LinkSum

Version 5.0.12

Revision History

June 2013 - Created by Volpe Center

The **LinkSum** program is 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.

10. Report various network performance statistics.

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:

Optional Flags:

-Q[uiet] = execute without screen messages

-H[elp] = show program syntax and control keys

-C[ontrol] = create/update a default control file

-K[eyCheck] = list unrecognized control file keys

-P[ause] = pause before exiting

-N[oPause] = never pause before exiting

-D[etail] = execute with detailed status messages

-X[ML] = write an XML file with control keys

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

# Version 5 Features

Link Data and Link Direction files were updated to include data units. Unit codes for vehicle, PCE, and person hours and miles/kilometers of travel were added. Time periods are now read from the Link Data and Link Direction files.

NEW\_TURN\_VOLUME\_FILE, NEW\_TURN\_VOLUME\_FORMAT, and TURN\_NODE\_RANGE keys were added to create a turning movement file from the link delay data.

The Link Gap report will now include turning movement delays if included in the performance file and activated by including the connection file. The relative gap calculations were modified to aggregate the data from the two link delays files separately and then make the gap calculation. This approach provided more realistic gap calculation when the link and period travel times on the two link delay files are the same.

Relative gap is calculated as follows:

Relative gap = (Previous VHT – Current VHT) / Current VHT

# Control Key List

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

* Req / Opt indicates whether the key is **req**uired or **opt**ional
* The types include **Text**, Input **File**name, **New** file, **Bool**ean, **Path** (to a file), **Time**, **Int**eger, **Dec**imal, and **List** of items
* The Default is the default value, used if the key does not appear in the control file.
* I/O/P indicates Input, Output or Parameter.

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

## Configuration Keys

| **Control File Keys:** | **Req/Opt** | **Type** | **Default** | **I/O/P** |
| --- | --- | --- | --- | --- |
| TITLE | Opt | Text |  | P |
| REPORT\_DIRECTORY | Opt | Path |  | O |
| REPORT\_FILE | Opt | New |  | P |
| REPORT\_FLAG | Opt | Bool | FALSE | P |
| PAGE\_LENGTH | Opt | Int. | 65 | P |
| PROJECT\_DIRECTORY | Opt | Path |  | P |
| DEFAULT\_FILE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| TIME\_OF\_DAY\_FORMAT | Opt | Text | DAY\_TIME | P |
| MODEL\_START\_TIME | Opt | Time | 0:00 | P |
| MODEL\_END\_TIME | Opt | Time | 24:00:00 | P |
| MODEL\_TIME\_INCREMENT | Opt | Time | 15 minutes | P |
| UNITS\_OF\_MEASURE | Opt | Text | METRIC | P |
| RANDOM\_NUMBER\_SEED | Opt | Int. | 0 | P |
| MAX\_WARNING\_MESSAGES | Opt | Int. | 100000 | P |
| MAX\_WARNING\_EXIT\_FLAG | Opt | Bool | TRUE | P |
| MAX\_PROBLEM\_COUNT | Opt | Int. | 0 | P |
| NUMBER\_OF\_THREADS | Opt | Int. | 1 | P |

## System File Keys

| **Control File Keys:** | **Req/Opt** | **Type** | **Default** | **I/O/P** |
| --- | --- | --- | --- | --- |
| NODE\_FILE | Req | File |  | I |
| NODE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| LINK\_FILE | Req | File |  | I |
| LINK\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| PERFORMANCE\_FILE | Req | File |  | I |
| PERFORMANCE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| CONNECTION\_FILE | Opt | File |  | I |
| CONNECTION\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| LANE\_USE\_FILE | Opt | File |  | I |
| LANE\_USE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| LOCATION\_FILE | Opt | File |  | I |
| LOCATION\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| SAVE\_LANE\_USE\_FLOWS | Opt | Bool | FALSE | P |
| LINK\_EQUIVALENCE\_FILE | Opt | File |  | I |
| ZONE\_EQUIVALENCE\_FILE | Opt | File |  | I |

## Data Service Keys

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Control File Keys:** | **Req/Opt** | **Type** | **Default** | **I/O/P** |
| DAILY\_WRAP\_FLAG | Opt | Bool | FALSE | P |
| SUMMARY\_TIME\_RANGES | Opt | Text | ALL | P |
| SUMMARY\_TIME\_INCREMENT | Opt | Time | 15 minutes | P |

## Select Service Keys

| **Control File Keys:** | **Req/Opt** | **Type** | **Default** | **I/O/P** |
| --- | --- | --- | --- | --- |
| SELECT\_FACILITY\_TYPES | Opt | List | ALL | P |
| SELECT\_SUBAREA\_POLYGON | Opt | File |  | P |

## Control Keys

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Control File Keys:** | **Req/Opt** | **Type** | **Default** | **I/O/P** |
| COMPARE\_PERFORMANCE\_FILE | Opt | File |  | I |
| COMPARE\_PERFORMANCE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| MINIMUM\_LINK\_FLOW | Opt | Dec. | 2.0 | P |
| SELECT\_BY\_LINK\_GROUP | Opt | Bool | FALSE | P |
| NEW\_LINK\_ACTIVITY\_FILE | Opt | New |  | O |
| NEW\_LINK\_ACTIVITY\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| COPY\_LOCATION\_FIELDS | Opt | Text |  | P |
| NEW\_ZONE\_TRAVEL\_FILE | Opt | New |  | O |
| NEW\_ZONE\_TRAVEL\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| NEW\_GROUP\_TRAVEL\_FILE | Opt | New |  | O |
| NEW\_GROUP\_TRAVEL\_FORMAT | Opt | Text | TAB\_DELIMTED | P |
| NEW\_LINK\_DIRECTION\_FILE\_1 | Opt | New |  | O |
| NEW\_LINK\_DIRECTION\_FORMAT\_1 | Opt | Text | TAB\_DELIMITED | P |
| NEW\_LINK\_DIRECTION\_FIELD\_1 | Opt | Text |  | P |
| NEW\_LINK\_DIRECTION\_INDEX\_1 | Opt | Bool |  | P |
| NEW\_LINK\_DATA\_FILE\_1 | Opt | New |  | O |
| NEW\_LINK\_DATA\_FORMAT\_1 | Opt | Text | TAB\_DELIMITED | P |
| NEW\_LINK\_DATA\_FIELD\_1 | Opt | Text |  | P |
| NEW\_PERFORMANCE\_DATA\_FILE | Opt | New |  | O |
| NEW\_PERFORMANCE\_DATA\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| NEW\_TURN\_VOLUME\_FILE | Opt | New |  | O |
| NEW\_TURN\_VOLUME\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| TURN\_NODE\_RANGE | Opt | List | ALL | P |
| LINKSUM\_REPORT\_1 | Opt | Text |  | P |

Report Options:

TOP\_100\_LINK\_FLOWS

TOP\_100\_LANE\_FLOWS

TOP\_100\_PERIOD\_FLOWS

TOP\_100\_SPEED\_REDUCTIONS

TOP\_100\_TRAVEL\_TIME\_RATIOS

TOP\_100\_VOLUME\_CAPACITY\_RATIOS

TOP\_100\_TRAVEL\_TIME\_CHANGES

TOP\_100\_VOLUME\_CHANGES

LINK\_VOLUME\_GREATER\_THAN\_\*

GROUP\_VOLUME\_GREATER\_THAN\_\*

LINK\_EQUIVALENCE

ZONE\_EQUIVALENCE

TRAVEL\_TIME\_DISTRIBUTION

VOLUME\_CAPACITY\_RATIOS

TRAVEL\_TIME\_CHANGES

VOLUME\_CHANGES

LINK\_GROUP\_TRAVEL\_TIME

NETWORK\_PERFORMANCE\_SUMMARY

NETWORK\_PERFORMANCE\_DETAILS

RELATIVE\_GAP\_REPORT

#### Notes

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

TEXT, BINARY, FIXED\_COLUMN, COMMA\_DELIMITED, SPACE\_DELIMITED, TAB\_DELIMITED, CSV\_DELIMITED, DBASE, SQLITE3, VERSION3

# Control Key Changes in LinkSum Version 5

A number of keys have changed from V4 to V5. Refer to the File Reference and Parameter Reference documents for additional details. In addition to the network file name changes (e.g., NET\_NODE\_TABLE to NODE\_FILE), specific examples include the following control key and file name changes (V4 🡪 V5):

* LINK\_DELAY\_FILE -> PERFORMANCE\_FILE
* PREVIOUS\_LINK\_DELAY\_FILE->COMPARE\_PERFORMANCE\_FILE
* SUMMARY\_TIME\_PERIODS->SUMMARY\_TIME\_RANGES
* SUMMARY\_TIME\_INCREMENTS->SUMMARY\_TIME\_INCREMENT
* MINIMUM\_LINK\_VOLUME->MINIMUM\_LINK\_FLOW
* ACTIVITY\_LOCATION\_FIELDS->COPY\_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]

The following keys, used in version 4, are not used in version 5:

* CONGESTED\_TIME\_RATIO
* NEW\_LINK\_VOLUME\_FILE
* NEW\_LINK\_SPEED\_FILE
* NEW\_LINK\_TRAVEL\_TIME\_FILE
* NEW\_LINK\_VC\_RATIO\_FILE
* NEW\_LINK\_TIME\_RATIO\_FILE

New keys in version 5 include

* REPORT\_DIRECTORY
* PAGE\_LENGTH
* MODEL\_START\_TIME
* MODEL\_END\_TIME
* MODEL\_TIME\_INCREMENT
* UNITS\_OF\_MEASURE
* SAVE\_LANE\_USE\_FLOWS
* NEW\_TURN\_VOLUME\_FILE
* NEW\_TURN\_VOLUME\_FORMAT
* TURN\_NODE\_RANGE

# Example

## Demonstrating the reports and output files

TITLE LinkSum Default Control Keys

TIME\_OF\_DAY\_FORMAT HOUR\_CLOCK

MODEL\_START\_TIME 6:00 //---- >= 0 [seconds], 0.0 [hours], 0:00

MODEL\_END\_TIME 10:00 //---- > [model\_start\_time]

MODEL\_TIME\_INCREMENT 15 minutes //---- 0, 2..240 minutes

#---- System File Keys ----

NODE\_FILE network/node.txt

LINK\_FILE network/link.txt

CONNECTION\_FILE network/connection.txt

POCKET\_FILE network/pocket.txt

PARKING\_FILE network/parking.txt

LOCATION\_FILE network/location2.txt

PERFORMANCE\_FILE results/6AON.linkdelay.txt

SAVE\_LANE\_USE\_FLOWS FALSE //- TRUE/FALSE, YES/NO, 1/0, T/F, Y/N

COMPARE\_PERFORMANCE\_FILE results/5.linkdelay.txt

#---- Data Service Keys ----

DAILY\_WRAP\_FLAG FALSE

SUMMARY\_TIME\_RANGES 7.0..9.0 hours

SUMMARY\_TIME\_INCREMENT 15 minutes //---- 0, 2..240 minutes

#---- Select Service Keys ----

SELECT\_FACILITY\_TYPES ALL //---- FREEWAY..EXTERNAL

#---- LinkSum Control Keys ----

MINIMUM\_LINK\_FLOW 2.0 //---- >= 0

SELECT\_BY\_LINK\_GROUP FALSE

COPY\_LOCATION\_FIELDS FALSE

NEW\_ZONE\_TRAVEL\_FILE results/6.zonetravel.txt

NEW\_ZONE\_TRAVEL\_FORMAT TAB\_DELIMITED

NEW\_GROUP\_TRAVEL\_FORMAT TAB\_DELIMITED

NEW\_LINK\_DIRECTION\_FILE\_1 results/6.linkdir.txt

NEW\_LINK\_DIRECTION\_FORMAT\_1 TAB\_DELIMITED

NEW\_LINK\_DIRECTION\_FIELD\_1 VC\_RATIO

#---- Possible values include FLOW, TRAVEL\_TIME, VC\_RATIO, TIME\_RATIO, SPEED,

# DELAY, DENSITY, MAX\_DENSITY, QUEUE, MAX\_QUEUE, CYCLE\_FAILURE,

# VMT, VHT, CONGESTED\_TIME, CONGESTED\_VMT, CONGESTED\_VHT

NEW\_LINK\_DIRECTION\_INDEX\_1 FALSE

NEW\_LINK\_DIRECTION\_FIELD\_2 FLOW

NEW\_LINK\_DIRECTION\_INDEX\_2 FALSE

NEW\_LINK\_DATA\_FILE\_1 results/6.linkdata.txt

NEW\_LINK\_DATA\_FORMAT\_1 TAB\_DELIMITED

NEW\_LINK\_DATA\_FIELD\_1 VC\_RATIO

NEW\_PERFORMANCE\_DATA\_FORMAT TAB\_DELIMITED

NEW\_TURN\_VOLUME\_FORMAT TAB\_DELIMITED

LINKSUM\_REPORT\_1 TOP\_100\_LINK\_FLOWS

LINKSUM\_REPORT\_2 TOP\_100\_LANE\_FLOWS

LINKSUM\_REPORT\_3 TOP\_100\_PERIOD\_FLOWS

LINKSUM\_REPORT\_4 TOP\_100\_SPEED\_REDUCTIONS

LINKSUM\_REPORT\_5 TOP\_100\_TRAVEL\_TIME\_RATIOS

LINKSUM\_REPORT\_6 TOP\_100\_VOLUME\_CAPACITY\_RATIOS

LINKSUM\_REPORT\_7 TOP\_100\_TRAVEL\_TIME\_CHANGES

LINKSUM\_REPORT\_8 TOP\_100\_VOLUME\_CHANGES

LINKSUM\_REPORT\_9 LINK\_VOLUME\_GREATER\_THAN\_1000

LINKSUM\_REPORT\_11 TRAVEL\_TIME\_DISTRIBUTION

LINKSUM\_REPORT\_12 VOLUME\_CAPACITY\_RATIOS

LINKSUM\_REPORT\_13 TRAVEL\_TIME\_CHANGES

LINKSUM\_REPORT\_14 VOLUME\_CHANGES

LINKSUM\_REPORT\_16 NETWORK\_PERFORMANCE\_SUMMARY

LINKSUM\_REPORT\_17 NETWORK\_PERFORMANCE\_DETAILS

LINKSUM\_REPORT\_18 RELATIVE\_GAP\_REPORT

### Resulting .prn file with excerpts from the various reports

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| LinkSum - Version 5.0.12 |

| Copyright 2012 by TRANSIMS Open-Source |

| Tue Jun 18 08:58:38 2013 |

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Control File = 6.LinkSum.ctl

Report File = 6.LinkSum.prn (Create)

LinkSum Default Control Keys

Project Directory = ../

Default File Format = TAB\_DELIMITED

Time of Day Format = HOUR\_CLOCK

Model Start Time = 6:00

Model End Time = 10:00

Model Time Increment = 15.00 minutes

Units of Measure = ENGLISH

Random Number Seed = 1371560318

Number of Threads = 2

Warning: LinkSum is Not Thread Enabled

Input System Network Files:

Node File = ../network/node.txt

Link File = ../network/link.txt

Connection File = ../network/connection.txt

Location File = ../network/location2.txt

Input System Demand Files:

Performance File = ../results/6AON.linkdelay.txt

Save Lane Use Flows = FALSE

Data Service Controls:

Daily Wrap Flag = FALSE

Summary Time Increment = 15.00 minutes

Summary Time Ranges = 7.0..9.0 hours

Number of Time Periods = 8

Select Service Controls:

Select Facility Types = ALL

LinkSum Control Keys:

Compare Performance File = ../results/5.linkdelay.txt

Minimum Link Flow = 2

Select By Link Group = FALSE

New Zone Travel File = ../results/6.zonetravel.txt

New Link Direction File #1 = ../results/6.linkdir.txt

New Link Direction Field #1 = VC\_RATIO

New Link Direction Index #1 = FALSE

New Link Data File #1 = ../results/6.linkdata.txt

New Link Data Field = VC\_RATIO

LinkSum Reports: 1. TOP\_100\_LINK\_FLOWS

2. TOP\_100\_LANE\_FLOWS

3. TOP\_100\_PERIOD\_FLOWS

4. TOP\_100\_SPEED\_REDUCTIONS

5. TOP\_100\_TRAVEL\_TIME\_RATIOS

6. TOP\_100\_VOLUME\_CAPACITY\_RATIOS

7. TOP\_100\_TRAVEL\_TIME\_CHANGES

8. TOP\_100\_VOLUME\_CHANGES

9. LINK\_VOLUME\_GREATER\_THAN\_1000

11. TRAVEL\_TIME\_DISTRIBUTION

12. VOLUME\_CAPACITY\_RATIOS

13. TRAVEL\_TIME\_CHANGES

14. VOLUME\_CHANGES

16. NETWORK\_PERFORMANCE\_SUMMARY

17. NETWORK\_PERFORMANCE\_DETAILS

18. RELATIVE\_GAP\_REPORT

Number of Node File Records = 57

Number of Link File Records = 72

Number of Directional Links = 114

Number of Connection File Records = 190

Number of Location File Records = 196

Number of Performance File Records = 1015

Number of Performance Data Records = 912

Number of Link Direction Records = 912

Number of Link Connection Records = 0

Number of Summary Time Periods = 8

Percent of Link Periods with Travel Time Data = 100.0%

Percent of Time Periods with Performance Data = 100.0%

Number of Compare Performance File Records = 1015

Number of Performance Data Records = 912

Number of Link Direction Records = 912

Number of Link Connection Records = 0

Number of Summary Time Periods = 8

Percent of Link Periods with Travel Time Data = 100.0%

Percent of Time Periods with Performance Data = 100.0%

Number of Link Locations = 1000

Number of Selected Zones = 30

Number of Zone Travel Records = 30

Number of New Link Direction File #1 Records = 114

Number of Time Periods = 8

Number of New Link Data File #1 Records = 72

Number of Time Periods = 8

#### Top 100 Link Flow Report

Link From To-Node Time-of-Day Flow

37 115 122 7:45..8:00 697.0

23 107 126 7:45..8:00 661.0

53 136 137 7:45..8:00 640.0

60 146 147 7:45..8:00 628.0

…

44 115 119 7:45..8:00 156.0

19 107 103 8:00..8:15 149.0

45 116 120 7:45..8:00 147.0

25 127 108 8:00..8:15 144.0

27 106 111 7:45..8:00 141.0

Number of Records in the Report = 100

#### Top 100 Lane Flow Report

Link From To-Node Time-of-Day Flow

66 127 136 7:45..8:00 395.0

37 115 122 7:45..8:00 349.0

23 107 126 7:45..8:00 330.0

35 123 124 7:45..8:00 293.0

33 110 125 7:45..8:00 281.0

68 126 142 7:45..8:00 266.0

70 124 144 7:45..8:00 265.0

28 112 107 7:45..8:00 260.0

35 124 123 8:00..8:15 253.0

64 122 134 7:45..8:00 251.0

…

13 30 130 7:45..8:00 68.0

31 111 112 7:30..7:45 68.0

20 105 104 7:45..8:00 67.0

Number of Records in the Report = 100

#### Top 100 Period Flow Report

Link From To-Node Time-of-Day Flow

37 115 122 7:45..8:00 697.0

23 107 126 7:45..8:00 660.8

53 136 137 7:45..8:00 640.0

37 115 122 8:00..8:15 631.3

60 146 147 7:45..8:00 628.0

…

58 144 145 7:15..7:30 367.0

36 123 122 7:30..7:45 366.3

41 115 116 7:45..8:00 365.3

23 126 107 7:45..8:00 364.8

33 110 125 7:00..7:15 364.8

14 137 23 7:15..7:30 364.1

Number of Records in the Report = 100

#### Top 100 Speed Reductions Report

Link From To-Node Time-of-Day Base Loaded Percent

66 127 136 7:45..8:00 50.7 12.8 74.8

66 127 136 8:00..8:15 50.7 16.9 66.7

37 115 122 7:45..8:00 50.7 18.2 64.1

23 107 126 7:45..8:00 50.9 20.8 59.1

…

41 115 116 7:45..8:00 51.4 45.3 11.9

23 126 107 7:45..8:00 50.9 44.9 11.8

33 110 125 7:00..7:15 50.7 44.7 11.8

33 125 110 7:45..8:00 50.7 44.7 11.8

Number of Records in the Report = 100

#### Top 100 Travel Time Ratios

Link From To-Node Time-of-Day Base Loaded Percent

66 127 136 7:45..8:00 19.4 76.7 395.4

66 127 136 8:00..8:15 19.4 58.1 299.5

37 115 122 7:45..8:00 19.4 54.1 278.9

23 107 126 7:45..8:00 29.0 70.9 244.5

66 127 136 7:30..7:45 19.4 47.3 243.8

37 115 122 8:00..8:15 19.4 42.8 220.6

37 115 122 7:30..7:45 19.4 40.3 207.7

…

36 123 122 8:00..8:15 9.8 11.2 114.3

65 135 127 7:45..8:00 19.4 22.1 113.9

41 115 116 7:45..8:00 63.8 72.4 113.5

23 126 107 7:45..8:00 29.0 32.9 113.4

33 110 125 7:00..7:15 19.4 22.0 113.4

33 125 110 7:45..8:00 19.4 22.0 113.4

Number of Records in the Report = 100

#### Top 100 Volume Capacity Ratios

Link From To-Node Time-of-Day Capacity Volume Ratio

66 127 136 7:45..8:00 250 395 1.58

66 127 136 8:00..8:15 250 358 1.43

37 115 122 7:45..8:00 500 697 1.39

23 107 126 7:45..8:00 500 661 1.32

66 127 136 7:30..7:45 250 330 1.32

37 115 122 8:00..8:15 500 631 1.26

…

21 105 106 7:45..8:00 500 373 0.75

65 135 127 7:45..8:00 250 184 0.74

36 123 122 7:30..7:45 500 366 0.73

23 126 107 7:45..8:00 500 365 0.73

33 110 125 7:00..7:15 500 365 0.73

41 115 116 7:45..8:00 500 365 0.73

Number of Records in the Report = 100

#### Top 100 Travel Time Changes

Link From To-Node Time-of-Day Previous Current Percent

66 127 136 7:45..8:00 57.2 76.7 34.1

66 127 136 8:00..8:15 45.5 58.1 27.7

30 111 110 8:00..8:15 77.1 96.1 24.6

30 110 111 7:45..8:00 75.4 93.4 23.9

38 111 116 7:45..8:00 100.6 122.5 21.8

38 116 111 7:45..8:00 98.4 117.4 19.3

…

33 125 110 7:00..7:15 19.9 20.0 0.5

37 122 115 8:45..9:00 19.4 19.5 0.5

37 115 122 8:30..8:45 20.4 20.5 0.5

42 117 116 7:00..7:15 65.9 66.2 0.5

Number of Records in the Report = 100

#### Top 100 Volume Changes

Link From To-Node Time-of-Day Previous Current Percent

38 116 111 8:00..8:15 147 235 59.9

38 111 116 7:45..8:00 192 283 47.4

27 111 106 7:45..8:00 147 214 45.6

38 116 111 7:45..8:00 193 271 40.4

21 106 105 7:45..8:00 331 438 32.3

30 110 111 7:45..8:00 228 299 31.1

30 111 110 8:00..8:15 241 305 26.6

…

27 111 106 8:30..8:45 38 41 7.9

38 111 116 7:15..7:30 63 68 7.9

7 121 27 8:00..8:15 64 69 7.8

43 118 117 7:30..7:45 180 194 7.8

12 33 104 8:45..9:00 13 14 7.7

Number of Records in the Report = 100

#### Link Volumes Greater Than 1000

Link A-Node B-Node Time-of-Day Volume\_AB Volume\_BA

Number of Records in the Report = 72

#### 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..7:15 1.00 1.00 1.00 1.00 1.01 1.01 1.03 1.03 1.09 494

7:15..7:30 1.00 1.00 1.00 1.02 1.05 1.06 1.10 1.15 1.33 494

7:30..7:45 1.00 1.01 1.03 1.06 1.10 1.12 1.18 1.23 1.64 494

7:45..8:00 1.01 1.04 1.07 1.13 1.20 1.27 1.37 1.46 1.75 494

8:00..8:15 1.00 1.02 1.05 1.08 1.09 1.16 1.25 1.37 1.73 494

8:15..8:30 1.00 1.00 1.00 1.01 1.02 1.03 1.05 1.08 1.21 494

8:30..8:45 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.02 494

8:45..9:00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 494

Total 1.00 1.00 1.00 1.01 1.02 1.05 1.10 1.21 1.46 3953

#### Volume Capacity Ratio Distribution

Volume / Capacity Ratio

-------------Percentile Distribution by Time Period---------- Lane

Time Period 50% 65% 70% 75% 80% 85% 90% 95% 99% KM

7:00..7:15 0.20 0.25 0.31 0.36 0.39 0.44 0.50 0.54 0.67 494

7:15..7:30 0.27 0.36 0.38 0.47 0.57 0.60 0.69 0.76 0.91 494

7:30..7:45 0.35 0.45 0.53 0.60 0.69 0.72 0.79 0.84 1.08 494

7:45..8:00 0.42 0.54 0.63 0.73 0.81 0.88 0.94 1.00 1.12 494

8:00..8:15 0.38 0.46 0.58 0.65 0.67 0.77 0.85 0.94 1.12 494

8:15..8:30 0.24 0.32 0.34 0.37 0.48 0.54 0.59 0.66 0.82 494

8:30..8:45 0.14 0.19 0.21 0.23 0.28 0.29 0.34 0.37 0.46 494

8:45..9:00 0.07 0.10 0.10 0.13 0.15 0.16 0.19 0.21 0.25 494

Total 0.24 0.34 0.37 0.43 0.48 0.57 0.69 0.82 1.00 3953

#### Time Change Distribution

Time Change \* 100 / Previous Time

-------------Percentile Distribution by Time Period---------- Lane

Time Period 50% 65% 70% 75% 80% 85% 90% 95% 99% MI

7:00..7:15 0.0 0.0 0.0 0.0 0.1 0.1 0.1 0.4 0.7 94

7:15..7:30 0.0 0.1 0.2 0.4 0.6 1.3 2.0 2.8 3.6 94

7:30..7:45 0.1 0.5 0.8 1.0 2.0 2.4 3.7 5.2 7.4 94

7:45..8:00 0.2 2.1 3.5 4.1 5.1 7.3 10.1 19.3 23.8 94

8:00..8:15 0.1 0.7 0.8 1.4 1.6 2.6 4.3 7.6 24.6 94

8:15..8:30 0.0 0.1 0.1 0.1 0.4 0.4 0.4 0.7 1.2 94

8:30..8:45 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.1 94

8:45..9:00 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 94

Total 0.0 0.0 0.1 0.1 0.4 0.8 2.0 4.5 11.5 749

#### Volume Change Distribution

Volume Change \* 100 / Previous Volume

-------------Percentile Distribution by Time Period---------- Lane

Time Period 50% 65% 70% 75% 80% 85% 90% 95% 99% MI

7:00..7:15 0.7 1.4 1.7 1.9 2.9 3.3 4.0 6.2 7.9 94

7:15..7:30 2.4 3.7 3.9 4.9 5.8 6.8 7.5 8.3 13.7 94

7:30..7:45 2.8 5.0 6.1 6.7 7.8 8.9 10.4 12.7 19.4 94

7:45..8:00 5.2 7.7 9.7 10.7 13.8 14.5 19.2 31.2 45.6 94

8:00..8:15 4.1 6.5 6.9 7.9 8.6 9.3 10.6 15.2 26.5 94

8:15..8:30 1.8 2.5 3.0 3.3 3.6 4.2 4.9 6.6 11.4 94

8:30..8:45 0.4 1.5 1.6 1.7 2.1 2.5 3.2 4.9 7.9 94

8:45..9:00 0.0 0.9 1.2 1.4 2.5 3.0 3.4 4.7 5.9 94

Total 1.9 3.2 3.5 4.4 5.4 6.8 8.2 11.6 22.2 749

#### Network Performance Summary

Lane Vehicle Vehicle Miles Hours of Number

Time Period Miles Miles Hours /Hour Delay of Turns

7:00..7:15 93.58 6062.21 164.15 36.93 3.46 0

7:15..7:30 93.58 8415.54 238.81 35.24 16.07 0

7:30..7:45 93.58 10118.55 304.00 33.28 34.88 0

7:45..8:00 93.58 12084.54 395.19 30.58 74.34 0

8:00..8:15 93.58 10838.60 332.89 32.56 46.43 0

8:15..8:30 93.58 7430.05 203.99 36.42 8.67 0

8:30..8:45 93.58 4180.59 111.72 37.42 0.57 0

8:45..9:00 93.58 2213.74 59.55 37.18 0.02 0

Total 93.58 61343.83 1810.29 33.89 184.44 0

#### Network Performance Details

Current Previous Difference Percent

Time Period 7:00..7:15

Number of Links 114.00

Number of Roadway Miles 27.03

Number of Lane Miles 93.58

Vehicle Miles of Travel 6062.21 6029.15 33.06 (0.55%)

Vehicle Hours of Travel 164.15 163.03 1.12 (0.69%)

Vehicle Hours of Delay 3.46 3.38 0.09 (2.52%)

Number of Queued Vehicles 0.00 0.00 0.00 (0.00%)

Maximum Queued Vehicles 0.00 0.00 0.00 (0.00%)

Number of Cycle Failures 0.00 0.00 0.00 (0.00%)

Number of Turning Movements 0.00 0.00 0.00 (0.00%)

Average Link Time Ratio 1.01 1.01 0.00 (0.04%)

Average Link Density (/ln-mi) 0.00 0.00 0.00 (0.00%)

Maximum Link Density (/ln-mi) 0.00 0.00 0.00 (0.00%)

Average Miles per Hour 36.93 36.98 -0.05 (-0.14%)

…

Current Previous Difference Percent

Time Period 7:45..8:00

Number of Links 114.00

Number of Roadway Miles 27.03

Number of Lane Miles 93.58

Vehicle Miles of Travel 12084.54 11619.61 464.93 (4.00%)

Vehicle Hours of Travel 395.19 373.39 21.80 (5.84%)

Vehicle Hours of Delay 74.34 66.75 7.60 (11.38%)

Number of Queued Vehicles 0.00 0.00 0.00 (0.00%)

Maximum Queued Vehicles 0.00 0.00 0.00 (0.00%)

Number of Cycle Failures 0.00 0.00 0.00 (0.00%)

Number of Turning Movements 0.00 0.00 0.00 (0.00%)

Average Link Time Ratio 1.16 1.16 0.00 (0.01%)

Average Link Density (/ln-mi) 0.00 0.00 0.00 (0.00%)

Maximum Link Density (/ln-mi) 0.00 0.00 0.00 (0.00%)

Average Miles per Hour 30.58 31.12 -0.54 (-1.74%)

Time Period 8:00..8:15

Number of Links 114.00

Number of Roadway Miles 27.03

Number of Lane Miles 93.58

Vehicle Miles of Travel 10838.60 10435.97 402.62 (3.86%)

Vehicle Hours of Travel 332.89 316.03 16.86 (5.34%)

Vehicle Hours of Delay 46.43 40.64 5.79 (14.23%)

Number of Queued Vehicles 0.00 0.00 0.00 (0.00%)

Maximum Queued Vehicles 0.00 0.00 0.00 (0.00%)

Number of Cycle Failures 0.00 0.00 0.00 (0.00%)

Number of Turning Movements 0.00 0.00 0.00 (0.00%)

Average Link Time Ratio 1.11 1.11 0.01 (0.69%)

Average Link Density (/ln-mi) 0.00 0.00 0.00 (0.00%)

Maximum Link Density (/ln-mi) 0.00 0.00 0.00 (0.00%)

Average Miles per Hour 32.56 33.02 -0.46 (-1.40%)

…

Time Period 8:45..9:00

Number of Links 114.00

Number of Roadway Miles 27.03

Number of Lane Miles 93.58

Vehicle Miles of Travel 2213.74 2200.05 13.69 (0.62%)

Vehicle Hours of Travel 59.55 59.10 0.44 (0.75%)

Vehicle Hours of Delay 0.02 0.02 0.00 (21.73%)

Number of Queued Vehicles 0.00 0.00 0.00 (0.00%)

Maximum Queued Vehicles 0.00 0.00 0.00 (0.00%)

Number of Cycle Failures 0.00 0.00 0.00 (0.00%)

Number of Turning Movements 0.00 0.00 0.00 (0.00%)

Average Link Time Ratio 1.00 1.00 0.00 (0.00%)

Average Link Density (/ln-mi) 0.00 0.00 0.00 (0.00%)

Maximum Link Density (/ln-mi) 0.00 0.00 0.00 (0.00%)

Average Miles per Hour 37.18 37.22 -0.05 (-0.13%)

Time Period Total

Number of Links 114.00

Number of Roadway Miles 27.03

Number of Lane Miles 93.58

Vehicle Miles of Travel 61343.83 59989.64 1354.18 (2.26%)

Vehicle Hours of Travel 1810.29 1755.83 54.47 (3.10%)

Vehicle Hours of Delay 184.44 169.08 15.37 (9.09%)

Number of Queued Vehicles 0.00 0.00 0.00 (0.00%)

Maximum Queued Vehicles 0.00 0.00 0.00 (0.00%)

Number of Cycle Failures 0.00 0.00 0.00 (0.00%)

Number of Turning Movements 0.00 0.00 0.00 (0.00%)

Average Link Time Ratio 1.06 1.06 0.00 (0.07%)

Average Link Density (/ln-mi) 0.00 0.00 0.00 (0.00%)

Maximum Link Density (/ln-mi) 0.00 0.00 0.00 (0.00%)

Average Miles per Hour 33.89 34.17 -0.28 (-0.82%)

#### Relative Gap Report

Time Period Current VHT Previous VHT Relative Gap Current VMT Previous VMT Current Speed Previous Speed Difference

7:00..7:15 164.2 163.0 -0.006825 60622.1 60291.5 54.165 54.240 -0.075

7:15..7:30 238.8 234.8 -0.016768 84155.4 83113.2 51.684 51.915 -0.230

7:30..7:45 304.0 296.9 -0.023464 101185.5 98859.2 48.818 48.842 -0.024

7:45..8:00 395.2 373.4 -0.055161 120845.4 116196.1 44.850 45.642 -0.792

8:00..8:15 332.9 316.0 -0.050649 108386.0 104359.7 47.754 48.433 -0.679

8:15..8:30 204.0 201.7 -0.011199 74300.5 73536.7 53.421 53.470 -0.050

8:30..8:45 111.7 110.9 -0.007367 41805.9 41539.3 54.885 54.939 -0.055

8:45..9:00 59.5 59.1 -0.007463 22137.4 22000.5 54.525 54.595 -0.070

Total 1810.3 1755.8 -0.030089 613438.3 599896.4 49.700 50.110 -0.411

Tue Jun 18 08:58:38 2013 -- Process Complete with 1 Warning (0:00:00)