Georgia Department of Transportation

Interoffice Memo
Office of Design Policy & Support

DATE: 9/9/2022

FILE: P.I.# 0017219 & 0018363
Newton, Morgan, and Walton Counties / GDOT Districts 1 - Gainesville & 2 - Tennille
SR 12 from Willow Springs Church Road to Shire Parkway &
I-20 Frontage Road from Sr 12 to CR 249/Old Mill Road

FROM: Dave Peters for R. Christopher Rudd, PE, State Design Policy Engineer

TO: SEE DISTRIBUTION

SUBJECT: **APPROVED CONCEPT REPORT**

Attached is the approved Concept Report for the above subject project.

Attachment

Distribution:
Hiral Patel, Director of Engineering
Joe Carpenter, Director of P3
Albert Shelby, Director of Program Delivery
Clement Solomon, Director, Division of Intermodal
Darryl VanMeter, Assistant Director of P3/State Innovative Delivery Administrator
Matthew Markham, Deputy Director of Planning
Kim Nesbitt, Program Delivery Administrator
Bobby Hilliard, Program Control Administrator
Eric Duff, State Environmental Administrator
Donn Digamon, State Bridge Engineer
Alan Davis, State Traffic Engineer
Angela Robinson, Financial Management Administrator
Erik Rohde, State Project Review Engineer
Patrick Allen, State Materials Engineer
Nick Fields, State Utilities Administrator
Eric Conklin, State Transportation Data Administrator
Attn: Systems & Classification Branch
Lee Howell, Statewide Location Bureau Chief
Kelvin Mullins, District 1 Engineer
Corbett Reynolds, District 2 Engineer
SueAnne Decker, District 1 Preconstruction Engineer
Todd Price, District 2 Preconstruction Engineer
Yulonda Pride-Foster, District 1 Utilities Manager
Jamie Lindsey, District 2 Utilities Manager
Kathe Ahmed, Project Manager
BOARD MEMBER - 10th Congressional District

Directed Scope Project Concept Report

Template version: 2022.05.13

Project Type:	Reconstruction (PI0017219) & New Construction (PI0018363)	P.I. Number:	0017219 & 0018363
GDOT District:	1 & 2	County:	Walton, Newton, and Morgan
Federal Route Number:	I-20 / US 278	State Route Number:	SR 12 / SR 402
Project Number:	N/A		

GDOT P.I. No. 0017219 proposes capacity and operational improvements to SR 12 / US 278 in Newton and Walton Counties, Georgia. The project proposes to widen the roadway, including intersection improvements to the I-20 ramp terminals, US 278 at Shire Parkway, and a new location signal at the intersection of US 278 and the Frontage Road to be constructed under PI 0018363.
GDOT P.I. No. 0018363 proposes the construction of a new location frontage road in Walton and Morgan Counties, Georgia. The project proposes a new location roadway running north of and parallel to I-20 from SR 12 / US 278 in the west, continuing approximately 2.9 miles eastward, terminating at Old Mill Road.

Updated report received 7/23/2022

Submitted for approval:

Tyler Denning, PE, Arcadis	7/18/2022
Consultant Designer & Firm	Date
Darryl D. VanMeter, PE — Digitally signed by Darryl D. VanMeter, PE DN: C=US, E=dvanmeter@dot.ga.gov, O=GDOT P3 Division, OU=Innovative Delivery, CN="Darryl D. VanMeter, PE" Date: 2022.07.18 14:23:40-04'00'	07/18/2022
State Alternative Delivery Administrator	Date
Kathe Ahmed — Digitally signed by Kathe Ahmed DN: cn=Kathe Ahmed, o=GDOT, ou=OID, email=kahmed@dot.ga.gov, c=US Date: 2022.07.18 14:05:20 -04'00'	07/18/2022
GDOT Project Manager	Date

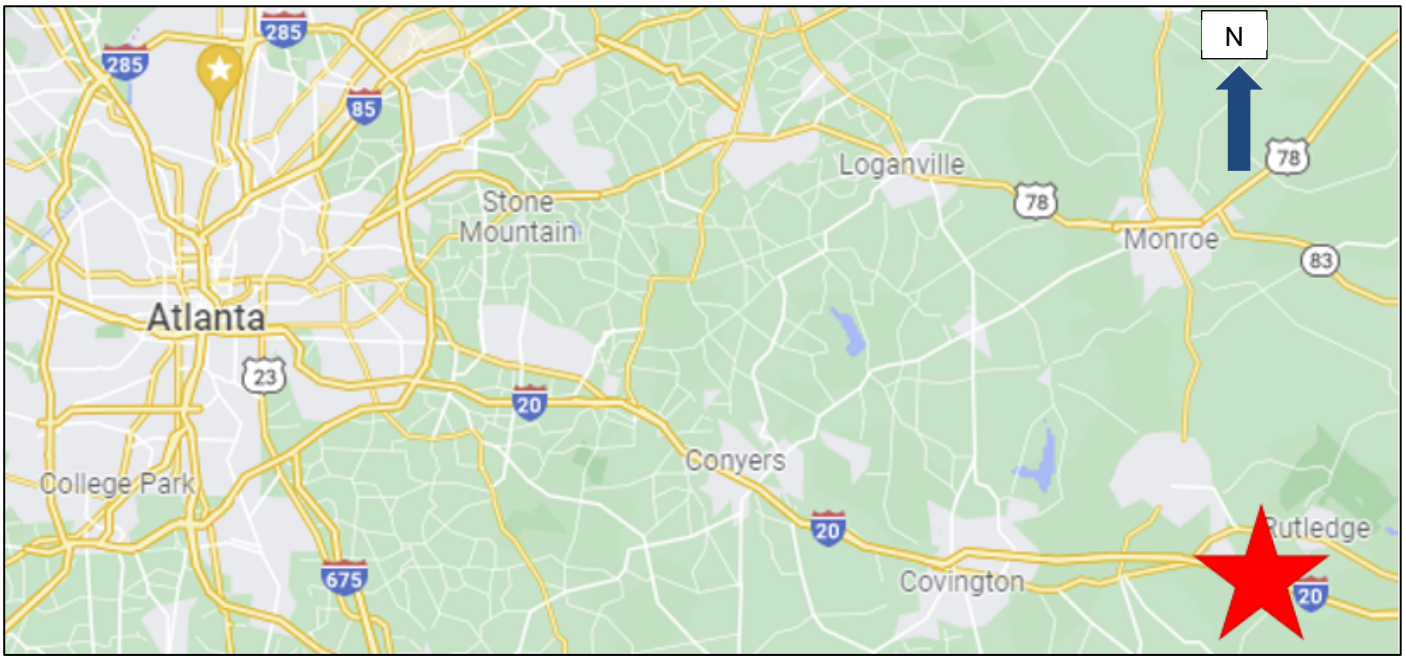
Recommendation for approval:

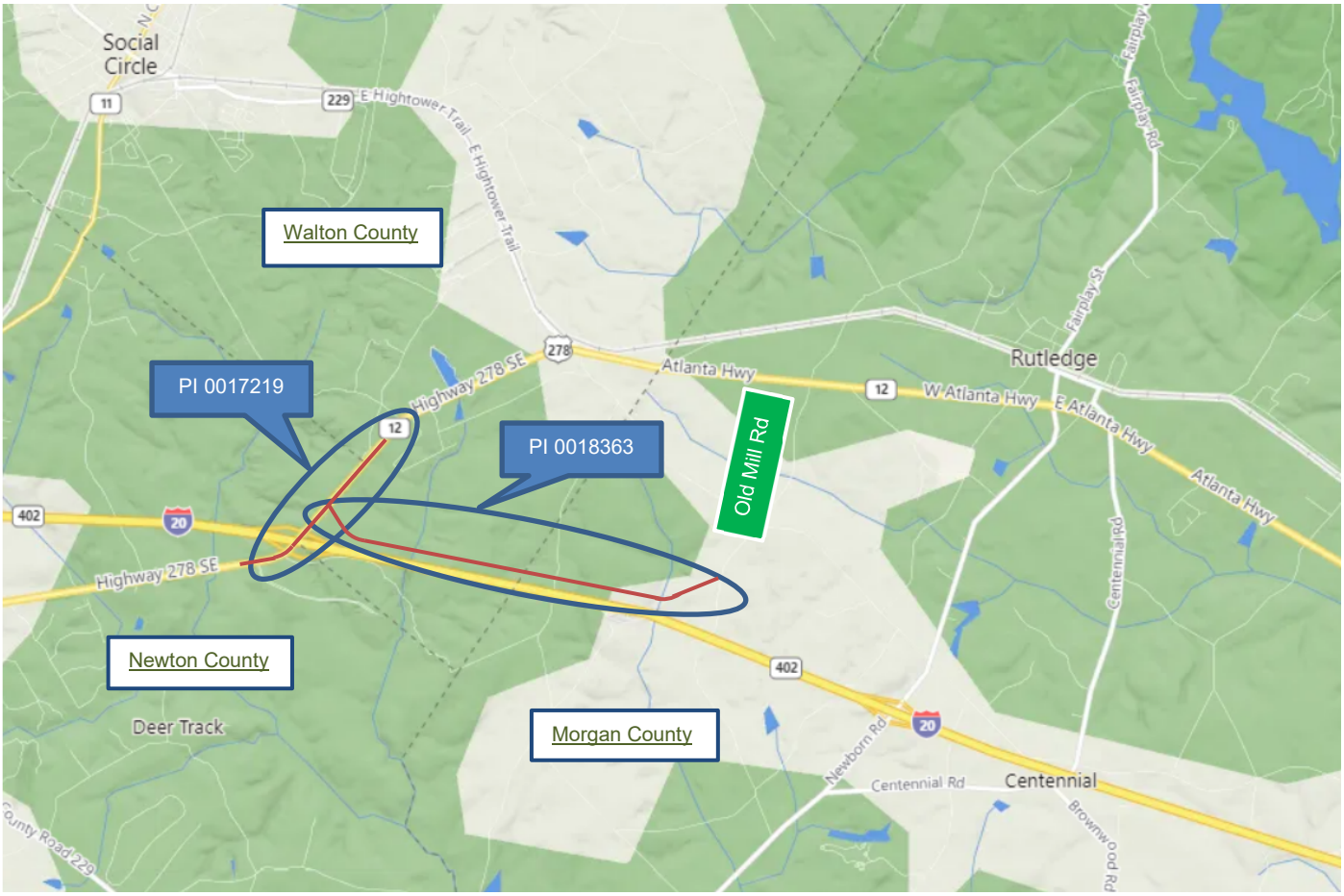
Eric Duff	7/26/2022
State Environmental Administrator	Date
Ola Onabanjo	7/25/2022
for State Traffic Engineer	Date
Erik Rohde	7/28/2022
Project Review Engineer	Date
Marcela Coll	8/1/2022
for State Utilities Engineer	Date
SueAnne Decker (for D1) & Todd Price (for D2)	8/3/22 & 7/28/22
for District Engineer	Date
Donn Digamon	7/25/2022
State Bridge Engineer	Date
Matt Markham	7/29/2022
for Division of Planning	Date

☐ MPO Area: This project is consistent with the MPO adopted Regional Transportation Plan (RTP)/Long Range Transportation Plan (LRTP).

☒ Rural Area: This project is consistent with the goals outlined in the Statewide Transportation Plan (SWTP) and/or is included in the State Transportation Improvement Program (STIP).

PROJECT LOCATION MAP





PLANNING AND BACKGROUND

Prepared By: *Office of Alternative Delivery* **Date Completed:** *6/17/2022*
Project Justification Statement: PI 0017219 & PI 0018363

The purpose of these projects (PI Nos. 0017219 and 0018363) is to address projected future traffic congestion and improve traffic flow resulting from planned development within the project area. The projects originated through an opportunity to develop the Stanton Springs North in conjunction with an approved Interchange Justification Report (IJR) for the Old Mill Road Interchange project (PI0018361). Three major economic developments are planned for construction or expansion in the project vicinity on each side of US 278. Based on data from the Traffic Analysis and Data Application (TADA), the current annual average daily traffic (AADT) volume at the US-278/SR-12 and I-20 interchange is approximately 5,850 vehicles per day (vpd) south of I-20 and 5,000 vpd north of I-20, with an average truck volume (2019) ranging from 5.5 to 9.0%. The corresponding interchange level of service (LOS) for 2019, as calculated using Highway Capacity Software (HCS), is between LOS A and LOS B at all ramps. The average number of crashes for minor arterials in GA for 2016-2019 was 9171 crashes, and the average crash rate for these minor arterials was 157 crashes/100 million vehicle miles/year. For US 278, the crash rate is 264 crashes/100 million vehicle miles/year which is 1.7x more than the state average for 2016-2019 of 157 crashes/100 MVM (Million Vehicle miles).

Future traffic volumes were calculated using an annual growth rate of 1.53% (based on the Atlanta Regional Commission's Travel Demand Model and Census population growth rates) and additional trips anticipated to be generated by the three economic developments. Based on this analysis, traffic on US 278 in this area is anticipated to increase to 13,025 vpd by the proposed project's open year (2024) in the No Build condition, resulting in near failing (LOS E) or failing (LOS F) operations in the interchange area during morning and afternoon peak periods. The proposed project would widen US 278 through the I-20 interchange area to provide additional capacity between the three developments and I-20 and would construct a new frontage road parallel to I-20 to the north to serve as a key access road to the major development site in this area (Stanton Springs North) and reduce anticipated traffic congestion from this development. As a result, open year (2024) traffic operations in the I-20/US 278 interchange area are anticipated to improve to acceptable levels (LOS D or better) for all intersections.

By design year 2044, projected AADT volumes on US 278 are anticipated to increase to approximately 21,175 vpd under No Build conditions. It should be noted that there is a separate, adjacent programmed project in the area to construct a new I-20 interchange at Old Mill Road to the east of the project area by 2025 (GDOT PI No. 0018361), which would change traffic patterns in the area. Without the proposed project, operations at the US 278/I-20 interchange are anticipated to deteriorate to LOS F with substantial delays (e.g., delays up to 335 seconds/vehicle) in both peak periods by the design year 2044. With construction of the proposed project, operations would greatly improve at the US 278/I-20 interchange because of the reduction in delay (LOS E or better in both peak periods). Even with LOS E operations during certain times at some ramp terminals, the delay would be reduced by one half to one third of the delay anticipated under No Build conditions (e.g., 56.6 sec/vehicle vs. 169.9 sec/vehicle and 67.2 sec/vehicle vs. 136.0 sec/vehicle).

Existing conditions:

<u>PI 0017219 – US 278 Widening</u>

US-278/SR-12 (US-278) consists of two 12-foot travel lanes (one lane in each direction) with an outside rural shoulder width of 2 feet on either side. US-278 is classified as a minor arterial with a posted speed limit of 55 miles per hour (mph). US-278 has an existing service interchange at I-20. Existing ramps consist of two 12-foot lanes with an inside shoulder width of 6 feet and outside shoulder width of 12 feet. These ramp connections at US-278 are unsignalized and are 2-way stop-controlled.

Existing US-278 bridge (ID: 217-5053-0) over I-20 is 52.42 feet wide curb to curb, with two 12-foot travel lanes in operation (one in each direction), with an outside paved shoulder width of 2 feet. The remainder of the bridge

deck is currently striped off. The existing bridge has 6.0-foot sidewalks on both sides. The bridge has a skew angle of 30 degrees. There are no bicycle accommodations along the US-278 corridor.

In the Southeast quadrant of US-278 interchange, industrial development including large data centers, with Facebook being one of the occupants and biotech companies like Takeda have been established and are served by Shire Parkway. To the north of I-20, the lands are owned by the Joint Development Authority (JDA), which is a four-county (Jasper, Morgan, Newton, and Walton) alliance to promote industrial development in the counties.

Shire Parkway:
Existing Shire Parkway is a four-lane roadway with a raised median of 16 feet and two lanes of 12 feet in each direction, with a posted speed limit of 35 mph. The existing Shire Parkway consists of curb and gutter and a sidewalk of 6 feet on the southern side. The Shire Parkway's junction with US-278 is unsignalized and stop control is provided for traffic on Shire Parkway.

Willow Springs Church Road:
Existing Willow Spring Church Road is classified as a local road, with a posted speed limit of 40 mph and two lanes (one 10-foot-wide lane in each direction). The existing roadway has 1-foot paved outside shoulders and swales on each side to collect surface water. The existing junction with US-278 is unsignalized and stop-controlled.

PI 0018363 – New Location I-20 Frontage Road from SR 12 / US 278 to CR 249 / Old Mill Road

Sewell Road:
Existing Sewell Road, which is a gravel road, is classified as a local road, with an 11-foot-wide lane in each direction. The existing Sewell Road bridge (ID 211-0008-0) is an overpass, with 11-foot-wide lanes and an overall width of 24.9 feet from curb to curb, over I-20. There is an existing easement for Georgia Transmission lines on the east side of Sewell Road. This easement is accessed by a gated driveway that is connected to Sewell Road.

Old Mill Road:
Existing Old Mill Road (CR-249) is classified as a local road, with a posted speed limit of 55 mph and two lanes (one 11-foot-wide lane in each direction). The existing roadway has 0.5-foot paved outside shoulders and swales on each side to collect surface water. The existing Old Mill Road bridge over I-20 (ID 211-0021-0) is an overpass, with 11-foot-wide lanes and an overall width of 23.9 feet from curb to curb. The existing bridge over I-20 will be retained for this project.

Refer Attachment 1 – Schematic Project Layout with PI Numbers

Other projects in the area:
The following table identifies other projects in the area. Coordination may be required, as indicated in the table, to ensure design elements, especially construction staging, do not overlap.

PI No.	Description	Status	County	Coordination Needed
0017218	SR-12 @ CR-466/Davis Academy Road	No Information	Walton	No
0016622	CR-107/Paine Crossing Road @ CSX #279635C	Under Construction	Newton	Yes
0018361	I-20 @ CR-249/Old Mill Road	Design	Morgan	Yes
0009927	SR-11 @ SR-12	No Information	Newton	NA
0013859	SR-11 @ SR-12	Design	Newton	NA
0006022	SR-11/I-20 Relocate Close Frontage Rd - River Rd Extension	No Information	Newton	NA
0019253	SR 12 from E Hightower Trail to W Dixie Hwy @ 2 New CSX Locs	Design	Walton	Yes

MPO: *NA - not in an MPO* **TIP #:** *Forthcoming***
Congressional District(s): *10*

*** ARC has indicated that the Frontage Road will need to be included in the air quality conformity model, and will do so in their next TIP update, which is scheduled to be completed early next year.*

Federal Oversight: ☐ **PoDI** ☐ **Exempt** ☒ **State Funded** ☐ **Other**

Projected Traffic: AADT (two-way)

US-278 :	24 HR T: 8.5 %	Current Year (2020): 5,700
	Open Year (2024) No-Build: 14,800	Design Year (2044) No-Build: 23,900
	Open Year (2024) Build: 17,350	Design Year (2044) Build: 19,550
Frontage Road:	24 HR T: 15.5 %	Current Year (2020): N/A
	Open Year (2024) No-Build: N/A	Design Year (2044) No-Build: N/A
	Open Year (2024) Build: 6,750	Design Year (2044) Build: 13,300
Old Mill Road:	24 HR T: 15 %	Current Year (2020): 350
	Open Year (2024) No-Build: 6,650	Design Year (2044) No-Build: 3,700
	Open Year (2024) Build: 4,800	Design Year (2044) Build: 4,000

Traffic data source: Field Counts
Traffic Projections Performed by: Arcadis U.S., Inc.
Date approved by the GDOT Office of Planning: *6/9/2022*

Refer Attachment 2 – Traffic Volume Diagrams and Attachment 3 – Capacity Analysis Summary

AASHTO Functional Classification (US 278 & Frontage Road): Minor Arterial
AASHTO Context Classification (US 278 & Frontage Road): Rural Town
AASHTO Project Type US-278/SR-12: Reconstruction
AASHTO Project Type Frontage Road: New Construction
Is the project located on an NHS roadway? ☐ No ☒ Yes (US-278 South of I-20 included in NHS)

Complete Streets - Bicycle, Pedestrian, and/or Transit Standards Warrants:
Warrants met: ☐ None ☐ Bicycle ☒ Pedestrian ☐ Transit

Existing US 278 between the northern and southern I-20 ramp terminals as well as the existing US 278 bridge over I-20 have sidewalks on both sides of the road. The proposed project will retain the existing sidewalks; however, sidewalk will not be extended north or south of the I-20 interchange. Under the current project, no additional pedestrian facilities are warranted along US-278 due to little/no existing pedestrian activity and no pedestrian traffic generators, like residential neighborhoods, commercial areas, schools, public parks, transit stops and stations.

Is this a 3R (Resurfacing, Restoration, & Rehabilitation) Project? ☒ No ☐ Yes

Pavement Evaluation and Recommendations
Initial Pavement Evaluation Summary Report Required? ☒ No ☐ Yes
(PES waived by GDOT Management on 05/12/2022)
Feasible Pavement Alternatives: ☐ HMA ☐ PCC ☒ HMA & PCC

Under the current projects, US-278 is proposed for reconstruction and Frontage Road will be newly constructed. It is to be noted that for off-system projects that are not part of the National Highway System, and do not have Federal Funds a PES report is not required unless significant pavement distresses are found within the project limits.

Is the project located on a Special Roadway or Network? ☒ No ☐ Yes *Network*

Do the limits of the project include one or more signalized intersections? ☐ No ☒ Yes

Is Federal Aviation Administration coordination anticipated? ☒ No ☐ Yes

DESIGN AND STRUCTURAL

Description of the proposed project:

The project comprises two separate PIs: 0017219 and 0018363, which would be let as one single construction contract.

PI 0017219 – US-278:

This project proposes capacity and operational improvements to US-278/SR-12 by widening an existing two-lane section to a three to four-lane section with a 14-foot flush median and rural shoulders; intersection improvements to the eastbound and westbound I-20 ramp terminals and US-278 at Shire Parkway; and a new signal at the intersection of US-278 and the Frontage Road to be constructed under PI 0018363. An additional driveway (DW1), which will be a signalized intersection is proposed on US-278 and will be primarily used by the employees working in Stanton Springs North facility. The proposed typical cross section is shown on Figure 1 below. This project begins approximately 2,200 feet south of the I-20 eastbound ramp intersection and extends north approximately 1.36 miles, terminating just north of Willow Springs Church Road. Existing right-of-way is 70 feet to 125 feet and proposed 80 to 180 feet.

The eastbound off-ramp from I-20 will be widened to include two left-turn lanes and one right-turn lane at the junction with US-278. The existing junctions at the ramp terminals will be upgraded from stop controlled to signalized. Additional signalized intersections are proposed at US-278 and Shire Parkway and the Stanton Springs North Driveway #1 (DW1). Willow Springs Church Road will be realigned to improve the skew angle, while avoiding impacts to the Georgia Transmission Corporation poles. The posted speed limit on the existing Willow Springs Church Road is 40 mph, and the revised junction will also be designed for a speed limit of 40 mph.

North of the Willow Springs Church Road junction, US-278 will be narrowed to a two-lane configuration to tie back into the existing two-lane road.

The overall width of the existing bridge over I-20 (ID 217-5053-0) is 52.42 feet curb to curb with two lanes in operation, with an outside paved shoulder width of 2 feet. It is proposed to increase the number of lanes on the bridge to four, 12 ft wide each, which will include one through south bound lane, two north bound lanes and a back-to-back left turn lane. There is an existing sidewalk on the bridge, 6.0 feet on either side, which s proposed to be removed to accommodate additional width for containing the gutter spread.

It is to be noted that curb and gutter with 5-feet wide Sidewalk is either constructed or the existing is maintained from the I-20 northbound and southbound ramp terminals to a point at short distance from each end of the existing bridge and will transition to meet the sidewalk on the bridge with ramps conforming to ADA requirements. The existing raised sidewalk on the bridge will be removed, replaced with a 5-foot sidewalk to allow for the pedestrian access which will have raised delineators to protect the pedestrians, and prevent the vehicles from accessing this space for emergency stopovers. No bicycle accommodations on the reconfigured bridge are proposed.

The Shire Parkway intersection with US-278 will be signalized. Shire Parkway will be designed for a speed of 35 mph, which is the posted speed limit.

PI 0018363 – Frontage Road from US-278 to Old Mill Road:

This project proposes construction of a Frontage Road roughly parallel to I-20, connecting US-278 on the west with Old Mill Road on the east, and will be designed for a speed limit of 45 mph. The Frontage Road will consist of four lanes with a 20-foot raised median, rural shoulders, and a 12-foot multiuse path north of and parallel to the Frontage Road from US-278/SR-12 on the west, continuing approximately 2.9 miles eastward, terminating at existing Old Mill Road. The existing Old Mill Road will be realigned to meet up with the Frontage Road at a new signalized intersection serving the Stanton Springs North facility.

A new interchange over I-20 will be constructed under PI 0018361, which will serve as direct access to Stanton Springs North facility. In the year 2024, a signalized T-intersection will be proposed at the intersection of the Frontage Road and the realigned Old Mill Road, and it will be converted to 4-legged signalized intersection in year 2025. PI 0018361 will create the fourth leg of the signalized intersection and is scheduled to let in 2023 and will be open to traffic in 2025 and will provide the connectivity to the new Old Mill Interchange. There is no existing Right-of-way for Frontage Road, and it is proposed to have a right-of-way of 170 feet to 250 feet.

The Frontage Road proposes 6 driveways including a junction at the existing Sewell Road to provide access to the Stanton Springs North facility and surrounding areas. A traffic signal is proposed at the eastern main entrance to the Stanton Springs North facility approximately 900 feet west of existing Old Mill Road (discussed above). The segment of the project from this junction to the tie in with existing Old Mill Road will be designed at 55 mph.

Sewell Road:

Sewell Road will tie into a new location four-legged intersection with the Frontage Road. Existing Sewell Road has an unbound gravel surface with a posted speed limit of 35 mph. Sewell Road will be upgraded at the tie-in with the Frontage Road to the radius of return on Sewell Road. The existing Sewell Road bridge over I-20 (ID 211-0008-0), which is two lanes (an 11-foot lane in each direction) with an overall width of 24.9 feet, will be retained.

Old Mill Road:

As part of PI 0018361, which will be opened to traffic in 2025, the existing Old Mill Road will be realigned west of the existing alignment over I-20 and will tie into the new Frontage Road signalized intersection mentioned above. In the interim condition, before the existing Old Mill Road Bridge over I-20 is removed and the new alignment constructed, connectivity will be retained by realigning a small portion of the existing road into the new, proposed Old Mill Road and Frontage Road alignment. The posted speed limit on the existing Old Mill Road is 55 mph, and the realigned tie-in will also be designed for a posted speed limit of 55 mph.

Refer Attachment 4 – Concept Layout (Preferred Alternative) and Attachment 5 – Typical Cross sections and Attachment 6 - Proposed Driveway Locations on Frontage Road.

Major Structures:

Existing US-278 bridge (ID: 217-5053-0) over I-20, which is 52.42 feet wide from curb to curb, will be restriped to accommodate four 12-foot lanes of traffic, with 2-foot outside shoulders. The existing curb and 6.0-foot-wide sidewalk will be removed to provide mitigation for gutter spread on the bridge. Raised delineators are proposed to be placed 5 feet off the face of the bridge barrier in lieu of raised sidewalk.

The existing two-lane Sewell Road bridge over I-20 (ID 211-0008-0), which consists of an 11-foot-wide lane in each direction and an overall width of 24.9 feet, will be retained.

Refer to Attachment 7 for Bridge Inventory Data Sheets.

Three new culverts are proposed on the Frontage Road: Triple-barrel box culvert, 9'X10' on Dennis Creek, Single Box culvert, 8'X7' on unnamed tributary to Dennis Creek, and triple barrel box culvert, 8'X8' on Hunnicutt Creek. The details of the existing and the proposed structures are given in the Table below.

Structure	Existing	Proposed
217-5053-0 (US-278 over I-20)	Existing bridge with a width of 52.42 feet from curb to curb, with two 12-foot lanes in operation. The existing bridge also has 6.0-foot sidewalk on both sides.	The bridge section will be restriped to accommodate four lanes of traffic, with 12-foot-wide lanes and 3-foot outside shoulders, raised delineators are proposed to be placed 5 feet off the face of the bridge barrier in lieu of raised sidewalk.
211-0008-0 (Sewell Road over I-20)	Existing bridge with an 11-foot-wide lane in each direction and an overall width of 24.9 feet from curb to curb.	Existing bridge will be retained.
Dennis Creek	Existing double 8'x8' box culvert. (*Note that this culvert is on I-20*)	Triple 9'x10' box culvert (*Proposed on Frontage Road)*
Unnamed Tributary to Dennis Creek	I-20 downstream of 4'x4'box culvert (*Note that this culvert is on I-20*)	Single 8'x7' (*Proposed on Frontage Road)*
Hunnicutt Creek	Triple 7'x5' box culvert (*Note that this culvert is on I-20*)	Triple 8'x8' (*Proposed on Frontage Road)*

Accelerated Bridge Construction (ABC) techniques anticipated: ☒ No ☐ Yes

Mainline Design Features:

I-20 Ramps	**Functional Classification:** *Interstates*		
Feature	**Existing**	***Policy**	**Proposed**
Typical Section:			
- Number of Through Lanes	1		1
- **Lane Width(s)**	12 feet	12-16 feet	12-16 feet
- **Median Width (feet) & Type**	NA	NA	NA
- **Shoulder Width (feet) (Outside)**	12 feet	12 feet (10 feet paved)	12 feet (10 feet paved)
- **Border Area Width (feet)**	NA	NA	NA
- **Cross Slope (%)**	2%	2%	2%
- **Outside Shoulder Slope (%)**	4%	4%	4%
- **Inside Shoulder Width (feet)**	6 feet	8 feet (4 feet paved)	8 feet (4 feet paved)
- **Sidewalks (feet)**	NA	NA	NA
- Auxiliary Lanes (# LTL, RTL or TWLTL/feet wide)	12 feet RTL and LTL	NA	12 feet RTL and LTL
- **Bike Accommodations**	NA	NA	NA
Posted Speed (mph)	NA		NA
Design Speed (mph)	35	35	35
Minimum Horizontal Curve Radius (feet)	371 feet	371 feet	371 feet
Maximum Superelevation Rate (%)	8%	8%	8%
Maximum Grade (%)	6%	6%	6%
Access Control	Limited access	Limited access	Limited access
Design Vehicle	WB-67		WB-67
Check Vehicle	NA	NA	NA
Pavement Type	PCC		PCC

**According to current GDOT Design Policy if applicable*

US 278 (Rural Section)	**Functional Classification:** *Minor Arterial*		
Feature	**Existing**	***Policy**	**Proposed**
Typical Section:			
- Number of Through Lanes	2		4
- **Lane Width(s) (feet)**	12 feet	11 feet (minimum) 12 feet (desired)	12 feet
- **Median Width (feet) & Type**	NA	Flush	14 feet, flush
- **Shoulder Width (feet) (Outside)**	NA	10 feet (6.5 feet paved)	10 feet (6.5 feet paved)
- **Border Area Width (feet)**	NA	NA	NA
- **Cross Slope (%)**	2%	2%	2%
- **Outside Shoulder Slope (%)**	4%	6%	6%
- **Inside Shoulder Width (feet)**	NA	NA	NA
- **Sidewalks (feet)**	NA	NA	NA
- Auxiliary Lanes (# LTL, RTL or TWLT/feet wide)	NA	TWLTL/14 feet	TWLTL/14 feet
- **Bike Accommodations**	NA	NA	NA
Posted Speed (mph)	55		45
Design Speed (mph)	55	45	45**
Minimum Horizontal Curve Radius (feet)	643 feet	643 feet	643 feet
Maximum Superelevation Rate (%)	6%	6%	6%
Maximum Grade (%)	6%	6%	6%
Access Control	Partial	Partial	Partial
Design Vehicle	WB-40		WB-67
Check Vehicle	NA		NA
Pavement Type	HMA		HMA

**According to current GDOT Design Policy if applicable*

*** Potential developments on both eastern and western side of US 278 and due to the addition of several new traffic signals will substantially change the nature of the land use and the operating speeds for this section of US 278. Reduction of speed is coordinated with District 2 and GDOT Traffic ops.*

US 278 (Urban Section) - North of I-20	**Functional Classification:** *Minor Arterial*		
Feature	**Existing**	***Policy**	**Proposed**
Typical Section:			
- Number of Through Lanes	2		4
- **Lane Width(s) (feet)**	12 feet	12 feet	12 feet
- **Median Width (feet) & Type**	NA	14 feet, Flush	14 feet, Flush
- **Shoulder Width (feet) (Outside)**	NA	NA	NA
- **Border Area Width (feet)**	NA	10 to 16 feet	10 feet
- **Cross Slope (%)**	2%	2%	2%
- **Outside Shoulder Slope (%)**	NA	2%	2%
- **Inside Shoulder Width (feet)**	NA	NA	NA
- **Sidewalks (feet)**	NA	5 feet	5 feet
- Auxiliary Lanes (# LTL, RTL or TWLT/feet wide)	NA	12' RTL and LTL	12' RTL and LTL
- **Bike Accommodations**	NA	NA	NA
Posted Speed (mph)	55		45
Design Speed (mph)	55	45	45
Minimum Horizontal Curve Radius (feet)	643 feet	711 feet	711 feet
Maximum Superelevation Rate (%)	6%	4%	4%
Maximum Grade (%)	6%	6%	6%
Access Control	Partial	Partial	Partial
Design Vehicle	WB-40		WB-67
Check Vehicle	NA		NA
Pavement Type	HMA		HMA

**According to current GDOT Design Policy if applicable*

Frontage Road	**Functional Classification:** *Minor Arterial*		
Feature	**Existing**	***Policy**	**Proposed**
Typical Section:			
- Number of Through Lanes	NA		4
- **Lane Width(s) (feet)**	NA	12 feet	12 feet
- **Median Width (feet) & Type**	NA	Raised	20 feet, raised
- **Shoulder Width (feet) (Outside)**	NA	10 feet (6.5 feet paved)	10 feet (6.5 feet paved)
- **Border Area Width (feet)**	NA	NA	NA
- **Cross Slope (%)**	NA	2%	2%
- **Outside Shoulder Slope (%)**	NA	6%	6%
- **Inside Shoulder Width (feet)**	NA	NA	NA
- **Sidewalks (feet)**	NA	NA	NA
- Auxiliary Lanes (# LTL, RTL or TWLTL/feet wide)	NA	12’ RTL and LTL	12’ RTL and LTL
- **Bike Accommodations**	NA	NA	12-foot multiuse path
Posted Speed (mph)	NA		45
Design Speed (mph)	NA	45	45
Minimum Horizontal Curve Radius (feet)	NA	643 feet	643 feet
Maximum Superelevation Rate (%)	NA	6%	6%
Maximum Grade (%)	NA	6%	5%
Access Control	NA	NA	NA
Design Vehicle	NA		WB-67
Check Vehicle	NA		NA
Pavement Type	NA		HMA / PCC

**According to current GDOT Design Policy if applicable*

Willow Springs Church Road	**Functional Classification:** *Local Road and Street*		
Feature	**Existing**	***Policy**	**Proposed**
Typical Section:			
- Number of Through Lanes	2		2
- **Lane Width(s) (feet)**	9 to 11 feet	11 feet (minimum) 12 feet (desired)	11 feet
- **Median Width (feet) & Type**	NA	NA	NA
- **Shoulder Width (feet) (Outside)**	2 foot graded	6 feet (2 feet paved)	6 feet (2 feet paved)
- **Border Area Width (feet)**	NA	NA	NA
- **Cross Slope (%)**	2%	2%	2%
- **Outside Shoulder Slope (%)**	NA	6%	6%
- **Inside Shoulder Width (feet)**	NA	NA	NA
- **Sidewalks (feet)**	NA	NA	NA
- Auxiliary Lanes (# LTL, RTL or TWLTL/feet wide)	NA	12’ RTL and LTL	12’ RTL and LTL
- **Bike Accommodations**	NA	NA	NA
Posted Speed (mph)	40		40
Design Speed (mph)	40	35	40
Minimum Horizontal Curve Radius (feet)	533 feet	371 feet	533 feet
Maximum Superelevation Rate (%)	4%	4%	4%
Maximum Grade (%)	10%	10%	2.5%
Access Control	NA	NA	NA
Design Vehicle	SU	SU	SU
Check Vehicle	SU	SU	WB-67
Pavement Type	HMA		HMA

**According to current GDOT Design Policy if applicable*

Old Mill Road Connector	**Functional Classification:** *Local Road and Street*		
Feature	**Existing**	***Policy**	**Proposed**
Typical Section:			
- Number of Through Lanes	2		2
- **Lane Width(s) (feet)**	12 feet	11 feet (minimum) 12 feet (desired)	12 feet
- **Median Width (feet) & Type**	NA	NA	NA
- **Shoulder Width (feet) (Outside)**	2 feet graded	6 feet (2 feet paved)	6 feet (2 feet paved)
- **Border Area Width (feet)**	NA	NA	NA
- **Cross Slope (%)**	2%	2%	2%
- **Outside Shoulder Slope (%)**	NA	6%	6%
- **Inside Shoulder Width (feet)**	NA	NA	NA
- **Sidewalks (feet)**	NA	NA	NA
- Auxiliary Lanes (# LTL, RTL or TWLTL/feet wide)	NA	12’ RTL and LTL	12’ RTL and LTL
- **Bike Accommodations**	NA	NA	NA
Posted Speed (mph)	55		55
Design Speed (mph)	55	55	55
Minimum Horizontal Curve Radius (feet)	1,060 feet	1,060 feet	1,060 feet
Maximum Superelevation Rate (%)	6%	6%	6%
Maximum Grade (%)	7%	7%	2%
Access Control	NA	NA	NA
Design Vehicle	SU	SU	SU
Check Vehicle	SU	SU	WB-67
Pavement Type	HMA		HMA

**According to current GDOT Design Policy if applicable*

Shire Parkway	**Functional Classification:** *Local Road and Street*		
Feature	**Existing**	***Policy**	**Proposed**
Typical Section:			
- Number of Through Lanes	4		4
- **Lane Width(s) (feet)**	12 feet	11 feet (minimum) 12 feet (desired)	12 feet
- **Median Width (feet) & Type**	NA	NA	NA
- **Shoulder Width (feet) (Outside)**	NA	NA	NA
- **Border Area Width (feet)**	7.5	10 to 16	10.5
- **Cross Slope (%)**	2%	2%	2%
- **Outside Shoulder Slope (%)**	NA	NA	NA
- **Inside Shoulder Width (feet)**	NA	NA	NA
- **Sidewalks (feet)**	NA	5	5
- Auxiliary Lanes (# LTL, RTL or TWLTL/feet wide)	12	12	12
- **Bike Accommodations**	NA	NA	NA
Posted Speed (mph)	35		35
Design Speed (mph)	35	35	35
Minimum Horizontal Curve Radius (feet)	371 feet	371 feet	371 feet
Maximum Superelevation Rate (%)	4%	4%	4%
Maximum Grade (%)	11%	11%	2%
Access Control	NA	NA	NA
Design Vehicle	SU	SU	SU
Check Vehicle	SU	SU	WB-67
Pavement Type	HMA		HMA

**According to current GDOT Design Policy if applicable*

Sewell Road	**Functional Classification:** *Local Road and Street*		
Feature	**Existing**	***Policy**	**Proposed**
Typical Section:			
- Number of Through Lanes	2		2
- **Lane Width(s) (feet)**	9 to 11 feet	11 feet (minimum) 12 feet (desired)	12 feet
- **Median Width (feet) & Type**	NA	NA	NA
- **Shoulder Width (feet) (Outside)**	NA	6 feet (2 feet paved)	6 feet (2 feet paved)
- **Border Area Width (feet)**	NA	NA	NA
- **Cross Slope (%)**	2%	2%	2%
- **Outside Shoulder Slope (%)**	NA	6%	6%
- **Inside Shoulder Width (feet)**	NA	NA	NA
- **Sidewalks (feet)**	NA	NA	NA
- Auxiliary Lanes (# LTL, RTL or TWLTL/feet wide)	NA	NA	NA
- **Bike Accommodations**	NA	NA	NA
Posted Speed (mph)	35		35
Design Speed (mph)	35	35	35
Minimum Horizontal Curve Radius (feet)	340 feet	340 feet	340 feet
Maximum Superelevation Rate (%)	6%	6%	6%
Maximum Grade (%)	10%	10%	2%
Access Control	NA	NA	NA
Design Vehicle	SU	SU	SU
Check Vehicle	SU	SU	SU
Pavement Type	HMA		HMA

**According to current GDOT Design Policy if applicable*

Design Exceptions/Design Variances to FHWA or GDOT Controlling Criteria anticipated: PI0017219

FHWA or GDOT Controlling Criteria	**No**	**Undetermined**	**Yes**	**DE or DV**	**Approval Date (if available)**
1. Design Speed	☒	☐	☐		
2. Design Loading Structural Capacity	☒	☐	☐		
3. Stopping Sight Distance	☒	☐	☐		
4. Horizontal Curve Radius	☒	☐	☐		
5. Maximum Grade	☐	☐	☒	DV	
6. Vertical Clearance	☒	☐	☐		
7. Superelevation Rate	☒	☐	☐		
8. Lane Width	☒	☐	☐		
9. Cross Slope	☒	☐	☐		
10. Shoulder Width	☒	☐	☐		

Design Exceptions/Design Variances to FHWA or GDOT Controlling Criteria anticipated: PI0018363

FHWA or GDOT Controlling Criteria	No	Undetermined	Yes	DE or DV	Approval Date (if available)
1. Design Speed	☒	☐	☐		
2. Design Loading Structural Capacity	☒	☐	☐		
3. Stopping Sight Distance	☒	☐	☐		
4. Horizontal Curve Radius	☒	☐	☐		
5. Maximum Grade	☒	☐	☐		
6. Vertical Clearance	☒	☐	☐		
7. Superelevation Rate	☒	☐	☐		
8. Lane Width	☒	☐	☐		
9. Cross Slope	☒	☐	☐		
10. Shoulder Width	☒	☐	☐		

Design Variances to GDOT Standard Criteria anticipated: PI0017219 & PI0018363

GDOT Standard Criteria	No	Undetermined	Yes	Approval Date (if applicable)
1. Access Control	☒	☐	☐	
2. Shoulder Width	☒	☐	☐	
3. Intersection Sight Distance	☒	☐	☐	
4. Intersection Skew Angle	☒	☐	☐	
5. Tangent Lengths on Reverse Curves	☒	☐	☐	
6. Lateral Offset to Obstruction	☒	☐	☐	
7. Rumble Strips	☒	☐	☐	
8. Safety Edge	☒	☐	☐	
9. Median Usage	☒	☐	☐	
10. Roundabout Illumination Levels	☒	☐	☐	
11. Complete Streets Warrants	☒	☐	☐	
12. ADA Requirements in PROWAG	☒	☐	☐	
13. GDOT Construction Standards	☒	☐	☐	
14. GDOT Drainage Manual	☒	☐	☐	

Design Variance: Maximum Grade

GDOT uses design speed, functional class, and type of terrain to determine maximum vertical Grade. GDOT DPM, Table 4.5, lists a maximum allowable at 6.0% for a rural arterial roadway, speed design of 45-mph with a rolling terrain.

AASHTO's Green Book, Chapter 7 Arterial Roads, and Streets, provides additional discussion on maximum grade, for arterial roadways (table 7-2).

US 278/SR 12 south of I-20 currently utilizes a 6% grade approaching Shire Pkwy. This portion of US 278 was originally constructed in the 1930's under project H014372 (see sheets H014372_0000014 & H014372_0000015). The existing roadway in the vicinity if Shire Parkway, currently has pavement cross-slopes less than 1.5%. The proposed design includes a pavement overlay to correct pavement cross-slopes providing a minimum cross slope to 2%. The overlay section will maintain the existing 6% grade. As the profile transitions to meet the existing conditions the overlay section will create a tie-in condition where a 170-ft of US 278/SR 12 will be at 6.48% grade. Therefore, a design variance is needed for the tie-in section of 6.48%.

VE Study anticipated: ☒ No ☐ Yes ☐ Completed: *Date*
No VE study anticipated as both PIs will be DB projects.

Lighting Proposed: ☐ No ☒ Yes (Lighting proposed for shared use path)

Off-site Detours Anticipated: ☐ No ☒ Undetermined ☐ Yes

If yes:	Roadway type to be closed:	☐ Local Road	☐ State Route
	Detour Route selected:	☐ Local Road	☐ State Route
	District Concurrence w/Detour Route:	☐ No/Pending	☐ Received *Date*
	Detour Presented to Public:	☐ No	☐ Yes *Date*

Transportation Management Plan [TMP] Required: ☐ No ☒ Yes

If Yes: Project classified as:	☒ Non-Significant	☐ Significant	
TMP Components Anticipated:	☒ TTC	☐ TO	☐ PI

INTERCHANGES AND INTERSECTIONS

Interchanges/Major Intersections:

US 278 at Shire Pkwy:

- Existing Configuration: *Minor Stop Controlled* (T-intersection)
  - North Bound (NB): 1 North Bound Through (NBT) lane, 1 North Bound Right (NBR) turn lane (free)
  - South Bound (SB): 1 South Bound Through (SBT) lane, 1 South Bound Left (SBL) turn lane
  - West Bound (WB): 1 West Bound Left (WBL) lane (stop), 1 West Bound Right (WBR) lane (yield)
- Open (2024)/ Design (2044) Configuration: *Signalized* (T-intersection)
  - NB: 1 NBT, 1 NBR turn lane (yield)
  - SB: 1 SBT, 2 SBL turn lanes
  - WB: 1 WBL, 1 WBR (free)

US 278 at I-20 EB Ramps:

- Existing Configuration: *Minor Stop Controlled* (Interchange)
  - NB: 1 NBT, 1 NBR turn lane (free)
  - SB: 1 shared SBT/SBL
  - EB: 1 EBL (stop), 1 EBR (yield)
- Open (2024)/ Design (2044) Configuration: *Signalized* (Interchange)
  - NB: 2 NBT, 1 NBR turn lane (yield)
  - SB: 1 SBT, 1 SBL turn lane
  - EB: 2 EBL, 1 EBR (No RTOR)

US 278 at I-20 WB Ramps:

- Existing Configuration: *Minor Stop Controlled* (Interchange)
  - NB: 1 shared NBT/NBL
  - SB: 1 SBT, 1 SBR turn lane (free)
  - WB: 1 WBL (stop), 1 WBR (free)
- Open (2024)/ Design (2044) Configuration: *Signalized* (Interchange)
  - NB: 1 NBT, 1 shared NBT/NBL, 1 NBL turn lane
  - SB: 1 SBT, 1 SBR (yield)
  - WB: 1 WBL, 1 WBR (yield)

US 278 at Willow Springs Church Rd

- Existing Configuration: *Minor Stop Controlled* (T-intersection)
  - NB: 1 shared NBT/NBL
  - SB: 1 shared SBT/SBR
  - EB: 1 shared EBL/EBR (stop)
- Open (2024) Configuration: *Minor Stop Controlled* – (T-intersection)
  - NB: 1 NBT, 1 NBL turn lane
  - SB: 1 shared SBT/SBR
  - EB: 1 EBL (stop), 1 EBR turn lane (stop)
- Design (2044) Configuration: *All-Way Stop Controlled* – (same configuration as 2024)

US 278 at Stanton Springs North Driveway 1

- This is a *new intersection* in open year
- Open (2024) Configuration: *Signalized* – (T-intersection)
  - NB: 1 NBT, 1 NBR (yield)
  - SB: 2 SBT, 1 SBL turn lane
  - WB: 1 WBL, 1 WBR
- Design (2044) Configuration: *Signalized* – (4-way intersection)
  - NB: 1 NBT, 1 NBL turn lane, 1 NBR (yield)
  - SB: 1 SBT, 1 shared SBT/SBR, 1 SBL turn lane
  - WB: 1 WBT, 1 WBL turn lane, 1 WBR
  - EB: 1 EBT, 1 EBL turn lane, 1 EBR turn lane

US 278 at Frontage Road

- This is a *new intersection* in open year
- Open (2024) Configuration: *Signalized* – (T-intersection)
  - NB: 2 NBT, 1 NBR turn lane (yield)
  - SB: 2 SBT, 1 SBL turn lane
  - WB: 1 WBL, 1 WBR
- Design (2044) Configuration: *Signalized* – (4-way intersection)
  - NB: 2 NBT, 1 NBL turn lane, 1 NBR turn lane (yield)
  - SB: 1 SBT, 1 shared SBT/SBR, 1 SBL turn lane
  - WB: 1 WBT, 1 WBL turn lane, 1 WBR
  - EB: 1 EBT, 1 EBL turn lane, 1 EBR turn lane

Frontage Road at Stanton Springs North Driveway 5

- This is a *new intersection* in open year
- Open (2024) Configuration: *Minor Stop Controlled* (T-intersection)
  - EB: 2 EBT, 1 EBL turn lane
  - WB: 1 WBT, 1 shared WBT/WBR
  - SB: 1 SBL (Stop), 1 SBR (Stop)
- Design (2044) Configuration: *Signalized* – (same configuration as 2044)

Frontage Road at Sewell Rd/Stanton Springs North Driveway 6

- This is a *new intersection* in open year
- Open (2024) Configuration: *Minor Stop Controlled* – (4-way intersection)
  - EB: 1 EBT, 1 shared EBT/EBR, 1 EBL/EBU turn lane
  - WB: 1 WBT, 1 shared WBT/WBR, 1 WBL/WBU turn lane
  - NB: 1 shared NBT/NBL/NBR
  - SB: 1 shared SBT/SBR, 1 SBL turn lane
- Design (2044) Configuration: *Signalized* – (same configuration as 2044)

Old Mill Rd at Frontage Road/Stanton Springs North Driveway 8

- This is a *new intersection* in open year
- Open (2024) Configuration: *Signalized* (T-intersection)
  - EB: 1 EBT, 1 EBL/EBU
  - WB: 1 WBT, 1 shared WBT/WBR
  - SB: 1 SBL, 1 SBR
- Design (2044) Configuration: *Signalized* (4-way intersection)
  - EB: 1 EBT, 1 EBL/EBU turn lane, 1 EBR (free)
  - WB: 1 WBT, 1 WBL turn lane, 1 shared WBT/WBR
  - NB: 2 NBT, 2 NBL turn lanes, 1 NBR (yield)
  - SB: 1 SBT, 1 SBL turn lane, 1 SBR

Old Mill Rd (new) at Old Mill Rd (old)

- This is a *new intersection* in open year
- Open (2024)/ Design (2044) Configuration – *Minor Stop Controlled* (T-intersection)
  - EB: 1 shared EBT/EBR
  - WB: 1 WBT, 1 WBL turn lane
  - NB: 1 shared NBL/NBR (Stop)

Intersection Control Evaluation (ICE) Required: ☒ No ☐ Yes

Through close coordination with all parties of the EDA, GDOT leadership, a directed scope of work was developed for the projects PI 0017219, PI 0018363, and PI 0018361. This directed scope included design elements and type and configurations for all intersections in the study area of the listed projects:

- PI 001729 – US 278 / SR 12 Widening: Perform intersection improvements via traffic signals at the eastbound and westbound I-20 ramp terminals, US 278 at Shire Parkway, at the intersection of US 278 and PI 0018363 and Stanton Spring North (Driveway 1).
- PI 0018363 – Frontage Road from US 278 to Old Mill Road: Proposed traditional signalized intersections at SR12/US278 and the intersection with Driveway 8 and the proposed realignment for PU 0018361, Old Mill Road Interchange at I-20.
- PI 0018361 – Interstate 20 at CR 249 Old Mill Road Interchange: Proposed a new signalized intersection at the Driveway 8 and tying into PI 0018363-Frontage Road from US 278 to Old Mill Road.

Hence GDOT's Intersection Control Evaluation (ICE) process was not used in selecting the intersection controls.

Refer to Attachment 8 – Signal Warrant Analysis and Attachment 9 – Crash Analysis.

Roundabout Concept Validation Required: ☒ No ☐ Yes ☐ Completed *Date*

UTILITY AND PROPERTY

Railroad Involvement: N/A

Utility Involvements:

Utility Company	Facility Type
BellSouth/AT&T	Telecommunications
AT&T Long Distance	Telecommunications
Charter Communications	Telecommunications
City of Social Circle	Water
City of Social Circle	Sewer

Utility Company	Facility Type
City of Social Circle	Gas
Comcast	Telecommunications
City of Covington	Gas
Fiberlight	Telecommunications
Georgia Power Distribution	Electrical Power
Georgia Power Transmission	Electrical Power
Georgia Transmission Corporation	Electrical Power
Newton County Water and Sewerage Authority	Water
Walton EMC	Electrical Power

SUE Required: ☐ No ☒ Yes ☐ Undetermined

Sue QL-B and QL-D will be performed for the entire project area. A Utility Risk Management Plan will be issued by the selected Design Build team.

Refer to Attachment 10 – Preliminary Utility Costs

Public Interest Determination Policy and Procedure recommended: ☐ No ☒ Yes

US-278:

Right-of-Way (ROW): Existing width: 60 to 120 ft. Proposed width: 80 to 180 ft.

Frontage Road:

Right-of-Way (ROW): Existing width: N/A ft. Proposed width: 170 to 300 ft.

Willow Springs Church Road:

Right-of-Way (ROW): Existing width: 50 ft. Proposed width: 80 to 110 ft.

Old Mill Road:

Right-of-Way (ROW): Existing width: 100 ft. Proposed width: 140 to 270 ft.

Shire Parkway:

Right-of-Way (ROW): Existing width: 100 to 115 ft. Proposed width: 100 to 115 ft.

Sewell Road:

Right-of-Way (ROW): Existing width: 100 ft. Proposed width: 100 ft.

Required Right-of-Way anticipated: ☐ None ☒ Yes ☐ Undetermined
Easements anticipated: ☐ None ☒ Temporary ☒ Permanent * ☐ Utility ☐ Other
** Permanent easements include the right to place utilities.*

		PI Number	0017219	0018363
Anticipated total number of impacted parcels:			11	8
Displacements anticipated:		Businesses:	0	0
		Residences:	0	1
		Other:	0	0
Total Displacements:			0	1

Location and Design approval: ☐ Not Required ☒ Required

Impacts to federally managed property anticipated: ☒ No ☐ Yes ☐ Undetermined

ENVIRONMENTAL & PERMITS

Anticipated Environmental Document: *GEPA ~ None*

Level of Environmental Analysis:

☒ The environmental considerations noted below are based on preliminary desktop or screening level environmental analysis and are subject to revision after the completion of resource identification, delineation, and agency concurrence.

☐ The environmental considerations noted below are based on the completion of resource identification, delineation, and agency concurrence.

GDOT MS4 Permit Compliance – Is the project located in a GDOT MS4 area? ☒ No ☐ Yes

If yes, is the GDOT MS4 Permit anticipated to apply to all or part of this project? ☒ No ☐ Yes

Is ecology water quality mitigation anticipated? ☒ No ☐ Yes

Will a Non-MS4 Detention Report be required during preliminary design? ☐ No ☒ Yes

Environmental Permits/Variances/Commitments/Coordination anticipated:

Permit/Variance/Commitment/ Coordination Anticipated	No	Yes	Remarks
1. U.S. Coast Guard Permit	☒	☐	
2. Forest Service/NPS	☒	☐	
3. CWA Section 404 Permit	☐	☒	PI # 0017219- Obtained by DB Contractor post let. PI # 0018363 – Obtained by the JDA.
4. Tennessee Valley Authority Permit	☒	☐	
5. USACE Real Estate Outgrant	☒	☐	
6. Buffer Variance	☐	☒	By DB Contractor
7. Coastal Zone Management Coordination	☒	☐	
8. NPDES	☐	☒	By DB contractor
9. FEMA	☒	☐	
10. Cemetery Permit	☐	☐	TBD
11. Other Permits	☐	☒	See below
12. Other Commitments	☐	☒	See below
13. Other Coordination	☐	☒	See below

Other Commitments
On May 02, 2022 an Economic Development Agreement (EDA) was signed between the State of Georgia, the Georgia Department of Economic Development (GDEcD), the Joint Development Authority (JDA) of Jasper, Morgan, Newton, and Walton Counties, and Rivian Automotive, LLC detailing the roles, obligations, permitting responsibilities, due diligence requirements, and other responsibilities of each party as related to the site development of the new Facility and the roadway construction as detailed in this report.

Other Commitments (contd.)
Memorandum of Understanding (MOU) among GDOT, the JDA, and the Georgia Department of Economic Development (GDEcD) detailing the roles and responsibilities will be signed, TBD. This MOU will detail the roles and responsibilities of each party pertaining to Clean Water Act Section 404 permitting, mitigation, violations, and fines; and Section 106 of the National Historic Preservation Act Cultural Resources mitigation and post-review discoveries and treatment of human remains for PI No. 0018363. GDOT is an invited signatory on a Section 106 Programmatic Agreement (PA) that is in development among the JDA, the United States Army Corps of Engineers (USACE), the Georgia State Historic Preservation Officer (SHPO), and the Advisory Council on Historic Preservation (ACHP), which details the phased Section 106 process for PI No. 0018363.

Is a PAR required? ☒ No ☐ Yes ☐ Completed *Date*

Environmental Comments and Information:
NEPA/GEPA: No GEPA document is anticipated because the cost for both projects will be less than $100 million.

Ecology: An ecology resources survey to assess and document the presence of ecological resources such as habitat/land use within the project boundaries, presence and location of jurisdictional and state waters, protected species and their habitats, and other ecological resources was conducted. Suitable habitat was verified, and species presence assumed for: Chattahoochee crayfish (*Cambarus howardi*) and Altamaha shiner (*Cyprinella xaenura*). Special Provision SP107.23H will be required. Suitable habitat and species verification confirmed for: Tri-colored Bat (*Perimyotis subfalvus*). Special Provision SP107.23 will be required. Potentially suitable habitat occurs statewide and may be present within existing and proposed GDOT rights-of-way for: *Danaus plexippus* (monarch butterfly). The FHWA and GDOT have determined a Section 7 conference is not warranted for this species. Additionally, five (5) perennial streams, ten (10) intermittent streams, three (3) ephemeral channels, five (5) wetlands, and one (1) open water were identified; A determination of USACE jurisdiction of these waters is outstanding. A Section 404 permit is anticipated, and the JDA has committed to obtaining the permit for these projects. An Ecology Assessment of Effects Report for the projects is anticipated.

History: The draft Historic Resource Survey Reports for the projects recommended three (3) historic resources eligible for the National Register of Historic Places (NRHP), all of which are in the area of potential effects of PI 0018363. Concurrence on NRHP recommendations is required by the SHPO for PI 0018363. SHPO concurrence may be required for PI 0017219, pending USACE jurisdiction. Assessment of effects to the NRHP-eligible resources will be required and, should there be any adverse effects to the NRHP-eligible resources, avoidance and mitigation measures would be required.

Archeology: Ten (10) archaeological sites, which include two cemeteries and one modern headstone over a buried crematory urn were identified in the projects' Environmental Survey Boundary (ESB). A Phase I report is anticipated. None of the archaeological sites identified will be recommended eligible for the National Register of Historic Places.

Air Quality:
Is the project located in an Ozone Non-attainment area? ☐ No ☒ Yes
Walton and Newton County are in an Ozone maintenance area, therefore we will need to provide the TIP/STIP number for the Air Quality Impact Assessment.
Is a Carbon Monoxide hotspot analysis required? ☒ No ☐ Yes

Noise Effects: A noise analysis is not required for state-funded projects.

Public Involvement: Early coordination letters were sent to local residents and stakeholders in March 2022. Three PIOH meetings were held between June 14 and 15, 2022. One virtual Live Question and Answer PIOH was held on June 14th and an additional Live Question and Answer PIOH was held on June 15th. An in-person PIOH was held on June 14th at the Morgan County High School located at 1231 College Drive, Madison, Georgia 30650. The public comment period was open from June 1 to June 30, 2022. A total of **1,564** people attended the open house, viewed the website or virtual room, or attended the live virtual meeting. A total of 38 comments were received during the comment period pertaining to PI Nos. 0017219 and 0018363. Of the 21 respondents who formally commented on PI No. 0017219, 8 were in support of the project, 6 were opposed, 7 were uncommitted, and 0 expressed conditional support. Of the 17 respondents who formally commented on PI No. 0018363, 6 were in support of the project, 8 were opposed, 2 were uncommitted, and 1 expressed conditional support. No significant project changes were made as a result of the comments received at the PIOHs.

Major stakeholders:
Newton, Walton, and Morgan Counties, Joint Development Authority (JDA), GDOT, Georgia Department of Economic Development (GDEcD)

CONSTRUCTION

Issues potentially affecting constructability/construction schedule:

No major constructability issues are anticipated. Only minor off-peak lane closures anticipated during construction of the I-20 ramp tie-ins.

Early Completion Incentives recommended for consideration: ☒ No ☐ Yes

Recommendations for Early Completion Incentives have not been requested by the Office of Construction.

COORDINATION, ACTIVITIES, RESPONSIBILITIES, AND COSTS

Initial Concept Team Meeting: N/A
Initial Concept Team meeting was waived by GDOT, refer to Attachment 11.

Concept Team Meeting: 3/28/2022 Four separate "Crosswalk" meetings were held with various GDOT Offices. Meetings were held with the Offices of Design Policy, Traffic Operations (State and District), District 1 and 2 Construction, Bridge, and OES. These meetings were held in lieu of a CTM. Waiver of the CTM was requested on 4/1/2022 and email approval of this waiver was received via email from the Office of Design Policy and Support on 4/5/2022. Minutes corresponding to the crosswalk meetings are included in Attachment 11.

Refer Attachment 11 – CTM Waiver & Cross Walk MOMs

Other coordination to date:

As part of early coordination, letters were sent to residents and other stakeholders in March 2022. Two virtual public information open houses (PIOH) were held on June 14, 2022, and June 15, 2022, each with interactive question-and-answer Sessions. Additionally, a live in-person "drop in" event was held on June 14, 2022. Refer to Attachment 4 – Concept Layout – Preferred Alternative.

- Public Involvement Open House Results Summary:
  - Three PIOH meetings were held between June 14 and 15, 2022. One virtual Live Question and Answer PIOH was held on June 14th and an additional Live Question and Answer

PIOH was held on June 15th. An in-person PIOH was held on June 14th at the Morgan County High School located at 1231 College Drive, Madison, Georgia 30650. The public comment period was open from June 1 to June 30, 2022. A total of **1,564** people attended the open house, viewed the website or virtual room, or attended the live virtual meeting. A total of 38 comments were received during the comment period pertaining to PI Nos. 0017219 and 0018363. Of the 21 respondents who formally commented on PI No. 0017219, 8 were in support of the project, 6 were opposed, 7 were uncommitted, and 0 expressed conditional support. Of the 17 respondents who formally commented on PI No. 0018363, 6 were in support of the project, 8 were opposed, 2 were uncommitted, and 1 expressed conditional support. No significant project changes were made as a result of the comments received at the PIOHs.

- Public officials who attended included: Andy Ainslie, Morgan County Commissioner; Adam Mestres, Morgan County Manager; Mark Williams, Assistant Morgan County Manager; Ben Riden, Morgan County Commissioner; Eric Joyce, Madison County Council.

- Major concerns from the public comments included:

  1. Projects are only for developments in the area and would not be built but for the developments
  2. Types of project lighting that could impact bats, migratory birds, and Hard Labor Creek State Park
  3. How stop light locations impact traffic flow
  4. Poor use of taxpayer money to build transportation projects for developments

Project Activity	Party Responsible for Performing Task(s)
Concept Development	Arcadis U.S., Inc (GEC)
Design	Design-Build Contractor
Right-of-Way Acquisition	GDOT/Design-Build Contractor
Utility Coordination (Preconstruction)	Design-Build Contractor
Utility Relocation (Construction)	Design-Build Contractor
Letting to Contract	GDOT/HNTB (PMC)
Construction Supervision	GDOT/ HNTB (PMC)
Providing Material Pits	Design-Build Contractor
Providing Detours	Design-Build Contractor
Environmental Studies, Documents, & Permits	Arcadis U.S., Inc. (GEC)/Design-Build Contractor
Environmental Mitigation	GDOT
Construction Inspection & Materials Testing	GDOT
PIOH	Arcadis/GDOT/HNTB (PMC)

Project Cost Estimate Summary and Funding Responsibilities: PI0017219 – US 278/SR 12						
	PE Activities		ROW[2]	Reimbursable Utilities[3]	CST[4]	Total Cost[5]
	PE Funding[1]	Section 404 Mitigation				
Date of Estimate:	*7/22/2022*	*7/22/2022*	*7/22/2022*	*7/22/2022*	*7/22/2022*	
Proposed Funding Source(s):	State	State / Local	State / Local	State / Local	State	
Programmed Cost:	$2,100,000		$10,800,000	NA	$23,600,000	$36,500,000
Estimated Cost:	$1,500,000	NA	$3,100,000	NA	$25,218,312	$29,818,312
Total Cost Difference:						$6,681,688

Project Cost Estimate Summary and Funding Responsibilities: PI0018363 - Frontage Road						
	PE Activities		ROW[2]	Reimbursable Utilities[3]	CST[4]	Total Cost[5]
	PE Funding[1]	Section 404 Mitigation				
Date of Estimate:	*7/22/2022*	*7/22/2022*	*7/22/2022*	*7/22/2022*	*7/22/2022*	
Proposed Funding Source(s):	State	State / Local	State / Local	State / Local	State	
Programmed Cost:	$4,513,153		$720,000	NA	$44,300,000	$49,533,153
Estimated Cost:	$3,213,153	$ 1,300,000	$500,000	NA	$59,742,442	$64,755,595
Total Cost Difference:						($15,222,442)

1 PE Cost includes the estimated pre-let engineering costs and estimated stipulated fee.
2 ROW estimate is preliminary
3 Any reimbursable utilities are included in the CST costs
4 CST includes Construction, Final Design, Quality Management, Bonding & Insurance, Contingency, Post-Let GEC/CEI and PMC/Agency Costs. (Asphalt Fuel Price Adjustment included)
5 All values are in Year of Expenditure (YOE) escalated to the midpoint of phase.

Refer to Attachment 12 – Detailed Cost Estimate Memo

ALTERNATIVES DISCUSSION

Directed Scope Concept Development:

A memorandum has been produced that provides a summary of the GDOT's approach to incorporating the commitments made within the EDA pertaining to the Project detailed in this report. This memorandum also details portions of the design that were directed by GDOT Executive Leadership to be incorporated into the project's design, thereby eliminating the need for a traditional alternative selection evaluation. This memorandum has been

circulated to GDOT Executive Leadership and was executed on June 13, 2022. This memo is included as Attachment 13.

PI0017219
Alternative selection:

Preferred Alternative:
This alternative proposes improvements to US-278 including widening to a four-lane section with two 12-foot-wide lanes in each direction, a paved 6.5-foot-wide shoulder and an overall shoulder width of 10 feet, and 12-foot-wide lanes on the US-278 bridge over I-20. The existing bridge on I-20 will be retained; however, the number of lanes will be increased to four by restriping the chevron markings on the existing bridge. A 150-foot-wide corridor is required to accommodate the proposed four-lane cross section.

Traffic signals are proposed at the I-20 ramp terminal connections, which will improve traffic flow, safety, and operational efficiency at these junctions. Existing ramp terminal junctions will be designed to accommodate the traffic signals, which will increase the footprint of the existing junctions. Widening of US-278 north of I-20 will require additional right-of-way. Additional traffic signals are proposed on US-278 at Shire Parkway, at intersections with the Frontage Road, and at the employee entrance to the Stanton Springs North development on US 278.

Estimated Property Impacts:	**11**	**Estimated Total Cost:**	**$ 14.89M**
Estimated ROW Cost:	**$ 3.1M**	**Estimated CST Time:**	**12 months**

Rationale:
This alternative was selected because it addresses the issues identified in the project justification statement while having the lowest costs, utility impacts, and environmental impacts.

No-Build Alternative:
This alternative would maintain the existing conditions.

Estimated Property Impacts:	0	Estimated Total Cost:	$ 0
Estimated ROW Cost:	$ 0	Estimated CST Time:	0 months

Rationale:
This alternative was not selected because it does not address the capacity and safety issues identified in the project justification statement.

PI0018363
Alternative selection:

Preferred Alternative:
The proposed Frontage Road will be parallel to I-20 and will connect US-278 on the west with realigned Old Mill Road on the east. The Frontage Road centerline will be designed at a minimum offset of 110 feet from the edge of the I-20 right-of-way. The proposed Frontage Road will have a four-lane section with two 12-foot-wide lanes in each direction, 20-foot raised median, a paved shoulder width of 6.5 feet, and an overall shoulder width of 10 feet. A 12-foot-wide multiuse path is proposed on the northern side of the Frontage Road. An overall corridor width of approximately 170 feet will be required to accommodate the proposed four-lane cross section and the multiuse facility.

Estimated Property Impacts:	**8**	**Estimated Total Cost:**	**$ 35.47M**
Estimated ROW Cost:	**$ 0.5M**	**Estimated CST Time:**	**12 months**

Rationale:
This alternative was selected because it addresses the issues identified in the project justification statement and at the same time provides a shared pedestrian-bicyclist facility.

No-Build Alternative: NA as there is no existing facility.			
Estimated Property Impacts:	0	Estimated Total Cost:	$ 0
Estimated ROW Cost:	$ 0	Estimated CST Time:	0 months
Rationale: There is no existing facility.			

LIST OF ATTACHMENTS/SUPPORTING DATA

1. Schematic Project Layout with PI Numbers
2. Traffic Volume Diagrams
3. Capacity Analysis Summary
4. Concept Layout – Preferred Alternative
5. Typical Cross sections
6. Proposed Driveways on Frontage Road
7. Bridge Inventory Sheets
8. Signal Warrant Analysis
9. Crash Analysis
10. Preliminary Utility Costs
11. CTM Waiver & Cross Walk MOMs
12. Detailed Cost Estimate Memo
13. Directed Scope Concept Memo

APPROVALS

Concur: Hiral Patel Digitally signed by Hiral Patel DN: C=US, E=hpatel@dot.ga.gov, O=GDOT, CN=Hiral Patel Date: 2022.09.09 11:20:11-04'00' — 09/09/2022

Director of Engineering — Date

Approve: Meg Pirkle AJH Digitally signed by Andrew Heath DN: C=US, E=aheath@dot.ga.gov, O=Georgia DOT, OU=Chief Engineer Office, CN=Andrew Heath Date: 2022.09.09 15:42:13-04'00' — 9/9/2022

Chief Engineer — Date

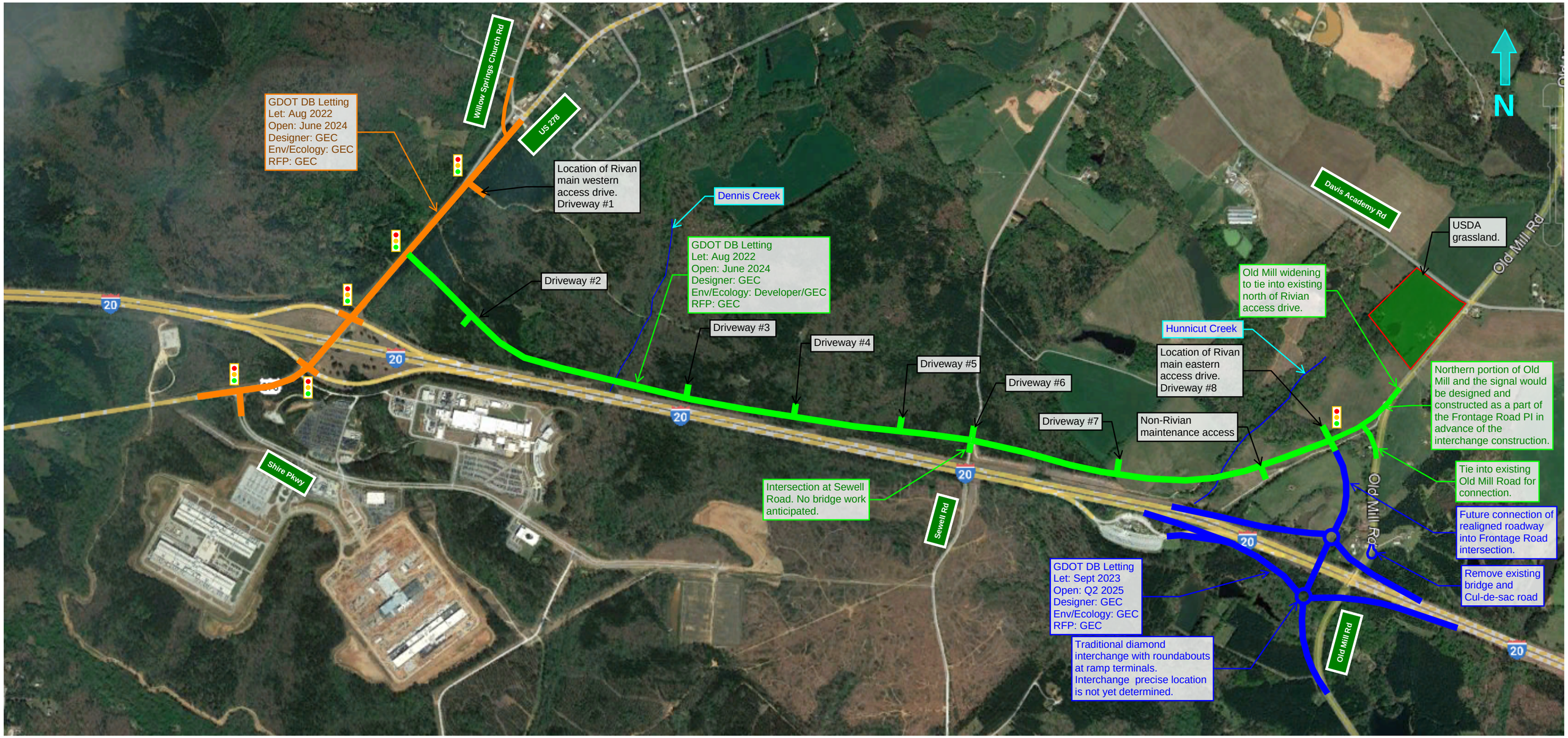
Attachment 1 – PA Layout with PI Nos

Project Adventure PI Planning Diagram

Orange: US 278 Widening
PI 0017219 (Anticipated Let: Aug 2022)

Green: Frontage Road and Interim Old Mill Widening
PI 0018363 (Anticipated Let: Aug 2022)

Blue: Old Mill Interchange and Widening
PI 0018361 (Anticipated Let: Sept 2023)



For Diagrammatic Purposes Only

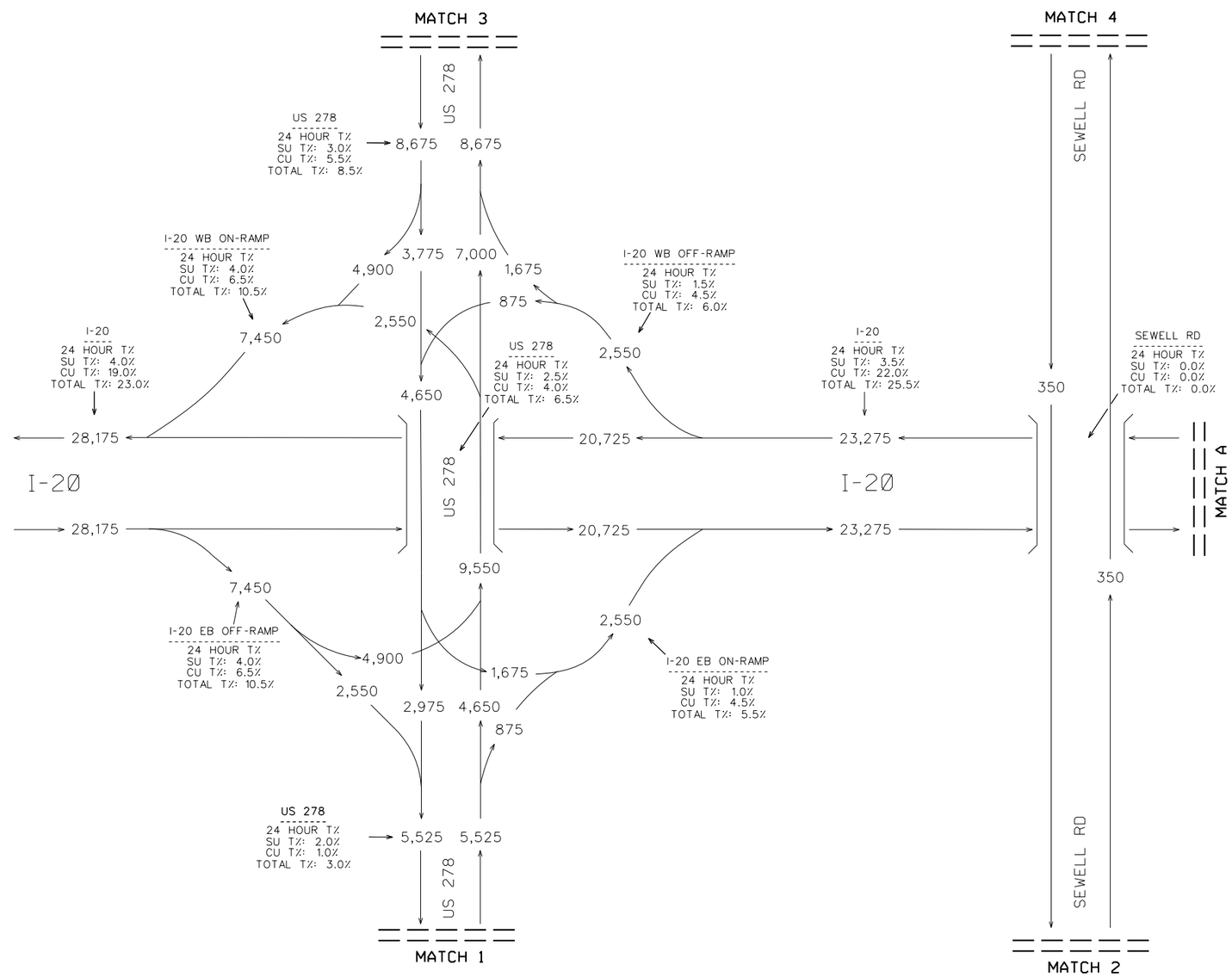
Not to Scale

version: April 28, 2022

Attachment 2 – Traffic Volume Diagrams

P.I. No.
0017219 & 0018363

AADT VOLUMES
PRJ 1 OPEN YEAR 2024
BUILD
AADT = XXX



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES		

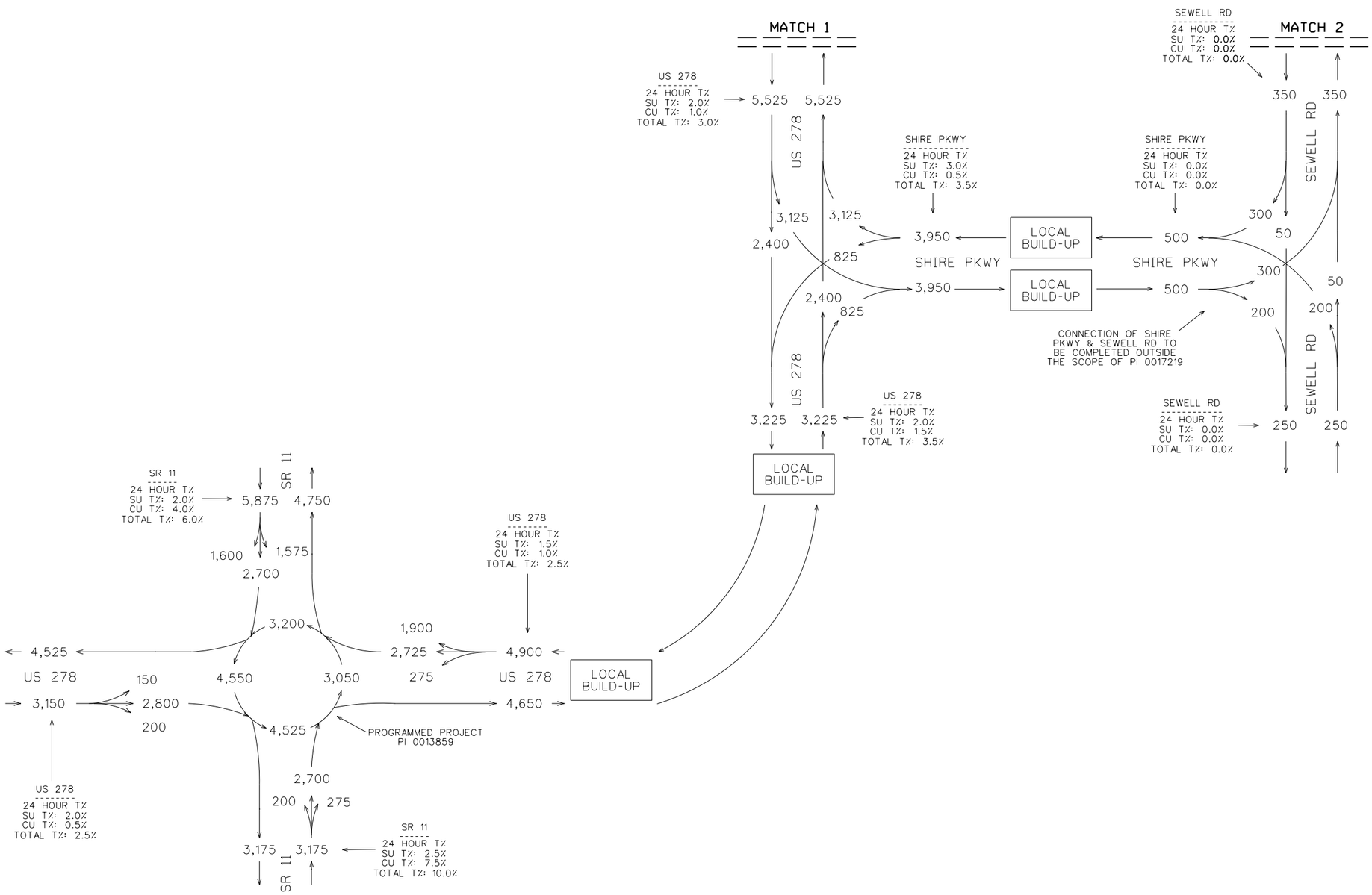
TRAFFIC DIAGRAM
US 278 / SR 12

NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0001
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No.
0017219 & 0018363

AADT VOLUMES
PRJ 1 OPEN YEAR 2024
BUILD
AADT = XXX



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES

TRAFFIC DIAGRAM
US 278 / SR 12

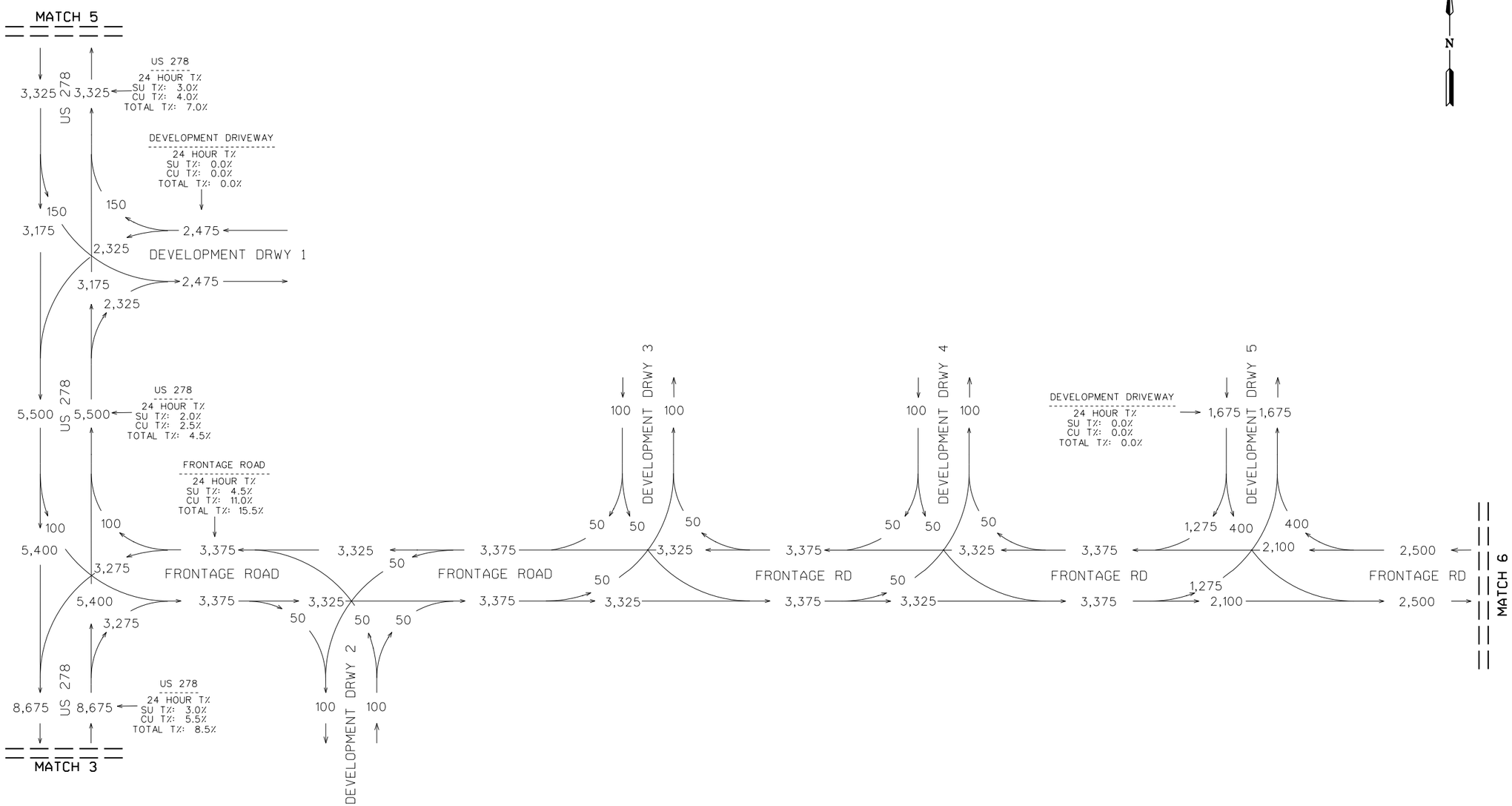
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0002
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No.
0017219 & 0018363

AADT VOLUMES
PRJ 1 OPEN YEAR 2024
BUILD
AADT = XXX

N



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES		

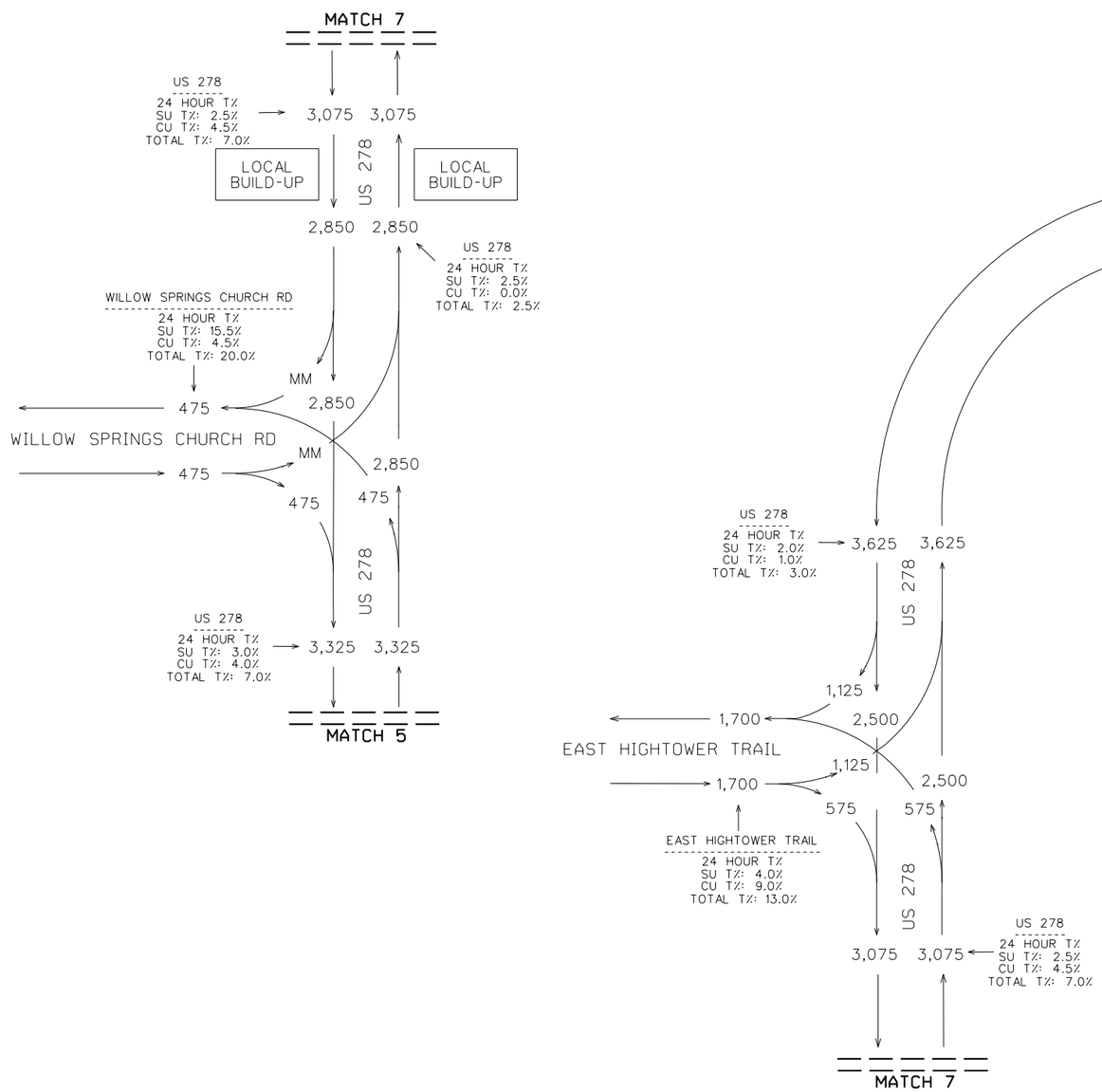
TRAFFIC DIAGRAM
US 278 / SR 12 AND FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0003
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No.
0017219 & 0018363

AADT VOLUMES
PRJ 1 OPEN YEAR 2024
BUILD
AADT = XXX

N



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES		

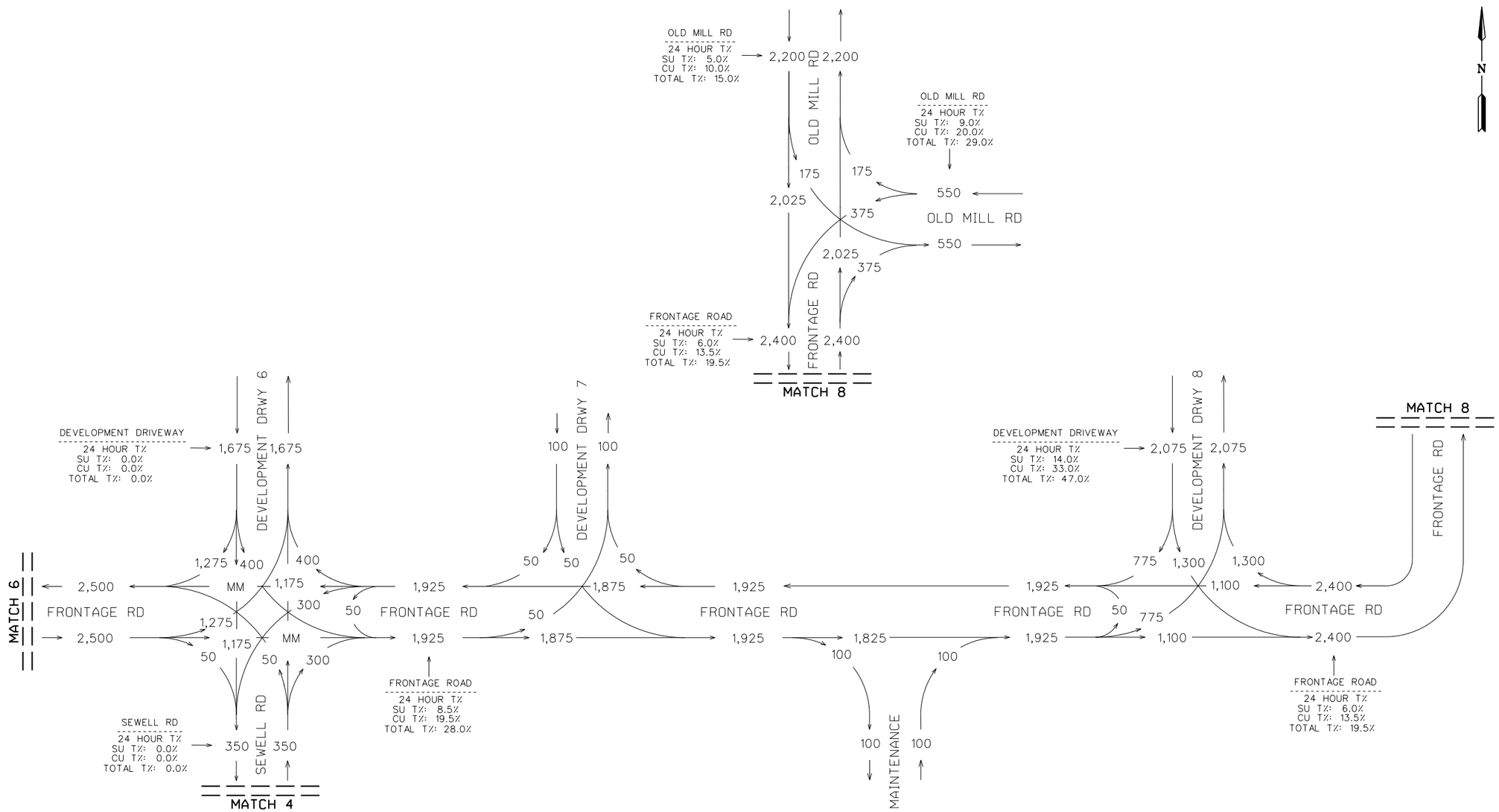
TRAFFIC DIAGRAM
US 278 / SR 12

NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0004
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No. 0017219 & 0018363

AADT VOLUMES
PRJ 1 OPEN YEAR 2024
BUILD
AADT = XXX



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES		

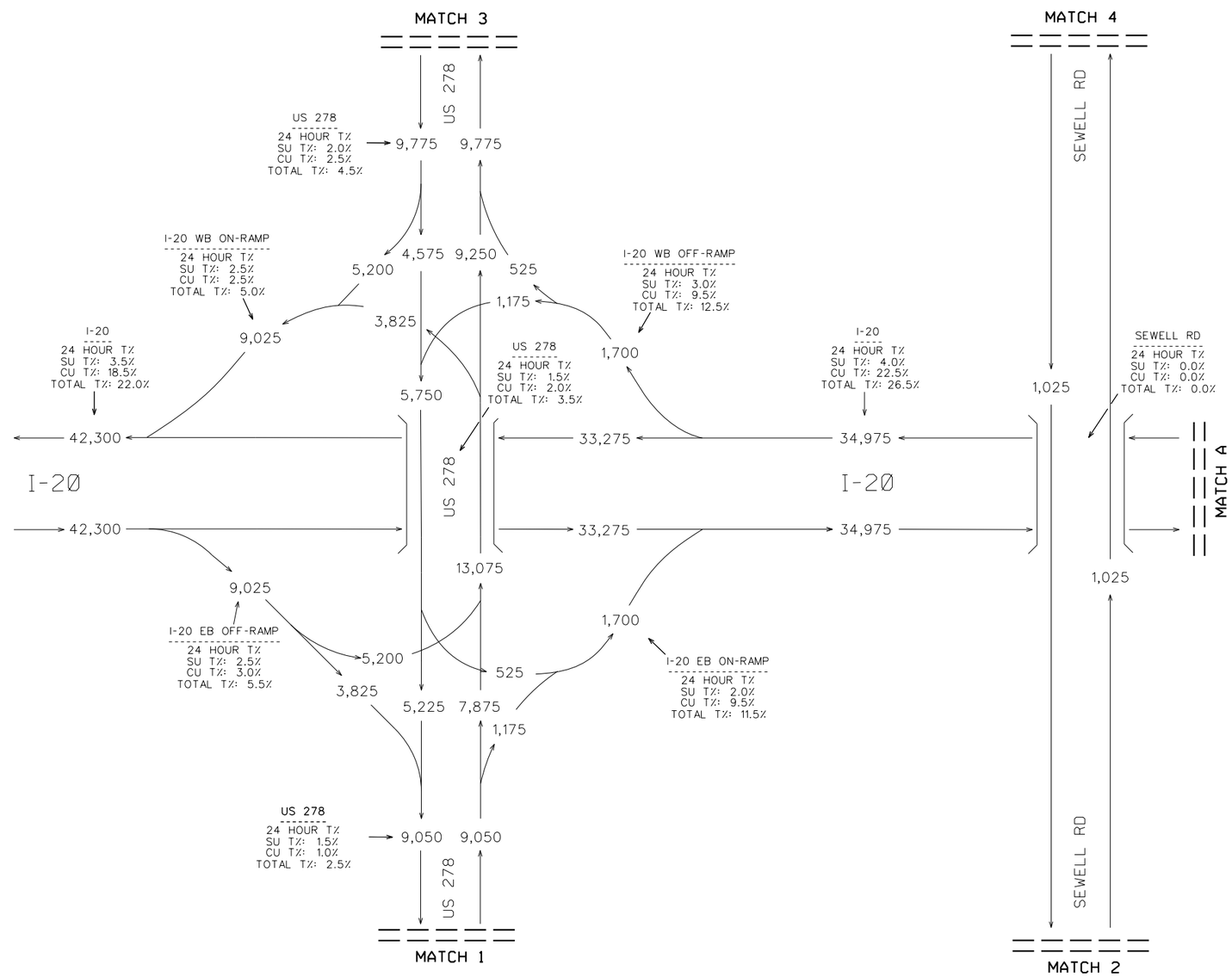
TRAFFIC DIAGRAM
FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0005
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No.
0017219 & 0018363

AADT VOLUMES
PRJ 1 DESIGN YEAR
2044 BUILD
AADT = XXX

N



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES		

TRAFFIC DIAGRAM
US 278 / SR 12

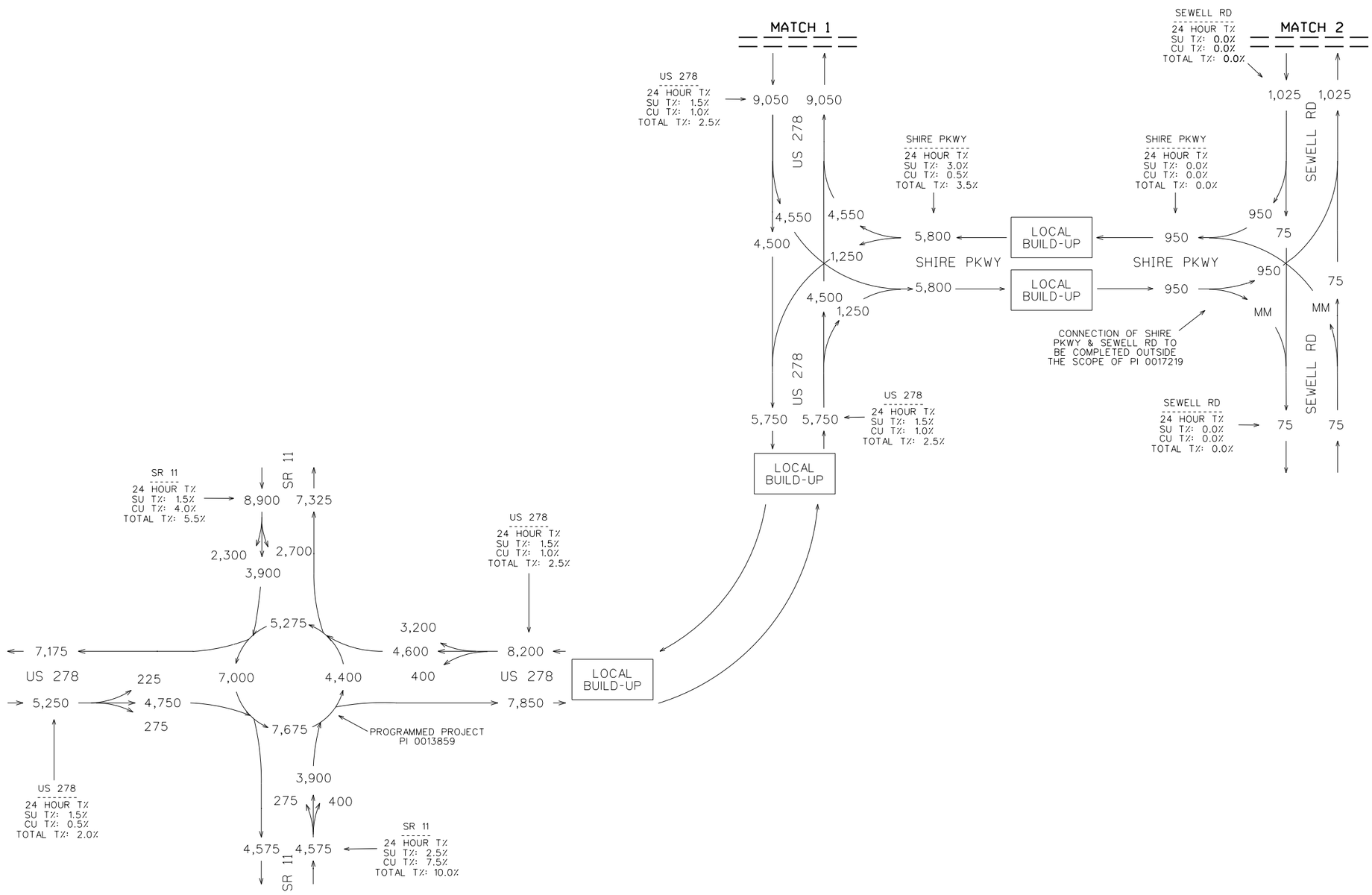
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0006
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No.
0017219 & 0018363

AADT VOLUMES
PRJ 1 DESIGN YEAR
2044 BUILD
AADT = XXX

N



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES

TRAFFIC DIAGRAM
US 278 / SR 12

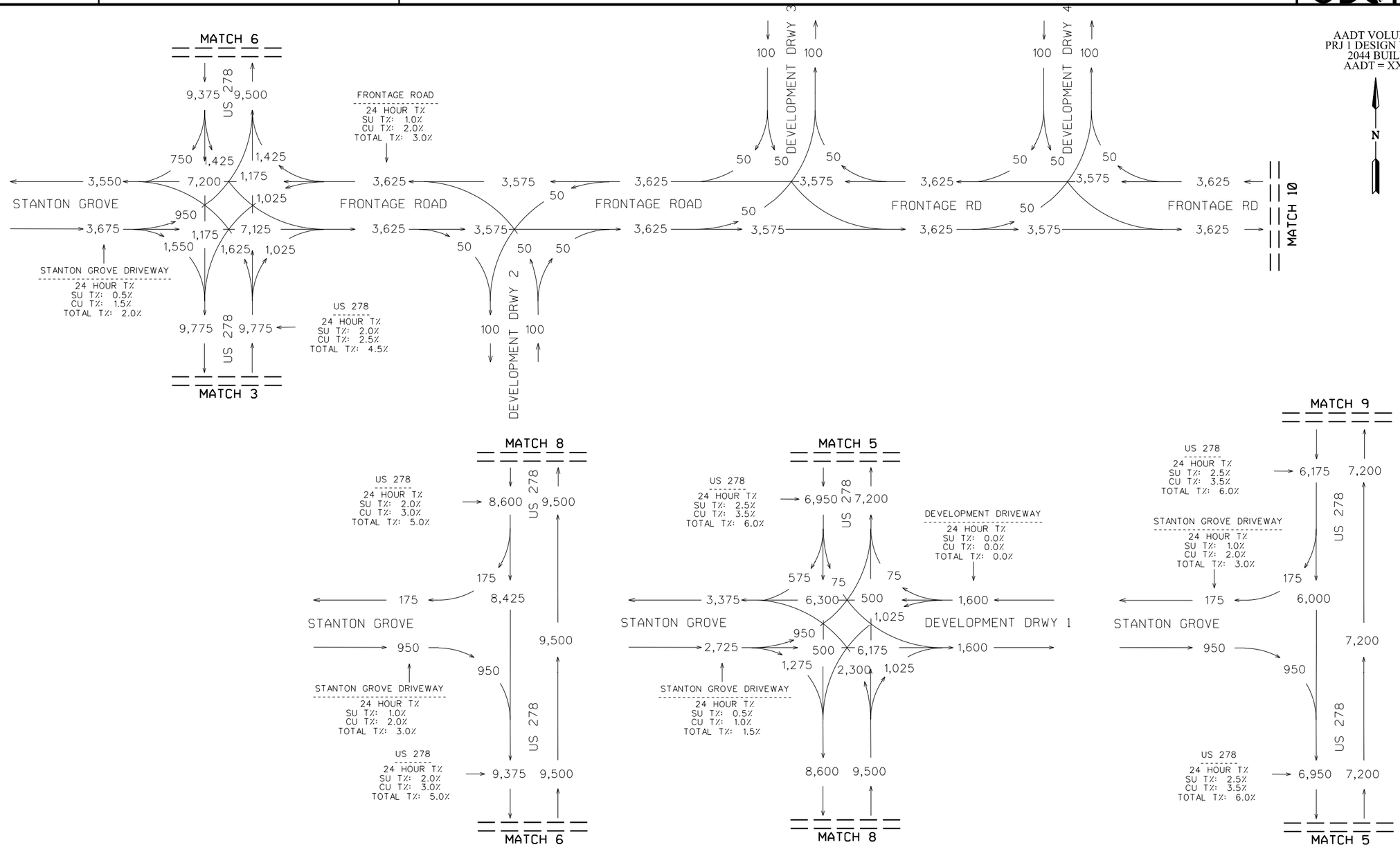
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0007
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No. 0017219 & 0018363

AADT VOLUMES
PRJ 1 DESIGN YEAR
2044 BUILD
AADT = XXX

N



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

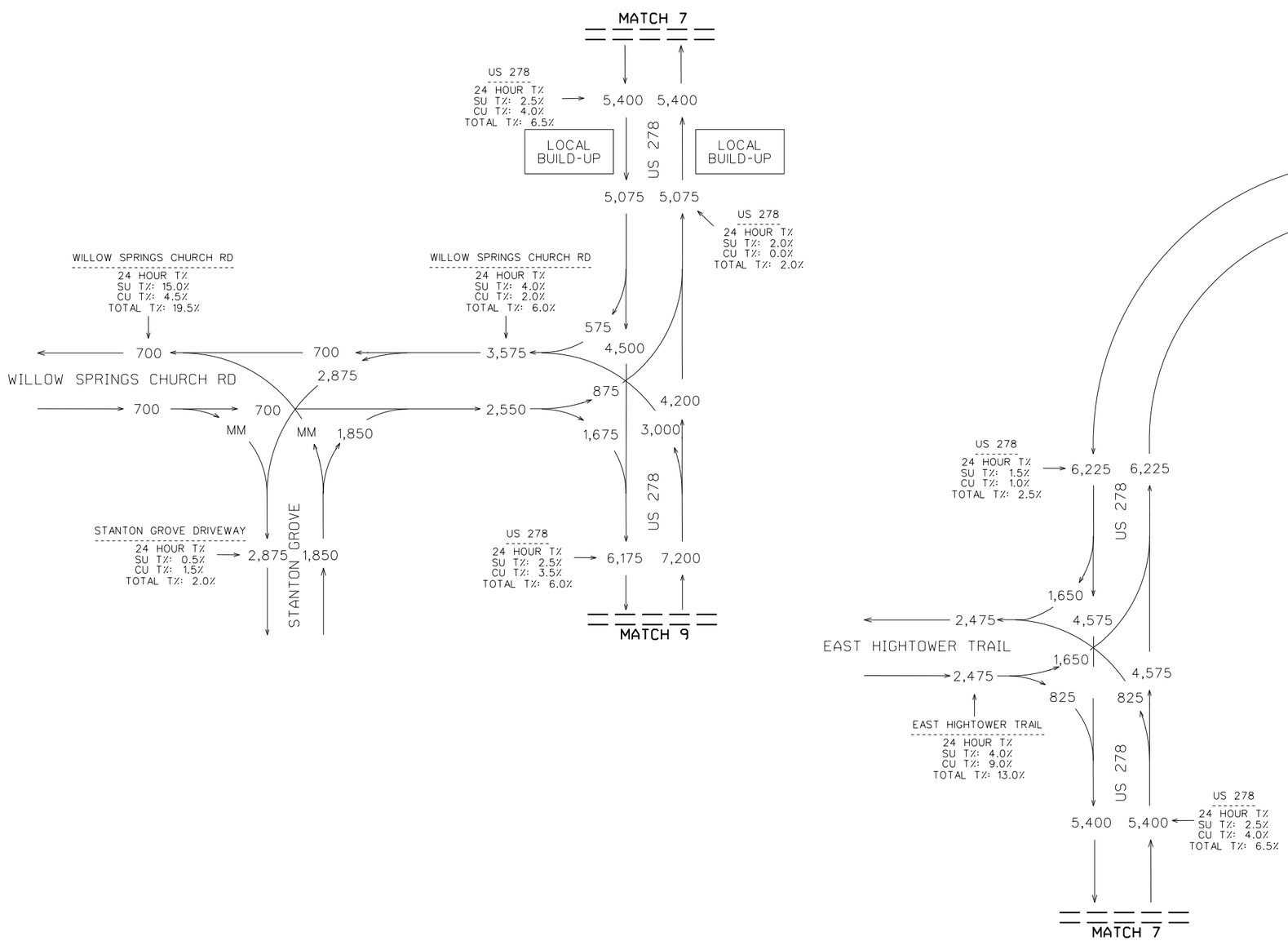
REVISION DATES		

TRAFFIC DIAGRAM
US 278 / SR 12 AND FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0008
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No.
0017219 & 0018363

AADT VOLUMES
PRJ 1 DESIGN YEAR
2044 BUILD
AADT = XXX



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES		

TRAFFIC DIAGRAM
US 278 / SR 12

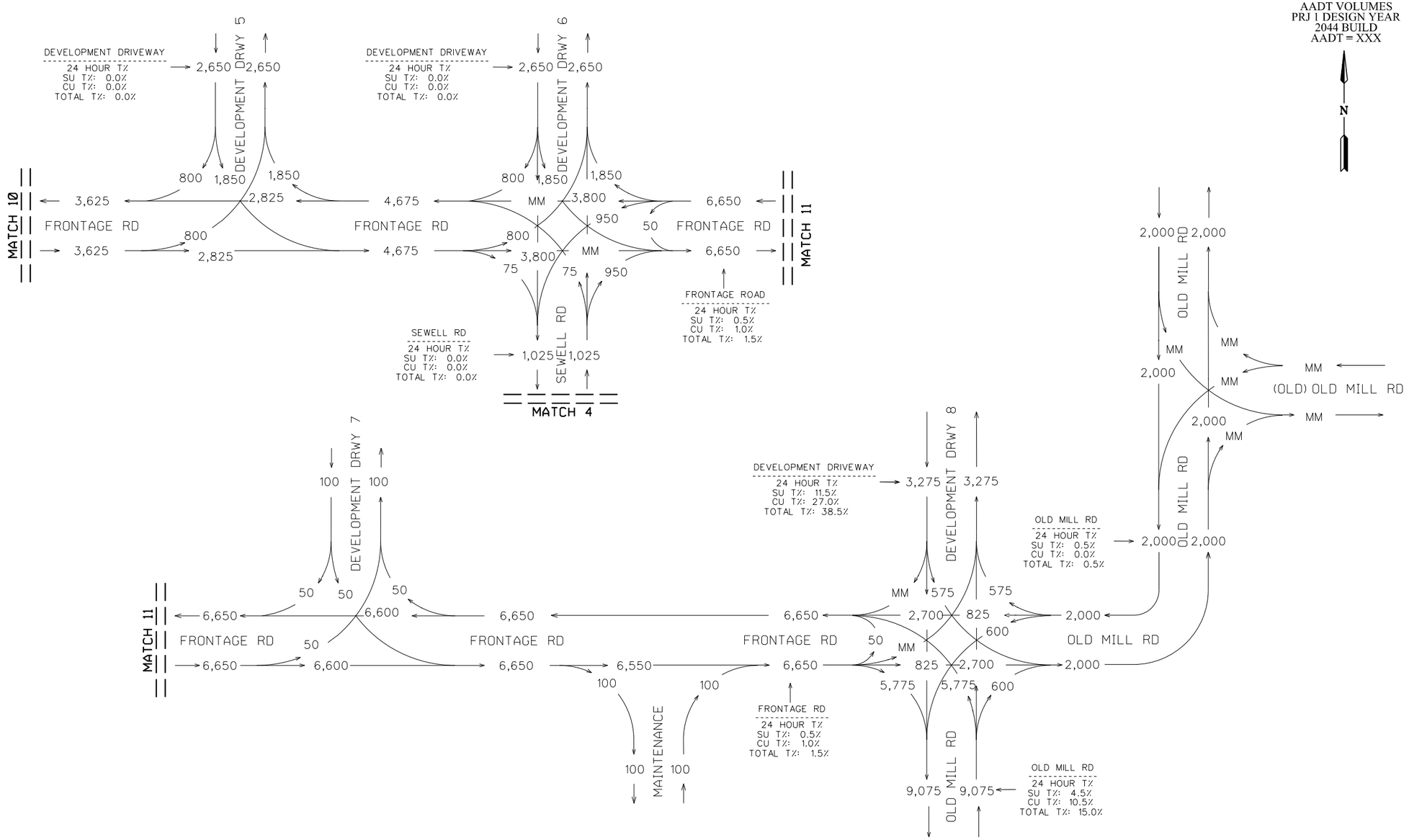
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0009
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No.
0017219 & 0018363

AADT VOLUMES
PRJ 1 DESIGN YEAR
2044 BUILD
AADT = XXX

N



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

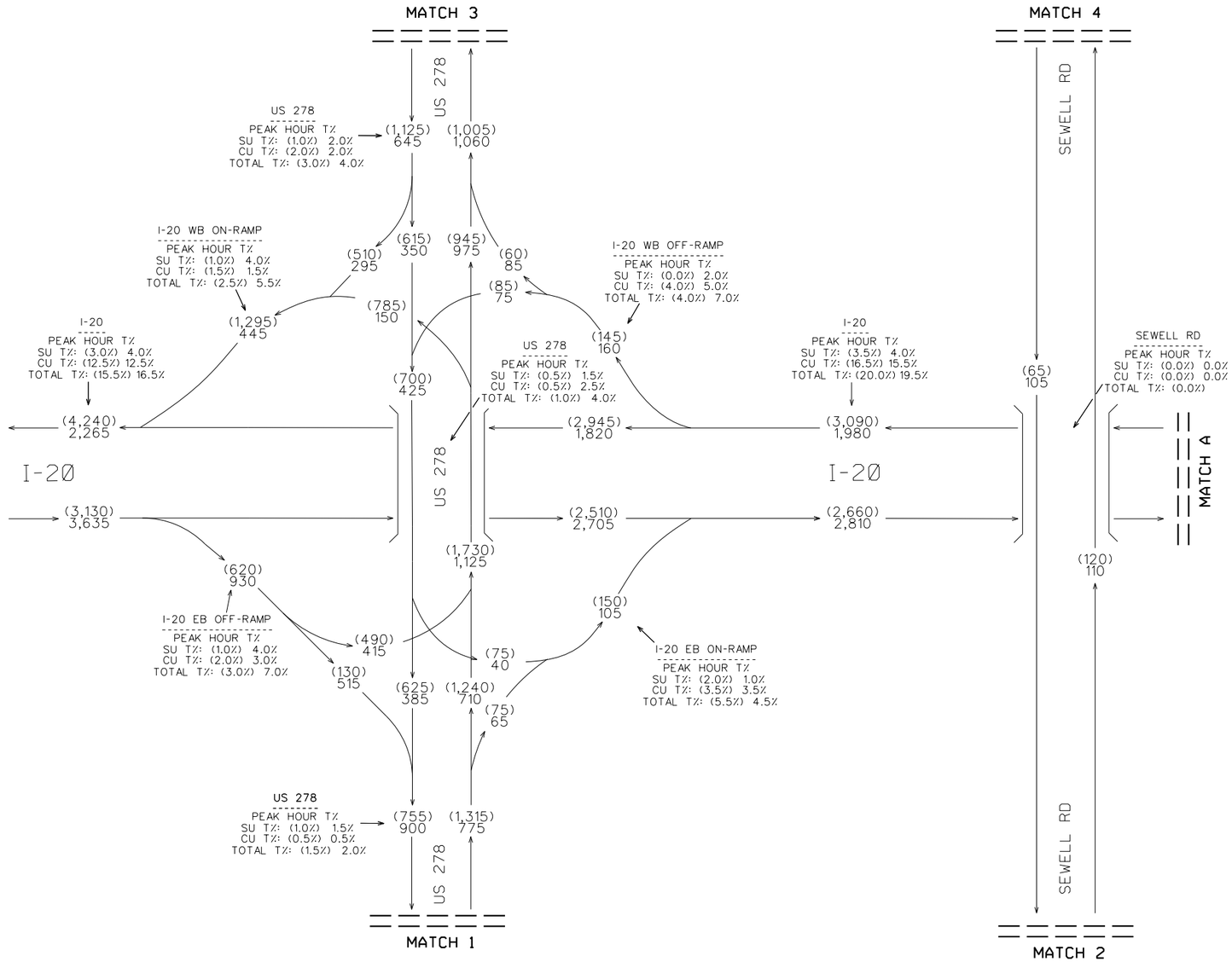
REVISION DATES		

TRAFFIC DIAGRAM
FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0010
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No.
0017219 & 0018363

DHV VOLUMES
PRJ 1 DESIGN YEAR
2044 BUILD
PM PEAK = (XXX)
AM PEAK = XXX



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES		

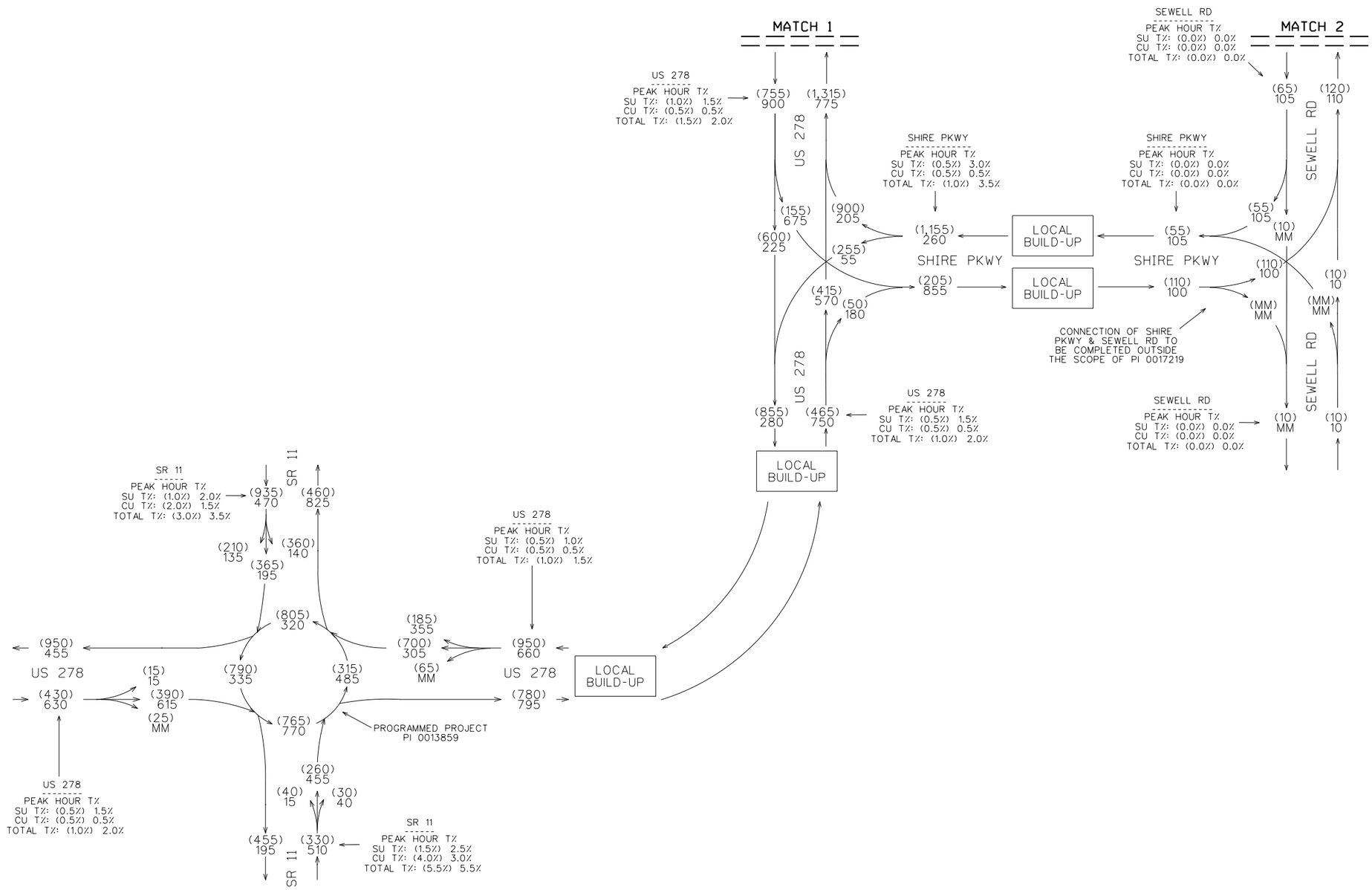
TRAFFIC DIAGRAM
US 278 / SR 12

NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0011
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No. 0017219 & 0018363

DHV VOLUMES
PRJ 1 DESIGN YEAR
2044 BUILD
PM PEAK = (XXX)
AM PEAK = XXX



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES

TRAFFIC DIAGRAM
US 278 / SR 12

NEWTON/WALTON/MORGAN COUNTY

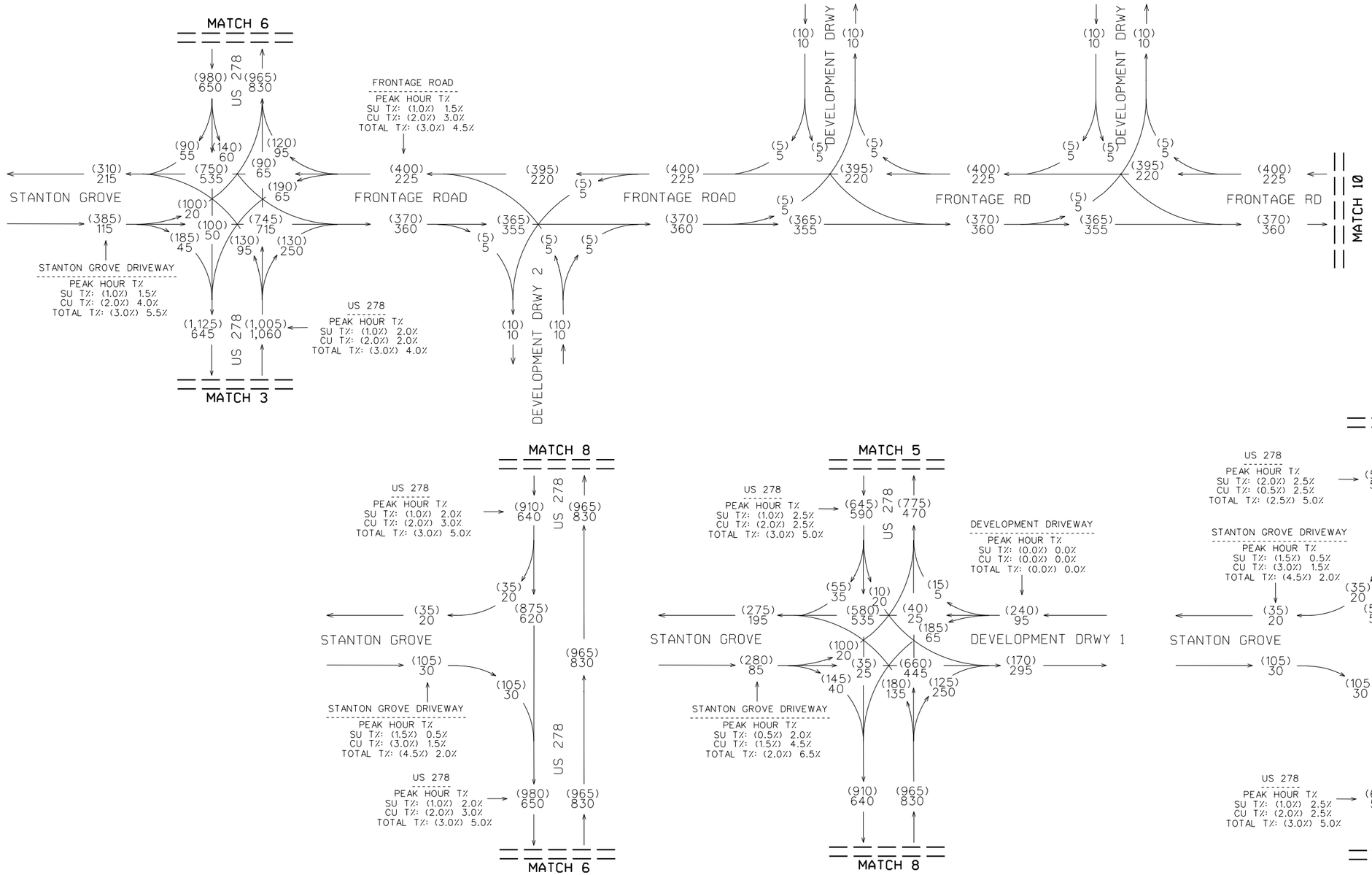
CHECKED:		DATE:	
BACKCHECKED:		DATE:	
CORRECTED:		DATE:	
VERIFIED:		DATE:	

DRAWING No.
10-0012

P.I. No. 0017219 & 0018363

DHV VOLUMES
PRJ 1 DESIGN YEAR
2044 BUILD
PM PEAK = (XXX)
AM PEAK = XXX

N



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

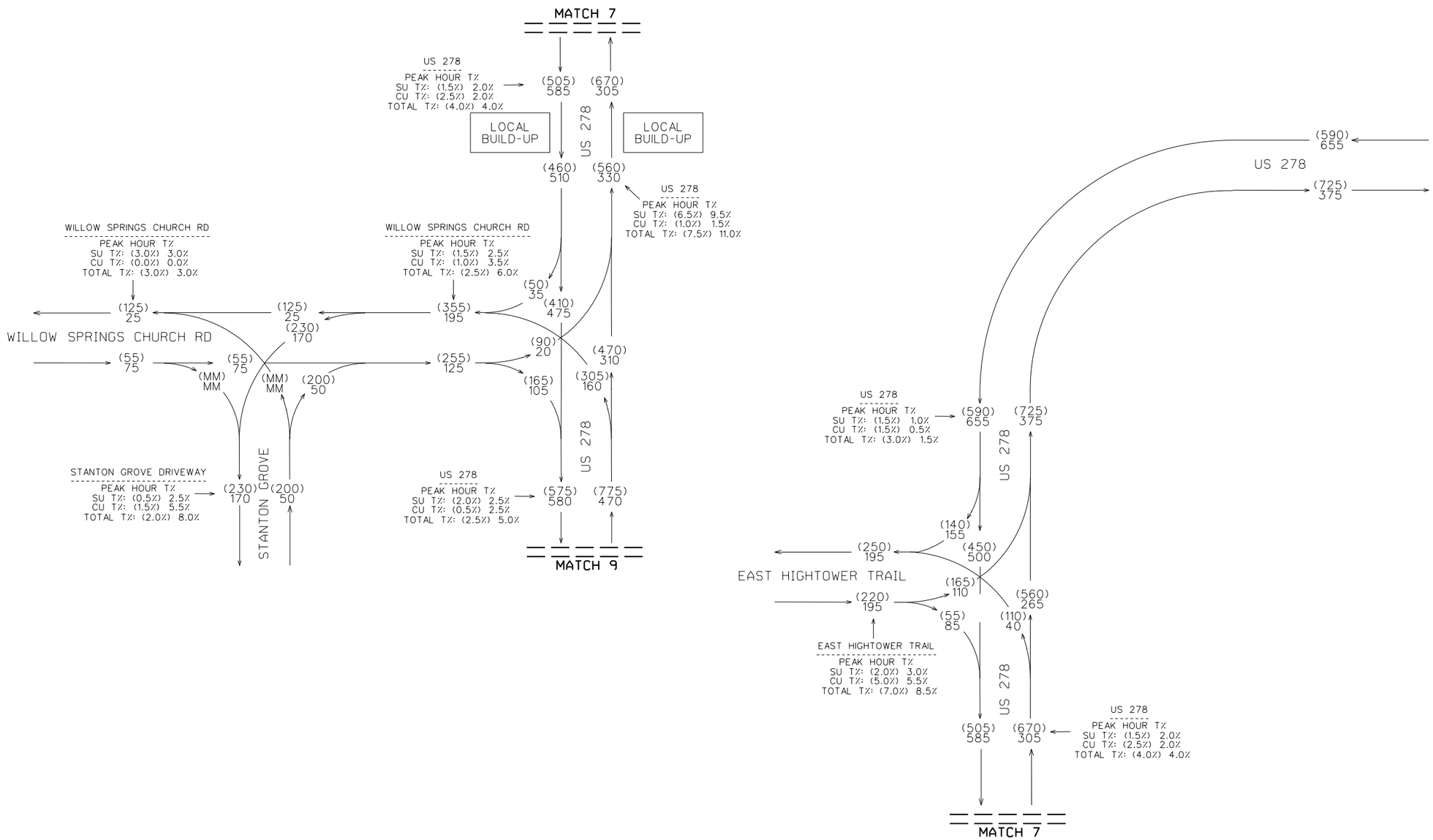
REVISION DATES		

TRAFFIC DIAGRAM
US 278 / SR 12 AND FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0013
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No. 0017219 & 0018363

DHV VOLUMES
PRJ 1 DESIGN YEAR
2044 BUILD
PM PEAK = (XXX)
AM PEAK = XXX



GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES		

TRAFFIC DIAGRAM
US 278 / SR 12

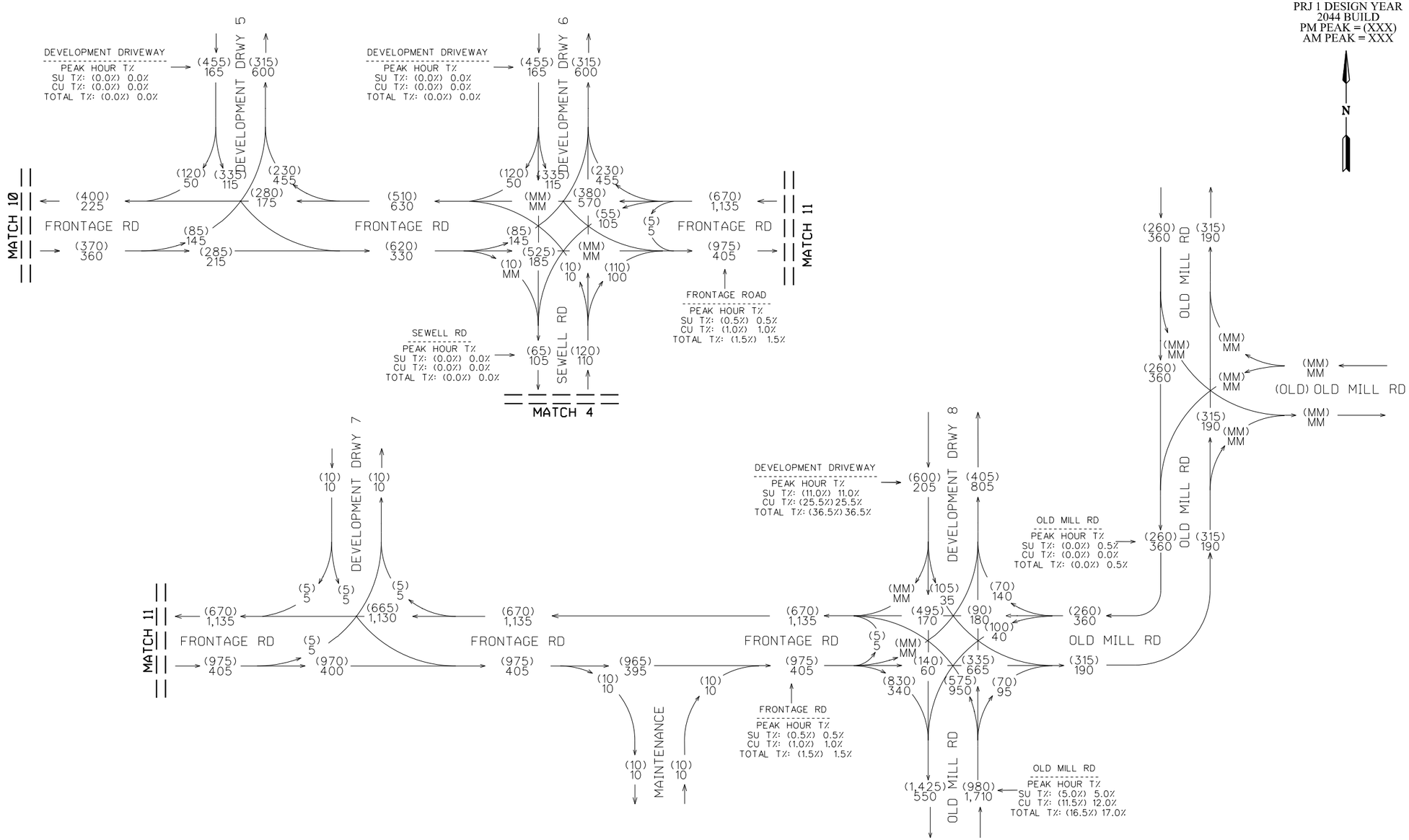
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0014
CORRECTED:		DATE:		
VERIFIED:		DATE:		

P.I. No. 0017219 & 0018363

DHV VOLUMES
PRJ 1 DESIGN YEAR
2044 BUILD
PM PEAK = (XXX)
AM PEAK = XXX

N



GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

REVISION DATES		

TRAFFIC DIAGRAM
FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:		DRAWING No.
BACKCHECKED:		DATE:		10-0015
CORRECTED:		DATE:		
VERIFIED:		DATE:		

Attachment 3 – Capacity Analysis Summary

1.1 Capacity Analysis Summary

1.1.1 Existing Conditions Operational Analysis

Existing operational performance in the AM and PM peak hours was evaluated for both signalized and unsignalized intersections using delay and LOS results from Synchro 11 software. Results of this delay for existing year is presented in the following section.

Operational Analysis for intersections in the study area was performed using the Highway Capacity Manual 6th Edition methodologies, as part of Synchro 11's software capabilities. The HCM 6th edition measures the control delay at a signalized intersection as the sum of deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For all-way stop intersections, control delay is a weighted average based on each approach; two-way stop intersections break out the control delay to each minor street approach. The intersection's control delay can then be assigned a single Level of Service (LOS). The below **Table 1** shows LOS categories for both signalized and unsignalized intersections based on the delay results.

Table 1: Level of Service (LOS) and Delay Categories for Unsignalized and Signalized Intersections

Level of Service	Average Control Delay (seconds/vehicle)	
	Unsignalized Intersections	Signalized Intersections
A	≤ 10.0	≤ 10.0
B	> 10.0 and ≤ 15.0	> 10.0 and ≤ 20.0
C	> 15.0 and ≤ 25.0	> 20.0 and ≤ 35.0
D	> 25.0 and ≤ 35.0	> 35.0 and ≤ 55.0
E	> 35.0 and ≤ 50.0	> 55.0 and ≤ 80.0
F	> 50.0	> 80.0

At signalized intersections, Synchro's operational analysis calculates delay as a function of intersection geometry, AM and PM peak hour volumes, truck percentages, and signal timings; signal cycle lengths, offsets, and splits were optimized at a 10 second increment, and intersections were placed in zones where applicable. For minor stop-controlled intersections, the maximum side street approach delay is used as opposed to Synchro's weighted average delay, since the average delay will unfairly weight major street approaches that experience no delay.

The below **Table 2** shows intersection delay and LOS results for the Existing Year 2020. Detailed results of the existing year (2020) analysis are provided in **Appendix 1**. As seen in the results, the I-20 interchange at US 278 performs poorly in the PM peak hour, with LOS E at the eastbound ramps and LOS F at the westbound ramps; this can be attributed to vehicles on the stop-controlled off-ramp having to find gaps in the high volumes of the thru movements; this is especially evident for left-turning vehicles. In general, the other intersections perform well as minor stop controlled (LOS A or B), however it is the expectation that traffic patterns will be drastically increased and impacted by the addition of the Development facility. Only four of the ten intersections in the study area have results for the existing year, since the remainder of the intersections are new intersections which are to be constructed by open year.

Table 2: Existing Year (2020) – Intersection Delay and LOS

Roadway	Intersection	Existing Year (2020)		
		Control Type	Control Delay (sec/veh) / LOS	
			AM Peak	PM Peak
US 278	Shire Pkwy	Unsignalized – Minor Stop	11.1 B	14.4 B
	I-20 EB Ramps	Unsignalized – Minor Stop	12.2 B	38.6 E
	I-20 WB Ramps	Unsignalized – Minor Stop	11.9 B	175.1 F
	Willow Springs Church Rd	Unsignalized – Minor Stop	9.8 A	9.7 A

1.1.2 Future Conditions Operational Analysis

Synchro 11 software was used to perform intersection-level traffic delay analysis for both the Build and No-Build scenarios in Open (2024) and Design (2044) years. With these results, the benefits resulting from the project can be seen in comparing how delay improves/changes from No-Build to Build scenarios. In general, HCM 6th results are used to analyze delay/LOS in the study area; at locations with U-turn movements or shared thru/left movements, HCM 2000 edition results are used since HCM 6th edition methodology cannot accurately capture these movement types.

In the Build alternative, US 278 will be widened from a two-lane section to a four-lane section from Shire Pkwy to Development Driveway 1. Additionally, the Frontage Road will be constructed, running parallel to I-20 from US 278 just north of the I-20 interchange in the west to Old Mill Rd just north of the proposed I-20 interchange in the east. This Frontage Road will intersect with Sewell Rd and feature 7 proposed driveways into the Development facility and one maintenance driveway, with an additional driveway on US 278 north of the Frontage Road intersection. The No-Build alternative does not include the US 278 widening or the Frontage Road.

There are some additional layout differences when comparing open year 2024 to design year 2044. As part of Project 2, a new I-20 interchange at Old Mill Road will be constructed by the year 2025; this will realign the portion of Old Mill Rd south of the Frontage Road. Thus, this interchange is included in the 2044 models but not the 2024 models. Additionally, a number of new driveways will be constructed west of US 278 as part of the Stanton Grove development by 2044; this will cause the T-intersections of US 278 @ Frontage Road and US 278 @ Development Driveway 1 to become four-way intersections with the new Stanton Grove Driveways by the year 2044. All of the above changes will have significant impacts on the traffic distribution in the area when comparing open and design year.

Table 3 shows intersection delay and LOS results for the build and no-build scenarios in the Open Year (2024). Detailed results for Open Year analysis are provided in **Appendix 2**. As shown in the table, the US 278 widening/Frontage Road addition project generally improves the delay at each intersection, or at least keeps the LOS at the same level; in the best case, the LOS changes from a level F (AM) and F (PM) to a level C (AM) and B (PM) at Shire Pkwy. It is worth noting that the I-20 at Old Mill interchange will not be constructed until 2025; thus a significant portion of the large through volume (headed to the Development) seen on US 278 will be rerouted to the new Old Mill interchange, reducing the delay at the intersection.

Therefore, the high delay around the US 278 interchange will be a temporary condition for the 1 year between the completion of the interchange.

Table 3: Open Year (2024) Scenarios – Intersection Delay and LOS

Roadway	Intersection	Open Year (2024) - BUILD			Open Year (2024) – NO BUILD		
		Control Type	Control Delay (sec/veh) / LOS		Control Type	Control Delay (sec/veh) / LOS	
			AM Peak	PM Peak		AM Peak	PM Peak
US 278	Shire Pkwy	Signalized	32.2 C	14.8 B	Unsignalized - Minor Stop	Exceeds^ F	Exceeds^ F
	I-20 EB Ramps	Signalized	46.4 D	46.1 D	Unsignalized - Minor Stop	Exceeds^ F	Exceeds^ F
	I-20 WB Ramps	Signalized*	108.1 F	82.0 F	Unsignalized - Minor Stop	Exceeds^ F	Exceeds^ F
	Willow Springs Church Rd	Unsignalized - Minor Stop	10.7 B	10.3 B	Unsignalized - Minor Stop	10.7 B	10.0 B
	Frontage Rd	Signalized	6.2 A	29.7 D	Signalized	2.5 A	22.6 C
	Development Drwy 1	Signalized	9.4 A	16.0 B	Signalized	10.4 B	15.5 B
Frontage Rd	Sewell Rd/ Development Drwy 6	Unsignalized - Minor Stop	18.9 C	14.1 B			
	Development Drwy 5	Unsignalized - Minor Stop	17.5 C	17.8 C			
Old Mill Rd	Development Drwy 8/Frontage Rd*	Signalized	8.8 B	10.5 B	Signalized	11.9 B	14.2 B
	Old Mill Rd	Unsignalized - Minor Stop	18.6 C	17.1 C	Unsignalized - Minor Stop	94.1 F	48.1 E

* HCM 2000 used at this location due to u-turn movements or turning movements with shared & exclusive lanes

^ Delay exceeds 300 s/veh, based on the threshold used in Synchro

Table 4 shows intersection delay and LOS results for the build and no-build scenarios in the Design Year (2044). Detailed results of the Design Year analysis are provided in **Appendix 3**. As shown in the table, the US 278 widening/Frontage Road addition project generally improves the delay at each intersection, or at least keeps the LOS at the same level; in the best case, the LOS changes from a level F (AM) and F (PM) to a level D (AM) and C (PM) at Shire Pkwy. Looking at the Build scenario, each I-20 ramp intersection experiences at least one peak hour with an LOS E (I-20 EB Ramps in the AM, I-20 WB Ramps in the PM); in the future, a possible bridge widening should be considered at this interchange in order to accommodate for additional capacity – this would be useful especially as development in the area grows. With an all-way stop control type, Willow Springs Church Rd at US 278 has an LOS F in both the Build and No-Build scenarios, with only slight improvements to delay in the Build scenario; while not warranted at this location, intersection signalization (or another form of improvement) should be considered at Willow Springs Church Rd in future stages of the project.

Table 4: Design Year (2044) – Intersection Delay and LOS

Roadway	Intersection	Design Year (2044) - BUILD			Design Year (2044) – NO BUILD		
		Control Type	Control Delay (sec/veh) / LOS		Control Type	Control Delay (sec/veh) / LOS	
			AM Peak	PM Peak		AM Peak	PM Peak
US 278	Shire Pkwy	Signalized	48.3 D	27.7 C	Unsignalized - Minor Stop	Exceeds^ F	Exceeds^ F
	I-20 EB Ramps	Signalized	56.6 E	18.5 B	Unsignalized - Minor Stop	Exceeds^ F	Exceeds^ F
	I-20 WB Ramps*	Signalized	23.4 C	67.2 E	Unsignalized - Minor Stop	Exceeds^ F	Exceeds^ F
	Willow Springs Church Rd	Unsignalized - All Way Stop	58.7 F	135.1 F	Unsignalized - All Way Stop	Exceeds^ F	Exceeds^ F
	Frontage Rd	Signalized	11.4 B	20.9 C	Signalized	19.3 B	62.4 E
	Development Drwy 1	Signalized	19.3 B	22.7 C	Signalized	18.3 B	32.9 C
Frontage Rd	Sewell Rd/ Development Drwy 6*	Signalized	11.9 B	13.3 B			
	Development Drwy 5	Signalized	7.2 A	9.5 A			
Old Mill Rd	Development Drwy 8/Frontage Rd*	Signalized	16.3 B	21.9 C	Signalized	29.2 C	27.9 C
	Old Mill Rd	Unsignalized - Minor Stop	0.0 A	0.0 A	Unsignalized - Minor Stop	0.0 A	0.0 A

* HCM 2000 used at this location due to u-turn movements or turning movements with shared & exclusive lanes

^ Delay exceeds 300s/veh, based on the threshold used in Synchro

Appendix 1

2020 Existing - Synchro Analysis

Intersection	
Int Delay, s/veh	6.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	5	30	75	80	295	55
Future Vol, veh/h	5	30	75	80	295	55
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	None
Storage Length	0	0	-	185	300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	44	65	68	61	86
Heavy Vehicles, %	5	5	6	6	5	5
Mvmt Flow	7	68	115	118	484	64

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1147	115	0	-	115	0
Stage 1	115	-	-	-	-	-
Stage 2	1032	-	-	-	-	-
Critical Hdwy	6.45	6.25	-	-	4.15	-
Critical Hdwy Stg 1	5.45	-	-	-	-	-
Critical Hdwy Stg 2	5.45	-	-	-	-	-
Follow-up Hdwy	3.545	3.345	-	-	2.245	-
Pot Cap-1 Maneuver	217	929	-	0	1455	-
Stage 1	902	-	-	0	-	-
Stage 2	339	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	145	929	-	-	1455	-
Mov Cap-2 Maneuver	145	-	-	-	-	-
Stage 1	902	-	-	-	-	-
Stage 2	226	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.1	0	7.7
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	145	929	1455	-
HCM Lane V/C Ratio	-	0.046	0.073	0.332	-
HCM Control Delay (s)	-	31	9.2	8.7	-
HCM Lane LOS	-	D	A	A	-
HCM 95th %tile Q(veh)	-	0.1	0.2	1.5	-

Intersection	
Int Delay, s/veh	7.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	95	0	230	0	0	0	0	80	25	10	120	0
Future Vol, veh/h	95	0	230	0	0	0	0	80	25	10	120	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	-	-	-	-	-	115	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	25	60	25	25	25	25	61	78	75	80	25
Heavy Vehicles, %	7	7	7	8	8	8	5	5	5	7	7	7
Mvmt Flow	161	0	383	0	0	0	0	131	32	13	150	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	323	-	150	-	0	0	163	0	0
Stage 1	176	-	-	-	-	-	-	-	-
Stage 2	147	-	-	-	-	-	-	-	-
Critical Hdwy	6.47	-	6.27	-	-	-	4.17	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	-	3.363	-	-	-	2.263	-	-
Pot Cap-1 Maneuver	661	0	883	0	-	-	1386	-	0
Stage 1	843	0	-	0	-	-	-	-	0
Stage 2	868	0	-	0	-	-	-	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	654	0	883	-	-	-	1386	-	-
Mov Cap-2 Maneuver	654	0	-	-	-	-	-	-	-
Stage 1	843	0	-	-	-	-	-	-	-
Stage 2	859	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	12.2	0	0.6
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	EBLn2	SBL	SBT
Capacity (veh/h)	-	-	654	883	1386	-
HCM Lane V/C Ratio	-	-	0.246	0.434	0.01	-
HCM Control Delay (s)	-	-	12.3	12.2	7.6	0
HCM Lane LOS	-	-	B	B	A	A
HCM 95th %tile Q(veh)	-	-	1	2.2	0	-

Intersection	
Int Delay, s/veh	1.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	30	0	10	30	145	0	0	100	130
Future Vol, veh/h	0	0	0	30	0	10	30	145	0	0	100	130
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	0	-	0	-	-	-	-	-	125
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	25	25	25	69	75	56	73	81	25	25	77	79
Heavy Vehicles, %	8	8	8	18	18	18	7	7	7	6	6	6
Mvmt Flow	0	0	0	43	0	18	41	179	0	0	130	165

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	474	-	179	295	0	-	-	-	0
Stage 1	261	-	-	-	-	-	-	-	-
Stage 2	213	-	-	-	-	-	-	-	-
Critical Hdwy	6.58	-	6.38	4.17	-	-	-	-	-
Critical Hdwy Stg 1	5.58	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.58	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.662	-	3.462	2.263	-	-	-	-	-
Pot Cap-1 Maneuver	521	0	824	1238	-	0	0	-	-
Stage 1	747	0	-	-	-	0	0	-	-
Stage 2	786	0	-	-	-	0	0	-	-
Platoon blocked, %					-			-	-
Mov Cap-1 Maneuver	502	0	824	1238	-	-	-	-	-
Mov Cap-2 Maneuver	502	0	-	-	-	-	-	-	-
Stage 1	719	0	-	-	-	-	-	-	-
Stage 2	786	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	11.9	1.5	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	WBLn1	WBLn2	SBT	SBR
Capacity (veh/h)	1238	-	502	824	-	-
HCM Lane V/C Ratio	0.033	-	0.087	0.022	-	-
HCM Control Delay (s)	8	0	12.9	9.5	-	-
HCM Lane LOS	A	A	B	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	0.1	-	-

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	50	15	140	180	0
Future Vol, veh/h	0	50	15	140	180	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	64	54	78	88	25
Heavy Vehicles, %	3	3	6	6	18	18
Mvmt Flow	0	78	28	179	205	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	440	205	205	0	-	0
Stage 1	205	-	-	-	-	-
Stage 2	235	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.16	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.254	-	-	-
Pot Cap-1 Maneuver	573	833	1343	-	-	-
Stage 1	827	-	-	-	-	-
Stage 2	802	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	560	833	1343	-	-	-
Mov Cap-2 Maneuver	560	-	-	-	-	-
Stage 1	808	-	-	-	-	-
Stage 2	802	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.8	1	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1343	-	833	-	-
HCM Lane V/C Ratio	0.021	-	0.094	-	-
HCM Control Delay (s)	7.7	0	9.8	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.1	-	0.3	-	-

Intersection	
Int Delay, s/veh	10.8

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	125	430	85	15	40	115
Future Vol, veh/h	125	430	85	15	40	115
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	None
Storage Length	0	0	-	185	300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	73	70	92	85	97	73
Heavy Vehicles, %	1	1	2	2	2	2
Mvmt Flow	171	614	92	18	41	158

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	332	92	0	-	92	0
Stage 1	92	-	-	-	-	-
Stage 2	240	-	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.12	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.218	-
Pot Cap-1 Maneuver	665	968	-	0	1503	-
Stage 1	934	-	-	0	-	-
Stage 2	802	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	647	968	-	-	1503	-
Mov Cap-2 Maneuver	647	-	-	-	-	-
Stage 1	934	-	-	-	-	-
Stage 2	780	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	14.4	0	1.5
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	647	968	1503	-
HCM Lane V/C Ratio	-	0.265	0.635	0.027	-
HCM Control Delay (s)	-	12.6	14.9	7.5	-
HCM Lane LOS	-	B	B	A	-
HCM 95th %tile Q(veh)	-	1.1	4.7	0.1	-

Intersection	
Int Delay, s/veh	9.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	190	0	45	0	0	0	0	485	30	15	110	0
Future Vol, veh/h	190	0	45	0	0	0	0	485	30	15	110	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	-	-	-	-	-	115	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	81	25	81	25	25	25	25	72	79	67	79	25
Heavy Vehicles, %	3	3	3	12	12	12	2	2	2	2	2	2
Mvmt Flow	235	0	56	0	0	0	0	674	38	22	139	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	876	-	139	-	0	0	712	0	0
Stage 1	183	-	-	-	-	-	-	-	-
Stage 2	693	-	-	-	-	-	-	-	-
Critical Hdwy	6.43	-	6.23	-	-	-	4.12	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	-	3.327	-	-	-	2.218	-	-
Pot Cap-1 Maneuver	318	0	907	0	-	-	888	-	0
Stage 1	846	0	-	0	-	-	-	-	0
Stage 2	494	0	-	0	-	-	-	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	309	0	907	-	-	-	888	-	-
Mov Cap-2 Maneuver	309	0	-	-	-	-	-	-	-
Stage 1	846	0	-	-	-	-	-	-	-
Stage 2	481	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	38.6	0	1.3
HCM LOS	E		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	EBLn2	SBL	SBT
Capacity (veh/h)	-	-	309	907	888	-
HCM Lane V/C Ratio	-	-	0.759	0.061	0.025	-
HCM Control Delay (s)	-	-	45.6	9.2	9.2	0
HCM Lane LOS	-	-	E	A	A	A
HCM 95th %tile Q(veh)	-	-	5.8	0.2	0.1	-

Intersection	
Int Delay, s/veh	13.4

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	45	0	10	395	280	0	0	80	110
Future Vol, veh/h	0	0	0	45	0	10	395	280	0	0	80	110
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	Yield	-	-	None	-	-	None
Storage Length	-	-	-	0	-	0	-	-	-	-	-	125
Veh in Median Storage, #	-	1	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	25	25	25	91	25	75	73	81	25	25	73	71
Heavy Vehicles, %	1	1	1	7	7	7	2	2	2	3	3	3
Mvmt Flow	0	0	0	49	0	13	541	346	0	0	110	155

Major/Minor	Minor1			Major1			Major2			
Conflicting Flow All	1616	-	346	265	0	-	-	-	0
Stage 1	1428	-	-	-	-	-	-	-	-
Stage 2	188	-	-	-	-	-	-	-	-
Critical Hdwy	6.47	-	6.27	4.12	-	-	-	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	-	3.363	2.218	-	-	-	-	-
Pot Cap-1 Maneuver	111	0	686	1299	-	0	0	-	-
Stage 1	216	0	-	-	-	0	0	-	-
Stage 2	832	0	-	-	-	0	0	-	-
Platoon blocked, %					-			-	-
Mov Cap-1 Maneuver	54	0	686	1299	-	-	-	-	-
Mov Cap-2 Maneuver	54	0	-	-	-	-	-	-	-
Stage 1	105	0	-	-	-	-	-	-	-
Stage 2	832	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	175.1	5.9	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	WBLn1	WBLn2	SBT	SBR
Capacity (veh/h)	1299	-	54	686	-	-
HCM Lane V/C Ratio	0.417	-	0.916	0.019	-	-
HCM Control Delay (s)	9.7	0	219.5	10.4	-	-
HCM Lane LOS	A	A	F	B	-	-
HCM 95th %tile Q(veh)	2.1	-	4	0.1	-	-

Intersection	
Int Delay, s/veh	2.9

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	35	80	210	155	0
Future Vol, veh/h	0	35	80	210	155	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	38	71	94	88	25
Heavy Vehicles, %	3	3	3	3	12	12
Mvmt Flow	0	92	113	223	176	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	625	176	176	0	-	0
Stage 1	176	-	-	-	-	-
Stage 2	449	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	447	865	1394	-	-	-
Stage 1	852	-	-	-	-	-
Stage 2	641	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	405	865	1394	-	-	-
Mov Cap-2 Maneuver	405	-	-	-	-	-
Stage 1	773	-	-	-	-	-
Stage 2	641	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	9.7	2.6	0
HCM LOS	A		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1394	-	865	-	-
HCM Lane V/C Ratio	0.081	-	0.106	-	-
HCM Control Delay (s)	7.8	0	9.7	-	-
HCM Lane LOS	A	A	A	-	-
HCM 95th %tile Q(veh)	0.3	-	0.4	-	-

Appendix 2

2024 Build & No-Build - Synchro Analysis

2024 Build - Synchro Analysis

HCM 6th Signalized Intersection Summary
2: US 278 & Shire Pkwy

05/18/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	35	140	415	120	465	150
Future Volume (veh/h)	35	140	415	120	465	150
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1856	1856	1870	1870	1870	1870
Adj Flow Rate, veh/h	47	0	638	0	762	174
Peak Hour Factor	0.75	0.44	0.65	0.68	0.61	0.86
Percent Heavy Veh, %	3	3	2	2	2	2
Cap, veh/h	61		1178		827	1686
Arrive On Green	0.03	0.00	0.63	0.00	0.40	1.00
Sat Flow, veh/h	1767	1572	1870	1585	3456	1870
Grp Volume(v), veh/h	47	0	638	0	762	174
Grp Sat Flow(s),veh/h/ln	1767	1572	1870	1585	1728	1870
Q Serve(g_s), s	3.7	0.0	26.8	0.0	29.3	0.0
Cycle Q Clear(g_c), s	3.7	0.0	26.8	0.0	29.3	0.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	61		1178		827	1686
V/C Ratio(X)	0.77		0.54		0.92	0.10
Avail Cap(c_a), veh/h	227		1178		1024	1686
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.67	1.67
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.72	0.72
Uniform Delay (d), s/veh	67.0	0.0	14.6	0.0	40.8	0.0
Incr Delay (d2), s/veh	18.3	0.0	1.8	0.0	8.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.0	0.0	10.7	0.0	11.5	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	85.4	0.0	16.4	0.0	49.6	0.1
LnGrp LOS	F		B		D	A
Approach Vol, veh/h	47	A	638	A		936
Approach Delay, s/veh	85.4		16.4			40.4
Approach LOS	F		B			D

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	38.0	92.7			130.7	9.3
Change Period (Y+Rc), s	4.5	4.5			4.5	4.5
Max Green Setting (Gmax), s	41.5	67.0			113.0	18.0
Max Q Clear Time (g_c+I1), s	31.3	28.8			2.0	5.7
Green Ext Time (p_c), s	2.2	4.0			0.9	0.1

Intersection Summary	
HCM 6th Ctrl Delay	32.2
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
3: US 278 & I-20 EB Ramps

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	1000	0	345	0	0	0	0	500	55	130	270	0
Future Volume (veh/h)	1000	0	345	0	0	0	0	500	55	130	270	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1707	0	1707				0	1870	1870	1767	1767	0
Adj Flow Rate, veh/h	1695	0	575				0	820	0	173	338	0
Peak Hour Factor	0.59	0.25	0.60				0.25	0.61	0.78	0.75	0.80	0.25
Percent Heavy Veh, %	13	0	13				0	2	2	9	9	0
Cap, veh/h	1750	0	803				0	945		215	673	0
Arrive On Green	0.55	0.00	0.55				0.00	0.09	0.00	0.08	0.38	0.00
Sat Flow, veh/h	3155	0	1447				0	3647	1585	1682	1767	0
Grp Volume(v), veh/h	1695	0	575				0	820	0	173	338	0
Grp Sat Flow(s),veh/h/ln	1577	0	1447				0	1777	1585	1682	1767	0
Q Serve(g_s), s	72.4	0.0	41.1				0.0	31.9	0.0	10.2	20.5	0.0
Cycle Q Clear(g_c), s	72.4	0.0	41.1				0.0	31.9	0.0	10.2	20.5	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1750	0	803				0	945		215	673	0
V/C Ratio(X)	0.97	0.00	0.72				0.00	0.87		0.81	0.50	0.00
Avail Cap(c_a), veh/h	1769	0	811				0	945		215	673	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.89	0.00	0.12	0.12	0.00
Uniform Delay (d), s/veh	30.0	0.0	23.0				0.0	61.4	0.0	36.8	33.2	0.0
Incr Delay (d2), s/veh	14.6	0.0	3.0				0.0	9.6	0.0	2.8	0.3	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	29.6	0.0	14.2				0.0	16.5	0.0	4.2	8.6	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.6	0.0	26.0				0.0	71.0	0.0	39.6	33.5	0.0
LnGrp LOS	D	A	C				A	E		D	C	A
Approach Vol, veh/h		2270						820	A		511	
Approach Delay, s/veh		39.9						71.0			35.5	
Approach LOS		D						E			D	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	16.1	41.7		82.2		57.8
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s	11.6	36.4		78.5		52.5
Max Q Clear Time (g_c+I1), s	12.2	33.9		74.4		22.5
Green Ext Time (p_c), s	0.0	1.2		3.3		1.9

Intersection Summary	
HCM 6th Ctrl Delay	46.4
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM Signalized Intersection Capacity Analysis
4: US 278 & I-20 WB Ramps

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	60	0	365	95	1405	0	0	340	345
Future Volume (vph)	0	0	0	60	0	365	95	1405	0	0	340	345
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5		4.5	4.5	4.5			4.5	4.5
Lane Util. Factor				1.00		1.00	0.91	0.91			1.00	1.00
Frt				1.00		0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1770		1583	1507	3171			1743	1482
Flt Permitted				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1770		1583	1507	3171			1743	1482
Peak-hour factor, PHF	0.25	0.25	0.25	0.69	0.75	0.56	0.73	0.81	0.25	0.25	0.77	0.79
Adj. Flow (vph)	0	0	0	87	0	652	130	1735	0	0	442	437
RTOR Reduction (vph)	0	0	0	0	0	283	0	0	0	0	0	280
Lane Group Flow (vph)	0	0	0	87	0	369	117	1748	0	0	442	157
Heavy Vehicles (%)	11%	11%	11%	2%	2%	2%	9%	9%	9%	9%	9%	9%
Turn Type				Prot		Perm	Split	NA			NA	Perm
Protected Phases				8			2	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				25.5		25.5	69.5	69.5			31.5	31.5
Effective Green, g (s)				25.5		25.5	69.5	69.5			31.5	31.5
Actuated g/C Ratio				0.18		0.18	0.50	0.50			0.22	0.22
Clearance Time (s)				4.5		4.5	4.5	4.5			4.5	4.5
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				322		288	748	1574			392	333
v/s Ratio Prot				0.05			0.08	c0.55			c0.25	
v/s Ratio Perm						c0.23						0.11
v/c Ratio				0.27		1.28	0.16	1.11			1.13	0.47
Uniform Delay, d1				49.2		57.2	19.2	35.2			54.2	47.0
Progression Factor				1.00		1.00	0.99	0.92			0.96	1.11
Incremental Delay, d2				0.5		150.5	0.1	53.3			84.2	4.6
Delay (s)				49.7		207.8	19.2	85.6			136.2	56.7
Level of Service				D		F	B	F			F	E
Approach Delay (s)		0.0			189.2			81.4			96.7	
Approach LOS		A			F			F			F	

Intersection Summary			
HCM 2000 Control Delay	108.1	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.15		
Actuated Cycle Length (s)	140.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	60.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	1.5

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	55	15	250	280	0
Future Vol, veh/h	0	55	15	250	280	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	175	310	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	64	54	78	88	25
Heavy Vehicles, %	3	3	4	4	11	11
Mvmt Flow	0	86	28	321	318	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	695	318	318	0	-	0
Stage 1	318	-	-	-	-	-
Stage 2	377	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.14	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.236	-	-	-
Pot Cap-1 Maneuver	407	720	1231	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	691	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	398	720	1231	-	-	-
Mov Cap-2 Maneuver	398	-	-	-	-	-
Stage 1	718	-	-	-	-	-
Stage 2	691	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.6	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1231	-	-	720	-	-
HCM Lane V/C Ratio	0.023	-	-	0.119	-	-
HCM Control Delay (s)	8	-	0	10.7	-	-
HCM Lane LOS	A	-	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	-	0.4	-	-

HCM 6th Signalized Intersection Summary
32: US 278 & Development Drwy

05/18/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	230	5	870	900	10	455
Future Volume (veh/h)	230	5	870	900	10	455
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1663	1663	1767	1767	1870	1870
Adj Flow Rate, veh/h	250	5	946	0	11	495
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	16	16	9	9	2	2
Cap, veh/h	293	261	2304		510	2440
Arrive On Green	0.18	0.18	1.00	0.00	1.00	1.00
Sat Flow, veh/h	1584	1409	3445	1497	593	3647
Grp Volume(v), veh/h	250	5	946	0	11	495
Grp Sat Flow(s),veh/h/ln	1584	1409	1678	1497	593	1777
Q Serve(g_s), s	10.7	0.2	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	10.7	0.2	0.0	0.0	0.0	0.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	293	261	2304		510	2440
V/C Ratio(X)	0.85	0.02	0.41		0.02	0.20
Avail Cap(c_a), veh/h	409	364	2304		510	2440
HCM Platoon Ratio	1.00	1.00	1.67	1.67	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	27.6	23.3	0.0	0.0	0.0	0.0
Incr Delay (d2), s/veh	11.8	0.0	0.5	0.0	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.1	0.2	0.0	0.0	0.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	39.4	23.4	0.5	0.0	0.1	0.2
LnGrp LOS	D	C	A		A	A
Approach Vol, veh/h	255		946	A		506
Approach Delay, s/veh	39.1		0.5			0.2
Approach LOS	D		A			A

Timer - Assigned Phs		2				6	8
Phs Duration (G+Y+Rc), s		52.6				52.6	17.4
Change Period (Y+Rc), s		4.5				4.5	4.5
Max Green Setting (Gmax), s		42.9				42.9	18.1
Max Q Clear Time (g_c+I1), s		2.0				2.0	12.7
Green Ext Time (p_c), s		7.4				3.4	0.3

Intersection Summary	
HCM 6th Ctrl Delay	6.2
HCM 6th LOS	A

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
33: US 278 & Development Drwy 1

05/18/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	170	10	255	620	40	295
Future Volume (veh/h)	170	10	255	620	40	295
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1900	1870	1870	1841	1841
Adj Flow Rate, veh/h	185	11	277	0	43	321
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	2	2	4	4
Cap, veh/h	235	209	1387		907	2593
Arrive On Green	0.13	0.13	1.00	0.00	0.74	0.74
Sat Flow, veh/h	1810	1610	1870	1585	1085	3589
Grp Volume(v), veh/h	185	11	277	0	43	321
Grp Sat Flow(s),veh/h/ln	1810	1610	1870	1585	1085	1749
Q Serve(g_s), s	6.9	0.4	0.0	0.0	0.7	1.8
Cycle Q Clear(g_c), s	6.9	0.4	0.0	0.0	0.7	1.8
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	235	209	1387		907	2593
V/C Ratio(X)	0.79	0.05	0.20		0.05	0.12
Avail Cap(c_a), veh/h	473	421	1387		907	2593
HCM Platoon Ratio	1.00	1.00	1.67	1.67	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	29.5	26.7	0.0	0.0	2.4	2.6
Incr Delay (d2), s/veh	5.8	0.1	0.3	0.0	0.1	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.3	0.2	0.1	0.0	0.1	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.3	26.8	0.3	0.0	2.5	2.7
LnGrp LOS	D	C	A		A	A
Approach Vol, veh/h	196		277	A		364
Approach Delay, s/veh	34.8		0.3			2.7
Approach LOS	C		A			A

Timer - Assigned Phs		2				6	8
Phs Duration (G+Y+Rc), s		56.4				56.4	13.6
Change Period (Y+Rc), s		4.5				4.5	4.5
Max Green Setting (Gmax), s		42.7				42.7	18.3
Max Q Clear Time (g_c+I1), s		2.0				3.8	8.9
Green Ext Time (p_c), s		1.5				2.2	0.4

Intersection Summary	
HCM 6th Ctrl Delay	9.4
HCM 6th LOS	A

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	5.9

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	345	255	0	5	30	150	95	5	0	30	30	0	85
Future Vol, veh/h	345	255	0	5	30	150	95	5	0	30	30	0	85
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	-	Yield	-	-	None	-	-	None
Storage Length	235	-	-	-	235	-	175	-	-	-	85	-	-
Veh in Median Storage, #	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	16	16	0	31	31	31	31	0	0	0	0	0	0
Mvmt Flow	375	277	0	5	33	163	103	5	0	33	33	0	92

Major/Minor	Major1			Major2				Minor1			Minor2		
Conflicting Flow All	163	0	0	277	277	0	0	1185	1266	139	1128	1266	82
Stage 1	-	-	-	-	-	-	-	1027	1027	-	239	239	-
Stage 2	-	-	-	-	-	-	-	158	239	-	889	1027	-
Critical Hdwy	4.42	-	-	7.02	4.72	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.36	-	-	2.81	2.51	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1317	-	-	830	1097	-	-	147	171	890	162	171	968
Stage 1	-	-	-	-	-	-	-	255	314	-	749	711	-
Stage 2	-	-	-	-	-	-	-	834	711	-	309	314	-
Platoon blocked, %		-	-			-	-						
Mov Cap-1 Maneuver	1317	-	-	1042	1042	-	-	101	118	890	118	118	968
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	101	118	-	118	118	-
Stage 1	-	-	-	-	-	-	-	182	225	-	536	685	-
Stage 2	-	-	-	-	-	-	-	727	685	-	213	225	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	5.1	1.1	14.4	18.9
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	421	1317	-	-	1042	-	-	118	968
HCM Lane V/C Ratio	0.09	0.285	-	-	0.037	-	-	0.276	0.095
HCM Control Delay (s)	14.4	8.8	-	-	8.6	-	-	46.8	9.1
HCM Lane LOS	B	A	-	-	A	-	-	E	A
HCM 95th %tile Q(veh)	0.3	1.2	-	-	0.1	-	-	1	0.3

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	5	225	90	225	325	100	50
Future Volume (vph)	5	225	90	225	325	100	50
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5		4.5	4.5
Lane Util. Factor		1.00	1.00	0.95		1.00	1.00
Frt		1.00	1.00	0.91		1.00	0.85
Flt Protected		0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)		1378	1450	2765		1228	1099
Flt Permitted		0.43	1.00	1.00		0.95	1.00
Satd. Flow (perm)		618	1450	2765		1228	1099
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	245	98	245	353	109	54
RTOR Reduction (vph)	0	0	0	98	0	0	46
Lane Group Flow (vph)	0	250	98	500	0	109	8
Heavy Vehicles (%)	31%	31%	31%	19%	19%	47%	47%
Turn Type	Perm	Perm	NA	NA		pm+pt	Perm
Protected Phases			2	6		7	
Permitted Phases	2	2				4	7
Actuated Green, G (s)		49.4	49.4	49.4		9.9	9.9
Effective Green, g (s)		49.4	49.4	49.4		9.9	9.9
Actuated g/C Ratio		0.72	0.72	0.72		0.14	0.14
Clearance Time (s)		4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		446	1048	1999		177	159
v/s Ratio Prot			0.07	0.18		c0.09	
v/s Ratio Perm		c0.40					0.01
v/c Ratio		0.56	0.09	0.25		0.62	0.05
Uniform Delay, d1		4.4	2.8	3.2		27.4	25.1
Progression Factor		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		5.0	0.2	0.3		6.2	0.1
Delay (s)		9.4	3.0	3.5		33.6	25.3
Level of Service		A	A	A		C	C
Approach Delay (s)			7.6	3.5		30.9	
Approach LOS			A	A		C	

Intersection Summary			
HCM 2000 Control Delay	8.8	HCM 2000 Level of Service	A
HCM 2000 Volume to Capacity ratio	0.57		
Actuated Cycle Length (s)	68.3	Sum of lost time (s)	9.0
Intersection Capacity Utilization	46.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	340	570	145	95	30	90
Future Vol, veh/h	340	570	145	95	30	90
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	235	-	-	175	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	16	16	16	16	0	0
Mvmt Flow	370	620	158	103	33	98

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	158	0	-	0	1208	79
Stage 1	-	-	-	-	158	-
Stage 2	-	-	-	-	1050	-
Critical Hdwy	4.42	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.36	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	1323	-	-	-	178	972
Stage 1	-	-	-	-	860	-
Stage 2	-	-	-	-	302	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1323	-	-	-	128	972
Mov Cap-2 Maneuver	-	-	-	-	128	-
Stage 1	-	-	-	-	619	-
Stage 2	-	-	-	-	302	-

Approach	EB	WB	SB
HCM Control Delay, s	3.3	0	17.5
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1323	-	-	-	128	972
HCM Lane V/C Ratio	0.279	-	-	-	0.255	0.101
HCM Control Delay (s)	8.8	-	-	-	42.5	9.1
HCM Lane LOS	A	-	-	-	E	A
HCM 95th %tile Q(veh)	1.2	-	-	-	0.9	0.3

Intersection	
Int Delay, s/veh	2.4

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	160	30	10	465	85	10
Future Vol, veh/h	160	30	10	465	85	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	310	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	19	19	15	15	36	36
Mvmt Flow	174	33	11	505	92	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	207	0	718	191
Stage 1	-	-	-	-	191	-
Stage 2	-	-	-	-	527	-
Critical Hdwy	-	-	4.25	-	6.76	6.56
Critical Hdwy Stg 1	-	-	-	-	5.76	-
Critical Hdwy Stg 2	-	-	-	-	5.76	-
Follow-up Hdwy	-	-	2.335	-	3.824	3.624
Pot Cap-1 Maneuver	-	-	1290	-	349	771
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	529	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1290	-	346	771
Mov Cap-2 Maneuver	-	-	-	-	346	-
Stage 1	-	-	-	-	766	-
Stage 2	-	-	-	-	524	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	18.6
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	367	-	-	1290	-
HCM Lane V/C Ratio	0.281	-	-	0.008	-
HCM Control Delay (s)	18.6	-	-	7.8	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	1.1	-	-	0	-

HCM 6th Signalized Intersection Summary
2: US 278 & Shire Pkwy

05/18/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	170	620	270	30	110	380
Future Volume (veh/h)	170	620	270	30	110	380
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	227	0	415	0	180	442
Peak Hour Factor	0.75	0.44	0.65	0.68	0.61	0.86
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	491		792		441	1144
Arrive On Green	0.27	0.00	0.42	0.00	0.25	1.00
Sat Flow, veh/h	1795	1598	1885	1598	3483	1885
Grp Volume(v), veh/h	227	0	415	0	180	442
Grp Sat Flow(s),veh/h/ln	1795	1598	1885	1598	1742	1885
Q Serve(g_s), s	7.9	0.0	12.3	0.0	3.2	0.0
Cycle Q Clear(g_c), s	7.9	0.0	12.3	0.0	3.2	0.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	491		792		441	1144
V/C Ratio(X)	0.46		0.52		0.41	0.39
Avail Cap(c_a), veh/h	491		792		441	1144
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.89	0.89
Uniform Delay (d), s/veh	22.7	0.0	16.2	0.0	25.7	0.0
Incr Delay (d2), s/veh	3.1	0.0	2.5	0.0	0.5	0.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.6	0.0	4.8	0.0	1.2	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	25.8	0.0	18.7	0.0	26.2	0.9
LnGrp LOS	C		B		C	A
Approach Vol, veh/h	227	A	415	A		622
Approach Delay, s/veh	25.8		18.7			8.2
Approach LOS	C		B			A

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	14.0	36.0			50.0	25.0
Change Period (Y+Rc), s	4.5	4.5			4.5	4.5
Max Green Setting (Gmax), s	9.5	31.5			45.5	20.5
Max Q Clear Time (g_c+I1), s	5.2	14.3			2.0	9.9
Green Ext Time (p_c), s	0.2	1.9			2.7	0.5

Intersection Summary	
HCM 6th Ctrl Delay	14.8
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
3: US 278 & I-20 EB Ramps

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	610	0	85	0	0	0	0	830	60	280	405	0
Future Volume (veh/h)	610	0	85	0	0	0	0	830	60	280	405	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1737	0	1737				0	1885	1885	1841	1841	0
Adj Flow Rate, veh/h	1034	0	142				0	1361	0	373	506	0
Peak Hour Factor	0.59	0.25	0.60				0.25	0.61	0.78	0.75	0.80	0.25
Percent Heavy Veh, %	11	0	11				0	1	1	4	4	0
Cap, veh/h	993	0	455				0	1294		358	1050	0
Arrive On Green	0.31	0.00	0.31				0.00	0.72	0.00	0.15	0.57	0.00
Sat Flow, veh/h	3209	0	1472				0	3676	1598	1753	1841	0
Grp Volume(v), veh/h	1034	0	142				0	1361	0	373	506	0
Grp Sat Flow(s),veh/h/ln	1605	0	1472				0	1791	1598	1753	1841	0
Q Serve(g_s), s	23.2	0.0	5.5				0.0	27.1	0.0	11.2	12.2	0.0
Cycle Q Clear(g_c), s	23.2	0.0	5.5				0.0	27.1	0.0	11.2	12.2	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	993	0	455				0	1294		358	1050	0
V/C Ratio(X)	1.04	0.00	0.31				0.00	1.05		1.04	0.48	0.00
Avail Cap(c_a), veh/h	993	0	455				0	1294		358	1050	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.50	0.00	0.13	0.13	0.00
Uniform Delay (d), s/veh	25.9	0.0	19.8				0.0	10.4	0.0	30.4	9.5	0.0
Incr Delay (d2), s/veh	40.0	0.0	0.4				0.0	33.1	0.0	29.5	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.6	0.0	1.8				0.0	9.2	0.0	8.8	3.8	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.9	0.0	20.2				0.0	43.5	0.0	59.9	9.7	0.0
LnGrp LOS	F	A	C				A	F		F	A	A
Approach Vol, veh/h		1176						1361	A		879	
Approach Delay, s/veh		60.4						43.5			31.0	
Approach LOS		E						D			C	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	15.7	31.6		27.7		47.3
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s	11.2	27.1		23.2		42.8
Max Q Clear Time (g_c+I1), s	13.2	29.1		25.2		14.2
Green Ext Time (p_c), s	0.0	0.0		0.0		3.1

Intersection Summary	
HCM 6th Ctrl Delay	46.1
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM Signalized Intersection Capacity Analysis
4: US 278 & I-20 WB Ramps

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	60	0	235	530	910	0	0	625	810
Future Volume (vph)	0	0	0	60	0	235	530	910	0	0	625	810
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5		4.5	4.5	4.5			4.5	4.5
Lane Util. Factor				1.00		1.00	0.91	0.91			1.00	1.00
Frt				1.00		0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95		1.00	0.95	0.99			1.00	1.00
Satd. Flow (prot)				1787		1599	1579	3308			1759	1495
Flt Permitted				0.95		1.00	0.95	0.99			1.00	1.00
Satd. Flow (perm)				1787		1599	1579	3308			1759	1495
Peak-hour factor, PHF	0.25	0.25	0.25	0.69	0.75	0.56	0.73	0.81	0.25	0.25	0.77	0.79
Adj. Flow (vph)	0	0	0	87	0	420	726	1123	0	0	812	1025
RTOR Reduction (vph)	0	0	0	0	0	384	0	0	0	0	0	182
Lane Group Flow (vph)	0	0	0	87	0	36	595	1254	0	0	812	843
Heavy Vehicles (%)	9%	9%	9%	1%	1%	1%	4%	4%	4%	8%	8%	8%
Turn Type				Prot		Perm	Split	NA			NA	Perm
Protected Phases				8			2	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				12.7		12.7	56.3	56.3			67.5	67.5
Effective Green, g (s)				12.7		12.7	56.3	56.3			67.5	67.5
Actuated g/C Ratio				0.08		0.08	0.38	0.38			0.45	0.45
Clearance Time (s)				4.5		4.5	4.5	4.5			4.5	4.5
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				151		135	592	1241			791	672
v/s Ratio Prot				c0.05			0.38	c0.38			0.46	
v/s Ratio Perm						0.02						c0.56
v/c Ratio				0.58		0.26	1.01	1.01			1.03	1.25
Uniform Delay, d1				66.1		64.3	46.9	46.9			41.2	41.2
Progression Factor				1.00		1.00	0.78	0.78			0.88	0.88
Incremental Delay, d2				5.2		1.0	12.3	10.4			35.1	123.9
Delay (s)				71.3		65.3	49.0	47.0			71.2	160.3
Level of Service				E		E	D	D			E	F
Approach Delay (s)		0.0			66.3			47.7			120.9	
Approach LOS		A			E			D			F	

Intersection Summary			
HCM 2000 Control Delay	82.0	HCM 2000 Level of Service	F
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	150.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	67.1%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	40	85	330	260	0
Future Vol, veh/h	0	40	85	330	260	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	175	310	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	64	54	78	88	25
Heavy Vehicles, %	3	3	2	2	8	8
Mvmt Flow	0	63	157	423	295	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1032	295	295	0	-	0
Stage 1	295	-	-	-	-	-
Stage 2	737	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.12	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.218	-	-	-
Pot Cap-1 Maneuver	257	742	1266	-	-	-
Stage 1	753	-	-	-	-	-
Stage 2	472	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	225	742	1266	-	-	-
Mov Cap-2 Maneuver	225	-	-	-	-	-
Stage 1	660	-	-	-	-	-
Stage 2	472	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.3	2.2	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	EBLn2	SBT	SBR
Capacity (veh/h)	1266	-	-	742	-	-
HCM Lane V/C Ratio	0.124	-	-	0.084	-	-
HCM Control Delay (s)	8.2	-	0	10.3	-	-
HCM Lane LOS	A	-	A	B	-	-
HCM 95th %tile Q(veh)	0.4	-	-	0.3	-	-

HCM 6th Signalized Intersection Summary
32: US 278 & Development Drwy

05/18/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	695	5	705	440	10	740
Future Volume (veh/h)	695	5	705	440	10	740
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1663	1663	1781	1781	1885	1885
Adj Flow Rate, veh/h	755	5	766	0	11	804
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	16	16	8	8	1	1
Cap, veh/h	797	709	1274		221	1349
Arrive On Green	0.50	0.50	0.25	0.00	0.12	0.12
Sat Flow, veh/h	1584	1409	3474	1510	707	3676
Grp Volume(v), veh/h	755	5	766	0	11	804
Grp Sat Flow(s),veh/h/ln	1584	1409	1692	1510	707	1791
Q Serve(g_s), s	33.9	0.1	15.0	0.0	1.1	15.9
Cycle Q Clear(g_c), s	33.9	0.1	15.0	0.0	16.1	15.9
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	797	709	1274		221	1349
V/C Ratio(X)	0.95	0.01	0.60		0.05	0.60
Avail Cap(c_a), veh/h	919	817	1274		221	1349
HCM Platoon Ratio	1.00	1.00	0.67	0.67	0.33	0.33
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	17.7	9.3	23.1	0.0	34.6	27.4
Incr Delay (d2), s/veh	17.0	0.0	2.1	0.0	0.4	1.9
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.6	0.0	6.3	0.0	0.2	7.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	34.6	9.3	25.2	0.0	35.0	29.4
LnGrp LOS	C	A	C		D	C
Approach Vol, veh/h	760		766	A		815
Approach Delay, s/veh	34.5		25.2			29.5
Approach LOS	C		C			C

Timer - Assigned Phs		2				6	8
Phs Duration (G+Y+Rc), s		32.7				32.7	42.3
Change Period (Y+Rc), s		4.5				4.5	4.5
Max Green Setting (Gmax), s		22.5				22.5	43.5
Max Q Clear Time (g_c+I1), s		17.0				18.1	35.9
Green Ext Time (p_c), s		2.3				2.0	1.8

Intersection Summary	
HCM 6th Ctrl Delay	29.7
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
33: US 278 & Development Drwy 1

05/18/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	470	30	385	325	20	280
Future Volume (veh/h)	470	30	385	325	20	280
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1900	1885	1885	1870	1870
Adj Flow Rate, veh/h	511	33	418	0	22	304
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	1	1	2	2
Cap, veh/h	572	509	1063		642	2003
Arrive On Green	0.32	0.32	1.00	0.00	0.56	0.56
Sat Flow, veh/h	1810	1610	1885	1598	969	3647
Grp Volume(v), veh/h	511	33	418	0	22	304
Grp Sat Flow(s),veh/h/ln	1810	1610	1885	1598	969	1777
Q Serve(g_s), s	20.2	1.1	0.0	0.0	0.8	3.1
Cycle Q Clear(g_c), s	20.2	1.1	0.0	0.0	0.8	3.1
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	572	509	1063		642	2003
V/C Ratio(X)	0.89	0.06	0.39		0.03	0.15
Avail Cap(c_a), veh/h	832	741	1063		642	2003
HCM Platoon Ratio	1.00	1.00	2.00	2.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	24.4	17.9	0.0	0.0	7.3	7.8
Incr Delay (d2), s/veh	8.7	0.1	1.1	0.0	0.1	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	9.6	0.4	0.3	0.0	0.1	1.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	33.2	17.9	1.1	0.0	7.4	8.0
LnGrp LOS	C	B	A		A	A
Approach Vol, veh/h	544		418	A		326
Approach Delay, s/veh	32.2		1.1			7.9
Approach LOS	C		A			A

Timer - Assigned Phs		2				6	8
Phs Duration (G+Y+Rc), s		46.8				46.8	28.2
Change Period (Y+Rc), s		4.5				4.5	4.5
Max Green Setting (Gmax), s		31.5				31.5	34.5
Max Q Clear Time (g_c+I1), s		2.0				5.1	22.2
Green Ext Time (p_c), s		2.4				1.9	1.5

Intersection Summary	
HCM 6th Ctrl Delay	16.0
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	6.6

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations													
Traffic Vol, veh/h	175	170	5	5	10	230	55	5	0	30	75	0	260
Future Vol, veh/h	175	170	5	5	10	230	55	5	0	30	75	0	260
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	-	Yield	-	-	None	-	-	None
Storage Length	235	-	-	-	235	-	175	-	-	-	85	-	-
Veh in Median Storage, #	-	0	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	16	16	16	33	33	33	33	0	0	0	0	0	0
Mvmt Flow	190	185	5	5	11	250	60	5	0	33	82	0	283

Major/Minor	Major1			Major2				Minor1			Minor2		
Conflicting Flow All	250	0	0	190	190	0	0	725	850	95	755	852	125
Stage 1	-	-	-	-	-	-	-	568	568	-	282	282	-
Stage 2	-	-	-	-	-	-	-	157	282	-	473	570	-
Critical Hdwy	4.42	-	-	7.06	4.76	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.36	-	-	2.83	2.53	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	1217	-	-	943	1182	-	-	317	300	949	301	299	909
Stage 1	-	-	-	-	-	-	-	480	510	-	707	681	-
Stage 2	-	-	-	-	-	-	-	835	681	-	546	509	-
Platoon blocked, %		-	-			-	-						
Mov Cap-1 Maneuver	1217	-	-	1076	1076	-	-	190	249	949	253	248	909
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	190	249	-	253	248	-
Stage 1	-	-	-	-	-	-	-	405	430	-	597	671	-
Stage 2	-	-	-	-	-	-	-	567	671	-	445	430	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	4.3	0.4	11.4	14.1
HCM LOS			B	B

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	604	1217	-	-	1076	-	-	253	909
HCM Lane V/C Ratio	0.063	0.156	-	-	0.015	-	-	0.322	0.311
HCM Control Delay (s)	11.4	8.5	-	-	8.4	-	-	25.9	10.7
HCM Lane LOS	B	A	-	-	A	-	-	D	B
HCM 95th %tile Q(veh)	0.2	0.6	-	-	0	-	-	1.3	1.3

Movement	EBU	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations							
Traffic Volume (vph)	5	100	175	120	190	245	175
Future Volume (vph)	5	100	175	120	190	245	175
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5		4.5	4.5
Lane Util. Factor		1.00	1.00	0.95		1.00	1.00
Frt		1.00	1.00	0.91		1.00	0.85
Flt Protected		0.95	1.00	1.00		0.95	1.00
Satd. Flow (prot)		1357	1429	2731		1228	1099
Flt Permitted		0.55	1.00	1.00		0.95	1.00
Satd. Flow (perm)		784	1429	2731		1228	1099
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	109	190	130	207	266	190
RTOR Reduction (vph)	0	0	0	110	0	0	130
Lane Group Flow (vph)	0	114	190	227	0	266	60
Heavy Vehicles (%)	33%	33%	33%	20%	20%	47%	47%
Turn Type	Perm	Perm	NA	NA		pm+pt	Perm
Protected Phases			2	6		7	
Permitted Phases	2	2				4	7
Actuated Green, G (s)		20.0	20.0	20.0		13.5	13.5
Effective Green, g (s)		20.0	20.0	20.0		13.5	13.5
Actuated g/C Ratio		0.47	0.47	0.47		0.32	0.32
Clearance Time (s)		4.5	4.5	4.5		4.5	4.5
Vehicle Extension (s)		3.0	3.0	3.0		3.0	3.0
Lane Grp Cap (vph)		368	672	1285		390	349
v/s Ratio Prot			0.13	0.08		c0.22	
v/s Ratio Perm		c0.15					0.05
v/c Ratio		0.31	0.28	0.18		0.68	0.17
Uniform Delay, d1		7.0	6.9	6.5		12.6	10.5
Progression Factor		1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2		2.2	1.1	0.3		4.9	0.2
Delay (s)		9.2	7.9	6.8		17.5	10.7
Level of Service		A	A	A		B	B
Approach Delay (s)			8.4	6.8		14.7	
Approach LOS			A	A		B	

Intersection Summary			
HCM 2000 Control Delay	10.5	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.46		
Actuated Cycle Length (s)	42.5	Sum of lost time (s)	9.0
Intersection Capacity Utilization	40.1%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	175	275	440	55	75	260
Future Vol, veh/h	175	275	440	55	75	260
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	235	-	-	175	0	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	16	16	16	16	0	0
Mvmt Flow	190	299	478	60	82	283

Major/Minor	Major1		Major2		Minor2	
Conflicting Flow All	478	0	-	0	1008	239
Stage 1	-	-	-	-	478	-
Stage 2	-	-	-	-	530	-
Critical Hdwy	4.42	-	-	-	6.8	6.9
Critical Hdwy Stg 1	-	-	-	-	5.8	-
Critical Hdwy Stg 2	-	-	-	-	5.8	-
Follow-up Hdwy	2.36	-	-	-	3.5	3.3
Pot Cap-1 Maneuver	988	-	-	-	240	768
Stage 1	-	-	-	-	595	-
Stage 2	-	-	-	-	560	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	988	-	-	-	194	768
Mov Cap-2 Maneuver	-	-	-	-	194	-
Stage 1	-	-	-	-	481	-
Stage 2	-	-	-	-	560	-

Approach	EB	WB	SB
HCM Control Delay, s	3.7	0	17.8
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	988	-	-	-	194	768
HCM Lane V/C Ratio	0.193	-	-	-	0.42	0.368
HCM Control Delay (s)	9.5	-	-	-	36.4	12.4
HCM Lane LOS	A	-	-	-	E	B
HCM 95th %tile Q(veh)	0.7	-	-	-	1.9	1.7

Intersection	
Int Delay, s/veh	1.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	355	65	25	260	50	20
Future Vol, veh/h	355	65	25	260	50	20
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	310	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	20	20	15	15	31	31
Mvmt Flow	386	71	27	283	54	22

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	457	0	759	422
Stage 1	-	-	-	-	422	-
Stage 2	-	-	-	-	337	-
Critical Hdwy	-	-	4.25	-	6.71	6.51
Critical Hdwy Stg 1	-	-	-	-	5.71	-
Critical Hdwy Stg 2	-	-	-	-	5.71	-
Follow-up Hdwy	-	-	2.335	-	3.779	3.579
Pot Cap-1 Maneuver	-	-	1039	-	336	574
Stage 1	-	-	-	-	604	-
Stage 2	-	-	-	-	663	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1039	-	327	574
Mov Cap-2 Maneuver	-	-	-	-	327	-
Stage 1	-	-	-	-	604	-
Stage 2	-	-	-	-	646	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	17.1
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	373	-	-	1039	-
HCM Lane V/C Ratio	0.204	-	-	0.026	-
HCM Control Delay (s)	17.1	-	-	8.6	-
HCM Lane LOS	C	-	-	A	-
HCM 95th %tile Q(veh)	0.8	-	-	0.1	-

2024 No-Build - Synchro Analysis

Intersection	
Int Delay, s/veh	98.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	35	150	415	120	475	150
Future Vol, veh/h	35	150	415	120	475	150
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	None
Storage Length	0	0	-	185	300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	44	65	68	61	86
Heavy Vehicles, %	3	3	2	2	2	2
Mvmt Flow	47	341	638	176	779	174

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	2370	638	0	-	638	0
Stage 1	638	-	-	-	-	-
Stage 2	1732	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.12	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.218	-
Pot Cap-1 Maneuver	~ 38	475	-	0	946	-
Stage 1	524	-	-	0	-	-
Stage 2	156	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	~ 7	475	-	-	946	-
Mov Cap-2 Maneuver	~ 7	-	-	-	-	-
Stage 1	524	-	-	-	-	-
Stage 2	~ 28	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 456.4	0	19.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	7	475	946	-
HCM Lane V/C Ratio	-	6.667	0.718	0.823	-
HCM Control Delay (s)	-	$ 3574.3	29.6	23.7	-
HCM Lane LOS	-	F	D	C	-
HCM 95th %tile Q(veh)	-	7.3	5.7	9.6	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	1632

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	595	0	345	0	0	0	0	510	55	130	280	0
Future Vol, veh/h	595	0	345	0	0	0	0	510	55	130	280	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	-	-	-	-	-	115	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	25	60	25	25	25	25	61	78	75	80	25
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	1008	0	575	0	0	0	0	836	71	173	350	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	1568	-	350	-	0	0	907	0	0
Stage 1	696	-	-	-	-	-	-	-	-
Stage 2	872	-	-	-	-	-	-	-	-
Critical Hdwy	6.42	-	6.22	-	-	-	4.12	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.518	-	3.318	-	-	-	2.218	-	-
Pot Cap-1 Maneuver	~ 122	0	693	0	-	-	750	-	0
Stage 1	~ 495	0	-	0	-	-	-	-	0
Stage 2	~ 409	0	-	0	-	-	-	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	~ 87	0	693	-	-	-	750	-	-
Mov Cap-2 Maneuver	~ 87	0	-	-	-	-	-	-	-
Stage 1	~ 495	0	-	-	-	-	-	-	-
Stage 2	~ 292	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, $	3104.6	0	3.7
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	EBLn2	SBL	SBT
Capacity (veh/h)	-	-	87	693	750	-
HCM Lane V/C Ratio	-	-	11.592	0.83	0.231	-
HCM Control Delay (s)	-	-	$ 4857.5	30.3	11.2	-
HCM Lane LOS	-	-	F	D	B	-
HCM 95th %tile Q(veh)	-	-	118.4	9.1	0.9	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Unsignalized Intersection Capacity Analysis
4: US 278 & I-20 WB Ramps

07/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	60	0	365	95	1010	0	0	350	255
Future Volume (Veh/h)	0	0	0	60	0	365	95	1010	0	0	350	255
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.69	0.75	0.56	0.73	0.81	0.25	0.25	0.77	0.79
Hourly flow rate (vph)	0	0	0	87	0	652	130	1247	0	0	455	323
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1194	
pX, platoon unblocked												
vC, conflicting volume	1962	1962	455	1962	2285	1247	778			1247		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1962	1962	455	1962	2285	1247	778			1247		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	100	100	0	100	0	84			100		
cM capacity (veh/h)	0	53	601	42	33	212	839			562		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	87	652	1377	455	323
Volume Left	87	0	130	0	0
Volume Right	0	652	0	0	323
cSH	42	212	839	1700	1700
Volume to Capacity	2.08	3.08	0.16	0.27	0.19
Queue Length 95th (ft)	230	Err	14	0	0
Control Delay (s)	707.6	Err	6.3	0.0	0.0
Lane LOS	F	F	A		
Approach Delay (s)	8905.2		6.3	0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	2277.0		
Intersection Capacity Utilization	90.2%	ICU Level of Service	E
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	1.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	55	15	210	280	0
Future Vol, veh/h	0	55	15	210	280	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	64	54	78	88	25
Heavy Vehicles, %	3	3	4	4	13	13
Mvmt Flow	0	86	28	269	318	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	643	318	318	0	-	0
Stage 1	318	-	-	-	-	-
Stage 2	325	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.14	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.236	-	-	-
Pot Cap-1 Maneuver	436	720	1231	-	-	-
Stage 1	735	-	-	-	-	-
Stage 2	730	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	424	720	1231	-	-	-
Mov Cap-2 Maneuver	424	-	-	-	-	-
Stage 1	715	-	-	-	-	-
Stage 2	730	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10.7	0.7	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1231	-	720	-	-
HCM Lane V/C Ratio	0.023	-	0.119	-	-
HCM Control Delay (s)	8	0	10.7	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.1	-	0.4	-	-

HCM 6th Signalized Intersection Summary
32: US 278 & Development Drwy

07/14/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	150	0	835	540	10	455
Future Volume (veh/h)	150	0	835	540	10	455
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1900	1885	1885	1870	1870
Adj Flow Rate, veh/h	495	3	908	0	11	495
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	1	1	2	2
Cap, veh/h	9999	9999	1479		470	1468
Arrive On Green	0.08	0.08	0.78	0.00	1.00	1.00
Sat Flow, veh/h	1927782076	2207	4497792	1885	1598	614	1870
Grp Volume(v), veh/h	495	3	908	0	11	495
Grp Sat Flow(s),veh/h/ln	1810	1610	1885	1598	614	1870
Q Serve(g_s), s	0.0	0.0	13.0	0.0	0.3	0.0
Cycle Q Clear(g_c), s	0.0	0.0	13.0	0.0	13.3	0.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	1482724960	6007	4547	20	1479	470	1468
V/C Ratio(X)	0.00	0.00	0.61		0.02	0.34
Avail Cap(c_a), veh/h	5338473776	5284	8332	800	1479	470	1468
HCM Platoon Ratio	1.00	1.00	1.00	1.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	2.9	0.0	1.7	0.0
Incr Delay (d2), s/veh	0.0	0.0	1.9	0.0	0.1	0.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	0.0	0.8	0.0	0.0	0.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	0.0	0.0	4.8	0.0	1.8	0.6
LnGrp LOS	A	A	A		A	A
Approach Vol, veh/h	498		908	A		506
Approach Delay, s/veh	0.0		4.8			0.6
Approach LOS	A		A			A

Timer - Assigned Phs		2			6	8
Phs Duration (G+Y+Rc), s		55.5			55.5	9.5
Change Period (Y+Rc), s		4.5			4.5	4.5
Max Green Setting (Gmax), s		38.0			38.0	18.0
Max Q Clear Time (g_c+I1), s		15.0			15.3	2.0
Green Ext Time (p_c), s		6.2			2.7	1.6

Intersection Summary	
HCM 6th Ctrl Delay	2.5
HCM 6th LOS	A

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
33: US 278 & Development Drwy 1

07/14/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	170	10	215	620	40	295
Future Volume (veh/h)	170	10	215	620	40	295
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1900	1870	1870	1841	1841
Adj Flow Rate, veh/h	185	11	234	0	43	321
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	2	2	4	4
Cap, veh/h	238	212	1366		891	1344
Arrive On Green	0.13	0.13	0.73	0.00	0.73	0.73
Sat Flow, veh/h	1810	1610	1870	1585	1128	1841
Grp Volume(v), veh/h	185	11	234	0	43	321
Grp Sat Flow(s),veh/h/ln	1810	1610	1870	1585	1128	1841
Q Serve(g_s), s	6.4	0.4	2.5	0.0	0.8	3.7
Cycle Q Clear(g_c), s	6.4	0.4	2.5	0.0	3.3	3.7
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	238	212	1366		891	1344
V/C Ratio(X)	0.78	0.05	0.17		0.05	0.24
Avail Cap(c_a), veh/h	504	448	1366		891	1344
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	27.3	24.7	2.7	0.0	3.2	2.9
Incr Delay (d2), s/veh	5.4	0.1	0.3	0.0	0.1	0.4
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.0	0.2	0.3	0.0	0.1	0.5
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	32.7	24.8	3.0	0.0	3.3	3.3
LnGrp LOS	C	C	A		A	A
Approach Vol, veh/h	196		234	A		364
Approach Delay, s/veh	32.3		3.0			3.3
Approach LOS	C		A			A

Timer - Assigned Phs		2				6	8
Phs Duration (G+Y+Rc), s		52.0				52.0	13.0
Change Period (Y+Rc), s		4.5				4.5	4.5
Max Green Setting (Gmax), s		37.9				37.9	18.1
Max Q Clear Time (g_c+I1), s		4.5				5.7	8.4
Green Ext Time (p_c), s		1.1				1.8	0.4

Intersection Summary	
HCM 6th Ctrl Delay	10.4
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	90	330	550	150	0
Future Volume (vph)	0	90	330	550	150	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00	
Frt		1.00	1.00	0.85	1.00	
Flt Protected		1.00	1.00	1.00	0.95	
Satd. Flow (prot)		1900	1462	1242	1228	
Flt Permitted		1.00	1.00	1.00	0.95	
Satd. Flow (perm)		1900	1462	1242	1228	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	98	359	598	163	0
RTOR Reduction (vph)	0	0	0	372	0	0
Lane Group Flow (vph)	0	98	359	226	163	0
Heavy Vehicles (%)	0%	0%	30%	30%	47%	47%
Turn Type		NA	NA	Perm	pm+pt	Perm
Protected Phases		4	8		1	
Permitted Phases	4			8	6	6
Actuated Green, G (s)		16.9	16.9	16.9	18.8	
Effective Green, g (s)		16.9	16.9	16.9	18.8	
Actuated g/C Ratio		0.38	0.38	0.38	0.42	
Clearance Time (s)		4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		718	552	469	516	
v/s Ratio Prot		0.05	c0.25		c0.13	
v/s Ratio Perm				0.18		
v/c Ratio		0.14	0.65	0.48	0.32	
Uniform Delay, d1		9.1	11.5	10.6	8.7	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.1	2.7	0.8	1.6	
Delay (s)		9.2	14.2	11.4	10.3	
Level of Service		A	B	B	B	
Approach Delay (s)		9.2	12.4		10.3	
Approach LOS		A	B		B	

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.47		
Actuated Cycle Length (s)	44.7	Sum of lost time (s)	9.0
Intersection Capacity Utilization	46.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	17.8

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	185	55	10	675	205	10
Future Vol, veh/h	185	55	10	675	205	10
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	310	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	30	30	25	25	39	39
Mvmt Flow	201	60	11	734	223	11

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	261	0	987	231
Stage 1	-	-	-	-	231	-
Stage 2	-	-	-	-	756	-
Critical Hdwy	-	-	4.35	-	6.79	6.59
Critical Hdwy Stg 1	-	-	-	-	5.79	-
Critical Hdwy Stg 2	-	-	-	-	5.79	-
Follow-up Hdwy	-	-	2.425	-	3.851	3.651
Pot Cap-1 Maneuver	-	-	1181	-	235	725
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	404	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1181	-	233	725
Mov Cap-2 Maneuver	-	-	-	-	233	-
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	400	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.1	94.1
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	241	-	-	1181	-
HCM Lane V/C Ratio	0.97	-	-	0.009	-
HCM Control Delay (s)	94.1	-	-	8.1	-
HCM Lane LOS	F	-	-	A	-
HCM 95th %tile Q(veh)	8.9	-	-	0	-

Intersection	
Int Delay, s/veh	327.4

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	170	630	270	30	110	380
Future Vol, veh/h	170	630	270	30	110	380
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	None
Storage Length	0	0	-	185	300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	44	65	68	61	86
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	227	1432	415	44	180	442

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1217	415	0	-	415	0
Stage 1	415	-	-	-	-	-
Stage 2	802	-	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	~ 201	~ 640	-	0	1149	-
Stage 1	669	-	-	0	-	-
Stage 2	443	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	~ 169	~ 640	-	-	1149	-
Mov Cap-2 Maneuver	~ 169	-	-	-	-	-
Stage 1	669	-	-	-	-	-
Stage 2	373	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 531.3	0	2.5
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	169	640	1149	-
HCM Lane V/C Ratio	-	1.341	2.237	0.157	-
HCM Control Delay (s)	-	240$	577.4	8.7	-
HCM Lane LOS	-	F	F	A	-
HCM 95th %tile Q(veh)	-	13.5	104.1	0.6	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	4.3

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	430	0	85	0	0	0	0	840	60	280	405	0
Future Vol, veh/h	430	0	85	0	0	0	0	840	60	280	405	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	-	-	-	-	-	115	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	25	60	25	25	25	25	61	78	75	80	25
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	729	0	142	0	0	0	0	1377	77	373	506	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	2668	-	506	-	0	0	1454	0	0
Stage 1	1252	-	-	-	-	-	-	-	-
Stage 2	1416	-	-	-	-	-	-	-	-
Critical Hdwy	6.41	-	6.21	-	-	-	4.11	-	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.509	-	3.309	-	-	-	2.209	-	-
Pot Cap-1 Maneuver	~ 25	0	568	0	-	-	468	-	0
Stage 1	~ 271	0	-	0	-	-	-	-	0
Stage 2	~ 225	0	-	0	-	-	-	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	0	0	568	-	-	-	468	-	-
Mov Cap-2 Maneuver	0	0	-	-	-	-	-	-	-
Stage 1	~ 271	0	-	-	-	-	-	-	-
Stage 2	0	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s		0	15.6
HCM LOS	-		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	EBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	568	468	-
HCM Lane V/C Ratio	-	-	-	0.249	0.798	-
HCM Control Delay (s)	-	-	-	13.4	36.7	-
HCM Lane LOS	-	-	-	B	E	-
HCM 95th %tile Q(veh)	-	-	-	1	7.3	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Unsignalized Intersection Capacity Analysis
4: US 278 & I-20 WB Ramps

07/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	60	0	235	530	740	0	0	625	500
Future Volume (Veh/h)	0	0	0	60	0	235	530	740	0	0	625	500
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.69	0.75	0.56	0.73	0.81	0.25	0.25	0.77	0.79
Hourly flow rate (vph)	0	0	0	87	0	420	726	914	0	0	812	633
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1194	
pX, platoon unblocked	0.91	0.91	0.91	0.91	0.91		0.91					
vC, conflicting volume	3178	3178	812	3178	3811	914	1445			914		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	3340	3340	746	3340	4034	914	1440			914		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	100	0	0	0	0			100		
cM capacity (veh/h)	0	0	379	0	0	332	433			750		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	87	420	1640	812	633
Volume Left	87	0	726	0	0
Volume Right	0	420	0	0	633
cSH	0	332	433	1700	1700
Volume to Capacity	Err	1.26	1.68	0.48	0.37
Queue Length 95th (ft)	Err	479	1075	0	0
Control Delay (s)	Err	173.5	337.9	0.0	0.0
Lane LOS	F	F	F		
Approach Delay (s)	Err		337.9	0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	114.5%	ICU Level of Service	H
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	2.2

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	0	40	85	315	225	0
Future Vol, veh/h	0	40	85	315	225	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	64	54	78	88	25
Heavy Vehicles, %	3	3	3	3	9	9
Mvmt Flow	0	63	157	404	256	0

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	974	256	256	0	-	0
Stage 1	256	-	-	-	-	-
Stage 2	718	-	-	-	-	-
Critical Hdwy	6.43	6.23	4.13	-	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	2.227	-	-	-
Pot Cap-1 Maneuver	278	780	1303	-	-	-
Stage 1	784	-	-	-	-	-
Stage 2	481	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	235	780	1303	-	-	-
Mov Cap-2 Maneuver	235	-	-	-	-	-
Stage 1	662	-	-	-	-	-
Stage 2	481	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	10	2.3	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	1303	-	780	-	-
HCM Lane V/C Ratio	0.121	-	0.08	-	-
HCM Control Delay (s)	8.1	0	10	-	-
HCM Lane LOS	A	A	B	-	-
HCM 95th %tile Q(veh)	0.4	-	0.3	-	-

HCM 6th Signalized Intersection Summary
32: US 278 & Development Drwy

07/14/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	415	5	690	285	5	710
Future Volume (veh/h)	415	5	690	285	5	710
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1900	1885	1885	1885	1885
Adj Flow Rate, veh/h	451	5	750	0	5	772
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	1	1	1	1
Cap, veh/h	506	6	1068		321	1068
Arrive On Green	0.28	0.28	0.57	0.00	0.19	0.19
Sat Flow, veh/h	1784	20	1885	1598	718	1885
Grp Volume(v), veh/h	457	0	750	0	5	772
Grp Sat Flow(s),veh/h/ln	1807	0	1885	1598	718	1885
Q Serve(g_s), s	14.6	0.0	17.2	0.0	0.4	23.1
Cycle Q Clear(g_c), s	14.6	0.0	17.2	0.0	17.6	23.1
Prop In Lane	0.99	0.01		1.00	1.00	
Lane Grp Cap(c), veh/h	512	0	1068		321	1068
V/C Ratio(X)	0.89	0.00	0.70		0.02	0.72
Avail Cap(c_a), veh/h	587	0	1068		321	1068
HCM Platoon Ratio	1.00	1.00	1.00	1.00	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	20.6	0.0	9.4	0.0	25.5	20.0
Incr Delay (d2), s/veh	14.6	0.0	3.9	0.0	0.1	4.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.2	0.0	5.2	0.0	0.1	12.2
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	35.2	0.0	13.2	0.0	25.6	24.2
LnGrp LOS	D	A	B		C	C
Approach Vol, veh/h	457		750	A		777
Approach Delay, s/veh	35.2		13.2			24.2
Approach LOS	D		B			C

Timer - Assigned Phs		2				6	8
Phs Duration (G+Y+Rc), s		38.5				38.5	21.5
Change Period (Y+Rc), s		4.5				4.5	4.5
Max Green Setting (Gmax), s		31.5				31.5	19.5
Max Q Clear Time (g_c+I1), s		19.2				25.1	16.6
Green Ext Time (p_c), s		3.6				2.5	0.5

Intersection Summary	
HCM 6th Ctrl Delay	22.6
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
33: US 278 & Development Drwy 1

07/14/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	470	30	370	325	20	245
Future Volume (veh/h)	470	30	370	325	20	245
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1900	1900	1885	1885	1856	1856
Adj Flow Rate, veh/h	511	33	402	0	22	266
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	0	0	1	1	3	3
Cap, veh/h	584	520	994		547	978
Arrive On Green	0.32	0.32	0.70	0.00	0.53	0.53
Sat Flow, veh/h	1810	1610	1885	1598	975	1856
Grp Volume(v), veh/h	511	33	402	0	22	266
Grp Sat Flow(s),veh/h/ln	1810	1610	1885	1598	975	1856
Q Serve(g_s), s	16.0	0.9	5.3	0.0	0.8	4.7
Cycle Q Clear(g_c), s	16.0	0.9	5.3	0.0	6.1	4.7
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	584	520	994		547	978
V/C Ratio(X)	0.87	0.06	0.40		0.04	0.27
Avail Cap(c_a), veh/h	829	738	994		547	978
HCM Platoon Ratio	1.00	1.00	1.33	1.33	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	19.2	14.0	5.0	0.0	9.7	7.8
Incr Delay (d2), s/veh	7.6	0.1	1.2	0.0	0.1	0.7
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	7.4	0.3	1.5	0.0	0.1	1.4
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	26.7	14.1	6.3	0.0	9.8	8.5
LnGrp LOS	C	B	A		A	A
Approach Vol, veh/h	544		402	A		288
Approach Delay, s/veh	26.0		6.3			8.6
Approach LOS	C		A			A

Timer - Assigned Phs		2				6	8
Phs Duration (G+Y+Rc), s		36.1				36.1	23.9
Change Period (Y+Rc), s		4.5				4.5	4.5
Max Green Setting (Gmax), s		23.5				23.5	27.5
Max Q Clear Time (g_c+I1), s		7.3				8.1	18.0
Green Ext Time (p_c), s		1.8				1.2	1.4

Intersection Summary	
HCM 6th Ctrl Delay	15.5
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (vph)	0	250	175	290	425	0
Future Volume (vph)	0	250	175	290	425	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00	
Frt		1.00	1.00	0.85	1.00	
Flt Protected		1.00	1.00	1.00	0.95	
Satd. Flow (prot)		1900	1462	1242	1228	
Flt Permitted		1.00	1.00	1.00	0.95	
Satd. Flow (perm)		1900	1462	1242	1228	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	272	190	315	462	0
RTOR Reduction (vph)	0	0	0	231	0	0
Lane Group Flow (vph)	0	272	190	84	462	0
Heavy Vehicles (%)	0%	0%	30%	30%	47%	47%
Turn Type		NA	NA	Perm	pm+pt	Perm
Protected Phases		4	8		1	
Permitted Phases	4			8	6	6
Actuated Green, G (s)		11.7	11.7	11.7	23.1	
Effective Green, g (s)		11.7	11.7	11.7	23.1	
Actuated g/C Ratio		0.27	0.27	0.27	0.53	
Clearance Time (s)		4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		507	390	331	647	
v/s Ratio Prot		c0.14	0.13		c0.38	
v/s Ratio Perm				0.07		
v/c Ratio		0.54	0.49	0.25	0.71	
Uniform Delay, d1		13.7	13.5	12.6	7.8	
Progression Factor		1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.1	1.0	0.4	6.6	
Delay (s)		14.8	14.5	13.0	14.5	
Level of Service		B	B	B	B	
Approach Delay (s)		14.8	13.6		14.5	
Approach LOS		B	B		B	

Intersection Summary			
HCM 2000 Control Delay	14.2	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.65		
Actuated Cycle Length (s)	43.8	Sum of lost time (s)	9.0
Intersection Capacity Utilization	44.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	5.3

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	515	160	25	355	110	15
Future Vol, veh/h	515	160	25	355	110	15
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	310	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	29	29	24	24	36	36
Mvmt Flow	560	174	27	386	120	16

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	734	0	1087	647
Stage 1	-	-	-	-	647	-
Stage 2	-	-	-	-	440	-
Critical Hdwy	-	-	4.34	-	6.76	6.56
Critical Hdwy Stg 1	-	-	-	-	5.76	-
Critical Hdwy Stg 2	-	-	-	-	5.76	-
Follow-up Hdwy	-	-	2.416	-	3.824	3.624
Pot Cap-1 Maneuver	-	-	779	-	206	416
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	583	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	779	-	199	416
Mov Cap-2 Maneuver	-	-	-	-	199	-
Stage 1	-	-	-	-	462	-
Stage 2	-	-	-	-	563	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0.6	48.1
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	212	-	-	779	-
HCM Lane V/C Ratio	0.641	-	-	0.035	-
HCM Control Delay (s)	48.1	-	-	9.8	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	3.8	-	-	0.1	-

Appendix 3

2044 Build & No-Build - Synchro Analysis

2044 Build - Synchro Analysis

HCM 6th Signalized Intersection Summary
2: US 278 & Shire Pkwy

05/18/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	55	205	570	180	675	225
Future Volume (veh/h)	55	205	570	180	675	225
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1856	1856	1870	1870	1870	1870
Adj Flow Rate, veh/h	73	0	877	0	1107	262
Peak Hour Factor	0.75	0.44	0.65	0.68	0.61	0.86
Percent Heavy Veh, %	3	3	2	2	2	2
Cap, veh/h	94		1003		1031	1631
Arrive On Green	0.05	0.00	0.54	0.00	0.50	1.00
Sat Flow, veh/h	1767	1572	1870	1585	3456	1870
Grp Volume(v), veh/h	73	0	877	0	1107	262
Grp Sat Flow(s),veh/h/ln	1767	1572	1870	1585	1728	1870
Q Serve(g_s), s	4.9	0.0	49.2	0.0	35.8	0.0
Cycle Q Clear(g_c), s	4.9	0.0	49.2	0.0	35.8	0.0
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	94		1003		1031	1631
V/C Ratio(X)	0.78		0.87		1.07	0.16
Avail Cap(c_a), veh/h	265		1003		1031	1631
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.67	1.67
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.26	0.26
Uniform Delay (d), s/veh	56.1	0.0	24.3	0.0	30.1	0.0
Incr Delay (d2), s/veh	12.8	0.0	10.6	0.0	38.8	0.1
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	2.5	0.0	21.8	0.0	16.6	0.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	68.9	0.0	34.9	0.0	68.9	0.1
LnGrp LOS	E		C		F	A
Approach Vol, veh/h	73	A	877	A		1369
Approach Delay, s/veh	68.9		34.9			55.8
Approach LOS	E		C			E

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	40.3	68.8			109.1	10.9
Change Period (Y+Rc), s	4.5	4.5			4.5	4.5
Max Green Setting (Gmax), s	35.8	52.7			93.0	18.0
Max Q Clear Time (g_c+I1), s	37.8	51.2			2.0	6.9
Green Ext Time (p_c), s	0.0	0.8			1.5	0.1

Intersection Summary	
HCM 6th Ctrl Delay	48.3
HCM 6th LOS	D

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
3: US 278 & I-20 EB Ramps

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	415	0	515	0	0	0	0	710	65	40	385	0
Future Volume (veh/h)	415	0	515	0	0	0	0	710	65	40	385	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1796	0	1796				0	1870	1870	1841	1841	0
Adj Flow Rate, veh/h	703	0	858				0	1164	0	53	481	0
Peak Hour Factor	0.59	0.25	0.60				0.25	0.61	0.78	0.75	0.80	0.25
Percent Heavy Veh, %	7	0	7				0	2	2	4	4	0
Cap, veh/h	1756	0	806				0	1151		121	729	0
Arrive On Green	0.53	0.00	0.53				0.00	0.11	0.00	0.03	0.40	0.00
Sat Flow, veh/h	3319	0	1522				0	3647	1585	1753	1841	0
Grp Volume(v), veh/h	703	0	858				0	1164	0	53	481	0
Grp Sat Flow(s),veh/h/ln	1659	0	1522				0	1777	1585	1753	1841	0
Q Serve(g_s), s	15.2	0.0	63.5				0.0	38.9	0.0	2.3	25.6	0.0
Cycle Q Clear(g_c), s	15.2	0.0	63.5				0.0	38.9	0.0	2.3	25.6	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	1756	0	806				0	1151		121	729	0
V/C Ratio(X)	0.40	0.00	1.07				0.00	1.01		0.44	0.66	0.00
Avail Cap(c_a), veh/h	1756	0	806				0	1151		133	729	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	0.33	0.33	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.51	0.00	0.54	0.54	0.00
Uniform Delay (d), s/veh	16.9	0.0	28.3				0.0	53.6	0.0	31.1	29.6	0.0
Incr Delay (d2), s/veh	0.1	0.0	50.5				0.0	21.8	0.0	1.4	2.5	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	5.6	0.0	32.8				0.0	21.9	0.0	1.0	11.3	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	17.0	0.0	78.8				0.0	75.4	0.0	32.5	32.2	0.0
LnGrp LOS	B	A	F				A	F		C	C	A
Approach Vol, veh/h		1561						1164	A		534	
Approach Delay, s/veh		51.0						75.4			32.2	
Approach LOS		D						E			C	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	8.6	43.4		68.0		52.0
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s	5.0	38.0		63.5		47.5
Max Q Clear Time (g_c+I1), s	4.3	40.9		65.5		27.6
Green Ext Time (p_c), s	0.0	0.0		0.0		2.6

Intersection Summary	
HCM 6th Ctrl Delay	56.6
HCM 6th LOS	E

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM Signalized Intersection Capacity Analysis
4: US 278 & I-20 WB Ramps

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	75	0	85	150	975	0	0	350	295
Future Volume (vph)	0	0	0	75	0	85	150	975	0	0	350	295
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5		4.5	4.5	4.5			4.5	4.5
Lane Util. Factor				1.00		1.00	0.91	0.91			1.00	1.00
Frt				1.00		0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (prot)				1687		1509	1579	3322			1827	1553
Flt Permitted				0.95		1.00	0.95	1.00			1.00	1.00
Satd. Flow (perm)				1687		1509	1579	3322			1827	1553
Peak-hour factor, PHF	0.25	0.25	0.25	0.69	0.75	0.56	0.73	0.81	0.25	0.25	0.77	0.79
Adj. Flow (vph)	0	0	0	109	0	152	205	1204	0	0	455	373
RTOR Reduction (vph)	0	0	0	0	0	136	0	0	0	0	0	260
Lane Group Flow (vph)	0	0	0	109	0	16	184	1225	0	0	455	113
Heavy Vehicles (%)	5%	5%	5%	7%	7%	7%	4%	4%	4%	4%	4%	4%
Turn Type				Prot		Perm	Split	NA			NA	Perm
Protected Phases				8			2	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				13.0		13.0	57.0	57.0			36.5	36.5
Effective Green, g (s)				13.0		13.0	57.0	57.0			36.5	36.5
Actuated g/C Ratio				0.11		0.11	0.48	0.48			0.30	0.30
Clearance Time (s)				4.5		4.5	4.5	4.5			4.5	4.5
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				182		163	750	1577			555	472
v/s Ratio Prot				c0.06			0.12	c0.37			c0.25	
v/s Ratio Perm						0.01						0.07
v/c Ratio				0.60		0.10	0.25	0.78			0.82	0.24
Uniform Delay, d1				51.0		48.2	18.7	26.2			38.7	31.3
Progression Factor				1.00		1.00	0.37	0.46			0.83	0.42
Incremental Delay, d2				5.2		0.3	0.5	2.4			12.6	1.2
Delay (s)				56.2		48.5	7.4	14.6			44.8	14.3
Level of Service				E		D	A	B			D	B
Approach Delay (s)		0.0			51.7			13.6			31.0	
Approach LOS		A			D			B			C	

Intersection Summary			
HCM 2000 Control Delay	23.4	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.77		
Actuated Cycle Length (s)	120.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	59.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	58.7
Intersection LOS	F

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	105	160	310	475	35
Future Vol, veh/h	20	105	160	310	475	35
Peak Hour Factor	0.25	0.64	0.54	0.78	0.88	0.25
Heavy Vehicles, %	6	6	5	5	11	11
Mvmt Flow	80	164	296	397	540	140
Number of Lanes	1	1	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	2
HCM Control Delay	13.1	20.3	114.3
HCM LOS	B	C	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	0%
Vol Thru, %	0%	100%	0%	0%	93%
Vol Right, %	0%	0%	0%	100%	7%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	160	310	20	105	510
LT Vol	160	0	20	0	0
Through Vol	0	310	0	0	475
RT Vol	0	0	0	105	35
Lane Flow Rate	296	397	80	164	680
Geometry Grp	7	7	7	7	4
Degree of Util (X)	0.553	0.687	0.178	0.31	1.165
Departure Headway (Hd)	6.96	6.449	8.451	7.213	6.172
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	521	564	427	502	591
Service Time	4.66	4.149	6.151	4.913	4.181
HCM Lane V/C Ratio	0.568	0.704	0.187	0.327	1.151
HCM Control Delay	17.9	22.1	13	13.1	114.3
HCM Lane LOS	C	C	B	B	F
HCM 95th-tile Q	3.3	5.3	0.6	1.3	23.1

HCM 6th Signalized Intersection Summary
32: US 278 & Stanton Grove Drwy/Frontage Rd

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	50	45	65	65	95	95	715	250	60	535	55
Future Volume (veh/h)	20	50	45	65	65	95	95	715	250	60	535	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1841	1841	1841	1841	1841	1841	1826	1826	1826
Adj Flow Rate, veh/h	22	54	49	71	71	103	103	777	0	65	582	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	4	4	4	4	4	4	5	5	5
Cap, veh/h	105	132	112	161	271	230	457	1705		759	2191	225
Arrive On Green	0.07	0.07	0.07	0.04	0.15	0.15	0.10	0.98	0.00	0.51	1.00	1.00
Sat Flow, veh/h	1182	1826	1547	1753	1841	1560	1753	3497	1560	1739	3175	327
Grp Volume(v), veh/h	22	54	49	71	71	103	103	777	0	65	317	325
Grp Sat Flow(s),veh/h/ln	1182	1826	1547	1753	1841	1560	1753	1749	1560	1739	1735	1767
Q Serve(g_s), s	2.2	3.4	3.2	0.0	4.1	7.2	4.0	1.2	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	6.3	3.4	3.2	0.0	4.1	7.2	4.0	1.2	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.18
Lane Grp Cap(c), veh/h	105	132	112	161	271	230	457	1705		759	1197	1220
V/C Ratio(X)	0.21	0.41	0.44	0.44	0.26	0.45	0.23	0.46		0.09	0.27	0.27
Avail Cap(c_a), veh/h	241	342	290	248	575	487	597	1705		759	1197	1220
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.6	53.2	40.0	54.8	45.4	46.7	17.2	0.8	0.0	5.6	0.0	0.0
Incr Delay (d2), s/veh	1.0	2.0	2.7	1.9	0.5	1.4	0.2	0.9	0.0	0.0	0.5	0.5
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.7	1.6	1.5	2.1	1.9	2.8	1.5	0.5	0.0	0.4	0.2	0.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.6	55.3	42.6	56.7	45.9	48.1	17.5	1.7	0.0	5.7	0.5	0.5
LnGrp LOS	E	E	D	E	D	D	B	A		A	A	A
Approach Vol, veh/h		125			245			880	A		707	
Approach Delay, s/veh		50.7			49.9			3.5			1.0	
Approach LOS		D			D			A			A	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	34.8	63.0	9.0	13.2	10.5	87.3		22.2
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	10.5	58.5	10.5	22.5	15.5	53.5		37.5
Max Q Clear Time (g_c+I1), s	2.0	3.2	2.0	8.3	6.0	2.0		9.2
Green Ext Time (p_c), s	0.1	5.7	0.1	0.4	0.1	3.9		0.6

Intersection Summary	
HCM 6th Ctrl Delay	11.4
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
33: US 278 & Stanton Grove Drwy/Development Drwy 1

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	25	40	65	25	5	135	445	250	20	535	35
Future Volume (veh/h)	20	25	40	65	25	5	135	445	250	20	535	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1900	1900	1900	1826	1826	1826	1826	1826	1826
Adj Flow Rate, veh/h	22	27	43	71	27	5	147	484	0	22	582	38
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	6	6	6	0	0	0	5	5	5	5	5	5
Cap, veh/h	105	85	72	149	232	196	873	1466		442	1419	93
Arrive On Green	0.05	0.05	0.05	0.04	0.12	0.12	0.67	1.00	0.00	0.43	0.43	0.43
Sat Flow, veh/h	1333	1811	1535	1810	1900	1610	1739	1826	1547	890	3306	216
Grp Volume(v), veh/h	22	27	43	71	27	5	147	484	0	22	305	315
Grp Sat Flow(s),veh/h/ln	1333	1811	1535	1810	1900	1610	1739	1826	1547	890	1735	1787
Q Serve(g_s), s	1.9	1.7	3.3	0.0	1.5	0.3	0.0	0.0	0.0	1.7	14.6	14.7
Cycle Q Clear(g_c), s	3.5	1.7	3.3	0.0	1.5	0.3	0.0	0.0	0.0	1.7	14.6	14.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.12
Lane Grp Cap(c), veh/h	105	85	72	149	232	196	873	1466		442	744	767
V/C Ratio(X)	0.21	0.32	0.60	0.47	0.12	0.03	0.17	0.33		0.05	0.41	0.41
Avail Cap(c_a), veh/h	282	324	275	239	578	490	873	1466		442	744	767
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	56.9	55.3	56.1	55.3	46.9	46.4	4.5	0.0	0.0	20.0	23.7	23.7
Incr Delay (d2), s/veh	1.0	2.1	7.8	2.3	0.2	0.1	0.1	0.6	0.0	0.2	1.7	1.6
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.7	0.8	1.4	2.2	0.7	0.1	0.7	0.2	0.0	0.4	6.1	6.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	57.9	57.5	63.9	57.6	47.1	46.4	4.6	0.6	0.0	20.3	25.4	25.4
LnGrp LOS	E	E	E	E	D	D	A	A		C	C	C
Approach Vol, veh/h		92			103			631	A		642	
Approach Delay, s/veh		60.6			54.3			1.5			25.2	
Approach LOS		E			D			A			C	

Timer - Assigned Phs		2	3	4	5	6		8				
Phs Duration (G+Y+Rc), s		100.9	9.0	10.1	44.9	56.0		19.1				
Change Period (Y+Rc), s		4.5	4.5	4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s		74.5	10.5	21.5	18.5	51.5		36.5				
Max Q Clear Time (g_c+I1), s		2.0	2.0	5.5	2.0	16.7		3.5				
Green Ext Time (p_c), s		3.1	0.1	0.2	0.3	3.8		0.1				

Intersection Summary	
HCM 6th Ctrl Delay	19.3
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM Signalized Intersection Capacity Analysis
35: Sewell Rd/Development Drwy 6 & Frontage Rd

05/18/2022

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	145	185	0	5	105	570	455	10	0	100	115	0
Future Volume (vph)	145	185	0	5	105	570	455	10	0	100	115	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5		4.5		4.5	4.5
Lane Util. Factor	1.00	0.95			1.00	0.95	1.00		1.00		1.00	1.00
Frt	1.00	1.00			1.00	1.00	0.85		0.88		1.00	0.85
Flt Protected	0.95	1.00			0.95	1.00	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1736	3471			1787	3574	1599		1659		1805	1615
Flt Permitted	0.27	1.00			0.63	1.00	1.00		0.96		0.51	1.00
Satd. Flow (perm)	500	3471			1177	3574	1599		1605		961	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	158	201	0	5	114	620	495	11	0	109	125	0
RTOR Reduction (vph)	0	0	0	0	0	0	329	0	104	0	0	38
Lane Group Flow (vph)	158	201	0	0	119	620	166	0	16	0	125	16
Heavy Vehicles (%)	4%	4%	4%	1%	1%	1%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	Perm	NA	Perm	Perm	NA		pm+pt	NA
Protected Phases	5	2				6			8		7	4
Permitted Phases	2			6	6		6	8			4	
Actuated Green, G (s)	24.0	24.0			15.9	15.9	15.9		6.4		14.5	14.5
Effective Green, g (s)	24.0	24.0			15.9	15.9	15.9		6.4		14.5	14.5
Actuated g/C Ratio	0.51	0.51			0.33	0.33	0.33		0.13		0.31	0.31
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5		4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	346	1753			393	1196	535		216		357	493
v/s Ratio Prot	c0.03	0.06				0.17					c0.03	0.01
v/s Ratio Perm	c0.20				0.10		0.10		0.01		c0.08	
v/c Ratio	0.46	0.11			0.30	0.52	0.31		0.07		0.35	0.03
Uniform Delay, d1	7.0	6.2			11.7	12.7	11.7		18.0		12.7	11.6
Progression Factor	1.00	1.00			1.00	1.00	1.00		1.00		1.00	1.00
Incremental Delay, d2	1.0	0.0			0.4	0.4	0.3		0.1		0.6	0.0
Delay (s)	8.0	6.2			12.1	13.1	12.1		18.1		13.3	11.6
Level of Service	A	A			B	B	B		B		B	B
Approach Delay (s)		7.0				12.6			18.1			12.8
Approach LOS		A				B			B			B

Intersection Summary			
HCM 2000 Control Delay	11.9	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.51		
Actuated Cycle Length (s)	47.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	54.2%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	50
Future Volume (vph)	50
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	54
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	0%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
36: Old Mill Rd & Frontage Rd & Development Drwy 8

05/18/2022

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	5	0	60	340	40	180	140	950	665	95	35	170
Future Volume (vph)	5	0	60	340	40	180	140	950	665	95	35	170
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.0	4.5	4.5		4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00	1.00	1.00	0.95		0.97	0.95	1.00	1.00	1.00
Frt		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	1.00
Flt Protected		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1787	1881	1599	1787	3340		2993	3085	1380	1327	1397
Flt Permitted		0.40	1.00	1.00	0.71	1.00		0.95	1.00	1.00	0.37	1.00
Satd. Flow (perm)		760	1881	1599	1344	3340		2993	3085	1380	511	1397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	0	65	370	43	196	152	1033	723	103	38	185
RTOR Reduction (vph)	0	0	0	0	0	131	0	0	0	27	0	0
Lane Group Flow (vph)	0	5	65	370	43	217	0	1033	723	76	38	185
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	17%	17%	17%	36%	36%
Turn Type	Perm	Perm	NA	Free	Perm	NA		Prot	NA	Perm	Perm	NA
Protected Phases			4			8		5	2			6
Permitted Phases	4	4		Free	8					2	6	
Actuated Green, G (s)		9.9	9.9	72.0	9.9	9.9		29.6	53.1	53.1	19.0	19.0
Effective Green, g (s)		9.9	9.9	72.0	9.9	9.9		29.6	53.1	53.1	19.0	19.0
Actuated g/C Ratio		0.14	0.14	1.00	0.14	0.14		0.41	0.74	0.74	0.26	0.26
Clearance Time (s)		4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		104	258	1599	184	459		1230	2275	1017	134	368
v/s Ratio Prot			0.03			c0.06		c0.35	0.23			c0.13
v/s Ratio Perm		0.01		0.23	0.03					0.06	0.07	
v/c Ratio		0.05	0.25	0.23	0.23	0.47		0.84	0.32	0.07	0.28	0.50
Uniform Delay, d1		27.0	27.7	0.0	27.7	28.6		19.1	3.2	2.6	21.1	22.5
Progression Factor		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.2	0.5	0.3	0.7	0.8		5.2	0.4	0.1	5.2	4.8
Delay (s)		27.2	28.3	0.3	28.3	29.4		24.3	3.6	2.8	26.3	27.3
Level of Service		C	C	A	C	C		C	A	A	C	C
Approach Delay (s)			4.8			29.3			15.0			27.2
Approach LOS			A			C			B			C

Intersection Summary			
HCM 2000 Control Delay	16.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.67		
Actuated Cycle Length (s)	72.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	56.8%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	0
Future Volume (vph)	0
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	0
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	36%
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 6th Signalized Intersection Summary
42: Frontage Rd & Development Drwy 5

05/18/2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	145	215	175	455	115	50
Future Volume (veh/h)	145	215	175	455	115	50
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1841	1841	1841	1841	1900	1900
Adj Flow Rate, veh/h	158	234	190	0	125	54
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	4	4	4	4	0	0
Cap, veh/h	655	1682	648		335	299
Arrive On Green	0.13	0.48	0.19	0.00	0.19	0.19
Sat Flow, veh/h	1753	3589	3589	1560	1810	1610
Grp Volume(v), veh/h	158	234	190	0	125	54
Grp Sat Flow(s),veh/h/ln	1753	1749	1749	1560	1810	1610
Q Serve(g_s), s	1.6	1.0	1.3	0.0	1.6	0.8
Cycle Q Clear(g_c), s	1.6	1.0	1.3	0.0	1.6	0.8
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	655	1682	648		335	299
V/C Ratio(X)	0.24	0.14	0.29		0.37	0.18
Avail Cap(c_a), veh/h	761	3631	2386		1208	1075
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	5.8	3.9	9.5	0.0	9.6	9.3
Incr Delay (d2), s/veh	0.2	0.0	0.2	0.0	0.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.3	0.0	0.5	0.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	6.0	3.9	9.7	0.0	10.3	9.5
LnGrp LOS	A	A	A		B	A
Approach Vol, veh/h		392	190	A	179	
Approach Delay, s/veh		4.8	9.7		10.1	
Approach LOS		A	A		B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		17.5		9.5	8.0	9.5
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		28.0		18.0	5.1	18.4
Max Q Clear Time (g_c+I1), s		3.0		3.6	3.6	3.3
Green Ext Time (p_c), s		1.3		0.4	0.1	0.8

Intersection Summary	
HCM 6th Ctrl Delay	7.2
HCM 6th LOS	A

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	190	0	0	360	0	0
Future Vol, veh/h	190	0	0	360	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	310	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	207	0	0	391	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	207	0	598	207
Stage 1	-	-	-	-	207	-
Stage 2	-	-	-	-	391	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1370	-	468	839
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	688	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1370	-	468	839
Mov Cap-2 Maneuver	-	-	-	-	468	-
Stage 1	-	-	-	-	832	-
Stage 2	-	-	-	-	688	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1370	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

HCM 6th Signalized Intersection Summary
2: US 278 & Shire Pkwy

05/18/2022

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	255	900	415	50	155	600
Future Volume (veh/h)	255	900	415	50	155	600
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	1.00		1.00	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	340	0	638	0	254	698
Peak Hour Factor	0.75	0.44	0.65	0.68	0.61	0.86
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	514		900		396	1191
Arrive On Green	0.29	0.00	0.48	0.00	0.11	0.63
Sat Flow, veh/h	1795	1598	1885	1598	3483	1885
Grp Volume(v), veh/h	340	0	638	0	254	698
Grp Sat Flow(s),veh/h/ln	1795	1598	1885	1598	1742	1885
Q Serve(g_s), s	18.3	0.0	29.4	0.0	7.7	23.8
Cycle Q Clear(g_c), s	18.3	0.0	29.4	0.0	7.7	23.8
Prop In Lane	1.00	1.00		1.00	1.00	
Lane Grp Cap(c), veh/h	514		900		396	1191
V/C Ratio(X)	0.66		0.71		0.64	0.59
Avail Cap(c_a), veh/h	514		900		396	1191
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	0.76	0.76
Uniform Delay (d), s/veh	34.6	0.0	22.7	0.0	46.6	11.8
Incr Delay (d2), s/veh	6.6	0.0	4.7	0.0	2.7	1.6
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.9	0.0	12.7	0.0	3.4	9.0
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	41.1	0.0	27.4	0.0	49.3	13.5
LnGrp LOS	D		C		D	B
Approach Vol, veh/h	340	A	638	A		952
Approach Delay, s/veh	41.1		27.4			23.0
Approach LOS	D		C			C

Timer - Assigned Phs	1	2			6	8
Phs Duration (G+Y+Rc), s	17.0	57.0			74.0	36.0
Change Period (Y+Rc), s	4.5	4.5			4.5	4.5
Max Green Setting (Gmax), s	12.5	52.5			69.5	31.5
Max Q Clear Time (g_c+I1), s	9.7	31.4			25.8	20.3
Green Ext Time (p_c), s	0.2	3.6			5.0	0.8

Intersection Summary	
HCM 6th Ctrl Delay	27.7
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR, WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
3: US 278 & I-20 EB Ramps

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	490	0	130	0	0	0	0	1240	75	75	625	0
Future Volume (veh/h)	490	0	130	0	0	0	0	1240	75	75	625	0
Initial Q (Qb), veh	0	0	0				0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00				1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00				1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No						No			No	
Adj Sat Flow, veh/h/ln	1856	0	1856				0	1885	1885	1885	1885	0
Adj Flow Rate, veh/h	831	0	217				0	2033	0	100	781	0
Peak Hour Factor	0.59	0.25	0.60				0.25	0.61	0.78	0.75	0.80	0.25
Percent Heavy Veh, %	3	0	3				0	1	1	1	1	0
Cap, veh/h	870	0	399				0	2079		265	1253	0
Arrive On Green	0.25	0.00	0.25				0.00	1.00	0.00	0.04	0.66	0.00
Sat Flow, veh/h	3428	0	1572				0	3676	1598	1795	1885	0
Grp Volume(v), veh/h	831	0	217				0	2033	0	100	781	0
Grp Sat Flow(s),veh/h/ln	1714	0	1572				0	1791	1598	1795	1885	0
Q Serve(g_s), s	26.3	0.0	13.1				0.0	0.0	0.0	2.3	26.1	0.0
Cycle Q Clear(g_c), s	26.3	0.0	13.1				0.0	0.0	0.0	2.3	26.1	0.0
Prop In Lane	1.00		1.00				0.00		1.00	1.00		0.00
Lane Grp Cap(c), veh/h	870	0	399				0	2079		265	1253	0
V/C Ratio(X)	0.96	0.00	0.54				0.00	0.98		0.38	0.62	0.00
Avail Cap(c_a), veh/h	870	0	399				0	2079		269	1253	0
HCM Platoon Ratio	1.00	1.00	1.00				1.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00				0.00	0.09	0.00	0.09	0.09	0.00
Uniform Delay (d), s/veh	40.4	0.0	35.5				0.0	0.0	0.0	7.5	10.6	0.0
Incr Delay (d2), s/veh	20.5	0.0	1.5				0.0	2.7	0.0	0.1	0.2	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0				0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	13.3	0.0	5.1				0.0	0.8	0.0	0.8	9.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	60.9	0.0	37.1				0.0	2.7	0.0	7.6	10.8	0.0
LnGrp LOS	E	A	D				A	A		A	B	A
Approach Vol, veh/h		1048						2033	A		881	
Approach Delay, s/veh		56.0						2.7			10.4	
Approach LOS		E						A			B	

Timer - Assigned Phs	1	2		4		6
Phs Duration (G+Y+Rc), s	9.3	68.3		32.4		77.6
Change Period (Y+Rc), s	4.5	4.5		4.5		4.5
Max Green Setting (Gmax), s	5.0	63.6		27.9		73.1
Max Q Clear Time (g_c+I1), s	4.3	2.0		28.3		28.1
Green Ext Time (p_c), s	0.0	29.6		0.0		6.0

Intersection Summary	
HCM 6th Ctrl Delay	18.5
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM Signalized Intersection Capacity Analysis
4: US 278 & I-20 WB Ramps

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	85	0	60	785	945	0	0	615	510
Future Volume (vph)	0	0	0	85	0	60	785	945	0	0	615	510
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)				4.5		4.5	4.5	4.5			4.5	4.5
Lane Util. Factor				1.00		1.00	0.91	0.91			1.00	1.00
Frt				1.00		0.85	1.00	1.00			1.00	0.85
Flt Protected				0.95		1.00	0.95	0.99			1.00	1.00
Satd. Flow (prot)				1736		1553	1626	3385			1845	1568
Flt Permitted				0.95		1.00	0.95	0.99			1.00	1.00
Satd. Flow (perm)				1736		1553	1626	3385			1845	1568
Peak-hour factor, PHF	0.25	0.25	0.25	0.69	0.75	0.56	0.73	0.81	0.25	0.25	0.77	0.79
Adj. Flow (vph)	0	0	0	123	0	107	1075	1167	0	0	799	646
RTOR Reduction (vph)	0	0	0	0	0	100	0	0	0	0	0	112
Lane Group Flow (vph)	0	0	0	123	0	7	731	1511	0	0	799	534
Heavy Vehicles (%)	2%	2%	2%	4%	4%	4%	1%	1%	1%	3%	3%	3%
Turn Type				Prot		Perm	Split	NA			NA	Perm
Protected Phases				8			2	2			6	
Permitted Phases						8						6
Actuated Green, G (s)				7.5		7.5	46.5	46.5			42.5	42.5
Effective Green, g (s)				7.5		7.5	46.5	46.5			42.5	42.5
Actuated g/C Ratio				0.07		0.07	0.42	0.42			0.39	0.39
Clearance Time (s)				4.5		4.5	4.5	4.5			4.5	4.5
Vehicle Extension (s)				3.0		3.0	3.0	3.0			3.0	3.0
Lane Grp Cap (vph)				118		105	687	1430			712	605
v/s Ratio Prot				c0.07			c0.45	0.45			c0.43	
v/s Ratio Perm						0.00						0.34
v/c Ratio				1.04		0.07	1.06	1.06			1.12	0.88
Uniform Delay, d1				51.2		48.0	31.8	31.8			33.8	31.4
Progression Factor				1.00		1.00	0.85	0.85			0.84	0.75
Incremental Delay, d2				94.7		0.3	37.7	30.7			71.7	16.2
Delay (s)				145.9		48.3	64.6	57.7			100.1	39.8
Level of Service				F		D	E	E			F	D
Approach Delay (s)		0.0			100.5			60.0			73.2	
Approach LOS		A			F			E			E	

Intersection Summary			
HCM 2000 Control Delay	67.2	HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio	1.09		
Actuated Cycle Length (s)	110.0	Sum of lost time (s)	13.5
Intersection Capacity Utilization	63.7%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Intersection Delay, s/veh	135.1
Intersection LOS	F

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	90	165	305	470	410	50
Future Vol, veh/h	90	165	305	470	410	50
Peak Hour Factor	0.25	0.64	0.54	0.78	0.88	0.25
Heavy Vehicles, %	2	2	2	2	7	7
Mvmt Flow	360	258	565	603	466	200
Number of Lanes	1	1	1	1	1	0

Approach	EB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	2
Conflicting Approach Left	SB	EB	
Conflicting Lanes Left	1	2	0
Conflicting Approach Right	NB		EB
Conflicting Lanes Right	2	0	2
HCM Control Delay	31.9	158.3	190.3
HCM LOS	D	F	F

Lane	NBLn1	NBLn2	EBLn1	EBLn2	SBLn1
Vol Left, %	100%	0%	100%	0%	0%
Vol Thru, %	0%	100%	0%	0%	89%
Vol Right, %	0%	0%	0%	100%	11%
Sign Control	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	305	470	90	165	460
LT Vol	305	0	90	0	0
Through Vol	0	470	0	0	410
RT Vol	0	0	0	165	50
Lane Flow Rate	565	603	360	258	666
Geometry Grp	7	7	7	7	4
Degree of Util (X)	1.257	1.257	0.833	0.511	1.345
Departure Headway (Hd)	8.511	7.992	8.667	7.423	7.27
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes
Cap	429	458	421	490	499
Service Time	6.211	5.692	6.367	5.123	5.333
HCM Lane V/C Ratio	1.317	1.317	0.855	0.527	1.335
HCM Control Delay	159.4	157.2	42.1	17.6	190.3
HCM Lane LOS	F	F	E	C	F
HCM 95th-tile Q	22.5	23.5	7.9	2.9	29.6

HCM 6th Signalized Intersection Summary
32: US 278 & Stanton Grove Drwy/Frontage Rd

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	100	185	190	90	120	130	745	130	140	750	90
Future Volume (veh/h)	100	100	185	190	90	120	130	745	130	140	750	90
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	109	109	201	207	98	130	141	810	0	152	815	98
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	198	293	248	240	456	386	646	1490		667	1311	158
Arrive On Green	0.16	0.16	0.16	0.05	0.25	0.25	0.44	0.85	0.00	0.42	0.83	0.83
Sat Flow, veh/h	1143	1856	1572	1767	1856	1572	1767	3526	1572	1767	3169	381
Grp Volume(v), veh/h	109	109	201	207	98	130	141	810	0	152	453	460
Grp Sat Flow(s),veh/h/ln	1143	1856	1572	1767	1856	1572	1767	1763	1572	1767	1763	1787
Q Serve(g_s), s	10.2	5.8	13.6	2.8	4.6	7.5	0.0	7.2	0.0	0.0	10.1	10.1
Cycle Q Clear(g_c), s	14.9	5.8	13.6	2.8	4.6	7.5	0.0	7.2	0.0	0.0	10.1	10.1
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.21
Lane Grp Cap(c), veh/h	198	293	248	240	456	386	646	1490		667	729	739
V/C Ratio(X)	0.55	0.37	0.81	0.86	0.22	0.34	0.22	0.54		0.23	0.62	0.62
Avail Cap(c_a), veh/h	220	329	279	391	649	550	646	1490		667	729	739
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	47.5	41.4	44.7	48.1	33.1	34.1	10.1	5.5	0.0	9.5	6.4	6.4
Incr Delay (d2), s/veh	2.4	0.8	14.8	10.4	0.2	0.5	0.2	1.4	0.0	0.2	4.0	3.9
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	3.1	2.7	6.1	6.0	2.0	2.8	1.3	1.9	0.0	1.4	2.9	2.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.9	42.2	59.5	58.5	33.3	34.6	10.2	6.9	0.0	9.7	10.4	10.4
LnGrp LOS	D	D	E	E	C	C	B	A		A	B	B
Approach Vol, veh/h		419			435			951	A		1065	
Approach Delay, s/veh		52.5			45.7			7.4			10.3	
Approach LOS		D			D			A			B	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	27.5	51.0	9.6	21.9	28.5	50.0		31.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	11.5	46.5	14.5	19.5	12.5	45.5		38.5
Max Q Clear Time (g_c+I1), s	2.0	9.2	4.8	16.9	2.0	12.1		9.5
Green Ext Time (p_c), s	0.2	5.9	0.4	0.5	0.2	6.0		0.9

Intersection Summary	
HCM 6th Ctrl Delay	20.9
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
33: US 278 & Stanton Grove Drwy/Development Drwy 1

05/18/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	35	145	185	40	15	180	660	125	10	580	55
Future Volume (veh/h)	100	35	145	185	40	15	180	660	125	10	580	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1900	1900	1900	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	109	38	158	201	43	16	196	717	0	11	630	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	0	0	0	3	3	3	3	3	3
Cap, veh/h	203	226	191	249	393	333	686	1320		387	1434	136
Arrive On Green	0.12	0.12	0.12	0.05	0.21	0.21	0.46	1.00	0.00	0.44	0.44	0.44
Sat Flow, veh/h	1344	1870	1585	1810	1900	1610	1767	1856	1572	729	3253	309
Grp Volume(v), veh/h	109	38	158	201	43	16	196	717	0	11	341	349
Grp Sat Flow(s),veh/h/ln	1344	1870	1585	1810	1900	1610	1767	1856	1572	729	1763	1800
Q Serve(g_s), s	8.7	2.0	10.7	1.7	2.0	0.9	0.0	0.0	0.0	0.9	14.7	14.8
Cycle Q Clear(g_c), s	10.7	2.0	10.7	1.7	2.0	0.9	0.0	0.0	0.0	0.9	14.7	14.8
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.17
Lane Grp Cap(c), veh/h	203	226	191	249	393	333	686	1320		387	777	794
V/C Ratio(X)	0.54	0.17	0.83	0.81	0.11	0.05	0.29	0.54		0.03	0.44	0.44
Avail Cap(c_a), veh/h	267	315	267	373	613	520	686	1320		387	777	794
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	48.2	43.4	47.2	47.9	35.4	34.9	11.0	0.0	0.0	17.5	21.3	21.3
Incr Delay (d2), s/veh	2.2	0.3	13.7	7.7	0.1	0.1	0.2	1.6	0.0	0.1	1.8	1.8
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	3.1	1.0	5.0	5.9	1.0	0.4	1.9	0.6	0.0	0.2	6.1	6.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.4	43.8	60.9	55.6	35.5	35.0	11.2	1.6	0.0	17.6	23.1	23.1
LnGrp LOS	D	D	E	E	D	C	B	A		B	C	C
Approach Vol, veh/h		305			260			913	A		701	
Approach Delay, s/veh		55.0			51.0			3.7			23.0	
Approach LOS		E			D			A			C	

Timer - Assigned Phs		2	3	4	5	6		8				
Phs Duration (G+Y+Rc), s		82.7	9.5	17.8	29.7	53.0		27.3				
Change Period (Y+Rc), s		4.5	4.5	4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s		65.5	12.5	18.5	12.5	48.5		35.5				
Max Q Clear Time (g_c+I1), s		2.0	3.7	12.7	2.0	16.8		4.0				
Green Ext Time (p_c), s		5.3	0.4	0.5	0.4	4.2		0.2				

Intersection Summary	
HCM 6th Ctrl Delay	22.7
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM Signalized Intersection Capacity Analysis
35: Sewell Rd/Development Drwy 6 & Frontage Rd

05/18/2022

Movement	EBL	EBT	EBR	WBU	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	85	525	10	5	55	380	230	10	0	110	335	0
Future Volume (vph)	85	525	10	5	55	380	230	10	0	110	335	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.5	4.5			4.5	4.5	4.5		4.5		4.5	4.5
Lane Util. Factor	1.00	0.95			1.00	0.95	1.00		1.00		1.00	1.00
Frt	1.00	1.00			1.00	1.00	0.85		0.88		1.00	0.85
Flt Protected	0.95	1.00			0.95	1.00	1.00		1.00		0.95	1.00
Satd. Flow (prot)	1752	3495			1787	3574	1599		1658		1805	1615
Flt Permitted	0.37	1.00			0.43	1.00	1.00		0.96		0.49	1.00
Satd. Flow (perm)	684	3495			814	3574	1599		1592		939	1615
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	92	571	11	5	60	413	250	11	0	120	364	0
RTOR Reduction (vph)	0	2	0	0	0	0	183	0	113	0	0	82
Lane Group Flow (vph)	92	580	0	0	65	413	67	0	18	0	364	48
Heavy Vehicles (%)	3%	3%	3%	1%	1%	1%	1%	0%	0%	0%	0%	0%
Turn Type	pm+pt	NA		Perm	Perm	NA	Perm	Perm	NA		pm+pt	NA
Protected Phases	5	2				6			8		7	4
Permitted Phases	2			6	6		6	8			4	
Actuated Green, G (s)	19.1	19.1			12.0	12.0	12.0		6.2		16.4	16.4
Effective Green, g (s)	19.1	19.1			12.0	12.0	12.0		6.2		16.4	16.4
Actuated g/C Ratio	0.43	0.43			0.27	0.27	0.27		0.14		0.37	0.37
Clearance Time (s)	4.5	4.5			4.5	4.5	4.5		4.5		4.5	4.5
Vehicle Extension (s)	3.0	3.0			3.0	3.0	3.0		3.0		3.0	3.0
Lane Grp Cap (vph)	355	1500			219	963	431		221		456	595
v/s Ratio Prot	0.02	c0.17				0.12					c0.10	0.03
v/s Ratio Perm	0.10				0.08		0.04		0.01		c0.19	
v/c Ratio	0.26	0.39			0.30	0.43	0.16		0.08		0.80	0.08
Uniform Delay, d1	7.9	8.7			12.9	13.4	12.4		16.7		12.5	9.1
Progression Factor	1.00	1.00			1.00	1.00	1.00		1.00		1.00	1.00
Incremental Delay, d2	0.4	0.2			0.8	0.3	0.2		0.2		9.4	0.1
Delay (s)	8.3	8.9			13.7	13.7	12.6		16.8		21.9	9.2
Level of Service	A	A			B	B	B		B		C	A
Approach Delay (s)		8.8				13.3			16.8			18.6
Approach LOS		A				B			B			B

Intersection Summary			
HCM 2000 Control Delay	13.3	HCM 2000 Level of Service	B
HCM 2000 Volume to Capacity ratio	0.74		
Actuated Cycle Length (s)	44.5	Sum of lost time (s)	18.0
Intersection Capacity Utilization	55.5%	ICU Level of Service	B
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	120
Future Volume (vph)	120
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	130
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	0%
Turn Type	
Protected Phases	
Permitted Phases	
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM Signalized Intersection Capacity Analysis
36: Old Mill Rd & Frontage Rd & Development Drwy 8

05/18/2022

Movement	EBU	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Configurations												
Traffic Volume (vph)	5	0	140	830	100	90	70	575	335	70	105	495
Future Volume (vph)	5	0	140	830	100	90	70	575	335	70	105	495
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.5	4.0	4.5	4.5		4.5	4.5	4.5	4.5	4.5
Lane Util. Factor		1.00	1.00	1.00	1.00	0.95		0.97	0.95	1.00	1.00	1.00
Frt		1.00	1.00	0.85	1.00	0.93		1.00	1.00	0.85	1.00	1.00
Flt Protected		0.95	1.00	1.00	0.95	1.00		0.95	1.00	1.00	0.95	1.00
Satd. Flow (prot)		1787	1881	1599	1805	3373		3019	3112	1392	1327	1397
Flt Permitted		0.64	1.00	1.00	0.59	1.00		0.95	1.00	1.00	0.53	1.00
Satd. Flow (perm)		1208	1881	1599	1127	3373		3019	3112	1392	747	1397
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	5	0	152	902	109	98	76	625	364	76	114	538
RTOR Reduction (vph)	0	0	0	0	0	64	0	0	0	22	0	0
Lane Group Flow (vph)	0	5	152	902	109	110	0	625	364	54	114	538
Heavy Vehicles (%)	1%	1%	1%	1%	0%	0%	0%	16%	16%	16%	36%	36%
Turn Type	Perm	Perm	NA	Free	Perm	NA		Prot	NA	Perm	Perm	NA
Protected Phases			4			8		5	2			6
Permitted Phases	4	4		Free	8					2	6	
Actuated Green, G (s)		12.1	12.1	74.2	12.1	12.1		16.7	53.1	53.1	31.9	31.9
Effective Green, g (s)		12.1	12.1	74.2	12.1	12.1		16.7	53.1	53.1	31.9	31.9
Actuated g/C Ratio		0.16	0.16	1.00	0.16	0.16		0.23	0.72	0.72	0.43	0.43
Clearance Time (s)		4.5	4.5		4.5	4.5		4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)		3.0	3.0		3.0	3.0		3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)		196	306	1599	183	550		679	2227	996	321	600
v/s Ratio Prot			0.08			0.03		c0.21	0.12			c0.39
v/s Ratio Perm		0.00		c0.56	0.10					0.04	0.15	
v/c Ratio		0.03	0.50	0.56	0.60	0.20		0.92	0.16	0.05	0.36	0.90
Uniform Delay, d1		26.1	28.3	0.0	28.8	26.9		28.1	3.4	3.1	14.2	19.6
Progression Factor		1.00	1.00	1.00	1.00	1.00		1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2		0.1	1.3	1.4	5.1	0.2		17.9	0.2	0.1	3.1	18.6
Delay (s)		26.1	29.5	1.4	33.9	27.0		46.0	3.6	3.2	17.3	38.2
Level of Service		C	C	A	C	C		D	A	A	B	D
Approach Delay (s)			5.6			29.7			28.4			34.6
Approach LOS			A			C			C			C

Intersection Summary			
HCM 2000 Control Delay	21.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.88		
Actuated Cycle Length (s)	74.2	Sum of lost time (s)	13.5
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Movement	SBR
Lane Configurations	
Traffic Volume (vph)	0
Future Volume (vph)	0
Ideal Flow (vphpl)	1900
Total Lost time (s)	
Lane Util. Factor	
Frt	
Flt Protected	
Satd. Flow (prot)	
Flt Permitted	
Satd. Flow (perm)	
Peak-hour factor, PHF	0.92
Adj. Flow (vph)	0
RTOR Reduction (vph)	0
Lane Group Flow (vph)	0
Heavy Vehicles (%)	36%
Turn Type	Perm
Protected Phases	
Permitted Phases	6
Actuated Green, G (s)	
Effective Green, g (s)	
Actuated g/C Ratio	
Clearance Time (s)	
Vehicle Extension (s)	
Lane Grp Cap (vph)	
v/s Ratio Prot	
v/s Ratio Perm	
v/c Ratio	
Uniform Delay, d1	
Progression Factor	
Incremental Delay, d2	
Delay (s)	
Level of Service	
Approach Delay (s)	
Approach LOS	

Intersection Summary

HCM 6th Signalized Intersection Summary
42: Frontage Rd & Development Drwy 5

05/18/2022

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Volume (veh/h)	85	285	280	230	335	120
Future Volume (veh/h)	85	285	280	230	335	120
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00			1.00	1.00	1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No	No		No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1856	1900	1900
Adj Flow Rate, veh/h	92	310	304	0	364	130
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	3	0	0
Cap, veh/h	508	1488	661		517	460
Arrive On Green	0.09	0.42	0.19	0.00	0.29	0.29
Sat Flow, veh/h	1767	3618	3618	1572	1810	1610
Grp Volume(v), veh/h	92	310	304	0	364	130
Grp Sat Flow(s),veh/h/ln	1767	1763	1763	1572	1810	1610
Q Serve(g_s), s	1.1	1.7	2.4	0.0	5.5	1.9
Cycle Q Clear(g_c), s	1.1	1.7	2.4	0.0	5.5	1.9
Prop In Lane	1.00			1.00	1.00	1.00
Lane Grp Cap(c), veh/h	508	1488	661		517	460
V/C Ratio(X)	0.18	0.21	0.46		0.70	0.28
Avail Cap(c_a), veh/h	645	3205	2106		1058	941
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	7.4	5.6	11.1	0.0	9.8	8.5
Incr Delay (d2), s/veh	0.2	0.1	0.5	0.0	1.8	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.2	0.2	0.6	0.0	1.8	1.9
Unsig. Movement Delay, s/veh						
LnGrp Delay(d),s/veh	7.6	5.7	11.6	0.0	11.6	8.9
LnGrp LOS	A	A	B		B	A
Approach Vol, veh/h		402	304	A	494	
Approach Delay, s/veh		6.1	11.6		10.9	
Approach LOS		A	B		B	

Timer - Assigned Phs		2		4	5	6
Phs Duration (G+Y+Rc), s		17.5		13.3	7.2	10.3
Change Period (Y+Rc), s		4.5		4.5	4.5	4.5
Max Green Setting (Gmax), s		28.0		18.0	5.1	18.4
Max Q Clear Time (g_c+I1), s		3.7		7.5	3.1	4.4
Green Ext Time (p_c), s		1.8		1.3	0.0	1.4

Intersection Summary	
HCM 6th Ctrl Delay	9.5
HCM 6th LOS	A

Notes

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	315	0	0	260	0	0
Future Vol, veh/h	315	0	0	260	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	310	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	342	0	0	283	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	342	0	625	342
Stage 1	-	-	-	-	342	-
Stage 2	-	-	-	-	283	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1228	-	452	705
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	770	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1228	-	452	705
Mov Cap-2 Maneuver	-	-	-	-	452	-
Stage 1	-	-	-	-	724	-
Stage 2	-	-	-	-	770	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1228	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

2044 No-Build - Synchro Analysis

Intersection	
Int Delay, s/veh	95.1

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	55	225	570	180	695	225
Future Vol, veh/h	55	225	570	180	695	225
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	None
Storage Length	0	0	-	185	300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	44	65	68	61	86
Heavy Vehicles, %	3	3	2	2	2	2
Mvmt Flow	73	511	877	265	1139	262

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	3417	877	0	-	877	0
Stage 1	877	-	-	-	-	-
Stage 2	2540	-	-	-	-	-
Critical Hdwy	6.43	6.23	-	-	4.12	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-
Follow-up Hdwy	3.527	3.327	-	-	2.218	-
Pot Cap-1 Maneuver	~ 8	~ 346	-	0	~ 770	-
Stage 1	405	-	-	0	-	-
Stage 2	~ 60	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	0	~ 346	-	-	~ 770	-
Mov Cap-2 Maneuver	0	-	-	-	-	-
Stage 1	405	-	-	-	-	-
Stage 2	0	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s		0	194.4
HCM LOS	-		

Minor Lane/Major Mvmt	NBT	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	-	346	~ 770	-
HCM Lane V/C Ratio	-	-	1.478	1.48	-
HCM Control Delay (s)	-	-	258.9	239.1	-
HCM Lane LOS	-	-	F	F	-
HCM 95th %tile Q(veh)	-	-	27.6	54.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	1652.8

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	415	0	515	0	0	0	0	730	65	105	405	0
Future Vol, veh/h	415	0	515	0	0	0	0	730	65	105	405	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	-	-	-	-	-	115	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	25	60	25	25	25	25	61	78	75	80	25
Heavy Vehicles, %	7	7	7	5	5	5	2	2	2	4	4	4
Mvmt Flow	703	0	858	0	0	0	0	1197	83	140	506	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	2025	-	506	-	0	0	1280	0	0
Stage 1	786	-	-	-	-	-	-	-	-
Stage 2	1239	-	-	-	-	-	-	-	-
Critical Hdwy	6.47	-	6.27	-	-	-	4.14	-	-
Critical Hdwy Stg 1	5.47	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.47	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.563	-	3.363	-	-	-	2.236	-	-
Pot Cap-1 Maneuver	~ 61	0	~ 556	0	-	-	536	-	0
Stage 1	~ 440	0	-	0	-	-	-	-	0
Stage 2	~ 267	0	-	0	-	-	-	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	~ 39	0	~ 556	-	-	-	536	-	-
Mov Cap-2 Maneuver	~ 39	0	-	-	-	-	-	-	-
Stage 1	~ 440	0	-	-	-	-	-	-	-
Stage 2	~ 170	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, $	3690.3	0	3
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	EBLn2	SBL	SBT
Capacity (veh/h)	-	-	39	556	536	-
HCM Lane V/C Ratio	-	-	18.036	1.544	0.261	-
HCM Control Delay (s)	-	-	$ 7859.9	273.3	14.1	0
HCM Lane LOS	-	-	F	F	B	A
HCM 95th %tile Q(veh)	-	-	86.1	45	1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Unsignalized Intersection Capacity Analysis
4: US 278 & I-20 WB Ramps

07/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	75	0	205	150	995	0	0	435	295
Future Volume (Veh/h)	0	0	0	75	0	205	150	995	0	0	435	295
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.69	0.75	0.56	0.73	0.81	0.25	0.25	0.77	0.79
Hourly flow rate (vph)	0	0	0	109	0	366	205	1228	0	0	565	373
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1194	
pX, platoon unblocked												
vC, conflicting volume	2203	2203	565	2203	2576	1228	938			1228		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	2203	2203	565	2203	2576	1228	938			1228		
tC, single (s)	7.1	6.5	6.2	7.2	6.6	6.3	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.6	4.1	3.4	2.2			2.2		
p0 queue free %	0	100	100	0	100	0	72			100		
cM capacity (veh/h)	0	31	519	23	17	208	722			557		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	109	366	1433	565	373
Volume Left	109	0	205	0	0
Volume Right	0	366	0	0	373
cSH	23	208	722	1700	1700
Volume to Capacity	4.65	1.76	0.28	0.33	0.22
Queue Length 95th (ft)	Err	630	29	0	0
Control Delay (s)	Err	400.7	11.9	0.0	0.0
Lane LOS	F	F	B		
Approach Delay (s)	2603.3		11.9	0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	440.5		
Intersection Capacity Utilization	97.7%	ICU Level of Service	F
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	55

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	20	105	155	325	495	35
Future Vol, veh/h	20	105	155	325	495	35
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	64	54	78	88	25
Heavy Vehicles, %	6	6	5	5	10	10
Mvmt Flow	80	164	287	417	563	140

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	1624	633	703	0	-	0
Stage 1	633	-	-	-	-	-
Stage 2	991	-	-	-	-	-
Critical Hdwy	6.46	6.26	4.15	-	-	-
Critical Hdwy Stg 1	5.46	-	-	-	-	-
Critical Hdwy Stg 2	5.46	-	-	-	-	-
Follow-up Hdwy	3.554	3.354	2.245	-	-	-
Pot Cap-1 Maneuver	110	473	881	-	-	-
Stage 1	522	-	-	-	-	-
Stage 2	353	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 63	473	881	-	-	-
Mov Cap-2 Maneuver	~ 63	-	-	-	-	-
Stage 1	301	-	-	-	-	-
Stage 2	353	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 358.7	4.5	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	881	-	151	-	-
HCM Lane V/C Ratio	0.326	-	1.616	-	-
HCM Control Delay (s)	11	0	$ 358.7	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	1.4	-	17	-	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM 6th Signalized Intersection Summary
32: US 278 & Stanton Grove Drwy/Development Drwy

07/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	25	70	65	25	5	135	815	250	20	595	55
Future Volume (veh/h)	20	25	70	65	25	5	135	815	250	20	595	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1826	1826	1826	1900	1900	1900	1826	1826	1826	1841	1841	1841
Adj Flow Rate, veh/h	22	27	76	71	27	5	147	886	0	22	647	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	5	5	5	0	0	0	5	5	5	4	4	4
Cap, veh/h	157	124	105	219	294	249	516	1062		417	1102	102
Arrive On Green	0.07	0.07	0.07	0.05	0.15	0.15	0.06	0.58	0.00	0.28	1.00	1.00
Sat Flow, veh/h	1344	1826	1547	1810	1900	1610	1739	1826	1547	1753	1659	154
Grp Volume(v), veh/h	22	27	76	71	27	5	147	886	0	22	0	707
Grp Sat Flow(s),veh/h/ln	1344	1826	1547	1810	1900	1610	1739	1826	1547	1753	0	1813
Q Serve(g_s), s	1.7	1.5	5.3	3.9	1.3	0.3	4.5	43.4	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	1.7	1.5	5.3	3.9	1.3	0.3	4.5	43.4	0.0	0.0	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.08
Lane Grp Cap(c), veh/h	157	124	105	219	294	249	516	1062		417	0	1204
V/C Ratio(X)	0.14	0.22	0.72	0.32	0.09	0.02	0.28	0.83		0.05	0.00	0.59
Avail Cap(c_a), veh/h	285	299	253	219	475	403	533	1062		417	0	1204
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	48.6	48.5	50.2	43.2	39.9	39.4	11.7	18.7	0.0	22.5	0.0	0.0
Incr Delay (d2), s/veh	0.4	0.9	8.9	0.9	0.1	0.0	0.3	7.7	0.0	0.1	0.0	2.1
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.6	0.7	2.3	1.7	0.6	0.1	1.6	17.3	0.0	0.3	0.0	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	49.0	49.3	59.1	44.1	40.0	39.5	12.0	26.4	0.0	22.6	0.0	2.1
LnGrp LOS	D	D	E	D	D	D	B	C		C	A	A
Approach Vol, veh/h		125			103			1033	A		729	
Approach Delay, s/veh		55.2			42.8			24.4			2.7	
Approach LOS		E			D			C			A	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	20.0	68.5	9.5	12.0	10.9	77.6		21.5
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	64.0	5.0	18.0	7.5	61.5		27.5
Max Q Clear Time (g_c+I1), s	2.0	45.4	5.9	7.3	6.5	2.0		3.3
Green Ext Time (p_c), s	0.0	5.6	0.0	0.3	0.0	4.8		0.1

Intersection Summary	
HCM 6th Ctrl Delay	19.3
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
33: US 278 & Stanton Grove Drwy/Development Drwy 1

07/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	20	25	40	65	25	5	135	455	250	20	555	35
Future Volume (veh/h)	20	25	40	65	25	5	135	455	250	20	555	35
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1811	1811	1811	1900	1900	1900	1841	1841	1841	1826	1826	1826
Adj Flow Rate, veh/h	22	27	43	71	27	5	147	495	0	22	603	38
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	6	6	6	0	0	0	4	4	4	5	5	5
Cap, veh/h	112	86	73	159	245	207	647	1453		528	893	56
Arrive On Green	0.05	0.05	0.05	0.04	0.13	0.13	0.45	1.00	0.00	0.53	0.53	0.53
Sat Flow, veh/h	1333	1811	1535	1810	1900	1610	1753	1841	1560	881	1700	107
Grp Volume(v), veh/h	22	27	43	71	27	5	147	495	0	22	0	641
Grp Sat Flow(s),veh/h/ln	1333	1811	1535	1810	1900	1610	1753	1841	1560	881	0	1807
Q Serve(g_s), s	1.8	1.6	3.0	0.0	1.4	0.3	0.0	0.0	0.0	1.3	0.0	28.7
Cycle Q Clear(g_c), s	3.2	1.6	3.0	0.0	1.4	0.3	0.0	0.0	0.0	1.3	0.0	28.7
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.06
Lane Grp Cap(c), veh/h	112	86	73	159	245	207	647	1453		528	0	949
V/C Ratio(X)	0.20	0.31	0.59	0.45	0.11	0.02	0.23	0.34		0.04	0.00	0.68
Avail Cap(c_a), veh/h	268	298	253	178	487	413	647	1453		528	0	949
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	52.1	50.6	51.3	50.4	42.3	41.9	12.8	0.0	0.0	12.7	0.0	19.2
Incr Delay (d2), s/veh	0.8	2.0	7.3	2.0	0.2	0.0	0.2	0.6	0.0	0.1	0.0	3.8
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	0.6	0.8	1.3	2.0	0.7	0.1	1.5	0.3	0.0	0.3	0.0	11.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	52.9	52.7	58.6	52.4	42.5	41.9	12.9	0.6	0.0	12.9	0.0	23.0
LnGrp LOS	D	D	E	D	D	D	B	A		B	A	C
Approach Vol, veh/h		92			103			642	A		663	
Approach Delay, s/veh		55.5			49.3			3.5			22.7	
Approach LOS		E			D			A			C	

Timer - Assigned Phs		2	3	4	5	6		8				
Phs Duration (G+Y+Rc), s		91.3	8.9	9.7	29.0	62.3		18.7				
Change Period (Y+Rc), s		4.5	4.5	4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s		72.8	5.6	18.1	10.5	57.8		28.2				
Max Q Clear Time (g_c+I1), s		2.0	2.0	5.2	2.0	30.7		3.4				
Green Ext Time (p_c), s		2.9	0.0	0.2	0.2	4.0		0.1				

Intersection Summary	
HCM 6th Ctrl Delay	18.3
HCM 6th LOS	B

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM Signalized Intersection Capacity Analysis
36: Old Mill Rd & Development Drwy & Development Drwy 8

07/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	40	195	40	160	140	745	665	100	35	170	0
Future Volume (vph)	0	40	195	40	160	140	745	665	100	35	170	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1900	1615	1787	1881	1599	1517	3034	1357	1327	1397	
Flt Permitted		1.00	1.00	0.73	1.00	1.00	0.95	1.00	1.00	0.38	1.00	
Satd. Flow (perm)		1900	1615	1371	1881	1599	1517	3034	1357	526	1397	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	43	212	43	174	152	810	723	109	38	185	0
RTOR Reduction (vph)	0	0	0	0	0	131	0	0	24	0	0	0
Lane Group Flow (vph)	0	43	212	43	174	21	810	723	85	38	185	0
Heavy Vehicles (%)	0%	0%	0%	1%	1%	1%	19%	19%	19%	36%	36%	36%
Turn Type	Perm	NA	Free	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		Free	8		8			2	6		6
Actuated Green, G (s)		14.5	106.6	14.5	14.5	14.5	58.5	83.1	83.1	20.1	20.1	
Effective Green, g (s)		14.5	106.6	14.5	14.5	14.5	58.5	83.1	83.1	20.1	20.1	
Actuated g/C Ratio		0.14	1.00	0.14	0.14	0.14	0.55	0.78	0.78	0.19	0.19	
Clearance Time (s)		4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		258	1615	186	255	217	832	2365	1057	99	263	
v/s Ratio Prot		0.02			c0.09		c0.53	0.24			c0.13	
v/s Ratio Perm			0.13	0.03		0.01			0.06	0.07		
v/c Ratio		0.17	0.13	0.23	0.68	0.10	0.97	0.31	0.08	0.38	0.70	
Uniform Delay, d1		40.7	0.0	41.1	43.9	40.3	23.3	3.4	2.8	37.8	40.5	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		0.3	0.2	0.6	7.3	0.2	24.7	0.3	0.1	10.9	14.6	
Delay (s)		41.0	0.2	41.7	51.2	40.5	48.0	3.7	2.9	48.7	55.1	
Level of Service		D	A	D	D	D	D	A	A	D	E	
Approach Delay (s)		7.1			45.7			25.5			54.0	
Approach LOS		A			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	29.2	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.87		
Actuated Cycle Length (s)	106.6	Sum of lost time (s)	13.5
Intersection Capacity Utilization	70.4%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0

Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	175	0	0	340	0	0
Future Vol, veh/h	175	0	0	340	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	310	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	1	1	1	0	0
Mvmt Flow	190	0	0	370	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	190	0	560	190
Stage 1	-	-	-	-	190	-
Stage 2	-	-	-	-	370	-
Critical Hdwy	-	-	4.11	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.209	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1390	-	493	857
Stage 1	-	-	-	-	847	-
Stage 2	-	-	-	-	703	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1390	-	493	857
Mov Cap-2 Maneuver	-	-	-	-	493	-
Stage 1	-	-	-	-	847	-
Stage 2	-	-	-	-	703	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1390	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Intersection	
Int Delay, s/veh	1005.7

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	255	925	415	50	165	600
Future Vol, veh/h	255	925	415	50	165	600
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	Yield	-	Free	-	None
Storage Length	0	0	-	185	300	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	75	44	65	68	61	86
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	340	2102	638	74	270	698

Major/Minor	Minor1		Major1		Major2	
Conflicting Flow All	1876	638	0	-	638	0
Stage 1	638	-	-	-	-	-
Stage 2	1238	-	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11	-
Critical Hdwy Stg 1	5.41	-	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209	-
Pot Cap-1 Maneuver	~ 79	~ 478	-	0	951	-
Stage 1	528	-	-	0	-	-
Stage 2	~ 275	-	-	0	-	-
Platoon blocked, %			-			-
Mov Cap-1 Maneuver	~ 57	~ 478	-	-	951	-
Mov Cap-2 Maneuver	~ 57	-	-	-	-	-
Stage 1	528	-	-	-	-	-
Stage 2	~ 197	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	$ 1666.1	0	2.9
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	WBLn1	WBLn2	SBL	SBT
Capacity (veh/h)	-	57	478	951	-
HCM Lane V/C Ratio	-	5.965	4.398	0.284	-
HCM Control Delay (s)	$ 2375.$	$ 1551.3		10.3	-
HCM Lane LOS	-	F	F	B	-
HCM 95th %tile Q(veh)	-	38.7	206.8	1.2	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

Intersection	
Int Delay, s/veh	19.1

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	490	0	130	0	0	0	0	1265	75	260	635	0
Future Vol, veh/h	490	0	130	0	0	0	0	1265	75	260	635	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	Yield	-	-	None	-	-	None	-	-	None
Storage Length	0	-	0	-	-	-	-	-	115	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	59	25	60	25	25	25	25	61	78	75	80	25
Heavy Vehicles, %	3	3	3	7	7	7	1	1	1	1	1	1
Mvmt Flow	831	0	217	0	0	0	0	2074	96	347	794	0

Major/Minor	Minor2			Major1			Major2		
Conflicting Flow All	3610	-	794	-	0	0	2170	0	0
Stage 1	1488	-	-	-	-	-	-	-	-
Stage 2	2122	-	-	-	-	-	-	-	-
Critical Hdwy	6.43	-	6.23	-	-	-	4.11	-	-
Critical Hdwy Stg 1	5.43	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	5.43	-	-	-	-	-	-	-	-
Follow-up Hdwy	3.527	-	3.327	-	-	-	2.209	-	-
Pot Cap-1 Maneuver	~ 6	0	386	0	-	-	~ 248	-	0
Stage 1	~ 206	0	-	0	-	-	-	-	0
Stage 2	~ 99	0	-	0	-	-	-	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	0	0	386	-	-	-	~ 248	-	-
Mov Cap-2 Maneuver	0	0	-	-	-	-	-	-	-
Stage 1	~ 206	0	-	-	-	-	-	-	-
Stage 2	0	0	-	-	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s		0	72.9
HCM LOS	-		

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	EBLn2	SBL	SBT
Capacity (veh/h)	-	-	-	386	~ 248	-
HCM Lane V/C Ratio	-	-	-	0.561	1.398	-
HCM Control Delay (s)	-	-	-	25.6	240	0
HCM Lane LOS	-	-	-	D	F	A
HCM 95th %tile Q(veh)	-	-	-	3.3	19.1	-

Notes

~: Volume exceeds capacity $: Delay exceeds 300s +: Computation Not Defined *: All major volume in platoon

HCM Unsignalized Intersection Capacity Analysis
4: US 278 & I-20 WB Ramps

07/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	85	0	210	785	970	0	0	810	510
Future Volume (Veh/h)	0	0	0	85	0	210	785	970	0	0	810	510
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
Peak Hour Factor	0.25	0.25	0.25	0.69	0.75	0.56	0.73	0.81	0.25	0.25	0.77	0.79
Hourly flow rate (vph)	0	0	0	123	0	375	1075	1198	0	0	1052	646
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (ft)											1194	
pX, platoon unblocked	0.54	0.54	0.54	0.54	0.54		0.54					
vC, conflicting volume	4400	4400	1052	4400	5046	1198	1698			1198		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	6830	6830	677	6830	8017	1198	1864			1198		
tC, single (s)	7.1	6.5	6.2	7.1	6.5	6.2	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	0	0	100	0	0	0	0			100		
cM capacity (veh/h)	0	0	246	0	0	224	177			579		

Direction, Lane #	WB 1	WB 2	NB 1	SB 1	SB 2
Volume Total	123	375	2273	1052	646
Volume Left	123	0	1075	0	0
Volume Right	0	375	0	0	646
cSH	0	224	177	1700	1700
Volume to Capacity	Err	1.67	6.07	0.62	0.38
Queue Length 95th (ft)	Err	615	Err	0	0
Control Delay (s)	Err	360.1	2328.7	0.0	0.0
Lane LOS	F	F	F		
Approach Delay (s)	Err		2328.7	0.0	
Approach LOS	F				

Intersection Summary			
Average Delay	Err		
Intersection Capacity Utilization	151.8%	ICU Level of Service	H
Analysis Period (min)	15		

Intersection	
Int Delay, s/veh	23490.6

Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Vol, veh/h	90	165	305	495	415	50
Future Vol, veh/h	90	165	305	495	415	50
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	-	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	25	64	54	78	88	25
Heavy Vehicles, %	2	2	2	2	7	7
Mvmt Flow	360	258	565	635	472	200

Major/Minor	Minor2		Major1		Major2	
Conflicting Flow All	2337	572	672	0	-	0
Stage 1	572	-	-	-	-	-
Stage 2	1765	-	-	-	-	-
Critical Hdwy	6.42	6.22	4.12	-	-	-
Critical Hdwy Stg 1	5.42	-	-	-	-	-
Critical Hdwy Stg 2	5.42	-	-	-	-	-
Follow-up Hdwy	3.518	3.318	2.218	-	-	-
Pot Cap-1 Maneuver	~ 40	520	919	-	-	-
Stage 1	565	-	-	-	-	-
Stage 2	~ 151	-	-	-	-	-
Platoon blocked, %				-	-	-
Mov Cap-1 Maneuver	~ 2	520	919	-	-	-
Mov Cap-2 Maneuver	~ 2	-	-	-	-	-
Stage 1	~ 28	-	-	-	-	-
Stage 2	~ 151	-	-	-	-	-

Approach	EB	NB	SB
HCM Control Delay, s	$ 94617.4	7	0
HCM LOS	F		

Minor Lane/Major Mvmt	NBL	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	919	-	3	-	-
HCM Lane V/C Ratio	0.615	2	05.938	-	-
HCM Control Delay (s)	15	$ 0	94617.4	-	-
HCM Lane LOS	B	A	F	-	-
HCM 95th %tile Q(veh)	4.4	-	79.8	-	-

Notes			
~: Volume exceeds capacity	$: Delay exceeds 300s	+: Computation Not Defined	*: All major volume in platoon

HCM 6th Signalized Intersection Summary
32: US 278 & Stanton Grove Drwy/Development Drwy

07/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	35	250	185	40	15	180	875	125	10	885	90
Future Volume (veh/h)	100	35	250	185	40	15	180	875	125	10	885	90
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1856	1856	1856	1900	1900	1900	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	109	38	272	201	43	16	196	951	0	11	962	98
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	3	3	3	0	0	0	3	3	3	3	3	3
Cap, veh/h	178	182	154	217	330	280	555	1343		236	1021	104
Arrive On Green	0.10	0.10	0.10	0.05	0.17	0.17	0.12	0.72	0.00	0.02	1.00	1.00
Sat Flow, veh/h	1333	1856	1572	1810	1900	1610	1767	1856	1572	1767	1656	169
Grp Volume(v), veh/h	109	38	272	201	43	16	196	951	0	11	0	1060
Grp Sat Flow(s),veh/h/ln	1333	1856	1572	1810	1900	1610	1767	1856	1572	1767	0	1825
Q Serve(g_s), s	12.0	2.8	11.8	6.9	2.9	1.2	0.0	43.5	0.0	0.4	0.0	0.0
Cycle Q Clear(g_c), s	12.0	2.8	11.8	6.9	2.9	1.2	0.0	43.5	0.0	0.4	0.0	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	178	182	154	217	330	280	555	1343		236	0	1126
V/C Ratio(X)	0.61	0.21	1.77	0.93	0.13	0.06	0.35	0.71		0.05	0.00	0.94
Avail Cap(c_a), veh/h	209	224	190	217	374	317	555	1343		273	0	1126
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	66.5	62.3	43.4	64.1	52.4	51.7	12.2	11.7	0.0	18.9	0.0	0.0
Incr Delay (d2), s/veh	3.9	0.6	370.6	41.1	0.2	0.1	0.4	3.2	0.0	0.1	0.0	16.0
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	4.3	1.4	20.4	6.7	1.4	0.5	3.0	15.8	0.0	0.1	0.0	5.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.4	62.9	414.0	105.2	52.6	51.8	12.6	14.9	0.0	19.0	0.0	16.0
LnGrp LOS	E	E	F	F	D	D	B	B		B	A	B
Approach Vol, veh/h		419			260			1147	A		1071	
Approach Delay, s/veh		292.8			93.2			14.5			16.1	
Approach LOS		F			F			B			B	

Timer - Assigned Phs	1	2	3	4	5	6		8
Phs Duration (G+Y+Rc), s	6.3	113.1	11.4	19.2	22.4	97.0		30.6
Change Period (Y+Rc), s	4.5	4.5	4.5	4.5	4.5	4.5		4.5
Max Green Setting (Gmax), s	5.0	102.0	6.9	18.1	14.5	92.5		29.5
Max Q Clear Time (g_c+I1), s	2.4	45.5	8.9	14.0	2.0	2.0		4.9
Green Ext Time (p_c), s	0.0	8.0	0.0	0.6	0.4	10.5		0.2

Intersection Summary	
HCM 6th Ctrl Delay	62.4
HCM 6th LOS	E

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th Signalized Intersection Summary
33: US 278 & Stanton Grove Drwy/Development Drwy 1

07/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	100	35	145	185	40	15	180	685	125	10	585	55
Future Volume (veh/h)	100	35	145	185	40	15	180	685	125	10	585	55
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		1.00	1.00		1.00
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1900	1900	1900	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	109	38	158	201	43	16	196	745	0	11	636	60
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	2	2	2	0	0	0	3	3	3	3	3	3
Cap, veh/h	178	216	183	226	358	303	563	1395		415	864	81
Arrive On Green	0.12	0.12	0.12	0.04	0.19	0.19	0.41	1.00	0.00	0.52	0.52	0.52
Sat Flow, veh/h	1344	1870	1585	1810	1900	1610	1767	1856	1572	710	1670	158
Grp Volume(v), veh/h	109	38	158	201	43	16	196	745	0	11	0	696
Grp Sat Flow(s),veh/h/ln	1344	1870	1585	1810	1900	1610	1767	1856	1572	710	0	1827
Q Serve(g_s), s	12.0	2.8	14.7	4.0	2.8	1.2	0.0	0.0	0.0	1.1	0.0	44.5
Cycle Q Clear(g_c), s	14.8	2.8	14.7	4.0	2.8	1.2	0.0	0.0	0.0	1.1	0.0	44.5
Prop In Lane	1.00		1.00	1.00		1.00	1.00		1.00	1.00		0.09
Lane Grp Cap(c), veh/h	178	216	183	226	358	303	563	1395		415	0	945
V/C Ratio(X)	0.61	0.18	0.86	0.89	0.12	0.05	0.35	0.53		0.03	0.00	0.74
Avail Cap(c_a), veh/h	224	281	238	330	532	451	563	1395		415	0	945
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	66.6	59.9	65.2	66.0	50.6	49.9	24.0	0.0	0.0	17.7	0.0	28.2
Incr Delay (d2), s/veh	3.4	0.4	21.7	18.0	0.1	0.1	0.4	1.5	0.0	0.1	0.0	5.1
Initial Q Delay(d3),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
%ile BackOfQ(50%),veh/ln	4.3	1.3	7.1	8.8	1.4	0.5	3.8	0.6	0.0	0.2	0.0	19.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	70.0	60.3	86.9	84.0	50.7	50.0	24.4	1.5	0.0	17.9	0.0	33.3
LnGrp LOS	E	E	F	F	D	D	C	A		B	A	C
Approach Vol, veh/h		305			260			941	A		707	
Approach Delay, s/veh		77.6			76.4			6.2			33.1	
Approach LOS		E			E			A			C	

Timer - Assigned Phs		2	3	4	5	6		8				
Phs Duration (G+Y+Rc), s		117.3	10.9	21.8	35.2	82.1		32.7				
Change Period (Y+Rc), s		4.5	4.5	4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s		99.0	15.0	22.5	16.9	77.6		42.0				
Max Q Clear Time (g_c+I1), s		2.0	6.0	16.8	2.0	46.5		4.8				
Green Ext Time (p_c), s		5.1	0.4	0.5	0.4	4.6		0.3				

Intersection Summary	
HCM 6th Ctrl Delay	32.9
HCM 6th LOS	C

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM Signalized Intersection Capacity Analysis
36: Old Mill Rd & Development Drwy & Development Drwy 8

07/14/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	120	555	100	80	70	375	335	65	105	495	0
Future Volume (vph)	0	120	555	100	80	70	375	335	65	105	495	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)		4.5	4.0	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Lane Util. Factor		1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00	
Frt		1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	
Flt Protected		1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)		1900	1615	1805	1900	1615	1517	3034	1357	1327	1397	
Flt Permitted		1.00	1.00	0.61	1.00	1.00	0.95	1.00	1.00	0.53	1.00	
Satd. Flow (perm)		1900	1615	1166	1900	1615	1517	3034	1357	747	1397	
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	0	130	603	109	87	76	408	364	71	114	538	0
RTOR Reduction (vph)	0	0	0	0	0	65	0	0	18	0	0	0
Lane Group Flow (vph)	0	130	603	109	87	11	408	364	53	114	538	0
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	19%	19%	19%	36%	36%	36%
Turn Type	Perm	NA	Free	Perm	NA	Perm	Prot	NA	Perm	Perm	NA	Perm
Protected Phases		4			8		5	2			6	
Permitted Phases	4		Free	8		8			2	6		6
Actuated Green, G (s)		12.6	84.8	12.6	12.6	12.6	24.1	63.2	63.2	34.6	34.6	
Effective Green, g (s)		12.6	84.8	12.6	12.6	12.6	24.1	63.2	63.2	34.6	34.6	
Actuated g/C Ratio		0.15	1.00	0.15	0.15	0.15	0.28	0.75	0.75	0.41	0.41	
Clearance Time (s)		4.5		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	
Vehicle Extension (s)		3.0		3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)		282	1615	173	282	239	431	2261	1011	304	570	
v/s Ratio Prot		0.07			0.05		c0.27	0.12			c0.39	
v/s Ratio Perm			0.37	c0.09		0.01			0.04	0.15		
v/c Ratio		0.46	0.37	0.63	0.31	0.05	0.95	0.16	0.05	0.38	0.94	
Uniform Delay, d1		33.0	0.0	33.9	32.2	31.0	29.7	3.1	2.9	17.5	24.2	
Progression Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2		1.2	0.7	7.3	0.6	0.1	29.9	0.2	0.1	3.5	26.1	
Delay (s)		34.2	0.7	41.2	32.8	31.0	59.6	3.3	3.0	21.1	50.3	
Level of Service		C	A	D	C	C	E	A	A	C	D	
Approach Delay (s)		6.6			35.7			30.5			45.2	
Approach LOS		A			D			C			D	

Intersection Summary			
HCM 2000 Control Delay	27.9	HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio	0.89		
Actuated Cycle Length (s)	84.8	Sum of lost time (s)	13.5
Intersection Capacity Utilization	70.3%	ICU Level of Service	C
Analysis Period (min)	15		
c Critical Lane Group			

Intersection	
Int Delay, s/veh	0

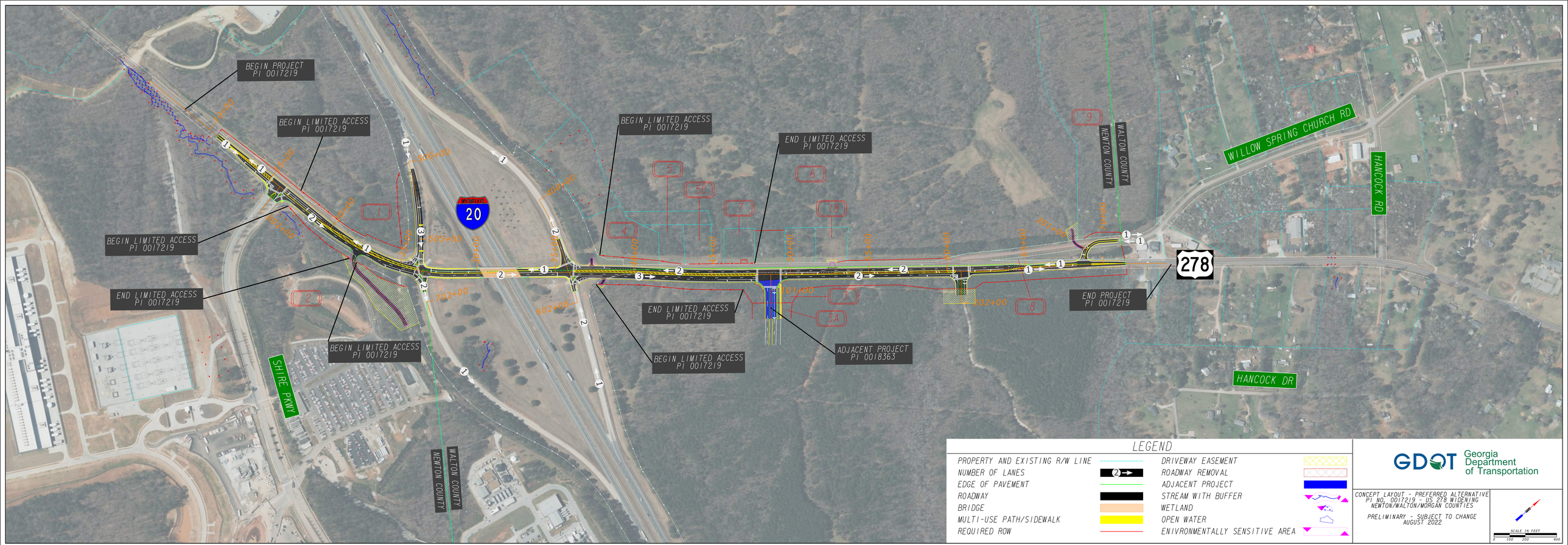
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	290	0	0	250	0	0
Future Vol, veh/h	290	0	0	250	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	310	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	315	0	0	272	0	0

Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	315	0	587	315
Stage 1	-	-	-	-	315	-
Stage 2	-	-	-	-	272	-
Critical Hdwy	-	-	4.1	-	6.4	6.2
Critical Hdwy Stg 1	-	-	-	-	5.4	-
Critical Hdwy Stg 2	-	-	-	-	5.4	-
Follow-up Hdwy	-	-	2.2	-	3.5	3.3
Pot Cap-1 Maneuver	-	-	1257	-	475	730
Stage 1	-	-	-	-	744	-
Stage 2	-	-	-	-	778	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1257	-	475	730
Mov Cap-2 Maneuver	-	-	-	-	475	-
Stage 1	-	-	-	-	744	-
Stage 2	-	-	-	-	778	-

Approach	EB	WB	NB
HCM Control Delay, s	0	0	0
HCM LOS			A

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	-	-	-	1257	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	0	-	-	0	-
HCM Lane LOS	A	-	-	A	-
HCM 95th %tile Q(veh)	-	-	-	0	-

Attachment 4 – Concept Layout (Preferred Alternative)


BEGIN PROJECT
PI 0017219
BEGIN LIMITED ACCESS
PI 0017219
BEGIN LIMITED ACCESS
PI 0017219
END LIMITED ACCESS
PI 0017219
BEGIN LIMITED ACCESS
PI 0017219
END LIMITED ACCESS
PI 0017219
BEGIN LIMITED ACCESS
PI 0017219
END LIMITED ACCESS
PI 0017219
BEGIN LIMITED ACCESS
PI 0017219
ADJACENT PROJECT
PI 0018363
END PROJECT
PI 0017219
INTERSTATE
20
278
WILLOW SPRING CHURCH RD
HANCOCK RD
HANCOCK DR
SHIRE PKWY
WALTON COUNTY
NEWTON COUNTY
WALTON COUNTY
NEWTON COUNTY
LEGEND
PROPERTY AND EXISTING R/W LINE
NUMBER OF LANES
EDGE OF PAVEMENT
ROADWAY
BRIDGE
MULTI-USE PATH/SIDEWALK
REQUIRED ROW
DRIVEWAY EASEMENT
ROADWAY REMOVAL
ADJACENT PROJECT
STREAM WITH BUFFER
WETLAND
OPEN WATER
ENIVRONMENTALLY SENSITIVE AREA
GDOT Georgia Department of Transportation
CONCEPT LAYOUT - PREFERRED ALTERNATIVE
PI NO. 0017219 - US 278 WIDENING
NEWTON/WALTON/MORGAN COUNTIES
PRELIMINARY - SUBJECT TO CHANGE
AUGUST 2022
SCALE IN FEET
0 100 200 400

LEGEND

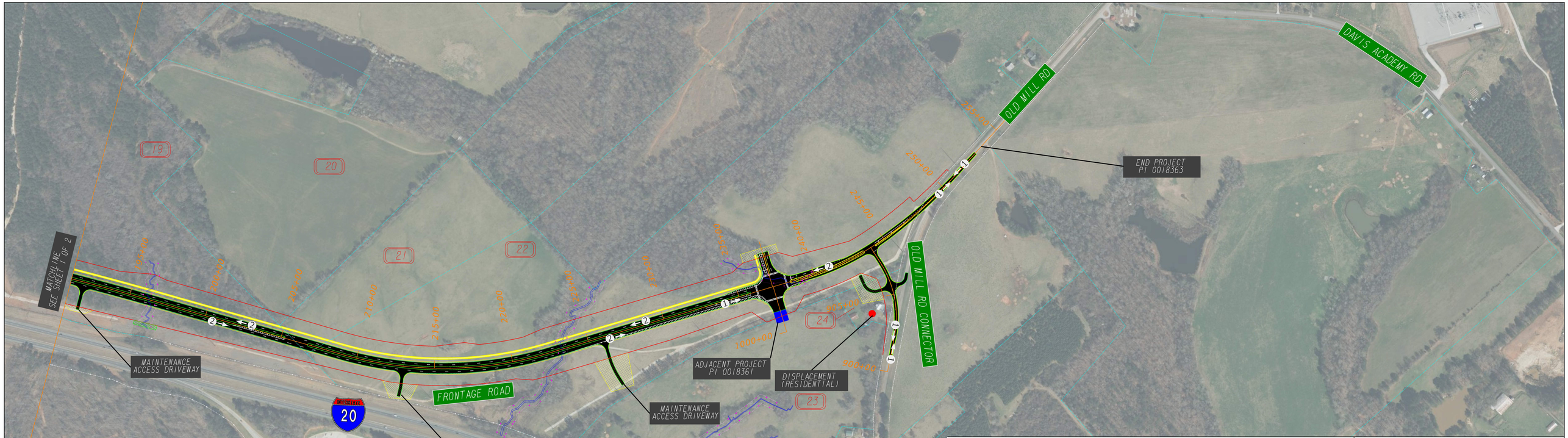
PROPERTY AND EXISTING R/W LINE	DRIVEWAY EASEMENT
NUMBER OF LANES	ROADWAY REMOVAL
EDGE OF PAVEMENT	ADJACENT PROJECT
ROADWAY	STREAM WITH BUFFER
BRIDGE	WETLAND
MULTI-USE PATH/SIDEWALK	OPEN WATER
REQUIRED ROW	ENIVRONMENTALLY SENSITIVE AREA

GDOT Georgia Department of Transportation

CONCEPT LAYOUT - PREFERRED ALTERNATIVE
PI NO. 0018363 - FRONTAGE ROAD FROM
SR 12 TO CR 249/OLD MILL ROAD
NEWTON/WALTON/MORGAN COUNTIES

PRELIMINARY - SUBJECT TO CHANGE
AUGUST 2022
SHEET 1 OF 2

SCALE IN FEET
0 100 200 400



LEGEND

PROPERTY AND EXISTING R/W LINE	DRIVEWAY EASEMENT
NUMBER OF LANES	ROADWAY REMOVAL
EDGE OF PAVEMENT	ADJACENT PROJECT
ROADWAY	STREAM WITH BUFFER
BRIDGE	WETLAND
MULTI-USE PATH/SIDEWALK	OPEN WATER
REQUIRED ROW	ENIVRONMENTALLY SENSITIVE AREA

GDOT Georgia Department of Transportation

CONCEPT LAYOUT - PREFERRED ALTERNATIVE
PI NO. 0018363 - FRONTAGE ROAD FROM SR 12 TO CR 249/OLD MILL ROAD
NEWTON/WALTON/MORGAN COUNTIES

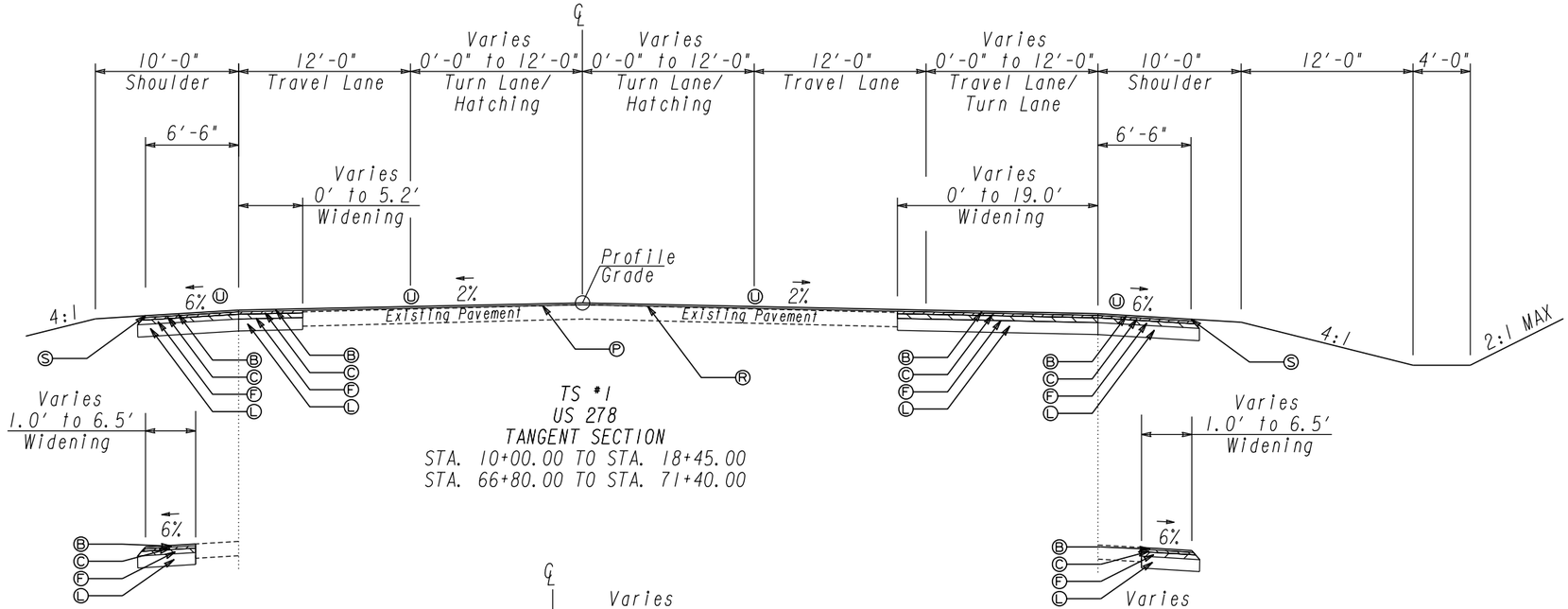
PRELIMINARY - SUBJECT TO CHANGE
AUGUST 2022

SHEET 2 OF 2

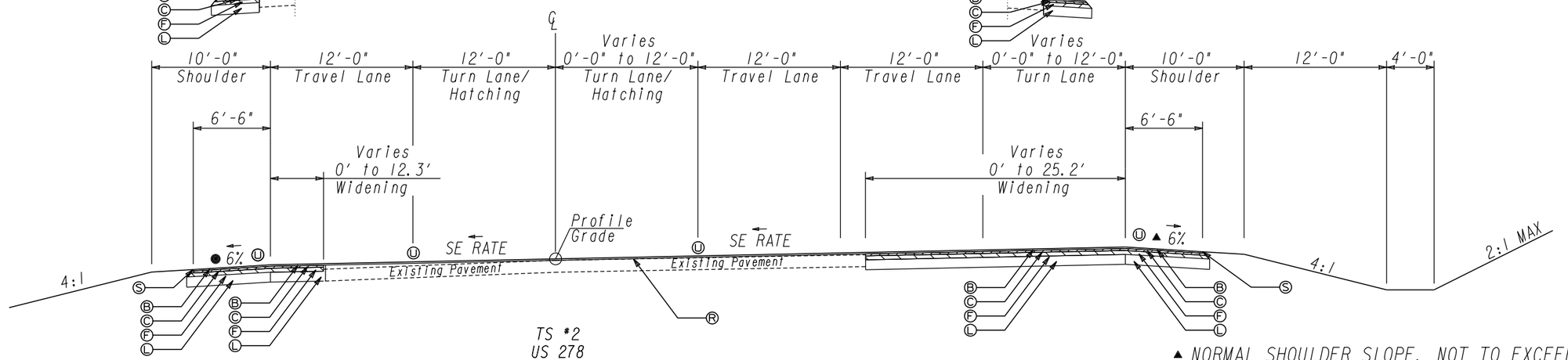
N

SCALE IN FEET
0 100 200 400

Attachment 5 – Typical Cross Sections



TS #1
US 278
TANGENT SECTION
STA. 10+00.00 TO STA. 18+45.00
STA. 66+80.00 TO STA. 71+40.00



TS #2
US 278
SUPERELEVATION SECTION
STA. 18+45.00 to STA. 26+50.00

▲ NORMAL SHOULDER SLOPE, NOT TO EXCEED MAXIMUM SHOULDER BREAKOVER OF 8%.

● 6% OR RATE OF SE, WHICHEVER IS GREATER.

PAVEMENT LEGEND

- Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
- Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
- Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
- Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
- Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
- Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
- Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
- Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
- Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
- Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
- Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
- Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
- Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
- Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
- Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
- Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
- Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
- Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
- Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25))
- Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
- Ⓦ CONCRETE MEDIAN, 6 INCH

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

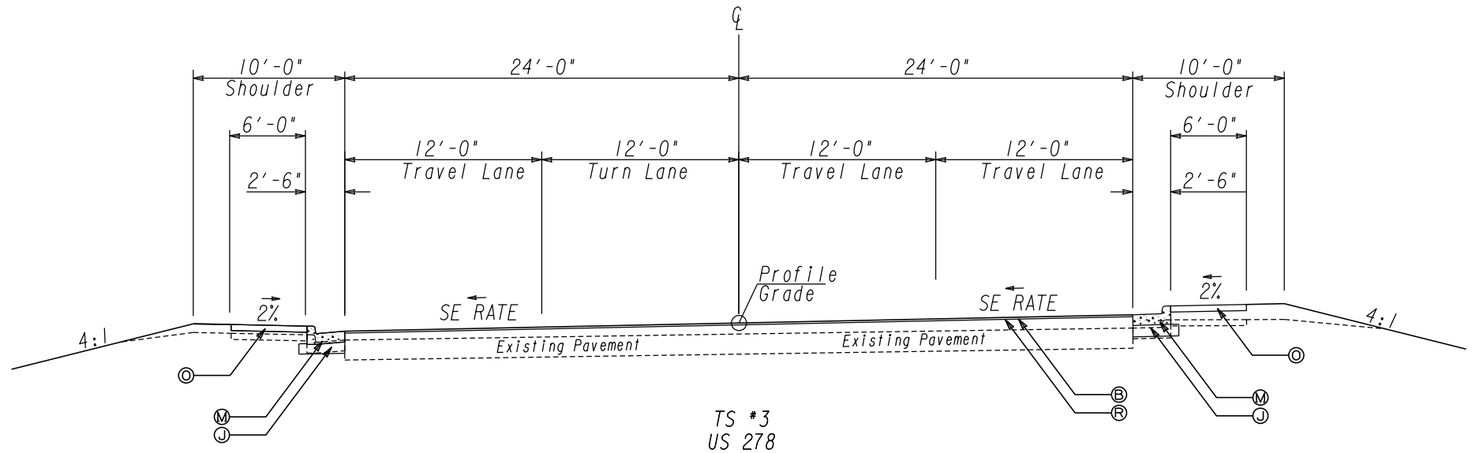
NTS

REVISION DATES

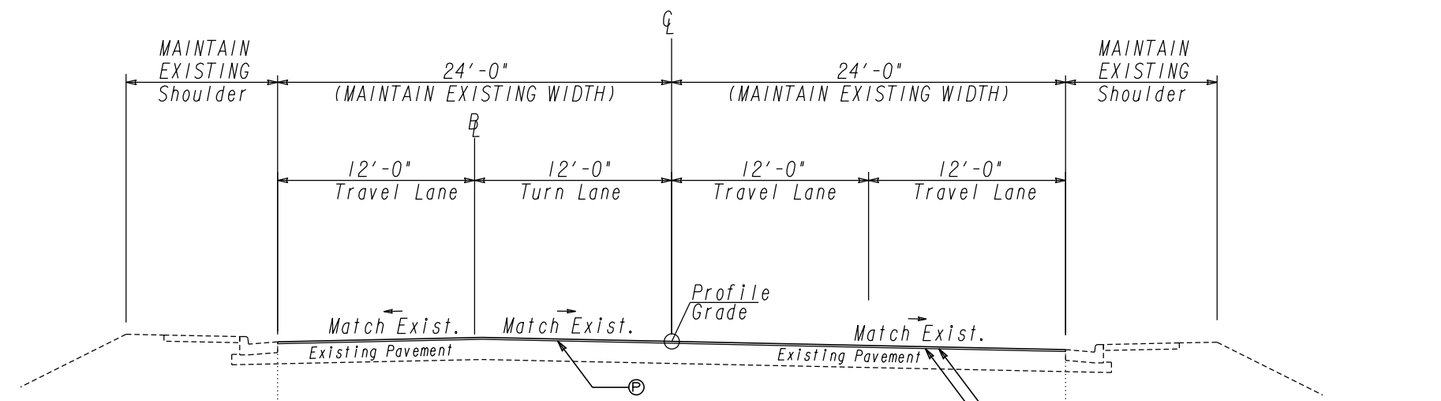
TYPICAL SECTIONS
US 278 / SR 12

CHECKED:		DATE:	
BACKCHECKED:		DATE:	
CORRECTED:		DATE:	
VERIFIED:		DATE:	

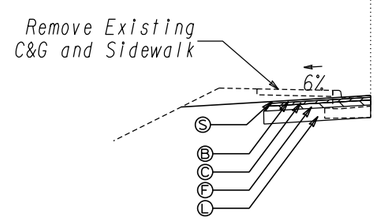
DRAWING No. 05-0001



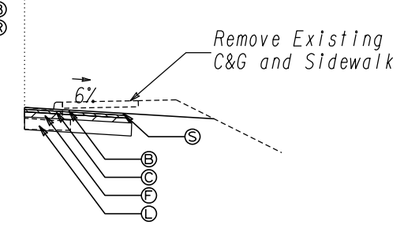
TS #3
US 278
SUPERELEVATION SECTION
STA. 26+50.00 TO STA. 29+00.00



TS #4
US 278
TANGENT SECTION
STA. 29+00.00 TO STA. 30+34.33
STA. 32+65.14 TO STA. 36+00.00



STA. 29+72.00 TO STA. 30+34.33
STA. 32+65.14 TO STA. 32+88.00



STA. 30+12.00 TO STA. 30+34.33
STA. 32+65.14 TO STA. 33+39.00

PAVEMENT LEGEND

- Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
- Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
- Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
- Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
- Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
- Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
- Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
- Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
- Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
- Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
- Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
- Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
- Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
- Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
- Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
- Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
- Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
- Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
- Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25))
- Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
- Ⓦ CONCRETE MEDIAN, 6 INCH

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

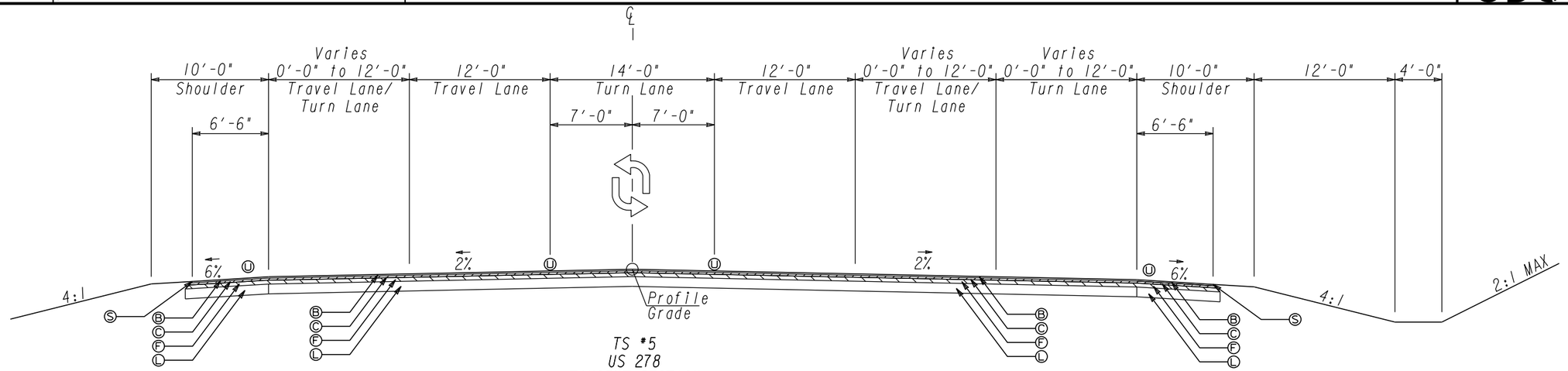
NTS

REVISION DATES

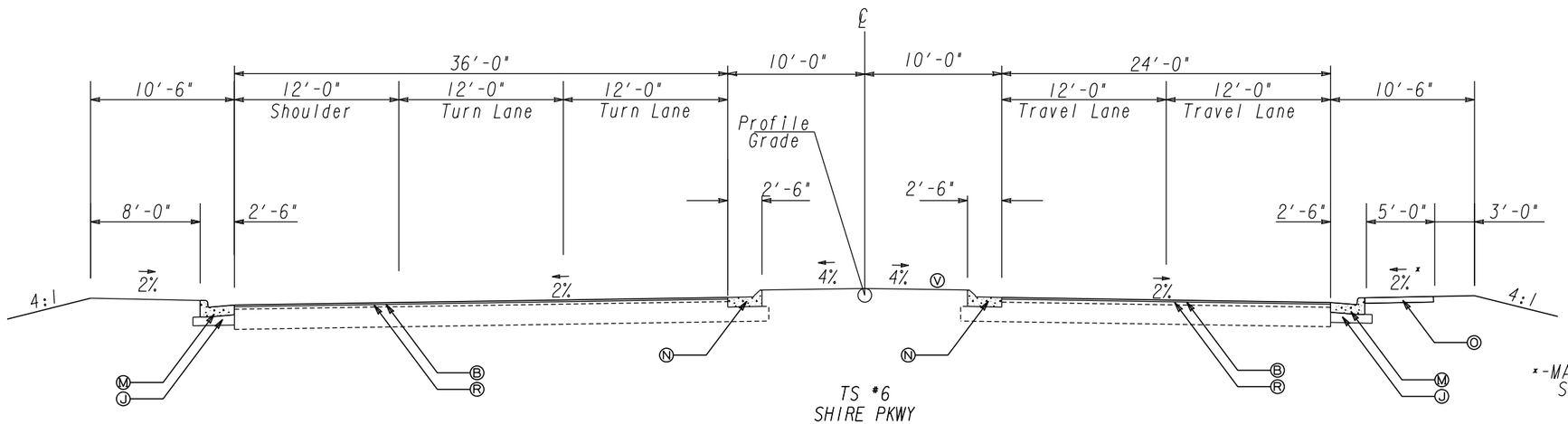
TYPICAL SECTIONS
US 278 / SR 12

CHECKED: DATE:
BACKCHECKED: DATE:
CORRECTED: DATE:
VERIFIED: DATE:

DRAWING No.
05-0002



TS #5
US 278
TANGENT SECTION
STA. 36+00.00 TO STA. 66+80.00



x-MAINTAIN EXISTING SIDEWLAK FROM STA 800+65.35 TO STA 800+90.00

TS #6
SHIRE PKWY
TANGENT SECTION
STA. 800+35.39 TO STA. 800+90.00

PAVEMENT LEGEND

- Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
- Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
- Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
- Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
- Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
- Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
- Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
- Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
- Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
- Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
- Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
- Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
- Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
- Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
- Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
- Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
- Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
- Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
- Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25))
- Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
- Ⓦ CONCRETE MEDIAN, 6 INCH

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

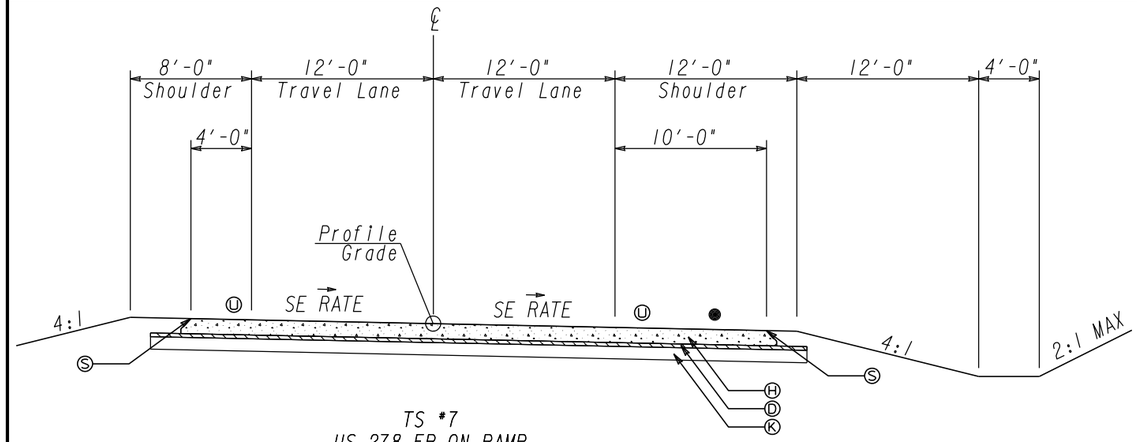
NTS

REVISION DATES

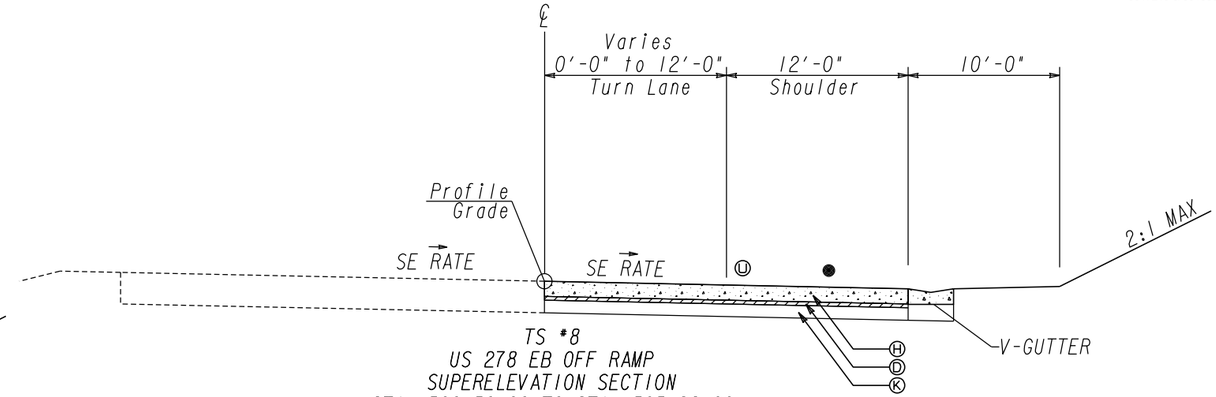
TYPICAL SECTIONS
US 278 / SR 12

CHECKED:		DATE:	
BACKCHECKED:		DATE:	
CORRECTED:		DATE:	
VERIFIED:		DATE:	

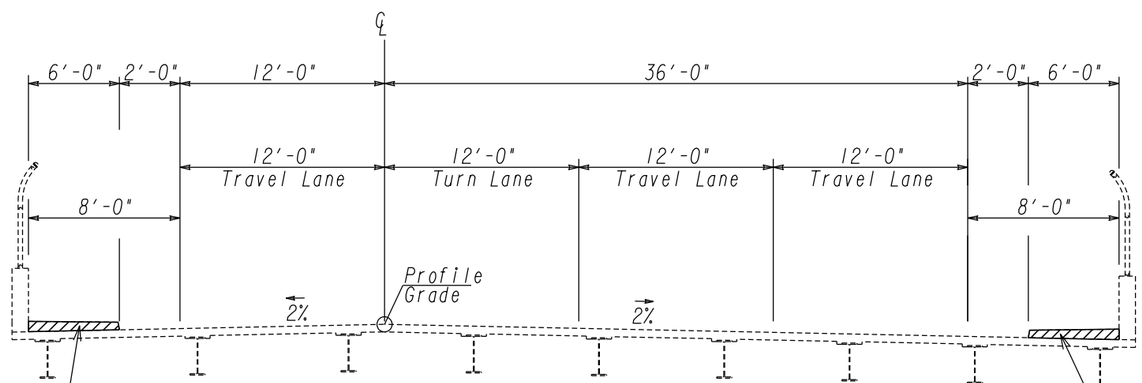
DRAWING No.
05-0003



TS #7
US 278 EB ON RAMP
SUPERELEVATION SECTION
STA. 700+24.90 TO STA. 701+35.00



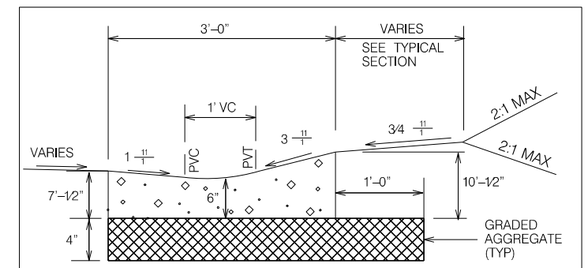
TS #8
US 278 EB OFF RAMP
SUPERELEVATION SECTION
STA. 500+50.00 TO STA. 505+92.00



Remove Existing Sidewalk
Place Raised Delineators
To Allow Pedestrians To
Walk Safetly.

US 278 BRIDGE OVER I-20
STA. 30+34.33 TO STA. 32+65.14

Remove Existing Sidewalk
Place Raised Delineators
To Allow Pedestrians To
Walk Safetly.



SPECIAL DESIGN
"V" GUTTER DETAILS

PAVEMENT LEGEND

Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25))
Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
Ⓦ CONCRETE MEDIAN, 6 INCH

● 6% OR RATE OF SE, WHICHEVER IS GREATER.

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

NTS

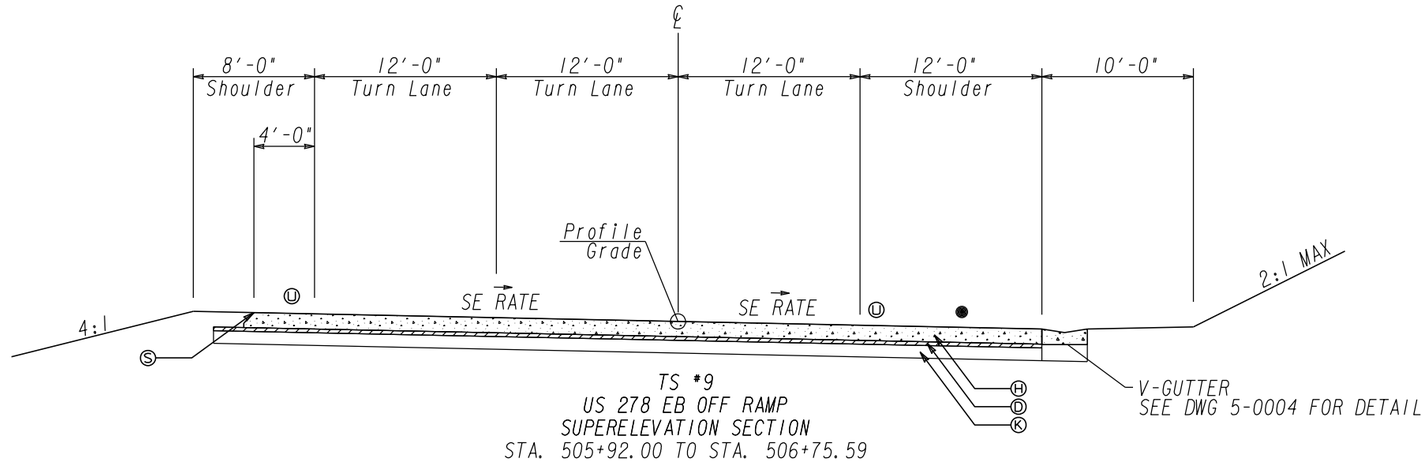
REVISION DATES

TYPICAL SECTIONS
US 278 / SR 12

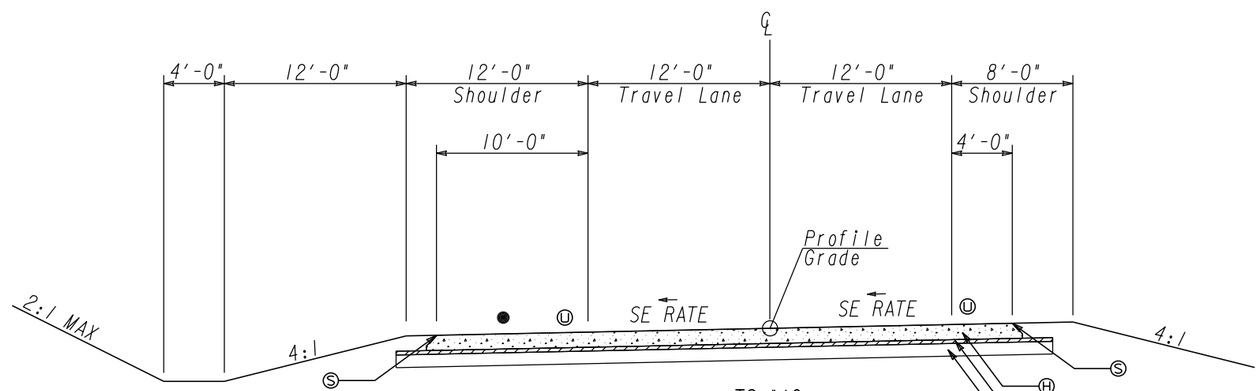
CHECKED: DATE:
BACKCHECKED: DATE:
CORRECTED: DATE:
VERIFIED: DATE:

DRAWING No. 05-0004

GPLN-CE



TS #9
US 278 EB OFF RAMP
SUPERELEVATION SECTION
STA. 505+92.00 TO STA. 506+75.59



TS #10
US 278 WB ON RAMP
SUPERELEVATION SECTION
STA. 402+80.00 TO STA. 404+73.09

PAVEMENT LEGEND

Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25))
Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
Ⓦ CONCRETE MEDIAN, 6 INCH

● 6% OR RATE OF SE, WHICHEVER IS GREATER.

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

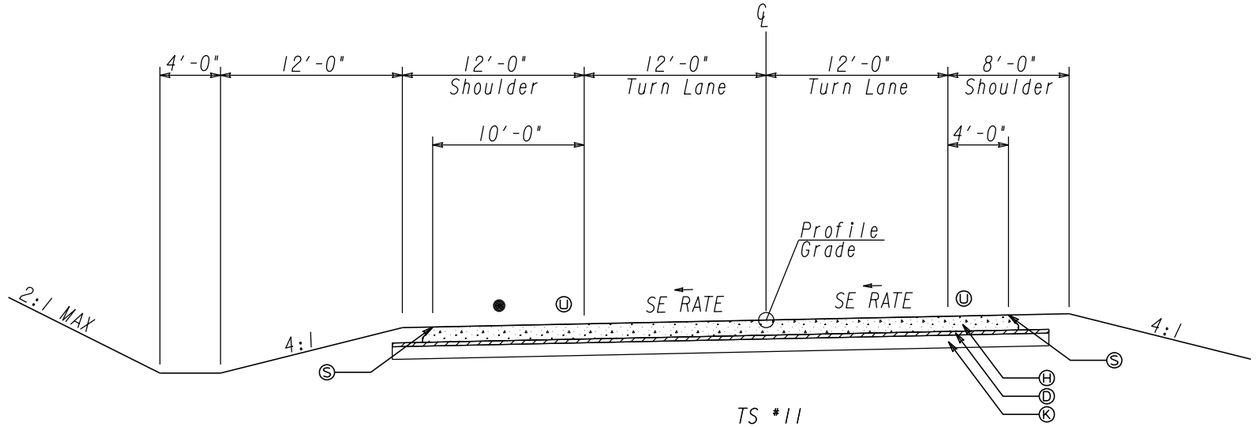
NTS

REVISION DATES

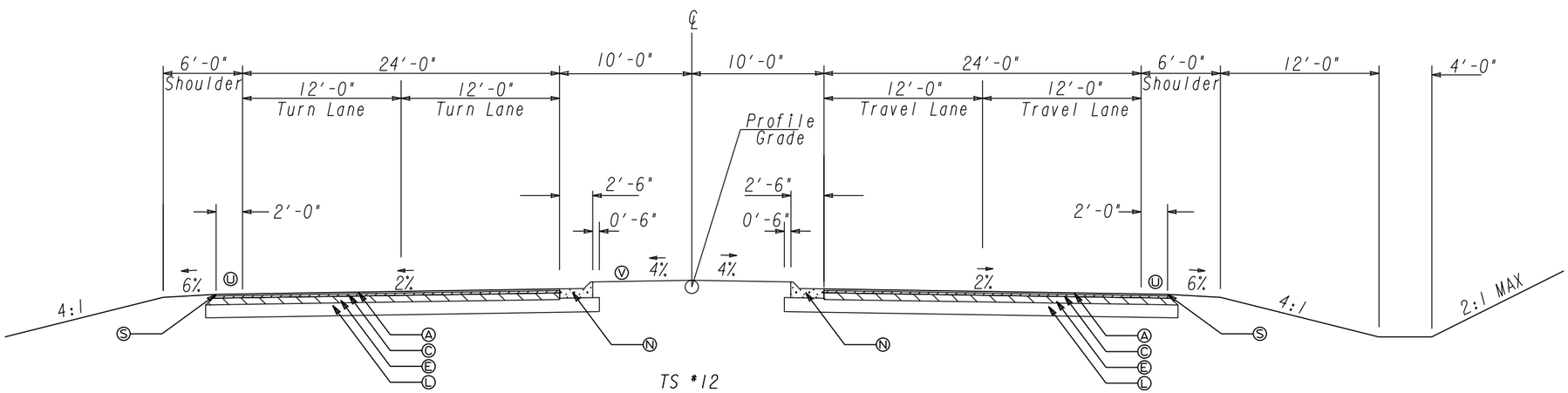
TYPICAL SECTIONS
US 278 / SR 12

CHECKED: DATE:
BACKCHECKED: DATE:
CORRECTED: DATE:
VERIFIED: DATE:

DRAWING No. 05-0005



TS #11
US 278 WB OFF RAMP
SUPERELEVATION SECTION
STA. 600+24.74 TO STA. 601+25.00



TS #12
DW 1
TANGENT SECTION
STA. 200+19.00 TO STA. 201+50.00

PAVEMENT LEGEND

Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND 1, INCL BITUM MATL & H LIME (135 LB/SQ YD)
Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25))
Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
Ⓦ CONCRETE MEDIAN, 6 INCH

● 6% OR RATE OF SE, WHICHEVER IS GREATER.

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

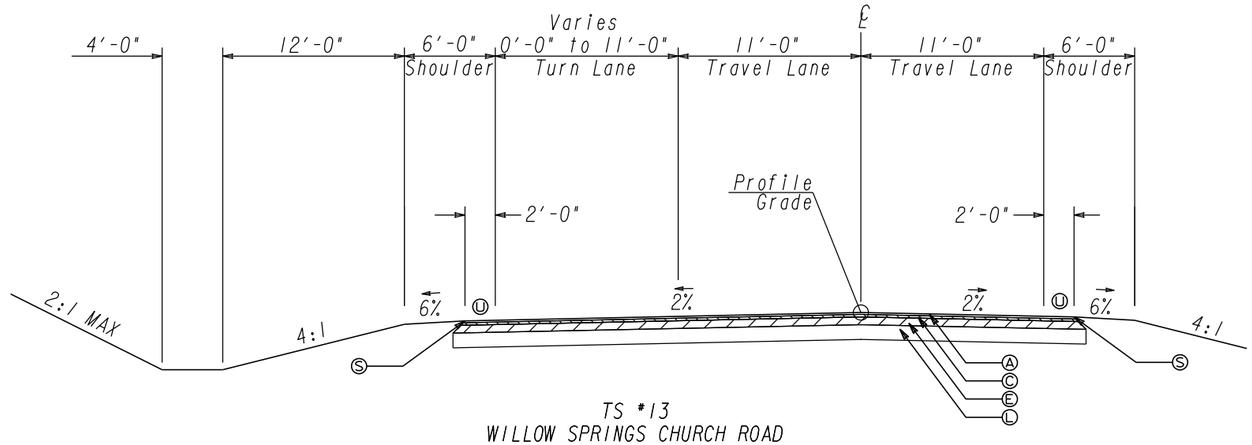
NTS

REVISION DATES

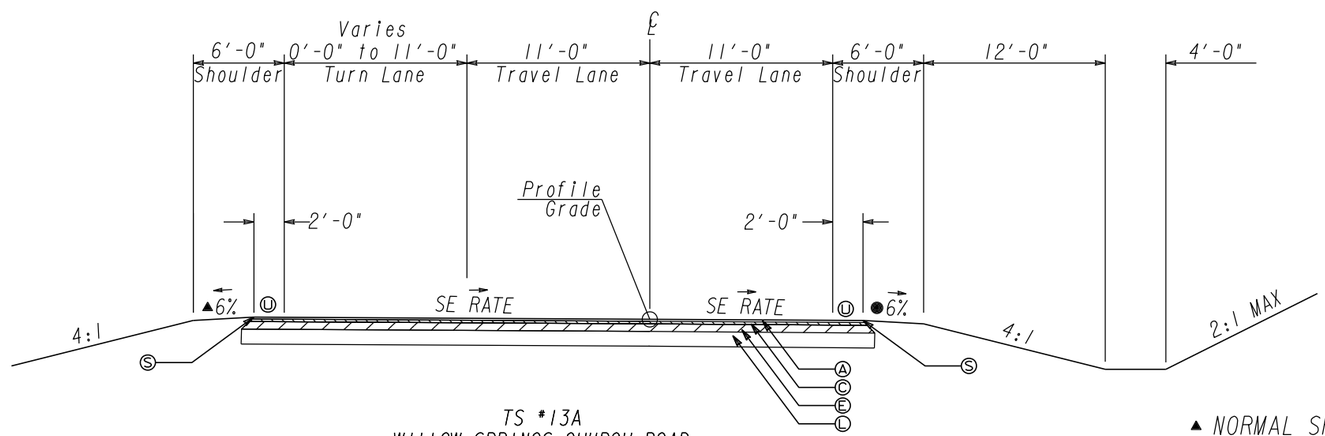
TYPICAL SECTIONS
US 278 / SR 12

CHECKED:		DATE:	
BACKCHECKED:		DATE:	
CORRECTED:		DATE:	
VERIFIED:		DATE:	

DRAWING No.
05-0006



TS #13
WILLOW SPRINGS CHURCH ROAD
TANGENT SECTION
STA. 300+18.09 TO STA. 303+14.53



TS #13A
WILLOW SPRINGS CHURCH ROAD
SUPERELEVATION SECTION

▲ NORMAL SHOULDER SLOPE, NOT TO EXCEED MAXIMUM SHOULDER BREAKOVER OF 8%.

● 6% OR RATE OF SE, WHICHEVER IS GREATER.

PAVEMENT LEGEND

Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25))
Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
Ⓦ CONCRETE MEDIAN, 6 INCH

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

NTS

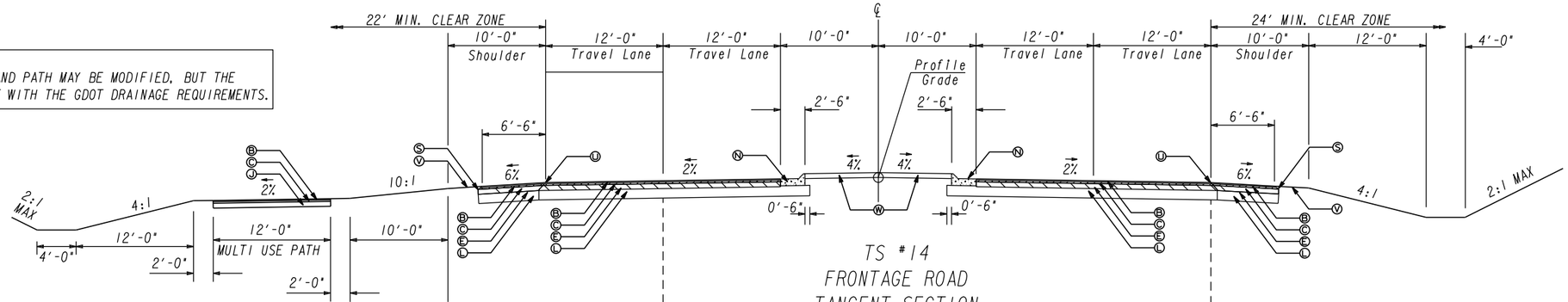
REVISION DATES

TYPICAL SECTIONS
US 278 / SR 12

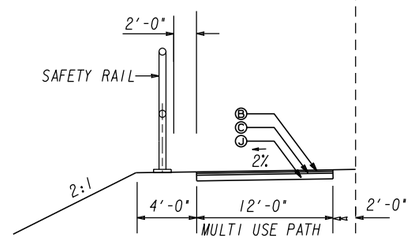
CHECKED: DATE:
BACKCHECKED: DATE:
CORRECTED: DATE:
VERIFIED: DATE:

DRAWING No. 05-0007

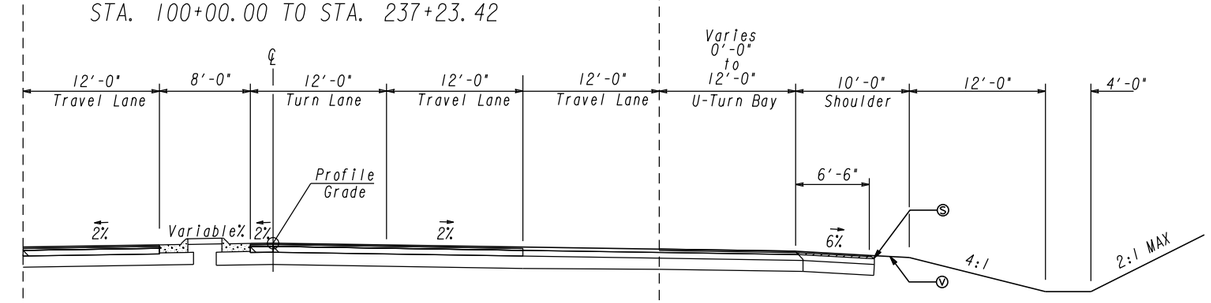
NOTE:
SLOPE BETWEEN ROADWAY AND PATH MAY BE MODIFIED, BUT THE GRADING TO BE COMPLIANT WITH THE GDOT DRAINAGE REQUIREMENTS.



TS #14
FRONTAGE ROAD
TANGENT SECTION
STA. 100+00.00 TO STA. 237+23.42

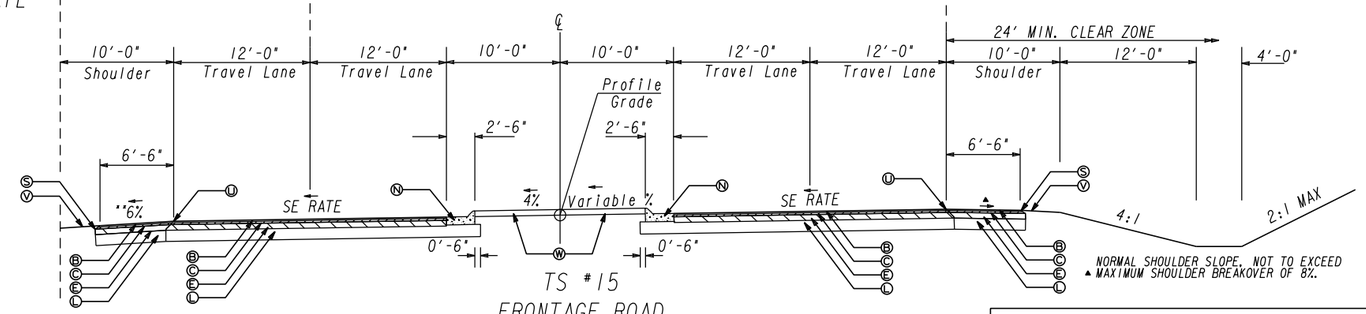


SHARED MULTI USE PATH DETAIL



TURN LANE DETAIL

U-TURN DETAIL

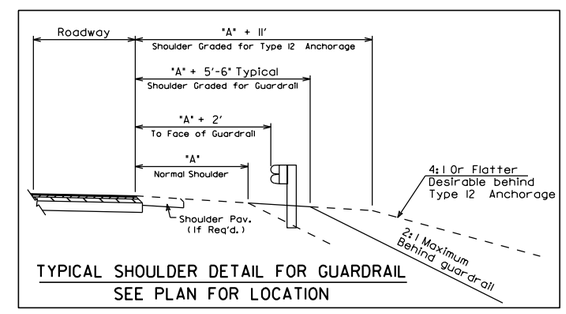


NORMAL SHOULDER SLOPE, NOT TO EXCEED
▲ MAXIMUM SHOULDER BREAKOVER OF 8%.

**6% OR RATE OF SE, WHICHEVER IS GREATER

TS #15
FRONTAGE ROAD
SUPER ELEVATED SECTION

NOTES:
1. SEE PLANS FOR GUARDRAIL LOCATION
2. FOLLOW GDOT CONSTRUCTION DETAIL S-4 FOR SHOULDER PAVEMENT AT GUARDRAIL



TYPICAL SHOULDER DETAIL FOR GUARDRAIL
SEE PLAN FOR LOCATION

PAVEMENT LEGEND

- Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE 11, BLEND 1, INCL BITUM MATL & H LIME (135 LB/SQ YD)
- Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
- Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
- Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
- Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
- Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
- Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
- Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
- Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
- Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
- Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
- Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
- Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
- Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
- Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
- Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
- Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
- Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
- Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25)
- Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
- Ⓦ CONCRETE MEDIAN, 6 INCH

COSTING PLANS
NOT FOR CONSTRUCTION

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

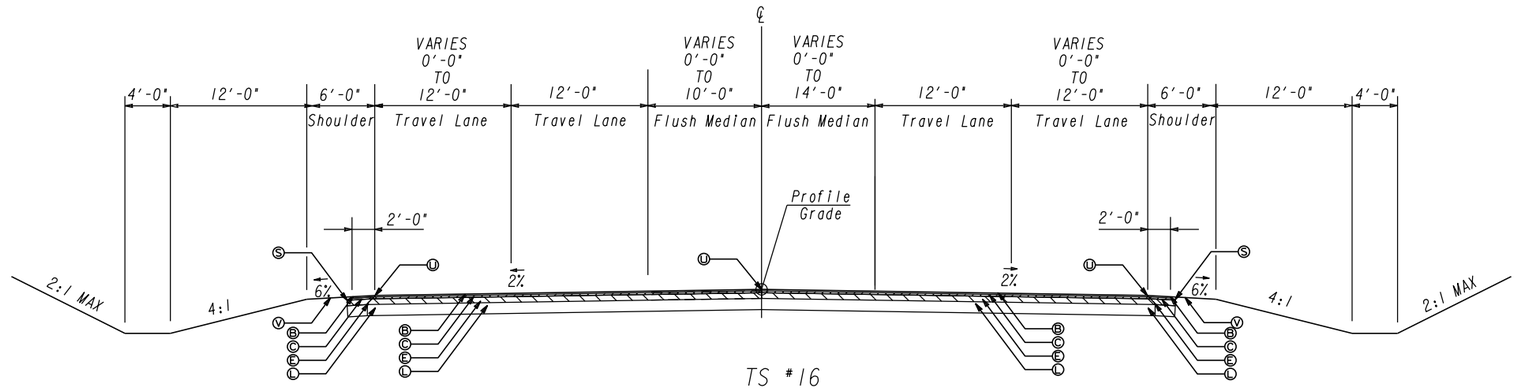
NOT TO SCALE

REVISION DATES

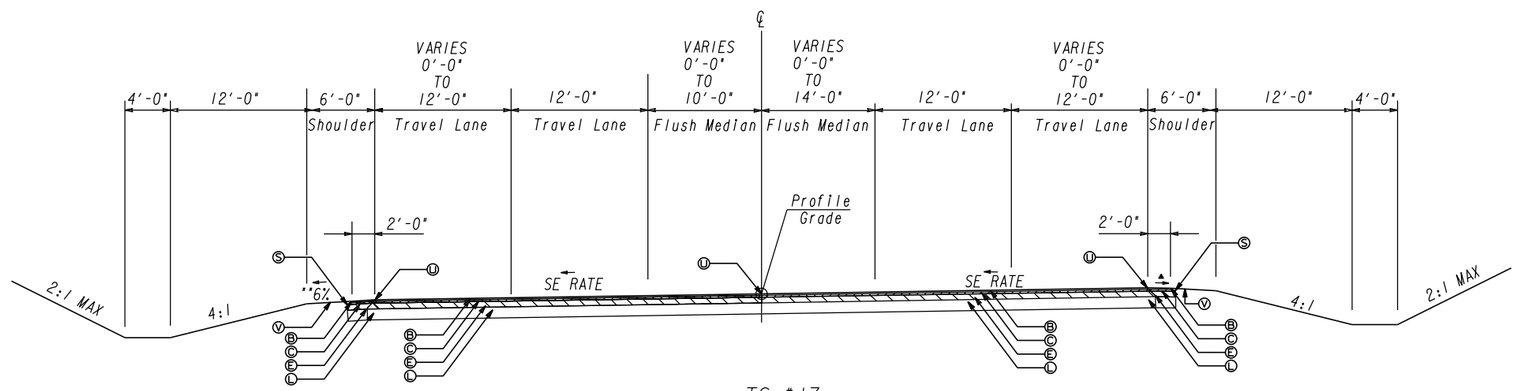
TYPICAL SECTIONS
FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:	
BACKCHECKED:		DATE:	
CORRECTED:		DATE:	
VERIFIED:		DATE:	

DRAWING No. 05-0008



TS #16
OLD MILL ROAD
TANGENT SECTION
STA. 237+23.42 TO STA. 248+75.49



TS #17
OLD MILL ROAD
SUPER ELEVATED SECTION

**6% OR RATE OF SE, WHICHEVER IS GREATER

▲ NORMAL SHOULDER SLOPE, NOT TO EXCEED MAXIMUM SHOULDER BREAKOVER OF 8%.

PAVEMENT LEGEND

Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25)
Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
Ⓦ CONCRETE MEDIAN, 6 INCH

COSTING PLANS
NOT FOR CONSTRUCTION

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

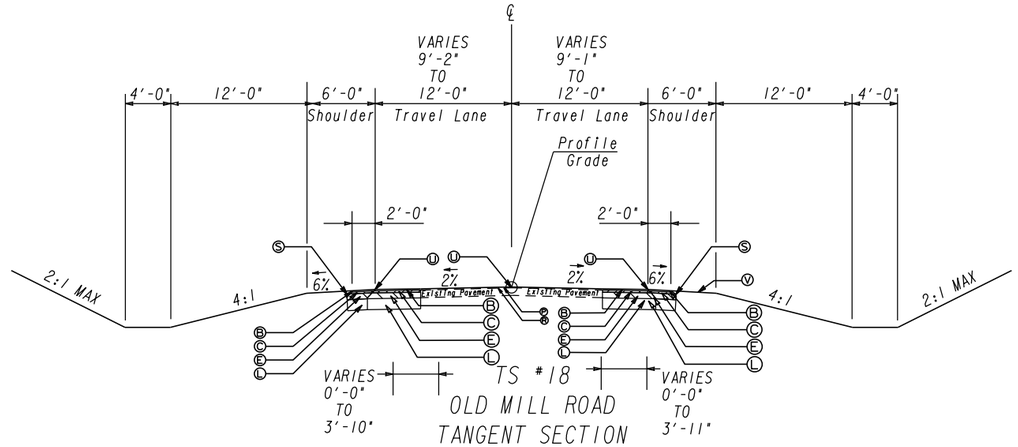
NOT TO SCALE

REVISION DATES

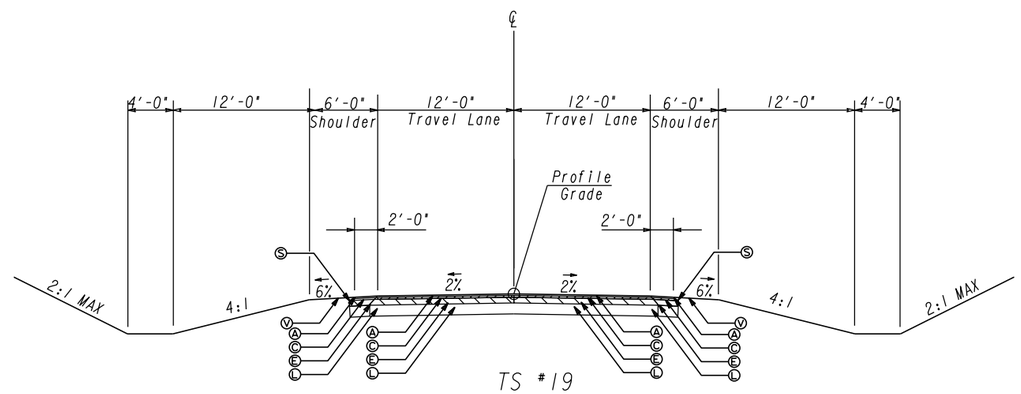
TYPICAL SECTIONS
FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:	
BACKCHECKED:		DATE:	
CORRECTED:		DATE:	
VERIFIED:		DATE:	

DRAWING No.
05-0009



TS #18
OLD MILL ROAD
TANGENT SECTION
STA. 248+75.49 TO STA. 253+00.00



TS #19
SEWELL ROAD
TANGENT SECTION
STA. 804+01.83 TO STA. 805+26.79

PAVEMENT LEGEND

- Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
- Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
- Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
- Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
- Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
- Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
- Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
- Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
- Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
- Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
- Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
- Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
- Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
- Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
- Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
- Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
- Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
- Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
- Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25)
- Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
- Ⓦ CONCRETE MEDIAN, 6 INCH

COSTING PLANS
NOT FOR CONSTRUCTION

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

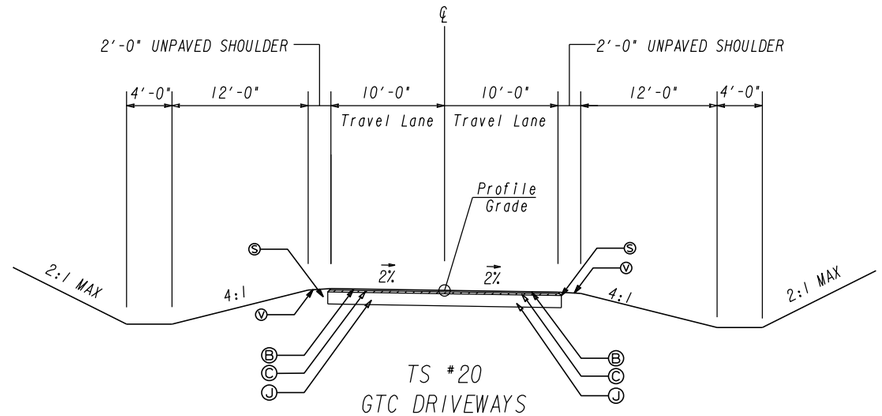
NOT TO SCALE

REVISION DATES

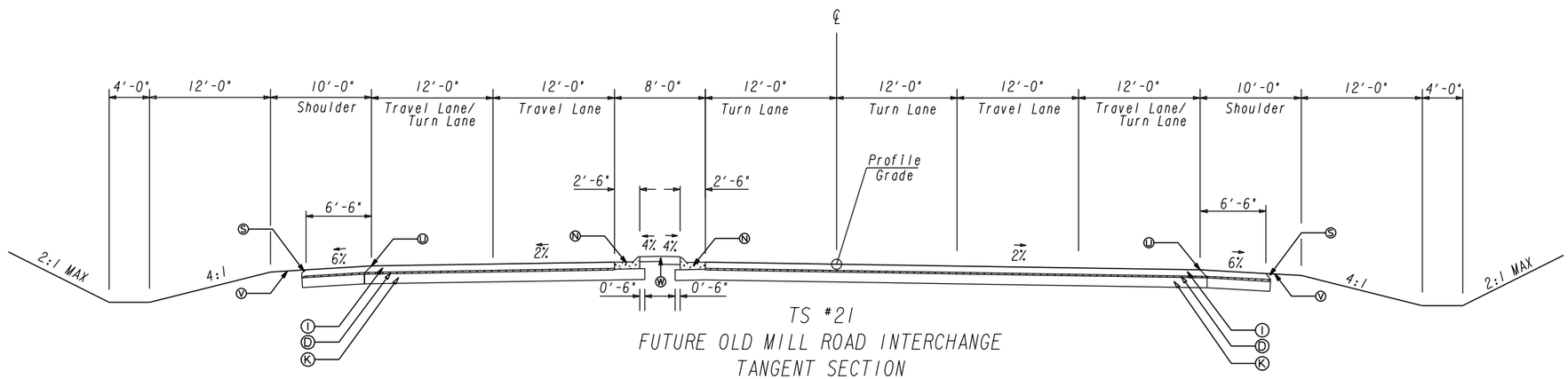
TYPICAL SECTIONS
FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:	
BACKCHECKED:		DATE:	
CORRECTED:		DATE:	
VERIFIED:		DATE:	

DRAWING No. 05-0010



TS #20
GTC DRIVEWAYS



TS #21
FUTURE OLD MILL ROAD INTERCHANGE
TANGENT SECTION
(FOR REFERENCE ONLY)

PAVEMENT LEGEND

Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25)
Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
Ⓦ CONCRETE MEDIAN, 6 INCH

COSTING PLANS
NOT FOR CONSTRUCTION

GDOT
Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

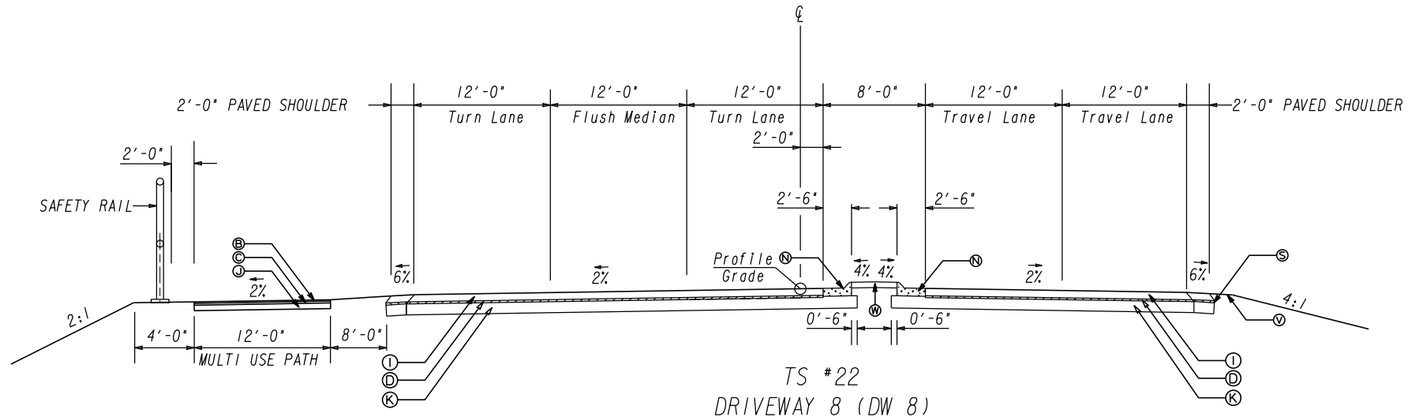
NOT TO SCALE

REVISION DATES

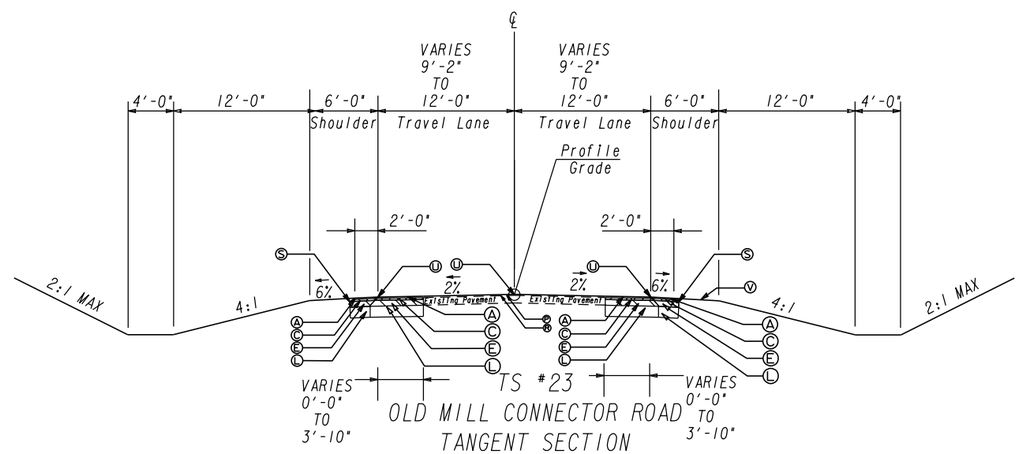
TYPICAL SECTIONS
FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED: DATE:
BACKCHECKED: DATE:
CORRECTED: DATE:
VERIFIED: DATE:

DRAWING No.
05-0011



TS #22
DRIVEWAY 8 (DW 8)
TANGENT SECTION
STA. 1100+00.00 TO STA. 1102+27.00



TS #23
OLD MILL CONNECTOR ROAD
TANGENT SECTION
STA. 900+90.00 TO STA. 904+00.00

PAVEMENT LEGEND

- Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
- Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
- Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
- Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
- Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
- Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
- Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
- Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
- Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
- Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
- Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
- Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
- Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
- Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
- Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
- Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
- Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
- Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
- Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
- Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25)
- Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
- Ⓦ CONCRETE MEDIAN, 6 INCH

COSTING PLANS
NOT FOR CONSTRUCTION

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

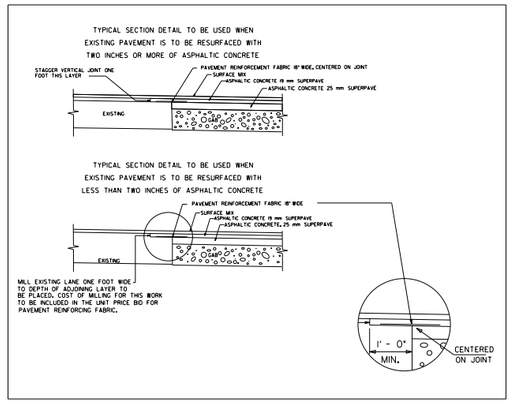
NOT TO SCALE

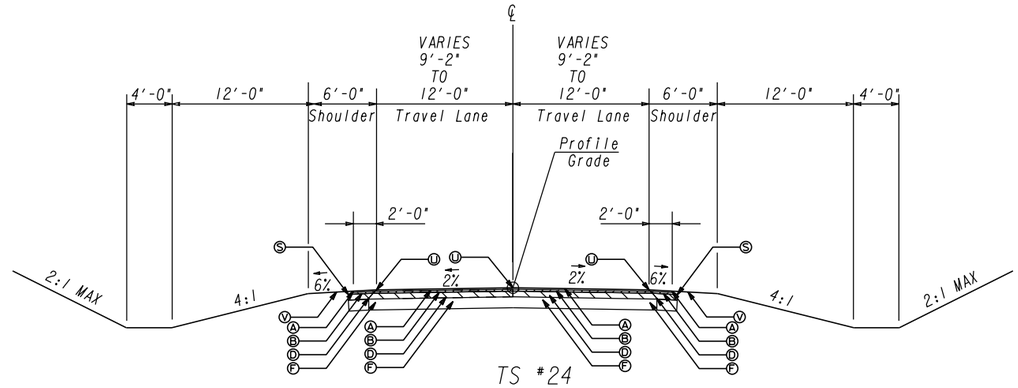
REVISION DATES

TYPICAL SECTIONS
FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

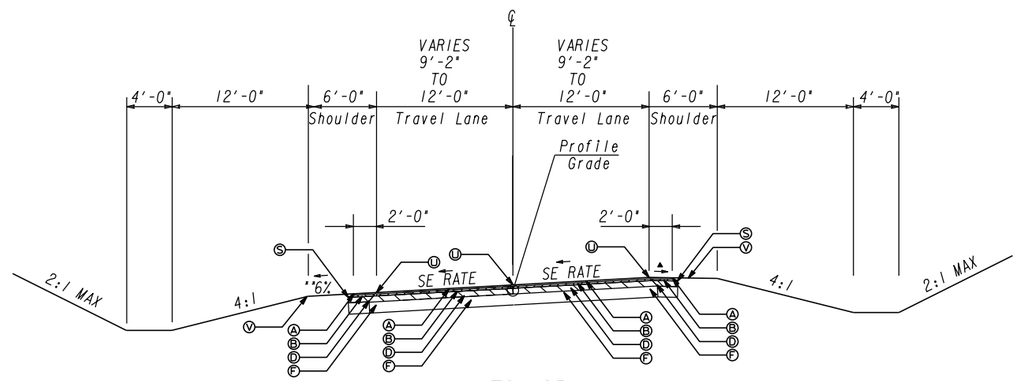
CHECKED:		DATE:	
BACKCHECKED:		DATE:	
CORRECTED:		DATE:	
VERIFIED:		DATE:	

DRAWING No.
05-0012





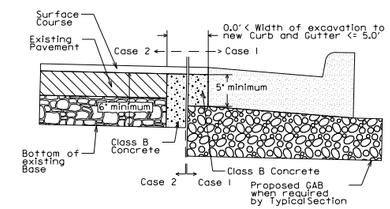
TS #24
OLD MILL CONNECTOR ROAD
TANGENT SECTION
STA. 900+00.00 TO STA. 908+33.39



**6% OR RATE OF SE, WHICHEVER IS GREATER

TS #25
OLD MILL CONNECTOR ROAD
SUPER ELEVATED SECTION

▲ NORMAL SHOULDER SLOPE, NOT TO EXCEED MAXIMUM SHOULDER BREAKOVER OF 8%.



NO SCALE
CLASS "B" CONCRETE BASE FOR PAVEMENT WIDENING
Item Code 500-9999 - CY Unit of Measure

Case 1:
Where CAB is required under the new Curb and Gutter and the depth of proposed paving between the top of the CAB and the bottom of the surface course is 5 inches or greater, Class B Concrete shall be placed in lieu of the paving between the CAB and surface courses specified by the typical section.

Case 2:
Where CAB is not required under the new Curb and Gutter and/or the depth of proposed paving between the top of the Base and the bottom of the surface course is less than 5 inches, Class B Concrete shall be placed beneath the proposed surface course to the depth of either the bottom of the existing base course, the bottom of the Base specified by the typical section, or to a depth of 6 inches; whichever is greater.

CLASS "B" CONCRETE BASE FOR WIDENING DETAIL

ALLOWABLE RANGES TABLE

FOR THIS PROJECT, CROSS SLOPES THAT ARE ADJUSTED TO 'BEST FIT'
EXISTING PAVEMENT SLOPES ARE SUBJECT TO THE FOLLOWING LIMITS:

A. NORMAL CROWN

SECTION WITH GRADES 0.5% OR GREATER	SECTION WITH GRADES LESS THAN 0.5%
0.0150 FT/FT - MINIMUM	0.0156 FT/FT - MINIMUM
0.0208 FT/FT - DESIRABLE	0.0208 FT/FT - DESIRABLE
0.0250 FT/FT - MAXIMUM	0.0300 FT/FT - MAXIMUM

B. SUPERELEVATION RATE

S.E. RATE SHOWN ON PLANS OR SE RATE EXISTING IN FIELD, WHICHEVER IS GREATER.

C. SUPERELEVATION TRANSITION LENGTH (LENGTH FROM FLAT POINT TO FULL SE)

	RATE OF CHANGE	CORRESPONDING DIFFERENCE IN GRADE BETWEEN PIVOT POINT AND EDGE OF PAVEMENT
MINIMUM	1:150	0.67%
DESIRABLE	1:200	0.50%
MAXIMUM	1:300	0.33%

LENGTH SHALL BE SET TO AVOID CREATING A FLAT GUTTER GRADE ON LOW SIDE AND TO AVOID FLAT CROSS SLOPES AT OR NEAR THE LOW POINT OF VERTICAL CURVES.

D. POSITIONING OF SUPERELEVATION TRANSITION LENGTH ON SIMPLE CURVES

50% OF TRANSITION INSIDE CURVE - MAXIMUM
33% OF TRANSITION INSIDE CURVE - DESIRABLE
20% OF TRANSITION INSIDE CURVE - MINIMUM

NOTE: CROWN WIPE-OUT SHALL BE AT THE SAME RATE AS THE SE TRANSITION.

E. SMOOTHING OF BREAKS IN EDGE PROFILE AT BEGIN AND END OF TRANSITION SHALL BE ACCOMPLISHED BY VERTICAL CURVE WITH A MINIMUM LENGTH (IN FEET) EQUAL TO THE SPEED DESIGN (IN MPH).

PAVEMENT LEGEND

Ⓐ RECYCLED ASPH CONC 9.5 MM SUPERPAVE, TYPE II, BLEND I, INCL BITUM MATL & H LIME (135 LB/SQ YD)
Ⓑ RECYCLED ASPH CONC 12.5 MM SUPERPAVE, GP 2 ONLY, INCL BITUM MATL & H LIME (165 LB/SQ YD)
Ⓒ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (220 LB/SQ YD)
Ⓓ RECYCLED ASPH CONC 19 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓔ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (330 LB/SQ YD)
Ⓕ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (550 LB/SQ YD)
Ⓖ RECYCLED ASPH CONC 25 MM SUPERPAVE, GP 1 OR 2, INCL BITUM MATL & H LIME (660 LB/SQ YD)
Ⓗ PLAIN PC CONC PVMT, CL 3 CONC, 10 INCH THK
Ⓘ PLAIN PC CONC PVMT, CL 3 CONC, 12.5 INCH THK
Ⓙ GR AGGR BASE CRS, 6 INCH, INCL MATL
Ⓚ GR AGGR BASE CRS, 8 INCH, INCL MATL
Ⓛ GR AGGR BASE CRS, 12 INCH, INCL MATL
Ⓜ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 2
Ⓝ CONCRETE CURB & GUTTER, 8 IN X 30 IN, TP 7
Ⓞ CONCRETE SIDEWALK, 4 IN. (SEE GDOT CONST DETAIL A1 TO A4)
Ⓟ MILL ASPH CONC PVMT, VARIABLE DEPTH AS REQUIRED
Ⓠ RECYCLED ASPH CONC PATCHING, INCL BITUM MATL & H LIME (AS DIRECTED BY ENGINEER)
Ⓡ RECYCLED ASPH CONC LEVELING, INCL BITUM MATL & H LIME
Ⓢ ASPHALT PAVEMENT EDGE TREATMENT (SEE GDOT CONST DETAIL P-7)
Ⓣ PAVEMENT REINFORCEMENT FABRIC, 18" WIDE. (SEE DETAIL ON DRAWING 5-0006)
Ⓤ RUMBLE STRIPS (SEE GDOT CONST DETAIL T-23A, T-23B, T-24 & T-25)
Ⓥ SOD (END SOD AT SHOULDER BREAK POINT)
Ⓦ CONCRETE MEDIAN, 6 INCH

COSTING PLANS
NOT FOR CONSTRUCTION

GDOT Georgia Department of Transportation

ARCADIS Design & Consultancy for natural and built assets
Michael Baker INTERNATIONAL

NOT TO SCALE

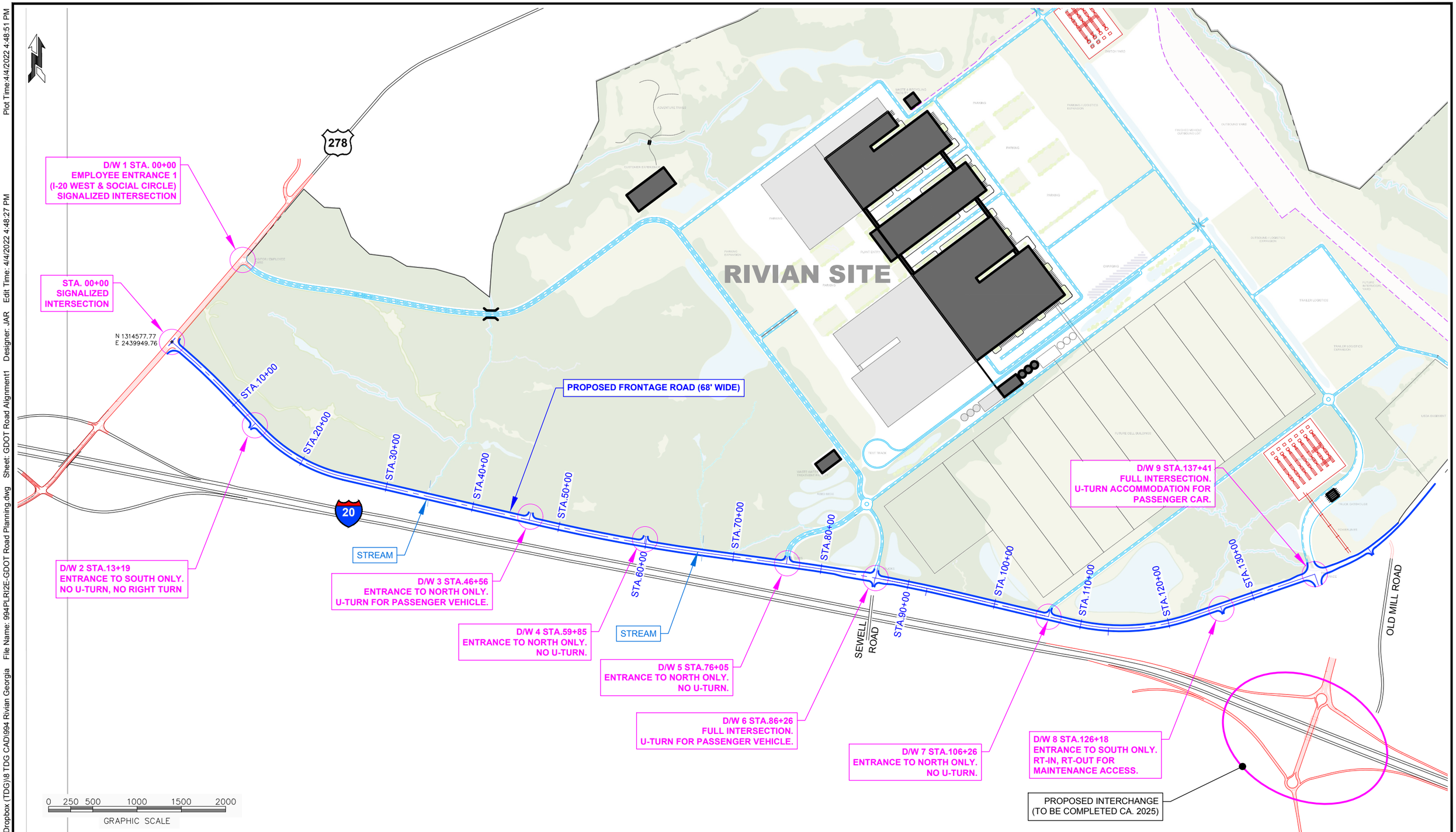
REVISION DATES

TYPICAL SECTIONS
FRONTAGE RD & INTERIM
OLD MILL RD WIDENING (0018363)
NEWTON/WALTON/MORGAN COUNTY

CHECKED:		DATE:	
BACKCHECKED:		DATE:	
CORRECTED:		DATE:	
VERIFIED:		DATE:	

DRAWING No. 05-0013

Attachment 6 – Proposed Driveways on FR



© COPYRIGHT TD GROUP LLC

VERSION

NO.	DATE	NOTES
6	4 APR 22	REVISION
5	28 MAR 22	REVISION
4	25 MAR 22	REVISION
3	1 MAR 22	REVISION
2	28 FEB 22	REVISION

RIVIAN

TRANSDEVELOPMENT GROUP

PROJECT	994
FILE	994PLRI2E
CTB	tdg-lw.ctb
DESIGNER	JAR
EDIT DATE	4/4/2022
SAVE TIME	4:48:27 PM
PLOT DATE	4/4/2022
PLOT TIME	4:48:51 PM

GDOT FRONTAGE ROAD PLAN

RIVIAN SITE PLAN

SOCIAL CIRCLE, GEORGIA

Project: Q:\Clients\TD Group\Dropbox (TDG)\8 TDG CAD\994 Rivian Georgia File Name: 994PLRI2E-GDOT Road Planning.dwg Sheet: GDOT Road Alignment1 Designer: JAR Edit Time: 4/4/2022 4:48:27 PM Plot Time:4/4/2022 4:48:51 PM

Attachment 7 – Bridge Inventory Sheets

Latitude:33.60947, Longitude:-83.69948

Route:00278 Log:16

District 2, Newton County

Owner: 1-State Highway Agency

Team Leader: Joshua Cofer

Bridge #217-5053-0(Routine)
US 278 over I-20 (217-00012D-015.63E)
County: Newton, **District:** 2, **Inspection Area:** 7
Team Lead: Joshua Cofer, **Inspection Date:** 02/04/2021

IDENTIFICATION	
(1) State Names	13-Georgia
(8) Structure Number	217-5053-0
(5) Inventory Route	00278
(2) Highway Agency District	2
(3) County Code	Newton
(4) Place Code	0
(6) Features Intersected	I-20
(7) Facility Carried	US 278
(9) Location	NEWTON-WALTON CO. LINE
(11) Mile Point	16 mi
(12) Base Highway Network	Yes
(13) LRS Inventory Rte & Subrte	2171001200
(16) Latitude	33.60947
(17) Longitude	-83.69948
(98) Border Bridge State Code	000
(99) Border Bridge Structure No.	0000
STRUCTURE TYPE AND MATERIAL	
(43) Main Structure Type	42
Material	4-Steel continuous
Type	2-Stringer/Multi-beam or girder
(44) Approach Structure Type	0
Material	0-Other
Type	0-Other
(45) No. of Spans in Main Unit	2
(46) No. of Approach Spans	0
(107) Deck Structure Type	1-Concrete Cast-in-Place
(108) Wearing Surface/Protective System	
Type of Wearing Surface	0-None (no additional concrete thickness
Type of Membrane	0-None
Type of Deck Protection	8-Unknown
AGE AND SERVICE	
(27) Year Built	2003
(106) Year Reconstructed	
(42) Type of Service	51
On	5-Highway-pedestrian
Under	1-Highway, with or without pedestrian
(28) Lane	
On	2
Under	4
(29) Average Daily Traffic	2730
(30) Year of ADT	2011
(109) Truck ADT	1 %
(19) Bypass, Detour Length	0 mi
GEOMETRIC DATA	
(48) Length of Maximum Span	120 ft
(49) Structure Length	240 ft
(50) Curb or Sidewalk Width	
Left	5.9 ft
Right	5.9 ft
(51) Bridge Roadway Width Curb to Curb	52.4 ft
(52) Deck Width Out to Out	66.6 ft
(32) Approach Roadway Width (W/Shoulders)	24 ft
(33) Bridge Median	0-No median
(34) Skew	30 Deg
(35) Structure Flared	0-No flare
(10) Inventory Route Min Vert Clear	99.99 ft
(47) Inventory Route Total Horiz Clear	52.4 ft
(53) Min Vert Clear Over Bridge Rdwy	99.99 ft
(54) Min Vert Underclear	17 ft
Ref:	
(55) Min Lat Underclear RT	43 ft
Ref:	
(56) Min Lat Underclear LT	29.5 ft
NAVIGATION DATA	
(38) Navigation Control	N-Not applicable, no waterway.
(111) Pier Protection	1-Navigation protection not re
(39) Navigation Vertical Clearance	0 ft
(116) Vert-Lift Bridge Nav Min Vert Clear	0 ft
(40) Navigation Horizontal Clearance	0 ft

CLASSIFICATION	
(112) NBIS Bridge Length	Y
(104) Highway System	1
(26) Functional Class	6-Rural Minor Arterial
(100) Defense Highway	1-The inventory route is on a
(101) Parallel Structure	N-No parallel structure exists
(102) Direction of Traffic	2-2 - way traffic
(103) Temporary Structure	
(105) Federal Lands Highways	0-N/A
(110) Designated National Network	0-The inventory route is not part o
(20) Toll	3-On free road. The structure is tol
(21) Maintain	1-State Highway Agency
(22) Owner	1-State Highway Agency
(37) Historical Significance	5-Bridge is not eligible for the NR
CONDITION	
(58) Deck	7
(59) Superstructure	7
(60) Substructure	7
(61) Channel & Channel Protection	N
(62) Culverts	N
LOAD RATING AND POSTING	
(31) Design Load	6-MS 18+Mod / HS 20+Mod
(63) Operating Rating Method	1
(64) Operating Rating	
Type	1-Load Factor(LF)
Rating	60
(65) Inventory Rating Method	1-Load Factor(LF)
(66) Inventory Rating	
Type	2
Rating	36
(70) Bridge Posting	5-Equal to or above legal loads
(41) Structure Open/Posted/Closed	A-Open, no restriction
APPRAISAL	
(67) Structural Evaluation	8
(68) Deck Geometry	9
(69) Clearances, Vertical/Horizontal	9
(71) Waterway Adequacy	N
(72) Approach Roadway Alignment	9
(36) Traffic Safety Features	1111
A) Bridge Railings	1-Inspected feature meets currently
B) Transitions	1-Inspected feature meets currently
C) Approach Guardrail	1-Inspected feature meets currently
D) Approach Guardrail Ends	1-Inspected feature meets currently
(113) Scour Critical Bridges	N-Bridge not over waterway.
PROPOSED IMPROVEMENTS	
(75) Type of Work	
(76) Length of Structure Improvement	0 ft
(94) Bridge Improvement Cost	$ 938
(95) Roadway Improvement Cost	$ 94
(96) Total Project Cost	$ 1407
(97) Year of Improvement Cost Estimate	2013
(114) Future ADT	4095
(115) Year of Future ADT	2031

INSPECTIONS			
(90) Inspection Date			02/2019
(91) Frequency			24 Months
(92) Critical Feature Inspection	Done	Freq. (Mon)	Date
A: Fracture Critical Detail	No		
B: Underwater Inspection	No		
C: Other Special Inspection	No		

Evaluation

Deck

NBIS Condition: 7 **Material:** O. Concrete **Deck Wearing Surface:** 0-None (no additional concrete thickness or wearing surface is included in the bridge deck)

Deck Evaluation:
Continuous concrete deck is 8.5" thick at 240' long x 66.6' wide with 2" steel stay-in-place forms.
Abutments 1 and 3 are Evazote expansion joints.
Bent 2 is a Silicone expansion joint.
There are two Silicone dummy joints, one in each span.

Minor transverse and shrinkage cracking throughout.
The deck top has areas of 1/64" wide map cracking.
Note: Bay 5 deck underside has approximately a 2' wide section with no steel stay-in-place forms.
The deck overhang have transverse cracks with moderate efflorescence at the joints in the barrier wall.
The joints have a moderate accumulation of dirt and debris.
At Abutment 1 the armor plate over the right sidewalk has one broken fastener and several loose fasteners.
Abutment 3 joint has pulled loose in several areas and is leaking.
Abutment 3 has a header spall along the joint on the approach slab side.
Abutment 3, the armor plate over the right sidewalk has six of seven broken fasteners and the plate can be easily moved.

Superstructure

NBIS Condition: 7 **Material:** M. Steel **Year Painted:** 2017 **Paint Type:** 2- Non-Lead Oil Alkyd System (System IV)

Superstructure Evaluation:
Superstructure consists of two spans continuous with nine beams spaced at 7.7' with steel diaphragms.
Continuous special steel design Plate Girders (See Plans).
Steel expansion pot bearings at both abutments and steel fixed pot bearings at Bent 2.

Bent 2 - Some of the anchor bolt nuts for the bearings are backed off up to 1/2".

Substructure

NBIS Condition: 7 **Material:** O. Concrete **Year Painted:** 0000 **Paint Type:** 0- Not Applicable

Substructure Evaluation:
Abutments 1 and 3 are concrete caps at 79' long on unknown foundations.
Bent 2 is a concrete cap at 75.5' long on five concrete columns with pile footings.
Both abutments have reinforced concrete retaining walls and reinforced earth walls (MSE walls).

Both abutment caps have random vertical cracks up to 18" long x 1/64" wide.
The abutment cap MSE wall closure pour joints at both abutments are not sealed and both closure pours have full width x up to 1/8" wide cracks.
Bent 2 cap has minor diagonal cracking at both sides, forward and rear, with the one at the left rear face being open more than the others.

General

This Bridge:

Two spans, Built in 2003 at 228' long x 78.4' wide
Project # IM-00MS (268); PI # 210880
Replaced structure 217-0007-0
Handrails are 2.9' high parapets with 7' fencing attached on both sides.
Both approach slabs have an asphalt overlay.

Forward approach slab has a 3’ X 3” X 4” spall at adjacent to abutment 3 joint. Inspectors were able to stick a range rod into the spall and discovered a 4 foot void underneath the approach lab at the center of the joint, adjacent to the Eastbound lane.

The parapets have corrosion staining on the lower outside faces at the construction joints.
Span 2 left curb, 24' from Pier 2, has a 7" L x 6" W x 2" D spalled/honeycomb area.
The near approach slab over the approach roadway transition has intermittent up to 1/16" wide diagonal cracking in the travel lanes.
The forward approach slab in the right lane at the shoulder adjacent to Abutment 3 has a 20" L x 13" W x 3" D pothole.
The rear right approach roadway sidewalk has 1-1/2" of uplift at the approach slab sidewalk.
In Bays 1 and 8 near Abutment 3, some of the fiberglass conduits are separated. These conduits are abandoned.
In Bay 1, the first utility hanger from Abutment 3 is not assembled and the hardware is on the cap.

04/03/2021: Structure was inspected beyond 24 months due to staff availability or scheduling.

Conditional Situations

Confined Space: No **Traffic Control:** No **Underwater Inspection:** No **Specialized Inspection:** No

Equipment Used

Access Equipment: None
Waders: None
Topside Boat: None
Special Imaging Device: Binoculars

Load Rating and Posting

103-Temporarily Shored:
41-Structure Open, Posted, Closed: A-Open, no restriction

Truck Type	Gross/H-Mod	HSMod	Tandem	3-S-2	Timber	Piggyback
Calculated Posting	21	30	33	40	37	40
Posting required	0	0	0	0	0	0
Existing Posting	00	00	00	00	00	00

Elements & Defects

ELEM	DESCRIPTION	UNITS	TOTAL	CS1	CS2	CS3	CS4
12	Reinforced Concrete Deck	SF	9984	9984	0	0	0
107	Steel Open Girder/Beam	LF	2160	2160	0	0	0
515	Steel Protective Coating	SF	2506	2506	0	0	0
205	Reinforced Concrete Column	EA	5	5	0	0	0
215	Reinforced Concrete Abutment	LF	158	158	0	0	0
234	Reinforced Concrete Pier Cap	LF	76	68	8	0	0
1130	Cracking (RC and Other)	LF	8	0	8	0	0
(234-1130)							
Bent 2 diagonal cracking, left rear. There are diagonal cracks at all four quadrants, but this is the worst.							
301	Pourable Joint Seal	LF	60	60	0	0	0
302	Compression Joint Seal	LF	120	62	0	52	6
314	Pot Bearing	EA	27	27	0	0	0
321	Reinforced Concrete Approach Slab	SF	3996	3996	0	0	0
510	Wearing Surfaces	SF	2986	2983	0	0	3
3210	Delam/Spall/Patched Area/Pothole	SF	3	0	0	0	3
(321-510-3210)							
Inspectors were able to stick a range rod into the spall and discovered a 4 foot void underneath the approach lab at the center of the joint, adjacent to the Eastbound lane.							
331	Reinforced Concrete Bridge Railing	LF	480	480	0	0	0

Maintenance Items

Activity	Priority	Location	Comments
800-Bridge Joint Sealing	B	Abutment 3	Clean and seal
205-Approach Undersealing	B	Forward approach slab	Forward approach slab has a 3' X 3" X 4" spall at adjacent to abutment 3 joint. Inspectors were able to stick a range rod into the spall and discovered a 4 foot void underneath the approach lab at the center of the joint, adjacent to the Eastbound lane. Place flowable fill in the void to prevent settlement of the approach.

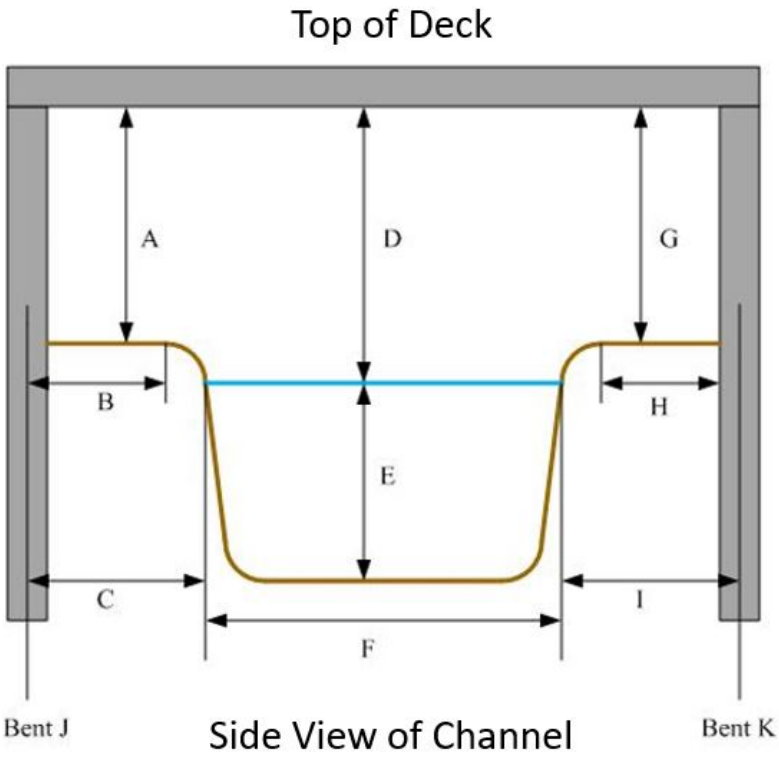
Superstructure Data

Span #	Beam Type	Beam Spacing (ft)	Span Length (ft)	# Beams	Remarks
1	Steel Beam	7.7	120	9	45 x 443
2	Steel Beam	7.7	120	9	45 x 443

Bearing Data

Span #	Rear Type Bearing	Forward Type Bearing	Remarks
1	Pot	Pot	
2	Pot	Pot	

Channel Information



B,C,H, & I are measured to the center of bent or Back Face of Paving Rest

A:	0	**B:**	0	**C:**	0	**D:**	00.0
E:	00.0	**F:**	0	**G:**	0	**H:**	0
I:	0	**J:**	0	**K:**	0		

Location of Bridge Height:
Bridge Height Taken:
Scour Condition: 10
Waterway Adequacy: N
Channel Protection: N
Channel Protection:

+ Substructure Skew = 0 **- Channel Skew =** 0 **Angle of Stream Attack =** 0

Vertical Clearance

(54B) Min Vertical Underclearance (ft-in): 17-5
(228A) Actual Min Vertical Odometer (ft-in): 99-99
(228B) Actual Min Vertical Opposite (ft-in): 99-99
(228C) Posted Min Vertical Odometer (ft-in): 00-00
(228D) Posted Min Vertical Opposite (ft-in): 00-00
(5E) Direction: 0-N/A
(55A) Lateral Type: H-Highway beneath structure
(55B) Min Lateral Under Clearance on Right (ft): 43
(56) Min Lateral Under Clearance on Left (ft): 29.5
(47) Total Horizontal Clearance (ft): 52.4
(69) Rating-Under Clearance Horizontal/Vertical: 9

Underwater Report

Dive Supervisor: **Diver:** **Standby Diver:**

Bents Inspected: **Bent Construction:**
Boat Used: **Inspection Type:**
Maximum Water Depth: **Water Level Reference:**
Bridge Inspection Procedure:

Condition Ratings:
Substructure: 7 **Channel Protection:** N **Scour:** 10 **Underwater:** 10 **Waterway Adequacy:** N

Detailed Inspection:

Collision Information

Beam Type
Span Number with Beam Damage: 0
Total Number of Beams in Span: 0
Number of Damaged Beams: 0

Minimum Vertical Clearance: 0-0
Actual Vertical Clearance: 0-0
Posted Vertical Clearance: 0-0

Damage Location in Span:

Repairs Required: No **Repairs Made:**

Additional Comments:

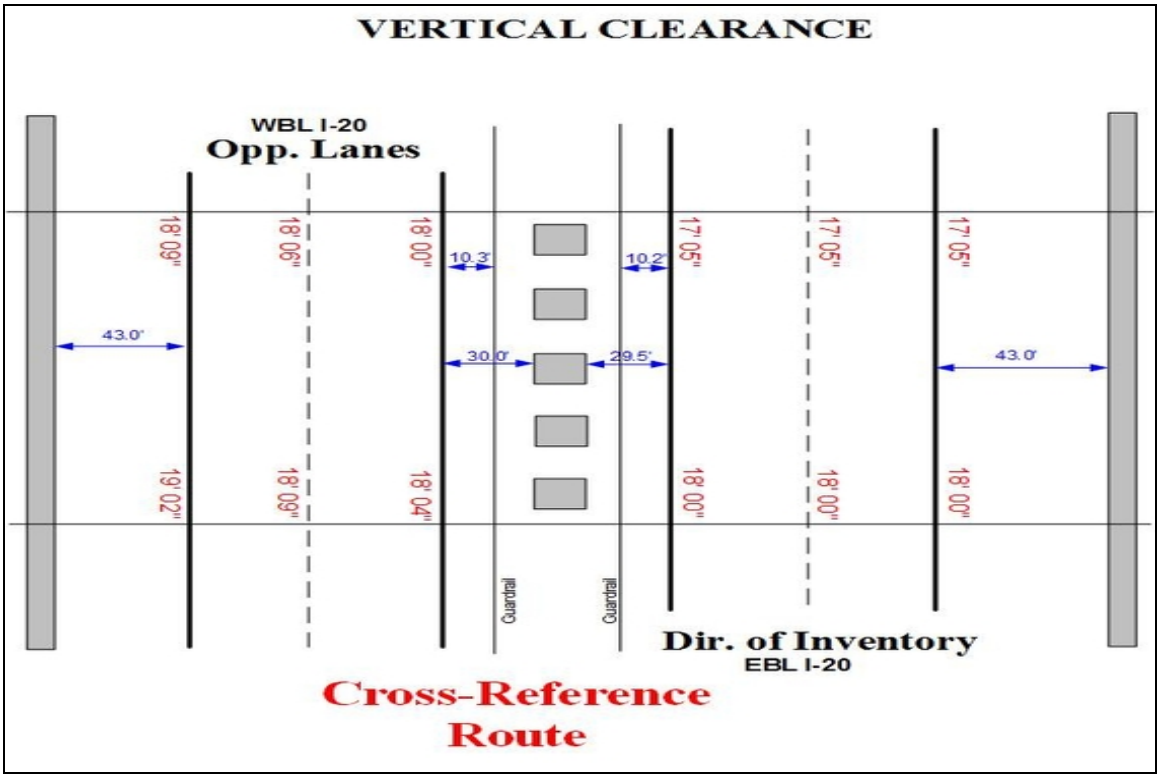
Second from right rear

Span1/Bent2

Taken with inventory

Telephone - Bay 1

Telephone - Bay 8



Drawing

Bent 2 diagonal cracking, left rear.

Abutment 3 joint is allowing a free flow of water.

Forward approach slab has a 3’ X 3” X 4” spall at adjacent to abutment 3 joint.

Georgia Department of Transportation

Bridge Inspection Report

District: 4841200000 - District Two- **Inspection Area:** 2 **County:** Morgan
Location ID: 211-00046X-000.77N **Over:** I-20
Structure ID: 211-0008-0 **Road Name:** SEWELL CHURCH RD
Bridge Information: 6-Revised inventory or operating ratings; load limits

Georgia Department of Transportation

Evaluation

Topside Inspection Team **Inspection Type:** General **Inspection Date:** 09/23/2020

Team Leader: Vinson Thomas Tanner

Assistants: Billy Lanthrip

Deck

NBIS Condition 7 - Good Condition **Material:** O. Concrete

Deck Wearing Surface Type: 1. Concrete

Concrete deck

A polymer overlay has been added to the deck top surface in all spans

Spans 2, 3 and 4 have transverse cracking with light efflorescence on the bottom.
All spans have minor cracking on the bottom of the deck
Armored joints at both abutments have been replaced with pourable type joints.

Superstructure

NBIS Condition 7 - Good Condition **Material:** M. Steel **Year Painted:** 1991

Paint Type : 2- Non-Lead Oil Alkyd System (System IV) **Temperature (F):**

Steel beams (Continuous)
The beams are spliced rear and forward of bents 2, 3 and 4 with back up bars.
Concrete diaphragms on slight skew

9" pedestals have been added under bearings and beams in all spans
Span 1, beam 2 - splice has 1" jog. No problems.
The beams have freckle rust on the bottom flanges throughout
Both end walls have minor cracking.

Substructure

NBIS Condition 7 - Good Condition **Material:** O. Concrete **Year Painted:** 0000

Paint Type : 0- Not Applicable

Abutments - Steel H piling and concrete caps
Bents - Spread footing, concrete columns and concrete caps

Both abutment caps have minor vertical cracks.
High chairs exposed on bottom of caps at bents 2, 3 and 4.
The caps at bents 2, 3 and 4 have minor vertical cracking.

General

This Bridge:

Sewell Church Road over I-20

Both approach slabs have been replaced in 2019
Approach slabs have asphalt overlays

Conditional Situations

Confined Space: No **Traffic Control Needed:** No

District: 4841200000 - District Two- **Inspection Area:** 2 **County:** Morgan
Location ID: 211-00046X-000.77N **Over:** I-20
Structure ID: 211-0008-0 **Road Name:** SEWELL CHURCH RD

Equipment Used

Access Equipment: None **Topside Boat:** None
Waders: None **Special Imaging Device:** None

Load Rating and Posting

Truck Type	Gross/H-Modified	HSModified	Tandem	3-S-2	Log	Piggy
Calculated Posting	21	26	23	31	29	00
Posting Required	No	No	No	No	No	No
Existing Posting	00	00	00	00	00	00

Item 103 Temporarily Shored : No **Posting Required:** No
Item 41 - Structure Open, Posted or Closed: A. Open, no restriction

Element Data

Element	Parent Element	Measurement Unit	Env*	Quantity	State 1	State 2	State 3	State 4
12-Reinforced Concrete Deck		SQUARE FEET	2	8096	8086	10		
521-Concrete Protective Coating(12)	12-Reinforced Concrete Deck	SQUARE FEET	2	8096	8096			
107-Steel Open Web Girder/Beam		Linear Foot	2	1052	1052			
515-Steel Protective Coating (107)	107-Steel Open Web Girder/Beam	SQUARE FEET	2	9191	8091	1100		
205-Reinforced Conc Column		Each	2	6	6			
215-Reinforced Conc Abutment		Linear Foot	2	70	70			
234-Reinforced Conc Pier Cap		Linear Foot	2	117	117			
301-Pourable Joint Seal		Linear Foot	2	120	120			
311-Movable Bearing		Each	2	16	16			
515-Steel Protective Coating (311)	311-Movable Bearing	SQUARE FEET	2	32	32			
313-Fixed Bearing		Each	2	4	4			
515-Steel Protective Coating (313)	313-Fixed Bearing	SQUARE FEET	2	8	8			
321-Reinforced Concrete Approach Slab		SQUARE FEET	2	1842	1842			
510-Wearing Surfaces (321)	321-Reinforced Concrete Approach Slab	SQUARE FEET	2	1842	1842			
330-Metal Bridge Railing		Linear Foot	2	526	526			

Env* = Environment

Defects

Element	Defect	State 2	State 3	State 4
12-Reinforced Concrete Deck	Efflorescence/Rust Staining	10		
515-Steel Protective Coating (107)	Peeling/Bubbling/Cracking (Steel Protective	1100		

Maintenance Items

Activity	Work Quantity	Priority	Location	Inspection Date	Completion Date	Comments
800 - BRIDGE JOINT SEALING (LINEAR FEET)		C	Deck joints	10/13/2014	10/08/2019	Clean and seal all deck joints
550 - EROSION CONTROL (PERSON HOURS)		B	Catch basin	10/13/2014	10/08/2019	Repair the erosion behind the rear left catch basin

No Specialized Inspection performed on this bridge.

Other Special Inspection

Inspection Team

Team Leader : **Inspection Date :** 10/08/2019

Assistants : Billy Lanthrip

Deck

NBIS Condition Code : 7 - Good Condition

Concrete deck

A polymer overlay has been added to the deck top surface in all spans

Spans 2, 3 and 4 have transverse cracking with light efflorescence on the bottom.
All spans have minor cracking on the bottom of the deck
Armored joints at both abutments have been replaced with pourable type joints.

Superstructure

NBIS Condition Code : 7 - Good Condition **Temperature (F):**

Steel beams (Continuous)
The beams are spliced rear and forward of bents 2, 3 and 4 with back up bars.
Concrete diaphragms on slight skew

9" pedestals have been added under bearings and beams in all spans
Span 1, beam 2 - splice has 1" jog. No problems.
The beams have freckle rust on the bottom flanges throughout
Both end walls have minor cracking.

Substructure

NBIS Condition Code : 7 - Good Condition

Abutments - Steel H piling and concrete caps
Bents - Spread footing, concrete columns and concrete caps

Both abutment caps have minor vertical cracks.
High chairs exposed on bottom of caps at bents 2, 3 and 4.
The caps at bents 2, 3 and 4 have minor vertical cracking.

General

Sewell Church Road over I-20

Both approach slabs have been replaced in 2019
Approach slabs have asphalt overlays

Conditional Situations

Confined Space: No **Traffic Control Needed:** No

Equipment Used

Access Equipment: None **Special Imaging Device:** None

No Fracture Critical Inspection performed on this bridge.

Bridge Components

Superstructure Data

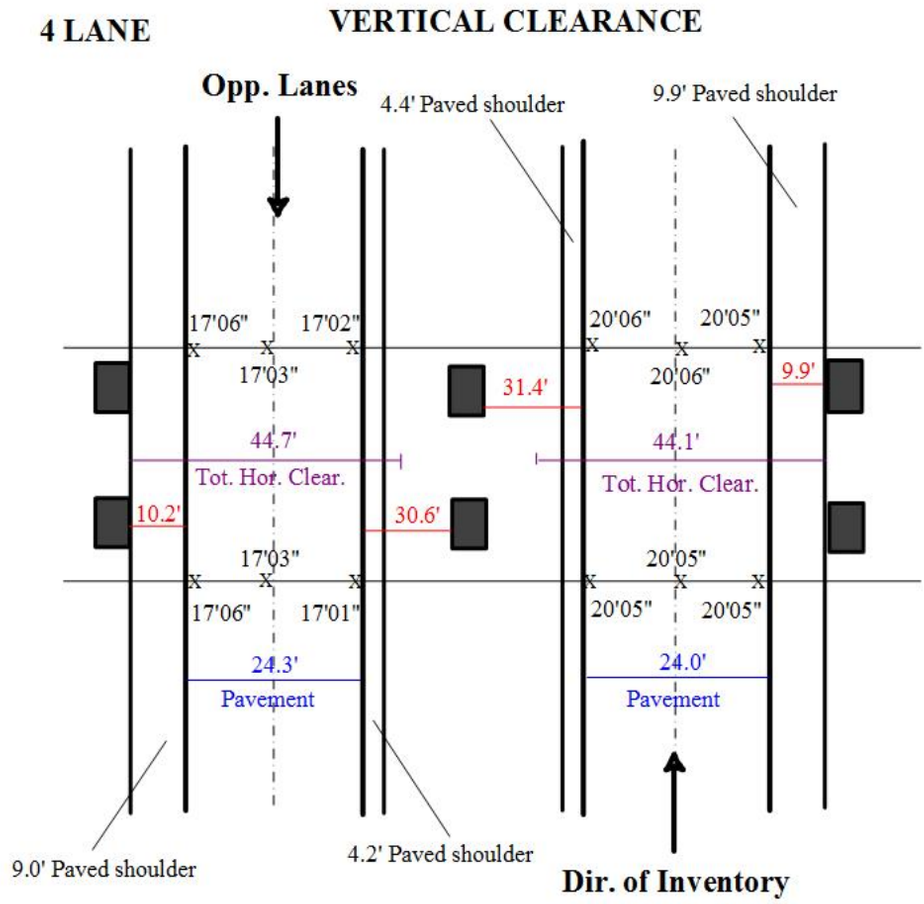
Span #	Beam Type	Beam Spacing	Length	# Beams	Remarks
1	Steel	8	63	4	W36 x 135
2	Steel	8	70	4	W36 x 150
3	Steel	8	70	4	W36 x 150
4	Steel	8	60	4	W36 x 135

Bearing Data

Span #	Rear Type Bearing	Forward Type Bearing	Remarks
1	01 - Sliding Plate	10 - Continuous	
2	01 - Sliding Plate	10 - Continuous	
3	02 - Fixed Plate	10 - Continuous	
4	01 - Sliding Plate	01 - Sliding Plate	

District: 4841200000 - District Two- **Inspection Area:** 2 **County:** Morgan
Location ID: 211-00046X-000.77N **Over:** I-20
Structure ID: 211-0008-0 **Road Name:** SEWELL CHURCH RD

Vertical Clearance



7B - Facility Carried: I-20

Cross Reference Location ID: 211-00402D-102.44E

Cross Reference ID :211-0008-0-2

10 - Maximum Minimum Vertical Clearance (ft-in): 20-6

53 - Minimum Clearance Over (ft-in): 99-99

54A - Clearance Type: H- Highway beneath structure.

54B - Minimum Clearance Under (ft-in): 16-4

228A - Actual Minimum Vertical Odometer (ft-in): 20-05 **228B - Actual Minimum Vertical Opposite (ft-in):** 17-03

228C - Posted Minimum Vertical Odometer (ft-in): 00-00 **228D - Posted Minimum Vertical Opposite (ft-in):** 00-00

5E - Direction : 0. Not applicable

55A Lateral Type : H- Highway beneath structure.

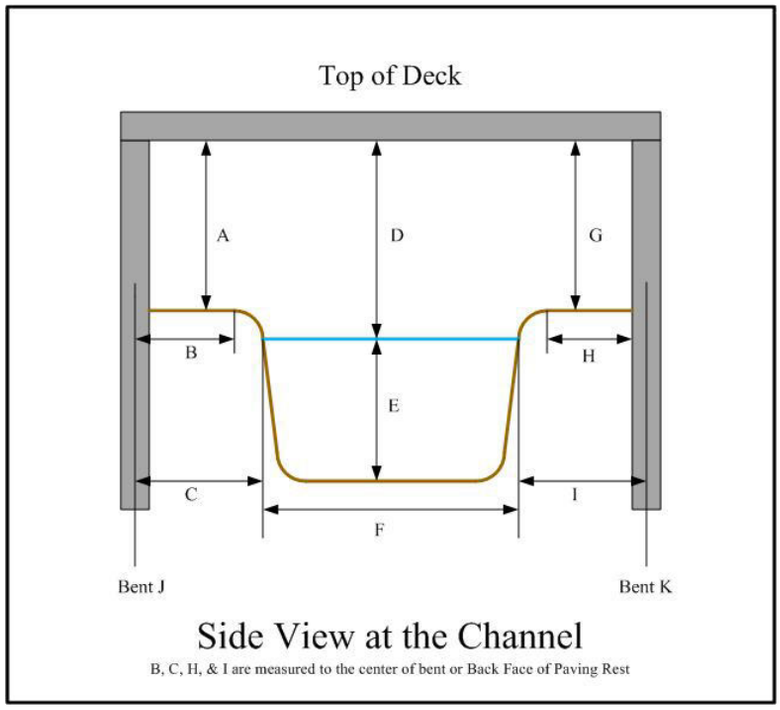
55B Lateral Under Clearance Right (ft): 9.9 **56 Lateral Under Clearance Left (ft):** 30.6

69 - Rating - Under Clearance Horizontal/Vertical : 6 **47 - Total Horizontal Clearance (ft) :** 44.7

No Underwater Inspection performed on this bridge.

District: 4841200000 - District Two- **Inspection Area:** 2 **County:** Morgan
Location ID: 211-00046X-000.77N **Over:** I-20
Structure ID: 211-0008-0 **Road Name:** SEWELL CHURCH RD

Waterway Information



A :
B :
C :
D : 00.0
E : 00.0
F :
G :
H :
I :
J :
K :

Location of Bridge Height :
Bridge Height Taken:
Scour Condition : N
Waterway Adequacy : N
Channel Protection : N

Comments :

Substructure Skew = **Channel Skew =** **Stream Angle =**

Collision Information

Beam Type :

Span # with Beam Damage :

Total # of Beams in Span :

# of Damaged Beams :

Minimum Vertical Clearance : ft - in

Actual Vertical Clearance at Point of Impact : ft - in

Posted Vertical Clearance : ft - in

Report Type :

Report Date :

Damage Location in Span :

Damage Type :
Damage Details :

Repairs Required : No **Repairs Made :** No
Repair Details :

Additional Comments :

Photographs

IMG_4743.JPG

Direction of Inventory - North

IMG_4741.JPG

Right side, Looking South

IMG_4742.JPG

9" pedestals under bearings and beams in all spans

IMG_4740.JPG

Looking South toward Bent 3

Georgia Department of Transportation

Bridge Inspection Report

District: 4841200000 - District Two- **Inspection Area:** 2 **County:** Morgan
Location ID: 211-00249X-001.49N **Over:** I-20
Structure ID: 211-0021-0 **Road Name:** OLD MILL ROAD
Bridge Information: 6-Revised inventory or operating ratings; load limits

Georgia Department of Transportation

Evaluation

Topside Inspection Team **Inspection Type:** General **Inspection Date:** 09/23/2020

Team Leader: Vinson Thomas Tanner

Assistants: Billy Lanthrip

Deck

NBIS Condition 7 - Good Condition **Material:** O. Concrete

Deck Wearing Surface Type: 1. Concrete

Concrete deck

A polymer overlay has been added to the deck top surface in all spans
All spans have minor cracking on the bottom

Superstructure

NBIS Condition 7 - Good Condition **Material:** M. Steel **Year Painted:** 2005

Paint Type : 5- Waterborne System (Type VI or VII) **Temperature (F):**

Steel beams (Continuous)
Beams are spliced rear and forward of bents 2, 3 and 4 with back up bars
Concrete diaphragms on slight skew

The paint on beams are in good condition
The end wall is cracked at abutment 5, minor.

Substructure

NBIS Condition 7 - Good Condition **Material:** O. Concrete **Year Painted:** 0000

Paint Type : 0- Not Applicable

Abutments - Steel H piling and concrete caps
Bents - Spread footing, concrete columns and concrete caps (36"x36"x28'L)

Both abutment caps have hairline to minor vertical cracking.
This bridge has been lifted 11" with steel pedestals under all bearings at the abutments and the bent caps at Bents 2, 3 and 4 have been reconstructed.
Column 2 at bent 4 has 2 spalls from impact damage.
Guardrail and crash wall have impact damage but does not affect the bridge. This is on the the West bound lane side of the structure at bent 4.

General

This Bridge:

Old Mill Road over I-20

The approach slabs have been replaced and both have asphalt overlays added in 2019
This bridge has been lifted 11" with steel pedestals under bearings at the abutments and reconstructed caps at Bents 2, 3 and 4

Conditional Situations

Confined Space: No **Traffic Control Needed:** No

Equipment Used

Access Equipment: None **Topside Boat:** None

Waders: None **Special Imaging Device:** None

District: 4841200000 - District Two- **Inspection Area:** 2 **County:** Morgan
Location ID: 211-00249X-001.49N **Over:** I-20
Structure ID: 211-0021-0 **Road Name:** OLD MILL ROAD

Load Rating and Posting

Truck Type	Gross/H-Modified	HSModified	Tandem	3-S-2	Log	Piggy
Calculated Posting	21	22	22	25	23	00
Posting Required	No	No	No	No	No	No
Existing Posting	00	00	00	00	00	00

Item 103 Temporarily Shored : No **Posting Required:** No
Item 41 - Structure Open, Posted or Closed: A. Open, no restriction

Element Data

Element	Parent Element	Measurement Unit	Env*	Quantity	State 1	State 2	State 3	State 4
12-Reinforced Concrete Deck		SQUARE FEET	2	8596	8596			
521-Concrete Protective Coating(12)	12-Reinforced Concrete Deck	SQUARE FEET	2	8596	8596			
107-Steel Open Web Girder/Beam		Linear Foot	2	1120	1120			
515-Steel Protective Coating (107)	107-Steel Open Web Girder/Beam	SQUARE FEET	2	9852	9852			
205-Reinforced Conc Column		Each	2	6	5	1		
215-Reinforced Conc Abutment		Linear Foot	2	60	55	5		
234-Reinforced Conc Pier Cap		Linear Foot	2	84	84			
301-Pourable Joint Seal		Linear Foot	2	72	72			
302-Compression Joint Seal		Linear Foot	2	48	48			
311-Movable Bearing		Each	2	16	16			
515-Steel Protective Coating (311)	311-Movable Bearing	SQUARE FEET	2	32	32			
313-Fixed Bearing		Each	2	8	8			
515-Steel Protective Coating (313)	313-Fixed Bearing	SQUARE FEET	2	16	16			
321-Reinforced Concrete Approach Slab		SQUARE FEET	2	1842	1842			
510-Wearing Surfaces (321)	321-Reinforced Concrete Approach Slab	SQUARE FEET	2	1842	1842			
330-Metal Bridge Railing		Linear Foot	2	560	560			

Env* = Environment

Defects

Element	Defect	State 2	State 3	State 4
205-Reinforced Conc Column	Delamination/Spall/Patched Area	1		
215-Reinforced Conc Abutment	Cracking (RC and Other)	5		

Maintenance Items

Activity	Work Quantity	Priority	Location	Inspection Date	Completion Date	Comments
800 - BRIDGE JOINT SEALING (LINEAR FEET)	32	C	Deck joints	10/13/2014	10/08/2019	Clean and seal all joints
845 - OTHER BRIDGE MAINT (PERSON HOURS)	56	B	Abutment 1	08/26/2002	10/08/2019	Repair sheared anchor bolts

No Specialized Inspection performed on this bridge.

Other Special Inspection

Inspection Team

Team Leader : **Inspection Date :** 10/08/2019

Assistants : Billy Lanthrip

Deck

NBIS Condition Code : 7 - Good Condition

Concrete deck

A polymer overlay has been added to the deck top surface in all spans
All spans have minor cracking on the bottom

Superstructure

NBIS Condition Code : 7 - Good Condition **Temperature (F):**

Steel beams (Continuous)
Beams are spliced rear and forward of bents 2, 3 and 4 with back up bars
Concrete diaphragms on slight skew

The paint on beams are in good condition
The end wall is cracked at abutment 5, minor.

Substructure

NBIS Condition Code : 7 - Good Condition

Abutments - Steel H piling and concrete caps
Bents - Spread footing, concrete columns and concrete caps (36"x36"x28'L)

Both abutment caps have minor vertical cracking
This bridge has been lifted 11" with steel pedestals under all bearings at the abutments and the bent caps at Bents 2, 3 and 4 have been reconstructed

General

Old Mill Road over I-20

The approach slabs have been replaced and both have asphalt overlays added in 2019
This bridge has been lifted 11" with steel pedestals under bearings at the abutments and reconstructed caps at Bents 2, 3 and 4

Conditional Situations

Confined Space: No **Traffic Control Needed:** No

Equipment Used

Access Equipment: 24' Ladder **Special Imaging Device:** None

No Fracture Critical Inspection performed on this bridge.

Bridge Components

Superstructure Data

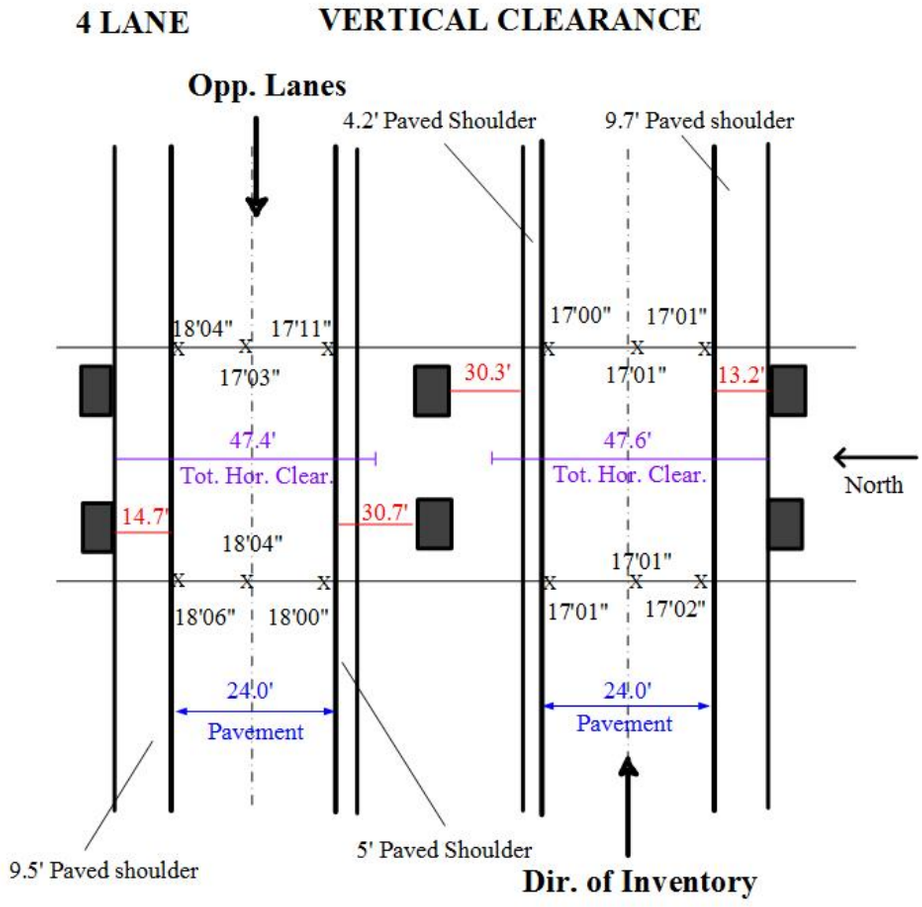
Span #	Beam Type	Beam Spacing	Length	# Beams	Remarks
1	Steel	8	62	4	W36 x 135
2	Steel	8	74	4	W36 x 170
3	Steel	8	74	4	W36 x 170
4	Steel	8	70	4	W36 x 170

Bearing Data

Span #	Rear Type Bearing	Forward Type Bearing	Remarks
1	01 - Sliding Plate	10 - Continuous	
2	01 - Sliding Plate	10 - Continuous	
3	02 - Fixed Plate	10 - Continuous	
4	01 - Sliding Plate	01 - Sliding Plate	

District: 4841200000 - District Two- **Inspection Area:** 2 **County:** Morgan
Location ID: 211-00249X-001.49N **Over:** I-20
Structure ID: 211-0021-0 **Road Name:** OLD MILL ROAD

Vertical Clearance



7B - Facility Carried: I-20

Cross Reference Location ID: 211-00402D-103.52E

Cross Reference ID :211-0021-0-2

10 - Maximum Minimum Vertical Clearance (ft-in): 18-4

53 - Minimum Clearance Over (ft-in): 99-99

54A - Clearance Type: H- Highway beneath structure.

54B - Minimum Clearance Under (ft-in): 16-1

228A - Actual Minimum Vertical Odometer (ft-in): 17-00 **228B - Actual Minimum Vertical Opposite (ft-in):** 17-11

228C - Posted Minimum Vertical Odometer (ft-in): 00-00 **228D - Posted Minimum Vertical Opposite (ft-in):** 00-00

5E - Direction : 0. Not applicable

55A Lateral Type : H- Highway beneath structure.

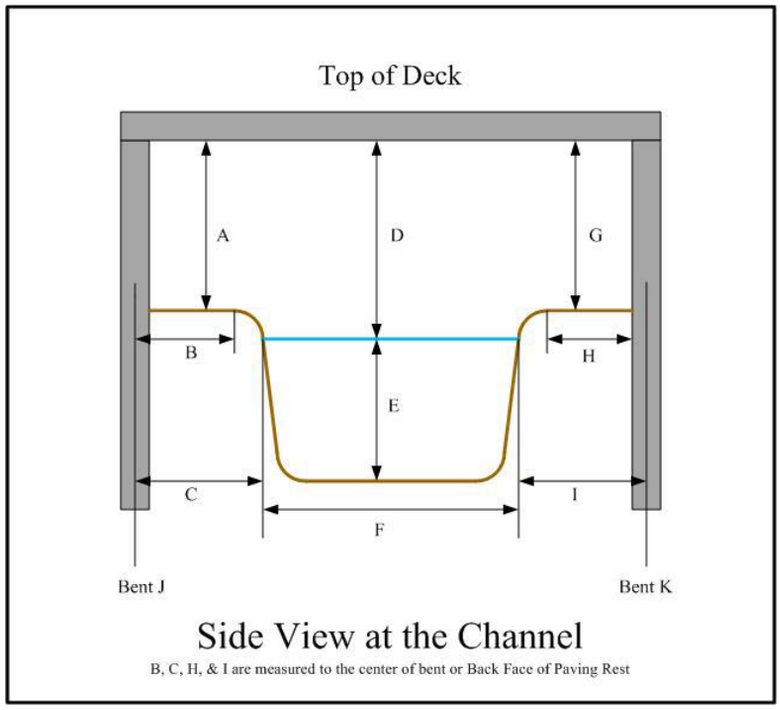
55B Lateral Under Clearance Right (ft): 13.2 **56 Lateral Under Clearance Left (ft):** 30.3

69 - Rating - Under Clearance Horizontal/Vertical : 7 **47 - Total Horizontal Clearance (ft) :** 47.6

No Underwater Inspection performed on this bridge.

District: 4841200000 - District Two- **Inspection Area:** 2 **County:** Morgan
Location ID: 211-00249X-001.49N **Over:** I-20
Structure ID: 211-0021-0 **Road Name:** OLD MILL ROAD

Waterway Information



A :
B :
C :
D : 00.0
E : 00.0
F :
G :
H :
I :
J :
K :

Location of Bridge Height :
Bridge Height Taken:
Scour Condition : N
Waterway Adequacy : N
Channel Protection : N

Comments :

Substructure Skew = **Channel Skew =** **Stream Angle =**

Collision Information

Beam Type :

Span # with Beam Damage :

Total # of Beams in Span :

# of Damaged Beams :

Minimum Vertical Clearance : ft - in

Actual Vertical Clearance at Point of Impact : ft - in

Posted Vertical Clearance : ft - in

Report Type :

Report Date :

Damage Location in Span :

Damage Type :
Damage Details :

Repairs Required : No **Repairs Made :** No
Repair Details :

Additional Comments :

Photographs

IMG_4734.JPG

Impact damage at bent 4

IMG_4735.JPG

Impact damage at bent 4

IMG_4733.JPG

Minor spalls

IMG_4732.JPG

Minor spalls

IMG_4736.JPG

Direction of Inventory - North

IMG_4737.JPG

Left side, Looking North

Photographs

IMG_4738.JPG

11" pedestals have been added under all bearings at the abutments

IMG_4739.JPG

Looking North at Bent 3

Attachment 8 – Signal Warrant Analysis

Signal Warrants - 2024 Build

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **2**

Intersection Data:

Intersection: US 278 @ Shire Pkwy
County: Walton
City:

Warrant Analysis Conducted By:

Date:
Project ID:
Agency: Arcadis
Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	Shire Pkwy
Speed:	45 MPH	Speed:	30 MPH
Lanes:	2 or more lane	Lanes:	2 or more lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	SB LT

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	0%
From North (SB)	100%
From West (EB)	100%
From East (WB)	0%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										Shire Pkwy										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	NBL	NBT	NBR	Total	U-Turn	SBL	SBT	SBR	Total	U-Turn	EBL	EBT	EBR	Total	U-Turn	WBL	WBT	WBR	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	415	120	535	0	465	150	0	615	0	0	0	0	0	0	35	0	140	175	1,325
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	270	30	300	0	110	380	0	490	0	0	0	0	0	0	170	0	620	790	1,580
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	0	685	150	835	0	575	530	0	1,105	0	0	0	0	0	0	205	0	760	965	2,905

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	200	160
No. of Hours	0	1

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	100	80
No. of Hours	0	1

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,030	35	1,065
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	760	170	930
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	760	1030	#N/A	#N/A
Minor Rd Vol.	170	35	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	5	Yes
Volume on Minor Approach	150	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
7:00	1030	35

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

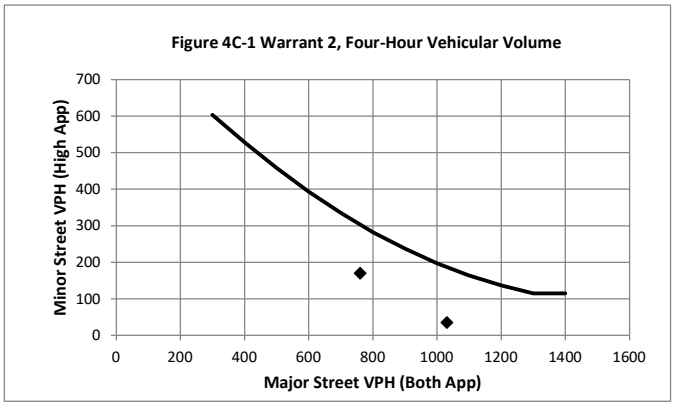
Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1030
8:00	0	0
9:00	0	0

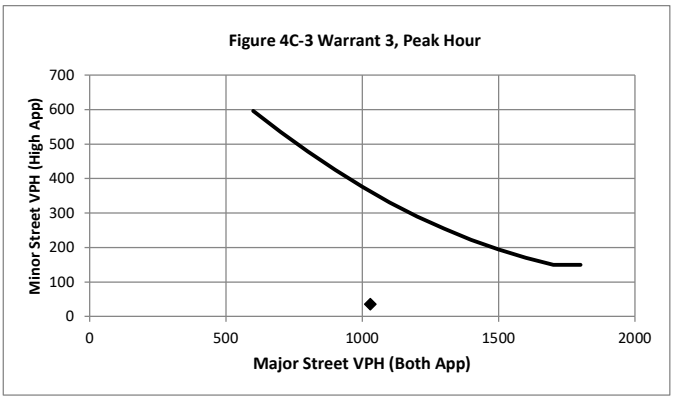
Criterion A Satisfied? N/A

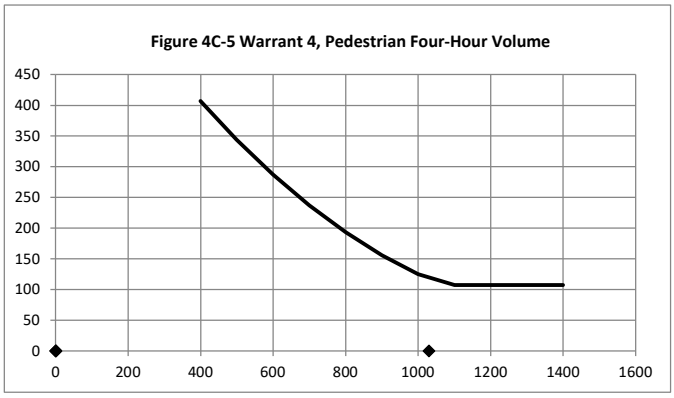
Criterion B: Peak Hour

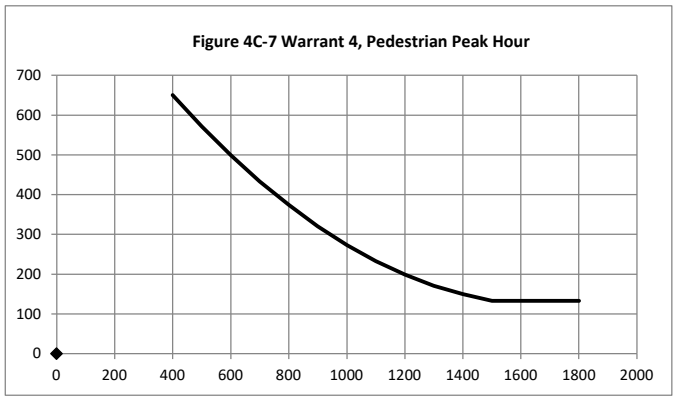
Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A









Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria							Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour						1065	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3						1	Yes	
	Hour								
	Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	7:00	1030	35	33

Warrant Analysis Conclusions/Comments:

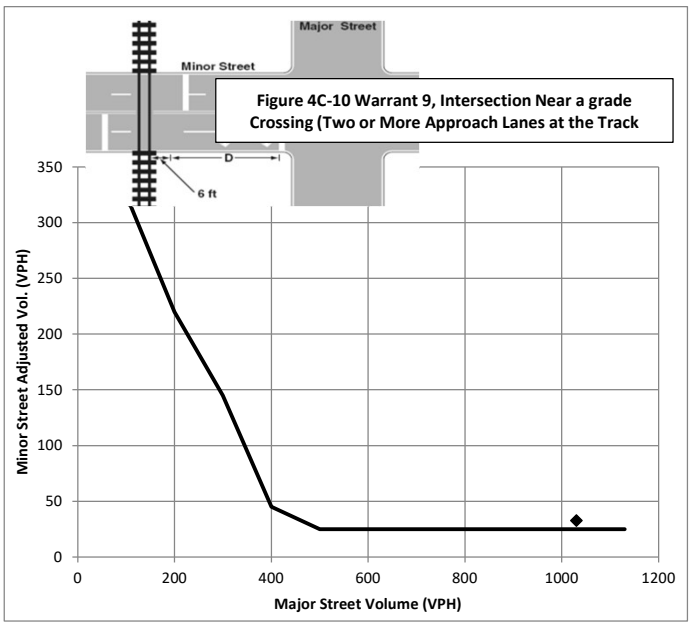


Figure 4C-10 Warrant 9, Intersection Near a grade Crossing (Two or More Approach Lanes at the Track

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **3**

Intersection Data:

Intersection: US 278 @ I-20 EB Ramps

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	I-20 EB Ramps
Speed:	45 MPH	Speed:	35 MPH
Lanes:	2 or more lane	Lanes:	1 lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	SB LT

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	0%
From North (SB)	100%
From West (EB)	100%
From East (WB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										I-20 EB Ramps										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	500	55	555	0	130	270	0	400	0	595	0	345	940	0	0	0	0	0	1,895
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	830	60	890	0	280	405	0	685	0	430	0	85	515	0	0	0	0	0	2,090
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	0	1,330	115	1,445	0	410	675	0	1,085	0	1,025	0	430	1,455	0	0	0	0	0	3,985

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	150	120
No. of Hours	2	2

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	75	60
No. of Hours	2	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	900	940	1,840
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,515	515	2,030
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	1515	900	#N/A	#N/A
Minor Rd Vol.	515	940	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	1515	515

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	900
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

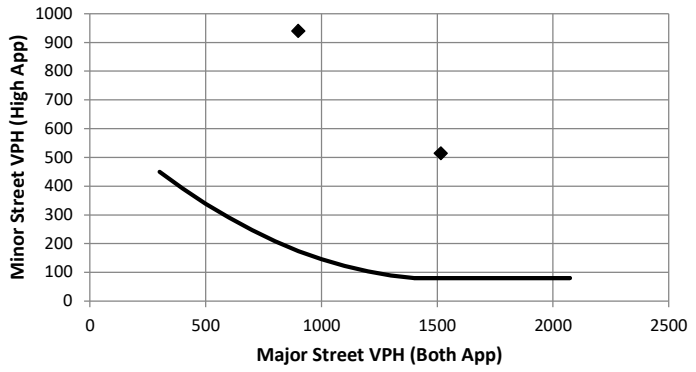


Figure 4C-3 Warrant 3, Peak Hour

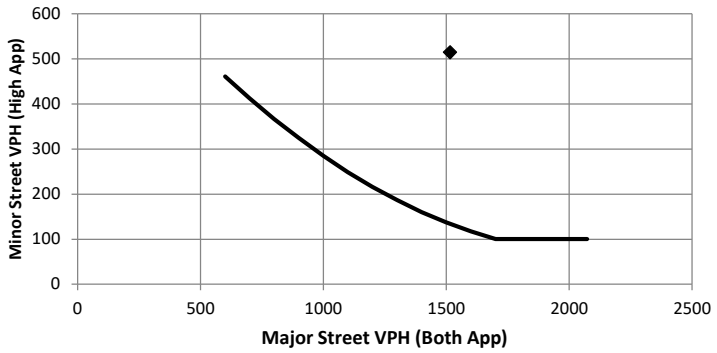


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

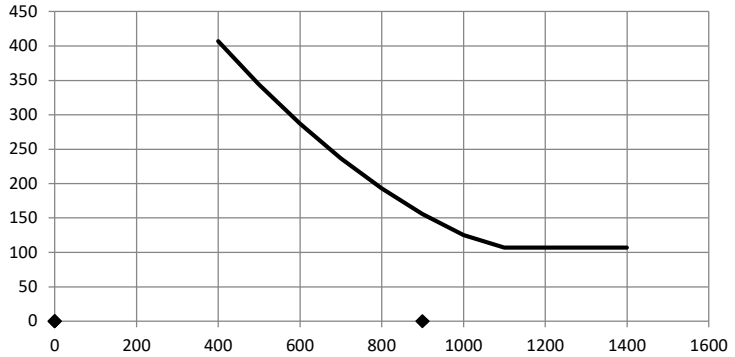
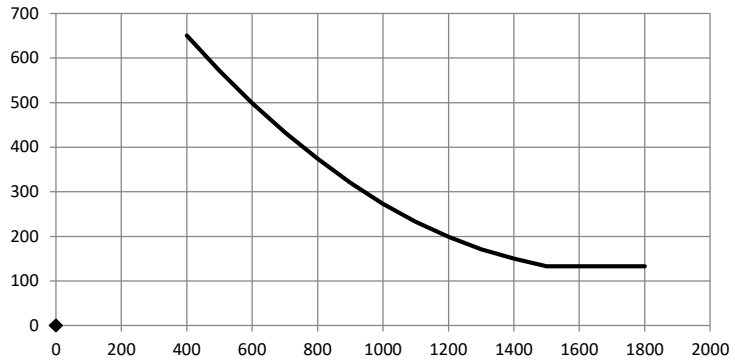


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	2030	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	1515	515	483

Warrant Analysis Conclusions/Comments:

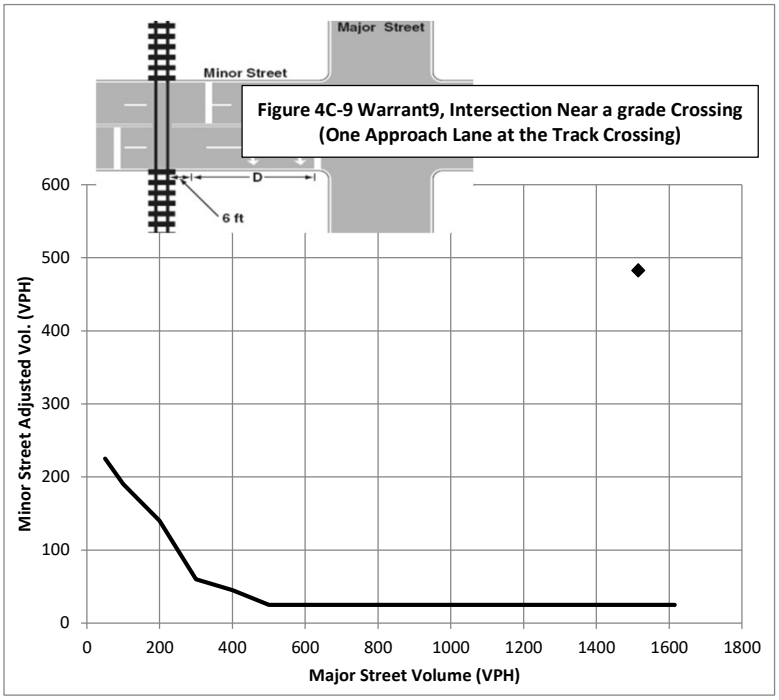


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **4**

Intersection Data:

Intersection: US 278 @ I-20 WB Ramps

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	I-20 WB Ramps
Speed:	45 MPH	Speed:	35 MPH
Lanes:	2 or more lane	Lanes:	1 lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	No

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	100%
From North (SB)	0%
From West (EB)	0%
From East (WB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										I-20 WB Ramps										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	95	1,000	0	1,095	0	0	340	255	595	0	0	0	0	0	0	60	0	365	425	2,115
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	530	730	0	1,260	0	0	625	500	1,125	0	0	0	0	0	0	60	0	235	295	2,680
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	625	1,730	0	2,355	0	0	965	755	1,720	0	0	0	0	0	0	120	0	600	720	4,795

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	150	120
No. of Hours	2	2

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	75	60
No. of Hours	2	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,435	425	1,860
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,885	295	2,180
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	1885	1435	#N/A	#N/A
Minor Rd Vol.	295	425	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	1885	295

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1435
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

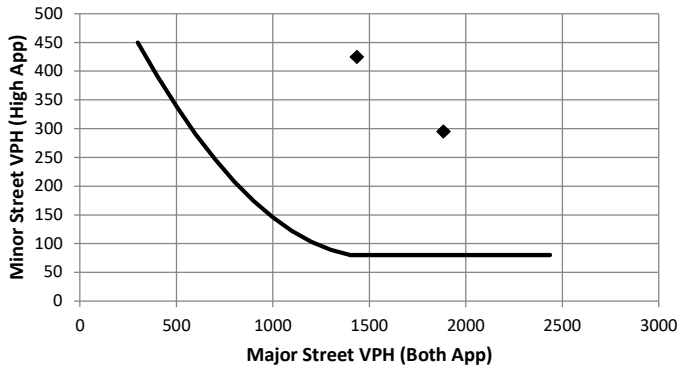


Figure 4C-3 Warrant 3, Peak Hour

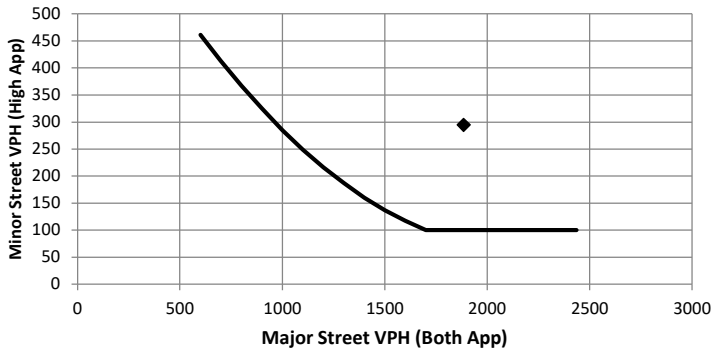


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

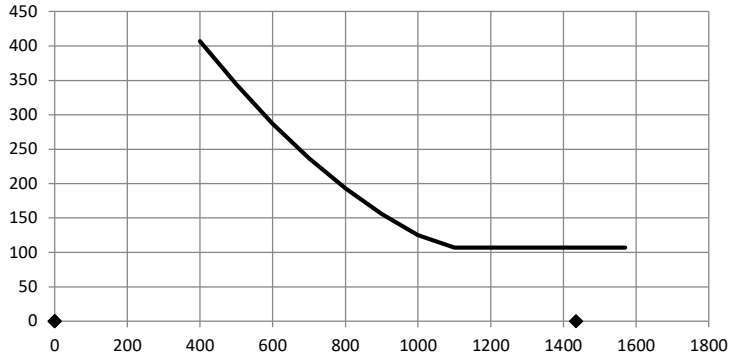
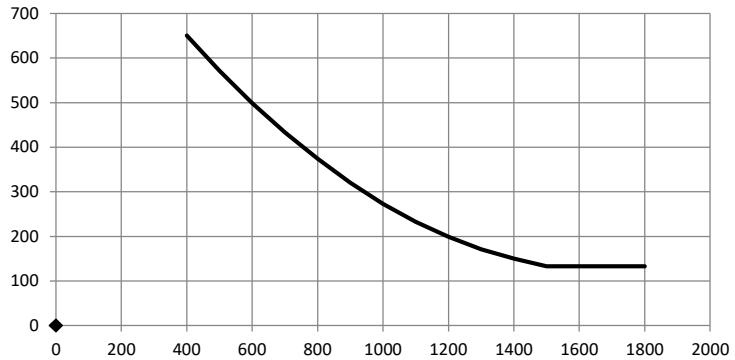


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	2180	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	1885	295	277

Warrant Analysis Conclusions/Comments:

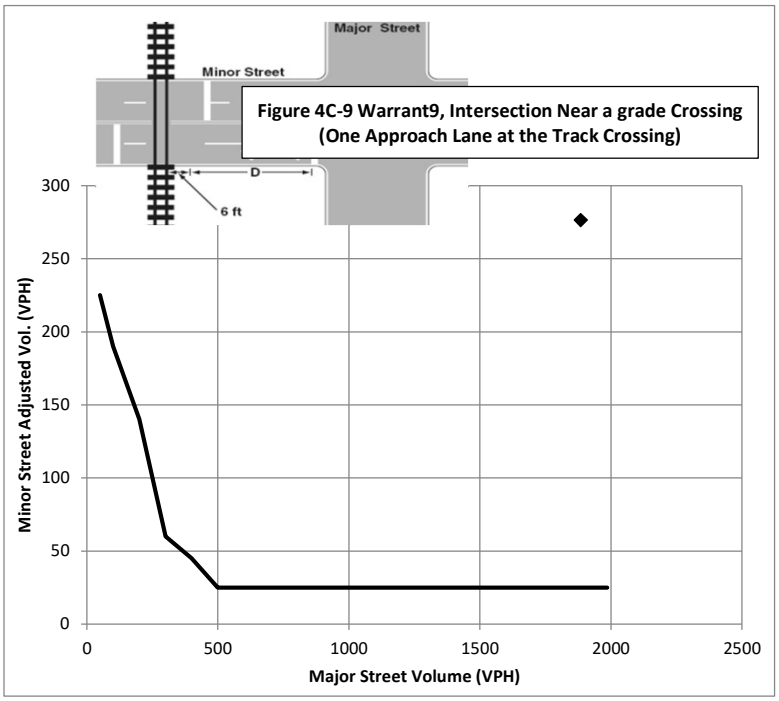


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **5**

Intersection Data:

Intersection: US 278 @ Willow Springs Church Rd

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	Willow Springs Church Rd
Speed:	45 MPH	Speed:	40 MPH
Lanes:	1 lane	Lanes:	1 lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	NB LT

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**No**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	100%
From North (SB)	100%
From West (EB)	0%
From East (WB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										Willow Springs Church Rd										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	15	205	0	220	0	0	270	0	270	0	0	0	55	55	0	0	0	0	0	545
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	85	310	0	395	0	0	230	0	230	0	0	0	40	40	0	0	0	0	0	665
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	100	515	0	615	0	0	500	0	500	0	0	0	95	95	0	0	0	0	0	1,210

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	500	400
Minor Rd. Req	150	120
No. of Hours	0	0

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	750	600
Minor Rd. Req	75	60
No. of Hours	0	0

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	490	0	490
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	625	0	625
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	625	490	#N/A	#N/A
Minor Rd Vol.	0	0	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **No**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	4	No
Volume on Minor Approach	100	No
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	625	0

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	490
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

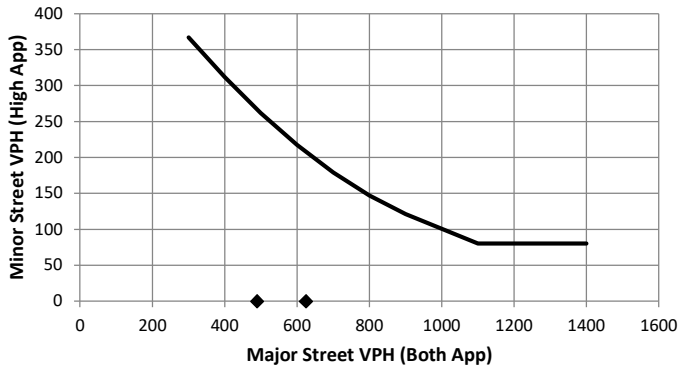


Figure 4C-3 Warrant 3, Peak Hour

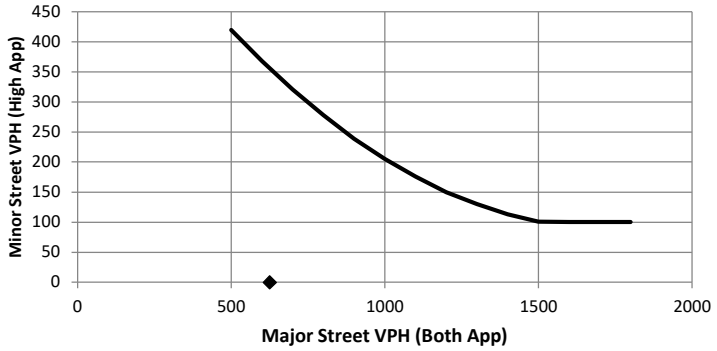


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

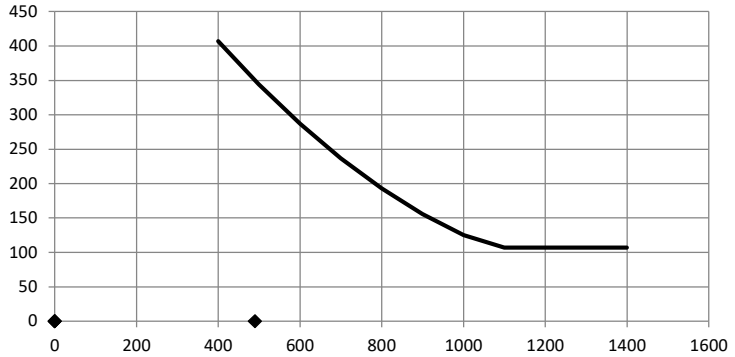
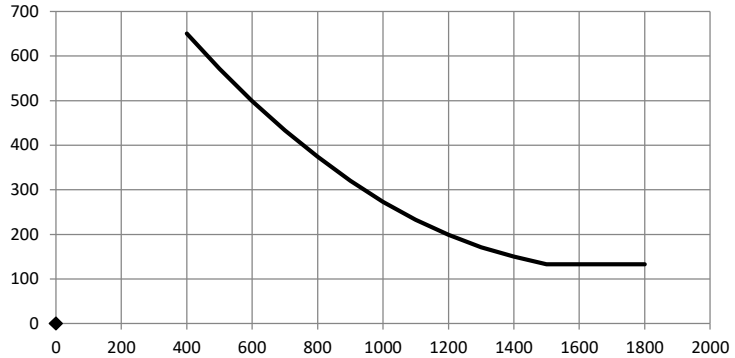


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	625	No	No
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	625	0	0

Warrant Analysis Conclusions/Comments:

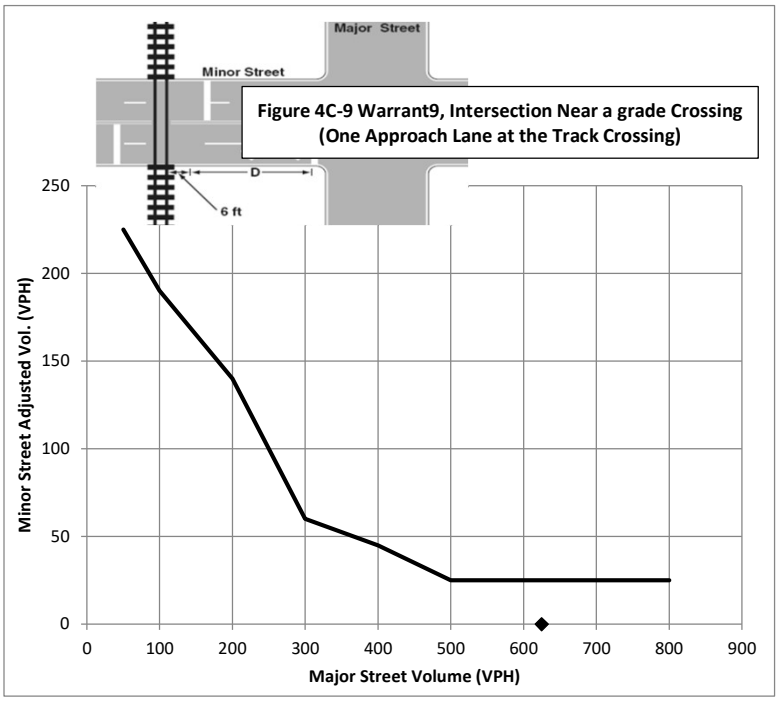


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **32**

Intersection Data:

Intersection: US 278 @ Frontage Rd

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	Frontage Rd
Speed:	45 MPH	Speed:	45 MPH
Lanes:	2 or more lane	Lanes:	2 or more lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	NB LT

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	0%
From North (SB)	100%
From West (EB)	100%
From East (WB)	0%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										Frontage Rd										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	825	540	1,365	0	10	445	0	455	0	0	0	0	0	0	150	0	5	155	1,975
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	685	280	965	0	10	710	0	720	0	0	0	0	0	0	415	0	5	420	2,105
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	0	1,510	820	2,330	0	20	1,155	0	1,175	0	0	0	0	0	0	565	0	10	575	4,080

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	200	160
No. of Hours	1	1

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	100	80
No. of Hours	2	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,280	150	1,430
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,405	415	1,820
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	1405	1280	#N/A	#N/A
Minor Rd Vol.	415	150	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	5	Yes
Volume on Minor Approach	150	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	1405	415

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1280
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

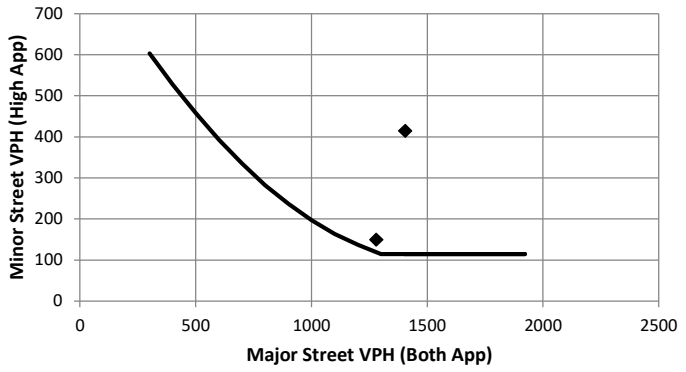


Figure 4C-3 Warrant 3, Peak Hour

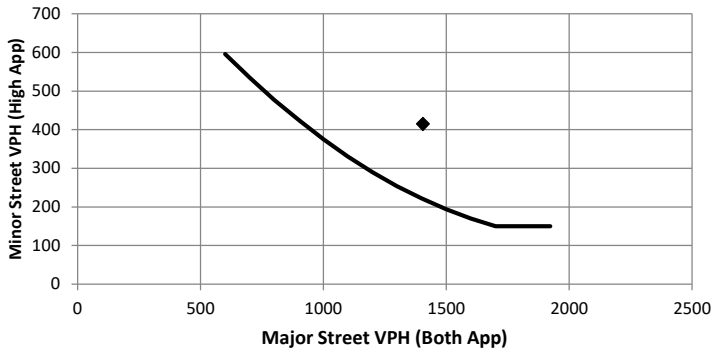


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

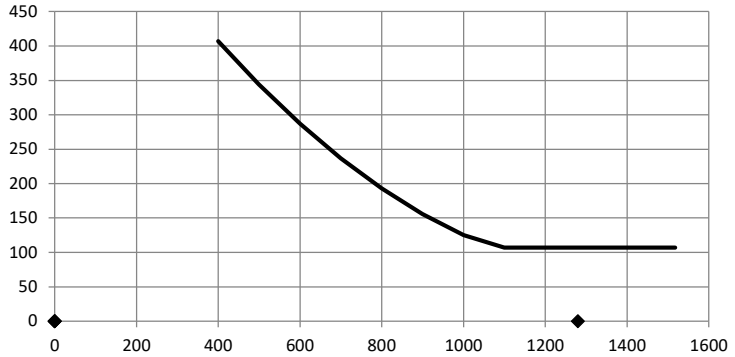
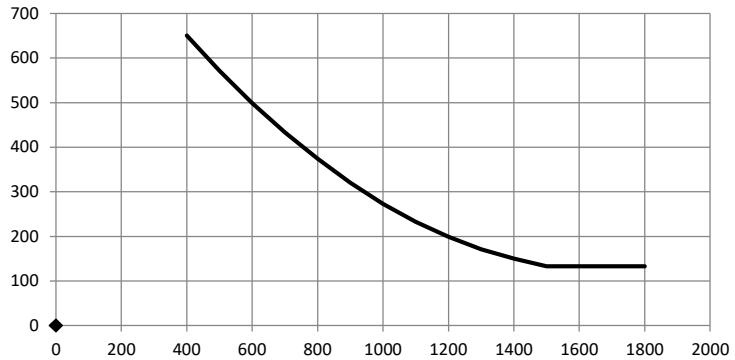


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	1820	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	1405	415	389

Warrant Analysis Conclusions/Comments:

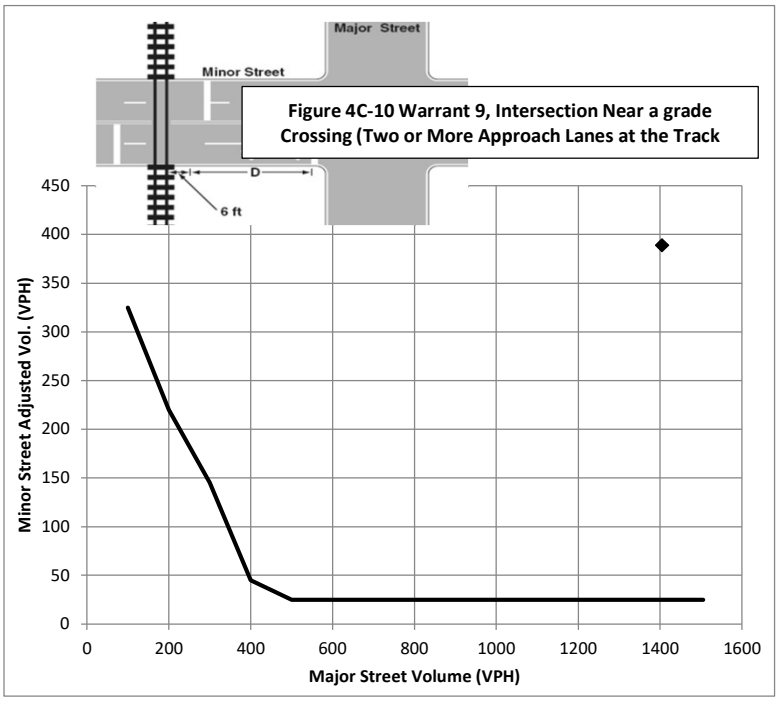


Figure 4C-10 Warrant 9, Intersection Near a grade Crossing (Two or More Approach Lanes at the Track

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **33**

Intersection Data:

Intersection: US 278 @ Stanton Springs North 1

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	Stanton Springs North 2
Speed:	45 MPH	Speed:	25 MPH
Lanes:	2 or more lane	Lanes:	2 or more lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	NB LT

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	0%
From North (SB)	100%
From West (EB)	100%
From East (WB)	0%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										Stanton Springs North 2										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	210	620	830	0	40	285	0	325	0	0	0	0	0	0	170	0	10	180	1,335
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	365	325	690	0	20	250	0	270	0	0	0	0	0	0	470	0	30	500	1,460
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	0	575	945	1,520	0	60	535	0	595	0	0	0	0	0	0	640	0	40	680	2,795

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	200	160
No. of Hours	1	2

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	100	80
No. of Hours	0	0

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	535	170	705
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	635	470	1,105
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	635	535	#N/A	#N/A
Minor Rd Vol.	470	170	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	5	Yes
Volume on Minor Approach	150	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	635	470

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	535
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

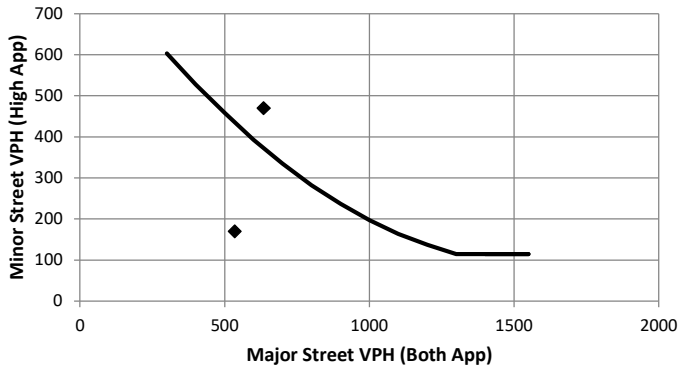


Figure 4C-3 Warrant 3, Peak Hour

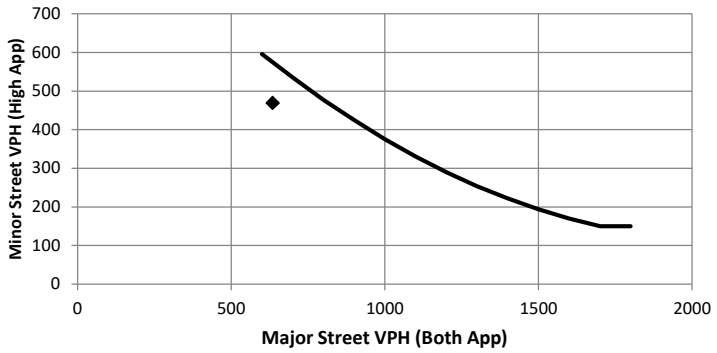


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

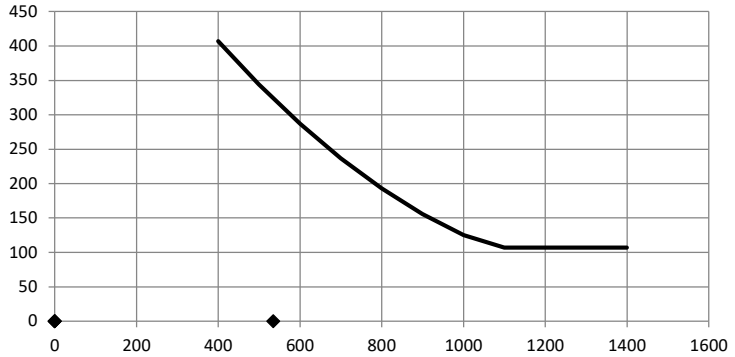
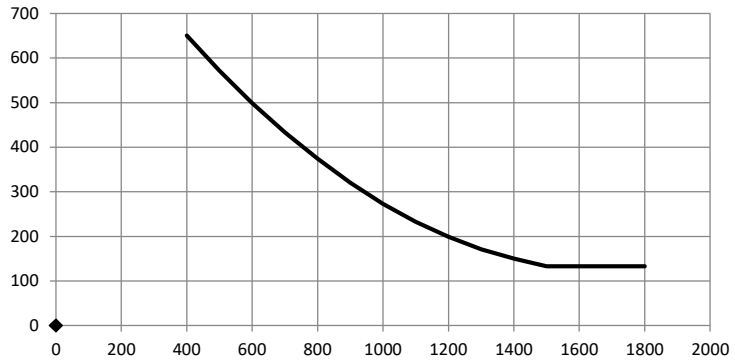


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing

100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System

100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience

100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network

100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	1105	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing

100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	635	470	441

Warrant Analysis Conclusions/Comments:

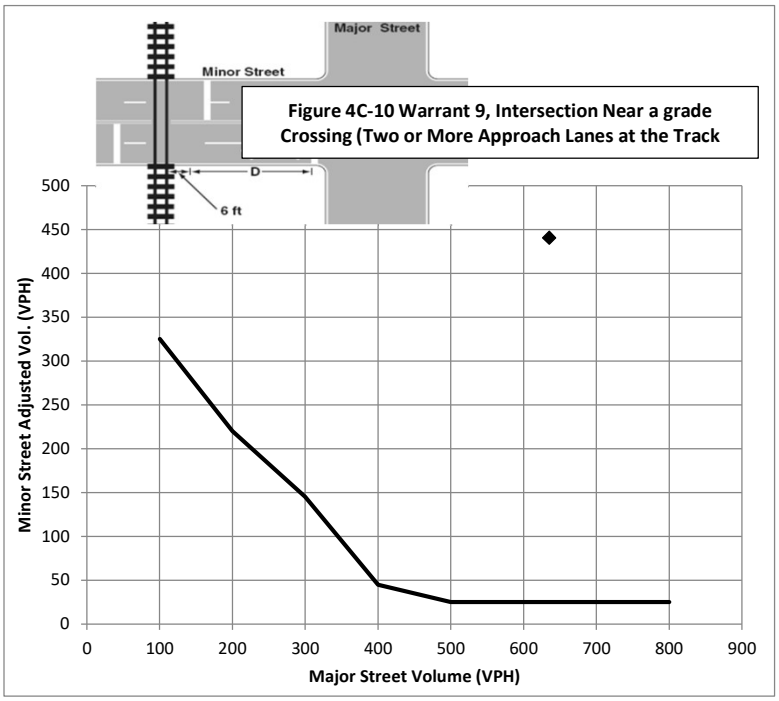


Figure 4C-10 Warrant 9, Intersection Near a grade Crossing (Two or More Approach Lanes at the Track

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **35**

Intersection Data:

Intersection: Sewell Rd/Stanton Springs North 6 @ Frontage Rd

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**No**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

Major Street:		Minor Street:	
Name:	Frontage Rd	Name:	Sewell Rd/Stanton Springs Nc
Speed:	45 MPH	Speed:	35 MPH
Lanes:	2 or more lane	Lanes:	1 lane
Direction:	E/W	Major Rd Left Turn as Minor Approach?	No

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	4 or more
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

% Right Turns Inc. (Default 0%)

From West (EB)	100%
From East (WB)	100%
From South (NB)	100%
From North (SB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	Frontage Rd										Sewell Rd/Stanton Springs North 5										Total Entering Volume
	Eastbound					Westbound					Northbound					Southbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	275	45	0	320	0	30	165	165	360	0	5	0	30	35	0	45	0	75	120	835
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	145	120	5	270	0	15	80	85	180	0	5	0	35	40	0	125	0	210	335	825
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	420	165	5	590	0	45	245	250	540	0	10	0	65	75	0	170	0	285	455	1,660

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	150	120
No. of Hours	1	1

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	75	60
No. of Hours	0	0

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	680	155	835
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	450	375	825
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	450	680	#N/A	#N/A
Minor Rd Vol.	375	155	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **No**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	4	No
Volume on Minor Approach	100	Yes
Total Entering Volume (veh/h)	800	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
7:00	680	155

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	680
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

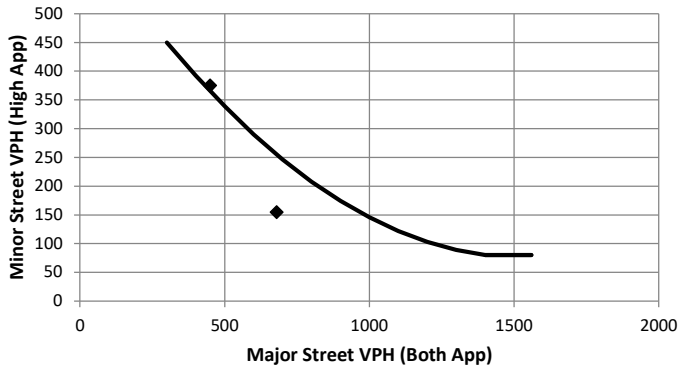


Figure 4C-3 Warrant 3, Peak Hour

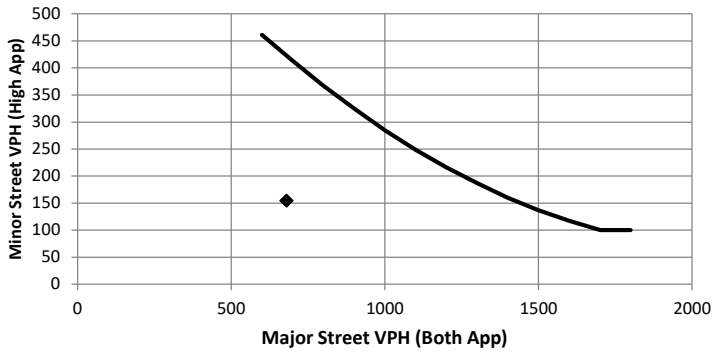


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

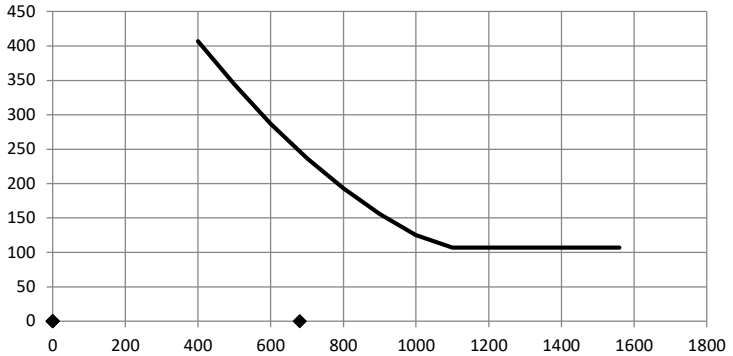
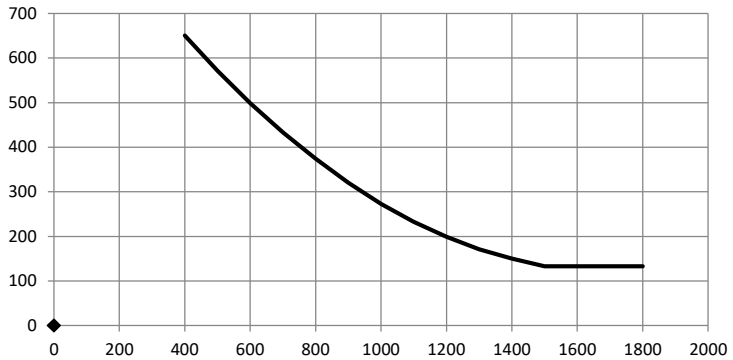


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	835	No	No
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	7:00	680	155	145

Warrant Analysis Conclusions/Comments:

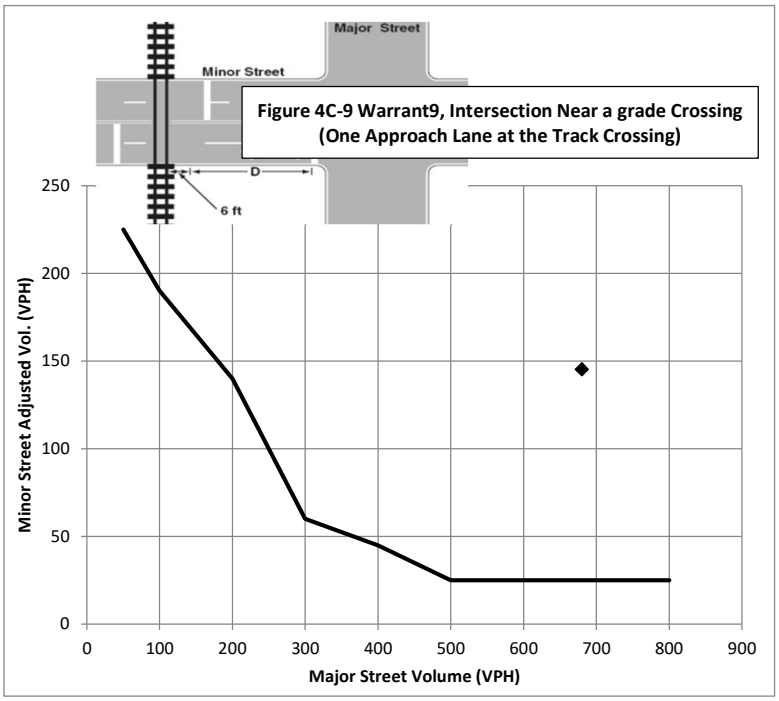


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **36**

Intersection Data:

Intersection: Old Mill Rd @ Frontage Rd/Stanton Springs North 8

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	Old Mill Rd	Name:	Frontage Rd/Stanton Springs
Speed:	55 MPH	Speed:	45 MPH
Lanes:	2 or more lane	Lanes:	2 or more lane
Direction:	E/W	Major Rd Left Turn as Minor Approach?	No

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From West (EB)	100%
From East (WB)	100%
From South (NB)	0%
From North (SB)	0%

Hourly Volume Data Input

One Hour Time Period Start Time	Old Mill Rd										Frontage Rd/Stanton Springs North 8										Total Entering Volume
	Eastbound					Westbound					Northbound					Southbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	120	0	120	0	0	360	550	910	0	0	0	0	0	0	150	0	0	150	1,180
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	280	0	280	0	0	180	290	470	0	0	0	0	0	0	425	0	0	425	1,175
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	0	400	0	400	0	0	540	840	1,380	0	0	0	0	0	0	575	0	0	575	2,355

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	200	160
No. of Hours	1	1

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	100	80
No. of Hours	1	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,030	150	1,180
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	750	425	1,175
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	750	1030	#N/A	#N/A
Minor Rd Vol.	425	150	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here		
Criteria		Met?
Delay on Minor Approach	5	Yes
Volume on Minor Approach	150	Yes
Total Entering Volume (veh/h)	650	
Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
7:00	1030	150

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1030
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

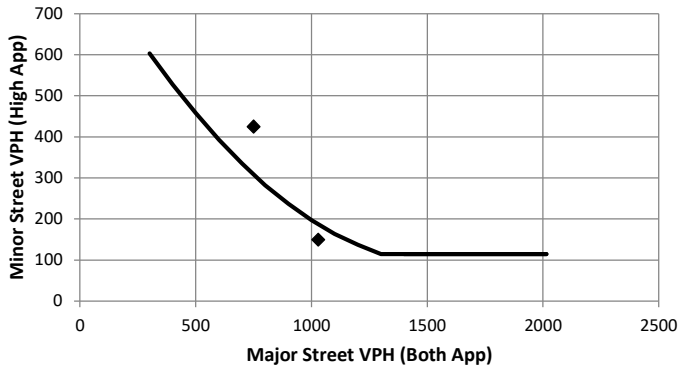


Figure 4C-3 Warrant 3, Peak Hour

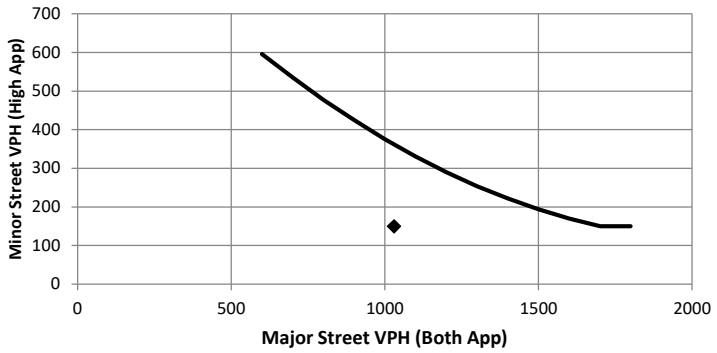


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

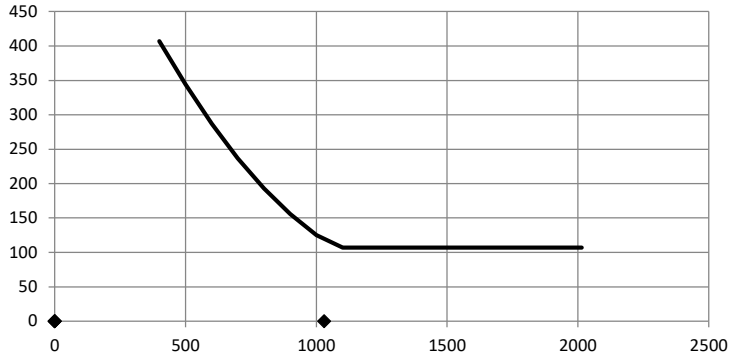
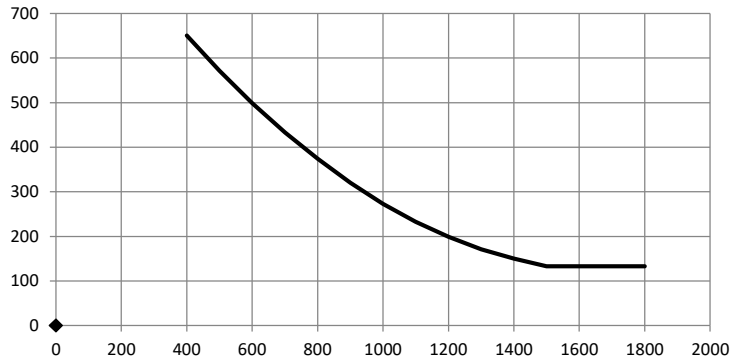


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	1180	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	7:00	1030	150	141

Warrant Analysis Conclusions/Comments:

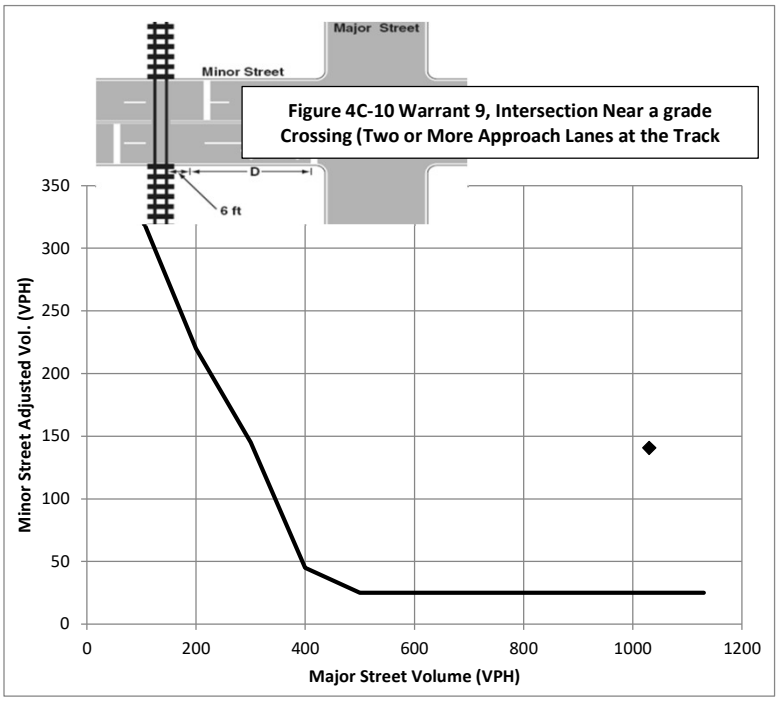


Figure 4C-10 Warrant 9, Intersection Near a grade Crossing (Two or More Approach Lanes at the Track

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **42**

Intersection Data:

Intersection: Frontage Rd @ Stanton Springs North 5

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**No**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

Major Street:		Minor Street:	
Name:	Frontage Rd	Name:	Stanton Springs North 1
Speed:	45 MPH	Speed:	25 MPH
Lanes:	2 or more lane	Lanes:	2 or more lane
Direction:	E/W	Major Rd Left Turn as Minor Approach?	No

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

% Right Turns Inc. (Default 0%)

From West (EB)	100%
From East (WB)	100%
From South (NB)	100%
From North (SB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	Frontage Rd										Stanton Springs North 1										Total Entering Volume
	Eastbound					Westbound					Northbound					Southbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	275	275	0	550	0	0	80	165	245	0	0	0	0	0	0	45	0	75	120	915
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	145	145	0	290	0	0	210	85	295	0	0	0	0	0	0	125	0	210	335	920
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	420	420	0	840	0	0	290	250	540	0	0	0	0	0	0	170	0	285	455	1,835

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	200	160
No. of Hours	0	1

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	100	80
No. of Hours	0	1

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	795	120	915
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	585	335	920
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	585	795	#N/A	#N/A
Minor Rd Vol.	335	120	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **No**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	5	No
Volume on Minor Approach	150	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	585	335

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	795
8:00	0	0
9:00	0	0

Criterion A Satisfied? **N/A**

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? **N/A**

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

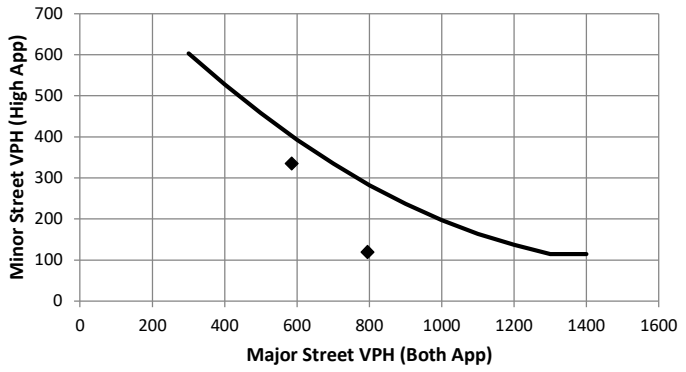


Figure 4C-3 Warrant 3, Peak Hour

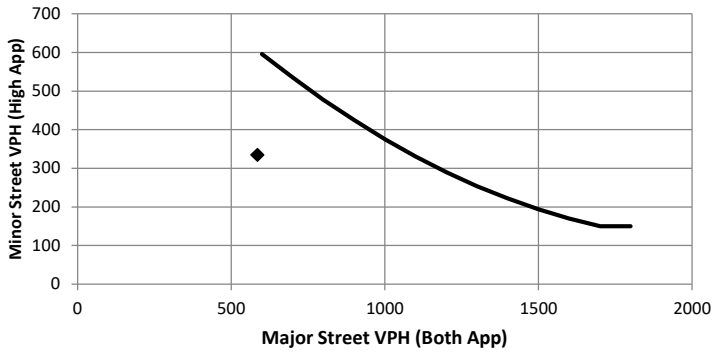


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

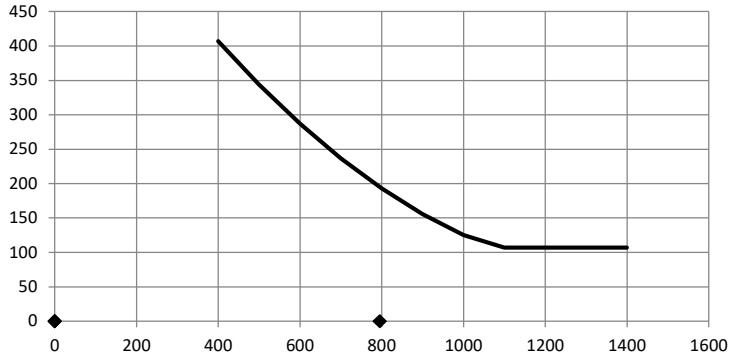
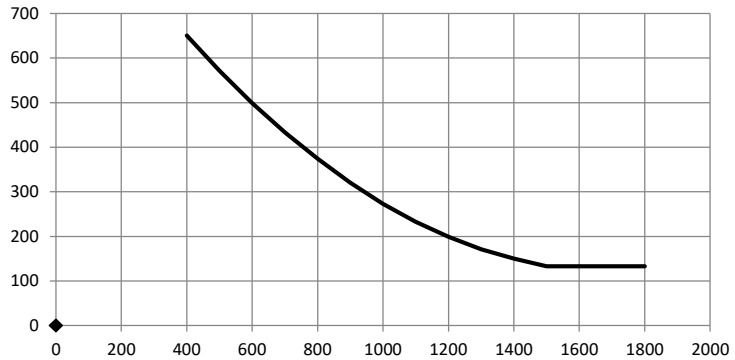


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	920	No	No
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	585	335	314

Warrant Analysis Conclusions/Comments:

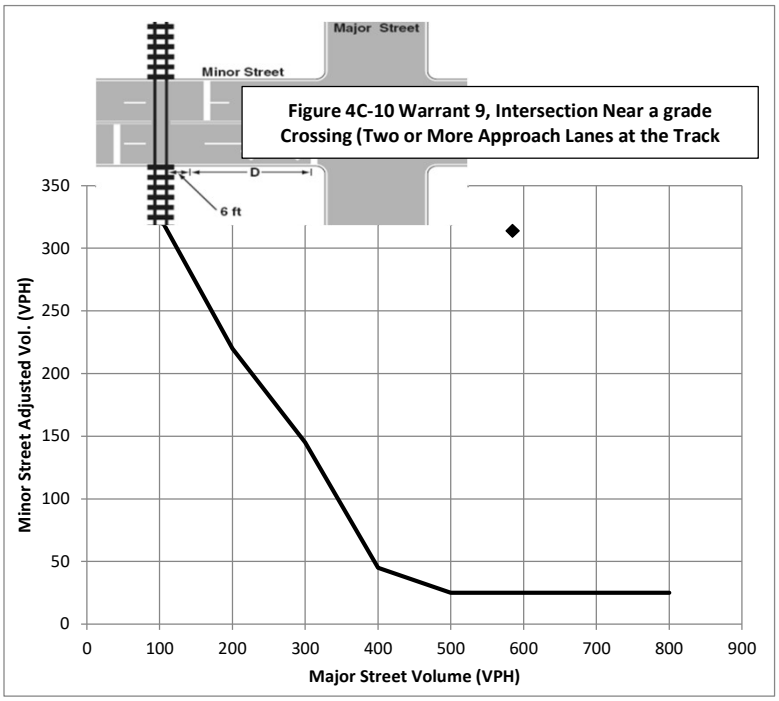


Figure 4C-10 Warrant 9, Intersection Near a grade Crossing (Two or More Approach Lanes at the Track

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **84**

Intersection Data:

Intersection: Old Mill @ Old Mill

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

Major Street:		Minor Street:	
Name:	Old Mill Rd (E/W)	Name:	Old Mill Rd (N/S)
Speed:	55 MPH	Speed:	30 MPH
Lanes:	1 lane	Lanes:	1 lane
Direction:	E/W	Major Rd Left Turn as Minor Approach?	No

% Right Turns Inc. (Default 0%)

From West (EB)	100%
From East (WB)	100%
From South (NB)	100%
From North (SB)	100%

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Hourly Volume Data Input

One Hour Time Period Start Time	Old Mill Rd (E/W)										Old Mill Rd (N/S)										Total Entering Volume
	Eastbound					Westbound					Northbound					Southbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	215	55	270	0	10	705	0	715	0	205	0	10	215	0	0	0	0	0	1,200
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	545	160	705	0	25	365	0	390	0	105	0	10	115	0	0	0	0	0	1,210
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	0	760	215	975	0	35	1,070	0	1,105	0	310	0	20	330	0	0	0	0	0	2,410

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	500	400
Minor Rd. Req	150	120
No. of Hours	1	1

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	750	600
Minor Rd. Req	75	60
No. of Hours	2	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	985	215	1,200
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,095	115	1,210
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	1095	985	#N/A	#N/A
Minor Rd Vol.	115	215	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	1095	115

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	985
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

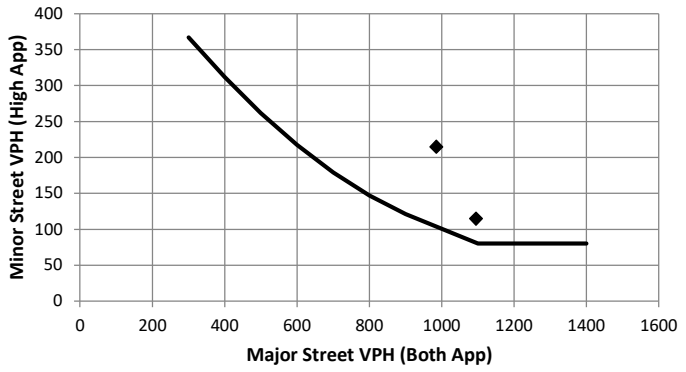


Figure 4C-3 Warrant 3, Peak Hour

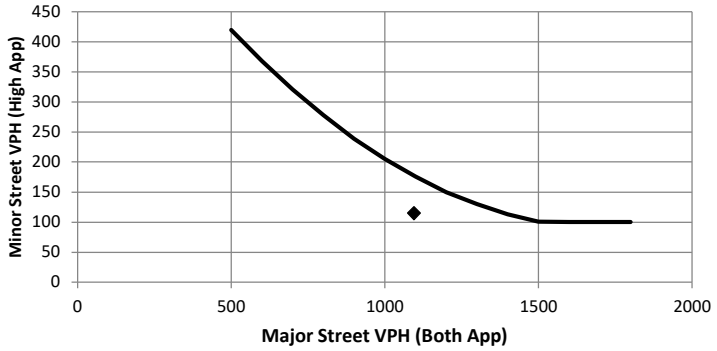


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

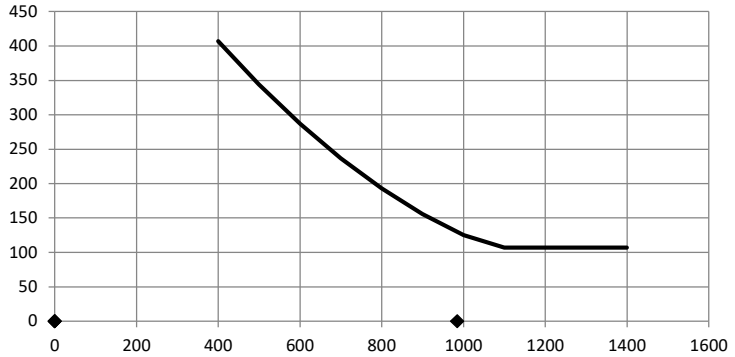
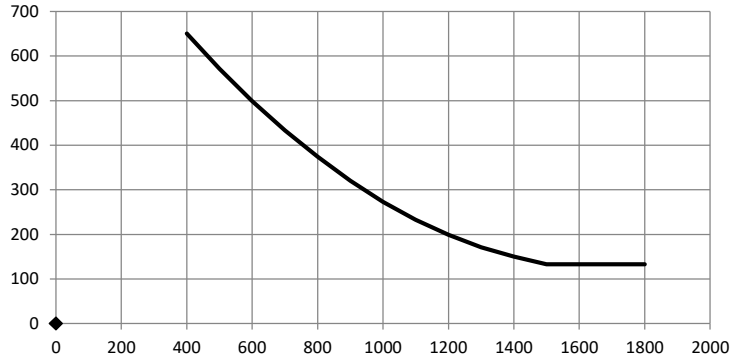


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Signal Warrants - 2044 Build

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **2**

Intersection Data:

Intersection: US 278 @ Shire Pkwy

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	Shire Pkwy
Speed:	45 MPH	Speed:	30 MPH
Lanes:	2 or more lane	Lanes:	2 or more lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	SB LT

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	0%
From North (SB)	100%
From West (EB)	100%
From East (WB)	0%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										Shire Pkwy										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	NBL	NBT	NBR	Total	U-Turn	SBL	SBT	SBR	Total	U-Turn	EBL	EBT	EBR	Total	U-Turn	WBL	WBT	WBR	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	570	180	750	0	675	225	0	900	0	0	0	0	0	0	55	0	205	260	1,910
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	415	50	465	0	155	600	0	755	0	0	0	0	0	0	255	0	900	1,155	2,375
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	0	985	230	1,215	0	830	825	0	1,655	0	0	0	0	0	0	310	0	1,105	1,415	4,285

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	200	160
No. of Hours	1	1

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	100	80
No. of Hours	1	1

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,470	55	1,525
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,170	255	1,425
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	1170	1470	#N/A	#N/A
Minor Rd Vol.	255	55	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	5	Yes
Volume on Minor Approach	150	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
7:00	1470	55

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1470
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

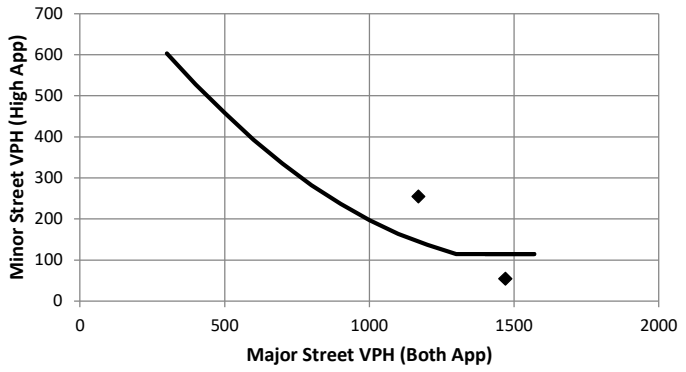


Figure 4C-3 Warrant 3, Peak Hour

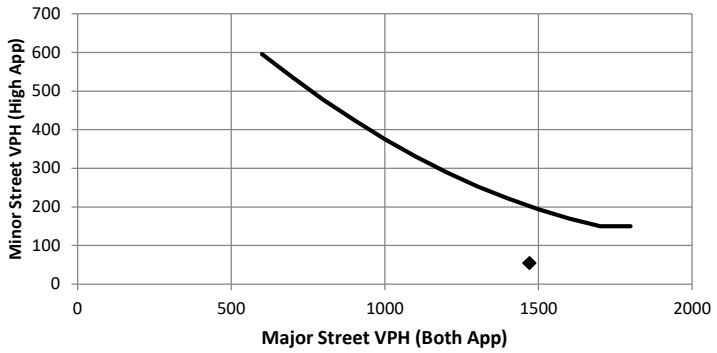


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

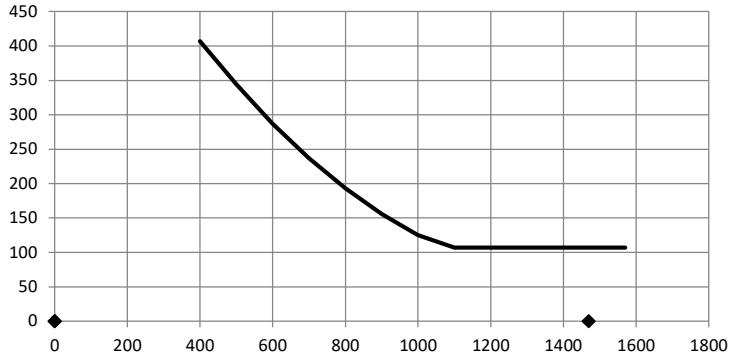
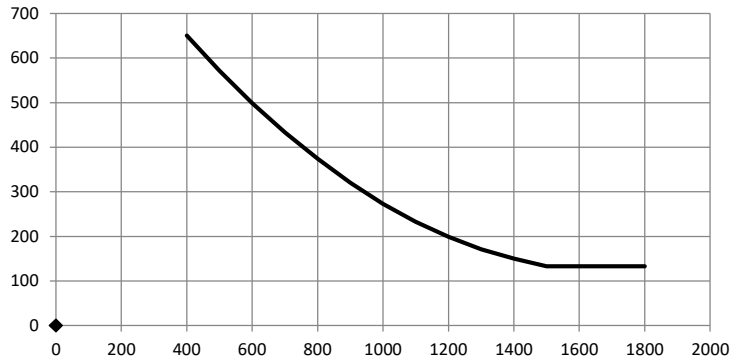


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	1525	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	7:00	1470	55	52

Warrant Analysis Conclusions/Comments:

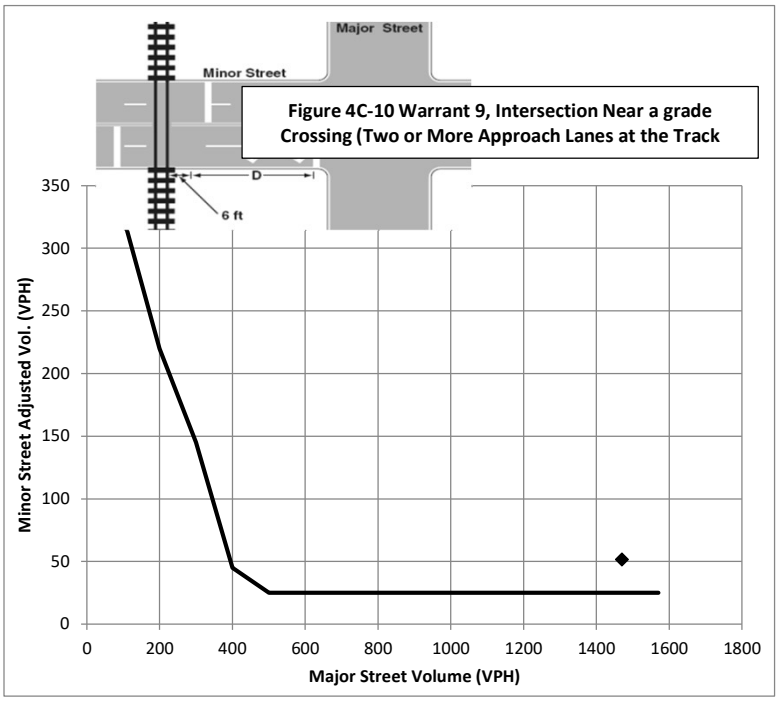


Figure 4C-10 Warrant 9, Intersection Near a grade Crossing (Two or More Approach Lanes at the Track

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **3**

Intersection Data:

Intersection: US 278 @ I-20 EB Ramps

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	I-20 EB Ramps
Speed:	45 MPH	Speed:	35 MPH
Lanes:	2 or more lane	Lanes:	1 lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	SB LT

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	0%
From North (SB)	100%
From West (EB)	100%
From East (WB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										I-20 EB Ramps										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	710	65	775	0	40	385	0	425	0	415	0	515	930	0	0	0	0	0	2,130
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	1,240	75	1,315	0	75	625	0	700	0	490	0	130	620	0	0	0	0	0	2,635
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	0	1,950	140	2,090	0	115	1,010	0	1,125	0	905	0	645	1,550	0	0	0	0	0	4,765

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	150	120
No. of Hours	2	2

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	75	60
No. of Hours	2	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,135	930	2,065
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,940	620	2,560
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	1940	1135	#N/A	#N/A
Minor Rd Vol.	620	930	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	1940	620

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1135
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

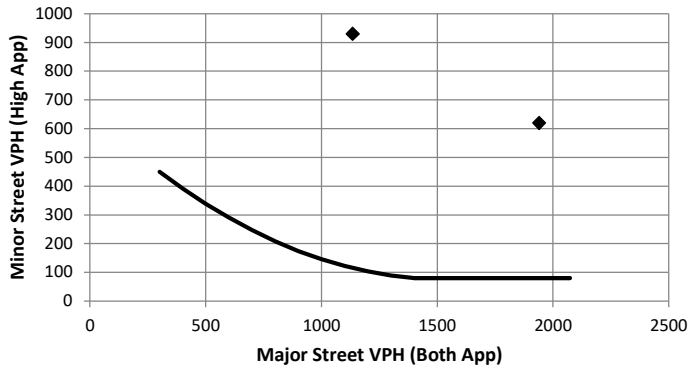


Figure 4C-3 Warrant 3, Peak Hour

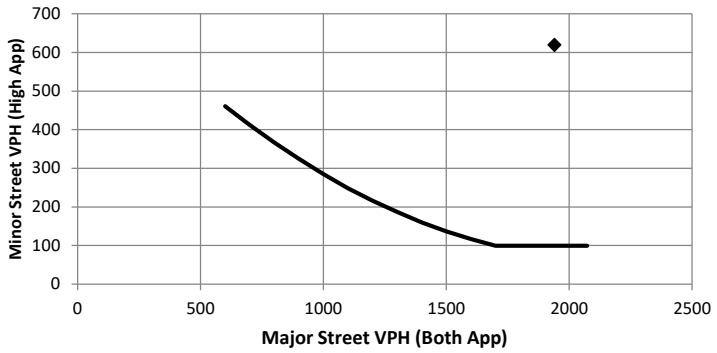


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

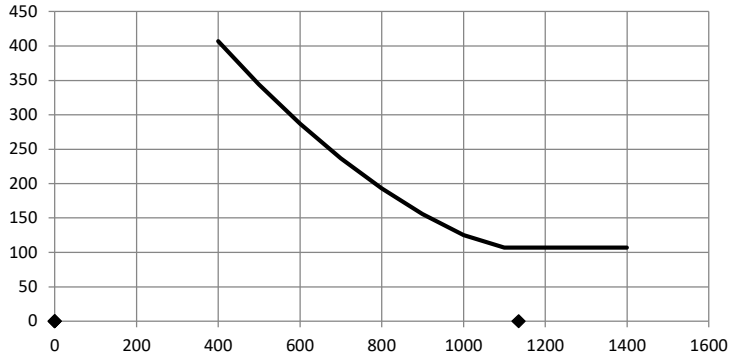
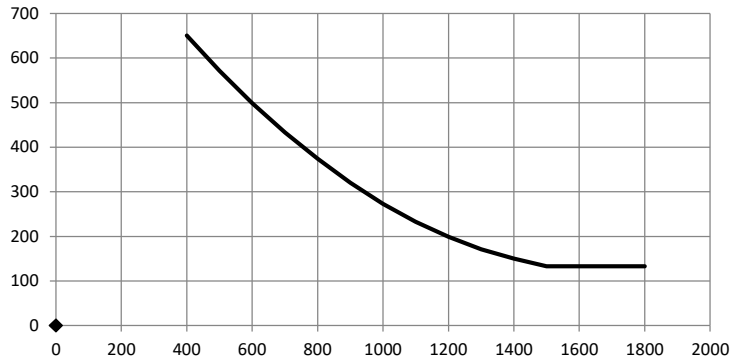


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	2560	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	1940	620	581

Warrant Analysis Conclusions/Comments:

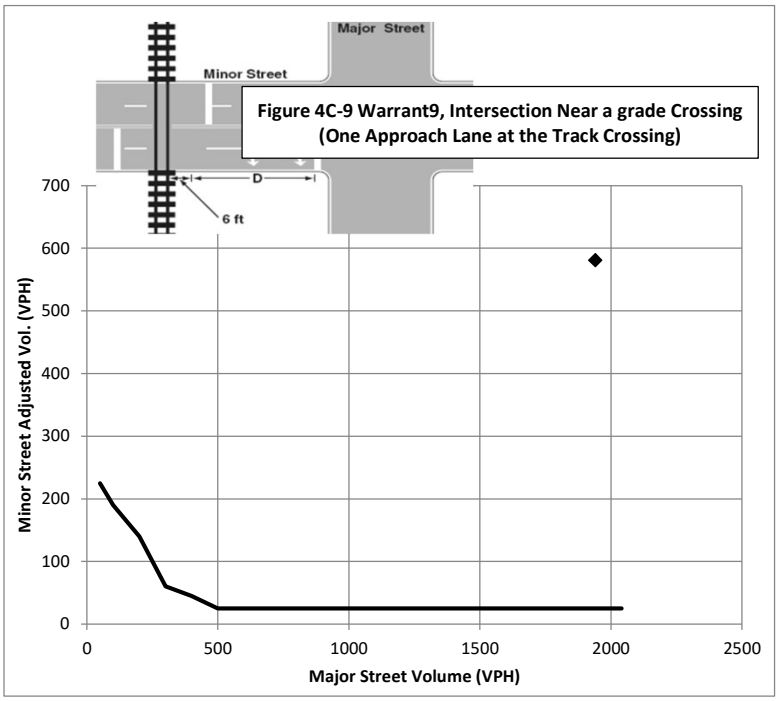


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **4**

Intersection Data:

Intersection: US 278 @ I-20 WB Ramps

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	I-20 WB Ramps
Speed:	45 MPH	Speed:	35 MPH
Lanes:	2 or more lane	Lanes:	1 lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	No

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	100%
From North (SB)	0%
From West (EB)	0%
From East (WB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										I-20 WB Ramps										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	150	975	0	1,125	0	0	350	295	645	0	0	0	0	0	0	75	0	85	160	1,930
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	785	945	0	1,730	0	0	615	510	1,125	0	0	0	0	0	0	85	0	60	145	3,000
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	935	1,920	0	2,855	0	0	965	805	1,770	0	0	0	0	0	0	160	0	145	305	4,930

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	150	120
No. of Hours	1	2

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	75	60
No. of Hours	2	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,475	160	1,635
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	2,345	145	2,490
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	2345	1475	#N/A	#N/A
Minor Rd Vol.	145	160	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	2345	145

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1475
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

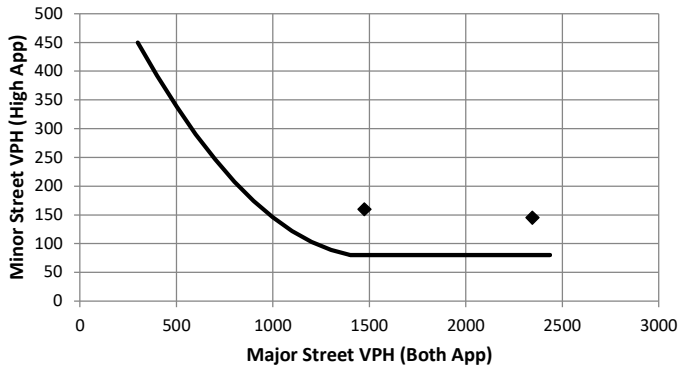


Figure 4C-3 Warrant 3, Peak Hour

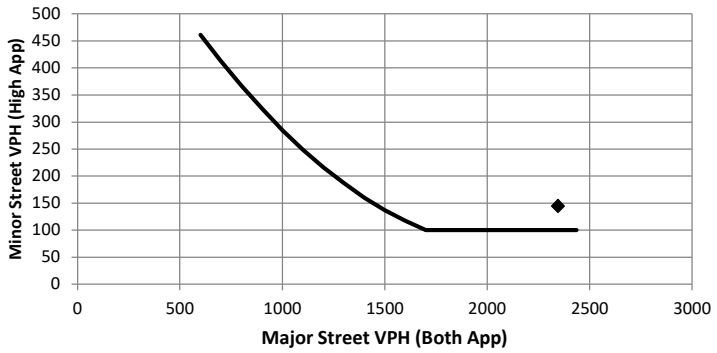


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

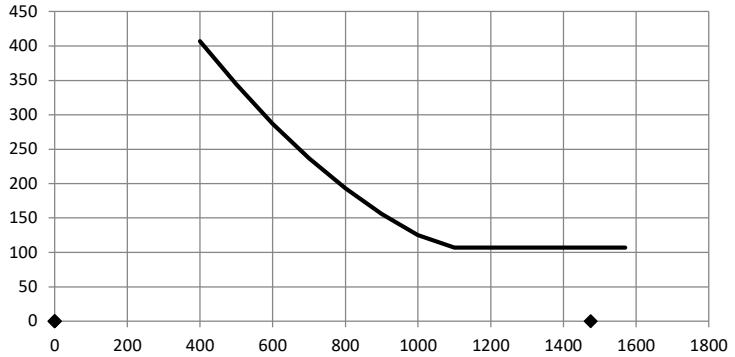
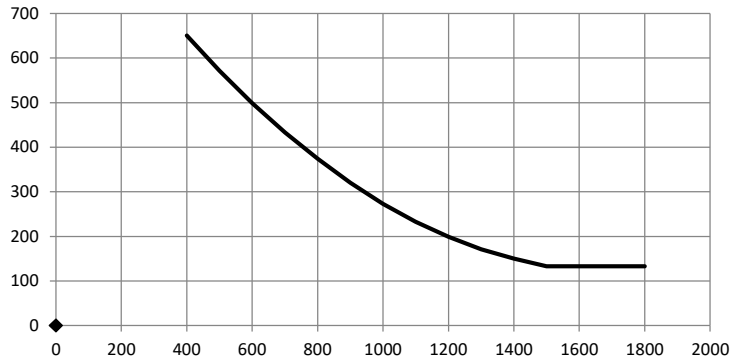


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	2490	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	2345	145	136

Warrant Analysis Conclusions/Comments:

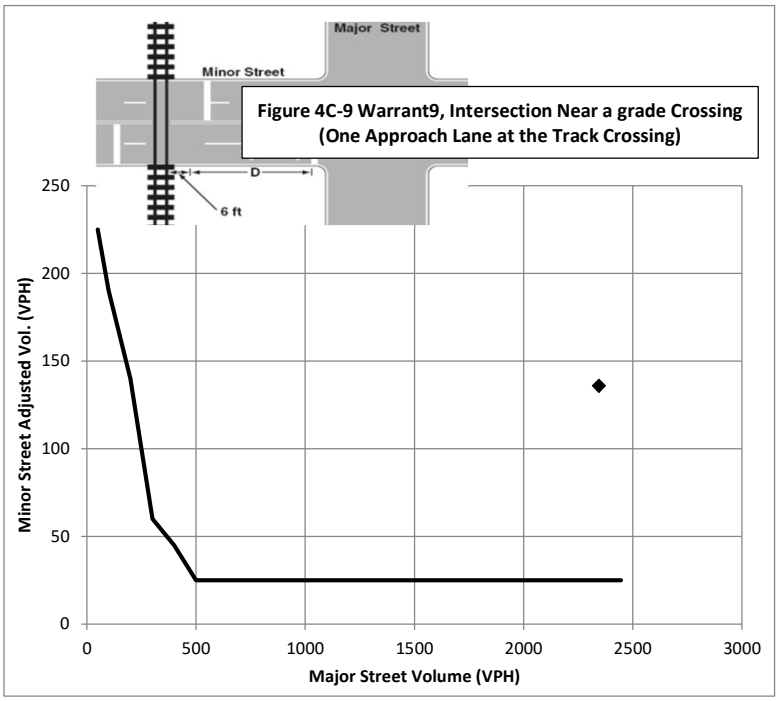


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **5**

Intersection Data:

Intersection: US 278 @ Willow Springs Church Rd

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	Willow Springs Church Rd
Speed:	45 MPH	Speed:	40 MPH
Lanes:	1 lane	Lanes:	1 lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	NB LT

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**No**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	100%
From North (SB)	100%
From West (EB)	0%
From East (WB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										Willow Springs Church Rd										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	160	310	0	470	0	0	475	35	510	0	20	0	105	125	0	0	0	0	0	1,105
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	305	470	0	775	0	0	410	50	460	0	90	0	165	255	0	0	0	0	0	1,490
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	465	780	0	1,245	0	0	885	85	970	0	110	0	270	380	0	0	0	0	0	2,595

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	500	400
Minor Rd. Req	150	120
No. of Hours	0	0

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	750	600
Minor Rd. Req	75	60
No. of Hours	1	1

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	980	20	1,000
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,235	90	1,325
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	1235	980	#N/A	#N/A
Minor Rd Vol.	90	20	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **No**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	No
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	1235	90

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	980
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

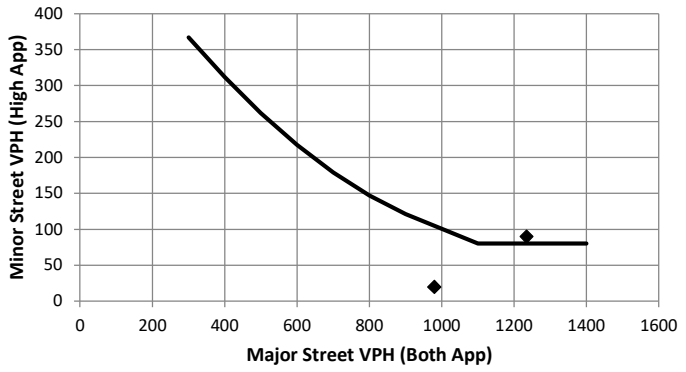


Figure 4C-3 Warrant 3, Peak Hour

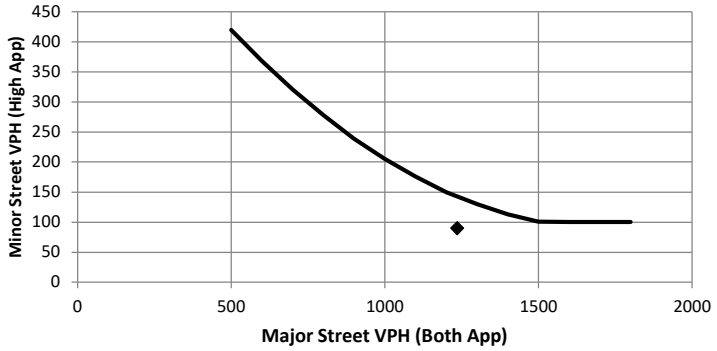


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

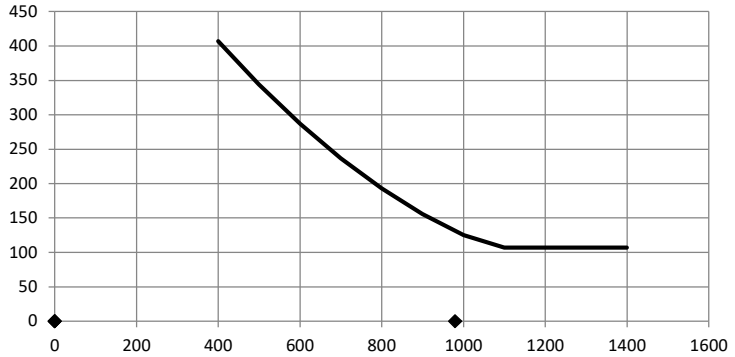
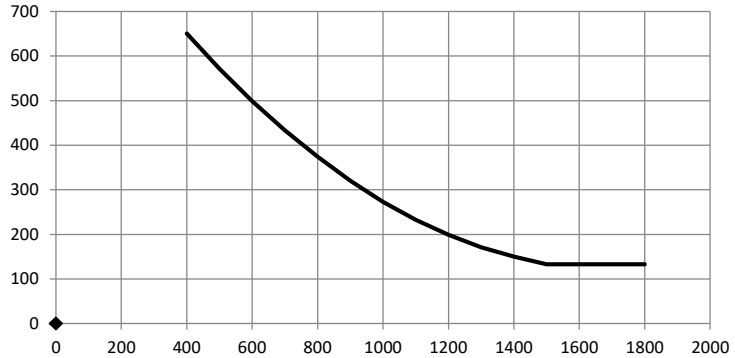


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	1325	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	1235	90	84

Warrant Analysis Conclusions/Comments:

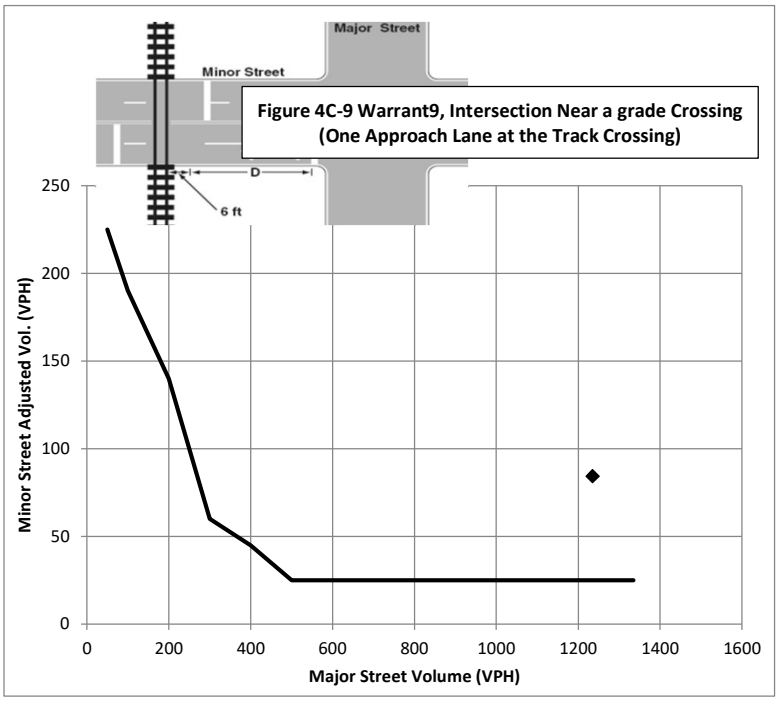


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **32**

Intersection Data:

Intersection: US 278 @ Frontage Rd

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	Frontage Rd
Speed:	45 MPH	Speed:	45 MPH
Lanes:	2 or more lane	Lanes:	2 or more lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	NB LT

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	4 or more
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	0%
From North (SB)	100%
From West (EB)	0%
From East (WB)	0%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										Frontage Rd										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	95	715	250	1,060	0	60	535	55	650	0	20	50	45	115	0	65	65	95	225	2,050
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	130	745	130	1,005	0	140	750	90	980	0	100	100	185	385	0	190	90	120	400	2,770
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	225	1,460	380	2,065	0	200	1,285	145	1,630	0	120	150	230	500	0	255	155	215	625	4,820

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	200	160
No. of Hours	2	2

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	100	80
No. of Hours	2	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,460	200	1,660
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,855	480	2,335
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	1855	1460	#N/A	#N/A
Minor Rd Vol.	480	200	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	5	Yes
Volume on Minor Approach	150	Yes
Total Entering Volume (veh/h)	800	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	1855	480

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1460
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

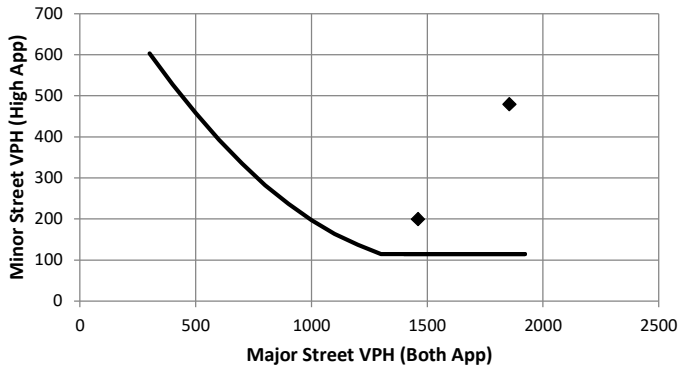


Figure 4C-3 Warrant 3, Peak Hour

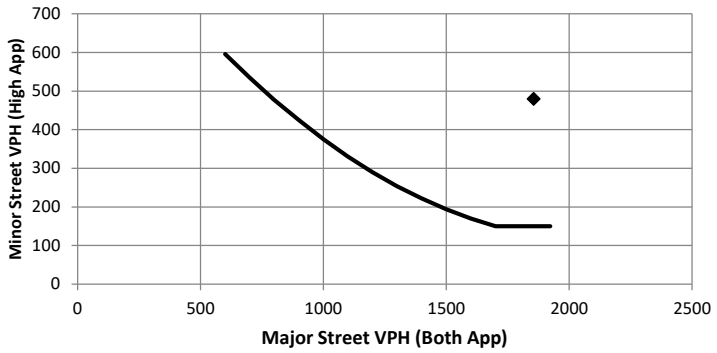


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

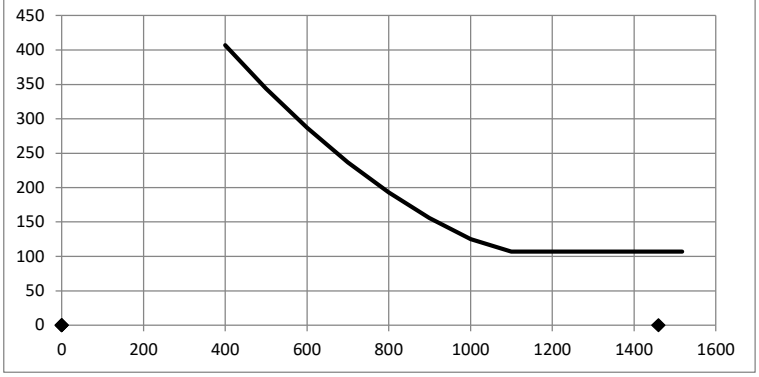
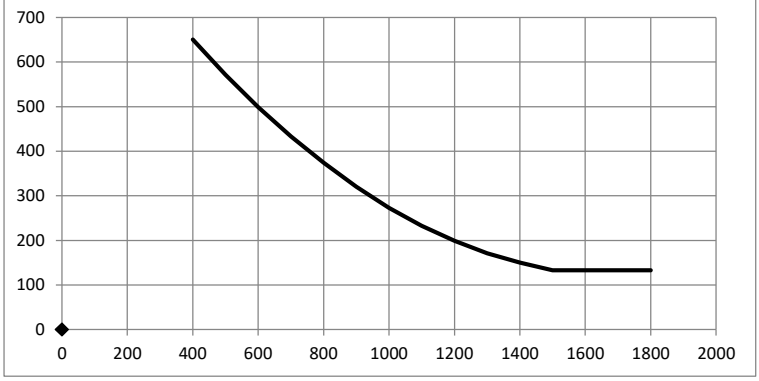


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	2335	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	1855	480	450

Warrant Analysis Conclusions/Comments:

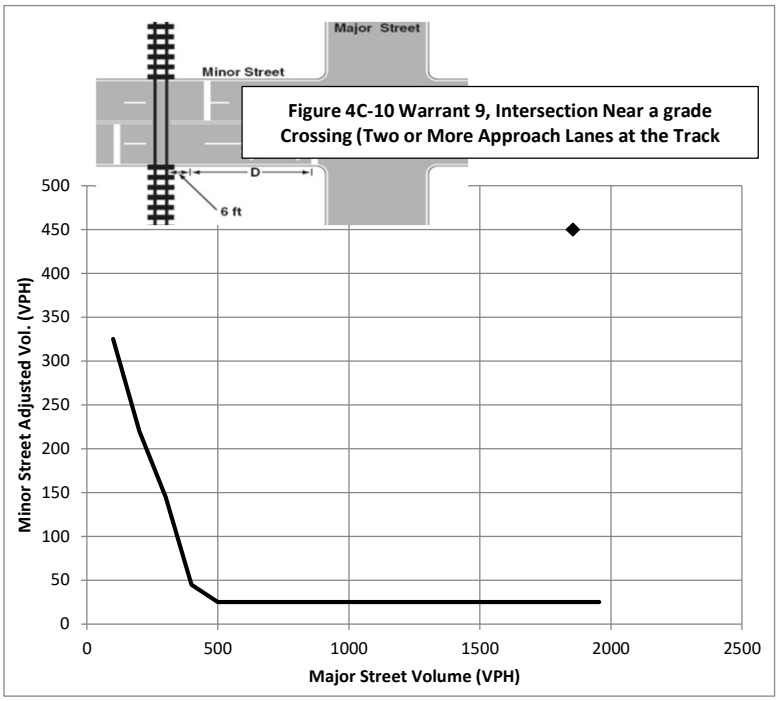


Figure 4C-10 Warrant 9, Intersection Near a grade Crossing (Two or More Approach Lanes at the Track

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **33**

Intersection Data:

Intersection: US 278 @ Stanton Springs North 1

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	US 278	Name:	Stanton Springs North 1
Speed:	45 MPH	Speed:	25 MPH
Lanes:	2 or more lane	Lanes:	2 or more lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	NB LT

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	4 or more
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	0%
From North (SB)	100%
From West (EB)	0%
From East (WB)	0%

Hourly Volume Data Input

One Hour Time Period Start Time	US 278										Stanton Springs North 1										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	135	445	250	830	0	20	535	35	590	0	20	25	40	85	0	65	25	5	95	1,600
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	180	660	125	965	0	10	580	55	645	0	100	35	145	280	0	185	40	15	240	2,130
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	315	1,105	375	1,795	0	30	1,115	90	1,235	0	120	60	185	365	0	250	65	20	335	3,730

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	200	160
No. of Hours	1	1

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	100	80
No. of Hours	2	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,170	135	1,305
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,485	360	1,845
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	1485	1170	#N/A	#N/A
Minor Rd Vol.	360	135	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	5	Yes
Volume on Minor Approach	150	Yes
Total Entering Volume (veh/h)	800	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	1485	360

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1170
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

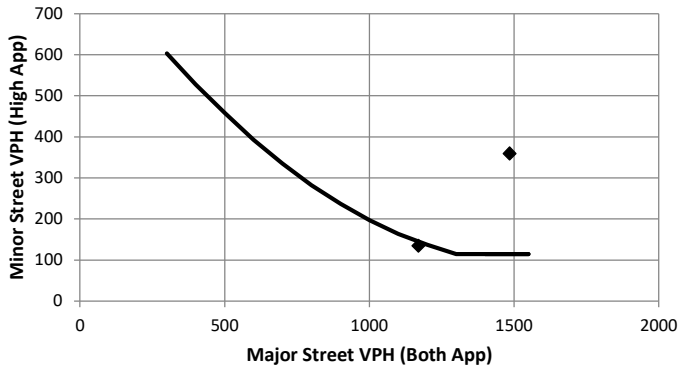


Figure 4C-3 Warrant 3, Peak Hour

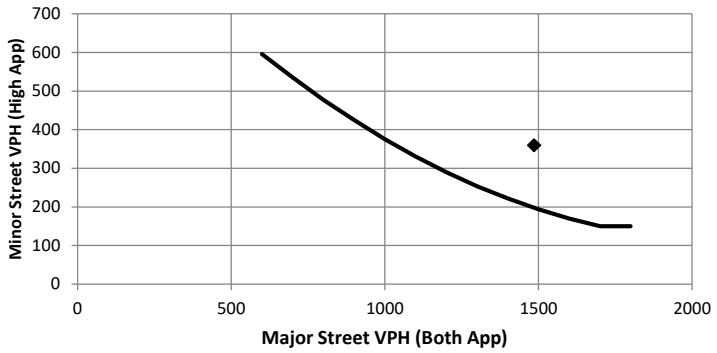


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

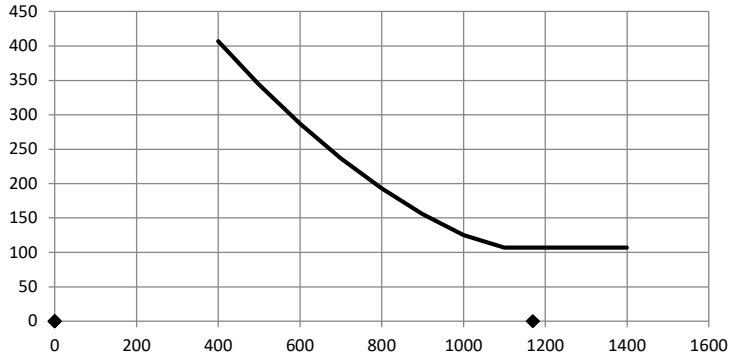
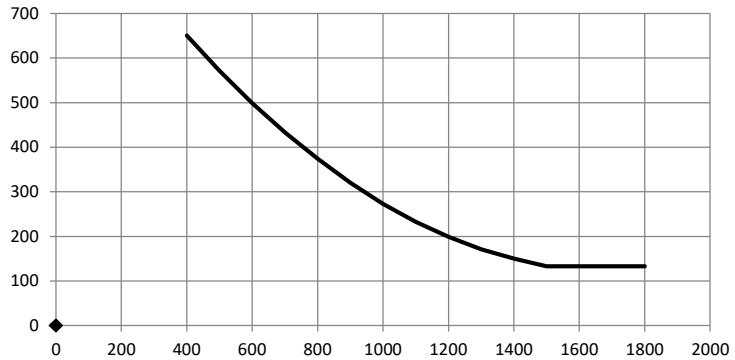


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria							Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour						1845	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3						1	Yes	
	Hour								
	Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	1485	360	338

Warrant Analysis Conclusions/Comments:

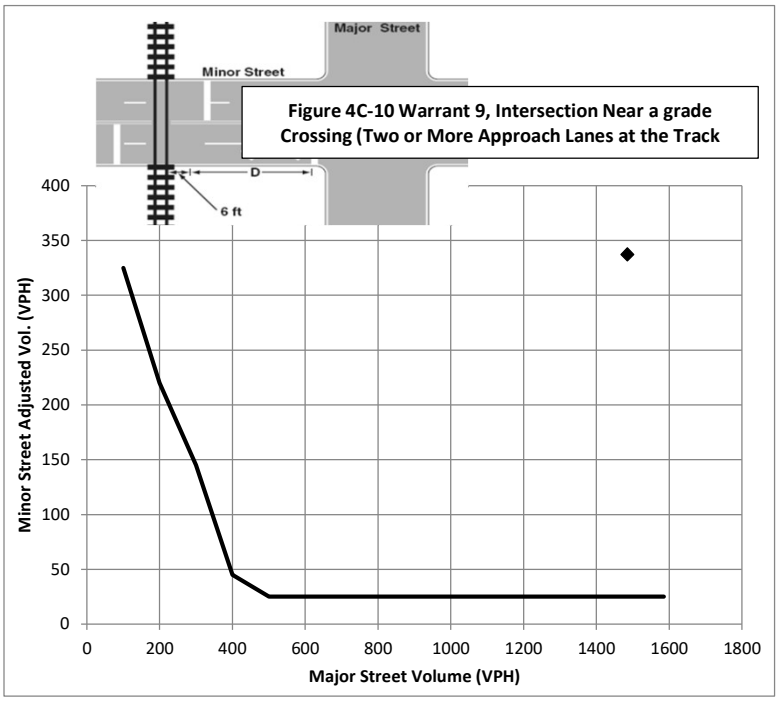


Figure 4C-10 Warrant 9, Intersection Near a grade Crossing (Two or More Approach Lanes at the Track

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **35**

Intersection Data:

Intersection: Sewell Rd/Stanton Springs North 6 @ Frontage Rd

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	Frontage Rd	Name:	Sewell Rd/Stanton Springs Nc
Speed:	45 MPH	Speed:	35 MPH
Lanes:	2 or more lane	Lanes:	1 lane
Direction:	E/W	Major Rd Left Turn as Minor Approach?	No

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	4 or more
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From West (EB)	100%
From East (WB)	100%
From South (NB)	100%
From North (SB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	Frontage Rd										Sewell Rd/Stanton Springs North 6										Total Entering Volume
	Eastbound					Westbound					Northbound					Southbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	145	185	0	330	0	105	570	455	1,130	0	10	0	100	110	0	115	0	50	165	1,735
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	85	525	10	620	0	55	380	230	665	0	10	0	110	120	0	335	0	120	455	1,860
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	230	710	10	950	0	160	950	685	1,795	0	20	0	210	230	0	450	0	170	620	3,595

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	150	120
No. of Hours	2	2

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	75	60
No. of Hours	2	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,460	275	1,735
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,285	575	1,860
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	1285	1460	#N/A	#N/A
Minor Rd Vol.	575	275	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	4	Yes
Volume on Minor Approach	100	Yes
Total Entering Volume (veh/h)	800	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	1285	575

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1460
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

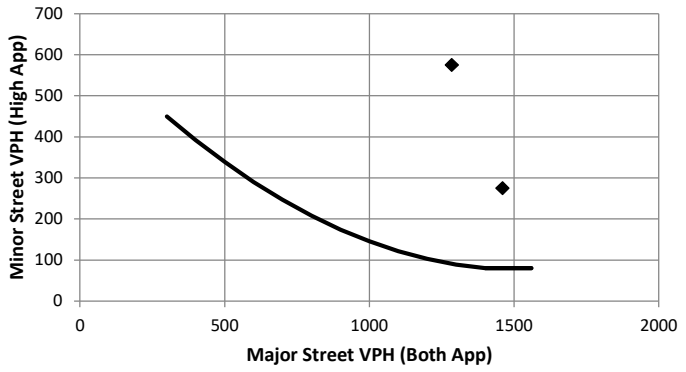


Figure 4C-3 Warrant 3, Peak Hour

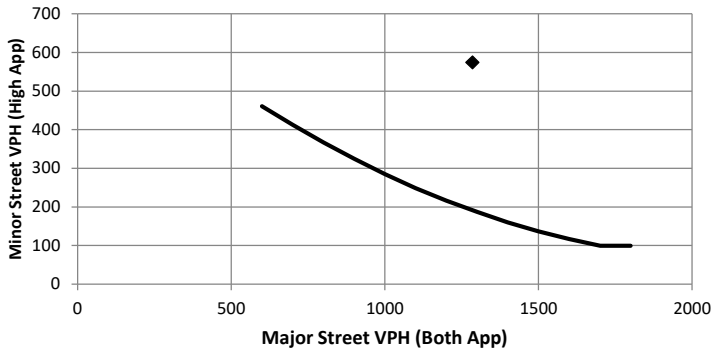


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

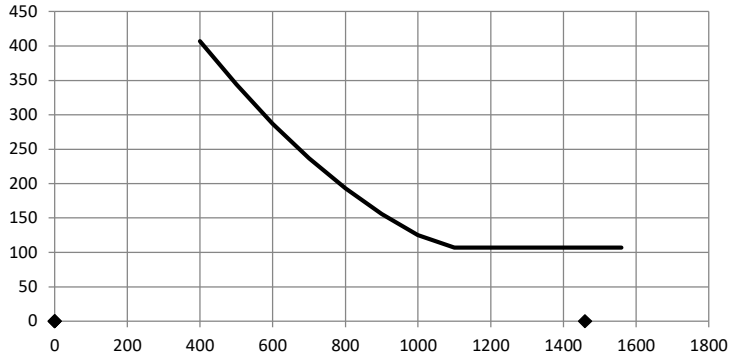
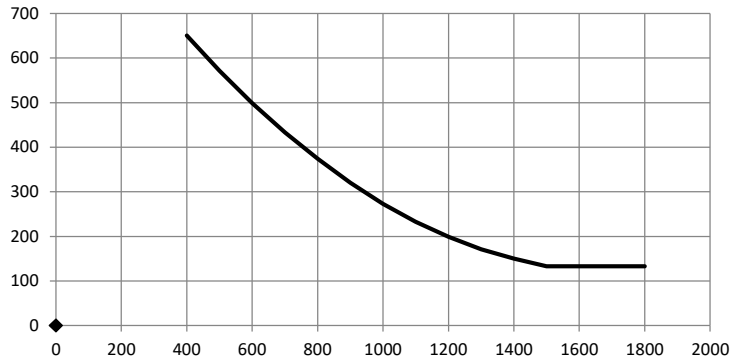


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	1860	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	1285	575	539

Warrant Analysis Conclusions/Comments:

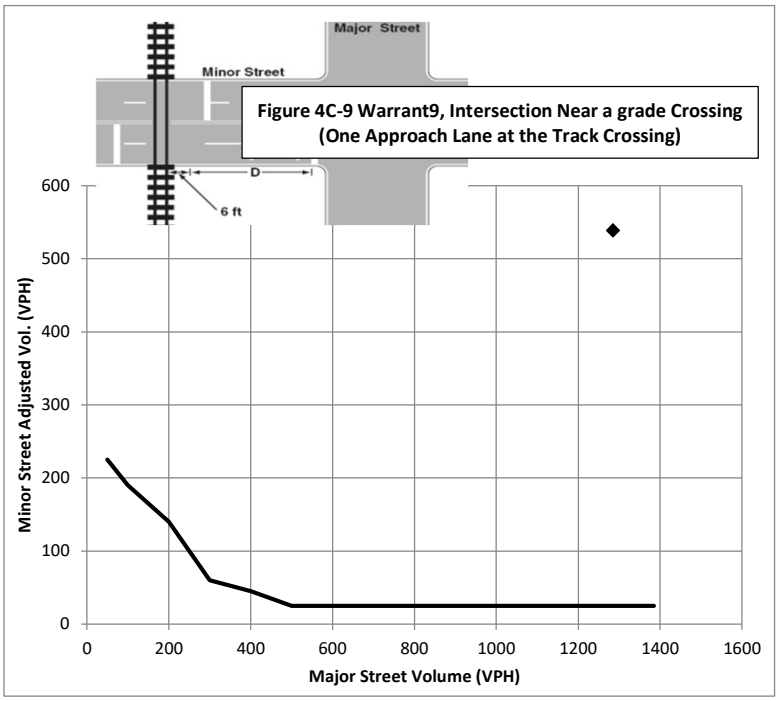


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **36**

Intersection Data:

Intersection: Old Mill Rd @ Frontage Rd/Stanton Springs North 8

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Major Street:		Minor Street:	
Name:	Old Mill Rd	Name:	Frontage Rd/Stanton Springs
Speed:	55 MPH	Speed:	45 MPH
Lanes:	2 or more lane	Lanes:	2 or more lane
Direction:	N/S	Major Rd Left Turn as Minor Approach?	No

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	4 or more
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

% Right Turns Inc. (Default 0%)

From South (NB)	100%
From North (SB)	0%
From West (EB)	0%
From East (WB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	Old Mill Rd										Frontage Rd/Stanton Springs North 8										Total Entering Volume
	Northbound					Southbound					Eastbound					Westbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	950	665	95	1,710	0	35	170	0	205	0	0	60	340	400	0	40	180	140	360	2,675
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	575	335	70	980	0	105	495	0	600	0	0	140	830	970	0	100	90	70	260	2,810
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	1,525	1,000	165	2,690	0	140	665	0	805	0	0	200	1,170	1,370	0	140	270	210	620	5,485

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	200	160
No. of Hours	2	2

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	100	80
No. of Hours	2	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	1,915	420	2,335
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	1,580	400	1,980
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	7:00	17:00	#N/A	#N/A
Major Rd Vol.	1915	1580	#N/A	#N/A
Minor Rd Vol.	420	400	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	5	Yes
Volume on Minor Approach	150	Yes
Total Entering Volume (veh/h)	800	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
7:00	1915	420

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	1915
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

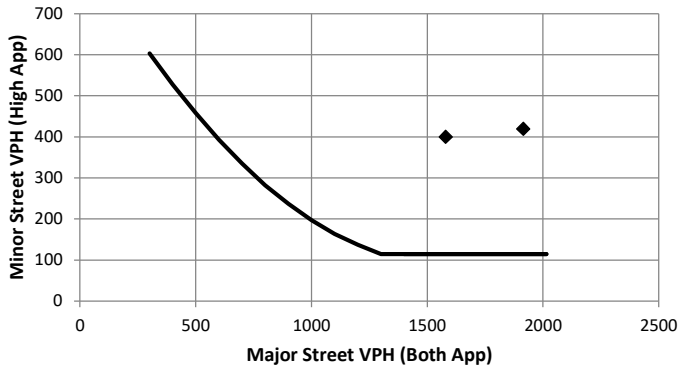


Figure 4C-3 Warrant 3, Peak Hour

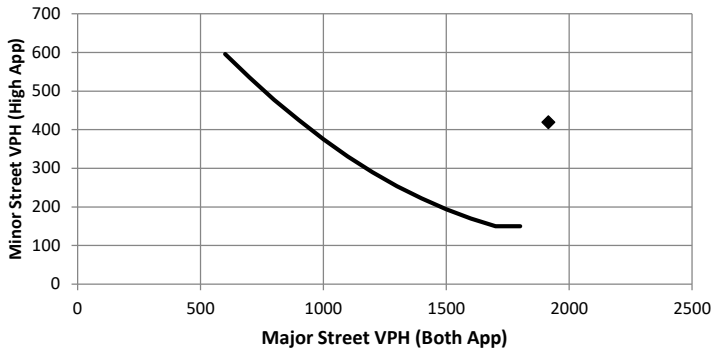


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

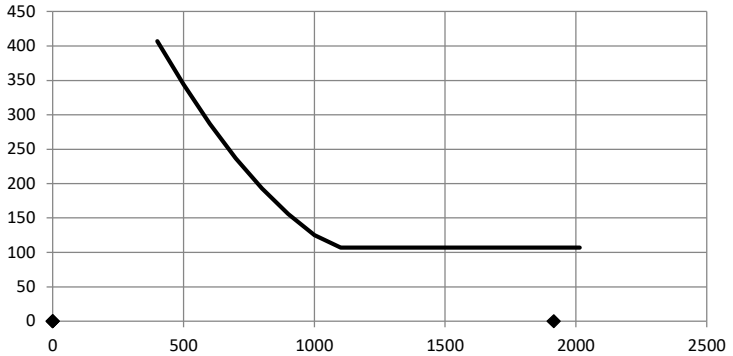
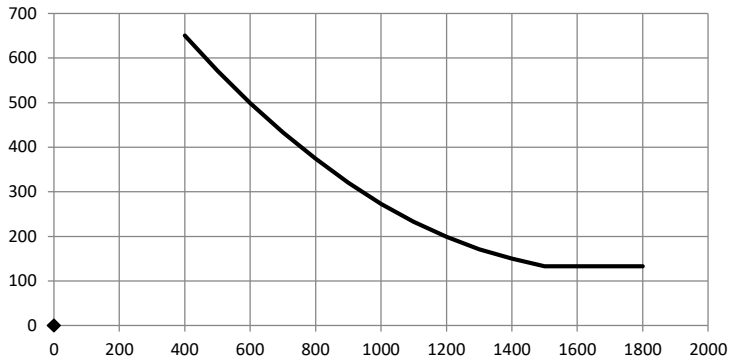


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	2335	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	7:00	1915	420	394

Warrant Analysis Conclusions/Comments:

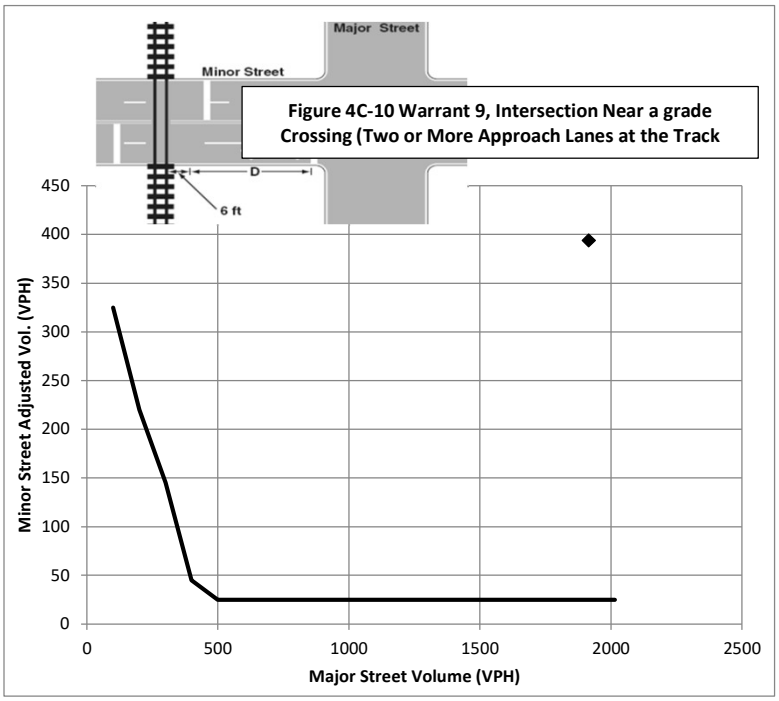


Figure 4C-10 Warrant 9, Intersection Near a grade Crossing (Two or More Approach Lanes at the Track

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **42**

Intersection Data:

Intersection: Frontage Rd @ Stanton Springs North 5

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**Yes**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

Major Street:		Minor Street:	
Name:	Frontage Rd	Name:	Stanton Springs North 5
Speed:	45 MPH	Speed:	25 MPH
Lanes:	2 or more lane	Lanes:	2 or more lane
Direction:	E/W	Major Rd Left Turn as Minor Approach?	No

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

% Right Turns Inc. (Default 0%)

From West (EB)	100%
From East (WB)	100%
From South (NB)	100%
From North (SB)	100%

Hourly Volume Data Input

One Hour Time Period Start Time	Frontage Rd										Stanton Springs North 5										Total Entering Volume
	Eastbound					Westbound					Northbound					Southbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	145	215	0	360	0	0	175	455	630	0	0	0	0	0	0	115	0	50	165	1,155
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	85	285	0	370	0	0	280	230	510	0	0	0	0	0	0	335	0	120	455	1,335
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	230	500	0	730	0	0	455	685	1,140	0	0	0	0	0	0	450	0	170	620	2,490

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	600	480
Minor Rd. Req	200	160
No. of Hours	1	2

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	900	720
Minor Rd. Req	100	80
No. of Hours	1	2

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	990	165	1,155
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	880	455	1,335
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	880	990	#N/A	#N/A
Minor Rd Vol.	455	165	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **Yes**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	5	Yes
Volume on Minor Approach	150	Yes
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	880	455

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	990
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

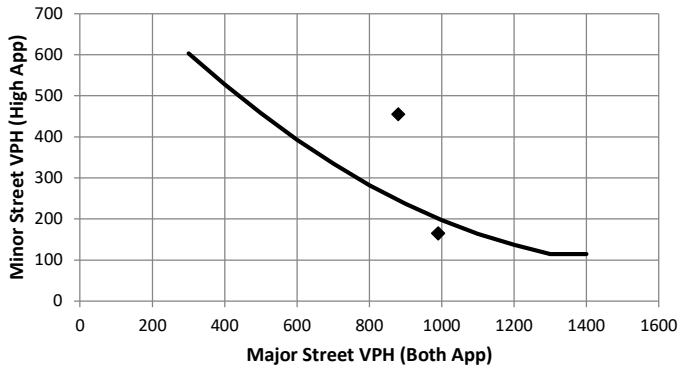


Figure 4C-3 Warrant 3, Peak Hour

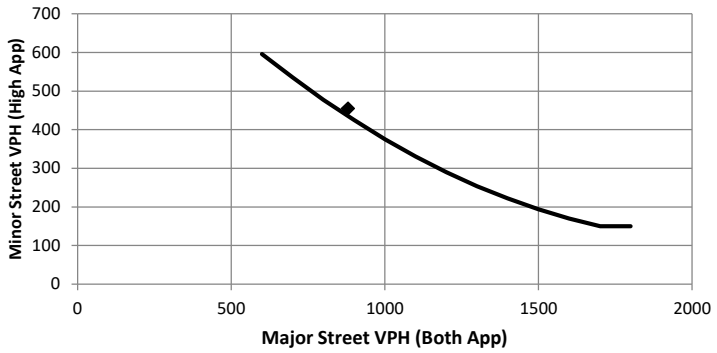


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

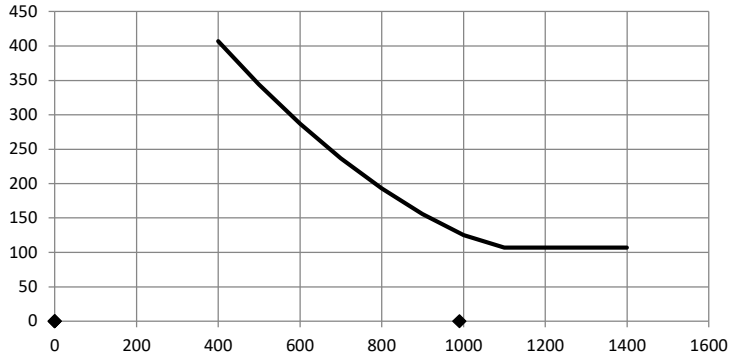
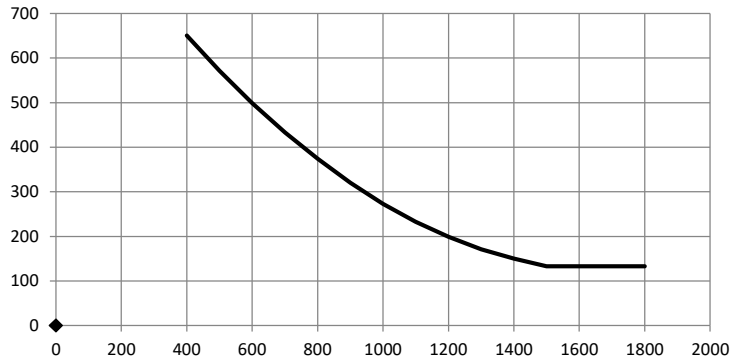


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	1335	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	880	455	427

Warrant Analysis Conclusions/Comments:

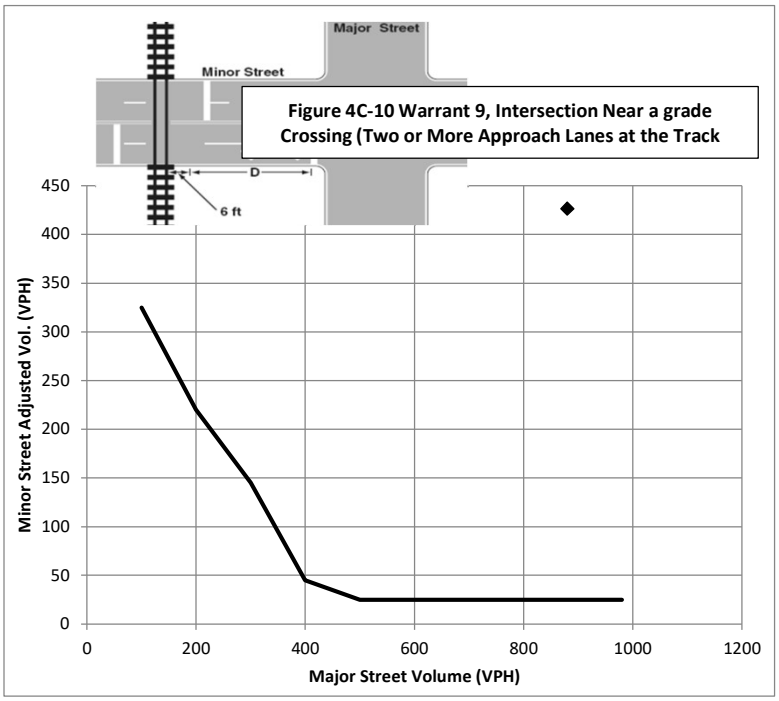


Figure 4C-10 Warrant 9, Intersection Near a grade Crossing (Two or More Approach Lanes at the Track

Traffic Signal Warrant Summary Worksheet

Based on Manual of Uniform Traffic Control Devices (MUTCD) Warrant Analysis

NODE **84**

Intersection Data:

Intersection: Old Mill @ Old Mill

County: Walton

City:

Warrant Analysis Conducted By:

Date:

Project ID:

Agency: Arcadis

Analyst: CH

Warrant Evaluation Summary	Warrant Met:
Warrant 1: Eight - Hour Vehicular Volume	**N/A**
Condition A: Minimum Vehicular Volume	
Condition B: Interruption of Continuous Traffic	
Condition C: Combination: 80% of A and B	
Warrant 2: Four-Hour Volume	**N/A**
Warrant 3: Peak Hour Volume	**No**
Warrant 4: Pedestrian Volume	**N/A**
Criterion A: Four-Hour	N/A
Criterion B: Peak-Hour	N/A
Warrant 5: School Crossing	**N/A**
Warrant 6: Coordinated Signal System	**N/A**
Warrant 7: Crash Experience	**N/A**
Warrant 8: Roadway Network	**N/A**
Warrant 9: Intersection Near a Grade Crossing	**N/A**

Major Street:		Minor Street:	
Name:	Old Mill Rd (E/W)	Name:	Old Mill Rd (N/S)
Speed:	55 MPH	Speed:	30 MPH
Lanes:	1 lane	Lanes:	1 lane
Direction:	E/W	Major Rd Left Turn as Minor Approach?	No

% Right Turns Inc. (Default 0%)

From West (EB)	100%
From East (WB)	100%
From South (NB)	100%
From North (SB)	100%

Is intersection in a built-up area of isolated community of < 10,000 population?	No
Total number of approaches at intersection?	3
If T-intersection, inflate minor threshold to 150%?	No
Volume Threshold used in analysis:	**100%**
Manually set volume level?	100%

Hourly Volume Data Input

One Hour Time Period Start Time	Old Mill Rd (E/W)										Old Mill Rd (N/S)										Total Entering Volume
	Eastbound					Westbound					Northbound					Southbound					
	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	U-Turn	Left	Thru	Right	Total	
6:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7:00	0	0	190	0	190	0	0	360	0	360	0	0	0	0	0	0	0	0	0	0	550
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	315	0	315	0	0	260	0	260	0	0	0	0	0	0	0	0	0	0	575
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16-hr total	0	0	505	0	505	0	0	620	0	620	0	0	0	0	0	0	0	0	0	0	1,125

Warrant 1: Eight - Hour Vehicular Volume 100%

Warrant Evaluated? **No** Warrant 1 Satisfied? **N/A**

Condition A : Min. Veh. Volume		
Volume Level	100%	80%
Major Rd. Req	500	400
Minor Rd. Req	150	120
No. of Hours	0	0

Condition A Satisfied?

Condition B: Interruption of Continuous Traffic		
Volume Level	100%	80%
Major Rd. Req	750	600
Minor Rd. Req	75	60
No. of Hours	0	0

Condition B Satisfied?

Condition C: Combination of A & B at 80%

Condition C Satisfied?

Time Period	From	To	Maj Road: Both App. (VPH)	Min Road: High App. (VPH)	Total
1	6:00	7:00	0	0	0
2	7:00	8:00	550	0	550
3	8:00	9:00	0	0	0
4	9:00	10:00	0	0	0
5	10:00	11:00	0	0	0
6	11:00	12:00	0	0	0
7	12:00	13:00	0	0	0
8	13:00	14:00	0	0	0
9	14:00	15:00	0	0	0
10	15:00	16:00	0	0	0
11	16:00	17:00	0	0	0
12	17:00	18:00	575	0	575
13	18:00	19:00	0	0	0
14	19:00	20:00	0	0	0
15	20:00	21:00	0	0	0
16	21:00	22:00	0	0	0

Warrant 2: Four-Hour Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Hour Start	17:00	7:00	#N/A	#N/A
Major Rd Vol.	575	550	#N/A	#N/A
Minor Rd Vol.	0	0	#N/A	#N/A

Warrant 3: Peak Hour Volume 100%

Warrant Evaluated? Yes Warrant Satisfied? **No**

Condition justifying use of warrant:

Write in response here

Criteria		Met?
Delay on Minor Approach	4	No
Volume on Minor Approach	100	No
Total Entering Volume (veh/h)	650	

Peak Hour	Major Road Vol. (Both Approch)	Minor Road Vol. (High Approach)
17:00	575	0

Warrant 4: Pedestrian Volume 100%

Warrant Evaluated? **No** Warrant Satisfied? **N/A**

Ped Data

Hour (Start)	Ped Volume
6:00	0
7:00	0
8:00	0
9:00	0
10:00	0
11:00	0
12:00	0
13:00	0
14:00	0
15:00	0
16:00	0
17:00	0
18:00	0
19:00	0
20:00	0
21:00	0

Criterion A: Four Hour

Hour (Start)	Ped Volume	Maj Rd Volume
6:00	0	0
7:00	0	550
8:00	0	0
9:00	0	0

Criterion A Satisfied? N/A

Criterion B: Peak Hour

Peak Hour	Ped Volume	Maj Rd Volume
6:00	0	0

Criterion B Satisfied? N/A

Figure 4C-1 Warrant 2, Four-Hour Vehicular Volume

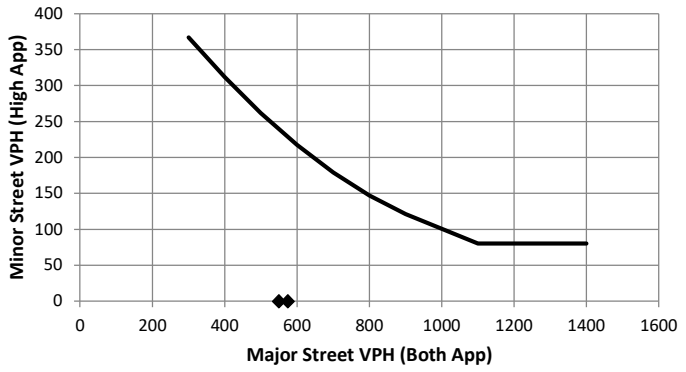


Figure 4C-3 Warrant 3, Peak Hour

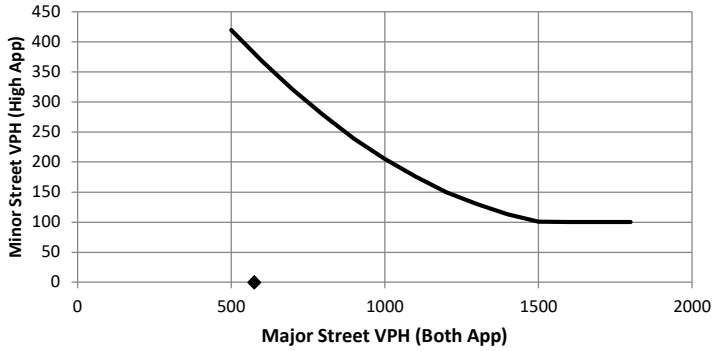


Figure 4C-5 Warrant 4, Pedestrian Four-Hour Volume

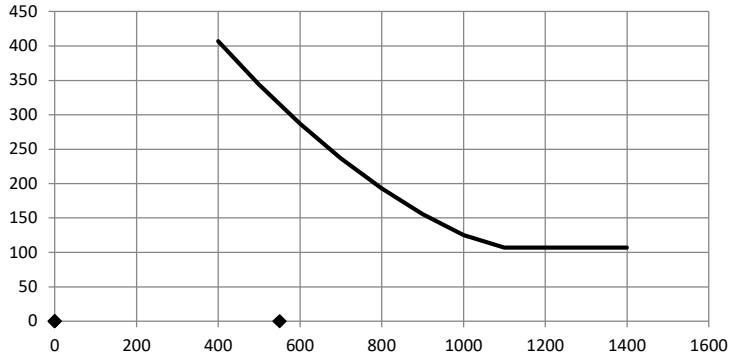
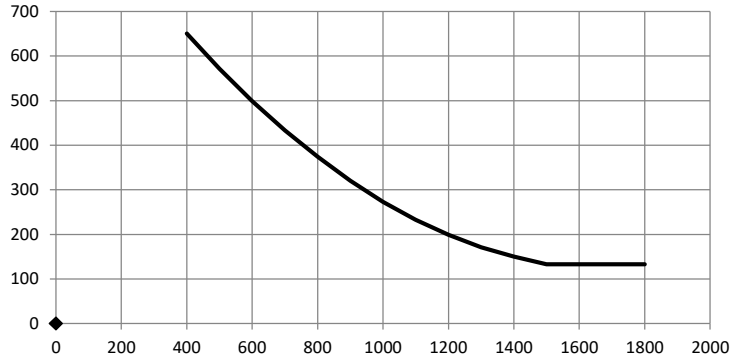


Figure 4C-7 Warrant 4, Pedestrian Peak Hour



Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency.					Yes
	Measures Tried:					
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	575	No	No
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	575	0	0

Warrant Analysis Conclusions/Comments:

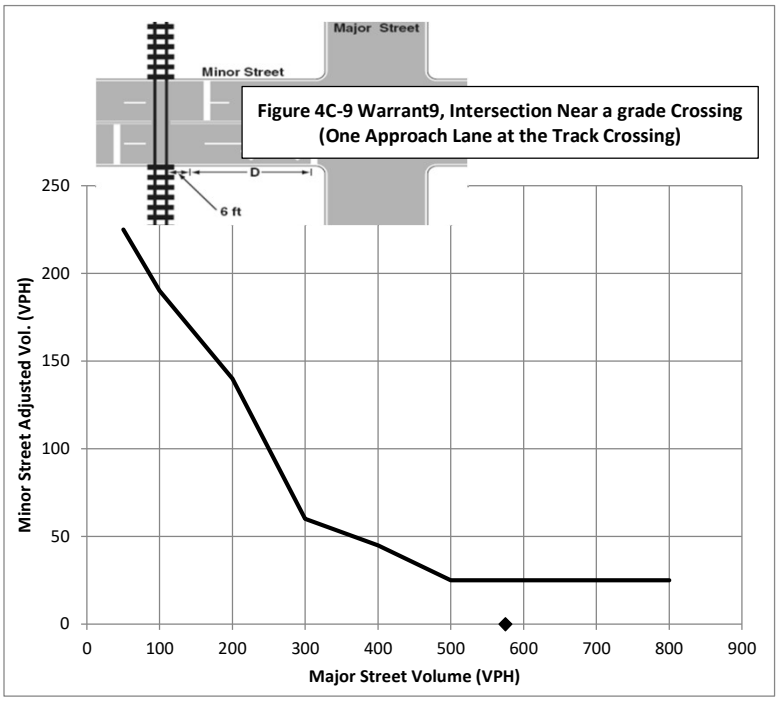


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Warrant 5: School Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Fulfilled?
1	There are a MINIMUM of 20 school children during the highest crossing hour.	No
2	There are fewer adequate gaps in the major road traffic stream during the period when the school children are using the crossing than the number of minutes in the same period.	No
3	The nearest traffic signal along the major road is located more than 300 ft away. Or, the nearest traffic signal is within 300 ft but the proposed traffic signal will not restrict the progressive movement of traffic.	No

Warrant 6: Coordinated Signal System 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		
1	Signal spacing > 1000 ft	Yes
2	On a one-way road or a road that has traffic predominantly in one direction, the adjacent signals are so far apart that they do not provide the necessary degree of vehicle platooning.	No
3	On a two-way road, adjacent signals do not provide the necessary degree of platooning and the proposed and the adjacent signals will collectively provide a progressive operation.	No

Warrant 7: Crash Experience 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria					Met?	Fulfilled?
1	Adequate trial of other remedial measures has failed to reduce crash frequency. Measures Tried:					Yes
2	Five or more reported crashes, of types susceptible to correction by signal, have occurred within a 12 month period	# of correctible crashes		Period (Years)		#DIV/0!
3	Warrant 1, Condition A (80%)				No	Yes
	Warrant 1, Condition B (80%)				No	
	Warrant 4, Criterion A (80%)				No	
	Warrant 4, Criterion B (80%)				Yes	

Warrant 8: Roadway Network 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Criteria		Volume	Met?	Fulfilled?
1	Total entering volume of at least 1,000 veh/h during typical weekday peak hour	1210	Yes	Yes
2	5-yr vol projections satisfy Warrants 1, 2, or 3	1	Yes	

Hour								
Volume								

Answer YES if all intersecting routes have following characteristics:		Fulfilled?
1	Part of hwy system serving as principal roadway for thru traffic?	No
2	Rural or suburban hwy outside of, entering, or traversing city	No
3	Appears as a major route on an official plan	No

Warrant 9: Intersection Near a Grade Crossing 100%

Warrant Evaluated? **No** **Warrant Satisfied?** **N/A**

Adjustment Factors							
Trains per Day	% Buses on Minor Road	%Trucks on Minor Road	D	Peak Hour	Maj Rd Vol.	Min Rd Vol.	Adj Min Vol.
9 to 11	0.02	2.6% to 7.5%	660	17:00	1095	115	108

Warrant Analysis Conclusions/Comments:

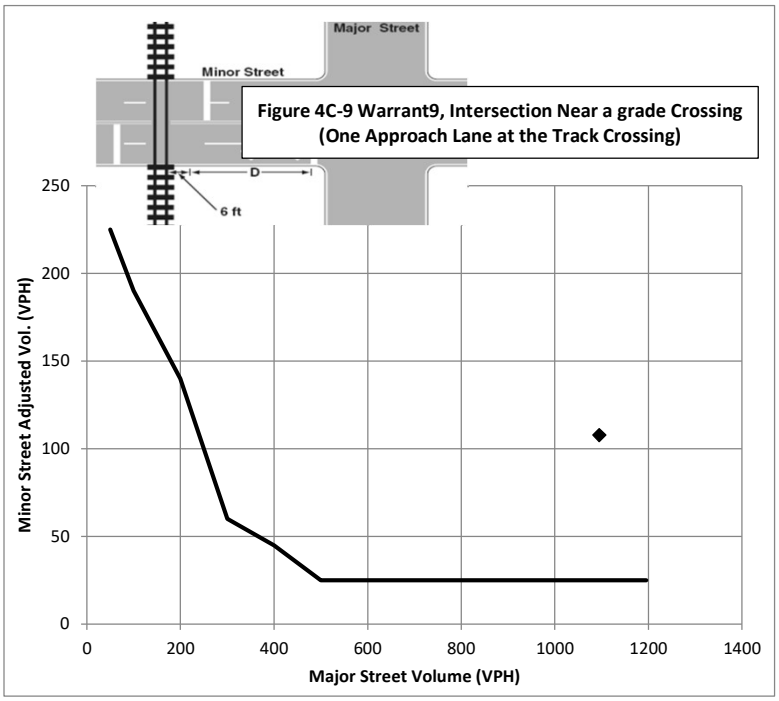


Figure 4C-9 Warrant9, Intersection Near a grade Crossing (One Approach Lane at the Track Crossing)

Attachment 9 – Crash Analysis

Historic Crash Analysis

Historical crash data for the years 2016 through 2020 were obtained from Georgia Electronic Accident Reporting System (GEARS). The five years of crash data collected were analyzed to quantify the severity, type, and manner of crashes on US-278 at its ramp terminal intersections with I-20. The results provide an understanding of the causes of crashes. In most cases, no single factor causes a crash; rather there are typically multiple underlying causes of each crash, including roadway geometry, weather conditions, driver behavior, traffic operations, on-road or roadside hazards, and construction activity. Crashes by severity for the project location are summarized in the Table 1 below. A total of 18 crashes occurred in the vicinity of the project intersections from 2016-2020, 5 of these being either fatal or injury crashes. This historical data was used to further predict the future crashes of the project location for both Build and No-Build scenarios.

Table 1: *Historic Crash Data Summary*

Manner of Collision	PDO	Injury	Fatal	Total Crashes (2016-2020)
Angle	7	2	0	9
Head On	1	0	0	1
Not a Collision with Motor Vehicle	2	0	0	2
Rear End	2	3	0	5
Sideswipe-Same Direction	1	0	0	1
Sideswipe-Opposite Direction	0	0	0	0
Total	**13**	**5**	**0**	**18**

Source: GEARS Database (2016 – 2020)

Future Crash Prediction

A quantitative analysis of future safety performance was conducted using HSM-based procedures and methodologies. These procedures and methodologies incorporate project-specific characteristics (geometry, traffic, etc.) and mathematical equations (crash modification factors [CMFs], safety performance functions [SPFs], etc.) to objectively estimate safety performance measures. Using the HCS Highway Safety Software tool, site data (including geometry, traffic etc.) were specified for project intersections, and CMFs derived from the historical crashes were applied to calculate the predicted future crash counts for both No-Build and Build scenarios. Table 2 presents a summary of crash reduction by open year and design year of the project. A slight reduction in both PDO and FI (Fatal and Injury) crashes was noticed by open year. With proposed project improvements and increased volumes, design year build crashes were noticed to be same as no-build.

Table 2: Crash Reduction by year

Year	Scenario	Crash Severity		
		PDO	Fatal and Injury	Total
2024	No-Build	5	2	7
	Build	4	1	5
	Reduction in Crashes	**1**	**1**	**2**
2044	No-Build	6	3	9
	Build	6	3	9
	Reduction in Crashes	**0**	**0**	**0**

Attachment 10 – Preliminary Utility Costs

Preliminary Utilities Cost Estimate						
Utility Owner	**Frontage Road**	**US 278**	**Design $**	**Const $**	**FR Cost**	**US 278 Cost**
ATT LD	100%	0%	$ 6,000.00	$ 25,000.00	$ 31,000.00	$ -
Bellsouth	0%	100%	$ 10,000.00	$ 50,000.00	$ -	$ 60,000.00
Charter	0%	100%	$ -	$ 25,000.00	$ -	$ 25,000.00
Comcast	0%	100%	$ 3,000.00	$ 25,000.00	$ -	$ 28,000.00
Covington	0%	100%	$ 20,000.00	$280,000.00	$ -	$ 300,000.00
Fiberlight	0%	100%	$ 10,000.00	$954,000.00	$ -	$ 964,000.00
GPCD	0%	100%	$ 20,000.00	$ 85,000.00	$ -	$ 105,000.00
GPCT	100%	0%	$ 25,000.00	$ 45,000.00	$ 70,000.00	$ -
Newton	0%	100%	$150,000.00	$850,000.00	$ -	$1,000,000.00
SCG	0%	100%	$ 30,000.00	$288,000.00	$ -	$ 318,000.00
SCWA	0%	100%	$ 65,000.00	$650,000.00	$ -	$ 715,000.00
Walton	0%	100%	$ 40,000.00	$160,000.00	$ -	$ 200,000.00
					$101,000.00	$3,715,000.00

Attachment 11 – CTM Waiver & Crosswalk MOMs

Karmungi, Harish

From: Denning, Tyler
Sent: Monday, April 11, 2022 2:12 PM
To: Karmungi, Harish
Subject: FW: PI 0017219/0018363-- US 278 Widening and Frontage Road--Project Adventure

Follow Up Flag: Follow up
Flag Status: Flagged

FYI – keep for our records. May need to attach to the CR.

Tyler Denning PE
Transportation Group Leader
Arcadis U.S., Inc.
2839 Paces Ferry Rd, Suite 900 | Atlanta, GA | 30339 | USA
T +1 770 384 6552
M +1 404 245 7272
www.arcadis.com

From: Langley, Jonathan <Jonathan.Langley@arcadis.com>
Sent: Sunday, April 10, 2022 6:17 PM
To: Switzer, Lauran <Jessica.Switzer@arcadis.com>; Stevens, Robin <Robin.Stevens@arcadis.com>; Denning, Tyler <Tyler.Denning@arcadis.com>
Subject: FW: PI 0017219/0018363-- US 278 Widening and Frontage Road--Project Adventure

FYI – since you weren't copied…

From: Ahmed, Kathe <KAhmed@dot.ga.gov>
Sent: Tuesday, April 5, 2022 12:21 PM
To: Wayne Mote <wmote@hntb.com>; Langley, Jonathan <Jonathan.Langley@arcadis.com>
Cc: Clowers, Marlo <mclowers@dot.ga.gov>
Subject: Fwd: PI 0017219/0018363-- US 278 Widening and Frontage Road--Project Adventure

FYI…. See below

Get Outlook for iOS

From: Pass, Daniel <dpass@dot.ga.gov>
Sent: Tuesday, April 5, 2022 12:16:48 PM
To: Ahmed, Kathe <KAhmed@dot.ga.gov>
Cc: Peters, Dave <dpeters@dot.ga.gov>; Clowers, Marlo <mclowers@dot.ga.gov>; VanMeter, Darryl <dvanmeter@dot.ga.gov>
Subject: RE: PI 0017219/0018363-- US 278 Widening and Frontage Road--Project Adventure

Kathe – please proceed as we discussed. Districts and SMEs will have the opportunity to provide comments on the concept report, which should further benefit the project and reduce risk..

Daniel G. Pass

Assistant State Design Policy Engineer

Engineering Division, Design Policy & Support
600 West Peachtree St, 26th floor
Atlanta, GA, 30308
404.804.7173 cell

From: Ahmed, Kathe <KAhmed@dot.ga.gov>
Sent: Friday, April 1, 2022 3:19 PM
To: Pass, Daniel <dpass@dot.ga.gov>; VanMeter, Darryl <dvanmeter@dot.ga.gov>
Cc: Peters, Dave <dpeters@dot.ga.gov>; Clowers, Marlo <mclowers@dot.ga.gov>
Subject: RE: PI 0017219/0018363-- US 278 Widening and Frontage Road--Project Adventure

Correction I meant to say crosswalk meetings below!

From: Ahmed, Kathe
Sent: Friday, April 1, 2022 3:15 PM
To: Pass, Daniel <dpass@dot.ga.gov>; VanMeter, Darryl <dvanmeter@dot.ga.gov>
Cc: Peters, Dave <dpeters@dot.ga.gov>; Clowers, Marlo <mclowers@dot.ga.gov>
Subject: PI 0017219/0018363-- US 278 Widening and Frontage Road--Project Adventure

Dan,

As per our conversation, we will waive the concept team meeting for PI 0017219/0018363-- US 278 Widening and the Frontage Road project. We have coordinated with the district and this week we also held cross over meetings to develop the RFP with various offices including design policy and the district. I did advise the team to include language in the concept report explaining why we didn't hold the concept team meeting. We really appreciate you collaborating with us to streamline certain tasks so we can meet our accelerated schedule.

Thanks,

Kathe Ahmed
P3 Project Manager

Office of Alternative Delivery
600 West Peachtree Street - 19th Floor
Atlanta, GA 30308
Email:Kahmed@dot.ga.gov
Phone: 404-631-1570 Cell: 470-898-2842

Georgia is a state of natural beauty. And it's a state that spends millions each year cleaning up litter that not only mars that beauty, but also affects road safety, the environment and the economy. Do your part to **KEEP IT CLEAN GEORGIA** – don't litter. How can you play an active role in protecting the splendor of the Peach State? Find out at http://keepgaclean.com/.

Meeting Minutes

I. Meeting Information

Program:	Design Build Program
Topic:	PI No. 0017219/0018363: US 278 Widening and Frontage Road GDOT Office of Design Policy and Support RFP Crosswalk Meeting
Date/Time:	March 28, 2022 2pm
Location:	Microsoft Teams Meeting

II. Attendees:

GDOT	PMC	Arcadis/GEC
Teri Freinkel	Mary Johnson	Robin Stevens
Brad McManus	Wayne Mote	Eric Seckinger
Michelle Pate	Michelle Henggeler	Alex Osborne
Christopher Rudd	Kathryn Masters	Jonathan Langley
Frank Flanders	Greg Burch	Tyler Denning
Kathe Ahmed	Matt Nelson	Patrick Pecot
Marlo Clowers	Nick Castronova	William Dial
	Anthony Prevost	
	Leslie Boone	
	Jessica Ridley	
	Sabrina Gerold	

III. Meeting Topics

- Eric provided an overview of the project location, description, schedule, and design status.
    - Design team confirmed that the design features for US 278 align with 45mph design speed.
- Chris Rudd asked what the ADT is on US 278. GEC replied: ADT is 7,900 in 2024, one-way. 2044 ADT is 9775 one way
- Michelle Pate: What does limited access look like on the Old Mill Road realignment on the eastern end?
    - Ty explained limited access was going to be acquired between I-20 and the future Old Mill Road/Frontage Road realigned tie-in.
- Michelle Pate: Is new Frontage Road going to be access controlled up to the interstate (on the south side)?
    - Ty responded that ROW acquisition will be up to the frontage road; remaining land would be unusable between most of frontage road and I-20.
        - On western infill area, may be some buildings built.
        - On eastern infill area, most land may be taken up by detention basin.
    - US 278: Limited Access going to be acquired from I-20 north to the frontage road tie in.

        - EDITOR'S NOTE: Limited Access ROW will also be acquired along US 278 south of I-20 from the southern ramp terminals to the proposed signal at Shire Pkwy

- US 278 Bridge over I-20 has gutter spread issues. Feasible mitigation includes: 1) Adding drainage scuppers along the curb line in areas that the scuppers would not fall on the I-20 travel lanes, 2) Reprofiling/slope correction through leveling/increasing slope (which would likely require a bridge inspection to validate this option's viability), and 3) Remove sidewalk on bridge.
    - Existing sidewalk exists between the I-20 ramps only (including over bridge).
    - Ty demonstrated that scuppers could not be used since there are existing utility ducts directly under where the scuppers would need to be placed.
    - William noted that everything Ty is showing is for a 45mph design speed; everything gets worse for a 55mph design speed (as currently posted).
    - Michelle asked what does it look like if we do sidewalk on only one side of bridge? For example, on the side of the multi-use path/frontage road?
        - Ty noted that the side of the multi-use path is worse for gutter spread issues.
    - Frank Flanders asked what would happen to the sidewalk between the ramps and the bridge? Ty explained this would also be removed.
    - William Dial asked if we could stripe out a sidewalk? Patrick Pecot indicated the 6-inch curb is needed to separate travel lanes from sidewalk. Michelle noted that she's seen it with flexible pylons (physical delineators). Michelle suggests we look at something more non-conventional.
    - Michelle noted that a 6-inch curb is not for redirection, it's for visual indication.
    - Ty indicated that he would do some further research on the applicable types of raised delineators and a configuration that would allow for acceptable gaps in the delineator for drainage

- Michelle asked if lane widths were being reduced to 11-foot on the bridge. Ty confirmed this is the case and that it's consistent with the road classification.
- Michelle asked about considering multiuse path on one side of roadway.
    - Ty stated that the team would look at it, but he is concerned we'd be splitting crown through one of the travel lanes.
    - Michelle asked if the sidewalk could be converted to a multi-use path on one side and removed from the other; therefore, the scuppers could be used out of the utility areas. Ty mentioned from a roadway perspective, this would force the crown of the road to be in the middle of a lane unless overlay on the bridge was used as well.

IV. Action Items

- GEC will look at non-conventional pedestrian accommodations on the bridge if sidewalks are removed from bridge to mitigate gutter spread issues.
- GEC will look at the potential for a multi-use path on one side of bridge if sidewalks are removed from bridge to mitigate gutter spread issues.

Meeting Minutes

I. Meeting Information

Program:	Design Build Program
Topic:	PI No. 0017219/0018363: US 278 Widening and Frontage Road GDOT Office of Environmental Services RFP Crosswalk Meeting
Date/Time:	March 30, 2022 12pm
Location:	Microsoft Teams Meeting

II. Attendees:

GDOT	PMC	Arcadis/GEC
Kathe Ahmed	Mary Johnson	Robin Stevens
Marlo Clowers	Wayne Mote	Eric Seckinger
Sam Carter	Michelle Henggeler	Alex Osborne
Matt Carroll	Kathryn Masters	Jonathan Langley
Eric Duff	Greg Burch	Tyler Denning
Amber Phillips	Matt Nelson	Lauran Switzer
Doug Chamblin	Katie Zornig	Brittany Potter
David Hedeen	Jessica Ridley	
Jim Pomfret	Sabrina Gerold	

III. Meeting Topics

- Wayne provided an update from a Section 404 permitting call with the U.S. Army Corps of Engineers (USACE) last week including a follow-up phone call he had with Adam White today, which changed the previous permitting approach for the project.
    - USACE sees this as two permits—one for the site (which would include the Frontage Road) and one for US 278
    - Permitting change would not change our letting date.
    - PMC/GEC believes that Design-Builder (DB) should get the US 278 permit if a permit is necessary.
- Lauran Switzer provided an overview of the project location, description, and schedule.
- Lauran overviewed the changes to the standard TP 5 language due to the fact that these are state-funded projects, subject to GEPA not NEPA
- Lauran outlined the current proposed Section 404 permitting strategy:
    - Frontage Road will be part of the 404 permit of the site development, prepared for by a third party. DB to deliver supporting documentation for permit modifications, if needed.
    - US 278: DB would prepare on behalf of GDOT
- Section 106 Programmatic Agreement is in development for the site development and Frontage Road permit area. This will outline mitigation responsibilities and define the phased reporting process

    - USACE is still defining the Scope of Analysis (SOA) for roadway portions, which will inform how reporting will proceed for cultural resources.
    - If PA is not complete prior to RFP advertisement, a draft of the document will be included as Attachment 5-6 and an RFP amendment would be processed once the document is ratified.
- Dave Hedeen: were you expecting a single ERSR-AOE for both roads and the site, or are you expecting to separate them out?
    - Lauran stated that, currently, US 278 and frontage road are combined into a single report, but due to new permitting approach, we may have to separate this out.
    - Matt Carroll concurred with the approach to separate out the 2 roads into separate reports because of the permitting. We would not prepare an Ecology report for the development site.
- Matt Carroll asked about schedule for OES to review the RFP. Michelle Henggeler stated that GDOT review will be between 5/10/22 – 5/31/22.
- Dave Hedeen asked if anyone has made any headway on minimizing the risk and liability of a third party obtaining and holding a 404 permit for the project.
    - Per Wayne, PMC was trying to set up a meeting about roles, responsibilities, and payment of mitigation. It has not been set up yet, but it's on the radar.

IV. Action Items

- OAD to weigh in on revised permitting approach.
- Hold meeting to establish roles, responsibilities, and payment of mitigation.

Meeting Minutes

I. Meeting Information

Program:	Design Build Program
Topic:	PI No. 0017219/0018363: US 278 Widening and Frontage Road GDOT Office of Traffic Operations RFP Crosswalk Meeting
Date/Time:	March 28, 2022 1230pm
Location:	Microsoft Teams Meeting

II. Attendees:

GDOT	PMC	Arcadis/GEC
David Miranda Marlo Clowers Jason Dykes Kathe Ahmed	Mary Johnson Wayne Mote Michelle Henggeler Greg Burch Matt Nelson Nick Castronova Leslie Boone Jessica Ridley Sabrina Gerold Keith McCage Kathryn Masters	Robin Stevens Eric Seckinger Jaap Tigelaar Alex Osborne Jonathan Langley Tyler Denning

III. Meeting Topics

- Eric Seckinger introduced the project, schedule, design, design elements and typical sections.
    - Eric described the role of the Joint Development Authority (JDA) in the adjacent economic development, as well as in ROW acquisition for the proposed roadway project.
    - Eric noted that on the US 278 bridge over I-20, there are gutter spread issues. Tyler Denning reviewed some options we are looking at to mitigate this are:
        - Scuppers: Utilities are problematic with this option.
        - Reprofiling/slope correction through leveling/increasing slope, which will add capacity to the gutter as well
        - Removing existing sidewalks and reassigning that space as usable space for travel lanes

- Jaap reviewed highway signage and signalization.
    - Jaap asked if adding a destination sign on I-20 would be required by GDOT. No comments or input were received.
    - 6 new signals proposed. Jaap noted that signals 4 and 5 (along US 278) will be specified as needing to be placed on the east side due to future development.

- ITS: there are no existing ITS equipment in project limits; plan is to Reserve TP 17 in RFP as a result.
    - Dave Miranda: There are plans to put in ITS in the area, but that will be after this project is completed. So, proposal for this project is good.
    - Team wants to make sure we are not precluding ITS from this area in the future.
    - Future pole stations are proposed at the interchange. Two cameras.

- Eric asked if proposed lane closure restrictions could be less restrictive than they are listed on the slides. GDOT provided no input.
- Jason Dykes: inquired about signalized intersections.
    - Jaap noted that we are looking at the ICE this week, but at this time, we are planning to have them signalized. Initially we looked at doing roundabouts, but it was not typical for these types of intersections. Ty confirmed that roundabouts were not appropriate for these intersections; however, they will be considered for the Old Mill Interchange.

IV. Action Items

None

Meeting Minutes

I. Meeting Information

Program:	Design Build Program
Topic:	PI No. 0017219/0018363: US 278 Widening and Frontage Road GDOT Office of Bridge Design and Maintenance RFP Crosswalk Meeting
Date/Time:	March 29, 2022 1pm
Location:	Microsoft Teams Meeting

II. Attendees:

GDOT	PMC	Arcadis/GEC
Kathe Ahmed Marlo Clowers Steve Gaston Teri Freinkel	Mary Johnson Michelle Henggeler Anton Sova Greg Burch Nick Castronova Leslie Boone Jessica Ridley	Robin Stevens Eric Seckinger Alex Osborne Jonathan Langley Tyler Denning Patrick Pecot

III. Meeting Topics

- Patrick Pecot gave an overview of the project, schedule, design status, design elements, and RFP language. Patrick noted that US 278 crosses over I-20 via a bridge, and there is an existing culvert carrying Hunnicut Creek under I-20. EDITOR'S NOTE: There is also an existing culvert carrying Dennis Creek under I-20. The existing culverts under I-20 are not proposed to be modified by the proposed project. New culverts are proposed where the new Frontage Road crosses over Hunnicut and Dennis creeks. There is also an existing bridge carrying Sewell Road over I-20, which is not proposed to be modified by the project.
- Steve Gaston: Are there any agreements in place to ensure the permits (third party applicant) are obtained in time for construction of the project?
    - Robin Stevens responded that there are ongoing discussions with the third party to develop an MOU or some other agreement outlining responsibilities, etc. This has been brought up as a concern internally and we are working on a solution.
- Steve: How closely have you looked at the drainage around the culverts?
    - GEC noted that hydraulic memo is being prepared, but we are assuming replacement with a culvert.
- Gutter Spread issues on the US 278 bridge over I-20: Mitigation is being investigated:
    - Scuppers: existing reinforcement and location of existing utilities make scuppers a difficult solution.
    - Slope correction and leveling (relocate centerline of road to true centerline of bridge; changing asphalt thickness to create a gutter)
        - Steve noted that they don't want to put asphalt on this bridge.
        - Patrick noted it would be about a 30% increase in weight loading on the beam

        - Ty noted that gutter spread is extending well within travel lanes (8 (eastern) to 6 (western) feet). Mitigation would reduce to about 4' spread on each side.
        - Reviewing an option to remove sidewalks to mitigate gutter spread issue. This would allow the gutter spread to be completely contained within the sidewalk area.
            - Ty noted that the west side of US 278 is planned for development, which makes Design Policy & Support concerned about the need for pedestrian accommodations along the bridge area.
            - If this option were to move forward and we put back some sort of pedestrian path with flexible pylons or rubberized delineator, Steve is concerned about the roadway speed
                - Ty pointed out that curb and gutter is routinely placed next to travel lanes in a traditional 45 MPH urban section
            - Steve asked if we could place some sort of physical barrier.
                - Patrick noted that the need to structurally tie the barrier to the bridge deck could be problematic
                - A physical barrier could present drainage issues if weep holes were not added at acceptable intervals. Also, the ends of the barrier would need to be protected with some sort of impact attenuator.
            - Steve noted that there does not seem to be any pedestrian generators at this time, so removal may not be an issue. If and when the future developments occur, they can put the sidewalks back in if needed.
        - From a bridge perspective, per Steve, it would be best to remove the sidewalks and use that area for the gutter spread.
- Steve: Will there be one-on-one meetings as part of this RFP process?
    - Michelle Henggeler: Yes, typically these would happen right after RFP advertises.
- Steve: Will there be a time component to the selection? PMC and GDOT responded that it is not likely since this is a one phase, low bid.

IV. Action Items

- None

Meeting Minutes

I. Meeting Information

Program:	Design Build Program
Topic:	PI No. 0017219/0018363: US 278 Widening and Frontage Road GDOT State and District Construction RFP Crosswalk Meeting
Date/Time:	March 29, 2022 8am
Location:	Microsoft Teams Meeting

II. Attendees:

GDOT	PMC	Arcadis/GEC
Kathe Ahmed	Mary Johnson	Robin Stevens
Marlo Clowers	Wayne Mote	Eric Seckinger
John Hancock	Michelle Henggeler	Alex Osborne
Beau Quarles	Kathryn Masters	Jonathan Langley
Harold Mull	Greg Burch	Tyler Denning
Kevin Mullins	Matt Nelson	Patrick Pecot
Caleb Lord	Leslie Boone	William Dial
Todd Price	Jessica Ridley	Jaap Tigelaar
Teri Freinkel	Sabrina Gerold	

III. Meeting Topics

- Eric Seckinger introduced the project, and gave an overview of schedule, design status, and design elements.
- John Hancock asked if the fact that the US 278 widening goes over the interstate necessitates a NEPA document. Robin Stevens responded that the project does not affect the interstate on-ramps or the interstate itself, does not require an Interchange Modification Report, and does not involve bridge construction/reconstruction (restriping only).
- Ty Denning explained the gutter spread concerns on the US 278 bridge over I-20.
- Salvageable items (guardrail): Caleb Lord indicated that they had not taken salvageable guardrail in the last 5 or so years, but it may be something they need to consider given the increasing costs of guardrail. He clarified that GDOT has a facility in Newton County off SR 212 where salvageable guardrail from this project can be taken.
- Caleb noted that there is opportunity to do daytime closures for interchange ramp terminals, given how far out from metro Atlanta this site is. Closures could occur between 9am to 4pm. Need to check development south of I-20 (Facebook)—need to get shift change information from them and try to avoid shift change time.
- US 278—Caleb noted that there is opportunity for daytime lane closures on this route, too. Todd Price stated that this may interfere with construction on the Megasite and construction traffic; this may slow construction/delivery. This is something the team could look into.
    - Ty noted that Rivian has indicated that road construction would not impede construction of the megasite. Wayne added that they previously only expressed concern out complete closure of US 278.

- Caleb asked if the team anticipates any impact to I-20 at all. Eric clarified that no work is anticipated on I-20.

IV. Action Items

- None

Attachment 12 – Detailed Cost Estimate Memo

ARCADIS Design & Consultancy for natural and built assets

Georgia Department of Transportation

FINAL COSTING PLANS BASIS OF ESTIMATE

Project Adventure

US-278 Widening & Frontage Road

Newton, Morgan, and Walton County, GA

July 2022

CONTENTS

ACRONYMS AND ABBREVIATIONS ii
PREFACE 1
INTRODUCTION 2
BASIS OF ESTIMATE 3
BASIS OF ASSUMPTIONS 4
ALLOWANCES 5
EXCLUSIONS 6
COMPARISION WITH CONCEPT ESTIMATE 7
ATTACHMENTS 8

ACRONYMS AND ABBREVIATIONS

ICE	Independent Cost Estimate
CSI	Construction Specifications Institute
GDOT	GEORGIA Department of Transportation
CTD	Contract Time Determination
O&P	Overhead and Profit
ROW	Right of Way
PMC	Program Management Consultant
ITS	Intelligent Transportation Systems

PREFACE

Arcadis U.S., Inc. (Arcadis) has prepared an Independent Cost Estimate (ICE) report for the GDOT Project Adventure – US 278 and Frontage Road located in Newton, Morgan, and Walton County, GA.

The main objective of the ICE report preparation is to establish the Original Engineer's Estimate.

The cost estimate is prepared based on coordination with the Engineering team for the current project scope and existing field conditions.

The ICE report is created by developing standard crews with man and equipment resources for various trades to derive the labor unit costs. Most of the material unit prices are obtained from the suppliers, similar past project cost data, and standard reference rates for the material cost unable to receive from the vendors. The overhead, profit, contingencies, allowances, etc., is assumed based on the cost professional's experience with past projects of similar scale and complexity.

This report describes the overview of the project scope, basis of estimate, basis of assumptions, crew considerations, labor cost considerations, mark up considerations, and any other assumptions made to determine the final cost of the project.

INTRODUCTION

The project along US 278 / State Road 12 and Interstate 20, southeast of Atlanta, involves widening of a state road for 1.4 miles and constructing approximately 2.93 miles of frontage roadway to serve the imminent industrial development.

South of I-10, US 278 will be widened at grade to three lanes (one lane SB and two lanes NB) with turn lanes added where applicable. North of I-20, US 278 will be shifted east of the existing alignment and paved full depth, providing four travel lanes (two in each direction) and a flush median. Frontage Road will be new alignment construction, providing four lanes (two in each direction) with a raised grass median. The interchange and county roads will provide safe access to other local roads, local businesses, and neighborhoods.

Based on the detailed ICE, the cost of the project is estimated as **$ 50,358,058.**

The summary of the project cost breakdown is shown below:

	US-278	**Frontage Rd**
General	$ 1,377,088	$ 4,131,332
Design Services	$ 1,434,745	$ 3,313,650
Construction	$ 12,078,320	$ 28,022,924
	$ 14,890,153	**$ 35,467,906**

BASIS OF ESTIMATE

The Independent cost estimate is developed based on utilizing the following documents/information:

- Coordination with Engineering Team for current project scope and existing field conditions.
- Costing Plans
- GDOT Standard Specifications dated 2022.

The bare labor cost data and fringes cost data are obtained from the U.S. Department of Labor prevailing wage rate under Davis-Bacon Act. The cost data is considered for Fulton County. Fulton County was selected due to the proximity to the project and the likelihood that labor would be traveling from that area. The bare labor cost was increased by 20 - 30% based on the labor availability and worker type. The burdened labor rate for hourly wage laborers is calculated by adding the labor base rate, fringes, payroll tax and worker's compensation multiplier based on the trade.

The equipment rates are based on the 2022-RS Means Construction Cost Data. The production and the efficiency rates are considered based on the cost professional's judgement and experience by analysis of the work complexity, work hour restrictions and work sequence along with the historic production rates provided in the 2022-RS Means Construction Cost Data.

The material costs are based on budgetary quotes provided by local suppliers. For the materials with no supplier cost details, the material costs are used from the similar past projects cost data and 2022-RS Means Construction cost data. Also, the material costs are adjusted to account for the purchasing quantities, shipping etc.

The contract duration, work restriction and sequencing are considered based on the coordination with the engineer. The quantity takeoffs are computed by utilizing Bluebeam Revu software.

BASIS OF ASSUMPTIONS

The quantity takeoff and cost estimates were developed utilizing the costing plans provided by the engineering team. However, there are some items which do not state the clear information. In such cases, certain logical assumptions are made from cost professional's experience to establish a complete cost estimate.

Some of the major assumptions considered in preparing the ICE report are stated below:

- **Estimate**
  - Asphalt leveling course assumed at 1" average thickness.
  - Assumed 80% of excavated soil can be re used as embankment.
  - The traffic control assumes placement of temporary barrier along the entire US 278 construction and lane closures for the ends of Frontage Rd. The traffic control includes police assistance.
  - The landscaping was considered as seeding for the embankment slopes. The erosion control assumes the use of silt fence and temporary grassing.
- **Labor Crew**
  - The unit labor rates are assumed to derive from the hourly unit rate of the built-up crew which includes the labor and the equipment costs associated with the trade.
  - To simplify the complexity of labor unit cost calculations for each trade, the crews are optimized in such a way that a certain crew is utilized for more than one specific trades. crews are developed by using multiple labor resources, and appropriate equipment and small tools required to perform the work.
  - The work shift considered was six days at ten hours per day. The premium rate on labor is fifty percent of the base rate excluding fringes.

ALLOWANCES

The cost estimation team worked their best to reduce the possible allowance costs but there are some unavoidable conditions where allowance costs need to be included in the estimate.

The following are items that are incorporated into the estimate based on a percentage of the direct construction costs due to the stage of design. Costs will be updated in subsequent stages upon design completion.

Allowance	US-278	Frontage Rd
Erosion Control	2.00%	1.75%
Landscaping	0.50%	0.75%
Signage	1.00%	1.00%
Traffic Control	6.50%	1.00%
Mobilization/Demobilization and Punch list	4.50%	4.50%
Final Design Fee	12.00%	12.00%
Bonding & Insurance Costs	3.00%	3.00%
Developer Quality management	1.50%	1.50%

EXCLUSIONS

The cost estimation team worked their best to reduce the possible exclusion costs but there are some unavoidable conditions where exclusions exist in the estimate.

The following are the items that are excluded from the estimate. Costs will be updated in subsequent stages upon design completion.

- ITS
- Escalation to Midpoint of Construction
- Contingency
- ROW Cost

COMPARISION WITH CONCEPT ESTIMATE

The cost estimation team worked their best to reduce a cost increase from the concept level estimate but there are some unavoidable conditions where costs and/or quantities were updated in the estimate.

The following are the items that changed from the concept level estimate.

- There was an increase to asphalt paving costs of between $10/TN - $15/TN. With the prices of fuel expected to drop, the cost for asphalt should follow in the next few months. The price used within the estimate is the current market rate.
- For US278, there were marginal changes.
    - There was an increase in quantity to the mill & overlay area. This reduced earthwork and paving quantities. This quantity savings was offset by the increase in material price.
    - There were additional costs added for the modification of the bridge over I-20 and the removal of the sidewalks.
- For the Frontage Rd, there were significant changes.
    - There was an increase in earthwork quantities due to changes in the profile.
    - There were increases in base and paving due to old mill connector, driveway, and shoulders at full depth.
    - There was an increase in drainage costs due to the concept estimate being based off a percentage and an assumption that minimal closed drainage would be required.
    - There was an increase in utility costs due to values from the UAs. Previous assumption was no major utility relocations would be required.

ATTACHMENTS

1. Combined Design Build Form F
2. Estimate Cover Sheet
3. Cost Estimate Summary DB Form F
4. Comparison of Concept Estimate vs Costing Plans Estimate
5. Quotes

Form F - Estimated Schedule of Values (SOV)

PI#0017219 & PI#0018363, US 278 Widening & Frontage Rd Costing Plans BOE	Estimate Date	07/22/22
	Estimator Initials	AK

SOV Line Item Description	US 278 Scheduled Value	Frontage Rd Scheduled Value	SUMMARY
A. GENERAL			
1. Insurance & Bonds	$ 358,687	$ 828,413	$ 1,187,100
2. Project Office Facilities, Equipment, and Supplies	$ 120,000	$ 150,000	$ 270,000
3. General Conditions and Administration			
a. Project Management and Coordination	$ 211,570	$ 392,915	$ 604,485
b. Home Office Overhead & Support	$ 118,479	$ 220,032	$ 338,512
c. Project Management Plan	$ 21,157	$ 39,292	$ 60,449
d. Project Schedule and SOV	$ 21,157	$ 39,292	$ 60,449
e. Project Reporting	$ 21,157	$ 39,292	$ 60,449
f. Public Information and Communications	$ 29,620	$ 55,008	$ 84,628
4. Design-Builder-Led Environmental Permit Approval Services	$ -	$ -	$ -
5. Environmental Mitigation Costs	$ -	$ 1,269,442	$ 1,269,442
6. Design-Builder Quality Management	$ 179,344	$ 414,207	$ 593,551
7. Mobilization (see Note 1)	$ 295,917	$ 683,440	$ 979,357
Subtotal A. GENERAL (see Note 2)	**$ 1,377,087.50**	**$ 4,131,332.45**	**$ 5,508,420.00**
B. DESIGN SERVICES			
1. Engineering Design Services & Support			
a. Design Documents (Excluding Record Design Documents)	$ 674,330	$ 1,557,416	$ 2,231,746
b. Design-Builder Support to Provided Environmental Approval Reevaluation	$ 86,085	$ 198,819	$ 284,904
c. ROW Acquisition Services	$ 86,085	$ 198,819	$ 284,904
d. Utility Design	$ 243,907	$ 563,321	$ 807,227
Sub-Subtotal B.1. Engineering Design Services & Support (see Note 3)	**$ 1,090,406.20**	**$ 2,518,374.00**	**$ 3,608,780**
2. Design Support During Construction & Record Design Documents (see Note 4)	$ 344,339	$ 795,276	$ 1,139,615
Subtotal B. DESIGN SERVICES	**$ 1,434,745.00**	**$ 3,313,650.00**	**$ 4,748,395.00**
C. CONSTRUCTION			
1. Construction Cost and Support			
a. Earthwork & Roadway Removals	$ 1,327,596	$ 7,841,856	$ 9,169,452
b. Base & Paving	$ 4,801,708	$ 12,987,695	$ 17,789,404
c. Barrier & Guardrail	$ 32,349	$ 414,298	$ 446,647
d. Noise Barrier	$ -	$ -	$ -
e. Structural Walls	$ -	$ -	$ -
f. Bridges	$ 423,301	$ -	$ 423,301
g. Structure Removal / Demo	$ -	$ -	$ -
h. Pavement Markings	$ 109,741	$ 144,262	$ 254,003
i. Overhead Sign Structures	$ -	$ -	$ -
j. Lighting	$ -	$ 583,031	$ 583,031
k. Traffic Signals	$ 500,000	$ 175,000	$ 675,000
l. ITS Infrastructure	$ -	$ -	$ -
m. Drainage	$ 173,828	$ 3,850,686	$ 4,024,514
n. Erosion Control	$ 149,797	$ 460,645	$ 610,442
o. Landscaping	$ 38,747	$ 373,121	$ 411,868
p. Signage	$ 74,899	$ 263,226	$ 338,125
q. Maintenance During Construction & Temporary Conditions	$ -	$ -	$ -
r. Traffic Control	$ 486,839	$ 263,226	$ 750,065
s. Utility Adjustment Work (construction only)	$ 3,715,000	$ 101,000	$ 3,816,000
Sub-Subtotal C.1. Construction Cost and Support	**$ 11,833,806.65**	**$ 27,458,045.18**	**$ 39,291,852**
2. Training Hours ([#] hours)	$ 2,400	$ 5,700	$ 8,100
3. Punch List, Final Close-out, and Demobilization (see Note 5)	$ 242,114	$ 559,179	$ 801,292
Subtotal C. CONSTRUCTION	**$ 12,078,320.15**	**$ 28,022,923.73**	**$ 40,101,244.00**
D&C Amount (Subtotal A. GENERAL + Subtotal B. DESIGN SERVICES + Subtotal C. CONSTRUCTION)	**$ 14,890,152.65**	**$ 35,467,906.18**	**$ 50,358,059.00**

NOTES

1. "A.7. Mobilization" value shall not exceed 2.5% of the sum of the "Sub-Subtotal C.1. Construction Cost and Support" plus "Sub-Subtotal B.1 Engineering Design Services & Support" values".
2. "Subtotal A. GENERAL" value shall not exceed 25% of "D&C Amount" value.
3. "Sub-Subtotal B.1. Engineering Design Services & Support" value shall not be less than 5% of "D&C Amount" value and shall not exceed 10% of "D&C Amount" value.
4. "B.2. Design Support During Construction & Record Design Documents" Value shall not be less than 2.0% of "D&C Amount" value.
5. "C.3. Punch List, Final Close-out, and Demobilization" shall be at least 1.0% of the sum of the "Sub-Subtotal C.1 Construction Cost and Support" plus " Sub-Subtotal B.1. Engineering Design Services & Support" values.

GDOT PI#0017219-- SR 12 From Will Springs Church Rd to Shire Pkwy (US 278 Widening) Costing Plans BOE	Estimate Date	07/22/22
	Estimator Initials	AK
SOV Line Item Description	**Scheduled Value**	**% of D&C**
A. GENERAL		
1. Insurance & Bonds	$ 358,687	2.41%
2. Project Office Facilities, Equipment, and Supplies	$ 120,000	0.81%
3. General Conditions and Administration		
a. Project Management and Coordination	$ 211,570	1.42%
b. Home Office Overhead & Support	$ 118,479	0.80%
c. Project Management Plan	$ 21,157	0.14%
d. Project Schedule and SOV	$ 21,157	0.14%
e. Project Reporting	$ 21,157	0.14%
f. Public Information and Communications	$ 29,620	0.20%
4. Design-Builder-Led Environmental Permit Approval Services	$ -	0.00%
5. Environmental Mitigation Costs	$ -	0.00%
6. Design-Builder Quality Management	$ 179,344	1.20%
7. Mobilization (see Note 1)	$ 295,917	1.99%
Subtotal A. GENERAL (see Note 2)	**$ 1,377,087.50**	9.25%
B. DESIGN SERVICES		
1. Engineering Design Services & Support		
a. Design Documents (Excluding Record Design Documents)	$ 674,330	4.53%
b. Design-Builder Support to Provided Environmental Approval Reevaluation	$ 86,085	0.58%
c. ROW Acquisition Services	$ 86,085	0.58%
d. Utility Design	$ 243,907	1.64%
Sub-Subtotal B.1. Engineering Design Services & Support (see Note 3)	**$ 1,090,406.20**	7.32%
2. Design Support During Construction & Record Design Documents (see Note 4)	$ 344,339	2.31%
Subtotal B. DESIGN SERVICES	**$ 1,434,745.00**	9.64%
C. CONSTRUCTION		
1. Construction Cost and Support		
a. Earthwork & Roadway Removals	$ 1,327,596	8.92%
b. Base & Paving	$ 4,801,708	32.25%
c. Barrier & Guardrail	$ 32,349	0.22%
d. Noise Barrier	$ -	0.00%
e. Structural Walls	$ -	0.00%
f. Bridges	$ 423,301	2.84%
g. Structure Removal / Demo	$ -	0.00%
h. Pavement Markings	$ 109,741	0.74%
i. Overhead Sign Structures	$ -	0.00%
j. Lighting	$ -	0.00%
k. Traffic Signals	$ 500,000	3.36%
l. ITS Infrastructure	$ -	0.00%
m. Drainage	$ 173,828	1.17%
n. Erosion Control	$ 149,797	1.01%
o. Landscaping	$ 38,747	0.26%
p. Signage	$ 74,899	0.50%
q. Maintenance During Construction & Temporary Conditions	$ -	0.00%
r. Traffic Control	$ 486,839	3.27%
s. Utility Adjustment Work (construction only)	$ 3,715,000	24.95%
Sub-Subtotal C.1. Construction Cost and Support	**$ 11,833,806.65**	79.47%
2. Training Hours ([#] hours)	$ 2,400	0.02%
3. Punch List, Final Close-out, and Demobilization (see Note 5)	$ 242,114	1.63%
Subtotal C. CONSTRUCTION	**$ 12,078,320.15**	81.12%
D&C Amount (Subtotal A. GENERAL + Subtotal B. DESIGN SERVICES + Subtotal C. CONSTRUCTION)	**$ 14,890,152.65**	100.00%

NOTES

1. "A.7. Mobilization" value shall not exceed 2.5% of the sum of the "Sub-Subtotal C.1. Construction Cost and Support" plus "Sub-Subtotal B.1 Engineering Design Services & Support" values".
2. "Subtotal A. GENERAL" value shall not exceed 25% of "D&C Amount" value.
3. "Sub-Subtotal B.1. Engineering Design Services & Support" value shall not be less than 5% of "D&C Amount" value and shall not exceed 10% of "D&C Amount" value.
4. "B.2. Design Support During Construction & Record Design Documents" Value shall not be less than 2.0% of "D&C Amount" value.
5. "C.3. Punch List, Final Close-out, and Demobilization" shall be at least 1.0% of the sum of the "Sub-Subtotal C.1 Construction Cost and Support" plus " Sub-Subtotal B.1. Engineering Design Services & Support" values.

*The percentages and values shown in the Notes section are examples only. The estimator should work closely with the PMC Estimating Manager to make sure the most current rules are being followed.

GDOT PI#0018363, I-20 Frontage Road From SR12 to CR249 Old Mill Road Costing Plans BOE	Estimate Date	07/22/22
	Estimator Initials	AK
SOV Line Item Description	**Scheduled Value**	**% of D&C**
A. GENERAL		
1. Insurance & Bonds	$ 828,413	2.34%
2. Project Office Facilities, Equipment, and Supplies	$ 150,000	0.42%
3. General Conditions and Administration		
a. Project Management and Coordination	$ 392,915	1.11%
b. Home Office Overhead & Support	$ 220,032	0.62%
c. Project Management Plan	$ 39,292	0.11%
d. Project Schedule and SOV	$ 39,292	0.11%
e. Project Reporting	$ 39,292	0.11%
f. Public Information and Communications	$ 55,008	0.16%
4. Design-Builder-Led Environmental Permit Approval Services	$ -	0.00%
5. Environmental Mitigation Costs	$ 1,269,442	3.58%
6. Design-Builder Quality Management	$ 414,207	1.17%
7. Mobilization (see Note 1)	$ 683,440	1.93%
Subtotal A. GENERAL (see Note 2)	**$ 4,131,332.45**	11.65%
B. DESIGN SERVICES		
1. Engineering Design Services & Support		
a. Design Documents (Excluding Record Design Documents)	$ 1,557,416	4.39%
b. Design-Builder Support to Provided Environmental Approval Reevaluation	$ 198,819	0.56%
c. ROW Acquisition Services	$ 198,819	0.56%
d. Utility Design	$ 563,321	1.59%
Sub-Subtotal B.1. Engineering Design Services & Support (see Note 3)	**$ 2,518,374.00**	7.10%
2. Design Support During Construction & Record Design Documents (see Note 4)	$ 795,276	2.24%
Subtotal B. DESIGN SERVICES	**$ 3,313,650.00**	9.34%
C. CONSTRUCTION		
1. Construction Cost and Support		
a. Earthwork & Roadway Removals	$ 7,841,856	22.11%
b. Base & Paving	$ 12,987,695	36.62%
c. Barrier & Guardrail	$ 414,298	1.17%
d. Noise Barrier	$ -	0.00%
e. Structural Walls	$ -	0.00%
f. Bridges	$ -	0.00%
g. Structure Removal / Demo	$ -	0.00%
h. Pavement Markings	$ 144,262	0.41%
i. Overhead Sign Structures	$ -	0.00%
j. Lighting	$ 583,031	1.64%
k. Traffic Signals	$ 175,000	0.49%
l. ITS Infrastructure	$ -	0.00%
m. Drainage	$ 3,850,686	10.86%
n. Erosion Control	$ 460,645	1.30%
o. Landscaping	$ 373,121	1.05%
p. Signage	$ 263,226	0.74%
q. Maintenance During Construction & Temporary Conditions	$ -	0.00%
r. Traffic Control	$ 263,226	0.74%
s. Utility Adjustment Work (construction only)	$ 101,000	0.28%
Sub-Subtotal C.1. Construction Cost and Support	**$ 27,458,045.18**	77.42%
2. Training Hours ([#] hours)	$ 5,700	0.02%
3. Punch List, Final Close-out, and Demobilization (see Note 5)	$ 559,179	1.58%
Subtotal C. CONSTRUCTION	**$ 28,022,923.73**	79.01%
D&C Amount (Subtotal A. GENERAL + Subtotal B. DESIGN SERVICES + Subtotal C. CONSTRUCTION)	**$ 35,467,906.18**	100.00%

NOTES

1. "A.7. Mobilization" value shall not exceed 2.5% of the sum of the "Sub-Subtotal C.1. Construction Cost and Support" plus "Sub-Subtotal B.1 Engineering Design Services & Support" values".
2. "Subtotal A. GENERAL" value shall not exceed 25% of "D&C Amount" value.
3. "Sub-Subtotal B.1. Engineering Design Services & Support" value shall not be less than 5% of "D&C Amount" value and shall not exceed 10% of "D&C Amount" value.
4. "B.2. Design Support During Construction & Record Design Documents" Value shall not be less than 2.0% of "D&C Amount" value.
5. "C.3. Punch List, Final Close-out, and Demobilization" shall be at least 1.0% of the sum of the "Sub-Subtotal C.1 Construction Cost and Support" plus " Sub-Subtotal B.1. Engineering Design Services & Support" values.

*The percentages and values shown in the Notes section are examples only. The estimator should work closely with the PMC Estimating Manager to make sure the most current rules are being followed.

Arcadis U.S., Inc.

2839 Paces Ferry Road, Suite 900

Atlanta, GA 30339

Tel 770 431 8666

www.arcadis.com

Attachment 13 – Directed Scope Concept Summary Memorandum

Georgia Department of Transportation

Interoffice Memo

Date: June 9, 2022

From: Darryl D. VanMeter, PE
Assistance P3 Division Director
State Alternative Delivery Administrator

To: Margaret B. Pirkle, P.E.
Chief Engineer, Georgia DOT

Subject: Directed Scope Concept Summary Memorandum
Project Adventure
PI Nos. 0017219, 0018363 and 0018361

On May 2, 2022, the State of Georgia executed an Economic Development Agreement (EDA) among Rivian Horizon, LLC (Rivian), the State of Georgia, the Georgia Department of Economic Development, and the Joint Development Authority (JDA) of Jasper County, Morgan County, Newton County, and Walton County. The attached memo summarizes GDOT's role in fulfilling portions of the EDA, on behalf of the State of Georgia, relating to the transportation infrastructure commitments associated with the following projects:

0017219	US 278 / SR 12 Widening
0018363	Frontage Road from US 278 to Old Mill Road
0018361	Interstate 20 (I-20) at CR 249 / Old Mill Road Interchange

In fulfillment of the State of Georgia's commitment made within the EDA,GDOT adopts the scope and design of the projects as described in the memorandum attached.

Margaret B. Pirkle, P.E.
Chief Engineer, GDOT

06/13/2022
Date

Memorandum

PIs 0017219, 0018363, and 0018361: Project Adventure

Project Name
Project Adventure
PIs 0017219, 0018363, and 0018361
GDOT Office of Alternative Delivery

Date
June 1, 2022

Submitted To
GDOT Office of Alternative Delivery and Program Management Consultant

Subject
Directed Scope Concept Summary Memorandum

DIRECTED SCOPE CONCEPT SUMMARY MEMORANDUM

Purpose

On May 2, 2022, the State of Georgia executed an Economic Development Agreement (EDA) among Rivian Horizon, LLC (Rivian), the State of Georgia and the Georgia Department of Economic Development, and the Joint Development Authority of Jasper County, Morgan County, Newton County, and Walton County (JDA).

This memo summarizes GDOT's role in fulfilling portions of the EDA, on behalf of the State of Georgia, relating to the transportation infrastructure commitments within the agreement. To fulfill the obligations of the State of Georgia within the EDA, the following projects have been programmed:

PI	Project Name
0017219	US 278 / SR 12 Widening
0018363	Frontage Road from US 278 to Old Mill Road
0018361	Interstate-20 (I-20) at CR 249 / Old Mill Road Interchange

The purpose of this memorandum is to provide a high-level description of each project.

Related Documentation

The following documents have been executed and provide direction regarding the State of Georgia's commitments:

Economic Development Agreement

The EDA executed on May 2, 2022 details commitments and provisions among the State of Georgia, Rivian, and the JDA. GDOT is fulfilling certain transportation commitments, including those within Section 2.4.d and Exhibit A-10-1. This includes the widening of US 278, a Frontage Road between US 278 and Old Mill Road, and an interchange at Old Mill Road and I-20.

Old Mill Road Interchange Justification Report (IJR)

An IJR was completed by GDOT and executed by the Federal Highway Administration (FHWA) on March 24, 2022. This IJR examines the transportation demand generated by existing conditions and various proposed developments in the vicinity of US 278 and Old Mill Road and analyzes interchange alternatives for I-20 and Old Mill Road. The IJR recommends an interchange configuration based on the results of the alternatives analysis.

Memorandum of Understanding (MOU)

As of the time of the execution of this memo, GDOT, the JDA, and the Georgia Department of Economic Development are drafting an MOU detailing responsibilities of ecology mitigation.

Project Components

GDOT's Program Management Consultant (PMC) and General Engineering Consultant (GEC) were tasked with coordination with the JDA and Rivian. Through close coordination with all parties of the EDA, including participation of GDOT leadership, the following design elements, layout configurations, and criteria have been selected on the listed projects:

PI 0017219 – US 278 / SR 12 Widening:

This project proposes to widen US 278 / SR 12 from two lanes to four lanes. Further descriptions of the project are given below. Refer to Attachment 2 for the proposed Typical Sections:

- Project begins approximately 2,200 feet south of the I-20 EB ramp intersection and extends north approximately 1.36 miles, terminating just north of Willow Springs Church Road
- Proposed design speed of 45 mph for the widened section of US 278/SR 12
- Proposed widening of US 278/SR 12 existing 2-lane section to a 4-lane section with 14-foot flush median and rural shoulders
- Retain the existing bridge at I-20 and restripe to accommodate 4 lanes on the bridge, which includes a shared left turn lane
- Identification of various access locations and requirements for the Rivian development, including intersections and driveways along US 278
- Perform intersection improvements via traffic signals at the eastbound and westbound I-20 ramp terminals, US 278 at Shire Parkway, at the intersection of US 278 and PI 0018363 – Frontage Road, and Stanton Springs North (Driveway-1)
- Proposed right-of-way of 80 to 180 feet to accommodate the improvements
- Exclusion of requirement for a Practical Alternatives Review (PAR) for US 278
- Exclusion of a Pavement Evaluation Survey

PI 0018363 – Frontage Road from US 278 to Old Mill Road:

This project proposes to construct a new four lane frontage road. Further description of the project is given below. Refer to Attachment 2 for the proposed Typical Sections:

- Project proposes a 4-lane section with 20-foot raised median, rural shoulders, and a 12-foot multi-use path, running north of and parallel to I-20 from SR 12 / US 278 in the west to, continuing approximately 2.75 miles eastward, terminating at Old Mill Road.
- Proposed traditional signalized intersections at SR 12 / US 278 and the intersection with Driveway-8 (Rivian primary truck entrance) and the proposed realignment for PI 0018361, Old Mill Road Interchange at I-20
- Proposed design speed of 45 mph for Frontage Road
- Proposed right of way is 170 feet to 250 feet.

- Identification of various access locations and requirements for the Rivian development, including intersections and driveways along Old Mill and Frontage Road.
- Proposed lighting along the Frontage Road
- Exclusion of requirement for a Practical Alternatives Review (PAR) for Frontage Road.

PI 0018361 – Interstate -20 (I-20) at CR 249 / Old Mill Road Interchange:

This project proposes to construct a new Tight Urban Diamond Interchange at CR 249 / Old Mill Road. Further description of the project is given below. Refer to Attachment 2 for the proposed Typical Sections:

- Project proposes the construction of a new location interchange in Morgan County, Georgia.
- Project begins approximately 2,000 feet south of I-20 and realigns approximately 0.9 miles of Old Mill Road, including the construction of a new bridge over I-20, and ties into a signalized intersection at the northern project terminus, PI 0018363 - Frontage Road from US 278 to Old Mill Road.
- Project proposes to relocate Old Mill Road over I-20 as a 2-lane to 4-lane section with 20-foot raised median with rural shoulders and build a new service interchange approximately 0.5 miles east of the existing rest area on I-20 at Mile Post 103.
- Proposed design speed of 45 mph to 55 mph for the realigned section of Old Mill Road
- Propose two roundabouts at the eastbound and westbound I-20 ramp terminals
- Propose a new signalized intersection at the Rivian development Driveway-8 and tying into PI 0018363 – Frontage Road from US 278 to Old Mill Road.
- Existing right-of-way for Old Mill Road is 100 feet. Proposed right-of-way for the relocated alignment is being assessed and will be finalized.

Adoption of Projects

In fulfillment of the State of Georgia's commitment made within the EDA,GDOT adopts the scope and design of the projects as described above.