AGENDA ITEM A:
WELCOME & INTRODUCTIONS

Michael Chiume
AGENDA ITEM B: PROJECT STATUS / SCHEDULE

Bob Donnelly
Project Status / Schedule

- Overall, about 80% complete
- Major data updates – SED, Counts, Tolls, etc. completed
- **NYBPM 2010 Update – Final Version Stage 2.0 in Progress**
  - SED forecasts – revised future year allocation for NYC (100%)
  - Stage 2 BPM Update Base Year Highway network conflation and attribute integration for (100%) *
  - Transit (EHR) transit network & assignment calibration (35%) – PB and AECOM active now that Tier 1.2 TAZs are fixed
  - Second pass at TAZ system: Census 2010 tract-based – major expansion in number of zones in NY (Tier 1.2) (98%)
  - External Out-of-Region analysis and forecasting methods (90%) **
  - Improved Truck and CV models (85%) **
- Overall project completion date was extended to mid-March 2014.
- Total Project GANTT Chart not updated, but a detailed flow chart of final stage model integration and project completion steps in development and will be shared with NYMTC end of this month.

* Focus of this meeting
AGENDA ITEM C:
TASK 13: OUT OF REGION ANALYSIS / EXTERNAL MODEL (TO 3-K)

Pascal Volet
Update External Trips Model

• Why Change?
  • To be able to link core models to out-of-region trips
  • Count based growth forecasts out-of-date 15 years later
  • Ability to forecast based on evolving pop/emp growth

• Data Requirements
  • Forecasts available from public sources (pop/emp)
  • National network already available from FAA study
  • BPM sub-network to remain frozen at 2G (2005 base)
  • Zone system compatible with 2010 tier 1.2
Comparison of 2010 Counts to Original Forecast

External stations

$y = 0.9903x$

$R^2 = 0.8626$

RMSE$\% = 43\%$
38 Halo Counties
Data sources

NYSDOT
MassDOT
ConnDOT
NJTPA
DVRPC
SJTPO

Data sources:
- SJTPO
- DVRPC
- NJTPA
- NYSDOT
- MassDOT
- ConnDOT

Task Order 3-K: Improved BPM Forecasting with Out of Region Analysis - Framework

1. SED Data: Model Area NJTPA (13 nj co.s)
2. SED Data: Model Area NYMTC (28 co.s)
3. SED Data: Mega Region: BPM plus Halo Area Counties (n=66)
4. Mega Region Forecasts: State SED forecasts (NY, MA, CT) Statewide models and MPOs: NJTPA, SJTPO, DVRPC
5. Total Employment (by work loc.)
6. Total Labor Force (by residence)
7. ACS: Journey to Work Linkages
8. Home-to-Work Coefficients
9. ORA Procedures: Reconcile
   - Resident working outside
   - Nonres working inside
   - Generate E-I / I-E OD: Validation
10. NJTRM-E
    - Screenline Identification of NonWork Long and Short Trips
    - Validate by facility
    - TLFD for NonWorkShort trips
11. Labor Force (EI)
12. Jobs (IE)
13. BPM External Model Auto
14. Labor Force (I)
    - LF – Jobs (IE)
15. Jobs (I):
    - Work
    - Other Purposes
16. Tours by Origin - Production
    - Work
    - Other Purposes
17. Tours by Origin - Destination
    - Work
    - Other Purposes
18. NELDP
19. Long Distance
20. NonWork
21. SD NonWork

Next Update

Core Model Update

November 21, 2013 NYBPM Base Year Update & Validation - 2010
Parsons Brinckerhoff
Long Distance Trips - Approach

- Long-distance non-Work trips to use NELDT
  - National Evaluation of Long-Distance Trips (Java based)
  - Uses National Household Travel Survey (2001 NHTS) as input
  - Forecast based on overall population growth
- Uses 3 out of 4 NHTS purposes
  - Commute purpose left out
  - Outer purposes: business, personal, commercial
- National Model Network Needed for Assignments
  - Truck model and NELDT integrated in same network
  - BPM sub-area trip-tables extracted from national network
  - Core model traffic used as background for assignments
**NELDT Process**

**Read Data:** Reads in the NHTS data along with a list of the US states and all countries.

**Synthesize Missing States:** NHTS only reports states that have a total population of 2M+. These records are generated using the data from the surrounding states.

**Expand Records:** The records for all modes are expanded using the total number of air travelers provided by BTS.

**Write State-State Matrix:** Outputs an auto trip table from state to state.

**Disaggregate Autos:** Using the local TAZ and the local Pop/Emp data, the auto trips are disaggregated down to the BPM TAZ level.

**Write Auto Trip Table:** Outputs the auto trip table by purpose: business, personal, and commercial.
HBW Trips - Approach

• 38 County Halo around BPM area

• Use of External Population & Employment Growth
  • Input received from NYSDOT, ConnDOT, MassDOT (statewide models)
  • Input received from DVRPC, SJTPO, NJTPA (MPO regional models)

• Fratar Model For All Work Trips (PANYNJ)
  • Based on CTPP 2006-2010 (auto) County-to-County Seed Matrix
  • Includes EI/IE and EE trips (both long and short distance)
  • Population and Employment (normalized) used as OD vectors
  • Forecasts based on both Pop. & Emp. growth by County
  • E-I & I-E labor force/jobs adjusted from core calcs using all-mode seed matrix instead of auto only.
  • BPM sub-area trip-tables extracted from national network
HomeToWork Process
TransCAD Subarea Network

BPM Network
National Network
External trip adjustment

• Short distance (SD) nonWork trips not included
• Calibration by road type/purpose
  • Counts split using NJTRM-E screenline/SLK analysis
    • Adapted data to take into account overestimation of SD trips
  • Centroid connectors added to fit all adjacent County highway totals
• Disaggregation from Cty/Cty to Cty/TAZ or TAZ/Cty based on employment for HBW attractions and LD business trips and on population for other purpose or HBW productions
**NJTRM-E Screen Line/Select Link Results**

**NJTRM-E Results, raw**

<table>
<thead>
<tr>
<th></th>
<th>Freeway</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ShortNW</td>
<td>39%</td>
<td>66%</td>
<td>48%</td>
</tr>
<tr>
<td>LongNW</td>
<td>15%</td>
<td>2%</td>
<td>10%</td>
</tr>
<tr>
<td>HBW</td>
<td>47%</td>
<td>33%</td>
<td>42%</td>
</tr>
</tbody>
</table>

**Raw results adapted for SNW overestimation (-20%)**

<table>
<thead>
<tr>
<th></th>
<th>Freeway</th>
<th>Other</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ShortNW</td>
<td>31%</td>
<td>52%</td>
<td>38%</td>
</tr>
<tr>
<td>LongNW</td>
<td>22%</td>
<td>15%</td>
<td>20%</td>
</tr>
<tr>
<td>HBW</td>
<td>47%</td>
<td>33%</td>
<td>42%</td>
</tr>
</tbody>
</table>
External Cordon Results

External Model, Observed Data

- Total External Counts: 1,396,362 auto trips
  - Home to Work share (47%): 654,089 auto trips
  - Long NonWork share (20%): 275,767 auto trips
  - Short NonWork share (33%): 466,506 auto trips

External Model, assigned to national network

- Home to Work Flows (47%): 654,059 auto trips
  - Long NonWork Flows (20%): 284,945 auto trips
Proportions of EI/IE trips to E-E

Subarea matrix extraction

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NonWork LD</td>
<td>265,000</td>
</tr>
<tr>
<td>HBW EI/IE</td>
<td>462,000</td>
</tr>
<tr>
<td>HBW E-E</td>
<td>98,000</td>
</tr>
<tr>
<td>NonWork SD</td>
<td>413,000</td>
</tr>
<tr>
<td>Total EI/IE</td>
<td>1,120,000</td>
</tr>
<tr>
<td>Total E-E</td>
<td>120,000</td>
</tr>
<tr>
<td>Total Crossings</td>
<td>1,360,000</td>
</tr>
</tbody>
</table>

In current Ext Model

1,084,000 EI/IE
37,000 E-E
1,111,000 Total Crossings
Next steps

- Fine tune calibration by facility type and State border
- GISDK code to integrate Java programs
- Adapt HAJ, MDSC and PAP to HBW results
- Strategy for non Work Short Distance trips
AGENDA ITEM D:
TASK 14: MODEL REFINEMENTS: UPDATE TRUCK AND OTHER SMALL COMMERCIAL VEHICLES MODEL

Rolf Moeckel, Chrissy Bernardo
Two-Layer Concept
Short- & Long-Distance Freight flows

**Short-Distance**
- Trips shorter than 50 miles
- Revised Quick Response Freight Manual (QRFM) approach

**Long-Distance**
- Trips longer than 50 miles
- Based on commodity flow survey data (FAF3)
- Covers all trips nationwide
FHWA Vehicle Classes

1. Motorcycles
   2 axles, 2 or 3 tires

2. Passenger Cars
   2 axles, can have 1- or 2-axle trailers

3. Pickups, Panels, Vans
   2 axles, 4-tire single units
   Can have 1 or 2 axle trailers

4. Buses
   2 or 3 axles, full length

5. Single Unit 2-Axle Trucks
   2 axles, 6 tires (dual rear tires)

6. Single Unit 3-Axle Trucks
   3 axles, single unit

7. Single Unit 4 or More-Axle Trucks
   4 or more axles, single unit

8. Single Trailer 3- or 4-Axle Trucks
   3 or 4 axles, single trailer

9. Single Trailer 5-Axle Trucks
   5 axles, single trailer

10. Single Trailer 6 or More-Axle Trucks
    6 or more axles, single trailer

11. Multi-Trailer 5 or Less-Axle Trucks
    5 or less axles, multiple trailers

12. Multi-Trailer 6-Axle Trucks
    6 axles, multiple trailers

13. Multi-Trailer 7 or More-Axle Trucks
    7 or more axles, multiple trailers
Long-Distance Truck Model Design

- US county Employment
- Commodity flow data
  - Freight flows between 3,079 counties
- NYMTC Employment
- Payload factors
- Empty trucks
- Freight flows between NYMTC Zones
- O/D matrix of loaded truck trips
- Truck trip O/D matrix including empty trucks
Flow Disaggregation (1)

\[
flow_{\text{county}_i, \text{county}_j} = \frac{\text{flow}_{\text{FAF}_a, \text{FAF}_b}}{\sum_{\text{county}_k \in \text{FAF}_a} \left( \sum_{\text{county}_l \in \text{FAF}_b} \text{weight}_{\text{county}_k, \text{county}_l} \right)} \cdot \text{weight}_{\text{county}_i, \text{county}_j}
\]

\[
\text{weight}_{\text{county}_i, \text{county}_j} = \text{empl}_{\text{county}_i} \cdot \text{empl}_{\text{county}_j}
\]

\(\text{county}_i\) is located in FAF\(_a\)
\(\text{county}_j\) is located in FAF\(_b\)
\(\text{county}_k\) are all counties located in FAF\(_a\)
\(\text{county}_l\) are all counties located in FAF\(_b\)
\(\text{empl}_{\text{county}}\) is total employment in county \(i\)
### Flow Disaggregation (2)

**Flow Calculation Weight Share Tons**

<table>
<thead>
<tr>
<th>Flow</th>
<th>Calculation</th>
<th>Weight</th>
<th>Share</th>
<th>Tons</th>
</tr>
</thead>
<tbody>
<tr>
<td>i → k</td>
<td>1,000 * 5,000</td>
<td>5,000,000</td>
<td>30 %</td>
<td>2,424</td>
</tr>
<tr>
<td>j → k</td>
<td>2,000 * 5,000</td>
<td>10,000,000</td>
<td>61 %</td>
<td>2,848</td>
</tr>
<tr>
<td>i → l</td>
<td>1,000 * 500</td>
<td>500,000</td>
<td>3 %</td>
<td>242</td>
</tr>
<tr>
<td>j → l</td>
<td>2,000 * 500</td>
<td>1,000,000</td>
<td>6 %</td>
<td>485</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16,500,000</strong></td>
<td><strong>100 %</strong></td>
<td><strong>8,000</strong></td>
<td></td>
</tr>
</tbody>
</table>
Flow Disaggregation (make/use coefficients)

\[
\text{weight}_{\text{county}_i, \text{county}_j, \text{com}_c} = \sum_{\text{ind}_m} (\text{empl}_{\text{county}_i, \text{ind}_m} \cdot \text{mc}_{\text{ind}_m, \text{com}_c}) \cdot \sum_{\text{ind}_m} (\text{empl}_{\text{county}_j, \text{ind}_m} \cdot \text{uc}_{\text{ind}_m, \text{com}_c})
\]

\text{empl}_{\text{county}_i, \text{ind}_m} \quad \text{employment in county } i \text{ in sector } m

\text{mc}_{\text{ind}_m, \text{com}_c} \quad \text{make coefficient describing how many goods of commodity } c \text{ are produced by industry } m

\text{uc}_{\text{ind}_m, \text{com}_c} \quad \text{use coefficient describing how many goods of commodity } c \text{ are consumed by industry } m
Ton-to-Truck Conversion

- Truck type depends on trip distance
- Payload factors by truck type convert tons to trucks

Yearly-to-Weekday Truck Conversion

- Divide by 365.25
- Apply “weekday-to-average-day” factor of 2.1%
Distribution Centers & Intermodal Facilities

- Trucks: Distribution Centers
- Rail+Trucks: Rail yards
- Water+Trucks: Marine Ports
- Air+Trucks: Airports
Empty Truck Trips

Zone A
-10 trucks
+5 trucks
-8 trucks
+5 trucks
-8 trucks

Zone B
10 trucks
5 trucks
0 trucks
2 trucks

Zone C
-5 trucks
+8 trucks
-0 trucks
+2 trucks
+5 trucks

3 empty trucks
8 trucks
5 empty trucks
5 trucks
5 trucks
5 trucks

NYMTC / Progress Meeting
Parsons Brinckerhoff
ZONE SYSTEM

Update Truck and Other Small Commercial Vehicles Model
National Zone System
National Zones: Northeast
National Zones: NY Region
Special Generators

Flows through special generators are represented explicitly

FAF data provides mode, destination and quantity
### Special Generators Represented

**Color code:** New added SG zones

<table>
<thead>
<tr>
<th>Tier TAZ</th>
<th>SG Area</th>
<th>Zone ID</th>
<th>Special Generator Name</th>
<th>Tier 1.2 TAZ</th>
<th>Zone processing</th>
</tr>
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<tbody>
<tr>
<td><strong>AIRPORTS</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>x x x</td>
<td>JFK</td>
<td>605</td>
<td>JFK General</td>
<td>x</td>
<td>6151</td>
</tr>
<tr>
<td>x x x</td>
<td>JFK</td>
<td>3590</td>
<td>JFK Cargo Terminal</td>
<td>x</td>
<td>6151</td>
</tr>
<tr>
<td>x</td>
<td>JFK</td>
<td>3814</td>
<td>JFK Arriving/Departing Passengers</td>
<td>x</td>
<td>6152</td>
</tr>
<tr>
<td>x x x</td>
<td>LGA</td>
<td>407</td>
<td>LGA General</td>
<td>x</td>
<td>6153</td>
</tr>
<tr>
<td>x</td>
<td>LGA</td>
<td>3815</td>
<td>LGA Arriving/Departing Passengers</td>
<td>x</td>
<td>6153</td>
</tr>
<tr>
<td>x x x</td>
<td>EWR</td>
<td>3000</td>
<td>Newark General</td>
<td>x</td>
<td>6154</td>
</tr>
<tr>
<td>x x x</td>
<td>EWR</td>
<td>3588</td>
<td>Newark Airport North Cargo Terminal</td>
<td>x</td>
<td>6154</td>
</tr>
<tr>
<td>x x x</td>
<td>EWR</td>
<td>3589</td>
<td>Newark Airport South Cargo Terminal</td>
<td>x</td>
<td>6155</td>
</tr>
<tr>
<td>x</td>
<td>EWR</td>
<td>3816</td>
<td>Newark Arriving/Departing Passengers</td>
<td>x</td>
<td>6156</td>
</tr>
<tr>
<td>x x x</td>
<td>SWF</td>
<td>3591</td>
<td>SWF General</td>
<td>x</td>
<td>6157</td>
</tr>
<tr>
<td>x</td>
<td>SWF</td>
<td>3817</td>
<td>SWF Arriving/Departing Passengers</td>
<td>x</td>
<td>6157</td>
</tr>
<tr>
<td><strong>TRUCK TERMINALS</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>x x x x</td>
<td>2816</td>
<td>Port Jersey Trucks</td>
<td>x</td>
<td>6158</td>
<td>Split - Add</td>
</tr>
<tr>
<td>x x x x</td>
<td>2817</td>
<td>MOTBY - Military Ocean Terminal at Bayonne</td>
<td>x</td>
<td>6159</td>
<td>Split - Add</td>
</tr>
<tr>
<td>x x x</td>
<td>3587</td>
<td>Howland Hook (New York Container Terminal)</td>
<td>x</td>
<td>6160</td>
<td>Split - Add</td>
</tr>
<tr>
<td>x x</td>
<td>3592</td>
<td>South Brooklyn Marine Terminal</td>
<td>x</td>
<td>6161</td>
<td>Split - Add</td>
</tr>
<tr>
<td>x x</td>
<td>3593</td>
<td>Red Hook Container Terminal</td>
<td>x</td>
<td>6162</td>
<td>Split - Add</td>
</tr>
<tr>
<td>x x</td>
<td>3667</td>
<td>Port Newark Container Terminal</td>
<td>x</td>
<td>6163</td>
<td>Split - Add</td>
</tr>
<tr>
<td>x x</td>
<td>3750</td>
<td>Port Elizabeth Marine Terminal</td>
<td>x</td>
<td>6164</td>
<td>Split - Add</td>
</tr>
</tbody>
</table>
Merged networks
Merged Networks in New York Region
Functional Classes in National Network

01 Rural Interstate  
02 Rural Principal Arterial  
06 Rural Minor Arterial  
07 Rural Major Collector  
08 Rural Minor Collector  
09 Rural Local  
11 Urban Interstate  
12 Urban Freeway/Expr.way  
14 Urban Principal Arterial  
16 Urban Minor Arterial  
17 Urban Collector  
19 Urban Local
Urban vs. Rural Facility Types
Definition of Capacity by Functional Class

- Interstate capacity: 2,400 vehicles per hour per lane (vphpl)
- Other links: 1,700 vehicles per hour per lane
- Daily capacity is assumed to be 10-times the hourly capacity
Background Volume

**Within BPM Study Area**
- Local autos
- Local trucks
- External autos

**Outside BPM Study Area**
- Synthesized background volume
Background Volume

**Rural Areas**
- Level of Service C
- Volume-to-capacity ratio of autos and local trucks: 0.6

**Urban Areas**
- Level of Service D to E
- Volume-to-capacity ratio of autos and local trucks: 0.9
Assignment of Long-Distance Trucks
Calibration Challenge

Extent of NJTRM-E Model

- Freeways: 10% Local
- Other Roads: 65% Local

Boundary of BPM Study Area

<50 miles

50 miles: X %?

New Jersey

New York City
Commercial Vehicle Model Overview

1. Starting Point:
   - QRFM Factors, adapted to NYMTC sub-areas (original model) \(\rightarrow\) starting seed O/D matrix

2. Perform Origin-Destination Matrix Estimation (ODME) to adjust trip tables based on 2010 counts

3. Regress trip productions on zonal data:
   - SED:
     - Population, HH Income, Emp Wages, Population / Employment Density, Employment by Industry, etc.
   - Additional Zonal Attributes
In Progress: ODME

- Adjusts O/D Matrix based on count volumes
- CV Counts:
  - Estimated by proportion of total count volume where unavailable, segmented by:
    - FCLASS grouping
    - Manhattan vs. other NYC vs. Outer NY counties
Preliminary ODME Results

- MD Period:

![ODME Output](image)

\[ R^2 = 0.8411 \]
Preliminary ODME Results

• MD Period:

<table>
<thead>
<tr>
<th>Total Count Volume</th>
<th>356,073</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Flow Volume (on count links)</td>
<td>345,395</td>
</tr>
<tr>
<td>RMSE</td>
<td>97.6</td>
</tr>
<tr>
<td>Percent RMSE</td>
<td>5.2%</td>
</tr>
</tbody>
</table>

• Next Steps:
  • Run procedure for AM, PM, NT periods
  • Validate ODME results
  • Estimate Regression
Additional Data

- Commercial Vehicle Parking Sign data
  - From NYCDOT
  - Midtown + Downtown Manhattan
  - Tag signs to TAZ layer (100 TAZs)
Commercial Vehicle Parking Data
Next Steps

• Estimate step-wise linear regression of trip productions on zonal data
  • More realistic forecasts (based on SED forecasts)
  • Responsive to changes in model inputs
AGENDA ITEM E:
STAGE 1 (2010N) / CONFLATED BASE NETWORK (2010T-7) - TESTING FOR MODELING

Chrissy Bernardo, Yuri Teleshevsky
Recap of Networks Involved in Task 6:

- **2010N** – Current working BPM 2010 Stage 1 Network
  - Evolved network with current calibration – prior updates
  - Incorporates TH-TDFM improvements and NJPTA net in NJ
  - Platform for future / alt network coding
  - Other linkages – screenline, bus preloads,

- **2005T** – Source network for Caliper conflation

- **2010T** – Result of Caliper work in Task
  - Conflation of full 28 county region
  - Merged attributes from 2010N
  - Added important links missing from 2005 source
Recap of Networks Involved in Task 6:

• **2010T-2** – Result NYTMC’s review and refinement (PSA2-11-25)
  - QA/QC review
    - manual topological conflation w/r to external base maps
    - Correction of attributes – key: direction of flow lanes, fclass
  - Restructuring improvements
    - Rationalized topological and flow direction in network dataview
    - Added some turn prohibitions to prevent “illegal” flows in divided arterials coded as bi-directional links

• **2010T-3** – First Assignable conflated version
  - Testing and further reconciliation with 2010
    - Turn prohibitions
    - NETPREP – to build time of day networks (AM, PM, MD, NT)
    - Assignment tests – fixed 2010 trip table, compare to Stage 1 calibration results
Recap of Networks Involved in Task 6:

- **2010T-4** – Basic Attribute Checks for Links with no Matching_ID to correspond to 2010N
  - Verify/edit FCLASS, number of lanes
  - Minor additional manual conflation

- **2010T-5 / 2010B-S2.0** (transmitted 10/30/2013) – Basic Attribute Checks for all Links
  - 2010T-4 Edits
  - Verify/edit FCLASS, number of lanes for Links with a Matching_ID corresponding to 2010N
  - AUTOTOLL & TRUKTOLL updated to latest 2010 values
Recap of Networks Involved in Task 6:

- **2010T-6** – 2010 Update Attributes Added
  - TOD and vehicle class tolls added to network
  - Links that represent multiple streets identified

- **2010T-7 / 2010B-S2.1** (transmitted 11/18/2013) – Connected to new Tier 1.2 TAZ system
  - Centroid Connectors built to Tier 1.2 (4629) zone system, using only original 2010N loading points for comparability and consistency with calibrated model
  - Additional Lincoln Tunnel lane edits to reflect reversible center tube lane and Express Bus Lane
Recap of Networks Involved in Task 6:

<table>
<thead>
<tr>
<th>Transmitted Name</th>
<th>Working Version Name</th>
<th>Date Developed</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2010T</td>
<td>2010T-1</td>
<td>3/13/2013</td>
<td>Original from Caliper</td>
</tr>
<tr>
<td></td>
<td>2010T-3</td>
<td>9/24/2013</td>
<td>Edited for NETPREP and Assignment</td>
</tr>
<tr>
<td></td>
<td>2010T-4</td>
<td>10/23/2013</td>
<td>Links with NO matching ID to 2010N checked for primary attributes</td>
</tr>
<tr>
<td>2010B-S2.0</td>
<td>2010T-5</td>
<td>10/30/2013</td>
<td>Links WITH matching ID to 2010N checked for attributes</td>
</tr>
<tr>
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<td>2010T-6</td>
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<td>TOD Tolls added Multiple Roadways identifiers added</td>
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<td>11/18/2013</td>
<td>Centroid Connectors built to TAZ Tier 1.2 Lincoln Tunnel edits</td>
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</table>
New Centroid Connections

- Connect new Tier 1.2 TAZ centroids to conflated network
- Original 2010N loading points retained
- TransCAD built-in connector-building procedure used
  - Setting restrictions (i.e. crossing water, max distance, etc.)
  - Finds closest loading points within a maximum distance, segmented by county
  - Manual checks and edits
Test Assignment Run: 2010B-S2.1

- Compare with same trip tables assigned to 2010N, converted from Tier 1.1 (3824) to Tier 1.2 (4629) TAZ system
- Validation on aggregate scale, at major highway crossings:
  - Conflated network
  - Network attributes
  - New Centroid Connectors
## Assignment: Validation Results

<table>
<thead>
<tr>
<th>Free and Tolled Facility Summary</th>
<th>Counts</th>
<th>2010N</th>
<th>2010B-S2.0</th>
<th>2010B-S2.1</th>
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</thead>
<tbody>
<tr>
<td><strong>East River Crossings - NYC &amp; MTA</strong></td>
<td></td>
<td></td>
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<tr>
<td>WB</td>
<td>242,661</td>
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<tr>
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<td>271,242</td>
<td>278,530</td>
<td>272,686</td>
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<td><strong>Total</strong></td>
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<td><strong>537,125</strong></td>
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<tr>
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</tr>
<tr>
<td>2010B-S2.0</td>
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<tr>
<td>2010B-S2.1</td>
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<tr>
<td><strong>East River Crossings - MTA</strong></td>
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</tr>
<tr>
<td>WB</td>
<td>111,923</td>
<td>77,504</td>
<td>99,979</td>
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<tr>
<td>EB</td>
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<td>68,236</td>
<td>74,466</td>
<td>71,814</td>
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<td><strong>Verrazano Narrows Bridge - MTA</strong></td>
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## Assignment: Validation Results

### Major Crossing Cordon Summary

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<tbody>
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<td>Bronx- Manhattan Crossings</td>
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<tr>
<td>Bronx-Bound</td>
<td>278,744</td>
<td>249,776</td>
<td>269,814</td>
<td>271,857</td>
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</tr>
<tr>
<td>Manhattan-Bound</td>
<td>270,830</td>
<td>274,079</td>
<td>293,235</td>
<td>296,094</td>
<td>1%</td>
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<tr>
<td>Total</td>
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<td>523,855</td>
<td>563,049</td>
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<td>Bronx-Bound</td>
<td>278,744</td>
<td>249,776</td>
<td>269,814</td>
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<td>-10%</td>
</tr>
<tr>
<td>Manhattan-Bound</td>
<td>270,830</td>
<td>274,079</td>
<td>293,235</td>
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</tr>
<tr>
<td>Total</td>
<td>549,574</td>
<td>523,855</td>
<td>563,049</td>
<td>567,951</td>
<td>-5%</td>
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<tr>
<td><strong>Tolled Bridge</strong></td>
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<tr>
<td>Henry Hudson Bridge - MTA</td>
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### % Diff From Counts

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<th>2010B- S2.1</th>
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<tr>
<td>Manhattan-Bound</td>
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<tr>
<td>Total</td>
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<td>8%</td>
<td>-2%</td>
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<td>9%</td>
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<tr>
<td>Manhattan-Bound</td>
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<tr>
<td>Total</td>
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<td>7%</td>
<td>3%</td>
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<tr>
<td>Henry Hudson Bridge - MTA</td>
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<tr>
<td>Manhattan-Bound</td>
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<td></td>
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</tr>
<tr>
<td>Total</td>
<td>-10%</td>
<td>2%</td>
<td>-8%</td>
</tr>
<tr>
<td>Bronx-Bound</td>
<td>-3%</td>
<td>2%</td>
<td>-1%</td>
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<tr>
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<td>-4%</td>
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# Assignment: Validation Results

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<th>Major Crossing Cordon Summary</th>
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<th>2010N</th>
<th>2010B-S2.0</th>
<th>2010B-S2.1</th>
<th>% Diff from Counts</th>
</tr>
</thead>
<tbody>
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<td><strong>Bronx-Queens Crossings - MTA</strong></td>
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<td>174,046</td>
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<td>173,517</td>
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<td><strong>Tolled Bridges</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Mid-Hudson Bridges**        |        |       |            |            |                    |
| WB                            | 107,648 | 114,522 | 102,267 | 105,156 | 6% -11% -2%        |
| EB                            | 115,904 | 117,198 | 118,324 | 119,568 | 1% 1% 3%           |
| **Total**                     | 223,552 | 231,720 | 220,591 | 224,724 | 4% -5% 1%          |
| **Tolled Bridges**            |        |       |            |            |                    |

| **Hudson River Crossings - PANYNJ** |        |       |            |            |                    |
| WB                            | 257,486 | 262,616 | 259,609 | 261,787 | 2% -1% 2%          |
| EB                            | 247,690 | 237,411 | 228,707 | 228,955 | -4% -4% -8%        |
| **Total**                     | 505,176 | 500,026 | 488,316 | 490,741 | -1% -2% -3%        |
| **Tolled Bridges & Tunnels**  |        |       |            |            |                    |

| **Staten Island Bridges - PANYNJ** |        |       |            |            |                    |
| WB                            | 79,081  | 83,383 | 82,705 | 82,943 | 5% -1% 5%          |
| EB                            | 90,442  | 96,298 | 98,827 | 99,317 | 6% 3% 10%          |
| **Total**                     | 169,523 | 179,682 | 181,531 | 182,260 | 6% 1% 8%           |
| **Tolled Bridges**            |        |       |            |            |                    |
Next Steps

- **Overall**: 2010B-S2.1 Assignment results look good, reasonably close to or better than 2010N
- Current results reflect the basis for BPM 2010 calibration moving forward
- Freeze 2010B-S2.1 as base network for BPM 2010 Update
- Future / Additional edits and corrections to network will be built as Projects
  - NYMTC and PANYNJ comments and modifications
  - Additional edits by PB
  - Network Calibration work
Related Work

• Update all existing PROJ & CHG files – Leo Tsang and Sandeep Puppala
  • Adapt for new network geometry and additional fields
  • Possible procedure update to handle additional fields?

• Ongoing Roadway Attribute Update Project (51237G) – Feng Lu and Sandra Forte
  • Continue attribute update work through PROJ / CHG system, built on top of “frozen” base 2010B-S2.1
  • Final delivery January 2014