

Terry O. Brown P.E.

McMahon / Unser Commercial Development
(Southwest Corner)

**Traffic Impact Study Supplement
For CVS Pharmacy**

December 15, 2009

FINAL

FINAL

Signature

Date

Presented to:

City of Albuquerque
Transportation Development Section

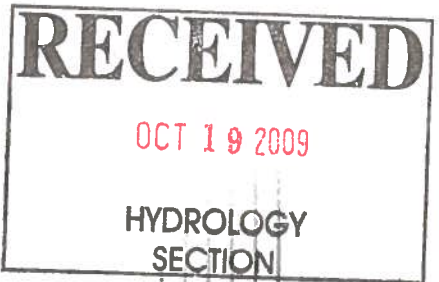
Prepared for:

Douglas Peterson
Peterson Properties
2325 San Pedro Dr. NE, Ste. 2-A
Albuquerque, NM 87102



Terry O. Brown

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Albuquerque, NM 87199
505 · 883 · 8807



A-112

Tuesday, September 15, 2009

Kristal D. Metro, P.E.
City of Albuquerque Transportation Development
600 2nd St. NW
Albuquerque, NM 87102

Re: McMahon / Unser Commercial Development Update (CVS Pharmacy)

Dear Kristal:

Please consider this submittal as an update to the November, 2006 Traffic Impact Study and the May 15, 2007 Supplemental Analysis for McMahon / Unser Commercial Development (Southeast Corner) for the purpose of providing additional information and recommendations to the City of Albuquerque Transportation Development Section to allow determination of offsite mitigation measures associated with the currently proposed phase of the referenced project. The proposed first phase consists of construction of a new 14,000 S.F. CVS Pharmacy at the southeast corner of McMahon Blvd. / Unser Blvd. as depicted on the Site Plan attached to this letter of analysis as an Appendix item.

This supplemental analysis will consider the recommendations of the November, 2006 Traffic Impact Study and May 15, 2007 Supplemental Analysis to determine if implementation of the CVS Pharmacy alone will trigger any of the recommended improvements associated with full development of the project. The recommendations of the May 15, 2007 Supplemental Analysis (which replaced the recommendations of the November, 2006 Traffic Impact Study) are as follows:

- All design and construction for this project shall insure that adequate site distances at the proposed access points and any offsite intersection for which improvements are constructed.
- Driveways shall be constructed using a minimum of 25-foot radius curb returns or larger is required to accommodate delivery trucks.

Mitigation Recommendations:

- **McMahon Blvd. / Unser Blvd.** – This report assumes that a second northbound and a second southbound thru lane on Unser Blvd. at McMahon Blvd. will be construct by others. The developer of the southwest corner of McMahon Blvd. / Unser Blvd. will be responsible to construct the two southbound lanes on Unser Blvd. south of McMahon Blvd. The projected 2010 PM Peak Hour NO BUILD and BUILD Volumes are projected to operate at level-of-service "E". Dual westbound left turn lanes will likely be needed to remedy the capacity shortfalls that are likely to occur as a result of this development as well as development of

IL has
7.5'
expansion
along W side
of Unser

This project
resp. for
E 1/2 of
Unser
(includes
2-12'
traffic

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- the other three quadrants of the intersection. This study does not recommend that the dual westbound left turn lanes be constructed with this development. However, the existing single westbound left turn lane should be lengthened with this project to contain the queues projected based on the 2010 forecast volumes.
- **Bandelier Dr. / Unser Blvd.** – Construct a new eastbound right turn lane at the signalized intersection of Bandelier Dr. / Unser Blvd. Construct the eastbound left turn lane and eastbound right turn lane to a minimum length of 300 feet plus transition or as long as possible between Unser Blvd. and Sagittarius Ave. Incorporate an eastbound right turn overlap phase into the signal at the intersection. In addition, construct a new northbound right turn lane on Unser Blvd. at Bandelier Dr. Incorporate a northbound right turn overlap phase into the signal timing at the intersection.
- **McMahon Blvd. / Fineland Dr.** – This study determined that the intersection of McMahon Blvd. / Fineland Dr. will meet the warrant for a traffic signal based on projected 2010 BUILD volumes forecast for this project. Therefore, the City of Albuquerque should consider permitting a traffic signal to be constructed at the intersection of McMahon Blvd. / Fineland Dr. Currently, the intersection is a tee intersection, but it is expected to be a full four-legged intersection in the future. **Cost to construct the signal should be shared with the developer to the north of this project.** The south leg of the intersection (Fineland Dr.) should be constructed to implement dual northbound left turn lanes and a right turn lane at the approach. The outside left turn lane will serve as a future thru lane when the intersection is constructed as a four-legged intersection. A westbound left turn lane should be constructed on McMahon Blvd. at Fineland Dr. The westbound left turn lane on McMahon Blvd. should be constructed to a length of 325 feet plus transition. The northbound left turn lanes on Fineland Dr. should be 200 feet long plus transition. The northbound right turn lane can be constructed to a length of 50 feet plus transition.
- **Access Driveways:**
 - This project should be accessed utilizing the proposed two unsignalized driveways and the signalized intersection of McMahon Blvd. / Fineland Dr. as shown on the site development plan on Page A-2 of this report. Two driveways are also proposed on Fineland Dr. No driveway on Fineland Dr. should be constructed within 200 feet of McMahon Blvd. All driveway design should comply with the requirements of the City of Albuquerque's Development Process Manual, current edition.
 - Driveway "A" should be constructed as a right-turn-in, right-turn-out, left-turn-in access unsignalized driveway located on the east side of Unser Blvd. approximately 600 feet south of McMahon Blvd. A minimum 150 feet long (plus transition) southbound left turn lane is recommended at Driveway "A".

This signal
is listed on
the IL
- whole
signal,
not 90

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- Driveway "B" should be a right-in, right-out unsignalized driveway located approximately 500 feet east of the centerline of Unser Blvd. An eastbound right turn deceleration lane on McMahon Blvd. is warranted at Driveway "B". The eastbound right turn deceleration lane at Driveway "B" should be constructed to a length of 150 feet plus transition.

With regard to the previous recommendations, this update recommends the following offsite improvements be constructed with the CVS Pharmacy only:

McMahon Blvd. / Unser Blvd. – The calculated increase in queuing for the westbound left turn movement on McMahon Blvd. at Unser is 50 feet. The total calculated westbound left turn queue length is 575 feet, but most of that length is due to queuing of the background traffic, and not the CVS Pharmacy traffic. Since the increase in queue length resulting from traffic generated by the CVS Pharmacy is only 50 feet, this updated report makes no recommendation to lengthen the lane at this time. The operation of the intersection of McMahon Blvd. / Unser Blvd. is projected to be C – 26.0 for the 2010 AM Peak Hour and E – 66.3 for the 2010 PM Peak Hour period after applying the volumes generated by the proposed CVS Pharmacy.

Bandelier Dr. / Unser Blvd. – In order to mitigate the impact of the volumes of traffic generated by the proposed new CVS Pharmacy, this update recommends that the existing traffic signal at the intersection be updated to add a northbound left turn arrow and a westbound left turn arrow so that the northbound and westbound left turn movements will operate as permitted / protected left turn movements. The following table summarizes the results of the signalized intersection analyses for the intersection based on the CVS Pharmacy scenario:

Bandelier Dr. / Unser Blvd.	2010 No Build		2010 BUILD	
	A.M.	P.M.	A.M.	P.M.
Existing Geometry	F-113.9	F-129.8	F-138.1	F-131.4
Mitigated Geometry*			F-102.8	F-91.0

* - Mitigated Geometry consists of implementing a northbound and a westbound left turn arrow on the existing traffic signal (NB and WB left turn movements should operate as permitted / protected movements)

McMahon Blvd. / Fineland Dr. – This updated supplemental analysis finds that a traffic signal at McMahon Blvd. / Fineland Dr. will not be warranted provided that the south leg of Fineland is constructed with a minimum two lane approach (one left turn lane and one right turn lane). The calculated queue length for the northbound left turn lane is 425 feet.

Re: McMahon / Unser Commercial Development Update (CVS Pharmacy)

• **Access Driveways:**

- This initial phase of the project should be accessed utilizing the proposed two unsignalized driveways and the unsignalized intersection of McMahon Blvd. / Fineland Dr. as shown on the site development plan attached to this report. Two driveways are also proposed on Fineland Dr. No driveway on Fineland Dr. should be constructed within 200 feet of McMahon Blvd. All driveway design should comply with the requirements of the City of Albuquerque's Development Process Manual, current edition.
- Driveway "A" should be constructed as a right-turn-in, right-turn-out, left-turn-in access unsignalized driveway located on the east side of Unser Blvd. approximately 600 feet south of McMahon Blvd. A minimum 150 feet long (plus transition) southbound left turn lane is recommended at Driveway "A".
- Driveway "B" should be a right-in, right-out unsignalized driveway located approximately 500 feet east of the centerline of Unser Blvd. An eastbound right turn deceleration lane on McMahon Blvd. is warranted at Driveway "B". The eastbound right turn deceleration lane at Driveway "B" should be constructed to a length of 150 feet plus transition.

The preceding recommendations should mitigate the impact of the proposed CVS Pharmacy on the adjacent transportation system. The remaining recommendation of the full Traffic Impact Study for the McMahon / Unser Commercial Development (SE Corner) may be implemented with future development of the project.

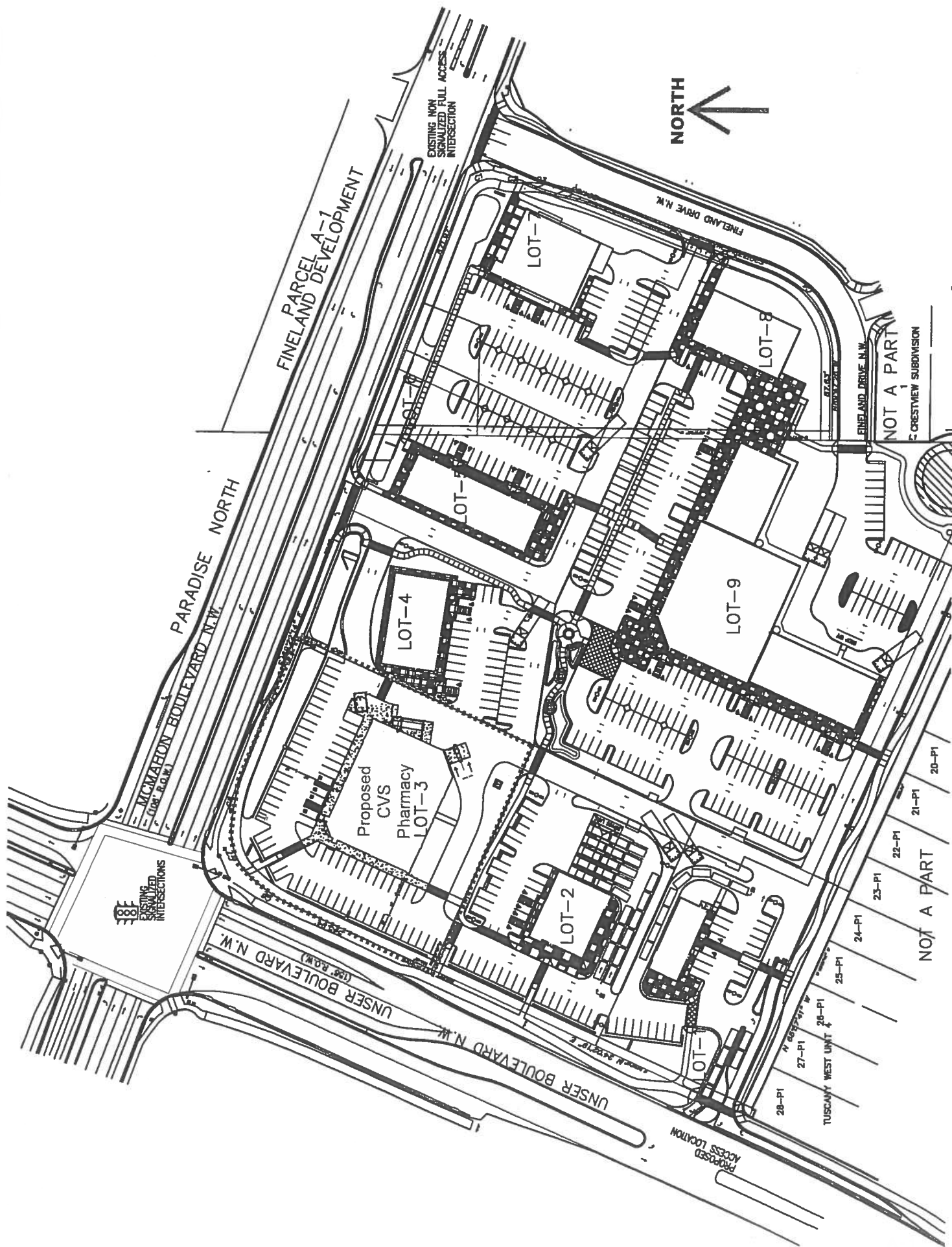
Please call me if you have questions or if you need additional information.

Best Regards,


Terry O. Brown, P.E.

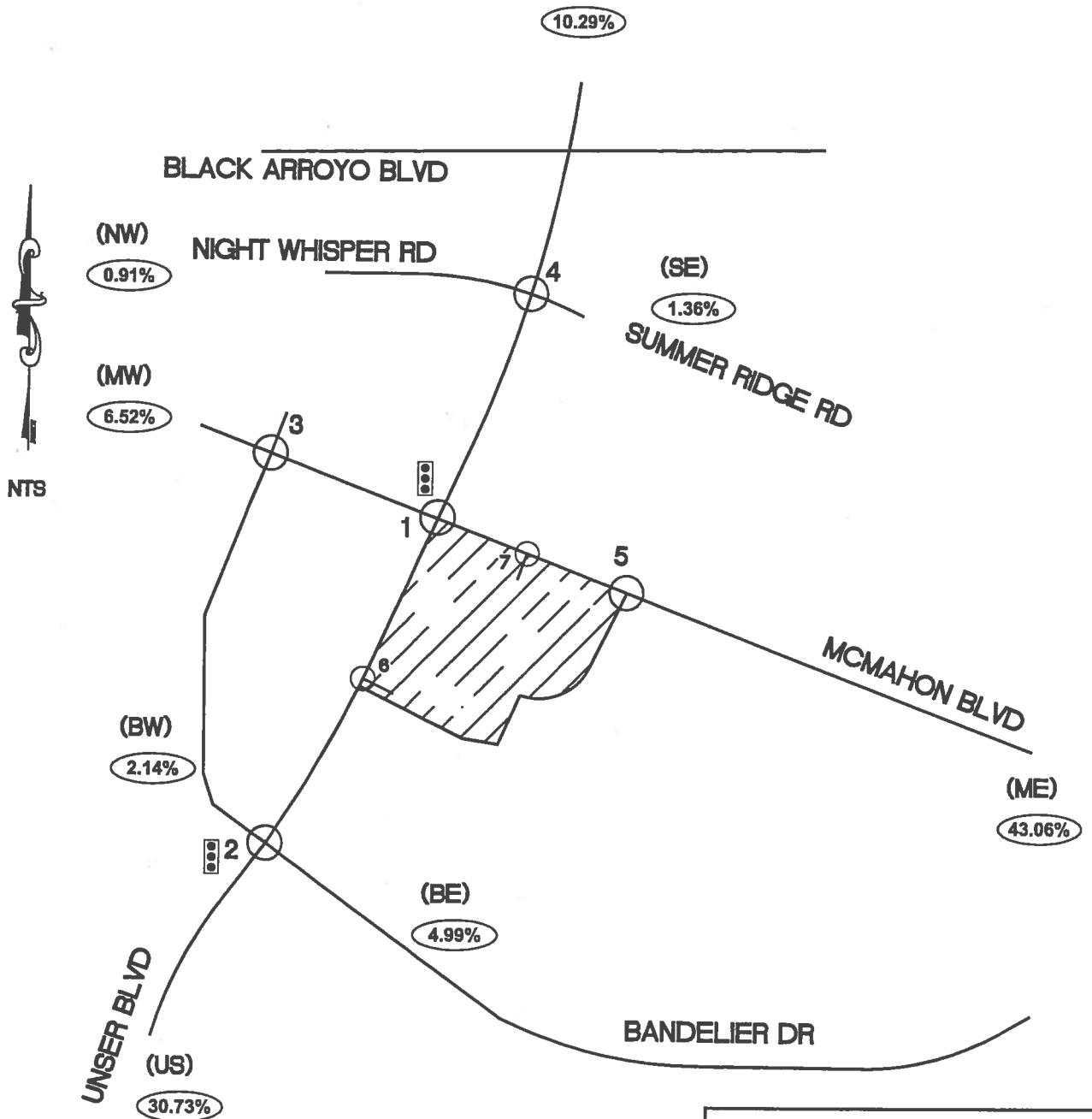
cc: Doug Peterson, Peterson Properties w/attachments

attachments as noted (Appendix Pages A-1 thru A- 33)



McMahon / Unser Commercial Development

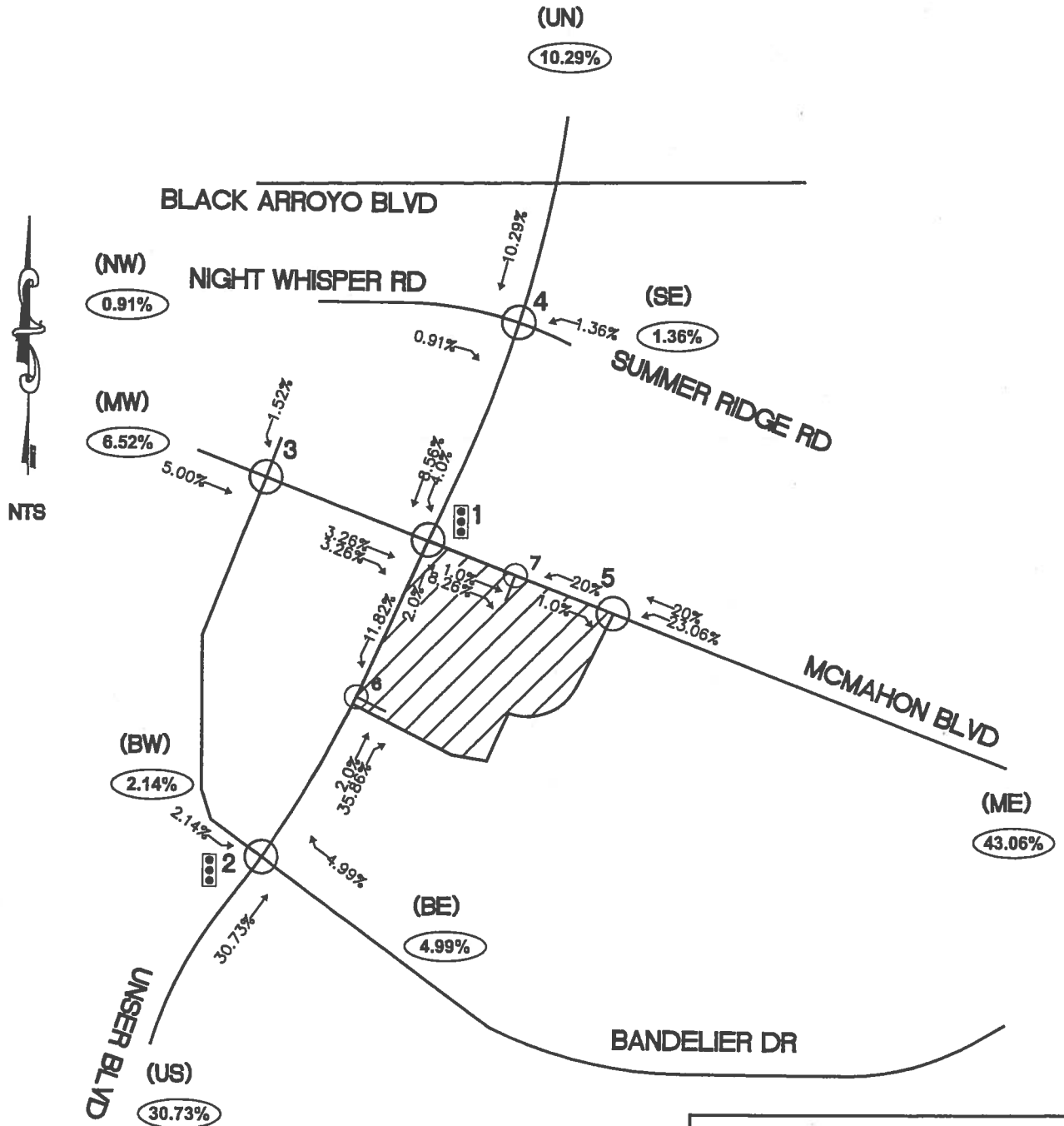
Trip Distribution Map (%)



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McMahon / Unser Commercial Development

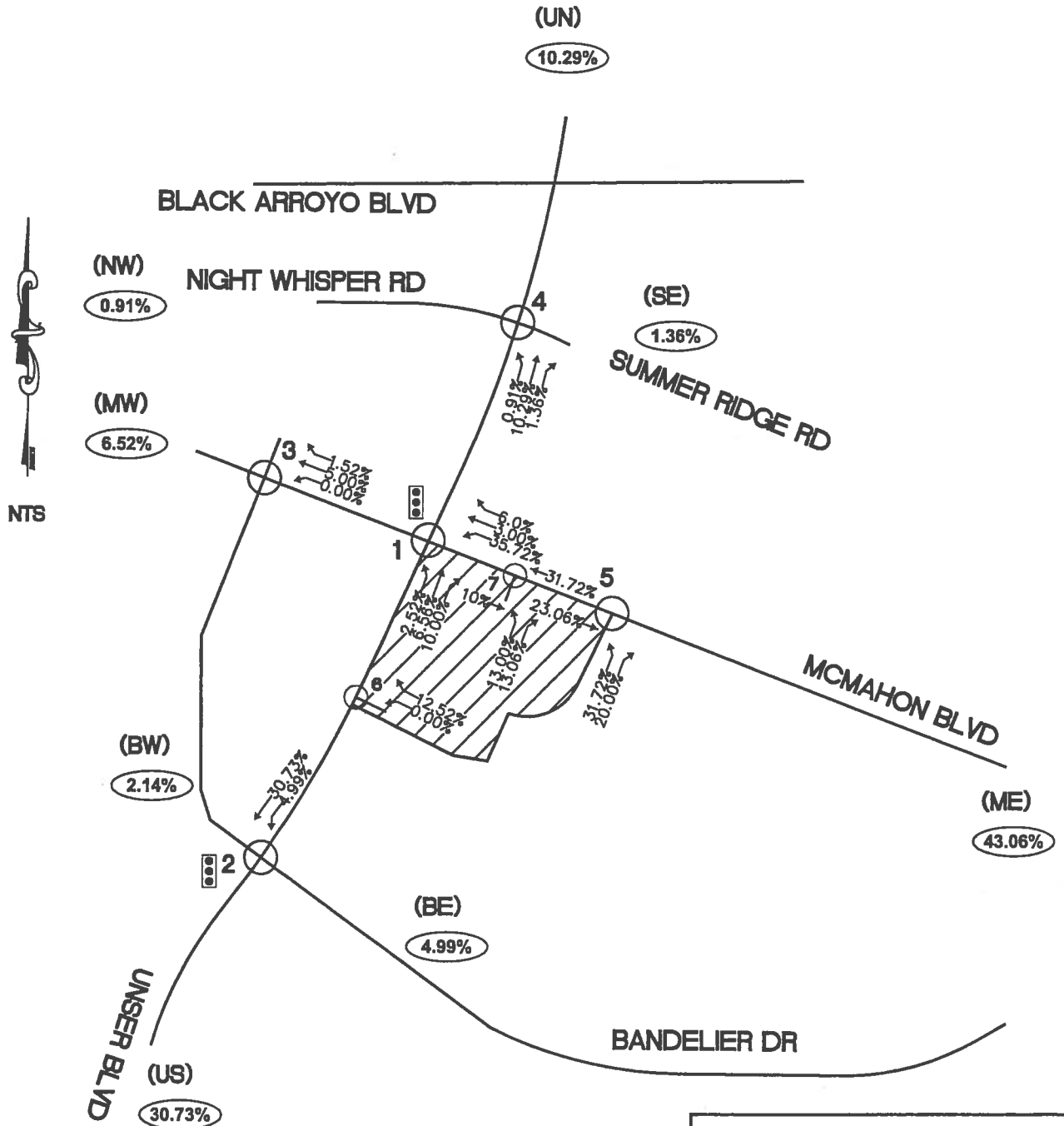
Trip Assignments (% Entering)



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McMahon / Unser Commercial Development

Trip Assignments (% Exiting)



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CV'S Pharmacy (McMahon Blvd. / Unser Blvd.) *Trip Generation Data (ITE Trip Generation Manual - 8th Edition)*

USE (ITE CODE)	24 HOUR TWO-WAY VOLUME		A.M. PEAK HOUR		P.M. PEAK HOUR	
	GROSS	ENTER	EXIT	ENTER	EXIT	ENTER
Walgreen's (Local Data)	1,750	31	22	115	120	
	14.00					
	Units					
	1,000 S.F.					

ITE Trip Generation Equations:

Average Vehicle Trip Ends on a Weekday (24 HOUR TWO-WAY VOLUME)

$$T = \frac{125 (X) + 0}{50\% \text{ Enter, } 50\% \text{ Exit}}$$

Average Vehicle Trip Ends on a Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 7am and 9am (A.M. PEAK HOUR)

$$T = \frac{3.79 (X) + 0}{59\% \text{ Enter, } 41\% \text{ Exit}}$$

Average Vehicle Trip Ends on a Weekday, Peak Hour of Adjacent Street Traffic, One Hour Between 4pm and 6pm (P.M. PEAK HOUR)

$$T = \frac{16.82 (X) + 0}{49\% \text{ Enter, } 51\% \text{ Exit}}$$

Comments:
 Tract No.

Based on ITE Trip Generation Manual - 8th Edition

McMahon / Unser Commercial Development (SE Corner) - CVS Update
Projected Turning Movements SUMMARY
PROPOSED DEVELOPMENT (2010) - 100% Development

INTERSECTION: Summary

McMahon Blvd. / Unser Blvd.		0.90			0.90			0.90			0.90			PHF
(1)		Eastbound (McMahon Blvd.)			Westbound (McMahon Blvd.)			Northbound (Unser Blvd.)			Southbound (Unser Blvd.)			
	3.0% Truck	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Existing (2006)		9	21	10	100	111	22	35	526	100	65	335	28	
2010 (NO BUILD - A.M.)		210	190	47	205	114	106	53	1,213	141	152	1,260	121	
2010 (BUILD - A.M.)		210	191	48	213	115	107	54	1,214	144	153	1,263	121	

		0.90			0.90			0.90			0.90			PHF
		Eastbound (McMahon Blvd.)			Westbound (McMahon Blvd.)			Northbound (Unser Blvd.)			Southbound (Unser Blvd.)			
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Existing (2006)		8	14	10	278	267	89	96	534	83	24	48	73	
2010 (NO BUILD - P.M.)		304	212	47	411	266	165	146	1,845	120	91	973	199	
2010 (BUILD - P.M.)		304	216	51	454	270	172	149	1,853	134	96	983	199	

Bandelier Dr. / Unser Blvd.		0.81			0.72			0.79			0.86			PHF
(2)		Eastbound (Bandelier Dr.)			Westbound (Bandelier Dr.)			Northbound (Unser Blvd.)			Southbound (Unser Blvd.)			
	3.0% Truck	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Existing (2006)		37	78	220	90	21	56	59	559	166	102	1,312	6	
2010 (NO BUILD - A.M.)		132	95	427	100	29	73	212	890	215	137	1,746	15	
2010 (BUILD - A.M.)		133	95	427	100	29	75	212	900	215	138	1,753	15	

		0.94			0.98			0.94			0.90			PHF
		Eastbound (Bandelier Dr.)			Westbound (Bandelier Dr.)			Northbound (Unser Blvd.)			Southbound (Unser Blvd.)			
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Existing (2006)		28	43	64	119	61	133	256	1,143	119	107	642	38	
2010 (NO BUILD - P.M.)		184	61	360	132	76	163	510	1,672	154	148	920	50	
2010 (BUILD - P.M.)		186	61	360	132	76	169	510	1,707	154	154	957	50	

McMahon Blvd. / Fineland Dr.		0.92			0.86			0.65			0.85			PHF
(5)		Eastbound (McMahon Blvd.)			Westbound (McMahon Blvd.)			Northbound (Fineland Dr.)			Southbound (Fineland Dr.)			
	3.0% Truck	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Existing (2006)		0	658	0	5	403	0	10	0	3	0	0	0	
2010 (NO BUILD - A.M.)		0	1,140	0	8	804	0	11	0	3	0	0	0	
2010 (BUILD - A.M.)		0	1,145	0	15	810	0	21	0	7	0	0	0	

		0.89			0.94			0.75			0.85			PHF
		Eastbound (McMahon Blvd.)			Westbound (McMahon Blvd.)			Northbound (Fineland Dr.)			Southbound (Fineland Dr.)			
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Existing (2006)		0	479	0	12	1,125	0	2	0	1	0	0	0	
2010 (NO BUILD - P.M.)		0	929	0	18	1,919	0	2	0	1	0	0	0	
2010 (BUILD - P.M.)		0	930	10	81	1,906	0	121	0	42	0	0	0	

Driveway "A" / Unser Blvd.		0.85			0.85			0.85			0.85			PHF
(6)		Eastbound (Driveway "A")			Westbound (Driveway "A")			Northbound (Unser Blvd.)			Southbound (Unser Blvd.)			
	3.0% Truck	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Existing (2006)		0	0	0	0	0	0	0	0	0	0	0	0	
2010 (NO BUILD - A.M.)		0	0	0	0	0	0	0	1,407	0	0	1,512	0	
2010 (BUILD - A.M.)		0	0	0	0	0	3	0	1,416	11	4	1,512	0	

		0.85			0.85			0.90			0.90			PHF
		Eastbound (Driveway "A")			Westbound (Driveway "A")			Northbound (Unser Blvd.)			Southbound (Unser Blvd.)			
		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	
Existing (2006)		0	0	0	0	0	0	0	0	0	0	0	0	
2010 (NO BUILD - P.M.)		0	0	0	0	0	0	0	2,111	0	0	1,431	0	
2010 (BUILD - P.M.)		0	0	0	0	0	75	0	2,096	101	54	1,391	0	

McMahon / Unser Commercial Development (SE Corner) - CVS Update

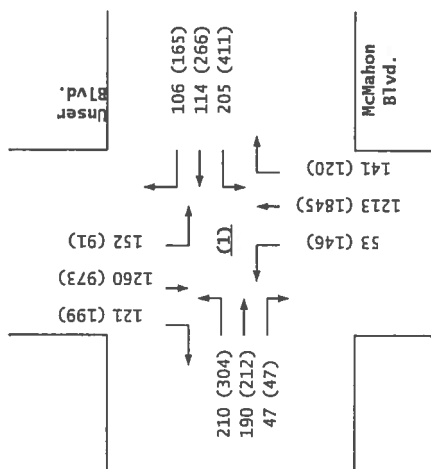
Projected Turning Movements SUMMARY
PROPOSED DEVELOPMENT (2010) - 100% Development

INTERSECTION: Summary

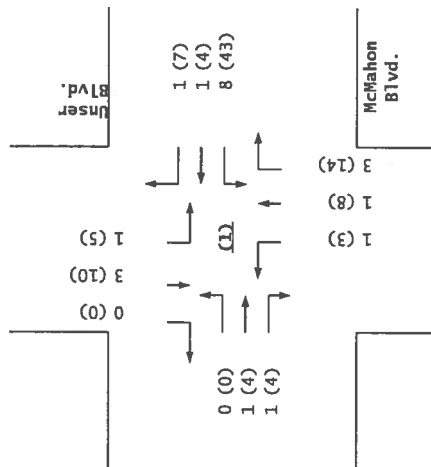
McMahon Blvd. / Driveway "B"

			0.90			0.90			0.85			0.85			PHF
(7)	Eastbound (McMahon Blvd.)			Westbound (McMahon Blvd.)			Northbound (Driveway "B")			Southbound (Driveway "B")					
3.0% Truck	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			
Existing (2006)	0	0	0	0	0	0	0	0	0	0	0	0			
2010 (NO BUILD - A.M.)	0	483	0	0	425	0	0	0	0	0	0	0			
2010 (BUILD - A.M.)	0	485	3	6	432	0	0	0	3	0	0	0			
			0.95			0.95			0.85			0.85			PHF
	Eastbound (McMahon Blvd.)			Westbound (McMahon Blvd.)			Northbound (Driveway "B")			Southbound (Driveway "B")					
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right			
Existing (2006)	0	0	0	0	0	0	0	0	0	0	0	0			
2010 (NO BUILD - P.M.)	0	423	0	0	842	0	0	0	0	0	0	0			
2010 (BUILD - P.M.)	0	418	27	41	891	0	30	0	26	0	0	0			

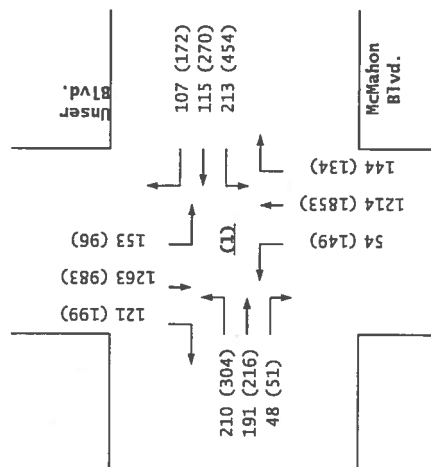
2010
NO BUILD



Trips



2010
BUILD



McMahon Blvd. / Unser Blvd.

McMahon / Unser Commercial Development (SE Corner)

Projected Turning Movements Worksheet

Bandelier Dr. / Unser Blvd.**INTERSECTION:**E-W Street: **Bandelier Dr.** (2)N-S Street: **Unser Blvd.**

Year of Existing Counts 2003

Implementation Year 2010

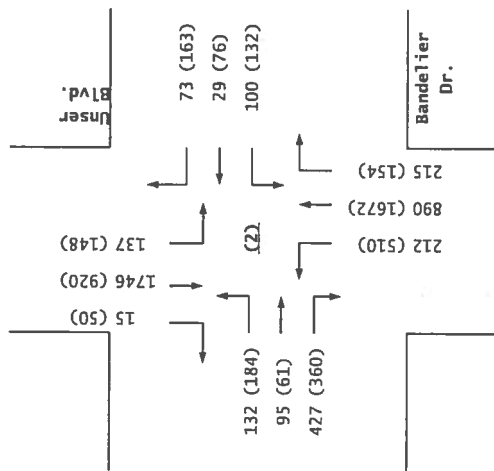
Growth Rates

	3.00%			3.00%			9.30%			9.30%		
	Eastbound (Bandelier Dr.)			Westbound (Bandelier Dr.)			Northbound (Unser Blvd.)			Southbound (Unser Blvd.)		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Existing Volumes	34	72	202	83	19	51	46	437	130	80	1,026	5
Background Traffic Growth	7	15	42	17	4	11	30	284	85	52	668	3
Subtotal	41	87	244	100	23	62	76	721	215	132	1,694	8
McMahon / Unser (SW Corner) Trips	91	8	183	0	6	11	136	109	0	5	10	7
Night Whisper Trips	0	0	0	0	0	0	0	60	0	0	62	0
Subtotal (NO BUILD - A.M.)	132	95	427	100	29	73	212	890	215	137	1,746	15
Percent Commercial Trips Generated(Entering)	2.14%	0.00%	0.00%	0.00%	0.00%	4.99%	0.00%	30.73%	0.00%	0.00%	0.00%	0.00%
Percent Commercial Trips Generated(Exiting)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.99%	30.73%	0.00%
Total Trips Generated	1	0	0	0	0	2	0	10	0	1	7	0
Total AM Peak Hour BUILD Volumes	133	95	427	100	29	75	212	900	215	138	1,753	15

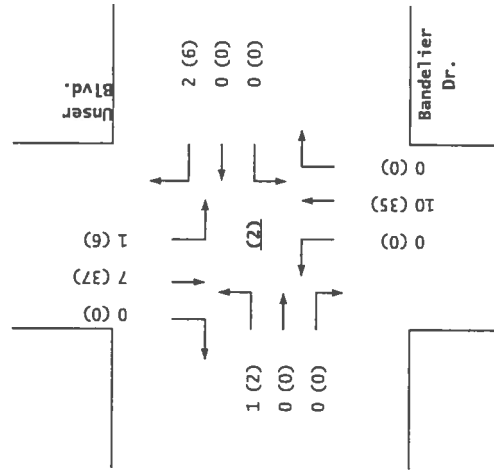
	Eastbound (Bandelier Dr.)			Westbound (Bandelier Dr.)			Northbound (Unser Blvd.)			Southbound (Unser Blvd.)		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Existing Volumes	26	39	59	109	56	122	200	894	93	84	502	30
Background Traffic Growth	5	8	12	23	12	26	130	582	61	55	327	20
Subtotal	31	47	71	132	68	148	330	1,476	154	139	829	50
McMahon / Unser (SW Corner) Trips	153	14	289	0	8	15	180	135	0	9	34	0
Night Whisper Trips	0	0	0	0	0	0	0	61	0	0	57	0
Subtotal (NO BUILD - P.M.)	184	61	360	132	76	163	510	1,672	154	148	920	50
Percent Commercial Trips Generated(Entering)	2.14%	0.00%	0.00%	0.00%	0.00%	4.99%	0.00%	30.73%	0.00%	0.00%	0.00%	0.00%
Percent Commercial Trips Generated(Exiting)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.99%	30.73%	0.00%
Total Trips Generated	2	0	0	0	0	6	0	35	0	6	37	0
Total PM Peak Hour BUILD Volumes	186	61	360	132	76	169	510	1,707	154	154	957	50

Number of Commercial Trips Generated	Entering	Exiting	A.M.	100% Commercial Development
	31	22		
	115	120	P.M.	

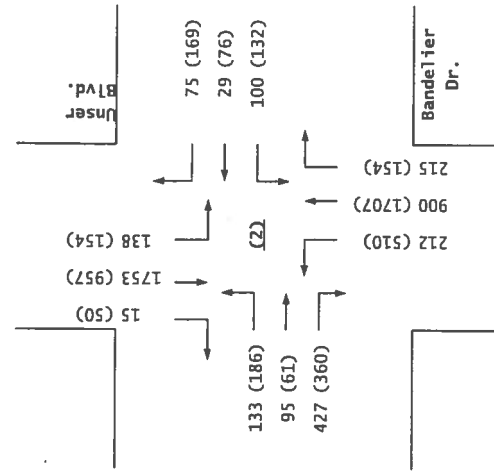
2010
NO BUILD



Trips



2010
BUILD



Bandelier Dr. / Unser Blvd.

McMahon / Unser Commercial Development (SE Corner)

Projected Turning Movements Worksheet

McMahon Blvd. / Finland Dr.**INTERSECTION :**E-W Street: **McMahon Blvd.** (5)N-S Street: **Finland Dr.**

Year of Existing Counts

2006

Implementation Year

2010

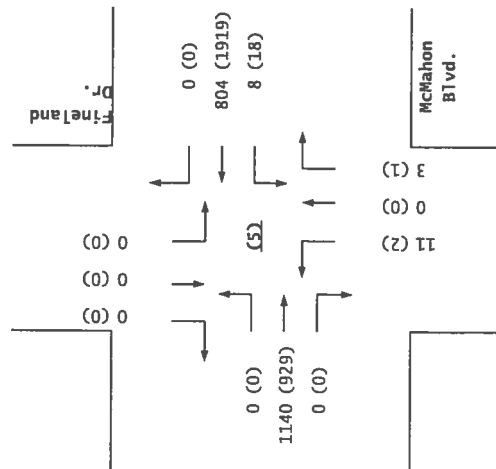
Growth Rates

	12.60%			12.60%			3.00%			3.00%		
	Eastbound (McMahon Blvd.)			Westbound (McMahon Blvd.)			Northbound (Finland Dr.)			Southbound (Finland Dr.)		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Existing Volumes	0	658	0	5	403	0	10	0	3	0	0	0
Background Traffic Growth	0	332	0	3	203	0	1	0	0	0	0	0
Subtotal	0	990	0	8	606	0	11	0	3	0	0	0
Trips from Other Developments	0	100	0	0	149	0	0	0	0	0	0	0
Night Whisper Trips	0	50	0	0	49	0	0	0	0	0	0	0
Subtotal (NO BUILD - A.M.)	0	1,140	0	8	804	0	11	0	3	0	0	0
Percent Commercial Trips Generated(Entering)	0.00%	0.00%	1.00%	23.06%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Percent Commercial Trips Generated(Exiting)	0.00%	23.06%	0.00%	0.00%	0.00%	0.00%	44.72%	0.00%	20.00%	0.00%	0.00%	0.00%
Total AM Peak Hour BUILD Volumes	0	1,140	0	8	804	0	11	0	3	0	0	0

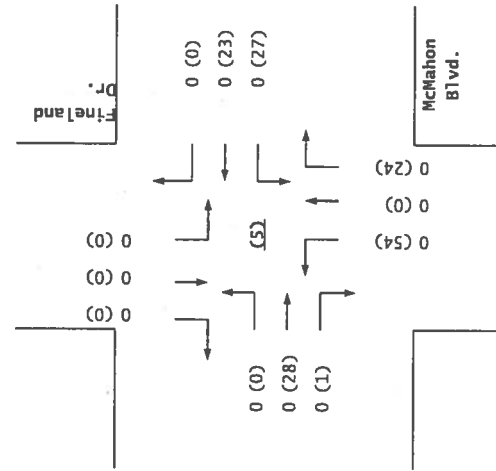
	Eastbound (McMahon Blvd.)			Westbound (McMahon Blvd.)			Northbound (Finland Dr.)			Southbound (Finland Dr.)		
	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Existing Volumes	0	479	0	12	1,125	0	2	0	1	0	0	0
Background Traffic Growth	0	241	0	6	567	0	0	0	0	0	0	0
Subtotal	0	720	0	18	1,692	0	2	0	1	0	0	0
Trips from Other Developments	0	162	0	0	177	0	0	0	0	0	0	0
Night Whisper Trips	0	47	0	0	50	0	0	0	0	0	0	0
Subtotal (NO BUILD - P.M.)	0	929	0	18	1,919	0	2	0	1	0	0	0
Percent Commercial Trips Generated(Entering)	0.00%	0.00%	1.00%	23.06%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Percent Commercial Trips Generated(Exiting)	0.00%	23.06%	0.00%	0.00%	0.00%	0.00%	44.72%	0.00%	20.00%	0.00%	0.00%	0.00%
Total Trips Generated	0	28	1	27	23	0	54	0	24	0	0	0
Total PM Peak Hour BUILD Volumes	0	957	1	45	1,942	0	56	0	25	0	0	0

Number of Commercial Trips Generated	Entering	Exiting	A.M.	100% Commercial Development
	31	22		
	115	120	P.M.	

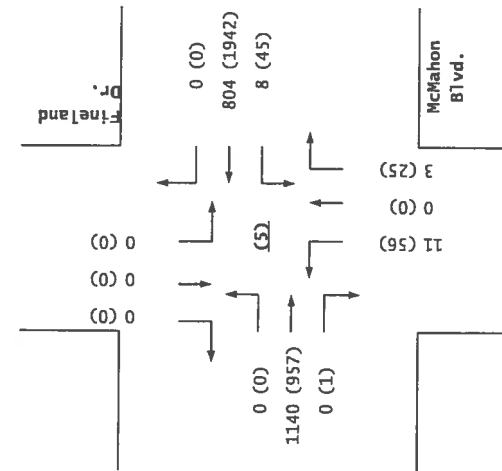
2010
NO BUILD



Trips

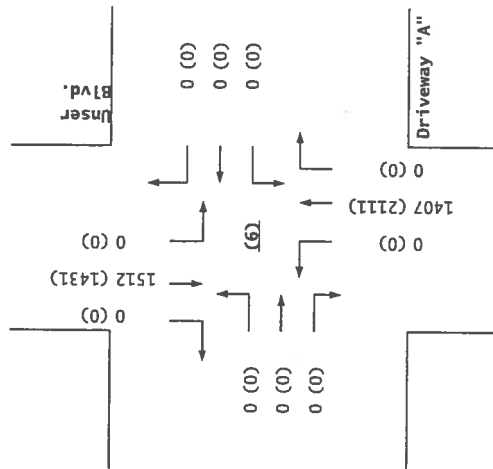


2010
BUILD

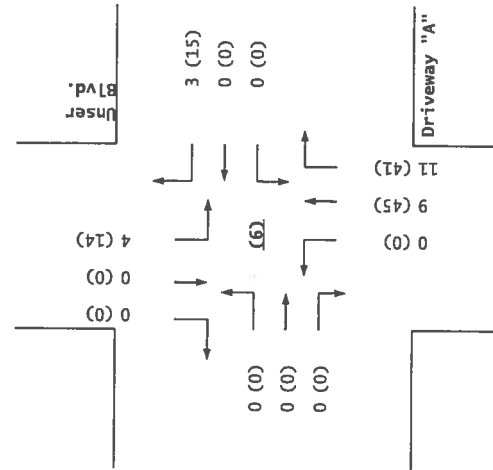


McMahon Blvd. / Fineland Dr.

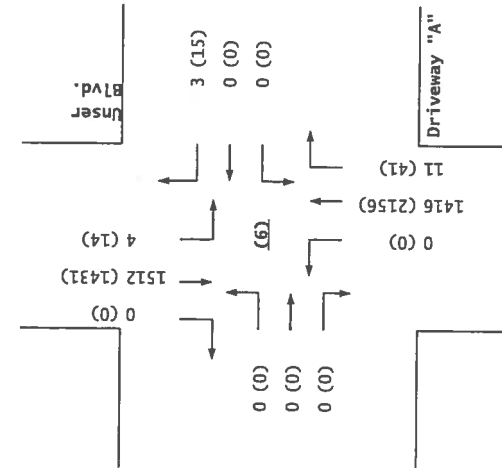
2010
NO BUILD



Trips



2010
BUILD



Driveway "A" / Unser Blvd.

McMahon / Unser Commercial Development (SE Corner)

Projected Turning Movements Worksheet

McMahon Blvd. / Driveway "B"**INTERSECTION :**

E-W Street: McMahon Blvd. (7)

N-S Street: Driveway "B"

Year of Existing Counts

2020

Implementation Year

2010

Growth Rates

6.65%

-0.80%

3.00%

3.00%

Subtotal (NO BUILD - A.M.)

Percent Commercial Trips Generated(Entering)

Percent Commercial Trips Generated(Exiting)

Total Trips Generated

Total AM Peak Hour BUILD Volumes

Eastbound (McMahon Blvd.)			Westbound (McMahon Blvd.)			Northbound (Driveway "B")			Southbound (Driveway "B")		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
0	483	0	0	425	0	0	0	0	0	0	0
0.00%	1.00%	8.26%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
0.00%	10.00%	0.00%	0.00%	31.72%	0.00%	0.00%	0.00%	13.06%	0.00%	0.00%	0.00%
0	2	3	6	7	0	0	0	3	0	0	0
0	485	3	6	432	0	0	0	3	0	0	0

Subtotal (NO BUILD - P.M.)

Percent Commercial Trips Generated(Entering)

Percent Commercial Trips Generated(Exiting)

Total Trips Generated

Total PM Peak Hour BUILD Volumes

Eastbound (McMahon Blvd.)			Westbound (McMahon Blvd.)			Northbound (Driveway "B")			Southbound (Driveway "B")		
Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
0	423	0	0	842	0	0	0	0	0	0	0
0.00%	1.00%	8.26%	20.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
0.00%	10.00%	0.00%	0.00%	31.72%	0.00%	0.00%	0.00%	13.06%	0.00%	0.00%	0.00%
0	13	9	23	38	0	0	0	16	0	0	0
0	436	9	23	880	0	0	0	16	0	0	0

Number of Commercial Trips Generated

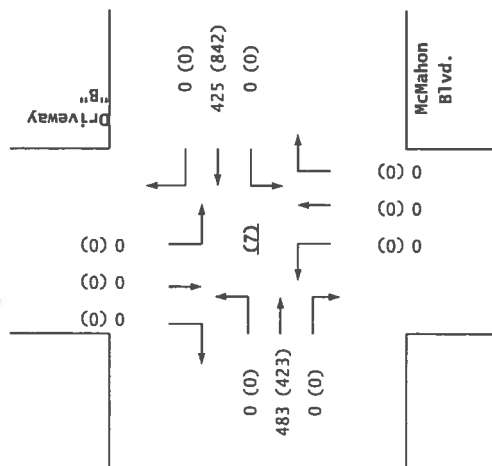
Entering Exiting

31 22 A.M.

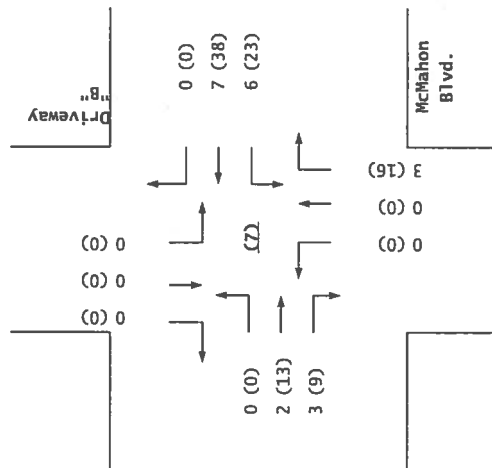
115 120 P.M.

100% Commercial Development

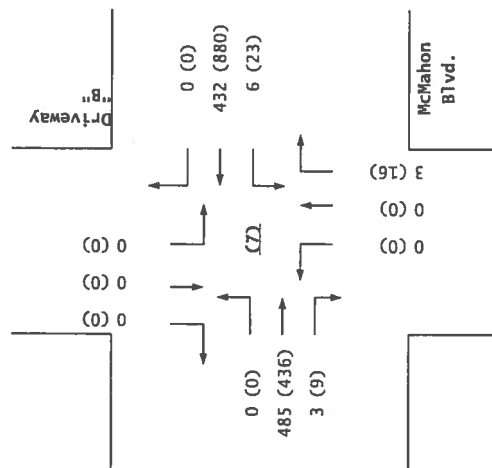
2010
NO BUILD



Trips



2010
BUILD



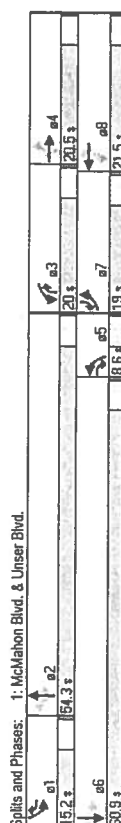
McMahon Blvd. / Driveway "B"

Timings
1: McMahon Blvd. & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	210	191	48	213	115	107	54	1214	144	153	1263	121
Turn Type	pm+pt	pm+pt	pm+ov	pm+pt	pm+ov	pm+pt	pm+ov	pm+pt	pm+ov	pm+pt	pm+ov	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases	4	4	4	8	8	2	2	2	6	6	6	6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase												
Minimum Initial (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
Minimum Split (s)	8.5	20.5	8.5	8.5	20.5	8.5	8.5	20.5	8.5	8.5	20.5	8.5
Total Split (s)	19.0	20.5	8.6	20.0	21.5	15.2	8.6	54.3	20.0	15.2	60.9	19.0
Total Split (%)	17.3%	18.5%	7.8%	18.2%	19.5%	13.8%	7.8%	49.4%	18.2%	13.8%	55.4%	17.3%
Yellow 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
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
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
Lead/Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min
Act Eff Green (s)	27.5	12.4	19.4	28.1	12.8	54.8	54.8	74.2	59.2	59.2	74.3	19.0
Actuated g/C Ratio	0.25	0.11	0.18	0.26	0.12	0.26	0.50	0.50	0.67	0.54	0.54	0.68
v/c Ratio	0.61	0.54	0.17	0.68	0.31	0.25	0.28	0.77	0.14	0.69	0.74	0.12
Control Delay	39.2	50.7	7.5	42.2	45.8	11.0	24.9	24.1	0.8	35.4	23.1	0.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	39.2	50.7	7.5	42.2	45.8	11.0	24.9	24.1	0.8	35.4	23.1	0.9
LOS	D	D	A	D	B	C	C	A	D	D	C	A
Approach Delay												
Approach LOS												

Intersection Summary												
Cycle Length: 110												
Offset: 13 (12%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green												
Natural Cycle: 80												
Control Type: Actuated-Coordinated												
Maximum v/c Ratio: 0.77												
Intersection Signal Delay: 25.9												
Intersection Capacity Utilization: 72.4%												
Analysis Period (min): 15												



McMahon / Unser Commercial Development (SE Corner)
2010 AM Peak Hr BUILD Cond - BASE CASE
D:\AT08\PROJECTS\McMahon_Unser_Update\Synchro2010_AM_BUILD.syn

HCM Signalized Intersection Capacity Analysis
1: McMahon Blvd. & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔	↔
Volume (vph)	210	191	48	213	115	107	54	1214	144	153	1263	121
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	1.00	0.95	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flt Protected	1.00	1.00	0.85	1.00	0.95	1.00	0.85	1.00	0.85	1.00	1.00	0.85
Satd. Flow (prot)	1782	3505	1568	1752	3505	1568	1752	3505	1568	1752	3505	1568
Flt Permitted	0.67	1.00	1.00	0.49	1.00	1.00	0.13	1.00	1.00	0.08	1.00	1.00
Satd. Flow (perm)	1237	3505	1568	897	3505	1568	234	3505	1568	155	3505	1568
Peak-hour factor, PHF	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	233	212	53	237	128	119	60	1348	160	170	1403	134
RTOR Reduction (vph)	0	0	44	0	0	71	0	0	58	0	0	44
Lane Group Flow (vph)	233	212	9	237	128	48	60	1349	102	170	1403	90
Turn Type	pm+pt	pm+pt	pm+ov	pm+pt	pm+ov	pm+pt	pm+ov	pm+pt	pm+ov	pm+pt	pm+ov	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases	4	4	4	8	8	2	2	2	6	6	6	6
Actuated Green, G (s)	26.6	12.0	18.5	27.2	12.3	23.2	54.2	54.2	69.1	58.6	58.6	73.2
Effective Green, g (s)	27.6	12.5	19.5	28.2	12.8	24.2	54.7	54.7	70.1	59.1	59.1	74.2
Actuated g/C Ratio	0.25	0.11	0.18	0.26	0.12	0.22	0.50	0.50	0.64	0.54	0.54	0.67
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
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)	381	398	278	350	408	402	213	1743	1056	249	1883	1058
v/s Ratio Prot	0.08	0.06	0.00	0.00	0.04	0.01	0.02	0.38	0.01	0.07	0.40	0.01
v/s Ratio Perm	0.07	0.00	0.00	0.00	0.00	0.02	0.12	0.12	0.05	0.30	0.05	0.05
v/s Ratio	0.61	0.53	0.03	0.68	0.31	0.12	0.28	0.77	0.10	0.68	0.75	0.09
Uniform Delay, d1	35.6	46.0	37.5	35.2	44.6	34.4	27.8	22.6	7.7	23.3	19.6	6.2
Progression Delay, d2	1.00	1.00	1.00	1.00	1.00	1.00	0.86	0.87	0.41	1.00	1.00	1.00
Incremental Delay, d2	2.9	1.4	0.0	5.1	0.4	0.1	0.7	3.1	0.0	7.5	2.7	0.0
Delay (s)	38.5	47.4	37.5	40.3	45.0	34.5	24.7	22.8	32	30.8	22.4	6.2
Level of Service	D	D	D	D	D	C	C	C	A	C	C	A
Approach Delay (s)												
Approach LOS												

Intersection Summary												
HCM Average Control Delay	26.0											
HCM Volume to Capacity ratio	0.73											
Actuated Cycle Length (s)	110.0											
Intersection Capacity Utilization	72.4%											
Analysis Period (min)	15											
g Critical Lane Group												

McMahon / Unser Commercial Development (SE Corner)
2010 AM Peak Hr BUILD Cond - BASE CASE
D:\AT08\PROJECTS\McMahon_Unser_Update\Synchro2010_AM_BUILD.syn

Movement	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	132	95	100	29	73	212	890	137
Volume (vph)	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Turn Type	4	4	8	8	8	2	2	6
Protected Phases	4	4	8	8	8	2	2	6
Permitted Phases	4	4	8	8	8	2	2	6
Detector Phases	4	4	8	8	8	2	2	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Total Split (s)	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
Total Split (%)	38.9%	38.9%	38.9%	38.9%	38.9%	38.9%	38.9%	38.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag								
Lead-Lag Optimize?								
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min
Act Effct Green (s)	31.0	31.0	31.0	31.0	31.0	51.0	51.0	51.0
Actuated Cycle Length: 90	0.34	0.34	0.34	0.34	0.34	0.57	0.57	0.57
v/c Ratio	0.35	1.14	1.70	0.06	0.17	3.27	0.72	1.45
Control Delay	26.6	115.4	385.0	20.2	8.2	1066.0	16.2	257.9
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	26.6	115.4	385.0	20.2	8.2	1066.0	16.2	257.9
LOS	C	F	F	C	A	F	B	F
Approach Delay	97.4	F	196.9	F	F	185.0	F	57.0
Approach LOS	F	F	F	F	F	F	F	E

Intersection Summary
Cycle Length: 90
Actuated Cycle Length: 90
Offset: 88 (88%), Referenced to phase 2:NETL and 6:SBTL, Start of Green
Natural Cycle: 55
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 3.27
Intersection Signal Delay: 114.5
Intersection Capacity Utilization 110.7%
Analysis Period (min) 15



Movement	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt. Protected	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt. Flow (prot)	1752	1618	1752	1845	1568	1752	3403	1752
Satd. Flow (prot)	1752	1618	1752	1845	1568	1752	3403	1752
Flt. Permitted	0.73	1.00	0.13	1.00	1.00	0.08	1.00	1.00
Satd. Flow (perm)	1348	1618	238	1845	1568	145	3403	195
Volume (vph)	132	95	427	100	29	73	212	890
Peak-hour factor, PHF	0.81	0.81	0.81	0.72	0.72	0.79	0.79	0.86
Adj. Flow (vph)	163	117	527	139	40	101	268	1127
RTOR Reduction (vph)	0	5	0	0	0	0	23	0
Lane Group Flow (vph)	163	639	0	139	40	51	268	1376
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	8	8	2	2	6	6
Permitted Phases	4	4	8	8	2	2	6	6
Actuated Green, G (s)	30.5	30.5	30.5	30.5	30.5	50.5	50.5	50.5
Effective Green, g (s)	31.0	31.0	31.0	31.0	31.0	51.0	51.0	51.0
Actuated g/C Ratio	0.34	0.34	0.34	0.34	0.34	0.57	0.57	0.57
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grip Cap (vph)	464	557	82	636	540	82	1928	111
v/s Ratio Prot	0.12	0.39	0.02	0.02	0.02	0.40	0.40	0.58
v/c Ratio Perm	0.35	1.15	1.70	0.06	0.09	3.27	0.71	1.43
Uniform Delay, d1	22.0	29.5	29.5	19.8	20.0	19.5	14.2	19.5
Progression Factor	1.08	1.08	1.00	1.00	1.00	1.00	1.00	0.61
Incremental Delay, d2	0.5	85.5	359.4	0.0	0.1	1051.4	2.3	231.9
Delay (s)	24.3	117.3	388.9	19.8	20.1	1070.9	16.5	243.4
Level of Service	C	F	F	B	C	F	B	D
Approach Delay (s)	98.5	F	203.1	F	F	186.0	F	53.8
Approach LOS	F	F	F	F	F	F	F	D

Intersection Summary	113.9	HCM Level of Service	F
HC-M Average Control Delay	2.67	Sum of lost time (s)	8.0
	90.0	ICU Level of Service	H
	110.7%		
	15		

Synchro 6 HCM Report from 11/26/2008 Traffic Impact Study for McMahon / Unser Commercial Development (Southeast Corner)

Timings
2: Bandler Dr. & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	133	95	100	29	75	212	900	138
Volume (vph)	133	95	100	29	75	212	900	138
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	8	8	8	2	2	6
Permitted Phases	4	4	8	8	8	2	2	6
Detector Phase	4	4	8	8	8	2	2	6
Switch Phase	4	4	8	8	8	2	2	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Total Split (s)	43.0	43.0	43.0	43.0	43.0	67.0	67.0	67.0
Total Split (%)	39.1%	39.1%	39.1%	39.1%	39.1%	60.9%	60.9%	60.9%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead-Lag Optimize?								
Recall Mode	Min	Min	Min	Min	Min	C-Min	C-Min	C-Min
Act Eff Green (s)	39.0	39.0	39.0	39.0	39.0	63.0	63.0	63.0
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.35	0.57	0.57	0.57
g/C Ratio	0.34	1.11	2.07	0.06	0.17	4.06	0.72	1.48
Control Delay	28.7	106.2	554.1	23.9	9.3	1425.1	19.0	276.2
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	28.7	106.2	554.1	23.9	9.3	1425.1	19.0	276.2
LOS	C	F	F	C	A	F	B	F
Approach Delay	90.5	F	F	F	F	243.5	F	59.5
Approach LOS	F	F	F	F	F	F	F	E
Intersection Summary								
Cycle Length: 110								
Actuated Cycle Length: 110								
Offset: 108 (98%), Referenced to phase 2:NBTL and 6:SBTL Start of Green								
Natural Cycle: 55								
Control Type: Actuated-Coordinated								
Maximum v/c Ratio: 4.06								
Intersection Signal Delay: 139.0								
Intersection Capacity Utilization 110.9%								
Analysis Period (min) 15								
Splits and Phases: 2: Bandler Dr. & Unser Blvd.								
	67 s	67 s	67 s	67 s	67 s	67 s	67 s	67 s
	67 s	67 s	67 s	67 s	67 s	67 s	67 s	67 s

McMahon / Unser Commercial Development (SE Corner)
2010 AM Peak Hr BUILD Cond - BASE CASE
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HCM Signalized Intersection Capacity Analysis
2: Bandler Dr. & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBT
Lane Configurations	133	95	427	100	29	75	212	900	215	138	1753	15
Volume (vph)	133	95	427	100	29	75	212	900	215	138	1753	15
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.88	1.00	1.00	1.00	0.85	1.00	0.97	1.00	1.00	1.00	1.00
Flt Protected	0.95	1.00	0.95	1.00	1.00	0.95	1.00	0.95	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	1618	1752	1845	1568	1752	3404	1752	3404	1752	3501	3501
Flt Permitted	0.73	1.00	0.73	1.00	1.00	0.06	1.00	0.10	1.00	0.10	1.00	1.00
Satd. Flow (perm)	1348	1618	1348	1845	1568	117	3404	189	3501	189	3501	3501
Peak-hour factor, PHF	0.81	0.81	0.81	0.72	0.72	0.72	0.79	0.79	0.79	0.86	0.86	0.86
Adj. Flow (vph)	164	117	527	139	40	104	268	1139	272	160	2038	17
RTOR Reduction (vph)	0	0	0	0	0	50	0	19	0	0	0	0
Lane Group Flow (vph)	164	639	0	139	40	54	268	1392	0	160	2055	0
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	4	8	8	8	2	2	2	6	6	6
Permitted Phases	4	4	4	8	8	8	2	2	2	6	6	6
Actual Green, G (s)	38.5	38.5	38.5	38.5	38.5	38.5	62.5	62.5	62.5	62.5	62.5	62.5
Effective Green, g (s)	39.0	39.0	39.0	39.0	39.0	39.0	63.0	63.0	63.0	63.0	63.0	63.0
Actuated g/C Ratio	0.35	0.35	0.35	0.35	0.35	0.35	0.57	0.57	0.57	0.57	0.57	0.57
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
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)	478	574	67	654	556	67	1950	108	2055	108	2055	2055
v/c Ratio Prot	0.12	0.39	0.03	0.07	0.02	0.03	0.29	0.03	0.08	0.08	0.08	0.08
v/c Ratio Perm	0.34	1.11	2.07	0.06	0.10	0.10	0.71	0.71	0.71	0.71	0.71	0.71
Uniform Delay, d1	26.1	35.5	35.5	23.4	23.7	23.5	17.0	17.0	23.5	23.5	23.5	23.5
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	72.5	530.8	0.0	0.1	1384.9	2.3	2.3	254.7	25.4	25.4	25.4
Delay (s)	26.5	108.0	566.3	23.5	23.8	23.8	19.3	19.3	270.3	41.1	41.1	41.1
Level of Service	C	F	F	C	C	C	B	B	F	F	F	F
Approach Delay (s)	91.5	F	F	290.2	F	F	241.0	F	57.7	57.7	57.7	57.7
Approach LOS	F	F	F	F	F	F	F	F	F	F	F	F
Intersection Summary												
HCM Average Control Delay	138.1											F
HCM Volume to Capacity ratio	3.26											F
Actuated Cycle Length (s)	110.0											8.0
Intersection Capacity Utilization	110.9%											H
Analysis Period (min)	15											
g : Critical Lane Group												

McMahon / Unser Commercial Development (SE Corner)
2010 AM Peak Hr BUILD Cond - BASE CASE
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Timings
2: Bandler Dr. & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	133	95	100	29	75	212	138	1753
Volume (vph)	Perm	4	8	8	8	2	6	6
Turn Type	Perm	4	8	8	8	2	6	6
Protected Phases	4	4	3	8	8	5	2	6
Permitted Phases	4	4	3	8	8	5	2	6
Detector Phase	4	4	3	8	8	5	2	6
Switch Phase	4	4	3	8	8	5	2	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Spk (s)	20.5	20.5	8.5	20.5	8.5	20.5	20.5	20.5
Total Spk (s)	31.0	31.0	8.5	39.5	13.0	70.5	57.5	57.5
Total Split (%)	28.2%	28.2%	7.7%	35.9%	11.8%	64.1%	52.3%	52.3%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lag	Lag	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Min	Min	None	Min	None	C-Min	C-Min	C-Min
Act Effct Green (s)	27.0	27.0	35.5	35.5	35.5	66.5	53.5	53.5
Act Effct Green (s)	0.25	0.25	0.32	0.32	0.32	0.60	0.49	0.49
Act Effct Green (s)	0.50	0.50	1.26	1.00	0.07	1.27	0.68	1.26
Control Delay	41.7	160.6	111.0	26.3	8.4	179.8	161	166.7
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	41.7	160.6	111.0	26.3	8.4	179.8	161	166.7
LOS	D	F	F	C	A	F	B	F
Approach Delay	136.4	F	61.3	E		42.2	D	127.2
Approach LOS	F							F
Intersection Summary								
Cycle Length: 110								
Offset: 0 (0%), Referenced to phase 2:NBT, Start of Green								
Natural Cycle: 130								
Control Type: Actuated-Coordinated								
Maximum v/c Ratio: 1.27								
Intersection Signal Delay: 96.4								
Intersection Capacity Utilization 110.9%								
Analysis Period (min) 15								
Spills and Phases: 2: Bandler Dr. & Unser Blvd.								
a2	70.5 s					a3	131 s	a4
a5	13 s					a6	39.5 s	

McMahon / Unser Commercial Development (SE Corner)
2010 AM Peak Hr BUILD Cond - MITIGATED
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HCM Signalized Intersection Capacity Analysis
2: Bandler Dr. & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	133	95	427	100	29	75	212	138	1753	15		
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Flt Protected	1752	1618	1752	1618	1752	1618	1752	1618	1752	1618	1752	1618
Satd. Flow (vph)	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73	0.73
Flt Permitted	1348	1618	1348	1618	1348	1618	1348	1618	1348	1618	1348	1618
Satd. Flow (vph)	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Peak-hour factor, PHF	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81	0.81
Adj. Flow (vph)	164	117	527	139	40	104	268	172	160	2038	17	
RTOR Reduction (vph)	0	114	0	0	0	60	0	19	0	0	1	
Lane Group Flow (vph)	164	630	0	139	40	44	268	1392	0	160	2054	0
Turn Type	Perm	4	Perm	3	8	Perm	5	2	Perm	6		
Protected Phases	4	4	Perm	3	8	Perm	5	2	Perm	6		
Permitted Phases	4	4	Perm	3	8	Perm	5	2	Perm	6		
Actuated Green, G (s)	26.5	26.5	35.0	35.0	35.0	35.0	66.0	66.0	35.0	53.0		
Effective Green, g (s)	27.0	27.0	35.5	35.5	35.5	35.5	66.5	66.5	35.5	53.5		
Actuated g/C Ratio	0.25	0.25	0.32	0.32	0.32	0.32	0.60	0.60	0.32	0.49		
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		
Lane Grp Cap (vph)	331	397	139	595	506	210	2058	127	1703			
v/c Ratio Pct	0.12	0.12	0.04	0.02	0.02	0.02	0.10	0.41	0.09	0.59		
v/c Ratio	0.50	1.34	0.28	0.07	0.07	0.07	0.68	1.26	0.28	1.21		
Uniform Delay, d1	35.6	41.5	36.9	25.8	25.8	25.8	34.5	14.6	28.2	28.2		
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.82		
Incremental Delay, d2	1.2	157.1	76.3	0.0	0.1	155.9	1.8	180.6	98.0	121.3		
Delay (s)	36.8	208.6	113.2	25.8	26.0	190.4	36.3	182.4	129.3	149.3		
Level of Service	D	F	F	C	C	C	F	B	F	F		
Approach Delay (s)	173.8	F	68.8	E			44.1	D	125.8	F		
Approach LOS	F											
Intersection Summary												
HCM Average Control Delay	102.8									F		
HCM Volume to Capacity ratio	1.26											
Actuated Cycle Length (s)	110.0									12.0		
Intersection Capacity Utilization	110.9%									H		
Analysis Period (min)	15											
c Critical Lane Group												

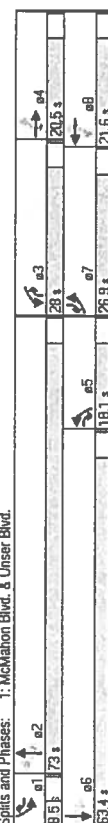
McMahon / Unser Commercial Development (SE Corner)
2010 AM Peak Hr BUILD Cond - MITIGATED
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Timings
1: McMahon Blvd. & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	304	216	51	454	270	172	149	1853	134	96	983	199
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Turn Type	pm+pt	pm+pt	pm+ov	pm+pt	pm+ov	pm+ov	pm+pt	pm+ov	pm+pt	pm+ov	pm+pt	pm+ov
Permitted Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases	4	4	4	8	8	2	2	2	6	6	6	6
Detector Phase	7	4	5	3	8	1	5	2	3	1	6	7
Switch Phase	7	4	5	3	8	1	5	2	3	1	6	7
Minimum Initial (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
Minimum Split (s)	8.5	20.5	8.5	20.5	8.5	8.5	20.5	8.5	20.5	8.5	20.5	8.5
Total Split (s)	26.9	20.5	18.1	28.0	21.6	8.5	18.1	73.0	28.0	8.5	63.4	26.9
Total Split (%)	20.7%	15.8%	13.9%	21.5%	16.6%	6.5%	13.9%	56.2%	21.5%	6.5%	48.8%	20.7%
Yellow 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
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
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
Lead/Lag	Lead	Lag	Lag	Lead	Lead	Lag	Lag	Lead	Lag	Lead	Lead	Lead
Lead/Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min	Min
Act Elct Green (s)	37.1	14.7	39.4	40.3	16.3	26.6	69.0	69.0	97.0	50.6	50.6	73.0
Actuated g/C Ratio	0.29	0.11	0.30	0.31	0.13	0.20	0.53	0.75	0.39	0.39	0.58	0.58
Vehicle Delay	0.90	0.60	0.11	1.21	0.68	0.54	0.40	1.11	0.12	0.76	0.80	0.23
Control Delay	63.8	61.4	5.8	148.4	62.6	42.0	31.1	78.8	1.1	61.5	39.9	2.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	63.8	61.4	5.8	148.4	62.6	42.0	31.1	78.8	1.1	61.5	39.9	2.3
LOS	E	E	A	F	E	D	C	E	A	E	D	A
Approach Delay	57.8											
Approach LOS	E											
Intersection Summary												
Cycle Length: 130												
Actuated Cycle Length: 130												
Offset: 22 (17%), Referenced to phase 2NBT, Start of Green												
Natural Cycle: 150												
Control Type: Actuated-Coordinated												
Maximum Vc Ratio: 1.21												
Intersection Signal Delay: 65.6												
Intersection Capacity Utilization: 101.0%												
Analysis Period (min): 15												

Spits and Phases: 1: McMahon Blvd. & Unser Blvd.



HCM Signalized Intersection Capacity Analysis
1: McMahon Blvd. & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	304	216	51	454	270	172	149	1853	134	96	983	199
Volume (vph)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
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	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Flt Protected	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00	0.95	1.00
Satd Flow (prot)	1752	3505	1568	1752	3505	1568	1752	3505	1568	1752	3505	1568
Flt Permitted	0.36	1.00	1.00	0.37	1.00	1.00	0.13	1.00	1.00	0.09	1.00	1.00
Satd Flow (perm)	669	3505	1568	682	3505	1568	233	3505	1568	167	3505	1568
Peak-hour factor, PHF	0.90	0.90	0.90	0.92	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Adj. Flow (vph)	338	240	57	493	300	191	166	2059	149	107	1092	221
RTOR Reduction (vph)	0	0	36	0	0	36	0	0	30	0	0	72
Lane Group Flow (vph)	338	240	21	493	300	155	166	2059	119	107	1092	149
Turn Type	pm+pt	pm+pt	pm+ov	pm+pt	pm+ov	pm+ov	pm+pt	pm+ov	pm+pt	pm+ov	pm+pt	pm+ov
Protected Phases	7	4	5	3	8	1	5	2	3	1	6	7
Permitted Phases	4	4	4	8	8	2	2	2	6	6	6	6
Actuated Green, G (s)	36.1	14.2	38.4	39.3	15.8	21.6	68.5	68.5	92.0	50.1	50.1	72.0
Effective Green, g (s)	37.1	14.7	39.4	40.3	16.3	22.6	69.0	69.0	93.0	50.6	50.6	73.0
Actuated g/C Ratio	0.29	0.11	0.30	0.31	0.13	0.17	0.53	0.72	0.39	0.39	0.58	0.58
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
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 Cap Cap (vph)	378	395	475	409	439	321	412	1860	1170	142	1364	880
v/s Ratio Prot	0.15	0.07	0.01	e0.22	0.09	0.02	0.08	e0.59	0.02	0.04	e0.31	0.03
v/s Ratio Perm	0.10	0.01	0.01	e0.15	0.08	0.08	0.14	0.06	0.06	0.26	0.07	0.07
Uniform Delay, d1	41.3	54.9	32.0	41.6	54.4	48.4	34.8	30.5	5.7	32.5	35.2	13.8
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	0.82	0.77	0.53	1.00	1.00	1.00
Incremental Delay, d2	22.5	2.6	0.0	113.5	4.4	1.2	0.5	94.3	0.0	20.0	5.0	0.1
Delay (s)	63.8	57.5	32.0	155.0	58.7	49.6	28.1	77.7	3.6	52.5	40.2	13.9
Level of Service	E	E	C	F	E	D	C	E	A	D	D	B
Approach Delay (s)	58.6											
Approach LOS	E											
Intersection Summary												
HCM Average Control Delay	66.3											
HCM Volume to Capacity ratio	1.15											
Actuated Cycle Length (s)	130.0											
Intersection Capacity Utilization	101.0%											
Analysis Period (min)	15											
g Critical Lane Group												

McMahon / Unser Commercial Development (SE Corner)
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McMahon / Unser Commercial Development (SE Corner)
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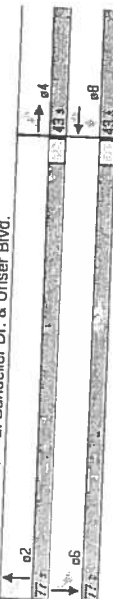
Timings

2: Bandler Dr. & Unser Blvd.

Terry O. Brown, P.E.
10/31/2006

Lane Group	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBT	SBT
Lane Configurations	184	61	132	76	163	510	1672	148	920
Volume (vph)	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Turn Type	4	4	8	8	8	2	2	6	6
Protected Phases	4	4	8	8	8	2	2	6	6
Permitted Phases	4	4	8	8	8	2	2	6	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5	20.5
Total Split (s)	43.0	43.0	43.0	43.0	43.0	77.0	77.0	77.0	77.0
Total Split (%)	35.8%	35.8%	35.8%	35.8%	35.8%	64.2%	64.2%	64.2%	64.2%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lead/Lag									
Lead-Lag Optimize?									
Recall Mode									
Act Eff Green (s)	39.0	39.0	39.0	39.0	39.0	73.0	73.0	73.0	73.0
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32	0.61	0.61	0.61	0.61
v/c Ratio	0.46	0.74	1.08	0.13	0.32	2.40	0.92	2.69	0.51
Control Delay	32.8	30.9	143.8	29.4	28.7	663.2	29.5	806.2	14.8
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	32.8	30.9	143.8	29.4	28.7	663.2	29.5	806.2	14.8
LOS	C	C	F	C	C	F	C	F	B
Approach Delay	31.5	69.8				167.9		119.3	F
Approach LOS	C	E				F		F	F
Intersection Summary									
Cycle Length: 120									
Actuated Cycle Length: 120									
Offset: 4 (3%), Referenced to phase 2:NBT and 6:SBTL, Start of Green									
Natural Cycle: 70									
Control Type: Actuated-Coordinated									
Maximum v/c Ratio: 2.69									
Intersection Signal Delay: 128.9									
Intersection Capacity Utilization 105.4%									
Analysis Period (min) 15									

Splits and Phases: 2: Bandler Dr. & Unser Blvd.



HCM Signalized Intersection Capacity Analysis

2: Bandler Dr. & Unser Blvd.

Terry O. Brown, P.E.
10/31/2006

Movement	EBL	EBT	WBL	WBT	WBR	NBL	NBT	SBT	SBT
Lane Configurations	1900	1900	1900	1900	1900	1900	1900	1900	1900
Ideal Flow (vphpl)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Total Lost time (s)	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lane Util. Factor	1.00	0.87	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Flt Protected	0.95	1.00	0.95	1.00	0.85	1.00	0.99	1.00	0.99
Satd. Flow (prot)	1752	1608	1752	1608	1568	1752	1608	1752	1608
Flt Permitted	0.71	1.00	0.71	1.00	0.71	1.00	0.71	1.00	0.71
Satd. Flow (perm)	1303	1608	1303	1608	1245	1568	1303	1608	1245
Volume (vph)	184	61	360	132	76	163	510	1672	148
Peak-hour factor, PHF	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Adj. Flow (vph)	196	65	383	135	78	166	543	1779	164
RTOR Reduction (vph)	0	80	0	0	0	14	0	6	0
Lane Group Flow (vph)	196	368	0	135	78	153	543	1937	0
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	8	8	8	2	2	6	6
Permitted Phases	4	4	8	8	8	2	2	6	6
Actuated Green, G (s)	38.5	38.5	38.5	38.5	38.5	72.5	72.5	72.5	72.5
Effective Green, g (s)	39.0	39.0	39.0	39.0	39.0	73.0	73.0	73.0	73.0
Actuated g/C Ratio	0.32	0.32	0.32	0.32	0.32	0.61	0.61	0.61	0.61
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	423	523	125	600	510	226	2105	61	2116
v/s Ratio Prot	0.15	0.23	0.04	0.10	0.10	0.56	0.31	0.31	0.31
v/c Ratio	0.46	0.70	0.04	0.13	0.13	0.24	0.92	0.92	0.92
Uniform Delay, d1	32.2	35.5	40.5	28.5	30.3	23.5	20.9	23.5	13.3
Progression Factor	0.89	0.85	1.00	1.00	1.00	1.00	1.00	1.16	1.07
Incremental Delay, d2	0.8	4.3	103.6	0.1	0.3	644.6	8.1	788.5	0.6
Delay (s)	29.3	34.5	144.1	28.6	30.6	668.1	29.0	815.8	14.7
Level of Service	C	C	F	C	C	F	C	F	B
Approach Delay (s)	32.9			70.6		168.6		120.5	
Approach LOS	C			E		F		F	
Intersection Summary									
HCM Average Control Delay	129.8	2.12							
HCM Level of Service	F								
Sum of lost time (s)	120.0								
ICU Level of Service	105.4%								
	15								

Synchro 6 HCM Report from 11/26/2008 Traffic Impact Study for McMahon / Unser Commercial Development (Southeast Corner)

McMahon / Unser Commercial Development (SE Corner) 2010 PM Peak Hr NO BUILD Cond - BASE CASE
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McMahon / Unser Commercial Development (SE Corner) 2010 PM Peak Hr NO BUILD Cond - BASE CASE
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Terry O. Brown, P.E.
9/15/2009 - Synchro 7

	a2	a4
	a6	a8
	a10	a12
	a14	a16
	a18	a20
	a22	a24
	a26	a28
	a30	a32
	a34	a36
	a38	a40
	a42	a44
	a46	a48
	a50	a52
	a54	a56
	a58	a60
	a62	a64
	a66	a68
	a70	a72
	a74	a76
	a78	a80
	a82	a84
	a86	a88
	a90	a92
	a94	a96
	a98	a100

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Terry O. Brown, P.E.
9/15/2009 - Synchro 7

2010 PM Peak Hr BUILD Cond - BASE CASE
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Timings
2: Bandler Dr. & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

Lane Group	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	186	61	132	76	169	510	1707	154
Volume (vph)	186	61	132	76	169	510	1707	154
Turn Type	Perm	Perm	Perm	Perm	Perm	Perm	Perm	Perm
Protected Phases	4	4	3	8	8	2	2	6
Permitted Phases	4	4	3	8	8	2	2	6
Detector Phase	4	4	3	8	8	2	2	6
Switch Phase	4	4	3	8	8	2	2	6
Minimum Initial (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Minimum Split (s)	20.5	20.5	8.5	20.5	20.5	20.5	20.5	20.5
Total Split (s)	21.0	21.0	9.0	30.0	15.0	100.0	85.0	85.0
Total Split (%)	16.2%	16.2%	6.9%	23.1%	11.5%	76.9%	65.4%	65.4%
Yellow Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
All-Red Time (s)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lost Time Adjust (s)	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5	-0.5
Total Lost Time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0
Lead/Lag	Lead	Lead	Lead	Lead	Lead	Lag	Lag	Lag
Lead-Lag Optimizer?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	Min	Min	Min	Min	Min	C-Min	C-Min	C-Min
Act Effct Green (s)	17.0	17.0	26.0	26.0	96.0	96.0	81.0	81.0
Actuated g/C Ratio	0.13	0.13	0.20	0.20	0.74	0.74	0.62	0.62
v/c Ratio	1.21	1.20	1.09	0.21	0.50	1.47	2.14	0.52
Control Delay	186.7	140.0	158.5	45.3	40.7	244.3	129	553.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	186.7	140.0	158.5	45.3	40.7	244.3	129	553.3
LOS	F	F	F	D	D	F	F	A
Approach Delay	154.3	82.9	F	F	F	62.7	E	78.2
Approach LOS	F	F	F	F	F	E	E	E
Intersection Summary								
Cycle Length: 130								
Actuated Cycle Length: 130								
Offset: 0 (0%), Referenced to phase 2:NBLT and 6:SBTL, Start of Green								
Natural Cycle: 130								
Control Type: Actuated-Coordinated								
Maximum v/c Ratio: 2.14								
Intersection Signal Delay: 80.7								
Intersection Capacity Utilization 106.7%								
Analysis Period (min) 15								
Intersection LOS: F								
(ICU Level of Service G)								
Splits and Phases: 2: Bandler Dr. & Unser Blvd.								
	a3	a2	a4	a5	a6	a7	a8	a9
	100 s	100 s	21 s	100 s	100 s	100 s	100 s	100 s
	116 s	116 s	116 s	116 s	116 s	116 s	116 s	116 s

McMahon / Unser Commercial Development (SE Corner)
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2010 PM Peak Hr BUILD Cond - BASE CASE

HCM Signalized Intersection Capacity Analysis
2: Bandler Dr. & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

Movement	EBL	EBT	WBL	WBT	NBL	NBT	SBL	SBT
Lane Configurations	186	61	132	76	169	510	1707	154
Volume (vph)	186	61	132	76	169	510	1707	154
Ideal Flow (vphpl)	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
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Flt	1.00	0.87	1.00	1.00	1.00	0.95	1.00	0.95
Flt Protected	0.95	1.00	1.00	1.00	1.00	0.95	1.00	0.95
Satd. Flow (prot)	1752	1608	1752	1845	1568	1752	3461	1752
Flt Permitted	0.68	1.00	0.19	1.00	1.00	0.18	1.00	0.07
Satd. Flow (perm)	1248	1608	351	1845	1568	338	3461	129
Peak-hour factor, PHF	0.94	0.94	0.94	0.98	0.98	0.94	0.94	0.90
Adj. Flow (vph)	198	65	383	135	78	172	543	164
RTOR Reduction (vph)	0	163	0	0	32	0	5	0
Lane Group Flow (vph)	198	285	0	135	78	140	543	1975
Turn Type	Perm	4	pm-plt	3	8	pm-plt	5	2
Protected Phases	4	4	8	8	8	2	6	6
Permitted Phases	16.5	16.5	25.5	25.5	25.5	95.5	95.5	80.5
Effective Green, g (s)	17.0	17.0	26.0	26.0	26.0	96.0	96.0	81.0
Actuated g/C Ratio	0.13	0.13	0.20	0.20	0.20	0.74	0.74	0.62
Clearance Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Lane Grp Cap (vph)	163	210	124	389	314	389	2556	80
v/s Ratio Prot	0.16	0.18	0.04	0.04	0.04	0.12	0.57	0.32
v/s Ratio Perm	1.21	1.36	1.09	0.21	0.45	1.47	2.14	0.51
Uniform Delay, d1	56.5	56.5	59.4	43.4	45.7	17.5	10.4	24.5
Progression Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.82
Incremental Delay, d2	139.8	187.7	106.6	0.3	1.0	226.5	2.3	534.0
Delay (s)	196.3	244.2	166.1	43.7	46.7	244.0	12.7	554.2
Level of Service	F	F	F	D	D	F	B	A
Approach Delay (s)	229.5	F	87.9	F	F	62.5	E	78.3
Approach LOS	F	F	F	F	F	E	E	E
Intersection Summary								
HCM Average Control Delay	91.0							
HCM Volume to Capacity ratio	1.85							
Actuated Cycle Length (s)	130.0							
Sum of lost time (s)	12.0							
Intersection Capacity Utilization	106.7%							
Analysis Period (min)	15							
c Critical Lane Group								

McMahon / Unser Commercial Development (SE Corner)
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2010 PM Peak Hr BUILD Cond - BASE CASE

HCM Unsignalized Intersection Capacity Analysis
5: McMahon Blvd. & Fineland Dr.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

	→	↘	↙	←	↖	↗		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗		
Volume (veh/h)	930	10	81	1906	121	42		
Sign Control	Free			Free	Stop			
Grade	0%			0%	0%			
Peak Hour Factor	0.89	0.89	0.94	0.94	0.92	0.90		
Hourly flow rate (vph)	1045	11	86	2028	132	47		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	Raised		Raised					
Median storage veh	1		1					
Upstream signal (ft)	858							
pX, platoon unblocked			0.96		0.96	0.96		
vC, conflicting volume			1056		2231	522		
vC1, stage 1 conf vol					1045			
vC2, stage 2 conf vol					1186			
vCu, unblocked vol			979		2201	424		
tC, single (s)			4.2		6.9	7.0		
tC, 2 stage (s)					5.9			
tF (s)			2.2		3.5	3.3		
p0 queue free %			87		0	92		
cM capacity (veh/h)			668		131	554		
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	522	522	11	86	1014	1014	132	47
Volume Left	0	0	0	86	0	0	132	0
Volume Right	0	0	11	0	0	0	0	47
cSH	1700	1700	1700	668	1700	1700	131	554
Volume to Capacity	0.31	0.31	0.01	0.13	0.60	0.60	1.00	0.08
Queue Length 95th (ft)	0	0	0	11	0	0	176	7
Control Delay (s)	0.0	0.0	0.0	11.2	0.0	0.0	143.9	12.1
Lane LOS				B			F	B
Approach Delay (s)	0.0			0.5			109.4	
Approach LOS							F	
Intersection Summary								
Average Delay			6.1					
Intersection Capacity Utilization			66.1%	ICU Level of Service		C		
Analysis Period (min)			15					

McMahon / Unser Commercial Development (SE Corner)

2010 PM Peak Hr BUILD Cond - BASE CASE
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HCM Unsignalized Intersection Capacity Analysis
5: McMahon Blvd. & Fineland Dr.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

	→	↘	↙	←	↖	↗		
Movement	EBT	EBR	WBL	WBT	NBL	NBR		
Lane Configurations	↑↑	↗	↙	↑↑	↙	↗		
Volume (veh/h)	1256	6	138	917	170	103		
Sign Control	Free			Free	Stop			
Grade	0%			0%	0%			
Peak Hour Factor	0.92	0.92	0.86	0.86	0.80	0.80		
Hourly flow rate (vph)	1365	7	160	1066	212	129		
Pedestrians								
Lane Width (ft)								
Walking Speed (ft/s)								
Percent Blockage								
Right turn flare (veh)								
Median type	Raised		Raised					
Median storage (veh)	1		1					
Upstream signal (ft)	858							
pX, platoon unblocked			0.98		0.98		0.98	
vC, conflicting volume			1372		2219		683	
vC1, stage 1 conf vol					1365			
vC2, stage 2 conf vol					854			
vCu, unblocked vol			1345		2206		644	
tC, single (s)			4.2		6.9		7.0	
tC, 2 stage (s)					5.9			
tF (s)			2.2		3.5		3.3	
p0 queue free %			68		0		68	
cM capacity (veh/h)			495		114		406	
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2
Volume Total	683	683	7	160	533	533	212	129
Volume Left	0	0	0	160	0	0	212	0
Volume Right	0	0	7	0	0	0	0	129
cSH	1700	1700	1700	495	1700	1700	114	406
Volume to Capacity	0.40	0.40	0.00	0.32	0.31	0.31	1.86	0.32
Queue Length 95th (ft)	0	0	0	35	0	0	424	33
Control Delay (s)	0.0	0.0	0.0	15.7	0.0	0.0	482.3	17.9
Lane LOS				C			F	C
Approach Delay (s)	0.0			2.1			307.1	
Approach LOS							F	
Intersection Summary								
Average Delay	36.5							
Intersection Capacity Utilization	61.8%				ICU Level of Service		B	
Analysis Period (min)	15							

McMahon / Unser Commercial Development (SE Corner)

2010 AM Peak Hr BUILD Cond - BASE CASE

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HCM Unsignalized Intersection Capacity Analysis
6: "A" & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Volume (veh/h)	0	75	2096	101	54	1391	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.90	0.90	0.95	0.90	0.90	0.95	
Hourly flow rate (vph)	0	83	2206	112	60	1464	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage (veh)							
Upstream signal (ft)			991			604	
pX, platoon unblocked	0.65	0.51			0.51		
vC, conflicting volume	3058	1103			2319		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1231	0			1670		
tC, single (s)	6.9	7.0			4.2		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	85			69		
cM capacity (veh/h)	75	554			193		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	83	1103	1103	112	60	732	732
Volume Left	0	0	0	0	60	0	0
Volume Right	83	0	0	112	0	0	0
cSH	554	1700	1700	1700	193	1700	1700
Volume to Capacity	0.15	0.65	0.65	0.07	0.31	0.43	0.43
Queue Length 95th (ft)	13	0	0	0	32	0	0
Control Delay (s)	12.6	0.0	0.0	0.0	31.9	0.0	0.0
Lane LOS	B				D		
Approach Delay (s)	12.6	0.0			1.3		
Approach LOS	B						
Intersection Summary							
Average Delay		0.8					
Intersection Capacity Utilization		69.2%		ICU Level of Service		C	
Analysis Period (min)		15					

McMahon / Unser Commercial Development (SE Corner)

2010 PM Peak Hr BUILD Cond - BASE CASE
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HCM Unsignalized Intersection Capacity Analysis
6: "A" & Unser Blvd.

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

							
Movement	WBL	WBR	NBT	NBR	SBL	SBT	
Lane Configurations							
Volume (veh/h)	0	63	1597	202	67	1512	
Sign Control	Stop		Free			Free	
Grade	0%		0%			0%	
Peak Hour Factor	0.90	0.90	0.95	0.90	0.90	0.95	
Hourly flow rate (vph)	0	70	1681	224	74	1592	
Pedestrians							
Lane Width (ft)							
Walking Speed (ft/s)							
Percent Blockage							
Right turn flare (veh)							
Median type			None			None	
Median storage veh							
Upstream signal (ft)			991			604	
pX, platoon unblocked	0.79	0.79			0.79		
vC, conflicting volume	2626	841			1905		
vC1, stage 1 conf vol							
vC2, stage 2 conf vol							
vCu, unblocked vol	1311	251			1607		
tC, single (s)	6.9	7.0			4.2		
tC, 2 stage (s)							
tF (s)	3.5	3.3			2.2		
p0 queue free %	100	88			76		
cM capacity (veh/h)	90	586			313		
Direction, Lane #	WB 1	NB 1	NB 2	NB 3	SB 1	SB 2	SB 3
Volume Total	70	841	841	224	74	796	796
Volume Left	0	0	0	0	74	0	0
Volume Right	70	0	0	224	0	0	0
cSH	586	1700	1700	1700	313	1700	1700
Volume to Capacity	0.12	0.49	0.49	0.13	0.24	0.47	0.47
Queue Length 95th (ft)	10	0	0	0	23	0	0
Control Delay (s)	12.0	0.0	0.0	0.0	20.1	0.0	0.0
Lane LOS	B				C		
Approach Delay (s)	12.0	0.0			0.9		
Approach LOS	B						
Intersection Summary							
Average Delay		0.6					
Intersection Capacity Utilization		54.7%		ICU Level of Service		A	
Analysis Period (min)		15					

McMahon / Unser Commercial Development (SE Corner)

2010 AM Peak Hr BUILD Cond - BASE CASE
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HCM Unsignalized Intersection Capacity Analysis

7: McMahon Blvd. & "B"

Terry O. Brown, P.E.
9/15/2009 - Synchro 7

	→	↘	↙	←	↖	↗
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑	↑		↑↑		↑
Volume (veh/h)	418	27	0	930	0	26
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.85	0.85
Hourly flow rate (vph)	464	30	0	1033	0	31
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	Raised			Raised		
Median storage (veh)	1			1		
Upstream signal (ft)	418					
pX, platoon unblocked			0.94		0.94	0.94
vC, conflicting volume			494		981	232
vC1, stage 1 conf vol					464	
vC2, stage 2 conf vol					517	
vCu, unblocked vol			347		862	69
tC, single (s)			4.2		6.9	7.0
tC, 2 stage (s)					5.9	
tF (s)			2.2		3.5	3.3
p0 queue free %			100		100	97
cM capacity (veh/h)			1135		403	922
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	NB 1
Volume Total	232	232	30	517	517	31
Volume Left	0	0	0	0	0	0
Volume Right	0	0	30	0	0	31
cSH	1700	1700	1700	1700	1700	922
Volume to Capacity	0.14	0.14	0.02	0.30	0.30	0.03
Queue Length 95th (ft)	0	0	0	0	0	3
Control Delay (s)	0.0	0.0	0.0	0.0	0.0	9.0
Lane LOS						A
Approach Delay (s)	0.0			0.0		9.0
Approach LOS						A
Intersection Summary						
Average Delay			0.2			
Intersection Capacity Utilization			29.0%		ICU Level of Service	A
Analysis Period (min)			15			

McMahon / Unser Commercial Development (SE Corner)

2010 PM Peak Hr BUILD Cond - BASE CASE
D:\ATOB\PROJECTS\McMahon_Unser_Update\Synchro\2010_PM_BUILD.syn



Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↔↔	↔	↔	↔↔	↔	↔
Volume (veh/h)	539	47	113	584	65	66
Sign Control	Free			Free	Stop	
Grade	0%			0%	0%	
Peak Hour Factor	0.90	0.90	0.90	0.90	0.85	0.85
Hourly flow rate (vph)	599	52	126	649	76	78
Pedestrians						
Lane Width (ft)						
Walking Speed (ft/s)						
Percent Blockage						
Right turn flare (veh)						
Median type	Raised			Raised		
Median storage (veh)	1			1		
Upstream signal (ft)	418					
PX, platoon unblocked			0.96		0.96	0.96
VC, conflicting volume			651		1174	299
VC1, stage 1 conf vol					599	
VC2, stage 2 conf vol					576	
VCU, unblocked vol			546		1093	179
IC, single (s)			4.2		6.9	7.0
IC, 2 stage (s)					5.9	
IF (s)			2.2		3.5	3.3
p0 queue free %			87		75	90
cM capacity (veh/h)			969		305	794
Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3
Volume Total	299	299	52	126	324	324
Volume Left	0	0	0	126	0	0
Volume Right	0	0	52	0	0	0
CSH	1700	1700	1700	969	1700	1700
Volume to Capacity	0.18	0.18	0.03	0.13	0.19	0.19
Queue Length 95th (ft)	0	0	0	11	0	0
Control Delay (s)	0.0	0.0	0.0	9.3	0.0	0.0
Lane LOS				A		
Approach Delay (s)	0.0			1.5		
Approach LOS				C		

Intersection Summary

Average Delay	2.2	ICU Level of Service	A
Intersection Capacity Utilization	34.8%		
Analysis Period (min)	15		

Queueing Analysis Summary Sheet

Project: McMahon / Unser Commercial Development (SE Corner) - CVS Update
 Intersection: McMahon Blvd. / Unser Blvd.

2010

Approach				Left Turns			Thru Movements			Right Turns		
Eastbound				# Lanes	Vol.	Length	# Lanes	Vol.	Length	# Lanes	Vol.	Length
<i>Existing Lane Length</i>				1	130	200	2	310	Cont	1	140	150
AM NO BUILD Queue				1	210	300	2	190	175	1	47	100
AM BUILD Queue				1	210	300	2	191	175	1	48	100
<i>Existing Lane Length</i>				1	120	200	2	200	Cont	1	140	150
PM NO BUILD Queue				1	304	425	2	212	200	1	47	100
PM BUILD Queue				1	304	425	2	216	200	1	51	100
Westbound				# Lanes	Vol.	Length	# Lanes	Vol.	Length	# Lanes	Vol.	Length
<i>Existing Lane Length</i>				1	90	200	2	100	Cont	1	20	175
AM NO BUILD Queue				1	205	275	2	114	125	1	106	175
AM BUILD Queue				1	213	300	2	115	125	1	107	175
<i>Existing Lane Length</i>				1	250	200	2	240	Cont	1	80	175
PM NO BUILD Queue				1	411	525	2	266	225	1	165	250
PM BUILD Queue				1	454	575	2	270	225	1	172	275
Northbound				# Lanes	Vol.	Length	# Lanes	Vol.	Length	# Lanes	Vol.	Length
<i>Existing Lane Length</i>				1	80	280	2	1,210	Cont	1	230	200
AM NO BUILD Queue				1	53	100	2	1,213	750	1	141	225
AM BUILD Queue				1	54	100	2	1,214	750	1	144	225
<i>Existing Lane Length</i>				1	220	280	2	1,230	Cont	1	190	200
PM NO BUILD Queue				1	146	225	2	1,845	>1,000 *	1	120	200
PM BUILD Queue				1	149	225	2	1,853	>1,000 *	1	134	225
Southbound				# Lanes	Vol.	Length	# Lanes	Vol.	Length	# Lanes	Vol.	Length
<i>Existing Lane Length</i>				1	160	280	2	830	Cont	1	70	180
AM NO BUILD Queue				1	152	225	2	1,260	775	1	121	200
AM BUILD Queue				1	153	225	2	1,263	775	1	121	200
<i>Existing Lane Length</i>				1	60	280	2	119	Cont	1	180	180
PM NO BUILD Queue				1	91	175	2	973	675	1	199	300
PM BUILD Queue				1	96	175	2	983	675	1	199	300

Cycle Length: AM PM
 120 130

NOTE: Queue lengths are in feet.