



MEMORANDUM

TO: Bill Irwin, Project Manager, MRG, LP

FROM: Christopher J. Fasching, PE, PTOE

DATE: May 25th, 2022

SUBJECT: CE Oil/Gas Pad Site on LCR 3
Traffic Impact Assessment
FHU Project Number 122133-01

INTRODUCTION

MRG, LP is proposing to construct, develop and operate a new oil and gas well located on the west side of LCR 3 approximately one-third mile north of US 34. The site will occupy an approximate 10-acre site on the east side of Kinston.

The intent of this memo is to assess the traffic impact associated with the well site. Specifically, this memo shows the impact of each phase of the well's development and construction relative to the nature of trip-making with the intent of focusing on the phase in which the daily trip generation is greatest. Typically, well development/construction is an eight to ten-month process, and each phase can be as short as one week or as long as three months. Only short-term analyses are presented since the development/construction time represents the greatest trip-making for this proposal which will only be a short-term consideration. The long-term impact will be minimal as the daily generation (once operating) will average only three trips per day.

The scope and several key assumptions presented in this memorandum were documented in a scoping package submitted to the city. A meeting was held and to discuss the content, and a city representative approved the package. A copy is attached.

EXISTING CONDITIONS

The site is currently vacant, and Kinston is developing to the west. The immediate surrounding area is rural with agricultural activity. LCR 3 is an unimproved two-lane road adjacent to the site up to Crossroads Boulevard. From observation, the roadway appears to be treated with dust control mitigation. South of the Loveland and Greeley Canal, the surface of LCR 3 contains some pavement down to US 34. Auxiliary left turn and right turn accel/decel lanes are provided at the US 34/LCR 3 intersection. Ultimately, LCR 3 is proposed to be realigned to the east in conjunction with the Encore development in Johnstown (on the east side of LCR 3). The realignment will shift this roadway's US 34 intersection approximately 875 feet east once completed.

There is the potential of routing well truck traffic along Colorado Boulevard which is one mile east of LCR 3. Colorado Boulevard is two-lane paved highway. Its intersection with US 34 is signalized, and auxiliary accel/decel lanes are provided. In addition, the northbound and southbound approaches at this intersection include separate right turn lanes; through southbound approach also include a separated bike-one lane.

Traffic count data was collected at both US 34 intersections and a 24-hour count was collected along LCR 3. The data are summarized in **Figure I**. The peak hour traffic flows along US 34 reach as much as 2145 vehicles per hour in the eastbound direction (at LCR 3). Colorado Boulevard serves 300 to 400 vehicles per hour in

each direction during the PM peak hour, and LCR 3 serves far less with 10 to 20 vehicles per hour traveling in each direction at peak times.

Based on the peak hour traffic counts, Levels of Service were calculated at the two intersections, which is also shown in **Figure 1**. Currently, left turn movements from the LCR 3 onto US 34 experience significant delay due to the heavy through traffic that US 34 serves. The intersection of US 34/Colorado Boulevard, being signalized, functions at an overall LOS of C during the AM peak hour and LOS E during the PM peak hour. The heavy east-west through traffic is the primary culprit to the less-than-ideal LOS's. The LOS worksheets are attached.

TRIP GENERATION

The trip-making associated with oil & gas wells is very unique. In the long-term (once the well is up and operating), trip generation is minimal. The greater level of trip-making occurs while the well is being developed, and there are varying construction phases to well development. Each phase entails unique equipment, resources and personnel, and this uniqueness directly translates into varying level of trip generation.

Each phase of the well's development and construction has been assessed to understand the nature of trip-making associated with each, and the phase in which the daily trip generation is greatest has been the analytical focus. Typically, well development/construction is an 8 to 10-month process, and each phase can be as short as one week or as long as three months. No long-term analyses are needed in this evaluation since daily generation once operating will only be 3 trips per day.

Several tables are attached showing activity and trip generation for the CE well's development phases. **Table 1** is a trip generation summary table that is informed by detailed information in **Table 2**. From these tables, there are two phases that surface as possibly being critical; the Completion-Stimulation phase which is projected to generate 112 trips per day and the Flowback Operations phase with is projected to generate 124 trips per day.

A deeper review was conducted that entailed traffic routing associated with each phase. The Completion-Stimulation phase entails a truck routing plan routing that would use a number of routing plans depending on the exact sand terminal that ends up being used. Trucks could be oriented down LCR 3 to US 34 and west to I-25 (and vice versa for inbound trips), or they could be oriented to/from the east via US 34. With respect to the US 34/ LCR 3 intersection, this phase could add southbound right turn movements and eastbound left turn movements during its duration, or it might instead add southbound left turn movement and westbound right turn movements.

The other critical phase, Flowback Operations, would entail hauling out water to disposal wells in the Gilcrest area. This phase will without a doubt add more traffic to the southbound left turn movement and westbound right turn movement at US 34/LCR3. The southbound left turn movement is the more critical consideration at this intersection, so given this and that the Flowback Operations phase will generate slightly more traffic than the Completion-Stimulation phase, the Flowback Operations phase will be the focus of this analysis. This phase will generate 124 trips per day in which 97 percent will be heavy vehicles (which we accounted in the capacity analyses). The duration of this phase is projected to be 30 days, so again it will be relatively short-lived.

The Flowback Operations phase is the critical phase, and distribution for this phase will tend to involve movements to/from the east along US 34. For this analysis, Flowback Operations trip distribution is assumed to be onto US 34 with 80 percent oriented to/from the east and 20 percent to/from the west, as depicted in **Figure 2**.

TRAFFIC PROJECTIONS

As mentioned, only short-term traffic analyses are being assessed since the trip-making associated with the well site will be minimal in the long-term planning horizon. For the short-term, two traffic volume projection scenarios have been developed. Scenario 1 entails the site utilizing LCR 3 for all its traffic to/from US 34. Scenario 2 entails utilizing Colorado Boulevard for the outbound well traffic that will be traveling toward the east. Scenario 2 was identified in a scoping session with the city as a means of alleviated southbound to eastbound left turn movements at the unsignalized intersection of US 34/LCR 3. Rather, these movements would instead travel north along LCR 3, east along Crossroads Boulevard to Colorado Boulevard, and then south to US 34 where a left turn can be better accommodated via a signalized intersection.

The site-generated traffic for each scenario is presented in **Figure 3** and **Figure 4** for Scenarios 1 and 2, respectively. These were derived by applying the site trip distribution percentages to the trip estimates of **Table I**. The difference between these two is simply how southbound to eastbound left turns are assigned.

Total traffic projections were developed simply by adding well construction traffic (Flowback Operations phase) to existing traffic. **Figure 5** and **Figure 6** shows the total traffic results for Scenario 1 and 2, respectively, which were derived by summing traffic projections shown in **Figure 3** and **Figure 4** with existing traffic of **Figure 1**. As compared to the existing traffic, each scenario adds a handful movements to the north legs at US 34/LCR 3 and US 34/Colorado Boulevard.

TRAFFIC ANALYSIS

Figure 5 and **Figure 6** also show the LOS for the two intersections for each scenario. The additional traffic generated by well construction/development was assumed to be heavy vehicles, so the analytical worksheets reflect a much higher heavy-vehicle presence accordingly. From these figures, the same movements are seen to have poor LOS's, namely the SB and NB lefts at LCR 3 and select movements at the Colorado Boulevard. The LOS worksheets are attached.

A deeper review of the LOS results and associated delay calculation results was conducted, and the results are presented in **Table 3** on a movement-by-movement basis. The table shows that the southbound left at US 34/LCR 3 would significantly diminish given the additional traffic associated with Scenario 1. Shifting the southbound left turning traffic to the US 34/Colorado Boulevard alleviates this issue, and the US 34/Colorado Boulevard intersection will have adequate reserve to accommodate the additional demand. Again, the condition is temporary lasting about 30 days. Over the long-term, the well will generate minimal traffic, and the US 34/LCR 3 intersection will eventually be signalized once the LCR 3 alignment is realigned to the east and traffic from other nearby planned development warrants its installation.

RECOMMENDATIONS

The key recommendation resulting from the preceding analysis entails routing outbound traffic heading east on US 34 to Colorado Boulevard where a traffic signal onto US 34 is provided. Allowing well construction traffic, particularly heavy vehicles, to turn left onto eastbound US 34 at LCR 3 will be problematic given the heavy flows that exist along US 34 during peak hours. Truck routing to US 34 east will need to be controlled, entailing outbound heavy vehicles to travel north from the site to Crossroads Boulevard, turning east to Colorado Boulevard, and then south to US 34. Continued roadway surface maintenance to control dust along LCR 3 is recommended while the well site is under construction.

Table 1 CE Oil & Gas Well Development Trip Generation Estimates

Oil/Gas Well Phase	Duration in Days	Average Daily Trip Generation	AM Peak hour Generation IN/OUT	PM Peak hour Generation IN/OUT	% Heavy Vehicles
Well Pad Construction	21	26	4/0	1/4	92
Drilling Rig Mobilization and Demobilization	7	32	4/0	1/4	65
Drilling - Actual*	90	28	2/0	1/2	70
Completion-Stimulation*	60	112	10/2	3/10	90
Completion - Rig Work*	30	25	2/1	1/2	5
Completion - Facility Construction	30	24	4/0	1/5	50
Flowback Operations*	30	124	5/3	3/5	97
Production 1st Year	305	53	4/0	1/4	90
Production subsequent 19 years	6935	3	1/0	0/1	35
Well Abandonment*	30	12	2/0	1/2	50

* 24-hour operation.

Table 2 CE PAD ESTIMATED VEHICLE TRIP COUNT - Frac Water Piped to Location - 15 wells

4/12/2022

Vehicle Type		Load Weight ¹	Number of Vehicles	Trips per vehicle ²	UOM	Number	Total Trips ³	Notes
WELL PAD CONSTRUCTION		Construct Drilling Pad			Duration (days)	21	536	TOTAL TRIPS Avg Daily 26
Dozer	in loaded, out loaded	80,000	1	2	Pad	1	2	
Motor Grader	in loaded, out loaded	70,000	1	2			2	
Scraper	in loaded, out loaded	70,000	1	2			2	
Haul trucks	out empty, in empty	25,000	3	2			6	
Backhoe	in loaded, out loaded	45,000	1	2			2	
Semi Truck Belly Dump	in loaded	75,000	10	24			240	Hauling gravel
Semi Truck Belly Dump	out empty	25,000	10	24			240	Hauling gravel
Supervisor pickups		6,500	2	21			42	
DRILLING - RIG MOBILIZATION & DEMOB		Move rig equipment in and out			Duration (days)	7	222	TOTAL TRIPS Avg Daily 32
Substructure	in loaded, out loaded	75,000	1	2	Pad	1	2	
Rig Carrier	in loaded, out loaded	92,000	1	2			2	
Derrick, blocks, drilling line	in loaded, out loaded	65,000	1	2			2	
Top Doghouse/Water tank	in loaded, out loaded	70,000	1	2			2	
Bottom Doghouse	in loaded, out loaded	65,000	1	2			2	
Generators	in loaded, out loaded	60,000	3	2			6	
Fuel Tank	in loaded, out loaded	30,000	1	2			2	
Catwalks & pipe racks	in loaded, out loaded	50,000	1	2			2	
Fittings Baskets	in loaded, out loaded	50,000	1	2			2	
Mud Pumps	in loaded, out loaded	80,000	3	2			6	
Drill pipe and drill collars	in loaded, out loaded	75,000	3	2			6	
Loader w/ Bucket-Forks	in loaded, out loaded	60,000	1	2			2	
Light Plant	in loaded, out loaded	60,000	1	2			2	
Solids Control - Rig	in loaded, out loaded	75,000	2	2			4	
Solids Control - Closed Loop	in loaded, out loaded	75,000	3	2			6	
Logging truck	in loaded, out loaded	45,000	1	2			2	Logging once per pad
Trash Basket	in empty, out loaded	10,000	1	2			2	
Accommodations Trailers	in loaded, out loaded	32,000	10	2			20	
Septic/Fresh water system	in loaded, out loaded	15,000	5	2			10	
PortaPotties	in loaded, out loaded	12,000	1	2			2	
Crew pickups		6,500	6	7			42	
Supervisor Vehicle		6,500	4	7			28	
Mobilization: Haul trucks	out empty	30,000	34	1			34	
Demobilization: Haul trucks	in empty	30,000	34	1			34	
DRILLING - ACTUAL		Drill 15 x 1.5 mile Hz Wells -			Duration (days)	90	2490	TOTAL TRIPS Avg Daily 28
Water truck - 150 bbl Semi	in loaded	75,000	1	5	Well	15	75	Drilling Fluids are Recycled
Water truck - 150 bbl Semi	out empty	30,000	1	5			75	
Drilling Fluid Chemicals - Tandem	in loaded	54,000	1	1			15	
Drilling Fluid Chemicals - Tandem	out empty	24,000	1	1			15	
Fuel truck - Tandem	in loaded	50,000	1	2			30	
Fuel truck - Tandem	out empty	20,000	1	2			30	
Cuttings haul truck - Tandem	out loaded	54,000	1	25			375	
Cuttings haul truck - Tandem	in empty	24,000	1	25			375	
Crew Vehicle		6,500	2	12			360	
Supervisor Vehicle		6,500	2	12			360	
Potable water	in loaded, out empty	20,000	2	2			60	
Septic Service	in empty, out loaded	20,000	2	2			60	
Trash Basket	in empty, out loaded	10,000	1	2			30	
Directional Tools	in and out	30,000	1	2			30	
Miscellaneous Tools	in and out	30,000	1	2			30	
Surface Casing pipe trucks	in loaded	75,000	2	2			60	
Surface Casing pipe trucks	out empty	25,000	2	2			60	
Production Casing pipe trucks	in loaded	75,000	5	1			75	
Production Casing pipe trucks	out empty	25,000	5	1			75	
Surface Casing Cement pickup		6,500	1	2			30	
Surface Casing Cement pump truck		75,000	1	2			30	
Surface Casing Cement bulk truck	in loaded	75,000	2	2			60	
Surface Casing Cement bulk truck	out empty	30,000	2	2			60	
Production Casing Cement pickup		6,500	1	2			30	
Production Casing Cement pump truck		75,000	1	2	30			
Production Casing Cement bulk trucks	in loaded	75,000	2	1	30			
Production Casing Cement bulk trucks	out empty	30,000	2	1	30			

Table 2 CE PAD ESTIMATED VEHICLE TRIP COUNT - Frac Water Piped to Location - 15 wells

4/12/2022

Vehicle Type		Load Weight ¹	Number of Vehicles	Trips per vehicle ²	UOM	Number	Total Trips ³	Notes			
COMPLETION - STIMULATION		Fracture 15 wells - Duration (days)				60	6722	TOTAL TRIPS Avg Daily 112			
Downhole blender		75,000	1	2	Pad	1	2	Move In and Out Frac and Auxillary Equipment			
Pre-gel blender		75,000	1	2			2				
Pump trucks		75,000	12	2			24				
Iron truck		54,000	2	2			4				
Control Van		50,000	1	2			2				
Wireline Truck - CBL, Plug and Perf		45,000	1	2			2				
Frac tanks 10	loaded	35,000	10	2			20				
Frac tanks 10	empty	25,000	10	2			20				
MLVT tanks 4	loaded	75,000	4	2			8				
MLVT tanks 4	empty	25,000	4	2			8				
Chemical truck	in loaded	50,000	1	1	Well	15	15	Water is piped to Location			
Chemical truck	out empty	20,000	1	1			15				
Supervisor Pickups		6,500	6	8			720				
Crew Bus		15,000	2	8			240				
Fuel truck	in loaded	50,000	1	4			60				
Fuel truck	out empty	30,000	1	4			60				
Gel truck	in loaded	75,000	1	4			60				
Gel truck	out empty	30,000	1	4			60				
Sand trucks	in loaded	75,000	20	9			2700		Hauling frac sand		
Sand trucks	out empty	25,000	20	9			2700				
Water truck - 120 bbl Semi	in loaded						0				
Water truck - 120 bbl Semi	out empty						0				
COMPLETION - RIG WORK		Drill out Plugs and Run Tubing 15 wells - Duration (days)							30	758	TOTAL TRIPS Avg Daily 25
Completion Rig	in & out	90,000	1	2			Pad		1	2	Concurrent w/ facility construction
Breakdown Truck	in & out	75,000	2	2						4	
Kill Fluid Chemical - Tandem	Loaded In	54,000	1	1	1						
Kill Fluid Chemical - Tandem	Empty Out	24,000	1	1	1						
Supervisor pickups		6,500	4	8	Well	15	480				
Crew pickups		6,500	2	8			240				
Tubing trucks	in loaded	75,000	1	1			15				
Tubing trucks	out empty	30,000	1	1			15				
COMPLETION - FACILITY CONSTRUCTION		Construct Production Facility Duration (days)				30	724	TOTAL TRIPS Avg Daily 24			
Backhoe		45,000	1	2	Pad	1	2	Concurrent w/ rig work			
Tool trucks & welder		45,000	5	60			300				
Equipment delivery - tanks	in loaded	50,000	1	1			1				
	out empty	24,000	1	1			1				
Equipment delivery - production equipment	in loaded	50,000	25	1			25				
	out empty	24,000	25	1			25				
Flowlines and Fittings	in loaded	50,000	5	1			5				
	out empty	24,000	5	1			5				
Supervisor Pickups		6,500	2	60			120				
Crew Pickups		6,500	4	60			240				
COMPLETION - TOTAL		(Stimulation, Rig Work, Facility Construction) Duration (days)				90	8204	TOTAL TRIPS Avg Daily 91			

Table 2 CE PAD ESTIMATED VEHICLE TRIP COUNT - Frac Water Piped to Location - 15 wells

4/12/2022

Vehicle Type		Load Weight ¹	Number of Vehicles	Trips per vehicle ²	UOM	Number	Total Trips ³	Notes			
FLOWBACK OPERATIONS		Flowback 15 wells after Completion			Duration (days)		60	7450	TOTAL TRIPS	Avg Daily	124
Water Trucks - 150 bbl Semi	Empty In	25,000	20	168	Pad	1	3360				
Water Trucks - 150 bbl Semi	Loaded Out	75,000	20	168			3360				
Equipment delivery & removal	Loaded In	50,000	5	1			5				
	Empty Out	24,000	5	1			5				
Crew Pickups			2	120			240				
Supervisor pickups		6,500	4	120			480				
PRODUCTION REMAINDER OF FIRST YEAR		Haul water			Duration (days)		305	16220	TOTAL TRIPS	Avg Daily	53
Production attendant pickup		6,500	2	610	Pad	1	1220				
Crew pickups		6,500	2	300			600				
Oil haul truck	pipeline	85,000		0			0				
Oil haul truck	pipeline	25,000		0			0				
Water haul truck	out loaded	75,000	10	720			7200				
Water haul truck	in empty	30,000	10	720			7200				
PRODUCTION NEXT 19 YEARS		Oil and Water Offtake -			Duration (days)		6935	20870	TOTAL TRIPS	Avg Daily	3
Production attendant pickup		6,500	1	13870	Pad	1	13870	Once Daily			
Oil haul truck	pipeline	85,000					0				
Oil haul truck	pipeline	25,000					0				
Water haul truck	out loaded	75,000	1	3500			3500				
Water haul truck	in empty	30,000	1	3500			3500				
WELL ABANDONMENT (after 20 years)		Abandon wells and facility -			Duration (days)		30	362	TOTAL TRIPS	Avg Daily	12
Completion Rig		90,000	1	2	Pad	1	2				
Supervisor pickups		6,500	2	4	Well	15	120				
Crew pickups		6,500	1	4			60				
Tubing trucks	out loaded	75,000	1	1			15				
Tubing trucks	in empty	30,000	1	1			15				
Casing Cement pickup		6,500	1	2			30				
Casing Cement pump truck		75,000	1	2			30				
Casing Cement bulk truck	in loaded	75,000	1	1			15				
Casing Cement bulk truck	out empty	30,000	1	1			15				
Wireline truck		45,000	1	2			30				
Water truck - 150 bbl Semi	in loaded	75,000	1	1			15				
Water truck - 150 bbl Semi	out empty	30,000	1	1			15				
Production equipment haul trucks	in empty	25,000	5	5			Pad	1	25		
Production equipment haul trucks	out loaded	75,000	5	5			25				

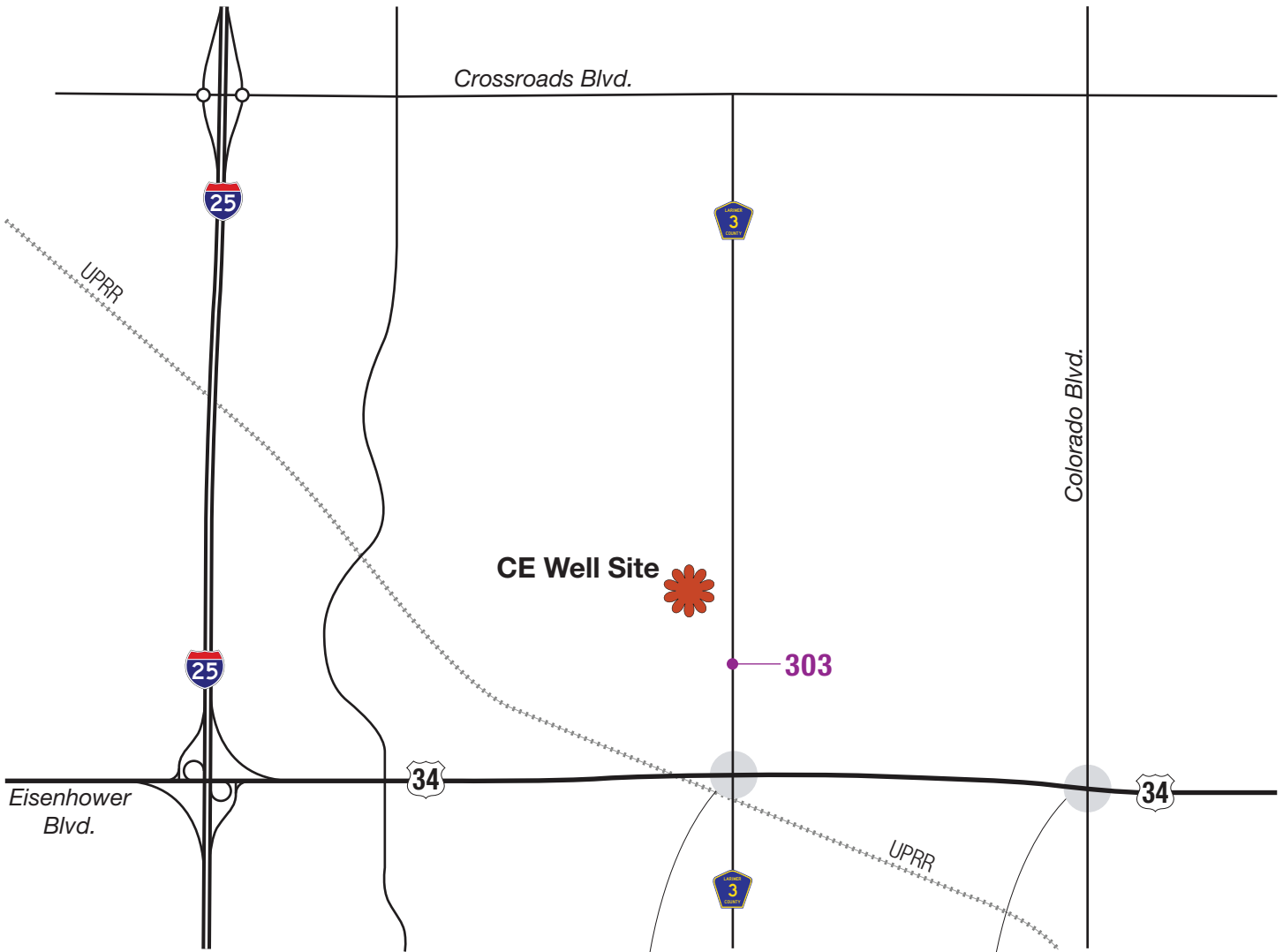
¹ Load weights include haul trucks, if applicable

² A trip is defined as one-way event, ie one vehicle going to the well will be counted as two trips, 1 in & 1 out

³ Total trips for each phase, not trips per day

Table 3. Intersection LOS and Delay (Seconds per Vehicle)

Intersection/ Movement	Existing LOS(Delay(s))		Scenario 1 LOS(Delay(s))		Scenario 2 LOS(Delay(s))	
	AM	PM	AM	PM	AM	PM
US34 & LCR 3						
NB Right	C(21)	D(32)	C(21)	D(32)	C(21)	D(32)
SB Approach	F(58)	F(59)	F(254)	F(395)	F(118)	F(100)
EB Left	C(20)	C(20)	C(24)	C(21)	C(24)	C(21)
WB Left	C(18)	D(29)	C(18)	D(29)	C(18)	D(29)
NB Thru/Left	F(118)	F(257)	F(118)	F(257)	F(118)	F(257)
US34 & Colorado Blvd						
NB Thru/Left	E(69)	F(519)	E(69)	F(519)	E(74)	F(519)
NB Right	A(0)	A(0)	A(0)	A(0)	A(0)	A(0)
SB Thru/Left	D(44)	F(103)	D(44)	F(103)	D(45)	F(107)
SB Right	C(34)	D(38)	C(34)	D(38)	C(34)	D(38)
EB Left	E(58)	F(108)	E(58)	F(109)	E(58)	F(109)
EB Thru	B(17)	D(42)	B(17)	D(42)	B(17)	D(42)
EB Right	A(8)	B(12)	A(8)	B(12)	A(8)	B(12)
WB Left	E(62)	F(119)	E(62)	F(119)	E(61)	F(119)
WB Thru	C(29)	D(41)	C(29)	D(41)	C(30)	D(41)
WB Right	A(9)	B(15)	A(9)	B(15)	A(9)	B(15)
Overall	C(26)	E(62)	C(26)	E(62)	C(26)	E(62)



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XXX(XXX) = AM(PM) Peak Hour Traffic Volumes

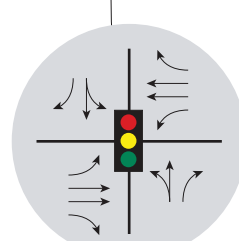
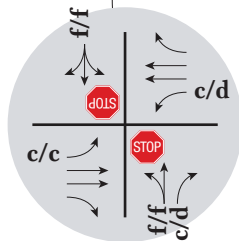
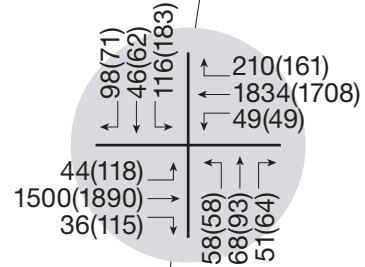
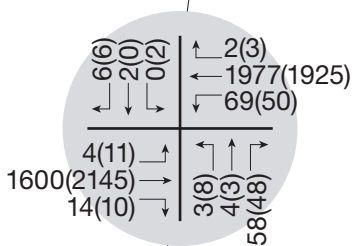
XXXX = 24-Hour Count

X/X = AM/PM Peak Hour Signalized Intersection Level of Service

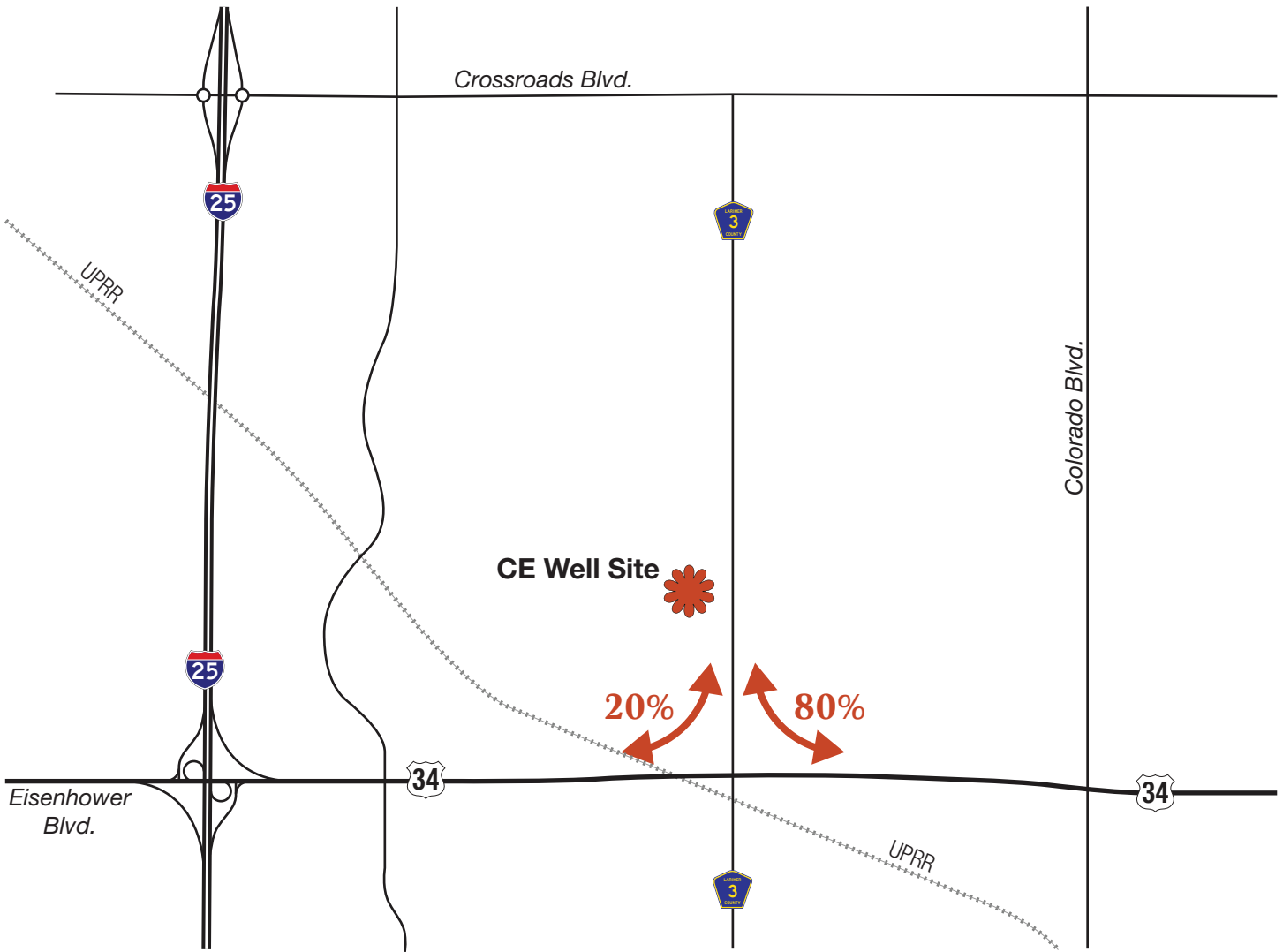
x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

= Stop Sign

= Traffic Signal



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XX% = Site Trip Distribution



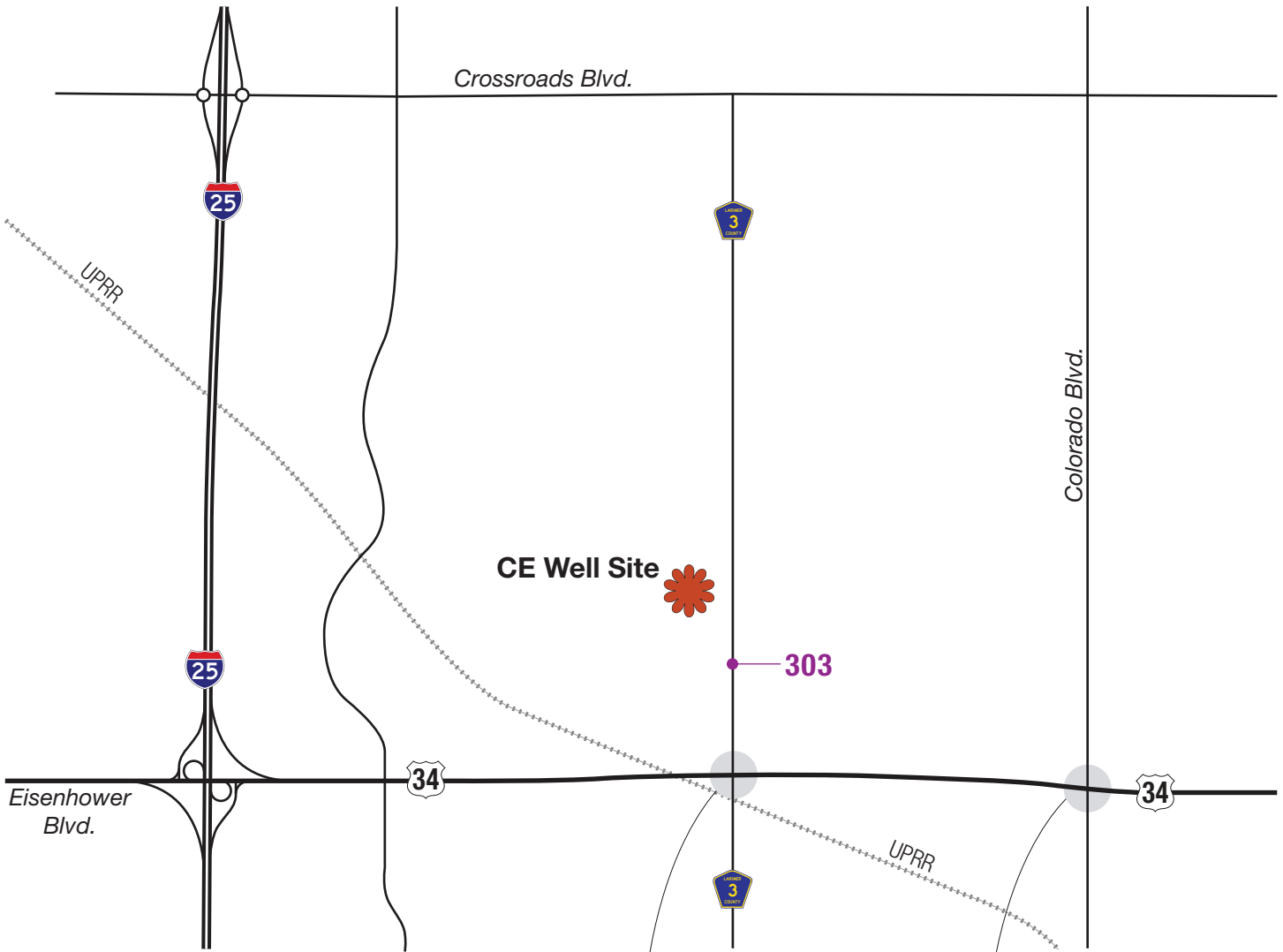
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XXX(XXX) = AM(PM) Peak Hour Traffic Volumes



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- XXX(XXX) = AM(PM) Peak Hour Traffic Volumes
- * = Nominal Volumes




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XXX(XXX) = AM(PM) Peak Hour Traffic Volumes

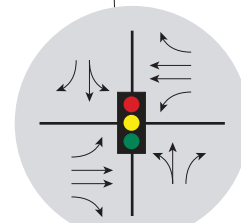
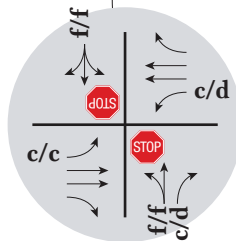
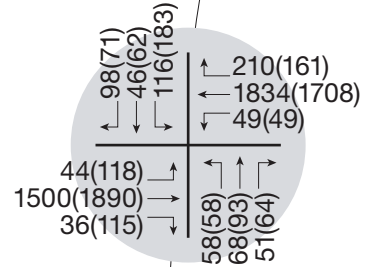
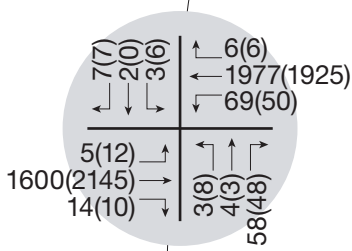
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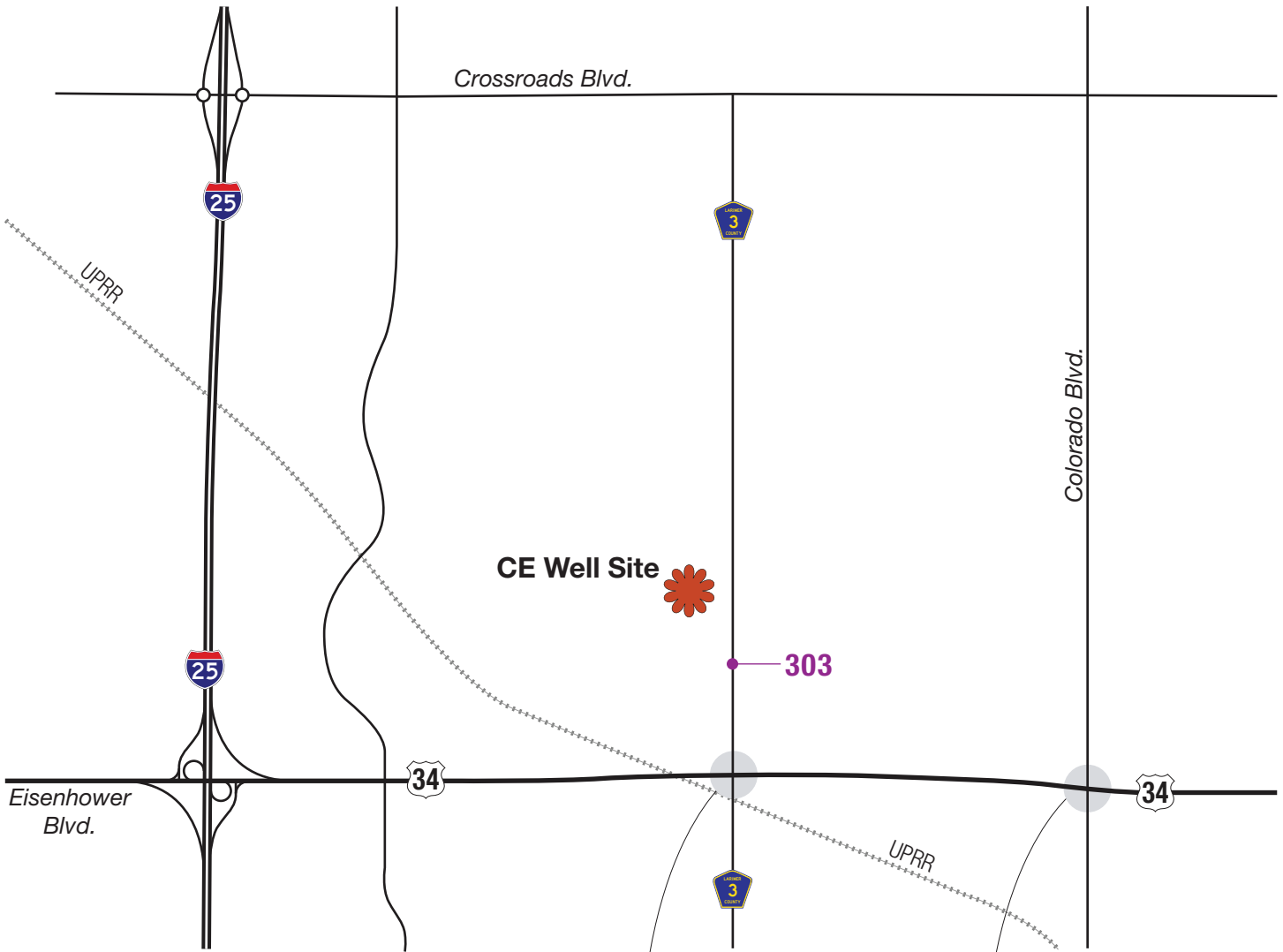
x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

 = Stop Sign

 = Traffic Signal



C/E




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XXX(XXX) = AM(PM) Peak Hour Traffic Volumes

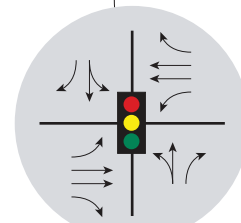
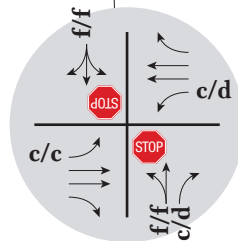
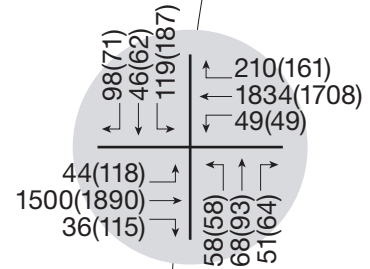
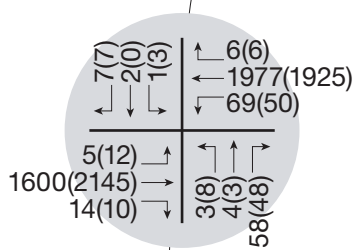
XXXX = 24-Hour Count

X/X = AM/PM Peak Hour Signalized Intersection Level of Service

x/x = AM/PM Peak Hour Unsignalized Intersection Level of Service

 = Stop Sign

 = Traffic Signal



C/E

Attachment A Transportation Impact Study Base Assumptions

Project Information			
Project Name			
Project Location			
TIS Assumptions			
Type of Study	Full:	Intermediate:	
Study Area Boundaries	North:	South:	
	East:	West:	
Study Years	Short Range:		Long Range:
Future Traffic Growth Rate			
Study Intersections	1. All access drives	5.	
	2.	6.	
	3.	7.	
	4.	8.	
Time Period for Study	AM: 7:00-9:00	PM: 4:00-6:00	Sat Noon:
Trip Generation Rates			
Trip Adjustment Factors	Passby:		Captive Market:
Overall Trip Distribution	SEE ATTACHED SKETCH		
Mode Split Assumptions			
Committed Roadway Improvements			
Other Traffic Studies			
Areas Requiring Special Study			

Date: _____

Traffic Engineer: _____

Local Entity Engineer: _____



Oil & Gas Well CE Traffic Impact Study Assumptions/Parameters

Background and Preliminary Analysis

This well site is located in the eastern side of the Kinston Master Plan adjacent to LCR 3. The trip-making associated with oil & gas wells is very unique. In the long-term (once the well is up and operating), trip generation is minimal. The greater level of trip-making occurs while the well is being developed, and there are varying construction phases to well development. Each phase entails unique equipment, resources and personnel, and this uniqueness directly translates into varying level of trip generation. The trip distribution also varies by phase depending on the exact resource needed at that time.

The intent here is to explore each phase of the well's development and construction, understand the nature of trip-making associated with each, and then focus on the phase in which the daily trip generation is greatest. Typically, well development/construction is an 8 to 10-month process, and each phase can be as short as one week or as long as three months. No long-term analyses are needed in this evaluation since daily generation once operating will only be 3 trips per day.

Several tables are attached showing activity and trip generation for the CE well's development phases.

Table 1 is a trip generation summary table that is informed by detailed information in **Table 2**. From these table, there are two phases that surface as being critical; the Completion-Stimulation phase which is projected to generate 112 trips per day and the Flowback Operations phase with is projected to generate 124 trips per day.

A deeper review was conducted with respect to the routing associated with each phase. The Completion-Stimulation phase entails a truck routing plan routing that would use a number of routing plans depending on the exact sand terminal that is used. Trucks could be oriented down LCR 3 to US 34 and west to I-25 (and vice versa for inbound trips), or they could be oriented to/from the east via US 34. With respect to the US 34/ LCR 3 intersection, this phase could add southbound right turn movements and eastbound left turn movements during its duration, or it might instead add southbound left turn movement and westbound right turn movements. The other critical phase, Flowback Operations, would entail hauling out water to disposal wells in the Gilcrest area. This phase will without a doubt add more traffic to the southbound left turn movement and westbound right turn movement at US 34/LCR3. The southbound left turn movement is the more critical consideration at this intersection, so given this and that the Flowback Operations phase will generate slightly more traffic than the Completion-Stimulation phase, the Flowback Operations phase will be the focus of this analysis. This phase will generate 124 trips per day in which 97 percent will be heavy vehicles (which we accounted in the capacity analyses). The duration of this phase is projected to be 30 days, so again it will be relatively short-lived.

Key Scope Items

The study will address several items including:

- Trip generation relative to passenger cars versus heavy vehicles. Appropriate heavy-vehicle equivalents will be applied per Highway Capacity Manual guidelines.
- Impact to LCR 3 during the development phase
- Peak hour Impact to the US 34/LCR 3 intersection during the identified development phase
- Assessing access permit needs at the US 34/LCR 3 intersection (some of which will be done through discussion with CDOT)
- No long-term analysis will be conducted

Trip Distribution

The distribution of trips to/from the well site is based on the nature of trips that will be generated at that time. The busiest phase is the Flowback Operation in which water will be delivered from the site to locations near Gilcrest. As such, much of the site's traffic during this phase will be oriented to/from the east via US 34. The attached figure shows overarching assumptions of trip generation for this development phase in which most of the traffic will be to/from the east along US 34.

Trip Generation

Again, a summary of trip-making by phase is shown on the next page on **Table 1**. The peak hour trips estimates were estimated from the average daily trip generation value realizing typical directionality associated with AM and PM travel periods.

A much more detail set of data has been provided by the applicant is in **Table 2**, which informed Table 1, follows. This shows equipment, hardware, personnel, and other resources that need to be delivered and hauled away. From this information, the Flowback Operation is the critical time with respect to daily generation, and it is therefore this phase that will be the focus of this traffic impact study.

Table 1 CE Oil & Gas Well Development Trip Generation Estimates

Oil/Gas Well Phase	Duration in Days	Average Daily Trip Generation	AM Peak hour Generation IN/OUT	PM Peak hour Generation IN/OUT	% Heavy Vehicles
Well Pad Construction	21	26	4/0	1/4	92
Drilling Rig Mobilization and Demobilization	7	32	4/0	1/4	65
Drilling - Actual*	90	28	2/0	1/2	70
Completion-Stimulation*	60	112	10/2	3/10	90
Completion - Rig Work*	30	25	2/1	1/2	5
Completion - Facility Construction	30	24	4/0	1/5	50
Flowback Operations*	30	124	5/3	3/5	97
Production 1st Year	305	53	4/0	1/4	90
Production subsequent 19 years	6935	3	1/0	0/1	35
Well Abandonment*	30	12	2/0	1/2	50

* 24-hour operation.

Table 2 CE PAD ESTIMATED VEHICLE TRIP COUNT - Frac Water Piped to Location - 15 wells

4/12/2022

Vehicle Type		Load Weight ¹	Number of Vehicles	Trips per vehicle ²	UOM	Number	Total Trips ³	Notes
WELL PAD CONSTRUCTION		Construct Drilling Pad			Duration (days)	21	536	TOTAL TRIPS Avg Daily 26
Dozer	in loaded, out loaded	80,000	1	2	Pad	1	2	
Motor Grader	in loaded, out loaded	70,000	1	2			2	
Scraper	in loaded, out loaded	70,000	1	2			2	
Haul trucks	out empty, in empty	25,000	3	2			6	
Backhoe	in loaded, out loaded	45,000	1	2			2	
Semi Truck Belly Dump	in loaded	75,000	10	24			240	Hauling gravel
Semi Truck Belly Dump	out empty	25,000	10	24			240	Hauling gravel
Supervisor pickups		6,500	2	21			42	
DRILLING - RIG MOBILIZATION & DEMOB		Move rig equipment in and out			Duration (days)	7	222	TOTAL TRIPS Avg Daily 32
Substructure	in loaded, out loaded	75,000	1	2	Pad	1	2	
Rig Carrier	in loaded, out loaded	92,000	1	2			2	
Derrick, blocks, drilling line	in loaded, out loaded	65,000	1	2			2	
Top Doghouse/Water tank	in loaded, out loaded	70,000	1	2			2	
Bottom Doghouse	in loaded, out loaded	65,000	1	2			2	
Generators	in loaded, out loaded	60,000	3	2			6	
Fuel Tank	in loaded, out loaded	30,000	1	2			2	
Catwalks & pipe racks	in loaded, out loaded	50,000	1	2			2	
Fittings Baskets	in loaded, out loaded	50,000	1	2			2	
Mud Pumps	in loaded, out loaded	80,000	3	2			6	
Drill pipe and drill collars	in loaded, out loaded	75,000	3	2			6	
Loader w/ Bucket-Forks	in loaded, out loaded	60,000	1	2			2	
Light Plant	in loaded, out loaded	60,000	1	2			2	
Solids Control - Rig	in loaded, out loaded	75,000	2	2			4	
Solids Control - Closed Loop	in loaded, out loaded	75,000	3	2			6	
Logging truck	in loaded, out loaded	45,000	1	2			2	Logging once per pad
Trash Basket	in empty, out loaded	10,000	1	2			2	
Accommodations Trailers	in loaded, out loaded	32,000	10	2			20	
Septic/Fresh water system	in loaded, out loaded	15,000	5	2			10	
PortaPotties	in loaded, out loaded	12,000	1	2			2	
Crew pickups		6,500	6	7			42	
Supervisor Vehicle		6,500	4	7			28	
Mobilization: Haul trucks	out empty	30,000	34	1			34	
Demobilization: Haul trucks	in empty	30,000	34	1			34	
DRILLING - ACTUAL		Drill 15 x 1.5 mile Hz Wells -			Duration (days)	90	2490	TOTAL TRIPS Avg Daily 28
Water truck - 150 bbl Semi	in loaded	75,000	1	5	Well	15	75	Drilling Fluids are Recycled
Water truck - 150 bbl Semi	out empty	30,000	1	5			75	
Drilling Fluid Chemicals - Tandem	in loaded	54,000	1	1			15	
Drilling Fluid Chemicals - Tandem	out empty	24,000	1	1			15	
Fuel truck - Tandem	in loaded	50,000	1	2			30	
Fuel truck - Tandem	out empty	20,000	1	2			30	
Cuttings haul truck - Tandem	out loaded	54,000	1	25			375	
Cuttings haul truck - Tandem	in empty	24,000	1	25			375	
Crew Vehicle		6,500	2	12			360	
Supervisor Vehicle		6,500	2	12			360	
Potable water	in loaded, out empty	20,000	2	2			60	
Septic Service	in empty, out loaded	20,000	2	2			60	
Trash Basket	in empty, out loaded	10,000	1	2			30	
Directional Tools	in and out	30,000	1	2			30	
Miscellaneous Tools	in and out	30,000	1	2			30	
Surface Casing pipe trucks	in loaded	75,000	2	2			60	
Surface Casing pipe trucks	out empty	25,000	2	2			60	
Production Casing pipe trucks	in loaded	75,000	5	1			75	
Production Casing pipe trucks	out empty	25,000	5	1			75	
Surface Casing Cement pickup		6,500	1	2			30	
Surface Casing Cement pump truck		75,000	1	2			30	
Surface Casing Cement bulk truck	in loaded	75,000	2	2			60	
Surface Casing Cement bulk truck	out empty	30,000	2	2			60	
Production Casing Cement pickup		6,500	1	2			30	
Production Casing Cement pump truck		75,000	1	2	30			
Production Casing Cement bulk trucks	in loaded	75,000	2	1	30			
Production Casing Cement bulk trucks	out empty	30,000	2	1	30			

Table 2 CE PAD ESTIMATED VEHICLE TRIP COUNT - Frac Water Piped to Location - 15 wells

4/12/2022

Vehicle Type		Load Weight ¹	Number of Vehicles	Trips per vehicle ²	UOM	Number	Total Trips ³	Notes			
COMPLETION - STIMULATION	Fracture 15 wells -		Duration (days)			60	6722	TOTAL TRIPS Avg Daily 112			
Downhole blender		75,000	1	2	Pad	1	2	Move In and Out Frac and Auxillary Equipment			
Pre-gel blender		75,000	1	2			2				
Pump trucks		75,000	12	2			24				
Iron truck		54,000	2	2			4				
Control Van		50,000	1	2			2				
Wireline Truck - CBL, Plug and Perf		45,000	1	2			2				
Frac tanks 10	loaded	35,000	10	2			20				
Frac tanks 10	empty	25,000	10	2			20				
MLVT tanks 4	loaded	75,000	4	2			8				
MLVT tanks 4	empty	25,000	4	2			8				
Chemical truck	in loaded	50,000	1	1	Well	15	15	Water is piped to Location			
Chemical truck	out empty	20,000	1	1			15				
Supervisor Pickups		6,500	6	8			720				
Crew Bus		15,000	2	8			240				
Fuel truck	in loaded	50,000	1	4			60				
Fuel truck	out empty	30,000	1	4			60				
Gel truck	in loaded	75,000	1	4			60				
Gel truck	out empty	30,000	1	4			60				
Sand trucks	in loaded	75,000	20	9			2700		Hauling frac sand		
Sand trucks	out empty	25,000	20	9			2700				
Water truck - 120 bbl Semi	in loaded						0				
Water truck - 120 bbl Semi	out empty						0				
COMPLETION - RIG WORK	Drill out Plugs and Run Tubing 15 wells -		Duration (days)						30	758	TOTAL TRIPS Avg Daily 25
Completion Rig	in & out	90,000	1	2			Pad		1	2	Concurrent w/ facility construction
Breakdown Truck	in & out	75,000	2	2						4	
Kill Fluid Chemical - Tandem	Loaded In	54,000	1	1	1						
Kill Fluid Chemical - Tandem	Empty Out	24,000	1	1	1						
Supervisor pickups		6,500	4	8	Well	15	480				
Crew pickups		6,500	2	8			240				
Tubing trucks	in loaded	75,000	1	1			15				
Tubing trucks	out empty	30,000	1	1			15				
COMPLETION - FACILITY CONSTRUCTION	Construct Production Facility		Duration (days)			30	724	TOTAL TRIPS Avg Daily 24			
Backhoe		45,000	1	2	Pad	1	2	Concurrent w/ rig work			
Tool trucks & welder		45,000	5	60			300				
Equipment delivery - tanks	in loaded	50,000	1	1			1				
	out empty	24,000	1	1			1				
Equipment delivery - production equipment	in loaded	50,000	25	1			25				
	out empty	24,000	25	1			25				
Flowlines and Fittings	in loaded	50,000	5	1			5				
	out empty	24,000	5	1			5				
Supervisor Pickups		6,500	2	60			120				
Crew Pickups		6,500	4	60			240				
COMPLETION - TOTAL	(Stimulation, Rig Work, Facility Construction)		Duration (days)			90	8204	TOTAL TRIPS Avg Daily 91			

Table 2 CE PAD ESTIMATED VEHICLE TRIP COUNT - Frac Water Piped to Location - 15 wells

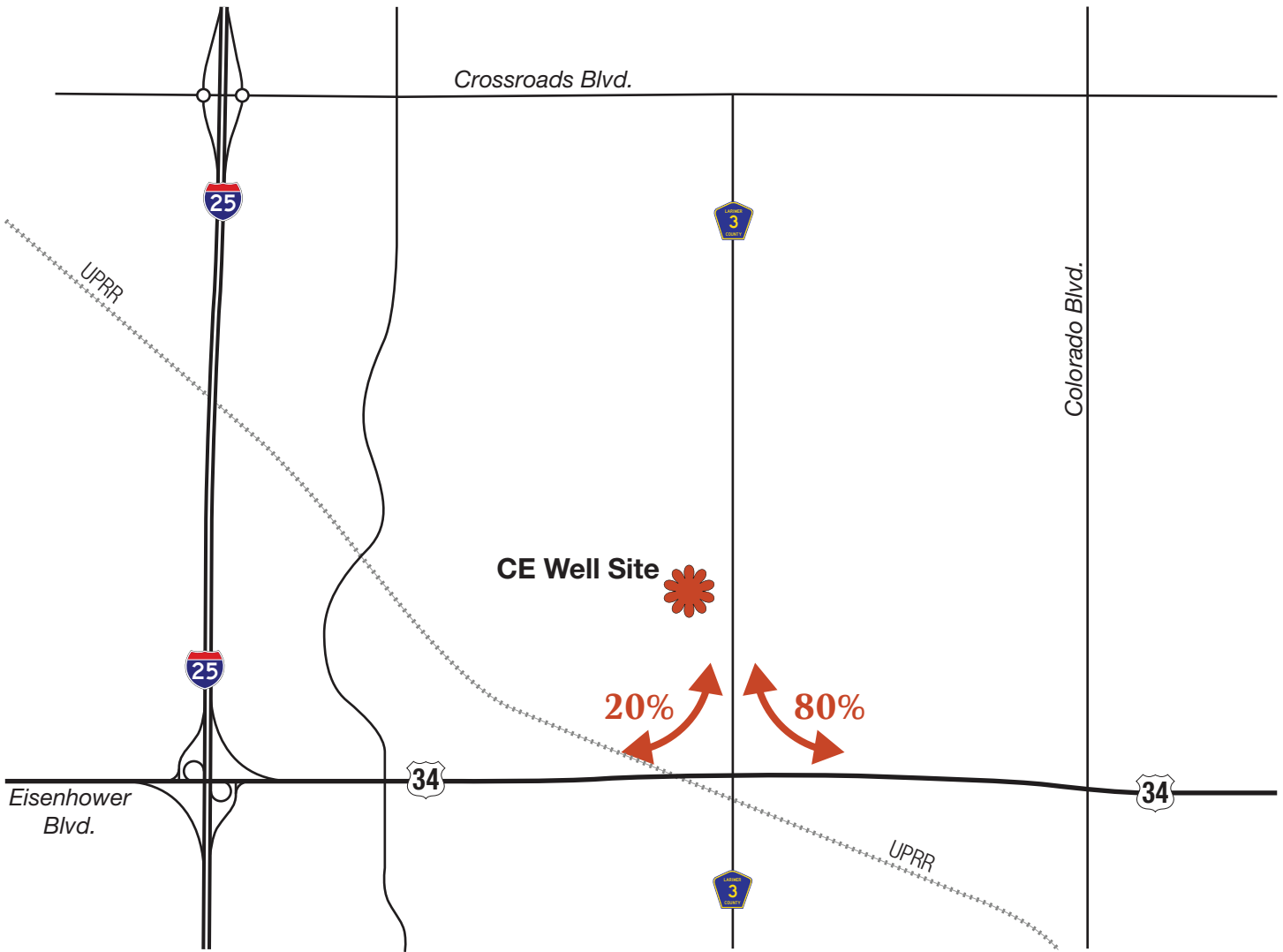
4/12/2022

Vehicle Type		Load Weight ¹	Number of Vehicles	Trips per vehicle ²	UOM	Number	Total Trips ³	Notes		
FLOWBACK OPERATIONS		Flowback 15 wells after Completion		Duration (days)		60	7450	TOTAL TRIPS Avg Daily 124		
Water Trucks - 150 bbl Semi	Empty In	25,000	20	168	Pad	1	3360			
Water Trucks - 150 bbl Semi	Loaded Out	75,000	20	168			3360			
Equipment delivery & removal	Loaded In	50,000	5	1			5			
	Empty Out	24,000	5	1			5			
Crew Pickups			2	120			240			
Supervisor pickups		6,500	4	120			480			
PRODUCTION REMAINDER OF FIRST YEAR		Haul water		Duration (days)		305	16220	TOTAL TRIPS Avg Daily 53		
Production attendant pickup		6,500	2	610	Pad	1	1220			
Crew pickups		6,500	2	300			600			
Oil haul truck	pipeline	85,000		0			0			
Oil haul truck	pipeline	25,000		0			0			
Water haul truck	out loaded	75,000	10	720			7200			
Water haul truck	in empty	30,000	10	720			7200			
PRODUCTION NEXT 19 YEARS		Oil and Water Offtake -		Duration (days)		6935	20870	TOTAL TRIPS Avg Daily 3		
Production attendant pickup		6,500	1	13870	Pad	1	13870	Once Daily		
Oil haul truck	pipeline	85,000					0			
Oil haul truck	pipeline	25,000					0			
Water haul truck	out loaded	75,000	1	3500			3500			
Water haul truck	in empty	30,000	1	3500			3500			
WELL ABANDONMENT (after 20 years)		Abandon wells and facility -		Duration (days)		30	362	TOTAL TRIPS Avg Daily 12		
Completion Rig		90,000	1	2	Pad	1	2			
Supervisor pickups		6,500	2	4	Well	15	120			
Crew pickups		6,500	1	4			60			
Tubing trucks	out loaded	75,000	1	1			15			
Tubing trucks	in empty	30,000	1	1			15			
Casing Cement pickup		6,500	1	2			30			
Casing Cement pump truck		75,000	1	2			30			
Casing Cement bulk truck	in loaded	75,000	1	1			15			
Casing Cement bulk truck	out empty	30,000	1	1			15			
Wireline truck		45,000	1	2			30			
Water truck - 150 bbl Semi	in loaded	75,000	1	1			15			
Water truck - 150 bbl Semi	out empty	30,000	1	1			15			
Production equipment haul trucks	in empty	25,000	5	5			Pad	1	25	
Production equipment haul trucks	out loaded	75,000	5	5					25	

¹ Load weights include haul trucks, if applicable

² A trip is defined as one-way event, ie one vehicle going to the well will be counted as two trips, 1 in & 1 out

³ Total trips for each phase, not trips per day



LEGEND

XX% = Site Trip Distribution

9:

Intersection												
Int Delay, s/veh	1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↗	↗		↗	↗		↗	↗
Traffic Vol, veh/h	4	1600	14	69	1977	2	3	4	58	0	2	6
Future Vol, veh/h	4	1600	14	69	1977	2	3	4	58	0	2	6
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	187	-	230	250	-	320	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	4	1739	15	75	2149	2	3	4	63	0	2	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2151	0	0	1754	0	0	2973	4048	870	3179	4061	1075
Stage 1	-	-	-	-	-	-	1747	1747	-	2299	2299	-
Stage 2	-	-	-	-	-	-	1226	2301	-	880	1762	-
Critical Hdwy	4.18	-	-	4.18	-	-	7.58	6.58	6.98	7.58	6.58	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-	6.58	5.58	-	6.58	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.58	5.58	-	6.58	5.58	-
Follow-up Hdwy	2.24	-	-	2.24	-	-	3.54	4.04	3.34	3.54	4.04	3.34
Pot Cap-1 Maneuver	240	-	-	345	-	-	6	~3	291	4	~2	212
Stage 1	-	-	-	-	-	-	87	136	-	38	70	-
Stage 2	-	-	-	-	-	-	186	70	-	304	133	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	240	-	-	345	-	-	4	~2	291	2	~2	212
Mov Cap-2 Maneuver	-	-	-	-	-	-	49	34	-	28	26	-
Stage 1	-	-	-	-	-	-	86	134	-	37	55	-
Stage 2	-	-	-	-	-	-	136	55	-	227	131	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	31.3	58.4
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	39	291	240	-	-	345	-	-	76
HCM Lane V/C Ratio	0.195	0.217	0.018	-	-	0.217	-	-	0.114
HCM Control Delay (s)	118.4	20.8	20.3	-	-	18.3	-	-	58.4
HCM Lane LOS	F	C	C	-	-	C	-	-	F
HCM 95th %tile Q(veh)	0.6	0.8	0.1	-	-	0.8	-	-	0.4

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

Intersection												
Int Delay, s/veh	1.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕	↗	↘	↕	↗		↕	↗		↕	
Traffic Vol, veh/h	11	2145	10	50	1925	3	8	3	48	2	0	6
Future Vol, veh/h	11	2145	10	50	1925	3	8	3	48	2	0	6
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	187	-	230	250	-	320	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	4	4	4	4	4	4	4	4	4	4	4	4
Mvmt Flow	12	2332	11	54	2092	3	9	3	52	2	0	7

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2095	0	0	2343	0	0	3510	4559	1166	3392	4567	1046
Stage 1	-	-	-	-	-	-	2356	2356	-	2200	2200	-
Stage 2	-	-	-	-	-	-	1154	2203	-	1192	2367	-
Critical Hdwy	4.18	-	-	4.18	-	-	7.58	6.58	6.98	7.58	6.58	6.98
Critical Hdwy Stg 1	-	-	-	-	-	-	6.58	5.58	-	6.58	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.58	5.58	-	6.58	5.58	-
Follow-up Hdwy	2.24	-	-	2.24	-	-	3.54	4.04	3.34	3.54	4.04	3.34
Pot Cap-1 Maneuver	253	-	-	201	-	-	~ 2	~ 1	184	3	1	222
Stage 1	-	-	-	-	-	-	35	66	-	45	79	-
Stage 2	-	-	-	-	-	-	206	79	-	195	65	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	253	-	-	201	-	-	~ 1	~ 1	184	~ 1	1	222
Mov Cap-2 Maneuver	-	-	-	-	-	-	24	25	-	25	7	-
Stage 1	-	-	-	-	-	-	33	63	-	43	58	-
Stage 2	-	-	-	-	-	-	146	58	-	126	62	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.7	74.1	59.2
HCM LOS			F	F

Minor Lane/Major Mvmt	<i>right</i>		EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	24	184	253	-	-	201	-	-	75
HCM Lane V/C Ratio	0.498	0.284	0.047	-	-	0.27	-	-	0.116
HCM Control Delay (s)	257.4	32.1	19.9	-	-	29.4	-	-	59.2
HCM Lane LOS	F	D	C	-	-	D	-	-	F
HCM 95th %tile Q(veh)	1.5	1.1	0.1	-	-	1.1	-	-	0.4

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

HCM 6th Signalized Intersection Summary

Colo. Blvd

13:

05/23/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	1500	36	49	1834	210	58	66	51	116	46	98
Future Volume (veh/h)	44	1500	36	49	1834	210	58	66	51	116	46	98
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	48	1630	39	53	1993	228	63	72	0	126	50	107
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, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	97	2079	927	97	2079	927	89	81		216	67	312
Arrive On Green	0.06	0.59	0.59	0.06	0.59	0.59	0.20	0.20	0.00	0.20	0.20	0.20
Sat Flow, veh/h	1753	3497	1560	1753	3497	1560	151	406	1560	737	335	1560
Grp Volume(v), veh/h	48	1630	39	53	1993	228	135	0	0	176	0	107
Grp Sat Flow(s),veh/h/ln	1753	1749	1560	1753	1749	1560	557	0	1560	1072	0	1560
Q Serve(g_s), s	2.4	31.9	0.9	2.6	48.4	6.2	3.9	0.0	0.0	0.0	0.0	5.3
Cycle Q Clear(g_c), s	2.4	31.9	0.9	2.6	48.4	6.2	18.0	0.0	0.0	14.1	0.0	5.3
Prop In Lane	1.00		1.00	1.00		1.00	0.47		1.00	0.72		1.00
Lane Grp Cap(c), veh/h	97	2079	927	97	2079	927	170	0		283	0	312
V/C Ratio(X)	0.49	0.78	0.04	0.54	0.96	0.25	0.79	0.00		0.62	0.00	0.34
Avail Cap(c_a), veh/h	97	2079	927	97	2079	927	170	0		283	0	312
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.3	13.9	7.6	41.4	17.2	8.7	38.2	0.0	0.0	34.3	0.0	30.9
Incr Delay (d2), s/veh	16.7	3.0	0.1	20.1	12.1	0.6	30.7	0.0	0.0	9.9	0.0	3.0
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	1.5	11.9	0.3	1.7	20.3	2.1	4.4	0.0	0.0	4.4	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.0	16.9	7.7	61.5	29.4	9.3	68.9	0.0	0.0	44.2	0.0	33.9
LnGrp LOS	E	B	A	E	C	A	E	A		D	A	C
Approach Vol, veh/h		1717			2274			135	A		283	
Approach Delay, s/veh		17.8			28.1			68.9			40.3	
Approach LOS		B			C			E			D	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.5	9.5	58.0		22.5	9.5	58.0				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.0	5.0	53.5		18.0	5.0	53.5				
Max Q Clear Time (g_c+I1), s		20.0	4.6	33.9		16.1	4.4	50.4				
Green Ext Time (p_c), s		0.0	0.0	12.7		0.3	0.0	2.9				

Intersection Summary		
HCM 6th Ctrl Delay		26.1
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

Colo. Blvd.

13:

05/23/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	1890	115	49	1708	161	58	93	64	183	62	71
Future Volume (veh/h)	118	1890	115	49	1708	161	58	93	64	183	62	71
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	128	2054	125	53	1857	175	63	101	0	199	67	77
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, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	144	2085	930	69	1934	863	38	45		213	55	407
Arrive On Green	0.08	0.60	0.60	0.04	0.55	0.55	0.26	0.26	0.00	0.26	0.26	0.26
Sat Flow, veh/h	1753	3497	1560	1753	3497	1560	0	174	1560	632	213	1560
Grp Volume(v), veh/h	128	2054	125	53	1857	175	164	0	0	266	0	77
Grp Sat Flow(s),veh/h/ln	1753	1749	1560	1753	1749	1560	174	0	1560	845	0	1560
Q Serve(g_s), s	9.4	74.7	4.6	3.9	65.8	7.3	0.0	0.0	0.0	0.0	0.0	5.0
Cycle Q Clear(g_c), s	9.4	74.7	4.6	3.9	65.8	7.3	33.9	0.0	0.0	33.9	0.0	5.0
Prop In Lane	1.00		1.00	1.00		1.00	0.38		1.00	0.75		1.00
Lane Grp Cap(c), veh/h	144	2085	930	69	1934	863	84	0		269	0	407
V/C Ratio(X)	0.89	0.99	0.13	0.77	0.96	0.20	1.96	0.00		0.99	0.00	0.19
Avail Cap(c_a), veh/h	144	2085	930	69	1934	863	84	0		269	0	407
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	59.1	25.7	11.5	61.9	27.7	14.6	47.5	0.0	0.0	51.0	0.0	37.4
Incr Delay (d2), s/veh	49.6	16.5	0.3	56.7	13.0	0.5	471.7	0.0	0.0	52.4	0.0	1.0
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	6.2	33.9	1.7	2.8	29.7	2.7	13.8	0.0	0.0	12.8	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	108.6	42.2	11.8	118.6	40.7	15.2	519.2	0.0	0.0	103.4	0.0	38.4
LnGrp LOS	F	D	B	F	D	B	F	A		F	A	D
Approach Vol, veh/h		2307			2085			164	A			343
Approach Delay, s/veh		44.2			40.5			519.2				88.8
Approach LOS		D			D			F				F
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		38.4	9.6	82.0		38.4	15.2	76.4				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		33.9	5.1	77.5		33.9	10.7	71.9				
Max Q Clear Time (g_c+I1), s		35.9	5.9	76.7		35.9	11.4	67.8				
Green Ext Time (p_c), s		0.0	0.0	0.8		0.0	0.0	3.7				

Intersection Summary		
HCM 6th Ctrl Delay		61.7
HCM 6th LOS		E

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

Intersection												
Int Delay, s/veh	1.7											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	5	1600	14	69	1977	6	3	4	58	3	2	7
Future Vol, veh/h	5	1600	14	69	1977	6	3	4	58	3	2	7
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	187	-	230	250	-	320	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	20	4	4	4	4	67	4	4	4	100	4	14
Mvmt Flow	5	1739	15	75	2149	7	3	4	63	3	2	8

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	2156	0	0	1754
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.5	-	-	4.18
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.4	-	-	2.24
Pot Cap-1 Maneuver	191	-	-	345
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	191	-	-	345
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	31.3	254.4
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	39	291	191	-	-	345	-	-	25
HCM Lane V/C Ratio	0.195	0.217	0.028	-	-	0.217	-	-	0.522
HCM Control Delay (s)	118.4	20.8	24.4	-	-	18.3	-	-	254.4
HCM Lane LOS	F	C	C	-	-	C	-	-	F
HCM 95th %tile Q(veh)	0.6	0.8	0.1	-	-	0.8	-	-	1.6

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

9:

Intersection												
Int Delay, s/veh	2.6											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↕	↗	↘	↕	↗		↕	↗		↕	↗
Traffic Vol, veh/h	12	2145	10	50	1925	6	8	3	48	6	0	7
Future Vol, veh/h	12	2145	10	50	1925	6	8	3	48	6	0	7
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	187	-	230	250	-	320	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	8	4	4	4	4	50	4	4	4	67	4	14
Mvmt Flow	13	2332	11	54	2092	7	9	3	52	7	0	8

Major/Minor	Major1	Major2			Minor1			Minor2				
Conflicting Flow All	2099	0	0	2343	0	0	3512	4565	1166	3394	4569	1046
Stage 1	-	-	-	-	-	-	2358	2358	-	2200	2200	-
Stage 2	-	-	-	-	-	-	1154	2207	-	1194	2369	-
Critical Hdwy	4.26	-	-	4.18	-	-	7.58	6.58	6.98	8.84	6.58	7.18
Critical Hdwy Stg 1	-	-	-	-	-	-	6.58	5.58	-	7.84	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.58	5.58	-	7.84	5.58	-
Follow-up Hdwy	2.28	-	-	2.24	-	-	3.54	4.04	3.34	4.17	4.04	3.44
Pot Cap-1 Maneuver	238	-	-	201	-	-	~2	~1	184	~1	1	206
Stage 1	-	-	-	-	-	-	35	66	-	20	79	-
Stage 2	-	-	-	-	-	-	206	79	-	118	65	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	238	-	-	201	-	-	~1	~1	184	0	1	206
Mov Cap-2 Maneuver	-	-	-	-	-	-	24	24	-	9	6	-
Stage 1	-	-	-	-	-	-	33	62	-	19	58	-
Stage 2	-	-	-	-	-	-	145	58	-	76	61	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.7	74.1	\$ 395.1
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	24	184	238	-	-	201	-	-	19
HCM Lane V/C Ratio	0.498	0.284	0.055	-	-	0.27	-	-	0.744
HCM Control Delay (s)	257.4	32.1	21	-	-	29.4	-	-	\$ 395.1
HCM Lane LOS	F	D	C	-	-	D	-	-	F
HCM 95th %tile Q(veh)	1.5	1.1	0.2	-	-	1.1	-	-	2

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

HCM 6th Signalized Intersection Summary

Colo. Blvd

05/23/2022

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Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↶	↷	↷	↶	↷	↷		↶	↷		↶	↷
Traffic Volume (veh/h)	44	1500	36	49	1834	210	58	66	51	116	46	98
Future Volume (veh/h)	44	1500	36	49	1834	210	58	66	51	116	46	98
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	48	1630	39	53	1993	228	63	72	0	126	50	107
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, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	97	2079	927	97	2079	927	89	81		216	67	312
Arrive On Green	0.06	0.59	0.59	0.06	0.59	0.59	0.20	0.20	0.00	0.20	0.20	0.20
Sat Flow, veh/h	1753	3497	1560	1753	3497	1560	151	406	1560	737	335	1560
Grp Volume(v), veh/h	48	1630	39	53	1993	228	135	0	0	176	0	107
Grp Sat Flow(s),veh/h/ln	1753	1749	1560	1753	1749	1560	557	0	1560	1072	0	1560
Q Serve(g_s), s	2.4	31.9	0.9	2.6	48.4	6.2	3.9	0.0	0.0	0.0	0.0	5.3
Cycle Q Clear(g_c), s	2.4	31.9	0.9	2.6	48.4	6.2	18.0	0.0	0.0	14.1	0.0	5.3
Prop In Lane	1.00		1.00	1.00		1.00	0.47		1.00	0.72		1.00
Lane Grp Cap(c), veh/h	97	2079	927	97	2079	927	170	0		283	0	312
V/C Ratio(X)	0.49	0.78	0.04	0.54	0.96	0.25	0.79	0.00		0.62	0.00	0.34
Avail Cap(c_a), veh/h	97	2079	927	97	2079	927	170	0		283	0	312
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(l)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.3	13.9	7.6	41.4	17.2	8.7	38.2	0.0	0.0	34.3	0.0	30.9
Incr Delay (d2), s/veh	16.7	3.0	0.1	20.1	12.1	0.6	30.7	0.0	0.0	9.9	0.0	3.0
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	1.5	11.9	0.3	1.7	20.3	2.1	4.4	0.0	0.0	4.4	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.0	16.9	7.7	61.5	29.4	9.3	68.9	0.0	0.0	44.2	0.0	33.9
LnGrp LOS	E	B	A	E	C	A	E	A		D	A	C
Approach Vol, veh/h		1717			2274			135	A		283	
Approach Delay, s/veh		17.8			28.1			68.9			40.3	
Approach LOS		B			C			E			D	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.5	9.5	58.0		22.5	9.5	58.0				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.0	5.0	53.5		18.0	5.0	53.5				
Max Q Clear Time (g_c+I1), s		20.0	4.6	33.9		16.1	4.4	50.4				
Green Ext Time (p_c), s		0.0	0.0	12.7		0.3	0.0	2.9				

Intersection Summary		
HCM 6th Ctrl Delay		26.1
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

Colo. Blvd

05/23/2022

13:



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘		↖	↗		↖	↗
Traffic Volume (veh/h)	118	1890	115	49	1708	161	58	93	64	183	62	71
Future Volume (veh/h)	118	1890	115	49	1708	161	58	93	64	183	62	71
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841	1841
Adj Flow Rate, veh/h	128	2054	125	53	1857	175	63	101	0	199	67	77
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, %	4	4	4	4	4	4	4	4	4	4	4	4
Cap, veh/h	144	2085	930	69	1934	863	38	45		213	55	407
Arrive On Green	0.08	0.60	0.60	0.04	0.55	0.55	0.26	0.26	0.00	0.26	0.26	0.26
Sat Flow, veh/h	1753	3497	1560	1753	3497	1560	0	174	1560	632	213	1560
Grp Volume(v), veh/h	128	2054	125	53	1857	175	164	0	0	266	0	77
Grp Sat Flow(s),veh/h/ln	1753	1749	1560	1753	1749	1560	174	0	1560	845	0	1560
Q Serve(g_s), s	9.4	74.7	4.6	3.9	65.8	7.3	0.0	0.0	0.0	0.0	0.0	5.0
Cycle Q Clear(g_c), s	9.4	74.7	4.6	3.9	65.8	7.3	33.9	0.0	0.0	33.9	0.0	5.0
Prop In Lane	1.00		1.00	1.00		1.00	0.38		1.00	0.75		1.00
Lane Grp Cap(c), veh/h	144	2085	930	69	1934	863	84	0		269	0	407
V/C Ratio(X)	0.89	0.99	0.13	0.77	0.96	0.20	1.96	0.00		0.99	0.00	0.19
Avail Cap(c_a), veh/h	144	2085	930	69	1934	863	84	0		269	0	407
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	59.1	25.7	11.5	61.9	27.7	14.6	47.5	0.0	0.0	51.0	0.0	37.4
Incr Delay (d2), s/veh	49.6	16.5	0.3	56.7	13.0	0.5	471.7	0.0	0.0	52.4	0.0	1.0
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	6.2	33.9	1.7	2.8	29.7	2.7	13.8	0.0	0.0	12.8	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	108.6	42.2	11.8	118.6	40.7	15.2	519.2	0.0	0.0	103.4	0.0	38.4
LnGrp LOS	F	D	B	F	D	B	F	A		F	A	D
Approach Vol, veh/h		2307			2085			164	A			343
Approach Delay, s/veh		44.2			40.5			519.2				88.8
Approach LOS		D			D			F				F
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		38.4	9.6	82.0		38.4	15.2	76.4				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		33.9	5.1	77.5		33.9	10.7	71.9				
Max Q Clear Time (g_c+I1), s		35.9	5.9	76.7		35.9	11.4	67.8				
Green Ext Time (p_c), s		0.0	0.0	0.8		0.0	0.0	3.7				

Intersection Summary

HCM 6th Ctrl Delay	61.7
HCM 6th LOS	E

Notes

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

2B

HCM 6th TWSC

LCR 3

9:

05/24/2022

Intersection												
Int Delay, s/veh	1.2											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↗	↗		↘	↗		↕	
Traffic Vol, veh/h	5	1600	14	69	1977	6	3	4	58	1	2	7
Future Vol, veh/h	5	1600	14	69	1977	6	3	4	58	1	2	7
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	187	-	230	250	-	320	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	20	4	4	4	4	67	4	4	4	100	4	14
Mvmt Flow	5	1739	15	75	2149	7	3	4	63	1	2	8

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	2156	0	0	1754	0	0	2975	4055	870	3181	4063	1075
Stage 1	-	-	-	-	-	-	1749	1749	-	2299	2299	-
Stage 2	-	-	-	-	-	-	1226	2306	-	882	1764	-
Critical Hdwy	4.5	-	-	4.18	-	-	7.58	6.58	6.98	9.5	6.58	7.18
Critical Hdwy Stg 1	-	-	-	-	-	-	6.58	5.58	-	8.5	5.58	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.58	5.58	-	8.5	5.58	-
Follow-up Hdwy	2.4	-	-	2.24	-	-	3.54	4.04	3.34	4.5	4.04	3.44
Pot Cap-1 Maneuver	191	-	-	345	-	-	6	~2	291	~1	~2	196
Stage 1	-	-	-	-	-	-	87	135	-	11	70	-
Stage 2	-	-	-	-	-	-	186	70	-	165	133	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	191	-	-	345	-	-	4	~2	291	~1	~2	196
Mov Cap-2 Maneuver	-	-	-	-	-	-	49	34	-	8	26	-
Stage 1	-	-	-	-	-	-	85	131	-	11	55	-
Stage 2	-	-	-	-	-	-	134	55	-	122	130	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.6	31.3	118.4
HCM LOS			D	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	39	291	191	-	-	345	-	-	42
HCM Lane V/C Ratio	0.195	0.217	0.028	-	-	0.217	-	-	0.259
HCM Control Delay (s)	118.4	20.8	24.4	-	-	18.3	-	-	118.4
HCM Lane LOS	F	C	C	-	-	C	-	-	F
HCM 95th %tile Q(veh)	0.6	0.8	0.1	-	-	0.8	-	-	0.9

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

2B

LCR 3

HCM 6th TWSC

9:

05/24/2022

Intersection

Int Delay, s/veh 1.7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↘	↗	↗	↘	↗	↗		↘	↗		↕	
Traffic Vol, veh/h	12	2145	10	50	1925	6	8	3	48	3	0	7
Future Vol, veh/h	12	2145	10	50	1925	6	8	3	48	3	0	7
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	187	-	230	250	-	320	-	-	0	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	1	-	-	1	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	8	4	4	4	4	50	4	4	4	33	4	14
Mvmt Flow	13	2332	11	54	2092	7	9	3	52	3	0	8

Major/Minor	Major1	Major2	Minor1	Minor2
Conflicting Flow All	2099	0	0	2343
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Critical Hdwy	4.26	-	-	4.18
Critical Hdwy Stg 1	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-
Follow-up Hdwy	2.28	-	-	2.24
Pot Cap-1 Maneuver	238	-	-	201
Stage 1	-	-	-	-
Stage 2	-	-	-	-
Platoon blocked, %	-	-	-	-
Mov Cap-1 Maneuver	238	-	-	201
Mov Cap-2 Maneuver	-	-	-	-
Stage 1	-	-	-	-
Stage 2	-	-	-	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0.7	74.1	100.7
HCM LOS			F	F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	24	184	238	-	-	201	-	-	48
HCM Lane V/C Ratio	0.498	0.284	0.055	-	-	0.27	-	-	0.226
HCM Control Delay (s)	257.4	32.1	21	-	-	29.4	-	-	100.7
HCM Lane LOS	F	D	C	-	-	D	-	-	F
HCM 95th %tile Q(veh)	1.5	1.1	0.2	-	-	1.1	-	-	0.8

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

HCM 6th Signalized Intersection Summary

Colo. Blvd.

05/25/2022

13:

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	118	1890	115	49	1708	161	58	93	64	187	62	71
Future Volume (veh/h)	118	1890	115	49	1708	161	58	93	64	187	62	71
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1811	1841	1841
Adj Flow Rate, veh/h	128	2054	125	53	1857	175	63	101	0	203	67	77
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, %	4	4	4	4	4	4	4	4	4	6	4	4
Cap, veh/h	144	2085	930	69	1934	863	38	45		214	55	407
Arrive On Green	0.08	0.60	0.60	0.04	0.55	0.55	0.26	0.26	0.00	0.26	0.26	0.26
Sat Flow, veh/h	1753	3497	1560	1753	3497	1560	0	174	1560	633	209	1560
Grp Volume(v), veh/h	128	2054	125	53	1857	175	164	0	0	270	0	77
Grp Sat Flow(s),veh/h/ln	1753	1749	1560	1753	1749	1560	174	0	1560	842	0	1560
Q Serve(g_s), s	9.4	74.7	4.6	3.9	65.8	7.3	0.0	0.0	0.0	0.0	0.0	5.0
Cycle Q Clear(g_c), s	9.4	74.7	4.6	3.9	65.8	7.3	33.9	0.0	0.0	33.9	0.0	5.0
Prop In Lane	1.00		1.00	1.00		1.00	0.38		1.00	0.75		1.00
Lane Grp Cap(c), veh/h	144	2085	930	69	1934	863	84	0		268	0	407
V/C Ratio(X)	0.89	0.99	0.13	0.77	0.96	0.20	1.96	0.00		1.01	0.00	0.19
Avail Cap(c_a), veh/h	144	2085	930	69	1934	863	84	0		268	0	407
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	59.1	25.7	11.5	61.9	27.7	14.6	47.5	0.0	0.0	51.1	0.0	37.4
Incr Delay (d2), s/veh	49.6	16.5	0.3	56.7	13.0	0.5	471.7	0.0	0.0	56.7	0.0	1.0
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	6.2	33.9	1.7	2.8	29.7	2.7	13.8	0.0	0.0	13.1	0.0	2.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	108.6	42.2	11.8	118.6	40.7	15.2	519.2	0.0	0.0	107.8	0.0	38.4
LnGrp LOS	F	D	B	F	D	B	F	A		F	A	D
Approach Vol, veh/h		2307			2085			164	A		347	
Approach Delay, s/veh		44.2			40.5			519.2			92.4	
Approach LOS		D			D			F			F	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		38.4	9.6	82.0		38.4	15.2	76.4				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		33.9	5.1	77.5		33.9	10.7	71.9				
Max Q Clear Time (g_c+l1), s		35.9	5.9	76.7		35.9	11.4	67.8				
Green Ext Time (p_c), s		0.0	0.0	0.8		0.0	0.0	3.7				

Intersection Summary

HCM 6th Ctrl Delay	61.9
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

Color Blvd.

13:

05/25/2022

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	44	1500	36	49	1834	210	58	66	51	119	46	98
Future Volume (veh/h)	44	1500	36	49	1834	210	58	66	51	119	46	98
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	1841	1841	1841	1841	1841	1841	1841	1841	1841	1796	1841	1841
Adj Flow Rate, veh/h	48	1630	39	53	1993	228	63	72	0	129	50	107
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, %	4	4	4	4	4	4	4	4	4	7	4	4
Cap, veh/h	97	2079	927	97	2079	927	86	77		217	64	312
Arrive On Green	0.06	0.59	0.59	0.06	0.59	0.59	0.20	0.20	0.00	0.20	0.20	0.20
Sat Flow, veh/h	1753	3497	1560	1753	3497	1560	135	387	1560	743	322	1560
Grp Volume(v), veh/h	48	1630	39	53	1993	228	135	0	0	179	0	107
Grp Sat Flow(s),veh/h/ln	1753	1749	1560	1753	1749	1560	522	0	1560	1065	0	1560
Q Serve(g_s), s	2.4	31.9	0.9	2.6	48.4	6.2	3.5	0.0	0.0	0.0	0.0	5.3
Cycle Q Clear(g_c), s	2.4	31.9	0.9	2.6	48.4	6.2	18.0	0.0	0.0	14.5	0.0	5.3
Prop In Lane	1.00		1.00	1.00		1.00	0.47		1.00	0.72		1.00
Lane Grp Cap(c), veh/h	97	2079	927	97	2079	927	163	0		282	0	312
V/C Ratio(X)	0.49	0.78	0.04	0.54	0.96	0.25	0.83	0.00		0.64	0.00	0.34
Avail Cap(c_a), veh/h	97	2079	927	97	2079	927	163	0		282	0	312
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	41.3	13.9	7.6	41.4	17.2	8.7	38.4	0.0	0.0	34.5	0.0	30.9
Incr Delay (d2), s/veh	16.7	3.0	0.1	20.1	12.1	0.6	36.3	0.0	0.0	10.5	0.0	3.0
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	1.5	11.9	0.3	1.7	20.3	2.1	4.6	0.0	0.0	4.5	0.0	2.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	58.0	16.9	7.7	61.5	29.4	9.3	74.7	0.0	0.0	44.9	0.0	33.9
LnGrp LOS	E	B	A	E	C	A	E	A		D	A	C
Approach Vol, veh/h		1717			2274			135	A		286	
Approach Delay, s/veh		17.8			28.1			74.7			40.8	
Approach LOS		B			C			E			D	
Timer - Assigned Phs		2	3	4		6	7	8				
Phs Duration (G+Y+Rc), s		22.5	9.5	58.0		22.5	9.5	58.0				
Change Period (Y+Rc), s		4.5	4.5	4.5		4.5	4.5	4.5				
Max Green Setting (Gmax), s		18.0	5.0	53.5		18.0	5.0	53.5				
Max Q Clear Time (g_c+I1), s		20.0	4.6	33.9		16.5	4.4	50.4				
Green Ext Time (p_c), s		0.0	0.0	12.7		0.2	0.0	2.9				

Intersection Summary

HCM 6th Ctrl Delay	26.4
HCM 6th LOS	C

Notes

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