



September 9, 2014

Ms. Kim Wise
Property Evolution Investors, LLC
12400 Coit Road, Suite 800
Dallas, TX 75251

Re: *Trip Generation and Trip Distribution Study – Mansfield Multifamily Development*

Dear Ms. Wise:

Lee Engineering has completed the trip generation and trip distribution analysis for the proposed multi-family development located southwest of the intersection of Walnut Creek Drive and US 287 in Mansfield, Texas.

Background Information

A 237-unit multi-family development is proposed to be located southwest of the intersection of Walnut Creek Drive and US 287 in Mansfield, Texas. The site is currently undeveloped. The eastern half of the site is zoned C-2 (Community Business District) and the western half is zoned PR (Pre-Development District) based on the City of Mansfield *Zoning Map* updated July 2013. The proposed zoning for this site is multi-family. **Figure 1** provides an aerial view of the location. Access to this development will be provided by two existing driveways along US 287 Eastbound Frontage Road and one existing driveway on Walnut Creek Drive. The proposed site plan is provided in **Figure 2**.

Walnut Creek Drive is a five-lane roadway with a two-way center left turn lane and a posted speed limit of 40 miles per hour (mph). Walnut Creek Drive is classified as a Minor Arterial (M5U) in the *Mansfield Thoroughfare Plan* from February 2010. The US 287 eastbound frontage road is a two-lane one-way roadway with a posted speed limit of 40 mph. The existing interchange of Walnut Creek Drive and the US 287 frontage roads is signalized.

Figure 1: Proposed Development Vicinity Map



AM and PM peak period traffic volumes were collected by Lee Engineering at the intersections of Walnut Creek Drive and the US 287 frontage roads as part of another traffic study on Tuesday, February 5, 2013. These traffic volumes are shown in **Figure 3**.

Trip Generation

The number of trips generated by the development is a function of the type and quantity of land use for the development. The number of vehicle trips generated by the proposed development was estimated based on the trip generation rates and equations provided in the publication entitled *Trip Generation Manual, Ninth Edition*, by the Institute of Transportation Engineers (ITE). Estimates of the number of trips generated by the site were made for the AM and PM peak hour, as well as on a daily basis. The trip generation rates, directional splits and estimated number of trips generated by the proposed multi-family development at build-out are provided in **Table 1**.

Table 1: Trip Generation Calculations for Proposed Multi-Family Development

Land Use	ITE Code	AM Peak Hour	PM Peak Hour	Average Weekday						
Equation/Rates ¹										
Apartment	220	T = 0.49*X + 3.73	T = 0.55*X + 17.65	T = 6.06*X + 123.56						
Directional Splits ²										
Apartment	220	20 / 80	65 / 35	50 / 50						
Trips Generated (237 Dwelling Units)										
Apartment	220	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
		120	24	96	148	96	52	1,436	718	718

¹T = Trip Ends; X = Dwelling Units²XX / YY = % entering vehicles / % exiting vehicles

Based on current commercial zoning, the site could support approximately 110,000 square feet of retail and 35,000 square feet of office space. **Table 2** shows the trip generation for the site under the existing zoning for comparison.

Table 2: Trip Generation Calculations for Existing Commercial Zoning

Land Use	ITE Code	AM Peak Hour	PM Peak Hour	Average Weekday						
Equation/Rates ¹										
Shopping Center	820	Ln(T) = 0.61*Ln(X) + 2.24	Ln(T) = 0.67*Ln(X) + 3.31	Ln(T) = 0.65*Ln(X) + 5.83						
General Office Building	710	Ln(T) = 0.80*Ln(X) + 1.57	T = 1.12*X + 78.45	Ln(T) = 0.76*Ln(X) + 3.68						
Directional Splits ²										
Shopping Center	820	62 / 38	48 / 52	50 / 50						
General Office Building	710	88 / 12	17 / 83	50 / 50						
Trips Generated										
Land Use	Amount	Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Retail	110,000 ft ²	165	102	63	639	307	332	7,226	3,613	3,613
Office	35,000 ft ²	83	73	10	118	20	98	592	296	296
TOTAL		248	175	73	757	327	430	7,818	3,909	3,909

¹T = Trip Ends; X = 1,000 Square Feet²XX / YY = % entering vehicles / % exiting vehicles

As shown in Table 2, the site would generate significantly more trips under the existing commercial zoning when compared to the trips generated by the proposed multi-family development. A commercial development would generate approximately 6,380 more trips on a daily basis than the proposed multi-family development. During the AM peak hour, based on the

current commercial zoning, the site could generate more than double the trips generated by the proposed multi-family development (128 more trips). During the PM peak hour, a commercial development could generate over five times the trips generated by the proposed multi-family development (609 more trips). Therefore, the proposed change in zoning will result in a less intense land use and significantly less traffic will be generated.

Directional Distribution

The previously collected traffic volumes in the area, proposed site layout, and existing roadway network were reviewed to determine the directions from which traffic would approach and depart the development. The directional distribution used for the analysis is also shown in Figure 3.

Traffic Volumes

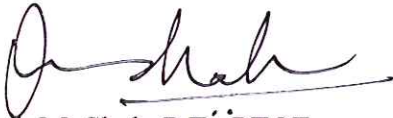
Traffic volumes expected to be generated by the proposed multi-family development were assigned to the area roadways and site access points based on the directional distribution identified in Figure 3. The estimated site generated traffic volumes for the AM and PM peak hours for the proposed multi-family development are shown in **Figure 4**. It should be noted that the existing eastbound US 287 exit ramp is already approved by the City Council for relocation further west, which will make it easier for traffic to access the site driveways for the proposed development and minimize weaving on the US 287 eastbound frontage road.

Summary

The proposed multi-family development is expected to generate 1,436 daily trips with 120 trips during the AM peak hour and 148 trips during the PM peak hour. The proposed change in zoning will result in significantly fewer site generated trips than the existing commercial zoning and will have significantly less traffic impact on the area roadways.

If you have any questions regarding this study, please contact me at (972) 248-3006. We appreciate the opportunity to provide these services.

Sincerely,



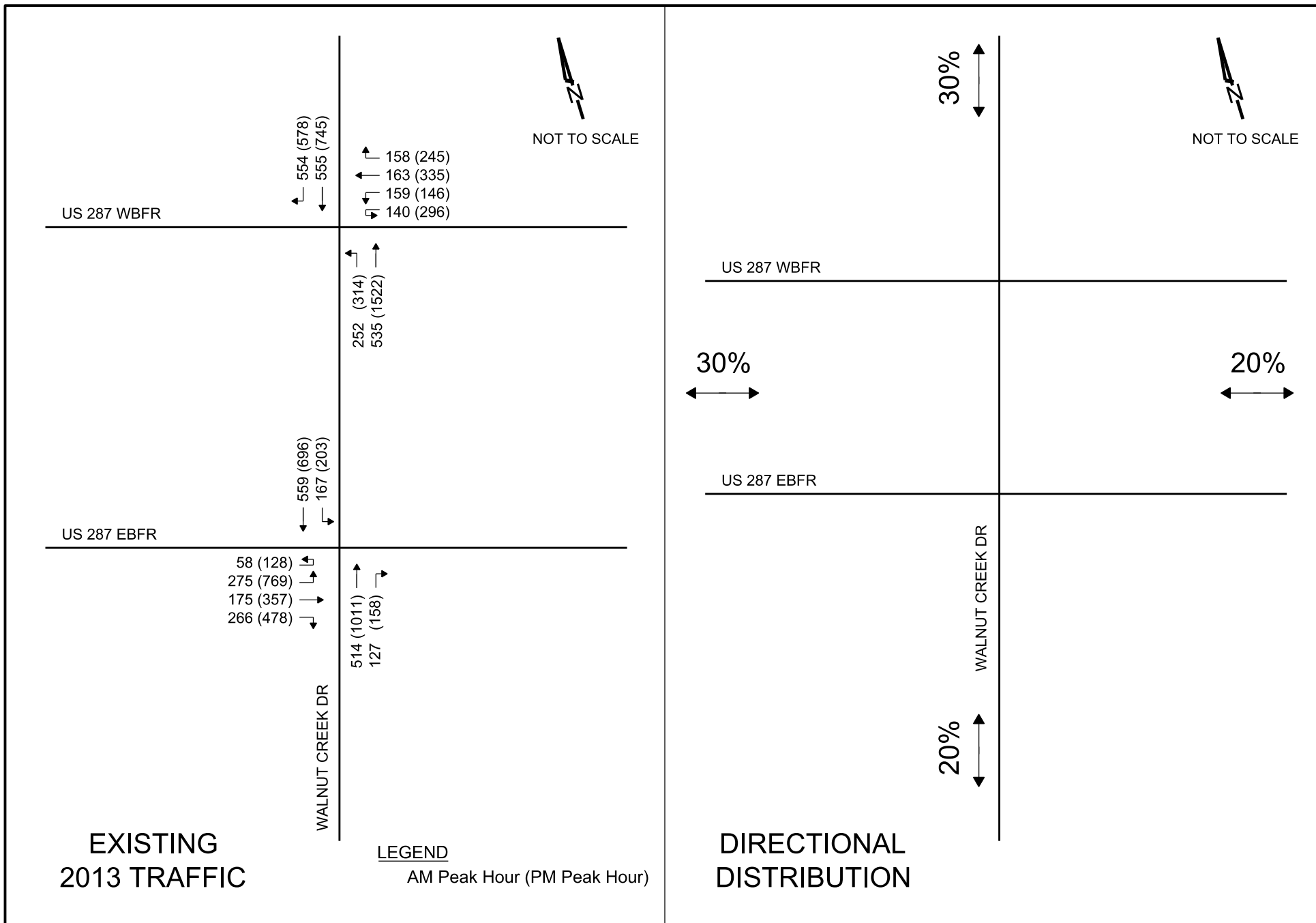
Dharmesh M. Shah, P.E., PTOE
Vice President
Lee Engineering, LLC
TBPE Firm F-450

Attachments



LEE ENGINEERING

Figure 2



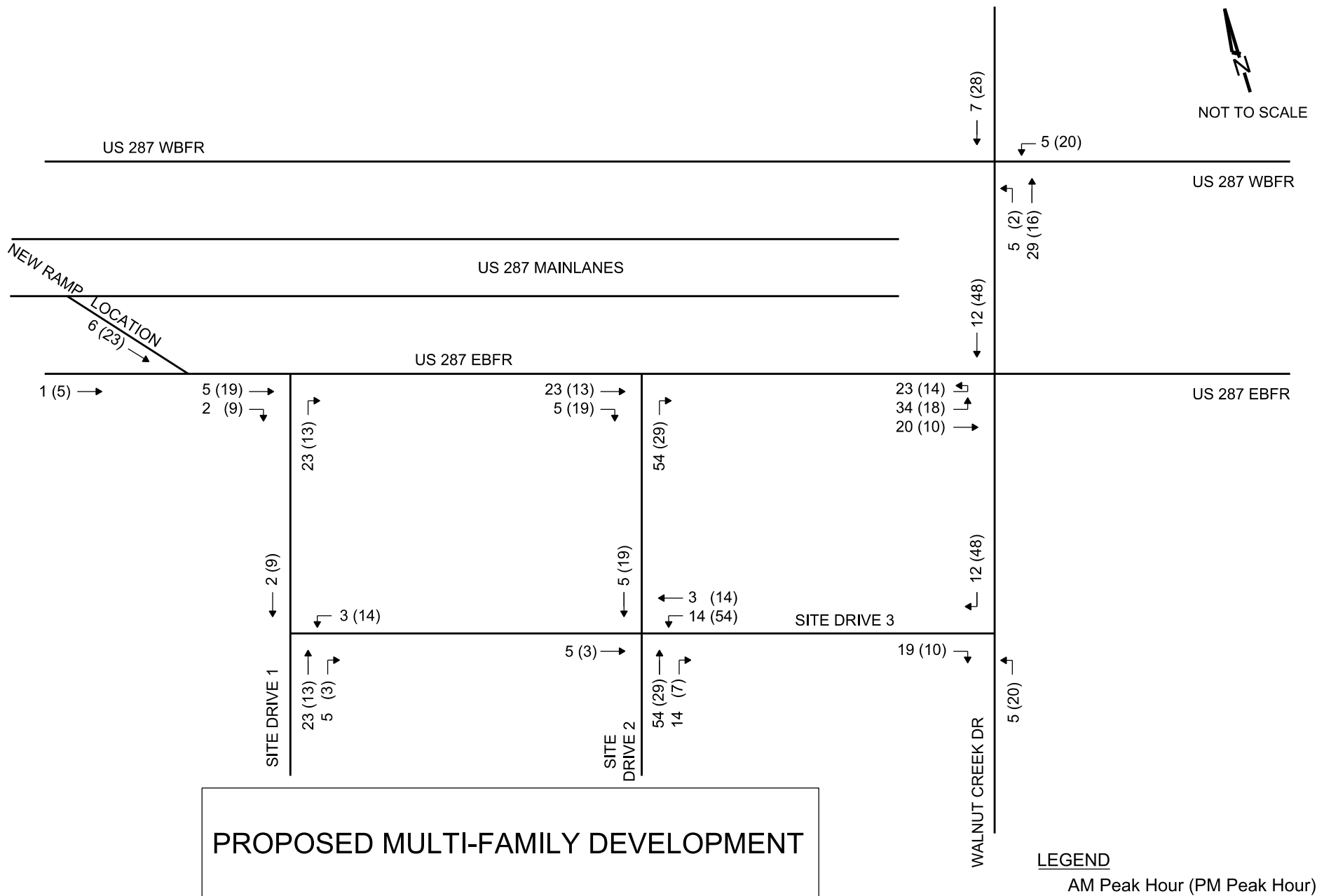
3030 LBJ FREEWAY
SUITE 1660
DALLAS, TEXAS 75234
972-248-3006 FAX 972-248-3855

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OKLAHOMA CITY - SAN ANTONIO

Existing (2013) Peak Hour Traffic Volumes and
Proposed Directional Distribution

Figure 3



3030 LBJ FREEWAY
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Site Generated Traffic Volumes

Figure 4

Accurate Counts
Traffic Data Collection Service
(214) 681-6468

Location: Walnut Creek @ US 287 WBFR
Weather: Cool
Counted By: EP

File Name : walnut creek at us 287 wbfr
Site Code : 00000000
Start Date : 02/05/2013
Page No : 1

Groups Printed- Unshifted

	WALNUT CREEK Southbound					US 287 WBFR Westbound					WALNUT CREEK Northbound					US 287 WBFR Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Utrn	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:15	0	116	143	0	259	9	11	39	26	85	43	97	0	0	140	0	0	0	0	0	484
07:30	0	125	145	0	270	20	18	32	20	90	52	123	0	0	175	0	0	0	0	0	535
07:45	0	152	153	0	305	30	44	48	25	147	63	129	0	0	192	0	0	0	0	0	644
Total	0	393	441	0	834	59	73	119	71	322	158	349	0	0	507	0	0	0	0	0	1663
08:00	0	136	155	0	291	28	45	45	44	162	67	130	0	0	197	0	0	0	0	0	650
08:15	0	130	144	0	274	53	28	43	35	159	56	137	0	0	193	0	0	0	0	0	626
08:30	0	137	102	0	239	48	46	22	36	152	66	139	0	0	205	0	0	0	0	0	596
08:45	0	136	77	0	213	38	44	27	45	154	58	130	0	0	188	0	0	0	0	0	555
Total	0	539	478	0	1017	167	163	137	160	627	247	536	0	0	783	0	0	0	0	0	2427
09:00	0	92	74	0	166	40	36	30	18	124	60	133	0	0	193	0	0	0	0	0	483
Total	0	92	74	0	166	40	36	30	18	124	60	133	0	0	193	0	0	0	0	0	483
11:45	0	116	67	0	183	33	64	25	46	168	79	157	0	0	236	0	0	0	0	0	587
Total	0	116	67	0	183	33	64	25	46	168	79	157	0	0	236	0	0	0	0	0	587
12:00	0	122	71	0	193	45	78	32	41	196	101	172	0	0	273	0	0	0	0	0	662
12:15	0	109	57	0	166	36	69	24	46	175	79	141	0	0	220	0	0	0	0	0	561
12:30	0	152	65	0	217	44	33	38	54	169	88	176	0	0	264	0	0	0	0	0	650
12:45	0	125	67	0	192	34	50	23	48	155	80	161	0	0	241	0	0	0	0	0	588
Total	0	508	260	0	768	159	230	117	189	695	348	650	0	0	998	0	0	0	0	0	2461
13:00	0	102	43	0	145	30	47	26	50	153	76	159	0	0	235	0	0	0	0	0	533
13:15	0	115	64	0	179	32	49	23	38	142	63	175	0	0	238	0	0	0	0	0	559
13:30	0	120	58	0	178	25	62	21	48	156	59	181	0	0	240	0	0	0	0	0	574
Total	0	337	165	0	502	87	158	70	136	451	198	515	0	0	713	0	0	0	0	0	1666
16:30	0	171	97	0	268	32	74	48	33	187	75	299	0	0	374	0	0	0	0	0	829
16:45	0	189	106	0	295	46	65	54	39	204	82	259	0	0	341	0	0	0	0	0	840
Total	0	360	203	0	563	78	139	102	72	391	157	558	0	0	715	0	0	0	0	0	1669
17:00	0	187	124	0	311	31	78	63	59	231	90	351	0	0	441	0	0	0	0	0	983
17:15	0	185	131	0	316	49	90	54	72	265	88	371	0	0	459	0	0	0	0	0	1040
17:30	0	175	143	0	318	40	90	71	69	270	70	375	0	0	445	0	0	0	0	0	1033
17:45	0	197	153	0	350	28	76	60	74	238	71	401	0	0	472	0	0	0	0	0	1060
Total	0	744	551	0	1295	148	334	248	274	1004	319	1498	0	0	1817	0	0	0	0	0	4116
18:00	0	188	151	0	339	29	79	60	81	249	85	375	0	0	460	0	0	0	0	0	1048
18:15	0	164	143	0	307	38	85	58	75	256	79	299	0	0	378	0	0	0	0	0	941
Grand Total	0	344	253	0	5974	838	136	966	112	4287	173	507	0	0	6800	0	0	0	0	0	17061
Apprch %	0.0	57.6	42.4	0.0		19.5	31.7	22.5	26.2		25.4	74.6	0.0	0.0		0.0	0.0	0.0	0.0		
Total %	0.0	20.2	14.8	0.0	35.0	4.9	8.0	5.7	6.6	25.1	10.1	29.7	0.0	0.0	39.9	0.0	0.0	0.0	0.0	0.0	

Accurate Counts
Traffic Data Collection Service
(214) 681-6468

Location: Walnut Creek @ US 287 WBFR
Weather: Cool
Counted By: EP

File Name : walnut creek at us 287 wbfr
Site Code : 00000000
Start Date : 02/05/2013
Page No : 2

	WALNUT CREEK Southbound					US 287 WBFR Westbound					WALNUT CREEK Northbound					US 287 WBFR Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Utrn	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Int. Total
Peak Hour From 07:15 to 09:45 - Peak 1 of 1																					
Intersection 07:45																					
Volume	0	555	554	0	1109	159	163	158	140	620	252	535	0	0	787	0	0	0	0	0	2516
Percent	0.0	50.0	50.0	0.0		25.6	26.3	25.5	22.6		32.0	68.0	0.0	0.0		0.0	0.0	0.0	0.0		
Volume	0	555	554	0	1109	159	163	158	140	620	252	535	0	0	787	0	0	0	0	0	2516
Volume	0	136	155	0	291	28	45	45	44	162	67	130	0	0	197	0	0	0	0	0	650
Peak Factor																					0.968
High Int. 07:45						08:00					08:30					7:00:00 AM					
Volume	0	152	153	0	305	28	45	45	44	162	66	139	0	0	205						
Peak Factor					0.909					0.957					0.960						
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																					
Intersection 12:00																					
Volume	0	508	260	0	768	159	230	117	189	695	348	650	0	0	998	0	0	0	0	0	2461
Percent	0.0	66.1	33.9	0.0		22.9	33.1	16.8	27.2		34.9	65.1	0.0	0.0		0.0	0.0	0.0	0.0		
Volume	0	508	260	0	768	159	230	117	189	695	348	650	0	0	998	0	0	0	0	0	2461
Volume	0	122	71	0	193	45	78	32	41	196	101	172	0	0	273	0	0	0	0	0	662
Peak Factor																					0.929
High Int. 12:30						12:00					12:00										
Volume	0	152	65	0	217	45	78	32	41	196	101	172	0	0	273						
Peak Factor					0.885					0.886					0.914						
Peak Hour From 14:00 to 18:15 - Peak 1 of 1																					
Intersection 17:15																					
Volume	0	745	578	0	1323	146	335	245	296	1022	314	152 2	0	0	1836	0	0	0	0	0	4181
Percent	0.0	56.3	43.7	0.0		14.3	32.8	24.0	29.0		17.1	82.9	0.0	0.0		0.0	0.0	0.0	0.0		
Volume	0	745	578	0	1323	146	335	245	296	1022	314	152 2	0	0	1836	0	0	0	0	0	4181
Volume	0	197	153	0	350	28	76	60	74	238	71	401	0	0	472	0	0	0	0	0	1060
Peak Factor																					0.986
High Int. 17:45						17:30					17:45										
Volume	0	197	153	0	350	40	90	71	69	270	71	401	0	0	472						
Peak Factor					0.945					0.946					0.972						

Accurate Counts
Traffic Data Collection Service

Location:Walnut Creek @ US 287 EBFR
Weather:Cool
Counted By:CT

(214) 681-6468

File Name : walnut creek at us 287 ebfr wkday

Site Code : 00000000

Start Date : 02/05/2013

Page No : 1

Groups Printed- Unshifted

	WALNUT CREEK Southbound					US 287 EBFR Westbound					WALNUT CREEK Northbound					US 287 EBFR Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Utrn	App. Total	Int. Total
Factor	1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		1.0	1.0	1.0	1.0		
07:15	49	76	0	0	125	0	0	0	0	0	0	96	16	0	112	38	36	66	9	149	386
07:30	40	105	0	0	145	0	0	0	0	0	0	123	16	0	139	50	32	74	14	170	454
07:45	43	143	0	0	186	0	0	0	0	0	0	112	33	0	145	76	37	76	14	203	534
Total	132	324	0	0	456	0	0	0	0	0	0	331	65	0	396	164	105	216	37	522	1374
08:00	46	123	0	0	169	0	0	0	0	0	0	131	21	0	152	68	43	62	15	188	509
08:15	40	145	0	0	185	0	0	0	0	0	0	128	29	0	157	68	48	69	18	203	545
08:30	38	148	0	0	186	0	0	0	0	0	0	143	44	0	187	63	47	59	11	180	553
08:45	40	128	0	0	168	0	0	0	0	0	0	122	22	0	144	65	45	72	19	201	513
Total	164	544	0	0	708	0	0	0	0	0	0	524	116	0	640	264	183	262	63	772	2120
09:00	25	108	0	0	133	0	0	0	0	0	0	122	26	0	148	69	38	65	11	183	464
Total	25	108	0	0	133	0	0	0	0	0	0	122	26	0	148	69	38	65	11	183	464
11:45	30	117	0	0	147	0	0	0	0	0	0	163	15	0	178	76	74	83	17	250	575
Total	30	117	0	0	147	0	0	0	0	0	0	163	15	0	178	76	74	83	17	250	575
12:00	25	144	0	0	169	0	0	0	0	0	0	186	21	0	207	86	69	71	23	249	625
12:15	27	119	0	0	146	0	0	0	0	0	0	145	27	0	172	77	74	110	21	282	600
12:30	51	146	0	0	197	0	0	0	0	0	0	165	26	0	191	104	73	90	24	291	679
12:45	35	127	0	0	162	0	0	0	0	0	0	172	32	0	204	77	81	95	20	273	639
Total	138	536	0	0	674	0	0	0	0	0	0	668	106	0	774	344	297	366	88	1095	2543
13:00	25	117	0	0	142	0	0	0	0	0	0	149	26	0	175	83	92	82	25	282	599
13:15	28	112	0	0	140	0	0	0	0	0	0	147	18	0	165	85	83	82	21	271	576
13:30	33	116	0	0	149	0	0	0	0	0	0	156	21	0	177	82	80	84	18	264	590
Total	86	345	0	0	431	0	0	0	0	0	0	452	65	0	517	250	255	248	64	817	1765
16:30	42	168	0	0	210	0	0	0	0	0	0	225	37	0	262	147	91	97	23	358	830
16:45	56	177	0	0	233	0	0	0	0	0	0	197	40	0	237	150	75	113	26	364	834
Total	98	345	0	0	443	0	0	0	0	0	0	422	77	0	499	297	166	210	49	722	1664
17:00	45	170	0	0	215	0	0	0	0	0	0	264	23	0	287	174	70	107	28	379	881
17:15	42	196	0	0	238	0	0	0	0	0	0	235	44	0	279	210	83	120	32	445	962
17:30	50	170	0	0	220	0	0	0	0	0	0	255	33	0	288	184	91	114	32	421	929
17:45	62	165	0	0	227	0	0	0	0	0	0	255	39	0	294	187	106	118	43	454	975
Total	199	701	0	0	900	0	0	0	0	0	0	1009	139	0	1148	755	350	459	135	1699	3747
18:00	49	165	0	0	214	0	0	0	0	0	0	266	42	0	308	188	77	126	21	412	934
18:15	51	151	0	0	202	0	0	0	0	0	0	208	24	0	232	172	80	121	16	389	823
Grand Total	972	3336	0	0	4308	0	0	0	0	0	0	4165	675	0	4840	2579	1625	2156	501	6861	16009
Apprch %	22.6	77.4	0.0	0.0		0.0	0.0	0.0	0.0		0.0	86.1	13.9	0.0		37.6	23.7	31.4	7.3		
Total %	6.1	20.8	0.0	0.0	26.9	0.0	0.0	0.0	0.0	0.0	0.0	26.0	4.2	0.0	30.2	16.1	10.2	13.5	3.1	42.9	

Accurate Counts
Traffic Data Collection Service

Location: Walnut Creek @ US 287 EBFR

(214) 681-6468

File Name : walnut creek at us 287 ebfr wkday

Weather: Cool

Site Code : 00000000

Counted By: CT

Start Date : 02/05/2013

Page No : 2

	WALNUT CREEK Southbound					US 287 EBFR Westbound					WALNUT CREEK Northbound					US 287 EBFR Eastbound					
Start Time	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Peds	App. Total	Left	Thru	Right	Utrn	App. Total	Int. Total
Peak Hour From 07:15 to 09:45 - Peak 1 of 1																					
Intersection	07:45																				
Volume	167	559	0	0	726	0	0	0	0	0	0	514	127	0	641	275	175	266	58	774	2141
Percent	23.0	77.0	0.0	0.0		0.0	0.0	0.0	0.0		0.0	80.2	19.8	0.0		35.5	22.6	34.4	7.5		
Volume	167	559	0	0	726	0	0	0	0	0	0	514	127	0	641	275	175	266	58	774	2141
Volume	38	148	0	0	186	0	0	0	0	0	0	143	44	0	187	63	47	59	11	180	553
Peak Factor																					0.968
High Int.	07:45					7:00:00 AM					08:30					07:45					
Volume	43	143	0	0	186	0	0	0	0	0	0	143	44	0	187	76	37	76	14	203	
Peak Factor	0.976										0.857					0.953					
Peak Hour From 10:00 to 13:45 - Peak 1 of 1																					
Intersection	12:00																				
Volume	138	536	0	0	674	0	0	0	0	0	0	668	106	0	774	344	297	366	88	1095	2543
Percent	20.5	79.5	0.0	0.0		0.0	0.0	0.0	0.0		0.0	86.3	13.7	0.0		31.4	27.1	33.4	8.0		
Volume	138	536	0	0	674	0	0	0	0	0	0	668	106	0	774	344	297	366	88	1095	2543
Volume	51	146	0	0	197	0	0	0	0	0	0	165	26	0	191	104	73	90	24	291	679
Peak Factor																					0.936
High Int.	12:30										12:00					12:30					
Volume	51	146	0	0	197	0	0	0	0	0	0	186	21	0	207	104	73	90	24	291	
Peak Factor	0.855										0.935					0.941					
Peak Hour From 14:00 to 18:15 - Peak 1 of 1																					
Intersection	17:15																				
Volume	203	696	0	0	899	0	0	0	0	0	0	1011	158	0	1169	769	357	478	128	1732	3800
Percent	22.6	77.4	0.0	0.0		0.0	0.0	0.0	0.0		0.0	86.5	13.5	0.0		44.4	20.6	27.6	7.4		
Volume	203	696	0	0	899	0	0	0	0	0	0	1011	158	0	1169	769	357	478	128	1732	3800
Volume	62	165	0	0	227	0	0	0	0	0	0	255	39	0	294	187	106	118	43	454	975
Peak Factor																					0.974
High Int.	17:15										18:00					17:45					
Volume	42	196	0	0	238	0	0	0	0	0	0	266	42	0	308	187	106	118	43	454	
Peak Factor	0.944										0.949					0.954					