

TransimsNet

Version 5.0.9

Revision History

May 2012 - Created by Volpe Center

The **TransimsNet** program is used to:

1. *Synthesize TRANSIMS network files from generic node and link information.*
2. *Generate Node, Link, Activity Location, Parking, Process Link, Lane Connectivity, and Pocket Lane files.*
3. *Generate Sign and Signal Warrant files that can be used as inputs to the IntControl program to synthesize the TRANSIMS Unsignalized Node, Signalized Node, Timing Plan, Phasing Plan, Detector and Signal Coordinator files.*
4. *Copy an existing network and update or delete network components associated with selected links or nodes.*

Syntax is `TransimsNet [-flag] [control_file]`

The `control_file` is the file name of an ASCII file that contains the control strings expected by the program. The `control_file` is optional. If a file name is not provided, the program will prompt the user to enter a file name. The flag parameters are also optional. Any combination of the following flag parameters can be included on the command line:

Optional Flags:

- Q[uiet] = execute without screen messages
- H[elp] = show program syntax and control keys
- C[ontrol] = create/update a default control file
- K[eyCheck] = list unrecognized control file keys
- P[ause] = pause before exiting
- N[oPause] = never pause before exiting
- D[etail] = execute with detailed status messages
- X[ML] = write an XML file with control keys

The program automatically creates a printout file based on the control file name. If the filename includes an extension (e.g., ".ctl"), the extension is replaced with ".prn". The printout file will be created in the current working directory and will overwrite an existing file with the same name.

Version 5 Features

1. Version 5 includes additional data manipulation and update/delete tools, and tools for selecting a subset of links from an all-streets network.
2. TransimsNet now includes much finer controls of synthetic data generation:
 - Pocket lanes, link connections (previously lane connectivity in Version 4), activity locations, traffic controls, parking details, speeds, and other attributes.
 - Lane numbers and pocket lanes, multi-node signals, toll lanes and lane processing rates, access links (formerly process links), link offsets, and additional refinements.

- Apply warrants/rules to synthesize TRANSIMS network details
- Pocket lanes, lane connectivity, activity locations, parking lots, access links, lane use, turn prohibitions, and signal and sign warrants

Control Key List

The list of control file keys appears in the table below:

- Req / Opt indicates whether the key is **required** or **optional**
- The types include **Text**, Input **Filename**, **New** file, **Boolean**, **Path** (to a file), **Time**, **Integer**, **Decimal**, and **List** of items
- The Default is the default value, used if the key does not appear in the control file.
- I/O/P indicates Input, Output or Parameter.

For a more detailed description of the Parameter control keys, refer to the Parameter Reference. For a more detailed description of the Input or Output control keys, refer to the File Reference. These two documents also provide the possible values or range of values allowed for each control key listed below. For instance, files can usually be output to numerous formats beyond TAB_DELIMITED for additional post-processing / file manipulation actions.

Configuration Keys

Control File Keys:	Req/Opt	Type	Default	I/O/P
TITLE	Opt	Text		P
REPORT_FILE	Opt	File		O
REPORT_FLAG	Opt	Bool	FALSE	P
PROJECT_DIRECTORY	Opt	Path		P
DEFAULT_FILE_FORMAT ¹	Opt	Text	TAB_DELIMITED	P
TIME_OF_DAY_FORMAT ¹	Opt	Text	DAY_TIME	P
MODEL_START_TIME	Opt	Time	0:00	P
MODEL_END_TIME	Opt	Time	24:00:00	P
UNITS_OF_MEASURE	Opt	Text	METRIC	P
RANDOM_NUMBER_SEED	Opt	Int.	0	P
MAX_WARNING_MESSAGES	Opt	Int.	100000	P
MAX_WARNING_EXIT_FLAG	Opt	Bool	TRUE	P
MAX_PROBLEM_COUNT	Opt	Int.	0	P
NUMBER_OF_THREADS	Opt	Int.	1	P
TRANSIMSNET_REPORT_*	Opt	Text		P

System File Keys

Control File Keys:	Req/Opt	Type	Default	I/O/P
NODE_FILE	Req	File		I
NODE_FORMAT	Opt	Text	TAB_DELIMITED	P
ZONE_FILE	Req	File		I
ZONE_FORMAT	Opt	Text	TAB_DELIMITED	P
LINK_FILE	Req	File		I

LINK_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_LINK_FILE	Req	File		O
NEW_LINK_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_LOCATION_FILE	Req	File		O
NEW_LOCATION_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_PARKING_FILE	Req	File		O
NEW_PARKING_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_POCKET_FILE	Req	File		O
NEW_POCKET_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_CONNECTION_FILE	Req	File		O
NEW_CONNECTION_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_SIGN_FILE	Req	File		O
NEW_SIGN_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_SIGNAL_FILE	Req	File		O
NEW_SIGNAL_FORMAT	Opt	Text	TAB_DELIMITED	P
SHAPE_FILE	Opt	File		I
SHAPE_FORMAT	Opt	Text	TAB_DELIMITED	P
TURN_PENALTY_FILE	Opt	File		I
TURN_PENALTY_FORMAT	Opt	Text	TAB_DELIMITED	P
LOCATION_FILE	Opt	File		I
LOCATION_FORMAT	Opt	Text	TAB_DELIMITED	P
PARKING_FILE	Opt	File		I
PARKING_FORMAT	Opt	Text	TAB_DELIMITED	P
ACCESS_FILE	Opt	File		I
ACCESS_FORMAT	Opt	Text	TAB_DELIMITED	P
POCKET_FILE	Opt	File		I
POCKET_FORMAT	Opt	Text	TAB_DELIMITED	P
CONNECTION_FILE	Opt	File		I
CONNECTION_FORMAT	Opt	Text	TAB_DELIMITED	P
SIGN_FILE	Opt	File		I
SIGN_FORMAT	Opt	Text	TAB_DELIMITED	P
SIGNAL_FILE	Opt	File		I
SIGNAL_FORMAT	Opt	Text	TAB_DELIMITED	P
LANE_USE_FILE ²	Opt	File		I
LANE_USE_FORMAT ²	Opt	Text	TAB_DELIMITED	P
NEW_LANE_USE_FILE ²	Opt	File		O
NEW_LANE_USE_FORMAT ²	Opt	Text	TAB_DELIMITED	P
NEW_NODE_FILE	Opt	File		O
NEW_NODE_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_ZONE_FILE	Opt	File		O
NEW_ZONE_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_SHAPE_FILE	Opt	File		O
NEW_SHAPE_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_ACCESS_FILE	Opt	File		O

NEW_ACCESS_FORMAT	Opt	Text	TAB_DELIMITED	P
NEW_TURN_PENALTY_FILE	Opt	File		O
NEW_TURN_PENALTY_FORMAT	Opt	Text	TAB_DELIMITED	P

File Service Keys

Control File Keys:	Req/Opt	Type	Default	I/O/P
NOTES_AND_NAME_FIELDS	Opt	Bool	FALSE	P

Projection, Smooth Data, Difference Data Keys

Control File Keys:	Req/Opt	Type	Default	I/O/P
INPUT_COORDINATE_SYSTEM	Opt	List		P
INPUT_COORDINATE_ADJUSTMENT	Opt	List		P
OUTPUT_COORDINATE_SYSTEM	Opt	List		P
OUTPUT_COORDINATE_ADJUSTMENT	Opt	List		P
OUTPUT_XYZ_SHAPES	Opt	Bool	FALSE	P
OUTPUT_XYM_SHAPES	Opt	Bool	FALSE	P

Control Keys

Control File Keys:	Req/Opt	Type	Default	I/O/P
DEFAULT_LINK_SETBACK	Opt	Dec.	7.5 meters	P
DEFAULT_LOCATION_SETBACK	Opt	Dec.	30 meters	P
MAXIMUM_CONNECTION_ANGLE	Opt	Int.	120 degrees	P
ADD_UTURN_TO_DEAD_END_LINKS	Opt	Bool	FALSE	P
SIGNAL_ID_AS_NODE_ID ²	Opt	Bool	FALSE	P
EXTERNAL_ZONE_RANGE	Opt	List	0	P
EXTERNAL_STATION_OFFSET	Opt	Int.	30 meters	P
ZONE_BOUNDARY_FILE	Opt	File		I
ZONE_FIELD_NAME	Opt	Text		P
POCKET_LANE_WARRANT_*	Opt	Text		P
TRAFFIC_CONTROL_WARRANT_*	Opt	Text		P
FACILITY_ACCESS_WARRANT_*	Opt	Text		P
PARKING_DETAILS_WARRANT_*	Opt	Text		P
STREET_PARKING_WARRANT_*	Opt	Text		P
UPDATE_NODE_RANGE	Opt	List	ALL	P
UPDATE_LINK_RANGE	Opt	List	ALL	P
UPDATE_NODE_FILE	Opt	File		I
UPDATE_LINK_FILE	Opt	File		I
LINK_DETAIL_FILE ²	Opt	File		I

Notes

Each '_FILE' key has a corresponding '_FORMAT' key. The following file formats can be used for input and output files:

TEXT, BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, SQLITE3, VERSION3

¹-Control key is listed in the -h command line listing generated by TransimsNet, but the key is not listed in the associated Quick Reference document.

²-Control key is listed in the TransimsNet Quick Reference document, but the key is not listed in the associated -h command line listing generated by this program.

Control Key Changes in TransimsNet Version 5

KEEP_NODE_LIST → KEEP_NODE_FILE (NetPrep 5.0)

The KEEP_NODE_LIST file control key has no equivalent control key in TransimsNet 5.0. Instead, the key is included in the NetPrep program (new in TRANSIMS 5.0) as KEEP_NODE_FILE. Refer to the NetPrep Program Reference and Highway Network How-To Guide for TRANSIMS 5.0 for additional information on these control key.

ACTIVITY_LOCATION_TABLE → LOCATION_FILE

The ACTIVITY_LOCATION_TABLE file control key (and associated file format key) from TransimsNet 4.0 is replaced by the LOCATION_FILE key in TransimsNet 5.0. Refer to the File Reference mentioned above for additional details on the programmatic changes made to the LOCATION_FILE control key in TRANSIMS 5.0. These changes also apply to the NEW_ACTIVITY_LOCATION_FILE control key and associated file output format control key.

LINK_NODE_EQUIVALENCE → (Not yet implemented)

The LINK_NODE_EQUIVALENCE file control key has not yet been implemented in TransimsNet 5.0.

MINIMUM_LINK_LENGTH → (Not implemented; see DROP_SHORT_LINKS in NetPrep 5.0)

The MINIMUM_LINK_LENGTH parameter control key is not implemented in TransimsNet 5.0.

MAXIMUM_LENGTH_TO_XY_RATIO → (NetPrep 5.0)

The MAXIMUM_LENGTH_TO_XY_RATIO control key parameter from TransimsNet 4.0 is now included in NetPrep 5.0 instead and retains the same name as before. Refer to the NetPrep 5.0 Program Reference and Quick Reference documents for additional information on this control key.

COLLAPSE_NODES_FLAG → COLLAPSE_SHAPE_NODES (NetPrep 5.0)

The COLLAPSE_NODES_FLAG in TransimsNet 4.0 is now included in NetPrep 5.0 instead as COLLAPSE_SHAPE_NODES. Refer to the NetPrep 5.0 Program Reference and Quick Reference documents for additional information on this control key.

EXTERNAL_STATION_OFFSET (New in TransimsNet 5.0)

The EXTERNAL_STATION_OFFSET parameter control key is a new addition to TransimsNet 5.0. This parameter is hard-coded with a value of 30 meters in TransimsNet 4.0. Refer to the Highway Network How-To Guide for additional information on this control key.

Network File Name and Control Key Name Changes (TransimsNet 4.0 → 5.0)

Additional control key changes are present in TransimsNet 5.0 that are not described in this section. Changes have been made to select control key and file and parameter names in many instances as can be seen from the list below. Addi-

tionally, file structures have been modified in some instances. New conceptual constructs have been introduced to improve overall performance and ease of use and robustness of TRANSIMS 5.0 as well. Lastly, new data fields have been added within some input and output files (e.g., SubArea). Refer to the File Reference and Parameter Reference documents for additional details. Some specific examples include the following control key and file name changes (V4 → V5):

- NET_NODE_TABLE → NODE_FILE
- NET_ZONE_TABLE → ZONE_FILE
- NET_SHAPE_TABLE → SHAPE_FILE
- NET_LINK_TABLE → LINK_FILE
- NET_POCKET_LANE_TABLE → POCKET_FILE
- NET_LANE_USE_TABLE → LANE_USE_FILE
- NET_TOLL_TABLE → LANE_USE_FILE
- NET_LANE_CONNECTIVITY_TABLE → CONNECTION_FILE
- NET_TURN_PROHIBITION_TABLE → TURN_PENALTY_FILE
- NET_PARKING_TABLE → PARKING_FILE
- NET_ACTIVITY_LOCATION_TABLE → LOCATION_FILE
- NET_PROCESS_LINK_TABLE → ACCESS_FILE
- NET_UNSIGNALIZED_NODE_FILE → SIGN_FILE
- NET_SIGNALIZED_NODE_TABLE → SIGNAL_FILE

TransimsNet Version 5 Network Conversion Process

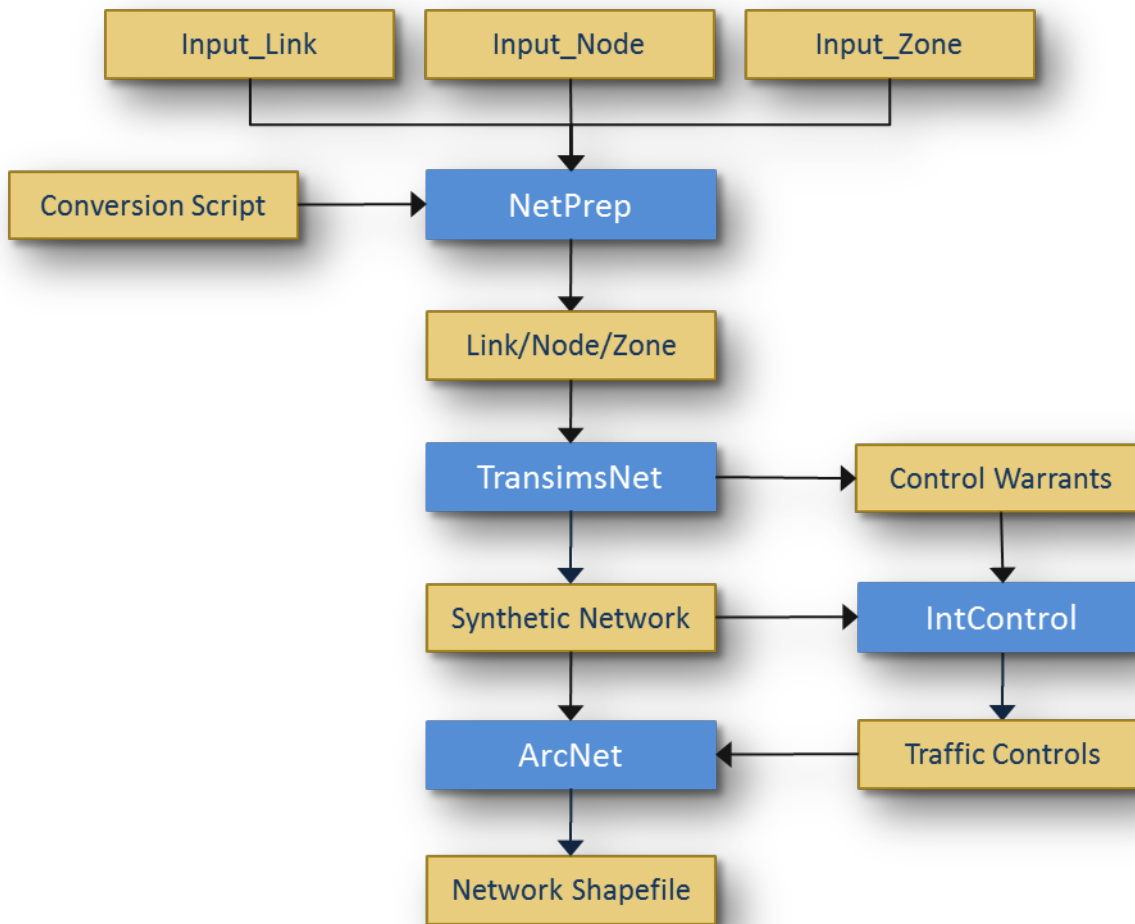


Figure 1: Network Conversion Process (High-Level)

The above flowchart shows the typical execution sequence of TRANSIMS 5.0 network programs and file inputs and outputs relative to each program, and relative to the overall process. NetPrep is discussed further in a separate document and is new to TRANSIMS 5.0. Starting with TRANSIMS 5.0, NetPrep is used instead of TransimsNet to convert input network files (nodes, links, and zones) into TRANSIMS 5.0 network format compatible files.

The raw input files may be from an existing TRANSIMS 4.0 network, from raw network files exported from commercial traffic modeling software such as TransCAD®, or may be manually created given that the file names, file types/formats/extensions, location, layout (header row in particular), and contents are consistent with what is expected by TRANSIMS 5.0 and the relevant control files for each program noted above. The initial network input files and the TRANSIMS 5.0 network format files that result from the process are shown in Figure 1 above at a relatively high level. The combined file output of TransimsNet and IntControl comprise the majority of the synthetic network files which will be used for subsequent trip table generation, trip routing, and finally trip simulation.

For a more detailed look at this process, refer to the Highway Network How-To document.

Some associated tasks and notes not readily apparent from Figure 1 are the iterative nature of the process, subsequent review, manipulation, and generation of the remaining TRANSIMS network files. The process depicted in Figure 1 indicates the proper order for sequentially synthesizing the network. However, the overall process of network generation actually employed (within certain constraints) to develop a TRANSIMS 5.0 implementation varies based on the available network input data as well as the complexity of the implementation and its objectives.

Additional methods will typically be needed in order to generate a valid and verifiable TRANSIMS 5.0 synthetic network suitable for trip table generation, and eventually, for accurate simulation of traffic flows. This includes both pre- and post-processing methods to review, edit, and reiterate a process step or steps as needed. Errors and warnings should be addressed as they arise, and resolved whenever feasible. Warnings don't necessarily prevent subsequent use of a file by another program. Batch files can be used to good effect in iterating some repetitive tasks such as regenerating the network from scratch using updated files. Additionally, scripting methods (e.g., Visual Basic®, VBA®, Python, Perl, etc.) can also prove quite useful for automating many repetitive tasks (iterative program execution, file manipulation, file input/output, etc.), especially with larger scale efforts.

These methods are discussed in greater detail in the NetPrep, TransimsNet, IntControl, and ArcNet program references and quick references and training documents, as well as in the Highway Network How-To and Network Edit How-To documents. The Highway Network How-To document also provides a more detailed discussion of the aforementioned supply/network-side TRANSIMS 5.0 programs in the context of the sequential, iterative, network synthesis process.

Examples

*TransimsNet Input Control File with Required Keys Only**

Input System Network Files:

Node File = ../../input/Input_node.txt

Zone File = ../../input/Input_zone.txt

Link File = ../../input/Input_link.txt

Output System Network Files:

New Node File = ../../network/node.txt

New Zone File = ../../network/zone.txt

New Link File = ../../network/link.txt

New Pocket File = ../../network/pocket.txt

New Connection File = ../../network/connection.txt

New Parking File = ../../network/parking.txt

New Location File = ../../network/location.txt

New Sign File = ../../network/sign_warrant.txt

New Signal File = ../../network/signal_warrant.txt

**The above example is conceptual. Refer to the example below for actual control file syntax.*

Example Input File / Control File (TransimsNet.ctl)

TITLE	TransimsNet Test
LINK_FILE	../../input/Input_link.txt
NODE_FILE	../../input/Input_node.txt
SHAPE_FILE	../../input/Input_shape.txt
ZONE_FILE	../../input/Input_zone.txt
NEW_NODE_FILE	../network/node.txt
NEW_ZONE_FILE	../network/zone.txt
NEW_LINK_FILE	../network/link.txt
NEW_SHAPE_FILE	../network/shape.txt
NEW_LOCATION_FILE	../network/location.txt
NEW_PARKING_FILE	../network/parking.txt
NEW_POCKET_FILE	../network/pocket.txt
NEW_CONNECTION_FILE	../network/connection.txt
NEW_SIGN_FILE	../network/sign_warrant.txt
NEW_SIGNAL_FILE	../network/signal_warrant.txt
POCKET_LANE_WARRANT_1	FREEWAY, ALL, 1, RIGHT, 100 meters, 1
[Pocket Lane Warrants #2 through #19 omitted for simplicity]	
POCKET_LANE_WARRANT_20	RAMP, ALL, 4, LEFT, 200 meters, 1
TRAFFIC_CONTROL_WARRANT_1	PRINCIPAL..MAJOR, PRINCIPAL..COLLECTOR, ALL, SIGNAL, 30 feet, 1
TRAFFIC_CONTROL_WARRANT_2	FREEWAY..EXPRESSWAY, RAMP, ALL, YIELD, 30 feet
TRAFFIC_CONTROL_WARRANT_3	PRINCIPAL..MAJOR, RAMP, ALL, YIELD, 30 feet
MAXIMUM_CONNECTION_ANGLE	150

EXTERNAL_ZONE_RANGE	10..15
---------------------	--------

```
*****
|
|      TransimsNet - Version 5.0.3
|      Copyright 2011 by TRANSIMS Open-Source
|      Tue Feb 21 13:43:34 2012
|
|*****
```

Data Service Controls:

TransimsNet Control Keys:

Maximum Connection Angle = 150 degrees

External Zone Range = 10..15

Pocket Lane Warrant #1 = FREEWAY, FREEWAY..EXTERNAL, 1, RIGHT_TURN, 100.0 meters, 1 lane

[Pocket Lane Warrants #2 through #19 omitted for simplicity]

Pocket Lane Warrant #20 = RAMP, FREEWAY..EXTERNAL, 4, LEFT_TURN, 200.0 meters, 1 lane

Traffic Control Warrant #1 = PRINCIPAL..MAJOR, PRINCIPAL..COLLECTOR, 0..100, SIGNAL, 9.1 meters, 1

Traffic Control Warrant #2 = FREEWAY..EXPRESSWAY, RAMP, 0..100, YIELD, 9.1 meters, 1

Traffic Control Warrant #3 = PRINCIPAL..MAJOR, RAMP, 0..100, YIELD, 9.1 meters, 1

Facility Access Warrant #1 = PRINCIPAL..LOCAL, 0..100, 15.2 meters, 45.7 meters, 3 points

Number of Node File Records = 23

Number of Zone File Records = 8

Highest Zone Number = 14

Number of Shape File Records = 13

Number of Link Shape Records = 3

Number of Link File Records = 24

Number of Directional Links = 37

New Location File Records = 60

New Parking File Records = 60

Warning: No Exit from Link 22 at Node 17

New Sign File Records = 2

New Signal File Records = 2

New Pocket File Records = 7

New Connection File Records = 49

New Node File Records = 23

New Zone File Records = 8

Highest Zone Number = 14

New Shape File Records = 13

New Link File Records = 24

Number of Input Node Records = 23

Number of Input Link Records = 24

Number of Input Zone Records = 8

Highest Zone Number = 14

Number of New Node Records = 23

Number of New Zone Records = 8

Number of New Link Records = 24

Number of New Link Shapes = 3

Number of New Shape_Records = 13

Number of New Location Records = 60

Number of New Parking Lot Records = 60

Number of New Access Link Records = 0

Number of New Pocket Lane Records = 7

Number of New Connection Records = 49

Number of New Sign Records = 2

Number of New Signal Records = 2

Number of Yield Signs = 2

Tue Feb 21 13:43:34 2012 -- Process Complete with 1 Warning (0:00:00)

Transims 5 Network Shape File Review using GIS Software

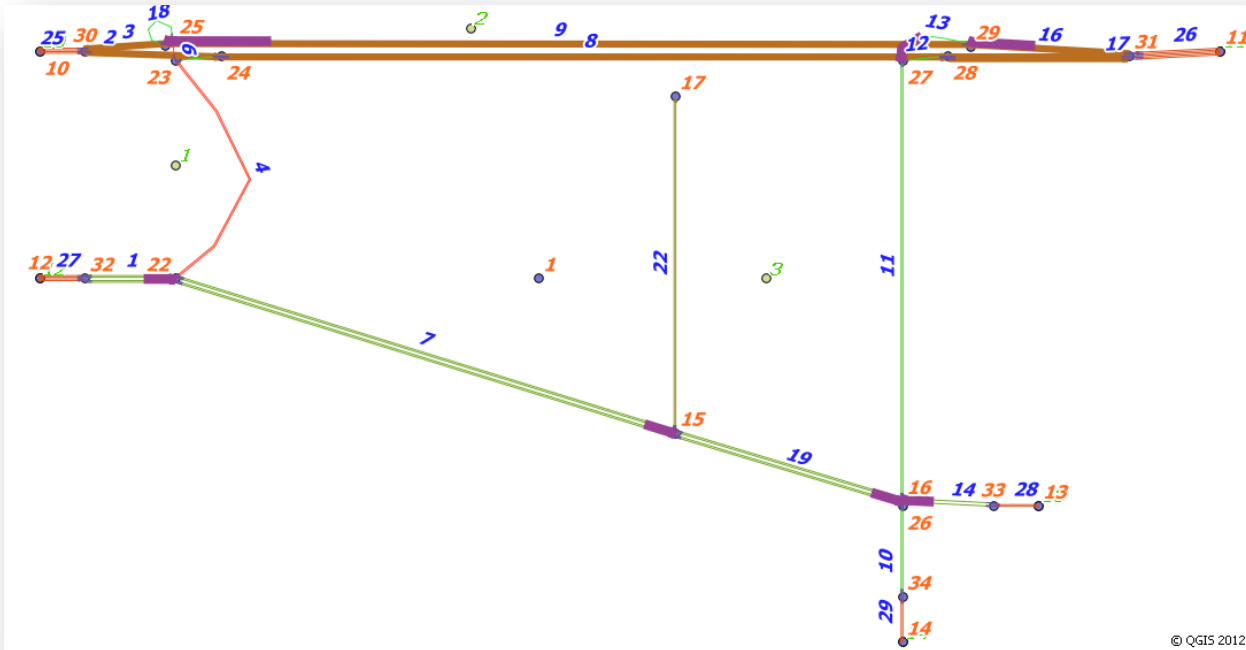


Figure 2: A Transims Test Network Visualization using Shape Files 3rd Party GIS Software

The Transims 5 test network shown in Figure 2 and elsewhere in this document is rendered using 3rd party GIS software. Select TransimsNet 5 file outputs are displayed by converting the output text files to ESRI shape files (i.e., .shp, .shpx) using ArcNet 5.0. This conversion process is discussed further in the ArcNet 5.0 Program Reference and Highway Network How-To documents. Displayed above are vector layers corresponding to TransimsNet-produced links (green lines with blue labels), nodes (blue points with red labels), zones, connections (not visible in this view; represents connections between links at intersections), and pocket lanes (thick, purple shaded lines centered at specific intersections). Note that the node, link, and zone shape file labels reflect the numbering assigned by TransimsNet. This is a very simple network but still quite sufficient to show many of the various features of Transims 5. The process of reviewing output network files (further described elsewhere as noted) is a key element of the Transims network iterative review and refinement process. For instance, network coding errors can be identified visually in many cases, corrections can be made, and the network can then be re-synthesized. This iterative process is a fundamental step toward producing a valid, verified network that is both representative of the traffic network being modeled and suitable for subsequent routing and simulation.

Note that all the network graphics presented in this document use the Tiny Example Network, updated for TRANSIMS 5.0.

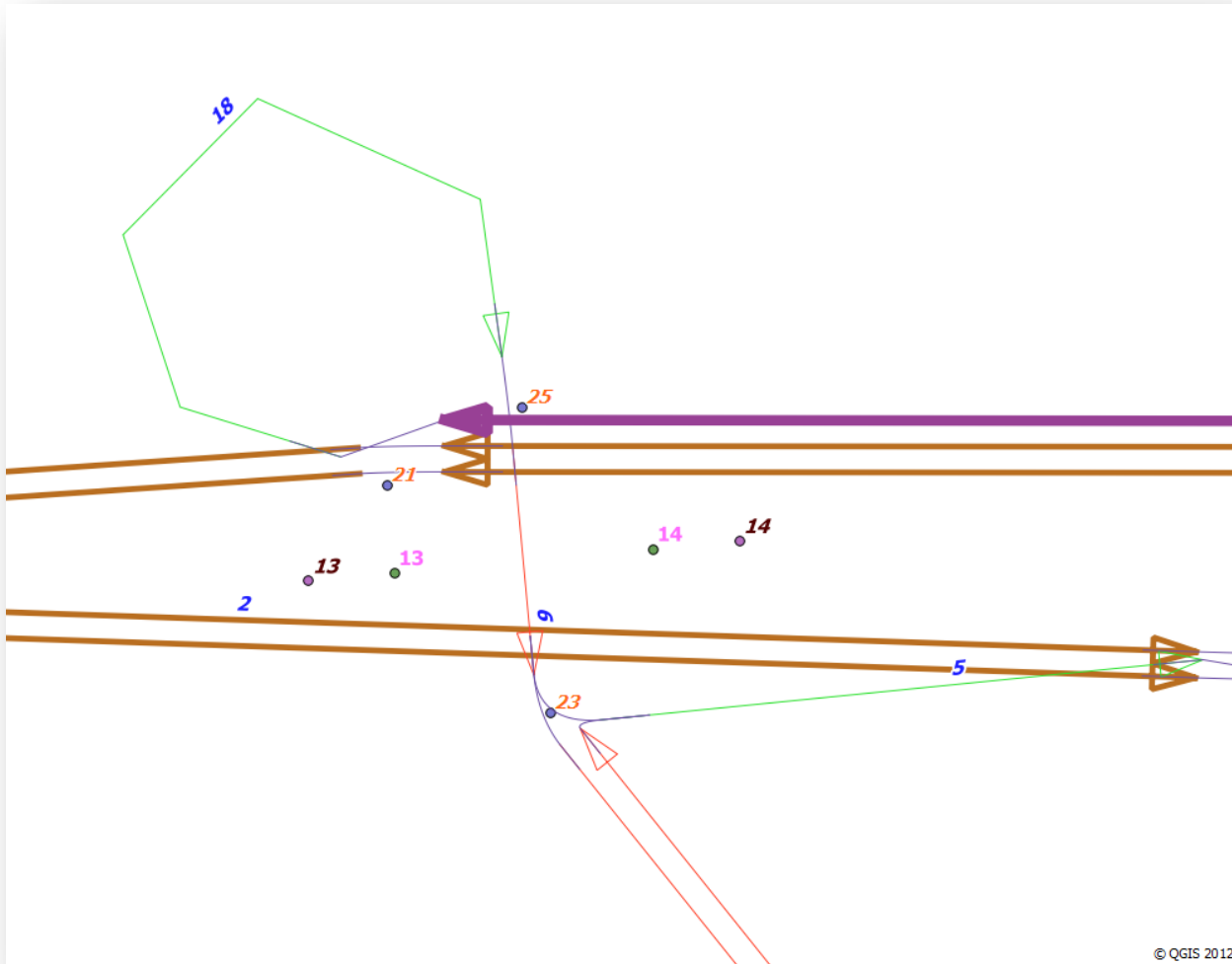


Figure 3: Transims Test Network Upper-Left Corner-Links, Nodes, and Pocket Lanes

The above graphic is a zoomed in view of the upper-left corner of the test network shown in Figure 2 that shows a high-way onramp/off-ramp network structure. A few items are worth noting here. First, link directionality is indicated for links and pocket lanes in the network. As noted above, the thick, purple, shaded link (and arrow) indicate a pocket line (and directionality as visible here). The different color links correspond to the various functional classes or types of links (major arterial, minor arterial, etc.) The link type is an attribute present in the Link shape file (produced by ArcNet, or other methods), and this attribute can be used to stratify the various link types visually using most of the common GIS packages (ArcGIS®, TransCAD®, QuantumGIS®-which is used above, etc.)

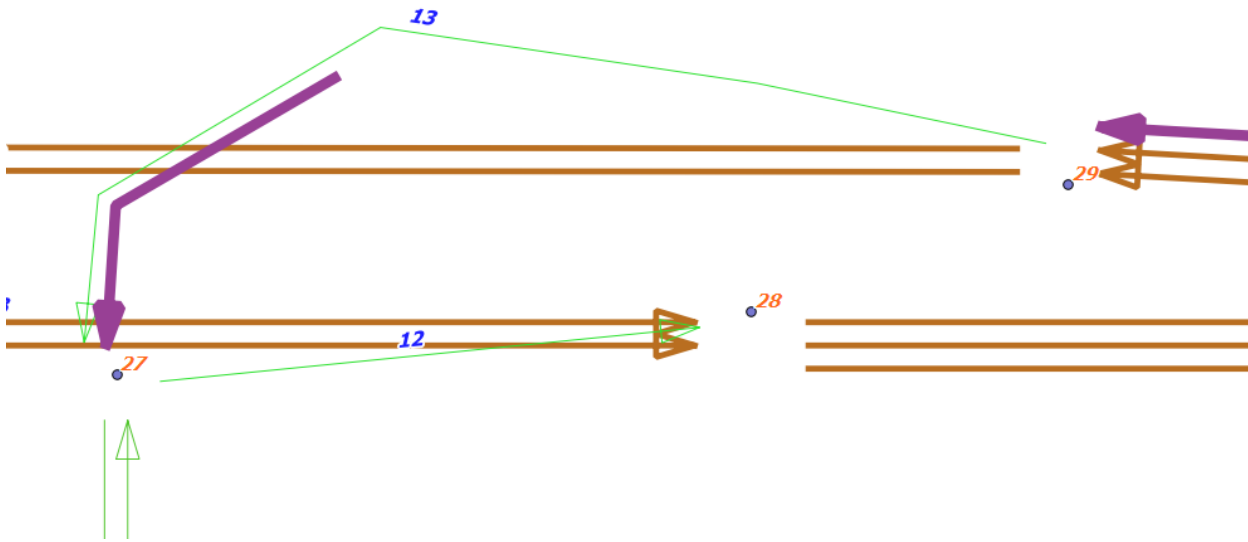


Figure 4: Transims Test Network Upper-Right Corner-Lane Connection Shape File Hidden

The above figure shows a zoomed in view of the upper right corner of the test network without the Connection shape file layer included. The nodes (numbered in red) are clearly visible and are anchored in the center of links connected at each respective node. The inclusion of the Connection shape file layer is very helpful, as illustrated in the screenshots below. However, hiding the connection shape file may be beneficial at times in the iterative network review and correction process.

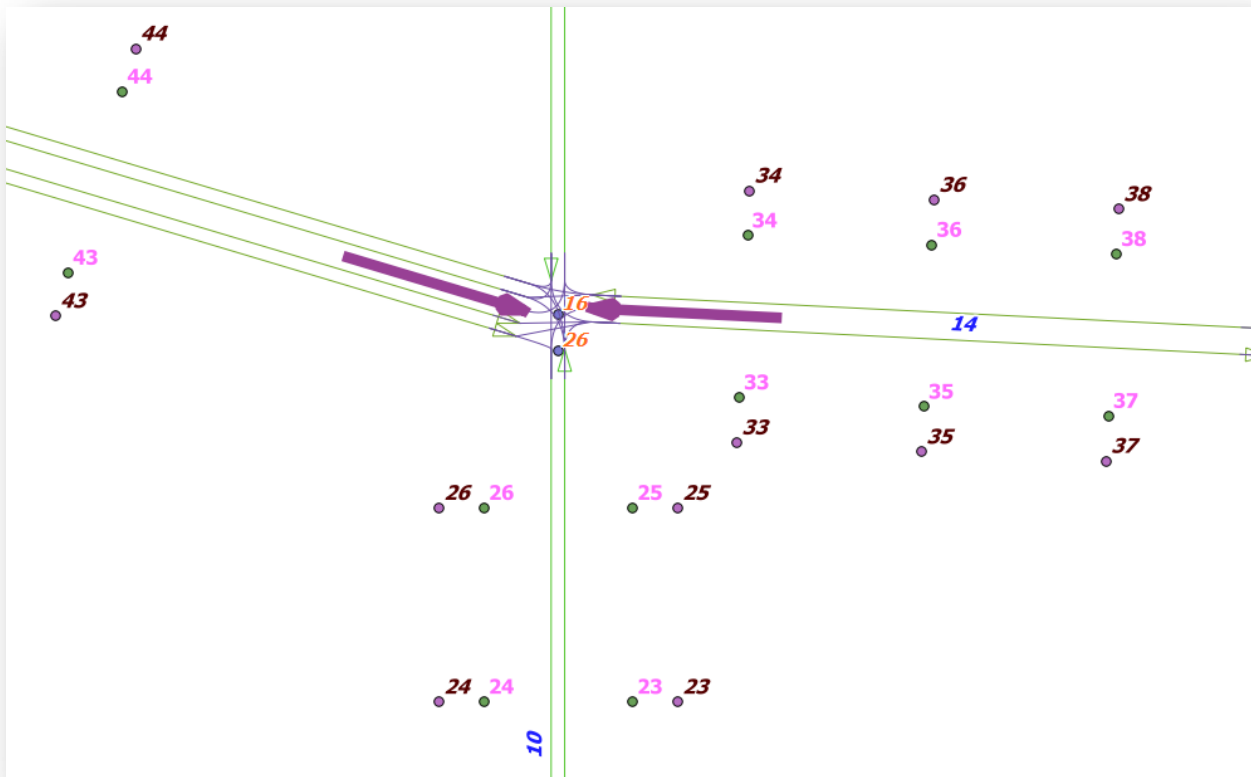


Figure 5: Transims Test Network Lower-Right Corner-Parking and Location Shape Files Visible

Note the purple and green nodes that have corresponding numbers and are offset from and parallel to the nearby network links both vertically (e.g., 23, 23...26, 26) and horizontally (e.g., 33, 33...38, 38; 43, 43...44, 44). These nodes represent the Parking file (green nodes) and Location file shape files (purple nodes), respectively. These files/nodes also represent the means by which Transims loads vehicles onto the network to initiate a trip and off of the network to end a trip. They are discussed further in the Highway Network How-To Guide.

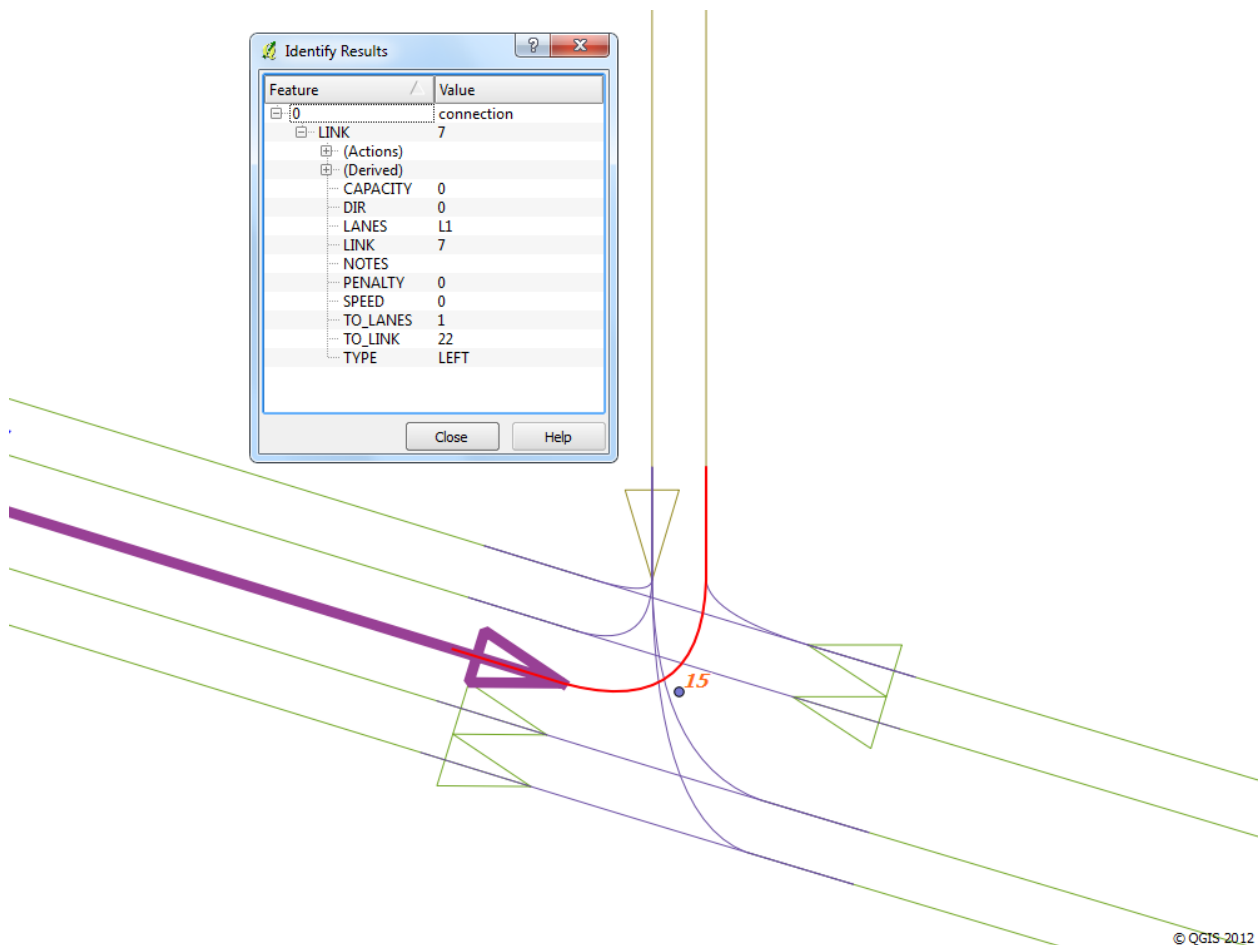


Figure 6: Transims Test Network Lower-Middle Intersection-Lane Connections and Textual Attributes

Figure 6 shows a zoomed in view of the lower-middle test network intersection. At this level of detail, the user can select an individual link, node, or connection quite easily. An initially suspect looking left turn connection shape is highlighted in red above. Note that the attributes associated with it are listed in the popup table also pictured. This combination of textual network data validation in tandem with graphical methods (and vice versa) for reviewing the final network is crucial to creating a network that is free of significant coding errors. Whenever any are found, previously mentioned pre- and post-processing methods can be applied to quickly correct the issues in many cases, regenerate the network, and confirm the result is correct. Complicated intersections should be given particular attention.

Also note that starting in TRANSIMS 5.0, the program ArcNet 5.0 generates smoothed/curved shape file links at intersections rather than angled ramps for instance. This provides for easier accessibility in the graphical review process and a more realistic representation of the network. ArcNet 5.0 is discussed further in its respective program reference.