# Demand Estimation Model for Park-and-Ride Service: Fort Bend County to Central Houston





### LITERATURE/SOURCE REVIEW RELATIVE DEMAND ESTIMATION

Investigation of past and present methods/thoughts

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

- Limited by distance to facility vs. destination
- Facilities close together <u>may</u> 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**







### CASE STUDY ANALYSIS OF HOUSTON AREA PARK-AND-RIDES



# **Location of Case Study Facilities**



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

**Nine Metro Facilities:** 

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

# **Observations**

- 2.5 mi radius circle covers approximately 37% of riders based on 2008 or 2009 data for 8 case study facilities
- Parabola can describe general distribution
- Findings concur with research
  - 2.5 mile radius circle to measure/estimate demand may safely represent 37% of riders



# **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



# Step 1. Select areas for analysis





## Step 2. Select analysis settings



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### Step 3. Run analysis, record findings



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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 study sites
- Estimate demand for P&R services by applying rates from case study to LEHD data for new P&R sites



# **Location of Final Study Site**



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

Workgroup selected site for service/cost scenario analysis:

43, University of Houston

# 43, University of Houston





## 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 P&R worker-flow capture ratio for AM riders traveling to Central Houston from the 2.5 mile circle around P&R facility:
  - Low estimate **10.72%**
  - Medium or average estimate 17.76%
  - High estimate **28.18%**



# Things to Note

- Estimated ridership is to Central Houston in peak hours, does <u>not</u> 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



### **Ridership Estimation: Avg/Low/High**

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

Grand Parkway, Kingwood, and Spring										
		Workers Living Model Worker Ear		Earn	Earn	More	Distance to next	Estimated		
	Current Future Within 2.5 miles of Flow P&R \$1,250 \$1,251 than Metro compe		Metro competing park-	<b>Demand for Peak</b>						
	Lot	Lot	P&R with Jobs in	<b>Capture Ratio</b>	month or	to	\$3,333	and-ride facility in	Hour P&R Service	
Analysis P&R Site	Spaces	Capacity	Houston CBD	(LOW)	less	\$3,333	per month	corridor:	to Central Houston	
On or near UH Campus in Sugar Land	576	22	1 127	10 72%	4.0%	7 2%	99 7%	0	222	
(workgrp agreed assumption)	570		1,137	10.72%	4.0%	1.5%	00.770	9	555	

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

			Workers Living	Model Worker	Earn	Earn	More	Distance to next	Estimated
	Current	Future	Within 2.5 miles of	Flow P&R	\$1,250	\$1,251	than	Metro competing park-	Demand for Peak
Lot Lot		Lot	P&R with Jobs in	<b>Capture Ratio</b>	month or	to	\$3,333	and-ride facility in	Hour P&R Service
Analysis P&R Site	Spaces	Capacity	Houston CBD	(AVERAGE)	less	\$3,333	per month	corridor:	to Central Houston
On or near UH Campus in Sugar Land	576	22	1 1 2 7	17 76%	4.0%	7 20/	00 70/	0	E22
(workgrp agreed assumption)	576	: <b>!</b>	1,137	17.70%	4.0%	7.3%	00.7%	9	532

HIGH SCENARIO: RIDERSHIP GENERATION SIMILAR TO THREE HIGHEST CASE STUDY PARK-AND-RIDE FACILITIES										
Townsen, Cypress, and Northwest Station										
Workers Living Model Worker Earn Earn More Distance to next Estin										
Current Future		Future	Within 2.5 miles of	Flow P&R	\$1,250	\$1,251	than	Metro competing park	Demand for Peak	
	Lot	Lot	P&R with Jobs in	Capture Ratio	month or	to	\$3 <i>,</i> 333	and-ride facility in	Hour P&R Service	
Analysis P&R Site	Spaces	Capacity	Houston CBD	(HIGH)	less	\$3,333	per month	corridor:	to Central Houston	
On or near UH Campus in Sugar Land	576	22	1 1 2 7	20 1 00/	4.0%	7 20/	00 70/	0	076	
(workgrp agreed assumption)	576	r f	1,137	20.18%	4.0%	7.3%	00.7%	9	876	



# **Ridership Estimation by Option**

Options	2	2		3	4		5	
Description	Fort Bend Shu	ttle	Extension ME	TRO 262	New Fort Bend Route		New METRO Route	
Example from Case Studies	Loudoun Cour Mesquite to D	nty PART	Baytown P&R		Cobb Count Loudoun Co The Woodla	y unty inds Express	GRTA Express Planned Brazoria P&R	
Operator	Fort Bend Cou (Contractor)	inty	METRO		Fort Bend Co (Contractor)	ounty )	METRO	
Type of Service	Shuttle from F West Bellfort	BC to Park & Ride[1]	Commuter Ex stops at West	press with wood P&R	Park & Ride		Park & Ride	
Type of Vehicle	Small transit b	ous 32 seats	Current METR	O vehicle assig	Small transit seats	t bus 32	Assume current METRO Park & Ride vehicle	
Service Assumptions	Buses operate FBC on a sche METRO Route West Bellfort	e from P&R in dule to meet e 265 P&R	Selected bus t METRO Route at P&R in FBC	rips on the 262 start/end	Buses opera in FBC direct downtown H	ite from P&R tly to Houston	Buses operate from P&R in FBC directly to downtown Houston	
Cost Model	Current FBC c First Transit	ontract with	METRO cost n Baytown P&R	nodel for	Current FBC with First Tr	contract ansit	METRO cost model for Planned Brazoria P&R	
Fare Assumptions	See Option 1		\$5.00 each wa from Sugar La	ay nd	\$5.00 each v	way	\$5.00 each way	
ESTIMATED AM	PEAK RIDERSH	P - Fort Bend	County to Cer	tral Houston	-			
	Option 2		Option 3		Options 4	and 5 Non-S	top P&R to I	Downtown
Location	35% of Low Non-stop P&R	50% of Low Non-Stop P&R	75% of Low Non-stop P&R	100% of Low Non-Stop P&R	Low	Med	Medium	
On or near UH	83	167	250	333	333	532 8		876

