

LinkSum (version 4.0.32)

Revision History

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Created by Volpe Center

The LinkSum program summarizes link volumes, speeds, and volume-to-capacity ratios from simulator or router output. Additional capabilities include reporting lane volumes and summing volumes for a user-defined group of links. LinkSum can be used to

1. Generate link data files of volumes, speeds, travel times, V/C ratios, travel time ratios, delay, average density, maximum density, average queue, maximum queue, and cycle failures summarized by time of day;
2. Summarize data within a subarea polygon or for specified facility types;
3. Summarize link data by zone or zone group found in the activity location file;
4. Summarize activity location data fields by link direction;
5. Report the links with the top 100 link volumes, lane volumes, period volumes, speed reductions, V/C ratios, travel time ratios, volume changes, or travel time changes;
6. Report the link groups with total volumes greater than user specified values;
7. Report the distribution of travel time, V/C ratio, travel time change, and volume change by lane kilometer and time period;
8. Select links to output using a link equivalence file;
9. Calculate congestion duration-based measures by aggregating time periods with time ratios greater than a specified value; and
10. Report various network performance statistics.

LinkSum is a console-based program that runs in a command window on either Windows or Linux. The command syntax is:

```
LinkSum [-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:

-Q[uiet]	= execute without screen messages
-H[elp]	= show program syntax and control keys
-K[eyCheck]	= list unrecognized control file keys
-P[ause]	= pause before exiting
-N[oPause]	= never pause before exiting
-B[atch]	= execute in batch processing mode

The program automatically creates a printout file based on the control_file name. If the file name includes an extension, the extension is removed and “.prn” is added. The printout file will be created in the current working directory and will overwrite an existing file with the same name.

Control File Examples

EXAMPLE 1

```

TITLE                               Summarize Links

# ---- Input Files ----

#NET_DIRECTORY                      ../network
NET_LINK_TABLE                      Link.txt
NET_NODE_TABLE                      Node.txt
LINK_DELAY_FILE                     Link_Delay_Current.txt
LINK_DELAY_FORMAT                   TAB_DELIMITED
SUMMARY_TIME_PERIODS                7:00..9:00
SUMMARY_TIME_INCREMENT              60
MINIMUM_LINK_VOLUME                 1

# ---- Output Files ----
NEW_LINK_VOLUME_FILE                LinkSumVolume1.txt
NEW_LINK_SPEED_FILE                 LinkSumSpeed1.txt
NEW_LINK_TRAVEL_TIME_FILE           LinkTravelTime.txt
NEW_LINK_VC_RATIO_FILE              LinkVC.txt
NEW_LINK_TIME_RATIO_FILE            LinkTimeRatio.txt

LINKSUM_REPORT_1                    NETWORK_PERFORMANCE_SUMMARY
LINKSUM_REPORT_3                    TOP_100_LINK_VOLUMES
LINKSUM_REPORT_4                    TOP_100_LANE_VOLUMES
LINKSUM_REPORT_5                    TOP_100_PERIOD_VOLUMES
LINKSUM_REPORT_6                    TOP_100_SPEED_REDUCTIONS
LINKSUM_REPORT_7                    TOP_100_TRAVEL_TIME_RATIOS
LINKSUM_REPORT_8                    TOP_100_VOLUME_CAPACITY_RATIOS
LINKSUM_REPORT_9                    VOLUME_CAPACITY_RATIOS
LINKSUM_REPORT_10                   LINK_VOLUME_GREATER_THAN_1500
LINKSUM_REPORT_11                   TRAVEL_TIME_DISTRIBUTION

```

The control key specifications defined above will generate five separate files containing 60-minute aggregate statistics of the volumes, speeds, travel times, volume-to-capacity ratios, and ratio of simulated travel times to free-flow travel times. In this example, only two time periods will be reported: 7-8 AM and 8-9 AM. These files can be joined with the link file in ArcGIS so that the data can be displayed on maps.

In addition, summary reports are generated according to the LINKSUM_REPORT_* keys and included in the "LinkSum.prn" file.

EXAMPLE 2

```

TITLE                               Compare Two Link Delay Files

# ---- Input Files ----

#NET_DIRECTORY                      ../network
NET_LINK_TABLE                      Link.txt
NET_NODE_TABLE                      Node.txt
LINK_DELAY_FILE                     Link_Delay_Current.txt
LINK_DELAY_FORMAT                   TAB_DELIMITED

```

PREVIOUS_LINK_DELAY_FILE	Link_Delay_Previous.txt
PREVIOUS_LINK_DELAY_FORMAT	TAB_DELIMITED
SUMMARY_TIME_PERIODS	7:00..9:00
SUMMARY_TIME_INCREMENT	60
MINIMUM_LINK_VOLUME	1
LINKSUM_REPORT_1	NETWORK_PERFORMANCE_SUMMARY
LINKSUM_REPORT_2	NETWORK_PERFORMANCE_DETAILS
LINKSUM_REPORT_3	TOP_100_TRAVEL_TIME_CHANGES
LINKSUM_REPORT_4	TOP_100_VOLUME_CHANGES
LINKSUM_REPORT_5	TRAVEL_TIME_CHANGES
LINKSUM_REPORT_6	VOLUME_CHANGES
LINKSUM_REPORT_7	RELATIVE_GAP_REPORT

This control file will generate a series of reports that compare the current and previous link delay files. The files will be compared on the basis of hourly data. Only the time periods 7-8 AM and 8-9 AM will be compared and reported.

EXAMPLE 3

```

TITLE                               Custom Link Direction and Data Files

# ---- Input Files ----

#NET_DIRECTORY                      ../network
NET_LINK_TABLE                      Link.txt
NET_NODE_TABLE                      Node.txt
NET_ACTIVITY_LOCATION_TABLE         Activity_Location.txt
NET_LANE_CONNECTIVITY_TABLE         Lane_Connectivity.txt
LINK_DELAY_FILE                     Link_Delay_Current.txt
LINK_DELAY_FORMAT                   TAB_DELIMITED
SUMMARY_TIME_PERIODS                7:00..9:00
SUMMARY_TIME_INCREMENT              60
CONGESTED_TIME_RATIO                1.5
#ACTIVITY_LOCATION_FIELDS           USER_FIELD

# ---- Output Files ----
NEW_LINK_DIRECTION_FILE_1           LinkDirectionA.txt
NEW_LINK_DIRECTION_FIELD_1          CONGESTED_VHT
NEW_LINK_DIRECTION_INDEX_1          TRUE
NEW_LINK_DIRECTION_FORMAT_1         TAB_DELIMITED

NEW_LINK_DIRECTION_FILE_2           LinkDirectionB.txt
NEW_LINK_DIRECTION_FIELD_2          CONGESTED_VHT
#NEW_LINK_DIRECTION_INDEX_2         FALSE
#NEW_LINK_DIRECTION_FORMAT_2        TAB_DELIMITED

NEW_LINK_DATA_FILE_1                LinkDataA.txt
NEW_LINK_DATA_FIELD_1               CONGESTED_VHT
NEW_LINK_DATA_FORMAT_1              TAB_DELIMITED

LINKSUM_REPORT_1                    NETWORK_PERFORMANCE_SUMMARY

```

This example generates custom files with congested VHT, and demonstrates the use of the NEW_LINK_DIRECTION_ and NEW_LINK_DATA_ keys. The output data will be reported hourly. Only the time periods 7-8 AM and 8-9 AM will be reported.

EXAMPLE 4

```

TITLE                               Some other Features

# ---- Input Files ----

#NET_DIRECTORY                      ../network
NET_LINK_TABLE                      Link.txt
NET_NODE_TABLE                      Node.txt
NET_ACTIVITY_LOCATION_TABLE         Activity_Location.txt
NET_LANE_CONNECTIVITY_TABLE        Lane_Connectivity.txt
LINK_DELAY_FILE                     Link_Delay_Current.txt
LINK_DELAY_FORMAT                   TAB_DELIMITED
SUMMARY_TIME_PERIODS                7:00..9:00
SUMMARY_TIME_INCREMENT              60
ACTIVITY_LOCATION_FIELDS            USER_FIELD

# ---- Output Files ----
NEW_LINK_ACTIVITY_FILE               LinkActivity.txt
NEW_ZONE_TRAVEL_FILE                 ZoneTravel.txt

LINKSUM_REPORT_1                     NETWORK_PERFORMANCE_SUMMARY

```

This example demonstrates the LinkActivity and ZoneTravel outputs. In it, the Activity_Location.txt file has a column called USER_FIELD, which contains numbers. The output data will be reported hourly. Only the time periods 7-8 AM and 8-9 AM will be reported.

Control File Parameters

Control parameters are defined using a control key followed by a string or number. The control parameters can be specified in any order. If a given key is defined more than once, the last instance of the key is used. Note that comment lines or extraneous keys can be included in the file. They will be ignored by the program.

The keys recognized by the **LinkSum** program are listed below. These keys can be defined in a variety of different ways to perform different tasks.

A number of output examples are presented in graphs later in this document. Unless otherwise specified, they use the parameters as stated in Example 1, above.

Required Keys**NET_LINK_TABLE**

The link table key is required. It specifies the name of the TRANSIMS link file within the network directory. The full path and file name for the link table is constructed by appending the value of this key to the value of the NET_DIRECTORY key.

NET_NODE_TABLE

The node table key is required. It specifies the name of the TRANSIMS node file within the network directory. The full path and file name for the node table is constructed by appending the value of this key to the value of the NET_DIRECTORY key.

LINK_DELAY_FILE

The link delay file key is required. It specifies the name of the TRANSIMS link_delay or performance file. The program automatically detects which format (link_delay or performance) is provided. Normally the performance file from the Microsimulator is input to LinkSum to generate performance statistics.

Optional Keys**TITLE**

Any text string can be used on this line. This text is printed on the top of each output page.

REPORT_FILE

The report file name is optional. If a file name is not provided, the program automatically creates a report file name based on the input control file name plus the partition number. The report file will overwrite an existing file with the same name if the Report Flag key is False or not specified.

REPORT_FLAG

The report flag key is optional. If it is specified as Yes or True, the report file or default printout file will be opened in 'Append' mode rather than 'Create' mode. This permits the user to consolidate the output of several programs into a single report file.

MAX_WARNING_MESSAGES

When the program generates a warning message, a counter is incremented and the total number of warning messages is reported and a warning return coded (2) is set at the end of the execution. By default the program prints up to 100,000 warning messages to the print-out file. If more than 100,000 warning messages are sent, the program stops printing additional messages to the file or terminates the program with an error message.

MAX_WARNING_EXIT_FLAG

If the maximum number of warning messages is exceeded, this flag directs the program in what to do. If the flag is TRUE (the default), the program is terminated with an error message about the warning messages. If the flag is FALSE, the program continues execution, but no additional warning messages are sent to the screen or written to the printout file. The warning message counter continues to count the messages and reports the total at the end of the execution.

PROJECT_DIRECTORY

The project directory key is not required. If it is specified, it is added to all non-network file names required by the program. If it is not specified, all non-network file names should fully specify the file path.

DEFAULT_FILE_FORMAT

Default format for files other than network files. Default is VERSION3. Other possible values include BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL and SQLITE3.

NET_DIRECTORY

The network directory key is not required. If it is specified, it is added to all network table names. If it is not specified, the network table names should fully specify the file path.

NET_LANE_USE_TABLE

The network lane use table key is optional. It specifies the name of the TRANSIMS lane use file within the network directory. The full path and file name for the lane use table is constructed by appending the value of this key to the value of the NET_DIRECTORY key. The LANE_USE table is used for reporting lane level data.

NET_LANE_CONNECTIVITY_TABLE

The network lane connectivity table key is optional, but is required if the number of turns is to be reported in the output reports. It specifies the name of the TRANSIMS lane connectivity file within the network directory. The full path and file name for the lane connectivity table is constructed by appending the value of this key to the value of the NET_DIRECTORY key.

NET_ACTIVITY_LOCATION_TABLE

The activity location table key is optional. It specifies the name of the TRANSIMS activity location file within the network directory. The full path and file name for the activity location table is constructed by appending the value of this key to the value of the NET_DIRECTORY key. If LinkSum is being used to summarize activities along a link (see New_Link_Activity_File and Activity_Location_Fields, below) then the ACTIVITY_LOCATION_FILE is required.

PREVIOUS_LINK_DELAY_FILE

If two link delay files are being compared, this is the name of the previous link delay file.

SUMMARY_TIME_PERIODS

Defaults to All time periods. A Time Range (e.g., 0:00..6:00, 18:00..23:00) can be entered.

SUMMARY_TIME_INCREMENTS

Defaults to 0 minutes, with a range of 0 to 240 minutes. Zero is used to process each time period in the input link delay file (typically, 15 minutes) as one increment.

MINIMUM_LINK_VOLUME

Links and time periods with less than this number of vehicles will be excluded from summaries and reports. Defaults to 2.

CONGESTED_TIME_RATIO

The threshold of travel time ratios (actual travel time / free flow travel time) that determines whether a link is congested. The default is 3.0. A value of 0 disables the congestion calculations. Values greater than 1 enable the congestion calculations, and the maximum is 10.0. When congestion calculations are enabled, the CONGESTED_VMT, CONGESTED_VHT, and CONGESTED_TIME fields are available for reporting in link data files (NEW_LINK_DIRECTION_FIELD_* and NEW_LINK_DATA_FIELD_*). The reported values represent VMT, VHT, and travel time, respectively, occurring under congested conditions as defined by this parameter.

SELECT_FACILITY_TYPES

One or more facility types, separated by commas. Defaults to ALL. Facility types include FREEWAY, EXPRESSWAY, PRINCIPAL, MAJOR, MINOR, COLLECTOR, LOCAL, FRONTAGE, RAMP, BRIDGE, EXTERNAL, XPRESSWAY, PRIARTER, SECARTER, ZONECONN, OTHER, WALKWAY, BIKEWAY, BUSWAY, LIGHTRAIL, HEAVYRAIL, FERRY. If used, will restrict reporting to only the listed facility types.

SELECT_SUBAREA_POLYGON

A subarea polygon, used to select certain links for reporting.

SELECT_BY_LINK_GROUP

Used to select links in a certain link group. Link groups are defined in the LINK_EQUIVALENCE_FILE. If SELECT_BY_LINK_GROUP is True, then only links included in the link equivalence file are included in the summary reports and output files.

DEFAULT_OUTPUT_FORMAT

Default format for output files. See DEFAULT_FILE_FORMAT for available options.

NEW_LINK_ACTIVITY_FILE

File that, for each link, contains the sum of selected fields (from ACTIVITY_LOCATION_FIELDS) for that link's activity locations.

ACTIVITY_LOCATION_FIELDS

List of fields from the activity location file that will be considered in creating the NEW_LINK_ACTIVITY_FILE. Required if a new link activity file is being generated.

NEW_ZONE_TRAVEL_FILE

Provides vehicle miles (M) and vehicle hours (H) of travel out of each zone.

ZONE	M700_800	H700_800	M800_900	H800_900
1	98.05	5.11	116.20	6.38
10	2717.86	191.84	3303.44	321.60
11	0.00	0.00	0.00	0.00
12	418.48	6.52	506.27	8.13
13	1133.59	167.96	1364.15	305.59
14	96.56	3.53	118.93	4.36

NEW_GROUP_TRAVEL_FILE

Undocumented

ZONE_EQUIVALENCE_FILE

The zone equivalence file is a tab, space, or comma-delimited ASCII file with special format rules. A sample equivalence file is shown below.

```

1 0 Portland CBD - 1
1 1 1..16
2 0 West Suburbs - 2
2 1 79..307, 1248..1253
3 0 Southwest Suburbs - 3
3 1 308..403, 931..933
4 0 Southeast Suburbs - 4
4 1 404..557, 934..943, 1254..1258
5 0 East Portland - 5
5 1 561..563, 714..721, 731..738, 763..929, 949..961, 963..969
6 0 East Suburbs - 6
6 1 558..560, 564..713, 722..730, 739..762, 1259..1260
7 0 West Portland - 7
7 1 17..78, 930, 944..948, 962, 1247
8 0 Clark County - 8
8 1 970..1246

```

If the file contains a header record, it is ignored by the software. The first integer on each subsequent record is the district or zone group number. This number is followed by an index number that is used to associate multiple records with a given district. If the index number is zero, the software interprets everything that follows the index number as the district label. The first 25 characters of the label are printed in reports.

If the index number is not zero, the values that follow are interpreted as a range of zone numbers. Individual zone numbers and ranges of zone numbers can be specified on a given record. A range of zone numbers is specified using the first and last number in the sequence connected by two or more periods. For example, '79..307' represents all of the zone numbers between 79 and 307.

NEW_LINK_DIRECTION_FILE_*

Name of a file to be populated with directional link information. Each direction of two-way links is reported on a separate line. The information that is output is given by NEW_LINK_DIRECTION_FIELD_*.

NEW_LINK_DIRECTION_FIELD_*

The data to be reported in the NEW_LINK_DIRECTION_FILE_*. Options include VOLUME, TRAVEL_TIME, VC_RATIO, TIME_RATIO, SPEED, DELAY, DENSITY, MAX_DENSITY, QUEUE, MAX_QUEUE, CYCLE_FAILURE, VEH_METERS or VEH_SECONDS. CONGESTED_VMT, CONGESTED_VHT, and CONGESTED_TIME options are also available if the CONGESTED_TIME_RATIO key is not 0.0.

For example, the following parameters (the “2” could be any integer)

```
NEW_LINK_DIRECTION_FILE_2      LinkDirectionB.txt
NEW_LINK_DIRECTION_FIELD_2     CONGESTED_VHT
```

will generate the following file

LinkDirectionB.txt

LINK	DIR	P700_800	P800_900
1	0	21104.7	31337.0
1	1	9560.0	24127.0
4	0	55087.0	101875.9
6	0	560.9	1583.7

NEW_LINK_DIRECTION_INDEX_*

True/false index (default is false) that indicates whether a LINKDIR field is added to the NEW_LINK_DIRECTION_FILE_*. Possible values include true, false, yes, no, 1, 0. If TRUE, the Link direction index is Link * 2 + Direction (0 for A_B and 1 for B_A)

For example, the following parameters (the “1” could be any integer)

```
NEW_LINK_DIRECTION_FILE_1      LinkDirectionA.txt
NEW_LINK_DIRECTION_FIELD_1     CONGESTED_VHT
NEW_LINK_DIRECTION_INDEX_1     TRUE
```

will generate the following file

LinkDirectionA.txt

LINKDIR	LINK	DIR	P700_800	P800_900
2	1	0	21104.7	31337.0
3	1	1	9560.0	24127.0
8	4	0	55087.0	101875.9
12	6	0	560.9	1583.7

NEW_LINK_DIRECTION_FORMAT_*

Format (default same as DEFAULT_OUTPUT_FORMAT) for the NEW_LINK_DIRECTION_FILE_*

NEW_LINK_DATA_FILE_*

Name of a file to be populated with directional link information. The information that is output is given by NEW_LINK_DATA_FIELD_*. Each link has a separate row, with the directions in AB_ and BA_ columns.

NEW_LINK_DATA_FIELD_*

The data that is placed in the NEW_LINK_DATA_FILE_*. Options include VOLUME, TRAVEL_TIME, VC_RATIO, TIME_RATIO, SPEED, DELAY, DENSITY, MAX_DENSITY, QUEUE, MAX_QUEUE, CYCLE_FAILURE, VEH_METERS or VEH_SECONDS. CONGESTED_VMT, CONGESTED_VHT, and CONGESTED_TIME options are also available if the CONGESTED_TIME_RATIO key is not 0.0.

For example, the following parameters (the “1” could be any integer)

```
NEW_LINK_DATA_FILE_1      LinkDataA.txt
NEW_LINK_DATA_FIELD_1     CONGESTED_VHT
```

will generate the following file:

LinkDataA.txt

LINK	ANODE	BNODE	AB_700_800	AB_800_900	BA_700_800	BA_800_900
1	12	22	21104.7	31337.0	9560.0	24127.0
4	22	23	55087.0	101875.9	0.0	0.0
6	25	23	560.9	1583.7	0.0	0.0

NEW_LINK_DATA_FORMAT_*

Format (default TAB_DELIMITED) for the NEW_LINK_DATA_FILE_*

NEW_LINK_VOLUME_FILE

Tab delimited file of link volumes. An example appears below:

LINK	ANODE	BNODE	AB_700_800	AB_800_900	BA_700_800	BA_800_900
1	12	22	585	707	591	724
2	10	24	1307	1565	0	0
3	10	21	0	0	1291	1585
4	22	23	664	803	319	399
5	23	24	663	804	0	0
6	25	23	319	398	0	0
7	22	15	478	596	622	764
8	24	28	1966	2368	0	0
9	29	21	1607	1954	0	0

NEW_LINK_SPEED_FILE

A file of speeds (m / s) on the links. An example appears below.

LINK	ANODE	BNODE	AB_700_800	AB_800_900	BA_700_800	BA_800_900
1	12	22	5.2	4.2	7.4	5.5
2	10	24	28.3	27.5	0.0	0.0
3	10	21	0.0	0.0	29.3	28.3
4	22	23	5.5	4.2	11.2	10.3
5	23	24	16.5	14.8	0.0	0.0
6	25	23	13.3	13.3	0.0	0.0
7	22	15	16.9	16.2	14.5	13.8
8	24	28	29.5	28.0	0.0	0.0
9	29	21	30.4	29.4	0.0	0.0

NEW_LINK_TRAVEL_TIME_FILE

A file of travel times (in seconds) on each link. An example appears below.

LINK	ANODE	BNODE	AB_700_800	AB_800_900	BA_700_800	BA_800_900
1	12	22	38.7	47.1	27.0	36.1
2	10	24	10.8	11.1	0.0	0.0
3	10	21	0.0	0.0	7.3	7.5
4	22	23	103.8	137.2	51.4	55.8
5	23	24	6.7	7.5	0.0	0.0
6	25	23	3.9	3.9	0.0	0.0
7	22	15	68.0	70.9	79.2	83.6
8	24	28	56.0	59.0	0.0	0.0
9	29	21	58.2	60.4	0.0	0.0

NEW_LINK_VC_RATIO_FILE

A file of volume / capacity ratios on each link.

LINK	ANODE	BNODE	AB_700_800	AB_800_900	BA_700_800	BA_800_900
1	12	22	0.97	1.18	0.98	1.21
2	10	24	0.33	0.39	0.00	0.00
3	10	21	0.00	0.00	0.32	0.40
4	22	23	1.11	1.34	0.53	0.67
5	23	24	0.66	0.80	0.00	0.00
6	25	23	0.32	0.40	0.00	0.00
7	22	15	0.30	0.37	0.39	0.48
8	24	28	0.49	0.59	0.00	0.00
9	29	21	0.40	0.49	0.00	0.00

NEW_LINK_TIME_RATIO_FILE

A file of time ratios on each link.

LINK	ANODE	BNODE	AB_700_800	AB_800_900	BA_700_800	BA_800_900
1	12	22	2.32	2.82	1.62	2.16
2	10	24	0.95	0.97	0.00	0.00
3	10	21	0.00	0.00	0.92	0.95
4	22	23	2.16	2.86	1.07	1.16
5	23	24	1.21	1.36	0.00	0.00
6	25	23	1.49	1.50	0.00	0.00
7	22	15	0.83	0.86	0.96	1.02
8	24	28	0.91	0.96	0.00	0.00
9	29	21	0.88	0.91	0.00	0.00

NEW_PERFORMANCE_DATA_FILE

This tab delimited file formats the Network Detail Report information for easy import into spreadsheet analysis software.

LINK_EQUIVALENCE_FILE

The new link equivalence file key is appended to the PROJECT_DIRECTORY key to specify the file name for the link equivalence file used by the program. It is used to set up groups of links (for example, screenlines). A sample file, along with a sketch of the network, is shown below. Screenline 1 is the dotted horizontal line crossing links 4 and 11, while Screenline 2 is the dotted vertical line crossing links 7, 8 and 9. Each link in the diagram has a link number and A-B orientation. Links 8 and 9 are one-way links; the others are two-way:

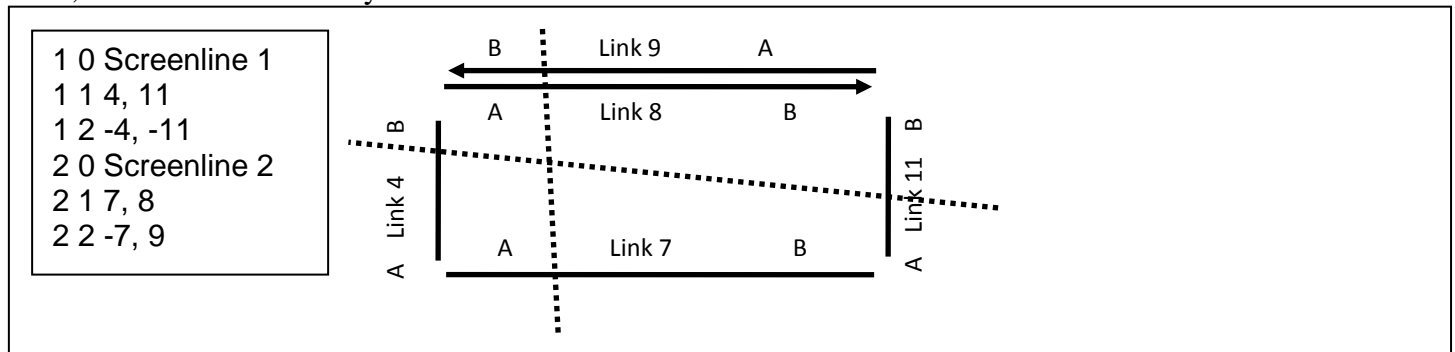


Figure 1 Link Equivalence File Used to Construct Screenlines

NET_DEFAULT_FORMAT

Default format for network files. The default file format is set by DEFAULT_FILE_FORMAT. Other options include VERSION3, BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL.

NET_*_FORMAT

The file format key enables the user to specify the input format for an input network file. Replace the * with any of the network file types: node, link, pocket_lane, etc. The default file format is set by NET_DEFAULT_FORMAT. Other options include VERSION3, BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL.

DEMAND_FILE_FORMAT

Undocumented

LINK_DELAY_FORMAT

Format for the input link delay file. Not necessary to provide if a valid definition file (.def) exists for the input link delay file.

PREVIOUS_LINK_DELAY_FORMAT

Format for the previous link_delay file. Not necessary to provide if a valid definition file (.def) exists for the previous link delay file.

NEW_DEFAULT_FORMAT

Default format for new output files. If not provided, the value of DEFAULT_FILE_FORMAT will be used. Options include VERSION3, BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL.

NEW_*_FORMAT

The file format key enables the user to specify the format for new file. Replace the * with any of the file types, link_direction, link_data, etc. The available options are NEW_DEFAULT_FORMAT. The format options include VERSION3, BINARY, FIXED_COLUMN, COMMA_DELIMITED, SPACE_DELIMITED, TAB_DELIMITED, CSV_DELIMITED, DBASE, LANL.

LINKSUM_REPORT_#

TOP_100_LINK_VOLUMES
 TOP_100_LANE_VOLUMES
 TOP_100_PERIOD_VOLUMES
 TOP_100_SPEED_REDUCATIONS
 TOP_100_TRAVEL_TIME_RATIOS
 TOP_100_VOLUME_CAPACITY_RATIOS
 TOP_100_TRAVEL_TIME_CHANGES
 TOP_100_VOLUME_CHANGES
 LINK_VOLUME_GREATER_THAN_* (3)
 GROUP_VOLUME_GREATER_THAN_* (3)
 PRINT_LINK_EQUIVALENCIES
 PRINT_ZONE_EQUIVALENCIES
 TRAVEL_TIME_DISTRIBUTION
 VOLUME_CAPACITY_RATIOS
 TRAVEL_TIME_CHANGES
 VOLUME_CHANGES
 LINK_GROUP_TRAVEL_TIME
 NETWORK_PERFORMANCE_SUMMARY
 NETWORK_PERFORMANCE_DETAILS

3) The “*” is replaced by an integer volume criteria (e.g., _GREATER_THAN_1000).

Examples of a few of these reports appear below¹:

Volume Change Distribution

Time Period	Volume Change * 100 / Previous Volume -----Percentile Distribution by Time Period-----									Lane KM
	50%	65%	70%	75%	80%	85%	90%	95%	99%	
7:00..8:00	0.5	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.3	24
8:00..9:00	1.6	1.7	1.7	1.7	2.0	2.3	2.4	2.4	2.6	24
Total	0.9	1.5	1.5	1.6	1.7	1.7	2.0	2.4	2.6	47

The Volume Change Distribution report is used to compare differences between iterations. The column header Lane KM refers to the lane kilometers available for traffic at a given time period. If you have lane-use restrictions by time of day, these values may be different. It also only includes the link if it has a previous link volume greater than or equal to the MINIMUM_LINK_VOLUME key. The number in the percentile table is the cumulative percent difference between the current and previous volume. For example, the 7-8 hour data indicates that 50% of the lane KM changed by 0.5% or less, 75% of the lane KM changed by 0.8% or less, 85% of the lane KM changed by 0.9% or less, and 99% of the lane KM changed by 1.3% or less (i.e., they do not add to 100 and should always increase). One way to use this table is to choose a percent of lane KM criteria (e.g., 90%) and iterate until the percent change is less than a predefined value (e.g., 5%). This would mean the convergence criterion is stated as: 90% of the lane miles have a change in volume of less than 5%.

Time Change Distribution

Time Period	Time Change * 100 / Previous Time -----Percentile Distribution by Time Period-----									Lane KM
	50%	65%	70%	75%	80%	85%	90%	95%	99%	
7:00..8:00	25.0	29.5	30.9	34.9	42.6	48.2	69.4	99.9	99.9	24
8:00..9:00	31.6	35.0	39.1	40.6	49.2	70.5	99.9	99.9	99.9	24
Total	29.5	34.5	35.0	40.6	48.2	63.0	99.9	99.9	99.9	47

The Time Change Distribution report is similar in structure to the Volume Change Distribution report. Since the output is from LinkSum, one must remember that it is links, and not trips, that are being compared. The report describes travel time changes by link. Reading the 7:00..8:00 line, and comparing link by link between iterations:

- Average travel time in this period was reduced by at least 50% on 25% of all links in use.
- Average travel time in this period was reduced by at least 35% on 29.5% of all links in use (i.e., the new average travel time was 65% or less than the previous average travel time on 29.5% of all links in use).
- Skipping to the 99% column: 99.9% of all links in use had a reduction in average travel time of at least 1% (i.e., the new average travel time was 99% or less than the previous average travel time on 99.9% of all links).

The reporting periods and intervals can be adjusted using the SUMMARY_TIME_PERIODS and SUMMARY_TIME_INCREMENT keys.

¹ We thank John Kerenyi and David Roden for providing much of the material for this section, primarily via an exchange on the TRANSIMS e-mail list.

Travel Time Distribution

	Loaded / Base Travel Time Ratio									
	-----Percentile Distribution by Time Period-----									Lane
Time Period	50%	65%	70%	75%	80%	85%	90%	95%	99%	KM
7:00..8:00	0.90	0.96	1.15	1.17	1.30	1.33	1.91	3.98	9.72	24
8:00..9:00	0.95	1.01	1.34	1.36	1.44	1.48	2.16	6.22	9.99	24
Total	0.95	1.01	1.15	1.30	1.34	1.48	2.16	3.98	9.72	47

Although similar in structure to Volume Change Distribution and Time Change Distribution, the Travel Time Distribution report does not report differences between iterations; rather, it reports congestion levels in the current iteration. Reading the 7:00..8:00 line:

- 50% of all links had a loaded/base travel time ratio of 0.95 or less. In other words, the travel time as predicted by the BPR formula (or equivalent) is 0.95 times the free-flow travel time or less.
- 80% of all links had a loaded/base travel time ratio of 1.30 or less; that is, the loaded travel times are roughly no more than 130% of the free-flow travel times.
- 99% of all links had a loaded/base travel time ratio of 9.72 or less.

Sample Printouts

Sample printout files generated by the LinkSum program are shown below. Each printout is an ASCII text file with a maximum of 95 characters per line and 65 lines per page. The file can be viewed or printed using a variety of text editors. For best results in a word processor, use a 10-point Courier font and 0.5 inch margins on all sides. In the examples, headings for reports have been reformatted to improve readability.

Example 1

```
*****
|                                     |
|           LinkSum - Version 4.0.32   |
|   Copyright (c) 2009 by AECOM Consult |
|           Tue Feb 08 08:24:28 2011  |
|                                     |
*****

Control File = LinkSum1.ct1
Report_File  = LinkSum1.prn (Create)

Summarize Links

Node File = Node.txt
Node File Format = TAB_DELIMITED
Link File = Link.txt
Link File Format = TAB_DELIMITED

Link Delay File = Link_Delay_Current.txt
Link Delay File Format = TAB_DELIMITED

Summary Time Periods = 7:00..9:00
Summary Time Increment = 60 minutes

Minimum Link Volume = 1 vehicles/period

Congested Time Ratio = 3.00 loaded time / free flow time

New Link Volume File = LinkSumVolume1.txt

New Link Speed File = LinkSumSpeed1.txt

New Link Travel Time File = LinkTravelTime.txt

New Link V/C Ratio File = LinkVC.txt

New Link Time Ratio File = LinkTimeRatio.txt

LinkSum Reports:  1. NETWORK_PERFORMANCE_SUMMARY
                  3. TOP_100_LINK_VOLUMES
                  4. TOP_100_LANE_VOLUMES
                  5. TOP_100_PERIOD_VOLUMES
                  6. TOP_100_SPEED_REDUCTIONS
                  7. TOP_100_TRAVEL_TIME_RATIOS
                  8. TOP_100_VOLUME_CAPACITY_RATIOS
                  9. VOLUME_CAPACITY_RATIOS
                 10. LINK_VOLUME_GREATER_THAN_1500
                 11. TRAVEL_TIME_DISTRIBUTION

Number of Node File Records = 17
```


Number of Link File Records = 20
 Number of Directional Links = 28

Number of Link Delay File Records = 4256, Periods = 2
 Percent of Link Directions with Travel Time Data = 100.0%
 Percent of Link Time Periods with Travel Time Data = 100.0%

Number of New Link Volume File Records = 20

Number of New Link Speed File Records = 20

Number of New Link Travel Time File Records = 20

Number of New Link V/C Ratio File Records = 20

Number of New Link Time Ratio File Records = 20

Network Performance Summary

Time Period	Lane Miles	Vehicle Miles	Vehicle Hours	Miles /Hour	Hours of Delay	Number of Turns
7:00..8:00	14.70	9526.56	469.68	20.28	327.95	0
8:00..9:00	14.70	11527.91	773.61	14.90	602.01	0
Total	14.70	21054.48	1243.29	16.93	929.96	0

Top 100 Link Volume Report

Link	From	To-Node	Time-of-Day	Volume
15	30	11	8:00..9:00	3882
17	28	30	8:00..9:00	3829
16	11	29	8:00..9:00	2580
8	24	28	8:00..9:00	2368
9	29	21	8:00..9:00	1954
3	21	10	8:00..9:00	1585
2	10	24	8:00..9:00	1565
...
22	15	17	7:00..8:00	54

Number of Records in the Report = 28

Top 100 Lane Volume Report

Link	From	To-Node	Time-of-Day	Volume
16	11	29	8:00..9:00	2580
11	26	27	8:00..9:00	1468
12	27	28	8:00..9:00	1465
15	30	11	8:00..9:00	1294
17	28	30	8:00..9:00	1276
...
22	15	17	7:00..8:00	54

Number of Records in the Report = 28

Top 100 Period Volume Report

Link	From	To-Node	Time-of-Day	Volume
15	30	11	8:00..9:00	3882
17	28	30	8:00..9:00	3829
15	30	11	7:00..8:00	3212
17	28	30	7:00..8:00	3179
...
22	15	17	8:00..9:00	47

Number of Records in the Report = 56

Top 100 Speed Reductions Report

Link	From	To-Node	Time-of-Day	Base	Loaded	Percent
16	11	29	8:00..9:00	20.1	1.3	93.5
16	11	29	7:00..8:00	20.1	2.1	89.6
11	26	27	8:00..9:00	12.0	1.9	84.2
11	26	27	7:00..8:00	12.0	3.0	75.0
...
7	15	22	8:00..9:00	14.0	13.8	1.4

Number of Records in the Report = 33

Top 100 Travel Time Ratios

Link	From	To-Node	Time-of-Day	Base	Loaded	Percent
16	11	29	8:00..9:00	27.4	408.1	1489.4
16	11	29	7:00..8:00	27.4	266.4	972.3
11	26	27	8:00..9:00	83.3	518.5	622.4
11	26	27	7:00..8:00	83.3	332.1	398.7
12	27	28	8:00..9:00	5.5	19.5	354.5
...
22	15	17	7:00..8:00	61.7	47.1	76.3

Number of Records in the Report = 56

Top 100 Volume Capacity Ratios

Link	From	To-Node	Time-of-Day	Capacity	Volume	Ratio
16	11	29	8:00..9:00	1000	2580	2.58
16	11	29	7:00..8:00	1000	2149	2.15
11	26	27	8:00..9:00	800	1468	1.84
11	26	27	7:00..8:00	800	1228	1.53
12	27	28	8:00..9:00	1000	1465	1.47
4	22	23	8:00..9:00	600	803	1.34
...
22	15	17	8:00..9:00	600	47	0.08

Number of Records in the Report = 56

Volume Capacity Ratio Distribution

Volume / Capacity Ratio										Lane KM
-----Percentile Distribution by Time Period-----										
Time Period	50%	65%	70%	75%	80%	85%	90%	95%	99%	
7:00..8:00	0.40	0.49	0.53	0.59	0.67	0.79	0.98	1.54	2.15	24
8:00..9:00	0.49	0.59	0.63	0.74	0.79	0.96	1.18	1.84	2.58	24
Total	0.49	0.59	0.59	0.67	0.79	0.80	0.99	1.54	2.15	47

Link Volumes Greater Than 1500

Link	A-Node	B-Node	Time-of-Day	Volume_AB	Volume_BA
2	10	24	8:00..9:00	1565	
3	10	21	8:00..9:00		1585
8	24	28	7:00..8:00	1966	
8	24	28	8:00..9:00	2368	
9	29	21	7:00..8:00	1607	
9	29	21	8:00..9:00	1954	
15	11	30	7:00..8:00		3212
15	11	30	8:00..9:00		3882
16	11	29	7:00..8:00	2149	
16	11	29	8:00..9:00	2580	
17	28	30	7:00..8:00	3179	
17	28	30	8:00..9:00	3829	

Number of Records in the Report = 12

Travel Time Distribution

	Loaded / Base Travel Time Ratio									
	-----Percentile Distribution by Time Period-----									Lane
Time Period	50%	65%	70%	75%	80%	85%	90%	95%	99%	KM
7:00..8:00	0.90	0.96	1.15	1.17	1.30	1.33	1.91	3.98	9.72	24
8:00..9:00	0.95	1.01	1.34	1.36	1.44	1.48	2.16	6.22	9.99	24
Total	0.95	1.01	1.15	1.30	1.34	1.48	2.16	3.98	9.72	47

Tue Feb 08 08:24:28 2011 -- Process Complete (0:00:00)

Example 2

```
*****
|                                     |
|      LinkSum - Version 4.0.32      |
|  Copyright (c) 2009 by AECOM Consult |
|      Tue Feb 08 09:06:09 2011      |
|                                     |
*****
```

```
Control File = LinkSum2.ct1
Report_File  = LinkSum2.prn (Create)
```

Summarize Links

```
Node File = Node.txt
Node File Format = TAB_DELIMITED
Link File = Link.txt
Link File Format = TAB_DELIMITED
```

```
Link Delay File = Link_Delay_Current.txt
Link Delay File Format = TAB_DELIMITED
```

```
Previous Link Delay File = Link_Delay_Previous.txt
Previous Link Delay File Format = TAB_DELIMITED
```

```
Summary Time Periods = 7:00..9:00
Summary Time Increment = 60 minutes
```

Minimum Link Volume = 1 vehicles/period

Congested Time Ratio = 3.00 loaded time / free flow time

```
LinkSum Reports:  1. NETWORK_PERFORMANCE_SUMMARY
                  2. NETWORK_PERFORMANCE_DETAILS
                  3. TOP_100_TRAVEL_TIME_CHANGES
                  4. TOP_100_VOLUME_CHANGES
                  5. TRAVEL_TIME_CHANGES
                  6. VOLUME_CHANGES
                  7. RELATIVE_GAP_REPORT
```

Number of Node File Records = 17

Number of Link File Records = 20
Number of Directional Links = 28

Number of Link Delay File Records = 4256, Periods = 2
Percent of Link Directions with Travel Time Data = 100.0%
Percent of Link Time Periods with Travel Time Data = 100.0%

Number of Previous Link Delay File Records = 5375
Percent of Link Directions with Travel Time Data = 100.0%
Percent of Link Time Periods with Travel Time Data = 100.0%

Total Vehicle Hours of Travel = 379.5

Network Performance Summary

Time Period	Lane Miles	Vehicle Miles	Vehicle Hours	Miles /Hour	Hours of Delay	Number of Turns
7:00..8:00	14.70	9526.56	469.68	20.28	327.95	0
8:00..9:00	14.70	11527.91	773.61	14.90	602.01	0
Total	14.70	21054.48	1243.29	16.93	929.96	0

Network Performance Details

	Current	Previous	Difference	Percent
Time Period	7:00..8:00			
Number of Links	28.00			
Number of Roadway Miles	6.32			
Number of Lane Miles	14.70			
Vehicle Miles of Travel	9526.56	9565.31	-38.75	(-0.41%)
Vehicle Hours of Travel	469.68	178.21	291.47	(163.55%)
Vehicle Hours of Delay	327.95	35.93	292.01	(812.66%)
Average Queued Vehicles	7.42	14.76	-7.35	(-49.76%)
Maximum Queued Vehicles	63.00	121.00	-58.00	(-47.93%)
Number of Cycle Failures	26.00	50.00	-24.00	(-48.00%)
Number of Turning Movements	0.00	0.00	0.00	(0.00%)
Average Link Time Ratio	1.64	0.94	0.70	(74.85%)
Average Link Density	4.66	8.60	-3.94	(-45.87%)
Average Link Max Density	14.81	28.80	-13.99	(-48.57%)
Average Miles Per Hour	20.28	53.67	-33.39	(-62.21%)
Percent VMT Congested	13.87	0.00	13.87	(0.00%)
Percent VHT Congested	53.81	0.00	53.81	(0.00%)
Percent Time Congested	7.14	0.00	7.14	(0.00%)
Time Period	8:00..9:00			
Number of Links	28.00			
Number of Roadway Miles	6.32			
Number of Lane Miles	14.70			
Vehicle Miles of Travel	11527.91	11689.57	-161.65	(-1.38%)
Vehicle Hours of Travel	773.61	237.86	535.76	(225.24%)
Vehicle Hours of Delay	602.01	63.85	538.17	(842.90%)
Average Queued Vehicles	11.30	22.53	-11.23	(-49.85%)
Maximum Queued Vehicles	83.00	159.00	-76.00	(-47.80%)
Number of Cycle Failures	70.00	132.00	-62.00	(-46.97%)
Number of Turning Movements	0.00	0.00	0.00	(0.00%)
Average Link Time Ratio	2.07	0.97	1.10	(112.55%)
Average Link Density	6.03	11.19	-5.16	(-46.13%)
Average Link Max Density	16.68	32.46	-15.78	(-48.62%)
Average Miles Per Hour	14.90	49.15	-34.24	(-69.68%)
Percent VMT Congested	17.33	0.11	17.22	(15211.50%)
Percent VHT Congested	67.01	0.65	66.36	(10220.54%)
Percent Time Congested	12.50	0.89	11.61	(1300.00%)
Time Period	Total			
Number of Links	28.00			
Number of Roadway Miles	6.32			
Number of Lane Miles	14.70			
Vehicle Miles of Travel	21054.48	21254.88	-200.40	(-0.94%)
Vehicle Hours of Travel	1243.29	416.07	827.22	(198.82%)
Vehicle Hours of Delay	929.96	99.78	830.18	(832.01%)
Average Queued Vehicles	18.72	37.29	-18.58	(-49.82%)
Maximum Queued Vehicles	146.00	280.00	-134.00	(-47.86%)
Number of Cycle Failures	96.00	182.00	-86.00	(-47.25%)
Number of Turning Movements	0.00	0.00	0.00	(0.00%)
Average Link Time Ratio	1.86	0.96	0.90	(94.03%)
Average Link Density	5.34	9.90	-4.55	(-46.02%)
Average Link Max Density	15.75	30.63	-14.89	(-48.60%)
Average Miles Per Hour	16.93	51.08	-34.15	(-66.85%)
Percent VMT Congested	15.77	0.06	15.70	(25227.14%)
Percent VHT Congested	62.02	0.37	61.65	(16608.89%)
Percent Time Congested	9.82	0.45	9.38	(2100.00%)

Top 100 Travel Time Changes

Link	From	To-Node	Time-of-Day	Previous	Current	Percent
16	11	29	8:00..9:00	19.9	408.1	1950.8
16	11	29	7:00..8:00	19.8	266.4	1245.5
11	26	27	7:00..8:00	59.2	332.1	461.0
11	26	27	8:00..9:00	99.0	518.5	423.7
12	27	28	8:00..9:00	4.5	19.5	333.3
...
19	15	26	7:00..8:00	46.8	49.1	4.9

Number of Records in the Report = 50

Top 100 Volume Changes

Link	From	To-Node	Time-of-Day	Previous	Current	Percent
14	26	13	7:00..8:00	380	385	1.3
7	15	22	7:00..8:00	616	622	1.0
10	26	14	7:00..8:00	388	391	0.8
22	17	15	7:00..8:00	253	255	0.8
3	21	10	7:00..8:00	1285	1291	0.5
4	22	23	7:00..8:00	661	664	0.5
10	26	14	8:00..9:00	469	471	0.4
15	30	11	8:00..9:00	3867	3882	0.4
1	22	12	7:00..8:00	589	591	0.3
3	21	10	8:00..9:00	1580	1585	0.3
5	23	24	7:00..8:00	661	663	0.3
12	27	28	8:00..9:00	1460	1465	0.3
15	30	11	7:00..8:00	3203	3212	0.3
10	14	26	8:00..9:00	463	464	0.2

Number of Records in the Report = 14

Time Change Distribution

Time Period	Time Change * 100 / Previous Time -----Percentile Distribution by Time Period-----									Lane KM
	50%	65%	70%	75%	80%	85%	90%	95%	99%	
7:00..8:00	25.0	29.5	30.9	34.9	42.6	48.2	69.4	99.9	99.9	24
8:00..9:00	31.6	35.0	39.1	40.6	49.2	70.5	99.9	99.9	99.9	24
Total	29.5	34.5	35.0	40.6	48.2	63.0	99.9	99.9	99.9	47

Volume Change Distribution

Time Period	Volume Change * 100 / Previous Volume -----Percentile Distribution by Time Period-----									Lane KM
	50%	65%	70%	75%	80%	85%	90%	95%	99%	
7:00..8:00	0.5	0.7	0.7	0.8	0.9	0.9	0.9	1.0	1.3	24
8:00..9:00	1.6	1.7	1.7	1.7	2.0	2.3	2.4	2.4	2.6	24
Total	0.9	1.5	1.5	1.6	1.7	1.7	2.0	2.4	2.6	47

Relative Gap Report

Time Period	Current VHT	Previous VHT	Relative Gap
7:00..8:00	177.4	178.2	0.004323
8:00..9:00	234.8	237.9	0.013059
Total	412.2	416.1	0.009317

Tue Feb 08 09:06:09 2011 -- Process Complete (0:00:00)

Example 3

```
*****
|
|      LinkSum - Version 4.0.32      |
|  Copyright (c) 2009 by AECOM Consult  |
|      Thu Feb 10 15:16:14 2011      |
|
|*****
```

```
Control File = LinkSum3.ct1
Report_File  = LinkSum3.prn (Create)
```

Custom Link Direction and Data Files

```
Node File = Node.txt
Node File Format = TAB_DELIMITED
Link File = Link.txt
Link File Format = TAB_DELIMITED
Lane Connectivity File = Lane_Connectivity.txt
Lane Connectivity File Format = TAB_DELIMITED
Activity Location File = Activity_Location.txt
Activity Location File Format = TAB_DELIMITED
```

```
Link Delay File = Link_Delay_Current.txt
Link Delay File Format = TAB_DELIMITED
```

```
Summary Time Periods = 7:00..9:00
Summary Time Increment = 60 minutes
```

```
Minimum Link Volume = 2 vehicles/period
```

```
Congested Time Ratio = 1.50 loaded time / free flow time
```

```
New Link Direction File #1 = LinkDirectionA.txt
New Link Direction File #1 Format = TAB_DELIMITED
New Link Direction Field #1 = CONGESTED_VHT
Link Direction Index Field was Added
```

```
New Link Direction File #2 = LinkDirectionB.txt
New Link Direction Field #2 = CONGESTED_VHT
```

```
New Link Data File #1 = LinkDataA.txt
New Link Data File #1 Format = TAB_DELIMITED
New Link Data Field #1 = CONGESTED_VHT
```

```
LinkSum Reports:  1. NETWORK_PERFORMANCE_SUMMARY
```

```
Number of Node File Records = 17
```

```
Number of Link File Records = 20
Number of Directional Links = 28
```

```
Number of Lane Connectivity File Records = 63
Number of Lane Connectivity Data Records = 41
```

```
Number of Link Delay File Records = 4256, Periods = 2
Percent of Link Directions with Travel Time Data = 100.0%
```


Percent of Link Time Periods with Travel Time Data = 100.0%
 Percent of Link Connections with Travel Time Data = 43.9%
 Percent of Connection Periods with Travel Time Data = 100.0%

Number of New Link Direction File #1 Records = 11

Number of New Link Direction File #2 Records = 11

Number of New Link Data File #1 Records = 10

Network Performance Summary

Time Period Turns	Lane Miles	Vehicle Miles	Vehicle Hours	Miles /Hour	Hours of Delay	Number of
7:00..8:00	14.70	9526.56	469.68	20.28	327.95	1187
8:00..9:00	14.70	11527.91	773.61	14.90	602.01	1547
Total	14.70	21054.48	1243.29	16.93	929.96	2734

Thu Feb 10 15:16:14 2011 -- Process Complete (0:00:00)

Please see pages 9 and 9 for examples of LinkDirectionA.txt, LinkDirectionB.txt and LinkDataA.txt.

Example 4

```
*****
|                                     |
|      LinkSum - Version 4.0.32      |
|  Copyright (c) 2009 by AECOM Consult |
|      Tue Feb 08 13:20:23 2011      |
|                                     |
*****
```

```
Control File = LinkSum3.ct1
Report_File  = LinkSum3.prn (Create)
```

Summarize Links

```
Node File = Node.txt
Node File Format = TAB_DELIMITED
Link File = Link.txt
Link File Format = TAB_DELIMITED
Lane Connectivity File = Lane_Connectivity.txt
Lane Connectivity File Format = TAB_DELIMITED
Activity Location File = Activity_Location.txt
Activity Location File Format = TAB_DELIMITED
```

```
Link Delay File = Link_Delay_Current.txt
Link Delay File Format = TAB_DELIMITED
```

```
Summary Time Periods = 7:00..9:00
Summary Time Increment = 60 minutes
```

Minimum Link Volume = 2 vehicles/period

Congested Time Ratio = 3.00 loaded time / free flow time

```
New Link Activity File = LinkActivity.txt
Activity Location Fields = USER_FIELD
```

LinkSum Reports: 1. NETWORK_PERFORMANCE_SUMMARY

Number of Node File Records = 17

Number of Link File Records = 20
Number of Directional Links = 28

Number of Lane Connectivity File Records = 63
Number of Lane Connectivity Data Records = 41

Number of Activity Location File Records = 42

Number of Link Delay File Records = 4256, Periods = 2
Percent of Link Directions with Travel Time Data = 100.0%
Percent of Link Time Periods with Travel Time Data = 100.0%
Percent of Link Connections with Travel Time Data = 43.9%
Percent of Connection Periods with Travel Time Data = 100.0%

Number of Link Activity Records = 20

Network Performance Summary

Time Period	Lane Miles	Vehicle Miles	Vehicle Hours	Miles /Hour	Hours of Delay	Number of Turns
7:00..8:00	14.70	9526.56	469.68	20.28	327.95	1187

DRAFT February 2011

LinkSum Documentation

8:00..9:00	14.70	11527.91	773.61	14.90	602.01	1547
Total	14.70	21054.48	1243.29	16.93	929.96	2734

Tue Feb 08 13:20:23 2011 -- Process Complete (0:00:00)