 3.2	10/86	HALLEY	50	HALLEY.D	10	L123	3
	HieLoW-Hierarchical Logit for Windows™ (English)	9/95	HIELOW.EN	4000	(Included)		WIN	7
	HieLoW-Hierarchical Logit for Windows™ (French)	9/95	HIELOW.FR	4000	(Included)		WIN	7
	Demo	9/95	HIELOW.DEM	10				
	HLFM II+ with QRS II (300 Zones), Ver. 2.0	1/94	HLFMQRS.300	390	(Included)		WIN	7
	HLFM II+ with QRS II (600 Zones)		HLFMQRS.600	585	(Included)		WIN	7
	HLFM II+ with QRS II (900 Zones)		HLFMQRS.900	780	(Included)		WIN	7
	Advanced GNE when purchased with HLFM		GNE.HLF	195	(Included)			7
	MODE CHOICE	11/84	MODE	50	(On Disk)		L123	3
	Mode Choice Modeling (CALIB), Ver. 1.11	10/87	CALIB	60	(Included)			3
	Simplified Project Forecasting	8/85	SPF	50	SPF.D	20		3
	TDC (Transportation Data Cruncher), Ver. 3.0	8/88	TDC	5	(On Disk)			4
	The Highway Emulator	7/91	THE	50	THE.D	15		3
	TMOVES, Ver. 1.1	12/89	TMOVES	50	TMOVES.D	5		3
	TRANS-EXPERT, Ver. 4.0	3/97	TRANEXPT	495	(Included)			6
	Travel Demand Management Evaluation Model, Ver. 2.2	11/93	TDM	250	TDM.D	20		1
	Demo		TDM.DEM	5				

	Product Description	Release Date	Software Product No.	Price	Documentation Product No.	Price	Supporting Software	LOS
	UfosNET Professional A	6/96	UFOSNET	$9500	(Included)			7
	UfosNET Professional B		UFOSNETB	6500	(Included)			7
	UfosNET Lite		UFOSLIT	3500	(Included)			7
	UfosNET Academic		UFOSACA	995	(Included)			7
	Transportation Planning Network Assignment							
new!	b-Node Model, Ver.1.0	6/99	BNODE	900	(included)			7
	MicroTRIMS, Ver. 1.1	12/88	MCTRIMS	55	MCTRIMS.D	$5		3
	QRS II, Ver. 5.10	10/93						
	300 Zones		QRS.300	195	(Included)		W95/WIN	7
	600 Zones		QRS.600	390	(Included)		W95/WIN	7
	900 Zones		QRS.900	585	(Included)		W95/WIN	7
	QRS and ADV.GNE (300 Zones)		QRSGNE.300	390	(Included)		W95/WIN	7
	QRS and ADV.GNE (600 Zones)		QRSGNE.600	585	(Included)		W95/WIN	7
	QRS and ADV.GNE (900 Zones)		QRSGNE.900	780	(Included)		W95/WIN	7
	QRS and ADV.GNE (2400 Zones)		QRSGN2.400	1075	(Included)		W95	7
	Demo for QRS II and GNE		QRSGNE.DEM	5	(Included)			6
	SATURN, Ver. 8.4	8/93	SATURN	12950				7
	TMODEL2™, Ver. 2.0		TMODEL2	3800	(Included)			7
	TMODEL2, Education Version		TMODEL2.ED	150	(Included)			7
	TMODEL2, Sample Version		TMODEL2.DEM	125	(Included)			7
new!	TP/4-in-1	6/99	TP4IN1	900	(Included)			7
	TrafikPlan™		TRAFIKP	1995	(Included)			6
	Educational		TRAFIKP.ED	495	(Included)			6
	Transportation Network Analysis System 2, Ver. 1.0	7/86	TNAS2	50	TNAS2.D	5		3
update	TRIPS/32 (Basic Highways)		TRIPS	8715[2]	(Included)		W95/WIN	7
	Call for details on additional modules.							
	Transportation Planning Project Management							
	Better Decisions, Release 4		BD	95	(Included)			7
	candlink	11/86	CANDLINK	5	(None)			5
	Decision Support System, Version 2.0	6/88	DSS	50	DSS.D	10		3
	Highway Design and Maintenance		HDM	400	(Included)			1
	Standards Model (HDM III and HDM-PC)	(See Highway Engineering/Pavements)						
	Highway User Cost Accounting	4/90	HUCA	50	HUCA.D	15	L123	3
	MicroBENCOST, Ver.1.A	3/95	BENCOST	50	BENCOST.D	35		3
	Document Supplement				BENCOST.DS	30		
	Municipal Equipment Management System	4/93	MEMS	50	MEMS.D	20	IB	3
	Program Development and Management System		PDMS	250	(Included)			7
	Project Analysis Package, Version 2.0	10/88	PAP	50	PAP.D	5		3
	TSM	7/89	TSM	55	TSM.D	20		3
	Transportation Planning Site Analysis							
	ASSIGN9		ASSIGN9	700	(Included)			7
	Demo		ASSIGN9.DEM	20				7
	Intersection Analysis Spreadsheets, Version 3.0	7/90	IAS	50	IAS.D	5	L123	3
	Planning and Project Development Spreadsheets	2/88	PPDS	50	PPDS.D	10	L123	3
	Roadway/Intersection Air Quality	7/84	RAQIAQ	50	RAQIAQ.D	10	L123	3
	SITE, Ver. 2.0	7/89	SITE	50	(On Disk)		L123	3
	Macintosh Version		SITE.MAC	50	(On Disk)		EXC	3
	SITE/TEAPAC (12 Intersections), Ver. 3.40	8/98	TPCSIT.1	395[1]	(Included)			7
	SITE/TEAPAC (25 Intersections), Ver. 3.40	8/98	TPCSIT.2	495[1]	(Included)			7
	Demo		TPCSIT.0	5	(On Disk)			6
	TEAPAC Site Impact Analysis Package	8/98	TPC*.*.3	2195[1]	(Included)		W95/WIN	7
	TRAFFIX Traffic Impact Analysis Software, Ver. 7.0	9/97	TRAFFIX.W95	1840	TRAFFIX.D	75	W95	7
	TRANMAP Site Traffic Impact Analysis	9/97	TRANMAP	900	Included)			7
	TRIP GENERATION, Ver. 4.0	3/98	TRIPGEN	400	(Included)			7
update	VisualTraffic	6/99	VTRAF	150	(Included)		EXC	7
	VisualTraffic Lite	6/99	VTRAFLT	5	(Included)			7
	WinTASS, Ver.2.0	3/98	WINTASS	295	(Included)		W95/WIN	7
	Demo	3/98	WINTASS.DEM	5	(On Disk)		W95/WIN	7
	General interest Administration							
	Equipment Manager, Ver.1.51		EQMGR	1495	(Included)			7
	FINDER, Ver.1.0	4/89	FINDER	75[1]	(Included)			1
	HIGHMANAGE	3/90	HMNG	1500	(Included)			6
	Mortgage Toolbox Demo, Ver.1.0+	2/90	MORTGAGE	5	(On Disk)			4

Product Description	Release Date	Software Product No.	Price	Documentation Product No.	Price	Supporting Software	LOS
General interest Miscellaneous							
ALERT, Ver.1.1	3/90	ALERT	$5	(On Disk)			4
CADmagic, Ver.1.5		CADM	100	(Included)			7
DMPLAS, Ver.1.1	11/91	DMPLAS	5	(On Disk)			4
Engineering Geometry Assistant	3/99	EGA	350	(Included)		W95/98/NT	7
McPrimer, Third Edition	6/93	MCP	20	(Included)			6
Educational		MCP.ED	15	(Included)			6
McPRIMER for WINDOWS	6/94	MCPWIN	20				
MetriCAD, Ver. 1.0		MCAD	90	(Included)			
MetriCAD for Windows, Ver. 1.0	6/95	MCAD.WIN	125	(Included)		WIN	7
Sample Size Estimate		SAMSIZE	50	(Included)			7
Yukon!		YUKON	30	(Included)			7
Windows Version	7/93	YUKON.WIN	50	(Included)		WIN	7
ZTEST		ZTEST	65	(Included)			7