

# Texas State University Campus Basemap Project

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# Presentation Outline

1. Introduction



2. Data



3. Methodology



4. Results



5. Conclusion

# Introduction

- Phase 1 of the university's plan to migrate control of geospatial data to an in house solution.
- Provided legacy data was cleaned, edited and enhanced with new layers built using external resources (TxDOT, Google Earth, TXST building floorplans).
- Foundational geodatabase has been constructed and ready for implementation.



# Data

Data for this project was provided to Old Main Geospatial Solutions by the client. Original source data was combined with additional internal and external sources to clean, organize, and create data.

| File Name               | Description                                                                                | Data Type             | Client Source Layer        |
|-------------------------|--------------------------------------------------------------------------------------------|-----------------------|----------------------------|
| txst_buildings          | Building footprints                                                                        | Polygon feature class | Txst_buildings.shp         |
| txst_roads              | Roads connecting buildings and parking lots                                                | Line feature class    | Txst_roads.shp             |
| txst_green_zone         | Green areas maintained by the university                                                   | Polygon feature class | Txst_green_zones.shp       |
| txst_crosswalk          | Crosswalks that connect sidewalks                                                          | Line feature class    | Txst_crosswalks.shp        |
| txst_parking_lot        | Parking lots owned by the university                                                       | Polygon feature class | Txst_parking_lots.shp      |
| txst_property_boundary  | Property boundary of Texas State University campus                                         | Polygon feature class | Txst_property_boundary.shp |
| txst_building_entrances | Digitized entrances to all buildings on campus                                             | Point feature class   | N/A                        |
| txst_sidewalks_dissolve | Represent all sidewalks, paths, stairs, and trails connecting building entrances on campus | Line feature class    | Txst_sidewalks.shp         |

# Methodology

Data Review



Data Editing



Data Organization, Schema  
Standardization and Database  
Structure



Network Dataset Construction and  
Analysis

# Data Review

All legacy shapefiles and layers were examined in ArcGIS Pro to assess initial data quality across three primary areas of concern:

- topological integrity
- schema consistency
- attribute field relevance

In addition, all layers were reprojected to ensure spatial accuracy and consistency across the dataset.



| NAME_ABBRE | NAME                    | TYPE     | YEAR_BUILT | NUM_ENTRANCES | Address or Place         | City       |
|------------|-------------------------|----------|------------|---------------|--------------------------|------------|
| N/A        | Aqua Sports             | Athletic | 1971       | <Null>        | 301 State St             | San Marcos |
| N/A        | N/A                     | Athletic | 0          | <Null>        | 944 1/2 Aquarena Spri... | San Marcos |
| TRAC       | Track & Field Press Box | Athletic | 2012       | 1             | 1200 Aquarena Springs... | San Marcos |
| BS         | Bobcat Stadium          | Athletic | 1982       | 3             | 1100 Aquarena Springs... | San Marcos |
| BCPA       | Bobcat Stadium Pavilion | Athletic | 1986       | 1             | 310 Stadium Dr           | San Marcos |



# Data Editing

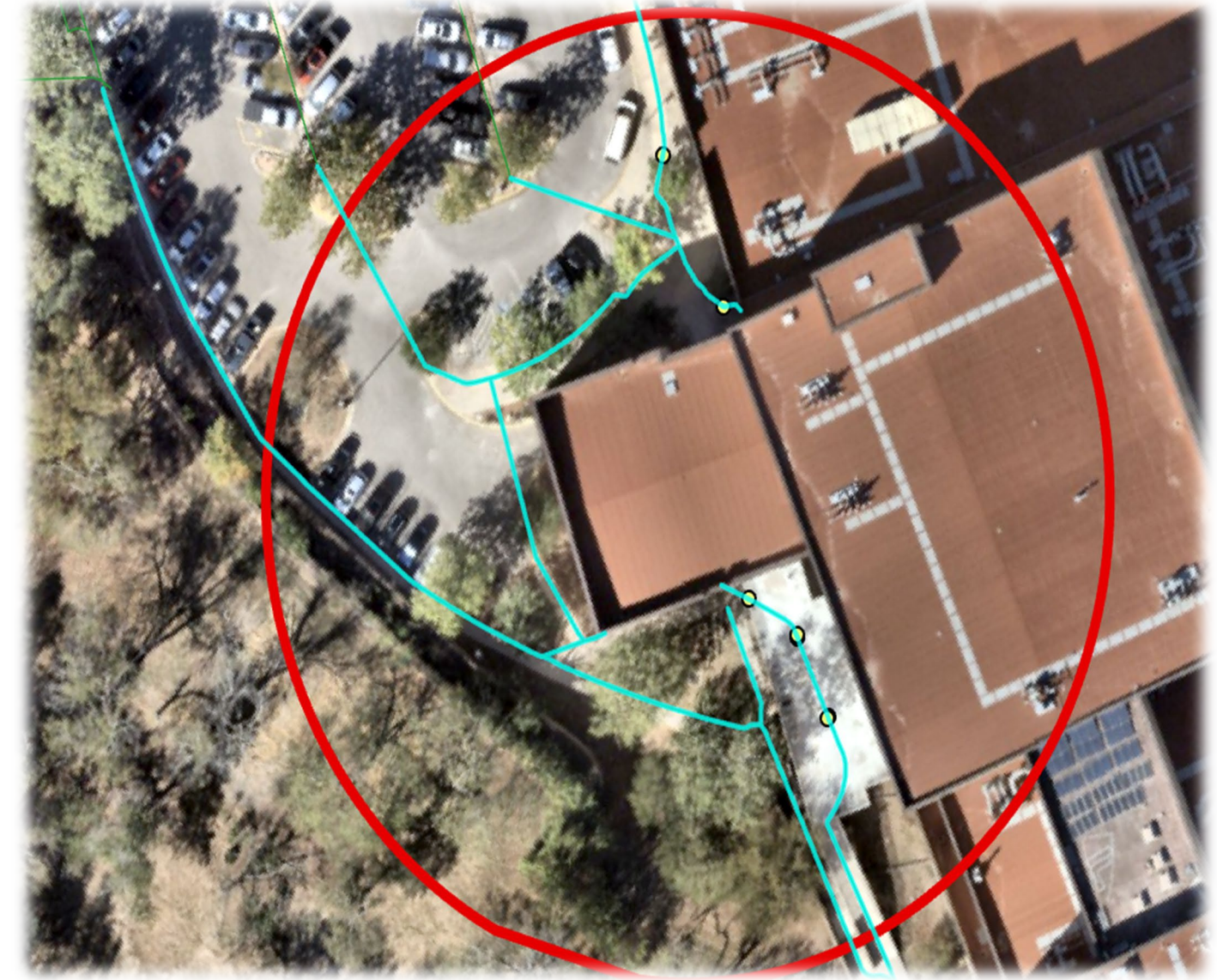
- Converted Sidewalk Polygon Layer to a line using Polygon to centerline
- Cleaned up redundancies and topological errors
- Connected sidewalks to building entrances and crosswalks



# Data Editing



# Data Editing



# Data Organization and Standardization

- Standardized naming conventions and domains
- Defined field types were applied consistently across all feature classes
- Ensure long-term data integrity and support future querying and analysis

| Field:  Add  Calculate |            |            |     |        |                          |                 | Selection:  Select By Attributes  Zoom To  Switch  Clear  Delete  Copy |  |  |  |  |  |  |
|------------------------|------------|------------|-----|--------|--------------------------|-----------------|------------------------------------------------------------------------|--|--|--|--|--|--|
|                        | OBJECTID * | Shape *    | FID | ID     | Street                   | Sidewalk_Type ▼ | Shape_Length                                                           |  |  |  |  |  |  |
| 67                     | 340        | Polyline Z | 69  | <Null> | State St.                | Paved           | 95.884577                                                              |  |  |  |  |  |  |
| 68                     | 342        | Polyline Z | 71  | <Null> | Pleasant St.             | Paved           | 207.174955                                                             |  |  |  |  |  |  |
| 69                     | 343        | Polyline Z | 72  | <Null> | State St.                | Paved           | 11.029351                                                              |  |  |  |  |  |  |
|                        | 355        | Polyline Z | 77  | <Null> | Old Main Dr.             | Paved ▼         | 13.984782                                                              |  |  |  |  |  |  |
| 71                     | 360        | Polyline Z | 79  | <Null> | Hill House Cir.          | <Null>          | 72.769836                                                              |  |  |  |  |  |  |
| 72                     | 363        | Polyline Z | 80  | <Null> | Hill House Cir.          | Paved           | 43.39389                                                               |  |  |  |  |  |  |
| 73                     | 365        | Polyline Z | 82  | <Null> | Hill House Cir.          | Unpaved         | 51.151986                                                              |  |  |  |  |  |  |
| 74                     | 366        | Polyline Z | 82  | <Null> | Hill House Cir.          | Crosswalk       | 51.44148                                                               |  |  |  |  |  |  |
| 75                     | 381        | Polyline Z | 89  | <Null> | Hill House Cir.          | Stairs          | 136.080504                                                             |  |  |  |  |  |  |
| 76                     | 382        | Polyline Z | 89  | <Null> | JC Kellam                | Other           | 113.111407                                                             |  |  |  |  |  |  |
| 77                     | 401        | Polyline Z | 96  | <Null> | Freeman Aquatic Biolo... | Paved           | 140.429028                                                             |  |  |  |  |  |  |
| 78                     | 412        | Polyline Z | 100 | <Null> | University Dr.           | Paved           | 134.960087                                                             |  |  |  |  |  |  |
| 79                     | 424        | Polyline Z | 101 | <Null> | Theater Center           | Paved           | 460.79744                                                              |  |  |  |  |  |  |
| 80                     | 425        | Polyline Z | 101 | <Null> | Theater Center           | Paved           | 221.456108                                                             |  |  |  |  |  |  |
| 81                     | 433        | Polvline Z | 101 | <Null> | Theater Center           | Paved           | 83.320382                                                              |  |  |  |  |  |  |

| Selection:  Select By Attributes  Zoom To  Switch  Clear  Delete  Copy |           |              |             |              |        |              |          |              |                          |  |
|------------------------------------------------------------------------|-----------|--------------|-------------|--------------|--------|--------------|----------|--------------|--------------------------|--|
| Road_Name                                                              | Road_Type | Number_Lanes | Speed_Limit | Length_Miles | County | Municipality | Zip_Code | Shape_Length | OwnerType                |  |
| Blanco Hall                                                            | Dr        | 2            | 30          | 0.275774     | Hays   | San Marcos   | 78666    | 512.96       | Texas State University   |  |
| Lueders                                                                | Dr        | 2            | 30          | 0.076739     | Hays   | San Marcos   | 78666    | 142.54       | Texas State University   |  |
| Llano                                                                  | Cir       | 2            | 30          | 0.222223     | Hays   | San Marcos   | 78666    | 413.09       | Texas State University   |  |
| Academy                                                                | St        | 2            | 30          | 0.245187     | Hays   | San Marcos   | 78666    | 456.02       | Texas State University   |  |
| James                                                                  | St        | 2            | 30          | 0.047083     | Hays   | San Marcos   | 78666    | 87.43        | Texas State University   |  |
| Woods                                                                  | St        | 2            | 30          | 0.129341     | Hays   | San Marcos   | 78666    | 239.98       | Texas State University   |  |
| Woods                                                                  | St        | 2            | 30          | 0.131882     | Hays   | San Marcos   | 78666    | 244.63       | Texas State University ▼ |  |
| Talbot                                                                 | St        | 2            | 30          | 0.055666     | Hays   | San Marcos   | 78666    | 103.68       | <Null>                   |  |
| Fredericksburg                                                         | St        | 2            | 30          | 0.090878     | Hays   | San Marcos   | 78666    | 169.32       | Texas State University   |  |
| Student Center                                                         | Dr        | 3            | 30          | 0.300002     | Hays   | San Marcos   | 78666    | 557.5        | City                     |  |
| Pickard                                                                | St        | 2            | 30          | 0.12087      | Hays   | San Marcos   | 78666    | 224.33       | TxDOT                    |  |
| Matthews                                                               | St        | 2            | 30          | 0.227444     | Hays   | San Marcos   | 78666    | 422.75       | Texas State University   |  |
| Russell                                                                | Cir       | 2            | 30          | 0.071475     | Hays   | San Marcos   | 78666    | 132.88       | Texas State University   |  |

# Data Organization and Standardization

Coded domains created for

- Buildings
- Green zones

| Field: Add Calculate Selection: Select By Attributes Zoom To Switch Clear Delete Copy |         |            |            |      |                          |                           |               |         |
|---------------------------------------------------------------------------------------|---------|------------|------------|------|--------------------------|---------------------------|---------------|---------|
| FID *                                                                                 | Shape * | NUMBER     | NAME_ABBRE | NAME | TYPE                     | YEAR_BUILT                | NUM_ENTRANCES |         |
| 37                                                                                    | 37      | Polygon ZM | 649        | LNA  | Lantana Hall             | Res/Life                  | 1962          | 7       |
| 38                                                                                    | 38      | Polygon ZM | 508        | ELA  | Evans-Liberal Arts       | Academic & Adminis        | 1939          | 4       |
| 39                                                                                    | 39      | Polygon ZM | 816        | ALK  | Alkek Library            | < Null>                   | 1990          | 4       |
| 40                                                                                    | 40      | Polygon ZM | 663        | JON  | Jones Dining Hall        | Athletic Dining           | 1965          | 7       |
| 41                                                                                    | 41      | Polygon ZM | 824        | ENC  | Encino Hall              | Academic & Administrative | 1992          | 4       |
| 42                                                                                    | 42      | Polygon ZM | 661        | EAD  | Elliott Hall Pavilion    | Facilities                | 1963          | 1       |
| 43                                                                                    | 43      | Polygon ZM | 818        | SUPP | Jerome & Catherine S...  | Garage                    | 0             | 3       |
| 44                                                                                    | 44      | Polygon ZM | 852        | STRH | Strahan House            | Maintenance               | 0             | 1       |
| 45                                                                                    | 45      | Polygon ZM |            | N/A  | N/A                      | Mechanical                | 0             | < Null> |
| 46                                                                                    | 46      | Polygon ZM | 853        | SMIT | Smith House              | Medical                   | 0             |         |
| 47                                                                                    | 47      | Polygon ZM | 748        | ADAM | Adamson ROTC             | Offices                   | 1958          | 1       |
| 48                                                                                    | 48      | Polygon ZM | 825        | SRC  | Student Recreation Ce... | Other                     | 1964          | 3       |
| 49                                                                                    | 49      | Polygon ZM | 753        | CDC  | Child Development Ce...  | Police Department         | 1994          | 2       |
| 50                                                                                    | 50      | Polygon ZM | 511        | ADA  | Undergraduate Admis...   | Recreation                | 1970          | 1       |
| 51                                                                                    | 51      | Polygon ZM | 7022       | APG  | Alkek Parking Garage     | Res/Life                  | 2000          | 1       |
| 52                                                                                    | 52      | Polygon ZM | 7063       | HS   | Horse Stable             | Transportation            | 1990          | 3       |
|                                                                                       |         |            |            |      | Unknown                  | Warehouse                 |               |         |
|                                                                                       |         |            |            |      | Water                    |                           |               |         |
|                                                                                       |         |            |            |      | Other                    |                           | 0             | 1       |

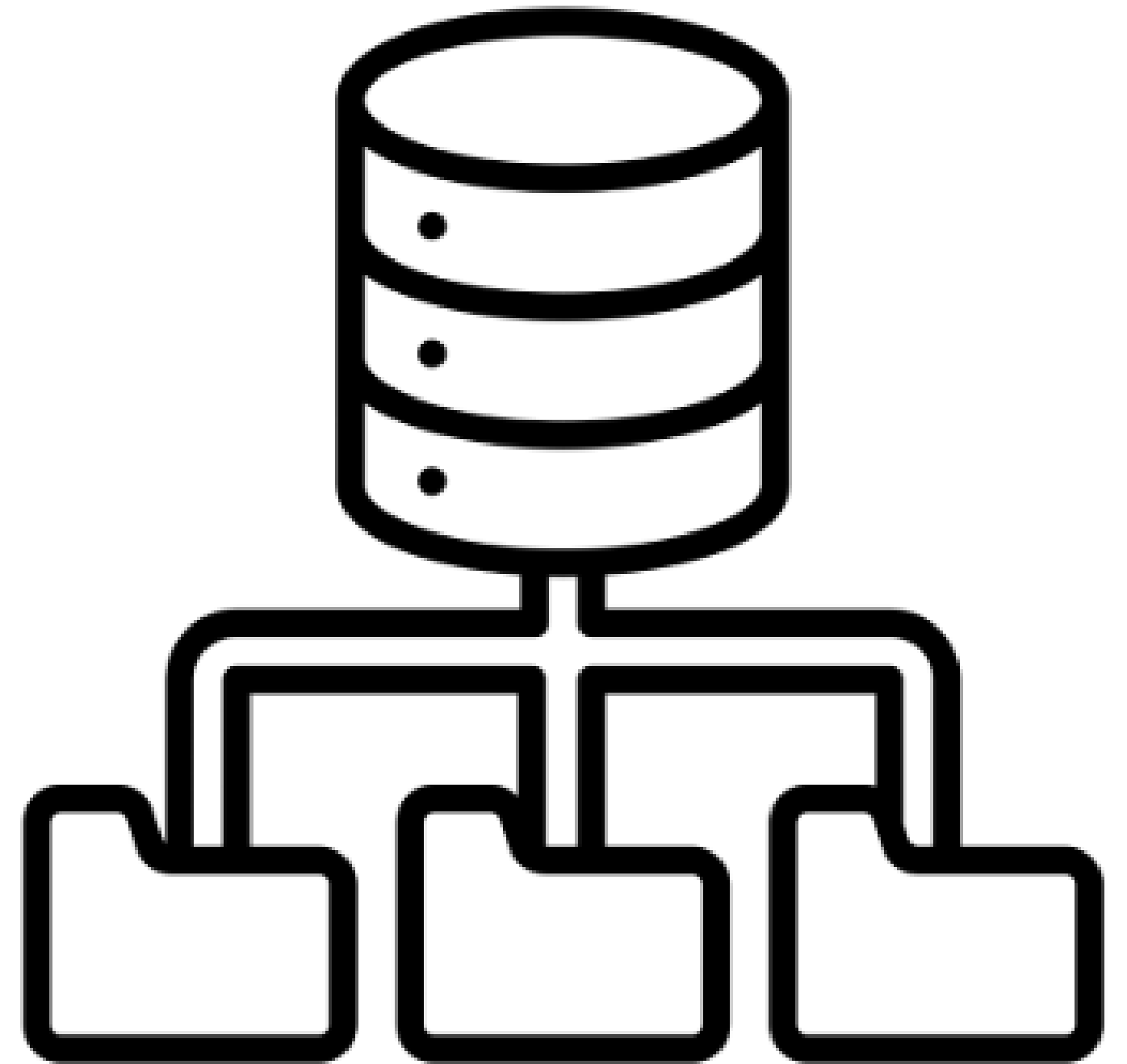


1:2,629 2,308,112.97 13,871,682.92 ftUS

| bxt_green_zones_Project                                                               |         |            |               |                      |                |               |              |              |              |
|---------------------------------------------------------------------------------------|---------|------------|---------------|----------------------|----------------|---------------|--------------|--------------|--------------|
| Field: Add Calculate Selection: Select By Attributes Zoom To Switch Clear Delete Copy |         |            |               |                      |                |               |              |              |              |
| OBJECTID *                                                                            | Shape * | Maintained | Irrigated     | Cover_Type           | Area_Feet      | Area_Meter    | Shape_Length | Shape_Area   |              |
| 13                                                                                    | 2073    | Polygon    | Yes           | Yes irrigated        | Athletic       | 7125.134357   | 661.94929    | 138.428056   | 883.597115   |
| 2074                                                                                  | Polygon | Yes        | Yes irrigated | Athletic             | 92201.724704   | 8565.854782   | 642.507086   | 11434.148892 |              |
| 15                                                                                    | 2075    | Polygon    | Yes           | Yes irrigated        | < Null>        | 27978.062943  | 2599.257498  | 370.074267   | 3469.645113  |
| 16                                                                                    | 2076    | Polygon    | Unknown       | Unknown if irrigated | Gravel         | 108753.645005 | 10103.584646 | 480.550454   | 13487.590563 |
| 17                                                                                    | 1       | Polygon    | Yes           | Unknown if irrigated | Residential    | 106.069708    | 9.854238     | 16.692317    | 13.153848    |
| 18                                                                                    | 3       | Polygon    | Yes           | Yes irrigated        | Other          | 489.578517    | 45.483514    | 39.584459    | 60.714633    |
| 19                                                                                    | 4       | Polygon    | Yes           | Yes irrigated        | Turf           | 8702.558654   | 808.497389   | 227.423855   | 1079.239782  |
| 20                                                                                    | 5       | Polygon    | Yes           | Yes irrigated        | Bed            | 1264.338272   | 117.461339   | 108.936371   | 156.796294   |
| 21                                                                                    | 6       | Polygon    | Yes           | Yes irrigated        | Wild           | 889.054325    | 82.59618     | 77.635196    | 110.252776   |
| 22                                                                                    | 7       | Polygon    | Yes           | Yes irrigated        | Bed/ Rock      | 218.547671    | 20.303824    | 28.294058    | 27.103081    |
| 23                                                                                    | 8       | Polygon    | Yes           | Yes irrigated        | Utility        | 610.627768    | 56.729403    | 39.097244    | 75.726275    |
| 24                                                                                    | 9       | Polygon    | Yes           | Yes irrigated        | Athletic       | 506.468481    | 47.05265     | 36.676763    | 62.808969    |
| 25                                                                                    | 10      | Polygon    | Yes           | Yes irrigated        | Detention Pond | 1964.748383   | 182.531828   | 79.968902    | 243.655715   |
| 26                                                                                    | 11      | Polygon    | Yes           | Yes irrigated        | Park           | 2781.956285   | 258.45323    | 84.374719    | 345.001338   |
|                                                                                       |         |            |               |                      | Marsh          |               |              |              |              |
|                                                                                       |         |            |               |                      | Creek Bank     |               |              |              |              |
|                                                                                       |         |            |               |                      | Unknown        |               |              |              |              |

# Database Structure

- Geodatabase Structure determined project proposal planning phase
- Building entrances and sidewalks grouped in a feature dataset to create routing network
- All other feature classes grouped as basemap features



# Network Dataset Construction and Analysis

- Fourth and final phase of methodology
- Network dataset created within geodatabase
- Topology layer created from network dataset source layers with rules
- Route layer ran between building entrances and sidewalks



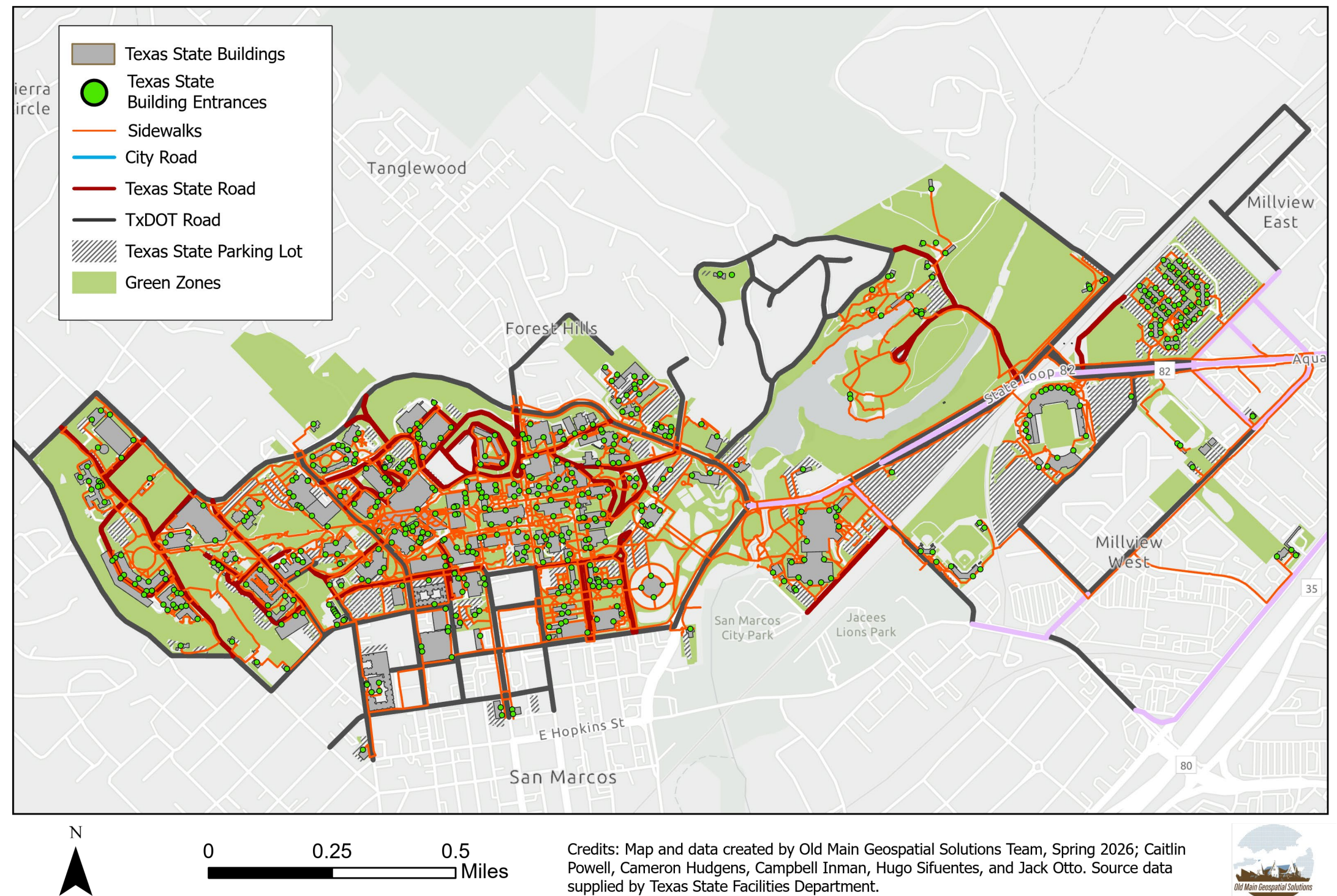
# Results

- Converted line layers into a single path
- Tagged building entrances accurately
- Enhanced parking surfaces with additional attributes

These smaller processes allowed us to achieve our broader goals

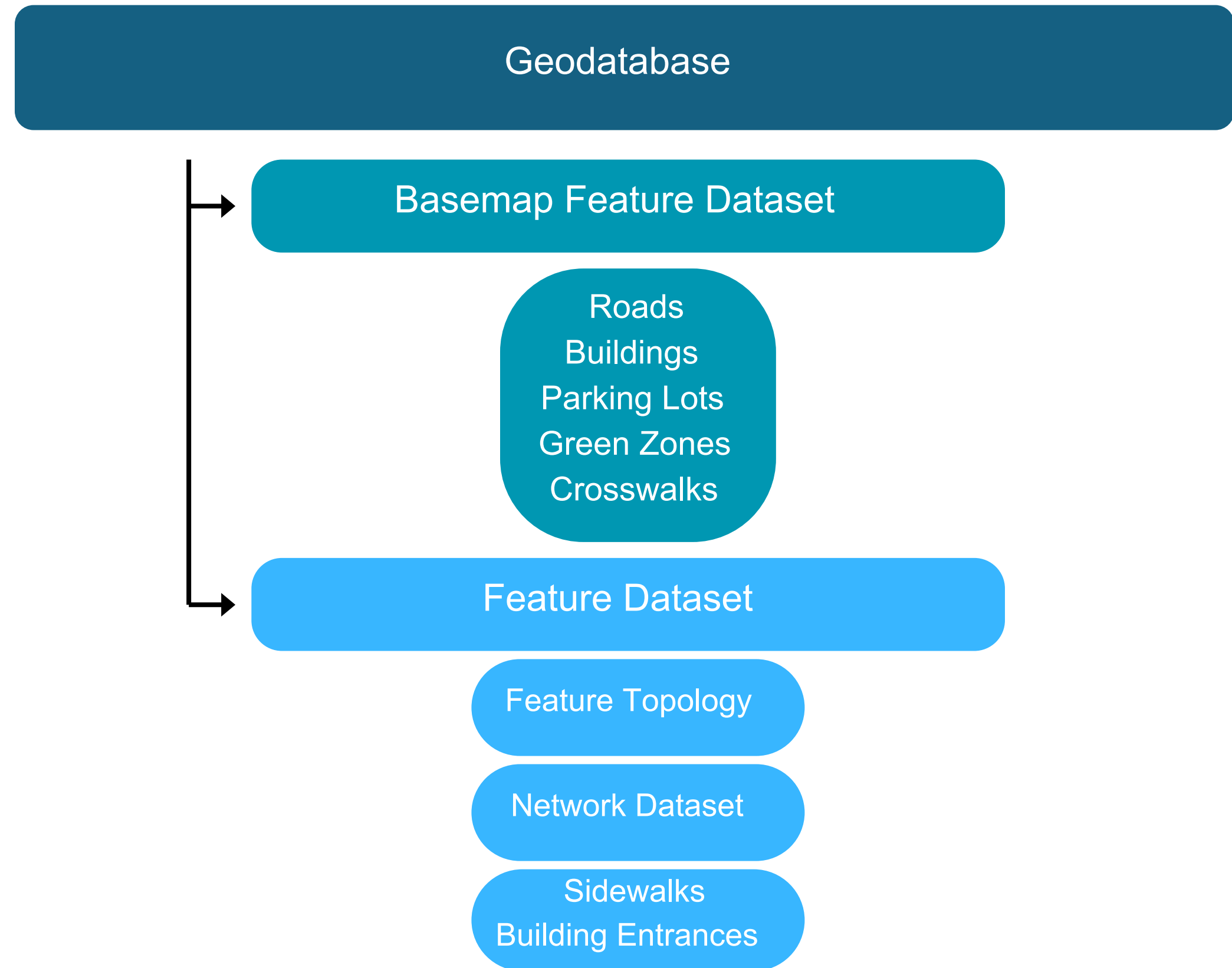
## Texas State University, San Marcos Campus Map

Texas State University Campus Basemap Geodatabase Development Project: Phase 1



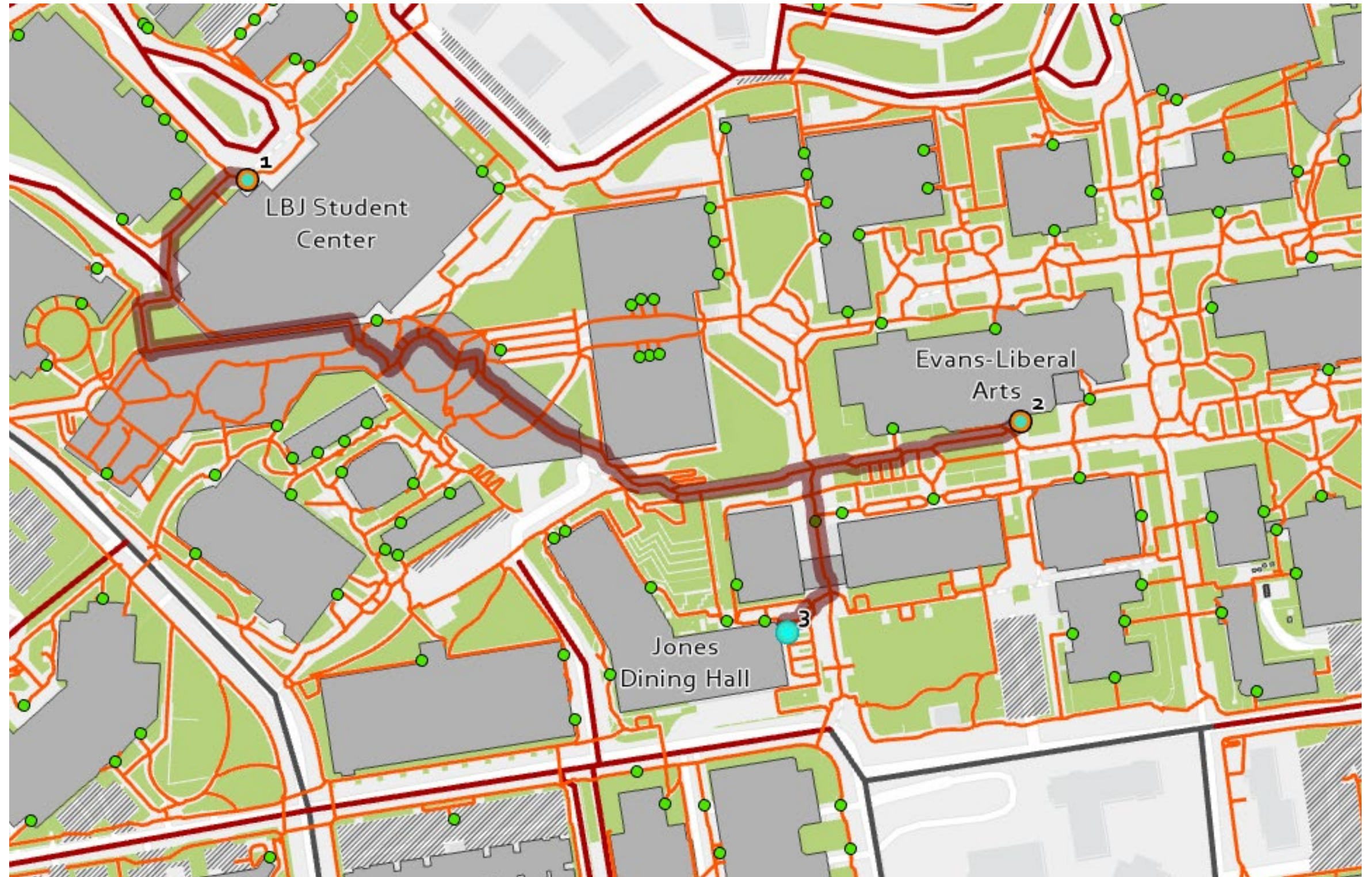
# Results

- Geodatabase with standardized feature classes
- Both old data and new data support data integrity and are easily accessible



# Results

- Network dataset with routing capabilities
- Able to route between selected buildings
- Routes display shortest walking distance in feet



# Discussion

The manual sidewalk digitization and building entrance placement were time and labor intensive

Wayfinding test was constrained to a basic route between two or three stop locations

Simplified sidewalk layer created specifically for network testing

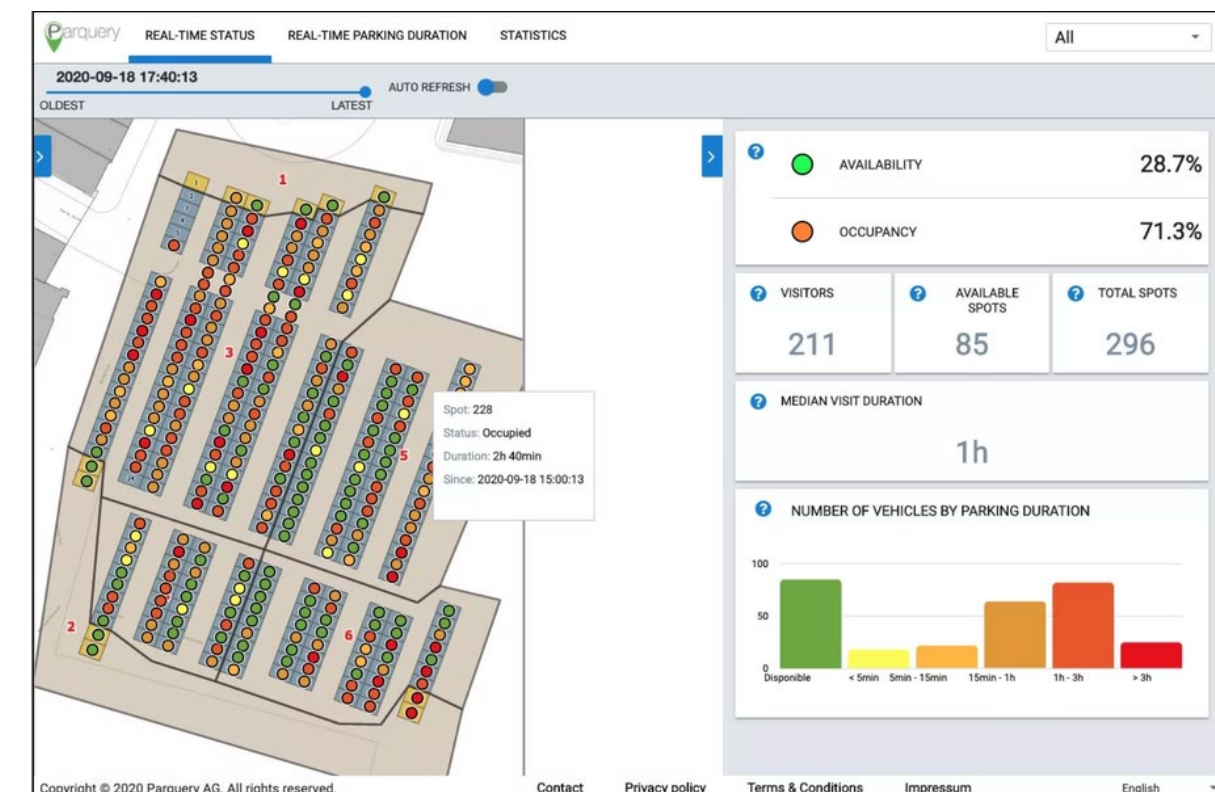


# Future Recommendations

Incorporate **ADA-relevant attributes** into network layers

Integration of **real-time parking data**

Incorporate ADA attributes and traversal time to produce **more realistic routing outputs**.



Credit: Parquery.com

# Conclusion



Our constructed geodatabase serves as the foundation for future university geospatial operations.



Much of the project was labor and time intensive, but necessary to ensure data quality.



The university can now build on our work through development of wayfinding, ADA compliance, and web mapping applications





Thank you.  
Questions?