

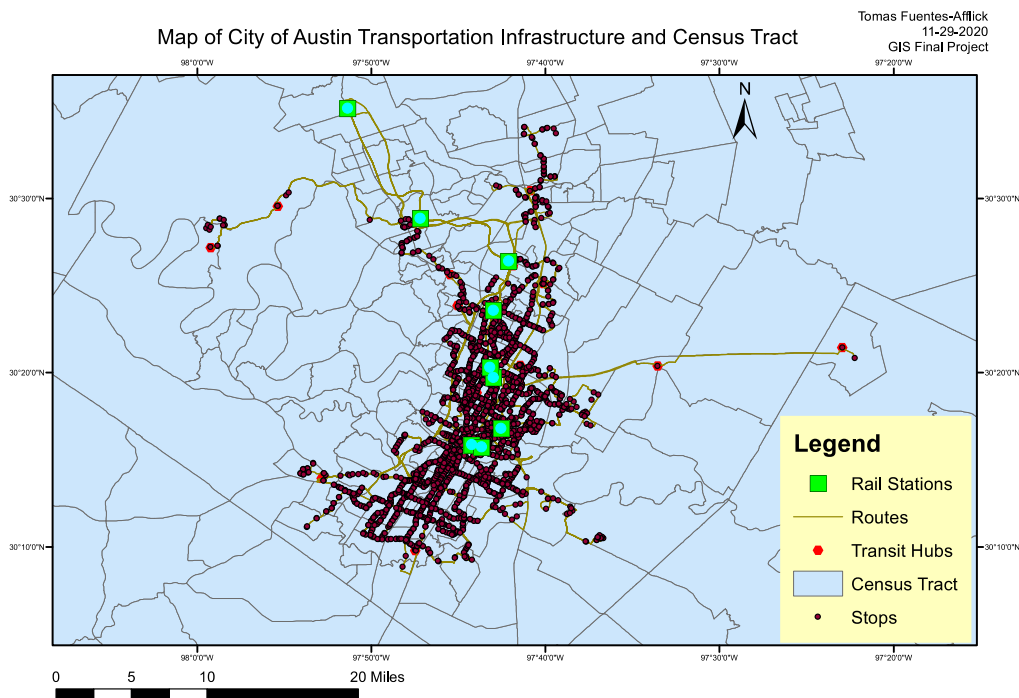
GIS Semester Final Project

Problem:

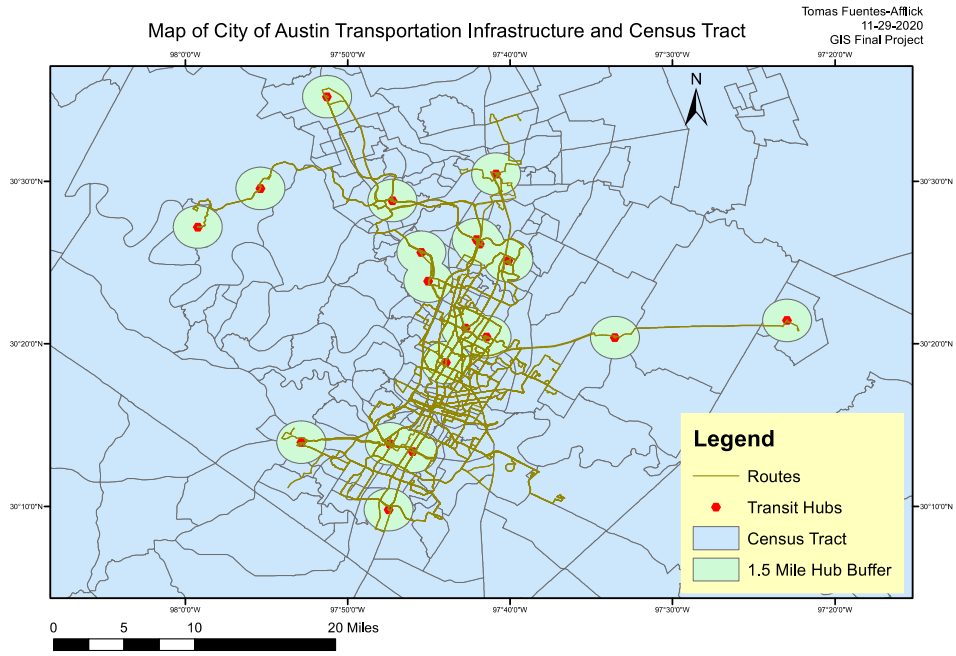
The city of Austin has a relatively vast public transportation infrastructure that serves many parts of the city. Additionally, the city has planned \$7.1 Billion Project Connect, which will run from North to South Austin, serve the airport and extend to Colony Park in East Austin. However, with this increased investment in public transportation infrastructure comes questions regarding who is and is not served. The planned line that connects North and South Austin will be in West Austin, which tends to be whiter and more affluent, while East Austin tends to have more minorities and be less affluent. I will be analyzing current public transportation routes and stops to see which demographic groups have the most and least access to this public transportation infrastructure.

Data:

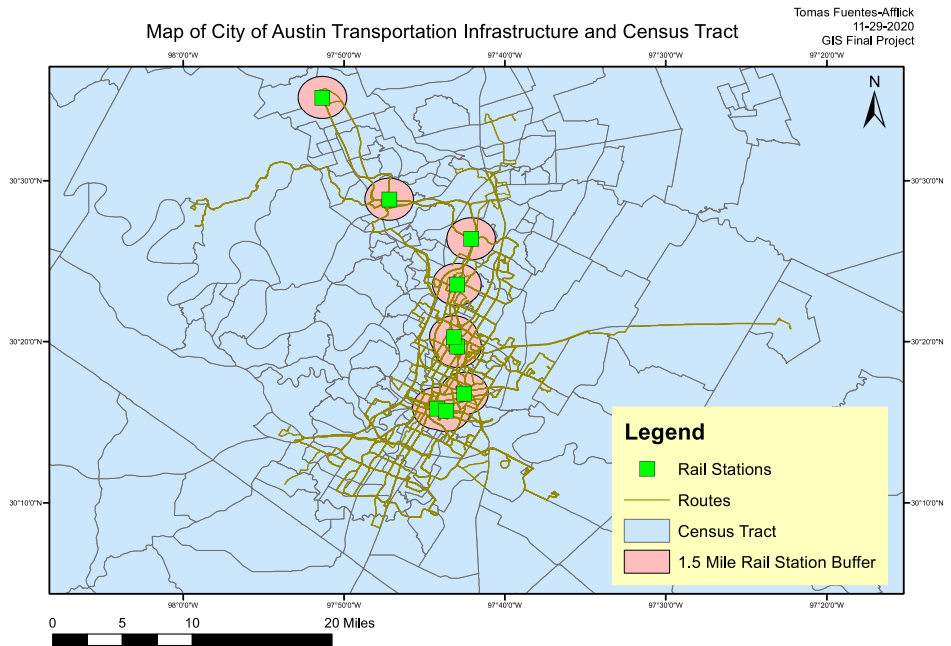
The two sources of data to address this problem are a map of Austin's CapMetro's bus stops and routes and census data with different demographic breakdowns. I found a shapefile on data.austin.gov that outlines all stops, routes, service areas and transit hubs for CapMetro's system in the city of Austin.



Map 1



Map 2



Map 3

Process:

1. Upload Routes.shp, Service_Area.shp, Stops.shp and Transit_Hubs.shp (i.e. all shapefiles in June 2020 folder) from <https://data.texas.gov/dataset/CapMetro-Shapefiles-June-2020/p3km-d4px>.
2. In the Stops.shp, go to the Attribute table and select all stops that are classified as Rail Station under STOP_TYPE.

FID	Shape *	STOP_ID	BENCHES	SHELTERS	BIKERACKS	TRASHCANS	STOP_NAME	STOP_ABBR	STREET_NMB	ON STREET	AT STREET	CITY	ZIP	BAY	STOP_TYPE	PLACEMENT
2296	Point	6388	1	0	0	0	1 2751 Foster/Rockwood	6388	002751	Foster	Rockwood	Austin	78757	None	Bus Stop	Mid-Block
2297	Point	6390	0	0	0	0	0 6188 Convict Hi/Escarpment	6390	006188	Convict Hill	Escarpment	Austin	78749	None	Bus Stop	Farside
2298	Point	6391	0	0	0	0	0 6317 Convict Hi/Escarpment	6391	006317	Convict Hill	Escarpment	Austin	78749	None	Bus Stop	Farside
2299	Point	6392	0	0	0	0	0 6959 Convict Hi/290	6392	006959	Convict Hill	290	Austin	78749	None	Bus Stop	Mid-Block
2300	Point	6393	0	0	0	0	0 6954 Convict Hi/290	6393	006954	Convict Hill	290	Austin	78749	None	Bus Stop	Mid-Block
2301	Point	6394	1	0	0	0	0 609 Colorado/7th	6394	000609	Colorado	7th	Austin	78701	None	Bus Stop	Nearside
2302	Point	6395	0	0	0	0	0 5169 290 Hwy/Boston	6395	005169	290 Hwy	Boston	Austin	78735	None	Bus Stop	Nearside
2303	Point	6396	0	0	0	0	0 5638 290 Hwy/Westcreek	6396	005638	290 Hwy	Westcreek	Austin	78735	None	Bus Stop	Farside
2304	Point	6404	0	0	0	0	0 27 Waller/Flores	6404	000027	Waller	Flores	Austin	78702	None	Bus Stop	Mid-Block
2306	Point	6407	1	0	0	0	1 603 Slaughter/1St	6407	000603	Slaughter	1St	Austin	78748	None	Bus Stop	Farside
2307	Point	6408	1	1	0	0	1 5843 Balcones/Northland	6408	005843	Balcones	Northland	Austin	78731	None	Bus Stop	Mid-Block
2308	Point	6409	0	0	0	0	1 1509 Barbara Jordan/Mueller	6409	001509	Barbara Jordan	Mueller	Austin	78723	None	Bus Stop	Farside
2309	Point	6412	1	0	0	0	1 530 Shady/5th	6412	000530	Shady	5th	Austin	78702	None	Bus Stop	Nearside
2310	Point	6413	1	1	0	0	1 5104 Shady/5th	6413	000509	5th	Shady	Austin	78702	None	Bus Stop	Nearside
2311	Point	6414	0	0	0	0	0 189 Springdale/Cesar Chavez	6414	000189	Springdale	Cesar Chavez	Austin	78702	None	Bus Stop	Farside
2316	Point	6427	1	0	0	0	1 10099 Burnet/Mc Hale	6427	010099	Burnet	Mc Hale	Austin	78758	None	Bus Stop	Nearside
2317	Point	6428	0	0	0	0	0 2007 Pleasant Valley/Riverside	6428	002007	Pleasant Valley	Riverside	Austin	78741	None	Bus Stop	Farside
2318	Point	6431	1	1	0	0	1 6822 Cameron/Camino La Costa	6431	006822	Cameron	Camino La Costa	Austin	78752	None	Bus Stop	Farside
2319	Point	6432	0	0	0	0	0 State Campsite	PATBAS13	000636	Patton	Bastrop Hwy	Austin	78741	None	Bus Stop	Mid-Block
2320	Point	6433	0	0	0	0	0 1031 Braker/Bluff Bend	6433	001031	Braker	Bluff Bend	Austin	78753	None	Bus Stop	Farside
2321	Point	6434	1	0	0	0	1 6749 Metropolis/Smith School	6434	006749	Metropolis	Smith School	Austin	78744	None	Bus Stop	Mid-Block
1800	Point	5534	4	3	0	0	4 Downtown Station	RAIL001	000400	4th	Red River	Austin	78701	None	Rail Station	Mid-Block
1801	Point	5535	1	0	1	0	4 Plaza Sattilo Station	RAIL002	000000	5th	Comal	AUSTRN	78702	None	Rail Station	Mid-Block
1802	Point	5536	0	0	0	0	0 M L King Jr Station	RAIL003	000000	Martin Luther King	Clifford	AUSTRN	78702	None	Rail Station	Mid-Block
1803	Point	5537	5	2	4	0	2 Highland Station	RAIL004	000000	Airport	Denson	AUSTRN	78752	None	Rail Station	Mid-Block
1804	Point	5538	0	0	0	0	0 Crestview Station	RAIL005	000000	Airport	Justin	AUSTRN	78757	None	Rail Station	Mid-Block
1805	Point	5539	0	4	20	0	0 Kramer Station	RAIL006	000000	Burnet	Kramer	AUSTRN	78756	None	Rail Station	Mid-Block
1806	Point	5540	0	0	0	0	0 Howard Station	RAIL007	000000	Howard	Mopac	Austin	78727	None	Rail Station	Mid-Block
1807	Point	5541	0	0	0	0	0 Lakeview Station	RAIL008	000000	Lyndhurst	Lakeline	AUSTRN	78717	None	Rail Station	Mid-Block
1808	Point	5542	0	0	0	0	0 Leander Station	RAIL009	000000	US 183	Metro	LEAND	78641	None	Rail Station	Mid-Block
12	Point	484	3	0	1	0	2 TRIANGLE STATION (SB)	S1805	004600	Guadalupe	Lamar	Austin	78751	None	Rapid Station	Mid-Block
19	Point	497	2	0	0	0	2 UT WEST MALL STATION (SB)	S19	002246	Guadalupe	23Rd	Austin	78705	None	Rapid Station	Mid-Block
41	Point	559	1	0	1	0	1 LITTLE TEXAS STATION (NB)	S330	005901	Congress	Little Texas	Austin	78745	None	Rapid Station	Nearside
50	Point	591	4	0	1	0	1 CAPITOL STATION (NB)	S1944	001200	Lavaca	13Th	Austin	78701	None	Rapid Station	Nearside
56	Point	606	1	0	1	0	1 HYDE PARK STATION (NB)	S35	003901	Guadalupe	39Th	Austin	78751	None	Rapid Station	Farside
60	Point	610	1	0	1	0	1 TRIANGLE STATION (NB)	S41	004701	Guadalupe	46Th	Austin	78751	None	Rapid Station	Mid-Block
62	Point	684	2	0	0	0	1 North Loop Station (SB)	S944	005242	Burnet	North Loop	Austin	78756	None	Rapid Station	Farside
134	Point	777	2	0	1	0	1 LAMAR SQUARE STATION (NB)	S2356	001303	Lamar	Lamar Square	Austin	78704	None	Rapid Station	Nearside
135	Point	781	1	0	1	0	2 BARTON SPRINGS STATION (NB)	S216	000401	Lamar	Butler	Austin	78704	None	Rapid Station	Nearside
144	Point	817	1	0	1	0	1 NORTH LOOP STATION (NB)	S2013	005229	Burnet	North	Austin	78756	None	Rapid Station	Mid-Block

Figure 1

3. Export a new feature class from the Stops.shp shapefile with only the Rail Stations.
4. Under Analysis Tools → Proximity → Buffer, create a 1.5-mile buffer around all rail stations, dissolving by “List.”

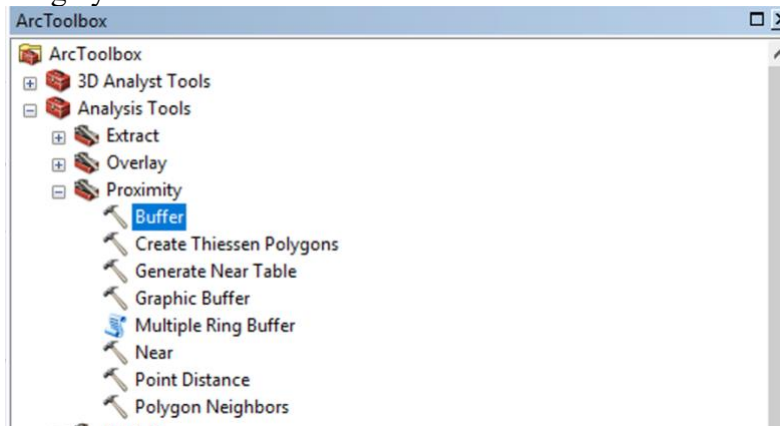


Figure 2

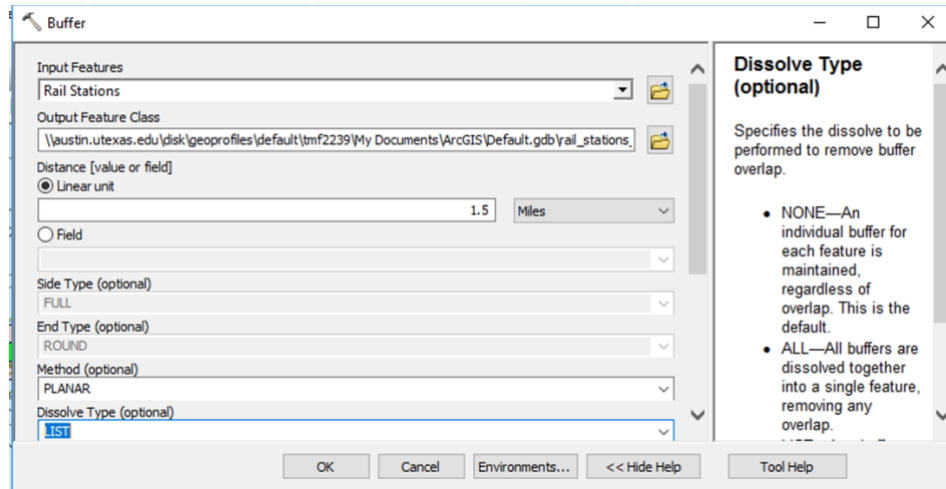


Figure 3

5. Under Analysis Tools → Proximity → Buffer, create a 1.5-mile buffer around all Transit Hubs, dissolving by “List.”
6. Download the Travis County boundary shapefile from https://tnr-traviscountytexas.opendata.arcgis.com/datasets/574bb42ff98547c0a3d241bb15a858a7_0 and add the shapefile to the table of contents.

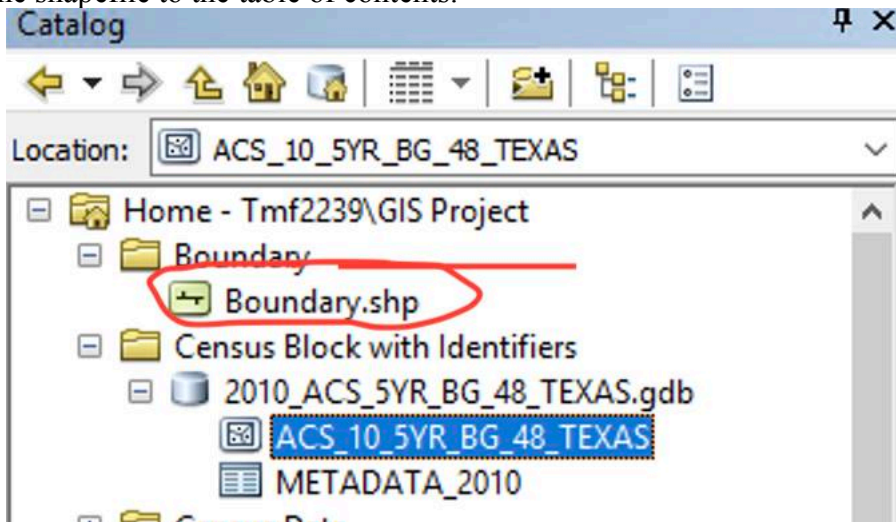


Figure 4

7. Convert the Travis County boundary shapefile line into a polygon.

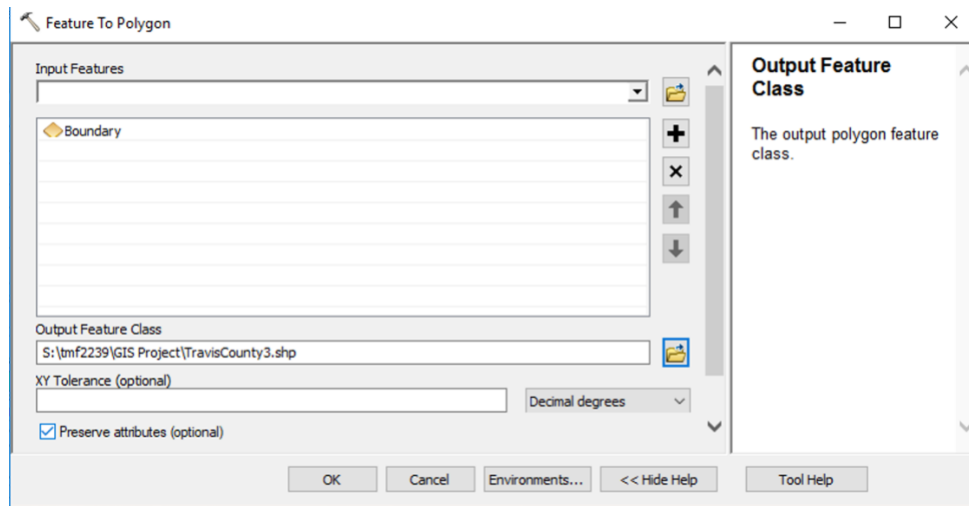


Figure 5

8. Download Census Block data for the state of Texas from <https://www.census.gov/geographies/mapping-files/time-series/geo/tiger-data.2010.html> and add the census block data to the table of contents.

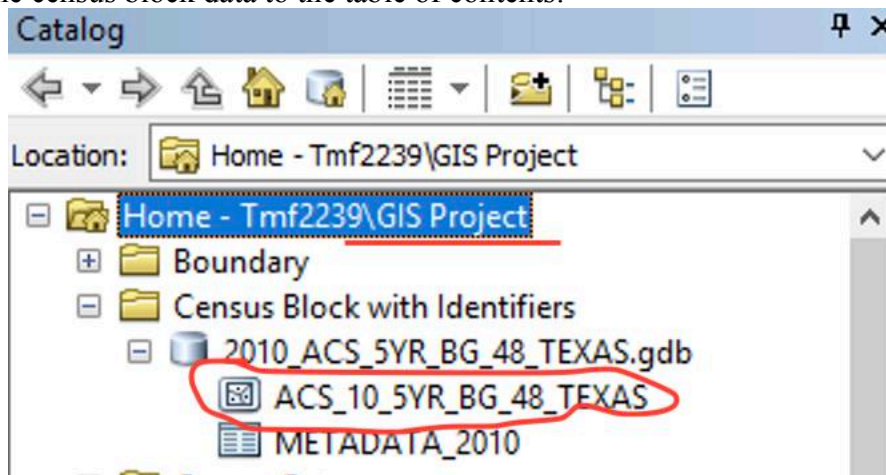
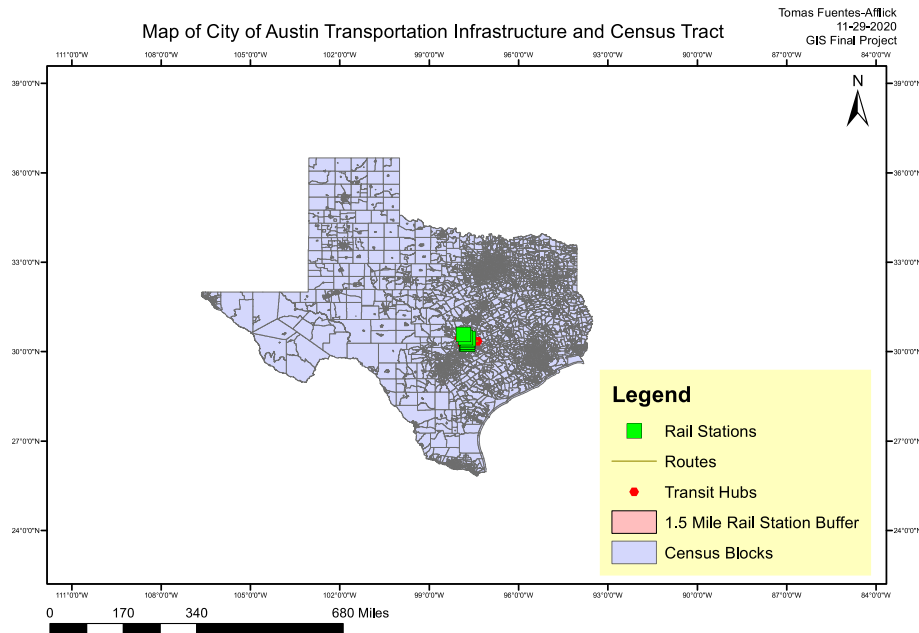


Figure 6



Map 4

9. Within the Census Block data, using the Delete Field (Data Management) Tool, delete all of the columns beginning with B and C except the following: B00001e1, B01001e2, B01001e26, B02001e2, B02001e3, B02001e4, B02001e5, B02001e6, B02001e7, B02001e8, B03001e1, B03001e3, B19001e1, B19001e2, B19001e3, B19001e4, B19001e5, B19001e6, B19001e7, B19001e8, B19001e9, B19001e10, B19001e11, B19001e12, B19001e13, B19001e14, B19001e15, B19001e16, B19001e17.

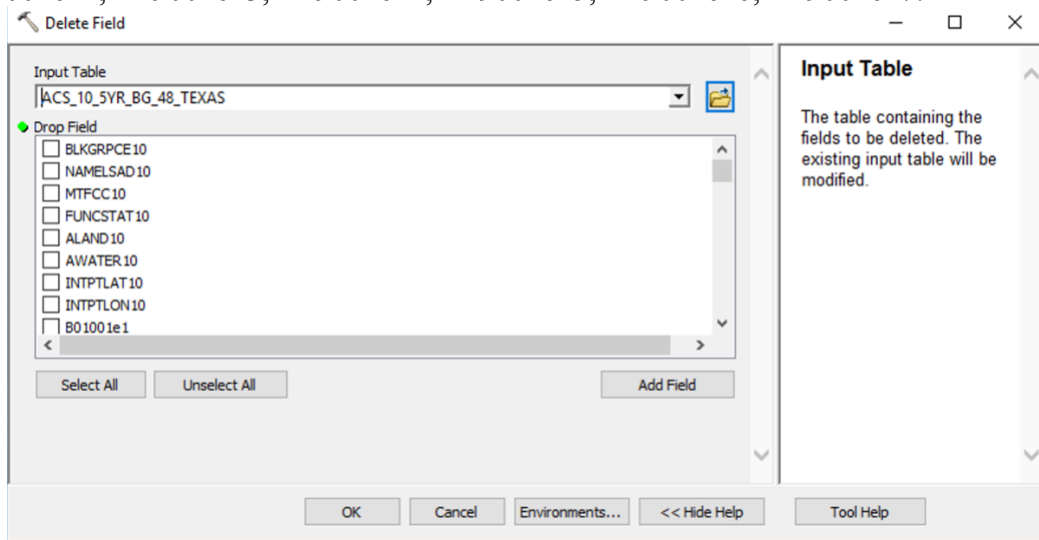


Figure 7

10. Clip the Census Block data to the Travis County polygon

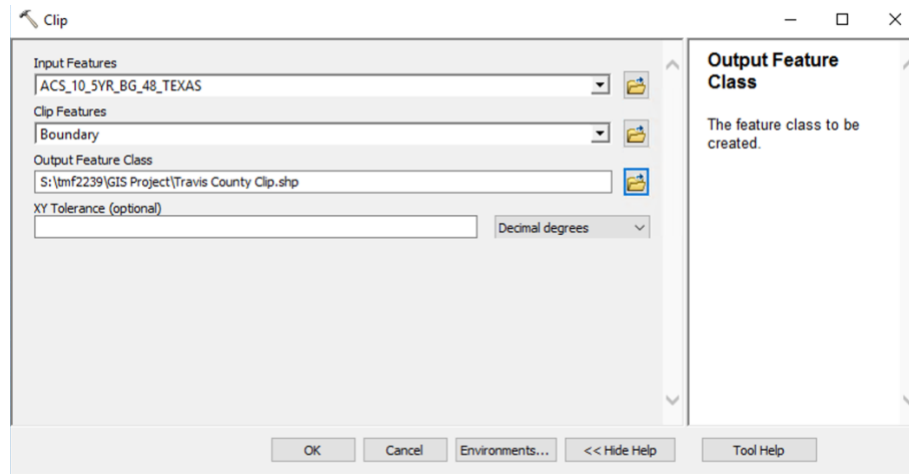
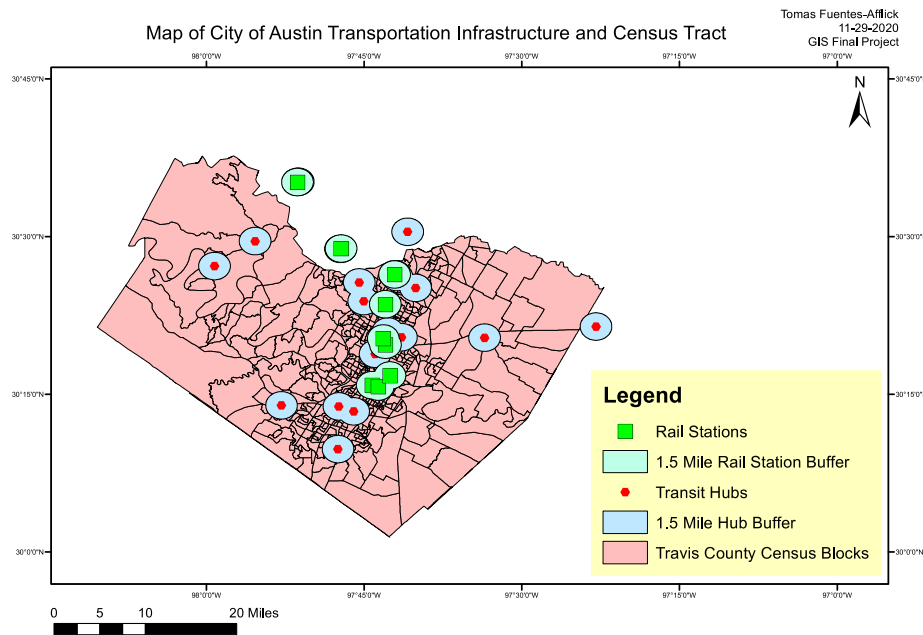
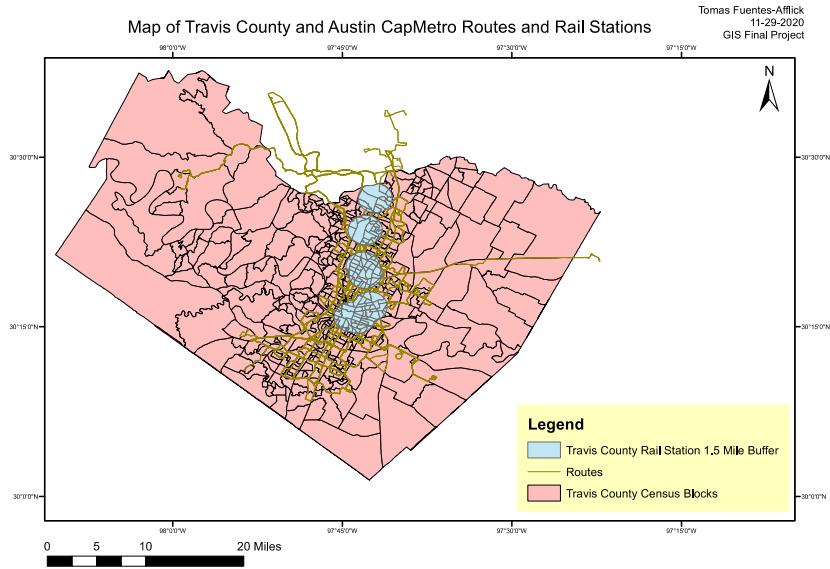


Figure 8

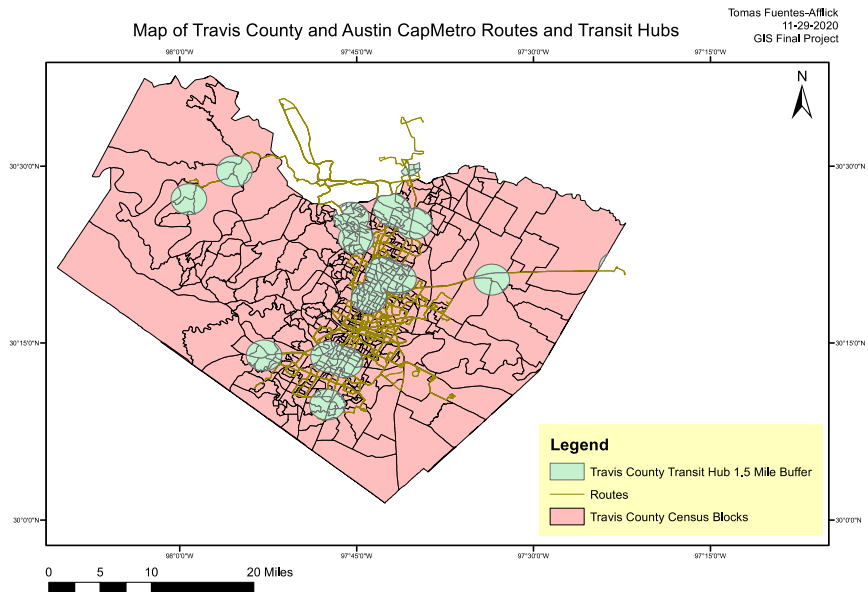


Map 5

11. Using the Clip (Analysis) tool, clip the Travis County Census Blocks layer to the 1.5 Mile Rail Station Buffer, and then to the 1.5 Mile Transit Hub Buffer.



Map 6



Map 7

12. Using the Attribute Table, find the total population, and populations for the various groups that were listed in Step 9.

Conclusion:

After analyzing the data, the CapMetro Rail Stations and Transit Hubs serve men and women, as well as various races at a rate that is fairly consistent with their proportions throughout Travis County. In terms of Household Income, CapMetro Rail Stations and Transit Hubs seem to serve households with incomes lower than \$45,000 at a rate higher than their given proportions in Travis County.

I would have liked to have done an analysis on the future infrastructure that is planned for CapMetro that includes more trains and a route to the airport, but I could not find data that showed those routes. Additionally, I would have like to have done various iterations of the buffers around the transit hubs and rail stations, of 0.5 miles, 1 mile, 1.5 miles and 2 miles, to see if there were any noticeable differences.

Travis County

	Number	Percent	Rail Station Buffers	Percent	Transit Hub Buffers	Percent
Total Population	1,016,234		233,078		481,634	
Male	513,174	50.5%	122,203	52.4%	243,900	50.6%
Female	503,060	49.5%	110,875	47.6%	237,734	49.4%
White	689,601	67.9%	151,331	64.9%	328,122	68.1%
Black/African-American	85,552	8.4%	23,400	10.0%	37,680	7.8%
American Indian and Alaska Native	4,756	0.5%	1,115	0.5%	2,469	0.5%
Asian	58,464	5.8%	12,981	5.6%	31,534	6.5%
Native Hawaiian and Other Pacific Islander	852	0.1%	117	0.1%	430	0.1%
Other Race	153,109	15.1%	39,796	17.1%	70,378	14.6%
Two or More Race	23,900	2.4%	4,338	1.9%	11,011	2.3%

	Number	Percent	Rail Station Buffers	Percent	Transit Hub Buffers	Percent
Total Households	403,062		99,287		200,158	
HH Income <\$10,000	29,370	7.3%	10,460	10.5%	14,865	7.4%
\$14,999	17,928	4.4%	6,285	6.3%	10,075	5.0%
\$19,999	17,947	4.5%	5,918	6.0%	9,994	5.0%
\$24,999	20,084	5.0%	6,120	6.2%	11,017	5.5%
\$29,999	21,010	5.2%	5,750	5.8%	11,955	6.0%
\$34,999	21,205	5.3%	5,891	5.9%	12,133	6.1%
\$39,999	19,840	4.9%	5,878	5.9%	11,023	5.5%
\$44,999	20,810	5.2%	5,483	5.5%	10,591	5.3%
\$49,999	16,533	4.1%	4,073	4.1%	8,094	4.0%
\$59,999	32,847	8.1%	8,048	8.1%	16,604	8.3%
\$74,999	39,475	9.8%	9,670	9.7%	20,003	10.0%
HH Income \$75K-	46,806	11.6%	10,166	10.2%	23,042	11.5%
HH Income \$100K-						
\$124,999	32,692	8.1%	6,475	6.5%	14,811	7.4%
HH Income \$125K-						
\$149,999	19,948	4.9%	3,239	3.3%	9,019	4.5%
HH Income \$150K-						
\$199,999	21,629	5.4%	3,377	3.4%	8,901	4.4%
HH Income >\$200,000	24,938	6.2%	2,454	2.5%	8,031	4.0%

Identifiers to use

B00001e1 UNWEIGHTED SAMPLE COUNT OF THE POPULATION: Total: Total Population -- (Estimate)

B01001e2 SEX BY AGE: Male: Total Population -- (Estimate)

B01001e26 SEX BY AGE: Female: Total Population -- (Estimate)

B02001e2 RACE: Total: White alone: Total Population -- (Estimate)

B02001e3 RACE: Total: Black or African American alone: Total Population -- (Estimate)

B02001e4 RACE: Total: American Indian and Alaska Native alone: Total Population -- (Estimate)

B02001e5 RACE: Total: Asian alone: Total Population -- (Estimate)

B02001e6 RACE: Total: Native Hawaiian and Other Pacific Islander alone: Total Population -- (Estimate)

B02001e7 RACE: Total: Some other race alone: Total Population -- (Estimate)

B02001e8 RACE: Two or more races: Total Population -- (Estimate)

B03001e1 HISPANIC OR LATINO ORIGIN BY SPECIFIC ORIGIN: Total: Total Population -- (Estimate)

B03001e3 HISPANIC OR LATINO ORIGIN BY SPECIFIC ORIGIN: Hispanic or Latino: Total Population -- (Estimate)

B19001e1 HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: Households -- (Estimate)

B19001e2 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: Less than \$10,000: Households -- (Estimate)"

B19001e3 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$10,000 to \$14,999: Households -- (Estimate)"

B19001e4 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$15,000 to \$19,999: Households -- (Estimate)"

B19001e5 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$20,000 to \$24,999: Households -- (Estimate)"

B19001e6 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$25,000 to \$29,999: Households -- (Estimate)"

B19001e7 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$30,000 to \$34,999: Households -- (Estimate)"

B19001e8 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$35,000 to \$39,999: Households -- (Estimate)"

B19001e9 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$40,000 to \$44,999: Households -- (Estimate)"

B19001e10 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$45,000 to \$49,999: Households -- (Estimate)"

B19001e11 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$50,000 to \$59,999: Households -- (Estimate)"

B19001e12 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$60,000 to \$74,999: Households -- (Estimate)"

B19001e13 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$75,000 to \$99,999: Households -- (Estimate)"

B19001e14 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$100,000 to \$124,999: Households -- (Estimate)"

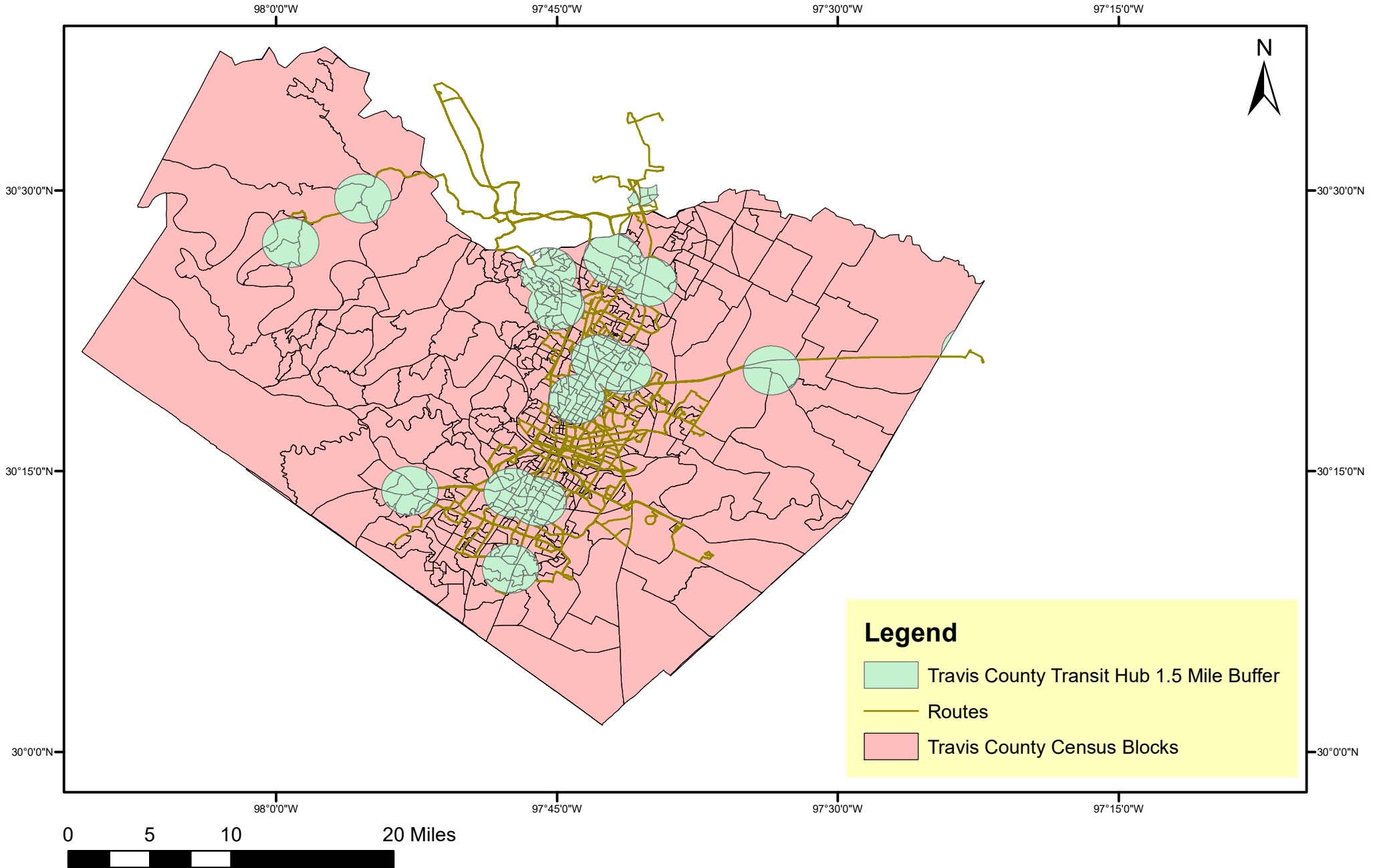
B19001e15 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$125,000 to \$149,999: Households -- (Estimate)"

B19001e16 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-ADJUSTED DOLLARS): Total: \$150,000 to \$199,999: Households -- (Estimate)"

B19001e17 "HOUSEHOLD INCOME IN THE PAST 12 MONTHS (IN 2018 INFLATION-
ADJUSTED DOLLARS): Total: \$200,000 or more: Households -- (Estimate)"

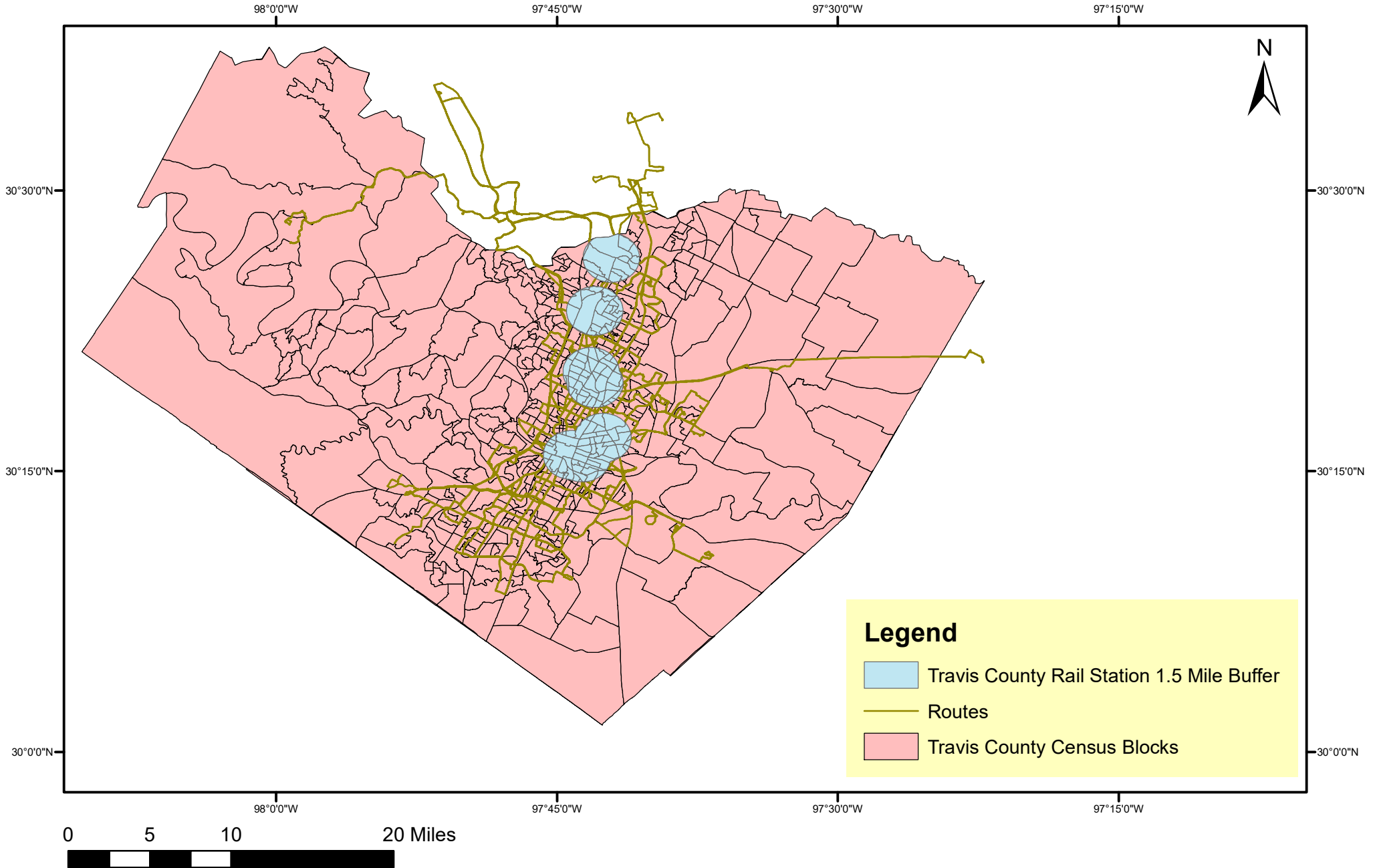
Map of Travis County and Austin CapMetro Routes and Transit Hubs

Tomas Fuentes-Afflick
11-29-2020
GIS Final Project



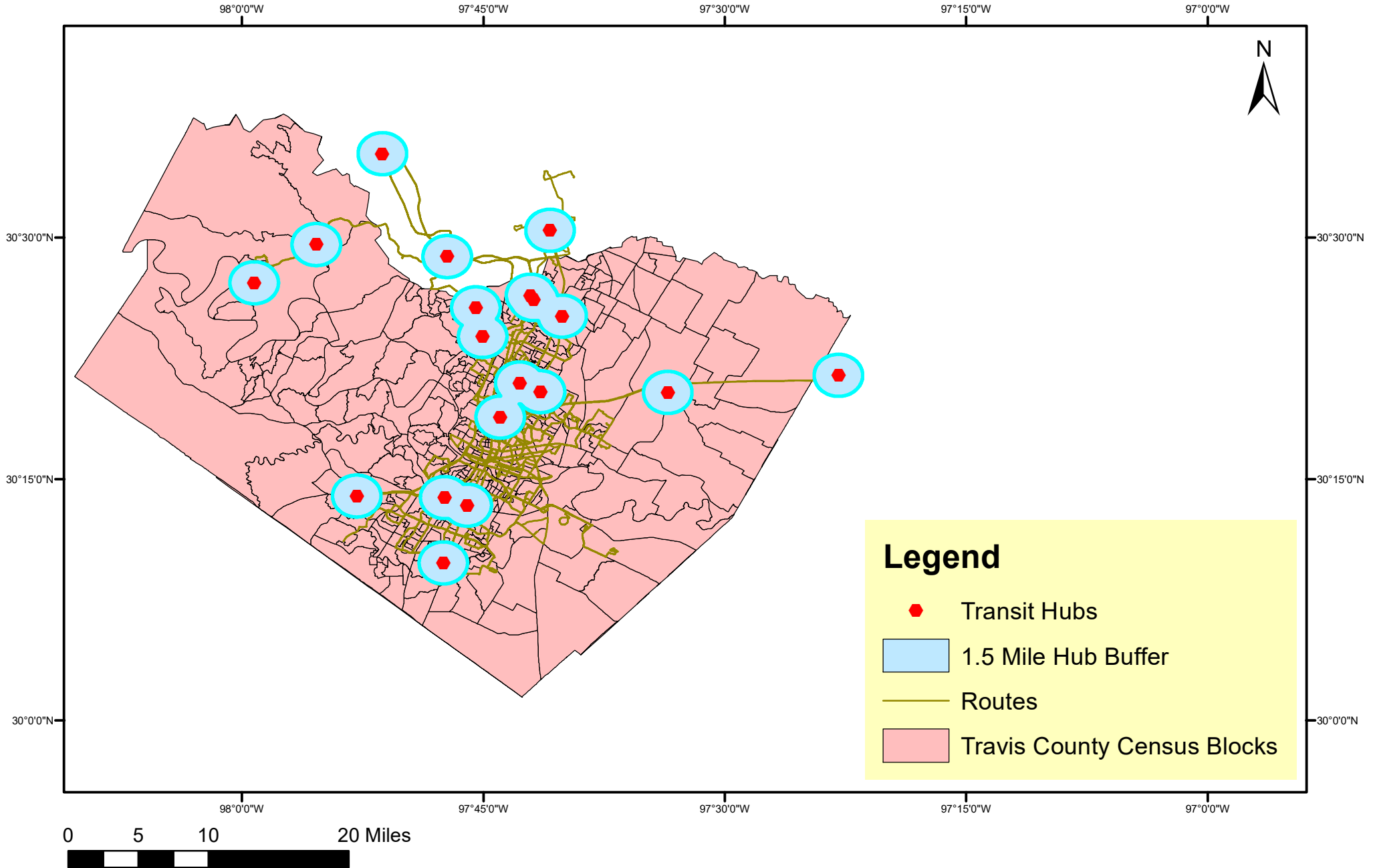
Map of Travis County and Austin CapMetro Routes and Rail Stations

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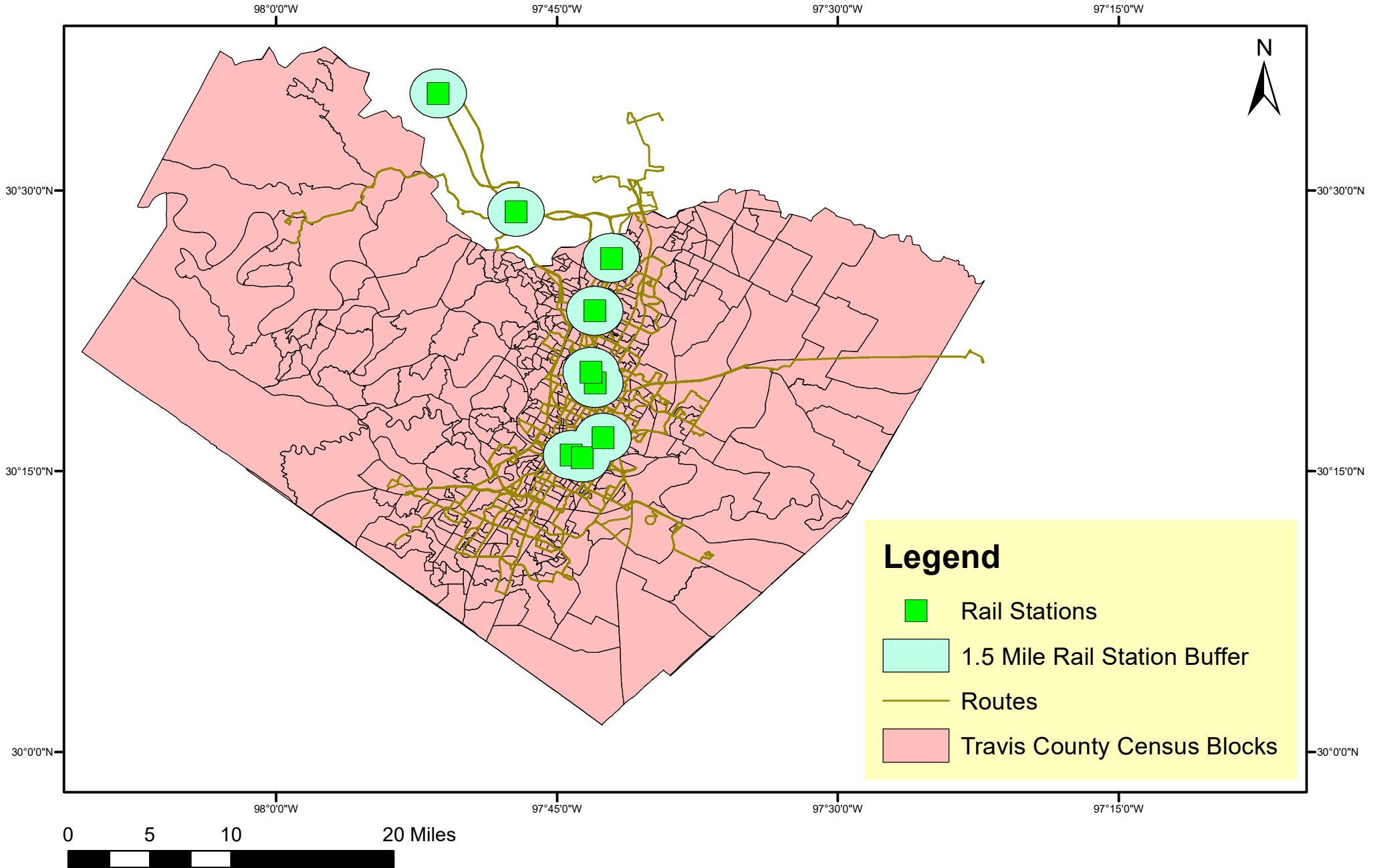
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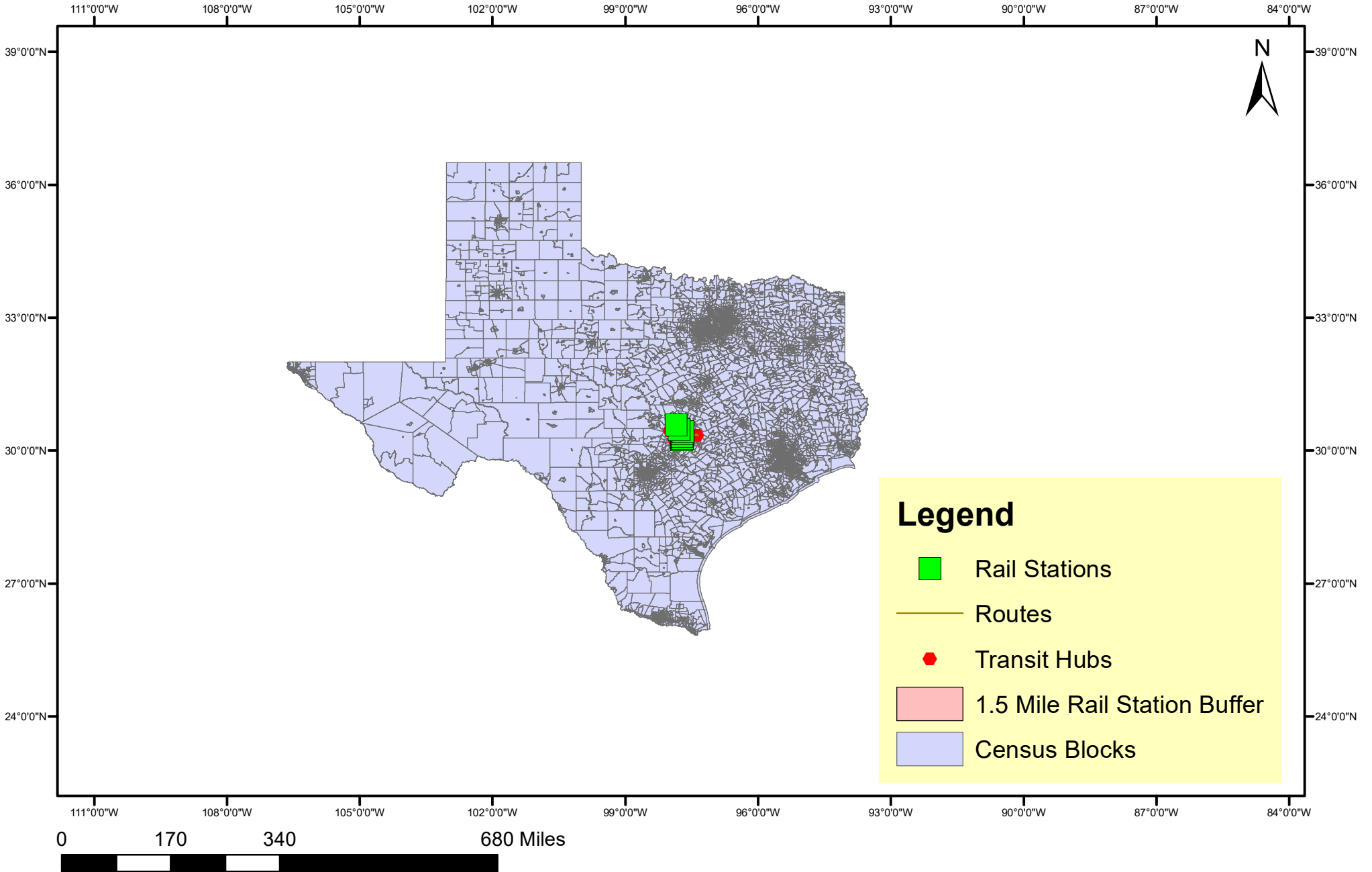
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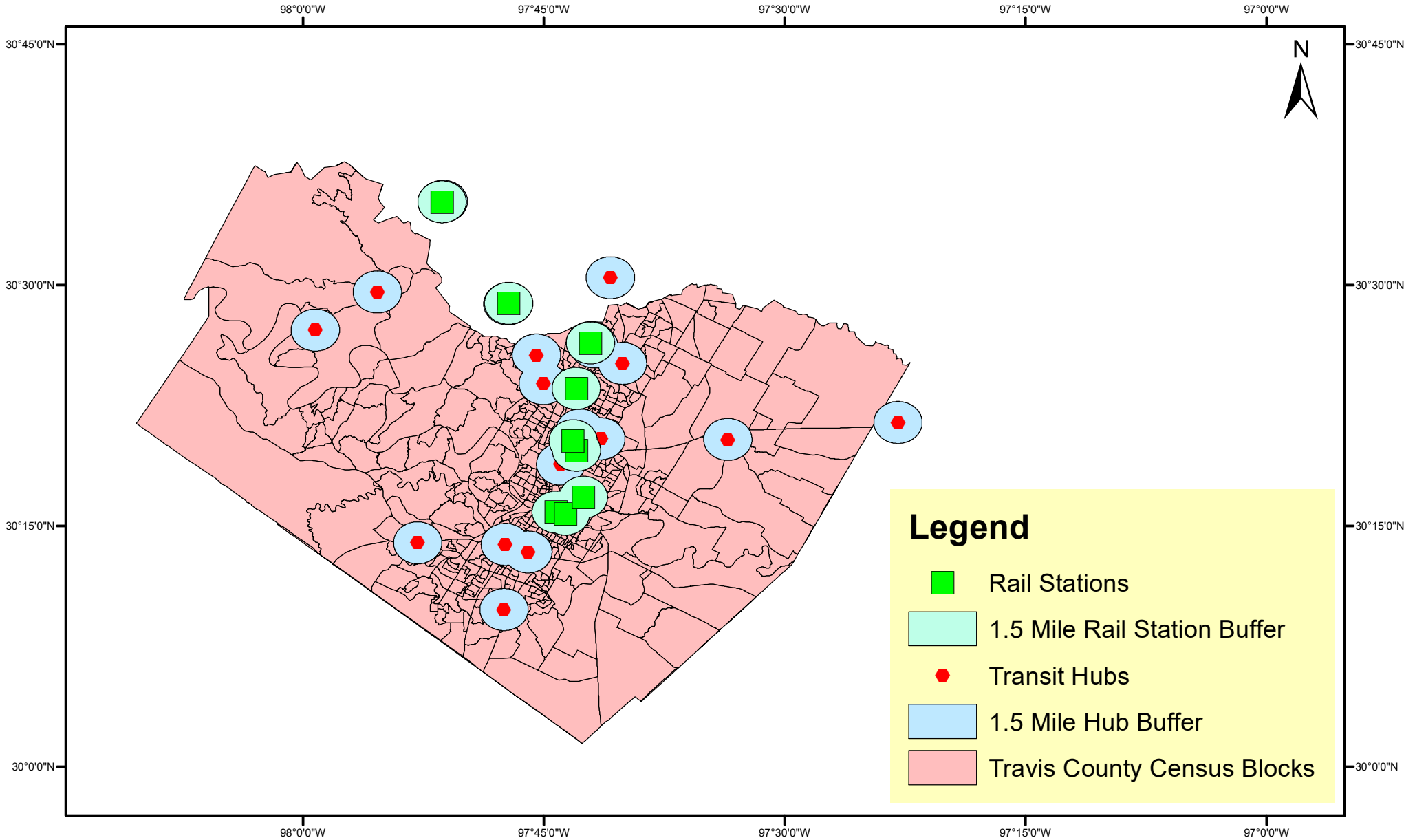
Map of City of Austin Transportation Infrastructure and Census Tract

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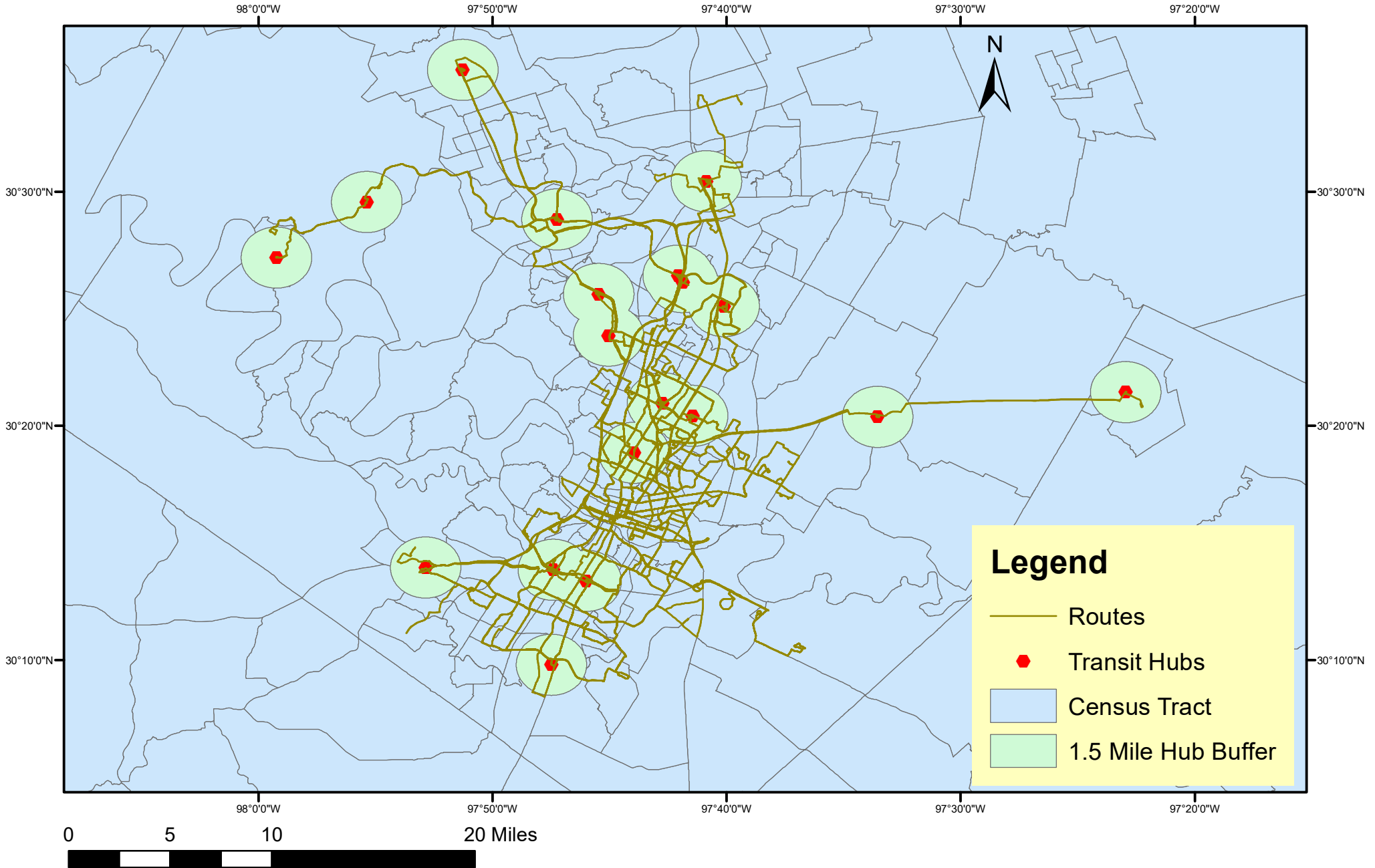
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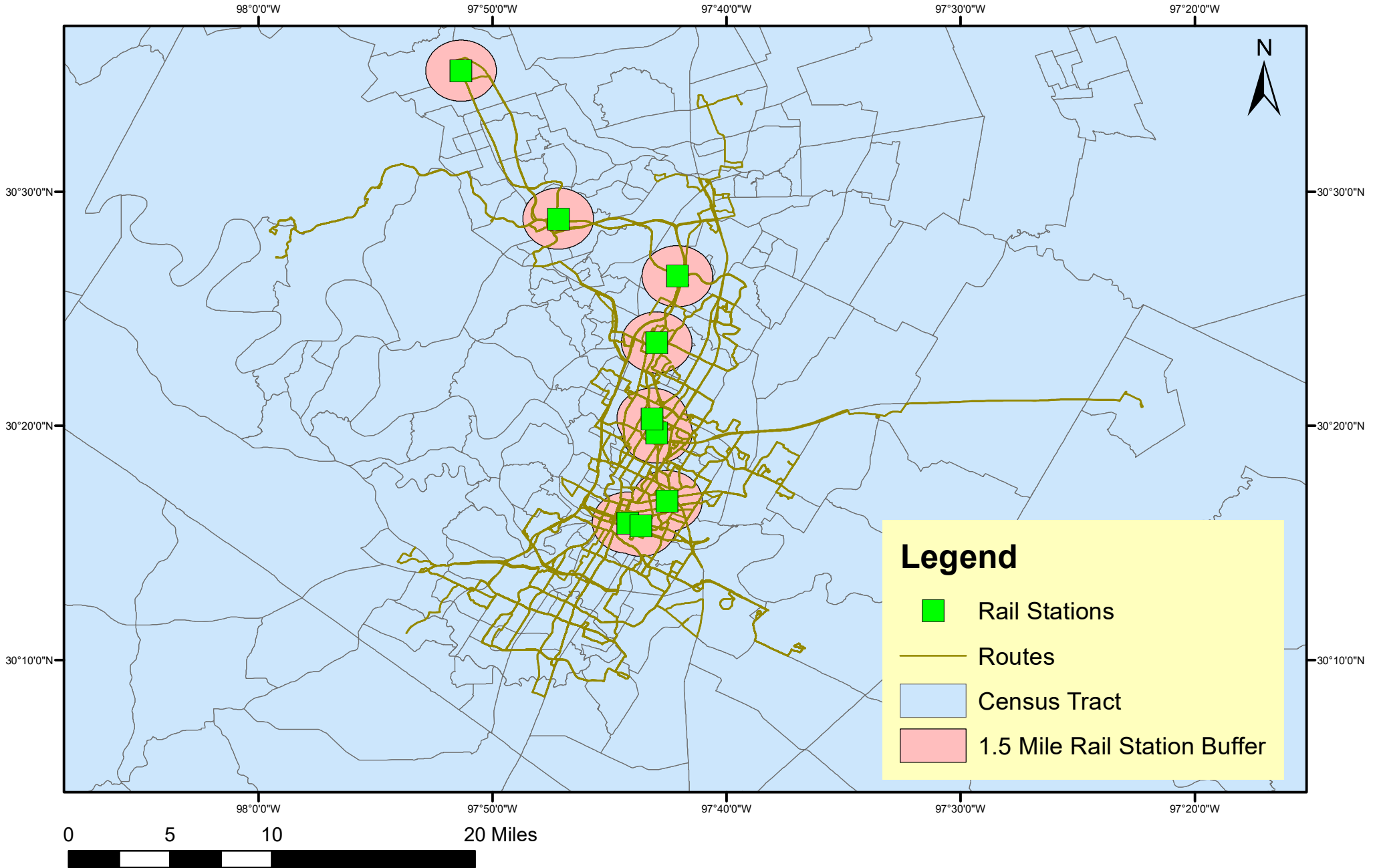
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