

Using the LED Program to Substantiate Travel Demand Forecast Modeling

March 2012



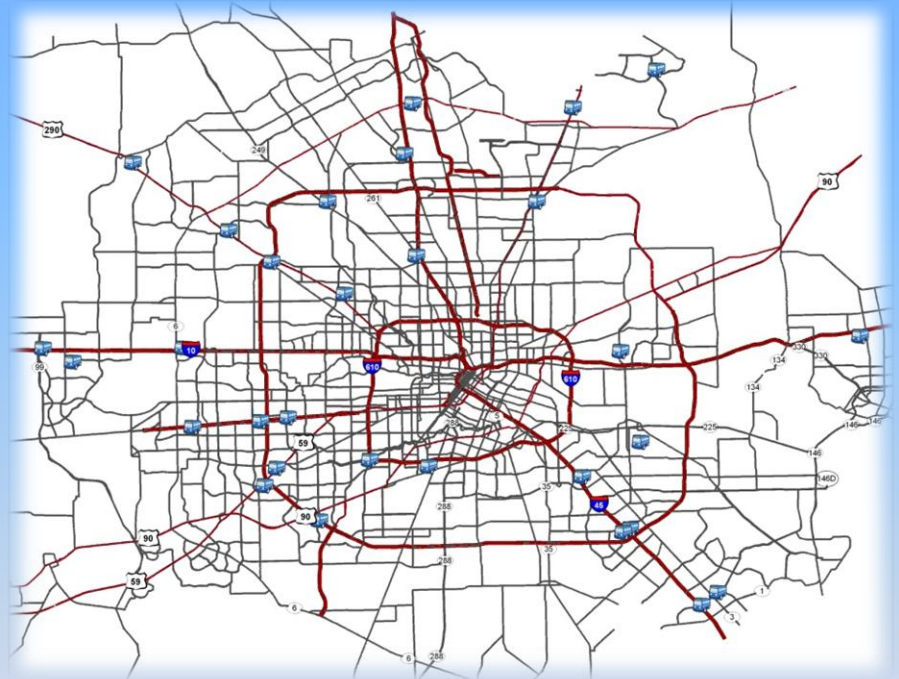
Robert McHaney,
Planning Technical Services Manager
The Goodman Corporation



Background

Since 1980, The Goodman Corporation (TGC) has assisted private and public entities plan, finance and implement various land use and mobility projects throughout the nation.

On behalf of its Houston-based clients, TGC is analyzing the demand for park & ride facilities within the city's loop system with services to major destinations.



City of Houston Major Roadway Network

Agenda

- **Problem Statement**
- **Alternative to Auto - Public Transportation**
- **Travel Demand Forecast Model Overview**
- **Utilizing LED to Substantiate Travel Demand Forecast Modeling**
- **Benefits and Challenges of using LED in Travel Demand Forecast Modeling**

Problem Statement

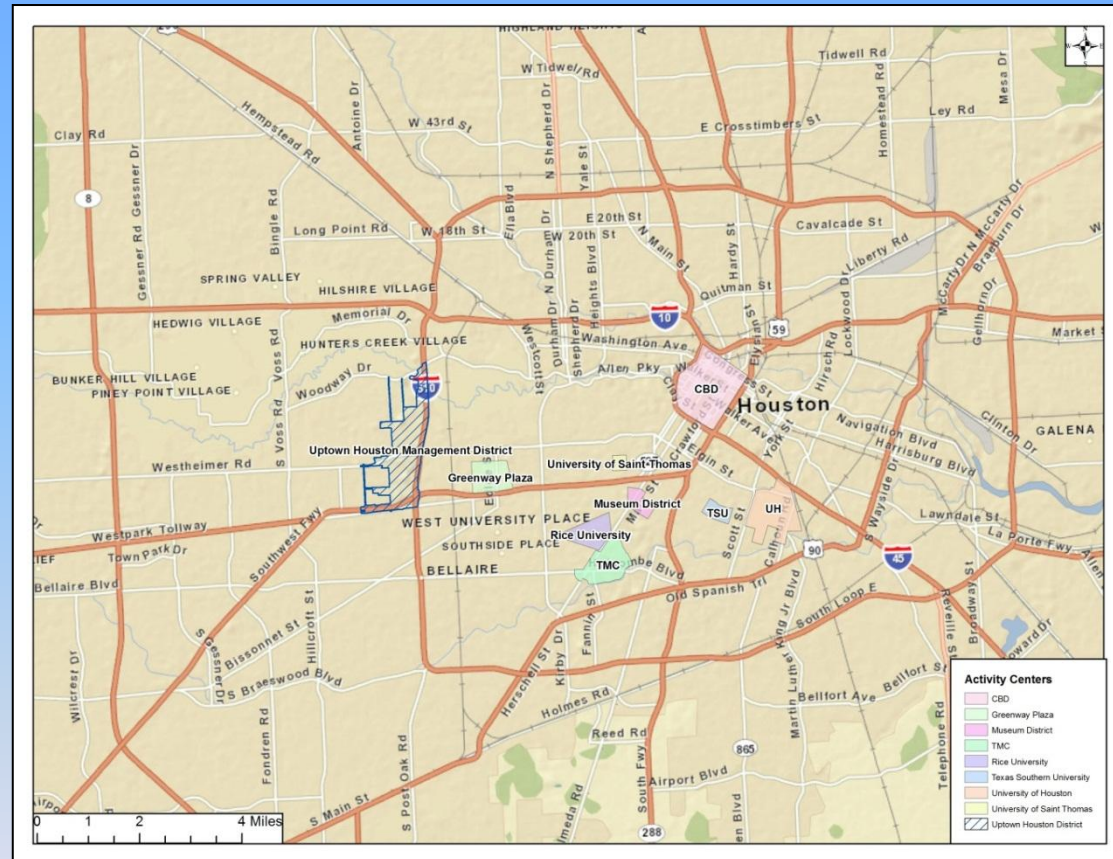
The overcrowding of the major thoroughfares during commutes causes significant time delays and contributes to poor air quality in Houston, Texas.



Hwy 59 in Houston, Texas

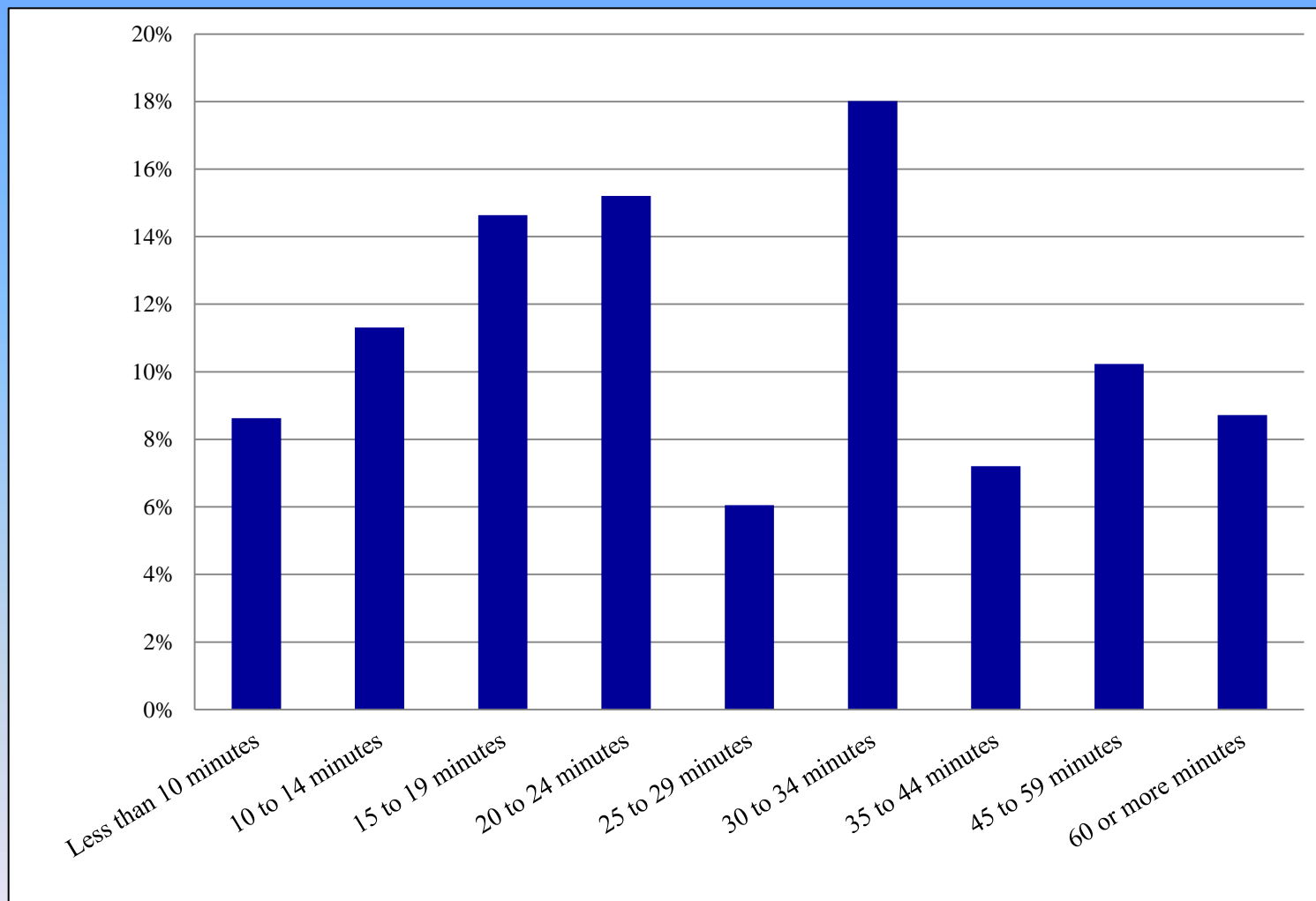
Major Destinations in Houston

- **Central Business Dist.**
- **Texas Medical Center**
- **Uptown - Galleria**
- **Greenway Plaza**
- **University of Houston**



Major Destination in Houston

Average Commute Time to Work



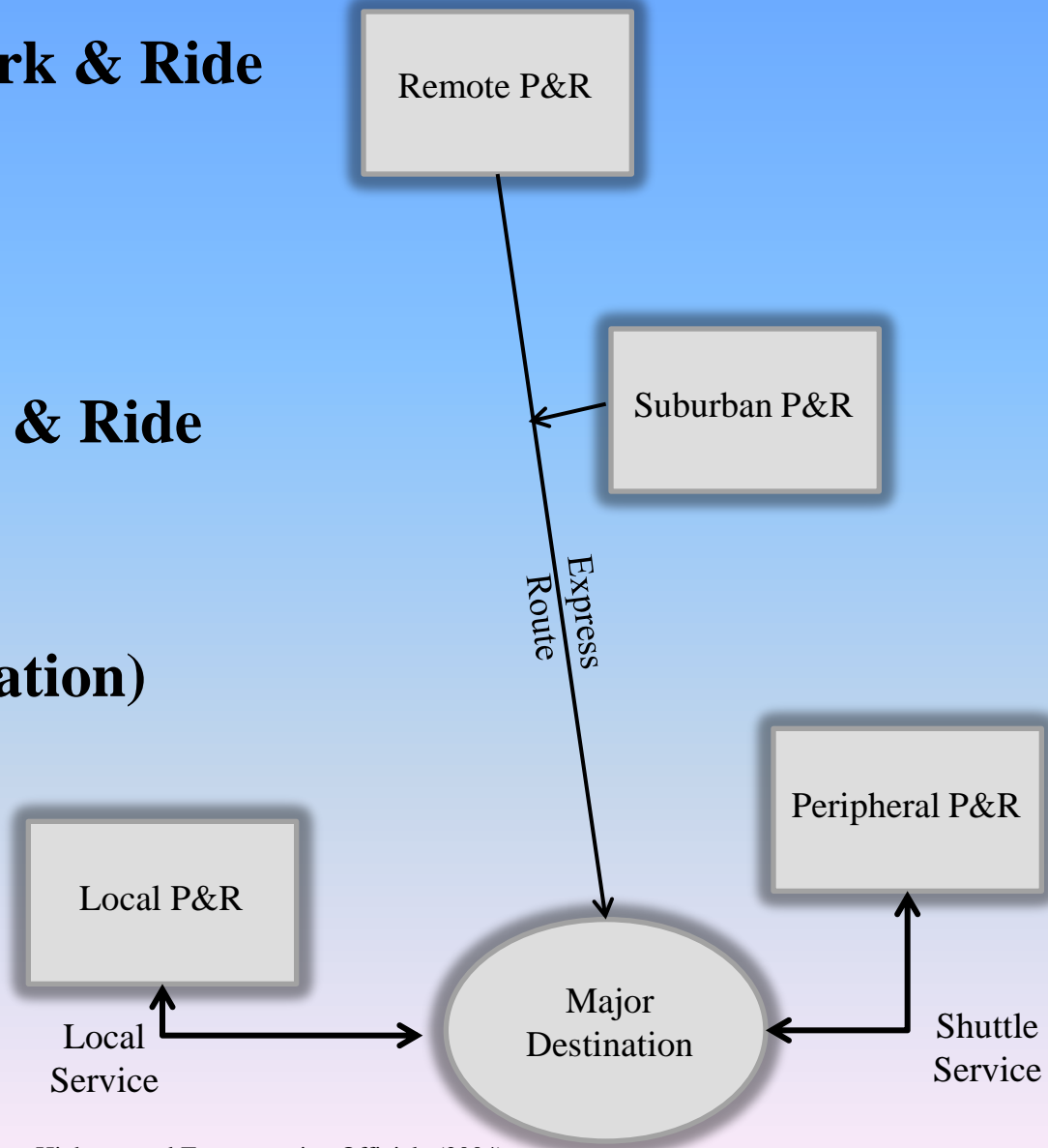
MEANS OF TRANSPORTATION TO WORK BY TRAVEL TIME TO WORK

Universe: Workers 16 years and over who did not work at home

2010 American Community Survey 1-Year Estimates

Public Transportation – Types of Park & Ride Facilities

- **Remote Long-Distance Park & Ride**
Distance - (40-80 miles)
- **Suburban Park & Ride**
Distance - (4-30 miles)
- **Local Service Urban Park & Ride**
Distance - (1-4 miles)
- **Peripheral Park & Ride**
Distance - (Edge of Destination)



Accurate Travel Forecast Modeling is Key

An accurate 4-step Travel Demand Forecast Model can aid planners in the development of a new or expanded Park & Ride facility. Trip distribution is the second of four steps.

1. Trip Generation

2. Trip Distribution

3. Mode Choice

4. Trip Assignment

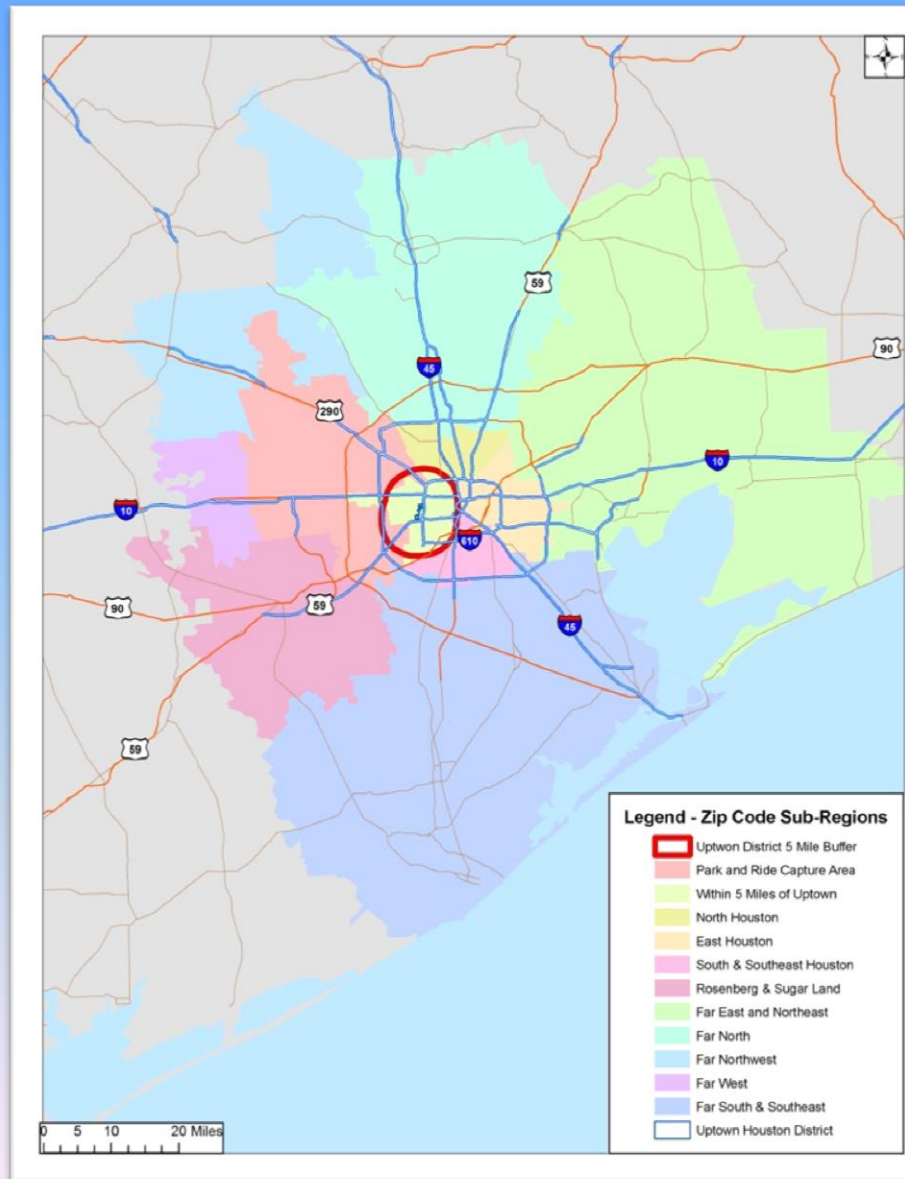
Trip Distribution Check

- **Trip distribution is a process used to model where trips are beginning and ending.**
- **It is often one of the more difficult steps of the 4-step modeling process.**
- **It is possible to use LED and other data to substantiate the accuracy of the Trip Distribution output.**

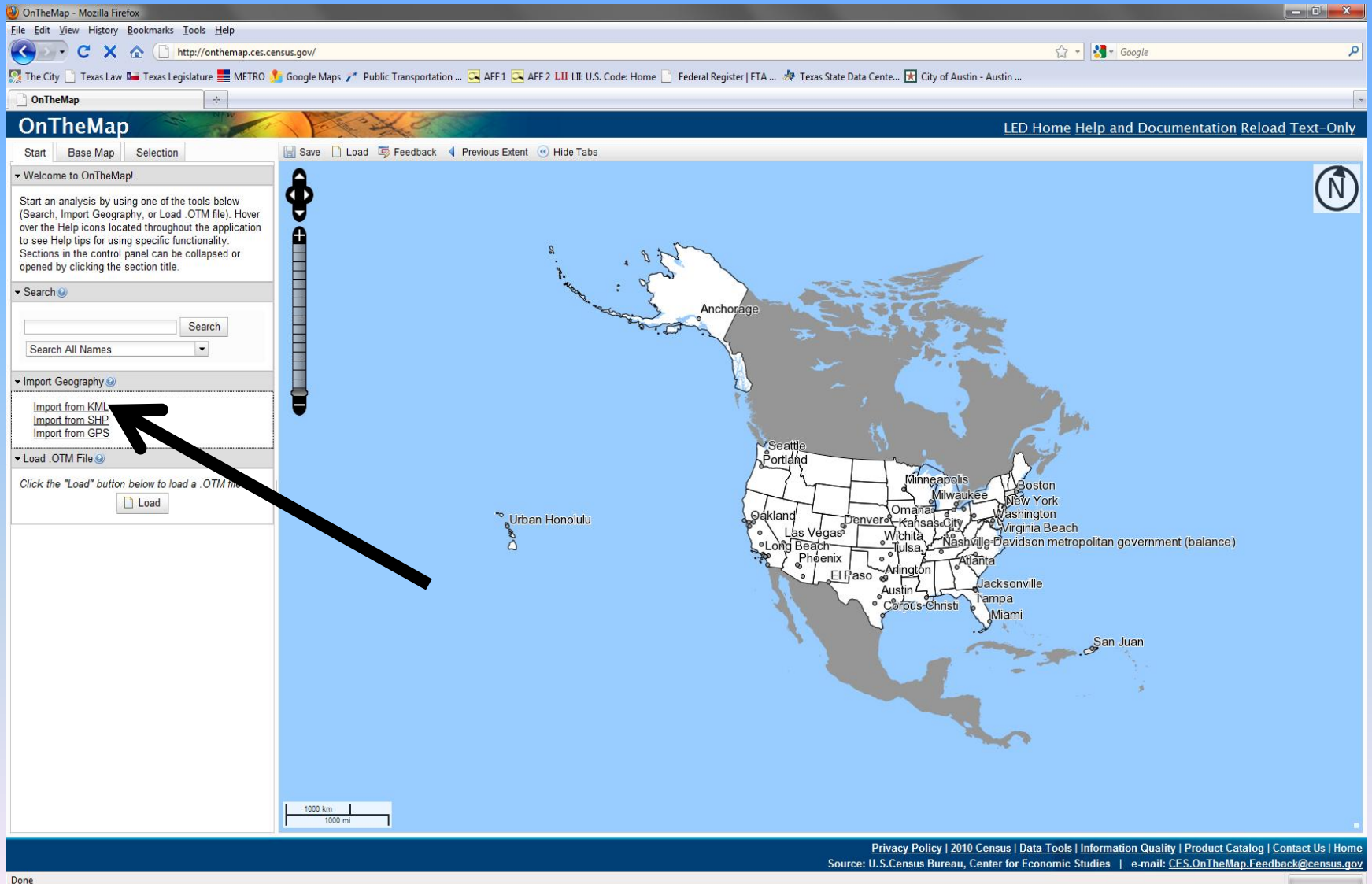
Data Sources

- **Houston-Galveston Area Council (H-GAC) – Trip Distribution Table**
 - **3,000 traffic analysis zone pairs**
- **Survey data from 2008 & 2011 employee survey**
 - **2008 – Uptown-Houston Employer Survey – 12,080 surveyed**
 - **2011 – Uptown-Houston Employer Survey – 956 surveyed**
- **LED 2008 Distance-Direction Home-Work Data**

Zip Code Sub-Regions



LED Data – Step 1



LED Data – Step 2

The screenshot displays the OnTheMap application running in a Mozilla Firefox browser. The browser's address bar shows the URL <http://onthemap.ces.census.gov/>. The application interface includes a top navigation bar with links for [LED Home](#), [Help](#), and [Documentation](#). Below this, a sidebar on the left contains sections for 'Welcome to OnTheMap', 'Search', 'Import Geography', and 'Load .OTM File'. The main area features a map of the United States with various cities labeled, including Anchorage, Minneapolis, Boston, New York, Washington, and San Juan. A large black circle highlights a dialog box titled 'Select Shapes from a KML/KMZ' that is overlaid on the map. This dialog box contains the text 'Upload data from a KML/KMZ file.' and a field for 'KML file:' with 'Browse...' and 'Clear' buttons. At the bottom of the dialog are 'Cancel' and 'Import' buttons. The bottom of the browser window shows a footer with links for [Privacy Policy](#), [2010 Census](#), [Data Tools](#), [Information Quality](#), [Product Catalog](#), [Contact Us](#), and [Home](#), along with the source information: 'Source: U.S.Census Bureau, Center for Economic Studies | e-mail: CES.OnTheMap.Feedback@census.gov'.

OnTheMap - Mozilla Firefox

File Edit View History Bookmarks Tools Help

<http://onthemap.ces.census.gov/>

The City Texas Law Texas Legislature METRO Google Maps Public Transportation ... AFF 1 AFF 2 LII U.S. Code: Home Federal Register | FTA ... Texas State Data Cente... City of Austin - Austin ...

OnTheMap

LED Home Help and Documentation Reload Text-Only

Start Base Map Selection

Save Load Feedback Previous Extent Hide Tabs

Welcome to OnTheMap

Start an analysis by using one of the tools below (Search, Import Geography, or Load .OTM file). Hover over the Help icons located throughout the application to see Help tips for using specific functionality. Sections in the control panel can be collapsed or opened by clicking the section title.

Search

Search

Search All Names

Import Geography

Import from KML
Import from SHP
Import from GPS

Load .OTM File

Click the "Load" button below to load a .OTM file.

Load

Select Shapes from a KML/KMZ

Upload data from a KML/KMZ file.

KML file: Browse... Clear

Cancel Import

1000 km
1000 mi

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Source: U.S.Census Bureau, Center for Economic Studies | e-mail: CES.OnTheMap.Feedback@census.gov

Done

LED Data – Step 3

OnTheMap - Mozilla Firefox

File Edit View History Bookmarks Tools Help

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OnTheMap

LED Home Help and Documentation Reload Text-Only

Start Base Map Selection

Save Load Feedback Previous Extent Hide Tabs

Selection Preview:

 **Confirm Selection**

Confirm and Add Advanced Selection

Help?

Drawing Tools

Navigation

Draw Polygon (Freehand)

Draw Line

Draw Point(s)

Edit Drawn Shape

Clear Selection

Add Layer Selection

No Selected Layer

Add Buffer to Selection

☒ Do Not Buffer

☐ Simple/Ring

Radius: miles

☐ Donut

Inside Radius: miles

Outside Radius: miles

☐ Plume

Start Radius: miles

End Radius: miles

Import Geography

Import from KML

Import from SHP

Import from GPS

Previous Shapes

Selection Area

Shape from Uptown_District.kmz

Selection Area: 3.393 Sq. Mi

Census Blocks: 217

[Perform Analysis on Selection Area](#)

[Change Selection Area](#)

[Add Advanced Selection](#)

95 51600, 29 76831

Transferring data from onthemap.ces.census.gov...

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LED Data – Step 4

OnTheMap - Mozilla Firefox

File Edit View History Bookmarks Tools Help

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OnTheMap

LED Home Help and Documentation Reload Text-Only

Start Base Map Selection

Selection Preview:

Confirm Selection

Confirm and Add Advanced Selection

Help?

Drawing Tools

Navigation

Draw Polygon (Freehand)

Draw Line

Draw Point(s)

Edit Drawn Shape

Clear Selection

Add Layer Selection

No Selected Layer

Add Buffer to Selection

Do Not Buffer

Simple/Ring

Radius: miles

Donut

Inside Radius: miles

Outside Radius: miles

Plume

Start Radius: miles

End Radius: miles

Import Geography

Import from KML

Import from SHP

Import from GPS

Previous Shapes

Analysis Settings

Distance/Direction Analysis in 2009 by All Jobs

Home/Work Area

Determines whether the selection area is analyzed on where workers live ("Home") or where workers are employed ("Work").

Home

Work

Analysis Type

Determines the type of results that will be generated for the selected area.

Area Profile

Labor Market Segment: All Workers

Area Comparison

Areas to Compare: Places (Cities, CDPs, etc.)

Labor Market Segment: All Workers

Distance/Direction

Destination

Destination Type: Places (Cities, CDPs, etc.)

Inflow/Outflow

Note: Home/Work choice does not affect results

Year

Determines the year(s) of data that will be processed in the analysis.

2010

2009

2008

2007

2006

2005

2004

2003

2002

Job Type

Determines the scope of jobs that will be processed in the analysis.

All Jobs

Primary Jobs

All Private Jobs

Private Primary Jobs

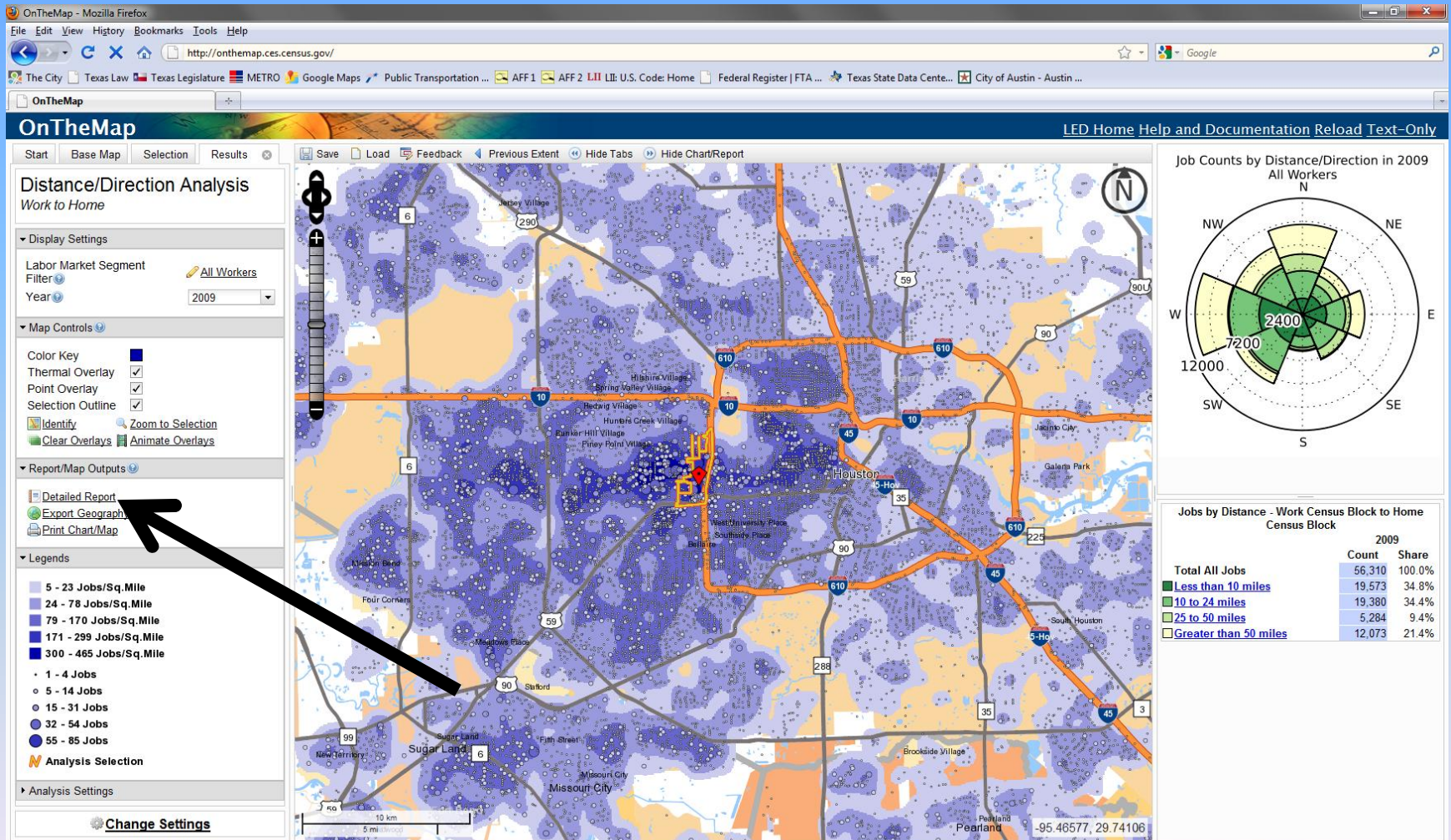
Cancel Go!

Transferring data from onthemap.ces.census.gov...

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LED Data – Step 5



LED Data – Step 1

OnTheMap - Mozilla Firefox

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The City Texas Law Texas Legislature METRO Google Maps Public Transportation ... AFF 1 AFF 2 LII U.S. Code Home Federal Register | FTA ... Texas State Data Cente... City of Austin - Austin ...

OnTheMap

LED Home Help and Documentation Reload Text-Only

Start Base Map Selection Results Save Load Feedback Previous Extent Hide Tabs Hide Chart/Report

Distance/Direction Analysis

Work to Home

Display Settings

Labor Market Segment **All Workers**

Year 2009

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 - 23 Jobs/Sq.Mile
- 24 - 78 Jobs/Sq.Mile
- 79 - 170 Jobs/Sq.Mile
- 171 - 298 Jobs/Sq.Mile
- 300 - 465 Jobs/Sq.Mile

- 1 - 4 Jobs
- 5 - 14 Jobs
- 15 - 31 Jobs
- 32 - 54 Jobs
- 55 - 85 Jobs

Analysis Selection

Analysis Settings

Change Settings

Export Geography

Choose an export format.

- ☒ ShapeFile (All Years)
- ☐ KML (Current Year Only)
- ☐ CSV (Census Blocks in Selection Area)

Cancel Okay

Job Counts by Distance/Direction in 2009
All Workers

Jobs by Distance - Work Census Block to Home
Census Block

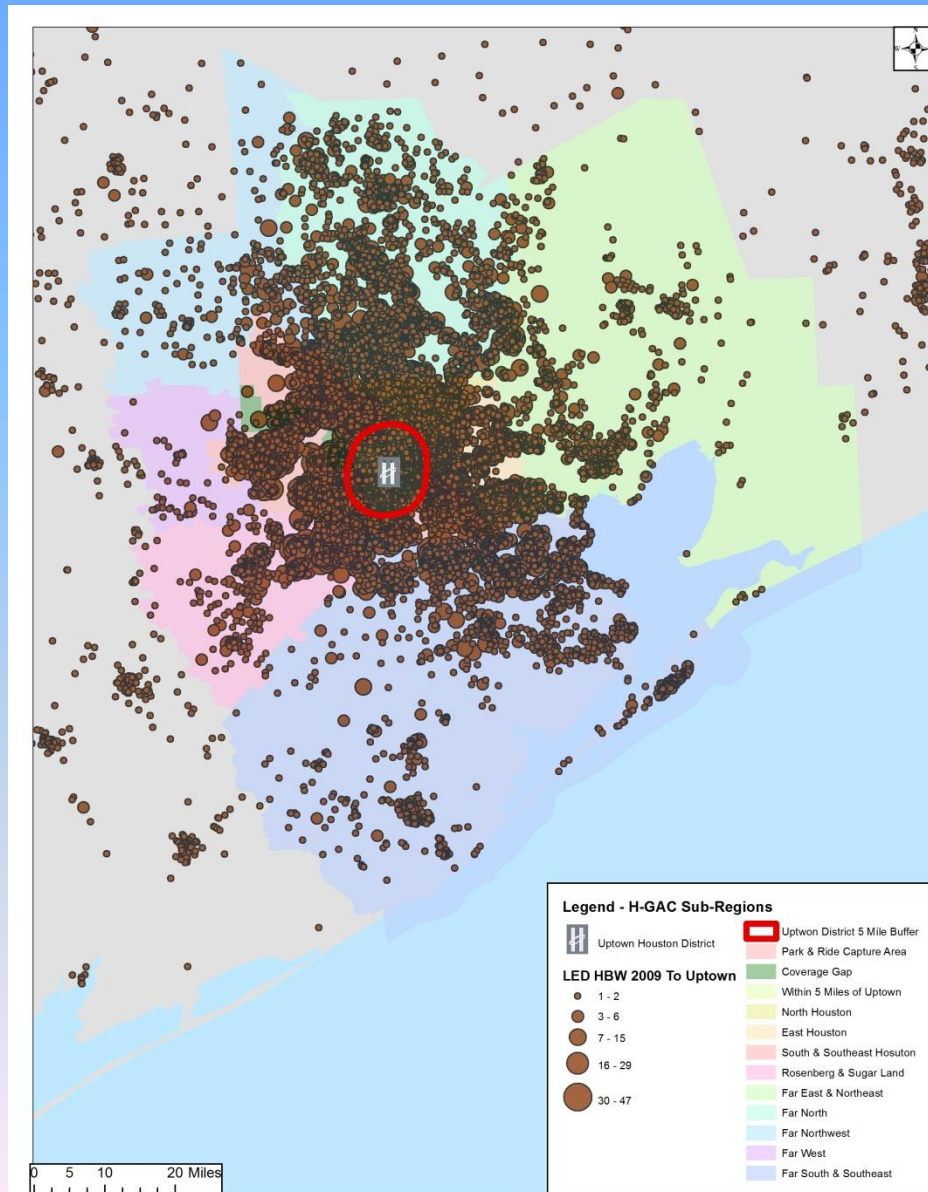
	2009	
	Count	Share
Total All Jobs	56,310	100.0%
Less than 10 miles	19,573	34.8%
10 to 24 miles	19,380	34.4%
25 to 50 miles	5,284	9.4%
Greater than 50 miles	12,073	21.4%

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Done

LED Data – GIS Results



Results - Trip Distribution Check

H-GAC's TDF Model HBW distributions are consistent with the 2008 & 2011 zip code data, and **U.S. Census Longitudinal Employer-Household Dynamics (LED) data.**

Region	HGAC Data	Share		2011 Survey Zip Code Data	Share		2008 Survey Zip Code Data	Share		LED Code 2008 Data	Share
Within 5 Miles of Uptown (Outside Capture Area)	22,327	28%		282	29%		3,562	29%		11,169	23%
Park and Ride Capture Area	22,145	28%		326	34%		3,966	33%		14,165	30%
Far North	8,907	11%		108	11%		1,169	10%		5,219	11%
East Houston	5,855	7%		18	2%		273	2%		2,838	6%
South and Southeast Houston	4,472	6%		20	2%		224	2%		2,003	4%
Far South and Southeast	5,589	7%		93	10%		1,397	12%		5,815	12%
North Houston	3,487	4%		9	1%		147	1%		1,884	4%
Far East and Northeast	3,950	5%		33	3%		394	3%		2,226	5%
Rosenberg & Sugar Land	2,558	3%		53	6%		827	7%		1,979	4%
Far Northwest	872	1%		10	1%		106	1%		593	1%
Far West	193	0%		4	0%		23	0%		36	0%
Total	80,355			956			12,088			47,927	

LED Benefits and Challenges in Park & Ride Facility Planning

- **Benefits** – Within a large-scale study area, LED can enhance the confidence in the trip distribution output of a 4-step model.
- **Challenges** – Within a small-scale study area, payroll data does not necessarily correlate with employment location, which can be especially problematic.



Re-Cap

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Questions/Comments:

Robert McHaney

The Goodman Corporation

(512) 236-8002, ext. 304

rmchaney@thegoodmancorp.com

www.thegoodmancorp.com



The Goodman Corporation

