

4.0 Alternatives Generator

The purpose of the *Alternatives Generator* (AG) is to provide a graphical interface for the IDAS user to view a transportation planning network in both graphical and tabular formats, enter all user-required data, and specify the location of ITS components on that network for further assessment within IDAS.

The AG accepts and displays a network of the control alternative, which is input from the regional travel demand model (TDM) through the IDAS I/O interface. From this control alternative network, the user can employ the AG to deploy ITS components and to create and save ITS options for evaluation within IDAS.

Via the AG, the user is able to specify all of the required ITS improvements that accompany each of the defined ITS options. The end product of the application of this module is a set of ITS options that contain various ITS improvements. Figure 4.1 illustrates the data flow for the AG. The next sections discuss the data that are input to and output from the AG.

■ 4.1 Data Inputs

This section describes the data required by the IDAS AG module. There are two primary sources of data for the AG:

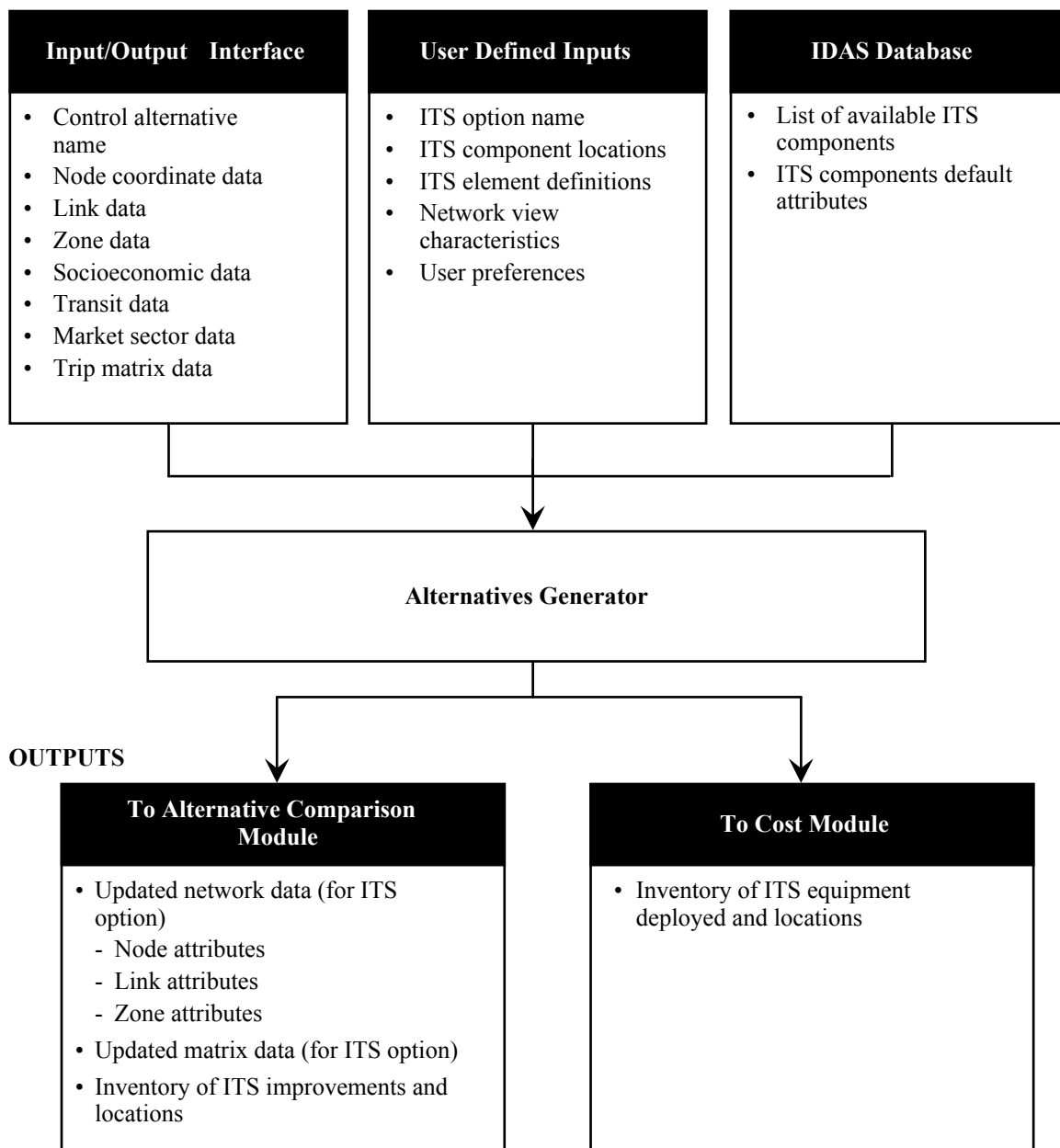
- Network and matrix data obtained from the input/output interface; and
- User-defined inputs specifying the deployment of particular ITS improvements.

4.1.1 Inputs Specified by the User

The AG serves as the primary interface for the IDAS user to specify ITS improvements within a transportation planning network. Using the AG, the user is able to view and manipulate the view of the network consisting of zones, nodes, and links. Also, the user is able to view the corresponding tabular data supporting the graphical view.

Figure 4.1 IDAS Alternatives Generator

INPUTS



A comprehensive list of ITS components is available for the user to select and deploy on the network. The list of available ITS components is maintained in the IDAS database along with a set of attributes associated with the components. These attributes include:

- Inventories of the ITS equipment needed to comprise the ITS component;
- List of prerequisite ITS components needed to successfully deploy the component (e.g., centrally controlled ramp metering requires a traffic management center to be available prior to deployment);
- Network spatial elements (link-, node-, zone-, network-wide, etc.) associated with the ITS component (i.e., a description of where the component can be deployed);
- Default values for the anticipated useful life and construction period associated with each ITS component;
- Lists of observed benefits compiled in the IDAS benefits library; and
- A set of internal model procedures to be performed to estimate the impacts (benefits) of the ITS component, if deployed.

For each of the ITS components, the AG provides a set of dialogues and graphical interfaces that allow the user to specify the component attributes, such as deployment date, construction period, and anticipated useful life of the improvement. Additional screens are available to allow the user to more precisely define the actual ITS equipment included in the improvement and the degree to which that equipment can be shared with other ITS components. IDAS maintains a comprehensive inventory of ITS equipment that comprises each ITS component. The user may choose to view and edit the equipment specified for any ITS improvement in order to customize the deployment to the user’s specifications. These user inputs become part of the definition of the ITS improvements augmenting the ITS option.

4.1.2 Inputs from Other IDAS Modules

The primary inputs to the AG module are the internal data arrays generated by the IDAS input/output interface. The interface converts the zone, node, and link data obtained from a travel demand model to a format useable by the AG. The AG uses these data to graphically represent the control alternative network obtained from the travel demand model.

The I/O interface also converts matrix data files from the travel demand models. The AG associates these data with the different ITS options created by the user. Additionally, the AG updates various zone, node, and link attributes when encoding ITS improvements. These attributes may include link capacities, link speeds, and other attributes specified in the I/O interface section. The AG enables the user to save each newly defined ITS option and subsequently to retrieve these options for review or modification.

■ 4.2 Module Procedures and Components

The AG provides a view of a travel demand model network to the IDAS user. This network may be either the unmodified control alternative imported from the travel demand model, or the modified network for an ITS-augmented option. Viewing functions provided by the AG consist of: zoom in, zoom out, select viewing extents, pan, and scroll screen. The user may also specify graphical attributes such as display size and color for the zones, nodes, links, and icons representing the deployed ITS components.

The AG supplies an extensive set of Windows-based tools (e.g., dialogues, edit fields) and graphical interfaces that allow the user to specify all requisite attributes and parameters for each ITS component considered by IDAS. These interfaces may apply globally (i.e., to the entire network) or be specific to an element within the network.

The AG allows the user to save an ITS option at any point in its creation. Subsequently, the user is able to retrieve a control-alternative network or any saved ITS option networks for review or modification.

The graphics/mapping functions of the AG were implemented using OpenGL. Although this choice means that some of the zoom, pan, and other viewing functions had to be coded, it provides a rich set of graphics utilities, has no associated royalties, and is portable to platforms other than Windows 95 and NT.

4.2.1 Adding ITS Improvements

Within the AG display, the user is able to select from a list of ITS components to deploy on the network. The user may select a single component to deploy on the network as an ITS improvement, or the user may deploy a single component at multiple locations as part of the same ITS improvement. Once defined by the user, the ITS improvement will appear on the AG screen as a highlighted network link or node and is supplemented with ITS component icons.

The model then provides a set of dialog screens to prompt the user to provide additional information (or accept the defaults) regarding the ITS improvement. The information requested will vary depending on the ITS component(s) included in the improvement. The user has the option to view and edit the default ITS equipment associated with the components comprising the particular improvement. This capability allows the user to precisely define the actual improvement and specify where equipment may be shared with other existing or planned ITS improvements.

The model tracks the various improvements by maintaining an inventory of all of the ITS equipment associated with an improvement and its locations on the network. This detailed list of equipment is passed on to the cost module and forms the basis of cost estimation for the ITS option.

4.2.2 Generating Updated Networks

Any number of ITS improvements and combinations of improvements may be added to the network to create a single ITS option. Once the desired number and types of ITS improvements have been defined and added to the network, the user can save the ITS option. Upon saving the ITS option, the model analyzes the types and locations of ITS components added to the network and creates new internal network data to be used as input into the benefits module.

The new ITS option network contains altered link and node attributes representing the effect of the ITS components located at particular locations. For example, a ramp meter deployed by the user at a particular on-ramp, would result in the model assigning a capacity reduction on the network links representing the ramp location and a capacity increase on the affected freeway links. Other ITS components may have an effect on trip tables instead of the network data.

The various factors representing the effects of the different ITS components are maintained in the IDAS database. These factors alter the network link attributes, node attributes, and matrix data. The default values for these factors are based on observed impacts of existing deployments or simulations of deployments compiled in the IDAS benefits library. The resulting network, representing the cumulative effect of all the components added to the ITS option, serves as the primary input into the benefits module. The benefits module will then conduct detailed analysis to calculate the impact these changes have on various performance measures.

4.2.3 ITS Library

The purpose of the ITS Library (sometimes referred to as the “Direct Benefits spreadsheet”) is to provide users with information on the direct benefits experienced and/or estimated with the deployment of various ITS elements and components. The data contained in this library were critical in the development of the IDAS impact analysis methodology for each of the ITS improvements.

The performance measures included in the ITS library include:

- Travel time/speed/delay;
- Throughput/capacity/vehicle stops;
- Change mode;
- Change time of day;
- Change route;
- Safety;
- Customer satisfaction;
- Emissions;

- Energy;
- Costs;
- Efficiency; and
- Other – examples include fare evasion reductions, reduced passenger wait times, reduced response times, etc.

Viewing the ITS Library

The ITS library presents the performance measures by ITS element type and performance measure type. It contains a description, specifies the location of the particular ITS deployment, the specifics of the observed benefit, and the source of the data.

There are two approaches for viewing the ITS library, one within IDAS and the other through Microsoft Excel. To view within IDAS, the user should use the ITS Element tab-card in the Workspace window, right-click on the desired ITS element to view and highlight on ITS Library. Figure 4.2 presents a sample view of the ITS library. In the same pop-up window and in addition to the ITS library of benefits the user also has access to the “Description,” “Prerequisites” and “Impact Analysis Methodology” for each of the ITS elements/components in IDAS.

The ITS library can also be viewed through Excel. IDAS, at installation, places the DIRECTBENEFITS2_3.XLS file in the IDAS\DOCUMENTS directory. Each performance measure is contained on a separate worksheet within the spreadsheet. Figure 4.3 shows a sample view of the Direct Benefits spreadsheet.

Figure 4.2 ITS Library

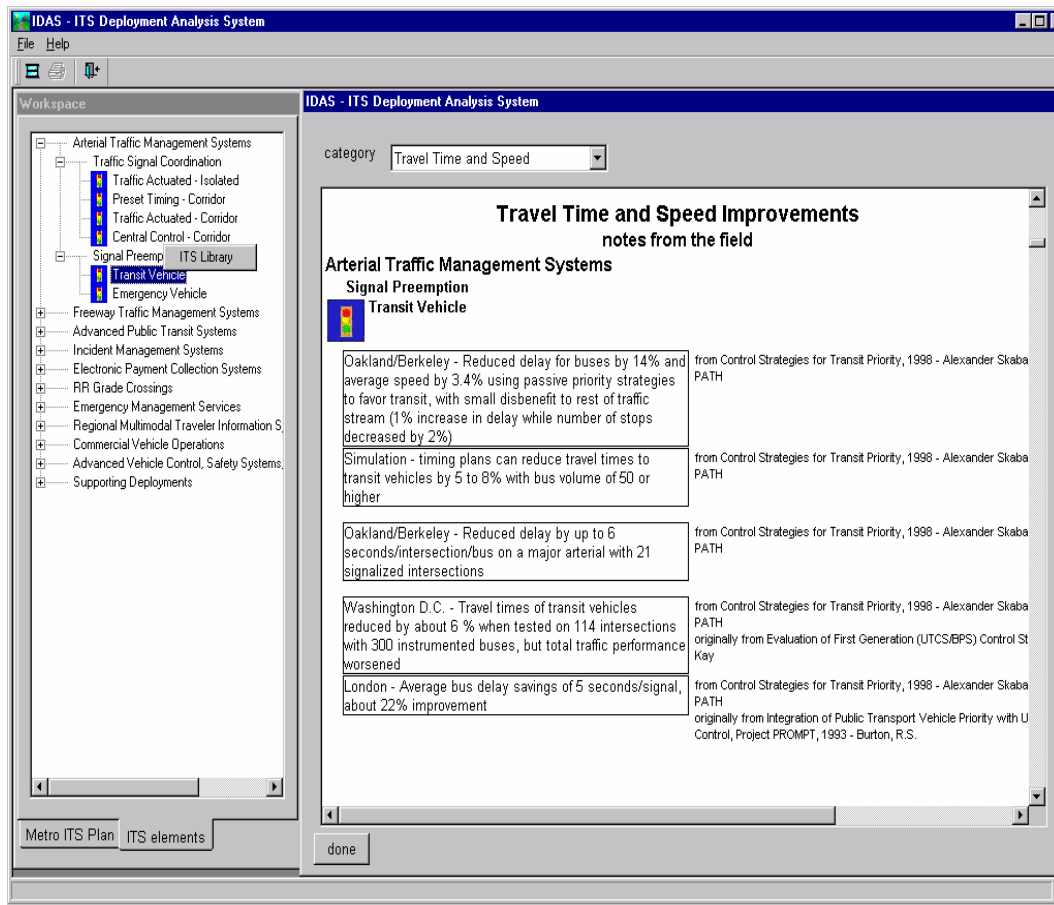
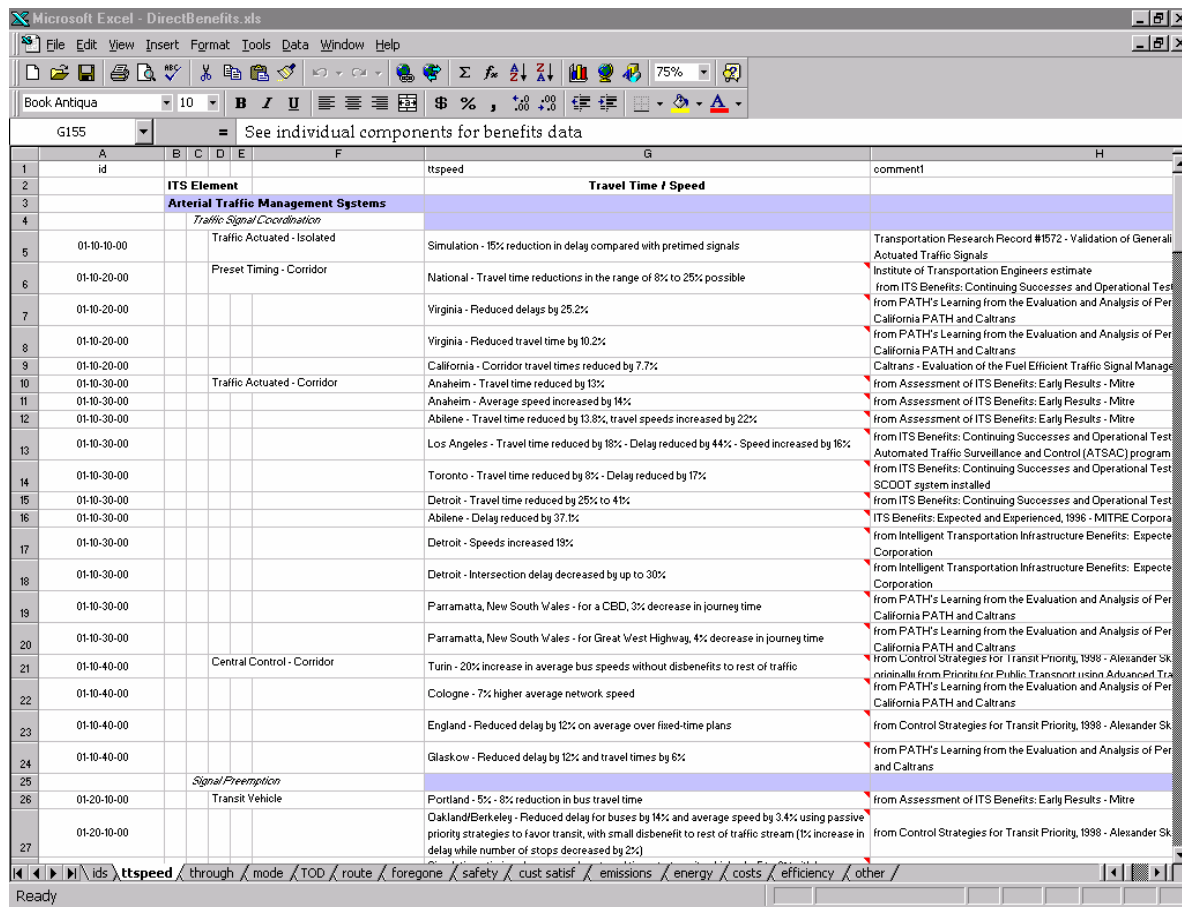


Figure 4.3 The Direct Benefits Spreadsheet



Modifying the Direct Benefits Spreadsheet

User revisions to the DIRECTBENEFITS2_3.XLS file are possible but not recommended. The DIRECTBENEFITS2_3.XLS file contains the identification codes for each ITS element, IDAS ITS element naming conventions, and icon specifications for each type of deployment. This spreadsheet ties IDAS to the ITS library and the equipment and cost specifications. If modifications are not made properly, IDAS deployment and analysis results may not be valid. If the user desires to add other benefit measures to an existing ITS element in the ITS library, the correct identification code (id) must be specified in the id column. No changes should be made to the data on the first sheet (ids) of the workbook.

Importing a Revised Direct Benefits Spreadsheet

If modifications are made to the DIRECTBENEFITS2_3.XLS spreadsheet, the user will need to import the revised file into IDAS, as shown in Section 2, Figure 2.11. This is done by selecting File – Setup from the toolbar and using the following steps:

- Click on the **Data Maintenance** tabcard, and
- Click on **File** button next to the **ITS Components** field to select the file name and to initiate the import.

Note: Modifications to the Direct Benefits spreadsheet which have been imported into an IDAS database will only be applicable to new ITS options (i.e., only ITS options created after the revised spreadsheet has been imported).

■ 4.3 Outputs

The AG module has two primary outputs:

- The set of modified network and matrix data representing an ITS option; and
- The inventories of ITS components and equipment comprising all the improvements in the ITS option.

The modified network and matrix data are used in the benefits module. The inventory of ITS components is also used in the benefits module to determine which analysis procedures to perform at which locations. The inventory of ITS equipment in an ITS option forms the basis for cost estimation in the cost module.