Travel Forecasting for New Starts

St. Louis, Missouri

September 19-20, 2007

1. Welcome

- Purpose
- Approach
- Participants
- Logistics
- Agenda

Purpose

- No surprises
  - For project sponsors
  - For New Starts travel forecasters
  - For FTA

Approach to Workshop

- Goals
  - Closure on most topics from Minneapolis
  - Discussion of ongoing issues
  - Comments/ideas from participants
- Elements
  - FTA presentations
  - Participant presentations – Thanks!
  - Summary of comments; website

Participants

- Affiliation
- Experience with New Starts forecasting
- Attendance at Minneapolis workshop

Logistics

- Schedule
  - Lunches provided
  - Scheduled breaks (Phils at Cards, 7:10pm tonight)
  - Schedule adherence
- Facilities

Agenda

- Activities since Minneapolis
- Travel models and New Starts
  - Properties of travel models
  - Data collection
  - Calibration and validation of models
  - Presentation and QC of forecasts
  - Lifting the user-benefits cap
  - CTPP-based forecasts
  - Applying alternative-specific effects

Agenda

- Uncertainties in forecasts
  - Uncertainties analysis
  - Before-and-after studies
  - Contractor performance tracking
- Continuing challenges
  - Representing transit choices
  - Making the case for a project
  - Evaluating economic-development benefits

New Starts Highlights

- SAFETEA-LU implementation
  - NPRM
  - Policy guidance
- Others
  - Discretionary AA funding
- NAS report

SAFETEA-LU Provisions for Ridership Forecasting

- Before and After Study
  - Required for FFGA & PCGA comparing forecasts with actual ridership
- Before and After Study Report
  - Required annually to Congress documenting results of B&A studies
- Contractor Performance Report
  - Required annually to Congress citing contractor forecasts

SAFETEA-LU Provisions for Ridership Forecasting

- Incentives awards
  - Allows more federal funding if actual ridership is at least 90% of forecast and cost no more than 110%
- Reliability as an evaluation criterion

Policy Guidance: Provisions for Ridership Forecasting

- Requires preservation of information for Before and After study as a condition for PE and FD entry, FFGA and two years after project opening
- For projects to enter PE or PD, requires travel models used to be validated against data sufficient to describe current travel conditions
- Allows project sponsors of new modes to receive user benefit credits beyond time and cost based on modal attributes
- Commits FTA to work with sponsors of projects with calibrated constants to ensure those constants are consistent with sponsors of new modes

Discretionary Alternatives Analysis Funding

- FTA solicited proposals for technical work supporting AA studies in 4 areas:
  - Collection of information on ridership patterns for validating travel models
  - Collection of data on transit service reliability for assessing benefits of fixed guideways
  - Development of simplified forecasting methods for Small Starts
  - Development of methods to address improved forecasts of highway user benefits resulting from transit projects
- $12m awarded in August
- Possible funding available in FY08 if earmarks less than $25m authorized

Other Programmatic Issues

- “Medium” rating of cost effectiveness required for Full Funding Grant Agreements more difficult for many projects
- Congressional and transit industry interest in economic development impacts of transit projects is proving difficult to address analytically
- New and Small Starts proposed rule requires more rigor for travel forecasts

2. Status Report

- Topics at the 2006 workshop
  - Project benefits
  - Quality control
  - Guidance topics
- Status report
- FTA staffing

Project Benefits

- Additional transit attributes
  - Policy guidance: alternative-specific effects
  - Session 9
- Congestion relief
  - Report to Congress: barriers → allowance
  - Departmental initiative?
  - Software updates by vendors

Project Benefits (cont'd)

- Variable trip tables
  - Barriers → allowance
  - Eclipsed by next topic
- Variable trip ends
  - Economic development
  - Session 15

Quality Control

- Predicted and actual ridership
  - Release of 2002 study
  - 2007 update underway → TRB session
- Data library
- CTPP-based aggregate model
  - Lots of applications
  - Session 8

Quality Control

- Semi-independent forecasts
  - NCTCOG testing
  - Further development
- Additional QC measures
  - Project contribution, IVT contribution
  - Session 6
- Summit – Version 0.992 still current

Quality Control (cont'd)

- Early service analysis of alternatives
- Dealing with uncertainties
  - Current emphasis
  - Session 10: conceptual direction
- Tracking accuracy of forecasts
  - Reports to Congress underway
  - Session 12: concept direction

Guidance Topics

- Properties of travel models: Session 3
- Calibration and validation: Session 5
- Rider surveys: Session 4
- Before-and-after studies: Session 11

FTA Staffing

- Hires since the Minneapolis workshop
  - Stephanie McVey
  - Nazrul Islam
  - Ken Cervenka
- Emphasis areas
  - Technical assistance and guidance
  - Project reviews
  - Research: contract mgmt.; in-house

3. Properties of Models

- FTA requirements for New Starts
- Implications
- Frequently made FTA comments

FTA Requirements

- Approach to New Starts forecasting
  - Local models
  - Locally prepared forecasts
- Compelling reasons for this approach
  - Absence of standard, “correct” methods
  - Conditions unique to individual metro areas
  - Responsiveness to local decision-making

FTA Requirements

- Models used for New Starts must:
  1. Grasp the current (transit) situation
     - Calibrated (FTA definition, Session 5)
     - Validated (FTA definition, Session 5)
  2. Provide plausible forecasts for alternatives
     - Deltas that make sense
     - Guideway volumes unlikely to embarrass

FTA Requirements (cont'd)

- Models used for New Starts must:
  3. Adequately support "making the case"
     - Primary causes of changes and benefits
     - Main effects on principal markets
  4. Quantify FTA evaluation measures
     - Mobility benefits for all travelers
     - Mobility benefits for "transit dependents"
     - Forecasting conventions for New Starts

Implications

- Inadequacy of traditional:
  - Model testing
  - Reporting
  - QC
- But, nothing has to be perfect
  - Adequacy defined by “no show-stoppers”
  - Range of acceptable approaches

Acceptable Approaches

- Traditional trip-based aggregate models
- Tour-based enumerated models
- Incremental versions of model sets
- Simplified models
- Calculations of travel-time savings

So long as they meet requirements #1-#4

Implications

- Technical
  - User-benefits (or time savings) capabilities
  - Plausible mode-choice parameters
    - Coefficients (particularly ratios to C_{ivt})
    - Constants
  - Fixed-trip-table capabilities
  - Fixed-highway-times, perhaps

Implications

- Strategic
  - Early FTA review of models
    - Documentation
      - Specifications
      - Calibration results
      - Validation tests
    - Useful to identify likely problems
    - Not conclusive, because proof is in the forecasts

Frequently Made Comments

- Insufficient data
  - Transit travel patterns
  - Highway speeds
- Calibration errors
  - Unrealistic markets for discrete choices
  - Over-specification of constants
  - Overly tight closure on target values

Frequently Made Comments

- Supply-side forecasting problems
  - Unrealistically low highway speeds
  - Unfaithful station coding
- Demand-side forecasting problems
  - Unrealistic access-mode shares
  - Benefits unrelated to the project

Bottom Line

- Models
  - Good models required
  - Fancy models (that work) optional
- Good models
  - Known by their forecasts
  - Forecasts that are coherent, not perfect

Bottom Line

- Keys to success in New Starts forecasting
  - Useful calibration and validation of models
  - Analytical reporting of forecasts
  - Routine and rigorous QC of forecasts
  - Development and communication of insights into the performance and benefits of the alternatives → ultimately, the project

4. Data Collection

- FTA requirements for New Starts
- Implications
- Thoughts on good practice
- Three presentations

FTA Requirements

- Transit rider data for model testing
  - For forecasts supporting PE applications
  - Transit travel patterns
  - "Current"
- Rider data for Before-and-After studies
  - Before and 2 years after project opening
  - Part of the project scope → funding
  - FTA approval of plan = condition for $$$

Implications

- Model testing with ridership patterns
  - System-wide data
  - Necessary data items for comparisons
  - Controlled sample → representative data
- "Current" ridership
  - Usefulness of older datasets depends on:
    - Rate of growth in the metropolitan area
    - Any major changes to the transit system
    - Any substantial change in transit ridership
  - Older datasets → updates with counts?

Implications

- B-A evaluation of forecast accuracy
  - Corridor specific data, but system-wide OK
  - Necessary data items for comparisons
  - Controlled samples → meaningful B-A Δ's

Thoughts on Good Practice

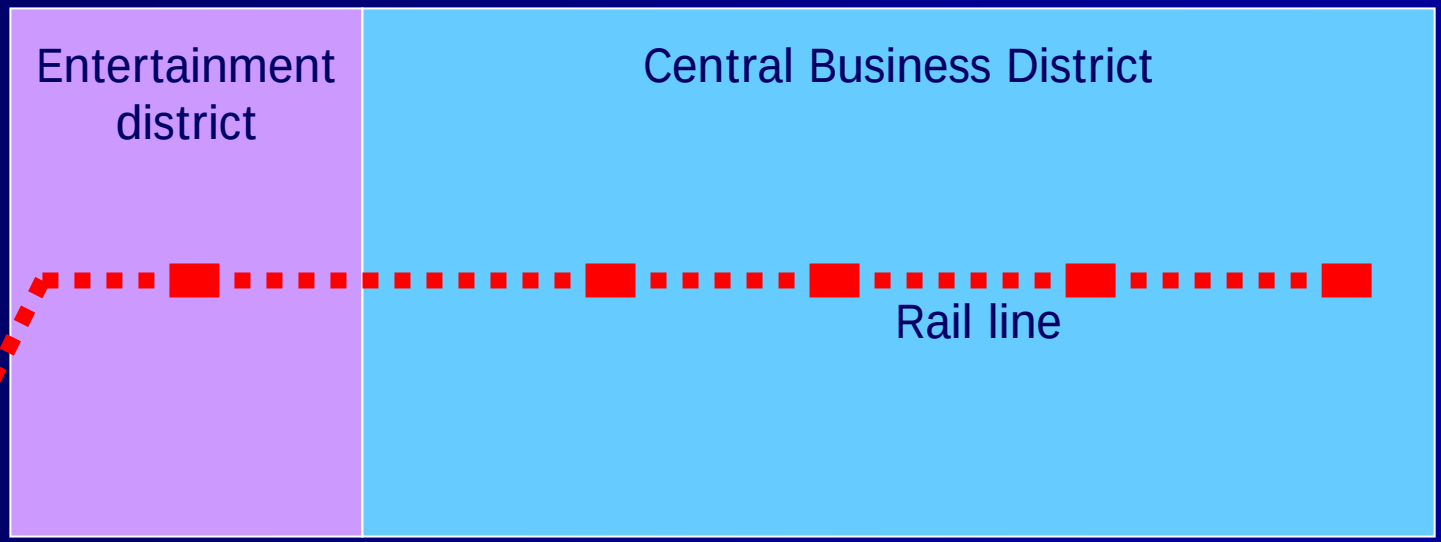
- Rider surveys
  - Sampling plan
  - Questionnaire design
  - Data items

Rider Surveys

- Sampling plan
  - Designed with transit markets in mind
  - Sample allocation
  - Survey methods
  - Non-response biases
  - Count data for sample expansion

Rider Surveys

Markets Example



Urban and suburban residential areas

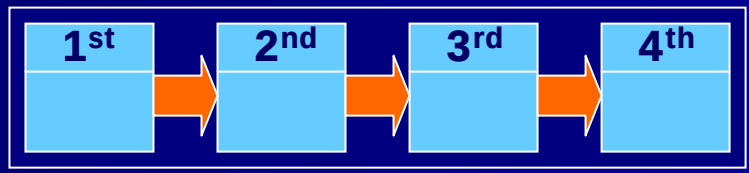
Afternoon west-bound rail markets:
- Within-CBD trips
- CBD-to-residence low-income workers
- CBD-to-residence high-income workers
- CBD-to-entertainment trips

Rider Surveys

- Response rates by market
  - CBD-CBD - low?
  - CBD-entertainment - low?
  - CBD-home-low-income - moderate?
  - CBD-home-high-income - high?
- Implications for uniform expansion
  - Too few: non-work trips; bus transfers
  - Too many: work trips; park-ride cars
- Better: counts? additional survey methods?

Rider Surveys

- Questionnaire design
  - Layout, readability, and wording
  - Avoidance of round-trip reporting
    - Instructions
    - Example: HOME → bus → train → WORK
  - O→D transit paths
    - Questions: first line, next line, next line
    - Chart:



Rider Surveys

- Data items
  - Trip origin and destination
  - Purposes at origin and destination
  - Access and egress modes
  - Transit path
  - Rider characteristics

Rider Surveys

Trip characteristics

Items	?	Comments
O and D purposes	Y	Required
O and D locations	Y	Required
O and D access modes	Y	Required
Park-ride location	Y	Required
All routes in O-D path	Y	Required
Xfer from, Xfer to	?	Redundant; useful for path checking?
Number of Xfers	?	Redundant; useful for path checking?
O-on and D-off locations	?	Desirable, but adds complexity, length
Fare paid / method	?	Desirable, but adds length

Rider Surveys

Traveler characteristics

Items	Y	Comments
Driver's license	Y	Required
Age	?	
Disabilities	?	
Household drivers	Y	Required
Household workers	?	
Household adults	?	
Household persons	?	Marginally useful
Household vehicles	Y	Required
Household income	?	Necessary if used in mode choice model

Rider Surveys

Other data items

Items	Y	Comments
Options if no transit	?	Best for “captivity”
Vehicle available for trip	N	Ambiguous
Path attribute weights	?	May inform pathbuilder calibration
Previous behavior	y	Useful in Before-After studies
Customer satisfaction	?	Length/responsiveness/funding
Open-ended comment	?	Responsiveness
Contact information	?	Call-backs for QC checks; responsiveness

Other Data Collection

- Traditional
  - Ride-checks: ons and offs
  - Counts of park-ride lot utilization
- Automated
  - Passenger counters
  - Vehicle locators

Rider Data – Research

- Oklahoma State University
  - FTA funding
  - Tests of rider-data collection methods
    - Questionnaire design and content
    - Ancillary data collection
  - FTA anticipating working relationships between OSU and grantees receiving discretionary AA funding for data collection

Three Presentations

- Fielding the Survey
  - Dr. Johanna Zmud, NuStats
- Intercept Surveys
  - Franco S. Saraceno, Gannett Fleming
- Survey Expansion Weights Computed with Matrix Balancing
  - Robert Farley, LACMTA

Fielding the Survey: The Entrepreneurial Mind

Dr. Johanna Zmud
NuStats

Overview of Presentation

- Key challenges
- Contextual factors
- Strategic issues
- Tactical solutions
- Overall driver
- Conclusions

Key Challenges

- Survey timeframe: short
- Surveyors
  - Number: having enough
  - Quality: competency, communications
  - Characteristics: match riders
  - Churn: enthusiasm, motivation
- Riding public: interest, literacy, time

Contextual Factors

- Unemployment rate
- Cost of living
- Size of system
- Characteristics of riders
- Service types
- Equipment features

Definitions

- Strategic
  - Big picture, anticipate issues, have smart alternatives
- Tactical
  - Getting the job done

Strategic Issues

- Optimizing time in field
  - Balance sample, system complexity, size of field staff
- Having experienced field managers
  - Ascertain in-house versus outsourced talent
- Culling the field staff
  - Trade-off quality for quantity; quality for schedule
  - Subcontracting to local field service
- Motivating field staff
  - Determine cost versus benefit of incentives
  - Decide incentive focus – longevity versus production

Tactical Solutions

- Timeframes
  - Communicate implications of short schedules
- Numbers
  - Multiple temporary agencies
  - Having an account manager
  - Have back-up: Local field service; Craig's List
- Quality
  - Provide detailed job description to temp agency
  - Screen prior to training session

Tactical Solutions (cont)

- Characteristics
  - Seek special skills (e.g., language) elsewhere
- Churn
  - Training
  - Good management
  - Incentives
- Riding public
  - Questionnaire design
  - Market survey
  - Incentives
  - Match surveyors

The Driver of Survey Quality

- Real-Time Information System
  - Continuous processing of data
  - Automatic devices
  - Web-accessible
  - Report templates
  - Distribution channels

Conclusions

- Staffing the survey linked to:
  - Context: economic, population, system
  - Client flexibility: schedule, cost
- Meeting challenges depends on:
  - Experience
  - Planning
  - Creativity
  - Trial and error
- Real-time information system = key to quality

Intercept Surveys: City of Miami Transit Circulators

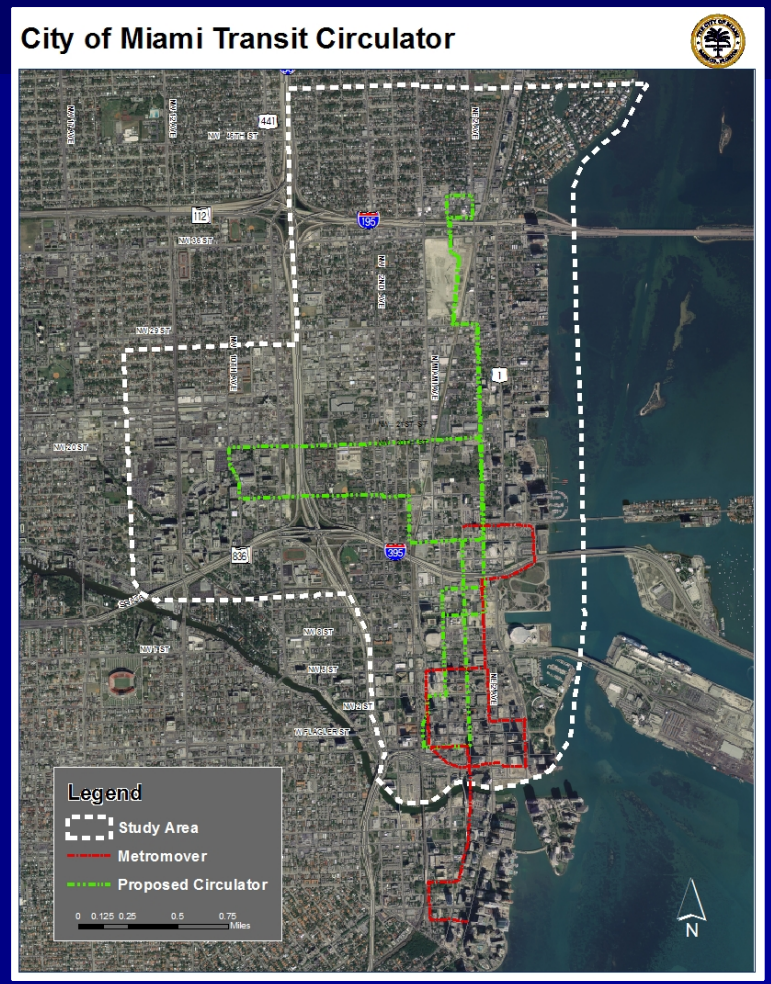
Franco S. Saraceno
Gannett Fleming

Background on Project

- Travel market analysis
  - Distribution of external trips (external to study area)
  - Circulation of intra-study area trips
- Model validation
  - Update factors/targets
  - Calibrate mode choice model

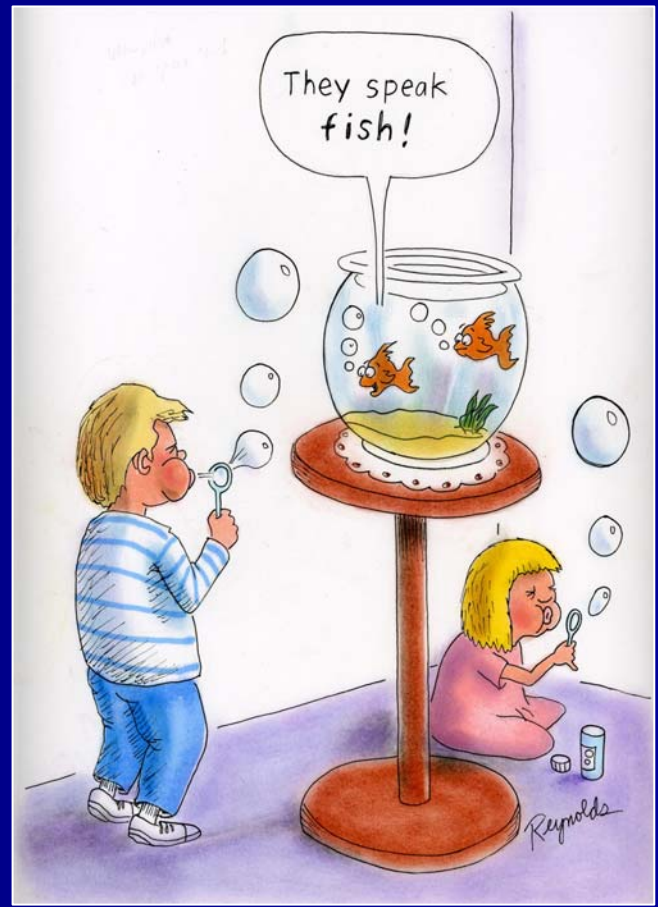
Transit Surveys

- Surveyed Transit Modes
  - Metromover
  - Metrobus

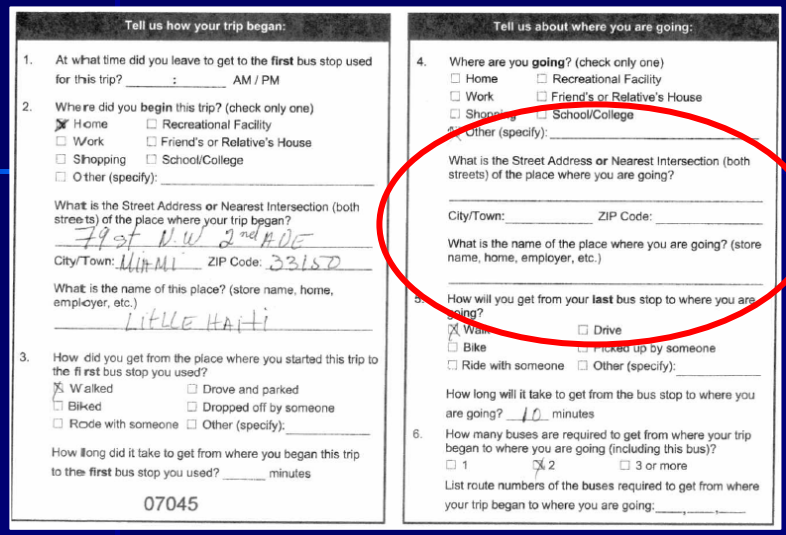


Survey Design

- Nature of Study
  - Systems planning
  - Corridor analysis
- Accurate / Inaccurate Data
  - No English
  - No Spanish
  - No Creole



On-Board Transit Surveys



Tell us how your trip began:

1. At what time did you leave to get to the **first** bus stop used for this trip? _____ : _____ AM / PM
2. Where did you **begin** this trip? (check only one)
   - [x] Home
   - [ ] Recreational Facility
   - [ ] Work
   - [ ] Friend's or Relative's House
   - [ ] Shopping
   - [ ] School/College
   - [ ] Other (specify): _____

   What is the Street Address **or** Nearest Intersection (both streets) of the place where your trip began?
   79 ST N.W. 2nd AVE
   City/Town: MIAMI ZIP Code: 33150
   What is the name of this place? (store name, home, employer, etc.)
   LITTLE HAITI
3. How did you get from the place where you started this trip to the **first** bus stop you used?
   - [x] Walked
   - [ ] Drove and parked
   - [ ] Biked
   - [ ] Dropped off by someone
   - [ ] Rode with someone
   - [ ] Other (specify): _____

   How long did it take to get from where you began this trip to the **first** bus stop you used? _____ minutes

07045

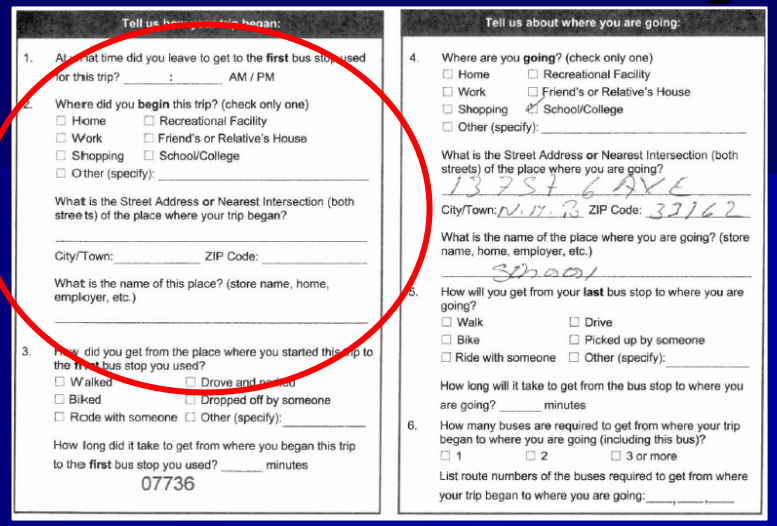
Tell us about where you are going:

4. Where are you **going**? (check only one)
   - [ ] Home
   - [ ] Recreational Facility
   - [ ] Work
   - [ ] Friend's or Relative's House
   - [ ] Shopping
   - [ ] School/College
   - [x] Other (specify): _____

   What is the Street Address **or** Nearest Intersection (both streets) of the place where you are going?
   City/Town: _____ ZIP Code: _____
   What is the name of the place where you are going? (store name, home, employer, etc.)
5. How will you get from your **last** bus stop to where you are going?
   - [x] Walk
   - [ ] Drive
   - [ ] Bike
   - [ ] Picked up by someone
   - [ ] Ride with someone
   - [ ] Other (specify): _____

   How long will it take to get from the bus stop to where you are going? 10 minutes
6. How many buses are required to get from where your trip began to where you are going (including this bus)?
   - [ ] 1
   - [x] 2
   - [ ] 3 or more

   List route numbers of the buses required to get from where your trip began to where you are going: _____, _____, _____



Tell us how your trip began:

1. At what time did you leave to get to the **first** bus stop used for this trip? _____ : _____ AM / PM
2. Where did you **begin** this trip? (check only one)
   - [ ] Home
   - [ ] Recreational Facility
   - [ ] Work
   - [ ] Friend's or Relative's House
   - [ ] Shopping
   - [ ] School/College
   - [ ] Other (specify): _____

   What is the Street Address **or** Nearest Intersection (both streets) of the place where your trip began?
   City/Town: _____ ZIP Code: _____
   What is the name of this place? (store name, home, employer, etc.)
3. How did you get from the place where you started this trip to the **first** bus stop you used?
   - [ ] Walked
   - [ ] Drove and parked
   - [ ] Biked
   - [ ] Dropped off by someone
   - [ ] Rode with someone
   - [ ] Other (specify): _____

   How long did it take to get from where you began this trip to the **first** bus stop you used? _____ minutes

07736

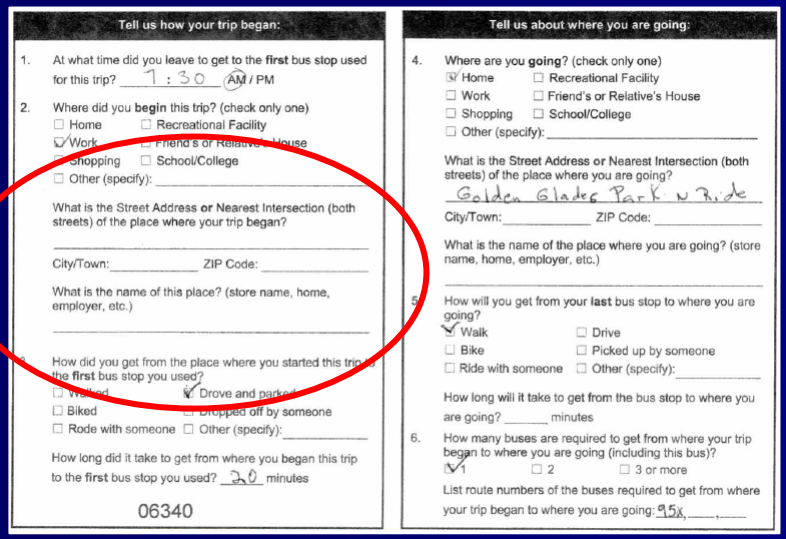
Tell us about where you are going:

4. Where are you **going**? (check only one)
   - [ ] Home
   - [ ] Recreational Facility
   - [ ] Work
   - [ ] Friend's or Relative's House
   - [ ] Shopping
   - [x] School/College
   - [ ] Other (specify): _____

   What is the Street Address **or** Nearest Intersection (both streets) of the place where you are going?
   13 ST & 6 AVE
   City/Town: N. MIAMI ZIP Code: 33162
   What is the name of the place where you are going? (store name, home, employer, etc.)
   SUNNY
5. How will you get from your **last** bus stop to where you are going?
   - [ ] Walk
   - [ ] Drive
   - [ ] Bike
   - [ ] Picked up by someone
   - [ ] Ride with someone
   - [ ] Other (specify): _____

   How long will it take to get from the bus stop to where you are going? _____ minutes
6. How many buses are required to get from where your trip began to where you are going (including this bus)?
   - [ ] 1
   - [ ] 2
   - [ ] 3 or more

   List route numbers of the buses required to get from where your trip began to where you are going: _____, _____, _____



Tell us how your trip began:

1. At what time did you leave to get to the **first** bus stop used for this trip? 7 : 30 AM / PM
2. Where did you **begin** this trip? (check only one)
   - [ ] Home
   - [ ] Recreational Facility
   - [x] Work
   - [ ] Friend's or Relative's House
   - [ ] Shopping
   - [ ] School/College
   - [ ] Other (specify): _____

   What is the Street Address **or** Nearest Intersection (both streets) of the place where your trip began?
   City/Town: _____ ZIP Code: _____
   What is the name of this place? (store name, home, employer, etc.)
3. How did you get from the place where you started this trip to the **first** bus stop you used?
   - [x] Walked
   - [ ] Drove and parked
   - [ ] Biked
   - [ ] Dropped off by someone
   - [ ] Rode with someone
   - [ ] Other (specify): _____

   How long did it take to get from where you began this trip to the **first** bus stop you used? 20 minutes

06340

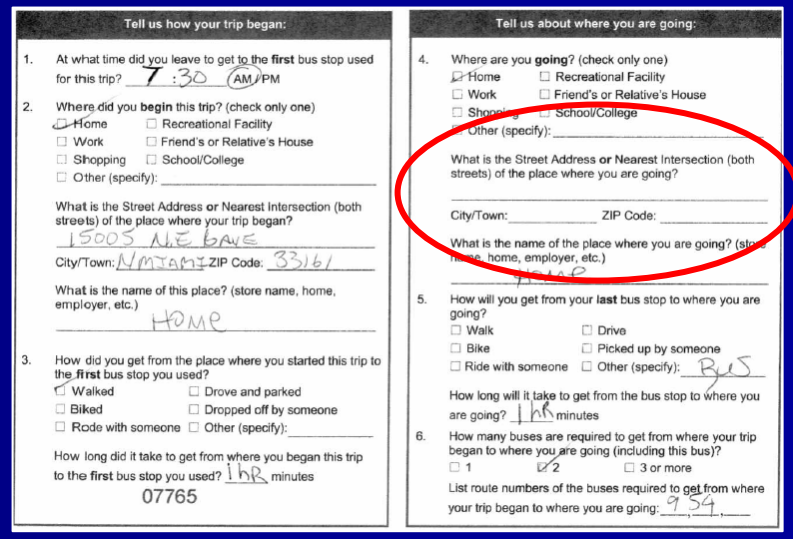
Tell us about where you are going:

4. Where are you **going**? (check only one)
   - [x] Home
   - [ ] Recreational Facility
   - [ ] Work
   - [ ] Friend's or Relative's House
   - [ ] Shopping
   - [ ] School/College
   - [ ] Other (specify): _____

   What is the Street Address **or** Nearest Intersection (both streets) of the place where you are going?
   Golden Glades Park N Ride
   City/Town: _____ ZIP Code: _____
   What is the name of the place where you are going? (store name, home, employer, etc.)
5. How will you get from your **last** bus stop to where you are going?
   - [x] Walk
   - [ ] Drive
   - [ ] Bike
   - [ ] Picked up by someone
   - [ ] Ride with someone
   - [ ] Other (specify): _____

   How long will it take to get from the bus stop to where you are going? _____ minutes
6. How many buses are required to get from where your trip began to where you are going (including this bus)?
   - [x] 1
   - [ ] 2
   - [ ] 3 or more

   List route numbers of the buses required to get from where your trip began to where you are going: 95X, _____, _____



Tell us how your trip began:

1. At what time did you leave to get to the **first** bus stop used for this trip? 7 : 30 AM / PM
2. Where did you **begin** this trip? (check only one)
   - [x] Home
   - [ ] Recreational Facility
   - [ ] Work
   - [ ] Friend's or Relative's House
   - [ ] Shopping
   - [ ] School/College
   - [ ] Other (specify): _____

   What is the Street Address **or** Nearest Intersection (both streets) of the place where your trip began?
   15005 NE 6 AVE
   City/Town: N MIAMI ZIP Code: 33161
   What is the name of this place? (store name, home, employer, etc.)
   HOME
3. How did you get from the place where you started this trip to the **first** bus stop you used?
   - [x] Walked
   - [ ] Drove and parked
   - [ ] Biked
   - [ ] Dropped off by someone
   - [ ] Rode with someone
   - [ ] Other (specify): _____

   How long did it take to get from where you began this trip to the **first** bus stop you used? 1 hR minutes

07765

Tell us about where you are going:

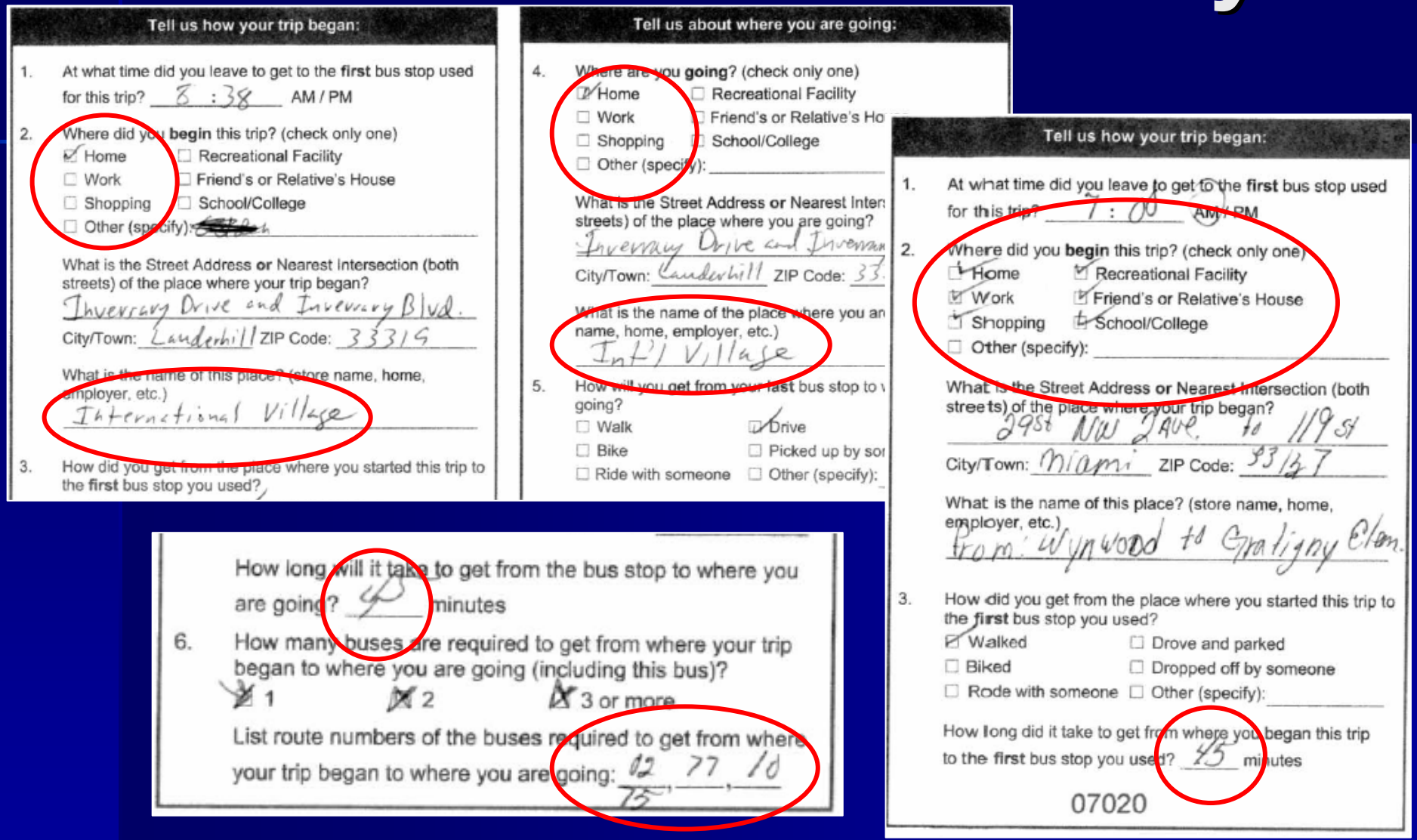
4. Where are you **going**? (check only one)
   - [x] Home
   - [ ] Recreational Facility
   - [ ] Work
   - [ ] Friend's or Relative's House
   - [ ] Shopping
   - [ ] School/College
   - [ ] Other (specify): _____

   What is the Street Address **or** Nearest Intersection (both streets) of the place where you are going?
   City/Town: _____ ZIP Code: _____
   What is the name of the place where you are going? (store name, home, employer, etc.)
   HOME
5. How will you get from your **last** bus stop to where you are going?
   - [ ] Walk
   - [ ] Drive
   - [ ] Bike
   - [ ] Picked up by someone
   - [ ] Ride with someone
   - [ ] Other (specify): BUS

   How long will it take to get from the bus stop to where you are going? 1 hR minutes
6. How many buses are required to get from where your trip began to where you are going (including this bus)?
   - [ ] 1
   - [x] 2
   - [ ] 3 or more

   List route numbers of the buses required to get from where your trip began to where you are going: 9, 54, _____

On-Board Transit Surveys



Tell us how your trip began:

1. At what time did you leave to get to the **first** bus stop used for this trip? 8 : 38 AM / PM

2. Where did you **begin** this trip? (check only one)
   - ☑ Home
   - ☐ Work
   - ☐ Shopping
   - ☐ Other (specify):
   - ☐ Recreational Facility
   - ☐ Friend's or Relative's House
   - ☐ School/College

   What is the Street Address **or** Nearest Intersection (both streets) of the place where your trip began?
   Inverrary Drive and Inverrary Blvd.
   City/Town: Lauderhill ZIP Code: 33319

   What is the name of this place? (store name, home, employer, etc.)
   International Village

3. How did you get from the place where you started this trip to the **first** bus stop you used?

Tell us about where you are going:

4. Where are you **going**? (check only one)
   - ☑ Home
   - ☐ Work
   - ☐ Shopping
   - ☐ Other (specify):
   - ☐ Recreational Facility
   - ☐ Friend's or Relative's Ho
   - ☐ School/College

   What is the Street Address **or** Nearest Inter streets) of the place where you are going?
   Inverrary Drive and Inverrar
   City/Town: Lauderhill ZIP Code: 33

   What is the name of the place where you ar name, home, employer, etc.)
   Int'l Village

5. How will you get from your last bus stop to v going?
   - ☐ Walk
   - ☐ Bike
   - ☐ Ride with someone
   - ☑ Drive
   - ☐ Picked up by so
   - ☐ Other (specify):

How long will it take to get from the bus stop to where you are going? 45 minutes

6. How many buses are required to get from where your trip began to where you are going (including this bus)?
   - ☒ 1
   - ☒ 2
   - ☒ 3 or more

   List route numbers of the buses required to get from where your trip began to where you are going: 02, 77, 10, 75

Tell us how your trip began:

1. At what time did you leave to get to the **first** bus stop used for this trip? 7 : 00 AM / PM

2. Where did you **begin** this trip? (check only one)
   - ☑ Home
   - ☑ Work
   - ☐ Shopping
   - ☐ Other (specify):
   - ☑ Recreational Facility
   - ☑ Friend's or Relative's House
   - ☐ School/College

   What is the Street Address **or** Nearest Intersection (both streets) of the place where your trip began?
   29st NW 2Ave. to 119 St
   City/Town: Miami ZIP Code: 33167

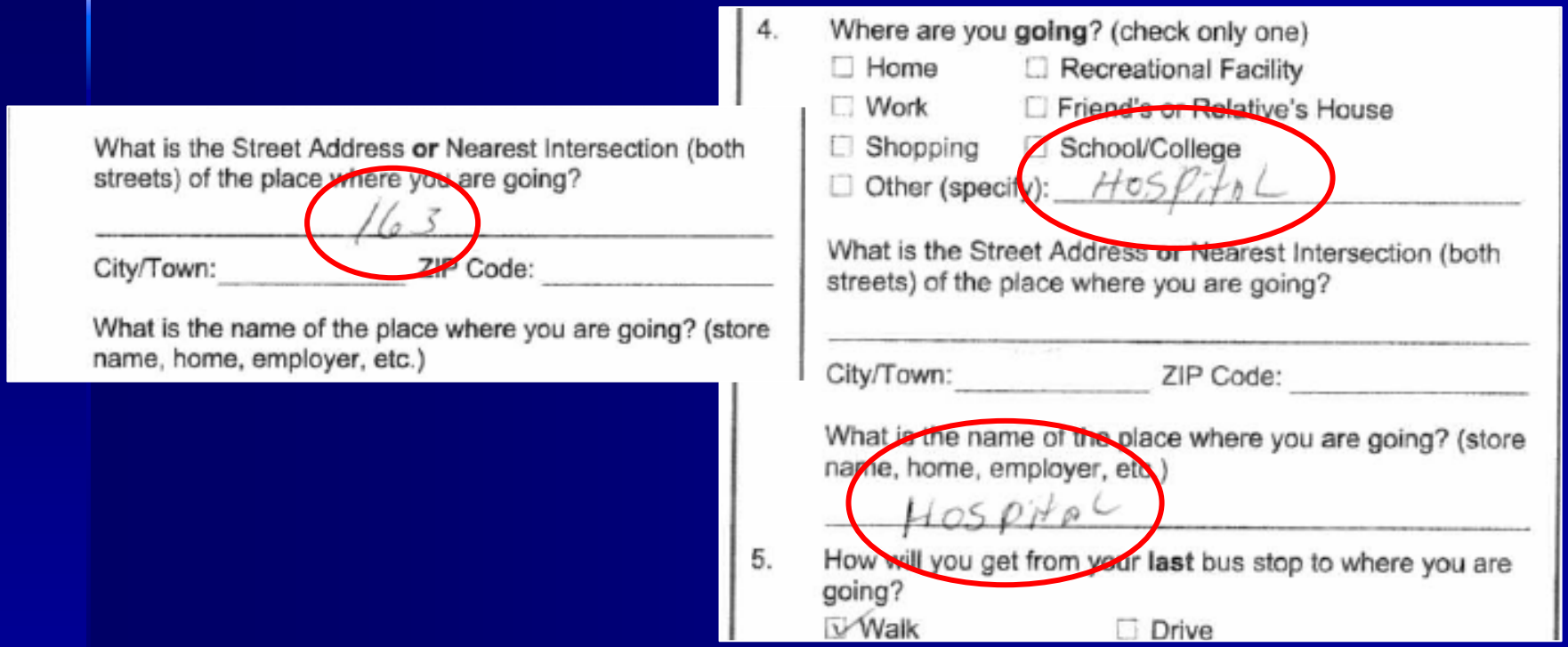
   What is the name of this place? (store name, home, employer, etc.)
   from: Wynwood to Gratigny Elem.

3. How did you get from the place where you started this trip to the **first** bus stop you used?
   - ☑ Walked
   - ☐ Biked
   - ☐ Rode with someone
   - ☐ Drove and parked
   - ☐ Dropped off by someone
   - ☐ Other (specify):

   How long did it take to get from where you began this trip to the **first** bus stop you used? 45 minutes

07020

On-Board Transit Surveys



What is the Street Address **or** Nearest Intersection (both streets) of the place where you are going?

163

City/Town: _____ ZIP Code: _____

What is the name of the place where you are going? (store name, home, employer, etc.)

4. Where are you **going**? (check only one)

☐ Home ☐ Recreational Facility
☐ Work ☐ Friend's or Relative's House
☐ Shopping ☐ School/College
☐ Other (specify): Hospital

What is the Street Address or Nearest Intersection (both streets) of the place where you are going?

City/Town: _____ ZIP Code: _____

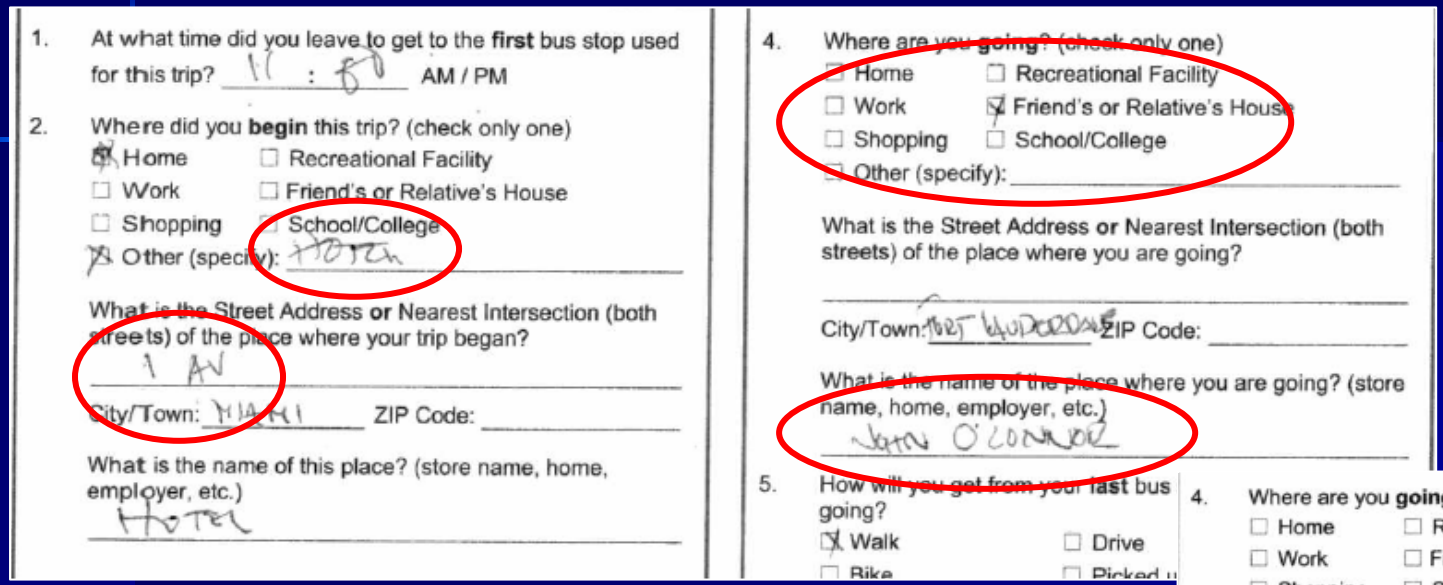
What is the name of the place where you are going? (store name, home, employer, etc.)

Hospital

5. How will you get from your **last** bus stop to where you are going?

☑ Walk ☐ Drive

On-Board Transit Surveys



1. At what time did you leave to get to the **first** bus stop used for this trip? 11 : 50 AM / PM

2. Where did you **begin** this trip? (check only one)
   - ☒ Home
   - ☐ Recreational Facility
   - ☐ Work
   - ☐ Friend's or Relative's House
   - ☐ Shopping
   - ☐ School/College
   - ☒ Other (specify): HOTEL

What is the Street Address **or** Nearest Intersection (both streets) of the place where your trip began?

1 AV

City/Town: MIAMI ZIP Code:

What is the name of this place? (store name, home, employer, etc.)

HOTEL

4. Where are you going? (check only one)
   - ☐ Home
   - ☐ Recreational Facility
   - ☐ Work
   - ☒ Friend's or Relative's House
   - ☐ Shopping
   - ☐ School/College
   - ☐ Other (specify):

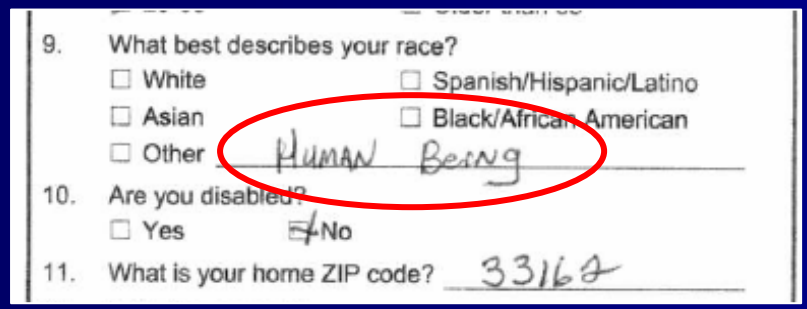
What is the Street Address **or** Nearest Intersection (both streets) of the place where you are going?

City/Town: MIAMI ZIP Code:

What is the name of the place where you are going? (store name, home, employer, etc.)

JOHN O'CONNOR

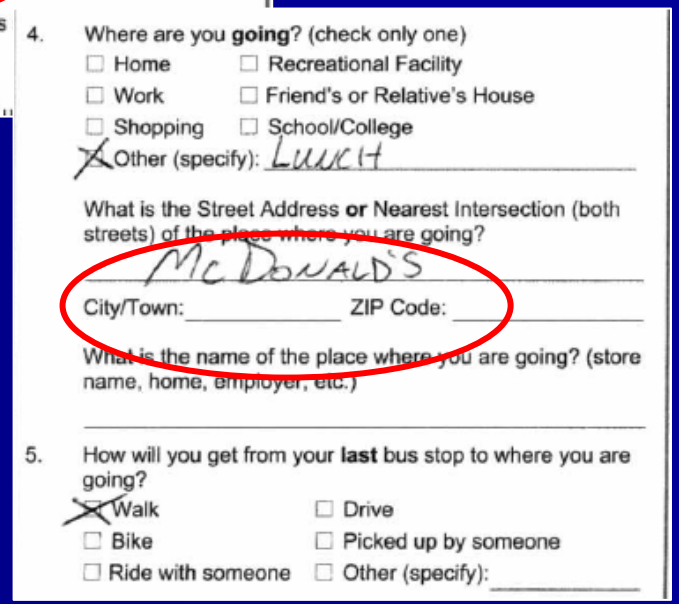
5. How will you get from your **last** bus going?
   - ☒ Walk
   - ☐ Drive
   - ☐ Bike
   - ☐ Picked u



9. What best describes your race?
   - ☐ White
   - ☐ Spanish/Hispanic/Latino
   - ☐ Asian
   - ☐ Black/African American
   - ☐ Other HUMAN BEING

10. Are you disabled?
    - ☐ Yes
    - ☒ No

11. What is your home ZIP code? 33162



4. Where are you **going**? (check only one)
   - ☐ Home
   - ☐ Recreational Facility
   - ☐ Work
   - ☐ Friend's or Relative's House
   - ☐ Shopping
   - ☐ School/College
   - ☒ Other (specify): LUNCH

What is the Street Address **or** Nearest Intersection (both streets) of the place where you are going?

MCDONALD'S

City/Town: ZIP Code:

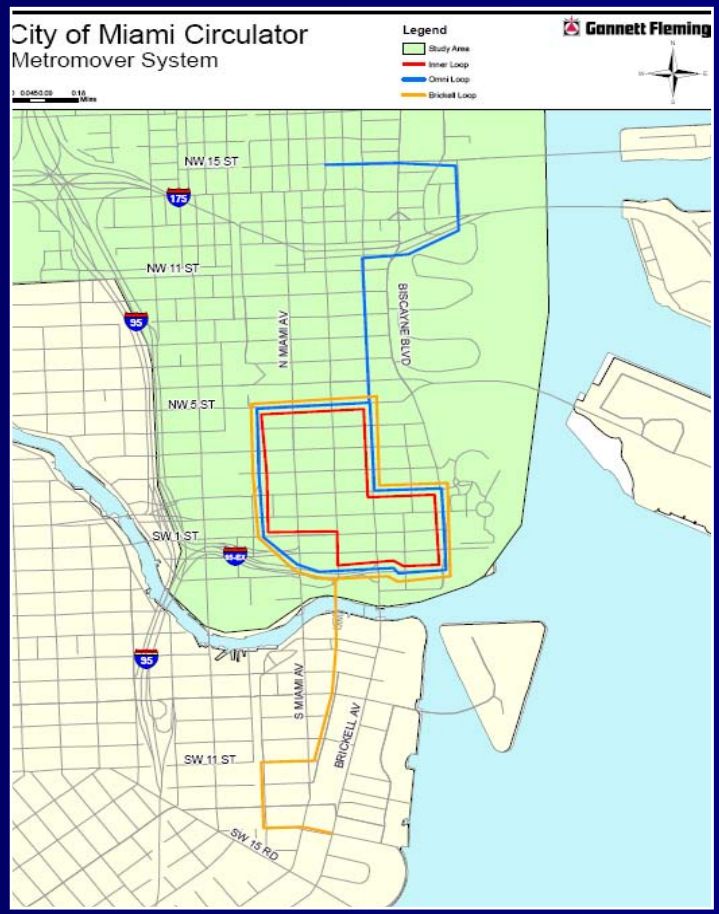
What is the name of the place where you are going? (store name, home, employer, etc.)

5. How will you get from your **last** bus stop to where you are going?
   - ☒ Walk
   - ☐ Drive
   - ☐ Bike
   - ☐ Picked up by someone
   - ☐ Ride with someone
   - ☐ Other (specify):

Methodology Comparisons

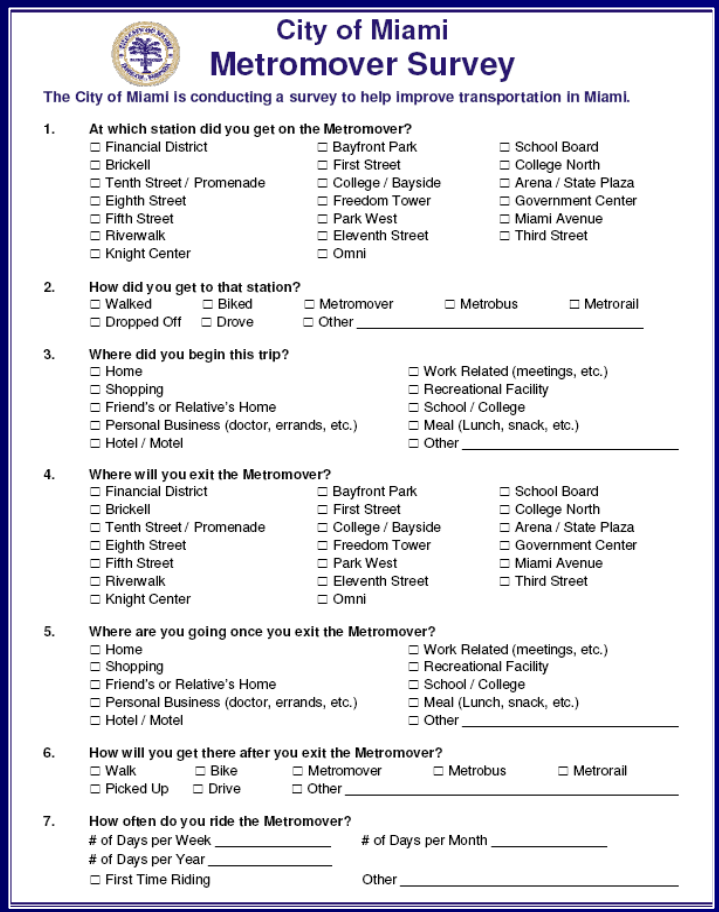
- Self Administered
  - Temps
  - More questions
  - Greater distribution
  - Questionable accuracy
  - Interpretation challenges
- Intercept/interviews
  - Professionals
  - Limited # of questions
  - Less samples
  - More usable data
  - Easier for data entry

Metromover Survey - Methodology



- 2 Teams of 2 surveyors
  - 3 Days
- Routes surveyed
  - Inner Loop
  - Omni Loop
  - Brickell Loop
- Survey period
  - 7 AM to 6 PM

Metromover Survey – Instrument



City of Miami
Metromover Survey

The City of Miami is conducting a survey to help improve transportation in Miami.

1. **At which station did you get on the Metromover?**

☐ Financial District	☐ Bayfront Park	☐ School Board
☐ Brickell	☐ First Street	☐ College North
☐ Tenth Street / Promenade	☐ College / Bayside	☐ Arena / State Plaza
☐ Eighth Street	☐ Freedom Tower	☐ Government Center
☐ Fifth Street	☐ Park West	☐ Miami Avenue
☐ Riverwalk	☐ Eleventh Street	☐ Third Street
☐ Knight Center	☐ Omni	

2. **How did you get to that station?**

☐ Walked ☐ Biked ☐ Metromover ☐ Metrobus ☐ Metrorail
☐ Dropped Off ☐ Drove ☐ Other _____

3. **Where did you begin this trip?**

☐ Home	☐ Work Related (meetings, etc.)
☐ Shopping	☐ Recreational Facility
☐ Friend's or Relative's Home	☐ School / College
☐ Personal Business (doctor, errands, etc.)	☐ Meal (Lunch, snack, etc.)
☐ Hotel / Motel	☐ Other _____

4. **Where will you exit the Metromover?**

☐ Financial District	☐ Bayfront Park	☐ School Board
☐ Brickell	☐ First Street	☐ College North
☐ Tenth Street / Promenade	☐ College / Bayside	☐ Arena / State Plaza
☐ Eighth Street	☐ Freedom Tower	☐ Government Center
☐ Fifth Street	☐ Park West	☐ Miami Avenue
☐ Riverwalk	☐ Eleventh Street	☐ Third Street
☐ Knight Center	☐ Omni	

5. **Where are you going once you exit the Metromover?**

☐ Home	☐ Work Related (meetings, etc.)
☐ Shopping	☐ Recreational Facility
☐ Friend's or Relative's Home	☐ School / College
☐ Personal Business (doctor, errands, etc.)	☐ Meal (Lunch, snack, etc.)
☐ Hotel / Motel	☐ Other _____

6. **How will you get there after you exit the Metromover?**

☐ Walk ☐ Bike ☐ Metromover ☐ Metrobus ☐ Metrorail
☐ Picked Up ☐ Drive ☐ Other _____

7. **How often do you ride the Metromover?**

# of Days per Week _____ # of Days per Month _____
# of Days per Year _____
☐ First Time Riding Other _____

- 7 Questions
  - Station origin
  - Access mode
  - Origin purpose
  - Station destination
  - Destination purpose
  - Egress mode
  - Frequency

Results – Response Rates

- Recent self-administered survey: 45%
- Metromover intercept survey: 70%

Question	Self-Administered Methodology			Intercept Methodology		
	Riders Contacted	Riders Responding	Useful Data	Riders Contacted	Riders Responding	Useful Data
Origin Purpose	17,366	7,780	7,048	3,707	2,615	2,583
Origin Location	17,366	7,780	4,324	N/A	N/A	N/A
Access Mode	17,366	7,780	6,979	3,707	2,615	2,581
Destination Purpose	17,366	7,780	6,980	3,707	2,615	2,583
Destination Location	17,366	7,780	3,353	N/A	N/A	N/A
Egress Mode	17,366	7,780	5,946	3,707	2,615	2,570

Results – Accuracy

Question	Self-Administered Methodology	Intercept Methodology
Origin Purpose	91%	99%
Origin Location	56%	Not Available
Access Mode	90%	99%
Destination Purpose	90%	99%
Destination Location	43%	Not Available
Egress Mode	76%	98%

- Useable-data rates
  - Vary by question
  - Overall better with intercept survey

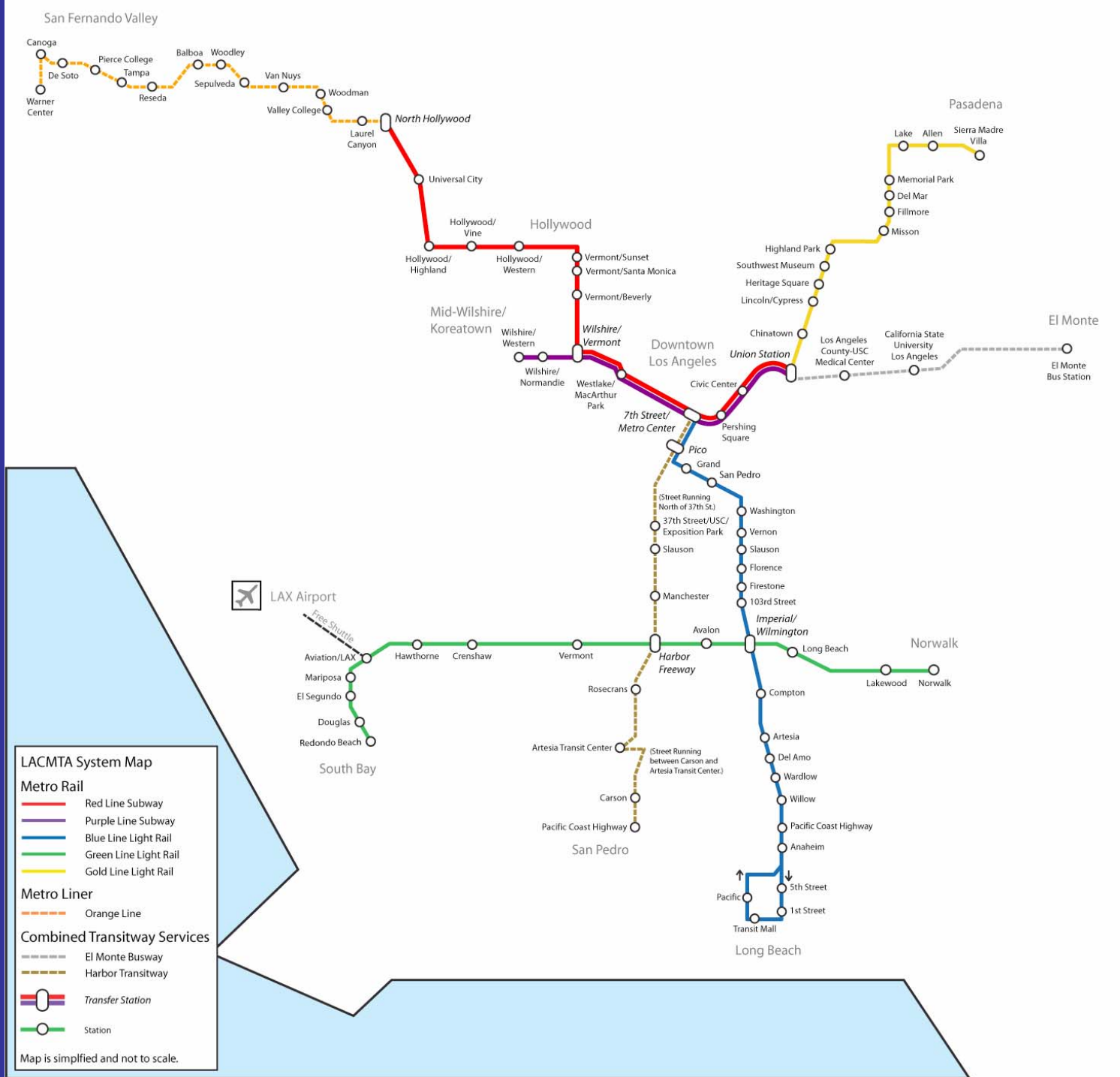
Considerations

- Hybrid of methodologies
- Short form / long form
- Study area
- Transit modes

Survey Expansion Weights Computed with Matrix Balancing

Robert Farley
LACMTA

LA County Fixed-Guideway Transit System



Background

- "Customer Satisfaction" Rail On-Board Survey
  - Included station-on and station-off
  - Never expanded to station volumes
- Boarding/alighting counts available
- Proof of concept
  - Test bed for Fratar code development

Approach

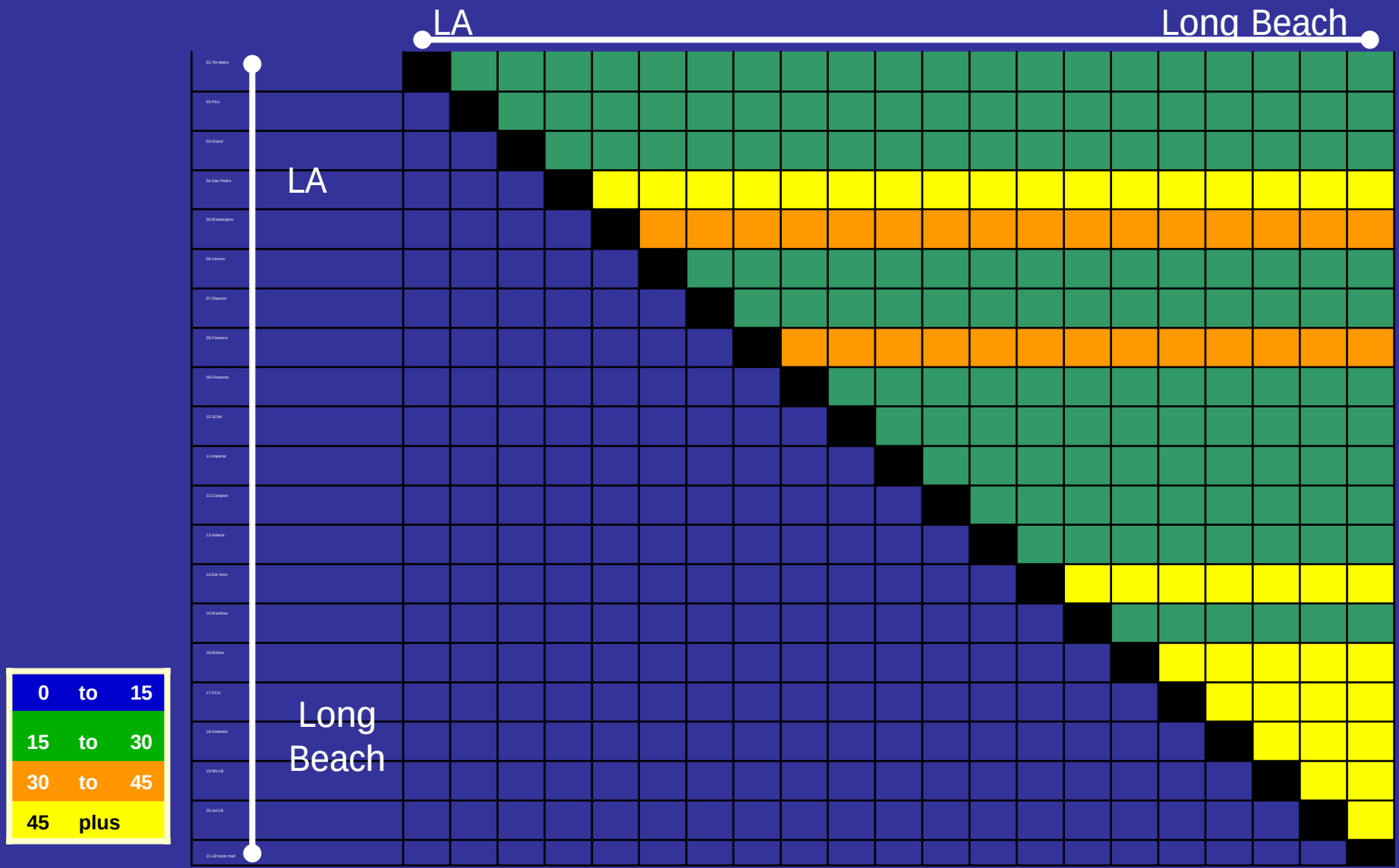
- “Balance” survey returns by Station OD
- Seed matrix
  - Volumes from unexpanded survey
  - Missing cells set to 0.1
- O & D targets from ride check surveys
- Resultant table provides weights
  - Ratio of balanced volumes to seed volumes gives weights

Results

- Compare to flat expansion and expansion by boardings
  - More short trips, fewer long trips
- Findings are consistent with expected “time pressure” bias hypothesis
- Demographic profile relatively unchanged
  - Very modest income effect

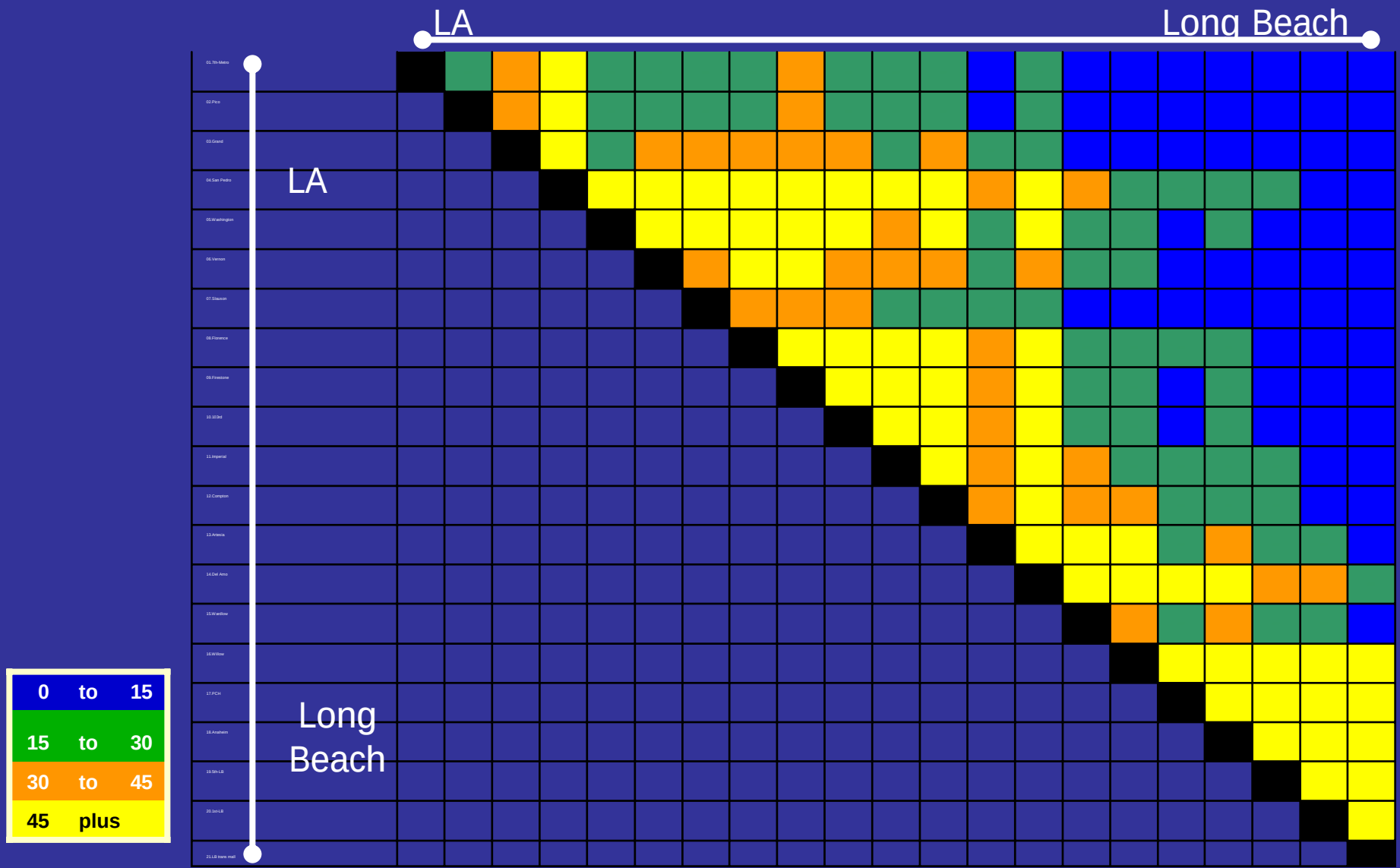
Expansion (Weights)

Normalized by Boarding



Expansion (Weights)

Balanced to Boarding and Alighting



Metro Blue Line Statistics
(South Bound Trips)

Types of Sample Expansion Methods	Number of Station Traveled	Passenger-Miles per Boarding	Passenger-Minute per Boarding
By Boardings of Entire Line			
Mean	9.1	10.4	22.5
Std.Dev	*4.8*	*5.8*	*12.8*
By Boarding at Stations			
Mean	8.2	9.5	20.4
Std.Dev	*4.8*	*5.8*	*12.9*
By Boarding and Alighting at Stations			
Mean	6.3	7.1	15.0
Std.Dev	*3.9*	*4.8*	*10.0*

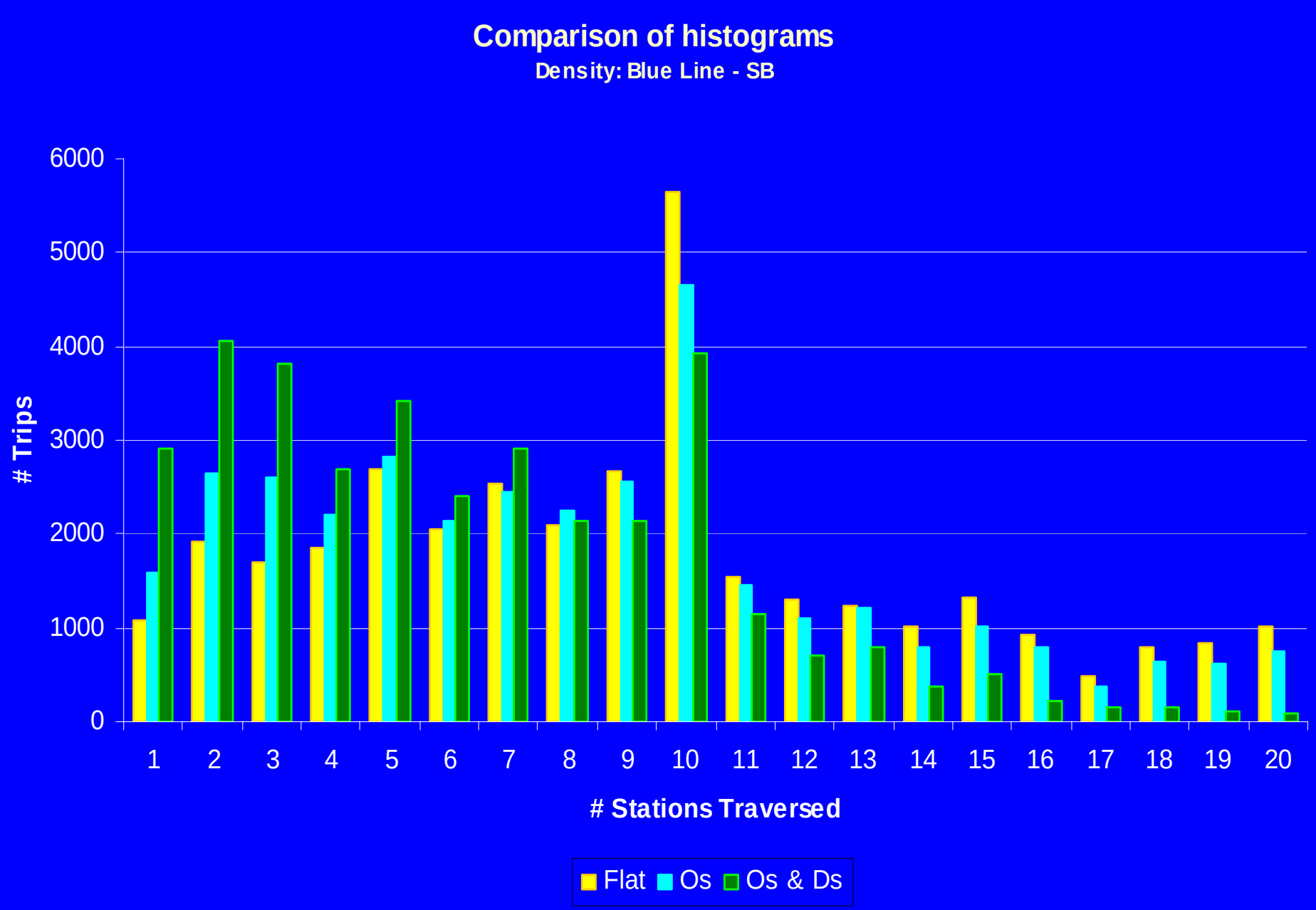
Demographics (Northbound + Southbound)	"Flat" Weight		"Origin" Weight		"Balanced" Weight	
Frequency of Transit Usage	Frequency	Valid %	Frequency	Valid %	Frequency	Valid %
< once mo	1,521	2.1%	1,330	1.8%	1,307	1.7%
< once wk	1,798	2.4%	1,630	2.2%	1,317	1.8%
1-2 days wk	5,776	7.8%	5,318	7.3%	5,040	6.7%
3-4 days wk	10,790	14.6%	11,456	15.6%	10,836	14.5%
>=5 days wk	51,989	70.4%	51,668	70.5%	54,480	72.8%
first time	744	1.0%	719	1.0%	567	0.8%
Total	73,822	100.0%	73,301	100.0%	74,813	100.0%

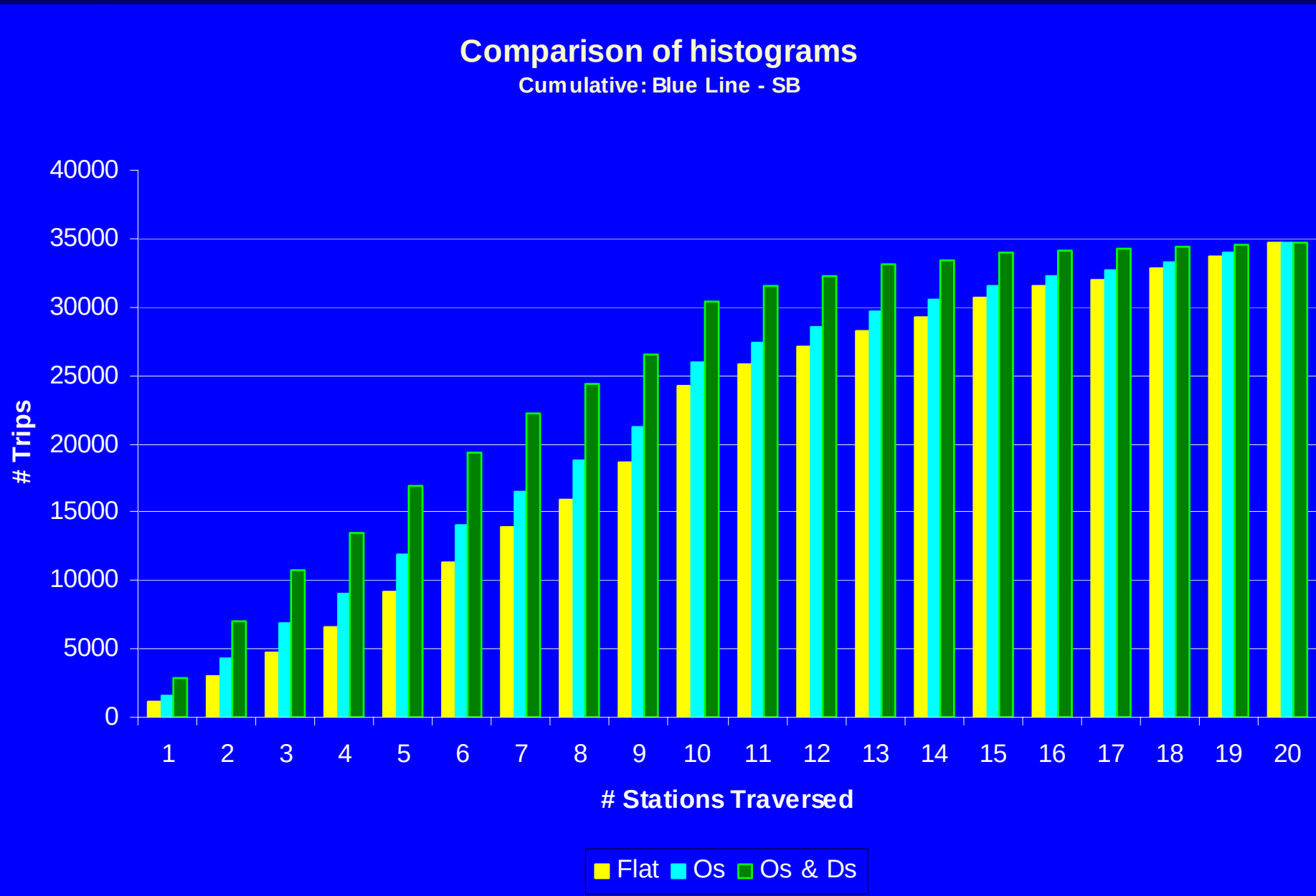
	"Flat" Weight		"Origin" Weight		"Balanced" Weight	
Ethnicity	Frequency	Valid %	Frequency	Valid %	Frequency	Valid %
latino/hisp	30,943	41.9%	33,173	45.3%	34,980	46.8%
black/afram	22,753	30.8%	21,953	29.9%	21,711	29.0%
white/cauc	10,531	14.3%	9,255	12.6%	9,894	13.2%
asian/pacisl	5,014	6.8%	4,718	6.4%	3,833	5.1%
am indian	740	1.0%	636	0.9%	436	0.6%
mul-rac,mul-eth	454	0.6%	406	0.6%	381	0.5%
other	1,179	1.6%	1,053	1.4%	1,307	1.7%
Total	73,822	100.0%	73,301	100.0%	74,813	100.0%

	"Flat" Weight		"Origin" Weight		"Balanced" Weight	
Annual HH Income	Frequency	Valid %	Frequency	Valid %	Frequency	Valid %
<$7,500	16,906	22.9%	18,022	24.6%	19,168	25.6%
$7,500-14,999	13,942	18.9%	14,141	19.3%	14,762	19.7%
$15,000-24,999	12,244	16.6%	12,580	17.2%	15,362	20.5%
$25,000-34,999	6,533	8.8%	6,185	8.4%	5,790	7.7%
$35,000-49,999	6,543	8.9%	5,815	7.9%	4,939	6.6%
>=$50,000	10,361	14.0%	8,828	12.0%	6,908	9.2%
Total	73,822	100.0%	73,301	100.0%	74,813	100.0%

Demographic profiles (original intent of survey) are not very sensitive to weighting method

Income shows slight impact in highest category


Comparison of histograms
Density: Blue Line - SB
6000
5000
4000
3000
2000
1000
0
Trips
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Stations Traversed
Flat
Os
Os & Ds


Comparison of histograms
Cumulative: Blue Line - SB
40000
35000
30000
25000
20000
15000
10000
5000
0
Trips
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
Stations Traversed
Flat
Os
Os & Ds

Conclusions

- Approach for future on-board surveys?
- Resource requirements
  - Quality On/Off control totals by line
  - Base survey complete enough to fill “most” cells in trip table
  - Survey cleaning {directionality}
  - Formatting/processing for Fratar program
- Bus surveys are more challenging
  - Typically many more stops per route