Analyzing Demographic Data for Transportation Planning

2013 South Central Arc User Group (SCAUG) Annual Conference

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CDM Smith

Project Background

- Traffic study for potential improvements
  - Case study in San Antonio
- Data needs
  - Traffic
  - Speed Delay
  - Population and employment baseline
  - Origin and Destination data

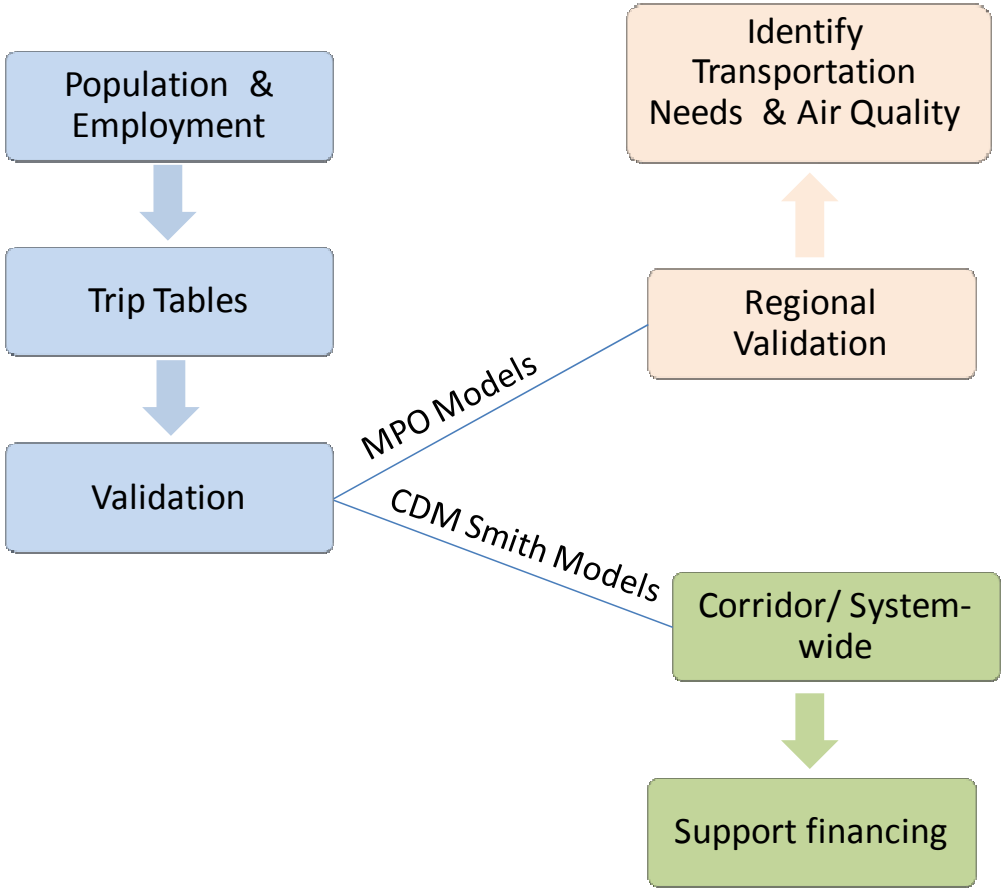
Project Background

- **Population and employment are the key drivers for the trips, which in turn impacts traffic**
- **We are dealing with a high volume of data that needs to be reviewed, compiled and analyzed using technology**
- **Without digitization, manual effort takes several weeks/months**

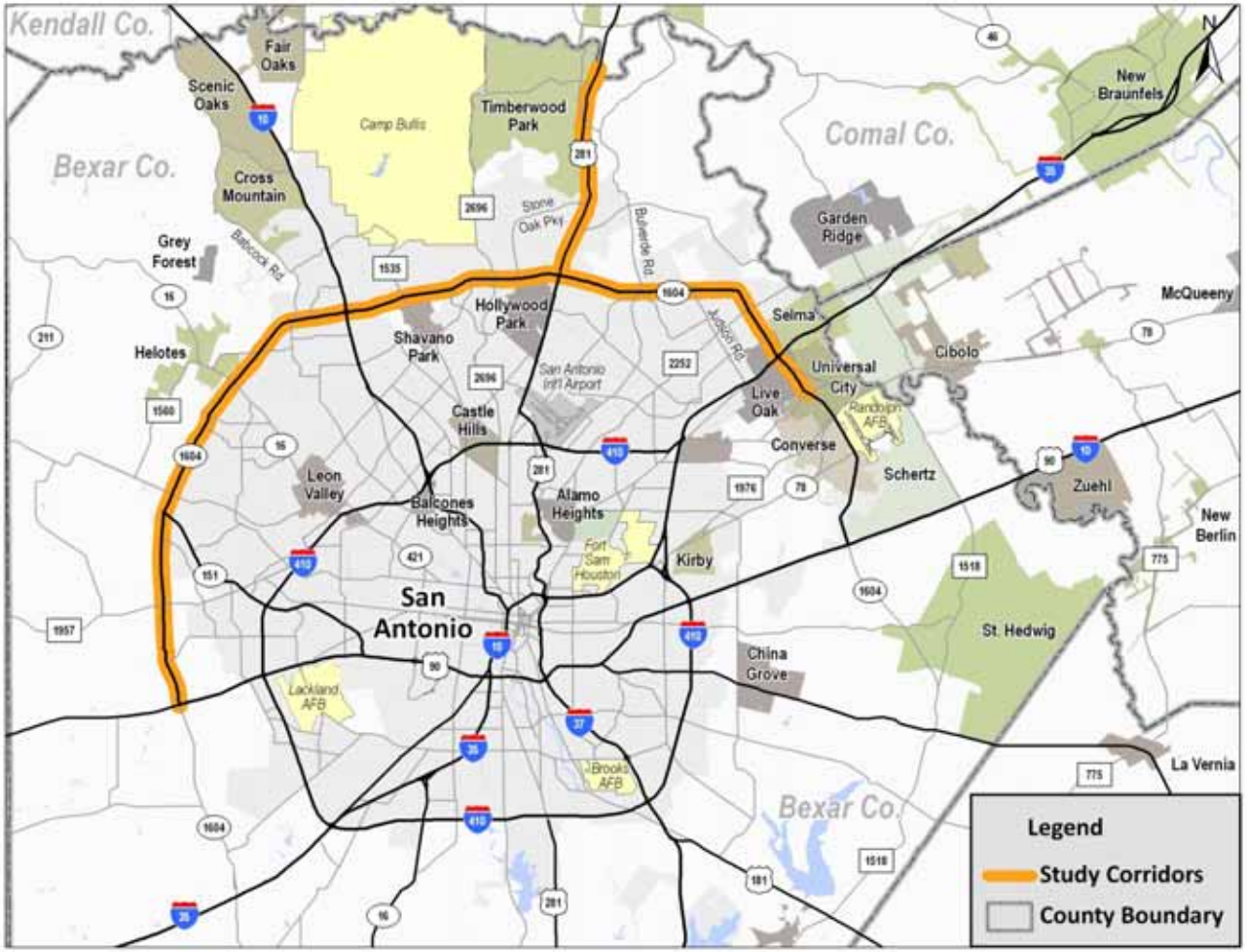
Data Sources

- **Population**
  - **Census 2010 data available and provides a solid baseline**
- **Employment**
  - **Different sources – MPO baseline, BLS, Workforce Commission, LEHD, Woods and Poole and MOODY's etc.**
- **What is the actual employment number in your study area?**

Models purpose



Study area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Scenic Oaks
Camp Bullis
Timberwood Park
Bexar Co.
Cross Mountain
Comal Co.
New Braunfels
Grey Forest
Garden Ridge
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Universal City
Live Oak
Castle Hills
Converse
Schertz
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Leon Valley
Balcones Heights
Alamo Heights
New Berlin
Kirby
San Antonio
St. Hedwig
China Grove
Lackland AFB
Brooks AFB
La Vernia
Bexar Co.
Legend
Study Corridors
County Boundary

GIS use to input Travel Demand Model

- Decision made to use GIS to analyze employment data.
- GIS utilized to analyze several different types of employment data including;
  - MPO
  - LEHD/Census
  - BLS/Workforce
- Employment Data mapped and analyzed to identify differences between datasets

Texas Workforce Commission Data (TWC)

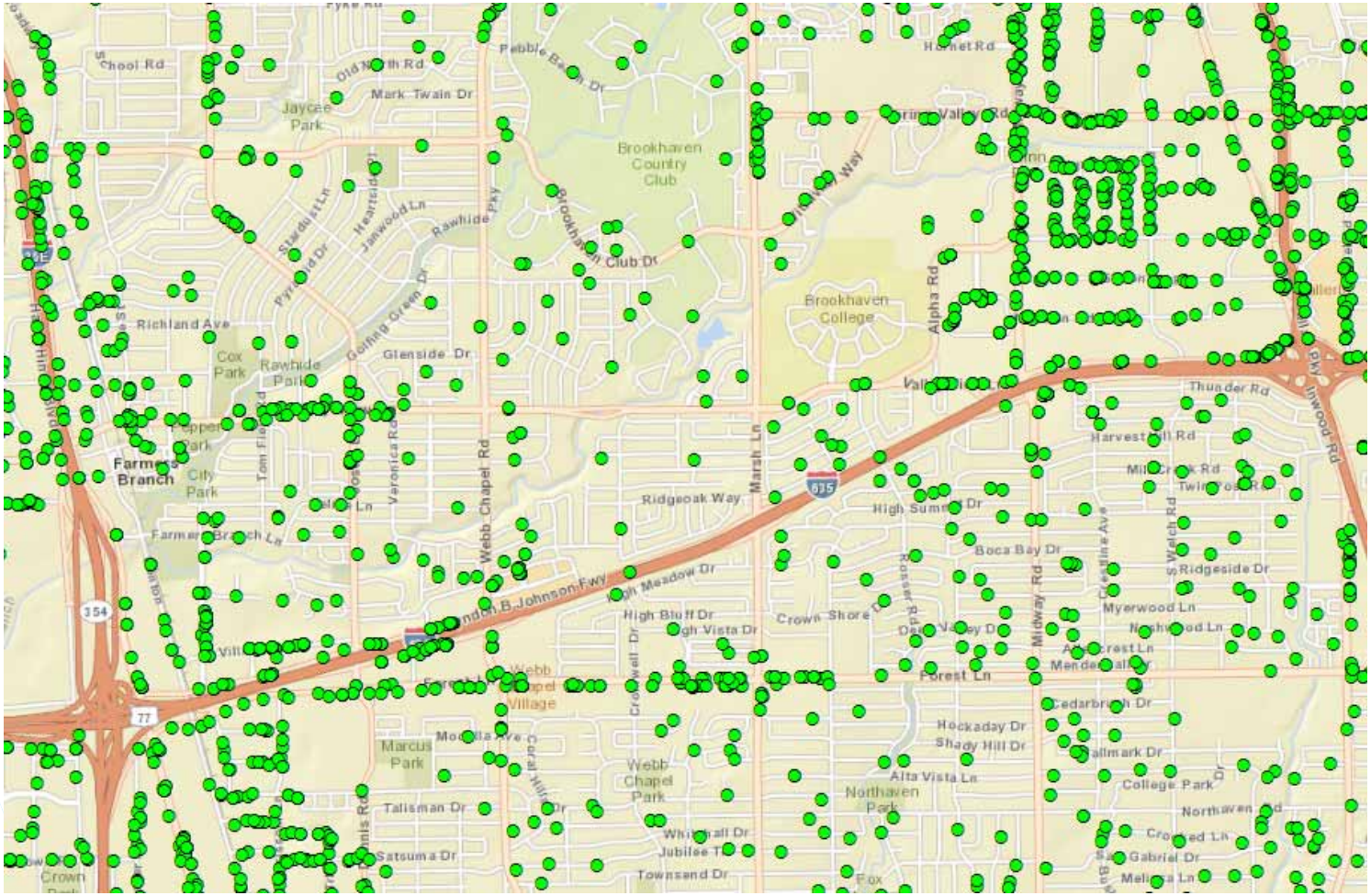
- Confidential Data
- Data must be Geocoded and aggregated to the TAZ level
- Goal is to geocode as much employment as possible - 100% not feasible
- Drawbacks
  - Corporate headquarters
  - Schools
  - Different District vs. Main Offices
  - Part time employment not included

TWC Data Geocode

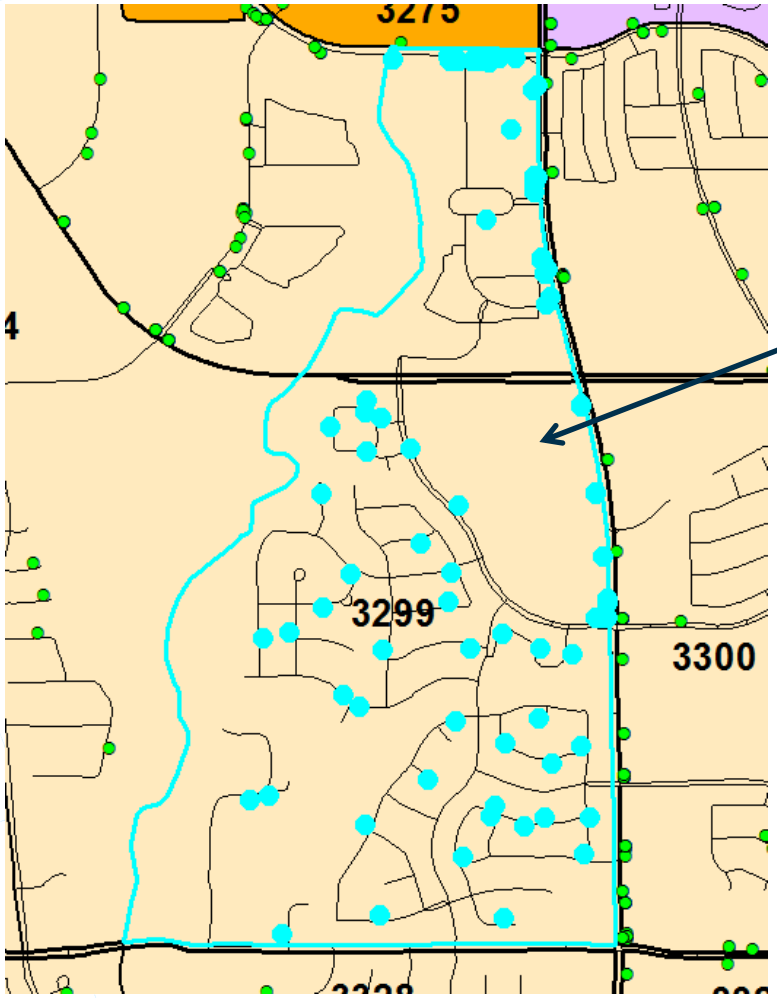
- TWC address data "scrubbed"
- Initial Geocode Performed
- Initial Geocode results were approximately 80% with a geocode score of 100
- Further data scrubbing and second geocode performed (results approximately 90% with score of 100).
- Non-matching records with high employment identified and manually researched.

PL_ADDR1
9712 SUMMER DRIVE
1000 14TH ST # 425
2681 HUNT CTY ROAD 1077
5804 COMMUNICATIONS PKWY #200
2404 ROYAL BIRKDALE LOCATION
2570 ELDORADO PKWY STE 150
5107 BRIARGROVE LN
205 W MAIN ST STE D
11536 WILD ROSE LN
1108 SUMMIT AVE #8
3857 ROLLING HILLS DR
90 AFFIRMED LANE
2504 TEAKWOOD LN
5 ESTATES ROAD/LUCAS BRANCH

TWC Data Geocode Results



TWC Data Geocode Results

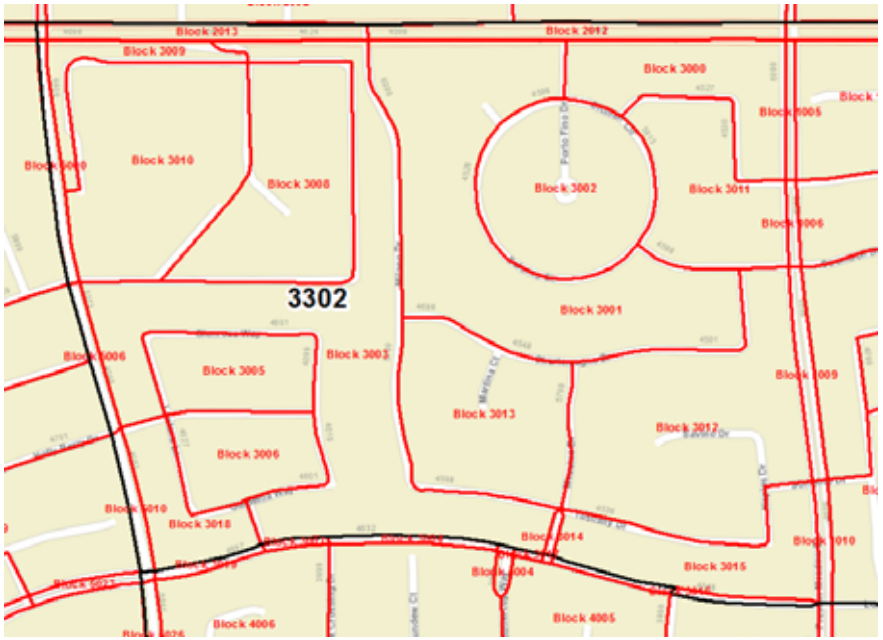


TAZ **3299**

Employment = **150**

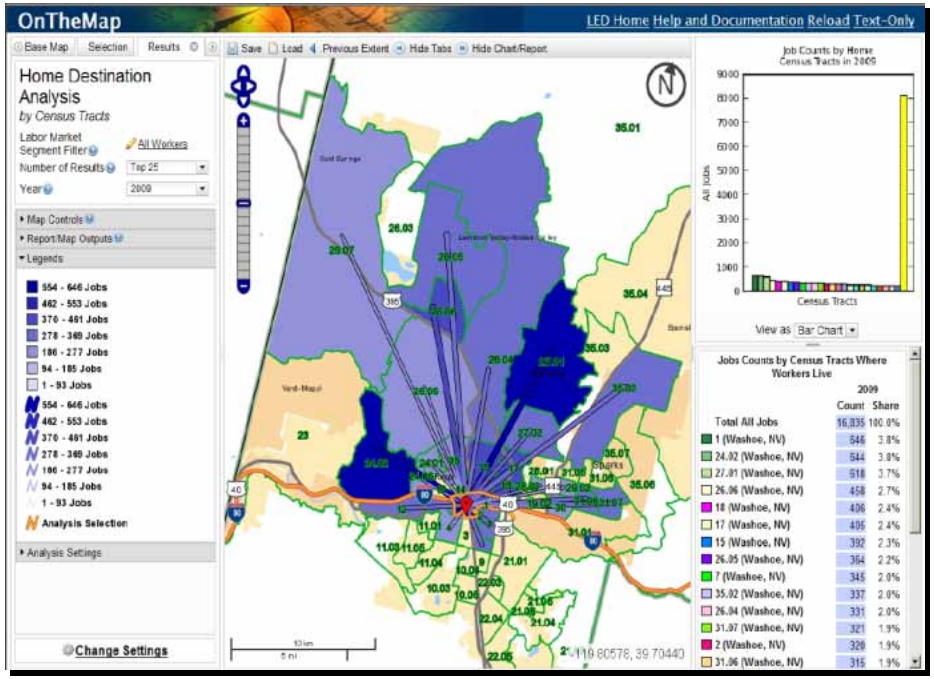
Population Data – LEHD/Census

- **2010 Census available**
  - **Block level data**
  - **GIS can be used to aggregate population at the TAZ level**
  - **Readily available**
  - **Environmental Justice considerations, driving age population**



Population Data - LEHD/Census

- **LEHD Origin-Destination Employment Statistics**
- **Compiled from federal administrative records**
- **Covers 90% of all U.S. workers**
- **Easily downloaded**
- **Quality Assurance Performed**



Population Data - MPO

- **Employment information compiled by County**
- **Forecast for employment using landuse models updated typically every 5-years**
- **Data is at the Transportation Analysis Zone (TAZ) level**
- **Drawbacks**
  - **County control total and then disaggregation**

YR10_DMF40_FEB11ACTDATA

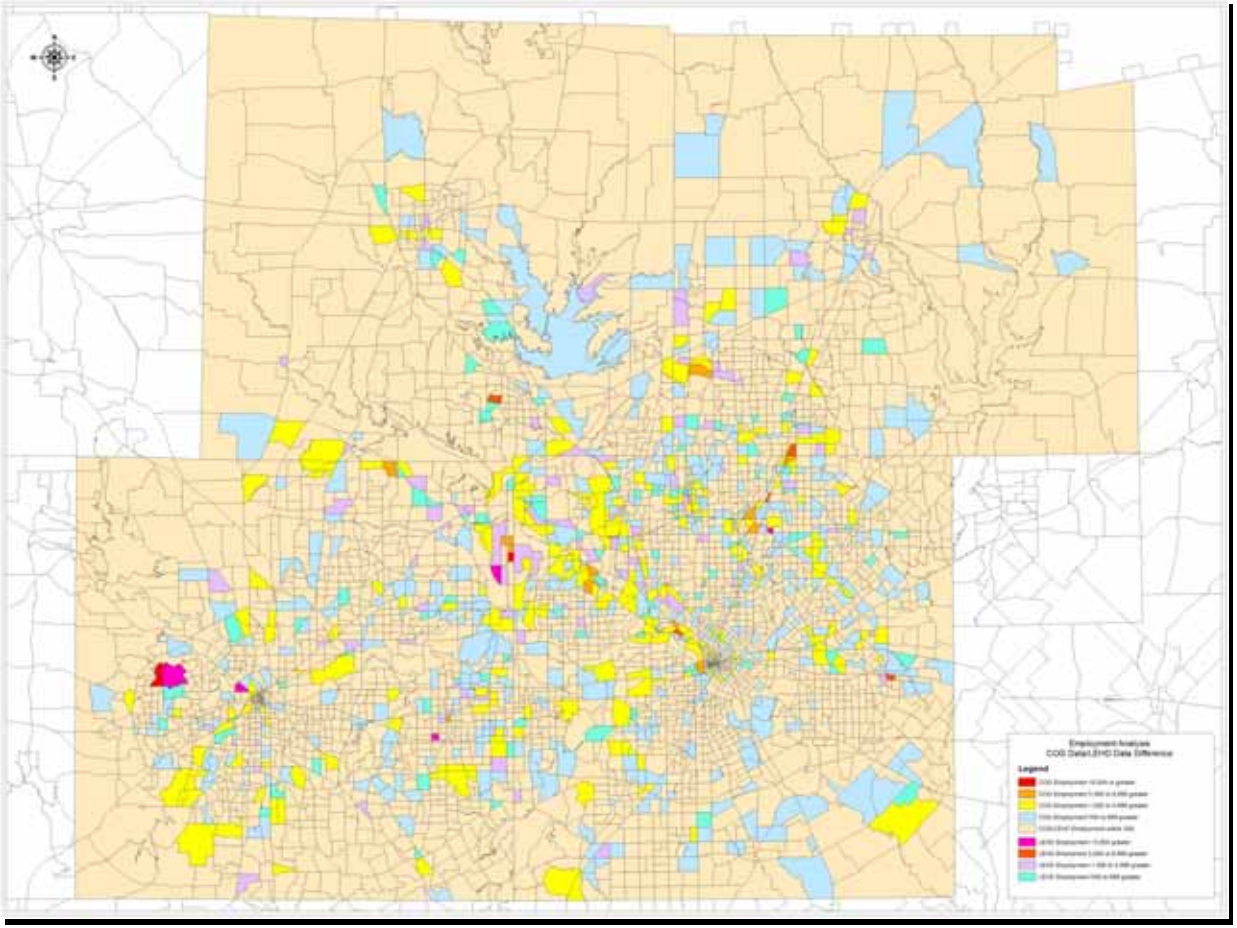
OID	ID	TSZ *	DISTRICT	XCOOR	YCOOR	MEDINC	HHOLD	POP	BASIC	RETAIL	SERVICE
0	1	1001	237	2198804.47633	7191555.90562	40673	185	567	69	33	154
1	2	1004	238	2215929.24871	7181569.22244	40673	290	889	47	49	127
2	3	1006	237	2212987.28853	7167981.73011	40673	290	889	170	82	383
3	4	1007	238	2233585.11122	7163442.42564	44917	113	347	29	30	78
4	5	1009	237	2179764.38766	7151640.55913	40000	233	715	120	58	272
5	6	1011	237	2224435.65467	7153001.28517	44917	124	380	26	12	58
6	7	1012	237	2237824.9173	7139463.69387	34216	77	236	85	41	193
7	8	1013	238	2243017.99785	7144918.19503	34216	211	647	65	69	178
8	9	1014	238	2251496.559	7142294.16375	34216	105	322	43	45	116
9	10	1016	237	2242477.25488	7133009.78363	34216	81	248	67	32	153
10	11	1017	237	2244769.1857	7134006.08424	34216	18	55	63	30	142
11	12	1018	241	2246400.47792	7135277.49886	34216	325	997	100	43	138
12	13	1019	241	2249385.32224	7135563.05041	34216	202	620	213	90	293
13	14	1020	241	2285915.2912	7131587.50325	54599	257	788	12	5	16
14	15	1021	239	2189202.27744	7122488.17063	32304	380	1165	359	74	367
15	16	1024	240	2243208.12255	7128750.1289	34216	108	331	432	581	1341
16	17	1025	241	2247297.12748	7130248.55059	34216	512	1570	308	131	425
17	18	1026	241	2258136.16285	7131831.51732	34216	494	1515	446	189	614
18	19	1027	237	2155006.82555	7110560.01907	45304	582	1785	66	32	150
19	20	1028	239	2197580.5911	7117755.83001	32304	0	0	86	18	87
20	21	1029	241	2276508.69515	7111280.13792	54599	708	2171	123	52	170
21	22	1030	239	2203805.26483	7106656.18597	46192	427	1310	209	43	213
22	23	1031	240	2216887.08373	7109132.79901	46192	129	396	36	49	113
23	24	1032	240	2229491.04221	7119064.39794	54599	687	2107	83	112	259
24	25	1033	240	2254815.57441	7103314.35776	54599	418	1282	145	195	451

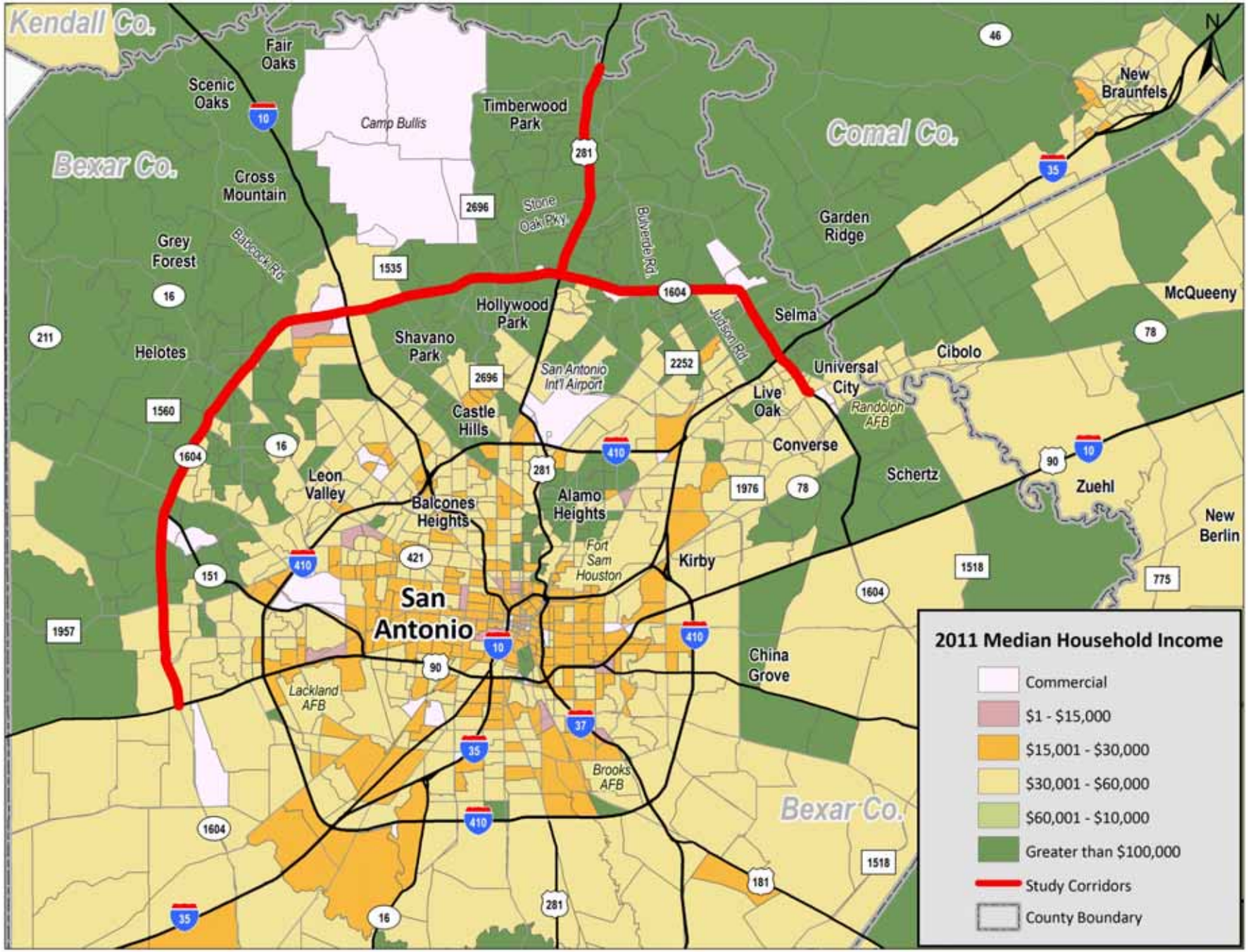
Comparing and Analyzing Employment Data

- **Once all employment source have been mapped data is analyzed and compared using GIS tools**
- **Identify anomalies and large discrepancies between data sources**
- **Further analysis completed on areas where employment differs by more than 20%**
- **Employment data compared to population and demographic data.**

Population Data

- **Major differences between data sources**

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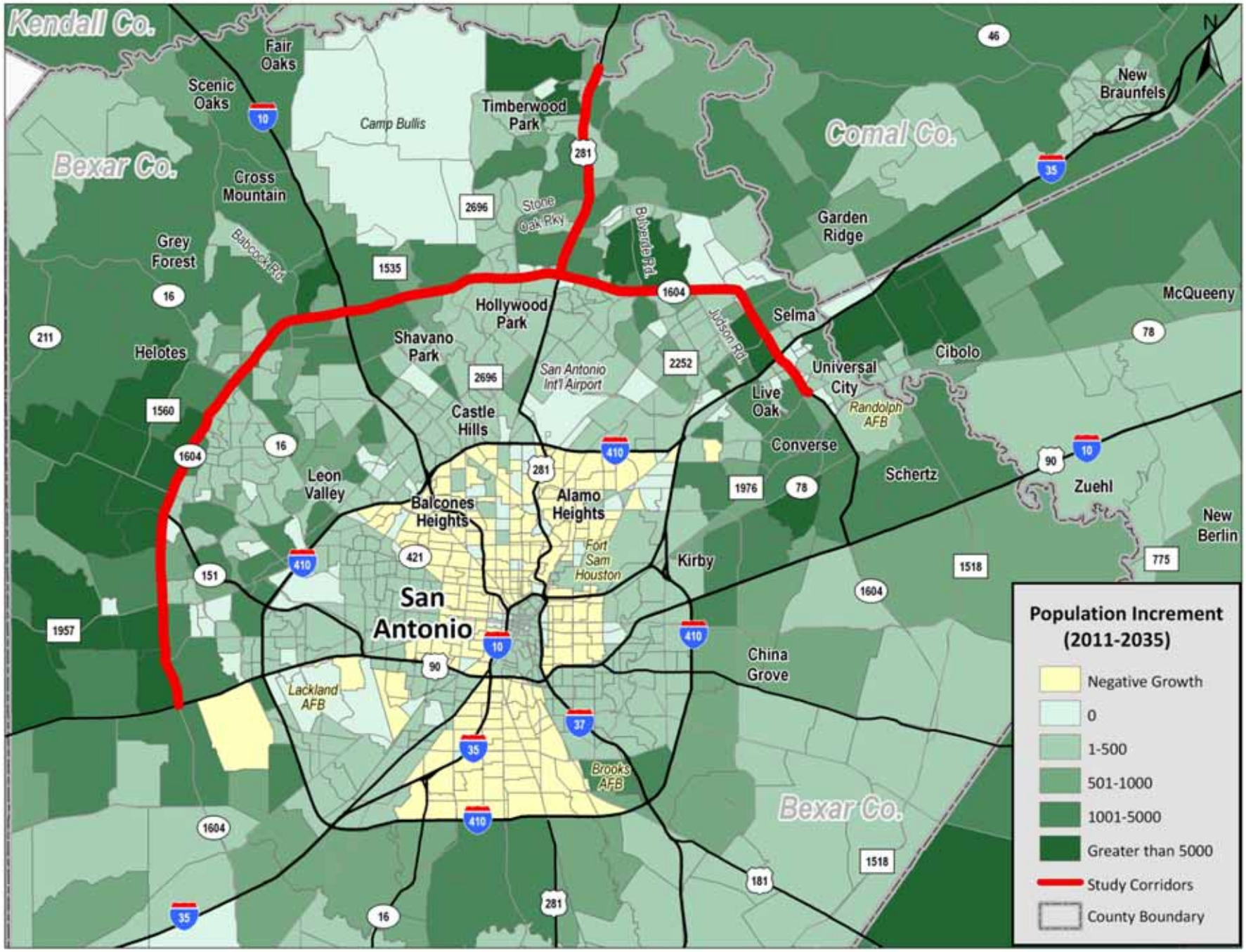
Alamo Heights
Fort Sam Houston
Kirby
San Antonio
China Grove
Lackland AFB
Brooks AFB
Bexar Co.
2011 Median Household Income
Commercial
$1 - $15,000
$15,001 - $30,000
$30,001 - $60,000
$60,001 - $10,000
Greater than $100,000
Study Corridors
County Boundary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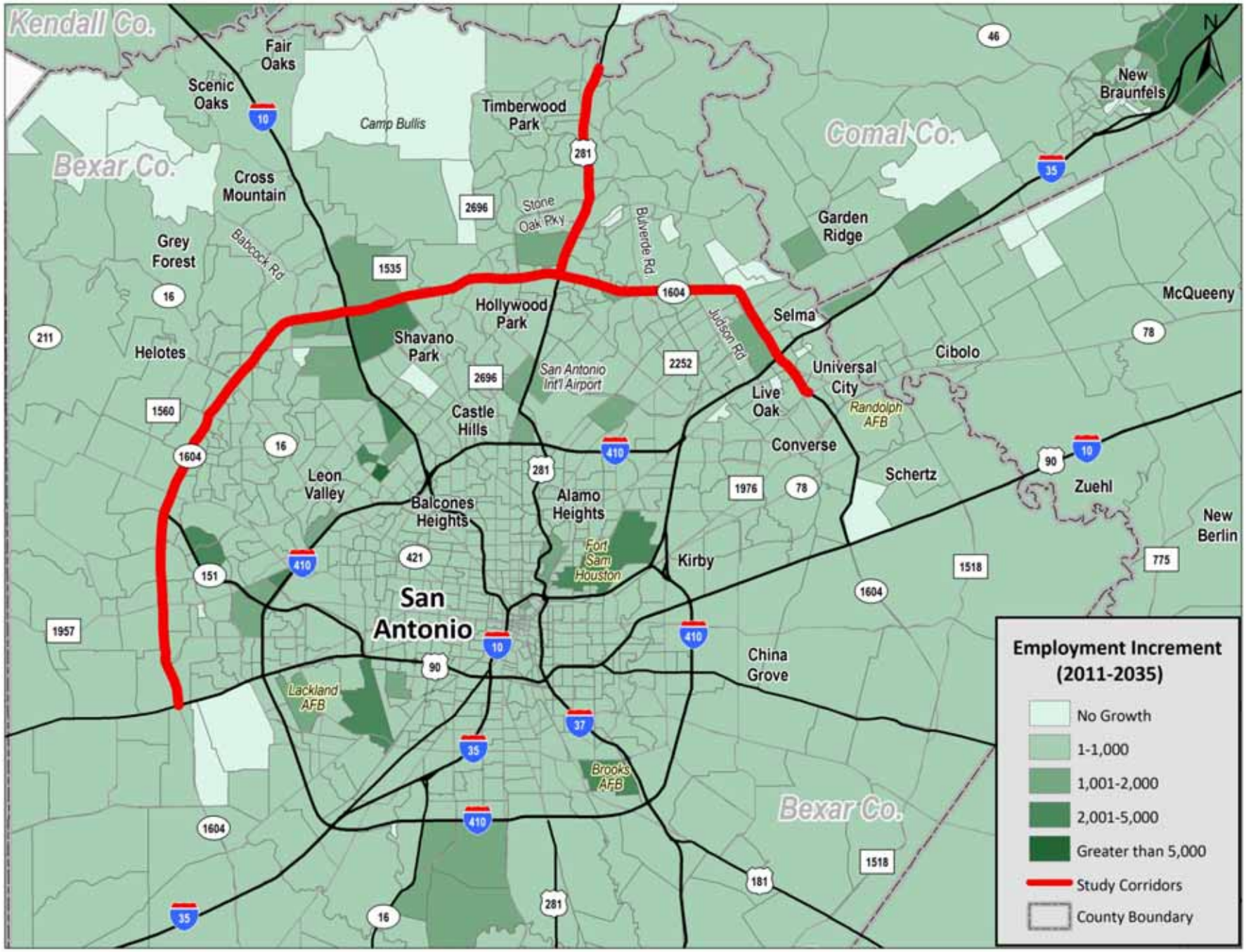
Lackland AFB
Brooks AFB
Bexar Co.
N
Population Increment (2011-2035)
Negative Growth
0
1-500
501-1000
1001-5000
Greater than 5000
Study Corridors
County Boundary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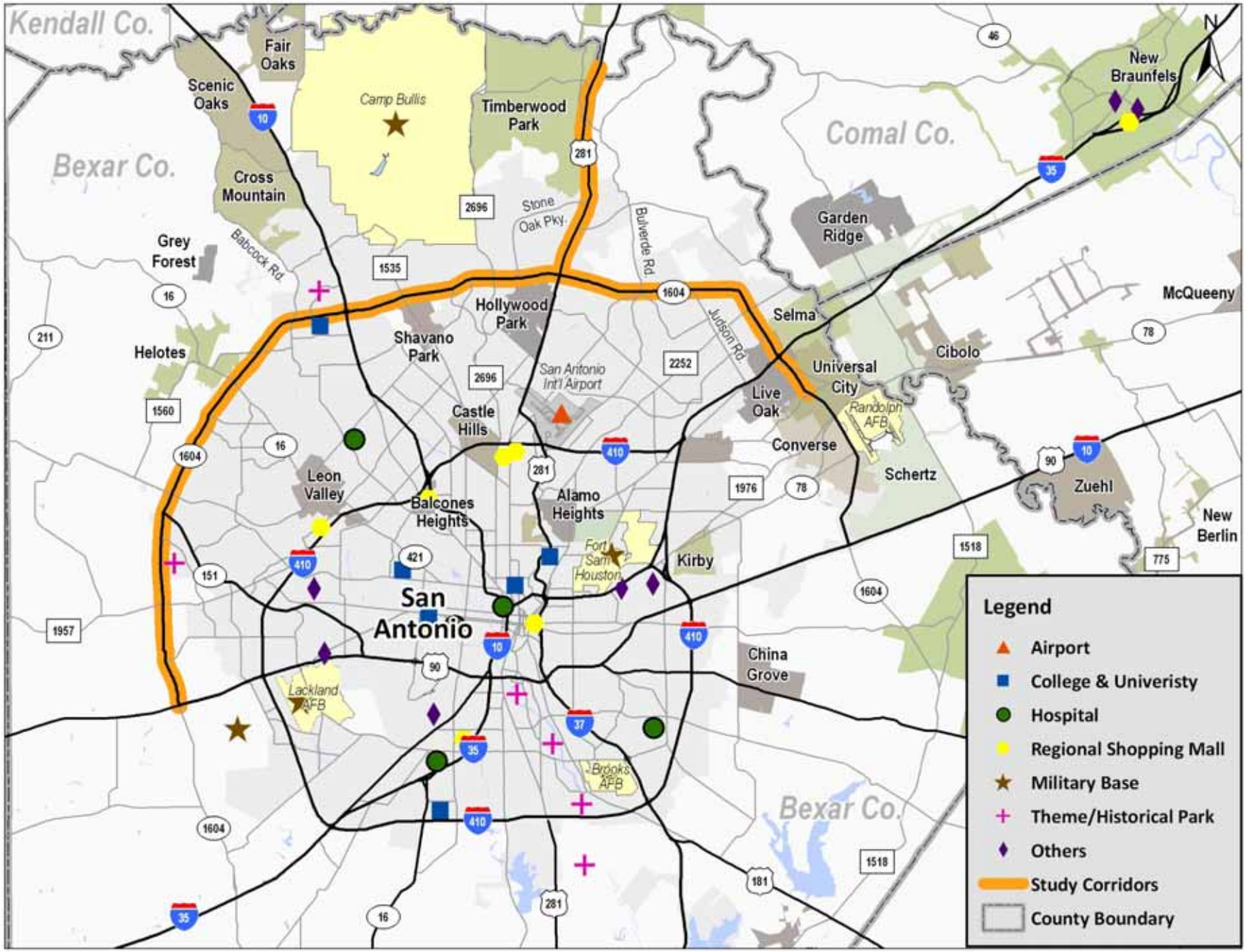
Bexar Co.
N
Employment Increment (2011-2035)
No Growth
1-1,000
1,001-2,000
2,001-5,000
Greater than 5,000
Study Corridors
County Boundary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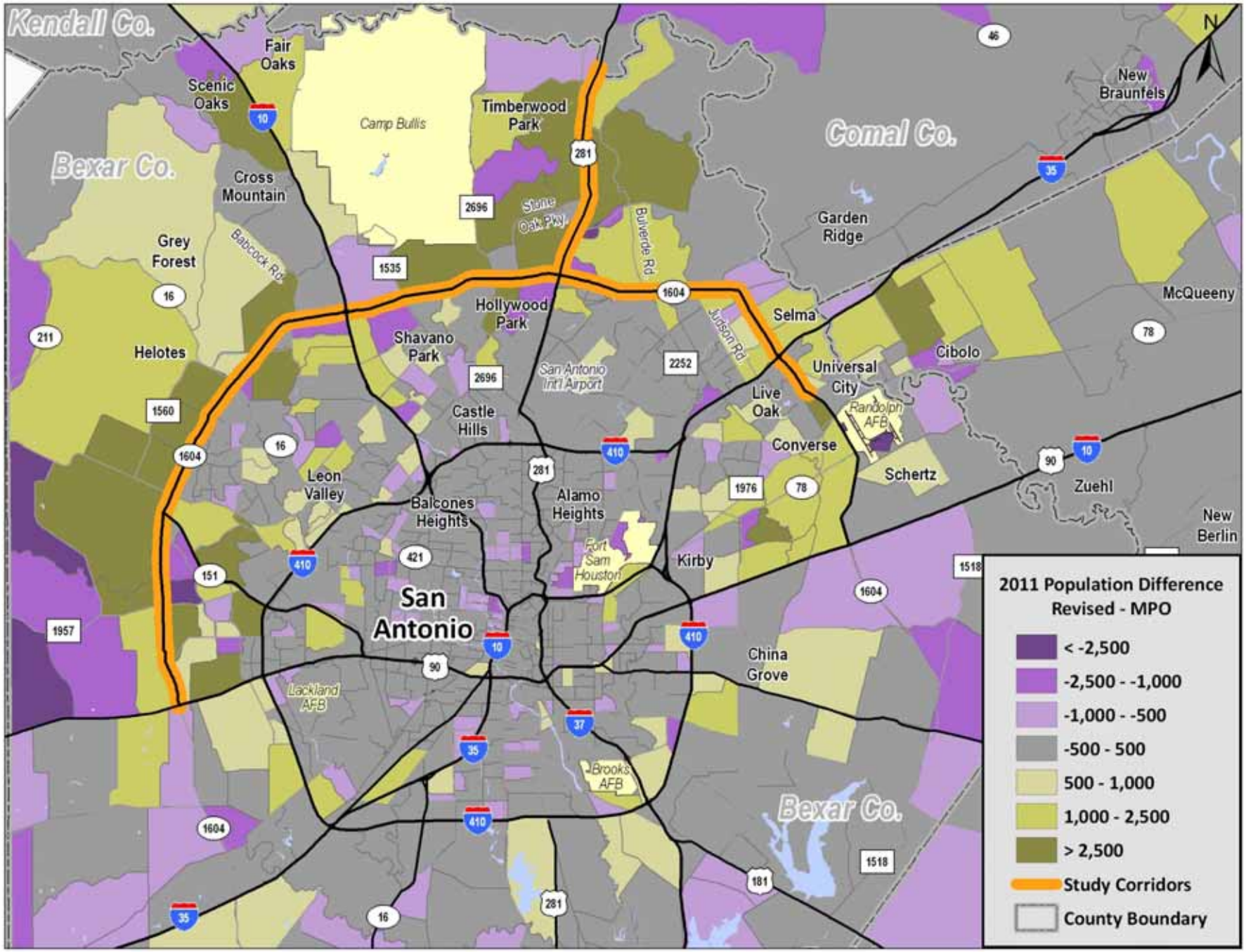
China Grove
Lackland AFB
Brooks AFB
Bexar Co.
Legend
Airport
College & Univeristy
Hospital
Regional Shopping Mall
Military Base
Theme/Historical Park
Others
Study Corridors
County Boundary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China Grove
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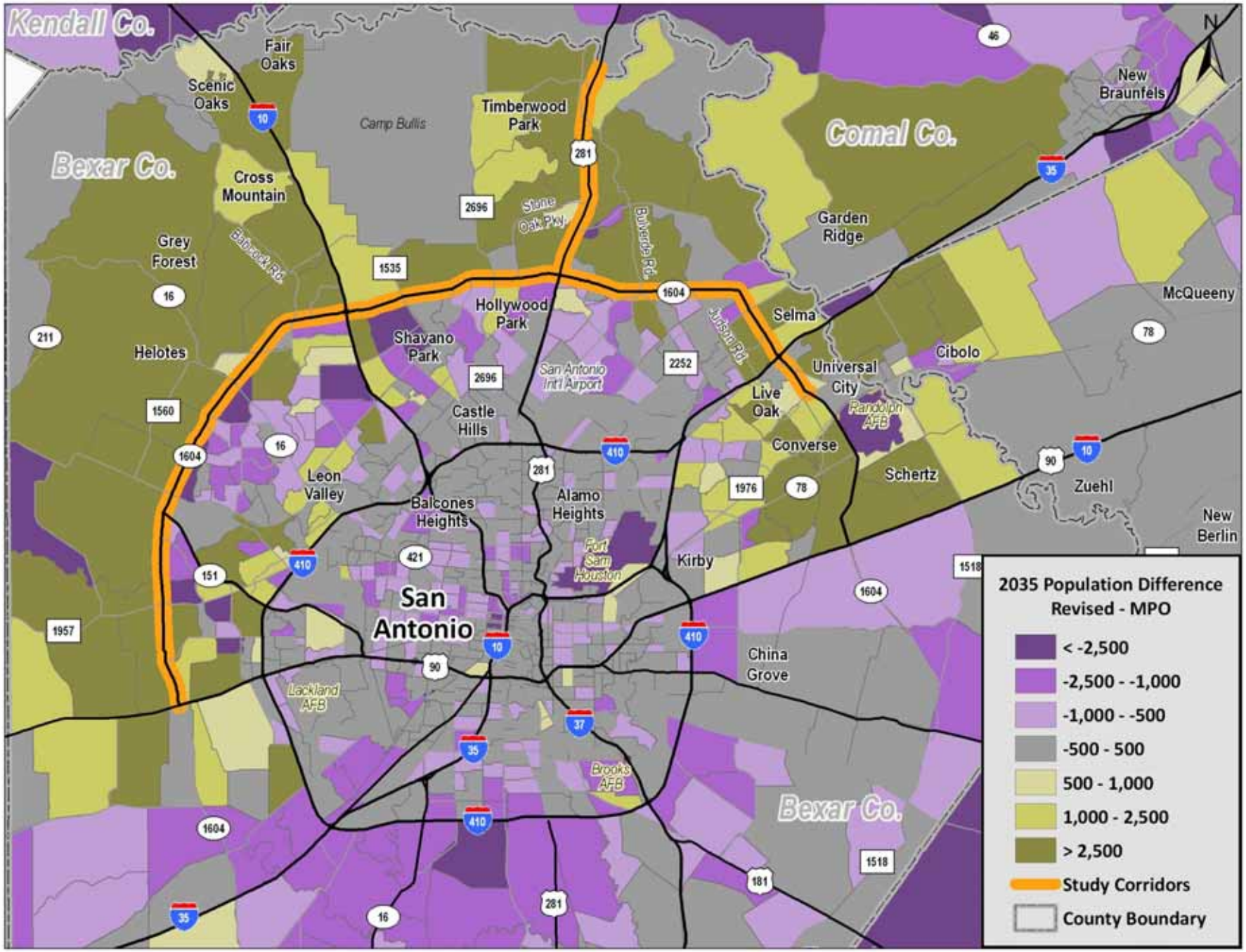
Brooks AFB
N
2011 Population Difference Revised - MPO
< -2,500
-2,500 - -1,000
-1,000 - -500
-500 - 500
500 - 1,000
1,000 - 2,500
> 2,500
Study Corridors
County Boundary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2035 Population Difference Revised - MPO
< -2,500
-2,500 - -1,000
-1,000 - -500
-500 - 500
500 - 1,000
1,000 - 2,500
> 2,500
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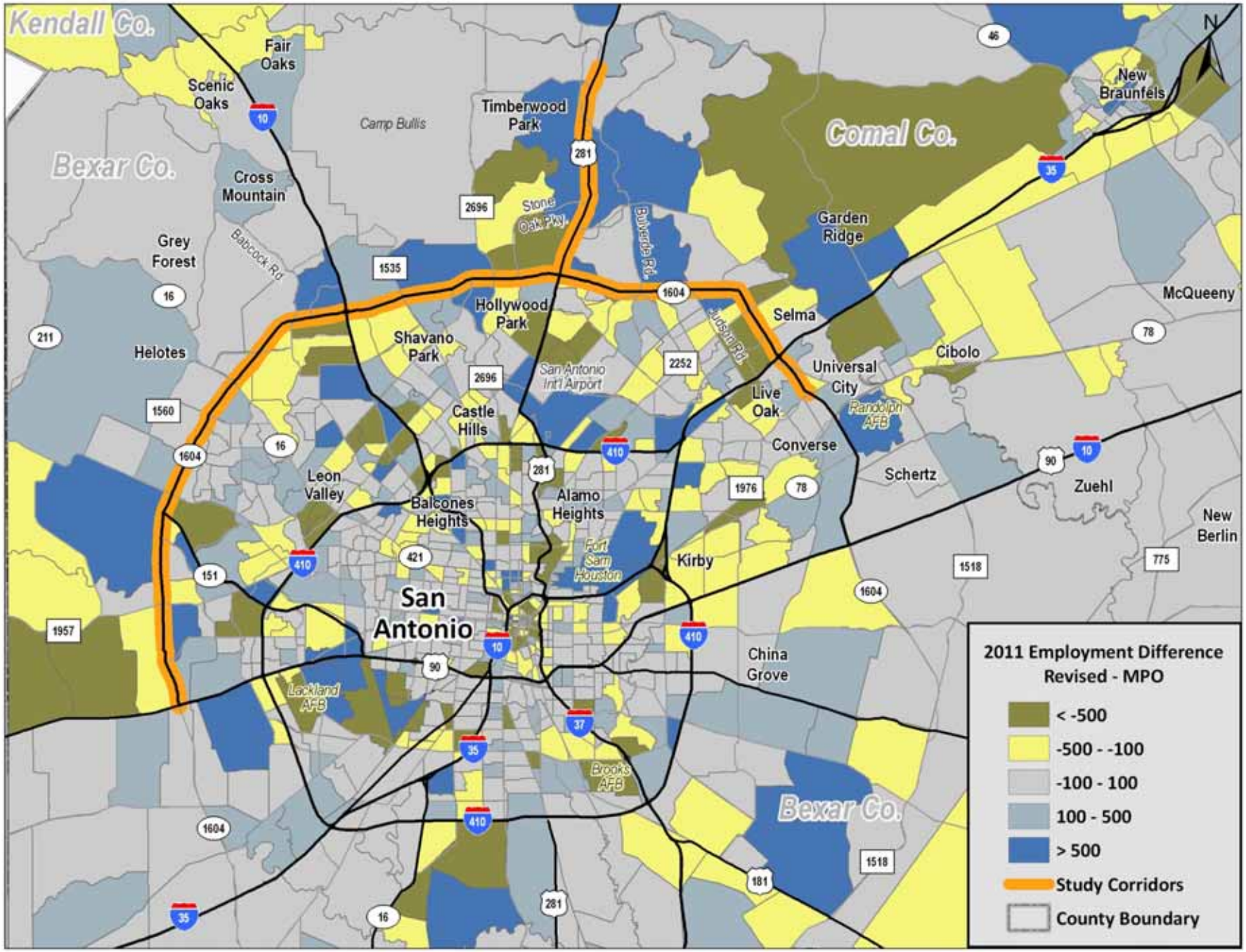
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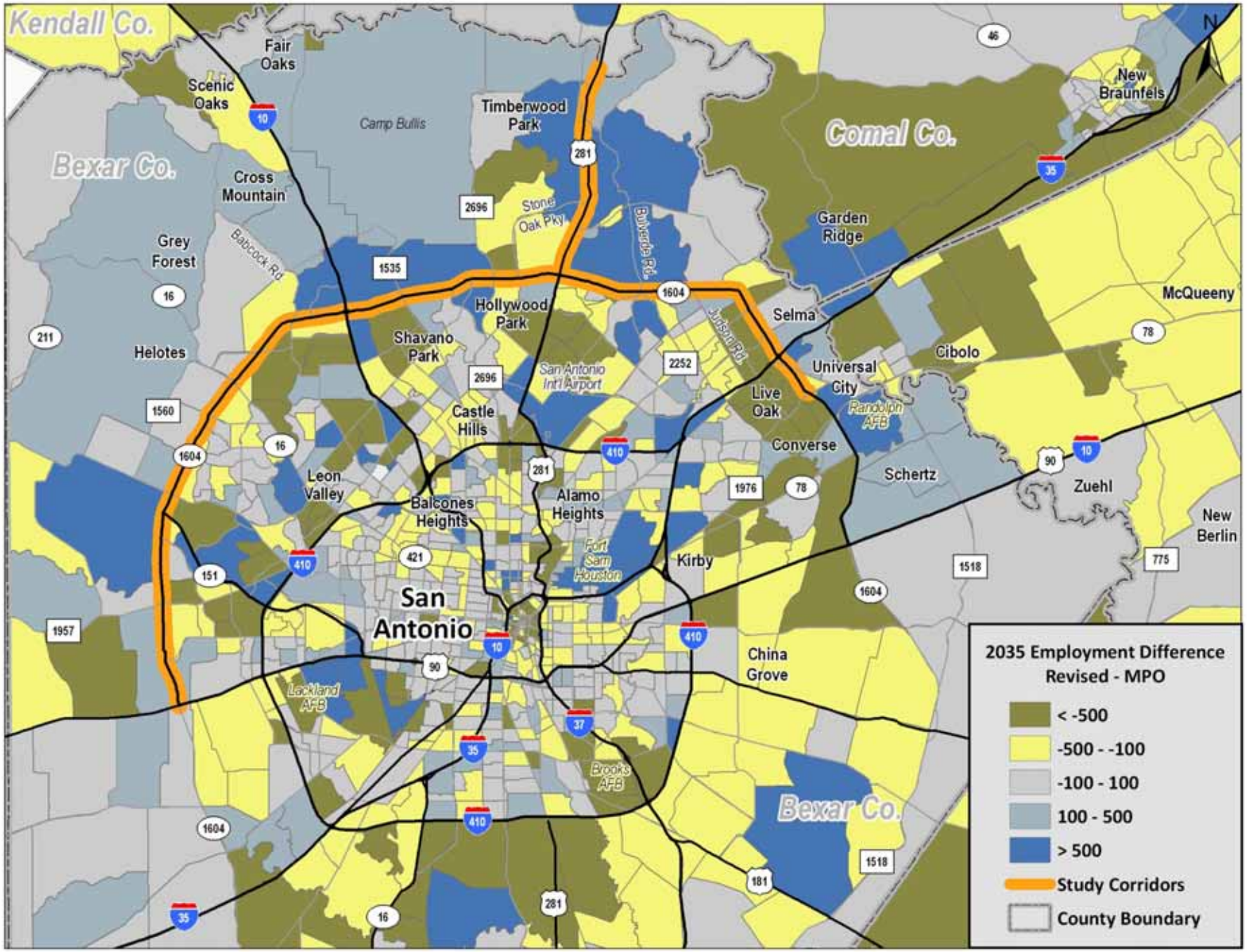
San Antonio
China Grove
Lackland AFB
Brooks AFB
Bexar Co.
N
2011 Employment Difference Revised - MPO
< -500
-500 - -100
-100 - 100
100 - 500
> 500
Study Corridors
County Boundary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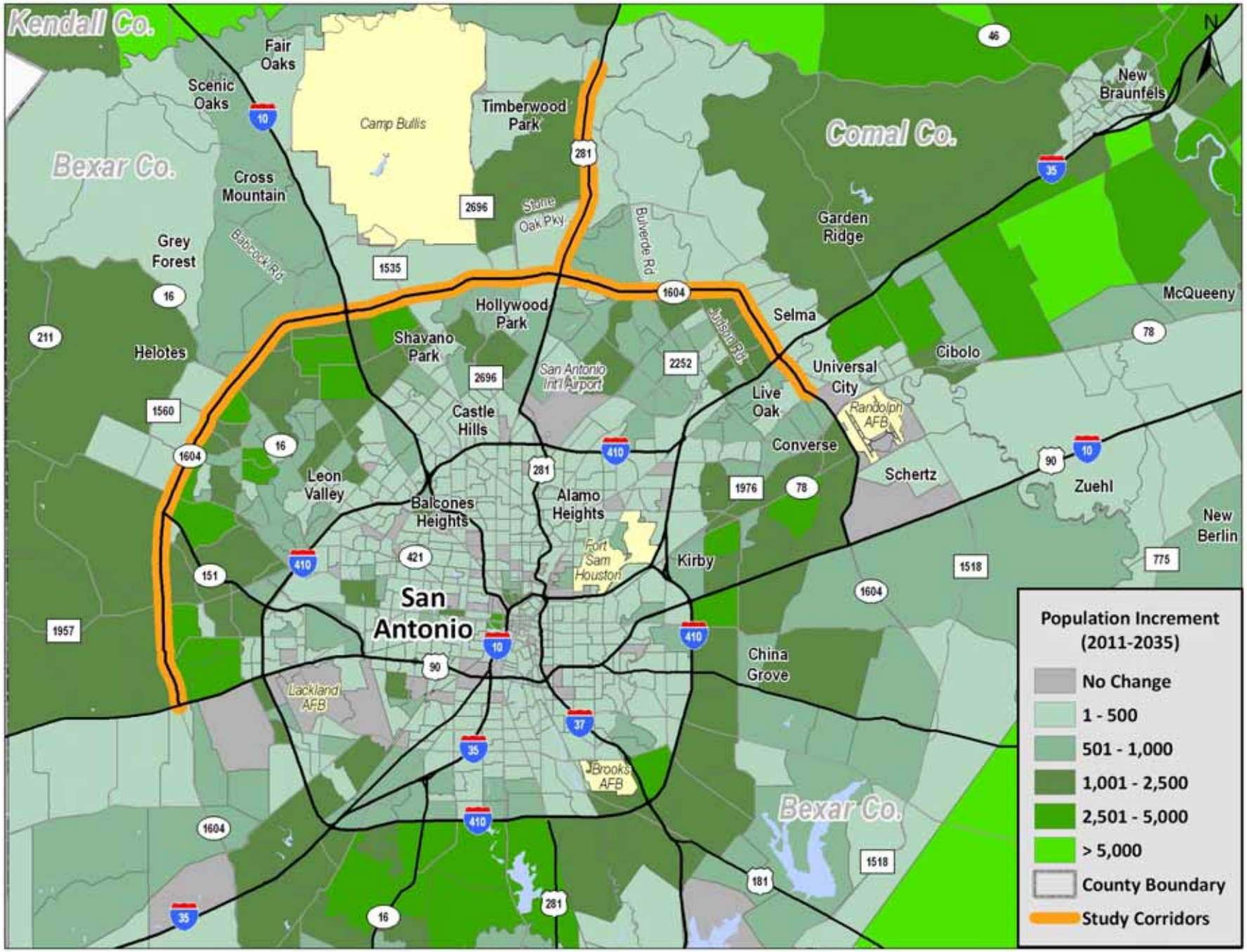
-500 - -100
-100 - 100
100 - 500
> 500
Study Corridors
County Boundary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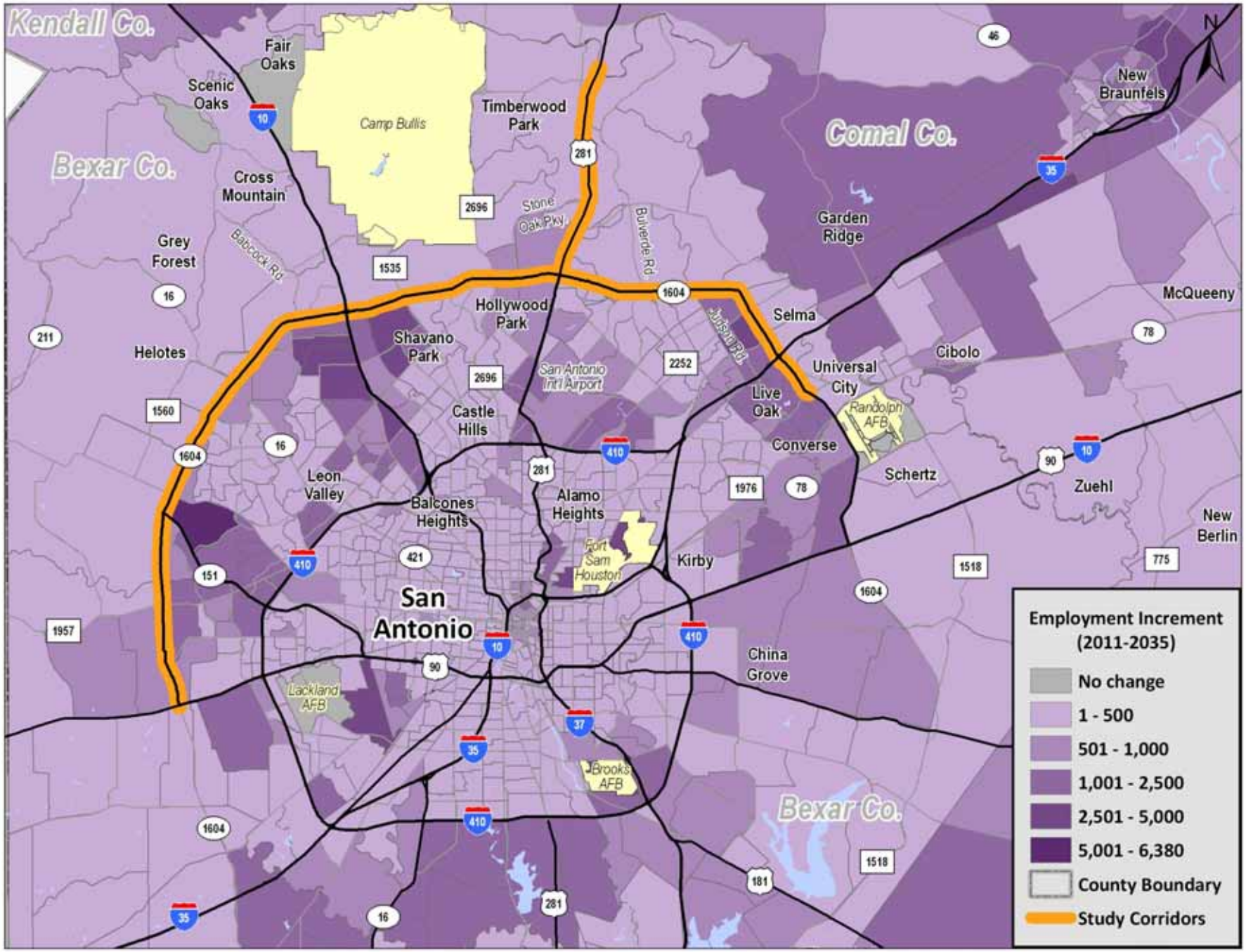
Bexar Co.
N
Population Increment (2011-2035)
No Change
1 - 500
501 - 1,000
1,001 - 2,500
2,501 - 5,000
> 5,000
County Boundary
Study Corridors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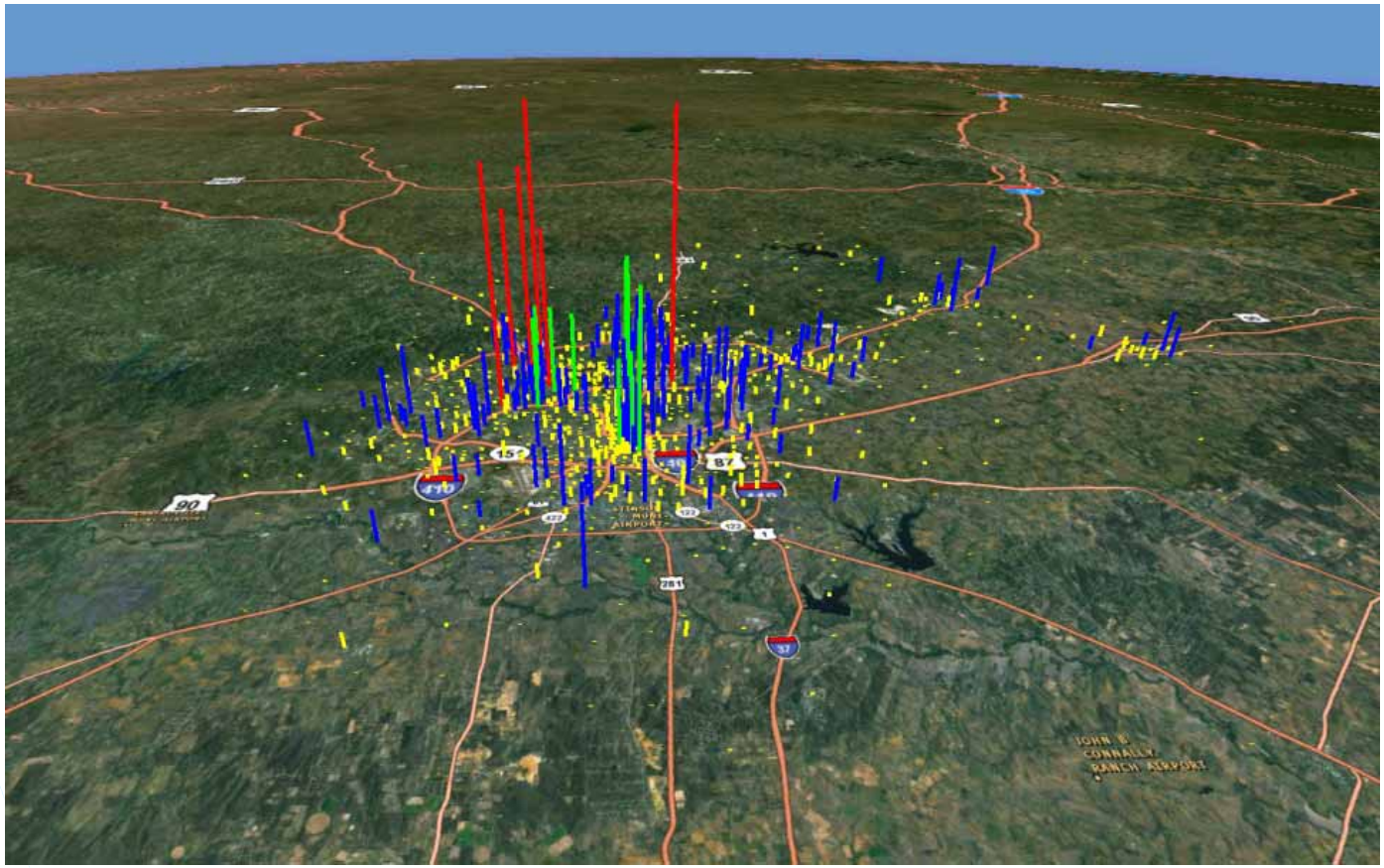
Bexar Co.
N
Employment Increment (2011-2035)
No change
1 - 500
501 - 1,000
1,001 - 2,500
2,501 - 5,000
5,001 - 6,380
County Boundary
Study Corridors

Population Data

- **3D Map of Employment for Study Area**



Develop base year and future year estimates

- Gives us population
- Employment data compared and anomalies identified
- Further analysis completed on areas where employment differs by more than 20%
- Employment data compared to population and demographic data.

Model inputs

- **Demographic results included;**
  - **Table with all employment information**
  - **SIC Code Analyzed to breakdown service, employment, retail and analyzed against MPO**
  - **Population and employment by age, household income**

All of this Demographic data feeds in developing Trip Tables

Model runs

Baseline vs. Risk profile

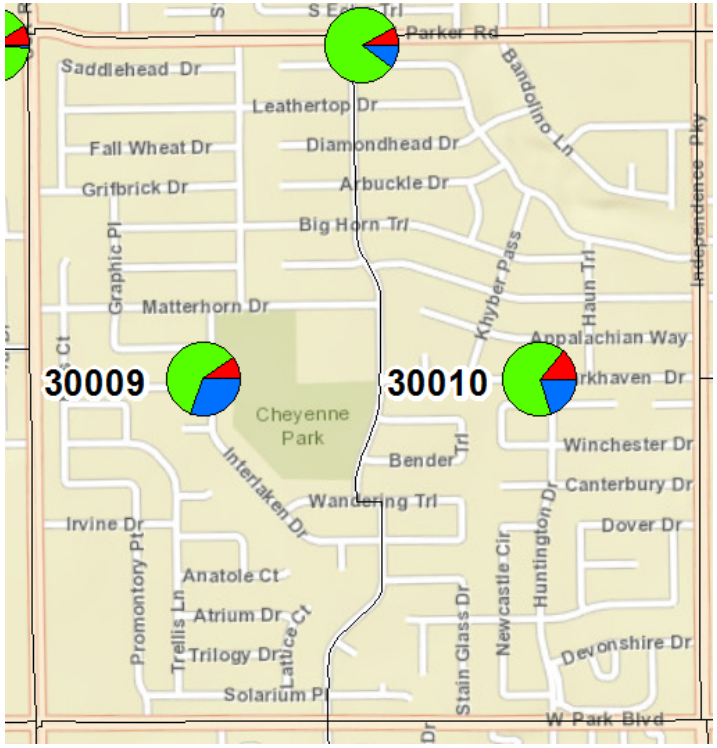
- **GIS used for:**
  - **Proximity to transit**
  - **Proximity to school**
  - **Proximity to special generators such as stadium, universities, airports, hospitals**
  - **TAZ build out**
  - **Summed up to the county level**

GIS Played Essential Role in this Project

- **Able to visualize employment information.**
- **Able to analyze data from many different sources.**
- **Identify discrepancies between datasets**

Other Uses

- **Build Out Analysis**
- **Hydraulic Modeling Support**
- **Municipal Applications**
  - **Redistricting**
  - **Schools, Wards, Precinct boundaries**
  - **Service Areas**



Questions and Contact

Contact: **Yagnesh Jarmarwala – jarmarwalaym@cdmsmith.com**

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