TECHNICAL REPORT





CLARKSVILLE
METROPOLITAN PLANNING
ORGANIZATION

TENNESSEE
DEPARTMENT OF TRANSPORTATION

STATE ROUTE 374

From: Madison Street (US-41A S.R. 112) in Clarksville to Dunbar Cave Road, Log Mile 0.00 to 2.85 Montgomery County

PREPARED BY TRC Worldwide Engineering, Inc. for Clarksville MPO

in coordination with TDOT Strategic Transportation Investments Division

Recommended by:	Signature	DATE
TRANSPORTATION DIRECTOR STRATEGIC TRANSPORTATION INVESTMENTS DIVISION	Steven Allen (Mar 26, 2021 05:35 CDT)	Mar 26, 2021
TRANSPORTATION DIRECTOR CLARKSVILLE MPO		

Executive Summary

Purpose of Report

This Technical Report was initiated at the request of the Clarksville Metropolitan Planning Organization. The purpose of this Technical Report is to provide an overview of the existing route deficiencies, define the preliminary purpose and need for the project, and provides conceptual design that is feasible, cost effective, and improves mobility for this segment of State Route (S.R.) 374 from Log Mile (L.M.) 0.00 to L.M. 2.85 in Clarksville, Montgomery County Tennessee. In addition, any modifications to the existing improvements strive to provide a safer facility for all users and a regional route which fits the needs of the community.

Description of the Existing Route

The portion of S.R. 374 under study begins at the intersection of Madison Street (US-41A S.R. 112) at L.M. 0.00 and extends north to Dunbar Cave Road intersection at L.M. 2.85. The terrain is rolling along this section and there is variable right of way (ROW) and shoulder width.

The speed limit varies between 40 and 50 mph. There is a 20 mph school speed limit in effect from L.M. 0.23 to L.M. 0.90 when school is in session.

This section is illuminated and is a designated a Tennessee Bicycle Route per information from the Tennessee Roadway Information Management System (TRIMS). Land use is classified as mixed residential commercial from L.M. 0.00 to L.M. 0.23, residential from L.M. 0.23 to L.M. 1.10 and rural from L.M. 1.1 to the end of the study section.

This 2.85 mile section has been divided into three (3) segments for analysis.

- Segment one extends from L.M. 0.00 (Madison Street, US-41A S.R. 112) to L.M. 0.78 (Memorial Drive). Section one has a 40 mph speed limit with a 20 mph school zone speed limit. The AADT is 16,015 VPD. Madison Street at the intersection of S.R. 374 is a five (5) lane urban minor arterial with a 45 mph speed limit and AADT of 20,830 VPD. The south approach of the Madison Street intersection is S. Richview Road, a local dead end street serving three businesses and a residential neighborhood. Segment one is a three (3) lane section with two (2) eleven (11) foot travel lanes and an eleven (11) foot continuous left turn lane. Clarksville High School and Richview Middle school are located along this segment. Turning lanes are present at the Madison Street intersection, school entrances, and Memorial Drive intersection.
- Segment two extends from L.M. 0.78 (Memorial Drive) to L.M. 1.32. This is a three (3) lane section (auxiliary truck climbing lane in southbound direction) with twelve (12) foot lane widths from L.M. 0.78 to L.M. 1.1 and transitions to a two (2) lane section before crossing the Red River at L.M. 1.16. The segment transitions to a three lane section with two (2) 12 (twelve) foot travel lanes and a twelve (12) foot continuous left turn lane at L.M. 1.32. The speed limit is 40 mph to L.M. 1.27 then raises to 50 mph.

Segment three extends from L.M. 1.32 to L.M. 2.85 (Dunbar Cave Road). This is a three (3) lane section with two (2) 12 (twelve) foot travel lanes and a twelve (12) foot continuous left turn lane. Turning lanes are present at the Dunbar Cave Road intersection. The speed limit is 50 mph. The AADT for segments 2 and 3 increase to 27,825 VPD in the 2023 base year.

Existing Traffic and Safety Conditions

S.R. 374 Annual Average Daily Traffic (AADT)

			2018 Cycle Count	Base Year (2023)	Design Year (2043)	
L.M.		L.M. AADT		AADT	AADT	
0	to	0.78	12,840	16,015	23,850	
0.78	to	2.85	20,700	27,825	48,165	
2.85	to	3.75	14,820	-	-	

The base year (2023) annual average daily traffic (AADT) for the section of S.R. 374 under study is 21,920 vehicles per day. The design year (2043) AADT is projected to be 36,010 vehicles per day.

Crash rates were calculated for the three segments of the route. Crash rates were calculated based on TDOT 2018 cycle counts and using crash data from the dates of January 1, 2017 to December 31, 2019.

Segment one had a total crash rate of 7.66 versus a statewide average of 2.978. There were no severe (Fatal+Incapacitating) injures in that segment. Segment two had a crash rate of 3.032 versus a statewide average of 2.574. There were no severe injuries in that segment as well. Segment three had a crash reate of 3.028 versus a statewide average of 2.978. The severe crash rate for this segment was 0.058 versus a statewide severe crash rate of 0.08.

The intersection of S.R. 374 with S.R. 112 had a crash rate of 2.995 versus a statewide average of 0.682. There were no severe injuries at that intersection. The intersection of S.R. 374 with Memorial Drive has a crash rate of 2.589 versus a statewide average of 0.682. There were no severe injuries at this intersection. The intersection of S.R. 374 with Dunbar Cave Road had a crash rate of 2.549 versus a statewide average of 0.682. It had a severe crash rate of 0.07 versus a statewide average of 0.014.

The total crash rate is higher than the statewide average for all three segments and for each of the three analyzed intersections. The severe crash rate is lower than the statewide average for all three segments and for two of the three analyzed intersections. Dunbar Cave Road intersection severe crash rate is higher than the statewide average.

Most of the crashes within the study section occurred during daylight hours. Most were property damage or non-incapacitating injury type crashes. Only one (1) percent were incapacititating type crashes and there were no fatalities. The predominant type of crash was rear-end.

Conceptual Alternative

After evaluating the safety, operational, and geometric conditions on existing S.R. 374 within the study limits, two options were considered to address the deficiencies: The Build and the No Build Alternative. The Build alternative for S.R. 374 is a five (5) lane roadway with ten (10) foot shoulders, curb and gutter, and five (5) foot sidewalks based on TDOT Design Standard Drawing RD11-TS-6B and MM-SW-1. The area in front of the schools will have six (6) foot sidewalks. The thru lanes are twelve (12) feet and the two-way left turn lane is fourteen (14) feet. As the roadway approaches the major intersections, the cross section is widened to accommodate traffic demands.

Intersection and Roadway Analysis

Capacity analyses were conducted on the northern section so S.R. 374 between Memorial Drive and Dunbar Cave Road. For the base year 2023 with the No Build scenario, the roadway operates at a Level of Service (LOS) E. For both the 2033 and 2043 design years, the roadway will operate at a LOS F. Under the Build scenario, the roadway will operate at a LOS C for the 2033 design year and LOS D for the 2043 design year.

Capacity analyses were also conducted on the two major intersections; US- 41A with S.R. 374 and S.R. 374 with Memorial Drive. Traffic counts were taken to develop Design Hourly Volumes (DHVs) for both intersections. The DHV's were developed for the base year 2023, and future design years 2033 and 2043.

The intersection of S.R. 374 with Madison Street (US 41-A S.R. 112) is operating at a LOS F for the 2023 base year. With the proposed laneage, the intersection will operate at a LOS B for the morning peak and LOS C for the afternoon peak in the baseline 2023 year. For the design year 2033, the intersection will operate at a LOS C for the morning peak and LOS D in the afternoon peak. In design year 2043, the intersection will operate at a LOS C for morning peak. In the afternoon peak the intersection will operate at a LOS E.

The intersection of S.R. 374 with Memorial Drive is operating at a LOS F for the 2023 base year. With the proposed lane configuration, a capacity analysis for the 2023 base line year was improved to LOS B for both the morning and afternoon peaks. For the design year 2033, the LOS will operate at a LOS C for both the morning and afternoon peaks. For the design year 2043, the intersection will operate at a LOS E for both the morning and afternoon peak hours.

Traffic and Safety Comparison

The Build Alternative adds additional capacity, improves safety, and reduces the overall density and delay along the route. Below is a table showing the LOS difference between the No Build and the Build Alternative.

LEVEL OF SERVICE COMPARISON TABLE												
Description	No Build			Build								
		Alternative			Alternative							
	2023		2033		20	043	2023		2033		2	043
Memorial Drive to Dunbar Cave Road	Е		F			F	ļ	∖-B	В	-C	(C-D
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
S.R. 374/US-41A Intersection	F	F	F	F	F	F	В	С	С	D	С	E
S.R. 374/Memorial Dr. Intersection	F	F	F	F	F	F	В	В	С	С	E	E

Crash Modification Factors (CMF) and Crash Reduction Factors (CRF) from the Highway Safety Manual (HSM) provide a good example of how roadway improvements impact safety. For the Conceptual Alternatives, the CMF for converting a 2 lane roadway to a 4 lane divided roadway is 0.714 and the CRF is 29% for all crash severities. Providing a right turn lane on both major road approaches yields a CMF of 0.92 and a CRF of 26% for all crash severities. Adding a right turn lane on both major road approaches yields a CMF of 0.59 and a CRF of 49% for fatal and severe injury crashes.

Cost Estimate

The total estimated planning level estimate required for preliminary engineering, ROW and utilities, and construction for this project is approximately \$51,000,000 based on 2020 costs. The 5 year inflated cost is approximately \$65,000,000 and the 10 year inflated cost is approximately \$83,000,000. These costs were based on a five percent (5%) inflation rate.

	COST ESTIMATE SUMMARY (2020)								
PIN	Project Type of Work	Preliminary Engineering:	Right-of-Way:	Utilities:	Construction:	Total Project Cost (2020):			
0.00	Widen	\$ 2,470,000	\$ 4,840,000		\$ 40,800,000	\$ 50,900,000			

	Technical Report					
No. of Years	Year	Preliminary Engineering:	Right-of-Way:	Utilities:	Construction:	Total Inflated Project Cost
5	2025	\$ 3,150,000	5 6,180,000	5 7,900,000	5 52,100,000	\$ 65,000,000
10	2030	\$ 4,020,000	\$ 7,880,000	\$ 10,100,000	\$ 66,500,000	\$ 82,900,000

Conclusions

After analysis, the Build scenario is recommended for the study limits of S.R. 374. The Build scenario consists of five (5) lane roadway with ten (10) foot shoulders, curb and gutter, and five (5) foot sidewalks. The thru lanes are twelve (12) feet and the two-way left turn lane is fourteen (14) feet. The shoulder will be striped with a five (5) foot bicycle lane and a five (5) foot buffer. The sidewalk will be expanded to six (6) foot within the school zone area. In addition, right turn lanes will be added at both the high school and the middle school entrances. Additional study may be required to determine the optimal school entrance configurations. The major intersections will include right and left turn lanes with ten (10) foot shoulders, curb and gutter, and five (5) foot sidewalks. At the intersection of S.R. 374 with U.S. 41-A, S.R. 374 will have a raised median for positive access control near the intersection. Signal control at the major intersections will be upgraded to accommodate the new cross-section and traffic demands. The roadway and signals should provide acceptable levels of service up to the 2043 design year.

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1.0 Introduction

The Technical Report process involves a comprehensive study of historic, current, and projected highway data. An assembled team reviews the project to validate identified deficiencies and determine cost effective measures to resolve those deficiencies with an emphasis placed on mobility and motorist safety.

The purpose of this Technical Report is to provide an overview of the existing route deficiencies, define the preliminary purpose and need for the project, and to provide preliminary design that is feasible, cost effective, and improves mobility for this segment of S.R. 374.

1.1 Study Area, Vicinity, Existing Roadway Network Maps

S.R. 374 in Clarksville is an urban arterial route 16.20 miles in length that extends from Madison Street (US-41A S.R. 112) to S.R. 76. TDOT is currently developing a separate project that will extend S.R. 374 south of S.R. 76 and across the Cumberland River to connect with S.R. 149.

L.M.			Road Name
0	0 to 0.78		Richview Road
0.78	to	5.32	Warfield Blvd.
5.32	to	11.66	101st Airborne Division Parkway
11.66	to	13.91	Purple Heart Parkway
13.91	to	16.2	Paul B. Huff Memorial Parkway

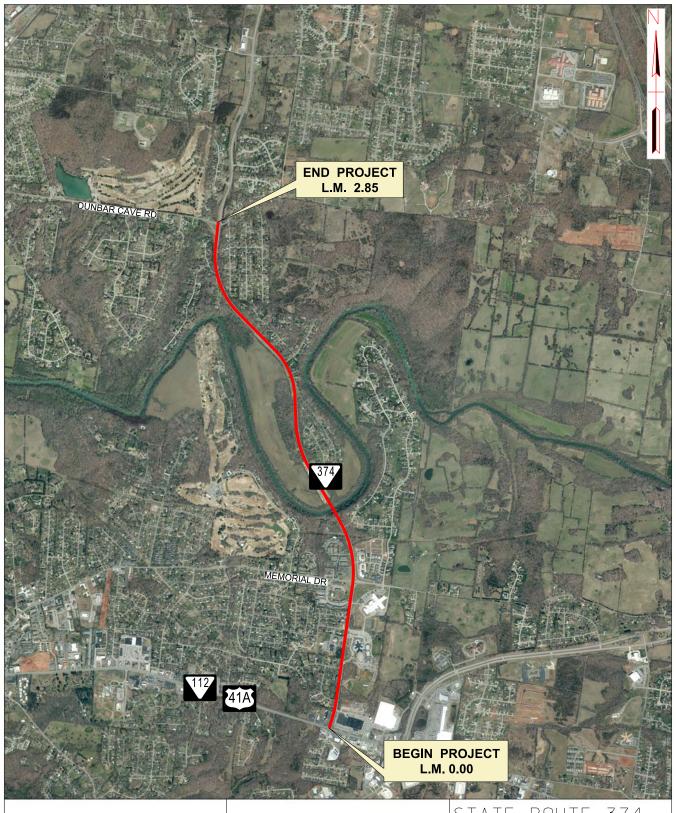
S.R. 374 Road Names

The portion of S.R. 374 under study begins at the intersection of Madison Street at L.M. 0.00 and extends north to Dunbar Cave Road intersection at L.M. 2.85.

The terrain is rolling along this section and there is variable right of way (ROW) width.

The speed limit is 40 mph from L.M. 0.00 to L.M. 1.27 and 50 mph from L.M. 1.27 to L.M. 2.85. There is a 20 mph school speed limit in effect from L.M. 0.23 to L.M. 0.90 when school is in session.

The section of S.R. 374 in the study is illuminated and is a designated Tennessee Bicycle Route per information from the Tennessee Roadway Information Management System (TRIMS).



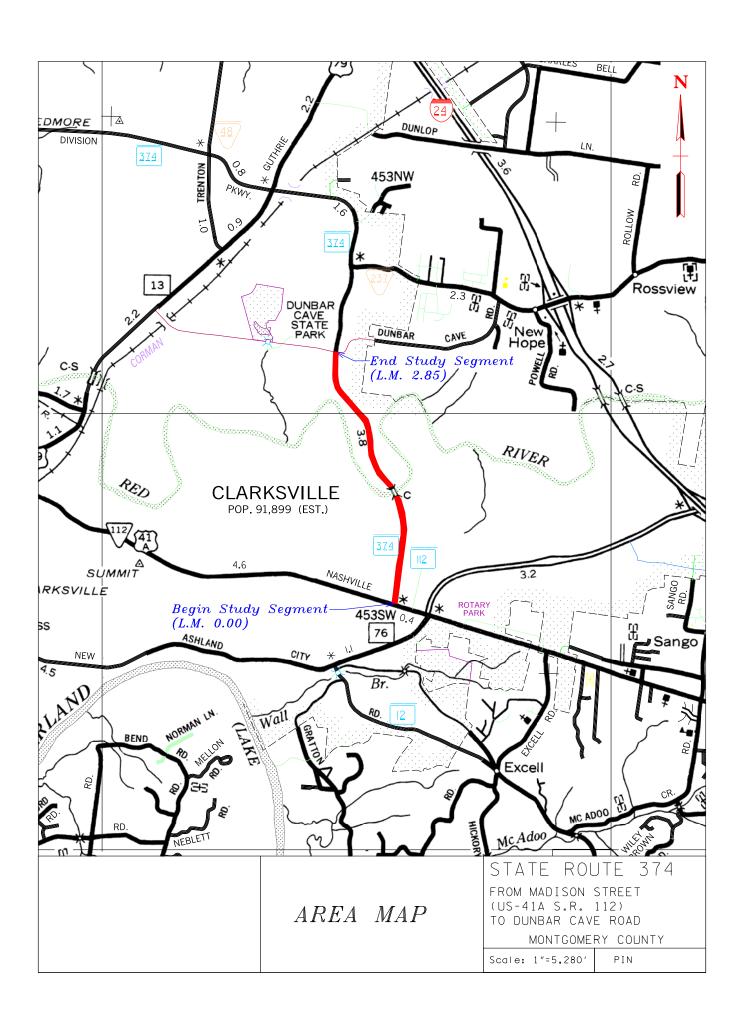
LOCATION MAP

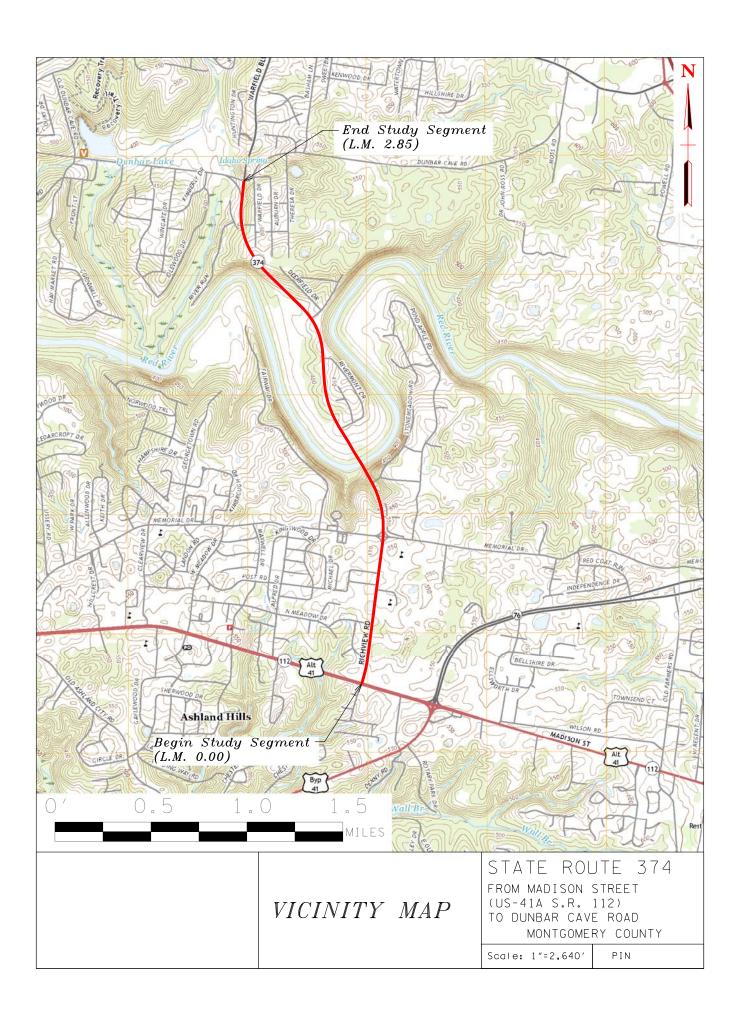
STATE ROUTE 374
FROM MADISON STREET
(US-41A S.R. 112)
TO DUNBAR CAVE ROAD

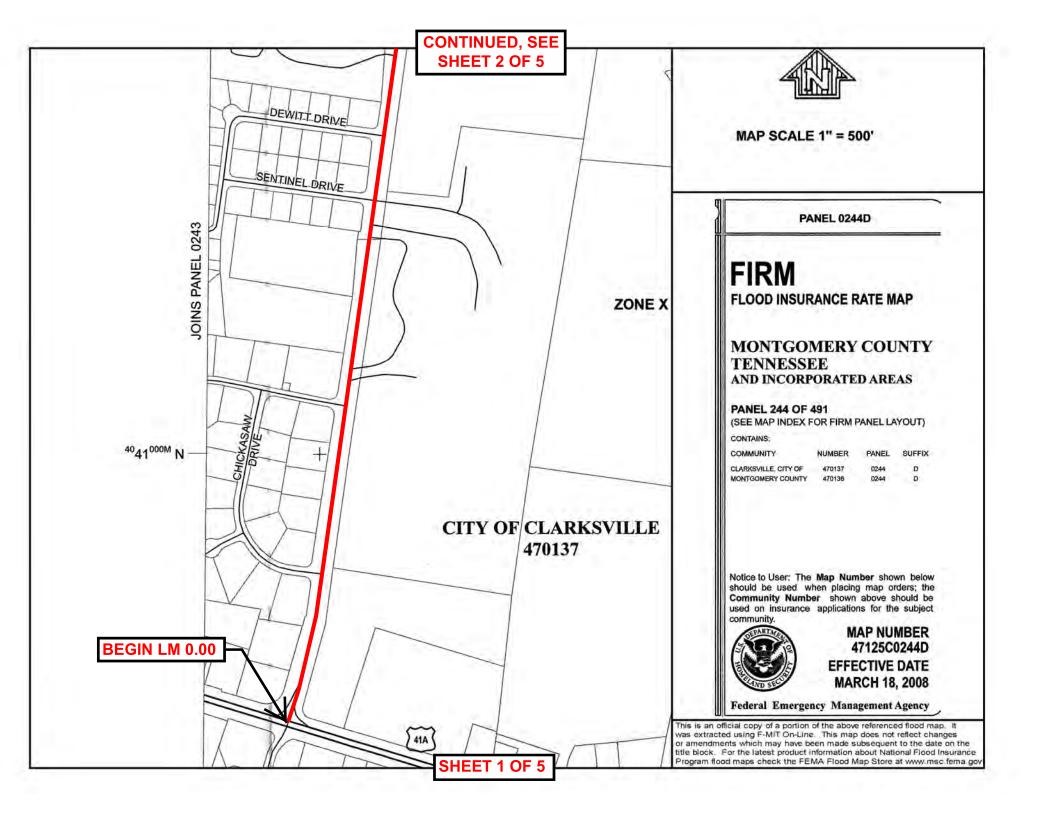
MONTGOMERY COUNTY

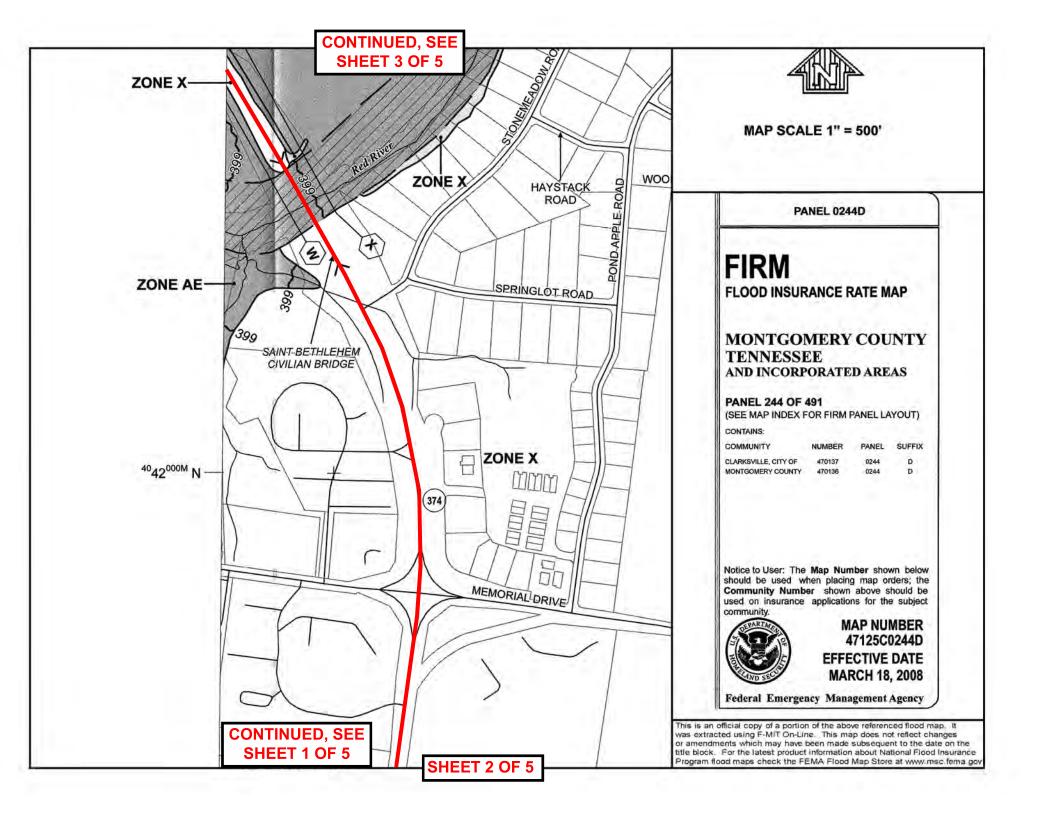
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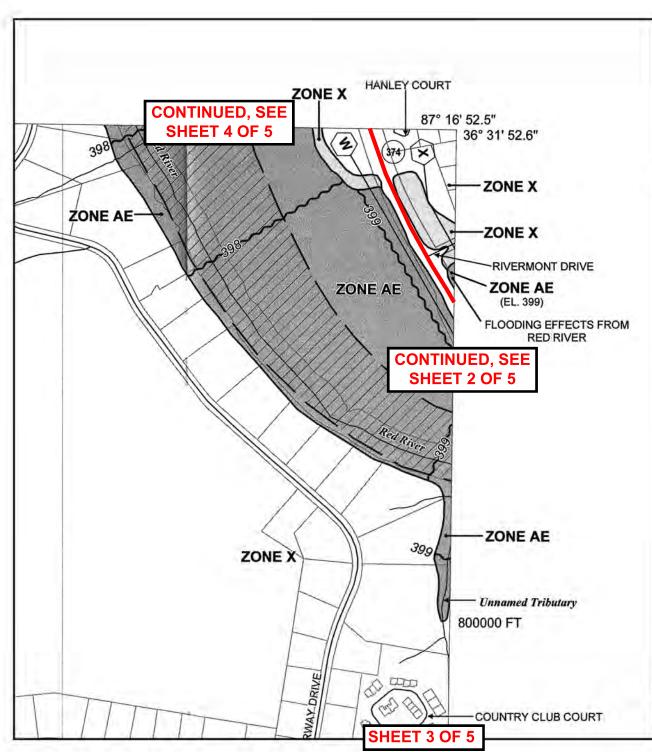
PIN













MAP SCALE 1" = 500'

PANEL 0243D

FIRM

FLOOD INSURANCE RATE MAP

MONTGOMERY COUNTY TENNESSEE AND INCORPORATED AREAS

PANEL 243 OF 491

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY NUMBER PANEL SUFFIX
CLARKSVILLE, CITY OF 470137 0243 D

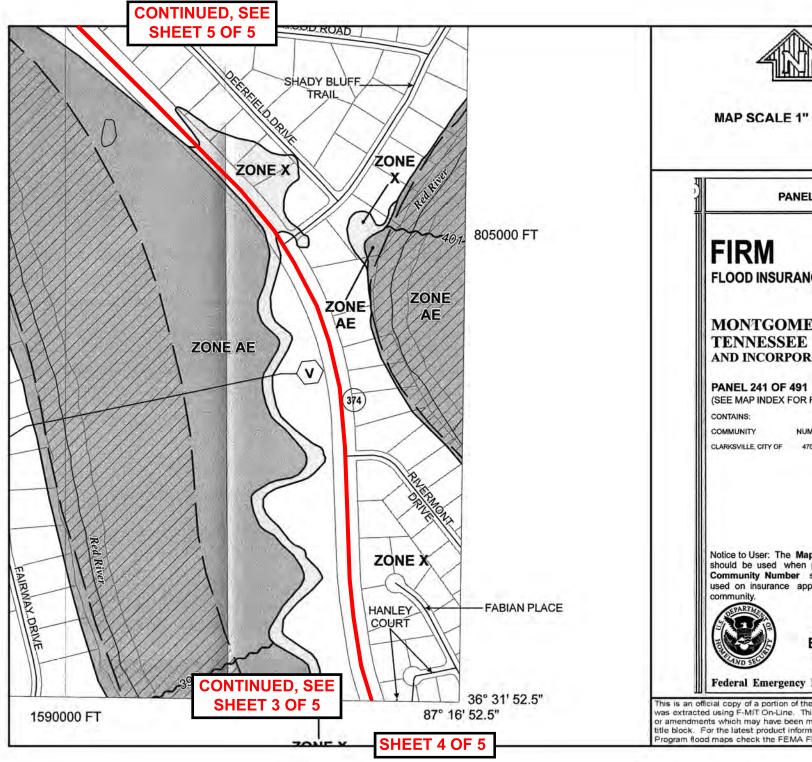
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.



MAP NUMBER 47125C0243D EFFECTIVE DATE MARCH 18, 2008

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MiT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov





MAP SCALE 1" = 500'

PANEL 0241D

FLOOD INSURANCE RATE MAP

MONTGOMERY COUNTY AND INCORPORATED AREAS

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

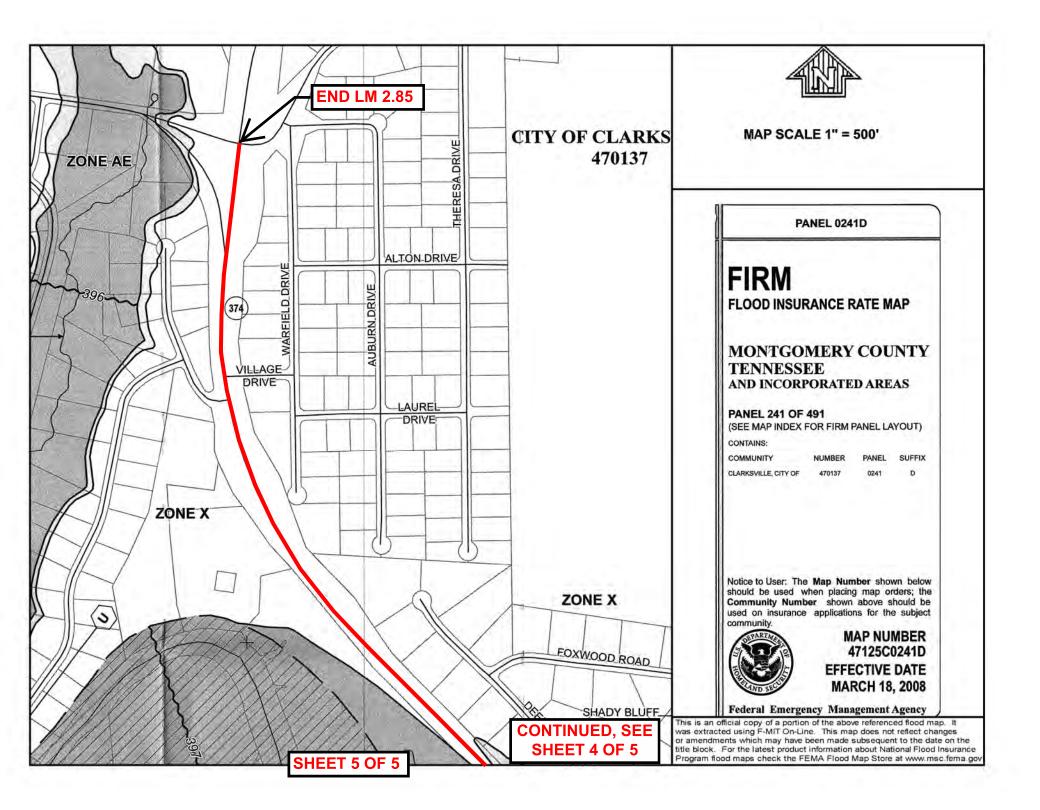
SUFFIX

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject

> MAP NUMBER 47125C0241D **EFFECTIVE DATE MARCH 18, 2008**

Federal Emergency Management Agency

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1.2 Demographics

The portion of S.R. 374 under review lies within the City Limits of Clarksville in Montgomery County, Tennessee. The route is located approximately forty-five (45) miles northwest of Nashville, Tennessee. The 2018 population of Montgomery County was estimated by the United States (U.S.) Census Bureau as 205,950. The 2018 population of Clarksville was estimated to be 156,794. Clarksville experienced an 18% growth rate between 2010 and 2018 with a 19.5% countywide growth rate. Select demographics are provided in Table 1, which compares equivalent demographics for Tennessee and the United States.

Comparison of Demographics to TN and US

		Montgomery		United
Characteristic	Clarksville	County	Tennessee	States
Growth Rate (April 1, 2010-July 1, 2018)	18%	19.50%	6.70%	6%
Unemployment (2018)	7.20%	7.10%	5.90%	5.90%
Minority Population (2018)	42.40%	37.20%	26.30%	39.60%
Median Household Income (2014-2018)	\$53,007.00	\$55,972.00	\$50,972.00	\$60,293.00
Persons Below Poverty Level (2014-2018)	14.70%	12.00%	15.30%	11.80%
Median Age (2014-2018)	29.5	30.6	38.7	37.9

Source: U.S. Census Bureau

As shown in the table, Clarksville and Montgomery County experienced much higher than average growth rates between 2010 and 2018. Employment in the Clarksville MPO area has seen dramatic changes over the last several decades relative to the number of jobs and types of jobs that comprise the local economy. Government employment (both civilian and non-civilian) is the largest supplier of jobs within the MPO area. Fort Campbell supports the 3rd largest military population in the Army, and the 7th largest in the Department of the Army, with nearly 30,000 soldiers and civilians assigned to Fort Campbell.

1.3 Existing Land Use and Zoning

Land use is classified as mixed residential commercial from L.M. 0.00 to L.M. 0.23, residential from L.M. 0.23 to L.M. 1.10 and rural from L.M. 1.1 to the end of the study section. It is zoned primarily as residential, with some commercial and industrial zoning near the Madison Street intersection. Clarksville High School and Richview Middle School are located within the study area as well as Family Life Worship Center and Community of Hope Church of the Nazarene. There is an office park located within the study area adjacent to the Memorial Drive intersection. River Club golf course is located within the study area south of Dunbar Cave Road intersection.

1.4 Existing Adjacent Projects

Construction was recently completed to widen S.R. 374 from three (3) lanes to five (5) lanes beginning just south of Dunbar Cave Road intersection and extending to Stokes Road. (R-STP-374(10), 63111-3218-14)

2.0 Existing Roadway Conditions

This 2.85 mile section has been divided into three (3) segments for analysis.

- Segment one extends from L.M. 0.00 (Madison Street, US-41A S.R. 112) to L.M. 0.78 (Memorial Drive). Section one has a 40 mph speed limit with a 20 mph school zone speed limit. The AADT is 16,015 VPD. Madison Street at the intersection of S.R. 374 is a five (5) lane urban minor arterial with a 45 mph speed limit and AADT of 20,830 VPD. The south approach of the Madison Street intersection is S. Richview Road, a local dead end street serving three businesses and a residential neighborhood. Segment one is a three (3) lane section with two (2) eleven (11) foot travel lanes and an eleven (11) foot continuous left turn lane. Clarksville High School and Richview Middle school are located along this segment. Turning lanes are present at the Madison Street intersection, school entrances, and Memorial Drive intersection.
- Segment two extends from L.M. 0.78 (Memorial Drive) to L.M. 1.32. This is a three (3) lane section (auxiliary truck climbing lane in southbound direction) with twelve (12) foot lane widths from L.M. 0.78 to L.M. 1.1 and transitions to a two (2) lane section before crossing the Red River at L.M. 1.16. The segment transitions to a three lane section with two (2) 12 (twelve) foot travel lanes and a twelve (12) foot continuous left turn lane at L.M. 1.32. The speed limit is 40 mph to L.M. 1.27 then raises to 50 mph.
- Segment three extends from L.M. 1.32 to L.M. 2.85 (Dunbar Cave Road). This is a three (3) lane section with two (2) 12 (twelve) foot travel lanes and a twelve (12) foot continuous left turn lane. Turning lanes are present at the Dunbar Cave Road intersection. The speed limit is 50 mph. The AADT for segments 2 and 3 increase to 27,825 VPD in the 2023 base year.

2.1 Existing Structures and Bridges Conditions

There is an existing two (2) lane bridge [63S62701005] that crosses the Red River located at L.M. 1.16 with a 2018 sufficiency rating of 81.3.

According to E-TRIMS, there are eight (8) culverts or pipes less than four (4) feet in diameter along the existing route that will be impacted by this project. Other structures may be present along the project route that are not identified by TRIMS. TDOT Design plans for project 63111-3218-14 indicate that there is an existing 60" corrugated metal pipe located just east of Stonemeadow Drive at approximate log mile (L.M.) 1.07. TRIMS shows a culvert or pipe less than four (4) in diameter at this same location, and it is unclear if this structure was mislabeled in TRIMS, replaced with a larger diameter pipe, or if there are two (2) pipes at this location. The modification of end treatments, extension, or replacement of impacted structures should be included in the eventual scope of the project.

2.2 Existing Utility Infrastructure

CDE Lightband and Clarksville Gas and Water provided information regarding their utilities within the project area which can be found in the appendix of this report.

2.3 Preliminary Environmental Constraints

There is an existing 0.84 acre detention pond that will be impacted by construction on the left side of roadway in front of the Family Life Worship Center located north of Sequoia Drive. The pond is classified as a palustrine unconsolidated bottom permanently flooded pond (PUBH). The National Wetlands Inventory Wetlands Mapper shows one (1) crossing within the project limit. S.R. 374 crosses the Red River at L.M. 1.16. This 913.35 acre habitat is classified as riverine lower perennial mud unconsolidated bottom permanently flooded (R2UB3H). Special precaution should be taken to avoid contamination or destruction of environmental features in the project area. Wetland areas exist in the general area but are located several hundred feet away from the existing roadway and are not expected to be impacted by construction. The project will progress in accordance with the National Environmental Policy Act (NEPA) and a detailed Environmental Boundaries Report will be prepared to identify ecological resources within the project area. The report should be used by the designer to minimize the projects impact on the resources.

TDOT Technical Study Staff have identified the following resources within the project limits:

Air and Noise

This is a Type I noise project, so a detailed noise study will be required. If the NEPA doc is going to be a D-List CE, then Mobile Source Air Toxic Analysis (MSAT) will not be required.

Archaeology

We studied the existing ROW in the early 2000's and did not identify any archaeological resources at that time. An archaeological survey of all proposed ROW, easements, and undisturbed areas within existing ROW will be required for the subject project. However, due to the geographic context and recent land-use, the probability of identifying archaeological resources that are eligible for the National Register of Historic Places within the area of potential effects is low.

Ecology

According to the Tennessee Department of Environment and Conservation (TDEC) Natural Heritage Rare Species database, there are two records of rare species within one mile of the proposed project; the state and federally-listed Endangered gray bat, Myotis grisescens and state-listed purple milkweed. Within four miles there are several records of rare plants and animals, many of the records are historic. Of the rare species within four miles, only one Physaria globosa, Short's bladderpod is federally-listed. All of the others are state-listed. The state -listed species within four miles are: Bewick's wren, hellbender, Northern pine snake, Southern bog lemming, barking tree frog, slenderhead darter, Short's rock cress, pale purple coneflower, sand grape, beak grass, limestone bluestar, and prairie ragwort. There is at least one stream, the Red River within this project area. Since the report states that there are 8 culverts, it is likely that there are smaller streams, ephemeral streams or wet weather conveyances. There may be wetlands in low-lying areas, especially near the river. Tree cutting may affect bats such as Indiana bats and Northern long-eared bats that use trees for summer roosting habitat.

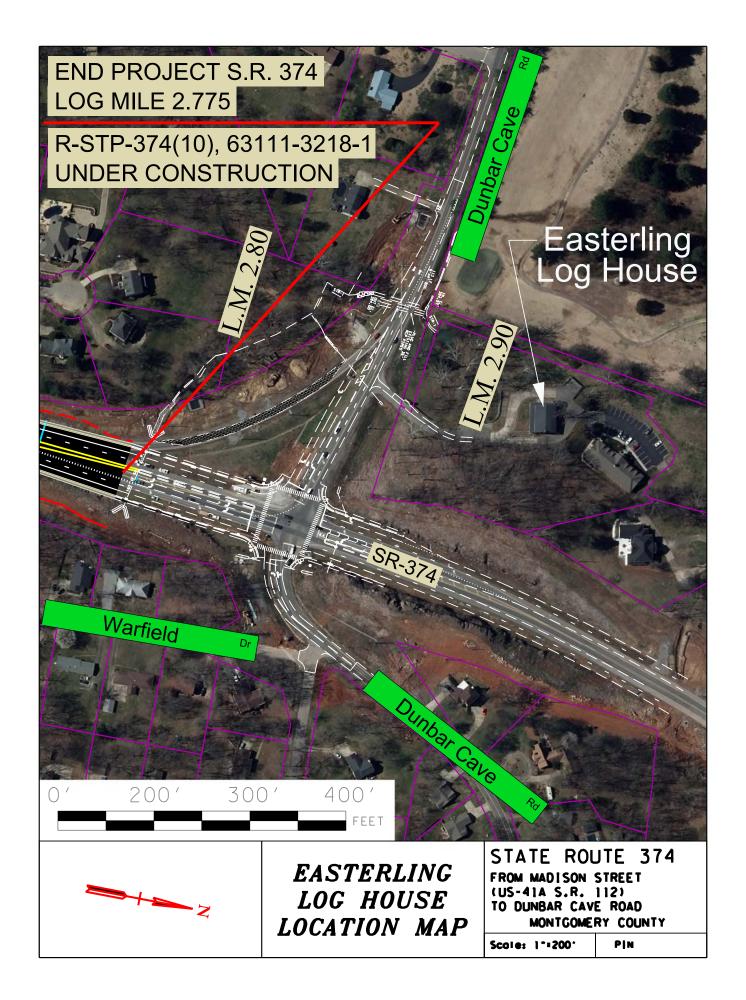
HazMat

No hazardous materials sites are identified along the corridor other than two current or former UST facilities on the corner of S.R. 374 and Madison St., but no proposed ROW is shown on the figures. The bridge over Red River, and possibly the culverts (anything other than corrugated metal pipe) will require asbestos surveys.

Historic

There is one structure previously surveyed by TDOT and deemed eligible for listing on the National Register of Historic Places: The Easterling Log Cabin, located at the corner of Dunbar Cave Road and Warfield Blvd. Below is an updated functional map with the location of this property. Further study will be required to assess the project's effect on this property. In addition to the previously surveyed property, there are other properties in the project area that are 50+ years old that may be eligible for listing on the National Register of Historic Places. Further study will be required once we receive our official tech request.





Multimodal

According to TDOT's Roadway Design Guidelines Chapter 3-Multimodal Design (New Chapter, Revised September 11, 2020), there should be a minimum buffer of three (3) feet between the roadway and a five (5) foot bike lane (Table 3-4 shown below). The Tennessee Department of Transportation Multimodal Transportation Resources Division has recommended a five (5) foot buffer with a five (5) foot bike lane. The following is an excerpt from the Design Guidelines:

3-501.04 BUFFERED ON-STREET BICYCLE LANES

Buffered bicycle lanes are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. The buffer space is created with pavement markings. When a buffer is placed between the traveled way and a bicycle lane, it improves safety by separating bicyclists from moving motor vehicles. A buffer can also be placed between on-street parking lanes and bicycle lanes. When that configuration is selected, bicyclists have less risk of being hit by a car door being opened from a parked car. Both locations are acceptable, and the preferred placement of the buffer(s) depends upon local conditions. Buffered bicycle lanes provide the following advantages when compared to conventional bicycle lanes.

- Provide greater distance between bicyclists and motor vehicles
- Provide space for faster moving bicyclists to pass slower moving bicyclists without having to encroach into the motor vehicle travel lane
- Provide a greater space for bicycling without making the bicycle lane appear so wide that it might be mistaken for a travel lane or a parking lane
- •Appeal to a wider range of bicyclists and encourages bicycling

1/4	ADT	< 2,000	2,000 - 10,000	> 10,000
	≤ 35 mph	SL or WOL	BL	8L
Posted Speed Limit	40 - 45 mph	BL (5 ft)	BL (5 ft) or BBL (4 ft▲)	BL (5 ft) or BBL (4 ft ▲) or SBL (5 ft ▲)
	50 - 55 mph	BBL (4 ft ▲) or SBL (5 ft ▲)	BBL (4 ft▲) or SBL (5 ft▲)	BBL (4 ft ▲) or SBL (5 ft ▲)
	> 55 mph	SUP	SUP	SUP
	ared Lane ared-Use Path	BBL = Buffered SBL = Separate BL = Conventi	d Bike Lane	L = Wide Outside Lane (Min. 14 Ft Wide)

Table 3-4: Bicycle Facilities on Urban Roadways Design Guidance (For Mono Directional Only)

Section 4(f)

There are two potential Section 4(f) resources along the corridor.

- Clarksville High School Baseball Field along S.R. 374 Potential Section 4(f) resource –
 coordination needed with the Official with Jurisdiction (OWJ) is needed to determine. If it is a
 Section 4(f) resource, any ROW acquisition would cause the need for a de minimis
 determination. If only temporary easements would be needed, temporary occupancy would be
 appropriate.
 - o If the public-school baseball field serves only school activities and functions and is not open to the public or serve as either organized or substantial walk-on recreational purposes that are determined to be significant, then it is not subject to Section 4(f). The project lead should obtain documentation from the OWJ explaining that the baseball field is only used for school functions and does not have any other local significance for recreational purposes.
- Crow Community Center is located on the same tract as Clarksville High School at 211 Richview Road and is one of three recreation centers managed by the City of Clarksville Park & Recreation. This resource appears to be open to the public but through a daily admission cost or an annual membership. Further coordination with the OWJ and the Federal Highway Administration (FHWA) would be needed to determine if this is a Section 4(f) resource. Neither the center nor it's parking appear to be impacted by the proposed project; however, disruption of access during construction could result in a de minimis impact if this Center is determined to be a Section 4(f) resource.
- River Club Golf and Learning Center located at 1150 Warfield Blvd. Not a Section 4(f) resource. While open to the public, it is privately owned by River Investments GP.
- The Villages at the River Club Not a Section 4(f) resource. This is a luxury retirement community that does not appear to have ROW or easement impacts.

Section 6(f)

No resources identified.

ROW

A Conceptual Stage Relocation Plan (CSRP) will be necessary for any business or residential relocations.

Other Notes

- This portion of S.R. 374 has signage for Clarksville Transit System (CTS) Bus Route along the roadway. There is one pedestrian bench located on S.R. 374 near the Clarksville High School driveway across from Sentinel Drive. Appropriate coordination will need to take place.
- Ensure that the project has appropriate transitions of traffic at Madison Street, Dunbar Cave Road, and all other crossing intersections. At Dunbar Cave Road, it appears that two lanes will carry through the intersection, but there is only one existing lane on the other side. Is there another project that will improve that portion of S.R. 374 to match the typical? At Madison Street, turn lanes need to be added on S. Richview Road to show how residential traffic will turn left and right onto Madison Street.

3.0 Safety

The calculated crash rate (A) and the severe crash rates for the three segments of the route can be found in the table below. Crash rates were calculated based on TDOT 2018 cycle counts and using crash data from the dates of January 1, 2017 to December 31, 2019.

Crash Rates							
Segment 1: L.M. 0.	00-0.78 (A/C r	atio 1.81)					
Туре	Crash Rate	SW Average					
Total	7.66	2.978					
Severe (Fatal+Incap)	0.00	0.08					
Segment 2: L.M. 0.	78-1.32 (A/C r	atio 0.82)					
Туре	Crash Rate	SW Average					
Total	3.023	2.574					
Severe (Fatal+Incap)	0.00	0.1					
Segment 3: L.M. 1.	Segment 3: L.M. 1.32-2.85 (A/C ratio 0.82)						
Туре	Crash Rate	SW Average					
Total	3.028	2.978					
Severe (Fatal+Incap)	0.058	0.08					
S.R. 112 intersec	tion (A/C ration	2.86)					
Туре	Crash Rate	SW Average					
Total	2.995	0.682					
Severe (Fatal+Incap)	0.00	0.014					
Memorial Drive inte	rsection (A/C	ratio 2.46)					
Туре	Crash Rate	SW Average					
Total	2.589	0.682					
Severe (Fatal+Incap)	0.00	0.014					
Dunbar Cave Road int	ersection (A/0	C ratio 2.41)					
Туре	Crash Rate	SW Average					
Total	2.549	0.682					
Severe (Fatal+Incap)	0.07	0.014					

The total crash rate is higher than the statewide average for all three segments and for each of the three analyzed intersections. The severe crash rate is lower than the statewide average for all three segments and for two of the three analyzed intersections. Dunbar Cave Road intersection severe crash rate is higher than the statewide average.

S.R. 374 CRASH STATISTICS						
	1/1/2017-	12/31/2019				
	Number of	Percentage				
Condition	Crashes	of Total				
Lighting Condition	ns					
Daylight	161	72%				
Dark-Not Lighted	37	17%				
Dark-Lighted	17	7%				
Dusk/ Dawn	9	4%				
Crash Severity	,					
Property Damage	188	84%				
Non-incap Injury	34	15%				
Incap Injury	2	1%				
Fatality	0	0%				
Manner of Collisi	on					
Rear-End	132	59%				
Angle	41	18%				
No Collision w/ Vehicle	36	16%				
Head-on	6	3%				
Sideswipe, Same Direction	5	2%				
Other	3	1%				
Sideswipe, Opposite Direction	1	1%				
Weather Condition	ons					
Clear	171	76%				
Rain	27	12%				
Cloudy	23	10%				
Sleet/ Hail	1	0.70%				
Fog	1	0.70%				
Blowing Sand/Soil/Dirt	1	0.70%				

4.0 Existing and Future Traffic Projections

			2018 Cycle Count	Base Year (2023)	Design Year (2043)
L.M.			AADT	AADT	AADT
0	to	0.78	12,840	16,015	23,850
0.78	to	2.85	20,700	27,825	48,165
2.85	to	3.75	14,820	-	-

Traffic Projections provided by TDOT Strategic Transportation Investments Division

The base year (2023) AADT for the section of S.R. 374 under study is 21,920 vehicles per day. The design year (2043) AADT is projected to be 36,010 vehicles per day.

5.0 Preliminary Purpose and Need

Existing S.R. 374 is experiencing increased traffic demands as well as increased frequency of rear end and right angle collisions within the project area. The current roadway does not have the capacity to handle the current and projected traffic volumes during peak hours. As the corridor continues to develop, safety and capacity improvements will be needed to provide an adequate and efficient transportation facility.

The needs to be addressed with this project are:

- Providing increased capacity with an additional lane in each direction and continuous left turn lane for current and future traffic demand.
- Intersection upgrades to improve traffic flow.
- Improving safety conditions through reducing conflicts with the addition of right turn lanes at the major intersections.
- Reducing delay and congestion.

By implementing these improvements, S.R. 374 can provide a more efficient, reliable facility. These improvements may also help support existing and future traffic demands.

6.0 Conceptual Project Alternatives

After evaluating the safety, operational, and geometric conditions existing on S.R. 374 within the study limits, two options were considered: The No-Build and the Build Alternative.

No-Build Alternative

The no-build alternative maintains the existing roadway network through the design year providing no improvements to capacity or efficiency. Routine maintenance would continue and projects programmed for completion would still occur.

Build Alternative

S.R. 374 will be widened to become a five (5) lane roadway with ten (10) foot shoulders, curb and gutter, and five (5) foot sidewalks based on TDOT Design Standard Drawing RD11-TS-6B and MM-SW-1. The thru lanes will be twelve (12) feet and the two-way left turn lane is fourteen (14) feet. As the roadway approaches the major intersections, the cross section is widened to accommodate traffic demands.

The Build alternative's ROW limits and slope lines, as presented on the functional plans, are conceptual in nature and estimated from the Digital Elevation Model (DEM) data provided. The actual ROW needed will be confirmed by future phases of project development. ROW limits shown are to be used to establish the boundaries for additional required environmental technical studies.

7.0 Traffic Analysis

The traffic operations analysis for the S.R. 374 widening includes the use of techniques provided in the sixth edition of the Highway Capacity Manual (HCM), published by the Transportation Research Board (TRB) in 2016. Calculations are performed using Highway Capacity Software (HCS), version 7.3.

The HCM prescribes the use of Level of Service (LOS) to characterize operational conditions. LOS is a qualitative measure, defined by the HCM, which describes the operational conditions of a transportation facility in terms of general service measures, such as speed, travel time, freedom to maneuver, interruptions, and user comfort and convenience. Six levels are defined for all transportation facilities with operational analysis methodology in the HCM; the levels are designated using letters from "A" to "F", with "A" representing the best operational conditions and "F" the worst.

Level of Service (LOS) Definitions for Vehicular Operations

LOS	Vehicular Operations Definition						
^	Free flow operations. Vehicles are almost completely unimpeded in their ability to maneuver with the traffic stream.						
А	Free flow operations. Vehicles are almost completely unimpeded in their ability to maneuver with the traffic stream. The general level of physical and psychological comfort provided to the driver is high.						
В	Reasonable free flow operations. The ability to maneuver within the traffic stream is only slightly restricted.						
В	Reasonable free flow operations. The ability to maneuver within the traffic stream is only slightly restricted. The general level of physical and psychological comfort provided to the driver is still high.						
_							
C	Flow with speeds at or near free flow speeds. Freedom to maneuver within the traffic stream is noticeably restricted and lane changes require more vigilance on the part of the driver. The driver notices an increase in tension.						
0							
U	Speeds decline with increasing traffic. Freedom to maneuver within the traffic stream is more noticeably limited. The driver experiences reduced physical and psychological comfort levels.						
F							
	At lower boundary; the facility is at capacity. Operations are volatile because there are virtually no gaps in the traffic stream. There is little room to maneuver. The driver experiences poor levels of physical and psychological comfort.						
-	Breakdowns in traffic flow. The number of vehicles entering the highway section exceeds the ability of the highway to accommodate that number of vehicles. There is no room to maneuver. The driver experiences poor levels of physical and psychological comfort.						

Capacity analyses were conducted on the northern section so S.R. 374 between Memorial Drive and Dunbar Cave Road. For the base year 2023 with the no-build scenario, the roadway operates at a LOS E. For both the 2033 and 2043 design years, the roadway will operate at a LOS F. Under the build scenario, the roadway will operate at a LOS C for the 2033 design year and LOS D for the 2043 design year.

Capacity analyses were conducted on the two major intersections; US-41A with S.R. 374 and S.R. 374 with Memorial Drive. Traffic counts were taken to develop Design Hourly Volumes (DHVs) for both intersections. The DHV's were developed for the base year 2023, and future design years 2033 and 2043.

S.R. 374 with US-41A (S.R. 112-Madison St.) L.M. 0.00

This intersection experiences a high southbound to eastbound left turn and a reciprocal westbound to northbound right turn during the morning and afternoon peak. Capacity analysis of the intersection utilizing the existing cross section and base year 2023 traffic data showed the intersection failing with a LOS of F. The southbound left had a peak volume of 807 vehicles. Typically, when traffic volumes reach these levels, additional lanes are needed to reduce the signal green needed time to clear vehicle queues during each traffic signal cycle. The reciprocal right turn has a peak volume of 911 vehicles thus requiring a dedicated right turn lane.

Multiple cross section and intersection phasing scenarios were conducted to provide a solution to provide adequate future capacity at the intersection. With the planned laneage, acceptable levels of service were feasibl throught the 2043 design year. With the proposed laneage, the intersection will operate at a LOS B for the morning peak and LOS C for the afternoon peak in the baseline 2023 year. For the design year 2033, the intersection will operate at a LOS C for morning peak and LOS D in the afternoon peak. In design year 2043, the intersection will operate at a LOS C for morning peak and LOS E for the afternoon peak.

S.R. 374 with Memorial Drive L.M. 0.780

This intersection experiences a high southbound to westbound right turn and a reciprocating eastbound to northbound left turn volume. The volumes indicate a need for multiple lanes for those movements. Although the intersection currently has left turn lanes and right turn ramps, the intersection operates at a level of service F for the baseline year 2023.

Multiple cross section and intersection phasing scenarios were also conducted to determine which solutions provided adequate future capacity at the intersection. Dual southbound right turn lanes and dual eastbound left turn lanes were incorporated to compensate for the high turning movements on those approaches. In addition, dual westbound left turn lanes were added for lane alignment. With the proposed lane configuration, a capacity analysis for the 2023 base line year was improved to LOS B for both the morning and afternoon peaks. For the design year 2033, the LOS C for both the morning and afternoon peak hours.

8.0 Horizontal and Vertical Alignment

The horizontal and vertical alignment of the build alternative follows the horizontal alignment of the existing S.R. 374, with widening from three (3) to five (5) lanes assumed to occur symmetrically throughout the study area. Depending on the specific impacts to and possible acquisitions of properties along the study area, it may be economical to consider widening asymmetrically for certain segments of the build alternative. This determination can be made during the design phase when more extensive survey data is available.

8.1 Maintenance of Traffic and Constructability

Traffic shall be maintained throughout construction. Lane shifts will be used to maintain normal traffic flow in conjunction with the construction. No major constructability issues were identified. Typical construction methods can be used. Efforts will be made to minimize cost and environmental impacts.

8.2 Design Exceptions, Retaining Walls, and Slope Adjustments

No design exceptions are needed for this project. Preliminary retaining wall locations have been identified on the functionals. Retaining walls and adjustments to ditch slopes could be considered as the project moves to the next stage of design if ROW acquisition is a concern.

9.0 Benefits: Traffic Analysis

Traffic analyses of the existing roadway indicated that Levels of Service for the facility was poor. The improvements recommended provide for an acceptable Level of Service until the design year 2043. The table below provides Level of Service differences between the No-Build and the Build Alternative.

LEVEL OF SERVICE COMPARISON TABLE												
Description			No	Build			Build					
			Alter	native			Alternative					
	20	2023 2033 2043			2023 2033			2043				
Memorial Drive to Dunbar Cave Road	E		F		F		A-B		B-C		C-D	
	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
S.R. 374/US-41A Intersection	F F		F	F	F	F	В	С	С	D	С	E
S.R. 374/Memorial Dr. Intersection	F	F	F	F	F	F	В	В	С	С	E	E

9.1 Benefits: Safety

Crash Modification Factors for Proposed Alternatives

Crash modification factors (CMFs) are an index of how much crash experience is expected to change following a modification in design or traffic control. A CMF is defined as the ratio between the number of crashes per unit of time expected after a modification or measure is implemented and the number of crashes per unit of time expected if the change does not take place:

Expected Average Crash Frequency with Modification Measure

CMF= Expected Average Crash Frequency with No Change

Where the implementation of a modification in design or traffic control may be expected to result in a reduction in crashes (i.e., where the CMF is less than 1), the change can be expressed as a crash reduction factor (CRF), which is the percentage crash reduction that might be expected after implementing a certain modification in design or traffic control. A CRF is calculated as follows:

CRF=1-CMF

The CMF Clearinghouse (http://www.cmfclearinghouse.org), a website funded by the US Department of Transportation (USDOT) Federal Highway Administration (FHWA) and maintained by the University of North Carolina Highway Safety Research Center, is a comprehensive and searchable database of published CMFs. The CMF Clearinghouse provides information on all available CMFs, including the CMF value and all published details about the CMF, citations and related information about the study that produced each CMF, and a star rating that provides an indication of the quality of each CMF.

The star ratings provided in the CMF Clearinghouse are based on a 1-to-5 scale, where five stars indicates the highest or most-reliable rating. The review process to determine the star rating judges the accuracy

and precision as well as the general applicability of the study results. Reviewers considered five categories for each study—study design, sample size, standard error, potential bias, and data source—and judged each CMF according to its performance in each category.

CMF Clearinghouse Relative Ratings and Performance Categories

Relative Rating	Excellent	Fair	Poor	
	Statistically rigorous	Cross sectional study	Simple before/ after	
	study design with	or other coefficient	study	
Study Design	reference group or	based analysis		
	randomized			
	experiment and control			
	Large sample, multiple	Moderate sample size,	Limited homogenous	
Sample Size	years, diversity of sites	limited years, and	sample	
Sample Size		limited diversity		
		of sites		
	Small compared to	Relatively large SE,	Large SE and	
Standard Error (SE)	CRF	but confidence interval	confidence interval	
		does not include zero	includes zero	
	Controls for all sources	Controls for some	No consideration of	
Potential Bias	of know potential	sources of potential	potential bias	
	bias	bias		
	Diversity in States	Limited to one State,	Limited to one	
Data Source	representing different	but diversity in	jurisdiction in one	
	geographies	geography within State	State	

To provide a more quantitative translation from these categories to the star rating, a point-based system was developed. Points are assigned to each CMF characteristic based on the level of rigor (excellent = 2 points, fair = 1 point, or poor = 0 points). While the points decrease from excellent to poor, not all characteristics receive equal weight. Study design and sample size categories receive twice the weight of the other characteristics:

Score = (2 x Study Design)+(2 x Sample Size)+Standard Error + Potential Bias + Data Source

Scores and Corresponding Star Ratings

Score	Star Rating
14 (maximum possible)	5 Stars
11-13	4 Stars
7-10	3 Stars
3-6	2 Stars
1-2	1 Star
0	0 Stars

While the primary improvement featured in the Build Alternative is widening the existing S.R. 374 from three (3) to five (5) lanes, the CMF Clearinghouse does not feature a category of CMFs for that improvement. The CMF Category for "Convert 2 lane roadway to 4 lane divided roadway" is similar to the widening proposed for the Build Alternative but may present higher crash reduction values due to the divided roadway compared to Two-Way Left Turn Lane (TWLTL). A number of minor improvements featured in the Build Alternative have corresponding categories. The below table lists the CMFs with identifying information.

Crash Modification Factors (CMF) Applying to Conceptual Alternatives

CMF	Countermeasure	CMF CRF		Adj.	Quality	Crash	Crash	Area
ID	Description	CIVIF	CKF	SE	Quality	Type	Severity	Type
	Convert 2 lane							
7574	roadway to 4	0.714	29%	0.11	***	All	All	All
7374	lane divided	0.714			***	AII	AII	AII
	roadway to 4							
	Provide a right-	0.92	26%	0.08		All	All	
289	turn lane on both				****			All
203	major-road							AII
	approaches							
	Provide a right-							
4649	turn lane on both	0.59	41%	N/A	Cannot	All	Fatal,	All
4049	major-road	0.39			Be Rated (HSM)		Injury	AII
	approaches							

10.0 Recommended Improvements

The recommended cross section for S.R. 374 is a five (5) lane roadway with ten (10) foot shoulders, curb and gutter, and sidewalks. The thru lanes are twelve (12) feet and the two-way left turn lane is fourteen (14) feet. As the roadway approaches the major intersections, the cross section is widened to accommodate traffic demands.

11.0 Cost

The total estimated cost of preliminary engineering, ROW and utilities, and construction for the Build Alternative is approximately \$51,000,000. The cost estimate was completed using the Estimating Tool provided by TDOT. Actual property values should be confirmed at the next phase of project. The inflated costs for 5 and 10 years out is shown in the table below:

	COST ESTIMATE SUMMARY (2020)									
PIN	PIN Project Type of Work Preliminary Engineering: Right-of-Way: Utilities: Construction: Total Project Cost (2020):									
0.00	Widen	\$ 2,470,000	\$ 4,840,000	\$ 6,190,000	\$ 40,800,000	\$ 50,900,000				

INFLATED COST ESTIMATE SUMMARY Report Type:										Technical Report	
No. of Years	Year	Prelimi	nary Engineering:	Ri	ght-of-Way:		Utilities:	C	Construction:	Т	otal Inflated Project Cost
5	2025	\$	3,150,000	\$	6,180,000	\$	7,900,000	\$	52,100,000	\$	65,000,000
10	2030	\$	4,020,000	\$	7,880,000	\$	10,100,000	\$	66,500,000	\$	82,900,000

Inflated values were based on a five percent (5%) inflation rate.

12.0 Conclusions

After analysis, the Build scenario is recommended for the study limits of S.R. 374. The Build scenario consists of five (5) lane roadway with ten (10) foot shoulders, curb and gutter, and five (5) foot sidewalks. The thru lanes are twelve (12) feet and the two-way left turn lane is fourteen (14) feet. The shoulder will be striped with a five (5) foot bicycle lane and a five (5) foot buffer. The sidewalk will be expanded to six (6) foot within the school zone area. In addition, right turn lanes will be added at both the high school and the middle school entrances. Additional study may be required to determine the optimal school entrance configurations. The major intersections will include right and left turn lanes with ten (10) foot shoulders, curb and gutter, and five (5) foot sidewalks. At the intersection of S.R. 374 with U.S. 41-A, S.R. 374 will have a raised median for positive access control near the intersection. Signal control at the major intersections will be upgraded to accommodate the new cross-section and traffic demands. The roadway and signals should provide acceptable levels of service up to the 2043 design year.

13.0 Functionals

Index Of Sheets

TITLE SHEET	.1
TYPICAL SECTIONS	.2
PROPOSED I AVOLITS	3-8

STATE OF TENNESSEE DEPARTMENT OF TRANSPORTATION BUREAU OF ENGINEERING

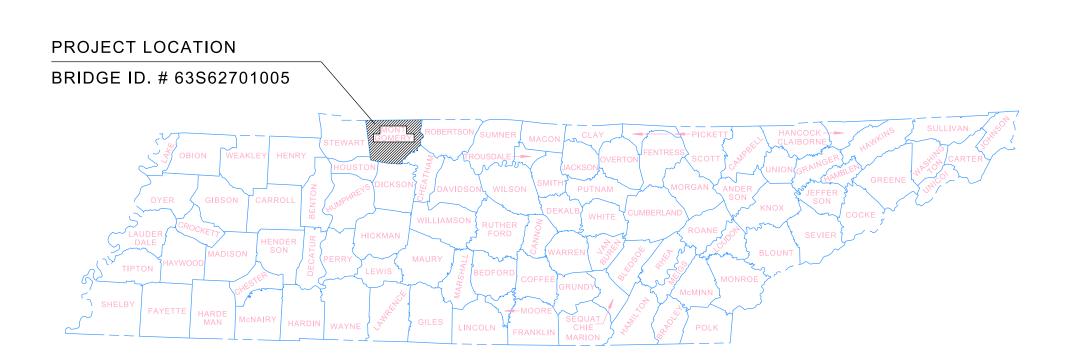
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TENN.	2020	1
FED. AID PROJ. NO.		
STATE PROJ. NO.		

MONTGOMERY COUNTY

STATE ROUTE 374
FROM MADISON ST. (US-41A, STATE ROUTE 112 L.M. 0.00)
TO DUNBAR CAVE RD. (L.M. 2.85)

FUNCTIONAL PLANS WIDENING

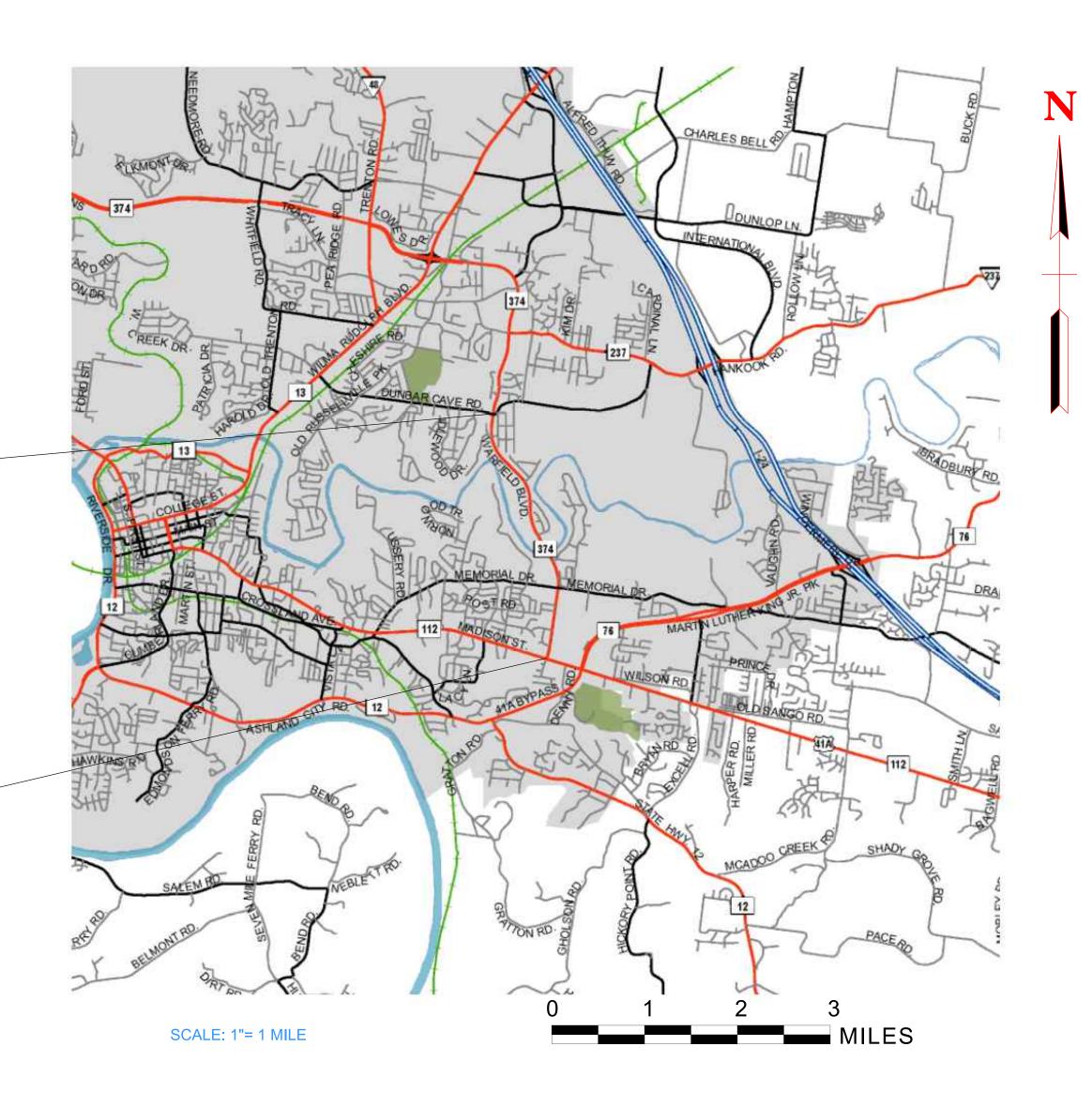
STATE HIGHWAY NO. 374 F.A.H.S. NO.



END PROJECT FUNCTIONAL

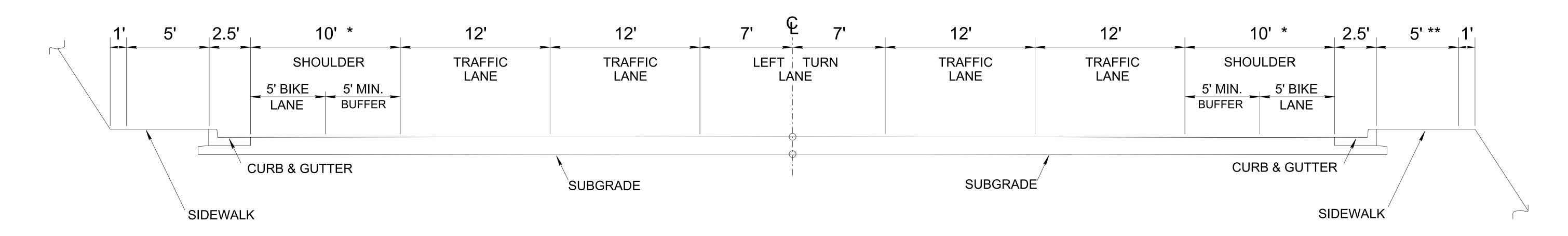
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BEGIN PROJECT FUNCTIONAL LOG MILE 0.00



TRAFFIC	DATA
ADT (2023)	21,920
ADT (2043)	36,010
DHV (2043)	3,752
D	55 - 45
T (ADT)	3 %
T (DHV)	2 %
V	50 MPH

TYPICAL SECTION



BASED ON TDOT DESIGN STANDARD DRAWING RD11-TS-6B

* SHOULDERS ARE REDUCED TO 8' FROM:
L.M. 0.015 LT TO L.M. 0.062 LT AND L.M. 0.017 RT TO L.M. 0.096 RT

SHOULDERS ARE TRANSITIONING FROM 8' TO 10' FROM: L.M. 0.062 LT TO L.M. 0.114 LT AND L.M. 0.096 RT TO L.M. 0.138 RT

** SIDEWALK WILL BE WIDENED TO 6' WITHIN SCHOOL LIMITS BEGINNING AT L.M. 0.161 RT TO LIMITS OF CONSTRUCTION ON EAST MEMORIAL DRIVE ON RT

TECHNICAL REPORT

STATE ROUTE 374 LOG MILE 0.00 TO LOG MILE 2.85 MONTGOMERY COUNTY

DEPARTMENT OF TRANSPORTATION S.T.I.D.

> FIGURE 2 **TYPICAL** SECTION

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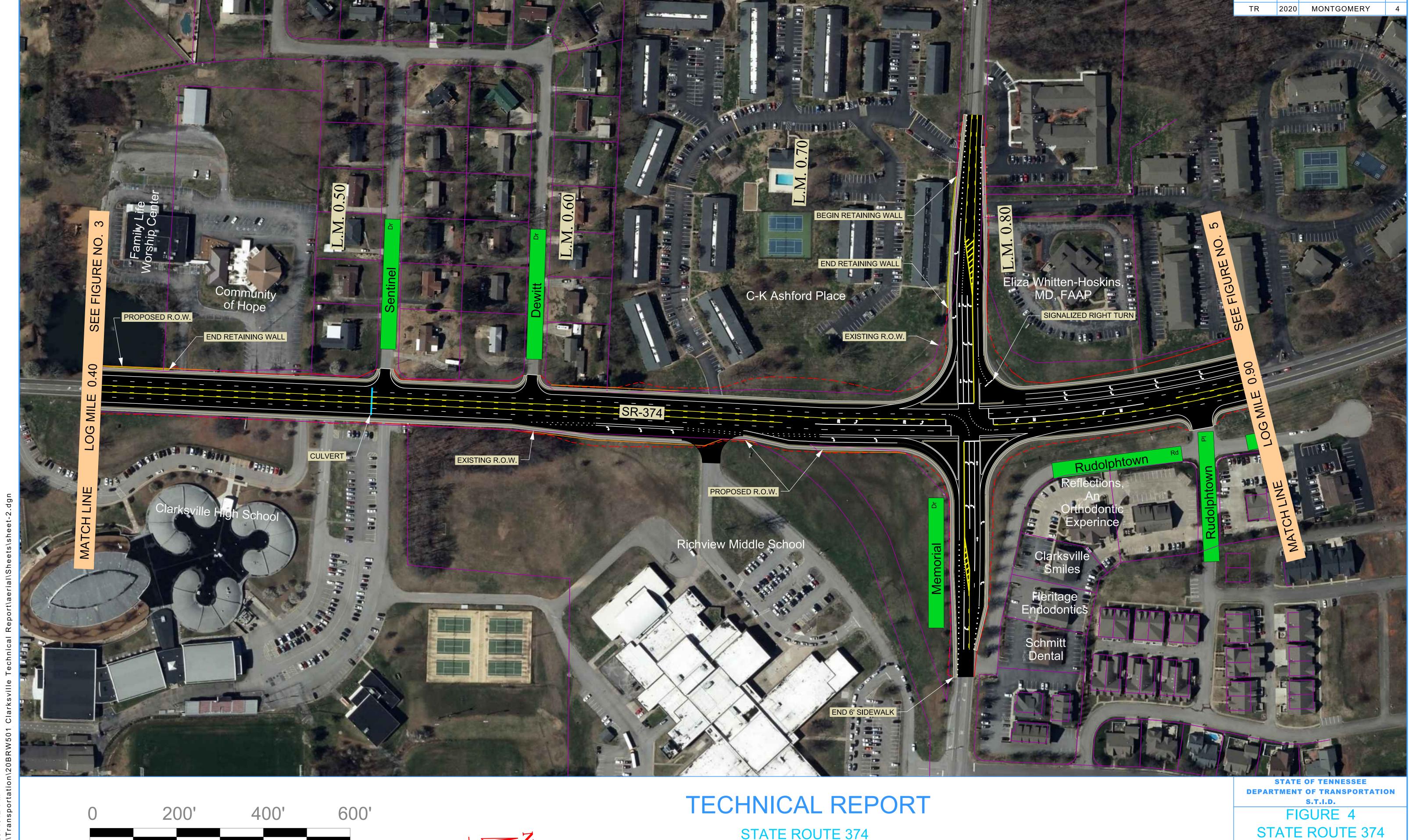
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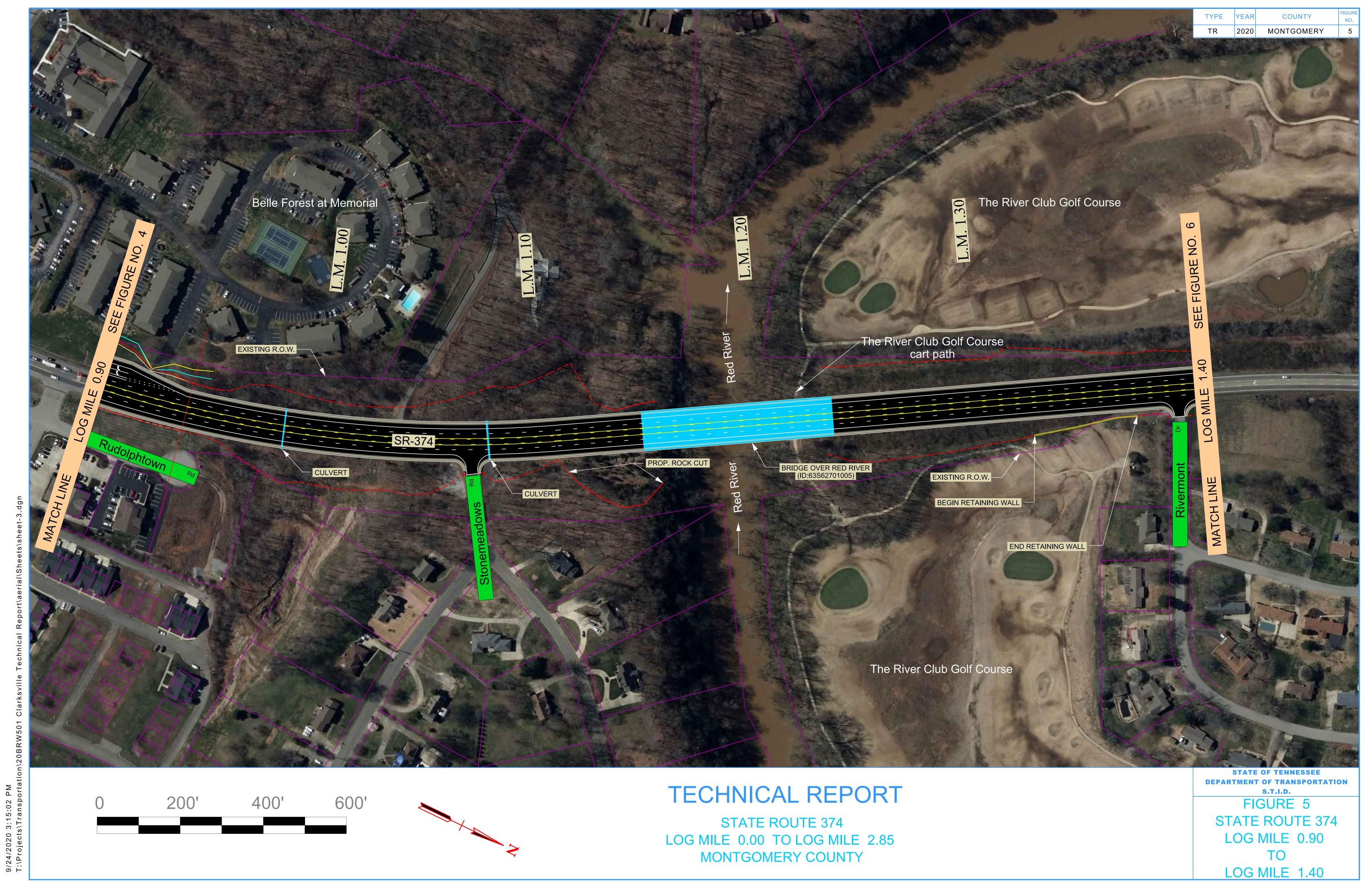
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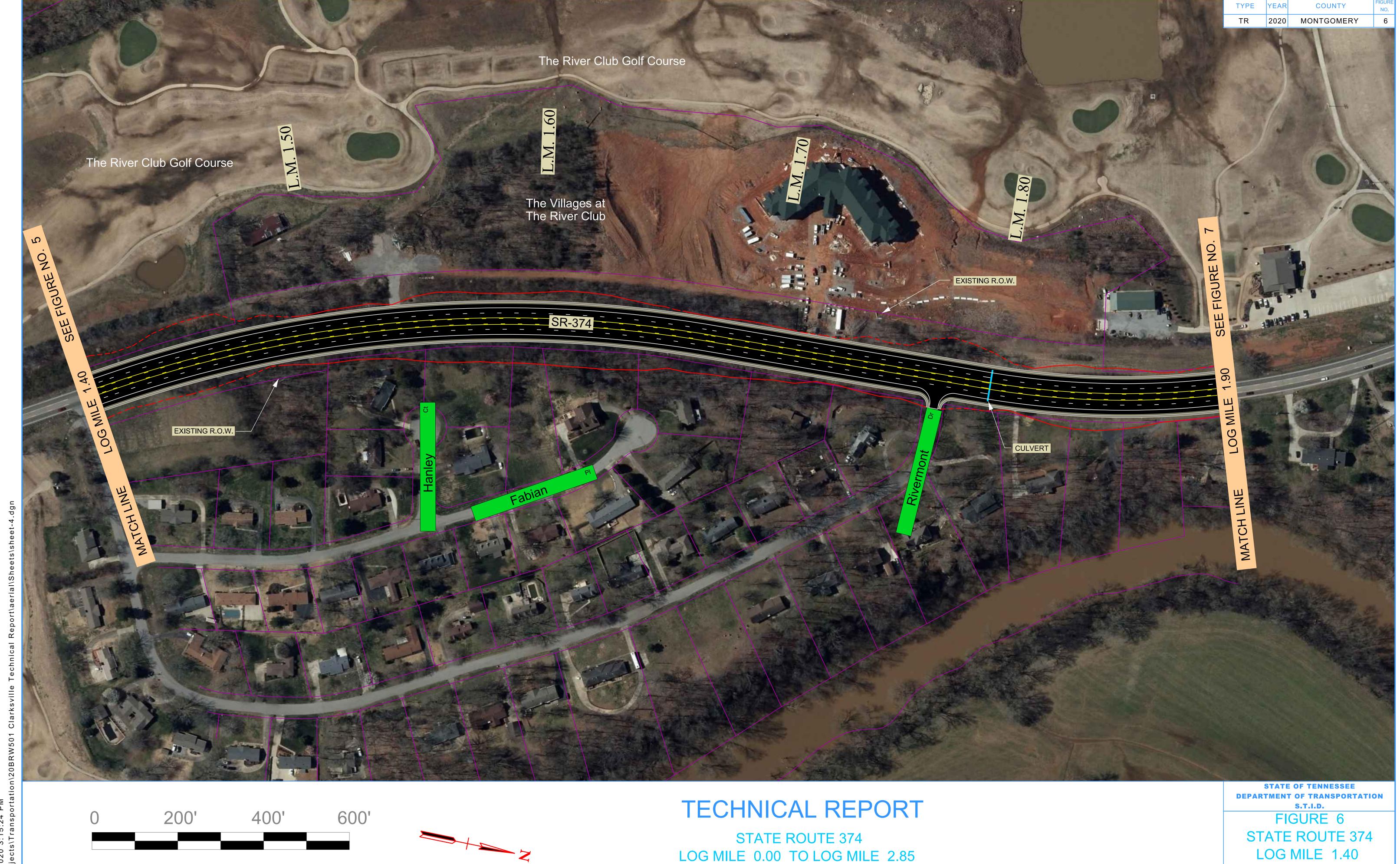
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MONTGOMERY COUNTY

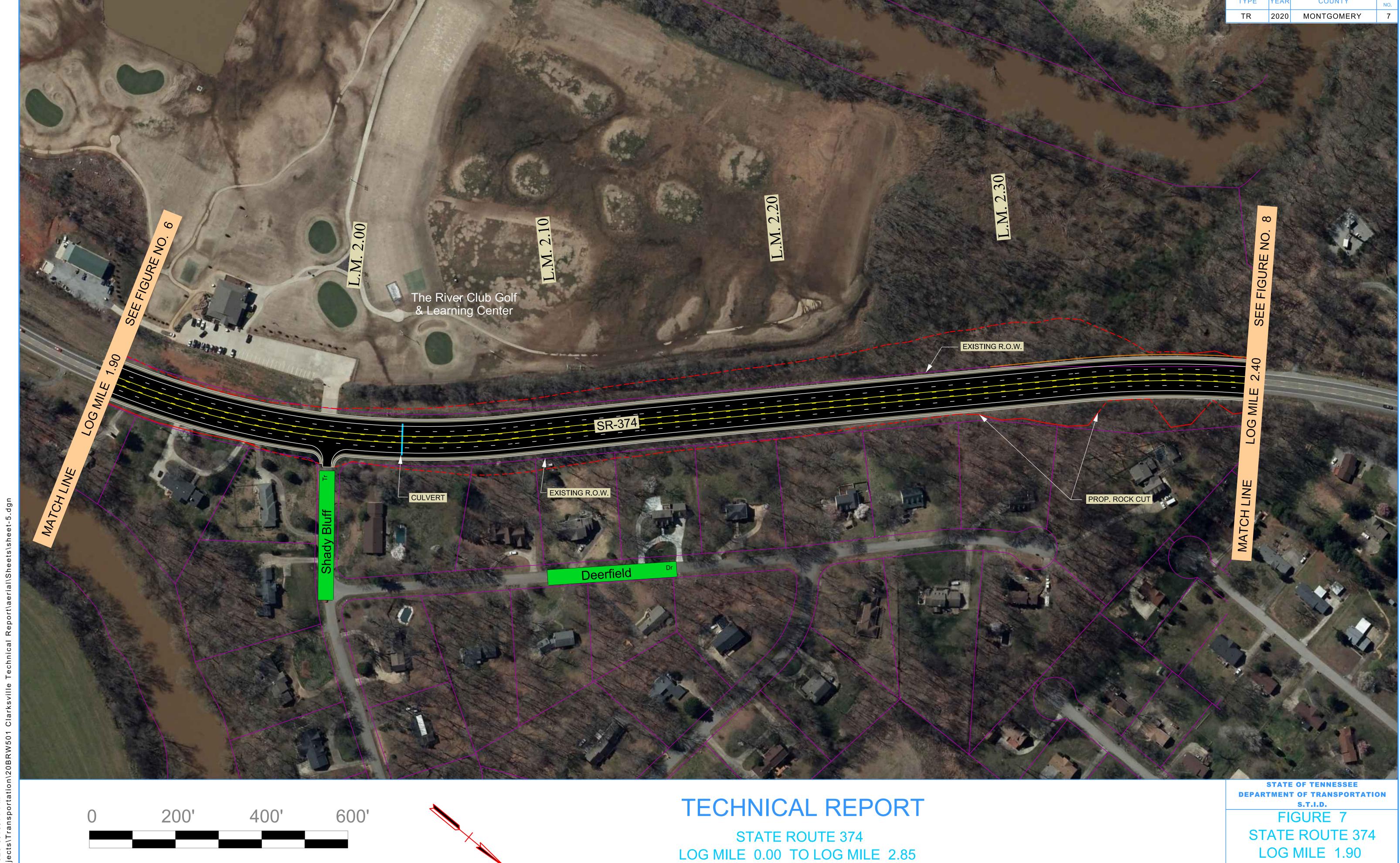
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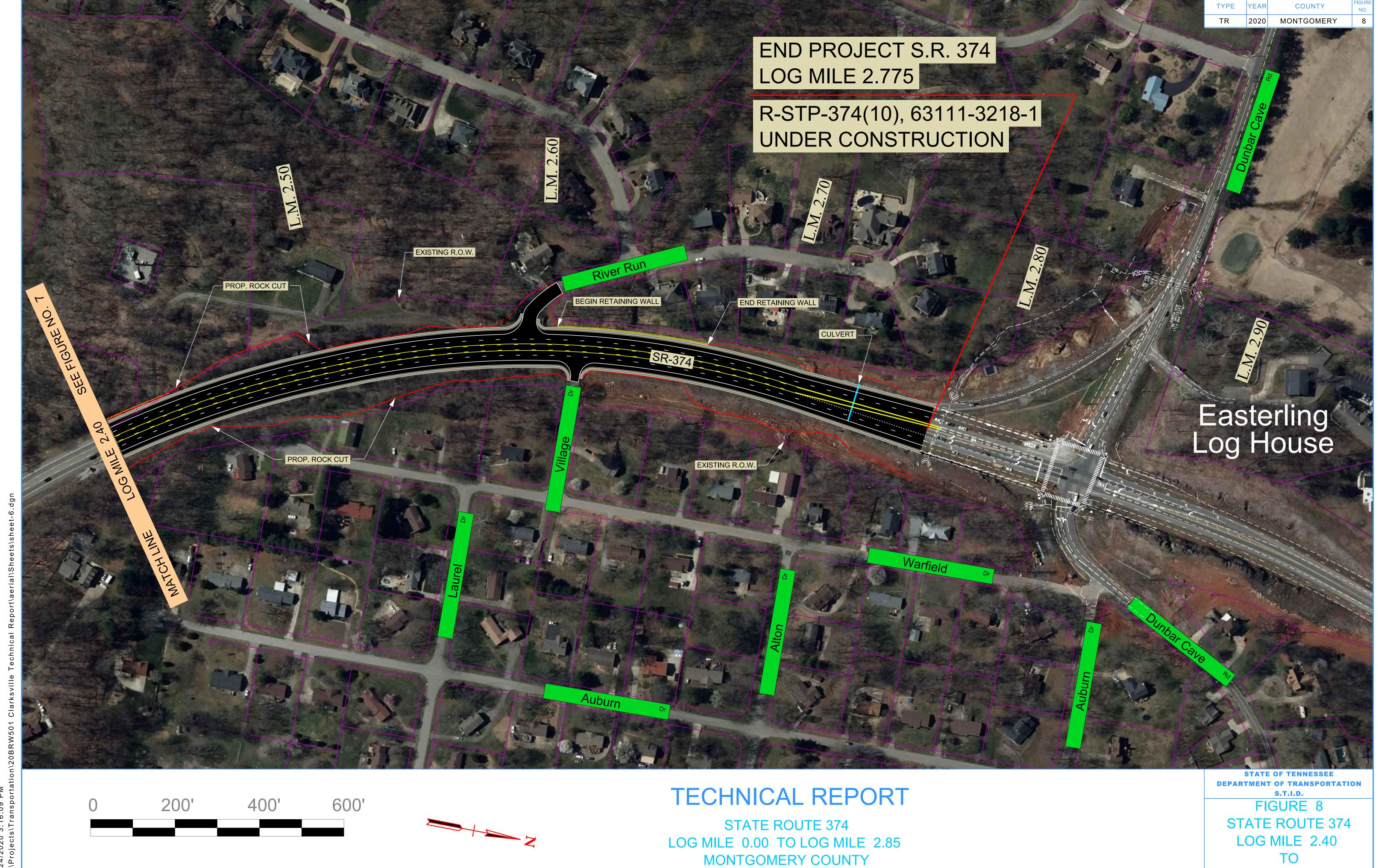
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14.0 Appendix

14.1 Clarksville Gas and Water Utility Information

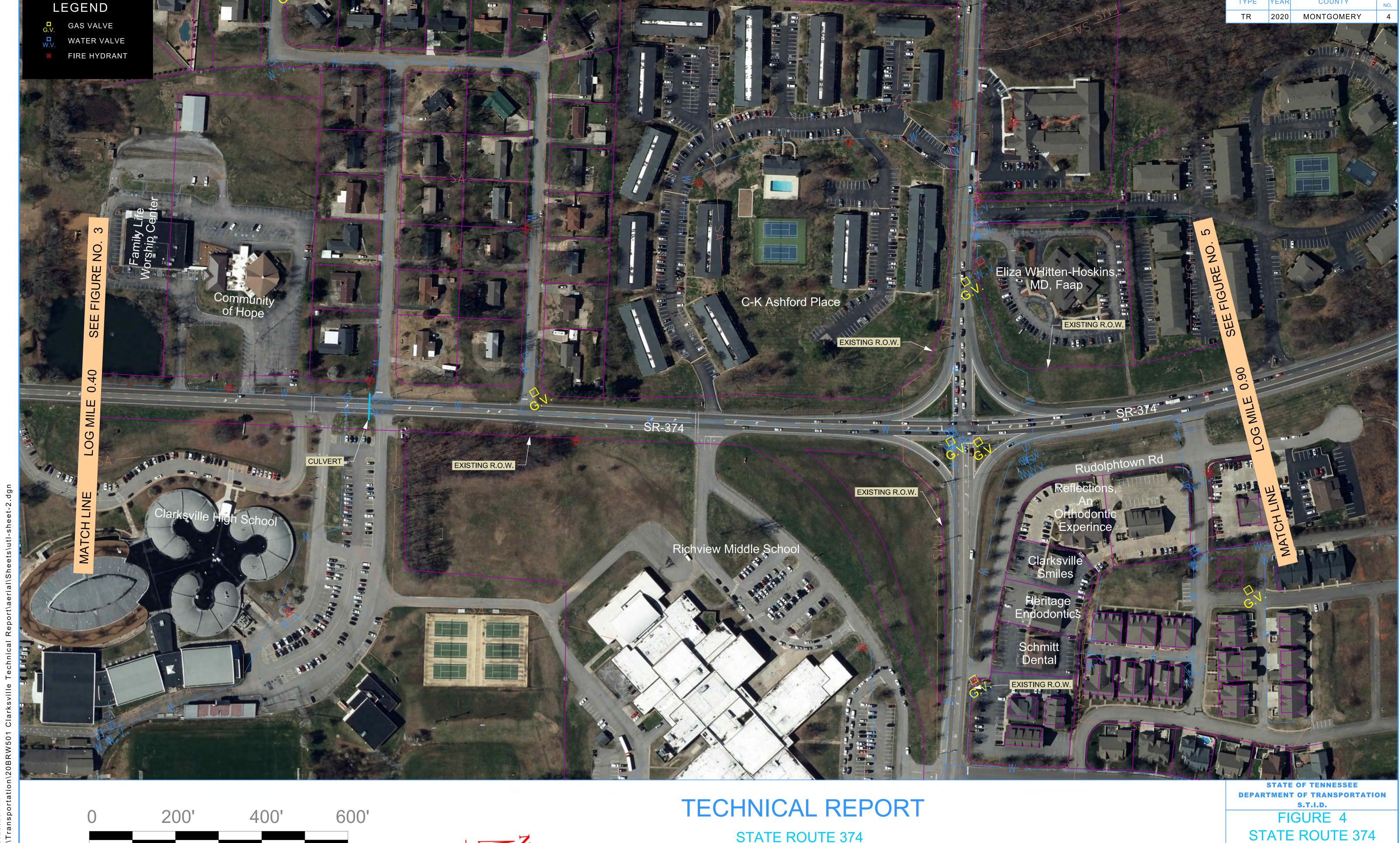
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MONTGOMERY COUNTY

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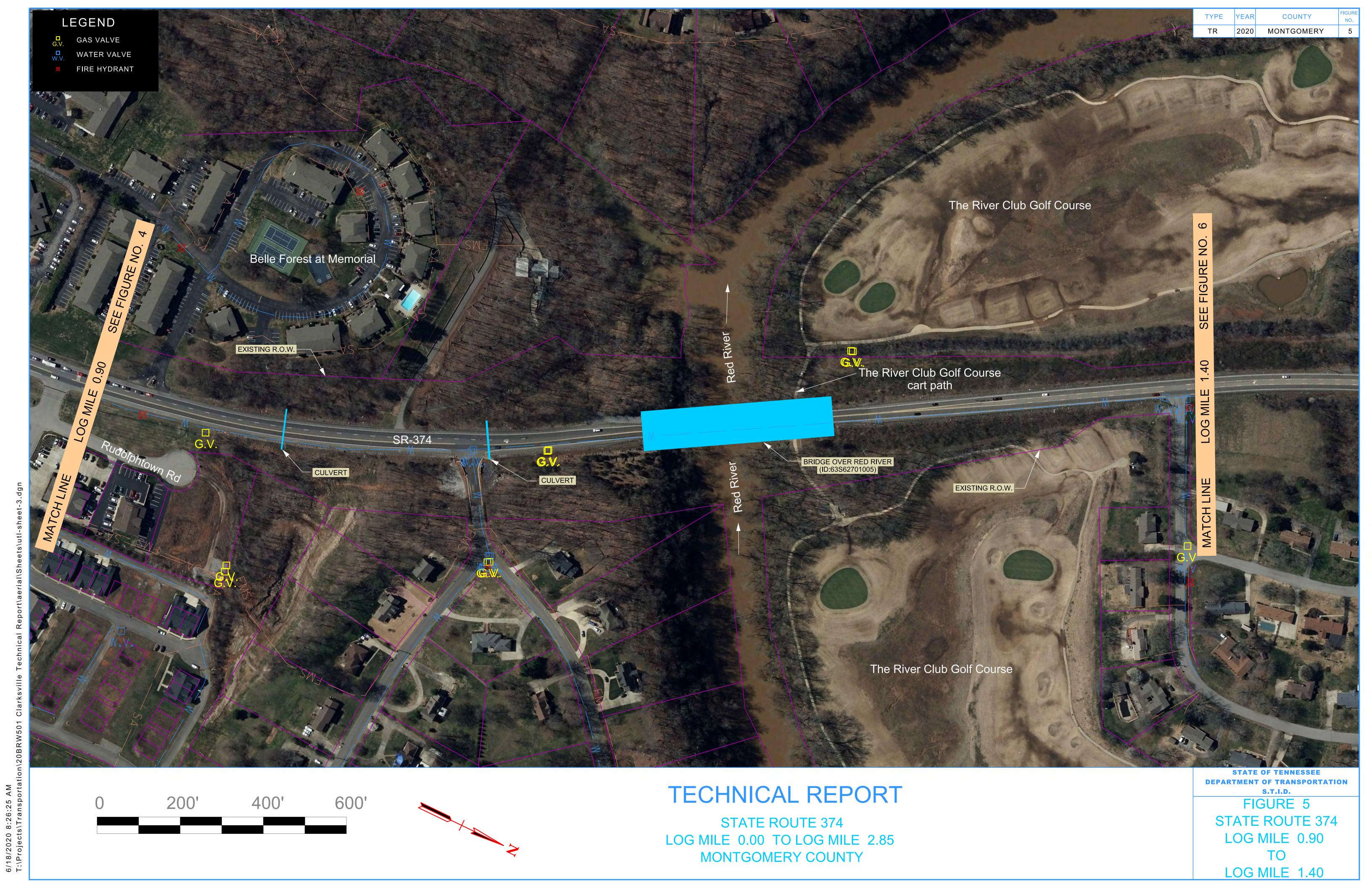
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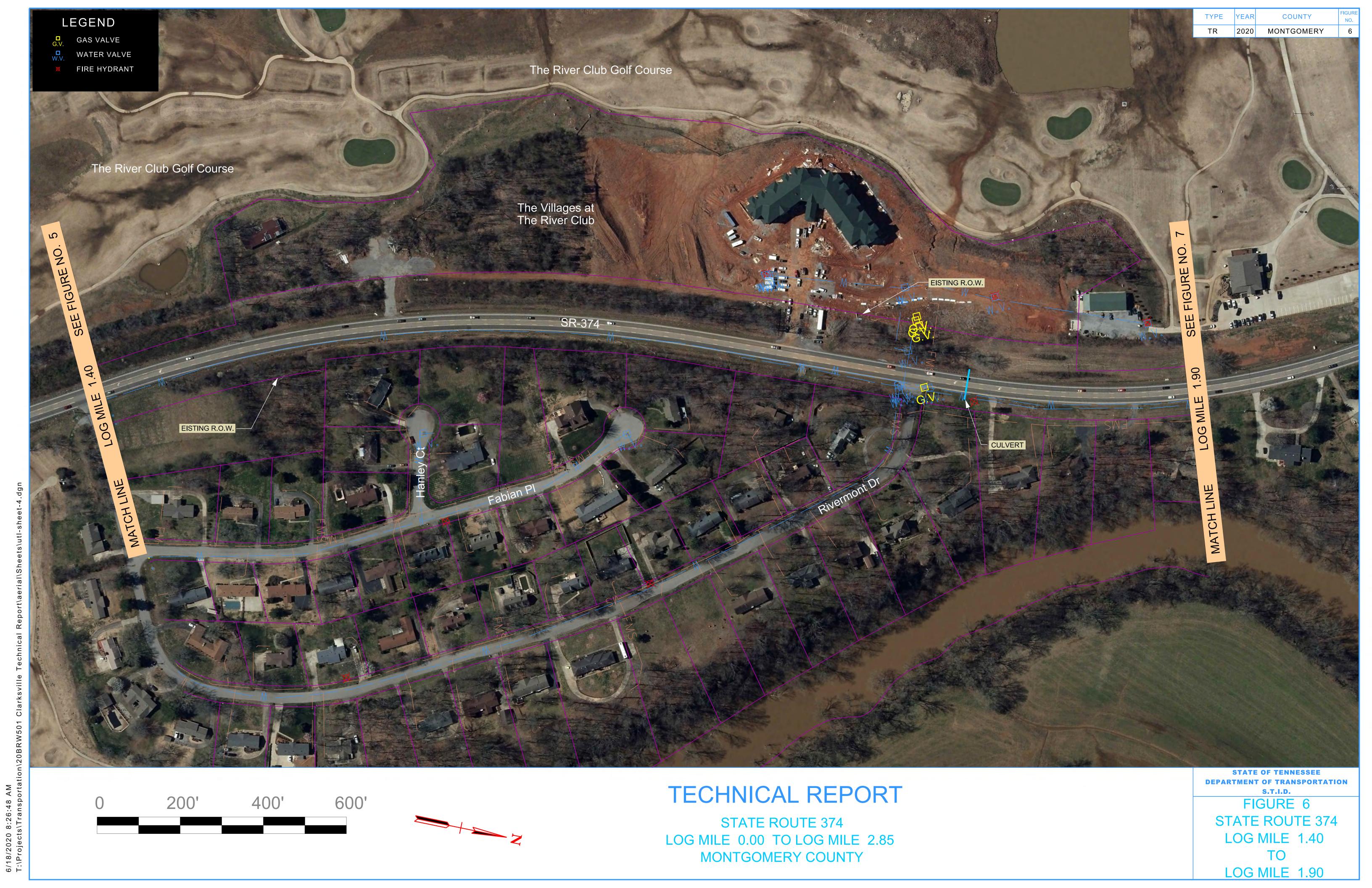
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MONTGOMERY COUNTY

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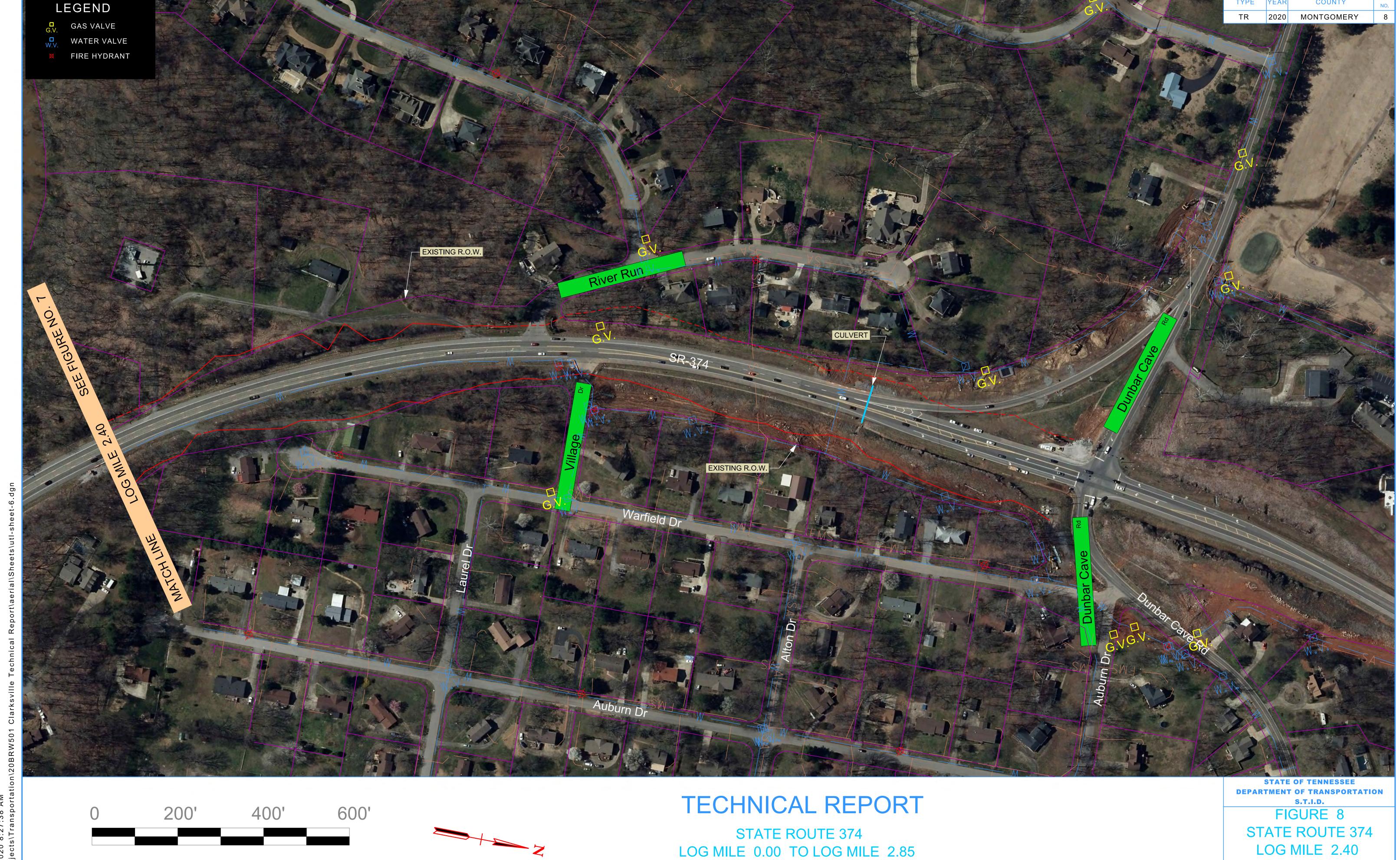




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TO

14.2 CDE LIGHTBAND UTILITY INFORMATION

Warfield Blvd Symbology

Primary Overhead Conductor

—— DC534

—— E954

—— E964

----- RP724

Primary Underground Conductor

- - - DC534

-- E954

--- E964

Secondary Overhead

Overhead Secondary

Overhead Service

Secondary Underground

--- Underground Secondary

--- Undergound Service

Support Structure

- Distribution Pole
- ▼ Transmission Pole

Lightning Arrestor

─ Lightning Arrestor

Fuse Bank

• Fuse Bank

Light

- Flood Light
- Security Light
- Street Light

Protective Device

- Recloser
- Sectionalizer

ServiceLocation

Service Point

Transformer Bank

Pad Mount

Pole Mount 1 Phase

Pole Mount 2 Phase



Surface Structure

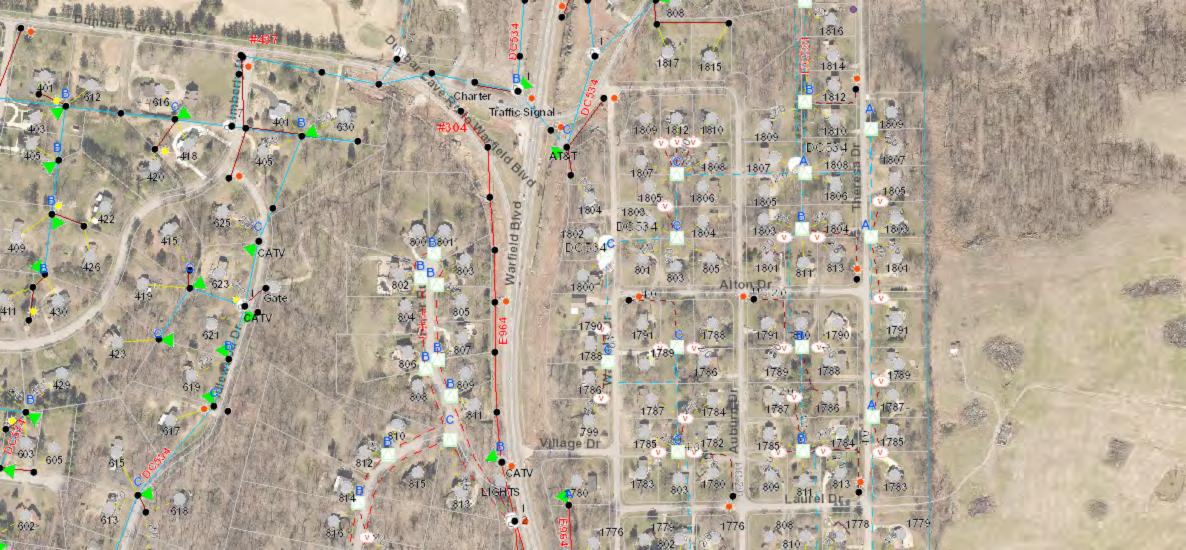
Pad

Underground Structure

Vault

Switch Bank

Air Brake







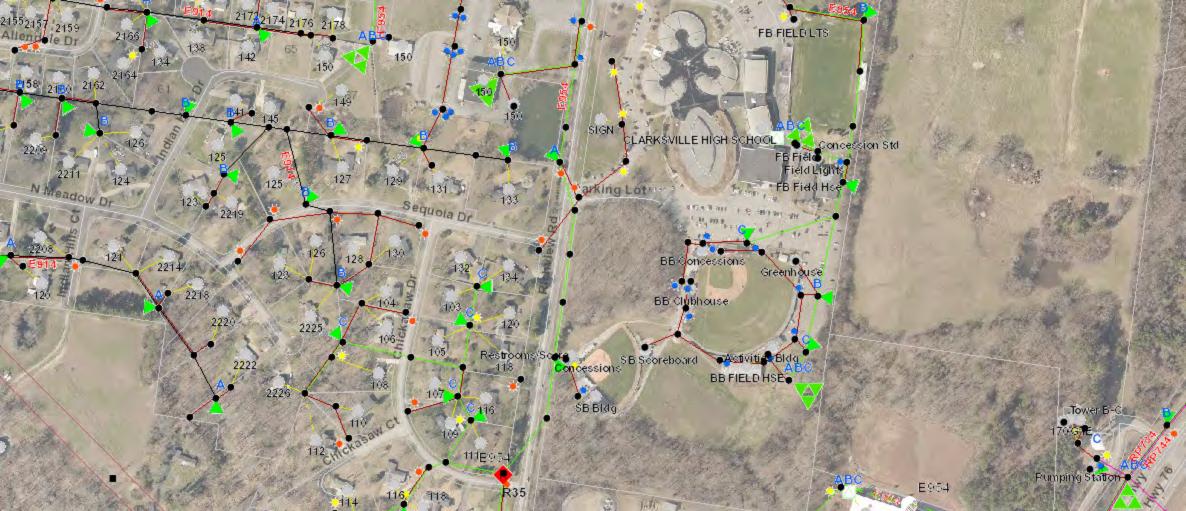














14.3 FIELD REVIEW PACKAGE AND CRASH FUNCTIONALS

Technical Report Field Review Packet

Montgomery County S.R. 374

From Madison Street (US-41A, State Route 112 L.M. 0.00) to Dunbar Cave Road (L.M. 2.85)

Existing Conditions:

- Classification
 - o Urban Minor Arterial
 - Bicycle Route (according to ETRIMS)
- Typical Section
 - Three lane (two travel lanes and continuous left turn lane) L.M. 0.00-0.78
 - o Three lane (two southbound lanes and one northbound lane) L.M. 0.78-1.10
 - o Two lane L.M. 1.10-1.32
 - o Three lane (two travel lanes and continuous left turn lane) L.M. 1.32-2.85
- Located within Clarksville City Limits
- Lane Widths =11-12 ft
- Shoulder Widths (outside) = variable 2 to 8 ft
- Speed Limit =
 - o 40 mph (LM 0.00 to LM 1.27)
 - o 50 mph (LM 1.27 to LM 2.85)
 - o 20 mph school speed limit (LM 0.23-0.90)
- Traffic AADT (2018):
 - o 12,840 (LM 0.00-0.78)
 - o 20,700 (LM 0.78-2.85)
 - o 14,820 (LM 2.85-3.75)
- Existing ROW = variable

Proposed improvements:

• Widen roadway to 5x12' lanes, 12' shoulders (bike lane), curb and gutter, sidewalk

Structures:

- Bridge [63S62701005]: Red River log mile 1.16
 There is an existing two-lane bridge [63S62701005] that crosses the Red River located at log mile 1.16 with a 2018 sufficiency rating of 81.3.
- There are eight (8) culverts or pipes less than four (4) feet in diameter along the existing route that will be impacted by this project.

Notes for field review discussion:

- Design Speed and Posted speed limit for curb and gutter sections
- Proposed lane shift at bridge
- Typical section width at bridge and in areas with tight right of way
- Continuous left turn lane throughout
- School entrances and parking

STATE ROUTE 374 CRASH STATISTICS				
	1/1/2017-12/31/2019			
	Number of	Percentage		
Condition	Crashes	of Total		
Lighting Conditions				
Daylight	161	72%		
Dark-Not Lighted	37	17%		
Dark-Lighted	17	7%		
Dusk/ Dawn	9	4%		
Crash Severity				
Property Damage	188	84%		
Non-incap Injury	34	15%		
Incap Injury	2	1%		
Fatality	0	0%		
Manner of Collision				
Rear-End	132	59%		
Angle	41	18%		
No Collision w/ Vehicle		16%		
Head-on	6	3%		
Sideswipe, Same Direction	5	2%		
Other	3	1%		
Sideswipe, Opposite Direction	1	1%		
Weather Conditions				
Clear	171	76%		
Rain	27	12%		
Cloudy	23	10%		
Sleet/ Hail	1	0.70%		
Fog	1	0.70%		
Blowing Sand/Soil/Dirt	1	0.70%		

Crash Rates			
Segment 1: LM 0.00-0.78 (A/C ratio 1.81)			
Туре	Crash Rate	SW Average	
Total	7.66	2.978	
Severe (Fatal+Incap)	0.00	0.08	
Segment 2: LM 0.78-1.32 (A/C ratio 0.82)			
Туре	Crash Rate	SW Average	
Total	3.023	2.574	
Severe (Fatal+Incap)	0.00	0.01	
Segment 3: LM 1.32-2.85 (A/C ratio 0.82)			
Туре	Crash Rate	SW Average	
Total	3.028	2.978	
Severe (Fatal+Incap)	0.058	0.08	
SR 112 intersection (A/C ratio 2.86)			
Туре	Crash Rate	SW Average	
Total	2.995	0.682	
Severe (Fatal+Incap)	0.00	0.014	
Memorial Drive intersection (A/C ratio 2.46)			
Туре	Crash Rate	SW Average	
Total	2.589	0.682	
Severe (Fatal+Incap)	0.00	0.014	
Dunbar Cave Road intersection (A/C ratio 2.41)			
Туре	Crash Rate	SW Average	
Total	2.549	0.682	
Severe (Fatal+Incap)	0.07	0.014	

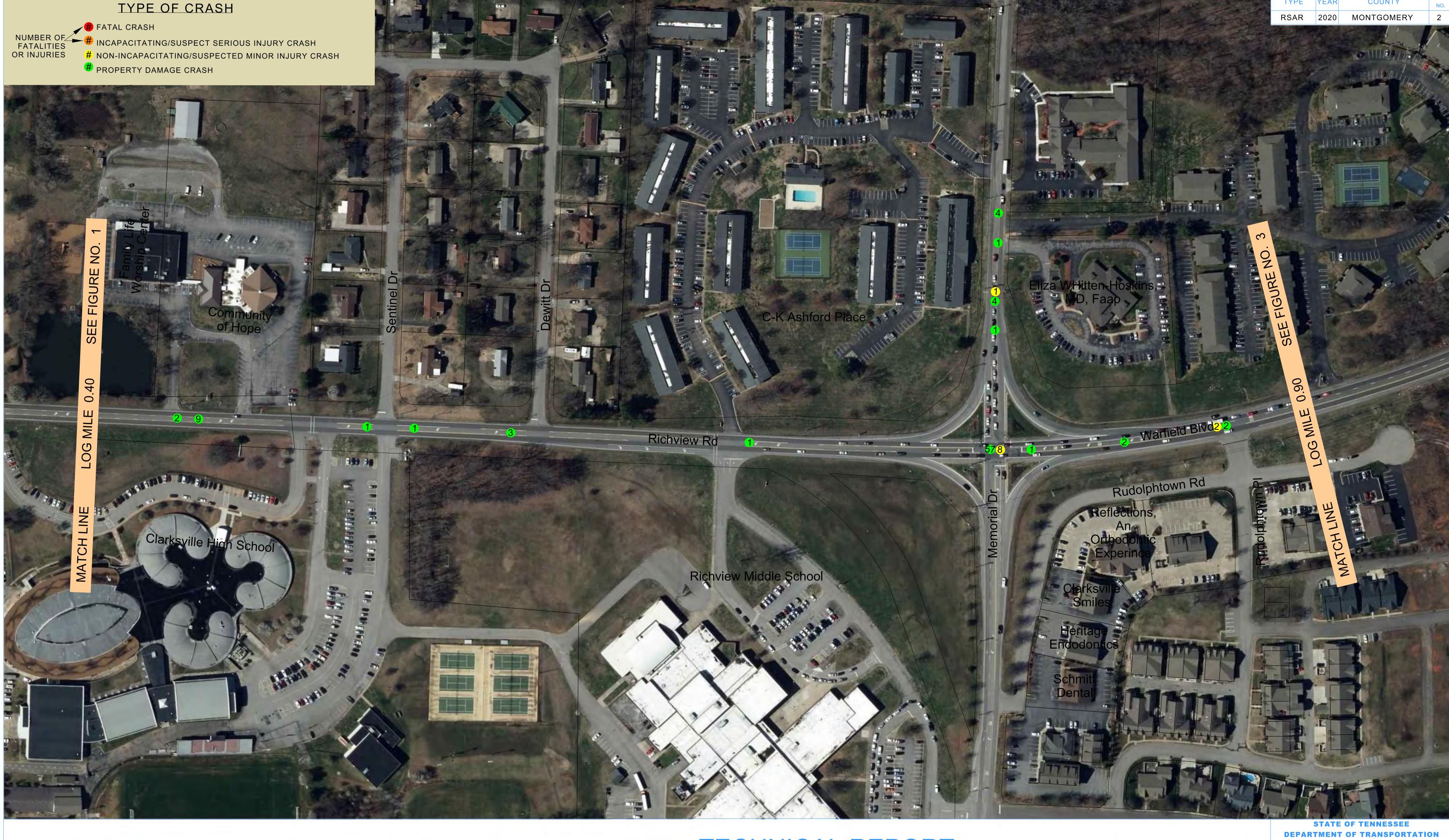
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200' 400' 600'

TECHNICAL REPORT

STATE ROUTE 374
LOG MILE 0.00 TO LOG MILE 2.85
MONTGOMERY COUNTY

FIGURE 1
STATE ROUTE 374
LOG MILE 0.00
TO
LOG MILE 0.40



.

200'

7

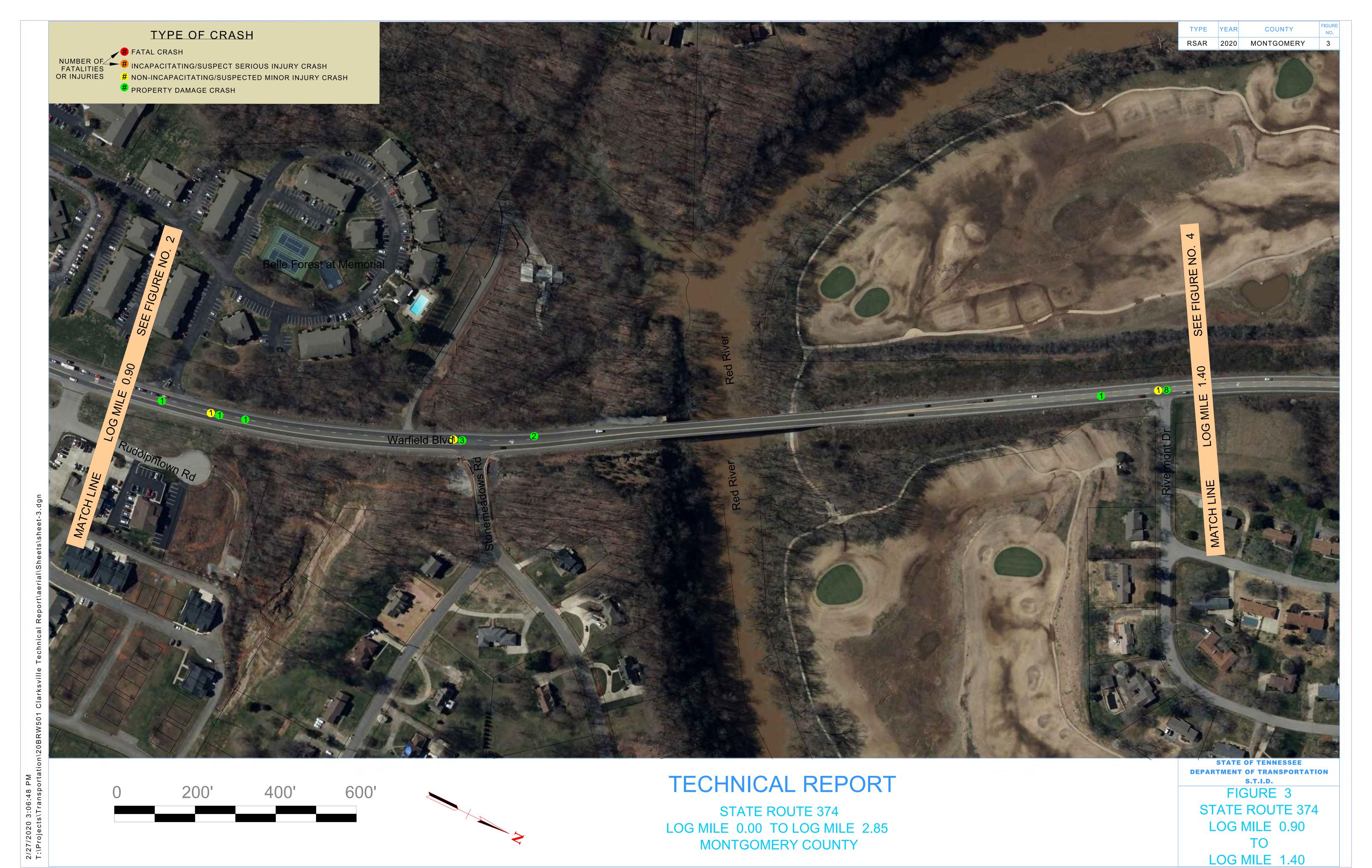
600'

400'

TECHNICAL REPORT

STATE ROUTE 374
LOG MILE 0.00 TO LOG MILE 2.85
MONTGOMERY COUNTY

FIGURE 2
STATE ROUTE 374
LOG MILE 0.40
TO





LOG MILE 0.00 TO LOG MILE 2.85

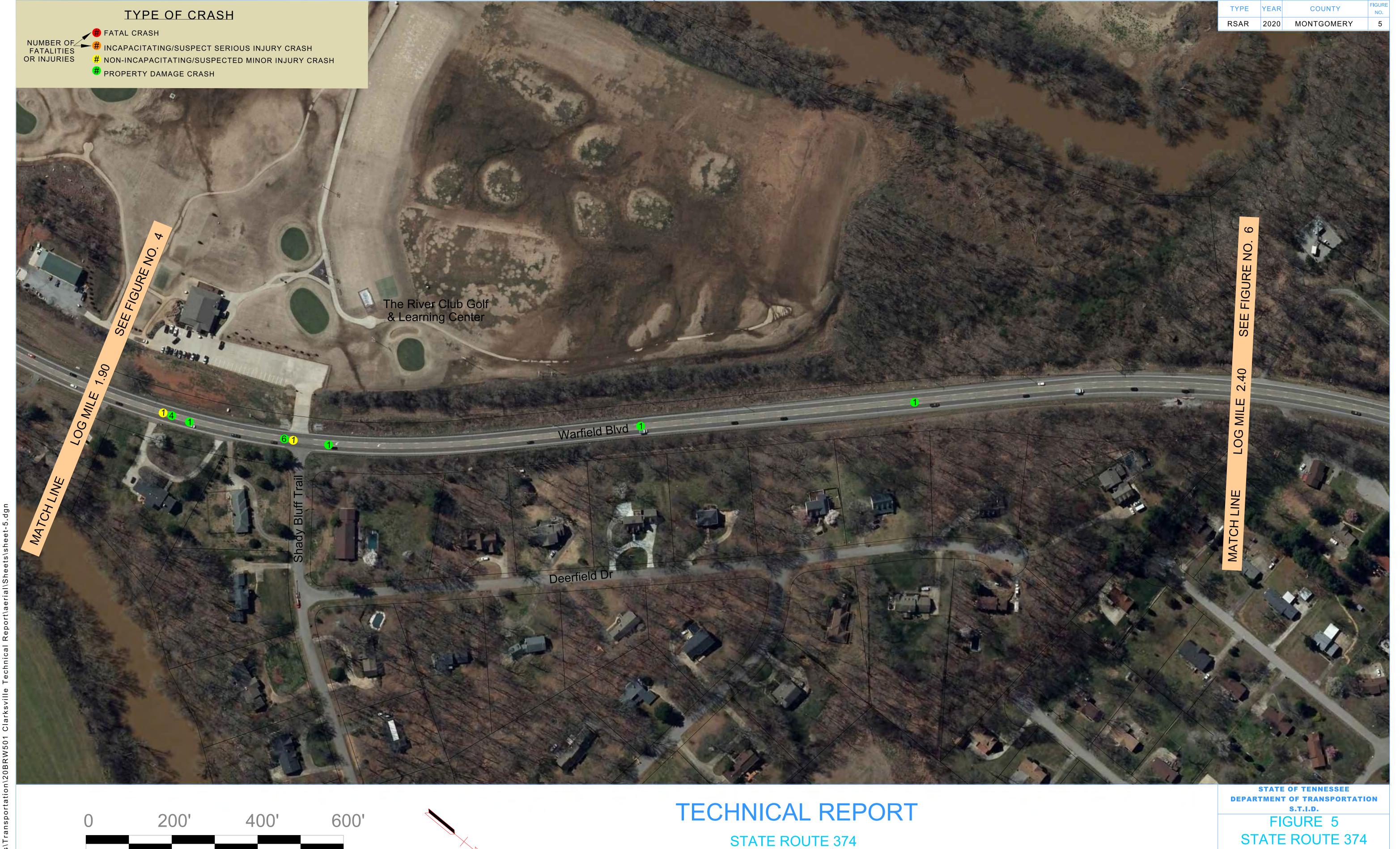
MONTGOMERY COUNTY

LOG MILE 1.40

TO

LOG MILE 1.90

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LOG MILE 0.00 TO LOG MILE 2.85

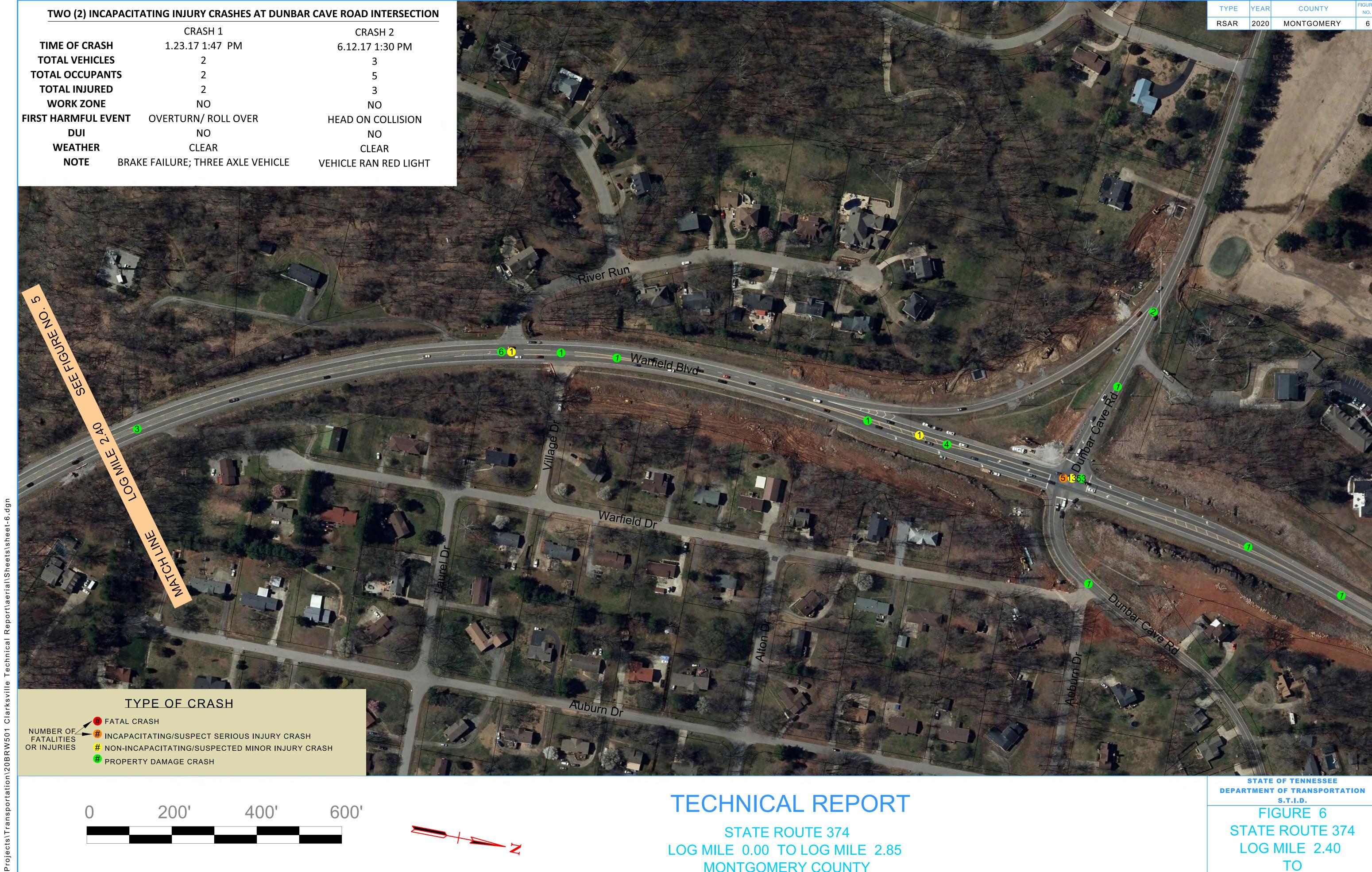
MONTGOMERY COUNTY

LOG MILE 1.90

TO

LOG MILE 2.40

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MONTGOMERY COUNTY

LOG MILE 2.85

14.4 CRASH RATE SHEETS

COUNTY =	Montgomery				Date:	6/23/2020
	State Route 37	' 4			Dato.	0/20/2020
		→ IA intersection				
Location =	5K-112 00 41	i A intersection				
Highway Type = 1	urhan multi la	ne with turn lar				
FUNCTIONAL CLASS=			ic			
	2017-2019	rteriai				
ADT YEARS USED=						
COMMENTS =	1 KIWS 2018					
COMMENTS =						
ANALYZED BY =	BG					
SECTION = MORE T		E / SDOT_ ESS	THAN OR FOLIAL	TO 0.10 MILE		
BLM	ELM	Length	Average AADT	VMT		
DLIVI	LLIVI	0.000	Average AAD I	0		
0.000		0.000		0		
	0.000					
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
		0.000	0	0		
INTERRETION					To Contact A ADT	
INTERSECTION	•			Leg	Traffic AADT	
Log Mile =	0			North =	12,840	
	~			East =	20,830	
PRODUCED PUR				South =	1,000	
PUBLIC RECORD				West =	20,830	
This document is cover	-			Entering AADT =	27,750	
and its production pur	-			Trims 2018		
document records re	-		Urban Minor Art	erial		
waive the provision	ons of §409	:	2017-2019			
					*Severe	Other
		Total	Fatal	Incap. Injury	Crashes	Injury
No. of Crashes	=	91	0	0	0	16
No. of Years	=	3				
SW avg. rate	=	0.682	0.001	0.013	0.014	0.160
14-16 S/W Rates						
_						
Exposure (E)	=	30.3863				
Crash Rate (A)	=	2.995	0.000	0.000	0.000	0.527
Critical Rate (C)	=	1.047				
Severity Index (SI)	=	0.1758				
Actual Rate/SW Avera	age =	4.39	0.00	0.00	0.00	3.29
Ratio of A/C	=	2.86				
* Severe Crashes a	re the sum of	fatal and inca	pacitating injury	y crashes		
						Revised 11/3/2009
T.D.O.T. STRTAEGIC	TRANSPORT	ATION INVEST	MENTS DIVISION	(SAFETY DATA	SECTION)	Bg

COUNTY =	Montgomery				Date:	6/23/2020
Route =	State Route 37	4				
Location =	Memorial Driv	ve				
Highway Type = 1	urban multi-la	ne with turn lar	ne			
FUNCTIONAL CLASS=	Urban Minor A	rterial				
	2017-2019					
ADT YEARS USED=						
COMMENTS =	770000					
COMMENTO =						
ANALYZED BY =	BG					
SECTION = MORE T		= / SDOT_ ESS	THAN OF FOLIA	TO 0 10 MILE		
BLM	ELM	Length	Average AADT	VMT		
DLIVI	LLIVI		Average AADT			
0.000		0.000		0		
0.000		0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
		0.000	0	0		
INTERSECTION				Leg	Traffic AADT	
Log Mile =	0.78			North =	20,700	
				East =	6,850	
PRODUCED PUR	SUANT TO			South =	12,840	
PUBLIC RECORD	S REQUEST			West =	13,930	
This document is cover	ed by 23 USC §4	409	•	Entering AADT =	27,160	
and its production pur				Trims 2018	,	
document records re	-		Urban Minor Art			
waive the provision	=		2017-2019			
F 2.01		·			*Severe	Other
		Total	Fatal	Incap. Injury	Crashes	Injury
No. of Crashes			0			
	=	77	U	0	0	9
No. of Years	=	3	0.004	0.040	0.044	0.400
SW avg. rate	=	0.682	0.001	0.013	0.014	0.160
14-16 S/W Rates						
F.,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		20.7400				
Exposure (E)	=	29.7402	0.000	0.000	0.000	0.000
Crash Rate (A)	=	2.589	0.000	0.000	0.000	0.303
Critical Rate (C)	=	1.051				
Severity Index (SI)	=	0.1169				
Actual Rate/SW Avera	age =	3.80	0.00	0.00	0.00	1.89
Ratio of A/C	=	2.46				
* Severe Crashes a	re the sum of	fatal and inca	pacitating injury	/ crashes		
						Revised 11/3/2009
T.D.O.T. STRTAEGIC	TRANSPORT	ATION INVEST	MENTS DIVISION	(SAFETY DATA	SECTION)	Bg

COUNTY =	Montgomery				Date:	6/23/2020
Route =	State Route 37	'4				
Location =	Dunbar Cave	Road				
Highway Type =	urban multi-la	ne with turn lar	ne			
FUNCTIONAL CLASS=	Urban Minor A	rterial				
DATA YEARS =	2017-2019					
ADT YEARS USED=	TRIMS 2018					
COMMENTS =						
ANALYZED BY =	BG					
SECTION = MORE 1	THAN 0.10 MILI	E / SPOT= LESS	THAN OR EQUA	TO 0.10 MILE		
BLM	ELM	Length	Average AADT	VMT		
		0.000	<u> </u>	0		
0.000		0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000	0	0		
		0.000	· ·	v		
INTERSECTION				Leg	Traffic AADT	
Log Mile =	2.85			North =	14,820	
Log Wille =	2.03			East =	5,100	
PRODUCED PUR	CITA NT TO			<u> </u>	20,700	
PUBLIC RECORD				South = West =	11,690	
This document is cover		400	:		-	
				Entering AADT = Trims 2018	20,133	
and its production pur	-		Urban Minor Art			
document records re waive the provision	=		2017-2019	enai		
waive the provision	JIIS 01 8409	•	2017-2019			
		T	Fatal		*Severe	Other
N		Total		Incap. Injury	Crashes	Injury
No. of Crashes	=	73	0	2	2	13
No. of Years	=	3	0.004	0.010	0.044	0.400
SW avg. rate	=	0.682	0.001	0.013	0.014	0.160
14-16 S/W Rates						
Exposure (E)	_	28.6397				
Crash Rate (A)	=	20.0397	0.000	0.070	0.070	0.454
Critical Rate (C)	=	1.059	0.000	0.070	0.070	0.454
` '	=					
Severity Index (SI)	=	0.2329				
Actual Pota/SIM Assar	2000	2 74	0.00	5.37	4.99	2.84
Actual Rate/SW Aver		3.74	0.00	5.37	4.99	2.84
Ratio of A/C	=	2.41				
* 0	ma 41a					
* Severe Crashes a	re tne sum of	Tatal and Inca	ipacitating injury	crashes		
						Davies I 44/0/0000
	. =		15150 D	(0)===:	050510:: `	Revised 11/3/2009
T.D.O.T. STRTAEGIC	FRANSPORT	ATION INVEST	MENTS DIVISION	(SAFETY DATA	SECTION)	Bg

COUNTY =	Montgomery				Date:	6/23/2020				
Route = S	State Route 37	74								
Location =	og mile 0.00-	-0.78								
Highway Type = t	wo lane with t	turn								
FUNCTIONAL CLASS=	Jrban Minor A	rterial								
DATA YEARS = 2	2017-2019									
ADT YEARS USED=	TRIMS 2018									
COMMENTS =										
ANALYZED BY =	BG									
SECTION = MORE T	HAN 0.10 MIL	E / SPOT= LESS	THAN OR EQUAL	TO 0.10 MILE						
BLM	ELM	Length	Average AADT	VMT						
0.000	0.780	0.780	12,840	10,015						
0.000	0.700	0.000	12,040	0						
0.000	0.000	0.000		0						
0.000	0.000	0.000		0						
0.000	0.000	0.000		0						
0.000	0.000									
0.000	0.000	0.000 0.000		0						
0.000	0.000		40.040							
		0.780	12,840	10,015						
INTEROCOTION					To Contact A ADT					
INTERSECTION				Leg	Traffic AADT					
Log Mile =				North =						
				East =						
PRODUCED PURS				South =						
PUBLIC RECORD				West =						
This document is covered	-			Entering AADT =	0					
and its production pur	suant to a publ			Trims 2018						
document records re	=		Urban Minor Art	erial						
waive the provision	ns of §409		2017-2019							
					*Severe	Other				
		Total	Fatal	Incap. Injury	Crashes	Injury				
No. of Crashes	=	84	0	0	0	10				
No. of Years	=	3								
SW avg. rate	=	2.978	0.009	0.071	0.080	0.583				
14-16 S/W Rates										
Exposure (E)	=	10.9666								
Crash Rate (A)	=	7.660	0.000	0.000	0.000	0.912				
Critical Rate (C)	=	4.236								
Severity Index (SI)	=	0.1190								
Actual Rate/SW Avera	age =	2.57	0.00	0.00	0.00	1.56				
Ratio of A/C	=	1.81								
* Severe Crashes ar	* Severe Crashes are the sum of fatal and incapacitating injury crashes									
						Revised 11/3/2009				
T.D.O.T. STRTAEGIC	TRANSPORT	ATION INVEST	MENTS DIVISION	(SAFETY DATA		Bg				
			=	\ = DAIA		29				

COUNTY =	Montgomery				Date:	6/23/2020			
Route =	State Route 37	74							
Location =	log mile 0.78-	-1.32							
Highway Type = t	two or three la	ine							
FUNCTIONAL CLASS=	Urban Minor A	rterial							
	2017-2019								
ADT YEARS USED=									
COMMENTS =									
ANALYZED BY =	BG								
SECTION = MORE T		E / SDOT_ ESS	THAN OF FOLIAL	TO 0 10 MILE					
BLM	ELM	Length	Average AADT	VMT					
0.780	1.320	0.540	20,700	11,178					
0.000		0.000		0					
0.000	0.000	0.000		0					
0.000	0.000	0.000		0					
0.000	0.000	0.000		0					
0.000	0.000	0.000		0					
0.000	0.000	0.000		0					
		0.540	20,700	11,178					
INTERSECTION				Leg	Traffic AADT				
Log Mile =				North =					
				East =					
PRODUCED PUR	SUANT TO			South =					
PUBLIC RECORD	S REQUEST			West =					
This document is covere	ed by 23 USC §	409	•	Entering AADT =	0				
and its production pur	-			Trims 2018					
document records re	-		Urban Minor Art						
waive the provisio	-		2017-2019						
Wall to the provision	225 02 3 .05		2017 2010		*Severe	Other			
		Total	Fatal	Incap. Injury	Crashes	Injury			
No. of Crookes						• •			
No. of Crashes	=	37	0	0	0	7			
No. of Years	=	3	0.045	2.005	0.400	0.550			
SW avg. rate	=	2.574	0.015	0.085	0.100	0.559			
14-16 S/W Rates									
Evnosuro (E)		12.2399							
Exposure (E)	=		0.000	0.000	0.000	0 F70			
Crash Rate (A)	=	3.023	0.000	0.000	0.000	0.572			
Critical Rate (C)	=	3.682							
Severity Index (SI)	=	0.1892							
Actual Rate/SW Avera	age =	1.17	0.00	0.00	0.00	1.02			
Ratio of A/C	=	0.82							
* Severe Crashes a	re the sum of	f fatal and inca	pacitating injury	/ crashes					
						Revised 11/3/2009			
T.D.O.T. STRTAEGIC	TRANSPORT	ATION INVEST	MENTS DIVISION	(SAFETY DATA	SECTION)	Bg			

COUNTY =	Montgomery				Date:	6/23/2020
Route =	State Route 37	4				
Location =	log mile 1.32-	2.85				
Highway Type =	two lane with t	urn				
FUNCTIONAL CLASS=						
	2017-2019	rtoriai				
ADT YEARS USED=						
COMMENTS =	11KIIWIS 2010					
COMMENTS =						
ANALYZED BY =	BG					
		E / ODOT FOO	THAN OR FOLIA	TO 040 MILE		
SECTION = MORE T						
BLM	ELM	Length	Average AADT	VMT		
1.320	2.850	1.530	20,700	31,671		
0.000		0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
0.000	0.000	0.000		0		
		1.530	20,700	31,671		
INTERSECTION				Leg	Traffic AADT	
Log Mile =				North =		
				East =		
PRODUCED PUR	SUANT TO			South =		
PUBLIC RECORD	OS REQUEST			West =		
This document is cover	ed by 23 USC §4	409	=	Entering AADT =	0	
and its production pur	rsuant to a publi	ic		Trims 2018		
document records re			Urban Minor Art	erial		
waive the provision	-		2017-2019			
•	, and the second				*Severe	Other
		Total	Fatal	Incap. Injury	Crashes	Injury
No. of Crashes	=	105	0	2	2	17
No. of Years		3	0		2	- 17
	=	_	0.009	0.071	0.080	0.583
SW avg. rate	=	2.978	0.009	0.071	0.060	0.563
14-16 S/W Rates						
Exposure (E)	=	34.6797				
Crash Rate (A)		3.028	0.000	0.058	0.058	0.490
Critical Rate (C)	=	3.674	0.000	0.036	0.036	0.490
	=					
Severity Index (SI)	=	0.2000				
A		4.00	0.00	0.04	0.70	0.04
Actual Rate/SW Aver	age =	1.02	0.00	0.81	0.72	0.84
Ratio of A/C	=	0.82				
* Severe Crashes a	re the sum of	fatal and inca	pacitating injury	/ crashes		
						Revised 11/3/2009
T.D.O.T. STRTAEGIC	TRANSPORT	ATION INVEST	MENTS DIVISION	(SAFETY DATA	SECTION)	Bg

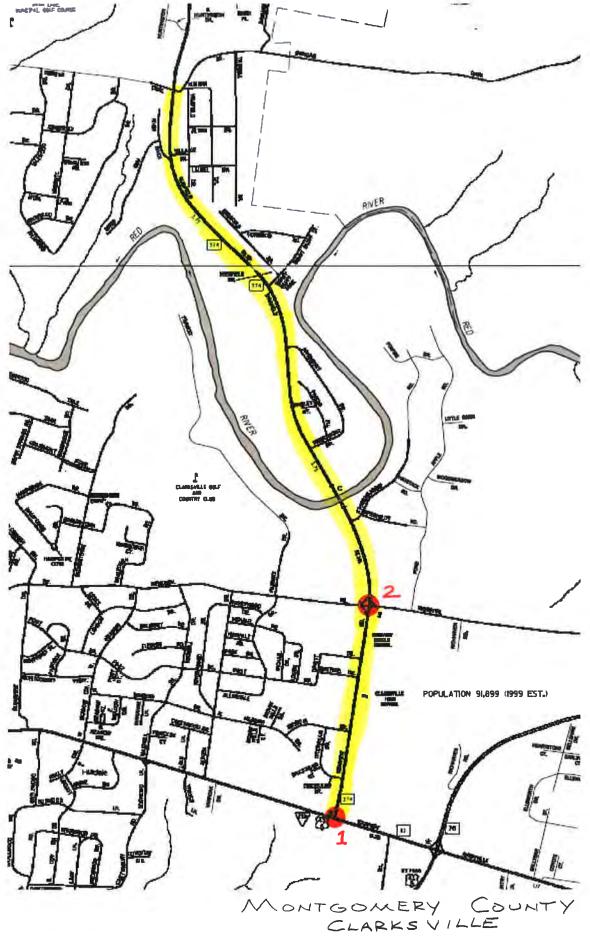
14.5 TRAFFIC DATA

TENNESSEE DEPARTMENT OF TRANSPORTATION STRATEGIC TRANSPORTATION INVESTMENTS DIVISION

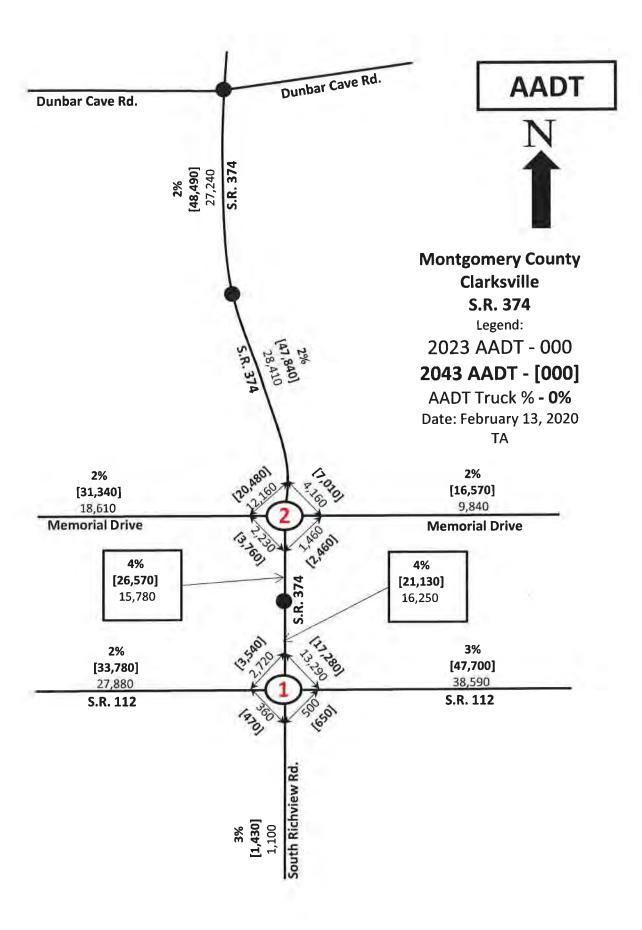
	PROJECT						ROUTE:	S.R. 374				
	COUNTY:		MONTGOMI	ERY			CITY:	CLARK	SVILLE			
	PROJECT			DOMED	110 T	DIDID	AD CAVE DO	AD				
	PROJECT	DESCRI	PHON: F	KUM S.R.	112 10	DUNBA	AR CAVE RO	AD.				
			_									
				I J S.R. 374	AVER	AGE TR	AFFIC DATA					
	DIVISIO	N REC	UESTING	<u>G:</u>						-	_	
	MAINTE	NANCE		Г	٦		PAVEMEN STRUCTU		GN	F	-	
	S.T.I.D.	NANCE		SURVEY & ROADWAY DESIGN						i i		
			PMENT &	ADM.	<u> </u>		TRAFFIC			1]	
			& AERO. ROGRAMM] Oneti	RUCTIO	OTHER _			2	\leq	
			ING DATE:		ONST	KUCIIO	**				_	
		C 4 001									_	
TRAFFIC ASSIGNMENT:												
									SIGN DWAY		SIGN	
	BASE YEAR			DESIGN YEAR					RUCKS	AVERAGE DAILY LOADS		
	AA	AADT	YEAR	AADT	DHV	%	YEAR	DIR.DIST.	DHV	AADT	FLEX	RIGII
	21,920	2023	36,010	3,752	10	2043	55-45	2	3			
			1									
	REQUEST	ED BY:	NAME DIVISION	MIKE			NGINEERIN	G	DATE	2/10/20	-	
			ADDRESS	-		AVENU	E		=			
				TAMP	A, FL	33602	/			1	1	
	REVIEWE	D BY:	DEBBI HOV	VARD	0	Del	li Hos	ween	COATE	2/10	2/20	
			TRANSPOR	TATION M.						1	/	
			SUITE 1000	, JAMES K.		BUILDING	1					
	APPROVE	D BY:	TONY ARM		lon	-	instron	9	DATI	2.12.	20	
				FRANSPORTATION MANAGER 2 SUITE 1000, JAMES K. POLK BUILDING								
			3011E 1000	, jaivies K.	OLK.	POILDING	J					
	COMMI			- 011-01-		n 00	· · · · · · · · · · · · · · · · · · ·			NG		
		-					ITS AND TW WITH THIS F					
	YEA	AR TRAF	FIC IS BAS	ED ON TH	E AVE	ERAGE O	F GROWTH	RATES I	FROM THI	Е		
	CLA	RKSVIL	LE MPO CO	IMPUTER	ASSIC	INMENT	MODEL. A	ADT's AN	ND BOTH	YEAR		

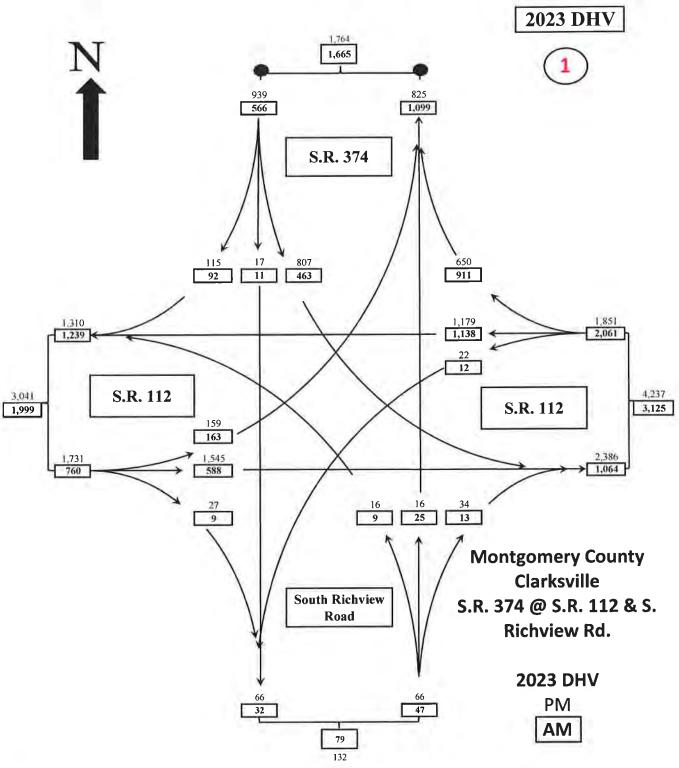
DHV's ARE INCLUDED.

DHV'S ARE NOT REQUIRED FOR SIDE ROADS LESS THAN 1000 AADT. NOTE: FOR BRIDGE REPLACEMENT PROJECTS, ADLS ARE NOT REQUIRED FOR ADTS OF 1000 OR LESS AND PERCENTAGE OF TRUCKS OF 7% OR LESS. SEE ATTACHMENTS FOR TURNING MOVEMENTS AND/OR OTHER DETAILS. (REV. 4/1/18)

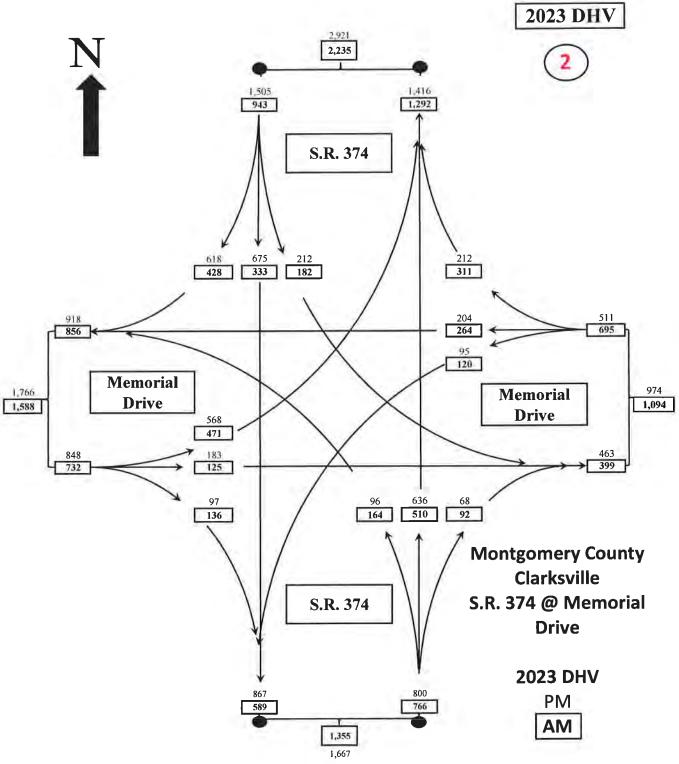


S.R. 374

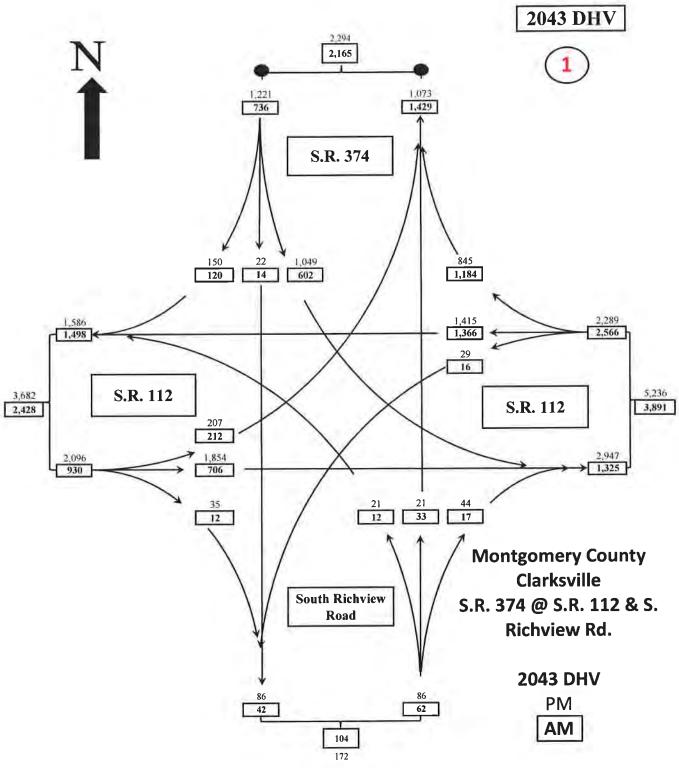




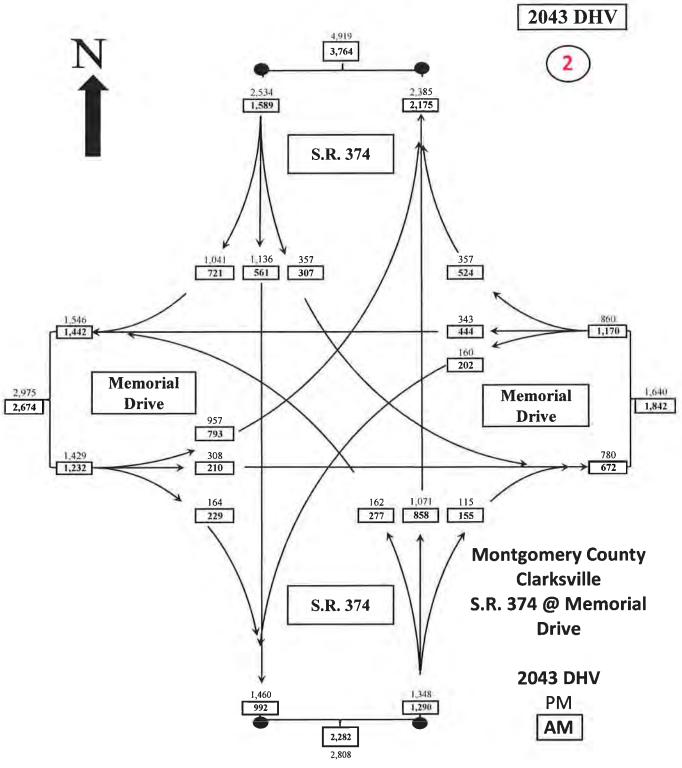
Date: February 13, 2020 TA



Date: February 13, 2020 TA



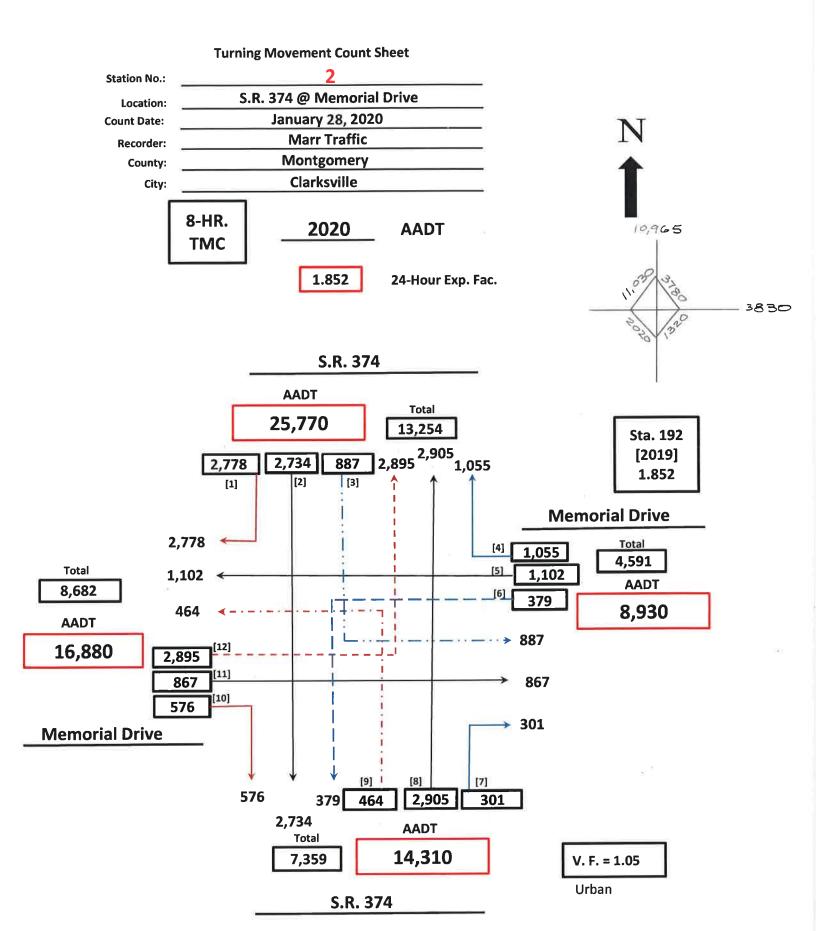
Date: February 13, 2020 TA



Date: February 13, 2020 TA

Turning Movement Count Sheet Station No.: S.R. 112 @ S.R. 374 Location: January 28, 2020 **Count Date: Marr Traffic** Recorder: Montgomery County: Clarksville City: 8-HR. 2020 **AADT TMC** 230 1.812 24-Hour Exp. Fac. Sta. 80 8/20 160 [2019] 24,075 1.812 S.R. 374 **AADT Total** 15,550 8,175 46 3,168 703 3,517 665 [2] [3] [1] S.R. 112 665 Total [4] 3,517 19,591 Total 6,627 6,627 **AADT** 14,201 116 37,270 82 **AADT → 3,168** 27,020 703 6,027 6,027 [10] 97 **136** S.R. 112 [9] [8] [7] 97 116 76 82 136 46 **AADT Total** 1,050 553 V. F. = 1.05 Urban

S. Richview Road



14.6 COST ESTIMATE

COST ESTIMATE SUMMARY

SR 374 Route:

From Madison Street (US-41A, SR 112 LM 0.00) Description:

To Dunbar Cave Road (LM 2.85)

Widen Project Type of Work: County: Montgomery Length: 2.85 Miles

Date: September 22, 2020

Estimate Type: Concept



DESCRIPTION	LOCAL	STATE	FEDERAL	TOTAL							
	0%	0%	0%								
Construction Items											
Removal Items	\$0	\$0	\$0	\$268,000							
Asphalt Paving	\$0	\$0	\$0	\$7,520,000							
Concrete Pavement	\$0	\$0	\$0	\$181,000							
Drainage	\$0	\$0	\$0	\$2,330,000							
Appurtenances	\$0	\$0	\$0	\$2,320,000							
Structures	\$0	\$0	\$0	\$5,700,000							
Fencing	\$0	\$0	\$0	\$0							
Signalization & Lighting	\$0	\$0	\$0	\$750,000							
Railroad Crossing	\$0	\$0	\$0	\$0							
Earthwork	\$0	\$0	\$0	\$4,010,000							
Clearing and Grubbing	\$0	\$0	\$0	\$61,000							
Seeding & Sodding	\$0	\$0	\$0	\$32,400							
Rip-Rap or Slope Protection	\$0	\$0	\$0	\$31,900							
Guardrail	\$0	\$0	\$0	\$210,000							
Signing	\$0	\$0	\$0	\$23,400							
Pavement Markings	\$0	\$0	\$0	\$93,900							
Maintenance of Traffic	\$0	\$0	\$0	\$266,000							
Mobilization 5%	\$0	\$0	\$0	\$1,190,000							
Other Items 10%	\$0	\$0	\$0	\$2,500,000							
Const. Contingency 30%	\$0	\$0	\$0	\$6,540,000							
Const. Eng. & Inspec. 10%	\$0	\$0	\$0	\$3,400,000							
Construction Estimate	\$0	\$0	\$0	\$37,400,000							
Interchanges & Unique Intersections											
Roundabouts	\$0	\$0	\$0	\$0							
Interchanges	\$0	\$0	\$0	\$0							
Right-of-Way & Utilties	LOCAL	STATE	FEDERAL	TOTAL							
	0%	0%	0%								
Right-of-Way	\$0	\$0	\$0	\$4,840,000							
Utilities	\$0	\$0	\$0	\$6,190,000							
Preliminary & Construction Engineerin	Preliminary & Construction Engineering and Inspection										
Prelim. Eng. 7%	\$0	\$0	\$0	\$2,470,000							
Total Project Cost (2020)	\$0	\$0	\$0								

	COST ESTIMATE SUMMARY (2020)									
PIN	Project Type of Work	Preliminary Engineering:	Right-of-Way:	Utilities: Construction: Total Project Cost						
0.00	Widen	\$ 2,470,000	\$ 4,840,000	\$ 6,190,000	\$ 40,800,000	\$ 50,900,000				

	INFLATED COST ESTIMATE SUMMARY Report Type:								Te	chnical Report
No. of Years	Year	Preliminary Engineering:	Right	t-of-Way:	Utilities:		Construction:		Total Inflated Project Cost	
5	2025	\$ 3,150,000	\$	6,180,000	\$	7,900,000	\$	52,100,000	\$	65,000,000
10	2030	\$ 4,020,000	\$	7,880,000	\$	10,100,000	\$	66,500,000	\$	82,900,000

INFLATION INPUTS						
Inflation Rate:	5.00%					

PAY ITEM SUMMARY

					TOOL QUANTITIES +	Statewide	
TDOT PAY ITEM	TDOT DESCRIPTION	UNIT	TOOL QUANTITIES	ADDITIONAL QUANTITIES	ADDITIONAL QUANTITIES	UNIT COST	TOTAL COST
							< Unit Cost Trends with Quantities
Pavment Removal 202-03.01	REMOVAL OF ASPHALT PAVEMENT	SY	3889	1	3889	\$ 33.89	
202-03.02	REMOVAL OF RIGID PAVEMENT	CY	154		154	\$ 33.89	\$ 2,285.49
415-01.02	COLD PLANING BITUMINOUS PAVEMENT	SY	55176		55176	\$ 2.42 OVAL TOTAL (ROUNDED)	\$ 133,525.92 \$ 267,700
					PAVEINIENT REIM	TVAL TOTAL (NOONBLD)	207,700
Asphalt Roads 303-01	MINERAL AGGREGATE, TYPE A BASE, GRADING D	TON	89718	4800	94518	\$ 21.20	\$ 2,003,777.82
307-02.01	ASPHALT CONCRETE MIX (PG70-22) (BPMB-HM) GRADING A	TON	17834	930	18764	\$ 99.41	\$ 1,865,326.26
307-01.21 307-02.08	AGGREGATE (BPMB-HM) GRADING A-S MIX ASPHALT CONCRETE MIX (PG70-22) (BPMB-HM) GRADING B-M2		11963 10014	660 770	12623 10784	\$ 97.57 \$ 99.60	\$ 1,231,641.72 \$ 1,074,047.36
402-01	BITUMINOUS MATERIAL FOR PRIME COAT (PC)	TON	123	11	134	\$ 570.81	\$ 76,351.03
402-02 403-01	AGGREGATE FOR COVER MATERIAL (PC) BITUMINOUS MATERIAL FOR TACK COAT (TC)	TON	443 97	44 10	487 107	\$ 40.02 \$ 657.80	\$ 19,492.94 \$ 70,568.72
411-02.10	ACS MIX(PG70-22) GRADING D		10335	1400	11735	\$ 100.50	\$ 1,179,372.53
					РА	VING TOTAL (ROUNDED)	\$ 7,520,600
Concrete Roads 604-01.01	CLASS A CONCRETE (ROADWAY)	CY	56	250	306	\$ 591.74	\$ 180,809.44
004-01.01	CD33 X CONCILETE (NOXDWAT)	Ci	30			VAYS TOTAL (ROUNDED)	\$ 180,900
Drainage							
607-05.02	24" CONCRETE PIPE CULVERT (CLASS III)		22647		22647	\$ 75.01	\$ 1,698,769.47
607-09.02 607-11.03	48" CONCRETE PIPE CULVERT (CLASS III) 60" CONCRETE PIPE CULVERT (CLASS III)	LF LF		40 40	40 40	\$ 143.27 \$ 214.60	\$ 5,730.80 \$ 8,584.00
611-12.02	CATCH BASINS, TYPE 12, > 4' - 8' DEPTH	EA	50		50	\$ 4,082.39	\$ 204,772.83
611-14.02 611-42.02	CATCH BASINS, TYPE 14, > 4' - 8' DEPTH CATCH BASINS, TYPE 42, > 4' - 8' DEPTH		25 11		25 11	\$ 6,847.88 \$ 5,435.85	\$ 171,744.78 \$ 61,968.69
710-02	Aggregate Underdrains (with pipe)		30096		30096	\$ 6.07	\$ 182,682.72
					DRAII	NAGE TOTAL (ROUNDED)	\$ 2,334,300
Appurtenances 701-01.01	CONCRETE SIDEWALK (4 ")	SF	150480	9300	159780	\$ 7.97	\$ 1,772,446,60
701-01.01 702-03	CONCRETE SIDEWALK (4 ") CONCRETE COMBINED CURB & GUTTER		150480 2161	250	2411	\$ 432.38	\$ 1,042,551.96
				ROADWAY AND PA	VEMENT APPURTENA	NCES TOTAL (ROUNDED)	\$ 2,316,000
Earthwork & Mineral							
105-01 203-01	CONSTRUCTION STAKES, LINES AND GRADES ROAD & DRAINAGE EXCAVATION (UNCLASSIFIED)	LS	1 303698		1 303698	\$ 282,491.98 \$ 7.40	\$ 282,491.98 \$ 2,247,365.82
203-02.01	BORROW EXCAVATION (GRADED SOLID ROCK)	TON	25271		25271	\$ 32.33	\$ 817,011.10
203-03	BORROW EXCAVATION (UNCLASSIFIED)	CY	68209		68209	\$ 9.71 ERAL TOTAL (ROUNDED)	\$ 662,194.31 \$ 4,009,100
					EARTH OTHER COMMISSION		4,003,100
Structures N/A	Widen Existing Bridge (Concrete Girder):	SF	17860		17860	\$ 48.00	\$ 857,280.00
N/A	New Bridge (Concrete Girder):	SF	29140		29140	\$ 150.00	\$ 4,371,000.00
604-07.01	RETAINING WALL	SF	6250		6250 STRUCT	\$ 75.00 URES TOTAL (ROUNDED)	\$ 468,750.00 \$ 5,697,100
Lighting & Signalization N/A	Traffic Signal	EA	2	1	3	\$ 250,000.00	\$ 750,000.00
				LI	IGHTING & SIGNALIZA	TION TOTAL (ROUNDED)	\$ 750,000
Guardrail							
705-01.01 705-06.01	GUARDRAIL AT BRIDGE ENDS W Beam GR (Type 2) Mash TL3		100 8276		100 8276.4	\$ 66.52 \$ 20.07	\$ 6,651.84 \$ 166,107.35
705-06.20	Tangent Energy Absorbing Term Mash TL-3	EA	10		10	\$ 2,626.00	\$ 26,260.00
705-04.09	EARTH PAD FOR TYPE 38 GR END TREATMENT	EA	10		10 GUARE	\$ 1,122.29 RAIL TOTAL (ROUNDED)	\$ 11,222.90 \$ 210,300
Conding and Codding							
Seeding and Sodding 801-01	SEEDING (WITH MULCH)	UNIT	564		564	\$ 27.26	\$ 15,382.82
801-01.07 801-02	TEMPORARY SEEDING (WITH MULCH) SEEDING (WITHOUT MULCH)		423 423		423 423	\$ 22.31 \$ 17.70	\$ 9,442.15 \$ 7,491.08
801-02	SEEDING (WITHOUT MICECITY	ONII	423			DING TOTAL (ROUNDED)	\$ 32,400
Maintenace of Traffic							
N/A	Traffic Control		1		1		\$ 243,546.48
712-02.02	INTERCONNECTED PORTABLE BARRIER RAIL	LF	752		752 MAINTENANCE OF TRA	\$ 30.18 AFFIC TOTAL (ROUNDED)	\$ 22,707.43 \$ 266,300
Cione							
Signs Not Listed	Signs (Construction)	LS	1		1	\$ -	\$ 23,400
					SIG	NING TOTAL (ROUNDED)	\$ 23,400
Pavement Markings							
716-13.06	Spray Thermo P.M. (40 mil 4")	LM	54.7	2	56.7 PAVEMENT MARK	\$ 1,654.23 INGS TOTAL (ROUNDED)	
Die C							
Rip-Rap 709-05.05	Machined Rip-Rap (Class A-3)	TON	800			\$ 39.85	
				RIP-	RAP & SLOPE PROTEC	TION TOTAL (ROUNDED)	\$ 31,900.00
Clearing and Grubing							
201-01	Clearing and Grubbing	LS		1	1 CLEAR AND GRUB	\$ 60,931.51 BING TOTAL (ROUNDED)	\$ 60,931.51 \$ 61,000.00
					33333371113 31103	(IIOONISIEO)	01,000.00
Utilties N/A	Overhead Distribution	LM	2.85	1	2.85	\$ 375,000	\$ 1,068,750
N/A	Underground Power	LM	2.85		2.85	\$ 500,000	\$ 1,425,000
N/A N/A	Underground Communication Underground Gas		2.85 2.85		2.85 2.85	\$ 500,000 \$ 250,000	\$ 1,425,000 \$ 712,500
N/A	Underground Water	LM	2.85		2.85	\$ 237,600	\$ 677,160
N/A	Underground Sewer	LM	2.85		2.85	\$ 310,200 ES TOTAL (ROUNDED)	\$ 884,070 \$ 6,192,500.00
							0,132,300.00
Right-of-Way N/A	Right-of-Way	LS	1	I	1	\$ 4,838,831.17	\$ 4,838,831.17
, ,	.agic of way					AY TOTAL (ROUNDED)	\$ 4,838,900.00

14.7 FIELD REVIEW MEETING NOTES

State Route 374 from Madison Street (US-41A, State Route 112 to Dunbar Cave Road Technical Report WebEx Conference

A WebEx conference was held at 10:00 AM CST Thursday May 28, 2020 to discuss the preliminary conceptual plans for the widening of State Route 374 in Clarksville, TN from Madison Street to Dunbar Cave Road. Those who attended the meeting were as follows.

- Steve Allen, Strategic Transportation Investments Division
- Jim Waters, Strategic Transportation Investments Division
- Shaun Armstrong, Strategic Transportation Investments Division
- Emily Burgess, Strategic Transportation Investments Division
- Chris Cowan, City of Clarksville
- Stan Williams, City of Clarksville
- Sharon Schutz, TDOT Region 3 Project Development
- Jon Zirkle, TDOT Region 3 Project Development
- Melissa Portell, TDOT Region 3 Survey
- Amy Hume, TDOT Environmental
- Sharon Sanders, TDOT Environmental
- Ted Kniazewycz, TDOT Structures
- George Hardy, TDOT Region 3 Traffic
- Mike Tugwell, TRC Worldwide Engineering, Inc.
- Jon Meadows, TRC Worldwide Engineering, Inc.
- Anthony Smith, TRC Worldwide Engineering, Inc.
- Brady Griggs, TRC Worldwide Engineering, Inc.

TRC has prepared the following bullet points regarding the discussion of this meeting:

- The preliminary functionals prepared by TRC Worldwide Engineering showed twelve (12) foot shoulders for the typical section to maintain continuity with the adjacent project to the north. Based upon the discussion at this meeting it was determined to reduce the shoulder widths to ten (10) feet, which is the current standard for RD11-TS-6B and provides sufficient width for the proposed bicycle lanes.
- The preliminary functionals currently include a raised curb island at the Madison Street intersection that will prevent left turn movements onto State Route 374 from the shopping center located on the northwest corner. This was discussed at the meeting but no definitive determination was made if this should instead be changed to pavement marking to allow left turn movements.

- Sidewalks may have to be widened adjacent to the high school and middle school to accommodate the 'Safe Route to Schools' requirements. Current sidewalk width is five (5) feet. TRC will update functionals as required if guidance is provided regarding required changes.
- Any proposed shoulder reductions to reduce right of way near the beginning of the project should be sketched out and provided to Shaun Armstrong for approval.
- A retaining wall should be used at the pond across from the High School to reduce impacts.
- Other potential retaining wall locations should be shown on the functionals if adjacent property is adversely affected.
- Future study may be required to determine optimum layout for school entrances. Crossing guards are present during school hours at three (3) locations in the school zone.
- The southbound to westbound right turn lanes at the Memorial Drive intersection should be reviewed to determine optimal configuration.
- Signalized Intersections should be illuminated.
- TDOT Structures has determined that the existing bridge should be widened to accommodate the new typical section. Symmetrical widening of the bridge is preferred. Bridge should use the full typical section width.
- River Run intersection tie-in will be reviewed to determine if it needs to be extended.
- Shaun Armstrong has provided TRC with Microstation files for the north project to be incorporated into the functionals. Project should end at tie in to the north project south of Dunbar Cave Road.

Additional comments were received from TDOT Strategic Transportation Investments Division after the meeting. These comments are summarized as follows:

- Estimated proposed ROW should be added to functional sheets.
- If functionals include locations where the plan is to hold one side of the existing Edge of Pavement, provide notes throughout describing the concept plan.
- Tie slope lines into side roads.
- Label any areas of major rock cuts
- Shade proposed median at Madison Street intersection.
- Bike lane should include three (3) to four (4) foot buffer area.
- Label design speed, or list segments where different design speed is used.
- Review if a double left turn lane is warranted for the eastbound to northbound movement at the Madison Street Intersection. There are two (2) receiving lanes currently proposed.
- Will Clarksville Gas and Water be receptive to moving the back entrance to State Route 374 further north if feasible?
- Change all roadway name labels on the main route to State Route 374.

- Does existing right turn lane at the Clarksville High School and Richview Middle School need to be replaced? The functionals currently do not include right turn lanes into school entrances.
- Change line-style to solid white for left turn lane.
- The apartment on the southwest side of the Memorial Drive intersection will have right of way issues. Review to determine if typical section can be modified to reduce impact.
- Review if traffic warrants a double left turn lane for the northbound to westbound movement at the Memorial Drive intersection.
- Square up the limit of construction on Memorial Drive east approach.
- Label golf course locations on aerial.
- Show flow arrows of Red River.
- Label access path under bridge over Red River.
- Show adjacent project linework (under construction)

Comments have also been received from TDOT Technical study staff regarding known resources within the project limits. These comments were as follows:

Air and Noise

This is a Type I noise project, so a detailed noise study will be required. If the NEPA doc is going to be a D-List CE, then MSATs will not be required.

Archaeology

We studied the existing ROW in the early 2000s and did not identify any archaeological resources at that time. An archaeological survey of all proposed ROW, easements, and undisturbed areas within existing ROW will be required for the subject project. However, due to the geographic context and recent land-use, the probability of identifying archaeological resources that are eligible for the National Register of Historic Places within the area of potential effects is low.

Ecology

According to the TDEC Natural Heritage Rare Species database, there are two records of rare species within one mile of the proposed project; the state and federally-listed Endangered gray bat, Myotis grisescens and state-listed purple milkweed. Within four miles there are several records of rare plants and animals, many of the records are historic. Of the rare species within four miles, only one Physaria globosa, Short's bladderpod is federally-listed. All of the others are state-listed. The state -listed species within four miles are: Bewick's wren, hellbender, Northern pine snake, Southern bog lemming, barking tree frog, slenderhead darter, Short's rock cress, pale purple coneflower, sand grape, beak grass, limestone bluestar, and prairie ragwort. There is at least one stream, the Red River within this project area. Since the report states that there are 8 culverts, it is likely that there are smaller streams, ephemeral streams or wet weather conveyances. There may be wetlands in low-lying areas, especially near the river. Tree cutting may affect bats such as Indiana bats and Northern long-eared bats that use trees for summer roosting habitat.

HazMat

No hazardous materials sites are identified along the corridor other than two current or former UST facilities on the corner of SR-374 and Madison St, but no proposed ROW is shown on the figures. The bridge over Red River, and possibly the culverts (anything other than corrugated metal pipe) will require asbestos surveys.

Historic

There is one structure previously surveyed by TDOT and deemed eligible for listing on the National Register of Historic Places: The Easterling Log Cabin, located at the corner of Dunbar Cave Road and Warfield Blvd. I have attached an updated functional map with the location of this property. Further study will be required to assess the project's effect on this property. In addition to the previously surveyed property, there are other properties in the project area that are 50+ years old that may be eligible for listing on the National Register of Historic Places. Further study will be required once we receive our official tech request.

Multimodal

There should be a buffer of 3-4 feet between the roadway and a 5' bike lane. Please see pages 43-44 of TDOT's Multimodal Roadway Design Guidelines with the following:

9-501.04 BUFFERED ON-STREET BICYCLE LANES

Buffered bicycle lanes are conventional bicycle lanes paired with a designated buffer space separating the bicycle lane from the adjacent motor vehicle travel lane and/or parking lane. The buffer space is created with pavement markings. When a buffer is placed between the traveled way and a bicycle lane, it improves safety by separating bicyclists from moving motor vehicles. A buffer can also be placed between on-street parking lanes and bicycle lanes. When that configuration is selected, bicyclists have less risk of being hit by a car door being opened from a parked car. Both locations are acceptable, and the preferred placement of the buffer(s) depends upon local conditions. Buffered bicycle lanes provide the following advantages when compared to conventional bicycle lanes.

- Provide greater distance between bicyclists and motor vehicles
- Provide space for faster moving bicyclists to pass slower moving bicyclists without having to encroach into the motor vehicle travel lane
- Provide a greater space for bicycling without making the bicycle lane appear so wide that it might be mistaken for a travel lane or a parking lane
- Appeal to a wider range of bicyclists and encourages bicycling

Page 45 of the Multimodal Design Guidelines also has the table with the minimum buffer and bike lane width guidelines.

Section 4(f)

There are two potential Section 4(f) resources along the corridor.

- Clarksville High School Baseball Field along SR-374 Potential Section 4(f) resource coordination needed with the Official with Jurisdiction (OWJ) is needed to determine. If it is a Section 4(f) resource, any ROW acquisition would cause the need for a de minimis determination. If only temporary easements would be needed, temporary occupancy would be appropriate.
 - o If the public-school baseball field serves only school activities and functions and is not open to the public or serve as either organized or substantial walk-on recreational purposes that are determined to be significant, then it is not subject to Section 4(f). The project lead should obtain documentation from the OWJ explaining that the baseball field is only used for school functions and does not have any other local significance for recreational purposes.
- Crow Community Center is located on the same tract as Clarksville High School at 211 Richview Road and is one of three recreation centers managed by the City of Clarksville Park & Recreation. This resource appears to be open to the public but through a daily admission cost or an annual membership. Further coordination with the OWJ and FHWA would be needed to determine if this is a Section 4(f) resource. Neither the center nor it's parking appear to be impacted by the proposed project; however, disruption of access during construction could result in a de minimis impact if this Center is determined to be a Section 4(f) resource.
- River Club Golf and Learning Center located at 1150 Warfield Blvd. Not a Section 4(f) resource. While open to the public, it is privately owned by River Investments GP.
- The Villages at the River Club Not a Section 4(f) resource. This is a luxury retirement community that does not appear to have ROW or easement impacts.

TRC Worldwide Engineering, Inc. Meeting Minutes 5.28.20

Section 6(f)

No resources identified.

ROW

A Conceptual Stage Relocation Plan (CSRP) will be necessary for any business or residential relocations.

Other Notes

- This portion of SR-374 has signage for Clarksville Transit System (CTS) Bus Route along the roadway. There is one pedestrian bench located on SR-374 near the Clarksville High School driveway across from Sentinel Drive. Appropriate coordination will need to take place.
- Ensure that the project has appropriate transitions of traffic at Madison Street, Dunbar Cave Road, and all other crossing intersections. At Dunbar Cave Road, it appears that two lanes will carry through the intersection, but there is only one existing lane on the other side. Is there another project that will improve that portion of SR-374 to match the typical? At Madison Street, turn lanes need to be added on S. Richview Road to show how residential traffic will turn left and right onto Madison Street.

14.8 CAPACITY ANALYSIS

HCS7 Two-La	ine	Highway Re	eport			
MLT		Date		7/8/2020		
TRC Worldwide Engineering, Inc.			2023			
Clarksville MPO		Time Period Analy	zed	AM Peak		
SR 374 between Memorial Unit Drive and Dunbar Cave Road			United States Customary			
Se	egn	nent 1				
Passing Constrained		Length, ft		5280		
12		Shoulder Width, ft		3		
50		Access Point Density, pts/mi		5.0		
Demand and Capacity						
1292		Opposing Demand Flow Rate, veh/h		-		
1.00		Total Trucks, %		2.00		
1700		Demand/Capacity (D/C)		0.76		
1	1 Free-Flow Speed, mi/h		mi/h	53.6		
3.46439		Speed Power Coefficient		0.41674		
-1.34598 PF Power Coe		PF Power Coefficie	ent	0.74335		
No	Total Segment D		nsity, veh/mi/ln	20.8		
0.0		% Improved Avg S	Speed	0.0		
Length, ft	Rad	ius, ft	Superelevation, %	Average Speed, mi/h		
5280	-		-	49.9		
49.9		Percent Followers, %		80.4		
1.20		Followers Density, followers/mi/ln		20.8		
E						
0		Pavement Condition Rating		3		
1292		Bicycle Effective Width, ft		15		
5.40		Bicycle Effective Speed Factor		4.62		
E						
	MLT	MLT	MLT Date TRC Worldwide Engineering, Inc. Clarksville MPO Time Period Analysis Year Engineering, Inc. Clarksville MPO Time Period Analysis Segment 1 Segment 1 Passing Constrained Length, ft 12 Shoulder Width, ft 150 Access Point Dension 100 Total Trucks, % 1700 Demand/Capacity 1 Free-Flow Speed, 3.46439 Speed Power Coefficient No Total Segment Dension 100 Total Segment Densio	TRC Worldwide Engineering, Inc. Clarksville MPO SR 374 between Memorial Drive and Dunbar Cave Road Segment 1 Passing Constrained Length, ft 12 Shoulder Width, ft 150 Access Point Density, pts/mi 1292 Opposing Demand Flow Rate, veh/h 1700 Demand/Capacity (D/C) 1 Free-Flow Speed, mi/h 3.46439 Speed Power Coefficient -1.34598 PF Power Coefficient No Total Segment Density, veh/mi/In 0.0 Value Speed Length, ft Radius, ft Superelevation, % 5280 - 49.9 Percent Followers, % 1.20 Followers Density, followers/mi/In E O Pavement Condition Rating 1292 Bicycle Effective Width, ft 5.40 Bicycle Effective Speed Factor		

	HCS7 Two-Lar	ne Highway R	eport	
Project Information				
Analyst	MLT	Date		7/8/2020
Agency	TRC Worldwide Engineering, Inc.	/		2023
Jurisdiction	Clarksville MPO	Time Period Anal	yzed	PM Peak
Project Description	SR 374 between Memori Drive and Dunbar Cave Road	ial Unit		United States Customary
	Seg	gment 1		
Vehicle Inputs				
Segment Type	Passing Constrained	Length, ft		5280
Lane Width, ft	12	Shoulder Width, f	t	3
Speed Limit, mi/h	50	Access Point Den	sity, pts/mi	5.0
Demand and Capacity				
Directional Demand Flow Rate, veh/h	1505	Opposing Demar	nd Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %		2.00
Segment Capacity, veh/h	1700	Demand/Capacity	y (D/C)	0.89
Intermediate Results				
Segment Vertical Class	1	Free-Flow Speed,	mi/h	53.6
Speed Slope Coefficient	3.46439	Speed Power Coe	efficient	0.41674
PF Slope Coefficient	-1.34598	PF Power Coeffici	ent	0.74335
In Passing Lane Effective Length?	No	Total Segment De	ensity, veh/mi/ln	25.5
%Improved % Followers	0.0	% Improved Avg	Speed	0.0
Subsegment Data				
# Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1 Tangent	5280	-	-	49.6
Vehicle Results				
Average Speed, mi/h	49.6	Percent Followers	5, %	83.9
Segment Travel Time, minutes	1.21	Followers Density	, followers/mi/ln	25.5
Vehicle LOS	E			
Bicycle Results				
Percent Occupied Parking	0	Pavement Condit	ion Rating	3
Flow Rate Outside Lane, veh/h	1505	Bicycle Effective V	Vidth, ft	15
Bicycle LOS Score	5.48	Bicycle Effective S	Speed Factor	4.62
Bicycle LOS	E			
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	HCS7 Two-Lar	ne Highway R	leport	
Project Information				
Analyst	MLT	Date		7/8/2020
Agency	TRC Worldwide Engineering, Inc.	Analysis Year		2033
Jurisdiction	Clarksville MPO	Time Period Anal	yzed	AM Peak
Project Description	SR 374 between Memori Drive and Dunbar Cave Road			United States Customary
	Seg	gment 1		
Vehicle Inputs				
Segment Type	Passing Constrained	Length, ft		5280
Lane Width, ft	12	Shoulder Width,	ft	3
Speed Limit, mi/h	50	Access Point Den	nsity, pts/mi	5.0
Demand and Capacity				
Directional Demand Flow Rate, veh/h	1733	Opposing Demai	nd Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %		2.00
Segment Capacity, veh/h	1700	Demand/Capacit	y (D/C)	1.02
Intermediate Results				
Segment Vertical Class	1	Free-Flow Speed	, mi/h	75.0
Speed Slope Coefficient	0.00000	Speed Power Coe	efficient	0.00000
PF Slope Coefficient	0.00000	PF Power Coeffic	ient	0.00000
In Passing Lane Effective Length?	No	Total Segment D	ensity, veh/mi/ln	0.0
%Improved % Followers	0.0	% Improved Avg	Speed	0.0
Subsegment Data				
# Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1 Tangent	5280	-	-	75.0
Vehicle Results				
Average Speed, mi/h	75.0	Percent Followers	s, %	0.0
Segment Travel Time, minutes	0.00	Followers Density	y, followers/mi/ln	0.0
Vehicle LOS	F			
Bicycle Results				
Percent Occupied Parking	0	Pavement Condit	tion Rating	3
Flow Rate Outside Lane, veh/h	1733	Bicycle Effective	Width, ft	15
Bicycle LOS Score	5.55	Bicycle Effective	Speed Factor	4.62
Bicycle LOS	F	, , , , , , , , , , , , , , , , , , ,		
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	HCS7 Two-Lar	ne Highway R	eport	
Project Information				
Analyst	MLT	Date		7/8/2020
Agency	TRC Worldwide Engineering, Inc.	Analysis Year		2033
Jurisdiction	Clarksville MPO	Time Period Analy	yzed	PM Peak
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road			United States Customary
	Seg	gment 1		
Vehicle Inputs				
Segment Type	Passing Constrained	Length, ft		5280
Lane Width, ft	12	Shoulder Width, f	t	3
Speed Limit, mi/h	50	Access Point Den	sity, pts/mi	5.0
Demand and Capacity				
Directional Demand Flow Rate, veh/h	2019	Opposing Deman	nd Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %		2.00
Segment Capacity, veh/h	1700	Demand/Capacity	y (D/C)	1.19
Intermediate Results				
Segment Vertical Class	1	Free-Flow Speed,	mi/h	75.0
Speed Slope Coefficient	0.00000	Speed Power Coe	efficient	0.00000
PF Slope Coefficient	0.00000	PF Power Coeffici	ent	0.00000
In Passing Lane Effective Length?	No	Total Segment De	ensity, veh/mi/ln	0.0
%Improved % Followers	0.0	% Improved Avg	Speed	0.0
Subsegment Data				
# Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1 Tangent	5280	-	-	75.0
Vehicle Results				
Average Speed, mi/h	75.0	Percent Followers	5, %	0.0
Segment Travel Time, minutes	0.00	Followers Density	, followers/mi/ln	0.0
Vehicle LOS	F			
Bicycle Results		•		
Percent Occupied Parking	0	Pavement Condit	ion Rating	3
Flow Rate Outside Lane, veh/h	2019	Bicycle Effective V	Vidth, ft	15
Bicycle LOS Score	5.63	Bicycle Effective S	Speed Factor	4.62
Bicycle LOS	F	· · · · · · · · · · · · · · · · · · ·		
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	HCS7 Two-Lar	ne Highway R	eport	
Project Information				
Analyst	MLT	Date		7/8/2020
Agency	TRC Worldwide Engineering, Inc.	Analysis Year		2043
Jurisdiction	Clarksville MPO	Time Period Analy	yzed	AM Peak
Project Description	SR 374 between Memori Drive and Dunbar Cave Road	ial Unit		United States Customary
	Seg	gment 1		
Vehicle Inputs				
Segment Type	Passing Constrained	Length, ft		5280
Lane Width, ft	12	Shoulder Width, f	t	3
Speed Limit, mi/h	50	Access Point Den	sity, pts/mi	5.0
Demand and Capacity				
Directional Demand Flow Rate, veh/h	2175	Opposing Demar	nd Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %		2.00
Segment Capacity, veh/h	1700	Demand/Capacity	y (D/C)	1.28
Intermediate Results				
Segment Vertical Class	1	Free-Flow Speed,	mi/h	75.0
Speed Slope Coefficient	0.00000	Speed Power Coe	efficient	0.00000
PF Slope Coefficient	0.00000	PF Power Coeffici	ent	0.00000
In Passing Lane Effective Length?	No	Total Segment De	ensity, veh/mi/ln	0.0
%Improved % Followers	0.0	% Improved Avg	Speed	0.0
Subsegment Data				
# Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1 Tangent	5280	-	-	75.0
Vehicle Results				
Average Speed, mi/h	75.0	Percent Followers	5, %	0.0
Segment Travel Time, minutes	0.00	Followers Density	, followers/mi/ln	0.0
Vehicle LOS	F			
Bicycle Results				
Percent Occupied Parking	0	Pavement Condit	ion Rating	3
Flow Rate Outside Lane, veh/h	2175	Bicycle Effective V	Vidth, ft	15
Bicycle LOS Score	5.66	Bicycle Effective S	Speed Factor	4.62
Bicycle LOS	F			
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	HCS7 Two-Lar	ne Highway R	eport	
Project Information				
Analyst	MLT	Date		7/8/2020
Agency	TRC Worldwide Engineering, Inc.	Analysis Year		2043
Jurisdiction	Clarksville MPO	Time Period Anal	yzed	PM Peak
Project Description	SR 374 between Memori Drive and Dunbar Cave Road	ial Unit		United States Customary
	Seg	gment 1		
Vehicle Inputs				
Segment Type	Passing Constrained	Length, ft		5280
Lane Width, ft	12	Shoulder Width,	ft	3
Speed Limit, mi/h	50	Access Point Den	sity, pts/mi	5.0
Demand and Capacity				
Directional Demand Flow Rate, veh/h	2534	Opposing Demar	nd Flow Rate, veh/h	-
Peak Hour Factor	1.00	Total Trucks, %		2.00
Segment Capacity, veh/h	1700	Demand/Capacit	y (D/C)	1.49
Intermediate Results				
Segment Vertical Class	1	Free-Flow Speed	mi/h	75.0
Speed Slope Coefficient	0.00000	Speed Power Coe	efficient	0.00000
PF Slope Coefficient	0.00000	PF Power Coeffic	ient	0.00000
In Passing Lane Effective Length?	No	Total Segment De	ensity, veh/mi/ln	0.0
%Improved % Followers	0.0	% Improved Avg	Speed	0.0
Subsegment Data				
# Segment Type	Length, ft	Radius, ft	Superelevation, %	Average Speed, mi/h
1 Tangent	5280	-	-	75.0
Vehicle Results				
Average Speed, mi/h	75.0	Percent Followers	5, %	0.0
Segment Travel Time, minutes	0.00	Followers Density	, followers/mi/ln	0.0
Vehicle LOS	F			
Bicycle Results				
Percent Occupied Parking	0	Pavement Condit	ion Rating	3
Flow Rate Outside Lane, veh/h	2534	Bicycle Effective	Width, ft	15
Bicycle LOS Score	5.74	Bicycle Effective S	Speed Factor	4.62
Bicycle LOS	F			
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	HCS7 Multilane	Highway Report			
Project Information					
Analyst	MLT	Date	7/8/2020		
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2023		
Jurisdiction	Clarksville MPO	Time Period Analyzed	AM PEAK		
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary		
Direction 1 Geometric Data					
Direction 1	Northbound				
Number of Lanes (N), In	2	Terrain Type	Rolling		
Segment Length (L), ft	-	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0		
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6		
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12		
Free-Flow Speed (FFS), mi/h	43.8				
Direction 1 Adjustment Factor	ors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000		
Driver Population CAF	1.000				
Direction 1 Demand and Cap	acity				
Volume(V) veh/h	1099	Heavy Vehicle Adjustment Factor (fHV)	1.000		
Peak Hour Factor	0.94	Flow Rate (Vp), pc/h/ln	584		
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900		
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.31		
Direction 1 Speed and Densi	ty				
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8		
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	13.3		
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	В		
Access Point Density Adjustment (fA)	1.3				
Direction 1 Bicycle LOS	Direction 1 Bicycle LOS				
Flow Rate in Outside Lane (vol),veh/h	585	Effective Speed Factor (St)	4.42		
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.28		
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	В		
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	HCS7 Multilane	Highway Report			
Project Information	Project Information				
Analyst	MLT	Date	7/8/2020		
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2023		
Jurisdiction	Clarksville MPO	Time Period Analyzed	AM PEAK		
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary		
Direction 2 Geometric Data					
Direction 2	Southbound				
Number of Lanes (N), In	2	Terrain Type	Rolling		
Segment Length (L), ft	-	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0		
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6		
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12		
Free-Flow Speed (FFS), mi/h	43.8				
Direction 2 Adjustment Factor	ors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000		
Driver Population CAF	1.000				
Direction 2 Demand and Cap	acity				
Volume(V) veh/h	566	Heavy Vehicle Adjustment Factor (fHV)	1.000		
Peak Hour Factor	0.94	Flow Rate (V _p), pc/h/ln	301		
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900		
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.16		
Direction 2 Speed and Densi	ty				
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8		
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	6.9		
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	A		
Access Point Density Adjustment (fA)	1.3				
Direction 2 Bicycle LOS					
Flow Rate in Outside Lane (vol),veh/h	301	Effective Speed Factor (St)	4.42		
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	1.94		
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	В		
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	HCS7 Multilane	Highway Report		
Project Information				
Analyst	MLT	Date	7/8/2020	
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2023	
Jurisdiction	Clarksville MPO	Time Period Analyzed	PM PEAK	
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary	
Direction 1 Geometric Data				
Direction 1	Northbound			
Number of Lanes (N), In	2	Terrain Type	Rolling	
Segment Length (L), ft	-	Percent Grade, %	-	
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-	
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0	
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6	
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12	
Free-Flow Speed (FFS), mi/h	43.8			
Direction 1 Adjustment Factor	ors			
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000	
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000	
Driver Population CAF	1.000			
Direction 1 Demand and Cap	acity			
Volume(V) veh/h	825	Heavy Vehicle Adjustment Factor (fHV)	1.000	
Peak Hour Factor	0.94	Flow Rate (Vp), pc/h/ln	439	
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900	
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900	
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.23	
Direction 1 Speed and Densi	ty			
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8	
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	10.0	
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	А	
Access Point Density Adjustment (fA)	1.3			
Direction 1 Bicycle LOS				
Flow Rate in Outside Lane (vol),veh/h	439	Effective Speed Factor (St)	4.42	
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.13	
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	В	
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	HCS7 Multilane	Highway Report			
Project Information					
Analyst	MLT	Date	7/8/2020		
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2023		
Jurisdiction	Clarksville MPO	Time Period Analyzed	PM PEAK		
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary		
Direction 2 Geometric Data					
Direction 2	Southbound				
Number of Lanes (N), In	2	Terrain Type	Rolling		
Segment Length (L), ft	-	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0		
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6		
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12		
Free-Flow Speed (FFS), mi/h	43.8				
Direction 2 Adjustment Factor	ors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000		
Driver Population CAF	1.000				
Direction 2 Demand and Cap	acity				
Volume(V) veh/h	939	Heavy Vehicle Adjustment Factor (fHV)	1.000		
Peak Hour Factor	0.94	Flow Rate (Vp), pc/h/ln	500		
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900		
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.26		
Direction 2 Speed and Densi	ty				
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8		
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	11.4		
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	В		
Access Point Density Adjustment (fA)	1.3				
Direction 2 Bicycle LOS	Direction 2 Bicycle LOS				
Flow Rate in Outside Lane (vol.),veh/h	499	Effective Speed Factor (St)	4.42		
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.20		
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	В		
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	HCS7 Multilane	Highway Report			
Project Information					
Analyst	MLT	Date	7/8/2020		
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2033		
Jurisdiction	Clarksville MPO	Time Period Analyzed	AM PEAK		
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary		
Direction 1 Geometric Data					
Direction 1	Northbound				
Number of Lanes (N), In	2	Terrain Type	Rolling		
Segment Length (L), ft	-	Percent Grade, %	-		
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-		
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0		
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6		
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12		
Free-Flow Speed (FFS), mi/h	43.8				
Direction 1 Adjustment Factor	ors				
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000		
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000		
Driver Population CAF	1.000				
Direction 1 Demand and Cap	acity				
Volume(V) veh/h	1733	Heavy Vehicle Adjustment Factor (fHV)	1.000		
Peak Hour Factor	0.94	Flow Rate (Vp), pc/h/ln	922		
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900		
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900		
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.49		
Direction 1 Speed and Densi	ty				
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8		
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	21.1		
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	С		
Access Point Density Adjustment (fA)	1.3				
Direction 1 Bicycle LOS	Direction 1 Bicycle LOS				
Flow Rate in Outside Lane (vol.),veh/h	922	Effective Speed Factor (St)	4.42		
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.51		
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	С		
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	HCS7 Multilane	Highway Report	
Project Information			
Analyst	MLT	Date	7/8/2020
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2033
Jurisdiction	Clarksville MPO	Time Period Analyzed	AM PEAK
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary
Direction 2 Geometric Data			
Direction 2	Southbound		
Number of Lanes (N), In	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12
Free-Flow Speed (FFS), mi/h	43.8		
Direction 2 Adjustment Factor	ors		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		
Direction 2 Demand and Cap	acity		
Volume(V) veh/h	1265	Heavy Vehicle Adjustment Factor (fHV)	1.000
Peak Hour Factor	0.94	Flow Rate (Vp), pc/h/ln	673
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.35
Direction 2 Speed and Densi	ty		
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	15.4
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	В
Access Point Density Adjustment (fA)	1.3		
Direction 2 Bicycle LOS			
Flow Rate in Outside Lane (vol.),veh/h	673	Effective Speed Factor (St)	4.42
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.35
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	В
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	HCS7 Multilane	Highway Report	
Project Information			
Analyst	MLT	Date	7/8/2020
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2033
Jurisdiction	Clarksville MPO	Time Period Analyzed	PM PEAK
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary
Direction 1 Geometric Data			
Direction 1	Northbound		
Number of Lanes (N), In	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12
Free-Flow Speed (FFS), mi/h	43.8		
Direction 1 Adjustment Factor	ors		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		
Direction 1 Demand and Cap	acity		
Volume(V) veh/h	1899	Heavy Vehicle Adjustment Factor (fHV)	1.000
Peak Hour Factor	0.94	Flow Rate (Vp), pc/h/ln	1010
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.53
Direction 1 Speed and Densi	ty		
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	23.1
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	С
Access Point Density Adjustment (fA)	1.3		
Direction 1 Bicycle LOS			
Flow Rate in Outside Lane (vOL),veh/h	1010	Effective Speed Factor (St)	4.42
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.56
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	С
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	HCS7 Multilane	Highway Report	
Project Information			
Analyst	MLT	Date	7/8/2020
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2033
Jurisdiction	Clarksville MPO	Time Period Analyzed	PM PEAK
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary
Direction 2 Geometric Data			
Direction 2	Southbound		
Number of Lanes (N), In	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12
Free-Flow Speed (FFS), mi/h	43.8		
Direction 2 Adjustment Factor	ors		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		
Direction 2 Demand and Cap	acity		
Volume(V) veh/h	2019	Heavy Vehicle Adjustment Factor (fHV)	1.000
Peak Hour Factor	0.94	Flow Rate (V _p), pc/h/ln	1074
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.57
Direction 2 Speed and Densi	ty		
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	24.5
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	С
Access Point Density Adjustment (fA)	1.3		
Direction 2 Bicycle LOS			
Flow Rate in Outside Lane (vOL),veh/h	1074	Effective Speed Factor (St)	4.42
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.59
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	С
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	HCS7 Multilane	Highway Report	
Project Information			
Analyst	MLT	Date	7/8/2020
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2043
Jurisdiction	Clarksville MPO	Time Period Analyzed	AM PEAK
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary
Direction 1 Geometric Data			
Direction 1	Northbound		
Number of Lanes (N), In	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12
Free-Flow Speed (FFS), mi/h	43.8		
Direction 1 Adjustment Factor	ors		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		
Direction 1 Demand and Cap	acity		
Volume(V) veh/h	2175	Heavy Vehicle Adjustment Factor (fHV)	1.000
Peak Hour Factor	0.94	Flow Rate (Vp), pc/h/ln	1157
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.61
Direction 1 Speed and Densi	ty		
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	26.4
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	D
Access Point Density Adjustment (fA)	1.3		
Direction 1 Bicycle LOS			
Flow Rate in Outside Lane (vOL),veh/h	1157	Effective Speed Factor (St)	4.42
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.63
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	С
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	HCS7 Multilane	Highway Report	
Project Information			
Analyst	MLT	Date	7/8/2020
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2043
Jurisdiction	Clarksville MPO	Time Period Analyzed	AM PEAK
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary
Direction 2 Geometric Data			
Direction 2	Southbound		
Number of Lanes (N), In	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12
Free-Flow Speed (FFS), mi/h	43.8		
Direction 2 Adjustment Factor	ors		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		
Direction 2 Demand and Cap	acity		
Volume(V) veh/h	1589	Heavy Vehicle Adjustment Factor (fHV)	1.000
Peak Hour Factor	0.94	Flow Rate (Vp), pc/h/ln	845
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.44
Direction 2 Speed and Densi	ty		
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	19.3
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	С
Access Point Density Adjustment (fA)	1.3		
Direction 2 Bicycle LOS			
Flow Rate in Outside Lane (vOL),veh/h	845	Effective Speed Factor (St)	4.42
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.47
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	В
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	HCS7 Multilane	Highway Report	
Project Information			
Analyst	MLT	Date	7/8/2020
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2043
Jurisdiction	Clarksville MPO	Time Period Analyzed	PM PEAK
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary
Direction 1 Geometric Data			
Direction 1	Northbound		
Number of Lanes (N), In	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12
Free-Flow Speed (FFS), mi/h	43.8		
Direction 1 Adjustment Factor	ors		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		
Direction 1 Demand and Cap	acity		
Volume(V) veh/h	2385	Heavy Vehicle Adjustment Factor (fHV)	1.000
Peak Hour Factor	0.94	Flow Rate (Vp), pc/h/ln	1268
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.67
Direction 1 Speed and Densi	ty		
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	28.9
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	D
Access Point Density Adjustment (fA)	1.3		
Direction 1 Bicycle LOS			
Flow Rate in Outside Lane (vol),veh/h	1269	Effective Speed Factor (St)	4.42
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.67
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	С
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	HCS7 Multilane	Highway Report	
Project Information			
Analyst	MLT	Date	7/8/2020
Agency	TRC Worldwide Engineers, Inc.	Analysis Year	2043
Jurisdiction	Clarksville MPO	Time Period Analyzed	PM PEAK
Project Description	SR 374 between Memorial Drive and Dunbar Cave Road	Unit	United States Customary
Direction 2 Geometric Data			
Direction 2	Southbound		
Number of Lanes (N), In	2	Terrain Type	Rolling
Segment Length (L), ft	-	Percent Grade, %	-
Measured or Base Free-Flow Speed	Base	Grade Length, mi	-
Base Free-Flow Speed (BFFS), mi/h	45.0	Access Point Density, pts/mi	5.0
Lane Width, ft	12	Left-Side Lateral Clearance (LCR), ft	6
Median Type	TWLTL	Total Lateral Clearance (TLC), ft	12
Free-Flow Speed (FFS), mi/h	43.8		
Direction 2 Adjustment Factor	ors		
Driver Population	All Familiar	Final Speed Adjustment Factor (SAF)	1.000
Driver Population SAF	1.000	Final Capacity Adjustment Factor (CAF)	1.000
Driver Population CAF	1.000		
Direction 2 Demand and Cap	acity		
Volume(V) veh/h	2534	Heavy Vehicle Adjustment Factor (fHV)	1.000
Peak Hour Factor	0.94	Flow Rate (Vp), pc/h/ln	1348
Total Trucks, %	0.02	Capacity (c), pc/h/ln	1900
Single-Unit Trucks (SUT), %	-	Adjusted Capacity (cadj), pc/h/ln	1900
Tractor-Trailers (TT), %	-	Volume-to-Capacity Ratio (v/c)	0.71
Direction 2 Speed and Densi	ty		
Lane Width Adjustment (fLW)	0.0	Average Speed (S), mi/h	43.8
Total Lateral Clearance Adj. (fLLC)	0.0	Density (D), pc/mi/ln	30.8
Median Type Adjustment (fM)	0.0	Level of Service (LOS)	D
Access Point Density Adjustment (fA)	1.3		
Direction 2 Bicycle LOS			
Flow Rate in Outside Lane (vOL),veh/h	1348	Effective Speed Factor (St)	4.42
Effective Width of Volume (Wv), ft	18	Bicyle LOS Score (BLOS)	2.70
Average Effective Width (We), ft	24	Bicycle Level of Service (LOS)	С
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General Inform	nation	I=50.00								ction Inf				JIL	
Agency		TRC Worldwide En	gineerin						Duration	•	0.250				N.
Analyst		MLT		1		2/17/2			Area Ty	pe	Other				~
Jurisdiction		Clarksville MPO		Time F	Period	DHV I Peak	Morning		PHF		0.92			w ∔ E S	
Urban Street		SR 374 (Richview D		Analys	is Year	_			Analysi		1> 7:0			*	-
Intersection		US 41A (SR 112-Ma	adiso	File Na	ame	SR 37	'4 w US	41A	AM DHV	Yr 2023	Existing	g.xus	*	4 1 4 47	7
Project Descrip	tion	Existing Condtions													
Demand Inform	notion				EB			۱۸	/B		NB			SB	
Approach Move					T	R	L		г R	L	T	R	L	T	R
Demand (v), v				163	588	9	12		38 91	_	25	13	463	11	92
Demand (v), v	CII/II			103	300	9	12	11	30 91	9	23	13	403	- ' '	92
Signal Informa	ition				Π	Т	5	JJ	L I	$\overline{}$					
Cycle, s	111.8	Reference Phase	2	1	12 6		-					<u>_</u> _	→	•	4
Offset, s	0	Reference Point	End	Green	20	5.0	40.0	30	0.0 4.8	0.0		1	2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	4.				,	\leftarrow		кŤа
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.		0.0		5	6	7	8
													•		
Traffic Informa	tion				EB			WI	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), ve	h/h			163	588	9	12	113	8 911	9	25	13	463	11	92
Initial Queue (C	(a), veh/	h		0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation		Rate (<i>s</i> ₀), veh/h		1900	1900	1900	1900	190	0 1900	1900	1900	1900	1900	1900	1900
Parking (Nm), m					None			Nor	_	╄	None			None	
Heavy Vehicles		%		2	2		0	2	2	_	0		2	0	2
Ped / Bike / RT				0	0	0	0	0	0	0	0	0	0	0	0
Buses (N _b), bus				0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (A7				3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filter	• • •			1.00	1.00	1.00	1.00	1.0	_	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (W				12.0	12.0		12.0	12.		\vdash	12.0		12.0	12.0	12.0
Turn Bay Lengt	n, π			280	1000		200	100	0 210	-	200		1000	275	275
Grade (<i>Pg</i>), %	: /1-			40	0	40	40	0	40	10	0	40	40	0	40
Speed Limit, mi	ı/n	_		40	40	40	40	40	40	40	40	40	40	40	40
Phase Informa	tion			EBL		EBT	WBI		WBT	NBI	-	NBT	SBL	.	SBT
Maximum Gree	n (G _{max})) or Phase Split, s		20.0)	40.0	20.0)	40.0			30.0			30.0
Yellow Change	Interval	(Y), s		4.0		4.0	4.0		4.0			4.0			4.0
Red Clearance	Interval	(<i>Rc</i>), s		2.0		2.0	2.0		2.0			2.0			2.0
Minimum Greer	_ `			6		6	6		6			6			6
Start-Up Lost T	· , ,			2.0	_	2.0	2.0	_	2.0	2.0		2.0	2.0		2.0
Extension of Ef		Green (e), s		2.0		2.0	2.0	_	2.0	2.0		2.0	2.0		2.0
Passage (PT),	S			2.0		2.0	2.0	\rightarrow	2.0	\vdash		2.0			2.0
Recall Mode Dual Entry				Off	-	Min Yes	Off No	_	Min Yes	-		Off Yes			Off Yes
Walk (<i>Walk</i>), s				No		0.0	INO	-	0.0	-		0.0			0.0
Pedestrian Clea	arance 7	Time (PC), s				0.0		-	0.0			0.0			0.0
. Substituti Olde						0.0			5.0			5.5			5.5
Multimodal Inf					EB			WE	3		NB			SB	
		Walk / Corner Radi	us	0	No	25	0	No	_	0	No	25	0	No	25
		Vidth / Length, ft		9.0	12	0	9.0	12	_	9.0	12	0	9.0	12	0
Street Width / Is				0	0	No	0	0	No	0	0	No	0	0	No
		ane / Shoulder, ft		12	5.0	2.0	12	5.0		12	5.0	2.0	12	5.0	2.0
Pedestrian Sigr	nal / Occ	cupied Parking		No		0.50	No		0.50	No		0.50	No		0.50

		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts Sur	nmar	у				
General Inforn	aation								Intersec	lian Inf	0 mm 04i		T .	المعارية	bs L
-	iation	TDC Worldwide En	ninaarin	. ~							0.250			JAL	
Agency		TRC Worldwide Eng	gineerir		:- D-4	0/47/0	2000	_	Duration,				_3		R.
Analyst		MLT				2/17/2			Area Typ	<u>e</u>	Other		-		— }- ↓- ↓-
Jurisdiction		Clarksville MPO		Time F	erioa	Peak	Morning		PHF		0.92		¥ *	W T L	← ↓ ↓
Urban Street		SR 374 (Richview D		Analys	sis Year				Analysis		1> 7:0			*	
Intersection		US 41A (SR 112-Ma	adiso	File Na	ame	SR 37	74 w US	41A A	M DHV)	′r 2023	Existing	g.xus		14144	") *
Project Descrip	tion	Existing Condtions													
Demand Inforr	nation				EB			WI	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			163	588	9	12	113	8 911	9	25	13	463	11	92
Signal Informa	ntion				Τ	T		ال		_					
Cycle, s	111.8	Reference Phase	2	1	12 6	+3	-	7~	4.2		K		_		4
Offset, s	0	Reference Point	End			3	3					1	2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Green Yellow		5.0 4.0	40.0	30. 4.0		0.0		,	←		rt v
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0		0.0		5	6	7	8
Timer Results				EBI		EBT	WB	L	WBT	NB	L	NBT	SBI	L	SBT
Assigned Phase	e			5	_	2	1	_	6		_	8	_	_	4
Case Number				2.0 19.0	_	4.0	2.0	_	3.0			12.0		_	9.0
	ase Duration, s ange Period, (<i>Y+R c</i>), s x Allow Headway (<i>MAH</i>), s				,	57.0 6.0	8.0 6.0	_	46.0 6.0			10.8 6.0			36.0 6.0
	x Allow Headway (<i>MAH</i>), s				_	3.1	3.1		3.1			3.1		_	3.1
	eue Clearance Time (g s), s					14.8	2.8	-	42.0			5.1			32.0
	eue Clearance Time (g $_{ extstyle s}$), $ extstyle s$					9.6	0.0	_	0.0			0.1			0.0
	eue Clearance Time (<i>g</i> _s), s een Extension Time (<i>g</i> _e), s ase Call Probability					1.00	0.33	3	1.00			0.80			1.00
Max Out Proba	bility			0.01		0.24	0.00)	1.00			0.00			1.00
Movement Gro	oup Res	sults			EB			WB			NB			SB	
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I	Rate (v), veh/h		177	325	324	13	1237	990		51		503	12	100
Adjusted Satura	ation Flo	ow Rate (<i>s</i>), veh/h/l	n	1781	1870	1860	1810	1781	1585		1794		1781	1900	1585
Queue Service		· /·		10.9	12.8	12.8	0.8	38.2			3.1		30.0	0.5	5.5
Cycle Queue C		e Time (<i>g շ</i>), s		10.9	12.8	12.8	0.8	38.2			3.1		30.0	0.5	5.5
Green Ratio (g				0.12	0.46	0.46	0.02	0.36			0.04		0.27	0.27	0.27
Capacity (c), v		4:- / X /		208	854	849	32	1274			77		478	510	425
Volume-to-Cap		Itio(X) In(50 th percentile)		0.854	0.381	0.381	0.403 9.6	0.97°			0.667 36.7		1.053 509.5	0.023 5.9	0.235 52.9
		eh/In (50 th percentile)		5.2	5.4	5.3	0.4	19.0	_		1.5		20.1	0.2	2.1
		RQ) (50 th percent		0.47	0.14	0.14	0.05	0.48			0.18		0.51	0.02	0.19
Uniform Delay		, , , , , , , , , , , , , , , , , , , ,		48.5	20.0	20.0	54.3	35.3			52.7		40.9	30.1	31.9
Incremental De	` ,			8.2	0.1	0.1	3.0	18.5	_		3.7		55.8	0.0	0.1
Initial Queue De	elay (d	з), s/veh		0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
Control Delay (d), s/ve	eh		56.7	20.1	20.1	57.3	53.8	378.9		56.4		96.7	30.1	32.0
Level of Service				E	С	С	E	D	F		E		F	С	С
Approach Delay				28.0)	С	197.	5	F	56.4	1	E	84.9	9	F
Intersection De	lay, s/ve	eh / LOS				13	9.5						F		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS		/LOS		1.68	3	В	2.11		В	2.48		В	2.32	-	В
Bicycle LOS So	ore / LC	os		1.17	7	Α	2.34	1	В	0.57	7	Α	1.50)	В

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** JIL TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2023 1> 7:00 **Analysis Period** US 41A (SR 112-Madiso.. File Name SR 374 w US 41A AM DHV Yr 2023 Existing.xus Intersection **Project Description Existing Condtions** WB NB **Demand Information** EΒ SB Approach Movement L Т R L R L R L R 163 588 9 25 13 463 92 12 1138 911 9 11 Demand (v), veh/h ᄱ Signal Information Cycle, s 111.8 Reference Phase 2 ₹ ₹ Offset, s 0 Reference Point End Green 2.0 5.0 40.0 30.0 4.8 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 0.0 Saturation Flow / Delay Т R R R R 1.000 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 0.952 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.944 0.944 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.000 0.952 0.000 0.000 Right-Turn Adjustment Factor (fRT) 0.995 0.995 0.000 0.847 0.000 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (fRpb) 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3674 56 1810 3561 1585 343 954 496 1781 1900 1585 Proportion of Vehicles Arriving on Green (P) 0.36 0.04 0.04 0.12 0.46 0.46 0.02 0.36 0.04 0.27 0.27 0.27 0.04 Incremental Delay Factor (k) 0.09 0.04 0.04 0.47 0.50 0.04 0.50 0.04 0.04 Signal Timing / Movement Groups **EBL** FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 4.0 0.12 0.46 0.02 0.36 0.04 0.27 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 0 0 0 0 0 1781 Shared Saturation Flow Rate (ssh), veh/h/ln 0.0 0.0 0.0 Permitted Effective Green Time (g_p) , s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln 0 0 0.0 Protected Right Effective Green Time (g_R) , s 0.0 Multimodal EΒ WB NB SB Pedestrian Fw / Fv 0.972 0.000 0.000 1.710 1.389 0.000 1.557 0.000 Pedestrian Fs / Fdelay 0.000 0.000 0.112 0.000 0.126 0.166 0.000 0.158 Pedestrian Mcorner / Mcw Bicycle cb / db 912.80 16.52 715.59 23.05 85.39 51.23 63.12 Bicvcle Fw / Fv -3.640.68 -3.641.85 -3.64 0.08 -3.64 1.02

HCS7 Signalized Intersection Results Graphical Summary 7 4 7 4 1 1 1 **General Information Intersection Information** JIL TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF 0.92 Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2023 Analysis Period 1> 7:00 US 41A (SR 112-Madiso.. File Name SR 374 w US 41A AM DHV Yr 2023 Existing.xus Intersection **Project Description Existing Condtions Demand Information** EΒ WB NB SB Approach Movement L Т R L Т R L R L Т R 163 588 13 463 92 9 12 1138 911 9 25 11 Demand (v), veh/h Signal Information Cycle, s 111.8 Reference Phase 2 ₹ ₹ Offset, s Reference Point End Green 2.0 5.0 40.0 30.0 4.8 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement Т Т R Т R L R L L R L Т Back of Queue (Q), ft/ln (50 th percentile) 132.5 136 133.2 9.6 482.8 1745 36.7 509.5 5.9 52.9 Back of Queue (Q), veh/ln (50 th percentile) 5.2 5.4 5.3 0.4 19.0 68.7 1.5 20.1 0.2 2.1 Queue Storage Ratio (RQ) (50 th percentile) 0.47 0.05 0.48 0.18 0.51 0.02 0.14 0.14 8.31 0.19 56.7 57.3 53.8 378.9 56.4 32.0 Control Delay (d), s/veh 20.1 20.1 96.7 30.1 Level of Service (LOS) Ε С С Ε D F Ε F С С F Approach Delay, s/veh / LOS 28.0 С 197.5 F 56.4 Ε 84.9 Intersection Delay, s/veh / LOS 139.5 F 20.1 0.2 30.1 5.2 ____ 56.7 68.7 53.8 ______ 19 5.4 📥 20.1 5.3 ___ 20.1 57.3 0.4 LOS A LOS B LOS C Queue Storage Ratio < 1 LOSD LOS E Queue Storage Ratio > 1 LOS F

--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

WARNING: The shared-plus-exclusive turn lane solution is an approximation of the HCM method, because more than three lane groups cannot be accommodated. Input data for Percent Turns in Shared Lane are used to specify proportion of turning vehicles in the shared lane.

--- Comments ---

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HCS™ Streets Version 7.8.5

Generated: 4/28/2020 9:39:34 AM

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Urban Street		SR 374 (Richview D	Orive)	Analys	is Year	2023			Analysis	s Period	1> 7:0	00		₩.	i i
Intersection		US 41A (SR 112-Ma	adiso	File Na	ame	SR 37	'4 w US	41A	PM DHV	Yr 2023	Existin	g.xus	15	4147	7
Project Descrip	tion	Existing Condtions													
Demand Inform	nation				EB			V	/B		NB			SB	
Approach Move	ement			L	Т	R	L	Т.	T R	L	Т	R	L	Т	R
Demand (v), v				159	1545		22	11	79 650) 16	16	34	807	17	115
				10			"								
Signal Informa					1 2 .	\rfloor	6	닐	ll l			_			人
Cycle, s	112.9	Reference Phase	2		L. 6	\mathbb{R}	\bowtie		512			1	→ 2	3	4
Offset, s	0	Reference Point	End	Green	3.2	3.7	40.0	30	0.0 6.0	0.0			<u> </u>		
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	4.				/			\$
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.	0 2.0	0.0	_	5	6	7	8
Traffic Informa	tion				EB			WI	2	1	NB			SB	
Approach Move				L	T	R	L	T	R	L	T	R		T	R
Demand (v), ve				159	1545	27	22	117	_	16	16	34	807	17	115
Initial Queue (C		h		0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation				1900	1900	1900	1900	190	_	1900	1900	1900	1900	1900	1900
Parking (N _m), m		(),			None			Nor	_		None			None	
Heavy Vehicles		%		2	2		0	2	2		0		2	0	2
Ped / Bike / RT	, ,			0	0	0	0	0	0	0	0	0	0	0	0
Buses (N _b), bus	ses/h			0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (A7	Γ)			3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filter	ing (<i>I</i>)			1.00	1.00	1.00	1.00	1.0	0 1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (W), ft			12.0	12.0		12.0	12.			12.0		12.0	12.0	12.0
Turn Bay Lengt	h, ft			280	1000		200	100	0 210	_	200		1000	275	275
Grade (<i>Pg</i>), %					0			0		╄	0			0	
Speed Limit, mi	i/h			40	40	40	40	40	40	40	40	40	40	40	40
Phase Informa	tion			EBL		EBT	WBI	L	WBT	NBI		NBT	SBL		SBT
Maximum Gree	n (<i>G</i> max) or Phase Split, s		20.0		40.0	20.0)	40.0	1		30.0		-	30.0
Yellow Change	Interval	(Y), s		4.0		4.0	4.0		4.0			4.0			4.0
Red Clearance	Interval	(<i>Rc</i>), s		2.0		2.0	2.0		2.0			2.0			2.0
Minimum Greer				6		6	6		6			6			6
Start-Up Lost T				2.0		2.0	2.0	_	2.0	2.0		2.0	2.0		2.0
Extension of Ef		Green (e), s		2.0	_	2.0	2.0	$\overline{}$	2.0	2.0		2.0	2.0		2.0
Passage (PT),	S			2.0		2.0	2.0	_	2.0	-	_	2.0			2.0
Recall Mode				Off		Min	Off	_	Min Yes			Off			Off
Dual Entry				No		Yes	No	-		\vdash		Yes			Yes
Walk (<i>Walk</i>), s Pedestrian Clea	arance T	Time (PC) s				0.0		-	0.0			0.0			0.0
i cuestilali Olea	ai ai iUE					0.0			0.0			0.0			0.0
Multimodal Inf					EB			WE	1		NB			SB	
		Walk / Corner Radi	us	0	No	25	0	No	_	0	No	25	0	No	25
		Vidth / Length, ft		9.0	12	0	9.0	12		9.0	12	0	9.0	12	0
Street Width / Is				0	0	No	0	0	No	0	0	No	0	0	No
		ane / Shoulder, ft		12	5.0	2.0	12	5.0		12	5.0	2.0	12	5.0	2.0
Pedestrian Sigr	nal / Occ	cupied Parking		No		0.50	No		0.50	No		0.50	No		0.50

Signal Information Cycle, s 112.9 Reference Phase 2 Offset, s 0 Reference Point End Uncoordinated Yes Simult. Gap E/W On Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 0.0 NBL NBT SBL SB Timer Results EBL EBT WBL WBT NBL NBT SBL SB CB Assigned Phase 5 2 1 6 8 4 4 2.0 3.0 12.0 9.0 9.0 Chase Number 2.0 4.0 2.0 3.0 12.0 9.0 <			HCS	7 Sig	nalize	d Inte	ersec	tion F	Resu	lts Su	mmar	у				
Agency	Canaval Inform	otion								Intorocc	tion In	io umo o til		T p		ايا
Analyst		iation	TDC Worldwide En	ainaarin										- 1		
Urban Street				gineerin	_	:- D-4-	0/47/0	2000			<u>, </u>			_#		R.
Urban Street	-						_			•	oe			<u>_</u> _₹		\
Intersection	Jurisdiction		Clarksville MPO		I Ime F	erioa		Afternoo	n	PHF		0.92		¥ *	W T = 8	<u>←</u>
Project Description	Urban Street		\ <u>`</u>		Analys	is Year									*	
Demand Information				adiso	File Na	ame	SR 37	'4 w US	41A	PM DHV	Yr 2023	Existin	g.xus	_	4 1 4 7	7 4
Approach Movement Demand (v), velv/h 159 1645 27 22 1179 650 16 16 34 807 17 Signal Information Cycle, s 112,9 Reference Phase 2 Offset, s 0 Reference Point End Uncoordinated Yes Simult. Gap EM On Force Mode Fixed Simult. Gap N/S On Force Mode Fixed Simult. Gap EM On Force Mode Fixed Simult. Gap N/S On Force Mode Fixed Simult. Gap EM On Force Mode Fixed Simult. Gap E	Project Descrip	tion	Existing Condtions													
Demand (v), veh/h	Demand Inform	nation				EB		Т	W	В	Т	NB			SB	
Signal Information Cycle, s 112.9 Reference Phase 2 Offset, s 0 Reference Point End Uncoordinated Yes Simult. Gap E/W On Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 0.0 Timer Results EBL EBT WBL WBT NBL NBT SBL SB Assigned Phase 5 2 1 6 8 4 4 Case Number 2.0 4.0 2.0 3.0 12.0 9.6 Phase Duration, s 18.9 55.7 9.2 46.0 12.0 36. Change Period, (Y+R c), s 6.0	Approach Move	ement			L	Т	R	L	7	R	L	Т	R	L	Т	R
Cycle, s 112.9 Reference Point End Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 30.0 6.0 0.0 Force Mode Fixed Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 Timer Results EBL EBT WBL WBT NBL NBT SBL SB Assigned Phase 5 2 1 6 8 4 4 Case Number 2.0 4.0 2.0 3.0 12.0 9.9 Phase Duration, s 18.9 55.7 9.2 46.0 12.0 36. Change Period, (Y+Rc.), s 6.0 6.0 6.0 6.0 6.0 6.0 6.0 Max Allow Headway (MAH), s 3.1 3.0 3.1 3.0 3.2 3.3 Queue Clearance Time (g s), s 12.7 51.7 3.5 42.0 6.7 32.2 Green Extension Time (g s), s 0.2 0.0 0.0 0.0<	Demand (v), v	eh/h			159	1545	27	22	11	79 650	16	16	34	807	17	115
Cycle, s 112.9 Reference Point End Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 30.0 6.0 0.0 Force Mode Fixed Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 Timer Results EBL EBT WBL WBT NBL NBT SBL SB Assigned Phase 5 2 1 6 8 4 4 Case Number 2.0 4.0 2.0 3.0 12.0 9.9 Phase Duration, s 18.9 55.7 9.2 46.0 12.0 36. Change Period, (Y+Rc.), s 6.0 6.0 6.0 6.0 6.0 6.0 6.0 Max Allow Headway (MAH), s 3.1 3.0 3.1 3.0 3.2 3.3 Queue Clearance Time (g s), s 12.7 51.7 3.5 42.0 6.7 32.2 Green Extension Time (g s), s 0.2 0.0 0.0 0.0<	Signal Informa	ition				Т	T	- 5	ال	Į.						
Offset, s 0 Reference Point Red Uncoordinated Ves Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 6.0 0.0 Force Mode Fixed Simult. Gap R/W Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 0.0 0.0 Timer Results EBL EBL EBT WBL WBT NBL NBT SBL SB Assigned Phase 5 2 1 6 8 4 4 4 4.0 4.0 4.0 4.0 9.0 9.0 Phase Duration, s 18.9 55.7 9.2 46.0 12.0 9.0			Reference Phase	2	1	12 6		\vdash	٦٣,	24.21		×		_		4
Uncoordinated Yes Simult. Gap E/W On Fellow 3.2 3.7 40.0 30.0 6.0 0.0 7 7 7 7 7 7 7 7 7		0	Reference Point	End			3	3					1	2	3	4
Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 0.0 s 7 Timer Results EBL EBL EBL WBL WBT NBL NBT SBL SB Assigned Phase 5 2 1 6 8 4 4 2.0 3.0 12.0 9.0 9.0 Phase Duration, s 18.9 55.7 9.2 46.0 12.0 36. 6.0 6.7 332. 3.3 3.1 3.0 3.1 3.0 3.2 3.2 3.3 3.1 3.0 3.1 3.0 3.1 3.0 3.1 3.0 3.1 3.0 3.1 3.0 3.1 3.0 3.2 3.3 3.1	· · · · · · · · · · · · · · · · · · ·	-							_				Я	←		-4-
Assigned Phase						-							5	6	7	8
Assigned Phase	,		,													
Case Number 2.0 4.0 2.0 3.0 12.0 9.0 Phase Duration, s 18.9 55.7 9.2 46.0 12.0 36. Change Period, (Y+R⋄), s 6.0 6.0 6.0 6.0 6.0 6.0 Max Allow Headway (MAH), s 3.1 3.0 3.1 3.0 3.2 3.3 Queue Clearance Time (g⋄), s 12.7 51.7 3.5 42.0 6.7 32. Green Extension Time (g⋄), s 0.2 0.0 0.0 0.0 0.1 0.89 1.0 Phase Call Probability 1.00 1.00 0.53 1.00 0.89 1.0 Max Out Probability 0.01 1.00 0.00 1.00 0.00 1.0 Movement Group Results EB WB NB SB Approach Movement 5 2 12 1 6 16 3 8 18 7 4 Adjusted Flow Rate (v), veh/h 173 855 853						-			L		NB	L		SBI		SBT
Phase Duration, s 18.9 55.7 9.2 46.0 12.0 36. Change Period, (Y+R c), s 6.0 6.0 6.0 6.0 6.0 6.0 6.0 Max Allow Headway (MAH), s 3.1 3.0 3.1 3.0 3.2 3.3 Queue Clearance Time (g s), s 12.7 51.7 3.5 42.0 6.7 32. Green Extension Time (g s), s 0.2 0.0 0.0 0.0 0.1 0.0 Max Out Probability 1.00 1.00 0.53 1.00 0.89 1.0 Movement Group Results EB WB NB SB Approach Movement L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L		е			_				_							4
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$									-							9.0
Max Allow Headway (MAH), s 3.1 3.0 3.1 3.0 3.2 3.3 Queue Clearance Time (g s), s 12.7 51.7 3.5 42.0 6.7 32. Green Extension Time (g e), s 0.2 0.0 0.0 0.0 0.1 0.0 Phase Call Probability 1.00 1.00 0.53 1.00 0.89 1.0 Max Out Probability 0.01 1.00 0.00 1.00 0.00 0.00 1.0 Movement Group Results EB WB NB SB Approach Movement L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T R L T		ange Period, (Y+R c), s							-							_
Queue Clearance Time (gs), s 12.7 51.7 3.5 42.0 6.7 32. Green Extension Time (ge), s 0.2 0.0 0.0 0.0 0.1 0.0 Phase Call Probability 1.00 1.00 0.53 1.00 0.89 1.0 Max Out Probability 0.01 1.00 0.00 1.00 0.00 1.0 Movement Group Results EB WB NB SB Approach Movement L T R		x Allow Headway (<i>MAH</i>), s							_							
Green Extension Time (g_e), s 0.2 0.0 0.0 0.0 0.1 0.0 Phase Call Probability 1.00 1.00 0.53 1.00 0.89 1.0 Max Out Probability 0.01 1.00 0.00 1.00 0.00 1.0 Movement Group Results EB WB NB SB Approach Movement L T R L T <td></td> <td colspan="5">x Allow Headway (<i>MAH</i>), s eue Clearance Time (<i>g s</i>), s</td> <td></td> <td>_</td> <td>_</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>32.0</td>		x Allow Headway (<i>MAH</i>), s eue Clearance Time (<i>g s</i>), s						_	_							32.0
Phase Call Probability 1.00 1.00 0.53 1.00 0.89 1.00 Max Out Probability 0.01 1.00 0.00 1.00 0.00 1.00 Movement Group Results EB WB NB SB Approach Movement L T R		ieue Clearance Time (g $_{ ext{s}}$), $ ext{s}$							_							0.0
Movement Group Results EB WB NB SB Approach Movement L T R L T T 4 L D T A L D A L D D D D D D D D			(90),0		_	_			-							1.00
Approach Movement L T R						_	1.00		_	1.00			0.00			1.00
Approach Movement L T R	Movement Gro	un Res	sults			FR			W/F	.		NR			SB	
Assigned Movement Assigned Movement 5 2 12 1 6 16 3 8 18 7 4 Adjusted Flow Rate (v), veh/h Adjusted Saturation Flow Rate (s), veh/h/ln Adjusted Saturation Flow Rate (s), veh/h/ln 1781 1870 1859 1810 1781 1585 1720 1781 1900 1 Queue Service Time (g s), s 10.7 49.7 49.7 1.5 40.0 40.0 4.7 30.0 0.8 Cycle Queue Clearance Time (g c), s 10.7 49.7 49.7 1.5 40.0 40.0 4.7 30.0 0.8 Green Ratio (g/C) Capacity (c), veh/h 203 823 818 51 1262 562 92 473 505 4 Volume-to-Capacity Ratio (X) Back of Queue (Q), ft/ln (50 th percentile) 129.9 776 765.9 17.3 550.2 889.1 52.7 1631.5 9.2 (Queue Storage Ratio (RQ) (50 th percentile) 0.46 0.78 0.78 0.09 0.55 4.23 0.26 1.63 0.03 0.03					L		R		ir	1	L	T	R	L	ir .	R
Adjusted Flow Rate (v), veh/h 173 855 853 24 1282 707 72 877 18 1 Adjusted Saturation Flow Rate (s), veh/h/ln 1781 1870 1859 1810 1781 1585 1720 1781 1900 1 Queue Service Time (g s), s 10.7 49.7 49.7 1.5 40.0 40.0 4.7 30.0 0.8 3 Cycle Queue Clearance Time (g c), s 10.7 49.7 49.7 1.5 40.0 40.0 4.7 30.0 0.8 3 Green Ratio (g/C) 0.11 0.44 0.44 0.03 0.35 0.35 0.05 0.27 0.27 0 Capacity (c), veh/h 203 823 818 51 1262 562 92 473 505 2 Volume-to-Capacity Ratio (X) 0.852 1.039 1.043 0.471 1.016 1.258 0.779 1.853 0.037 0 Back of Queue (Q), tf/ln (50 th percentile) 129.9 776 765.9 17.3 550.2 889.1 52.7	• • • • • • • • • • • • • • • • • • • •				5	2		1	6	_	3	8		7	4	14
Adjusted Saturation Flow Rate (s), veh/h/ln 1781 1870 1859 1810 1781 1585 1720 1781 1900 1 Queue Service Time (g_s), s 10.7 49.7 49.7 1.5 40.0 40.0 4.7 30.0 0.8 7 Cycle Queue Clearance Time (g_c), s 10.7 49.7 49.7 1.5 40.0 40.0 4.7 30.0 0.8 7 Green Ratio (g/C) 0.11 0.44 0.44 0.03 0.35 0.35 0.05 0.27 0.27 0.27 0.0 Capacity (c), veh/h 203 823 818 51 1262 562 92 473 505 4 Volume-to-Capacity Ratio (X) 0.852 1.039 1.043 0.471 1.016 1.258 0.779 1.853 0.037 0. Back of Queue (Q), ft/ln (50 th percentile) 129.9 776 765.9 17.3 550.2 889.1 52.7 1631.5 9.2 0 Back of Queue (Q), veh/ln (50 th percentile) 5.1 30.5 30.6 0.7 21.7), veh/h		173		853	24	128			72		877		125
Cycle Queue Clearance Time ($g c$), s 10.7 49.7 49.7 1.5 40.0 40.0 4.7 30.0 0.8 7 Green Ratio (g/C) 0.11 0.44 0.44 0.03 0.35 0.35 0.05 0.27	•		<u> </u>	n	1781	1870	1859	1810	_	_		1720		1781	1900	1585
Green Ratio (g/C) 0.11 0.44 0.44 0.03 0.35 0.35 0.05 0.27 0.27 0 Capacity (c), veh/h 203 823 818 51 1262 562 92 473 505 2 Volume-to-Capacity Ratio (X) 0.852 1.039 1.043 0.471 1.016 1.258 0.779 1.853 0.037 0 Back of Queue (Q), ft/ln (50 th percentile) 129.9 776 765.9 17.3 550.2 889.1 52.7 1631.5 9.2 0 Back of Queue (Q), veh/ln (50 th percentile) 5.1 30.5 30.6 0.7 21.7 35.0 2.1 64.2 0.4 0 Queue Storage Ratio (RQ) (50 th percentile) 0.46 0.78 0.78 0.09 0.55 4.23 0.26 1.63 0.03 0	Queue Service	Time (g	g s), s		10.7	49.7	49.7	1.5	40.0	40.0		4.7		30.0	0.8	7.1
Capacity (c), veh/h 203 823 818 51 1262 562 92 473 505 4 Volume-to-Capacity Ratio (X) 0.852 1.039 1.043 0.471 1.016 1.258 0.779 1.853 0.037 0. Back of Queue (Q), ft/ln (50 th percentile) 129.9 776 765.9 17.3 550.2 889.1 52.7 1631.5 9.2 0. Back of Queue (Q), veh/ln (50 th percentile) 5.1 30.5 30.6 0.7 21.7 35.0 2.1 64.2 0.4 0.0 Queue Storage Ratio (RQ) (50 th percentile) 0.46 0.78 0.78 0.09 0.55 4.23 0.26 1.63 0.03 0	Cycle Queue C	learanc	e Time ($g c$), s		10.7	49.7	49.7	1.5	40.0	40.0		4.7		30.0	0.8	7.1
Volume-to-Capacity Ratio (X) 0.852 1.039 1.043 0.471 1.016 1.258 0.779 1.853 0.037	, -						-									0.27
Back of Queue (Q), ft/ln (50 th percentile) 129.9 776 765.9 17.3 550.2 889.1 52.7 1631.5 9.2 0.2 Back of Queue (Q), veh/ln (50 th percentile) 5.1 30.5 30.6 0.7 21.7 35.0 2.1 64.2 0.4 0.0 Queue Storage Ratio (RQ) (50 th percentile) 0.46 0.78 0.78 0.09 0.55 4.23 0.26 1.63 0.03 0															505	421
Back of Queue (Q), veh/ln (50 th percentile) 5.1 30.5 30.6 0.7 21.7 35.0 2.1 64.2 0.4 0.4 Queue Storage Ratio (RQ) (50 th percentile) 0.46 0.78 0.78 0.09 0.55 4.23 0.26 1.63 0.03 0	·						_				_					0.297
Queue Storage Ratio (RQ) (50 th percentile) 0.46 0.78 0.78 0.09 0.55 4.23 0.26 1.63 0.03 0		, ,														0.4
										_						0.00
				.iie)	49.1	31.6	31.6	54.0		_		52.8		41.4	30.7	33.0
		` ,														0.1
		• •	·							_		_				0.0
		- '					-					_				33.2
	- '						_									С
Approach Delay, s/veh / LOS 72.6 E 101.0 F 58.0 E 377.2 F	Approach Delay	, ,					E	101.	0	F	58.	0	E	377.	2	F
Intersection Delay, s/veh / LOS 146.2 F	Intersection Del	lay, s/ve	eh / LOS				14	6.2						F		
Multimodal Results EB WB NB SB	Multimodal Po	quite				FR			\//=	}		NR			SB	
			/LOS		1.69		В	2.12	_		2.4		В	2.31		В
								_	-		_			_	-	В

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** بالجال TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period DHV Afternoon PHF Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2023 1> 7:00 **Analysis Period** US 41A (SR 112-Madiso.. File Name SR 374 w US 41A PM DHV Yr 2023 Existing.xus Intersection **Project Description Existing Condtions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 1545 1179 650 34 159 27 22 16 16 807 17 115 Demand (v), veh/h ᄱ Signal Information Cycle, s 112.9 Reference Phase 2 ₹ ₹ Offset, s 0 Reference Point End Green 3.2 3.7 40.0 30.0 6.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 0.0 Saturation Flow / Delay Т R R R R 1.000 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 0.952 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.000 0.905 0.905 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.952 0.000 0.000 Right-Turn Adjustment Factor (fRT) 0.994 0.994 0.000 0.847 0.000 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (*f*_{Rpb}) 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3665 64 1810 3561 1585 417 417 886 1781 1900 1585 0.44 0.35 0.35 0.05 0.27 Proportion of Vehicles Arriving on Green (P) 0.11 0.44 0.03 0.05 0.05 0.27 0.27 Incremental Delay Factor (k) 80.0 0.50 0.50 0.04 0.50 0.50 0.04 0.50 0.04 0.04 Signal Timing / Movement Groups **EBL** FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 4.0 0.11 0.44 0.03 0.35 0.05 0.27 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 0 0 0 0 0 1781 Shared Saturation Flow Rate (ssh), veh/h/ln 0.0 0.0 0.0 Permitted Effective Green Time (g_p) , s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln 0 0 0.0 Protected Right Effective Green Time (g_R) , s 0.0 Multimodal EΒ WB NB SB Pedestrian Fw / Fv 0.972 0.000 0.000 1.710 1.389 0.000 1.557 0.000 Pedestrian Fs / Fdelay 0.000 0.000 0.115 0.000 0.127 0.167 0.000 0.157 Pedestrian Mcorner / Mcw Bicycle cb / db 880.25 17.69 708.61 23.53 107.03 63.67 50.57 Bicvcle Fw / Fv -3.641.55 -3.641.66 -3.64 0.12 -3.64 1.68

HCS7 Signalized Intersection Results Graphical Summary 7 4 7 4 1 1 1 **General Information Intersection Information** بالجالي TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other Jurisdiction Clarksville MPO Time Period **DHV Afternoon** PHF 0.92 Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2023 1> 7:00 **Analysis Period** US 41A (SR 112-Madiso.. File Name SR 374 w US 41A PM DHV Yr 2023 Existing.xus Intersection **Project Description Existing Condtions Demand Information** EΒ WB NB SB Approach Movement L Т R L Т R L R L Т R 650 34 159 1545 27 22 1179 16 16 807 17 115 Demand (v), veh/h Signal Information Cycle, s 112.9 Reference Phase 2 ₹ ₹ Offset, s Reference Point End Green 3.2 3.7 40.0 30.0 6.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement Т Т R Т Τ R L R L L R L Back of Queue (Q), ft/ln (50 th percentile) 129.9 776 765.9 17.3 550.2 889.1 52.7 1631.5 9.2 0.4 Back of Queue (Q), veh/ln (50 th percentile) 5.1 30.5 30.6 0.7 21.7 35.0 2.1 64.2 0.4 0.0 Queue Storage Ratio (RQ) (50 th percentile) 0.46 0.55 0.26 0.03 0.00 0.78 0.78 0.09 4.23 1.63 56.8 56.5 65.8 166.5 58.0 Control Delay (d), s/veh 73.6 74.8 433.5 30.7 33.2 Level of Service (LOS) Ε F F Ε F F Ε F С С F Approach Delay, s/veh / LOS 72.6 Ε 101.0 F 58.0 Ε 377.2 Intersection Delay, s/veh / LOS 146.2 F 64.2 433.5 5.1 ___ 56.8 166.5 30.5 65.8 21.7 30.6∎ 56.5 0.7 LOS A LOS B LOS C Queue Storage Ratio < 1 LOSD LOS E Queue Storage Ratio > 1 LOS F

--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

WARNING: The shared-plus-exclusive turn lane solution is an approximation of the HCM method, because more than three lane groups cannot be accommodated. Input data for Percent Turns in Shared Lane are used to specify proportion of turning vehicles in the shared lane.

--- Comments ---

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HCS™ Streets Version 7.8.5

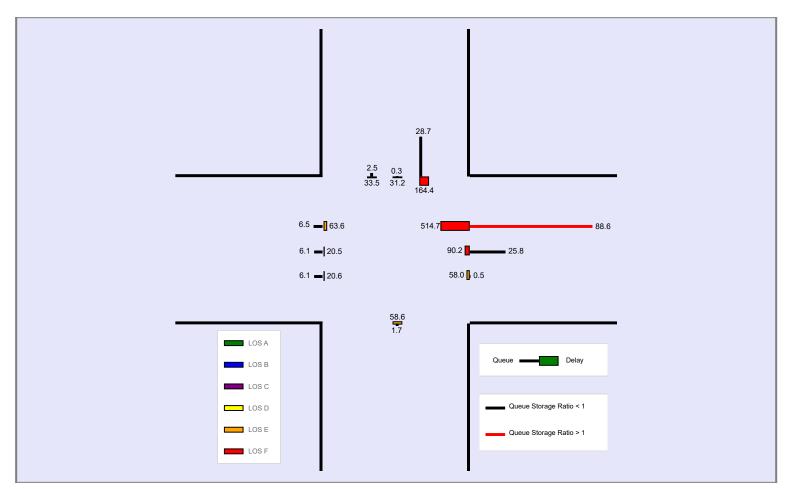
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		ŀ	HCS7	Signa	lized	Inter	section	on li	nput D	ata					
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General Inform	nation	TD0 14/ 11/ 11/ E							Intersec		W		_	JAL	P 4
Agency		TRC Worldwide En	gineerin	_		014710			Duration		0.250				P_
Analyst		MLT		Analys					Area Typ	e	Other			w∱E	<u> </u>
Jurisdiction		Clarksville MPO		Time F		Peak	Morning		PHF		0.92		1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	W † E 8	↑
Urban Street		SR 374 (Richview [Analys					Analysis		1> 7:0			•	
Intersection		US 41A (SR 112-M	adiso	File Na	ame	SR 37	'4 w US	41A	AM DHV	Yr 2033	Existin	g.xus	The state of the s	ব 1 কম্	7 4
Project Descrip	tion	Existing Condtions													
Demand Inform	nation				EB			W	'B		NB			SB	
Approach Move	ement			L	Т	R	L	1	R	L	T	R	L	T	R
Demand (v), v	eh/h			187	647	10	14	12	52 1048	10	29	15	532	13	106
Signal Informa	ition						5	4/	L. I						
Cycle, s	114.0	Reference Phase	2	1	2 6		\vdash	٦٣,	24.21		K		→	-	4
Offset, s	0	Reference Point	End	0	0.0	B	10.0	100				1	2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Green Yellow		6.6 4.0	40.0	30 4.0		0.0	_	, I	\leftarrow		r†a
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0		0.0		5	6	7	8
Traffic Informa	tion				EB			WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), ve	h/h			187	647	10	14	125	2 1048	10	29	15	532	13	106
Initial Queue (C	(a), veh/	h		0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation	n Flow F	Rate (<i>s</i> ₀), veh/h		1900	1900	1900	1900	190	0 1900	1900	1900	1900	1900	1900	1900
Parking (Nm), m	nan/h				None			Non	е		None			None	
Heavy Vehicles	(<i>P</i> _{HV}), ⁹	%		2	2		0	2	2		0		2	0	2
Ped / Bike / RT	OR, /h			0	0	0	0	0	0	0	0	0	0	0	0
Buses (N _b), bus	ses/h			0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (A7	Γ)			3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filter	ing (<i>I</i>)			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (W)), ft			12.0	12.0		12.0	12.0	12.0		12.0		12.0	12.0	12.0
Turn Bay Lengt	h, ft			280	1000		200	100	0 210		200		1000	275	275
Grade (<i>Pg</i>), %					0			0			0			0	
Speed Limit, mi	i/h			40	40	40	40	40	40	40	40	40	40	40	40
Phase Informa	ition			EBL		EBT	WBI		WBT	NBL	_	NBT	SBL		SBT
Maximum Gree	n (G _{max})) or Phase Split, s		20.0		40.0	20.0)	40.0			30.0			30.0
Yellow Change	Interval	(Y), s		4.0		4.0	4.0		4.0			4.0			4.0
Red Clearance	Interval	(<i>Rc</i>), s		2.0		2.0	2.0		2.0			2.0			2.0
Minimum Greer	า (<i>Gmin</i>)	, S		6		6	6		6			6			6
Start-Up Lost Ti				2.0		2.0	2.0	-	2.0	2.0		2.0	2.0		2.0
Extension of Ef		Green (e), s		2.0		2.0	2.0	_	2.0	2.0		2.0	2.0		2.0
Passage (PT), s	s			2.0		2.0	2.0	-	2.0			2.0			2.0
Recall Mode				Off		Min	Off	_	Min			Off			Off
Dual Entry				No		Yes	No		Yes			Yes			Yes
Walk (Walk), s		F: (D2)				0.0			0.0			0.0			0.0
Pedestrian Clea	arance	ime (<i>PC</i>), s				0.0			0.0			0.0			0.0
Multimodal Inf	ormatio	on			EB			WE	3		NB			SB	
85th % Speed /	Rest in	Walk / Corner Radi	us	0	No	25	0	No	25	0	No	25	0	No	25
		Vidth / Length, ft		9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Is				0	0	No	0	0	No	0	0	No	0	0	No
		ane / Shoulder, ft		12	5.0	2.0	12	5.0		12	5.0	2.0	12	5.0	2.0
Pedestrian Sigr	nal / Occ	cupied Parking		No		0.50	No		0.50	No		0.50	No		0.50

General Information Agency TRC World															
Agency TRC World														시 가하 1	
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	dwide En	igineerin			1				ation, l		0.250				R.
Analyst MLT			<u> </u>		2/17/2				а Туре -	;	Other			w	~
Jurisdiction Clarksville	MPO		Time F	Period	DHV I Peak	Morning		PHF	-		0.92		\(\frac{1}{2}\)	₩ E 8	← ‡ ← ↓ ↓
Urban Street SR 374 (F	Richview I	Drive)	Analys	is Year	2033			Anal	lysis F	Period	1> 7:0	00	_la	•	
Intersection US 41A (S	SR 112-M	adiso	File Na	ame	SR 37	'4 w US	41A	AM D	HV Yı	r 2033	Existing	J.xus	1	4 144	t- (*
Project Description Existing C	ondtions														
Demand Information				EB			W	В			NB		Т	SB	
Approach Movement			L	Т	R	L	T	-	R	L	Т	R	L	Т	R
Demand (v), veh/h			187	647	10	14	12	52 1	1048	10	29	15	532	13	106
Cianal Information					-	1 -	. 11			<u> </u>					
Signal Information Cycle, s 114.0 Reference	n Dhasa	2	1		42	L ?	늭묎	7				/			人
Offset, s 0 Reference		End			R	R	,					1	2	3	4
Uncoordinated Yes Simult. G		-	Green		6.6	40.0	30		5.1	0.0		_			
		On	Yellow		4.0	4.0	4.0		4.0	0.0		^ _		-	Ψ
Force Mode Fixed Simult. G	ap N/S	On	Red	2.0	2.0	2.0	2.0)	2.0	0.0		5	6	1	8
Timer Results			EBI	_	EBT	WB	L	WB	3T	NBL	_	NBT	SBI	-	SBT
Assigned Phase			5		2	1		6				8			4
Case Number			2.0		4.0	2.0		3.0)			12.0			9.0
Phase Duration, s			20.9	,	58.6	8.3		46.0	0			11.1			36.0
Change Period, (Y+Rc), s			6.0		6.0	6.0		6.0)			6.0			6.0
Max Allow Headway (<i>MAH</i>), s	ue Clearance Time (g s), s					3.1		3.1	1			3.1			3.1
Queue Clearance Time (g s), s	ue Clearance Time (g s), s				16.5	2.9		42.0	0			5.7			32.0
Green Extension Time (g_e), s	en Extension Time (g $_e$), s				11.5	0.0		0.0)			0.1			0.0
Phase Call Probability	e Call Probability				1.00	0.38	3	1.00	0			0.84			1.00
Max Out Probability	·				0.40	0.00)	1.00	0		(0.00			1.00
Movement Group Results				EB			WE	3			NB			SB	
Approach Movement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Assigned Movement			5	2	12	1	6	1	16	3	8	18	7	4	14
Adjusted Flow Rate (v), veh/h			203	358	356	15	136	_	139		59		578	14	115
Adjusted Saturation Flow Rate (s), veh/h/	ln	1781	1870	1860	1810	178	_	585		1794		1781	1900	1585
Queue Service Time (g s), s	,.		12.8	14.5	14.5	0.9	40.0) 40	0.0		3.7		30.0	0.6	6.6
Cycle Queue Clearance Time (g	c), S		12.8	14.5	14.5	0.9	40.0) 40	0.0		3.7		30.0	0.6	6.6
Green Ratio (g/C)			0.13	0.46	0.46	0.02	0.35	5 0.	.35		0.04		0.26	0.26	0.26
Capacity (c), veh/h			233	863	859	36	125	0 5	556		80		469	500	417
Volume-to-Capacity Ratio (X)			0.873	0.415	0.415	0.418	1.08	9 2.0	048		0.736		1.233	0.028	0.276
Back of Queue (Q), ft/ln (50 th p	ercentile)	165.5	154.7	151.5	11.3	655.		249. 7		43.5		728	7.1	63.5
Back of Queue (Q), veh/ln (50 t	n percent	ile)	6.5	6.1	6.1	0.5	25.8		8.6		1.7		28.7	0.3	2.5
Queue Storage Ratio (RQ) (50	-		0.59	0.15	0.15	0.06	0.66	_	0.71		0.22		0.73	0.03	0.23
Uniform Delay (d 1), s/veh			48.6	20.4	20.4	55.2	37.0	3	7.0		53.8		42.0	31.2	33.4
Incremental Delay (d 2), s/veh			15.0	0.1	0.1	2.8	53.2	2 47	77.7		4.9		122.4	0.0	0.1
Initial Queue Delay (d з), s/veh			0.0	0.0	0.0	0.0	0.0	0	0.0		0.0		0.0	0.0	0.0
Control Delay (d), s/veh			63.6	20.5	20.6	58.0	90.2	2 51	14.7		58.6		164.4	31.2	33.5
Level of Service (LOS)			E	С	С	Е	F		F		E		F	С	С
Approach Delay, s/veh / LOS			30.1		С	282.	2	F		58.6		E	140.	4	F
Intersection Delay, s/veh / LOS					20	0.1							F		
Multimodal Results				EB			WE	3			NB			SB	
Pedestrian LOS Score / LOS			1.68		В	2.12	_	В		2.48		В	2.32		В
Bicycle LOS Score / LOS			1.24		A	2.56	_	С		0.58	_	A	1.66		В

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** بالجال TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2033 1> 7:00 **Analysis Period** US 41A (SR 112-Madiso.. File Name SR 374 w US 41A AM DHV Yr 2033 Existing.xus Intersection **Project Description Existing Condtions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 647 1048 29 15 106 187 10 14 1252 10 532 13 Demand (v), veh/h 泒 Signal Information Cycle, s 114.0 Reference Phase 2 ₹ ₹ Offset, s 0 Reference Point End Green 2.3 6.6 40.0 30.0 5.1 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 0.0 Saturation Flow / Delay Т R Т R R R 1.000 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 0.952 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.000 0.944 0.944 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.952 0.000 0.000 Right-Turn Adjustment Factor (fRT) 0.995 0.995 0.000 0.847 0.000 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (*f*_{Rpb}) 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3674 57 1810 3561 1585 332 963 498 1781 1900 1585 Proportion of Vehicles Arriving on Green (P) 0.35 0.35 0.04 0.04 0.13 0.46 0.46 0.02 0.04 0.26 0.26 0.26 Incremental Delay Factor (k) 0.18 0.04 0.04 0.04 0.50 0.50 0.04 0.50 0.04 0.04 Signal Timing / Movement Groups **EBL** FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 4.0 0.13 0.46 0.02 0.35 0.04 0.26 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 0 0 0 0 0 1781 Shared Saturation Flow Rate (ssh), veh/h/ln 0.0 0.0 0.0 Permitted Effective Green Time (g_p) , s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln 0 0 0.0 Protected Right Effective Green Time (g_R) , s 0.0 Multimodal EΒ WB NB SB Pedestrian Fw / Fv 0.972 0.000 0.000 1.710 1.389 0.000 1.557 0.000 Pedestrian Fs / Fdelay 0.000 0.000 0.112 0.000 0.127 0.167 0.000 0.158 Pedestrian Mcorner / Mcw Bicycle cb / db 923.18 16.52 24.00 64.20 88.89 701.97 52.03 Bicvcle Fw / Fv -3.640.76 -3.642.08 -3.64 0.10 -3.64 1.17

		HCS7 Sig	nalize	ed Inte	ersect	ion R	Result	ts G	raphic	al Sur	nmar	y			
General Inform	nation								Intersec	tion Inf	ormatic	n	لير] [[4 작화 1 1	يدا يد
Agency		TRC Worldwide En	gineerin	ıg					Duration	, h	0.250			5 h 2	Pr.
Analyst		MLT		Analys	is Date	2/17/2	020		Area Ty	е	Other	•	±, →₹		<u> </u>
Jurisdiction		Clarksville MPO		Time F	Period	DHV N Peak	/lorning		PHF		0.92		\$ → -{ → →	w ↑ E 8	- \
Urban Street		SR 374 (Richview [Orive)	Analys	is Year	2033			Analysis	Period	1> 7:0	00		uta-	
Intersection		US 41A (SR 112-Ma	adiso	File Na	ame	SR 37	4 w US	41A	AM DHV	Yr 2033	Existing	g.xus	*1	4 1 4 Y 1	in [4
Project Descript	tion	Existing Condtions											7		
										_,					
Demand Inforn					EB		<u> </u>	W		<u> </u>	NB			SB	
Approach Move				L	T	R	L	Т		L	Т	R	L	Т	R
Demand (<i>v</i>), v	eh/h			187	647	10	14	12	52 1048	3 10	29	15	532	13	106
Oi ann al lasfa anns a	4!				1	T	1 -		T I						
Signal Informa	114.0	Reference Phase	2	-	ے جا	12	1. ?	닉섿	7			_			ΔⅡ
Cycle, s	0	Reference Point		4		R	R	7	1171			1	> 2	3	4
Offset, s Uncoordinated			End	Green		6.6	40.0	30		0.0		_	<u> </u>		
	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	4.0		0.0					$ \Psi $
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0	2.0	0.0	_	5	6	7	8
Movement Gro	un Bos	aulto			EB			WE)		NB			SB	
Approach Move		buits			Т	R	L	T	R	L	T	R		T	R
		/In (50 th percentile)	\	165.5	154.7	151.5	11.3	655.			43.5	K	728	7.1	63.5
									7						
	• ,	eh/In (50 th percenti		6.5	6.1	6.1	0.5	25.8			1.7		28.7	0.3	2.5
Queue Storage	Ratio (RQ) (50 th percent	tile)	0.59	0.15	0.15	0.06	0.66	3 10.71		0.22		0.73	0.03	0.23
Control Delay (63.6	20.5	20.6	58.0	90.2	514.7		58.6		164.4	31.2	33.5
Level of Service				E	С	С	E	F	F		E		F	С	С
Approach Delay	, s/veh	/ LOS		30.1		С	282.	2	F	58.6	3	Е	140.4	1	F
Intersection Del	lay, s/ve	h / LOS				200	0.1						F		



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HCS™ Streets Version 7.8.5

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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

WARNING: The shared-plus-exclusive turn lane solution is an approximation of the HCM method, because more than three lane groups cannot be accommodated. Input data for Percent Turns in Shared Lane are used to specify proportion of turning vehicles in the shared lane.

--- Comments ---

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HCS™ Streets Version 7.8.5

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General Inform	nation	TD0 W										ormatic	n	- 1	با ال	~ X
Agency		TRC Worldwide En	gineerin			0/47/0	200		Durati			0.250				R.
Analyst		MLT		1		2/17/2			Area	ype		Other			w ↑ E	<u> </u>
Jurisdiction		Clarksville MPO		Time F		Peak	Afternoo	n 	PHF			0.92		 	W † E 8	# \ # \ # \
Urban Street		SR 374 (Richview [Analys	is Year	_			Analys			1> 7:0			*	
Intersection		US 41A (SR 112-M	adiso	File Na	ame	SR 37	'4 w US	41A	PM DH	V Yr	2033	Existing	g.xus		4144	7
Project Descrip	tion	Existing Condtions														
Demand Inform	nation				EB			V	/B			NB			SB	
Approach Move	ement			L	Т	R	L	Т-	Г	R	L	Т	R	L	Т	R
Demand (v), v				183	1700	31	25	_	$\overline{}$	48	18	19	39	928	20	132
				16-												
Signal Informa	tion				2	2	5	닐	7							\mathbf{L}
Cycle, s	115.9	Reference Phase	2		L. 6	Ħ	\bowtie		512					→ 2	3	4
Offset, s	0	Reference Point	End	Green	3.5	5.3	40.0	30		.1	0.0			<u> </u>		
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	4.0		.0	0.0		~ '	_		V
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0	0 2	.0	0.0		5	6	7	8
Traffic Informa					EB			WE		+		NB			SB	
Approach Move				L	T	R	L	T	R	_	L	T	R	L	T	R
Demand (v), ve				183	1700	31	25	129	_	_	18	19	39	928	20	132
Initial Queue (C				0	0	0	0	0	0	_	0	0	0	0	0	0
Base Saturation		Rate (S₀), ven/n		1900	1900	1900	1900	190	_	00	1900	1900	1900	1900	1900	1900
Parking (N _m), m		n/		0	None			Non	_	+		None		0	None	
Heavy Vehicles		%		2	2		0	2	2	_		0		2	0	2
Ped / Bike / RT				0	0	0	0	0	0	-	0	0	0	0	0	0
Buses (N _b), bus				3	3	3	3	3	3	-	3	3	3	3	3	3
Arrival Type (A7 Upstream Filter				1.00	1.00	1.00	1.00	1.0	_	_	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (W)				12.0	12.0	1.00	12.0	12.	_	_	1.00	12.0	1.00	12.0	12.0	12.0
Turn Bay Lengt				280	1000		200	100	_	_		200		1000	275	275
Grade (Pg), %	,			200	0		200	0	7			0		1000	0	210
Speed Limit, mi	i/h			40	40	40	40	40	40		40	40	40	40	40	40
populari, m	.,										.0					
Phase Informa				EBL	_	EBT	WBI	_	WBT	1	NBL	_	NBT	SBL		SBT
		or Phase Split, s		20.0		40.0	20.0	_	40.0	4		_	30.0			30.0
Yellow Change		· · · · ·		4.0		4.0	4.0	_	4.0	4			4.0			4.0
Red Clearance				2.0		2.0	2.0	_	2.0	4			2.0			2.0
Minimum Green	_ `			6		6	6		6	1			6			6
Start-Up Lost T	. ,			2.0	_	2.0	2.0	_	2.0	+	2.0		2.0	2.0		2.0
Extension of Ef		sieen (e), s		2.0		2.0	2.0	_	2.0	-	2.0	_	2.0	2.0		2.0
Recall Mode	5			Off		Min	Off	_	Min	+			Off			Off
Dual Entry				No		Yes	No	_	Yes	-			Yes			Yes
Walk (<i>Walk</i>), s				INO		0.0	INO		0.0				0.0			0.0
Pedestrian Clea	arance 7	Time (PC), s				0.0			0.0	+			0.0			0.0
		(), -														
Multimodal Inf					EB			WE	3			NB			SB	
		Walk / Corner Radi	us	0	No	25	0	No	_	5	0	No	25	0	No	25
		Vidth / Length, ft		9.0	12	0	9.0	12	_	_	9.0	12	0	9.0	12	0
Street Width / Is				0	0	No	0	0	No	_	0	0	No	0	0	No
		ane / Shoulder, ft		12	5.0	2.0	12	5.0)	12	5.0	2.0	12	5.0	2.0
Pedestrian Sigr	nai / Occ	cupied Parking		No		0.50	No		0.50	_	No		0.50	No		0.50

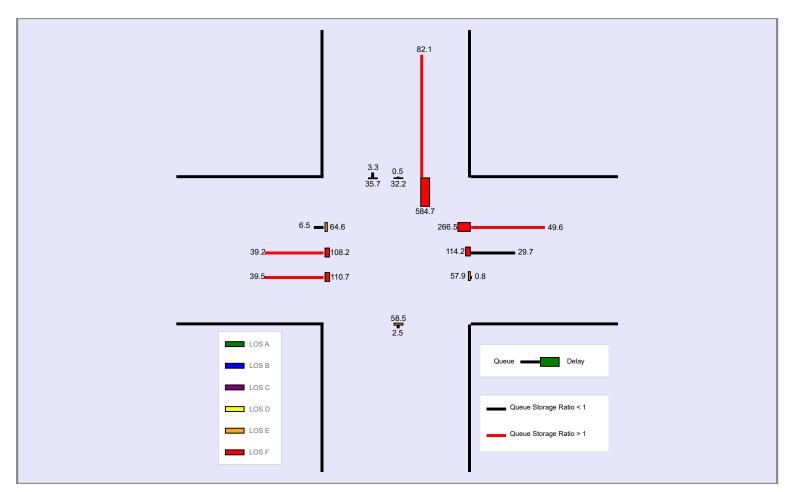
		HCS	7 Sig	nalize	d Int	ersec	tion R	Resu	ılts Suı	mmar	у				
	41														L. I
General Inforn	nation	Y							Intersec		V		_	1 1	\$× 1.7
Agency		TRC Worldwide En	gıneerin			1011-10			Duration		0.250				K.
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Jurisdiction		Clarksville MPO		Time F	Period	DHV / Peak	Afternoo	n	PHF		0.92		\$ → -{ -} -}	₩ E 8	← ‡
Urban Street		SR 374 (Richview [Orive)	Analys	sis Year	2033			Analysis	Period	1> 7:0	00	N N	₩.	l _k
Intersection		US 41A (SR 112-Ma	adiso	File Na	ame	SR 37	74 w US	41A	PM DHV	Yr 2033	Existing	g.xus	ň	4 1 4 7	†* (*
Project Descrip	tion	Existing Condtions													
Demand Inforr	nation				EB			W	'В		NB			SB	
Approach Move				L	Т	R	L	T 7		1	T	R	L	Т	R
Demand (v), v				183	1700		25	12	_	18	19	39	928	20	132
															102
Signal Informa	tion						5	되기	7	\top					T
Cycle, s	115.9	Reference Phase	2		F 6	Ħ	\ R		542			-	\leftrightarrow .	1	47 2
Offset, s	0	Reference Point	End	Green	3.5	5.3	40.0	30	.0 7.1	0.0		1	¥ 2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	4.0		0.0		>			S
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0		0.0		5	6	7	8
Timer Results				EBI	-	EBT	WB	L	WBT	NB	L	NBT	SBL	-	SBT
Assigned Phas	е			5		2	1	_	6			8	_	_	4
Case Number				2.0		4.0	2.0		3.0			12.0			9.0
Phase Duration	·			20.8	3	57.3	9.5	_	46.0			13.1	_		36.0
Change Period	-			6.0	_	6.0	6.0	_	6.0		_	6.0	-	_	6.0
Max Allow Head				3.1		3.0	3.1	-	3.0		_	3.2	_		3.1
Queue Clearan		, - ,		14.7		53.3	3.7	_	42.0		_	7.5	-		32.0
Green Extension		(<i>g</i> _e), S		0.2	-	0.0	0.0	_	0.0			0.1	-		0.0
				1.00 0.10	_	1.00	0.58	_	1.00			0.93	-	_	1.00
Max Out Proba	se Call Probability Out Probability					1.00	0.00)	1.00			0.00			1.00
Movement Gro	oup Res	sults			EB			WE	3		NB			SB	
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	Т	R
Assigned Move	ment			5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I	Rate (v), veh/h		199	941	940	27	141	0 813		83		1009	22	143
Adjusted Satura	ation Flo	ow Rate (s), veh/h/l	n	1781	1870	1858	1810	178	1 1585		1721		1781	1900	1427
Queue Service	Time (g s), s		12.7	51.3	51.3	1.7	40.0	40.0		5.5		30.0	1.0	9.6
Cycle Queue C	learanc	e Time (<i>g c</i>), s		12.7	51.3	51.3	1.7	40.0	40.0		5.5		30.0	1.0	9.6
Green Ratio (g	/C)			0.13	0.44	0.44	0.03	0.3	0.35		0.06		0.26	0.26	0.26
Capacity (c), v	/eh/h			228	828	823	55	122	9 547		105		461	492	369
Volume-to-Cap	acity Ra	ntio (X)		0.872	1.136	1.142	0.497	1.14	7 1.487		0.786		2.188	0.044	0.389
Back of Queue	(Q), ft	/In (50 th percentile))	164.7	994.7	987.4	20.2	753.	4 1258. 7		61.8		2086.3	11.3	83.8
Back of Queue	(Q). ve	eh/In (50 th percenti	ile)	6.5	39.2	39.5	0.8	29.7			2.5		82.1	0.5	3.3
	· ,	RQ) (50 th percent		0.59	0.99	1.00	0.10	0.7			0.31		2.09	0.04	0.30
Uniform Delay				49.6	32.3	32.3	55.3	38.0			53.7		43.0	32.2	35.4
Incremental De	`			15.0	75.9	78.4	2.6	76.2	2 228.6		4.8		541.7	0.0	0.2
Initial Queue De	- 1	,		0.0	0.0	0.0	0.0	0.0			0.0		0.0	0.0	0.0
Control Delay (d), s/ve	eh		64.6	108.2	110.7	57.9	114.	2 266.5		58.5		584.7	32.2	35.7
Level of Service	e (LOS)			Е	F	F	Е	F	F		Е		F	С	D
Approach Delay	y, s/veh	/ LOS		105.	2	F	168.	5	F	58.	5	E	507.4	4	F
Intersection De	lay, s/ve	eh / LOS				21	4.5						F		
Multimodal Re	sulte				EB			WE	3		NB			SB	
Pedestrian LOS		/LOS		1.69		В	2.12	-	В	2.4		В	2.31		В
Bicycle LOS So				2.20		В	2.34	_	В	0.6		A	2.42		В
	J. J , L			(_			_	3.0		•			_

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** بالجال TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period DHV Afternoon PHF Peak **Urban Street** SR 374 (Richview Drive) 2033 1> 7:00 Analysis Year **Analysis Period** US 41A (SR 112-Madiso.. File Name SR 374 w US 41A PM DHV Yr 2033 Existing.xus Intersection **Project Description Existing Condtions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 1700 748 39 132 183 31 25 1297 18 19 928 20 Demand (v), veh/h ᄱ Signal Information Cycle, s 115.9 Reference Phase 2 ₹ ₹ Offset, s 0 Reference Point End Green 3.5 5.3 40.0 30.0 7.1 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 0.0 Saturation Flow / Delay Т R R R R 1.000 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.900 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 0.952 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.000 0.906 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.906 0.952 0.000 0.000 Right-Turn Adjustment Factor (fRT) 0.994 0.994 0.000 0.847 0.000 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (*f*_{Rpb}) 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3662 67 1810 3561 1585 408 430 883 1781 1900 1427 0.35 0.35 0.06 Proportion of Vehicles Arriving on Green (P) 0.13 0.44 0.44 0.03 0.06 0.06 0.26 0.26 0.26 Incremental Delay Factor (k) 0.18 0.50 0.50 0.04 0.50 0.50 0.04 0.50 0.04 0.04 Signal Timing / Movement Groups **EBL** FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 4.0 0.13 0.44 0.03 0.35 0.06 0.26 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 0 0 0 0 0 1781 Shared Saturation Flow Rate (ssh), veh/h/ln 0.0 0.0 0.0 Permitted Effective Green Time (g_p) , s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln 0 0 0.0 Protected Right Effective Green Time (g_R) , s 0.0 Multimodal EΒ WB NB SB Pedestrian Fw / Fv 0.972 0.000 0.000 1.710 1.389 0.000 1.557 0.000 Pedestrian Fs / Fdelay 0.000 0.000 0.116 0.000 0.129 0.167 0.000 0.158 Pedestrian Mcorner / Mcw Bicycle cb / db 885.82 17.99 690.14 24.86 65.17 122.10 51.10 Bicvcle Fw / Fv -3.641.72 -3.641.86 -3.64 0.14 -3.64 1.94

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General Inform	nation								Inter	rsect	ion Inf	ormatic	n	لير] [4 Y/4> 1	js l _s
Agency		TRC Worldwide En	gineerin	ıg					Dura	ation,	h	0.250			5 h 2	I _C
Analyst		MLT		Analys	is Date	2/17/2	020		Area	а Туре	Э	Other		±, →₹		~ ≜
Jurisdiction		Clarksville MPO		Time P	eriod	DHV A Peak	Afternoc	n	PHF	=		0.92			w‡E 8	- \
Urban Street		SR 374 (Richview [Orive)	Analys	is Year	2033			Anal	lysis l	Period	1> 7:0	00		.t.	
Intersection		US 41A (SR 112-M	adiso	File Na	me	SR 37	4 w US	41A	PM D	HV Y	r 2033	Existing	g.xus	ኻ	1 1 1 4 7 1	7
Project Descrip	tion	Existing Condtions				,								7		
Demand Inform	nation				EB			W	'B			NB		<u> </u>	SB	
Approach Move				L	T	R	L	1		R	L	T	R	<u> </u>	T	R
Demand (<i>v</i>), v	eh/h			183	1700	31	25	12	97	748	18	19	39	928	20	132
Signal Informa	ition						5		J		Т					
Cycle, s	115.9	Reference Phase	2			Ħ	\ ∃	٦,	542					\rightarrow	<u> </u>	4 2
Offset, s	0	Reference Point	End	Green	3.5	5.3	40.0	30		7.1	0.0		1	¥ 2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	4.0		4.0	0.0		>	←		512
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0		2.0	0.0		5	6	7	8
Movement Gro	up Res	sults			EB			WE	3			NB			SB	
Approach Move	ement			L	Т	R	L	Т		R	L	Т	R	L	Т	R
Back of Queue	(Q), ft.	/In (50 th percentile))	164.7	994.7	987.4	20.2	753.		258. 7		61.8		2086.3	11.3	83.8
Back of Queue	(Q), v	eh/In (50 th percent	ile)	6.5	39.2	39.5	0.8	29.7	7 49	9.6		2.5		82.1	0.5	3.3
Queue Storage	Ratio (RQ) (50 th percen	tile)	0.59	0.99	1.00	0.10	0.75	5 5.	.99		0.31		2.09	0.04	0.30
Control Delay (d), s/v	eh		64.6	108.2	110.7	57.9	114.	2 26	66.5		58.5		584.7	32.2	35.7
Level of Service	e (LOS)			E	F	F	Е	F		F		Е		F	С	D
Approach Delay	y, s/veh	/LOS		105.2	2	F	168.	5	F		58.5	5	E	507.4	1	F

214.5

Intersection Delay, s/veh / LOS



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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

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--- Comments ---

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General Inforn	nation	TD0 \M							Intersec		V		_	با بار	P
Agency		TRC Worldwide En	gineerin	_		011710		_		•					P_
Analyst		MLT			EB WB NB L T R L T R L T R 212 706 12 16 1366 1184 12 33 1 0 0 0 0 0 0 0 0 0 0 0 900 1900 1900 1								w∱E	<u> </u>	
Jurisdiction		Clarksville MPO				Peak	Morning						**************************************	W † E 8	↑
Urban Street		SR 374 (Richview D		Analys	is Year									*	
Intersection		US 41A (SR 112-Ma	adiso	File Na	ame	SR 37	'4 w US	41A A	M DHV	/r 2043	Existing	g.xus		ব 1471	h (*
Project Descrip	tion	Existing Condtions													
Demand Inforr	mation				EB			WI	В		NB		1	SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v				212	706	_	16	136	_	12	33	17	602	14	120
Signal Informa	ation					T	1 5	الرك		$\overline{}$					
Cycle, s	116.6	Reference Phase	2		12 6	+3	\vdash	7~	M 21		K		→	-	4
Offset, s	0	Reference Point	End	0	0.0		10.0	00				1	2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On					_				٠ بر	\leftarrow		r 🕇 🛪
Force Mode	Fixed	Simult. Gap N/S	On	Red				_				5	6	7	8
												<u> </u>		<u>'</u>	
Traffic Informa	ation				EB			WB			NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), ve	Demand (<i>v</i>), veh/h			212	706	12	16	1366	1184	12	33	17	602	14	120
Initial Queue (C	nitial Queue (Q _b), veh/h			0	0	0	0	0	0	0	0	0	0	0	0
Base Saturation	n Flow F	Rate (s₀), veh/h		1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Parking (N _m), m	nan/h				None			None)		None			None	
Heavy Vehicles	(<i>P</i> _{HV}), ⁽	%		2	2		0	2	2		0		2	0	2
Ped / Bike / RT	OR, /h			0	0	0	0	0	0	0	0	0	0	0	0
Buses (N _b), bus	ses/h			0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (A	<i>T</i>)			3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filter	ing (/)			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (W), ft			12.0	12.0		12.0	12.0	12.0		12.0		12.0	12.0	12.0
Turn Bay Lengt	h, ft			280	1000		200	1000	210		200		1000	275	275
Grade (<i>Pg</i>), %					0			0			0			0	
Speed Limit, m	i/h			40	40	40	40	40	40	40	40	40	40	40	40
Phase Informa	ition			EBL		EBT	WBI		WBT	NBL		NBT	SBL		SBT
) or Phase Split, s		20.0		40.0	20.0	_	40.0			30.0			30.0
Yellow Change				4.0		4.0	4.0		4.0			4.0			4.0
Red Clearance	Interval	I (Rc), s		2.0		2.0	2.0	\neg	2.0			2.0			2.0
Minimum Green	n (<i>Gmin</i>)), S		6		6	6		6			6			6
Start-Up Lost T	ime (<i>lt</i>)	, s		2.0		2.0	2.0		2.0	2.0		2.0	2.0		2.0
Extension of Ef		Green (e), s		2.0		2.0	2.0	_	2.0	2.0		2.0	2.0		2.0
Passage (<i>PT</i>),	s			2.0	_	2.0	2.0	-	2.0			2.0			2.0
Recall Mode				Off	_	Min	Off		Min			Off			Off
	Oual Entry			No		Yes	No	_	Yes			Yes			Yes
Walk (Walk), s	· · · · · ·					0.0			0.0			0.0			0.0
Pedestrian Clea	edestrian Clearance Time (<i>PC</i>), s					0.0			0.0			0.0			0.0
Multimodal Inf	Multimodal Information				EB			WB			NB			SB	
85th % Speed / Rest in Walk / Corner Radius			0	No	25	0	No	25	0	No	25	0	No	25	
Walkway / Cros	Walkway / Crosswalk Width / Length, ft			9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Is	Street Width / Island / Curb			0	0	No	0	0	No	0	0	No	0	0	No
	Vidth Outside / Bike Lane / Shoulder, ft			12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Sigr	estrian Signal / Occupied Parking			No		0.50	No		0.50	No		0.50	No		0.50

		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	ts Sur	nmar	у				
General Inforn	otion								Intersect	ion Inf	o um oti c		T ,	ا مایایه ا	b. L.
-	iation	TRC Worldwide Eng	ninaarin	. ~					Duration,		0.250		- 1	يا لم ل	
Agency		MLT	Jineeni		io Dot	e 2/17/2	2020	_			Other		_# #		K.
Analyst Jurisdiction		Clarksville MPO		Time F		_	Morning		Area Typ PHF	e	0.92			N W 1 E 8	<u>~</u> }
Jurisalction		Clarksville MPO		Time F	erioa	Peak	viorning		РПГ		0.92		-₹ *		←
Urban Street		SR 374 (Richview D	rive)	Analys	sis Yea	2043			Analysis	Period	1> 7:0	00		₩.	<u></u>
Intersection		US 41A (SR 112-Ma	adiso	File Na	ame	SR 37	'4 w US	41A A	M DHV Y	′r 2043	Existing	g.xus	_	1 1 1 1 1 1 1 1 1 1	7 1
Project Descrip	tion	Existing Condtions	_	_	_	_	_	_	_	_	_	_		_	
Demand Inforr	nation				EB			WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), v	eh/h			212	706	12	16	136	6 1184	12	33	17	602	14	120
Signal Informa	tion				Т					-					
Cycle, s	116.6	Reference Phase	2	1		-12	L	7	N N					ı	$oldsymbol{\Lambda}$
Offset, s	0	Reference Point	End			-	- S		17			1	2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Green	-	8.4	40.0	30.		0.0	_	_	←		
Force Mode	Fixed	Simult. Gap N/S	On	Yellow Red	2.0	2.0	4.0 4.0 2.0 2.0		4.0 2.0	0.0		5	6	7	\mathbf{Y}_{s}
							1		1=:0						•
Timer Results				EBI	-	EBT	WB	L	WBT	NB	L L	NBT	SBI	L	SBT
	Assigned Phase			5		2	1		6			8			4
Case Number					2.0		2.0		3.0		_	12.0			9.0
	Phase Duration, s			22.9	_	60.4	8.6	_	46.0			11.7	_	_	36.0
Change Period							6.0	-	6.0			6.0		_	6.0
Max Allow Head				3.1		3.1	3.1		3.1			3.1			3.1
Queue Clearan Green Extension		, - ,		16.8	•	18.5	3.1 0.0		42.0 0.0			0.1		_	32.0
Phase Call Pro		(<i>g e)</i> , s		1.00		1.00	0.0	-	1.00			0.89			1.00
Max Out Proba				0.89		0.57	0.00	_	1.00			0.00		_	1.00
				0.00			0.00								
Movement Gro		sults			EB			WB			NB	1		SB	
Approach Move				L	Т	R	L	Т	R	L	Т	R	L	T	R
Assigned Move				5	2	12	1	6	16	3	8	18	7	4	14
Adjusted Flow I		<u> </u>		230	391	389	17	1485			67		654	15	130
		ow Rate (s), veh/h/l	n	1781	1870	1859	1810	1781 40.0	1585 40.0		1794 4.3		1781	1900	1585 7.8
Queue Service Cycle Queue C		- /:		14.8 14.8	16.5 16.5	16.5 16.5	1.1	40.0	40.0		4.3		30.0	0.7	7.8
Green Ratio (g		c mic (g t), 3		0.15	0.47	0.47	0.02	0.34	0.34		0.05		0.26	0.7	0.26
Capacity (c), v				259	872	866	40	1221	-		88		458	489	408
Volume-to-Cap		rtio (X)		0.891	0.449	_	0.433	1.216	_		0.769		1.428	0.031	0.320
Back of Queue	(Q), ft/	/In (50 th percentile)		203	176.2	_	13.2	875	2759		51.2		987.2	8	75.2
Back of Queue	(Q), ve	eh/ln (50 th percenti	le)	8.0	6.9	6.9	0.5	34.4	108.6		2.0		38.9	0.3	3.0
Queue Storage	Ratio (RQ) (50 th percent	ile)	0.72	0.18	0.18	0.07	0.87	13.14		0.26		0.99	0.03	0.27
Uniform Delay	(d 1), s	/veh		48.9	21.0	21.0	56.3	38.3	38.3		54.8		43.3	32.4	35.1
Incremental De	• •	·		21.6	0.1	0.1	2.7	104.8	621.1		5.2		205.0	0.0	0.2
	nitial Queue Delay (d з), s/veh			0.0	0.0	0.0	0.0	0.0	0.0		0.0		0.0	0.0	0.0
	Control Delay (d), s/veh			70.5	21.2	21.2	59.0	143.1	_		60.0		248.3	32.4	35.2
	Level of Service (LOS)			E	С	С	E 200	F	F	00.7	E		F 200	С	D
	Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS			32.4		C 27	380.	გ	F	60.0)	E	209. F	5	F
intersection De	ıay, S/V€	ii / LU3				21	1.3						r .		
Multimodal Re	sults				EB			WB			NB			SB	
Pedestrian LOS		/LOS		1.68	3	В	2.12		В	2.48		В	2.32		В
Bicycle LOS So	Bicycle LOS Score / LOS			1.32	2	Α	2.79	9	С	0.60)	Α	1.81	1	В

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** بالجال TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2043 1> 7:00 **Analysis Period** US 41A (SR 112-Madiso.. File Name SR 374 w US 41A AM DHV Yr 2043 Existing.xus Intersection **Project Description Existing Condtions** WB NB **Demand Information** EΒ SB Approach Movement L Т R L R L R L R 212 1184 33 120 706 12 16 1366 12 17 602 14 Demand (v), veh/h 泒 Signal Information Cycle, s 116.6 Reference Phase 2 ₹ ₹ Offset, s 0 Reference Point End Green 2.6 8.4 40.0 30.0 5.7 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 0.0 Saturation Flow / Delay Т R R R R 1.000 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 0.952 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.000 0.944 0.944 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.952 0.000 0.000 Right-Turn Adjustment Factor (fRT) 0.994 0.994 0.000 0.847 0.000 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (*f*_{Rpb}) 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3667 62 1810 3561 1585 347 955 492 1781 1900 1585 Proportion of Vehicles Arriving on Green (P) 0.47 0.34 0.34 0.05 0.05 0.15 0.47 0.02 0.05 0.26 0.26 0.26 Incremental Delay Factor (k) 0.27 0.04 0.04 0.04 0.50 0.50 0.04 0.50 0.04 0.04 Signal Timing / Movement Groups **EBL** FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 4.0 0.15 0.47 0.02 0.34 0.05 0.26 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 0 0 0 0 0 1781 Shared Saturation Flow Rate (ssh), veh/h/ln 0.0 0.0 0.0 Permitted Effective Green Time (g_p) , s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln 0 0 0.0 Protected Right Effective Green Time (g_R) , s 0.0 Multimodal EΒ WB NB SB Pedestrian Fw / Fv 0.972 0.000 0.000 1.710 1.389 0.000 1.557 0.000 Pedestrian Fs / Fdelay 0.000 0.000 0.113 0.000 0.129 0.168 0.000 0.159 Pedestrian Mcorner / Mcw Bicycle cb / db 932.02 16.63 25.18 65.53 97.67 685.91 52.76 Bicvcle Fw / Fv -3.640.83 -3.642.30 -3.64 0.11 -3.64 1.32

HCS7 Signalized Intersection Results Graphical Summary 7 4 7 4 1 1 1 **General Information Intersection Information** با الم الم TRC Worldwide Engineering Duration, h 0.250 Agency Analysis Date 2/17/2020 Analyst MLT Area Type Other Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF 0.92 Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2043 Analysis Period 1> 7:00 US 41A (SR 112-Madiso... File Name SR 374 w US 41A AM DHV Yr 2043 Existing.xus Intersection **Project Description Existing Condtions Demand Information** EΒ WB NB SB Approach Movement L Т R L Τ R L R L Т R 120 212 706 12 16 1366 1184 12 33 17 602 14 Demand (v), veh/h Signal Information Cycle, s 116.6 Reference Phase 2 ₹ ₹ Offset, s Reference Point End Green 2.6 8.4 40.0 30.0 5.7 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement Т Т R Т R L R L L R L Т Back of Queue (Q), ft/ln (50 th percentile) 203 176.2 172.4 13.2 875 2759 51.2 987.2 8 75.2 Back of Queue (Q), veh/ln (50 th percentile) 8.0 6.9 0.5 34.4 108.6 2.0 38.9 0.3 3.0 6.9 Queue Storage Ratio (RQ) (50 th percentile) 0.72 0.07 0.87 13.14 0.26 0.99 0.03 0.27 0.18 0.18 70.5 659.4 60.0 Control Delay (d), s/veh 21.2 21.2 59.0 143.1 248.3 32.4 35.2 Level of Service (LOS) Ε С С Ε F F Ε F С D Approach Delay, s/veh / LOS 32.4 С 380.8 F 60.0 Ε 209.5 F Intersection Delay, s/veh / LOS 271.3 F 38.9 0.3 32.4 659.4 108.6 6.9 📥 21.2 143.1 6.9 🕳 21.2 59.0 0.5 LOS A LOS B LOS C Queue Storage Ratio < 1 LOSD LOS E Queue Storage Ratio > 1 LOS F

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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

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--- Comments ---

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General Inform	nation	TD0 14/ 11/ 11/ 5							Intersec		v		-	JAL	- 'A
Agency		TRC Worldwide En	gineerin	_		014710			Duration		0.250				K.
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Jurisdiction		Clarksville MPO		Time F		Peak	Afternoo	n	PHF		0.92		4 4	W † E 8	4
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Intersection		US 41A (SR 112-M	adiso	File Na	ame	SR 37	'4 w US	41A	PM DHV	Yr 2043	Existin	g.xus	15	ব 1 কম্	7
Project Descrip	tion	Existing Condtions													
Demand Inform	nation				EB			W	/B		NB			SB	
Approach Move	ement			L	Т	R	L	1	ΓR	L	T	R	L	T	R
Demand (v), v	eh/h			207	1854	35	29	14	15 845	21	21	44	1049	22	150
Signal Informa	ition					Т	5	47	Ţ.						
Cycle, s	119.0	Reference Phase	2	1	12 6	n	\vdash	٦٣,	242			<u>_</u> _	→	h	4
Offset, s	0	Reference Point	End	C	2.0	_	40.0	100				1	2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Green Yellow		7.0 4.0	40.0	30 4.0		0.0	_	д	\leftarrow		κŤ»
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0		0.0		5	6	7	8
				JI-										,	
Traffic Informa	tion				EB			WE	3		NB			SB	
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), ve	Demand (v), veh/h			207	1854	35	29	141	5 845	21	21	44	1049	22	150
Initial Queue (C	nitial Queue (Qb), veh/h				0	0	0	0	0	0	0	0	0	0	0
Base Saturation	Base Saturation Flow Rate (s₀), veh/h			1900	1900	1900	1900	190	0 1900	1900	1900	1900	1900	1900	1900
Parking (Nm), m	nan/h				None			Non	е		None			None	
Heavy Vehicles	(<i>P</i> _{HV}), ^c	%		2	2		0	2	2		0		2	0	2
Ped / Bike / RT	OR, /h			0	0	0	0	0	0	0	0	0	0	0	0
Buses (N _b), bus	ses/h			0	0	0	0	0	0	0	0	0	0	0	0
Arrival Type (A7	<i>r</i>)			3	3	3	3	3	3	3	3	3	3	3	3
Upstream Filter	ing (<i>I</i>)			1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Width (W)), ft			12.0	12.0		12.0	12.0	12.0		12.0		12.0	12.0	12.0
Turn Bay Lengt	h, ft			280	1000		200	100	0 210		200		1000	275	275
Grade (<i>Pg</i>), %					0			0			0			0	
Speed Limit, mi	i/h			40	40	40	40	40	40	40	40	40	40	40	40
Phase Informa	tion			EBL		EBT	WBI		WBT	NBL	_	NBT	SBL		SBT
Maximum Gree	n (<i>G</i> max) or Phase Split, s		20.0		40.0	20.0		40.0			30.0			30.0
Yellow Change	Interval	(Y), s		4.0		4.0	4.0		4.0			4.0			4.0
Red Clearance	Interval	(<i>Rc</i>), s		2.0		2.0	2.0		2.0			2.0			2.0
Minimum Greer	n (Gmin)	, S		6		6	6		6			6			6
Start-Up Lost Ti	ime (<i>It</i>)	, s		2.0		2.0	2.0		2.0	2.0		2.0	2.0		2.0
Extension of Eff		Green (e), s		2.0		2.0	2.0	_	2.0	2.0		2.0	2.0		2.0
Passage (<i>PT</i>), s	S			2.0		2.0	2.0	_	2.0			2.0			2.0
Recall Mode				Ped		Min	Off	_	Min			Off			Off
Dual Entry				No		Yes	No		Yes			Yes			Yes
Walk (<i>Walk</i>), s	· · · · · ·					0.0			0.0			0.0			0.0
Pedestrian Clea	Pedestrian Clearance Time (PC), s					0.0			0.0			0.0			0.0
Multimodal Inf	Multimodal Information				EB			WE	3		NB			SB	
85th % Speed / Rest in Walk / Corner Radius			0	No	25	0	No	25	0	No	25	0	No	25	
Walkway / Cros	Walkway / Crosswalk Width / Length, ft			9.0	12	0	9.0	12	0	9.0	12	0	9.0	12	0
Street Width / Island / Curb			0	0	No	0	0	No	0	0	No	0	0	No	
Width Outside /	/idth Outside / Bike Lane / Shoulder, ft			12	5.0	2.0	12	5.0	2.0	12	5.0	2.0	12	5.0	2.0
Pedestrian Sigr	destrian Signal / Occupied Parking			No		0.50	No		0.50	No		0.50	No		0.50

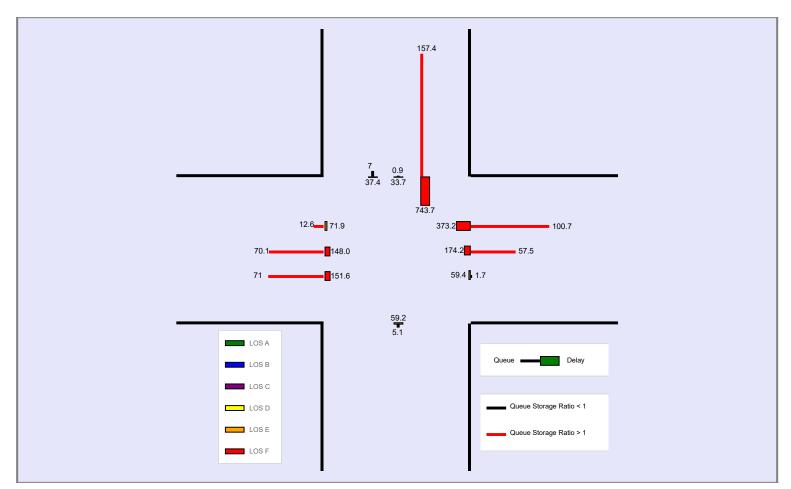
HCS7 Signalized Intersection Results Summary														
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General Information	I									- V		_] [.]	<i>ي</i> ا لاي
Agency	TRC Worldwide En	gıneerir			1011-10		Intersection Information Duration, h 0.250 Area Type Other 0.92 Analysis Period 1> 7:00 S 41A PM DHV Yr 2043 Existing xu							R_
Analyst	MLT		1	Analysis Date 2/17/2020 Time Period DHV Afternoon Peak Analysis Year 2043 SR 374 w US SR 374 w US				•	ре		•		N ₩ E 8	\
Jurisdiction	Clarksville MPO		Time F	Period		Afternoo	n	PHF		0.92		* →	₩ E 8	← ‡
Urban Street	SR 374 (Richview I	Orive)	Analys	is Year	2043			Analysi	s Perioc	l 1> 7:0	00		**	· ·
Intersection	US 41A (SR 112-M	adiso…	File Na	ame	SR 37	74 w US	41A I	PM DHV	Yr 204	3 Existin	g.xus	1	4 1 4 Y	F* (*
Project Description	Existing Condtions													
Demand Information				EB			W	В		NB			SB	
Approach Movement			L	Т	R	L	T	R	L	Т	R	L	Т	R
Demand (v), veh/h			207	1854	35	29	14	15 84	5 21	21	44	1049	22	150
			1											
Signal Information	I =			La .		E	닐겓	7			_			\downarrow
Cycle, s 119.0		2	ļ	Γκ	R	R		17A		K	1	→ 2	3	4
Offset, s 0	Reference Point	End	Green	3.9	7.0	40.0	30	.0 8.1	0.0)		<u>-</u>		
Uncoordinated Yes	Simult. Gap E/W	On									~			W
Force Mode Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0	2.0	0.0)	5	6	7	8
Timer Results			FBI		FBT	WB		WBT	NF	31	NBT	SBI		SBT
Assigned Phase							_		1					4
Case Number			_			2.0	_		+					9.0
Phase Duration, s						9.9	_							36.0
Change Period, (Y+R c), s						6.0	_							6.0
Max Allow Headway (3.1			_					3.1
Queue Clearance Time						4.0								32.0
Green Extension Time	, - ,					0.0	-		1					0.0
Phase Call Probability	(0)		1.00)	1.00	0.65	5	1.00			0.95			1.00
Max Out Probability			0.85	5	1.00	0.00		1.00			0.00			1.00
	••						\ A (F			ND			0.0	
Movement Group Res Approach Movement	sults				В		ir		+	1	R		SB T	D
Assigned Movement							_		+		18	7	4	14
Adjusted Flow Rate (v	() vob/b				-		<u> </u>		1 3		10	1140	24	163
Adjusted Flow Rate (v	,	n					_		+			1781	1900	1585
Queue Service Time (· · ·	11			-							30.0	1.1	10.2
Cycle Queue Clearance	- ,			_	-							30.0	1.1	10.2
Green Ratio (g/C)	(g t), 3											0.25	0.25	0.25
Capacity (c), veh/h					_	_		_	+			449	479	400
Volume-to-Capacity Ra	atio (X)											2.539	0.050	0.408
Back of Queue (Q), ft	· · · · ·)	320.1						_	_		3997.4	23.4	178.9
				8	1		3	7						
Back of Queue (Q), v	<u>`</u>	,	12.6		_			_				157.4	0.9	7.0
Queue Storage Ratio (· · · · · · · · · · · · · · · · · · ·	tile)										4.00	0.09	0.65
Uniform Delay (d 1), s							_			_		44.5	33.7	37.1
Incremental Delay (d 2					1		-	_				699.2	0.0	0.2
nitial Queue Delay (d 3), s/veh												0.0	0.0	0.0
Control Delay (d), s/veh							_					743.7	33.7	37.4
Level of Service (LOS)									50			F 644	C	D
Approach Delay, s/veh / LOS ntersection Delay, s/veh / LOS			142.	I			_	F	59	.∠	E	644.: F		F
miler section Delay, S/V	лі / LOO				29	U. 4								
Multimodal Results	Multimodal Results			EB			WE	3		NB			SB	
Pedestrian LOS Score	/LOS		1.69		В	2.12	2	В	2.4	18	В	2.32	2	В
Bicycle LOS Score / LO	os		2.37	7	В	2.54	1	С	0.6	64	Α	2.68	3	С

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** بالجال TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period DHV Afternoon PHF Peak **Urban Street** SR 374 (Richview Drive) 2043 1> 7:00 Analysis Year **Analysis Period** US 41A (SR 112-Madiso.. File Name SR 374 w US 41A PM DHV Yr 2043 Existing.xus Intersection **Project Description Existing Condtions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 207 1854 845 21 44 1049 22 150 35 29 1415 21 Demand (v), veh/h ᄱ Signal Information Cycle, s 119.0 Reference Phase 2 ₹ ₹ Offset, s 0 Reference Point End Green 3.9 7.0 40.0 30.0 8.1 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 0.0 Saturation Flow / Delay Т R R R R 1.000 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 0.952 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.906 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.000 0.906 0.952 0.000 0.000 Right-Turn Adjustment Factor (fRT) 0.993 0.993 0.000 0.847 0.000 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (*f*_{Rpb}) 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3659 69 1810 3561 1585 420 420 880 1781 1900 1585 0.45 0.34 0.07 0.07 Proportion of Vehicles Arriving on Green (P) 0.14 0.45 0.03 0.34 0.07 0.25 0.25 0.25 Incremental Delay Factor (k) 0.27 0.50 0.50 0.04 0.50 0.50 0.04 0.50 0.04 0.04 Signal Timing / Movement Groups **EBL** FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 4.0 0.14 0.45 0.03 0.34 0.07 0.25 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 0 0 0 0 0 1781 Shared Saturation Flow Rate (ssh), veh/h/ln 0.0 0.0 0.0 Permitted Effective Green Time (g_p) , s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln 0 0 0.0 Protected Right Effective Green Time (g_R) , s 0.0 Multimodal EΒ WB NB SB Pedestrian Fw / Fv 0.972 0.000 1.710 1.389 0.000 0.000 1.557 0.000 Pedestrian Fs / Fdelay 0.000 0.117 0.000 0.131 0.000 0.168 0.000 0.158 Pedestrian Mcorner / Mcw Bicycle cb / db 890.72 18.31 672.23 26.23 66.71 136.50 51.66 Bicvcle Fw / Fv -3.641.88 -3.642.05 -3.64 0.15 -3.64 2.19

HCS7 Signalized Intersection Results Graphical Summary											nmary	/				
General Inform	nation								Intersect	ion Inf	ormatic	n	Į.		s _k	
Agency		TRC Worldwide En	gineerin	ıg					Duration,	h	0.250			147		
Analyst		MLT		Analys	is Date	2/17/2	020		Area Typ	е	Other		±, ±,		.	
Jurisdiction		Clarksville MPO		Time F	eriod	DHV A Peak	Afternoc	n	PHF		0.92		\$ → - ₹ - ₹	w E 8	<u> </u>	
Urban Street		SR 374 (Richview [Orive)	Analys	is Year	2043			Analysis	Period	1> 7:0	00			F	
Intersection		US 41A (SR 112-Ma	adiso	File Na	ıme	SR 37	4 w US	41A F	M DHV	′r 2043	Existing	g.xus	<u> </u>	4 1 4 1 1	F (*	
Project Descrip	tion	Existing Condtions											1			
										,			_			
Demand Inform					EB	1	 	WE	-	<u> </u>	NB		ļ	SB	1	
	opproach Movement				Т	R	L	Т	R	L	T	R	L	Т	R	
Demand ($ u$), $ u$	emand (v), veh/h				1854	35	29	141	5 845	21	21	44	1049	22	150	
Signal Informa	ition				2	7	B	<u> </u>	2	Т					\mathbf{L}	
Cycle, s	119.0	Reference Phase	2			ĸ	R	15	17Z			1	→ 2	3	(1) V	
Offset, s	0	Reference Point	End	Green	3.9	7.0	40.0	30.	0 8.1	0.0			K		7	
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	4.0		0.0		7			₩.	
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0	2.0	0.0		5	6	7	8	
Movement Gro	-	sults			EB			WB	_		NB					
Approach Move				L	T	R	L	Т	R	L	T	R		•		
Back of Queue	(Q), ft	/In (95 th percentile))	320.1	1780. 8	1775. 1	43.4	1459 3	. 2556. 7		128.7		3997.4	23.4	178.9	
Back of Queue	Back of Queue (Q), veh/ln (95 th percentile)				70.1	71.0	1.7	57.5	100.7		5.1		157.4	0.9	7.0	
Queue Storage	Queue Storage Ratio (RQ) (95 th percentile)				1.78	1.80	0.22	1.46	12.17		0.64		4.00	0.09	0.65	
Control Delay (d), s/veh				71.9	148.0	151.6	59.4	174.2	2 373.2		59.2		743.7	33.7	37.4	
Level of Service	Level of Service (LOS)				F	F	E	F	F		E		F	С	D	
Approach Delay	proach Delay, s/veh / LOS				1	F	246.	2	F	59.2	2	E	644.2	SB L T R 997.4 23.4 178. 157.4 0.9 7.0 4.00 0.09 0.66 743.7 33.7 37.4		

290.4

Intersection Delay, s/veh / LOS



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HCS™ Streets Version 7.8.5

Generated: 9/8/2020 1:24:43 PM

--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

WARNING: The shared-plus-exclusive turn lane solution is an approximation of the HCM method, because more than three lane groups cannot be accommodated. Input data for Percent Turns in Shared Lane are used to specify proportion of turning vehicles in the shared lane.

--- Comments ---

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HCS™ Streets Version 7.8.5

Generated: 9/8/2020 1:24:43 PM

HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date Mar 11, 2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Morning** Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2023 1> 7:00 **Analysis Period** Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A AM DHV Yr 2023 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak **Demand Information** EΒ WB NB SB Approach Movement L R L R L R L R 163 588 9 12 1138 911 25 13 463 92 9 11 Demand (v), veh/h Ж **Signal Information** Cycle, s 98.5 Reference Phase 2 Offset, s 0 Reference Point End Green 6.2 54.4 10.0 5.9 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 0.0 2.0 0.0 0.0 **Traffic Information** ΕB **WB** NB SB Approach Movement R Т Τ L Т L R L R L Т R Demand (v), veh/h 163 588 9 12 1138 911 9 25 13 463 11 92 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 2 2 0 0 2 2 0 0 2 2 0 100 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 280 1500 200 1000 375 0 200 1000 275 275 n Grade (Pg), % 0 0 0 0 40 40 40 40 40 40 Speed Limit, mi/h 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL WBT **NBL** NBT SBL SBT 10.0 20.0 72.0 10.0 20.0 Maximum Green (Gmax) or Phase Split, s 72.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 2.0 2.0 2.0 2.0 0.0 2.0 Minimum Green (Gmin), s 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off **Dual Entry** No Yes Yes Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** FB WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 Walkway / Crosswalk Width / Length, ft 9.0 12 0 9.0 12 0 9.0 12 0 9.0 12 0 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No 12 5.0 2.0 12 2.0 12 2.0 12 Width Outside / Bike Lane / Shoulder, ft 5.0 5.0 5.0 2.0 Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50

0.50

No

HCS7 Signalized Intersection Results Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date Mar 11, 2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Morning** Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2023 1> 7:00 Analysis Period Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A AM DHV Yr 2023 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak **Demand Information** ΕB WB NB SB Approach Movement R L R L R L R 163 588 9 12 1138 911 25 13 463 92 9 11 Demand (v), veh/h Щ **Signal Information** IJ. Cycle, s 98.5 Reference Phase 2 Offset, s 0 Reference Point End Green 6.2 54.4 10.0 5.9 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 0.0 2.0 0.0 0.0 **Timer Results EBL EBT WBL WBT NBL NBT** SBL SBT **Assigned Phase** 5 2 6 8 4 7 Case Number 1.0 3.0 5.3 6.3 1.0 3.0 Phase Duration, s 12.2 72.6 60.4 11.9 14.0 25.9 Change Period, (Y+Rc), s 6.0 6.0 6.0 6.0 4.0 6.0 Max Allow Headway (MAH), s 3.1 3.1 3.1 3.2 3.1 3.2 Queue Clearance Time (g_s), s 6.0 9.0 44.7 4.2 12.0 6.9 10.9 Green Extension Time (g_e), s 0.2 9.7 0.0 0.0 0.2 Phase Call Probability 0.99 1.00 1.00 0.99 1.00 1.00 Max Out Probability 0.00 0.01 0.17 0.06 1.00 0.00 WB NB SB **Movement Group Results** EΒ Approach Movement L Т R L Т R L Т R ī Т R **Assigned Movement** 5 2 12 16 3 7 4 14 1 6 8 18 177 1237 882 503 12 Adjusted Flow Rate (v), veh/h 639 10 13 10 41 100 1900 Adjusted Saturation Flow Rate (s), veh/h/ln 1781 1781 1610 802 1781 1585 1425 1790 1730 1585 Queue Service Time (g_s), s 4.0 7.0 0.2 0.7 23.5 42.7 0.6 2.2 10.0 0.5 4.9 Cycle Queue Clearance Time (g_c), s 4.0 7.0 0.2 0.7 23.5 42.7 0.6 2.2 10.0 0.5 4.9 Green Ratio (g/C) 0.64 0.68 0.68 0.55 0.55 0.65 0.06 0.06 0.18 0.20 0.26 326 2407 1088 516 1967 1037 159 108 601 384 420 Capacity (c), veh/h Volume-to-Capacity Ratio (X) 0.543 0.266 0.009 0.025 0.629 0.850 0.062 0.383 0.837 0.031 0.238 Back of Queue (Q), ft/ln (50 th percentile) 34.2 54.7 1.4 3 214.7 335.8 5.6 24.3 50.7 5.6 45.8 0.1 0.2 Back of Queue (Q), veh/ln (50 th percentile) 1.3 2.2 0.1 8.5 13.2 0.2 1.0 2.0 1.8 Queue Storage Ratio (RQ) (50 th percentile) 0.12 0.04 0.00 0.01 0.21 0.90 0.03 0.12 0.05 0.02 0.17 44.5 39.9 Uniform Delay (d 1), s/veh 12.7 6.3 5.2 10.0 15.1 13.3 43.8 31.5 28.4 Incremental Delay (d 2), s/veh 0.5 0.0 0.0 0.0 0.1 3.7 0.1 0.8 9.6 0.0 0.1 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 13.2 10.0 15.2 16.9 43.9 45.4 49.4 Control Delay (d), s/veh 6.3 5.2 31.6 28.5 Level of Service (LOS) В Α Α В В В D D D С С Approach Delay, s/veh / LOS 7.8 Α 15.9 В 45.1 D 45.7 D Intersection Delay, s/veh / LOS 19.5 R **Multimodal Results** FB WB NB SB Pedestrian LOS Score / LOS 1.86 В 2.25 2.60 2.45 В С В Bicycle LOS Score / LOS 1.17 Α 2.25 В 0.57 Α 1.50

HCS7 Signalized Intersection Intermediate Values General Information Intersection Information TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date Mar 11, 2020 Area Type Other PHF Jurisdiction Clarksville MPO Time Period **DHV Morning** 0.92 Peak **Urban Street** SR 374 (Richview Drive) 2023 1> 7:00 Analysis Year Analysis Period File Name SR 374 w US 41A AM DHV Yr 2023 Future 2 SBL.. Intersection US 41A (SR 112-Madiso... **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak ΕB WB NB SB **Demand Information** Approach Movement R L R L R L R 9 12 1138 13 463 92 163 588 911 9 25 11 Demand (v), veh/h Ж **Signal Information** Cycle, s 98.5 Reference Phase 2 Offset, s 0 Reference Point End Green 6.2 54.4 10.0 5.9 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 0.0 2.0 0.0 0.0 Saturation Flow / Delay L Т R Τ R Т R R Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 0.952 1.000 1.000 0.952 1.000 1.000 1.000 1.000 0.971 1.000 1.000 0.422 0.000 0.000 Left-Turn Adjustment Factor (fLT) 0.952 0.000 0.750 0.952 0.000 Right-Turn Adjustment Factor (fRT) 0.000 0.847 0.000 0.847 0.942 0.942 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (fRpb) Work Zone Adjustment Factor (fwz) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fddi) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3561 1610 802 3561 1585 1425 1177 612 3459 1900 1585 Proportion of Vehicles Arriving on Green (P) 0.06 0.68 0.68 0.55 0.55 0.55 0.06 0.06 0.06 0.10 0.20 0.20 0.04 Incremental Delay Factor (k) 0.04 0.04 0.04 0.04 0.04 0.19 0.04 0.35 0.04 0.04 **Signal Timing / Movement Groups** FBI FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 4.0 6.0 0.64 0.68 0.55 0.06 0.18 0.20 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 450 0 802 1425 1366 0 Shared Saturation Flow Rate (ssh), veh/h/ln Permitted Effective Green Time (g_p) , s 56.4 0.0 54.4 5.9 7.9 0.0 31.0 0.0 54.5 5.9 3.7 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (q_{ps}) , s 16.5 0.7 0.6 3.7 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln 0 1585 1585 Protected Right Effective Green Time (g_R) , s 0.0 10.0 6.2 Multimodal WB EΒ NB SB Pedestrian Fw / Fv 1.198 1.710 1.710 0.000 1.557 0.000 0.142 0.000 0.000 Pedestrian Fs / Fdelay 0.000 0.066 0.000 0.092 0.151 0.000 0.138 Pedestrian Mcorner / Mcw Bicycle cb / db 1351.68 9.87 43.50 404.66 31.34 5.18 1104.74 120.42

-3.64

0.68

Bicvcle Fw / Fv

1.76

-3.64

0.08

-3.64

1.02

-3.64

HCS7 Signalized Intersection Results Graphical Summary General Information Intersection Information Agency TRC Worldwide Engineering Duration, h 0.250 Area Type Analyst MLT Analysis Date Mar 11, 2020 Other Clarksville MPO PHF Jurisdiction Time Period DHV Morning 0.92 Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2023 Analysis Period 1> 7:00 Intersection SR 374 w US 41A AM DHV Yr 2023 Future 2 SBL.. US 41A (SR 112-Madiso... File Name **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak WB **Demand Information** EΒ NB Approach Movement L Τ R L Τ R L Т R L 163 588 9 12 911 25 13 463 1138 9 Demand (v), veh/h \mathbb{M} مالك **Signal Information** Cycle, s 98.5 Reference Phase 2 Offset, s 0 Reference Point End Green 6.2 54.4 10.0 5.9 0.0 0.0 On Uncoordinated Yes Simult. Gap E/W Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 0.0 2.0 0.0 0.0

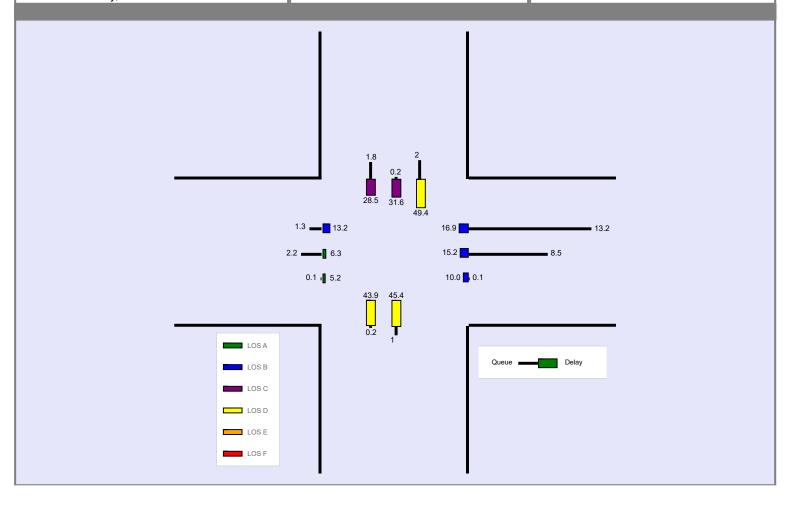
SB

11

R

92

Movement Group Results		EB			WB			NB			SB		
Approach Movement	L	Т	R	L	T	R	L	T	R	L	Т	R	
Back of Queue (Q), ft/ln (50 th percentile)	34.2	54.7	1.4	3	214.7	335.8	5.6	24.3		50.7	5.6	45.8	
Back of Queue (Q), veh/ln (50 th percentile)	1.3	2.2	0.1	0.1	8.5	13.2	0.2	1.0		2.0	0.2	1.8	
Queue Storage Ratio (RQ) (50 th percentile)	0.12	0.04	0.00	0.01	0.21	0.90	0.03	0.12		0.05	0.02	0.17	
Control Delay (d), s/veh	13.2	6.3	5.2	10.0	15.2	16.9	43.9	45.4		49.4	31.6	28.5	
Level of Service (LOS)	В	Α	Α	В	В	В	D	D		D	С	С	
Approach Delay, s/veh / LOS	7.8		Α	15.9	9	В	45.1		D	45.7	D		
Intersection Delay, s/veh / LOS			19	9.5						В	·		



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No errors or warnings exist.

--- Comments ---

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HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date 2/17/2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Afternoon** Peak 1> 7:00 **Urban Street** SR 374 (Richview Drive) Analysis Year 2023 Analysis Period Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A PM DHV Yr 2023 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL PM Peak **Demand Information** EΒ WB NB SB Approach Movement L R L R L R L R 159 1545 27 22 1179 650 34 807 16 16 17 115 Demand (v), veh/h Ж Signal Information Cycle, s 115.0 Reference Phase 2 Offset, s 0 Reference Point End Green 7.7 54.4 25.0 5.9 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 0.0 2.0 0.0 0.0 **Traffic Information** ΕB **WB** NB SB Approach Movement Т L Τ R L R L Τ R L Τ R Demand (v), veh/h 159 1545 27 22 1179 650 16 16 34 807 17 115 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None 0 L None R 0 Heavy Vehicles (PHV), % 2 2 0 0 2 2 0 0 2 2 0 120 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Buses (Nb), buses/h 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 280 1500 200 1000 375 0 200 1000 275 275 n Grade (Pg), % 0 0 0 0 40 40 40 40 40 40 Speed Limit, mi/h 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL WBT **NBL** NBT SBL SBT 20.0 75.0 75.0 10.0 25.0 10.0 Maximum Green (Gmax) or Phase Split, s Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 2.0 2.0 2.0 2.0 0.0 2.0 Minimum Green (Gmin), s 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off **Dual Entry** No Yes Yes Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** FB WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 Walkway / Crosswalk Width / Length, ft 9.0 12 0 9.0 12 0 9.0 12 0 9.0 12 0 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No 12 5.0 2.0 12 2.0 12 2.0 12 Width Outside / Bike Lane / Shoulder, ft 5.0 5.0 5.0 2.0 Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50 Nο Nο 0.50

HCS7 Signalized Intersection Results Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date 2/17/2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Afternoon** Peak 1> 7:00 **Urban Street** SR 374 (Richview Drive) Analysis Year 2023 Analysis Period Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A PM DHV Yr 2023 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL PM Peak **Demand Information** EΒ WB NB SB Approach Movement R L R L R L R 159 1545 27 22 1179 650 34 807 16 16 17 115 Demand (v), veh/h 儿 Signal Information IJ. Cycle, s 115.0 Reference Phase 2 Offset, s 0 Reference Point End Green 7.7 54.4 25.0 5.9 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 0.0 2.0 0.0 0.0 **Timer Results EBL EBT WBL WBT NBL NBT** SBL SBT **Assigned Phase** 5 2 6 8 4 7 Case Number 1.0 3.0 5.3 6.3 1.0 3.0 Phase Duration, s 13.7 74.1 60.4 11.9 29.0 40.9 Change Period, (Y+Rc), s 6.0 6.0 6.0 6.0 4.0 6.0 Max Allow Headway (MAH), s 3.1 3.1 3.1 3.2 3.1 3.2 43.8 Queue Clearance Time (g_s), s 7.5 38.0 5.6 27.0 8.9 15.5 Green Extension Time (g_e), s 0.2 16.6 0.1 0.0 0.0 1.00 Phase Call Probability 1.00 1.00 1.00 1.00 1.00 Max Out Probability 0.00 0.33 0.26 0.34 1.00 1.00 WB NB SB **Movement Group Results** EΒ Approach Movement L Т R L Т R L Т R ī Т R 5 2 12 16 3 7 4 14 **Assigned Movement** 1 6 8 18 1282 17 877 Adjusted Flow Rate (v), veh/h 173 1679 29 24 576 54 18 125 299 1900 Adjusted Saturation Flow Rate (s), veh/h/ln 1781 1781 1610 1781 1585 1416 1693 1730 1427 Queue Service Time (g_s), s 5.5 41.8 0.9 7.7 34.0 20.3 1.4 3.6 25.0 8.0 6.9 Cycle Queue Clearance Time (g_c), s 5.5 41.8 0.9 36.0 34.0 20.3 1.4 25.0 0.8 3.6 6.9 Green Ratio (g/C) 0.56 0.59 0.59 0.47 0.47 0.69 0.05 0.05 0.29 0.30 0.37 257 2108 953 131 1684 1095 135 87 931 577 528 Capacity (c), veh/h Volume-to-Capacity Ratio (X) 0.671 0.797 0.031 0.183 0.761 0.526 0.129 0.627 0.942 0.032 0.237 151.3 Back of Queue (Q), ft/ln (50 th percentile) 54.4 402.8 7.3 14.1 346.5 12 39.5 345.3 8.8 58.5 0.4 Back of Queue (Q), veh/ln (50 th percentile) 2.1 15.9 0.3 0.6 13.6 6.0 0.5 1.6 13.6 2.3 Queue Storage Ratio (RQ) (50 th percentile) 0.19 0.27 0.00 0.07 0.35 0.40 0.06 0.20 0.35 0.03 0.21 21.8 53.4 39.9 Uniform Delay (d 1), s/veh 18.1 9.7 37.3 24.9 8.6 52.3 28.1 25.0 Incremental Delay (d 2), s/veh 1.1 1.6 0.0 0.2 0.6 0.1 0.2 2.8 16.9 0.0 0.1 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 23.0 19.7 37.5 25.5 52.5 56.2 56.8 25.0 Control Delay (d), s/veh 9.8 8.8 28.1 Level of Service (LOS) С В Α D С D F F С С Α 19.9 Approach Delay, s/veh / LOS В 20.5 С 55.3 Ε 52.4 D Intersection Delay, s/veh / LOS 27.5 С **Multimodal Results** FB WB NB SB Pedestrian LOS Score / LOS 1.89 2.27 2.64 2.44 В В С В Bicycle LOS Score / LOS 2.04 В 2.04 0.61 Α 2.17

HCS7 Signalized Intersection Intermediate Values General Information Intersection Information TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other PHF Jurisdiction Clarksville MPO Time Period DHV Afternoon 0.92 Peak **Urban Street** 2023 1> 7:00 SR 374 (Richview Drive) Analysis Year Analysis Period File Name SR 374 w US 41A PM DHV Yr 2023 Future 2 SBL.. Intersection US 41A (SR 112-Madiso... **Project Description** Future 2 SBL 1 WBR 1 EBL PM Peak EΒ WB NB SB **Demand Information** Approach Movement R L R L R L R 22 650 807 159 1545 27 1179 16 16 34 17 115 Demand (v), veh/h Ж **Signal Information** Cycle, s 115.0 Reference Phase 2 Offset, s 0 Reference Point End Green 7.7 54.4 25.0 5.9 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 0.0 2.0 0.0 0.0 Saturation Flow / Delay L Т R Τ R Т R R Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.900 Bus Blockage Adjustment Factor (fbb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 0.952 1.000 1.000 0.952 1.000 1.000 1.000 1.000 0.971 1.000 1.000 0.000 0.000 0.000 Left-Turn Adjustment Factor (fLT) 0.952 0.000 0.157 0.745 0.952 Right-Turn Adjustment Factor (fRT) 0.000 0.847 0.000 0.847 0.891 0.891 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (fRpb) Work Zone Adjustment Factor (fwz) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fddi) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3561 1610 299 3561 1585 1416 542 1151 3459 1900 1427 Proportion of Vehicles Arriving on Green (P) 0.07 0.59 0.59 0.47 0.47 0.47 0.05 0.05 0.05 0.22 0.30 0.30 0.04 Incremental Delay Factor (k) 0.04 0.24 0.04 0.04 0.09 0.04 0.04 0.45 0.04 0.04 **Signal Timing / Movement Groups** FBI FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 4.0 6.0 0.56 0.59 0.47 0.05 0.29 0.30 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 431 0 299 1416 1350 0 Shared Saturation Flow Rate (ssh), veh/h/ln Permitted Effective Green Time (g_p) , s 56.3 0.0 54.3 5.9 7.9 0.0 20.2 26.1 2.3 0.0 5.9 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (q_{ps}) , s 20.2 7.7 1.4 2.3 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s 1427 Protected Right Saturation Flow (sR), veh/h/ln 0 1585 Protected Right Effective Green Time (g_R) , s 0.0 25.0 7.7 Multimodal WB EΒ NB SB Pedestrian Fw / Fv 1.198 0.000 1.710 1.710 0.000 1.557 0.171 0.000 0.000 Pedestrian Fs / Fdelay 0.000 0.091 0.000 0.111 0.158 0.000 0.133 Pedestrian Mcorner / Mcw Bicycle cb / db 9.56 946.90 15.94 102.31 51.76 606.73 1184.50 27.90

-3.64

1.55

Bicvcle Fw / Fv

1.55

-3.64

0.12

-3.64

1.68

-3.64

HCS7 Signalized Intersection Results Graphical Summary Intersection Information TRC Worldwide Engineering Duration, h 0.250 MLT Analysis Date 2/17/2020 Area Type Other

Peak

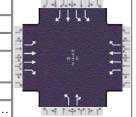
DHV Afternoon

PHF

Analysis Period

0.92

1> 7:00



Intersection	US 41A (SR 112-Madiso	File Name	SR 374 w US 41A PM DHV Yr 20	23 Future 2 SBL
Project Description	Future 2 SBL 1 WBR 1 EBL	.PM Peak		

Analysis Year 2023

Time Period

General Information

Clarksville MPO

SR 374 (Richview Drive)

Agency

Analyst

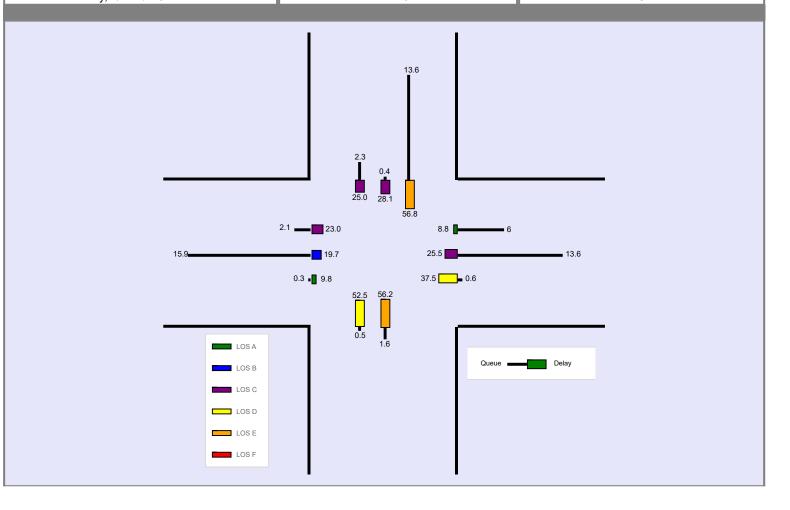
Jurisdiction

Urban Street

Demand Information		EB			WB			NB		SB		
Approach Movement	L	Т	R	L	Т	R	L	Т	R	L	Т	R
Demand (v), veh/h	159	1545	27	22	1179	650	16	16	34	807	17	115

Signal Informa	ition				2		211							
Cycle, s	115.0	Reference Phase	2		Ħ.			542				→		ζĺΖ
Offset, s	0	Reference Point	End	Green	7.7	54.4	25.0	5.9	0.0	0.0	1	Y 2	1 🛧	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	4.0	4.0	0.0	0.0	4,	→	(L	stz.
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	0.0	2.0	0.0	0.0	5	6	7	8

Movement Group Results		EB			WB			NB			SB	
Approach Movement	L	Т	R	L	T	R	L	T	R	L	Т	R
Back of Queue (Q), ft/ln (50 th percentile)	54.4	402.8	7.3	14.1	346.5	151.3	12	39.5		345.3	8.8	58.5
Back of Queue (Q), veh/ln (50 th percentile)	2.1	15.9	0.3	0.6	13.6	6.0	0.5	1.6		13.6	0.4	2.3
Queue Storage Ratio (RQ) (50 th percentile)	0.19	0.27	0.00	0.07	0.35	0.40	0.06	0.20		0.35	0.03	0.21
Control Delay (d), s/veh	23.0	19.7	9.8	37.5	25.5	8.8	52.5	56.2		56.8	28.1	25.0
Level of Service (LOS)	С	В	Α	D	С	Α	D	Е		E	С	С
Approach Delay, s/veh / LOS	19.9	9	В	20.5	5	С	55.3	3	E	52.4		D
Intersection Delay, s/veh / LOS			27	7.5						С		



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No errors or warnings exist.

--- Comments ---

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HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date Mar 11, 2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Morning** Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2033 1> 7:00 **Analysis Period** Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A AM DHV Yr 2033 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak **Demand Information** EΒ WB NB SB Approach Movement L R L R L R L R 187 10 1252 1048 29 15 532 106 647 14 10 13 Demand (v), veh/h Ж Signal Information Cycle, s 117.1 Reference Phase 2 Offset, s 0 Reference Point End Green 7.7 63.3 20.3 5.8 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Traffic Information** ΕB **WB** NB SB Approach Movement Т R L Τ R L L Τ R L Τ R Demand (v), veh/h 187 647 10 14 1252 1048 10 29 15 532 13 106 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 2 2 0 0 2 2 0 0 2 2 0 120 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 280 1500 200 1000 375 0 200 1000 275 275 n Grade (Pg), % 0 0 0 0 40 40 40 40 40 Speed Limit, mi/h 40 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL WBT **NBL** NBT SBL SBT 8.0 65.0 65.0 20.0 22.0 20.0 Maximum Green (Gmax) or Phase Split, s Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 0.0 2.0 2.0 2.0 0.0 2.0 Minimum Green (Gmin), s 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off **Dual Entry** No Yes Yes Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** FB WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 Walkway / Crosswalk Width / Length, ft 9.0 12 0 9.0 12 0 9.0 12 0 9.0 12 0 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No 12 5.0 2.0 12 2.0 12 2.0 12 Width Outside / Bike Lane / Shoulder, ft 5.0 5.0 5.0 2.0 Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50

0.50

Nο

HCS7 Signalized Intersection Results Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date Mar 11, 2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Morning** Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2033 1> 7:00 Analysis Period Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A AM DHV Yr 2033 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak **Demand Information** EΒ WB NB SB Approach Movement R L R L R L R 187 10 1252 1048 29 15 532 106 647 14 10 13 Demand (v), veh/h Ж Signal Information Cycle, s 117.1 Reference Phase 2 Offset, s 0 Reference Point End Green 7.7 63.3 20.3 5.8 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Timer Results EBL EBT WBL WBT NBL NBT** SBL SBT **Assigned Phase** 5 2 6 8 4 7 Case Number 1.0 3.0 5.3 6.3 1.0 3.0 Phase Duration, s 11.7 81.0 69.3 11.8 24.3 36.1 Change Period, (Y+Rc), s 4.0 6.0 6.0 6.0 4.0 6.0 Max Allow Headway (MAH), s 3.1 3.1 3.1 3.2 3.1 3.2 Queue Clearance Time (g_s), s 7.7 12.4 60.6 5.1 19.9 8.2 13.9 Green Extension Time (g_e), s 0.0 2.7 0.1 0.4 0.3 1.00 Phase Call Probability 1.00 1.00 1.00 1.00 1.00 Max Out Probability 1.00 0.07 0.93 0.00 1.00 0.00 WB NB SB **Movement Group Results** EΒ Approach Movement L Т R L Т R L Т R ī Т R **Assigned Movement** 5 2 12 16 3 7 4 14 1 6 8 18 203 578 Adjusted Flow Rate (v), veh/h 703 11 15 1361 1009 11 48 14 115 1900 Adjusted Saturation Flow Rate (s), veh/h/ln 1781 1781 1610 756 1781 1585 1422 1790 1730 1585 Queue Service Time (g_s), s 5.7 10.4 0.3 1.1 33.3 58.6 0.9 3.1 17.9 0.7 6.2 Cycle Queue Clearance Time (g_c), s 5.7 10.4 0.3 1.1 33.3 58.6 0.9 17.9 0.7 6.2 3.1 Green Ratio (g/C) 0.62 0.64 0.64 0.54 0.54 0.71 0.05 0.05 0.24 0.26 0.32 88 281 2282 1032 470 1926 1132 132 785 488 511 Capacity (c), veh/h Volume-to-Capacity Ratio (X) 0.723 0.308 0.011 0.032 0.706 0.891 0.083 0.541 0.736 0.029 0.225 82.4 487.7 Back of Queue (Q), ft/ln (50 th percentile) 93 2.3 4.5 330.5 7.6 35 196 7.4 59.2 3.2 0.2 0.3 7.7 0.3 Back of Queue (Q), veh/ln (50 th percentile) 3.7 0.1 13.0 19.2 1.4 2.3 Queue Storage Ratio (RQ) (50 th percentile) 0.29 0.06 0.00 0.02 0.33 1.30 0.04 0.18 0.20 0.03 0.22 20.0 20.0 54.4 40.8 Uniform Delay (d 1), s/veh 9.4 7.6 12.6 13.2 53.3 32.6 29.0 Incremental Delay (d 2), s/veh 7.4 0.0 0.0 0.0 1.0 8.5 0.1 1.9 2.7 0.0 0.1 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 27.4 9.4 12.6 20.9 56.3 43.5 Control Delay (d), s/veh 7.6 21.7 53.4 32.6 29.1 Level of Service (LOS) С Α Α В С С D F D С С Approach Delay, s/veh / LOS 13.4 В 21.2 С 55.8 Ε 40.9 D Intersection Delay, s/veh / LOS 23.4 C **Multimodal Results** FB WB NB SB Pedestrian LOS Score / LOS 1.88 В 2.26 2.64 2.45 В С В Bicycle LOS Score / LOS 1.24 Α 2.46 В 0.58 Α 1.66

HCS7 Signalized Intersection Intermediate Values General Information Intersection Information TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date Mar 11, 2020 Area Type Other PHF Jurisdiction Clarksville MPO Time Period **DHV Morning** 0.92 Peak **Urban Street** SR 374 (Richview Drive) 2033 1> 7:00 Analysis Year Analysis Period File Name SR 374 w US 41A AM DHV Yr 2033 Future 2 SBL.. Intersection US 41A (SR 112-Madiso... **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak EΒ WB NB SB **Demand Information** Approach Movement R L R L R L R 1048 187 647 10 14 1252 10 29 15 532 13 106 Demand (v), veh/h Ж **Signal Information** Cycle, s 117.1 Reference Phase 2 Offset, s 0 Reference Point End Green 7.7 63.3 20.3 5.8 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 Saturation Flow / Delay L Т R Τ R Т R R Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 0.952 1.000 1.000 0.952 1.000 1.000 1.000 1.000 0.971 1.000 1.000 0.000 0.000 Left-Turn Adjustment Factor (fLT) 0.952 0.000 0.398 0.748 0.952 0.000 Right-Turn Adjustment Factor (fRT) 0.000 0.847 0.000 0.847 0.942 0.942 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (fRpb) Work Zone Adjustment Factor (fwz) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fddi) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3561 1610 756 3561 1585 1422 1180 610 3459 1900 1585 0.54 Proportion of Vehicles Arriving on Green (P) 0.07 0.64 0.64 0.54 0.54 0.05 0.05 0.05 0.17 0.26 0.26 0.23 Incremental Delay Factor (k) 0.04 0.04 0.04 0.21 0.38 0.04 0.04 0.22 0.04 0.04 **Signal Timing / Movement Groups** FBI FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 4.0 6.0 6.0 6.0 4.0 6.0 0.62 0.64 0.54 0.05 0.24 0.26 Green Ratio (g/C) 400 Permitted Saturation Flow Rate (sp), veh/h/ln 0 756 1422 1358 0 Shared Saturation Flow Rate (ssh), veh/h/ln Permitted Effective Green Time (g_p) , s 65.4 0.0 63.4 5.8 7.8 0.0 30.1 2.7 0.0 63.4 5.8 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (q_{ps}) , s 30.1 1.1 0.9 1.4 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln 0 1585 1585 Protected Right Effective Green Time (g_R) , s 0.0 20.3 7.7 Multimodal WB EΒ NB SB Pedestrian Fw / Fv 1.198 1.710 1.710 0.000 1.557 0.000 0.171 0.000 0.000 Pedestrian Fs / Fdelay 0.000 0.081 0.000 0.101 0.159 0.000 0.139 Pedestrian Mcorner / Mcw Bicycle cb / db 7.56 1081.92 12.34 98.83 52.91 513.55 32.34 1281.48

-3.64

0.76

Bicvcle Fw / Fv

1.97

-3.64

0.10

-3.64

1.17

-3.64

HCS7 Signalized Intersection Results Graphical Summary Intersection Information **General Information** 0.250 TRC Worldwide Engineering Duration, h Agency Analyst MLT Analysis Date Mar 11, 2020 Area Type Other PHF Jurisdiction Clarksville MPO Time Period DHV Morning 0.92 Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2033 1> 7:00 **Analysis Period** Intersection File Name SR 374 w US 41A AM DHV Yr 2033 Future 2 SBL.. US 41A (SR 112-Madiso... **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak **Demand Information** ΕB WB NB SB Approach Movement L Τ R L Τ R R L R 1048 187 647 10 14 1252 10 29 15 532 13 106 Demand (v), veh/h 瓜 **Signal Information** Cycle, s 117.1 Reference Phase 2 Offset, s 0 Reference Point End Green 7.7 63.3 20.3 5.8 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Movement Group Results** EΒ **WB** NB SB Approach Movement Т R Т R Τ L L L R L Τ R Back of Queue (Q), ft/ln (50 th percentile) 82.4 93 2.3 4.5 330.5 487.7 7.6 35 196 7.4 59.2 Back of Queue (Q), veh/ln (50 th percentile) 3.2 3.7 0.1 0.2 13.0 0.3 1.4 7.7 0.3 2.3 19.2 Queue Storage Ratio (RQ) (50 th percentile) 0.06 0.00 0.02 0.33 0.18 0.03 0.22 0.29 1.30 0.04 0.20 27.4 56.3 43.5 Control Delay (d), s/veh 9.4 7.6 12.6 20.9 21.7 53.4 32.6 29.1 Level of Service (LOS) С Α Α В С С D Ε D С С Approach Delay, s/veh / LOS 13.4 В 21.2 С 55.8 Ε 40.9 D Intersection Delay, s/veh / LOS 23.4 С 3.2 _____ 27.4 3.7 _____ 9.4 0.1 7.6 12.6 0.2 LOS B LOS C Queue Storage Ratio < 1 LOSD LOS E Queue Storage Ratio > 1 LOS F

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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

--- Comments ---

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HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date 2/17/2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Afternoon** Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2033 1> 7:00 Analysis Period Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A PM DHV Yr 2033 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL PM Peak **Demand Information** ΕB WB NB SB Approach Movement L R L R L R L R 183 25 1297 748 39 928 132 1700 31 18 19 20 Demand (v), veh/h Ж Signal Information Cycle, s 148.3 Reference Phase 2 Offset, s 0 Reference Point End Green 10.7 70.0 40.0 7.6 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Traffic Information** ΕB **WB** NB SB Approach Movement Τ R Т R L L L Т R L Т R Demand (v), veh/h 183 1700 31 25 1297 748 18 19 39 928 20 132 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None R 0 Heavy Vehicles (PHV), % 2 2 0 0 2 2 0 0 2 2 0 120 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 280 1500 200 1000 375 0 200 1000 275 275 n Grade (Pg), % 0 0 0 0 40 40 40 40 40 40 Speed Limit, mi/h 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL WBT **NBL** NBT SBL SBT 40.0 70.0 20.0 40.0 10.0 Maximum Green (Gmax) or Phase Split, s 81.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 0.0 2.0 2.0 2.0 0.0 2.0 Minimum Green (Gmin), s 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off **Dual Entry** No Yes Yes Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** FB WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 Walkway / Crosswalk Width / Length, ft 9.0 12 0 9.0 12 0 9.0 12 0 9.0 12 0 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No 12 5.0 2.0 12 2.0 12 2.0 12 Width Outside / Bike Lane / Shoulder, ft 5.0 5.0 5.0 2.0 Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50 Nο Nο 0.50

HCS7 Signalized Intersection Results Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date 2/17/2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Afternoon** Peak 1> 7:00 **Urban Street** SR 374 (Richview Drive) Analysis Year 2033 Analysis Period Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A PM DHV Yr 2033 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL PM Peak **Demand Information** EΒ WB NB SB Approach Movement R L R L R L R 183 25 1297 748 39 928 20 132 1700 31 18 19 Demand (v), veh/h 儿 Signal Information IJ. Cycle, s 148.3 Reference Phase 2 Offset, s 0 Reference Point End Green 10.7 70.0 40.0 7.6 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Timer Results EBL EBT WBL WBT NBL NBT** SBL SBT **Assigned Phase** 5 2 6 8 4 7 Case Number 1.0 3.0 5.3 6.3 1.0 3.0 Phase Duration, s 14.7 90.7 76.0 13.6 44.0 57.6 Change Period, (Y+Rc), s 4.0 6.0 6.0 6.0 4.0 6.0 Max Allow Headway (MAH), s 3.1 3.1 3.1 3.2 3.1 3.2 Queue Clearance Time (g_s), s 10.3 70.6 71.5 7.4 42.0 11.6 0.3 8.4 Green Extension Time (g_e), s 0.0 0.1 0.0 0.0 1.00 Phase Call Probability 1.00 1.00 1.00 1.00 1.00 Max Out Probability 0.00 0.82 1.00 0.00 1.00 1.00 NB SB **Movement Group Results** EΒ **WB** Approach Movement L Т R L Т R L Т R ī Т R 5 2 12 16 3 7 4 14 **Assigned Movement** 1 6 8 18 Adjusted Flow Rate (v), veh/h 27 20 1009 22 199 1848 34 1410 683 63 143 Adjusted Saturation Flow Rate (s), veh/h/ln 1781 1781 1610 254 1781 1585 1412 1695 1730 1900 1427 Queue Service Time (g_s), s 8.3 68.6 1.4 15.8 51.4 29.0 2.0 5.4 40.0 1.1 9.6 Cycle Queue Clearance Time (g_c), s 8.3 68.6 1.4 69.5 51.4 29.0 2.0 5.4 40.0 1.1 9.6 Green Ratio (g/C) 0.56 0.57 0.57 0.47 0.47 0.74 0.05 0.05 0.33 0.35 0.42 660 226 2035 920 76 1680 1175 87 1068 600 Capacity (c), veh/h 121 Volume-to-Capacity Ratio (X) 0.882 0.908 0.037 0.355 0.839 0.581 0.162 0.728 0.945 0.033 0.239 494.7 Back of Queue (Q), ft/ln (50 th percentile) 92.6 743.9 12.4 25.9 568.8 227 18 61.2 13 83.5 0.7 2.4 Back of Queue (Q), veh/ln (50 th percentile) 3.6 29.3 0.5 1.0 22.4 8.9 19.5 0.5 3.3 Queue Storage Ratio (RQ) (50 th percentile) 0.33 0.50 0.01 0.13 0.57 0.61 0.09 0.31 0.49 0.05 0.30 31.9 69.4 46.8 Uniform Delay (d 1), s/veh 28.3 13.9 65.8 34.3 8.7 67.8 31.9 27.7 Incremental Delay (d 2), s/veh 4.4 6.3 0.0 1.0 3.7 0.5 0.2 4.3 15.8 0.0 0.1 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 36.3 34.6 66.9 38.0 68.0 73.7 62.6 32.0 Control Delay (d), s/veh 13.9 9.2 27.8 Level of Service (LOS) D C В F D Α Ε F F С С Approach Delay, s/veh / LOS 34.4 С 29.1 С 72.4 Ε 57.8 Ε Intersection Delay, s/veh / LOS 38.0 D **Multimodal Results** FB WB NB SB Pedestrian LOS Score / LOS 1.90 В 2.28 2.65 2.45 В С В Bicycle LOS Score / LOS 2.20 В 2.24 0.62 Α 2.42

HCS7 Signalized Intersection Intermediate Values General Information Intersection Information TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other PHF Jurisdiction Clarksville MPO Time Period DHV Afternoon 0.92 Peak **Urban Street** 2033 1> 7:00 SR 374 (Richview Drive) Analysis Year Analysis Period File Name SR 374 w US 41A PM DHV Yr 2033 Future 2 SBL.. Intersection US 41A (SR 112-Madiso... **Project Description** Future 2 SBL 1 WBR 1 EBL PM Peak EΒ WB NB SB **Demand Information** Approach Movement R L R L R L R 25 1297 748 39 928 132 183 1700 31 18 19 20 Demand (v), veh/h Ж **Signal Information** Cycle, s 148.3 Reference Phase 2 Offset, s 0 Reference Point End Green 10.7 70.0 40.0 7.6 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 Saturation Flow / Delay L Т R Τ R Т R R 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.900 Bus Blockage Adjustment Factor (fbb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 0.952 1.000 1.000 0.952 1.000 1.000 1.000 1.000 0.971 1.000 1.000 0.000 0.000 0.000 Left-Turn Adjustment Factor (fLT) 0.952 0.000 0.134 0.743 0.952 Right-Turn Adjustment Factor (fRT) 0.000 0.847 0.000 0.847 0.892 0.892 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (fRpb) Work Zone Adjustment Factor (fwz) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fddi) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3561 1610 254 3561 1585 1412 555 1140 3459 1900 1427 Proportion of Vehicles Arriving on Green (P) 0.07 0.57 0.57 0.47 0.47 0.47 0.05 0.05 0.05 0.27 0.35 0.35 Incremental Delay Factor (k) 0.04 0.42 0.04 0.04 0.35 0.11 0.04 0.04 0.45 0.04 0.04 **Signal Timing / Movement Groups** FBI FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 4.0 6.0 6.0 6.0 4.0 6.0 0.56 0.57 0.47 0.05 0.33 0.35 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 382 0 254 1412 1339 0 Shared Saturation Flow Rate (ssh), veh/h/ln 72.0 Permitted Effective Green Time (g_p) , s 0.0 70.0 7.6 9.6 0.0 18.3 16.3 7.6 2.1 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (q_{ps}) , s 18.3 15.8 2.0 2.1 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s 1427 Protected Right Saturation Flow (s_R), veh/h/ln 0 1585 Protected Right Effective Green Time (g_R) , s 0.0 40.0 10.8 Multimodal WB EΒ NB SB Pedestrian Fw / Fv 1.198 0.000 1.710 1.710 1.557 0.000 0.171 0.000 0.000 0.000 Pedestrian Fs / Fdelay 0.105 0.000 0.121 0.168 0.000 0.138 Pedestrian Mcorner / Mcw Bicycle cb / db 13.63 943.94 20.68 102.14 66.78 695.46 1142.68 31.55

-3.64

1.72

Bicvcle Fw / Fv

1.75

-3.64

0.14

-3.64

1.94

-3.64

HCS7 Signalized Intersection Results Graphical Summary Intersection Information **General Information** TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other PHF Jurisdiction Clarksville MPO Time Period DHV Afternoon 0.92 Peak **Urban Street** SR 374 (Richview Drive) 2033 1> 7:00 Analysis Year **Analysis Period** File Name SR 374 w US 41A PM DHV Yr 2033 Future 2 SBL.. Intersection US 41A (SR 112-Madiso... **Project Description** Future 2 SBL 1 WBR 1 EBL PM Peak **Demand Information** ΕB WB NB SB Approach Movement L Τ R L Τ R R L R 25 39 132 183 1700 31 1297 748 18 19 928 20 Demand (v), veh/h 瓜 **Signal Information** Cycle, s 148.3 Reference Phase 2 Offset, s 0 Reference Point End Green 10.7 70.0 40.0 7.6 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement Т R Т Τ L L R L R L Τ R Back of Queue (Q), ft/ln (50 th percentile) 92.6 743.9 12.4 25.9 568.8 227 18 61.2 494.7 13 83.5 Back of Queue (Q), veh/ln (50 th percentile) 3.6 29.3 0.5 22.4 0.7 2.4 19.5 0.5 3.3 1.0 8.9 Queue Storage Ratio (RQ) (50 th percentile) 0.50 0.01 0.57 0.31 0.49 0.05 0.33 0.13 0.61 0.09 0.30 36.3 Control Delay (d), s/veh 34.6 13.9 66.9 38.0 9.2 68.0 73.7 62.6 32.0 27.8 Level of Service (LOS) D С В Ε D Ε Ε Ε С С Α Approach Delay, s/veh / LOS 34.4 С 29.1 С 72.4 Ε 57.8 Ε Intersection Delay, s/veh / LOS 38.0 D 3.6 ____ 36.3 9.2 8.9 29.3 22.4 0.5 💶 13.9 66.9 LOS B LOS C LOSD LOS E

LOS F

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No errors or warnings exist.

--- Comments ---

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HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date Mar 11, 2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Morning** Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2043 1> 7:00 **Analysis Period** Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A AM DHV Yr 2043 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak **Demand Information** ΕB WB NB SB Approach Movement L R L R L R L R 212 12 1184 33 17 602 120 706 16 1366 12 14 Demand (v), veh/h Ж Signal Information Cycle, s 185.2 Reference Phase 2 Offset, s 0 Reference Point End Green 11.0 111.6 34.9 7.6 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Traffic Information** ΕB **WB** NB SB Approach Movement R Т R R L Т L L Т L Т R Demand (v), veh/h 212 706 12 16 1366 1184 12 33 17 602 14 120 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 2 2 0 0 2 2 0 0 2 2 0 120 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 280 1500 200 1000 375 0 200 1000 275 275 n Grade (Pg), % 0 0 0 0 40 40 40 40 40 Speed Limit, mi/h 40 40 40 40 40 40 40 **Phase Information EBL EBT** WBL **WBT NBL** NBT SBL SBT 12.0 115.0 115.0 10.0 20.0 Maximum Green (Gmax) or Phase Split, s 35.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 0.0 2.0 2.0 2.0 0.0 2.0 Minimum Green (Gmin), s 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off **Dual Entry** No Yes Yes Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** FB WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 Walkway / Crosswalk Width / Length, ft 9.0 12 0 9.0 12 0 9.0 12 0 9.0 12 0 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No 12 5.0 2.0 12 2.0 12 2.0 12 Width Outside / Bike Lane / Shoulder, ft 5.0 5.0 5.0 2.0 Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50 Nο Nο 0.50

HCS7 Signalized Intersection Results Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date Mar 11, 2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Morning** Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2043 1> 7:00 Analysis Period Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A AM DHV Yr 2043 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak **Demand Information** EΒ WB NB SB Approach Movement R L R L R L R 212 12 16 1184 33 17 602 120 706 1366 12 14 Demand (v), veh/h 儿 Signal Information IJ. Cycle, s 185.2 Reference Phase 2 Offset, s 0 Reference Point End Green 11.0 111.6 34.9 7.6 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Timer Results EBL EBT WBL WBT NBL NBT** SBL SBT **Assigned Phase** 5 2 6 8 4 7 Case Number 1.0 3.0 5.3 6.3 1.0 3.0 Phase Duration, s 15.0 132.7 117.6 13.6 38.9 52.5 Change Period, (Y+Rc), s 4.0 6.0 6.0 6.0 4.0 6.0 Max Allow Headway (MAH), s 3.1 3.1 3.1 3.2 3.1 3.2 Queue Clearance Time (g_s), s 11.0 18.1 106.3 7.6 34.8 13.4 0.0 19.6 Green Extension Time (g_e), s 5.3 0.0 0.0 0.2 1.00 Phase Call Probability 1.00 1.00 1.00 1.00 1.00 Max Out Probability 1.00 0.03 0.81 1.00 1.00 0.04 WB NB SB **Movement Group Results** EΒ Approach Movement L Т R L Т R L Т R ī Т R **Assigned Movement** 5 2 12 16 3 7 4 14 1 6 8 18 230 654 Adjusted Flow Rate (v), veh/h 767 13 17 1485 1157 13 54 15 130 1900 Adjusted Saturation Flow Rate (s), veh/h/ln 1781 1781 1610 712 1781 1585 1420 1790 1730 1585 Queue Service Time (g_s), s 9.0 16.1 0.5 1.9 52.6 104.3 1.6 5.6 32.8 1.1 11.4 Cycle Queue Clearance Time (g_c), s 9.0 16.1 0.5 2.9 52.6 104.3 32.8 1.1 11.4 1.7 5.6 Green Ratio (g/C) 0.67 0.68 0.68 0.60 0.60 0.79 0.04 0.04 0.24 0.25 0.31 258 2436 1102 464 2147 1254 97 73 759 477 492 Capacity (c), veh/h Volume-to-Capacity Ratio (X) 0.892 0.315 0.012 0.037 0.691 0.922 0.134 0.740 0.862 0.032 0.265 Back of Queue (Q), ft/ln (50 th percentile) 215.2 160.5 4.3 7.8 558.7 897.6 15.3 70.7 391.6 13.5 116.3 0.2 0.3 Back of Queue (Q), veh/ln (50 th percentile) 8.5 6.3 22.0 35.3 0.6 2.8 15.4 0.5 4.6 Queue Storage Ratio (RQ) (50 th percentile) 0.77 0.11 0.00 0.04 0.56 2.39 80.0 0.35 0.39 0.05 0.42 87.8 Uniform Delay (d 1), s/veh 31.7 11.8 9.3 15.4 25.0 14.9 85.9 66.1 52.4 47.9 Incremental Delay (d 2), s/veh 27.4 0.0 0.0 0.0 0.7 10.7 0.2 12.3 9.5 0.0 0.1 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 11.8 15.4 25.8 86.2 100.1 75.7 52.4 48.1 Control Delay (d), s/veh 59.1 9.3 25.6 Level of Service (LOS) Ε В Α В С F F Ε D D С 22.5 Approach Delay, s/veh / LOS С 25.6 С 97.4 F 70.7 Ε Intersection Delay, s/veh / LOS 34.0 С **Multimodal Results** FB WB NB SB Pedestrian LOS Score / LOS 1.89 В 2.26 2.66 2.47 В С В Bicycle LOS Score / LOS 1.32 Α 2.68 0.60 Α 1.81

HCS7 Signalized Intersection Intermediate Values General Information Intersection Information TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date Mar 11, 2020 Area Type Other PHF Jurisdiction Clarksville MPO Time Period **DHV Morning** 0.92 Peak **Urban Street** SR 374 (Richview Drive) 2043 1> 7:00 Analysis Year Analysis Period File Name SR 374 w US 41A AM DHV Yr 2043 Future 2 SBL.. Intersection US 41A (SR 112-Madiso... **Project Description** Future 2 SBL 1 WBR 1 EBL AM Peak EΒ WB NB SB **Demand Information** Approach Movement R L R L R L R 12 1184 602 212 706 16 1366 12 33 17 14 120 Demand (v), veh/h 泒 **Signal Information** Cycle, s 185.2 Reference Phase 2 Offset, s 0 Reference Point End Green 11.0 34.9 7.6 0.0 111.6 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 Saturation Flow / Delay L Т R Τ R Т R R 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 0.952 1.000 1.000 0.952 1.000 1.000 1.000 1.000 0.971 1.000 1.000 0.000 0.000 0.000 Left-Turn Adjustment Factor (fLT) 0.952 0.000 0.375 0.748 0.952 Right-Turn Adjustment Factor (fRT) 0.000 0.847 0.000 0.847 0.942 0.942 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (fRpb) Work Zone Adjustment Factor (fwz) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fddi) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3561 1610 712 3561 1585 1420 1182 609 3459 1900 1585 Proportion of Vehicles Arriving on Green (P) 0.06 0.68 0.68 0.60 0.60 0.60 0.04 0.04 0.04 0.19 0.25 0.25 0.04 0.20 Incremental Delay Factor (k) 0.37 0.04 0.04 0.41 0.04 0.10 0.37 0.04 0.04 **Signal Timing / Movement Groups** FBI FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 4.0 6.0 6.0 6.0 4.0 6.0 0.67 0.68 0.60 0.04 0.24 0.25 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 355 0 712 1420 1350 0 Shared Saturation Flow Rate (ssh), veh/h/ln Permitted Effective Green Time (g_p) , s 113.7 0.0 111.7 7.6 9.6 0.0 59.1 110.7 7.6 2.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (q_{ps}) , s 59.1 1.9 1.6 2.0 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln 0 1585 1585 Protected Right Effective Green Time (g_R) , s 0.0 34.9 11.0 Multimodal WB EΒ NB SB Pedestrian Fw / Fv 1.198 1.710 1.710 0.000 1.557 0.000 0.171 0.000 0.000 0.000 Pedestrian Fs / Fdelay 0.089 0.000 0.107 0.178 0.000 0.158 Pedestrian Mcorner / Mcw Bicycle cb / db 1368.38 9.23 1205.93 14.59 82.02 85.14 501.98 51.94

-3.64

0.83

Bicvcle Fw / Fv

2.19

-3.64

0.11

-3.64

1.32

-3.64

HCS7 Signalized Intersection Results Graphical Summary Intersection Information **General Information** 0.250 TRC Worldwide Engineering Duration, h Agency Analyst MLT Analysis Date Mar 11, 2020 Area Type Other PHF Jurisdiction Clarksville MPO Time Period DHV Morning 0.92 Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2043 1> 7:00 **Analysis Period** File Name SR 374 w US 41A AM DHV Yr 2043 Future 2 SBL.. Intersection US 41A (SR 112-Madiso... Future 2 SBL 1 WBR 1 EBL AM Peak **Project Description Demand Information** ΕB WB NB SB Approach Movement L Т R L Τ R R L R 12 212 706 16 1366 1184 12 33 17 602 14 120 Demand (v), veh/h 瓜 **Signal Information** Cycle, s 185.2 Reference Phase 2 Offset, s 0 Reference Point End Green 11.0 111.6 34.9 7.6 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement Т R Т Τ R L L R L R L Τ Back of Queue (Q), ft/ln (50 th percentile) 215.2 160.5 4.3 7.8 558.7 897.6 15.3 70.7 391.6 13.5 116.3 Back of Queue (Q), veh/ln (50 th percentile) 8.5 6.3 0.2 0.3 22.0 2.8 15.4 0.5 4.6 35.3 0.6 Queue Storage Ratio (RQ) (50 th percentile) 0.77 0.11 0.00 0.04 0.56 0.35 0.39 0.05 0.42 2.39 80.0 59.1 11.8 9.3 15.4 100.1 Control Delay (d), s/veh 25.8 25.6 86.2 75.7 52.4 48.1 Level of Service (LOS) Ε В Α В С F F Ε D С Approach Delay, s/veh / LOS 22.5 С 25.6 С 97.4 F 70.7 Ε Intersection Delay, s/veh / LOS 34.0 С 8.5 _____ 59.1 6.3 _____ 11.8 0.2 1 9.3 15.4 0.3 100.1 LOS B LOS C Queue Storage Ratio < 1 LOSD LOS E Queue Storage Ratio > 1 LOS F

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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

--- Comments ---

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HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 Analyst MLT Analysis Date 2/17/2020 Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period **DHV Afternoon** Peak **Urban Street** SR 374 (Richview Drive) Analysis Year 2043 1> 7:00 Analysis Period Intersection US 41A (SR 112-Madiso... File Name SR 374 w US 41A PM DHV Yr 2043 Future 2 SBL.. **Project Description** Future 2 SBL 1 WBR 1 EBL PM Peak **Demand Information** EΒ WB NB SB Approach Movement L R L R L R L R 207 1854 35 29 845 44 1049 22 150 1415 21 21 Demand (v), veh/h Ж Signal Information Cycle, s 177.2 Reference Phase 2 Offset, s 0 Reference Point End 57.4 Green 20.4 70.0 9.4 0.0 0.0 Uncoordinated Yes Simult, Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Traffic Information** ΕB **WB** NB SB Approach Movement R Т Τ L Τ L R L R L Τ R Demand (v), veh/h 207 1854 35 29 1415 845 21 21 44 1049 22 150 0 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None R 0 Heavy Vehicles (PHV), % 2 2 0 0 2 2 0 0 2 2 0 120 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 280 1500 200 1050 375 0 200 1000 275 275 n Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 40 40 40 40 40 40 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL **WBT NBL** NBT SBL SBT 40.0 85.0 70.0 15.0 62.0 15.0 Maximum Green (Gmax) or Phase Split, s Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 0.0 2.0 2.0 2.0 0.0 2.0 Minimum Green (Gmin), s 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Off Ped Off Off Off **Dual Entry** No Yes Yes Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** FB WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 Walkway / Crosswalk Width / Length, ft 9.0 12 0 9.0 12 0 9.0 12 0 9.0 12 0 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No 12 5.0 2.0 12 2.0 12 2.0 12 Width Outside / Bike Lane / Shoulder, ft 5.0 5.0 5.0 2.0 Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50 Nο Nο 0.50

HCS7 Signalized Intersection Results Summary General Information Intersection Information TRC Worldwide Engineering Duration, h 0.250 Agency Other Analyst MLT Analysis Date 2/17/2020 Area Type PHF Jurisdiction Clarksville MPO Time Period DHV Afternoon 0.92 Peak **Urban Street** 2043 1> 7:00 SR 374 (Richview Drive) Analysis Year Analysis Period SR 374 w US 41A PM DHV Yr 2043 Future 2 SBL.. Intersection US 41A (SR 112-Madiso... File Name Future 2 SBL 1 WBR 1 EBL PM Peak **Project Description** EΒ WB NB SB **Demand Information** Approach Movement L R L R L R L R 29 845 44 1049 22 150 207 1854 35 1415 21 21 Demand (v), veh/h Ж **Signal Information** Cycle, s 177.2 Reference Phase 2 Offset, s 0 Reference Point End Green 20.4 70.0 57.4 0.0 9.4 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 **Timer Results EBL EBT WBL WBT NBL NBT** SBL **SBT Assigned Phase** 5 2 6 8 7 4 Case Number 1.0 3.0 5.3 6.3 1.0 3.0 Phase Duration, s 24.4 100.4 76.0 15.4 61.4 76.8 4.0 6.0 6.0 4.0 Change Period, (Y+Rc), s 6.0 6.0 Max Allow Headway (MAH), s 3.1 3.1 3.1 3.2 3.1 3.2 Queue Clearance Time (g_s), s 20.0 96.4 72.0 9.3 55.3 13.1 Green Extension Time (g_e), s 0.4 0.0 0.0 0.1 2.0 0.1 Phase Call Probability 1.00 1.00 1.00 1.00 1.00 1.00 Max Out Probability 0.00 1.00 1.00 0.13 0.31 1.00 **Movement Group Results** EΒ **WB** NB SB L Т R L Т R L Т R Т R Approach Movement L **Assigned Movement** 5 2 12 3 7 4 14 1 6 16 8 18 23 Adjusted Flow Rate (v), veh/h 225 2015 38 32 1538 788 71 1140 24 163 1781 1781 1610 215 1781 1585 1409 1694 1730 1900 1427 Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time (g_s), s 18.0 94.4 2.0 0.0 70.0 49.3 2.8 7.3 53.3 1.4 11.1 18.0 94.4 2.0 70.0 70.0 49.3 2.8 7.3 53.3 1.4 Cycle Queue Clearance Time (g c), s 11.1 Green Ratio (g/C) 0.52 0.53 0.53 0.39 0.39 0.72 0.05 0.05 0.39 0.40 0.51 246 1897 858 41 1406 1139 115 90 1233 759 734 Capacity (c), veh/h 0.776 Volume-to-Capacity Ratio (X) 0.915 1.062 0.044 1.094 0.692 0.198 0.785 0.925 0.032 0.222 Back of Queue (Q), ft/ln (50 th percentile) 267 1279 19.2 52.4 1048 430.6 25.4 83.2 622.3 15.9 96.4 4 50.4 2.1 41.3 24.5 Back of Queue (Q), veh/ln (50 th percentile) 10.5 8.0 17.0 1.0 3.3 0.6 3.8 Queue Storage Ratio (RQ) (50 th percentile) 0.95 0.85 0.01 0.26 1.00 1.15 0.13 0.42 0.62 0.06 0.35 Uniform Delay (d 1), s/veh 60.4 41.4 19.8 88.6 53.6 13.9 8.08 82.9 49.8 23.6 32.4 10.3 Incremental Delay (d 2), s/veh 6.4 39.5 0.0 57.5 53.9 1.5 0.3 5.6 0.0 0.1 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 60.1 Control Delay (d), s/veh 66.8 80.9 19.8 146.1 107.5 15.5 81.1 88.5 32.4 23.6 Level of Service (LOS) Ε F В F F В F F Ε С С Approach Delay, s/veh / LOS 78.5 Ε 77.3 E 86.7 F 55.1 Ε Intersection Delay, s/veh / LOS 73.0 Ε **Multimodal Results** FB WB NB SB Pedestrian LOS Score / LOS 1.92 В 2.30 В 2.66 С 2.45 В Bicycle LOS Score / LOS 2.37 В 2.43 0.64 Α 2.68

HCS7 Signalized Intersection Intermediate Values General Information Intersection Information TRC Worldwide Engineering Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other PHF Jurisdiction Clarksville MPO Time Period DHV Afternoon 0.92 Peak **Urban Street** 2043 1> 7:00 SR 374 (Richview Drive) Analysis Year Analysis Period File Name SR 374 w US 41A PM DHV Yr 2043 Future 2 SBL.. Intersection US 41A (SR 112-Madiso... **Project Description** Future 2 SBL 1 WBR 1 EBL PM Peak ΕB WB NB SB **Demand Information** Approach Movement R L R L R L R 207 29 845 44 1049 22 150 1854 35 1415 21 21 Demand (v), veh/h Ж **Signal Information** ٨, Cycle, s 177.2 Reference Phase 2 Offset, s 0 Reference Point End Green 20.4 70.0 57.4 9.4 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 0.0 2.0 0.0 2.0 0.0 0.0 Saturation Flow / Delay L Т R Τ R Т R R 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 1.000 0.984 0.984 1.000 1.000 1.000 0.984 1.000 0.984 Parking Activity Adjustment Factor (f_p) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.900 Bus Blockage Adjustment Factor (fbb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 0.952 1.000 1.000 0.952 1.000 1.000 1.000 1.000 0.971 1.000 1.000 0.000 0.000 0.000 Left-Turn Adjustment Factor (fLT) 0.952 0.000 0.113 0.742 0.952 Right-Turn Adjustment Factor (fRT) 0.000 0.847 0.000 0.847 0.891 0.891 0.000 0.847 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (fRpb) Work Zone Adjustment Factor (fwz) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fddi) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 3561 1610 215 3561 1585 1409 547 1146 3459 1900 1427 0.39 Proportion of Vehicles Arriving on Green (P) 0.12 0.53 0.53 0.39 0.39 0.05 0.05 0.05 0.32 0.40 0.40 0.29 0.22 Incremental Delay Factor (k) 0.05 0.50 0.04 0.50 0.04 0.04 0.37 0.04 0.04 **Signal Timing / Movement Groups** FBI FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 4.0 6.0 6.0 6.0 4.0 6.0 0.52 0.53 0.39 0.05 0.39 0.40 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 337 0 215 1409 1330 0 Shared Saturation Flow Rate (ssh), veh/h/ln 72.0 Permitted Effective Green Time (g_p) , s 0.0 70.0 9.4 11.4 0.0 0.0 0.0 2.1 0.0 9.4 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (q_{ps}) , s 0.0 0.0 2.8 2.1 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s 1427 Protected Right Saturation Flow (sR), veh/h/ln 0 1585 Protected Right Effective Green Time (g_R) , s 0.0 57.4 20.4 Multimodal WB EΒ NB SB Pedestrian Fw / Fv 1.198 1.710 1.710 0.000 1.557 0.000 0.171 0.000 0.000 Pedestrian Fs / Fdelay 0.000 0.119 0.000 0.140 0.175 0.000 0.139 Pedestrian Mcorner / Mcw Bicycle cb / db 1065.60 19.34 789.95 32.44 79.45 798.94 106.18 31.96

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Bicvcle Fw / Fv

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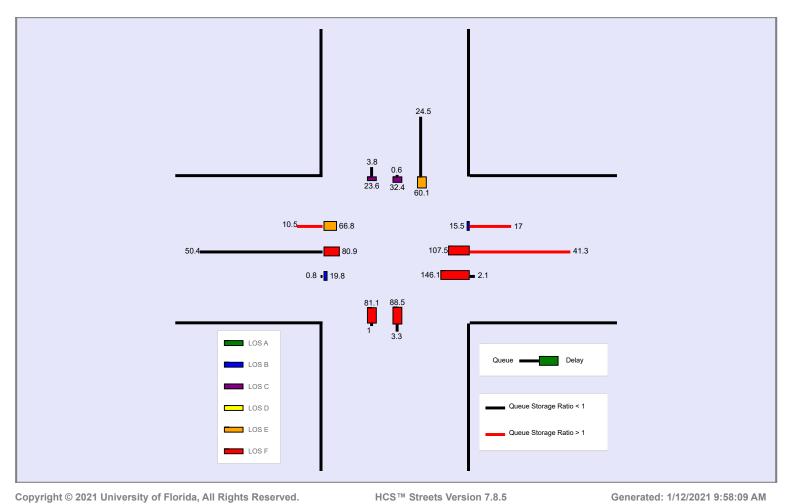
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/In (50 th percentile)		267	1279. 4	19.2	52.4	1048	3 430.6	25.4	83.2		622.3	15.9	96.4
eh/ln (50 th percenti	le)	10.5	50.4	0.8	2.1	41.3	17.0	1.0	3.3		24.5	0.6	3.8
RQ) (50 th percent	tile)	0.95	0.85	0.01	0.26	1.00	1.15	0.13	0.42		0.62	0.06	0.35
Control Delay (d), s/veh			80.9	19.8	146.1	107.	5 15.5	81.1	88.5		60.1	32.4	23.6
Level of Service (LOS)			F	В	F	F	В	F	F		E	С	С
/LOS		78.5	Т.	E	77.3	3	E	86.7	7	F	55.1		E
ntersection Delay, s/veh / LOS				73.0							E		
	MLT Clarksville MPO SR 374 (Richview I US 41A (SR 112-Ma) Future 2 SBL 1 WB Reference Phase Reference Point Simult. Gap E/W Simult. Gap N/S sults /In (50 th percentile) eh/In (50 th percentile) // LOS	MLT Clarksville MPO SR 374 (Richview Drive) US 41A (SR 112-Madiso Future 2 SBL 1 WBR 1 EBI Reference Phase 2 Reference Point End Simult. Gap E/W On Simult. Gap N/S On sults /In (50 th percentile) eh/In (50 th percentile) eh/In (50 th percentile) eh/In (50 th percentile)	Clarksville MPO SR 374 (Richview Drive) US 41A (SR 112-Madiso File Na Future 2 SBL 1 WBR 1 EBL PM Pe L 207 Reference Phase 2 Reference Point End Simult. Gap E/W On Simult. Gap N/S On Red Sults //In (50 th percentile) eh/In (50 th percentile) PRQ) (50 th percentile) eh 10.5 RQ) (50 th percentile) E 10.5 RQ) (50 th percentile)	MLT Clarksville MPO SR 374 (Richview Drive) US 41A (SR 112-Madiso File Name Future 2 SBL 1 WBR 1 EBL PM Peak EB L T 207 1854 Reference Phase 2 Reference Point End Simult. Gap E/W On Simult. Gap N/S On Red 0.0 Sults EB L T 207 1854 EB L T 207 1854	MLT	MLT	Analysis Date 2/17/2020 Clarksville MPO	TRC Worldwide Engineering	TRC Worldwide Engineering	TRC Worldwide Engineering	MILT	TRC Worldwide Engineering	TRC Worldwide Engineering



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HCS™ Streets Version 7.8.5

--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

--- Comments ---

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HCS™ Streets Version 7.8.5

Generated: 1/12/2021 9:58:09 AM

HCS7 Signalized Intersection Input Data 7 4 7 4 1 1 1 **General Information** Intersection Information TRC Worldwide Engineering, Inc. Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF Peak Urban Street SR 374 (Richview Dr./W... 2023 Analysis Period 1> 7:00 Analysis Year Intersection Memorial Dr. File Name SR 374 w Memorial Dr AM DHV Yr 2023 Existing.... **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 471 125 136 120 264 164 92 333 428 311 510 182 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 136.4 Reference Phase 2 Offset, s 0 Reference Point End Green 11.6 0.9 50.0 9.7 4.3 30.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 0.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 0.0 2.0 2.0 2.0 2.0 **Traffic Information** EB WB NB SB Approach Movement Τ R R L Τ R L L Τ R L Τ Demand (v), veh/h 471 125 136 120 264 311 164 510 92 182 333 428 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 2 2 2 2 2 2 2 0 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 O O Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 375 1000 1000 160 325 1000 430 1000 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 40 40 40 40 40 40 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL WBT **NBL NBT** SBL SBT Maximum Green (Gmax) or Phase Split, s 30.0 30.0 50.0 20.0 20.0 20.0 50.0 20.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Red Clearance Interval (Rc). s Minimum Green (Gmin), s 6 6 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Ped Off Off Off Min Off Min **Dual Entry** No Yes No Yes No Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 12 9.0 0 9.0 0 9.0 12 0 9.0 12 0 Walkway / Crosswalk Width / Length, ft 12 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No Width Outside / Bike Lane / Shoulder, ft 12 5.0 12 2.0 12 5.0 2.0 12 2.0 2.0 5.0 5.0 No Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50 Nο 0.50

HCS7 Signalized Intersection Results Summary 7 4 7 4 1 1 1 **General Information Intersection Information** TRC Worldwide Engineering, Inc. Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF Peak Urban Street 2023 Analysis Period 1> 7:00 SR 374 (Richview Dr./W... Analysis Year Intersection Memorial Dr. File Name SR 374 w Memorial Dr AM DHV Yr 2023 Existing.... **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 471 125 136 264 164 510 92 333 428 120 311 182 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 136.4 Reference Phase 2 Offset, s 0 Reference Point End 4.3 Green 11.6 0.9 50.0 9.7 30.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 0.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 0.0 2.0 2.0 2.0 2.0 **Timer Results EBL EBT WBL WBT NBL NBT** SBL SBT Assigned Phase 7 4 3 8 5 2 1 6 Case Number 1.1 4.0 1.1 4.0 1.1 4.0 1.1 4.0 Phase Duration, s 26.0 46.3 15.7 36.0 17.6 56.0 18.4 56.9 Change Period, (Y+Rc), s 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 Max Allow Headway (MAH), s 3.1 3.2 3.1 3.2 3.1 3.1 3.1 3.1 Queue Clearance Time (g s), s 22.0 21.1 9.6 32.0 11.4 50.5 12.2 52.9 Green Extension Time (g e), s 0.0 1.6 0.1 0.0 0.2 0.0 0.2 0.0 Phase Call Probability 1.00 1.00 0.99 1.00 1.00 1.00 1.00 1.00 Max Out Probability 1.00 0.13 0.00 1.00 0.00 1.00 0.01 1.00 **Movement Group Results** EΒ WB NB SB L Т R L Т R L Т R L т R Approach Movement 7 4 14 3 8 18 5 2 12 6 16 Assigned Movement 1 512 130 625 178 198 827 Adjusted Flow Rate (v), veh/h 284 654 1781 1781 1710 1781 1704 1820 1781 1725 Adjusted Saturation Flow Rate (s), veh/h/ln Queue Service Time (g_s), s 20.0 19.1 7.6 30.0 9.4 48.5 10.2 50.9 9.4 Cycle Queue Clearance Time (g c), s 20.0 19.1 7.6 30.0 48.5 10.2 50.9 Green Ratio (g/C) 0.38 0.30 0.29 0.22 0.45 0.37 0.46 0.37 314 505 333 375 204 667 224 643 Capacity (c), veh/h Volume-to-Capacity Ratio (X) 1.631 0.562 0.391 1.668 0.875 0.981 0.885 1.286 Back of Queue (Q), ft/ln (50 th percentile) 854.4 204.9 84.7 1144.9 102.8 677.1 119.2 1149.9 46.0 Back of Queue (Q), veh/ln (50 th percentile) 33.6 8.1 3.3 45.1 4.0 26.7 4.7 Queue Storage Ratio (RQ) (50 th percentile) 2.28 0.20 80.0 7.16 0.32 0.68 0.28 1.15 42.3 40.6 42.7 36.5 42.8 Uniform Delay (d 1), s/veh 37.5 53.2 37.9 Incremental Delay (d 2), s/veh 298.1 0.9 0.3 312.0 10.6 29.9 14.1 140.2 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 340.4 41.5 37.8 365.2 48.5 50.6 Control Delay (d), s/veh 72.6 183.0 Level of Service (LOS) F D D D Ε D Approach Delay, s/veh / LOS 233.8 308.7 F 67.5 Ε 157.5 F 186.8 Intersection Delay, s/veh / LOS WB **Multimodal Results** FB NB SB Pedestrian LOS Score / LOS 1.94 1.95 В В 1.93 В 1.93 В Bicycle LOS Score / LOS 1.80 1.73 1.86 В 2.18

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** TRC Worldwide Engineering, Inc. Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF Peak **Urban Street** 2023 1> 7:00 SR 374 (Richview Dr./W... Analysis Year **Analysis Period** File Name SR 374 w Memorial Dr AM DHV Yr 2023 Existing.... Intersection Memorial Dr. **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 471 136 164 92 428 125 120 264 311 510 182 333 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 136.4 Reference Phase 2 Offset, s 0 Reference Point End Green 11.6 50.0 9.7 4.3 30.0 0.9 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 0.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 0.0 2.0 2.0 2.0 2.0 Saturation Flow / Delay Т R Т R R R 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 0.984 0.984 1.000 0.984 0.984 1.000 0.984 1.000 1.000 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.952 0.000 0.952 0.000 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.000 0.952 0.000 Right-Turn Adjustment Factor (fRT) 0.914 0.914 0.911 0.911 0.973 0.973 0.908 0.908 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (fRpb) 1.000 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 819 891 1781 783 922 1781 1542 278 1781 755 970 Proportion of Vehicles Arriving on Green (P) 0.22 0.22 0.37 0.37 0.15 0.30 0.30 0.07 0.08 0.37 0.09 0.37 Incremental Delay Factor (k) 0.50 0.10 0.04 0.50 0.10 0.48 0.14 0.50 Signal Timing / Movement Groups **EBL** FBT/R WBI WBT/R NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 0.38 0.30 0.29 0.22 0.45 0.37 0.46 0.37 Green Ratio (g/C) 1095 Permitted Saturation Flow Rate (sp), veh/h/ln 800 0 0 663 0 778 n Shared Saturation Flow Rate (ssh), veh/h/ln 30.0 0.0 50.0 0.0 Permitted Effective Green Time (g_p) , s 32.0 0.0 50.0 0.0 0.0 19.1 0.0 0.0 1.5 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 1.5 0.0 1.5 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln Protected Right Effective Green Time (g_R) , s Multimodal EΒ WB NB SB 0.000 Pedestrian Fw / Fv 1.198 0.000 1.198 1.198 1.198 0.000 0.000 0.000 Pedestrian Fs / Fdelay 0.141 0.000 0.149 0.000 0.133 0.000 0.132 Pedestrian Mcorner / Mcw Bicycle cb / db 590.64 33.87 439.79 41.51 732.99 27.38 745.57 26.84

-3.64

1.31

Bicvcle Fw / Fv

1.25

-3.64

1.37

-3.64

1.69

-3.64

HCS7 Signalized Intersection Results Graphical Summary 1 4 1 4 1 **General Information Intersection Information** TRC Worldwide Engineering, Inc. Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF 0.92 Peak **Urban Street** SR 374 (Richview Dr./W... Analysis Year 2023 Analysis Period 1> 7:00 File Name SR 374 w Memorial Dr AM DHV Yr 2023 Existing.... Intersection Memorial Dr. **Project Description Existing Conditions Demand Information** ΕB WB NB SB Approach Movement L Т R L R L R Т R 471 136 92 428 125 120 264 311 164 510 182 333 Demand (v), veh/h 从 思 Signal Information Cycle, s 136.4 Reference Phase 2 Offset, s 0 Reference Point End Green 11.6 0.9 50.0 9.7 4.3 30.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 0.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 0.0 2.0 2.0 2.0 2.0 **Movement Group Results** EΒ WB NB SB Approach Movement Т Т Т Т R L R L R L R L Back of Queue (Q), ft/ln (50 th percentile) 854.4 204.9 84.7 1144.9 102.8 677.1 119.2 1149.9 Back of Queue (Q), veh/ln (50 th percentile) 33.6 3.3 45.1 4.0 26.7 4.7 46.0 8.1 Queue Storage Ratio (RQ) (50 th percentile) 2.28 80.0 7.16 0.28 0.20 0.32 0.68 1.15 340.4 365.2 183.0 Control Delay (d), s/veh 41.5 37.8 48.5 72.6 50.6 Level of Service (LOS) F D D F D Ε D F Approach Delay, s/veh / LOS 233.8 F 308.7 F 67.5 Ε 157.5 F Intersection Delay, s/veh / LOS 186.8 F 340.4 8.1 _____ 41.5 365.2 45.1 37.8 _ 3.3 LOS A LOS B LOS C Queue Storage Ratio < 1 LOSD LOS E Queue Storage Ratio > 1 LOS F

--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

--- Comments ---

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HCS™ Streets Version 7.8.5

Generated: 4/28/2020 9:36:44 AM

HCS7 Signalized Intersection Input Data 7 4 7 4 1 1 1 **General Information** Intersection Information Agency TRC Worldwide Engineering, Inc. Duration, h 0.250 Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Afternoon** PHF Peak Urban Street SR 374 (Richview Dr./W... 2023 Analysis Period 1> 7:00 Analysis Year Intersection Memorial Dr. File Name SR 374 w Memorial Dr PM DHV Yr 2023 Existing.... **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 568 183 97 95 212 636 68 675 204 96 212 618 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 139.9 Reference Phase 2 Offset, s 0 Reference Point End 5.8 Green 7.1 2.8 50.0 8.2 30.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 2.0 **Traffic Information** EB WB NB SB Approach Movement Τ R R L Τ R L L Τ R L Т Demand (v), veh/h 568 183 97 95 204 212 96 636 68 212 675 618 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 2 2 2 2 2 2 2 0 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 375 1000 1000 160 325 1000 430 1000 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 40 40 40 40 40 40 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL WBT **NBL NBT** SBL SBT Maximum Green (Gmax) or Phase Split, s 30.0 30.0 50.0 20.0 20.0 20.0 50.0 20.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Red Clearance Interval (Rc), s Minimum Green (Gmin), s 6 6 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Ped Off Off Off Min Off Min **Dual Entry** No Yes No Yes No Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 12 Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No Width Outside / Bike Lane / Shoulder, ft 12 5.0 12 2.0 12 5.0 2.0 12 2.0 2.0 5.0 5.0 No Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50 Nο 0.50

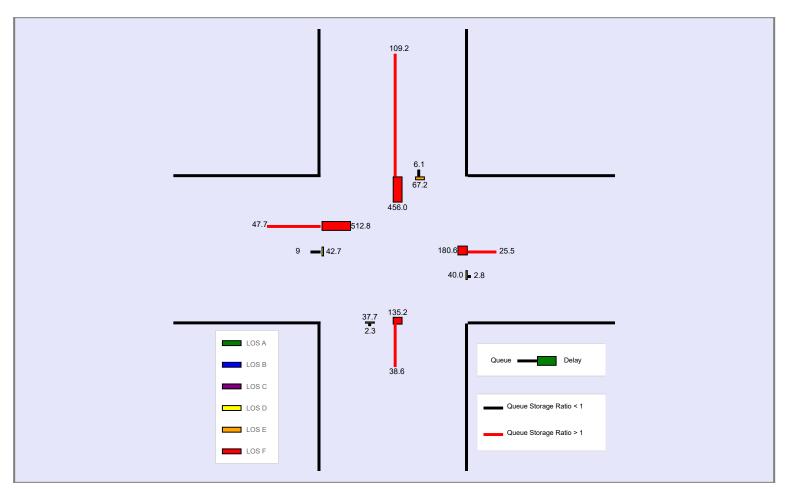
		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	lts Su	mmar	у						
								1						a J. abs	CTI		
General Inform	nation	Y						-		ction Inf	v		_	4 7 4 1	<u>}*</u> \ <u>\</u>		
Agency		TRC Worldwide En	gıneerin			011=1			Duration		0.250				K.		
Analyst		MLT		-		2/17/2		-	Area Ty	ре	Other	-			- A. }		
Jurisdiction		Clarksville MPO		Time F	Period	DHV / Peak	Afternoo	n	PHF		0.92		\$ -₹ -₹	w‡€ 8	√ ≑ ← ∀		
Urban Street		SR 374 (Richview [Dr./W	Analys	is Year	2023			Analysis	s Period	1> 7:0	00		5 ቱ	*_		
Intersection		Memorial Dr.		File Name SR 374 w Memorial						DHV Yr	2023 Ex	kisting		4 1 4 7	7		
Project Description Existing Conditions																	
Demand Inform	nation				EB WB NB								SB				
Approach Move	ment			L	Т	R	L	T	R	L	Т	R	L	Т	R		
Demand (v), veh/h				568	183	97	95	20	4 212	2 96	636	68	212	675	618		
				1													
Signal Informa		1			7				2		\exists		-4-		3		
Cycle, s	139.9	Reference Phase	2	ļ	5		S	2 F	ľR	R	8	1	Y_2	3	→ ₄		
Offset, s	0	Reference Point	End	Green	7.1	2.8	50.0	8.2	5.8	30.	0				<u>-</u>		
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	4.0				くしく	D _	→	7		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0	2.0	2.0		5	6	7	8		
Timer Results				EBI		EBT	WB	1	WBT	NB	1	NBT	SBI		SBT		
Assigned Phase						4	3	_	8	5	_	2	1		6		
Case Number				7 1.1		4.0	1.1	$\overline{}$	4.0	1.1		4.0	1.1		4.0		
Phase Duration	. S					47.8	14.2		36.0	13.		56.0	21.9		64.8		
Change Period,		c). S		6.0		6.0	6.0		6.0 6.			6.0	6.0		6.0		
Max Allow Head				3.1		3.1		3.1 3.1		3.1		3.1	3.1		3.1		
Queue Clearan		· · · · · · · · · · · · · · · · · · ·		22.0		22.5	8.3	-	32.0	7.2		52.0	15.8	3	60.8		
Green Extensio		, = ,		0.0		1.1	0.1	_	0.0	0.1		0.0	0.2		0.0		
Phase Call Prol	bability	<u>, , , , , , , , , , , , , , , , , , , </u>		1.00		1.00	0.98	3	1.00	0.9	8	1.00	1.00)	1.00		
Max Out Probal	bility			1.00		0.15	0.00)	1.00	0.0	0	1.00	0.33	3	1.00		
Manager 4 0	D							\A/D			ND			OD			
Movement Gro		suits		L	EB T	R	L	WB T	R	+-	NB T	R	L	SB T	R		
Assigned Move				7	4	14	3	8	18	5	2	12	1	6	16		
Adjusted Flow F) voh/h		617	304	14	103	452	_	104	765	12	230	1405	10		
		ow Rate (s), veh/h/l	n	1781	1761		1781	1713		1781	1838		1781	1749			
Queue Service		, ,	11	20.0	20.5		6.3	30.0		5.2	50.0		13.8	58.8			
Cycle Queue C		- ,		20.0	20.5		6.3	30.0	_	5.2	50.0		13.8	58.8			
Green Ratio (g		5 mile (g v), 5		0.37	0.30		0.27	0.21		0.41	0.36		0.49	0.42			
Capacity (c), v				306	526		304	367		142	657		254	735			
Volume-to-Capa		atio (X)		2.017	0.579		0.340	1.23		0.733	1.165		0.906	1.912			
		/In (50 th percentile))	1210.	227.5	_	69.9	648.4		58	979.6		_	2729.1			
Back of Oueuc	(0) "	eh/In (50 th percenti	ile)	7 47.7	9.0		2.8	25.5		2.3	38.6		6.1	109.2			
	· ,	RQ) (50 th percent		3.23	0.23		0.07	4.05		0.18	0.98		0.36	2.73			
				43.5	41.6		39.7	55.0		35.0	45.0		43.4	40.6			
Uniform Delay (d 1), s/veh Incremental Delay (d 2), s/veh			469.2	1.1		0.2	125.0		2.7	90.2		23.8	415.4				
Initial Queue Delay (d 3), s/veh		0.0	0.0		0.0	0.0	_	0.0	0.0		0.0	0.0					
Control Delay (d), s/veh			512.8	42.7		40.0	180.	_	37.7	135.2		67.2	456.0				
Level of Service (LOS)			F	D		D	F		D	F		E	F				
Approach Delay				357.		F	154.	5	F	123	.5	F	401.	2	F		
Intersection Del						29	6.0						F				
Multimastri								14/5			ND			0.0			
Multimodal Re		// 00		4.0	EB	D	4.00	WB		4.0	NB	D	4.00	SB	D		
Pedestrian LOS				1.94 2.01		В	1.95 1.40		B A	1.9		В	1.92		С		
bicycle LOS SC	Bicycle LOS Score / LOS			2.01		D	1.40	,	А	1.9	۷	D	3.19	7	C		

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** TRC Worldwide Engineering, Inc. Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period DHV Afternoon PHF Peak **Urban Street** 2023 1> 7:00 SR 374 (Richview Dr./W... Analysis Year Analysis Period File Name SR 374 w Memorial Dr PM DHV Yr 2023 Existing... Intersection Memorial Dr. **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 568 183 97 212 636 68 675 95 204 96 212 618 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 139.9 Reference Phase 2 Offset, s 0 Reference Point End Green 7.1 2.8 50.0 5.8 30.0 8.2 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 2.0 Saturation Flow / Delay Т R Т R R R 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 0.984 0.984 1.000 0.984 0.984 1.000 0.984 1.000 1.000 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.000 0.952 0.000 0.000 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.952 Right-Turn Adjustment Factor (fRT) 0.941 0.941 0.916 0.916 0.983 0.983 0.921 0.921 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (*f*_{Rpb}) 1.000 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 1151 610 1781 840 873 1781 1661 178 1781 913 836 0.30 0.21 0.36 Proportion of Vehicles Arriving on Green (P) 0.14 0.30 0.06 0.21 0.05 0.36 0.11 0.42 0.42 Incremental Delay Factor (k) 0.50 0.11 0.04 0.50 0.04 0.50 0.27 0.50 WBT/R Signal Timing / Movement Groups **EBL** FBT/R WBI NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 0.37 0.30 0.27 0.21 0.41 0.36 0.49 0.42 Green Ratio (g/C) 1075 Permitted Saturation Flow Rate (sp), veh/h/ln 939 0 0 383 0 702 n Shared Saturation Flow Rate (ssh), veh/h/ln 30.0 0.0 50.0 0.0 Permitted Effective Green Time (g_p) , s 32.0 0.0 52.0 0.0 0.0 19.3 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 1.1 0.0 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln Protected Right Effective Green Time (g_R) , s Multimodal EΒ WB NB SB 0.000 Pedestrian Fw / Fv 1.198 0.000 1.198 1.198 1.198 0.000 0.000 0.000 Pedestrian Fs / Fdelay 0.142 0.000 0.151 0.000 0.135 0.000 0.127 Pedestrian Mcorner / Mcw Bicycle cb / db 34.43 428.74 43.19 714.56 28.90 840.40 597.16 23.52 Bicvcle Fw / Fv -3.641.52 -3.640.92 -3.64 1.43 -3.64 2.70

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General Inforn	nation								Intersec	tion Inf	ormatic	n .	T is	ا الموالد إدا	ı L
Agency	iation	TRC Worldwide En	gineerin	a Inc					Duration, h 0.250					47	
Analyst		MLT	9		is Date	2/17/2	020		Area Type		Other				₹ .
Jurisdiction		Clarksville MPO	Time Period I		DHV Afternoon Peak		_	PHF		0.92		^ - ^ - × - · · · · · · · · · · · · · · · · ·	w	.×. }- \$- \$- \$r	
Urban Street		SR 374 (Richview [Analys	is Year	2023			Analysis	Period	1> 7:0	00		火化	<u>~</u>	
Intersection		Memorial Dr.	File Na	ame	SR 37	4 w Me	morial	Dr PM D	HV Yr 2	2023 Ex	isting			* (*	
Project Descrip	tion	Existing Conditions											1		
		^													
Demand Information					EB			WE	3		NB		SB		
	Approach Movement				T	R	L	Т	R	<u> </u>	T	R	<u> </u>	T	R
Demand ($ u$), $ u$	eh/h			568	183	97	95	204	4 212	96	636	68	212	675	618
Signal Informa	i				7	111	25	7	2	7					
Cycle, s	139.9	Reference Phase	2		5		1 50	2 🗀		R	6	1	\mathbf{Y}_{2}	3	← ₄
Offset, s	0	Reference Point	End	Green	7.1	2.8	50.0	8.2	5.8	30.0)				<u></u>
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	4.0	4.0		4.0			<u> </u>	⋰	7
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0	2.0	2.0		5	6	7	8
Movement Gro		sults			EB			WB			NB			SB	
Approach Move				느	T	R	L	Т	R	L	T	R	L	Т	R
Back of Queue (Q), ft/ln (50 th percentile)				1210. 7	227.5		69.9	648.4	1	58	979.6		154.2	2729.1	
Back of Queue (Q), veh/ln (50 th percentile)					9.0		2.8	25.5		2.3	38.6		6.1	109.2	
Queue Storage Ratio (RQ) (50 th percentile)				3.23	0.23		0.07	4.05		0.18	0.98		0.36	2.73	
Control Delay (d), s/veh				512.8	42.7		40.0	180.6	3	37.7	135.2		67.2	456.0	
Level of Service	Level of Service (LOS)			F	D		D	F		D	F		E	F	
Approach Delay	Approach Delay, s/veh / LOS				5	F	154.	5	F	123.	5	F	401.2 F		
													_		

296.0

Intersection Delay, s/veh / LOS



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HCS™ Streets Version 7.8.5

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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

--- Comments ---

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HCS7 Signalized Intersection Input Data 7 4 7 4 1 1 1 **General Information** Intersection Information Agency TRC Worldwide Engineering, Inc. Duration, h 0.250 Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF Peak Urban Street SR 374 (Richview Dr./W... 2033 Analysis Period 1> 7:00 Analysis Year Intersection Memorial Dr. File Name SR 374 w Memorial Dr AM DHV Yr 2033 Existing.... **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 632 168 182 354 417 220 684 124 447 574 161 244 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 143.0 Reference Phase 2 Offset, s 0 Reference Point End Green 17.0 2.0 50.0 13.0 1.0 30.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 0.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 0.0 2.0 2.0 2.0 2.0 **Traffic Information** EB WB NB SB Approach Movement Τ R R L Τ R L L Τ R L Т 182 Demand (v), veh/h 632 168 161 354 417 220 684 124 244 447 574 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 2 2 2 2 2 2 2 0 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 O O Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 375 1000 1000 160 325 1000 430 1000 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 40 40 40 40 40 40 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL WBT **NBL NBT** SBL SBT Maximum Green (Gmax) or Phase Split, s 30.0 30.0 50.0 20.0 20.0 20.0 50.0 20.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Red Clearance Interval (Rc). s Minimum Green (Gmin), s 6 6 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Ped Off Off Off Min Off Min **Dual Entry** No Yes No Yes No Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 12 Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No Width Outside / Bike Lane / Shoulder, ft 12 5.0 12 2.0 12 5.0 2.0 12 2.0 2.0 5.0 5.0 No Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50 Nο 0.50

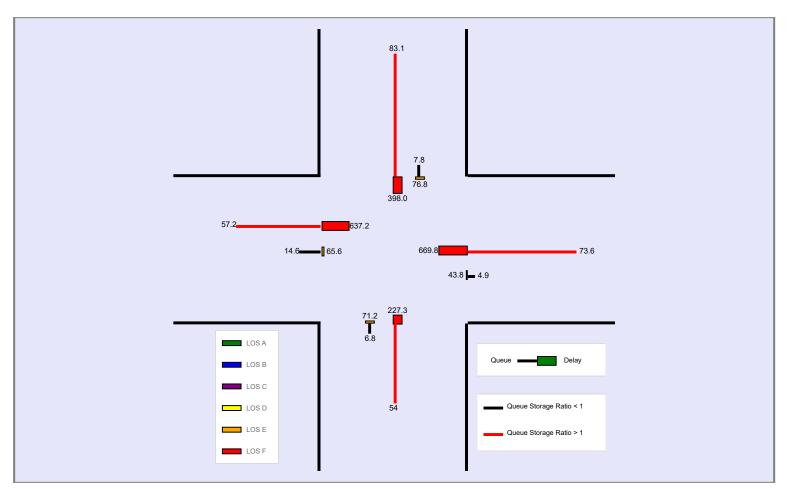
		HCS	7 Sig	nalize	d Int	ersec	tion F	Resu	Its Su	mmar	у					
General Inform	nation	Y								ction Inf	-		_		to it	
Agency		TRC Worldwide En	gineerir			1011-10			Duratio		0.250				E.	
Analyst		MLT		-		2/17/2			Area Ty	pe	Other	•			× É	
Jurisdiction		Clarksville MPO		Time F	Period	DHV I Peak	Morning		PHF		0.92		**************************************	w ‡ E 8	√ + ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ± ±	
Urban Street		SR 374 (Richview [Dr./W	Analys	sis Year	2033			Analysi	s Period	1> 7:	00	7	5 ቱ	r I	
Intersection		Memorial Dr.		File Name SR 374 w Memorial						DHV Yr	2033 Ex	disting		1 1 1 4 7	†* (*	
Project Description Existing Conditions																
Demand Inforn	nation				EB			WI		NB		SB				
Approach Movement				L	Т	R	L	Т	R	L	Т	R	L	Т	R	
Demand (v), veh/h				632	168	182	161	35	4 41	7 220	684	124	244	447	574	
Signal Informa		Υ		ļ	7			1 2		3	\succeq		-4-	_	_	
Cycle, s	143.0	Reference Phase	2	4	5		<u></u>	2F -	ľR	R	6	1	\mathbf{Y}_{2}	3	→ 4	
Offset, s	0	Reference Point	End	Green		2.0	50.0	13.	0 1.0							
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		0.0	4.0	4.0				$\setminus \mid \prec$	P	- ∕ ∣		
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	2.0	2.0	2.0		5	6	7	8	
Timer Results				EBI	_	EBT	WB	L	WBT	NB	L	NBT	SBI	L	SBT	
Assigned Phase	====== e			7	\neg	4	3	\neg	8	5	\neg	2	1	\neg	6	
Case Number				1.1		4.0	1.1		4.0	1.1		4.0	1.1		4.0	
Phase Duration	, S					43.0	19.0		36.0	23.	0	56.0	25.0		58.0	
Change Period,	Change Period, ($Y+R_c$), s					6.0	6.0		6.0)	6.0	6.0		6.0	
Max Allow Head		<u>, </u>		3.1		3.2	3.1		3.2	3.1	\neg	3.1	3.1		3.1	
Queue Clearan	ce Time	e (g s), s		22.0)	32.3	12.9	9	32.0	16.9	9	52.0	18.9	9	54.0	
Green Extensio	n Time	(g e), s		0.0		0.0	0.2	:	0.0	0.1		0.0	0.1		0.0	
Phase Call Prol	bability			1.00)	1.00	1.00	0	1.00	1.0	0	1.00	1.00)	1.00	
Max Out Proba	bility			1.00)	1.00	0.0	1	1.00	0.9	0.94 1.00		1.00)	1.00	
Movement Gro	un Pos	eulte			EB			WB			NB			SB		
Approach Move		suits		L	T	R	L	T	R		T	R	L	T	R	
Assigned Move				7	4	14	3	8	18	5	2	12	1	6	16	
Adjusted Flow F) veh/h		687	380	17	175	838		239	878	12	265	1110	10	
		ow Rate (s), veh/h/l	n	1781	1710		1781	1704		1781	1820		1781	1725		
Queue Service		· ,		20.0	30.3		10.9	30.0		14.9	50.0		16.9	52.0		
Cycle Queue C		- ,		20.0	30.3		10.9	30.0		14.9	50.0		16.9	52.0		
Green Ratio (g		<u> </u>		0.36	0.26		0.30	0.21		0.47	0.35		0.48	0.36		
Capacity (c), v				299	442		245	358	_	262	636		287	627		
Volume-to-Capa		atio (X)		2.294	0.861		0.714		_	0.912	1.380		0.924	1.769		
		/In (50 th percentile))	1452.	371.5		124.3	1869		173.7	1371.		199.4	_		
Back of Oueue	(O) v	eh/In (50 th percent	ile)	7 57.2	14.6		4.9	73.6		6.8	54.0		7.8	83.1		
	· ,	RQ) (50 th percent		3.87	0.37		0.12	11.69	_	0.53	1.37		0.46	2.08		
Uniform Delay (/	44.5	50.6		41.5	56.5	_	44.5	46.5		45.5	45.5		
Incremental Delay (d 2), s/veh			592.7	15.1		2.3	613.3		26.8	180.8		31.4	352.5			
Initial Queue Delay (d 2), s/veh			0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0			
Control Delay (d), s/veh			637.2	65.6		43.8	669.8	3	71.2	227.3		76.8	398.0			
Level of Service (LOS)				F	E		D	F		E	F		E	F		
Approach Delay				433.		F	561.	.7	F	193	.9	F	336.	0	F	
Intersection De						37	4.0						F			
Multimastal								14/5			ND		7			
Multimodal Re		// 00		4.04	EB	D	4.01	WB		4.0	NB	D	4.00	SB	D	
Pedestrian LOS				1.94 2.25		В	1.95		B B	1.93		В	1.93		С	
Dicycle LOS So	Bicycle LOS Score / LOS					В	2.16	0	В	2.3	S	В	2.76)	U	

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** TRC Worldwide Engineering, Inc. Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF Peak **Urban Street** 2033 1> 7:00 SR 374 (Richview Dr./W... Analysis Year Analysis Period File Name SR 374 w Memorial Dr AM DHV Yr 2033 Existing.... Intersection Memorial Dr. **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 632 182 354 417 220 684 124 244 447 574 168 161 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 143.0 Reference Phase 2 Offset, s 0 Reference Point End Green 17.0 2.0 50.0 1.0 30.0 13.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 0.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 0.0 2.0 2.0 2.0 2.0 Saturation Flow / Delay Т R Т R R R 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 0.984 0.984 1.000 0.984 0.984 1.000 0.984 1.000 1.000 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.000 0.952 0.000 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.952 0.000 Right-Turn Adjustment Factor (fRT) 0.914 0.914 0.911 0.911 0.973 0.973 0.908 0.908 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (*f*_{Rpb}) 1.000 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 821 889 1781 783 922 1781 1541 279 1781 755 970 Proportion of Vehicles Arriving on Green (P) 0.21 0.35 0.14 0.26 0.26 0.09 0.21 0.12 0.35 0.13 0.36 0.36 Incremental Delay Factor (k) 0.50 0.37 0.07 0.50 0.31 0.50 0.39 0.50 WBT/R Signal Timing / Movement Groups **EBL** FBT/R WBI NBL NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 0.36 0.26 0.30 0.21 0.47 0.35 0.48 0.36 Green Ratio (g/C) 1003 Permitted Saturation Flow Rate (sp), veh/h/ln 656 0 0 508 0 632 n Shared Saturation Flow Rate (ssh), veh/h/ln 30.0 0.0 50.0 Permitted Effective Green Time (g_p) , s 32.0 0.0 0.0 50.0 0.0 0.0 4.6 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 4.6 0.0 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln Protected Right Effective Green Time (g_R) , s Multimodal EΒ WB NB SB 0.000 Pedestrian Fw / Fv 1.198 0.000 1.198 1.198 1.198 0.000 0.000 0.000 Pedestrian Fs / Fdelay 0.147 0.000 0.152 0.000 0.137 0.000 0.135 Pedestrian Mcorner / Mcw Bicycle cb / db 516.90 39.32 419.57 44.65 699.28 30.24 727.23 28.96 Bicvcle Fw / Fv -3.641.76 -3.641.67 -3.64 1.84 -3.64 2.27

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Agency	iation	TRC Worldwide En	aineerin	a Inc					Intersection Information Duration, h 0.250				-	41,	
Analyst		MLT	giricerii		is Data	2/17/2	020		Area Typ	<u> </u>	Other		_1 _1,		<u>₹</u> &
Jurisdiction		Clarksville MPO	Analysis Date 2		-	DHV Morning		PHF		0.92			w ↑ E	.x. }- 	
Julisuiction		Clarksville IVII O	1111161	enou	Peak	viorining		FNF		0.92		-{ **		√ ←	
Urban Street		SR 374 (Richview [Analys	is Year	2033			Analysis	Period	1> 7:0	00		<u></u> ማ ሴ	_ r	
Intersection		Memorial Dr.	File Na	ame	SR 37	4 w Me	morial	Dr AM D	HV Yr 2	2033 Ex	isting		1 4 1 4 Y 1	T T	
Project Descrip	tion	Existing Conditions											1		
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Demand Information					EB		<u> </u>	WE			NB		SB		
Approach Move				L	Т	R	L	T	R	L	T	R	L	T	R
Demand (v), v	eh/h			632	168	182	161	354	4 417	220	684	124	244	447	574
Signal Informa	tion				1 [1			R .				
Cycle, s	143.0	Reference Phase	2	1	2	KΦZ		<u> </u>	43	2		L	V		Z
Offset, s	0	Reference Point	End		170		<u>"</u>		3	3		1	2	3	4
Uncoordinated	Yes	Simult. Gap E/W	On	Green Yellow		0.0	50.0	13. 4.0		30.0 4.0)			7	→
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	0.0	2.0	2.0		2.0		5	6	7	8
		•		Ji-											
Movement Gro	up Res	sults			EB			WB			NB		SB		
Approach Move	ment			L	Т	R	L	Т	R	L	Т	R	L	Т	R
Back of Queue	(Q), ft	In (50 th percentile))	1452. 7	371.5		124.3	1869		173.7	1371.		199.4	2076.4	
								8			1				
Back of Queue (Q), veh/ln (50 th percentile)				57.2	14.6		4.9	73.6		6.8	54.0		7.8	83.1	
Queue Storage Ratio (RQ) (50 th percentile)				3.87	0.37		0.12	11.69		0.53	1.37		0.46	2.08	
Control Delay (d), s/veh				637.2	65.6		43.8	669.8	3	71.2	227.3		76.8	398.0	
	Level of Service (LOS)			F	E		D	F		E 193.	F	F	E	F	
Approach Delay	pproach Delay, s/veh / LOS			433.5 F 561.7					F	336.0 F					

374.0

Intersection Delay, s/veh / LOS



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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

--- Comments ---

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HCS™ Streets Version 7.8.5

Generated: 9/8/2020 2:16:11 PM

HCS7 Signalized Intersection Input Data 7 4 7 4 1 1 1 **General Information** Intersection Information Agency TRC Worldwide Engineering, Inc. Duration, h 0.250 Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Afternoon** PHF Peak Urban Street SR 374 (Richview Dr./W... 2033 Analysis Period 1> 7:00 Analysis Year Intersection Memorial Dr. File Name SR 374 w Memorial Dr PM DHV Yr 2033 Existing.... **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 762 245 182 284 853 91 284 829 128 274 129 906 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 144.0 Reference Phase 2 Offset, s 0 Reference Point End Green 9.4 4.6 50.0 3.2 30.0 10.8 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 2.0 **Traffic Information** EB WB NB SB Approach Movement Т R R L Τ R L L Τ R L Т 762 182 Demand (v), veh/h 245 128 274 284 129 853 91 284 906 829 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 2 2 2 2 2 2 2 0 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 O O Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 375 1000 1000 160 325 1000 430 1000 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 40 40 40 40 40 40 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL WBT **NBL NBT** SBL SBT Maximum Green (Gmax) or Phase Split, s 30.0 30.0 50.0 20.0 20.0 20.0 50.0 20.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Red Clearance Interval (Rc), s Minimum Green (Gmin), s 6 6 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Ped Off Off Off Min Off Min **Dual Entry** No Yes No Yes No Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 12 Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No Width Outside / Bike Lane / Shoulder, ft 12 5.0 12 2.0 12 5.0 2.0 12 2.0 2.0 5.0 5.0 No Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50 Nο 0.50

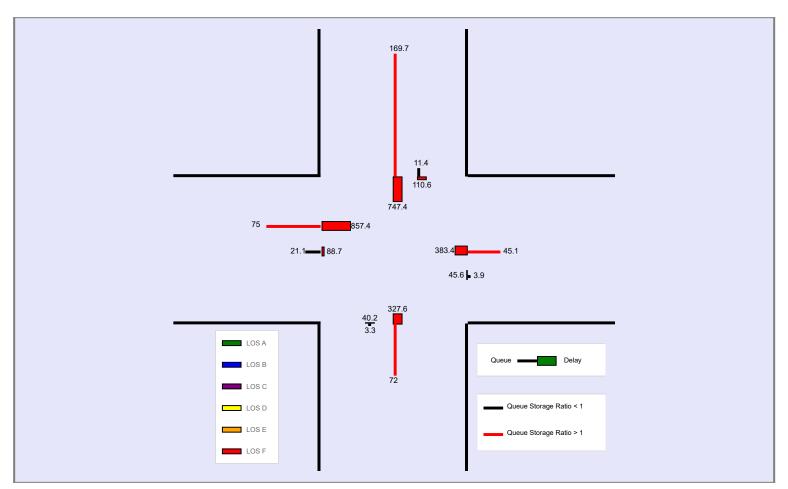
	HCS	7 Sig	nalize	d Inte	ersec	tion F	Resul	lts Su	mmar	у					
General Information								Intersec	tion Inf	ormatic	n		7 [4] Y 4	<u></u>	
Agency	TRC Worldwide En	gineerir	ıg, Inc.					Duratior	ı, h	0.250		_#	4 4	P.	
Analyst	MLT		Analys	is Date	2/17/2	2020		Area Ty _l	ре	Other		<i>≯</i>		2.5	
Jurisdiction	Clarksville MPO		Time F	Period	DHV A	Afternoo	on	PHF		0.92		\$ \frac{1}{4}	w 	÷	
Urban Street	SR 374 (Richview I	Dr./W	Analysis Year 2033 A						Period	1> 7:0	00		K 4.	¢.	
Intersection	Memorial Dr.		File Na		-0-	'4 w Me			OHV Yr :	2033 Ex	isting		—		
Project Description	Existing Conditions	3													
Demand Information	1		EB WB							NB			SB		
Approach Movement			L	Т	R	L	Т	R	L	Т	R	L	Т	R	
Demand (v), veh/h	762	245	182	128	274	1 284	129	853	91	284	906	829			
(),				1											
Signal Information				7		25				<u>S</u>		.			
Cycle, s 144.0	Reference Phase	2		8		- F:↑	2 P			§	>	$ \Psi $		~	
Offset, s 0	Reference Point	End	Green	0.4	4.6	50.0	10.8	8 3.2	30.0		1	2	3	4	
Uncoordinated Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	4.0	-	4.0			N	7	→	
Force Mode Fixed		On	Red	2.0	2.0	2.0	2.0	2.0	2.0	_	5	6	7	8	
			,				н -								
Timer Results			EBI	-	EBT	WB	L	WBT	NB	L	NBT	SBI	-	SBT	
Assigned Phase			7		4	3		8	5		2	1		6	
Case Number			1.1		4.0	1.1		4.0	1.1		4.0	1.1		4.0	
Phase Duration, s					45.2	16.8		36.0	15.4	1	56.0	26.0)	66.6	
Change Period, (Y+F	₹ c), s		6.0		6.0	6.0		6.0			6.0	6.0		6.0	
Max Allow Headway (3.1		3.1	3.1		3.1	3.1		3.1		3.1		
Queue Clearance Time (g_s), s)	40.2	10.7		32.0	9.2		52.0	22.0)	62.6	
Green Extension Time (g e), s					0.0	0.1		0.0	0.2		0.0	0.0		0.0	
Phase Call Probability	, = ,		1.00)	1.00	1.00	_	1.00	1.00		1.00	1.00		1.00	
Max Out Probability			1.00	_	1.00	0.00	_	1.00	0.00		1.00	1.00		1.00	
Movement Group Re	esults			EB			WB			NB			SB		
Approach Movement			L	T	R	L	T	R	L	Т	R	L	Т	R	
Assigned Movement			7	4	14	3	8	18	5	2	12	1	6	16	
Adjusted Flow Rate (v), veh/h		828	464		139	607		140	1026		309	1886		
Adjusted Saturation F	low Rate (s), veh/h/	ln	1781	1737		1781	1713		1781	1838		1781	1750		
Queue Service Time	(g s), s		20.0	38.2		8.7	30.0		7.2	50.0		20.0	60.6		
Cycle Queue Clearan	ce Time (<i>g c</i>), s		20.0	38.2		8.7	30.0		7.2	50.0		20.0	60.6		
Green Ratio (g/C)			0.36	0.27		0.28	0.21		0.41	0.35		0.50	0.42		
Capacity (c), veh/h			297	472		184	357		166	638		297	737		
Volume-to-Capacity F	Ratio (X)		2.785	0.982		0.756	1.699		0.846	1.607		1.038	2.559		
Back of Queue (Q),	ft/In (50 th percentile)	1905. 9	537		100.1	1146.	5	83	1829. 5		290.8	4242		
Back of Queue (Q),	veh/ln (50 th percent	ile)	75.0	21.1		3.9	45.1		3.3	72.0		11.4	169.7		
Queue Storage Ratio	(RQ) (50 th percen	tile)	5.08	0.54		0.10	7.17		0.26	1.83		0.68	4.24		
Uniform Delay (d 1),	s/veh		44.9	52.1		43.2	57.0		35.7	47.0		48.2	41.7		
Incremental Delay (d 2), s/veh			812.6	36.6		2.4	326.4		4.5	280.6		62.4	705.7		
Initial Queue Delay (d 3), s/veh		0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0			
Control Delay (d), s/veh			857.4	88.7		45.6	383.4		40.2	327.6		110.6	747.4		
Level of Service (LOS)				F		D	F		D	F		F	F		
Approach Delay, s/ve	581.	4	F	320.	4	F	293.	0	F	657.	8	F			
Intersection Delay, s/v	ntersection Delay, s/veh / LOS					4.1						F			
	314.1														
			EB					WB NB					SB		
Multimodal Results				EB			WB			NB			SB		
Multimodal Results Pedestrian LOS Score	e / LOS		1.94		В	1.95	-	В	1.93		В	1.93		В	

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** TRC Worldwide Engineering, Inc. Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period DHV Afternoon PHF Peak **Urban Street** 2033 1> 7:00 SR 374 (Richview Dr./W... Analysis Year Analysis Period File Name SR 374 w Memorial Dr PM DHV Yr 2033 Existing.... Intersection Memorial Dr. **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 762 182 284 853 91 284 829 245 128 274 129 906 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 144.0 Reference Phase 2 Offset, s 0 Reference Point End Green 9.4 50.0 3.2 30.0 4.6 10.8 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 2.0 Saturation Flow / Delay Т R Т R R R 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 0.984 0.984 1.000 0.984 0.984 1.000 0.984 1.000 1.000 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.000 0.952 0.000 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.952 0.000 Right-Turn Adjustment Factor (fRT) 0.929 0.929 0.916 0.916 0.983 0.983 0.921 0.921 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (*f*_{Rpb}) 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 997 740 1781 841 872 1781 1661 177 1781 914 836 0.27 0.27 0.21 0.35 Proportion of Vehicles Arriving on Green (P) 0.14 0.08 0.21 0.06 0.35 0.14 0.42 0.42 Incremental Delay Factor (k) 0.50 0.48 0.04 0.50 0.04 0.50 0.50 0.50 WBT/R Signal Timing / Movement Groups **EBL** FBT/R WBI NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 0.36 0.27 0.28 0.21 0.41 0.35 0.50 0.42 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 814 928 0 241 0 550 n n Shared Saturation Flow Rate (ssh), veh/h/ln 30.0 0.0 50.0 Permitted Effective Green Time (g_p) , s 32.0 0.0 0.0 52.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln Protected Right Effective Green Time (g_R) , s Multimodal EΒ WB NB SB Pedestrian Fw / Fv 1.198 0.000 1.198 1.198 1.198 0.000 0.000 0.000 0.000 Pedestrian Fs / Fdelay 0.146 0.000 0.153 0.000 0.137 0.000 0.128 Pedestrian Mcorner / Mcw Bicycle cb / db 543.91 38.16 416.67 45.13 694.44 30.68 842.32 24.12 Bicvcle Fw / Fv -3.642.13 -3.641.23 -3.64 1.92 -3.64 3.62

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Agency	lation	TRC Worldwide En	gineerin	a Inc					Duration, h 0.250					44	
Analyst		MLT	9		is Date	2/17/2	2/17/2020		Area Type		Other				₹_ &
Jurisdiction		Clarksville MPO	Time Period D		1	DHV Afternoon		PHF		0.92	**************************************		w Î E S	.x. }-	
Urban Street		SR 374 (Richview [Analys	is Year	2033			Analysis	Period	1> 7:0	00		K &	<u></u>	
Intersection		Memorial Dr.	File Na	ame	SR 37	4 w Me	morial	Dr PM D	HV Yr 2	2033 Ex	isting		r 작 1 수 약 1	74 LA	
Project Descrip	tion	Existing Conditions											1		
		^												SB	
Demand Inforr					EB			WE			NB				
Approach Move				L	Т	R	L	Т	R	L	T	R	L	T	R
Demand (v), v	eh/h			762	245	182	128	274	4 284	129	853	91	284	906	829
Signal Informa	ition				7	211		7	2	7	<u> </u>				
Cycle, s	144.0	Reference Phase	2		5		1:3	2 🗀		Ħ	Ę	1	Ψ		- ← ₄
Offset, s	0	Reference Point	End	Green	9.4	4.6	50.0	10.	8 3.2	30.0				Ŭ	<u> </u>
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow	4.0	4.0	4.0	4.0	4.0	4.0				⋰ │	₹
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	2.0	2.0	2.0		5	6	7	8
Movement Gro		sults		<u> </u>	EB			WB			NB			SB	
Approach Move				L	T	R	L	Т	R	L	T	R	L	T	R
Back of Queue (Q), ft/ln (50 th percentile)				1905. 9	537		100.1	1146.	5	83	1829. 5		290.8	4242	
Back of Queue (Q), veh/ln (50 th percentile)				75.0	21.1		3.9	45.1		3.3	72.0		11.4	169.7	
Queue Storage Ratio (RQ) (50 th percentile)				5.08	0.54		0.10	7.17		0.26	1.83		0.68	4.24	
Control Delay (d), s/veh				857.4	88.7		45.6	383.4	1	40.2	327.6		110.6	747.4	
Level of Service	Level of Service (LOS)			F	F		D	F		D	F		F	F	
Approach Delay	proach Delay, s/veh / LOS			581.4	4	F	320.	4	F	293.0 F 657.8					F
	" D I / I / I 00														

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Intersection Delay, s/veh / LOS



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HCS™ Streets Version 7.8.5

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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

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--- Comments ---

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HCS™ Streets Version 7.8.5

Generated: 9/8/2020 1:59:13 PM

HCS7 Signalized Intersection Input Data 7 4 7 4 1 1 1 **General Information** Intersection Information Agency TRC Worldwide Engineering, Inc. Duration, h 0.250 Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF Peak Urban Street SR 374 (Richview Dr./W... Analysis Year 2043 Analysis Period 1> 7:00 Intersection Memorial Dr. File Name SR 374 w Memorial Dr AM DHV Yr 2043 Existing.... **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 793 229 444 524 858 155 307 210 202 277 561 721 Demand (v), veh/h Signal Information Ж, Cycle, s 144.0 Reference Phase 2 Offset, s 0 Reference Point End Green 20.0 4.1 30.0 0.0 50.0 15.9 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 0.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 0.0 2.0 0.0 **Traffic Information** EB WB NB SB Approach Movement Τ R R L Τ R L L Τ R L Т Demand (v), veh/h 793 210 229 202 444 524 277 858 155 307 561 721 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 2 2 2 2 2 2 2 0 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 375 1000 1000 160 325 1000 430 1000 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 40 40 40 40 40 40 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL WBT **NBL NBT** SBL SBT Maximum Green (Gmax) or Phase Split, s 30.0 30.0 50.0 20.0 20.0 20.0 50.0 20.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Red Clearance Interval (Rc), s Minimum Green (Gmin), s 6 6 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Ped Off Off Off Min Off Min **Dual Entry** No Yes No Yes No Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 12 Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No Width Outside / Bike Lane / Shoulder, ft 12 5.0 12 2.0 12 5.0 2.0 12 2.0 2.0 5.0 5.0 No Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50 Nο 0.50

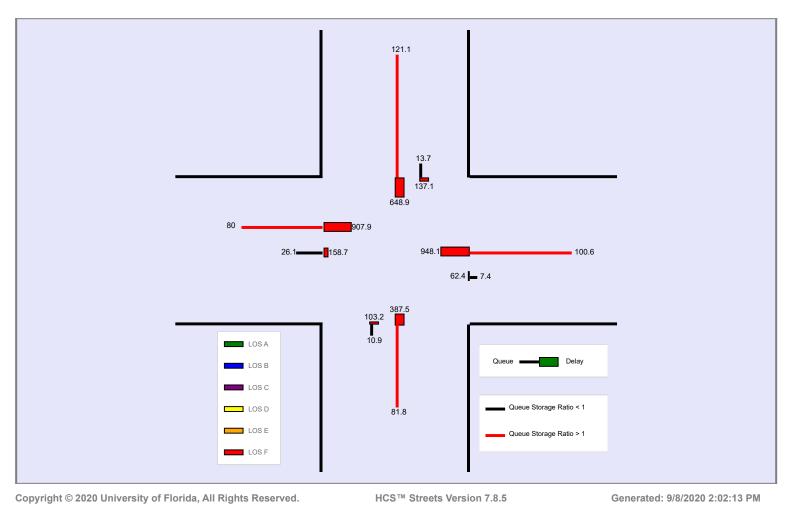
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Agency		TRC Worldwide En	gineerir			1011-10			Dura			0.250				<u>.</u>
Analyst		MLT		-		2/17/2			Area		e	Other		<u>_</u>		× É
Jurisdiction		Clarksville MPO		Time F	Period	DHV I Peak	Morning		PHF			0.92			₩ ‡ E 8	√ ≑ ÷ ₹
Urban Street		SR 374 (Richview [Or./W	Analys	is Year	2043			Anal	ysis	Period	1> 7:0	00		5 ቱ	F
Intersection		Memorial Dr.		File Na	ame	SR 37	'4 w Me	moria	I Dr A	AM D	HV Yr 2	2043 Ex	isting		4 1 4 7	7
Project Descrip	tion	Existing Conditions														
Demand Inforn	nation				EB			W	В			NB			SB	
Approach Move	ment			L	Т	R	L	7	- T	R	L	Т	R	L	Т	R
Demand (v), v				793	210	229	202	44	4	524	277	858	155	307	561	721
Signal Informa		1	1 -		7	عالما	La .			.21 5				-4-		3
Cycle, s	144.0	Reference Phase	2		5	1 51	2 F	Ŕ	Ë	≒ '	·		1	Y_2	3	→ ₄
Offset, s	0	Reference Point	End	Green	20.0	50.0	15.9	4.1		30.0	0.0					<u>-</u>
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	0.0		4.0	0.0			> _	- ∕ ∣	7
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0) [:	2.0	0.0		5	6	7	8
Timer Results				EBL	_	EBT	WB	L	WB	вт	NBI		NBT	SBI		SBT
Assigned Phase				7		4	3	_	8		5		2	1		6
Case Number				1.1		4.0	1.1	\neg	4.0)	1.1		4.0	1.1		4.0
Phase Duration	, S			26.0		40.1	21.9	9	36.0	0	26.0)	56.0	26.0		56.0
Change Period,		c). S		6.0		6.0	6.0	_	6.0	_			6.0	6.0		6.0
	Max Allow Headway (<i>MAH</i>), s			3.1		3.2	3.1	\neg	3.2	2	3.1	\neg	3.1	3.1	\neg	3.1
Queue Clearance Time (g s), s				22.0		36.1	15.8		32.0		22.0) :	52.0	22.0)	52.0
	Green Extension Time (g_s), s			0.0		0.0	0.2		0.0)	0.0		0.0	0.0		0.0
Phase Call Prol	bability	\ <u>-</u>		1.00		1.00	1.00		1.00	0	1.00)	1.00	1.00		1.00
Max Out Proba	bility			1.00		1.00	0.33	3	1.00		1.00)	1.00	1.00)	1.00
Mayarant Cra	Das				EB			WE	,			NB			SB	
Movement Gro		Suits		L	T	R	L	T	- 1	R	L	Т	R	L	T	R
Assigned Move				7	4	14	3	8		18	5	2	12	1	6	16
Adjusted Flow F) veh/h		862	477	14	220	105	_	10	301	1101	12	334	1393	10
		ow Rate (<i>s</i>), veh/h/l	n	1781	1710		1781	170		-	1781	1820		1781	1725	
Queue Service		· ,		20.0	34.1		13.8	30.0	_		20.0	50.0		20.0	50.0	
Cycle Queue C		- ,		20.0	34.1		13.8	30.0	_		20.0	50.0		20.0	50.0	
Green Ratio (g		<u> </u>		0.35	0.24		0.32	0.2			0.49	0.35		0.49	0.35	
Capacity (c), v				297	404		247	355	_		297	632		297	599	
Volume-to-Capa		atio (X)		2.898	1.180		0.888	2.96	_		1.012	1.742		1.122	2.326	
		/In (50 th percentile))	2032. 4	662		188.7	255 ²	_		276.1	2078. 1		347	3026.7	
Back of Queue	(Q). ve	eh/ln (50 th percent	ile)	80.0	26.1		7.4	100.	6		10.9	81.8		13.7	121.1	
	· ,	RQ) (50 th percen		5.42	0.66		0.19	15.9	_		0.85	2.08		0.81	3.03	
Uniform Delay (,	44.5	55.0		41.2	57.0			47.9	47.0		47.9	47.0	
Incremental De				863.4	103.7		21.1	891.	_		55.4	340.5		89.2	601.9	
Initial Queue De	- 1	,		0.0	0.0		0.0	0.0	_		0.0	0.0		0.0	0.0	
Control Delay (,		907.9	158.7		62.4	948.	1		103.2	387.5		137.1	648.9	
Level of Service	(LOS)			F	F		Е	F			F	F		F	F	
Approach Delay	, s/veh	/ LOS		640.	9	F	795.	2	F		326.	5	F	550.	0	F
Intersection De	lay, s/ve	eh / LOS				57	0.9							F		
Multimodal Re	sulte				EB			WE	3			NB			SB	
Pedestrian LOS		/1 OS		1.95		В	1.95		В		1.93		В	1.93		В
Bicycle LOS Sc				2.70		С	2.59	_	С	_	2.80		С	3.34		С
,	J. J / L	-		, 0		-	00						J	0.0		

HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** TRC Worldwide Engineering, Inc. Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Morning** PHF Peak **Urban Street** 2043 1> 7:00 SR 374 (Richview Dr./W... Analysis Year Analysis Period File Name SR 374 w Memorial Dr AM DHV Yr 2043 Existing.... Intersection Memorial Dr. **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L Т R L R L R L R 793 229 444 524 858 155 210 202 277 307 561 721 Demand (v), veh/h Signal Information ٨, Cycle, s 144.0 Reference Phase 2 Offset, s 0 Reference Point End Green 20.0 4.1 30.0 0.0 50.0 15.9 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 0.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 0.0 2.0 0.0 Saturation Flow / Delay Т R R R R 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 0.984 0.984 1.000 0.984 0.984 1.000 0.984 1.000 1.000 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.000 0.952 0.000 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.952 0.000 Right-Turn Adjustment Factor (fRT) 0.914 0.914 0.911 0.911 0.973 0.973 0.908 0.908 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (*f*_{Rpb}) 1.000 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 818 892 1781 782 923 1781 1542 279 1781 755 970 Proportion of Vehicles Arriving on Green (P) 0.24 0.24 0.21 0.35 0.14 0.11 0.21 0.14 0.35 0.14 0.35 0.35 Incremental Delay Factor (k) 0.50 0.50 0.26 0.50 0.50 0.50 0.50 0.50 WBT/R Signal Timing / Movement Groups **EBL** FBT/R WBI NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 0.35 0.24 0.32 0.21 0.49 0.35 0.49 0.35 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 536 0 917 0 388 0 512 n Shared Saturation Flow Rate (ssh), veh/h/ln 30.0 0.0 50.0 0.0 Permitted Effective Green Time (g_p) , s 30.1 0.0 50.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln Protected Right Effective Green Time (g_R) , s Multimodal EΒ WB NB SB 0.000 Pedestrian Fw / Fv 1.198 0.000 1.198 1.198 1.198 0.000 0.000 Pedestrian Fs / Fdelay 0.000 0.150 0.000 0.153 0.000 0.137 0.000 0.137 Pedestrian Mcorner / Mcw Bicycle cb / db 473.08 41.97 416.67 45.13 694.44 30.68 694.44 30.68 Bicvcle Fw / Fv -3.642.21 -3.64 2.10 -3.64 2.31 -3.64 2.85

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Jurisdiction		Clarksville MPO		Time F		-	/lorning		PHF		0.92		- -	w	* }
Urban Street		SR 374 (Richview [Dr./W	Analys	is Year	2043		1	Analysis	Period	1> 7:0	00		火化	<u>~</u>
Intersection		Memorial Dr.		File Na	ame	SR 37	4 w Me	morial	Dr AM D	HV Yr 2	2043 Ex	isting			* *
Project Descrip	tion	Existing Conditions													
Demand Inforr					EB		<u> </u>	WE		<u> </u>	NB		<u> </u>	SB	
Approach Move				L	Т	R	L	Т	R	L	T	R	L	T	R
Demand (<i>v</i>), v	eh/h			793	210	229	202	444	4 524	277	858	155	307	561	721
Signal Information					7		2	1 2		<u></u>	π				
Cycle, s	144.0	Reference Phase	2]	5	_ <u>S</u> ⊕?	م الم	Ħ.	Ħ	è		Y	Ψ		♣ .
Offset, s	0	Reference Point	End	Green	20.0	50.0	15.9	4.1	30.0	0.0		'		3	X *
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	0.0		0.0				→	→
Force Mode	Fixed	Simult. Gap N/S	On	Red	2.0	2.0	2.0	0.0	2.0	0.0		5	6	7	8
Movement Gro		sults			EB			WB			NB			SB	
Approach Move				L	T	R	L	Т	R	L	T	R	L	Т	R
Back of Queue	(Q), ft	/In (50 th percentile))	2032. 4	662		188.7	2554 7		276.1	2078. 1		347	3026.7	
Back of Queue	(Q), ve	eh/In (50 th percent	ile)	80.0	26.1		7.4	100.6		10.9	81.8		13.7	121.1	
Queue Storage	Ratio (RQ) (50 th percent	tile)	5.42	0.66		0.19	15.97	7	0.85	2.08		0.81	3.03	
Control Delay (d), s/ve	eh		907.9	158.7		62.4	948.1		103.2	387.5		137.1	648.9	
Level of Service	e (LOS)			F	F		E	F		F	F		F	F	
Approach Delay	y, s/veh	/ LOS		640.9 F 795.2					F 326.5 F				550.	0	F

570.9

Intersection Delay, s/veh / LOS



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HCS™ Streets Version 7.8.5

--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

--- Comments ---

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HCS™ Streets Version 7.8.5

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HCS7 Signalized Intersection Input Data 7 4 7 4 1 1 1 **General Information** Intersection Information Agency TRC Worldwide Engineering, Inc. Duration, h 0.250 Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period **DHV Afternoon** PHF Peak Urban Street SR 374 (Richview Dr./W... 2043 Analysis Period 1> 7:00 Analysis Year Intersection Memorial Dr. File Name SR 374 w Memorial Dr PM DHV Yr 2043 Existing.... **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 957 308 164 160 343 357 162 1041 1071 115 357 1136 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 144.0 Reference Phase 2 Offset, s 0 Reference Point End Green 12.1 1.9 50.0 13.1 0.9 30.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 2.0 **Traffic Information** EB WB NB SB Approach Movement Т R R L Τ R L L Τ R L Т Demand (v), veh/h 957 308 164 160 343 357 162 1071 115 357 1136 1041 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (so), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 2 2 2 2 2 2 2 0 Ped / Bike / RTOR, /h 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 Arrival Type (AT) 3 3 3 3 3 3 3 3 3 3 3 3 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Upstream Filtering (I) Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 Turn Bay Length, ft 375 1000 1000 160 325 1000 430 1000 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 40 40 40 40 40 40 40 40 40 40 40 40 **Phase Information** EBL **EBT** WBL WBT **NBL NBT** SBL SBT Maximum Green (Gmax) or Phase Split, s 30.0 30.0 50.0 20.0 20.0 20.0 50.0 20.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Red Clearance Interval (Rc). s Minimum Green (Gmin), s 6 6 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Ped Off Off Off Min Off Min **Dual Entry** No Yes No Yes No Yes No Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 0 No 25 0 No 25 0 No 25 0 No 25 12 Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 Street Width / Island / Curb 0 0 No 0 0 No 0 0 No 0 0 No Width Outside / Bike Lane / Shoulder, ft 12 5.0 12 2.0 12 5.0 2.0 12 2.0 2.0 5.0 5.0 No Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50 Nο 0.50

Assigned Phase 7 4 3 8 5 2 1 Case Number 1.1 4.0	
Agency TRC Worldwide Engineering, Inc. Duration, h 0.250	l L
Analyst MLT Analysis Date 2/17/2020 Area Type Other Jurisdiction Clarksville MPO Time Period DHV Afternoon Peak Urban Street SR 374 (Richview Dr./W Analysis Year 2043 Analysis Period 1> 7:00 Intersection Memorial Dr. File Name SR 374 w Memorial Dr PM DHV Yr 2043 Existing Project Description Existing Conditions Demand Information EB WB NB SB Approach Movement L T R L T R L T R L T R L T Demand (v), veh/h 957 308 164 160 343 357 162 1071 115 357 1136 Signal Information Cycle, s 144.0 Reference Phase 2 Offset, s 0 Reference Point End Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap E/W On Red 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	
Urban Street	r_ JS
Urban Street SR 374 (Richview Dr./W Analysis Year 2043 Analysis Period 1>7:00 Intersection Memorial Dr. File Name SR 374 w Memorial Dr PM DHV Yr 2043 Existing Project Description Existing Conditions Demand Information EB WB NB SB Approach Movement L T R L L T R <t< td=""><td>-X- 2-</td></t<>	-X- 2-
Intersection	- - ¥
Demand Information	F
Demand Information EB WB NB SB Approach Movement L T R L T T R L T R L T T R L T R L T R L T T R L T R L NB S B NB	٢
Approach Movement Demand (v), veh/h Signal Information Cycle, s	
Approach Movement Demand (v), veh/h Signal Information Cycle, s	
Demand (v), veh/h 957 308 164 160 343 357 162 1071 115 357 1136 Signal Information Cycle, s 144.0 Reference Phase 2 Offset, s 0 Reference Point End Uncoordinated Yes Simult. Gap E/W On Force Mode Fixed Simult. Gap E/W On Red 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0	R
Signal Information Cycle, s 144.0 Reference Phase 2 Offset, s 0 Reference Point End Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 7 4.0	1041
Cycle, s 144.0 Reference Phase 2 Offset, s 0 Reference Point End Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 <	
Offset, s 0 Reference Point Uncoordinated Yes End Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 8.0 5.0 2.0	
Offset, s 0 Reference Point Uncoordinated Yes End Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 8.0 5 2 1 2.0 1.1 4.0 1.1 <td>↔ ₄</td>	↔ ₄
Force Mode Fixed Simult. Gap N/S On Red 2.0	<u></u>
Timer Results EBL EBT WBL WBT NBL NBT SBL SBL Assigned Phase 7 4 3 8 5 2 1 Case Number 1.1 4.0	Z
Assigned Phase $\begin{array}{c ccccccccccccccccccccccccccccccccccc$	8
Assigned Phase 7 4 3 8 5 2 1 Case Number 1.1 4.0	SBT
Case Number 1.1 4.0 6.0	6
Change Period, (Y+Rc), s 6.0 <td< td=""><td>4.0</td></td<>	4.0
Max Allow Headway (MAH), s 3.1	33.9
Queue Clearance Time (gs), s 22.0 38.9 12.9 32.0 12.0 52.0 22.0 5 Green Extension Time (ge), s 0.0 0.0 0.2 0.0 0.2 0.0 <t< td=""><td>6.0</td></t<>	6.0
Green Extension Time (g e), s 0.0 0.0 0.2 0.0 0.2 0.0 0.0	3.1
	59.9
	0.0
Phase Call Probability 1.00 1.0	1.00
Max Out Probability 1.00 1.00 0.01 1.00 0.00 1.00 1.00 1	1.00
Movement Group Results EB WB NB SB	
Approach Movement L T R L T R L T	R
Assigned Movement 7 4 14 3 8 18 5 2 12 1 6	16
Adjusted Flow Rate (v), veh/h 1040 513 174 761 176 1289 388 2366	
Adjusted Saturation Flow Rate (s), veh/h/ln	
Queue Service Time (g s), s 20.0 36.9 10.9 30.0 10.0 50.0 20.0 57.9	
Cycle Queue Clearance Time (g c), s 20.0 36.9 10.9 30.0 10.0 50.0 20.0 57.9	
Green Ratio (g/C) 0.36 0.26 0.30 0.21 0.43 0.35 0.50 0.40	
Capacity (c), veh/h 297 451 212 357 200 638 297 703	
Volume-to-Capacity Ratio (X) 3.498 1.136 0.822 2.132 0.879 2.020 1.305 3.367	
Back of Queue (Q), ft/ln (50 th percentile) 2576. 679.1 133.4 1630. 114.6 2656. 494.4 5821.2	
Back of Queue (Q), veh/ln (50 th percentile) 101.5 26.7 5.3 64.2 4.5 104.6 19.5 232.8	
Queue Storage Ratio (RQ) (50 th percentile) 6.87 0.68 0.13 10.19 0.35 2.66 1.15 5.82	
Uniform Delay (<i>d</i> ₁), s/veh 44.9 53.5 42.3 57.0 40.3 47.0 48.2 43.1	
Incremental Delay (d 2), s/veh 1132. 85.3 8.4 518.7 13.2 464.4 159.4 1068.6	
Initial Queue Delay (d 3), s/veh 0.0 <	
Control Delay (<i>d</i>), s/veh 1177. 138.8 50.7 575.7 53.4 511.4 207.7 1111.7	
Level of Service (LOS) F F D F F F	
Approach Delay, s/veh / LOS 834.2 F 478.0 F 456.3 F 984.3	F
Intersection Delay, s/veh / LOS 763.7 F	
Multimodal Results EB WB NB SB Deduction 100 Security 100 B 100	
Pedestrian LOS Score / LOS 1.95 B 1.93 B 1.93	В

 Bicycle LOS Score / LOS
 3.05
 C
 2.03
 B
 2.91
 C
 5.03

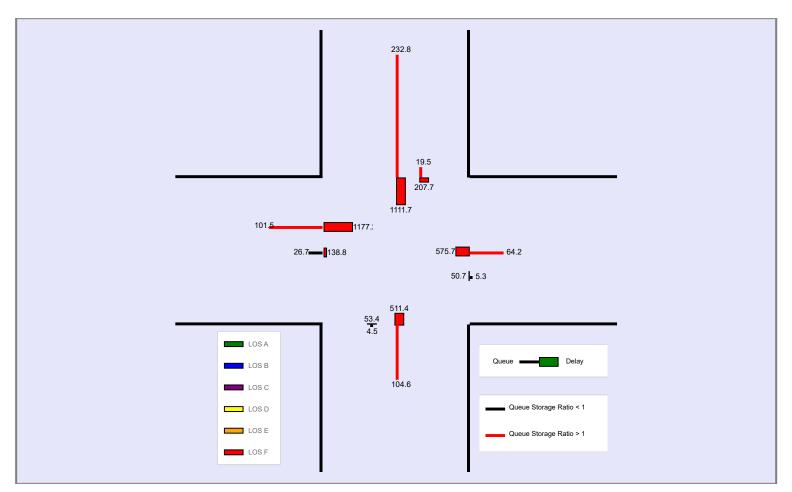
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HCS™ Streets Version 7.8.5

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HCS7 Signalized Intersection Intermediate Values 7 4 7 4 1 1 1 **General Information Intersection Information** TRC Worldwide Engineering, Inc. Duration, h 0.250 Agency Analyst MLT Analysis Date 2/17/2020 Area Type Other 0.92 Jurisdiction Clarksville MPO Time Period DHV Afternoon PHF Peak **Urban Street** 2043 1> 7:00 SR 374 (Richview Dr./W... Analysis Year **Analysis Period** File Name SR 374 w Memorial Dr PM DHV Yr 2043 Existing.... Intersection Memorial Dr. **Project Description Existing Conditions** WB NB **Demand Information** EΒ SB Approach Movement L R L R L R L R 957 164 160 343 357 1041 308 162 1071 115 357 1136 Demand (v), veh/h 瓜 Signal Information ٨, Cycle, s 144.0 Reference Phase 2 Offset, s 0 Reference Point End Green 12.1 50.0 0.9 30.0 1.9 13.1 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 4.0 4.0 Force Mode Fixed Simult. Gap N/S On Red 2.0 2.0 2.0 2.0 2.0 2.0 Saturation Flow / Delay Т R Т R R R 1.000 Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 0.984 0.984 1.000 0.984 0.984 1.000 0.984 0.984 1.000 0.984 1.000 1.000 Parking Activity Adjustment Factor (f_p) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 0.000 0.952 0.000 0.952 0.000 Left-Turn Adjustment Factor (f_Lτ) 0.952 0.952 0.000 Right-Turn Adjustment Factor (fRT) 0.941 0.941 0.916 0.916 0.983 0.983 0.921 0.921 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 1.000 1.000 1.000 1.000 1.000 Right-Turn Ped-Bike Adjustment Factor (*f*_{Rpb}) 1.000 1.000 Work Zone Adjustment Factor (fwz) 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Movement Saturation Flow Rate (s), veh/h 1781 1149 612 1781 839 874 1781 1660 178 1781 913 837 0.26 0.21 0.35 Proportion of Vehicles Arriving on Green (P) 0.14 0.26 0.09 0.21 0.08 0.35 0.14 0.40 0.40 Incremental Delay Factor (k) 0.50 0.50 0.12 0.50 0.12 0.50 0.50 0.50 WBT/R Signal Timing / Movement Groups **EBL** FBT/R WBI NBI NBT/R SBL SBT/R Lost Time (t_L) 6.0 6.0 6.0 6.0 6.0 6.0 6.0 6.0 0.36 0.26 0.30 0.21 0.43 0.35 0.50 0.40 Green Ratio (g/C) Permitted Saturation Flow Rate (sp), veh/h/ln 705 0 887 0 150 0 428 n Shared Saturation Flow Rate (ssh), veh/h/ln 30.0 0.0 50.0 0.0 Permitted Effective Green Time (g_p) , s 32.0 0.0 52.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (g_{ps}) , s 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 0.0 0.0 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (sR), veh/h/ln Protected Right Effective Green Time (g_R) , s Multimodal EΒ WB NB SB Pedestrian Fw / Fv 1.198 0.000 1.198 1.198 1.198 0.000 0.000 0.000 0.000 Pedestrian Fs / Fdelay 0.148 0.000 0.153 0.000 0.137 0.000 0.130 Pedestrian Mcorner / Mcw Bicycle cb / db 512.94 39.80 416.67 45.13 694.44 30.68 803.54 25.77 Bicvcle Fw / Fv -3.642.56 -3.641.54 -3.64 2.42 -3.64 4.54

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Agency	lation	TRC Worldwide En	aineerir	a. Inc.				_	Duration		0.250			47		
Analyst		MLT	900	_	is Date	2/17/2	020		Area Typ		Other		_7 _5,		<u>*</u> _ &	
Jurisdiction		Clarksville MPO		Time F		1	Afternoon PHF				0.92		- → → → → → → → → → → → → → → → → → → →	w	** }- \$- \$- \$-	
Urban Street		SR 374 (Richview [Dr./W	Analys	is Year	2043			Analysis	Period	1> 7:0	00		K &	<u>_</u>	
Intersection		Memorial Dr.		File Na	ame	SR 37	4 w Me	morial	Dr PM D	HV Yr 2	2043 Ex	isting		P 제 1 속 딱 1	F (*	
Project Descrip	tion	Existing Conditions											1			
										li e						
Demand Inforr					EB			WE	3		NB			SB		
Approach Move				L	T	R	L	T	R	L	T	R	L	T	R	
Demand (v), v	eh/h			957	308	164	160	343	3 357	162	1071	115	357	1136	1041	
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Cycle, s 144.0 Reference Phase 2			2	ł	7	2117		_ 🗀	2	2	} \		S		Z	
Offset, s	0	Reference Point	End	1	1							1	2	3	4	
Uncoordinated	Yes	Simult. Gap E/W	On	Green		1.9	50.0	13.		30.0				_	A	
Force Mode	Fixed	Simult. Gap N/S	On	Yellow Red	2.0	2.0	4.0 2.0	4.0	2.0	4.0 2.0) ⁵ × 1	6		8	
1 orce mode	1 IACU	Ollifidit. Gap 14/0	OII	itteu	2.0	12.0	2.0	2.0	2.0	2.0						
Movement Gro	up Res	sults			EB		WE				NB		SB			
Approach Move	ement			L	Т	R	L	Т	R	L	Т	R	L	Т	R	
Back of Queue	(Q), ft	/In (50 th percentile))	2576. 9	679.1		133.4	1630. 4		114.6	2656. 4		494.4	5821.2		
Back of Queue	(Q), ve	eh/ln (50 th percenti	ile)	101.5	26.7		5.3	64.2		4.5	104.6		19.5	232.8		
Queue Storage	Ratio (RQ) (50 th percent	tile)	6.87	0.68		0.13	10.19)	0.35	2.66		1.15	5.82		
Control Delay (Control Delay (d), s/veh				138.8		50.7	575.7		53.4	511.4		207.7	1111.7		
Level of Service	e (LOS)			F	F		D	F		D	F		F	F		
Approach Delay	y, s/veh	/ LOS		834.	2	F	478.	0	F	456.	3	F	984.	3	F	
Intersection De	ersection Delay, s/veh / LOS				763.7 F						F					



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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

--- Comments ---

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HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period AM Peak SR 374 Urban Street Analysis Year 2023 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr AM DHV yr 2023 Lead LTs... Intersection **Project Description** 2 Southbound RT Lead Lag **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 125 264 92 Demand (v), veh/h 471 136 120 311 164 510 182 333 428 **Signal Information** Cycle, s 64.6 Reference Phase 2 ":17 Offset, s 0 Reference Point End Green 10.0 12.9 0.6 14.3 0.0 6.8 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 0.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 0.0 1.0 0.0 **Traffic Information** EΒ WB NB SB Approach Movement R Т R R L Т L L Т L Τ R Demand (v), veh/h 471 125 136 120 264 311 164 510 92 182 333 428 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (s₀), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 0 0 0 0 0 0 0 0 0 0 0 0 Ped / Bike / RTOR, /h 0 0 120 0 0 120 0 0 92 0 0 120 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 0 0 0 3 3 3 3 3 3 3 3 3 3 3 3 Arrival Type (AT) 1.00 1.00 1.00 Upstream Filtering (I) 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 0 Turn Bay Length, ft 0 0 0 0 0 0 0 0 0 0 0 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 35 35 35 35 35 35 35 35 35 35 35 35 **Phase Information** EBL EBT WBL WBT NBT SBL SBT **NBL** Maximum Green (Gmax) or Phase Split, s 30.0 35.0 35.0 20.0 30.0 20.0 35.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 1.0 1.0 1.0 1.0 1.0 1.0 1.0 Minimum Green (Gmin), s 6 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off Off **Dual Entry** No Yes Yes No Yes Nο Yes 0.0 Walk (Walk), s 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 25 0 25 0 25 0 25 0 No No No Nο Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 12 Street Width / Island / Curb 0 0 0 0 0 0 0 0 No No No No Width Outside / Bike Lane / Shoulder, ft 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0

Pedestrian Signal / Occupied Parking

0.50

No

No

0.50

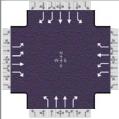
0.50

0.50

HCS7 Signalized Intersection Results Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period AM Peak Urban Street SR 374 Analysis Year 2023 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr AM DHV yr 2023 Lead LTs... Intersection **Project Description** 2 Southbound RT Lead Lag **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 125 264 311 92 Demand (v), veh/h 471 136 120 164 510 182 333 428 **Signal Information** Cycle, s 64.6 Reference Phase 2 512° Offset, s 0 Reference Point End Green 10.0 12.9 0.6 0.0 6.8 14.3 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 0.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 0.0 1.0 0.0 **Timer Results EBL EBT WBL** WBT NBL **NBT** SBL SBT **Assigned Phase** 5 2 6 3 8 4 7 Case Number 1.0 3.0 5.3 1.1 3.0 1.1 3.0 Phase Duration, s 15.0 32.9 17.9 11.8 19.3 12.4 19.9 Change Period, (Y+Rc), s 5.0 5.0 5.0 5.0 5.0 5.0 5.0 Max Allow Headway (MAH), s 3.1 3.2 3.2 3.1 3.1 3.1 3.1 4.8 Queue Clearance Time (g_s), s 8.8 11.2 6.8 11.1 7.3 7.5 Green Extension Time (g_e), s 1.2 1.6 1.6 0.2 3.1 0.3 3.3 Phase Call Probability 1.00 1.00 1.00 0.96 1.00 0.97 1.00 0.00 0.00 0.00 0.00 0.01 0.00 0.00 Max Out Probability WB SB **Movement Group Results** EΒ NB Approach Movement L Т R L Т R L Т R L Т R **Assigned Movement** 5 2 12 1 6 16 3 8 18 7 4 14 Adjusted Flow Rate (v), veh/h 512 136 17 130 287 208 178 554 0 198 362 335 1757 1900 1610 1273 1900 1610 1810 1809 1610 1810 1809 1425 Adjusted Saturation Flow Rate (s), veh/h/ln 6.8 2.8 0.4 2.8 9.2 4.8 9.1 0.0 5.3 5.5 5.3 Queue Service Time (g_s), s 6.6 0.0 Cycle Queue Clearance Time (q c), s 6.8 2.8 0.4 2.8 9.2 6.6 4.8 9.1 5.3 5.5 5.3 0.43 0.20 0.20 0.22 0.22 0.34 0.23 Green Ratio (g/C) 0.39 0.43 0.31 0.33 0.39 Capacity (c), veh/h 897 822 696 731 379 506 421 802 357 388 836 1103 Volume-to-Capacity Ratio (X) 0.571 0.165 0.025 0.179 0.756 0.411 0.423 0.691 0.000 0.509 0.433 0.304 Back of Queue (Q), ft/ln (50 th percentile) 59.9 26.1 3.1 19.5 98.5 55.6 45.2 90.4 0 50.1 54.4 37.6 Back of Queue (Q), veh/ln (50 th percentile) 2.4 1.0 0.1 8.0 3.9 2.2 1.8 3.6 0.0 2.0 2.2 1.5 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 23.2 Uniform Delay (d 1), s/veh 15.6 11.2 10.6 21.9 24.4 17.5 16.7 0.0 16.9 21.3 13.8 Incremental Delay (d 2), s/veh 0.2 0.0 0.0 0.0 1.2 0.2 0.3 0.4 0.0 0.4 0.1 0.1 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Control Delay (d), s/veh 15.8 11.3 10.6 21.9 25.6 17.7 17.0 23.6 0.0 17.3 21.4 13.9 Level of Service (LOS) В В В С С В В С В С В 14.7 В 22.2 С 22.0 С 17.7 В Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS 19.1 В **Multimodal Results** ΕB WB NB Pedestrian LOS Score / LOS 2.54 С 2.74 С 2.45 2.60 С В Bicycle LOS Score / LOS 1.59 В 1.52 1.09 Α 1.23 Α

HCS7 Signalized Intersection Intermediate Values

General Information			Intersection Info	rmation	
Agency	TRC Worldwide Engineerin	g		Duration, h	0.250
Analyst	MLT	Analysis Date	4/22/2020	Area Type	Other
Jurisdiction	Clarksville MPO	Time Period	AM Peak	PHF	0.92
Urban Street	SR 374	Analysis Year	2023	Analysis Period	1> 7:00
Intersection	Memorial Drive	File Name	SR 374 w Memoria	al Dr AM DHV yr 20	23 Lead LTs
Project Description	2 Southbound RT Lead Lac	'n			



Urban Street		SR 374		Α	nalysis	Year	2023			Ana	ılysis F	eriod	1> 7	1> 7:00			<u> </u>
Intersection		Memorial Drive		Fi	le Nar	ne	SR 374	w Me	mor	rial Dr	AM DH	IV yr	2023 L	ead LTs		5 f f	7
Project Descrip	tion	2 Southbound RT Le	ad	Lag												ጎ ቀ ተቀን	* \$= {*
															_		
Demand Inform			_	-		EB			\	WB	_		NI			SB	
Approach Move			_	_	L	T	R	L	+	Т	R	L	T		L	T	R
Demand (v), v	eh/h			4	171	125	136	120	2	264	311	164	51	0 92	182	333	428
Signal Informa	tion				T	V.	8		T	Ш		_					
Cycle, s	64.6	Reference Phase		2	Ŀ	<u>-</u> 2		71	72	STP &					7	\	本
Offset, s	04.0	Reference Point	Er	24		₹	- 3	5			11:7			1	Y 2	3	4
Uncoordinated	Yes	Simult. Gap E/W	0	G	reen		12.9	6.8		0.6	14.3	0.0		J __ ∖	5 -	Į î	
Force Mode	Fixed	Simult. Gap N/S			ellow ed	4.0 1.0	4.0 1.0	4.0 1.0		0.0	4.0 1.0	0.0			6	\	Y
T GIGG WIGGG	TIXOU	Cimati: Cap 14/C	Ŭ	11	ou	1.0	1.0	1.0		<i></i>	1.0	10.0					
Saturation Flor	w / Dela	ay	Т	L	Т	R	L	Т	- 1	R	L		Т	R	L	Т	R
Lane Width Adj			T	1.000	1.000	1.00	0 1.000	1.0	00	1.000	1.0	00	1.000	1.000	1.000	1.000	1.000
		ade Factor (f _{HVg})	-	1.000	1.000		_		-	1.000	_	_	1.000	1.000	1.000	1.000	1.000
Parking Activity	Adjustr	ment Factor (f _p)	T	1.000	1.000	1.00	1.000	1.0	00	1.000	_		1.000	1.000	1.000	1.000	1.000
Bus Blockage A	djustme	ent Factor (fbb)	T	1.000	1.000	1.00	0 1.000	1.0	00	1.000	1.0	00	1.000	1.000	1.000	1.000	1.000
Area Type Adju	stment	Factor (f _a)	T	1.000	1.000	1.00	0 1.000	1.0	00	1.000	1.0	00	1.000	1.000	1.000	1.000	1.000
Lane Utilization	Adjustr	ment Factor (fLU)	T	0.971	1.000	1.00	0.971	1.0	00	1.000	1.0	00	0.952	1.000	1.000	0.952	0.885
Left-Turn Adjust	ment F	actor (f∟τ)	T	0.952	0.000		0.670	0.0	00		0.9	52	0.000		0.952	0.000	
Right-Turn Adjustment Factor (<i>f</i> _R <i>T</i>)		Т		0.000	0.84	7	0.0	00	0.847	7		0.000	0.847		0.000	0.847	
Left-Turn Pedestrian Adjustment Factor (fLpb))	1.000			1.000				1.0	00			1.000			
Right-Turn Ped-	Right-Turn Ped-Bike Adjustment Factor (f _{Rpb}))			1.00	0			1.000)			1.000			1.000
Work Zone Adju	ıstment	Factor (fwz)	Т	1.000	1.000	1.00	0 1.000	1.0	00	1.000	1.0	00	1.000	1.000	1.000	1.000	1.000
DDI Factor (fdd))		T	1.000	1.000	1.00	0 1.000	1.0	00	1.000	1.0	00	1.000	1.000	1.000	1.000	1.000
Movement Satu	ration F	Flow Rate (s), veh/h		3514	1900	1610	2547	190	00	1610) 18	10	3618	1610	1810	3618	2850
Proportion of Ve	ehicles /	Arriving on Green (<i>P</i>)	1	0.16	0.43	0.43	0.20	0.2	20	0.20	0.	10	0.22	0.00	0.11	0.23	0.23
Incremental De	lay Fac	tor (<i>k</i>)		0.04	0.04	0.04	0.04	0.0)4	0.04	0.0)4	0.04		0.04	0.04	0.04
			Ų				_										
Signal Timing	/ Move	ment Groups	4	EBL	-	EBT/R	W	BL		VBT/R	_	NBL	1	IBT/R	SBI		SBT/R
Lost Time (t∠)			4	5.0	_	5.0	—			5.0	_	5.0		5.0	5.0		5.0
Green Ratio (g/			4	0.39	_	0.43	-			0.20	_	0.33	_	0.22	0.34	_	0.23
		low Rate (s_p) , veh/h/lr	1	1110)	0			1	1273	-	1036	_	0	868		0
		v Rate (ssh), veh/h/ln	4			0.5				10.5	-	44:		0.0			0.0
Permitted Effect		,- ,-	4	14.9	-	0.0				12.9	-	14.4		0.0	14.4		0.0
Permitted Servi		1= /	1	3.7	_	0.0				13.1		7.5		0.0	5.3	_	0.0
Permitted Queu		·- ,	+	3.4	_	0.0				2.8	+	1.4		0.0	2.7	-	0.0
Time to First Blo			4	0.0	-	0.0	+			0.0	-	0.0		0.0	0.0	-	0.0
		efore Blockage (<i>gfs</i>), s	-			0	+			1010	+			0			4.405
		tion Flow (s _R), veh/h/l	_			0				1610	-		-	0			1425
	∟itecti\	ve Green Time (g _R), s	+			0.0	+	,,,		7.4	+		NID.	0.0		- 05	10.1
Multimodal			+	4 74	EB	0.424	4.0		/B	174		EF7	NB	174	4 74	SB	0.474
Pedestrian F _w /			+	1.71	_	0.131	1.8	_).171	_	.557	_).171	1.71		0.171
Pedestrian F _s /			+	0.00	U	0.094	0.0	00	U).122	-	.000		0.119	0.00	U	0.118
Pedestrian Mcon	ner / IVI cu		+	864.4	2	10 42	200	73	2	20.71	1	42 DO		10.50	161.0	7	19.11
Bicycle <i>c_b</i> / <i>d_b</i>			+		-	10.42	398				_	42.98	_	19.58	461.9 -3.6		
Bicycle Fw / Fv				-3.04	3.64 1.10		-3.64		1.03			3.64		0.60		+	0.74

HCS7 Signalized Intersection Results Graphical Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period AM Peak Urban Street SR 374 Analysis Year 2023 **Analysis Period** 1> 7:00 Intersection Memorial Drive File Name SR 374 w Memorial Dr AM DHV yr 2023 Lead LTs.. **Project Description** 2 Southbound RT Lead Lag WB **Demand Information** EB NB SB Approach Movement Τ R L R L R L R 125 92 Demand (v), veh/h 471 136 120 264 311 164 510 182 333 428 **Signal Information** 215 Cycle, s 64.6 Reference Phase 2 ":17 Offset, s 0 Reference Point End Green 10.0 12.9 6.8 0.6 14.3 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 0.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 0.0 1.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement R Т R R L Τ L L Τ L Τ R Back of Queue (Q), ft/ln (50 th percentile) 59.9 26.1 3.1 19.5 98.5 55.6 45.2 90.4 0 50.1 54.4 37.6 Back of Queue (Q), veh/ln (50 th percentile) 2.4 1.0 0.1 8.0 3.9 2.2 3.6 0.0 2.0 2.2 1.5 1.8 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 Control Delay (d), s/veh 15.8 11.3 10.6 21.9 25.6 17.7 17.0 23.6 0.0 17.3 21.4 13.9 Level of Service (LOS) В В В С С В В С В С В Approach Delay, s/veh / LOS 14.7 В 22.2 С 22.0 С 17.7 В Intersection Delay, s/veh / LOS В 19.1 23.6 LOS B LOS C LOSD LOSE LOS F

No errors or warnings exist.

--- Comments ---

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HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period PM Peak SR 374 Urban Street Analysis Year 2023 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr PM DHV yr 2023 Lead LTs.. Intersection **Project Description** 2 Southbound RT Lead Lag **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 183 97 95 204 68 Demand (v), veh/h 568 212 96 636 212 675 618 **Signal Information** 215 Cycle, s 75.1 Reference Phase 2 517 Offset, s 0 Reference Point End Green 13.7 11.7 8.6 21.1 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 **Traffic Information** EΒ WB NB SB Approach Movement Τ R R L Τ R L L Т L Τ R Demand (v), veh/h 568 183 97 204 212 96 636 68 212 675 618 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 1900 Base Saturation Flow Rate (s₀), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None 0 ı None None Heavy Vehicles (PHV), % 0 0 0 0 0 0 0 0 0 0 0 0 Ped / Bike / RTOR, /h 0 0 97 0 0 120 0 0 68 0 0 120 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 0 0 0 3 3 3 3 3 3 3 3 3 3 3 3 Arrival Type (AT) 1.00 1.00 1.00 Upstream Filtering (I) 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 0 Turn Bay Length, ft 0 0 0 0 0 0 0 0 0 0 0 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 35 35 35 35 35 35 35 35 35 35 35 35 **Phase Information** EBL EBT WBL WBT NBT SBL SBT **NBL** Maximum Green (Gmax) or Phase Split, s 30.0 35.0 35.0 35.0 20.0 35.0 4.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 1.0 1.0 1.0 1.0 1.0 1.0 Minimum Green (Gmin), s 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off **Dual Entry** No Yes Yes Yes Nο Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 25 0 25 0 25 0 25 0 No No No Nο Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 12 Street Width / Island / Curb 0 0 0 0 0 0 0 0 No No No No Width Outside / Bike Lane / Shoulder, ft 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0

Pedestrian Signal / Occupied Parking

0.50

No

No

0.50

No

0.50

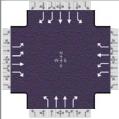
0.50

HCS7 Signalized Intersection Results Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period PM Peak Urban Street SR 374 Analysis Year 2023 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr PM DHV yr 2023 Lead LTs.. Intersection **Project Description** 2 Southbound RT Lead Lag **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 183 97 95 204 68 Demand (v), veh/h 568 212 96 636 212 675 618 **Signal Information** ٨, Cycle, s 75.1 Reference Phase 2 517 Offset, s 0 Reference Point End Green 13.7 11.7 8.6 0.0 0.0 21.1 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 **Timer Results EBL EBT WBL WBT** NBL **NBT** SBL SBT **Assigned Phase** 5 2 6 8 4 7 Case Number 1.0 3.0 5.3 5.3 1.0 3.0 Phase Duration, s 18.7 35.4 16.7 26.1 13.6 39.8 Change Period, (Y+Rc), s 5.0 5.0 5.0 5.0 5.0 5.0 Max Allow Headway (MAH), s 3.1 3.2 3.2 3.2 3.1 3.2 7.2 Queue Clearance Time (g_s), s 12.2 10.4 14.8 8.3 12.3 Green Extension Time (g_e), s 1.5 1.2 1.2 5.9 0.3 6.5 Phase Call Probability 1.00 1.00 1.00 1.00 0.99 1.00 0.00 0.00 0.00 0.10 0.00 0.07 Max Out Probability WB NB SB **Movement Group Results** EΒ Approach Movement L Т R L Т R L Т R L Т R **Assigned Movement** 5 2 12 1 6 16 3 8 18 7 4 14 Adjusted Flow Rate (v), veh/h 617 199 0 103 222 100 104 691 0 230 734 541 1757 1900 1610 1202 1900 1610 735 1809 1610 1810 1809 1425 Adjusted Saturation Flow Rate (s), veh/h/ln 10.2 5.2 0.0 2.9 3.6 9.0 12.8 0.0 6.3 10.3 6.3 Queue Service Time (g_s), s 8.4 Cycle Queue Clearance Time (q c), s 10.2 5.2 0.0 2.9 8.4 3.6 9.0 12.8 0.0 6.3 10.3 6.3 0.27 0.28 0.28 Green Ratio (g/C) 0.36 0.40 0.40 0.16 0.16 0.28 0.42 0.46 0.65 Capacity (c), veh/h 936 768 651 565 295 435 302 1018 453 388 1674 1839 Volume-to-Capacity Ratio (X) 0.660 0.259 0.000 0.183 0.751 0.230 0.345 0.679 0.000 0.594 0.438 0.294 Back of Queue (Q), ft/ln (50 th percentile) 96.2 52.3 0 19.7 94.3 32.6 36.8 128.3 0 60.3 93.9 36.1 Back of Queue (Q), veh/ln (50 th percentile) 3.8 2.1 0.0 8.0 3.8 1.3 1.5 5.1 0.0 2.4 3.8 1.4 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 19.4 14.9 24.0 16.5 Uniform Delay (d 1), s/veh 0.0 28.0 30.4 21.4 22.6 0.0 13.6 5.8 Incremental Delay (d 2), s/veh 0.3 0.1 0.0 0.1 1.5 0.1 0.3 0.3 0.0 0.5 0.1 0.0 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Control Delay (d), s/veh 19.7 15.0 0.0 28.1 31.8 21.5 22.9 24.3 0.0 17.0 13.7 5.9 Level of Service (LOS) В В С С С С С В В Α 24.1 18.6 В 28.5 С С 11.4 В Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS 18.0 В **Multimodal Results** ΕB WB NB Pedestrian LOS Score / LOS 2.51 С 2.75 С 2.45 2.54 В С Bicycle LOS Score / LOS 1.83 В 1.19 Α 1.14 Α 1.73

Generated: 1/12/2021 9:28:17 AM

HCS7 Signalized Intersection Intermediate Values

General Information			Intersection Info	rmation	
Agency	TRC Worldwide Engineerin	g		Duration, h	0.250
Analyst	MLT	Analysis Date	4/22/2020	Area Type	Other
Jurisdiction	Clarksville MPO	Time Period	PM Peak	PHF	0.92
Urban Street	SR 374	Analysis Year	2023	Analysis Period	1> 7:00
Intersection	Memorial Drive	File Name	SR 374 w Memoria	al Dr PM DHV yr 20)23 Lead LTs
Project Description	2 Southbound RT Lead Lac	'n			



•																	-
Urban Street		SR 374		A	nalysis	Year	2023			Ana	alysis F	eriod	1> 7	7:00	3		- F
Intersection		Memorial Drive		Fi	ile Nar	ne	SR 374	w Me	mor	rial Dr	PM DF	IV yr	2023 L	ead LTs		5 f f	7
Project Descrip	tion	2 Southbound RT Le	ad	Lag												ነ ተ ተቀጥ	7 4
						E5				14/5							
Demand Inform			_	-		EB			_	WB	_		NI	1		SB	
Approach Move			_	_	L	T	R	L	+	T	R	L	T		L	T	R
Demand (v), v	eh/h				568	183	97	95	1	204	212	96	63	6 68	212	675	618
Signal Informa	tion				T	2	8		T	П	T T	T					
Cycle, s	75.1	Reference Phase			Ŀ	-3		ᄴ	4	Z472					7		本
Offset, s	0	Reference Point	En	vd		₹	- 3			<u>":17"</u>				1	Y 2	3	4
Uncoordinated	Yes	Simult. Gap E/W	0		reen		11.7	8.6		21.1	0.0	0.0		J _a ∖	5 -	Į 🛍	
Force Mode	Fixed	Simult. Gap N/S	0		ellow ed	4.0 1.0	4.0 1.0	4.0 1.0		4.0 1.0	0.0	0.0			6	7	Y
1 orde widde	TIXCU	Cimat. Cap 14/C		11 11	cu	1.0	1.0	1.0		1.0	0.0	10.0					
Saturation Flo	w / Dela	ay	Т	L	Т	R	L	T 7	Γ	R	L		Т	R	L	Т	R
Lane Width Adj			T	1.000	1.000	1.00	1.000	1.0	000	1.000	0 1.0	00	1.000	1.000	1.000	1.000	1.000
		ade Factor (f _{HVg})	-	1.000	1.000					1.00	\rightarrow		1.000	1.000	1.000	1.000	1.000
Parking Activity	Adjustr	ment Factor (f _p)	T	1.000	1.000	1.00	0 1.000	1.0	00	1.00	0 1.0	00	1.000	1.000	1.000	1.000	1.000
Bus Blockage A		• • • • • • • • • • • • • • • • • • • •	1	1.000	1.000	1.00	1.000	1.0	00	1.00	0 1.0	00	1.000	1.000	1.000	1.000	1.000
Area Type Adju	stment	Factor (f _a)	T	1.000	1.000	1.00	0 1.000	1.0	00	1.00	0 1.0	00	1.000	1.000	1.000	1.000	1.000
Lane Utilization	Adjustr	ment Factor (fLU)		0.971	1.000	1.00	0.97	1 1.0	00	1.000	0 1.0	00	0.952	1.000	1.000	0.952	0.885
Left-Turn Adjust	ment F	actor (f∟τ)		0.952	0.000		0.633	3 0.0	00		0.3	87	0.000		0.952	0.000	
Right-Turn Adjustment Factor (<i>f</i> _R <i>T</i>)		Т		0.000	0.84	7	0.0	00	0.84	7		0.000	0.847		0.000	0.847	
Left-Turn Pedestrian Adjustment Factor (fLpb))	1.000			1.000)			1.0	00			1.000			
Right-Turn Ped-Bike Adjustment Factor (f _{Rpb})					1.00	0			1.000	0			1.000			1.000	
Work Zone Adju	ıstment	Factor (fwz)	T	1.000	1.000	1.00	0 1.000	1.0	00	1.000	0 1.0	00	1.000	1.000	1.000	1.000	1.000
DDI Factor (fdd))		T	1.000	1.000	1.00	1.000	1.0	00	1.000	0 1.0	00	1.000	1.000	1.000	1.000	1.000
Movement Satu	ration F	Flow Rate (s), veh/h		3514	1900	1610	2405	19	00	1610	73	35	3618	1610	1810	3618	2850
Proportion of Ve	ehicles /	Arriving on Green (<i>P</i>)	1	0.18	0.40	0.00	0.16	0.	16	0.16	0.2	28	0.28	0.00	0.11	0.46	0.46
Incremental De	lay Fac	tor (<i>k</i>)		0.04	0.04		0.04	0.0	04	0.04	0.0	04	0.04		0.04	0.04	0.04
			Ų				_										
Signal Timing	/ Move	ment Groups	1	EBL	-	EBT/R	W	BL	٧	VBT/R	_	NBL	1	NBT/R	SBI		SBT/R
Lost Time (t⊥)			1	5.0	_	5.0	_			5.0	_			5.0	5.0		5.0
Green Ratio (g/			4	0.36	_	0.40	-			0.16	_		_	0.28	0.42	_	0.46
		low Rate (s_p), veh/h/li	1	1178	3	0	_		_	1202	_		_	735	764		0
		v Rate (ssh), veh/h/ln	+		_		-				+		_				
Permitted Effec		,- ,-	+	13.7	_	0.0	-			11.7	+		_	21.2	23.2		0.0
Permitted Servi		1= /	+	3.3		0.0	-			11.8	+		_	21.2	8.3		0.0
Permitted Queu		·- ,	+	3.3	_		-			2.9	+		_	9.0	6.4	-	
Time to First Blo			+	0.0	-	0.0	-			0.0	+-		_	0.0	0.0	_	0.0
		efore Blockage (gfs), s	_							10/0	-			•			1.105
		tion Flow (s _R), veh/h/l	_			0				1610				0			1425
	Effectiv	ve Green Time (<i>g</i> _R), s	+			0.0	+			8.6	+			0.0			13.7
Multimodal	_		+	4 74	EB	0.007	4.0		VB	2.474			NB	174	4 74	SB	0.400
Pedestrian F _w /			+	1.710	_	0.097	1.8			0.171	_	.557	_	0.171	1.71		0.138
Pedestrian F _s /			+	0.000	U	0.104	0.0	00		0.132		0.000		0.119	0.00	U	0.096
Pedestrian Mcon	ner / IVI cu		+	000.4	17	12.22	240	60		26.00		60.70		10.40	005.0	06	10.05
Bicycle Cb / Cb			+	808.4		13.33	310		_	26.80	_	62.70	_	19.40	925.2		10.85
Bicycle F _w / F _v				-3.64	.64 1.3		-3.	04		0.70		3.64		0.66	-3.6	+	1.24

HCS7 Signalized Intersection Results Graphical Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period PM Peak SR 374 Urban Street Analysis Year 2023 **Analysis Period** 1> 7:00 Intersection Memorial Drive File Name SR 374 w Memorial Dr PM DHV yr 2023 Lead LTs.. **Project Description** 2 Southbound RT Lead Lag **Demand Information** EB **WB** NB SB Approach Movement Т R L R L R L R 95 Demand (v), veh/h 568 183 97 204 212 96 636 68 212 675 618 **Signal Information** 215 Cycle, s 75.1 Reference Phase 2 517 Offset, s 0 Reference Point End Green 13.7 11.7 8.6 21.1 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement Т R L Т R L L Т R L Τ R Back of Queue (Q), ft/ln (50 th percentile) 96.2 52.3 0 19.7 94.3 32.6 36.8 128.3 0 60.3 93.9 36.1 Back of Queue (Q), veh/ln (50 th percentile) 3.8 2.1 0.0 8.0 3.8 1.3 5.1 0.0 2.4 3.8 1.4 1.5 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 Control Delay (d), s/veh 19.7 15.0 0.0 28.1 31.8 21.5 22.9 24.3 0.0 17.0 13.7 5.9 Level of Service (LOS) В В С С С С С В Α Approach Delay, s/veh / LOS 18.6 В 28.5 С 24.1 С 11.4 В Intersection Delay, s/veh / LOS 18.0 В 2.1 LOS B LOS C LOSD LOSE LOS F

No errors or warnings exist.

--- Comments ---

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HCS™ Streets Version 7.8.5

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--- Messages ---

WARNING: Since queue spillover from turn lanes and spillback into upstream intersections is not accounted for in the HCM procedures, use of a simulation tool may be advised in situations where the Queue Storage Ratio exceeds 1.0.

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

--- Comments ---

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HCS™ Streets Version 7.8.5

Generated: 4/28/2020 9:33:36 AM

HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period AM Peak Urban Street SR 374 Analysis Year 2033 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr AM DHV yr 2033 Lead LTs... Intersection **Project Description** 2 Southbound RT Lead Lag **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 168 354 417 244 447 Demand (v), veh/h 632 182 161 220 684 124 574 **Signal Information** Cycle, s 97.1 Reference Phase 2 ":17 Offset, s 0 Reference Point End Green 17.1 22.8 11.6 1.0 0.0 24.5 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 0.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 0.0 1.0 0.0 **Traffic Information** EΒ WB NB SB Approach Movement R Т R R L Τ L L Τ L Τ R Demand (v), veh/h 632 168 182 161 354 417 220 684 124 244 447 574 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 Base Saturation Flow Rate (s₀), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None None None None Heavy Vehicles (PHV), % 0 0 0 0 0 0 0 0 0 0 0 0 Ped / Bike / RTOR, /h 0 0 120 0 0 120 0 0 120 0 0 120 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 0 0 0 3 3 3 3 3 3 3 3 3 3 3 3 Arrival Type (AT) 1.00 1.00 1.00 Upstream Filtering (I) 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 0 Turn Bay Length, ft 0 0 0 0 0 0 0 0 0 0 0 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 35 35 35 35 35 35 35 35 35 35 35 35 **Phase Information** EBL EBT WBL WBT NBT SBL SBT **NBL** Maximum Green (Gmax) or Phase Split, s 30.0 35.0 35.0 20.0 30.0 20.0 35.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 1.0 1.0 1.0 1.0 1.0 1.0 1.0 Minimum Green (Gmin), s 6 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off Off **Dual Entry** No Yes Yes No Yes Nο Yes 0.0 Walk (Walk), s 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 25 0 25 0 25 0 25 0 No No No Nο Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 12 Street Width / Island / Curb 0 0 0 0 0 0 0 0 No No No No Width Outside / Bike Lane / Shoulder, ft 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0

Pedestrian Signal / Occupied Parking

0.50

No

No

0.50

0.50

0.50

No

Generated: 1/12/2021 9:34:06 AM

HCS7 Signalized Intersection Results Summary Intersection Information **General Information** TRC Worldwide Engineering Duration, h 0.250 Agency 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period AM Peak Urban Street SR 374 Analysis Year 2033 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr AM DHV yr 2033 Lead LTs... Intersection **Project Description** 2 Southbound RT Lead Lag **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 168 354 417 244 447 Demand (v), veh/h 632 182 161 220 684 124 574 **Signal Information** Cycle, s 97.1 Reference Phase 2 ":17 Offset, s 0 Reference Point End Green 17.1 22.8 11.6 0.0 1.0 24.5 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 0.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 0.0 1.0 0.0 **Timer Results EBL EBT WBL** WBT NBL **NBT** SBL SBT **Assigned Phase** 5 2 6 3 8 4 7 Case Number 1.0 3.0 5.3 1.1 3.0 1.1 3.0 Phase Duration, s 22.1 49.9 27.8 16.6 29.5 17.7 30.5 Change Period, (Y+Rc), s 5.0 5.0 5.0 5.0 5.0 5.0 5.0 Max Allow Headway (MAH), s 3.1 3.2 3.2 3.1 3.1 3.1 3.1 Queue Clearance Time (g_s), s 15.4 7.6 20.9 11.3 20.8 12.3 13.4 Green Extension Time (g_e), s 1.6 2.5 1.8 0.3 3.5 0.3 4.8 Phase Call Probability 1.00 1.00 1.00 1.00 1.00 1.00 1.00 0.00 0.00 0.04 0.01 0.31 0.02 0.03 Max Out Probability WB SB **Movement Group Results** EΒ NB Approach Movement L Т R L Т R L Т R L Т R **Assigned Movement** 5 2 12 1 6 16 3 8 18 7 4 14 Adjusted Flow Rate (v), veh/h 687 183 67 175 385 323 239 743 4 265 486 493 1757 1900 1610 1220 1900 1810 1809 1610 1810 1809 1425 Adjusted Saturation Flow Rate (s), veh/h/ln 1610 5.6 2.3 5.8 18.9 9.3 18.8 0.2 10.3 11.1 Queue Service Time (g_s), s 13.4 15.5 11.4 Cycle Queue Clearance Time (q c), s 13.4 5.6 2.3 5.8 18.9 15.5 9.3 18.8 0.2 10.3 11.1 11.4 0.24 0.24 0.25 0.25 Green Ratio (g/C) 0.43 0.46 0.46 0.37 0.37 0.38 0.26 0.44 Capacity (c), veh/h 850 880 746 722 447 590 410 912 406 353 951 1252 Volume-to-Capacity Ratio (X) 808.0 0.208 0.090 0.242 0.860 0.547 0.584 0.815 0.011 0.752 0.511 0.394 Back of Queue (Q), ft/ln (50 th percentile) 133.4 58 20.1 41.5 226.1 142.8 96.7 210.6 1.9 111.1 118.8 90.1 Back of Queue (Q), veh/ln (50 th percentile) 5.3 2.3 8.0 1.7 9.0 5.7 3.9 8.4 0.1 4.4 4.8 3.6 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 24.4 Uniform Delay (d 1), s/veh 22.5 15.5 14.7 30.7 35.7 24.5 23.1 34.3 27.3 30.6 18.5 Incremental Delay (d 2), s/veh 1.1 0.0 0.0 0.1 4.6 0.3 0.5 3.2 0.0 2.4 0.2 0.1 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Control Delay (d), s/veh 23.5 15.6 14.7 30.7 40.3 24.8 23.6 37.5 27.3 26.8 30.7 18.6 Level of Service (LOS) С В В С D С С D С С С В 21.4 С 32.7 С 34.1 С 25.1 С Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS 28.1 С **Multimodal Results** ΕB WB NB Pedestrian LOS Score / LOS 2.59 С 2.76 С 2.46 2.61 С В

Bicycle LOS Score / LOS

1.30

Α

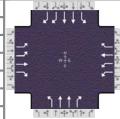
2.03

В

1.51

HCS7 Signalized Intersection Intermediate Values

General Information			Intersection Info	rmation	
Agency	TRC Worldwide Engineerin	g		Duration, h	0.250
Analyst	MLT	Analysis Date	4/22/2020	Area Type	Other
Jurisdiction	Clarksville MPO	Time Period	AM Peak	PHF	0.92
Urban Street	SR 374	Analysis Year	2033	Analysis Period	1> 7:00
Intersection	Memorial Drive	File Name	SR 374 w Memoria	al Dr AM DHV yr 20	33 Lead LTs
Project Description	2 Southbound RT Lead Lac	r			



Julisuiction		Clarksville IVII O			illie i e	illou	VINI I CO	אג		1 1 1	<u>' </u>		0.92				
Urban Street		SR 374		Α	nalysis	Year	2033			Ana	alysis l	sis Period		7:00	4		-
Intersection		Memorial Drive		F	ile Nar	ne	SR 374	w Me	emoi	rial Dr	AM DI	∃V yr 2	2033 L	ead LTs.		511	7
Project Descrip	tion	2 Southbound RT Lo	ead	Lag												ጎ ቀ ተቀነ	7 + 1
Demand Inform	nation					EB		<u> </u>		WB		1	NI	R	_	SB	
Approach Move					L	T	R		Т	T	R	1	T		1	T	R
Demand (v), v					632	168	182	161		354	417	220	_	_	_	_	
Signal Informa	tion	-				2	⊱		R 6	JJ					_ [x	L
Cycle, s	97.1	Reference Phase		2	ŀ	₹	R	5			5.1	7			- ♦ ,	` `),	KİZ
Offset, s	0	Reference Point	Eı	nd G	reen	17.1	22.8	11.6	+	1.0	24.5	0.0	4	1	<u> </u>	1 1	-
Uncoordinated	Yes	Simult. Gap E/W		n Y	ellow	4.0	4.0	4.0		0.0	4.0	0.0			7	7_	₩
Force Mode	Fixed	Simult. Gap N/S	С	n R	ed	1.0	1.0	1.0		0.0	1.0	0.0	_	5	6	7	8
Ostanskia a Flan	/ D I.		Ţ		T -			Т.	_								
Saturation Flow		-	4	1 000	T	R	L 0 1 000		T	1 00	_		T	1 000	1 000	T	1 000
Lane Width Adju		ractor (fw) rade Factor (fнvg)	-	1.000	1.000		_	_	000	1.00	_	$\overline{}$	1.000	1.000	1.000	1.000	1.000
Parking Activity			-	1.000				_	000	1.00	_	$\overline{}$	1.000	1.000	1.000	1.000	
Bus Blockage A		· · · · · ·	-	1.000	1.000	_		_	000	1.00	_		1.000	1.000	1.000	1.000	
Area Type Adjus			-	1.000	1.000				000	1.00	_	_	1.000	1.000	1.000	1.000	
		ment Factor (<i>f</i> ∟ <i>∪</i>)	-	0.971	1.000	_	_	_	000	1.00	_	_	0.952	1.000	1.000	0.952	
Left-Turn Adjust			-	0.952	0.000		0.642		000	1.00	_	_	0.000	1.000	0.952	0.000	
Right-Turn Adju			1	0.002	0.000	_		_	000	0.84	_	-	0.000	0.847	0.002	0.000	
Left-Turn Pedestrian Adjustment Factor (f _{Lpb}))	1.000			1.000				_	000			1.000			
Right-Turn Ped-Bike Adjustment Factor (fRpb)		-			1.00	_			1.00	_			1.000			1.000	
Work Zone Adju			_	1.000	1.000			1.0	000	1.00	_	000	1.000	1.000	1.000	1.000	
DDI Factor (fdd))	· ·	7	1.000	1.000	1.00	0 1.000	1.0	000	1.00	0 1.0	000	1.000	1.000	1.000	1.000	1.000
Movement Satu	ration F	Flow Rate (s), veh/h	T	3514	1900	1610	2441	19	00	1610	0 18	10	3618	1610	1810	3618	2850
Proportion of Ve	ehicles /	Arriving on Green (P)		0.18	0.46	0.46	0.24	0.	24	0.24	4 0.	12	0.25	0.25	0.13	0.26	0.26
Incremental De	lay Fac	tor (<i>k</i>)		0.06	0.04	0.04	0.04	0.	10	0.04	4 0.	04	0.19	0.04	0.08	0.04	0.04
			Ų														
Signal Timing	/ Move	ment Groups	4	EBI	_	EBT/R	W	BL	V	WBT/R	2	NBL	1	NBT/R	SBI	_	SBT/R
Lost Time (t _L)	(O)		4	5.0		5.0	-			5.0	-	5.0	_	5.0	5.0		5.0
Green Ratio (g/		lavy Data (a.), yak /k /l	+	0.43		0.46	-		-	0.24	-	0.37	-	0.25	0.38	_	0.26
		low Rate (s_p) , veh/h/l v Rate (s_{sh}) , veh/h/ln	11	1014	+	0	+			1220	+	924	+	0	728	·	0
Permitted Effec		, ,	+	24.9		0.0	-			22.9	-	24.6	-	0.0	24.6		0.0
Permitted Servi		(5.7)	+	4.0		0.0			_	23.1		12.5		0.0	5.7	_	0.0
Permitted Queu			+	4.0	_	0.0				5.8	-	4.2		0.0	5.7		0.0
Time to First Blo		·- ,	+	0.0	_	0.0				0.0		0.0		0.0	0.0	_	0.0
		efore Blockage (<i>g</i> _{fs}),	s	3.0		0.0				0.0		2.0		0.0	0.0		0.0
		tion Flow (s _R), veh/h/	-			0				1610				0			1425
		ve Green Time (g_R) ,	_			0.0			-	12.7				0.0			17.2
Multimodal			T		EB			٧	VB				NB			SB	
Pedestrian F _w /	Fv		7	1.71	-	0.171	1.8	352		0.171		1.557	_	0.171	1.71	0	0.171
Pedestrian F _s /	F _{delay}			0.00	_	0.106	0.0		-	0.134	_	0.000	_	0.132	0.00		0.131
Pedestrian Mcon	ner / Mcw	v	Ī														
Bicycle c _b / d _b				925.6	64	14.01	470).35	2	28.41	5	04.21	2	27.16	525.7	72	26.39
Bicycle Fw / Fv				-3.6	4	1.55	-3.	64	_		.46 -			0.81	-3.64		1.03

HCS7 Signalized Intersection Results Graphical Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period AM Peak Urban Street SR 374 Analysis Year 2033 **Analysis Period** 1> 7:00 Intersection Memorial Drive File Name SR 374 w Memorial Dr AM DHV yr 2033 Lead LTs.. **Project Description** 2 Southbound RT Lead Lag WB **Demand Information** EB NB SB Approach Movement Т R L R L R L R 168 Demand (v), veh/h 632 182 161 354 417 220 684 124 244 447 574 **Signal Information** 泒 <u>ال</u>اي Cycle, s 97.1 Reference Phase 2 <u>"}}</u> Offset, s 0 Reference Point End Green 17.1 22.8 11.6 1.0 24.5 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 0.0 4.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 0.0 1.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement R Τ R L Т L L Т R L Τ R Back of Queue (Q), ft/ln (50 th percentile) 133.4 58 20.1 41.5 226.1 142.8 96.7 210.6 1.9 111.1 118.8 90.1 Back of Queue (Q), veh/ln (50 th percentile) 5.3 2.3 8.0 1.7 9.0 8.4 0.1 4.4 4.8 3.6 5.7 3.9 0.00 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 Control Delay (d), s/veh 23.5 15.6 14.7 30.7 40.3 24.8 23.6 37.5 27.3 26.8 30.7 18.6 Level of Service (LOS) С В В С D С С D С С С В Approach Delay, s/veh / LOS 21.4 С 32.7 С 34.1 С 25.1 С Intersection Delay, s/veh / LOS С 28.1 30.7 LOS B LOS C LOSD LOSE LOS F

No errors or warnings exist.

--- Comments ---

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HCS™ Streets Version 7.8.5

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HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period PM Peak SR 374 Urban Street Analysis Year 2033 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr PM DHV yr 2033 Lead LTs.. Intersection **Project Description** 2 Southbound RT Lead EB Lead WB **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 245 128 284 Demand (v), veh/h 762 130 274 129 853 91 284 906 829 **Signal Information** 215 Cycle, s 111.6 Reference Phase 2 517 Offset, s 0 Reference Point End Green 23.9 20.4 15.9 31.4 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 **Traffic Information** FB WB NB SB Approach Movement R Τ R R L Т L L Т L Т R Demand (v), veh/h 762 245 130 128 274 284 129 853 91 284 906 829 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 1900 Base Saturation Flow Rate (s₀), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None 0 ı None None Heavy Vehicles (PHV), % 0 0 0 0 0 0 0 0 0 0 0 0 Ped / Bike / RTOR, /h 0 0 120 0 0 120 0 0 91 0 0 120 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 0 0 0 3 3 3 3 3 3 3 3 3 3 3 3 Arrival Type (AT) 1.00 1.00 1.00 Upstream Filtering (I) 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 0 Turn Bay Length, ft 0 0 0 0 0 0 0 0 0 0 0 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 35 35 35 35 35 35 35 35 35 35 35 35 **Phase Information** EBL EBT WBL WBT NBT SBL SBT **NBL** Maximum Green (Gmax) or Phase Split, s 30.0 35.0 35.0 35.0 20.0 35.0 4.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 1.0 1.0 1.0 1.0 1.0 1.0 Minimum Green (Gmin), s 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off **Dual Entry** No Yes Yes Yes Nο Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 25 0 25 0 25 0 25 0 No No No Nο Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 12 Street Width / Island / Curb 0 0 0 0 0 0 0 0 No No No No Width Outside / Bike Lane / Shoulder, ft 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0 0.50 Pedestrian Signal / Occupied Parking No 0.50 0.50 No 0.50

HCS7 Signalized Intersection Results Summary Intersection Information **General Information** TRC Worldwide Engineering Duration, h 0.250 Agency 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period PM Peak SR 374 Urban Street Analysis Year 2033 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr PM DHV yr 2033 Lead LTs.. Intersection **Project Description** 2 Southbound RT Lead EB Lead WB **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 245 128 284 Demand (v), veh/h 762 130 274 129 853 91 284 906 829 **Signal Information** ٨, Cycle, s 111.6 Reference Phase 2 517 Offset, s 0 Reference Point End Green 23.9 20.4 15.9 0.0 31.4 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S 1.0 On Red 1.0 1.0 1.0 0.0 0.0 **Timer Results EBL EBT WBL WBT** NBL **NBT** SBL SBT **Assigned Phase** 5 2 6 8 4 7 Case Number 1.0 3.0 5.3 5.3 1.0 3.0 Phase Duration, s 28.9 54.3 25.4 36.4 20.9 57.3 Change Period, (Y+Rc), s 5.0 5.0 5.0 5.0 5.0 5.0 Max Allow Headway (MAH), s 3.1 3.2 3.2 3.3 3.1 3.3 Queue Clearance Time (g_s), s 22.2 12.2 19.0 29.8 15.5 24.3 Green Extension Time (g_e), s 1.6 1.9 1.2 1.5 0.3 6.8 Phase Call Probability 1.00 1.00 1.00 1.00 1.00 1.00 0.13 0.00 0.01 0.88 0.33 0.61 Max Out Probability WB NB SB **Movement Group Results** EΒ Approach Movement L Т R L Т R L Т R L Т R **Assigned Movement** 5 2 12 1 6 16 3 8 18 7 4 14 Adjusted Flow Rate (v), veh/h 828 266 11 139 298 178 140 927 0 309 985 771 1757 1900 1610 1131 1900 1610 581 1809 1610 1810 1809 1425 Adjusted Saturation Flow Rate (s), veh/h/ln 20.2 10.2 0.4 6.0 17.0 9.4 26.0 27.8 0.0 22.3 13.2 Queue Service Time (g_s), s 13.5 Cycle Queue Clearance Time (q c), s 20.2 10.2 0.4 6.0 17.0 9.4 27.1 27.8 0.0 13.5 22.3 13.2 0.42 0.44 0.28 0.28 0.44 Green Ratio (g/C) 0.44 0.18 0.18 0.33 0.28 0.47 0.68 Capacity (c), veh/h 949 840 712 542 348 525 222 1018 453 343 1696 1948 Volume-to-Capacity Ratio (X) 0.873 0.317 0.015 0.257 0.857 0.340 0.632 0.911 0.000 0.901 0.581 0.396 Back of Queue (Q), ft/ln (50 th percentile) 223.8 111.1 3.9 41.6 203.4 90.2 95.6 335.1 0 185.5 229.4 89.5 Back of Queue (Q), veh/ln (50 th percentile) 9.0 4.4 0.2 1.7 8.1 3.6 3.8 13.4 0.0 7.4 9.2 3.6 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 17.6 44.4 Uniform Delay (d 1), s/veh 27.2 20.3 39.9 28.7 39.2 38.9 0.0 28.0 21.7 7.7 Incremental Delay (d 2), s/veh 5.9 0.1 0.0 0.1 2.5 0.1 3.2 9.7 0.0 18.8 0.3 0.0 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Control Delay (d), s/veh 33.2 20.4 17.6 40.0 46.9 28.8 42.5 48.7 0.0 46.8 22.1 7.8 Level of Service (LOS) С С В D D С D D D С Α 29.9 С 40.1 D 47.9 D 20.4 С Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS 31.1 С **Multimodal Results** ΕB WB NB Pedestrian LOS Score / LOS 2.55 С 2.77 С 2.46 2.59 С В Bicycle LOS Score / LOS 2.31 В 1.50 1.37 Α 2.19

HCS7 Signalized Intersection Intermediate Values General Information Intersection Information TRC Worldwide Engineering Duration, h 0.250 Agency 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period PM Peak Urban Street SR 374 Analysis Year 2033 Analysis Period 1> 7:00 File Name SR 374 w Memorial Dr PM DHV yr 2033 Lead LTs.. Intersection Memorial Drive **Project Description** 2 Southbound RT Lead EB Lead WB **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 245 Demand (v), veh/h 762 130 128 274 284 129 853 91 284 906 829 **Signal Information** ٨, Cycle, s 111.6 Reference Phase 2 517 Offset, s 0 Reference Point End Green 23.9 20.4 15.9 31.4 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 Saturation Flow / Delay Т R L Т R Т R L Т R Lane Width Adjustment Factor (fw) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Heavy Vehicles and Grade Factor (fHVg) 1.000 1.000 | 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Parking Activity Adjustment Factor (f_p) 1.000 Bus Blockage Adjustment Factor (fbb) 1.000 Area Type Adjustment Factor (fa) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Lane Utilization Adjustment Factor (fLU) 0.971 1.000 1.000 0.971 1.000 1.000 1.000 0.952 1.000 1.000 0.952 0.885 Left-Turn Adjustment Factor (fLT) 0.952 0.000 0.595 0.000 0.306 0.000 0.952 0.000 Right-Turn Adjustment Factor (fRT) 0.000 0.847 0.000 0.847 0.000 0.847 0.000 0.847 1.000 1.000 1.000 Left-Turn Pedestrian Adjustment Factor (fLpb) 1.000 Right-Turn Ped-Bike Adjustment Factor (fRpb) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 Work Zone Adjustment Factor (fwz) 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 1.000 DDI Factor (fdd) 581 Movement Saturation Flow Rate (s), veh/h 3514 1900 2261 1900 1610 3618 1610 1810 2850 1610 3618 Proportion of Vehicles Arriving on Green (P) 0.21 0.44 0.44 0.18 0.18 0.18 0.28 0.28 0.00 0.14 0.47 0.47 0.04 0.04 0.34 Incremental Delay Factor (k) 0.25 0.04 0.04 0.04 0.12 0.28 0.11 0.04 **Signal Timing / Movement Groups** EBL EBT/R WBL WBT/R NBL NBT/R SBL SBT/R 5.0 5.0 5.0 5.0 5.0 5.0 Lost Time (t_L) Green Ratio (g/C) 0.42 0.44 0.18 0.28 0.44 0.47 Permitted Saturation Flow Rate (sp), veh/h/ln 1099 0 1131 581 613 0 Shared Saturation Flow Rate (ssh), veh/h/ln Permitted Effective Green Time (g_p) , s 22.5 0.0 20.5 31.6 33.6 0.0 3.4 20.7 0.0 30.5 3.6 0.0 Permitted Service Time (gu), s Permitted Queue Service Time (q_{ps}) , s 3.4 6.0 26.0 3.6 0.0 0.0 0.0 0.0 0.0 Time to First Blockage (gf), s 0.0 Queue Service Time Before Blockage (gfs), s Protected Right Saturation Flow (s_R), veh/h/ln 0 1610 0 1425 Protected Right Effective Green Time (g_R) , s 0.0 16.0 0.0 24.1 Multimodal WB EΒ NB SB Pedestrian Fw / Fv 1.710 0.129 1.852 0.171 1.557 0.171 1.710 0.171

0.000

883.70

-3.64

0.115

17.39

1.82

Pedestrian Fs / Fdelay

Bicycle cb / db

Bicycle Fw / Fv

Pedestrian Mcorner / Mcw

0.000

365.46

-3.64

0.145

37.29

1.02

0.000

562.72

-3.64

0.135

28.83

0.88

0.000

937.13

-3.64

0.111

15.77

1.70

HCS7 Signalized Intersection Results Graphical Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period PM Peak Urban Street SR 374 Analysis Year 2033 **Analysis Period** 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr PM DHV yr 2033 Lead LTs.. Intersection **Project Description** 2 Southbound RT Lead EB Lead WB **Demand Information** EB **WB** NB SB Approach Movement Τ R L R L R L R Demand (v), veh/h 762 245 130 128 274 284 129 853 91 284 906 829 **Signal Information** 215 Cycle, s 111.6 Reference Phase 2 517 Offset, s 0 Reference Point End Green 23.9 20.4 15.9 31.4 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement Т R L Τ R L L Τ R L Τ R Back of Queue (Q), ft/ln (50 th percentile) 223.8 111.1 3.9 41.6 203.4 90.2 95.6 335.1 0 185.5 229.4 89.5 Back of Queue (Q), veh/ln (50 th percentile) 9.0 4.4 0.2 1.7 8.1 3.6 13.4 0.0 7.4 9.2 3.8 3.6 0.00 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 Control Delay (d), s/veh 33.2 20.4 17.6 40.0 46.9 28.8 42.5 48.7 0.0 46.8 22.1 7.8 Level of Service (LOS) С С В D D С D D D С Α Approach Delay, s/veh / LOS 29.9 С 40.1 D 47.9 D 20.4 С Intersection Delay, s/veh / LOS С 31.1 0.2 17.6 40.0 LOS B LOS C LOSD LOSE LOS F 13.4

No errors or warnings exist.

--- Comments ---

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HCS™ Streets Version 7.8.5

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HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period AM Peak SR 374 Urban Street Analysis Year 2043 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr AM DHV yr 2043 Lead LTs... Intersection **Project Description** 2 Southbound RT Lead EB Lead SB **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 210 229 202 444 307 Demand (v), veh/h 793 524 277 858 155 561 721 **Signal Information** 215 Cycle, s 157.4 Reference Phase 2 517 Offset, s 0 Reference Point End Green 37.4 30.0 20.0 50.0 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 **Traffic Information** EΒ WB NB SB Approach Movement R Τ R R L Τ L L Τ L Т R Demand (v), veh/h 793 210 229 202 444 524 277 858 155 307 561 721 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 1900 Base Saturation Flow Rate (s₀), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None 0 ı None None Heavy Vehicles (PHV), % 0 0 0 0 0 0 0 0 0 0 0 0 Ped / Bike / RTOR, /h 0 0 120 0 0 120 0 0 120 0 0 120 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 0 0 0 3 3 3 3 3 3 3 3 3 3 3 3 Arrival Type (AT) 1.00 1.00 1.00 Upstream Filtering (I) 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 0 Turn Bay Length, ft 0 0 0 0 0 0 0 0 0 0 0 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 35 35 35 35 35 35 35 35 35 35 35 35 **Phase Information** EBL EBT WBL WBT NBT SBL SBT **NBL** Maximum Green (Gmax) or Phase Split, s 45.0 35.0 30.0 50.0 20.0 50.0 4.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 1.0 1.0 1.0 1.0 1.0 1.0 Minimum Green (Gmin), s 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off **Dual Entry** No Yes Yes Yes Nο Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 25 0 25 0 25 0 25 0 No No No Nο Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 12 Street Width / Island / Curb 0 0 0 0 0 0 0 0 No No No No Width Outside / Bike Lane / Shoulder, ft 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0

Pedestrian Signal / Occupied Parking

0.50

No

No

0.50

0.50

0.50

No

Generated: 1/12/2021 9:38:30 AM

HCS7 Signalized Intersection Results Summary Intersection Information **General Information** TRC Worldwide Engineering Duration, h 0.250 Agency 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period AM Peak Urban Street SR 374 Analysis Year 2043 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr AM DHV yr 2043 Lead LTs... Intersection **Project Description** 2 Southbound RT Lead EB Lead SB **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 210 202 444 307 Demand (v), veh/h 793 229 524 277 858 155 561 721 **Signal Information** ٨, Cycle, s 157.4 Reference Phase 2 517 Offset, s 0 Reference Point End Green 37.4 30.0 20.0 50.0 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 **Timer Results EBL EBT WBL WBT** NBL **NBT** SBL SBT **Assigned Phase** 5 2 6 8 4 7 Case Number 1.0 3.0 5.3 5.3 1.0 3.0 Phase Duration, s 42.4 77.4 35.0 55.0 25.0 0.08 Change Period, (Y+Rc), s 5.0 5.0 5.0 5.0 5.0 5.0 Max Allow Headway (MAH), s 3.1 3.2 3.2 3.3 3.1 3.3 Queue Clearance Time (g_s), s 35.6 13.6 32.0 52.0 22.0 18.7 Green Extension Time (g_e), s 1.8 3.5 0.0 0.0 0.0 9.9 Phase Call Probability 1.00 1.00 1.00 1.00 1.00 1.00 0.07 0.02 1.00 1.00 1.00 0.10 Max Out Probability WB NB SB **Movement Group Results** EΒ Approach Movement L Т R L Т R L Т R L Т R **Assigned Movement** 5 2 12 1 6 16 3 8 18 7 4 14 Adjusted Flow Rate (v), veh/h 862 228 118 220 483 439 301 933 38 334 610 653 1757 1900 1610 1900 1610 824 1809 1610 1810 1809 1425 Adjusted Saturation Flow Rate (s), veh/h/ln 1171 11.6 6.8 13.2 30.0 30.0 37.3 2.6 20.0 16.7 13.4 Queue Service Time (g_s), s 33.6 49.9 Cycle Queue Clearance Time (q c), s 33.6 11.6 6.8 13.2 30.0 30.0 50.0 37.3 2.6 20.0 16.7 13.4 0.44 0.32 Green Ratio (g/C) 0.46 0.46 0.19 0.19 0.32 0.32 0.32 0.46 0.48 0.71 Capacity (c), veh/h 926 874 740 538 362 512 307 1149 512 325 1724 2035 Volume-to-Capacity Ratio (X) 0.931 0.261 0.160 0.408 1.332 0.858 0.980 0.811 0.074 1.027 0.354 0.321 Back of Queue (Q), ft/ln (50 th percentile) 452.4 133.2 65.7 98.1 781.8 449.3 402.6 436.4 26.1 349.4 181.5 99.5 Back of Queue (Q), veh/ln (50 th percentile) 18.1 5.3 2.6 3.9 31.3 18.0 16.1 17.5 1.0 14.0 7.3 4.0 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 47.4 49.3 37.5 Uniform Delay (d 1), s/veh 26.1 24.8 56.9 63.7 50.3 57.0 39.9 25.9 8.3 Incremental Delay (d 2), s/veh 11.6 0.1 0.0 0.2 167.3 13.1 45.5 4.2 0.0 57.0 0.0 0.0 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Control Delay (d), s/veh 59.0 26.1 24.8 57.1 230.9 63.4 102.5 53.5 37.5 96.9 26.0 8.4 Level of Service (LOS) Ε С С Ε F Ε F D D F С Α 64.6 49.5 D 133.0 F Ε 33.6 С Approach Delay, s/veh / LOS Intersection Delay, s/veh / LOS 66.6 Ε **Multimodal Results** ΕB WB NB SR Pedestrian LOS Score / LOS 2.61 С 2.78 С 2.47 2.60 С В Bicycle LOS Score / LOS 2.48 В 2.37 1.54 В 1.80

HCS7 Signalized Intersection Intermediate Values General Information Intersection Information Agency TRC Worldwide Engineering Duration, h 0.250

Time Period

File Name

Analysis Year

Analyst

Jurisdiction

Urban Street

Intersection

Saturation Flow / Dolay

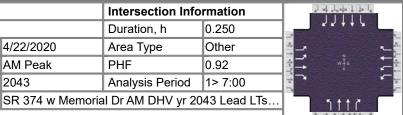
Signal Timing / Movement Groups

MLT

SR 374

Clarksville MPO

Memorial Drive



Project Description 2 Southbound RT Lead EB Lead SB												ጎ ተ ተ ቀ ነ ተ ሶ			
Demand Information		EB			WB			NB		SB					
Approach Movement	L	T	R	L	Т	R	L	Т	R	L	Т	R			
Demand (v), veh/h	793	210	229	202	444	524	277	858	155	307	561	721			

AM Peak

2043

Area Type

Analysis Period

PHF

Other

0.92

1> 7:00

Analysis Date 4/22/2020

Signal Informa	ition				2		<i>.</i>							1
Cycle, s	157.4	Reference Phase	2		Ħ.	H Z	1	542				→ .		xtz
Offset, s	0	Reference Point	End	Green	37.4	30.0	20.0	50.0	0.0	0.0	1	Y 2	1 1	4
Uncoordinated	Yes	Simult. Gap E/W	On	Yellow		4.0	4.0	4.0	0.0	0.0		→	\ _	松
Force Mode	Fixed	Simult. Gap N/S	On	Red	1.0	1.0	1.0	1.0	0.0	0.0	5	6	7	8

Saturation Flow / Delay	L	1	K	L	l	K	L	l	K	L	Į.	K
Lane Width Adjustment Factor (fw)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Heavy Vehicles and Grade Factor (fHVg)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Parking Activity Adjustment Factor (f _p)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Bus Blockage Adjustment Factor (fbb)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Area Type Adjustment Factor (fa)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Lane Utilization Adjustment Factor (fLU)	0.971	1.000	1.000	0.971	1.000	1.000	1.000	0.952	1.000	1.000	0.952	0.885
Left-Turn Adjustment Factor (f⊥τ)	0.952	0.000		0.616	0.000		0.434	0.000		0.952	0.000	
Right-Turn Adjustment Factor (frt)		0.000	0.847		0.000	0.847		0.000	0.847		0.000	0.847
Left-Turn Pedestrian Adjustment Factor (fLpb)	1.000			1.000			1.000			1.000		
Right-Turn Ped-Bike Adjustment Factor (fRpb)			1.000			1.000			1.000			1.000
Work Zone Adjustment Factor (fwz)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
DDI Factor (fddi)	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
Movement Saturation Flow Rate (s), veh/h	3514	1900	1610	2341	1900	1610	824	3618	1610	1810	3618	2850
Proportion of Vehicles Arriving on Green (P)	0.24	0.46	0.46	0.19	0.19	0.19	0.32	0.32	0.32	0.13	0.48	0.48
Incremental Delay Factor (k)	0.30	0.04	0.04	0.04	0.50	0.37	0.48	0.33	0.04	0.50	0.04	0.04

WBL

WBT/R

EBT/R

E 0

EBL

F 0

NBL

Lost Time (tL)	5.0	5.0		5.0		5.0	5.0	5.0
Green Ratio (g/C)	0.44	0.46		0.19		0.32	0.46	0.48
Permitted Saturation Flow Rate (s_p), veh/h/ln	927	0		1171		824	610	0
Shared Saturation Flow Rate (ssh), veh/h/ln								
Permitted Effective Green Time (g_p) , s	32.0	0.0		30.0		50.0	52.0	0.0
Permitted Service Time (gu), s	0.0	0.0		30.0		49.9	12.7	0.0
Permitted Queue Service Time (gps), s	0.0			13.2		49.9	12.7	
Time to First Blockage (<i>g</i> _f), s	0.0	0.0		0.0		0.0	0.0	0.0
Queue Service Time Before Blockage (gfs), s								
Protected Right Saturation Flow (s _R), veh/h/ln		0		1610		0		1425
Protected Right Effective Green Time (gR), s		0.0		20.0		0.0		37.3
Multimodal	E	B	V	VB	N	IB	S	B
Pedestrian F _w / F _v	1.710	0.171	1.852	0.171	1.557	0.171	1.710	0.171
Pedestrian F _s / F _{delay}	0.000	0.126	0.000	0.158	0.000	0.144	0.000	0.123
Pedestrian Mcorner / Mcw								
Bicycle c _b / d _b	919.68	22.96	381.31	51.54	635.44	36.62	953.19	21.55
Bicycle F _w / F _v	-3.64	1.99	-3.64	1.88	-3.64	1.05	-3.64	1.32
Bicycle c _b / d _b	_							_

SBL

NBT/R

SBT/R

HCS7 Signalized Intersection Results Graphical Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period AM Peak SR 374 Urban Street Analysis Year 2043 **Analysis Period** 1> 7:00 Intersection Memorial Drive File Name SR 374 w Memorial Dr AM DHV yr 2043 Lead LTs.. **Project Description** 2 Southbound RT Lead EB Lead SB WB **Demand Information** EB NB SB Approach Movement Τ R L R L R L R 210 202 444 Demand (v), veh/h 793 229 524 277 858 155 307 561 721 **Signal Information** 215 Cycle, s 157.4 Reference Phase 2 542 Offset, s 0 Reference Point End 50.0 Green 37.4 30.0 20.0 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement R Т R L Т L R L Т L Τ R Back of Queue (Q), ft/ln (50 th percentile) 452.4 133.2 65.7 98.1 781.8 449.3 402.6 436.4 26.1 349.4 181.5 99.5 18.0 Back of Queue (Q), veh/ln (50 th percentile) 18.1 5.3 2.6 3.9 31.3 17.5 1.0 14.0 7.3 4.0 16.1 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 Control Delay (d), s/veh 59.0 26.1 24.8 57.1 230.9 63.4 102.5 53.5 37.5 96.9 26.0 8.4 Level of Service (LOS) Ε С С Ε F F D D F С Ε Α Approach Delay, s/veh / LOS 49.5 D 133.0 F 64.6 Ε 33.6 С Intersection Delay, s/veh / LOS Ε 66.6 5.3 _____ 26.1 2.6 ___ 24.8 LOS B LOS C LOSD LOSE LOS F

--- Messages ---

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

--- Comments ---

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HCS™ Streets Version 7.8.5

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HCS7 Signalized Intersection Input Data Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period PM Peak SR 374 Urban Street Analysis Year 2043 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr PM DHV yr 2043 Lead LTs.. Intersection **Project Description** 2 Southbound RT Lead EB Lead SB **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 308 164 160 343 357 1041 Demand (v), veh/h 957 162 1071 115 357 1136 **Signal Information** 215 Cycle, s 152.2 Reference Phase 2 517 Offset, s 0 Reference Point End Green 30.0 32.2 20.0 50.0 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 **Traffic Information** EΒ WB NB SB Approach Movement R Τ R R L Т L L Т L Т R Demand (v), veh/h 957 308 164 160 343 357 162 1071 115 357 1136 1041 Initial Queue (Qb), veh/h 0 0 0 0 0 0 0 0 0 0 0 0 1900 Base Saturation Flow Rate (s₀), veh/h 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 1900 Parking (Nm), man/h None 0 ı None None Heavy Vehicles (PHV), % 0 0 0 0 0 0 0 0 0 0 0 0 Ped / Bike / RTOR, /h 0 0 120 0 0 120 0 0 91 0 0 120 Buses (Nb), buses/h 0 0 0 0 0 0 0 0 0 0 0 0 3 3 3 3 3 3 3 3 3 3 3 3 Arrival Type (AT) 1.00 1.00 1.00 Upstream Filtering (I) 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 Lane Width (W), ft 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 12.0 0 Turn Bay Length, ft 0 0 0 0 0 0 0 0 0 0 0 Grade (Pg), % 0 0 0 0 Speed Limit, mi/h 35 35 35 35 35 35 35 35 35 35 35 35 **Phase Information** EBL EBT WBL WBT NBT SBL SBT **NBL** Maximum Green (Gmax) or Phase Split, s 30.0 35.0 35.0 50.0 20.0 50.0 4.0 Yellow Change Interval (Y), s 4.0 4.0 4.0 4.0 4.0 Red Clearance Interval (Rc). s 1.0 1.0 1.0 1.0 1.0 1.0 Minimum Green (Gmin), s 6 6 6 6 6 6 Start-Up Lost Time (It), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Extension of Effective Green (e), s 2.0 2.0 2.0 2.0 2.0 2.0 2.0 2.0 Passage (PT), s 2.0 2.0 2.0 2.0 2.0 2.0 Recall Mode Off Min Min Off Off Off **Dual Entry** No Yes Yes Yes Nο Yes Walk (Walk), s 0.0 0.0 0.0 0.0 Pedestrian Clearance Time (PC), s 0.0 0.0 0.0 0.0 **Multimodal Information** EΒ WB NB SB 85th % Speed / Rest in Walk / Corner Radius 25 0 25 0 25 0 25 0 No No No Nο Walkway / Crosswalk Width / Length, ft 9.0 0 9.0 0 9.0 12 0 9.0 12 0 12 12 Street Width / Island / Curb 0 0 0 0 0 0 0 0 No No No No Width Outside / Bike Lane / Shoulder, ft 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0 12 5.0 2.0

Pedestrian Signal / Occupied Parking

0.50

No

No

0.50

0.50

0.50

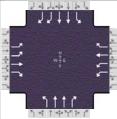
No

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HCS7 Signalized Intersection Results Summary Intersection Information **General Information** TRC Worldwide Engineering Duration, h 0.250 Agency 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period PM Peak Urban Street SR 374 Analysis Year 2043 Analysis Period 1> 7:00 Memorial Drive File Name SR 374 w Memorial Dr PM DHV yr 2043 Lead LTs.. Intersection **Project Description** 2 Southbound RT Lead EB Lead SB **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 308 164 160 343 357 1041 Demand (v), veh/h 957 162 1071 115 357 1136 **Signal Information** ٨, Cycle, s 152.2 Reference Phase 2 517 Offset, s 0 Reference Point End Green 30.0 32.2 20.0 50.0 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S 0.0 On Red 1.0 1.0 1.0 1.0 0.0 **Timer Results EBL EBT WBL WBT** NBL **NBT** SBL SBT **Assigned Phase** 5 2 6 8 4 7 Case Number 1.0 3.0 5.3 5.3 1.0 3.0 Phase Duration, s 35.0 72.2 37.2 55.0 25.0 0.08 Change Period, (Y+Rc), s 5.0 5.0 5.0 5.0 5.0 5.0 Max Allow Headway (MAH), s 3.1 3.2 3.2 3.4 3.1 3.4 Queue Clearance Time (g_s), s 32.0 20.2 31.3 52.0 22.0 42.0 Green Extension Time (g_e), s 0.0 2.5 0.9 0.0 0.0 6.6 Phase Call Probability 1.00 1.00 1.00 1.00 1.00 1.00 1.00 0.04 0.88 1.00 1.00 0.87 Max Out Probability WB NB SB **Movement Group Results** EΒ Approach Movement L Т R L Т R L Т R L Т R **Assigned Movement** 5 2 12 1 6 16 3 8 18 7 4 14 Adjusted Flow Rate (v), veh/h 1040 335 48 174 373 258 176 1164 26 388 1235 1001 1757 1900 1610 1062 1900 1610 458 1809 1610 1810 1809 1425 Adjusted Saturation Flow Rate (s), veh/h/ln 18.2 2.6 10.7 29.3 35.0 48.5 1.7 20.0 25.5 Queue Service Time (g_s), s 30.0 19.0 40.0 Cycle Queue Clearance Time (q c), s 30.0 18.2 2.6 10.7 29.3 19.0 50.0 48.5 1.7 20.0 40.0 25.5 0.44 0.21 0.33 Green Ratio (g/C) 0.42 0.44 0.21 0.34 0.33 0.33 0.47 0.49 0.69 Capacity (c), veh/h 826 839 711 543 402 552 153 1189 529 290 1783 1967 Volume-to-Capacity Ratio (X) 1.259 0.399 0.067 0.320 0.928 0.467 1.153 0.979 0.049 1.338 0.692 0.509 Back of Queue (Q), ft/ln (50 th percentile) 687.5 209.2 25.3 71.9 417.9 190 276.6 629.1 16.8 629.2 435.7 193.1 Back of Queue (Q), veh/ln (50 th percentile) 27.5 8.4 1.0 2.9 16.7 7.6 11.1 25.2 0.7 25.2 17.4 7.7 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 44.4 24.5 Uniform Delay (d 1), s/veh 28.8 51.6 58.9 39.1 64.0 50.6 34.9 49.8 29.7 11.3 126.5 Incremental Delay (d 2), s/veh 0.1 0.0 0.1 24.2 0.2 120.0 21.1 0.0 173.5 1.0 0.1 Initial Queue Delay (d 3), s/veh 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 Control Delay (d), s/veh 170.9 28.9 24.5 51.7 83.1 39.3 184.0 71.7 34.9 223.4 30.7 11.4 Level of Service (LOS) F С С D F D F Ε С F С В 132.6 F 62.3 Е 85.4 F D Approach Delay, s/veh / LOS 51.8 Intersection Delay, s/veh / LOS 79.0 Ε **Multimodal Results** ΕB WB NB Pedestrian LOS Score / LOS 2.57 С 2.78 С 2.47 2.60 С В Bicycle LOS Score / LOS 2.84 С 1.81 1.61 В 2.65

HCS7 Signalized Intersection Intermediate Values

General Information			rmation			
Agency	TRC Worldwide Engineerin	C Worldwide Engineering Duration, h				
Analyst	MLT	Analysis Date	4/22/2020	Area Type	Other	
Jurisdiction	Clarksville MPO	Time Period	PM Peak	PHF	0.92	
Urban Street	SR 374	Analysis Year	2043	Analysis Period	1> 7:00	
Intersection	Memorial Drive	File Name	SR 374 w Memoria	I Dr PM DHV yr 20	43 Lead LTs	
Project Description	2 Southbound RT Lead EB	Lead SB				



Jurisdiction		Clarksville MPO			Time Period F					PHF	<u> </u>		0.92	2			f € 0	€	
Urban Street		SR 374			nalysi		_	2043				lysis P		1> 7		7			- F
Intersection		Memorial Drive			ile Na		S	SR 374	w Mer	noria	al Dr	PM DF	IV yr	2043 L	ead LTs	· ¬	11	11	
Project Description	on	2 Southbound RT Le	eac	d EB Le	ad SE	3											ን ቀ ሰ	ቀ ነኅ ቱ	1
																_			
Demand Inform			_	-	. 1	E		_		_	VB			NI		-		B -	
Approach Mover					L	T	_	R	L		T	R	L	T	_	_	\rightarrow	T	R
Demand (v), ve	Demand (v), ven/n			957	30	8	164	160	3	43	357	162	10	71 11	5 357	11	36	1041	
Signal Informat	ion			Т		e	Т	Š.	211		<u> </u>		Т						1
Cycle, s	152.2	Reference Phase		2		\exists	Ŀ	3	243		512				-	-		_ ≤	1
Offset, s	0	Reference Point	Е	ind	roon	30.0			20.0		.:[[0.0	0.0	0.0		1	2	1.4	3	4
Uncoordinated	Yes	Simult. Gap E/W	(reen ellow			32.2 4.0	20.0 4.0	4.		0.0	0.0		ן ער	→	יע		ĸŤ2
Force Mode	Fixed	Simult. Gap N/S	(ed	1.0	_	1.0	1.0	1.		0.0	0.0		5	6	_	7	8
Saturation Flow	/ Dela	ny		L	Т		R	L	Т		R	L		Т	R	L	Т		R
Lane Width Adjus	stment	Factor (f _w)	٦	1.000	1.00	0 1	.000	1.000	1.00	00	1.000	1.0	00	1.000	1.000	1.000	1.0	00	1.000
Heavy Vehicles a	and Gr	ade Factor (f _{HVg})		1.000	1.00	0 1	.000	1.000	1.00	00	1.000	1.0	00	1.000	1.000	1.000	1.0	00	1.000
Parking Activity A	Adjustn	nent Factor (f _p)	П	1.000	1.00	0 1	.000	1.000	1.00	00	1.000	1.0	00	1.000	1.000	1.000	1.0	00	1.000
Bus Blockage Ac	djustme	ent Factor (fbb)		1.000	1.00	0 1	.000	1.000	1.00	00	1.000	1.0	00	1.000	1.000	1.000	1.0	00	1.000
Area Type Adjust	tment I	Factor (f _a)	\neg	1.000	1.00	0 1	.000	1.000	1.00	00	1.000	1.0	00	1.000	1.000	1.000	1.0	00	1.000
Lane Utilization A	Adjustn	nent Factor (<i>f</i> ∟∪)		0.971	1.00	0 1	.000	0.971	1.00	00	1.000	1.0	00	0.952	1.000	1.000	0.9	52	0.885
Left-Turn Adjustr	nent F	actor (<i>f</i> ∟ <i>τ</i>)	\neg	0.952	0.00	0		0.559	0.00	00		0.2	41 0.000			0.952	0.0	00	
Right-Turn Adjus	tment	Factor (<i>f</i> _{RT})			0.00	0 0	.847		0.00	00	0.847	7		0.000	0.847		0.0	00	0.847
Left-Turn Pedest	Left-Turn Pedestrian Adjustment Factor (fLpb))	1.000				1.000				1.0	00			1.000			
Right-Turn Ped-E	Bike Ac	djustment Factor (f _{Rpl})			1	.000				1.000)			1.000				1.000
Work Zone Adjus	stment	Factor (fwz)		1.000	1.00	0 1	.000	1.000	1.00	00	1.000	1.0	00	1.000	1.000	1.000	1.0	00	1.000
DDI Factor (fdd)				1.000	1.00	1.000 1.000		1.000	1.00	00	1.000	1.0	1.000		1.000	1.000	1.000 1.0		1.000
Movement Satur	ation F	low Rate (s), veh/h		3514	1900	900 1610		2124	190	0	1610) 45	8	3618	1610	1810	361	18	2850
Proportion of Vel	hicles A	Arriving on Green (P)		0.20	0.44	1 ().44	0.21	0.2	1	0.21	0.3	33	0.33	0.33	0.13	0.4	.9	0.49
Incremental Dela	ay Fact	or (<i>k</i>)		0.50	0.04	1 (0.04	0.04	0.3	6	0.04	0.5	50	0.48	0.04	0.50	0.2	2	0.05
Signal Timing /	Mover	ment Groups	4	EBI	-	EB.		WE	3L			NBL		NBT/R		SBL		SBT/R	
Lost Time (t∠)			_	5.0	_	5.			_			5.0		_	5.0	5.0		5.0	
Green Ratio (g/C	•			0.42	_	0.4				0.21		_		4	0.33	0.47	$\overline{}$	0).49
		ow Rate (s _p), veh/h/l	n	1020	3	0)			10	1062			\perp	458	490)	0	
		Rate (ssh), veh/h/ln	4									-							
Permitted Effecti		,- ,	4	34.2	_	0.		_	\rightarrow		2.2	_			50.0	52.0	\rightarrow		0.0
Permitted Servic		1- /		2.8	_	0.	0		_		2.1				35.0	1.5	_	(0.0
Permitted Queue				2.8	_				_		0.7	_		_	35.0	1.5			
Time to First Bloo		1- /	4	0.0	-	0.	0	-	-	(0.0	-		+	0.0	0.0	_	(0.0
		efore Blockage (gfs),	_		_				_		- 1 -	_		_		_	_		10=
	Protected Right Saturation Flow (s _R), veh/h/ln				0			_		610	_			0				425	
	Protected Right Effective Green Time (<i>g</i> _R), s				0.	U				0.0	_			0.0	\vdash			30.0	
Multimodal			4		EB				W			-	١					SB	
Pedestrian F _w / F				1.71	-	0.1		1.8	\rightarrow		171	_	1.557		0.171		0		.171
Pedestrian F _s / F				0.00	U	0.1	27	0.00	00	0.	155	0	.000	(0.142	0.00	U	0.	.119
Pedestrian Mcorne	er / M cw	,		000	70	00	7.4	125	00		7.00		-7 ^ -		24.00				0.50
Bicycle c _b / d _b			4	882.7	_	23.		422.	-		7.32	_	57.22	_	34.29	985.8	_		9.56
Bicycle F _w / F _v			_	-3.6	4	2.3	35	-3.64		1	1.33 -		-3.64 1.13			-3.6	4	2	2.16

HCS7 Signalized Intersection Results Graphical Summary Intersection Information **General Information** Agency TRC Worldwide Engineering Duration, h 0.250 4/22/2020 Analyst MLT Analysis Date Area Type Other Clarksville MPO PHF 0.92 Jurisdiction Time Period PM Peak Urban Street SR 374 Analysis Year 2043 **Analysis Period** 1> 7:00 Intersection Memorial Drive File Name SR 374 w Memorial Dr PM DHV yr 2043 Lead LTs.. **Project Description** 2 Southbound RT Lead EB Lead SB **Demand Information** EB **WB** NB SB Approach Movement R L R L R L R 160 Demand (v), veh/h 957 308 164 343 357 162 1071 115 357 1136 1041 **Signal Information** 215 Cycle, s 152.2 Reference Phase 2 542 Offset, s 0 Reference Point End Green 30.0 32.2 20.0 50.0 0.0 0.0 Uncoordinated Yes Simult. Gap E/W On Yellow 4.0 4.0 4.0 4.0 0.0 0.0 Force Mode Fixed Simult. Gap N/S On Red 1.0 1.0 1.0 1.0 0.0 0.0 **Movement Group Results** EΒ WB NB SB Approach Movement R Т R L Τ L R L Τ L Τ R Back of Queue (Q), ft/ln (50 th percentile) 687.5 209.2 25.3 71.9 417.9 190 276.6 629.1 16.8 629.2 435.7 193.1 Back of Queue (Q), veh/ln (50 th percentile) 27.5 8.4 1.0 2.9 16.7 7.6 25.2 0.7 25.2 17.4 7.7 11.1 0.00 0.00 Queue Storage Ratio (RQ) (50 th percentile) 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 Control Delay (d), s/veh 170.9 28.9 24.5 51.7 83.1 39.3 184.0 71.7 34.9 223.4 30.7 11.4 Level of Service (LOS) F С С D F D F Ε С F С В Approach Delay, s/veh / LOS 132.6 F 62.3 Ε 85.4 F 51.8 D Intersection Delay, s/veh / LOS 79.0 Ε 25.2 17.4 223.4 1 = 24.5 51.7 184.0 LOS B LOS C LOSD LOSE LOS F

--- Messages ---

WARNING: If demand exceeds capacity, a multiple-period analysis should be conducted.

--- Comments ---

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14.9 WebEx Teleconference

WebEx Teleconference

A WebEx conference was held at 10:00 AM CST Thursday May 28, 2020 to discuss the preliminary conceptual plans for the widening of S.R. 374 in Clarksville, TN from Madison Street to Dunbar Cave Road. Those who attended the meeting were as follows.

- Steve Allen, Strategic Transportation Investments Division
- Jim Waters, Strategic Transportation Investments Division
- Shaun Armstrong, Strategic Transportation Investments Division
- Emily Burgess, Strategic Transportation Investments Division
- Chris Cowan, City of Clarksville
- Stan Williams, City of Clarksville
- Sharon Schutz, TDOT Region 3 Project Development
- Jon Zirkle, TDOT Region 3 Project Development
- Melissa Portell, TDOT Region 3 Survey
- Amy Hume, TDOT Environmental
- Sharon Sanders, TDOT Environmental
- Ted Kniazewycz, TDOT Structures
- George Hardy, TDOT Region 3 Traffic
- Mike Tugwell, TRC Worldwide Engineering, Inc.
- Jon Meadows, TRC Worldwide Engineering, Inc.
- Anthony Smith, TRC Worldwide Engineering, Inc.
- Brady Griggs, TRC Worldwide Engineering, Inc.

The following bullet points may require further discussion:

- The preliminary functionals prepared by TRC Worldwide Engineering showed twelve
 (12) foot shoulders for the typical section to maintain continuity with the adjacent
 project to the north. Based upon the discussion at this meeting it was determined to
 reduce the shoulder widths to ten (10) feet, which is the current standard for RD11-TS 6B and provides sufficient width for the proposed bicycle lanes.
- The preliminary functionals currently include a raised curb island at the Madison Street intersection that will prevent left turn movements onto S.R. 374 from the shopping center located on the northwest corner, thus providing positive access management near the intersection. This was discussed at the meeting but no definitive determination was made if this should instead be changed to pavement marking to allow left turn movements.

- Sidewalks may have to be widened adjacent to the high school and middle school to accommodate the 'Safe Route to Schools' requirements. Current sidewalk width is five (5) feet. **Response:** Sidewalk to be widened to six (6) feet in the school area.
- A retaining wall should be used at the pond across from the High School to reduce impacts.
- Future study may be required to determine optimum layout for school entrances.
 Crossing guards are present during school hours at three (3) locations in the school zone.
- TDOT Structures has determined that the existing bridge should be widened to accommodate the new typical section. Symmetrical widening of the bridge is preferred. Bridge should use the full typical section width.
- Review if a double left turn lane is warranted for the eastbound to northbound movement at the Madison Street Intersection. There are two (2) receiving lanes currently proposed. Response: There are only 212 vehicles turning left onto S.R. 374 in the 2043 peak hour. It would require lane shifting and additional ROW to line up a double left.
- Will Clarksville Gas and Water be receptive to moving the back entrance to S.R. 374 further north if feasible?
- Does existing right turn lane at the Clarksville High School and Richview Middle School need to be replaced? The functionals currently do not include right turn lanes into school entrances. Response: Right turn lanes are to be added at both the high school and middle school entrances.
- Review if traffic warrants a double left turn lane for the northbound to westbound movement at the Memorial Drive intersection. Response: There are only 277 vehicles turning left onto Memorial Drive in the peak hour. There are 1,041 vehicles turning right onto Memorial Drive in the peak hour.