# Assistance with Development and Application of the TPB Travel Demand Model

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AECOM

May 23, 2014

# FY 2014 Task Orders

- T.O. 10 – Meetings and General Support
  - LineSum software and network corrections – April 15th
- T.O. 11 – Cube-Based Walkshed Process
  - Received MWCOG comments on May 15th
- T.O. 12 – HOT/HOV Highway Assignment
  - Calibrated HOV model and streamlined toll processing
  - Draft report submitted on May 22nd
- T.O. 13 – Mode Choice and Transit Modeling
  - Calibrated ModeChoice models and PT path building
  - Draft report submitted on May 9th

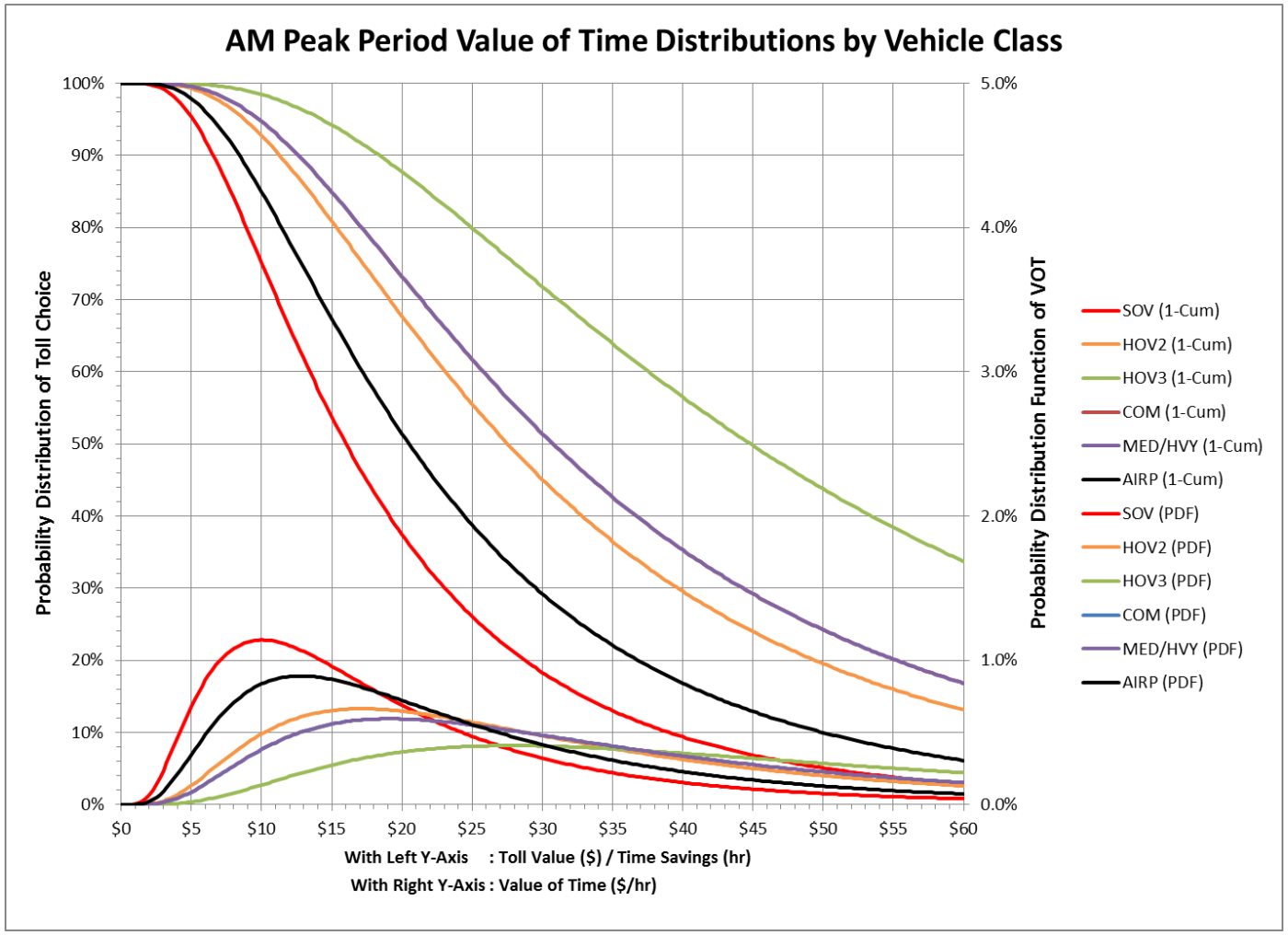
# T.O. 11 – Cube Walkshed Process

- MWCOG Comments
  - Minor reporting-related correction delivered on 5/19
  - MWCOG testing produced acceptable results
  - Editorial comments to be addressed in final report
  - Process integrated into Version 2.3.56
  - Hands-on walk-through scheduled for 5/28

# T.O. 12 – HOT/HOV Assignments

- Revised HOV choice model
  - Incorporated Value of Time (VOT) curves
  - Re-calibrated HOV choice model using TPB counts
    - SOV <> HOV2 <> HOV3
- Integrated toll-setting/choice in traffic assignment
  - TPB VOT distributions by time-period & vehicle-class
  - Consolidated toll-groups from 134 to 91
- Software & Documentation delivered on 5/22

# Sample AM VOT Distribution



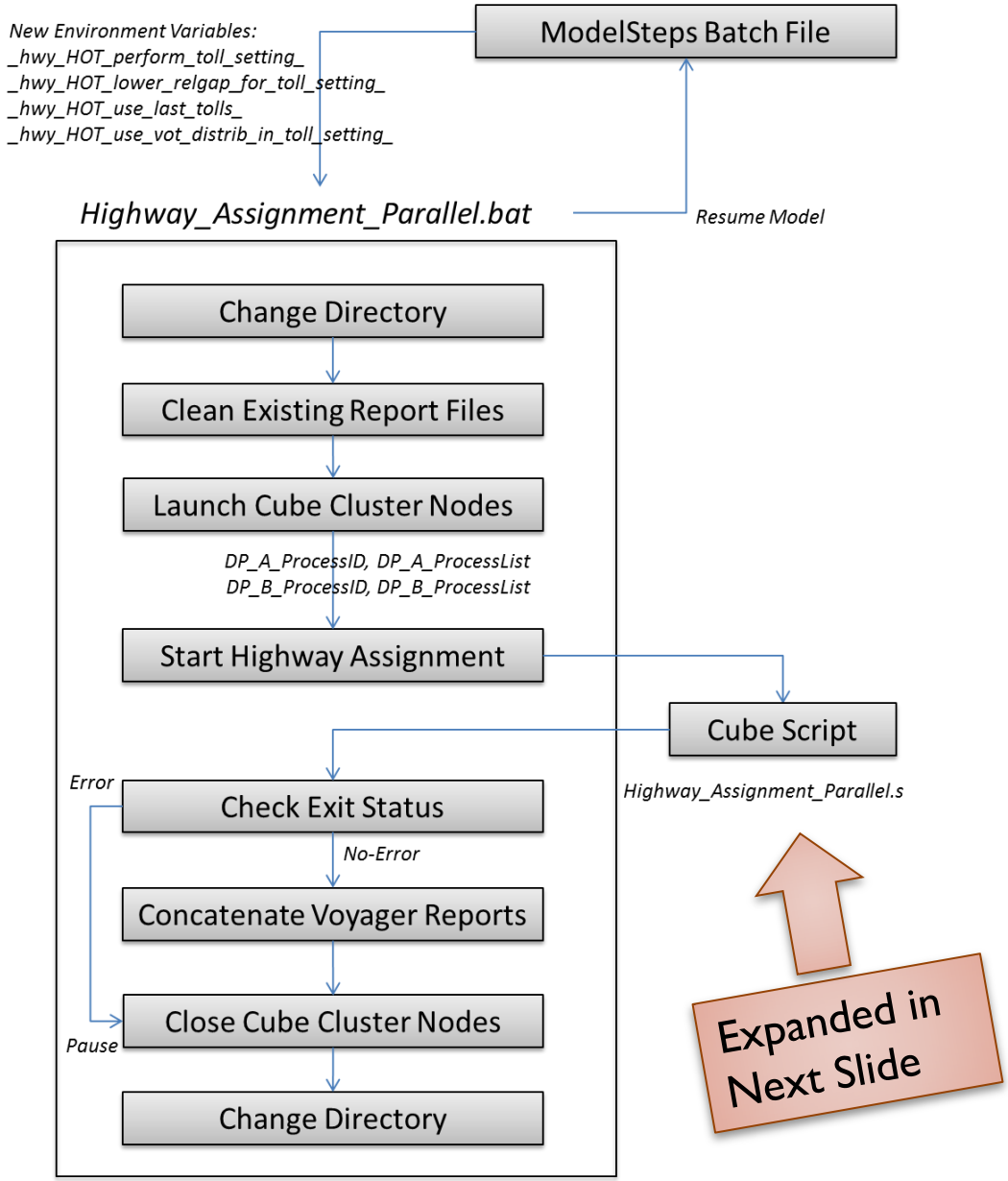
# Key Enhancements

- Consolidates "_base" & "_final" → "_EC" (existing plus committed)
  - Cuts model execution time to 50%
- Removes "two-step" assignment
  - HOV-Choice model helps in improving HOV3 volumes
- Integrated optional toll-setting
  - Option to lower relative gap during toll-setting
  - Option to carry forward latest-tolls across speed-feedbacks
- Streamlined Cube Cluster setup
  - AMsubnode, PMsubnode → DP_A_ProcessID, DP_B_ProcessID
- Centralized/consistent code across time periods
  - Scripts divided into logical files
  - Selectively re-use common code with "READ FILE"

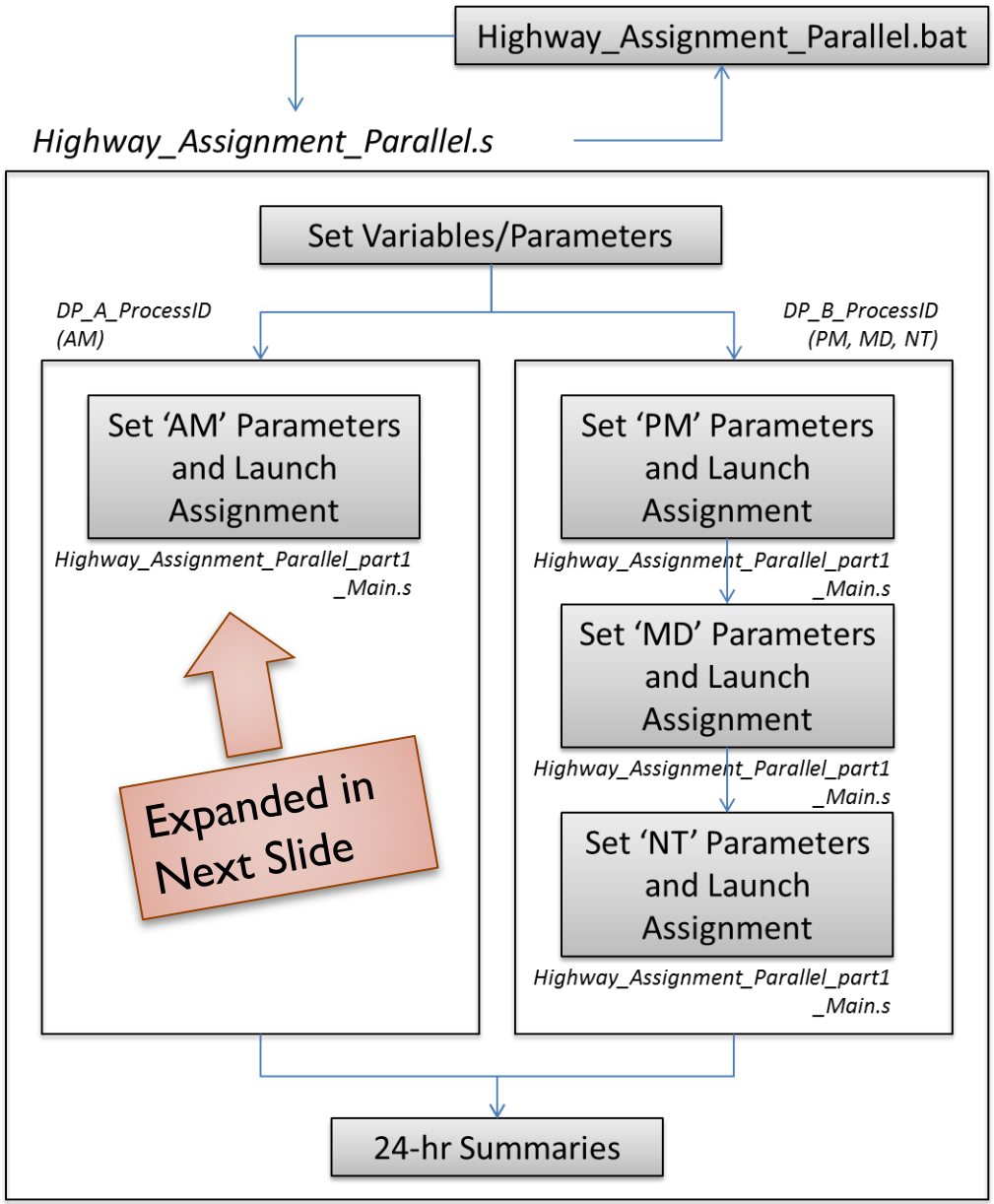
# Other Enhancements

- Improves/re-organizes assignment code
  - Moved functions and link-variables to ADJUST phase
    - Ensures all Cube Cluster subnodes use common data
- Avoids zero-lane volume assignment
  - New pathgroup (=32) traps and disables links with zero lanes
- Includes setups for
  - Walkshed (T.O. 11) and ModeChoice (T.O. 13)
- Includes new/modified files in "Inputs"
  - New : Value of time distributions, seed toll files
  - Modified : Link.dbf, Toll_Esc.dbf
- Includes several parameters for toll calibration
  - Toll limits, rate of change, resolution of precision
  - Perceived toll-path travel time (reliability), etc.

# Batch Process



# Parallel Execution



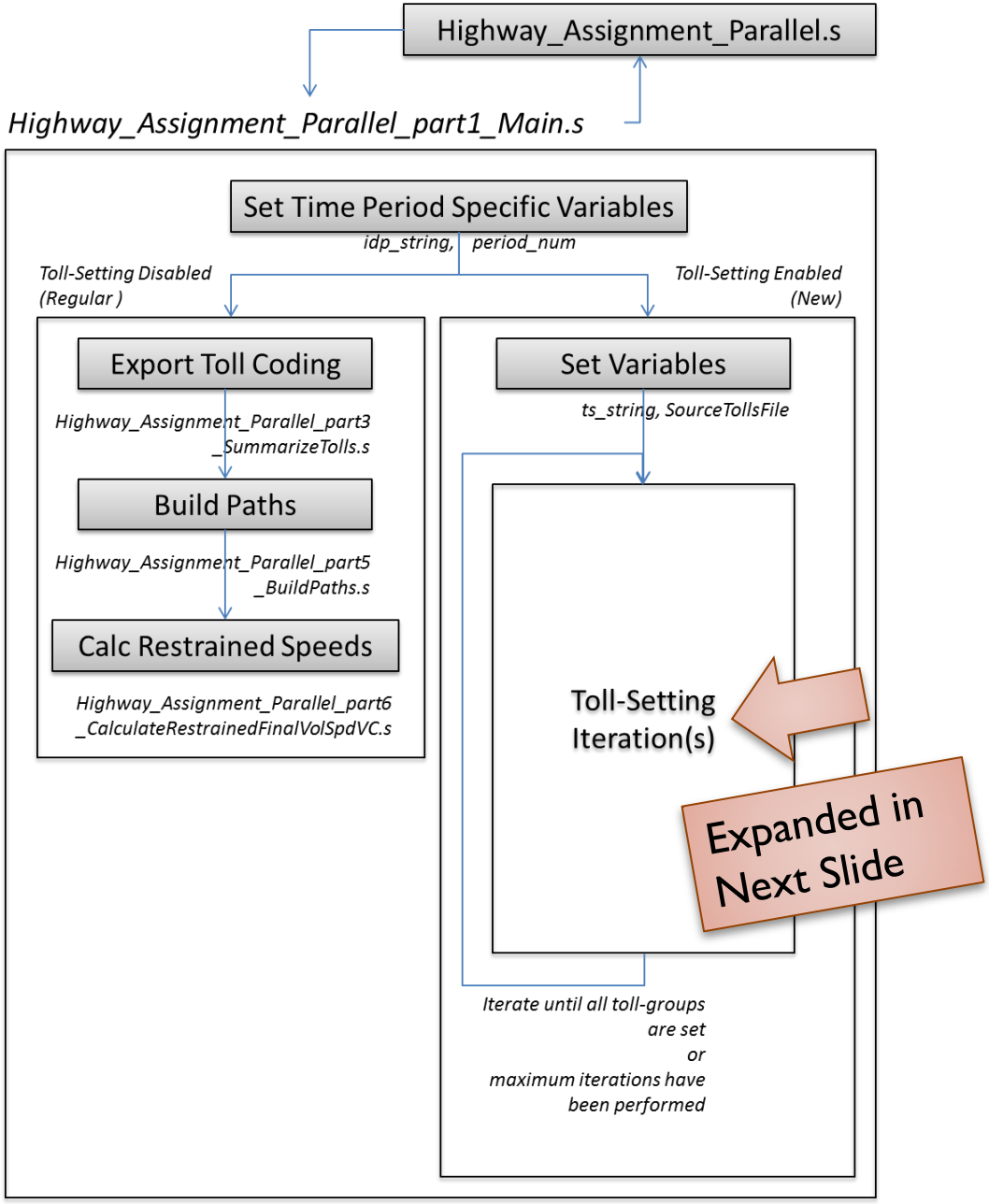
# Toll-Based Options

## Estimated Runtimes:

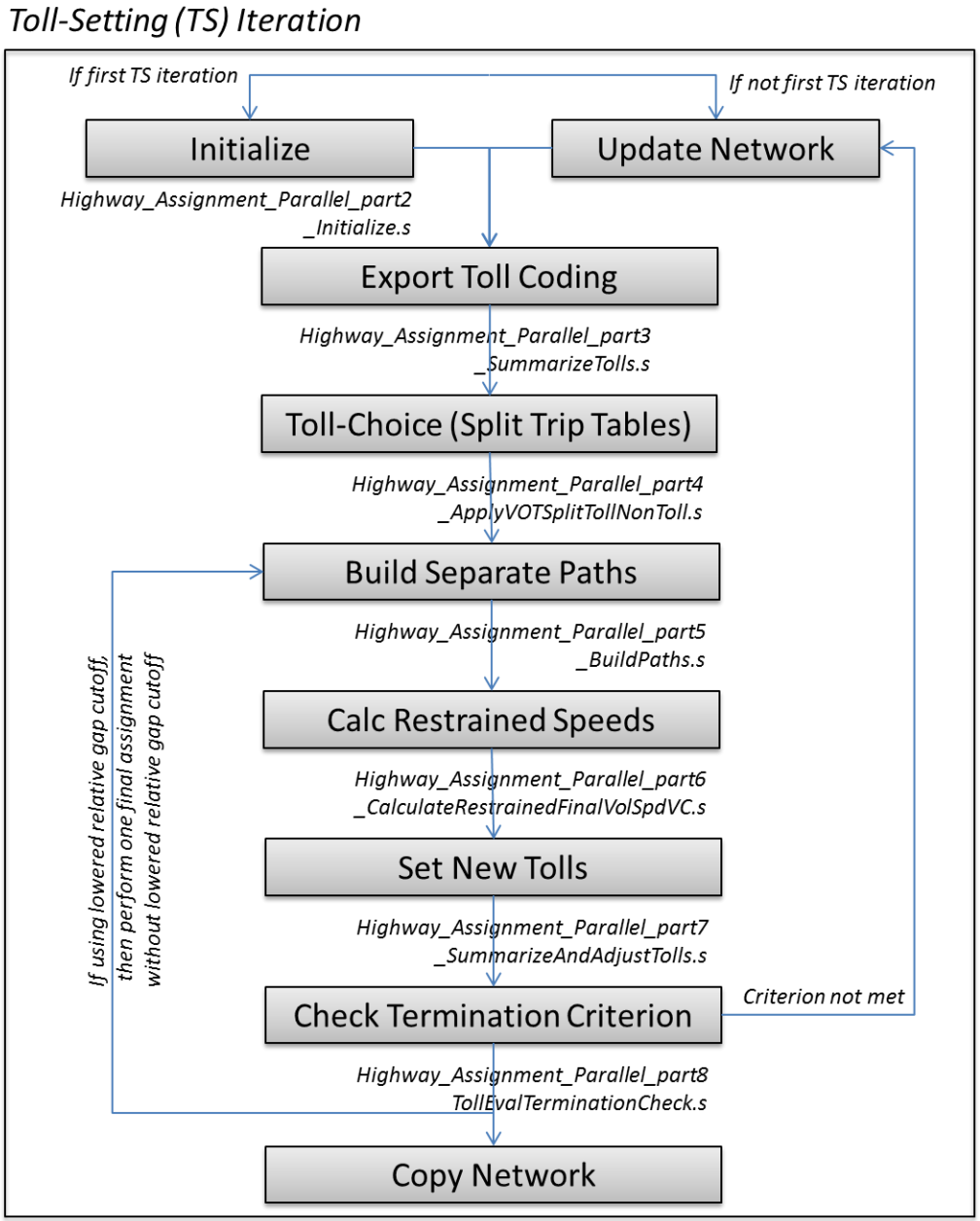
Full model run (equal to base+final) with 4 speed feedback iterations

Without toll-setting: ~24 hours

With toll-setting: 24 hrs to 5+ days



# Toll-Setting Iterations



# T.O. 13 – Mode Choice and PT Paths

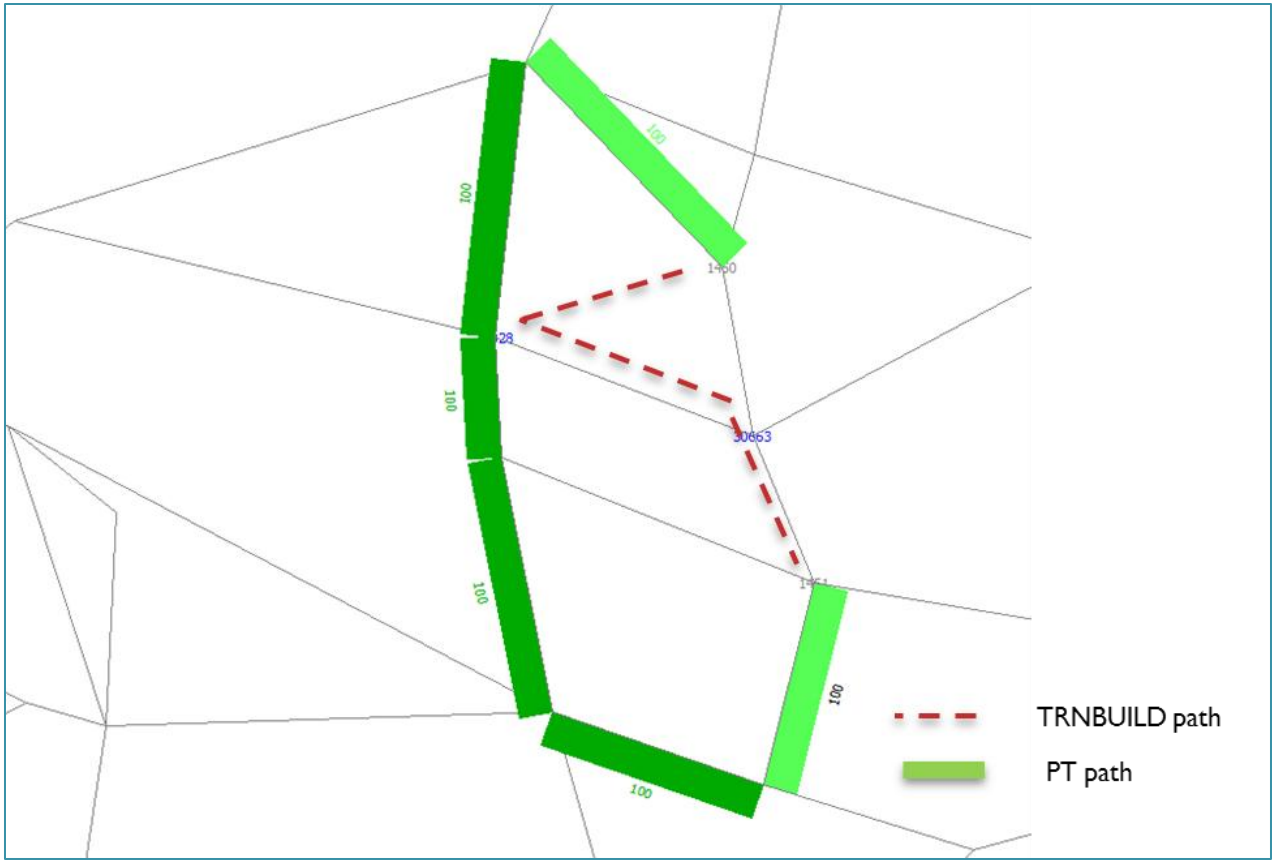
- Compare PT and TRNBUILD transit paths
- Adjust parameters and calibrate PT-based paths
- Finalize ModeChoice calibration targets
- Calibrate ModeChoice with PT or TRNBUILD skims

# PT vs. TRNBUILD Transit Paths

- PT factor file updated based on TRNBUILD parameters implemented in transit skim script
  - Link RUNFACTOR for transit modes set to 1.00
  - Walk access RUNFACTOR set to 1.50
  - Drive access RUNFACTOR set to 2.00
  - Walk transfer link RUNFACTOR set to 2.00
  - A wait time factor of 2.50 is specified at nodes
  - A transfer penalty of 2.50 from modes 1-10 to 1-10

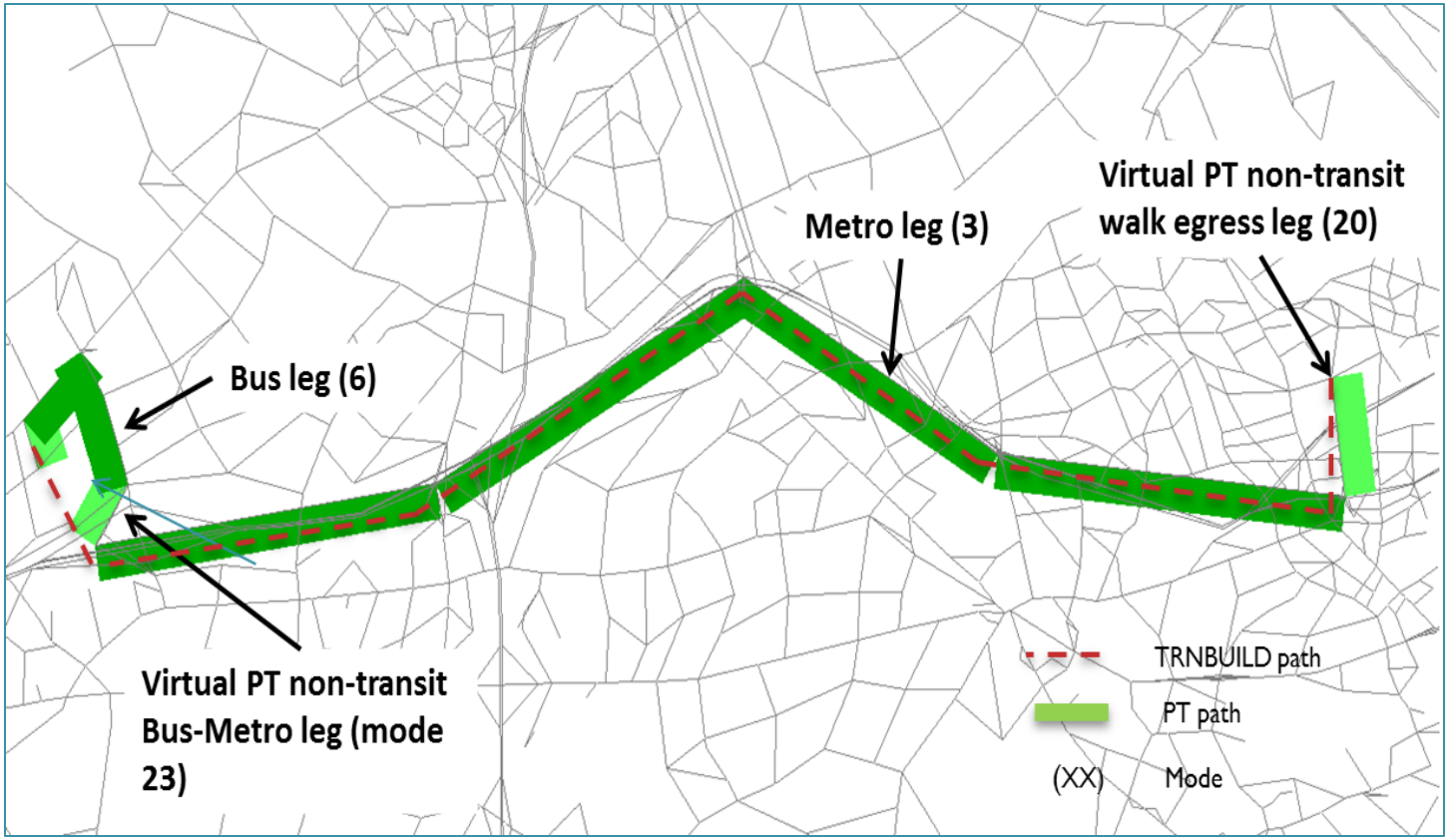
# Walk-Only Path Difference

- PT doesn't allow walk-only transit paths



# Long Walks to Metro Station

- PT limits long walks to Metrorail stations



# PT vs. TRNBUILD Transit Skim

- Average AM Peak Bus-Metro skim values by mode of access

| | | TRNBUILD | | | PT | | |
|---|---|---|---|---|---|---|---|
| | | PNR | KNR | WK | PNR | KNR | WK |
| In-Vehicle Time (minutes) | Local Bus | 24 | 24 | 27 | 47 | 51 | 51 |
| | Express Bus | 45 | 46 | 43 | 55 | 54 | 45 |
| | Metro Rail | 32 | 32 | 32 | 20 | 21 | 22 |

# PT Recommendations

- Access Legs
  - Adjust walk access leg maximum distance and time
  - Add walk links for large zones without appropriate walk leg
- Factors
  - Add new factors that were not included in TB path building
  - Calibrate the boarding, wait and transfer factors and penalties to represent reasonable paths
- Path Conditioning
  - Build walk-only paths and drop transit paths with longer travel times (or add walk choice to mode choice)

# ModeChoice vs AEMS

- ModeChoice Replicates AEMS results

| | AEMS | | ModeChoice | | Difference | |
|---|---|---|---|---|---|---|
| Purpose | Auto | Transit | Auto | Transit | Auto | Transit |
| HBW | 2,974,260 | 788,720 | 2,974,260 | 788,719 | 0 | 0 |
| HBO | 6,658,699 | 199,628 | 6,658,699 | 199,628 | 0 | 0 |
| HBS | 2,929,669 | 20,075 | 2,929,669 | 20,075 | 0 | 0 |
| NHW | 1,480,717 | 75,107 | 1,480,717 | 75,107 | 0 | 0 |
| NHO | 3,129,409 | 31,418 | 3,129,409 | 31,418 | 0 | 0 |

- ModeChoice runs significantly faster than AEMS

| Purpose | AEMS | ModeChoice | Time Saving | Time Saving % |
|---|---|---|---|---|
| HBW | 0:13:30 | 0:05:46 | 0:07:44 | 57% |
| HBO | 0:12:30 | 0:05:13 | 0:07:17 | 58% |
| HBS | 0:10:00 | 0:03:38 | 0:06:22 | 64% |
| NHW | 0:12:45 | 0:03:55 | 0:08:50 | 69% |
| NHO | 0:14:45 | 0:03:47 | 0:10:58 | 74% |

# Developing ModeChoice Targets

- 2007/2008 Household Travel Survey and transit on-board surveys include "Other" mode
  - Distribute "Other" trips to HOV2/3+ and walk/bike
- Scale target trips to input person trip totals

| Purpose | | Inc_1 | Inc_2 | Inc_3 | Inc_4 | Total |
|---|---|---|---|---|---|---|
| HBW | Person Trips | 634,125 | 1,111,528 | 907,913 | 1,109,413 | 3,762,978 |
| | Target | 455,314 | 1,158,295 | 1,180,607 | 719,282 | 3,513,498 |
| | Ratio | 1.39 | 0.96 | 0.77 | 1.54 | 1.07 |
| HBS | Person Trips | 549,712 | 871,438 | 707,461 | 821,131 | 2,949,743 |
| | Target | 441,532 | 999,342 | 984,940 | 456,151 | 2,881,965 |
| | Ratio | 1.25 | 0.87 | 0.72 | 1.80 | 1.02 |
| HBO | Person Trips | 1,041,523 | 1,994,036 | 1,705,448 | 2,117,320 | 6,858,327 |
| | Target | 847,629 | 2,158,608 | 2,187,745 | 1,222,492 | 6,416,474 |
| | Ratio | 1.23 | 0.92 | 0.78 | 1.73 | 1.07 |
| NHW | Person Trips | 1,555,825 | - | - | - | 1,555,825 |
| | Target | 1,608,589 | - | - | - | 1,608,589 |
| | Ratio | 0.97 | - | - | - | 0.97 |
| NHO | Person Trips | 3,160,826 | - | - | - | 3,160,826 |
| | Target | 2,916,721 | - | - | - | 2,916,721 |
| | Ratio | 1.08 | - | - | - | 1.08 |

# Mode Choice Targets by Geography

- Existing mode choice results used to develop geographic market segments targets

| Segment | Mode | Target | HBWI1Psn | HBWI2Psn | HBWI3Psn | HBWI4Psn | Min_Const | Max_Const |
|---|---|---|---|---|---|---|---|---|
| 1 | AUTO | 15,069 | 1,780 | 4,129 | 2,568 | 6,591 | -8 | 8 |
| 1 | TRANSIT | 135,305 | 39,664 | 45,536 | 26,877 | 23,228 | -8 | 8 |
| 1 | SOV | 11,111 | 1,039 | 2,958 | 1,989 | 5,125 | -8 | 8 |
| 1 | HOV | 3,957 | 741 | 1,171 | 579 | 1,466 | -8 | 8 |
| 1 | SR2 | 3,236 | 401 | 961 | 536 | 1,338 | -8 | 8 |
| 1 | SR3 | 721 | 340 | 210 | 43 | 128 | -8 | 8 |
| 1 | WALK | 126,698 | 38,983 | 43,463 | 25,561 | 18,690 | -8 | 8 |
| 1 | PNR | 6,806 | 321 | 1,764 | 1,138 | 3,584 | -8 | 8 |
| 1 | KNR | 1,801 | 360 | 308 | 179 | 954 | -8 | 8 |
| 1 | WK_CR | - | - | - | - | - | -8 | 8 |
| 1 | WK_BUS | 26,021 | 9,790 | 8,702 | 4,328 | 3,201 | -8 | 8 |
| 1 | WK_BUS_MR | 1,078 | 559 | 284 | 166 | 69 | -8 | 8 |
| 1 | WK_MR | 99,599 | 28,634 | 34,477 | 21,067 | 15,421 | -8 | 8 |
| 1 | PNR_CR | 16 | - | 1 | 1 | 14 | -8 | 8 |
| 1 | PNR_BUS | 1,957 | 37 | 229 | 191 | 1,500 | -8 | 8 |
| 1 | PNR_BUS_MR | 53 | 1 | 8 | 5 | 38 | -8 | 8 |
| 1 | PNR_MR | 4,780 | 283 | 1,526 | 940 | 2,031 | -8 | 8 |
| 1 | KNR_CR | 15 | - | 1 | 1 | 13 | -8 | 8 |
| 1 | KNR_BUS | 252 | 15 | 41 | 13 | 182 | -8 | 8 |
| 1 | KNR_BUS_MR | 17 | 1 | 2 | 1 | 14 | -8 | 8 |
| 1 | KNR_MR | 1,517 | 344 | 265 | 163 | 746 | -8 | 8 |

# ModeChoice Control File

- ModeChoice program includes a calibration option with the following control keys

```
CALIBRATION_TARGET_FILE          ..\Targets\HBW_Target.txt
CALIBRATION_SCALING_FACTOR       1.0
MAX_CALIBRATION_ITERATIONS       35
CALIBRATION_EXIT_RMSE            1.0

NEW_MODE_CONSTANT_FILE           Results\HBW_Constant.txt
NEW_CALIBRATION_DATA_FILE        Results\HBW_Data.txt
```

  - In this example, mode choice calibration is terminated after 35 iterations or after the %RMSE reaches 1.0
  - New constant file generated by the calibration process
    - This file could be used as input to additional iterations or manually adjusted to smooth the mode relationships

# Calibrated Mode Choice Constants

| SEGMENT | MODE | CONSTANT | HBWI1Psn | HBWI2Psn | HBWI3Psn | HBWI4Psn |
|---|---|---|---|---|---|---|
| 1 | AUTO | -4.10187 | 0 | 0 | 0 | 0 |
| 1 | TRANSIT | 0.457475 | 0 | 0 | 0 | 0 |
| 1 | SOV | 0.452156 | 0.086808 | -0.047207 | -0.115911 | -0.021701 |
| 1 | HOV | -1.26907 | 0 | 0 | 0 | 0 |
| 1 | SR2 | 0.327719 | 0.019066 | -0.002239 | -0.052639 | 0.007548 |
| 1 | SR3 | -1.472459 | 0.132683 | -0.0077 | -0.063468 | -0.071511 |
| 1 | WALK | 0.559373 | 0 | 0 | 0 | 0 |
| 1 | PNR | -6.163959 | 0 | 0 | 0 | 0 |
| 1 | KNR | -8 | 0 | 0 | 0 | 0 |
| 1 | WK_CR | -8 | 0 | 0 | 0 | 0 |
| 1 | WK_BUS | -8 | 2.050827 | -0.111487 | -0.388347 | -1.546896 |
| 1 | WK_BUS_MR | -8 | 2.141045 | -0.05426 | -0.109891 | -1.986867 |
| 1 | WK_MR | 4.355141 | 0.539211 | 0.398683 | 1.380123 | -2.715556 |
| 1 | PNR_CR | 0.330064 | -0.000004 | -0.000019 | -0.000834 | 0.000813 |
| 1 | PNR_BUS | -0.88912 | 0.00784 | -0.073179 | -0.050764 | 0.147235 |
| 1 | PNR_BUS_MR | -3.396381 | 0.000355 | 0.000255 | -0.000725 | 0.000142 |
| 1 | PNR_MR | 0.402574 | 0.083632 | -0.078456 | -0.072367 | 0.054999 |
| 1 | KNR_CR | 2.842118 | -0.000005 | 0.000056 | -0.000606 | 0.000691 |
| 1 | KNR_BUS | 0.565216 | 0.006458 | -0.012631 | -0.022639 | 0.036693 |
| 1 | KNR_BUS_MR | -1.731248 | 0.00036 | 0.000176 | -0.000359 | -0.00043 |
| 1 | KNR_MR | -0.101797 | 0.100862 | -0.018457 | -0.043119 | -0.126873 |
| 2 | AUTO | -3.362189 | 0 | 0 | 0 | 0 |
| 2 | TRANSIT | 0.52012 | 0 | 0 | 0 | 0 |
| 2 | SOV | 0.451049 | 0.617618 | -0.155096 | -0.165504 | -0.751373 |
| 2 | HOV | -1.906077 | 0 | 0 | 0 | 0 |
| 2 | SR2 | 0.275734 | 0.205458 | 0.002103 | -0.030392 | -0.463965 |
| 2 | SR3 | -0.578636 | 0.331371 | -0.057415 | -0.142665 | -0.48458 |
| 2 | WALK | 0.587861 | 0 | 0 | 0 | 0 |
| 2 | PNR | -4.792535 | 0 | 0 | 0 | 0 |
| 2 | KNR | -8 | 0 | 0 | 0 | 0 |

# Initial Targets vs. Estimated Trips

- Discrepancies by geographic market segments (HBW)

| Geographic Segment | Auto Target | Auto Trips | Auto Difference | Transit Target | Transit Trips | Transit Difference | Total Target | Total Trips | Total Difference |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15,068 | 5,068 | (10,000) | 135,305 | 145,306 | 10,001 | 150,373 | 150,374 | 1 |
| 2 | 1,408 | 1,813 | 405 | 9,097 | 8,694 | (403) | 10,505 | 10,507 | 2 |
| 3 | 12,219 | 12,570 | 351 | 64,008 | 63,659 | (349) | 76,227 | 76,229 | 2 |
| 4 | 34,426 | 37,648 | 3,222 | 9,403 | 6,185 | (3,218) | 43,829 | 43,833 | 4 |
| 5 | 7,826 | 7,899 | 73 | 23,678 | 23,607 | (71) | 31,504 | 31,506 | 2 |
| 6 | 1,031 | 1,171 | 140 | 1,955 | 1,816 | (139) | 2,986 | 2,987 | 1 |
| 7 | 22,326 | 23,447 | 1,121 | 12,845 | 11,725 | (1,120) | 35,171 | 35,172 | 1 |
| 8 | 23,501 | 23,826 | 325 | 3,441 | 3,117 | (324) | 26,942 | 26,943 | 1 |
| 9 | 5,216 | 6,064 | 848 | 38,422 | 37,576 | (846) | 43,638 | 43,640 | 2 |
| 10 | 15,703 | 17,396 | 1,693 | 11,470 | 9,779 | (1,691) | 27,173 | 27,175 | 2 |
| 11 | 24,503 | 27,147 | 2,644 | 19,157 | 16,510 | (2,647) | 43,660 | 43,657 | (3) |
| 12 | 37,263 | 35,916 | (1,347) | 2,899 | 4,248 | 1,349 | 40,162 | 40,164 | 2 |
| 13 | 177,452 | 178,547 | 1,095 | 120,364 | 119,270 | (1,094) | 297,816 | 297,817 | 1 |
| 14 | 29,012 | 29,535 | 523 | 16,728 | 16,205 | (523) | 45,740 | 45,740 | - |
| 15 | 226,826 | 209,538 | (17,288) | 51,325 | 68,611 | 17,286 | 278,151 | 278,149 | (2) |
| 16 | 1,196,552 | 1,196,782 | 230 | 21,859 | 21,629 | (230) | 1,218,411 | 1,218,411 | - |
| 17 | 110,368 | 98,934 | (11,434) | 55,865 | 67,300 | 11,435 | 166,233 | 166,234 | 1 |
| 18 | 50,533 | 49,644 | (889) | 27,004 | 27,893 | 889 | 77,537 | 77,537 | - |
| 19 | 137,427 | 125,526 | (11,901) | 25,637 | 37,537 | 11,900 | 163,064 | 163,063 | (1) |
| 20 | 972,742 | 973,404 | 662 | 11,100 | 10,438 | (662) | 983,842 | 983,842 | - |
| **Total** | **3,101,402** | **3,061,875** | **(39,527)** | **661,562** | **701,105** | **39,543** | **3,762,964** | **3,762,980** | **16** |

# Adjust Income Targets

- Income adjustment factors by market segment (HBW)

| Geographic Segment | Initial Targets | | | | Trips from the Calibration Run | | | | Ratios | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Total HBWI1Psn | Total HBWI2Psn | Total HBWI3Psn | Total HBWI4Psn | Total HBWI1Psn | Total HBWI2Psn | Total HBWI3Psn | Total HBWI4Psn | HBWI1Psn | HBWI2Psn | HBWI3Psn | HBWI4Psn |
| 1 | 33,513 | 44,391 | 26,130 | 32,935 | 41,444 | 49,664 | 29,446 | 29,820 | 1.24 | 1.12 | 1.13 | 0.91 |
| 2 | 3,422 | 3,204 | 1,754 | 1,875 | 3,908 | 3,279 | 1,771 | 1,549 | 1.14 | 1.02 | 1.01 | 0.83 |
| 3 | 16,318 | 18,560 | 10,173 | 13,655 | 22,928 | 25,187 | 14,099 | 14,015 | 1.41 | 1.36 | 1.39 | 1.03 |
| 4 | 13,367 | 13,246 | 6,287 | 5,440 | 17,513 | 14,188 | 6,861 | 5,270 | 1.31 | 1.07 | 1.09 | 0.97 |
| 5 | 4,121 | 10,027 | 7,938 | 10,434 | 5,558 | 9,810 | 7,378 | 8,760 | 1.35 | 0.98 | 0.93 | 0.84 |
| 6 | 690 | 1,037 | 722 | 593 | 753 | 967 | 639 | 629 | 1.09 | 0.93 | 0.88 | 1.06 |
| 7 | 5,840 | 11,001 | 7,082 | 8,516 | 7,694 | 11,715 | 7,569 | 8,194 | 1.32 | 1.06 | 1.07 | 0.96 |
| 8 | 6,937 | 9,259 | 5,318 | 4,723 | 7,709 | 9,247 | 5,392 | 4,596 | 1.11 | 1.00 | 1.01 | 0.97 |
| 9 | 2,848 | 10,451 | 10,650 | 20,373 | 4,364 | 12,345 | 11,948 | 14,984 | 1.53 | 1.18 | 1.12 | 0.74 |
| 10 | 3,553 | 8,814 | 6,826 | 8,721 | 4,320 | 8,574 | 6,558 | 7,724 | 1.22 | 0.97 | 0.96 | 0.89 |
| 11 | 4,939 | 12,639 | 9,939 | 15,022 | 6,688 | 13,709 | 10,719 | 12,541 | 1.35 | 1.08 | 1.08 | 0.83 |
| 12 | 8,726 | 13,836 | 9,251 | 8,840 | 8,938 | 13,579 | 9,217 | 8,431 | 1.02 | 0.98 | 1.00 | 0.95 |
| 13 | 21,110 | 70,064 | 76,476 | 100,371 | 28,074 | 75,557 | 77,597 | 116,589 | 1.33 | 1.08 | 1.01 | 1.16 |
| 14 | 4,918 | 11,477 | 11,587 | 13,533 | 5,502 | 12,316 | 11,688 | 16,233 | 1.12 | 1.07 | 1.01 | 1.20 |
| 15 | 29,365 | 77,564 | 70,710 | 88,258 | 35,706 | 79,745 | 71,493 | 91,206 | 1.22 | 1.03 | 1.01 | 1.03 |
| 16 | 267,519 | 410,101 | 306,509 | 305,388 | 238,084 | 391,248 | 294,863 | 294,217 | 0.89 | 0.95 | 0.96 | 0.96 |
| 17 | 3,812 | 24,933 | 35,238 | 75,343 | 7,048 | 30,704 | 42,070 | 86,412 | 1.85 | 1.23 | 1.19 | 1.15 |
| 18 | 4,379 | 16,213 | 18,117 | 30,445 | 6,780 | 18,138 | 19,446 | 33,174 | 1.55 | 1.12 | 1.07 | 1.09 |
| 19 | 8,989 | 34,643 | 39,374 | 69,189 | 12,496 | 36,996 | 41,678 | 71,893 | 1.39 | 1.07 | 1.06 | 1.04 |
| 20 | 189,759 | 310,067 | 247,833 | 295,759 | 168,618 | 294,565 | 237,483 | 283,177 | 0.89 | 0.95 | 0.96 | 0.96 |
| | 634,125 | 1,111,528 | 907,913 | 1,109,413 | 634,125 | 1,111,529 | 907,913 | 1,109,413 | 1.00 | 1.00 | 1.00 | 1.00 |

# Final Targets vs. Estimated HBW Trips

| HBW | Auto Target | Auto Trips | Auto Difference | Transit Target | Transit Trips | Transit Difference | Total Target | Total Trips | Total Difference |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 15,068 | 15,081 | 13 | 135,305 | 135,293 | -12 | 150,373 | 150,374 | 1 |
| 2 | 1,408 | 1,408 | 0 | 9,097 | 9,099 | 2 | 10,505 | 10,507 | 2 |
| 3 | 12,219 | 12,218 | -1 | 64,008 | 64,011 | 3 | 76,227 | 76,229 | 2 |
| 4 | 34,426 | 34,429 | 3 | 9,403 | 9,403 | 0 | 43,829 | 43,832 | 3 |
| 5 | 7,826 | 7,835 | 9 | 23,678 | 23,671 | -7 | 31,504 | 31,506 | 2 |
| 6 | 1,031 | 1,033 | 2 | 1,955 | 1,955 | 0 | 2,986 | 2,988 | 2 |
| 7 | 22,326 | 22,338 | 12 | 12,845 | 12,833 | -12 | 35,171 | 35,171 | 0 |
| 8 | 23,501 | 23,500 | -1 | 3,441 | 3,444 | 3 | 26,942 | 26,944 | 2 |
| 9 | 5,216 | 5,227 | 11 | 38,422 | 38,413 | -9 | 43,638 | 43,640 | 2 |
| 10 | 15,703 | 15,717 | 14 | 11,470 | 11,458 | -12 | 27,173 | 27,175 | 2 |
| 11 | 24,503 | 24,503 | 0 | 19,157 | 19,154 | -3 | 43,660 | 43,657 | -3 |
| 12 | 37,263 | 37,266 | 3 | 2,899 | 2,898 | -1 | 40,162 | 40,164 | 2 |
| 13 | 177,452 | 177,481 | 29 | 120,364 | 120,336 | -28 | 297,816 | 297,817 | 1 |
| 14 | 29,012 | 28,887 | -125 | 16,728 | 16,852 | 124 | 45,740 | 45,739 | -1 |
| 15 | 226,826 | 226,819 | -7 | 51,325 | 51,331 | 6 | 278,151 | 278,150 | -1 |
| 16 | 1,196,552 | 1,196,567 | 15 | 21,859 | 21,845 | -14 | 1,218,411 | 1,218,412 | 1 |
| 17 | 110,368 | 110,393 | 25 | 55,865 | 55,841 | -24 | 166,233 | 166,234 | 1 |
| 18 | 50,533 | 50,536 | 3 | 27,004 | 27,001 | -3 | 77,537 | 77,537 | 0 |
| 19 | 137,427 | 137,430 | 3 | 25,637 | 25,633 | -4 | 163,064 | 163,063 | -1 |
| 20 | 972,742 | 972,750 | 8 | 11,100 | 11,092 | -8 | 983,842 | 983,842 | 0 |
| **Total** | **3,101,402** | **3,101,418** | **16** | **661,562** | **661,563** | **1** | **3,762,964** | **3,762,981** | **17** |

# Calibrated ModeChoice vs AEMS (HBW)

| Market | Auto | | | Transit | | | Walk Access Mode | | | PNR Access Mode | | | KNR Access Mode | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Seg. | AEMS | ModeChoice | % Diff. | AEMS | ModeChoice | % Diff. | AEMS | ModeChoice | % Diff. | AEMS | ModeChoice | % Diff. | AEMS | ModeChoice | % Diff. |
| 1 | 14,448 | 15,081 | 4% | 135,925 | 135,293 | 0% | 125,029 | 124,303 | -1% | 8,053 | 6,704 | -17% | 2,844 | 4,286 | 51% |
| 2 | 1,376 | 1,408 | 2% | 9,132 | 9,099 | 0% | 8,089 | 8,215 | 2% | 803 | 662 | -18% | 239 | 222 | -7% |
| 3 | 9,342 | 12,218 | 31% | 66,887 | 64,011 | -4% | 62,184 | 58,479 | -6% | 2,164 | 2,898 | 34% | 2,539 | 2,633 | 4% |
| 4 | 28,018 | 34,429 | 23% | 15,814 | 9,403 | -41% | 14,000 | 8,198 | -41% | 717 | 603 | -16% | 1,097 | 602 | -45% |
| 5 | 8,233 | 7,835 | -5% | 23,273 | 23,671 | 2% | 17,709 | 19,683 | 11% | 3,972 | 3,008 | -24% | 1,592 | 979 | -38% |
| 6 | 995 | 1,033 | 4% | 1,992 | 1,955 | -2% | 1,190 | 1,280 | 8% | 510 | 440 | -14% | 292 | 235 | -19% |
| 7 | 20,013 | 22,338 | 12% | 15,158 | 12,833 | -15% | 13,675 | 11,699 | -14% | 711 | 618 | -13% | 771 | 516 | -33% |
| 8 | 21,342 | 23,500 | 10% | 5,601 | 3,444 | -39% | 5,250 | 3,190 | -39% | 199 | 173 | -13% | 152 | 80 | -47% |
| 9 | 5,637 | 5,227 | -7% | 38,003 | 38,413 | 1% | 33,049 | 33,400 | 1% | 2,265 | 1,695 | -25% | 2,689 | 3,318 | 23% |
| 10 | 15,833 | 15,717 | -1% | 11,342 | 11,458 | 1% | 10,649 | 10,653 | 0% | 313 | 287 | -8% | 380 | 518 | 36% |
| 11 | 23,071 | 24,503 | 6% | 20,586 | 19,154 | -7% | 18,919 | 17,345 | -8% | 619 | 583 | -6% | 1,048 | 1,226 | 17% |
| 12 | 35,224 | 37,266 | 6% | 4,940 | 2,898 | -41% | 4,482 | 2,506 | -44% | 144 | 158 | 10% | 314 | 234 | -26% |
| 13 | 157,753 | 177,481 | 13% | 140,064 | 120,336 | -14% | 39,542 | 31,440 | -20% | 85,314 | 78,059 | -9% | 15,208 | 10,837 | -29% |
| 14 | 25,357 | 28,887 | 14% | 20,382 | 16,852 | -17% | 3,233 | 1,980 | -39% | 15,313 | 13,646 | -11% | 1,837 | 1,226 | -33% |
| 15 | 207,083 | 226,819 | 10% | 71,066 | 51,331 | -28% | 34,667 | 20,184 | -42% | 28,204 | 25,600 | -9% | 8,195 | 5,547 | -32% |
| 16 | 1,176,019 | 1,196,567 | 2% | 42,393 | 21,845 | -48% | 32,528 | 12,056 | -63% | 6,696 | 7,598 | 13% | 3,170 | 2,192 | -31% |
| 17 | 96,897 | 110,393 | 14% | 69,337 | 55,841 | -19% | 24,569 | 16,232 | -34% | 34,799 | 32,645 | -6% | 9,970 | 6,963 | -30% |
| 18 | 45,766 | 50,536 | 10% | 31,771 | 27,001 | -15% | 12,380 | 6,864 | -45% | 15,224 | 17,170 | 13% | 4,168 | 2,967 | -29% |
| 19 | 123,432 | 137,430 | 11% | 39,631 | 25,633 | -35% | 17,913 | 9,105 | -49% | 16,159 | 12,994 | -20% | 5,559 | 3,534 | -36% |
| 20 | 958,421 | 972,750 | 1% | 25,422 | 11,092 | -56% | 22,435 | 8,353 | -63% | 1,580 | 1,610 | 2% | 1,407 | 1,130 | -20% |

| Market Seg. | Production | Attraction |
|---|---|---|
| 1 | DC | DC Core |
| 2 | DC | VA Core |
| 3 | DC | Urban DC, MD, VA |
| 4 | DC | Suburban MD, VA |
| 5 | MD Urban | DC Core |
| 6 | MD Urban | VA Core |
| 7 | MD Urban | Urban DC, MD, VA |

| Market Seg. | Production | Attraction |
|---|---|---|
| 8 | MD Urban | Suburban MD, VA |
| 9 | VA Core/Urban | DC Core |
| 10 | VA Core/Urban | VA Core |
| 11 | VA Core/Urban | Urban DC, MD, VA |
| 12 | VA Core/Urban | Suburban MD, VA |
| 13 | MD Suburban | DC Core |
| 14 | MD Suburban | VA Core |

| Market Seg. | Production | Attraction |
|---|---|---|
| 15 | MD Suburban | Urban DC, MD, VA |
| 16 | MD Suburban | Suburban MD, VA |
| 17 | VA Suburban | DC Core |
| 18 | VA Suburban | VA Core |
| 19 | VA Suburban | Urban DC, MD, VA |
| 20 | VA Suburban | Suburban MD, VA |

# Next Steps

- T.O. 11 – Cube-Based Walkshed Process
  - Respond to MWCOG comments and questions
- T.O. 12 – HOT/HOV Highway Assignment
  - Respond to MWCOG comments and questions
- T.O. 13 – Mode-Choice and Transit Modeling
  - Respond to MWCOG comments and questions
- Final Report (T.O. 10)
  - Deliver all software and processing scripts
  - Deliver draft final report by mid-June
  - Finalize report before July 1st