

Demand Estimation Model for Park-and-Ride Service

How to use case study analysis and LEHD data to estimate ridership and bus trip needs at new or existing park-and-ride sites in the Houston Area.

Investigation of past and present methods/thoughts

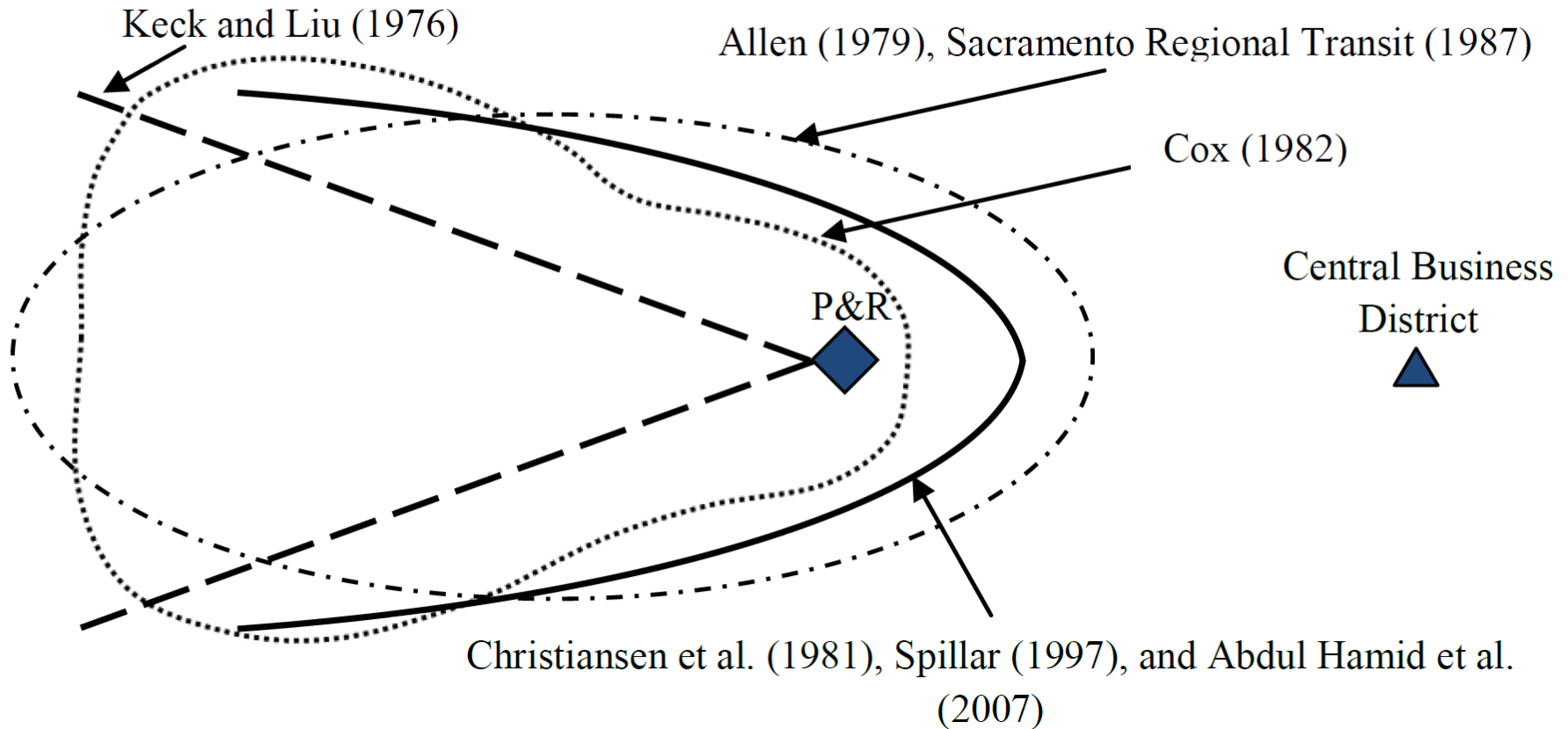
LITERATURE/SOURCE REVIEW

RELATIVE DEMAND ESTIMATION

General Notions About Shape of Market-Shed for Park-and-Rides

- Limited by distance to facility vs. destination
- Facilities close together may reduce each other's market generation effectiveness
- Riders' willingness to backtrack limited
- Parabola is most common shape
- 50% of riders typically live within 2.5 mile radius circle around facility

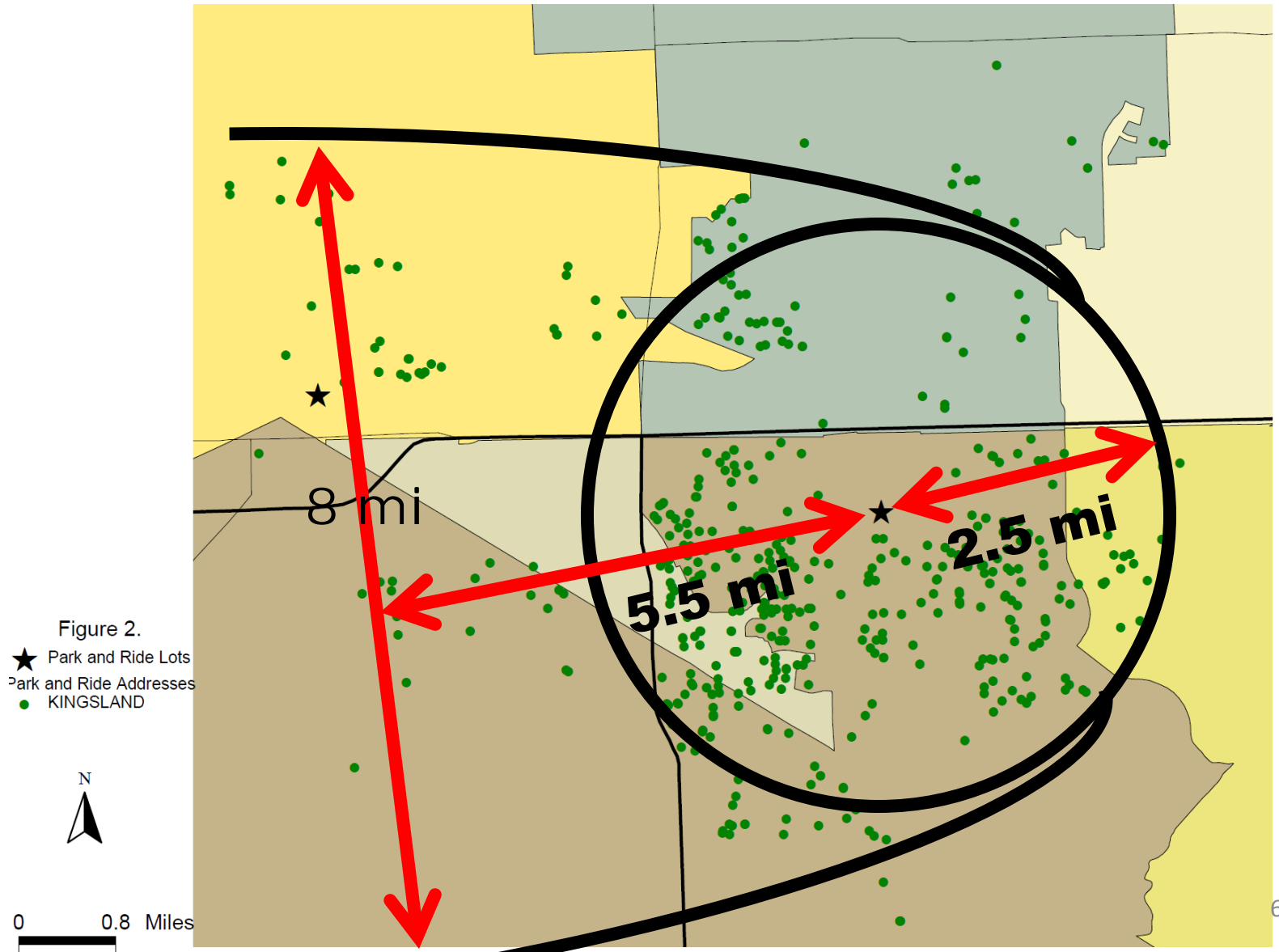
Figure 23: Catchment area determination



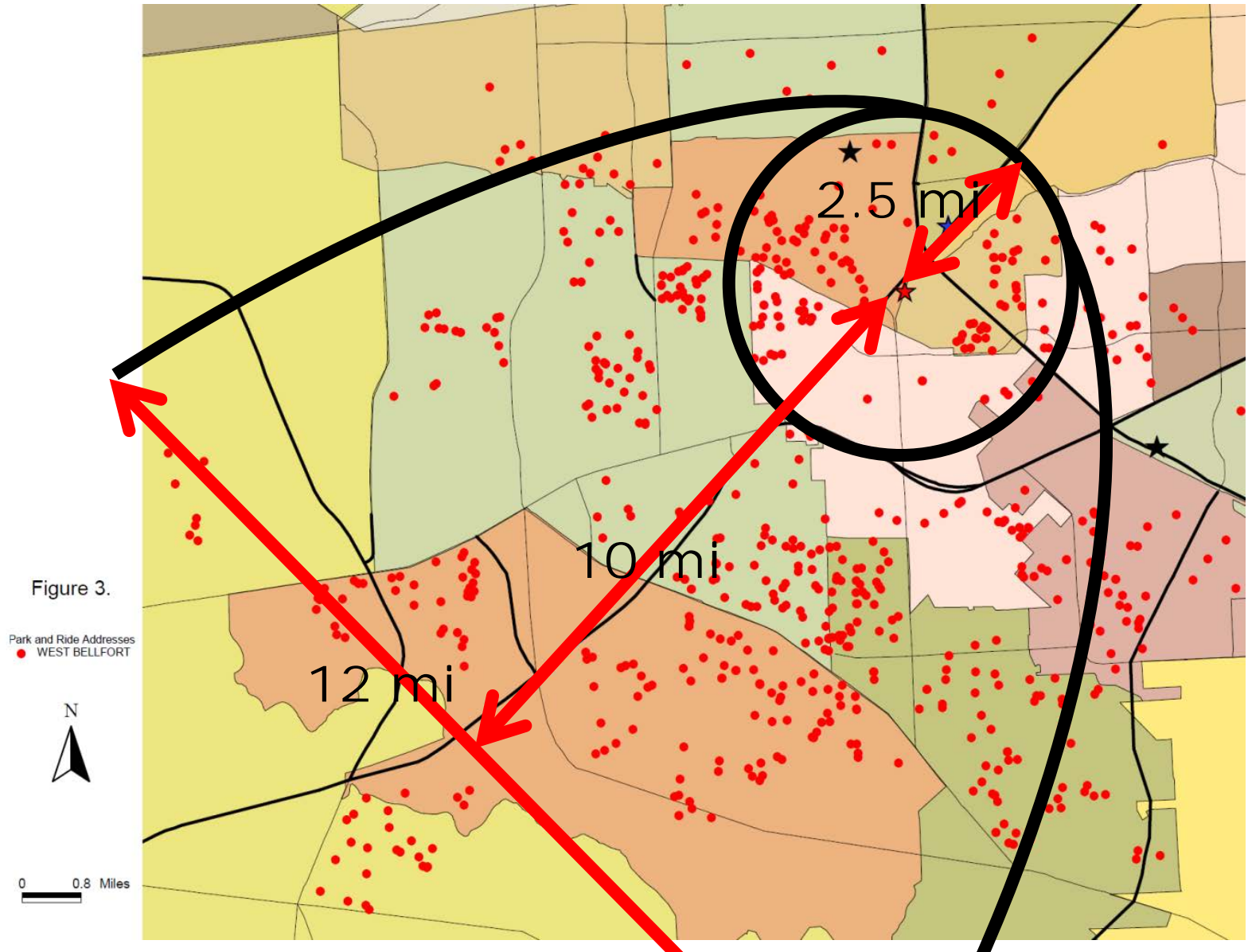
2000 Analysis of riders using one of three facilities

HOUSTON PARK-AND-RIDE STUDIES

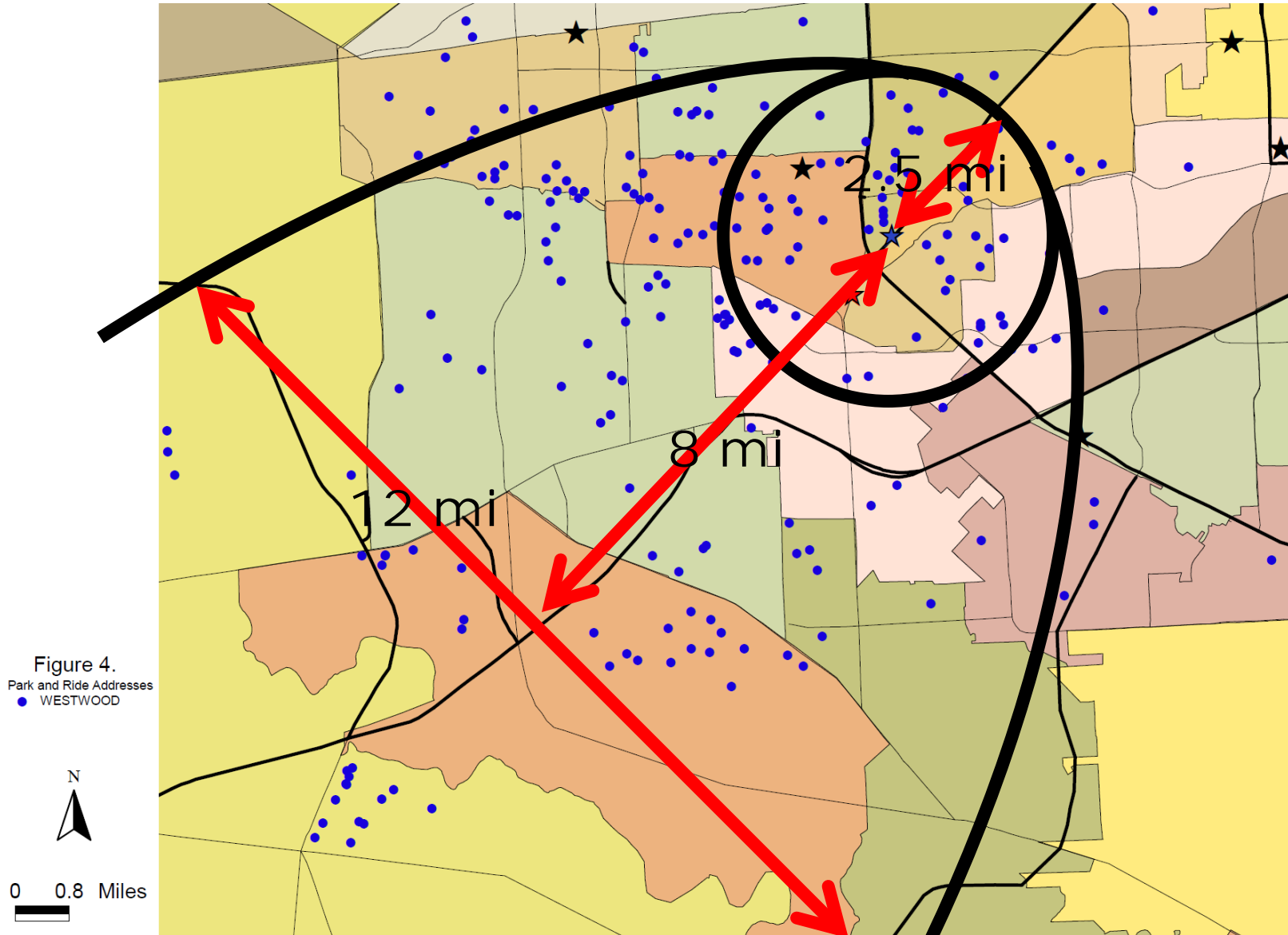
Kingsland P&R (2000)



West Belfort P&R (2000)



Westwood P&R (2000)



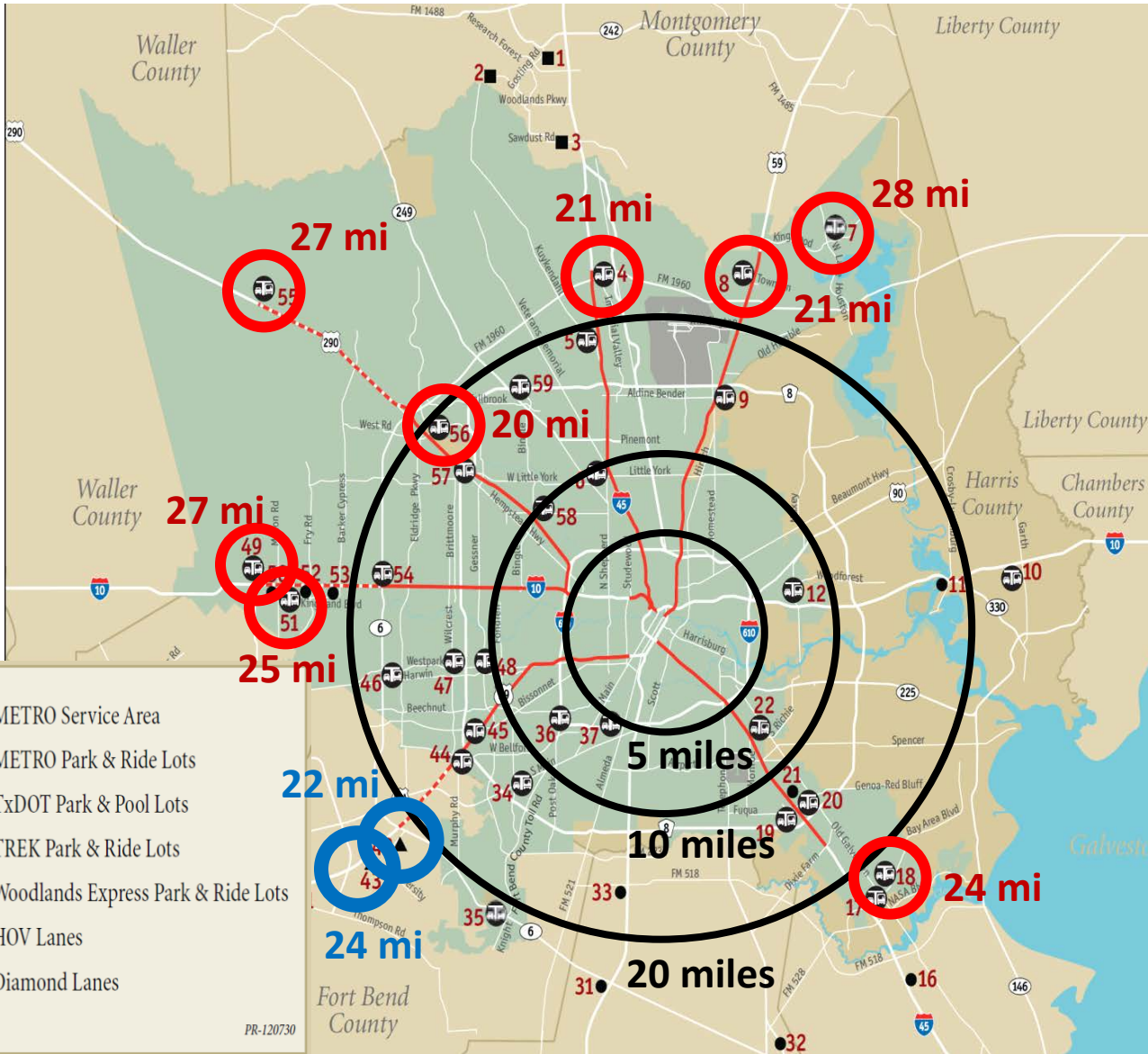
Observations

- 2.5 mi radius circle covers large amount of riders
- Parabola shape fits general distribution
- Findings concur with research
 - 2.5 mile radius circle to measure/estimate demand may safely represent 50% of riders

A close look at nine park-and-ride facilities

CASE STUDY ANALYSIS OF HOUSTON AREA PARK-AND-RIDES

Location of Case Study Facilities



Nine Facilities:

- 4, Spring
- 7, Kingwood
- 8, Townsen
- 18, Bay Area
- 49, Grand Parkway
- 51, Kingsland
- 55, Cypress
- 56, Northwest Station

Current FBC Facilities:

- 42, AMC Movie Theater
- 43, University of Houston

Summary of Case Study

- Average distance to CBD: **24.3 miles**
- Average peak weekday CBD bound riders: **726**
- Average # of inbound bus trips: **25**
- Average boardings per bus trip at P&R: **27.9**

Use the Census' online tool to obtain paired geography analysis of worker flows by income bracket.

OBTAIN LEHD DATA FOR ANALYSIS

LEHD OnTheMap Data, US Census Bureau

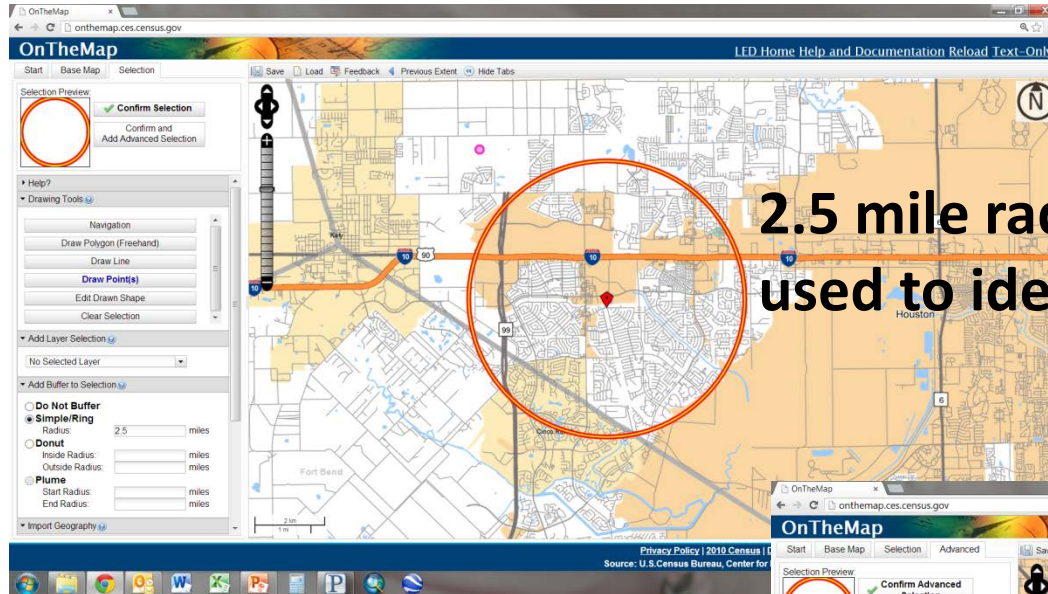
- Available annually from 2002-2010
- Longitudinal Employer-Household Dynamics (LEHD)
- Links home to work Census Blocks
- Work data, not exactly travel data
- [OnTheMap](#) is online tool for analysis

Paired Analysis to Get Worker Flows

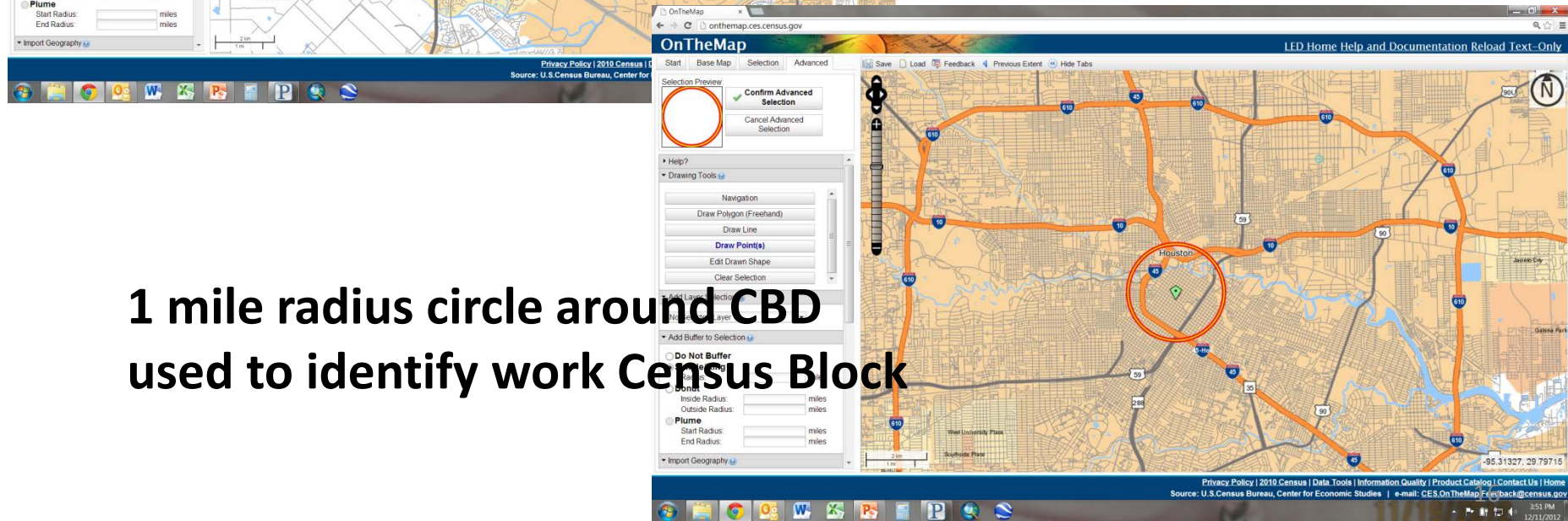
- Selecting 2.5 mile radius around P&R
- Selecting 1.0 mile radius to encompass CBD
- Tabulating worker flow by income brackets
 - \$1,250 per month or less
 - \$1,251 to \$3,333 per month
 - More than \$3,333 per month

Example: Kingsland P&R to CBD

Step 1. Select areas for analysis



**2.5 mile radius circle around facility
used to identify home Census Blocks**



**1 mile radius circle around CBD
used to identify work Census Block**

Example: Kingsland P&R to CBD

Step 2. Select analysis settings

The screenshot displays the OnTheMap web application interface. The browser address bar shows onthemap.ces.census.gov. The application has a navigation bar with tabs for Start, Base Map, Selection, and Advanced. A 'Selection Area' popup indicates a 'Freehand Drawing buffered 1.00 miles'. The 'Analysis Settings' dialog is open, titled 'Paired Area Analysis in 2010 by Primary Jobs'. It contains the following settings:

- Home/Work Area:** Describes the 'Work' and 'Home' areas. Includes 'Work' (red diamond) and 'Home' (green diamond) selection options, with a 'Swap' button between them.
- Analysis Type:** Paired Area
- Year:** A list of years from 2010 to 2002, with 2010 selected.
- Job Type:** Describes the scope of jobs. Includes All Jobs, Primary Jobs, All Private Jobs, and Private Primary Jobs.

The dialog has 'Cancel' and 'Go!' buttons at the bottom right. The background map shows Kingsland, GA, with major roads like I-610 and I-45. The bottom of the screen shows a Windows taskbar with various application icons and a system tray displaying the time as 3:51 PM on 12/13/2012.

Example: Kingsland P&R to CBD

Step 3. Run analysis, record findings

OnTheMap
 onthemap.ces.census.gov

OnTheMap LED Home Help and Documentation Reload Text-Only

Start Base Map Selection Advanced

Save Load Feedback Previous Extent Hide Tabs Hide Chart/Report

Paired Area Analysis

enter your own subtitle

Display Settings

Labor Market Segment Filter: All Workers

Year: 2010

Map Where Workers: Work

Map Controls

Color Key: Thermal Overlay, Point Overlay, Selection Outline

Identify, Zoom to Selection, Clear Overlays, Animate Overlays

Report/Map Outputs

Detailed Report, Export Geography, Print Chart/Map

Legends

- 5 - 288 Jobs/Sq.Mile
- 289 - 1,139 Jobs/Sq.Mile
- 1,140 - 2,558 Jobs/Sq.Mile
- 2,559 - 4,543 Jobs/Sq.Mile
- 4,544 - 7,097 Jobs/Sq.Mile

Change Settings

Click a Labor Market Segment link in the Summary Report to see more detail.

Age, Earnings, Industry Group

View as Pie Chart

Job Counts by Total Primary Jobs for Paired Area 2010

	Count	Share
All Workers	2,917	100.0%

Job Counts by Worker Age for Paired Area 2010

	Count	Share
Age 29 or younger	363	12.4%
Age 30 to 54	1,962	67.3%
Age 55 or older	592	20.3%

Job Counts by Earnings for Paired Area 2010

	Count	Share
\$1,250 per month or less	130	4.5%
\$1,251 to \$3,333 per month	401	13.7%
More than \$3,333 per month	2,386	81.8%

Privacy Policy | 2010 Census | Data Tools | Information Quality | Product Catalog | Contact Us | Home
 Source: U.S. Census Bureau, Center for Economic Studies | e-mail: CES.OnTheMap.Feedback@census.gov

3:53 PM 12/11/2012

Use of existing, local, and LEHD data to estimate demand for P&R service

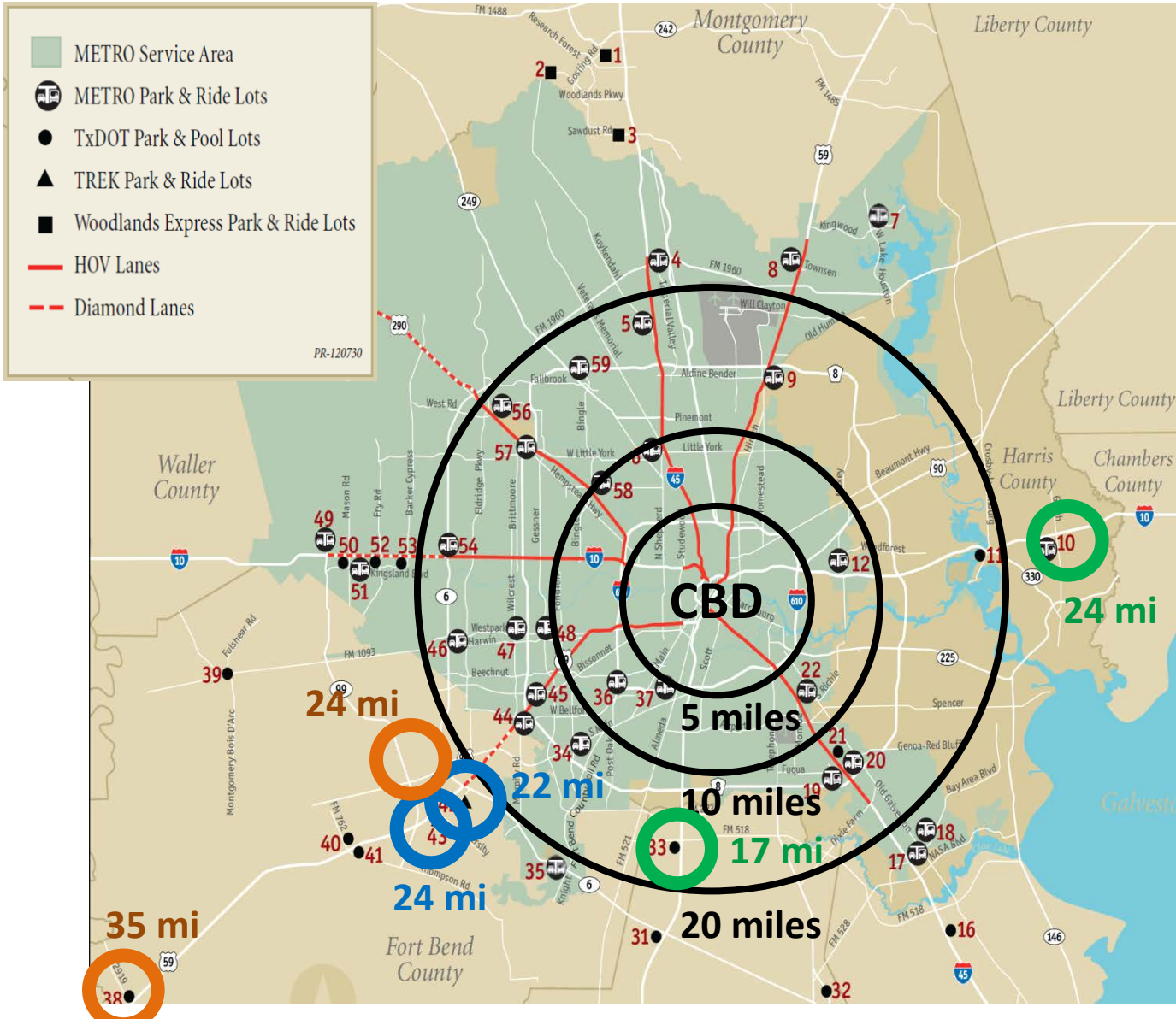
MODEL FOR P&R DEMAND ESTIMATION USING LEHD DATA

Demand Estimation Model

Simplified Steps

- Obtain initial LEHD and P&R data
- Clean, arrange P&R data for use
- Create case study rates by combining P&R and LEHD data
- Obtain LEHD data for new P&R sites
- Estimate demand for P&R services by applying rates from case study to LEHD data for new P&R sites

Location of Study Sites

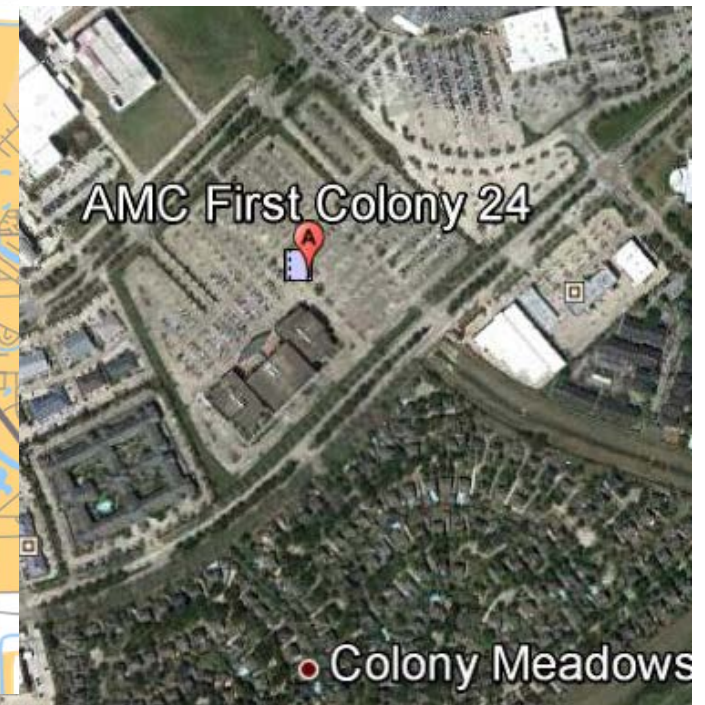
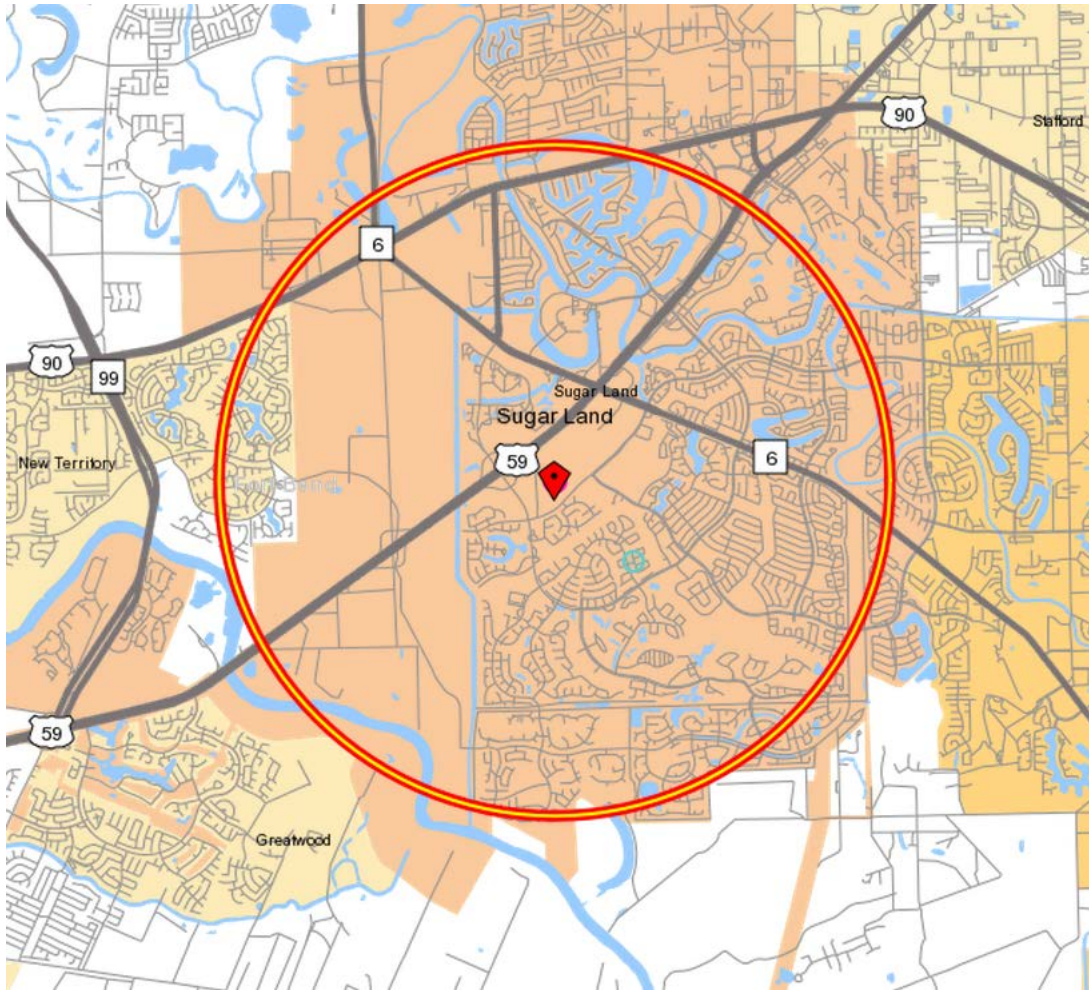


Current FBC Facilities:
42, AMC Movie Theater
43, University of Houston

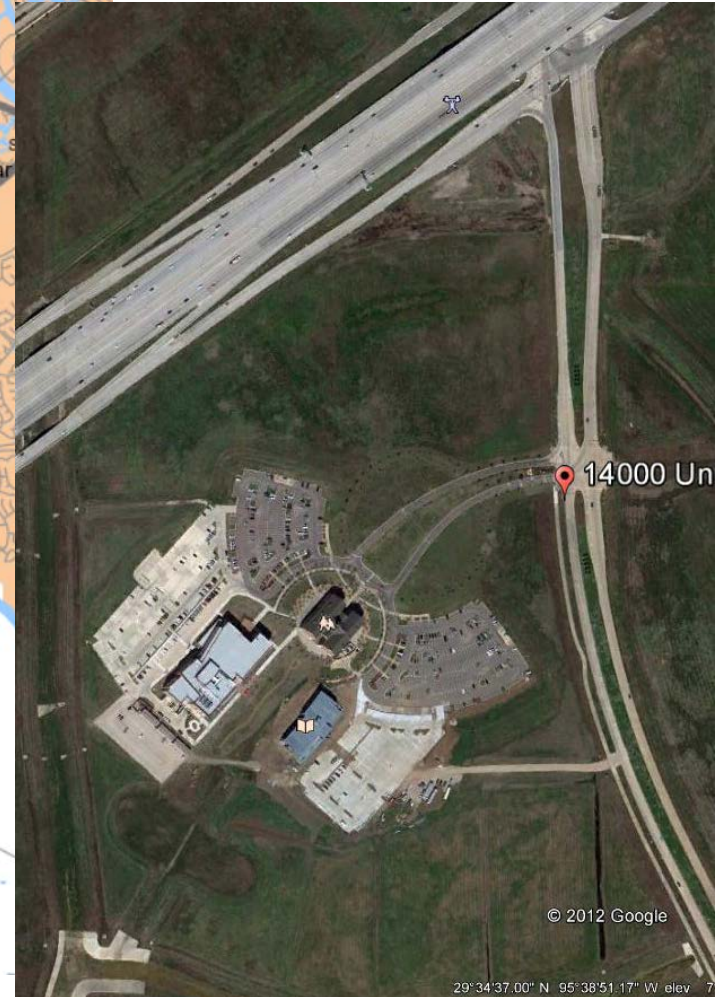
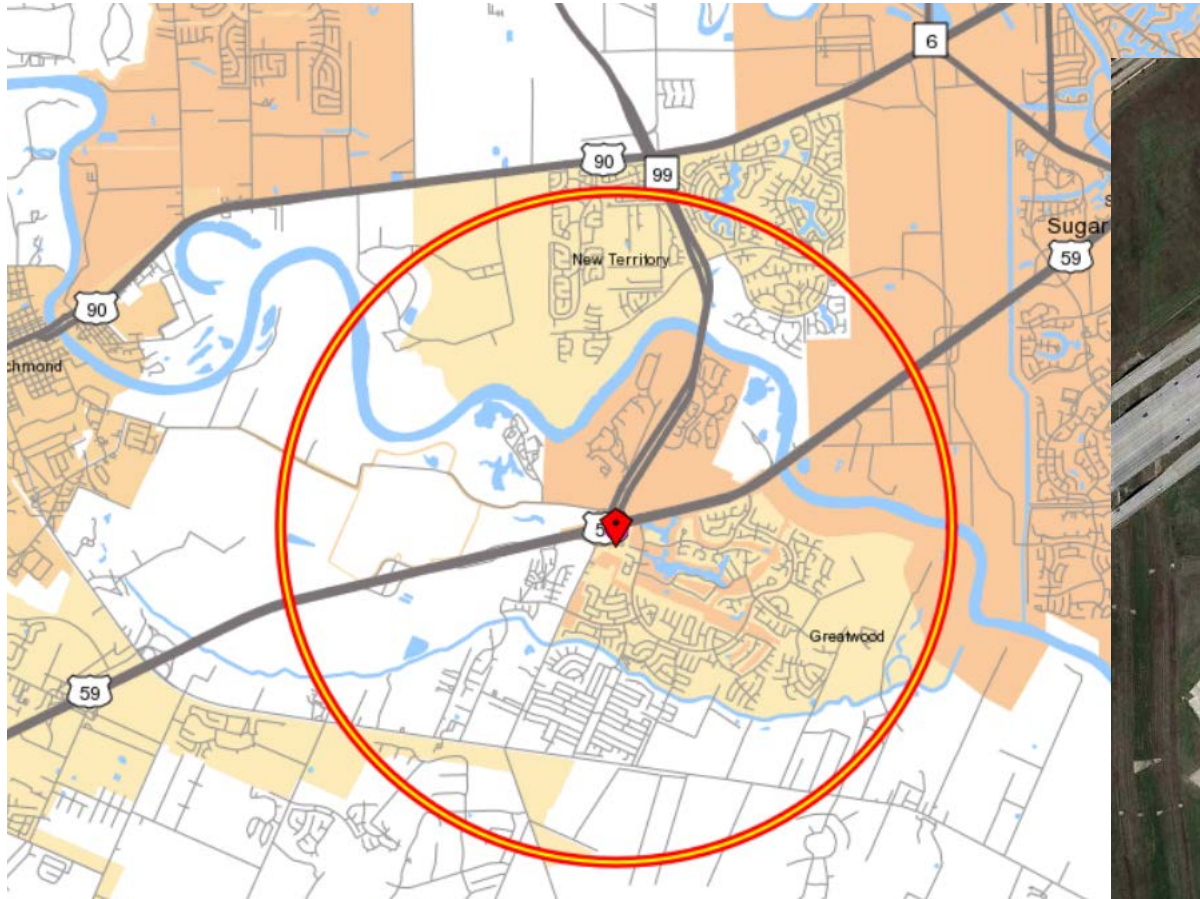
Exploratory Sites:
Constellation Field
FBC Fairgrounds

Other Sites Modeled:
Baytown (existing)
Brazoria (2013)

42, AMC Movie Theater Lot



43, University of Houston

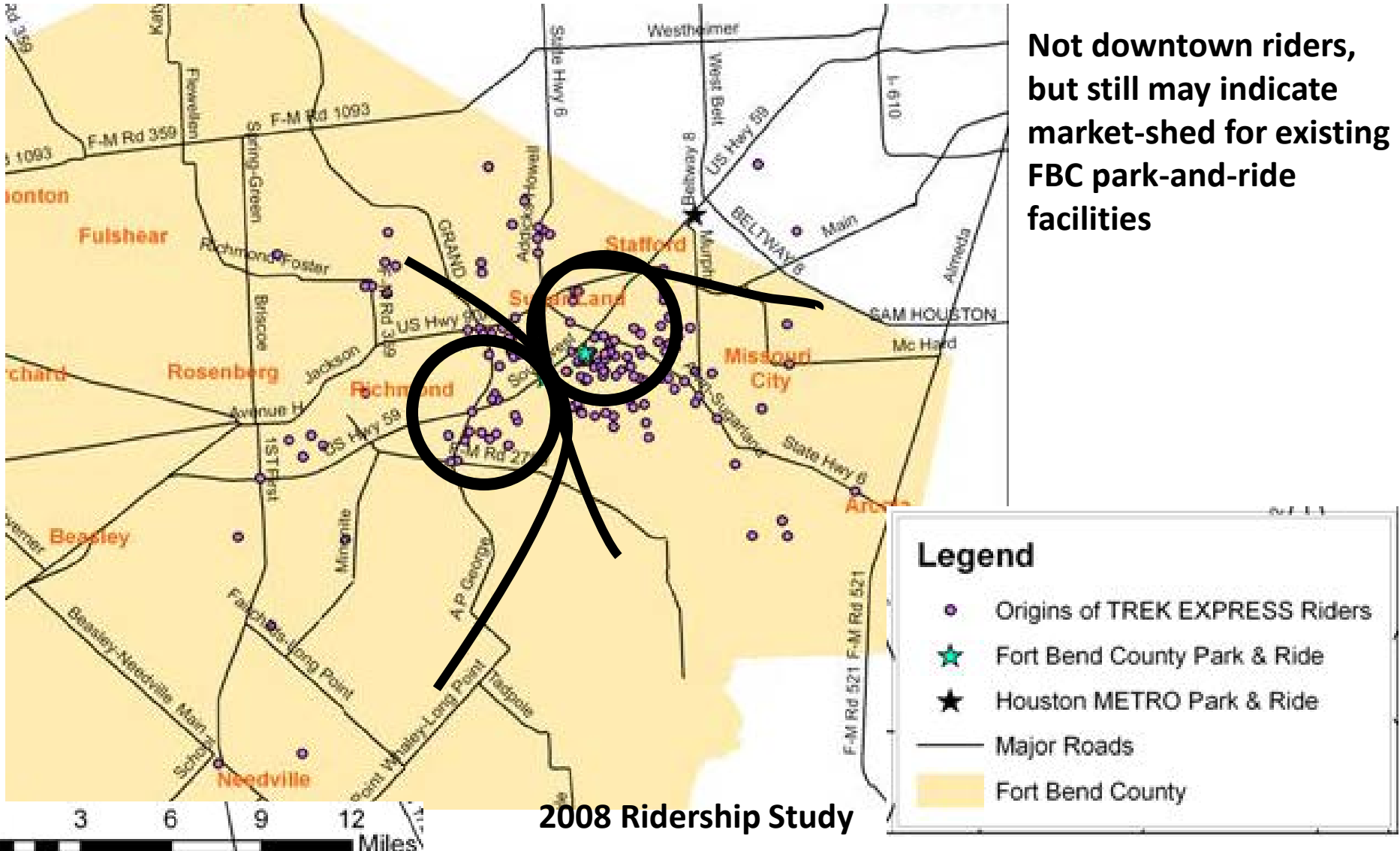


Circle intentionally offset from UH to the southwest along 59 to avoid most overlap with AMC Movie Theater P&R.

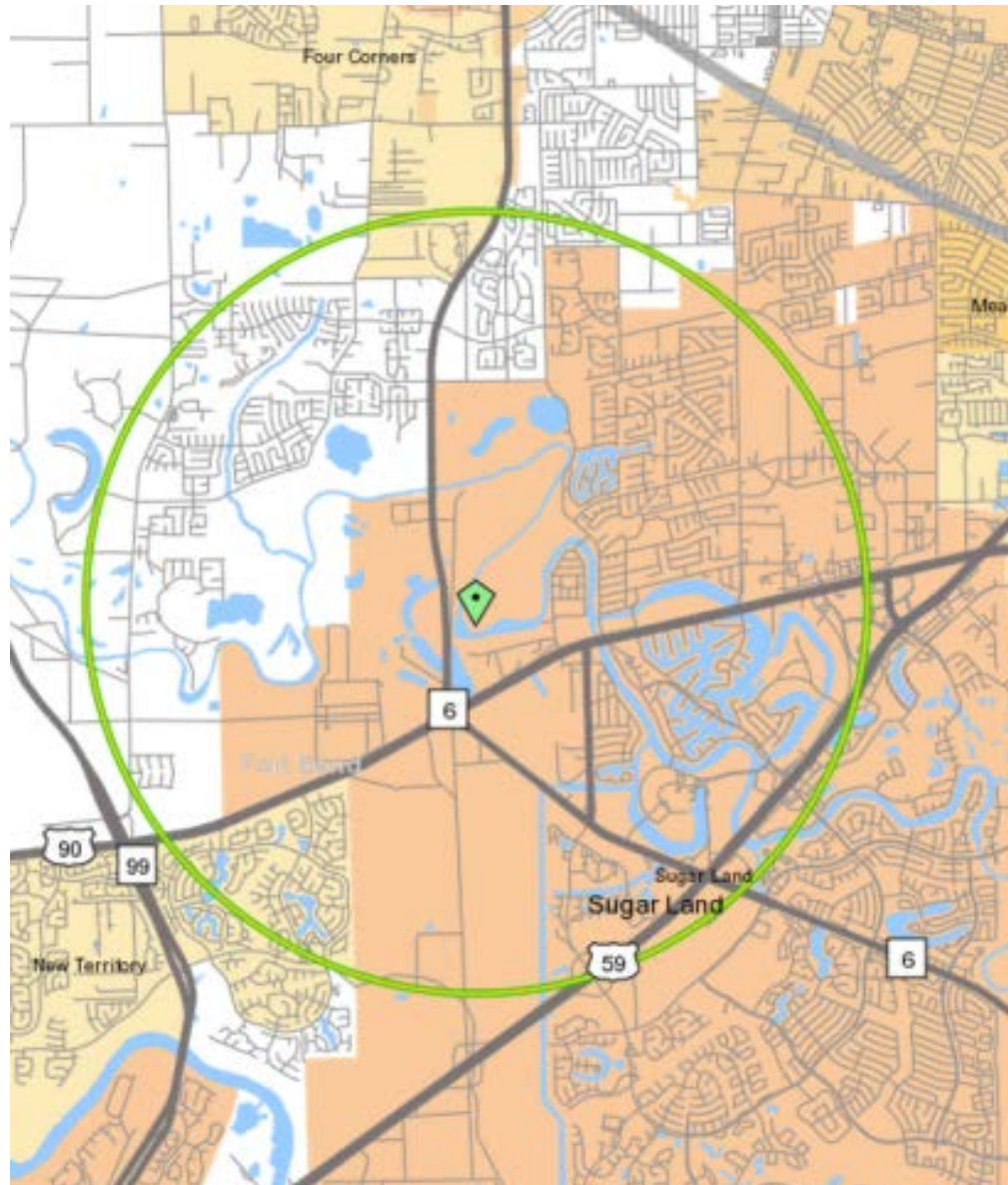
TrekExpress Study

Approx. Markets for Current P&Rs

Not downtown riders, but still may indicate market-shed for existing FBC park-and-ride facilities



Constellation Field



FBC Fairgrounds, Rosenberg



Based on Eight Case Study Sites: **Model Inputs**

- Average distance to CBD: **24.3 miles**
- Average peak weekday CBD bound riders: **767**
- Average # of inbound bus trips: **28**
- Average boardings per bus trip at P&R: **27.9**
- Average LEHD worker flow to CBD: **1,579**
- Case study adjusted ratios (percent of workers using P&R service):
 - Medium or average estimate **24.3%**
 - Low estimate **14.7%**
 - High estimate **38.5%**

Things to Note

- Estimated ridership is to Central Houston in peak hours, does not include other riders
- Estimated ridership is for transit services equivalent to the high-quality service at the 8 case study P&Rs
- The five options for P&R service in FBC each affect estimated demand differently
- Operating AMC/Town Center, UH, and Constellation Field at the same time may reduce total estimated demand due to site competition

Summary of Model Findings

Ridership Estimation: Avg/Low/High

LOW SCENARIO: RIDERSHIP GENERATION SIMILAR TO THREE LOWEST CASE STUDY PARK-AND-RIDE FACILITIES

Grand Parkway, Kingwood, and Spring

Analysis P&R Sites	Current Lot Spaces	Workers Living Within 2.5 miles of P&R with Jobs in Houston CBD	Model Worker Flow P&R Capture Ratio (LOW)	Earn \$1,250 month or less	Earn \$1,251 to \$3,333	More than \$3,333 per month	Distance to next Metro competing park-and-ride facility in corridor:	Estimated Demand for Peak Hour P&R Service to Central Houston
AMC Movie Theater Lot	150	1,439	14.65%	3.6%	9.1%	87.3%	7.4	422
University of Houston	576	1,045	14.65%	4.2%	9.1%	86.7%	8.9	306
Constellation Field	?	1,076	14.65%	4.0%	11.0%	84.9%	5.7	315
Fort Bend County Fairgrounds	?	235	14.65%	16.2%	33.2%	50.6%	18.7	69

AVERAGE SCENARIO: RIDERSHIP GENERATION SIMILAR TO ALL CASE STUDY PARK-AND-RIDE FACILITIES

Analysis P&R Sites	Current Lot Spaces	Workers Living Within 2.5 miles of P&R with Jobs in Houston CBD	Model Worker Flow P&R Capture Ratio (AVERAGE)	Earn \$1,250 month or less	Earn \$1,251 to \$3,333	More than \$3,333 per month	Distance to next Metro competing park-and-ride facility in corridor:	Estimated Demand for Peak Hour P&R Service to Central Houston
AMC Movie Theater Lot	150	1,439	24.27%	3.6%	9.1%	87.3%	7.4	698
University of Houston	576	1,045	24.27%	4.2%	9.1%	86.7%	8.9	507
Constellation Field	?	1,076	24.27%	4.0%	11.0%	84.9%	5.7	522
Fort Bend County Fairgrounds	?	235	24.27%	16.2%	33.2%	50.6%	18.7	114

HIGH SCENARIO: RIDERSHIP GENERATION SIMILAR TO THREE HIGHEST CASE STUDY PARK-AND-RIDE FACILITIES

Townsen, Cypress, and Northwest Station

Analysis P&R Sites	Current Lot Spaces	Workers Living Within 2.5 miles of P&R with Jobs in Houston CBD	Model Worker Flow P&R Capture Ratio (HIGH)	Earn \$1,250 month or less	Earn \$1,251 to \$3,333	More than \$3,333 per month	Distance to next Metro competing park-and-ride facility in corridor:	Estimated Demand for Peak Hour P&R Service to Central Houston
AMC Movie Theater Lot	150	1,439	38.50%	3.6%	9.1%	87.3%	7.4	1,108
University of Houston	576	1,045	38.50%	4.2%	9.1%	86.7%	8.9	805
Constellation Field	?	1076	38.50%	4.0%	11.0%	84.9%	5.7	829
Fort Bend County Fairgrounds	?	235	38.50%	16.2%	33.2%	50.6%	18.7	181