

Redtail Ridge

Traffic and Mobility Study



Date: March 23, 2021
Previous Draft: January 27, 2021

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EXECUTIVE SUMMARY

The purpose of this study is to evaluate potential traffic and mobility projects within and around the proposed Redtail Ridge development. The project site is generally bounded by S. 88th Street to the west, Campus Drive to the north, S. 96th Street/Northwest Parkway to the east and US 36 to the south. The first phase of the proposed development is anticipated to be completed in Year 2025 and includes approximately 414,000 square feet of industrial park and 287,000 square feet of general office building space. The full build out of the project includes a total of 15,000 square feet of general retail space, 1,380,000 square feet of industrial park, and 1,720,000 square feet of general office building space. Accounting for anticipated non-single occupancy vehicle (non-SOV) trips and internal capture trip reduction, the full build out of the project site is estimated to generate approximately 20,104 daily, 1,923 AM peak hour, and 2,010 PM peak hour trips.

Traffic Changes Since Storage Tek Closure

While the project area is currently vacant, this site was previously occupied by Storage Tek. Many changes have taken place in the Redtail Ridge project area since Storage Tek was an active campus in the late 1990's. New single-family residential neighborhoods and a mixed-use town center have been built in Superior; in Broomfield, a major regional shopping center at Flatiron Crossing and a mix of uses along the eastern side of what is now the Northwest Parkway and Interlocken Loop have been constructed; and the City of Louisville has added new uses to the Colorado Technology Center. Over this timeline the number of open enrollment students attending Monarch K8 and Monarch High School, who are not provided school bus services, has remained consistent. This growth has utilized the vehicle traffic capacity previously used by traffic generated by Storage Tek on the S. 88th Street, Dillon Road, and S.96th Street corridors.

Project Area Trip Generation Comparison

After Storage Tek vacated the project area, ConocoPhillips proposed to build a new research, training, and office development on the former Storage Tek site. At build out, the total development was not to exceed 2,500,000 square feet of building area. ConocoPhillips completed a traffic study as part of its development proposal. The project was approved by the City of Louisville in Year 2010; however, ConocoPhillips did not move forward with the project. **Table E.1** provides a comparison of the trip generation estimates for the full buildout of the Redtail Ridge development with the former Storage Tek site and the formerly approved ConocoPhillips development.

Table E.1. Trip Generation Comparison

Development	Trip Generation Estimates		
	Daily	AM Peak Hour	PM Peak Hour
Storage Tek	12,400	1,600	1,400
ConocoPhillips	17,500	2,660	2,455
Redtail Ridge	20,104	1,923	2,010
<i>Redtail % Diff. to Storage Tek</i>	62%	20%	44%
<i>Redtail % Diff. to ConocoPhillips</i>	15%	-28%	-18%

Comparing the estimated peak hour trips indicates the current proposal generates 20 to 44 percent more trips than Storage Tek; and 18 to 28 percent fewer trips compared to the formally approved ConocoPhillips development. The AM and PM peak hour trips were used for comparison since detailed traffic operation analysis is based on the peak hours. While it is noted that the currently proposed mix of office and industrial uses on the Redtail site may generate more daily trips than the previously approved Conoco Phillips project, the current proposal of more diverse office and industrial uses will likely have trips more widely dispersed over the course of the day rather than concentrated in the AM and PM peak commuting hours as was the case with the single corporate user in the Conoco Phillips project. The Redtail project has also utilized the most current Institute of Transportation Engineers trip generation rates which are updated over time. These factors account for why the Redtail Project may have fewer peak hour trips than the previous proposal. While daily traffic volumes provide planning level thresholds for roadway capacities, improvements are recommended based on the peak hour intersection capacity analysis.

Current Study Area Traffic and Safety Conditions

Current conditions have been evaluated based on traffic counts collected during August of 2019, while schools were in session during pre-COVID19 conditions. The Dillon Road/S. 88th Street and S. 88th Street/Campus Drive intersections are currently operating at LOS E or worse during the AM peak hour. Both intersections are heavily influenced by traffic generated by the Monarch school campus. Queues on S. 88th Street from Campus Drive were observed to extend to Dillon Road, and westbound left-turn queues on Dillon Road were observed to extend more than 2,500 feet. To address the existing operational issues during the AM peak hour, previous studies have recommended that Campus Drive be extended from where it dead ends 2,200 feet east of S. 88th Street to S. 96th Street to provide an alternative access to the Monarch school campus.

In addition, under existing conditions the Northwest Parkway/S. 96th Street/Via Varra intersection is approaching capacity in the AM peak and the Dillon Road/S. 96th Street intersection is approaching capacity in the PM peak hour. Both Dillon Road and S. 96th Street are currently two-lane roadways, but the existing daily traffic volumes on both roadways are pushing the planning level daily traffic volume thresholds that are typically assumed for a two-lane roadway [note that

traffic engineers generally consider 18,000 to 20,000 vehicles per day to be the daily capacity of a 2-lane roadway]. Dillon Road and S. 96th Street are two-lane roadways but expand to provide two through lanes in all directions at the Dillon Road/S. 96th Street intersection. While this increases the capacity through the intersection, this also results in poor lane utilization and occasionally some inefficiencies when vehicles exit the intersection and merge back down to one-lane.

The roadways around the project site are currently designed to optimize motor vehicle travel during peak times at speeds that present challenges for non-motorized travelers. Based on information provided in the City of Louisville Transportation Master Plan (TMP), four (4) existing arterial intersections near the Redtail Ridge project were identified as high crash locations, including the Dillon Road/S. 88th Street, Dillon Road/S. 96th Street, S. 88th Street/Campus Drive, and Northwest Parkway/S. 96th Street/Via Varra intersections. Also, three of the locations have documented bicycle crashes. The Dillon Road/S. 88th Street intersection has the highest number of bicycle crashes in the City of Louisville.

Near-Term Improvements

To address the expected issues at the study intersections, the improvements listed below are recommended to accommodate the project development anticipated to be completed by Year 2025. In addition to safety and improving traffic operations, these improvements are also designed to reduce crashes and improve operations for the Monarch school campus.

- Extend Campus Drive from where it dead ends east of S. 88th Street to S. 96th Street
- S. 88th Street/Campus Drive** extend the northbound right-turn lane
- S. 96th Street/Dillon Road** construct dual eastbound and westbound left-turn lanes on Dillon Road
- Widen S. 96th Street** to a four-lane roadway between Dillon Road and Northwest Parkway and extend the four-lane roadway to the north of the Dillon Road intersection a minimum of one-half mile
- S. 96th Street/Campus Drive (new intersection) construct a southbound right-turn lane, dual eastbound left-turn lanes with an eastbound right-turn lane, dual northbound left-turn lanes, and provide three northbound through lanes that extend from the Northwest Parkway/S. 96th Street/Via Varra intersection through the Campus Drive intersection. The three northbound through lanes will merge to two through lanes north of Campus Drive.
- Northwest Parkway/S. 96th Street** construct triple northbound left-turn lanes on Northwest Parkway to turn onto northbound S. 96th Street and modify the southbound right-turn lane movement to be controlled on Northwest Parkway.

*** Indicates an improvement that was also recommended under Year 2025 background conditions (without the project).*

Additional improvements beyond which have asterisks above were recommended under Year 2025 background conditions without the project to accommodate anticipated traffic volumes and conditions without the Campus Drive extension project. The Campus Drive extension project is located on the Redtail Ridge property and will only be constructed as part of a development project. The additional improvements needed to accommodate Year 2025 background conditions without the Campus Drive extension are listed below:

- Widen S. 88th Street between Dillon Road and Campus Drive to a four-lane roadway
- Dillon Road/S. 88th Street modify the westbound approach on Dillon Road from one left-turn lane and two through lanes, to dual left-turn lanes and one through lane
- S. 88th Street/Campus Drive construct a second northbound through lane that would begin approximately 500 feet south of Campus Drive

Potential Network Improvements

There are currently multiple ongoing projects that have the potential to affect traffic volumes, traffic patterns, and future transportation improvement assumptions in the study area in the mid- to long-term scenarios. While it is currently unknown if/when these projects will move forward, the projects are important to consider when determining future infrastructure needs for the study area:

Jefferson Parkway: The Level 1 Traffic and Revenue Study for Jefferson Parkway was completed for the Jefferson Parkway Public Highway Authority (JPPHA) and finalized in April 2018. The purpose of the study was to provide forecasts of traffic and revenue for the proposed Jefferson Parkway. The proposed Jefferson Parkway is a 9.2-mile toll road running along the northwestern perimeter of the Denver Metro area. The future roadway will be a limited access expressway with two lanes of travel in each direction from SH 128 (south of US 36) to SH 93 (south of SH 72). One of the scenarios considered in the study was the “Northwest Parkway Extension”, which includes the Redtail Ridge study area on Northwest Parkway between S. 96th Street/Via Varra and the US 36 interchange. The study noted that Northwest Parkway would be reconstructed to separate toll and local traffic which would include constructing new interchanges and a frontage road system to accommodate local traffic. If the Northwest Parkway Extension project is constructed, the future interchanges and frontage road system would provide additional capacity to the Redtail Ridge study network.

RTD Bus Rapid Transit (BRT): The Northwest Area Mobility Study (NAMS) study identified the S. 96th Street/Highway 42 as one of the six candidate Arterial Bus Rapid Transit corridors. All corridors were evaluated, and recommendations were made for transit priority elements such as transit signal priority, queue jump lanes and headway-based scheduling. Operations and maintenance costs for the corridors were also prepared. The NAMS Policy Advisory Committee (PAC) recommended that all six (6) arterial BRT projects be implemented with system-wide service improvements. This corridor was recently identified as a Priority 3 corridor in the RTD Regional Bus Rapid Transit Study, the Metro Mayors Caucus is reviewing a ballot initiative to fund

this corridor as part of regional ballot initiative, and the City of Louisville has applied for a grant to further study this service as part of a revised Highway 42 corridor study (see below).

State Highway 42 (SH 42): The City of Louisville is in the process of securing Denver Regional Council of Governments (DRCOG) funding for an updated study and plan for the SH 42 corridor. The proposed plan will provide design for improvements that address transportation, growth and land development challenges outlined in the DRCOG Metro Vision plan, including: increasing mobility options for individuals without a car or with mobility challenges, reducing traffic congestion, reducing traffic crashes and improving overall safety, and addressing access issues related to population and economic growth and development along this corridor.

Long-Term Improvements

The City of Louisville's TMP recommends building more Great/Complete streets citywide. The Redtail Ridge project team is recommending helping build Great/Complete Street design treatments for the S. 88th Street, Dillon Road, and S. 96th Street corridors and intersections consistent with the TMP's policies. Such streets and intersections will be designed and operated to be safe and accessible for all users, regardless of ability, age, or mode. Most importantly, Great Streets have been shown to reduce conflicts that lead to crashes.

To accommodate the trips generated by the full buildout of the Redtail Ridge development in Year 2040, the following capacity improvements are expected to be needed:

- Northwest Parkway/US 36 interchange – the South Ramps are expected to be at capacity with Year 2040 background traffic volumes and over capacity with Year 2030 + project traffic volumes. Additional capacity is needed to accommodate the projected traffic volumes with and without the project site trips. The additional capacity will likely require that the bridge be widened. A coordinated study should occur to begin to look at interchange concepts.
- Northwest Parkway between S. 96th Street/Via Varra and US 36 – continue coordination with Northwest Parkway Authority, City of Louisville, and City and County of Broomfield to study the future corridor needs. The Northwest Parkway intersections at 96th Street/Via Varra and at Rockcress Drive/Via Varra are anticipated to be near/at capacity between Year 2035-2040 with the project trips.
 - One option to improve operations through Year 2040 would be to add a third southbound through lane on Northwest Parkway from northeast of the 96th Street/Via Varra intersection to the US 36 interchange.
 - Additional study is needed to determine the optimal design for this corridor to accommodate the future needs and if/how the corridor will tie into the future US 36 interchange design. Further, if Jefferson Parkway is built, additional traffic volumes beyond what were projected for this study would be anticipated on Northwest Parkway and should be considered. As previously noted, previous studies have suggested that the future Northwest Parkway will be grade separated with frontage roads for local access.

Note that additional improvements beyond what are listed above were recommended under Year 2040 background conditions to accommodate anticipated traffic volumes/conditions without the Campus Drive extension project. The additional improvements under Year 2040 background conditions include:

- Widen Dillon Road between S. 88th Street and S. 96th Street to a four-lane roadway
- Dillon Road/S. 96th Street: construct dual northbound and southbound left-turn lanes

A summary of the recommended improvements and estimated year the improvement is needed is illustrated in **Figure E1** and **Figure E2** and summarized in **Table E.2**.

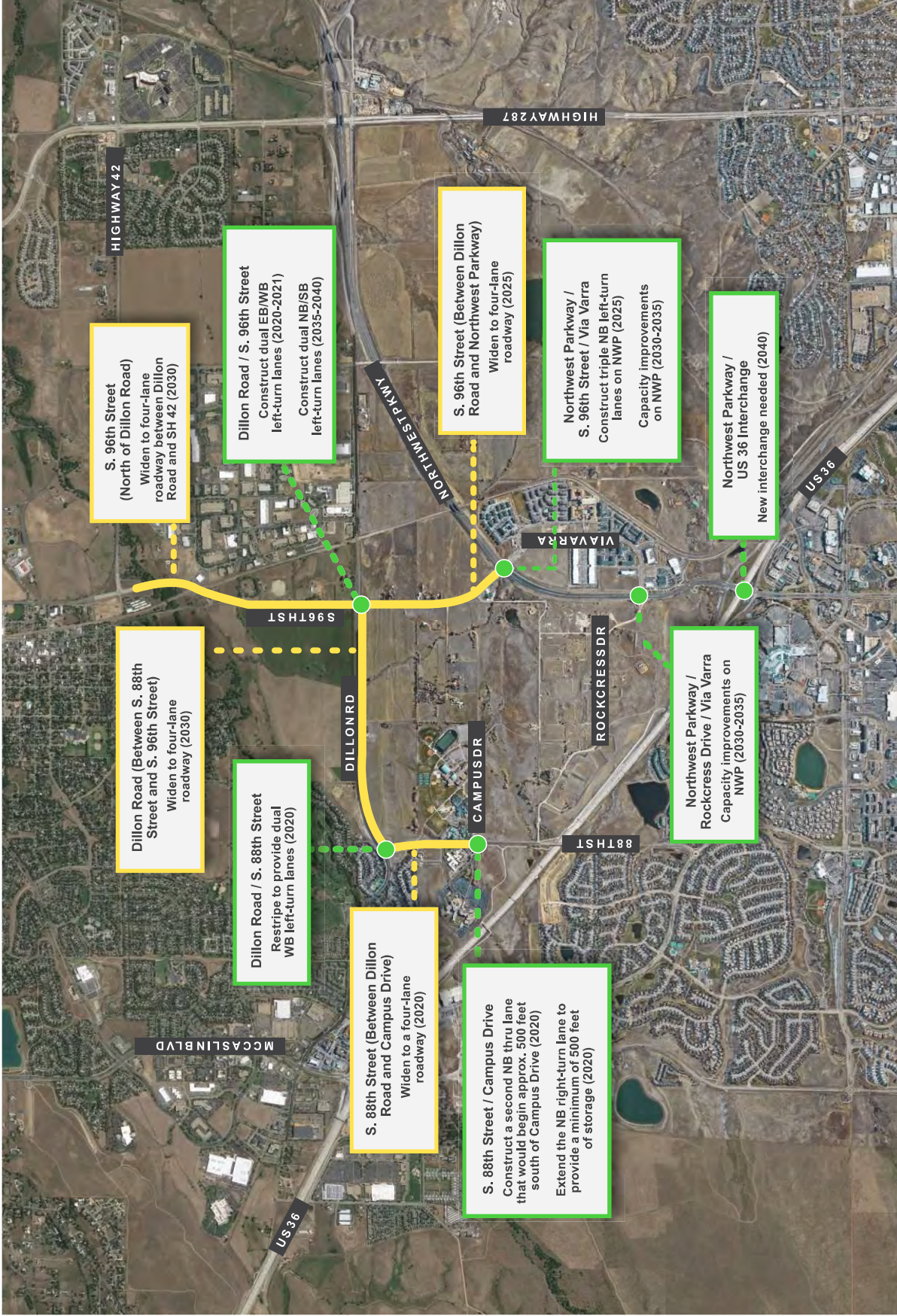
Internal Intersections

Fox Tuttle Transportation Group has worked with the Redtail Ridge team to design an internal roadway network that can accommodate the full buildout of the project trips safely and efficiently. The internal roadway consists of the Campus Drive extension to S. 96th Street, construction of Rockcress Drive between S. 88th Street and Northwest Parkway, as well as construction of Sorrel Avenue between Campus Drive and Rockcress Drive.

- Campus Drive: recommended to be a three-lane roadway between S. 88th Street and the Monarch High School eastern roundabout and a four-lane roadway between Sorrel Avenue and S. 96th Street, the section between the Monarch High School eastern roundabout and Sorrel Avenue is anticipated to operate acceptably as a two-lane roadway. Roundabout access is recommended at the Monarch school campus to the K-8 and High School main accesses as well as at Sorrel Avenue. The Campus Drive access to the Zone 3 office area is anticipated to operate acceptably as an unsignalized intersection with side-street stop control.
- Rockcress Drive: recommended to be a four-lane roadway between Sorrel Avenue and Northwest Parkway and to transition to two-lane collector west of Sorrel Avenue. The Sorrel Avenue intersection is anticipated to operate acceptably as a roundabout; the remaining intersections are expected to operate acceptably as unsignalized.
- Sorrel Avenue: recommended to be a two-lane roadway; the driveway accesses and internal intersections are expected to operate acceptably as unsignalized.

Next Steps

- Additional study and concept development are needed for the Northwest Parkway corridor and at the US 36 interchange.
- After the GDP submittal, vertical developers will be required to submit PUD documents prior to construction, including traffic conformance letters. The PUD documents will identify if/when traffic signals at the internal intersections are projected to be warranted as well as signal timing modifications/adjustments needed to the study intersections. In addition, the vertical developers will be required to submit building specific Travel Demand Management (TDM) Plans. The projected non-single occupancy vehicle (non-SOV) goals will be evaluated and adjusted as needed to reach goals. The Metro District will monitor the plan's effectiveness and make changes as needed to reach goals.



FT Project #	19055	Original Scale	NTS	Date	2/22/21	Drawn by	EJK	Figure #	E1
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TRANSPORTATION GROUP

Segment

REDTAIL RIDGE TRAFFIC AND MOBILITY STUDY

FT Project #	Original Scale	Date	Drawn by	Figure #
19055	NTS	2/22/21	EJK	E2

Table E.2 – Improvement Phasing Summary

Recommendation (Intersection/Segment)	Project Need (Expected Timeline/Year)		Notes
	Background (No Project)	With Project	
Campus Drive Extension	(N/A) - located on the Redtail Ridge project property	-Construct with first phase of the development (Opening Year 2022)	
McCasin Boulevard / Dillon Road	--	--	Signal timing should continually be monitored to manage queues.
Dillon Road / S. 88th Street	-- -Restripe to provide dual WB left-turn lanes (2020) – assumes Campus Drive is not extended	--	
Dillon Road (Between S. 88th Street and S. 96th Street)	-Widen to four-lane roadway (shortly after 2030) assumes Campus Drive is not extended	-Dillon Road is nearing capacity in Year 2040. Monitor the corridor and if traffic volumes increase at a higher rate than projected, Dillon Road may need to be expanded to a four-lane roadway	The City noted a desire to maintain Dillon Road as a two-lane roadway. Based on projected volumes, a two-lane is expected to operate acceptably with traffic generated by the project. However, without the Campus Drive extension, Dillon Road is expected to need to be a four-lane around 2030.
Dillon Road / S. 96th Street	-Construct dual EB/WB left-turn lanes (2020-2021)	-Construct dual EB/WB left-turn lanes (2022 with Campus Drive Ext.)	
McCasin Boulevard / Dillon Road	-Construct dual NB/SB left-turn lanes (2035-2040) assumes Campus Drive is not extended	-Monitor and if long queues/cycle failure begins to occur construct dual NB/SB left-turn lanes (after 2040)	
S. 96th Street (Between Dillon Road and Northwest Parkway)	-Widen to four-lane roadway (2025)	-Widen to four-lane roadway (2022 with Campus Drive Ext.)	
S. 96th Street (North of Dillon Road)	-Widen to four-lane roadway between Dillon Road and SH 42 (shortly after 2030)	-Widen to four-lane roadway – 1/2 mile to the north (2025)	Coordination with the SH 42 BRT project and other development/studies along S. 96th Street should occur to refine timing needs.
S. 88th Street (Between Dillon Road and Campus Drive)	-Widen to a four-lane roadway (2020) assumes Campus Drive is not extended	-Widen to four-lane roadway to SH 42 (shortly after 2030)	
S. 88th Street (Between Campus Drive and Rock Creek Pkwy)	--	--	
S. 88th Street / Campus Drive	-Construct a second NB thru lane that would begin approx. 500 feet south of Campus Drive (2020) assumes Campus Drive is not extended	-Extend the NB right-turn lane to provide 400- 500 feet of storage (with Campus Drive extension)	Expected to operate acceptably as a two-lane with turn lanes at key intersection.
S. 88th Street / Rockcress Drive	-Extend the NB right-turn lane to provide a minimum of 500 feet of storage (2020)	-Construct a SB left-turn lane and NB right-turn lane on S. 88th Street (with opening of Rockcress Drive, between 2025-2030).	
S. 88th Street and Rock Creek Pkwy	(N/A)	--	No improvements anticipated to be needed
S. 96th Street / Campus Drive	(N/A)	-Construct dual NB left-turn lanes and a SB right-turn lane on S. 96th Street, and dual EB left-turn and an EB right-turn lane on Campus Drive (2022 with Campus Drive Ext.). Signalize intersection when warranted.	
Northwest Parkway / S. 96th Street / Via Varra	-Construct triple NB left-turn lanes on NWP (2025) -Capacity improvements on NWP – see note (2030-2035)	-Construct triple NB left-turn lanes on NWP (2025); -Capacity improvements on NWP – see note (2030-2035)	Constructing a third SB thru lane from north of S. 96th Street to the US 36 interchange is expected to improve operations. However, this may not be the optimal design for travel time. Previous studies have recommended that this intersection be grade separated in the future. Therefore, a separate corridor study is recommended rather than specific intersection recommendations.
Northwest Parkway / Rockcress Drive / Via Varra	-Capacity improvements on NWP – see note (2030-2035)	-Capacity improvements on NWP – see note (2030-2035)	See note for Northwest Parkway / 96th Street / Via Varra intersection
Northwest Parkway / US 36 Interchange	-New interchange needed (2040)	-New interchange needed (2027-2028)	To address the anticipated capacity constraints, the interchange needs to be modified to provide additional capacity or an alternative access to this area needs to be provided via US 36. A follow-up study should be conducted that looks at future grade separation concepts along Northwest Parkway and evaluates all interchange configuration operations for US 36.

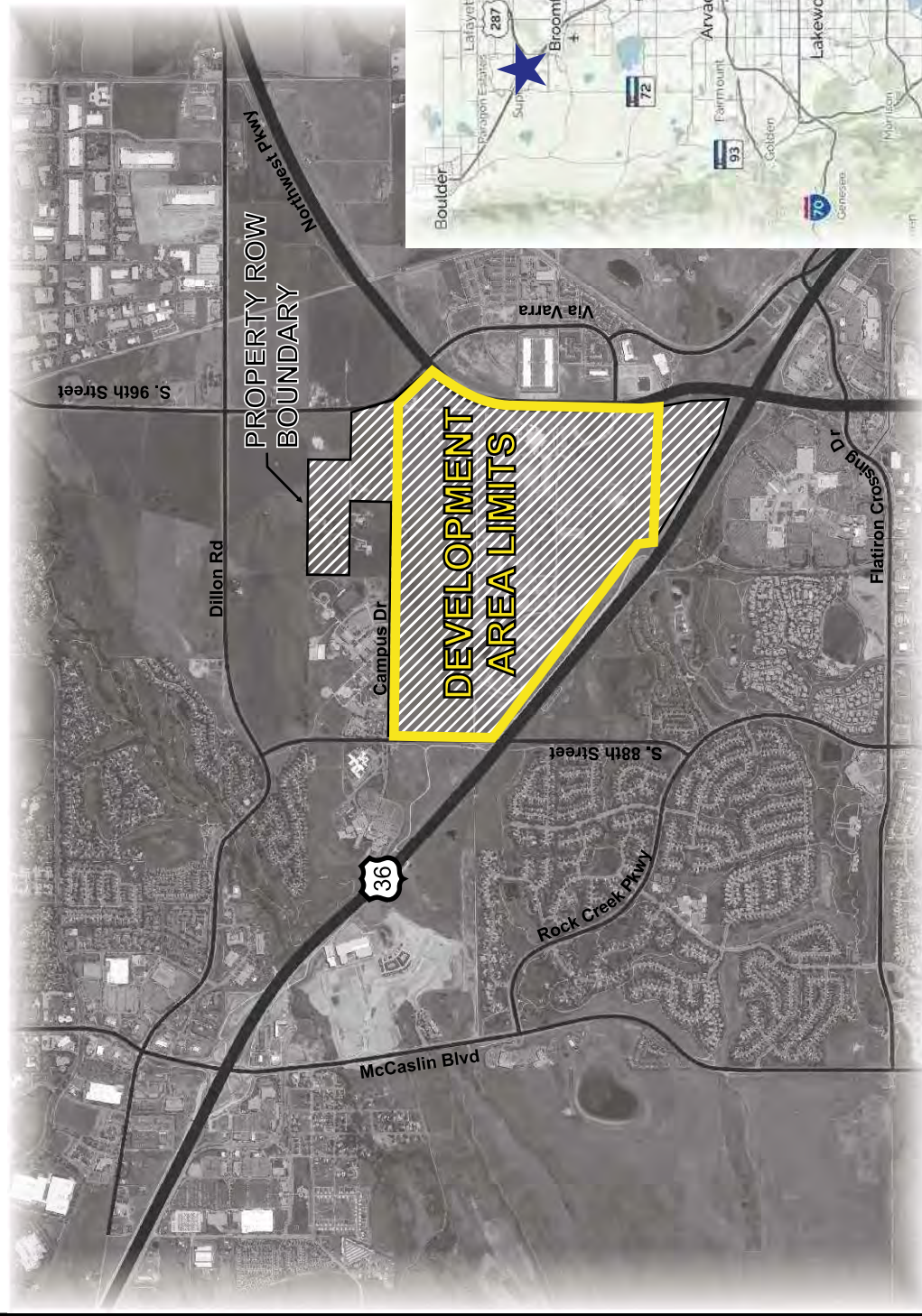
REDTAIL RIDGE TRAFFIC AND MOBILITY STUDY

1.0 INTRODUCTION

The Fox Tuttle Transportation Group has prepared this traffic and mobility study for the proposed development of the land bounded by S. 88th Street to the west, Campus Drive to the north, S. 96th Street/Northwest Parkway to the east and US 36 to the south (see **Figure 1: Vicinity Map**). The development is known as "Redtail Ridge" and proposes to develop a mix of office, industrial, and retail uses. A previous report was submitted for the former project name "Nawatny Ridge" in September 2019, along with an update in May 2020. This study evaluates an updated land use development plan and internal roadway network. This study supersedes the recommendations provided in previous studies.

The project area is currently vacant, but prior to being sold to Sun Microsystems in 2005, Storage Tek headquarters and production plant was located on the project site. Storage Tek consisted of approximately 1,700,000 square feet of building area. In 2008, ConocoPhillips purchased the property and demolished the buildings in 2009. This area has since been vacant but has recently been acquired by Brue Baukol Capital Partners. When Storage Tek was fully active in the late 1990's, approximately 4,000 employees worked on the campus and the campus generated approximately 12,400 vehicles per day (vpd), 1,600 vehicles per hour (vph) during the AM peak and 1,400 vph during the PM peak. The site was served by two access points along the former privately owned/maintained Tape Drive (hereon referred to as Rockcress Drive) which intersects with S. 88th Street to the west and Northwest Parkway to the east. Currently vehicles are not permitted to drive on Rockcress Drive and there are barricades blocking vehicles from accessing the roadway on both the west and east sides of the property.

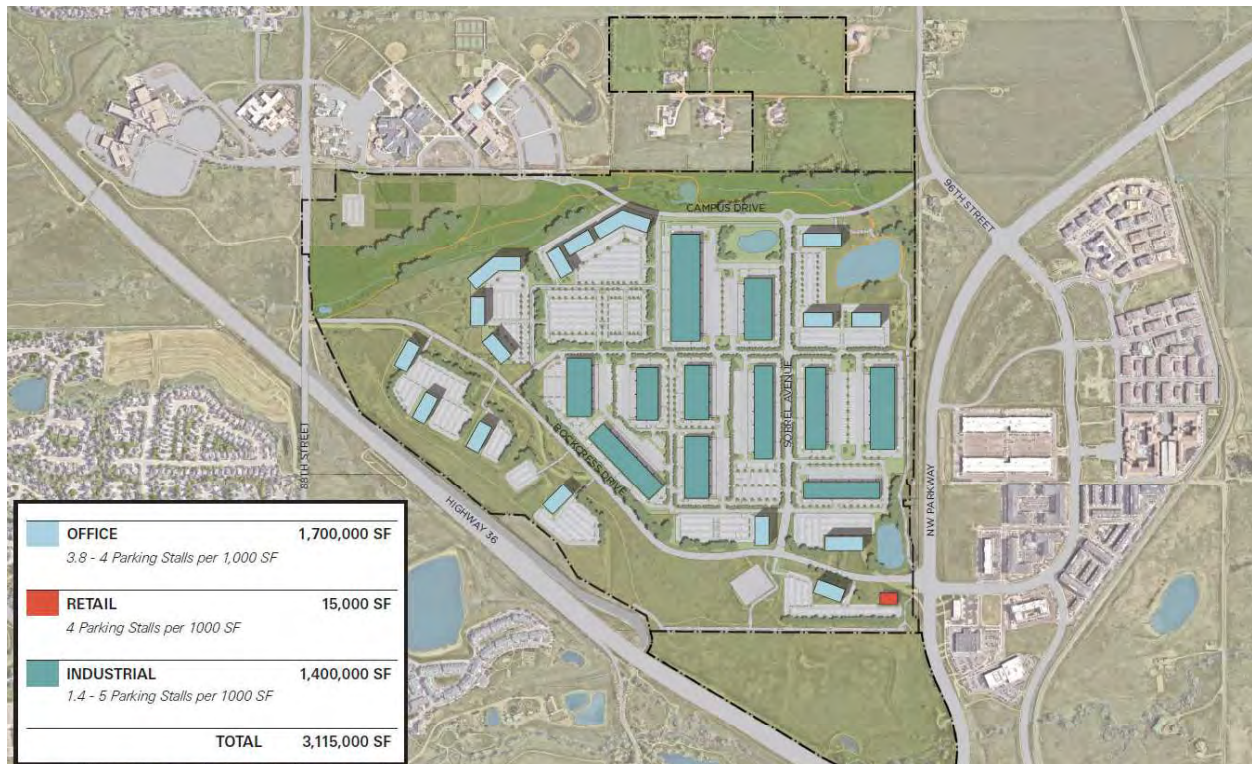
The purpose of this study is to assist in identifying potential traffic and mobility projects within the study area as a result of each of phase of this project. The traffic study evaluates peak hour intersection operations and roadway conditions in the study area with and without the project generated traffic. The information contained in this study is anticipated to be used by the City staff in identifying any intersection or roadway deficiencies and potential improvements for each scenario. This study focuses on the weekday AM and PM peak hours, which represent the periods of highest trip generation for the proposed uses and of adjacent street traffic.



2.0 PROJECT DESCRIPTION

A concept showing the preliminary proposed internal roadway network, proposed access to the external network, and the development areas is provided in **Figure 2**.

Figure 2. Proposed Land Use and Internal Roadways



While subject to change, the proposed land use type/size and estimated timeframe for when each phase will be completed and fully occupied is summarized below:

Anticipated Development Prior to Year 2025

- 414,000 square feet of industrial park and 286,666 square feet of office building space

Additional Growth Anticipated to be Completed Between Year 2025 and Year 2030

- 15,000 square feet of retail; 690,000 square feet of industrial park; and 716,665 square feet of office building space

Additional Growth Anticipated to be Completed Between Year 2030 and Year 2035

- 276,000 square feet of industrial park and 716,665 square feet of office building space

Full Build Out (Cumulative Development)

- 15,000 square feet of retail
- 1,380,000 square feet of industrial park
- 1,720,000 square feet of office building space

Prior to Year 2025, Campus Drive will be extended to connect between S. 88th Street and S. 96th Street (it currently dead ends at Monarch High School, approximately 2,200 feet east of S. 88th Street). This new connection will serve traffic generated by the proposed development, as well as existing traffic currently traveling through the Dillon Road/S. 88th Street and S. 88th Street/Campus Drive intersections which will now have an alternative route. With the Campus Drive extension, a new full-movement signalized access is proposed along S. 96th Street at the northeast corner of the site near where Old 96th Street/Disc Drive currently intersects as a 3/4 movement access.

Prior to Year 2025, Rockcress Drive will be constructed between Sorrel Avenue and Northwest Parkway; and prior to Year 2030, Rockcress Drive will connect to S. 88th Street.

A summary table showing the scenarios proposed to be evaluated in this project is shown in **Table 1**. This study evaluates Year 2025, Year 2030, and Year 2040 with and without the project. Note that while detailed traffic analysis was not completed for Year 2035, the development phasing was utilized to estimate the timeline for when improvements would be needed.

Table 1. Scenario Summary

Scenario	Background Traffic	Development Traffic Prior to Year 2025	Development Traffic Prior to Year 2030	Build Out Development Traffic	Campus Drive Extension	Rockcress Drive Extension
Existing	✓					
Year 2025 Background	✓					
Year 2025 Background + Project Trips	✓	✓			✓	
Year 2030 Background	✓					
Year 2030 Background + Project Trips	✓	✓	✓		✓	✓
Year 2040 Background	✓					
Year 2040 Background + Project Trips	✓	✓	✓	✓	✓	✓

3.0 PREVIOUS STUDIES

This section summarizes recently completed traffic and/or multimodal transportation studies in the study area. An overview of the study is provided below as well as key considerations for the Redtail Ridge study.

ConocoPhillips Campus Traffic Impact Study

In 2010 ConocoPhillips proposed to build a new research, training, and office development on the former Storage Tek site. At build out, the total development was not to exceed 2,500,000 square feet of building area and was anticipated to generate approximately 17,500 daily, 2,660 AM peak hour, and 2,455 PM peak hour vehicle trips. The site proposed to have four access points, a full movement access at the signalized west approach of the Northwest Parkway/Rockcress Drive/Via Varra intersection; a right-in/right-out access along Northwest Parkway between S. 96th Street and Rockcress Drive/Via Varra; a full-movement access along Campus Drive (Campus Drive was proposed to extend to the east to connect with S. 96th Street where Paradise Lane currently intersects); and an access along S. 88th Street where Rockcress Drive intersects.

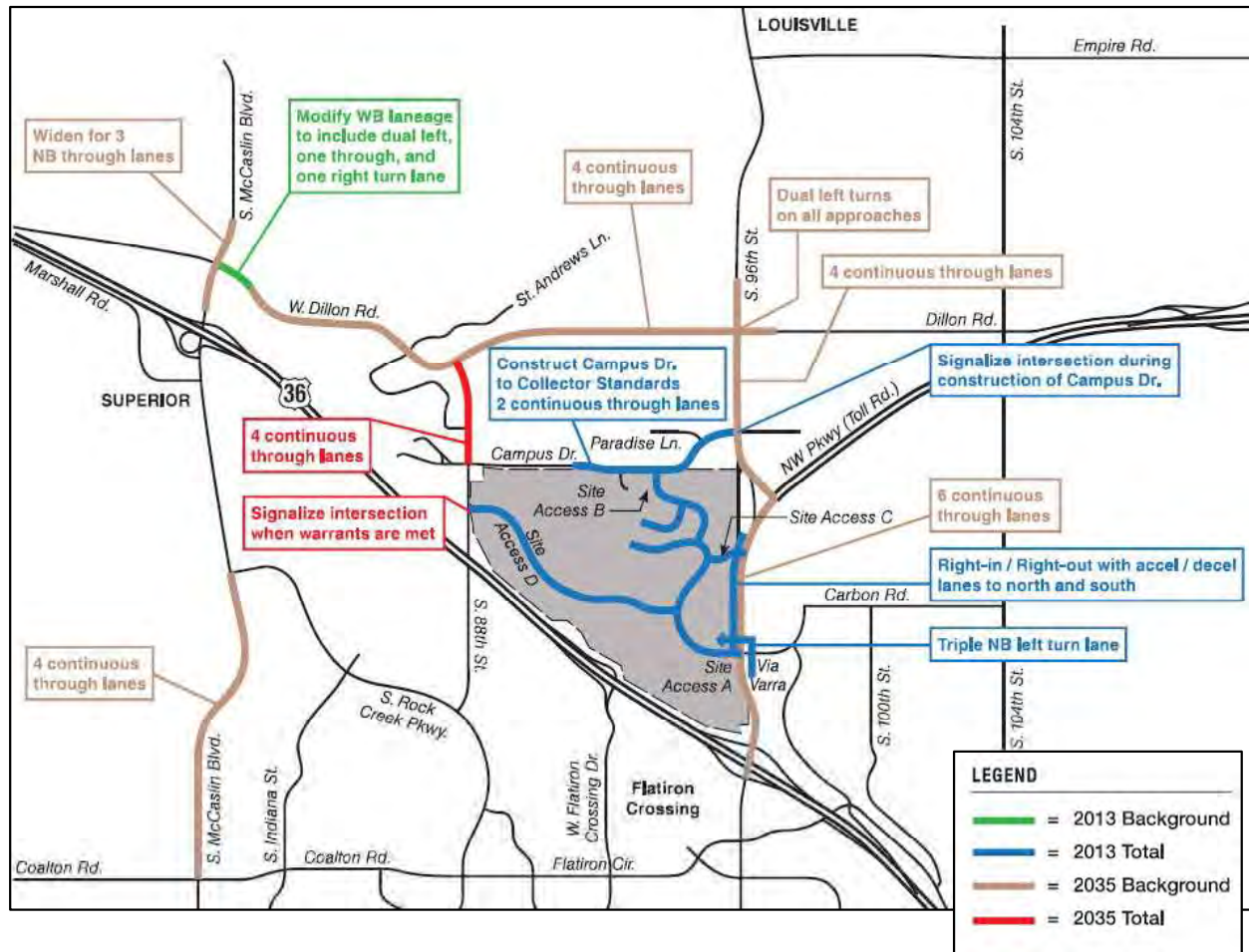
The study evaluated Year 2013 and Year 2035 with and without the project site trips. Recommendations were identified under the background and with project trip scenarios. Those improvements were illustrated in Figure ES-1 in the Traffic Impact Study (TIS) and are also shown in **Figure 3**. Notable recommended improvements include extending Campus Drive to S. 96th Street, expanding Northwest Parkway to a six-lane facility between S. 96th Street and US 36; expanding Dillon Road, S. 96th Street, and S. 88th Street to four-lane facilities, and constructing dual left-turn lanes on all approaches of the Dillon Road/S. 96th Street intersection.

Key Considerations for Redtail Ridge: The ConocoPhillips study evaluated the same project area that is being evaluated for the Redtail Ridge study. Although the project was approved by the City of Louisville in 2010, ConocoPhillips did not move forward with the project and most of the recommended improvements identified in the study have not been built. In addition to infrastructure improvements, Transportation Demand Management strategies, bicycle infrastructure improvements, and transit improvements were also recommended to reduce vehicular traffic to/from the site.

Parkway Circle South Retail Development Traffic Impact Study

The Parkway Circle South Retail Development (Land Rover Dealership) TIS is the most recent TIS to be completed for the Parkway Circle development area and is dated December 2016. A master traffic study for the development was completed in Year 2001. The Parkway Circle development area is located east of Northwest Parkway, west of the railroad tracks, and expands to the north and south of Via Varra in Broomfield, CO.

Figure 3. Summary of Roadway Improvements (ConocoPhillips Campus TIS)



Key Considerations for Redtail Ridge: The Parkway Circle development area is located adjacent to the Redtail Ridge study area. Two of the primary entrances/exits to/from the Parkway Circle development are shared study intersections with the Redtail Ridge traffic study (the accesses located along Northwest Parkway at the S. 96th Street/Via Varra and Rockcross Drive/Via Varra).

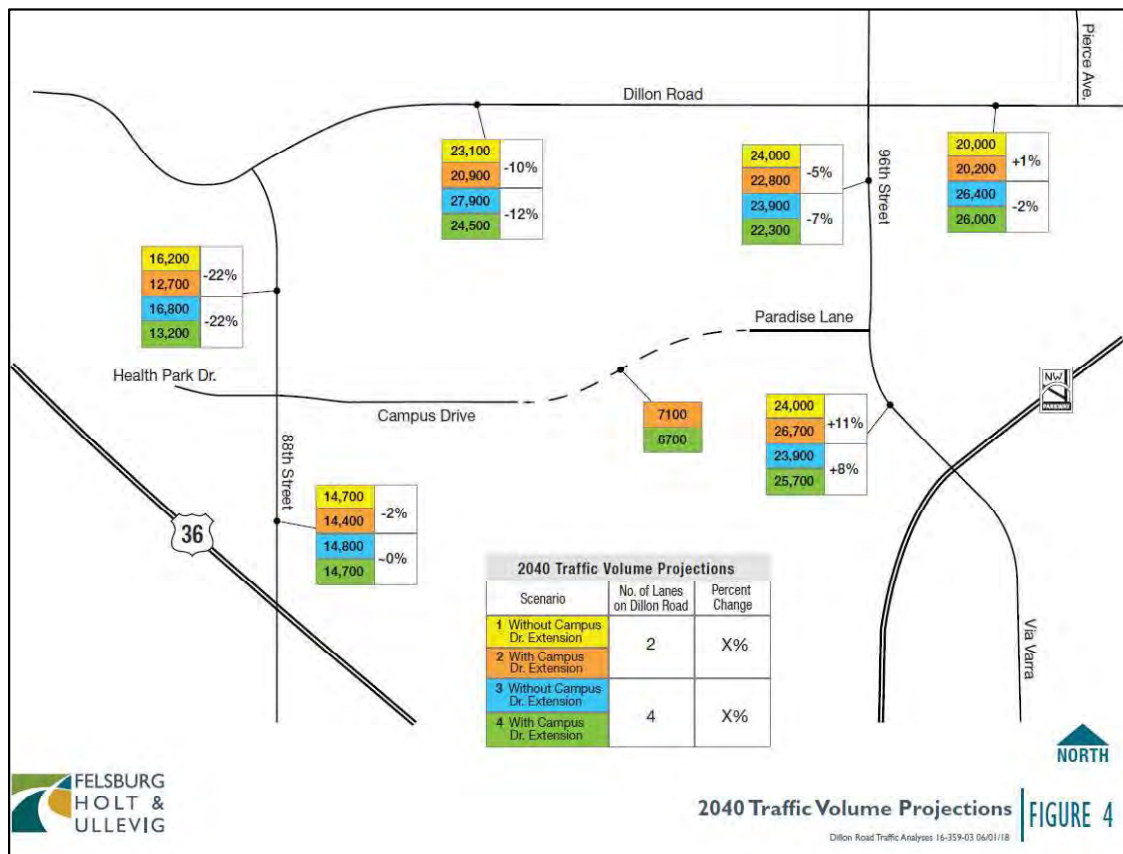
The Parkway Circle development area is approximately half built-out currently and is anticipated to be fully built out prior to Year 2040. Since the 2016 TIS, the auto dealership and some of the proposed retail to the south of Via Varra has been constructed and is open/operating. However, since this area is not fully built out, traffic generated by the undeveloped parcels in the Parkway Circle development was accounted for in the background traffic growth assumed for the Redtail Ridge analysis.

88th Street/Campus Drive Traffic Evaluation

In May 2018, a traffic analysis was completed along S. 88th Street and for the potential extension of Campus Drive to S. 96th Street for the Town of Superior. Based on field observations completed for the study, it was noted that there is congestion along S. 88th Street at Campus Drive prior to the Monarch schools starting. While queues entering Monarch school campus (southbound left-turn and northbound right-turn) along S. 88th Street do extend beyond the available turn lane storage consistently near the start of school, the queues were observed to occur for a relatively short amount of time and were slow rolling queues.

To address the existing congestion issues, the study recommended the extension of Campus Drive to the east to connect at S. 96th Street. This extension was expected to reduce congestion along S. 88th Street for the school. The Campus Drive extension was projected to accommodate 6,700 to 7,100 vpd in Year 2040 and a two-lane roadway was anticipated to operate acceptably. Projected Year 2040 daily traffic volumes were provided in Figure 3 from the S. 88th Street/Campus Drive study (see **Figure 4** below). At the S. 96th Street/Campus Drive intersection, dual northbound left-turn lanes on S. 96th Street and a free-flow right turn deceleration lane on southbound S. 96th Street were recommended.

Figure 4. 2040 Traffic Volume Projections (88th Street/Campus Drive and Dillon Road Studies)



Key Considerations for Redtail Ridge: Redtail Ridge shares study roadways and intersections with the S. 88th Street/Campus Drive Traffic Evaluation study. The Redtail Ridge project assumes that the Campus Drive extension will be constructed with the first phase of development (Year 2022). However, the S. 88th Street/Campus Drive Traffic Evaluation did not have the land use forecasts that are outlined in this study for the Redtail Ridge project. Further, since the completion of the 2018 study, the start/end times for the Monarch K-8 and High School have changed. The new hours for K-8 are 8:00 AM to 3:05 PM and for the High School are 8:30 AM to 3:30 PM.

Dillon Road Corridor Study

This corridor study was completed for the City of Louisville in June 2018 and evaluated Dillon Road between S. 88th Street and 104th Street as part of the City's ongoing planning efforts. The purpose of this study was to understand existing travel constraints and to plan for improvements as traffic grows and as new development occurs along the corridor.

The study evaluated the operations of the Campus Drive extension on Dillon Road and on S. 88th Street (see **Figure 4** above, which is also Figure 4 in the Dillon Road Corridor Study). The study estimated that the Campus Drive extension was expected to reduce daily traffic volumes on Dillon Road by 10-12 percent and on Campus Drive by approximately 22 percent. The corridor study's findings determined that the projected 20,900 vpd on Dillon Road in Year 2040 was likely to continue to function acceptably as a two-lane roadway. Further, Dillon Road as a two-lane would help restrict the level of motorists it attracts.

Key Considerations for Redtail Ridge: Redtail Ridge shares study roadways and intersections with the Dillon Road Corridor Study. As noted in the S. 88th Street/Campus Drive study, the Dillon Road Corridor Study also recommends that Campus Drive be extended to S. 96th Street to reduce traffic volumes on S. 88th Street north of Campus Drive and along Dillon Road between S. 88th Street and S. 96th Street. It should be noted that the Dillon Road Corridor Study did not have the land use forecasts that are outlined in this study for the Redtail Ridge project.

While this study suggests that Dillon Road will operate acceptably in Year 2040 as a two-lane roadway, it also notes that there is more vehicle demand that wants to be on Dillon Road but due to the very limited capacity available today during peak periods, that traffic is currently using alternative routes until Dillon Road is expanded to a four-lane. The study also notes the poor lane utilization for through movement at the Dillon Road/S. 96th Street intersection, due to the short segment of expanding from one-through lane to two-through lanes through the intersection. If/when Dillon Road is expanded to a four-lane roadway, this would resolve the poor lane utilization at this intersection.

96th and Dillon Commercial Development

In November 2019, LSC Transportation Consultants prepared the *96th & Dillon Trip Generation Comparison Letter* for the current proposed land uses for the development area north of Dillon Road and east of S. 96th Street. This is an update to the *St. Louis Parish Traffic Impact Analysis* study completed in September 2001. The development proposes two access on S. 96th Street. The area is currently owned by three property owners and the area is the process of updating the General Development Plan (GDP).

The project proposes to construct an indoor tennis center in "Zone A", a 10-fueling station gas station with a car wash, approximately 85,000 square feet of light industrial space, and a 3,000 square foot fast casual restaurant in "Zone B", and a 20,000 square foot church, approximately 100,000 square feet of light industrial, a 10,000 square foot day care center, and a 600 student school in "Zone C". Based on discussions with the developer, the industrial/commercial areas in Zone B and potentially Zone C are anticipated to be constructed in Year 2021. The tennis center, church and school are not expected to be developed until after Year 2030.

The November 2019 letter provided trip generation estimates for each of the proposed uses. Under full build-out the total development is anticipated to generate 6,294 daily, 958 AM peak hour, and 649 PM peak hour net new trips to the study network. An updated traffic study for the currently proposed land uses has not yet been completed for the project.

Key Considerations for Redtail Ridge: This development is located near the Dillon Road/S. 96th Street study intersection. The project is anticipated to generate traffic that will be added to the study intersections at a rate higher than the general background growth. Therefore, the traffic generated by this development was accounted for in the background traffic growth assumed for the Redtail Ridge analysis.

Morgan Ranch – Downtown Superior Traffic Impact Analysis

A traffic impact analysis was prepared for the proposed Morgan Ranch – DTS mixed-use development; the study is dated November 2019. The site is located east of McCaslin Boulevard in the center of Downtown Superior. The project includes approximately 352 apartment units, 64 townhome units, 33,900 square feet of restaurant, 39,430 square feet of retail space and 7,564 square feet of civic center. As part of the development, a new roadway connection is proposed to connect with S. 88th Street just south of the US 36 overpass bridge via Promenade Boulevard. The study found that the S. 88th Street / Promenade Boulevard intersection will likely require a traffic signal or roundabout in the future.

Key Considerations for Redtail Ridge: This development is proposing to construct a new access onto S. 88th Street. The traffic generated by this development was accounted for in the background traffic growth assumed for the Redtail Ridge analysis.

Level 1 Traffic and Revenue Study Jefferson Parkway

<http://www.jppha.org/wp-content/uploads/2019/08/Level-1-Traffic-and-Revenue-Study-Jefferson-Parkway.pdf>

This study was completed for the Jefferson Parkway Public Highway Authority (JPPHA) and finalized in April 2018. The purpose of the study was to provide forecasts of traffic and revenue for the proposed Jefferson Parkway. The proposed Jefferson Parkway is a 9.2-mile toll road running along the northwestern perimeter of the Denver Metro area. The future roadway will be a limited access expressway with two lanes of travel in each direction from SH 128 (south of US 36) to SH 93 (south of SH 72).

One of the scenarios considered was the "Northwest Parkway Extension" due to the project's proximity to the study corridor. The assumed roadway configuration for this scenario was described on page 4-8 in the study and is provided below:

The assumed configuration was based on the latest project information provided by the Northwest Parkway Toll Authority. The Northwest Parkway Extension will be a two-lane limited-access facility constructed between S. 96th Street and SH 128. Access to US 36 from S. 96th Street and Flatiron Crossing Drive will be provided via free local frontage roadways. Additional interchanges will be constructed at S. 96th Street, Interlocken Boulevard and El Dorado Boulevard. Local access to Flatiron Boulevard and Environmental Way will be retained. Due to the relative importance of the project, traffic assignments with and without the proposed Northwest Parkway Extension were conducted in order to estimate the potential traffic and revenue impact to the Jefferson Parkway.

Key Considerations for Redtail Ridge: The Northwest Parkway Extension segment in the Jefferson Parkway study, includes four of the study intersections along Northwest Parkway for the Redtail Ridge traffic Study (S. 96th Street/Via Varra, Rockcress Drive/Via Varra, US 36 North Ramps, and US 36 South Ramps). As noted above, the Northwest Parkway Extension would impact the study corridor with proposed "local frontage roadways" to maintain free local access and an interchange at S. 96th Street. No concepts were provided to illustrate the proposed frontage road or interchange configuration. The *Level 1 Study* indicated that the revenues generated from the Jefferson Parkway project would cover the cost of the frontage road and interchange improvements.

City of Louisville Transportation Master Plan (Adopted October 2019)

<https://www.engagelouisvilleco.org/transportation-master-plan>

The City of Louisville Transportation Master Plan (TMP) is the first effort conducted by the City to look comprehensively at transportation conditions and options throughout Louisville and the region for all modes of transportation. The TMP represents a long-range planning effort that describes baseline conditions of the City's transportation network, establishes eight overarching transportation Goals, and specific transportation Policies, Programs and Projects. The City

developed the plan with extensive community outreach, input from the City's advisory boards and commissions, regional partners, and City staff. It is important to note that the plan reflects a moment in time. The TMP provides guidance, but City priorities may change over time and transportation decisions will need to reflect these updated community needs, opportunities and priorities.

Key Considerations for Redtail Ridge: The TMP acknowledges that the development of the former Storage Tek campus provides additional opportunity to leverage transit (page 4-11, 4-31) with a potential new local route to connect the Redtail Ridge project area with other development areas and regional transportation stations in the study area. The TMP notes future corridor improvements including expanding SH 42/S. 96th Street to a four or five lane cross-section (page 4-14) and increasing capacity at the Dillon Road/S. 96th Street intersection (page 4-16). The City will need to partner with landowners (CTC, BNSF and BVSD) on the planned improvements; and as the former Storage Tek site develops and connects into the existing transportation network. The City will need to evaluate the capacity constraints of the surrounding road and trail network and ensure adequate improvements are made (page 4-16). The TMP recommends transit route connections from the former Storage Tek site to destinations within Louisville (page 4-31) and bike share stations that would be connected to other stations at McCaslin Station, Avista Hospital, the Colorado Technology Center (CTC), Downtown, DELO, and Kestrel (page 4-38).

Boulder County Transportation Master Plan

<https://www.bouldercounty.org/transportation/plans-and-projects/transportation-master-plan/>

The Boulder County TMP establishes a vision for a sustainable and inclusive transportation network by working together to prioritize transportation investments, explore new funding options, and plan for the future. The county's TMP provides a blueprint for Boulder County's transportation system for the next 25 years. The TMP provides a clear direction to the Boulder County Transportation Department to secure funding as it becomes available for transportation projects in the coming decades.

Key Considerations for Redtail Ridge: The Boulder County TMP identified the S. 96th Street/ Highway 42 as a key regional corridor (see Figure 2). The key regional corridors will expand and enhance affordable and equitable mobility options for older adults, people with disabilities, individuals with low income, and others living with mobility limitations while also increasing bike-to-transit programs to provide transportation options and make bus travel more accessible. S. 96th Street/Highway 42 is also identified as a conceptual corridor for Bus Rapid Transit (BRT) service in the TMP (see Figure 5). The BRT service would connect to a county-wide system of BRT routes that connect to regional destinations. The BRT system would include infrastructure investments and programs to reduce vehicle miles traveled and provide service to underserved communities. A component of the BRT vision is to expand and supplement existing Boulder County Eco Pass programs with the goal of a countywide community pass for all county residents

and employees. See **Section 9** for possible future scenario if this and other mobility plans in this section are completed in the future.

DRCOG Active Transportation Plan

<https://drcog.org/programs/transportation-planning/bicycle-and-pedestrian-planning/active-transportation-plan>

In 2017, the Denver Regional Council of Governments (DRCOG) initiated the development of the Denver region's first active transportation plan. The purpose of the plan is to establish a common vision for bicycling and walking in the region and to provide inspiration and tools for local agencies to implement projects in their respective jurisdictions. The Denver Regional Active Transportation Plan (ATP) supports DRCOG's Metro Vision plan and will foster collaboration among local agencies across boundaries. DRCOG worked with partners throughout the region to develop a regional active transportation vision, tools and products to support the development of a robust active transportation network in the Denver region. The ATP envisions a safe, comfortable and connected network and highlights opportunities and implementation strategies to improve active transportation across the Denver region.

Key Considerations for Redtail Ridge: The ATP identified regional active transportation corridors to allow safe and comfortable access to existing and future regional destinations for people of all ages, incomes and abilities. Development of these corridors supports Metro Vision outcomes related to creating a connected multimodal region and a vibrant regional economy. The regional network can facilitate cross-jurisdictional collaboration toward a common vision for a regional active transportation network. Local facilities that connect to the regional network are critical to connect residents to the regional network and are an important component of the network as well. The S. 96th Street/State Highway 42 corridor from Broomfield to Longmont is identified as a regional active transportation corridor. This plan will be implemented over the next two decades as part of DRCOG's regional Transportation Improvement Plan (TIP). See **Section 9** for possible future scenario if this and other mobility plans in this section are completed in the future.

Mobility Choice Blueprint

http://www.mobilitychoiceblueprintstudy.com/assets/docs/MCB_Final_Report_.pdf

The way we travel in the Denver metro area is rapidly changing. Advanced technology and internet connectivity are providing new options every day. To maintain the economic competitiveness and livability of our communities, we must identify and anticipate how technological advances like driverless vehicles, mobility apps and streamlined fare payment could dramatically change our transportation systems. The region's major multi-modal agencies have agreed to develop a Mobility Choice Blueprint (MCB). This is a coordinated strategy for how we enable more accessible and effective transportation mobility choices to enhance the quality of our social, cultural, and economic life now and in the future. The metropolitan agencies are collaborating, in partnership with community, nonprofit, and private sector leaders, to carefully

consider a range of effective and efficient solutions to the challenges and opportunities presented by emerging mobility technologies.

Key Considerations for Redtail Ridge: The MCB recommended implementation of transit priority on all major bus corridors, implementation of smart traffic signal control technology on all major regional arterial corridors, developing incentives to improve ride hailing and ridesharing operations, and encouraging shared use of driverless automated vehicles.

RTD First and Last Mile Strategic Plan

<http://www.rtd-denver.com/firstmile-lastmile.shtml>

Transit is only effective when riders can access it. First and Last Mile (FLM) is the problem of getting to transit (first mile) and getting to your final destination (last mile). Not all trips are the same, and first mile trips often differ from last mile trips in length, mode of travel, and purpose. Similarly, trips to access transit are not necessarily limited by a one-mile radius but can differ depending on the mode of travel used to access the transit service. RTD First and Last Mile Strategic Plan (FFM Plan) covers FLM strategies for multiple types of transit stations and stops in a variety of settings. This Plan is not intended to be a prescriptive guide to implementing FLM strategies and recommendations. It provides a framework from which to select a tailored set of FLM strategies to improve transit access. The FFM Plan aims to improve transit accessibility by empowering local jurisdictions, transportation management associations (TMAs), and other partners to understand the range of FLM solutions that are available and then apply those solutions to specific station areas. As FLM strategies and recommendations often span across jurisdictional boundaries, partnerships are identified as key toward implementation.

Key Considerations for Redtail Ridge: The FFM Plan identifies strategies for reusing existing infrastructure, building new connections, transportation demand management and new transportation services on the Redtail Ridge project site (Figure 4.1). It also identified how the strategies could be applicable to different transit rider groups who will want to access local and regional transit services in and near Redtail Ridge (Figure 4.1). The strategies in this plan can be implemented over the next two decades as part of the Transportation Demand Management (TDM) program for the project.

RTD Northwest Area Mobility Study

http://www.rtd-fastracks.com/nams_1

The Northwest Area Mobility Study (NAMS) was a 13-month effort to develop a prioritized list of mobility improvements for the Northwest area of the Regional Transportation District's (RTD) service area. The study focused on five key areas: Phased Construction of Northwest Rail, Feasibility of Extending North Metro Rail Line to Longmont, Finalizing the US 36 Bus Rapid Transit (BRT) Commitments identified for Year 2035, Feasibility of New Arterial BRT Lines, and Analysis

of the Reverse-Commute between Denver Union Station (DUS) and US 36. RTD staff and Board of Directors initiated the study in response to the significant cost increases associated with building and operating commuter rail in the 41-mile Northwest corridor. The goal of the study was to collaborate with corridor stakeholders to determine if there is a more cost-effective way to approach improving mobility in the area that could be implemented sooner. The result was multi-agency consensus on a prioritized list of agreed-upon mobility improvements for the Northwest RTD region.

The SH 42 corridor was recently identified as a Priority 3 corridor in the RTD Regional Bus Rapid Transit Study, the Metro Mayors Caucus is reviewing a ballot initiative to fund this corridor as part of regional ballot initiative, and the City of Louisville has applied for a grant to further study this service as part of a revised Highway 42 corridor study (see below). A Year 2040 scenario is provided in this study that assumes this service is in place.

Key Considerations for Redtail Ridge: NAMS identified the S. 96th Street/Highway 42 as one of the six candidate Arterial Bus Rapid Transit corridor (see Figure 6.1 in the study and **Figure 5** below). All corridors were evaluated, and recommendations were made for transit priority elements such as transit signal priority, queue jump lanes and headway-based scheduling. Operations and maintenance costs for the corridors were also prepared. The NAMS Policy Advisory Committee (PAC) recommended that all six arterial BRT projects be implemented with system-wide service improvements.

RTD Transportation Transformation (T2) Comprehensive Plan

<http://www.rtd-denver.com/documents/projects/T2-Summit-091018.pdf>

The RTD Transportation Transformations Comprehensive Plan (T2 Plan) is currently underway. The T2 Plan is a wholesale evaluation of RTD's current and anticipated resources in order to chart a roadmap for RTD's future as a Mobility Integrator and public transit provider for the Denver metro region. The study is an essential component of RTD's Transportation Transformation initiative as the District moves from a transit agency to a mobility integrator.

The T2 Plan will be completed in coordination with the RTD Board of Directors, DRCOG, CDOT, local governments, and stakeholders/citizens. The T2 Plan is anticipated to answer the question of "what's next" to complement FasTracks, charting a course that optimizes existing and future FasTracks infrastructure first before determining what other future investments are needed. Rather than "competing" with FasTracks, instead the idea is to provide incremental value to the existing program rather than a series of random projects that may have no relationship to each other or the overall regional system.

Key Considerations for Redtail Ridge: The T2 Plan will likely outline funding and timeline options for Bus Rapid Transit (BRT) projects in the S. 96th Street/Highway 42 corridor. Also, the future of how local RTD bus routes and shared ride mobility providers will be further defined.

4.0 STUDY CONSIDERATIONS

4.1 Data Collection

Intersection turning movement and daily traffic volumes were collected in August 2019 in the study area when school was in session on the Monarch school campus. The existing traffic volumes are illustrated on **Figure 6**. The existing intersection geometry and traffic control are also shown on this figure. Signal-related information for the existing intersections were provided by the City of Louisville and Broomfield and updated based on video observations to reflect current field operations. Count data sheets are provided in the **Appendix**.

4.2 Evaluation Methodology

The traffic operations analysis addressed the signalized and unsignalized intersection operations using the procedures and methodologies set forth by the *Highway Capacity Manual (HCM)*¹. Existing peak hour factors were applied to the intersections for the existing scenarios. Study intersections were evaluated using Synchro and SimTraffic software.

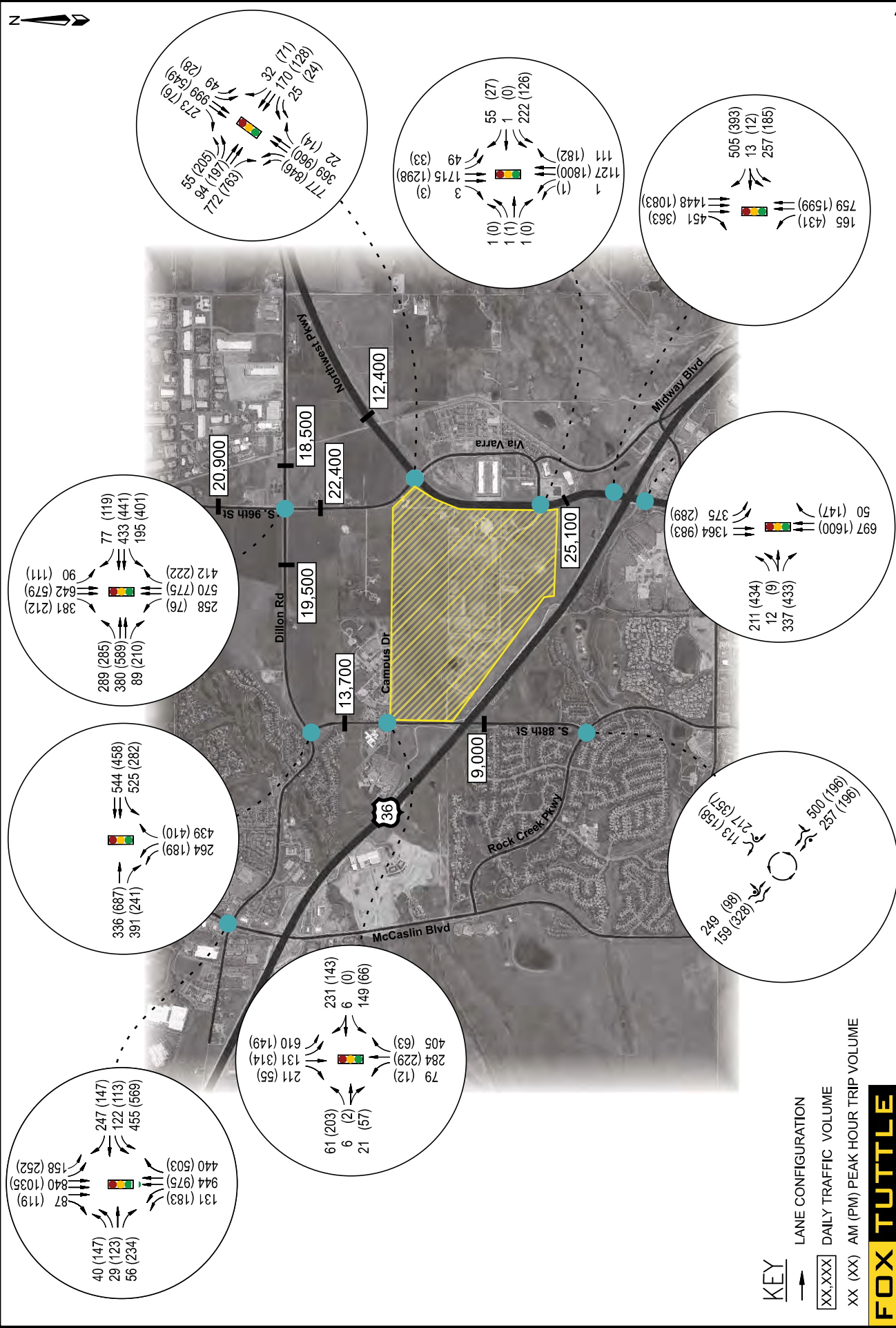
4.3 Level of Service Definitions

A Level of Service analysis was conducted to determine the existing and future performance of the study area intersection and to determine the most appropriate traffic control device and need for auxiliary lanes for the study intersections.

To measure and describe the operational status of the study intersections, transportation engineers and planners commonly use a grading system referred to as "Level of Service" (LOS) that is defined by the *HCM*. LOS characterizes the operational conditions of an intersection's traffic flow, ranging from LOS A (indicating very good, free flow operations) and LOS F (indicating congested and sometimes oversaturated conditions). These grades represent the perspective of drivers and are an indication of the comfort and convenience associated with traveling through the intersections. The intersection LOS is represented as a delay in seconds per vehicle for the intersection as a whole and for each turning movement. A more detailed discussion of LOS methodology is contained in the **Appendix** for reference.

Typically, LOS A through C is considered to be good for the overall intersection operations and the desired standard for overall intersection performance is LOS D or better. Individual movements may be allowed to fall to LOS E or F depending on the circumstances, such as a low-volume, side-street approach to an arterial where signal warrants are not met, or a protected-only, signalized left-turn movement where safety is prioritized over operational efficiency.

¹ Highway Capacity Manual, Highway Research Board Special Report 209, Transportation Research Board, National Research Council, 2010 and 6th Edition (2016).



REDTAIL RIDGE TRAFFIC AND MOBILITY STUDY
EXISTING (YEAR 2019) TRAFFIC VOLUMES

4.4 Safety for all Modes of Travel

Safety is an important factor for transportation planning and infrastructure investments. Intersections are key areas where a significant number of conflicts between people and vehicles can occur. The actual and perceived safety of an intersection or a corridor can greatly impact people's desire to utilize certain routes, particularly for those on foot or on bike. Safety in relation to schools is also a key factor in mobility and health. Monarch K-8 and Monarch High School, while accessible with trails and sidewalks, are located along corridors with higher travel speeds and volumes which pose potential risks. The roadways around the site are currently designed to optimize motor vehicle travel during peak times at speeds that present challenges for non-motorized travelers.

Four existing arterial intersections near the Redtail Ridge project were identified as high crash locations in the City of Louisville TMP, including the Dillon Road/S. 88th Street, Dillon Road/S. 96th Street, S. 88th Street/Campus Drive, and Northwest Parkway/S. 96th Street/Via Varra intersections as shown in **Figure 7**. Also, three of the locations have documented bicycle crashes. The Dillon Road/S. 88th Street intersection has the highest number of bicycle crashes in the City of Louisville.

The City of Louisville's TMP recommends a series of infrastructure, maintenance and training programs designed to reduce crashes for all roadway users. Likewise, the TMP recommends building more Great/Complete streets citywide. Great/Complete Streets include adding treatment such as detached sidewalks, landscaping, protected bikeways, and travel dimensions that support driving speeds at or below the speed limits (see **Figure 8** below, Figure 4.2 in the TMP).

In addition to building Great/Complete street design internal to the project on Campus Drive, Rockcress Drive, and Sorrel Avenue, the Redtail Ridge project team is recommending to help build Great/Complete street design treatments for the S. 88th Street, Dillon Road, and S. 96th Street corridors and intersections consistent with the TMP's policies. Such streets and intersections will be designed and operated to be safe and accessible for all users, regardless of ability, age, or mode. These corridors and intersections will make Louisville a more livable place, increase comfort and safety for pedestrian and bicyclists, improve first and last mile access to transit, reduce congestion and improve air quality. Most importantly, Great Streets have been shown by the Institute of Transportation Engineers (ITE) and the Federal Highway Administration (FHWA) to reduce conflicts that lead to crashes.

<https://www.ite.org/pub/?id=F56B1D96-EFFB-B97B-153B-F217E1B69DD8>

<https://www.transportation.gov/mission/health/complete-streets>

Figure 7. High Crash Locations (City of Louisville Transportation Master Plan)

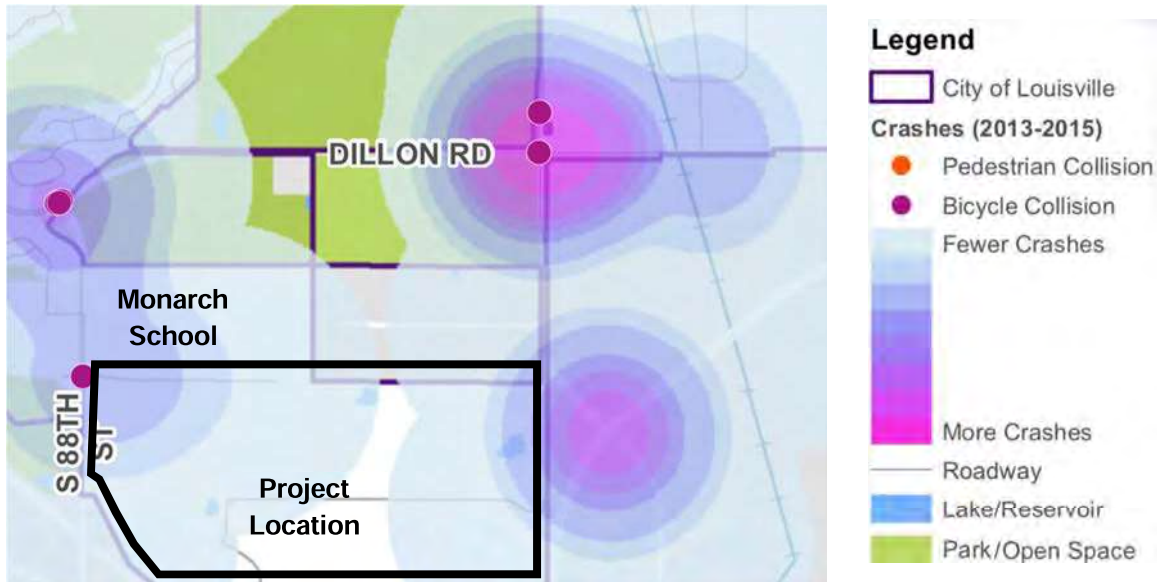
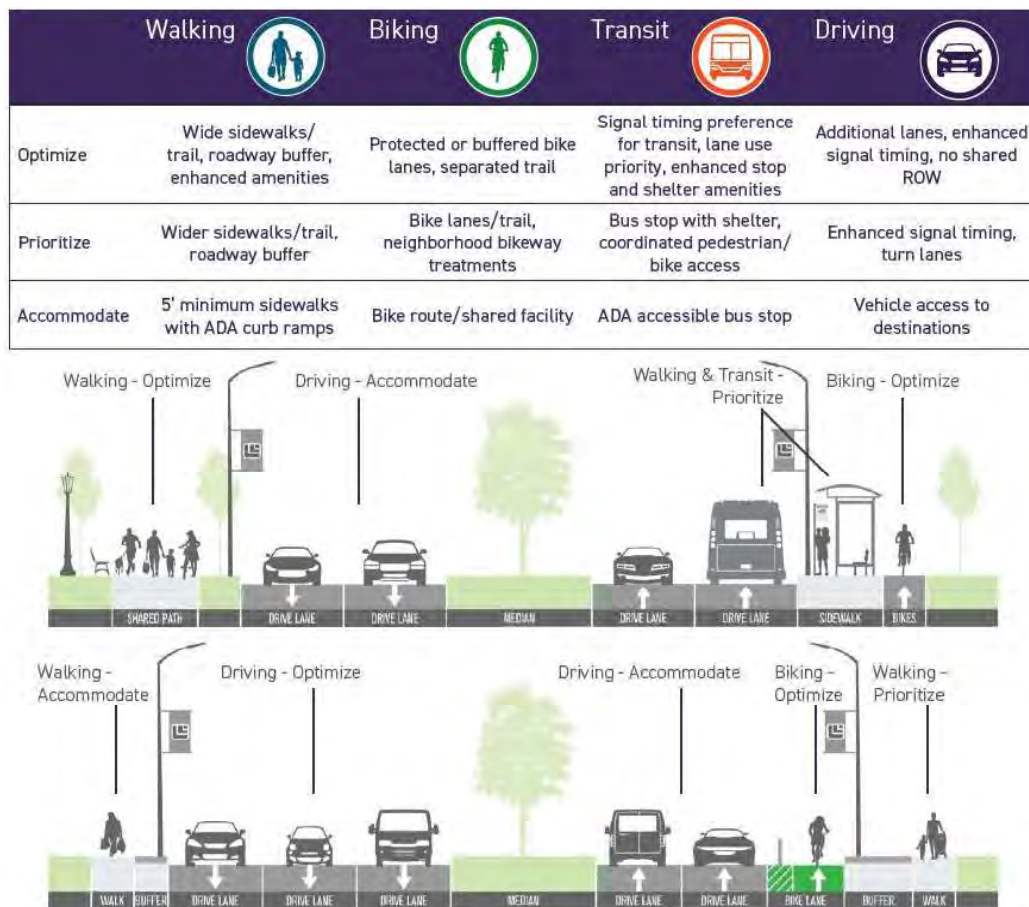


Figure 8. Great Street Graphic from the City of Louisville's TMP



5.0 EXISTING CONDITIONS

5.1 Roadways

The study area boundaries were established based on conversations with City staff. The existing study area street network consists of arterial and collector roadways as well as a US Highway. The primary public roadways that serve the project site are discussed in the following text.

US 36 is a freeway that connects Denver and Boulder from I-25 in Denver to Table Mesa Drive in Boulder. Near the study area, US 36 has two general purpose lanes in both directions and there is an Express Lane in each direction, alongside the general-purpose lanes. There are three (3) interchange accesses near the project area, at McCaslin Boulevard which was reconstructed to a Diverging Diamond Interchange in Year 2016, at Northwest Parkway/Interlocken Loop, which is diamond interchange, and there are two half diamond interchanges with one on either side of the Northwest Parkway/Interlocken Loop interchange. The RTD's Flatiron Flyer BRT service that connects Denver, Boulder, and other cities operates along the US 36 corridor. US 36 currently serves approximately 88,000 vpd west of the McCaslin Boulevard interchange and approximately 94,000 vpd east of the Northwest Parkway/Interlocken Loop interchange. The posted speed limit along this segment of US 36 is 65 miles per hour (mph).

Northwest Parkway is a four-lane divided highway under the jurisdiction of the City and County of Broomfield south of S. 96th Street. Northeast of S. 96th Street, Northwest Parkway becomes a toll road and freeway section with no at-grade intersection access. The roadway section consists of two travel lanes in each direction with a raised center median. Northwest Parkway currently serves approximately 24,400 vpd north of US 36 and 12,200 vpd northeast of S. 96th Street. The posted speed limit is 45 mph within the study area.

Dillon Road is a four-lane divided arterial roadway west of S. 88th Street and transitions to a two-lane undivided rural roadway east of S. 88th Street. Dillon Road is an east-west street that provides a direct connection between McCaslin Boulevard (to the west) and the Northwest Parkway (to the east) where it makes connections via interchange ramp terminals at US 287. While east of S. 88th Street, Dillon Road is a two-lane roadway, at the S. 88th Street and S. 96th Street intersections a second through lane is added in each direction to increase vehicular capacity through the intersections. The extra through lanes merge to one lane as motorists proceed away from these intersections, except that Dillon Road continues to have a second through lane to the west of S. 88th Street. Dillon Road currently serves approximately 18,000 vpd east of S. 96th Street. There are existing on-street bike lanes striped on Dillon Road. The posted speed limit is 35 mph west of S. 88th Street and 45 mph east of S. 88th Street within the study area.

McCaslin Boulevard is a six-lane divided roadway within the study area, but transitions to a four-lane divided roadway to the north at Via Appia and to the south, south of the US 36 interchange. McCaslin Boulevard provides north-south connectivity between South Boulder Road and 120th Avenue. Between US 36 and Dillon Road, McCaslin Boulevard serves approximately 33,900 vpd whereas north of Dillon Road McCaslin Boulevard serves approximately 22,300 vpd. There are existing on-street bike lanes striped on McCaslin Boulevard. The posted speed limit is 35 mph.

South 88th Street is a two-lane roadway that provides north-south connectivity between Rock Creek Parkway in the Town of Superior and Dillon Road in the City of Louisville. It provides access opportunities for the Monarch K-8 and High Schools via Campus Drive and to medical facilities along Health Park Drive. S. 88th Street has a grade-separated bridge crossing of US 36 to the south of Campus Drive. There are existing on-street bike lanes striped on S. 88th Street north of Campus Drive. S. 88th Street currently serves approximately 12,300 vpd between Dillon Road and St Andrews Lane. The posted speed limit along S. 88th Street is 35 mph; however, the speed limit is reduced to 20 mph three times per day during school activity hours.

S. 96th Street is a two-lane undivided roadway through most of the study area. S. 96th Street provides direct access to the Northwest Parkway to the south. To the north, S. 96th street continues past South Boulder Road with access to downtown Louisville before transitioning into N 95th Street and continuing to the City of Longmont. Like the eastbound/westbound directions of Dillon Road, S. 96th Street also widens to two through lanes in each direction at Dillon Road to provide extra capacity through the existing signalized intersection. There are existing on-street bike lanes striped on S. 96th Street within the study area. S. 96th Street currently serves approximately 21,700 vpd south of Dillon Road and approximately 16,500 vpd north of Dillon Road. The posted speed limit is 40 mph within the study area.

5.2 Intersections

The study area includes nine existing intersections that are listed below with the current traffic control. These intersections were analyzed for existing and future years with and without the project trips:

- Dillon Road and McCaslin Boulevard (signal)
- Dillon Road and S. 88th Street (signal)
- Dillon Road and S. 96th Street (signal)
- S. 88th Street and Campus Drive (signal)
- S. 88th Street and Rock Creek Parkway (multi-lane roundabout)
- Northwest Parkway and S. 96th Street/Via Varra (signal)

- Northwest Parkway and Rockcress Drive/Via Varra (signal)
- Northwest Parkway and US 36 Westbound/North Ramps (signal)
- Northwest Parkway and US 36 Eastbound/South Ramps (signal)

The existing lane configuration at each of the study locations is illustrated on **Figure 6**. Additional site-access intersections were analyzed for the scenarios with the addition of project-added traffic.

5.3 Traffic Changes Since Storage Tek Closure

Many changes have taken place in the Redtail Ridge project area since Storage Tek was an active campus in the late 1990's. The Town of Superior implemented their Comprehensive Plan that included new single-family residential neighborhoods and a mixed-use town center. The City and County of Broomfield constructed a major regional shopping center at Flatiron Crossing and a mix of uses along the eastern side of what is now the Northwest Parkway and Interlocken Loop. The City of Louisville also added new uses to the Colorado Technology Center. Also, over this timeline the number of open enrollment students attending Monarch K-8 and Monarch High School, who are not provided school bus services, has remained consistent at almost 40 percent of the student body at Monarch High School (approximately 700 students) and 25 percent at Monarch K8 (approximately 75 students). All these changes over the past 18 years since the Storage Tek property closed have utilized the vehicle traffic capacity previously used by traffic generated by Storage Tek on the S. 88th Street, Dillon Road, and S. 96th Street corridors.

The historic volumes shown in **Figure 9**, **Figure 10**, and **Figure 11** show what occurred in the area since the Storage Tek site was vacated in the early 2000's. When Storage Tek was fully active in the late 1990's it generated approximately 12,400 average daily trips in the study area. When Storage Tek closed, the other developments in Superior, Broomfield, and Louisville utilized the roadway capacity that was vacated by Storage Tek. Over this time there were incremental changes made to add turn lanes and motor vehicle capacity at some intersections. However, the S. 88th Street, Dillon Road, and S. 96th Street corridors are currently reaching capacity.

Planning level daily capacity estimates for two-lane roadways with turn lanes range from 16,000 to 18,000 vpd. However, as shown in **Figure 10** and **Figure 11**, both Dillon Road and S. 96th Street currently exceed the planning level thresholds. The increased capacity at the Dillon Road/S. 96th Street intersection and the limited number of access locations are two of the reason these corridors have traffic volumes that exceed the planning level daily capacity thresholds. Based on the current operations, it is estimated that between 22,000 and 24,000 vpd could be accommodated on these segments. However, if additional conflict points, intersections, or left-turning traffic is added to the corridors, the capacity will likely decrease.

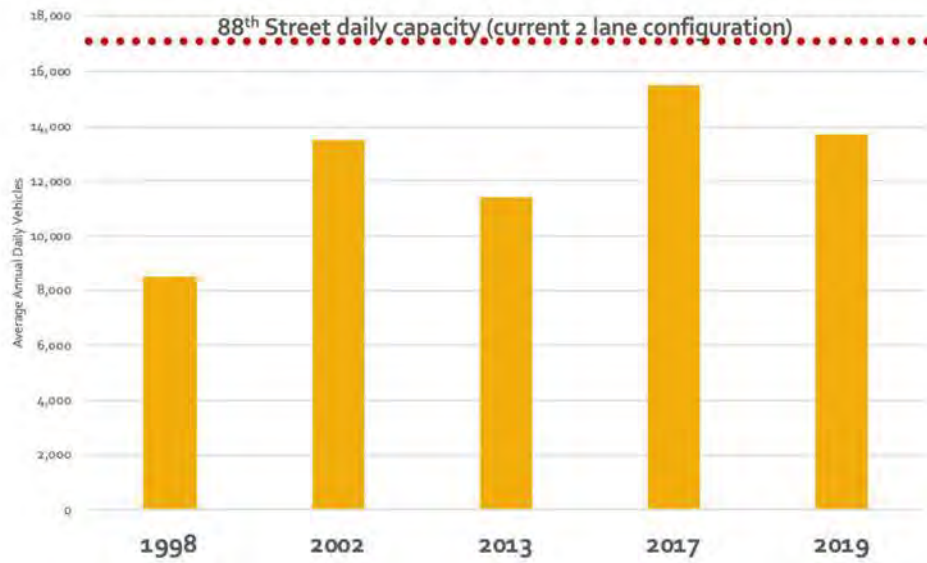
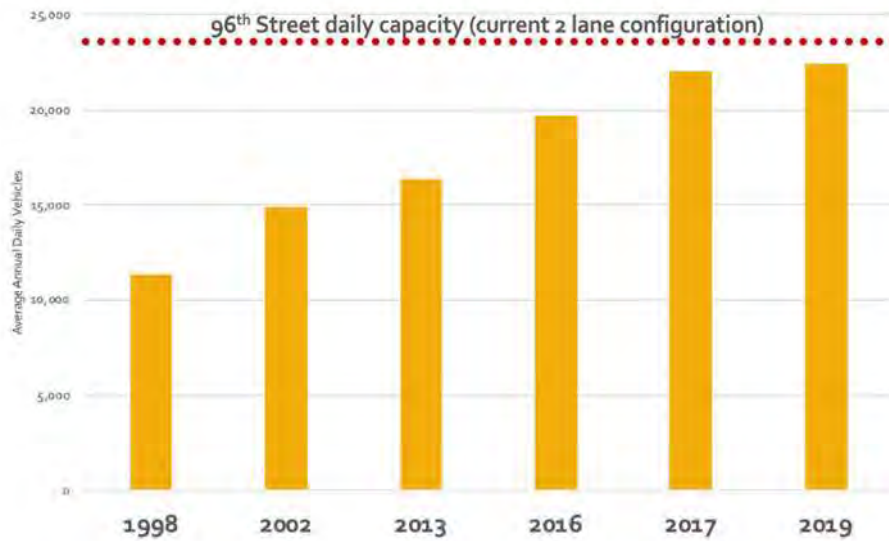
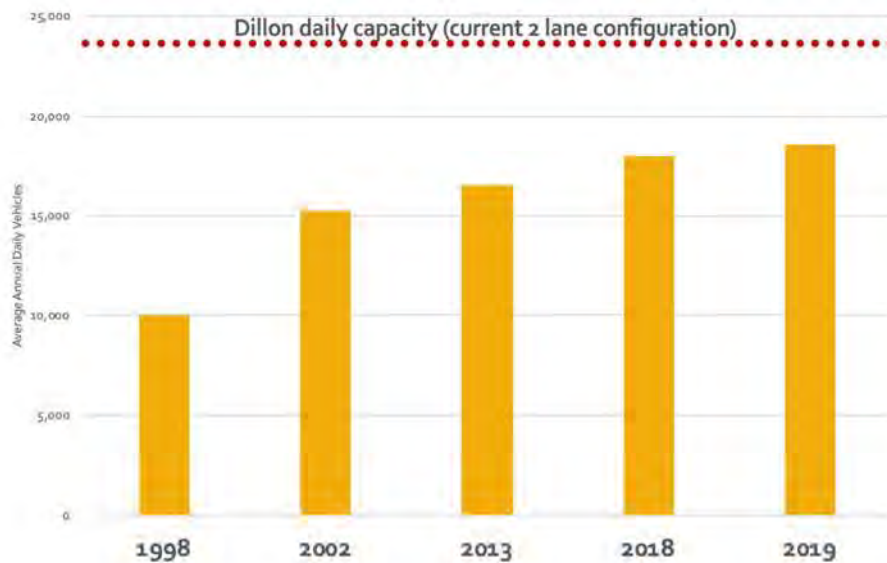
Figure 9. South 88th Street North of Campus Drive Volume Trends**Figure 10. South 96th Street South of Dillon Road Volume Trends**

Figure 11. Dillon Road East of S. 96th Street Volume Trends

5.4 Walking in the Project Area

Most of the current sidewalk and multi-use walking network near the Redtail Ridge project is in the S. 88th Street corridor. This is due to the open lands that mostly front Dillon Road and S. 96th Street in the study area. The S. 88th Street sidewalks and multi-use paths connect the Monarch school campus to neighborhoods in Louisville and Superior. There is an existing underpass that transverses under S. 88th Street just south of Dillon Road. This underpass connects the Monarch school campus to the sidewalks on Dillon Road. Although the sidewalk network in the area is missing connections in the S. 88th Street, Dillon Road and S. 96th Street corridors, each intersection has pedestrian crosswalks (an example of a missing sidewalk is shown in **Figure 12** which shows the informal connection on the north side of the Dillon Road/S. 88th Street intersection). It is anticipated that the demand to complete the sidewalk and multi-use path network between the CTC Campus, Redtail Ridge, and Monarch school campus will be increasingly important in the future as the TMP priorities are implemented. Specifically, new sidewalks and pathways will be necessary given future plans for shared ride mobility and BRT near Dillon Road and in the S. 96th Street corridor.

The southeast corner of the Redtail Ridge site has an existing underpass that connects under Northwest Parkway (a photo of the underpass is shown in **Figure 13**). This connects sidewalks and multi-use pathways on the westside of Northwest Parkway to the new Broomfield sidewalk network on the eastside of Northwest Parkway. This underpass is also a critical part of the future walking connections to the Rock Creek and Broomfield Trails.

Figure 12. Coal Creek Regional Trail Informal Connection



Figure 13. Northwest Parkway Multi-Use Path Underpass



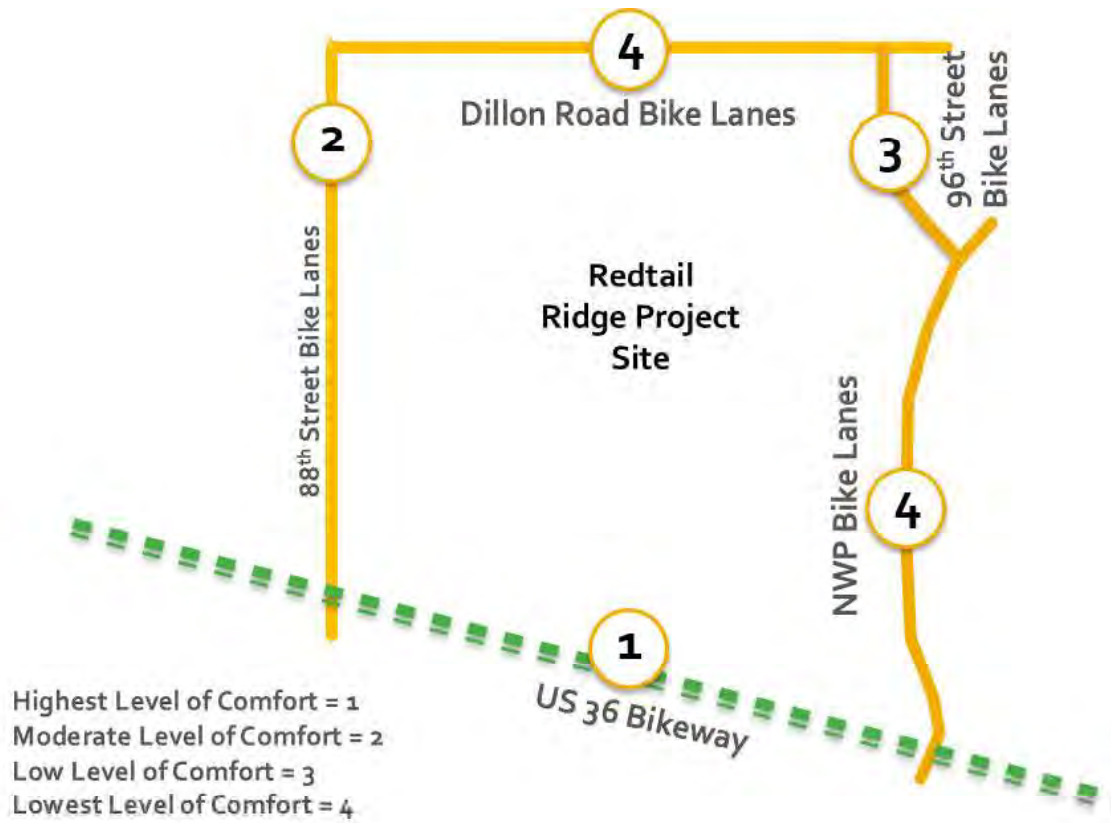
5.5 Bicycling in the Project Area

The Redtail Ridge site is located at the confluence of many off-street trails and on-street bicycle lanes. The Coal Creek Trail, Rock Creek Trail and the US 36 Bikeway are located within a short bike ride (5 minutes or less than one mile) of the project site. S. 88th Street, Dillon Road and S. 96th Street currently have on-street bicycle lanes that provide connections to the Coal/Rock Creek Regional Trails and the US 36 Bikeway. The City of Boulder is located within a 6-mile bike ride on the US 36 Bikeway and the RTD US 36 and East Flatiron Station is located within a one-mile

bike ride of the project site. Each intersection in the study area has approaches and departures that have accommodations for people on bicycles. The S. 88th Street underpass provides access to the Monarch school campus from Dillon Road.

The City of Louisville TMP evaluated the S. 88th Street, Dillon Road and S. 96th Street corridors/intersections for the level of bicycling comfort (a map summarizing the results of the bicycle level of comfort results is illustrated in **Figure 14**). Based on this analysis, the current design of the corridors and intersections have a high level of stress. This appears to be correlated to the high number of crashes that were shown in the prior section. The high posted speed limits in these corridors and significant peak hour traffic volumes also contribute to the low level of comfort people experience. The Redtail Ridge project team is recommending Great/Complete street design treatments for the S. 88th Street, Dillon Road, and S. 96th Street corridors and intersections consistent with the TMP's policies. This would include supporting the City's efforts to install protected bike lanes, multi-use pathways, and intersection treatments that provide greater protection for all skill levels, although it is noted that implementing these facilities by the City will be subject to public input, topographic limitations, right of way availability, conflicts with utilities and accesses, and construction costs. A later section of this study includes additional details on implementing lower stress bicycle networks in the S. 88th Street, Dillon Road, and S. 96th Street corridors that would connect to the US 36 Bikeway and the Coal/Rock Creek Regional Trails.

Figure 14. Bicycle Level of Comfort City of Louisville Transportation Master Plan



5.6 Transit Access in the Study Area

The Redtail Ridge site is located within one mile of the RTD US 36 and East Flatiron Station. This station is serviced by the Flatiron Flyer (routes FF1 and FF2) and the Sky Ride service to DEN (route AB). The station has an underpass under US 36 and is connected to a network of first and final mile destinations. There are approximately 265 parking spaces and eight (8) bike racks at the station. This station is connected to the project site via the Northwest Parkway underpass described in the prior sections.

The Flatiron Flyer BRT system provides fast and efficient service between Boulder and Denver. Buses are available at the US 36 and East Flatiron Station every 15 minutes during peak and every 30 minutes off peak (on average). Large air conditioned and air ride over the road coaches can serve approximately 50 passengers per vehicle. There is capacity for six (6) to eight (8) bikes on board depending on luggage and other passenger storage needs. The buses are equipped with charging for mobile devices. The vehicles travel in the High Occupancy Vehicle (HOV) lanes on US 36 and I-25. The trip between the US 36 and East Flatiron Station and Denver Union Station is 28 minutes. The trip between downtown Boulder and the US 36 and East Flatiron Station is 23 minutes. The AB route that provides services to Denver International Airport (DEN) is

available every 30 minutes during most hours of the day. Large air conditioned and air ride over the road coaches can serve approximately 50 passengers per vehicle also service this route. The trip between DEN and the US 36 and East Flatiron Station is 34 minutes via the Northwest Parkway.

Although not public transit, the BVSD operates many school buses in the project area to serve the Monarch school campus. The school buses only have one access point to the Monarch campus via S. 88th Street. The school buses provide transportation to students for school, field trips, and after school activities year-round.

5.7 Transportation Demand Management and Current Mode Share

Communities in the US 36 Corridor (Boulder, Superior, Louisville, Broomfield, and Westminster) have been working together for decades to plan and implement multimodal travel projects in the US 36 corridor. This includes work at the local community level to rebuild local roadways as complete streets and expand walk, bike, and transit connectivity within and across borders.

The new City of Louisville TMP documented how commuters in Louisville and nearby communities travel to work. This data is based on US Census American Community Survey (<https://www.census.gov/programs-surveys/acs>). This data is commonly used by agencies across the Denver region as a baseline for TDM programs. The current data is shown below as year 2012 to 2016 estimates. Based on this data (shown in **Figure 15**), approximately 28 percent of people who work in Louisville travel to work by non-SOV modes.

Figure 15: Louisville and comparison area commute mode share (from TMP)

							
	Drive Alone	Carpool	Transit	Bike	Walk	Work at Home	Other
City of Louisville	72.3%	4.7%	5.9%	2.3%	1.7%	12.7%	0.5%
City of Boulder	51.3%	4.9%	8.3%	10.3%	11.4%	12.5%	1.2%
Boulder County	65.2%	7.6%	5.0%	4.4%	5.3%	11.3%	1.3%
Denver Region	74.8%	8.5%	4.4%	1.2%	2.5%	7.5%	1.0%

The mode share data shown in **Figure 16** below is based on survey data from the *2016 Northwest Metro Region Mobility Report*, final draft dated July 2018, prepared by Commuting Solutions. This data shows the mode share for communities along the US 36 corridor, including the City of Louisville. The current data is shown below as year 2012 to 2016 estimates. Based on this data, approximately 22 percent of people who work in the US 36 corridor travel to work by non-SOV modes. Note that the data from the 2016 Report was collected between Year 2011 and 2015, which is prior to the opening of the RTD's Flatiron Flyer BRT service (opened in January 2016).

Figure 16: US 36 Communities Year 2016 Estimated Mode Share**US 36 communities: 78% single occupant vehicles**

<https://commutingsolutions.org/wp-content/uploads/2016-Northwest-Region-Mobility-Report.pdf>

5.8 Existing Intersection Capacity Analysis

The existing volumes, lane configuration, and traffic control are illustrated on **Figure 6**. The results of the LOS calculations for the intersections are summarized in **Table 2**. A summary table with LOS by movement and 95th percentile queues by lane as well as the intersection LOS worksheets are included in the **Appendix**. **Results of the existing peak hour intersection capacity analysis indicate that Dillon Road/S. 88th Street and S. 88th Street/Campus Drive currently operate at LOS E or worse during the AM peak hour. All other study intersections operate at LOS D or better.**

Table 2. Existing Conditions Level of Service Summary

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	C (31 sec)	C (32 sec)
Dillon Road/S. 88th Street	E (77 sec)	D (43 sec)
Dillon Road/S. 96th Street	C (32 sec)	D (52 sec)
S. 88th Street/Campus Drive	F (99 sec)	C (30 sec)
Northwest Parkway/S. 96th Street/Via Varra	D (51 sec)	C (24 sec)
Northwest Parkway/Rockcress Drive/Via Varra	B (14 sec)	B (11 sec)
Northwest Parkway/US 36 North Ramps (WB)	B (12 sec)	B (16 sec)
Northwest Parkway/US 36 South Ramps (EB)	B (15 sec)	C (25 sec)
S. 88th Street/Rock Creek Parkway ⁽¹⁾	A (8 sec)	A (6 sec)

⁽¹⁾ Roundabout controlled intersection

Queuing issues and movements with LOS E or worse during the peak hours are listed below:

Dillon Road and McCaslin Boulevard

- During the AM and PM peak hours, there are several movements that currently operate at LOS E or worse. At this intersection the northbound/southbound through movements are prioritized over the eastbound/westbound approaches and the left-turn movements.
 - During the AM peak hour, the following movements operate at LOS E or worse: eastbound left-, eastbound through, northbound left- and southbound left-turn.
 - During the PM peak hour, the following movements operate at LOS E or worse: eastbound left-, eastbound through, westbound left-, northbound left- and southbound left-turn.
- No significant queuing issues were observed in the field or in the traffic analysis reports.

Dillon Road and S. 88th Street

- The following movements operate at LOS E or worse:
 - During the AM peak hour, westbound left and northbound left.
 - During the PM peak hour, eastbound through and northbound left.
- During the AM peak hour this intersection operates near the LOS E/F border.
 - This intersection is heavily influenced by traffic generated by the Monarch school campus. Queues on S. 88th Street from Campus Drive were observed to extend back to Dillon Road, impacting traffic operations at this intersection.
 - Near the school start time, westbound left-turn queues were observed to extend more than 2,500 feet and northbound queues were observed to extend approximately 1,500 feet
 - When the pedestrian movement across Dillon Road is activated, all controlled movements are required to stop, this increases motorist delay.
- During the PM peak hour, eastbound through queues extend more than 1,000 feet.

Dillon Road and S. 96th Street

- During the AM and PM peak hours, there are several movements that currently operate at LOS E or worse. Both Dillon Road and S. 96th Street are two-lane roadways but expand to provide two through lanes in all directions at the intersection. This results in poor lane utilization and occasionally some inefficiencies when vehicles exit the intersection and merge back down to one-lane. These inefficiencies reduce the capacity of this intersection.
 - During the AM peak hour, the southbound through movement operates at LOS E.
 - During the PM peak hour, the westbound left-, northbound through, and southbound through operate at LOS E or worse.

- During the AM peak hour, northbound left-turn queues were observed to extend more than 700 feet.
- During the PM peak hour, westbound left-turn and northbound through queues extend more than 700 feet.

S. 88th Street and Campus Drive

- During the AM peak hour this intersection operates at LOS F. This intersection is the only access to the Monarch school campus and the adjacent medical campus.
 - The following movements operate at LOS E or worse: eastbound left, eastbound through, westbound through, northbound left, northbound through, northbound right, southbound left, southbound through, and southbound right.
 - Southbound queues on S. 88th Street extend back to Dillon Road, impacting traffic operations at the signal.
 - Northbound through queues extend 1,000 feet and vehicles making a northbound right-turn will utilize the shoulder when the right-turn lane queues extend beyond the available storage.
- It should be noted that the PM peak hour does not coincide with when Monarch schools end (K-8 ends at 3:05 PM and the High School ends at 3:30 PM).
- During the PM peak hour, the eastbound left- and eastbound through movements operate at LOS E or worse. All other movements operate at LOS D or better. No major queuing issues were observed.

Northwest Parkway and S. 96th Street/Via Varra

- During the AM peak hour, the following movements operate at LOS E or worse: eastbound left-, eastbound through, northbound left-, southbound left-, and southbound through.
- During the PM peak hour, all movements operate at LOS D or better.
- The northbound left and eastbound right- are high volume movements during both the AM and PM peak hours. Currently there are existing dual northbound left-turn lanes on Northwest Parkway that turn onto S. 96th Street. Three lanes merge into one northbound through lane on S. 96th Street approximately 600 feet north of the intersection. This merge will occasional queue back and cause inefficiencies at the Northwest Parkway intersection. The southbound right-turn is a free movement and turns into a third through lane (acceleration lane) on S. 96th Street.
- During the AM peak hour, the northbound left-turn queue is approximately 690 feet (700 feet of available storage) and the southbound through queue is approximately 770 feet.

- During the PM peak hour, the northbound left-turn conflicts with a lower southbound through volume and therefore while the northbound left-turn traffic volume is greater during the PM peak hour, the queue is less than the AM peak hour queue.

Northwest Parkway and Rockcress Drive/Via Varra

- At this intersection the northbound/southbound through movements are prioritized over the eastbound/westbound approaches and the left-turn movements.
 - During the AM peak hour, the eastbound left- and northbound left-turn movements operate at LOS E or worse. Both movements are low volume (one vehicle observed during the peak hour).
 - During the PM peak hour, all movements operate at LOS D or better.
- No significant queuing issues were observed in the field or in the traffic analysis reports.

Northwest Parkway and US 36 Westbound/North Ramps

- At this intersection the northbound/southbound through movements are prioritized over the eastbound/westbound approaches and the left-turn movements.
 - During the AM peak hour, the westbound left- and westbound through movements operate at LOS E.
 - During the PM peak hour, all movements operate at LOS D or better.
- During the PM peak hour, the northbound left-turn queues extend approximately 310 feet, which is beyond the available left-turn lane storage. These queues do not extend to the US 36 South Ramps intersection to the south.

Northwest Parkway and US 36 Eastbound/South Ramps

- At this intersection the northbound/southbound through movements are prioritized over the eastbound/westbound approaches and the left-turn movements.
 - During the AM and PM peak hours, the southbound left-turn operates at LOS E.
- No significant queuing issues were observed in the field or in the traffic analysis reports.

Although the Dillon Road/S. 88th Street and S. 88th Street/Campus Drive study intersections currently operate at LOS E/F, no mitigation is recommended at this time. As previously mentioned, previous studies have recommended the extension of Campus Drive to S. 96th Street to address the existing issues. The Campus Drive extension is evaluated as part of the Year 2025 with project traffic operations. The right-of-way for the Campus Drive extension is located on the Redtail Ridge property. Under background conditions, where the Campus Drive extension is not assumed, mitigation options are provided to address the existing/future background capacity issues without the Campus Drive extension.

6.0 FUTURE BACKGROUND CONDITIONS

6.1 Annual Growth Factor and Future Volume Methodology

In order to forecast the future peak hour traffic volumes, background traffic growth assumptions were estimated based on a review of various resources: historical traffic volumes, DRCOG 2040 regional model projections, and planned development projects in the study area.

Historical traffic volumes along the study roadway network were reviewed, including traffic volumes along S. 88th Street, Dillon Road, S. 96th Street, and Northwest Parkway. This review indicates that traffic volumes in the study area have been steadily increasing with annual growth rates ranging from less than one (1) percent to four (4) percent. As previously mentioned, when Storage Tek closed, other developments in Superior, Broomfield, and Louisville utilized the roadway capacity vacated by Storage Tek, and thus traffic volumes have steadily been increasing.

A comparison of the DRCOG base-year vs. 2040 projections shows annual growth of approximately one-half percent along the study roadways, except along Northwest Parkway, which is anticipated to have an annual growth rate of approximately one and one-half (1.5) percent. A review of the assumed projected socio-economic data within the traffic analysis zones (TAZ) where the project is proposed indicates that DRCOG did not anticipate that this area would redevelop. Therefore, the background growth rates from DRCOG data represent non-project traffic forecast to the study roadway network and the traffic volume generated by the project does not need to be factored out of the DRCOG forecasts.

A higher annual growth rate is likely to occur in the near-term and a lower growth rate is anticipated in the long-term. It is also important to consider that the Dillon Road and S. 96th Street corridors are approaching capacity. As daily traffic volumes increase on these corridors, the increase is likely to occur during non-peak period times where there is more capacity.

There are three planned development projects (bulleted below) in the study area (see section **3.0 Previous Studies** for additional information). Trips generated by these three developments were added to the study intersections in addition to the general background growth rate.

Parkway Circle: Approximately half of the parcels in the Parkway Circle development are currently developed. This area has a mix of residential, retail, and office type uses that generate a high percent of internal capture and trips that can be made walking/biking or taking transit. Under Year 2040 conditions, it is assumed that the Parkway Circle development will be fully developed. To estimate future traffic volumes generated by this development, vehicles currently entering/exiting the east approaches at the Northwest Parkway/S. 96th Street/Via Varra and Northwest Parkway/ Rockcress Drive/Via Varra intersections were increased by a factor of two (2) for year 2040, with approximately a quarter of the development occurring by Year 2025, half by Year 2030 and full build out by Year 2040. The traffic volumes were then proportionally distributed to the study roadway network based on existing travel patterns.

St. Louis Parish: The trip generation estimates from the November 2019 trip generation letter were assumed for the study area. The industrial/commercial uses were assumed to be constructed with the first phase in Year 2021 and were included in the Year 2025 background traffic forecasts. The full buildout of the site, which includes the tennis center, church, and school, was assumed to be constructed after Year 2030 and were included in the Year 2040 background traffic forecasts. Trips generated by the development were distributed to the study network based on the 2001 TIS.

Morgan Ranch: Trips generated by the Morgan Ranch DTS development and anticipated to utilize the new 88th Street / Promenade Boulevard intersection were added to the study intersections and included in the Year 2025 background traffic forecasts.

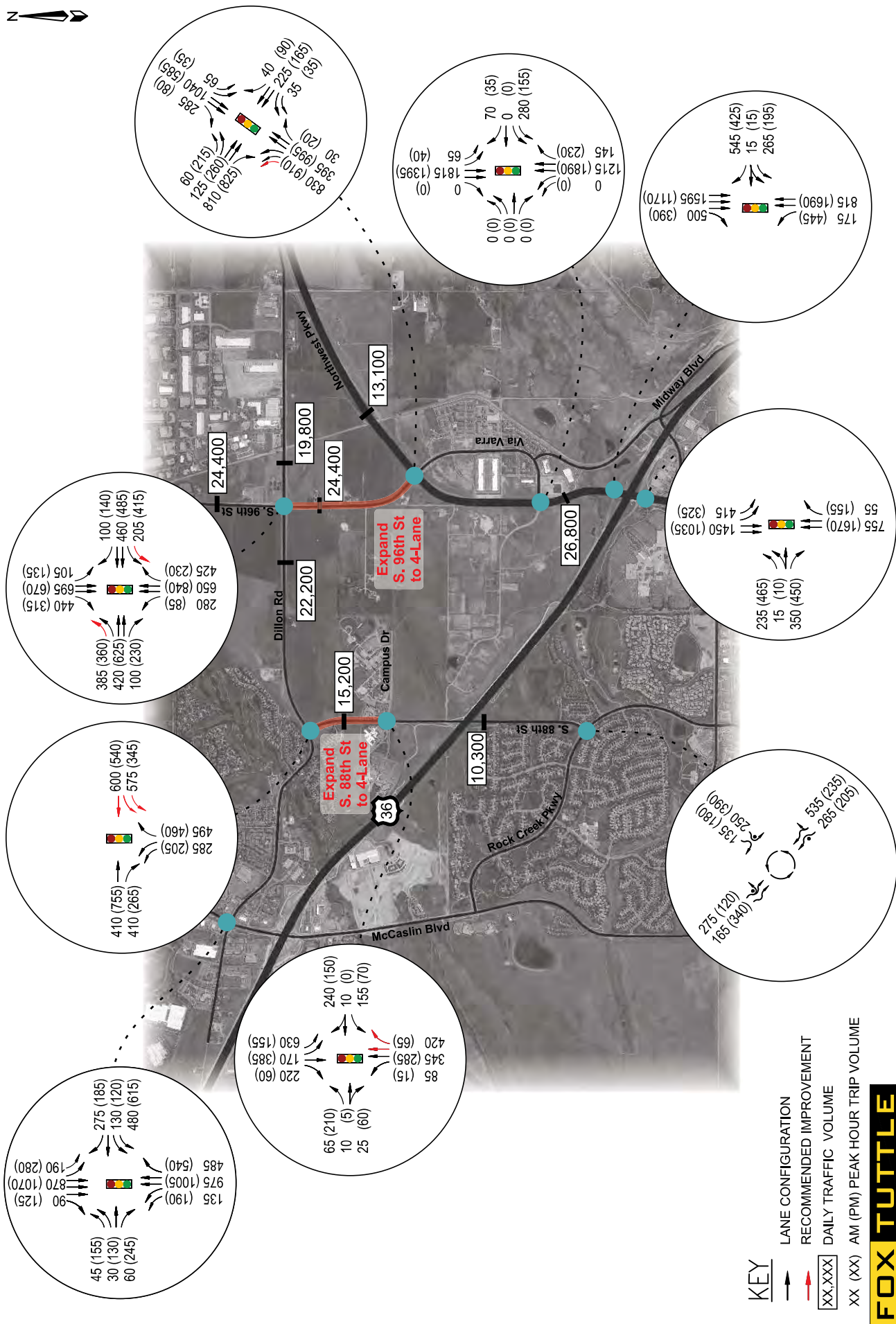
Based on a review of the historical traffic volume trends, the projected future traffic forecasts, and the known planned developments, the following assumptions were used to develop the background traffic volumes for Year 2025, 2030 and 2040:

- Year 2025 Background: an annual growth rate of one-half percent was applied to the existing traffic volumes at the study intersections; in addition, planned development trips generated by the Parkway Circle, St. Louis Parish, and Morgan Ranch were added to the study network. **The resultant growth rate to the study intersections is approximately two percent per year at the Dillon Road, S. 88th Street, and S. 96th Street intersections and approximately one percent per year at the Northwest Parkway and US 36 intersections.**
- Year 2030 and Year 2040 Background: an annual growth rate of one-quarter (0.25) percent was applied to all study intersections, except for through movements along Northwest Parkway which were grown by one and one-half (1.5) percent; in addition planned development trips generated by the Parkway Circle, St. Louis Parish, and Morgan Ranch were added to the study network. **The resultant growth rate to the study intersections is approximately one percent per year.**

The resultant background traffic volumes for Year 2025, Year 2030, and Year 2040 are provided in **Figure 17, Figure 18, and Figure 19.**

It is important to note that while the Year 2040 background traffic forecasts do not assume the Jefferson Parkway extension, if that project is constructed prior to Year 2040 it would increase traffic volumes along Northwest Parkway at the intersections between S. 96th Street and US 36 from what was projected for this study. As noted in the *Level 1 Traffic and Revenue Study Jefferson Parkway* report, with the Jefferson Parkway extension the project would rebuild the Northwest Parkway/Interlocken Loop corridor between S. 96th Street and SH 128. Under the Northwest Parkway Extension scenario, Northwest Parkway would be reconstructed to separate toll and local traffic which would include constructing new interchanges and a frontage road system to accommodate local traffic.

If the Northwest Parkway Extension project is constructed, the future interchanges and frontage road system would provide additional capacity to the Redtail Ridge study network. A collaborative study that includes CDOT, the City of Louisville, City and County of Broomfield, Northwest Parkway Authority, and JPPHA should be conducted to identify how interchanges and frontage roads could be constructed to accommodate future traffic volumes along Northwest Parkway. While the Redtail Ridge project team has met with Northwest Parkway and began preliminary discussions about a future study, at this time, no design or concepts have been completed for this segment of Northwest Parkway. Additional analysis should be completed to better understand projected peak hour traffic to the network as well as to identify what interchange options will provide acceptable operations and can be constructed within the right-of-way.

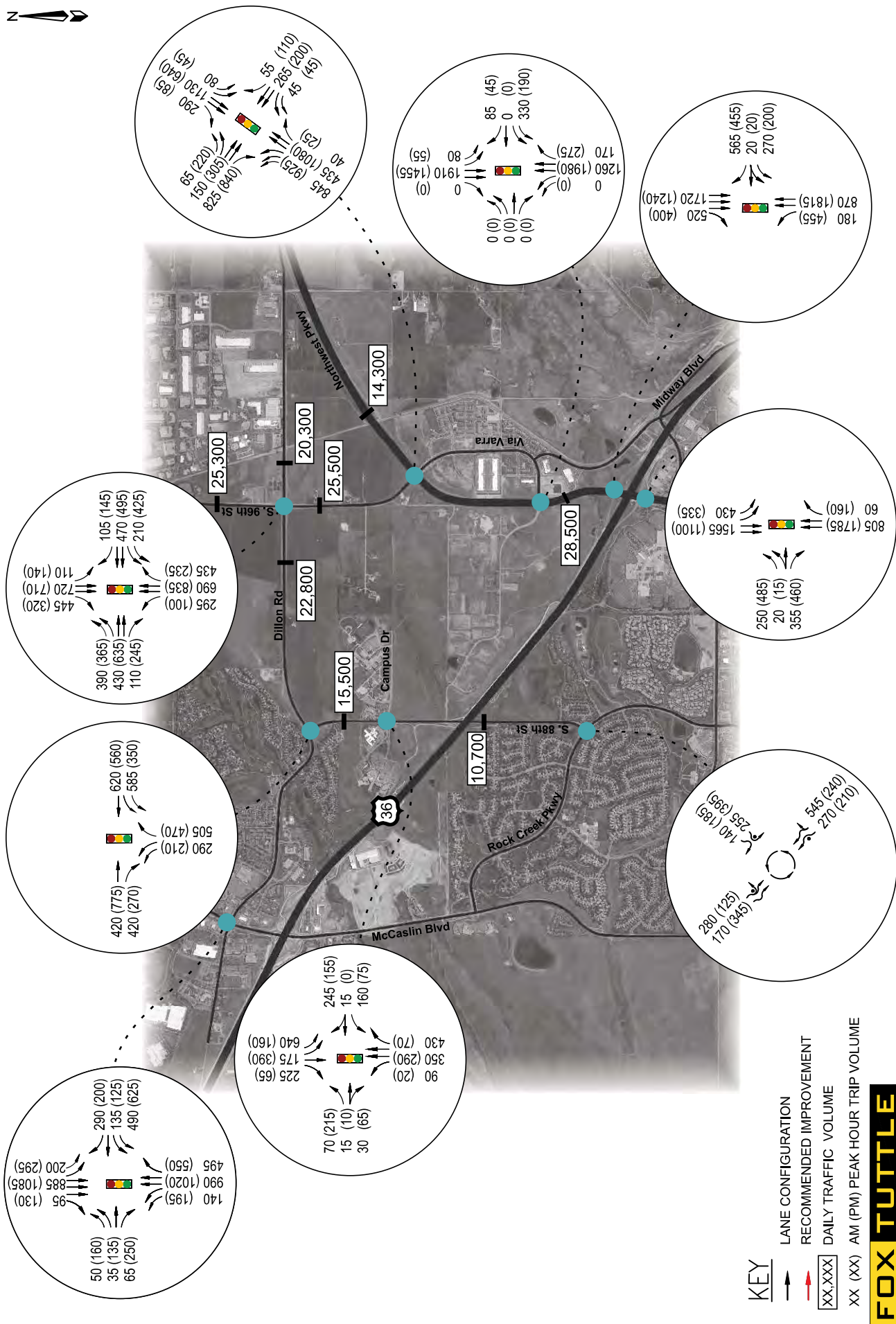


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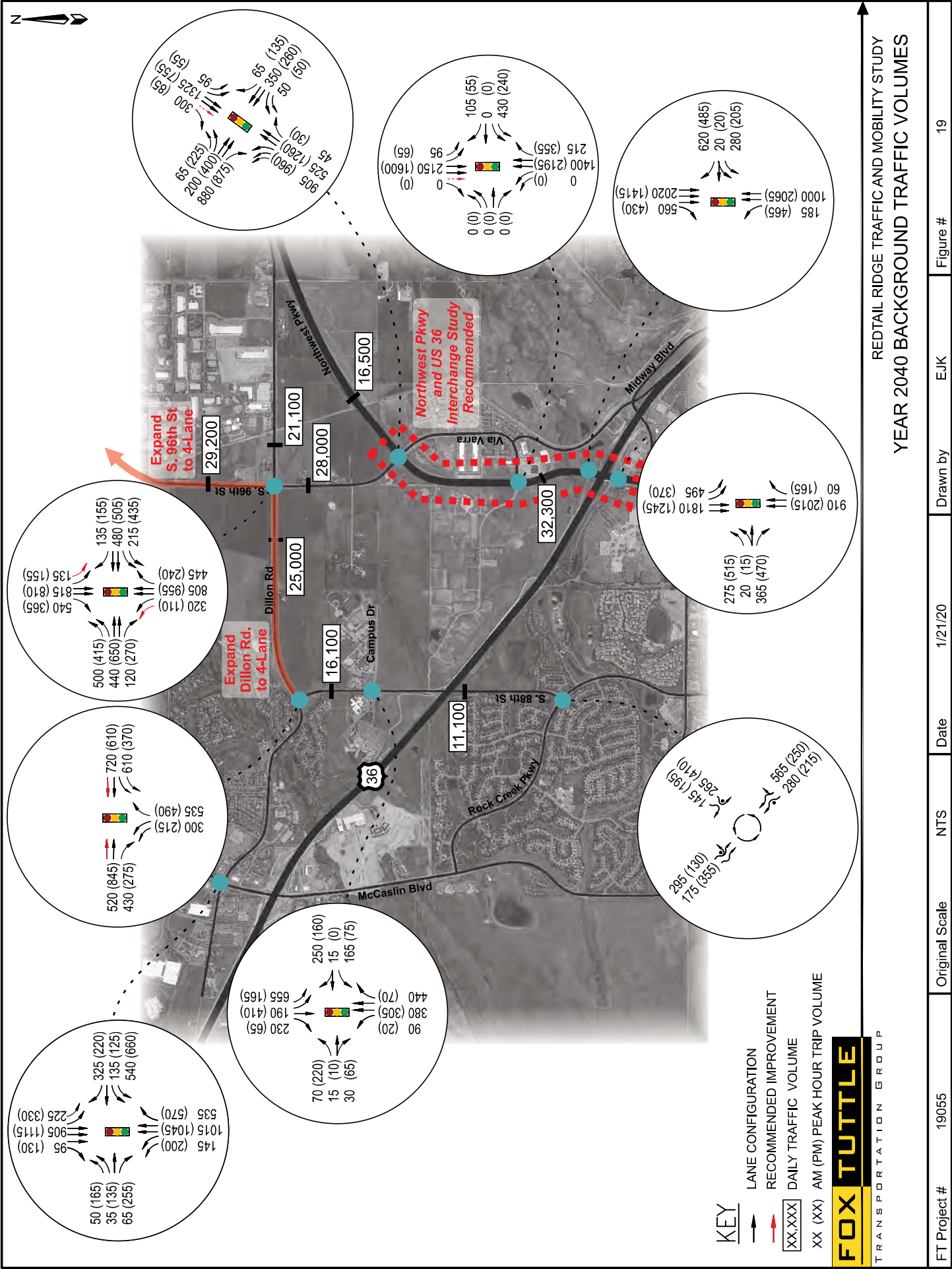
- LANE CONFIGURATION
- RECOMMENDED IMPROVEMENT
- XX,XXX DAILY TRAFFIC VOLUME
- XX (XX) AM (PM) PEAK HOUR TRIP VOLUME



REDTAIL RIDGE TRAFFIC AND MOBILITY STUDY
YEAR 2025 BACKGROUND TRAFFIC VOLUMES



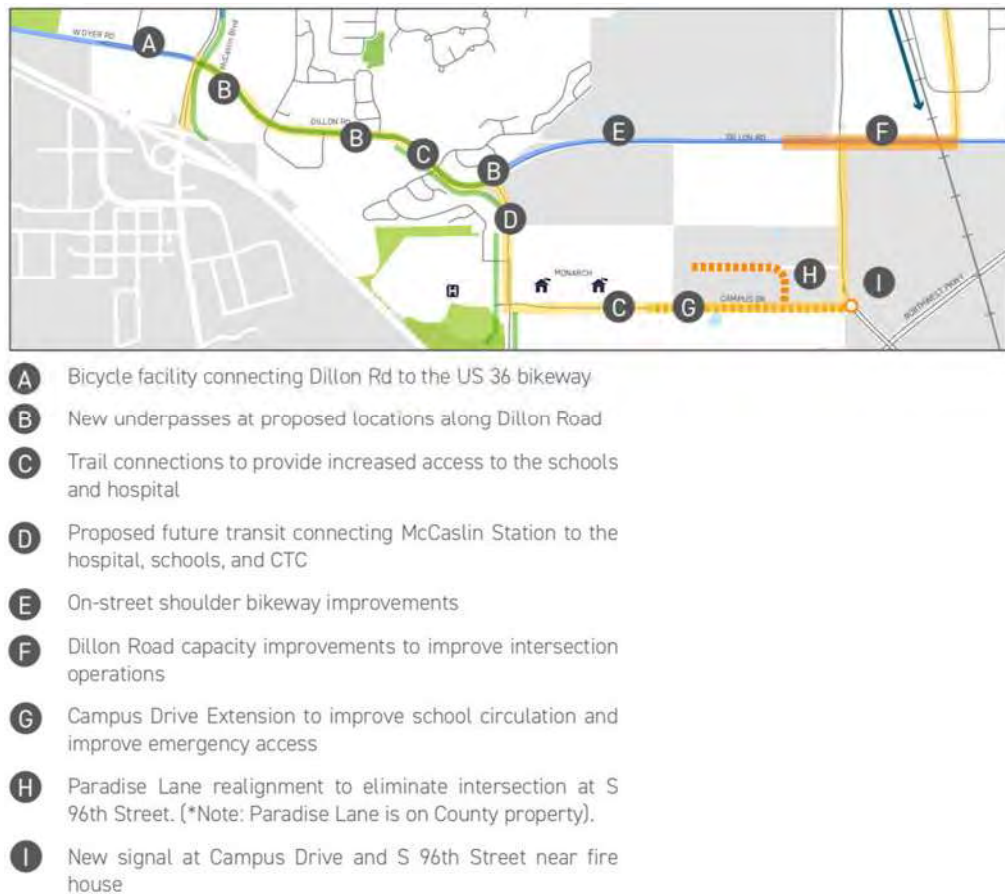
RETAIL RIDGE TRAFFIC AND MOBILITY STUDY
YEAR 2030 BACKGROUND TRAFFIC VOLUMES



6.2 Future Multimodal Network Assumptions

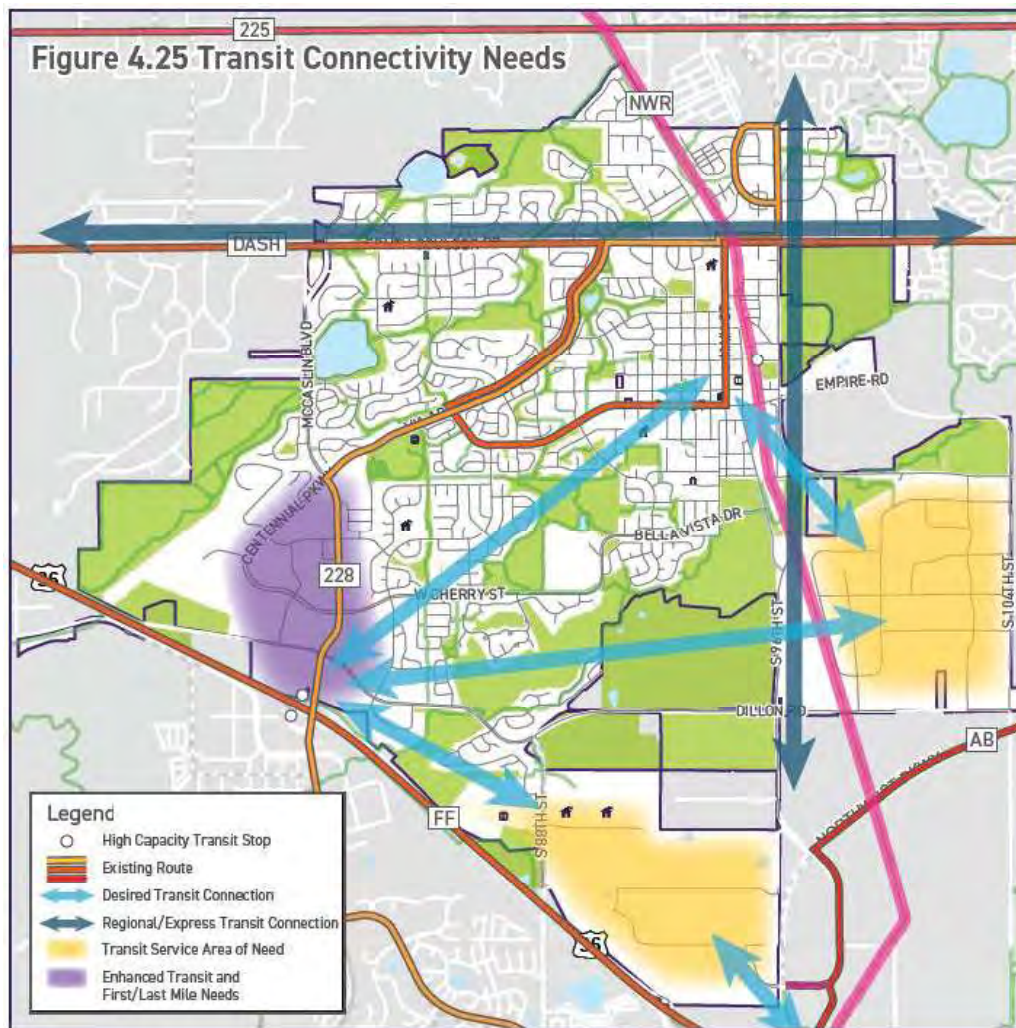
The future multimodal network improvements around Redtail Ridge project are outlined in the City of Louisville TMP and shown in **Figure 20**. They include a series of bike lanes, transit stops, underpasses, and multiuse trail connections.

Figure 20. Future Multimodal Network Identified in the City of Louisville TMP



The TMP also recommends a partnership with the City and the business community to provide a shuttle circulator that connects employment areas to regional transit, retail, and other destinations. CTC, Centennial Valley, and Redtail Ridge were identified as service areas for the route. The transit network also includes BRT service in the S. 96th street corridor and two Northwest Rail station within a mile of Redtail Ridge (see **Figure 21**). The Northwest Rail stations are planned to be located near the CTC and at the Flatiron and US 36 Park-n-Ride.

Figure 21. Future Transit Network Identified in the City of Louisville TMP



The City is also beginning to have discussions with RTD about a new local route that would serve the project site. The new route would require approval from RTD and grant funding. This project should support the development of that route and promote connections between Redtail Ridge and Downtown Louisville, McCaslin Station, CTC, and the Flatiron and US 36 Park-n-Ride. In addition, the project should work with RTD to determine feasibility of adding a stop for the Flatiron Flyer BRT to the west of Northwest Parkway on the project site.

Table 3 provides a summary of the assumed multimodal network under background conditions. This table only assumes what would occur in the future without additional support from the Redtail Ridge project. The recommendations for an expanded multimodal network and TDM programs with the Redtail Ridge project can be found in **Section 7** of this study.

Table 3. Future Multimodal Network Assumption Summary

Corridor	Bike Lanes	Multi-Use Pathways	Sidewalks	Bus Lanes
S. 88th Street (US 36 to Dillon Road)	unprotected	westside	westside	none
Dillon Road (S. 88th to S. 96th Street)	unprotected	none	none	none
S. 96th Street (Northwest Parkway to Front Street)	unprotected	none	none	yes
Northwest Parkway (S. 96th Street to US 36)	none	eastside	eastside	shoulder running

6.3 Year 2025 Background Intersection Capacity Analysis

The study intersections were evaluated to determine baseline operations and to identify any capacity constraints associated with background traffic for development traffic expected to be constructed prior to Year 2025. The background volumes, lane configuration, and traffic control are illustrated on **Figure 17**.

The LOS criteria discussed previously was applied to the study intersections to determine the travel conditions with the Year 2025 background volumes. The results of the LOS calculations for the intersections are summarized in **Table 4**. The intersection LOS and queuing report worksheets are attached in the **Appendix**. Note that signal timing was assumed to be optimized at the study intersections.

The results of the LOS calculations for the intersections are summarized in **Table 4**. Summary tables with LOS and 95th percentile queues by movement are included in the **Appendix**. **Results of the peak hour intersection capacity analysis indicate that the Dillon Road/S. 88th Street and S. 88th Street/Campus Drive intersections are expected to operate at LOS F during the AM peak hour. The Dillon Road/S. 96th Street and Northwest Parkway/S. 96th Street/Via Varra intersections are expected to operate at LOS E during the AM peak hour and the Dillon Road/S. 88th Street intersection is expected to operate at LOS E during the PM peak hour. The other study intersections are expected to operate at an overall LOS D or better.**

Table 4. Year 2025 Background Conditions Level of Service Summary

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	C (25 sec)	C (32 sec)
Dillon Road/S. 88th Street	F (97 sec)	E (57 sec)
Dillon Road/S. 96th Street	E (62 sec)	D (55 sec)
S. 88th Street/Campus Drive	F (113 sec)	C (33 sec)
Northwest Parkway/S. 96th Street/Via Varra	E (74 sec)	C (28 sec)
Northwest Parkway/Rockcress Drive/Via Varra	B (16 sec)	B (13 sec)
Northwest Parkway/US 36 North Ramps (WB)	B (12 sec)	B (17 sec)
Northwest Parkway/US 36 South Ramps (EB)	B (19 sec)	C (29 sec)
S. 88th Street/Rock Creek Parkway ⁽¹⁾	A (9 sec)	A (7 sec)

⁽¹⁾ Roundabout controlled intersection

Under Year 2025 Background conditions, there are three intersections that are expected to decrease a LOS grade with the added background traffic during the AM and/or PM peak hour:

- Dillon Road/S. 88th Street – this intersection operates at LOS E during the AM peak hour and LOS D during the PM peak hour under existing conditions and is expected to operate at LOS F during the AM peak hour and LOS E during the PM peak hour under Year 2025 background conditions. As noted under existing conditions, during the AM peak hour, the westbound left-turn currently extends more than 2,500 feet on Dillon Road and the northbound queues extend approximately 1,500 feet. These queues are expected to increase under Year 2025 background conditions. In addition, under Year 2025 conditions, during the AM and PM peak hour, the eastbound through queues are expected to extend more than 1,600 feet, into the adjacent signalized intersection to the west.
- Dillon Road/S. 96th Street – this intersection operates at LOS C during the AM peak hour under existing conditions and is expected to operate at LOS E under Year 2025 background conditions. As noted under existing conditions, the northbound left-turn currently extends more than 700 feet during the AM peak hour and the westbound left-turn currently extends more than 700 feet during the PM peak hour. These queues are expected to increase under Year 2025 background conditions. In addition, the southbound through queues during the AM peak hour are expected to extend approximately 1,500 feet, which is partially due to queues from the merge from two to one through lane south of Dillon Road extending back to the Dillon Road intersection.
- Northwest Parkway/S. 96th Street/Via Varra – during the AM peak hour this intersection operates at LOS D under existing conditions and is expected to operate at LOS E under Year 2025 background conditions. The high volume of northbound left-turn traffic conflicts with the high volume of southbound through traffic during the AM peak hour. The

northbound left-turn and southbound through delay and queues are expected to increase under Year 2025 background conditions.

As noted above, operations at the Dillon Road/S. 88th Street, Dillon Road/S. 96th Street, S. 88th Street/Campus Drive, and Northwest Parkway/S. 96th Street/Via Varra intersections are expected to get worse with the added traffic from the background growth applied. To address the operational issues expected in Year 2025 background conditions, the following is recommended:

- Expand S. 88th Street between Dillon Road and Campus Drive to a four-lane roadway.
- Dillon Road/S. 88th Street modify the westbound approach from one left-turn lane and two through lanes, to dual left-turn lanes and one through lane.
- S. 88th Street/Campus Drive extend the northbound right-turn lane to provide a minimum of 500 feet of storage. Construct a second northbound through lane that begins approximately 500 feet south of Campus Drive.
- Dillon Road/S. 96th Street construct dual eastbound and westbound left-turn lanes.
- Expand S. 96th Street between Dillon Road and Northwest Parkway to a four-lane roadway.
- Northwest Parkway/S. 96th Street/Via Varra construct triple left-turns from northeast bound Northwest Parkway onto northbound S. 96th Street.
 - Construct a third left-turn lane on Northwest Parkway within the existing grass median.
 - Modify the northwest approach on S. 96th Street to allow for three receiving lanes.
 - Modify the free right-turn movement to be controlled for the southwest bound right-turn lane movement on Northwest Parkway to northbound S. 96th Street.

Previous studies have identified the Campus Drive extension as a future improvement to mitigate traffic operational issues at the Dillon Road/S. 88th Street and S. 88th Street/Campus Drive intersections. However, the Campus Drive extension is located on the project property and based on conversations with City staff, this improvement would only be constructed as part of a development project. Therefore, it was not considered to mitigate background conditions.

The study intersections were evaluated with the recommended improvements listed above. The recommended geometric improvements are shown with red arrows on **Figure 17**. The intersection LOS and queuing report worksheets are attached in the **Appendix**. Summary tables with LOS and 95th percentile queues by movement are included in the **Appendix**.

Results of the peak hour intersection capacity analysis shown in Table 5 indicate that with the recommended improvements all study intersections are expected to operate at LOS D or better during the AM and PM peak hours.

Table 5. Year 2025 Background Conditions Level of Service Summary (Improvements)

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	--	--
Dillon Road/S. 88th Street	B (18 sec.)	C (28 sec.)
Dillon Road/S. 96th Street	D (36 sec.)	D (41 sec.)
S. 88th Street/Campus Drive	C (35 sec.)	C (27 sec.)
Northwest Parkway/S. 96th Street/Via Varra	D (41 sec.)	C (24 sec.)
Northwest Parkway/Rockcress Drive/Via Varra	--	--
Northwest Parkway/US 36 North Ramps (WB)	--	--
Northwest Parkway/US 36 South Ramps (EB)	--	--
S. 88th Street/Rock Creek Parkway	--	--

⁽¹⁾ LOS results only shown for Intersections with recommended improvements

With the recommended improvements the S. 88th Street intersections at Dillon Road and Campus Drive are still anticipated to be congested during the Monarch school campus arrival/departure peak periods. However, these improvements will significantly reduce queues and delay to non-school related traffic traveling through the study network. Generally, it is considered acceptable for queuing/delay issues to occur near intersections adjacent to a school during a school's arrival/departure peak periods, since the congestion occurs for a relatively short period of time.

6.4 Year 2030 Background Intersection Capacity Analysis

The study intersections were evaluated to determine baseline operations and to identify any capacity constraints associated with anticipated Year 2030 background traffic. The background volumes, lane configuration, and traffic control are illustrated on **Figure 18**.

The LOS criteria discussed previously was applied to the study intersections to determine the travel conditions with the Year 2030 background volumes. The results of the LOS calculations for the intersections are summarized in **Table 6**. The intersection LOS and queuing report worksheets are attached in the **Appendix**. Note that signal timing was assumed to be optimized at the study intersections.

The results of the LOS calculations for the intersections are summarized in **Table 6**. Summary tables with LOS and 95th percentile queues by movement are included in the **Appendix**. **Results of the peak hour intersection capacity analysis indicate that the study intersections are expected to operate at an acceptable overall LOS D or better during the AM and PM peak hours, except for the Northwest Parkway/S. 96th Street/Via Varra intersection, which is expected to operate at the LOS D/E border during the AM peak hour.**

Table 6. Year 2030 Background Conditions Level of Service Summary

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	C (27 sec)	D (35 sec)
Dillon Road/S. 88th Street	B (19 sec.)	C (30 sec.)
Dillon Road/S. 96th Street	D (40 sec.)	D (42 sec.)
S. 88th Street/Campus Drive	C (37 sec.)	C (28 sec.)
Northwest Parkway/S. 96th Street/Via Varra	E (57 sec.)	C (24 sec.)
Northwest Parkway/Rockcress Drive/Via Varra	B (19 sec)	B (13 sec)
Northwest Parkway/US 36 North Ramps (WB)	B (12 sec)	B (14 sec)
Northwest Parkway/US 36 South Ramps (EB)	B (17 sec)	C (34 sec)
S. 88th Street/Rock Creek Parkway ⁽¹⁾	A (10 sec)	A (7 sec)

⁽¹⁾ Roundabout controlled intersection

While the Northwest Parkway/S. 96th Street/Via Varra intersection is expected to operate near the LOS D/E border under Year 2030 background conditions, no queuing issues are anticipated and therefore no mitigation was recommended. Further, while congestion is anticipated to continue to occur near the Monarch school campus near the school arrival/departure peaks, the queues/delays were acceptable for the conditions. Further, no other significant queuing issues are anticipated.

6.5 Year 2040 Background Intersection Capacity Analysis

The study intersections were evaluated to determine baseline operations for the Year 2040 background scenario and to identify any capacity constraints associated with background traffic in a long-term buildout scenario. The background volumes, lane configuration, and traffic control are illustrated on **Figure 19**.

The LOS criteria discussed previously was applied to the study intersections to determine the travel conditions with the near-term background volumes. The results of the LOS calculations for the intersections are summarized in **Table 7**. Summary tables with LOS and 95th percentile queues by movement are included in the **Appendix**. The intersection LOS worksheets are attached in the **Appendix**. **Results of the Year 2040 background conditions traffic operations analysis indicate that there are three intersections that are anticipated to operate at an unacceptable LOS E or worse during the AM or PM peak hours, including the Dillon Road/S. 96th Street, Northwest Parkway/S. 96th Street/Via Varra, and Northwest Parkway/US 36 South Ramp intersections.**

Table 7. Year 2040 Background Conditions Level of Service Summary

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	C (27 sec)	D (38 sec)
Dillon Road/S. 88th Street	C (27 sec)	D (42 sec)
Dillon Road/S. 96th Street	E (59 sec)	D (53 sec)
S. 88th Street/Campus Drive	D (40 sec)	C (30 sec)
Northwest Parkway/S. 96th Street/Via Varra	F (89 sec)	D (36 sec)
Northwest Parkway/Rockcross Drive/Via Varra	C (27 sec)	B (14 sec)
Northwest Parkway/US 36 North Ramps (WB)	B (13 sec)	B (19 sec)
Northwest Parkway/US 36 South Ramps (EB)	B (19 sec)	E (56 sec)
S. 88th Street/Rock Creek Parkway ⁽¹⁾	B (11 sec)	A (7 sec)

⁽¹⁾ Roundabout controlled intersection

To address the capacity issues, the following is recommended for Year 2040 background traffic:

- Dillon Road/S. 96th Street – Construct dual northbound and southbound left-turn lanes.
- S. 96th Street- Expand the four-lane roadway to the north of Dillon Road. As noted in **Section 3 "Previous Studies"**, there are other studies that are also analyzing the S. 96th Street corridor. Traffic volume projections indicate the need to expand S. 96th Street to a four-lane roadway to the north, through the SH 42 intersection.
- Northwest Parkway/S. 96th Street/Via Varra – While the Jefferson Parkway project has identified the potential need for a grade separated intersection at this location, there are uncertainties to if/when that project may occur.
 - To address the anticipated capacity issues at this intersection, one option is to construct a third southbound through lane on Northwest Parkway that would begin north of the S. 96th Street/Via Varra intersection and continue to the US 36 interchange.
 - Additional study should be conducted along the Northwest Parkway corridor between S. 96th Street and US 36 to determine how capacity can be increased under future conditions. Key stakeholders include CDOT, Northwest Parkway, the City of Louisville, City and County of Broomfield, and Jefferson Parkway Public Highway Authority.
- Northwest Parkway/US 36 interchange – the South Ramps are at capacity during the PM peak hour with Year 2040 background traffic volumes. The northbound queues are expected to extend more than 1,600 feet into the right-in/right-out access to the south. Additional capacity will be needed to accommodate the projected traffic volumes. The additional capacity will likely require that the bridge be widened. As previously mentioned,

if the Jefferson Parkway project moves forward, that project would likely require modifications to the US 36 interchange as well.

- Due to the unknowns of future project impacts to this area, no specific mitigation is recommended. Additional study/analysis should be conducted at the interchange to determine the optimal design to meet the future needs. With a new design with increased capacity, this interchange should operate acceptably in the future.

In addition, while the Dillon Road/S. 88th Street intersection is expected to operate at an overall LOS D or better during the AM and PM peak hours, the eastbound approach delay and queues are not expected to operate acceptably. The eastbound through queues are expected to extend more than 1,400 feet during the PM peak hour, which impacts the signalized intersection to the west. **To address this and to improve lane utilization at the Dillon Road/S. 96th Street intersection, a four-lane roadway is recommended on Dillon Road between S. 88th Street and S. 96th Street.**

The study intersections were evaluated with the recommended improvements listed above. The recommended geometric improvements are shown with red arrows on **Figure 19**. The intersection LOS and queuing report worksheets are attached in the **Appendix**. Summary tables with LOS and 95th percentile queues by movement are included in the **Appendix**.

Results of the peak hour intersection capacity analysis shown in Table 8 indicate that with the recommended improvements all study intersections are expected to operate at LOS D or better during the AM and PM peak hours. Note that this assumes that a new interchange is constructed at the Northwest Parkway/US 36 interchange to address the anticipated capacity issues under Year 2040 background conditions during the PM peak hour.

Table 8. Year 2040 Background Conditions Level of Service Summary

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	--	--
Dillon Road/S. 88th Street	C (25 sec)	B (15 sec)
Dillon Road/S. 96th Street	D (38 sec)	D (38 sec)
S. 88th Street/Campus Drive	--	--
Northwest Parkway/S. 96th Street/Via Varra	D (52 sec)	D (35 sec)
Northwest Parkway/Rockcress Drive/Via Varra	B (15 sec.)	B (15 sec.)
Northwest Parkway/US 36 North Ramps (WB)	N/A	N/A
Northwest Parkway/US 36 South Ramps (EB)	N/A	N/A
S. 88th Street/Rock Creek Parkway	--	--

⁽¹⁾ LOS results only shown for Intersections with recommended improvements

N/A – Intersection identified to be included in an interchange study.

The Level 1 Traffic and Revenue Study Jefferson Parkway study reviewed a scenario that would rebuild the Northwest Parkway corridor between S. 96th Street and SH 128. In this study it was noted that Northwest Parkway would be reconstructed to separate toll and local traffic which would include constructing new interchanges and a frontage road system to accommodate local traffic. While no concepts were provided in the study to illustrate the proposed capacity changes to Northwest Parkway between S. 96th Street and US 36, it's important to note that this study is evaluating this section on a regional level.

Additional capacity improvements are needed at the US 36 interchange to accommodate the Year 2040 traffic volumes. However, this would require widening of the Northwest Parkway/Interlocken Loop bridge over US 36. Since concepts to increase capacity and funding has not been allocated to reconstruct the interchange, no capacity improvements were assumed. Further, if the Jefferson Parkway project is authorized, the US 36 interchange would likely be reconstructed as part of that project to accommodate the additional traffic generated by the Jefferson Parkway extension.

7.0 PROPOSED DEVELOPMENT TRAFFIC

7.1 Campus Drive Extension

Construction of the Campus Drive extension is proposed to coincide with the opening of the first vertical developer. Once extended, Campus Drive will connect from where it dead ends (approximately 2,200 feet east of S. 88th Street) to S. 96th Street. This will provide an alternative route for traffic generated by the Monarch school campus; it will also serve as an access to/from the Redtail Ridge development as shown in **Figure 2**.

In addition to serving traffic to/from the Monarch school campus, traffic generated by the Centennial Peaks Hospital/Avista Family Life Center medical facilities and residents living in the Rock Creek subdivision are also expected to use Campus Drive once connected. To estimate the number of vehicles that will change their route to use Campus Drive, existing travel patterns were reviewed, and a travel time analysis was performed. The primary movements that are anticipated to most likely shift from their current route to Campus Drive are the northbound right-turn and westbound left-turn movements at the Dillon Road/S. 88th Street intersection. As noted under existing conditions, these movements experience significant delay during the AM peak hour.

Vehicles that are traveling from south of the S. 88th Street/Campus Drive intersection to Northwest Parkway are anticipated to use the Campus Drive extension once it is constructed, since this is expected to be a faster route than Dillon Road. When looking at travel time to/from the Dillon Road/S. 96th Street intersection to the Monarch school campus, the travel distance for vehicles using the S. 96th Street/Campus Drive intersection versus the S. 88th Street/Campus Drive intersection is approximately 25 percent less. The travel distance for vehicles destined to/from the hospital is approximately the same.

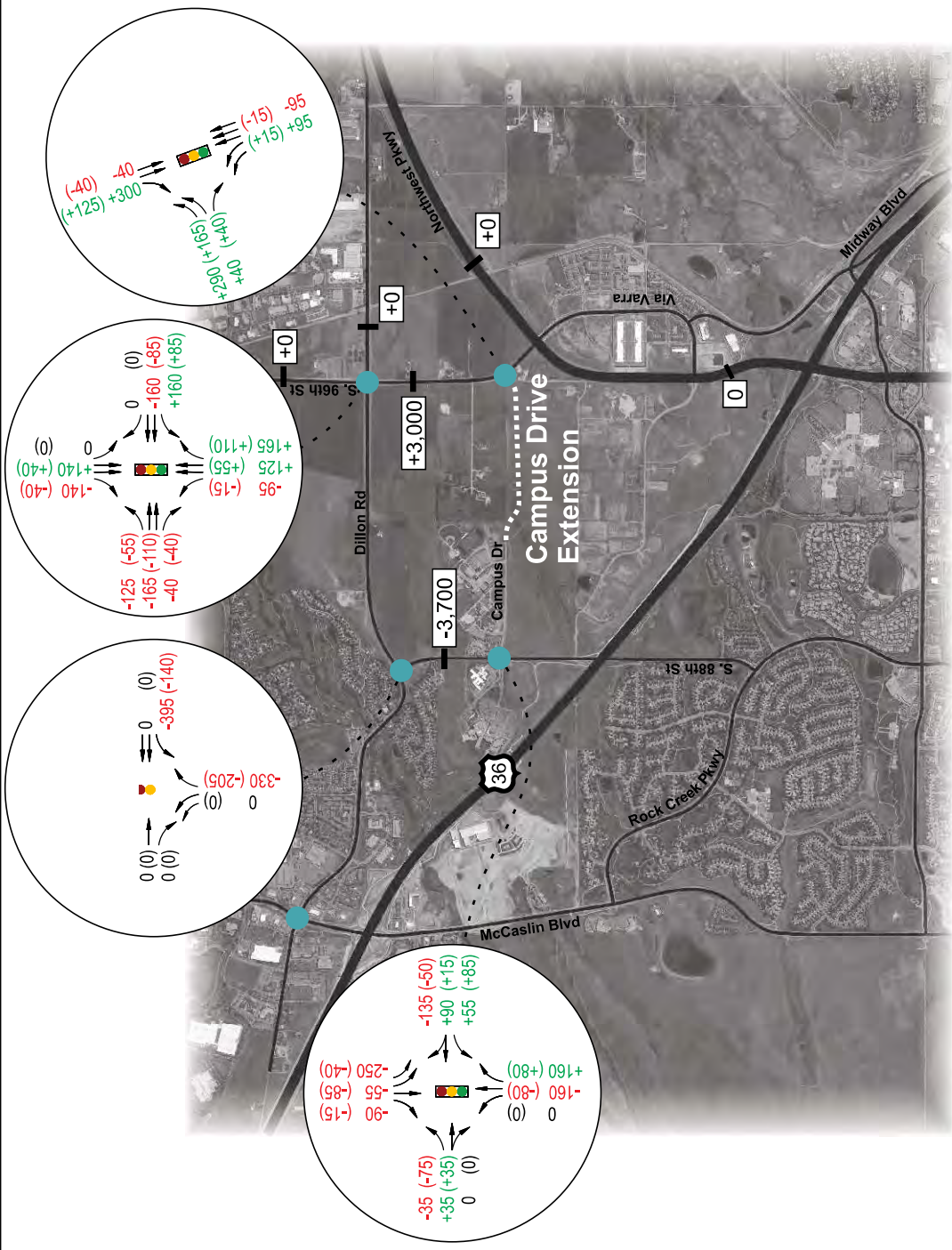
During the AM peak hour, a high percent of the vehicles making a westbound left-turn at the Dillon Road/S. 88th Street intersection are estimated to be destined to the Monarch school campus (65 percent). The existing congestion that is at the Dillon Road/S. 88th Street and S. 88th Street/Campus Drive intersections during the AM peak hour was also taken into consideration. Based on these factors, it is estimated that approximately 75 percent of vehicles currently making a northbound right-turn and westbound left-turn movements at the Dillon Road/S. 88th Street intersection would reroute to use Campus Drive during the AM peak hour.

During the PM peak hour, a lower percent of vehicles to/from the Dillon Road/S. 88th Street intersection are destined to/from the Monarch school campus (30 percent). Further, the northbound right-turn and westbound left-turn movements at the Dillon Road/S. 88th Street intersection operate acceptably during the PM peak hour. Therefore, it is estimated that 50 percent of vehicles currently making a northbound right-turn and westbound left-turn movements at the Dillon Road/S. 88th Street intersection would reroute to use Campus Drive during the PM peak hour.

The travel conditions of the Campus Drive extension to the existing traffic volumes during the AM and PM peak hours are illustrated on **Figure 22**.

The Campus Drive concept layout near the Monarch school campus is shown in **Figure 23**. Campus Drive is proposed to be a four-lane roadway with roundabouts at the K-8 access, the High School access (peanut roundabout), and Street B. The project team has met with BVSD on three occasions to discuss the proposed roundabout and has received positive feedback on the proposed layout. A follow-up study is planned to evaluate the Campus Drive at the K-8 and High School intersection design in more detail. In addition to studying the AM peak hour which coincides with the school arrival peak period, additional data will need to be collected for the afternoon peak period which coincides with the school departure period. Observations will also be conducted to evaluate the internal operations and current queues so that recommendations can be provided to BVSD to improve the internal operations.

It should be noted that the project is planning to build Rockcress Drive incrementally and is expected to be fully constructed prior to Year 2030. Like Campus Drive, Rockcress Drive will also be a new connection between S. 88th Street and Northwest Parkway. Consideration was given to the likelihood of existing/background vehicles rerouting to use Rockcress Drive from their current route. However, based on this review, few non-project related vehicles are anticipated to use Rockcress Drive to connect between S. 88th Street and Northwest Parkway.



KEY

→ LANE CONFIGURATION

XX,XXX DAILY TRAFFIC VOLUME

XX (XX) AM (PM) PEAK HOUR TRIP VOLUME CHANGE FROM EXISTING

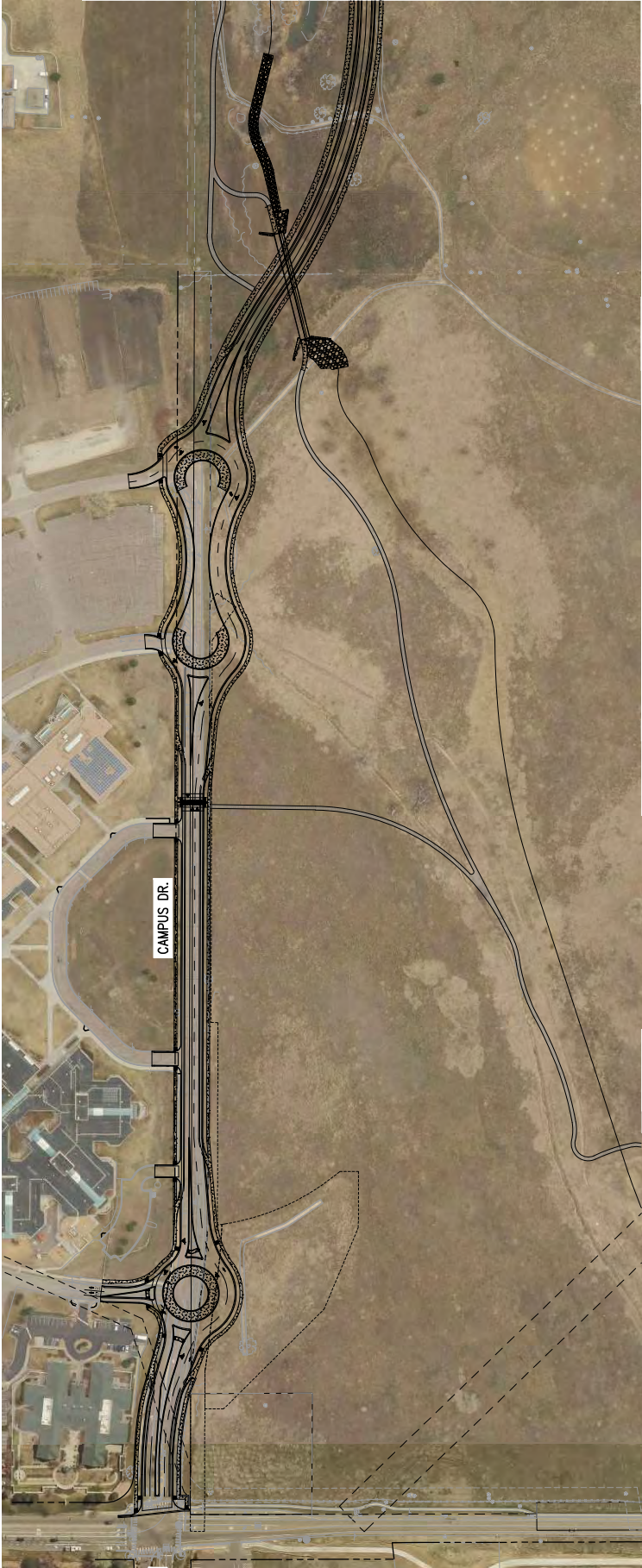
**** Note: Traffic volume shifts are only shown for the study intersections impacted by the Campus Drive extension**



REDTAIL RIDGE TRAFFIC AND MOBILITY STUDY

CAMPUS DRIVE EXTENSION TRAFFIC PATTERN CHANGES (EXISTING VOLUMES)

FT Project #	19055	Original Scale	NTS	Date	1/22/20	Drawn by	EJK	Figure #	22
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TRANSPORTATION GROUP

REDTAIL RIDGE TRAFFIC AND MOBILITY STUDY
CAMPUS DRIVE LAYOUT FOR MONARCH SCHOOL CAMPUS ACCESSES

FT Project #	19055	Original Scale	NTS	Date	1/25/21	Drawn by	EJK	Figure #	23
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7.2 Proposed Multimodal Network

The Redtail Ridge project will be built over the next 20 years. During this time major shifts in transportation mobility and regional transportation project completion are expected to take place. Transit projects such Northwest Rail, SH 42 BRT, and the RTD local circulator will potentially be operating before Year 2040. In addition, enhancements/construction of complete streets on S. 88th Street, Dillon Road, and S. 96th Street as well as the new connections within the project on Campus Drive, Rockcress Drive, and Sorrel Avenue will be a major part of the multimodal transformation in Louisville. As outlined in the policy documents in the background section of this report, these corridors will serve many more travelers and modes in the future. The transformations will use the current right of way to move more people using safe, reliable, connected and sustainable transportation options.

The enhanced-future multimodal network that is recommended with the Redtail Ridge project is shown in **Table 9**. Additional details regarding at-grade signalized crossings, underpasses, trail connections, transit stops, shared ride mobility, and other multimodal infrastructure will be detailed as this project continues ahead in the PUD process.

Table 9. Enhanced-Future Multimodal Network Assumption with Redtail Ridge Project

Corridor	Bike Lanes	Multi-use pathways	Sidewalks	Bus Lanes
S. 88th Street (US 36 to Dillon Road)	buffered or protected	westside or eastside	westside and eastside	none
Dillon Road (S. 88th to S. 96th Street)	buffered or protected	northside	northside and southside	none
S. 96th Street (Northwest Parkway to County Road)	buffered or protected	westside	westside and eastside	yes
Northwest Parkway (S. 96th Street to US 36)	None	eastside	eastside	shoulder running
Campus Drive (S. 88th Street to S. 96th Street)	buffered or protected	southside	northside	none
Rockcress Drive (S. 88th Street to Northwest Parkway)	buffered or protected	none	northside and southside	none
Sorrel Avenue (Campus Drive to Rockcress Drive)	buffered or protected	none	eastside and westside	none

** Expanded future multimodal network will include on-site and off-site improvements including connections beyond Louisville that do not exist today but have been identified. See the links to the documents in the "Previous Studies" Section for additional details.*

The proposed regional and local trail network for the Redtail Ridge project area is also illustrated in **Figure 24**. As shown in the graphic, the project proposes to connect the gap in the Rock Creek Regional Trail as well as provide new east/west and north/south connections through the project, giving users more route options to travel through the area.

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The Redtail Ridge project will be built over the next 20 years. During this time major shifts in transportation mobility and regional transportation project completion are expected to take place. Transit projects such Northwest Rail, SH 42 BRT, and the RTD local circulator will potentially be operating before Year 2040. In addition, enhancements/construction of complete streets on S. 88th Street, Dillon Road, and S. 96th Street as well as the new connections within the project on Campus Drive, Rockcress Drive, and Sorrel Avenue will be a major part of the multimodal transformation in Louisville. As outlined in the policy documents in the background section of this report, these corridors will serve many more travelers and modes in the future. The transformations will use the current right of way to move more people using safe, reliable, connected and sustainable transportation options.

The enhanced-future multimodal network that is recommended with the Redtail Ridge project is shown in **Table 9**. Additional details regarding at-grade signalized crossings, underpasses, trail connections, transit stops, shared ride mobility, and other multimodal infrastructure will be detailed as this project continues ahead in the PUD process.

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S. 88th Street (US 36 to Dillon Road)	buffered or protected	westside or eastside	westside and eastside	none
Dillon Road (S. 88th to S. 96th Street)	buffered or protected	northside	northside and southside	none
S. 96th Street (Northwest Parkway to County Road)	buffered or protected	westside	westside and eastside	yes
Northwest Parkway (S. 96th Street to US 36)	None	eastside	eastside	shoulder running
Campus Drive (S. 88th Street to S. 96th Street)	buffered or protected	southside	northside	none
Rockcress Drive (S. 88th Street to Northwest Parkway)	buffered or protected	none	northside and southside	none
Sorrel Avenue (Campus Drive to Rockcress Drive)	buffered or protected	none	eastside and westside	none

** Expanded future multimodal network will include on-site and off-site improvements including connections beyond Louisville that do not exist today but have been identified. See the links to the documents in the "Previous Studies" Section for additional details.*

The proposed regional and local trail network for the Redtail Ridge project area is also illustrated in **Figure 24**. As shown in the graphic, the project proposes to connect the gap in the Rock Creek Regional Trail as well as provide new east/west and north/south connections through the project, giving users more route options to travel through the area.

Figure 24. Proposed Enhanced Redtail Ridge Regional and Local Trail Network



7.3 Travel Demand Management Strategies

Transportation Demand Management (TDM) refers to activities that help people use the transportation system more efficiently, while reducing traffic congestion, vehicle emissions and fuel consumption. TDM activities help get the most out of transportation infrastructure and services by making lower-cost, higher-efficiency transportation options easier to use and more readily available.

TDM activities include such options as eliminating or shortening trips, changing the mode of travel, or changing the time of day a trip is made, as well as actions that increase transportation system efficiency through carpooling, vanpooling, transit, bicycling and walking. TDM strategies also include employer-based programs such as alternative work schedules, which can shift demand away from peak travel times, and telework, which can reduce the need for trips entirely.

The Redtail Ridge project has developed a draft TDM Plan that is included in the **Appendix** of this study. The programs listed in the TDM Plan are provided at this time as possible tools given where the project stands in the GDP process. Future submittals can provide additional information when additional details on land uses, tenants and funding is known. It is recommended that the Metro District partner with a local expert in transportation management solutions to help facilitate these programs.

Note that all vertical developers in the project will be required to submit a customized TDM for their building identifying what programs will be implemented to meet the non-SOV goals of the project. Periodic surveys will be conducted to evaluate the TDM program effectiveness and adjustments will be made, if needed, to reach the project non-SOV goals.

7.4 External Non-Single Occupant Vehicle (Non-SOV) Trips

Non-single occupant vehicles (non-SOV) trips are trips that originate from outside the site or are being made from the site to external destinations. These trips are made by people who bicycle, carpool, vanpool, used shared ride mobility services and/or ride transit. As previously reference, based on the *American Community Survey US Census Data*, the mixed-use development sites in the US 36 corridor currently have 25 to 30 percent non-SOV trips coming to/from the sites daily. In addition, this project reviewed mode share and trip generation data for other large-scale developments in the Denver Metro area as well as trip generation studies to estimate non-SOV percentages anticipated for this project area. A summary of the findings and references are provided in the **Appendix**.

The non-SOV goals for this project are to have 25 percent or more non-SOV trips, which is achievable based on the current conditions and proposed TDM programs. However, based on feedback provided by City staff, to provide a more conservative analysis, a lower non-SOV reduction was assumed for the trip generation and traffic analysis for this study.

A non-SOV of 12 percent was assume for all of the land uses within the proposed development, including the retail, industrial park, and office space. This accounts for employees/visitors /customers who walk, bicycle, carpool, vanpool, use shared ride mobility services and/or use transit.

It is assumed that some of the planned regional mobility plans for this area will be constructed/implemented by the time this project is built-out and that these projects will further

reduce the non-SOV trips for the project and background trips to the study area (such as Northwest Rail, NAMS BRT corridors, complete streets in the 88th Street, Dillon Road, and 96th Street corridor).

7.5 Trip Generation

A trip generation analysis was performed to determine the traffic characteristics for the project. Trip rates contained in the Institute of Transportation Engineers (ITE) *Trip Generation Manual, 10th Edition*² were applied to estimate the traffic for the proposed land uses. ITE trip generation rates for "Industrial Park" (#130), "General Office Building" (#710), and "Shopping Center" (#820) were utilized for the industrial, office, and retail uses, respectively. Specific land uses and tenants for the office and retail spaces are unknown currently. It is anticipated that the retail uses will be designed to support the industrial and office development. For the projected retail land use on the site, the "Shopping Center" (ITE #820) land use category was applied as the data for this land use code is described as follows:

Shopping centers, including neighborhood centers, community centers, regional centers, and super regional centers, were surveyed for this land use. Some of these centers contained non-merchandising facilities, such as office buildings, movie theaters, restaurants, post offices, banks, health clubs, and recreational facilities (for example, ice skating rinks or indoor miniature golf courses). Many shopping centers, in addition to the integrated unit of shops in one building or enclosed around a mall, include outparcels (peripheral buildings or pads located on the perimeter of the center adjacent to the streets and major access points). These buildings are typically drive-in banks, retail stores, restaurants, or small offices.

The ITE *Trip Generation Handbook (Volume 3)* provides recommendations for when to use the average rate versus the equation (fitted curve) when estimated trips for land use codes. Based on this review, land use codes where the equation has a R^2 value of at least 0.75 was used to determine what land use codes the equation was utilized versus the average rate to estimate the trip generation estimates before reductions were applied. Using this criterion, the equation was used to generate trips for all land uses that fall under the "General Office" (ITE #710) category. The other land uses had R^2 values of less than 0.75 and the average rate was therefore utilized.

Multi-Use (Internal) Trips. These internal trips occur from one land use or building to another within the site boundaries. For example, an office patron may also use a retail store or restaurant in one vehicular visit to the site. Multi-use or multi-purpose trips typically do not affect the exterior site access points, nor add any additional traffic volumes to the adjacent street network. For this project it is projected that the small retail uses on the site will be focused on serving the office and industrial employees of the project and most

² Trip Generation 10th Edition, Institute of Transportation Engineers, 2017.

(75% estimated) of the trips accessing them will be on-site or internal trips. The other end of these internal trips were attributed to the office and industrial employees, and resulted in a 3% reduction for those uses. Based on this approach, the multi-use factors applied for this project were assumed to be three (3) percent for the industrial and office uses and 75 percent for the retail uses.

Non-SOV Trips. These trips originate from outside the site that may be completed by walking, bicycling, carpooling, shared ride mobility, or riding transit. The 12 percent non-SOV assumption identified in **Section 7.4** were applied to the trip generation estimates.

As shown in **Table 10**, with the assumptions listed above, the project site is expected to generate approximately 4,194 daily, 394 AM peak hour, and 405 PM peak hour external trips by Year 2025. At full build out the project site is expected to generate approximately 20,104 daily, 1,923 AM peak hour, and 2,010 PM peak hour external trips.

Table 10. Trip Generation Summary

Land Use	Size	Unit	Non-SOV	Internal Capture	Net Reduction Factor	Average Weekday Trips		Weekday AM Peak Hour Trips				Weekday PM Peak Hour Trips			
						Rate	Total	Rate	Total	In	Out	Rate	Total	In	Out
Year 2025 Completion															
#130 Industrial Park	414	KSF	12%	3%	85%	*	1,678	0.4	141	114	27	0.4	141	30	111
#710 General Office Building	287	KSF	12%	3%	85%	**	2,516	***	253	218	35	****	264	42	222
Subtotal							4,194		394	332	62		405	72	333
Year 2030 Completion															
#820 Shopping Center	15.0	KSF	12%	75%	22%	37.75	125	0.94	3	2	1	3.81	13	6	7
#130 Industrial Park	690	KSF	12%	3%	85%	*	2,188	0.4	236	191	45	0.40	236	50	186
#710 General Office Building	717	KSF	12%	3%	85%	**	6,119	***	598	514	84	****	631	101	530
Subtotal							8,432		837	707	130		880	157	723
Year 2035 Completion															
#130 Industrial Park	276	KSF	12%	3%	85%	*	1,359	0.4	94	76	18	0.40	94	20	74
#710 General Office Building	717	KSF	12%	3%	85%	**	6,119	***	598	514	84	****	631	101	530
Subtotal							7,478		692	590	102		725	121	604
Full Buildout Total							20,104		1,923	1,629	294		2,010	350	1,660

* ITE Equation: $EXP(0.52LNx+4.45)$

** ITE Equation: $EXP(0.97LNx+2.5)$

*** ITE Equation: $(0.94x+26.49)$

**** ITE Equation $EXP(0.95LNx+0.36)$

7.6 Trip Distribution and Assignment

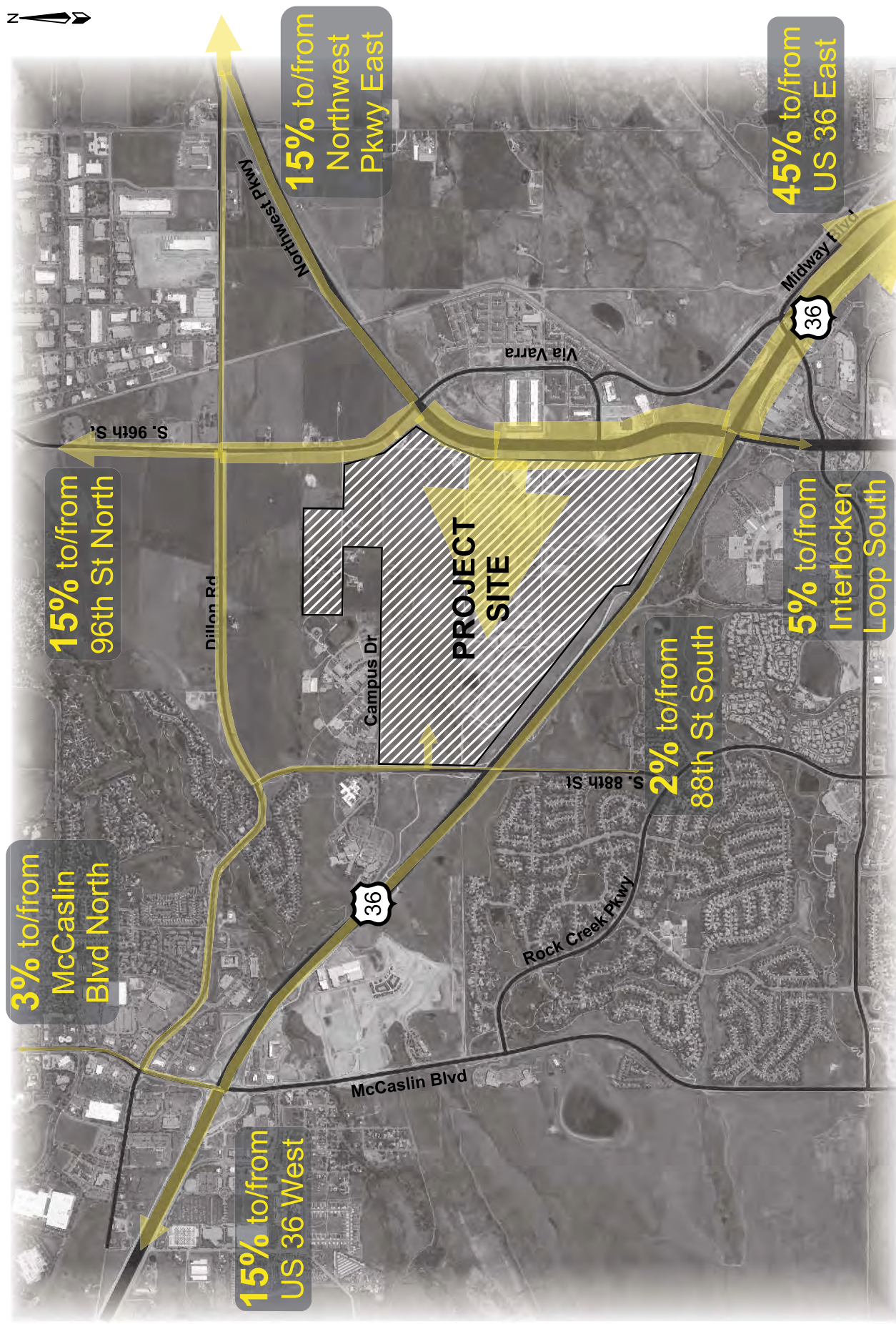
To develop the trip distribution for the proposed development, available traffic count and travel pattern data was reviewed. The proposed land uses for the project site were also taken into consideration which suggests that traffic generated to/from the project site is expected to utilize

the regional transportation system, with a smaller percent of the trips generated by the local system. Therefore, most vehicles are expected to use the regional routes (such as US 36, Northwest Parkway, and S. 96th Street to the north) and few vehicles are expected to use local roads. Travel routes/patterns were reviewed to determine how vehicles are expected to access the site and what route is likely to be fastest for vehicles to use to get to Boulder and Denver, but also communities to the south such as Arvada, Golden, Wheat Ridge, Westminster, etc.

In addition to available traffic/travel pattern information, data available from the StreetLight Data Company was reviewed for the offices in CTC. StreetLight collects mobility data on vehicle trips that can be used to analyze trip origin-destination, trip travel time/route, and trip purpose; this data was used to determine the trip distribution for existing traffic entering/exiting the offices in CTC. This data provided a baseline for where existing office trips in the study area have origins/destinations.

Taking into consideration the factors listed above, the trip distribution was developed for the development traffic entering/exiting the project site and is summarized in **Figure 25**. It is important to note that this trip distribution was evaluated by the City as well as their third-party consultant who used the DRCOG Year 2040 travel demand model for comparison purposes. Based on their review, the trip generation estimates shown in **Figure 25** were found to be acceptable.

Using these distribution assumptions, the projected site traffic was assigned to the study area roadway network for the weekday AM and PM peak hours. The site-generated traffic for Year 2025, Year 2030, and the project build out in Year 2040 are shown on **Figure 26**, **Figure 27**, and **Figure 28**, respectively.



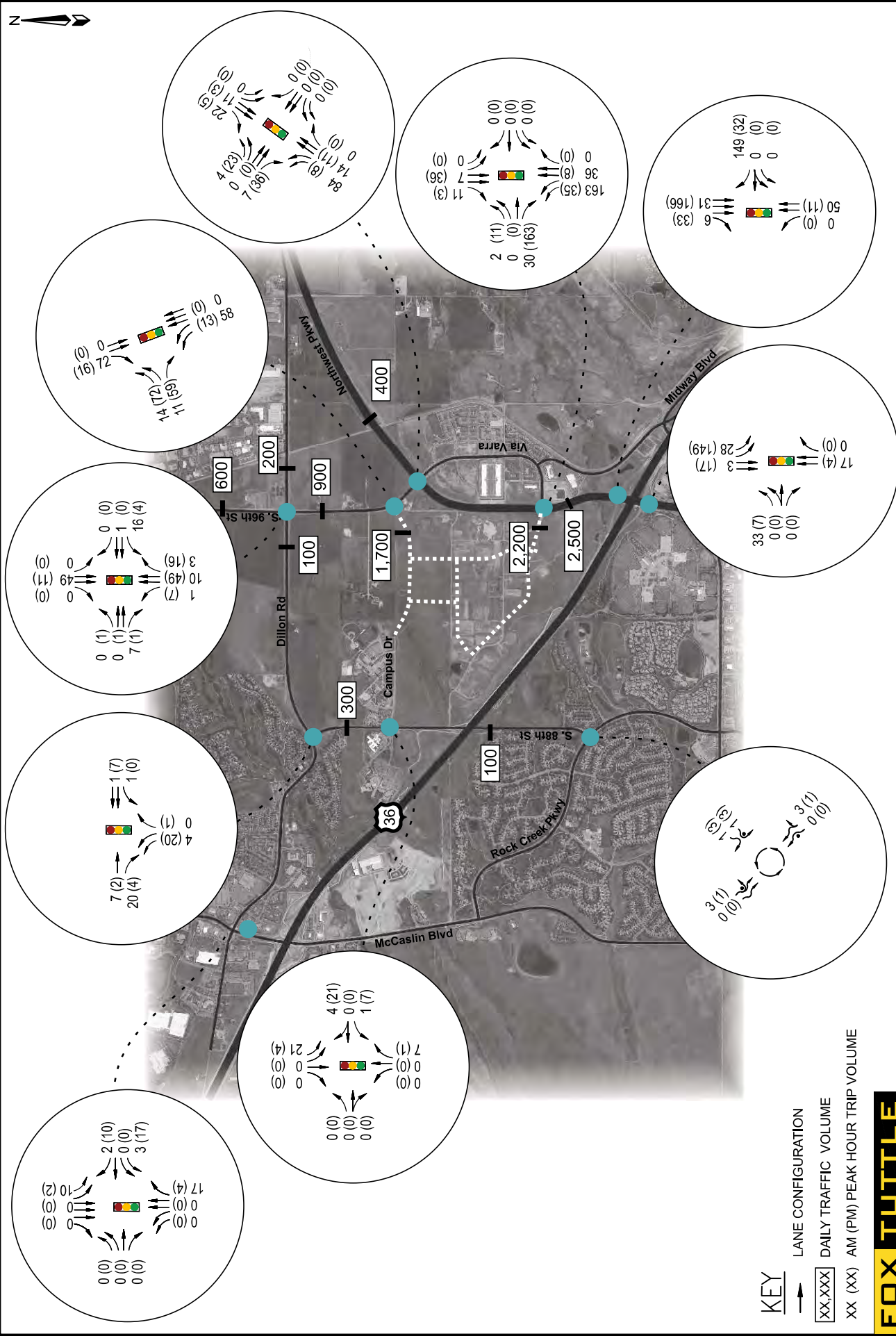
FOX TUTTLE

TRANSPORTATION GROUP

RETAIL RIDGE TRAFFIC AND MOBILITY STUDY

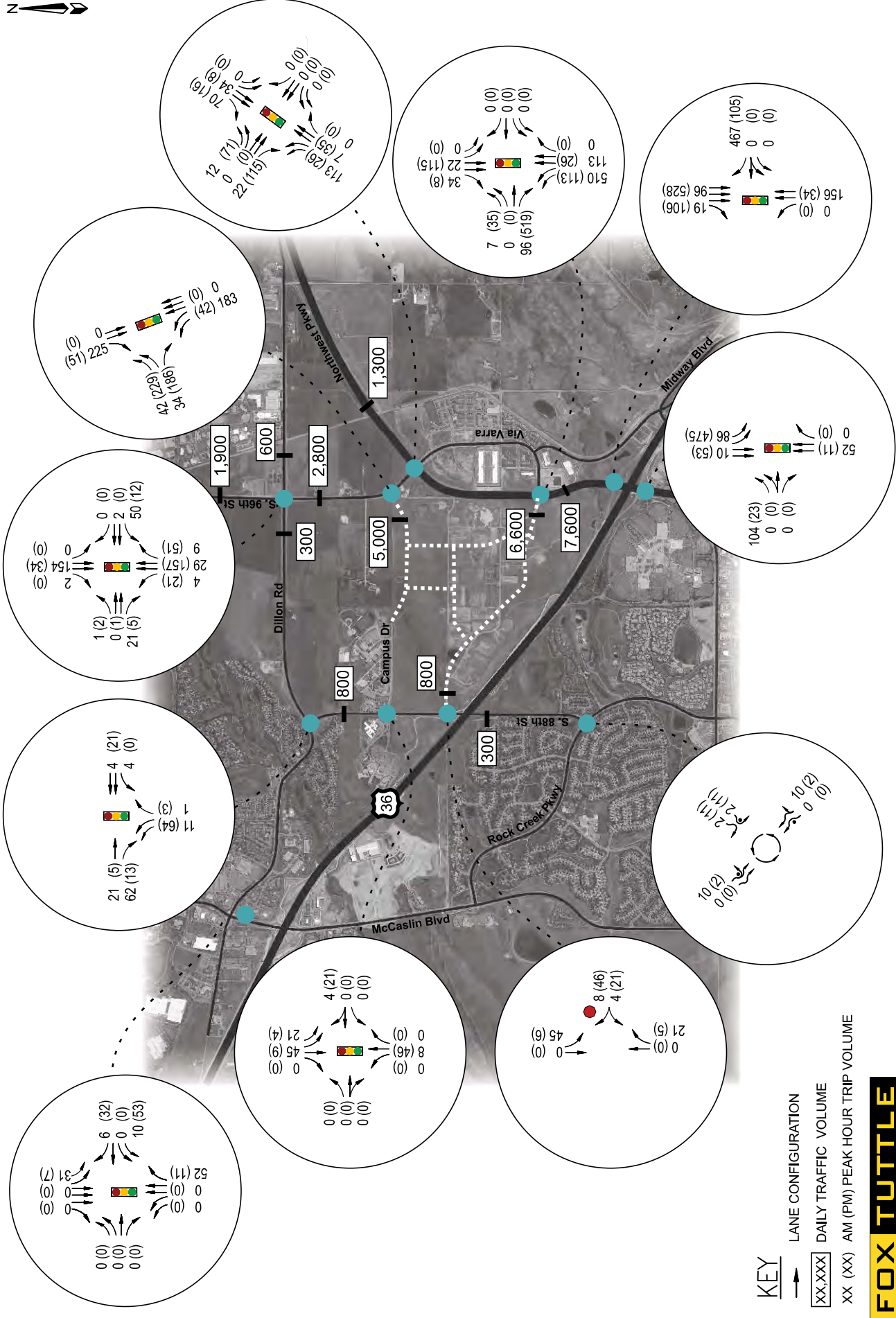
SITE DISTRIBUTION

FT Project #	19055	Original Scale	NTS	Date	1/22/20	Drawn by	EJK	Figure #	25
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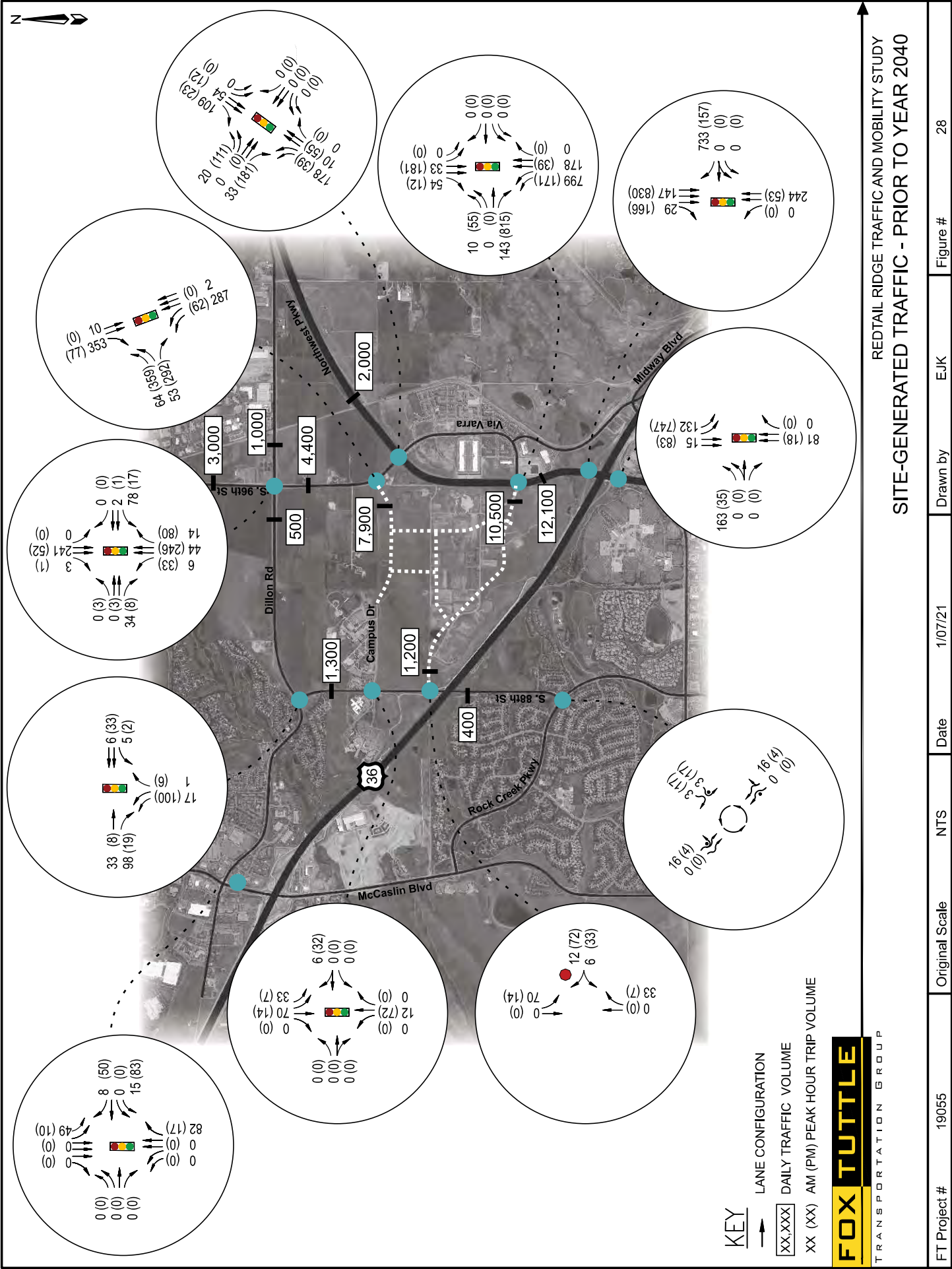


REDTAIL RIDGE TRAFFIC AND MOBILITY STUDY
SITE-GENERATED TRAFFIC - PRIOR TO YEAR 2025

FT Project #	19055	Original Scale	NTS	Date	1/07/21	Drawn by	EJK	Figure #	26
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REDTAIL RIDGE TRAFFIC AND MOBILITY STUDY
SITE-GENERATED TRAFFIC - PRIOR TO YEAR 2030



7.7 Crash Reduction and Vision Zero

The crash analysis completed in the City of Louisville TMP, also shown in **Section 3** of this study, documents the crash trends in the Redtail Ridge study area. As a result of the high crash locations, the TMP outlined priorities to work toward reducing all crashes in the City. The term "Vision Zero" encapsulates the concept of providing safe and complete roadways for all users with a goal of reducing all crashes, specifically fatal and life threatening crashes.

The Redtail Ridge design team is proposing to enhance the TMP Vision Zero recommendations. The intersection and multimodal improvements recommended in this study will accelerate the City's progress toward Vision Zero and provide safe travel as new residents, visitors and employees travel to and from Redtail Ridge. A specific overview of the recommended projects that could work toward Vision Zero are outlined below.

- Extension of Campus Drive east to S. 96th Street would provide a secondary route to/from the Monarch school campus. This would provide redundant access for emergency services and redistribute AM peak traffic to new intersections with enhanced safety features outlined below.
- Each of the intersections in the study area was evaluated in this study with future changes to signal timing and vehicle storage to reduce crashes. Providing safe clearance times and adequate storage will work toward Vision Zero goals in the S. 88th Street, Dillon Road, and S. 96th Street corridors.
- The intersections in this study utilized best practices for pedestrian signal timing at intersections. This includes walk phases that allow adequate time for seniors and children to cross streets. Additional protection is possible if City staff and the community would be willing to accept additional travel time delay during peak AM travel conditions. We look forward to finding the right balance that works toward Vision Zero goals.
- The bicycle network in this study recommends going beyond the TMP recommendations by building a network of buffered and protected bikeways in the S. 88th Street, S. 96th Street, and Dillon Road corridors as well as through the currently inaccessible project site. This would include intersection treatments that protect people on bicycles from turning movements when they are waiting for signals.

The design team will continue to apply Vision Zero best practices as additional site plan details are prepared during the PUD process. This includes the use of traffic calming features, properly sized lane widths, roundabouts, speed limits, and signage that works toward the City of Louisville's TMP safety goals.

8.0 FUTURE CONDITIONS + SITE GENERATED TRAFFIC

This section evaluates the anticipated future traffic operations with the project trips.

8.1 Year 2025 Background + Project Intersection Capacity Analysis

This section discusses travel conditions associated with the addition of development trips to the Year 2025 conditions. Signal timing was assumed to be optimized at all the study intersections. As previously noted, the Campus Drive extension was assumed as part of the initial phase and will be constructed/open to coincide with the opening of the first vertical development opening. The S. 88th Street/Rockcress Drive access was assumed to remain unsignalized with side-street stop control with southbound left- and northbound right-turn lanes assumed along S. 88th Street. The S. 96th Street/Campus Drive intersection was assumed to be signalized; a southbound right-turn lane, dual northbound left-turn lanes, and dual eastbound left-turn lanes with an eastbound right-turn lane (consistent with previous study recommendations). Since the Northwest Parkway/Rockcress Drive/Via Varra intersection was designed to accommodate higher traffic volumes from when Storage Tek was operating; only minor modifications (besides signal timing) were assumed under Year 2025 background + project conditions, including replacing the dual eastbound left-turn lanes with a single eastbound left-turn lane to better align with the proposed Rockcress Drive alignment to the west.

The improvements identified under Year 2025 background conditions were not assumed, since the Campus Drive extension could potentially reduce the need for some of the improvements.

The projected site-generated traffic was added to the Year 2025 background study area traffic volumes, which assumes travel pattern shifts for existing/background traffic due to the Campus Drive extension. The resultant traffic volumes are illustrated on **Figure 29**.

The results of the LOS calculations for the intersections are summarized in **Table 11**. Summary tables with LOS and 95th percentile queues by movement as well as the intersection LOS worksheets are included in the **Appendix**. **Results of the peak hour intersection capacity analysis indicate that the Dillon Road/S. 96th Street and the Northwest Parkway/S. 96th Street/Via Varra intersections are expected to operate at LOS E or worse during the AM or PM peak hour. All the other study intersections are expected to operate at an overall LOS D or better.**

As previous studies have suggested, the Campus Drive extension improves traffic operations at the Dillon Road/S. 88th Street and S. 88th Street/Campus Drive intersections. Both intersections were expected to operate at LOS F during the AM peak hour under Year 2025 background conditions. The Campus Drive extension provides an alternative route for Monarch school campus traffic to enter/exit. This reduces traffic volumes at these two key intersections on S. 88th Street.

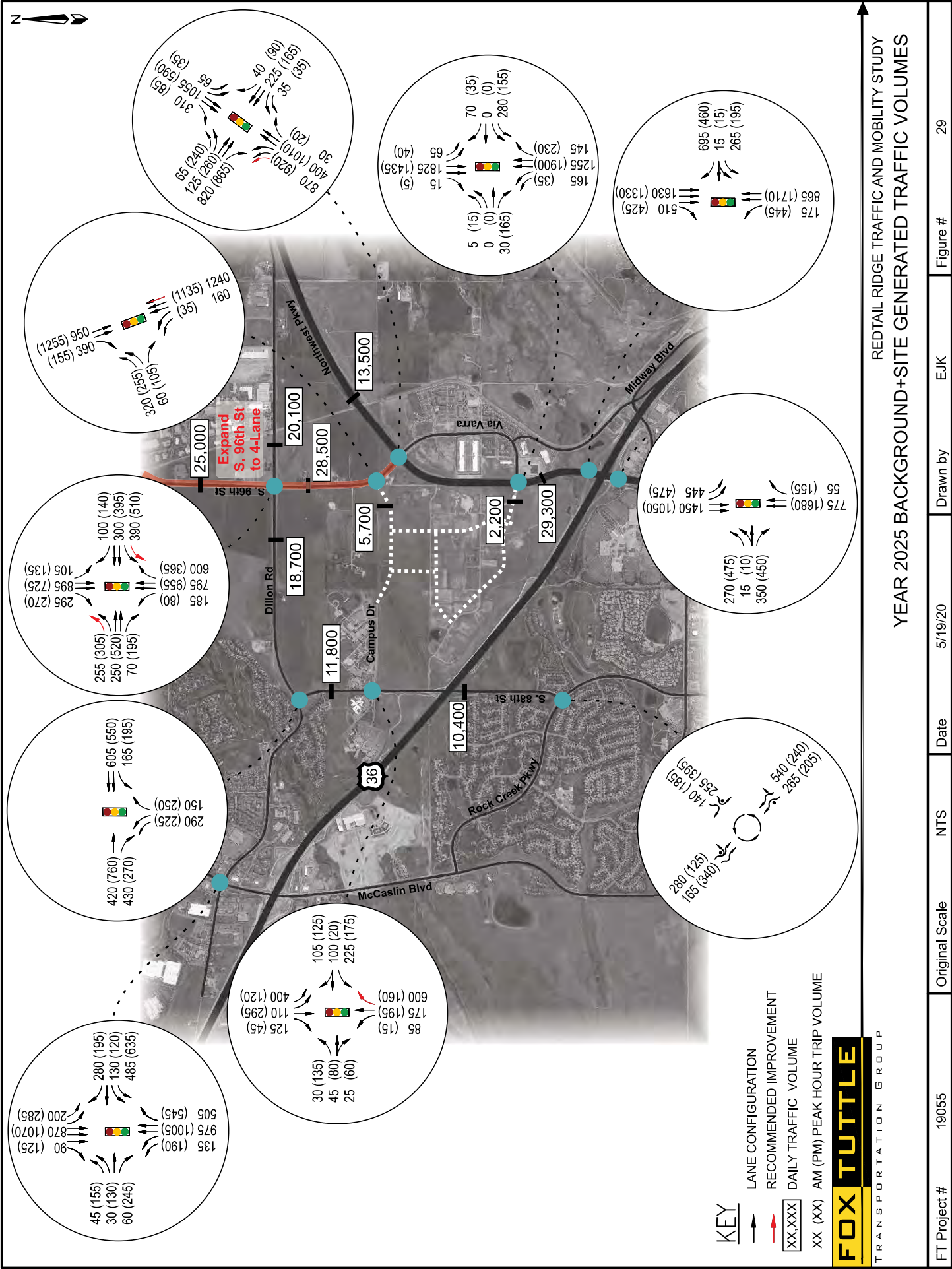


Table 11. Year 2025 + Project Conditions Level of Service Summary

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	C (25 sec)	C (33 sec)
Dillon Road/S. 88th Street	C (20 sec)	C (20 sec)
Dillon Road/S. 96th Street	E (64 sec)	F (85 sec)
S. 88th Street/Campus Drive	C (33 sec)	C (33 sec)
S. 88th Street/ Rockcress Drive ⁽¹⁾	--	--
S. 96th Street/Campus Drive	D (39 sec)	C (27 sec)
Northwest Parkway/S. 96th Street/Via Varra	F (90 sec)	C (32 sec)
Northwest Parkway/ Rockcress Drive/Via Varra	C (21 sec)	A (9 sec)
Northwest Parkway/US 36 North Ramps (WB)	A (9 sec)	B (15 sec)
Northwest Parkway/US 36 South Ramps (EB)	B (18 sec)	C (34 sec)
S. 88th Street/Rock Creek Parkway ⁽²⁾	A (10 sec)	A (7 sec)

⁽¹⁾ Intersection assumed to not be constructed until after Year 2025.

⁽²⁾ Roundabout controlled intersection

Note that the internal intersections were evaluated under Year 2025 background + project conditions and the intersection LOS worksheets are included in the **Appendix**. However, the analysis results, intersection operation discussion, and lane geometry/traffic control recommendations are included in a later section: **Section 10.0 "Internal Intersection Analysis"**.

To address the expected issues at the study intersections, the improvements listed below are recommended (these improvements are also illustrated in **Figure 29**). Additional information on the anticipated timing for improvements is provided in **Section 12.0 "Improvement Phasing"**.

- S. 96th Street/Dillon Road: Construct dual eastbound and westbound left-turn lanes on Dillon – *also recommended under Year 2025 background conditions*
- Widen S. 96th Street to a four-lane section between Dillon Road to Northwest Parkway and to the north of the Dillon Road intersection approximately one-half mile – *S. 96th Street between Dillon Road and Northwest Parkway also recommended to be expanded to a four-lane under Year 2025 background conditions*
- S. 88th Street/Campus Drive: Extend the northbound right-turn lane to provide 400 to 500 feet of storage – *also recommended under Year 2025 background conditions*
- S. 96th Street/Campus Drive: Construct three northbound through lanes that extend from the Northwest Parkway/S. 96th Street/Via Varra intersection to the Campus Drive intersection. The three northbound through lanes will merge to two through lanes north of Campus Drive.
- Northwest Parkway/S. 96th Street: Construct triple northeast bound left-turn lanes on Northwest Parkway and modify the southwest bound right-turn movement to be controlled on Northwest Parkway – *also recommended under Year 2025 background conditions*

The Year 2025 background + project conditions were evaluated with the improvements listed above. The results of the LOS calculations for the intersections are summarized in **Table 12**. A summary table with LOS and 95th percentile queue by movement as well as the intersection LOS worksheets are included in the **Appendix**. **Results of the peak hour intersection capacity analysis indicate that with the recommended improvements all study intersections are expected to operate at an overall LOS D or better during the AM and PM peak hours.**

Table 12. Year 2025 Background + Project Conditions Level of Service Summary (Improvements)

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	--	--
Dillon Road/S. 88th Street	--	--
Dillon Road/S. 96th Street	D (35 sec.)	D (37 sec.)
S. 88th Street/Campus Drive	C (30 sec.)	C (32 sec.)
S. 88th Street/ Rockcross Drive	--	--
S. 96th Street/Campus Drive	C (22 sec.)	B (14 sec.)
Northwest Parkway/S. 96th Street/Via Varra	D (38 sec.)	C (29 sec.)
Northwest Parkway/ Rockcross Drive/Via Varra	--	--
Northwest Parkway/US 36 North Ramps (WB)	--	--
Northwest Parkway/US 36 South Ramps (EB)	--	--
S. 88th Street/Rock Creek Parkway	--	--

⁽¹⁾ LOS results only shown for intersections with recommended improvements

Although the study intersections are expected to operate at overall acceptable level-of-service, the following movements are expected to operate at LOS E or worse under Year 2025 conditions with the recommended improvements. Any anticipated queuing issues are also noted below.

Dillon Road and McCaslin Boulevard

- During the PM peak hour, the following movements are expected to operate at LOS E: 4 northbound left- and southbound left-turn. All movements during the AM peak hour are expected to operate at LOS D or better.
- No significant queuing issues are expected. However, the southbound right-turn queue is expected to extend approximately 120 feet occasionally, which will queue beyond the available 110 feet of storage in the right-turn lane.
- The project-related traffic has minimal impact to operations at this intersection.

Dillon Road and S. 88th Street

- The extension of Campus Drive improves traffic operations at this intersection by removing traffic from a critical movement (westbound left-turn). The Campus Drive extension is expected to address the existing westbound left-turn and northbound queues that this intersection currently experiences during the AM peak hour.
- During the PM peak hour, the eastbound queues are expected to extend approximately 560 feet, (which is less than the 1,000 feet that the eastbound queues currently extend under existing conditions).

Dillon Road and S. 96th Street

- During the AM and PM peak hours, there are a few movements that are expected to operate at LOS E with the recommended improvements.
 - During the AM peak hour, the following movements operate at LOS E: eastbound left, eastbound through, and westbound left-turn.
 - During the PM peak hour, the following movements operate at LOS E: eastbound through and westbound left-turn.
- No significant queuing issues are expected. The westbound left-turn queue during the PM peak hour is expected to extend approximately 300 feet, which is a significant improvement from existing conditions.

S. 88th Street and Campus Drive

- The extension of Campus Drive improves traffic operations at this intersection by removing traffic from a critical movement (southbound left-turn).
- During the AM and PM peak hours, the eastbound through is expected to operate at LOS E with the recommended improvements.
- No significant queuing issues are expected during the AM or PM peak hours.

S. 96th Street/Campus Drive

- During the AM and PM peak hour, the northbound left-turn movement is expected to operate at LOS E or worse. However, the northbound left-turn queues are expected to be within the available left-turn lane storage (estimated to be 250 feet).

Northwest Parkway and S. 96th Street/Via Varra

- During the AM and PM peak hours, there are a few movements that are expected to operate at LOS E with the recommended improvements.
 - During the AM peak hour, the following movements operate at LOS E: the eastbound left, eastbound through, westbound left, and westbound through on S 96th Street/Via Varra and the northbound left- and southbound left-turn on Northwest Parkway.
 - During the PM peak hour, the following movements operate at LOS E: the eastbound left, eastbound through, westbound left-, and westbound through on S 96th Street/Via Varra and the southbound left-turn on Northwest Parkway.
- During the AM peak hour, with the recommended capacity improvements, the northbound left-turn queues on Northwest Parkway are expected to extend approximately 465 feet, which can be accommodated in the available left-turn lane storage of 700 feet. The southbound right-turn queue on Northwest Parkway, which was modified from an uncontrolled to a controlled movement, is expected to extend approximately 165 feet, which can also be accommodated in the available right-turn lane storage of 600 feet.

Northwest Parkway and Rockcress Drive/Via Varra

- During the AM and PM peak hours, there are a few movements that are expected to operate at LOS E or worse.
 - During the AM peak hour, the following movements operate at LOS E or worse: the westbound left and southbound left-turn.
 - During the PM peak hour, the following movements operate at LOS E: the eastbound left, westbound left-, northbound left- and southbound left-turn.
- No significant queuing issues are expected.

Northwest Parkway and US 36 Westbound/North Ramps

- During the AM and PM peak hour, the westbound left- and westbound through movements are expected to operate at/near LOS E.
- During the PM peak hour, the northbound left-turn queue is expected to extend approximately 340 feet, which is beyond the available storage. These queues do not extend to the US 36 South Ramps intersection to the south.

Northwest Parkway and US 36 Eastbound/South Ramps

- During the AM and PM peak hours, the eastbound left-, and eastbound through are expected to operate at/near LOS E or worse.
- During the PM peak hour, the eastbound left-turn queues extend approximately 485 feet and northbound through queues extend approximately 640 feet. This intersection is near

capacity under Year 2025 background + project site-generated trips. If traffic volumes increase at this intersection, it will quickly degrade, and the movement delay and approach queues will increase and begin to impact adjacent intersections.

8.2 Year 2030 Background + Project Intersection Capacity Analysis

This section discusses travel conditions associated with the addition of development trips to the Year 2030 background conditions. Signal timing was assumed to be optimized at all the study intersections. The improvements identified under Year 2025 background + project conditions were assumed to be in place for Year 2030 conditions. The projected site-generated traffic was added to the Year 2030 background study area traffic volumes. The resultant traffic volumes are illustrated on **Figure 30**.

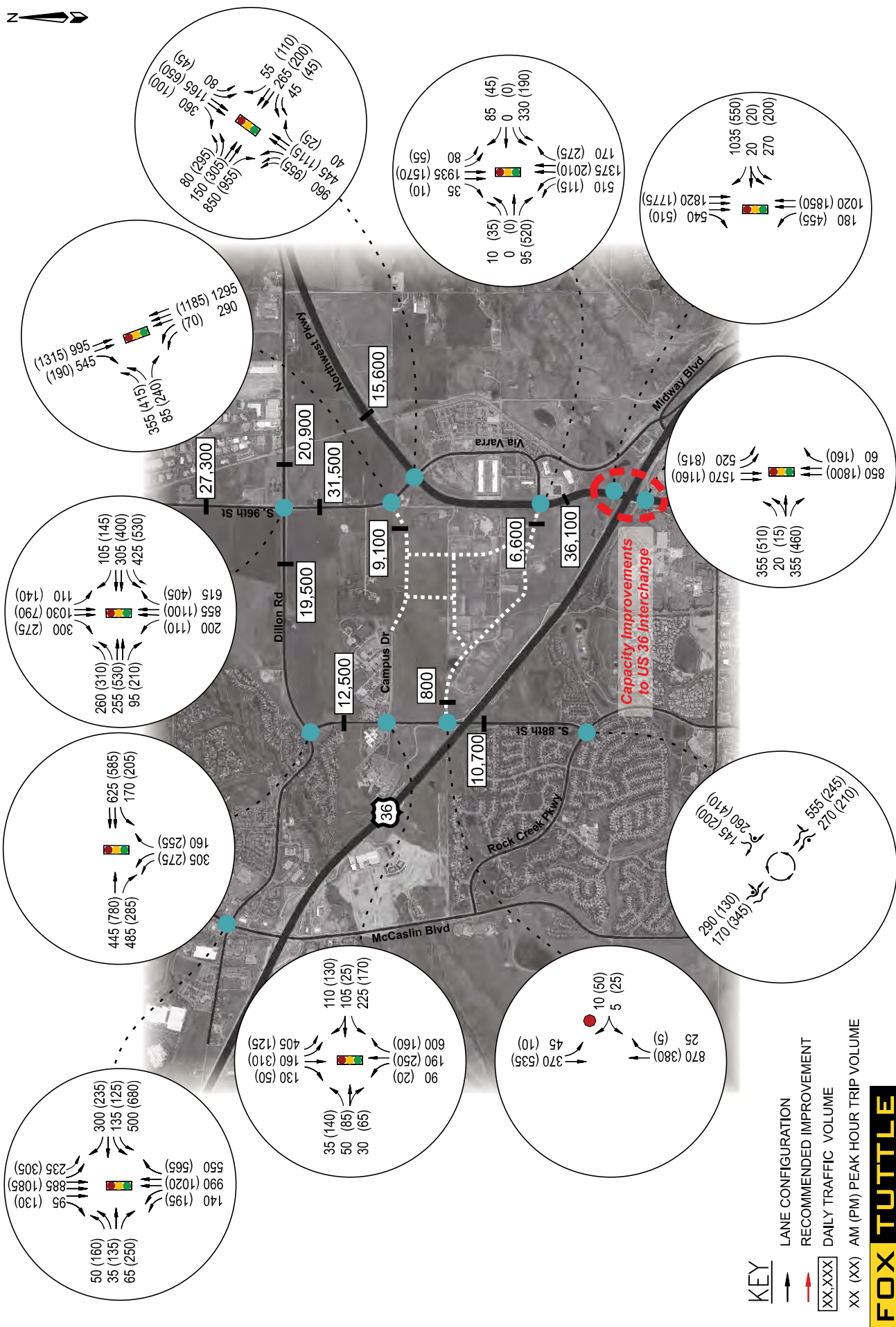
The results of the LOS calculations for the intersections are summarized in **Table 13**. Summary tables with LOS and 95th percentile queues by movement as well as the intersection LOS worksheets are included in the **Appendix**. **Results of the peak hour intersection capacity analysis indicate that the Northwest Parkway/US 36 South Ramps intersection is expected operate at LOS F during the PM peak hour. All the other study intersections are expected to operate at an overall LOS D or better.**

Table 13. Year 2030 + Project Conditions Level of Service Summary

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	C (27 sec)	C (34 sec)
Dillon Road/S. 88th Street	C (21 sec)	C (21 sec)
Dillon Road/S. 96th Street	D (37 sec)	D (40 sec)
S. 88th Street/Campus Drive	D (35 sec)	C (24 sec)
S. 88th Street/Rockcress Drive ⁽¹⁾	A / C (16 sec.)	A / B (11 sec)
S. 96th Street/Campus Drive	C (23 sec)	C (21 sec)
Northwest Parkway/S. 96th Street/Via Varra	D (51 sec)	C (30 sec)
Northwest Parkway/Rockcress Drive/Via Varra	D (42 sec)	B (16 sec)
Northwest Parkway/US 36 North Ramps (WB)	A (12 sec)	C (29 sec)
Northwest Parkway/US 36 South Ramps (EB)	B (18 sec)	F (82 sec)
S. 88th Street/Rock Creek Parkway ⁽²⁾	B (10 sec)	A (7 sec)

⁽¹⁾ Unsignalized with side-street stop control. The overall intersection LOS is followed by the worst-movement LOS and delay.

⁽²⁾ Roundabout controlled intersection



REDTAIL RIDGE TRAFFIC AND MOBILITY STUDY
YEAR 2030 BACKGROUND+SITE GENERATED TRAFFIC VOLUMES

Under Year 2030 background + project conditions, the South Ramps at the Northwest Parkway/US 36 interchange are expected to be over capacity during the PM peak hour. The intersection is expected to operate at a LOS F, with multiple movements anticipated to have an average delay of more than two minutes. Further, the eastbound queues are anticipated to extend more than 1,000 feet which is near the US 36 mainline traffic, and the northbound queues are expected to extend more than 1,700 feet.

Additional capacity is needed to accommodate the projected traffic volumes with and without the project site trips at the US 36/Northwest Parkway, which will likely require that the bridge be widened. As noted under the background conditions, due to the unknowns of future project impacts to this area (including both Northwest Parkway Extension and Jefferson Parkway), no specific mitigation is recommended. Additional study/analysis should be conducted at the interchange to determine the optimal design to meet the future needs. With a new design with increased capacity, this interchange should operate acceptably in the future.

Note that the internal intersections were evaluated under Year 2030 background + project conditions and the intersection LOS worksheets are included in the **Appendix**. However, the analysis results, intersection operation discussion, and lane geometry/traffic control recommendations are included in a later section: **Section 10.0 "Internal Intersection Analysis"**.

Although the other study intersections are expected to operate at overall acceptable level-of-service, the following movements are expected to operate at LOS E or worse under Year 2030 background conditions. Any anticipated queuing issues are also noted below.

Dillon Road and McCaslin Boulevard

- During the AM peak hour, the southbound left-turn is expected to operate at LOS E.
- During the PM peak hour, the following movements are expected to operate at LOS E: eastbound left-, eastbound through, northbound left-, and southbound left-turn.
- No significant queuing issues are expected. However, the southbound right-turn lane is expected to approximately 140 feet which will occasionally queue beyond the available storage for the right-turn lane of 110 feet.
- The project-related traffic has minimal impact to operations at this intersection.

Dillon Road and S. 88th Street

- During the PM peak hour, the eastbound queues are expected to extend approximately 640 feet. The nearest intersection is the signal located approximately 965 feet to the west.

Dillon Road and S. 96th Street

- During the AM peak hour, the following movements operate at/near LOS E: eastbound left, westbound, and northbound left-turn.
- During the PM peak hour, the following movements operate at LOS E: eastbound through and westbound left-turn.
- No significant queuing issues are expected.

S. 88th Street and Campus Drive

- During the AM peak hour, the eastbound through and southbound left-turn are expected to operate at LOS E or worse.
- During the AM peak hour, the southbound left-turn queues are expected to extend 380 feet, which is near the available 400-foot of available storage. This is expected to occur near the school arrival peak period for Monarch school campus. Generally, it is acceptable for queuing/delay issues to occur near intersections adjacent to a school during a school's the arrival/departure peak periods since the congestion occurs for a relatively short period of time.

S. 96th Street/Campus Drive

- During the AM peak hour, the eastbound left-and northbound left-turn are expected to operate at LOS E.
- During the PM peak hour, the northbound left-turn is expected to operate at LOS F.
- While, no significant queuing issues are expected during the AM or PM peak hours, it should be noted that poor lane utilization is anticipated for the southbound approach and the right-turn queues are expected to extend approximately 460 feet. The poor lane utilization is due to most vehicles positioning into the outside through lane since they are destined to make a right-turn onto Northwest Parkway.

Northwest Parkway and S. 96th Street/Via Varra

- During the AM peak hour, the following movements operate at LOS E or worse: the eastbound left, eastbound through, westbound left- and westbound through on S 96th Street/Via Varra and the northbound left- and southbound left-turn on Northwest Parkway.
- During the PM peak hour, the following movements operate at/near LOS E: the eastbound left, eastbound through, westbound left-turn, and westbound through on S 96th Street/Via Varra and the southbound left-turn on Northwest Parkway.
- During the AM peak hour, the northbound left-turn queues on Northwest Parkway are expected to extend approximately 745 feet, which will occasionally extend beyond the

available left-turn lane storage of 700 feet. This intersection should be monitored, and signal timing should be adjusted, as needed.

Northwest Parkway and Rockcress Drive/Via Varra

- During the AM and PM peak hours, the following movements operate at LOS E or worse: the eastbound left, westbound left, northbound left, southbound left and southbound through.
- While no significant queuing issues are expected, the southbound queues are expected to extend approximately 1,100 feet during the AM peak hour. The southbound traffic volume is approaching capacity for two through lanes.

8.3 Year 2040 Background + Project Intersection Capacity Analysis

This section discusses travel conditions associated with the build out of the proposed development in the long-term (Year 2040). The projected site-generated traffic was added to the Year 2040 background study area traffic volumes and are illustrated on **Figure 31**. Consistent with the Year 2040 background condition recommendations, S. 96th Street was assumed to be expanded to a four-lane roadway to the north of Dillon Road by Year 2040. Year 2025 background + project conditions recommended that the four-lane be expanded to the north a minimum of one-half mile, but by Year 2040 it is expected that traffic volumes on S. 96th Avenue will warrant a four-lane through the SH 42 intersection.

Based on the results of the Year 2030 background + project conditions, it was assumed that the US 36/ Northwest Parkway interchange would be reconstructed to add additional capacity that would accommodate future traffic volumes. However, since no concepts have been developed for the interchange, the interchange intersections were not evaluated under Year 2040 background + project conditions.

Once again it is also important to consider that if the Jefferson Parkway extension is constructed, then that project would potentially reconstruct the US 36 interchange as well as grade separate the Northwest Parkway/S. 96th Street/Via Varra intersection and construct a frontage road system to accommodate local traffic. However, no concepts showing the potential reconfiguration of Northwest Parkway have been developed.

Recently completed Jefferson Parkway studies have not evaluated the projected peak hour intersection traffic volumes on Northwest Parkway. Due to the regional connectivity that Jefferson Parkway provides, additional analysis should be completed to better understand projected peak hour traffic to the network and to identify what interchange options will provide acceptable operations and can also be constructed within the available right-of-way.

The results of the LOS calculations for the intersections are summarized in **Table 14**. Summary tables with LOS and 95th percentile queues by movement as well as the intersection LOS worksheets are included in the **Appendix**. **Results of the peak hour intersection capacity analysis indicate that Northwest Parkway intersections at S. 96th Street/Via Varra and Rockcress Drive/Via Varra are expected to operate at LOS F during the AM peak hour. All other study intersections are expected to operate at LOS D or better during the AM and PM peak hours.**

Table 14. Year 2040 + Project Conditions Level of Service Summary

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	C (28 sec)	D (40 sec)
Dillon Road/S. 88th Street	C (25 sec)	C (28 sec)
Dillon Road/S. 96th Street	D (44 sec)	D (43 sec)
S. 88th Street/Campus Drive	D (37 sec)	C (23 sec)
S. 88th Street/Rockcress Drive ⁽¹⁾	A / C (15 sec.)	A / B (12 sec)
S. 96th Street/Campus Drive	C (31 sec)	C (27 sec)
Northwest Parkway/S. 96th Street/Via Varra	F (100 sec.)	C (34 sec)
Northwest Parkway/Rockcress Drive/Via Varra	F (>2min)	C (24 sec)
Northwest Parkway/US 36 North Ramps (WB)	N/A	N/A
Northwest Parkway/US 36 South Ramps (EB)	N/A	N/A
S. 88th Street/Rock Creek Parkway ⁽²⁾	B (12 sec)	A (7 sec)

⁽¹⁾ Unsignalized with side-street stop control. The overall intersection LOS is followed by the worst-movement LOS and delay.

⁽²⁾ Roundabout controlled intersection

N/A – Intersection identified to be included in an interchange study.

Note that the internal intersections were evaluated under Year 2040 background + project conditions and the intersection LOS worksheets are included in the **Appendix**. However, the analysis results, intersection operation discussion, and lane geometry/traffic control recommendations are included in a later section: **Section 10.0 "Internal Intersection Analysis"**.

Both Northwest Parkway study intersections at S. 96th Street/Via Varra and Rockcress Drive/Via Varra are expected to operate at LOS F during the AM peak hour. While the Jefferson Parkway project has identified the potential need for a grade separated intersection at the S. 96th Street/Via Varra intersection, there are uncertainties to if/when that project may occur.

To address the anticipated capacity issues at this intersection, one option is to construct a third southbound through lane on Northwest Parkway that would begin north of the S. 96th Street/Via Varra intersection and continue to the US 36 interchange. While this is not the only option to provide acceptable levels of service on Northwest Parkway, for purposes of this study the third southbound through lane was assumed to address the capacity issues at the S. 96th Street/Via Varra and Rockcress Drive/Via Varra intersections.

Additional study should be conducted along the Northwest Parkway corridor between S. 96th Street and US 36 in conjunction with the planned improvements at the US 36 interchange to determine how capacity can be increased under future conditions. Key stakeholders include CDOT, Northwest Parkway, the City of Louisville, City and County of Broomfield, and Jefferson Parkway Public Highway Authority.

The Year 2040 background + project conditions were evaluated with the improvements to Northwest Parkway. The results of the LOS calculations for the intersections are summarized in **Table 15**. A summary table with LOS and 95th percentile queue by movement as well as the intersection LOS worksheets are included in the **Appendix**. **Results of the peak hour intersection capacity analysis indicate that with the recommended capacity improvements all study intersections are expected to operate at an overall LOS D or better during the AM and PM peak hours.**

Table 15. Year 2040 + Project Conditions Level of Service Summary (Improvements)

Intersection	Overall Intersection LOS (Delay)	
	AM Peak Hour	PM Peak Hour
Dillon Road/McCaslin Boulevard	--	--
Dillon Road/S. 88th Street	--	--
Dillon Road/S. 96th Street	--	--
S. 88th Street/Campus Drive	--	--
S. 88th Street/Rockcress Drive ⁽¹⁾	--	--
S. 96th Street/Campus Drive	--	--
Northwest Parkway/S. 96th Street/Via Varra	D (52 sec.)	C (32 sec.)
Northwest Parkway/Rockcress Drive/Via Varra	D (52 sec.)	C (25 sec.)
Northwest Parkway/US 36 North Ramps (WB)	--	--
Northwest Parkway/US 36 South Ramps (EB)	--	--
S. 88th Street/Rock Creek Parkway ⁽²⁾	--	--

⁽¹⁾ LOS results only shown for intersections with recommended improvements

The following movements are expected to operate at LOS E or worse under Year 2040 background conditions with improvements to Northwest Parkway. Any anticipated queuing issues are also noted below.

Dillon Road and McCaslin Boulevard

- During the AM peak hour, the eastbound through is expected to operate at LOS E.
- During the PM peak hour, the following movements are expected to operate at LOS E: eastbound left-, eastbound through, westbound left, northbound left-, and southbound left-turn.
- During the PM peak hour, the southbound left- turn and right-turn queues are expected to occasionally queue beyond the available storage. No mitigation is recommended.
- No other queuing issues are anticipated.
- The project-related traffic has minimal impact to operations at this intersection.

Dillon Road and S. 88th Street

- During the AM peak hour, the westbound left- and northbound left-turn are expected to operate at LOS E.
- During the PM peak hour, the northbound left-turn is expected to operate at LOS E.
- During the PM peak hour, the eastbound queues are expected to extend approximately 835 feet. The nearest intersection is the signal located approximately 965 feet to the west.
- Note that the City has a desire to maintain Dillon Road as a two-lane roadway. Since this intersection is anticipated to operate at an overall LOS C during the AM and PM peak hours with Year 2040 traffic volumes, no mitigation is recommended at this intersection. However, traffic volumes on Dillon Road should continue to be monitored and if traffic volumes increase at a higher rate than anticipated, then a four-lane may be needed on Dillon Road to accommodate future traffic volumes safely and efficiently.

Dillon Road and S. 96th Street

- During the AM peak hour, the following movements operate at/near LOS E: eastbound left, eastbound through, westbound left-turn, westbound through, northbound left, and southbound through.
- During the PM peak hour, the following movements operate at LOS E: eastbound left, eastbound through, and westbound left.
- No significant queuing issues are expected.
- As noted above, the City has a desire to maintain Dillon Road as a two-lane roadway. Since this intersection is anticipated to operate at a LOS D during the AM and PM peak hours, no mitigation is recommended at this intersection. However, traffic volumes and operations should continue to be monitored at this intersection. If Dillon Road is expanded to a four-lane, this intersection is expected to have more balanced lane utilization for the eastbound and westbound through movements, which would improve the efficiency of the overall intersection operations.

S. 88th Street and Campus Drive

- During the AM peak hour, the eastbound through and southbound left-turn are expected to operate at LOS E or worse.
- During the AM peak hour, the southbound left-turn queues are expected to extend beyond the 400-foot storage turn lane. This is expected to occur near the school arrival peak period for Monarch school campus. As noted under Year 2030 background conditions, it is generally considered acceptable for queuing/delay issues to occur near intersections adjacent to a school during a school's the arrival/departure peak periods, since the congestion occurs for a relatively short period of time.
- No significant queuing issues are expected during the AM or PM peak hours.

S. 96th Street/Campus Drive

- During the AM peak hour, the eastbound left- and northbound left-turn are expected to operate at LOS E or worse.
- During the PM peak hour, the northbound left-turn is expected to operate at LOS F.
- The northbound queues on S. 96th Street are expected to extend 500 feet during the AM peak hour. There is approximately 630 feet of space on S. 96th Street between Campus Drive and Northwest Parkway; therefore the S. 96th Street/Campus Drive location is expected to operate acceptably and does not need to be located further to the north.
- During the AM peak hour, the northbound left-turn queues are expected to extend approximately 330 feet.
- While, no significant queuing issues are expected during the AM or PM peak hours, it should be noted that poor lane utilization is anticipated for the southbound approach and the right-turn queues are expected to extend approximately 510 feet. The poor lane utilization is due to most vehicles positioning into the outside through lane since they are destined to make a right-turn onto Northwest Parkway. If the Northwest Parkway/ S. 96th Street/Via Varra intersection were grade separated, there is the potential that the lane utilization could be improved with the grade separation design.

Northwest Parkway and S. 96th Street/Via Varra

- During the AM and PM peak hours, there are a few movements that are expected to operate at LOS E with the recommended improvements.
 - During the AM peak hour, the following movements operate at LOS E or worse: the eastbound left, eastbound through, westbound left- and westbound through on S 96th Street/Via Varra and the northbound left-, and southbound left-turn on Northwest Parkway.

- During the PM peak hour, the following movements operate at LOS E: the eastbound through and westbound through on S 96th Street/Via Varra and the southbound left-turn on Northwest Parkway.
- During the AM peak hour, the northbound left-turn queues on Northwest Parkway are expected to extend approximately 760 feet, which will occasionally extend beyond the available left-turn lane storage of 700 feet. This intersection should be monitored, and signal timing should be adjusted, as needed.

Northwest Parkway and Rockcress Drive/Via Varra

- During the AM and PM peak hours, the eastbound left, westbound left, northbound left, southbound left are expected to operate at LOS E or worse with the recommended improvements.
- No significant queuing issues are expected during the AM or PM peak hours.

9.0 ARTERIAL TRAVEL TIME ANALYSIS

Two corridors were identified for possible expansion from a two-lane to a four-lane roadway with the project site-generated trips: S. 96th Street and Dillon Road.

S. 96th Street was recommended to be expanded from a two-lane to a four-lane between Dillon Road and Northwest Parkway once the Campus Drive extension is open (estimated to occur in year 2022). S. 96th Street was also recommended to be expanded to a four-lane to the north of Dillon Road. However, it is important to note that there are other ongoing projects adjacent/on S. 96th Street that should be further evaluated/considered when determining when and how far north the four-lane on S. 96th Street should continue, including the St. Louis Parish development project and the SH 42 BRT study. Both studies may recommend that a four-lane be constructed to the north to SH 42 sooner than anticipated in this study.

Dillon Road was not recommended to be expanded to a four-lane roadway under the Year 2040 background + project conditions. Based on discussions with City staff, there is a desire to maintain the Dillon Road corridor between S. 88th Street and S. 96th Street as a two-lane roadway. However, under Year 2040 background + project conditions, the corridor is nearing the capacity for a two-lane roadway. Therefore, it was recommended that this corridor continue to be monitored and studied in the future to reassess if/when a four-lane roadway may be needed.

To provide another metric to evaluate the corridor LOS, arterial travel time information is summarized for background and with project conditions for S. 96th Street corridors (between Dillon Road and Northwest Parkway) and Dillon Road (between S. 88th Street and S. 96th Street). A summary of the travel time estimates is illustrated in **Figures 32 to 35** and the key takeaways are bulleted below.

- Under with and without project conditions, S. 96th Street is recommended to be expanded to a four-lane roadway in Year 2025. As shown in **Figure 32**, the travel time notably decreases for southbound traffic once this improvement is constructed. The northbound traffic also is expected to experience a decrease in travel time with that improvement since vehicles making a heavy left-turn movement from Northwest Parkway onto northbound S. 96th Street no longer merge into a single through lane.
- Dillon Road is anticipated to have the highest travel times in Year 2025 background conditions prior to any improvements constructed. As shown in the graphics, the construction of the Campus Drive extension is expected to reduce travel time on Dillon Road.
- The decrease in travel time on Dillon Road under the improved Year 2025 background + project conditions is due to the dual eastbound/westbound left-turn lanes at the Dillon Road/S. 96th Street, which significantly decreases delay for vehicles traveling through that intersection.
- Under Year 2040 background + project conditions, the travel time on Dillon Road is anticipated to be like existing conditions besides the westbound direction during the AM peak hour which is expected to improve due to the Campus Drive extension. Review of this analysis supports the recommendation for Dillon Road to remain as a two-lane roadway through Year 2040.

Figure 32. S. 96th Street (Dillon Rd to Northwest Pkwy) Arterial Travel Time (Northbound)

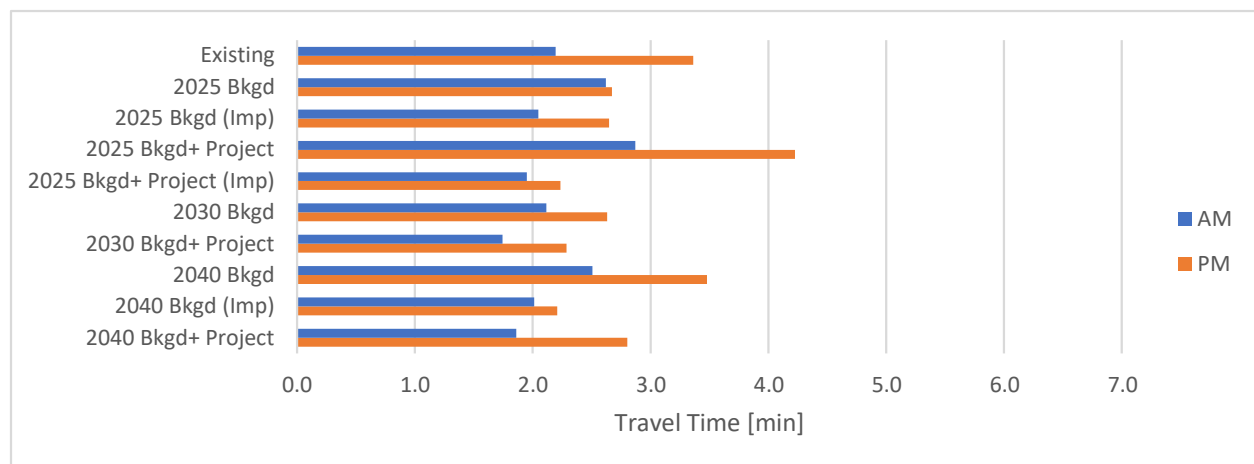
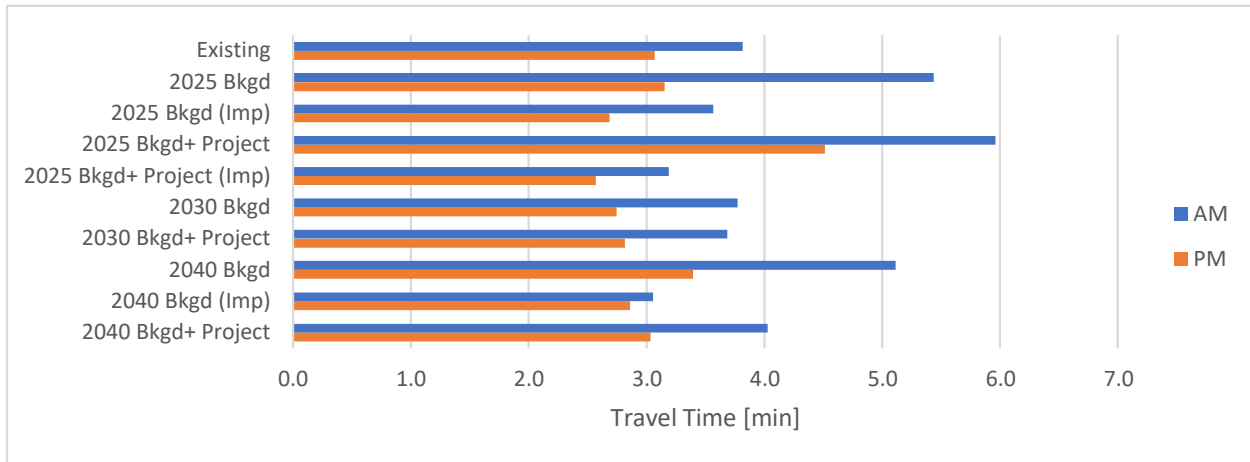
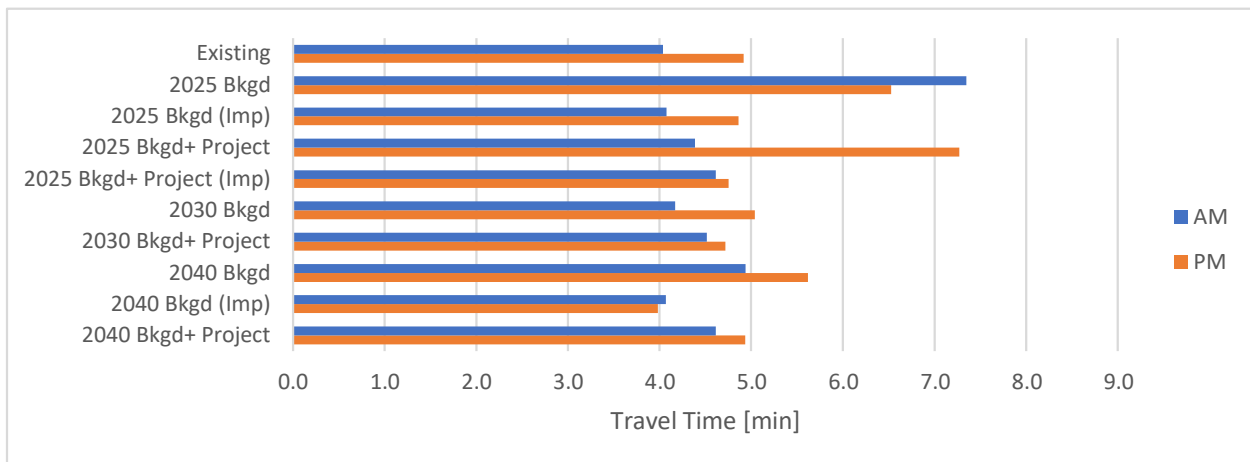
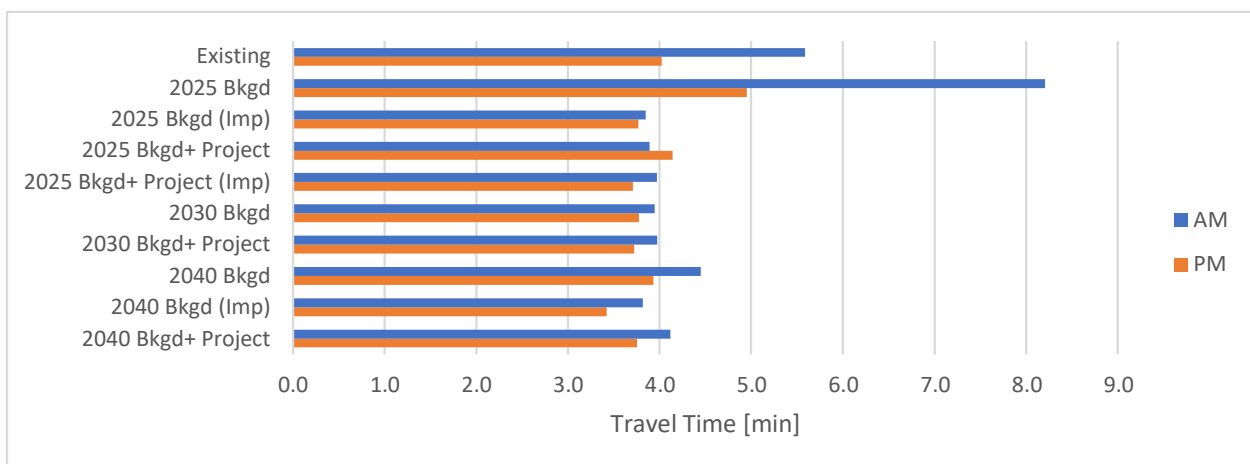


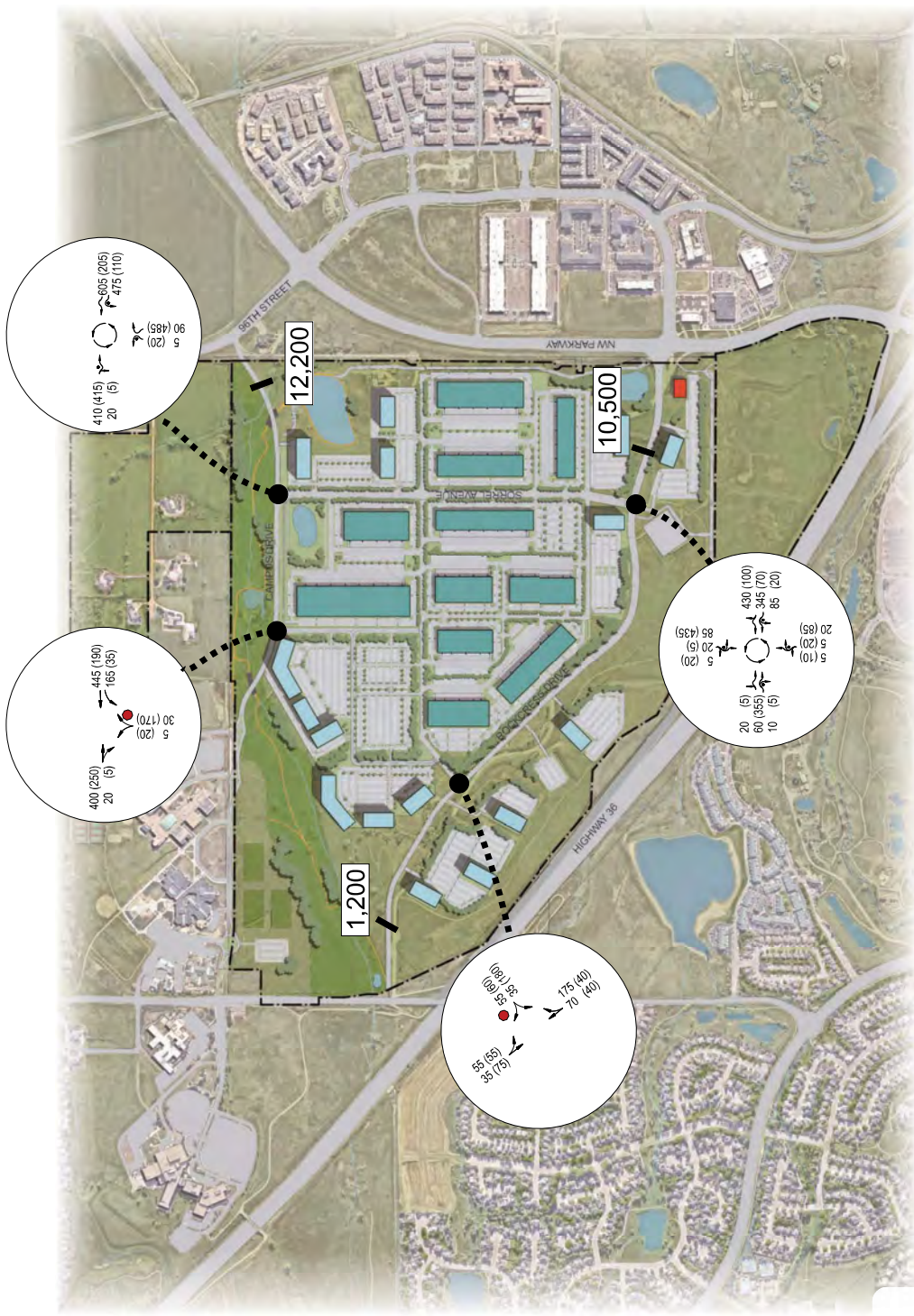
Figure 33. S. 96th Street (Dillon Rd to Northwest Pkwy) Arterial Travel Time (Southbound)**Figure 34. Dillon Road (S. 88th Street to S. 96th Street) Arterial Travel Time (Eastbound)****Figure 35. Dillon Road (S. 88th Street to S. 96th Street) Arterial Travel Time (Westbound)**

10.0 INTERNAL INTERSECTION ANALYSIS

Fox Tuttle Transportation Group has worked with the Redtail Ridge team to design an internal roadway network that can accommodate the full buildout of the project trips safely and efficiently. The internal roadway consists of the Campus Drive extension to S. 96th Street, construction of Rockcress Drive between S. 88th Street and Northwest Parkway, as well as construction of Sorrel Avenue between Campus Drive and Rockcress Drive.

- **Campus Drive**: recommended to be a three-lane roadway between S. 88th Street and the Monarch High School eastern roundabout and a four lane roadway between Sorrel Avenue and S. 96th Street, the section between the Monarch High School eastern roundabout and Sorrel Avenue is anticipated to operate acceptably as a two-lane roadway. Roundabout access is recommended at the Monarch school campus to the K-8 and High School main accesses as well as at Sorrel Avenue. The Campus Drive access to the Zone 3 office area is anticipated to operate acceptably as an unsignalized intersection with side-street stop control.
- **Rockcress Drive**: recommended to be a four-lane roadway between Sorrel Avenue and Northwest Parkway and to transition to two-lane collector west of Sorrel Avenue. The Sorrel Avenue intersection is anticipated to operate acceptably as a roundabout; the remaining intersections are expected to operate acceptably as unsignalized.
- **Sorrel Avenue**: recommended to be a two-lane roadway; the driveway accesses and internal intersections are expected to operate acceptably as unsignalized.

Projected Year 2040 background + project (full build out) conditions traffic volumes are shown in **Figure 36** for Campus Drive at Sorrel Avenue and the internal Zone 3 office area and Rockcress Drive at Sorrel Avenue and the western internal roadway. Also illustrated in the figure are the recommended intersection geometrics and traffic control for full build out conditions. All intersections and access locations are anticipated to operate at LOS B or better during the AM and PM peak hours. The intersection capacity reports are provided in the **Appendix**. Note that access locations will continue to be analyzed and refined through the PUD process.



KEY

→

LANE CONFIGURATION

XX.XXX

DAILY TRAFFIC VOLUME

XX (XX)

AM (PM) PEAK HOUR VOLUME

FOX TUTTLE

TRANSPORTATION GROUP

REDTAIL RIDGE TRAFFIC AND MOBILITY STUDY
INTERNAL ROADWAY/INTERSECTION - RECOMMENDED GEOMETRY (YEAR 2040 FULL BUILD OUT)

FT Project #	19055	Original Scale	NTS	Date	1/07/21	Drawn by	EJK	Figure #	36
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11.0 PERCENT CONTRIBUTION

The percent of trips generated by the Redtail Ridge development under Year 2025 and Year 2040 with project conditions at each of the study intersections is calculated in Appendix I and summarized below in **Table 16**. The percentages vary from one percent to 15 percent under Year 2025 with project conditions and vary from three percent to 27 percent under Year 2040 with project conditions.

Table 16. Percent Contribution to Intersection Traffic Volumes

Intersection/Segments	Project Percent of Total Entering Traffic			
	Year 2025+ Project (AM Peak)	Year 2025+ Project (PM Peak)	Year 2040+ Project (AM Peak)	Year 2040+ Project (PM Peak)
Dillon Rd/McCaslin Blvd	1%	1%	4%	3%
Dillon Rd /S. 88th St.	2%	2%	6%	6%
Dillon Rd /S. 96th St.	2%	2%	8%	8%
S. 88th St./Campus Dr	2%	2%	5%	8%
S. 88th St./Rockcress Dr	1%	1%	9%	12%
S. 96th St./Campus Drive	5%	5%	18%	20%
Northwest Pkwy/S. 96th St./Via Varra	2%	2%	8%	8%
Northwest Pkwy / Rockcress Dr/Via Varra	6%	6%	22%	22%
Northwest Pkwy /US 36 North Ramps	6%	5%	20%	19%
Northwest Pkwy /US 36 South Ramps	2%	4%	9%	16%
S. 88th St./Rock Creek Pkwy	0%	1%	2%	3%
S. 88th St. (Btw Dillon Rd and Campus Dr)	2%	3%	10%	12%
S. 88th St. (Btw Campus Dr and Rockcress Dr)	1%	1%	6%	8%
S. 88th St. (South of Rockcress Dr)	1%	1%	3%	4%
Dillon Rd (Btw S. 88th St. and S. 96th St.)	1%	1%	3%	2%
S. 96th St. (North of Dillon Rd)	2%	2%	9%	10%
S. 96th St. (Btw Dillon Road and Northwest Pkwy)	3%	3%	11%	12%
Northwest Pkwy (Northeast of S. 96th St.)	2%	2%	7%	7%
Northwest Pkwy (Btw S. 96th St. and Rockcress Dr)	2%	2%	7%	7%
Northwest Pkwy (Btw Rockcress Dr and US 36)	6%	6%	22%	22%
Northwest Pkwy (South of US 36)	1%	1%	3%	3%

12.0 IMPROVEMENT PHASING

A summary of improvements recommended in this report at the study intersections and segments is provided in **Table 17** for both with and without project conditions. The estimated timeline for when the improvement is needed/triggered is also noted in the summary table.

Table 17. Improvement Phasing Summary

Recommendation (Intersection/Segment)	Project Need (Expected Timeline/Year)		Notes
	Background (No Project)	With Project	
Campus Drive Extension	(N/A) - located on the Redtail Ridge project property	-Construct with first phase of the development (Opening Year 2022)	
McCaslin Boulevard / Dillon Road	--	--	Signal timing should continually be monitored to manage queues.
Dillon Road / S. 88th Street	-- -Restripe to provide dual WB left-turn lanes (2020) - assumes Campus Drive is not extended	--	
Dillon Road (Between S. 88th Street and S. 96th Street)	-Widen to four-lane roadway (shortly after 2030) assumes Campus Drive is not extended	-Dillon Road is nearing capacity in Year 2040. Monitor the corridor and if traffic volumes increase at a higher rate than projected, Dillon Road may need to be expanded to a four-lane roadway	The City noted a desire to maintain Dillon Road as a two-lane roadway. Based on projected volumes, a two-lane is expected to operate acceptably with traffic generated by the project. However, without the Campus Drive extension, Dillon Road is expected to need to be a four-lane around 2030.
Dillon Road / S. 96th Street	-Construct dual EB/WB left-turn lanes (2020-2021)	-Construct dual EB/WB left-turn lanes (2022 with Campus Drive Ext.)	
Between Dillon Road and Northwest Parkway	-Construct dual NB/SB left-turn lanes (2035-2040) assumes Campus Drive is not extended	-Monitor and if long queues/cycle failure begins to occur construct dual NB/SB left-turn lanes (after 2040)	
S. 96th Street (Between Dillon Road and Northwest Parkway)	-Widen to four-lane roadway (2025)	-Widen to four-lane roadway (2022 with Campus Drive Ext.)	
S. 96th Street (North of Dillon Road)	-Widen to four-lane roadway between Dillon Road and SH 42 (shortly after 2030)	-Widen to four-lane roadway ~ 1/2 mile to the north (2025)	Coordination with the SH 42 BRT project and other development/studies along S. 96th Street should occur to refine timing needs.
S. 88th Street (Between Dillon Road and Campus Drive)	-Widen to a four-lane roadway (2020) assumes Campus Drive is not extended	-Widen to four-lane roadway to SH 42 (shortly after 2030)	
S. 88th Street (Between Campus Drive and Rock Creek Pkwy)	--	--	
S. 88th Street / Campus Drive	-Construct a second NB thru lane that would begin approx. 500 feet south of Campus Drive (2020) assumes Campus Drive is not extended		Expected to operate acceptably as a two-lane with turn lanes at key intersection.
S. 88th Street / Rockcress Drive	-Extend the NB right-turn lane to provide a minimum of 500 feet of storage (2020)	-Extend the NB right-turn lane to provide 400- 500 feet of storage (with Campus Drive extension)	
S. 88th Street and Rock Creek Pkwy	(N/A)	-Construct a SB left-turn lane and NB right-turn lane on S. 88th Street (with opening of Rockcress Drive, between 2025-2030).	
S. 96th Street / Campus Drive	--	--	No improvements anticipated to be needed
Northwest Parkway / S. 96th Street / Via Varra	-Construct triple NB left-turn lanes on NWP (2025) -Capacity improvements on NWP - see note (2030-2035)	-Construct dual NB left-turn lanes and a SB right-turn lane on S. 96th Street, and dual EB left-turn and an EB right-turn lane on Campus Drive (2022 with Campus Drive Ext.). Signalize intersection when warranted.	Constructing a third SB thru lane from north of S. 96th Street to the US 36 interchange is expected to improve operations. However, this may not be the optimal design for travel time. Previous studies have recommended that this intersection be grade separated in the future. Therefore, a separate corridor study is recommended rather than specific intersection recommendations.
Northwest Parkway / Rockcress Drive / Via Varra	-Capacity improvements on NWP - see note (2030-2035)	-Capacity improvements on NWP - see note (2030-2035)	See note for Northwest Parkway / 96th Street / Via Varra intersection
Northwest Parkway / US 36 Interchange	-New interchange needed (2040)	-New interchange needed (2027-2028)	To address the anticipated capacity constraints, the interchange needs to be modified to provide additional capacity or an alternative access to this area needs to be provided via US 36. A follow-up study should be conducted that looks at future grade separation concepts along Northwest Parkway and evaluates all interchange configuration operations for US 36.

Table 17 includes a number of potential improvements to roadway segments and intersections that the City of Louisville should monitor over time as area traffic increases. This includes:

- The need to widen Dillon Road to four lanes between 88th Street and 96th Street,
- The need to widen 96th Street from south of Dillon Road to SH 42,
- Signalization of the Campus Drive/96th Street intersection.

The City will also want to monitor potential improvements to the Northwest Parkway between 96th Street and US 36, and potential implementation of the Jefferson Parkway.

13.0 NEXT STEPS

The follow traffic and mobility study next steps have been identified for this project:

- Additional study and concept development are needed for the Northwest Parkway corridor and at the US 36 interchange.
- After the GDP submittal, vertical developers will be required to submit PUD documents prior to construction, including traffic conformance letters. The PUD documents will identify if/when traffic signals at the internal intersections are projected to be warranted as well as signal timing modifications/adjustments needed to the study intersections. In addition, the vertical developers will be required to submit building specific Travel Demand Management (TDM) Plans. The projected non-single occupancy vehicle (non-SOV) goals will be evaluated and adjusted as needed to reach goals. The Metro District will monitor the plans effectiveness and make changes as needed to reach goals.