

## TECHNICAL MEMORANDUM

**To:** Madonna Marcelo, Terry A. Hayes Associates

**From:** Bryan Mayeda

**Date:** July 11, 2006

**Subject:** Gale Avenue – Walnut Drive Widening Traffic Impact Analysis

**P/J Number:** J06–1658

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### INTRODUCTION

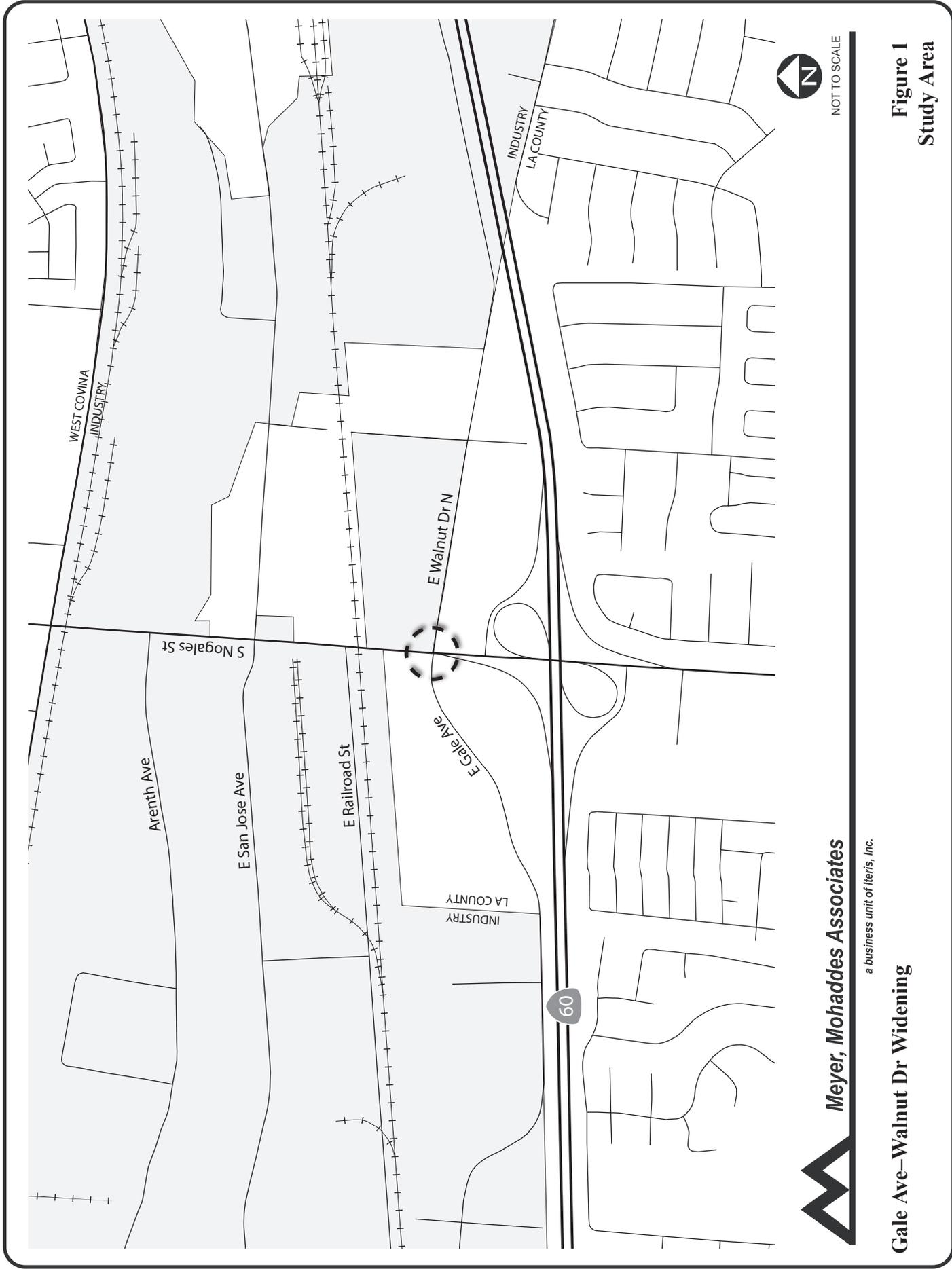
This technical memorandum summarizes a focused traffic impact analysis for the Gale Avenue – Walnut Drive widening in the vicinity of the planned Nogales Street grade separation. It is our understanding that the Gale Avenue – Walnut Drive widening had been assessed previously as part of the overall Nogales Street grade separation project. The widening project is now being assessed separately. The project would result in roadway and intersection modifications along the Gale Avenue – Walnut Drive corridor. The traffic analysis described below was conducted to identify the potential intersection operational impacts due to the widening of Gale Avenue - Walnut Drive, and focuses on the reconfiguration of the Gale Avenue - Walnut Drive and Nogales Street intersection.

### PROJECT DESCRIPTION

The proposed project would include the widening of a 1.7 mile segment of Gale Avenue/Walnut Drive bounded on each end by the City of Industry-County of Los Angeles boundary line. **Figure 1** illustrates the study area. The widening would extend approximately 1.25 miles on Walnut Drive and approximately 0.25 miles on Gale Avenue. At the intersection of Gale Avenue - Walnut Drive and Nogales Street, the proposed project would widen Walnut Drive by approximately 18 feet and reconfigure the eastbound approach to accommodate one exclusive left-turn lane, one shared through/right-turn lane, and one exclusive right-turn lane. The westbound approach would be widened by approximately 13 feet and reconfigured to accommodate one exclusive left-turn lane, one through lane, and one shared through/right-turn lane.

### EXISTING CONDITIONS

As mentioned above, the traffic impact analysis has been limited to the intersection of Gale Avenue - Walnut Drive and Nogales Street. Nogales Street is a six-lane roadway that travels in a north-south direction, while Gale Avenue - Walnut Drive provides two



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**Gale Ave-Walnut Dr Widening**

**Figure 1**  
**Study Area**

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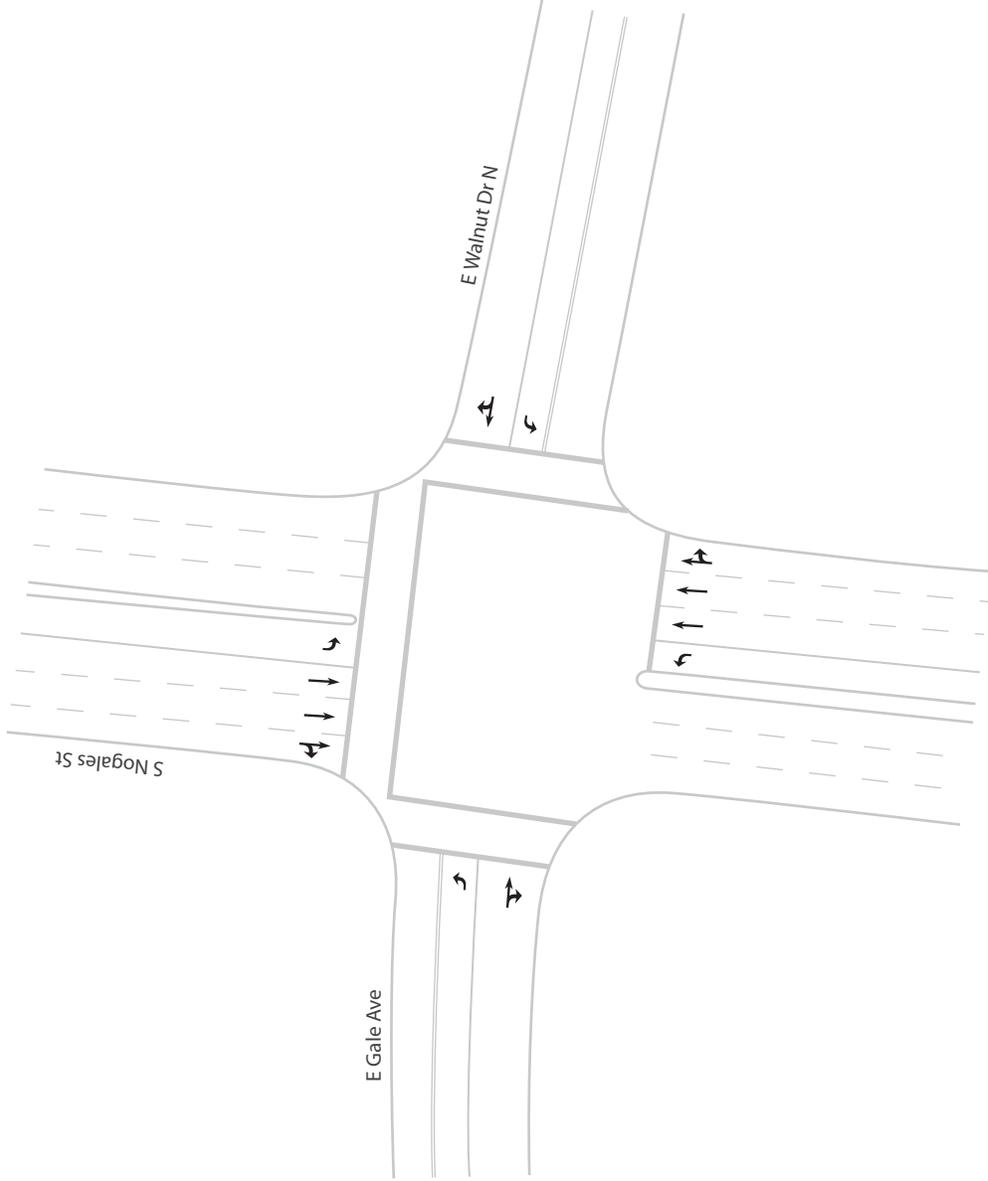
lanes with a left-turn center lane that runs east-west parallel to State Route 60 and intersects Nogales Street just north of the aforementioned freeway. **Figure 2** illustrates the existing lane configuration of the analyzed location.

New morning and evening peak period (7:00-9:00 AM and 4:00-6:00 PM) intersection turning movement traffic counts were conducted in July 2006 at the Gale Avenue - Walnut Drive and Nogales Street intersection. Based on the peak period traffic counts, the AM peak hour was determined to be 8:00 AM to 9:00 AM while the PM peak hour occurred at 5:00 PM to 6:00 PM. **Figure 3** illustrates the AM and PM peak hour turning movement volumes for the study intersection.

Using the existing traffic counts and lane configuration, a traffic model was developed to assess existing traffic operating conditions using the “Traffix” software package. Traffic operating conditions at the study intersection were analyzed using intersection capacity-based methodology known as the Circular 212 “Critical Movement Analysis” (CMA) method for the signalized locations. The efficiency of traffic operations at a location is measured in terms of Level of Service (LOS). Level of service is a description of traffic performance at intersections. The level of service concept is a measure of average operating conditions at intersections during an hour. It is based on a volume-to-capacity (V/C) ratio for signalized locations. Levels range from A to F with A representing excellent (free-flow) conditions and F representing extreme congestion. The CMA methodology compares the amount of traffic an intersection is able to process (the capacity) to the level of traffic during the peak hours (volume). A volume-to-capacity (V/C) ratio is calculated to determine the LOS. The delay for the intersection corresponds to a LOS value which describes the intersection operations. Intersections with vehicular volumes that are at or near capacity experience greater congestion and longer vehicle delays.

**Table 1** describes the LOS concept and the operating conditions for signalized intersections. Level of Service D is generally considered to be the minimum acceptable threshold for operating conditions in urban and suburban areas while LOS E and F conditions are considered deficient and warrant improvement to reach LOS D or better.

The results of the existing conditions level of service analysis indicate that the Gale Avenue - Walnut Drive and Nogales Street intersection currently operates at LOS C during the morning peak hour and at LOS F during the evening peak hour. **Table 2** summarizes the existing peak hour volume to capacity ratios and corresponding level-of-service for the study intersection based on existing traffic volumes, current intersection geometry and signal phasing pattern.



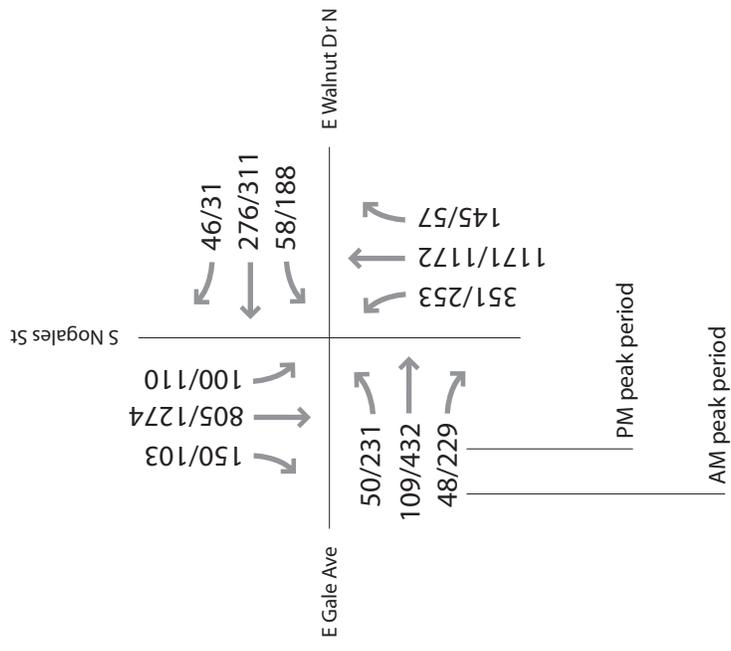
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**Gale Ave-Walnut Dr Widening**

**Figure 2  
 Existing Lane Configuration**

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**Figure 3**  
**Existing Peak Hour Volumes**

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**Table 1  
 Intersection Level-of-Service Definitions**

<b>LOS</b>	<b>Interpretation</b>	<b>Volume to Capacity Ratio</b>
A	Excellent operation. All approaches to the intersection appear quite open, turning movements are easily made, and nearly all drivers find freedom of operation.	0.000 - 0.600
B	Very good operation. Many drivers begin to feel somewhat restricted within platoons of vehicles. This represents stable flow. An approach to an intersection may occasionally be fully utilized and traffic queues start to form.	0.601 - 0.700
C	Good operation. Occasionally backups may develop behind turning vehicles. Most drivers feel somewhat restricted.	0.701 - 0.800
D	Fair operation. There are no long-standing traffic queues. This level is typically associated with design practice for peak periods.	0.801 - 0.900
E	Poor operation. Some long standing vehicular queues develop on critical approaches.	0.901 - 1.000
F	Forced flow. Represents jammed conditions. Backups from locations downstream or on the cross street may restrict or prevent movements of vehicles out of the intersection approach lanes; therefore, volumes carried are not predictable. Potential for stop and go type traffic flow.	Over 1.000
Source: Highway Capacity Manual, Special Report 209, Transportation Research Board, Washington D.C., 2000		

**Table 2  
 Existing Intersection Level-of-Service Summary**

<b>Gale Avenue - Walnut Drive &amp; Nogales Street</b>	<b>V/C</b>	<b>LOS</b>
AM Peak Hour	0.731	C
PM Peak Hour	1.095	F

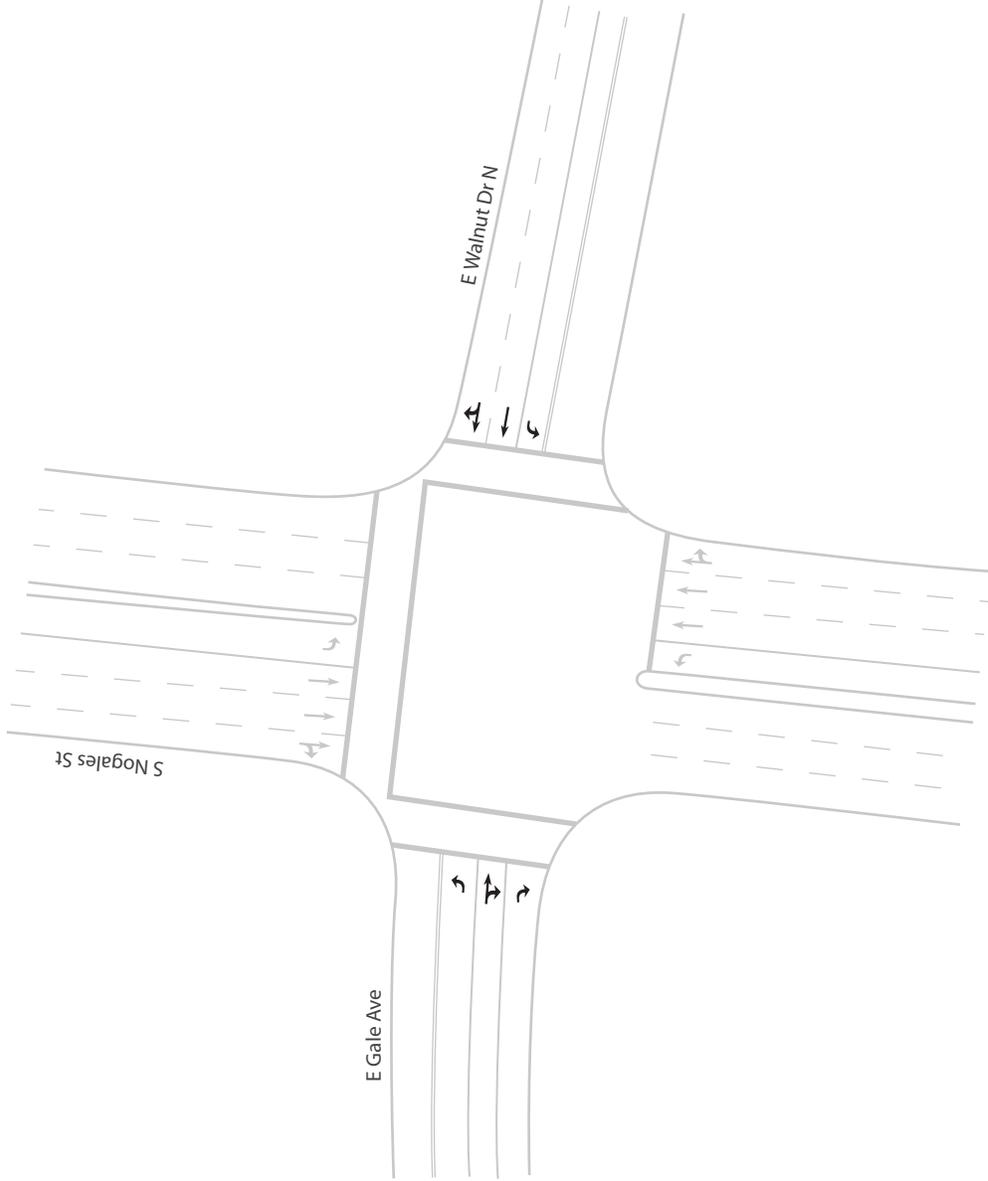
**EXISTING PLUS PROJECT CONDITIONS (PROPOSED CONFIGURATION)**

As described previously, the proposed project would reconfigure the intersection of Gale Avenue – Walnut Drive and Nogales Street by widening Walnut Drive by approximately 18 feet and reconfiguring the eastbound approach to accommodate one exclusive left-turn lane, one shared through/right-turn lane, and one exclusive right-turn lane. In addition, the westbound approach would be widened by approximately 13 feet and reconfigured to accommodate one exclusive left-turn lane, one through lane, and one shared through/right-turn lane. **Figure 4** illustrates the future lane configuration for the study intersection.

Intersection level-of-service analyses were then assessed at the analyzed intersection to reflect the “with-project” conditions. The existing peak hour traffic volumes previously shown in **Figure 3** were utilized in the assessment of conditions with the project. The results of the level of service analyses are summarized below in **Table 3**. As would be expected, the proposed reconfiguration of the intersection, due to the Gale Avenue – Walnut Drive widening, indicate that the intersection operating conditions would improve when compared to existing conditions (i.e., conditions without the project). As shown, under conditions with the project, the intersection is expected to operate at LOS B during the AM peak hour and LOS E during the PM peak hour. The level of service analysis would indicate a beneficial impact resulting in improved intersection operations.

**Table 3  
 Existing Plus Project Intersection Level-of-Service Summary**

<b>Gale Avenue - Walnut Drive &amp; Nogales Street</b>	<b>V/C</b>	<b>LOS</b>
AM Peak Hour	0.618	B
PM Peak Hour	0.935	E



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**Figure 4  
 Proposed Lane Configuration**

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It should be noted that the overall results at the analyzed intersection would be expected under future conditions with or without the Nogales Street grade separation. That is, the operating conditions at the Gale Avenue – Walnut Drive and Nogales Street intersection would be expected to improve with the future lane configuration at this location expected from the Gale Avenue – Walnut Drive widening (when compared to conditions without the widening).

## **CONCLUSIONS**

The widening of Gale Avenue - Walnut Drive resulting in the reconfiguring of the intersection at Nogales Street is expected to improve traffic operating conditions at this intersection. The traffic impact analysis showed an improvement of 0.113 in the V/C ratio for the AM peak hour (LOS C to LOS B) and a 0.160 improvement in V/C ratio for the PM peak hour (LOS F to LOS E) when comparing Existing conditions with Existing Plus Project conditions. This would indicate that with the widening project, the analyzed intersection at Gale Avenue – Walnut Drive and Nogales Street would be expected to experience an improvement in level of service.

Attached to this memo are the detailed level of service worksheets from the Traffix traffic model utilized for this analysis. The printouts contain all of the detailed information that was input to the model (e.g., peak hour turning movements and intersection geometry including number of lanes and signal phasing) to determine the peak hour operating conditions at the analyzed intersection.

**ATTACHMENT**  
**LEVEL OF SERVICE WORKSHEETS**

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 Gale/Walnut Traffic Analysis  
 AM Existing  
 Meyer Mohaddes Associates  
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Level Of Service Computation Report  
 Circular 212 Planning Method (Base Volume Alternative)  
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Intersection #1 Gale Avenue/Nogales St.  
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Cycle (sec): 100 Critical Vol./Cap. (X): 0.731  
 Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): xxxxxxx  
 Optimal Cycle: 69 Level Of Service: C  
 \*\*\*\*\*

Street Name:	Nogales Street						Gale Ave/Walnut Dr.					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0	2	1	0	2	1	0	0	1	0	0

Volume Module:	Nogales Street			Nogales Street			Gale Ave/Walnut Dr.			Gale Ave/Walnut Dr.		
Base Vol:	351	1171	145	100	805	150	50	109	48	58	276	46
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	351	1171	145	100	805	150	50	109	48	58	276	46
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	351	1171	145	100	805	150	50	109	48	58	276	46
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	351	1171	145	100	805	150	50	109	48	58	276	46
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	351	1171	145	100	805	150	50	109	48	58	276	46

Saturation Flow Module:	Nogales Street			Nogales Street			Gale Ave/Walnut Dr.			Gale Ave/Walnut Dr.		
Sat/Lane:	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.67	0.33	1.00	2.53	0.47	1.00	0.69	0.31	1.00	0.86	0.14
Final Sat.:	1425	3804	471	1425	3604	671	1425	989	436	1425	1221	204

Capacity Analysis Module:	Nogales Street			Nogales Street			Gale Ave/Walnut Dr.			Gale Ave/Walnut Dr.		
Vol/Sat:	0.25	0.31	0.31	0.07	0.22	0.22	0.04	0.11	0.11	0.04	0.23	0.23
Crit Vol:	351			318			50			322		
Crit Moves:	****			****			****			****		

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Gale/Walnut Traffic Analysis  
AM Mitigate (*w/Peas*)  
Meyer Mohaddes Associates

Level Of Service Computation Report  
Circular 212 Planning Method (Base Volume Alternative)

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Intersection #1 Gale Avenue/Nogales St.  
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Cycle (sec): 100 Critical Vol./Cap.(X): 0.618  
Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): xxxxxx  
Optimal Cycle: 49 Level Of Service: B  
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Street Name:	Nogales Street						Gale Ave/Walnut Dr.					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0	2	1	0	2	1	0	1	1	0	1

Volume Module:	Nogales Street			Nogales Street			Gale Ave/Walnut Dr.			Gale Ave/Walnut Dr.		
Base Vol:	351	1171	145	100	805	150	50	109	48	58	276	46
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	351	1171	145	100	805	150	50	109	48	58	276	46
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	351	1171	145	100	805	150	50	109	48	58	276	46
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	351	1171	145	100	805	150	50	109	48	58	276	46
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.00	1.00	1.00
Final Vol.:	351	1171	145	100	805	150	50	109	53	58	276	46

Saturation Flow Module:	Nogales Street			Nogales Street			Gale Ave/Walnut Dr.			Gale Ave/Walnut Dr.		
Sat/Lane:	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.67	0.33	1.00	2.53	0.47	1.00	1.00	1.00	1.00	1.71	0.29
Final Sat.:	1425	3804	471	1425	3604	671	1425	1425	1425	1425	2443	407

Capacity Analysis Module:	Nogales Street			Nogales Street			Gale Ave/Walnut Dr.			Gale Ave/Walnut Dr.		
Vol/Sat:	0.25	0.31	0.31	0.07	0.22	0.22	0.04	0.08	0.04	0.04	0.11	0.11
Crit Vol:	351				318		50				161	
Crit Moves:	****				****		****				****	

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 Gale Ave/ Nogales Ave Traffic Analysis  
 PM Existing  
 Meyer Mohaddes Associates  
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Level Of Service Computation Report  
 Circular 212 Planning Method (Base Volume Alternative)

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Intersection #1 Gale Avenue/Nogales St.

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Cycle (sec): 100 Critical Vol./Cap. (X): 1.095  
 Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): xxxxxx  
 Optimal Cycle: 180 Level Of Service: F

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Street Name:	Nogales Street						Gale Ave/Walnut Dr.					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0	2	1	0	2	1	0	0	1	0	0

Volume Module:

Base Vol:	253	1172	57	110	1274	103	231	432	229	188	311	31
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	253	1172	57	110	1274	103	231	432	229	188	311	31
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	253	1172	57	110	1274	103	231	432	229	188	311	31
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	253	1172	57	110	1274	103	231	432	229	188	311	31
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Final Vol.:	253	1172	57	110	1274	103	231	432	229	188	311	31

Saturation Flow Module:

Sat/Lane:	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.86	0.14	1.00	2.78	0.22	1.00	0.65	0.35	1.00	0.91	0.09
Final Sat.:	1425	4077	198	1425	3955	320	1425	931	494	1425	1296	129

Capacity Analysis Module:

Vol/Sat:	0.18	0.29	0.29	0.08	0.32	0.32	0.16	0.46	0.46	0.13	0.24	0.24
Crit Vol:	253			459			661			188		
Crit Moves:	****			****			****			****		

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Gale Ave/ Nogales Ave Traffic Analysis  
 PM Mitigate (w/ PROS)  
 Meyer Mohaddes Associates

Level Of Service Computation Report  
 Circular 212 Planning Method (Base Volume Alternative)

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Intersection #1 Gale Avenue/Nogales St.

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Cycle (sec): 100 Critical Vol./Cap.(X): 0.935  
 Loss Time (sec): 0 (Y+R=4.0 sec) Average Delay (sec/veh): xxxxxx  
 Optimal Cycle: 180 Level Of Service: E

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Street Name:	Nogales Street						Gale Ave/Walnut Dr.					
Approach:	North Bound			South Bound			East Bound			West Bound		
Movement:	L	T	R	L	T	R	L	T	R	L	T	R
Control:	Protected			Protected			Permitted			Permitted		
Rights:	Include			Include			Include			Include		
Min. Green:	0	0	0	0	0	0	0	0	0	0	0	0
Lanes:	1	0	2	1	0	2	1	0	1	1	0	1

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Volume Module:

Base Vol:	253	1172	57	110	1274	103	231	432	229	188	311	31
Growth Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Initial Bse:	253	1172	57	110	1274	103	231	432	229	188	311	31
User Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
PHF Volume:	253	1172	57	110	1274	103	231	432	229	188	311	31
Reduct Vol:	0	0	0	0	0	0	0	0	0	0	0	0
Reduced Vol:	253	1172	57	110	1274	103	231	432	229	188	311	31
PCE Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
MLF Adj:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.10	1.00	1.00	1.00
Final Vol.:	253	1172	57	110	1274	103	231	432	252	188	311	31

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Saturation Flow Module:

Sat/Lane:	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425	1425
Adjustment:	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Lanes:	1.00	2.86	0.14	1.00	2.78	0.22	1.00	1.00	1.00	1.00	1.82	0.18
Final Sat.:	1425	4077	198	1425	3955	320	1425	1425	1425	1425	2592	258

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Capacity Analysis Module:

Vol/Sat:	0.18	0.29	0.29	0.08	0.32	0.32	0.16	0.30	0.18	0.13	0.12	0.12
Crit Vol:	253			459			432			188		
Crit Moves:	****			****			****			****		

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