TRAFFIC IMPACT STUDY

AdventHealth Louisville

City of Louisville, Colorado

Prepared for:

SmithGroup

Kimley»Horn

T R A F F I C I M P A C T S T U D Y

AdventHealth Louisville

City of Louisville, Colorado

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TABLE OF CONTENTS

Appendices

LIST OF TABLES

LIST OF FIGURES

1.0 EXECUTIVE SUMMARY

AdventHealth Louisville is proposed to be located on the northwest corner of the Via Varra & Northwest Parkway intersection in Louisville, Colorado. At full buildout, the project is proposed to include a hospital and additional medical office buildings totaling approximately 800,000 square feet. By approximately the 2030 horizon, Phase 1 of the hospital and medical office buildings is expected to be complete. It is understood that Phase 1 will include an approximate 371,600 square-foot hospital (with 153 beds, 30 of which will be shelled for later use) and approximately 62,000 square feet of medical office space. To be conservative, Phase 1 traffic analysis was conducted assuming up to 200 beds would be available in the hospital while up to 80,000 square feet of medical office building uses was also assumed. For purposes of this study, full buildout of this site is expected to be complete by approximately 2040. At full buildout, it is understood the site will provide an approximately 639,600 square-foot hospital with a total of 300 beds while medical office buildings onsite are expected to total approximately 160,000 square feet. Based on coordination with the City of Louisville staff, the initial 2030 short-term Phase 1 horizon was analyzed, while the 2040 buildout horizon was also analyzed. At the request of City staff, the major intersections in the study area were also analyzed for the twenty-year 2045 long-term traffic conditions.

The purpose of this traffic study is to identify project traffic generation characteristics to determine potential project traffic related impacts on the local street system and to develop the necessary mitigation measures required for the identified traffic impacts. The following existing and future intersections were incorporated into this traffic study based on the City of Louisville, Colorado requested scope:

- Campus Drive & Sorrel Avenue (#1) – Future Intersection
- Campus Drive & 96th Street (#2)
- 96th Street/Via Varra & Northwest Parkway (#3)
- Rockcress Drive & Sorrel Avenue (#4) – Future Intersection
- Rockcress Drive/Via Varra & Northwest Parkway (#5)

In addition, the proposed full movement access on the north side of Rockcress Drive and the proposed three full movement accesses on the east side of Sorrel Avenue were also evaluated. The access along Rockcress Drive is anticipated to be located approximately 775 feet to the west

of the Rockcress Drive/Via Varra & Northwest Parkway (#5) intersection, measured center to center; a future south leg at this location is also proposed when development to the south of Rockcress Drive occurs. The two northernmost accesses on Sorrel Avenue are anticipated to align with two future accesses on the west side of Sorrel Avenue, creating two four-leg intersections. The third and southernmost access is expected to operate as a 'T'-intersection.

Regional access to the site will be provided by US-36, US-287, and Northwest Parkway, while primary access to the site will be provided by US-36, 96th Street, and Northwest Parkway. Direct access to the site will be provided by one full movement access on the north side of Rockcress Parkway to the west of Northwest Parkway, and three full movement accesses along the east side of Sorrel Avenue.

In the 2030 Phase 1 buildout, AdventHealth Louisville is expected to generate approximately 6,268 weekday daily trips, with 474 of these trips occurring during the morning peak hour and 557 of these trips occurring during the afternoon peak hour. With full buildout of the site by 2040, the project is anticipated to generate 10,632 weekday daily trips, with 772 of these trips occurring during the morning peak hour and 970 of these trips occurring during the afternoon peak hour.

Based on the analysis presented in this report, Kimley-Horn believes AdventHealth Louisville will be successfully incorporated into the existing and future roadway network. There is an existing AdventHealth hospital located at the intersection of Campus Drive and 88th Street approximately 1.25 miles to the west of this proposed site. This existing site includes approximately 400,000 square feet of hospital/medical office building uses and is approved with an expansion of an additional 350,000 square feet to include up to 750,000 square feet at full buildout. The currently proposed AdventHealth site within the Redtail Ridge development area is expected to include up to 799,600 square feet of hospital/medical office building uses. As such, this increase of 49,600 square feet of additional uses with relocation of the existing hospital with approved expansion to the new site is expected to result in approximately 658 additional weekday daily trips, with 47 more trips during the morning peak hour and 61 more trips during the afternoon peak hour compared to the traffic the existing site could generate. This results in approximately one additional vehicle every 75 seconds during the morning peak hour and one additional vehicle every minute (60 seconds) during the afternoon peak hour on the surrounding street network compared to the existing project site. This study assessed the additional improvements that could

be needed due to the additional square footage of this proposed site, and any vehicle rerouting that could occur with the site being located further to the east. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following recommendations:

2030 Recommendations

All offsite transportation recommendations identified as being needed within this horizon are consistent with the findings of the master traffic study. Those improvements are already being proposed and constructed to serve the entire development area. As such, the following outlines the recommendations found to be needed by the 2030 horizon:

- The Campus Drive & Sorrel Avenue (#1) intersection is anticipated to be constructed prior to AdventHealth Louisville construction. Based on currently proposed construction plans, it will be a 'T'-roundabout controlled intersection, with eastbound Campus Drive operating with a shared through/right turn lane, westbound Campus Drive providing separate left and through lanes, and the northbound Sorrel Avenue approach providing one lane for shared left/right turning movements. R1-2 "YIELD" signs should be posted on all three approaches to the roundabout.
- The Campus Drive & 96th Street (#2) intersection is anticipated to become a signalized 'T'-intersection with full movements allowed by the 2030 horizon prior to AdventHealth construction. For purposes of this study, the eastbound Campus Drive approach was based on the proposed construction plans, which would have dual continuous eastbound left turn lanes and a separate right turn lane approximately 500 feet in length. The northbound 96th Street approach was conservatively assumed to provide a single 200-foot left turn lane and two through lanes in this horizon. However, at full buildout based on construction plans, it is anticipated to provide dual left turn lanes and three through lanes northbound. The southbound 96th Street approach should provide two through lanes and a 200-foot right turn lane.
- The 96th Street/Via Varra & Northwest Parkway (#3) intersection may require extension of the eastbound right turn lane from 375 feet to approximately 475 feet by this horizon to meet expected vehicle queues. However, if not improved, it is believed any additional vehicles can safely queue in the southernmost eastbound through lane if these queues are experienced.
- The future Rockcress Drive & Sorrel Avenue (#4) intersection is proposed to be constructed as a four-leg roundabout prior to AdventHealth construction. The eastbound, northbound, and

southbound approaches are all expected to provide one approach lane for shared left/through/right turning movements, while the westbound approach would provide a shared left/through lane and a separate right turn lane. Each approach should provide R1-2 “YIELD” signs on approach to the intersection.

- The Rockcress Drive/Via Varra & Northwest Parkway (#5) intersection is expected to be improved on the eastbound approach to the intersection with dual left turn lanes, one of which would provide 400 feet in length while the other would be a continuous turn lane. These improvements are based on the currently proposed improvement plans. Although it is understood that three southbound through lanes are eventually proposed at this intersection, it was conservatively analyzed with the existing two southbound through lanes during this horizon.

The following recommendations are specific to accesses proposed for Phase 1 of the AdventHealth Louisville Hospital Campus to be constructed by the development:

- Two full movement accesses are proposed along the east side of Sorrel Avenue that will align with two proposed accesses on the west side of Sorrel Avenue. R1-1 “STOP” signs are proposed on the eastbound and westbound approaches to Sorrel Avenue at both accesses. These accesses should operate well with one approach lane for shared left/through/right turning movements. The northbound and southbound approaches of Sorrel Avenue to both accesses are recommended to provide 150-foot left turn lanes and shared through/right turn lanes.
- A third full movement access along the east side of Sorrel Avenue is also proposed, which is anticipated to be constructed as a ‘T’-intersection. An R1-1 “STOP” sign should be constructed on the westbound approach for vehicles exiting the site. A southbound left turn lane 150 feet in length should also be provided.
- The primary access into the proposed site is anticipated to be along Rockcress Drive, approximately 775 feet to the west of Northwest Parkway, measured center to center. This intersection is anticipated to operate well under minor street stop control through the 2030 horizon with Phase 1 construction of AdventHealth Louisville. The Rockcress Access (#8) is recommended to provide a 150-foot left turn lane, one through lane, and one shared through/right turn lane along both eastbound and westbound Rockcress Drive. The northbound approach to the intersection is anticipated to operate well with one lane for shared left/through/right turning movements while the southbound approach exiting the hospital

should provide a 200-foot left turn lane and a separate through/right lane. Of note, dual southbound left turn lanes are recommended at this access at full buildout and as such, it is recommended that pavement width be provided for the future second left turn lane, but that it be striped out with chevron striping to allow only one southbound left turn lane until full buildout of the hospital site. During this horizon, R1-1 "STOP" signs should be posted on the northbound and southbound approaches.

2040 & 2045 Recommendations

The offsite transportation recommendations identified in the 2040 and 2045 horizons are also consistent with the findings of the master traffic study. All of the improvements identified herein are anticipated to result in the study intersections and surrounding street network operating acceptably in both the 2040 and 2045 horizons. The improvements already being proposed and constructed to serve the entire development area as follows:

- By the 2040 horizon, it was assumed that the Campus Drive & 96th Street (#2) intersection would provide dual northbound left turn lanes 200 feet in length while a third northbound through lane would also be provided. This third northbound through lane would provide the third required receiving lane for the proposed triple northbound left turn lanes at Northwest Parkway just to the southeast.
- The 96th Street/Via Varra & Northwest Parkway (#3) intersection is anticipated to provide triple northbound left turn lanes on Northwest Parkway and triple eastbound left turn lanes on 96th Street based on proposed improvement plans. For purposes of this study, the third northbound left turn lane was assumed to provide 600 feet in length while the third eastbound left turn was assumed to provide 250 feet in length. It should be noted the third eastbound left turn lane will require three receiving lanes on Northwest Parkway to the north of this intersection.
- The Rockcress Parkway/Via Varra & Northwest Parkway (#5) intersection should provide three southbound through lanes by this horizon.

The following identified improvements are recommended in association with development of full buildout of the AdventHealth Louisville hospital and medical campus. These improvements are in addition to improvements already being planned and constructed.

- To meet expected vehicle queues, the inner northbound left turn lane at the Rockcress Parkway/Via Varra & Northwest Parkway (#5) intersection may need to be extended from 250

feet to 375 feet to meet expected vehicle queues. It is believed this northbound left turn lane extension can be accomplished with minor median reconstruction.

- With full buildout of the AdventHealth site, the Rockcress Access (#8) is recommended to be signalized and is expected to meet warrants for signalization. When signalized, the southbound approach exiting the hospital is recommended to be improved to provide dual left turn lanes 200 feet in length, with the westernmost left turn lane also providing through movement, while a separate right turn lane should be provided.

General Recommendations

- Any onsite or offsite improvements should be incorporated into the Civil Drawings and conform to standards of the City of Louisville and the Manual on Uniform Traffic Control Devices (MUTCD) – 11th Edition, 2023.

2.0 INTRODUCTION

Kimley-Horn has prepared this report to document the results of a Traffic Impact Study for AdventHealth Louisville proposed to be located on the northwest corner of the Via Varra and Northwest Parkway intersection in the City of Louisville, Colorado. A vicinity map illustrating the project development location is shown in **Figure 1**. At full buildout, the project is proposed to include a hospital and additional medical office buildings totaling approximately 800,000 square feet. By approximately the 2030 horizon, Phase 1 of the hospital and medical office buildings is expected to be complete. It is understood that Phase 1 will include an approximate 371,600 square-foot hospital (with 153 beds, 30 of which will be shelled for later use) and approximately 62,000 square feet of medical office space. To be conservative, Phase 1 traffic analysis was conducted assuming up to 200 beds would be available in the hospital while up to 80,000 square feet of medical office building uses was also assumed. For purposes of this study, full buildout of this site is expected to be complete by approximately 2040. At full buildout, it is understood the site will provide an approximately 639,600 square-foot hospital with a total of 300 beds while medical office buildings onsite are expected to total approximately 160,000 square feet. A conceptual plan for the site is attached in **Appendix A**. Based on coordination with the City of Louisville staff, the initial 2030 short-term Phase 1 horizon was analyzed, while the 2040 buildout horizon was also analyzed. At the request of City staff, the major intersections in the study area were also analyzed for the twenty-year 2045 long-term traffic conditions.

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In addition, the proposed full movement access on the north side of Rockcress Drive and the proposed three full movement accesses on the east side of Sorrel Avenue were also evaluated. The access along Rockcress Drive is anticipated to be located approximately 775 feet to the west of the Rockcress Drive/Via Varra & Northwest Parkway (#5) intersection, measured center to center; a future south leg at this location is also proposed when development to the south of Rockcress Drive occurs. The two northernmost accesses on Sorrel Avenue are anticipated to align with two future accesses on the west side of Sorrel Avenue, creating two four-leg intersections. The third and southernmost access is expected to operate as a 'T'-intersection.

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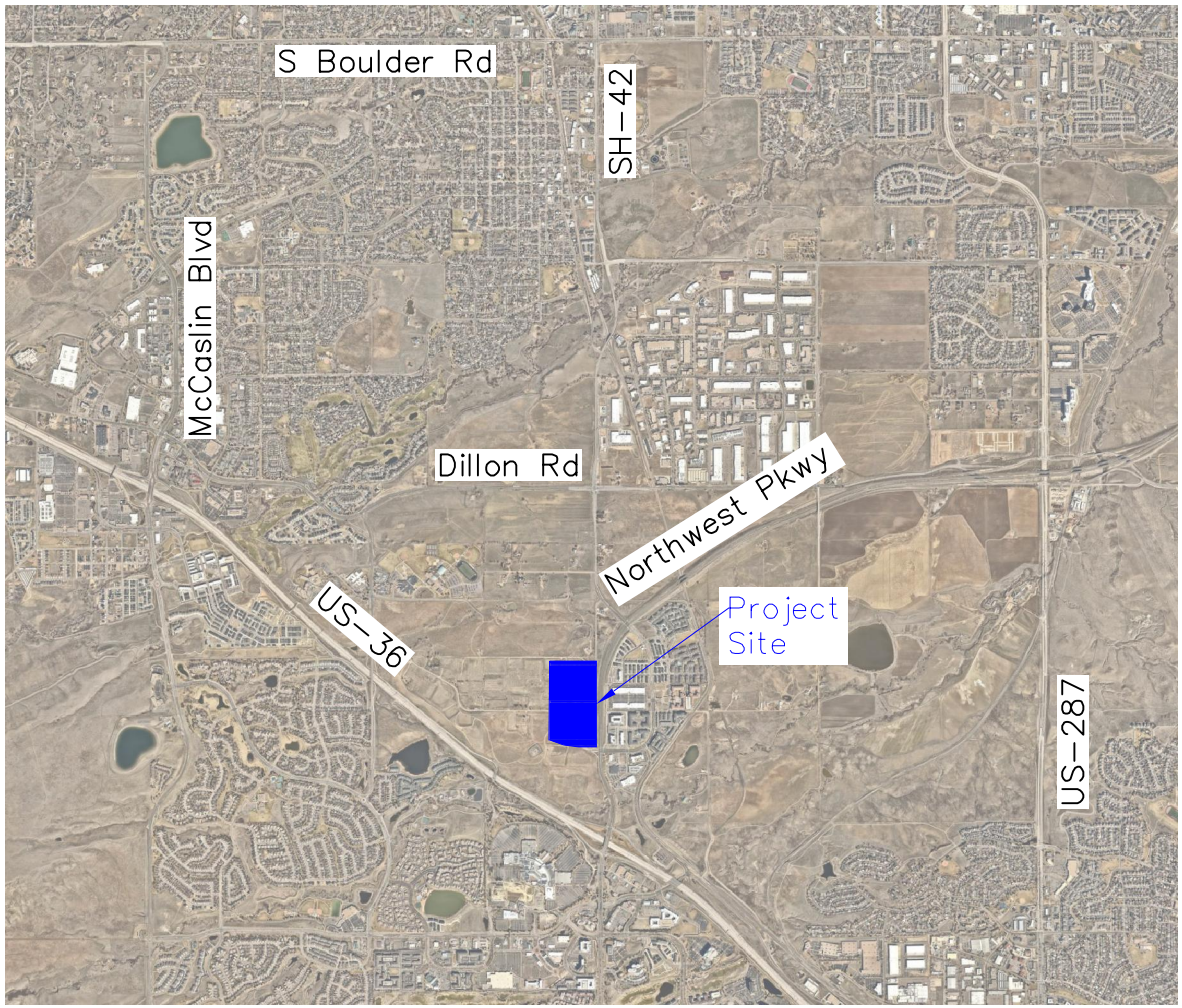


FIGURE 1
AdventHealth Louisville
Louisville, Colorado
Vicinity Map

3.1 Existing Study Area

The existing site is comprised of vacant land. The site is part of a larger future development known as Redtail Ridge, which is expected to include several other uses, including industrial/manufacturing, general office space, research/development buildings, and some local retail uses as well. The North Metro Fire Rescue Station 67 is located just to the north of the project site. The broader vicinity is generally comprised of additional vacant land, with Monarch High School to the northwest, and some additional retail/residential uses to the east and south of the site.

3.2 Existing and Proposed Roadway Network

Northwest Parkway is a divided highway that extends in the north/south direction adjacent to the study area and provides two continuous through lanes in each direction with acceleration and deceleration lanes provided at the intersections with 96th Street/Via Varra to the north and Via Varra to the south. The posted speed limit in this area is 45 miles per hour.

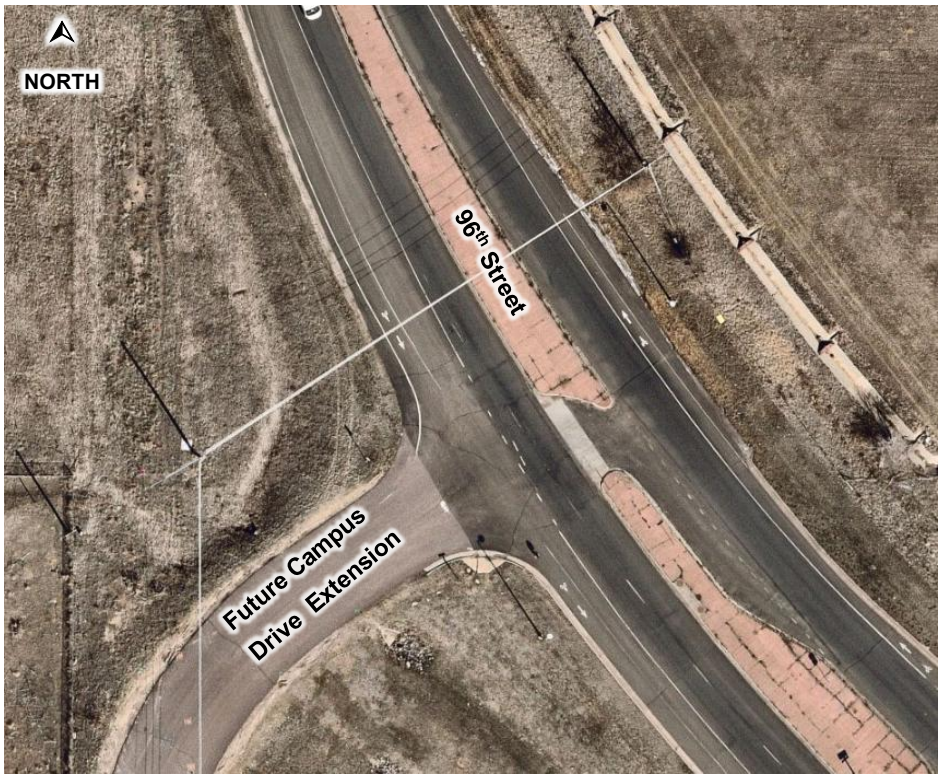
96th Street generally exists in the north/south direction, but it connects to Northwest Parkway with vehicles traveling eastbound/westbound. Two through lanes are provided in each direction nearest to the study area, which soon reduces to one through lane in each direction further to the north. The posted speed limit is 40 miles per hour within the study area. Via Varra loops from the intersection of Northwest Parkway and 96th Street/Via Varra and again connects to Northwest Parkway approximately 0.60 miles further to the south. Two through lanes are provided in each direction and the posted speed limit is 35 miles per hour.

Sorrel Avenue is proposed to be a north/south roadway with one through lane in each direction, approximately 1,150 feet to the west of Northwest Parkway. Rockcress Drive is proposed to be the west leg of the Northwest Parkway & south Via Varra (#5) intersection. Two through lanes in each direction along Rockcress Drive are anticipated to be provided between Sorrel Avenue and Northwest Parkway, and one through lane in each direction to the west of Sorrel Avenue.

Campus Drive is proposed to exist along the northern side of the project, traveling in the east/west direction. It is anticipated that two through lanes will exist to the east of Sorrel Avenue within the

study area, while just to the west of Sorrel Avenue one lane in each direction will be provided. A roundabout is proposed to be constructed at the future intersections of Campus Drive & Sorrel Avenue (#1) as well as at Rockcress Drive & Sorrel Avenue (#4). Based on current project understanding, the initial phases of other Redtail Ridge development will be constructed prior to Phase 1 of AdventHealth Louisville development. As such, for purposes of this study it is assumed that Campus Drive, Rockcress Drive, and Sorrel Avenue will be constructed prior to the 2030 short-term horizon.

The existing 'T'-intersection just to the north of the North Metro Fire Rescue Station 67 is a ¾-movement intersection. This location is proposed to become the connection point for the Campus Drive extension, which is anticipated to be completed prior to Phase 1 of AdventHealth development. When this extension is complete, it is understood this 'T'-intersection will become a full movement signalized intersection. The existing northbound 96th Street approach provides a left turn lane and one through lane while the southbound 96th Street approach provides a shared through/right turn lane. The existing minor street approach is restricted to right-out only movements. An aerial photo of the existing intersection configuration is provided below.



Future Campus Drive & 96th Street (#1)

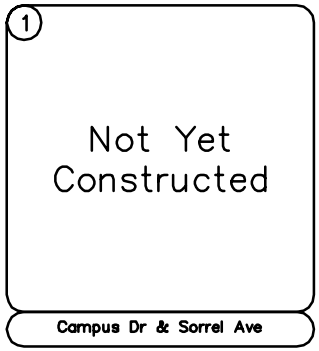
The existing signalized intersection of 96th Street/Via Varra & Northwest Parkway (#2) operates with protected-only left turn phasing on all four approaches to the intersection. Each of the four approaches provide dual left turn lanes, two through lanes, and a right turn lane, with the right turning movements operating with free turning movement in channelized right turn lanes. For purposes of this study, Northwest Parkway was identified to be the northbound/southbound approach to the intersection while 96th Street is the eastbound approach and Via Varra is the westbound approach. An aerial photo of the existing intersection configuration is provided below.

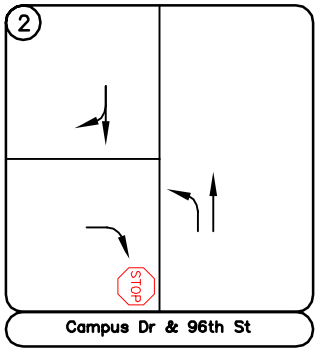
96th Street/Via Varra & Northwest Parkway (#2)

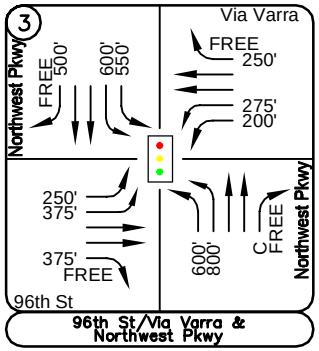
The Via Varra & Northwest Parkway (#5) intersection is signalized and operates with protected-only left turn phasing on all four approaches to the intersection. The northbound and southbound approaches to the intersection provide dual left turn lanes, two through lanes, and a right turn lane. The southbound right turning movement is channelized and operates with yield control. The eastbound approach operates with dual left turn lanes, one through lane, and a channelized right turn lane—that opens from the eastbound through lane just prior to the intersection—operates with free movement. The westbound approach provides dual left turn lanes, one through lane, and a shared through/right turn lane. An aerial photo of the existing intersection configuration is below.

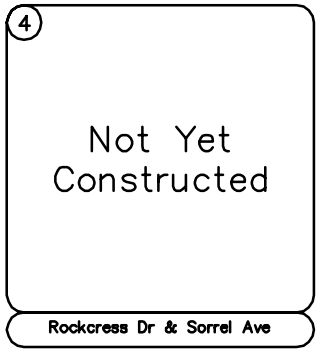
Via Varra & Northwest Parkway (#3)

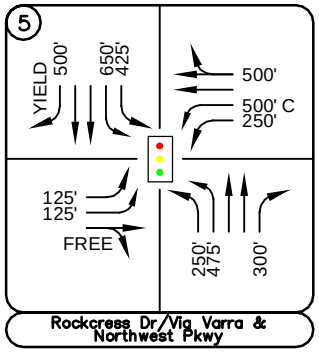
The intersection lane configuration and control for the existing study area intersections are shown in **Figure 2**.

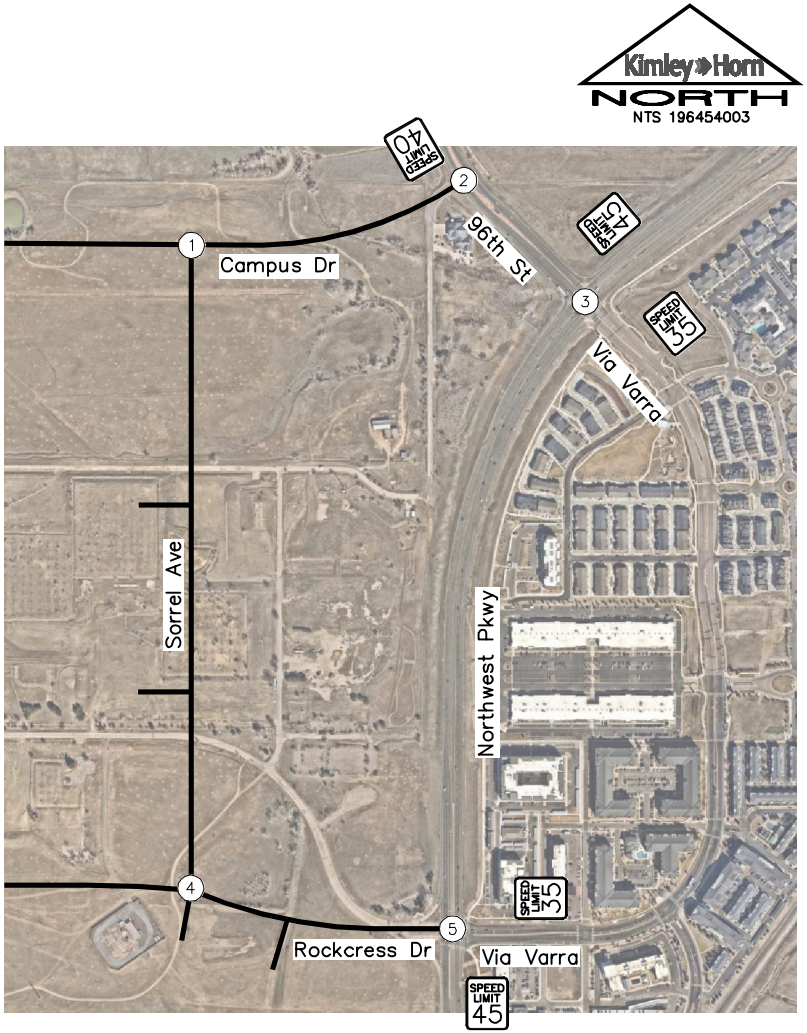












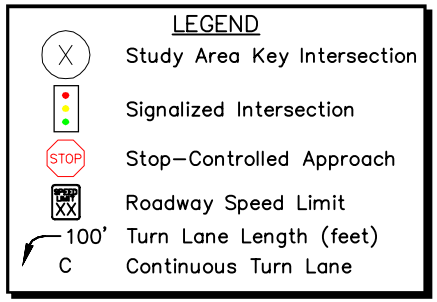


FIGURE 2
AdventHealth Louisville
Louisville, Colorado
Existing Geometry and Control

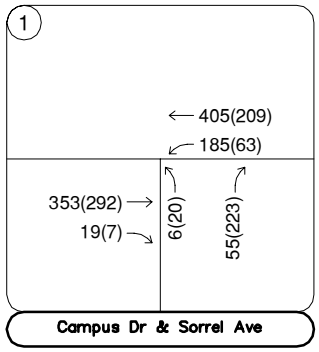
Kimley»Horn

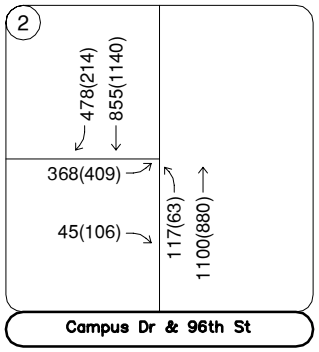
3.3 Future Traffic Volumes and Unspecified Development Traffic Growth

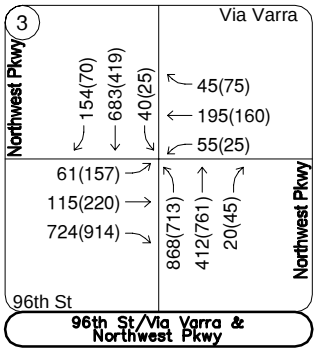
Future projected traffic volumes used in this study were based on the Redtail Ridge Traffic and Mobility Study completed by Fox Tuttle Transportation Group in July 2024. The Redtail Ridge study serves as a master study that analyzed full buildout of the entire Redtail Ridge development area, which includes additional development nearby the hospital, such as additional office uses, industrial/manufacturing buildings, research/development buildings, and some general retail uses. The master study included the entire AdventHealth parcel, which also assumed a hospital land use with adjoining medical office buildings; the hospital was assumed to house 160 beds while the medical office buildings were assumed to comprise approximately 150,000 square feet.

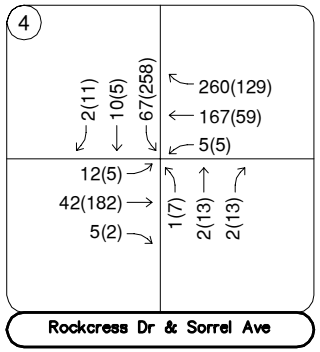
The Redtail Ridge master traffic study analyzed a 2025 short-term buildout year for some developments, with additional land uses constructed by a 2030 mid-year horizon—including full buildout of the hospital and medical office buildings—and a 2040 full buildout horizon. The 2030 and 2040 total traffic volumes from the Redtail Ridge study were used as a basis to generate traffic volumes in this study. However, because the currently proposed land use on the AdventHealth parcel is anticipated to generate more traffic than the originally studied intensities, this AdventHealth traffic study removed the traffic originally projected to be generated by this site to generate 2030 and 2040 background traffic volumes to represent the expected traffic volumes in the area if the hospital/medical office building construction did not occur. Applicable documents from the Fox Tuttle study are included in **Appendix B**.

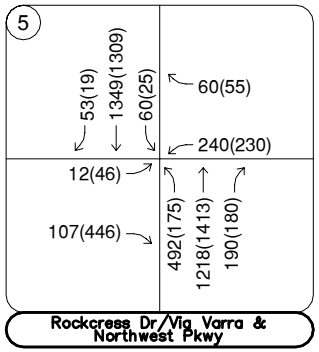
Based on communication with City staff, a twenty-year 2045 long-term horizon was also analyzed for the major external intersections, including Campus Drive & 96th Street (#1), 96th Street/Via Varra & Northwest Parkway (#2), and Rockcress Drive/Via Varra & Northwest Parkway (#3). To develop traffic projections for these intersections, the 2040 existing traffic volumes were grown by an annual growth rate of 0.50 percent per year to account for any additional future development traffic in the area. Of note, traffic volumes entering/exiting the east Via Varra legs of the Northwest Parkway intersections (#2 and #3) were not grown further, as this area is expected to be fully built out by the 2040 horizon. The calculated background traffic volumes for 2030, 2040, and 2045 are shown in **Figure 3**, **Figure 4,** and **Figure 5**, respectively.

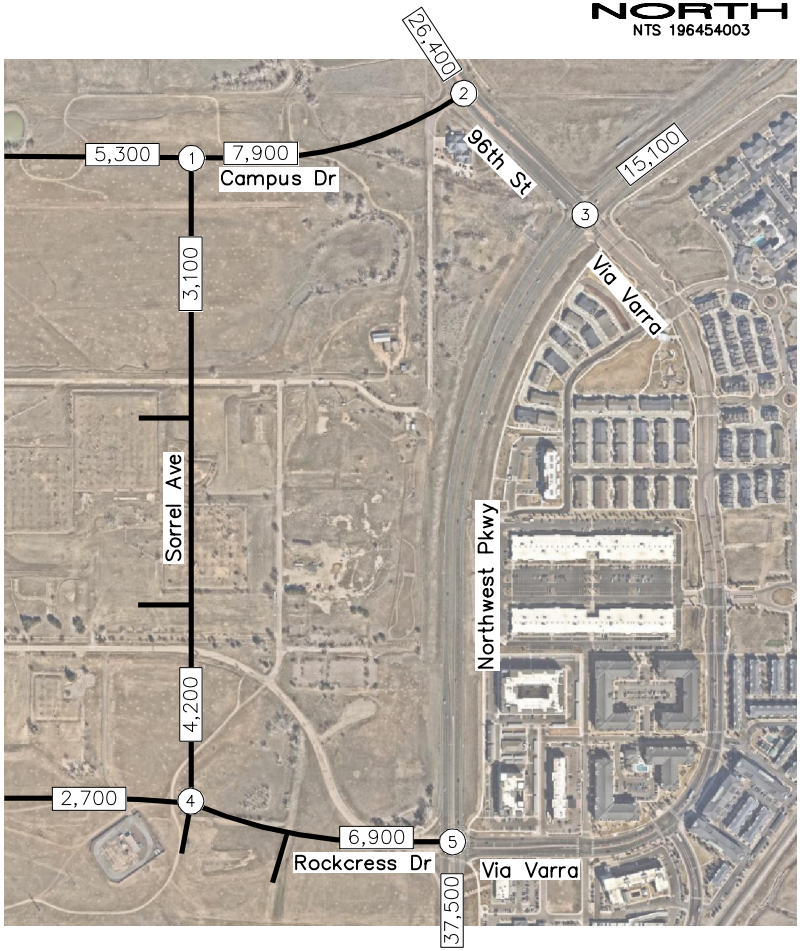












Kimley»Horn NORTH
NTS 196454003

LEGEND

(X)	Study Area Key Intersection
XXX(XXX)	Weekday AM(PM) Peak Hour Traffic Volumes
XX,X00	Estimated Daily Traffic Volume

FIGURE 3
AdventHealth Louisville
Louisville, Colorado
2030 Background Traffic Volumes

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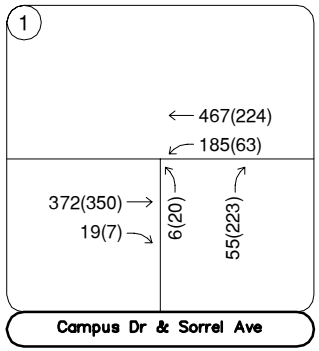
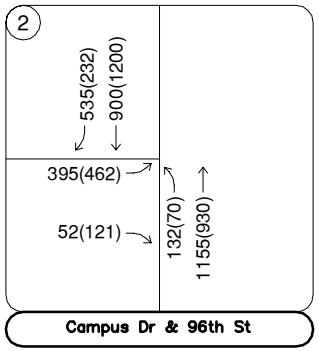
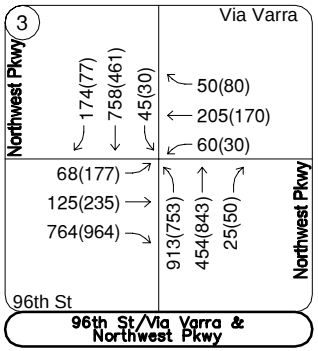
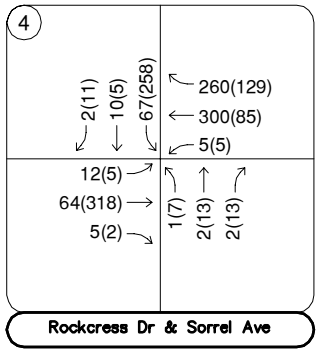
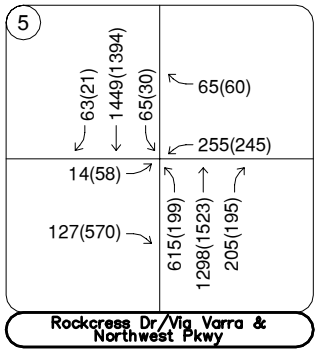
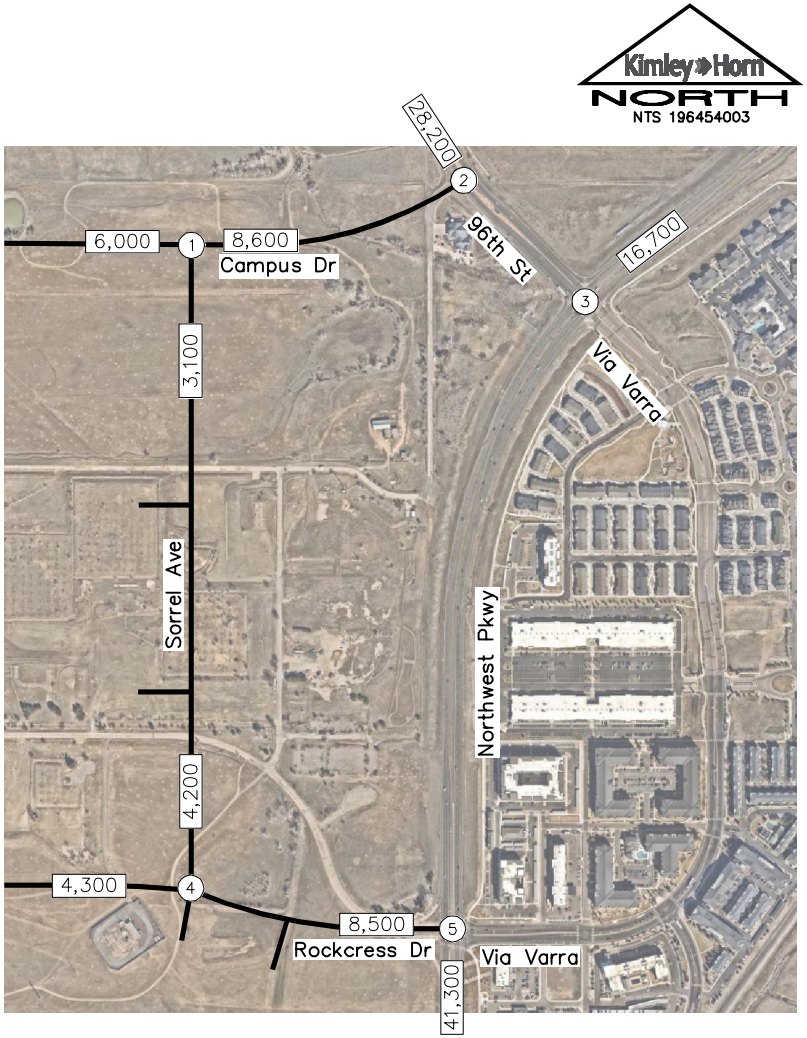










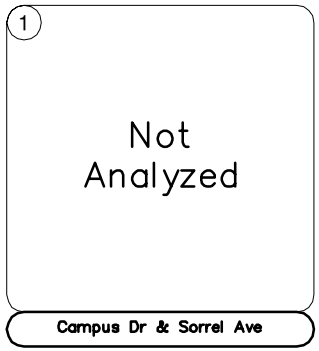


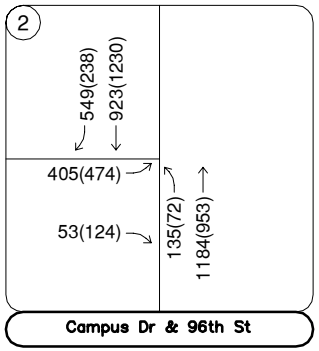
LEGEND

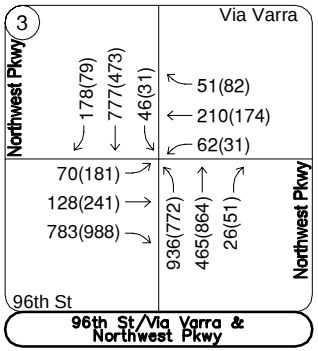
(X)	Study Area Key Intersection
XXX(XXX)	Weekday AM(PM) Peak Hour Traffic Volumes
XX,X00	Estimated Daily Traffic Volume

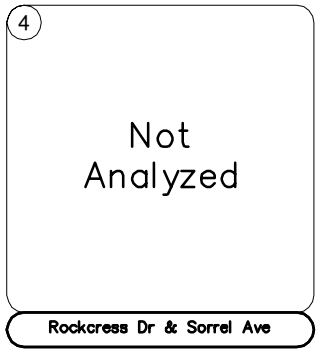
FIGURE 4
AdventHealth Louisville
Louisville, Colorado
2040 Background Traffic Volumes

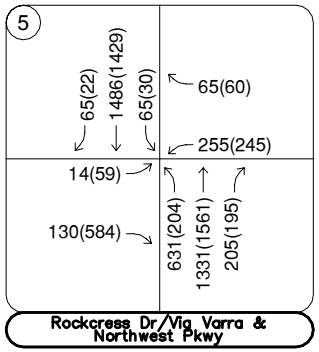
Kimley»Horn

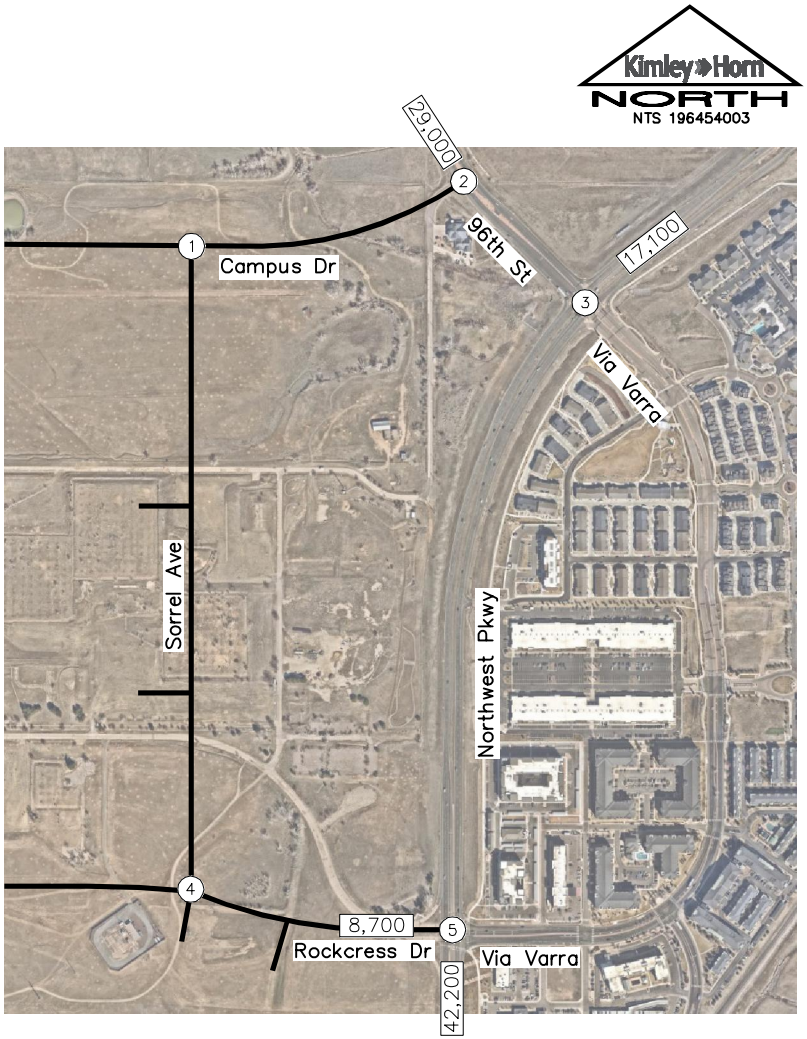












LEGEND

(X) Study Area Key Intersection

XXX(XXX) Weekday AM(PM) Peak Hour Traffic Volumes

XX,X00 Estimated Daily Traffic Volume

FIGURE 5
AdventHealth Louisville
Louisville, Colorado
2045 Background Traffic Volumes

Kimley»Horn

4.0 PROJECT TRAFFIC CHARACTERISTICS

4.1 Trip Generation

Site-generated traffic estimates are determined through a process known as trip generation. Rates and equations are applied to the proposed land use to estimate traffic generated by the development during a specific time interval. The acknowledged source for trip generation rates is the *Trip Generation Manual*[1] published by the Institute of Transportation Engineers (ITE). ITE has established trip rates in nationwide studies of similar land uses. For this study, Kimley-Horn chose to use the ITE Trip Generation Manual average rates and fitted curve equations that apply to Hospital (ITE Land Use Code 610) and Medical-Dental Office Building (ITE Land Use Code 720) and that match what was previously used in the Fox Tuttle study as best as possible for traffic associated with this development.

In the 2030 Phase 1 buildout assuming 200 hospital beds and 80,000 square feet of medical office building uses, AdventHealth Louisville is expected to generate approximately 6,268 weekday daily trips, with 474 of these trips occurring during the morning peak hour and 557 of these trips occurring during the afternoon peak hour. With full buildout of the site by 2040, the project is anticipated to generate 10,632 weekday daily trips, with 772 of these trips occurring during the morning peak hour and 970 of these trips occurring during the afternoon peak hour.

There is an existing AdventHealth hospital in Louisville at the Campus Drive and 88th Street intersection approximately 1.25 miles to the west of the proposed site. This existing site includes approximately 400,000 square feet of hospital/medical office building uses and is approved with an expansion of an additional 350,000 square feet to include up to 750,000 total square feet at full buildout. Thus, a traffic generation comparison is provided to assess the net difference in trips between the proposed site with approximately 799,600 total square feet at full buildout within the Redtail Ridge development area versus the 750,000 total square feet that could be constructed at the existing hospital site. To provide a uniform comparison between these two sites, the traffic generation of the proposed site with the 799,600 square feet of hospital/medical office building uses was prorated to the up to 750,000 total square feet of the existing site, assuming that approximately 93.8 percent (750,000 / 799,600 square feet = 93.8 percent) of the traffic

[1] Institute of Transportation Engineers, *Trip Generation Manual*, Eleventh Edition, Washington DC, 2021.

generation of the proposed site within Redtail Ridge would have been generated if the existing hospital site were to be developed to the full 750,000 square feet that is already approved to be constructed there. As such, the currently proposed hospital site located within the Redtail Ridge development area could generate approximately 658 additional weekday daily trips, with 47 additional trips during the morning peak hour and 61 additional trips during afternoon peak hour. This results in approximately one additional vehicle every 75 seconds during the morning peak hour and one additional vehicle every minute (60 seconds) during the afternoon peak hour on the surrounding street network compared to the existing project site.

Calculations were based on the procedure and information provided in the ITE *Trip Generation Manual, 11th Edition – Volume 1: User's Guide and Handbook*, 2021. **Table 1** summarizes the estimated trip generation and traffic comparison for the site. The trip generation worksheets are included in **Appendix D**.

Table 1 – AdventHealth Louisville Traffic Generation

Land Use and Size	Weekday Vehicle Trips						
	Daily	AM Peak Hour			PM Peak Hour		
		In	Out	Total	In	Out	Total
2030 – Phase 1 Development							
Hospital (ITE 610) – 200 Beds	3,810	220	86	306	95	193	289
Medical/Dental Office Building (ITE 720) – 80,000 Square Feet	2,458	133	35	168	81	188	268
Total Phase 1 Trips	**6,268**	**353**	**121**	**474**	**176**	**381**	**557**
2040 – Full Buildout Development							
Hospital (ITE 610) – 300 Beds	5,716	330	128	458	143	290	433
Medical/Dental Office Building (ITE 720) – 160,000 Square Feet	4,916	248	66	314	161	376	537
Full Buildout Total Project Trips	**10,632**	**578**	**194**	**772**	**304**	**666**	**970**
Existing AdventHealth Hospital Site – Estimated Traffic Generation at 750,000 SF Buildout							
Hospital (ITE 610) – 281 Beds	5,362	310	120	430	134	272	406
Medical/Dental Office Building (ITE 720) – 150,100 Square Feet	4,612	233	62	295	151	352	503
Total Trips	**9,974**	**543**	**182**	**725**	**285**	**624**	**909**
Net Difference in Trips	***+658***	***+35***	***+12***	***+47***	***+19***	***+42***	***+61***

4.2 Trip Distribution

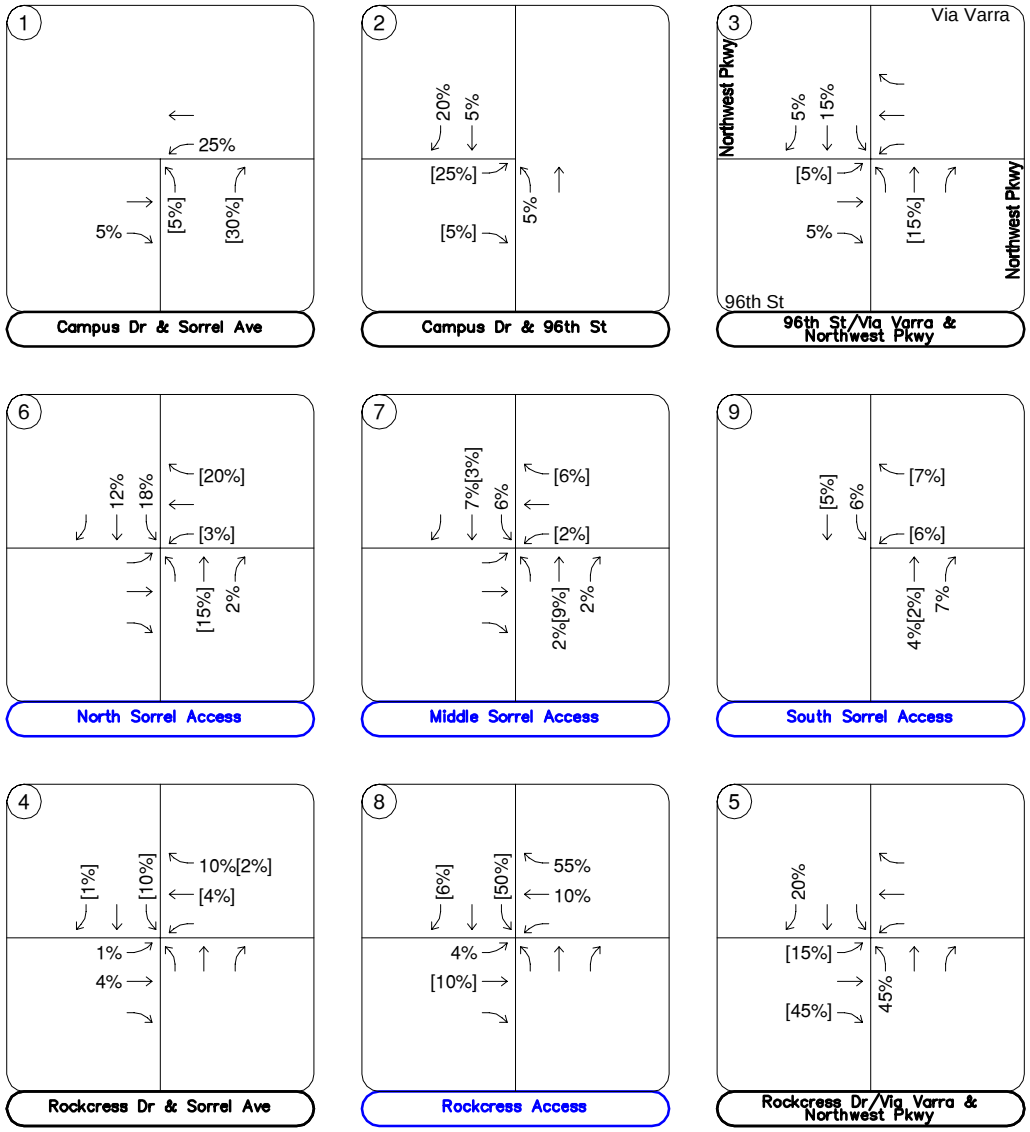
Distribution of site traffic on the street system was based on the area street system characteristics, existing traffic patterns, existing and anticipated surrounding demographic information, and the proposed access system for the project. The directional distribution of traffic is a means to quantify the percentage of site-generated traffic that approaches the site from a given direction and departs the site back to the original source. The project trip distribution for the proposed development is illustrated in **Figure 6**.

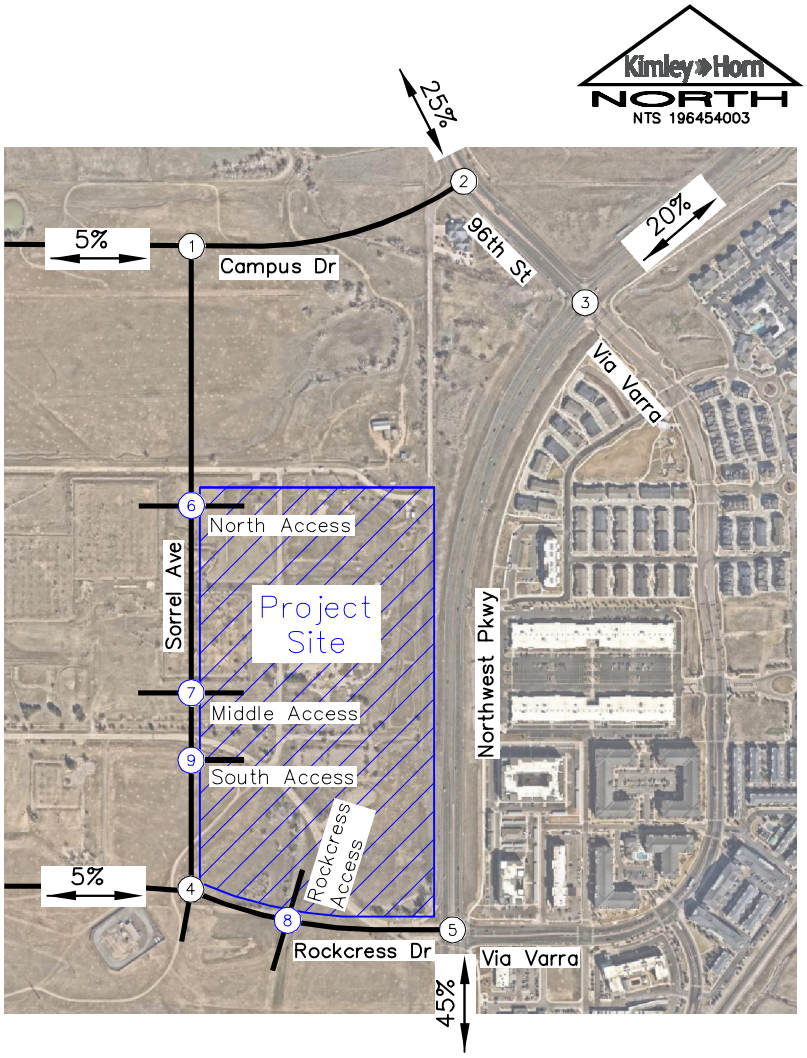
4.3 Traffic Assignment

The project's traffic assignment was obtained by applying the project trip distribution to the estimated traffic generation of the development shown in **Table 1**. Traffic assignment for the 2030 short-term Phase 1 horizon is shown in **Figure 7**, while 2040 full buildout traffic assignment is provided in **Figure 8**.

4.4 Total (Background Plus Project) Traffic

Site traffic volumes were added to the background volumes to represent estimated traffic conditions for the short-term 2030 Phase 1, 2040 buildout, and long-term 2045 twenty-year planning horizon. These total traffic volumes for the study area are illustrated for the 2030, 2040, and 2045 horizon years in **Figure 9**, **Figure 10**, and **Figure 11** respectively.



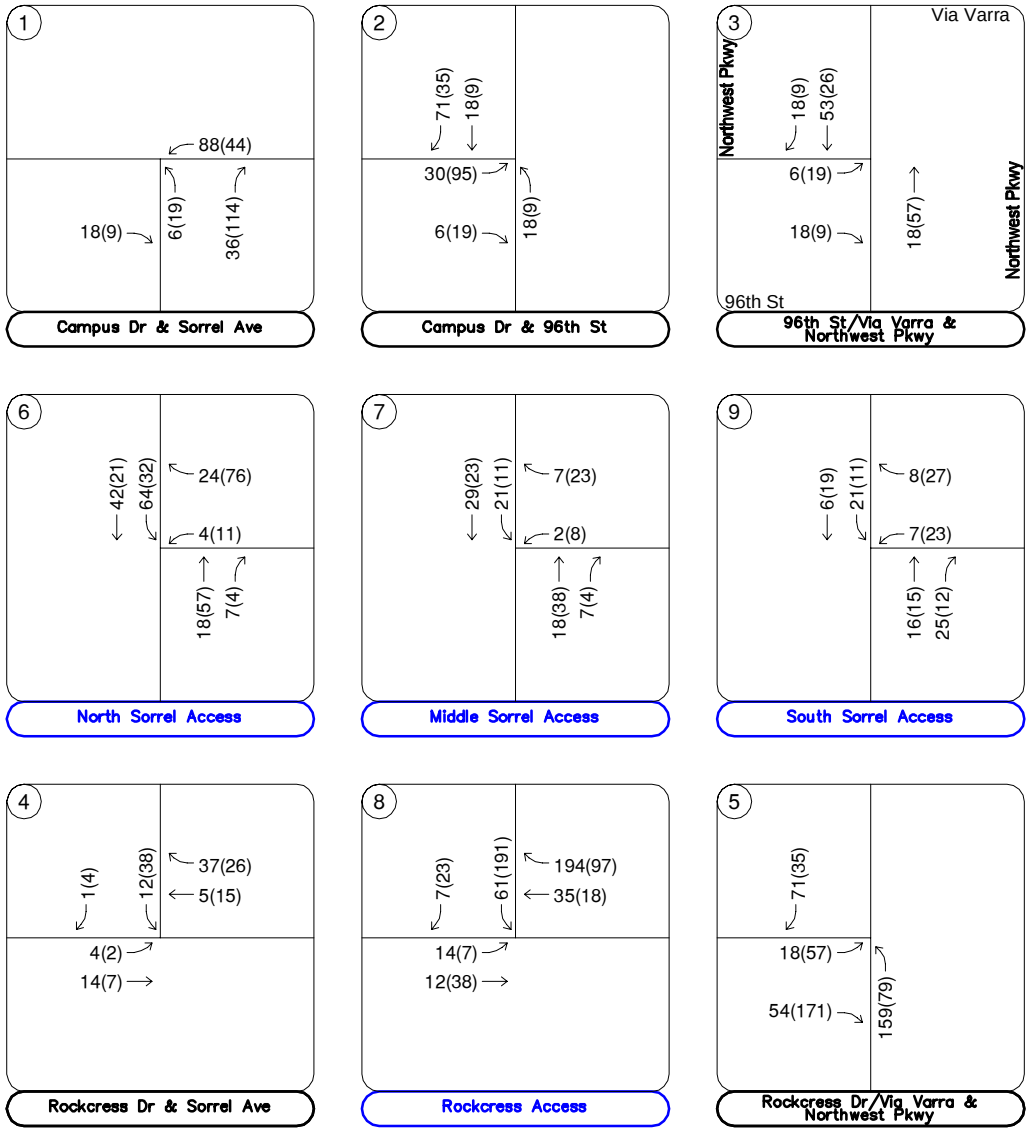


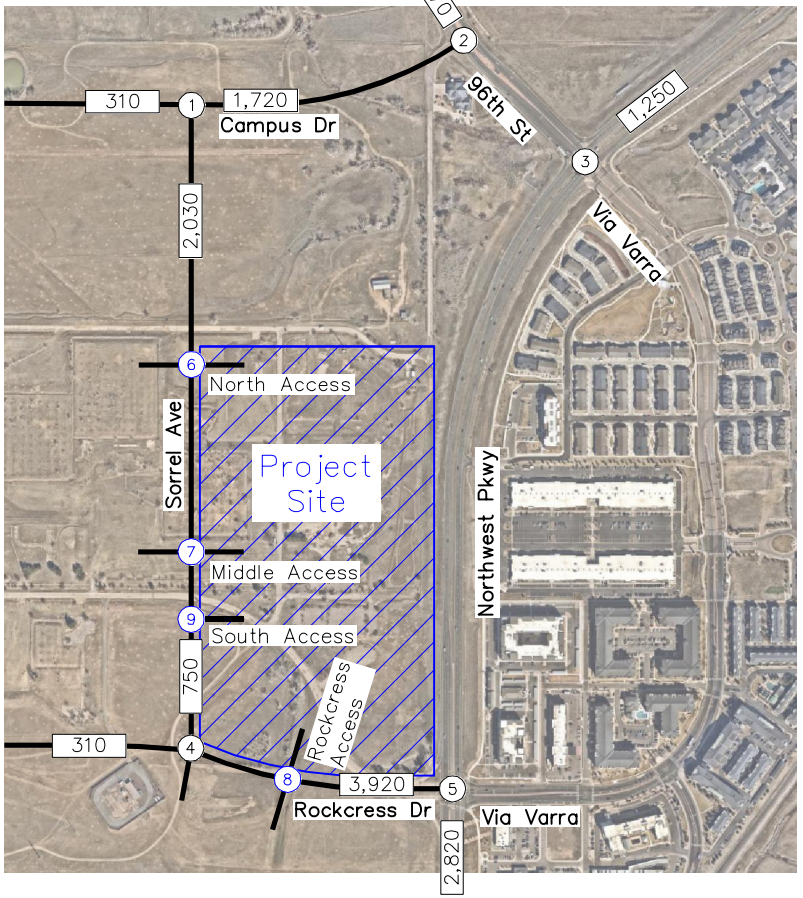
LEGEND

X	Study Area Key Intersection
X	Project Access Intersection
XX%	External Trip Distribution Percentage
XX%[XX%]	Entering[Exiting] Trip Distribution Percentage

FIGURE 6
AdventHealth Louisville
Louisville, Colorado
Project Trip Distribution

Kimley»Horn





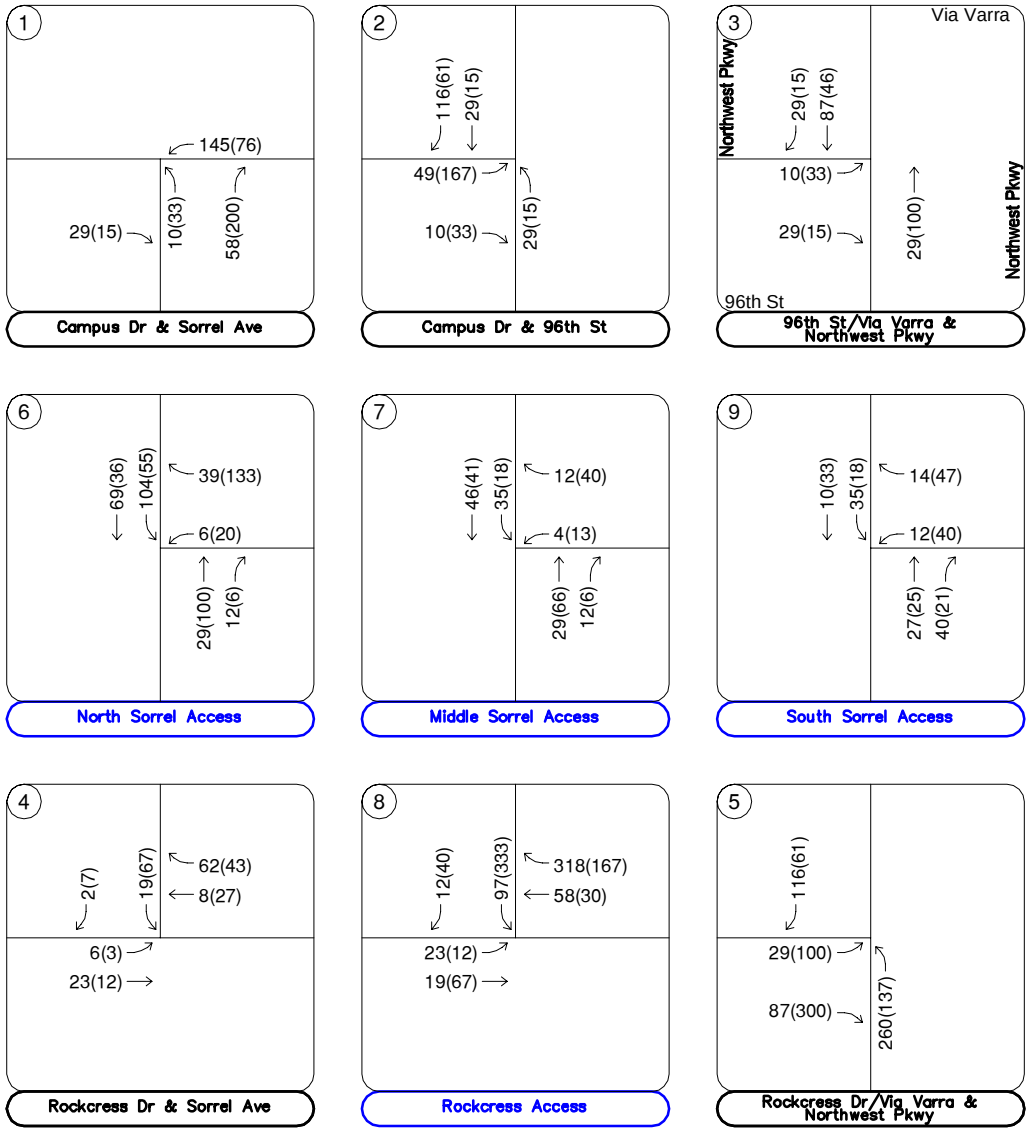
Kimley»Horn NORTH
NTS 196454003

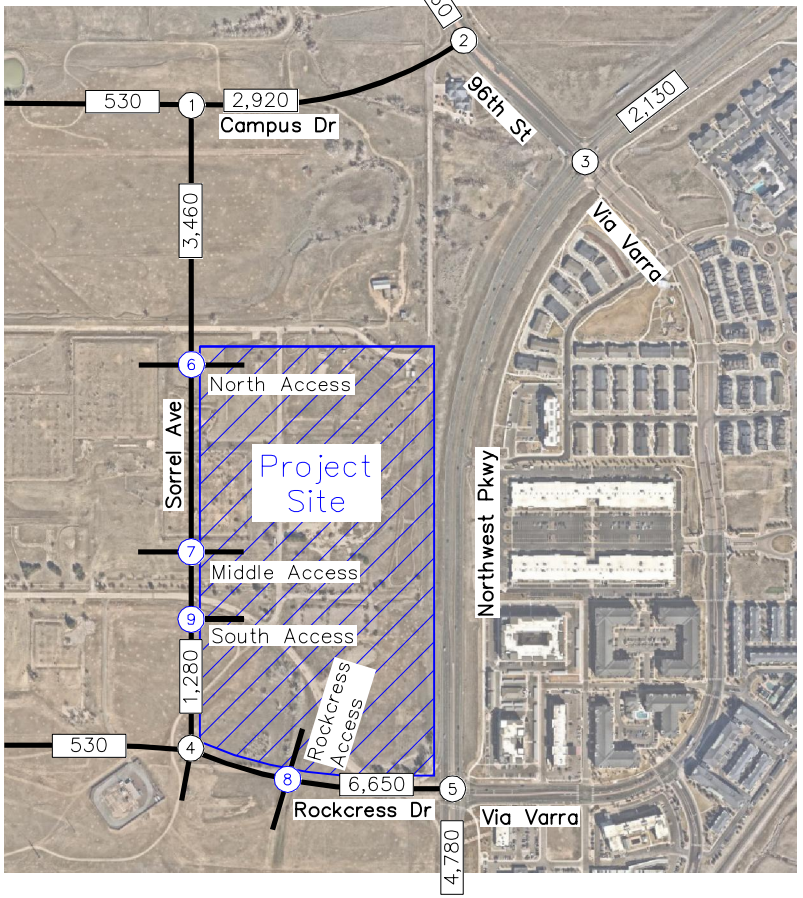
LEGEND

X	Study Area Key Intersection
X	Project Access Intersection
XXX(XXX)	Weekday AM(PM) Peak Hour Traffic Volumes
XX,X00	Estimated Daily Traffic Volume

FIGURE 7
AdventHealth Louisville
Louisville, Colorado
2030 Project Traffic Assignment

Kimley»Horn

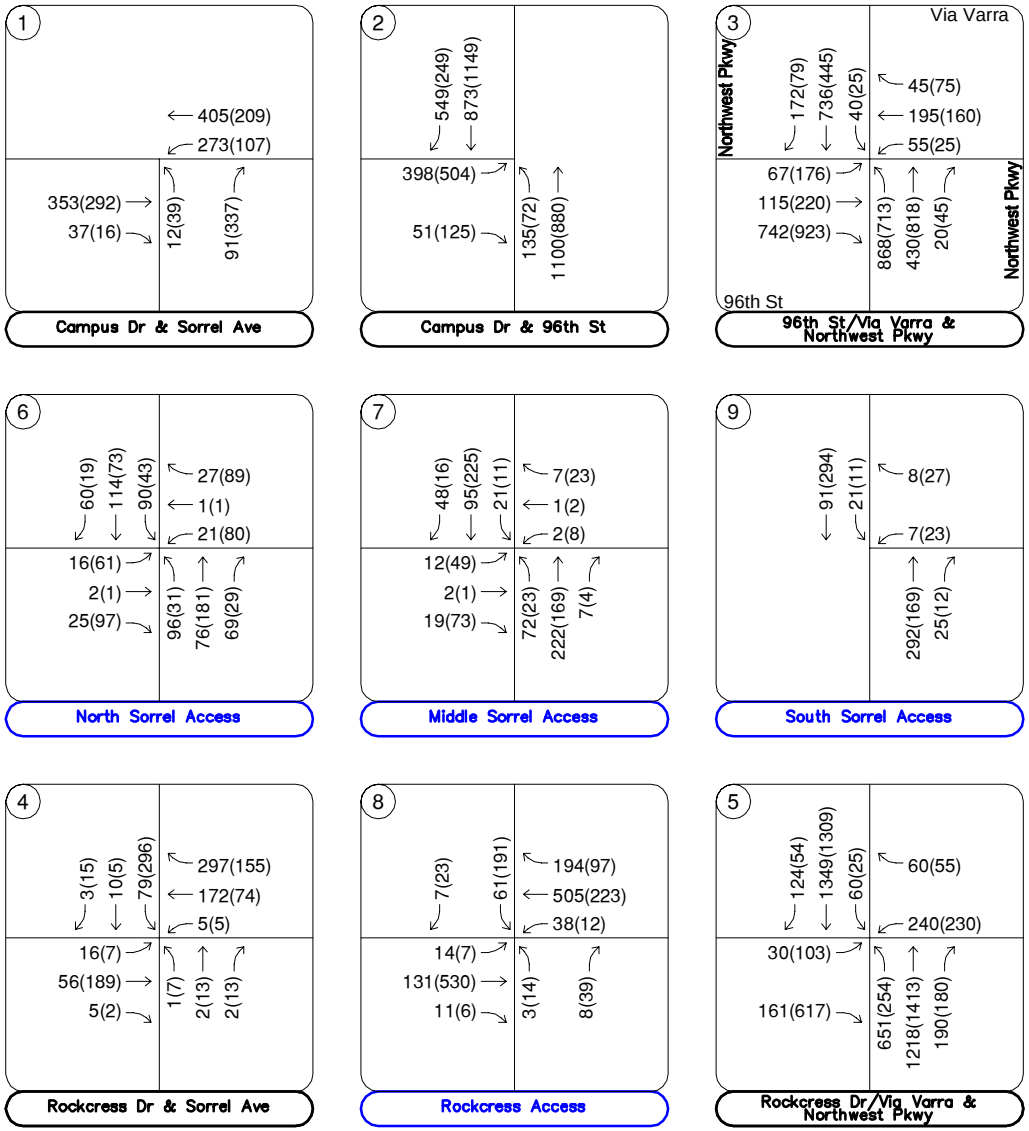


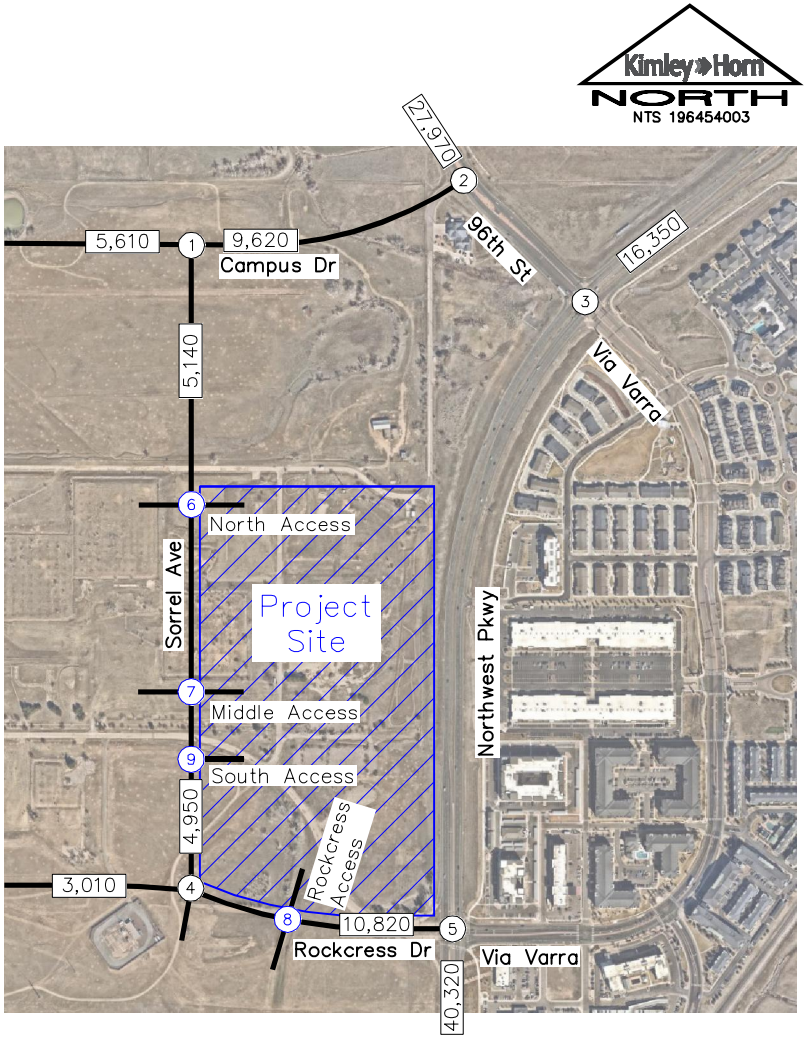


LEGEND

X	Study Area Key Intersection
X	Project Access Intersection
XXX(XXX)	Weekday AM(PM) Peak Hour Traffic Volumes
XX,X00	Estimated Daily Traffic Volume

FIGURE 8
AdventHealth Louisville
Louisville, Colorado
2040 Project Traffic Assignment



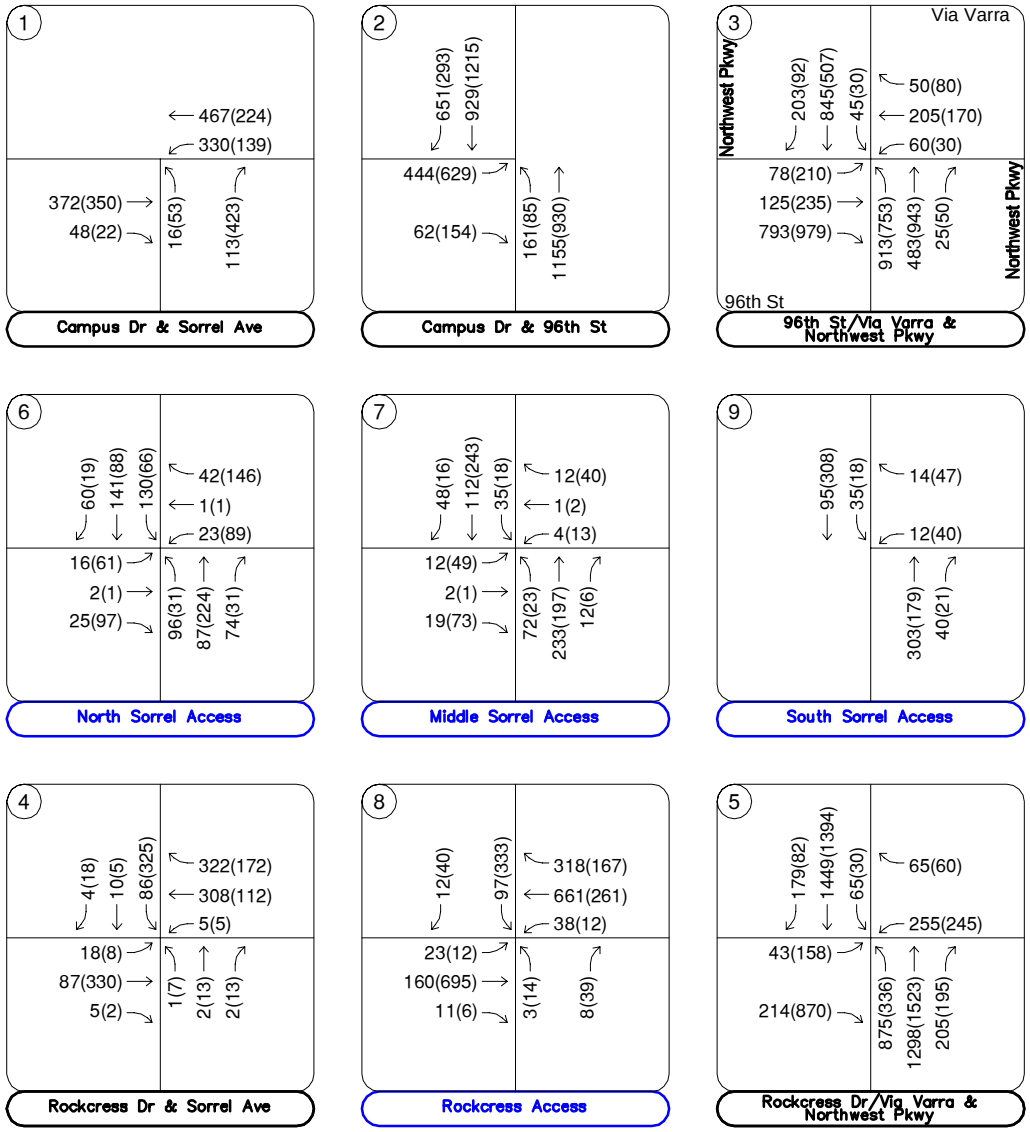


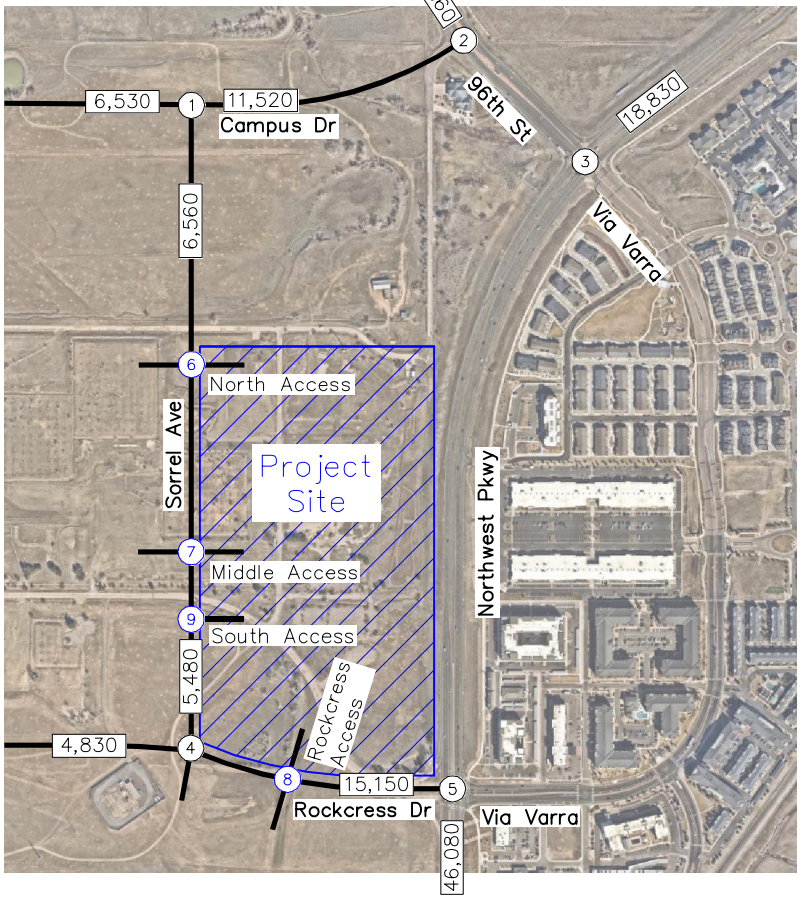
LEGEND

X	Study Area Key Intersection
X	Project Access Intersection
XXX(XXX)	Weekday AM(PM) Peak Hour Traffic Volumes
XX,X00	Estimated Daily Traffic Volume

FIGURE 9
AdventHealth Louisville
Louisville, Colorado
2030 Total Traffic Volumes

Kimley»Horn





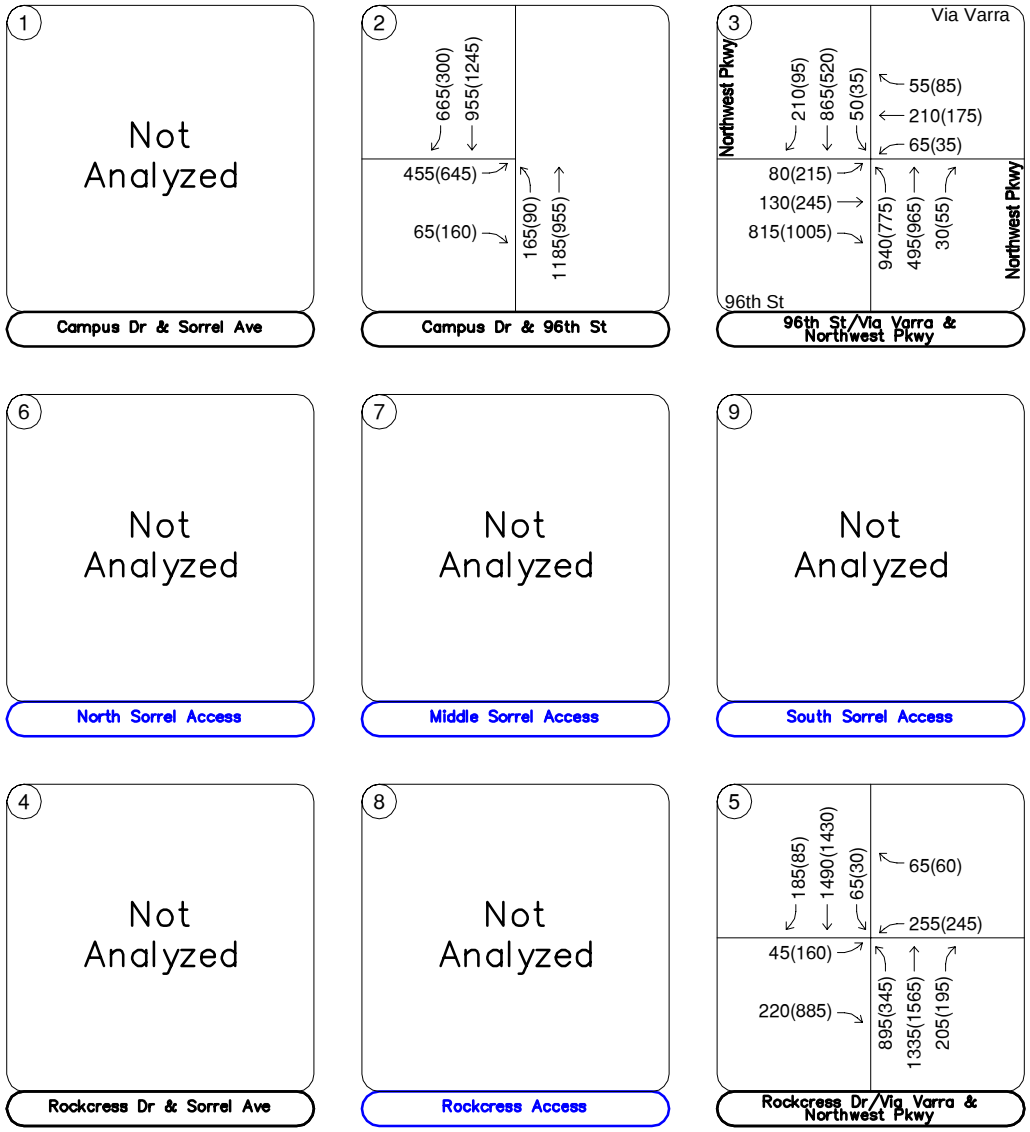
Kimley»Horn NORTH
NTS 196454003

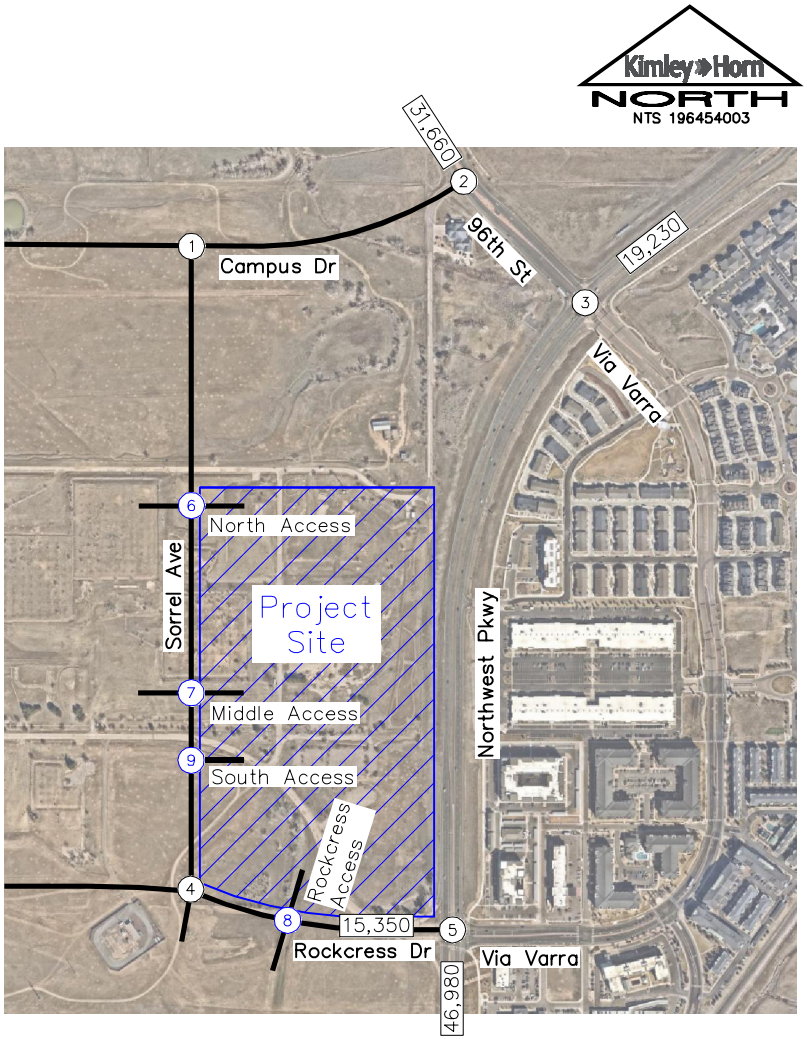
LEGEND

X	Study Area Key Intersection
X	Project Access Intersection
XXX(XXX)	Weekday AM(PM) Peak Hour Traffic Volumes
XX,X00	Estimated Daily Traffic Volume

FIGURE 10
AdventHealth Louisville
Louisville, Colorado
2040 Total Traffic Volumes

Kimley»Horn





LEGEND

X	Study Area Key Intersection
X	Project Access Intersection
XXX(XXX)	Weekday AM(PM) Peak Hour Traffic Volumes
XX,X00	Estimated Daily Traffic Volume

FIGURE 11
AdventHealth Louisville
Louisville, Colorado
2045 Total Traffic Volumes

Kimley»Horn

5.0 TRAFFIC OPERATIONS ANALYSIS

Kimley-Horn's analysis of traffic operations in the site vicinity was conducted to determine potential capacity deficiencies in the 2030, 2040, and 2045 development horizons at the identified key intersections. The acknowledged source for determining overall capacity is the *Highway Capacity Manual (HCM)*[2].

5.1 Analysis Methodology

Capacity analysis results are listed in terms of Level of Service (LOS). LOS is a qualitative term describing operating conditions a driver will experience while traveling on a particular street or highway during a specific time interval. It ranges from A (very little delay) to F (long delays and congestion). For intersections and roadways in this study area, standard traffic engineering practice recommends overall intersection LOS D and movement/approach LOS E as the minimum desirable thresholds for acceptable operations. **Table 2** shows the definition of level of service for signalized and unsignalized intersections.

Table 2 – Level of Service Definitions

Level of Service	Signalized Intersection Average Total Delay (sec/veh)	Unsignalized Intersection Average Total Delay (sec/veh)
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

Definitions provided from the Highway Capacity Manual, Seventh Edition, Transportation Research Board, 2022.

Study area intersections were analyzed based on average total delay analysis for signalized and unsignalized intersections. Under the unsignalized analysis, the LOS for a two-way stop-controlled intersection is determined by the computed or measured control delay and is defined for each minor movement. LOS for a two-way stop-controlled intersection is not defined for the whole intersection. LOS for signalized, roundabout, and all-way stop controlled intersections are defined for each approach and for the overall intersection.

[2] Transportation Research Board, *Highway Capacity Manual*, Seventh Edition, Washington DC, 2022.

5.2 Key Intersection Operational Analysis

Calculations for the operational level of service at the key intersections for the study area are provided in **Appendix E**. The existing year analysis is based on the lane geometry and intersection control shown in **Figure 2**. Synchro traffic analysis software was used to analyze the signalized and unsignalized key intersections for HCM level of service.

Campus Drive & Sorrel Avenue (#1)

The Campus Drive & Sorrel Avenue (#1) intersection is proposed to be a 'T'-intersection operating with roundabout control. Based on current improvement plans, it is understood that eastbound Campus Drive will provide one shared through/right turn lane, northbound Sorrel Avenue will provide a shared left/right turn lane, while westbound Sorrel Avenue will provide one left turn lane and a separate through lane. The intersection is anticipated to operate acceptably at LOS A in this configuration through the 2040 horizon with the addition of project traffic. **Table 3** provides the results of the LOS analysis conducted at this intersection.

Table 3 – Campus Drive & Sorrel Avenue (#1) LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2030 Background – Overall	5.7	A	5.1	A
Eastbound Approach	7.0	A	5.1	A
Westbound Approach	4.9	A	3.8	A
Northbound Approach	4.6	A	6.4	A
2030 Total – Overall	6.2	A	6.1	A
Eastbound Approach	8.4	A	5.5	A
Westbound Approach	5.0	A	3.8	A
Northbound Approach	5.1	A	8.4	A
2040 Background – Overall	6.0	A	5.4	A
Eastbound Approach	7.3	A	5.7	A
Westbound Approach	5.3	A	3.9	A
Northbound Approach	4.7	A	7.0	A
2040 Total – Overall	6.9	A	7.9	A
Eastbound Approach	10.0	A	6.5	A
Westbound Approach	5.5	A	4.0	A
Northbound Approach	5.6	A	11.9	B

Campus Drive & 96th Street (#2)

The future Campus Drive & 96th Street 'T'-intersection is understood to be signalized by the 2030 horizon with development of other land uses in the overall Redtail Ridge area. Based on proposed construction from the improvement plans, it is understood that dual northbound left turn lanes and three through lanes will be provided at full buildout along 96th Street. However, to be conservative in this study, it was assumed that by 2030, the northbound approach would provide one left turn lane and two through lanes. The eastbound Campus Drive approach is proposed to provide dual left turn lanes and a right turn lane, while southbound 96th Street is proposed to provide two through lanes and a right turn lane. As requested by the City of Louisville, a signal warrant analysis was performed and is expected to be warranted in the 2030 horizon with or without the addition of project traffic. The warrant analysis has been provided for this intersection and is included in **Appendix E**. By the 2040 horizon, it was assumed that the improvement plans for dual northbound left turn lanes and three northbound through lanes would be provided.

Table 4 provides the results of the LOS analysis conducted at this intersection with these improvements. As shown, the intersection is anticipated to operate acceptably at LOS C or better during the studied peak hours throughout 2045 with the anticipated improvements.

Table 4 – Campus Drive & 96th Street (#2) LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2030 Background	14.3	B	21.2	C
2030 Total	15.4	B	23.2	C
2040 Background[1]	21.5	C	22.1	C
2040 Total[1]	25.3	C	26.3	C
2045 Total[1]	25.9	C	26.6	C

[1]Dual NBL Turn Lanes and Three NBT Lanes

96th Street/Via Varra & Northwest Parkway (#3)

The 96th Street/Via Varra & Northwest Parkway (#3) intersection is signalized and operates with protected-only left turn phasing on all four approaches to the intersection. According to currently proposed improvement plans for this intersection, it is understood that the northbound dual left turn lanes on Northwest Parkway and dual eastbound left turn lanes on 96th Street will both be improved to provide triple left turn lanes. As such, this would require three receiving lanes on both westbound 96th Street to the west of Northwest Parkway as well as northbound Northwest Parkway to the north of 96th Street. However, to be conservative, it was assumed that this improvement would not be completed until the 2040 full buildout horizon to assess the intersection operation under 2030 Phase 1 conditions if no improvements are completed by 2030. As such, the intersection operates well at LOS C with the existing configuration in 2030 and continues to operate acceptably at LOS C in 2040 and 2045 with the proposed improvements. **Table 5** provides the results of the LOS analysis conducted at this intersection.

Table 5 – 96th Street/Via Varra & Northwest Parkway (#3) LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2030 Background	29.0	C	29.3	C
2030 Total	29.9	C	29.6	C
2040 Background[1]	28.5	C	22.3	C
2040 Total[1]	29.3	C	22.4	C
2045 Total[1]	29.7	C	22.7	C

[1]Dual NBL Turn Lanes and Three NBT Lanes

Rockcress Drive & Sorrel Avenue (#4)

The Rockress Drive & Sorrel Avenue (#4) intersection is proposed to be constructed a four-leg single-lane roundabout. The northbound, southbound, and eastbound approaches would all provide one lane for shared turning movements while the westbound approach would provide one left/through lane and a right turn only lane. The south leg of the roundabout is anticipated to serve as an access into a future development to the south of Rockcress Drive. In this proposed configuration, the intersection is anticipated to operate at an acceptable level of service A through the 2040 horizon with the addition of project traffic. **Table 6** provides the results of the LOS analysis at this intersection.

Table 6 – Rockcress & Sorrel Avenue (#4) LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2030 Background – Overall	4.0	A	4.7	A
Eastbound Approach	3.3	A	5.5	A
Westbound Approach	4.1	A	3.3	A
Northbound Approach	3.0	A	4.8	A
Southbound Approach	3.9	A	5.0	A
2030 Total – Overall	4.2	A	5.0	A
Eastbound Approach	3.5	A	6.0	A
Westbound Approach	4.3	A	3.5	A
Northbound Approach	3.2	A	5.0	A
Southbound Approach	4.0	A	5.4	A
2040 Background – Overall	4.4	A	5.5	A
Eastbound Approach	3.5	A	7.3	A
Westbound Approach	4.5	A	3.4	A
Northbound Approach	3.1	A	5.6	A
Southbound Approach	4.5	A	5.2	A
2040 Total – Overall	4.7	A	6.2	A
Eastbound Approach	3.8	A	8.4	A
Westbound Approach	4.8	A	3.6	A
Northbound Approach	3.3	A	6.2	A
Southbound Approach	4.9	A	6.1	A

Rockcress Drive/Via Varra & Northwest Parkway (#5)

The Rockcress Drive/Via Varra & Northwest Parkway (#5) intersection is signalized and operates with protected-only left turn phasing on all four approaches to the intersection. Based on currently proposed improvement plans and the results of the Fox Tuttle study, it is understood that the southbound Northwest Parkway approach to this intersection will provide three through lanes in the future. The results of this analysis further confirm that this improvement is anticipated to be needed in the future. However, to be conservative, it was assumed that the intersection would remain in its current configuration through the 2030 horizon and that the third southbound through lane would not be implemented until the 2040 horizon. In 2030, the intersection is anticipated to operate acceptably at LOS C or better during the peak hours with the existing configuration and control. Based on these proposed improvements, the intersection is anticipated to operate at an acceptable level of service through the 2045 horizon with the addition of project traffic. **Table 7** provides the results of the LOS analysis conducted at this intersection.

Table 7 – Rockcress Drive/Via Varra & Northwest Parkway (#5) LOS Results

Scenario	AM Peak Hour		PM Peak Hour	
	Delay (sec/veh)	LOS	Delay (sec/veh)	LOS
2030 Background	19.9	B	16.2	B
2030 Total	27.7	C	18.2	B
2040 Background[1]	29.0	C	16.6	B
2040 Total[1]	30.4	C	29.8	C
2045 Total[1]	31.4	C	31.1	C

[1]Three SBT lanes

Project Accesses

With completion of the project, a full movement access is proposed along the north side of Rockcress Drive, approximately 775 feet west of the Rockcress Drive/Via Varra & Northwest Parkway (#5) intersection, measured center to center. Three full movement accesses are also proposed along Sorrel Avenue, the two northernmost of which are anticipated to align with future accesses to other developments to the west of Sorrel Avenue. A third access along Sorrel Avenue is proposed into the hospital—located between Rockcress Drive and the Middle Sorrel Access (#7). This third southernmost access is expected to operate as a 'T'-intersection.

Sorrel Avenue Accesses (#6, #7, and #9)

The two northernmost full movement accesses (#6 and #7) proposed along the east side of Sorrel Avenue are anticipated to align with two accesses to the west of Sorrel Avenue that will serve other developments. At both access intersection locations, the northbound and southbound approaches are recommended to provide a left turn lane and a shared through/right turn lane, while the eastbound/westbound minor street access approaches would operate with stop control and one lane for shared left/through/right turning movements. R1-1 "STOP" signs should be posted on the minor street eastbound/westbound approaches to Sorrel Avenue at both access locations. Additionally, the third and southernmost access is expected to operate as a 'T'-intersection with an R1-1 "STOP" sign also posted on the westbound approach for vehicles exiting the site. A southbound left turn lane is also recommended at this intersection. A four-hour signal warrant analysis was conducted at the North Access (#6) to assess whether this intersection would meet warrants for a traffic signal. Based on the 2040 background plus project traffic volumes, a signal is not expected to be warranted at full buildout of the overall Redtail Ridge development area, with none of the four major peak hours on a typical day meeting warrants for a traffic signal. The signal warrant analysis for this intersection is included in **Appendix E**.

Rockcress Drive Access (#8)

The Rockcress Drive Access (#8) is anticipated to align with a future south leg for a development south of Rockcress Drive. This access is anticipated to serve as a primary entrance to the development. In the 2030 Phase 1 horizon, the intersection movements are anticipated to operate acceptably under stop control; only with full buildout traffic volumes by the 2040 horizon is a signal anticipated to be warranted and needed at this intersection. A signal warrant analysis was completed for this intersection, which is included in **Appendix E**. As such, this access is proposed

to operate under stop control with R1-1 “STOP” signs on the exiting access approaches to the intersection. During this horizon, the eastbound and westbound Rockcress Drive approaches to this access intersection are recommended to provide a left turn lane, one through lane, and a shared through/right turn lane. The northbound approach is anticipated to require only one lane for shared left/through/right turning movements. The southbound approach exiting the hospital would be recommended to provide a left turn lane and a shared through/right turn lane during this horizon.

By the 2040 horizon and full buildout of the AdventHealth site, signalization is recommended at this access location. When full buildout is complete and signalization occurs, the southbound approach would be recommended to provide dual left turn lanes, with the westernmost left turn lane also providing through movement, and a separate right turn lane. Because this improvement is anticipated to be needed at full buildout, it would be recommended that the pavement width be allocated during Phase 1 development to allow for eventual dual southbound left turn lanes. To be conservative, this intersection was analyzed with split phase operations on the northbound/southbound approaches to the intersection because of the difference in approach lane configurations.

At the request of City of Louisville staff, this intersection was also analyzed with roundabout control in the 2040 background plus project traffic scenario. The roundabout was assumed to provide two approach lanes on the eastbound/westbound Rockcress Drive approaches while the northbound and southbound access approaches were assumed to both be a single-lane approach. Based on the results of this analysis, a roundabout in this configuration would be expected to operate well through the 2040 horizon. However, as this access is expected to be the primary access into the hospital site, a signal is recommended to be constructed at this location as traffic signals allow for emergency vehicle preemption and offer more intuitive navigability for drivers unfamiliar with the area. **Table 8** provides the results of the level of service for these accesses. As shown in the table, the project access intersections are anticipated to operate at an acceptable level of service through the 2040 horizon.

Table 8 – Project Access Level of Service Results

Intersection	2030 Total				2040 Total			
	AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
	Delay (sec/ veh)	LOS	Delay (sec/ veh)	LOS	Delay (sec/ veh)	LOS	Delay (sec/ veh)	LOS
Sorrel North Access (#6)								
Northbound Left	7.8	A	7.5	A	7.9	A	7.5	A
Eastbound Approach	12.8	B	12.5	B	14.6	B	14.8	B
Westbound Approach	13.1	B	14.1	B	14.2	B	17.8	C
Southbound Left	7.7	A	7.8	A	7.9	A	8.0	A
Sorrel Middle Access (#7)								
Northbound Left	7.7	A	7.8	A	7.7	A	7.9	A
Eastbound Approach	11.5	B	12.7	B	12.1	B	13.6	B
Westbound Approach	11.0	B	10.8	B	11.4	B	11.4	B
Southbound Left	7.8	A	7.6	A	7.9	A	7.7	A
Rockcress Access (#8) – Unsignalized								
Northbound Approach	9.4	A	12.3	B				
Eastbound Left	8.8	A	7.8	A				
Westbound Left	7.6	A	8.7	A	-	-	-	-
Southbound Left	17.6	C	23.0	C				
Southbound Through/Right	8.9	A	8.7	A				
Rockcress Access (#8) – Signalized	-	-	-	-	12.1	B	29.5	C
Rockcress Access (#8) – Roundabout	-	-	-	-	6.2	A	7.1	A
Sorrel South Access (#9)								
Westbound Approach	10.6	B	10.6	B	11.0	B	11.2	B
Southbound Left	8.0	A	7.6	A	8.1	A	7.7	A

5.3 Vehicle Queuing Analysis

A vehicle queuing analysis was conducted for the study area intersections. The queuing analysis was performed using Synchro presenting the results of the 95th percentile queue lengths. Results are shown in the following **Table 9** with calculations provided within the level of service operational sheets of **Appendix D** for unsignalized intersections and **Appendix F** for signalized intersections. Of note, vehicle queues were assumed to be a minimum of 25 feet (approximately one vehicle).

Table 9 – Turn Lane Queuing Analysis Results

Intersection Turn Lane	Existing Turn Lane Length	2030 Calculated Queue (AM/PM)	2030 Recommended Length	2040/2045* Calculated Queue (AM/PM)	2040/2045* Recommended Length
Campus & 96th (#2)					
Eastbound Left	DNE	214'/260' DL	**C DL**	239'/330'	C DL
Eastbound Right	C	36'/51'	**500'**	39'/79'	500'
Northbound Left	75'	25'/25'	**200'**	103'/67'	200' **DL**
Southbound Right	DNE	52'/39'	**200'**	60'/51'	200'
96th/Via Varra & Northwest Pkwy (#3)					
Eastbound Left	250'/375' DL	45'/95' DL	250'/375' DL	36'/79' TL	**250'**/250'/375' TL
Eastbound Right	375' Free	450'/468'	**475'** Free	475'/430'	475' Free
Westbound Left	200'/275' DL	47'/27' DL	200'/275' DL	54'/34' DL	200'/275' DL
Westbound Right	250' Free	25'/25'	250' Free	25'/25'	250' Free
Northbound Left	600'/800' DL	477'/355' DL	600'/800' DL	352'/244' TL	**600'**/600'/800' TL
Northbound Right	C Free	25'/25'	C Free	25'/25'	C Free
Southbound Left	550'/600' DL	25'/25' DL	550'/600' DL	29'/25' DL	550'/600' DL
Southbound Right	500' Free	25'/25'	500' Free	25'/25'	500' Free
Rockcress/Via Varra & Northwest Pkwy (#5)					
Eastbound Left	125' DL	30'/73'	**400'/C** DL	42'/87'	400'/C DL
Eastbound Right	Free	25'/25'	Free	25'/284'	Free
Westbound Left	250'/500'C DL	141'/129'	250'/500'C DL	150'/133'	250'/500'C DL
Northbound Left	250'/475' DL	324'/202'	250'/475' DL	421'/197'	**375'**/475' DL
Northbound Right	300'	26'/30'	300'	26'/39'	300'
Southbound Left	425'/650' DL	42'/25'	425'/650' DL	42'/25'	425'/650' DL
Southbound Right	500' Yield	25'/25'	500' Yield	25'/25'	500' Yield
Sorrel North Access (#6)					
Northbound Left	DNE	25'/25'	**150'**	25'/25'	150'
Southbound Left	DNE	25'/25'	**150'**	25'/25'	150'
Sorrel Middle Access (#7)					
Northbound Left	DNE	25'/25'	**150'**	25'/25'	150'
Southbound Left	DNE	25'/25'	**150'**	25'/25'	150'
Rockcress Access (#8)					
Eastbound Left	DNE	25'/25'	**150'**	36'/25'	150'
Westbound Left	DNE	25'/25'	**150'**	25'/25'	150'
Southbound Left	DNE	25'/100'	**200'**	84'/184'	200' **DL**
Sorrel South Access (#9)					
Southbound Left	DNE	25'/25'	**150'**	25'/25'	150'

DNE = Does Not Exist; C = Continuous Turn Lane; DL = Dual Left Turn Lanes; TL = Triple Left Turn Lanes; **Blue** Text = Recommendation; * = 2040 horizon year used for internal intersections (#6, 7, 8, 9) while 2045 horizon year is used for major external intersections (#2, 3, 5)

All queues are anticipated to remain within the existing or recommended turn lane lengths through 2045. The recommended turn lane lengths provided in this table are generally based on the currently proposed construction improvement plans at the major external intersections of Campus Drive & 96th Street (#2), 96th Street/Via Varra & Northwest Parkway (#3), and Rockcress Parkway/Via Varra & Northwest Parkway (#5), where available, while the internal intersection turn

lane recommendations at the project accesses are based on a minimum assumed turn lane length of 150 feet, with additional storage provided to meet expected vehicle queues.

As noted previously, to be conservative it was assumed that the northbound left turning movement at Campus Drive & 96th Street (#2) would operate from a single lane in the 2030 horizon and would not be improved to dual left turn lanes until the 2040 horizon. It was also assumed that the triple northbound left turn lanes on Northwest Parkway and triple eastbound left turn lanes on 96th Street at the 96th Street/Via Varra & Northwest Parkway (#3) would not be implemented until the 2040 horizon. There is approximately 725 feet of spacing between the Campus Drive extension and Northwest Parkway along 96th Street available for left turn lane storage. Based on the proposed dual northbound left turn lanes at Campus Drive & 96th Street (#2) intersection providing 200 feet of storage and the triple southeast-bound left turn lanes at 96th Street/Via Varra & Northwest Parkway (#3) providing 250 to 375 feet of storage, there is space for a shared taper length of approximately 150 feet for these back-to-back left turn lanes. Vehicle queues are easily accommodated the left turn lanes at both of these locations, with the northbound dual left turn lanes at Campus Drive & 96th Street (#2) expected to have 95th percentile queues approximately 100 feet or less through the 2045 horizon, while the southeast-bound triple left turn lanes at 96th Street/Via Varra & Northwest Parkway (#3) are expected to experience 95th percentile queues under 80 feet through the 2045 horizon.

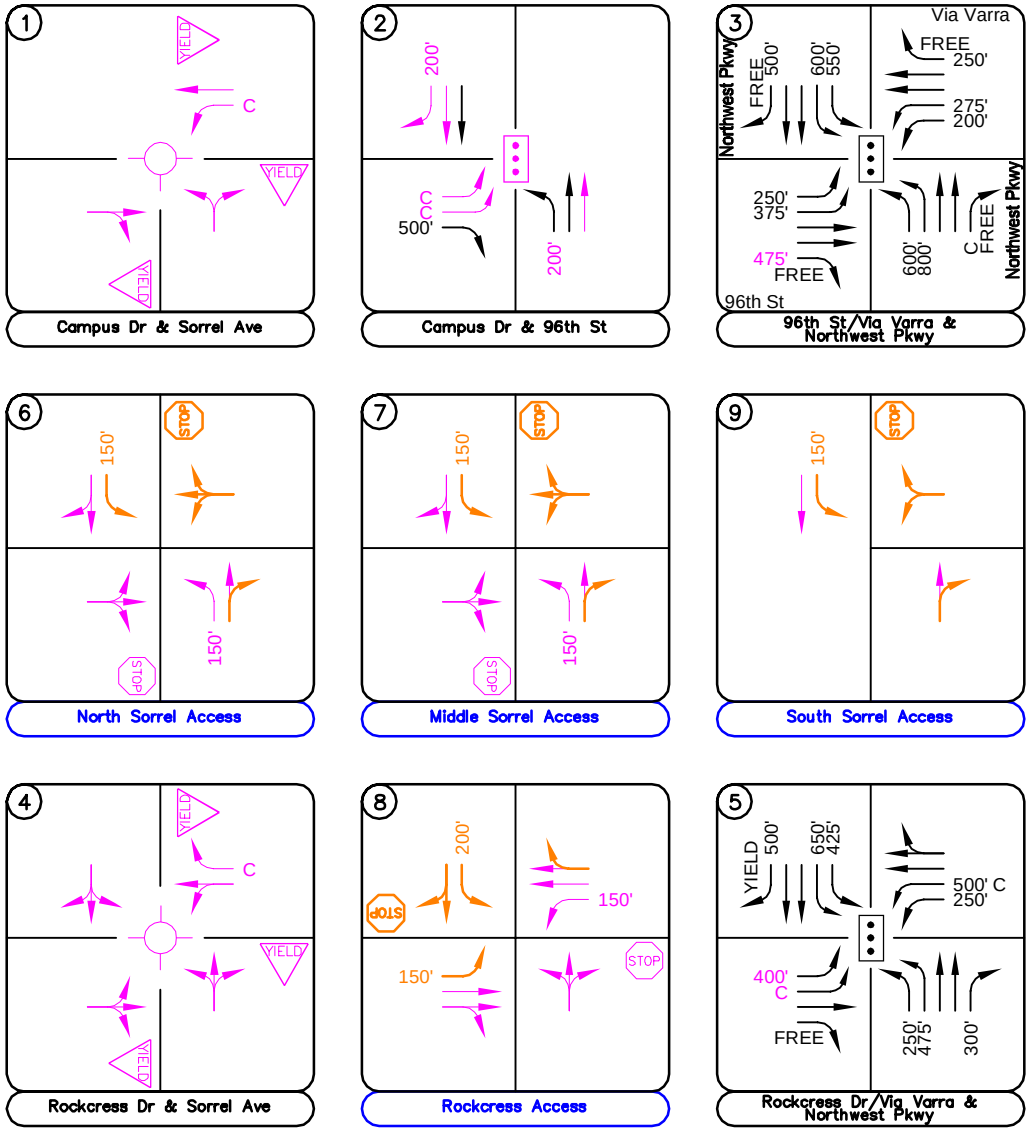
Additionally, because the Rockcress Access (#8) is proposed to operate with two-way stop control exiting the hospital in the 2030 horizon, the southbound approach is proposed to operate with only one southbound left turn lane in this horizon. By the 2040 horizon at full buildout and with signalization of this access, the dual left turn lanes, each proposed as 200 feet in length, should be provided. Because dual southbound left turn lanes are anticipated to be needed at full buildout at the Rockcress Access (#8), it would be recommended that pavement width be provided to allow for these dual left turn lanes, and that in the 2030 short-term horizon the second left turn lane be striped out with chevron striping to restrict its use until the intersection is signalized.

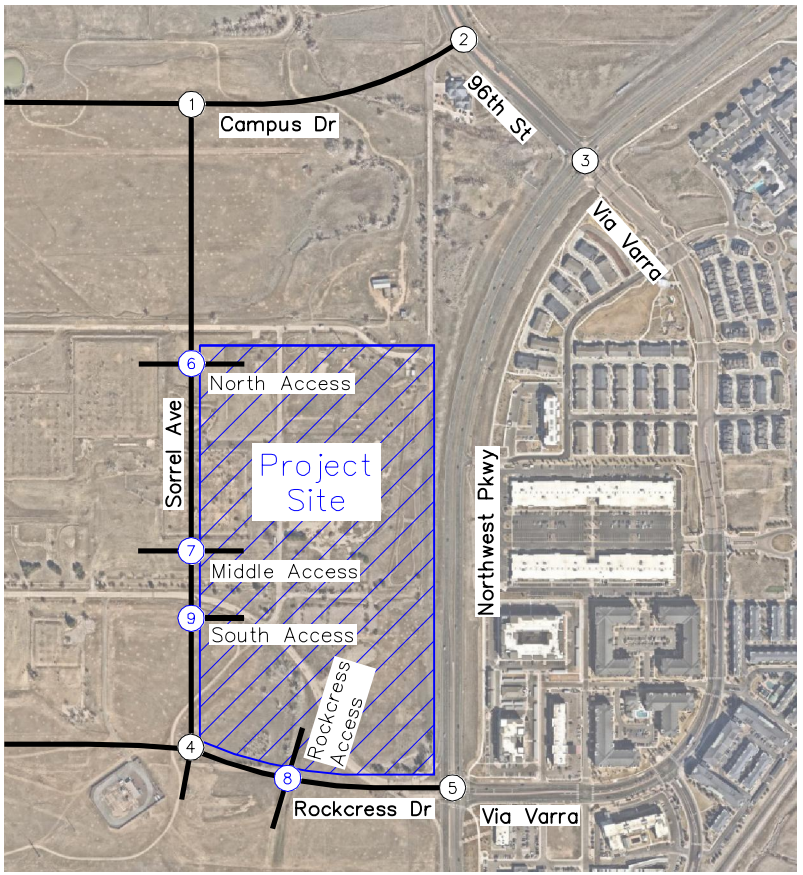
Rockcress Drive is proposed to provide two through lanes eastbound and westbound between Sorrel Avenue and Northwest Parkway. The second eastbound through lane is anticipated to become a forced left turn only lane at the Rockcress Drive/Via Varra & Northwest Parkway (#5) intersection, while a second left turn lane 400 feet in length will also be provided. There is

anticipated to be approximately 700 feet of spacing available for left turn lane storage. The westbound left turn lane at the Rockcress Access (#8) is proposed to provide 150 feet in length. This leaves 150 feet of additional length available between the Rockcress Access (#8) and Northwest Parkway available for a shared taper length for these back-to-back left turn lanes. The 95th percentile queue in the eastbound dual left turn lanes at Rockcress Drive/Via Varra & Northwest Parkway (#5) is expected to be approximately 87 feet or less through the 2045 horizon, while the westbound left turn queue at the Rockcress Access (#8) is anticipated to be 25 feet or less. As such, the provided left turn storage and taper length for these turn lanes are expected to easily accommodate projected traffic volumes through the 2045 horizon.

5.4 Improvement Summary

Based on the results of the intersection operational and vehicle queuing analysis, the key intersection recommended improvements and control are shown in **Figure 12** and **Figure 13** for the 2030 and 2040 horizons, respectively. Of note, the recommendations provided in **Figure 13** are anticipated to be needed by the 2040 horizon but are expected to provide acceptable operations through the 2045 horizon. These recommendations are distinguished by improvements expected to be needed due to the hospital site versus improvements that would be expected to be constructed by others as part of the master Redtail Ridge development.



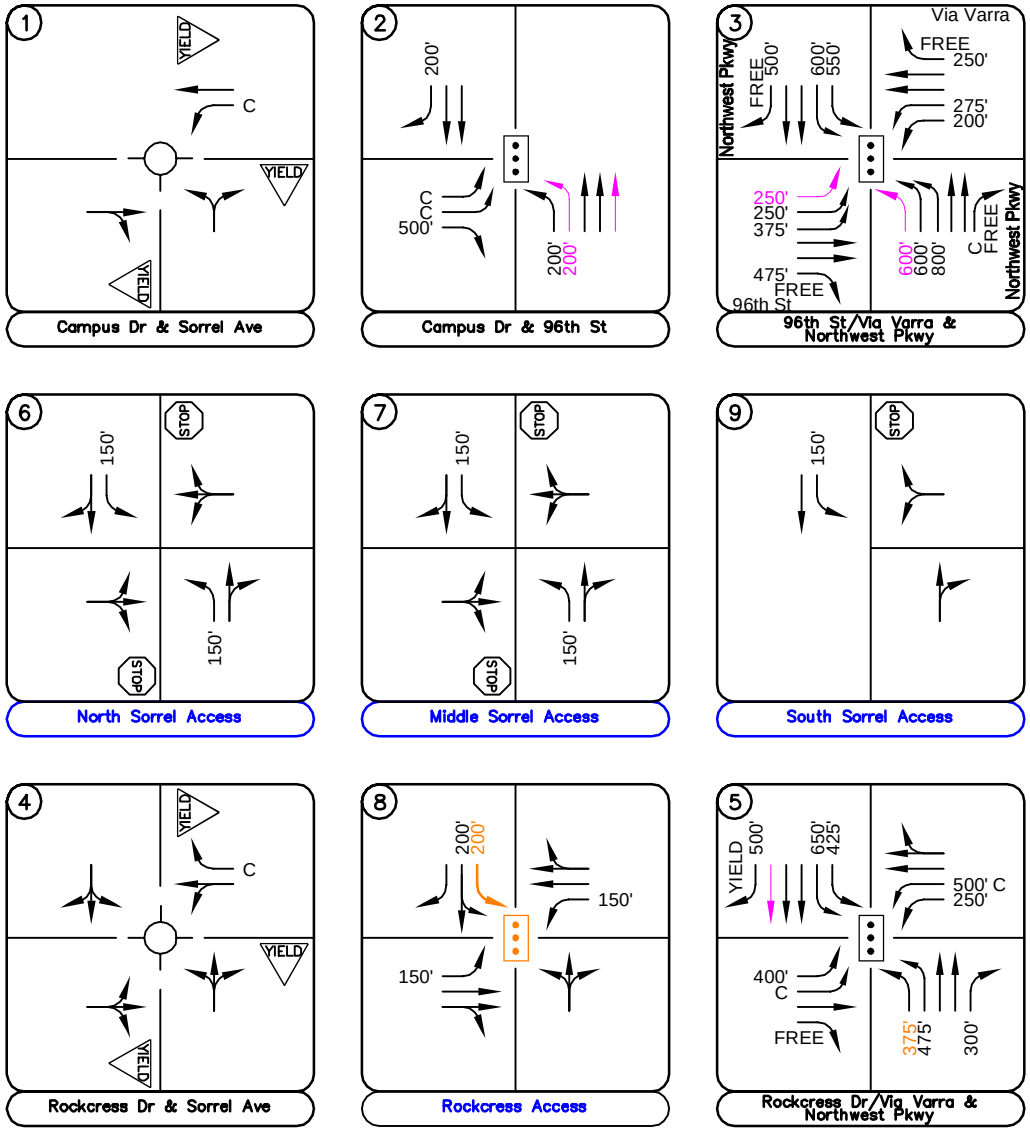


LEGEND

- X — Study Area Key Intersection
- Roundabout
- YIELD — Yield–Controlled Approach
- Signalized Intersection
- STOP — Stop–Controlled Approach
- Hospital–Specific Improvement
- Improvement by Others
- 100' — Turn Lane Length (feet)
- C — Continuous Turn Lane

FIGURE 12

AdventHealth Louisville
Louisville, Colorado
2030 Recommended Geometry and Control



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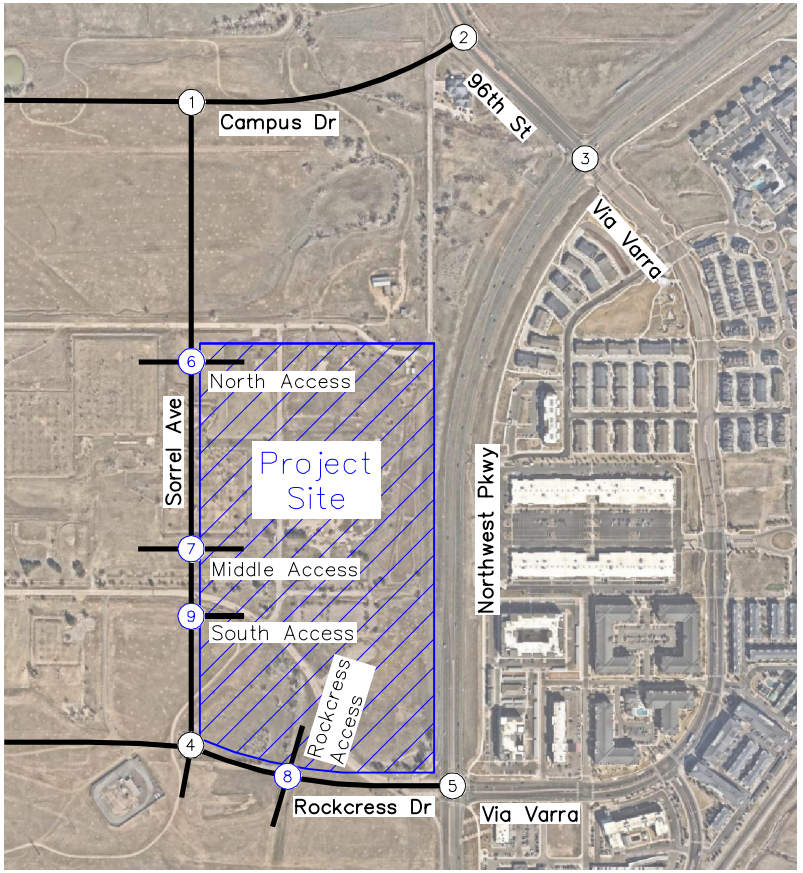

LEGEND

- X — Study Area Key Intersection
- Roundabout
- YIELD — Yield–Controlled Approach
- Signalized Intersection
- STOP — Stop–Controlled Approach
- Hospital–Specific Improvement
- Improvement by Others
- 100' — Turn Lane Length (feet)
- C — Continuous Turn Lane

FIGURE 13
AdventHealth Louisville
Louisville, Colorado
2040 Recommended Geometry and Control

Kimley»Horn

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis presented in this report, Kimley-Horn believes AdventHealth Louisville will be successfully incorporated into the existing and future roadway network. There is an existing AdventHealth hospital located at the intersection of Campus Drive and 88th Street approximately 1.25 miles to the west of this proposed site. This existing site includes approximately 400,000 square feet of hospital/medical office building uses and is approved with an expansion of an additional 350,000 square feet to include up to 750,000 square feet at full buildout. The currently proposed AdventHealth site within the Redtail Ridge development area is expected to include up to 799,600 square feet of hospital/medical office building uses. As such, this increase of 49,600 square feet of additional uses with relocation of the existing hospital with approved expansion to the new site is expected to result in approximately 658 additional weekday daily trips, with 47 more trips during the morning peak hour and 61 more trips during the afternoon peak hour compared to the traffic the existing site could generate. This results in approximately one additional vehicle every 75 seconds during the morning peak hour and one additional vehicle every minute (60 seconds) during the afternoon peak hour on the surrounding street network compared to the existing project site. This study assessed the additional improvements that could be needed due to the additional square footage of this proposed site, and any vehicle rerouting that could occur with the site being located further to the east. Analysis of the existing street network, the proposed project development, and expected traffic volumes resulted in the following recommendations:

2030 Recommendations

All offsite transportation recommendations identified as being needed within this horizon are consistent with the findings of the master traffic study. Those improvements are already being proposed and constructed to serve the entire development area. As such, the following outlines the recommendations found to be needed by the 2030 horizon:

- The Campus Drive & Sorrel Avenue (#1) intersection is anticipated to be constructed prior to AdventHealth Louisville construction. Based on currently proposed construction plans, it will be a 'T'-roundabout controlled intersection, with eastbound Campus Drive operating with a shared through/right turn lane, westbound Campus Drive providing separate left and through lanes, and the northbound Sorrel Avenue approach providing one lane for shared left/right

turning movements. R1-2 “YIELD” signs should be posted on all three approaches to the roundabout.

- The Campus Drive & 96th Street (#2) intersection is anticipated to become a signalized ‘T’-intersection with full movements allowed by the 2030 horizon prior to AdventHealth construction. For purposes of this study, the eastbound Campus Drive approach was based on the proposed construction plans, which would have dual continuous eastbound left turn lanes and a separate right turn lane approximately 500 feet in length. The northbound 96th Street approach was conservatively assumed to provide a single 200-foot left turn lane and two through lanes in this horizon. However, at full buildout based on construction plans, it is anticipated to provide dual left turn lanes and three through lanes northbound. The southbound 96th Street approach should provide two through lanes and a 200-foot right turn lane.
- The 96th Street/Via Varra & Northwest Parkway (#3) intersection may require extension of the eastbound right turn lane from 375 feet to approximately 475 feet by this horizon to meet expected vehicle queues. However, if not improved, it is believed any additional vehicles can safely queue in the southernmost eastbound through lane if these queues are experienced.
- The future Rockcress Drive & Sorrel Avenue (#4) intersection is proposed to be constructed as a four-leg roundabout prior to AdventHealth construction. The eastbound, northbound, and southbound approaches are all expected to provide one approach lane for shared left/through/right turning movements, while the westbound approach would provide a shared left/through lane and a separate right turn lane. Each approach should provide R1-2 “YIELD” signs on approach to the intersection.
- The Rockcress Drive/Via Varra & Northwest Parkway (#5) intersection is expected to be improved on the eastbound approach to the intersection with dual left turn lanes, one of which would provide 400 feet in length while the other would be a continuous turn lane. These improvements are based on the currently proposed improvement plans. Although it is understood that three southbound through lanes are eventually proposed at this intersection, it was conservatively analyzed with the existing two southbound through lanes during this horizon.

The following recommendations are specific to accesses proposed for Phase 1 of the AdventHealth Louisville Hospital Campus to be constructed by the development:

- Two full movement accesses are proposed along the east side of Sorrel Avenue that will align with two proposed accesses on the west side of Sorrel Avenue. R1-1 “STOP” signs are proposed on the eastbound and westbound approaches to Sorrel Avenue at both accesses. These accesses should operate well with one approach lane for shared left/through/right turning movements. The northbound and southbound approaches of Sorrel Avenue to both accesses are recommended to provide 150-foot left turn lanes and shared through/right turn lanes.
- A third full movement access along the east side of Sorrel Avenue is also proposed, which is anticipated to be constructed as a ‘T’-intersection. An R1-1 “STOP” sign should be constructed on the westbound approach for vehicles exiting the site. A southbound left turn lane 150 feet in length should also be provided.
- The primary access into the proposed site is anticipated to be along Rockcress Drive, approximately 775 feet to the west of Northwest Parkway, measured center to center. This intersection is anticipated to operate well under minor street stop control through the 2030 horizon with Phase 1 construction of AdventHealth Louisville. The Rockcress Access (#8) is recommended to provide a 150-foot left turn lane, one through lane, and one shared through/right turn lane along both eastbound and westbound Rockcress Drive. The northbound approach to the intersection is anticipated to operate well with one lane for shared left/through/right turning movements while the southbound approach exiting the hospital should provide a 200-foot left turn lane and a separate through/right lane. Of note, dual southbound left turn lanes are recommended at this access at full buildout and as such, it is recommended that pavement width be provided for the future second left turn lane, but that it be striped out with chevron striping to allow only one southbound left turn lane until full buildout of the hospital site. During this horizon, R1-1 “STOP” signs should be posted on the northbound and southbound approaches.

2040 & 2045 Recommendations

The offsite transportation recommendations identified in the 2040 and 2045 horizons are also consistent with the findings of the master traffic study. All of the improvements identified herein are anticipated to result in the study intersections and surrounding street network operating acceptably in both the 2040 and 2045 horizons. The improvements already being proposed and constructed to serve the entire development area as follows:

- By the 2040 horizon, it was assumed that the Campus Drive & 96th Street (#2) intersection would provide dual northbound left turn lanes 200 feet in length while a third northbound through lane would also be provided. This third northbound through lane would provide the third required receiving lane for the proposed triple northbound left turn lanes at Northwest Parkway just to the southeast.
- The 96th Street/Via Varra & Northwest Parkway (#3) intersection is anticipated to provide triple northbound left turn lanes on Northwest Parkway and triple eastbound left turn lanes on 96th Street based on proposed improvement plans. For purposes of this study, the third northbound left turn lane was assumed to provide 600 feet in length while the third eastbound left turn was assumed to provide 250 feet in length. It should be noted the third eastbound left turn lane will require three receiving lanes on Northwest Parkway to the north of this intersection.
- The Rockcress Parkway/Via Varra & Northwest Parkway (#5) intersection should provide three southbound through lanes by this horizon.

The following identified improvements are recommended in association with development of full buildout of the AdventHealth Louisville hospital and medical campus. These improvements are in addition to improvements already being planned and constructed.

- To meet expected vehicle queues, the inner northbound left turn lane at the Rockcress Parkway/Via Varra & Northwest Parkway (#5) intersection may need to be extended from 250 feet to 375 feet to meet expected vehicle queues. It is believed this northbound left turn lane extension can be accomplished with minor median reconstruction.
- With full buildout of the AdventHealth site, the Rockcress Access (#8) is recommended to be signalized and is expected to meet warrants for signalization. When signalized, the southbound approach exiting the hospital is recommended to be improved to provide dual left turn lanes 200 feet in length, with the westernmost left turn lane also providing through movement, while a separate right turn lane should be provided.

General Recommendations

- Any onsite or offsite improvements should be incorporated into the Civil Drawings and conform to standards of the City of Louisville and the Manual on Uniform Traffic Control Devices (MUTCD) – 11th Edition, 2023.