Chapter 2

TRANSIMS Network Data Files

CONTENTS

Network data files

Chapter Outline

This chapter provides format specifications for the complete set of the input tables used by TRANSIMS to code the transportation network. It also provides the methods for coding the transportation network into TRANSIMS Transportation Network Files. Figure-2.1 shows the major data input files used in TRANSIMS and their relationship with the TRANSIMS software modules. The focus of this chapter is on the network files only. Other input files are discussed in their respective TRANSIMS modules.

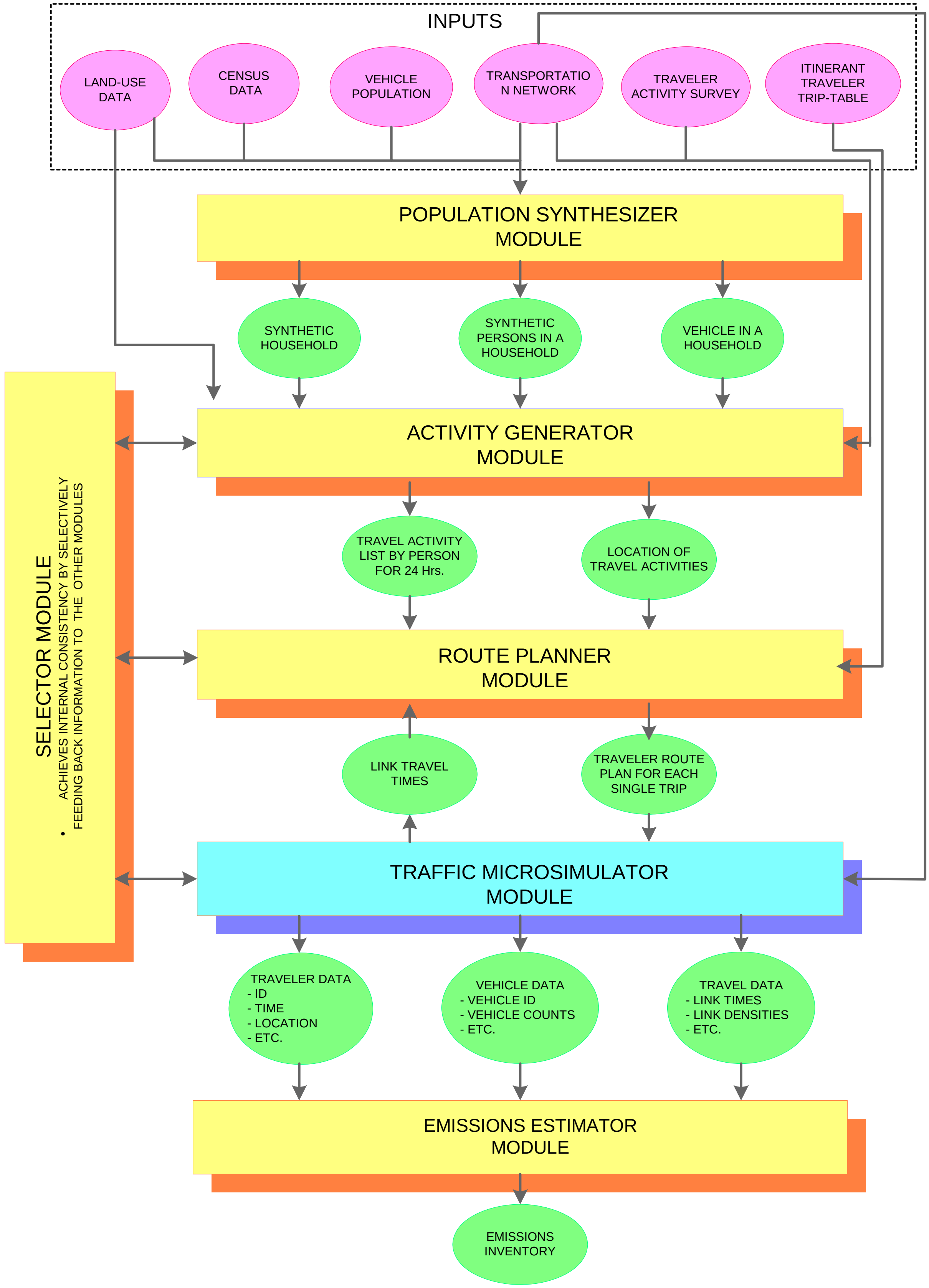


Figure-2.1: TRANSIMS Framework

2.1 Overview

TRANSIMS needs detailed information to process and simulate every single person and vehicle in a region. The input files, which can be grouped into 4 different categories, include Transportation Network Files, Census Files, Traveler Activity Survey Files, and Vehicle Information Files. This detailed information includes data about streets, intersections, transit, population, distribution of vehicles, activities in a region, etc.

This chapter discusses only the TRANSIMS Network Files.

2.2 TRANSIMS Transportation Network Files

A TRANSIMS network represents the configuration of streets and highways, the signage and the signals controlling traffic, and many other features such as parking, barriers, etc. These entities are modeled into TRANSIMS by the use of data files each of which depict a certain object like links, nodes etc.

The TRANSIMS Network representation provides detailed information about streets, intersections, signals, and transit in a road network. This section discusses the concepts involved in describing a road network and the TRANSIMS data table formats. The Network files provide inputs to the various modules of TRANSIMS. It can be said that the TRANSIMS network files are the most critical basic files. For example, the nodes and the links data files as well as the Activity Locations data files are used by most of the TRANSIMS modules. The Network files are introduced here in order to give the reader a better understanding of how to code the TRANSIMS network before using TRANSIMS.

The Network Data files include information about the network, i.e., Nodes, Links, Lane use and Connectivity, Activity locations, Parking and Transit Stops. The minimum network information that should be provided to TRANSIMS is the location of streets and intersections, the number of lanes on the streets, the way the lanes are connected, parking locations on streets and a collection of activity locations. However, some studies may require or benefit from more detailed information about the network like turn pockets and merge lanes, lane use restrictions (HOV lanes), turn prohibitions and speed limits. The data tables for the TRANSIMS road network include the following: node, link, speed, pocket lane, lane use, barrier, parking, transit stop, lane connectivity, turn prohibition, unsignalized node, signalized node, phasing plan, detector, signal coordinator, activity location, process link, and study area link.

TRANSIMS conceptually views the network as a set of interconnected, unimodal layers (see Figure-2.2). A separate layer exists for each travel mode (walk, bike, car, bus, rail, trolley, etc.). At certain designated locations in each layer (activity location, parking location, transit stop, etc.), which become nodes in the Route Planner’s view of the network, a special link called a *process link* connects one unimodal layer to another. These process links allow intermodal transitions to take place from one layer to another.

The layers themselves are constructed from the TRANSIMS network. The travel time for each link in each layer is computed via a link travel time function, which could be time-dependent, or time-independent.

Conceptually, layers are associated with travel modes. There are three major types of layers in the network:

- A walk layer, which consists of all activity locations and all of the streets that can be walked along. However, the parking locations and transit stops that belong to the other two types of layers are only accessible from activity locations in the walk layer via process links.
- A street layer, which consists of all links between intersections. This also includes the parking locations.
- A transit layer, which consists of separate layers for each type of transit vehicle (e.g., a bus layer, a rail layer, etc.). This also includes transit stops and transit routes. Note that each bus route in a bus system is a *separate* layer by itself.

Based on individual traveler preferences and constraints as specified by the activities data file, the Route Planner plans for trips that consist of multiple modal legs (e.g., walk-car-walk, etc.). The process of constructing multiple layers in which each layer can be encoded as a different unimodal network allows for the efficient computation of trips that are constrained by specified modal sequence requirements.

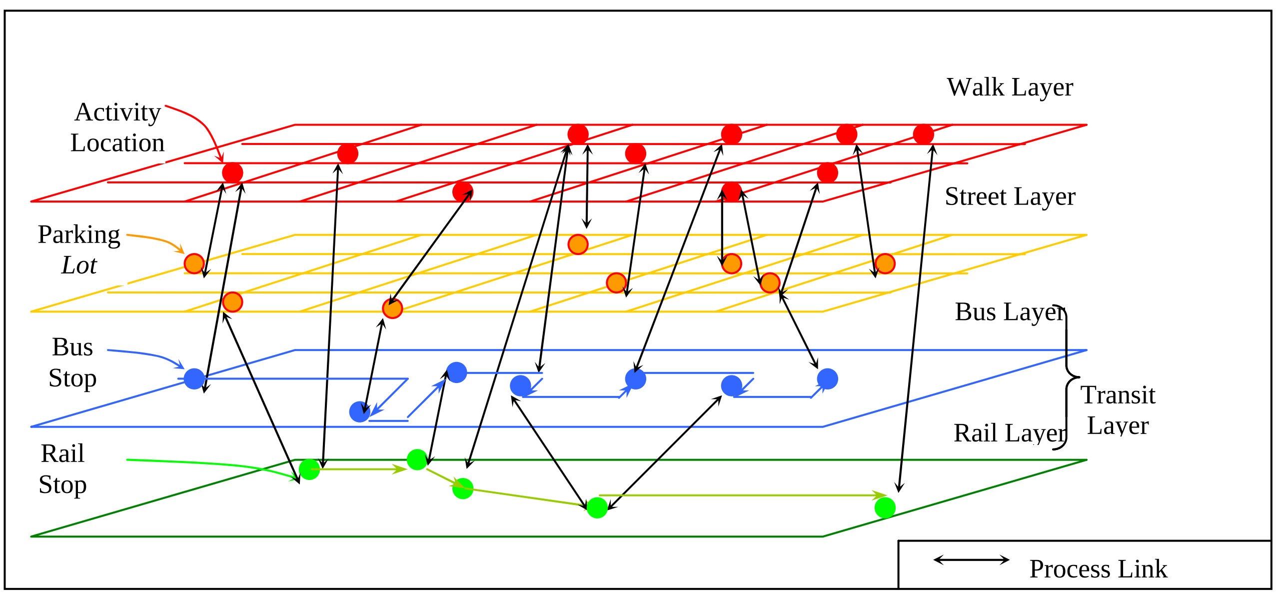


Figure-2.2: A high-level depiction of the various layers used by the Route Planner

An example network is used as a base example, as shown in Figure-2.3, in order to facilitate the understanding of this critical inputs file. This network, referred to as the Test

Network, provides a good example of how a network is represented with nodes, links, lane use, and even to the level of detectors embedded in the network. This network contains most of the network objects available in TRANSIMS. It can also be used for testing the code and for simulating traffic movements.

The Test Network comprises 15 nodes and 20 links. It contains most of the objects in a TRANSIMS Network, like pocket lanes, merge lanes, transit stops, detectors, signalized and unsignalized intersections, barriers, etc. The network also highlights a bus and a light rail route on the border of the network on the links that are specified as the buffer links. Activity locations, parking accessories, and transit stops are also present on the network.

The following section will give a detailed explanation of each table including the methodology of representing a roadway network in a numerical table. The first two sections give the explanation of node and link tables which are the most essential elements in the TRANSIMS Network. These first two sections explain in detail the methodology to virtually place nodes and links onto the roadway network. Other sections will explain other key elements that are also needed to complete the TRANSIMS Network.

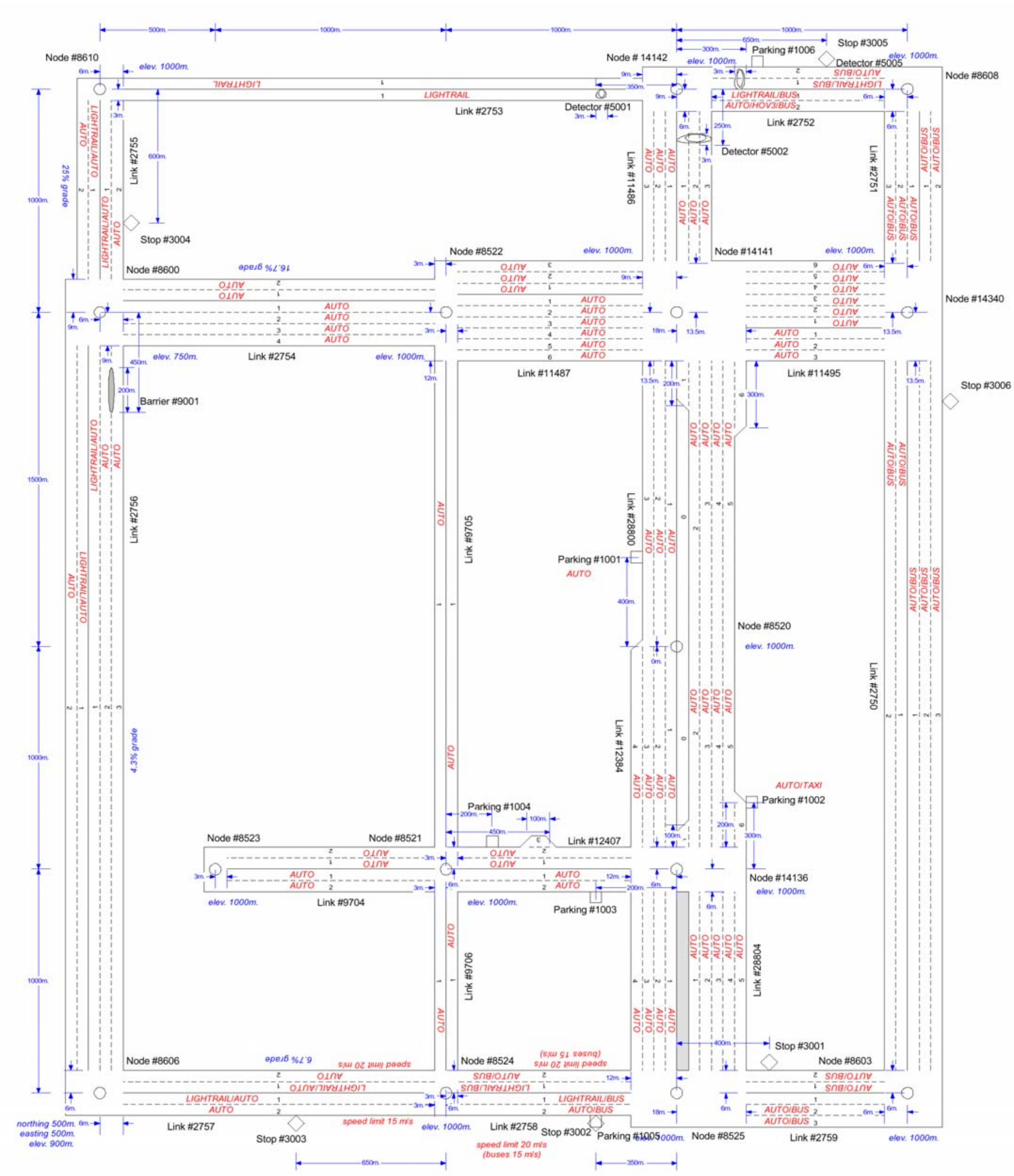


Figure-2.3: Layout of the Test Network

2.2.1 Node Table

The node table contains data about all the nodes in the network. Every node has a unique identifier number, a northing, an easting and an elevation attached to it that specifies the spatial location of that node as shown in Table-2.1. No two nodes can have the same set of northing, easting and elevation values; however, they may have the same northing and the easting values with a different elevation.

Table - 2.1: Node table format

Column Name	Description	Allowed Values
`ID`	The ID number of the node.	integer: 1 through 2,147,483,647
`EASTING`	The x-coordinate of the node (in meters, UTM grid system).	floating-point number
`NORTHING`	The y-coordinate of the node (in meters, UTM grid system).	floating-point number
`ELEVATION`	The z-coordinate of the node (in meters, UTM grid system).	floating-point number
`NOTES`	A character string used for data quality annotations; free format (may be blank).	255 characters

Nodes typically occur at the intersections in the roadway network. A node must exist when a road branches out, and when there is a change in the number of permanent lanes. However a node can exist anywhere for the purpose of convenience. It is important to note that nodes are not required when turn pockets start/end, as they are not considered permanent lanes. Figure-4 is the graphical representation of a node.

In summary, nodes will be virtually placed onto the roadway network:

1. at an intersection;
2. when the roadway branches out;
3. when there is a change in the number of permanent lanes; and
4. at the end of the road.

Figure-2.5 shows a part of the Test Network at node #8250. It shows parts of the two links (link #28800 and link #12384) connected to the node #8520. A parking accessory and the lane use for the lanes on these links are also presented. Table-2.2 shows the table format of this node.

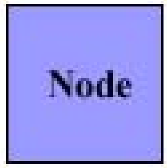


Figure-2.4: Graphical representation of node

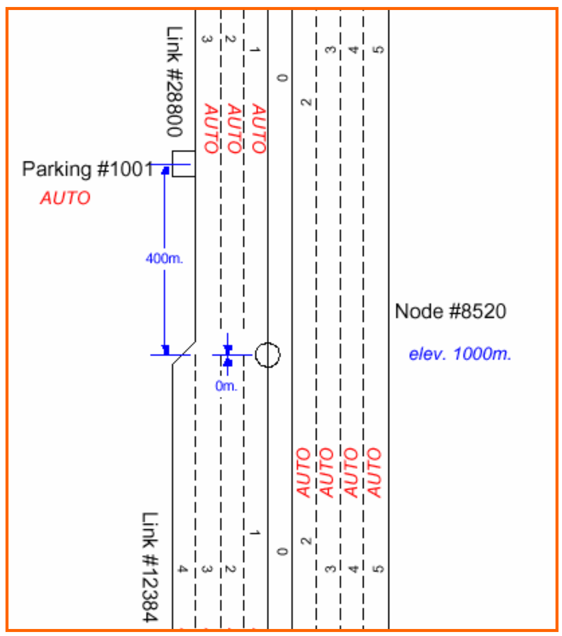


Figure-2.5: Part of Test Network Showing a Node

Table-2.2: Corresponding Node Table to node 8520 in Figure-2.4

ID	EASTING	NORTHING	ELEVATION	NOTES
8520	3000	2500	1000	

2.2.2 Link Table

A link is a connection between two nodes. A link represents a street, a road, a highway, a rail or a sidewalk segment. It should be noted that every link has a constant number of permanent lanes but may have a variable number of pocket lanes. A link can have lanes in both directions of traffic that would allow passing into oncoming lanes. If two links are specified, one for each direction of traffic, passing is prohibited. Links also contain speed information for vehicles. Figure-2.6 and Figure-2.7 are examples of links. Links can be graphically represented as two lines connecting to two nodes as shown in Figure-2.8. These two lines are representing one lane of road network.

Figure-2.6: Highway can be represented as link in TRANSIMS network

Figure-2.7: Rail system can be represented as link in TRANSIMS network

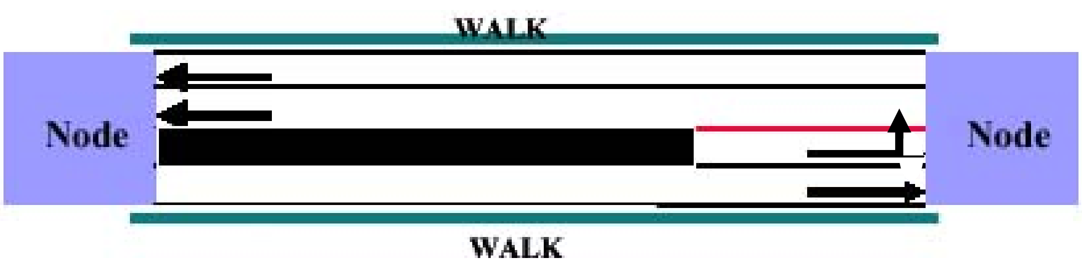


Figure-2.8: Graphical representation of links

The Link Table contains all the data that specifies the characteristics of all the links. Every link has a unique identifier and a set of attributes describing the link as shown in Table-2.3. They include the nodes that the link connects, the type of link, the number of permanent lanes, grade, capacity, etc. It should be kept in mind that a link should have permanent lanes in at least one direction, and it has at least one permanent lane in every direction where there exists a pocket lane. The coded length of the link should not be greater than 50% of the the distance between its end points. In addition, the length of the link should not be exceedingly small. The Microsimulator will have difficulty simulating successive links that are less than 123 feet long without the use of advanced coding techniques.

Table-2.3: Link table format

Column Name	Description	Allowed Values
NAME	The name of the street.	50 characters
NODEA	The ID number of the node at A.	integer: 1 through 2,147,483,647
NODEB	The ID number of the node at B.	integer: 1 through 2,147,483,647
PERMLANESA	The number of lanes on the link heading toward node A, not including pocket lanes.	integer: 0 through 255
PERMLANESB	The number of lanes on the link heading toward node B, not including pocket lanes.	integer: 0 through 255
LEFTPCKTSA	The number of pocket lanes to the left of the permanent lanes heading toward node A.	integer: 0 through 255
LEFTPCKTSB	The number of pocket lanes to the left of the permanent lanes heading toward node B.	integer: 0 through 255
RGHTPCKTSA	The number of pocket lanes to the right of the permanent lanes heading toward node A.	integer: 0 through 255
RGHTPCKTSB	The number of pocket lanes to the right of the permanent lanes heading toward node B.	integer: 0 through 255
TWOWAYTURN	The toggle for a two-way left-turn lane in the center of the link.	one character: F = false/no T = true/yes
LENGTH	The length of the link (in meters).	positive floating-point number
GRADE	The percentage grade from node A to node B (uphill being a positive number).	floating-point number between –100 and +100
SETBACKA	The setback distance (in meters) from the center of the intersection at node A.	non-negative floating-point number

Column Name	Description	Allowed Values
SETBACKB	The setback distance (in meters) from the center of the intersection at node B.	non-negative floating-point number
CAPACITYA	The total capacity (in vehicles per hour) for the lanes traveling to node A. This field is obsolete and its value is ignored—it will be deleted in a future TRANSIMS release.	non-negative floating-point number
CAPACITYB	The total capacity (in vehicles per hour) for the lanes traveling to node B. This field is obsolete and its value is ignored—it will be deleted in a future TRANSIMS release.	non-negative floating-point number
SPEEDLMTA	The default speed limit (in meters per second) for vehicles traveling toward node A.	positive floating-point number
SPEEDLMTB	The default speed limit (in meters per second) for vehicles traveling toward node B.	positive floating-point number
FREESPDA	The default free-flow speed (in meters per second) for vehicles traveling toward node A.	positive floating-point number
FREESPDB	The default free-flow speed (in meters per second) for vehicles traveling toward node B.	positive floating-point number
FUNCTCLASS	The functional class of the link. A link that permits both road and rail traffic should be coded with the roadway class.	ten characters: FREEWAY = freeway XPRESSWAY = expressway PRIARTER = primary arterial SECARTER = secondary arterial FRONTAGE = frontage road COLLECTOR = collector LOCAL = local street RAMP = freeway ramp ZONECONN = zonal connector OTHER = other WALKWAY = walk only BIKEWAY = bicycle only BUSWAY = bus only roadway LIGHTRAIL = light rail only HEAVYRAIL = heavy rail FERRY = ferry
THRUA	The default through link connected at node A. A zero indicates there is no through link.	integer: 0 through 2,147,483,647
THRUB	The default through link connected at node B. A zero indicates there is no through link.	integer: 0 through 2,147,483,647

Column Name	Description	Allowed Values
COLOR	The color number for the link (all of the links connected to a given link must have different colors). This field is obsolete and its value is ignored—it will be deleted in a future TRANSIMS release.	integer: 1 through 63
VEHICLE	The vehicle types (modes) allowed for use this link.	character string separated by slashes: WALK = walking allowed AUTO = private auto TRUCK = motor carrier BICYCLE = bicycle TAXI = paratransit BUS = bus TROLLEY = trolley STREETCAR = streetcar LIGHTRAIL = light rail transit RAPIDRAIL = rail rapid transit REGIONRAIL = regional rail
NOTES	A character string used for data quality annotations; free format (may be blank).	255 characters

Table-2.4 Functional classes for links

Class	Interpretation
Freeway	A divided, arterial highway for through traffic with full control of access. Full access control means the authority to control access is exercised to • give preference to through traffic by providing access connections with selected public roads • but prohibiting grade crossings and/or direct private driveway connections.
Expressway	A divided, arterial highway for through traffic with partial control of access. Partial control of access means that some authority is exercised to control access in the manner described above, but there are crossings at grade or direct private driveway connections.
Primary Arterial	A major arterial roadway with intersections at grade crossings and direct access to abutting property and on which geometric design and traffic-control measures are used to expedite safe movement of through traffic.
Secondary Arterial	A minor arterial roadway with intersections at grade crossings and direct access to abutting property and on which geometric design and traffic-control measures are used to expedite safe movement of through traffic.
Frontage Road	An arterial that runs parallel to a freeway or expressway.
Collector Street	A roadway on which vehicular traffic is given preferential right of way. These streets have entrances to which vehicular traffic from intersecting roadways is required by law to yield right-of-way to vehicles as a result of either a stop sign or a yield sign (when such signs are erected).

Class	Interpretation
Local Street	A street or road primarily used to access residence, business, or other abutting property.
Freeway Ramp	A unidirectional roadway that connects a freeway or expressway to an arterial.
Zonal Connector	An imaginary (non-physical) connection to or from the centroid of a traffic analysis zone.
Other	Any roadway not fitting the above definitions.
Walkway	A street restricted to use by pedestrians.
Busway	A street restricted to use by buses.
Light Rail	A roadbed restricted to use by light rail cars.
Heavy Rail	A roadbed restricted to use by heavy rail cars.
Ferry	A waterway crossed by ferry.

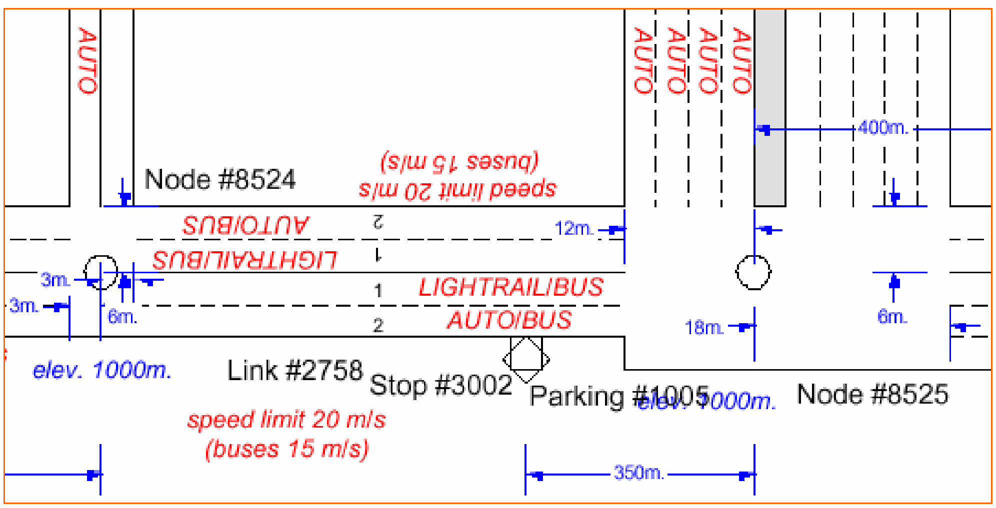


Figure-2.9: Part of Test Network Showing Links

Table-2.4: Corresponding Link Table to link 2758 in Figure-2.9

ID	NAME	NODEA	NODEB	PERMLANESA	PERMLANESB	LEFTPCKTSA	LEFTPCKTSB	RGHTPCKTSA
2758	1st Street	8524	8525	2	2	0	0	0

Continue

RGHTPCKTSB	TWOWAYTURN	LENGTH	GRADE	SETBACKA	SETBACKB	CAPACITYA	CAPACITYB
0	F	1000	0	3	12	800	1000

Continue

SPEEDLMTA	SPEEDLMTB	FREESPDA	FREESPDB	FUNCTCLASS	THRUA	THRUB	COLOR	VEHICLE	NOTES
20	20	25	25	LOCAL	2757	2759	4	AUTO/BUS/LIGHTRAIL	

Figure-2.9 shows the part of the roadway network that contains link number 2758 and nodes number 8524 and 8525. All of the information of link number 2758 is shown in Table-2.4. It is noted that the intersection is represented by a link setback from the nodes.

2.2.3 Pocket Lane Table

A pocket lane is defined as one of the following:

(a) a right or left turn pocket; e.g. a lane that starts after the from node ending at the to node,

(b) a right or left pull-out; e.g. a lane that starts after the from node and ends before the to node,

(c) a right or left merge pocket, e.g. a lane that starts at the from node and ends before the to node.

A lane starting at a from node and ending at a to node is considered a permanent lane. The example of the pocket lane is shown in Figure-2.10. The pocket table specifies the link on which the pocket lane exists, the type of pocket, its length and its starting location from a node. The graphical representation for pocket lane could be the same as link, with the darkened part representing the unused part of the lane.

Figure-2.10: An example of a pocket lane

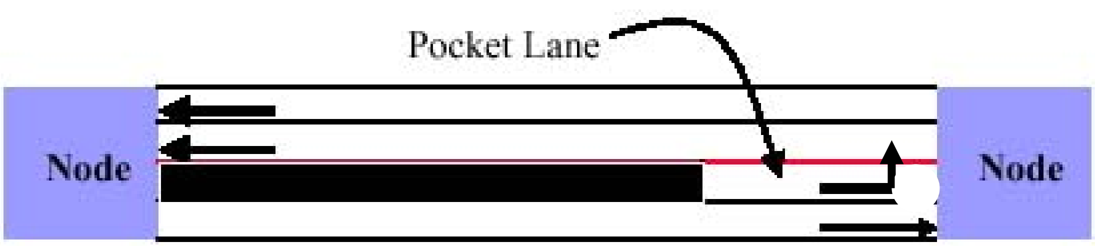


Figure-2.11: Graphical representation of pocket lane

The pocket lane table specifies a unique identifier for every pocket lane as shown in Table-2.6. The table contains the characteristics associated with the pocket lane such as the starting position, the type of lane, its length, and the link on which it is located. It should be noted that all pocket lanes specified in the link table are present in the pocket lane table.

Table-2.6: Pocket lane table format

Column Name	Description	Allowed Values
ID	The ID number of the pocket lane.	integer: 1 through 2,147,483,647
NODE	The ID number of the node toward which the pocket lane leads.	integer: 1 through 2,147,483,647
LINK	The ID number of the link on which the pocket lane lies.	integer: 1 through 2,147,483,647
OFFSET	The starting position of the pocket lane, measured (in meters) from NODE (applicable to pullout pockets only).	non-negative floating-point number
LANE	The lane number of the pocket lane.	integer: 1 through 255
STYLE	The type of the pocket lane.	one character: T = turn pocket P = pull-out pocket M = merge pocket
LENGTH	The length of the pocket lane (in meters). Turn and merge pockets always start or end at the appropriate limit line.	positive floating-point number
NOTES	A character string used for data quality annotations; free format (may be blank).	255 characters

Figure-2.12 displays part of the Test Network around node #14141. It shows a turn pocket lane of 300 meters on lane 6 of link #28800 going towards node #14141. The code for the Pocket Lane Table and its explanation for the turn pocket shown in Figure-2.12 are listed below in Table-2.7.

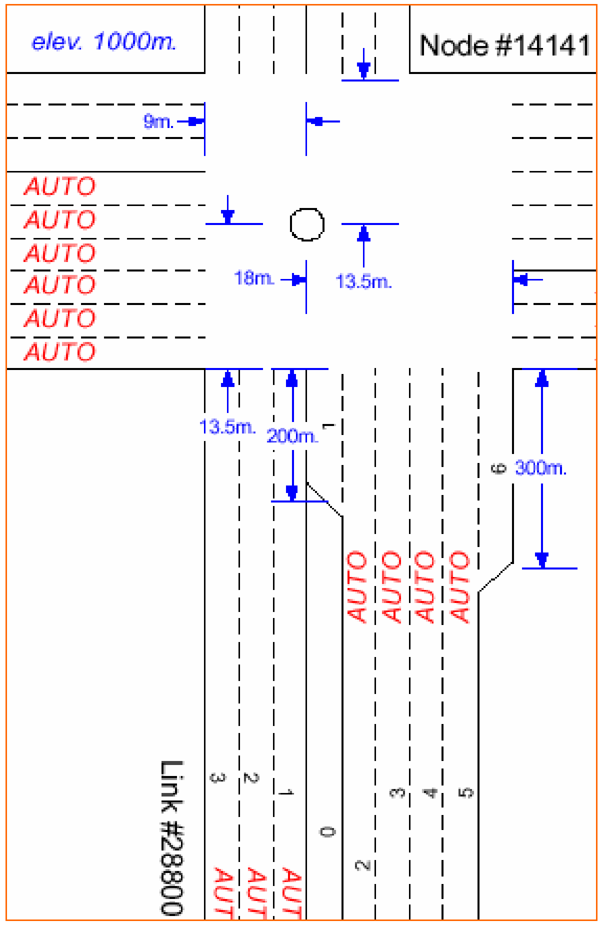


Figure-2.12: Part of the Test Network Showing Pocket Lane

Table-2.7: Test Network Pocket Lane Table corresponding to Figure-2.12

ID	NODE	LINK	OFFSET	LANE	STYLE	LENGTH	NOTES
141411	14141	28800	0	1	T	200	

2.2.4 Parking Table

An accessory located along links and used as origins and destinations for vehicle trips, parking may be placed where it is physically located in the network or it may be placed in aggregate generic parking areas representing several of the driveways, lots, parking places, etc., on a link.

In TRANSIMS, any vehicle enters or exits links at parking locations. The parking locations are bi-directional. A link may contain none or many parking locations. However, one parking location may represent all parking on that particular link. The parking table, as shown in Table-2.8, specifies all the data required about the parking places on the network such as the link on which the parking is present, the node to which vehicles are traveling to, its capacity and the type of vehicles allowed to park there. The examples of the parking places that can be represented as parking table are shown in Figure-2.13, and Figure-2.14. The graphical representation of the parking is shown in Figure-2.15.

Figure-2.13: Bus parking lot can be represented as parking in TRANSIMS network

Figure-2.14: Parking lot at the transit stop that can be represented as parking in TRANSIMS network

Figure-2.15: Graphical representation of parking

It is important to note that the vehicle types allowed for the parking place are consistent with the vehicle types allowed on the links.

Table-2.8: Parking table format

Column Name	Description	Allowed Values
ID	The ID number of the parking place.	integer: 1 through 2,147,483,647
NODE	The ID number of the node toward which vehicles are traveling.	integer: 1 through 2,147,483,647
LINK	The ID number of the link on which the parking place lies.	integer: 1 through 2,147,483,647
OFFSET	The location of the entrance from the link to the parking place, measured (in meters) from NODE.	non-negative floating-point number
STYLE	The type of parking place.	five characters: PRSTR = parallel on street HISTR = head in on street DRVWY = driveway LOT = parking lot BNDRY = network boundary PARKRIDE = park & ride lot
CAPACITY	The number of vehicles the parking place can accommodate; zero for unlimited capacity.	integer: 0 through 65,535
GENERIC	A toggle that indicates whether the parking place represents generic parking (not an actual driveway, lot, etc., but a group/aggregate of them used to simplify modeling).	one character: T = true/yes F = false/no
VEHICLE	The type of vehicle allowed to park at the parking place.	character string separated by slashes: AUTO = private auto TRUCK = motor carrier BICYCLE = bicycle TAXI = paratransit BUS = bus TROLLEY = trolley STREETCAR = streetcar LIGHTRAIL = light-rail transit RAPIDRAIL = rail-rapid transit REGIONRAIL = regional rail ANY = any vehicle type

Column Name	Description	Allowed Values
STARTTIME	The starting time for parking. This field is ignored in the current TRANSIMS release—current tables should not include records depending on the STARTTIME/ENDTIME fields.	character string with the day of week: SUN = Sunday MON = Monday TUE = Tuesday WED = Wednesday THU = Thursday FRI = Friday SAT = Saturday WKE = any weekend day WKD = any weekday ALL = any day The day is followed by the time of day (on a 24-hour clock). For example WKD13:20 is any weekday at 1:20 in the afternoon
ENDTIME	The ending time for parking. This field is ignored in the current TRANSIMS release—current tables should not include records depending on the STARTTIME/ENDTIME fields.	specified like STARTTIME
NOTES	A character string used for data quality annotations; free format (may be blank).	255 characters

Figure-2.16 shows a portion of the Test Network around node #8521. The Figure shows a parking accessory #1003 and #1004, a portion of the links connected to node #8521 and the lane use for the lanes on these links. Parking #1003 is a parking lot for any vehicle type, located at 200 meters from node #14136 and its capacity is 10. Parking #1004 is a parking lot for any vehicle type, located at 200 meters from node #8521 and its capacity is 1. The data for parking #1003 and #1004 in table format are shown in Table-2.9.

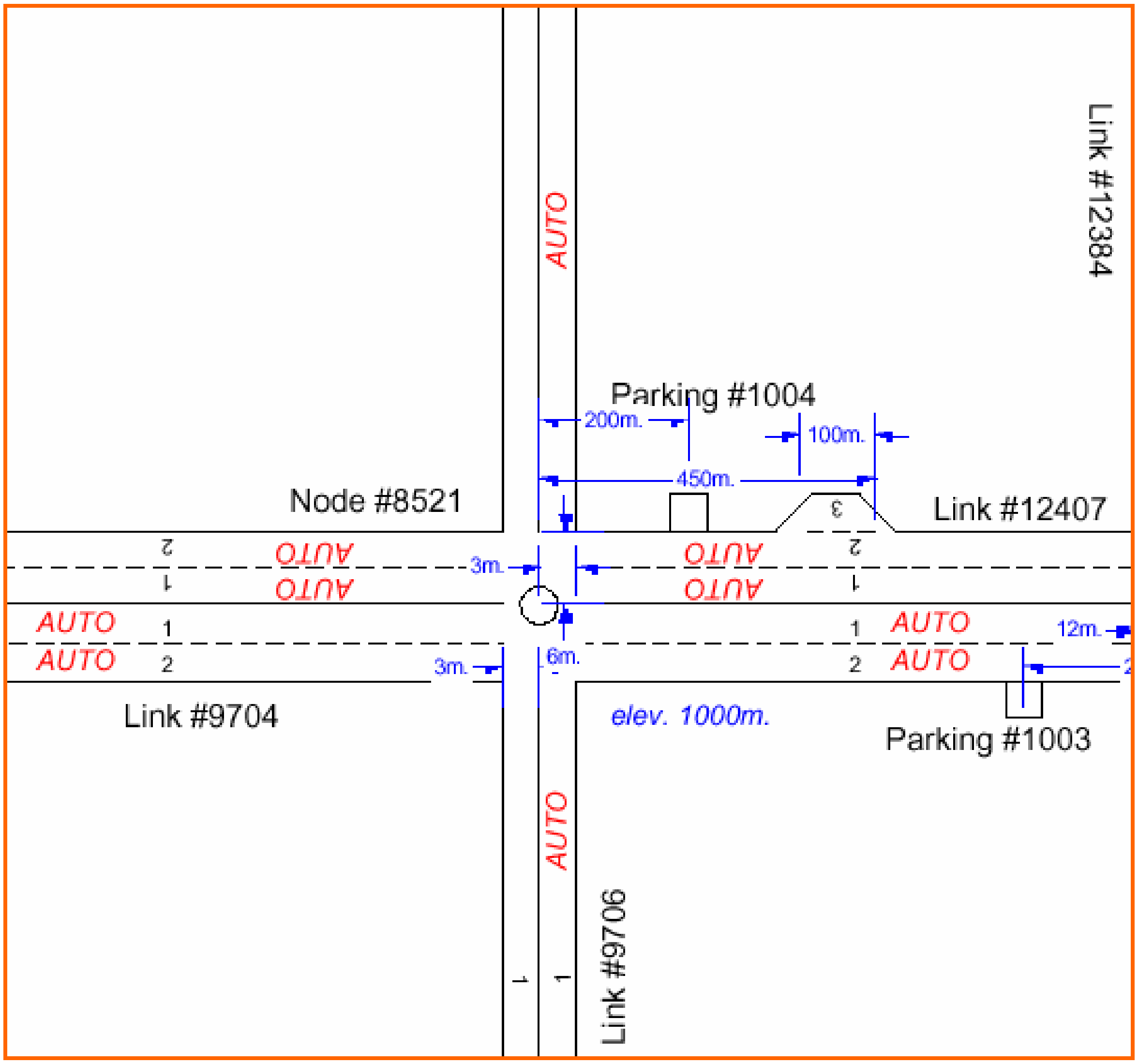


Figure-2.16: Part of the Test Network showing a parking place

Table-2.9: Test Network Parking Table for parking #1003 and #1004

ID	NODE	LINK	OFFSET	STYLE	CAPACITY	GENERIC	VEHICLE	STARTTIME	ENDTIME	NOTES
1003	14136	12407	200	HISTR	10	T	ANY	ALL00:00	ALL24:00	
1004	8521	12407	200	DRVWY	1	F	ANY	ALL00:00	ALL24:00	

2.2.5 Activity Locations Table

The activity locations represent a place where a household member would travel to and from. All activities occur at activity locations such as shopping mall, housing, and workplace as shown in Figure-2.17. The Activity Locations Table defines the location of the activity on the network such as the node entry, the offset and its spatial information in the form of northing, easting and the layer on which it resides. The abstract representation of the activity location is a circle as shown in Figure-2.18.

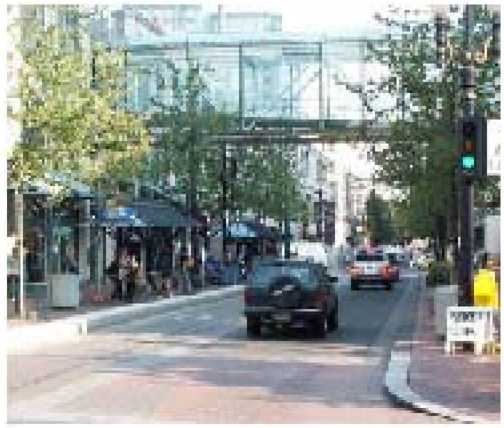


Figure-2.17: Shopping malls, restaurants, and coffee shops can be represented as activity locations in the TRANSIMS network

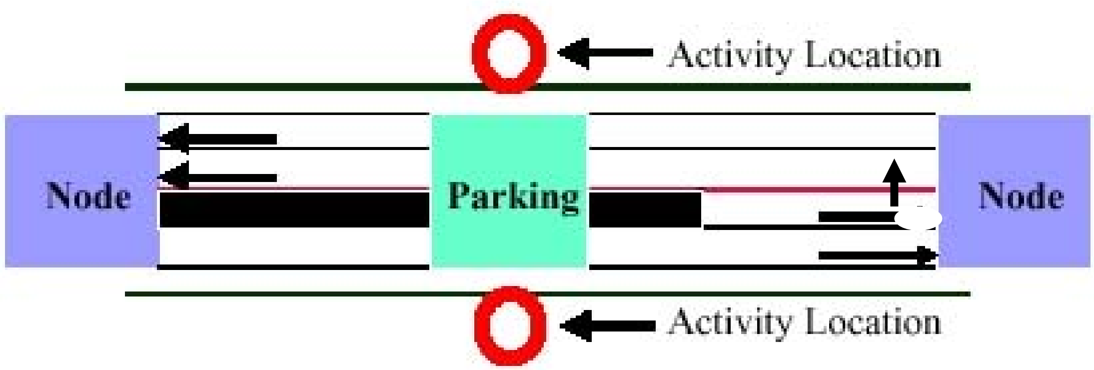


Figure-2.18: Graphical representation of activity locations

The entries in the activity locations table (Table-2.10) specify a unique identifier for each activity location and its characteristics, such as its offset, its spatial location, and the link on which it is present. It is important to note that the modal layer on which the activity location resides is consistent with the vehicle type allowed on the link. The activity locations are on either the walk or drive link layer. The user may also use up to 20 optional fields to describe land use or any other characteristic of the activity between the ELEVATION and the NOTES fields.

Table-2.10: Activity Locations Table Format

Column Name	Description	Allowed Values
ID	The ID number of the activity location.	integer: 1 through 2,147,483,647
NODE	The ID number of the node toward which vehicles are traveling (the location is taken to be on the right side of the street when headed this direction).	integer: 1 through 2,147,483,647
LINK	The ID number of the link on which the activity location lies.	integer: 1 through 2,147,483,647
OFFSET	The location of the entrance from the link to the activity location, which is measured (in meters) from NODE.	non-negative floating-point number
LAYER	The modal "layer" on which the activity location resides.	character string: AUTO BUS LIGHTRAIL WALK
EASTING	The x-coordinate of the activity location (in meters, UTM grid system).	floating-point number
NORTHING	The y-coordinate of the activity location (in meters, UTM grid system).	floating-point number
ELEVATION	The z-coordinate of the activity location (in meters, UTM grid system).	floating-point number
optional field 1	The first optional field related to land use.	floating-point number
optional field 2	The second optional field related to land use.	floating-point number
optional field n	The n^{th} optional field related to land use.	floating-point number
NOTES	A character string used for data quality annotations; free format (may be blank).	255 characters

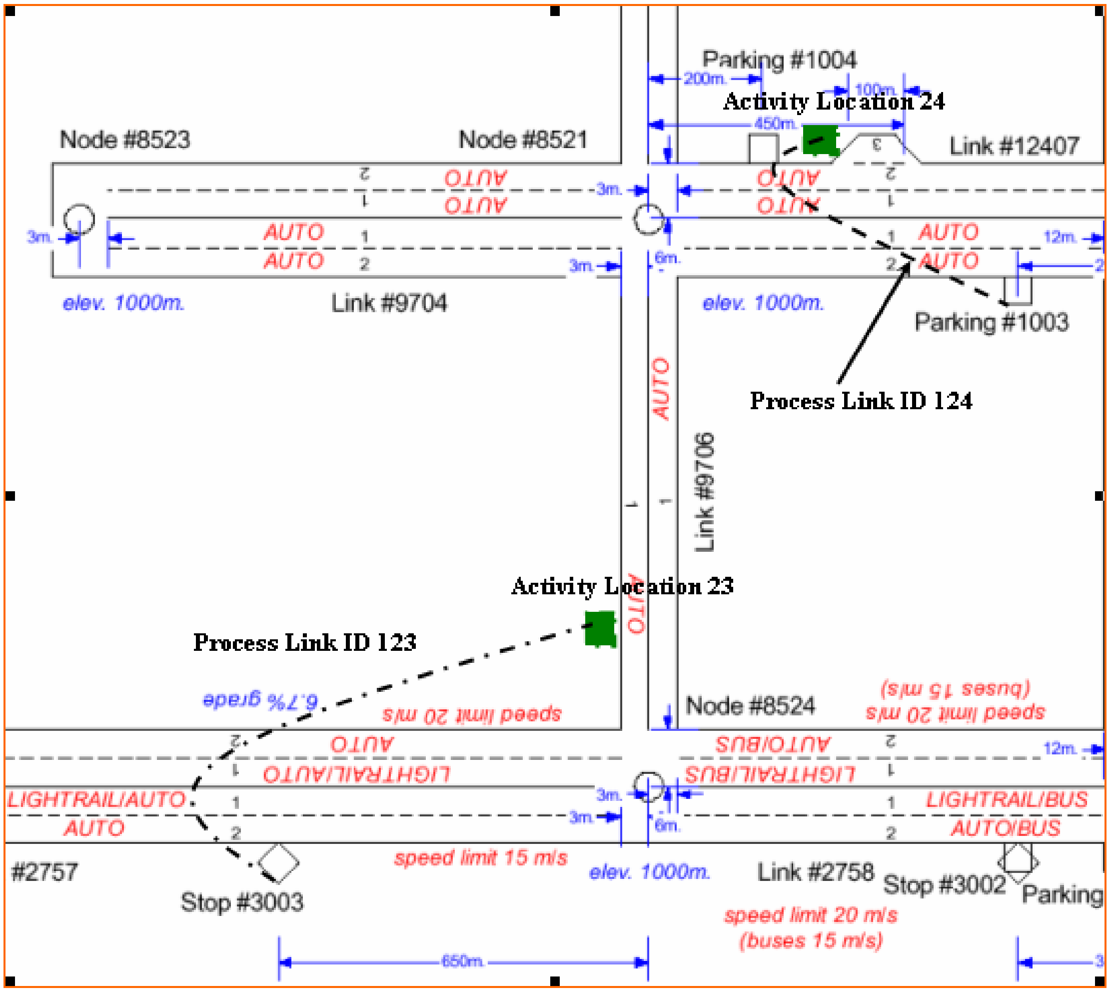


Figure-2.19: Part of Test Network Showing Activity Locations

Figure-2.19 shows two Activity Locations on the Test Network. The activity location #24 is connected to the Parking Accessory #1003 via Process links, which will be introduced in the following section. Activity location 24 is on link #12407 going towards node #8521, and it is located at 300 meters from the node. It is on the walk layer since it is a work activity. The easting, northing, and the elevation are 2300, 1500 and 1000 respectively. Table-2.11 shows this example in an Activity Location Table format.

Table-2.11: Test Network Activity Location #24 Table corresponding to Figure-2.19

ID	NODE	LINK	OFFSET	LAYER	EASTING	NORTHING	ELEVATION	ACCESS	HOME	WORK	NOTES
24	8521	12407	300	WALK	2300	1500	1000	375.	0.0	1.0	

2.2.6 Process Links Table

A process link is a virtual link that connects an activity location to a parking place or a transit stop. The process link allows the traveler to move between these locations. It represents the process of a traveler changing modes and accounts for the cost (in time and money) for the traveler to make the mode change. It does not represent a physical segment of road or sidewalk. The process link is directional, and is viewed as a walk link. In order to complete the network, two process links are placed to connect a parking place to the activity location. Figure-2.20 is the graphical representation of Process Links. Table-2.12 shows the data associated with a process link, such as ID number, the accessory that it connects and their types, and the time delay and cost incurred in traveling across the virtual link.

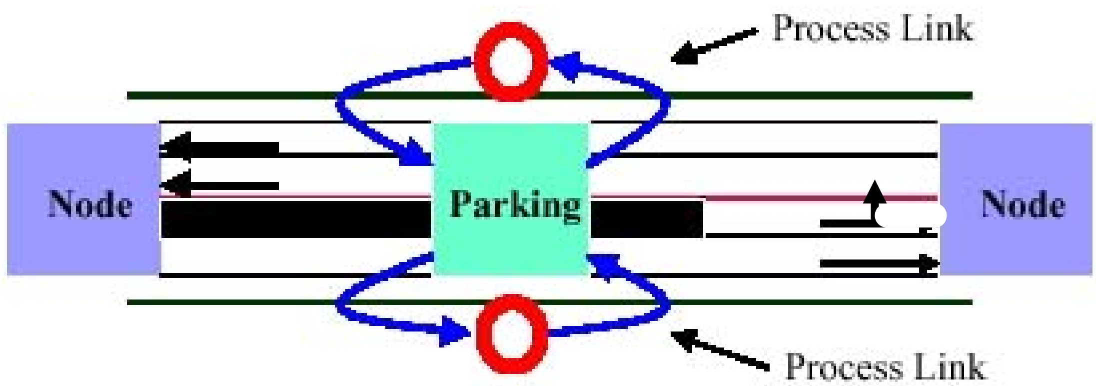


Figure-2.20: Graphical representation of process link

Table-2.12: Process Link Table Format

Column Name	Description	Allowed Values
ID	The ID number of the virtual link.	integer: 1 through 2,147,483,647
FROMID	The ID number of the accessory from which the virtual link leaves.	integer: 1 through 2,147,483,647
FROMTYPE	The type of accessory from which the virtual link leaves.	character string: ACTIVITY PARKING TRANSIT
TOID	The ID number of the accessory to which the virtual link leads.	integer: 1 through 2,147,483,647
TOTYPE	The type of accessory to which the virtual link leads.	character string: ACTIVITY PARKING TRANSIT
DELAY	The time delay (measured in seconds) incurred when traveling across the virtual link.	non-negative floating-point number
COST	The cost (measured in arbitrary units) incurred when traveling across the virtual link. Note that although the costs are measured for arbitrary units, the units must be the same for the whole data table.	non-negative floating-point number
NOTES	A character string used for data quality annotations; free format (may be blank).	255 characters

Figure-2.19, above, shows the Test Network has a process link with ID #124. This process link connects the activity ID #24, work activity, to parking place #1003. The table format for this link is shown in Table-2.13. The table also shows the process link #125 that connects the Parking to the Activity Location.

Table-2.13: Test Network Process Link Table corresponding to Figure-2.19

ID	FROMID	FROMTYPE	TOID	TOTYPE	DELAY	COST	NOTES
124	24	ACTIVITY	1004	PARKING	30	40	
125	1004	PARKING	24	ACTIVITY	30	40	

2.2.7 Transit stops table

A transit stop is an accessory defining a location on a link where a transit vehicle, such as a bus or light rail, waits to embark and disembark passengers. The examples of the transit stops are shown in Figure-2.21, and Figure-2.22. A transit stop is graphically represented by a dark circle on the network as shown in Figure-2.23. In this figure, the process links are placed to connect transit stops to the activity location.

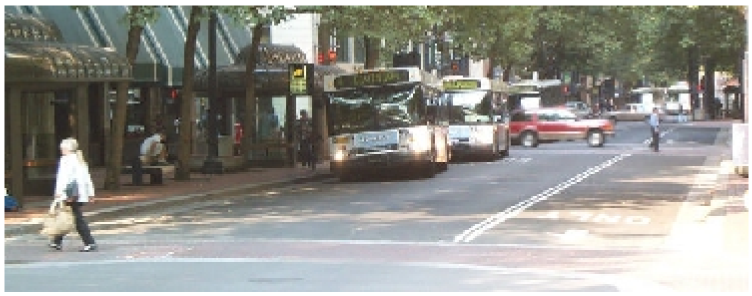


Figure-2.21: A bus stop can be represented by transit stop in the TRANSIMS network

Figure-2.22: Another view of a bus stop that can be represented by a transit stop in the TRANSIMS network

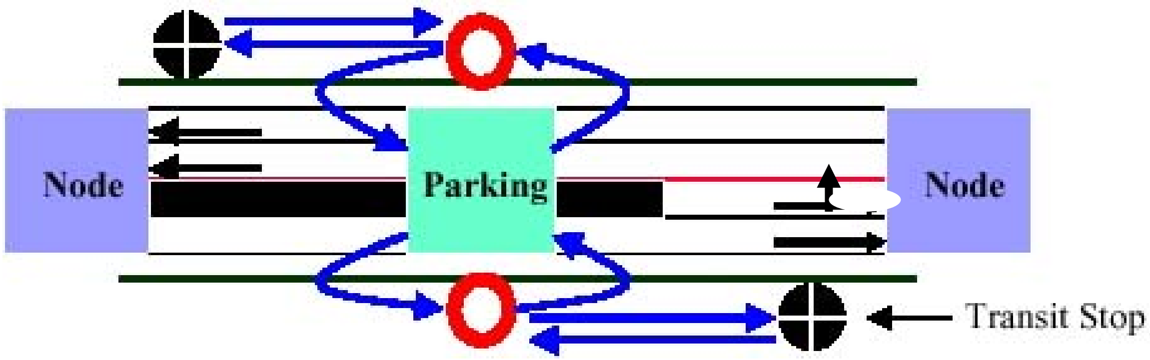


Figure-2.23: Graphical representation of transit stops

Entries in the Transit Stop Table (Table-2.14) specify characteristics, such as location, offsets, vehicle types that service the stop, capacity, etc. Every transit stop in the network is identified by a unique ID. It is necessary that the vehicle types allowed for the transit stop are consistent with the vehicle types on the link.

Table-2.14: Transit Stop Format

Column Name	Description	Allowed Values
`ID`	The ID number of the stop.	integer: 1 through 2,147,483,647
`NAME`	The name of the stop.	50 characters
`NODE`	The ID number of the node toward which vehicles are traveling.	integer: 1 through 2,147,483,647
`LINK`	The ID number of the link on which the stop takes place.	integer: 1 through 2,147,483,647
`OFFSET`	The location of the stop, which is measured (in meters) from `NODE`.	non-negative floating-point number
`VEHICLE`	The types of vehicles for which this is a stop.	character string separated by slashes: `BUS` = bus `TROLLEY` = trolley `STREETCAR` = streetcar `LIGHTRAIL` = light-rail transit `RAPIDRAIL` = rail-rapid transit `REGIONRAIL` = regional rail
`STYLE`	The type of stop.	ten characters: `STOP` = stop (no station) `STATION` = station
`CAPACITY`	The number of vehicles the stop can simultaneously handle; zero for unlimited capacity.	integer: 0 through 65,535
`NOTES`	A character string used for data quality annotations; free format (may be blank).	255 characters

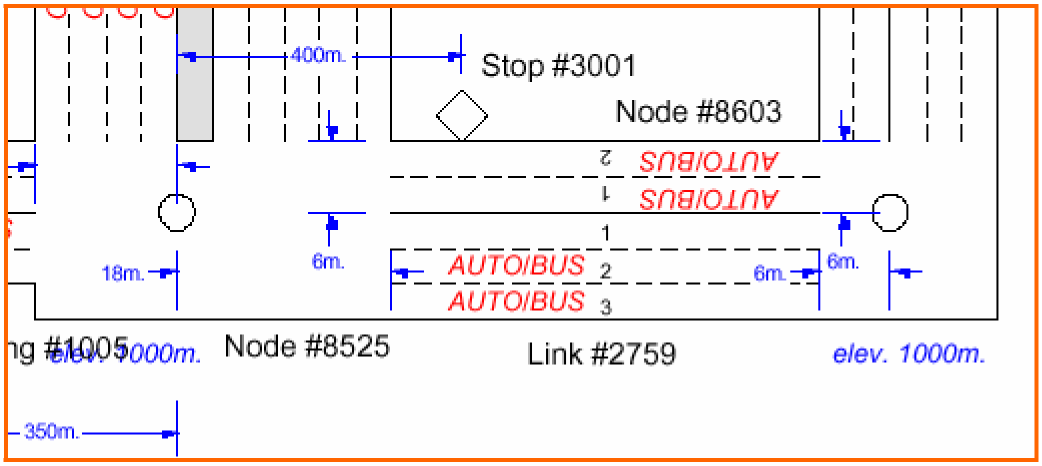


Figure-2.24: Part of the Test Network Showing a Transit Stop

Figure-2.24 displays a part of the Test Network around the Transit Stop (#3001), showing key information such as the offset of the stop from the node, and the link on which the stop is present. The Transit Stop Table for the Test Network given in Figure-2.24 is shown in Table-2.15.

Table-2.15: Test Network Transit Stop Table

ID	NAME	NODE	LINK	OFFSET	VEHICLE	STYLE	CAPACITY	NOTES
3001	1st & C NE	8525	2759	400	BUS	STOP	25	

2.2.8 Lane Connectivity Table

The lane connectivity table specifies the way in which each lane on a link is connected to the lane on the next link. In other words, it specifies the movement allowed at a node. An example of how lanes are connected is shown below in Figure-2.25.

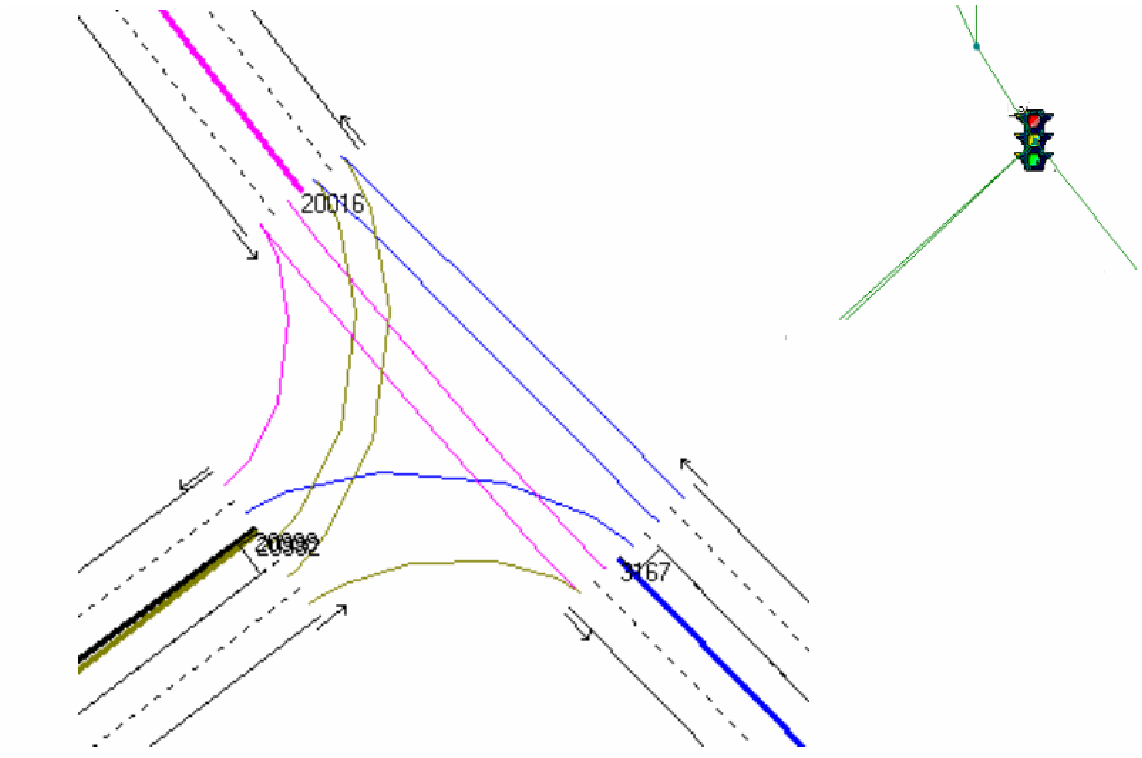


Figure-2.25: An example of how the lanes are connected at a signalized intersection

The lane connectivity table includes information such as specification of the incoming lane, outgoing lane, and outgoing link number, as shown in Table-2.16. Each incoming lane has at least one outgoing connection.

Table-2.16: Lane Connectivity Table Format

Column Name	Description	Allowed Values
NODE	The ID number of the node.	integer: 1 through 2,147,483,647
INLINK	The ID number of the incoming link.	integer: 1 through 2,147,483,647
INLANE	The lane number of the incoming lane.	integer: 1 through 255
OUTLINK	The ID number of the outgoing link.	integer: 1 through 2,147,483,647
OUTLANE	The lane number of the outgoing lane.	integer: 1 through 255
NOTES	A character string used for data quality annotations; free format (may be blank).	255 characters

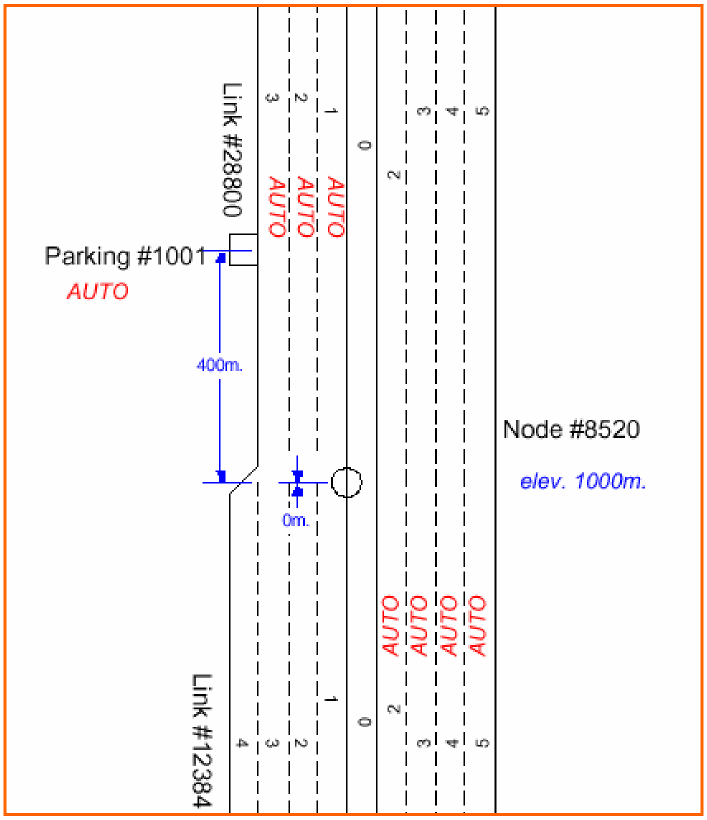


Figure-2.26: Lane Connectivity for a Part of the Test Network

Figure-2.26 displays a part of the Test Network around node #8520. It shows the lanes on link #28800 that are connected to the lanes of link #12384 at node #8520. For example, lane 1 is connected to lane 1 but lane 3 is connected to both lanes 3 and 4 on link #12384. Table-2.17 explains the lane connectivity corresponding to links #12384 and #28800.

Table-2.17: Test Network Lane Connectivity Table corresponding to Figure-2.26

NODE	INLINK	INLANE	OUTLINK	OUTLANE	NOTES
8520	12384	2	28800	2	
8520	12384	3	28800	3	
8520	12384	4	28800	4	
8520	12384	5	28800	5	
8520	28800	1	12384	1	
8520	28800	2	12384	2	
8520	28800	3	12384	3	
8520	28800	3	12384	4	

2.2.9 Speed Table

Speed is the velocity of the vehicle on the link. It is measured in cells/timestep and referred to as V. For example, a vehicle with velocity 1 cells/second is equivalent to 1 x 7.5 meters/second = 7.5 m/s or 27 Km/hr.

Entries in the speed table are required only when the speed limit or free speed for a link varies by different types of vehicles allowed to use the link. The speeds that are specified in the Link Tables are used as defaults for any vehicle types which are not specified in the Speed Table. Figure-2.27 shows part of the test network that has speed restrictions.

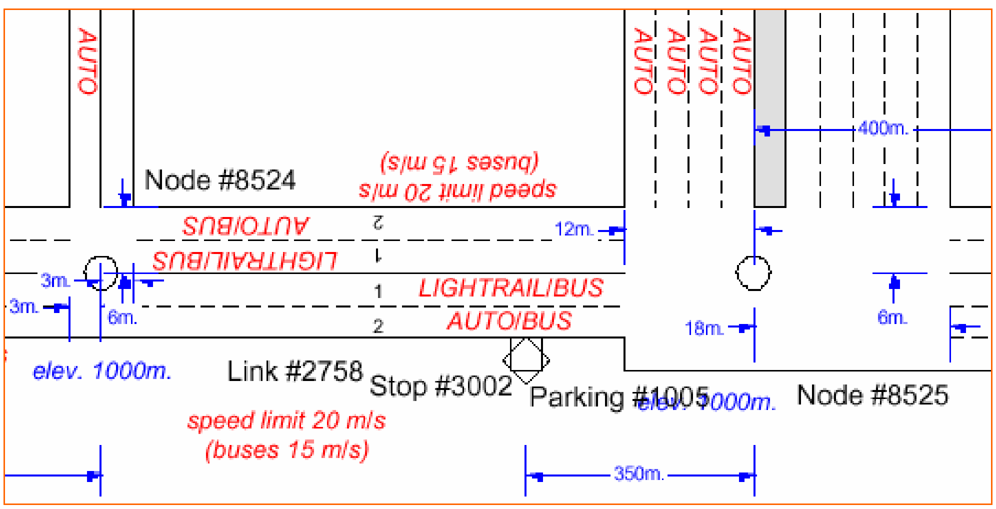


Figure-2.27: Part of the Test Network Showing Speed Restriction

Figure-2.27 displays link #2758 connecting nodes #8524 and #8525. It shows the lane use for the lanes on these links and the speed limit restrictions for the lanes. The buses are restricted to a speed of 15m/s, while the speed limit for Autos and Light Rail is 20m/s.

The speed table format is shown in Table-2.18. It specifies the time at which these speeds are followed giving a provision of variable speed limits for different vehicles at various times. Figure-2.28 provides an explanation of each field in the speed table corresponding to Figure-2.27. The Speed Table for the Test Network described in Figure-2.27 is listed in Table-2.19. It can be inferred from the file that speeds listed in the Link Table are used for all links other than link 2758.

Table-2.18: Speed table format

Column Name	Description	Allowed Values
LINK	The ID number of the link with multiple speeds.	integer: 1 through 2,147,483,647
NODE	The ID number of the node toward which lanes are headed.	integer: 1 through 2,147,483,647
SPEEDLMT	The speed limit (in meters per second) for vehicles.	positive floating-point number
FREESPD	Free-flow speed (in meters per second) for vehicles.	positive floating-point number
VEHICLE	The vehicle type to which speeds apply.	character string separated by slashes: AUTO = private auto TRUCK = motor carrier BICYCLE = bicycle TAXI = paratransit BUS = bus TROLLEY = trolley STREETCAR = streetcar LIGHTRAIL = light-rail transit RAPIDRAIL = rail-rapid transit REGIONRAIL = regional rail
STARTTIME	The starting time for the speeds.	character string with the day of week: SUN = Sunday MON = Monday TUE = Tuesday WED = Wednesday THU = Thursday FRI = Friday SAT = Saturday WKE = any weekend day WKD = any weekday ALL = any day The day is followed by the time of day (on a 24-hour clock). For example, WKD13:20 is any weekday at 1:20 in the afternoon.
ENDTIME	The ending time for the speeds.	specified like STARTTIME
NOTES	A character string used for data quality annotations; free format (may be blank).	255 characters

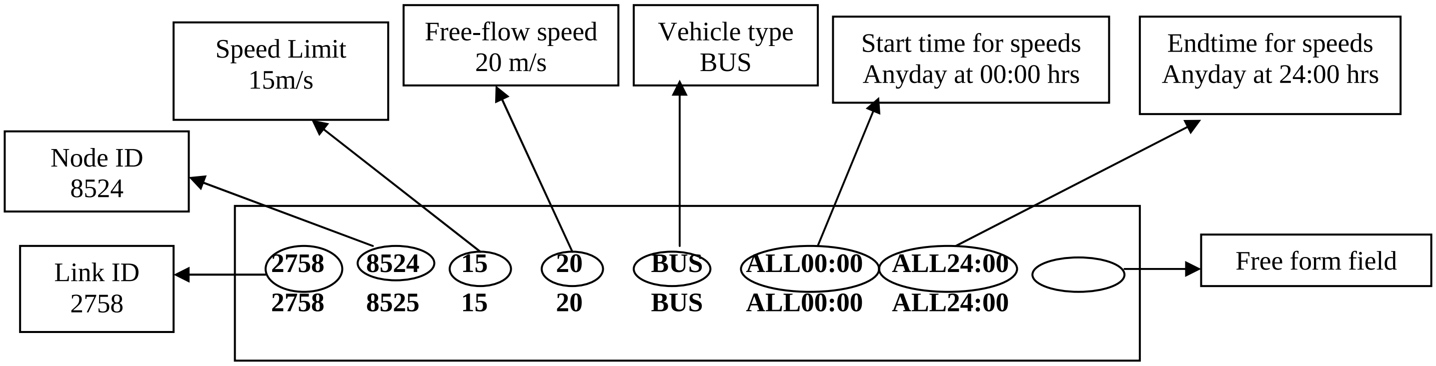


Figure-2.28: Explanation of each field in Speed Table corresponding to Figure-2.27

Table-2.19: Corresponding Speed Table to speed information shown in Figure-2.27

LINK	NODE	SPEEDLMT	FREESPD	VEHICLE	STARTTIME	ENDTIME	NOTES
2758	8524	15	20	BUS	ALL00:00	ALL24:00	
2758	8525	15	20	BUS	ALL00:00	ALL24:00	

2.2.10 Lane-Use Table

Entries in the lane-use table, as shown in Table-2.20, are required only when a lane has restrictions for certain vehicle types. The vehicle types specified in the Link Table are permitted unrestricted use of all lanes on the link when there is no record in the lane-use table. It is important that the vehicle types to which the restrictions apply are consistent with the vehicle types allowed on the link.

Table-2.20: Lane Use Table Format

Column Name	Description	Allowed Values
NODE	ID number of the node toward which the lane leads.	Integer: 1 through 2,147,483,647
LINK	ID number of the link on which the lane lies.	integer: 1 through 2,147,483,647
LANE	Lane number.	integer: 1 through 255
VEHICLE	Vehicle type(s) to which restriction applies.	string of characters separated by slashes: 'HOV2' = high occupancy vehicle with two or more occupants 'HOV3' = high occupancy vehicle with three or more occupants 'HOV4' = high occupancy vehicle with four or more occupants 'BICYCLE' = bicycle 'AUTO' = private auto 'TRUCK' = motor carrier 'BUS' = bus 'TROLLEY' = trolley 'STREETCAR' = streetcar 'LIGHTRAIL' = light rail transit 'RAPIDRAIL' = rail rapid transit 'REGIONRAIL' = regional rail
RESTRICT	Type of lane restriction.	one character: 'O' = only this vehicle type may use lane 'R' = lane required to be used by this vehicle type 'N' = lane not allowed to be used by this vehicle type
STARTTIME	Starting time for the restriction.	a character string with the day of week, 'SUN' = Sunday 'MON' = Monday 'TUE' = Tuesday 'WED' = Wednesday 'THU' = Thursday 'FRI' = Friday 'SAT' = Saturday 'WKE' = any weekend day 'WKD' = any weekday 'ALL' = any day, followed by the time of day (on a 24-hour clock), for example 'WKD13:20' is any weekday at 1:20 in the afternoon
ENDTIME	Ending time for the restriction.	specified like STARTTIME
NOTES	Character string used for data quality annotations; free format (may be blank).	255 characters

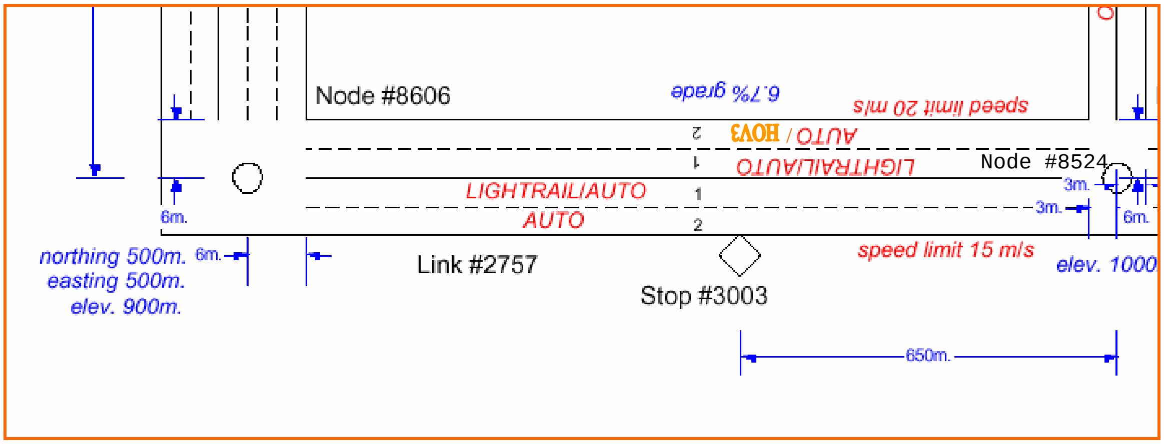
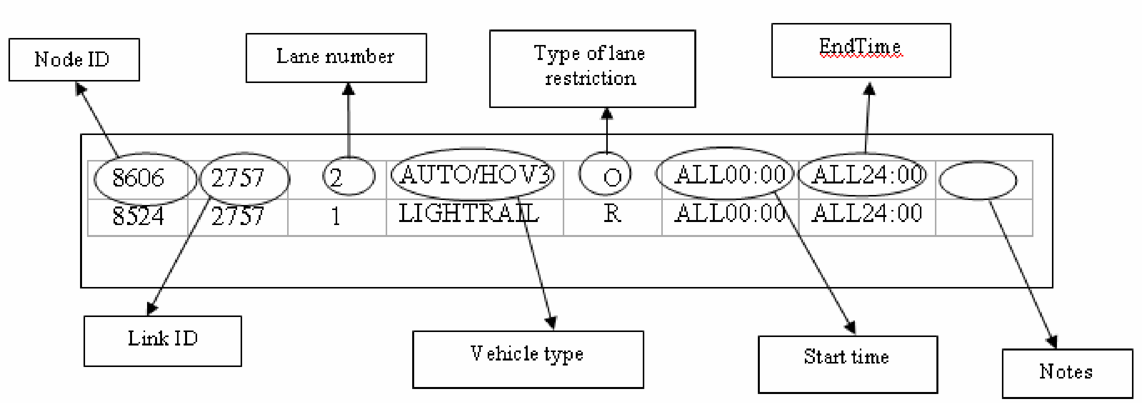


Figure-2.29: Part of the Test Network Showing Lane Use Characteristics

Figure-2.29 shows link #2757 of the Test Network around nodes #8606 and #8524. It is used to explain how the Lane Use Table is constructed. Also shown in the Figure are a stop, the percentage of grade for the link, and the speed limits on these lanes. Lane 2 of the link going towards Node #8606 is restricted to automobile with three passengers or more (HOV3). The Light Rail is required to use lane 1 in both directions, which is also shared by automobiles. All automobiles can also use lane 2 in the direction of travel towards Node #8524. The code and the explanation for the HOV3 lane use restriction is shown below.



For the Test Network described in Figure-2.3 the complete Lane Use table is listed below. As can be read from the file, lane 2 on link #2757 going towards node #8606 is an HOV3 lane all through the day. This provides a very restrictive use for that lane.

Table-2.21: Test Network Lane Use Table

NODE	LINK	LANE	VEHICLE	RESTRICT	STARTTIME	ENDTIME	NOTES
8606	2757	2	AUTO/HOV3	O	ALL00:00	ALL24:00	
T8524	2757	1	LIGHTRAIL	R	ALL00:00	ALL24:00	
8524	2758	1	LIGHTRAIL	R	ALL00:00	ALL24:00	
8524	2758	2	AUTO	R	ALL00:00	ALL24:00	
8525	2758	1	AUTO	N	ALL00:00	ALL24:00	
8525	2758	2	LIGHTRAIL	N	ALL00:00	ALL24:00	
8606	2756	1	LIGHTRAIL	R	ALL00:00	ALL24:00	
8600	2756	1	LIGHTRAIL	R	ALL00:00	ALL24:00	
8600	2755	2	LIGHTRAIL	N	ALL00:00	ALL24:00	
8610	2755	1	LIGHTRAIL	R	ALL00:00	ALL24:00	
14142	2752	1	LIGHTRAIL	R	ALL00:00	ALL24:00	
14142	2752	2	AUTO	R	ALL00:00	ALL24:00	
8608	2752	1	AUTO	N	ALL00:00	ALL24:00	
8608	2752	1	LIGHTRAIL	R	ALL00:00	ALL24:00	

2.2.11 Barrier Table

The Barrier Table, shown in Table-2.22, includes entries such as the link on which the barrier is present, the node toward which the vehicles are traveling, and the type and length of barrier. Each barrier has also a unique identifier with which it is referenced.

In the Test Network, there is a barrier in lane 3 on link #2756 going towards node #8600. The barrier is at a distance of 450 meters from the Node and it is of “BARRIER” Type. Figure-2.30 illustrates the existence of the barrier, and the following table shows the format with the explanation of the data in each column.

Table-2.22: Barrier Table Format

Column Name	Description	Allowed Values
ID	ID number of the barrier.	integer: 1 through 2,147,483,647
NODE	ID number of the node toward which vehicles are traveling.	integer: 1 through 2,147,483,647
LINK	ID number of the link on which the barrier lies.	integer: 1 through 2,147,483,647
OFFSET	Starting position of the barrier, measured (in meters) from NODE.	Non-negative floating-point number
LANE	Lane number of lane to the left of the barrier.	integer: 0 through 255
STYLE	Type of the barrier.	ten characters: ‘CURB’ = curb ‘BARRIER’ = barrier ‘GRADESEP’ = grade separation ‘STRIPE’ = painted stripe ‘TEMPORARY’ = temporary barrier
LENGTH	Length of the barrier (in meters).	Positive floating-point number

NOTES	Character string used for data quality annotations; free format (may be blank).	255 characters

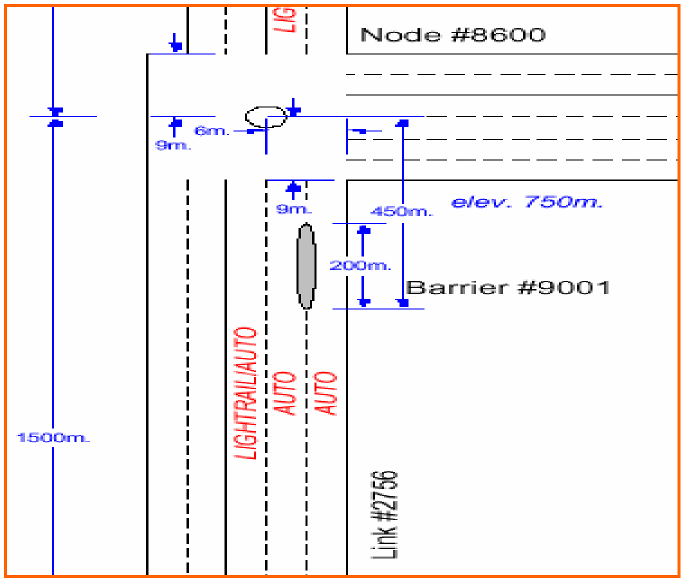
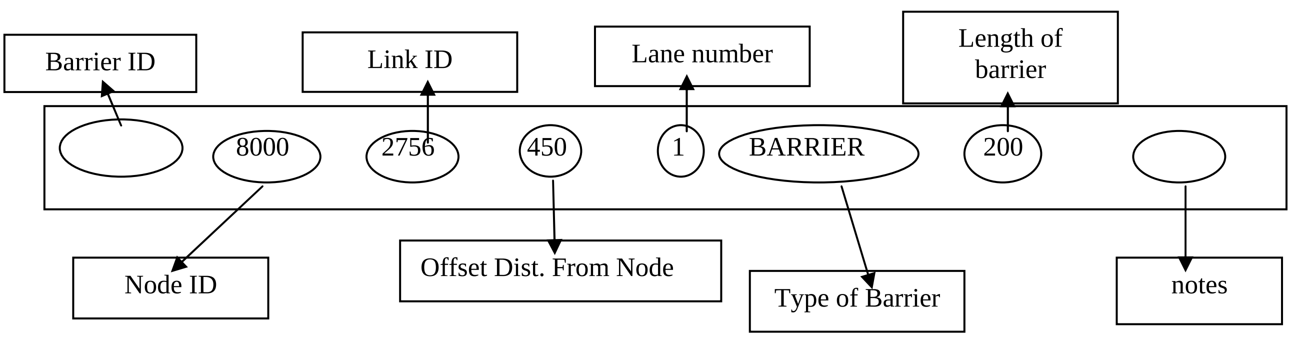


Figure-2.30: Part of the Test Network Highlighting a Barrier



For the Test Network described in Figure-2.3 the Barrier Table is shown in Table-2.23. It indicates that the Test Network has only one barrier.

Table-2.23: Test Network Barrier Table

ID	NODE	LINK	OFFSETT	LANE	STYLE	LENGHT	NOTES
9001	8600	2756	450	1	BARRIER	200	

2.2.12 Turn Prohibition Table

Entries in the Turn Prohibition Table are required when particular movements at a node are prohibited only at certain times of the day. The lane connectivity table specifies the allowed and prohibited movements that are always in effect at a node. The turn prohibition table comprises data such as the outgoing link, the incoming link, the start time and the end time for the prohibition as shown in Table-2.24.

Table-2.24: Turn Prohibition Table Format

Column Name	Description	Allowed Values
NODE	ID number of the node.	integer: 1 through 2,147,483,647
INLINK	ID number of the incoming link.	integer: 1 through 2,147,483,647
OUTLINK	ID number of the outgoing link.	integer: 1 through 2,147,483,647
STARTTIME	Starting time for the prohibition.	a character string with the day of week, 'SUN' = Sunday 'MON' = Monday 'TUE' = Tuesday 'WED' = Wednesday 'THU' = Thursday 'FRI' = Friday 'SAT' = Saturday 'WKE' = any weekend day 'WKD' = any weekday 'ALL' = any day, followed by the time of day (on a 24-hour clock), for example 'WKD13:20' is any weekday at 1:20 in the afternoon
ENDTIME	Ending time for the prohibition.	specified like STARTTIME
NOTES	Character string used for data quality annotations; free format (may be blank).	255 characters

There is no turn prohibition in the Test Network.

2.2.13 Unsignalized Node Table

The Unsignalized Node Table, shown in Table-2.25, contains data that specifies the type of control at an "unsignalized" node, such as a yield or a stop. Every node that is unsignalized should be specified in the Unsignalized Node Table.

Table-2.25 Unsignalized Node Table Format

Column Name	Description	Allowed Values
NODE	ID number of the node.	integer: 1 through 2,147,483,647
INLINK	ID number of the incoming link.	integer: 1 through 2,147,483,647
SIGN	Type of sign control on the link.	one character: 'S' = stop; 'Y' = yield; 'N' = none
NOTES	Character string used for data quality annotations; free format (may be blank).	255 characters

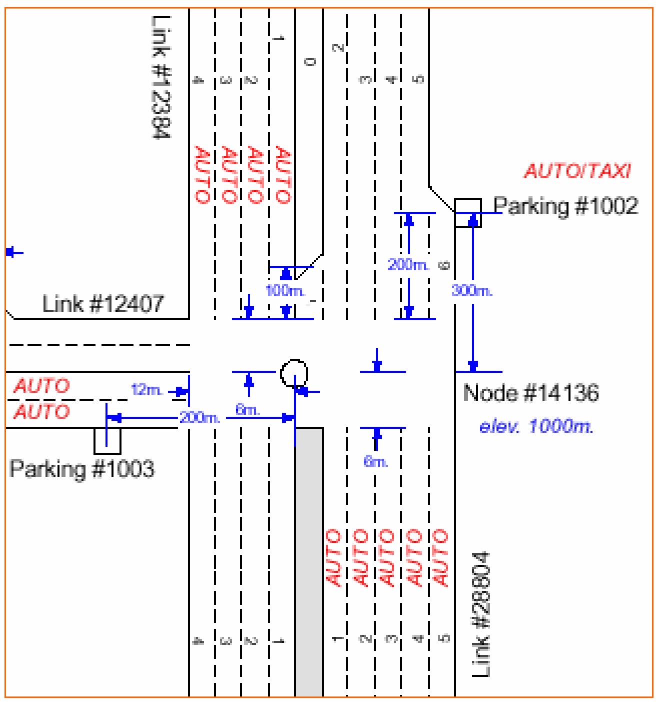


Figure-2.31: Part of the Test Network Showing an Unsignalized Node

Figure-2.31 highlights the Unsignalized Node #14136 of the Test Network. This Unsignalized intersection has a stop sign "S" on inlink #12407 and no signs on inlinks #12384 and #28804. The table format for this intersection is shown below.

14136	12407	S	
14136	12384	N	
14136	28804	N	

Node ID	Inlink	Type of control None	Notes

The Unsignalized Node Table for the Test Network described in Figure-2.3 is shown in Table-2.26.

Table-2.26: Test Network Unsignalized Node Table

NODE	INLINK	SIGN	LANE
8520	12384	Y	
8520	28800	N	
14136	12407	S	
14136	12384	N	
14136	28804	N	
8610	2753	N	
8610	2755	N	
14142	2753	N	
14142	11486	S	
14142	2752	N	
8608	2751	N	
8608	2752	N	
8600	2756	N	
8600	2754	S	
8600	2755	N	
8522	2754	N	
8522	9705	S	
8522	11487	N	
14340	2751	S	
14340	11495	S	
14340	2750	S	
8606	2756	N	
8606	2757	N	
8524	2757	N	
8524	2758	N	
8524	9706	Y	
8525	2758	N	
8525	2759	N	
8525	28804	S	
8603	2759	N	
8603	2750	N	

2.2.14 Signalized Node Table

The Signalized Node Table, shown in Table-2.27 contains data that describes the type of control at the nodes that are signalized. Characteristics of the signalized nodes are specified, such as whether the signal is actuated or pre-timed, offset time if the signal is coordinated, and the algorithm followed if the signal is actuated.

Table-2.27: Signalized Node Table Format

Column Name	Description	Allowed Values
NODE	ID number of the node.	integer: 1 through 2,147,483,647
TYPE	Type of the signal.	one character: 'T' = timed 'A' = actuated
PLAN	ID number of a timing plan.	integer: 1 through 65,535
OFFSET	Relative offset (in seconds) for coordinated signals.	non-negative floating-point number
STARTTIME	Starting time for the plan.	a character string with the day of week 'SUN' = Sunday 'MON' = Monday 'TUE' = Tuesday 'WED' = Wednesday 'THU' = Thursday 'FRI' = Friday 'SAT' = Saturday 'WKE' = any weekend day 'WKD' = any weekday 'ALL' = any day, followed by the time of day (on a 24-hour clock), for example 'WKD13:20' is any weekday at 1:20 in the afternoon
COORDINATR	ID number of coordinator for the signal; equivalent to NODE number if signal is isolated.	integer: 1 through 2,147,483,647
RING	Single or dual ring. Dual ring only for Type A only	one character: 'S' = single 'D' = dual
ALGORITHM	Control algorithm used by signal, required only for TYPE='A'	ten characters
NOTES	Character string used for data quality annotations; free format (may be blank).	255 characters

Figure-2.32 highlights the signalized node #14141 of the Test Network. The node has four links connected to it: link #11487, link #28800, link #11495, and link #11496. It is an isolated intersection with a pre-timed type of traffic signal. The timing plan for this signal operates for 24 hours and for all days. Since it is not an actuated signal nor it is a coordinated one, the offset time is zero, the ring type is S, the algorithm designation is left blank, and the coordinator number is replaced by the node number. The table format for describing this signal is shown below Figure-2.32.

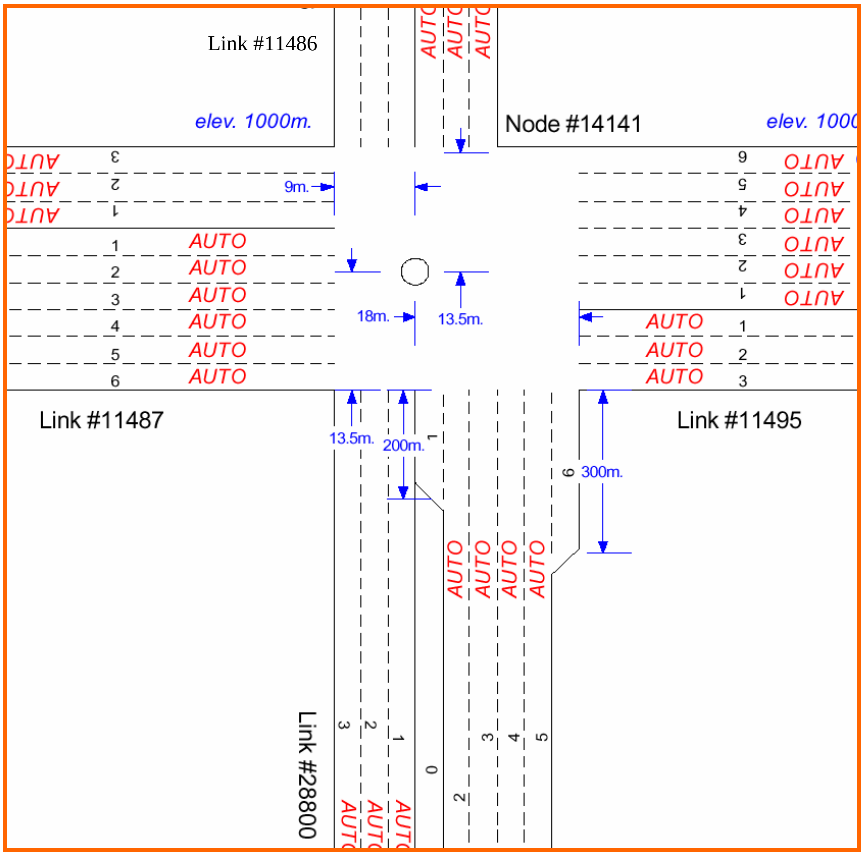
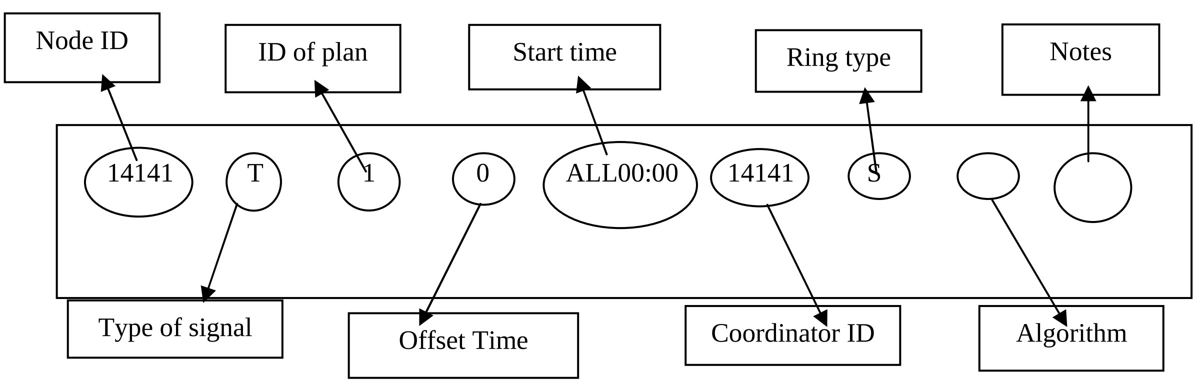


Figure-2.32: A Signalized Node in the Test Network



The Signalized Table for the Test Network described in Figure-2.3 is shown in Table-2.28. The Test Network has one other signal at node #8521, which is an actuated signal but not coordinated with other signals. It has a single ring, and B-type algorithm.

Table-2.28: Test Network Signalized Node Table

NODE	TYPE	PLAN	OFFSET	STARTTIME	COORDINATR	RING	ALGORITHM	NOTES
14141	T	1	0	ALL00:00	14141	S		
8521	A	2	0	ALL18:00	8521	S	B	
8521	A	3	0	WKD07:00	8521	S	B	

2.2.15 Phasing Plan Table

Entries in this table specify the phasing plans at an intersection, giving details about each phase such as the movement protection indicator, the number of detectors related to this movement, the incoming link and the outgoing link, as shown in Table-2.29. It should be noted that every incoming and outgoing link is controlled at the signalized node and is described in Table-2.29.

Table-2.29: Phasing Plan Table Format

Column Name	Description	Allowed Values
NODE	ID number of the node .	integer: 1 through 2,147,483,647
PLAN	ID number of the timing plan.	integer: 1 through 65,535
PHASE	Phase number.	integer: 1 through 255
INLINK	ID number of the incoming link.	integer: 1 through 2,147,483,647
OUTLINK	ID number of the outgoing link.	integer: 1 through 2,147,483,647
PROTECTION	Movement protection indicator.	one character: 'P' = protected 'U' = unprotected 'S' = unprotected after stop
DETECTORS	ID number of detectors related to this movement. This is required only for actuated controls.	String of detector Ids, separated by slashes
NOTES	Character string used for data quality annotations; free format (may be blank).	255 characters

Figure-2.33 highlights the signalized intersection at node #8521. As stated earlier, the signal at this node is actuated. It has two plans, plan 2 and plan 3. Each plan is divided into phases. Plan 2, for example, is composed of 2 phases, while plan 3 is composed of three phases as shown in Table-2.30. The two phases of plan 2 have no protected movements "U" and are controlled by detectors with IDs 6001 to 6006. The incoming links #9705, #9706, #12407 and #9704 have three unprotected movements straight, right and left respectively. The incoming links and the outgoing links for this plan and this phase are also stated in Table-2.30. The different entries and their corresponding meaning for phase 1 of plan 2 at this intersection are illustrated in the table below Figure-2.33.

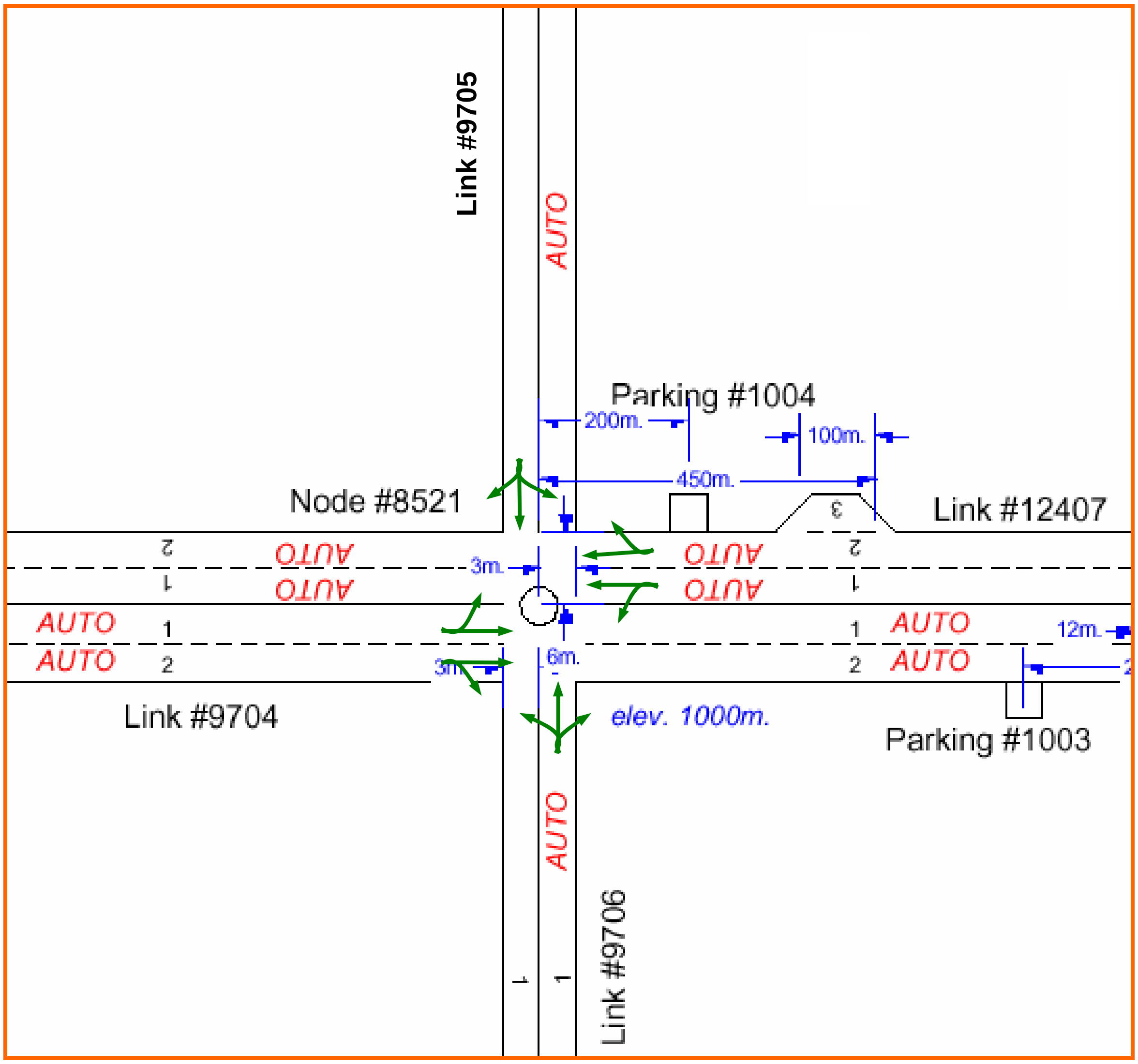


Figure-2.33: Part of the Test Network Showing the Phasing Plan 2 of the Signalized Intersection at Node #8521

Node ID	Plan ID	Phase number	ID of Inlink	ID of Outlink	Movement protection	Detectors	Notes
8521	2	1	9705	9704	U	6006	
8521	2	1	9705	9706	U	6006	
8521	2	1	9705	12407	U	6006	
8521	2	1	9706	9705	U	6003	
8521	2	1	9706	12407	U	6003	
8521	2	1	9706	9704	U	6003	

The overall phasing strategy for the signalized intersection at node #8521 is shown in Figure-2.34, which facilitates the understanding of the phasing movements.

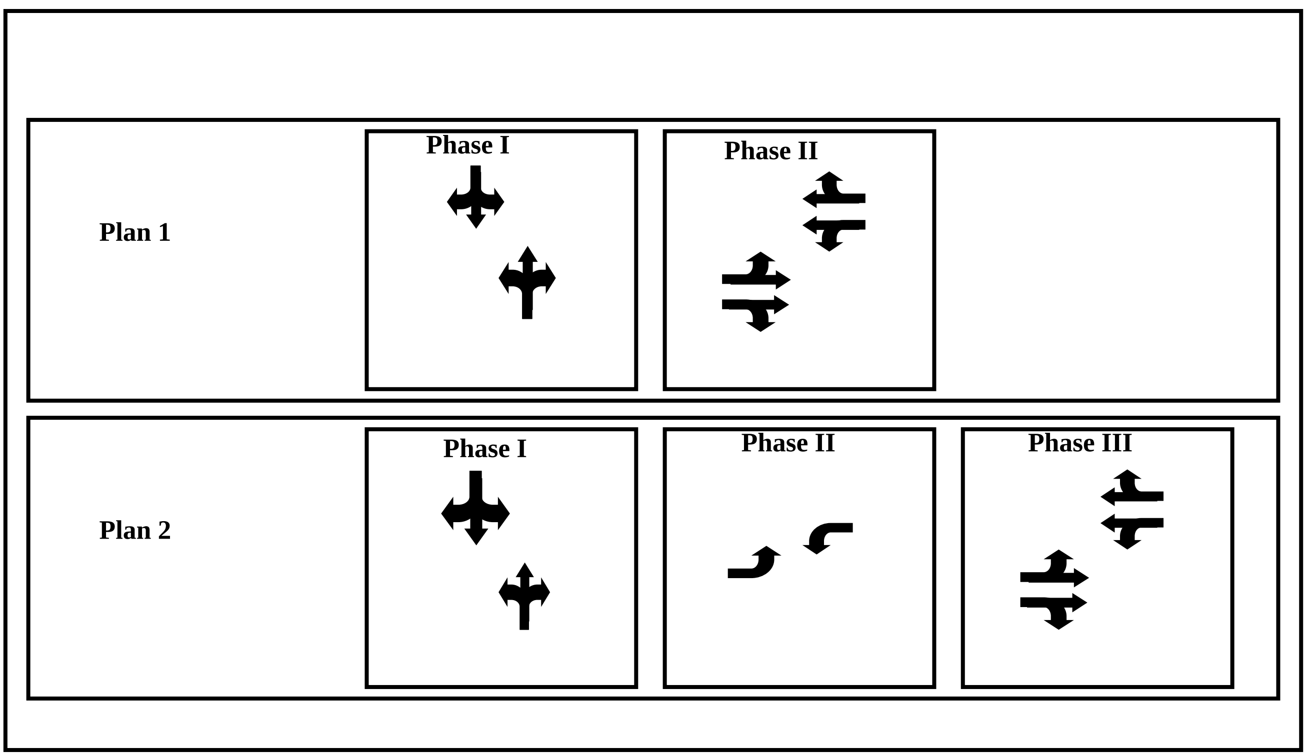


Figure-2.34: Phasing Plan at Signalized Node #8521

The Phasing Plan Table for the Test Network described in Figure-2.3 is shown in Table-2.30. As can be seen in the Table, the phasing plan is given for both nodes 14141 and 8521 for all the phases.

Table-2.30: Test Network Phasing Plan Table

NODE	PLAN	PHASE	INLINK	OUTLINK	PROTECTION	DETECTORS	NOTES
14141	1	1	11487	11495	U	0	
14141	1	1	11487	28800	P	0	
14141	1	1	11495	11487	U	0	
14141	1	1	11495	11486	P	0	
14141	1	1	11486	11487	S	0	
14141	1	1	28800	11495	S	0	
14141	1	2	11487	28800	P	0	
14141	1	2	11495	11486	P	0	
14141	1	2	11486	11495	P	0	
14141	1	2	28800	11487	P	0	
14141	1	2	28800	11495	S	0	
14141	1	2	11486	11487	S	0	
14141	1	3	11487	28800	P	0	
14141	1	3	28800	11487	P	0	
14141	1	3	28800	11486	U	0	
14141	1	3	28800	11495	P	0	
14141	1	3	11495	11486	S	0	
14141	1	3	11486	11487	S	0	
14141	1	4	11487	28800	P	0	
14141	1	4	11486	11495	U	0	
14141	1	4	11486	28800	U	0	
14141	1	4	11486	11487	P	0	
14141	1	4	28800	11486	U	0	
14141	1	4	28800	11495	P	0	
14141	1	4	11495	11486	S	0	
14141	1	5	11487	11486	P	0	
14141	1	5	11487	28800	P	0	
14141	1	5	11495	28800	P	0	
14141	1	5	11495	11486	S	0	
14141	1	5	11486	11487	P	0	
14141	1	5	28800	11495	P	0	
14141	1	6	11487	28800	P	0	
14141	1	6	11495	28800	P	0	
14141	1	6	11495	11487	U	0	
14141	1	6	11495	11486	P	0	
14141	1	6	11486	11487	S	0	
14141	1	6	28800	11495	P	0	
8521	2	1	9705	9704	U	6006	
8521	2	1	9705	9706	U	6006	
8521	2	1	9705	12407	U	6006	
8521	2	1	9706	9705	U	6003	
8521	2	1	9706	12407	U	6003	
8521	2	1	9706	9704	U	6003	
8521	2	2	12407	9704	U	6004/6005	
8521	2	2	12407	9705	U	6005	
8521	2	2	12407	9706	U	6004	

Table-2.30: Test Network Phasing Plan Table (Contd.)

8521	2	2	9704	12407	U	6001/6002	
8521	2	2	9704	9705	U	6001	
8521	2	2	9704	9706	U	6002	
8521	3	1	9705	9704	U	6006	
8521	3	1	9705	9706	U	6006	
8521	3	1	9705	12407	U	6006	
8521	3	1	9706	9705	U	6003	
8521	3	1	9706	12407	U	6003	
8521	3	1	9706	9704	U	6003	
8521	3	2	12407	9706	P	6004	
8521	3	2	9704	9705	P	6001	
8521	3	3	12407	9704	U	6004/6005	
8521	3	3	12407	9705	U	6005	
8521	3	3	12407	9706	U	6004	
8521	3	3	9704	12407	U	6001/6002	
8521	3	3	9704	9705	U	6001	
8521	3	3	9704	9706	U	6002	

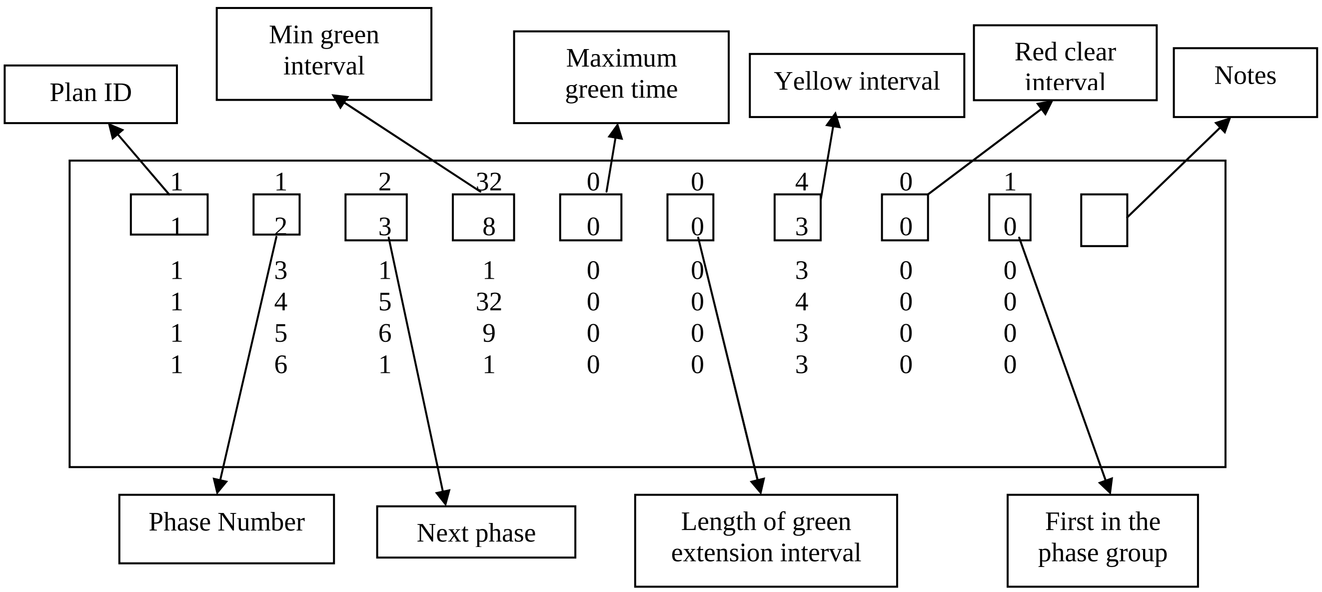
2.2.16 Timing Plan Table

Entries in this table, as shown in Table-2.31, supply information such as the phase number, phasing plan, next phase, minimum and maximum green time allowed, length of green extension interval and amber time. It should be noted that the user should verify that the (plan, phase) pairs are unique, the time values entered in the table are consistent, and the phase sequence references existent phases.

Table-2.31: Timing Plan Table Format

Column Name	Description	Allowed Values
PLAN	ID number of a timing plan.	integer: 1 through 65,535
PHASE	Phase number.	integer: 1 through 255
NEXTPHASES	Phase number(s) of the next phase(s) in sequence.	string of phase numbers, separated by slashes
GREENMIN	Minimum length (in seconds) of the green interval, or fixed green length for timed signal.	non-negative floating-point number
GREENMAX	Maximum length (in seconds) of the green interval.	non-negative floating-point number
GREENEXT	Length (in seconds) of the green extension interval.	non-negative floating-point number
YELLOW	Length (in seconds) of the yellow interval.	non-negative floating-point number
REDCLEAR	Length (in seconds) of the red clearance interval.	non-negative floating-point number
GROUPFIRST	For pre-timed or single ring: 1 if first phase, 0 if not first phase; for dual ring: number of phase group for which this phase is first phase, 0 if not first phase in the phase group.	integer: 0 through 255
NOTES	Character string used for data quality annotations; free format (may be blank).	255 characters

An example of the timing plan for the fixed time signal at node #14141 is shown below. This signal has a plan ID #1 and has six phases. The green on phase 1 lasts for 35 seconds with an amber time of 4 seconds, followed by phase 2 which has a green time of 5 seconds and amber time of 3 seconds. Phase 3 follows with a green time of 8 seconds and an amber time of 3 seconds. Phase 4 comes next with a green time of 32 seconds and an amber time of 4 seconds, followed by phase 5 with green time of 9 seconds and an amber time of 3 seconds. The last of the phasing cycle is phase 6 with 1 second of green time and an amber time of 3 seconds.



The Timing Phase Plan Table for the Test Network described in Figure-2.3 is listed in Table-2.32.

Table-2.32: Test Network Timing Phase Plan Table

PLAN	PHASE	NEXT PHASES	GREEN MIN	GREEN MAX	GREEN NEXT	YELLOW	RED CLEAR	GROUPFIRST	NOTES
1	1	2	35	0	0	4	0	1	
1	2	3	5	0	0	3	0	0	
1	3	4	8	0	0	3	0	0	
1	4	5	32	0	0	4	0	0	
1	5	6	9	0	0	3	0	0	
1	6	1	1	0	0	3	0	0	
2	1	2	12	30	4	3	0	1	
2	2	1	10	40	4	3	0	0	
3	1	2	12	30	4	3	1	1	
3	2	3	4	8	2	3	0	0	
3	3	1	10	20	4	3	1	0	

2.2.17 Detector Table

Every detector placed on the network which is not associated with a signalized intersection is coded in the Detector Table and is given a unique identifier. The Detector Table consists of data such as location of the detector, offset distance from node, length, style and other information as shown in Table-2.33.

Table-2.33: Detector Table Format

Column Name	Description	Allowed Values
ID	ID number of the detector.	Integer: 1 through 2,147,483,647
NODE	ID number of the node toward which vehicles are traveling.	Integer: 1 through 2,147,483,647
LINK	ID number of the link on which the detector lies.	Integer: 1 through 2,147,483,647
OFFSET	Starting position of the detector, measured (in meters) from NODE.	Non-negative floating-point number
LANEBEGIN	Lane number of lane at which the detector begins.	Integer: 1 through 255
LANEEND	Lane number of lane at which the detector ends, equal to LANEBEGIN for detector that lies on single lane.	Integer: 1 through 255
LENGTH	Length of the detector (in meters).	Non-negative floating-point number
STYLE	Type of the detector.	Ten characters: ‘PRESENCE’ = sense vehicles on detector ‘PASSAGE’ = sense vehicles crossing detector
COORDINATR	ID number of coordinators interested in detector output.	String of coordinator Ids separated by slashes
NOTES	Character string used for data quality annotations; free format (may be blank).	255 characters

Three detectors are placed on the Test Network outside the signalized intersections. They are all located around node #14142, as shown in Figure-2.35. One of them is on link #2753 (lane 1) going towards Node #14242. The detector #5001 is placed at 350 meters from Node #14242 and is 3 meters in length. This detector senses vehicles crossing the detector ("PASSAGE" type), and is connected to the coordinator ID #1000. The table format for the detector and its explanation is shown below.

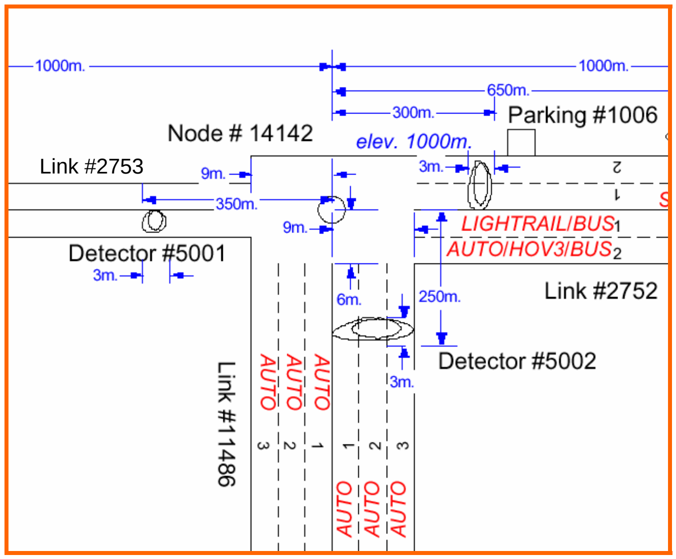
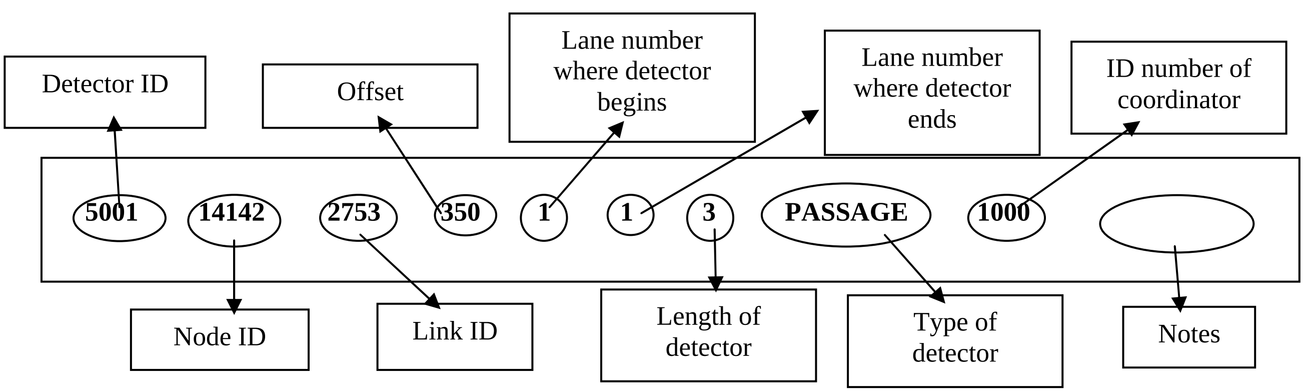


Figure-2.35: Part of the Test Network Showing a Detector



As mentioned earlier, the Test Network has three detectors and their formats are shown in Table-2.34.

Table-2.34: Test Network Detector Table

ID	NODE	LINK	OFFSET	LANEBEGIN	LANEEND	LENGHT	STYLE	COORDINATR	NOTES
5001	14142	2753	350	1	1	3	PASSAGE	1000	
5002	14142	11486	250	1	3	3	PRESENCE	1000	
5005	14142	2752	300	1	2	3	PASSAGE	1000	

2.2.18 Signal Coordinator Table

The Signal Coordinator Table, as shown in Table-2.35, provides information to the Microsimulator about the type of the coordinator and the control algorithm that will be used by the coordinator. It also includes an extra field with a free format that could be used for data quality annotations.

Table-2.35: Signal Coordinator Table Format

Column Name	Description	Allowed Values
ID	ID number of the signal coordinator.	integer: 1 through 2,147,483,647
TYPE	Type of coordinator.	ten characters: values to be determined
ALGORITHM	Control algorithm used by coordinator.	ten characters: values to be determined
NOTES	Character string used for data quality annotations; free format (may be blank).	255 characters

There is no signal coordination in the Test Network.

2.2.19 Study Area Link Table

This table specifies if the link is within the study area "N" or is in the buffer area "Y" outside the study area, as shown in Table-2.36. This table is optional. If it is not referenced in the configuration file, then all the links are assumed to be in the study area.

Table-2.36: Study Area Link Table Format

Column Name	Description	Allowed Values
ID	ID number of the link.	integer: 1 through 2,147,483,647

BUFFER	Whether the link is in the buffer area or the study area.	one character: 'Y' = in buffer area 'N' = in study area
NOTES	Character string used for data quality annotations; free format (may be blank).	255 characters

The Study Area Link Table for the Test Network shown in Figure-2.3 is shown in Table-2.37. It is interesting to note that the buffer links include all the boundary links for the Test Network. It is on the boundary links that the light rail and the bus systems operate.

Table-2.37: Test Network Study Area Buffer Table

ID	BUFFER	NOTES
9704	N	
9705	N	
9706	N	
11486	N	
11487	N	
11495	N	
12384	N	
12407	N	
28800	N	
28804	N	
2759	Y	
2750	Y	
2751	Y	
2752	Y	
2753	Y	
2755	Y	
2754	Y	
2756	Y	
2757	Y	
2758	Y	

2.3 Transit Data Files

The Transit Data required by TRANSIMS deals with the route paths of transit vehicles in the network, the schedule of stops, the transit driver plans, and the vehicle properties. These files are highlighted below and the format of these files is provided with examples. The transit stop table which defines the location of bus stops on the links was provided in 2.2.7.

2.3.1 Transit Route File Data Format

An ASCII text file, the Transit Route File has fields that are separated by white space [e.g., space(s), tab(s), or new line(s)]. The column names are currently not part of the route files. Table-2.38 lists the transit route file data definitions and format.

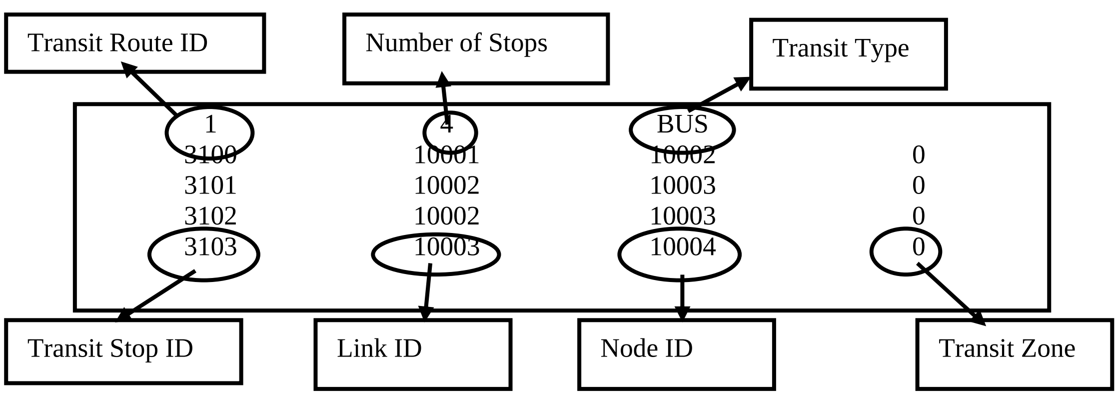
Table-2.38: Transit route file data definitions and format

Column Name	Description	Allowed Values
`Transit Route ID`	A unique identifier for this route.	integer
`Number of Stops`	The number of transit stops to follow.	integer

`Transit Type`	The type of transit vehicle serving this route.	`BUS`
		`TROLLEY`
		`STREETCAR`
		`LIGHTRAIL`
		`RAPIDRAIL`
		`REGIONALRAIL`

`Transit Stop ID`	The ID of the transit stop.	integer
`Link ID`	The ID of the link on which the transit stop resides.	integer
`Node ID`	The ID of the node toward which the vehicle is heading.	integer
`Transit Zone`	The ID of the zone in which the transit stop is located (or 0 if the cost is not zone based).	integer

Given below is a typical route data file and how it is interpreted.




```
1 4 BUS
3100 10001 10002 0
3101 10002 10003 0
```

3102 10002 10003 0
3103 10003 10004 0
2 4 BUS
3003 10003 10003 0
3002 10002 10002 0
3001 10002 10002 0
3000 10001 10001 0

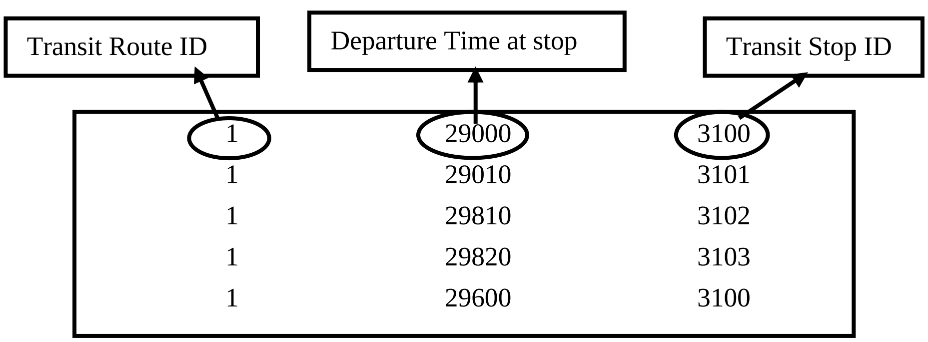
2.3.2 Transit Schedule and Format

This file, as shown in Table-2.39, contains information on each transit route including details about the transit departure time from each stop on the route.

Table-2.39: Transit schedule file data definitions and format

Column Name	Description	Allowed Values
`Transit Route ID`	A unique identifier for this route.	integer
`Time`	The departure time at the stop.	integer: seconds since midnight
`Transit Stop ID`	The ID of this transit stop, as specified in the network data tables.	integer

A typical file with interpretation of the fields is listed below.



2.3.3 Transit Zone File Format

This table defines the zones in which the transit trip begins and ends, including the cost of the transit trip in cents.

Table 2.40: Transit zone file data definitions and format

Column Name	Description	Allowed Values
From Zone	The zone in which the transit trip begins	integer
To Zone	The zone in which the transit trip ends.	integer
Transit Type	The type of transit to which the cost is applicable	BUS TROLLEY STREETCAR LIGHTRAIL RAPIDRAIL REGIONALRAIL
Cost	The cost of the transit trip, in cents	integer

2.3.4 Driver Plan File

This file contains the plans for each bus driver and it is similar to any other vehicle plan file except that this bus driver stops in each bus stop to pick up and drop off passengers. Following is an example of the Driver Plan File.

Driver Plan	**Dscription**
300000 101 1 1 27600 10000 2 10001 2 840 27600 1 0 0 1 1 5 12 300000 1 10 9 8 7 6 5 44 4 3 2 201 1001 27600 1002 27660 1003 27720 1004 27780 1005 27790 1006 27800 1007 27810 1008 27820 1009 27830 1010 27840 1011 27870 1012 27900	Driver #300000 with user field 101, trip id 1, and leg id 1, starts the trip 27600 seconds after midnight from Bus Parking #1000 to Bus Parking#10001 with accessory type 2. The trip mode is 1 (transit) with DriverFlag=1 Vehicle Type is 5 (Bus), Vehicle ID=300000 Bus Route=1. It Passes through stops 1001,1002,…,1012 at 27600, 27660,…,27900 seconds after midnight, respectively.