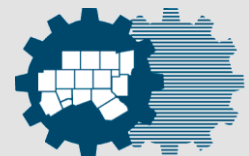


# Mapping Pedestrian Networks and Density to Improve Transit

Travis Liska, AICP



North Central Texas  
Council of Governments

# A vision for the region's multimodal transportation system



 THE METROPOLITAN TRANSPORTATION PLAN FOR NORTH CENTRAL TEXAS



# Sustainable Development

## Support alternative modes of transportation (walking, biking, transit)

- Walking-friendly development
- Bicycle/pedestrian infrastructure
- Transit-Oriented Development



# North Texas Transportation Mode Share

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## MEANS OF TRANSPORTATION TO WORK

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Drove alone	80.80%
Carpooled	10.10%
Public transportation (excluding taxicab)	<b>1.50%</b>
Walked	1.20%
Bicycled	0.20%
Taxicab, motorcycle, or other means	1.40%
Worked at home	4.80%

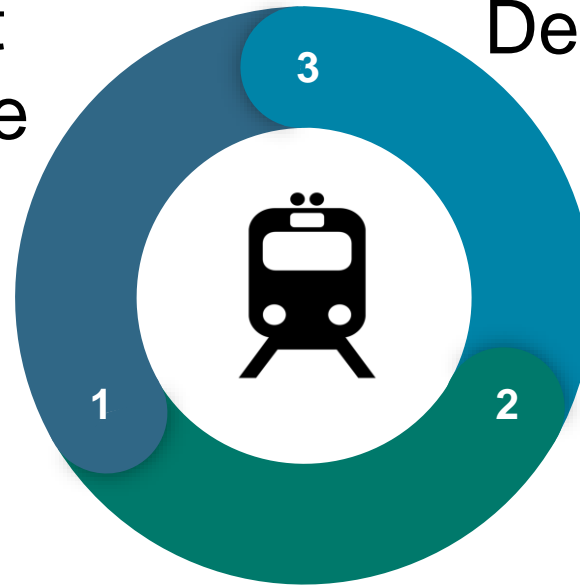
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Source:  
2011-2015 American Community Survey 5-Year Estimates (DFW MSA)

# Improving Mass Transit in North Texas

Transit  
Service

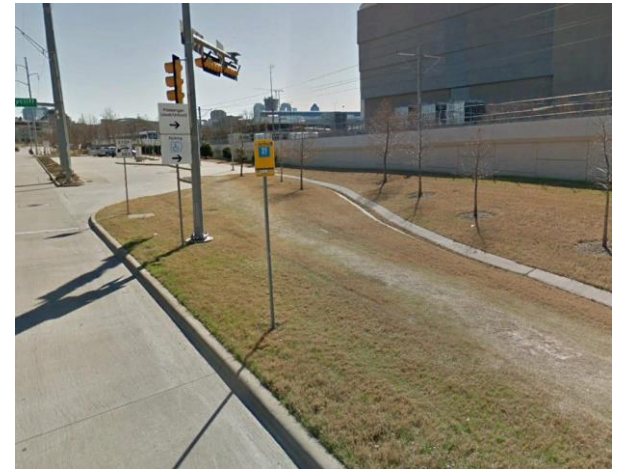
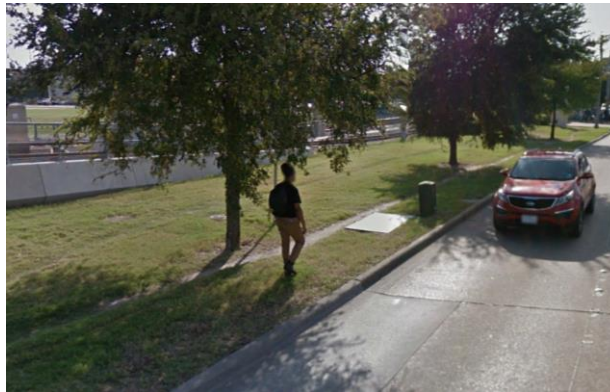
Development  
Design



Land Use & Density

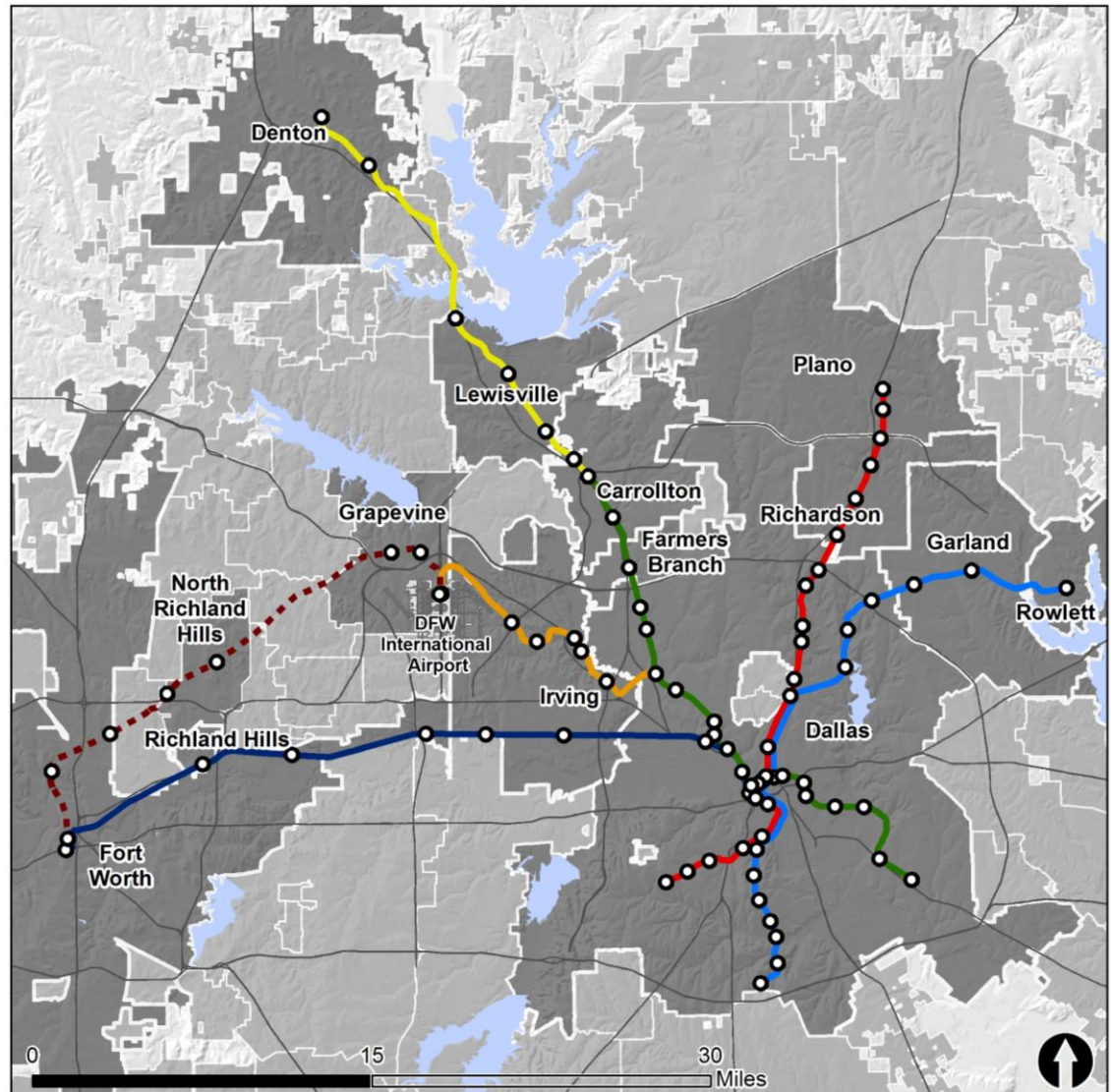


# Designed For Mass Transit?



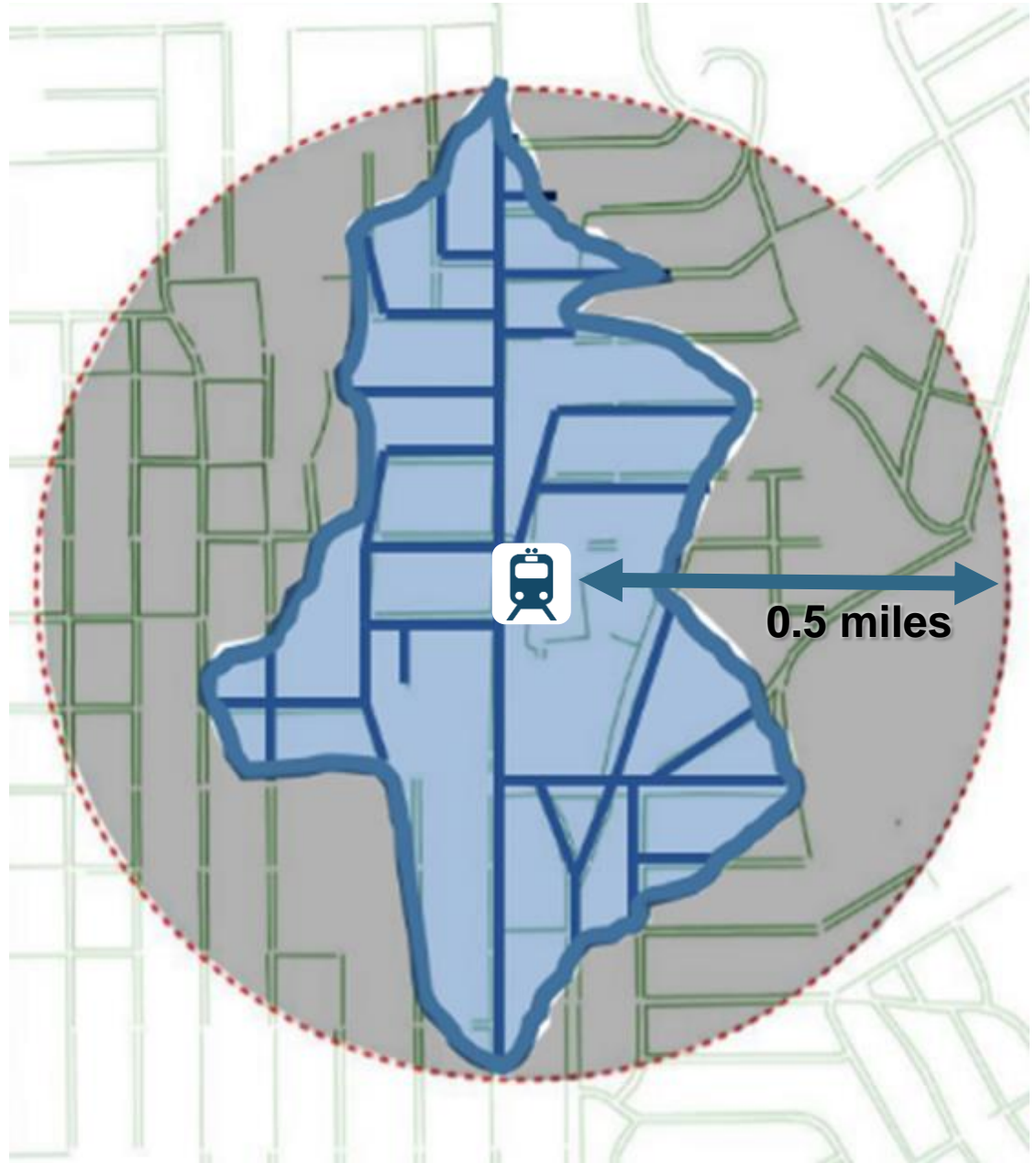
# Rail Stations

77 stations (2017)  
84 stations (2019)



# Routes to Rail

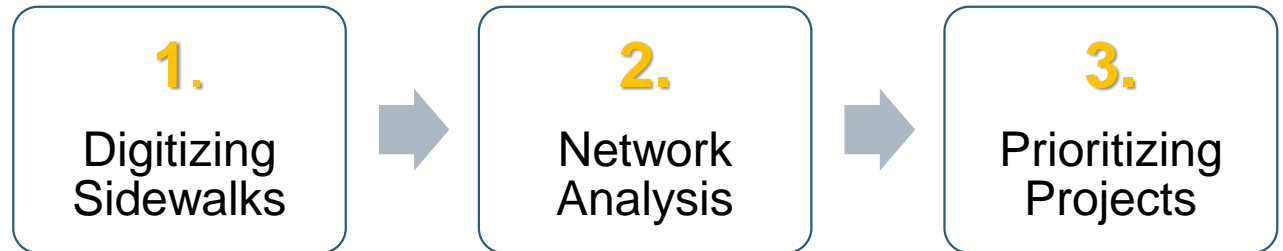
Measuring  
Access
















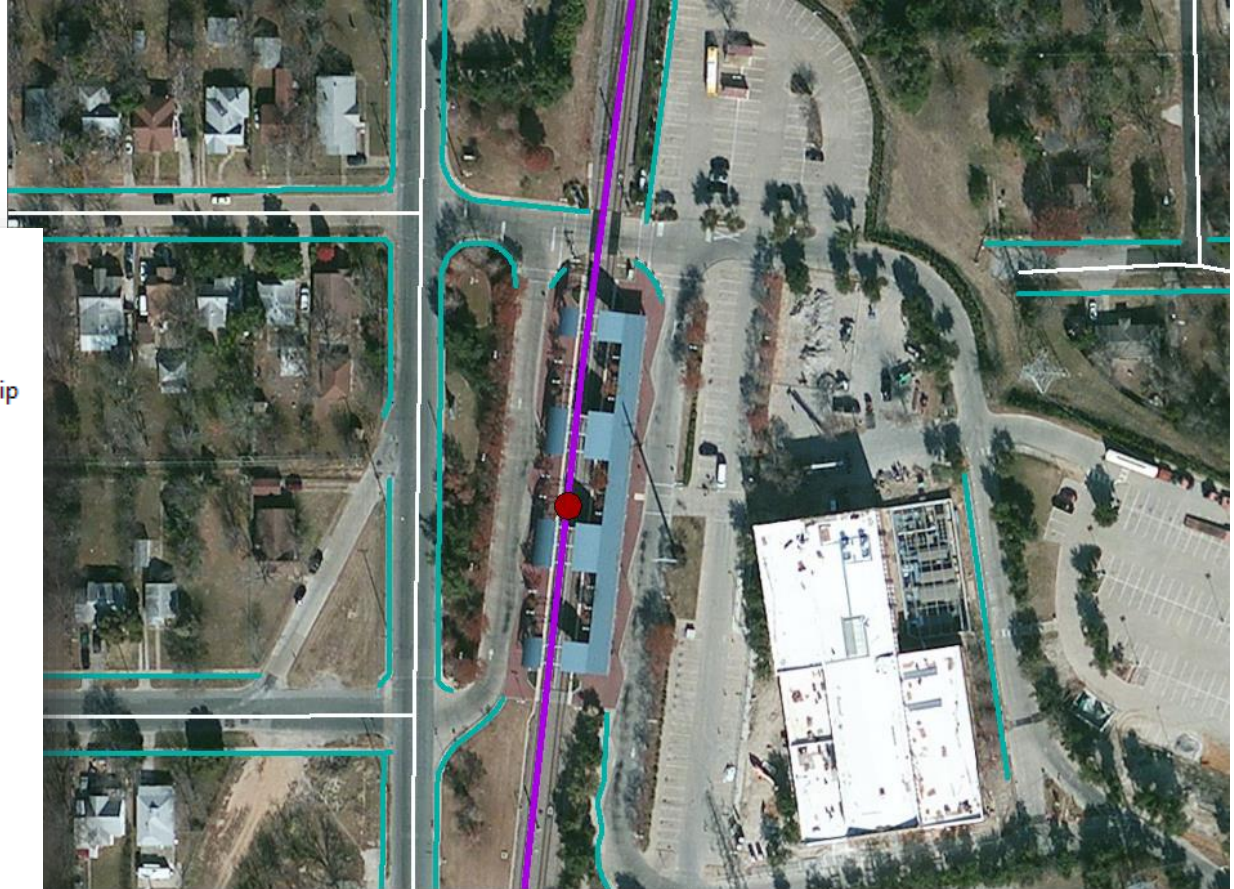
# Routes to Rail

**Goal:** Identify public rights of way needing sidewalks and sidewalk improvements

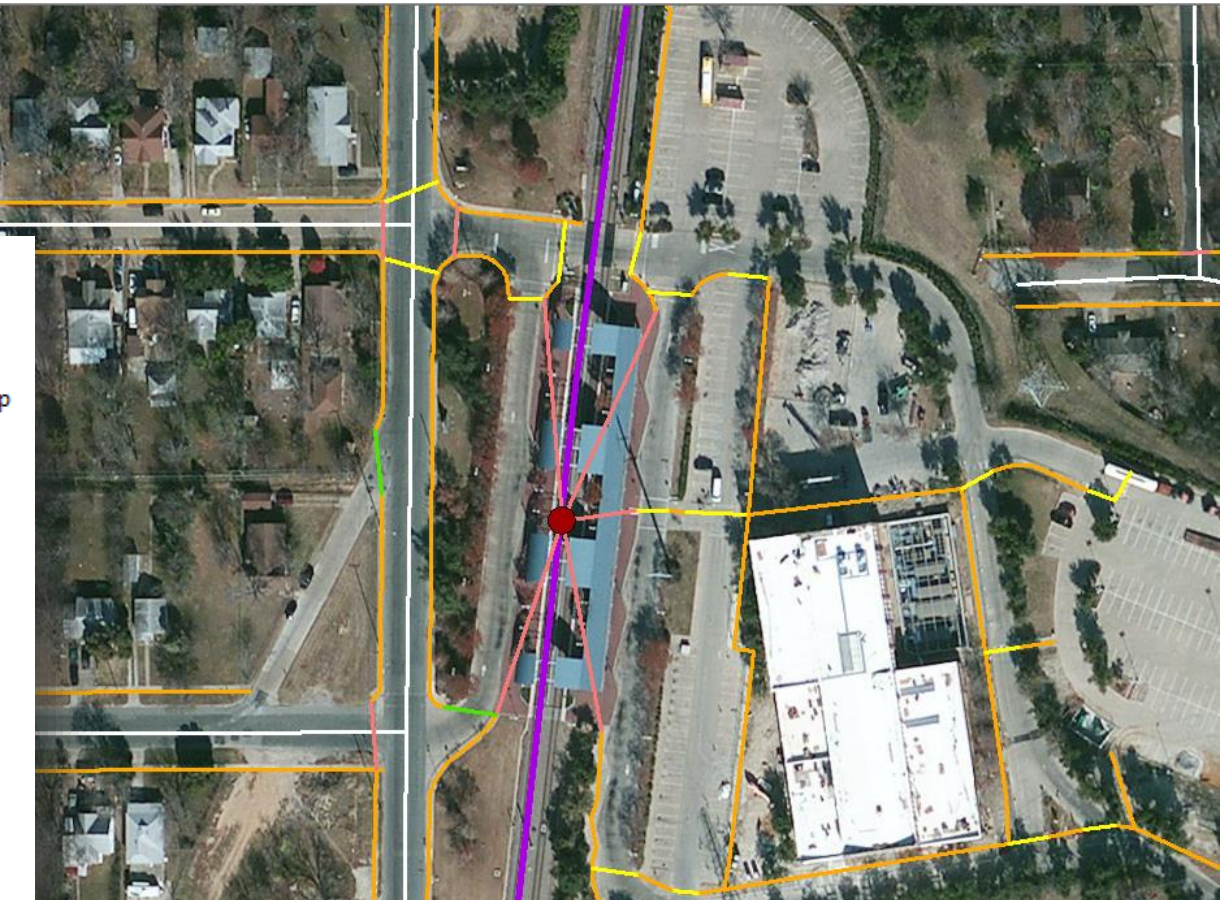


# 1. Digitizing Sidewalks

- Layers
  - RailStations
    - 
  - IllinoisStation\_HalfMile\_Sidewalk\_Clip
    - SegmentCategory
      -  Crosswalk
      -  Driveway
      -  Other
      -  Sidewalk
  - sidewalk\_arc
    - 
  - RailLines\_mergeCopy
    - 
  - Roads
    - <all other values>
    - Class
      -  Primary Highway
      -  Secondary Highway
      -  Major Arterial
      -  Access Ramp



# 1. Digitizing Sidewalks














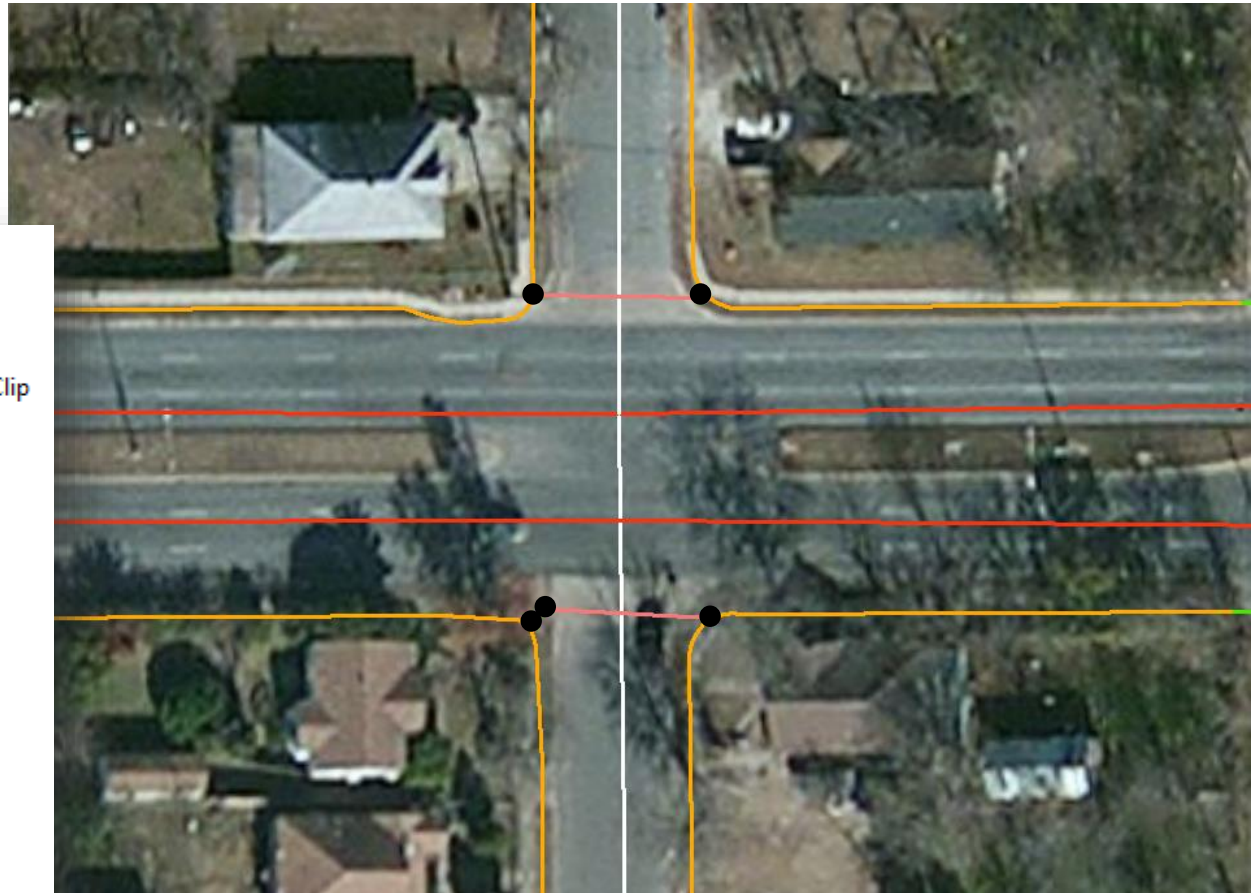
**Layers**

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  -
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  - SegmentCategory
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  -
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    - Access Ramp

# 1. Digitizing Sidewalks












**Layers**

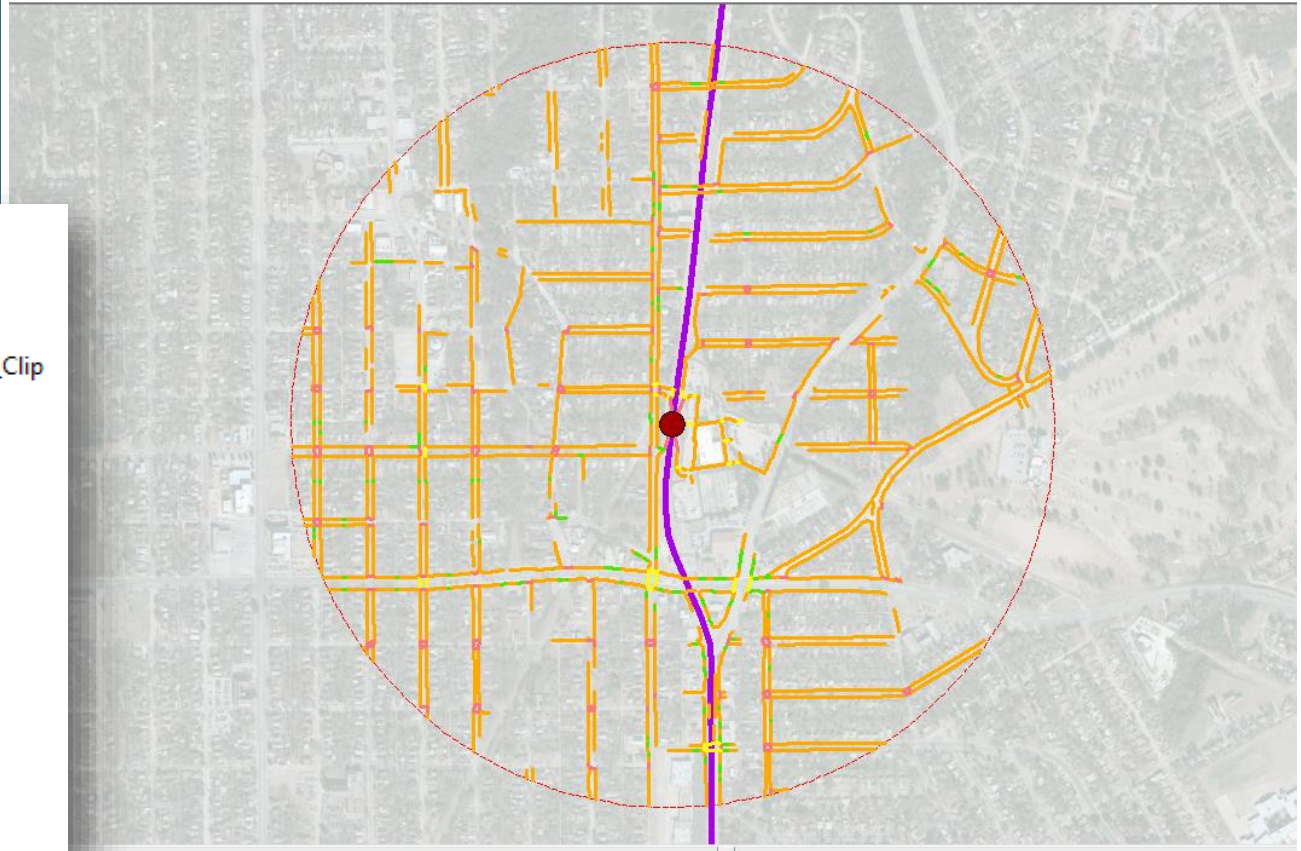
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# 1. Digitizing Sidewalks

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## 2. ArcGIS Network Analysis

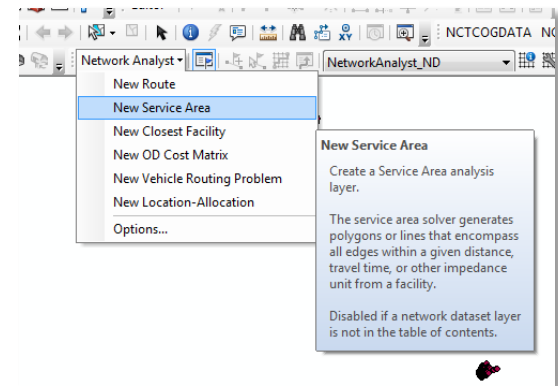


### New Network Dataset

- Connectivity = Vertices
- Length of line (miles) = cost

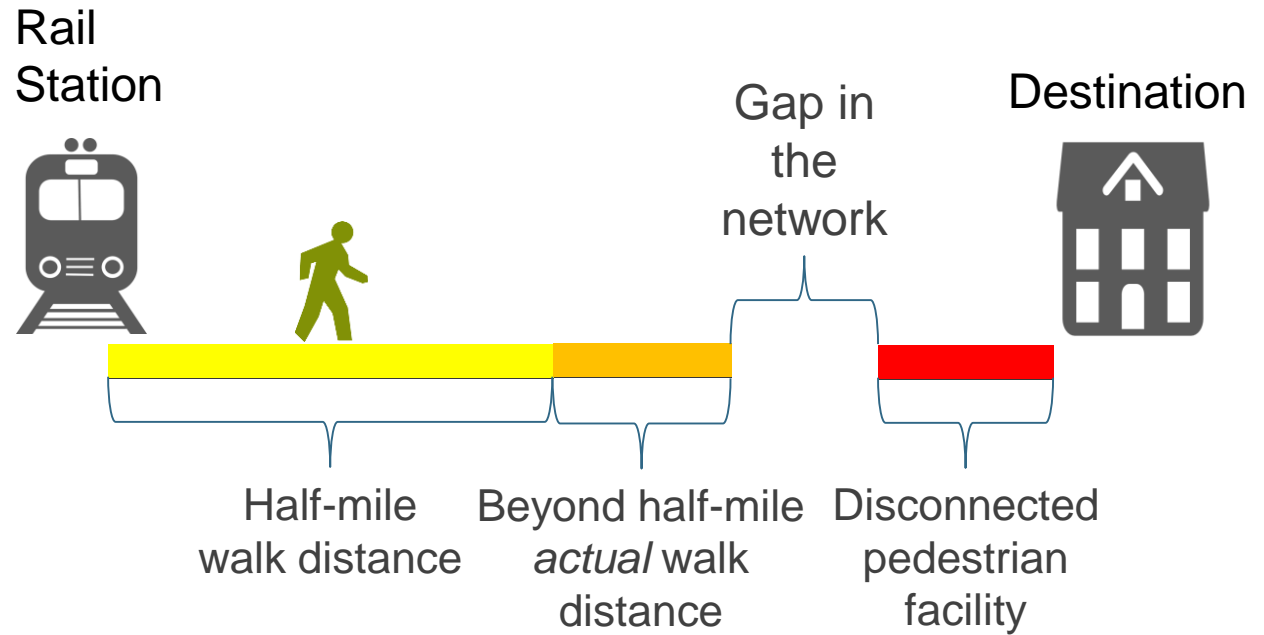
### Network Analyst

- Rail Stations = Facilities



## 2. ArcGIS Network Analysis

### Conceptual Product from Network Analyst

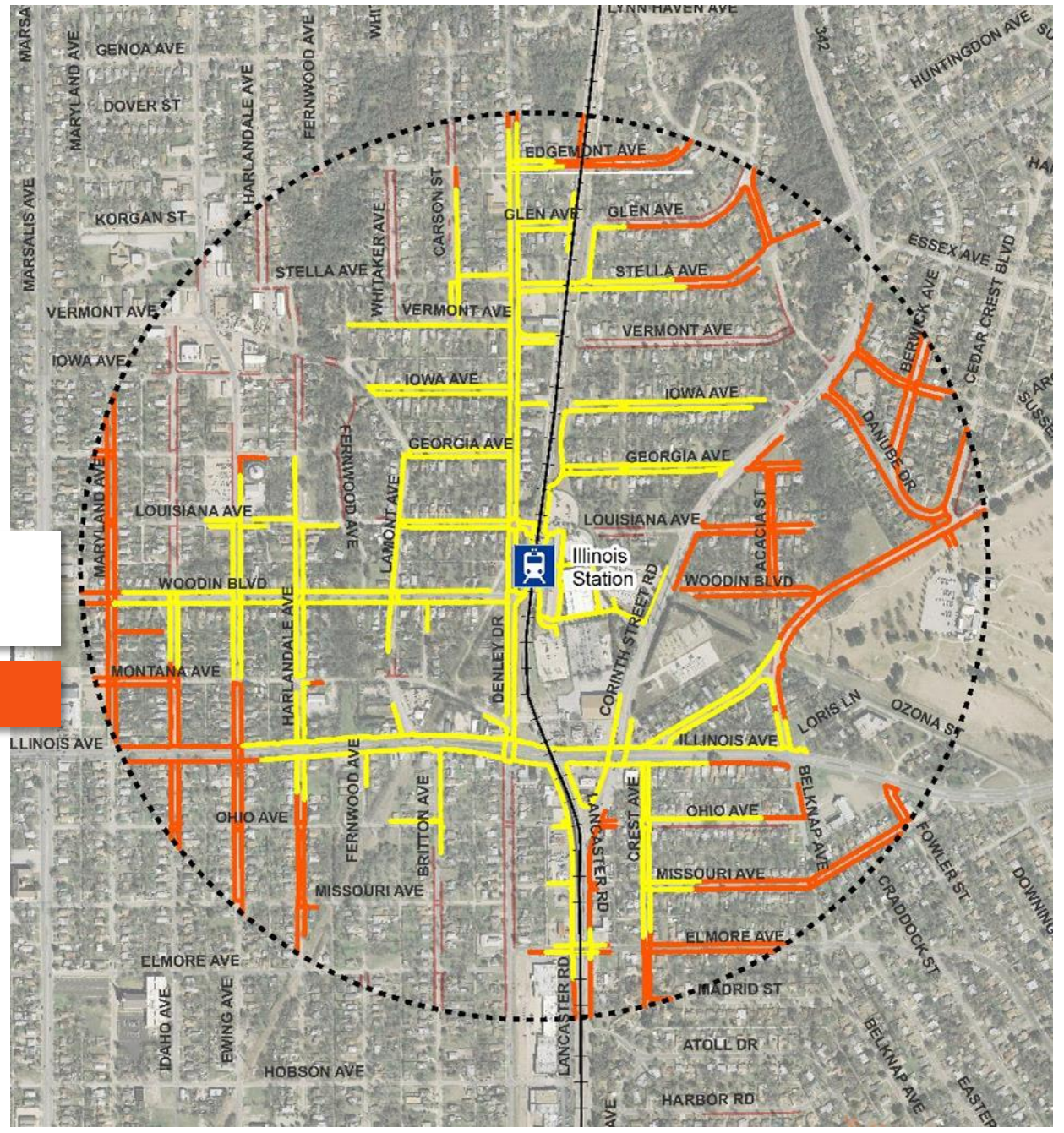






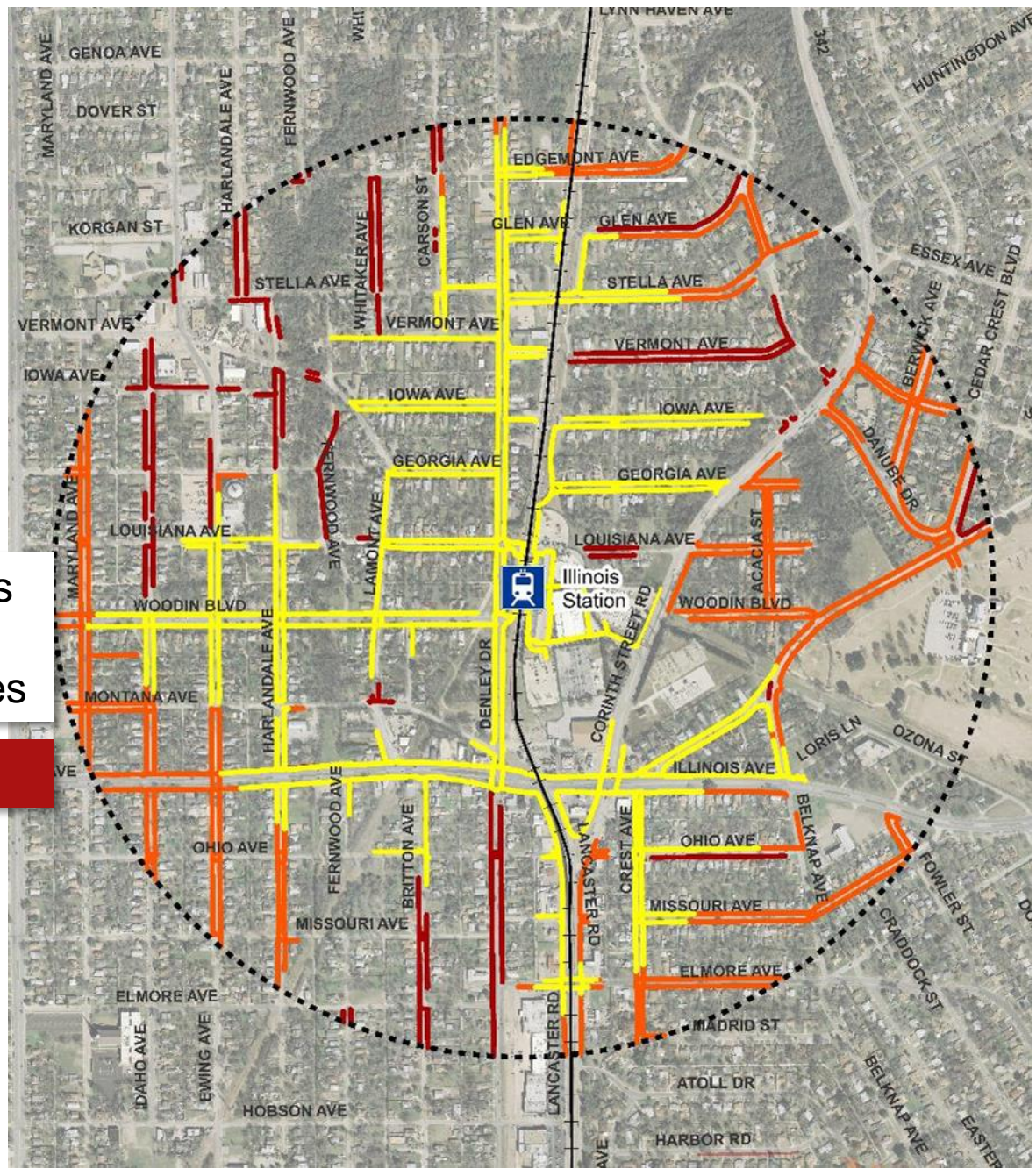
## 2. ArcGIS Network Analysis

Default Break: 2 miles



## 2. ArcGIS Network Analysis

Select all segments that are not in the other two categories



# Routes To Rail Maps 2013

74 stations




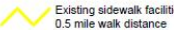
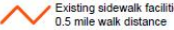
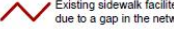
## Pedestrian Routes to Rail - Illinois Station

Last Updated: February 2015



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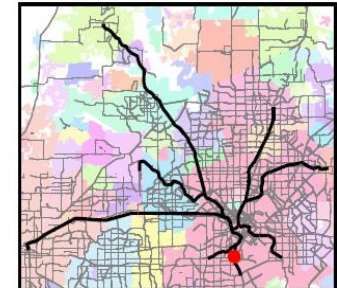
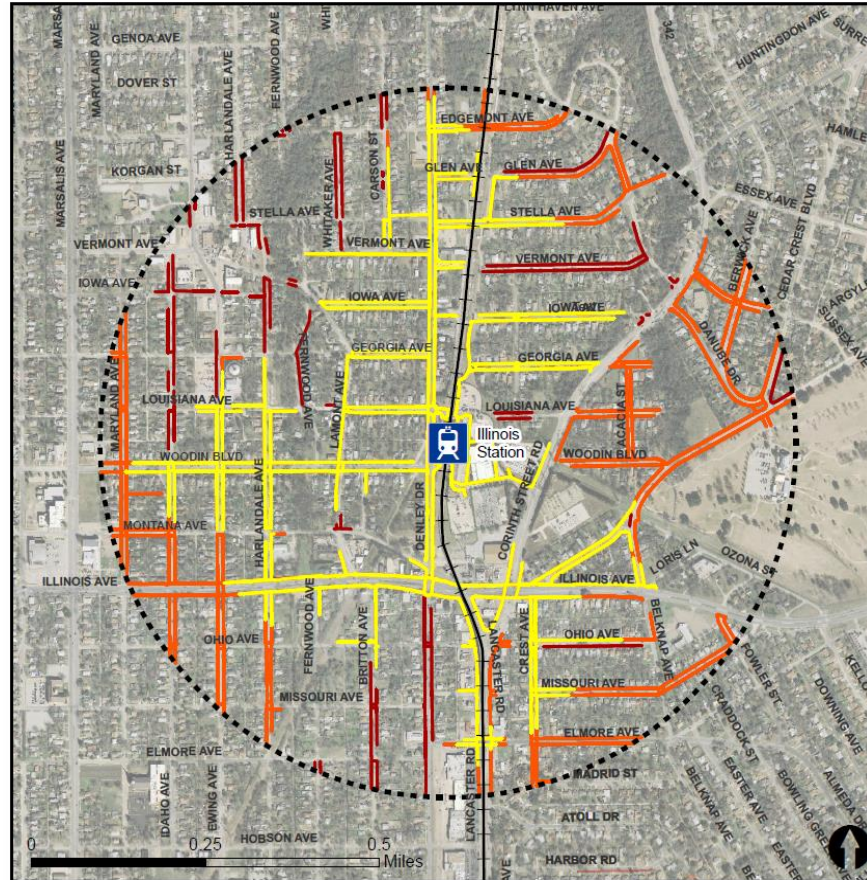
### Legend

-  Rail Stations
-  0.5 Mile Station Buffer
-  Railroads
-  Existing sidewalk facilities within a 0.5 mile walk distance
-  Existing sidewalk facilities greater than a 0.5 mile walk distance
-  Existing sidewalk facilities that are disconnected due to a gap in the network

### Project Overview

The Pedestrian Routes to Rail study identifies all existing pedestrian facilities within a half-mile radius of existing light rail and commuter rail stations in the Dallas-Fort Worth region based on 2014 data. ArcGIS Network Analyst tool was used to identify continuous facilities that are less than or greater than a half-mile actual walking distance to a station. The maps also reflect existing facilities that are disconnected due to gaps or other barriers not allowing a continuous pedestrian route to a station. The maps do not reflect the condition or ADA compliance of the existing infrastructure. More information on the Routes to Rail study and methodology can be found at:

[nctcog.org/RoutesToRail](http://nctcog.org/RoutesToRail)



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### 3. Prioritizing Projects

**300+ Miles missing sidewalk in the  
0.5 mile radius around rail stations**



**Where to start?**



### 3. Prioritizing Projects

**NCHRP**  
REPORT 803

NATIONAL  
COOPERATIVE  
HIGHWAY  
RESEARCH  
PROGRAM

**Pedestrian and Bicycle  
Transportation Along  
Existing Roads—ActiveTrans  
Priority Tool Guidebook**

[http://www.pedbikeinfo.org/planning/tools\\_appt.cfm](http://www.pedbikeinfo.org/planning/tools_appt.cfm)



### 3. Prioritizing Projects

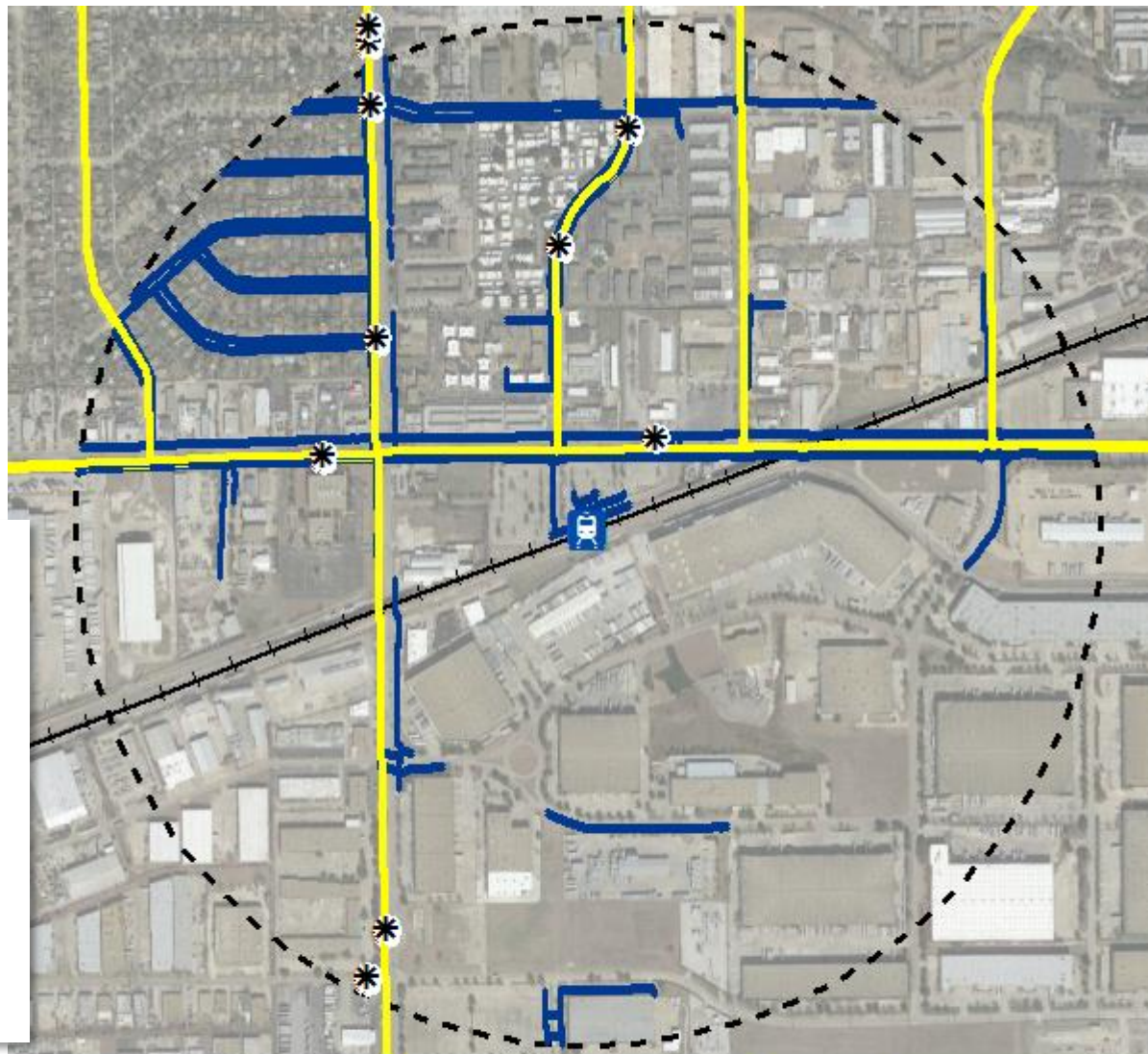
Variables:

Demographics

Crashes

Distance to station

Density



Pedestrian or Bike Incident w/ Vehicle (2012-2016)



Rail Station



Census Block Groups



Sidewalk



### 3. Prioritizing Projects

## Detailed Population density

Appraisal district parcel data (Dallas, Collin, Denton, Tarrant)

Edits/Quality control in 0.5 mile rail station buffer:  
SQFT, land use, and parcel geometry

Calculate parcel population  
e.g. 300 SQFT office = 1 person



### 3. Prioritizing Projects

COG LU	Description	Housing Units	SQFT	People	SQFT/person
111	Single family	1	--	2.5	--
112	Multi-family	1	--	1.8	--
120	Commercial	--	1,000	3.5	286
121	Office	--	1,000	3	333
122	Retail	--	1,000	8	125
125	Institutional/semi public	--	1,000	6	167
126	Education	--	1,000	12	83
131	Industrial	--	1,000	1	1,000
143	Utilities	--	--	0	--
148	Rail road	--	--	0	--
160	Mixed use	--	1,000	4	250
170	Parks/recreation	--	--	1	--
301	Vacant	--	--	0	--
401	Parking	--	--	0	--





### 3. Prioritizing Projects

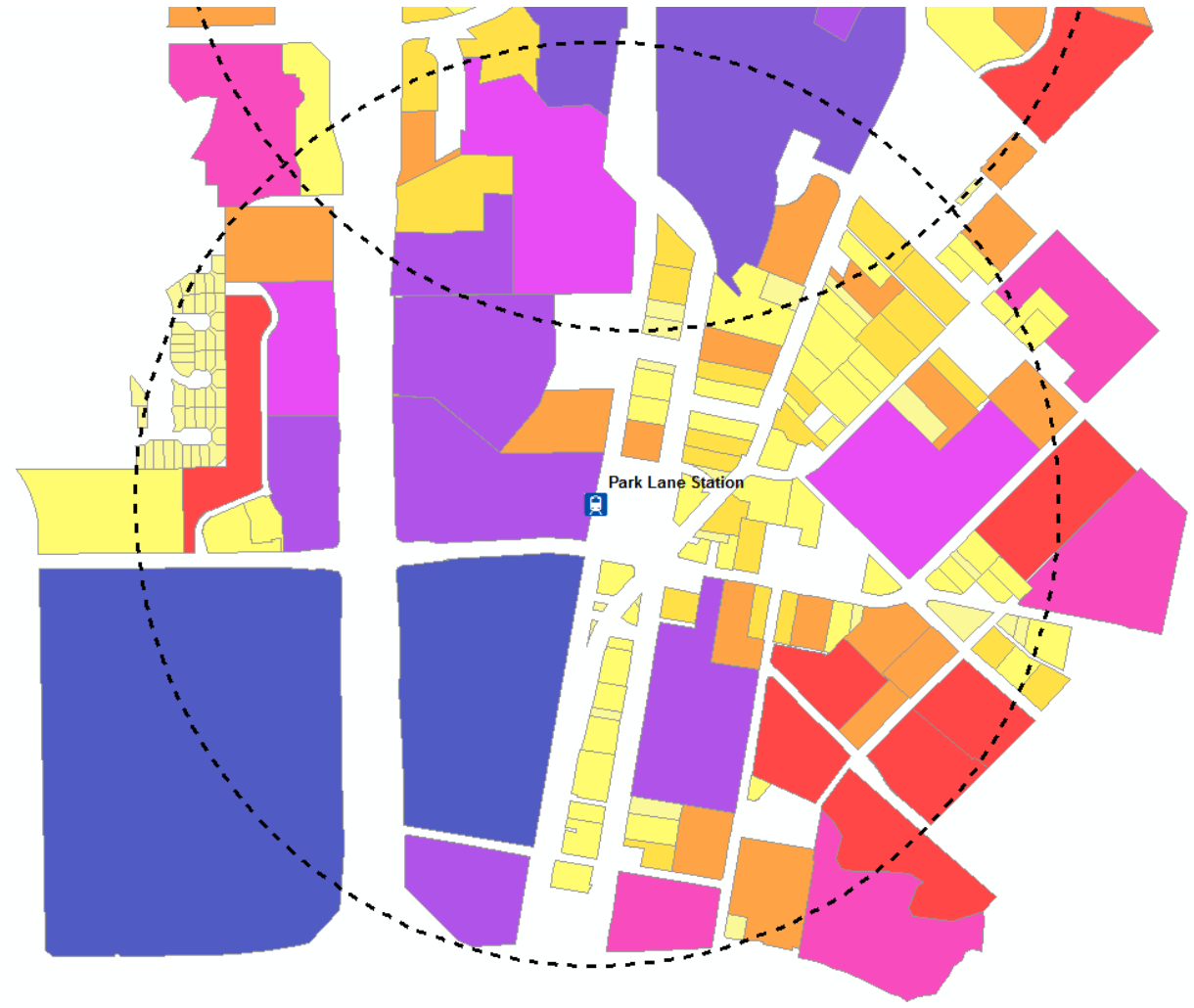
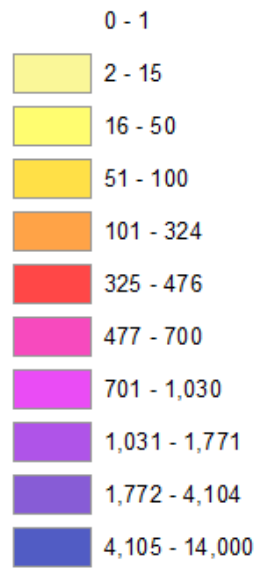
## Square Feet / People - Sources

- International Building Code – Section 1004 – Max floor Area Allowance per occupant
- US Census - Housing occupancy report
- Methods used in NCTCOG 2040 Demographic forecast




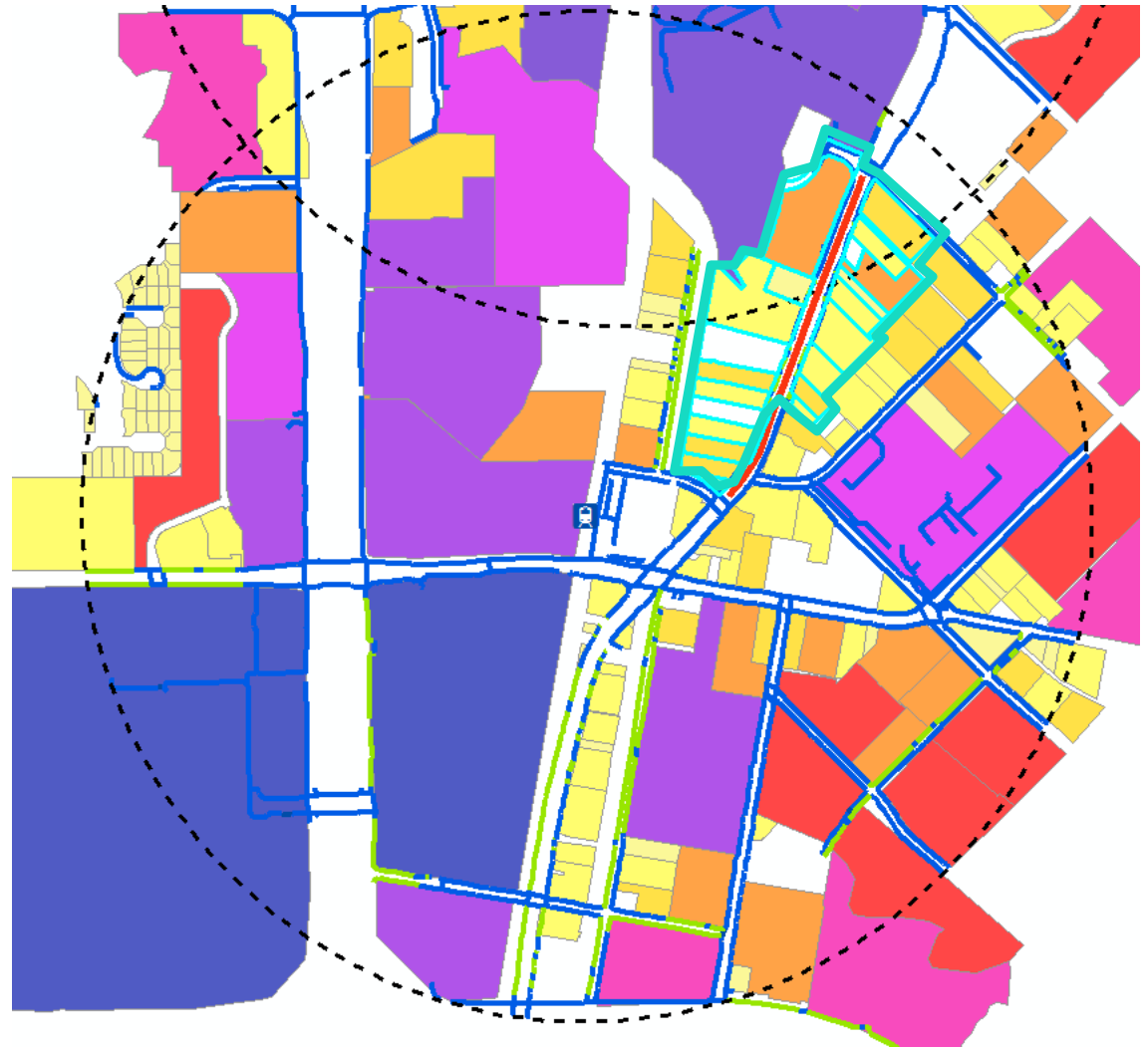
### 3. Prioritizing Projects

#### Population

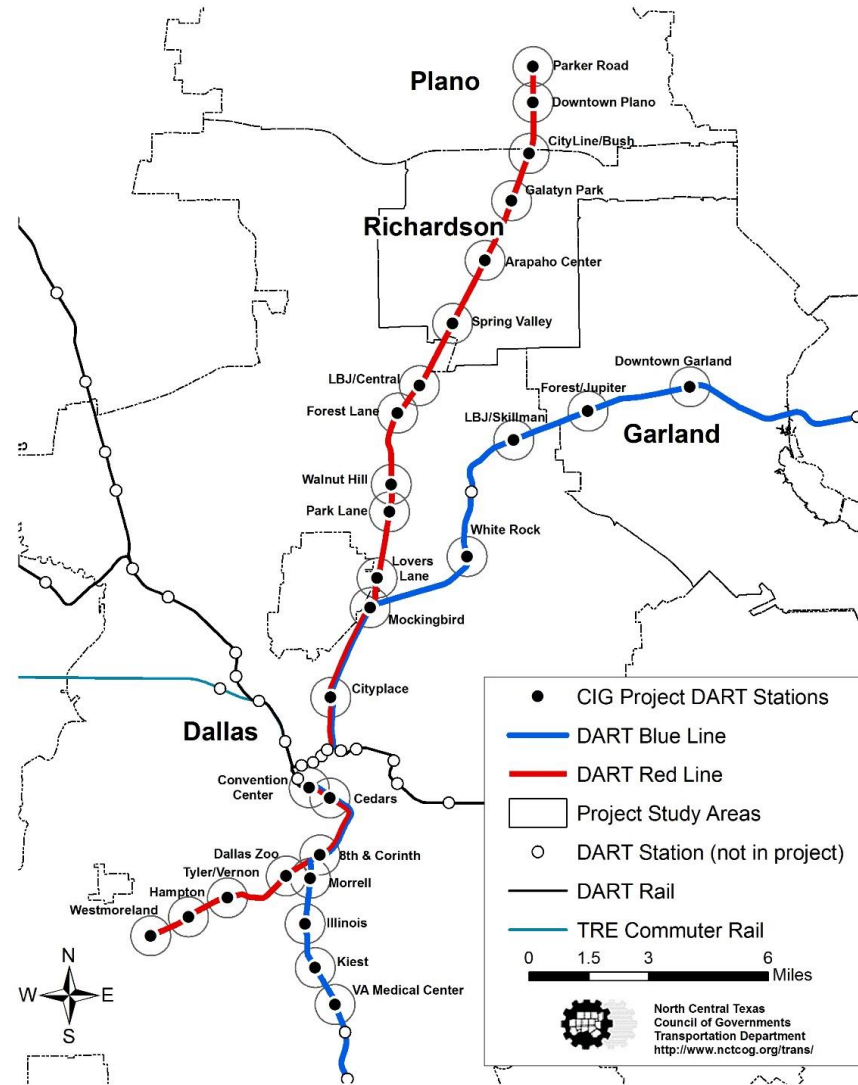


### 3. Prioritizing Projects

-  Sidewalk Gaps
-  Existing Sidewalk
-  Route
-  Density Zone



# FTA Grant



# Summary

Spatial data can assist with identifying infrastructure needs, prioritizing implementation, and demonstrating the potential benefit of first/last mile pedestrian improvements

## Next steps

- Expand parcel population estimate
- Continue to update sidewalk data
- Model pedestrian flow via shortest route



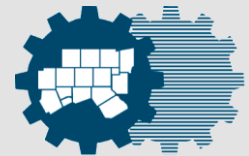
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(817) 704-2512

[nctcog.org/TOD](http://nctcog.org/TOD)



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