Router

Version 5.0.54

Revision History

April 2012 - Created by Volpe Center

June 2013 – Revised by Volpe Center

The **Router** program is used to:

1. Generate travel plans and link delays for household and itinerant trips by walk, drive, transit, park-&-

ride, kiss-&-ride, bicycle, and magic move modes.

3. Build travel plans from specified origins to specified destinations at specified times of day using a specified travel mode.

4. Selectively route activities or trips from specified origins, to specified destinations, at specified times of day, and\or by specified modes.

5. Generate problem files for those activities or trips that could not be routed for specific reasons.

6. Implement an incremental capacity restrained assignment algorithm.

7. Re-route selective trips with a household person’s tour.

8. Update the plans in an input plan file.

9. Routing by selected trip purposes.

Syntax is Router [-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

## Creation of Link\_Delay files

The version 5 Router creates both plan and link\_delay files. This simplifies the Router stabilization process (Figure 1) to use 2 programs: the Router and PlanSelect. Inputs to the Router include an (optional) LinkDelay file, and either a TripFile or a set of TravelPlans. Outputs from the Router include a new LinkDelay file and a new set of TravelPlans. These LinkDelay and TravelPlan files are then used by PlanSelect to select trips for re-routing.

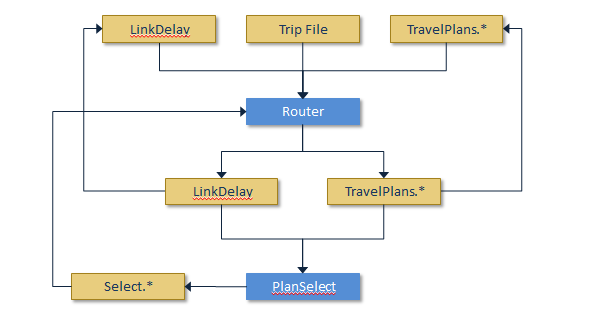


Figure 1 Router Stabilization

With these new link delay files, the user can independently control the update of link flows and link travel-times. New link delays can be built upon input flows / travel times (via an input plan or link delay file) or can start from free-flow conditions. There is a choice of periodic versus single final updates.

## Additional Path Building Controls

New controls and features include the following:

* Forward or backward path building with trip end constraints
* Expanded selection criterion
  + Time, location, zone, traveler type, mode, household, etc.
  + Build paths for individual travelers or trips within a household
* More rigorous path building algorithm available to minimize transit transfer anomalies
* Parking and vehicle operating costs included in path building. They can be varied by vehicle type
* Traveler type script for traveler-specific path building parameters
* Local impedance factor to avoid hard-limit effects
* Multi-step incremental loading can be replaced with single application
* Integrated Plan merging (PlanPrep), enabling a subset of input plans to be replaced with selective re-routing/update

To support these changes, a number of keys were changed or added:

MODEL\_TIME\_INCREMENT was added to create the time increment used for routing and link delay processing. The SUMMARY\_TIME\_RANGES and SUMMARY\_TIME\_INCREMENT keys are now used for data summaries and report processing.

REROUTE\_FROM\_TIME\_POINT key was added to re-route plans starting from their location within an existing plan file at a specified point in time.

UPDATE\_TURNING\_MOVEMENTS key was included to accumulate turning movements. CLEAR\_INPUT\_FLOW\_RATES, UPDATE\_FLOW\_RATES and UPDATE\_TRAVEL\_TIMES were added to better control the creating of new plans versus the re-skimming of existing plans. Either the UPDATE\_FLOW\_RATES or UPDATE\_TRAVEL\_TIMES key must be true for a new link delay file to be created.

The sort type of the input trip or plan file is posted on the output plan file. If the input trip and plan files are not sorted in the same way, an error message is generated. Applications with both trip and input plan files can now match the records using a time sort.

DELETION\_FILE, DELETION\_FORMAT, DELETE\_HOUSEHOLDS, DELETE\_MODES, and DELETE\_TRAVELER\_TYPES keys were activated to delete selected trips from the input trip or input plan files.

The local access impedance factor model was changed to include a smooth transition and a non-linear impact beyond the local access distance. WALK\_PENALTY\_DISTANCES, WALK\_PENALTY\_FACTOR, BIKE\_PENALTY\_DISTANCES, BIKE\_PENALTY\_FACTOR, WAIT\_PENALTY\_TIMES, and WAIT\_PENALTY\_FACTOR keys were added to implement the same impedance factoring model to minimize cliff effects. Initial implementation of transit path building was included.

A number of control key names were modified or corrected for consistency. The TRAVELER\_PARAMETER\_FILE key was added to permit the user to enter the traveler-related key values through an input file. This file operates like other control files, but can include multiple columns and column field names to help clarify the values assigned to a given traveler type. Up to 100 travel types can be provided. To more completely support traveler-related path building parameters, facility bias, penalty factor, and drive access keys were expanded and renamed. The key names are now: WALK\_PENALTY\_FACTORS, BIKE\_PENALTY\_FACTORS, WAIT\_PENALTY\_FACTORS, KISS\_RIDE\_TIME\_FACTORS, MAX\_PARK\_RIDE\_PERCENTS, and MAX\_KISS\_RIDE\_PERCENTS. The FACILITY\_BIAS\_FACTORS key was previously a list of impedance adjustment factors by facility type. This key is replaced by FREEWAY\_BIAS\_FACTORS and EXPREESWAY\_BIAS\_FACTORS that vary by traveler type. The HOUSEHOLD\_TYPE\_SCRIPT key was changed to TRAVELER\_TYPE\_SCRIPT to more accurately identify the purpose of the script. Improvements were made to the transit path tracing logic to include additional information in the output plan file. Park-&-Ride, Kiss-&-Ride, Magic Move (ride and other), and Taxi travel mode processing was implemented. Logic was added to adjust the activity duration for the previous trip made by a traveler when the current trip has an arrival time constraint and the estimated trip start time is earlier than the trip data anticipated.

ADJUST\_ACTIVITY\_SCHEDULE and IGNORE\_ACTIVITY\_DURATION keys were added to globally control how early and late arrivals are handled. If a trip’s travel time is less than expected, the schedule adjust key will permit the activity to move forward in time, but keep the activity duration the same. If a trip’s travel time is greater than expected, the ignore durations key will permit the activity duration to be reduced to as little as one minute to enable the next trip to start as close to the original time schedule as possible. The ignore durations key also drops activity records from the output plan file. These keys can be applied separately or in combination.

Negative or huge start and arrival times included in trip and activity files are now addressed with warning messages rather than error messages to enable the program to skip the erroneous record and continue processing. INTERPOLATE\_LINK\_DELAYS key was added to enable interpolate of the link travel time based on the time of day the path enters the link and the mid-points of the two closest time periods in the link delay file.

SAVE\_LANE\_USE\_FLOWS key was added to the file service. A Type field was added to the Link Delay and Performance files to split link flows and travel times into two lane use groups. The Flow Index method was added to the directional link data class to store the index into the flow vectors for the second lane use group. These changes enable the Router to track volume and calculate speeds for links with use restrictions on a subset of lanes. For example, an HOV or HOT lane on a mixed use freeway link. The Performance file and data classes were modified to inherit the attributes of the Link Delay classes to ensure processing consistency.

## Option of Built-in Multiple Runs for Convergence

In Version 4, the Router would effectively function as a shortest-path algorithm, with multiple runs required to attain user equilibrium. The Version 5 Router offers the option of implementing multiple iterations within a single router run, to attain either link-based or trip-based convergences. To support this option, the control keys MAXIMUM\_NUMBER\_OF\_ITERATIONS, LINK\_CONVERGENCE\_CRITERIA, TRIP\_CONVERGENCE\_CRITERIA, INITIAL\_WEIGHTING\_FACTOR, ITERATION\_WEIGHTING\_INCREMENT, MAXIMUM\_WEIGHTING\_FACTOR, NEW\_LINK\_CONVERGENCE\_FILE, NEW\_TRIP\_CONVERGENCE\_FILE, LINK\_GAP\_REPORT, TRIP\_GAP\_REPORT and ITERATION\_PROBLEMS report types were added.

Default values for these keys are listed below

|  |  |  |  |
| --- | --- | --- | --- |
| Key | Default | Range | Comment |
| MAXIMUM\_NUMBER\_OF\_ITERATIONS | 0 | 0..100 | Multiple runs is active when this is > 0 |
| LINK\_CONVERGENCE\_CRITERIA | 0 | 0..10 | Defines when sufficient convergence is reached |
| TRIP\_CONVERGENCE\_CRITERIA | 0 | 0..10 | Defines when sufficient convergence is reached |
| INITIAL\_WEIGHTING\_FACTOR | 1.0 | 0.0 or >= 0.5 | The initial weighting factor used for link\_delay averaging |
| ITERATION\_WEIGHTING\_INCREMENT | 1.0 | 0.0..5.0 | The increment between initial and maximum weighting factors. |
| MAXIMUM\_WEIGHTING\_FACTOR | 20.0 | 0.0 or >= 2.0 | The maximum weighting factor used for link\_delay averaging |

This version implements multiple iterations of the path building and loading process based on link delay averaging and exits when the convergence criteria are met. The trip gap measure is calculated at the trip level[[1]](#footnote-1), using the following measure

∑s (cxs ({cat}- cys ({cat}) / ∑s cxs ({cat})

where

s indexes trips

{cat} is an updated set of time-dependent link costs after combining new trip routes for a subset of household with previous iterations’ routes for the other households

cxs is the cost of the trip s along the path that was used for the calculation of {cat}

cys is the cost of the trip s along its shortest path, assuming {cat}

# 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\_FILE | Opt | File |  | O |
| REPORT\_FLAG | Opt | Bool | FALSE | 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 |
| CONNECTION\_FILE | Req | File |  | I |
| CONNECTION\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| LOCATION\_FILE | Req | File |  | I |
| LOCATION\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| POCKET\_FILE | Opt | File |  | I |
| POCKET\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| LANE\_USE\_FILE | Opt | File |  | I |
| LANE\_USE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| TURN\_PENALTY\_FILE | Opt | File |  | I |
| TURN\_PENALTY\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| PARKING\_FILE | Opt | File |  | I |
| PARKING\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| ACCESS\_FILE | Opt | File |  | I |
| ACCESS\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| TRANSIT\_STOP\_FILE | Opt | File |  | I |
| TRANSIT\_STOP\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| TRANSIT\_FARE\_FILE | Opt | File |  | I |
| TRANSIT\_FARE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| TRANSIT\_ROUTE\_FILE | Opt | File |  | I |
| TRANSIT\_ROUTE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| TRANSIT\_SCHEDULE\_FILE | Opt | File |  | I |
| TRANSIT\_SCHEDULE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| TRANSIT\_DRIVER\_FILE | Opt | File |  | I |
| TRANSIT\_DRIVER\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| HOUSEHOLD\_FILE | Opt | File |  | I |
| HOUSEHOLD\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| SELECTION\_FILE | Opt | File |  | I |
| SELECTION\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| TRIP\_FILE | Opt | File |  | I |
| TRIP\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| LINK\_DELAY\_FILE | Opt | File |  | I |
| LINK\_DELAY\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| VEHICLE\_FILE | Opt | File |  | I |
| VEHICLE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| VEHICLE\_TYPE\_FILE | Opt | File |  | I |
| VEHICLE\_TYPE\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| PLAN\_FILE | Opt | File |  | I |
| PLAN\_FORMAT | Opt | Text | TAB\_DELIMITED | I |
| NEW\_PLAN\_FILE | Opt | New |  | O |
| NEW\_PLAN\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| NEW\_PROBLEM\_FILE | Opt | New |  | O |
| NEW\_PROBLEM\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| NEW\_LINK\_DELAY\_FILE | Opt | New |  | O |
| NEW\_LINK\_DELAY\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| NOTES\_AND\_NAME\_FIELDS | Opt | Bool | FALSE | P |
| SAVE\_LANE\_USE\_FLOWS | Opt | Bool | FALSE | P |

## 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\_HOUSEHOLDS | Opt | List | ALL | P |
| SELECT\_MODES | Opt | List | ALL | P |
| SELECT\_PURPOSES | Opt | List | ALL | P |
| SELECT\_START\_TIMES | Opt | List | ALL | P |
| SELECT\_END\_TIMES | Opt | List | ALL | P |
| SELECT\_ORIGINS | Opt | List | ALL | P |
| SELECT\_DESTINATIONS | Opt | List | ALL | P |
| SELECT\_TRAVELER\_TYPES | Opt | List | ALL | P |
| SELECT\_ORIGIN\_ZONES | Opt | List | ALL | P |
| SELECT\_DESTINATION\_ZONES | Opt | List | ALL | P |
| SELECTION\_PERCENTAGE | Opt | Dec | 100.0 percent | P |
| DELETION\_FILE | Opt | File |  | I |
| DELETION\_FORMAT | Opt | Text | TAB\_DELIMITED | P |
| DELETE\_HOUSEHOLDS | Opt | List | NONE | P |
| DELETE\_MODES | Opt | List | NONE | P |
| DELETE\_TRAVELER\_TYPES | Opt | List | NONE | P |

## Path Building Service Keys

| **Control File Keys:** | **Req/Opt** | **Type** | **Default** | **I/O/P** |
| --- | --- | --- | --- | --- |
| IMPEDANCE\_SORT\_METHOD | Opt | Bool | FALSE | P |
| SAVE\_ONLY\_SKIMS | Opt | Bool | FALSE | P |
| WALK\_PATH\_DETAILS | Opt | Bool | FALSE | P |
| IGNORE\_VEHICLE\_ID | Opt | Bool | FALSE | P |
| LIMIT\_PARKING\_ACCESS | Opt | Bool | TRUE | P |
| IGNORE\_TIME\_CONSTRAINTS | Opt | Bool | FALSE | P |
| END\_TIME\_CONSTRAINT | Opt | Time | 0 minutes | P |
| IGNORE\_ROUTING\_PROBLEMS | Opt | Bool | FALSE | P |
| PERCENT\_RANDOM\_IMPEDANCE | Opt | Dec | 0.0 percent | P |
| TRAVELER\_TYPE\_SCRIPT | Opt | File |  | I |
| TRAVELER\_PARAMETER\_FILE | Opt | File |  | I |
| WALK\_SPEED | Opt | Dec | 1.0 mps | P |
| BICYCLE\_SPEED | Opt | Dec | 4.0 mps | P |
| WALK\_TIME\_VALUES\_\* | Opt | List | 20.0 impedance/second | P |
| BICYCLE\_TIME\_VALUES\_\* | Opt | List | 15.0 impedance/second | P |
| FIRST\_WAIT\_VALUES\_\* | Opt | List | 20.0 impedance/second | P |
| TRANSFER\_WAIT\_VALUES\_\* | Opt | List | 20.0 impedance/second | P |
| PARKING\_TIME\_VALUES\_\* | Opt | List | 0.0 impedance/second | P |
| VEHICLE\_TIME\_VALUES\_\* | Opt | List | 10.0 impedance/second | P |
| DISTANCE\_VALUES\_\* | Opt | List | 0.0 impedance/meter | P |
| COST\_VALUES\_\* | Opt | List | 0.0 impedance/cent | P |
| FREEWAY\_BIAS\_FACTORS\_\* | Opt | List | 1 | P |
| EXPRESSWAY\_BIAS\_FACTORS\_\* | Opt | List | 1 | P |
| LEFT\_TURN\_PENALTIES\_\* | Opt | List | 0 impedance | P |
| RIGHT\_TURN\_PENALTIES\_\* | Opt | List | 0 impedance | P |
| U\_TURN\_PENALTIES\_\* | Opt | List | 0 impedance | P |
| TRANSFER\_PENALTIES\_\* | Opt | List | 0 impedance | P |
| STOP\_WAITING\_PENALTIES\_\* | Opt | List | 0 impedance | P |
| STATION\_WAITING\_PENALTIES\_\* | Opt | List | 0 impedance | P |
| BUS\_BIAS\_FACTORS\_\* | Opt | List | 1 | P |
| BUS\_BIAS\_CONSTANTS\_\* | Opt | List | 0 impedance | P |
| RAIL\_BIAS\_FACTORS\_\* | Opt | List | 1 | P |
| RAIL\_BIAS\_CONSTANTS\_\* | Opt | List | 0 impedance | P |
| MAX\_WALK\_DISTANCES\_\* | Opt | List | 2000 meters | P |
| WALK\_PENALTY\_DISTANCES\_\* | Opt | List | 2000 meters | P |
| WALK\_PENALTY\_FACTORS\_\* | Opt | List | 0 | P |
| MIN\_WAIT\_TIMES\_\* | Opt | List | 0 seconds | P |
| MAX\_NUMBER\_OF\_TRANSFERS\_\* | Opt | List | 3 | P |
| MAX\_PARK\_RIDE\_PERCENTS\_\* | Opt | List | 50 percent | P |
| MAX\_KISS\_RIDE\_PERCENTS\_\* | Opt | List | 35 percent | P |
| KISS\_RIDE\_TIME\_FACTORS\_\* | Opt | List | 2.5 | P |
| KISS\_RIDE\_STOP\_TYPES | Opt | Text | EXTERNAL | P |
| MAX\_KISS\_RIDE\_DROPOFF\_WALK | Opt | Dec | 100 meters | P |
| TRANSIT\_PENALTY\_FILE | Opt | File |  | I |
| PARKING\_PENALTY\_FILE | Opt | File |  | I |
| DEFAULT\_PARKING\_DURATION | Opt | Time | 0.0 hours | P |
| MAX\_NUMBER\_OF\_PATHS | Opt | Int | 4 | P |
| MAX\_LEGS\_PER\_PATH | Opt | Int | 1000 | P |
| FARE\_CLASS\_DISTRIBUTION | Opt | List | 0 | P |
| LOCAL\_ACCESS\_DISTANCE | Opt | Dec | 2000 meters | P |
| LOCAL\_FACILITY\_TYPE | Opt | Text | EXTERNAL | P |
| LOCAL\_IMPEDANCE\_FACTOR | Opt | Dec | 0 | P |
| MAX\_CIRCUITY\_RATIO | Opt | Dec | 0 | P |
| MIN\_CIRCUITY\_DISTANCE | Opt | Dec | 2000 meters | P |
| MAX\_CIRCUITY\_DISTANCE | Opt | Dec | 20000 meters | P |
| MIN\_DURATION\_FACTORS | Opt | List | 0.1, 0.5, 0.8, 1.0 | P |

## Flow Time Service Keys

| **Control File Keys:** | **Req/Opt** | **Type** | **Default** | **I/O/P** |
| --- | --- | --- | --- | --- |
| UPDATE\_FLOW\_RATES | Opt | Bool | FALSE | P |
| CLEAR\_INPUT\_FLOW\_RATES | Opt | Bool | FALSE | P |
| UPDATE\_TURNING\_MOVEMENTS | Opt | Bool | FALSE | P |
| UPDATE\_TRAVEL\_TIMES | Opt | Bool | FALSE | P |
| LINK\_DELAY\_UPDATE\_RATE | Opt | Int | 0 | P |
| LINK\_DELAY\_FLOW\_FACTOR | Opt | Dec | 1 | P |
| EQUATION\_PARAMETERS\_\* | Opt | List | BPR, 0.15, 4.0, 0.75 | P |

## Router Control Keys

| **Control File Keys:** | **Req/Opt** | **Type** | **Default** | **I/O/P** |
| --- | --- | --- | --- | --- |
| UPDATE\_PLAN\_RECORDS | Opt | Bool | FALSE | P |
| REROUTE\_FROM\_TIME\_POINT | Opt | Time | 0:00 | P |
| PRINT\_UPDATE\_WARNINGS | Opt | Bool | FALSE | P |
| MAXIMUM\_NUMBER\_OF\_ITERATIONS | Opt | Int | 0 | P |
| LINK\_CONVERGENCE\_CRITERIA | Opt | Dec | 0.0 | P |
| TRIP\_CONVERGENCE\_CRITERIA | Opt | Dec | 0.0 | P |
| INITIAL\_WEIGHTING\_FACTOR | Opt | Dec | 1.0 | P |
| ITERATION\_WEIGHTING\_INCREMENT | Opt | Dec | 1.0 | P |
| MAXIMUM\_WEIGHTING\_FACTOR | Opt | Dec | 20.0 | P |
| NEW\_LINK\_CONVERGENCE\_FILE | Opt | New |  | O |
| NEW\_TRIP\_CONVERGENCE\_FILE | Opt | New |  | O |
| ROUTER\_REPORT\_\* | Opt | Text |  | P |

Report Options:

TRAVELER\_TYPE\_SCRIPT

TRAVELER\_TYPE\_STACK

LINK\_GAP\_REPORT

TRIP\_GAP\_REPORT

ITERATION\_PROBLEMS

#### 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 Router Version 5

A number of network keys have changed from V4 to V5. Refer to the File Reference and Parameter Reference documents for additional details. Some specific examples include the following control key and file name changes (V4 🡪 V5):

* NET\_NODE\_TABLE 🡪 NODE\_FILE
* NET\_ZONE\_TABLE 🡪 ZONE\_FILE
* NET\_SHAPE\_TABLE 🡪 SHAPE\_FILE
* NET\_LINK\_TABLE 🡪 LINK\_FILE
* NET\_PARKING\_TABLE 🡪 PARKING\_FILE
* NET\_PROCESS\_LINK\_TABLE -> ACCESS\_FILE
* NET\_ACTIVITY\_LOCATION\_TABLE -> ACTIVITY\_FILE
* NET\_LANE\_CONNECTIVITY\_TABLE -> CONNECTION\_FILE
* NET\_POCKET\_LANE\_TABLE -> POCKET\_FILE
* NET\_LANE\_USE\_TABLE -> LANE\_USE\_FILE
* NET\_TURN\_PROHIBITION\_FILE -> TURN\_PENALTY\_FILE
* NET\_TRANSIT\_STOP\_TABLE -> TRANSIT\_STOP\_FILE
* NET\_TRANSIT\_FARE\_TABLE -> TRANSIT\_FARE\_FILE
* NET\_TRANSIT\_ROUTE\_TABLE -> TRANSIT\_ROUTE\_FILE
* NET\_TRANSIT\_SCHEDULE\_TABLE -> TRANSIT\_SCHEDULE\_FILE
* HOUSEHOLD\_LIST -> SELECTION\_FILE
* HOUSEHOLD\_TYPE\_SCRIPT -> TRAVELER\_TYPE\_SCRIPT
* VEHICLE\_TYPE -> VEHICLE\_TYPE\_CODE
* ROUTE\_SELECTED\_MODES -> SELECT\_MODES
* ROUTE\_SELECTED\_PURPOSES -> SELECT\_PURPOSES
* ROUTE\_AT\_SPECIFIED\_TIMES -> SELECT\_START\_TIMES
* ROUTE\_FROM \_SPECIFIED\_LOCATIONS -> SELECT\_ORIGINS
* ROUTE\_TO\_SPECIFIED\_LOCATIONS -> SELECT\_DESTINATIONS
* LINK\_DELAY\_VOL\_FACTOR -> LINK\_DELAY\_FLOW\_FACTOR
* MAX\_ROUTING\_PROBLEMS -> MAX\_PROBLEM\_COUNT

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

NET\_DIRECTORY

ARCVIEW\_PROBLEM\_DUMP - does not exist in version 5

ROUTE\_WITH \_SPECIFIED \_MODE

SORT\_VEHICLES

ACTIVITY\_FILE

NODE\_LIST\_PATHS

MAX\_LINK\_DELAY\_ERRORS

# Examples

## Control File

TITLE Route the Highway and Transit Trips for 1.Router

DEFAULT\_FILE\_FORMAT TAB\_DELIMITED

PROJECT\_DIRECTORY ../

NODE\_FILE network/Node.txt

LINK\_FILE network/Link.txt

POCKET\_FILE network/Pocket.txt

PARKING\_FILE network/Parking.txt

CONNECTION\_FILE network/Connection.txt

LOCATION\_FILE network/Location.txt

#ACCESS\_FILE network/Access\_Link.txt

SELECTION\_FILE demand/Select.txt

LINK\_DELAY\_FILE NULL

TRIP\_FILE demand/Trip.txt

TIME\_OF\_DAY\_FORMAT HOUR\_CLOCK

VEHICLE\_FILE demand/Vehicle.txt

## (not needed in 4.0)

VEHICLE\_TYPE\_FILE ../input/Vehicle\_Type.txt

##PLAN\_FILE NULL

NEW\_PLAN\_FILE demand/1.Trip.Plans.\*

NEW\_PROBLEM\_FILE results/1.Trip.Problems

NEW\_LINK\_DELAY\_FILE results/1.Trip.LinkDelay

UPDATE\_FLOW\_RATES YES

CLEAR\_INPUT\_FLOW\_RATES YES

UPDATE\_TRAVEL\_TIMES YES

LINK\_DELAY\_UPDATE\_RATE -1

##LINK\_DELAY\_FLOW\_FACTOR 3.0

EQUATION\_PARAMETERS\_1 BPR, 0.15, 4.0, 0.75 //---- BPR, 0.15, 4.0, 0.75

EQUATION\_PARAMETERS\_2 BPR, 0.10, 4.5, 0.75

LIMIT\_PARKING\_ACCESS YES

IGNORE\_TIME\_CONSTRAINTS YES

WALK\_PATH\_DETAILS YES

WALK\_SPEED 1.0 //---- meters / second ----

WALK\_TIME\_VALUE 20.0 //---- imped / second ----

VEHICLE\_TIME\_VALUE 10.0 //---- imped / second ----

FIRST\_WAIT\_VALUE 20.0 //---- imped / second ----

TRANSFER\_WAIT\_VALUE 20.0 //---- imped / second ----

DISTANCE\_VALUE 1.0 //---- imped / meter ----

COST\_VALUE 5.0 //---- imped / cent ----

TRANSFER\_PENALTY 1200 //---- impedance ----

MAX\_WALK\_DISTANCE 2000 //---- meters ----

MIN\_WAIT\_TIME 60 //---- seconds ----

LEFT\_TURN\_PENALTY 300 //---- impedance ----

UTURN\_PENALTY 5000 //---- impedance ----

PARKING\_HOURS\_BY\_PURPOSE 8.5, 2.5, 1.0, 1.0 //---- hours ----

### Resulting .prn file from the above control file

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| Mon Apr 09 09:33:50 2012 |

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Control File = 1.Router.ctl

Report File = 1.Router.prn (Create)

Route the Highway and Transit Trips for 1.Router

Project Directory = ../

Default File Format = TAB\_DELIMITED

Time of Day Format = HOUR\_CLOCK

Model Start Time = 0:00

Model End Time = 27:00

Units of Measure = METRIC

Random Number Seed = 1333978430

Number of Threads = 1

Input System Network Files:

Node File = ../network/Node.txt

Link File = ../network/Link.txt

Pocket File = ../network/Pocket.txt

Connection File = ../network/Connection.txt

Parking File = ../network/Parking.txt

Location File = ../network/Location.txt

Input System Demand Files:

Selection File = ../demand/Select.txt

Vehicle Type File = ../../input/Vehicle\_Type.txt

Vehicle File = ../demand/Vehicle.txt

Trip File = ../demand/Trip.txt

Output System Demand Files:

New Link Delay File = ../results/1.Trip.LinkDelay

New Problem File = ../results/1.Trip.Problems

New Plan File = ../demand/1.Trip.Plans.\*

Notes And Name Fields = TRUE

Data Service Controls:

Number of Time Periods = 108

Flow-Time Service Controls:

Update Flow Rates = TRUE

Update Travel Times = TRUE

Link Delay Update Rate = -1

Equation Parameters 1 = BPR, A=0.15, B=4.00, C=0.75

Equation Parameters 2 = BPR, A=0.10, B=4.50, C=0.75

Path Building Parameters:

Walk Path Details = TRUE

Limit Parking Access = TRUE

Ignore Time Constraints = TRUE

Walk Speed = 1.00 mps

Select Service Controls:

Router Control Keys:

Number of Node File Records = 23

Number of Link File Records = 24

Number of Directional Links = 37

Number of Pocket File Records = 7

Number of Vehicle Type File Records = 15

Number of Connection File Records = 49

Number of Parking File Records = 60

Number of Location File Records = 60

Number of Selection File Records = 97008

Number of Vehicle File Records = 97001

Link Convergence Gap = 0

New Link Delay File Records = 3348

Number of Travel Time Updates = 1

Number of Trip File Records = 97008

Number of Trip File Households = 97001

Number of Trip File Persons = 97001

Number of Trip File Tours = 97002

Number of Trip File Trips = 97008

Number of Trip File Records = 97008

Number of New Plan File Partitions = 2

Number of New Plan File Records = 1014578

Number of New Plan File Households = 96830

Number of New Plan File Persons = 96830

Number of New Plan File Tours = 96831

Number of New Plan File Trips = 96837

Number of New Problem File Records = 171

Number of New Problem File Households = 171

Number of New Problem File Persons = 171

Number of New Problem File Tours = 171

Number of New Problem File Trips = 171

Total Number of Problems = 171 (0.2%)

Number of Path Building (#1) Problems = 171 (100.0%)

Mon Apr 09 09:34:02 2012 -- Process Complete (0:00:12)

## Control File Using Iterations

TITLE Route the Highway and Transit Trips for 1.Router

DEFAULT\_FILE\_FORMAT TAB\_DELIMITED

PROJECT\_DIRECTORY ../

NODE\_FILE network/Node.txt

LINK\_FILE network/Link.txt

POCKET\_FILE network/Pocket.txt

PARKING\_FILE network/Parking.txt

CONNECTION\_FILE network/Connection.txt

LOCATION\_FILE network/Location.txt

#ACCESS\_FILE network/Access\_Link.txt

SELECTION\_FILE demand/Select.txt

LINK\_DELAY\_FILE NULL

TRIP\_FILE demand/Trip.txt

TIME\_OF\_DAY\_FORMAT HOUR\_CLOCK

VEHICLE\_FILE demand/Vehicle.txt

## (not needed in 4.0)

VEHICLE\_TYPE\_FILE input/Vehicle\_Type\_v5.txt

##PLAN\_FILE NULL

NEW\_PLAN\_FILE demand/C.Trip.Plans.\*

NEW\_PROBLEM\_FILE results/C.Trip.Problems

NEW\_LINK\_DELAY\_FILE results/C.Trip.LinkDelay

## (no 4.0 equivalance)

UPDATE\_FLOW\_RATES YES

CLEAR\_INPUT\_FLOW\_RATES YES

UPDATE\_TRAVEL\_TIMES YES

LINK\_DELAY\_UPDATE\_RATE -1

LINK\_DELAY\_FLOW\_FACTOR 1.0

EQUATION\_PARAMETERS\_1 BPR, 0.15, 4.0, 0.75 //---- BPR, 0.15, 4.0, 0.75

EQUATION\_PARAMETERS\_2 BPR, 0.10, 4.5, 0.75

LIMIT\_PARKING\_ACCESS YES

IGNORE\_TIME\_CONSTRAINTS YES

WALK\_PATH\_DETAILS YES

WALK\_SPEED 1.0 //---- meters / second ----

WALK\_TIME\_VALUE 20.0 //---- imped / second ----

VEHICLE\_TIME\_VALUE 10.0 //---- imped / second ----

FIRST\_WAIT\_VALUE 20.0 //---- imped / second ----

TRANSFER\_WAIT\_VALUE 20.0 //---- imped / second ----

DISTANCE\_VALUE 1.0 //---- imped / meter ----

COST\_VALUE 5.0 //---- imped / cent ----

TRANSFER\_PENALTY 1200 //---- impedance ----

MAX\_WALK\_DISTANCE 2000 //---- meters ----

MIN\_WAIT\_TIME 60 //---- seconds ----

LEFT\_TURN\_PENALTY 300 //---- impedance ----

UTURN\_PENALTY 5000 //---- impedance ----

PARKING\_HOURS\_BY\_PURPOSE 8.5, 2.5, 1.0, 1.0 //---- hours ----

MAXIMUM\_NUMBER\_OF\_ITERATIONS 10

NEW\_LINK\_CONVERGENCE\_FILE results/LinkConvergence.txt

NEW\_TRIP\_CONVERGENCE\_FILE results/TripConvergence.txt

ROUTER\_REPORT\_1 LINK\_GAP\_REPORT

ROUTER\_REPORT\_2 TRIP\_GAP\_REPORT

ROUTER\_REPORT\_3 ITERATION\_PROBLEMS

### Resulting .prn file from the Control File with Iterations

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| Thu Apr 26 09:48:13 2012 |

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Control File = C.Router.ctl

Report File = C.Router.prn (Create)

Route the Highway and Transit Trips for 1.Router

Project Directory = ../

Default File Format = TAB\_DELIMITED

Time of Day Format = HOUR\_CLOCK

Model Start Time = 0:00

Model End Time = 27:00

Units of Measure = METRIC

Random Number Seed = 1335448093

Number of Threads = 1

Input System Network Files:

Node File = ../network/Node.txt

Link File = ../network/Link.txt

Pocket File = ../network/Pocket.txt

Connection File = ../network/Connection.txt

Parking File = ../network/Parking.txt

Location File = ../network/Location.txt

Input System Demand Files:

Selection File = ../demand/Select.txt

Vehicle Type File = ../input/Vehicle\_Type\_v5.txt

Vehicle File = ../demand/Vehicle.txt

Trip File = ../demand/Trip.txt

Output System Demand Files:

New Link Delay File = ../results/C.Trip.LinkDelay

New Problem File = ../results/C.Trip.Problems

New Plan File = ../demand/C.Trip.Plans.\*

Notes And Name Fields = TRUE

Data Service Controls:

Number of Time Periods = 108

Flow-Time Service Controls:

Update Flow Rates = TRUE

Update Travel Times = TRUE

Link Delay Update Rate = -1

Link Delay Flow Factor = 1

Equation Parameters 1 = BPR, A=0.15, B=4.00, C=0.75

Equation Parameters 2 = BPR, A=0.10, B=4.50, C=0.75

Path Building Parameters:

Walk Path Details = TRUE

Limit Parking Access = TRUE

Ignore Time Constraints = TRUE

Walk Speed = 1.00 mps

Select Service Controls:

Router Control Keys:

Maximum Number of Iterations = 10

New Link Convergence File = ../results/LinkConvergence.txt

New Trip Convergence File = ../results/TripConvergence.txt

Router Reports: 1. LINK\_GAP\_REPORT

2. TRIP\_GAP\_REPORT

3. ITERATION\_PROBLEMS

Number of Node File Records = 23

Number of Link File Records = 24

Number of Directional Links = 37

Number of Pocket File Records = 7

Number of Vehicle Type File Records = 16

Number of VehType Data Records = 15

Number of Connection File Records = 49

Number of Parking File Records = 60

Number of Location File Records = 60

Number of Selection File Records = 97000

Number of Vehicle File Records = 97000

Iteration Number 1: Weighting Factor = 1

Link Convergence Gap = 1

Trip Convergence Gap = 1

Total Number of Problems = 181 (0.2%)

Number of Path Building (#1) Problems = 181 (100.0%)

Iteration Number 2: Weighting Factor = 2

Link Convergence Gap = 0.552474

Trip Convergence Gap = 0

New Link Delay File Records = 3348

Link Gap Report

-------------- Link Gap -------------- % ---------- VHT ----------

Iteration Total Std.Dev Maximum RMSE Difference Total

1 1.000000 2.657797 1.000000 283.9 4380 4380

2 0.552474 1.683919 0.619440 177.2 2420 4380

Trip Gap Report

-------------- Trip Gap -------------- % ----- Impedance/100 -----

Iteration Total Std.Dev Maximum RMSE Difference Total

1 1.000000 0.153120 1.000000 101.2 2318640 2318640

2 0.000000 0.000000 0.000000 0.0 0 2318640

Number of Travel Time Updates = 2

Number of Trip File Records = 97000

Number of Trip File Households = 97000

Number of Trip File Persons = 97000

Number of Trip File Tours = 97000

Number of Trip File Trips = 97000

Number of Trip File Records = 97000

Number of New Plan File Partitions = 2

Number of New Plan File Records = 1014341

Number of New Plan File Households = 96819

Number of New Plan File Persons = 96819

Number of New Plan File Tours = 96819

Number of New Plan File Trips = 96819

Number of New Problem File Records = 181

Number of New Problem File Households = 181

Number of New Problem File Persons = 181

Number of New Problem File Tours = 181

Number of New Problem File Trips = 181

Total Number of Problems = 181 (0.2%)

Number of Path Building (#1) Problems = 181 (100.0%)

Thu Apr 26 09:48:49 2012 -- Process Complete (0:00:36)

## Control File to Update Travel Times in Existing Plans

TITLE Router Test

SELECTION\_FILE demand/select.txt

TRIP\_FILE demand/trip.txt

VEHICLE\_FILE demand/vehicle.txt

VEHICLE\_TYPE\_FILE inputs/vehicle\_type.txt

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

LINK\_DELAY\_FILE results/1.linkdelay.txt

PLAN\_FILE demand/1.plans.\*

NEW\_PLAN\_FILE demand/2.plans.\*

NEW\_PROBLEM\_FILE demand/router\_problems.txt

NEW\_LINK\_DELAY\_FILE results/2.linkdelay.txt

UPDATE\_FLOW\_RATES NO

CLEAR\_INPUT\_FLOW\_RATES NO

UPDATE\_TRAVEL\_TIMES YES

LINK\_DELAY\_UPDATE\_RATE -1

IMPEDANCE\_SORT\_METHOD FALSE

WALK\_PATH\_DETAILS TRUE

LIMIT\_PARKING\_ACCESS TRUE

IGNORE\_TIME\_CONSTRAINTS TRUE

END\_TIME\_CONSTRAINT 20

PERCENT\_RANDOM\_IMPEDANCE 0

WALK\_SPEED 1

MAX\_WALK\_DISTANCIES 2000

DEFAULT\_PARKING\_DURATION 2

LOCAL\_ACCESS\_DISTANCE 1000

LOCAL\_FACILITY\_TYPE EXTERNAL

LOCAL\_IMPEDANCE\_FACTOR 2.0

MAX\_CIRCUITY\_RATIO 0.0

MIN\_CIRCUITY\_DISTANCE 1000

MAX\_CIRCUITY\_DISTANCE 100000

### Resulting .prn file

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| Wed May 29 10:23:00 2013 |

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Control File = Router.ctl

Report File = Router.prn (Create)

Router Test

Project Directory = ../

Default File Format = TAB\_DELIMITED

Time of Day Format = HOUR\_CLOCK

Model Start Time = 6:00

Model End Time = 10:00

Units of Measure = ENGLISH

Random Number Seed = 1369837380

Number of Threads = 2

Warning: Router is Not Thread Enabled

Input System Network Files:

Node File = ../network/node.txt

Link File = ../network/link.txt

Pocket File = ../network/pocket.txt

Connection File = ../network/connection.txt

Parking File = ../network/parking.txt

Location File = ../network/location2.txt

Input System Demand Files:

Selection File = ../demand/select.txt

Link Delay File = ../results/1.linkdelay.txt

Vehicle Type File = ../inputs/vehicle\_type.txt

Vehicle File = ../demand/vehicle.txt

Trip File = ../demand/trip.txt

Plan File = ../demand/1.plans.\* (2 partitions)

Output System Demand Files:

New Link Delay File = ../results/2.linkdelay.txt

New Problem File = ../demand/router\_problems.txt

New Plan File = ../demand/2.plans.\*

Notes And Name Fields = TRUE

Data Service Controls:

Number of Time Periods = 16

Flow-Time Service Controls:

Update Flow Rates = FALSE

Update Travel Times = TRUE

Link Delay Update Rate = -1

Equation Parameters 1 = BPR, A=0.15, B=4.00, C=0.75

Path Building Parameters:

Impedance Sort Method = FALSE

Walk Path Details = TRUE

Limit Parking Access = TRUE

Ignore Time Constraints = TRUE

Percent Random Impedance = 0.00 percent

Walk Speed = 3.28 fps

Default Parking Duration = 2.0 hours

Local Facility Type = EXTERNAL

Max Circuity Ratio = 0

Select Service Controls:

Router Control Keys:

Number of Node File Records = 57

Number of Link File Records = 72

Number of Directional Links = 114

Number of Pocket File Records = 30

Number of Vehicle Type File Records = 14

Number of Connection File Records = 190

Number of Parking File Records = 192

Number of Location File Records = 192

Number of Selection File Records = 28251

Number of Link Delay File Records = 1021

Number of Link Direction Records = 1021

Number of Link Connection Records = 0

Number of Summary Time Periods = 16

Percent of Link Periods with Travel Time Data = 56.0%

Percent of Time Periods with Link Delay Data = 56.3%

Number of Vehicle File Records = 28251

Link Convergence Gap = 0

Trip Convergence Gap = 0.0705539

New Link Delay File Records = 0

Number of Travel Time Updates = 1

Number of Trip File Records = 28251

Number of Trip File Households = 28251

Number of Trip File Persons = 28251

Number of Trip File Tours = 28251

Number of Trip File Trips = 28251

Number of Plan File Partitions = 2

Number of Plan File Records = 315122

Number of Plan File Households = 28251

Number of Plan File Persons = 28251

Number of Plan File Tours = 28251

Number of Plan File Trips = 28251

Number of New Plan File Partitions = 2

Number of New Plan File Records = 310187

Number of New Plan File Households = 28251

Number of New Plan File Persons = 28251

Number of New Plan File Tours = 28251

Number of New Plan File Trips = 28251

Wed May 29 10:23:07 2013 -- Process Complete with 1 Warning (0:00:07)

1. Castiglione, Joe, et al, “Building and Integrated Activity Based and Dynamic Network Assignment Model,” downloaded from <http://jbowman.net/papers/2010.Castiglione_et_al.Integrated_Activity-Based_and_DTA.pdf>, on 10 April 2012. [↑](#footnote-ref-1)