south overland park

TRANSPORTATION PLAN

HNTB

OVERLAND PARK
KANSAS
ABOVE AND BEYOND. BY DESIGN.

FINAL

February 2015

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Executive Summary

Overland Park has been one of the fastest growing communities in Johnson County and the State of Kansas for the past few decades. The City's growth has primarily been from north to south over those decades. Today, the majority of the City's developable land is located in the southern portion of the City's incorporated boundary. One of Overland Park's keys to success has been to consistently provide efficient transportation for the mobility of people and goods.

However, the City will need to develop a transportation plan in south Overland Park that is different than the rest of the City. The infrastructure needs in south Overland Park are different because:

- South Overland Park is the last remaining area of the City with unimproved transportation infrastructure,
- The study area is different than the rest of the City:
    - Low density residential shown in the future land use plan
    - Steep grades make it difficult to develop
    - Floodplain of the Blue River make it difficult to develop
- The public has expressed a change in what they want in their transportation system (e.g. bicycle routes, lower speeds, and more facilities for pedestrians)

The primary message of change in how Overland Park plan's transportation is from a standard one-size-fits-all roadway section of 4-lane divided with dual left turn lane median width to street roadway sections that better fit the expected traffic and needs of all modes of mobility. Also, residents' expectations of an extremely high level of service in the City's thoroughfare system may not be relevant in the study area. Finally, residents have expressed a desire for transportation investments to be in "complete streets".

This change in how Overland Park develops a transportation system is needed for a number of reasons. First, roads are expensive. National, state, regional and local funding is limited and planning only what is needed will stretch limited financial resources further. This will allow the City to deliver capacity and safety needs sooner to more residents and businesses, provide more multi-modal transportation options and preserve green space.

The South Overland Park study limits are 159th Street on the north, Johnson/Miami County line on the south, Lackman Road/Black Bob Road on the west and the State Line Road and the state line boundary on the east. Also included in the study area is Quivira Road from 151st Street to 159th Street. The study analyzed all thoroughfare roadways within the study area. The study area represents an area approximately 7 x 8 square miles, 112 roadway centerline miles, and over 252 lane miles.

Recommended Plan

The recommended plan provides many benefits. First, the recommended plan saves costs by only building roadways that meet forecasted traffic demand. The recommended plan is scalable because the City would still buy the necessary right-of-way for a four-lane divided thoroughfare, should conditions change. Finally, the recommended plan meets the needs expressed by citizens by providing a complete street that addresses all mobility needs.

The study analyzed 2040 and full build out land use conditions in the study area. However, the recommended transportation plan is not based on a comprehensive transportation study. For example, the City is currently working on a City-wide bicycle master plan. There are a number of other issues that should be taken into account to inform future discussions of how to build out the transportation system. Some of these other issues include roadway safety, access control, costs and aesthetics

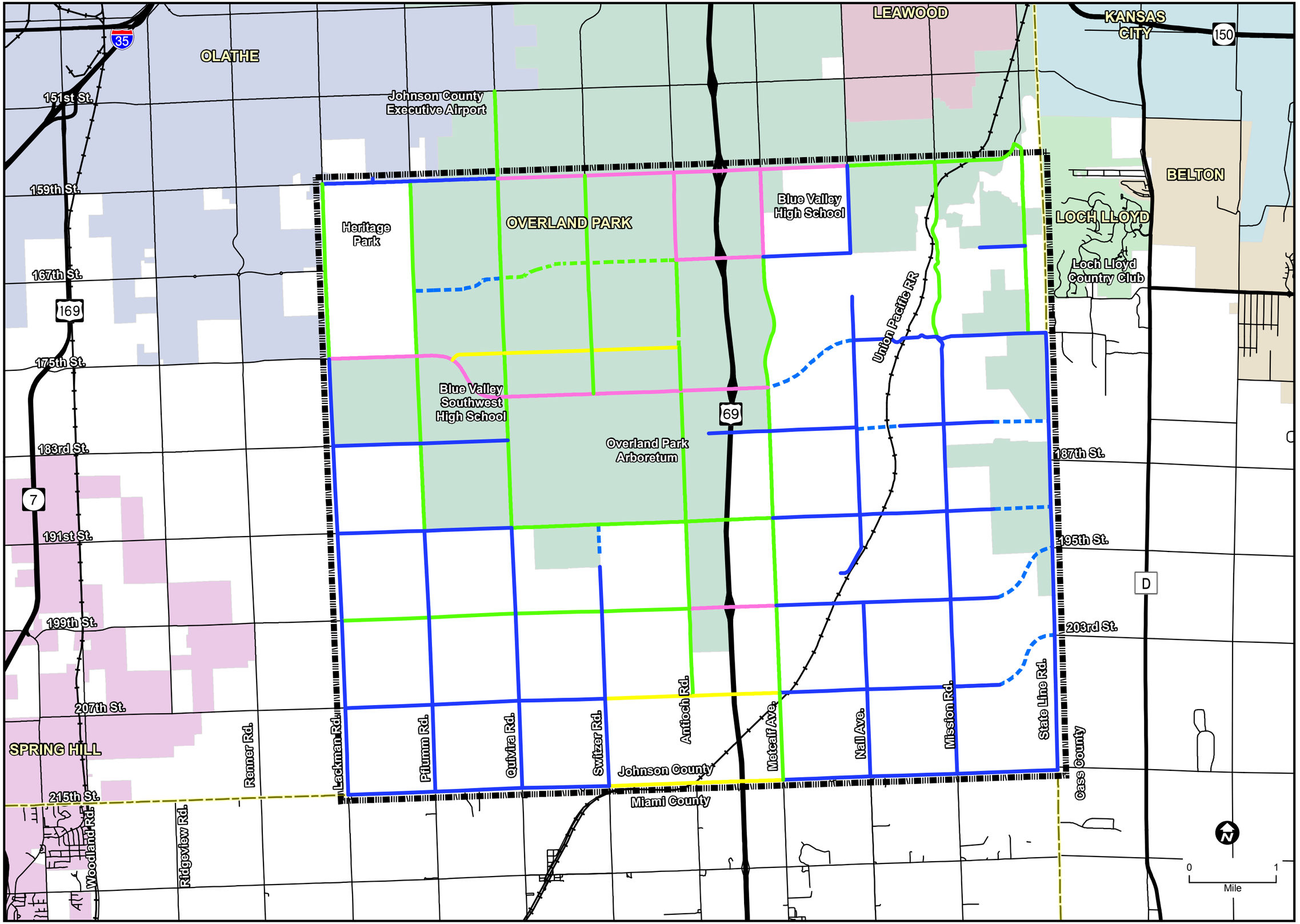
There are a number of factors that could affect the recommended plan.

- Changes in Overland Park land use type and density from the Future Land Use Plan.
- Changes in land use and/or transportation infrastructure outside the City of Overland Park (neighboring communities and regional changes).
- Local and regional economic conditions.
- Implementation of missing link improvements as they generate greater demand on peripheral roadways.
- Changes in travel characteristics (e.g. gas prices, technology, etc.).

Finally, the capacity of the thoroughfares can be extended by the following actions:

- Proper maintenance and geometric improvements
- Proper collector network layout including a grid network of local streets with fewer cul-de-sacs
- Missing link roadway improvements
- Proper corridor access management
- Proper intersection capacity improvements
    - Turn lane capacity
    - Intersection control (e.g. roundabouts, traffic signal, stop control)
- Good planning - development pattern and land use mix affect peaking characteristics

An implementation plan was not developed for the recommended plan. The City will now use this data to determine prioritization of roadway projects. The priority formula should be based on safety, traffic demand and economic development.



South Overland Park Transportation Plan

Recommended Capacity Improvements

Legend

- Study Area
- County Boundaries

Recommendations

- 2-Lane Ultimate
- 2-Lane Interim and 4-Lane Ultimate
- 3-Lane Interim and Ultimate
- 4-Lane Interim and Ultimate

Note: Dashed lines represent missing or relocated links. Color corresponds to legend above.

Note: Data from 2040 Traffic Model

Sources: Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

1.0 Introduction

Overland Park has been one of the fastest growing communities in Johnson County and the State of Kansas for the past few decades. The City's growth has primarily been from north to south over those decades. Today, the majority of the City's developable land is located in the southern portion of the City's incorporated boundary. One of Overland Park's keys to success has been to consistently provide efficient transportation for the mobility of people and goods.

However, the City will need to develop a transportation plan in south Overland Park that is different than the rest of the City. This infrastructure needs in south Overland Park are different because:

- This is the last remaining area of the City with unimproved transportation infrastructure,
- The study area is different than the rest of the City:
  - Low density residential shown in the future land use plan
  - Steep grades make it difficult to develop
  - Floodplain of the Blue River make it difficult to develop
- The public has expressed a change what they want in their transportation system (e.g. bicycles routes, lower speeds, more facilities for pedestrians)

The primary message of change in how Overland Park plan's transportation is from a standard one-size-fits-all roadway section of 4-lane divided with dual left turn lane median width to street roadway sections that better fit the expected traffic and needs of all modes of mobility. Also, residents' expectations of an extremely high level of service in the City's thoroughfare system may not be relevant in the study area. Finally, residents have expressed a desire for transportation investments to be in "complete streets".

163rd & Metcalf Eastbound

This change in how we develop a transportation system is needed for a number of reasons. First, roads are expensive. National, state, regional and local funding is limited and planning only what is needed will stretch limited financial resources further. This will allow the City to deliver capacity and safety needs sooner to more residents and businesses, provide more multi-modal transportation options and preserve green space.

The South Overland Park Transportation Plan focused solely on existing and future roadway capacity/travel demand needs. The Transportation Plan is based on existing and future roadway travel demand using the City's travel demand model. The Plan is a high level study and was not intended to be a comprehensive multimodal transportation plan. The primary study objectives were to:

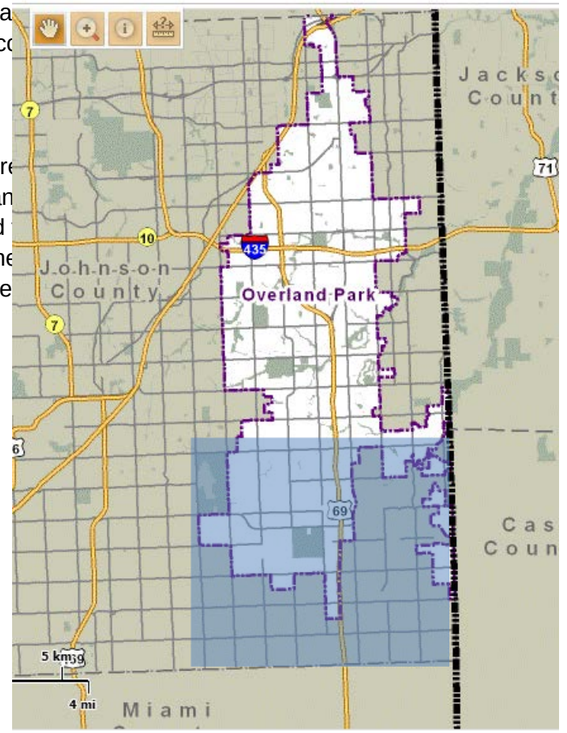
- Determine existing and future roadway and intersection traffic needs using the Overland Park TransCAD travel demand model,
- Develop a range of roadway classification and design standards, and
- Develop a South Overland Park Transportation Plan that will be used as a basis to update the City's Transportation Master Plan

Overland Park is undertaking this study because in the past the City built 4-lane divided thoroughfare roadways to serve the higher density growth it wa determine the type of roadway facilities needed to acc

Project Description and Location

The South Overland Park study limits are 159th Stre south, Lackman Road/Black Bob Road on the west an east. Also included in the study area is Quivira Road all thoroughfare roadways within the study area. The square miles, 112 roadway centerline miles, and ove limits.

Figure 1
Vicinity Map



2.0 Study Methodology

The study provided a quantitative analysis of the traffic demand in south Overland Park. The study methodology was comprised of 1.) data collection and analysis, 2.) OP Travel Demand Model analysis and 3.) study team discussions.

1.) Data Collection and Analysis

- Available daily and peak hour traffic counts (City and County)
- New traffic counts were collected at 10 locations
- Geometric data was collected through Google maps and field reconnaissance
- Other data was provided by the City's and County's GIS databases

2.) Travel Demand Model

The current Travel Demand Model was used to analyze future traffic demand in the study area. The 2010 travel demand model was compared to new 2014 traffic counts collected. The model counts and collected data were found to be within 10% of each other on average. Therefore, raw model output was used for this study.

The following travel demand model scenarios were analyzed.

1. **2010 Existing Base Model –** Existing land use with existing roadway network.

2. **2040 Modified Missing Links –** City staff identified the missing roadway links in the study area expected to be built by 2040. These roadway links were coded into the 2040 Base Model. 2040 land use was based on the Overland Park Future Land Use Plan (2040 land use represents approximately 70% of full build out land use). All thoroughfare roadways in the study area were initially coded as 2-lanes except those that are currently 4-lane along 159th Street and Antioch Road.

3. **Full Build Modified Missing Links** – The 2040 modified missing links scenario with full build out land use was used. The same roadway network as Scenarios 2 was used.

4. **Recommended South Streets Model(s)** – 2040 and Full Build models with recommended capacity improvements in the study area.

The number of thoroughfare miles was analyzed for each scenario. The number of miles changes between each scenario primarily due to the number of missing links that are improved. Roadway volume to capacity (V/C) was the primary measure of effectiveness used to evaluate the roadway network. In order to evaluate the volume to capacity of each roadway, Table 1 was used.

Table 1
Thoroughfare Peak Hour Volume/Capacity Thresholds

Threshold Level	A-C Uncongested	D Under Capacity	E Near Capacity	F Over Capacity
Volume/Capacity Ratio	≤0.5	≤0.85	≤1.0	>1.0
Peak Hour Volume per Lane	≤595	≤700	≤840	>840
Color	Green	Yellow	Orange	Red

Source: HCM 2010

The Overland Park Travel Demand Model is a link based model. Link capacities in the model have been reduced to account for intersection capacities. Model link capacities are coded in with 700 vehicles per hour per lane (vphpl). A more reasonable roadway capacity, defined by the Highway Capacity Manual, is 850 vphpl. As a result, model output volumes were compared to 850 vphpl instead of 700 vphpl when analyzing volume to capacity (v/c). Therefore, 850 vehicles per hour per lane (vphpl) was assumed to be the single lane capacity of an arterial. A V/C of 0.85 was used in this study as the threshold at which "unstable" conditions begin based on the capacity of 850 vphpl, If 850 vphpl represents the capacity (v/c = 1.0) or the LOS E maximum threshold, than 0.85 was used to represent the LOS D maximum threshold.

207th & Switzer Southbound

3.) Study Team Discussions

In addition to the technical analysis, the study team met a number of times to discuss the study inputs and results with the City and others. Below is a summary of each meeting date and the meeting purpose.

- Meeting 1 – Study expectations and initial inputs (February 12, 2014)
- Meeting 2 – Met with adjacent community partners to discuss land use and transportation (Johnson County, Olathe, Spring Hill, Miami County) (March 28, 2014)
- Meeting 3 – Presented preliminary results (June 24, 2014) to staff
- Meeting 4 – Working session to review the revised preliminary results (July 23, 2014) to staff
- Meeting 5 – Final results presented to City Council

3.0 Existing Transportation Conditions

The existing transportation conditions in the study area provide the baseline conditions of the transportation system. Existing baseline information includes a qualitative and quantitative assessment of travel, land use, and demographic characteristics. The following section summarizes Exhibits 1 through 9 in the Appendix.

The study area primarily consists of thoroughfare streets organized in a one-mile square grid. The thoroughfare grid network is split north-south by US 69, which runs between Antioch Road and Metcalf Avenue. East-west roads are numbered increasing from north to south from 159th to 215th. North-south roads are named starting with Lackman Road on the west and ending with State Line Road on the east. The Union Pacific Railroad runs through the study area in generally a north/east to south/west direction. There is a number of missing thoroughfare roadway links identified on Exhibit 1.

The existing land use within the study area and region is shown on Exhibit 2. The majority of the land is currently vacant or used for agriculture, with scattered areas of residential use. Nearly all residential zoning within the study area is for single family use. There are three notable industrial areas in the northern half of the study area, totaling approximately one square mile. All three industrial areas are located within 1.5 miles of US 69. There is a small amount of commercial land located within one mile of the US 69 and 199th Street interchange, and a very small amount of commercial land located between 159th and 167th Streets within a half mile of the highway. There are a number of public spaces in the study area consisting of Heritage Park, Overland Park Arboretum as well as public schools Blue Valley Southwest, Blue Valley West and Blue Valley High School in addition to other Blue Valley elementary and middle schools. A large portion of the study area east of US 69 is undevelopable due to the Blue River.

The existing thoroughfare surface type of paved and unpaved roads where data is available is shown on Exhibit 3. Of the 132 existing roadway miles, 106 miles (80%) of the study area roadways are paved and 26 miles (20%) of the roadways are unpaved. The majority of the unpaved roads are located in the southwest and southeast corners of the study area. Exhibit 4 shows the existing number of thoroughfare lanes. Of the 120 roadway miles, 116 miles (96.3%) are two-lane thoroughfares and 4 miles (3.7%) are four-lane thoroughfare roadways. Exhibit 5 shows the existing intersection control and thoroughfare roadway posted speeds. There are currently two signalized intersections at Antioch Road and 159th Street as well as Metcalf Avenue and 159th Street. Construction on ramps to and from 159th Street and US 69 started in 2014. These ramp intersections are planned to be signalized. All other thoroughfare to thoroughfare intersections are controlled by a stop sign in a combination of ways ranging from one approach stop to all-way stop.

Exhibit 6 shows the existing pavement condition of the thoroughfare roads ranging from very good to fair/poor. As shown in Table 2, 18% of the thoroughfare roads have a rating of fair or fair/poor. Those roadways are concentrated in isolated areas along the state line and in the northwest quadrant of the study area near Heritage Park and the Johnson County Executive Airport. Table 2 provides a summary of the existing pavement conditions within the existing City limits.

Table 2
Existing Pavement Conditions
(City of Overland Park Only)

Pavement Rating	Miles	Percent
Very Good	3.5	8.4%
Good	24.9	49.4%
Good/Fair	14.8	24.2%
Fair	5.19	10.3%
Fair/Poor	3.39	7.7%
Total	**51.78**	**100%**

Source: Overland Park

Exhibit 7 shows the existing average daily traffic for intersections and thoroughfares. Higher daily volume intersections are located along the 159th Street and Metcalf Avenue corridors. Lower daily volume roadways are primarily located on the south and east sides of the study area. Exhibit 8 shows the existing PM peak hour approach volumes of select intersections where data was collected. The PM peak hour traffic data mirrors the daily traffic, whereas the higher traffic demand is located along the 159th Street corridor and the lower traffic volumes are located along the southern and eastern portions of the study area. Exhibit 9 shows the existing PM peak hour volume / capacity ratios using Overland Park's travel demand model for the thoroughfare roadways and Highway Capacity Manual intersection level of service analysis where new traffic counts were collected. As shown, all study area thoroughfares and intersections are performing at a very good level with no capacity problems.

183rd & State Line Southbound

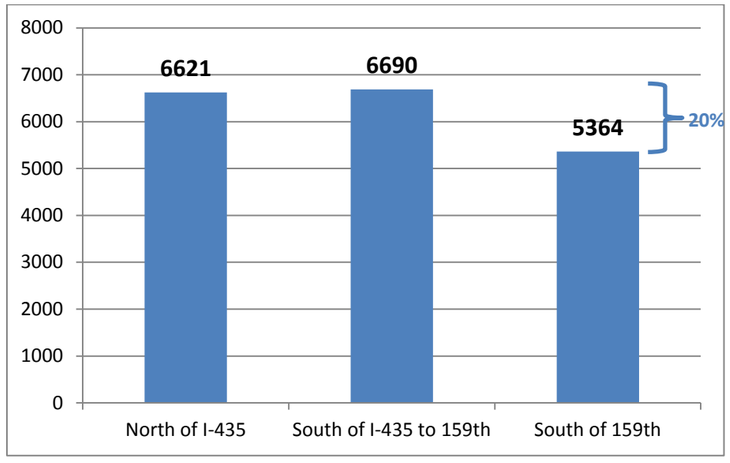
4.0 Future Transportation Conditions

The future transportation conditions in the study area provide the basis for the recommended transportation plan. Future information includes a qualitative and quantitative assessment of 2040 and full build travel, land use, and demographic characteristics provided by the City. The following section summarizes Exhibits 10 through 21 in the Appendix.

The future regional land use for the study area and broader area shows that the majority of the study area's land use in the future is planned to transition from vacant/agriculture to low or very low density single family residential. Along State Line Road and near Blue Valley Southwest High School, some of the land is expected to be medium density residential. There is a significant portion of the study area that will be set aside for parks and open space. This is partially due to the Blue River drainage basin that runs through the study area. Commercial land use is planned along 199th Street near the US 69 interchange and at the 199th and Quivira intersection. South of the US 69 and 199th Street interchange, a sizeable industrial area is envisioned, as shown in Exhibit 10.

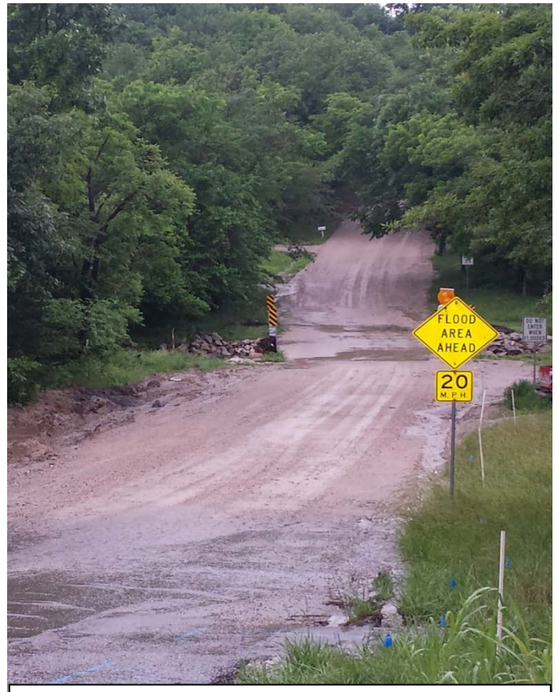
The study area is planned to have a lower population density than other parts of the City. Table 3 shows that the study area has a population density that is 20% less dense than the area to the north between I-435 and 159th Street.

Table 3
Existing and Planned Residential Population in Overland Park
People per Sq. Mile Density
(Full Build Out Residential Land Use Only)



Source: Overland Park

Exhibit 11 shows the future planned thoroughfares from Overland Park's Future Development Plan and Johnson County's Comprehensive Arterial Roadway Network Plan (CARNP). Both plans show a distribution of 2-lane and 4-lane roadways in the study area. Four-lane roadways are primarily concentrated in the northern portion of the study area. Exhibit 12 shows future development opportunities as defined by slopes less than 7% and planned sewer expansion by Johnson County Water. The east side of the study area has the most slopes that are greater than 7% indicating a difficulty to build in the Blue River watershed. Also, there are no plans for sewer expansion for a majority of the east side of the study area. The west side of the study area shows greater potential for development with less steep slopes and more sewer expansion plans over the next 20-years. Exhibit 13 shows future known proposed developments in the study area. The majority of the developments are single family residential and planned parks. The residential developments will be traffic generators but at a lower number of trips than office, commercial and industrial land uses.



175th & Mission Westbound

2040 Future Modified Missing Links Scenario

Model Input

City staff identified the missing roadway links in the study area expected to be built by 2040. These roadway links were coded into the 2040 Base Model. 2040 land use was based on the Overland Park Future Land Use Plan (2040 land use represents approximately 70% of full build out land use). All thoroughfare roadways in the study area were initially coded as 2-lanes except those that are currently 4-lane along 159th Street and Antioch Road. The 2040 modified missing links model number of lanes is shown in Exhibit 14. Exhibit 15 shows the future 2040 base model missing links. There were 14 missing links identified in the study area. Based on feedback from City staff, a reasonable set of missing links that would be built by 2040 were identified.

Model Output

Exhibit 16 shows the future 2040 modified missing links model two-way PM peak hour volumes. Traffic demand from the Overland Park model is shown in Table 4.

Exhibit 17 shows the future 2040 modified missing links PM peak volume/capacity ratio. Table 5 shows the volume / capacity for 2040 modified missing links.

Full Build Future Modified Missing Links Scenario

Model Input

The full build modified missing Links scenario modified the anticipated missing link improvements to be the same as the 2040 missing links, but used full build out land use instead of 2040 land use. This represents a 30% increase in land use. Exhibit 18 shows the future full build modified missing links. There were 14 missing links identified in the study area. Based on feedback from City staff, a reasonable set of missing links that would be built by 2040 were identified. Exhibit 19 shows the future full build base modified missing links number of lanes. Similar to the other scenario, the model was coded with 2-lane thoroughfares everywhere except 159th Street between Antioch Road and Metcalf Avenue.

Model Output

Exhibit 20 shows the future full build modified missing links model two-way PM peak hour volumes. Traffic demand from the Overland Park model is shown in Table 4. As shown in the Table, 88% of the roadway miles generated a 2040 traffic volume of less than 1,700 two-way vehicles representing a 2-lane roadway need. This is compared to the 70% of the roadway miles that generated a forecasted full build traffic volume of less than 1,700 two-way vehicles representing a 2-lane roadway need.

Table 4
Two-Way Peak Hour
2040 Modified Missing Links
Compared to
Full Build Modified Missing Links Volumes

Peak Hour Vehicles	Lane Capacity	2040 land use		Full Build land use	
		Miles	Percent	Miles	Percent
< 1700	< 2 - lane	125.4	87.9%	100.3	70.2%
1701 – 3,400	2 to 4 - lane	10.0	7.0%	32.7	22.9%
> 3,400	> 4 - lane	7.2	5.1%	9.7	6.9%
	Total	**142.6**	**100%**	**142.7**	**100%**

Source: Overland Park Model

Exhibit 21 shows the full build modified missing links PM peak hour volume/capacity ratio. As shown in Table 5, 95% of the roadway miles in the study area had a volume to capacity ratio of <1.0 with 2-lane roadways coded in 2040. By, full build, 78% of the roadway miles in the study area had a volume to capacity ratio of <1.0 with 2-lane roadways coded.

Table 5
Two-Way Peak Hour
2040 Modified Missing Links
Compared to
Full Build Modified Missing Links Volume / Capacity

Peak Hour V/C	2040 land use		Full Build land use	
	Miles	Percent	Miles	Percent
< 0.5	77.4	54.2%	33.0	23.1%
0.5 – 0.85	49.4	34.6%	48.1	33.7%
0.85 – 1.0	8.6	6.0%	30.0	21.0%
> 1.0	7.3	5.2%	31.5	22.2%
Total	**142.7**	**100%**	**142.6**	**100%**

Source: Overland Park Model

Intersection Control

Determination of intersection control is based on a number of factors. These factors include safety, traffic demand and timing of the traffic demand, pedestrian and bicycle demand, right-of-way, and cost. Often these decisions are made by performing a warrant analysis to determine intersection control. However, public and political input can also enter the decision. In conclusion, it is not reasonable to identify the future intersection control of nearly 100 intersections in the study area at this high level of study.

As a result, the forecasted traffic demand from Overland Park's Travel Model was plotted on graphs for the three model scenarios analyzed in the study, as shown in Figures 2 and 3 on the following page. For comparison purposes, a theoretical threshold for single lane and two-lane roundabouts are shown on the graph along with the Manual of Uniform Traffic Control Devices (MUTCD) signalized intersection threshold range. Finally, eight existing intersections in Overland Park are shown on the graph for comparison purposes. The eight intersections are:

1. 133rd and Lamar — Roundabout
2. Santa Fe and Conser — Roundabout
3. 91st and Switzer — Four-Way Stop
4. Santa Fe and 71st Street — Four-Way Stop
5. Lowell and 87th Street — Four-Way Stop
6. Roe Avenue and 99th Street — Four-Way Stop
7. Nall Avenue and 83rd Street — Traffic Signal
8. Frontage Road and Farley — Traffic Signal

Figure 2

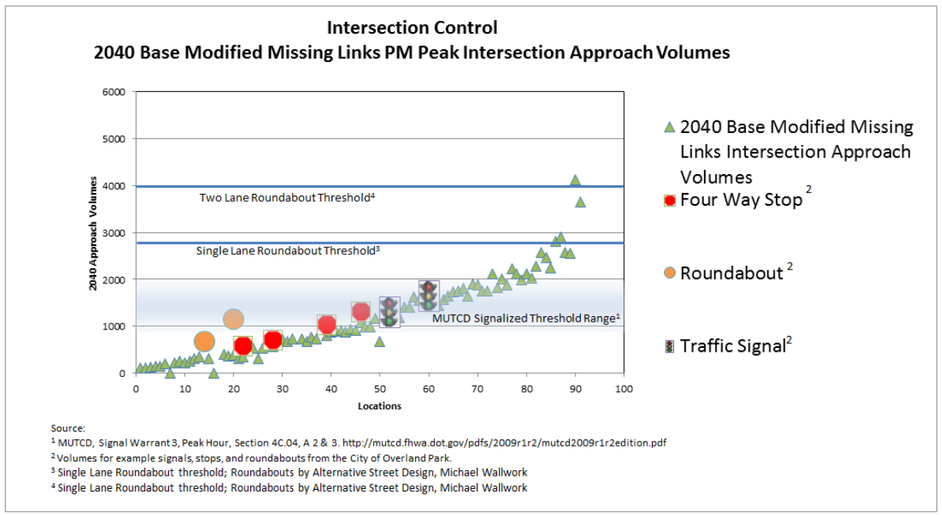
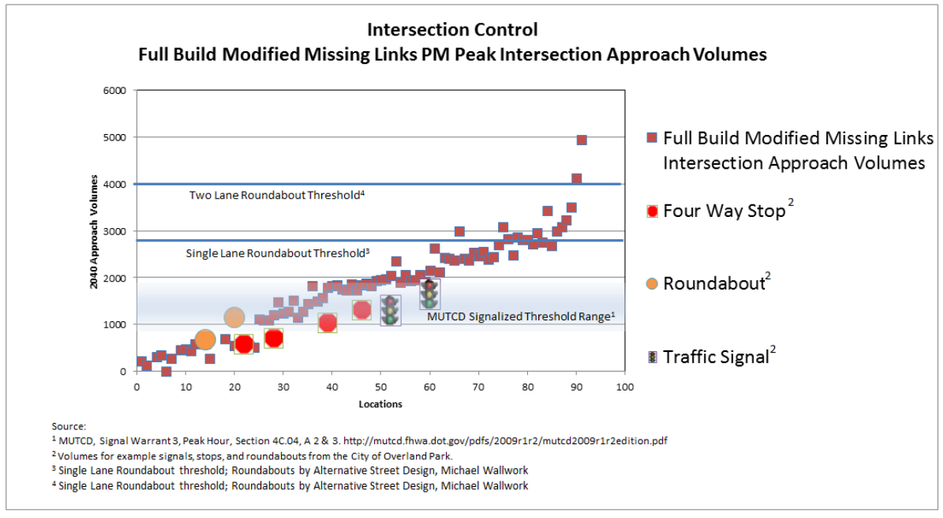


Figure 3



As shown in Figure 2, the vast majority of the intersections in 2040 are low volume intersections with only a dozen intersections above the 2,000 PM peak hour total volume threshold. This indicates that the vast majority of the intersections could be controlled with a single lane roundabout, stop control or signalized intersection if desired. Full build conditions, shown in Figure 3, shows more intersections above the 2,000 PM peak hour vehicle threshold but still the majority are in the range of a stop sign or roundabout control being adequate.

Typical Sections

The first step in developing a range of typical sections was to determine the 2040 and full build capacity for the thoroughfare roadways in the study area. From this data the required number of lanes for each roadway was determined. Several options were analyzed for each lane configuration as well as upgradability from the 2040 lane designations to the full build lane designations. Through this analysis there were a number of conditions that were exhibited throughout the study area and a range of typical section that could be used in the study area was developed.

Two-Lane Road

The first condition exhibited were existing thoroughfare roadways that were unimproved two-lane roadways that would only require a two-lane section in the future. A 2-lane road typical section could take advantage of a 120’ right of way and include 6’ bike lanes, a 10’ Bike/Hike trail, and a 5’ sidewalk. Ditches can also be utilized with this typical section.

Two-Lane Expandable Road, Four-Lane Road

The second condition exhibited was existing thoroughfare roadways that were unimproved two-lane roadways that would only require a two-lane section in the 2040 condition, but could be expanded to a four-lane section in the future full build condition. Some example typical sections include:

- Two-lane undivided expandable to a four-lane undivided typical section provides a standard two-lane section centered on the centerline that could be widened to four-lanes in the future. This option allows for a curb and gutter section or a ditch section in the expandable and four lane condition.

- Two-lane divided expandable and four-lane divided typical section takes advantage of a shoulder section with the median being used for water quality and drainage conveyance or the section could have a raised median. This option allows for the four-lane section being developed within the existing median.

- Two-lane undivided expandable and four-lane divided typical section includes a more standard curb and gutter section with the expandable two-lane section being offset of the centerline allowing the future four-lane section to be developed with minimal removal.

All sections could include 6’ bike lanes and a 10’ Bike/Hike trail in the expandable condition. The typical sections could include a 5’ sidewalk in the expandable condition and the third typical section adds the 5’ sidewalk.

Three-Lane Road

Another typical section option is an existing thoroughfare roadway that would be an unimproved two-lane roadway that would only require a three lane section in the future full build condition. This section may include 6’ bike lanes, a 10’ Bike/Hike trail, and a 5’ sidewalk. Ditches or curb and gutter could be utilized with this section.

Four-Lane Road

Another condition exhibited was existing thoroughfare roadways that were either improved or unimproved two-lane roadways that would require a four-lane section in the 2040 and full build conditions. Overland Park’s standard four-lane section with the addition of bike lanes could be used. This section may include 6’ bike lanes, a 10’ Bike/Hike trail, and a 5’ sidewalk.

Ultimately, the typical sections described above are a tool to assist design engineers in selection of the proper street section. Future typical sections may be similar or different than what is described above. Bike lane additions should consult the City’s Bicycle Master Plan.

Costs

Conceptual construction costs were analyzed for the two-lane section with ditches and the four-lane section. The base conceptual construction cost per mile for the two-lane section is approximately $4.2 million dollars and the base conceptual construction cost per mile for the four-lane section is approximately $8.3 million dollars. These costs are in 2014 dollars and do not include cost for potential bridges, large retaining walls, or traffic signals.

183rd & State Line Southbound

5.0 Recommended South Overland Park Transportation Plan

A good transportation system has been one of the cornerstones of Overland Park's success since its inception. As the City continues to grow southward, a transportation system that provides for the efficient transportation mobility of people and goods and access to property is paramount. The recommended south Overland Park transportation plan represents the City's blueprint for capacity improvements in the study area. The recommendations are based on the existing and future data presented in Chapters 3 and 4. Exhibit 24, shown on the next page and in the Appendix, shows the recommended plan. The Plan shows expandable improvements through 2040 and full build out capacity needs after 2040. The recommended plan will be used to update the City's Transportation Plan.

Exhibit 22 shows the recommended transportation plan volume / capacity results for 2040. Table 6 shows the 2040 recommended plan volume to capacity. As shown, the recommended plan would have 96% of the roadway miles with a V/C of < 1.0 representing an under capacity condition.

Table 6
2040 Modified Missing Links Compared to
2040 Recommended Plan Volume / Capacity

	2040 Recommended Plan	
V/C	**Miles**	**Percent**
< 0.5	85.5	60.0%
0.5 – 0.85	45.1	31.6%
0.85 – 1.0	6.0	4.2%
> 1.0	6.0	4.2%
Total	**142.6**	**100%**

Source: Overland Park Base Model

Exhibit 23 shows the recommended transportation plan volume / capacity results for the full build out land use. Table 7 shows the full build recommended plan volume to capacity. As shown, 94% of the roadway miles are expected to have a V/C of < 1.0 representing an under capacity condition for the recommended plan.

Table 7
Full Build Modified Missing Links Compared to
Full Build Recommended Plan Volume / Capacity

	Full Build Recommended Plan	
V/C	**Miles**	**Percent**
< 0.5	49.3	34.6%
0.5 – 0.85	70.9	49.8%
0.85 – 1.0	13.5	9.5%
> 1.0	8.7	6.1%
Total	**142.4**	**100%**

Source: Overland Park Base Model

The recommended transportation plan is not a comprehensive transportation study. There are a number of other issues that should be taken into account to inform future discussions of how to build out the transportation system. Some of these other issues include:

- Roadway safety
- Access control
- Costs
- Aesthetics

There are a number of factors that could affect the recommended plan.

- Changes in Overland Park land use type and density from the Future Land Use Plan.
- Changes in land use and/or transportation infrastructure outside the City of Overland Park (neighboring communities and regional changes).
- Local and regional economic conditions.
- Implementation of missing link improvements as they generate greater demand on peripheral roadways.
- Changes in travel characteristics (e.g. gas prices, technology, etc.).

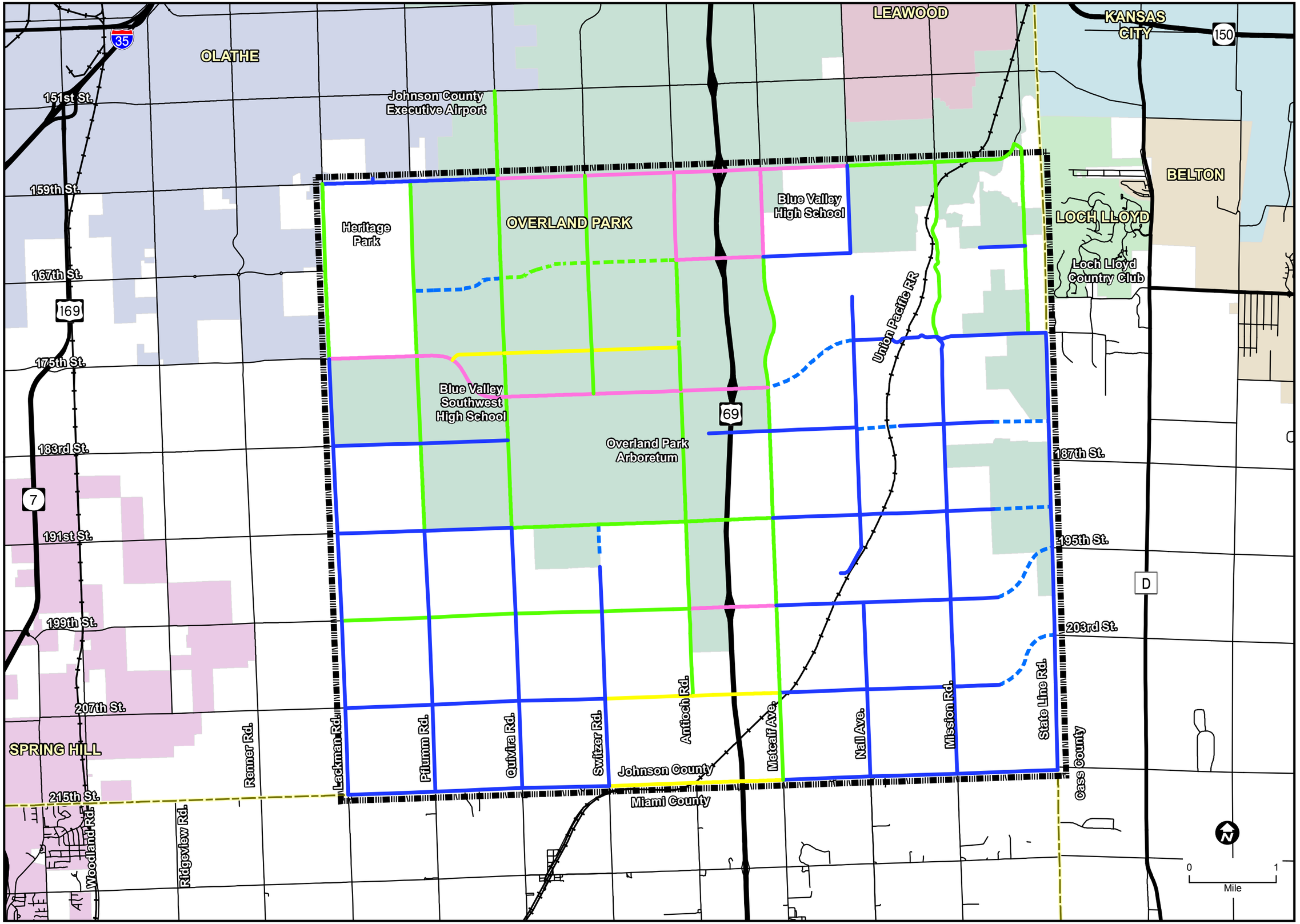
Finally, the capacity of the thoroughfares can be extended by the following actions:

- Maintenance and geometric improvements
- Proper collector network layout including a grid network of local streets with fewer cul-de-sacs
- Missing link roadway improvements
- Proper corridor Access Management
- Proper Intersection capacity improvements
    - o Turn lane capacity
    - o Intersection control (e.g. roundabouts, traffic signal, stop control)
- Development pattern and land use mix affect peaking characteristics

An implementation plan was not developed for the recommended plan. The City will now use this data to determine prioritization of roadway projects. The priority formula should be based on safety, traffic demand and economic development.

Next steps of the south Overland Park Transportation Plan include coordination with adjacent communities. This would include Johnson, Miami and Cass counties as well as the cities of Olathe and Spring Hill. Coordination of the recommended improvements is important within the study area and at the peripheral of the study area. Finally, the plan should be presented to the City Council, where the public will have an opportunity to review and comment on the plan. After all comments are received and any adjustments to the plan are made, the plan can be incorporated into the City-wide transportation plan.

After incorporation of the plan into the City-wide transportation plan, staff will monitor and manage the transportation system within the study area. When transportation corridors are identified for improvement, City staff will perform a more detailed assessment of each corridor's unique design characteristics including typical section and intersection control.



South Overland Park Transportation Plan

Recommended Capacity Improvements

Legend

- Study Area
- County Boundaries

Recommendations

- 2-Lane Ultimate
- 2-Lane Interim and 4-Lane Ultimate
- 3-Lane Interim and Ultimate
- 4-Lane Interim and Ultimate

Note: Dashed lines represent missing or relocated links. Color corresponds to legend above.

Note: Data from 2040 Traffic Model

Sources: Overland Park

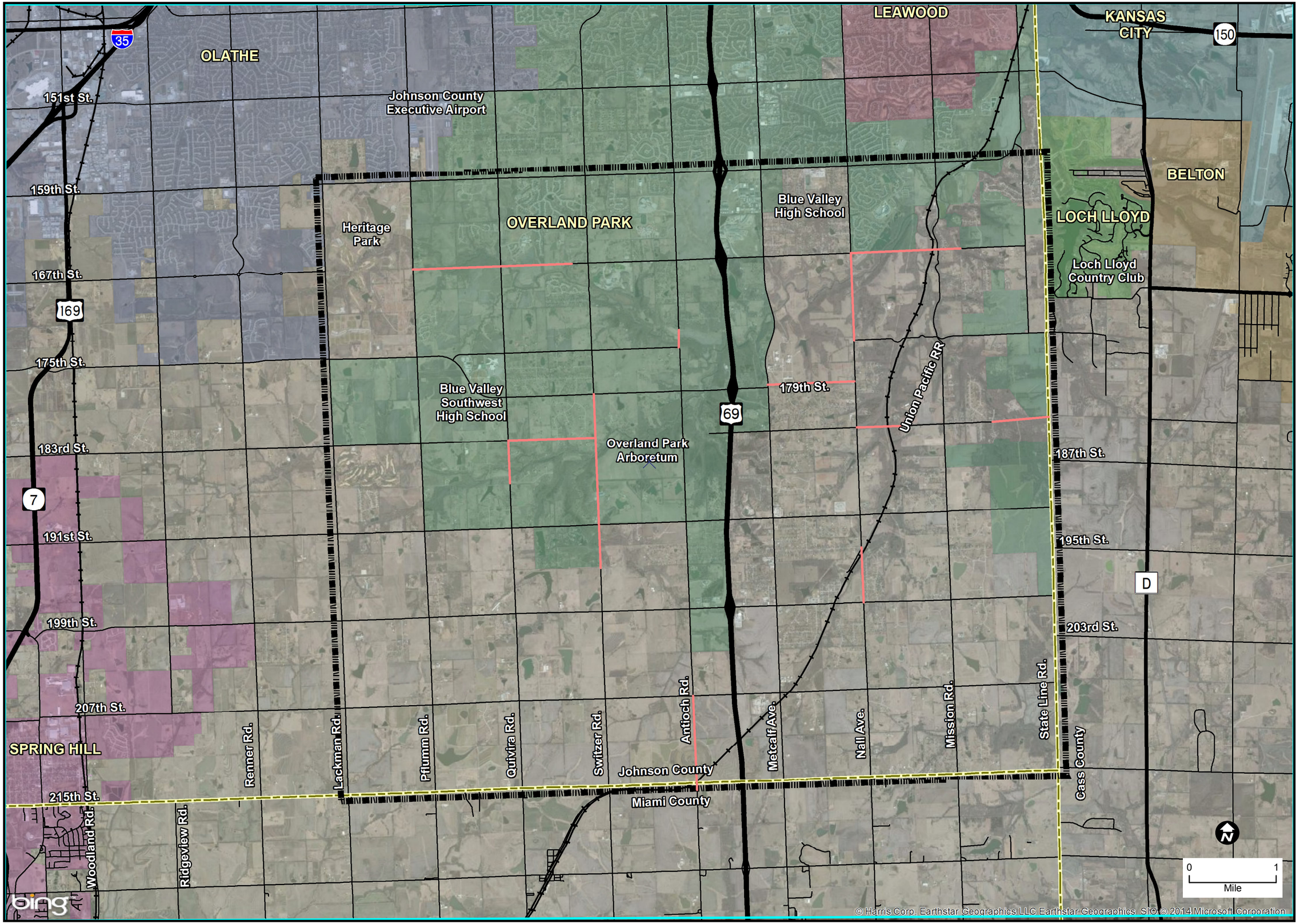
OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

Appendix

South Overland Park Transportation Plan

Exhibit 1
Study Area



Legend

- Missing Arterial Road Links
- Study Area
- County Boundaries
- Arterial Roads

Municipalities

- BELTON
- GRANDVIEW
- KANSAS CITY, MO
- LEAWOOD
- LOCH LLOYD
- OLATHE
- OVERLAND PARK
- SPRING HILL
- FadedBackgro...

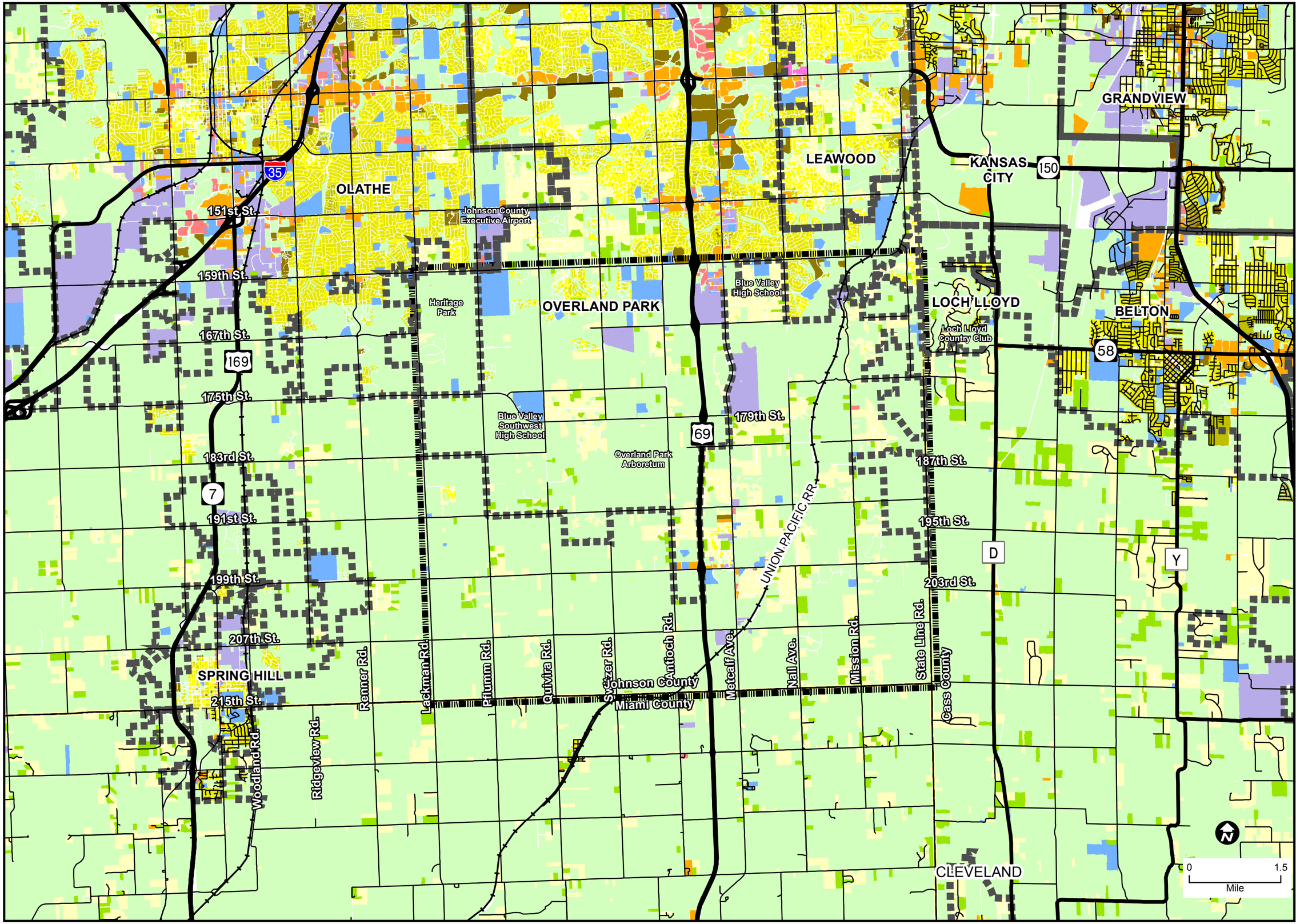
Source: MARC
Johnson County

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 2
Existing Regional Land Use



Legend

- Municipalities
- Study Area
- County Boundaries

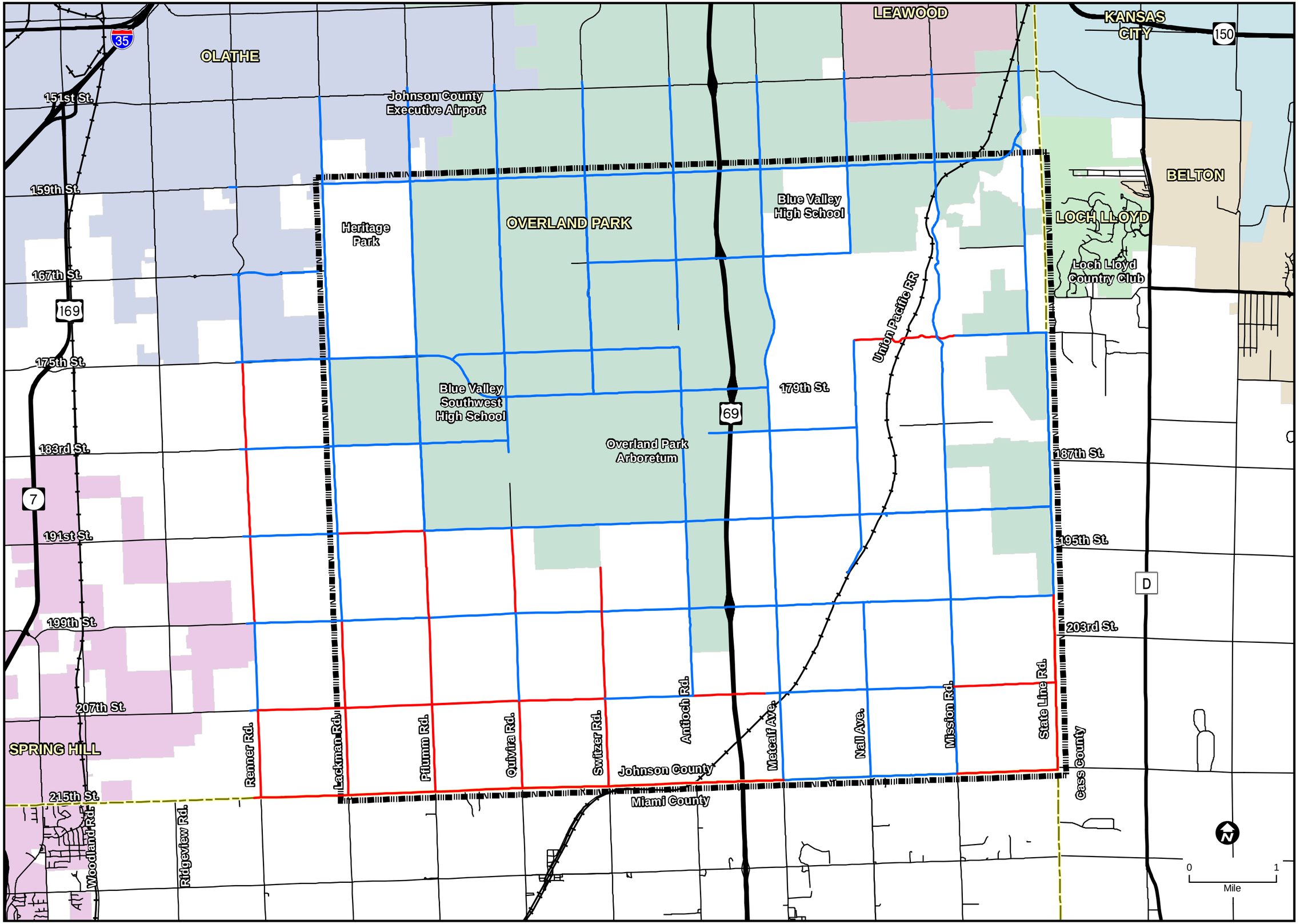
Existing Land Use

- Residential SF - Very Low
- Vacant/AG
- ROW
- Residential SF Low
- Commercial
- Residential SF Medium
- Public/Semi Public
- Residential SF Rural
- Residential MF - Low
- Residential SF - High
- Office
- Industrial/Business Park
- Residential MF - Medium
- Residential MF - Very High
- Residential MF - High
- Mixed Use - Low
- Condo
- Mixed Use - High

Source: MARC

South Overland Park Transportation Plan

Exhibit 3
Existing Surface Type



Legend

- Study Area
- County Boundaries

Surface Type

- Paved
- Unpaved
- No Data

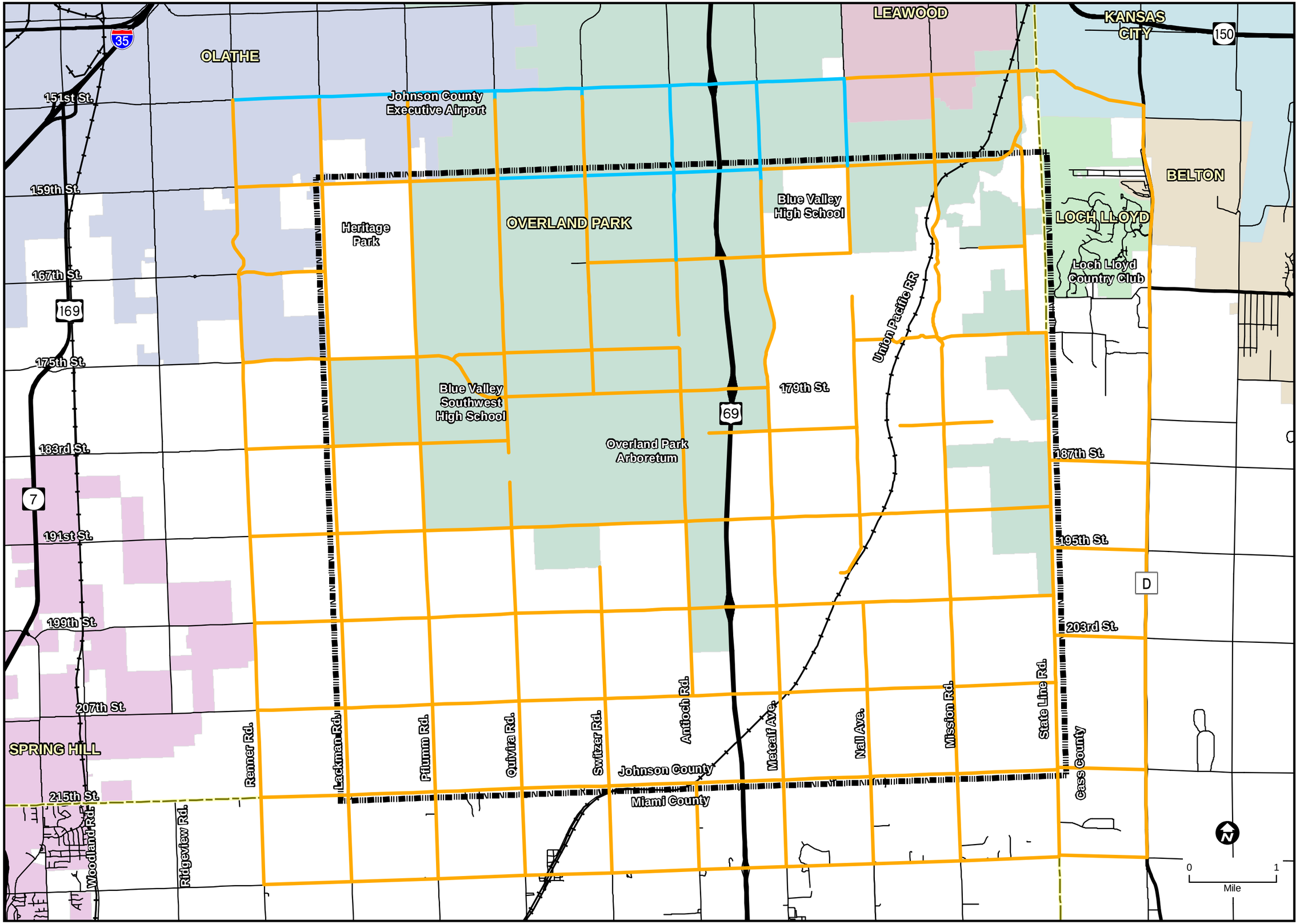
Source:
Field Survey

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 4
Existing Number of Arterial Lanes



Legend

- Study Area
- County Boundaries

Number of Arterial Lanes

- 2
- 4
- No Data

Source:
Field Survey

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 5
Existing Intersection Control and Arterial Speed

Legend

- Study Area
- County Boundaries

Intersection Control

- One-Way Stop, Eastbound
- One-Way Stop, Northbound
- One-Way Stop, Southbound
- One-Way Stop, Westbound
- Two-Way Stop, East/West
- Two-Way Stop, North/South
- All-Way Stop
- All-Way Signalized

Speed Limit - MPH

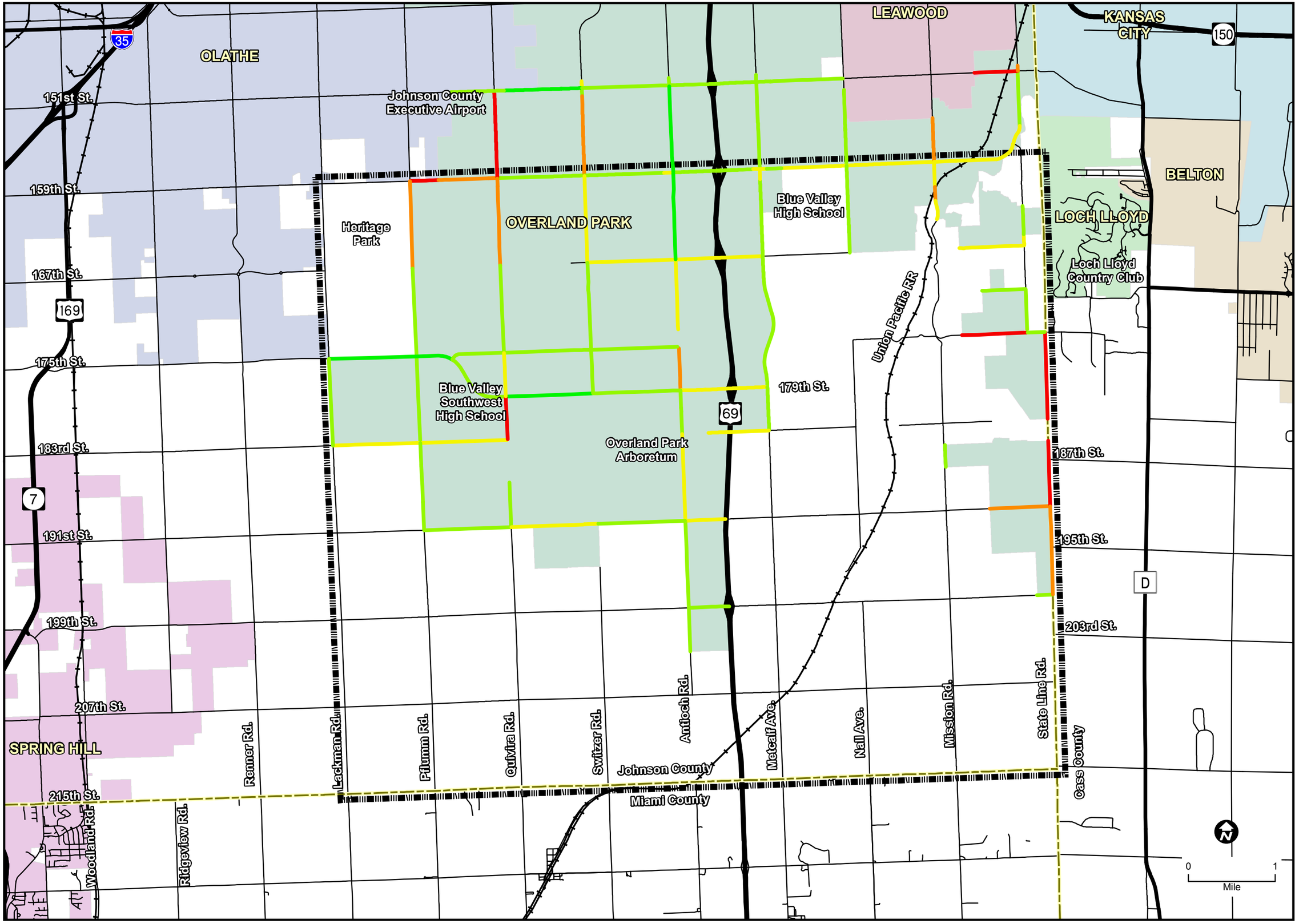
- 25
- 30
- 35
- 40
- 45
- 50

Source:
Field Survey
OP-Johnson County

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

0 1 Mile



South Overland Park Transportation Plan

Exhibit 6
Existing Pavement Condition

Legend

- Study Area
- County Boundaries

Pavement Condition Rating - Brnosec

- 65 - 82 (Very Good) - 8.4%
- 82 - 135 (Good) - 49.4%
- 135 - 184 (Good/Fair) - 24.2%
- 184 - 244 (Fair) - 10.3%
- 244 - 330 (Fair/Poor) - 7.7%
- No Data

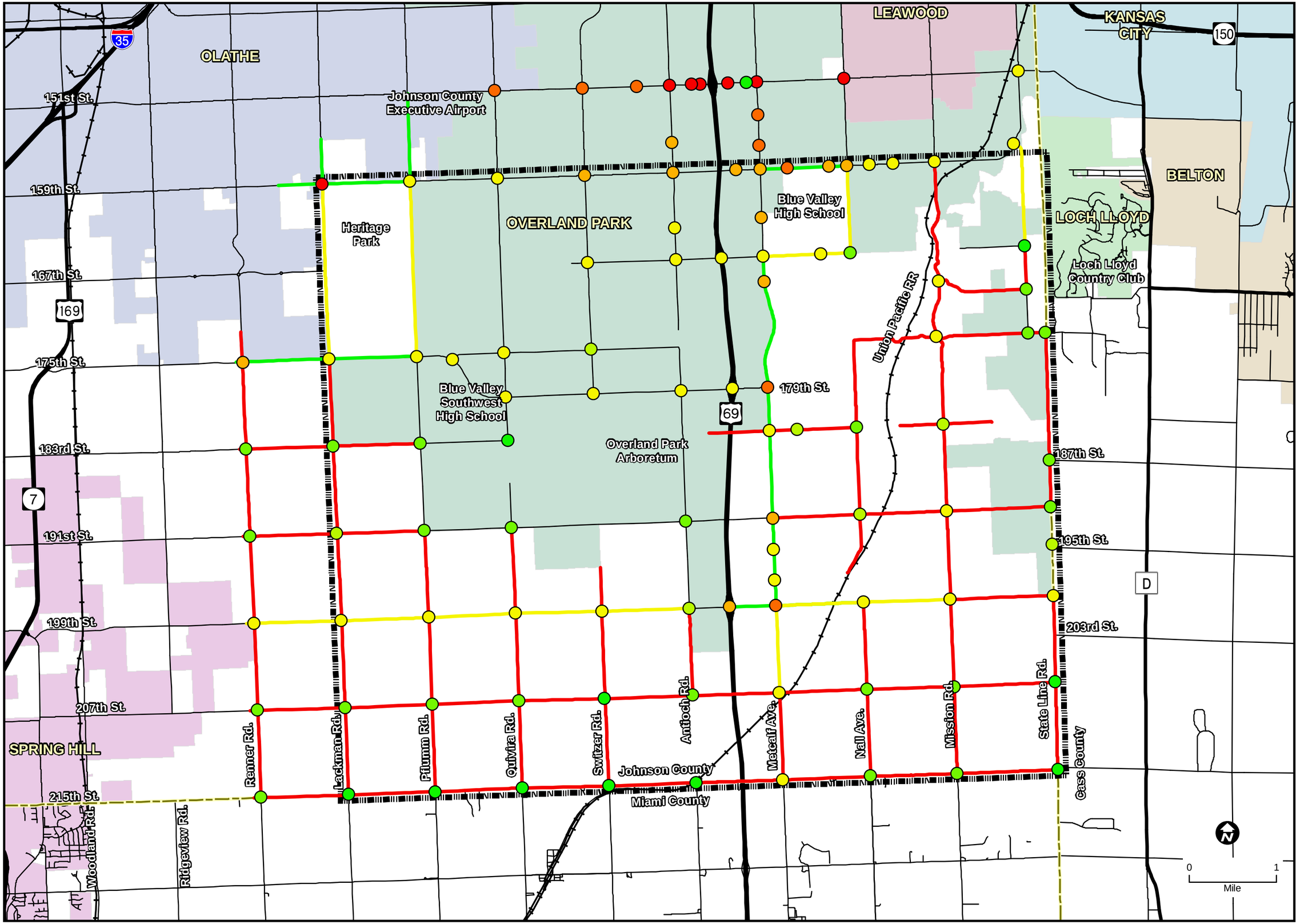
Source: Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 7
Existing Average Daily Traffic



Legend

- Study Area
- County Boundaries

Approach Volumes

- 0 - 500
- 501 - 1,500
- 1,501 - 3,000
- 3,001 - 9,000
- 9,001 - 15,000
- 15,001 - 25,000
- 25,001 - 45,000

Two-Way Volumes

- < 1,700
- 1,700 - 3,400
- > 3,400

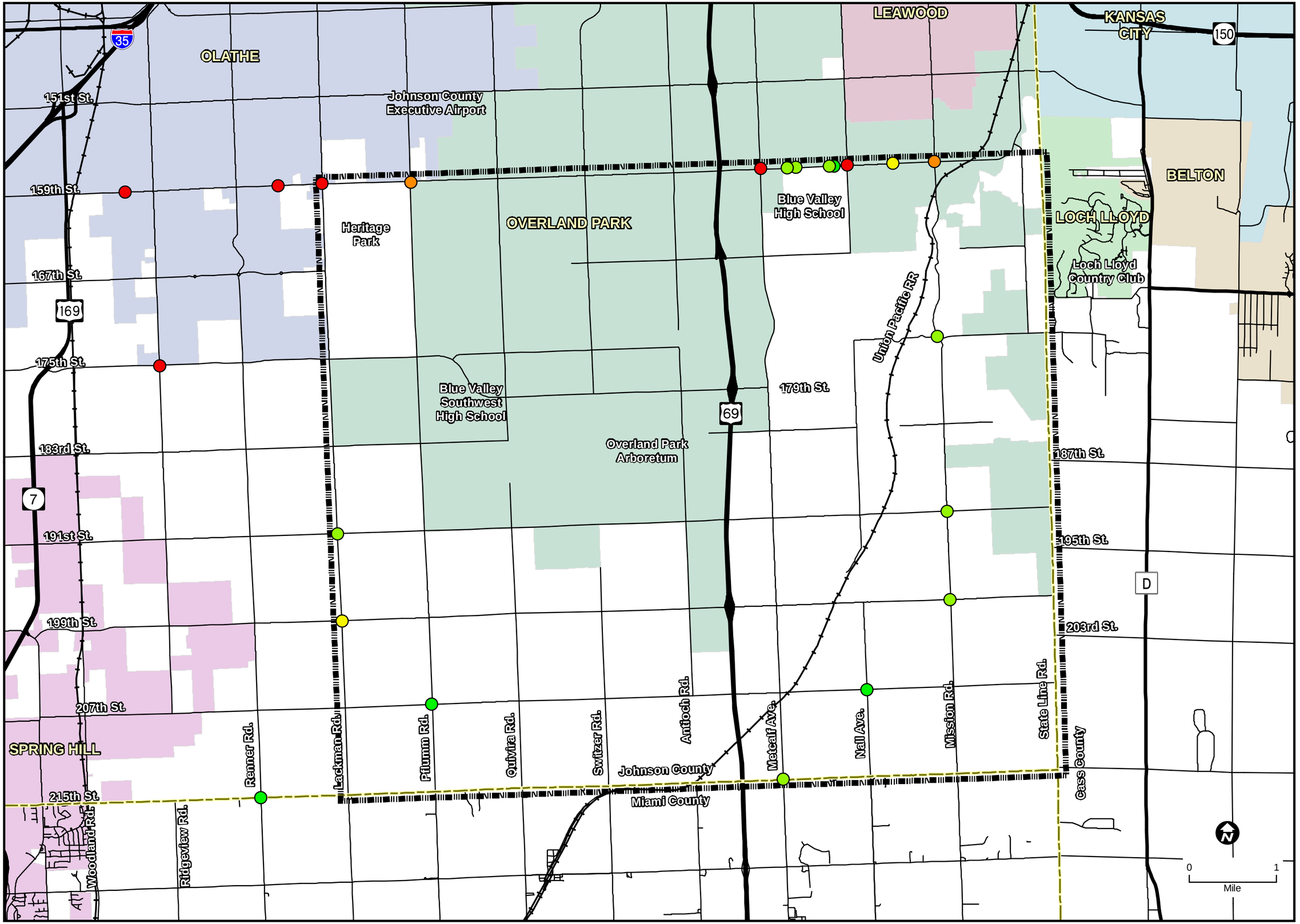
Sources:
Johnson County
Overland Park
KDOT

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 8
Existing PM Peak Hour Approach Volumes



Legend

- Study Area
- County Boundaries

PM Peak Approach Volume

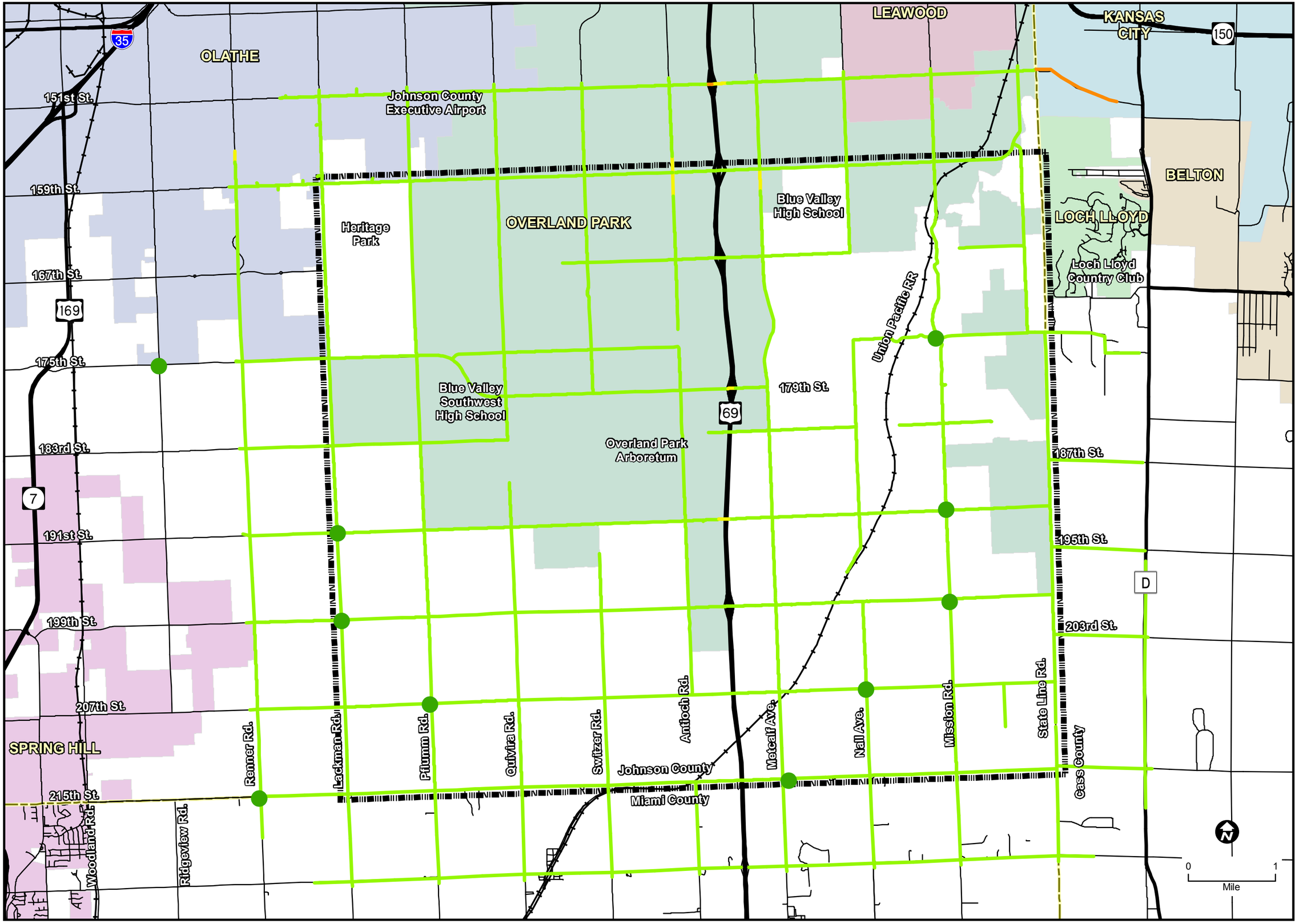
- 0 - 75
- 75 - 200
- 200 - 350
- 350 - 800
- 800 - 1,800

Note: Counts are from 2013 and 2014.

Sources:
Johnson County
Overland Park
KDOT

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB



South Overland Park Transportation Plan

Exhibit 9
Exsiting PM Peak Volume / Capacity Ratio and Level of Service

Legend

- Study Area
- County Boundaries

Level of Service

- A
- B
- C
- D
- E
- F

Volume / Capacity Ratio

- No Data
- Uncongested (<0.5)
- Under Capacity (0.5-0.85)
- Near Capacity (0.85-1.0)
- Over Capacity (>1.0)

Note: Data from 2010 Traffic Model

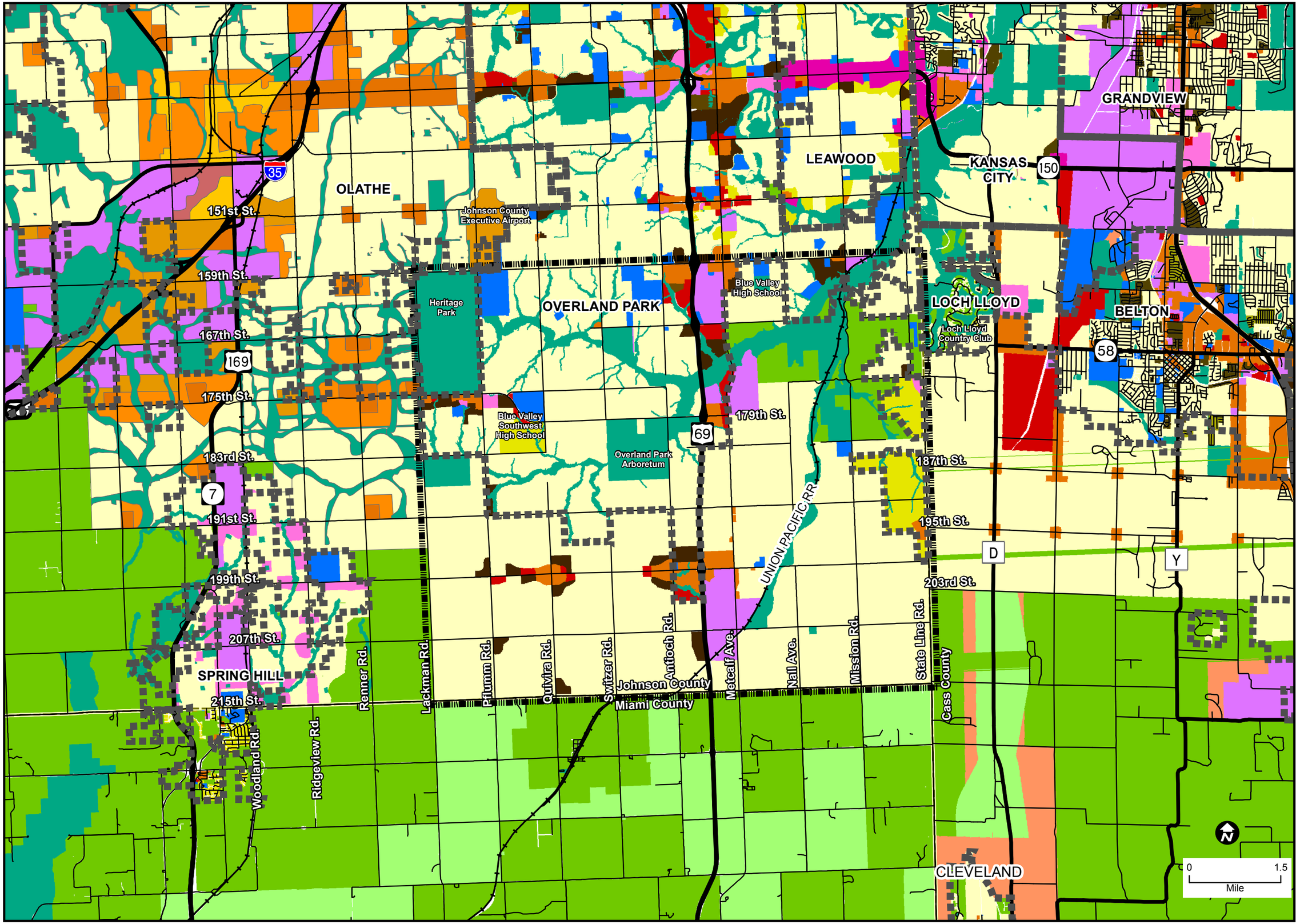
Sources: Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 10
Future Regional Land Use



Legend

- Municipalities
- Study Area
- County Boundaries

Future Land Use

- Commercial
- Community TOD
- Condo
- Employment Center
- High Mix
- Industrial/Business Park
- Low Mix
- Mixed Use High
- Mixed Use Low
- Mixed Use Very High
- Mod Mix
- Office
- Parks, Open Space
- Public/Semipublic
- Residential MF - Low
- Residential MF - Medium
- Residential MF High
- Residential MF Very High
- Residential SF High
- Residential SF - Low
- Residential SF Medium
- Residential SF - Very Low
- ROW
- Vacant/Ag

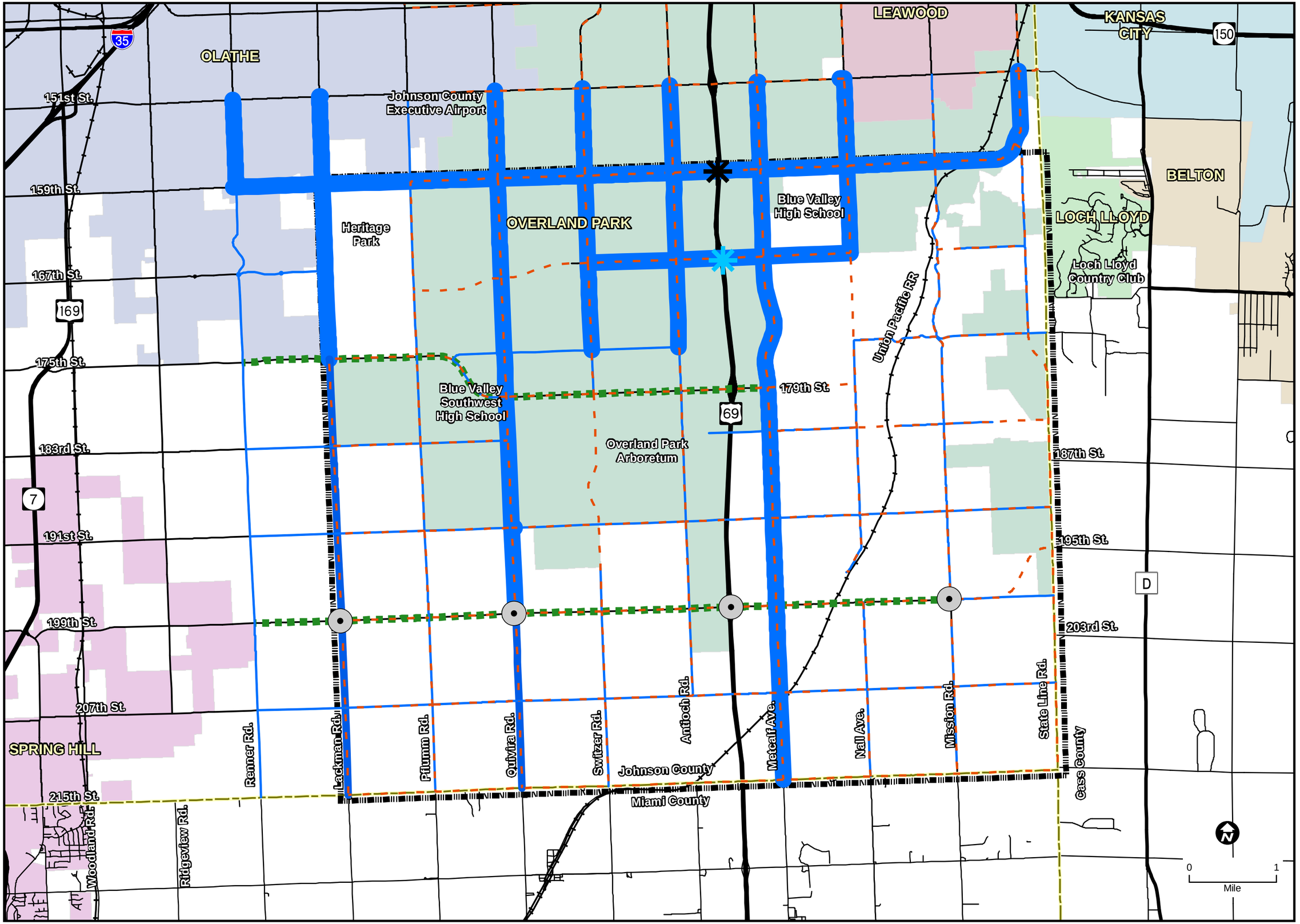
Source: MARC/ Olathe

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 11
Future Planned Arterials



Legend

- Study Area
- County Boundaries

Overland Park Future Development Plan

- Thoroughfare
- Proposed Full Interchange
- Proposed Partial Interchange

Johnson County CARNP Recommended Arterial Road Network Plan

- Type I / 2 Lanes 120ft. ROW
- Type II / 2 Lanes 120ft. ROW
- Type II / 4 Lanes 120ft. ROW
- Type III / 4 Lanes 150 - 200ft. ROW
- Area reserved for potential future grade-separation

Sources:
Overland Park Comprehensive Plan

Johnson County Rural Comprehensive Plan Update

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 12
Future Opportunities

Legend

- County Boundaries
- Study Area
- Slopes Over 7%

Sewer Availability Estimates

- Available
- 2014 - 2020
- 2021 - 2025
- 2026 - 2030
- 2031 - 2035

Sources:
Overland Park
and
Johnson County
Water

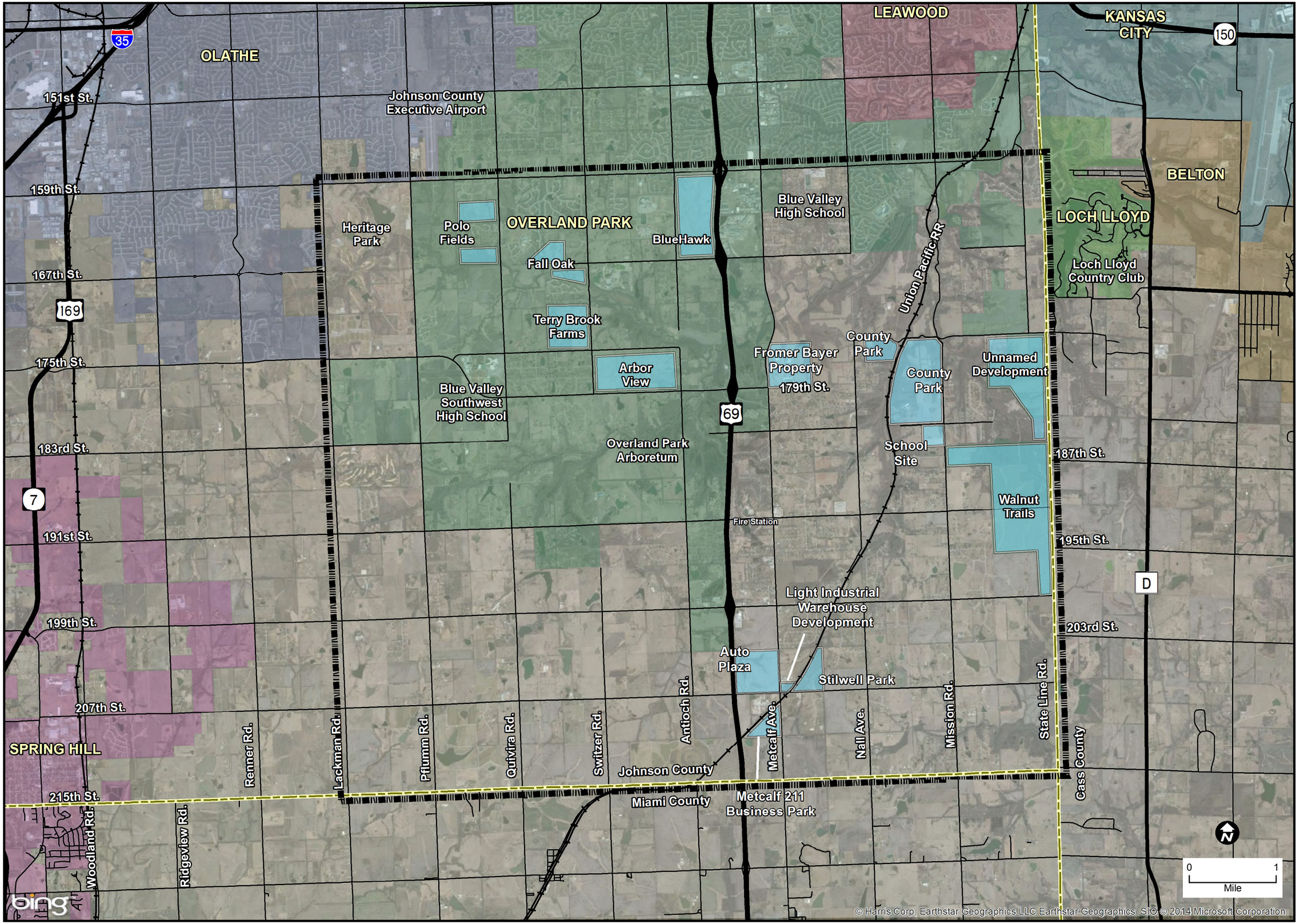
OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

0 1 Mile

South Overland Park Transportation Plan

Exhibit 13
Proposed Development



Legend

- Proposed Development
- Study
- County Boundaries
- FadedBackground

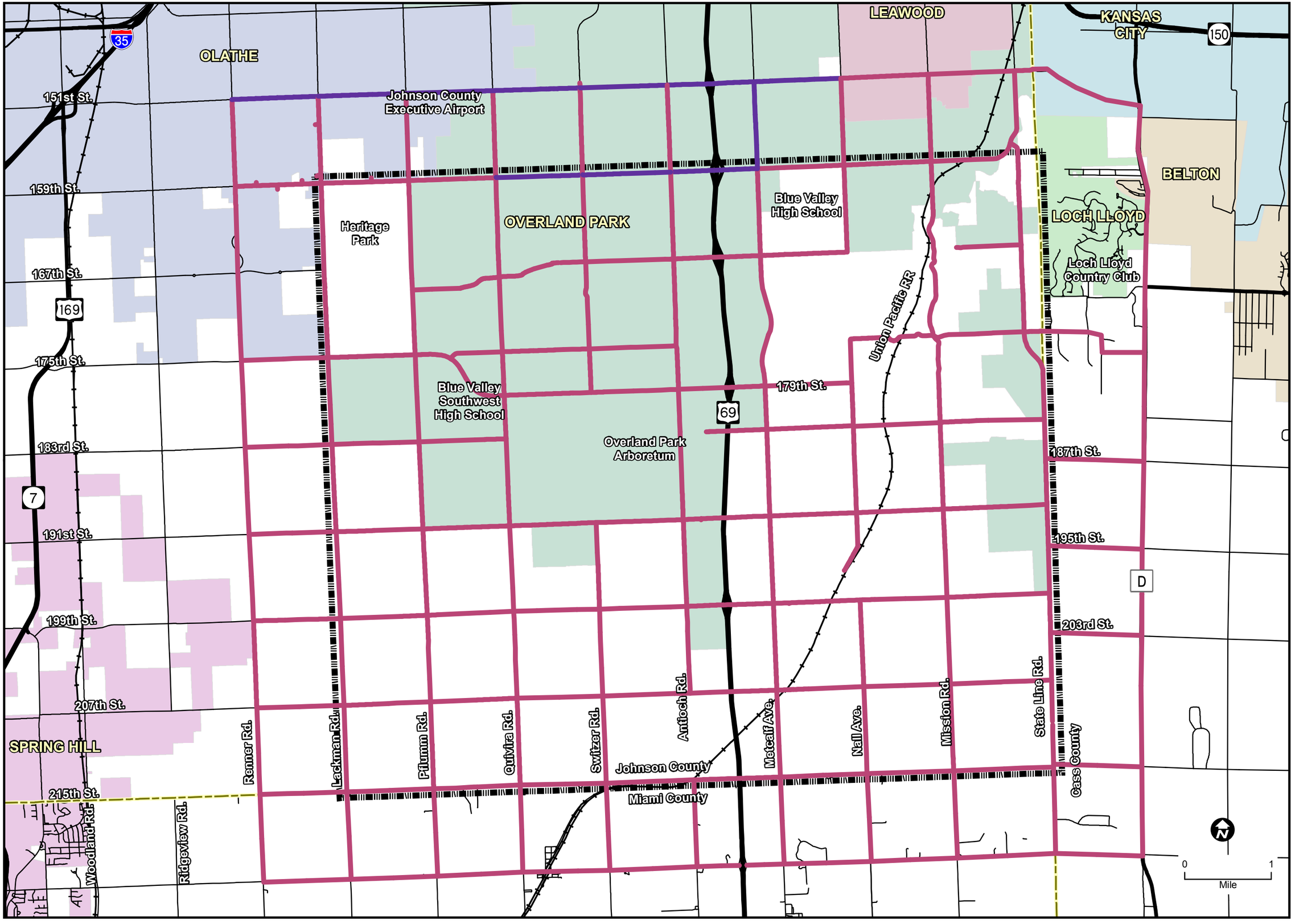
Source:
Overland Park
and
Johnson County

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 14
2040 Base Model Missing Links - Number of Lanes



Legend

- Study Area
- County Boundaries

Number of Lanes

- 1
- 2
- 3
- 4
- 6

Note: Data from 2040 Traffic Model

Sources: Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 15
2040 Base Model Modified Missing Links

Legend

- Study Area
- County Boundaries

Missing Links

- Modeled in Base Modified Links Scenario
- Not Modeled in Base Modified Links Scenario

Sources:
Overland Park 2040 Model

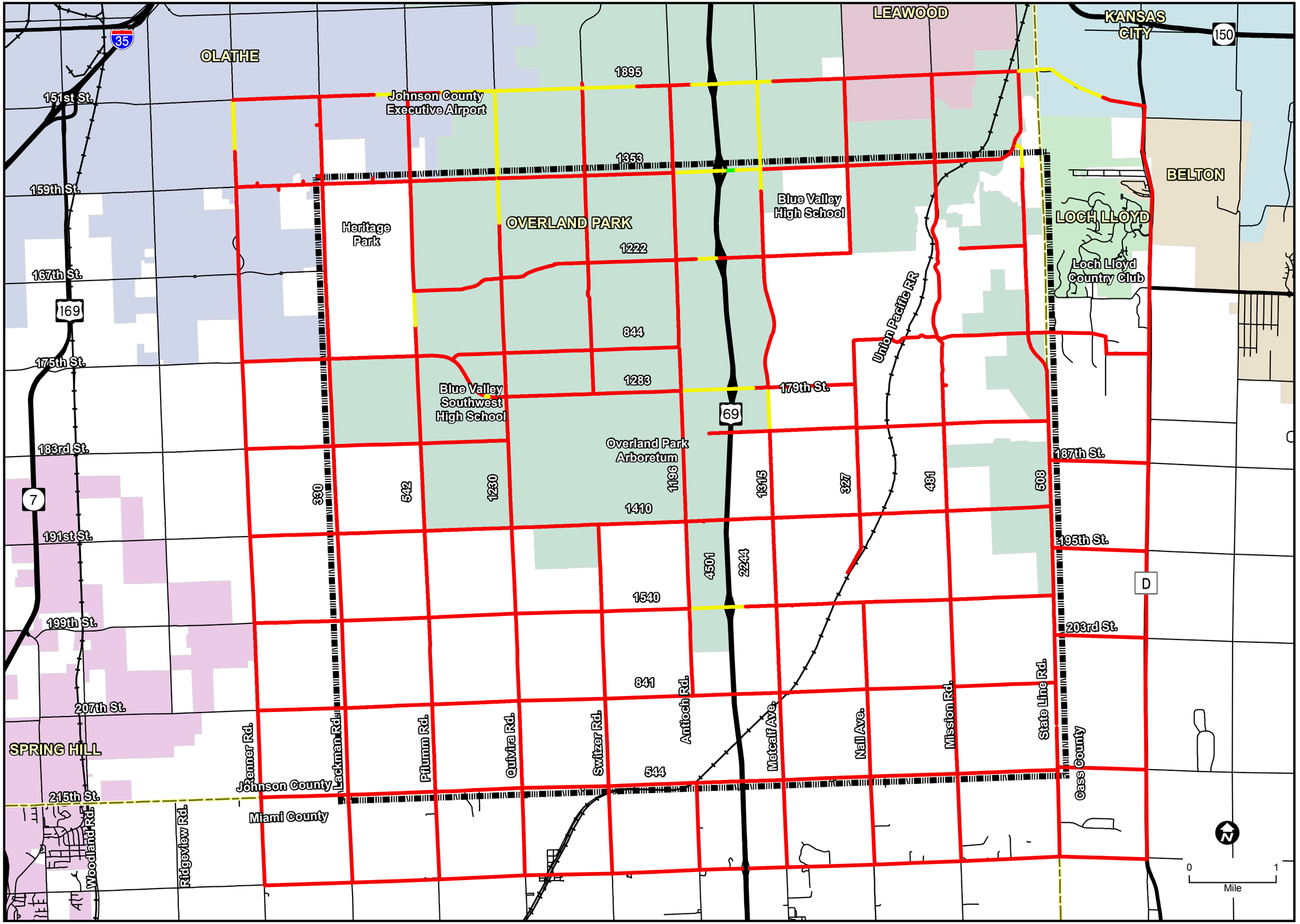
OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

0 1 Mile

South Overland Park Transportation Plan

Exhibit 16
2040 Base Model Missing Links - 2-Way PM Peak Volumes



Legend

- Study Area
- County Boundaries

Volume

- < 1,700
- 1,700 - 3,400
- > 3,400

Note: Data from 2040 Traffic Model

Sources:
Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 17
2040 Base Modified Missing Links - Volume to Capacity Ratio

Legend

- Study Area
- County Boundaries

Volume/ Capacity Ratio

- No Data
- Uncongested (<0.5)
- Under Capacity (0.5-0.85)
- Near Capacity (0.85-1.0)
- Over Capacity (>1.0)

Intersection Level of Service

- A
- B
- C
- D
- E
- F

Note: Data from 2040 Traffic Model

Sources: Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

0 1 Mile

South Overland Park Transportation Plan

Exhibit 18
Full Build
Modified
Missing Links
Number of Lanes

Legend

- Study Area
- County Boundaries

Number of Lanes

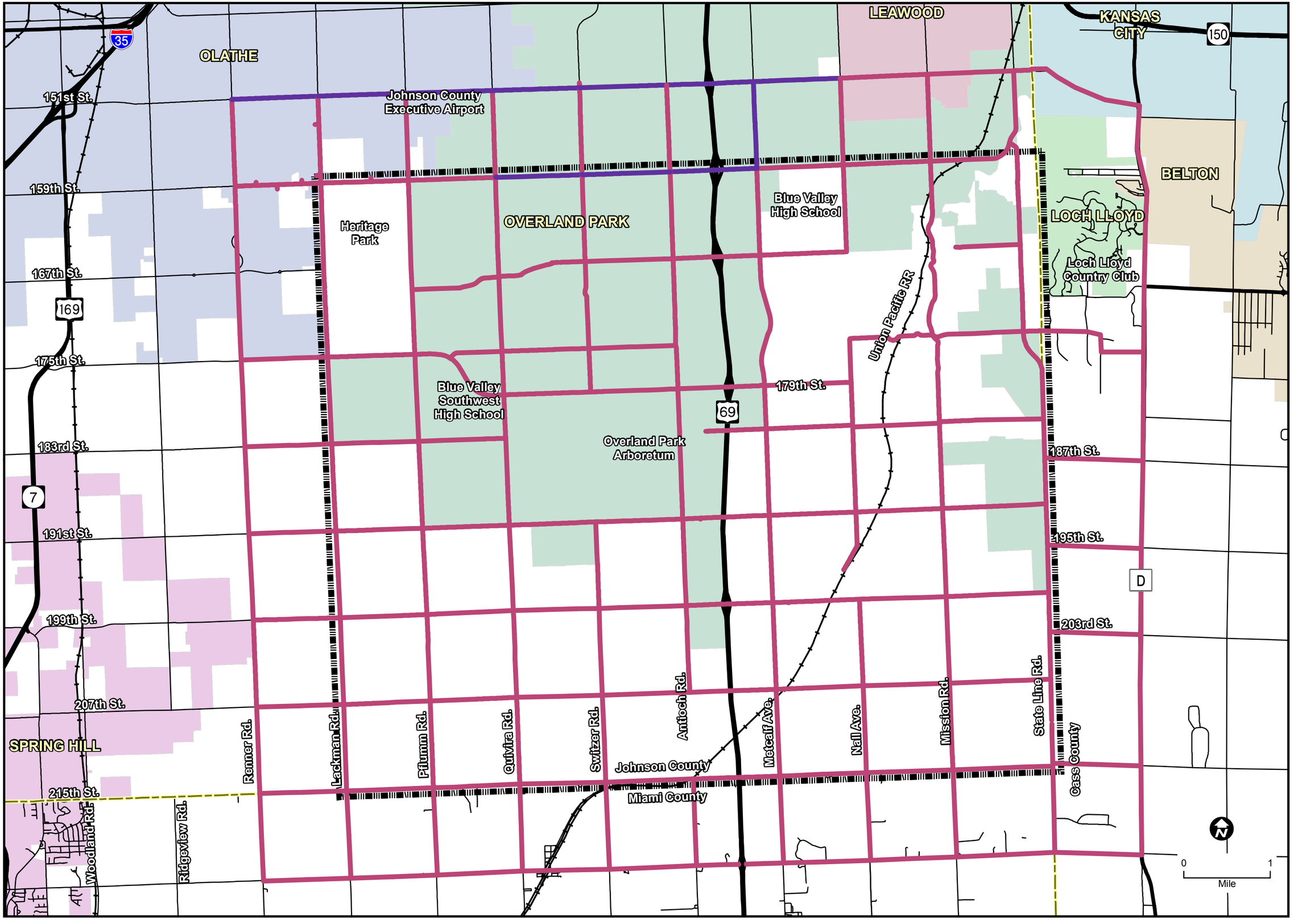
- 2
- 4
- 6

Note: Data from 2040 Traffic Model

Sources: Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB



South Overland Park Transportation Plan

Exhibit 19
2040 Full Build Modified Missing Links

Legend

- Study Area
- County Boundaries

Missing Links

- Modeled in Full Build
- Not Modeled in Full Build

Sources:
Overland Park 2040 Model

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

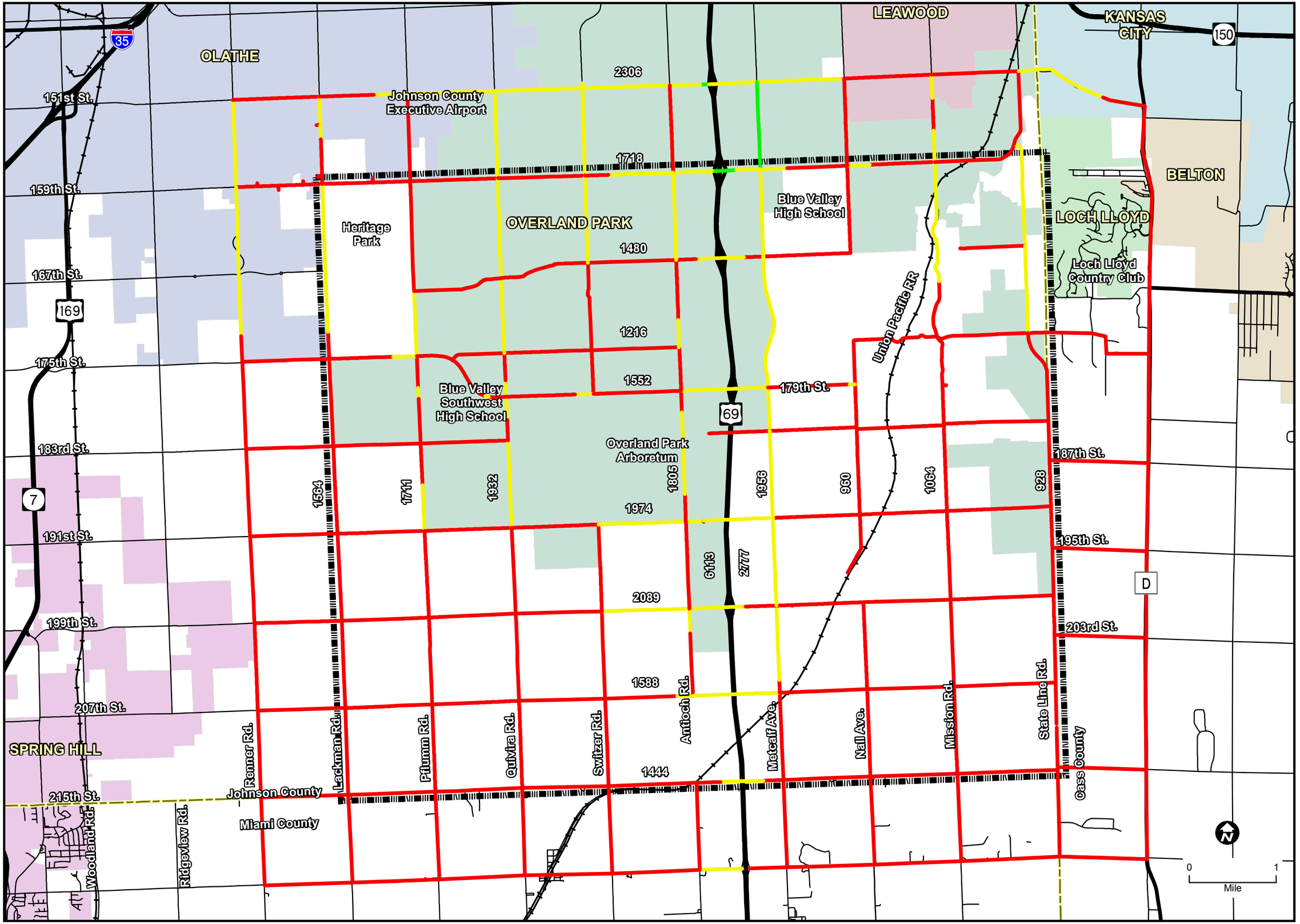
HNTB

0 1 Mile

OLATHE
LEAWOOD
KANSAS CITY
BELTON
LOCH LLOYD
OVERLAND PARK
SPRING HILL
Johnson County Executive Airport
Heritage Park
Blue Valley High School
Blue Valley Southwest High School
Overland Park Arboretum
Loch Lloyd Country Club
Union Pacific RR
Johnson County
Miami County
Cass County
151st St.
159th St.
167th St.
175th St.
179th St.
183rd St.
187th St.
191st St.
195th St.
199th St.
203rd St.
207th St.
215th St.
35
169
69
150
7
D
Woodland Rd.
Ridgeview Rd.
Renner Rd.
Lackman Rd.
Pflumm Rd.
Quivira Rd.
Switzer Rd.
Antioch Rd.
Metcalf Ave.
Nall Ave.
Mission Rd.
State Line Rd.
1
2
3
4
5
6
7
8
9
10
11
12
13
14

South Overland Park Transportation Plan

Exhibit 20
2040 Full Build
Modified
Missing Links
2-Way PM Peak



Legend

- Study Area
- County Boundaries

Volume

- < 1,700
- 1,700 - 3,400
- > 3,400

Note: Data from 2040 Traffic Model

Sources:
Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

South Overland Park Transportation Plan

Exhibit 21
Full Build
Modified
Missing Links
Volume to Capacity Ratio

Legend

- Study Area
- County Boundaries

Volume / Capacity Ratio

- No Data
- Uncongested (<0.5)
- Under Capacity (0.5-0.85)
- Near Capacity (0.85-1.0)
- Over Capacity (>1.0)

Intersection Level of Service

- A
- B
- C
- D
- E
- F

Note: Data from 2040 Traffic Model

Sources: Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

0 1 Mile

South Overland Park Transportation Plan

Exhibit 22
2040 Recommended Plan Volume/Capacity Ratio

Legend

- Study Area
- County Boundaries

Volume / Capacity Ratio

- No Data
- Uncongested (<0.5)
- Under Capacity (0.5-0.85)
- Near Capacity (0.85-1.0)
- Over Capacity (>1.0)

Note: Data from 2040 Traffic Model

Sources: Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

0 1 Mile

South Overland Park Transportation Plan

Exhibit 23
Ultimate Recommended Plan Volume/Capacity Ratio

Legend

- Study Area
- County Boundaries

Volume / Capacity Ratio

- No Data
- Uncongested (<0.5)
- Under Capacity (0.5-0.85)
- Near Capacity (0.85-1.0)
- Over Capacity (>1.0)

Note: Data from 2040 Traffic Model

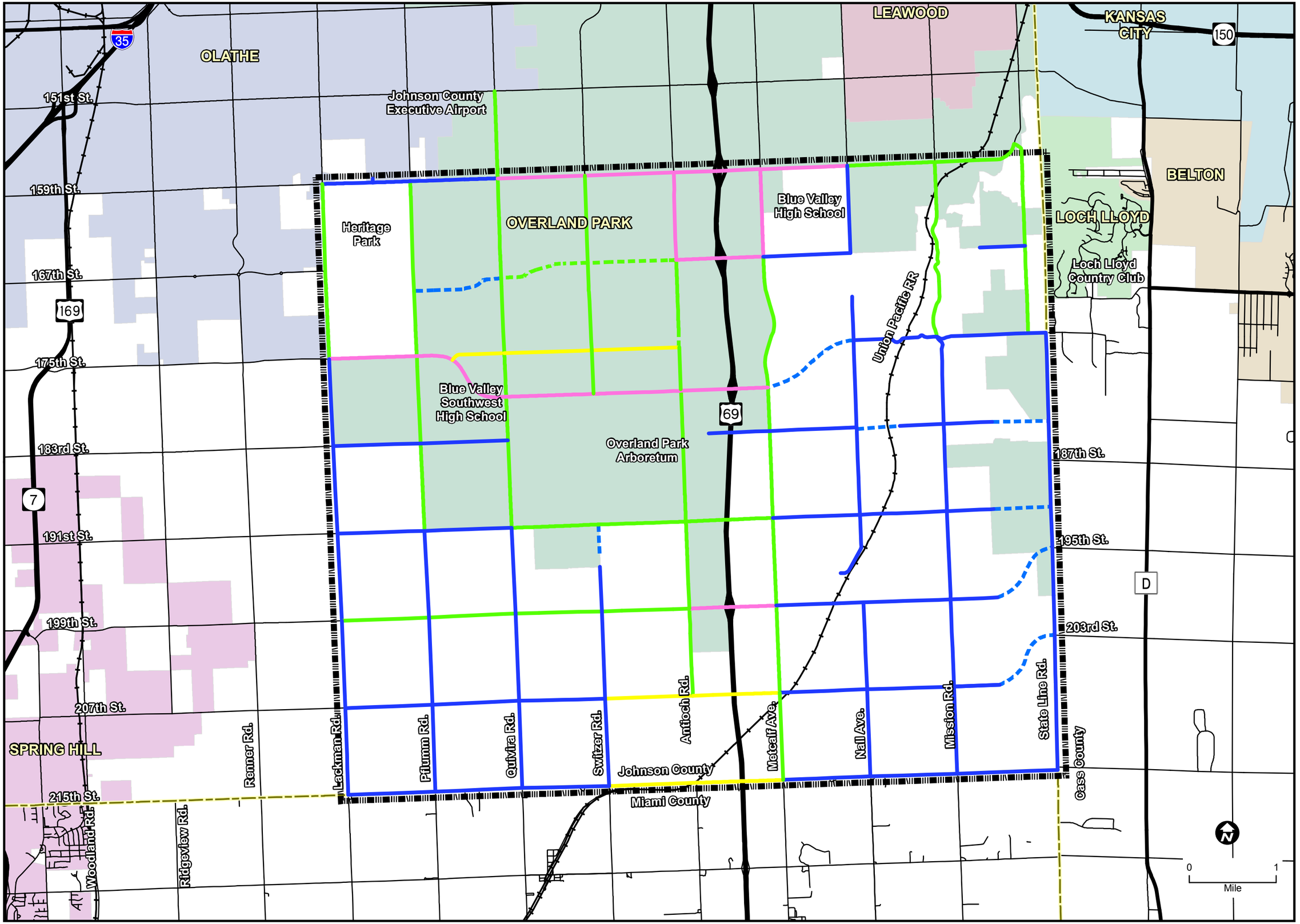
Sources: Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB

0 1 Mile

OLATHE
LEAWOOD
KANSAS CITY
BELTON
LOCH LLOYD
OVERLAND PARK
SPRING HILL
Johnson County Executive Airport
Heritage Park
Blue Valley High School
Loch Lloyd Country Club
Union Pacific RR
Blue Valley Southwest High School
Overland Park Arboretum
151st St.
159th St.
167th St.
175th St.
179th St.
183rd St.
187th St.
191st St.
195th St.
199th St.
203rd St.
207th St.
215th St.
35
169
69
7
150
D
Renner Rd.
Lackman Rd.
Pflumm Rd.
Quivira Rd.
Switzer Rd.
Antioch Rd.
Metcalf Ave.
Nall Ave.
Mission Rd.
State Line Rd.
Cass County
Woodland Rd.
Ridgeview Rd.
Johnson County
Miami County



South Overland Park Transportation Plan

Exhibit 24
Recommended Capacity Improvements

Legend

- Study Area
- County Boundaries

Recommendations

- 2-Lane Ultimate
- 2-Lane Interim and 4-Lane Ultimate
- 3-Lane Interim and Ultimate
- 4-Lane Interim and Ultimate

Note: Dashed lines represent missing or relocated links. Color corresponds to legend above.

Note: Data from 2040 Traffic Model

Sources: Overland Park

OVERLAND PARK KANSAS
ABOVE AND BEYOND. BY DESIGN.

HNTB