

QUIKTRIP – INDEPENDENCE TRAFFIC STUDY

**M-291 AND E. 23RD STREET
INDEPENDENCE, MO**

Project No. 0121168.01-119

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FINAL TRAFFIC STUDY

QUIKTRIP - INDEPENDENCE

M-291 AND E. 23RD STREET

INDEPENDENCE, MISSOURI

JANUARY 2022

Prepared for:

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INTRODUCTION

1.1 Study Background, Purpose and Goals

This report summarized the findings and recommendations of a traffic study for the proposed QuikTrip site located on the southwest corner of M-291 and E. 23rd Street. This property is bounded by E. 23rd Street to the north, M-291 to the east, Hub Drive to the west, and Private Road to the south. The location of this proposed development is shown in Figure 1.

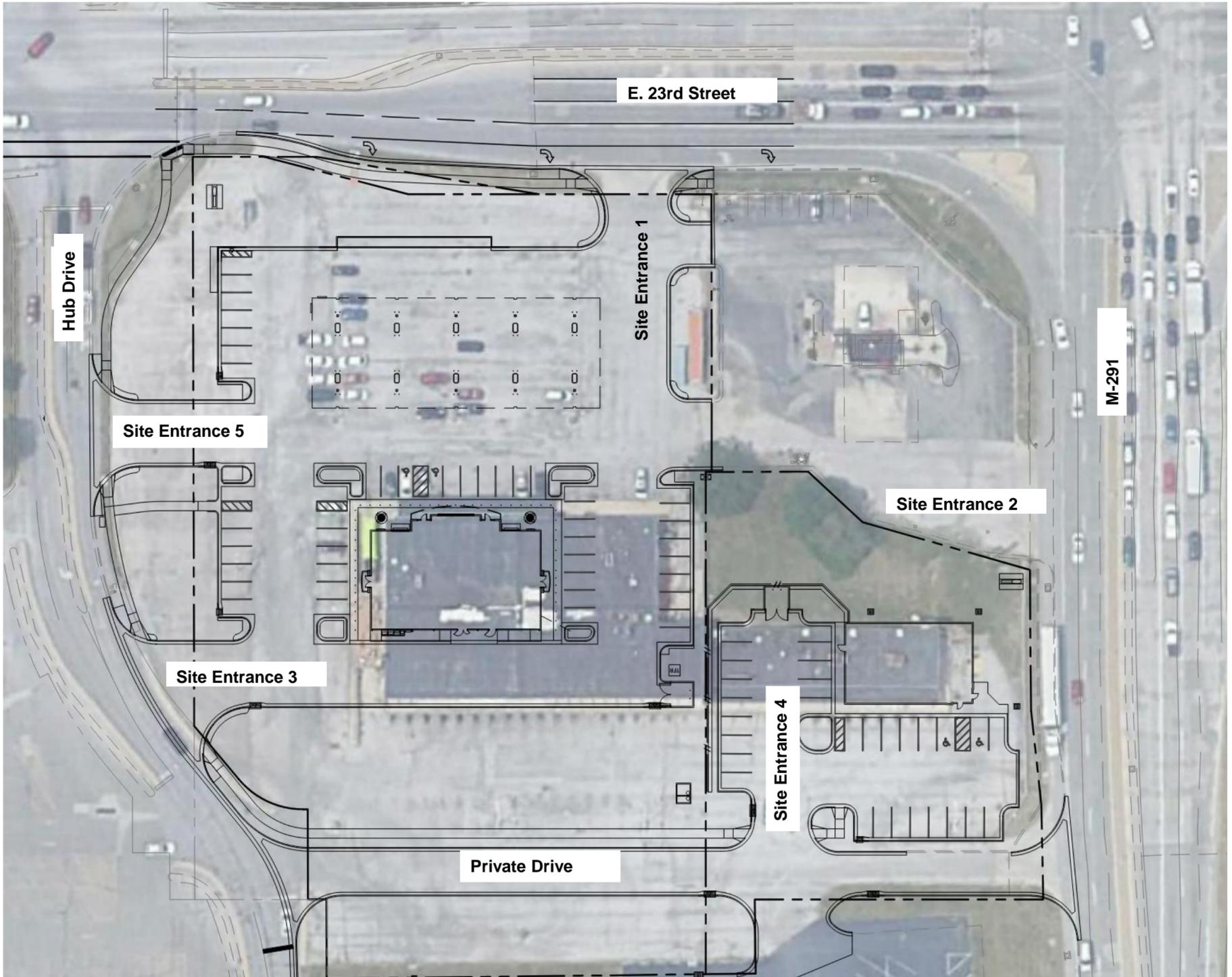
The proposed layout of the overall site is shown in Figure 2. The site is proposed to consist of a 20 pump QuikTrip gas station along with a 3,000 SF medical office building. The land uses and resulting trip generation is shown in Table 1.

The purpose of this study was to assess the capacity of the existing roadway system to handle the background traffic and the impacts of the proposed development on M-291 along with E. 23rd Street and Hub Drive in the vicinity of the site. Another objective of this study was to look at right and left turn lane warrants along with signal warrants at all intersections since these roadways and intersections will provide the primary access for traffic generated from the development on a daily basis.

1.2 Data Gathering

The following bullet chart summarizes the data and the source of the data used to complete this study:

- 2021 Existing Traffic Count at the intersections of M-291 and E. 23rd Street, E. 23rd Street and Hub Drive, and Hub Drive and Private Drive by Lamp Rynearson in September 2021
- Site generated trips – *ITE Trip Generation Manual, 10th Edition, 2017.*



1.3 Overview of Study Approach

To achieve the main goal of the study, the following tasks were accomplished:

- Field inspection to observe the current lane configuration, signal operation and geometry;
- Traffic counts were conducted at the intersections of M-291 and E. 23rd Street, E. 23rd Street and Hub Drive, and Hub Drive and Private Drive by Lamp Rynearson in September 2021;
- Determine site generated traffic, distribution and assignment including internal trips for the site;
- Determine total traffic volumes (site and background) for the peak hours in the year 2021, year 2022 and year 2040.
- Determine year 2021, year 2022 and year 2040 intersection capacity to handle background traffic using Synchro Version 11 and SimTraffic Software;
- Determine year 2021, year 2022 and year 2040 intersection capacity to handle opening day (build-out site + background traffic) and future horizon year traffic, using Synchro Version 11 and SimTraffic;
- Queue analysis; and
- Development of recommendations for roadway and traffic control improvements.

CHAPTER 2: ROADWAY NETWORK CHARACTERISTICS

2.1 Site and Study Area Boundaries

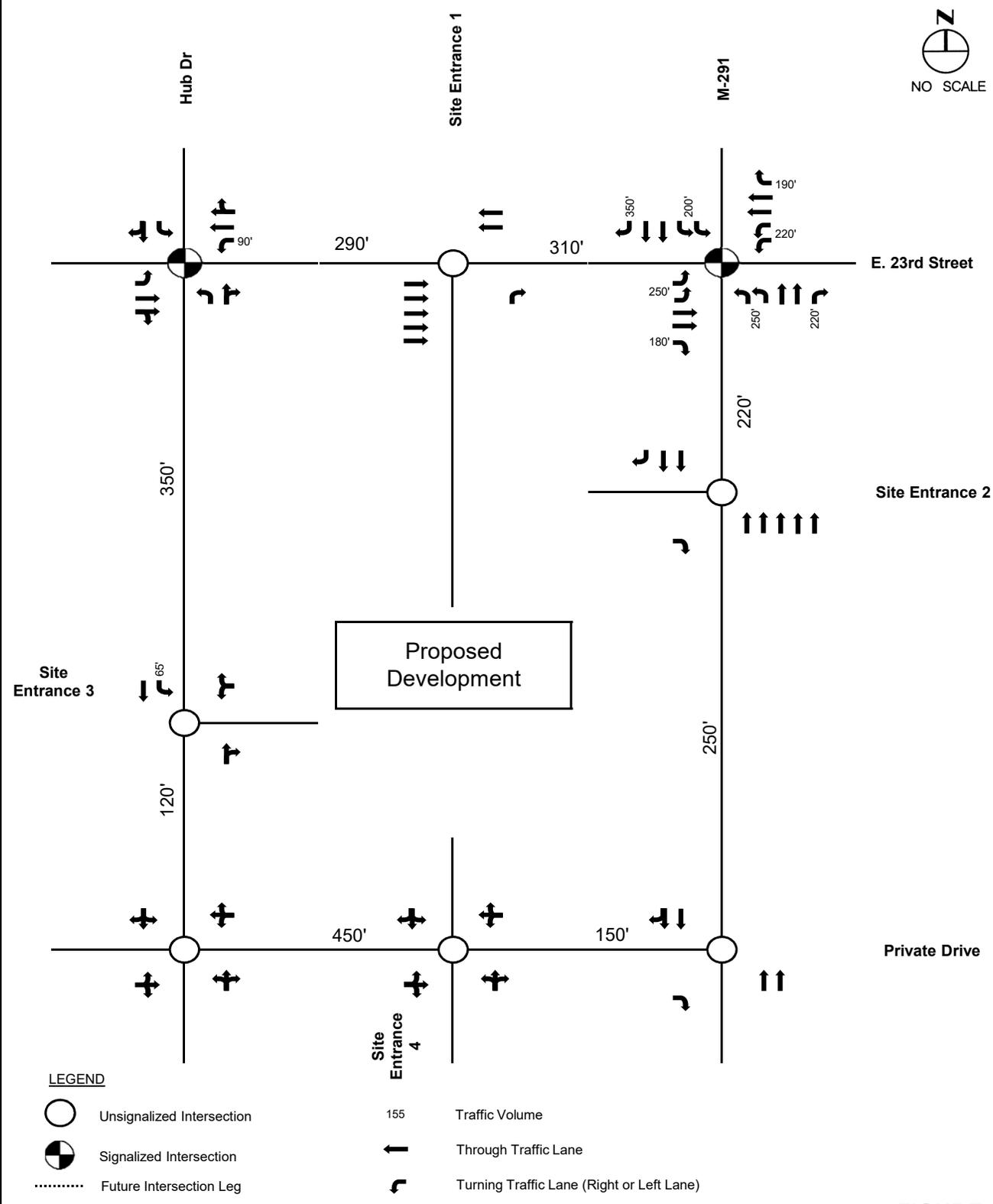
The study area is shown on Figure 1. The site is located in Independence, Missouri on the southwest corner of M-291 and E. 23rd Street. This property is bounded by E. 23rd Street to the north, Hub Drive to the west, Private Drive to the south, and M-291 to the east. The main intersections analyzed as a part of this study are:

- M-291 and E. 23rd Street
- E. 23rd Street and Hub Drive
- Hub Drive and Private Drive
- M-291 and Private Drive
- Site Entrance 1 and E. 23rd Street
- Site Entrance 2 and M-291
- Site Entrance 3 and Hub Drive
- Site Entrance 4 and Private Drive

The proposed site is anticipated to have five access points. The first access point is the existing right in/right out intersection of M-291 and Site Entrance 2. This intersection is not located on the property of the proposed QuikTrip development. The second access point is the right in/right out access point at along E. 23rd Street and Site Entrance 1, which is a shared access with the property on the southwest corner of M-291 and E. 23rd Street. Two access points are located along Hub Drive. The existing intersection of Site Entrance 3 and Hub Drive is a full movement access point. The second access point is proposed to be located just north of this intersection and would be a right in/right out access. The final access point is proposed to be located along Private Drive.

2.2 Existing Roadway Configuration

M-291 is a major arterial that runs north/south through the City of Independence and is under Missouri Department of Transportation jurisdiction. E. 23rd Street is also a major arterial that runs east/west through the City of Independence. At the intersection of M-291 and E. 23rd Street, each leg of the intersection consists of dual left turn lanes, two through lanes and a channelized right turn lane. The posted speed limit along M-291 is 45 miles per hour. The posted speed limit along E. 23rd Street is 40 miles per hour. The existing geometry is shown in Figure 3.



LEGEND

-  Unsignalized Intersection
-  Signalized Intersection
-  Future Intersection Leg

- 155 Traffic Volume
-  Through Traffic Lane
-  Turning Traffic Lane (Right or Left Lane)



**FIGURE 3
EXISTING GEOMETRY**

CHAPTER 3: EXISTING (BACKGROUND) TRAFFIC VOLUMES

3.1 Year 2021, year 2022 and year 2040 Background Traffic Volumes

A traffic count was conducted at the intersections of M-291 and E. 23rd Street, E. 23rd Street and Hub Drive, and Hub Drive and Private Drive in September of 2021. These intersections were counted in the morning from 7:00 am to 9:00 am and in the evening from 4:00 pm to 6:00 pm. The peak hour of the area was found to occur during the PM peak hour from 4:30 pm to 5:30 pm. The AM peak hour was observed from 7:15 am to 8:15 am. The 2021 background traffic for the AM peak hour is included in Figure 4 and the PM peak hour volumes in Figure 5.

An estimated overall growth factor of 1 percent was used around the site. This was determined based on most of the area surrounding the site already being developed and is a conservative estimate of the future traffic growth around the site. Using this growth factor, background traffic was developed for the years 2022 and 2040 from the growth rate. The future year of 2022 was selected as the full build-out year and the year 2040 was selected as a future horizon year. Figures 6 and 7 include the background volumes for the peak hours in the year 2022. The 2040 background volumes can be found in Figures 8 and 9.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

Following are the main conclusions and potential improvements:

- The site is anticipated to generate a total of 203 trips in the AM peak hour and 270 trips in the PM peak hour. In the AM peak hour, 102 vehicle trips will be entering the site and 101 trips exiting the site. For the PM peak hour, there will be 135 trips entering the site and 135 trips exiting the site.
- An annual growth rate of 1 percent was used at the intersections around the site.
- The Site Entrance 1 access point is a shared access with the property on the southwest corner of the intersection of M-291 and E. 23rd Street. This access is planned to be shifted west as a part of the redevelopment. The intersection of Site Entrance 2 is not located on the property of the proposed QuikTrip development.
- Synchro analysis shows that both E. 23rd Street and M-291 could have the potential need to be increased to three lanes in all directions by the background year 2040 at the intersection where those two roads meet. However, the area around this roadway consists of already developed land, therefore, there may be constraints or limitations to construct the additional lanes and not impact the layout of the surrounding properties. The roadway geometry at the remaining intersections are anticipated to be acceptable to handle the background traffic along with the development traffic.
- The intersection of Hub Drive and Private Drive is not anticipated to be above the threshold for a traffic signal in any scenario, according to the Manual on Uniform Traffic Control Devices (MUTCD) peak hour warrant (Warrant 3). The signal is also not warranted based on performance as all movements are anticipated to operate at a LOS of A in both the AM and PM peak hour in all scenarios.
- Currently, the eastbound right turning movement at the intersection of Hub Drive and E. 23rd Street is anticipated to be above the threshold for a right turn lane according to the NCHRP 279 Report. This is also the case for the southbound movement at the intersection of M-291 and Private Drive. In the year 2022 build-out scenario, this intersection of M-291 and Site Entrance 2 is anticipated to be above the threshold for a southbound right turn lane. This is based only on the

anticipated the right turn volumes at these two intersections, and not based on the expected performance at these intersections. Also, there is an existing auxiliary lane on M-291 for the southbound traffic from the eastbound right turn movement to the Private Drive that operates similarly to a turn lane.

- There are anticipated to be instances where long queues could potentially block a few right in/right out access point into developments around the site but there are not anticipated to be conflicts at any full movement intersections. The longest queue lengths occur in the 2040 PM background and build-out scenarios. This is anticipated to occur at the intersection of M-291 and E. 23rd Street. This 95th percentile length is estimated to be approximately 1,115 feet on the south leg of the intersection. This queue is anticipated to block a few right in/right out access points for the development on the east side of the roadway, however it is anticipated to end by the next full movement intersection to the south. On the north leg of this intersection, the 95th percentile queue length for the southbound through lane is anticipated to be 1,070 feet. This queue is not anticipated to block any intersections. In the same scenarios at the same intersection, the eastbound right turn lane is anticipated to have a 95th percentile queue length of 560 feet. This would extend past the intersection of Site Entrance 1 but is anticipated to end before the intersection of E. 23rd Street and Hub Drive.

