

# MEMORANDUM



## Public Works Department

---

**Date:** March 7, 2016

**To:** Tempe City Council

**From:** Shelly Seyler, Deputy Public Works Director – Transportation  
Julian Dresang, City Traffic Engineer

**Thru:** Don Bessler, Public Works Director (350-8205)

**Subject:** McClintock Drive Street Configuration  
March 17, 2016 Issue Review Session

### PURPOSE

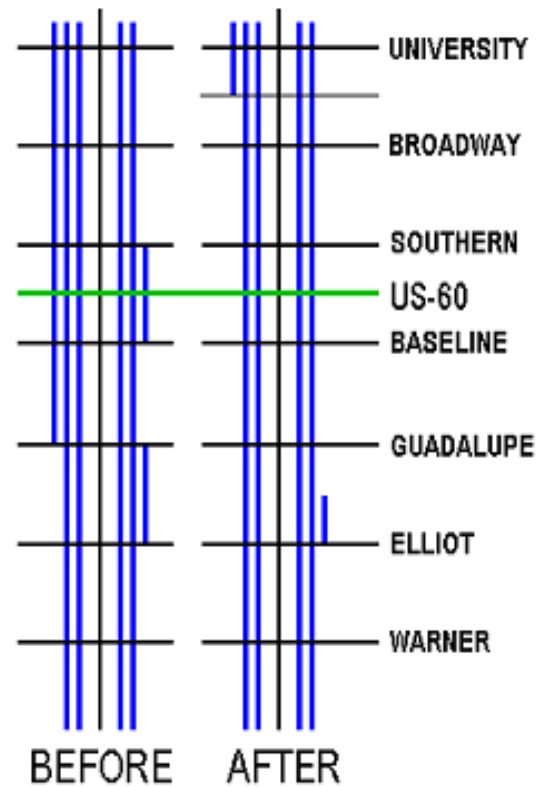
The purpose of this memo is to provide the City Council pre and post traffic condition data along McClintock Drive between Broadway and Guadalupe roads as it relates to the paving project and installation of bicycle lanes that occurred in summer 2015.

### BACKGROUND

In 2015, McClintock Drive, between Broadway and Guadalupe roads, was repaved as part of Tempe’s ongoing Asset Management Capital Maintenance Program. As part of this repaving project, McClintock Drive was reconfigured to include bike lanes on each side of the street, which required the removal of **at least** one vehicle lane on McClintock Drive. A minimum of two vehicular lanes, northbound and southbound, and a middle turn lane, was maintained, as well as medians/center turn lanes and formal turn lanes at the arterial intersections. Graph 1 is an illustration of the number of lanes in each direction prior to the reconfiguration and after the addition of the bicycle lanes.

McClintock Drive between Broadway and Guadalupe roads has seen traffic volumes, on average, decrease by a total of 22 percent between 2004 and 2014. This decrease is largely attributed to the completion of the urban freeway network and an increase in the number of commuters choosing alternative modes of travel.

Table 1 provides the traffic volume changes on McClintock Drive between 2004 and 2014.



Graph 1: McClintock Drive Vehicular Lane Configuration

Table 1: Traffic volume changes between 2004 and 2014 on McClintock Drive between Rio Salado and Ray

Segment of McClintock	Lane Configuration	2004 Volumes			2014 Volumes			Change (%)			Average Segment (%)
		NB	SB	T	NB	SB	T	NB	SB	T	
Rio Salado to University	2 NB, 3 SB	No Data			16087	18531	34618	N/A			-9.71%
University to Apache	2 NB, 3 SB	16264	21159	37423	16451	17340	33791	1.15%	-18.05%	-9.71%	
Apache to Broadway	2 NB, 3 SB	No Data			15375	17488	32863	N/A			
Broadway to Southern	2 NB, 3 SB	17207	19280	36487	15208	16514	31722	-11.62%	-14.35%	-13.06%	-22.19%
Southern to US60	3 NB, 3 SB	22293	22658	44951	17938	17229	35167	-19.54%	-23.96%	-21.77%	
US60 to Baseline	3 NB, 3 SB	20697	23145	43842	16074	16681	32755	-22.34%	-27.93%	-25.29%	
Baseline to Guadalupe	2 NB, 3 SB	17841	17485	35326	12718	12490	25208	-28.71%	-28.57%	-28.64%	
Guadalupe to Elliot	3 NB, 2 SB	18106	16083	34189	12233	12277	24510	-32.44%	-23.66%	-28.31%	-33.53%
Elliot To Warner	2 NB, 2 SB (Bike Lanes)	12466	17252	29718	9211	9366	18577	-26.11%	-45.71%	-37.49%	
Warner to Ray	2 NB, 2 SB (Bike Lanes)	16482	11366	27848	9202	8961	18163	-44.17%	-21.16%	-34.78%	

In the city's Transportation Master Plan (TMP) ([www.tempe.gov/transportationplan](http://www.tempe.gov/transportationplan)), McClintock Drive was identified as an arterial corridor that was lacking bicycle lanes (reference pages 80-83). The addition of bicycle lanes continues Tempe's longstanding commitment to sustainable transportation and providing streets with accommodations for all modes of travel. Also, the removal of vehicular traffic lane(s) in order to accommodate bicycle lanes is consistent with the Transportation Master Plan, which identified McClintock Drive as a candidate for bike lanes and was approved by the City Council in January 2015. As expressed in their adoption of the General Plan 2040, Tempe City Council and the Tempe community support managing our transportation future by, whenever practical, getting people out of their cars so that we are not committed to an endless strategy of building bigger, wider roads and parking facilities.

Sections of arterials streets that accommodate similar volumes of traffic (25,000-35,000 vehicles/day) with two travel lanes in each direction include:

- Warner Road from I-10 to Priest: 31,754 vehicles/day
- Warner Road from Priest to Kyrene: 31,703 vehicles/day
- University Drive from McClintock to Loop 101: 30,115 vehicles/day
- Rural Road from Baseline to Guadalupe: 29,395 vehicles/day
- Guadalupe Road from Kyrene to Rural: 28,960 vehicles/day
- University Drive from SR143 to Priest: 28,048 vehicles/day
- University Drive from Rural to McClintock: 27,360 vehicles/day
- Warner Road from McClintock to Loop 101: 25,930 vehicles/day
- Guadalupe Road from McClintock to Loop 101: 25,027 vehicles/day

In December 2015, Tempe added “candlesticks” to McClintock Drive as a buffer between bikes and vehicles. The candlesticks (vertical barriers) were installed along McClintock between Southern and Baseline to create more of a separation between bikes and vehicles. The candlesticks were added as a pilot program and to address concerns that drivers were using the new bicycle lanes for vehicle travel.



### **Public Outreach**

An open house was held May 4, 2015 to inform the public of the repaving project and inclusion of bicycle lanes, and approximately 46 people attended the open house. Residents who lived between Country Club and Dorsey from the railroad tracks just south of Apache to the Western Canal were notified of the meeting through the distribution of 5,800 door hangers. During the construction of the project, staff worked closely with businesses and neighborhoods adjacent to McClintock Drive by using a number of techniques to ensure timely communication, including door hangers, social media, the street closures web page and press releases.

### **Traffic Volumes on McClintock Drive and Rural Road**

From January 26 to 28, 2016, traffic volumes for Rural and McClintock were collected using automated counters. These charts demonstrate that traffic volumes have increased on both Rural and McClintock. Prior to the lane reconfiguration of McClintock Drive and the addition of the bicycle lanes, gasoline fluctuated between \$3.76 and \$2.66 for the seven month period from July 2014 to Jan. 2015. After the lane reconfiguration of McClintock Drive and the addition of the bicycle lanes, gasoline fluctuated between \$3.06 and \$2.17 for the seven month period from July 2015 to Jan. 2016. It can be assumed that more people are now driving their cars more frequently given the low price of gasoline. In addition, bus ridership has also seen a decrease during this same period. See tables 2 and 3.

Table 2: Gas Price Averages

<b>AVERAGE US GAS PRICES BEFORE LANE RECONFIGURATION</b>		<b>AVERAGE US GAS PRICES AFTER LANE RECONFIGURATION</b>	
July 2014	\$3.76	July 2015	\$3.06
Aug. 2014	\$3.62	Aug. 2015	\$2.88
Sept. 2014	\$3.52	Sept. 2015	\$2.56
Oct. 2014	\$3.28	Oct. 2015	\$2.41
Nov. 2014	\$2.99	Nov. 2015	\$2.30
Dec. 2014	\$2.66	Dec. 2015	\$2.23
Jan. 2015	\$2.26	Jan. 2016	\$2.17

Source: U.S. Energy Information Administration; Index: U.S. Regular Reformulated Retail Gasoline Prices

Table 3: Tempe Transit Ridership (Bus, Orbit, Light Rail and Express)

<b>TRANIST RIDERSHIP BEFORE LANE RECONFIGURATION</b>		<b>TRANIST RIDERSHIP AFTER LANE RECONFIGURATION</b>	
July 2014	705,765	July 2015	749,598
Aug. 2014	1,000,623	Aug. 2015	945,196
Sept. 2014	1,089,434	Sept. 2015	1,090,691
Oct. 2014	1,138,386	Oct. 2015	1,071,255
Nov. 2014	973,138	Nov. 2015	956,696
Dec. 2014	861,196	Dec. 2015	919,638
Jan. 2015	988,221	Jan. 2016	909,760
<b>TOTAL</b>	<b>6,756,763</b>		<b>6,642,834</b>

Table 4: McClintock Drive Vehicle Volumes 2004, 2014 and 2016

	Average 24-hour traffic volume (2004)	Average 24-hour traffic volume (Wed., 3/12/14)	Average 24 hour traffic volume (Tues., 1/26 to Thurs. 1/28/16)	% change
Apache to Broadway	No Data	32,863	34,913	6%
Broadway to Southern	36,487	31,722	30,782	-3%
Southern to US 60	44,951	35,167	37,670	7%
US 60 to Baseline	43,842	32,755	37,470	14%
*Baseline to Guadalupe	35,326	25,208	28,945	15%

\*SB 1/26 to 1/28/16 & NB 2/9 to 2/11/16

Table 5: Rural Road Vehicle Volumes 2004, 2012 and 2016

	Average 24-hour traffic volume (2004)	Average 24-hour traffic volume (Thurs., 10/4/12)	Average 24-hour traffic volume (Tues., 1/26 to Thurs. 1/28/16)	% change
Apache to Broadway	50,202	36,969	45,442	23%
Broadway to Southern	No Data	37,470	40,703	9%
Southern to US 60	No Data	40,300	45,241	12%
US 60 to Baseline	37,589	37,293	41,816	12%
Baseline to Guadalupe	30,927	29,395	37,093	26%

Table 6: Alameda Drive Vehicle Volumes 2014 and 2016

	Average 24-hour traffic volume (Tues., 1/21/14)	Average 24- hour traffic volume (Tues., 1/26 to Thurs. 1/28/16)	% change
Mill to Rural	1,981	2,174	10%

### Traffic Signal Timing

An analysis of the traffic signal timing was conducted to determine how much green time could be added along the McClintock study corridor to reduce the impact of a lane of traffic being converted to a bicycle lane. The amount of north and south green time that was added during the AM and PM peaks by intersection cross-street is shown below in Table 7. The table shows the additional number of vehicles/hour that can be processed as a result of the increase in number of seconds added as well as the total volume in each of the peak directions during the same am and pm peak hour.

Table 7: Traffic Signal Timing

Cross-Street								
	AM Peak				PM Peak			
	NB sec/cycle	% increase	Additional vehicles/ hour processed	Peak hour Volume	SB sec/cycle	% increase	Additional vehicles/ hour processed	Peak hour Volume
Apache	+4	8%	265	1536	No change	No change	N/A	1621
Broadway	+7	16%	460	1485	+4	10%	265	2602
Southern	No change	No change	N/A	1064	+2	5%	130	1924
US 60	No change	No change	N/A	1865	+3	9%	200	1338
Baseline	+3	7%	200	1644	No change	No change	N/A	2670
Guadalupe	+8	11%	530	1564	No change	No change	N/A	1566

Additionally, an analysis was conducted in January and February, 2016 to compare travel times between University Drive to Guadalupe Road along both Rural and McClintock. Table 4 illustrates that on average it takes between 10 and almost 13 minutes to travel northbound during the morning peak and between almost 13 and almost 14 minutes to travel southbound during the afternoon peak on these arterials.

Table 8: McClintock Drive and Rural Road after Travel Time Data – University to Guadalupe (Data Collected January 26-28,2016) in minutes and seconds.

AM Peak (7-9AM)	Minimum	Maximum	Average
McClintock NB	6:48	14:33	10:16
McClintock SB	7:12	8:37	7:40
Rural NB	8:50	22:12	12:31
Rural SB	7:13	9:10	7:42
Mid Day (11AM-1PM)	Minimum	Maximum	Average
McClintock NB	6:06	9:51	7:40
McClintock SB	6:05	9:15	8:00
Rural NB	7:52	11:11	9:20
Rural SB	6:16	12:15	8:32
PM Peak (4-6 PM)	Minimum	Maximum	Average
McClintock NB	7:45	10:57	9:23
McClintock SB	7:41	22:20	12:57
Rural NB	9:09	13:41	10:36
Rural SB	8:45	20:33	13:25

Table 9: McClintock Drive Before/After Travel Time Comparison – *University to Baseline*  
 (Data Collected February 18-20 and February 26, 2014 & January 26-28, 2016) in minutes and seconds.

<b>AM Peak (7-9AM)</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Average</b>
NB – Before	4:04	9:27	6:53
NB – After	5:13	12:43	9:47
NB – Change	1:09 <b>[+28.3%]</b>	3:16 <b>[+34.6%]</b>	2:54 <b>[+42.1%]</b>
SB – Before	3:29	7:29	5:36
SB – After	5:34	6:14	5:50
SB – Change	2:05 <b>[+59.8%]</b>	1:15 <b>[-16.7%]</b>	0:14 <b>[+4.2%]</b>
<b>Mid-Day (11AM-1PM)</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Average</b>
NB – Before	4:42	7:48	5:44
NB – After	4:48	7:58	5:51
NB – Change	0:06 <b>[+2.1%]</b>	0:10 <b>[+2.1%]</b>	0:07 <b>[+2.0%]</b>
SB – Before	4:23	7:40	5:45
SB – After	4:47	8:26	6:22
SB – Change	0:24 <b>[+9.1%]</b>	0:46 <b>[+10.0%]</b>	0:37 <b>[+10.7%]</b>
<b>PM Peak (4-6 PM)</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Average</b>
NB – Before	5:36	7:34	6:39
NB – After	5:45	8:55	7:14
NB – Change	0:09 <b>[+2.7%]</b>	1:21 <b>[+17.8%]</b>	0:35 <b>[+8.8%]</b>
SB – Before	5:19	9:00	7:26
SB – After	5:57	19:44	10:47
SB – Change	0:38 <b>[+11.9%]</b>	10:44 <b>[+119.3%]</b>	3:21 <b>[+45.1%]</b>

Table 10: Rural Road Before/After Travel Time Comparison – *University to Baseline*  
 (Data Collected September 19 and 26, 2012 & January 26-28 and February 3, 2016) in minutes and seconds.

<b>AM Peak (7-9AM)</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Average</b>
NB – Before	4:54	11:39	8:19
NB – After	6:54	19:45	10:06
NB – Change	2:00 <b>[+40.8%]</b>	8:06 <b>[+69.5%]</b>	1:47 <b>[+21.4%]</b>
SB – Before	5:24	7:50	6:02
SB – After	5:34	7:19	5:55
SB – Change	0:10 <b>[+3.1%]</b>	0:31 <b>[-6.6%]</b>	0:07 <b>[-1.9%]</b>
<b>Mid-Day (11AM-1PM)</b>	<b>Minimum</b>	<b>Maximum</b>	<b>Average</b>
NB – Before	5:50	7:30	6:38
NB – After	6:09	9:27	7:32
NB – Change	0:19 <b>[+5.4%]</b>	1:57 <b>[+26.0%]</b>	0:54 <b>[+13.6%]</b>
SB – Before	5:52	7:49	6:43
SB – After	4:50	9:16	6:49

SB – Change	1:02 [-17.6%]	1:27) [+18.6%]	0:06 [+1.5%]
PM Peak (4-6 PM)	Minimum	Maximum	Average
NB – Before	6:19	8:55	7:34
NB – After	7:20	11:06	8:32
NB – Change	1:01 [+16.1%]	2:11 [+24.5%]	0:58 [+12.8%]
SB – Before	6:44	10:25	8:56
SB – After	6:46	17:20	10:57
SB – Change	0:02 [+0.5%]	6:55 [+66.4%]	2:01 [+22.3%]

### Crash Data

Crash data is only available through September 30, 2015, given that, tables below only compare August – September 2014 to August – September 2015. As shown in the tables, crashes have decreased during this time period. It should be noted, that the restriped lanes had only been in place for two months during this period. It should be noted that industry standards typically review 3 years of crash data prior to making any conclusions about the benefits or drawbacks of changes. Staff will continue to monitor the crash data reviewing trends over time.

Table 11: Intersection Crashes at McClintock

	Aug. to Sept. 2014	Aug. to Sept. 2015
Apache	5	1
Broadway	2	0
Concorda	1	0
Loma Vista	0	1
Alameda	2	0
Del Rio	0	2
Southern	0	2
Hermosa	1	0
US 60	3	3
Carson	1	0
Ellis	1	0
Baseline	0	3
Oxford	0	1
Libra	1	1
Guadalupe	3	2
TOTAL	20	16



Table 12: Intersection Mid-Block Crashes at McClintock

	Aug. to Sept. 2014	Aug. to Sept. 2015
Apache to Broadway	3	1
Broadway to Alameda	5	3
Alameda to Southern	4	1
Southern to US 60	0	1
US 60 to Baseline	1	3
Baseline to Southshore	0	0
Southshore to Guadalupe	0	0
TOTAL	13	9

**Emissions Impact for Maricopa County**

Staff was asked to review data to determine if there was an impact on air quality due to the reduction in lanes. In order to determine the impact, the average additional travel time spent on McClintock during peak times was calculated. It is estimated that an additional 377 hours are spent each day. Average travel speeds were then used to calculate the equivalent number of additional miles traveled. Using data from the United States Environmental Protection Agency, the average vehicle produces 411 grams per mile. Based on these assumptions, it is estimated that the additional delay results in approximately 2.8 additional metric tons of CO<sub>2</sub> per day. As a reference, a typical passenger vehicle emits 4.7 metric tons of CO<sub>2</sub> per year.

Staff also contacted the Maricopa Association of Governments (MAG) to determine the emissions impact of the lane conversion at McClintock Drive between Western Canal and Apache Boulevard on a regional basis. The process involved calculating the changes in extra miles traveled and converting the miles into emissions as tracked by Maricopa County. Table 13 shows the results of the modeling analysis for the lane conversion at McClintock. There are 90,967,588 Vehicle Miles Traveled (VMT) per day in Maricopa County. Based on the emissions analysis performed by MAG, the total VMT increased by 1,544 per day or 0.002%.

Table 13: Emissions Impact for McClintock Drive on a regional level

Pollutant	Emissions in Maricopa County (kg/day)			% Change
	MAG Base 2015 Air Quality Emissions	MAG 2015 McClintock Bicycle Lane Conversion Emissions	Impact	
Carbon Monoxide (CO)	483,338	483,375	37	0.008%
Nitrous Dioxide (NOx)	78,995	78,998	3	0.004%
Volatile Organic Compounds (VOC)	44,575	44,576	1	0.003%
Particulate Matter-10 micrometers (PM-10)	6,010	6,011	1	0.016%
Vehicle Miles Travelled	90,965,988	90,967,532	1,544	0.002%

Source:

Maricopa Association of Governments Environmental Programs - January 2016

### Bicycle Counts on McClintock Drive

Between March 25 and March 27, 2014, Tempe Bicycle Action Group and volunteers counted bicycles along McClintock Drive on both the street and sidewalk. The average number of bikes over the morning (7 to 9 a.m.) peak hours and afternoon (4 to 6 p.m.) peak hours is shown in Table 14 below.

Table 14: 2014 McClintock Drive Bicycle Volumes- TBAG

	Average # of bikes during peak per hour	Dates Data Collected
McClintock at Broadway	17	3/25, 3/26,& 3/27/14
McClintock at Alameda	10	3/25, 3/26,& 3/27/14
McClintock at Southern	16	3/25, 3/26,& 3/27/14
McClintock at Western Canal	11	3/25, 3/26,& 3/27/14

Source: Tempe Bicycle Action Group

Between February 9 and 11, 2016 and again on February 24 and 25, 2016, automated counters were placed at mid-block locations on McClintock Drive across the sidewalks and bike lanes. The average 24 hour volume over the days collected is shown in Table 2 below. Note the below data reflects a 24 hour average whereas the bike counts conducted visually by TBAG are a one-hour peak average.

Table 15: 2016 McClintock Drive Bicycle Volumes- Automated Counters

	AM Peak Volumes	Mid-day Peak Volumes	PM Peak Volumes	Average 24 Hour Volumes	Dates Data Collected
Apache to Broadway (Southbound only)	7	3	7	59	2/9 to 2/11/16
Broadway to Southern	13	10	12	88	2/24 to 2/25/16
Southern to US 60	7	2	11	66	2/9 to 2/11/16
US 60 to Baseline	10	5	12	77	2/9 to 2/11/16
Baseline to Guadalupe	4	6	9	Error in count data	2/24 to 2/25/16

### Pedestrian Comfort

One positive aspect of having buffered bicycle lanes is the increased comfort pedestrians experience while walking on sidewalks. The greater the distance between pedestrians and vehicles, the greater sense of security and comfort they experience. The bike lanes on McClintock provide an additional six to 10 feet of a buffer between vehicle traffic and pedestrians.

### One Bike Lane on McClintock Drive and One Bike Lane on Rural Road

One option staff considered was to add one directional lane to Rural Road and one to McClintock Drive. In order to add one bike lane on Rural Road and one on McClintock Drive, the following would occur.

- One traffic lane would need to be removed from Rural to add one bike lane. There is not enough extra lane width or gutter space to add a bicycle lane without taking out one vehicle lane.
- On McClintock, there are sections of the roadway in which the original configuration was a two and three. In order to maintain even one bicycle lane, the buffer would need to be removed, and in this case where it was a two and three lane configuration, the third lane would still be removed to have one bike lane.

### Government/Municipality Feedback

The city of Tempe has received the following feedback:

- Federal Highway Administration staff is well aware of these bicycle projects being constructed in Tempe and asked City of Tempe staff to provide a presentation on “Separated Bike Lanes” at the 2016 ITE/IMSAs Spring Conference.
- Arizona Department of Transportation was contacted to determine if they had received any feedback at the interchange of US-60 and McClintock Drive following the striping changes. They have not received any feedback to date, positive or negative.
- The City of Chandler informed Tempe staff that in response to numerous complaints about bike lanes in Tempe terminating at the Chandler border, the City of Chandler will be narrowing medians on McClintock Drive and on Kyrene Road in order to accommodate bike lanes from the Tempe border south to the Loop 202.

**Public Comments**

Staff began receiving unsolicited public comments about the McClintock Drive project in April 2015. As of 6 p.m. on March 9, 2016, the City has received 385 comments of which 348 are unduplicated. Of the unduplicated comments, 190 people are against the bicycle lanes and 155 are in favor. Three people also commented, but did not have an opinion either way. Of the 190 people against the lane removal for the additional of the bike lane, 146 cited congestion and/or getting out of their neighborhood as a major issue. Comments were received via email to either staff, Council or through the web site and phone calls to either 311, Council or staff.

**Cost to Restripe McClintock Drive**

The cost to restripe McClintock Drive to its original configuration without bike lanes between Apache and Guadalupe would cost \$130,000 and take seven to 10 business days.

**ATTACHMENTS**

1. PowerPoint
2. Public Comments and Analysis