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FTA 'STOPS' TRANSIT MODELING

Chicago Regional Calibration

CATMUG June 3 2015

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TODAY'S PRESENTATION

1. What is STOPS?
2. How can STOPS be used?
3. Regional Input Calibration
4. Example Test Results

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1. WHAT IS STOPS?

- Developed by FTA for New Starts, Small Starts, and Core Capacity requirements
- Simplified Trips-on-Project Software
- A simplified 4-step travel demand model

  Step 1: Trip Generation

  Step 2: Trip Distribution

  Step 3: Mode Choice

  Step 4: Route Assignment

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SIMPLIFIED

- Trip Generation and Distribution are replaced with:
  - Freely available CTPP journey-to-work data
  - Zone-level demographic estimates provided by MPO for self-calibrating growth forecasting
- Mode Choice is based upon:
  - Freely available GTFS transit schedules
  - Zone-to-zone highway times provided by MPO

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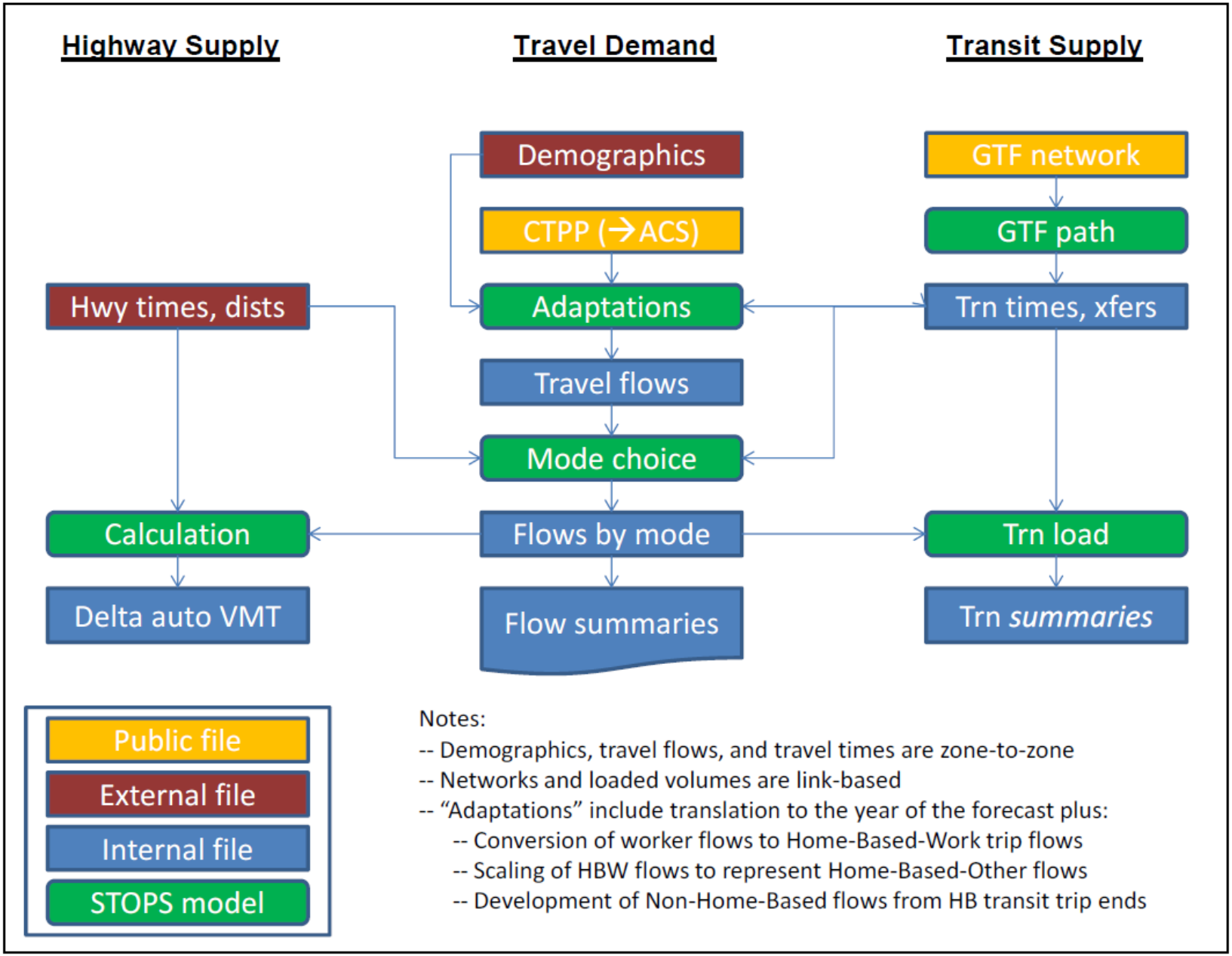

Figure 1. STOPS Application Flow Chart

TRIPS

- STOPS calculates estimated weekday transit trips (route assignments) for the following scenarios:
  - Existing
  - Future, no-build
  - Future, build
- At the following levels:
  - Route (bus, fixed-guideway)
  - Station (fixed-guideway)
  - Station Group (user-defined)
  - District (user-defined)

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PROJECTS

- Projects in GTFS build scenario
- Route Assignments can be analyzed at the corridor or regional level for:
  - Route extensions (fixed-guideway, BRT/ART)
  - New stations (in-fill or extension)
  - New service (fixed-guideway, BRT/ART)
- Reported as incremental transit trips, auto VMT change, total project trips, and more for estimating project benefits

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SOFTWARE

- Free software and census data package from FTA
- Workstation requirements:
  - ArcMap 10.0 or later (10.1+ for automatic mapping)
  - 2GB+ memory
  - 100GB drive space*
- Time requirements:
  - 1-2 weeks for existing scenario data preparation
  - 1-2 weeks for build scenario data preparation
  - 8 hours to run the program
  - 1-2 weeks to review the results

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2. HOW CAN STOPS BE USED?

- Before employing or in lieu of more complex and resource intensive regional travel models
- Estimate of project benefits for internal discussion, comparison, or official reporting
- Corridor or regional impact analysis
- Adjustment to project attributes for first-step optimization
    - i.e. Estimating required service levels (by adjusting GTFS data) to achieve alternative trip generation outcomes
    - Assessing O&M costs from STOPS Revenue Service outputs
- Mode-type treatment analysis

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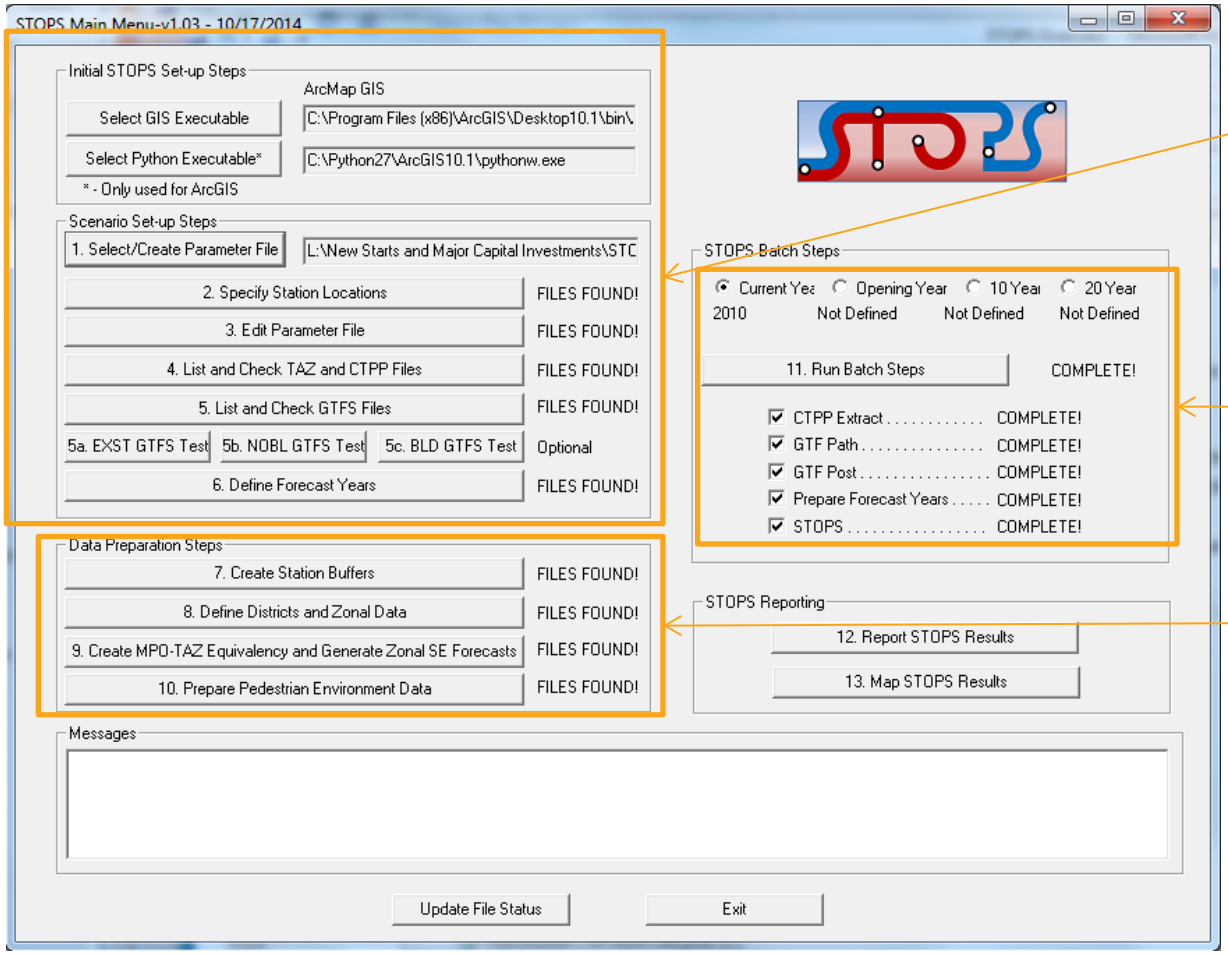
APPLICATION OVERVIEW



1) Data entry and configuration

3) Model Run

2) Data preparation

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Can we create a regionally-relevant framework for STOPS that agencies could individually use, from which we could have a reasonable expectation that results would be both replicable and comparable?

Good Question!

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3. REGIONAL INPUT CALIBRATION

- The RTA has led an effort in collaboration with CTA, Metra, Pace, NICTD, and CMAP to generate a regionally calibrated version of STOPS.
- FTA has been providing guidance on our work and has used our inputs to help inform STOPS version updates
- We have successfully tested some existing projects and have adjusted the model inputs for Chicago based on those outcomes

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OUR METHOD

1) Gather Data
2) Prepare initial inputs
3) Test 2010 model year against 2010 ridership
4) Adjust Inputs alongside STOPS software revisions
   - Repeat 3 & 4 until satisfied
5) Test 2015 model year against 2014 ridership
6) Adjust Inputs alongside STOPS software revisions
   - Repeat 5 & 6 until satisfied
7) Test recently built projects
8) Recommend a final set of inputs

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GATHER DATA

- Gathered, cleaned, and reformatted all necessary input data:
  - IL, WI, IN CTPP data
  - IL, WI, IN census shapes:
    - Tract
    - Block group
    - TAZ
    - Block
  - MPO population and employment forecasts
    - 2000, 2010, 2015, 2025, 2030, 2040
  - MPO Zone shapes

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CONTINUE GATHERING DATA…

- MPO auto travel time matrices
  - 2010, 2015, 2025, 2030, 2040
- STOPS Station data shapes
- GTFS data
  - CTA, Metra, NICTD, Pace
  - 2010, 2015
- Regional unlinked and home-based-work (HBW) annual transit trips (from NTD, RTAMS)
- Station boarding counts
  - CTA, Metra, NICTD, Pace (bus on shoulder)
  - 2010, 2014

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PREPARE INITIAL INPUTS

- STOPS has a number of input parameters that need to be tailored to specific metro applications:
  - Station STOPSTYPE
  - Station Penalties:
    - Access method (walk, drop-off, park-n-ride)
    - Transfer type (same service, different service)
  - Park-n-Rides (PNR.txt)
    - Park-n-Ride Availability & Location
    - Park-n-Ride Type
    - Park-n-Ride Shadow Pricing

PREPARE INITIAL INPUTS

- Station Groups
  - Used for reporting and aggregations for station-level calibration
  - Extremely important to STOPS internal calibration
  - In Chicago:
    - Metra & NICTD groups based on avg. travel times to loop
    - CTA groups based on line
    - Pace groups based on O/D locations
    - Uniquely considered groupings:
      - Downtown
      - Major Transfers
      - Airports

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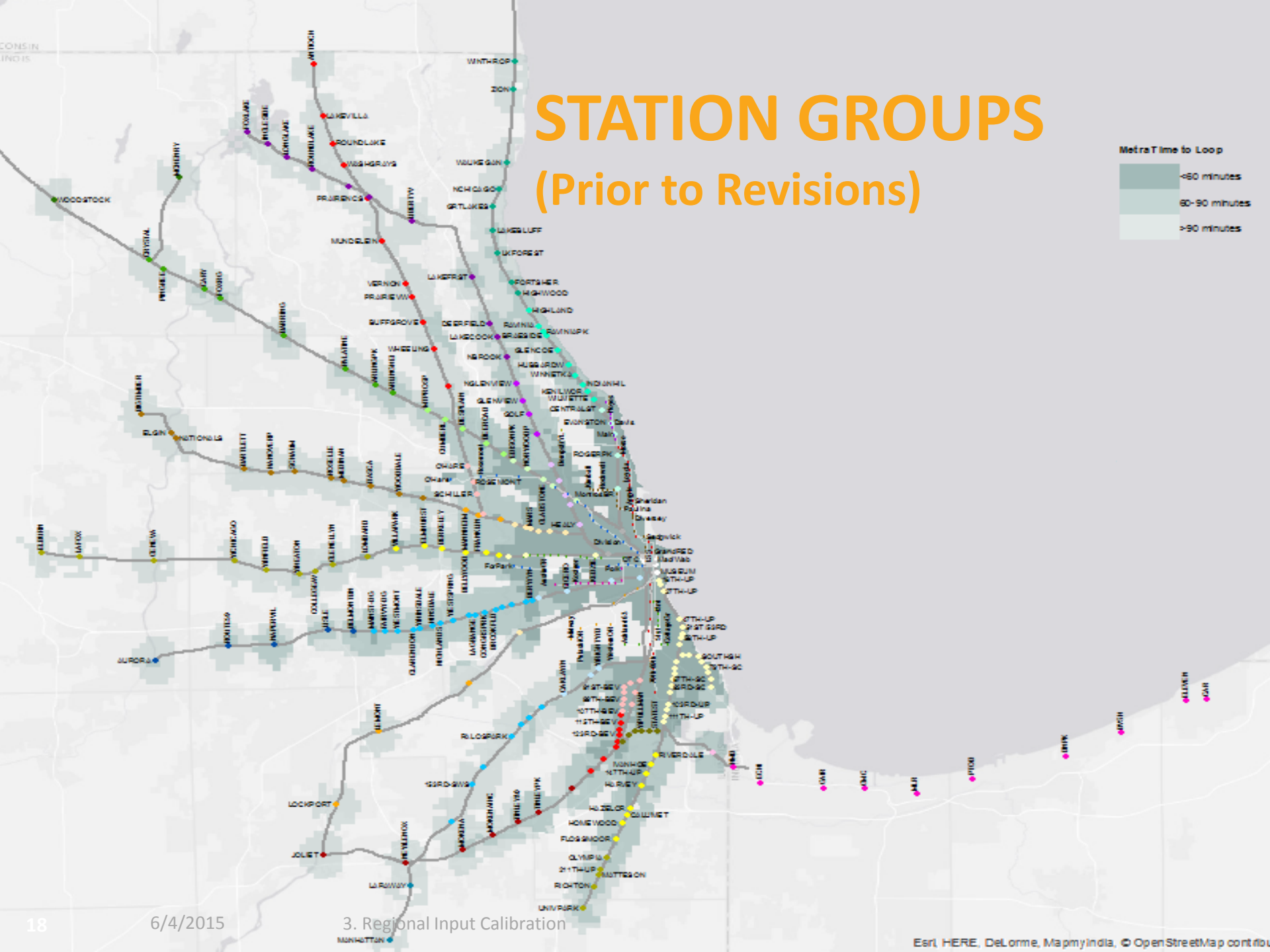
STATION GROUPS

(Prior to Revisions)



PREPARE INITIAL INPUTS

- Districts
  - Groups of TAZs used to aggregate travel data to a level suitable for model calibration and reporting
  - They should consist of zones with relatively similar transit modeshares and transit service
  - In Chicago:
    - Limit regional districts to around 35
    - Allow room for project-level district narrowing
    - Focus on transit modeshare

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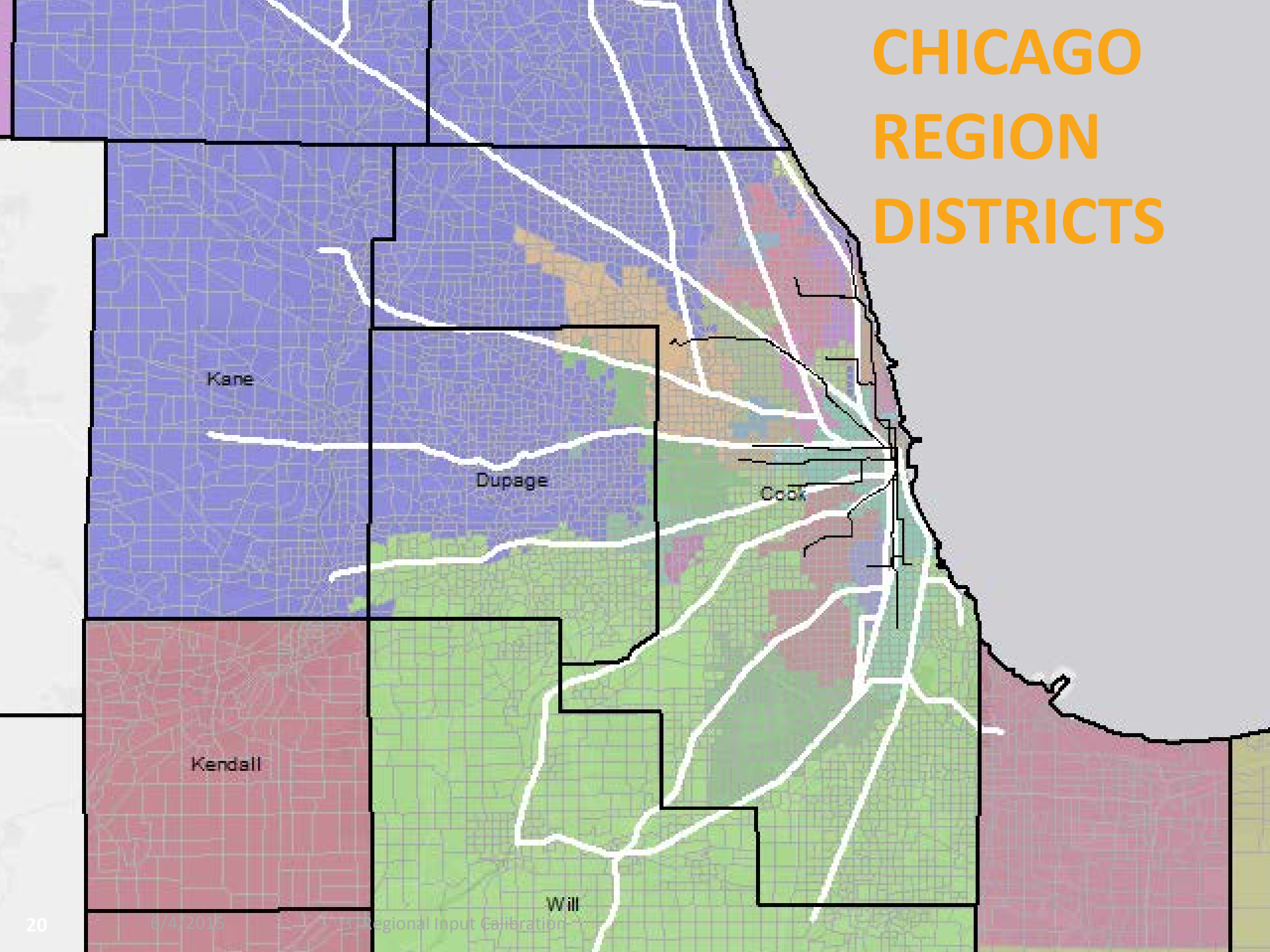
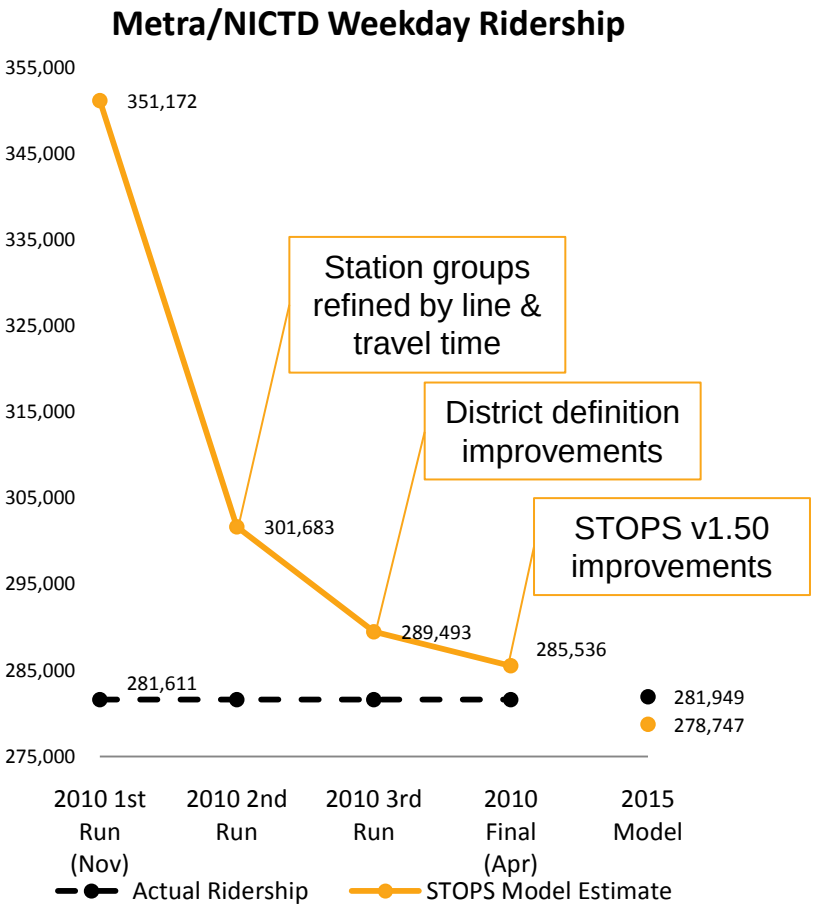
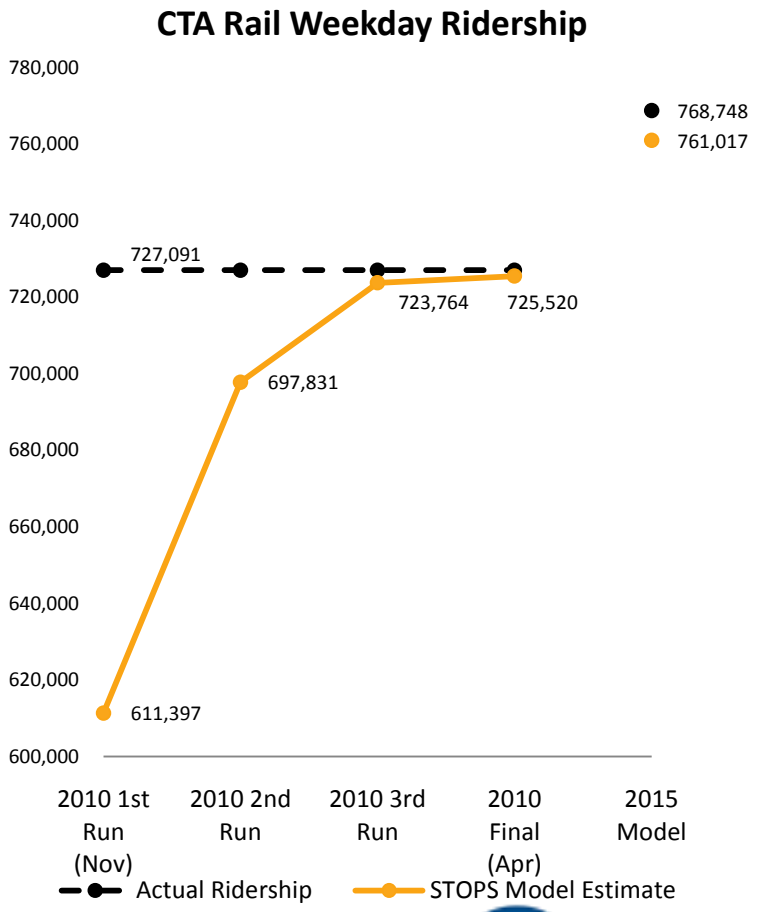

CHICAGO
REGION
DISTRICTS
Kane
Dupage
Cook
Kendall
Will

STOPS CALIBRATION PROGRESS





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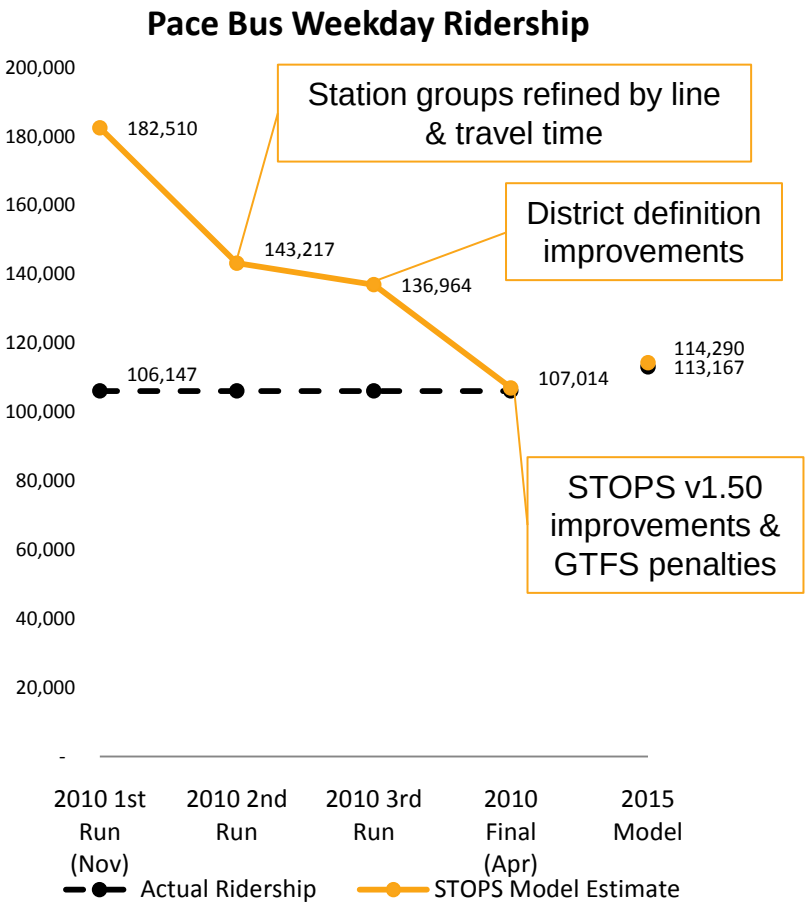
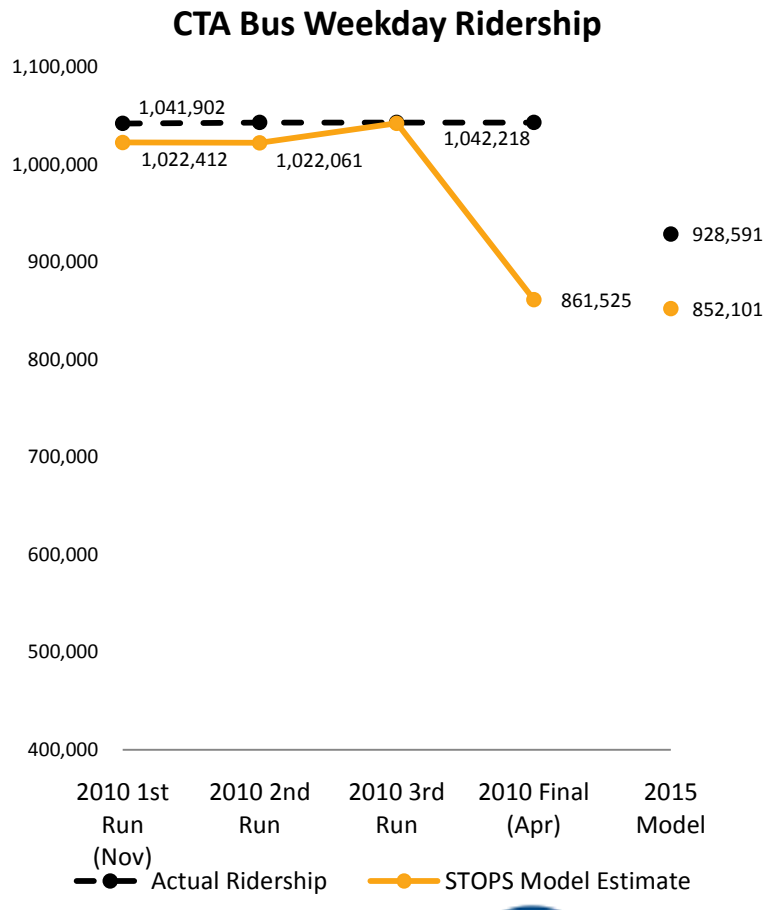
STOPS CALIBRATION PROGRESS





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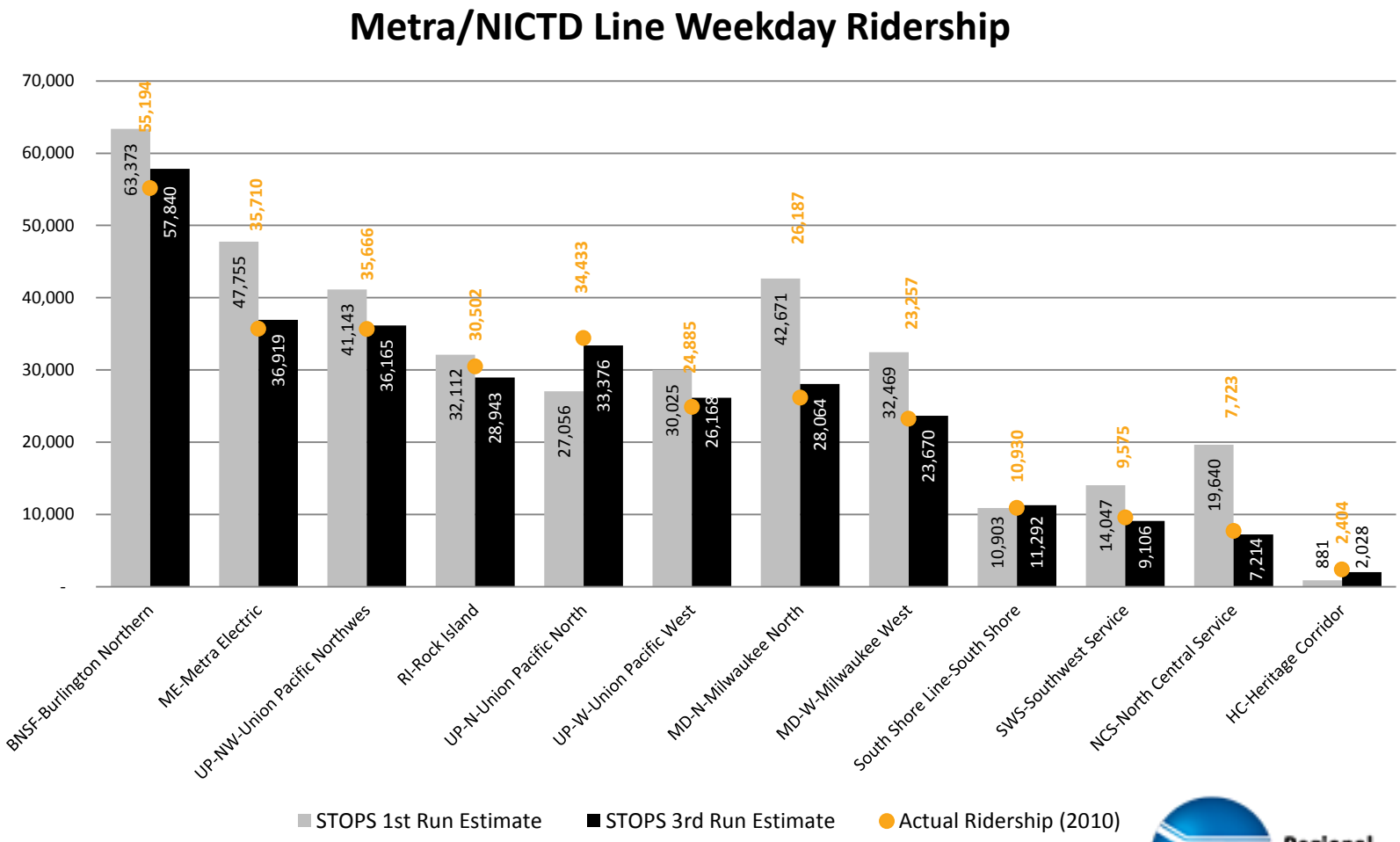

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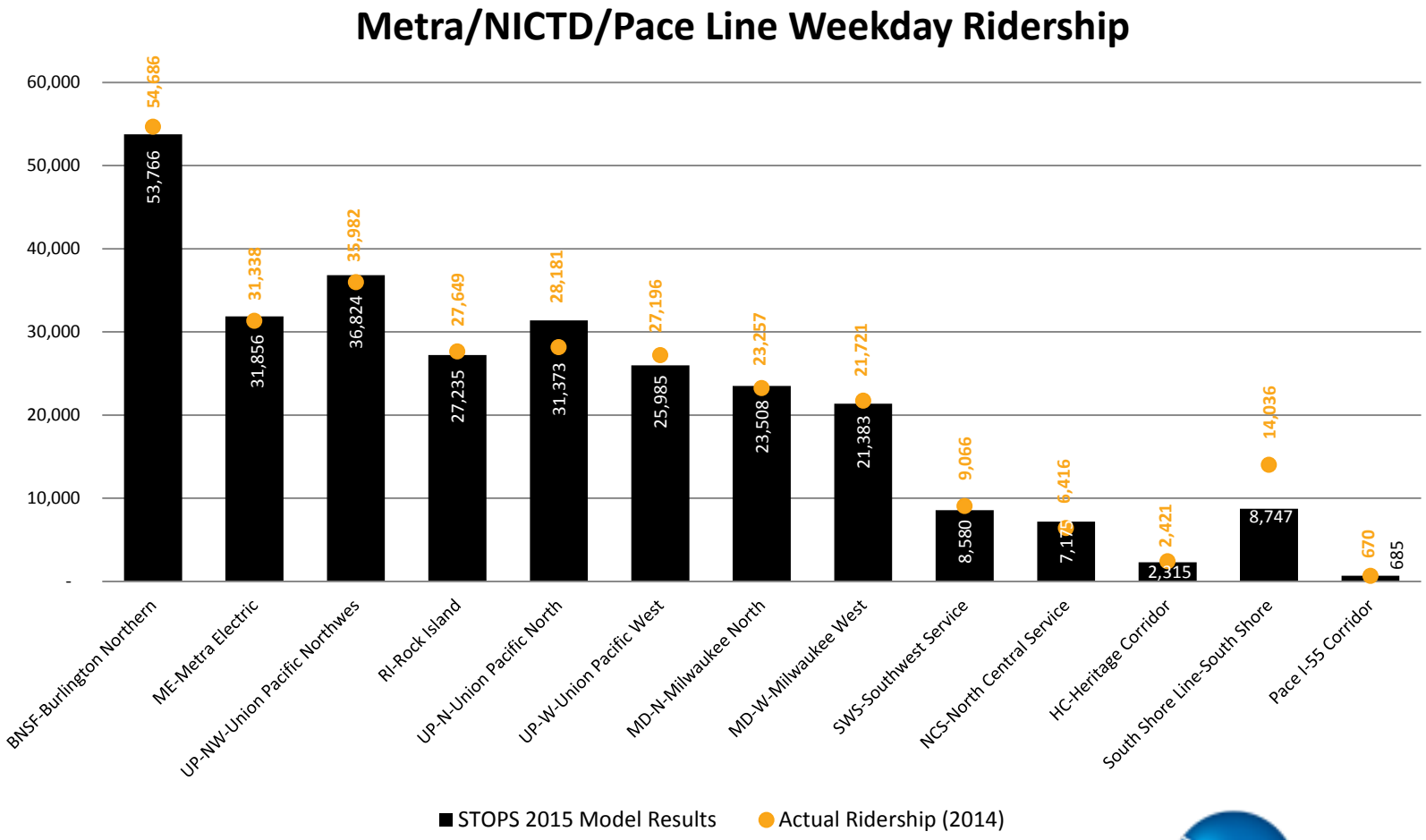

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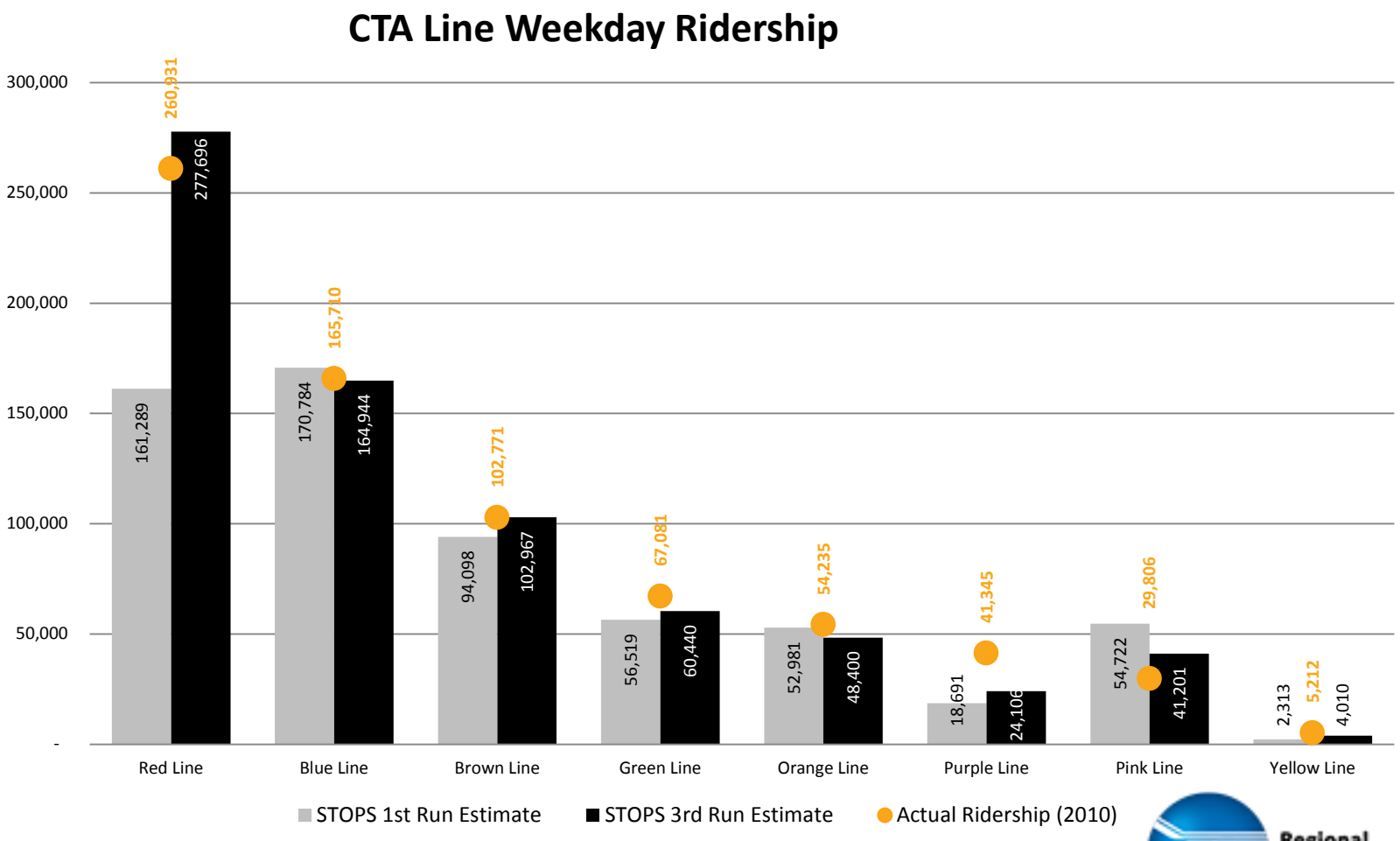

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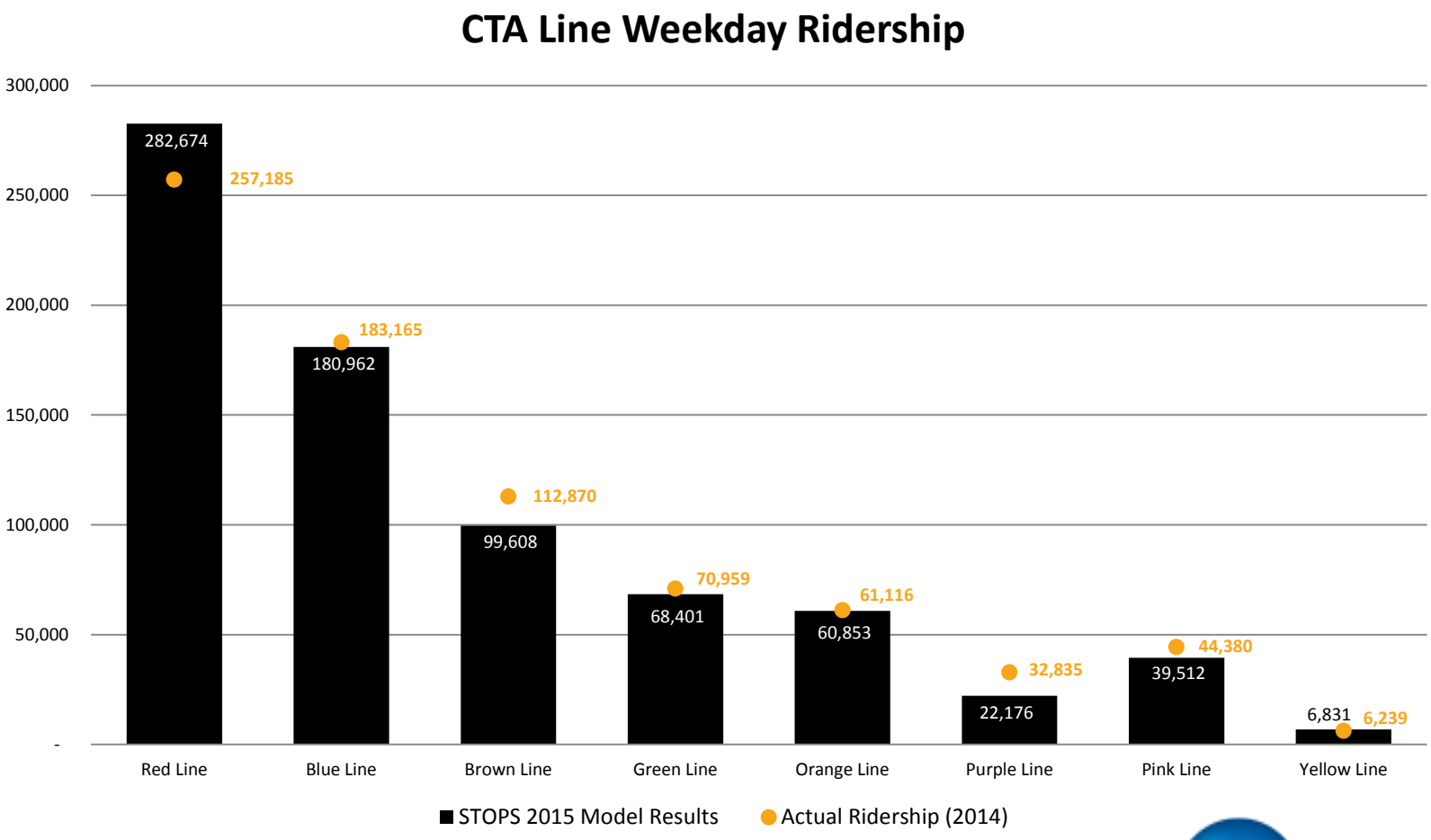

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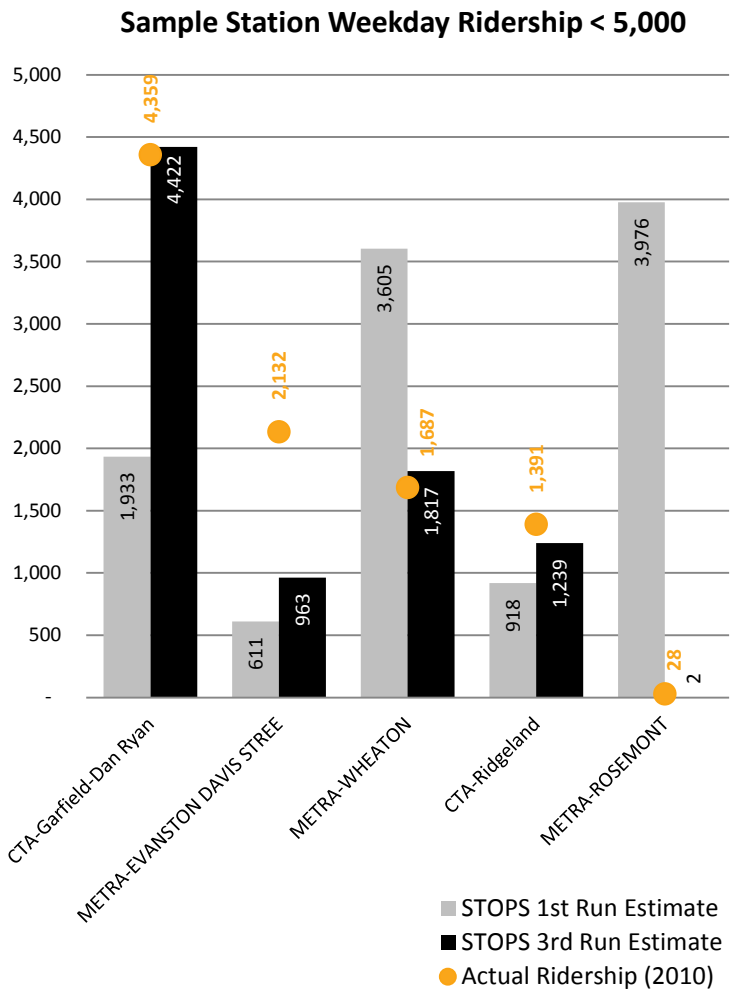

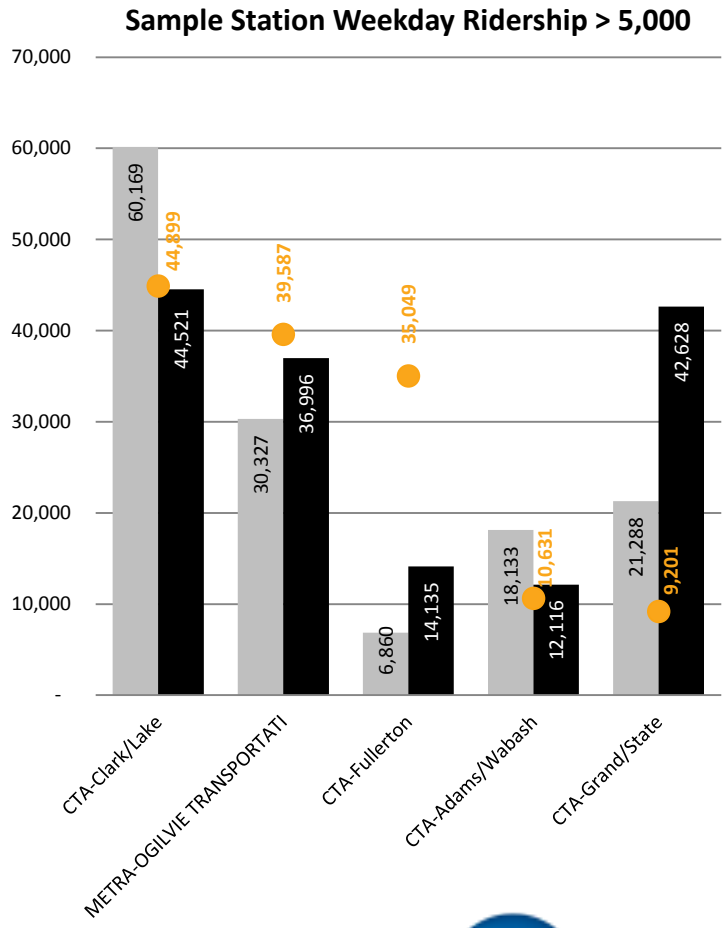

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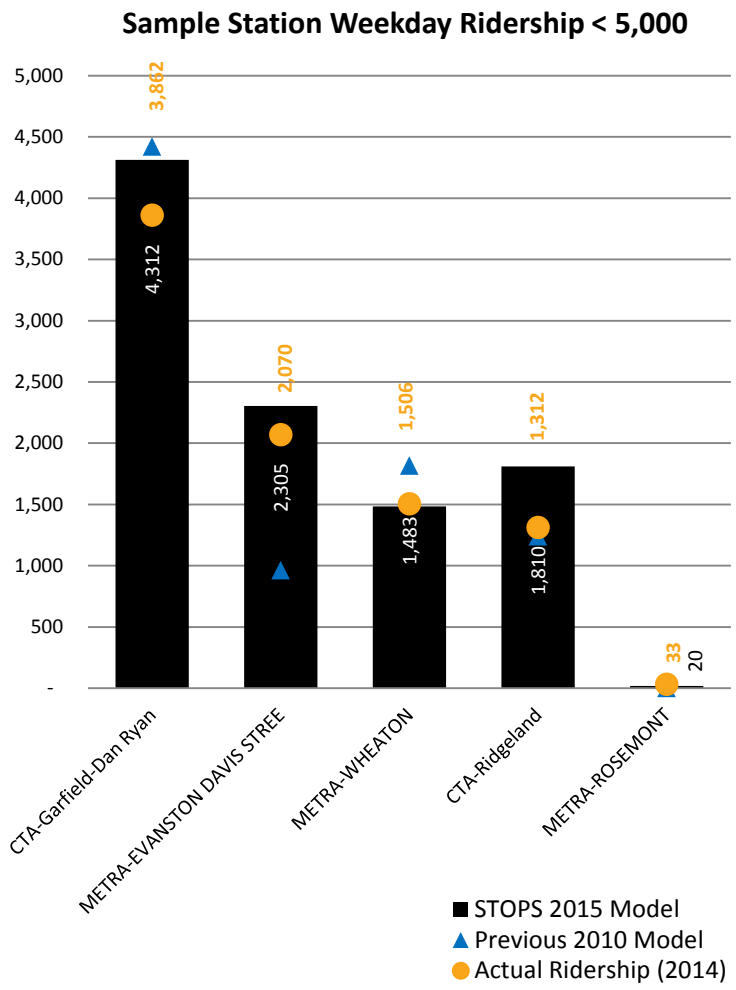

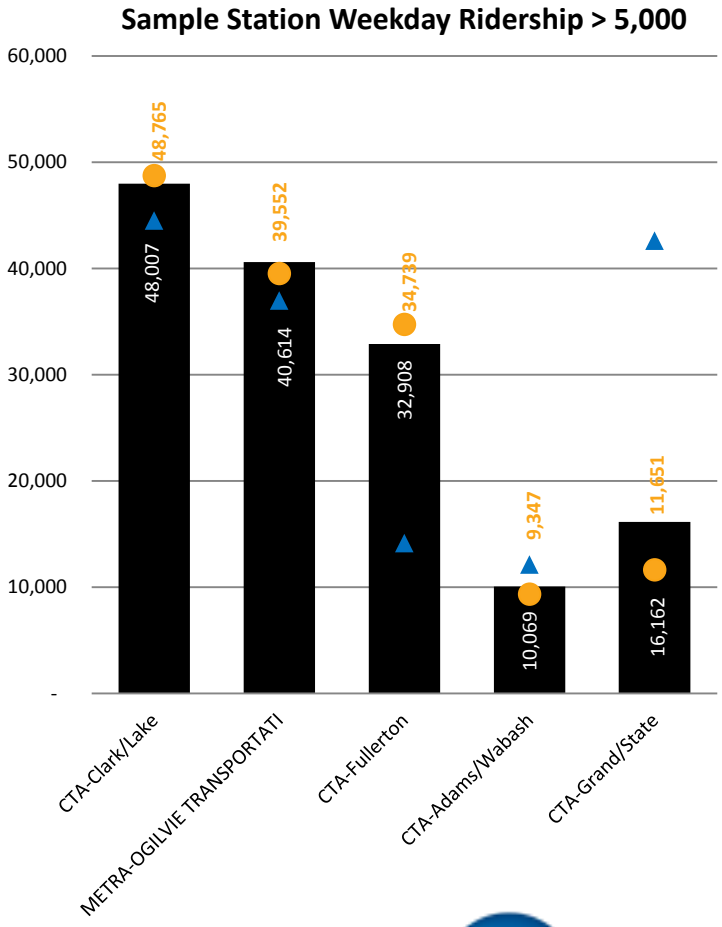

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4. EXAMPLE TEST RESULTS

Completed Project Testing

- With 2014 Model Inputs & latest STOPS version:
  - Test 2015 – 2040 Build scenario for completed projects:
    - EXTENSION: Metra Elburn-LaFox
    - NEW SERVICE: Pace I-55 Bus-On-Shoulder Corridor (755, 850, 851, 855)
    - INFILL: CTA Cermak-McCormick

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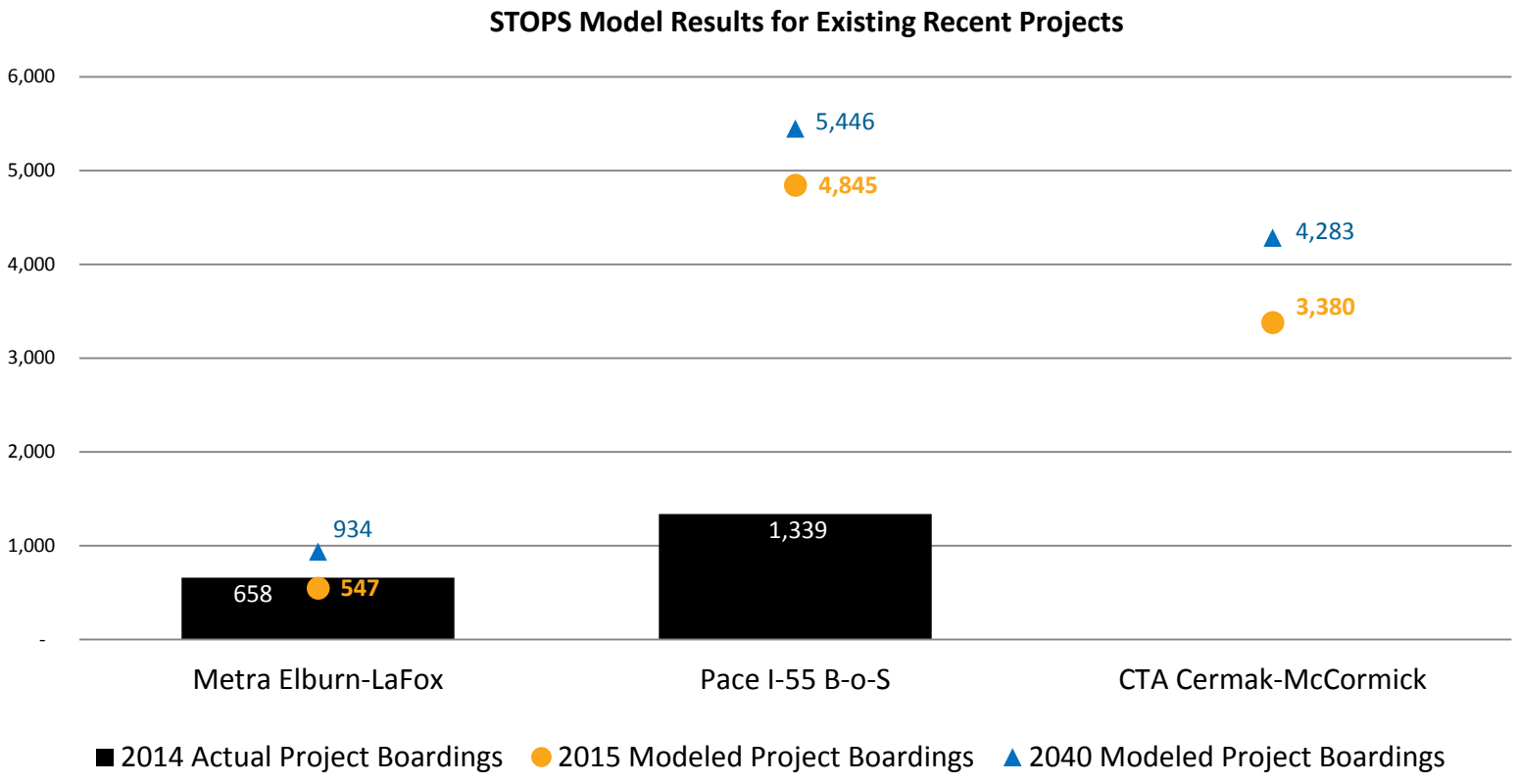
STOPS PROJECT RESULTS



REGIONAL IMPACT OF PROJECTS FOR REPORTING

- New Starts, Small Starts, Core Capacity
  - From STOPS Results Tables:
    - 4.xx = Trips on Project (total, incremental, …)
    - 8.01 = Weekday Auto PMT
    - 11.xx = Summary by access mode, scenario, auto-ownership…

2015	Metra Elburn-LaFox	Pace I-55 B-o-S	CTA Cermak-McCormick
Linked Trips on Project	1,089	4,925	20,435
*Transit Dependent	3	148	6,510
Incremental Transit Trips	1,080	2,082	333
Incremental Auto PMT	(47,181)	(55,492)	(1,547)

2040	Metra Elburn-LaFox	Pace I-55 B-o-S	CTA Cermak-McCormick
Linked Trips on Project	1,859	5,540	25,308
*Transit Dependent	3	172	7,949
Incremental Transit Trips	2,065	2,318	387
Incremental Auto PMT	(95,766)	(61,860)	(1,674)

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TESTING IMAGINARY SCENARIOS

Desire to test the calibrated STOPS inputs on a BIG project, but we don't have one ready to go.

- Create an imaginary scenario, but one that was recently experienced:
  - Remove all Dan Ryan stations from the current and no-build scenario (all station data and GTFS schedule information)
  - Insert "new" stations along Dan Ryan at actual Red Line locations, but with no boarding data and attached to no existing station grouping.
  - What will STOPS produce for ridership?

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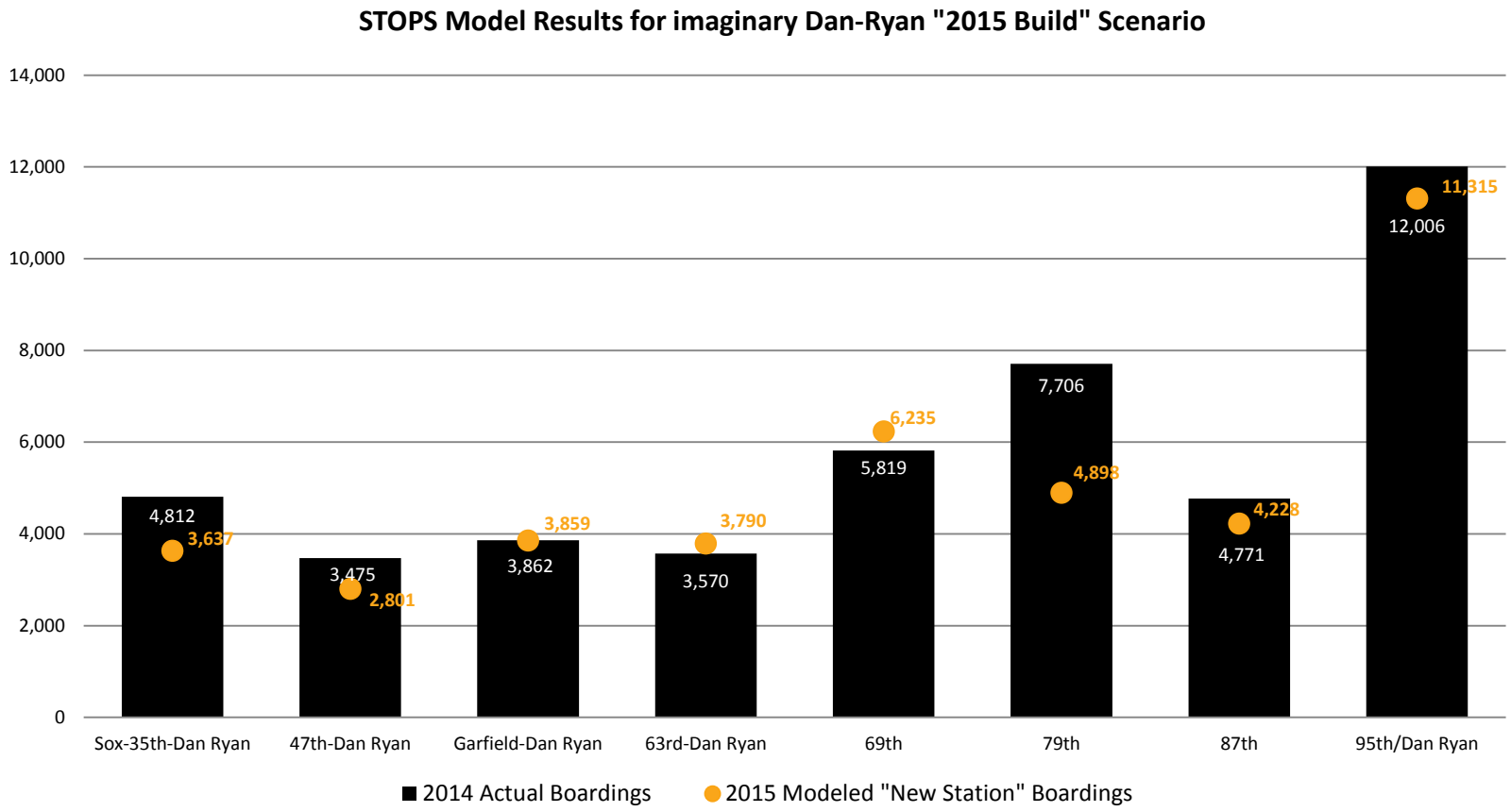
DAN RYAN IMAGINARY SCENARIO



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DAN RYAN IMAGINARY SCENARIO REGIONAL IMPACTS

2015	Dan Ryan
Linked Trips on Project	75,633
*Transit Dependent	23,563
Incremental Transit Trips	29,671
Incremental Auto PMT	(380,760)

2040	Dan Ryan
Linked Trips on Project	83,189
*Transit Dependent	26,512
Incremental Transit Trips	32,284
Incremental Auto PMT	(411,296)

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DAN RYAN IMAGINARY SCENARIO ADDITIONAL INSIGHT

- Sorted by ridership change (Bld v. No-bld), we can see what bus routes throughout the region are most impacted by the project

Rank (relative chg. in route ridership across region)	Route Name	Modeled Ridership Y2015 No-Build	Modeled Ridership Y2015 Build	Ridership Change
1	29-State	35,142	28,596	(6,546)
2	24-Wentworth	20,317	15,706	(4,611)
3	87-87th	3,958	7,083	3,125
4	112-Vincennes/111th	1,934	5,040	3,106
5	3-King Drive	16,705	14,100	(2,605)
6	79-79th	5,688	8,050	2,362
7	352-Halstead	3,299	5,622	2,323
8	67-67th-69th-71st	4,921	7,157	2,236
9	63-63rd	3,147	5,295	2,148
10	55-Garfield	3,754	5,568	1,814
11	30-South Chicago	4,823	6,627	1,804
12	9-Ashland	18,049	16,493	(1,556)
13	8-Halsted	15,794	14,323	(1,471)
14…	….all other regional routes	….	….	….

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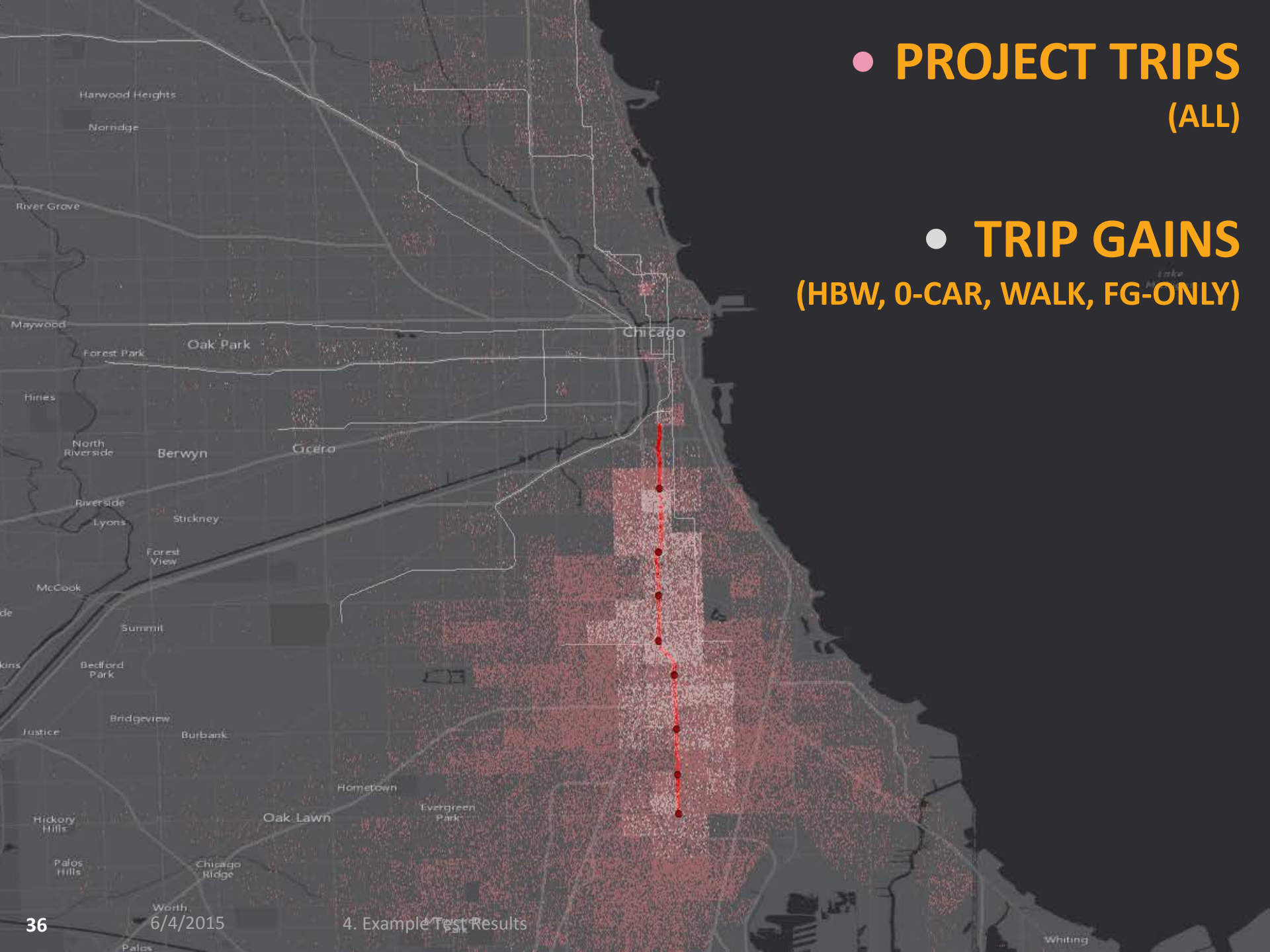

- **PROJECT TRIPS**
  (ALL)

- **TRIP GAINS**
  (HBW, 0-CAR, WALK, FG-ONLY)

WRAP-UP

Can we create a regionally-relevant framework for STOPS that agencies could individually use, from which we could have a reasonable expectation that results would be both replicable and comparable?

Yes!

(and let's keep improving it)

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