memorandum

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To: **Ms. Olivia Ervin**
M-Group

From: Zack Matley

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Project: PET175

Subject: Riverfront Traffic Study Follow-up Analysis

The following supplemental analyses and information have been prepared in response to comments received on the *Traffic Impact Study for the Petaluma Riverfront Project*, Whitlock & Weinberger Transportation, Inc. (W-Trans), March 2012.

Office Trip Generation Rates

Average trip generation rates for the "General Office Building" land use category as reported in *Trip Generation*, 8th Edition, Institute of Transportation Engineers (ITE) were applied. In addition to providing average trip generation rates, *Trip Generation* includes formula-based rates based on linear or logarithmic "best fit" curves. Based on a review of the data points, statistics, and guidance provided in Trip *Generation*, W-Trans deemed the use of average versus formula-based rates to be appropriate. ITE provides specific guidance on this topic when describing the trip characteristics of the office land use:

> *Some of the regression curves plotted for this land use may produce illogical trip end estimates for small office buildings. When the proposed site size is significantly smaller than the average-sized facility published in this report, caution should be used when applying these statistics.* (Trip Generation, 8th Edition, page 1194)

The 60,000 square feet of proposed office space is significantly smaller than the 216,000 square feet average reported in *Trip Generation* for the sites used to determine p.m. peak hour trip generation. The use of average rates instead of formula-based regression formulas was therefore determined to be more appropriate.

SMART Commuter Traffic

Traffic associated with the Downtown Petaluma SMART station in accounted for in the City of Petaluma's traffic model, and thereby the Future Conditions scenarios. As indicated in the recently-adopted Station Area Master Plan, the downtown SMART station is not intended to serve park-and-ride users; rather, it is intended to be used primarily by residents, visitors, and employees in the downtown area who would walk, ride, or use shuttles when traveling to and from the station. Facilities for park-and-ride users are planned to be provided at the second SMART rail station on Corona Road. Because the Corona station has been deferred to a date beyond the commencement of rail service, however, some park-and-ride activity is anticipated to occur at the downtown station under the Baseline scenario timeframe. Following is an assessment of the potential Baseline traffic impacts associated with SMART commuter traffic.

While commencement of SMART rail service may slightly increase traffic activity surrounding stations with commuter parking lots, it will also reduce commuter-related automobile traffic oriented to and from US 101, particularly on corridors such as Lakeville Street which is a major vehicle connector to the freeway system. With respect to the Riverfront traffic study, net changes to traffic volumes associated with the downtown Petaluma station would likely be negligible beyond the intersections adjacent to station parking areas. The Station Area Master Plan indicates that in the near-term, station parking would likely be located along D Street, thereby potentially affecting the Lakeville Street/D Street intersection. In order to assess the potential influences of the SMART station on this study intersection, updated LOS projections have been prepared for Baseline and Baseline plus Project conditions.

Table 5.10.D in the Station Area Plan provides a range of potential commuter-based peak parking demands at the downtown station, ranging from a low of 13 to a high of 102 spaces. It is important to distinguish that these numbers reflect peak parking demand, not peak hour trip generation. In order to translate parking projections to peak hour trip estimates, trip generation rates for commuter rail stations from the San Diego Association of Governments (SANDAG) were used. Assuming the high-range number of 102 spaces to represent the peak parking demand of the downtown park-and-ride users, a total of 36 a.m. peak hour and 38 p.m. peak hour trips would result[1]. While many of these trips are likely already passing through the intersection of Lakeville Street/D Street as commute trips to and from US 101, for the purposes of this comparative analysis all trips were assumed to be new to the street network.

A summary of the LOS calculations at the Lakeville Street/D Street intersection under Baseline conditions and with the addition of SMART station commuter traffic is shown in Table 1. The LOS calculations indicate that the intersection of Lakeville Street/D Street would be expected to operate at the same levels of service and similar average vehicle delays as reported for Baseline Conditions without the addition SMART commuter traffic. The conclusions, findings, and recommendations included in the traffic analysis of Baseline Conditions would therefore remain unchanged.

Table 1
Baseline Peak Hour Intersection Level of Service - With SMART Station

Study Intersection *Approach*	**Baseline Conditions**				**Baseline plus Project**			
	AM Peak		**PM Peak**		**AM Peak**		**PM Peak**	
	Delay	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**	**Delay**	**LOS**
2. Lakeville St/D St	**55.5**	**E**	42.3	D	**69.1**	**E**	48.6	D

Notes: Delay is measured in average seconds per vehicle; LOS = Level of Service
Bold text = deficient operation

Traffic Impacts Associated with Freight and Passenger Rail Operations

Potential intersection impacts associated with rail activity in Petaluma are addressed in the *Sonoma-Marin Area Rail Transit Project Final Environmental Impact Report*, Aspen Environmental Group, 2006. The FEIR indicates that mitigation measures have been developed to minimize rail impacts near the downtown Petaluma (and other) rail stations, including implementation of signal timing and sequencing that

[1] SANDAG trip generation rates for rail stations are 0.36 trips per parking space during the a.m. peak hour and 0.37 trips per parking space during the p.m. peak hour

integrates the train detection system with traffic signals, minimizing delays and allowing non-conflicting traffic movements to continue, as well as hardware interconnection systems that will allow gates to stay up while trains are stopped at an adjacent rail station (page 3.2-23). The FEIR reiterates the DEIR's conclusion that, with mitigation, SMART's impacts to delays at rail crossings would be a less than significant (page 3.2-23). With respect to additional activity associated with NWP freight trains, the FEIR indicates that freight service would be substantially less frequent than passenger service. More importantly, the DEIR and FEIR indicate that SMART has control of passenger and freight train dispatching, and that freight activity would occur during off-peak hours (FEIR page 3.2-24).

As indicated by the commenter, SMART headways are anticipated to be 30 minutes during peak hours, which translates to a maximum of four trains per hour (two in each direction). According to the SMART FEIR, the railroad gate operations associated with each train crossing are projected to last approximately 35 seconds (FEIR page 3.2-23) Cumulatively considered, this translates to rail gates being active approximately 2.3 minutes out of each peak hour. While there will be delays to drivers caused by each crossing activation, such delays represent only a small portion of the total delay encountered during the entire peak hour, even after considering the potential for residual delays to occur as traffic returns to normal operation. While precise accounting for the delays caused by SMART on adjacent intersections would require extensive modeling beyond that even conducted in the SMART EIR and FEIR, manual estimations suggest that the average peak hour vehicle delays reported in the Riverfront traffic analysis for intersections near rail crossings could increase by 1 to 2 seconds. Such increases would affect both the "without" and "with" project scenarios uniformly, and would result in no changes to traffic-related conclusions, findings, or recommendations.

Project Contribution toward Mitigation at Lakeville Street/D Street

The traffic analysis indicates that the intersection of Lakeville Street/D Street is projected to operate unacceptably at LOS F in the future both without and with the Riverfront project. The City of Petaluma General Plan EIR includes overriding considerations for future traffic operation at this intersection, finding that the installation of additional lanes or expanding vehicular capacity at this location (and five other intersections throughout the City) would conflict with General Plan goals and policies related to improving multi-modal circulation. The General Plan specifies roadway improvements including the Caulfield Lane extension (Southern Crossing) that may benefit area wide circulation at a broader level, including impacts at Lakeville Street/D Street.

From a traffic operations perspective and as described in the General Plan, the Caulfield Lane extension/Southern Crossing will benefit east-west connectivity for a large area of Petaluma. The Riverfront project would construct a portion of the extension between Hopper Avenue and the Petaluma River. The remaining component of the extension involving construction of a bridge over the Petaluma River and roadway extension to Petaluma Boulevard is included in the City's Traffic Mitigation Fee[2]. Developers of the Riverfront project would be subject to payment of traffic impact fees, which are by nature intended to be used for projects that benefit circulation at a citywide level, and would thereby be contributing toward the cost of numerous improvements including the Southern Crossing. In other words, the Project would be contributing to improvements that will improve future operation at Lakeville Street/D Street, as well as other streets, intersections, and multimodal facilities by paying their applicable traffic impact fees.

[2] *City of Petaluma Traffic Mitigation Fee Program Update*, Fehr & Peers, August 2012

Queuing Assessment for Lakeville Street near US 101 South Ramps

The potential for westbound vehicle queues at Lakeville Street/Caulfield Lane to affect operation at the adjacent intersection of Lakeville Highway/US 101 South Ramps was also assessed. If westbound queues originating at the Caulfield Lane intersection were to extend through the upstream US 101 South Ramps intersection, there would be a potential for spillback queues to then occur on the off-ramp, and potentially extend onto the mainline freeway. The two intersections are separated by approximately 650 feet, with approximately 540 feet of available storage between crosswalks.

As a condition of approval, the Riverfront project will be responsible for modifying the segment of Lakeville Street between Caulfield Lane and the US 101 South Ramps to increase queue storage in the westbound left turn lane to at least 250 feet, and to install a raised median in order to preclude left turn movements to and from abutting driveways. By extending the westbound left turn storage, the potential for upstream queuing to occur is decreased.

The projected westbound queue lengths at Lakeville Street/Caulfield Lane were evaluated in Simtraffic for Future plus Project conditions, assuming that the westbound left turn lane would be extended to at least 250 feet by the Riverfront project. The resulting 95th percentile westbound queues are projected to extend 304 feet in the a.m. peak hour and 565 feet in the p.m. peak hour. While the a.m. peak hour 95th percentile queues are projected to remain well within the available storage, the p.m. peak hour 95th percentile queue would extend approximately 25 feet beyond the 540 feet of available storage, or about one vehicle length. Such occurrences would be infrequent and short in duration, given that these queues represent the 95th percentile lengths, and the projection that *average* queue lengths are expected to be much shorter at 358 feet. A brief queue spillback of one vehicle into the Lakeville Highway/US 101 South Ramps intersection would also have minimal impact to queuing on the offramp itself, as only drivers in the offramp's right turn lane would be affected. Such conditions are typical at freeway interchanges during peak hours. A summary of the revised queuing calculations reflecting the lengthened westbound left turn pocket are attached.

Based on this assessment, the potential for queuing at Lakeville Street/Caulfield Lane to adversely affect the US 101 Southbound Ramps intersection and mainline freeway is considered to be a less-than-significant impact.

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Attachment: Queuing calculation sheets

Queuing and Blocking Report
AM Future plus Project (Mitigated with 250' WB left turn lane) 11/5/2013

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	151	288	228	252	297	254	118	180	295	389	99	479
Average Queue (ft)	132	227	180	173	155	156	40	137	249	308	93	379
95th Queue (ft)	186	320	253	292	304	274	132	220	331	424	114	568
Link Distance (ft)		1551	1551		534	534			536	536		487
Upstream Blk Time (%)										0		15
Queuing Penalty (veh)										0		0
Storage Bay Dist (ft)	130			250			100	120			75	
Storage Blk Time (%)	9	27		5	0	14		12	43		20	70
Queuing Penalty (veh)	28	54		18	0	10		25	68		75	94

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	338
Average Queue (ft)	137
95th Queue (ft)	434
Link Distance (ft)	487
Upstream Blk Time (%)	7
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Queuing and Blocking Report
PM Future plus Project (Mitigated with 250' WB left turn lane) 11/5/2013

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	L	T	TR	L	LT
Maximum Queue (ft)	154	654	638	349	512	494	220	180	418	457	99	507
Average Queue (ft)	130	477	461	304	354	358	170	132	259	309	68	503
95th Queue (ft)	196	727	717	387	565	562	299	207	451	498	128	511
Link Distance (ft)		1549	1549		534	534			538	538		487
Upstream Blk Time (%)					1	1			0	0		81
Queuing Penalty (veh)					13	11			0	2		0
Storage Bay Dist (ft)	130			250			100	120			75	
Storage Blk Time (%)	22	62		18	9	31	2	19	48		13	79
Queuing Penalty (veh)	85	156		90	47	95	10	42	88		63	79

Intersection: 3: Caulfield Ln & Lakeville St.

Movement	SB
Directions Served	R
Maximum Queue (ft)	500
Average Queue (ft)	413
95th Queue (ft)	656
Link Distance (ft)	487
Upstream Blk Time (%)	28
Queuing Penalty (veh)	0
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	