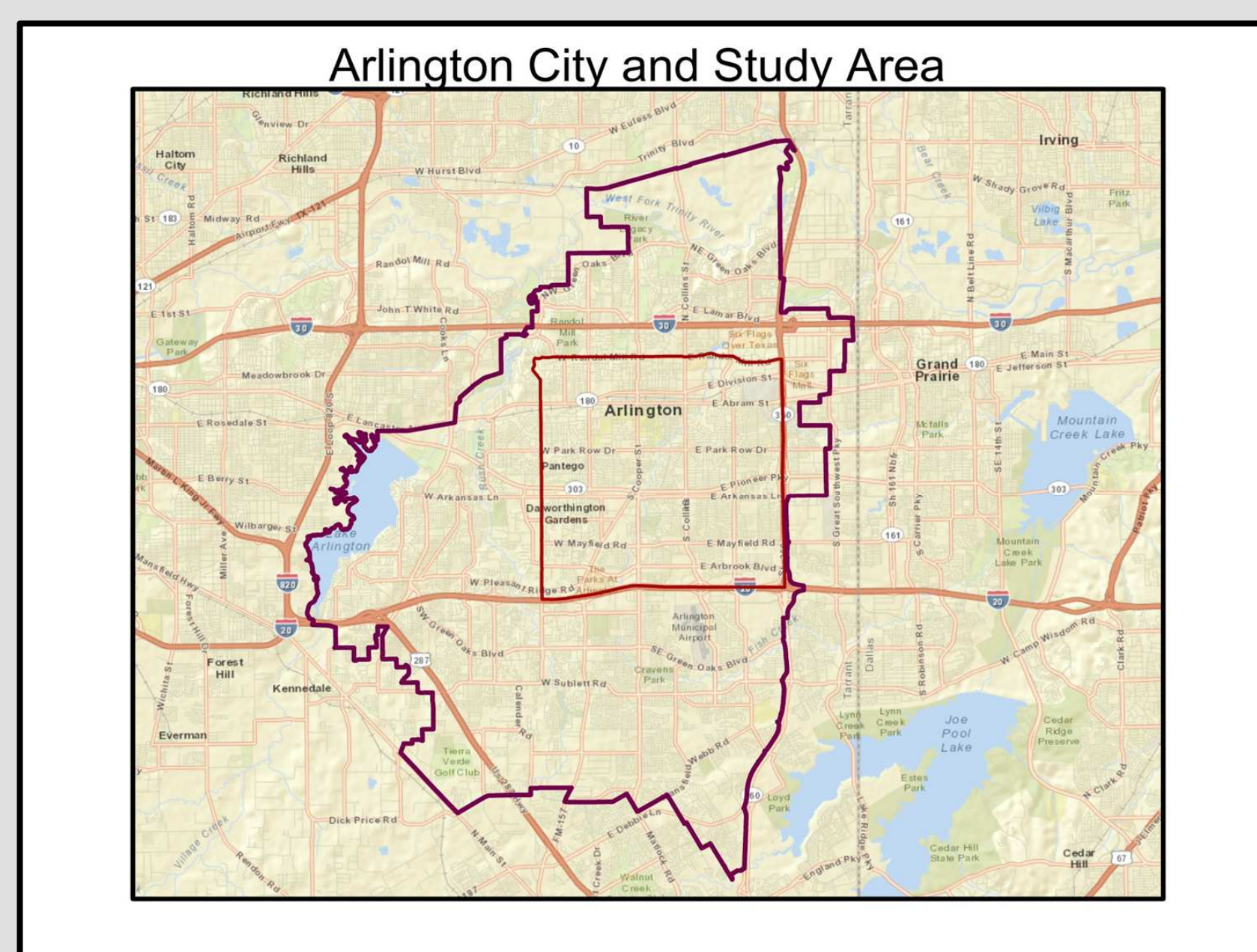


# Design and Demand Estimation of a Bus Transportation System for City of Arlington

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## Problem Statement

- With proper planning and operation, bus transit systems can be a fast, convenient and reliable mean of transportation to/from work, shopping centers,...
- Arlington is the largest city in the US that does not have a public transportation system.
- Bus transit systems provide multiple benefits including reduction in traffic congestion, decreasing air pollution, reducing fuel consumption,...
- City's voters have rejected transit proposals three times, opponents mostly argue that Arlington is a low-density city and a public transit system is not economically feasible.
- Arlington central area encircles several attraction points including University of Texas Arlington, AT&T Stadium, Ballpark Stadium, Parks Mall, GM Plant and ...

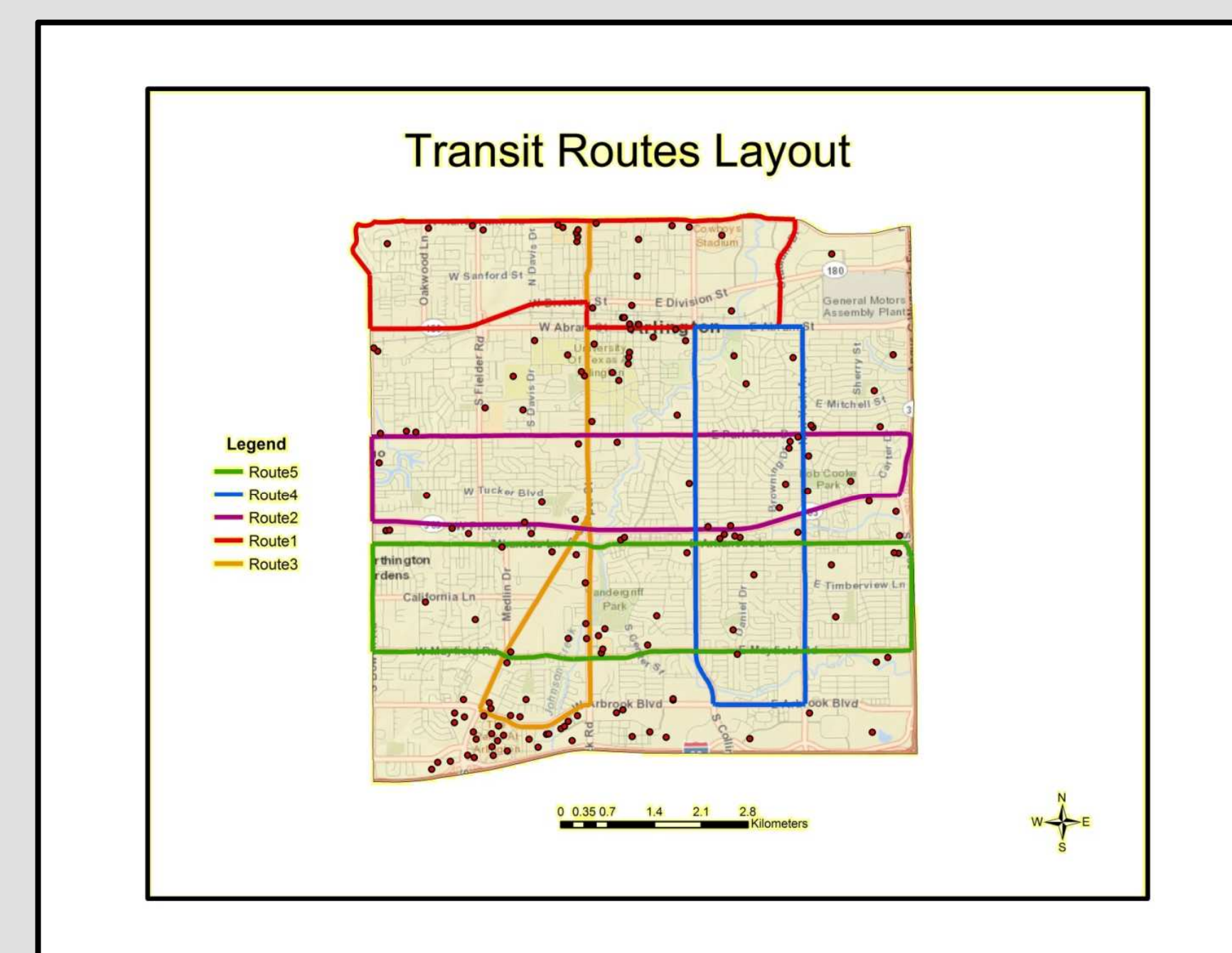


## Research Goal

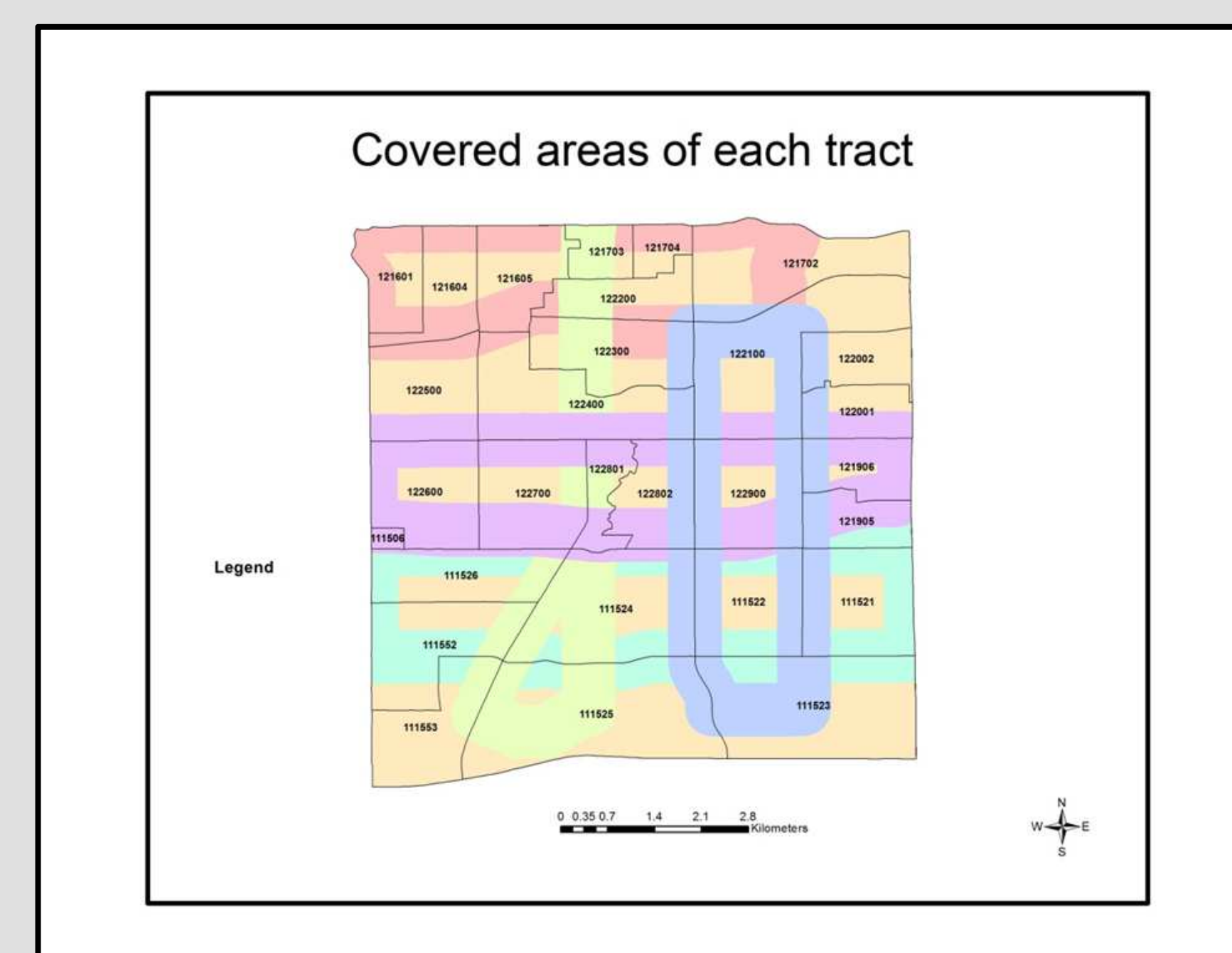
- This research tries to design a bus transit network in central area of Arlington
- This research tries to estimate potential bus ridership in central area of Arlington to find out if the designed bus system is justifiable.

## Methodology

- Five loops bus routes, are designed in the area in a way to have the highest coverage in residential areas and provide access to the major city attractions.

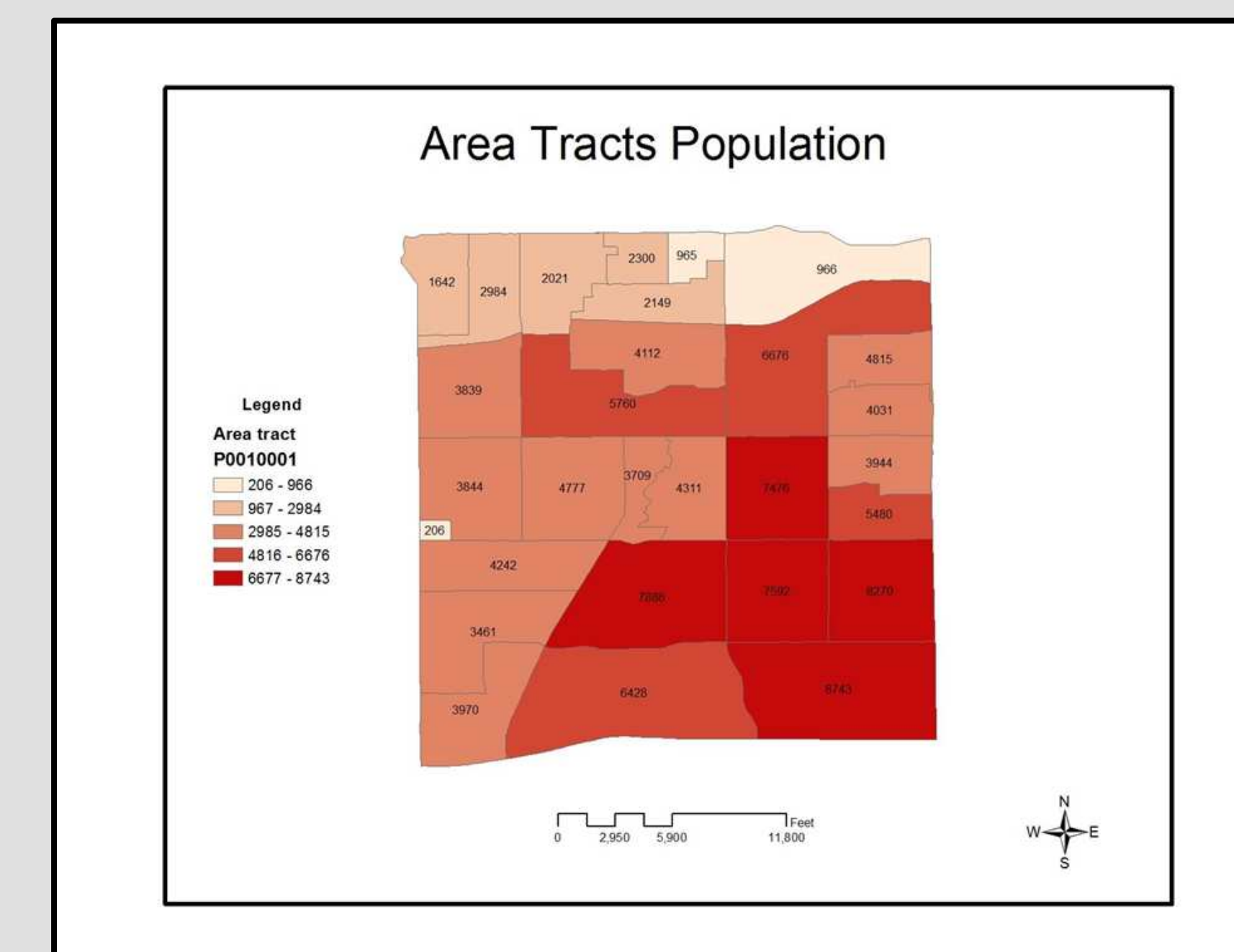


- ArcGIS is used for analysis and modeling of socio-spatial data in tract scale.
- Transit propensity of each tract is modeled comparing the average tract income to city average income.
- The coverage area for the low propensity zones are assumed to be a 1/4 mile, while the walking distance for both low and medium propensity zones are assumed to be 1/8 of a mile.

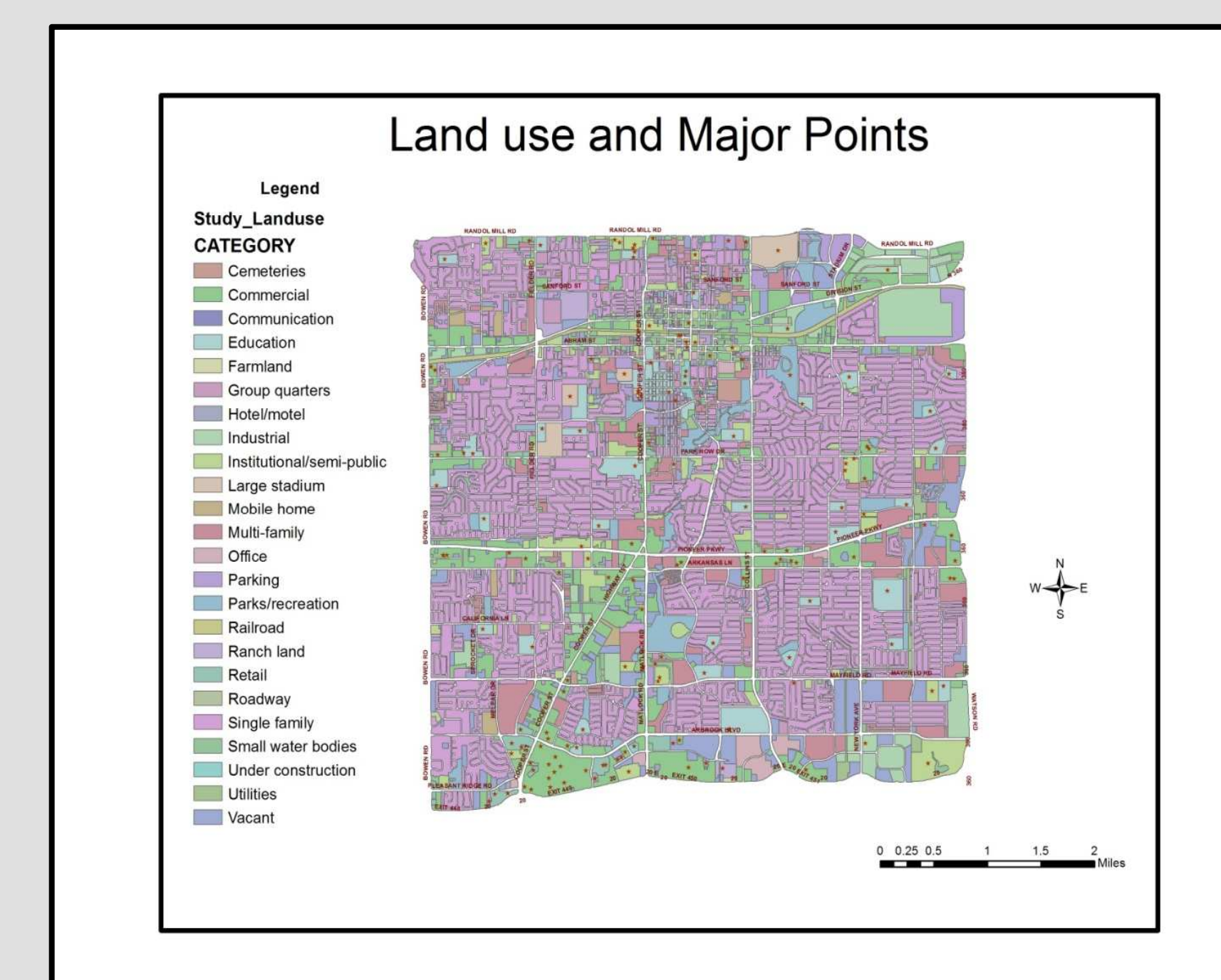


## Demand Estimation

- In this research, various public transit demand estimation models including Corradino's and Buttker's methods were taken into consideration.
- For estimating the demand, multiple socio-economic variables including number of households in tract, average income, population, & coverage was considered.



- Suggested transit system specifications including headway, quality of service, level of service was considered.
- Designated route characteristics including length of routes, length of one-way segments, effect of peak hour traffic, trip generators/attractors, land use were Considered.



## Capacity Analysis

- The system is designed to work at level of service D, This suggests the headway to be 21-30 mins, 12 -13 hours of operation daily, and coverage percentage of 60% - 69%.
- There are two types of capacities: (1) Maximum theoretical load, and (2) Possible throughput load.
- The maximum theoretical load is the maximum volume under ideal conditions for the system.
- The possible throughput load is the maximum volume under prevailing conditions for the system.

## Results

- The demand model shows that the designated transit system will have 754,200 riders/year.
- Based on system configuration, the capacity analysis reveals that the system will have 1,704,000 pax/year theoretical capacity and 994,115 pax/year Throughput.

Route	1	2	3	4	5
Length (mile)	10.35	11.35	12	8.95	12
Operation Speed(mile/hr)	12	12	10	10	10
# of Buses	2	2	3	2	3
Calculated Headway (min)	26	29	24	27	24
Design Headway (min)	30	30	30	30	30
Slack (min)	4	1	6	3	6
Theo Capacity (Pax/hr)	80	80	80	80	80
Theo Capacity (Pax/yr)	340800	340800	340800	340800	340800
Σ Theo Capacity	1,704,000				
Throughput Load (Pax/hr)	46	42	50	45	50
Throughput Load (Pax/yr)	197565	180159	213000	190391	213000
Σ Throughput Load	994,115				
Demand (Pax/yr)	754,200				

- The results of the study shows that Arlington Central districts provides enough ridership to support a local bus transit system.