



TECHNICAL MEMORANDUM 4

DATE: May 14, 2021

TO: Don Morehouse | ODOT

FROM: John Bosket, PE; Aaron Berger, PE (WA); Kayla Fleskes, EI | DKS Associates

SUBJECT: US 97 Baker Road IAMP Project #20020-006
Future Baseline (No-Build) Operational Conditions

This memorandum describes transportation operations under the future year 2040 baseline condition within the US 97 Baker Road Interchange Area Management Plan (IAMP) area of primary impact (API). The baseline condition, or “No-Build” condition, assumes that transportation improvements within the study area that are reasonably expected to be funded by 2040 are constructed, but that no improvements have been made to the US 97/Baker Road interchange. This information, together with the evaluation of current conditions in Technical Memorandum #3, highlight key deficiencies to be addressed and provide a baseline condition from which to evaluate the potential benefits of improvement concepts considered.

This memorandum does not revisit conditions for people walking and biking. Existing conditions for people walking and biking were discussed in Technical Memorandum #2. Because there are very few separate facilities for walking and biking in the interchange area, conditions are very poor. With no planned improvements by 2040, these conditions are assumed to worsen.

FUTURE YEAR (2040) TRAFFIC VOLUMES

Future year 2040 traffic volumes were forecast at the study intersections using the Bend-Redmond Regional Travel Demand Model (BRM). The BRM transportation network included financially constrained projects (i.e., those reasonably expected to be funded and constructed by 2040), as noted in *Technical Memorandum #1, Appendix A: Methodology Memorandum*. Key financially constrained projects include:

- US 97/Murphy Road northbound on-ramp and southbound off-ramp
- Closure of at-grade US 97 right-on, right-off access at China Hat Road/Ponderosa Street and Rocking Horse Court
- China Hat Road overcrossing of US 97 (including a realignment of Parrell Road at China Hat Road to accommodate the overcrossing)
- China Hat Road/Knott Road roundabout

The land use assumptions used for this analysis are consistent with the assumptions in the recently updated Bend Transportation System Plan (TSP), which include a significant amount of land use growth in the “thumb” (area between US 97, Knott Road, and China Hat Road) and the SE Area (area between 15th Street, Knott Road, 27th Street, and Ferguson Road). In the “thumb” area, in particular, approximately 600 households and 3,900 jobs are assumed by 2040, leading to nearly 1,300 trips exiting and 975 trips entering the area during the 2040 weekday PM peak hour. The majority of the trips entering and exiting the “thumb” utilize the US 97/Baker Road interchange or China Hat Road.

There is some degree of uncertainty when forecasting future traffic volumes, especially in light of what could be lasting travel behavior changes brought about by the pandemic or the continued proliferation of connected and autonomous vehicles. While traffic volumes in Bend and other metropolitan areas appear to be returning to pre-pandemic levels, it is still unknown if travel demand by time of day, and specifically during the peak periods, will be lower as a result of more people working from home. To respond to this uncertainty, as a preferred improvement alternative is identified the project team will conduct a sensitivity analysis to confirm the need for recommended elements under varying levels of future traffic demand.

Weekday PM peak hour traffic volumes at the study intersections were forecast using the methodology outlined in the *Methodology Memorandum*. Figure 1 shows the post-processed 2040 weekday PM peak hour (design hour¹) baseline turning movement volumes at the study intersections. Table 1 lists the traffic growth on major streets within the API. The largest growth in traffic is related to the “thumb” area. Westbound traffic accessing US 97 northbound at the US 97/Baker Road interchange increases by approximately 460 vehicles during the peak hour compared to existing conditions. US 97 southbound traffic heading towards the “thumb” area also increases, with southbound left turns from the US 97/Baker Road southbound ramp increasing by approximately 170 vehicles.

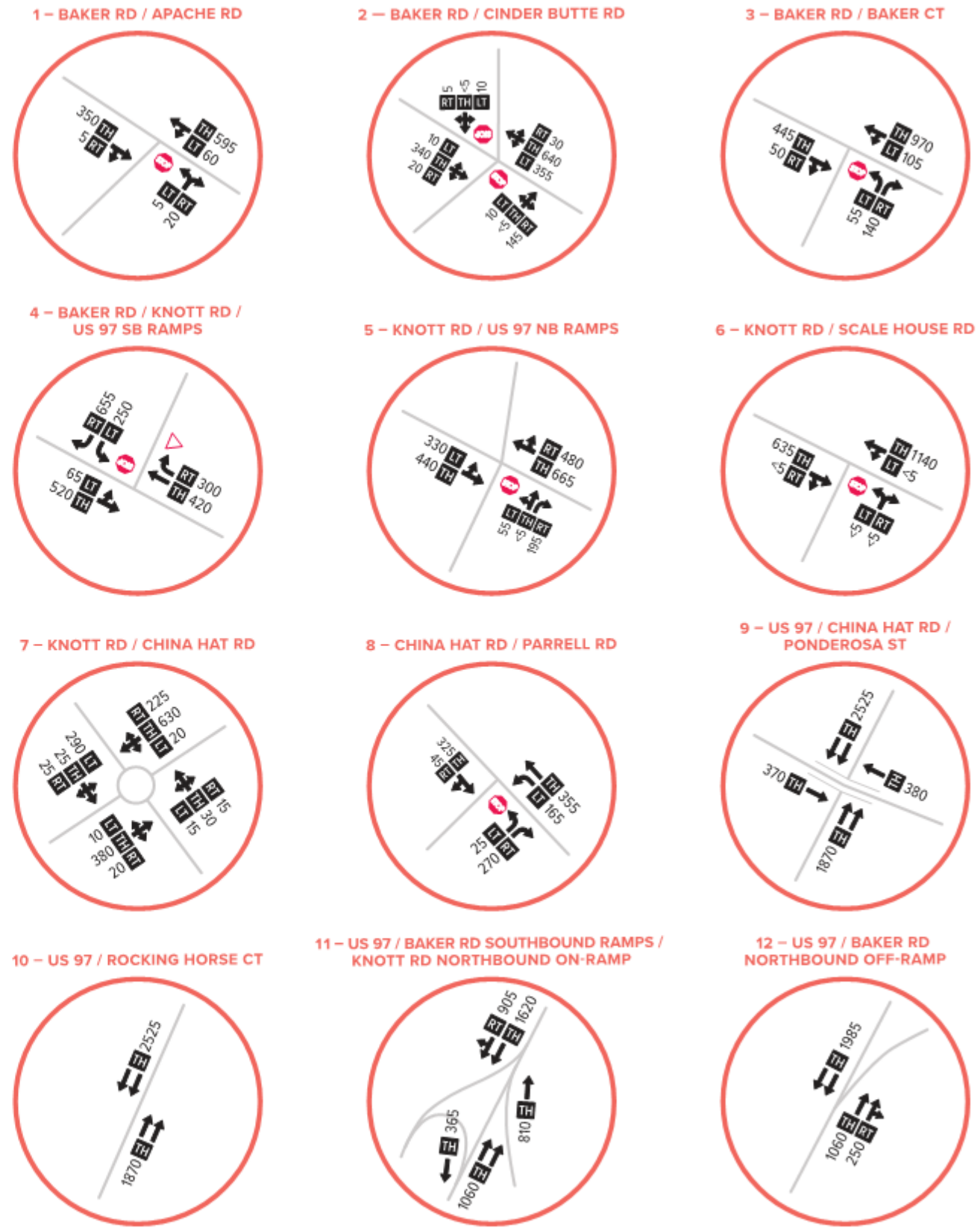
TABLE 1: FUTURE TRAFFIC GROWTH ON MAJOR ROADWAYS IN THE API

ROADWAY	LOCATION	2040 DESIGN HOUR TRAFFIC VOLUME	TRAFFIC GROWTH (2017 TO 2040)
US 97 SOUTHBOUND	Between Baker Rd and China Hat Rd	2,525	47%
US 97 NORTHBOUND	Between Baker Rd and China Hat Rd	1,870	87%
BAKER RD	West of the US 97/Baker Rd interchange	1,660	15%
KNOTT RD	East of the US 97/Baker Rd interchange	1,775	114%
CHINA HAT RD	East of Parrell Rd	1,115	337%

¹ Design hour volumes represent future year 30th highest annual hour (typically summer PM peak hour) traffic volumes.



FIGURE 1: FUTURE 2040 PM PEAK HOUR BASELINE TRAFFIC VOLUMES



STOP SIGN LANE CONFIGURATION THROUGH MOVEMENT ROUNDABOUT # MOTOR VEHICLE TRAFFIC VOLUME
 YIELD SIGN LEFT TURN MOVEMENT RIGHT TURN MOVEMENT

FUTURE BASELINE OPERATIONS ANALYSIS

Intersection operations were analyzed using Synchro and Sidra software with the Highway Capacity Manual 6th Edition (HCM 6) methodologies to assess the level of congestion experienced. The analysis was conducted at all study intersections using the year 2040 design hour traffic volumes and lane configurations shown in Figure 1. Performance measures used for this analysis include volume-to-capacity (V/C) ratios, seconds of control delay, and levels of service (LOS). Table 2 summarizes the results of this analysis, with each intersection's performance compared to the adopted mobility target.² HCM reports are included in Appendix A.

The most significant change in traffic operations seen by 2040 occurs at the US 97/Baker Road interchange ramp terminals as a result of new development to the east. Both intersections failed to meet ODOT's adopted mobility targets under existing conditions and will continue to do so in 2040, but with substantially more delay.

In particular, congestion will be severe at the US 97 northbound ramp terminal. This is largely due to significant growth in demand to travel to and from the east and the lack of a separate eastbound left turn lane that eventually blocks traffic on eastbound Knott Road and consequently limits the ability to make a left turn from the northbound off-ramp. The southbound ramp terminal also experiences a significant increase in delay, mostly resulting from growing demand to make the southbound left turn to reach destinations to the east.

The remaining intersections meet the adopted mobility targets although the stop-controlled approaches at Baker Court/Baker Road and Cinder Butte Road/Baker Road continue to operate at LOS F in the future and experience significant delay.

² Mobility targets for ODOT facilities obtained from the 1999 Oregon Highway Plan. Mobility standards for City facilities based on City Development Code 4.7.500. Mobility standards for County facilities obtained from the Deschutes County Transportation System Plan.

TABLE 2: FUTURE 2040 DESIGN HOUR BASELINE TRAFFIC OPERATIONS AT STUDY INTERSECTIONS

ID	STUDY INTERSECTION (MAJOR STREET/MINOR STREET)	CONTROL (EXISTING/ FUTURE)	JURISDICTION	MOBILITY TARGET	EXISTING (2017) RESULTS			FUTURE (2040) RESULTS		
					V/C ^A	LOS ^A	DELAY (SEC) ^A	V/C ^A	LOS ^A	DELAY (SEC) ^A
1	BAKER RD/APACHE RD	TWSC ^A	County	Average Delay ≤ 35 secs	0.36 / 0.05	A / B	1	0.42 / 0.07	A / B	1
2	BAKER RD/CINDER BUTTE RD	TWSC	County	Average Delay ≤ 35 secs	0.62 / 0.33	A / F	6	0.71 / 0.66	A / F	9
3	BAKER RD/BAKER CT	TWSC	County	Average Delay ≤ 35 secs	0.59 / 0.48	A / F	4	0.68 / 0.79	A / F	6
4	BAKER RD/KNOTT RD/ US 97 SB RAMPS	TWSC	ODOT	v/c ≤ 0.95 (Knott Rd) v/c ≤ 0.85 (ramp)	0.31 / 0.95	A / E	8 / 46	0.37 / 1.32	A / F	9 / 220
5	KNOTT RD/US 97 NB RAMPS	TWSC	ODOT	v/c ≤ 0.95 (Knott Rd) v/c ≤ 0.85 (ramp)	0.47 / 2.63	A / F	11 / >300	0.92 / >3.0	C / F	23 / >300
6	KNOTT RD/SCALE HOUSE RD	TWSC	County	LOS D	NA / 0.03	NA / B	NA / 14	NA / 0.09	NA / E	NA / 36
7	KNOTT RD/CHINA HAT RD	TWSC / Roundabout	City	v/c ≤ 1.0	0.01 / 0.52	A / E	9 / 37	0.76	B	15
8	CHINA HAT RD/PARRELL RD	TWSC	City	Critical Movement Delay ≤ 50 secs	0.37 / 0.17	A / B	8 / 11	0.37 / 0.45	A / C	9 / 18
9	US 97/CHINA HAT RD/ PONDEROSA ST	TWSC / Closed	ODOT	v/c ≤ 0.85 (major)	NA / 0.28	NA / C	NA / 19	NA	NA	NA
10	US 97/ROCKING HORSE RD	TWSC / Closed	ODOT	v/c ≤ 0.85 (major)	NA / 0.02	NA / C	NA / 18	NA	NA	NA

Bold and red indicates mobility target/standard is not met.

Major streets are those not stop-controlled at intersections, while minor streets are stop-controlled.

^A V/C ratio and LOS reported as worst major street/minor street movement at two-way stop-controlled (TWSC) intersections. Delay reported as worst major street/minor street movement for ODOT and City intersections and average for County intersections, to best match the existing mobility targets.

US 97 MAINLINE OPERATIONS

US 97 highway operations were analyzed for both northbound and southbound directions in the API. This included an evaluation of the levels of congestion occurring at the ramp connections where merging and diverging movements happen. Table 3 shows the US 97 mainline highway operations results for the merging and diverging areas. All ramp connections are expected to operate well in the future and comply with adopted mobility targets. For this analysis, FREEVAL software with HCM 6 methodologies was used. FREEVAL outputs are included in Appendix B.

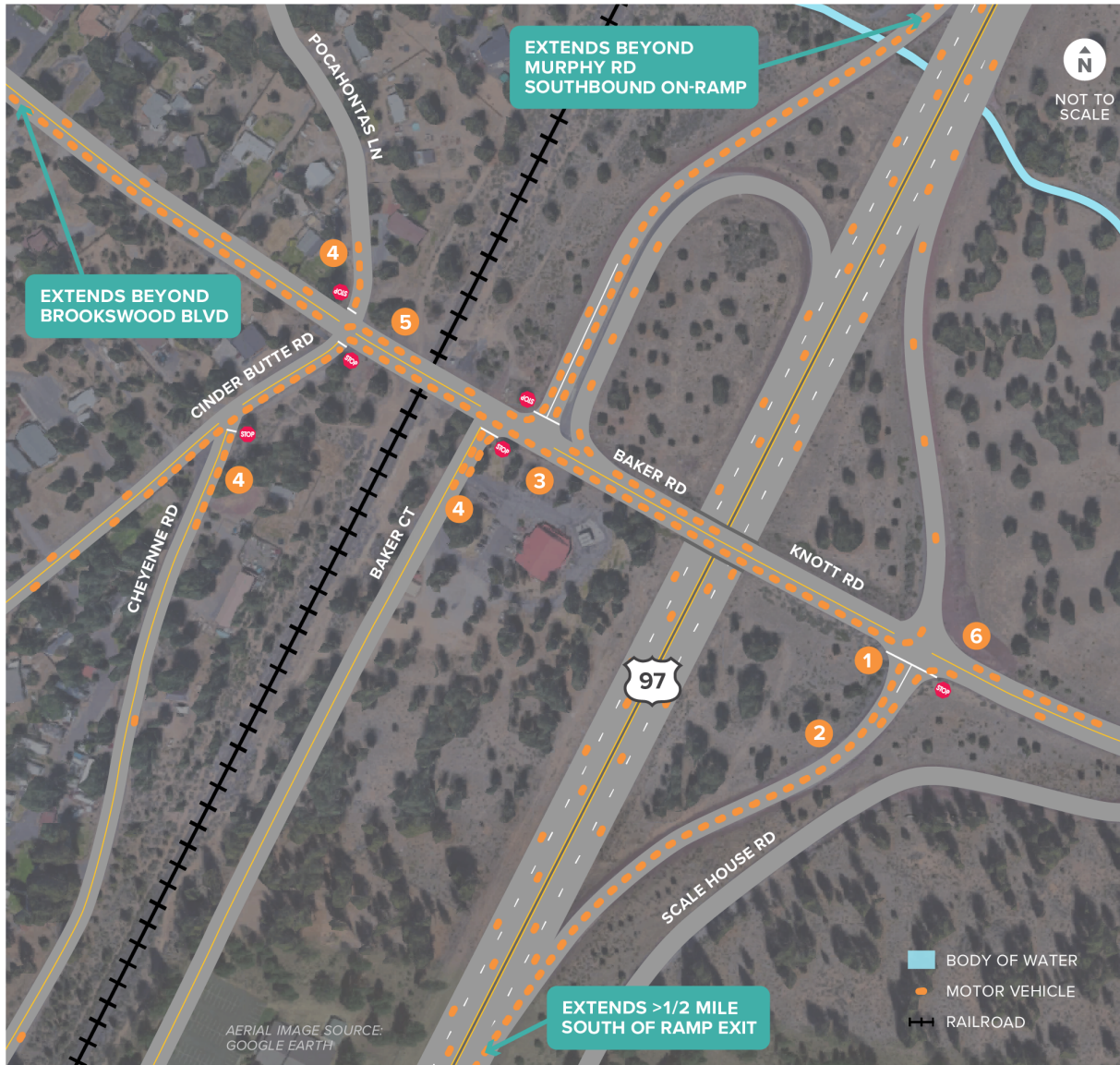
TABLE 3: FUTURE 2040 BASELINE US 97 MAINLINE TRAFFIC OPERATIONS DURING WEEKDAY PM PEAK HOUR OF TRAFFIC

SEGMENT	SEGMENT TYPE	V/C MOBILITY TARGET	V/C	LOS ^A
US 97 NORTHBOUND				
KNOTT RD OFF-RAMP	Diverge	0.85	0.30	B
KNOTT RD ON-RAMP	Merge	0.85	0.45	B
US 97 SOUTHBOUND				
BAKER RD OFF-RAMP	Diverge	0.85	0.58	C
BAKER RD ON-RAMP	Merge	0.85	0.46	B

^A LOS is based on density of traffic.

VEHICLE QUEUING ANALYSIS

Vehicle queue lengths on intersection approaches in the API were estimated using SimTraffic. With traffic forecasts indicating over-capacity conditions, the two-way stop-controlled ramp terminal intersections generate queues that back up along Baker Road/Knott Road and onto the US 97 mainline, as explained in Figure 2.



- 1 In the future, there is significant growth in eastbound traffic (to access new land use in the "thumb" area). Without a separate left turn lane, eastbound left turn vehicles block the through lane and cause extensive eastbound queuing on Knott Road/Baker Road (extending beyond Brookwood Blvd).
- 2 Because of the issue noted in (1), there are effectively no safe gaps in traffic for northbound left turning vehicles to enter Knott Road. The northbound left queue eventually blocks the northbound right turn lane and queues back to the US 97 mainline.
- 3 The eastbound queue at the US 97 northbound ramp extends beyond the US 97 southbound ramp. This blocks southbound left turning vehicles from entering Knott Road/Baker Road. The southbound left turn queue eventually blocks the southbound right turn lane and queues back to the US 97 mainline. Note that even if the eastbound queue at the US 97 northbound ramp did not extend to the US 97 southbound ramp, it is likely that the queue for the southbound left turn would still block access to the southbound right turn lane.
- 4 Since the eastbound queue at the US 97 northbound ramp extends through all of the study intersections, significant queuing develops on all of the side street approaches on Baker Road because they are unable to turn out unless another driver lets them in.
- 5 Even though the queuing and congestion on the US 97 ramps limits the amount of westbound traffic that can reach Cinder Butte Road/Baker Road, the lack of a westbound left turn lane causes the westbound approach to back up to the railroad tracks. Without constraints at the ramp terminals, this queue would likely extend farther.
- 6 Without a separate westbound right turn lane, vehicles slowing to make a westbound right turn cause westbound queues to extend nearly to Scale House Road.

FIGURE 2. FUTURE 2040 PM PEAK HOUR BASELINE (NO-BUILD) QUEUING

In particular, the eastbound left turn from Knott Road to US 97 northbound causes extensive eastbound queueing on Knott Road/Baker Road, causing the ramp and side street approaches to queue extensively as shown in Figure 2. Table 4 lists the queuing on the approaches where notable queuing was documented in *Technical Memorandum #3: Current Conditions*. Table 4 also notes where specific movement queues were either negatively impacted by downstream queuing, or positively impacted by upstream queues that limited conflicting traffic. Queueing results for all study intersections in the API are included in the SimTraffic reports in Appendix A.

TABLE 4: FUTURE 2040 BASELINE INTERSECTION VEHICLE QUEUING

ID	STUDY INTERSECTION	MOVEMENT	95 TH PERCENTILE QUEUE (FT)		APPROXIMATE AVAILABLE STORAGE (FT) ^A
			EXISTING (2017)	FUTURE (2040)	
2	BAKER RD/ CINDER BUTTE RD	NB	225	>400 *	250
		WB	175	150 ^B	100
4	BAKER RD/ KNOTT RD/ US 97 SB RAMPS	SBL	425 ^C	>1,500 *	275
		SBR	1,000	>1,500 *	725 ^D
		EB	75	>1,300 *	75
5	KNOTT RD/US 97 NB RAMPS	NBL	100	>1,200 *	150
		NBR	50	>1,200 *	375
		EBL	175	>775 *	700

Bold and red queue exceeds approximate available storage.

*= Queuing significantly exceeds storage due to downstream queue spillback queues

^A Available storage reported as approximate turn bay length or approximate distance to nearest intersection/railroad crossing.

^B Upstream congestion is metering the flow of arriving traffic, resulting in shorter queues.

^C Turn bay frequently blocked by southbound right queue.

^D Distance represents distance to allow vehicles leaving the highway mainline to safely come to a stop. 820 feet is needed from the gore point for safe stopping distance, assuming a 75 mph design speed, based on *AASHTO A Policy on Geometric Design of Highways and Streets*.

SENSITIVITY ANALYSIS FOR STREET NETWORK CHANGES

In addition to the baseline scenario, intersection operations were analyzed for two sensitivity scenarios. The future sensitivity analysis considered different street network assumptions to provide a range of forecasts for future traffic at the US 97/ Baker Road interchange and within the API. The sensitivity tests assume the same land use as the future baseline No-Build conditions (year 2040). The following network changes were tested for the two sensitivity scenarios, which

focused on the China Hat Road Overcrossing Project and US 97/China Hat Road/Ponderosa Street right-on, right-off closure Project:

- **Scenario 1:** Maintain existing US 97 right-on, right-off access at US 97/China Hat Road/Ponderosa Street without constructing the China Hat overcrossing of US 97 (existing configuration)
- **Scenario 2:** Close the right-on, right-off access at US 97/China Hat Road/Ponderosa Street without constructing the China Hat overcrossing

The sensitivity scenarios showed a shift in traffic volumes, particularly at the interchange ramp terminals and at the intersections of US 97/China Hat Road/Ponderosa Street and China Hat Road/Parrell Road. The traffic volume shifts related from each scenario are related to the two projects under consideration as discussed below:

- **Maintain existing access at US 97/China Hat Road/Ponderosa Street** (Scenario 1): Instead of utilizing the US 97/Baker Road interchange, vehicles wanting to travel northbound on US 97 can utilize the right-on, right-off access at US 97/China Hat Road. In particular, this decreases westbound right turns at the Baker Road/US 97 northbound on-ramp by nearly 30 percent compared to the baseline scenario.
- **Without the China Hat Road Overcrossing Project** (Scenario 2): Instead of utilizing the US 97/Murphy interchange and the China Hat Road overcrossing to access the “thumb”, vehicles instead split travel between the US 97/Baker Road interchange and Parrell Road. In particular, removing the China Hat Road overcrossing increases southbound left turns at the Baker Road/US 97 southbound off-ramp by approximately 40 percent compared to the baseline scenario. There is a reduction in traffic on China Hat Road by approximately 40 percent without a connection over US 97 and an increase in traffic on Parrell Road by 70 percent, which is identified as a key walking and bicycling route in the Bend Transportation System Plan. Without the China Hat Road overcrossing, traffic headed for the Murphy Road interchange is concentrated on the east side of US 97, resulting in more traffic through the Murphy Road/3rd Street and Murphy Road/Parrell Road intersections. These intersections would be operating at or over capacity without the new street connections west of US 97 between China Hat Road and Murphy Road.

SENSITIVITY TEST INTERSECTION OPERATIONS

Table 5 summarizes the impact of the sensitivity testing on four key intersections to understand the range of future traffic impacts likely to occur. HCM reports are included in Appendix C.

TABLE 5: SENSITIVITY TEST OF FUTURE (2040) WEEKDAY PM PEAK HOUR TRAFFIC OPERATIONS AT KEY STUDY INTERSECTIONS

ID	STUDY INTERSECTION (MAJOR STREET/MINOR STREET)	CONTROL (BASELINE/ SCENARIO 1/ SCENARIO 2)	JURIS- DICTION	V/C MOBILITY TARGET	BASELINE (WITH AT-GRADE US 97 ACCESS CLOSURE AND CHINA HAT OVERCROSSING)			SCENARIO 1 (MAINTAIN AT-GRADE US 97 ACCESS AND NO CHINA HAT OVERCROSSING)			SCENARIO 2 (WITH AT-GRADE US 97 ACCESS CLOSURE AND NO CHINA HAT OVERCROSSING)		
					V/C	LOS	DELAY (SEC)	V/C	LOS	DELAY (SEC)	V/C	LOS	DELAY (SEC)
4	BAKER RD/ KNOTT RD/ US 97 SB RAMPS	TWSC	ODOT	v/c ≤ 0.95 (Knott Rd) v/c ≤ 0.85 (ramp)	0.37 / 1.32	A / F	9 / 220	0.37 / 1.97	A / F	9 / >300	0.37 / 1.97	A / F	9 / >300
5	KNOTT RD/US 97 NB RAMPS	TWSC	ODOT	v/c ≤ 0.95 (Knott Rd) v/c ≤ 0.85 (ramp)	0.92 / >3.0	C / F	23 / >300	0.92 / >3.0	C / F	23 / >300	1.02 / >3.0	D / F	27 / >300
8	CHINA HAT RD/PARRELL RD	TWSC	City	Critical Movement Delay ≤ 50 secs	0.37 / 0.45	A / C	9 / 18	0.02 / 1.0	A / F	9 / 75	NA / 0.48	NA / B	NA / 14
9	US 97/ CHINA HAT RD/ PONDEROSA ST	TWSC / TWSC / Closed	ODOT	v/c ≤ 0.85 (major) v/c ≤ 0.95 (minor)	NA	NA	NA	NA / 1.8	NA / F	NA / >300	NA	NA	NA

Bold and red indicates mobility target/standard is not met.

Major streets are those not stop-controlled at intersections, while minor streets are stop-controlled.^A V/C ratio and LOS reported as worst major street/minor street movement at two-way stop-controlled (TWSC) intersections. Delay reported as worst major street/minor street movement for ODOT and City intersections and average for County intersections, to best match the existing mobility targets. Results reported as worst approach lane for roundabouts.

The range of potential impacts at each intersection include:

- **Baker Road/Knott Road/US 97 Southbound Ramps:** With an increase in southbound left turns at Baker Road/US 97 southbound ramps, the v/c ratio increases to 1.97 (compared to 1.32 under the baseline scenario) under both sensitivity scenarios due to the lack of overcrossing at China Hat Road.
- **Knott Road/US 97 Northbound Ramps:** In all scenarios, the intersection operates over capacity and does not meet mobility targets as a two-way stop-controlled intersection. In Scenario 2, more traffic is traveling eastbound (from the lack of an overcrossing at China Hat Road). This increase in eastbound traffic causes the major approach on Knott Road to also operate over capacity (v/c ratio of 1.02) for a shared left turn-through lane.
- **China Hat Road/Parrell Road:** Without the China Hat Road overcrossing, China Hat Road/Parrell Road would fail to meet City of Bend mobility targets if the at-grade right-on, right-off access at US 97/China Hat Road remained.
- **US 97/China Hat Road/Ponderosa Street:** Maintaining the existing at-grade right-on, right-off access at US 97/China Hat Road in the future would create a situation with significant queueing on the China Hat Road approach as traffic from the “thumb” area accesses US 97 northbound. The v/c ratio for the westbound approach is forecast to exceed 1.80, which would result in aggressive gap acceptance for vehicles making right turns onto US 97 and queueing along westbound China Hat Road.

Overall, the sensitivity tests indicate that the China Hat Road Overcrossing Project is critical to serving future demand in the “thumb” area by limiting traffic increases on Parrell Road and reducing traffic impacts to the US 97/Baker Road interchange. The sensitivity tests also indicate that while keeping the right-on, right-off access at US 97/China Hat Road/Ponderosa Street open does relieve some traffic stress from the US 97/Baker Road interchange (particularly the northbound on-ramp), the minor benefits at the US 97/Baker Road interchange would not offset the negative operational impacts to China Hat Road and US 97 under full development conditions in the “thumb”.

Both the US 97 Parkway Plan and the Bend TSP identify a closure of the at-grade access at US 97/China Hat Road/Ponderosa Street. Maintaining at-grade access into the future would require the addition of acceleration and deceleration lanes at the intersection. In particular, an acceleration lane for westbound right vehicles would extend to within approximately 1,000 feet of the US 97 northbound off-ramp at Murphy Road. This close proximity would create weaving maneuvers on the highway between the entrance and exit that would result in congestion and could be a potential safety hazard.

APPENDIX A: FUTURE BASELINE HCM AND QUEUING REPORTS

Shared Major Street Left Turn Approach V/C Ratio Adjustment

There is a limitation of the Highway Capacity Manual (HCM) unsignalized intersection methodology for shared left turn approaches. Major street left turns are always treated as exclusive turn lanes regardless of how they are coded. This can result in very low shared left turn v/c ratios (like 0.01) on an approach that should be over capacity. Shared major left turn vehicles are approximated in the HCM methodology by adjusting the potential for a "queue-free state" in the case of delaying through movement vehicles. The table below shows the inputs used to calculate the adjusted shared major street approach v/c ratio per ODOT Analysis and Procedures Manual Chapter 12.

Future No Build (Baseline) Results

ID	Intersection	Movement	Output from Synchro:		
			Left Turn V/C	Thru Vol	Adjusted V/C
1	Apache Rd & Baker Rd	WBL	0.066	595	0.42
2	Cinder Butte Rd/Pochahontas Ln & Baker Rd	WBL	0.337	640	0.71
2	Cinder Butte Rd/Pochahontas Ln & Baker Rd	EBL	0.013	340	0.21
3	Baker Ct & Baker Rd	WBL	0.105	970	0.68
4	Baker Rd/Knott Rd & US 97 SB ramp	EBL	0.064	520	0.37
5	Knott Rd & US 97 NB on ramp	EBL	0.661	440	0.92
8	Parrell Rd & China Hat Rd	WBL	0.16	355	0.37

HCM 6th TWSC
1: Apache Rd & Baker Rd

03/04/2021

Intersection						
Int Delay, s/veh	0.8					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	350	5	60	585	5	20
Future Vol, veh/h	350	5	60	585	5	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	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	88	88	88	88	88	88
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	398	6	68	665	6	23

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	404	0	1202
Stage 1	-	-	-	-	401
Stage 2	-	-	-	-	801
Critical Hdwy	-	-	4.1	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	-	-	2.2	-	3.5
Pot Cap-1 Maneuver	-	-	1166	-	206
Stage 1	-	-	-	-	681
Stage 2	-	-	-	-	445
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1166	-	187
Mov Cap-2 Maneuver	-	-	-	-	187
Stage 1	-	-	-	-	681
Stage 2	-	-	-	-	404

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	13.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	436	-	-	1166	-
HCM Lane V/C Ratio	0.065	-	-	0.058	-
HCM Control Delay (s)	13.8	-	-	8.3	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0.2	-

HCM 6th TWSC
2: Cinder Butte Rd/Pocahontas Ln & Baker Rd

03/04/2021

Intersection												
Int Delay, s/veh	8.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	10	340	20	340	630	30	10	0	145	10	0	5
Future Vol, veh/h	10	340	20	340	630	30	10	0	145	10	0	5
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	0	0	0	0	0	0	0	0	0	0	0	0
Mvmt Flow	11	378	22	378	700	33	11	0	161	11	0	6

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	733	0	0	400	0	0	1887	1900	389	1965	1895	717
Stage 1	-	-	-	-	-	-	411	411	-	1473	1473	-
Stage 2	-	-	-	-	-	-	1476	1489	-	492	422	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.1	6.5	6.2	7.1	6.5	6.2
Critical Hdwy Stg 1	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.1	5.5	-	6.1	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	881	-	-	1170	-	-	54	70	664	48	70	433
Stage 1	-	-	-	-	-	-	622	598	-	159	193	-
Stage 2	-	-	-	-	-	-	159	189	-	562	592	-
Platoon blocked, %		-	-		-	-						
Mov Cap-1 Maneuver	881	-	-	1170	-	-	30	31	664	20	31	433
Mov Cap-2 Maneuver	-	-	-	-	-	-	30	31	-	20	31	-
Stage 1	-	-	-	-	-	-	612	588	-	156	87	-
Stage 2	-	-	-	-	-	-	71	85	-	419	583	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			3.2			36.2			236.6		
HCM LOS							E			F		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	281	881	-	-	1170	-	-	29
HCM Lane V/C Ratio	0.613	0.013	-	-	0.323	-	-	0.575
HCM Control Delay (s)	36.2	9.1	0	-	9.5	0	-	236.6
HCM Lane LOS	E	A	A	-	A	A	-	F
HCM 95th %tile Q(veh)	3.7	0	-	-	1.4	-	-	1.8

HCM 6th TWSC
3: Baker Ct & Baker Rd

03/04/2021

Intersection						
Int Delay, s/veh	4.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔			↔	↔	↔
Traffic Vol, veh/h	450	45	100	950	50	135
Future Vol, veh/h	450	45	100	950	50	135
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	75
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	0	0	0	0	0	0
Mvmt Flow	474	47	105	1000	53	142

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	521	0	1708
Stage 1	-	-	-	-	498
Stage 2	-	-	-	-	1210
Critical Hdwy	-	-	4.1	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	-	-	2.2	-	3.5
Pot Cap-1 Maneuver	-	-	1056	-	101
Stage 1	-	-	-	-	615
Stage 2	-	-	-	-	285
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1056	-	78
Mov Cap-2 Maneuver	-	-	-	-	78
Stage 1	-	-	-	-	615
Stage 2	-	-	-	-	221

Approach	EB	WB	NB
HCM Control Delay, s	0	0.8	41.4
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	78	576	-	-	1056	-
HCM Lane V/C Ratio	0.675	0.247	-	-	0.1	-
HCM Control Delay (s)	117.2	13.3	-	-	8.8	0
HCM Lane LOS	F	B	-	-	A	A
HCM 95th %tile Q(veh)	3.1	1	-	-	0.3	-

Intersection

Int Delay, s/veh 51.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕	↕	↕	↕
Traffic Vol, veh/h	65	520	420	300	250	630
Future Vol, veh/h	65	520	420	300	250	630
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	-	-	50	180	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	8	3	3	1	2	2
Mvmt Flow	69	553	447	319	266	670

Major/Minor

	Major1	Major2	Minor2
Conflicting Flow All	447	0	0
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.18	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.272	-	-
Pot Cap-1 Maneuver	1082	-	-
Stage 1	-	-	-
Stage 2	-	-	-
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	1082	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach

	EB	WB	SB
HCM Control Delay, s	1	0	126.8
HCM LOS			F

Minor Lane/Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1082	-	-	-	202	612
HCM Lane V/C Ratio	0.064	-	-	-	1.317	1.095
HCM Control Delay (s)	8.6	0	-	-	219.1	90.2
HCM Lane LOS	A	A	-	-	F	F
HCM 95th %tile Q(veh)	0.2	-	-	-	14.8	19.9

Notes

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

HCM 6th TWSC
5: Knott Rd & US 97 NB On Ramp

03/04/2021

Intersection												
Int Delay, s/veh	859.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔	↔			
Traffic Vol, veh/h	330	440	0	0	665	480	55	0	195	0	0	0
Future Vol, veh/h	330	440	0	0	665	480	55	0	195	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	-	-	-	-	-	300	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	15	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	3	3	0	0	2	7	2	100	2	0	0	0
Mvmt Flow	363	484	0	0	731	527	60	0	214	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	1258	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.13	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.227	-	-
Pot Cap-1 Maneuver	549	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	549	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	10	0	\$ 7409.9
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	1	476	549	-	-	-
HCM Lane V/C Ratio	60.44	0.45	0.661	-	-	-
HCM Control Delay (s)	\$ 33615.4	18.6	23.4	0	-	-
HCM Lane LOS	F	C	C	A	-	-
HCM 95th %tile Q(veh)	9.8	2.3	4.8	-	-	-

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

HCM 6th TWSC
6: Scale House Rd & Knott Rd

03/04/2021

Intersection						
Int Delay, s/veh	0.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	635	0	0	1140	5	5
Future Vol, veh/h	635	0	0	1140	5	5
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	1	0	0	1	0	0
Mvmt Flow	690	0	0	1239	5	5

Major/Minor	Major1	Major2	Minor1	Minor2	Minor3
Conflicting Flow All	0	0	690	0	1929
Stage 1	-	-	-	-	690
Stage 2	-	-	-	-	1239
Critical Hdwy	-	-	4.1	-	6.4
Critical Hdwy Stg 1	-	-	-	-	5.4
Critical Hdwy Stg 2	-	-	-	-	5.4
Follow-up Hdwy	-	-	2.2	-	3.5
Pot Cap-1 Maneuver	-	-	914	-	74
Stage 1	-	-	-	-	502
Stage 2	-	-	-	-	276
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	914	-	74
Mov Cap-2 Maneuver	-	-	-	-	74
Stage 1	-	-	-	-	502
Stage 2	-	-	-	-	276

Approach	EB	WB	NB
HCM Control Delay, s	0	0	36
HCM LOS			E

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	127	-	-	914	-
HCM Lane V/C Ratio	0.086	-	-	-	-
HCM Control Delay (s)	36	-	-	0	-
HCM Lane LOS	E	-	-	A	-
HCM 95th %tile Q(veh)	0.3	-	-	0	-

USER REPORT FOR SITE

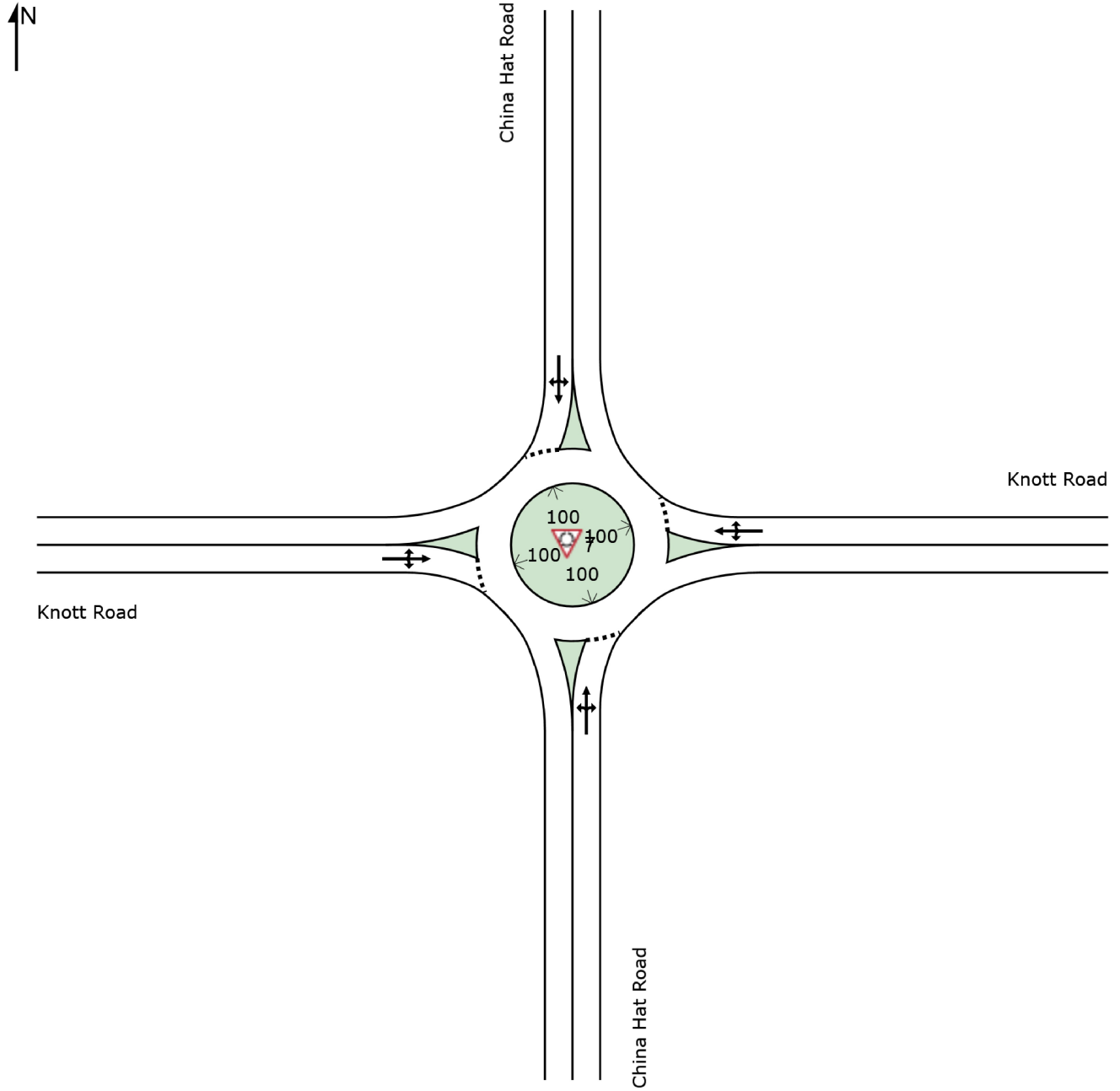
 Project: Baker IAMP - 01 - Future No Build

Template: Default Site User Report

Site: 7 [China Hat Road/Knott Road RAB]

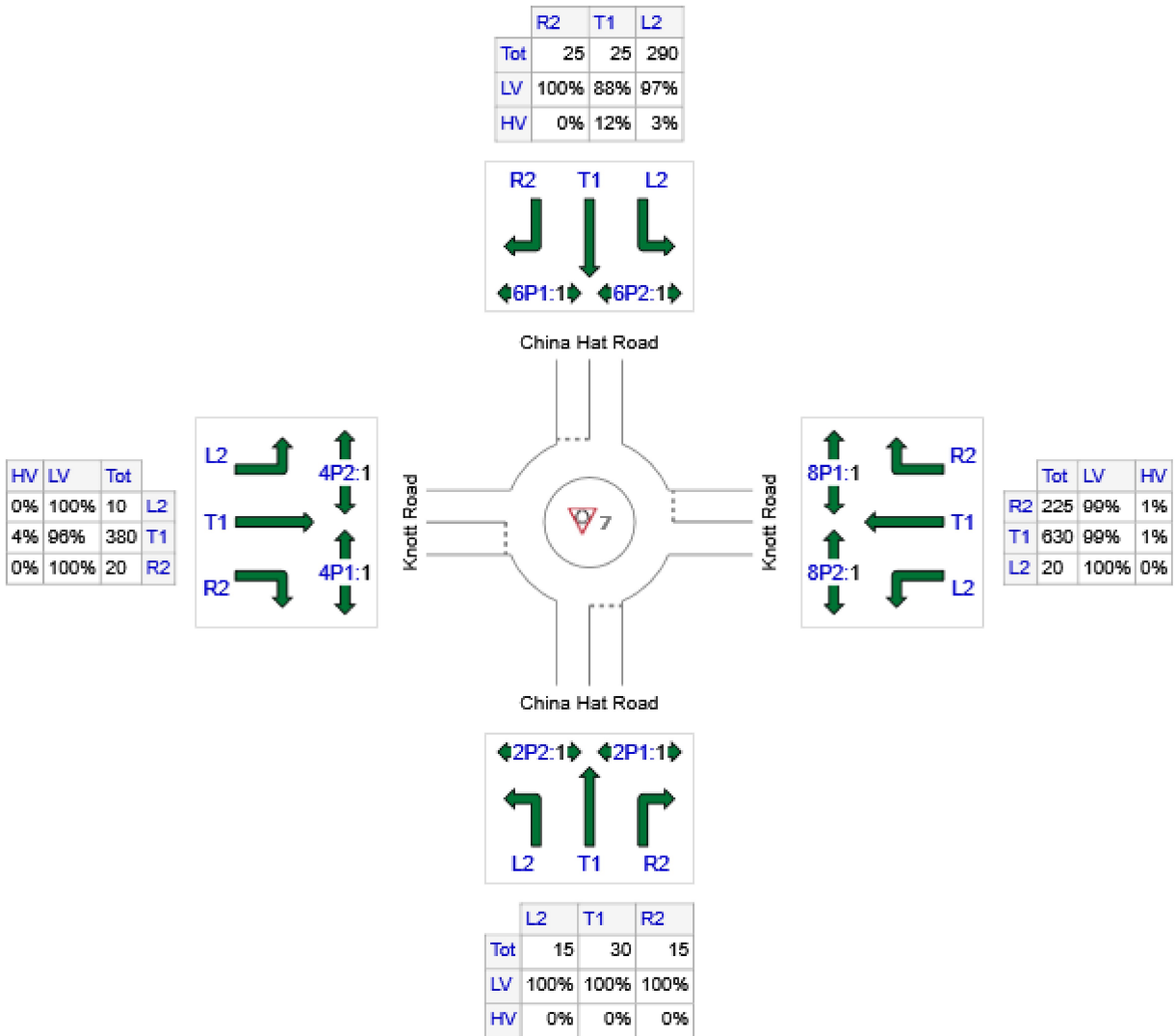
New Site
Site Category: (None)
Roundabout

Site Layout



Input Volumes

Volume Display Method: Total and %



	All MCs	Light Vehicles (LV)	Heavy Vehicles (HV)
S: China Hat Road	60	60	0
E: Knott Road	875	866	9
N: China Hat Road	340	328	12
W: Knott Road	410	395	15
Total	1685	1650	35

Lane Use and Performance													
	Demand	Flows		Deg.	Lane	Average	Level of	95% Back of Queue		Lane	Lane	Cap.	Prob.
	Total	HV	Cap.	Satn	Util.	Delay	Service	Veh	Dist	Config	Length	Adj.	Block.
	veh/h	%	veh/h	v/c	%	sec			ft		ft	%	%
South: China Hat Road													
Lane 1 ^d	67	0.0	621	0.107	100	7.0	LOS A	0.4	10.5	Full	1600	0.0	0.0
Approach	67	0.0		0.107		7.0	LOS A	0.4	10.5				
East: Knott Road													
Lane 1 ^d	972	1.0	1284	0.757	100	14.7	LOS B	10.6	266.0	Full	1600	0.0	0.0
Approach	972	1.0		0.757		14.7	LOS B	10.6	266.0				
North: China Hat Road													
Lane 1 ^d	378	3.4	623	0.606	100	17.3	LOS C	4.5	115.6	Full	1600	0.0	0.0
Approach	378	3.4		0.606		17.3	LOS C	4.5	115.6				
West: Knott Road													
Lane 1 ^d	456	3.7	898	0.507	100	10.6	LOS B	3.7	95.4	Full	1600	0.0	0.0
Approach	456	3.7		0.507		10.6	LOS B	3.7	95.4				
Intersection	1872	2.1		0.757		14.0	LOS B	10.6	266.0				

Site Level of Service (LOS) Method: Delay & v/c (HCM 6). Site LOS Method is specified in the Parameter Settings dialog (Site tab).

Roundabout LOS Method: Same as Sign Control.

Lane LOS values are based on average delay and v/c ratio (degree of saturation) per lane.

LOS F will result if v/c > 1 irrespective of lane delay value (does not apply for approaches and intersection).

Intersection and Approach LOS values are based on average delay for all lanes (v/c not used as specified in HCM 6).

Roundabout Capacity Model: US HCM 6.

HCM Delay Formula option is used. Control Delay does not include Geometric Delay since Exclude Geometric Delay option applies.

Gap-Acceptance Capacity: Traditional M1.

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

^d Dominant lane on roundabout approach

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Organisation: DKS ASSOCIATES | Created: Tuesday, March 16, 2021 3:03:22 PM

Project: X:\Projects\2020\IP20020-006 (ODOT Baker Rd IAMP)\Analysis\Synchro\02_Future No Build\Baker IAMP - 01 - Future No Build.sip8

Intersection						
Int Delay, s/veh	5					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔		↔	↑	↔	↔
Traffic Vol, veh/h	325	45	165	355	25	270
Future Vol, veh/h	325	45	165	355	25	270
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	250	-	150	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	0	2	2	1	1	2
Mvmt Flow	361	50	183	394	28	300

Major/Minor	Major1	Major2	Minor1			
Conflicting Flow All	0	0	411	0	1146	386
Stage 1	-	-	-	-	386	-
Stage 2	-	-	-	-	760	-
Critical Hdwy	-	-	4.12	-	6.41	6.22
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.218	-	3.509	3.318
Pot Cap-1 Maneuver	-	-	1148	-	221	662
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	464	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1148	-	186	662
Mov Cap-2 Maneuver	-	-	-	-	302	-
Stage 1	-	-	-	-	689	-
Stage 2	-	-	-	-	390	-

Approach	EB	WB	NB
HCM Control Delay, s	0	2.8	15.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	302	662	-	-	1148	-
HCM Lane V/C Ratio	0.092	0.453	-	-	0.16	-
HCM Control Delay (s)	18.1	14.9	-	-	8.7	-
HCM Lane LOS	C	B	-	-	A	-
HCM 95th %tile Q(veh)	0.3	2.4	-	-	0.6	-

Intersection												
Int Delay, s/veh	0											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↗↗	↗		↗↗	↗
Traffic Vol, veh/h	0	0	0	0	0	0	0	1870	0	0	2525	0
Future Vol, veh/h	0	0	0	0	0	0	0	1870	0	0	2525	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	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	53	-	-	57
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	6	0	0	0	0	6	0	0	4	2
Mvmt Flow	0	0	0	0	0	0	0	1948	0	0	2630	0

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	1315	-	-	974	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.02	-	-	6.9	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.36	-	-	3.3	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	143	0	0	255	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	143	-	-	255	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

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

Minor Lane/Major Mvmt	NBT	NBR	EBLn1WBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-	-
HCM Control Delay (s)	-	-	0	0	-
HCM Lane LOS	-	-	A	A	-
HCM 95th %tile Q(veh)	-	-	-	-	-

Intersection						
Int Delay, s/veh	0					
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations		↗		↕↕	↕↕	↗
Traffic Vol, veh/h	0	0	0	1870	2525	0
Future Vol, veh/h	0	0	0	1870	2525	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	-	-	-	100
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	96	96	96	96	96	96
Heavy Vehicles, %	0	0	0	4	2	0
Mvmt Flow	0	0	0	1948	2630	0

Major/Minor	Minor2	Major1	Major2
Conflicting Flow All	- 1315	-	0 - 0
Stage 1	-	-	- - -
Stage 2	-	-	- - -
Critical Hdwy	- 6.9	-	- - -
Critical Hdwy Stg 1	-	-	- - -
Critical Hdwy Stg 2	-	-	- - -
Follow-up Hdwy	- 3.3	-	- - -
Pot Cap-1 Maneuver	0 151	0	- - -
Stage 1	0 -	0	- - -
Stage 2	0 -	0	- - -
Platoon blocked, %			- - -
Mov Cap-1 Maneuver	- 151	-	- - -
Mov Cap-2 Maneuver	-	-	- - -
Stage 1	-	-	- - -
Stage 2	-	-	- - -

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

Minor Lane/Major Mvmt	NBT	EBLn1	SBT	SBR
Capacity (veh/h)	-	-	-	-
HCM Lane V/C Ratio	-	-	-	-
HCM Control Delay (s)	-	0	-	-
HCM Lane LOS	-	A	-	-
HCM 95th %tile Q(veh)	-	-	-	-

Intersection: 1: Apache Rd & Baker Rd

Movement	EB	WB	NB
Directions Served	TR	LT	LR
Maximum Queue (ft)	2188	49	342
Average Queue (ft)	1493	4	172
95th Queue (ft)	2834	26	395
Link Distance (ft)	2191	828	367
Upstream Blk Time (%)	36		18
Queuing Penalty (veh)	0		0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 2: Cinder Butte Rd/Pocahontas Ln & Baker Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	841	236	352	324
Average Queue (ft)	804	31	335	209
95th Queue (ft)	995	132	383	380
Link Distance (ft)	828	286	337	322
Upstream Blk Time (%)	61	0	96	27
Queuing Penalty (veh)	224	4	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 3: Baker Ct & Baker Rd

Movement	EB	WB	NB	NB
Directions Served	TR	LT	L	R
Maximum Queue (ft)	300	118	515	517
Average Queue (ft)	289	23	380	495
95th Queue (ft)	297	94	719	546
Link Distance (ft)	286	83	498	498
Upstream Blk Time (%)	72	9	73	95
Queuing Penalty (veh)	356	97	0	0
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 4: Baker Rd/Knott Rd & US 97 SB Ramp

Movement	EB	WB	WB	SB	SB
Directions Served	LT	T	R	L	R
Maximum Queue (ft)	143	438	112	425	611
Average Queue (ft)	100	47	9	410	589
95th Queue (ft)	131	313	83	474	606
Link Distance (ft)	83	758			555
Upstream Blk Time (%)	79	1			93
Queuing Penalty (veh)	464	9			844
Storage Bay Dist (ft)			150	300	
Storage Blk Time (%)		4		95	17
Queuing Penalty (veh)		12		620	42

Intersection: 5: Knott Rd & US 97 NB On Ramp

Movement	EB	WB	NB	NB	B91
Directions Served	LT	TR	LT	R	T
Maximum Queue (ft)	774	370	643	306	523
Average Queue (ft)	763	103	584	53	416
95th Queue (ft)	772	312	774	272	742
Link Distance (ft)	758	450	573		516
Upstream Blk Time (%)	72	1	83		76
Queuing Penalty (veh)	557	10	205		184
Storage Bay Dist (ft)				300	
Storage Blk Time (%)			93	9	
Queuing Penalty (veh)			180	5	

Intersection: 6: Scale House Rd & Knott Rd

Movement	WB	B19	NB
Directions Served	LT	T	LR
Maximum Queue (ft)	366	17	66
Average Queue (ft)	39	0	23
95th Queue (ft)	289	0	85
Link Distance (ft)	1198	1369	196
Upstream Blk Time (%)	0		1
Queuing Penalty (veh)	1		0
Storage Bay Dist (ft)			
Storage Blk Time (%)			
Queuing Penalty (veh)			

Intersection: 7: China Hat Rd & Knott Rd

Movement	EB	WB	NB	SB
Directions Served	LTR	LTR	LTR	LTR
Maximum Queue (ft)	102	330	50	245
Average Queue (ft)	21	95	15	94
95th Queue (ft)	70	282	45	181
Link Distance (ft)	1848	325	227	1110
Upstream Blk Time (%)		3		
Queuing Penalty (veh)		0		
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

Intersection: 8: Parrell Rd & China Hat Rd

Movement	EB	WB	NB	NB
Directions Served	TR	L	L	R
Maximum Queue (ft)	62	102	50	148
Average Queue (ft)	4	36	18	73
95th Queue (ft)	27	76	47	123
Link Distance (ft)				244
Upstream Blk Time (%)				
Queuing Penalty (veh)				
Storage Bay Dist (ft)		250	150	
Storage Blk Time (%)				0
Queuing Penalty (veh)				0

Intersection: 9: US 97 & Ponderosa St/China Hat Rd

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	2219	2213
Average Queue (ft)	1808	1808
95th Queue (ft)	3097	3096
Link Distance (ft)	2154	2154
Upstream Blk Time (%)	78	79
Queuing Penalty (veh)	0	0
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 10: US 97 & Rocking Horse Ct

Movement	SB	SB
Directions Served	T	T
Maximum Queue (ft)	1142	1147
Average Queue (ft)	973	975
95th Queue (ft)	1569	1570
Link Distance (ft)	1111	1111
Upstream Blk Time (%)	61	63
Queuing Penalty (veh)	762	793
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 60: China Hat Rd & Stonegate Dr

Movement	SW
Directions Served	LR
Maximum Queue (ft)	71
Average Queue (ft)	32
95th Queue (ft)	61
Link Distance (ft)	379
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 90: US 97 SB Ramp/US 97 SB Off Ramp & US 97 On Ramp

Movement	SW
Directions Served	T
Maximum Queue (ft)	1211
Average Queue (ft)	1180
95th Queue (ft)	1343
Link Distance (ft)	1189
Upstream Blk Time (%)	79
Queuing Penalty (veh)	713
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 118: US 97

Movement	NB	NW
Directions Served	T	R
Maximum Queue (ft)	28	48
Average Queue (ft)	2	4
95th Queue (ft)	18	23
Link Distance (ft)	1151	438
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 119: US 97 & US 97 On Ramp

Movement
Directions Served
Maximum Queue (ft)
Average Queue (ft)
95th Queue (ft)
Link Distance (ft)
Upstream Blk Time (%)
Queuing Penalty (veh)
Storage Bay Dist (ft)
Storage Blk Time (%)
Queuing Penalty (veh)

Intersection: 120: US 97 & US 97 NB Off Ramp

Movement	NB	NB	NB
Directions Served	T	T	R
Maximum Queue (ft)	3429	3428	183
Average Queue (ft)	1866	1879	118
95th Queue (ft)	4267	4262	272
Link Distance (ft)	3415	3415	
Upstream Blk Time (%)	38	38	
Queuing Penalty (veh)	0	0	
Storage Bay Dist (ft)			10
Storage Blk Time (%)			76
Queuing Penalty (veh)			391

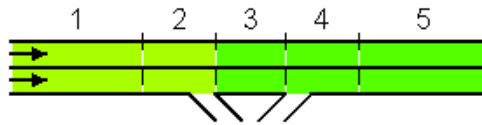
Intersection: 153: US 97 & US 97 SB Off Ramp

Movement	NB	NB	SB	SB
Directions Served	T	T	T	TR
Maximum Queue (ft)	9	46	3468	3468
Average Queue (ft)	0	2	3203	3216
95th Queue (ft)	7	35	4493	4473
Link Distance (ft)	274	274	3444	3444
Upstream Blk Time (%)		0	64	66
Queuing Penalty (veh)		0	803	826
Storage Bay Dist (ft)				
Storage Blk Time (%)				
Queuing Penalty (veh)				

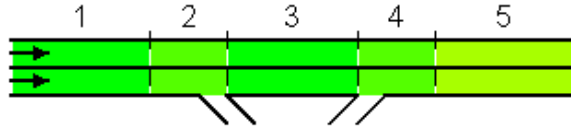
Network Summary

Network wide Queuing Penalty: 8101

APPENDIX B: FUTURE BASELINE FREEVAL OUTPUT



Segment	Seg. 1	Seg. 2	Seg. 3	Seg. 4	Seg. 5
General Purpose Segment Data	*	*	*	*	*
General Purpose Segment Name	US 97 SB	Baker SB Off-Ramp	Baker ramp to ramp	Baker on-ramp	South of Baker
General Purpose Segment Type	Basic	Off Ramp	Basic	On Ramp	Basic
Segment Length (ft)	2,640	1,500	1,425	1,500	2,640
Free Flow Speed (mph)	65	65	65	65	65
Mainline Dem. (vph)	2,525	2525	1645	2010	2010
Mainline Single Unit Truck and Bus (%)	4.00	4.00	4.00	4.00	4.00
Mainline Tractor Trailer (%)	4.00	4.00	4.00	4.00	4.00
Acc/Dec Lane Length (ft)		200		700	
# Lanes: ONR				1	
ONR Free Flow Speed (mph)				25	
ONR/Entering Dem. (vph)				365	
ONR Single Unit Truck and Bus (%)				4.00	
ONR Tractor Trailer (%)				4.00	
# Lanes: OFR		1			
OFR Free Flow Speed (mph)		45			
OFR/Exit Dem. (vph)		880			
OFR Single Unit Truck and Bus (%)		4.00			
OFR Tractor Trailer (%)		4.00			
Processed Segment Type	Basic	Off Ramp	Basic	On Ramp	Basic
Total Density (veh/mi/ln)	19.4	24.0	12.7	17.4	15.5
Total Density (pc/mi/ln)	21.0	25.9	13.7	18.8	16.7
D/C	0.58	0.58	0.38	0.46	0.46
V/C	0.58	0.58	0.38	0.46	0.46
Density Based LOS	C	C	B	B	B
Actual Travel Time (min)	0.46	0.30	0.25	0.30	0.46
FFS Travel Time (min)	0.46	0.26	0.25	0.26	0.46
Mainline Delay (min)	0.00	0.04	0.00	0.03	0.00



Segment	Seg. 1	Seg. 2	Seg. 3	Seg. 4	Seg. 5
General Purpose Segment Data	*	*	*	*	*
General Purpose Segment Name	S of Baker	Baker off-ramp	Baker ramp to ramp	Baker On-Ramp	US 97 NB
General Purpose Segment Type	Basic	Off Ramp	Basic	On Ramp	Basic
Segment Length (ft)	2,640	1,500	2,510	1,500	2,640
Free Flow Speed (mph)	65	65	65	55	45
Mainline Dem. (vph)	1,310	1310	1060	1870	1870
Mainline Single Unit Truck and Bus (%)	4.00	4.00	4.00	4.00	4.00
Mainline Tractor Trailer (%)	4.00	4.00	4.00	4.00	4.00
Acc/Dec Lane Length (ft)		230		700	
# Lanes: ONR				1	
ONR Free Flow Speed (mph)				45	
ONR/Entering Dem. (vph)				810	
ONR Single Unit Truck and Bus (%)				4.00	
ONR Tractor Trailer (%)				4.00	
# Lanes: OFR		1			
OFR Free Flow Speed (mph)		45			
OFR/Exit Dem. (vph)		250			
OFR Single Unit Truck and Bus (%)		4.00			
OFR Tractor Trailer (%)		4.00			
Processed Segment Type	Basic	Off Ramp	Basic	On Ramp	Basic
Total Density (veh/mi/ln)	10.1	13.3	8.2	18.2	20.8
Total Density (pc/mi/ln)	10.9	14.3	8.8	19.7	22.4
D/C	0.30	0.30	0.24	0.45	0.47
V/C	0.30	0.30	0.24	0.45	0.47
Density Based LOS	A	B	A	B	C
Actual Travel Time (min)	0.46	0.30	0.44	0.33	0.67
FFS Travel Time (min)	0.46	0.26	0.44	0.31	0.67
Mainline Delay (min)	0.00	0.03	0.00	0.02	0.00

APPENDIX C: FUTURE SENSITIVITY TESTING HCM REPORTS

Shared Major Street Left Turn Approach V/C Ratio Adjustment

There is a limitation of the Highway Capacity Manual (HCM) unsignalized intersection methodology for shared left turn approaches. Major street left turns are always treated as exclusive turn lanes regardless of how they are coded. This can result in very low shared left turn v/c ratios (like 0.01) on an approach that should be over capacity. Shared major left turn vehicles are approximated in the HCM methodology by adjusting the potential for a "queue-free state" in the case of delaying through movement vehicles. The table below shows the inputs used to calculate the adjusted shared major street approach v/c ratio per ODOT Analysis and Procedures Manual Chapter 12.

Future Sensitivity Scenario 1 Results

ID	Intersection	Movement	Output from Synchro:		
			Left Turn V/C	Thru Vol	Adjusted V/C
4	Baker Rd/Knott Rd & US 97 SB ramp	EBL	0.068	520	0.37
5	Knott Rd & US 97 NB on ramp	EBL	0.615	525	0.92
8	Parrell Rd & China Hat Rd	WBL	0.013	10	0.02

Intersection

Int Delay, s/veh 107.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕	↕	↕	↕
Traffic Vol, veh/h	65	520	490	300	335	630
Future Vol, veh/h	65	520	490	300	335	630
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	-	-	50	180	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	8	3	3	1	2	2
Mvmt Flow	69	553	521	319	356	670

Major/Minor

	Major1	Major2	Minor2		
Conflicting Flow All	521	0	0	1212	521
Stage 1	-	-	-	521	-
Stage 2	-	-	-	691	-
Critical Hdwy	4.18	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	5.42	-
Follow-up Hdwy	2.272	-	-	3.518	3.318
Pot Cap-1 Maneuver	1015	-	-	~ 201	~ 555
Stage 1	-	-	-	596	-
Stage 2	-	-	-	497	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1015	-	-	~ 181	~ 555
Mov Cap-2 Maneuver	-	-	-	~ 181	-
Stage 1	-	-	-	538	-
Stage 2	-	-	-	497	-

Approach

	EB	WB	SB
HCM Control Delay, s	1	0	260.2
HCM LOS			F

Minor Lane/Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1015	-	-	-	181	555
HCM Lane V/C Ratio	0.068	-	-	-	1.969	1.208
HCM Control Delay (s)	8.8	0	-	-	498.2	133.7
HCM Lane LOS	A	A	-	-	F	F
HCM 95th %tile Q(veh)	0.2	-	-	-	26.9	24.6

Notes

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

HCM 6th TWSC
5: Knott Rd & US 97 NB On Ramp

03/10/2021

Intersection												
Int Delay, s/veh	855.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔	↔			
Traffic Vol, veh/h	330	525	0	0	735	335	55	0	195	0	0	0
Future Vol, veh/h	330	525	0	0	735	335	55	0	195	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	-	-	-	-	-	300	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	15	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	3	3	0	0	2	7	2	100	2	0	0	0
Mvmt Flow	363	577	0	0	808	368	60	0	214	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	1176	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.13	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.227	-	-
Pot Cap-1 Maneuver	590	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	590	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	7.9	0	\$ 7413.6
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	1	406	590	-	-	-
HCM Lane V/C Ratio	60.44	0.528	0.615	-	-	-
HCM Control Delay (s)	\$ 33615.4	23.4	20.3	0	-	-
HCM Lane LOS	F	C	C	A	-	-
HCM 95th %tile Q(veh)	9.8	3	4.2	-	-	-

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

Intersection						
Int Delay, s/veh	27.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	10	10	480	165	360	25
Future Vol, veh/h	10	10	480	165	360	25
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	15	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	1	2	2	1
Mvmt Flow	11	11	533	183	400	28

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	716	0	-	0	658 625
Stage 1	-	-	-	-	625 -
Stage 2	-	-	-	-	33 -
Critical Hdwy	4.12	-	-	-	6.42 6.21
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	2.218	-	-	-	3.518 3.309
Pot Cap-1 Maneuver	885	-	-	-	429 487
Stage 1	-	-	-	-	534 -
Stage 2	-	-	-	-	989 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	885	-	-	-	424 487
Mov Cap-2 Maneuver	-	-	-	-	424 -
Stage 1	-	-	-	-	528 -
Stage 2	-	-	-	-	989 -

Approach	EB	WB	SB
HCM Control Delay, s	4.6	0	74.8
HCM LOS			F

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	885	-	-	-	428
HCM Lane V/C Ratio	0.013	-	-	-	0.999
HCM Control Delay (s)	9.1	-	-	-	74.8
HCM Lane LOS	A	-	-	-	F
HCM 95th %tile Q(veh)	0	-	-	-	12.7

Intersection												
Int Delay, s/veh	40.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations			↗			↗		↗↗	↗		↗↗	↗
Traffic Vol, veh/h	0	0	20	0	0	505	0	1705	20	0	2590	230
Future Vol, veh/h	0	0	20	0	0	505	0	1705	20	0	2590	230
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	-	-	None	-	-	None	-	-	None
Storage Length	-	-	0	-	-	0	-	-	53	-	-	57
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	96	96	96	96	96	96	96	96	96	96	96	96
Heavy Vehicles, %	0	0	6	0	0	0	0	6	0	0	4	2
Mvmt Flow	0	0	21	0	0	526	0	1776	21	0	2698	240

Major/Minor	Minor2		Minor1		Major1		Major2					
Conflicting Flow All	-	-	1349	-	-	888	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	7.02	-	-	6.9	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.36	-	-	3.3	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	136	0	0	~ 291	0	-	-	0	-	-
Stage 1	0	0	-	0	0	-	0	-	-	0	-	-
Stage 2	0	0	-	0	0	-	0	-	-	0	-	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	136	-	-	~ 291	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	-	-	-	-	-
Stage 1	-	-	-	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-	-	-	-

Approach	EB		WB		NB		SB	
HCM Control Delay, s	36.2		\$ 406.7		0		0	
HCM LOS	E		F					

Minor Lane/Major Mvmt	NBT	NBR	EBLn1	WBLn1	SBT	SBR
Capacity (veh/h)	-	-	136	291	-	-
HCM Lane V/C Ratio	-	-	0.153	1.808	-	-
HCM Control Delay (s)	-	-	36.2	\$ 406.7	-	-
HCM Lane LOS	-	-	E	F	-	-
HCM 95th %tile Q(veh)	-	-	0.5	35	-	-

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

Shared Major Street Left Turn Approach V/C Ratio Adjustment

There is a limitation of the Highway Capacity Manual (HCM) unsignalized intersection methodology for shared left turn approaches. Major street left turns are always treated as exclusive turn lanes regardless of how they are coded. This can result in very low shared left turn v/c ratios (like 0.01) on an approach that should be over capacity. Shared major left turn vehicles are approximated in the HCM methodology by adjusting the potential for a "queue-free state" in the case of delaying through movement vehicles. The table below shows the inputs used to calculate the adjusted shared major street approach v/c ratio per ODOT Analysis and Procedures Manual Chapter 12.

Future Sensitivity Scenario 2 Results

ID	Intersection	Movement	Output from Synchro:		
			Left Turn V/C	Thru Vol	Adjusted V/C
4	Baker Rd/Knott Rd & US 97 SB ramp	EBL	0.068	520	0.37
5	Knott Rd & US 97 NB on ramp	EBL	0.707	525	1.02

Intersection

Int Delay, s/veh 107.6

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations		↕	↕	↕	↕	↕
Traffic Vol, veh/h	65	520	490	300	335	630
Future Vol, veh/h	65	520	490	300	335	630
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	Yield	-	None
Storage Length	-	-	-	50	180	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	8	3	3	1	2	2
Mvmt Flow	69	553	521	319	356	670

Major/Minor

	Major1	Major2	Minor2		
Conflicting Flow All	521	0	0	1212	521
Stage 1	-	-	-	521	-
Stage 2	-	-	-	691	-
Critical Hdwy	4.18	-	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	5.42	-
Follow-up Hdwy	2.272	-	-	3.518	3.318
Pot Cap-1 Maneuver	1015	-	-	~ 201	~ 555
Stage 1	-	-	-	596	-
Stage 2	-	-	-	497	-
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	1015	-	-	~ 181	~ 555
Mov Cap-2 Maneuver	-	-	-	~ 181	-
Stage 1	-	-	-	538	-
Stage 2	-	-	-	497	-

Approach

	EB	WB	SB
HCM Control Delay, s	1	0	260.2
HCM LOS			F

Minor Lane/Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1015	-	-	-	181	555
HCM Lane V/C Ratio	0.068	-	-	-	1.969	1.208
HCM Control Delay (s)	8.8	0	-	-	498.2	133.7
HCM Lane LOS	A	A	-	-	F	F
HCM 95th %tile Q(veh)	0.2	-	-	-	26.9	24.6

Notes

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

HCM 6th TWSC
5: Knott Rd & US 97 NB On Ramp

03/10/2021

Intersection												
Int Delay, s/veh	3.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔			↔	↔			
Traffic Vol, veh/h	330	525	0	0	735	480	55	0	195	0	0	0
Future Vol, veh/h	330	525	0	0	735	480	55	0	195	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	Stop	-	-	None
Storage Length	-	-	-	-	-	-	-	-	300	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	16965	-
Grade, %	-	0	-	-	0	-	-	15	-	-	0	-
Peak Hour Factor	91	91	91	91	91	91	91	91	91	91	91	91
Heavy Vehicles, %	3	3	0	0	2	7	2	100	2	0	0	0
Mvmt Flow	363	577	0	0	808	527	60	0	214	0	0	0

Major/Minor	Major1	Major2	Minor1
Conflicting Flow All	1335	0	-
Stage 1	-	-	-
Stage 2	-	-	-
Critical Hdwy	4.13	-	-
Critical Hdwy Stg 1	-	-	-
Critical Hdwy Stg 2	-	-	-
Follow-up Hdwy	2.227	-	-
Pot Cap-1 Maneuver	513	-	0
Stage 1	-	-	0
Stage 2	-	-	0
Platoon blocked, %	-	-	-
Mov Cap-1 Maneuver	513	-	-
Mov Cap-2 Maneuver	-	-	-
Stage 1	-	-	-
Stage 2	-	-	-

Approach	EB	WB	NB
HCM Control Delay, s	10.5	0	
HCM LOS			-

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT	WBR
Capacity (veh/h)	-	406	513	-	-	-
HCM Lane V/C Ratio	-	0.528	0.707	-	-	-
HCM Control Delay (s)	-	23.4	27.2	0	-	-
HCM Lane LOS	-	C	D	A	-	-
HCM 95th %tile Q(veh)	-	3	5.6	-	-	-

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

Intersection						
Int Delay, s/veh	6.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	0	0	0	345	345	0
Future Vol, veh/h	0	0	0	345	345	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	15	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	2	0	1	2	2	1
Mvmt Flow	0	0	0	383	383	0

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	383	0	-	0	192
Stage 1	-	-	-	-	192
Stage 2	-	-	-	-	0
Critical Hdwy	4.12	-	-	-	6.42
Critical Hdwy Stg 1	-	-	-	-	5.42
Critical Hdwy Stg 2	-	-	-	-	5.42
Follow-up Hdwy	2.218	-	-	-	3.518
Pot Cap-1 Maneuver	1175	-	-	-	797
Stage 1	-	-	-	-	841
Stage 2	-	-	-	-	-
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1175	-	-	-	797
Mov Cap-2 Maneuver	-	-	-	-	797
Stage 1	-	-	-	-	841
Stage 2	-	-	-	-	-

Approach	EB	WB	SB
HCM Control Delay, s	0	0	13.6
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1175	-	-	-	797
HCM Lane V/C Ratio	-	-	-	-	0.481
HCM Control Delay (s)	0	-	-	-	13.6
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	2.6