

October 23, 2023

Ms. Andrea Montano
City of El Centro
1275 W. Main Street
El Centro, CA 92243

LLG Reference: 3-23-3805

Subject: **CR&R Transfer Station – Transportation Assessment**
City of El Centro

Dear Ms. Montano:

Linscott, Law & Greenspan (LLG), Engineers has prepared this transportation assessment for the CR&R Transfer Station project (hereafter referred to as the “Project”) to be located on the south side of Ross Avenue, just east of Dogwood Road in the City of El Centro.

Figure A shows the Project Area Map. *Figure B* shows the Project site plan.

The transfer station is proposed to be approximately 70,550 SF. The proposed site is currently zoned General Commercial (CG) which prohibits the construction of a transfer station. An amendment to the General Plan is being requested to designate the Project site’s land use from General Commercial to Light Industrial in conformance with the proposed ML zone which permits transfer stations.

The purpose of this letter report is to conduct a transportation assessment for the Project. Included in this letter report are the following:

- Existing Conditions / Existing Traffic Volumes
- Trip Generation / Distribution / Assignment
- Traffic Volume Forecast
- Analysis Results
- Conclusions

Effective evaluation of the traffic impacts associated with the Project requires an understanding of the existing transportation system within the Project area. Per coordination with the applicant, majority of the Project trips will be ingressing west of

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the Project site. Therefore, the following intersections were included in the analysis study area:

- Ross Avenue / Dogwood Road
- Ross Avenue / Project driveway

EXISTING CONDITIONS / EXISTING TRAFFIC VOLUMES

The following is a description of the existing street network in the study area.

Ross Avenue is classified as an Arterial west of Dogwood Road and as a Collector east of Dogwood Road in the *City of El Centro Circulation Element* and is currently constructed as a 2-lane roadway separated by a two-way left-turn lane. Within the Project study area, sidewalks are provided on the north side only. The posted speed limit is 45 mph.

Dogwood Road is classified as an Arterial in the *City of El Centro Circulation Element* and is currently constructed as a 2-lane roadway separated by a two-way left-turn lane. Within the study area, sidewalks are provided north of Ross Avenue on the west side only. The posted speed limit is 45 mph.

Peak hour intersection turning movement volume counts were conducted at the Ross Avenue / Dogwood Road intersection on Wednesday, August 16, 2023. In order to account for the counts being conducted in the Summer, a 5% growth factor was applied.

Figure C shows the Existing Conditions Diagram. **Figure D** shows the Existing traffic volumes. **Attachment A** contains the manual count sheets.

TRIP GENERATION/DISTRIBUTION/ASSIGNMENT

Project traffic will be comprised of employee vehicles and heavy vehicle trucks entering and exiting the site. A worst-case assumption is that each worker would generate one round trip to the Project site per workday (i.e. no carpooling). There will be up to 25 employees on the site each workday for an 8- to 12-hour shift.

In addition to the daily workers traveling to the site, there will be up to 59 heavy vehicle truck trips per day. Based on coordination with the applicant, the peak number of heavy vehicle truck trips at the Project site at any one time is 17. Per the *Highway Capacity Manual (6th Edition)*, a Passenger-Car Equivalent (PCE) factor of 2.5 was applied towards the heavy vehicle truck traffic to account for the fact that heavy vehicles are more impactful in the roadway system than passenger vehicles.

Table A shows the forecast trip generation for the Project. As shown in **Table A**, the Project is calculated to generate 345 Average Daily Traffic (ADT), with 95 trips

during the AM peak hour (53 inbound and 42 outbound), and 95 trips during the PM peak hour (43 inbound and 52 outbound). *Attachment A* contains the Project trip generation information provided by the applicant.

The Project traffic was distributed and assigned to the street system based on site location, access to I-8, and coordination with the applicant. The Project traffic distribution assumes 80% of the trips oriented to/from the west and 20% oriented to/from the east.

Figure E shows the Project traffic distribution. *Figure F* shows the Project traffic volumes.

TRAFFIC VOLUME FORECAST

Per coordination with the applicant, it was determined that Year 2024 is the expected opening year of the proposed Project. In order to forecast future traffic volumes for the Near-Term (Year 2024) without Project conditions, a growth rate of 5% was deemed appropriate to use as ambient growth and applied to the existing traffic volumes. Project traffic was added to the Near-Term (Year 2024) traffic volumes to develop Near-Term + Project Traffic Volumes.

Figure G shows the Near-Term without Project traffic volumes. *Figure H* shows the Near-Term + Project traffic volumes.

ANALYSIS RESULTS

The following section presents the intersection analysis at the study area locations.

Table B summarizes the peak hour intersection operations for the Near-Term scenarios. As shown in *Table B*, both intersections are calculated to operate at LOS C or better during both the AM and PM peak hours under the Near-Term scenarios.

Attachment B contains the Existing intersection analysis worksheets. *Attachment C* contains the Near-Term without Project intersection analysis worksheets. *Attachment D* contains the Near-Term + Project intersection analysis worksheets.

CONCLUSIONS

The analysis shows that the proposed Project driveway and Ross Avenue / Dogwood Road intersection will operate at acceptable LOS under the Near-Term scenarios. There is a two-way left-turn lane on Ross Avenue fronting the Project site. Therefore, employee vehicles and heavy vehicle trucks ingressing from east of the Project site can wait within the two-way left-turn lane for an adequate gap to enter the site without blocking the westbound through traffic. Project trips leaving the site by making a northbound left-turn can also wait in the two-way left-turn lane for an

adequate gap before entering the westbound through traffic. It is recommended that the Project provides a stop sign at the proposed driveway to ensure safe maneuvering for vehicles leaving the site.

Please let us know if you have any questions. Thank you.

Sincerely,

Linscott, Law & Greenspan, Engineers



John Boarman, P.E.
Principal



Renald Espiritu
Transportation Engineer III

cc: File

FIGURES

- Figure A:* Project Area Map
- Figure B:* Project Site Plan
- Figure C:* Existing Conditions Diagram
- Figure D:* Existing Traffic Volumes
- Figure E:* Project Traffic Distribution
- Figure F:* Project Traffic Volumes
- Figure G:* Near-Term without Project Traffic Volumes
- Figure H:* Near-Term + Project Traffic Volumes

TABLES

- Table A:* Project Trip Generation
- Table B:* Intersection Operations

ATTACHMENT

- Attachment A:* Intersection Manual Count Sheets, Project Trip Generation Information
- Attachment B:* Existing Peak Hour Intersection Analysis Worksheets
- Attachment C:* Near-Term without Project Peak Hour Intersection Analysis Worksheets
- Attachment D:* Near-Term + Project Peak Hour Intersection Analysis Worksheets

**TABLE A
 PROJECT TRIP GENERATION**

Use	Quantity ^a	PCE ^b	Daily Trip Ends (ADT ^c with PCE)		AM Peak Hour Volume			PM Peak Hour Volume		
			Rate	Volume	In	Out	Total	In	Out	Total
Employees	25	1	2/vehicle	50	10	0	10	0	10	10
Trucks (<i>Heavy Vehicles</i>)	59	2.5	2/vehicle	295	43	42	85 ^d	43	42	85 ^d
Total				345	53	42	95	43	52	95

Footnotes:

- Information provided by applicant (see *Attachment A*).
- PCE – Passenger-Car Equivalent. Assumes PCE factor of 2.5 was applied to heavy vehicle trucks per the *Highway Capacity Manual*.
- ADT – Average Daily Traffic
- Based on coordination with the applicant, the peak number of heavy vehicle truck trips at the Project site at any one time is 17. Therefore, 17 heavy vehicle trucks x 2.5 (PCE) x 2 (rate) = 85.

**TABLE B
 INTERSECTION OPERATIONS**

Intersection	Control Type	Peak Hour	Existing		Near-Term (Year 2024)		Near-Term (Year 2024) + Project		Δ ^c
			Delay ^a	LOS ^b	Delay	LOS	Delay	LOS	
1. Ross Ave / Dogwood Rd	Signal	AM	29.0	C	29.9	C	34.3	C	4.4
		PM	31.3	C	32.9	C	34.7	C	1.8
2. Ross Ave / Project Drwy	DNE/ TWSC ^d	AM	–	–	–	–	11.5	B	11.5
		PM	–	–	–	–	11.2	B	11.2

Footnotes:

- Average delay expressed in seconds per vehicle.
- Level of Service.
- Δ denotes an increase in delay due to project.
- TWSC – Two-Way Stop Controlled intersection. Minor street left-turn delay is reported.

General Notes:

- DNE – does not exist.

SIGNALIZED		UNSIGNALIZED	
DELAY/LOS THRESHOLDS		DELAY/LOS THRESHOLDS	
Delay	LOS	Delay	LOS
0.0 ≤ 10.0	A	0.0 ≤ 10.0	A
10.1 to 20.0	B	10.1 to 15.0	B
20.1 to 35.0	C	15.1 to 25.0	C
35.1 to 55.0	D	25.1 to 35.0	D
55.1 to 80.0	E	35.1 to 50.0	E
≥ 80.1	F	≥ 50.1	F

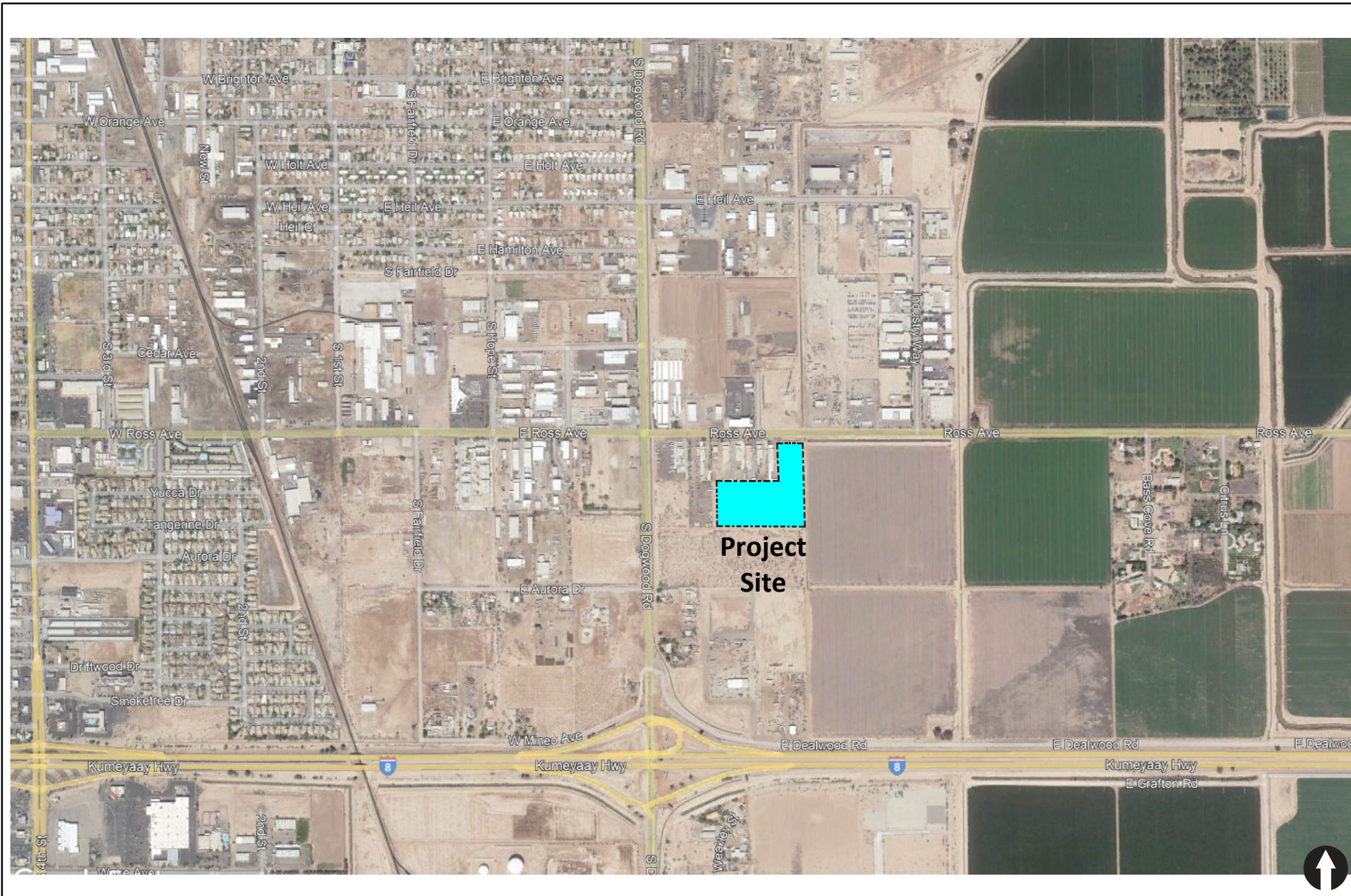
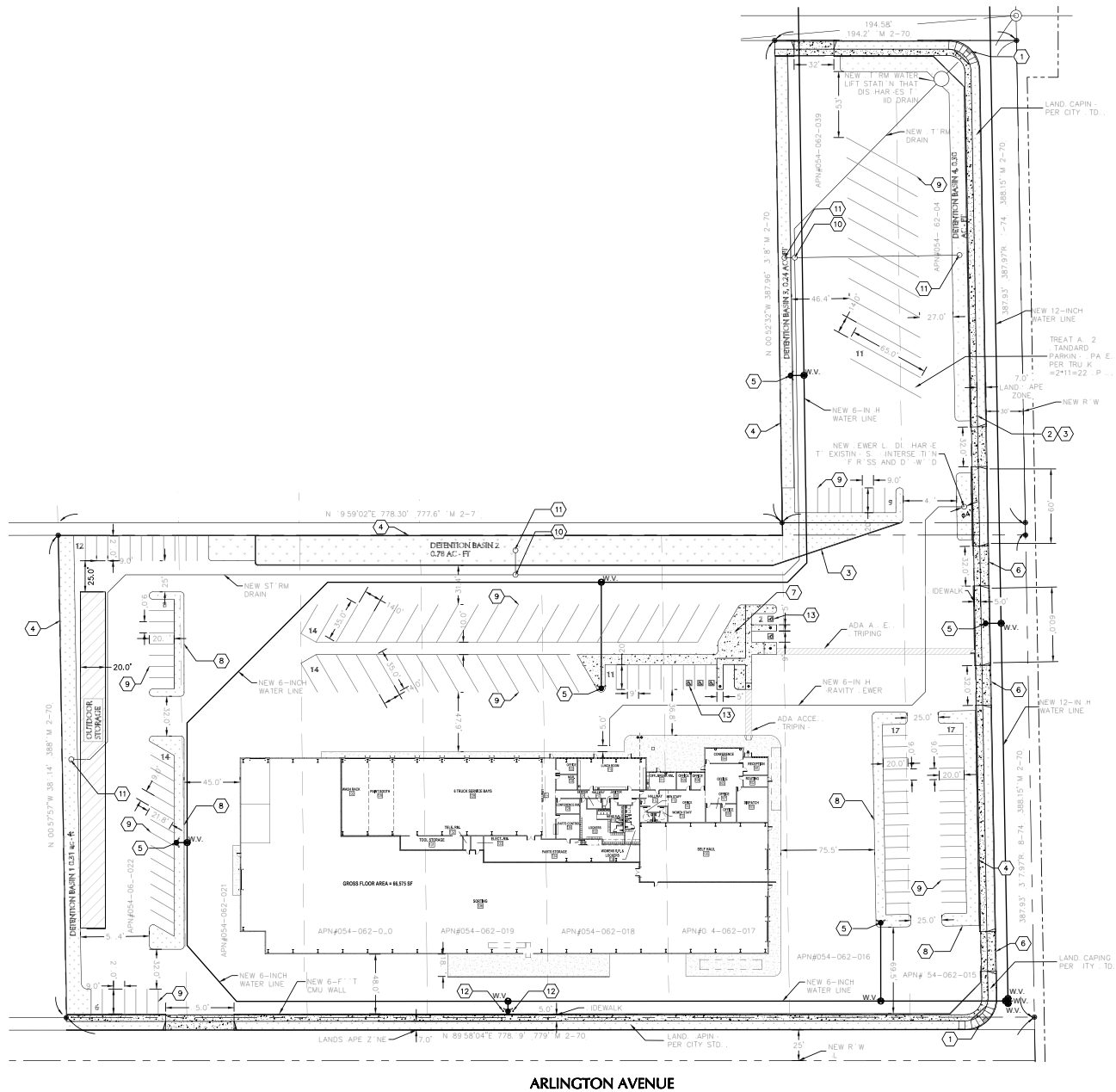


Figure A

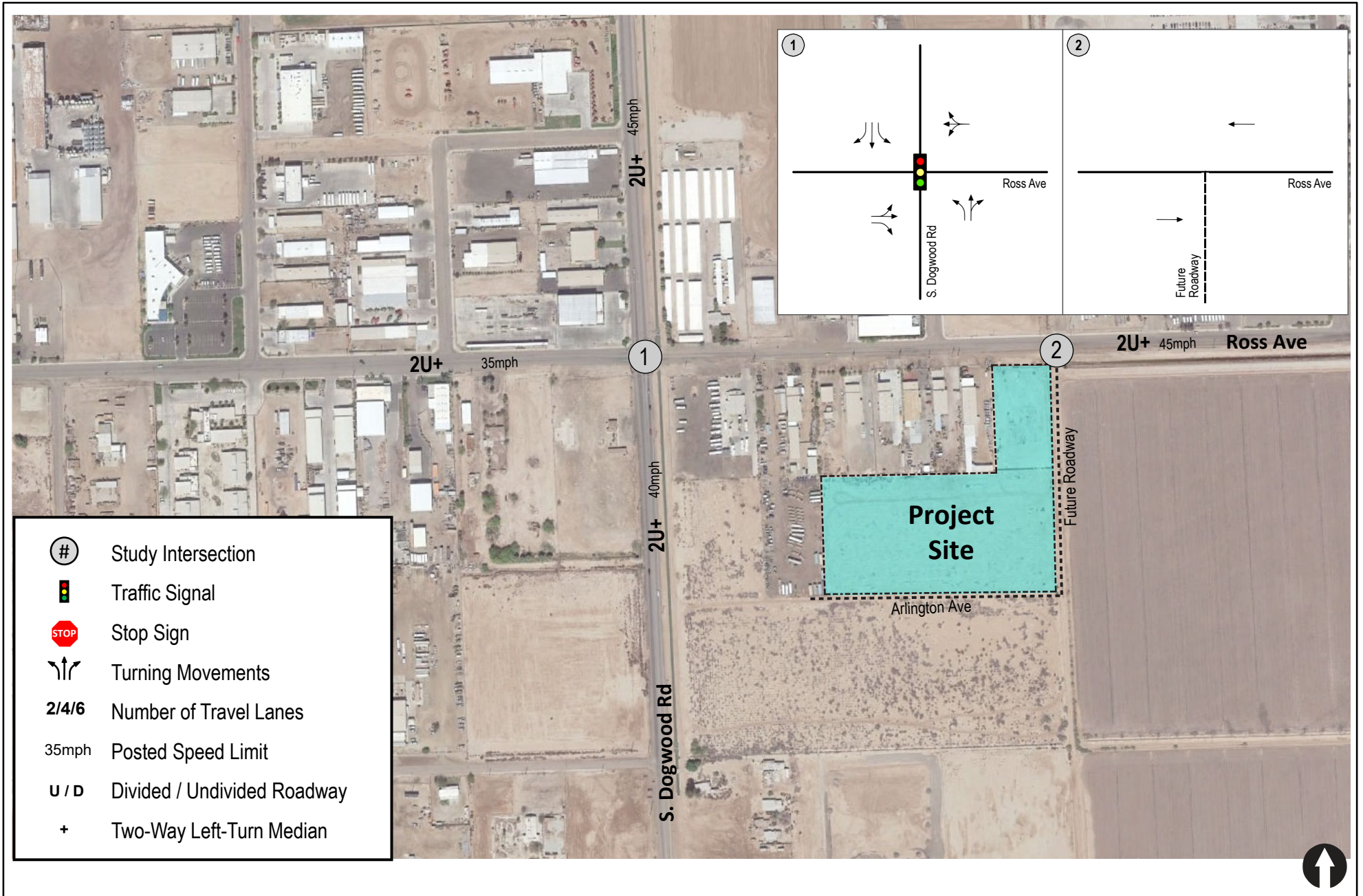
Project Area Map

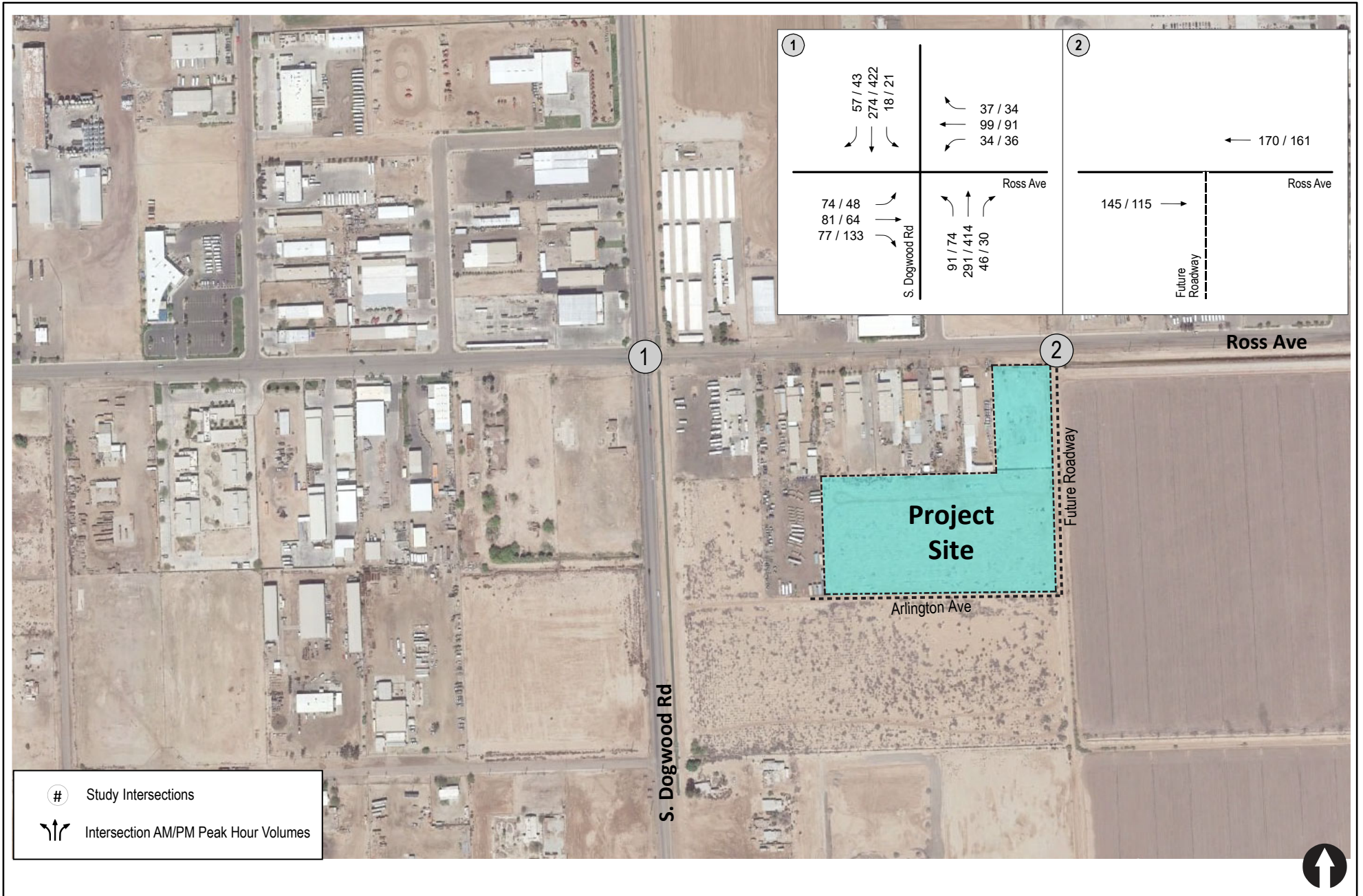
CR & R TRANSFER STATION

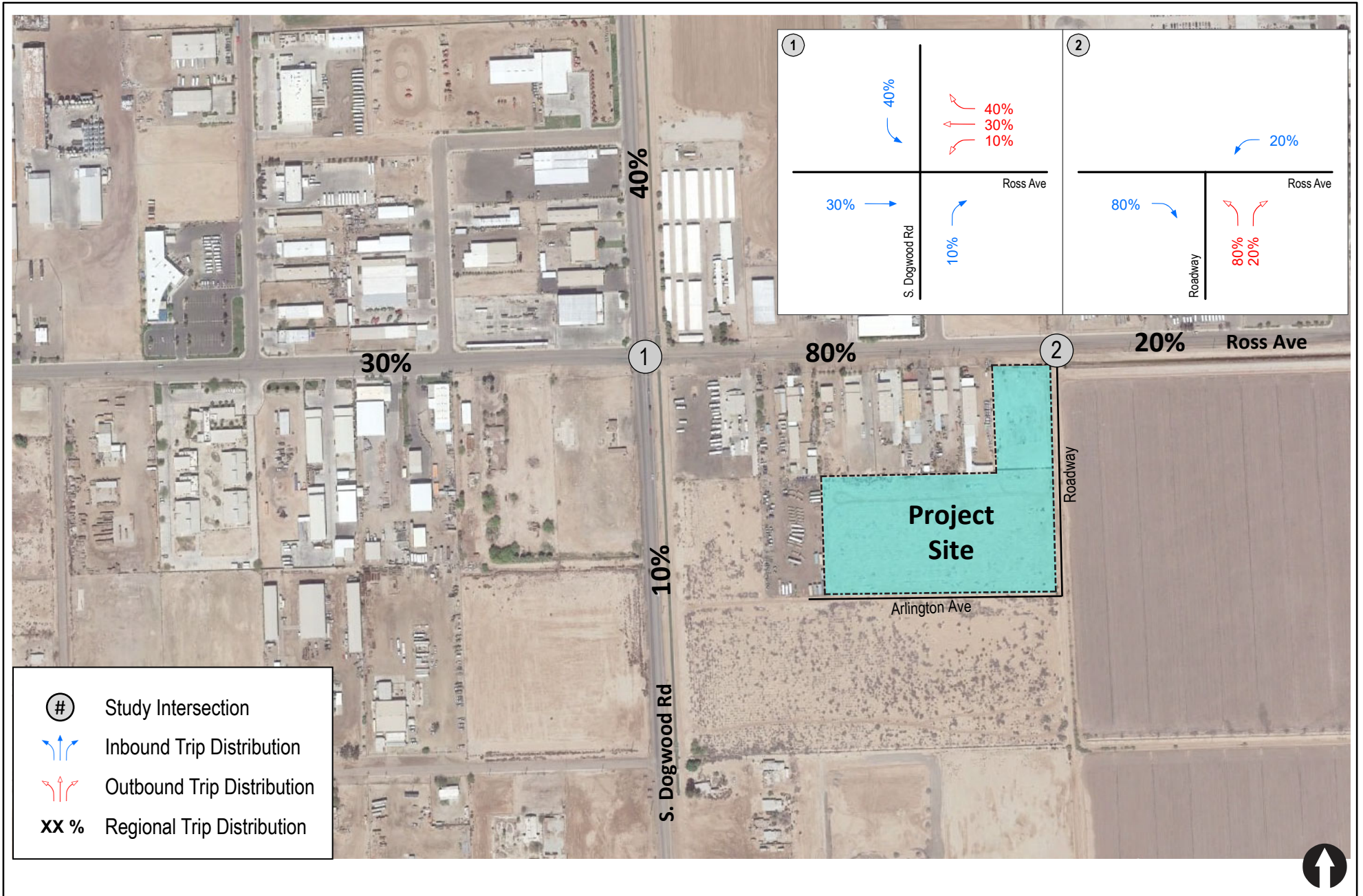


ARLINGTON AVENUE









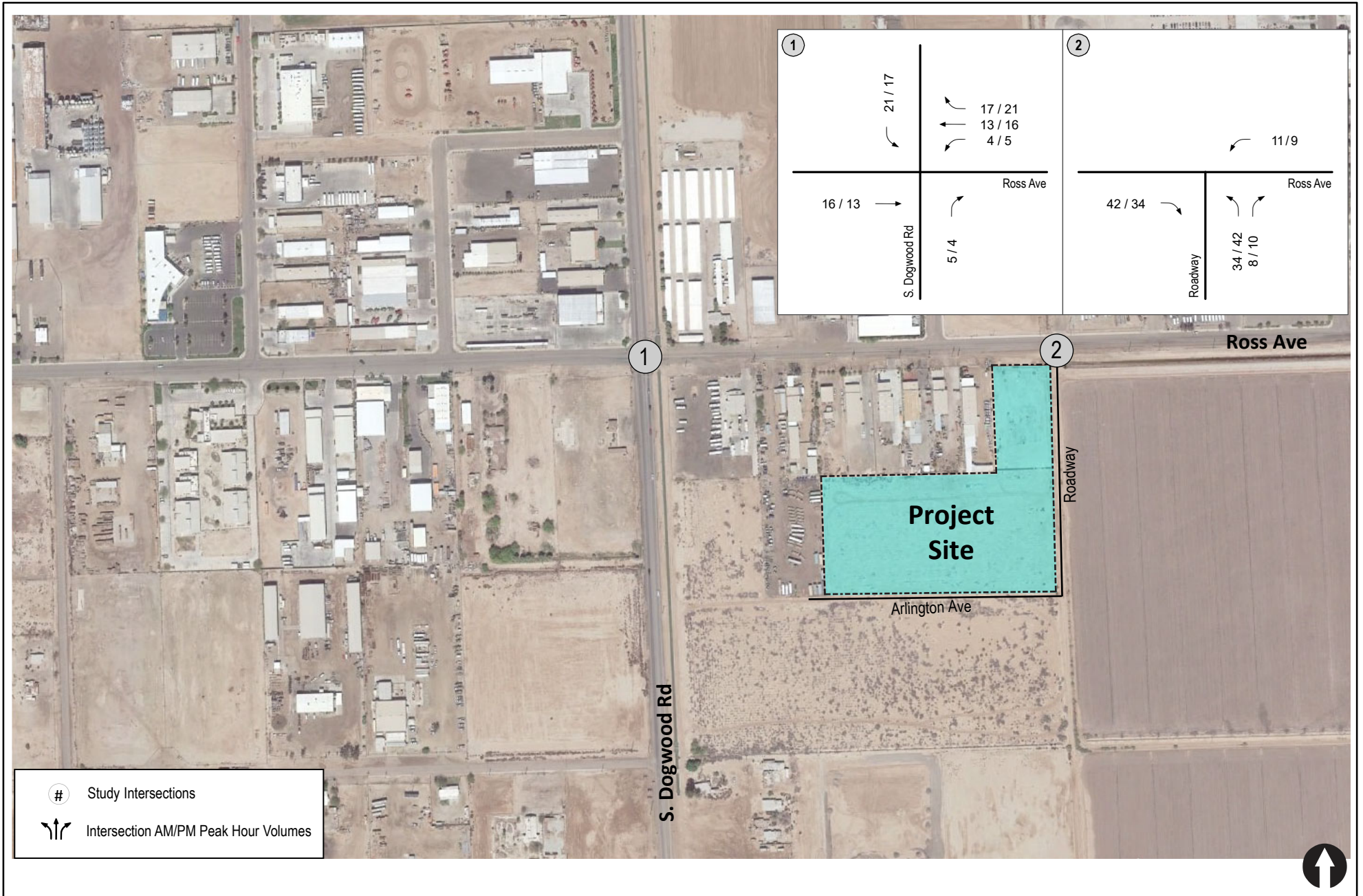


Figure F
Project Traffic Volumes

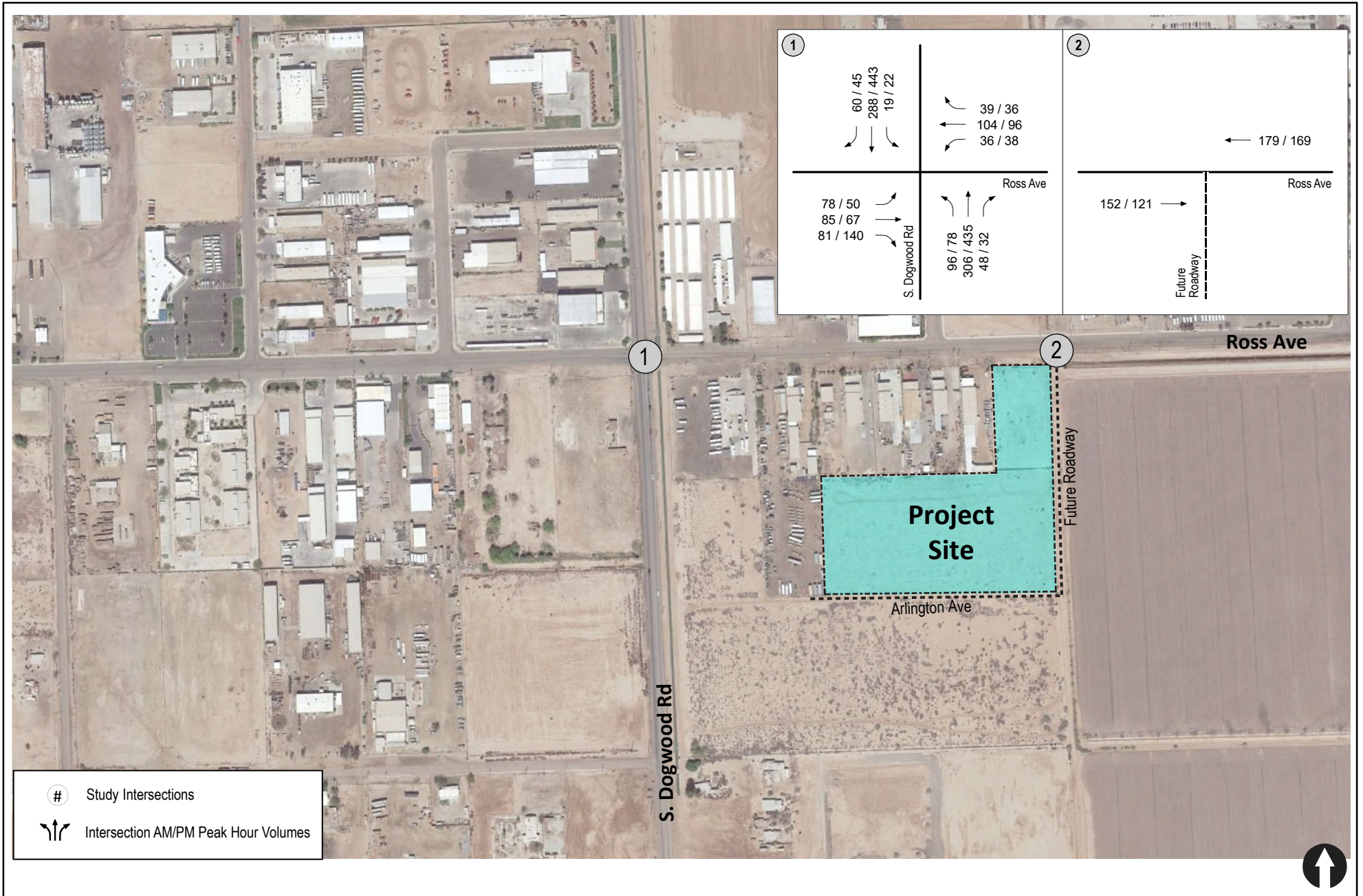


Figure G
Near-Term Without Project Traffic Volumes

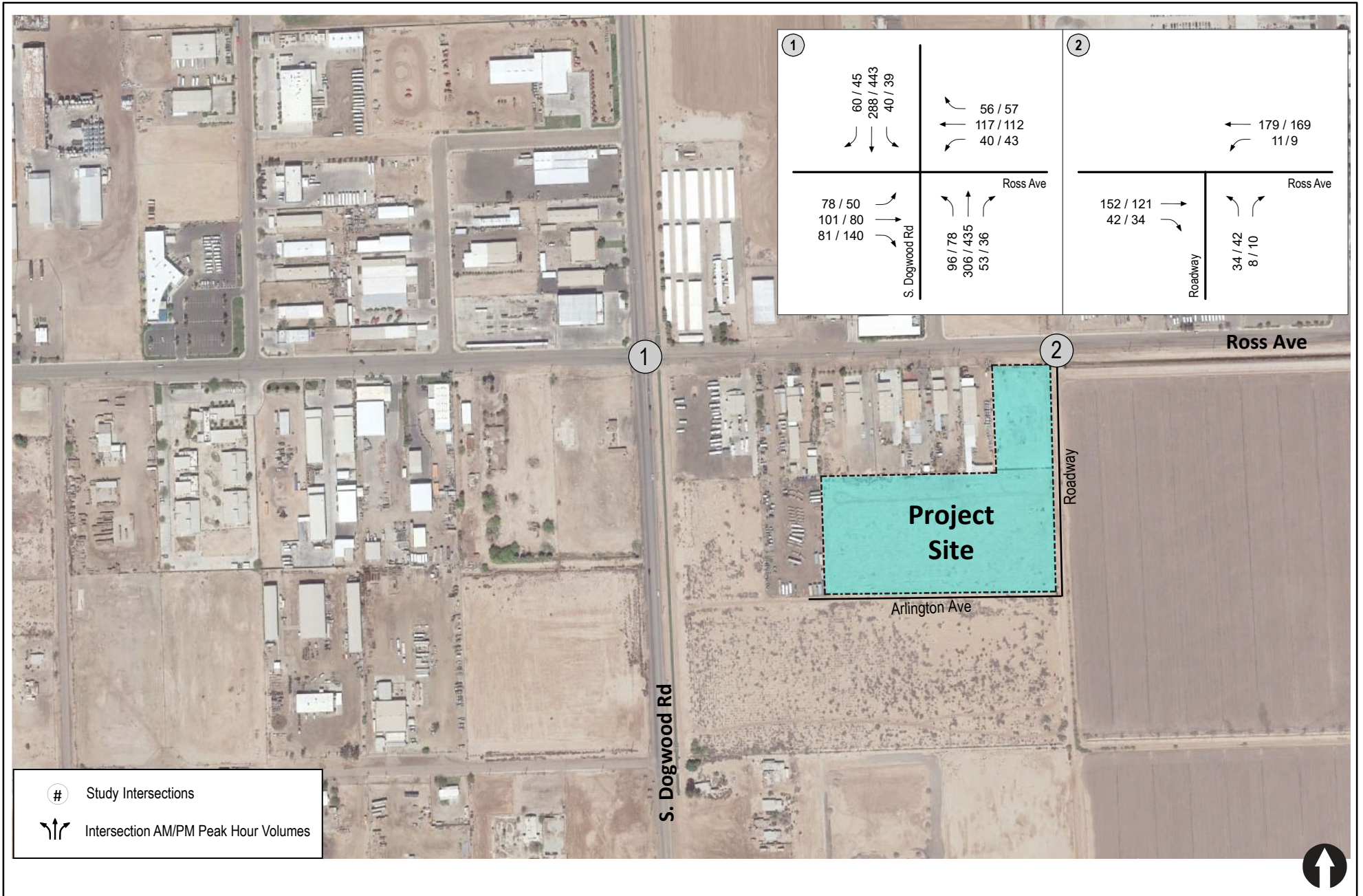


Figure H

Near-Term + Project Traffic Volumes

CR & R TRANSFER STATION

ATTACHMENT A

Intersection Turning Movement - Peak Hour Vehicle Count



Location: #01	File Name: ITM-23-083-01
Intersection: South Dogwood Road & Ross Avenue	Project: LLG Ref. 3-23-3805
Date of Count: Wednesday August 16, 2023	CR & R Transfer Station

AM	South Dogwood Road Southbound			East Ross Avenue Westbound			South Dogwood Road Northbound			Ross Avenue Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
7:00	0	31	9	3	15	7	24	64	6	16	13	8	196
7:15	6	40	15	10	24	10	14	70	7	12	23	16	247
7:30	2	62	20	5	26	7	21	83	8	27	22	16	299
7:45	7	92	10	7	22	12	30	72	15	14	19	23	323
8:00	3	50	13	14	18	5	20	65	12	16	17	14	247
8:15	5	57	11	6	28	11	16	57	9	13	19	20	252
8:30	3	57	13	11	18	12	11	50	8	14	17	19	233
8:45	2	86	17	12	26	9	22	41	8	13	11	11	258
Total	28	475	108	68	177	73	158	502	73	125	141	127	2055
Approach%	4.6	77.7	17.7	21.4	55.7	23.0	21.6	68.5	10.0	31.8	35.9	32.3	
Total%	1.4	23.1	5.3	3.3	8.6	3.6	7.7	24.4	3.6	6.1	6.9	6.2	

AM Intersection Peak Hour: 07:30 to 08:30

Volume	17	261	54	32	94	35	87	277	44	70	77	73	1,121
Approach%	5.1	78.6	16.3	19.9	58.4	21.7	21.3	67.9	10.8	31.8	35.0	33.2	
Total%	1.5	23.3	4.8	2.9	8.4	3.1	7.8	24.7	3.9	6.2	6.9	6.5	
PHF			0.76			0.89			0.87			0.85	0.94

PM	South Dogwood Road Southbound			East Ross Avenue Westbound			South Dogwood Road Northbound			Ross Avenue Eastbound			Total
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
16:00	3	73	9	7	19	12	15	88	7	10	23	43	309
16:15	9	91	6	6	17	5	21	81	7	9	22	33	307
16:30	4	89	10	6	24	10	15	103	4	8	16	25	314
16:45	6	94	7	7	15	7	19	102	6	5	12	26	306
17:00	3	112	16	11	19	2	19	97	8	8	16	50	361
17:15	10	117	7	7	16	11	16	106	3	7	13	25	338
17:30	3	83	9	9	31	9	19	103	7	19	16	26	334
17:45	4	90	9	7	21	10	16	88	11	12	16	26	310
Total	42	749	73	60	162	66	140	768	53	78	134	254	2579
Approach%	4.9	86.7	8.4	20.8	56.3	22.9	14.6	79.9	5.5	16.7	28.8	54.5	
Total%	1.6	29.0	2.8	2.3	6.3	2.6	5.4	29.8	2.1	3.0	5.2	9.8	

PM Intersection Peak Hour: 17:00 to 18:00

Volume	20	402	41	34	87	32	70	394	29	46	61	127	1,343
Approach%	4.3	86.8	8.9	22.2	56.9	20.9	14.2	79.9	5.9	19.7	26.1	54.3	
Total%	1.5	29.9	3.1	2.5	6.5	2.4	5.2	29.3	2.2	3.4	4.5	9.5	
PHF			0.86			0.78			0.96			0.79	0.90

Intersection Turning Movement - Bicycle & Pedestrian Count



Location: #01	File Name: ITM-23-083-01
Intersection: South Dogwood Road & Ross Avenue	Project: LLG Ref. 3-23-3805
Date of Count: Wednesday August 16, 2023	CR & R Transfer Station

AM	South Dogwood Road Southbound				East Ross Avenue Westbound				South Dogwood Road Northbound				Ross Avenue Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
7:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
7:45	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	
8:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
8:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Ped Total	0				0				0				0				0	
Bike Total		0	0	0		0	0	0		0	1	0		0	0	0	1	

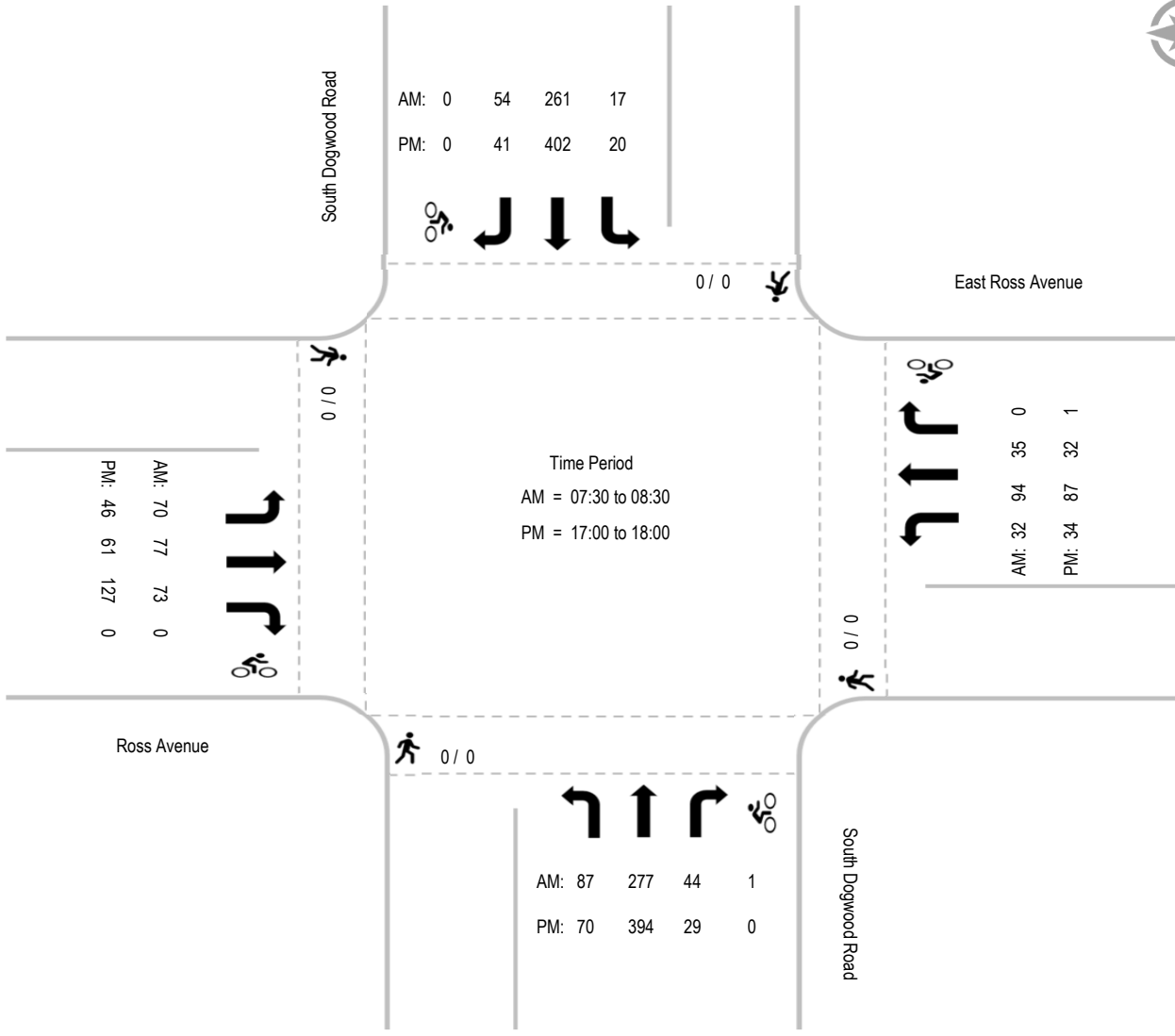
PM	South Dogwood Road Southbound				East Ross Avenue Westbound				South Dogwood Road Northbound				Ross Avenue Eastbound				Totals	
	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	B-Left	B-Thru	B-Right	Ped	Bicycle
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
16:30	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Ped Total	0				0				0				0				0	
Bike Total		0	0	0		0	1	0		0	0	0		0	0	0	1	

Intersection Turning Movement - Peak Hour Summary



Location: #01
Intersection: South Dogwood Road & Ross Avenue
Date of Count: Wednesday August 16, 2023

File Name: ITM-23-083-01
Project: LLG Ref. 3-23-3805
 CR & R Transfer Station



Traffic Analysis for Ross Road Development by CR&R										
Incoming	Autos				Truck Traffic Leaving returning					
	Drivers	Mechanics	Office	Operatons	res'l	comm'l	RO	Ancill		
4:00 AM										
5	5									
6	10					4	3	1	Leaving	
7		2			10				dump and return	
8			4	3		4 x 2				
9							3 x 2		dump and return	
10					10 x 2	4 x 2				
11							3 x 2		dump and return	
12 noon		2								
1					10 x 2	4 x 2	3 x 2		dump and return	
2										
3	5									
4	10				10	4	3	1	return	
5			4	3						
7		2								
	30	6	8	6	60	32	24	2	Total trips per day	





















Light Vehicles ADT = 50

Heavy Vehicles ADT = 118 x 2.5 (PCE) = 295

ATTACHMENT B





















HCM 6th Signalized Intersection Summary
1: Dogwood Rd & Ross Avenue

Ex AM
09/20/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	74	81	77	34	99	37	91	291	46	18	274	57
Future Volume (veh/h)	74	81	77	34	99	37	91	291	46	18	274	57
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.91	1.00		0.92	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	87	95	91	38	111	42	105	334	53	24	361	75
Peak Hour Factor	0.85	0.85	0.85	0.89	0.89	0.89	0.87	0.87	0.87	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	111	121	183	52	151	57	134	799	127	44	860	701
Arrive On Green	0.13	0.13	0.13	0.15	0.15	0.15	0.08	0.51	0.51	0.02	0.46	0.46
Sat Flow, veh/h	873	953	1447	347	1015	384	1781	1566	248	1781	1870	1524
Grp Volume(v), veh/h	182	0	91	191	0	0	105	0	387	24	361	75
Grp Sat Flow(s),veh/h/ln	1827	0	1447	1746	0	0	1781	0	1814	1781	1870	1524
Q Serve(g_s), s	9.2	0.0	5.6	9.9	0.0	0.0	5.5	0.0	12.6	1.3	12.3	2.7
Cycle Q Clear(g_c), s	9.2	0.0	5.6	9.9	0.0	0.0	5.5	0.0	12.6	1.3	12.3	2.7
Prop In Lane	0.48		1.00	0.20		0.22	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	231	0	183	260	0	0	134	0	926	44	860	701
V/C Ratio(X)	0.79	0.00	0.50	0.73	0.00	0.00	0.78	0.00	0.42	0.55	0.42	0.11
Avail Cap(c_a), veh/h	413	0	327	469	0	0	291	0	926	122	860	701
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	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.3	0.0	38.7	38.6	0.0	0.0	43.2	0.0	14.5	45.8	17.2	14.6
Incr Delay (d2), s/veh	5.9	0.0	2.1	4.0	0.0	0.0	9.5	0.0	1.4	10.1	1.5	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.3	0.0	2.0	4.3	0.0	0.0	2.7	0.0	5.0	0.7	5.1	0.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.1	0.0	40.8	42.6	0.0	0.0	52.7	0.0	15.9	55.9	18.7	14.9
LnGrp LOS	D	A	D	D	A	A	D	A	B	E	B	B
Approach Vol, veh/h		273			191			492			460	
Approach Delay, s/veh		44.3			42.6			23.7			20.0	
Approach LOS		D			D			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.8	53.0		16.5	11.7	48.2		18.7				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	6.5	48.5		21.5	15.5	39.5		25.5				
Max Q Clear Time (g_c+I1), s	3.3	14.6		11.2	7.5	14.3		11.9				
Green Ext Time (p_c), s	0.0	2.3		0.9	0.1	2.2		0.7				
Intersection Summary												
HCM 6th Ctrl Delay				29.0								
HCM 6th LOS				C								

HCM 6th Signalized Intersection Summary
1: Dogwood Rd & Ross Avenue

Ex PM
09/20/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	48	64	133	36	91	34	74	414	30	21	422	43
Future Volume (veh/h)	48	64	133	36	91	34	74	414	30	21	422	43
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.91	1.00		0.92	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	56	75	156	40	102	38	85	476	34	28	555	57
Peak Hour Factor	0.85	0.85	0.85	0.89	0.89	0.89	0.87	0.87	0.87	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	100	134	185	54	138	52	109	916	65	48	932	760
Arrive On Green	0.13	0.13	0.13	0.14	0.14	0.14	0.06	0.53	0.53	0.03	0.50	0.50
Sat Flow, veh/h	783	1048	1448	388	990	369	1781	1720	123	1781	1870	1526
Grp Volume(v), veh/h	131	0	156	180	0	0	85	0	510	28	555	57
Grp Sat Flow(s),veh/h/ln	1831	0	1448	1746	0	0	1781	0	1843	1781	1870	1526
Q Serve(g_s), s	7.0	0.0	10.9	10.3	0.0	0.0	4.9	0.0	18.6	1.6	22.0	2.0
Cycle Q Clear(g_c), s	7.0	0.0	10.9	10.3	0.0	0.0	4.9	0.0	18.6	1.6	22.0	2.0
Prop In Lane	0.43		1.00	0.22		0.21	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	233	0	185	244	0	0	109	0	982	48	932	760
V/C Ratio(X)	0.56	0.00	0.85	0.74	0.00	0.00	0.78	0.00	0.52	0.59	0.60	0.07
Avail Cap(c_a), veh/h	273	0	216	421	0	0	197	0	982	106	932	760
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	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.6	0.0	44.3	42.8	0.0	0.0	48.1	0.0	15.7	50.0	18.6	13.6
Incr Delay (d2), s/veh	2.1	0.0	22.6	4.3	0.0	0.0	11.4	0.0	2.0	11.1	2.8	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.2	0.0	4.9	4.6	0.0	0.0	2.4	0.0	7.5	0.8	9.3	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.7	0.0	66.9	47.1	0.0	0.0	59.5	0.0	17.6	61.0	21.4	13.8
LnGrp LOS	D	A	E	D	A	A	E	A	B	E	C	B
Approach Vol, veh/h		287			180			595			640	
Approach Delay, s/veh		56.8			47.1			23.6			22.4	
Approach LOS		E			D			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.3	59.8		17.7	10.8	56.2		19.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	6.2	55.3		15.5	11.5	50.0		25.0				
Max Q Clear Time (g_c+I1), s	3.6	20.6		12.9	6.9	24.0		12.3				
Green Ext Time (p_c), s	0.0	3.2		0.3	0.1	3.6		0.7				
Intersection Summary												
HCM 6th Ctrl Delay			31.3									
HCM 6th LOS			C									

ATTACHMENT C

HCM 6th Signalized Intersection Summary
 1: Dogwood Rd & Ross Avenue

NT AM
 09/20/2023



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↖	↗		↔		↖	↗		↖	↗	↗
Traffic Volume (veh/h)	78	85	81	36	104	39	96	306	48	19	288	60
Future Volume (veh/h)	78	85	81	36	104	39	96	306	48	19	288	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.92	1.00		0.92	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	92	100	95	40	117	44	110	352	55	25	379	79
Peak Hour Factor	0.85	0.85	0.85	0.89	0.89	0.89	0.87	0.87	0.87	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	115	125	191	53	156	59	140	789	123	45	841	685
Arrive On Green	0.13	0.13	0.13	0.15	0.15	0.15	0.08	0.50	0.50	0.03	0.45	0.45
Sat Flow, veh/h	875	951	1452	348	1017	383	1781	1570	245	1781	1870	1523
Grp Volume(v), veh/h	192	0	95	201	0	0	110	0	407	25	379	79
Grp Sat Flow(s),veh/h/ln	1827	0	1452	1747	0	0	1781	0	1815	1781	1870	1523
Q Serve(g_s), s	9.8	0.0	5.9	10.6	0.0	0.0	5.9	0.0	13.9	1.3	13.5	2.9
Cycle Q Clear(g_c), s	9.8	0.0	5.9	10.6	0.0	0.0	5.9	0.0	13.9	1.3	13.5	2.9
Prop In Lane	0.48		1.00	0.20		0.22	1.00		0.14	1.00		1.00
Lane Grp Cap(c), veh/h	241	0	191	268	0	0	140	0	913	45	841	685
V/C Ratio(X)	0.80	0.00	0.50	0.75	0.00	0.00	0.79	0.00	0.45	0.55	0.45	0.12
Avail Cap(c_a), veh/h	407	0	324	462	0	0	286	0	913	120	841	685
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	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.6	0.0	38.9	39.0	0.0	0.0	43.7	0.0	15.4	46.5	18.3	15.4
Incr Delay (d2), s/veh	6.0	0.0	2.0	4.2	0.0	0.0	9.4	0.0	1.6	10.2	1.7	0.3
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.6	0.0	2.1	4.6	0.0	0.0	2.8	0.0	5.5	0.7	5.7	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	46.6	0.0	40.9	43.2	0.0	0.0	53.1	0.0	16.9	56.7	20.1	15.7
LnGrp LOS	D	A	D	D	A	A	D	A	B	E	C	B
Approach Vol, veh/h		287			201			517				483
Approach Delay, s/veh		44.7			43.2			24.6				21.3
Approach LOS		D			D			C				C
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.9	53.0		17.2	12.1	47.9		19.3				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	6.5	48.5		21.5	15.5	39.5		25.5				
Max Q Clear Time (g_c+I1), s	3.3	15.9		11.8	7.9	15.5		12.6				
Green Ext Time (p_c), s	0.0	2.4		0.9	0.1	2.3		0.8				
Intersection Summary												
HCM 6th Ctrl Delay				29.9								
HCM 6th LOS				C								

HCM 6th Signalized Intersection Summary
 1: Dogwood Rd & Ross Avenue

NT PM
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




















Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕	↗		↕		↖	↗		↖	↕	↗
Traffic Volume (veh/h)	50	67	140	38	96	36	78	435	32	22	443	45
Future Volume (veh/h)	50	67	140	38	96	36	78	435	32	22	443	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.92	1.00		0.92	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	59	79	165	43	108	40	90	500	37	29	583	59
Peak Hour Factor	0.85	0.85	0.85	0.89	0.89	0.89	0.87	0.87	0.87	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	104	139	192	57	143	53	115	900	67	48	912	744
Arrive On Green	0.13	0.13	0.13	0.14	0.14	0.14	0.06	0.52	0.52	0.03	0.49	0.49
Sat Flow, veh/h	783	1048	1452	394	988	366	1781	1715	127	1781	1870	1526
Grp Volume(v), veh/h	138	0	165	191	0	0	90	0	537	29	583	59
Grp Sat Flow(s),veh/h/ln	1831	0	1452	1748	0	0	1781	0	1842	1781	1870	1526
Q Serve(g_s), s	7.5	0.0	11.7	11.1	0.0	0.0	5.2	0.0	20.6	1.7	24.5	2.2
Cycle Q Clear(g_c), s	7.5	0.0	11.7	11.1	0.0	0.0	5.2	0.0	20.6	1.7	24.5	2.2
Prop In Lane	0.43		1.00	0.23		0.21	1.00		0.07	1.00		1.00
Lane Grp Cap(c), veh/h	242	0	192	253	0	0	115	0	967	48	912	744
V/C Ratio(X)	0.57	0.00	0.86	0.75	0.00	0.00	0.79	0.00	0.56	0.60	0.64	0.08
Avail Cap(c_a), veh/h	269	0	214	415	0	0	194	0	967	105	912	744
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	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.9	0.0	44.7	43.3	0.0	0.0	48.6	0.0	16.8	50.7	20.1	14.4
Incr Delay (d2), s/veh	2.3	0.0	25.9	4.5	0.0	0.0	11.1	0.0	2.3	11.3	3.4	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.4	0.0	5.4	4.9	0.0	0.0	2.6	0.0	8.5	0.9	10.5	0.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	45.2	0.0	70.7	47.8	0.0	0.0	59.7	0.0	19.1	62.0	23.5	14.6
LnGrp LOS	D	A	E	D	A	A	E	A	B	E	C	B
Approach Vol, veh/h		303			191			627			671	
Approach Delay, s/veh		59.1			47.8			24.9			24.4	
Approach LOS		E			D			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.4	59.8		18.5	11.3	55.9		19.8				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	6.2	55.3		15.5	11.5	50.0		25.0				
Max Q Clear Time (g_c+I1), s	3.7	22.6		13.7	7.2	26.5		13.1				
Green Ext Time (p_c), s	0.0	3.4		0.2	0.1	3.7		0.7				
Intersection Summary												
HCM 6th Ctrl Delay				32.9								
HCM 6th LOS				C								

ATTACHMENT D

HCM 6th Signalized Intersection Summary
 1: Dogwood Rd & Ross Avenue

NT + P AM
 09/20/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	78	101	81	40	117	56	96	306	53	40	288	60
Future Volume (veh/h)	78	101	81	40	117	56	96	306	53	40	288	60
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.92	1.00		0.93	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	92	119	95	45	131	63	110	352	61	53	379	79
Peak Hour Factor	0.85	0.85	0.85	0.89	0.89	0.89	0.87	0.87	0.87	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	112	144	204	56	163	78	139	732	127	68	813	662
Arrive On Green	0.14	0.14	0.14	0.17	0.17	0.17	0.08	0.47	0.47	0.04	0.43	0.43
Sat Flow, veh/h	798	1032	1457	326	949	456	1781	1542	267	1781	1870	1522
Grp Volume(v), veh/h	211	0	95	239	0	0	110	0	413	53	379	79
Grp Sat Flow(s),veh/h/ln	1830	0	1457	1732	0	0	1781	0	1810	1781	1870	1522
Q Serve(g_s), s	11.5	0.0	6.1	13.6	0.0	0.0	6.2	0.0	15.9	3.0	14.7	3.2
Cycle Q Clear(g_c), s	11.5	0.0	6.1	13.6	0.0	0.0	6.2	0.0	15.9	3.0	14.7	3.2
Prop In Lane	0.44		1.00	0.19		0.26	1.00		0.15	1.00		1.00
Lane Grp Cap(c), veh/h	256	0	204	297	0	0	139	0	858	68	813	662
V/C Ratio(X)	0.82	0.00	0.47	0.80	0.00	0.00	0.79	0.00	0.48	0.78	0.47	0.12
Avail Cap(c_a), veh/h	385	0	306	432	0	0	270	0	858	113	813	662
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	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.8	0.0	40.5	40.7	0.0	0.0	46.3	0.0	18.3	48.7	20.5	17.2
Incr Delay (d2), s/veh	8.6	0.0	1.7	6.9	0.0	0.0	9.7	0.0	1.9	17.1	1.9	0.4
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	5.6	0.0	2.2	6.1	0.0	0.0	3.0	0.0	6.5	1.6	6.4	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	51.4	0.0	42.1	47.6	0.0	0.0	56.1	0.0	20.2	65.8	22.4	17.6
LnGrp LOS	D	A	D	D	A	A	E	A	C	E	C	B
Approach Vol, veh/h		306			239			523			511	
Approach Delay, s/veh		48.5			47.6			27.8			26.2	
Approach LOS		D			D			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.4	53.0		18.8	12.5	48.9		22.0				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	6.5	48.5		21.5	15.5	39.5		25.5				
Max Q Clear Time (g_c+I1), s	5.0	17.9		13.5	8.2	16.7		15.6				
Green Ext Time (p_c), s	0.0	2.5		0.9	0.1	2.3		0.8				
Intersection Summary												
HCM 6th Ctrl Delay			34.3									
HCM 6th LOS			C									

Intersection						
Int Delay, s/veh	1.3					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	152	42	11	179	34	8
Future Vol, veh/h	152	42	11	179	34	8
Conflicting Peds, #/hr	0	10	10	0	10	10
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	89	89	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	165	46	12	201	37	9





















Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	221	0	433 208
Stage 1	-	-	-	-	198 -
Stage 2	-	-	-	-	235 -
Critical Hdwy	-	-	4.12	-	6.42 6.22
Critical Hdwy Stg 1	-	-	-	-	5.42 -
Critical Hdwy Stg 2	-	-	-	-	5.42 -
Follow-up Hdwy	-	-	2.218	-	3.518 3.318
Pot Cap-1 Maneuver	-	-	1348	-	580 832
Stage 1	-	-	-	-	835 -
Stage 2	-	-	-	-	804 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1335	-	563 816
Mov Cap-2 Maneuver	-	-	-	-	563 -
Stage 1	-	-	-	-	827 -
Stage 2	-	-	-	-	789 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	11.5
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	598	-	-	1335	-
HCM Lane V/C Ratio	0.076	-	-	0.009	-
HCM Control Delay (s)	11.5	-	-	7.7	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.2	-	-	0	-

HCM 6th Signalized Intersection Summary
 1: Dogwood Rd & Ross Avenue

NT + P PM
 09/20/2023

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	80	140	43	112	57	78	435	36	39	443	45
Future Volume (veh/h)	50	80	140	43	112	57	78	435	36	39	443	45
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.92	1.00		0.93	1.00		0.96	1.00		0.96
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	59	94	165	48	126	64	90	500	41	51	583	59
Peak Hour Factor	0.85	0.85	0.85	0.89	0.89	0.89	0.87	0.87	0.87	0.76	0.76	0.76
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	97	155	200	59	156	79	115	818	67	66	849	691
Arrive On Green	0.14	0.14	0.14	0.17	0.17	0.17	0.06	0.48	0.48	0.04	0.45	0.45
Sat Flow, veh/h	708	1127	1456	349	915	465	1781	1699	139	1781	1870	1523
Grp Volume(v), veh/h	153	0	165	238	0	0	90	0	541	51	583	59
Grp Sat Flow(s),veh/h/ln	1835	0	1456	1728	0	0	1781	0	1839	1781	1870	1523
Q Serve(g_s), s	8.1	0.0	11.4	13.7	0.0	0.0	5.2	0.0	22.4	2.9	25.6	2.3
Cycle Q Clear(g_c), s	8.1	0.0	11.4	13.7	0.0	0.0	5.2	0.0	22.4	2.9	25.6	2.3
Prop In Lane	0.39		1.00	0.20		0.27	1.00		0.08	1.00		1.00
Lane Grp Cap(c), veh/h	252	0	200	295	0	0	115	0	885	66	849	691
V/C Ratio(X)	0.61	0.00	0.83	0.81	0.00	0.00	0.78	0.00	0.61	0.77	0.69	0.09
Avail Cap(c_a), veh/h	372	0	295	417	0	0	198	0	885	107	849	691
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	0.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	42.0	0.0	43.4	41.3	0.0	0.0	47.7	0.0	19.7	49.4	22.4	16.1
Incr Delay (d2), s/veh	2.4	0.0	11.5	7.7	0.0	0.0	11.0	0.0	3.1	16.9	4.5	0.2
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	3.7	0.0	4.6	6.2	0.0	0.0	2.6	0.0	9.5	1.6	11.3	0.8
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	44.4	0.0	54.9	49.0	0.0	0.0	58.8	0.0	22.9	66.3	26.9	16.3
LnGrp LOS	D	A	D	D	A	A	E	A	C	E	C	B
Approach Vol, veh/h		318			238			631			693	
Approach Delay, s/veh		49.8			49.0			28.0			28.9	
Approach LOS		D			D			C			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.3	54.3		18.7	11.2	51.5		22.2				
Change Period (Y+Rc), s	4.5	4.5		4.5	4.5	4.5		4.5				
Max Green Setting (Gmax), s	6.2	49.8		21.0	11.5	44.5		25.0				
Max Q Clear Time (g_c+I1), s	4.9	24.4		13.4	7.2	27.6		15.7				
Green Ext Time (p_c), s	0.0	3.3		0.8	0.1	3.4		0.8				
Intersection Summary												
HCM 6th Ctrl Delay			34.7									
HCM 6th LOS			C									

Intersection						
Int Delay, s/veh	1.7					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	121	34	9	169	42	10
Future Vol, veh/h	121	34	9	169	42	10
Conflicting Peds, #/hr	0	10	10	0	10	10
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	89	89	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	132	37	10	190	46	11

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	179	0	381
Stage 1	-	-	-	-	161
Stage 2	-	-	-	-	220
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	-	-	1397	-	621
Stage 1	-	-	-	-	868
Stage 2	-	-	-	-	817
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1384	-	604
Mov Cap-2 Maneuver	-	-	-	-	604
Stage 1	-	-	-	-	859
Stage 2	-	-	-	-	803

Approach	EB	WB	NB
HCM Control Delay, s	0	0.4	11.2
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT
Capacity (veh/h)	640	-	-	1384	-
HCM Lane V/C Ratio	0.088	-	-	0.007	-
HCM Control Delay (s)	11.2	-	-	7.6	0
HCM Lane LOS	B	-	-	A	A
HCM 95th %tile Q(veh)	0.3	-	-	0	-