

WATERSHED ESTRELLA ACCESS STUDY

MAY 1, 2013

Prepared For:
Pulte Homes
7601 Jefferson St NE, Suite 320
Albuquerque, NM 87109

Bohannon  Huston

Engineering
Spatial Data
Advanced Technologies



August 20, 2013

voice: 505.823.1000
facsimile: 505.798.7988
toll free: 800.877.5332Ms. Nancy Perea, P.E.
NMDOT
District 3 Assistant Traffic Engineer
7500 Pan American Freeway NE
Albuquerque, NM 87109Re: Watershed/Estrella – City of Albuquerque EPC Case #13EPC-40115
Traffic Analysis of Ladera and Unser Intersection

Dear Nancy:

As you are aware, as a condition of approval at the City of Albuquerque Environmental Planning Commission for the above reference project, the NMDOT requested that "an analysis of the operation and mitigation necessary to return traffic operations to that of the no build condition at the Ladera and Unser Intersection is required. This analysis shall be performed and submitted to the City and NMDOT for review prior to the first subdivision plat approval by the DRB."

This letter documents this required analysis.

This analysis uses the currently available traffic counts for the intersection, collected June 14, 2011. The traffic counts are included in the Enclosure. This analysis evaluates the 2011 AM and PM peak hours, the 2015 no-build AM and PM peak hours, and the 2015 build AM and PM peak hours. A 2% growth rate was used to grow the background traffic. The build traffic adds the anticipated traffic resulting from the Watershed/Estrella development. The analysis also evaluates the new geometry at the intersection that has been recently constructed by the land owner, Western Albuquerque Land Holdings (WALH).

The LOS results are summarized in the following table, and the Synchro summary reports are included in the Enclosure.

Table 1 –Signalized Intersection Capacity Analysis Results Ladera and Unser						
Signalized Intersections	AM Peak			PM Peak		
	Delay (sec.)	V/C	LOS	Delay (sec.)	V/C	LOS
2011	28.7	0.69	C	28.8	0.87	C*
2015 No Build	30.3	0.75	C	32.3	0.93	C*
2015 Build	30.4	0.76	C	32.6	0.94	C*
* - some movements LOS E						
** - some movements LOS F						

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Ms. Nancy Perea,
NMDOT District 3 Assistant Traffic Engineer
August 20, 2013
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It can be seen from the results that the intersection operates at acceptable levels of service in 2011, 2015 no build, and 2015 build. In the 2011 PM peak hour, the eastbound left operates at LOS E, and in the 2015 no build and build, the eastbound left and the westbound through operate at LOS E.

There is negligible difference in performance due to the addition of the Build traffic, as the bulk of the site traffic is anticipated to utilize Atrisco Vista to access the site.

The NMDOT has also expressed concern over the length of the queue for the northbound traffic, particularly the northbound left. The table below lists the 95th percentile Synchro queues for the northbound approach. The full queue summaries are included in the Enclosure.

Table 2 –Signalized Intersection Northbound Queue Analysis Results Ladera and Unser						
Signalized Intersections	AM Peak			PM Peak		
	NB Left	NB Through	NB Right	NB Left	NB Through	NB Right
2011	50	100	25	300	275	25
2015 No Build	50	100	25	350	275	25
2015 Build	50	100	25	375	300	25
Reported queue is greater of Synchro reported 50 th or 95 th percentile, rounded to the next highest 25-ft interval						

The results show there is no change in the northbound approach for the AM peak hour. The results show a small increase in queue for the northbound left and northbound through in the PM peak hour. As the recent improvements at the intersection provide for a 430-foot left turn lane, the existing turn bay length will accommodate the anticipated build queue in the PM peak hour.

The results indicate no mitigation is necessary to return traffic operations to that of the no build condition at the Ladera and Unser Intersection.

Please contact me directly at (505) 798-7859 if you have any questions regarding this analysis.

Sincerely,


Eric J. Wrage, P.E., P.T.O.E.
Project Manager
Traffic & Transportation

EJW/tms

Enclosure

cc: Antonio Jaramillo, NMDOT District 3
Jackie Fishman, Consensus Planning
Kevin Patton, BHI

Mike Henderson Consulting, LLC

5301 Camino Sandia NE

Albuquerque, NM 87111

(505) 275-5706

Collected by: MV

File Name : Unser@Ladera

Site Code : 00000000

Start Date : 6/14/2011

Page No : 1

Groups Printed- Cars - Trucks

Start Time	Ladera Dr Eastbound				Ladera Dr Westbound				Unser Blvd Northbound				Unser Blvd Southbound				Int. Total
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	
06:45	24	15	62	101	51	6	20	77	7	92	27	126	11	245	6	262	566
Total	24	15	62	101	51	6	20	77	7	92	27	126	11	245	6	262	566
07:00	39	27	79	145	82	10	10	102	9	65	29	103	18	256	4	278	628
07:15	25	33	99	157	87	9	9	105	6	86	23	115	15	327	13	355	732
07:30	40	35	99	174	94	9	13	116	12	124	31	167	19	305	11	335	792
07:45	37	34	61	132	85	9	13	107	21	119	38	178	13	305	12	330	747
Total	141	129	338	608	348	37	45	430	48	394	121	563	65	1193	40	1298	2899
08:00	34	37	64	135	69	12	9	90	10	63	40	113	17	190	11	218	556
08:15	33	24	62	119	61	18	13	92	19	73	39	131	12	203	13	228	570
08:30	28	32	57	117	58	18	18	94	12	74	46	132	13	177	10	200	543
08:45	28	28	51	107	58	11	20	89	13	65	28	106	12	149	14	175	477
Total	123	121	234	478	246	59	60	365	54	275	153	482	54	719	48	821	2146
09:00	22	22	42	86	49	12	13	74	15	83	38	136	11	133	14	158	454
09:15	23	32	41	96	51	13	15	79	18	76	45	139	12	119	12	143	457
09:30	24	32	48	104	53	19	16	88	11	60	31	102	15	121	15	151	445
*** BREAK ***																	
Total	69	86	131	286	153	44	44	241	44	219	114	377	38	373	41	452	1356
*** BREAK ***																	
11:00	19	27	21	67	51	16	16	83	22	80	45	147	12	85	14	111	408
11:15	26	30	14	70	48	21	15	84	17	91	39	147	10	87	15	112	413
11:30	28	35	39	102	56	25	16	97	19	89	48	156	20	126	17	163	518
11:45	24	29	28	81	48	24	14	86	23	101	37	161	14	101	15	130	458
Total	97	121	102	320	203	86	61	350	81	361	169	611	56	399	61	516	1797
12:00	12	36	27	75	31	22	23	76	28	105	49	182	14	79	15	108	441
12:15	23	24	27	74	52	36	14	102	34	111	59	204	20	66	17	103	483
12:30	28	31	28	87	48	36	21	105	30	103	54	187	20	82	19	121	500
12:45	28	42	21	91	40	27	19	86	32	88	46	166	18	105	19	142	485
Total	91	133	103	327	171	121	77	369	124	407	208	739	72	332	70	474	1909
13:00	29	29	37	95	43	34	21	98	25	96	49	170	24	98	15	137	500
13:15	22	30	25	77	42	34	19	95	26	99	48	173	19	87	14	120	465
13:30	32	30	35	97	50	31	16	97	24	102	43	169	12	95	24	131	494
13:45	24	24	23	71	41	24	19	84	26	104	60	190	18	88	22	128	473
Total	107	113	120	340	176	123	75	374	101	401	200	702	73	368	75	516	1932
*** BREAK ***																	
15:00	30	24	30	84	42	33	13	88	29	128	61	218	19	107	21	147	537
15:15	23	30	27	80	42	34	16	92	44	150	54	248	16	96	20	132	552
15:30	31	25	40	96	45	30	19	94	52	198	69	319	19	114	22	155	664
15:45	40	31	25	96	45	41	10	96	35	182	63	280	18	141	25	184	656
Total	124	110	122	356	174	138	58	370	160	658	247	1065	72	458	88	618	2409
16:00	27	23	33	83	38	35	24	97	62	185	77	324	20	117	26	163	667
16:15	35	28	26	89	47	54	23	124	48	252	90	390	18	132	49	199	802
16:30	35	40	29	104	59	51	29	139	57	247	93	397	17	126	30	173	813
16:45	30	42	30	102	70	53	39	162	64	248	111	423	26	133	45	204	891
Total	127	133	118	378	214	193	115	522	231	932	371	1534	81	508	150	739	3173
17:00	34	34	30	98	61	66	32	159	74	313	98	485	24	158	30	212	954
17:15	40	41	42	123	70	65	43	178	77	302	118	497	27	155	49	231	1029
17:30	37	31	37	105	63	60	33	156	88	240	110	438	27	147	47	221	920
17:45	38	36	40	114	60	44	35	139	83	267	103	453	21	129	40	190	896
Total	149	142	149	440	254	235	143	632	322	1122	429	1873	99	589	166	854	3799
Grand Total	1052	1103	1479	3634	1990	1042	698	3730	1172	4861	2039	8072	621	5184	745	6550	21986
Apprch %	28.9	30.4	40.7		53.4	27.9	18.7		14.5	60.2	25.3		9.5	79.1	11.4		
Total %	4.8	5	6.7	16.5	9.1	4.7	3.2	17	5.3	22.1	9.3	36.7	2.8	23.6	3.4	29.8	

Mike Henderson Consulting, LLC

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Groups Printed- Cars - Trucks

	Ladera Dr Eastbound				Ladera Dr Westbound				Unser Blvd Northbound				Unser Blvd Southbound				
	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Cars	1035	1098	1464	3597	1960	1038	695	3693	1156	4761	2006	7923	615	5120	737	6472	21685
% Cars	98.4	99.5	99	99	98.5	99.6	99.6	99	98.6	97.9	98.4	98.2	99	98.8	98.9	98.8	98.6
Trucks	17	5	15	37	30	4	3	37	16	100	33	149	6	64	8	78	301
% Trucks	1.6	0.5	1	1	1.5	0.4	0.4	1	1.4	2.1	1.6	1.8	1	1.2	1.1	1.2	1.4

	Ladera Dr Eastbound				Ladera Dr Westbound				Unser Blvd Northbound				Unser Blvd Southbound				
Start Time	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Left	Thru	Right	App. Total	Int. Total
Peak Hour Analysis From 06:45 to 09:45 - Peak 1 of 1																	
Peak Hour for Entire Intersection Begins at 07:00																	
07:00	39	27	79	145	82	10	10	102	9	65	29	103	18	256	4	278	628
07:15	25	33	99	157	87	9	9	105	6	86	23	115	15	327	13	355	732
07:30	40	35	99	174	94	9	13	116	12	124	31	167	19	305	11	335	792
07:45	37	34	61	132	85	9	13	107	21	119	38	178	13	305	12	330	747
Total Volume	141	129	338	608	348	37	45	430	48	394	121	563	65	1193	40	1298	2899
% App. Total	23.2	21.2	55.6		80.9	8.6	10.5		8.5	70	21.5		5	91.9	3.1		
PHF	.881	.921	.854	.874	.926	.925	.865	.927	.571	.794	.796	.791	.855	.912	.769	.914	.915
Cars	138	129	334	601	346	36	44	426	46	378	121	545	64	1187	40	1291	2863
% Cars	97.9	100	98.8	98.8	99.4	97.3	97.8	99.1	95.8	95.9	100	96.8	98.5	99.5	100	99.5	98.8
Trucks	3	0	4	7	2	1	1	4	2	16	0	18	1	6	0	7	36
% Trucks	2.1	0	1.2	1.2	0.6	2.7	2.2	0.9	4.2	4.1	0	3.2	1.5	0.5	0	0.5	1.2

Peak Hour Analysis From 10:00 to 13:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 12:15

12:15	23	24	27	74	52	36	14	102	34	111	59	204	20	66	17	103	483
12:30	28	31	28	87	48	36	21	105	30	103	54	187	20	82	19	121	500
12:45	28	42	21	91	40	27	19	86	32	88	46	166	18	105	19	142	485
13:00	29	29	37	95	43	34	21	98	25	96	49	170	24	98	15	137	500
Total Volume	108	126	113	347	183	133	75	391	121	398	208	727	82	351	70	503	1968
% App. Total	31.1	36.3	32.6		46.8	34	19.2		16.6	54.7	28.6		16.3	69.8	13.9		
PHF	.931	.750	.764	.913	.880	.924	.893	.931	.890	.896	.881	.891	.854	.836	.921	.886	.984
Cars	105	125	110	340	177	132	75	384	120	390	206	716	80	345	66	491	1931
% Cars	97.2	99.2	97.3	98.0	96.7	99.2	100	98.2	99.2	98.0	99.0	98.5	97.6	98.3	94.3	97.6	98.1
Trucks	3	1	3	7	6	1	0	7	1	8	2	11	2	6	4	12	37
% Trucks	2.8	0.8	2.7	2.0	3.3	0.8	0	1.8	0.8	2.0	1.0	1.5	2.4	1.7	5.7	2.4	1.9

Peak Hour Analysis From 14:00 to 17:45 - Peak 1 of 1

Peak Hour for Entire Intersection Begins at 17:00

17:00	34	34	30	98	61	66	32	159	74	313	98	485	24	158	30	212	954
17:15	40	41	42	123	70	65	43	178	77	302	118	497	27	155	49	231	1029
17:30	37	31	37	105	63	60	33	156	88	240	110	438	27	147	47	221	920
17:45	38	36	40	114	60	44	35	139	83	267	103	453	21	129	40	190	896
Total Volume	149	142	149	440	254	235	143	632	322	1122	429	1873	99	589	166	854	3799
% App. Total	33.9	32.3	33.9		40.2	37.2	22.6		17.2	59.9	22.9		11.6	69	19.4		
PHF	.931	.866	.887	.894	.907	.890	.831	.888	.915	.896	.909	.942	.917	.932	.847	.924	.923
Cars	148	142	149	439	251	235	143	629	320	1112	426	1858	97	582	166	845	3771
% Cars	99.3	100	100	99.8	98.8	100	100	99.5	99.4	99.1	99.3	99.2	98.0	98.8	100	98.9	99.3
Trucks	1	0	0	1	3	0	0	3	2	10	3	15	2	7	0	9	28
% Trucks	0.7	0	0	0.2	1.2	0	0	0.5	0.6	0.9	0.7	0.8	2.0	1.2	0	1.1	0.7

HCM Signalized Intersection Capacity Analysis 3: Unser & Ladera

NMDOT Analysis
Ladera and Unser - 2011 AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	141	129	338	348	37	45	48	394	121	65	1193	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	0.91
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	0.99
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	3539	1583	3433	1845	1568	1719	4940	1583	1770	5056	5056
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.10	1.00	1.00	0.46	1.00	1.00
Satd. Flow (perm)	3400	3539	1583	3433	1845	1568	183	4940	1583	855	5056	5056
Peak-hour factor, PHF	0.88	0.92	0.85	0.92	0.92	0.86	0.57	0.79	0.79	0.85	0.91	0.76
Adj. Flow (vph)	160	140	398	378	40	52	84	499	153	76	1311	53
RTOR Reduction (vph)	0	0	65	0	0	44	0	0	46	0	3	0
Lane Group Flow (vph)	160	140	333	378	40	8	84	499	107	76	1361	0
Heavy Vehicles (%)	3%	2%	2%	2%	3%	3%	5%	5%	2%	2%	2%	2%
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	NA
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	6
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	16.4	11.3	29.9	16.3	11.2	17.1	70.4	60.5	76.8	53.7	47.8	47.8
Effective Green, g (s)	16.4	11.3	29.9	16.3	11.2	17.1	70.4	60.5	76.8	53.7	47.8	47.8
Actuated g/C Ratio	0.15	0.10	0.27	0.15	0.10	0.16	0.64	0.55	0.70	0.49	0.43	0.43
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	506	363	487	508	187	300	376	2717	1162	466	2197	2197
v/s Ratio Prot	0.05	0.04	c0.12	c0.11	0.02	0.00	0.04	0.10	0.01	0.01	c0.27	c0.27
v/s Ratio Perm			0.09			0.00	0.11		0.05	0.07		
v/c Ratio	0.32	0.39	0.68	0.74	0.21	0.03	0.22	0.18	0.09	0.16	0.62	0.62
Uniform Delay, d1	41.8	46.1	35.8	44.9	45.4	39.4	10.9	12.4	5.4	15.1	24.1	24.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.7	4.0	5.8	0.6	0.0	0.3	0.1	0.0	0.2	1.3	1.3
Delay (s)	42.2	46.8	39.8	50.7	45.9	39.4	11.2	12.5	5.4	15.2	25.4	25.4
Level of Service	D	D	D	D	D	D	B	B	A	B	C	C
Approach Delay (s)		41.7			49.0			10.9			24.8	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay	28.7			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.69											
Actuated Cycle Length (s)	110.0			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	64.8%			ICU Level of Service			C					
Analysis Period (min)	15											
c Critical Lane Group												

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: Unser & Ladera

NMDOT Analysis
Ladera and Unser - 2011 PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	42	149	254	235	143	322	1122	429	99	589	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	0.96
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	0.96
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	3539	1583	3433	1845	1568	1719	4940	1583	1770	4893	4893
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.17	1.00	1.00	0.18	1.00	1.00
Satd. Flow (perm)	3400	3539	1583	3433	1845	1568	308	4940	1583	329	4893	4893
Peak-hour factor, PHF	0.88	0.92	0.85	0.92	0.92	0.86	0.57	0.79	0.79	0.85	0.91	0.76
Adj. Flow (vph)	169	46	175	276	255	166	565	1420	543	116	647	218
RTOR Reduction (vph)	0	0	52	0	0	66	0	0	180	0	50	0
Lane Group Flow (vph)	169	46	123	276	255	100	565	1420	363	116	815	0
Heavy Vehicles (%)	3%	2%	2%	2%	3%	3%	5%	5%	2%	2%	2%	2%
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	NA
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	6
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	8.0	11.9	45.9	16.0	19.9	28.4	70.1	57.6	73.6	40.6	32.1	32.1
Effective Green, g (s)	8.0	11.9	45.9	16.0	19.9	28.4	70.1	57.6	73.6	40.6	32.1	32.1
Actuated g/C Ratio	0.07	0.11	0.42	0.15	0.18	0.26	0.64	0.52	0.67	0.37	0.29	0.29
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	247	382	718	499	333	461	632	2586	1116	232	1427	1427
v/s Ratio Prot	c0.05	0.01	0.05	0.08	c0.14	0.02	c0.28	0.29	0.05	0.04	0.17	0.17
v/s Ratio Perm			0.02			0.05	c0.29		0.18	0.15		
v/c Ratio	0.68	0.12	0.17	0.55	0.77	0.22	0.89	0.55	0.33	0.50	0.57	0.57
Uniform Delay, d1	49.8	44.3	20.1	43.7	42.8	32.1	24.4	17.5	7.7	23.4	33.1	33.1
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.6	0.1	0.1	1.3	10.1	0.2	15.0	0.8	0.2	1.7	1.7	1.7
Delay (s)	57.4	44.5	20.2	45.0	52.9	32.3	39.5	18.4	7.9	25.1	34.8	34.8
Level of Service	E	D	C	D	D	C	D	B	A	C	C	C
Approach Delay (s)		39.2			44.9			20.8			33.6	
Approach LOS		D			D			C			C	
Intersection Summary												
HCM 2000 Control Delay	28.8			HCM 2000 Level of Service			C					
HCM 2000 Volume to Capacity ratio	0.87											
Actuated Cycle Length (s)	110.0			Sum of lost time (s)			16.0					
Intersection Capacity Utilization	62.9%			ICU Level of Service			B					
Analysis Period (min)	15											
c Critical Lane Group												

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

3: Unser & Ladera

NMDOT Analysis

Ladera and Unser - 2015 No Build AM (2% growth)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	141	129	338	348	37	45	48	394	121	65	1193	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	0.99
Fr't	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	1.00
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	3539	1583	3433	1845	1568	1719	4940	1583	1770	5056	5056
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.08	1.00	1.00	0.44	1.00	1.00
Satd. Flow (perm)	3400	3539	1583	3433	1845	1568	145	4940	1583	821	5056	5056
Peak-hour factor, PHF	0.88	0.92	0.85	0.92	0.92	0.86	0.57	0.79	0.79	0.85	0.91	0.76
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	173	151	429	409	43	57	91	539	165	83	1416	57
RTOR Reduction (vph)	0	0	64	0	0	48	0	0	51	0	4	0
Lane Group Flow (vph)	173	151	365	409	43	9	91	539	114	83	1469	0
Heavy Vehicles (%)	3%	2%	2%	2%	3%	3%	5%	5%	2%	2%	2%	2%
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	NA
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	6
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	16.8	11.6	31.4	16.8	11.6	17.7	69.6	59.5	76.3	51.9	45.8	45.8
Effective Green, g (s)	16.8	11.6	31.4	16.8	11.6	17.7	69.6	59.5	76.3	51.9	45.8	45.8
Actuated g/C Ratio	0.15	0.11	0.29	0.15	0.11	0.16	0.63	0.54	0.69	0.47	0.42	0.42
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	519	373	509	524	194	309	375	2672	1155	439	2105	2105
v/s Ratio Prot	0.05	0.04	c0.13	c0.12	0.02	0.00	0.04	0.11	0.02	0.01	c0.29	c0.29
v/s Ratio Perm			0.10			0.00	0.11		0.06	0.08		
v/c Ratio	0.33	0.40	0.72	0.78	0.22	0.03	0.24	0.20	0.10	0.19	0.70	0.70
Uniform Delay, d1	41.6	46.0	35.3	44.8	45.1	38.9	12.6	13.0	5.5	16.1	26.4	26.4
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.4	0.7	4.8	7.4	0.6	0.0	0.3	0.2	0.0	0.2	1.9	1.9
Delay (s)	42.0	46.7	40.1	52.2	45.6	38.9	12.9	13.2	5.6	16.3	28.4	28.4
Level of Service	D	D	D	D	D	D	B	B	A	B	C	C
Approach Delay (s)		41.9			50.2			11.6			27.7	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			30.3									
HCM 2000 Volume to Capacity ratio			0.75									
Actuated Cycle Length (s)			110.0									
Intersection Capacity Utilization			69.2%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Unser & Ladera

NMDOT Analysis

Ladera and Unser - 2015 No Build PM - 2% growth

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	149	42	149	254	235	143	322	1122	429	99	589	166
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lane Util. Factor	0.97	0.95	1.00	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	0.96
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96	0.96
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	3400	3539	1583	3433	1845	1568	1719	4940	1583	1770	4893	4893
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.13	1.00	1.00	0.16	1.00	1.00
Satd. Flow (perm)	3400	3539	1583	3433	1845	1568	227	4940	1583	291	4893	4893
Peak-hour factor, PHF	0.88	0.92	0.85	0.92	0.92	0.86	0.57	0.79	0.79	0.85	0.91	0.76
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	183	49	189	298	276	180	610	1534	586	126	699	236
RTOR Reduction (vph)	0	0	49	0	0	65	0	0	189	0	53	0
Lane Group Flow (vph)	183	49	140	298	276	115	610	1534	397	126	882	0
Heavy Vehicles (%)	3%	2%	2%	2%	3%	3%	5%	5%	2%	2%	2%	2%
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	NA
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	6
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	8.0	12.5	49.0	15.8	20.3	29.2	69.7	56.8	72.6	38.1	29.2	29.2
Effective Green, g (s)	8.0	12.5	49.0	15.8	20.3	29.2	69.7	56.8	72.6	38.1	29.2	29.2
Actuated g/C Ratio	0.07	0.11	0.45	0.14	0.18	0.27	0.63	0.52	0.66	0.35	0.27	0.27
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	247	402	762	493	340	473	638	2550	1102	220	1298	1298
v/s Ratio Prot	c0.05	0.01	0.06	0.09	c0.15	0.02	c0.32	0.31	0.05	0.05	0.18	0.18
v/s Ratio Perm			0.03			0.05	c0.29		0.20	0.15		
v/c Ratio	0.74	0.12	0.18	0.60	0.81	0.24	0.96	0.60	0.36	0.57	0.68	0.68
Uniform Delay, d1	50.0	43.8	18.4	44.2	43.0	31.7	28.6	18.7	8.3	25.3	36.2	36.2
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	11.3	0.1	0.1	2.1	13.7	0.3	25.0	1.1	0.2	3.6	2.9	2.9
Delay (s)	61.3	44.0	18.5	46.3	56.7	32.0	53.5	19.7	8.5	28.9	39.1	39.1
Level of Service	E	D	B	D	E	C	D	B	A	C	D	D
Approach Delay (s)		40.1			46.7			24.9			37.9	
Approach LOS		D			D			C			D	
Intersection Summary												
HCM 2000 Control Delay			32.3				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.93									
Actuated Cycle Length (s)			110.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			66.8%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis 3: Unser & Ladera

NMDOT Analysis
Ladera and Unser - 2015 Build AM (2% growth)

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (vph)	141	129	338	348	37	45	48	412	121	65	1239	40
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.99	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	3400	3539	1583	3433	1845	1568	1719	4940	1583	1770	5057	
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.08	1.00	1.00	0.43	1.00	
Satd. Flow (perm)	3400	3539	1583	3433	1845	1568	145	4940	1583	801	5057	
Peak-hour factor, PHF	0.88	0.92	0.85	0.92	0.92	0.86	0.57	0.79	0.79	0.85	0.91	0.76
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%
Adj. Flow (vph)	173	151	429	409	43	57	91	563	165	83	1470	57
RTOR Reduction (vph)	0	0	64	0	0	48	0	0	51	0	4	0
Lane Group Flow (vph)	173	151	365	409	43	9	91	563	114	83	1523	0
Heavy Vehicles (%)	3%	2%	2%	2%	3%	3%	5%	5%	2%	2%	2%	2%
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA	
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	
Permitted Phases			4			8	2		2	6		
Actuated Green, G (s)	16.8	11.6	31.4	16.8	11.6	17.7	69.6	59.5	76.3	51.9	45.8	
Effective Green, g (s)	16.8	11.6	31.4	16.8	11.6	17.7	69.6	59.5	76.3	51.9	45.8	
Actuated g/C Ratio	0.15	0.11	0.29	0.15	0.11	0.16	0.63	0.54	0.69	0.47	0.42	
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	
Lane Grp Cap (vph)	519	373	509	524	194	309	375	2672	1155	431	2105	
v/s Ratio Prot	0.05	0.04	c0.13	c0.12	0.02	0.00	0.04	0.11	0.02	0.01	c0.30	
v/s Ratio Perm			0.10			0.00	0.11		0.06	0.08		
v/c Ratio	0.33	0.40	0.72	0.78	0.22	0.03	0.24	0.21	0.10	0.19	0.72	
Uniform Delay, d1	41.6	46.0	35.3	44.8	45.1	38.9	13.0	13.1	5.5	16.1	26.8	
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.4	0.7	4.8	7.4	0.6	0.0	0.3	0.2	0.0	0.2	2.2	
Delay (s)	42.0	46.7	40.1	52.2	45.6	38.9	13.3	13.3	5.6	16.3	29.0	
Level of Service	D	D	D	D	D	D	B	B	A	B	C	
Approach Delay (s)		41.9			50.2			11.7			28.4	
Approach LOS		D			D			B			C	
Intersection Summary												
HCM 2000 Control Delay			30.4				HCM 2000 Level of Service			C		
HCM 2000 Volume to Capacity ratio			0.76									
Actuated Cycle Length (s)			110.0				Sum of lost time (s)			16.0		
Intersection Capacity Utilization			70.1%				ICU Level of Service			C		
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Unser & Ladera

NMDOT Analysis
Ladera and Unser - 2015 Build PM

													
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Volume (vph)	149	42	149	254	235	143	322	1173	429	99	620	166	
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	
Lane Util. Factor	0.97	0.95	1.00	0.97	1.00	1.00	1.00	0.91	1.00	1.00	0.91		
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.96		
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		
Satd. Flow (prot)	3400	3539	1583	3433	1845	1568	1719	4940	1583	1770	4900		
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.12	1.00	1.00	0.15	1.00		
Satd. Flow (perm)	3400	3539	1583	3433	1845	1568	218	4940	1583	270	4900		
Peak-hour factor, PHF	0.88	0.92	0.85	0.92	0.92	0.86	0.57	0.79	0.79	0.85	0.91	0.76	
Growth Factor (vph)	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	108%	
Adj. Flow (vph)	183	49	189	298	276	180	610	1604	586	126	736	236	
RTOR Reduction (vph)	0	0	49	0	0	65	0	0	188	0	50	0	
Lane Group Flow (vph)	183	49	140	298	276	115	610	1604	398	126	922	0	
Heavy Vehicles (%)	3%	2%	2%	2%	3%	3%	5%	5%	2%	2%	2%	2%	
Turn Type	Prot	NA	pm+ov	Prot	NA	pm+ov	pm+pt	NA	pm+ov	pm+pt	NA		
Protected Phases	7	4	5	3	8	1	5	2	3	1	6		
Permitted Phases			4			8	2		2	6			
Actuated Green, G (s)	8.0	12.5	49.0	15.8	20.3	29.2	69.7	56.8	72.6	38.1	29.2		
Effective Green, g (s)	8.0	12.5	49.0	15.8	20.3	29.2	69.7	56.8	72.6	38.1	29.2		
Actuated g/C Ratio	0.07	0.11	0.45	0.14	0.18	0.27	0.63	0.52	0.66	0.35	0.27		
Clearance Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	247	402	762	493	340	473	636	2550	1102	214	1300		
v/s Ratio Prot	c0.05	0.01	0.06	0.09	c0.15	0.02	c0.32	0.32	0.05	0.05	0.19		
v/s Ratio Perm			0.03			0.05	c0.29		0.20	0.16			
v/c Ratio	0.74	0.12	0.18	0.60	0.81	0.24	0.96	0.63	0.36	0.59	0.71		
Uniform Delay, d1	50.0	43.8	18.4	44.2	43.0	31.7	29.0	19.1	8.3	25.3	36.6		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
Incremental Delay, d2	11.3	0.1	0.1	2.1	13.7	0.3	25.6	1.2	0.2	4.1	3.3		
Delay (s)	61.3	44.0	18.5	46.3	56.7	32.0	54.6	20.2	8.6	29.4	39.9		
Level of Service	E	D	B	D	E	C	D	C	A	C	D		
Approach Delay (s)		40.1			46.7			25.3			38.7		
Approach LOS		D			D			C			D		
Intersection Summary													
HCM 2000 Control Delay			32.6									HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.94										
Actuated Cycle Length (s)			110.0									Sum of lost time (s)	16.0
Intersection Capacity Utilization			67.5%									ICU Level of Service	C
Analysis Period (min)			15										
c Critical Lane Group													

Queues
3: Unser & Ladera

NMDOT Analysis
Ladera and Unser - 2011 AM

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	160	140	398	378	40	52	84	499	153	76	1364
v/c Ratio	0.32	0.45	0.76	0.74	0.17	0.14	0.22	0.18	0.12	0.15	0.60
Control Delay	46.3	51.8	35.7	54.2	41.6	2.5	9.2	12.5	1.0	10.3	25.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.3	51.8	35.7	54.2	41.6	2.5	9.2	12.5	1.0	10.3	25.9
Queue Length 50th (ft)	56	50	199	131	25	0	20	62	0	18	265
Queue Length 95th (ft)	89	81	252	182	55	7	26	77	11	37	370
Internal Link Dist (ft)	823			827			885			635	
Turn Bay Length (ft)	250		250	250			400		400	250	
Base Capacity (vph)	507	514	585	561	402	366	439	2825	1257	496	2274
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.32	0.27	0.68	0.67	0.10	0.14	0.19	0.18	0.12	0.15	0.60
Intersection Summary											

Queues
3: Unser & Ladera

NMDOT Analysis
Ladera and Unser - 2011 PM

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	169	46	175	276	255	166	565	1420	543	116	865
v/c Ratio	0.69	0.11	0.23	0.55	0.80	0.32	0.89	0.54	0.42	0.49	0.57
Control Delay	64.7	42.1	7.6	49.4	61.7	15.2	39.8	18.7	1.7	26.4	33.5
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	64.7	42.1	7.6	49.4	61.7	15.2	39.8	18.7	1.7	26.4	33.5
Queue Length 50th (ft)	61	15	31	96	172	40	288	236	0	30	183
Queue Length 95th (ft)	#100	32	56	141	259	83	190	254	14	68	245
Internal Link Dist (ft)		823			827			885			635
Turn Bay Length (ft)	250		250	250			400		400	250	
Base Capacity (vph)	247	514	836	508	369	547	711	2621	1286	276	1515
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.68	0.09	0.21	0.54	0.69	0.30	0.79	0.54	0.42	0.42	0.57

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
3: Unser & Ladera

NMDOT Analysis
Ladera and Unser - 2015 No Build AM (2% growth)

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	173	151	429	409	43	57	91	539	165	83	1473
v/c Ratio	0.33	0.47	0.78	0.78	0.18	0.15	0.24	0.19	0.13	0.18	0.68
Control Delay	46.3	51.9	37.0	56.0	41.4	3.1	10.5	13.1	1.0	10.7	28.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.3	51.9	37.0	56.0	41.4	3.1	10.5	13.1	1.0	10.7	28.6
Queue Length 50th (ft)	61	54	217	142	26	0	23	69	0	21	312
Queue Length 95th (ft)	95	85	284	196	58	11	28	84	12	40	404
Internal Link Dist (ft)	823			827			885			635	
Turn Bay Length (ft)	250		250	250				400	400	250	
Base Capacity (vph)	520	514	584	561	402	374	415	2778	1246	470	2179
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.29	0.73	0.73	0.11	0.15	0.22	0.19	0.13	0.18	0.68
Intersection Summary											

Queues
3: Unser & Ladera

NMDOT Analysis
Ladera and Unser - 2015 No Build PM - 2% growth

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	183	49	189	298	276	180	610	1534	586	126	935
v/c Ratio	0.74	0.11	0.24	0.60	0.85	0.34	0.95	0.59	0.46	0.57	0.68
Control Delay	68.6	41.7	7.6	51.3	66.8	16.3	52.8	19.9	2.1	32.5	36.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.6	41.7	7.6	51.3	66.8	16.3	52.8	19.9	2.1	32.5	36.9
Queue Length 50th (ft)	66	15	33	106	187	47	349	271	7	35	213
Queue Length 95th (ft)	#113	34	62	#160	#314	94	232	274	21	82	265
Internal Link Dist (ft)	823			827			885			635	
Turn Bay Length (ft)	250		250	250			400	400		250	
Base Capacity (vph)	247	514	844	493	352	552	688	2586	1278	256	1385
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.10	0.22	0.60	0.78	0.33	0.89	0.59	0.46	0.49	0.68

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Queues
3: Unser & Ladera

NMDOT Analysis
Ladera and Unser - 2015 Build AM (2% growth)

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	173	151	429	409	43	57	91	563	165	83	1527
v/c Ratio	0.33	0.47	0.78	0.78	0.18	0.15	0.24	0.20	0.13	0.18	0.70
Control Delay	46.3	51.9	37.0	56.0	41.4	3.1	10.5	13.2	1.0	10.8	29.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	46.3	51.9	37.0	56.0	41.4	3.1	10.5	13.2	1.0	10.8	29.2
Queue Length 50th (ft)	61	54	217	142	26	0	23	73	0	21	328
Queue Length 95th (ft)	95	85	284	196	58	11	28	88	12	40	424
Internal Link Dist (ft)		823			827			885			635
Turn Bay Length (ft)	250		250	250			400		400	250	
Base Capacity (vph)	520	514	584	561	402	374	415	2778	1246	461	2179
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.33	0.29	0.73	0.73	0.11	0.15	0.22	0.20	0.13	0.18	0.70
Intersection Summary											

Queues
3: Unser & Ladera

NMDOT Analysis
Ladera and Unser - 2015 Build PM

											
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT
Lane Group Flow (vph)	183	49	189	298	276	180	610	1604	586	126	972
v/c Ratio	0.74	0.11	0.24	0.60	0.85	0.34	0.96	0.62	0.46	0.58	0.70
Control Delay	68.6	41.7	7.6	51.3	66.8	16.3	54.4	20.4	2.2	34.7	37.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	68.6	41.7	7.6	51.3	66.8	16.3	54.4	20.4	2.2	34.7	37.9
Queue Length 50th (ft)	66	15	33	106	187	47	353	289	7	38	225
Queue Length 95th (ft)	#113	34	62	#160	#314	94	235	291	22	85	279
Internal Link Dist (ft)	823			827			885			635	
Turn Bay Length (ft)	250	250		250	400		400		250		
Base Capacity (vph)	247	514	844	493	352	552	685	2586	1277	250	1385
Starvation Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0	0	0	0	0
Reduced v/c Ratio	0.74	0.10	0.22	0.60	0.78	0.33	0.89	0.62	0.46	0.50	0.70

Intersection Summary

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

**WATERSHED ESTRELLA
ACCESS STUDY**

MAY 1, 2013

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I. INTRODUCTION AND SUMMARY

Pulte Homes is moving forward on the Watershed Estrella development in Westland North. This area was studied previously in the October 4, 2007 *Traffic Impact Analysis for Watershed and Inspiration Subdivision*, prepared by Bohannon Huston, Inc... The 2007 study included a larger number of units for Watershed, and also consisted of 620 single family homes and 474 townhomes, for a total of 1,094 dwelling units. The new proposal consists of 904 dwelling units, consisting of 361 single family homes and 543 active adult homes.

A. STUDY PURPOSE

The purpose of the access study is to determine the appropriate number of lanes for the entrances to the development. A secondary purpose is to determine if the internal intersection at the entry to the active adult subdivision will operate at an acceptable level of service.

B. EXECUTIVE SUMMARY

1. SITE LOCATION AND STUDY AREA

The site is located in the Westland North Master Plan area, in an area known as Watershed. Another subdivision moving forward, known as Stormcloud 4-5, also has access to the northern entrance to Watershed Estrella. A vicinity map is shown in **Figure 1**. Pulte plans to use the northern entrance during the initial marketing phase of Watershed Estrella, and open the southern entrance in the future.

The intersection evaluations include analysis for the AM and PM peak hours for the 2015 Build Year

2. DEVELOPMENT DESCRIPTION

The project consists of 904 dwelling units, consisting of 361 single family homes and 543 active adult homes.

3. PRINCIPAL FINDINGS

Both entrances to Watershed Estrella will operate at acceptable levels of service at full build when the southern entrance is also open as full access (left-in).

The northern entrance will operate at acceptable levels of service up to approximately 50% development of Watershed Estrella (450 DU's). Left-in access to the southern

driveway is required after that time for the northern entrance intersection to operate at acceptable levels of service for the Stormcloud exiting left turn movement.

4. CONCLUSIONS

A four-lane roadway section on Tierra Pintada, with left turn lanes at the intersections, will result in acceptable levels of service.

The internal intersection entrance to the active adult subdivision will operate at acceptable level of service as an All-Way STOP Controlled intersection. The approaches operate acceptably as 2-lane road (1-lane in each direction).

5. RECOMMENDATIONS

The northern entrance will require a 150-foot right turn taper on Tierra Pintada for the right turn movement. The forecast number of right turns is 51.

The left turn lanes on Tierra Pintada at the entrances should be 150 feet in length.

The northern entrance exit laneage should consist of a left/through lane of 150 feet, and a right turn lane. This is because the dominant movement is expected to be to the south, towards Arroyo Vista and I-40.

The southern entrance exit laneage can consist of a single lane, as few left turns are anticipated at this intersection.



**PROJECT
LOCATION**



Tierra Pintada Blvd

Ladera Dr

Unser Blvd

Coors Blvd

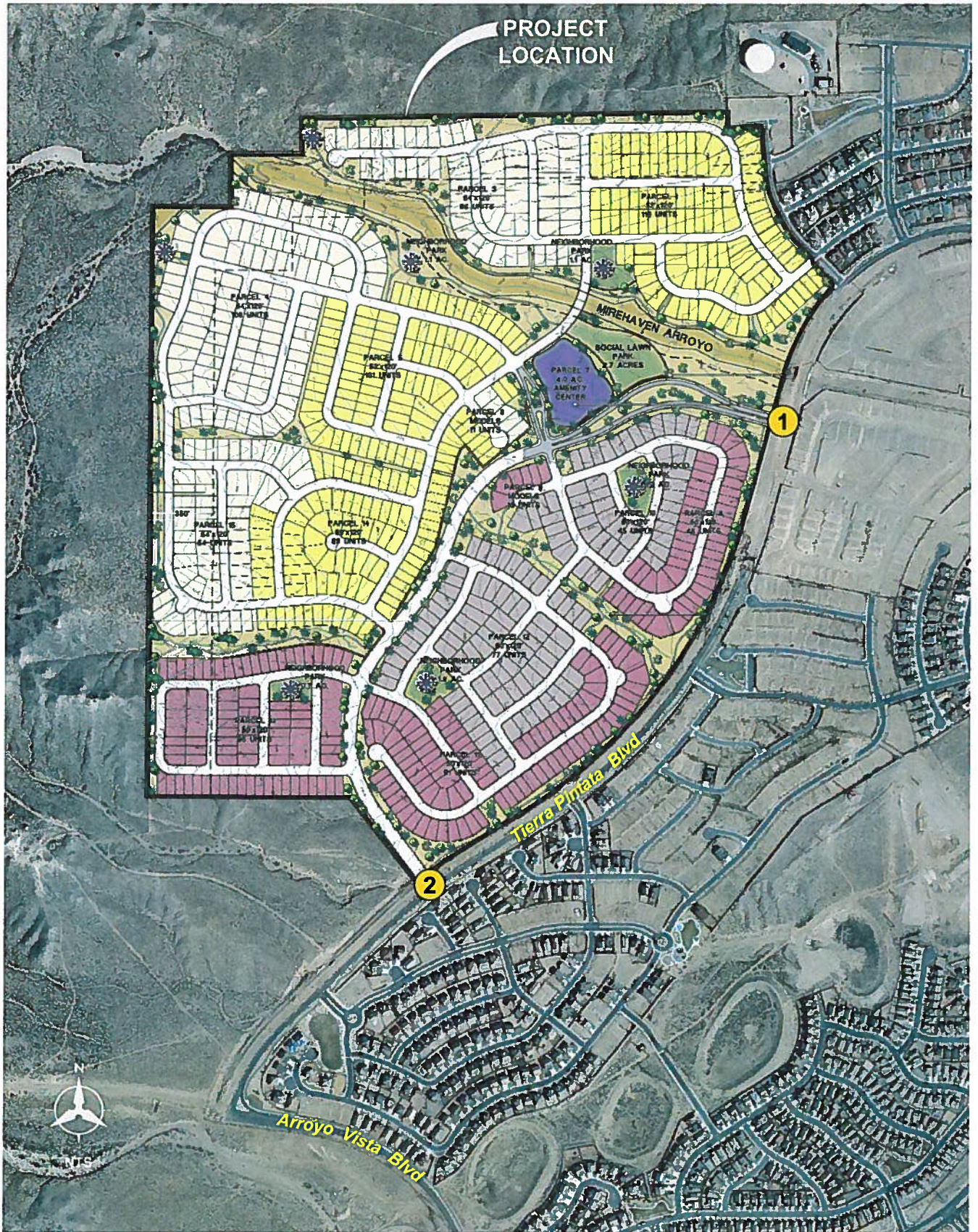
Arroyo Vista

98th Street

Interstate 40

Albuquerque, NM

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II. PROPOSED DEVELOPMENT

A. SITE LOCATION

The site is located in the Westland North Master Plan area, in an area known as Watershed. Another subdivision moving forward, known as Stormcloud 4-5, also has access to the northern entrance to Watershed Estrella. A vicinity map is shown in **Figure 1**. Pulte plans to use the northern entrance during the initial marketing phase of Watershed Estrella, and open the southern entrance in the future.

B. LAND USE AND INTENSITY

The project consists of 904 dwelling units, consisting of 361 single family homes and 543 active adult homes.

C. DEVELOPMENT PHASING AND TIMING

The construction is anticipated to occur as a series of rolling construction projects, without a pause between projects. These projects will be under continuous construction from 2014 to 2016. For the purposes of this study, construction of the entire site is anticipated to be complete in 2016.

III. STUDY AREA CONDITIONS

A. STUDY AREA

The study area consists of the two entrances to subdivision on Tierra Pintada, and the internal intersection to the entry to the active adult subdivision.

B. LAND USE

The surrounding land use is primarily residential, with the new APS Westside Stadium to the south. Albuquerque Public Schools also has a proposed education corridor to the south of the site, to include an elementary, middle and high school. Those schools are anticipated to be constructed in 5 years or more.

C. SITE ACCESSIBILITY

The site is access via Tierra Pintada. Tierra Pintada has connections to Arroyo Vista and Unser Boulevard, both which have interchanges with I-40. It is anticipated that I-40 will be the predominant destination, with the shortest path being Arroyo Vista.

IV. PROJECTED TRAFFIC

A. SITE TRAFFIC FORECASTING

1. TRIP GENERATION

Trip generation for this development was developed using the *Trip Generation*, 9th Edition.

Table 1 – TRIP GENERATION							
Land Use	ITE Land Use Code	Size	24 Hour Two-Way Volume	AM Peak Hour		PM Peak Hour	
				Enter	Exit	Enter	Exit
Single Family Detached Housing	210	361 DU	3,422	66	197	211	123
Senior Adult Housing – Detached	251	543 DU	2,132	44	79	98	62
Total		904	5,554	110	276	309	185

The number above is the total number of new trips to be added to the 2015 no-build traffic volumes discussed in the next section.

2. TRIP DISTRIBUTION AND ASSIGNMENT

Trip distribution and assignment was based on the trip distribution developed for the 2007 Watershed and Inspiration Traffic Impact Study. That study used a modified gravity model that assumed the residential distribution is directly proportional to employment, and inversely proportional to distance. An interpolated 2012 socioeconomic dataset was used to estimate employment locations.

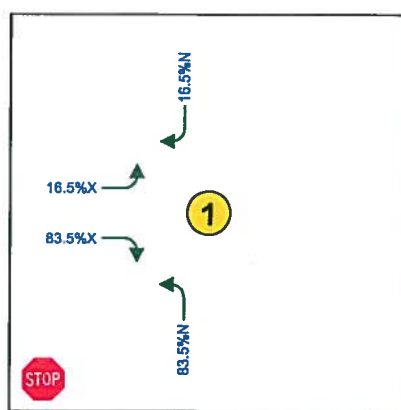
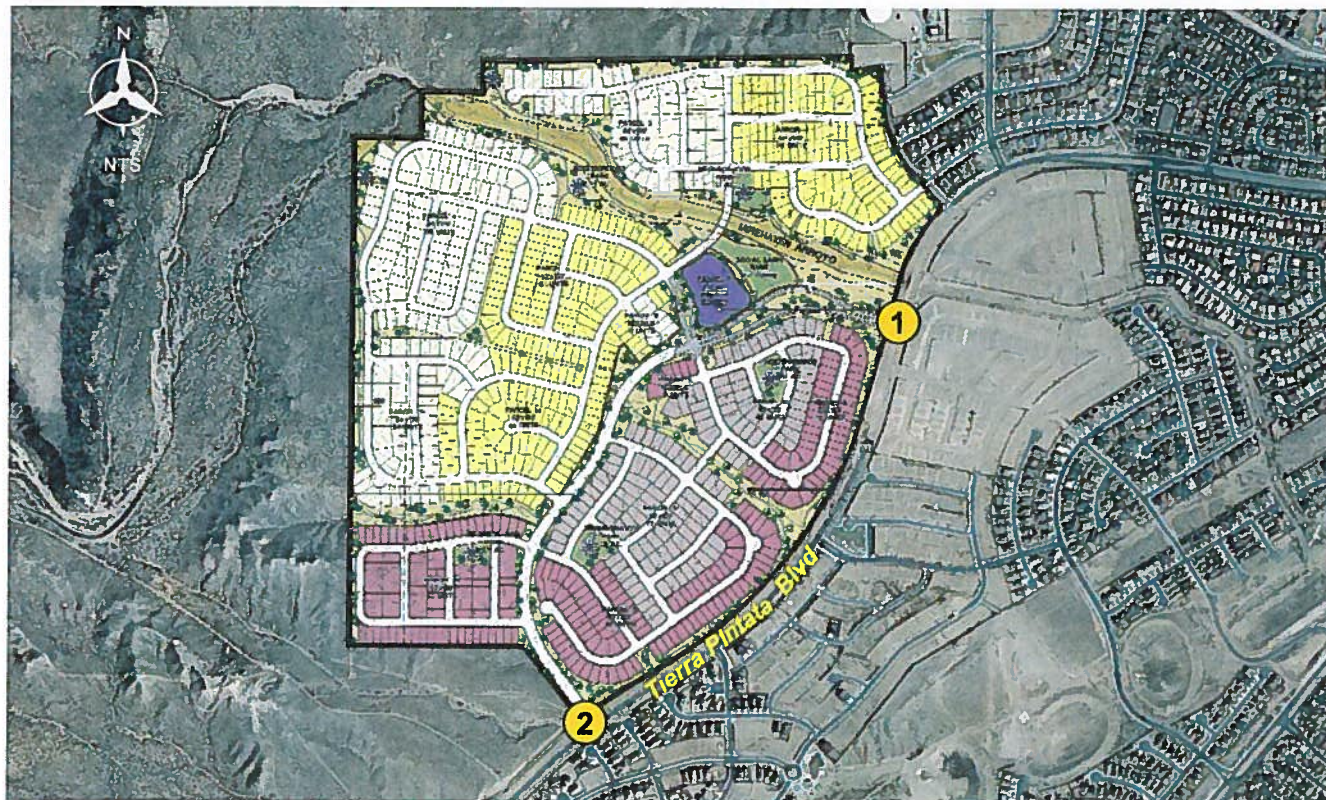
Two trip distributions were evaluated. As Pulte desires to have the northern entrance as the primary entrance during the initial stages of development, the first distribution analyzes the operations with all site traffic entering at the north entrance. The second distribution evaluates the operations when both of the entrances on Tierra Pintada are open. The trip assignment percentages and volumes for the scenario where only the north entrance is open is shown in Figure 3 and Figure 4. The trip assignment percentages and volumes for the scenario where both the north and south entrances are open is shown in Figure 5 and Figure 6.

3. BACKGROUND TRAFFIC PROJECTION

The 2015 MRCOG travel demand raw model forecast was used to estimate 2015 traffic volumes. This was done as Tierra Pintada is now, or will soon be, connected to Unser, and an estimate for traffic on this new connection was needed. In addition, traffic for the three proposed schools was also included in the 2015 traffic estimate. For purposes of this study, a 1,200-student High School, a 600-student middle school, and a 600-student elementary school was assumed. For analysis purposes, 50% of this traffic was assumed to use Tierra Pintada.

In addition, as mentioned previously, the Stormcloud 4-5 subdivision also proposed an entrance at the same location as the north driveway to Watershed Estrella. Stormcloud 4-5 is an approximately 241-lot single family residential subdivision. Stormcloud is planned to have two entrances onto Tierra Pintada, as well as residential roadway connections to Ladera. For purposes of this study, 50% of the Stormcloud 4-5 traffic was assumed to use the intersection with the proposed north driveway of Watershed Estrella.

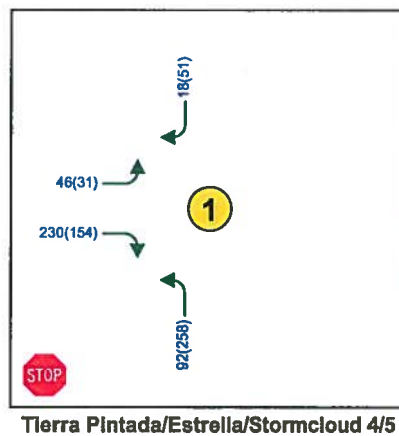
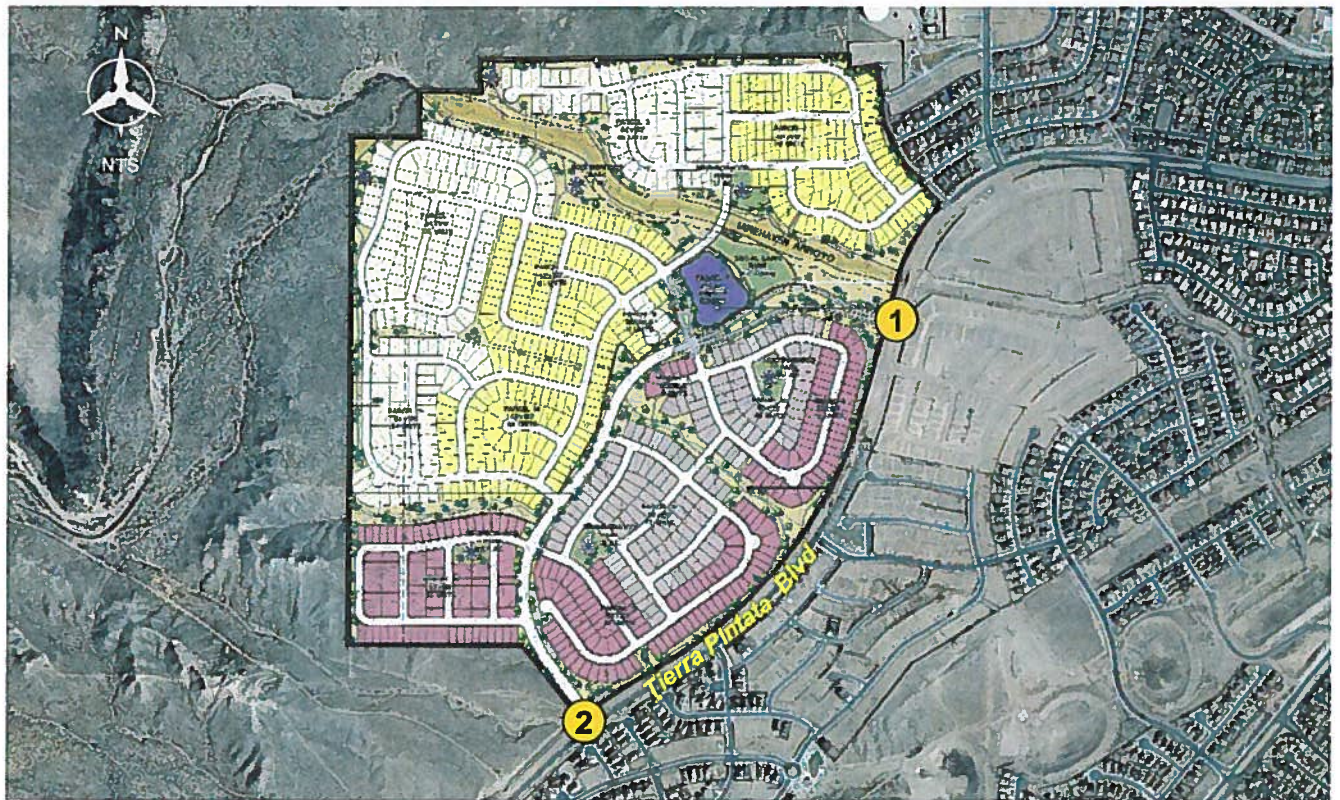
Spreadsheets showing the forecast traffic volumes are included in Appendix A.



Tierra Pintada/Estrella/Stormcloud 4/5

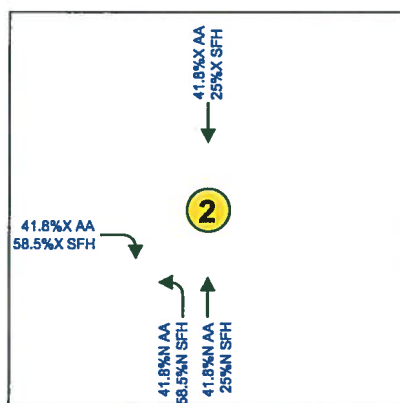
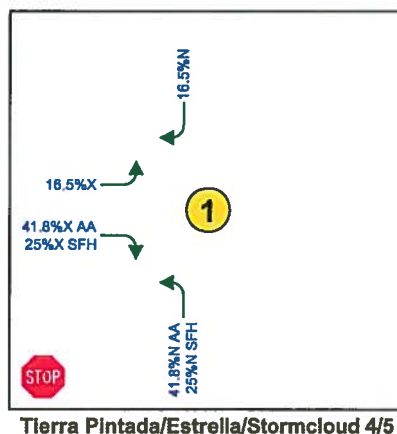
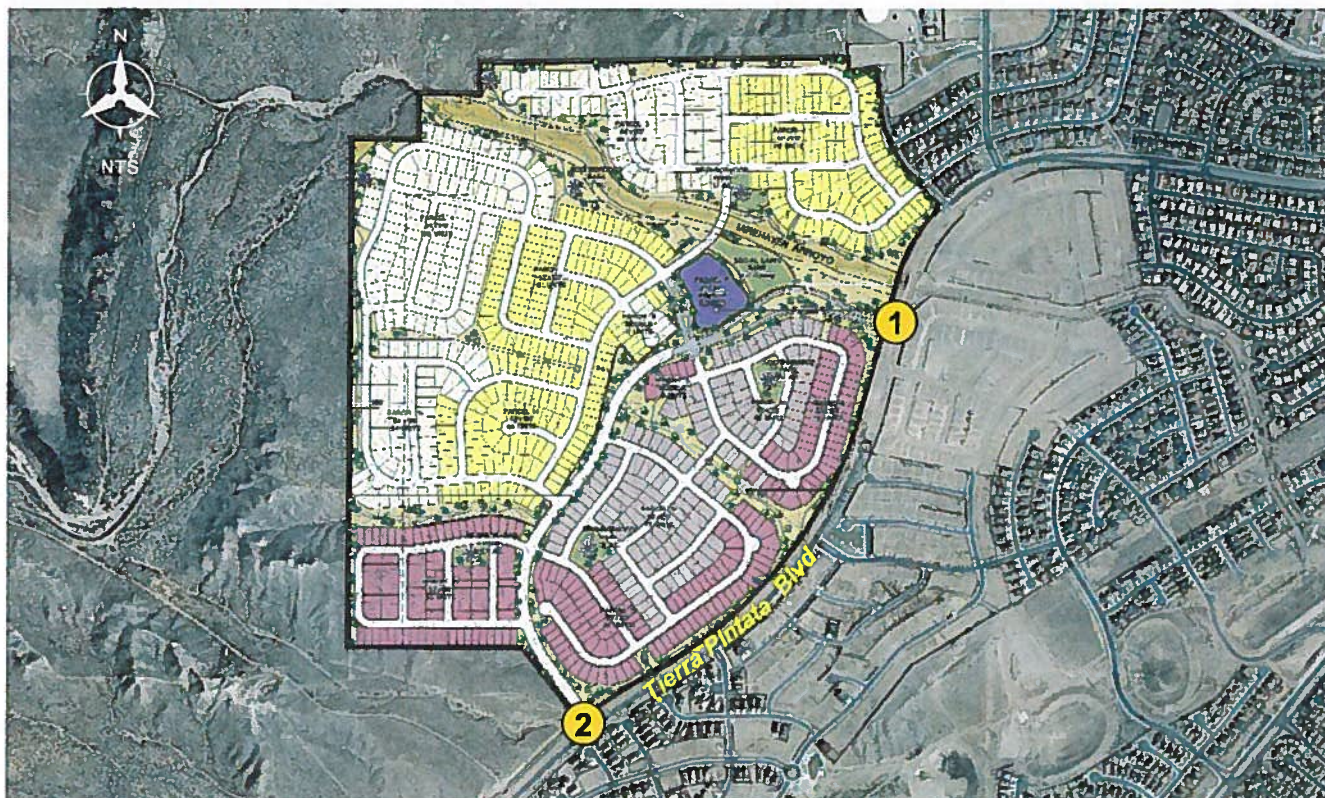
LEGEND

- Thru Lanes
(# as Indicated)
- Turning Lanes
(# as Indicated)
- 1234(1234) AM(PM) Traffic Counts
- N Entering
- X Exiting



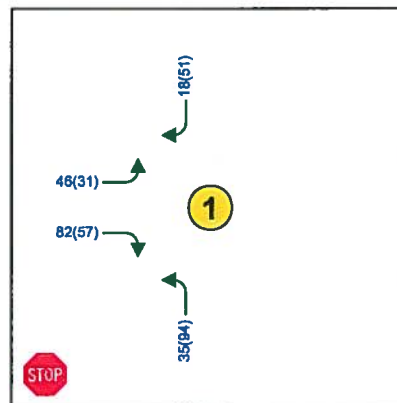
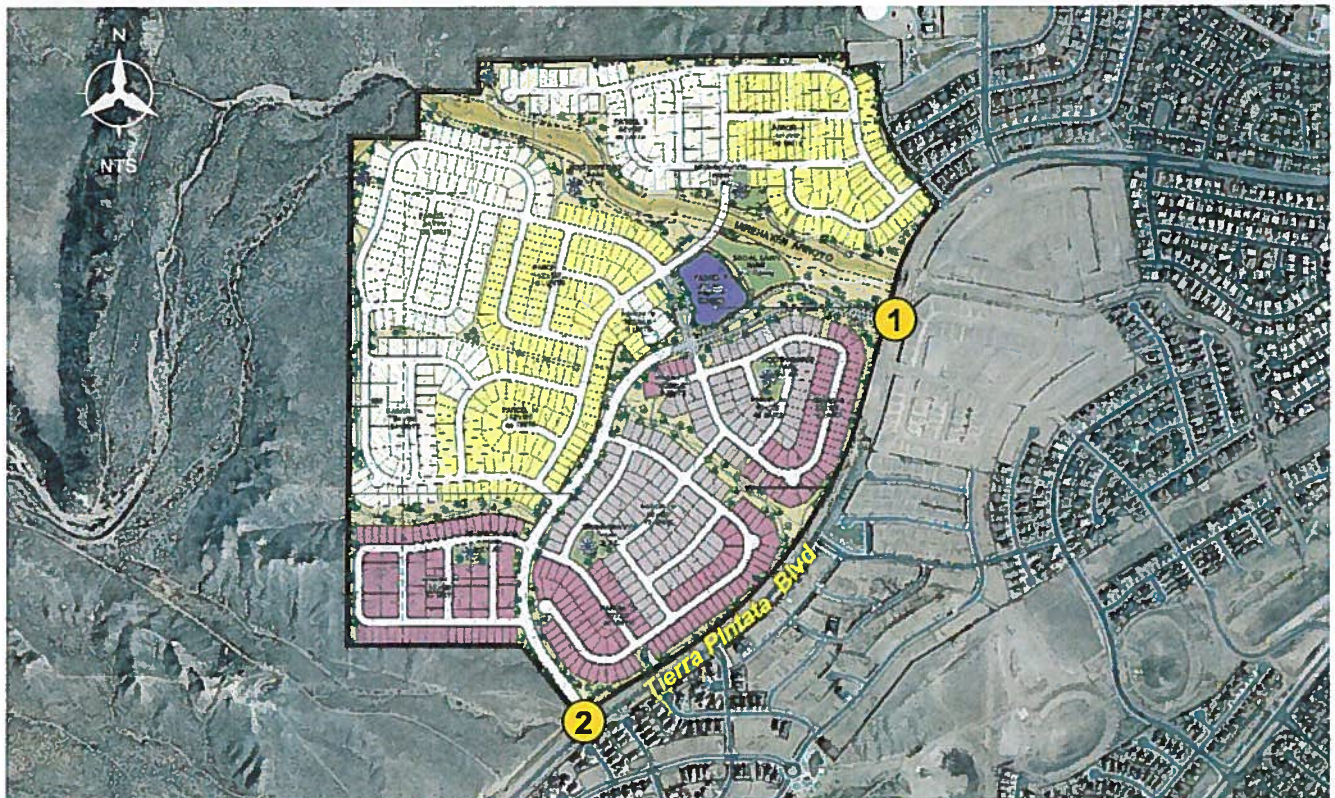
LEGEND

- ↑ ↑ ↑ Thru Lanes
(# as indicated)
- ↙ ↘ ↗ Turning Lanes
(# as indicated)
- 1234(1234) AM(PM) Traffic
Counts

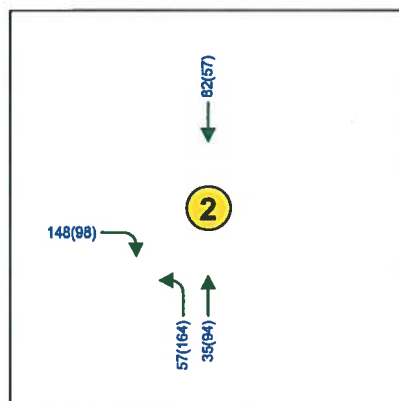


LEGEND

- ↑↑↑ Thru Lanes
(# as indicated)
- ↔↔↔ Turning Lanes
(# as indicated)
- 1234(1234) AM(PM) Traffic Counts
- N Entering
- X Exiting
- AA Active Adult
- SFH Single Family Housing



Tierra Pintada/Estrella/Stormcloud 4/5



SFH's/Active Adult/To Tierra Pintada/From Tierra Pintada

LEGEND

- ↑↑↑ Thru Lanes
(# as indicated)
- ↔↔↔ Turning Lanes
(# as indicated)
- 1234(1234) AM(PM) Traffic
Counts

V. TRAFFIC AND IMPROVEMENT ANALYSIS

The following section will discuss the results of the future year traffic analysis.

A. SITE ACCESS

As mentioned, two scenarios are evaluated. The first has full build of Watershed Estrella using only the northern entrance, the one shared with Stormcloud 4-5, and the second has both the northern and southern entrances open.

The analysis assumed Tierra Pintada was a 4-lane road (2-lanes in each direction); with left turn lanes at the intersections.

B. LEVEL OF SERVICE ANALYSIS

1. 2015 BUILD TRAFFIC VOLUMES

Based on the trip distribution and assignments, the estimated traffic generated by the proposed site development was added to the 2015 No-Build traffic projections.

Figure 7, page 16, is a summary of the 2015 Build Peak hour traffic projections, lane geometry, and movement and intersection level of service for the 2015 build analysis.

The intersections were again analyzed using Synchro version 8. Table 2 shows the results. The Synchro output is included in Appendix B.

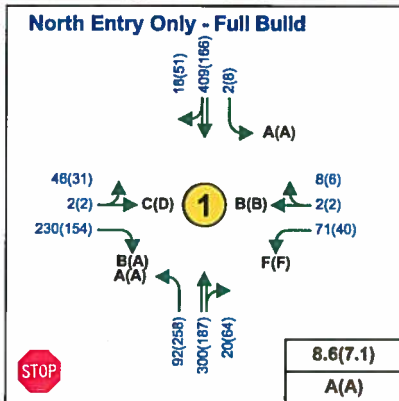
It can be seen from the table that the south entrance needs to be open prior to full build, as the traffic from Watershed Estrella results in Stormcloud exiting traffic to operate at LOS F. However the results show that the southern entrance does not begin to affect Stormcloud exiting traffic until after 50% development of Watershed Estrella, assuming the background traffic estimate is correct. However for fir safety concerns, the southern entrance would need to be opened prior to 50%, as 50% is approximately 450 DU's.

A peak hour volume traffic signal warrant analysis was prepared and neither intersection warrants a traffic signal. The peak hour volume traffic signal warrant analysis is included in Appendix B.

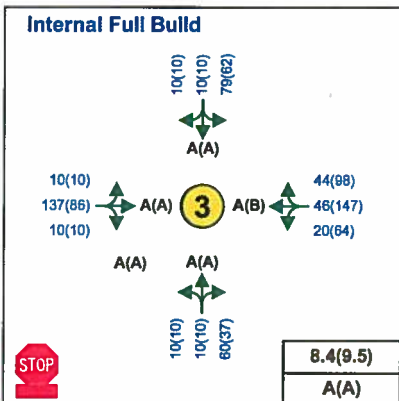
The internal intersection was also evaluated, as an All-Way STOP Controlled intersection. The results show it will operate at acceptable levels of service. It should be noted the internal intersection analysis assumed only the north entrance was open, as this results in the most traffic passing through the intersection.

Table 2 – 2015 Build Unsignalized Intersection Results

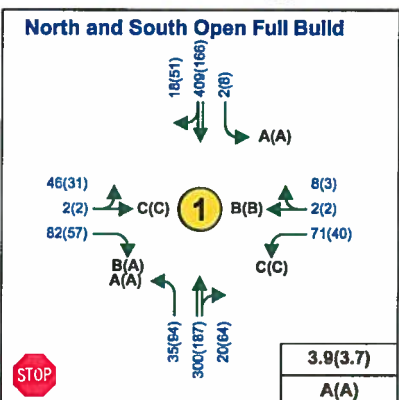
Intersection/Movement	2015 Build AM Peak				2015 Build PM Peak			
	Delay	v/c	Queue* (ft)	LOS	Delay	v/c	Queue* (ft)	LOS
Tierra Pintada and North Entrance – No South Access Full Build								
EB Left/Through	24.3	0.22	25	C	28.1	0.19	25	D
EB Right	11.9	0.32	50	B	9.8	0.18	25	A
WB Left	77.9	0.64	100	F	52.8	0.37	50	F
WB Through/Right	11.9	0.02	25	B	13.3	0.02	25	B
NB Left	8.6	0.09	25	A	8.4	0.21	25	A
SB Left	8.0	0.00	25	A	7.8	0.01	25	A
Tierra Pintada and North Entrance – No South Access 50% Build								
EB Left/Through	18.5	0.09	25	C	16.2	0.05	25	C
EB Right	10.5	0.16	25	B	9.2	0.09	25	A
WB Left	29.0	0.34	50	D	21.2	0.16	25	C
WB Through/Right	11.3	0.02	25	B	11.1	0.01	25	B
NB Left	8.4	0.05	25	A	7.9	0.10	25	A
SB Left	8.0	0.01	25	A	7.8	0.01	2	A
Tierra Pintada and North Entrance – With South Access								
EB Left/Through	19.2	0.17	25	C	15.1	0.09	25	C
EB Right	10.3	0.12	25	B	9.2	0.07	25	A
WB Left	24.1	0.29	50	C	17.7	0.13	25	C
WB Through/Right	11.2	0.02	25	B	11.8	0.01	25	B
NB Left	8.4	0.03	25	A	7.9	0.08	25	A
SB Left	8.0	0.00	25	A	7.8	0.01	25	A
Tierra Pintada and Development Entrance – South Access								
EB Left/Right	12.0	0.24	25	B	9.9	0.13	25	A
NB Left	9.1	0.06	25	A	8.3	0.14	25	A
Internal Entrance to Active Adult (AWSC)								
EB Approach	8.7	0.21	-	A	8.5	0.15	-	A
WB Approach	8.2	0.15	-	A	10.2	0.40	-	B
NB Approach	7.8	0.10	-	A	8.2	0.08	-	A
SB Approach	8.6	0.14	-	A	8.9	0.13	-	A
* - HCM 95 th percentile queue rounded to next 25-foot increment								



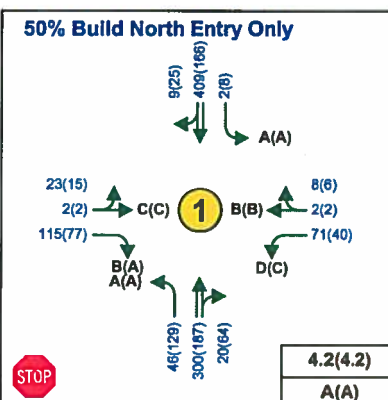
Tierra Pintada/Estrella/Stormcloud 4/5



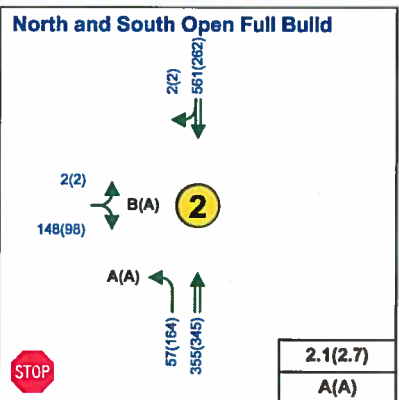
SFH's/Active Adult/To Tierra Pintada/From Tierra Pintada



Tierra Pintada/Estrella/Stormcloud 4/5



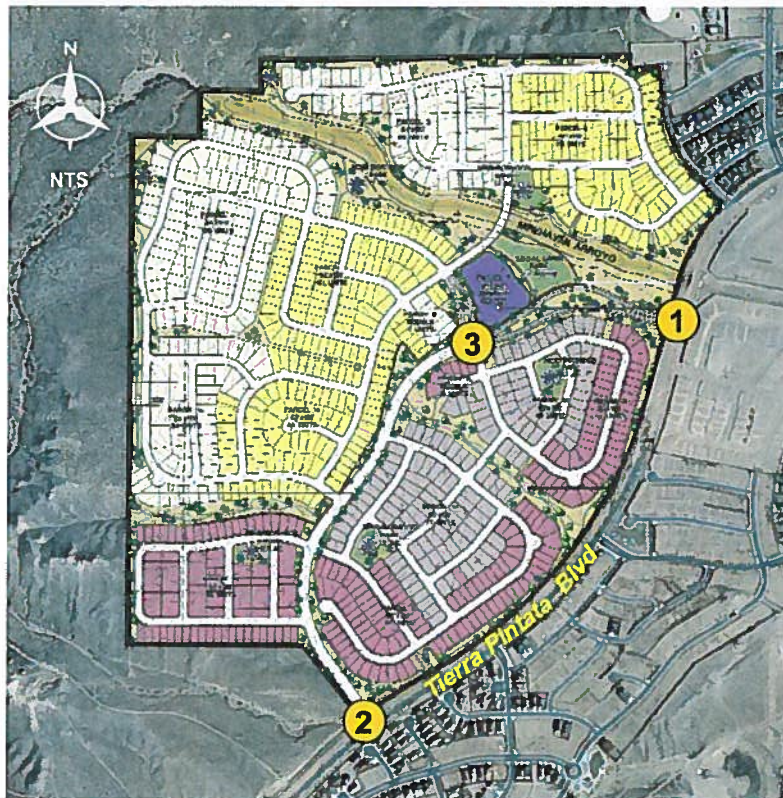
Tierra Pintada/Estrella/Stormcloud 4/5



Tierra Pintada/South Entrance

LEGEND

- ↑↑↑ Thru Lanes (# as Indicated)
- ↔↔↔ Turning Lanes (# as Indicated)
- 1234(1234) AM(PM) Traffic Counts
- X(X) AM(PM) Level of Service (LOS)



VI. CONCLUSIONS AND RECOMMENDATIONS

A. CONCLUSIONS

Both entrances to Watershed Estrella will operate at acceptable levels of service at full build when the southern entrance is also open as full access (left-in).

The northern entrance will operate at acceptable levels of service up to approximately 50% development of Watershed Estrella (450 DU's). Left-in access to the southern driveway is required after that time for the northern entrance intersection to operate at acceptable levels of service for the Stormcloud exiting left turn movement.

A four-lane roadway section on Tierra Pintada, with left turn lanes at the intersections, will result in acceptable levels of service.

The internal intersection entrance to the active adult subdivision will operate at acceptable level of service as an All-Way STOP Controlled intersection. The approaches operate acceptably as 2-lane road (1-lane in each direction).

B. RECOMMENDATIONS

The northern entrance will require a 150-foot right turn taper on Tierra Pintada for the right turn movement. The forecast number of right turns is 51.

The left turn lanes on Tierra Pintada at the entrances should be 150 feet in length.

The northern entrance exit laneage should consist of a left/through lane of 150 feet, and a right turn lane. This is because the dominant movement is expected to be to the south, towards Arroyo Vista and I-40.

The southern entrance exit laneage can consist of a single lane, as few left turns are anticipated at this intersection.

Appendix A

Forecast Turning Movements

Watershed Estrella
Forecast Turning Movement Tabulation

INTERSECTION: Tierra Pintada and Road 4 - Del Webb Entrance
(Future Stormcloud un-signalized intersection)

ONLY OPEN ENTRANCE

AM Peak Hour

		Southbound Tierra Pintada			Westbound Stormcloud			Northbound Tierra Pintada			Eastbound Del Webb Entrance		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Forecast (2015)			400						270				
Background Growth		0	1	0	11	0	1	0	3	2	0	0	0
Storm Cloud													
2015 No Build Volumes		2	8		60		7		27	18			
Proposed Developments:		2	409	0	71	0	8	0	300	20	0	0	0
Watershed/Estrella Single Family Residential													
Enter				11				55					
Exit											33		164
Watershed/Estrella Active Adult													
Enter				7				37					
Exit											13		66
2015 Build		2	409	18	71	0	8	92	300	20	46	0	230
PHF		0.920			0.920			0.920			0.920		

PM Peak Hour

		Southbound Tierra Pintada			Westbound Stormcloud			Northbound Tierra Pintada			Eastbound Del Webb Entrance		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Forecast (2015)			140						170				
Background Growth		1	3	0	6	0	1	0	2	7	0	0	0
Storm Cloud													
2015 No Build Volumes		7	23		34		5		15	57			
Proposed Developments:		8	166	0	40	0	6	0	187	64	0	0	0
Watershed/Estrella Single Family Residential													
Enter				35				176					
Exit											20		103
Watershed/Estrella Active Adult													
Enter				16				82					
Exit											10		52
2015 Build		8	166	51	40	0	6	258	187	64	31	0	154
PHF		0.92			0.92			0.92			0.92		

Watershed Estrella
Forecast Turning Movement Tabulation

INTERSECTION: Tierra Pintada and Road 4 - Del Webb Entrance
(Future Stormcloud un-signalized intersection)

ONLY OPEN ENTRANCE - 50% Build

AM Peak Hour

		Southbound Tierra Pintada			Westbound Stormcloud			Northbound Tierra Pintada			Eastbound Del Webb Entrance		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Forecast (2015)			400						270				
Background Growth		0	1	0	11	0	1	0	3	2	0	0	0
Storm Cloud		2	8		60		7		27	18			
2015 No Build Volumes		2	409	0	71	0	8	0	300	20	0	0	0
Proposed Developments:													
Watershed/Estrella Single Family Residential													
Enter				5				28					
Exit											16		82
Watershed/Estrella Active Adult													
Enter				4				18					
Exit											7		33
2015 Build		2	409	9	71	0	8	46	300	20	23	0	115
PHF		0.920			0.920			0.920			0.920		

PM Peak Hour

		Southbound Tierra Pintada			Westbound Stormcloud			Northbound Tierra Pintada			Eastbound Del Webb Entrance		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Forecast (2015)			140						170				
Background Growth		1	3	0	6	0	1	0	2	7	0	0	0
Storm Cloud		7	23		34		5		15	57			
2015 No Build Volumes		8	166	0	40	0	6	0	187	64	0	0	0
Proposed Developments:													
Watershed/Estrella Single Family Residential													
Enter				17				88					
Exit											10		51
Watershed/Estrella Active Adult													
Enter				8				41					
Exit											5		26
2015 Build		8	166	25	40	0	6	129	187	64	15	0	77
PHF		0.92			0.92			0.92			0.92		

Watershed Estrella
Forecast Turning Movement Tabulation

INTERSECTION: Tierra Pintada and North Del Webb Entrance
(Future Stormcloud un-signalized intersection)

South Entrance Open as Full Access

AM Peak Hour

		Southbound Tierra Pintada			Westbound Stormcloud			Northbound Tierra Pintada			Eastbound North Del Webb Entrance		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Forecast (2015)			400						270				
Background Growth		0	1	0	11	0	1	0	3	2	0	0	0
Storm Cloud		2	8		60		7		27	18			
2015 No Build Volumes		2	409	0	71	0	8	0	300	20	0	0	0
Proposed Developments:													
Watershed/Estrella Single Family Residential													
Enter				11				17					
Exit											33		49
Watershed/Estrella Active Adult													
Enter				7				18					
Exit											13		33
2015 Build		2	409	18	71	0	8	35	300	20	46	0	82
PHF		0.920			0.920			0.920			0.920		

PM Peak Hour

		Southbound Tierra Pintada			Westbound Stormcloud			Northbound Tierra Pintada			Eastbound North Del Webb Entrance		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Forecast (2015)			140						170				
Background Growth		1	3	0	6	0	1	0	2	7	0	0	0
Storm Cloud		7	23		34		5		15	57			
2015 No Build Volumes		8	166	0	40	0	6	0	187	64	0	0	0
Proposed Developments:													
Watershed/Estrella Single Family Residential													
Enter				35				53					
Exit											20		31
Watershed/Estrella Active Adult													
Enter				16				41					
Exit											10		26
2015 Build		8	166	51	40	0	6	94	187	64	31	0	57
PHF		0.92			0.92			0.92			0.92		

Watershed Estrella
Forecast Turning Movement Tabulation

INTERSECTION: Tierra Pintada and South Del Webb Entrance

South Entrance Open as Full Access

AM Peak Hour

		Southbound Tierra Pintada			Westbound			Northbound Tierra Pintada			Eastbound South Del Webb Entrance		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Forecast (2015)			400						270				
Background Growth		0	10	0				0	6	0	0	0	0
Storm Cloud			68						45				
2015 No Build Volumes		0	478	0	0	0	0	0	321	0	0	0	0
Proposed Developments:													
Watershed/Estrella Single Family Residential													
Enter								39	17				
Exit			49										115
Watershed/Estrella Active Adult													
Enter								18	18				
Exit			33										33
2015 Build		0	561	0	0	0	0	57	355	0	0	0	148
PHF		0.920						0.920			0.920		

PM Peak Hour

		Southbound Tierra Pintada			Westbound			Northbound Tierra Pintada			Eastbound South Del Webb Entrance		
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Forecast (2015)			140						170				
Background Growth		0	9	0				0	9	0	0	0	0
Storm Cloud			57						72				
2015 No Build Volumes		0	206	0	0	0	0	0	251	0	0	0	0
Proposed Developments:													
Watershed/Estrella Single Family Residential													
Enter								123	53				
Exit			31										72
Watershed/Estrella Active Adult													
Enter								41	41				
Exit			26										26
2015 Build		0	262	0	0	0	0	164	345	0	0	0	98
PHF		0.92						0.92			0.92		

Appendix B

2015 Build Intersection Capacity Analysis

HCM Unsignalized Intersection Capacity Analysis 1: Tierra Pintada & Estrella/Stormcloud 4/5

Estrella TIA
Build AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	2	230	71	2	8	92	300	20	2	409	18
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	50	2	250	77	2	9	100	326	22	2	445	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	832	1007	232	1015	1005	174	464			348		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	832	1007	232	1015	1005	174	464			348		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	79	99	68	36	99	99	91			100		
cM capacity (veh/h)	239	217	770	120	218	839	1093			1208		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	52	250	77	11	100	217	130	2	296	168		
Volume Left	50	0	77	0	100	0	0	2	0	0		
Volume Right	0	250	0	9	0	0	22	0	0	20		
cSH	238	770	120	534	1093	1700	1700	1208	1700	1700		
Volume to Capacity	0.22	0.32	0.64	0.02	0.09	0.13	0.08	0.00	0.17	0.10		
Queue Length 95th (ft)	20	35	83	2	8	0	0	0	0	0		
Control Delay (s)	24.3	11.9	77.9	11.9	8.6	0.0	0.0	8.0	0.0	0.0		
Lane LOS	C	B	F	B	A			A				
Approach Delay (s)	14.1		69.7		1.9			0.0				
Approach LOS	B		F									
Intersection Summary												
Average Delay			8.6									
Intersection Capacity Utilization			40.1%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 1: Tierra Pintada & Estrella/Stormcloud 4/5

Estrella TIA
Build PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	31	2	154	40	2	6	258	187	64	8	166	51
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	34	2	167	43	2	7	280	203	70	9	180	55
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	896	1059	118	1075	1052	136	236			273		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	896	1059	118	1075	1052	136	236			273		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	83	99	82	63	99	99	79			99		
cM capacity (veh/h)	193	175	912	117	176	887	1328			1287		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	36	167	43	9	280	136	137	9	120	116		
Volume Left	34	0	43	0	280	0	0	9	0	0		
Volume Right	0	167	0	7	0	0	70	0	0	55		
cSH	192	912	117	442	1328	1700	1700	1287	1700	1700		
Volume to Capacity	0.19	0.18	0.37	0.02	0.21	0.08	0.08	0.01	0.07	0.07		
Queue Length 95th (ft)	17	17	38	2	20	0	0	1	0	0		
Control Delay (s)	28.1	9.8	52.8	13.3	8.4	0.0	0.0	7.8	0.0	0.0		
Lane LOS	D	A	F	B	A			A				
Approach Delay (s)	13.1		46.2		4.3			0.3				
Approach LOS	B		E									
Intersection Summary												
Average Delay			7.1									
Intersection Capacity Utilization			39.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 1: Tierra Pintada & Estrella/Stormcloud 4/5

Estrella TIA
50% Build AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	23	2	115	71	2	8	46	300	20	2	409	9
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	25	2	125	77	2	9	50	326	22	2	445	10
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	727	902	227	790	896	174	454			348		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	727	902	227	790	896	174	454			348		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	99	84	66	99	99	95			100		
cM capacity (veh/h)	296	263	776	226	265	839	1103			1208		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	27	125	77	11	50	217	130	2	296	158		
Volume Left	25	0	77	0	50	0	0	2	0	0		
Volume Right	0	125	0	9	0	0	22	0	0	10		
cSH	293	776	226	586	1103	1700	1700	1208	1700	1700		
Volume to Capacity	0.09	0.16	0.34	0.02	0.05	0.13	0.08	0.00	0.17	0.09		
Queue Length 95th (ft)	8	14	36	1	4	0	0	0	0	0		
Control Delay (s)	18.5	10.5	29.0	11.3	8.4	0.0	0.0	8.0	0.0	0.0		
Lane LOS	C	B	D	B	A			A				
Approach Delay (s)	12.0		26.8		1.1			0.0				
Approach LOS	B		D									
Intersection Summary												
Average Delay			4.2									
Intersection Capacity Utilization			35.5%			ICU Level of Service				A		
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 1: Tierra Pintada & Estrella/Stormcloud 4/5

Estrella TIA
50% Build PM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	15	2	77	40	2	6	129	187	64	8	166	25
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	16	2	84	43	2	7	140	203	70	9	180	27
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	601	765	104	711	743	136	208			273		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	601	765	104	711	743	136	208			273		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	95	99	91	84	99	99	90			99		
cM capacity (veh/h)	348	296	931	266	304	887	1361			1287		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	18	84	43	9	140	136	137	9	120	87		
Volume Left	16	0	43	0	140	0	0	9	0	0		
Volume Right	0	84	0	7	0	0	70	0	0	27		
cSH	340	931	266	600	1361	1700	1700	1287	1700	1700		
Volume to Capacity	0.05	0.09	0.16	0.01	0.10	0.08	0.08	0.01	0.07	0.05		
Queue Length 95th (ft)	4	7	14	1	9	0	0	1	0	0		
Control Delay (s)	16.2	9.2	21.2	11.1	7.9	0.0	0.0	7.8	0.0	0.0		
Lane LOS	C	A	C	B	A			A				
Approach Delay (s)	10.5		19.5		2.7			0.3				
Approach LOS	B		C									
Intersection Summary												
Average Delay			4.2									
Intersection Capacity Utilization			31.4%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 1: Tierra Pintada & Estrella/Stormcloud 4/5

Estrella TIA
Build AM - South Entrance Open

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	46	2	82	71	2	8	35	300	20	2	409	18
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	50	2	89	77	2	9	38	326	22	2	445	20
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	708	883	232	730	882	174	464			348		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	708	883	232	730	882	174	464			348		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	84	99	88	71	99	99	97			100		
cM capacity (veh/h)	308	273	770	265	273	839	1093			1208		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	52	89	77	11	38	217	130	2	296	168		
Volume Left	50	0	77	0	38	0	0	2	0	0		
Volume Right	0	89	0	9	0	0	22	0	0	20		
cSH	306	770	265	594	1093	1700	1700	1208	1700	1700		
Volume to Capacity	0.17	0.12	0.29	0.02	0.03	0.13	0.08	0.00	0.17	0.10		
Queue Length 95th (ft)	15	10	29	1	3	0	0	0	0	0		
Control Delay (s)	19.2	10.3	24.1	11.2	8.4	0.0	0.0	8.0	0.0	0.0		
Lane LOS	C	B	C	B	A			A				
Approach Delay (s)	13.6		22.5		0.8			0.0				
Approach LOS	B		C									
Intersection Summary												
Average Delay			3.9									
Intersection Capacity Utilization			35.8%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis 2: Tierra Pintada & South Entrance

Estrella TIA
Build AM - South Entrance Open

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	2	148	57	355	561	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	161	62	386	610	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	928	306	612			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	928	306	612			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	77	94			
cM capacity (veh/h)	250	690	963			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	163	62	193	193	407	205
Volume Left	2	62	0	0	0	0
Volume Right	161	0	0	0	0	2
cSH	674	963	1700	1700	1700	1700
Volume to Capacity	0.24	0.06	0.11	0.11	0.24	0.12
Queue Length 95th (ft)	24	5	0	0	0	0
Control Delay (s)	12.0	9.0	0.0	0.0	0.0	0.0
Lane LOS	B	A				
Approach Delay (s)	12.0	1.2			0.0	
Approach LOS	B					
Intersection Summary						
Average Delay		2.1				
Intersection Capacity Utilization		38.2%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis 1: Tierra Pintada & Estrella/Stormcloud 4/5

Estrella TIA
Build PM - South Entrance Open

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Volume (veh/h)	31	2	57	40	2	3	94	187	64	8	166	51
Sign Control		Stop			Stop			Free			Free	
Grade		0%			0%			0%			0%	
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
Hourly flow rate (vph)	34	2	62	43	2	3	102	203	70	9	180	55
Pedestrians												
Lane Width (ft)												
Walking Speed (ft/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage (veh)												
Upstream signal (ft)												
pX, platoon unblocked												
vC, conflicting volume	536	703	118	613	696	136	236			273		
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	536	703	118	613	696	136	236			273		
tC, single (s)	7.5	6.5	6.9	7.5	6.5	6.9	4.1			4.1		
tC, 2 stage (s)												
tF (s)	3.5	4.0	3.3	3.5	4.0	3.3	2.2			2.2		
p0 queue free %	92	99	93	87	99	100	92			99		
cM capacity (veh/h)	397	331	912	327	334	887	1328			1287		
Direction, Lane #	EB 1	EB 2	WB 1	WB 2	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3		
Volume Total	36	62	43	5	102	136	137	9	120	116		
Volume Left	34	0	43	0	102	0	0	9	0	0		
Volume Right	0	62	0	3	0	0	70	0	0	55		
cSH	392	912	327	533	1328	1700	1700	1287	1700	1700		
Volume to Capacity	0.09	0.07	0.13	0.01	0.08	0.08	0.08	0.01	0.07	0.07		
Queue Length 95th (ft)	7	5	11	1	6	0	0	1	0	0		
Control Delay (s)	15.1	9.2	17.7	11.8	7.9	0.0	0.0	7.8	0.0	0.0		
Lane LOS	C	A	C	B	A			A				
Approach Delay (s)	11.4		17.0		2.2			0.3				
Approach LOS	B		C									
Intersection Summary												
Average Delay			3.7									
Intersection Capacity Utilization			30.3%		ICU Level of Service				A			
Analysis Period (min)			15									

HCM Unsignalized Intersection Capacity Analysis

2: Tierra Pintada & South Entrance

Estrella TIA
Build PM - South Entrance Open

						
Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Volume (veh/h)	2	98	164	345	262	2
Sign Control	Stop			Free	Free	
Grade	0%			0%	0%	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	2	107	178	375	285	2
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type				None	None	
Median storage (veh)						
Upstream signal (ft)						
pX, platoon unblocked						
vC, conflicting volume	830	143	287			
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	830	143	287			
tC, single (s)	6.8	6.9	4.1			
tC, 2 stage (s)						
tF (s)	3.5	3.3	2.2			
p0 queue free %	99	88	86			
cM capacity (veh/h)	265	878	1272			
Direction, Lane #	EB 1	NB 1	NB 2	NB 3	SB 1	SB 2
Volume Total	109	178	188	188	190	97
Volume Left	2	178	0	0	0	0
Volume Right	107	0	0	0	0	2
cSH	839	1272	1700	1700	1700	1700
Volume to Capacity	0.13	0.14	0.11	0.11	0.11	0.06
Queue Length 95th (ft)	11	12	0	0	0	0
Control Delay (s)	9.9	8.3	0.0	0.0	0.0	0.0
Lane LOS	A	A				
Approach Delay (s)	9.9	2.7			0.0	
Approach LOS	A					
Intersection Summary						
Average Delay		2.7				
Intersection Capacity Utilization		32.6%		ICU Level of Service		A
Analysis Period (min)		15				

HCM Unsignalized Intersection Capacity Analysis Estrella Internal Intersection with Active Adult 1: SFH's/Active Adult & To Tierra Pintada/From Tierra Pintada

Build AM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	137	10	20	46	44	10	10	60	79	10	10
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
Hourly flow rate (vph)	11	149	11	22	50	48	11	11	65	86	11	11
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	171	120	87	108								
Volume Left (vph)	11	22	11	86								
Volume Right (vph)	11	48	65	11								
Hadj (s)	0.01	-0.17	-0.39	0.13								
Departure Headway (s)	4.5	4.4	4.3	4.8								
Degree Utilization, x	0.21	0.15	0.10	0.14								
Capacity (veh/h)	752	767	770	695								
Control Delay (s)	8.7	8.2	7.8	8.6								
Approach Delay (s)	8.7	8.2	7.8	8.6								
Approach LOS	A	A	A	A								
Intersection Summary												
Delay				8.4								
Level of Service				A								
Intersection Capacity Utilization				30.9%	ICU Level of Service	A						
Analysis Period (min)				15								

HCM Unsignalized Intersection Capacity Analysis Estrella Internal Intersection with Active Adult 1: SFH's/Active Adult & To Tierra Pintada/From Tierra Pintada

Build pM

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Stop			Stop			Stop			Stop	
Volume (vph)	10	86	10	64	147	98	10	10	37	62	10	10
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
Hourly flow rate (vph)	11	93	11	70	160	107	11	11	40	67	11	11
Direction, Lane #	EB 1	WB 1	NB 1	SB 1								
Volume Total (vph)	115	336	62	89								
Volume Left (vph)	11	70	11	67								
Volume Right (vph)	11	107	40	11								
Hadj (s)	0.00	-0.11	-0.32	0.11								
Departure Headway (s)	4.7	4.3	4.7	5.1								
Degree Utilization, x	0.15	0.40	0.08	0.13								
Capacity (veh/h)	733	802	682	637								
Control Delay (s)	8.5	10.2	8.2	8.9								
Approach Delay (s)	8.5	10.2	8.2	8.9								
Approach LOS	A	B	A	A								
Intersection Summary												
Delay			9.5									
Level of Service			A									
Intersection Capacity Utilization			41.8%	ICU Level of Service		A						
Analysis Period (min)			15									

Scenario: 2015 Build - Includes Schools Estimate
Intersection: Tierra Pintada and Watershed/Estrella

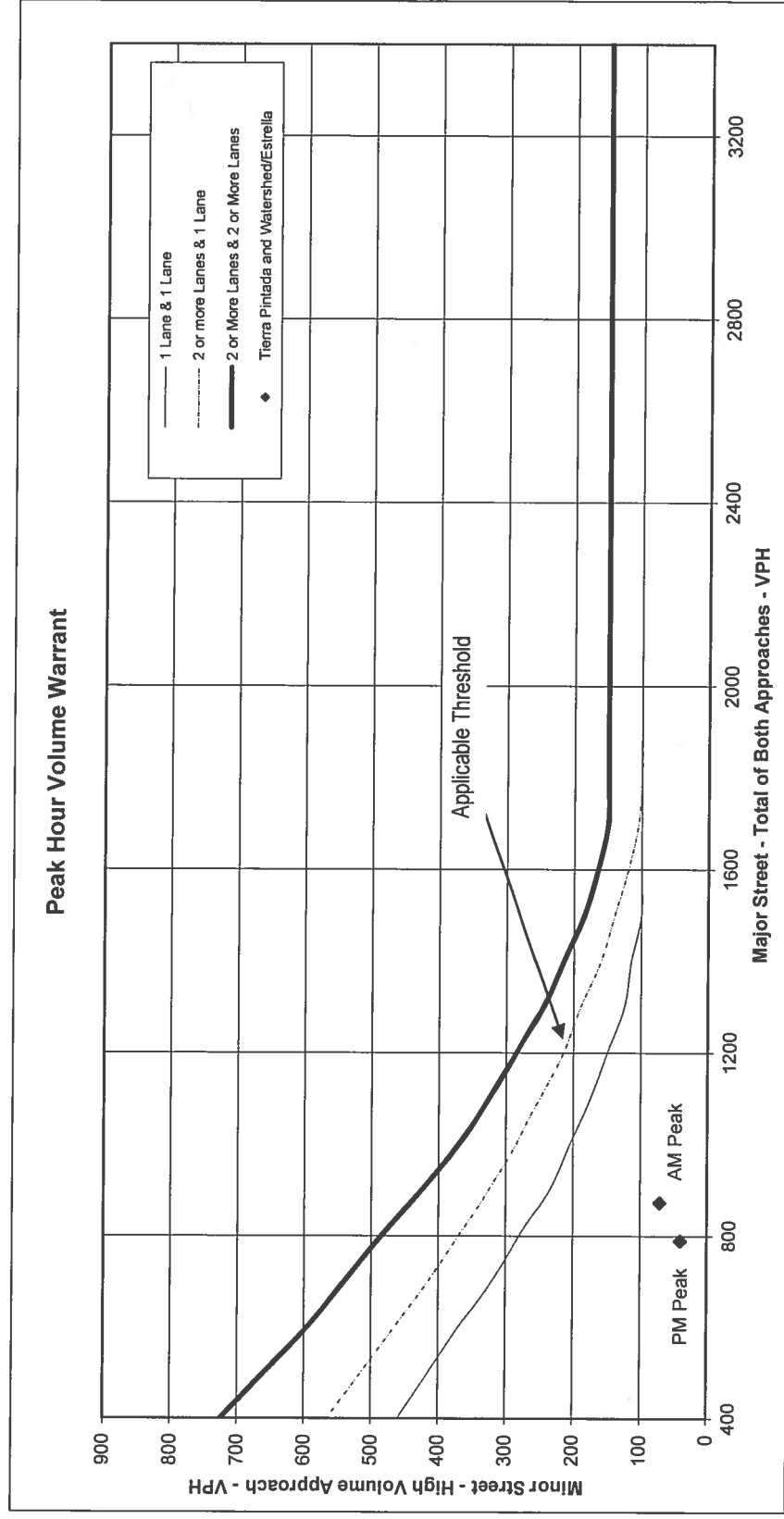
If rights included	EB	WB
AM	276	79
PM	185	46

Type: 2 Lane/1 Lane

Major Street (Orientation): Tierra Pintada (N/S)

Minor Street (Orientation): Watershed/Stormcloud 4/5

	Minor Street Approach Volume			Major Street Approach Volume			Satisfies
Time	EB Lefts	WB Lefts	High Vol Approach	NB	SB	NB + SB	Warrant 11?
AM Peak	46	71	71	437	435	872	NO
PM Peak	31	40	40	546	243	789	NO



Note: 150 VPH applies as the lower threshold for minor street approach with 2 or more lanes & 100 VPH as the threshold for a minor street approach with one lane