MAPLETON ROUNDABOUT DESIGN
PROJECT ID: CEEN_CPST_002

by

DADS Engineering
Adam Hill
Dylan Apelu
Daniel Neuffer

A Capstone Project Final Report

Submitted to

Seth Barrus
Rob Hunter
Mapleton City

Department of Civil and Construction Engineering
Brigham Young University

April 17, 2023

Executive Summary

PROJECT TITLE: MAPLETON ROUNDABOUT DESIGN
PROJECT ID: CEEn_CPST_002
PROJECT SPONSOR: Mapleton City
TEAM NAME: DADS Engineering

In response to a request from Mapleton City Public Works Division, DADS Engineering analyzed the feasibility and practicality of installing roundabout intersections at Main St. and Maple St., and Main St. and 1600 S. in Mapleton, UT. Cost estimates were not included in the scope of this project.

The collected data showed that volumes were consistent for roundabout usage. At current volumes a traffic signal is not warranted. Additionally, due to the high concern for speeding and safety considerations, a roundabout at these two intersections is an appropriate alternative.

VISSIM traffic models for the two intersections show a decreased driver delay with the installation of the roundabouts at both intersections for current and 2030 horizon years. However, after 2040, with a projected growth rate of 2.5%, both the roundabout and existing designs at Main St. and Maple St. result in significant delays. Main St. and 1600 S. remained functional, with benefits evident in the roundabout model through 2050.

Computer Aided Design and Drafting (CADD) modeling shows that the installation of a roundabout at both intersections is feasible with minimal right-of-way purchases. Both intersections were designed to accommodate a 40 ft. school bus. The intersections were analyzed for approach and internal speeds, and vehicle sweep path.

In summary, a roundabout at Main St. and Maple St. would be an effective alternative to existing conditions until volume growths warrant a signalized intersection. Additionally, a roundabout at Main St. and 1600 S. would reduce congestion. However, due to existing right-of-way constraints, additional design is needed to verify the feasibility of installation.

Additional benefits from relevant issues include increased pedestrian and driver safety, reduced emissions, improved traffic conditions, and lower speeds.

Table of Contents

List of Figures

List of Tables

Introduction

The scope of work for this project was to analyze the feasibility and design for two intersections in the City of Mapleton, namely the intersections of Main St. and Maple St., and Main St. and 1600 S. The feasibility and design involved the following tasks: traffic analysis for both intersections, projected growth models, traffic modeling and analysis, and roundabout designs.

Objectives for this project were to determine the feasibility and need for a roundabout installation at Main St. and Maple St., and Main St. and 1600 S. Projected construction costs, drainage design, public outreach materials, and bid documentation were not within the scope of work.

Greater detail regarding the schedule of the project is included in the "Schedule" section. Deliverables included in this final report are sections regarding existing traffic conditions, projected conditions, and conceptual designs. The conceptual design section consists of one conceptual proposed design for each intersection. Alternate conceptual designs are provided for comparison.

Figure 1 shows the locations for the two intersections in question.

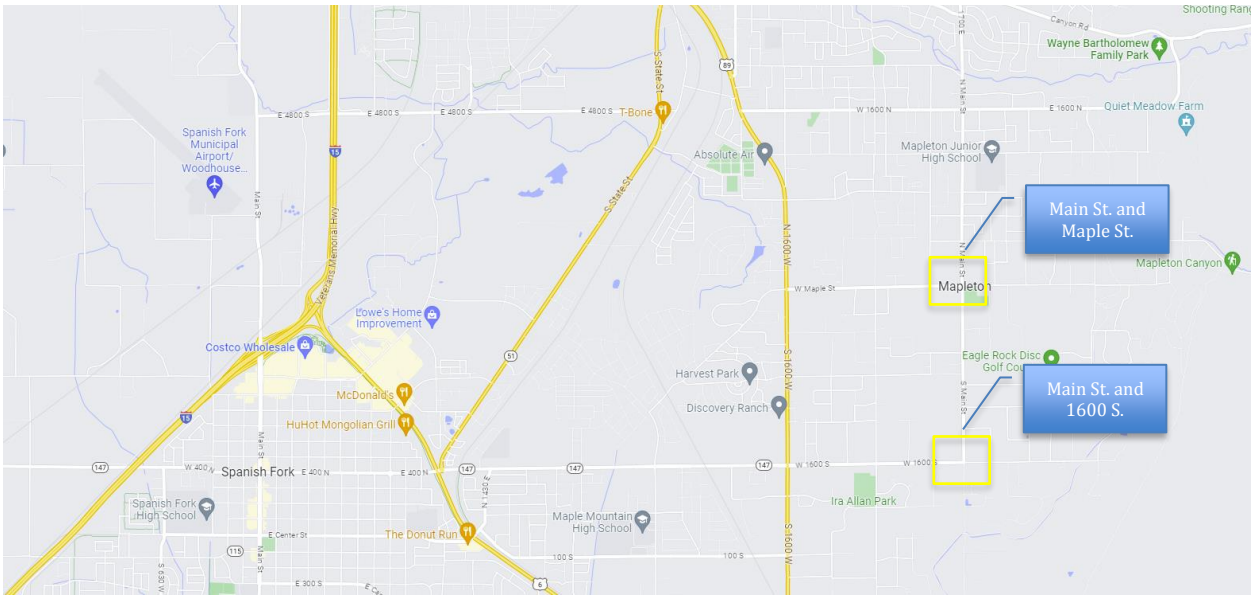


Figure 1: Intersection Locations

Schedule

PROJECT TIMELINE

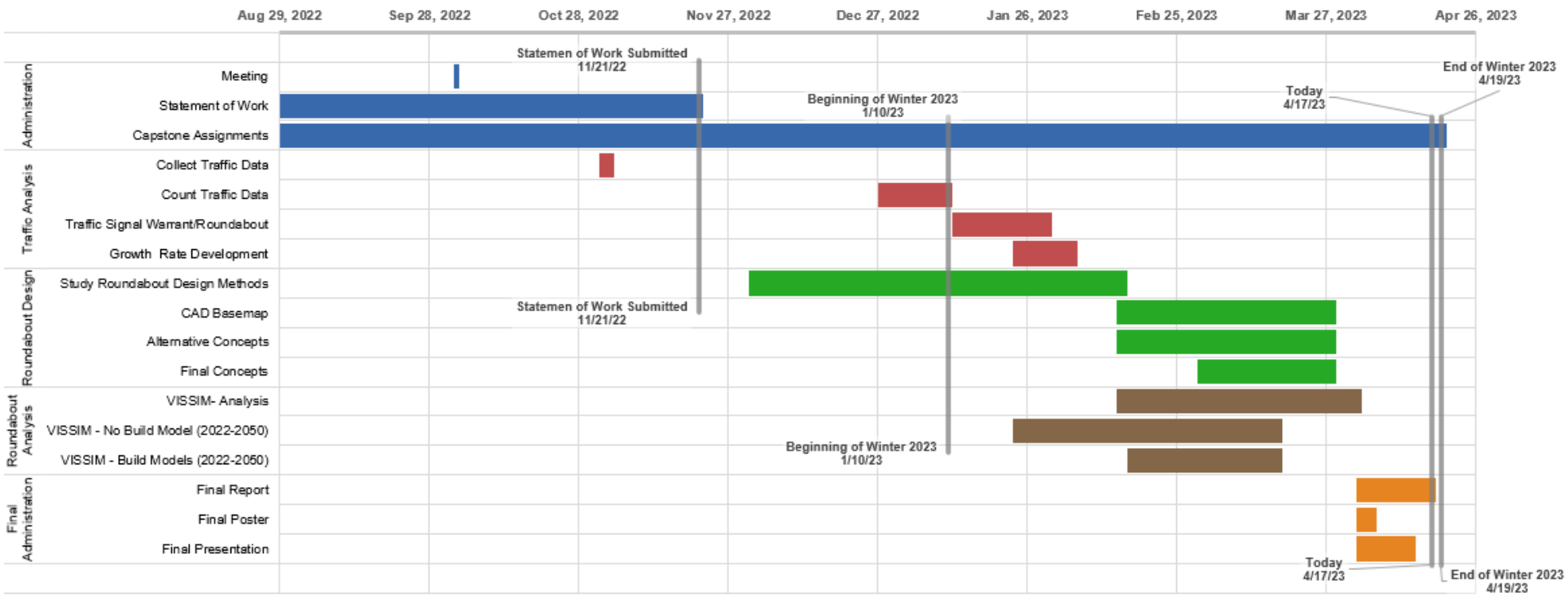


Figure 2: Project Timeline

Assumptions & Limitations

Traffic Analysis Assumptions & Limitations

Traffic data was collected on two days in early November 2022. However, during the end of the first day and through the second day a winter storm passed through the region, creating a possible weather interaction. However, it was assumed that the storm would help present a worst-case scenario for the analysis and the usage of the data would not negatively impact the analysis.

The percentage of trucks and high-grossing vehicles was not calculated, and a standard value of 2% was assumed for the analysis. During the data collection this assumption was observed to be a low estimation of percent trucks, but not by a significant margin.

The traffic analysis was performed using VISSIM traffic modeling software. In the creation of the base model, existing configurations, traffic control, and speed limits were created based off site images, and Google Maps (Google 2023).

Roundabouts were roughly modeled for both intersections. Care was taken to model entering and exiting movements as naturally as possible. Right-of-way was considered, but not treated as a constraint for the traffic modeling.

Concept Design Assumptions & Limitations

The design of the roundabout was constrained by the existing right-of-way and the guidelines set forth in the National Cooperative Highway Research Program (NCHRP) Report 672: Roundabouts, an Information Guide (NCHRP 2000). However, the right of way could not be clearly defined due to the limitations in the LIDAR data provided or the parcel data available on Utah Geospatial Resource Center (UGRC 2023).

It was assumed that the right-of-way for each parcel goes to the centerline of the road, except for the northwest corner of 1600 S., which has a parcel owned by the City of Mapleton for the separated right turn. Using an aerial map from Google Maps (Google 2023), the roundabouts were fitted to utilize the rights-of-way currently owned by the city.

The design of the roundabout was limited by the designer's knowledge and skills of the programs available to them free of charge. The program used was the Autodesk Civil 3D Roundabout Tool. The Roundabout Tool uses data from the Manual on Uniform Traffic Control Devices (MUTCD) (MUTCD 2009), NCHRP Report 672 (NCHRP 2000), and Federal Highway Administration (FHWA) standards (FHWA 2000 and FHWA 2006) to create a roundabout that follows all rules and regulations set forth by the U.S Department of Transportation (USDOT).

It was assumed that the warnings and designs assumptions produced by this tool are within standard and were accurate. However, this did cause a limitation in design since the designs were autogenerated and the designer's vision was not able to be accurately produced.

Design, Analysis & Results

The analysis took multiple stages, including an existing traffic analysis, VISSIM/ Highway Capacity Manual (HCM) traffic modeling, and geometric design. The following sections detail the processes used and relevant results.

Traffic Analysis

To inform the design and traffic related benefits for a roundabout, a traffic analysis was conducted. Traffic counts was collected, and models created that predict driver delay as a function of geometric design. These results predict the outcomes of installing a roundabout at these intersections.

Data Collection

To determine the efficacy of installing roundabouts at Main St. and Maple St., and Main St. and 1600 S., it was requested that a traffic study be performed to analyze current conditions. Traffic signal warrants were conducted using available data, and future growth models were developed.

To analyze the two intersections, traffic volumes and historical crash data were collected. Delay and gap data were not collected for this study due to limited funds and time of the project team.

Traffic Data

Traffic volume data were collected from 7 AM to 7 PM on November 1, 2022, and November 2, 2022. Portable cameras from the Brigham Young University (BYU) Transportation Lab were mounted in discrete locations to capture footage of the intersection. Once the traffic camera footage was downloaded, manual counts were performed to summarize the data for all turning movements, pedestrian crossings, and entering bicycles. See Appendix B for the count sheets.

On November 2, 2022, a storm front blew in, creating wintery conditions. The project team decided to let the data collection continue even with the somewhat adverse weather conditions. As seen in the data, volumes between the two days were similar, however, a difference was seen at Main St. and 1600 S. where the PM peak traffic volumes were lower than on November 1, 2022. It was hypothesized that some drivers chose an

alternate route due to the weather; however, the volumes were not different enough to warrant additional data collection.

Historical Crash Data

Historical crash data were collected using AASHTOWare Safety as provided by UDOT (Numetric 2023) The data available for Main St. and Maple St. went back to 2018, while data for Main St. and 1600 S. was only available after 2020. Table 1 and Table 2 show available crash data organized by year and crash severity.

Table 1: Crash History at Main St. and Maple St.

YEAR	CRASH SEVERITY	COUNT
2018	No Injury	2
2019	No Injury	3
2020	Suspected Injury	1
2021	No Injury	1
2022	No Injury	5
2022	Suspected Injury	2

Table 2: Crash History at Main St. and 1600 S.

YEAR	CRASH SEVERITY	COUNT
2020	No Injury	1
2021	No Injury	1
2021	Suspected Injury	1
2022	No Injury	1

Acceptable crash rates are generally considered to be less than 2 crashes/MEV. Thus, these intersections are not considered to be a safety hazard. Figure 3 shows the crashes at both intersections.

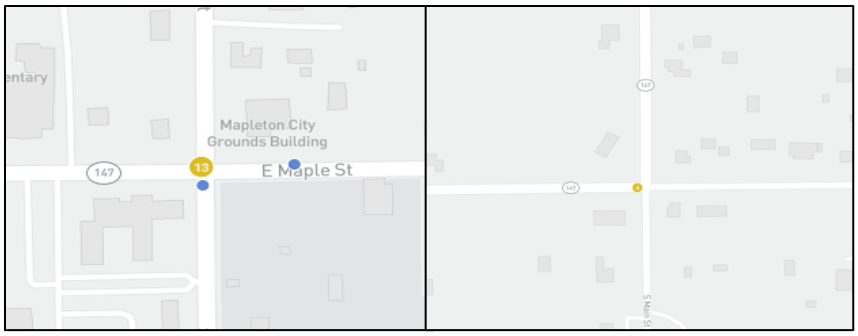


Figure 3: Crashes at Main St./1600 S. (right) and Main St./Maple St. (left)

Based on the crash and Annual Average Daily Traffic (AADT) data, crash Rates per Million Entering Vehicles (RMEV) were calculated. Main St. and Maple St. was estimated at 0.761 crashes/MEV and Main St. and 1600 S. was estimated at 0.854 crashes/MEV.

Peak Hour Determination

The AM and PM peak hours for the two intersections were calculated by finding the maximum entering vehicles for each intersection. It was estimated that the AM peak hour occurs from 7:30 AM to 8:30 AM. The PM peak hour was estimated to occur from 2:30 PM to 3:30 PM. Although data was not perfectly uniform between both data collection periods and between both intersections, the project team determined that these hours would be used for this project.

During the data collection period, the effects of bicycles on the intersection were negligible for both intersections. For Main St. and 1600 S., pedestrian impacts on the network were also negligible. Pedestrians are not negligible for Maple Street and Main St.. The pedestrian peak hours for Main St. and Maple St. are from 9:00 AM to 10:00 AM (18 crossing pedestrians), and from 3:30 PM to 4:30 PM (45 crossing pedestrians).

Figure 4 and Figure 5 show the peak entering vehicles for the two intersections during the AM and PM peak periods. Counts are in the format “AM (PM)”.

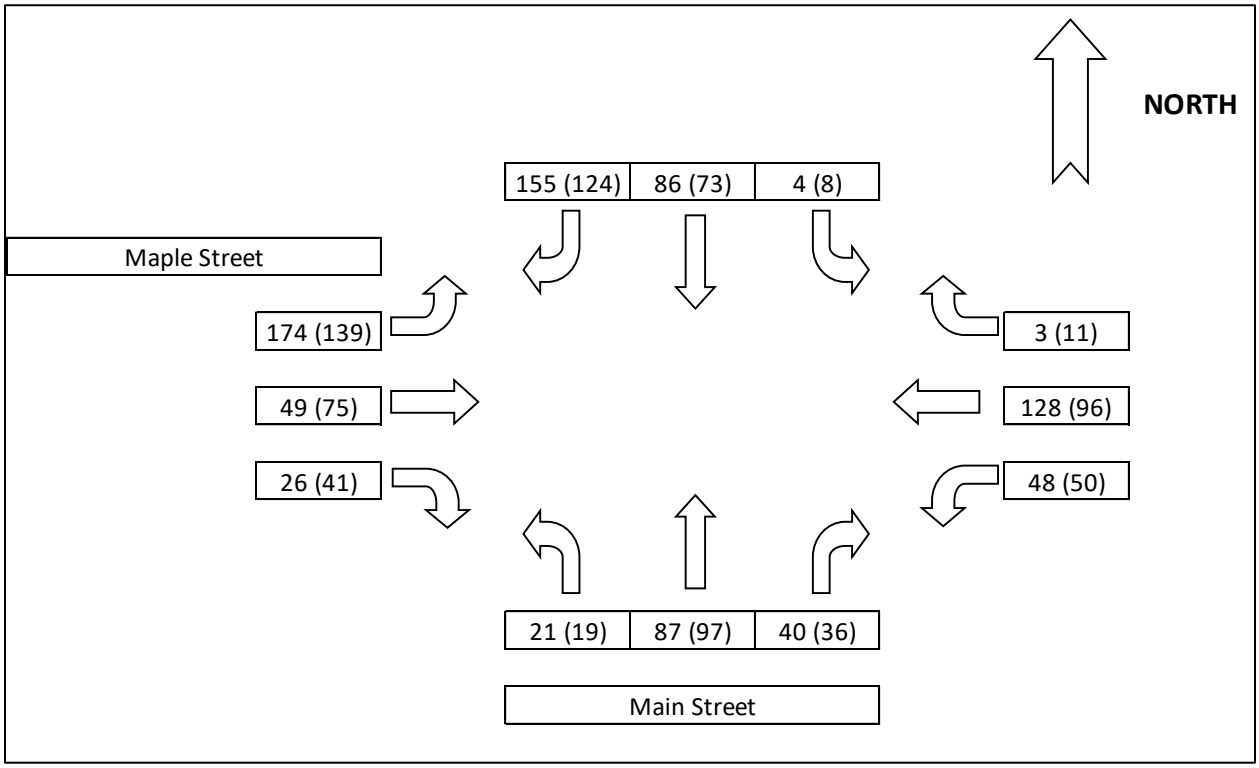


Figure 4: Main St. and Maple St. Peak Entering Vehicles

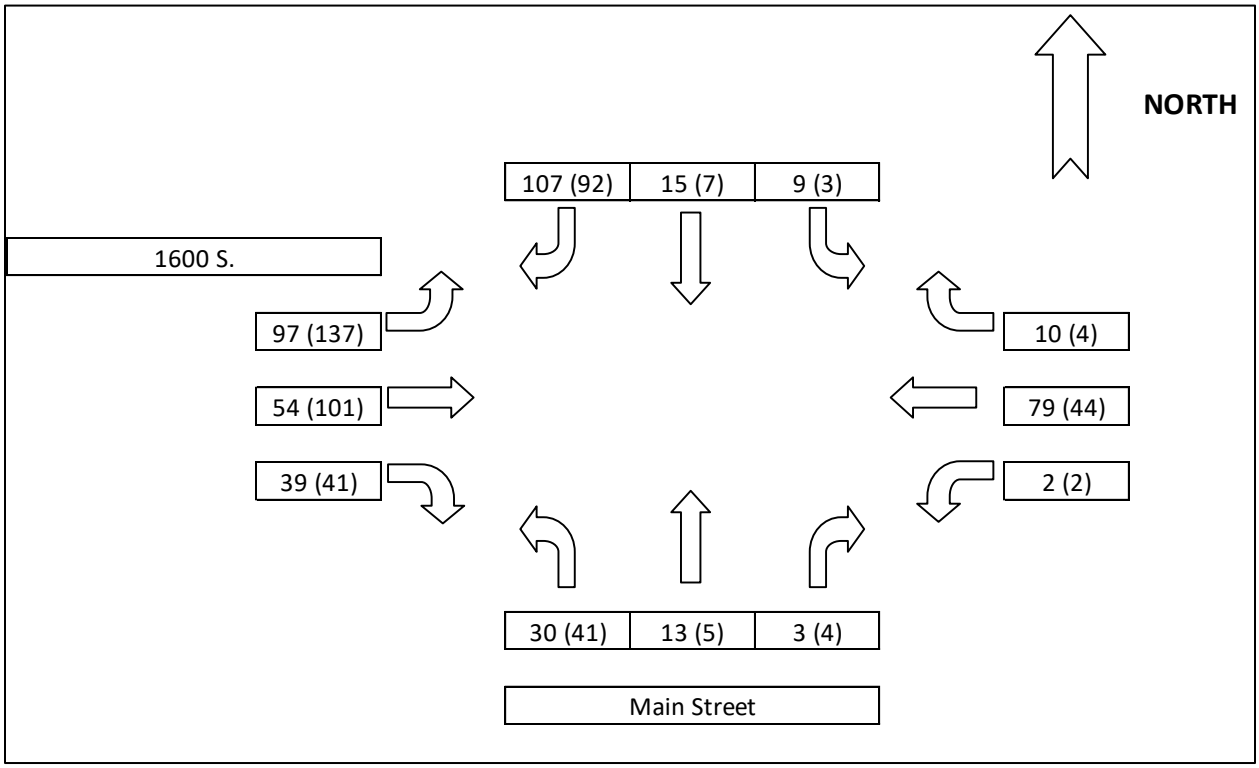


Figure 5: Main St. and 1600 S. Peak Entering Vehicles

Peak Hour Factors were determined from the data. Table 3 shows the Peak Hour Factor for each intersection during the AM/PM peaks. While most of the peaks appear to be well distributed, the AM peak for Main St. and Maple St. tends to peak over a 15–30-minute period, thus resulting in a relatively low Peak Hour Factor.

Table 3: Peak Hour Factors

	MAIN ST. /MAPLE ST.	MAIN ST. /1600 S.
AM PEAK	0.66	0.78
PM PEAK	0.78	0.91

Traffic Signal Warrants

Traffic signal warrants were calculated using Highway Capacity Software (HCS7). After adding the necessary data to the program for both intersections, it was determined that none of the traffic signal warrants for satisfied for either intersection. See Appendix C for the individual reports.

Currently, Main St. and Maple St. is an All-Way Stop Control intersection while Main St. and 1600 S. is a Two-Way Stop Control intersection. Neither intersection with current volumes warrants a signal. Additional studies should be performed to determine if Main St. and 1600 S. warrants All-Way Stop Control intersection, but findings up to this point do not exclude a roundabout as an alternate solution to existing conditions.

Growth Rate

Historical AADT counts were collected from UDOT's website (UDOT 2023) to estimate a future growth rate. Unrounded AADT values were collected from 2015 to 2019 from three different roadway segments surrounding the two intersections. From the 5-years of data, an average compounded growth rate of 2.3% was calculated.

In addition to the AADT data, data from the Mountainland Association of Governments (MAG) Small Area Population (MAG 2020) was gathered for Mapleton City. A compounded growth rate of 1.9% was derived from the data, while an average growth rate of 2.1% was calculated.

For design purposes, the average growth rate was rounded up to the nearest 0.5%. A rounded growth rate of 2.5% will be used for future growth projections. Figure 6 and Figure 7 show the estimated growth for each intersection in AM and PM peaks.

Additionally, referring to "The Preserve Traffic Impact Study (Horrocks Engineering 2017)," projected future growth on the SE part of Mapleton UT is expected to add

additional traffic to the Main St. and 1600 S. intersection. It was assumed that the project will complete Phase 3 by 2050. Additional volumes to the Main St. and 1600 S. intersection based on the projected traffic volumes for The Preserve are shown in Figure 8.

Figure 9 shows the 2050 Future Growth + "The Preserve" Volumes for Main St. and 1600 S. These volumes will be used for the projected growth models.

Additional volumes were projected for 2030 and 2040 using the same methodology as previously described. However, for the sake of brevity, volumes are not included in this report. Projected volumes from the Preserve development were included in the 2030 and 2040 total volumes.

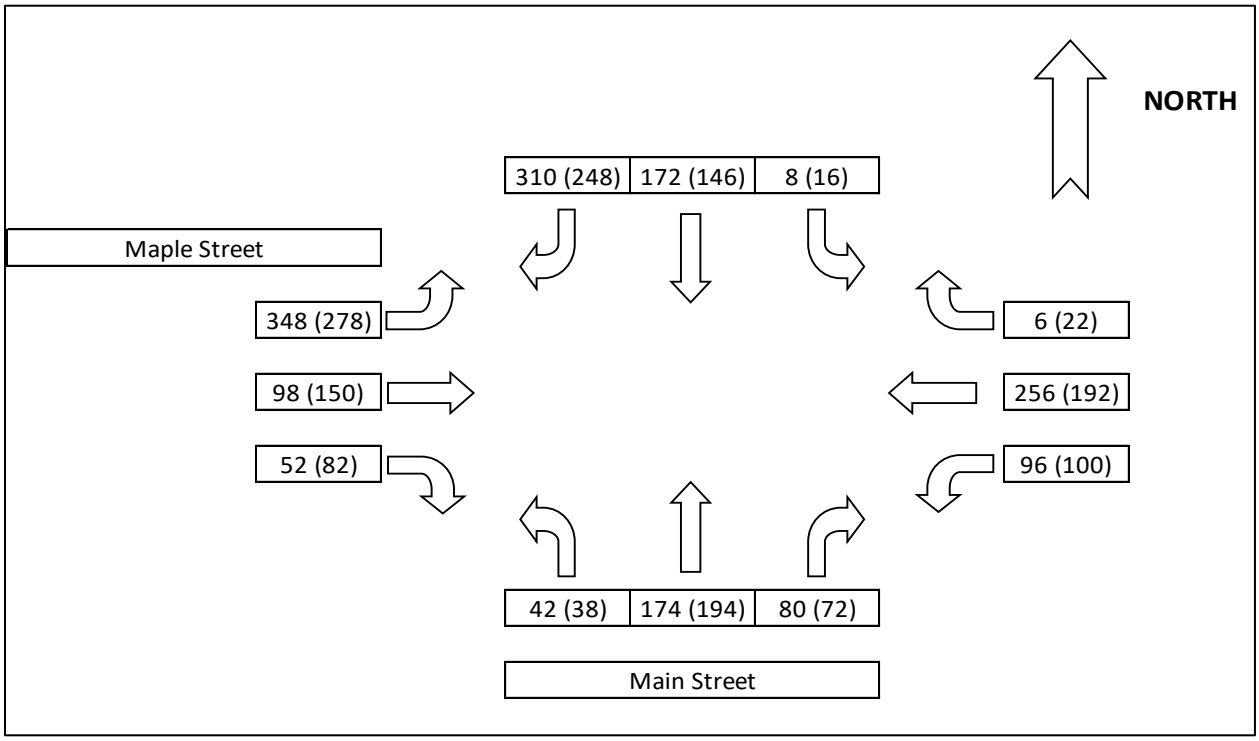


Figure 6: Main St. and Maple St. 2050 Projected Volumes

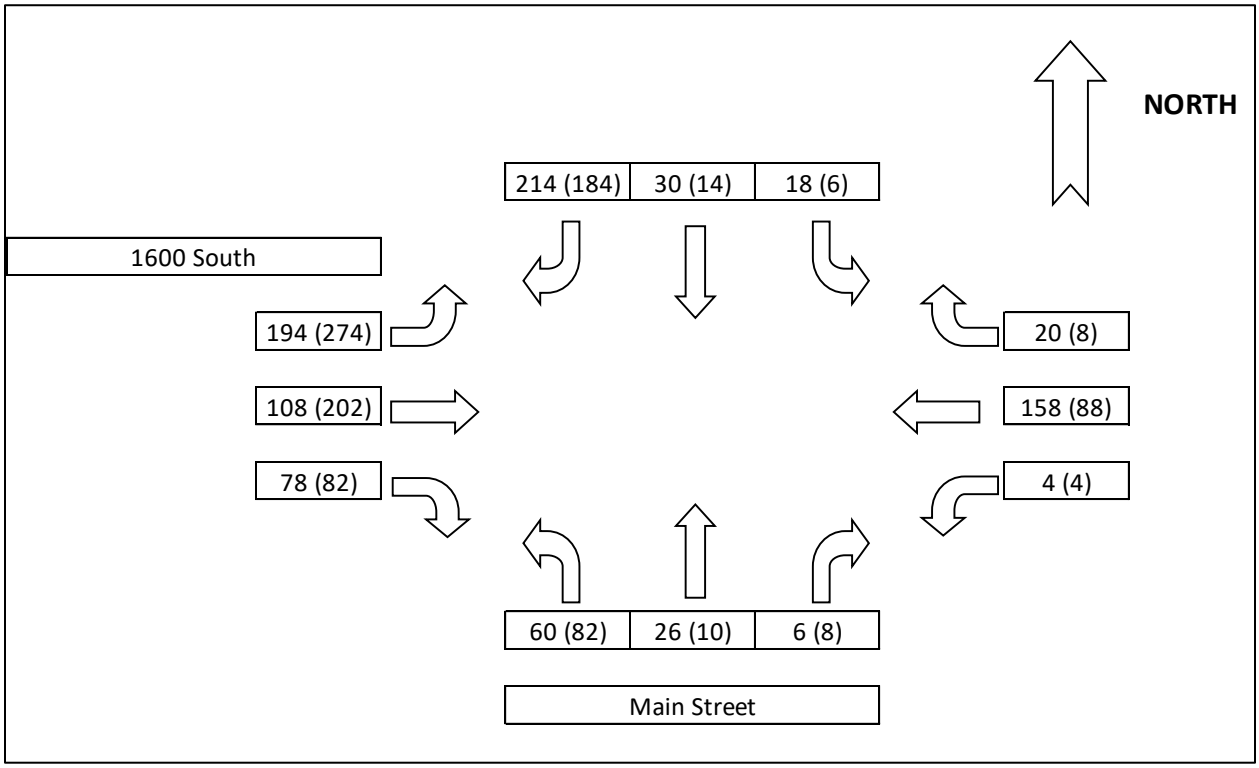


Figure 7: Main St. and 1600 S. 2050 Projected Volumes

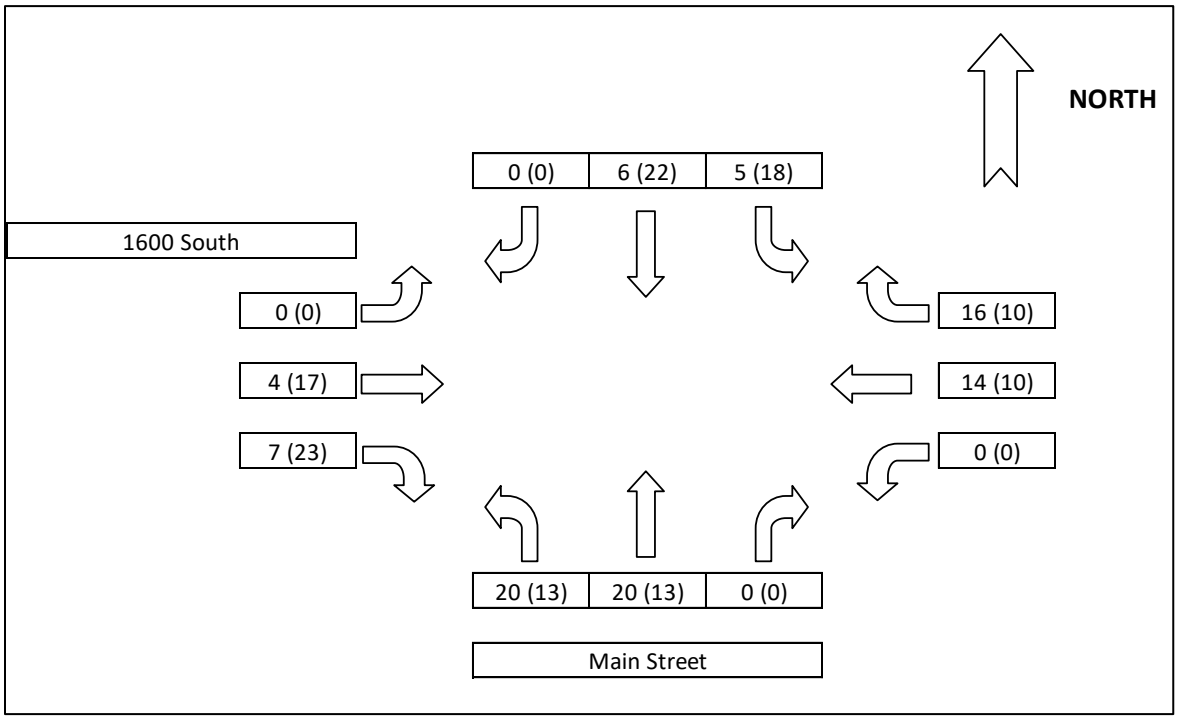


Figure 8: Main St. and 1600 S. "The Preserve" Volumes

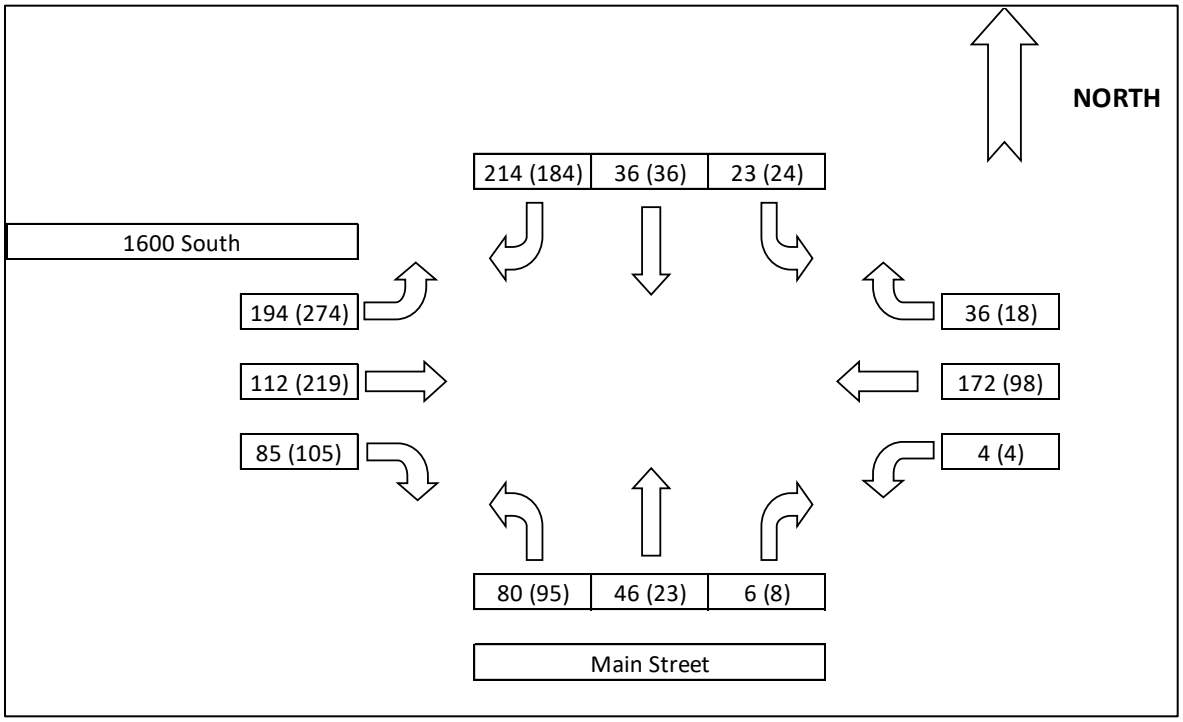


Figure 9: Main St. and 1600 S., 2050 Projected + Preserve Volumes

Conflicting and Entering Flow

Conflicting and entering flows were calculated using the methodology from NCHRP Report 672 (NCHRP 2000). Table 4 and Table 5 show the base maximum conflicting and entering movements for the two proposed roundabouts. For Main St. and Maple St., the maximum flow was during the AM peak, and for Main St. and 1600 S., the maximum flow was during the PM peak.

Table 4: Main St. and Maple St. Base Key Roundabout Volumes (AM)

	NB	EB	SB	WB
Conflicting	227	138	197	282
Entering	148	179	245	249

Table 5: Main St. and 1600 S., Base Key Roundabout Volumes (PM)

	NB	EB	SB	WB
Conflicting	241	12	87	183
Entering	50	50	116	279

Tables 6 and Table 7 show the projected growth volumes in 2050.

Table 6: Main St. and Maple St. 2050 Key Roundabout Volumes (AM)

	NB	EB	SB	WB
Conflicting	454	276	394	564
Entering	296	358	490	498

Table 7: Main St. and 1600 S., 2050 Key Roundabout Volumes (PM)

	NB	EB	SB	WB
Conflicting	482	24	174	366
Entering	100	100	232	558

Additionally, Table 8 shows the combined volumes for Main St. and 1600 S. with the Preserve volumes (PM).

Table 8: Main St. and 1600 S., 2050 + Preserve Key Roundabout Volumes (PM)

	NB	EB	SB	WB
Conflicting	504	35	197	392
Entering	126	120	243	598

Based on guidelines from NCHRP Report 672 (NCHRP 2000), designated right turn lanes are suggested when the sum of conflicting and entering vehicles for a movement is greater than 1200 vehicles. None of the entrances for either intersection warrant a designated right turn movement.

Traffic Modeling and Analysis

Vehicle delay and interactions were modeled using PTV VISSIM 2021 traffic analysis software. In total, 16 models were created to predict the interactions between vehicles during AM/PM peaks, at 2022/2030/2040/2050, and with existing or roundabout designs.

Existing conditions were modeling in reference to site visits and images available through Google Maps (Google 2023) and UDOT RoadViewer (UDOT 2023). Roundabouts were designed to fit the intersection. However, because the design of the roundabout was conducted simultaneously, the VISSIM model does not reflect the fine details of those models. Entering and exiting approaches were designed to be as natural as possible.

Calibration of the model was limited to the observation of simulated driver behavior at the two intersections. Travel time calibration was not implemented for this model. It was observed that drivers preformed as expected in the model.

However, modeling the intersection design at Main St. and Maple St. accurately in VISSIM is challenging due to the presence of a 4-way stop sign. To address this limitation, priority rules and conflict areas were implemented to create an intersection that adequately models driver behavior. Conflict areas instruct vehicles to avoid direct conflicts with other vehicles on different links, while priority rules instruct drivers to be aware of other vehicles not initially in direct conflict. The driver behavior at Main St. and 1600 S. was modeled using priority rules. Similarly, the driver behavior at the two roundabouts was accurately modeled using priority rules.

To quantitatively compare the results between the models, VISSIM driver delay data was collected after running 10 simulation runs of the model, and the averages were compiled. Traffic volumes, vehicle delay (measured in seconds per vehicle), average queue length (measured in feet), and the standard deviations for delay and queue length were also collected from the VISSIM models. Using the methodology from the Highway Capacity Manual (HCM), a Level of Service (LOS) was determined. The criteria for the LOS are shown in Table 9. For more detailed results, see Appendix D.

Table 9: Level of Service Criterium

LOS	Average Control Delay (sec/veh)	Description
A	≤ 10	Free flow traffic
B	>10 – 15	Stable flow (slight delays)
C	>15 – 25	Stable flow (acceptable delays)
D	>25 – 35	Approaching unstable flow (tolerable delay)
E	>35 – 50	Unstable flow (intolerable delay)
F	>50	Forced flow (congested and queues fail to clear)

Additional analysis was also conducted using HCS7, a HCM software. Reports were generated for the 32 intersection variations. Appendix E contains the reports and a summary table.

Table 10 compares the intersection driver delay and LOS for the VISSIM and HCM Analysis.

Although the results have key differences, the general trends in the data are generally consistent. At Main St. and 1600 S., there is a significant difference in the LOS and driver delay analysis in the two models. It is insightful that the general trends are evident, although on different magnitudes.

The HCM analysis shows that a roundabout would be highly beneficial for both intersections through the 2050 horizon year. Benefits are also present in the VISSIM analysis but are less present after the 2030 horizon year.

Installing a roundabout would improve traffic conditions for the two intersections. However, conditions at Main St. and Maple St., may necessitation the consideration of a traffic signal installation for greater reductions in vehicle delay.

Table 10: VISSIM and HCM Level of Service Analysis Results

				HCM		VISSIM	
Intersection	Year	Condition	Time	Delay	LOS	Delay	LOS
Main St. and Maple St.	2022	No Build	AM	13.70	B	12.17	B
Main St. and Maple St.	2022	No Build	PM	11.10	B	10.42	B
Main St. and Maple St.	2030	No Build	AM	18.80	C	13.06	B
Main St. and Maple St.	2030	No Build	PM	12.50	B	10.43	B
Main St. and Maple St.	2040	No Build	AM	58.50	F	23.43	C
Main St. and Maple St.	2040	No Build	PM	18.70	F	12.34	B
Main St. and Maple St.	2050	No Build	AM	305.70	F	40.94	E
Main St. and Maple St.	2050	No Build	PM	31.70	D	20.11	C
Main St. and 1600 S.	2022	No Build	AM	9[1]	A*	1.87	A
Main St. and 1600 S.	2022	No Build	PM	7.9[1]	A*	1.55	A
Main St. and 1600 S.	2030	No Build	AM	13.4[1]	B*	2.81	A
Main St. and 1600 S.	2030	No Build	PM	11.8[1]	B*	2.43	A
Main St. and 1600 S.	2040	No Build	AM	25.5[1]	D*	3.13	A
Main St. and 1600 S.	2040	No Build	PM	18.8[1]	C*	2.78	A
Main St. and 1600 S.	2050	No Build	AM	51.7[1]	F*	3.53	A
Main St. and 1600 S.	2050	No Build	PM	280.1[1]	F*	3.24	A
Main St. and Maple St.	2022	Build	AM	7.2	A	4.93	A
Main St. and Maple St.	2022	Build	PM	6	A	3.49	A
Main St. and Maple St.	2030	Build	AM	8.3	A	10.26	B
Main St. and Maple St.	2030	Build	PM	7.4	A	4.58	A
Main St. and Maple St.	2040	Build	AM	15.1	C	34.86	D
Main St. and Maple St.	2040	Build	PM	9.7	A	8.76	A
Main St. and Maple St.	2050	Build	AM	47.4	E	59.54	F
Main St. and Maple St.	2050	Build	PM	14.1	B	32.82	D
Main St. and 1600 S.	2022	Build	AM	4.3	A	1.59	A
Main St. and 1600 S.	2022	Build	PM	4.3	A	1.72	A
Main St. and 1600 S.	2030	Build	AM	5.1	A	2.19	A
Main St. and 1600 S.	2030	Build	PM	5.1	A	2.55	A
Main St. and 1600 S.	2040	Build	AM	5.9	A	2.82	A
Main St. and 1600 S.	2040	Build	PM	6.2	A	3.50	A
Main St. and 1600 S.	2050	Build	AM	6.7	A	3.67	A
Main St. and 1600 S.	2050	Build	PM	8.8	A	5.31	A

* Extrapolated using HCM Unsignalized Intersection Methodology
[1] Created using a weighted mean between the delay and the volume of the movement's

Conceptual Design

Having conducted the traffic analysis for the two intersections of concern, conceptual geometric designs were explored to determine the feasibility of installing roundabouts at these locations. The City of Mapleton desired to install roundabouts capable of handling current and future volumes and capacities that would assist in slowing down drivers and providing sufficient turning movements for design vehicles. Most importantly, the City of Mapleton desired to be a roundabout positioned within existing right-of-way for each intersection.

The design vehicle used for the conceptual designs was the S-BUS 40 Large School Bus as determined by the City of Mapleton. Additionally, passenger cars with boat and camper trailers, and motorhomes with boat trailers were tested because it was noted that several residents in the city own these vehicles.

The Main St. and Maple St. intersection has five potential parcels that may be affected by a roundabout. Two out of the five are owned by the city, with the others being owned by individual residents and The Church of Jesus Christ of Latter-Day Saints, as shown in Figure 10.

The Main St. and 1600 S. intersection has six parcels that can be affected by a roundabout due to the alignment of the roads. The city owns two of the six parcels including the right-of-way for E 1600 S., as shown in Figure 11. This alignment and parcel ownership creates a challenge in creating a roundabout that follows national standards.

The information from the data analysis indicates that a single-lane roundabout is likely to operate acceptably in current conditions, but for future years additional analysis may be needed (See NCHRP 672 Report (NCHRP 2000) Exhibit 3-12 and Exhibit 3-14).

The conceptual designs were produced using the Autodesk Civil 3D Roundabout Tool. This tool incorporates information from MUTCD (MUTCD 2009), NCHRP Report 672 (NCHRP 2000), and FHWA (FHWA 2000 and FHWA 2006) standards for roundabouts to ensure designs are within regulation. Additionally, the program performs a Fastest Path Analysis and SweptPath Analysis which determines if the geometric design helps mitigate the speeds of the vehicles and if the design vehicles can make the turns.

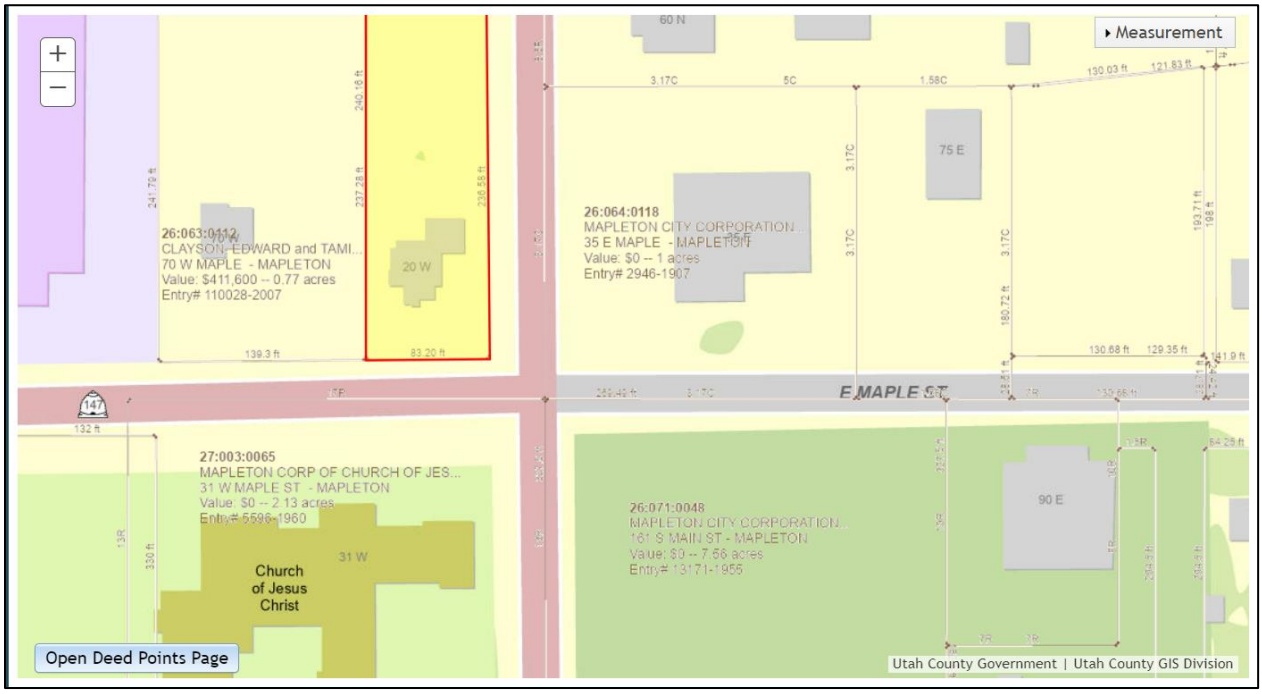


Figure 10: Main St. and Maple St. Map from Utah County Parcels

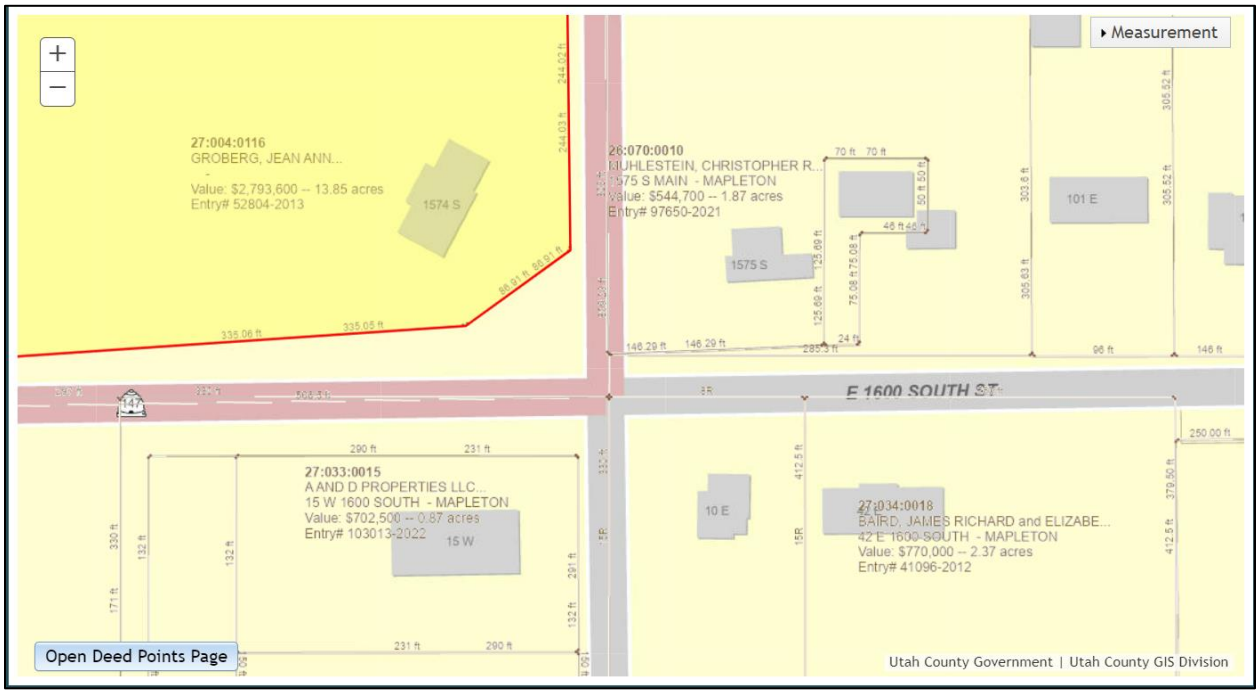


Figure 11: Main St. and 1600 S. Map from Utah County Parcels

The concepts drawings produced can be found in Appendix F of this report. The following sections provide information for each roundabout design. For reference of terms please refer to Figure 12 which is Exhibit 6-2 from the NCHRP Report 672 (NCHRP 2000).

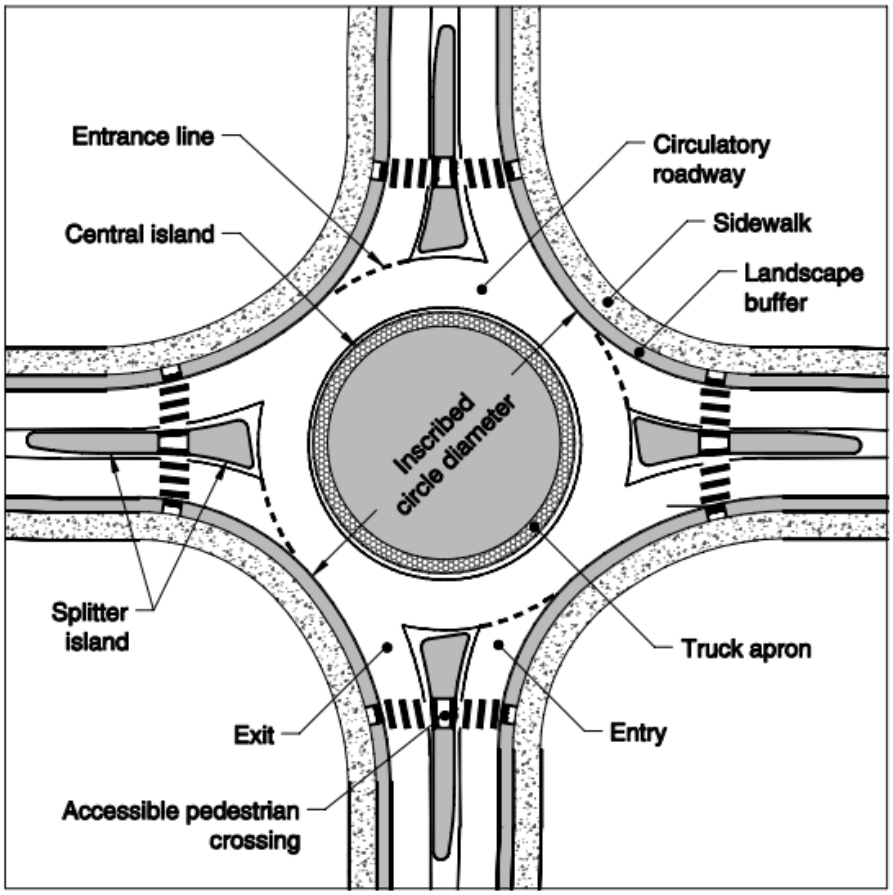


Figure 12: Exhibit 6-2 Basic Geometric Elements of a Roundabout (NCHRP 672 Report)

Main St. and Maple St.

The roundabout designed for the intersection of Main St. and Maple St. has an 89 ft. inscribed diameter. This roundabout includes a 59 ft. truck apron for longer vehicles to make the turn. According to the Sweptpath Analysis all design vehicles can make all turns in this design.

The Fastest Path Analysis determined that the current design of entry lanes were able to achieve and encourage speeds faster than the design speed, however this is not a

concern since the speeds were faster no more than 3 miles per hour. All other design elements were in accordance with the specifications of the used standards.

This intersection includes splitter islands with crosswalks to accommodate pedestrian traffic in the area. This intersection is down the street from an elementary school, so it has more pedestrian traffic than other intersections in the city. All markings and signage included in this intersection were the recommended devices as determined by the MUTCD (MUTCD 2009). The markings and signage indicated includes the following:

- Yield Line with Yield Sign
- Roundabout Direction Sign
- Pedestrian Crossing Sign
- Street Signs
- Roundabout Markings

The traffic control devices, along with the geometric design of the roundabout and its elements, provide adequate protection for drivers, pedestrians, and cyclists in the area.

Main St. and 1600 S.

The roundabout designed for the intersection of Main St. and 1600 S. has a 95 ft. inscribed diameter. This roundabout includes a 60 ft. truck apron for longer vehicles to make the turn. According to the Sweptpath Analysis all design vehicles can make all turns in this design.

The Fastest Path Analysis was a concern for this intersection because some speeds were extremely high or were unable to be determined based on the geometry of the roundabout. Due to the arrangement of the parcels owned by the city, an offset roundabout was used to fit within the existing parameters.

This offset alignment allows for a more linear path on 1600 S. traveling eastbound. This is like a regular intersection. Additionally, traveling northbound on Main St. produces the same effect, which allows drivers to go through the intersection at high speeds. The high speed indicated by the analysis is not anticipated to be a problem as long as proper markings and signage are installed.

This intersection includes splitter islands only because there is no pedestrian infrastructure in the area, and little to no pedestrian traffic. All markings and signage included in this intersection were the recommended devices as determined by the MUTCD (MUTCD 2009). The markings and signage indicated includes the following:

- Yield Line with Yield Sign
- Roundabout Direction Sign
- Street Signs
- Roundabout Markings

These traffic control devices, along with the geometric design of the roundabout and its elements, provide adequate protection for drivers, pedestrians, and cyclists in the area.

Related Issues

According to the FHWA (FHWA 2000), roundabouts are a proven safety countermeasure by:

- Improving safety.
- Promoting lower speeds and traffic calming.
- Reduce conflict points.
- Lead to improved operational performance.
- Meet a wide range of traffic conditions because they are versatile in size, shape, and design.

These effects of roundabouts have direct and indirect impacts on public health, safety, welfare, society, the environment, and the economy. Local municipalities and state DOTs should consider roundabouts when intersections don't warrant a signal, but current traffic conditions are not operational or safe.

Overall roundabouts have a positive impact on public health and safety, as their primary purpose is to reduce crashes. Roundabouts are safer because they reduce the potential conflict points between vehicles, as seen in Figure 13, specifically the high-severity conflicts. Additionally, due to their geometry of a combination of curves and turns, they force drivers to slow down if they are efficiently designed.

The NCHRP 672 Report states size, position, and alignment of the roundabout approach can affect the speed of vehicles entering and exiting a roundabout. It is recommended that offset alignment to the left of the center, or an alignment through the center is best for reducing the speeds or vehicles traveling through a roundabout.

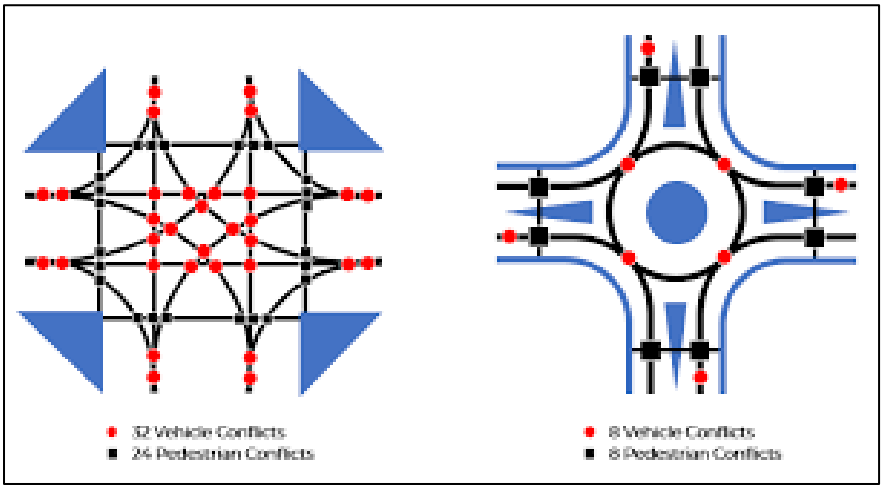


Figure 13: Conflict Points Comparison for Roundabouts (City of Spanish Fork)

In addition to the reduction in speed and conflict points, roundabouts also give safety benefits to other users such as bicyclists and pedestrians. Depending on the design and infrastructure added to the roundabout design, pedestrian and cyclist collisions can be reduced.

If the intersection has a high volume of pedestrian traffic, then adding a crosswalk may be necessary, but because of the splitter islands typically constructed with the crosswalks and roundabouts, pedestrians need only worry about one direction of traffic. For cyclists, if bike lanes or bike ramps are added to the roundabout, then the safety of cyclists increases.

Besides safety, roundabouts tend to improve operational performance. The effect of the geometry of the roundabout can allow for continuous flow of traffic so that it is able to handle the volumes and capacity of the intersection despite the reduction of speed. For this purpose, roundabouts are typically considered when a 4-way stop is starting to decrease in service or safety issues are apparent, but a signalized intersection is not warranted.

For Mapleton City, it was apparent that the 4-way stops at Main St. and Maple St., and Main St. and 1600 S. were beginning to be congested at peak hours, and were unsafe for drivers, pedestrians, and cyclists. There are multiple times a day that drivers are going at high speeds, and don't see the stop signs, thus almost colliding with one another. The safety concerns were the main reasoning for the roundabout concepts to be explored.

Although the crash data analysis shows that safety is not a concern, there were concerns because of the nearby school and the fast-growing economic development happening in Mapleton City. Additionally, concerns were raised regarding the operational performance of the intersections due to the rise in development and trips being assigned through these intersections. Constructing roundabouts at these intersections will improve the safety and operation of these roadways by providing the above-mentioned benefits.

Lastly, the indirect environmental and economic benefits of these roundabouts for the City of Mapleton are evident. Roundabouts can have continuous flow, and congestion and idle of vehicles is reduced, reducing emissions from vehicles.

Furthermore, lowering the potential for crashes has the possibility of saving lives of the citizens of Mapleton City, but also can help them save on insurance and material costs. With individuals getting into fewer crashes, insurance prices can be lowered, saving Mapleton City citizens on car insurance. Additionally, money is being saved on not buying a new car or getting repairs done because potential crashes are prevented.

Throughout the years as the City of Mapleton continues to develop and grow economically, providing a roundabout capable of operating with this future growth is important economically. These roundabouts will provide accessibility and short travel time for the travelers of Mapleton City by effectively and efficiently controlling current and future traffic.

Lessons Learned

One challenge the team faced was building a VISSIM model and related analysis spreadsheets from scratch. However, by referencing manuals and spending adequate amounts of time on the project, solutions became evident.

The design of a roundabout involves various considerations, including design requirements and ways to mitigate travel speeds. The team faced two main challenges during the process, which included understanding all the requirements for an effective and efficient roundabout and using appropriate software to create a roundabout in accordance with the standards.

To enhance their understanding of the different elements of a roundabout, the team invited Bill Baranowski, Salt Lake City Planner and Founder of Roundabouts USA, to speak to them. His presentation, titled “Introduction to Roundabout Design – and Some Recent Examples,” provided valuable insights. After reviewing NCHRP Report 672 (NCHRP 2000) and hearing from Bill, the team better understood the different elements of a roundabout and their purposes.

If given the opportunity to do it again, they would have invited Mr. Baranowski to speak to them earlier in the process to begin the design sooner. The team found it easier to comprehend the report after Bill's presentation and was able to focus on the necessary sections to complete the task.

The software used was the Roundabout Tool in Autodesk Civil 3D. Due to the element requirements specified in NCHRP Report 672 (NCHRP 2000), manual drafting of a roundabout is very challenging. The Roundabout Tool within Autodesk Civil 3D simplified this process as it created the roundabout and performed the necessary analysis involved with the geometric design with minimal user input.

Conclusions

As requested from Mapleton City Public Works Division, DADS Engineering modeled the feasibility and practicality of installing roundabout intersections at Main St. and Maple St., and Main St. and 1600 S. in Mapleton, UT.

Before the start of the study, it was known that the current four-way stop signs were not an optimal solution for traffic flow and safety, and that the issue would only get worse with increasing population growth. The team explored the possibility of signalized intersections, and conducted a traffic analysis using HCS7 warrants report to determine the need for a roundabout. The results showed that traffic signals were not necessary at either intersection, leading the team to conclude that roundabouts would be the best option.

Additionally, the VISSIM model provided comparisons between un-signalized intersections and roundabout intersections, the intersections with roundabouts consistently had a far better level of service compared to the current system. It is important to note, however, that roundabouts are not going to constantly promote a high level of service, as the VISSIM model shows significant delays during peak and high-volume periods. This does not mean that roundabouts will be ineffective or unnecessary, but simply that there will always be additional factors to consider optimizing traffic flow.

To conclude, a roundabout at Main St. and Maple St. would be a sufficient alternative to existing conditions until volume growths warrant a signalized intersection. Furthermore, a roundabout at Main St. and 1600 S. would increase traffic flow. However, due to existing right-of-way constraints, additional design is needed to verify the performance and practicability of installation.

Recommendations

Based off all the data from the VISSIM traffic analysis, signal warrant study, and right-of-way availability, DADS Engineering recommends roundabouts at Main St. and Maple St., and Main St. and 1600 S. as effective means of improving traffic flow and community safety. Appendix F provides multiple iterations of potential roundabout designs that illustrate our recommendation.

Due to population and economic growth in Mapleton City in the upcoming years, it is recommended that a licensed professional engineer investigate further the size and design of the roundabouts. The recommended conceptual designs provided meet the minimum requirements specified for geometric standards of roundabouts. These designs shall perform sufficiently with traffic growth until a certain point in the future.

While the use of roundabouts is recommended, the data and analyses aren't exhaustive for the needed considerations. As stated in the introduction, the scope of work did not include aspects such as a drainage analysis, material and production cost estimates, community outreach, and oversight by a licensed professional engineer. While these aspects must be considered and may further influence the efficacy of roundabouts in either intersection, the team is confident that the results and conclusions drawn from the study warrants the recommendation for the City of Mapleton to move forward in the areas beyond what was included in the scope of work.

References

City of Spanish Fork. “How to Navigate a Roundabout” 2020. [Online]. Available: https://www.spanishfork.org/news_detail_T17_R163.php [Accessed Feb. 2023].

Google. Google Maps. [Online]. Available: https://www.google.com/maps [Accessed: Jan. 2023].

Horrocks Engineers. "The Preserve Traffic Impact Study," 2017.

Mountainland Association of Governments. "Mountainland AOG Small Area Population and Employment Projections," 2020. [Online]. Available: https://mountainland.org/static/files/data/demographics/MAG%20Small%20Area%20Population%20Projections%202019.pdf [Accessed: Jan. 2023].

National Cooperative Highway Research Program (NCHRP). NCHRP Report 672: Roundabouts: An Informational Guide – First Edition. Transportation Research Board of the National Academies, Washington, D.C., 2000.

MUTCD: Federal Highway Administration. (2009). Manual on Uniform Traffic Control Devices for Streets and Highways. (MUTCD). [Online] Available: https://mutcd.fhwa.dot.gov/ [Accessed: Jan. 2023]

FHWA Standards: Federal Highway Administration. (2006). Highway Safety Improvement Program. (HSIP) Manual. [Online] Available: https://safety.fhwa.dot.gov/hsip/guidance/hsipman2006/ [Accessed: Feb. 2023]

FHWA. (2000). Roundabouts: An Informational Guide. (FHWA-RD-00-067). Federal Highway Administration, U.S. Department of Transportation. [Online] Available: https://www.fhwa.dot.gov/publications/research/safety/00067/ [Accessed: Feb. 2023]

Numetric. "AASHTOWare Utah Crash Portal," 2023. [Online]. Available: https://www.numetric.com/ [Accessed: Feb. 2023].

Utah Geospatial Resource Center (UGRC). "Utah GIS Portal," 2023. [Online]. Available: https://gis.utah.gov/ [Accessed: 2023].

Utah Department of Transportation (UDOT). "UDOT Traffic Data," 2023. [Online]. Available: https://www.udot.utah.gov/connect/business/traffic-data/ [Accessed: Feb. 2023].

UDOT. "Roadview Explorer 5," 2023. [Online]. Available: https://roadview.udot.utah.gov/utah/ [Accessed: Jan. 2023].

Appendix A: Resumes

Dylan Apelu (Engineer in Training)

(808)-232-9446 · dylanapelu22@gmail.com · www.linkedin.com/in/DylanApelu

EDUCATION

Brigham Young University Jan 2019-Apr 2023

Bachelor of Science: Civil and Environmental Engineering, Emphasis in Transportation/Structures Provo, UT

- GPA 3.83
- Multicultural-Student-Services Scholarship, Brigham Young University Scholarship.
- American Society of Civil Engineering, ITE, BYU Steel Bridge
- Residential Landscape Design, Computational Methods, Statics, Dynamics, Global Leadership, Sustainable Infrastructure, Structural Analysis, Material Science, Fluid Theory, Steel Design.

PROJECTS/RESEARCH

Measuring Pavement Smoothness from the Perspective of E-scooters April 2021-Present

Research Assistant Provo, UT

- Creating a network of over 8,000 road segments for mapping GPS and smoothness data.
- Collecting smoothness data of over 8,000 road segments of road on a E-scooter for interpretation.
- Analyze and interpret collected data to conduct a route choice model based on pavement smoothness.

EXPERIENCE (Additional Experience Available as Requested)

T-O Engineers/Ardurra Aug 2022-Present

Aviation Staff Engineer/Planner Heber City, UT

- Assist in design of 4+ airport projects for fence replacement and runway/taxiway reconstruction/seal coat.
- RPR onsite inspection and management for 4+ airport projects in mountain district region.
- Assist project engineers and planners on various tasks including AIP, CIP, Masterplans, Bid Docs, Plan Set, and Project Manual.

Special Projects Department May 2022 – August 2022

Field Engineer Intern Laie, HI

- Strategize with Project Manager, Architect, and General Contractor to construct 4 duplexes in accordance with FEMA code regulations.
- Assist Project Manager with quality control and quality assurance on multiple multi-million-dollar projects.
- Track RFI, Submittals, Purchase Orders, Change Orders, and Approvals between 7-8 commercial projects
- Compile 20+ test results, soil reports, SWPPP reports, and project status reports for director's use.
- Strategically plan and track 25+ permits currently in plan review.
- Create processes and procedures for clients and employer's use.

MW Brown Engineering Inc April 2021-April 2022

Civil Engineering Design Intern Orem, UT

- Organized proposals, construction bids, cost estimates, technical reports for over 50 project submittals.
- Designed concept, preliminary, final, and as built plan sets for over 20 clients in land development.
- Detected and corrected plans according to city code and design criteria.

VOLUNTEER EXPERIENCE (Additional Volunteer Work Available as Requested)

Taylorsville Highschool Football Team Nov 2014-Nov 2016

JV Defensive Coordinator and Varsity Assistant Defensive Coordinator Taylorsville, UT

- Established clear performance targets and evaluated player and team achievements.
- Collaborated with Head Coach and players to maintain a consistent athletic program.
- Aided in supporting effective relationships with school board and community members.

SKILLS/INTERESTS/ACHIEVEMENTS/ABILITIES

- Engineer in Training (EIT) *Successfully passed FE Exam
- Elementary Marshallese
- Basic VBA and Python
- AutoCAD/Revit/OpenSite/Microstation/Inroads/ArcGIS/Bluebeam/Procore
- *Driving into the Pandemic, Walking and Cycling out with Permanence* (http://www.et.byu.edu/~dapelu22/Transpo/361_project.html)
- Coordination and Leadership in team projects
- Scheduling/Telecommunications/Inventory Management/Cost Estimation and Budgeting

Adam Hill

Brigham Young University Civil and Construction Engineering Undergraduate/Graduate Student

Hill.adamw1@gmail.com
380 N 1020 E, Apt 203
Provo UT, 84606
C: (240) 600-1742
linkedin.com/in/adam-hill3512

Work Experience:

Traffic Engineering Intern – AECOM, *SLC, UT*
May 2022 – Current

KEY PROJECTS

LP 1604 from US 281 to Redland Rd Corridor Renovation:

- Calculated and reported Road User Costs (RUC's) for construction build stages from a no-build VISSIM model

SH-75 Timmerman Junction to Timber Way:

- Developed a no-build VISSIM model for corridor by manipulating simulated driver behaviors
- Modified evaluation spreadsheets to compare travel time results and node-based evaluation results from base 2020 volumes to projected 2050 volumes

Research Assistant- UDOT/BYU, *Provo, UT*
Jan 2022 – Current

KEY PROJECT

ITS Effectiveness Evaluation in the State of Utah Research:

- Developing a research model to understand benefits and constraints of ITS to the public and UDOT staff
- Assisting in document preparation, and data analysis, for lead graduate student

Software Exposure:

- ArcGIS- Pro
- Civil-3D
- MS Office
- Revit
- VISSIM

Additional Applicable Experiences:

ITE Traffic Bowl– BYU, *Provo, UT*
June 2022

- Participated in a multi-university, jeopardy style competition based on transportation vocabulary

AISC Steel Bridge– BYU, *Provo, UT*
Sept 2022 – Current

- Designed and fabricated a 20' span bridge within design constraints to be speed built and loaded to 2.5 kips
- Won 1st place at Regional Competition and competed at the 2022 AISC Steel Bridge National Competition

Education:

Civil and Construction Engineering B.S.
Brigham Young University
May 2023
GPA: 3.75
Applying for Graduate School, to complete by Aug 2024

Leadership Experiences

Y-Group Leader – BYU, *Provo, UT*
Aug 2022

- Volunteered 20+ hours to assist 26 incoming freshmen acclimate to BYU campus through discussions and tours

ASCE Historian – BYU Student Chapter, *Provo, UT*
Sept 2021 – May 2022

- Compiled and maintained records for the yearly report, which received an honorable mention from ASCE National Leadership Council
- Supported the ASCE president in club activities, and goals
- Assisted in organizing and leading BYU ASCE delegation to the Intermountain Student Symposium in Las Vegas, NV

Awards

- BYU Department of Civil and Construction Engineering Ramesh M. Khona Scholarship Award (2021)
- BYU College of Engineering Howard S. Bennion Memorial Scholarship Award (2022)
- BYU Department of Civil and Construction Engineering Dr. W. Don & Kaye M. Budge Award and Scholarship (2022)
- Eagle Scout Award (2014)

Society Memberships:

- American institute of Steel Construction (AISC)
- American Society of Civil Engineers (ASCE)
- American Railway Engineering and Maintenance-of-Way Association (AREMA)
- Institute of Transportation Engineers (ITE)
- National Eagle Scouts of America (NESA)

Interests: Backpacking, fly fishing, historical and fantasy literature/films, religious and political history/theory

Daniel B. Neuffer

(541) 760-0274 | dbneuffer@gmail.com | linkedin.com/in/daniel-neuffer

EDUCATION

Brigham Young University, Fulton College of Engineering Provo, UT
Bachelor of Science, Civil Engineering Apr 2024

- Member of American Society of Civil Engineers
- Relevant Coursework: Structural Analysis, Fluid Dynamics, Mechanics of Materials, Transportation
- Skills: Civil 3D, SolidWorks, ArcGIS, Excel VBA, Russian language proficiency

EXPERIENCE

Kimley-Horn Salt Lake City, Utah
Production Intern Apr 2022 – Aug 2022

- Drafted plan sets for 10+ commercial and industrial developments with AutoCAD to provide general contractor with overall site plan, erosion control measures, grading elevations, and standard details
- Estimated roadway paint and chip seal quantities for 8-mile UDOT pavement rehabilitation project on US-191 in Price, Utah
- Improved clarity and constructability of Mayflower Resort lodge plans by updating redlines and callouts

T-O Engineers Heber City, Utah
Municipal Engineering Intern Apr 2021 – Aug 2021

- Ensured adherence to environmental best management practices and plan sets for 10 urban developments by conducting site observations and submitting 50+ quality assurance inspection reports
- Coordinated daily with general contractors regarding project status, answered regulatory questions, and provided feedback to guarantee the highest standards of public health and safety
- Authored comprehensive subdivision acceptance form outlining criteria for developers seeking county approval

Geostabilization International West Virginia, South Carolina
Engineering Intern May 2020 – Aug 2020

- Composed project submittal for foundation improvement contract, providing client with construction narrative, design specs, safety plan, equipment, personnel, and job certifications
- Verified integrity of shotcrete retaining walls on 45 separate DOT highway projects over 5 weeks by conducting and reporting soil nail verification tests using specialized equipment
- Recognized by Superintendent for exceptional work ethic having labored 60+ hours weekly over 6 weeks as field technician on 9 geohazard mitigation projects

Skylake Heating and Air Orem, UT
Technician May 2019 – Aug 2019

- Delivered reliable energy to 80 newly constructed homes by installing gas lines to code
- Installed 15 HVAC systems to high energy and cost-efficient standards for custom homes
- Commended by management team for high productivity and quality of work

SERVICE

The Church of Jesus Christ of Latter-day Saints Kyiv, Ukraine
Full-time Volunteer Representative Jul 2016 – Jun 2018

- Tracked and managed finances of 3 congregations and submitted quarterly audit reports
- Improved community relations by organizing local humanitarian efforts and service projects in 7 cities
- Taught English as a second language in English clubs and schools

Appendix B: Traffic Counts

TURNING MOVEMENT COUNT SUMMARY

BYU
Civil & Construction Engineering

INTERSECTION:
N-S STREET: *Main Street*
E-W STREET: *Mapleton Street*

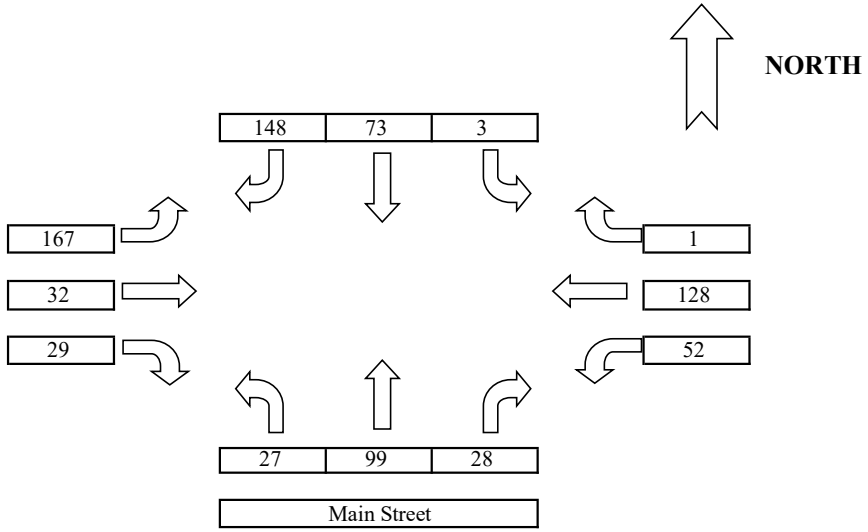
PROJ. NO.: *CE Capstone 02*
COUNT DATE: *1-Nov-22*
NOTES:

COUNT TIME:
FROM: *7:00 AM*
TO: *7:00 PM*

PK HR VOLUME:	787
PHF:	0.71
PEAK HOUR:	
FROM:	TO:
7:15 AM	8:15 AM

Mapleton Street

PEAK HOUR VOLUMES



COUNT DATA INPUT:

TIME PERIOD		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
FROM:	TO:	L	T	R	L	T	R	L	T	R	L	T	R	VOLUMES
7:00 AM	7:15 AM	2	5	1	15	4	2	1	10	23	1	15	1	80
7:15 AM	7:30 AM	3	13	3	22	3	8	1	9	16	5	19	0	102
7:30 AM	7:45 AM	10	36	8	69	10	7	1	20	50	19	38	0	268
7:45 AM	8:00 AM	6	39	13	56	11	6	1	25	50	23	48	0	278
8:00 AM	8:15 AM	8	11	4	20	8	8	0	19	32	5	23	1	139
8:15 AM	8:30 AM	8	13	1	17	10	5	1	9	16	1	15	0	96
8:30 AM	8:45 AM	9	15	3	16	10	1	1	14	17	5	22	1	114
8:45 AM	9:00 AM	9	9	3	16	12	12	2	15	13	4	20	0	115
9:00 AM	9:15 AM	17	16	2	27	18	28	1	18	16	17	35	1	196
9:15 AM	9:30 AM	8	11	0	14	7	15	4	9	16	3	20	1	108
9:30 AM	9:45 AM	7	11	1	21	11	4	1	11	18	3	18	1	107
9:45 AM	10:00 AM	6	8	2	14	13	6	0	9	13	2	20	1	94
10:00 AM	10:15 AM	9	3	4	12	12	7	0	9	19	3	9	0	87
10:15 AM	10:30 AM	4	9	3	7	16	7	2	10	7	1	11	0	77
10:30 AM	10:45 AM	4	7	2	14	17	3	0	11	13	4	14	1	90
10:45 AM	11:00 AM	9	11	3	12	10	5	0	9	18	4	17	3	101
11:00 AM	11:15 AM	6	5	3	14	10	6	4	11	13	1	18	1	92
11:15 AM	11:30 AM	10	7	5	22	10	6	3	13	19	4	19	5	123
11:30 AM	11:45 AM	7	2	5	16	13	3	0	13	26	3	5	2	95
11:45 AM	12:00 PM	4	4	4	16	16	12	2	15	16	1	17	3	110
12:00 PM	12:15 PM	10	15	3	11	14	2	4	13	22	5	22	1	122

TURNING MOVEMENT COUNT SUMMARY

12:15 PM	12:30 PM	10	8	3	21	20	13	1	13	7	0	10	3	109
12:30 PM	12:45 PM	3	11	2	10	17	2	2	7	22	2	23	1	102
12:45 PM	1:00 PM	8	15	4	22	21	5	2	16	23	3	24	2	145
1:00 PM	1:15 PM	6	15	3	17	19	6	0	10	9	2	14	2	103
1:15 PM	1:30 PM	3	10	2	15	118	6	3	7	8	1	17	0	190
1:30 PM	1:45 PM	6	9	2	19	9	7	5	11	7	1	11	4	91
1:45 PM	2:00 PM	7	6	5	26	17	7	0	12	11	3	16	0	110
2:00 PM	2:15 PM	5	14	3	25	17	8	1	5	7	1	11	1	98
2:15 PM	2:30 PM	3	17	5	34	12	15	4	8	6	2	11	3	120
2:30 PM	2:45 PM	11	32	11	69	24	9	2	17	37	14	35	1	262
2:45 PM	3:00 PM	10	25	14	28	11	4	2	26	29	12	64	1	226
3:00 PM	3:15 PM	8	25	0	33	18	13	2	12	29	4	15	1	160
3:15 PM	3:30 PM	9	18	5	15	9	17	1	9	16	5	12	1	117
3:30 PM	3:45 PM	7	25	6	23	26	14	3	16	14	4	19	4	161
3:45 PM	4:00 PM	6	20	5	29	27	2	0	18	24	5	19	3	158
4:00 PM	4:15 PM	7	14	3	18	18	5	4	18	20	3	16	1	127
4:15 PM	4:30 PM	5	11	6	28	12	2	4	11	21	2	16	0	118
4:30 PM	4:45 PM	8	18	7	25	20	0	2	11	16	0	15	3	125
4:45 PM	5:00 PM	10	10	3	16	14	7	1	12	18	3	18	1	113
5:00 PM	5:15 PM	11	28	4	31	21	5	5	16	12	5	18	2	158
5:15 PM	5:30 PM	18	16	1	17	17	9	5	25	27	2	16	2	155
5:30 PM	5:45 PM	9	16	3	23	29	4	4	12	27	3	15	3	148
5:45 PM	6:00 PM	5	14	2	25	14	12	2	14	15	5	16	3	127
6:00 PM	6:15 PM	6	21	2	25	15	6	5	14	12	4	13	1	124
6:15 PM	6:30 PM	7	18	6	20	24	7	3	13	26	3	16	1	144
6:30 PM	6:45 PM	6	12	2	8	26	7	0	11	13	3	16	2	106
6:45 PM	7:00 PM	6	11	2	18	23	6	2	4	12	5	18	1	108

HOURLY TOTALS:

TIME PERIOD		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
FROM:	TO:	L	T	R	L	T	R	L	T	R	L	T	R	VOLUMES
7:00 AM	8:00 AM	21	93	25	162	28	23	4	64	139	48	120	1	728
7:15 AM	8:15 AM	27	99	28	167	32	29	3	73	148	52	128	1	787
7:30 AM	8:30 AM	32	99	26	162	39	26	3	73	148	48	124	1	781
7:45 AM	8:45 AM	31	78	21	109	39	20	3	67	115	34	108	2	627
8:00 AM	9:00 AM	34	48	11	69	40	26	4	57	78	15	80	2	464
8:15 AM	9:15 AM	43	53	9	76	50	46	5	56	62	27	92	2	521
8:30 AM	9:30 AM	43	51	8	73	47	56	8	56	62	29	97	3	533
8:45 AM	9:45 AM	41	47	6	78	48	59	8	53	63	27	93	3	526
9:00 AM	10:00 AM	38	46	5	76	49	53	6	47	63	25	93	4	505
9:15 AM	10:15 AM	30	33	7	61	43	32	5	38	66	11	67	3	396
9:30 AM	10:30 AM	26	31	10	54	52	24	3	39	57	9	58	2	365
9:45 AM	10:45 AM	23	27	11	47	58	23	2	39	52	10	54	2	348
10:00 AM	11:00 AM	26	30	12	45	55	22	2	39	57	12	51	4	355
10:15 AM	11:15 AM	23	32	11	47	53	21	6	41	51	10	60	5	360

TURNING MOVEMENT COUNT SUMMARY

10:30 AM	11:30 AM	29	30	13	62	47	20	7	44	63	13	68	10	406
10:45 AM	11:45 AM	32	25	16	64	43	20	7	46	76	12	59	11	411
11:00 AM	12:00 PM	27	18	17	68	49	27	9	52	74	9	59	11	420
11:15 AM	12:15 PM	31	28	17	65	53	23	9	54	83	13	63	11	450
11:30 AM	12:30 PM	31	29	15	64	63	30	7	54	71	9	54	9	436
11:45 AM	12:45 PM	27	38	12	58	67	29	9	48	67	8	72	8	443
12:00 PM	1:00 PM	31	49	12	64	72	22	9	49	74	10	79	7	478
12:15 PM	1:15 PM	27	49	12	70	77	26	5	46	61	7	71	8	459
12:30 PM	1:30 PM	20	51	11	64	175	19	7	40	62	8	78	5	540
12:45 PM	1:45 PM	23	49	11	73	167	24	10	44	47	7	66	8	529
1:00 PM	2:00 PM	22	40	12	77	163	26	8	40	35	7	58	6	494
1:15 PM	2:15 PM	21	39	12	85	161	28	9	35	33	6	55	5	489
1:30 PM	2:30 PM	21	46	15	104	55	37	10	36	31	7	49	8	419
1:45 PM	2:45 PM	26	69	24	154	70	39	7	42	61	20	73	5	590
2:00 PM	3:00 PM	29	88	33	156	64	36	9	56	79	29	121	6	706
2:15 PM	3:15 PM	32	99	30	164	65	41	10	63	101	32	125	6	768
2:30 PM	3:30 PM	38	100	30	145	62	43	7	64	111	35	126	4	765
2:45 PM	3:45 PM	34	93	25	99	64	48	8	63	88	25	110	7	664
3:00 PM	4:00 PM	30	88	16	100	80	46	6	55	83	18	65	9	596
3:15 PM	4:15 PM	29	77	19	85	80	38	8	61	74	17	66	9	563
3:30 PM	4:30 PM	25	70	20	98	83	23	11	63	79	14	70	8	564
3:45 PM	4:45 PM	26	63	21	100	77	9	10	58	81	10	66	7	528
4:00 PM	5:00 PM	30	53	19	87	64	14	11	52	75	8	65	5	483
4:15 PM	5:15 PM	34	67	20	100	67	14	12	50	67	10	67	6	514
4:30 PM	5:30 PM	47	72	15	89	72	21	13	64	73	10	67	8	551
4:45 PM	5:45 PM	48	70	11	87	81	25	15	65	84	13	67	8	574
5:00 PM	6:00 PM	43	74	10	96	81	30	16	67	81	15	65	10	588
5:15 PM	6:15 PM	38	67	8	90	75	31	16	65	81	14	60	9	554
5:30 PM	6:30 PM	27	69	13	93	82	29	14	53	80	15	60	8	543
5:45 PM	6:45 PM	24	65	12	78	79	32	10	52	66	15	61	7	501
6:00 PM	7:00 PM	25	62	12	71	88	26	10	42	63	15	63	5	482

NOTE PHF IS BASED ON 15 MIN. PEAK WITHIN THE PEAK HOUR.

TURNING MOVEMENT COUNT SUMMARY

BYU
Civil & Construction Engineering

INTERSECTION:
N-S STREET: *Main Street*
E-W STREET: *Mapleton Street*

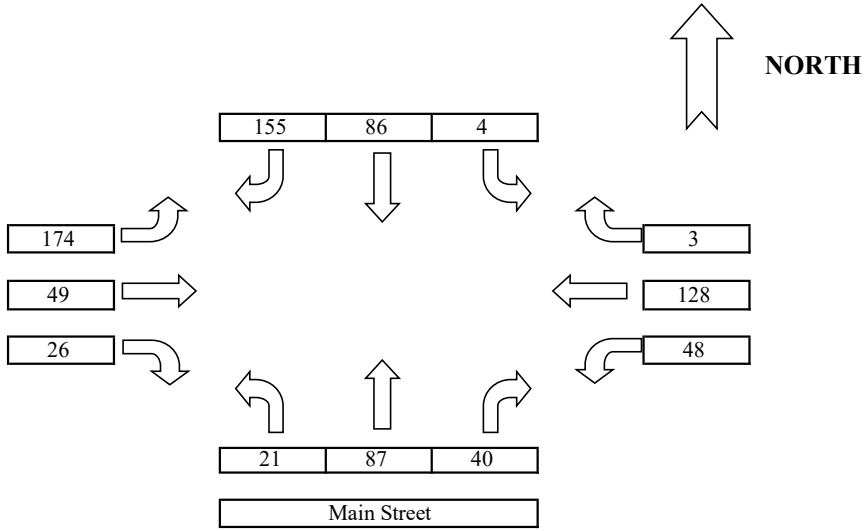
PROJ. NO.: *CE Capstone 02*
COUNT DATE: *2-Nov-22*
NOTES:

COUNT TIME:
FROM: *7:00 AM*
TO: *7:00 PM*

PK HR VOLUME:	821
PHF:	0.66
PEAK HOUR:	
FROM:	TO:
7:30 AM	8:30 AM

Mapleton Street

PEAK HOUR VOLUMES



COUNT DATA INPUT:

TIME PERIOD		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
FROM:	TO:	L	T	R	L	T	R	L	T	R	L	T	R	VOLUMES
7:00 AM	7:15 AM	3	3	0	16	4	1	1	13	16	1	11	1	70
7:15 AM	7:30 AM	2	4	16	29	5	6	0	8	15	6	10	0	101
7:30 AM	7:45 AM	5	39	7	69	19	9	2	18	52	22	43	0	285
7:45 AM	8:00 AM	10	31	16	62	15	6	1	37	62	23	49	1	313
8:00 AM	8:15 AM	4	2	15	20	4	5	0	20	26	3	19	2	120
8:15 AM	8:30 AM	2	15	2	23	11	6	1	11	15	0	17	0	103
8:30 AM	8:45 AM	8	12	2	17	5	5	2	9	12	3	17	0	92
8:45 AM	9:00 AM	14	15	1	18	22	11	0	11	19	4	13	0	128
9:00 AM	9:15 AM	10	17	2	20	23	20	2	18	26	8	19	1	166
9:15 AM	9:30 AM	13	9	3	23	25	9	4	15	14	4	22	3	144
9:30 AM	9:45 AM	16	10	3	8	15	4	2	12	13	3	15	0	101
9:45 AM	10:00 AM	10	4	3	14	15	3	7	5	11	5	16	2	95
10:00 AM	10:15 AM	6	13	2	10	17	8	1	7	17	2	18	4	105
10:15 AM	10:30 AM	9	8	4	20	12	5	5	9	10	2	21	3	108
10:30 AM	10:45 AM	8	8	1	8	14	3	1	13	15	3	17	3	94
10:45 AM	11:00 AM	7	10	3	12	13	8	5	8	5	0	16	3	90
11:00 AM	11:15 AM	8	15	4	31	29	6	4	8	25	2	25	4	161
11:15 AM	11:30 AM	0	3	2	18	22	1	6	6	26	0	8	3	95
11:30 AM	11:45 AM	8	9	3	18	18	6	3	9	64	2	25	2	167

TURNING MOVEMENT COUNT SUMMARY

11:45 AM	12:00 PM	9	9	0	19	21	8	1	8	18	2	30	5	130
12:00 PM	12:15 PM	10	13	2	11	22	2	2	13	14	3	24	3	119
12:15 PM	12:30 PM	5	13	2	38	23	7	3	11	12	2	13	5	134
12:30 PM	12:45 PM	3	9	2	15	22	5	4	8	9	2	19	1	99
12:45 PM	1:00 PM	2	22	2	16	17	8	3	12	18	0	17	2	119
1:00 PM	1:15 PM	4	8	2	19	24	3	3	11	13	4	19	4	114
1:15 PM	1:30 PM	6	14	6	6	23	3	4	12	10	3	15	2	104
1:30 PM	1:45 PM	5	10	1	12	11	5	0	9	8	4	18	4	87
1:45 PM	2:00 PM	2	5	4	18	9	6	2	6	16	2	20	2	92
2:00 PM	2:15 PM	4	13	4	15	9	11	3	15	10	0	13	1	98
2:15 PM	2:30 PM	3	19	3	37	18	8	3	11	12	3	15	2	134
2:30 PM	2:45 PM	4	35	16	57	18	5	2	21	38	15	29	5	245
2:45 PM	3:00 PM	7	23	9	29	20	9	2	16	50	14	31	4	214
3:00 PM	3:15 PM	3	18	6	33	14	11	3	17	18	7	17	2	149
3:15 PM	3:30 PM	5	21	5	20	23	16	1	19	18	14	19	0	161
3:30 PM	3:45 PM	6	21	10	19	37	31	5	16	13	5	19	3	185
3:45 PM	4:00 PM	6	17	5	37	19	8	6	15	30	3	25	6	177
4:00 PM	4:15 PM	5	21	3	24	18	7	6	21	23	3	13	1	145
4:15 PM	4:30 PM	3	14	2	28	19	8	4	15	16	2	18	7	136
4:30 PM	4:45 PM	11	8	3	21	20	7	3	18	17	4	18	3	133
4:45 PM	5:00 PM	4	10	4	12	10	3	1	9	17	1	14	0	85
5:00 PM	5:15 PM	3	19	2	16	13	7	3	12	24	0	14	5	118
5:15 PM	5:30 PM	7	22	4	32	17	7	3	9	18	3	10	3	135
5:30 PM	5:45 PM	3	13	2	16	30	4	2	13	15	2	13	0	113
5:45 PM	6:00 PM	7	9	5	21	22	9	3	14	18	2	17	3	130
6:00 PM	6:15 PM	5	15	1	18	18	16	6	8	16	3	16	3	125
6:15 PM	6:30 PM	4	8	2	13	15	6	1	11	12	2	9	2	85
6:30 PM	6:45 PM	6	13	3	17	14	12	2	16	13	0	9	1	106
6:45 PM	7:00 PM	2	10	4	29	26	9	5	9	24	3	18	4	143

HOURLY TOTALS:

TIME PERIOD		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
FROM:	TO:	L	T	R	L	T	R	L	T	R	L	T	R	VOLUMES
7:00 AM	8:00 AM	20	77	39	176	43	22	4	76	145	52	113	2	769
7:15 AM	8:15 AM	21	76	54	180	43	26	3	83	155	54	121	3	819
7:30 AM	8:30 AM	21	87	40	174	49	26	4	86	155	48	128	3	821
7:45 AM	8:45 AM	24	60	35	122	35	22	4	77	115	29	102	3	628
8:00 AM	9:00 AM	28	44	20	78	42	27	3	51	72	10	66	2	443
8:15 AM	9:15 AM	34	59	7	78	61	42	5	49	72	15	66	1	489
8:30 AM	9:30 AM	45	53	8	78	75	45	8	53	71	19	71	4	530
8:45 AM	9:45 AM	53	51	9	69	85	44	8	56	72	19	69	4	539
9:00 AM	10:00 AM	49	40	11	65	78	36	15	50	64	20	72	6	506
9:15 AM	10:15 AM	45	36	11	55	72	24	14	39	55	14	71	9	445

TURNING MOVEMENT COUNT SUMMARY

9:30 AM	10:30 AM	41	35	12	52	59	20	15	33	51	12	70	9	409
9:45 AM	10:45 AM	33	33	10	52	58	19	14	34	53	12	72	12	402
10:00 AM	11:00 AM	30	39	10	50	56	24	12	37	47	7	72	13	397
10:15 AM	11:15 AM	32	41	12	71	68	22	15	38	55	7	79	13	453
10:30 AM	11:30 AM	23	36	10	69	78	18	16	35	71	5	66	13	440
10:45 AM	11:45 AM	23	37	12	79	82	21	18	31	120	4	74	12	513
11:00 AM	12:00 PM	25	36	9	86	90	21	14	31	133	6	88	14	553
11:15 AM	12:15 PM	27	34	7	66	83	17	12	36	122	7	87	13	511
11:30 AM	12:30 PM	32	44	7	86	84	23	9	41	108	9	92	15	550
11:45 AM	12:45 PM	27	44	6	83	88	22	10	40	53	9	86	14	482
12:00 PM	1:00 PM	20	57	8	80	84	22	12	44	53	7	73	11	471
12:15 PM	1:15 PM	14	52	8	88	86	23	13	42	52	8	68	12	466
12:30 PM	1:30 PM	15	53	12	56	86	19	14	43	50	9	70	9	436
12:45 PM	1:45 PM	17	54	11	53	75	19	10	44	49	11	69	12	424
1:00 PM	2:00 PM	17	37	13	55	67	17	9	38	47	13	72	12	397
1:15 PM	2:15 PM	17	42	15	51	52	25	9	42	44	9	66	9	381
1:30 PM	2:30 PM	14	47	12	82	47	30	8	41	46	9	66	9	411
1:45 PM	2:45 PM	13	72	27	127	54	30	10	53	76	20	77	10	569
2:00 PM	3:00 PM	18	90	32	138	65	33	10	63	110	32	88	12	691
2:15 PM	3:15 PM	17	95	34	156	70	33	10	65	118	39	92	13	742
2:30 PM	3:30 PM	19	97	36	139	75	41	8	73	124	50	96	11	769
2:45 PM	3:45 PM	21	83	30	101	94	67	11	68	99	40	86	9	709
3:00 PM	4:00 PM	20	77	26	109	93	66	15	67	79	29	80	11	672
3:15 PM	4:15 PM	22	80	23	100	97	62	18	71	84	25	76	10	668
3:30 PM	4:30 PM	20	73	20	108	93	54	21	67	82	13	75	17	643
3:45 PM	4:45 PM	25	60	13	110	76	30	19	69	86	12	74	17	591
4:00 PM	5:00 PM	23	53	12	85	67	25	14	63	73	10	63	11	499
4:15 PM	5:15 PM	21	51	11	77	62	25	11	54	74	7	64	15	472
4:30 PM	5:30 PM	25	59	13	81	60	24	10	48	76	8	56	11	471
4:45 PM	5:45 PM	17	64	12	76	70	21	9	43	74	6	51	8	451
5:00 PM	6:00 PM	20	63	13	85	82	27	11	48	75	7	54	11	496
5:15 PM	6:15 PM	22	59	12	87	87	36	14	44	67	10	56	9	503
5:30 PM	6:30 PM	19	45	10	68	85	35	12	46	61	9	55	8	453
5:45 PM	6:45 PM	22	45	11	69	69	43	12	49	59	7	51	9	446
6:00 PM	7:00 PM	17	46	10	77	73	43	14	44	65	8	52	10	459

NOTE PHF IS BASED ON 15 MIN. PEAK WITHIN THE PEAK HOUR.

TURNING MOVEMENT COUNT SUMMARY

BYU
Civil & Construction Engineering

INTERSECTION:
N-S STREET: *Main Street*
E-W STREET: *1600 South*

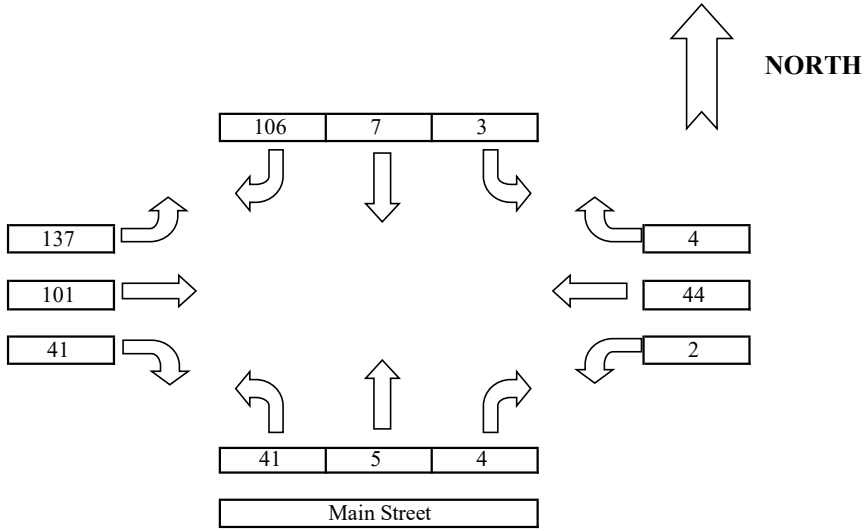
PROJ. NO.: *CE Capstone 02*
COUNT DATE: *1-Nov-22*
NOTES:

COUNT TIME:
FROM: *7:00 AM*
TO: *7:00 PM*

PK HR VOLUME:	481
PHF:	0.91
PEAK HOUR:	
FROM:	TO:
2:30 PM	3:30 PM

1600 South

PEAK HOUR VOLUMES



COUNT DATA INPUT:

TIME PERIOD		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
FROM:	TO:	L	T	R	L	T	R	L	T	R	L	T	R	VOLUMES
7:00 AM	7:15 AM	0	1	0	7	10	10	0	1	8	0	3	1	41
7:15 AM	7:30 AM	3	3	0	7	7	10	0	5	10	0	14	1	60
7:30 AM	7:45 AM	11	2	0	28	18	13	3	4	33	0	27	4	143
7:45 AM	8:00 AM	7	4	3	40	13	10	3	6	41	2	13	4	146
8:00 AM	8:15 AM	6	5	0	16	11	8	1	4	25	0	17	1	94
8:15 AM	8:30 AM	6	2	0	13	12	8	2	1	8	0	22	1	75
8:30 AM	8:45 AM	6	0	0	17	11	15	0	4	17	0	18	2	90
8:45 AM	9:00 AM	8	0	0	17	8	11	1	1	17	1	16	1	81
9:00 AM	9:15 AM	13	2	1	15	12	6	0	3	23	1	11	2	89
9:15 AM	9:30 AM	8	0	0	7	21	11	6	3	17	0	11	4	88
9:30 AM	9:45 AM	6	2	1	7	5	4	2	5	10	0	13	3	58
9:45 AM	10:00 AM	4	1	1	8	7	7	1	6	8	2	11	2	58
10:00 AM	10:15 AM	7	1	0	6	3	7	1	2	13	0	6	2	48
10:15 AM	10:30 AM	10	1	1	18	8	3	0	4	10	0	11	0	66
10:30 AM	10:45 AM	9	2	2	9	14	3	3	3	7	0	14	2	68
10:45 AM	11:00 AM	10	4	1	11	25	2	4	3	8	2	15	1	86
11:00 AM	11:15 AM	6	1	0	12	17	5	3	1	12	0	14	2	73
11:15 AM	11:30 AM	9	2	0	8	7	4	1	0	17	2	18	1	69
11:30 AM	11:45 AM	8	1	1	8	13	8	0	5	8	0	15	0	67

TURNING MOVEMENT COUNT SUMMARY

11:45 AM	12:00 PM	11	2	1	10	16	7	4	0	8	1	15	0	75
12:00 PM	12:15 PM	8	3	2	16	14	10	6	3	17	2	22	5	108
12:15 PM	12:30 PM	8	1	3	8	9	7	1	5	11	3	12	1	69
12:30 PM	12:45 PM	7	2	1	11	11	3	3	1	10	2	10	0	61
12:45 PM	1:00 PM	9	3	0	16	11	11	4	3	12	1	6	2	78
1:00 PM	1:15 PM	6	2	0	17	9	5	1	1	13	0	11	1	66
1:15 PM	1:30 PM	6	3	0	13	9	11	1	2	10	1	12	0	68
1:30 PM	1:45 PM	10	3	2	7	11	8	2	3	6	0	10	1	63
1:45 PM	2:00 PM	3	0	0	13	12	8	0	3	17	0	8	0	64
2:00 PM	2:15 PM	3	1	0	18	12	3	0	0	6	1	8	1	53
2:15 PM	2:30 PM	5	0	0	23	15	9	0	1	15	1	6	0	75
2:30 PM	2:45 PM	6	1	0	50	38	7	0	3	19	0	6	2	132
2:45 PM	3:00 PM	12	2	2	26	20	9	2	2	41	1	10	1	128
3:00 PM	3:15 PM	6	0	1	25	19	14	0	0	18	0	11	0	94
3:15 PM	3:30 PM	17	2	1	36	24	11	1	2	14	1	17	1	127
3:30 PM	3:45 PM	11	6	2	24	20	3	1	2	33	3	15	2	122
3:45 PM	4:00 PM	13	5	3	20	18	4	2	1	15	0	15	1	97
4:00 PM	4:15 PM	9	0	0	15	14	3	1	1	22	1	23	3	92
4:15 PM	4:30 PM	8	2	3	20	13	6	2	0	21	1	15	1	92
4:30 PM	4:45 PM	4	1	2	21	14	8	0	3	15	2	15	3	88
4:45 PM	5:00 PM	16	0	0	18	16	8	1	1	16	1	14	0	91
5:00 PM	5:15 PM	8	1	1	24	10	13	0	2	20	0	14	2	95
5:15 PM	5:30 PM	15	0	2	14	17	5	0	4	23	0	11	1	92
5:30 PM	5:45 PM	5	0	3	22	11	9	1	1	26	0	12	0	90
5:45 PM	6:00 PM	6	1	1	18	14	6	3	3	23	0	13	1	89
6:00 PM	6:15 PM	10	6	5	24	15	4	3	2	18	0	19	0	106
6:15 PM	6:30 PM	7	4	2	21	17	5	5	1	13	2	18	5	100
6:30 PM	6:45 PM	15	0	1	23	7	11	1	2	14	1	6	2	83
6:45 PM	7:00 PM	11	1	2	8	9	5	1	2	15	0	10	3	67

HOURLY TOTALS:

TIME PERIOD		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
FROM:	TO:	L	T	R	L	T	R	L	T	R	L	T	R	VOLUMES
7:00 AM	8:00 AM	21	10	3	82	48	43	6	16	92	2	57	10	390
7:15 AM	8:15 AM	27	14	3	91	49	41	7	19	109	2	71	10	443
7:30 AM	8:30 AM	30	13	3	97	54	39	9	15	107	2	79	10	458
7:45 AM	8:45 AM	25	11	3	86	47	41	6	15	91	2	70	8	405
8:00 AM	9:00 AM	26	7	0	63	42	42	4	10	67	1	73	5	340
8:15 AM	9:15 AM	33	4	1	62	43	40	3	9	65	2	67	6	335
8:30 AM	9:30 AM	35	2	1	56	52	43	7	11	74	2	56	9	348
8:45 AM	9:45 AM	35	4	2	46	46	32	9	12	67	2	51	10	316
9:00 AM	10:00 AM	31	5	3	37	45	28	9	17	58	3	46	11	293
9:15 AM	10:15 AM	25	4	2	28	36	29	10	16	48	2	41	11	252

TURNING MOVEMENT COUNT SUMMARY

9:30 AM	10:30 AM	27	5	3	39	23	21	4	17	41	2	41	7	230
9:45 AM	10:45 AM	30	5	4	41	32	20	5	15	38	2	42	6	240
10:00 AM	11:00 AM	36	8	4	44	50	15	8	12	38	2	46	5	268
10:15 AM	11:15 AM	35	8	4	50	64	13	10	11	37	2	54	5	293
10:30 AM	11:30 AM	34	9	3	40	63	14	11	7	44	4	61	6	296
10:45 AM	11:45 AM	33	8	2	39	62	19	8	9	45	4	62	4	295
11:00 AM	12:00 PM	34	6	2	38	53	24	8	6	45	3	62	3	284
11:15 AM	12:15 PM	36	8	4	42	50	29	11	8	50	5	70	6	319
11:30 AM	12:30 PM	35	7	7	42	52	32	11	13	44	6	64	6	319
11:45 AM	12:45 PM	34	8	7	45	50	27	14	9	46	8	59	6	313
12:00 PM	1:00 PM	32	9	6	51	45	31	14	12	50	8	50	8	316
12:15 PM	1:15 PM	30	8	4	52	40	26	9	10	46	6	39	4	274
12:30 PM	1:30 PM	28	10	1	57	40	30	9	7	45	4	39	3	273
12:45 PM	1:45 PM	31	11	2	53	40	35	8	9	41	2	39	4	275
1:00 PM	2:00 PM	25	8	2	50	41	32	4	9	46	1	41	2	261
1:15 PM	2:15 PM	22	7	2	51	44	30	3	8	39	2	38	2	248
1:30 PM	2:30 PM	21	4	2	61	50	28	2	7	44	2	32	2	255
1:45 PM	2:45 PM	17	2	0	104	77	27	0	7	57	2	28	3	324
2:00 PM	3:00 PM	26	4	2	117	85	28	2	6	81	3	30	4	388
2:15 PM	3:15 PM	29	3	3	124	92	39	2	6	93	2	33	3	429
2:30 PM	3:30 PM	41	5	4	137	101	41	3	7	92	2	44	4	481
2:45 PM	3:45 PM	46	10	6	111	83	37	4	6	106	5	53	4	471
3:00 PM	4:00 PM	47	13	7	105	81	32	4	5	80	4	58	4	440
3:15 PM	4:15 PM	50	13	6	95	76	21	5	6	84	5	70	7	438
3:30 PM	4:30 PM	41	13	8	79	65	16	6	4	91	5	68	7	403
3:45 PM	4:45 PM	34	8	8	76	59	21	5	5	73	4	68	8	369
4:00 PM	5:00 PM	37	3	5	74	57	25	4	5	74	5	67	7	363
4:15 PM	5:15 PM	36	4	6	83	53	35	3	6	72	4	58	6	366
4:30 PM	5:30 PM	43	2	5	77	57	34	1	10	74	3	54	6	366
4:45 PM	5:45 PM	44	1	6	78	54	35	2	8	85	1	51	3	368
5:00 PM	6:00 PM	34	2	7	78	52	33	4	10	92	0	50	4	366
5:15 PM	6:15 PM	36	7	11	78	57	24	7	10	90	0	55	2	377
5:30 PM	6:30 PM	28	11	11	85	57	24	12	7	80	2	62	6	385
5:45 PM	6:45 PM	38	11	9	86	53	26	12	8	68	3	56	8	378
6:00 PM	7:00 PM	43	11	10	76	48	25	10	7	60	3	53	10	356

NOTE PHF IS BASED ON 15 MIN. PEAK WITHIN THE PEAK HOUR.

TURNING MOVEMENT COUNT SUMMARY

BYU
Civil & Construction Engineering

INTERSECTION:
N-S STREET: *Main Street*
E-W STREET: *1600 South*

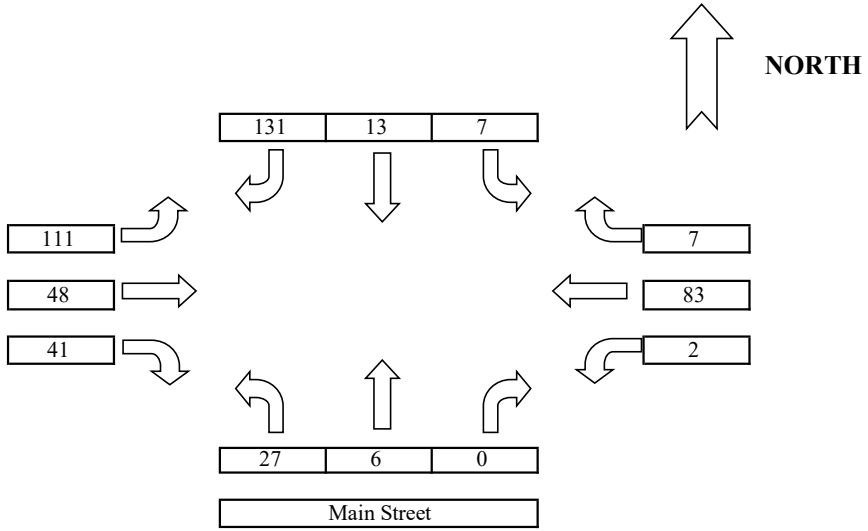
PROJ. NO.: *CE Capstone 02*
COUNT DATE: *2-Nov-22*
NOTES:

COUNT TIME:
FROM: *7:00 AM*
TO: *7:00 PM*

PK HR VOLUME:	476
PHF:	0.72
PEAK HOUR:	
FROM:	TO:
7:30 AM	8:30 AM

1600 South

PEAK HOUR VOLUMES



COUNT DATA INPUT:

TIME PERIOD		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
FROM:	TO:	L	T	R	L	T	R	L	T	R	L	T	R	VOLUMES
7:00 AM	7:15 AM	3	1	0	2	3	6	3	1	13	0	12	1	45
7:15 AM	7:30 AM	2	1	1	20	9	7	0	1	15	1	4	0	61
7:30 AM	7:45 AM	7	2	0	45	8	7	2	3	44	0	29	2	149
7:45 AM	8:00 AM	10	2	0	37	14	12	3	5	54	2	24	2	165
8:00 AM	8:15 AM	6	1	0	13	9	13	1	4	20	0	13	2	82
8:15 AM	8:30 AM	4	1	0	16	17	9	1	1	13	0	17	1	80
8:30 AM	8:45 AM	4	1	0	13	16	13	0	0	16	0	18	1	82
8:45 AM	9:00 AM	6	0	0	16	13	8	0	3	10	0	10	4	70
9:00 AM	9:15 AM	10	0	0	14	15	5	2	0	18	1	12	2	79
9:15 AM	9:30 AM	4	3	0	9	18	7	5	1	16	1	16	2	82
9:30 AM	9:45 AM	5	4	0	11	12	4	3	1	15	0	20	5	80
9:45 AM	10:00 AM	6	1	0	7	9	4	1	2	10	0	10	3	53
10:00 AM	10:15 AM	8	1	0	9	13	8	3	2	7	2	7	4	64
10:15 AM	10:30 AM	8	1	0	10	4	6	0	4	8	0	23	2	66
10:30 AM	10:45 AM	8	2	0	11	10	6	2	3	16	0	15	0	73
10:45 AM	11:00 AM	9	4	0	17	11	8	2	1	10	2	5	1	70
11:00 AM	11:15 AM	6	5	1	17	12	8	1	2	5	0	11	2	70
11:15 AM	11:30 AM	9	0	1	13	7	6	2	0	10	0	14	1	63
11:30 AM	11:45 AM	13	2	1	12	10	7	0	1	13	1	12	3	75

TURNING MOVEMENT COUNT SUMMARY

11:45 AM	12:00 PM	13	5	0	6	28	8	6	3	13	0	9	3	94
12:00 PM	12:15 PM	6	1	0	10	16	8	2	0	12	0	20	6	81
12:15 PM	12:30 PM	5	0	1	12	11	3	2	4	9	2	6	2	57
12:30 PM	12:45 PM	7	4	0	10	10	7	0	3	10	1	1	1	54
12:45 PM	1:00 PM	6	5	0	10	15	4	1	1	14	0	7	5	68
1:00 PM	1:15 PM	5	0	0	8	15	2	3	1	6	0	8	0	48
1:15 PM	1:30 PM	6	3	2	10	13	5	1	4	11	1	11	3	70
1:30 PM	1:45 PM	5	3	0	15	6	4	0	1	12	1	10	1	58
1:45 PM	2:00 PM	7	1	1	3	8	0	0	2	8	1	11	1	43
2:00 PM	2:15 PM	4	1	0	16	6	3	2	1	12	0	7	4	56
2:15 PM	2:30 PM	0	1	0	25	12	5	2	2	19	0	7	2	75
2:30 PM	2:45 PM	9	3	0	55	8	10	1	4	28	1	2	0	121
2:45 PM	3:00 PM	5	0	1	30	11	5	2	1	32	0	10	2	99
3:00 PM	3:15 PM	8	3	1	20	15	7	2	2	12	0	5	2	77
3:15 PM	3:30 PM	6	0	1	19	19	0	1	6	18	1	14	5	90
3:30 PM	3:45 PM	7	3	0	15	11	3	5	1	33	1	8	2	89
3:45 PM	4:00 PM	9	0	0	20	16	2	2	6	11	0	10	1	77
4:00 PM	4:15 PM	3	0	0	20	11	6	0	3	20	0	11	4	78
4:15 PM	4:30 PM	0	1	1	17	16	5	1	0	15	2	10	2	70
4:30 PM	4:45 PM	5	1	2	10	9	8	1	0	18	3	13	2	72
4:45 PM	5:00 PM	3	2	0	15	12	7	1	1	10	1	15	1	68
5:00 PM	5:15 PM	12	2	0	25	16	4	3	0	11	2	10	3	88
5:15 PM	5:30 PM	10	2	1	13	15	0	0	0	21	0	5	2	69
5:30 PM	5:45 PM	6	2	0	18	22	5	1	1	10	2	14	1	82
5:45 PM	6:00 PM	4	1	0	11	19	6	2	1	11	1	10	0	66
6:00 PM	6:15 PM	4	1	1	15	8	5	1	0	12	1	3	1	52
6:15 PM	6:30 PM	5	1	0	13	10	2	2	1	14	0	9	0	57
6:30 PM	6:45 PM	4	1	1	19	13	7	5	0	14	0	5	0	69
6:45 PM	7:00 PM	10	2	1	16	12	8	1	3	12	2	6	2	75

HOURLY TOTALS:

TIME PERIOD		NORTHBOUND			EASTBOUND			SOUTHBOUND			WESTBOUND			TOTAL
FROM:	TO:	L	T	R	L	T	R	L	T	R	L	T	R	VOLUMES
7:00 AM	8:00 AM	22	6	1	104	34	32	8	10	126	3	69	5	420
7:15 AM	8:15 AM	25	6	1	115	40	39	6	13	133	3	70	6	457
7:30 AM	8:30 AM	27	6	0	111	48	41	7	13	131	2	83	7	476
7:45 AM	8:45 AM	24	5	0	79	56	47	5	10	103	2	72	6	409
8:00 AM	9:00 AM	20	3	0	58	55	43	2	8	59	0	58	8	314
8:15 AM	9:15 AM	24	2	0	59	61	35	3	4	57	1	57	8	311
8:30 AM	9:30 AM	24	4	0	52	62	33	7	4	60	2	56	9	313
8:45 AM	9:45 AM	25	7	0	50	58	24	10	5	59	2	58	13	311
9:00 AM	10:00 AM	25	8	0	41	54	20	11	4	59	2	58	12	294
9:15 AM	10:15 AM	23	9	0	36	52	23	12	6	48	3	53	14	279

TURNING MOVEMENT COUNT SUMMARY

9:30 AM	10:30 AM	27	7	0	37	38	22	7	9	40	2	60	14	263
9:45 AM	10:45 AM	30	5	0	37	36	24	6	11	41	2	55	9	256
10:00 AM	11:00 AM	33	8	0	47	38	28	7	10	41	4	50	7	273
10:15 AM	11:15 AM	31	12	1	55	37	28	5	10	39	2	54	5	279
10:30 AM	11:30 AM	32	11	2	58	40	28	7	6	41	2	45	4	276
10:45 AM	11:45 AM	37	11	3	59	40	29	5	4	38	3	42	7	278
11:00 AM	12:00 PM	41	12	3	48	57	29	9	6	41	1	46	9	302
11:15 AM	12:15 PM	41	8	2	41	61	29	10	4	48	1	55	13	313
11:30 AM	12:30 PM	37	8	2	40	65	26	10	8	47	3	47	14	307
11:45 AM	12:45 PM	31	10	1	38	65	26	10	10	44	3	36	12	286
12:00 PM	1:00 PM	24	10	1	42	52	22	5	8	45	3	34	14	260
12:15 PM	1:15 PM	23	9	1	40	51	16	6	9	39	3	22	8	227
12:30 PM	1:30 PM	24	12	2	38	53	18	5	9	41	2	27	9	240
12:45 PM	1:45 PM	22	11	2	43	49	15	5	7	43	2	36	9	244
1:00 PM	2:00 PM	23	7	3	36	42	11	4	8	37	3	40	5	219
1:15 PM	2:15 PM	22	8	3	44	33	12	3	8	43	3	39	9	227
1:30 PM	2:30 PM	16	6	1	59	32	12	4	6	51	2	35	8	232
1:45 PM	2:45 PM	20	6	1	99	34	18	5	9	67	2	27	7	295
2:00 PM	3:00 PM	18	5	1	126	37	23	7	8	91	1	26	8	351
2:15 PM	3:15 PM	22	7	2	130	46	27	7	9	91	1	24	6	372
2:30 PM	3:30 PM	28	6	3	124	53	22	6	13	90	2	31	9	387
2:45 PM	3:45 PM	26	6	3	84	56	15	10	10	95	2	37	11	355
3:00 PM	4:00 PM	30	6	2	74	61	12	10	15	74	2	37	10	333
3:15 PM	4:15 PM	25	3	1	74	57	11	8	16	82	2	43	12	334
3:30 PM	4:30 PM	19	4	1	72	54	16	8	10	79	3	39	9	314
3:45 PM	4:45 PM	17	2	3	67	52	21	4	9	64	5	44	9	297
4:00 PM	5:00 PM	11	4	3	62	48	26	3	4	63	6	49	9	288
4:15 PM	5:15 PM	20	6	3	67	53	24	6	1	54	8	48	8	298
4:30 PM	5:30 PM	30	7	3	63	52	19	5	1	60	6	43	8	297
4:45 PM	5:45 PM	31	8	1	71	65	16	5	2	52	5	44	7	307
5:00 PM	6:00 PM	32	7	1	67	72	15	6	2	53	5	39	6	305
5:15 PM	6:15 PM	24	6	2	57	64	16	4	2	54	4	32	4	269
5:30 PM	6:30 PM	19	5	1	57	59	18	6	3	47	4	36	2	257
5:45 PM	6:45 PM	17	4	2	58	50	20	10	2	51	2	27	1	244
6:00 PM	7:00 PM	23	5	3	63	43	22	9	4	52	3	23	3	253

NOTE PHF IS BASED ON 15 MIN. PEAK WITHIN THE PEAK HOUR.

Appendix C : Intersection Signal Warrants

HCS7 Warrants Report

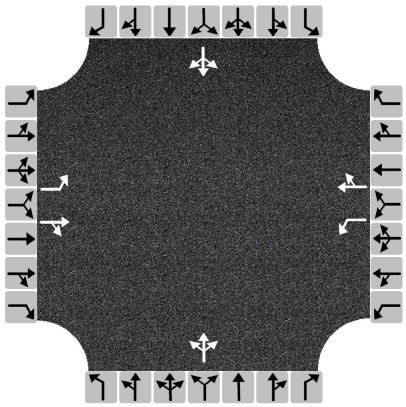
Project Information

Analyst	Daniel Neuffer	Date	1/24/2023
Agency		Analysis Year	2023
Jurisdiction	Mapleton City	Time Period Analyzed	
Project Description	Mapleton Roundabout Project		

General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	6
Major Street Speed (mi/h)	35	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	2500		

Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	1	1	0	1	1	0	0	1	0	0	1	0
Lane Usage	L	TR		L	TR			LTR			LTR	
Vehicle Volumes Averages (veh/h)	89	69	29	17	76	5	29	57	15	7	51	75
Pedestrian Averages (peds/h)	0			0			0			7		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	No
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	6

Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	4
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)		Tractor-Trailer Trucks (%)	10

HCS7 Warrants Report

ol me S mmary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (100%)	4A (100%)	4B (100%)
07 - 08	382	207	728	3	0	No	No	No	No	No	No	No	No	No
08 - 09	232	139	464	18	0	No	No	No	No	No	No	No	No	No
09 - 10	300	116	505	22	0	No	No	No	No	No	No	No	No	No
10 - 11	189	98	355	1	0	No	No	No	No	No	No	No	No	No
11 - 12	223	135	420	5	0	No	No	No	No	No	No	No	No	No
12 - 13	254	132	478	1	0	No	No	No	No	No	No	No	No	No
13 - 14	337	83	494	3	0	No	No	No	No	No	No	No	No	No
14 - 15	412	150	706	3	0	No	No	No	No	No	No	No	No	No
15 - 16	314	144	592	55	0	No	No	No	No	No	No	No	No	No
16 - 17	243	138	483	0	0	No	No	No	No	No	No	No	No	No
17 - 18	292	164	583	2	0	No	No	No	No	No	No	No	No	No
18 - 19	268	115	482	1	0	No	No	No	No	No	No	No	No	No
Total	3446	1621	6290	114	0	0	0	0	0	0	0	0	0	0

Warrants

Warrant 1: Eight-Hour Vehicular Volume	
A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	
Warrant 2: Four-Hour Vehicular Volume	
Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	
Warrant 3: Peak Hour	
A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	
Warrant 4: Pedestrian Volume	
A. Four Hour Volumes --or--	
B. One-Hour Volumes	
Warrant 5: School Crossing	
Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓
Warrant 6: Coordinated Signal System	
Degree of Platooning (Predominant direction or both directions)	
Warrant 7: Crash Experience	
A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported crashes susceptible to correction by signal (12-month period) --and--	✓
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	
Warrant 8: Roadway Network	
A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	
Warrant 9: Grade Crossing	
A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

HCS7 Warrants Report

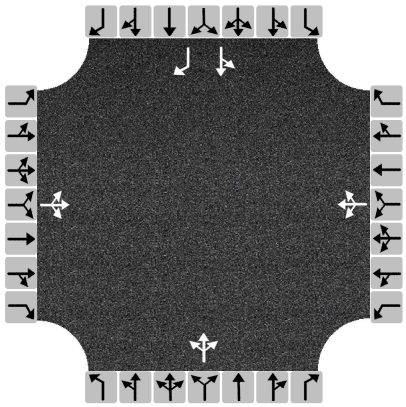
Project Information

Analyst	Adam Hill	Date	1/28/2023
Agency	DADS Engineering	Analysis Year	2022
Jurisdiction	Mapleton City	Time Period Analyzed	Novemeber 2022
Project Description	Roundabout Analysis		

General

Major Street Direction	East-West	Population < 10,000	No
Starting Time Interval	7	Coordinated Signal System	No
Median Type	Undivided	Crashes (crashes/year)	2
Major Street Speed (mi/h)	35	Adequate Trials of Crash Exp. Alt.	No
Nearest Signal (ft)	5355		

Geometry and Traffic



Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Number of Lanes, N	0	1	0	0	1	0	0	1	0	0	1	1
Lane Usage		LTR			LTR			LTR			LT	R
Vehicle Volumes Averages (veh/h)	67	53	29	2	52	6	32	7	4	6	9	65
Pedestrian Averages (peds/h)	0			0			0			0		
Gap Averages (gaps/h)	0			0			0			0		
Delay (s/veh)	0.0			0.0			0.0			0.0		
Delay (veh-hrs)	0.0			0.0			0.0			0.0		

School Crossing and Roadway Network

Number of Students in Highest Hour	0	Two or More Major Routes	No
Number of Adequate Gaps in Period	0	Weekend Counts	No
Number of Minutes in Period	0	5-year Growth Factor (%)	0

Railroad Crossing

Grade Crossing Approach	None	Rail Traffic (trains/day)	0
Highest Volume Hour with Trains	Unknown	High Occupancy Buses (%)	0
Distance to Stop Line (ft)		Tractor-Trailer Trucks (%)	10

HCS7 Warrants Report

ol me S mmary

Hour	Major Volume	Minor Volume	Total Volume	Peds/h	Gaps/h	1A (100%)	1A (80%)	1B (100%)	1B (80%)	2 (100%)	3A (100%)	3B (100%)	4A (100%)	4B (100%)
07 - 08	242	114	390	1	0	No	No	No	No	No	No	No	No	No
08 - 09	226	81	340	4	0	No	No	No	No	No	No	No	No	No
09 - 10	170	84	293	6	0	No	No	No	No	No	No	No	No	No
10 - 11	162	58	268	1	0	No	No	No	No	No	No	No	No	No
11 - 12	183	59	284	0	0	No	No	No	No	No	No	No	No	No
12 - 13	193	76	316	0	0	No	No	No	No	No	No	No	No	No
13 - 14	167	59	261	2	0	No	No	No	No	No	No	No	No	No
14 - 15	267	89	388	0	0	No	No	No	No	No	No	No	No	No
15 - 16	284	89	440	0	0	No	No	No	No	No	No	No	No	No
16 - 17	235	83	363	2	0	No	No	No	No	No	No	No	No	No
17 - 18	217	106	366	4	0	No	No	No	No	No	No	No	No	No
18 - 19	215	77	356	0	0	No	No	No	No	No	No	No	No	No
Total	2561	975	4065	20	0	0	0	0	0	0	0	0	0	0

Warrants

Warrant 1: Eight-Hour Vehicular Volume	
A. Minimum Vehicular Volumes (Both major approaches --and-- higher minor approach) --or--	
B. Interruption of Continuous Traffic (Both major approaches --and-- higher minor approach) --or--	
80% Vehicular --and-- Interruption Volumes (Both major approaches --and-- higher minor approach)	
Warrant 2: Four-Hour Vehicular Volume	
Four-Hour Vehicular Volume (Both major approaches --and-- higher minor approach)	
Warrant 3: Peak Hour	
A. Peak-Hour Conditions (Minor delay -- and-- minor volume --and-- total volume) --or--	
B. Peak-Hour Vehicular Volumes (Both major approaches --and-- higher minor approach)	
Warrant 4: Pedestrian Volume	
A. Four Hour Volumes --or--	
B. One-Hour Volumes	
Warrant 5: School Crossing	
Gaps Same Period --and--	
Student Volumes	
Nearest Traffic Control Signal (optional)	✓
Warrant 6: Coordinated Signal System	
Degree of Platooning (Predominant direction or both directions)	
Warrant 7: Crash Experience	
A. Adequate trials of alternatives, observance and enforcement failed --and--	
B. Reported crashes susceptible to correction by signal (12-month period) --and--	
C. 80% Volumes for Warrants 1A, 1B, --or-- 4 are satisfied	
Warrant 8: Roadway Network	
A. Weekday Volume (Peak hour total --and-- projected warrants 1, 2, or 3) --or--	
B. Weekend Volume (Five hours total)	
Warrant 9: Grade Crossing	
A. Grade Crossing within 140 ft --and--	
B. Peak-Hour Vehicular Volumes	

Appendix D : VISSIM Analyses

VISSIM Analysis Results Summary

Intersection	Year	Condition	Time	Approach Delay				Approach LOS				Overall	
				EB	WB	NB	SB	EB	WB	NB	SB	Delay	LOS
Main St and Maple St	2022	No Build	AM	14.49	11.67	11.17	10.65	B	B	B	B	12.17	B
Main St and Maple St	2022	No Build	PM	11.24	10.49	10.12	9.51	B	B	B	A	10.42	B
Main St and Maple St	2030	No Build	AM	17.06	11.37	11.58	10.99	C	B	B	B	13.06	B
Main St and Maple St	2030	No Build	PM	11.8	9.68	10.35	9.33	B	A	B	A	10.43	B
Main St and Maple St	2040	No Build	AM	44.35	13.62	14.24	14.22	E	B	B	B	23.43	C
Main St and Maple St	2040	No Build	PM	15.24	10.64	11.24	10.82	C	B	B	B	12.34	B
Main St and Maple St	2050	No Build	AM	84.44	17.87	17.02	26.25	F	C	C	D	40.94	E
Main St and Maple St	2050	No Build	PM	33.85	11.92	13.66	13.79	D	B	B	B	20.11	C
Main St and 1600 S.	2022	No Build	AM	0.64	0.15	7.58	2.79	A	A	A	A	1.87	A
Main St and 1600 S.	2022	No Build	PM	0.66	0.13	7.87	1.87	A	A	A	A	1.55	A
Main St and 1600 S.	2030	No Build	AM	0.81	0.24	9.66	3.61	A	A	A	A	2.81	A
Main St and 1600 S.	2030	No Build	PM	0.89	0.23	9.66	3.51	A	A	A	A	2.43	A
Main St and 1600 S.	2040	No Build	AM	1	0.28	11.31	3.98	A	A	B	A	3.13	A
Main St and 1600 S.	2040	No Build	PM	1.05	0.23	11.51	3.8	A	A	B	A	2.78	A
Main St and 1600 S.	2050	No Build	AM	1.26	0.32	12.85	4.62	A	A	B	A	3.53	A
Main St and 1600 S.	2050	No Build	PM	1.31	0.29	13.9	4.19	A	A	B	A	3.24	A
Main St and Maple St	2022	Build	AM	3.12	7.95	3.13	5.77	A	A	A	A	4.93	A
Main St and Maple St	2022	Build	PM	2.44	5.27	2.98	3.84	A	A	A	A	3.49	A
Main St and Maple St	2030	Build	AM	4.57	21.46	5.63	11.07	A	C	A	B	10.26	B
Main St and Maple St	2030	Build	PM	3.14	7.35	4.13	4.56	A	A	A	A	4.58	A
Main St and Maple St	2040	Build	AM	7.89	98.26	12.94	31.3	A	F	B	D	34.86	D
Main St and Maple St	2040	Build	PM	4.56	17.8	8.06	7.5	A	C	A	A	8.76	A
Main St and Maple St	2050	Build	AM	18.36	113.79	80.8	50.75	C	F	F	F	59.54	F
Main St and Maple St	2050	Build	PM	10.21	87.36	28.83	22.89	B	F	D	C	32.82	D
Main St and 1600 S.	2022	Build	AM	1.48	1.57	2.29	1.49	A	A	A	A	1.59	A
Main St and 1600 S.	2022	Build	PM	1.67	1.63	3.21	1.23	A	A	A	A	1.72	A
Main St and 1600 S.	2030	Build	AM	1.97	2.3	2.8	2.03	A	A	A	A	2.19	A
Main St and 1600 S.	2030	Build	PM	2.53	2.58	3.95	1.51	A	A	A	A	2.55	A
Main St and 1600 S.	2040	Build	AM	2.6	3.27	3.45	2.38	A	A	A	A	2.82	A
Main St and 1600 S.	2040	Build	PM	3.69	3.33	5.45	1.74	A	A	A	A	3.5	A
Main St and 1600 S.	2050	Build	AM	3.38	4.75	4.34	2.73	A	A	A	A	3.67	A
Main St and 1600 S.	2050	Build	PM	6.09	4.8	7.52	2.29	A	A	A	A	5.31	A

Simulation Run **Year: 2022** **Design: No Build** **Time: AM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	130	13.02575	0.519053	B	1.671109	0.533992
	NB	EB	49	6.117331	8.755071	A	0.498666	1.468855
	NB	WB	24	11.47518	0.519053	B	1.347667	0.533992
	SB	SB	103	12.0411	23.55428	B	0.983522	1.628946
	SB	EB	5	15.01864	0.415742	C	6.813831	0.69892
	SB	WB	203	9.839078	13.57736	A	1.079799	1.358353
	EB	EB	66	11.21687	30.12057	B	1.135985	4.524803
	EB	SB	34	5.779314	10.35508	A	0.362598	4.133987
	EB	NB	240	16.61809	3.144548	C	2.648704	2.589694
	WB	WB	169	12.40476	16.31658	B	1.300595	2.990577
	WB	NB	4	9.339687	9.93067	A	2.05622	2.278073
	WB	SB	66	9.936799	0.120198	A	0.833232	0.28893
			1091	12.16647	10.61901	B	20.731928	23.029122
Main St & 1600S	NB	NB	18	7.330008	1.365624	A	0.731956	0.108508
	NB	EB	2	5.333173	1.96261	A	1.115719	0.179032
	NB	WB	46	7.778886	1.365624	A	0.426021	0.108508
	SB	SB	18	9.748048	0.44382	A	0.356967	0.064057
	SB	EB	12	9.272492	0.44382	A	0.346938	0.064057
	SB	WB	135	1.280676	0.164375	A	0.168487	0.061134
	EB	EB	77	0.373848	0	A	0.113003	0
	EB	SB	51	0.669542	0	A	0.039859	0
	EB	NB	121	0.797243	0.021195	A	0.094658	0.022887
	WB	WB	110	0.076109	0	A	0.04126	0
	WB	NB	15	0.585796	0	A	0.036701	0
	WB	SB	2	1.038138	0.000842	A	0.883984	0.001776
			605	1.86597	0.494808	A	4.355553	0.609959
Sink/Source	NB	NB	153	0.119773	0	A	0.04121	0
	NB	EB	1	0.138446	0	A	0.143242	0
	NB	WB	0	0	0	A	0	0
	SB	SB	163	0.121483	0	A	0.040278	0
	SB	EB	14	0.918046	0.004318	A	0.169974	0.004576
	SB	WB	25	0.844188	0.01057	A	0.130369	0.008686
	EB	EB	0	0	0.004318	A	0	0.004576
	EB	SB	2	6.798135	0	A	0.929161	0
	EB	NB	18	7.843716	0.448092	A	0.505559	0.135458
	WB	WB	0	0	0	A	0	0
	WB	NB	32	8.476068	0	A	0.170828	0
	WB	SB	0	0	0.704565	A	0	0.089185
			407	1.222206	0.116755	A	2.130621	0.242481

Simulation Run **Year: 2022** **Design: Build** **Time: AM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	129	3.402627	1.26113	A	0.448094	0.318284
	NB	EB	49	2.587659	1.26113	A	0.656071	0.318284
	NB	WB	24	2.813357	1.26113	A	0.913527	0.318284
	SB	SB	103	5.690054	4.42545	A	1.070171	1.23519
	SB	EB	5	7.401487	4.42545	A	5.020666	1.23519
	SB	WB	203	5.775198	4.42545	A	0.595034	1.23519
	EB	EB	66	3.049118	1.878636	A	0.533495	0.662151
	EB	SB	34	2.77977	1.878636	A	0.427955	0.662151
	EB	NB	240	3.186816	1.878636	A	0.436589	0.662151
	WB	WB	169	7.601955	5.54809	A	2.022402	2.262921
	WB	NB	4	3.078643	5.54809	A	2.046808	2.262921
	WB	SB	66	9.140846	5.54809	A	1.531234	2.262921
			1091	4.926442	3.278326	A	15.702046	17.914184
Main St & 1600S	NB	NB	18	2.289328	0.206714	A	0.617691	0.066372
	NB	EB	2	2.167277	0.206714	A	1.230175	0.066372
	NB	WB	46	2.290696	0.206714	A	0.329392	0.066372
	SB	SB	18	1.57646	0.196618	A	0.354724	0.103313
	SB	EB	12	1.226126	0.196618	A	0.370031	0.103313
	SB	WB	135	1.507313	0.196618	A	0.22697	0.103313
	EB	EB	77	1.37778	0.236923	A	0.094902	0.142454
	EB	SB	51	1.529401	0.236923	A	0.211563	0.142454
	EB	NB	121	1.523692	0.236923	A	0.178674	0.142454
	WB	WB	109	1.519178	0.308965	A	0.1816	0.096009
	WB	NB	15	1.828148	0.308965	A	0.754431	0.096009
	WB	SB	2	2.487649	0.308965	A	2.364932	0.096009
			604	1.586483	0.237305	A	6.915085	1.632592
Sink/Source	NB	NB	153	0.126272	0	A	0.056171	0
	NB	EB	1	0.715503	0	A	0.784039	0
	NB	WB	0	0	0	A	0	0
	SB	SB	163	0.140828	0	A	0.086228	0
	SB	EB	14	0.775929	0.000609	A	0.086309	0.001288
	SB	WB	25	0.747784	0.010571	A	0.148361	0.026646
	EB	EB	0	0	0.000609	A	0	0.001288
	EB	SB	2	6.739644	0	A	0.777167	0
	EB	NB	18	8.177414	0.473525	A	0.493391	0.138773
	WB	WB	0	0	0	A	0	0
	WB	NB	32	8.423351	0	A	0.170031	0
	WB	SB	0	0	0.710615	A	0	0.087528
			407	1.230917	0.119532	A	2.601697	0.255523

Simulation Run **Year: 2030** **Design: No Build** **Time: AM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	182	12.82543	1.11181	B	1.613477	1.109598
	NB	EB	59	6.523988	13.30199	A	0.549489	2.463793
	NB	WB	41	13.32893	9.354954	B	1.731093	2.163052
	SB	SB	130	11.39226	29.69465	B	1.350056	3.10727
	SB	EB	7	13.7312	15.93277	B	2.183902	2.262955
	SB	WB	246	10.70465	18.10535	B	1.046055	2.320663
	EB	EB	81	11.31468	36.73123	B	1.109654	8.164307
	EB	SB	44	6.044679	20.8423	A	0.61472	8.479068
	EB	NB	296	20.2661	24.34788	C	4.017788	7.298808
	WB	WB	211	12.15296	20.0287	B	1.369196	3.712352
	WB	NB	4	9.293135	12.77286	A	2.292814	2.924938
	WB	SB	83	9.492021	8.493716	A	0.395964	2.373493
			1384	13.06381	17.55985	B	18.274208	46.380297
Main St & 1600S	NB	NB	43	9.524753	4.23323	A	0.687568	0.279352
	NB	EB	6	6.872651	5.674821	A	1.879456	0.393827
	NB	WB	90	9.909643	4.23323	A	0.279538	0.279352
	SB	SB	27	10.37438	0.837352	B	0.655242	0.247213
	SB	EB	18	10.55096	0.837352	B	0.781712	0.247213
	SB	WB	172	1.825276	0.418678	A	0.281841	0.146024
	EB	EB	97	0.578753	0	A	0.116144	0
	EB	SB	69	0.723296	0	A	0.06995	0
	EB	NB	153	0.987257	0.061035	A	0.111016	0.038496
	WB	WB	155	0.148819	0	A	0.054167	0
	WB	NB	34	0.580152	0	A	0.022389	0
	WB	SB	3	1.278946	0.003994	A	1.154752	0.006999
			866	2.805831	1.403639	A	6.093775	1.638476
Sink/Source	NB	NB	218	0.139906	0	A	0.0349	0
	NB	EB	6	0.613157	0.001019	A	0.493237	0.00223
	NB	WB	4	0.312186	0	A	0.315759	0
	SB	SB	212	0.149536	0	A	0.062333	0
	SB	EB	19	1.096567	0.008567	A	0.260675	0.007707
	SB	WB	24	0.809164	0.006089	A	0.187003	0.009087
	EB	EB	0	0	0.008567	A	0	0.007707
	EB	SB	4	6.49853	0	A	0.218523	0
	EB	NB	25	8.59459	0.70623	A	0.595937	0.117547
	WB	WB	0	0	0	A	0	0
	WB	NB	42	8.835507	0	A	0.283876	0
	WB	SB	2	8.449333	1.072362	A	0.76205	0.08548
			554	1.310753	0.179427	A	3.214293	0.229758

Simulation Run **Year: 2030** **Design: Build** **Time: AM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	182	5.939494	4.848417	A	1.014868	1.36716
	NB	EB	60	4.587828	4.848417	A	0.921491	1.36716
	NB	WB	41	5.774781	4.848417	A	1.299631	1.36716
	SB	SB	130	10.95902	16.41355	B	2.65459	4.54965
	SB	EB	7	10.96807	16.41355	B	5.651418	4.54965
	SB	WB	246	11.13464	16.41355	B	1.791923	4.54965
	EB	EB	82	4.399578	4.898197	A	1.007115	1.65175
	EB	SB	44	3.997036	4.898197	A	0.689451	1.65175
	EB	NB	298	4.700992	4.898197	A	0.655936	1.65175
	WB	WB	211	20.44223	28.88672	C	8.116824	16.875483
	WB	NB	4	8.703243	28.88672	A	7.03711	16.875483
	WB	SB	82	24.69499	28.88672	C	8.858764	16.875483
			1388	10.2567	13.76172	B	39.699121	97.776172
Main St & 1600S	NB	NB	43	2.68354	0.621936	A	0.30233	0.079635
	NB	EB	6	3.620695	0.621936	A	0.852165	0.079635
	NB	WB	90	2.800004	0.621936	A	0.213567	0.079635
	SB	SB	27	1.990458	0.516445	A	0.451508	0.177793
	SB	EB	18	2.12631	0.516445	A	0.547832	0.177793
	SB	WB	172	2.031382	0.516445	A	0.23232	0.177793
	EB	EB	97	1.977288	0.534564	A	0.322693	0.199127
	EB	SB	69	1.823599	0.534564	A	0.260345	0.199127
	EB	NB	153	2.023813	0.534564	A	0.188101	0.199127
	WB	WB	154	2.302191	0.866244	A	0.297232	0.169801
	WB	NB	34	2.262607	0.866244	A	0.706612	0.169801
	WB	SB	3	2.640097	0.866244	A	2.226283	0.169801
			865	2.1906	0.634797	A	6.600988	2.505424
Sink/Source	NB	NB	218	0.136214	0	A	0.036944	0
	NB	EB	6	0.505478	0.000387	A	0.313809	0.001223
	NB	WB	4	1.724912	0.003801	A	4.491504	0.008915
	SB	SB	212	0.159941	0	A	0.06202	0
	SB	EB	19	1.244583	0.0151	A	0.636005	0.019476
	SB	WB	24	0.830498	0.006298	A	0.125809	0.005689
	EB	EB	0	0	0.0151	A	0	0.019476
	EB	SB	4	6.550003	0	A	0.232109	0
	EB	NB	25	8.353812	0.697029	A	0.876773	0.134065
	WB	WB	0	0	0.003801	A	0	0.008915
	WB	NB	42	8.771795	0	A	0.272314	0
	WB	SB	2	8.383317	1.072263	A	0.623811	0.084362
			554	1.306297	0.179488	A	7.671098	0.282121

Simulation Run **Year: 2040** **Design: No Build** **Time: AM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	213	15.94008	3.924189	C	3.426534	3.918959
	NB	EB	73	7.538505	21.18336	A	1.230305	5.953961
	NB	WB	51	16.70884	15.99584	C	3.675614	5.546156
	SB	SB	166	13.56386	46.20831	B	2.223093	6.890033
	SB	EB	9	23.21115	27.94683	C	7.473245	5.738853
	SB	WB	316	14.31029	30.68682	B	2.182697	5.782569
	EB	EB	104	12.35124	146.7759	B	1.106261	54.144991
	EB	SB	57	6.196286	133.6281	A	0.277257	54.147243
	EB	NB	378	58.90219	128.8165	F	14.516142	53.330987
	WB	WB	271	14.7178	30.36307	B	2.068293	5.321597
	WB	NB	5	10.55461	20.76539	B	2.259251	4.521319
	WB	SB	109	11.0137	15.07274	B	1.209014	3.969635
			1750	23.43067	51.78059	C	41.647706	209.2663
Main St & 1600S	NB	NB	50	11.37131	6.245293	B	0.970734	0.710816
	NB	EB	6	8.563163	8.082887	A	3.35796	0.87853
	NB	WB	104	11.44104	6.245293	B	0.806269	0.710816
	SB	SB	36	10.93868	1.181688	B	0.416499	0.221582
	SB	EB	23	10.80842	1.181688	B	0.850363	0.221582
	SB	WB	223	2.15128	0.770677	A	0.263514	0.24939
	EB	EB	124	0.763381	0	A	0.101413	0
	EB	SB	90	0.784624	0	A	0.058688	0
	EB	NB	195	1.246352	0.133067	A	0.132888	0.072637
	WB	WB	192	0.198846	0	A	0.06053	0
	WB	NB	41	0.583586	0	A	0.029837	0
	WB	SB	3	1.321132	0.002693	A	0.804077	0.003811
			1086	3.133827	2.052038	A	7.852772	3.069164
Sink/Source	NB	NB	272	0.176857	0	A	0.040595	0
	NB	EB	7	0.518283	0	A	0.391185	0
	NB	WB	4	0.312886	0	A	0.438074	0
	SB	SB	278	0.188218	0	A	0.060385	0
	SB	EB	24	1.316855	0.018024	A	0.429192	0.024701
	SB	WB	29	1.113976	0.030331	A	0.29442	0.05104
	EB	EB	0	0	0.018024	A	0	0.024701
	EB	SB	4	6.537365	0	A	0.288092	0
	EB	NB	25	9.19238	0.768754	A	0.68697	0.152892
	WB	WB	0	0	0	A	0	0
	WB	NB	42	8.884127	0	A	0.288728	0
	WB	SB	2	9.307119	1.077052	A	2.302503	0.089251
			686	1.178889	0.189416	A	5.220144	0.342585

Simulation Run **Year: 2040** **Design: Build** **Time: AM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	212	13.61095	18.7144	B	1.917289	3.954449
	NB	EB	73	11.41206	18.7144	B	3.678664	3.954449
	NB	WB	51	12.31629	18.7144	B	2.65673	3.954449
	SB	SB	166	35.27359	78.12641	E	12.369842	29.825069
	SB	EB	9	19.98741	78.12641	C	8.806554	29.825069
	SB	WB	316	29.53325	78.12641	D	8.45996	29.825069
	EB	EB	107	7.689613	15.65288	A	1.26031	4.171972
	EB	SB	57	6.777893	15.65288	A	1.363841	4.171972
	EB	NB	382	8.112628	15.65288	A	1.233841	4.171972
	WB	WB	277	90.73844	204.3186	F	5.484963	16.443321
	WB	NB	11	55.77514	204.3186	F	15.680952	16.443321
	WB	SB	89	126.9304	204.3186	F	11.716342	16.443321
			1749	34.85792	79.20306	D	74.629288	217.57924
Main St & 1600S	NB	NB	50	3.331139	1.062962	A	0.617361	0.143165
	NB	EB	6	3.98269	1.062962	A	1.846697	0.143165
	NB	WB	104	3.474932	1.062962	A	0.28709	0.143165
	SB	SB	34	2.084469	0.868152	A	0.323003	0.280175
	SB	EB	22	2.589678	0.868152	A	0.768317	0.280175
	SB	WB	214	2.409007	0.868152	A	0.318147	0.280175
	EB	EB	124	2.472341	1.296919	A	0.236215	0.392074
	EB	SB	89	2.555485	1.296919	A	0.25269	0.392074
	EB	NB	195	2.699475	1.296919	A	0.245239	0.392074
	WB	WB	191	3.250673	1.876143	A	0.260672	0.29194
	WB	NB	41	3.296398	1.876143	A	0.774193	0.29194
	WB	SB	3	4.418618	1.876143	A	3.576587	0.29194
			1072	2.819384	1.276044	A	9.506211	4.429416
Sink/Source	NB	NB	272	0.148332	0	A	0.044667	0
	NB	EB	7	0.344766	0.000547	A	0.223425	0.00173
	NB	WB	4	0.384391	0	A	0.468982	0
	SB	SB	265	0.171652	0	A	0.053277	0
	SB	EB	22	1.448702	0.04065	A	0.444756	0.050037
	SB	WB	26	0.910975	0.009715	A	0.176684	0.010934
	EB	EB	0	0	0.04065	A	0	0.050037
	EB	SB	4	6.500948	0	A	0.236873	0
	EB	NB	25	9.172918	0.779287	A	0.568078	0.149033
	WB	WB	0	0	0	A	0	0
	WB	NB	42	8.779965	0	A	0.230029	0
	WB	SB	2	9.130495	1.079062	A	1.582093	0.086885
			668	1.165942	0.190926	A	4.028864	0.348656

Simulation Run **Year: 2050** **Design: No Build** **Time: AM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	252	19.39147	8.399426	C	2.207802	3.420354
	NB	EB	87	8.207465	32.22253	A	1.478016	4.257062
	NB	WB	61	19.81329	25.53314	C	2.854713	4.079043
	SB	SB	209	22.6572	104.4145	C	6.961783	44.454506
	SB	EB	11	32.95345	79.70594	D	11.56991	41.710057
	SB	WB	398	27.94651	82.92957	D	10.944515	41.914108
	EB	EB	128	13.66749	1019.546	B	1.373614	141.25118
	EB	SB	78	7.787878	1012.666	A	1.018517	142.91474
	EB	NB	472	116.2946	1007.884	F	6.390857	143.63846
	WB	WB	339	19.91456	50.39121	C	3.213676	10.670866
	WB	NB	6	18.07909	37.77445	C	8.60417	10.106023
	WB	SB	140	12.92176	30.24823	B	2.361404	9.740482
			2181	40.93911	290.9762	E	58.978977	598.15688
Main St & 1600S	NB	NB	57	12.38803	8.230731	B	4.008803	2.372592
	NB	EB	6	10.00627	10.50176	B	3.986808	2.679378
	NB	WB	115	13.22641	8.230731	B	3.127534	2.372592
	SB	SB	48	11.7358	1.856284	B	0.608331	0.276153
	SB	EB	30	11.27414	1.856284	B	0.596436	0.276153
	SB	WB	286	2.726512	1.540567	A	0.25771	0.32862
	EB	EB	153	1.045181	0.016742	A	0.15948	0.030942
	EB	SB	110	1.024846	0.016742	A	0.085547	0.030942
	EB	NB	246	1.490241	0.427006	A	0.121296	0.20076
	WB	WB	228	0.231313	0	A	0.052957	0
	WB	NB	49	0.600999	0	A	0.043032	0
	WB	SB	4	1.769642	0.010395	A	1.651646	0.012945
			1331	3.529318	2.822935	A	14.69958	9.592579
Sink/Source	NB	NB	336	0.224317	0	A	0.081706	0
	NB	EB	9	0.608752	0.016186	A	0.945017	0.05766
	NB	WB	4	0.591733	0	A	1.373957	0.010688
	SB	SB	360	0.280774	0	A	0.146517	0
	SB	EB	32	1.502885	0.048627	A	0.569998	0.151761
	SB	WB	34	1.207132	0.043825	A	0.288397	0.069637
	EB	EB	0	0	0.048627	A	0	0.151761
	EB	SB	4	6.780634	0	A	1.120481	0
	EB	NB	25	10.46325	0.895668	B	3.240196	0.29797
	WB	WB	0	0	0	A	0	0.010688
	WB	NB	42	8.859779	0	A	1.096535	0
	WB	SB	2	10.1013	1.08533	B	4.008619	0.229471
			846	1.113317	0.208963	A	12.871423	0.979636

Simulation Run **Year: 2050** **Design: Build** **Time: AM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	242	85.73422	327.7425	F	23.183665	174.94384
	NB	EB	95	70.95737	327.7425	F	14.09198	174.94384
	NB	WB	63	76.66705	327.7425	F	13.12991	174.94384
	SB	SB	207	60.11367	168.1799	F	14.691067	41.627643
	SB	EB	12	36.22372	168.1799	E	12.404172	41.627643
	SB	WB	396	46.29321	168.1799	E	8.656152	41.627643
	EB	EB	134	17.52563	70.19362	C	4.917569	36.450201
	EB	SB	69	16.28121	70.19362	C	5.031996	36.450201
	EB	NB	483	18.88473	70.19362	C	5.712758	36.450201
	WB	WB	376	103.4655	291.3226	F	3.735935	14.161523
	WB	NB	14	60.60652	291.3226	F	15.864117	14.161523
	WB	SB	72	178.0612	291.3226	F	15.358282	14.161523
			2161	59.5421	214.3597	F	136.777603	1068.7328
Main St & 1600S	NB	NB	57	4.115123	1.877436	A	0.738554	0.510376
	NB	EB	6	5.594506	1.877436	A	2.02738	0.510376
	NB	WB	115	4.386216	1.877436	A	0.709212	0.510376
	SB	SB	39	2.430195	1.280927	A	0.385977	0.270274
	SB	EB	25	2.900146	1.280927	A	0.787247	0.270274
	SB	WB	232	2.75985	1.280927	A	0.293331	0.270274
	EB	EB	153	3.208175	2.858845	A	0.467159	0.597522
	EB	SB	110	3.303876	2.858845	A	0.599315	0.597522
	EB	NB	246	3.523415	2.858845	A	0.347504	0.597522
	WB	WB	227	4.745935	4.015464	A	0.522807	0.624771
	WB	NB	49	4.732363	4.015464	A	0.877332	0.624771
	WB	SB	4	5.462208	4.015464	A	2.619689	0.624771
			1262	3.665058	2.508168	A	10.375507	8.011772
Sink/Source	NB	NB	336	0.188509	0	A	0.030694	0
	NB	EB	9	0.764048	0.006295	A	0.405927	0.008818
	NB	WB	4	1.18723	0.002617	A	1.15523	0.004915
	SB	SB	292	0.204071	0	A	0.061741	0
	SB	EB	26	1.433596	0.032301	A	0.347377	0.024841
	SB	WB	31	0.94242	0.023251	A	0.200002	0.030171
	EB	EB	0	0	0.032301	A	0	0.024841
	EB	SB	4	6.577269	0	A	0.284717	0
	EB	NB	25	9.417009	0.796802	A	1.021715	0.136319
	WB	WB	0	0	0.002617	A	0	0.004915
	WB	NB	42	8.789389	0	A	0.266254	0
	WB	SB	2	9.834002	1.081653	A	2.281413	0.092104
			769	1.092887	0.194292	A	6.05507	0.326924

Simulation Run **Year: 2022** **Design: No Build** **Time: PM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	130	11.4458	0.130642	B	0.747099	0.110261
	NB	EB	50	6.20199	7.519376	A	0.344844	0.99967
	NB	WB	21	11.28112	0.130642	B	0.834798	0.110261
	SB	SB	93	10.72552	18.12795	B	0.675052	1.234517
	SB	EB	10	11.63409	0.101754	B	4.103256	0.13231
	SB	WB	161	8.682667	10.26869	A	0.531558	0.804252
	EB	EB	89	10.54891	21.78415	B	0.476091	3.73831
	EB	SB	44	5.616034	6.428712	A	0.248487	3.926401
	EB	NB	197	12.80684	0.795605	B	2.720665	1.708433
	WB	WB	128	11.08587	12.47774	B	1.067393	2.712279
	WB	NB	16	9.82784	7.599112	A	1.517904	1.943315
	WB	SB	63	9.44952	0.110414	A	0.587962	0.270713
			1002	10.42485	7.758557	B	13.855109	17.690722
Main St & 1600S	NB	NB	6	8.711432	1.280364	A	1.710428	0.291955
	NB	EB	4	5.513681	1.782021	A	0.877995	0.392542
	NB	WB	48	7.964347	1.280364	A	0.569984	0.291955
	SB	SB	10	9.339119	0.192032	A	0.415889	0.066777
	SB	EB	3	9.321868	0.192032	A	0.601618	0.066777
	SB	WB	117	1.046088	0.085818	A	0.077627	0.02455
	EB	EB	139	0.538401	0	A	0.082688	0
	EB	SB	47	0.653167	0	A	0.028643	0
	EB	NB	185	0.7611	0.010598	A	0.068567	0.011201
	WB	WB	51	0.069197	0	A	0.046739	0
	WB	NB	6	0.569486	0	A	0.065255	0
	WB	SB	2	0.500376	0	A	0.331366	0
			619	1.553651	0.418854	A	4.876799	1.145757
Sink/Source	NB	NB	186	0.06811	0	A	0.044189	0
	NB	EB	7	0.413542	0.003521	A	0.318776	0.007422
	NB	WB	2	1.278398	0	A	1.381463	0
	SB	SB	125	0.14528	0	A	0.051839	0
	SB	EB	25	1.016733	0.009433	A	0.192186	0.009356
	SB	WB	47	0.762195	0.01399	A	0.103562	0.010905
	EB	EB	0	0	0.009433	A	0	0.009356
	EB	SB	5	7.039568	0	A	1.121572	0
	EB	NB	4	7.156164	0.181577	A	1.126641	0.052435
	WB	WB	0	0	0	A	0	0
	WB	NB	13	8.225797	0	A	0.342151	0
	WB	SB	1	11.481	0.28578	B	6.176864	0.076944
			414	0.662483	0.04943	A	10.859243	0.166418

Simulation Run **Year: 2022** **Design: Build** **Time: PM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	130	2.993609	1.215945	A	0.298081	0.267878
	NB	EB	50	3.035157	1.215945	A	0.512487	0.267878
	NB	WB	21	2.802032	1.215945	A	0.9027	0.267878
	SB	SB	93	3.774277	1.600237	A	0.45829	0.404695
	SB	EB	10	3.407633	1.600237	A	0.81712	0.404695
	SB	WB	161	3.89753	1.600237	A	0.443973	0.404695
	EB	EB	89	2.470632	1.064865	A	0.478785	0.472322
	EB	SB	44	2.15291	1.064865	A	0.298639	0.472322
	EB	NB	197	2.48266	1.064865	A	0.356257	0.472322
	WB	WB	128	5.09145	2.299196	A	0.605733	0.797995
	WB	NB	16	5.662736	2.299196	A	1.513723	0.797995
	WB	SB	63	5.520775	2.299196	A	1.060059	0.797995
			1001	3.491394	1.545061	A	7.745847	7.77156
Main St & 1600S	NB	NB	6	3.813644	0.370134	A	1.871079	0.132249
	NB	EB	4	2.570859	0.370134	A	1.306477	0.132249
	NB	WB	48	3.187685	0.370134	A	0.424656	0.132249
	SB	SB	10	1.130271	0.077937	A	0.374604	0.041193
	SB	EB	3	1.074158	0.077937	A	0.618983	0.041193
	SB	WB	117	1.239857	0.077937	A	0.115985	0.041193
	EB	EB	139	1.684234	0.321494	A	0.236521	0.284314
	EB	SB	47	1.480654	0.321494	A	0.290932	0.284314
	EB	NB	185	1.708992	0.321494	A	0.169036	0.284314
	WB	WB	51	1.617111	0.147979	A	0.259446	0.060934
	WB	NB	6	1.614812	0.147979	A	0.557372	0.060934
	WB	SB	2	1.983366	0.147979	A	1.47407	0.060934
			618	1.718982	0.229386	A	7.699161	2.07476
Sink/Source	NB	NB	186	0.058899	0	A	0.0261	0
	NB	EB	6	0.725728	0.01006	A	0.606186	0.017037
	NB	WB	2	0.110328	0	A	0.173953	0
	SB	SB	125	0.150655	0	A	0.048808	0
	SB	EB	25	1.089317	0.013601	A	0.217664	0.017663
	SB	WB	47	0.825387	0.018641	A	0.128224	0.018338
	EB	EB	0	0	0.013601	A	0	0.017663
	EB	SB	5	6.904877	0	A	0.648797	0
	EB	NB	4	7.291197	0.180431	A	1.40652	0.040195
	WB	WB	0	0	0	A	0	0
	WB	NB	13	8.121974	0	A	0.201414	0
	WB	SB	1	9.833577	0.276679	A	2.674594	0.065102
			413	0.660601	0.049941	A	6.13226	0.175998

Simulation Run **Year: 2030** **Design: No Build** **Time: PM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	168	11.61339	0.40343	B	1.24948	0.47592
	NB	EB	58	6.263667	10.11005	A	0.218763	1.753706
	NB	WB	28	11.2681	6.764298	B	1.248415	1.486249
	SB	SB	115	10.12937	21.9181	B	0.805449	1.35505
	SB	EB	11	11.18343	10.94896	B	1.514494	0.881419
	SB	WB	198	8.759733	12.5825	A	0.426633	0.963472
	EB	EB	113	11.18947	21.68254	B	1.021742	2.158925
	EB	SB	53	5.925209	9.214995	A	0.358682	1.897987
	EB	NB	236	13.40353	11.33368	B	1.017227	1.700562
	WB	WB	153	10.08411	14.06114	B	0.456064	1.927364
	WB	NB	20	9.331456	8.666053	A	0.599169	1.257546
	WB	SB	81	9.008187	5.263143	A	0.183924	0.881342
			1235	10.42559	11.07908	B	9.100042	16.739542
Main St & 1600S	NB	NB	22	10.07112	3.599557	B	1.021064	0.503545
	NB	EB	7	6.879424	4.725533	A	0.957553	0.673863
	NB	WB	89	9.780019	3.599557	A	0.541788	0.503545
	SB	SB	25	10.13829	0.671147	B	0.510377	0.147263
	SB	EB	15	9.806266	0.671147	A	0.398902	0.147263
	SB	WB	118	1.300016	0.127505	A	0.158379	0.03163
	EB	EB	195	0.828005	0.002756	A	0.088616	0.008717
	EB	SB	78	0.758474	0.002756	A	0.058315	0.008717
	EB	NB	237	0.981636	0.11029	A	0.109091	0.108846
	WB	WB	86	0.122935	0	A	0.08522	0
	WB	NB	20	0.580729	0	A	0.038922	0
	WB	SB	3	1.051787	0.000855	A	0.675072	0.001809
			894	2.429981	1.154705	A	4.643299	2.135198
Sink/Source	NB	NB	257	0.099596	0	A	0.040929	0
	NB	EB	11	0.887235	0.023709	A	0.681098	0.030145
	NB	WB	8	1.115649	0.006467	A	0.614324	0.011692
	SB	SB	160	0.184825	0	A	0.078571	0
	SB	EB	37	1.294747	0.028538	A	0.265197	0.023567
	SB	WB	48	0.876309	0.024098	A	0.157105	0.022194
	EB	EB	0	0	0.028538	A	0	0.023567
	EB	SB	0	0	0	A	0	0
	EB	NB	0	0	0	A	0	0
	WB	WB	0	0	0.006467	A	0	0.011692
	WB	NB	0	0	0	A	0	0
	WB	SB	0	0	0	A	0	0
			520	0.313445	0.008281	A	1.837224	0.122857

Simulation Run **Year: 2030** **Design: Build** **Time: PM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	168	4.167793	2.660354	A	0.80107	1.018594
	NB	EB	58	4.493943	2.660354	A	1.443676	1.018594
	NB	WB	28	3.122931	2.660354	A	1.115872	1.018594
	SB	SB	115	4.403059	2.66758	A	0.499296	0.473809
	SB	EB	11	4.56242	2.66758	A	1.625188	0.473809
	SB	WB	199	4.644117	2.66758	A	0.337479	0.473809
	EB	EB	114	2.96927	2.280305	A	0.404432	0.824362
	EB	SB	54	2.987605	2.280305	A	0.49367	0.824362
	EB	NB	242	3.249802	2.280305	A	0.642009	0.824362
	WB	WB	153	7.401245	5.109179	A	1.165866	2.0078
	WB	NB	20	6.983946	5.109179	A	3.04197	2.0078
	WB	SB	80	7.335682	5.109179	A	1.558464	2.0078
			1241	4.578174	3.179354	A	13.128992	17.29826
Main St & 1600S	NB	NB	22	4.030553	1.034283	A	1.19124	0.254864
	NB	EB	7	2.832787	1.034283	A	1.238299	0.254864
	NB	WB	89	4.02063	1.034283	A	0.44611	0.254864
	SB	SB	25	1.560922	0.187521	A	0.36877	0.048204
	SB	EB	15	1.355021	0.187521	A	0.243968	0.048204
	SB	WB	119	1.524387	0.187521	A	0.09933	0.048204
	EB	EB	194	2.552168	1.266302	A	0.210247	0.476196
	EB	SB	78	2.337067	1.266302	A	0.290106	0.476196
	EB	NB	236	2.579279	1.266302	A	0.256463	0.476196
	WB	WB	86	2.624945	0.599546	A	0.450648	0.155137
	WB	NB	20	2.438982	0.599546	A	0.805569	0.155137
	WB	SB	3	2.13429	0.599546	A	1.85377	0.155137
			893	2.545169	0.771913	A	7.45452	3.737604
Sink/Source	NB	NB	257	0.095046	0	A	0.0397	0
	NB	EB	11	0.732898	0.02944	A	0.51637	0.052711
	NB	WB	8	1.013298	0.004267	A	0.404271	0.007027
	SB	SB	160	0.219736	0	A	0.066206	0
	SB	EB	37	1.564142	0.064545	A	0.427004	0.0396
	SB	WB	48	0.956523	0.041958	A	0.191743	0.069453
	EB	EB	0	0	0.064545	A	0	0.0396
	EB	SB	0	0	0	A	0	0
	EB	NB	0	0	0	A	0	0
	WB	WB	0	0	0.004267	A	0	0.007027
	WB	NB	0	0	0	A	0	0
	WB	SB	0	0	0	A	0	0
			520	0.346031	0.014021	A	1.645294	0.215418

Simulation Run **Year: 2040** **Design: No Build** **Time: PM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	205	12.45815	0.708329	B	0.601743	0.472286
	NB	EB	72	6.943292	13.72843	A	0.463118	1.398705
	NB	WB	35	12.9005	9.435191	B	1.208462	1.188132
	SB	SB	147	11.04966	31.17573	B	0.832177	2.951291
	SB	EB	15	13.34244	16.62489	B	2.362437	2.056245
	SB	WB	247	10.52461	18.66673	B	0.930558	2.243741
	EB	EB	144	11.98504	38.23114	B	0.813327	7.63829
	EB	SB	70	6.412963	22.75653	A	0.536456	8.363211
	EB	NB	302	18.84653	23.97927	C	3.414194	6.679339
	WB	WB	194	11.32712	19.59798	B	0.626021	1.916129
	WB	NB	25	10.64836	12.36957	B	0.780263	1.376402
	WB	SB	101	9.332055	7.915527	A	0.380662	1.022154
			1556	12.34483	17.93244	B	12.949418	37.305925
Main St & 1600S	NB	NB	26	12.27421	5.506617	B	3.034064	1.193046
	NB	EB	8	8.353471	7.057574	A	2.181247	1.467937
	NB	WB	103	11.56427	5.506617	B	1.196214	1.193046
	SB	SB	32	10.51337	0.960908	B	0.383553	0.137608
	SB	EB	20	10.39975	0.960908	B	0.492613	0.137608
	SB	WB	154	1.545396	0.318196	A	0.179388	0.123126
	EB	EB	242	1.059092	0	A	0.136584	0
	EB	SB	100	0.866945	0	A	0.073186	0
	EB	NB	291	1.111855	0.124631	A	0.090272	0.078552
	WB	WB	102	0.126207	0	A	0.029432	0
	WB	NB	22	0.587789	0	A	0.051938	0
	WB	SB	4	1.065655	0.004534	A	0.76108	0.007305
			1103	2.780118	1.746558	A	8.609571	4.338228
Sink/Source	NB	NB	315	0.104474	0	A	0.036804	0
	NB	EB	11	0.673346	0.01217	A	0.41054	0.01531
	NB	WB	10	1.351923	0.007984	A	0.645775	0.00895
	SB	SB	209	0.30422	0	A	0.086197	0
	SB	EB	47	1.536896	0.075485	A	0.297758	0.061176
	SB	WB	59	1.043288	0.069935	A	0.243808	0.064519
	EB	EB	0	0	0.075485	A	0	0.061176
	EB	SB	0	0	0	A	0	0
	EB	NB	0	0	0	A	0	0
	WB	WB	0	0	0.007984	A	0	0.00895
	WB	NB	0	0	0	A	0	0
	WB	SB	0	0	0	A	0	0
			650	0.386726	0.016557	A	1.720882	0.220081

Simulation Run **Year: 2040** **Design: Build** **Time: PM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	205	8.113344	9.019308	A	1.838644	3.213624
	NB	EB	72	8.678538	9.019308	A	2.275041	3.213624
	NB	WB	35	6.433936	9.019308	A	1.783188	3.213624
	SB	SB	147	6.874302	9.343761	A	0.772656	1.88583
	SB	EB	15	5.880391	9.343761	A	1.308569	1.88583
	SB	WB	247	7.967268	9.343761	A	0.990523	1.88583
	EB	EB	146	4.397649	5.819874	A	0.690056	1.621519
	EB	SB	71	4.147409	5.819874	A	0.731354	1.621519
	EB	NB	309	4.723146	5.819874	A	0.646188	1.621519
	WB	WB	194	17.30511	24.16485	C	4.732973	11.252351
	WB	NB	25	19.35033	24.16485	C	7.206047	11.252351
	WB	SB	101	18.35459	24.16485	C	6.432814	11.252351
			1565	8.761795	12.08695	A	29.408053	71.893296
Main St & 1600S	NB	NB	26	5.925609	2.01636	A	1.601112	0.449061
	NB	EB	8	4.193265	2.01636	A	1.440617	0.449061
	NB	WB	103	5.422568	2.01636	A	0.744605	0.449061
	SB	SB	32	1.554973	0.320119	A	0.319067	0.10472
	SB	EB	20	1.872536	0.320119	A	0.460497	0.10472
	SB	WB	154	1.756166	0.320119	A	0.204411	0.10472
	EB	EB	241	3.835635	3.662653	A	0.51989	1.30876
	EB	SB	100	3.306554	3.662653	A	0.484655	1.30876
	EB	NB	291	3.698232	3.662653	A	0.566151	1.30876
	WB	WB	102	3.305061	1.03174	A	0.900107	0.512157
	WB	NB	22	3.511731	1.03174	A	1.213424	0.512157
	WB	SB	4	2.874712	1.03174	A	2.101641	0.512157
			1102	3.502649	1.757718	A	10.556177	9.498792
Sink/Source	NB	NB	315	0.084467	0	A	0.031069	0
	NB	EB	11	0.931774	0.014644	A	0.419474	0.011635
	NB	WB	10	1.212795	0.007957	A	0.772081	0.010799
	SB	SB	208	0.282425	0	A	0.061558	0
	SB	EB	47	1.584733	0.060147	A	0.392586	0.049262
	SB	WB	58	0.96161	0.024314	A	0.101119	0.0132
	EB	EB	0	0	0.060147	A	0	0.049262
	EB	SB	0	0	0	A	0	0
	EB	NB	0	0	0	A	0	0
	WB	WB	0	0	0.007957	A	0	0.010799
	WB	NB	0	0	0	A	0	0
	WB	SB	0	0	0	A	0	0
			649	0.368338	0.010706	A	1.777887	0.144957

Simulation Run **Year: 2050** **Design: No Build** **Time: PM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	260	15.52885	3.190177	C	1.189296	1.818406
	NB	EB	92	7.759998	23.13043	A	0.946962	2.474876
	NB	WB	46	14.93894	17.05468	B	1.616945	2.30454
	SB	SB	181	12.70321	48.79517	B	1.352473	11.957038
	SB	EB	19	16.72044	29.80972	C	2.332855	10.8628
	SB	WB	316	14.23316	32.34216	B	4.006158	11.018704
	EB	EB	181	12.96237	138.971	B	1.306212	62.071514
	EB	SB	92	6.587274	124.2841	A	0.242066	64.491174
	EB	NB	386	50.13765	119.7767	F	14.646539	61.308916
	WB	WB	243	12.83029	27.74907	B	0.72763	3.047813
	WB	NB	31	12.74972	18.25101	B	1.563248	2.441373
	WB	SB	130	10.00796	12.49494	B	0.95112	2.14152
			1977	20.11427	49.65409	C	30.881504	235.93867
Main St & 1600S	NB	NB	29	14.11593	8.152743	B	2.871052	1.604161
	NB	EB	9	10.66622	10.10003	B	4.243225	1.867275
	NB	WB	118	14.08721	8.152743	B	2.145257	1.604161
	SB	SB	46	11.12786	1.492139	B	0.513767	0.141639
	SB	EB	27	10.83742	1.492139	B	0.291812	0.141639
	SB	WB	215	1.865295	0.501573	A	0.247839	0.156569
	EB	EB	301	1.410507	0.046773	A	0.080877	0.090542
	EB	SB	121	1.076194	0.046773	A	0.139789	0.090542
	EB	NB	361	1.297312	0.367448	A	0.119034	0.244619
	WB	WB	118	0.175462	0	A	0.048615	0
	WB	NB	25	0.590364	0	A	0.034317	0
	WB	SB	4	1.762088	0.008536	A	0.890637	0.011508
			1372	3.235866	2.583655	A	11.626221	6.019027
Sink/Source	NB	NB	386	0.137039	0	A	0.086379	0
	NB	EB	15	0.788254	0.016274	A	1.287187	0.022604
	NB	WB	10	1.587965	0.00902	A	1.218912	0.013001
	SB	SB	267	0.413638	0	A	0.146217	0
	SB	EB	57	1.700634	0.10346	A	0.40452	0.059573
	SB	WB	73	1.0673	0.051666	A	0.269615	0.051939
	EB	EB	0	0	0.10346	A	0	0.059573
	EB	SB	15	7.390922	0	A	1.642751	0
	EB	NB	6	9.962247	0.534419	A	2.7812	0.306233
	WB	WB	0	0	0.00902	A	0	0.013001
	WB	NB	10	9.685723	0	A	1.229371	0
	WB	SB	8	11.47676	0.585766	B	1.73755	0.217883
			847	0.866253	0.130061	A	10.803702	0.743807

Simulation Run **Year: 2050** **Design: Build** **Time: PM**

Node	From	To	#Veh	VehDelay	Qlen	LOS	VehDelay SD	QLEn SD
Main St & Maple St	NB	NB	261	28.76176	65.79869	D	13.273027	41.434009
	NB	EB	91	31.52243	65.79869	D	13.009616	41.434009
	NB	WB	46	23.92792	65.79869	C	14.040301	41.434009
	SB	SB	183	21.27406	58.64525	C	7.41173	23.47619
	SB	EB	19	23.87886	58.64525	C	15.751451	23.47619
	SB	WB	314	23.77898	58.64525	C	7.333226	23.47619
	EB	EB	183	9.500852	28.39518	A	1.53783	8.443729
	EB	SB	92	8.430348	28.39518	A	1.247476	8.443729
	EB	NB	393	10.95621	28.39518	B	2.193668	8.443729
	WB	WB	241	87.50273	192.6178	F	10.121519	37.196447
	WB	NB	29	107.7655	192.6178	F	15.891584	37.196447
	WB	SB	127	82.4426	192.6178	F	13.548436	37.196447
			1979	32.82061	86.36423	D	115.359864	442.2015
Main St & 1600S	NB	NB	29	7.575714	3.719288	A	2.82864	1.011502
	NB	EB	9	6.187584	3.719288	A	1.580732	1.011502
	NB	WB	118	7.614362	3.719288	A	1.378231	1.011502
	SB	SB	44	2.074782	0.843741	A	0.366865	0.337094
	SB	EB	27	2.386062	0.843741	A	0.467259	0.337094
	SB	WB	217	2.318936	0.843741	A	0.302675	0.337094
	EB	EB	300	6.273783	12.34481	A	1.302484	4.927295
	EB	SB	121	5.650652	12.34481	A	0.997114	4.927295
	EB	NB	361	6.080652	12.34481	A	1.117878	4.927295
	WB	WB	117	4.644985	2.024734	A	0.933238	0.537156
	WB	NB	25	5.217824	2.024734	A	0.980166	0.537156
	WB	SB	4	6.584016	2.024734	A	7.148211	0.537156
			1371	5.309735	4.733142	A	19.403493	27.252188
Sink/Source	NB	NB	385	0.110281	0	A	0.033687	0
	NB	EB	14	0.79417	0.020473	A	0.57755	0.023119
	NB	WB	10	1.524239	0.012832	A	0.754963	0.010688
	SB	SB	268	0.437716	0	A	0.082459	0
	SB	EB	57	1.79243	0.121394	A	0.354433	0.101506
	SB	WB	74	1.087284	0.054087	A	0.135097	0.028403
	EB	EB	0	0	0.121394	A	0	0.101506
	EB	SB	15	7.379986	0	A	0.632007	0
	EB	NB	6	9.38509	0.528654	A	2.590224	0.165032
	WB	WB	0	0	0.012832	A	0	0.010688
	WB	NB	10	9.286101	0	A	0.806073	0
	WB	SB	8	10.95099	0.562982	B	1.61729	0.130636
			848	0.85569	0.130042	A	7.583783	0.571578

Appendix E : Highway Capacity Manual Analyses

Highway Capacity Manual Results Summary

Intersection	Year	Condition	Time	Approach Delay				Approach LOS				Overall	
				EB	WB	NB	SB	EB	WB	NB	SB	Delay	LOS
Main St and Maple St	2022	No Build	AM	15.9	13.2	12.4	12.7	C	B	B	B	13.7	B
Main St and Maple St	2022	No Build	PM	11.4	10.6	10.8	11.5	B	B	B	B	11.1	B
Main St and Maple St	2030	No Build	AM	24.2	16.9	15.4	16.6	C	C	C	C	18.8	C
Main St and Maple St	2030	No Build	PM	13.4	12	12.4	11.6	B	B	B	B	12.5	B
Main St and Maple St	2040	No Build	AM	124.1	32.1	23.5	32.9	F	D	C	D	58.5	F
Main St and Maple St	2040	No Build	PM	20.3	16.1	22.1	15.8	C	C	C	C	18.7	F
Main St and Maple St	2050	No Build	AM	630.6	164.3	64.3	299.6	F	F	F	F	305.7	F
Main St and Maple St	2050	No Build	PM	44.1	23.8	28.8	24.5	E	C	D	C	31.7	D
Main St and 1600 S.	2022	No Build	AM	4.3	0.2	15.8	10.2	A*	A*	B	C	9[1]	A*
Main St and 1600 S.	2022	No Build	PM	4.1	0.3	15.8	9.4	A*	A*	C	A	7.9[1]	A*
Main St and 1600 S.	2030	No Build	AM	4.3	0.2	27.6	11.9	A*	A*	D	B	13.4[1]	B*
Main St and 1600 S.	2030	No Build	PM	4	0.3	25.9	12.3	A*	A*	D	B	11.8[1]	B*
Main St and 1600 S.	2040	No Build	AM	4.7	0.2	76.6	13.9	A*	A*	F	B	25.5[1]	D*
Main St and 1600 S.	2040	No Build	PM	4.4	0.3	57.6	14.2	A*	A*	F	B	18.8[1]	C*
Main St and 1600 S.	2050	No Build	AM	5.1	0.2	255	15.5	A*	A*	F	C	51.7[1]	F*
Main St and 1600 S.	2050	No Build	PM	4.6	0.3	1389.7	23.4	A*	A*	F	C	280.1[1]	F*
Main St and Maple St	2022	Build	AM	6.9	7.8	6.3	7.8	A	A	A	A	7.2	A
Main St and Maple St	2022	Build	PM	6.6	5.8	5.8	5.4	A	A	A	A	6	A
Main St and Maple St	2030	Build	AM	8.6	8.6	7.8	8	A	A	A	A	8.3	A
Main St and Maple St	2030	Build	PM	7.1	8	6.4	8	A	A	A	A	7.4	A
Main St and Maple St	2040	Build	AM	13	17.7	11	17.9	B	C	B	C	15.1	C
Main St and Maple St	2040	Build	PM	9.4	10.5	9.6	9.7	A	B	A	A	9.7	A
Main St and Maple St	2050	Build	AM	29.7	64.8	21.8	68.5	D	F	C	F	47.4	E
Main St and Maple St	2050	Build	PM	15	15.4	12.6	13.2	B	C	B	B	14.1	B
Main St and 1600 S.	2022	Build	AM	4.4	4.2	3.8	4.4	A	A	A	A	4.3	A
Main St and 1600 S.	2022	Build	PM	4.7	3.8	4	3.7	A	A	A	A	4.3	A
Main St and 1600 S.	2030	Build	AM	5	5.3	4.6	5.3	A	A	A	A	5.1	A
Main St and 1600 S.	2030	Build	PM	5.7	4.4	4.8	4.5	A	A	A	A	5.1	A
Main St and 1600 S.	2040	Build	AM	5.8	6.2	5.3	6.3	A	A	A	A	5.9	A
Main St and 1600 S.	2040	Build	PM	7	4.9	5.7	5	A	A	A	A	6.2	A
Main St and 1600 S.	2050	Build	AM	6.7	6.5	5.5	7.2	A	A	A	A	6.7	A
Main St and 1600 S.	2050	Build	PM	10.5	5.8	8	5.8	B	A	A	A	8.8	A

HCS7 All-Way Stop Control Report

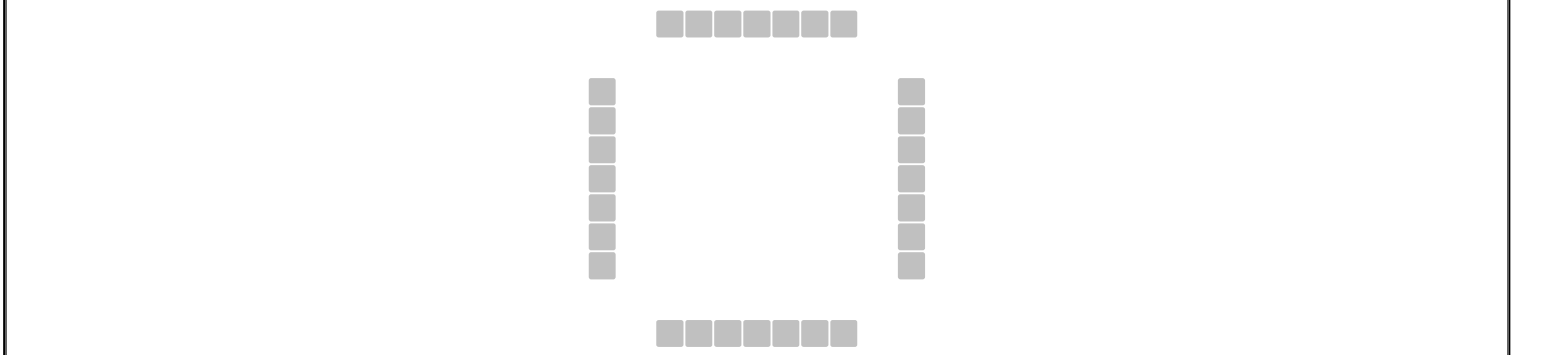
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Analysis Time Period (hrs)	1.00
Time Analyzed	2022 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St. and Main St.
Jurisdiction	Mapleton Public Works
East/West Street	Maple St.
North/South Street	Main St.
Peak Hour Factor	0.66

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	174	49	26	48	128	3	21	87	40	4	86	155
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LT	R		LT	R	
Flow Rate, v (veh/h)	265	114		73	200		165	61		137	236	
Percent Heavy Vehicles	2	2		2	2		2	2		2	2	

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20	3.20	
Initial Degree of Utilization, x	0.236	0.102		0.065	0.178		0.146	0.054		0.122	0.210	
Final Departure Headway, hd (s)	7.22	6.47		7.40	6.88		7.18	6.38		6.89	6.17	
Final Degree of Utilization, x	0.532	0.206		0.150	0.382		0.328	0.108		0.263	0.405	
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.3	2.3	
Service Time, ts (s)	4.92	4.17		5.10	4.58		4.88	4.08		4.59	3.87	

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	265	114		73	200		165	61		137	236	
Capacity	499	556		486	523		501	564		522	583	
95% Queue Length, Q_{95} (veh)	3.3	0.8		0.5	1.8		1.5	0.4		1.1	2.0	
Control Delay (s/veh)	18.0	10.8		11.4	13.8		13.4	9.9		12.0	13.1	
Level of Service, LOS	C	B		B	B		B	A		B	B	
Approach Delay (s/veh)	15.9			13.2			12.4			12.7		
Approach LOS	C			B			B			B		
Intersection Delay, s/veh | LOS	13.7						B					

HCS7 All-Way Stop Control Report

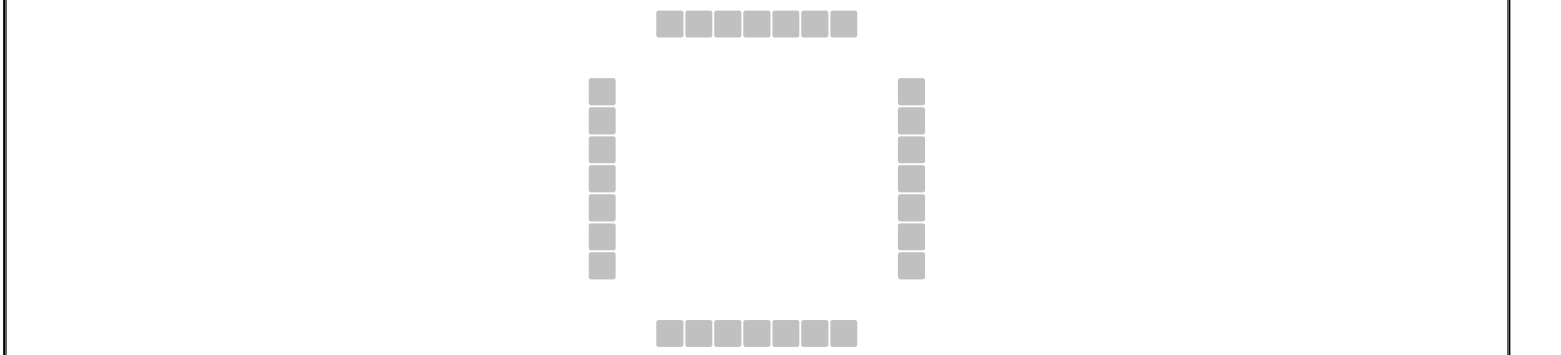
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Analysis Time Period (hrs)	1.00
Time Analyzed	2022 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St. and Main St.
Jurisdiction	Mapleton Public Works
East/West Street	Maple St.
North/South Street	Main St.
Peak Hour Factor	0.79

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	139	75	41	50	96	11	19	97	36	50	96	41
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LT	R		LT	R	
Flow Rate, v (veh/h)	176	147		63	135		147	46		185	52	
Percent Heavy Vehicles	2	2		2	2		2	2		2	2	

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20	3.20	
Initial Degree of Utilization, x	0.156	0.131		0.056	0.120		0.131	0.041		0.164	0.046	
Final Departure Headway, hd (s)	6.56	5.81		6.73	6.16		6.41	5.63		6.43	5.56	
Final Degree of Utilization, x	0.321	0.237		0.118	0.232		0.262	0.071		0.330	0.080	
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.3	2.3	
Service Time, ts (s)	4.26	3.51		4.43	3.86		4.11	3.33		4.13	3.26	

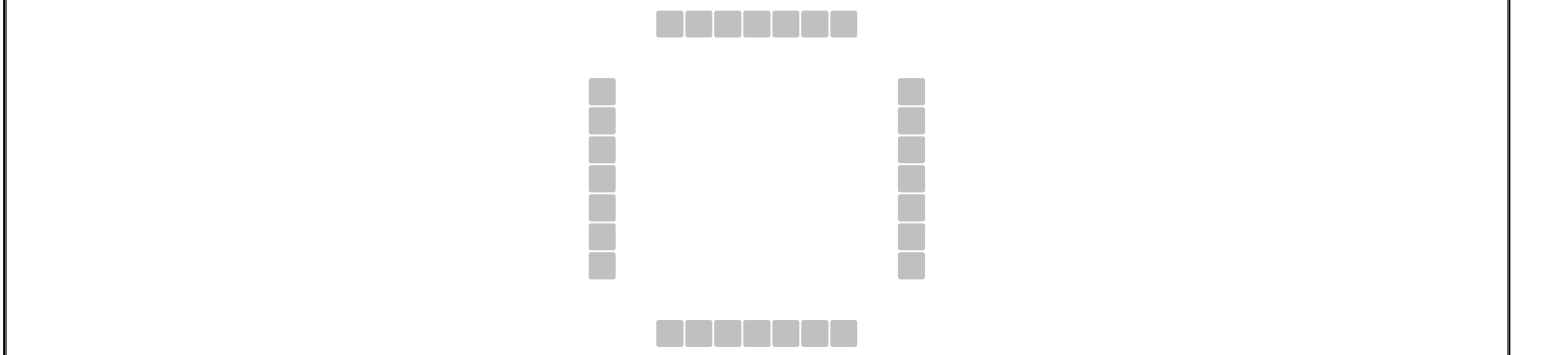
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	176	147		63	135		147	46		185	52	
Capacity	549	619		535	584		561	639		560	647	
95% Queue Length, Q_{95} (veh)	1.4	0.9		0.4	0.9		1.1	0.2		1.5	0.3	
Control Delay (s/veh)	12.3	10.3		10.3	10.7		11.4	8.8		12.3	8.7	
Level of Service, LOS	B	B		B	B		B	A		B	A	
Approach Delay (s/veh)	11.4			10.6			10.8			11.5		
Approach LOS	B			B			B			B		
Intersection Delay, s/veh | LOS	11.1						B					

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	Adam Hill	Intersection	Main St. and Maple St.
Agency/Co.	BYU CCE Capstone	Jurisdiction	Mapleton Public Works
Date Performed	3/11/2023	East/West Street	Maple St.
Analysis Year	2023	North/South Street	Main St.
Analysis Time Period (hrs)	1.00	Peak Hour Factor	0.66
Time Analyzed	2030 AM		
Project Description	Roundabout Feasability		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	213	60	32	59	156	4	26	107	49	5	105	189
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LT	R		LT	R	
Flow Rate, v (veh/h)	323	139		89	242		202	74		167	286	
Percent Heavy Vehicles	2	2		2	2		2	2		2	2	

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20	3.20	
Initial Degree of Utilization, x	0.287	0.124		0.079	0.215		0.179	0.066		0.148	0.255	
Final Departure Headway, hd (s)	7.91	7.17		8.16	7.64		7.96	7.16		7.61	6.88	
Final Degree of Utilization, x	0.709	0.278		0.203	0.515		0.445	0.148		0.352	0.548	
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.3	2.3	
Service Time, ts (s)	5.61	4.87		5.86	5.34		5.66	4.86		5.31	4.58	

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	323	139		89	242		202	74		167	286	
Capacity	455	502		441	471		452	503		473	523	
95% Queue Length, Q_{95} (veh)	6.7	1.1		0.8	3.1		2.4	0.5		1.6	3.5	
Control Delay (s/veh)	29.3	12.6		12.9	18.4		17.0	11.1		14.4	17.8	
Level of Service, LOS	D	B		B	C		C	B		B	C	
Approach Delay (s/veh)	24.2			16.9			15.4			16.6		
Approach LOS	C			C			C			C		
Intersection Delay, s/veh | LOS	18.8						C					

HCS7 All-Way Stop Control Report

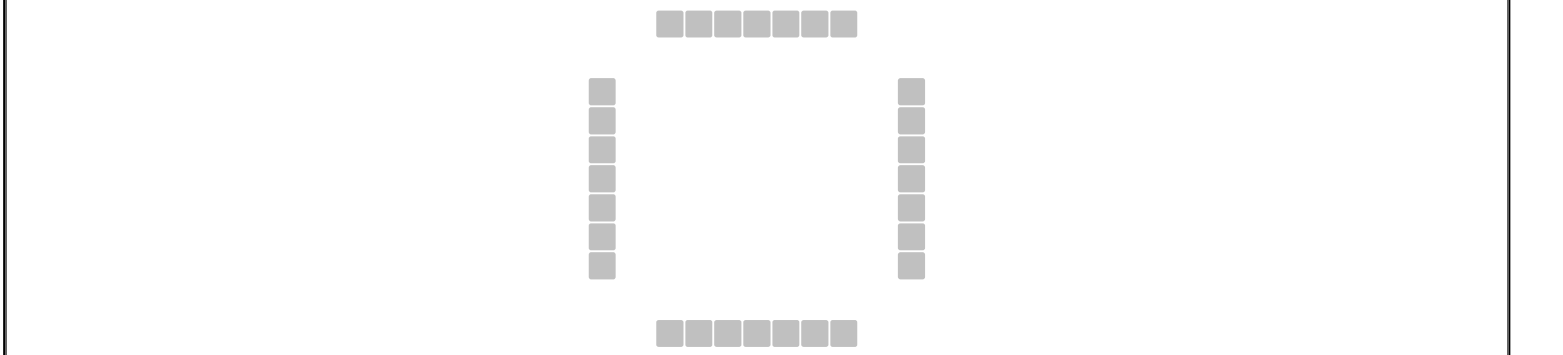
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Analysis Time Period (hrs)	1.00
Time Analyzed	2030 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St.
Jurisdiction	Mapleton Public Works
East/West Street	Maple St.
North/South Street	Main St.
Peak Hour Factor	0.79

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	170	92	50	61	117	14	24	119	44	10	89	152
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LT	R		LT	R	
Flow Rate, v (veh/h)	215	180		77	166		181	56		125	192	
Percent Heavy Vehicles	2	2		2	2		2	2		2	2	

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20	3.20	
Initial Degree of Utilization, x	0.191	0.160		0.069	0.147		0.161	0.050		0.111	0.171	
Final Departure Headway, hd (s)	7.02	6.27		7.25	6.68		6.93	6.15		6.80	6.05	
Final Degree of Utilization, x	0.420	0.313		0.156	0.308		0.349	0.095		0.237	0.323	
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.3	2.3	
Service Time, ts (s)	4.72	3.97		4.95	4.38		4.63	3.85		4.50	3.75	

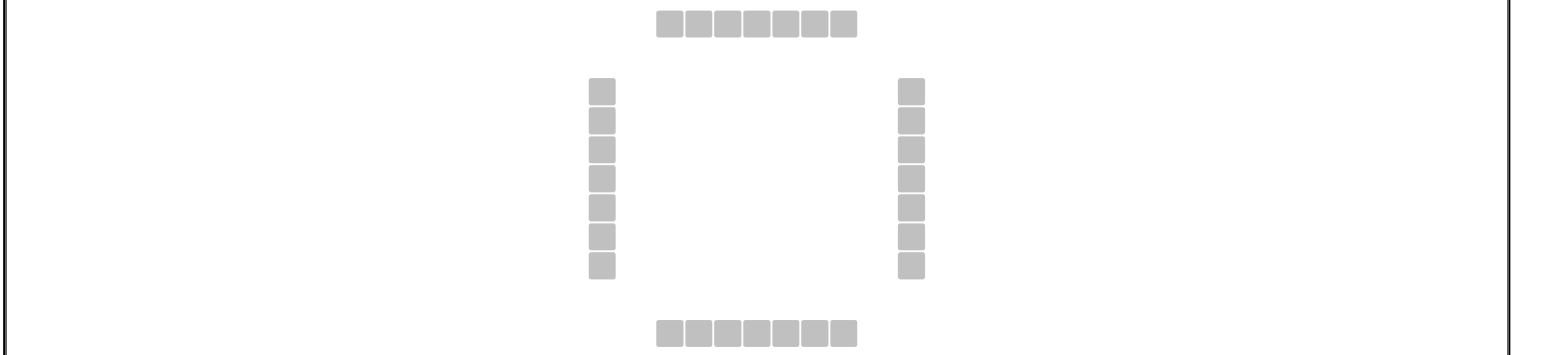
Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	215	180		77	166		181	56		125	192	
Capacity	513	574		496	539		519	585		529	595	
95% Queue Length, Q_{95} (veh)	2.1	1.4		0.6	1.3		1.6	0.3		0.9	1.4	
Control Delay (s/veh)	14.8	11.8		11.3	12.3		13.3	9.5		11.6	11.6	
Level of Service, LOS	B	B		B	B		B	A		B	B	
Approach Delay (s/veh)	13.4			12.0			12.4			11.6		
Approach LOS	B			B			B			B		
Intersection Delay, s/veh | LOS	12.5						B					

HCS7 All-Way Stop Control Report

General Information		Site Information	
Analyst	Adam Hill	Intersection	Main St. and Maple St.
Agency/Co.	BYU CCE Capstone	Jurisdiction	Mapleton Public Works
Date Performed	3/11/2023	East/West Street	Maple St.
Analysis Year	2023	North/South Street	Main St.
Analysis Time Period (hrs)	1.00	Peak Hour Factor	0.66
Time Analyzed	2040 AM		
Project Description	Roundabout Feasability		

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	272	77	41	75	200	5	33	136	63	7	135	242
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LT	R		LT	R	
Flow Rate, v (veh/h)	412	179		114	311		256	95		215	367	
Percent Heavy Vehicles	2	2		2	2		2	2		2	2	

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20	3.20	
Initial Degree of Utilization, x	0.366	0.159		0.101	0.276		0.228	0.085		0.191	0.326	
Final Departure Headway, hd (s)	9.00	8.25		9.25	8.75		9.00	8.24		8.58	7.89	
Final Degree of Utilization, x	1.030	0.410		0.292	0.755		0.640	0.219		0.513	0.803	
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.3	2.3	
Service Time, ts (s)	6.70	5.95		6.95	6.45		6.70	5.94		6.28	5.59	

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	412	179		114	311		256	95		215	367	
Capacity	400	436		389	412		400	437		419	456	
95% Queue Length, Q_{95} (veh)	28.1	2.1		1.2	8.0		5.0	0.8		3.1	10.0	
Control Delay (s/veh)	170.7	16.7		15.7	36.9		27.3	13.2		20.2	40.3	
Level of Service, LOS	F	C		C	E		D	B		C	E	
Approach Delay (s/veh)	124.1			31.2			23.5			32.9		
Approach LOS	F			D			C			D		
Intersection Delay, s/veh | LOS	58.5						F					

HCS7 All-Way Stop Control Report

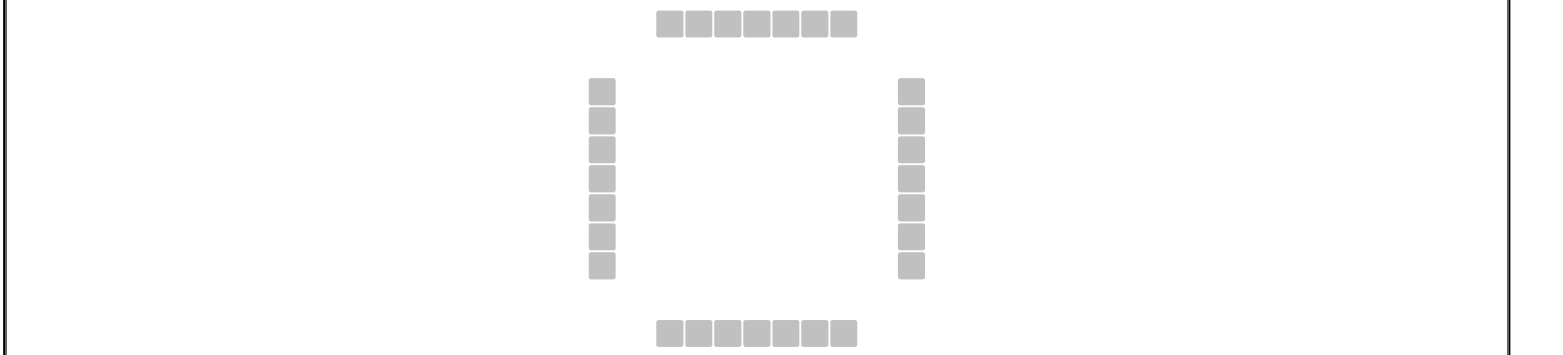
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Analysis Time Period (hrs)	1.00
Time Analyzed	2040 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St.
Jurisdiction	Mapleton Public Works
East/West Street	Maple St.
North/South Street	Main St.
Peak Hour Factor	0.79

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	217	117	64	78	150	18	78	152	57	13	114	194
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LT	R		LT	R	
Flow Rate, v (veh/h)	275	229		99	213		291	72		161	246	
Percent Heavy Vehicles	2	2		2	2		2	2		2	2	

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20	3.20	
Initial Degree of Utilization, x	0.244	0.204		0.088	0.189		0.259	0.064		0.143	0.218	
Final Departure Headway, hd (s)	8.08	7.34		8.41	7.84		7.97	7.10		7.86	7.10	
Final Degree of Utilization, x	0.617	0.467		0.231	0.463		0.645	0.142		0.351	0.485	
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.3	2.3	
Service Time, ts (s)	5.78	5.04		6.11	5.54		5.67	4.80		5.56	4.80	

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	275	229		99	213		291	72		161	246	
Capacity	445	491		428	459		452	507		458	507	
95% Queue Length, Q_{95} (veh)	4.6	2.6		0.9	2.5		5.1	0.5		1.6	2.8	
Control Delay (s/veh)	23.6	16.4		13.6	17.3		24.8	11.0		14.8	16.4	
Level of Service, LOS	C	C		B	C		C	B		B	C	
Approach Delay (s/veh)	20.3			16.1			22.1			15.8		
Approach LOS	C			C			C			C		
Intersection Delay, s/veh | LOS	18.7						C					

HCS7 All-Way Stop Control Report

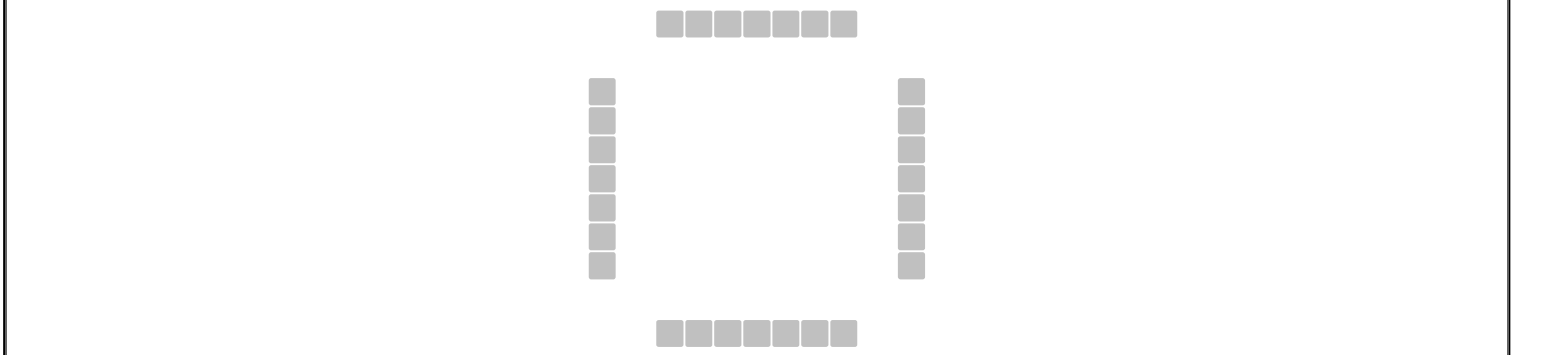
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Analysis Time Period (hrs)	1.00
Time Analyzed	2050 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St.
Jurisdiction	Mapleton Public Works
East/West Street	Maple St.
North/South Street	Main St.
Peak Hour Factor	0.66

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	348	98	52	96	256	6	42	174	90	9	172	310
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LT	R		LT	R	
Flow Rate, v (veh/h)	530	229		146	399		329	137		276	473	
Percent Heavy Vehicles	2	2		2	2		2	2		2	2	

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20	3.20	
Initial Degree of Utilization, x	0.472	0.203		0.130	0.355		0.293	0.122		0.245	0.420	
Final Departure Headway, hd (s)	9.99	9.27		10.09	9.59		9.97	9.20		9.48	8.79	
Final Degree of Utilization, x	1.472	0.589		0.410	1.064		0.912	0.351		0.727	1.153	
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.3	2.3	
Service Time, ts (s)	7.69	6.97		7.79	7.29		7.67	6.90		7.18	6.49	

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	530	229		146	399		329	137		276	473	
Capacity	360	388		357	375		361	391		380	410	
95% Queue Length, Q_{95} (veh)	93.5	4.1		2.0	31.2		15.7	1.6		7.0	46.6	
Control Delay (s/veh)	891.6	25.0		19.8	217.3		84.1	16.8		36.2	342.5	
Level of Service, LOS	F	D		C	F		F	C		E	F	
Approach Delay (s/veh)	630.6			164.3			64.3			229.6		
Approach LOS	F			F			F			F		
Intersection Delay, s/veh | LOS	305.7						F					

HCS7 All-Way Stop Control Report

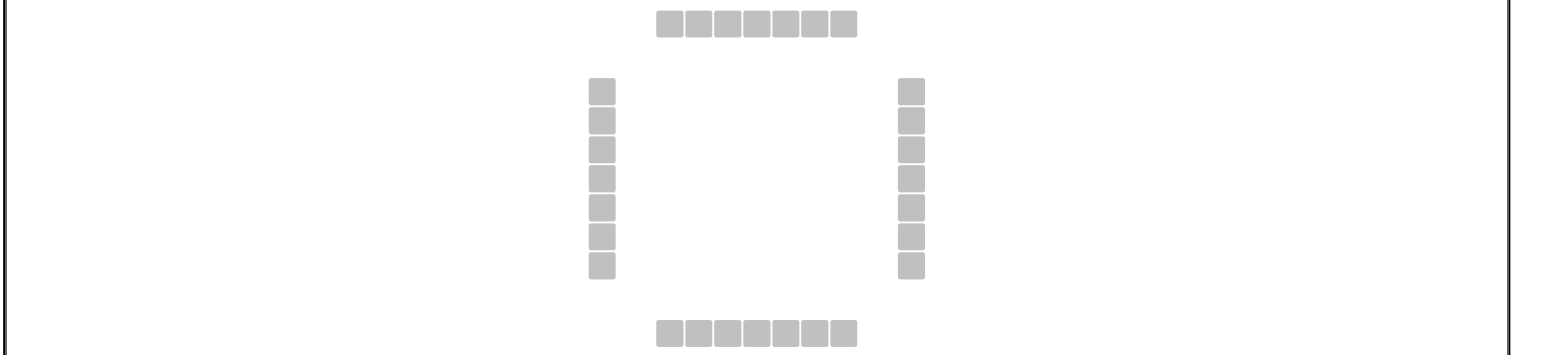
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Analysis Time Period (hrs)	1.00
Time Analyzed	2050 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St.
Jurisdiction	Mapleton Public Works
East/West Street	Maple St.
North/South Street	Main St.
Peak Hour Factor	0.79

Lanes



Vehicle Volume and Adjustments

Approach	Eastbound			Westbound			Northbound			Southbound		
Movement	L	T	R	L	T	R	L	T	R	L	T	R
Volume	278	150	82	100	192	22	38	194	72	16	146	248
% Thrus in Shared Lane												
Lane	L1	L2	L3	L1	L2	L3	L1	L2	L3	L1	L2	L3
Configuration	L	TR		L	TR		LT	R		LT	R	
Flow Rate, v (veh/h)	352	294		127	271		294	91		205	314	
Percent Heavy Vehicles	2	2		2	2		2	2		2	2	

Departure Headway and Service Time

Initial Departure Headway, hd (s)	3.20	3.20		3.20	3.20		3.20	3.20		3.20	3.20	
Initial Degree of Utilization, x	0.313	0.261		0.113	0.241		0.261	0.081		0.182	0.279	
Final Departure Headway, hd (s)	8.85	8.10		9.24	8.67		8.87	8.08		8.65	7.91	
Final Degree of Utilization, x	0.865	0.661		0.325	0.652		0.723	0.205		0.493	0.689	
Move-Up Time, m (s)	2.3	2.3		2.3	2.3		2.3	2.3		2.3	2.3	
Service Time, ts (s)	6.55	5.80		6.94	6.37		6.57	5.78		6.35	5.61	

Capacity, Delay and Level of Service

Flow Rate, v (veh/h)	352	294		127	271		294	91		205	314	
Capacity	407	444		390	415		406	445		416	455	
95% Queue Length, Q_{95} (veh)	13.0	5.5		1.4	5.2		7.0	0.8		2.8	6.1	
Control Delay (s/veh)	59.0	26.2		16.4	27.2		33.8	12.9		19.7	27.6	
Level of Service, LOS	F	D		C	D		D	B		C	D	
Approach Delay (s/veh)	44.1			23.8			28.8			24.5		
Approach LOS	E			C			D			C		
Intersection Delay, s/veh | LOS	31.7						D					

HCS7 Two-Way Stop-Control Report

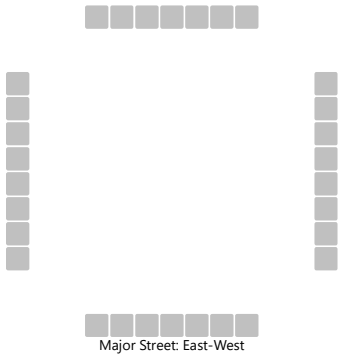
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2022 AM
Intersection Orientation	East-West
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S
Jurisdiction	Mapleton Public Works
East/West Street	1600 S
North/South Street	Maple St.
Peak Hour Factor	0.78
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		97	54	39		2	79	10		30	13	3		9	15	107
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		124				3					59			31		136
Capacity, c (veh/h)		1470				1463					392			446		944
v/c Ratio		0.08				0.00					0.15			0.07		0.14
95% Queue Length, Q_{95} (veh)		0.3				0.0					0.5			0.2		0.5
Control Delay (s/veh)		7.7				7.5					15.8			13.7		9.5
Level of Service (LOS)		A				A					C			B		A
Approach Delay (s/veh)	4.3				0.2				15.8				10.2			
Approach LOS									C				B			

HCS7 Two-Way Stop-Control Report

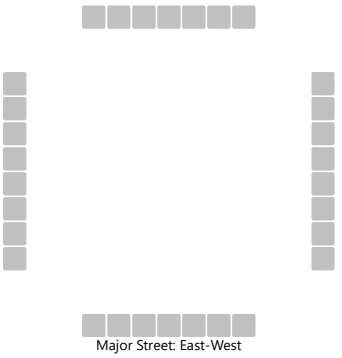
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2022 PM
Intersection Orientation	East-West
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S
Jurisdiction	Mapleton Public Works
East/West Street	1600 S
North/South Street	Maple St.
Peak Hour Factor	0.91
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		137	101	41		2	44	4		41	5	4		3	7	92
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		151				2					55			11		101
Capacity, c (veh/h)		1547				1418					389			420		1015
v/c Ratio		0.10				0.00					0.14			0.03		0.10
95% Queue Length, Q_{95} (veh)		0.3				0.0					0.5			0.1		0.3
Control Delay (s/veh)		7.6				7.5					15.8			13.8		8.9
Level of Service (LOS)		A				A					C			B		A
Approach Delay (s/veh)		4.1				0.3				15.8				9.4		
Approach LOS										C				A		

HCS7 Two-Way Stop-Control Report

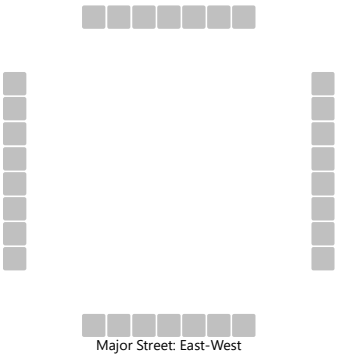
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2030 AM
Intersection Orientation	East-West
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S
Jurisdiction	Mapleton Public Works
East/West Street	1600 S
North/South Street	Maple St.
Peak Hour Factor	0.78
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		119	70	55		3	111	29		57	36	4		16	25	131
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized													No			
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		153				4					124			53		168
Capacity, c (veh/h)		1390				1413					283			336		881
v/c Ratio		0.11				0.00					0.44			0.16		0.19
95% Queue Length, Q_{95} (veh)		0.4				0.0					2.3			0.6		0.7
Control Delay (s/veh)		7.9				7.6					27.6			17.7		10.0
Level of Service (LOS)		A				A					D			C		B
Approach Delay (s/veh)	4.3				0.2				27.6				11.9			
Approach LOS									D				B			

HCS7 Two-Way Stop-Control Report

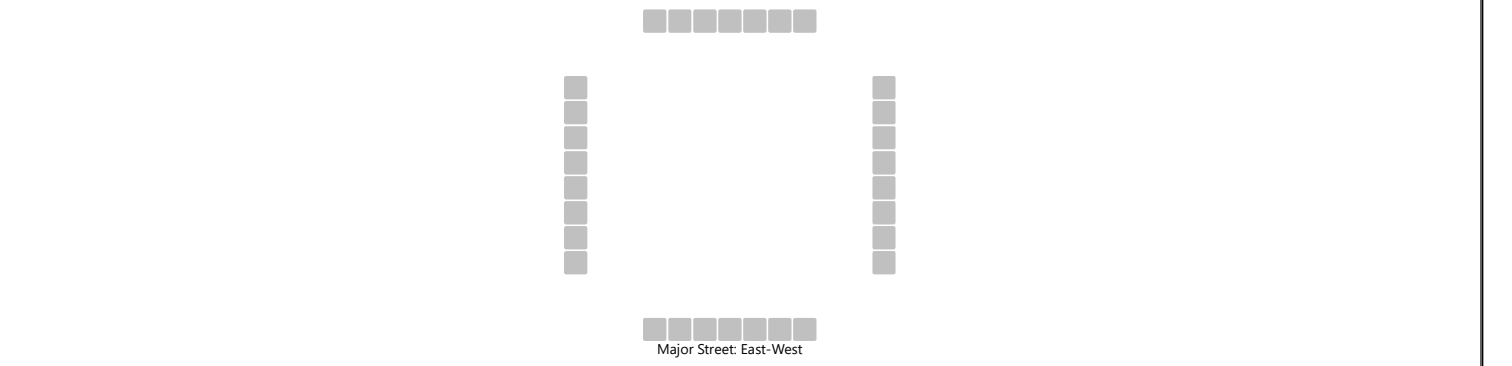
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2030 PM
Intersection Orientation	East-West
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S
Jurisdiction	Mapleton Public Works
East/West Street	1600 S
North/South Street	Maple St.
Peak Hour Factor	0.91
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		167	141	73		3	64	15		63	20	5		22	31	113
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		184				3					97			58		124
Capacity, c (veh/h)		1503				1326					269			315		979
v/c Ratio		0.12				0.00					0.36			0.18		0.13
95% Queue Length, Q_{95} (veh)		0.4				0.0					1.7			0.7		0.4
Control Delay (s/veh)		7.7				7.7					25.9			19.0		9.2
Level of Service (LOS)		A				A					D			C		A
Approach Delay (s/veh)		4.0				0.3				25.9				12.3		
Approach LOS										D				B		

HCS7 Two-Way Stop-Control Report

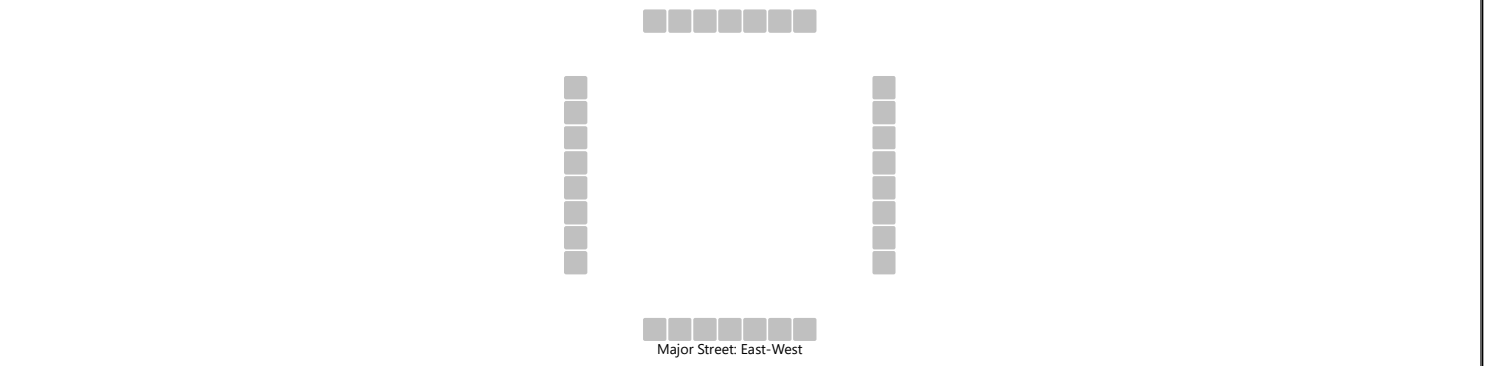
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2040 AM
Intersection Orientation	East-West
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S
Jurisdiction	Mapleton Public Works
East/West Street	1600 S
North/South Street	Maple St.
Peak Hour Factor	0.78
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		152	89	68		4	138	32		67	41	5		20	30	167
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)									0				0			
Right Turn Channelized													No			
Median Type | Storage	Undivided															

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		195				5					145			64		214
Capacity, c (veh/h)		1346				1365					191			249		841
v/c Ratio		0.14				0.00					0.76			0.26		0.25
95% Queue Length, Q_{95} (veh)		0.5				0.0					7.2			1.0		1.0
Control Delay (s/veh)		8.1				7.6					76.6			24.5		10.7
Level of Service (LOS)		A				A					F			C		B
Approach Delay (s/veh)	4.7				0.2				76.6				13.9			
Approach LOS									F				B			

HCS7 Two-Way Stop-Control Report

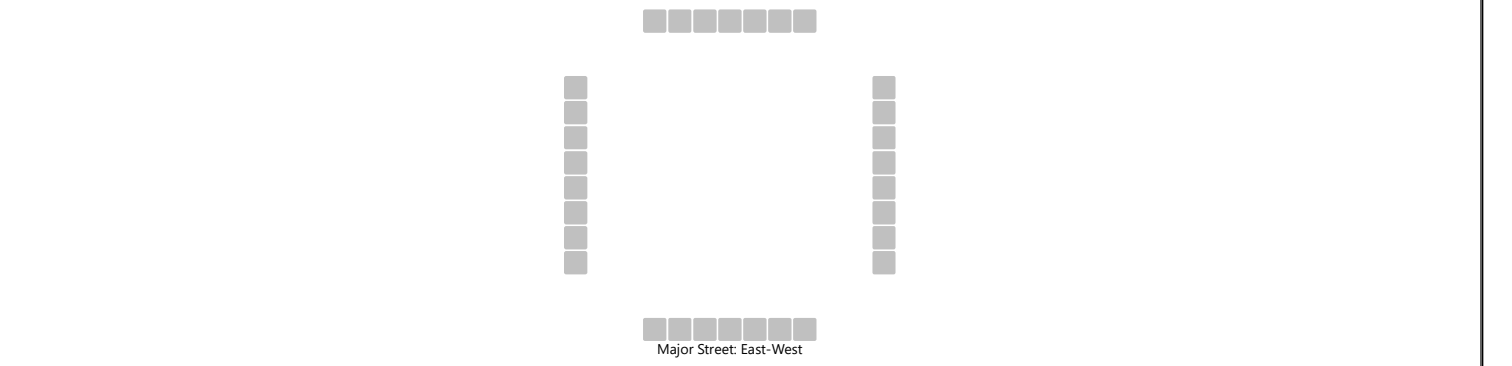
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2040 PM
Intersection Orientation	East-West
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S
Jurisdiction	Mapleton Public Works
East/West Street	1600 S
North/South Street	Maple St.
Peak Hour Factor	0.91
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		214	175	87		4	79	17		77	21	7		23	33	144
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		235				4					115			62		158
Capacity, c (veh/h)		1480				1268					182			231		957
v/c Ratio		0.16				0.00					0.63			0.27		0.17
95% Queue Length, Q_{95} (veh)		0.6				0.0					4.6			1.1		0.6
Control Delay (s/veh)		7.9				7.8					57.6			26.2		9.5
Level of Service (LOS)		A				A					F			D		A
Approach Delay (s/veh)	4.4				0.3				57.6				14.2			
Approach LOS									F				B			

HCS7 Two-Way Stop-Control Report

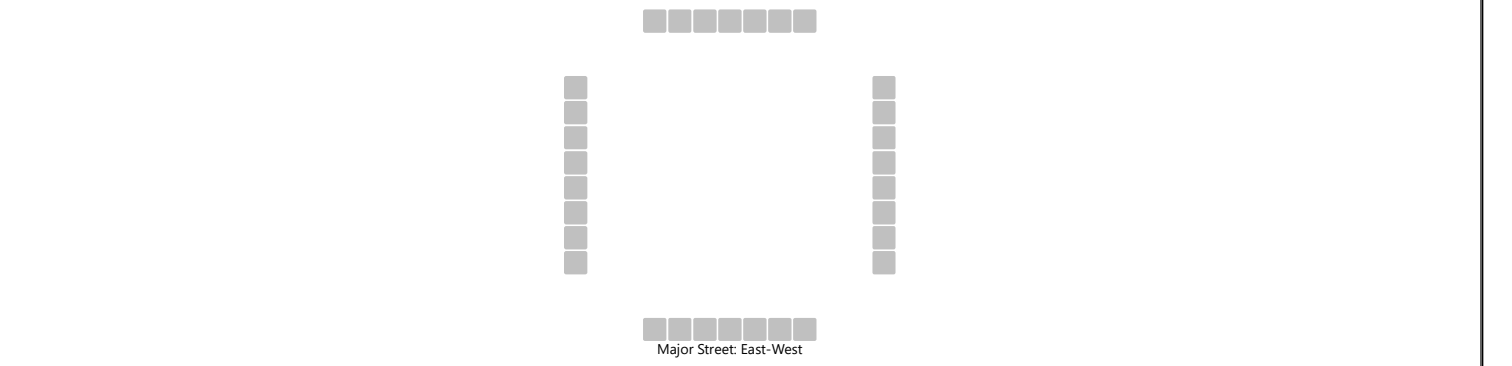
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2050 AM
Intersection Orientation	East-West
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S
Jurisdiction	Mapleton Public Works
East/West Street	1600 S
North/South Street	Maple St.
Peak Hour Factor	0.78
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		194	108	78		4	158	20		60	26	6		18	30	214
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		249				5					118			62		274
Capacity, c (veh/h)		1334				1323					120			190		822
v/c Ratio		0.19				0.00					0.99			0.32		0.33
95% Queue Length, Q_{95} (veh)		0.7				0.0					12.9			1.4		1.5
Control Delay (s/veh)		8.3				7.7					255.0			32.9		11.6
Level of Service (LOS)		A				A					F			D		B
Approach Delay (s/veh)		5.1				0.2				255.0				15.5		
Approach LOS										F				C		

HCS7 Two-Way Stop-Control Report

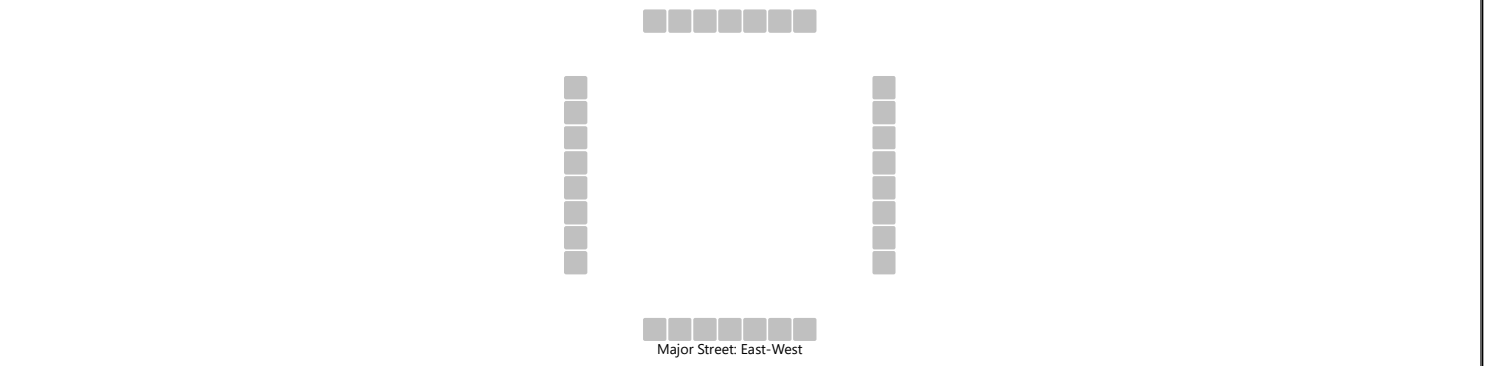
General Information

Analyst	Adam Hill
Agency/Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2050 PM
Intersection Orientation	East-West
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S
Jurisdiction	Mapleton Public Works
East/West Street	1600 S
North/South Street	Maple St.
Peak Hour Factor	0.91
Analysis Time Period (hrs)	1.00

Lanes



Vehicle Volumes and Adjustments

Approach	Eastbound				Westbound				Northbound				Southbound			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Priority	1U	1	2	3	4U	4	5	6		7	8	9		10	11	12
Number of Lanes	0	0	1	0	0	0	1	0		0	1	0		0	1	1
Configuration			LTR				LTR				LTR			LT		R
Volume (veh/h)		274	319	105		4	98	18		95	23	8		24	36	184
Percent Heavy Vehicles (%)		3				3				3	3	3		3	3	3
Proportion Time Blocked																
Percent Grade (%)										0				0		
Right Turn Channelized														No		
Median Type | Storage			Undivided													

Critical and Follow-up Headways

Base Critical Headway (sec)		4.1				4.1				7.1	6.5	6.2		7.1	6.5	6.2
Critical Headway (sec)		4.13				4.13				7.13	6.53	6.23		7.13	6.53	6.23
Base Follow-Up Headway (sec)		2.2				2.2				3.5	4.0	3.3		3.5	4.0	3.3
Follow-Up Headway (sec)		2.23				2.23				3.53	4.03	3.33		3.53	4.03	3.33

Delay, Queue Length, and Level of Service

Flow Rate, v (veh/h)		301				4					138			66		202
Capacity, c (veh/h)		1452				1090					82			125		932
v/c Ratio		0.21				0.00					1.69			0.53		0.22
95% Queue Length, Q_{95} (veh)		0.8				0.0					34.3			3.0		0.8
Control Delay (s/veh)		8.1				8.3					1389.7			64.8		9.9
Level of Service (LOS)		A				A					F			F		A
Approach Delay (s/veh)	4.6				0.3				1389.7				23.4			
Approach LOS									F				C			

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2022 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St
E/W Street Name	Main St.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.66
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	174	49	26	0	48	128	3	0	21	87	40	0	4	86	155
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	272	76	41	0	75	200	5	0	33	136	62	0	6	134	242
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		389			280			231			382	
Entry Volume, veh/h		378			272			224			371	
Circulating Flow (v_c), pc/h	215			441			354			308		
Exiting Flow (v_{ex}), pc/h	144			475			413			250		
Capacity (c_{pce}), pc/h		1108			880			962			1008	
Capacity (c), veh/h		1076			854			934			979	
v/c Ratio (x)		0.35			0.32			0.24			0.38	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.9			7.8			6.3			7.8	
Lane LOS		A			A			A			A	
95% Queue, veh		1.6			1.4			0.9			1.8	
Approach Delay, s/veh	6.9			7.8			6.3			7.8		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.2						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2022 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St
E/W Street Name	Main St.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.79
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	139	75	41	0	50	96	11	0	19	97	36	0	50	96	41
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	181	98	53	0	65	125	14	0	25	126	47	0	65	125	53
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		332			204			198			243	
Entry Volume, veh/h		322			198			192			236	
Circulating Flow (v_c), pc/h	255			332			344			215		
Exiting Flow (v_{ex}), pc/h	210			203			321			243		
Capacity (c_{pce}), pc/h		1064			984			972			1108	
Capacity (c), veh/h		1033			955			943			1076	
v/c Ratio (x)		0.31			0.21			0.20			0.22	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.6			5.8			5.8			5.4	
Lane LOS		A			A			A			A	
95% Queue, veh		1.3			0.8			0.8			0.8	
Approach Delay, s/veh	6.6			5.8			5.8			5.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.0						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2030 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St
E/W Street Name	Main St.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.66
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	170	92	50	0	61	117	14	0	24	119	44	0	10	89	152
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	265	144	78	0	95	183	22	0	37	186	69	0	16	139	237
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		487			300			292			392	
Entry Volume, veh/h		473			291			283			381	
Circulating Flow (v_c), pc/h	250			488			425			315		
Exiting Flow (v_{ex}), pc/h	229			457			473			312		
Capacity (c_{pce}), pc/h		1069			839			895			1001	
Capacity (c), veh/h		1038			814			869			972	
v/c Ratio (x)		0.46			0.36			0.33			0.39	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		8.6			8.6			7.8			8.0	
Lane LOS		A			A			A			A	
95% Queue, veh		2.4			1.6			1.4			1.9	
Approach Delay, s/veh	8.6			8.6			7.8			8.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	8.3						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2030 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St
E/W Street Name	Main St.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.79
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	213	60	32	0	59	156	4	0	26	107	49	0	5	105	189
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	278	78	42	0	77	203	5	0	34	140	64	0	7	137	246
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		398			285			238			390	
Entry Volume, veh/h		386			277			231			379	
Circulating Flow (v_c), pc/h	221			452			363			314		
Exiting Flow (v_{ex}), pc/h	149			483			423			256		
Capacity (c_{pce}), pc/h		1101			870			953			1002	
Capacity (c), veh/h		1069			845			925			973	
v/c Ratio (x)		0.36			0.33			0.25			0.39	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.1			8.0			6.4			8.0	
Lane LOS		A			A			A			A	
95% Queue, veh		1.7			1.4			1.0			1.9	
Approach Delay, s/veh	7.1			8.0			6.4			8.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	7.4						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2040 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St
E/W Street Name	Main St.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.66
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	272	77	41	0	75	200	5	0	33	136	63	0	7	135	242
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	424	120	64	0	117	312	8	0	52	212	98	0	11	211	378
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		608			437			362			600	
Entry Volume, veh/h		590			424			351			583	
Circulating Flow (v_c), pc/h	339			688			555			481		
Exiting Flow (v_{ex}), pc/h	229			742			644			392		
Capacity (c_{pce}), pc/h		977			684			783			845	
Capacity (c), veh/h		948			664			761			820	
v/c Ratio (x)		0.62			0.64			0.46			0.71	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		13.0			17.7			11.0			17.9	
Lane LOS		B			C			B			C	
95% Queue, veh		4.5			4.6			2.5			6.1	
Approach Delay, s/veh	13.0			17.7			11.0			17.9		
Approach LOS	B			C			B			C		
Intersection Delay, s/veh | LOS	15.1						C					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2040 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St
E/W Street Name	Main St.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.79
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	217	117	64	0	78	150	18	0	78	152	57	0	13	114	194
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	283	153	83	0	102	196	23	0	102	198	74	0	17	149	253
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		519			321			374			419	
Entry Volume, veh/h		504			312			363			407	
Circulating Flow (v_c), pc/h	268			583			453			400		
Exiting Flow (v_{ex}), pc/h	244			551			504			334		
Capacity (c_{pce}), pc/h		1050			761			869			918	
Capacity (c), veh/h		1019			739			844			891	
v/c Ratio (x)		0.49			0.42			0.43			0.46	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		9.4			10.5			9.6			9.7	
Lane LOS		A			B			A			A	
95% Queue, veh		2.8			2.1			2.2			2.4	
Approach Delay, s/veh	9.4			10.5			9.6			9.7		
Approach LOS	A			B			A			A		
Intersection Delay, s/veh | LOS	9.7						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2050 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St
E/W Street Name	Main St.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.66
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	348	98	52	0	96	256	6	0	42	174	90	0	9	172	310
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	543	153	81	0	150	400	9	0	66	272	140	0	14	268	484
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		777			559			478			766	
Entry Volume, veh/h		754			543			464			744	
Circulating Flow (v_c), pc/h	432			881			710			616		
Exiting Flow (v_{ex}), pc/h	307			950			824			499		
Capacity (c_{pce}), pc/h		888			562			669			736	
Capacity (c), veh/h		862			545			649			715	
v/c Ratio (x)		0.87			0.99			0.71			1.04	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		29.7			64.8			21.8			68.5	
Lane LOS		D			F			C			F	
95% Queue, veh		11.4			14.1			6.0			18.6	
Approach Delay, s/veh	29.7			64.8			21.8			68.5		
Approach LOS	D			F			C			F		
Intersection Delay, s/veh | LOS	47.4						E					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2050 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Main St. and Maple St
E/W Street Name	Main St.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.79
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	278	150	82	0	100	192	22	0	38	194	72	0	16	146	248
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	362	196	107	0	130	250	29	0	50	253	94	0	21	190	323
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		665			409			397			534	
Entry Volume, veh/h		646			397			385			518	
Circulating Flow (v_c), pc/h	341			665			579			430		
Exiting Flow (v_{ex}), pc/h	311			623			644			427		
Capacity (c_{pce}), pc/h		975			700			765			890	
Capacity (c), veh/h		946			680			742			864	
v/c Ratio (x)		0.68			0.58			0.52			0.60	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		15.0			15.4			12.6			13.2	
Lane LOS		B			C			B			B	
95% Queue, veh		5.6			3.8			3.0			4.1	
Approach Delay, s/veh	15.0			15.4			12.6			13.2		
Approach LOS	B			C			B			B		
Intersection Delay, s/veh | LOS	14.1						B					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2022 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S.
E/W Street Name	1600 S.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.78
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	97	54	39	0	2	79	10	0	30	13	3	0	9	15	107
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	128	71	52	0	3	104	13	0	40	17	4	0	12	20	141
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		251			120			61			173	
Entry Volume, veh/h		244			117			59			168	
Circulating Flow (v_c), pc/h	35			185			211			147		
Exiting Flow (v_{ex}), pc/h	87			285			158			75		
Capacity (c_{pce}), pc/h		1332			1143			1113			1188	
Capacity (c), veh/h		1293			1109			1080			1153	
v/c Ratio (x)		0.19			0.11			0.05			0.15	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.4			4.2			3.8			4.4	
Lane LOS		A			A			A			A	
95% Queue, veh		0.7			0.4			0.2			0.5	
Approach Delay, s/veh	4.4			4.2			3.8			4.4		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	4.3						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2022 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S.
E/W Street Name	1600 S.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.91
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	137	101	41	0	2	44	4	0	41	5	4	0	3	7	92
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	155	114	46	0	2	50	5	0	46	6	5	0	3	8	104
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		315			57			57			115	
Entry Volume, veh/h		306			55			55			112	
Circulating Flow (v_c), pc/h	13			207			272			98		
Exiting Flow (v_{ex}), pc/h	122			200			166			56		
Capacity (c_{pce}), pc/h		1362			1117			1046			1249	
Capacity (c), veh/h		1322			1085			1015			1212	
v/c Ratio (x)		0.23			0.05			0.05			0.09	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		4.7			3.8			4.0			3.7	
Lane LOS		A			A			A			A	
95% Queue, veh		0.9			0.2			0.2			0.3	
Approach Delay, s/veh	4.7			3.8			4.0			3.7		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	4.3						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2030 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S.
E/W Street Name	1600 S.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.78
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	119	70	55	0	3	111	29	0	57	36	4	0	16	25	131
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	157	92	73	0	4	147	38	0	75	48	5	0	21	33	173
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		322			189			128			227	
Entry Volume, veh/h		313			183			124			220	
Circulating Flow (v_c), pc/h	58			280			270			226		
Exiting Flow (v_{ex}), pc/h	118			395			243			110		
Capacity (c_{pce}), pc/h		1301			1037			1048			1096	
Capacity (c), veh/h		1263			1007			1017			1064	
v/c Ratio (x)		0.25			0.18			0.12			0.21	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.0			5.3			4.6			5.3	
Lane LOS		A			A			A			A	
95% Queue, veh		1.0			0.7			0.4			0.8	
Approach Delay, s/veh	5.0			5.3			4.6			5.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.1						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2030 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S.
E/W Street Name	1600 S.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.91
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	167	114	73	0	3	64	15	0	63	20	5	0	22	31	113
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	189	129	83	0	3	72	17	0	71	23	6	0	25	35	128
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		401			92			100			188	
Entry Volume, veh/h		389			89			97			183	
Circulating Flow (v_c), pc/h	63			283			343			146		
Exiting Flow (v_{ex}), pc/h	160			271			229			121		
Capacity (c_{pce}), pc/h		1294			1034			973			1189	
Capacity (c), veh/h		1256			1004			944			1154	
v/c Ratio (x)		0.31			0.09			0.10			0.16	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.7			4.4			4.8			4.5	
Lane LOS		A			A			A			A	
95% Queue, veh		1.3			0.3			0.3			0.6	
Approach Delay, s/veh	5.7			4.4			4.8			4.5		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.1						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2040 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S.
E/W Street Name	1600 S.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.78
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	152	89	68	0	4	138	32	0	67	41	5	0	20	30	167
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	201	118	90	0	5	182	42	0	88	54	7	0	26	40	221
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		409			229			149			287	
Entry Volume, veh/h		397			222			145			279	
Circulating Flow (v_c), pc/h	71			343			345			275		
Exiting Flow (v_{ex}), pc/h	151			491			297			135		
Capacity (c_{pce}), pc/h		1284			973			971			1042	
Capacity (c), veh/h		1246			944			942			1012	
v/c Ratio (x)		0.32			0.24			0.15			0.28	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		5.8			6.2			5.3			6.3	
Lane LOS		A			A			A			A	
95% Queue, veh		1.4			0.9			0.5			1.1	
Approach Delay, s/veh	5.8			6.2			5.3			6.3		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	5.9						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2040 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S.
E/W Street Name	1600 S.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.91
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	214	175	87	0	4	79	17	0	77	21	7	0	23	33	144
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	242	198	98	0	5	89	19	0	87	24	8	0	26	37	163
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		538			113			119			226	
Entry Volume, veh/h		522			110			116			219	
Circulating Flow (v_c), pc/h	68			353			466			181		
Exiting Flow (v_{ex}), pc/h	232			339			285			140		
Capacity (c_{pce}), pc/h		1288			963			858			1147	
Capacity (c), veh/h		1250			935			833			1114	
v/c Ratio (x)		0.42			0.12			0.14			0.20	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		7.0			4.9			5.7			5.0	
Lane LOS		A			A			A			A	
95% Queue, veh		2.1			0.4			0.5			0.7	
Approach Delay, s/veh	7.0			4.9			5.7			5.0		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.2						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2050 AM
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S.
E/W Street Name	1600 S.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.78
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	194	108	78	0	4	158	20	0	60	26	6	0	18	30	214
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	256	143	103	0	5	209	26	0	79	34	8	0	24	40	283
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		502			240			121			347	
Entry Volume, veh/h		487			233			117			337	
Circulating Flow (v_c), pc/h	69			369			423			293		
Exiting Flow (v_{ex}), pc/h	175			571			316			148		
Capacity (c_{pce}), pc/h		1286			947			896			1023	
Capacity (c), veh/h		1249			920			870			994	
v/c Ratio (x)		0.39			0.25			0.13			0.34	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		6.7			6.5			5.5			7.2	
Lane LOS		A			A			A			A	
95% Queue, veh		1.9			1.0			0.5			1.5	
Approach Delay, s/veh	6.7			6.5			5.5			7.2		
Approach LOS	A			A			A			A		
Intersection Delay, s/veh | LOS	6.7						A					

HCS7 Roundabouts Report

General Information

Analyst	Adam Hill
Agency or Co.	BYU CCE Capstone
Date Performed	3/11/2023
Analysis Year	2023
Time Analyzed	2050 PM
Project Description	Roundabout Feasability

Site Information

Intersection	Maple St and 1600 S.
E/W Street Name	1600 S.
N/S Street Name	Maple St.
Analysis Time Period (hrs)	0.25
Peak Hour Factor	0.91
Jurisdiction	Mapleton Public Works

Volume Adjustments and Site Characteristics

Approach	EB				WB				NB				SB			
Movement	U	L	T	R	U	L	T	R	U	L	T	R	U	L	T	R
Number of Lanes (N)	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0
Lane Assignment			LTR				LTR				LTR				LTR	
Volume (V), veh/h	0	274	319	105	0	4	98	18	0	95	23	8	0	24	36	184
Percent Heavy Vehicles, %	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Flow Rate (v_{PCE}), pc/h	0	310	361	119	0	5	111	20	0	108	26	9	0	27	41	208
Right-Turn Bypass	None				None				None				None			
Conflicting Lanes	1				1				1				1			
Pedestrians Crossing, p/h	0				0				0				0			

Critical and Follow-Up Headway Adjustment

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Critical Headway (s)		4.9763			4.9763			4.9763			4.9763	
Follow-Up Headway (s)		2.6087			2.6087			2.6087			2.6087	

Flow Computations, Capacity and v/c Ratios

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Entry Flow (v_e), pc/h		790			136			143			276	
Entry Volume, veh/h		767			132			139			268	
Circulating Flow (v_c), pc/h	73			444			698			224		
Exiting Flow (v_{ex}), pc/h	397			427			356			165		
Capacity (c_{pce}), pc/h		1281			877			677			1098	
Capacity (c), veh/h		1244			852			657			1066	
v/c Ratio (x)		0.62			0.16			0.21			0.25	

Delay and Level of Service

Approach	EB			WB			NB			SB		
Lane	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass	Left	Right	Bypass
Lane Control Delay (d), s/veh		10.5			5.8			8.0			5.8	
Lane LOS		B			A			A			A	
95% Queue, veh		4.5			0.5			0.8			1.0	
Approach Delay, s/veh	10.5			5.8			8.0			5.8		
Approach LOS	B			A			A			A		
Intersection Delay, s/veh | LOS	8.8						A					

Appendix F : Roundabout Designs

Manipulation	Main St	Maple	Main St	Maple
R1 / V1	307.01 ft / 27.91 mph	314.57 ft / 27.67 mph	320.16 ft / 27.88 mph	301.72 ft / 27.21 mph
R2 / V2	81.76 ft / 16.81 mph	77.05 ft / 16.46 mph	80.21 ft / 16.70 mph	77.06 ft / 16.46 mph
R3 / V3	321.54 ft / 27.90 mph	292.24 ft / 26.90 mph	333.18 ft / 28.28 mph	319.36 ft / 27.83 mph
R4 / V4	N/A	N/A	N/A	N/A
R5 / V5	59.16 ft / 14.97 mph	59.17 ft / 14.97 mph	58.86 ft / 14.95 mph	58.95 ft / 14.95 mph
Deflection	0.00 ft	0.00 ft	0.00 ft	0.00 ft
Entry Width (E)	18.021 ft	18.049 ft	17.366 ft	17.501 ft
Approach Lane Width (V)	11.000 ft	11.000 ft	11.000 ft	11.000 ft
Minimum Half Width (Vd)	0.000 ft	0.000 ft	0.000 ft	0.000 ft
Entry Radius (R)	107.605 ft	107.662 ft	104.861 ft	104.801 ft
Inscribed Diameter	9.959 ft	10.161 ft	11.887 ft	10.117 ft
Effective Flare (L')	0.000 ft	0.000 ft	0.000 ft	0.000 ft
Effective Flare (LM)	79.553 ft	76.378 ft	79.572 ft	69.447 ft
Next Arm Distance (Dist)	0.000 ft	0.000 ft	0.000 ft	0.000 ft
Curbline Distance (X)	0.000 ft	0.000 ft	0.000 ft	0.000 ft
Approach Grade (SG)	0.0 %	0.0 %	0.0 %	0.0 %
Entry Angle (Phi)	22.665 deg	20.653 deg	21.925 deg	24.624 deg
Inscribed Diameter	88.00 ft			
Center Island Diameter	39.00 ft			
Apron Diameter	58.00 ft			

Main St (North)

PEDESTRIAN CROSSWALK SIGN

YIELD SIGN

YIELD SIGN

PEDESTRIAN CROSSWALK SIGN

Maple (West)

ONE-WAY SIGN (TYP.)

Maple (East)

ROUNDABOUT MARKING (TYP.)

PEDESTRIAN CROSSWALK SIGN

YIELD SIGN

YIELD SIGN

PEDESTRIAN CROSSWALK SIGN

Main St (South)

NOTES:

DATE: March 20, 2023

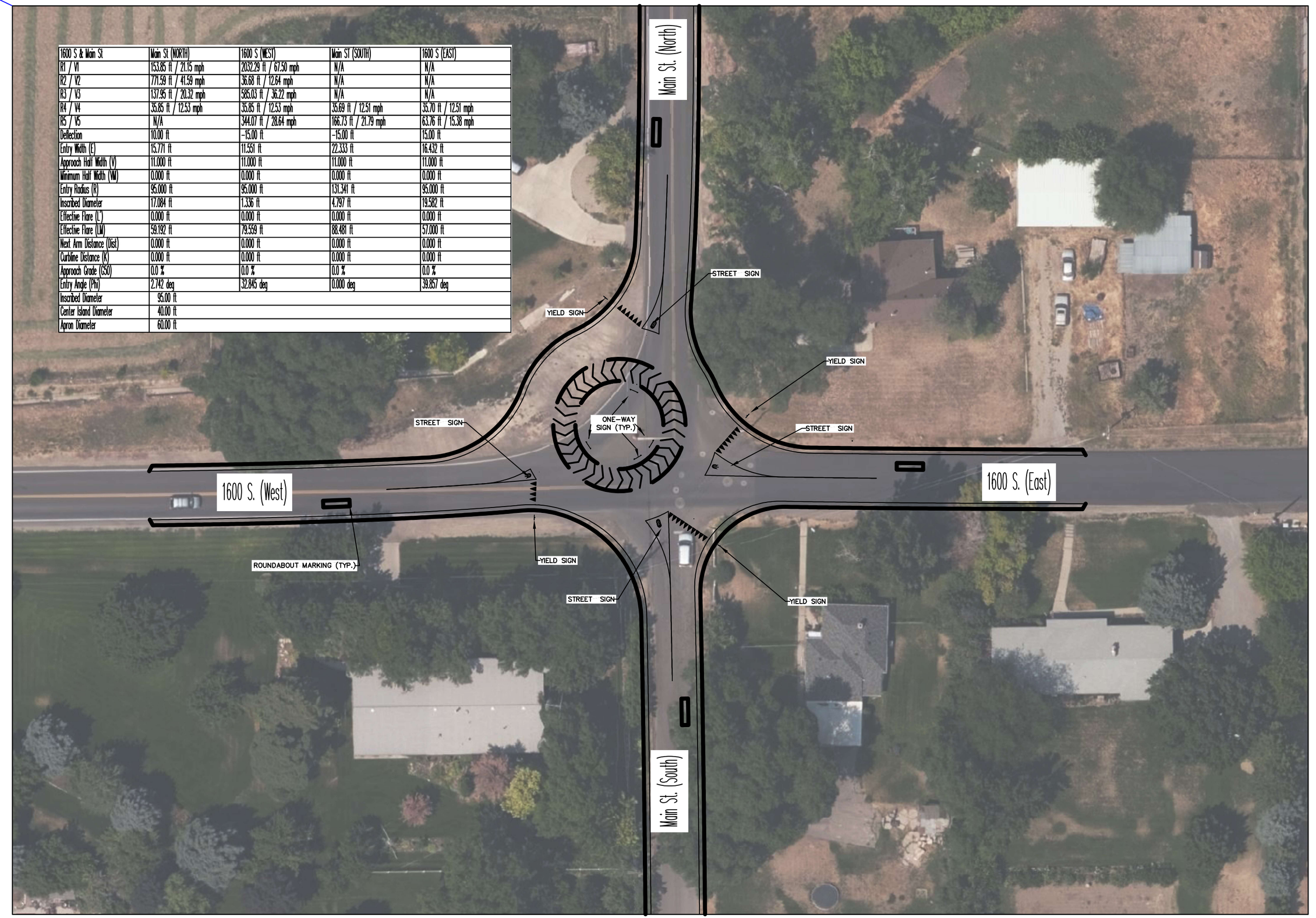
SCALE: 1" = .0833'

DRAWING: MAPLE AND MAIN CONCEPT

CLIENT: MAPLETON CITY

D.A.D.S
ENGINEERING

1600 S & Main St	Main St (NORTH)	1600 S (WEST)	Main ST (SOUTH)	1600 S (EAST)
R1 / V1	153.85 ft / 21.15 mph	2032.29 ft / 67.50 mph	N/A	N/A
R2 / V2	771.59 ft / 41.59 mph	36.68 ft / 12.64 mph	N/A	N/A
R3 / V3	137.95 ft / 20.32 mph	585.03 ft / 36.22 mph	N/A	N/A
R4 / V4	35.85 ft / 12.53 mph	35.85 ft / 12.53 mph	35.69 ft / 12.51 mph	35.70 ft / 12.51 mph
R5 / V5	N/A	344.07 ft / 28.64 mph	166.73 ft / 21.79 mph	63.76 ft / 15.38 mph
Deflection	10.00 ft	-15.00 ft	-15.00 ft	15.00 ft
Entry Width (E)	15.771 ft	11.551 ft	22.333 ft	16.432 ft
Approach Half Width (V)	11.000 ft	11.000 ft	11.000 ft	11.000 ft
Minimum Half Width (VM)	0.000 ft	0.000 ft	0.000 ft	0.000 ft
Entry Radius (R)	95.000 ft	95.000 ft	131.341 ft	95.000 ft
Inscribed Diameter	17.084 ft	1.336 ft	4.797 ft	19.582 ft
Effective Flare (L')	0.000 ft	0.000 ft	0.000 ft	0.000 ft
Effective Flare (LM)	59.192 ft	79.559 ft	88.481 ft	57.000 ft
Next Arm Distance (Dist)	0.000 ft	0.000 ft	0.000 ft	0.000 ft
Curbline Distance (K)	0.000 ft	0.000 ft	0.000 ft	0.000 ft
Approach Grade (CSD)	0.0 %	0.0 %	0.0 %	0.0 %
Entry Angle (Phi)	2.742 deg	32.845 deg	0.000 deg	39.857 deg
Inscribed Diameter	95.00 ft			
Center Island Diameter	40.00 ft			
Apron Diameter	60.00 ft			



NOTES:

DATE: March 20, 2023

SCALE: 1" = .0833'

DRAWING: 1600 S. AND MAIN CONCEPT

CLIENT: MAPLETON CITY

D.A.D.S
ENGINEERING

USER REVDATE FNAME

DATE: 4/6/2023	NOTES: This drawing is solely a concept of how a roundabout could be applied to this area while minimally crossing ROW lines. Lane widths, turning radii, and other specifications are not necessarily drawn according to NHVA specifications
SCALE: 1"=500'	
DRAWING: Main St./1600S Geometric Concept	
CLIENT: Mapleton City	
D.A.D.S ENGINEERING	