MEMORANDUM

Public Works Department

Date: August 1, 2016

To: Tempe City Council

From: Shelly Seyler, Deputy Public Works Director – Transportation (350-8854)
Mike Nevarez, Transit Manager (858-2209)

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

Subject: Bus Pullout Decision Matrix
August 11, 2016 Issue Review Session

PURPOSE

The purpose of this memo is to present Council with the decision matrix strategy for arterial-arterial and arterial–collector intersection bus pullout locations as requested at the May 5, 2016 Issue Review Session, and to gather feedback from the Council on the direction of the bus pullout prioritization based on the criteria presented.

BACKGROUND

Staff has been working on the list of remaining arterial-arterial and arterial-collector intersection locations without bus pullouts to create a process which ranks them based on factors impacting the flow of travel and safety. Currently, there is no industry standard process to rank bus pullouts that includes the factors included in staff's evaluation. Staff has identified factors as shown in Table 1 which impact the ability of the transportation system to flow effectively, safely and more efficiently. In each case, a score was assigned to each of the factors identified based on level of impact.

As an example, a one or two-lane roadway could be greatly impacted by a bus stopping and was considered a higher rank in the matrix process. Based on the scoring criteria, all one and two-lane roadways were awarded five points while those with three or more lanes were awarded zero points. In addition, those roadways which have higher levels of traffic volume are further impacted. Staff reviewed the daily directional volumes on the roadways and categorized them into three ranges (0-3,500 vehicles per day, 3,501-7,000 vehicles per day, and 7,001+ vehicles per day). Points were awarded to the locations according the level of volume on the roadway.

Additional factors taken into consideration include the number of bus trips on a particular roadway, bus schedule time points, passenger transfers, high crash locations, left -turn impacts, federal funded grants (only available on expansion of routes), bike lanes and the integration of projects on a roadway. Descriptions of each are provided below along with the assigned scores according to the criteria identified. Once staff identified the total score for each location, the bus pullout list was sorted to identify those locations identified as the highest rank. It should be noted that staff did not complete an in-depth analysis of the right-of-way requirements.

In addition to the scoring system identified, there are other circumstances that fall outside of the scoring system that might move a location up on a list for installation. These include:

- Locations with layovers – There are several bus routes that have termination locations within the city. In order to maintain on-time service, layovers are added to the end of each bus trip. Every attempt is made to utilize bus stops with existing pullouts for layovers; however there are a number of layovers where no pullout is available. For example, all of the east-west bus routes have certain trips that terminate at the

Mesa border and must layover on the Price Frontage Road before starting the next route. This is a safety concern given the speed of traffic and design of the frontage road. For these reasons, staff is recommending that layover locations be advanced when the opportunity arises even if they rank lower on the list.

- Development opportunities – As developments occur, it is often easier to work with property owners to obtain easements or right-of-way. In these cases, it would be advantageous to advance a bus-pullout for construction. Depending on the level of development occurring, the developer may be required to construct the bus pullout.
- City owned property – Locations that are located adjacent to city owned property would be another example of ideal locations to advance as no right-of-way acquisition/purchase would be required.
- Orbit Saturn implementation – Staff is also recommending that bus pullouts be installed at the southeast corner of Baseline Road and McClintock Drive and the northeast corner of Priest Drive and Elliot Road as part of the implementation of the Orbit Saturn route in south Tempe in October 2017. These will serve as layover locations for the Orbit Saturn route.
- Safety concerns. Staff performs annual crash data analysis and reviews intersections for potential safety improvements. Locations with high frequencies of rear-end and/or sideswipe crashes may benefit from the construction of bus pullouts.

Beyond the circumstances identified above and as the process continues, staff will review right-of-way or development impacts to determine the feasibility of moving forward with other locations. As previously discussed with the council, some of the locations on the list are more difficult to construct given right-of-way constraints.

TABLE 1 – Scoring Criteria

Factor	Range	Assigned Score	Why This Matters
Street Configuration	1 – 2 lanes	5	Streets with one or two lanes provide minimal opportunity for vehicles and cyclists to safely pass a stopped bus.
	3 + lanes	0	
Traffic Volume –Vehicles per day by direction (VPD)	0 – 3500 VPD	1	On streets with high traffic volume, a stopped bus is more likely to impede the flow of vehicle traffic and the potential for a collision is increased.
	3501 – 7000 VPD	3	
	7001+ VPD	5	
Count of Pass-through Bus Trips – Trips per day (TPD)	0 – 4 TPD	0	Bus stops with a greater number of trips will have a bus blocking traffic more often that those with a small number of trips. The higher quantity of disruptions increases the potential for traffic delays and collisions.
	5 – 100 TPD	1	
	101 – 200 TPD	2	
	201+ TPD	3	
Count of Timepoint Bus Trips – Time points per day	0 – 4 Timepoints	0	Bus stops that serve as timepoints may be especially impactful as buses sometimes must remain at the stop for several minutes.
	5 – 50 Timepoints	2	
	51 – 100 Timepoints	3	

	101+ Timepoints	4	
Transfers Routes Available	Yes	1	If there are transfer routes available, the volume of passengers using the stop would increase, as would the dwell time for stopped buses.
	No	0	
High Crash Location	Yes	5	Implementation of bus pullouts may help improve safety at intersections that appear on the city's high crash list
	No	0	
Left Turn Traffic Impeded by Bus	Yes	5	A significant safety issue occurs when turning traffic (typically left turns) is impeded by a stopped bus. This may result in intersection delays and unexpected lane changes, increasing the potential for a collision.
	No	0	
Federal Grants	Yes	20	The City of Tempe has dedicated grant funds for construction. Only bus routes that are expanding have the option to apply for grant funds related to bus pullouts.
	No	0	
Bike Lanes	Yes	2	When a bike lane is present, a stopped bus will impede the bike lane. This may result in lane changes by cyclists, increasing the potential for a collision.
	No	0	
Project Integration	Yes	2	When an adjacent project is scheduled, it might be advantageous to coordinate the projects allowing for integration and decreased impacts of construction on the traveling public. In addition, when construction of bus pullouts might enhance the success of an adjacent project.
	No	0	

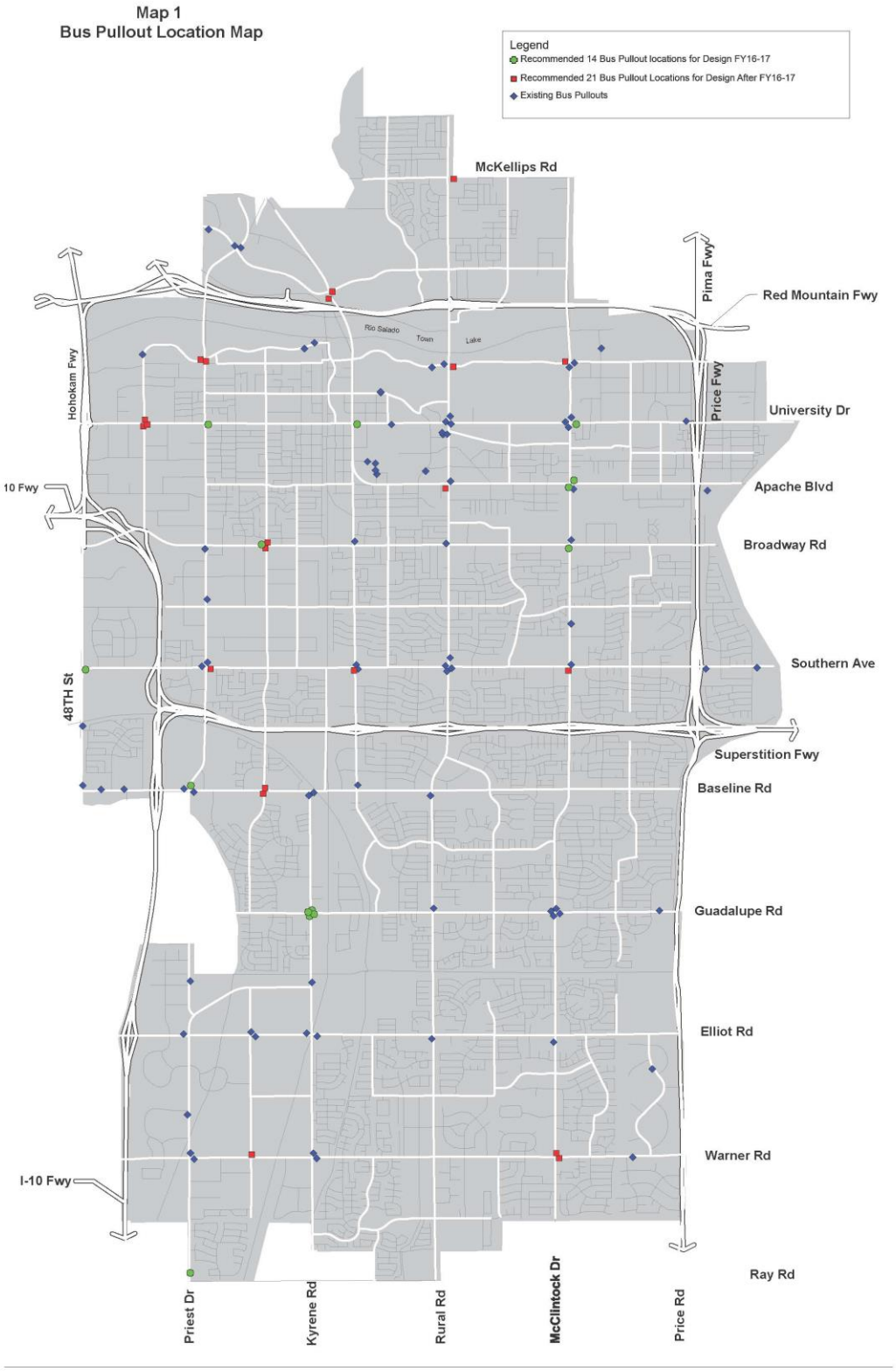
In Table 2 are the top 35 locations according to the ranking system established above. Those in blue are the bus pullouts recommended for design in FY 16-17 with up to three pullouts possibly constructed in FY 16-17. Some of the locations included will be implemented through striping modifications only. Those in green have existing designs completed.

TABLE 2 – Top 35 Recommended Bus Pullout Locations

	Location			**Overall**			
	Direction	On Street	At Street	Score	Rank	Property Owner	Comments
1	NB	Priest	Ray	30	1	Archland Property LLC	
2	EB	University	McClintock	27	2	Theolline Investments	
3	EB	University	Priest	27	2	Raffter M Enterprises Inc	Existing Design
4	NB	Priest	Baseline	25	4	Eck Baseline 33 LLC	
5	EB	University	Mill Avenue	25	4	Arizona State University	
6	SB	McClintock	Apache	23	6	n/a	Striping Modifications Only
7	WB	Broadway	Hardy	22	7	Circle K Stores Inc	

8	SB	McClintock	Broadway	21	8	Business Properties Partnership No. 41	
9	NB	McClintock	Apache	21	8	Kozinets Irving O/Esther S TR	
10	EB	Guadalupe	Kyrene	20	10	Supr Petro LLC	
11	SB	Kyrene	Guadalupe	19	11	R1 CS1 LLC	
12	NB	Kyrene	Guadalupe	19	11	The Elmukhtar Group	
13	EB	Southern	48th	19	11	n/a	Striping Modifications Only
14	WB	Guadalupe	Kyrene	18	14	Tempe Union High School District	
15	SB	52nd	University	18	14	University 52nd St LLC	
16	NB	52nd	University	18	14	MSC Tempe LLC	
17	SB	Hardy	Baseline	18	14	n/a	Striping Modifications Only
18	EB	Southern	Priest	17	18	Circle K Stores Inc	
19	SB	Mill	Southern	17	18	DBNCH Circle LLC	
20	WB	Rio Salado	McClintock	17	18	City of Phoenix	
21	EB	Rio Salado	Rural Road	17	18	Arizona Board of Regents	
22	SB	Hardy	Broadway	17	18	n/a	Striping Modifications Only
23	NB	Hardy	Broadway	17	18	n/a	Striping Modifications Only
24	EB	Curry	Mill	16	24	n/a	Striping Modifications Only
25	NB	Hardy	Warner	16	24	n/a	Striping Modifications Only
26	SB	Mill	Washington	16	24	City of Tempe	
27	SB	McClintock	Southern	16	24	Walgreen Arizona Drug Co	
28	NB	Hardy	Baseline	16	24	n/a	Striping Modifications Only
29	EB	McKellips	Scottsdale	15	29	Two Brothers VII Inc	
30	EB	Rio Salado	Priest	15	29	Vaughn Street LLC	
31	WB	Rio Salado	Priest	15	29	Salt River Project	
32	EB	Warner	McClintock	15	29	Simco Sales Company Inc	
33	SB	Rural	Apache	15	29	Supr Group LLC	
34	EB	University	52nd	15	29		Existing Design
35	NB	McClintock	Warner	15	29	Bank of America Arizona	

Map 1 – Top 35 Recommended Bus Pullout Locations



ATTACHMENTS

- PowerPoint