

Enhancements to IGIDS to Import Data from GEOPAK Designs, Interface with PASSER II-90, Update the HCM Chapter 9 Procedures, and Update the Training Materials

Introduction...

The Interactive Graphics Intersection Design System (IGIDS) is a computer software program developed for TxDOT that assists engineers in the analysis and design of individual, at-grade intersections. IGIDS is a MicroStation application which (1) contains geometric and traffic data, as well as signalization definition tools and pavement striping definition and tabulation tools; (2) contains built-in analysis tools for vehicle turning templates; horizontal sight distance checking for stop sign, yield sign, and no control; vertical sight distance checking within the horizontal sight triangle; and Highway Capacity Manual (HCM) Chapter 9 procedures; and (3) contains interfaces to external analysis programs for the TEXAS Model for Intersection Traffic (TEXAS), the TxDOT Automated Plan Preparation System (APP), and the Signal Operations and Analysis Package (SOAP). IGIDS can operate in Eng-

lish or metric units. IGIDS also has an extensive set of training materials. Data for both the built-in and external analysis tools are drawn from a common database that is maintained by IGIDS. Much of this data is extracted from the graphical intersection geometry definition that is constructed by the user. Some non-graphical data, such as volumes, must be entered through the keyboard.

IGIDS is currently being implemented statewide within TxDOT. Both Division and District personnel of TxDOT as well as engineers in other governmental agencies may utilize IGIDS. IGIDS software and training materials are available through The University of Texas at Austin Department of Civil Engineering's anonymous FTP site and Web page.

What We Did...

Most TxDOT engineers now use GEOPAK for the geometric design of inter-

sections. TxDOT Traffic Operations personnel generally have access to the GEOPAK design files for an intersection. IGIDS was enhanced to directly read the intersection geometry from an existing GEOPAK design file. The addition of this feature makes IGIDS much easier to use and reduces duplicated effort. In addition, most TxDOT engineers now prefer to use PASSER II-90 for signal timing optimization rather than using SOAP. IGIDS was enhanced by the addition of a PASSER II-90 interface. The addition of this feature increases the engineers' ability to analyze and design an intersection for optimum operation. Since the last release of IGIDS, the HCM Chapter 9 procedures have been updated. IGIDS was modified to use the 1998 version of the HCM Chapter 9 procedures. Training modules for these enhancements were developed and added to the training course previously developed for IGIDS.

In addition, each training module was updated to reflect recent experience using Web-based training. Finally, a test training session was held to evaluate the training materials and procedures.

GEOPAK is a roadway design package used by most state departments of transportation and is the standard for TxDOT. Like IGIDS, GEOPAK is a MicroStation MDL Application that runs on top of MicroStation. The Design and Computation Manager within GEOPAK adds geometric elements to a MicroStation design file using specific class, color, level, style, and weight as defined by each agency for the type of feature selected. Most agencies define unique attributes for centerline, lane edge, and pavement edge features. The design file to be processed does not have to be created by GEOPAK; any design file where the centerline and lane or pavement edges have unique attributes may be processed by IGIDS. The design file to be processed does have to be attached as a reference file. The IGIDS interface to GEOPAK consists of three commands:

The “Load From GEOPAK Centerline” command must be executed first; then either the “Load From GEOPAK Lane Edges” or the “Load From GEOPAK Pavement Edges” command is performed. The “Load From GEOPAK Centerline” command (a) adds the alternative, (b) adds each leg, and (c) adds the centerline segments for each leg. The “Load From GEOPAK Lane

Edges” command is used when there are one or more graphical elements defining the inner edge and outer edge for each lane. This command is executed once for the entire intersection and adds the inner edge, outer edge, stop line edge, median lane curb return, and curb lane curb return segments for each lane for each leg. The “Load From GEOPAK Pavement Edges” command is used when there are one or more graphical elements defining only the inner edge of the median lane

(optional; the centerline may be used as the inner edge of the median lane) and the outer edge of the curb lane. This command is executed once for each leg of the intersection and adds the inner edge, outer edge, stop line edge, median lane curb return, and curb lane curb return segments for each lane for a single specified leg. Figure 1a is the original intersection design drawn using GEOPAK while Figure 1b is the intersection imported into IGIDS.

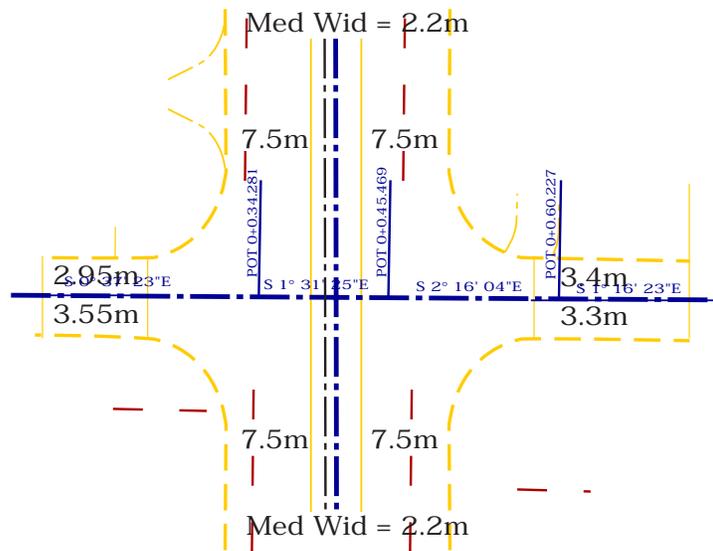


Figure 1a: Intersection imported into IGIDS

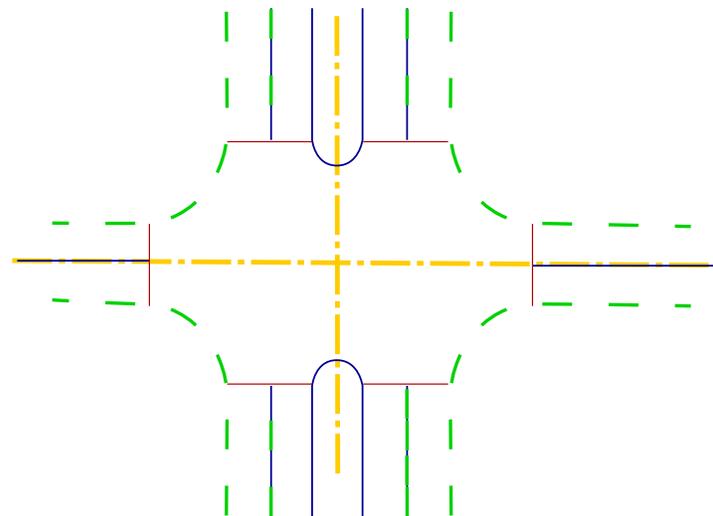


Figure 1b: Intersection imported into IGIDS



PASSER II was developed by the Texas Transportation Institute (TTI) at Texas A&M University. Most TxDOT engineers now prefer to use PASSER II for signal timing optimization. The IGIDS interface to PASSER II-90 consists of one command. The "Save To PASSER II-90" command accesses geometry, traffic, and traffic signal data stored in the IGIDS database, performs the portion of the Highway Capacity Manual (HCM) Chapter 9 procedures to calculate volume and saturation flow rate by lane groups, and writes the input data file for PASSER II-90. The user would then execute PASSER II-90 outside of IGIDS and MicroStation.

The HCM Chapter 9 procedures were developed as an internal analysis process to IGIDS. IGIDS was modified to use the Operational Analysis calculation methods described in Chapter 9 Signalized Intersections of the Highway Capacity Manual, Special Report 209, Third Edition, Transportation Research Board, National Research Council, Washington, D.C., 1998. Before using the HCM function, the intersection geometry, lane channelization, traffic control device characteristics, traffic turning movement volumes, and peak hour factors must be entered into the IGIDS database. This is to be done by using the suitable IGIDS functions. Each time the HCM data is recalculated, files with data for each module and any necessary worksheets are created. These files are in HTML format and can be viewed using

a Web browser such as Microsoft Internet Explorer or Netscape Navigator and printed using the browser's print function.

The IGIDS training materials includes the IGIDS User's Manual as a Microsoft Word document, an overview of IGIDS as a Microsoft PowerPoint presentation, the training course as a Microsoft Word document, and the training course as a Hyper Text Markup Language (HTML) file for the Web. Each of these training materials was updated to reflect the additions, modifications, and enhancements to IGIDS performed during this project. The IGIDS software (<ftp://ftp.ce.utexas.edu/igids>) and all of the training material files (<http://www.ce.utexas.edu/prof/rioux/pub/igids/igids.htm>) are available through The University of Texas at Austin Department of Civil Engineering's anonymous FTP site and Web page. A test training session was held for 11 TxDOT employees at the Houston District Office on August 22-24, 2001. Comments and recommendations from the test training session were incorporated in the training materials.

What We Found...

TxDOT personnel who attended the training session found that IGIDS was user friendly, easy to learn, and applicable to current projects. They also found that the newly added interfaces to GEOPAK and PASSER II-90 were useful.

The Researchers Recommend...

IGIDS should continue to be implemented statewide within TxDOT. Computer software developed in this project should be distributed throughout TxDOT and used to analyze and design isolated intersections. TxDOT personnel in major urban district offices should be trained to use IGIDS and the new enhancements.

IGIDS should continue to be enhanced as TxDOT design professionals recommend additional features. There is great benefit to TxDOT to have most of the intersection analysis and design tools coordinated by IGIDS where duplication of effort can be minimized and a consistent interface presented in a CAD environment.



For More Details...

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The research is documented in the following reports:

5-1291-01-imp-P2	The Interactive Graphics Intersection Design System (IGIDS) User's Manual October 2002
5-1291-01-imp-P3	The Interactive Graphics Intersection Design System (IGIDS) Training Manual October 2002
5-1291-01-imp-1	The Interactive Graphics Intersection Design System (IGIDS) Enhancements October 2002

To obtain copies of a report: CTR Library, Center for Transportation Research,
(512) 232-3138, email: ctrlib@uts.cc.utexas.edu

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IGIDS is not commonly used by TxDOT personnel; however, the training workshop conducted as part of this implementation project determined that IGIDS can be a useful tool. If IGIDS is implemented by TxDOT, it can be used at the district's or division's discretion.

For more information on this research project, please contact Wade Odel, P.E., Research and Technology Implementation Office, (512) 465-7403 or email at wodell@dot.state.tx.us.

Your Involvement Is Welcome!

Disclaimer

This research was performed in cooperation with the Texas Department of Transportation and the U. S. Department of Transportation, Federal Highway Administration. The contents of this report reflect the views of the authors, who are responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official view or policies of the FHWA or TxDOT. This report does not constitute a standard, specification, or regulation, nor is it intended for construction, bidding, or permit purposes. Trade names were used solely for information and not for product endorsement. The engineer in charge was Thomas W. Rioux, Ph.D., P.E. (Texas No. 48008).