

TRAFFIC STUDY

**PROPOSED COMMERCIAL DEVELOPMENT
AT THE NORTHEAST CORNER OF
SOUTH H STREET & TAFT HIGHWAY (SR 119)**

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A handwritten signature in blue ink, appearing to read "Ian J. Parks", is written over a horizontal line.

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INTRODUCTION

The purpose of this study is to evaluate the potential traffic impact of a proposed commercial development located at the northeast corner of South H Street and Taft Highway (State Route 119) in Kern County, California.

A. Land Use, Site and Study Area Boundaries

The proposed project consists of a travel center, which includes 16 auto fueling positions and 8 truck fueling position (See Figure 3: Site Plan). The City of Bakersfield zoning classification for the site is C-2 (General Commercial).

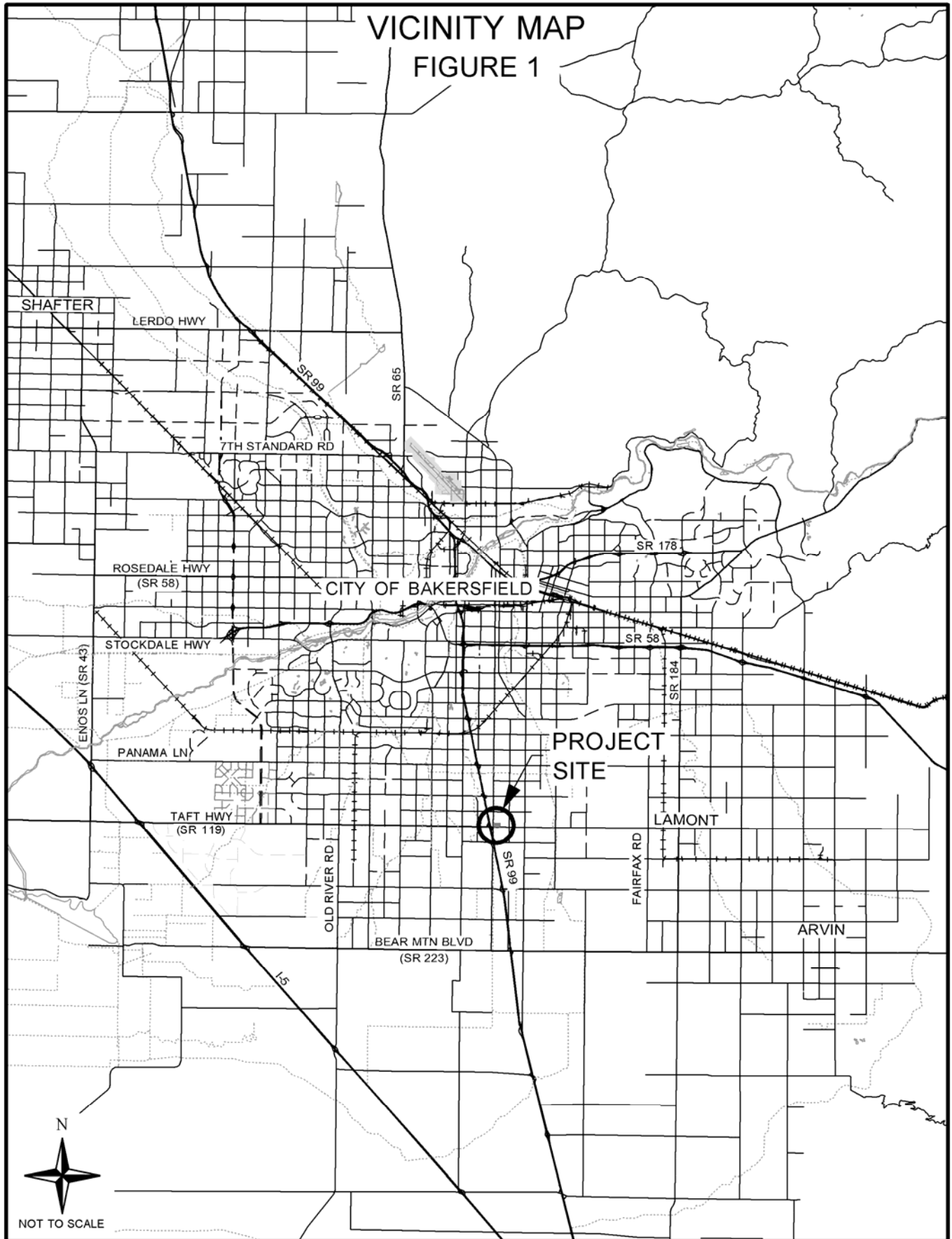
The scope of the study includes six intersections, five which are signalized and one that is stop controlled. The scope of the study was developed in association with the City of Bakersfield Public Works Department and Caltrans District 6. A vicinity map is presented in Figure 1 and a location map is presented in Figure 2.

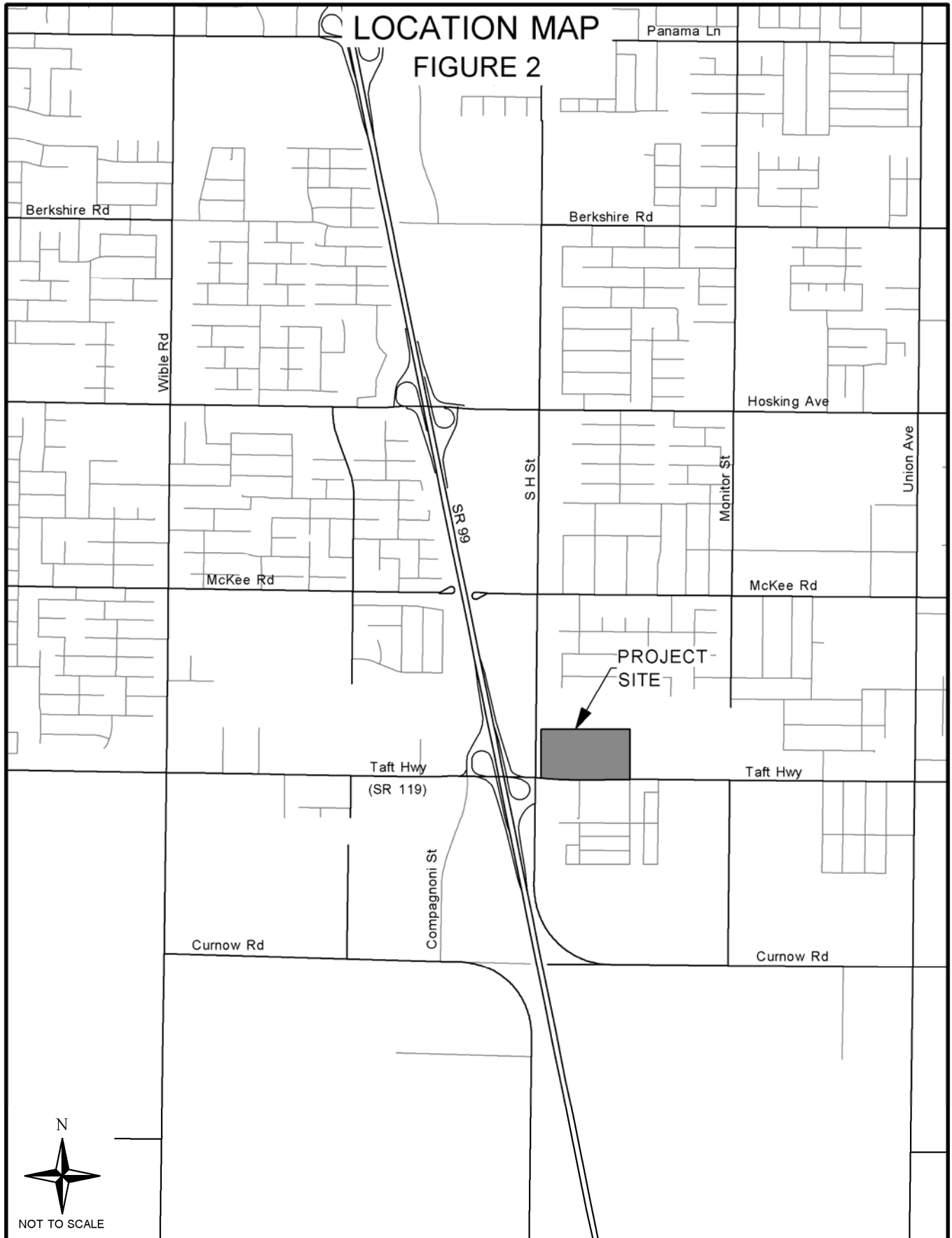
B. Existing Site Uses and Site Access

The project site currently consists of flat vacant land, with no building or other structures. Access to the site is proposed along Taft Highway.

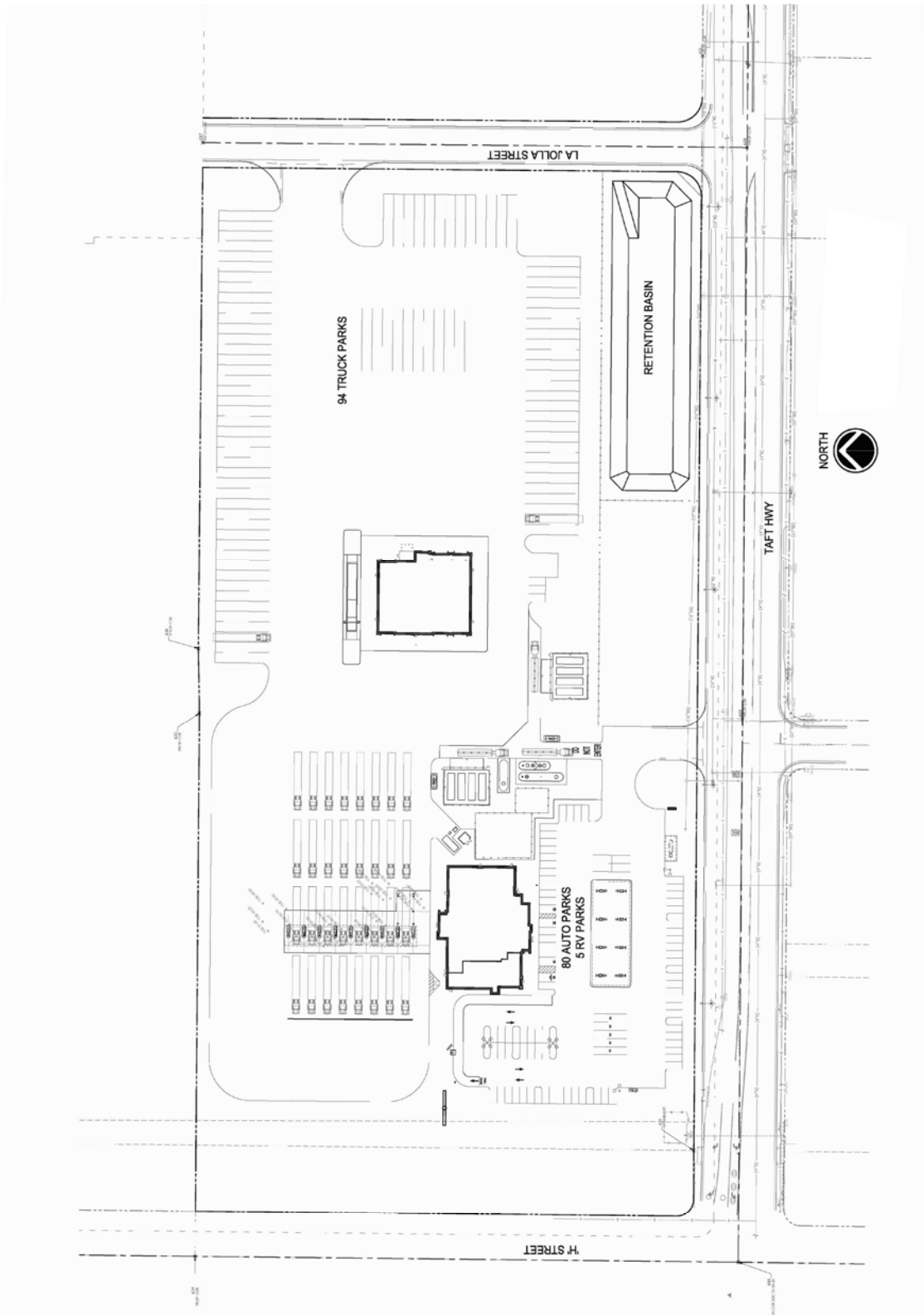
C. Existing Uses in Vicinity of the Site

Existing land uses in the vicinity of the project site include single-family residences to the north and east, a mini-storage facility, manufactured home retailer and mobile home park to the south, commercial and residential land uses to the west, as well as the Kern Island Canal along the west border of the site. The interchange of State Route 99 and State Route 119 is 650 feet west of the project site.





SITE PLAN FIGURE 3



D. Roadway Descriptions

State Route 99 (Golden State Highway) is a major north-south route through the central valley of California, extending from Interstate 5 south of Bakersfield to Sacramento. State Route 99 operates as an eight-lane freeway between the interchange with Taft Highway and Airport Drive, with six-lanes elsewhere in Kern County.

South H Street is a two-lane north-south arterial with improvements adjacent to development to the north. In the vicinity of the project, South H Street provides access to commercial and residential land uses, as well as State Route 119 (Taft Highway).

Taft Highway, an east-west roadway, is designated as an expressway west of State Route 99 (State Route 119) and as an arterial east of State Route 99. It currently exists as a two-lane roadway at various stages of widening adjacent to development between State Route 99 and South Union Avenue. Taft Highway continues as a two-lane roadway with graded shoulders east of South Union Avenue along the Panama Road alignment. Within the project vicinity, Taft Highway provides access from the communities of Greenfield, Weedpatch and Lamont to State Route 99.

S Union Avenue is designated as an arterial. Formerly a segment of State Route 99, South Union Avenue extends from State Route 99 to Brundage Lane, and continues north to Columbus Street as Union Avenue. In the project vicinity, South Union Avenue operates with six-lanes and narrows to four-lanes south of Taft Highway. It provides access to residential, commercial and industrial areas.

Wible Road is a north-south arterial located adjacent to State Route 99. It currently operates as a four-lane roadway north of Berkshire Road and as a two-lane roadway at various widths and stages of improvement south of Berkshire Road. It provides access to residential, commercial and industrial land uses within the study area.

PROJECT TRIP GENERATION AND DESIGN HOUR VOLUMES

The Institute of Transportation Engineers (ITE) Trip Generation, 10th Edition manual, which is typically used in order to estimate traffic volumes generated by various types of land uses, provides very little data for truck stops, and does not capture the wide range of services truck stops provide. Therefore, the trip generation and design hour volumes shown in Table 1 were calculated using a study prepared specifically for this type of land use. Information for the study was gathered from six locations with similar land uses throughout California, and represents the anticipated characteristics of the project being studied here (a copy of the study is included in the appendix). The data provided in the trip generation study was used to prepare the project traffic estimates shown below.

Table 1
Project Trip Generation

General Information			Daily Trips		AM Peak Hour Trips			PM Peak Hour Trips		
ITE Code	Development Type	Variable	ADT RATE	ADT	Rate	In % Split/ Trips	Out % Split/ Trips	Rate	In % Split/ Trips	Out % Split/ Trips
Omni	Commercial Development (Truck Stop)	24 Vehicle Fueling Positions	213.03	5113	10.7	50%	50%	12.12	50%	50%
						129	129		145	145
sub-total				5,113		129	129		145	145
<i>Adjustments</i>										
Pass-by		15%		767		19	19		22	22
Total				4,346		110	110		123	123

In addition to trip generation volumes, the study also determined that approximately 88% of the trips are diverted link trips when adjacent to an interchange, as this proposed project is.

TRIP DISTRIBUTION AND ASSIGNMENT

The project trip distribution in Table 2 represents the most logically traveled routes for traffic accessing the project. Project traffic distribution was estimated based on a review of the potential draw from State Route 119, State Route 99, and the type of land use involved. These assumptions were used to distribute project traffic as shown in Figure 4.

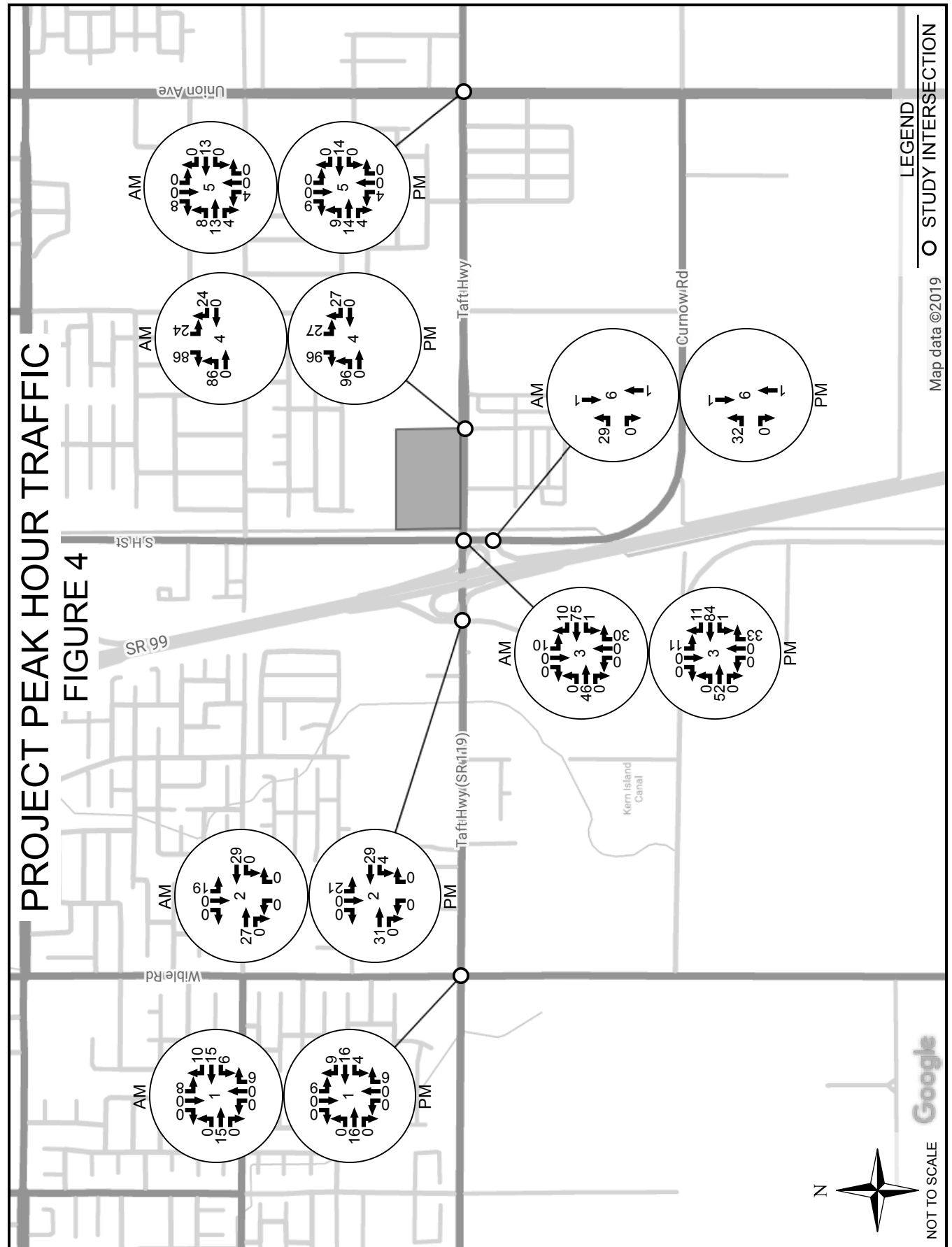
Table 2
Project Trip Distribution

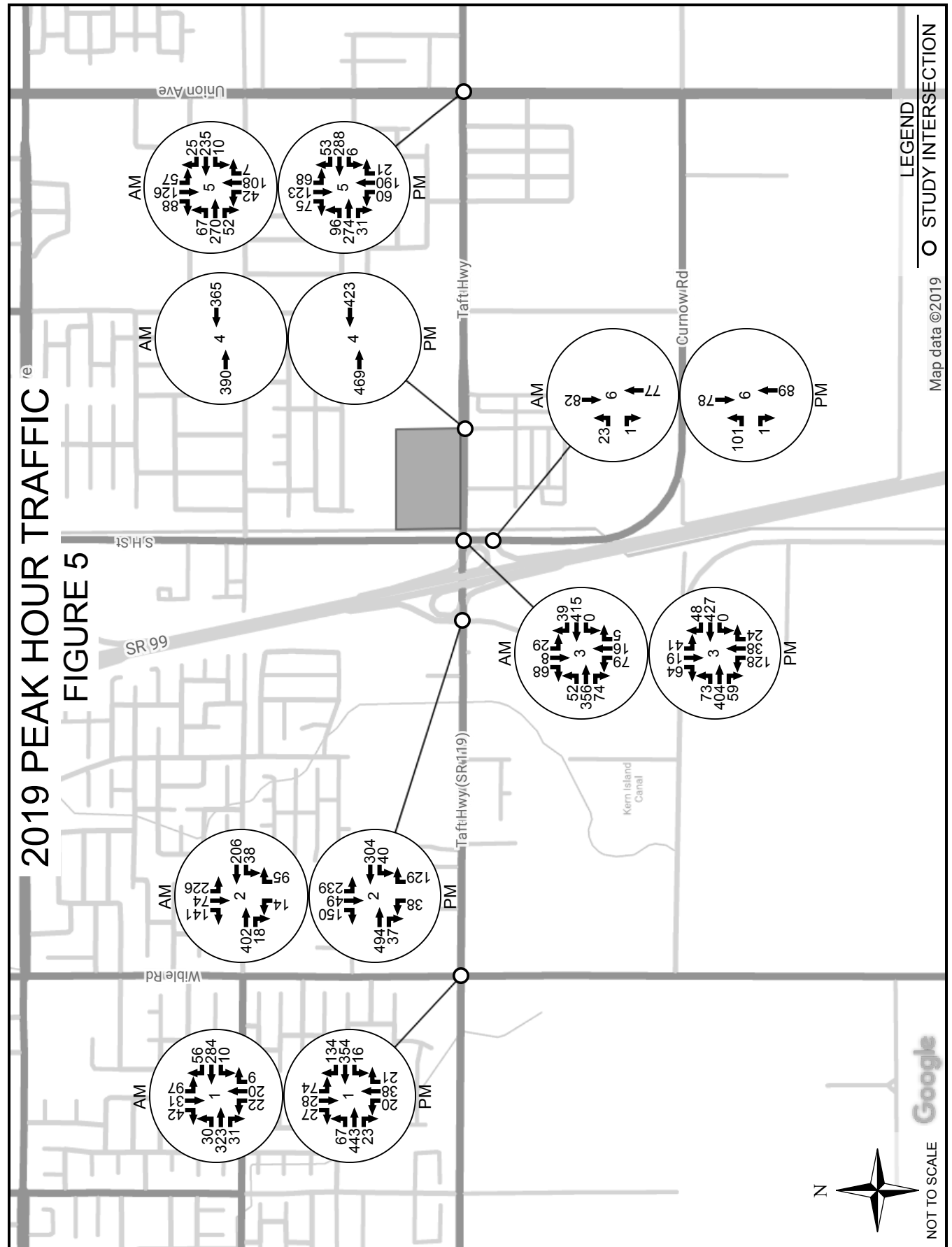
Direction	Percent	Primary Roadways
North	35%	South H Street/State Route 99
East	15%	Taft Highway (State Route 119)
South	35%	South H Street/State Route 99
West	15%	Taft Highway (State Route 119)

EXISTING AND FUTURE TRAFFIC

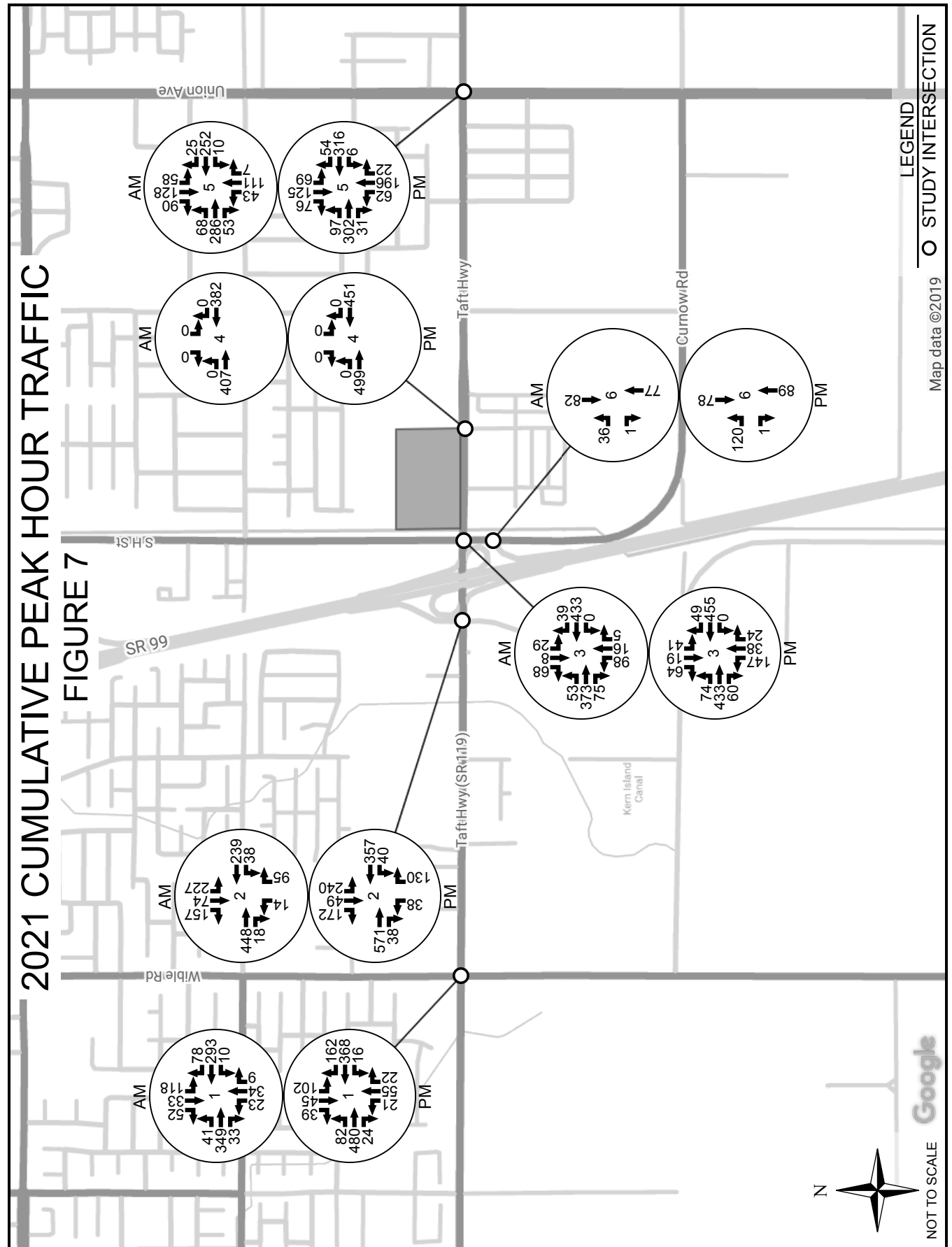
Existing peak hour turn movement volumes were field measured on May 9, 2019 at the study intersections and are shown in Figure 4. Existing plus project peak hour volumes are shown in Figure 6.

Annual growth rates of approximately 0.15% to 3.0% were applied to existing traffic volumes to estimate future traffic volumes for the year 2035. These growth rates were estimated based on a review of existing developments and KernCOG traffic model data. Cumulative traffic was also estimated for projects that would not yet be accounted for in the KernCOG traffic model. An estimate of the cumulative traffic was distributed and added to the future traffic volume estimates at the study intersections. Future peak hour volumes are shown in Figures 7 and 8.

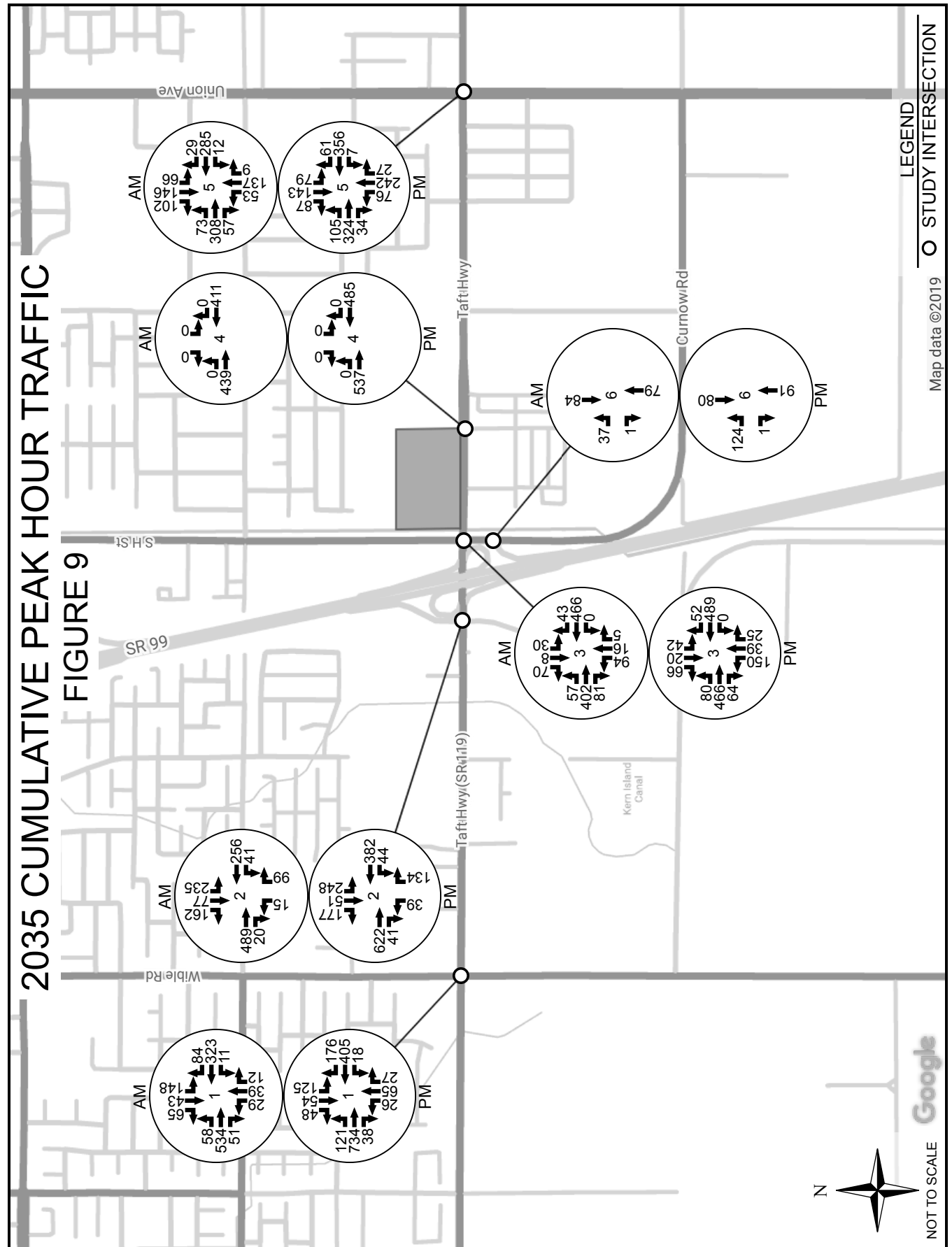


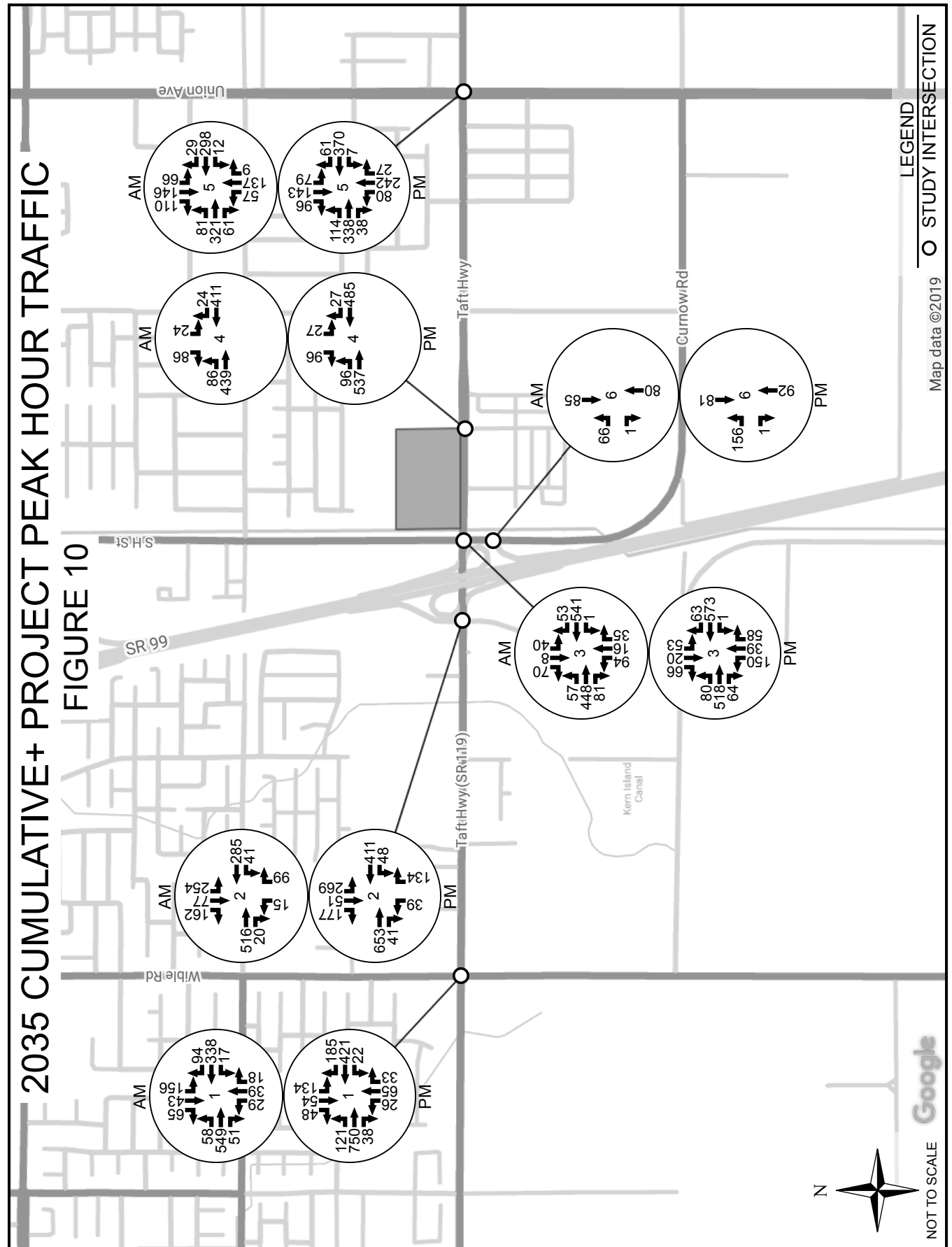












INTERSECTION ANALYSIS

A capacity analysis of the study intersections was conducted using Synchro 9 software from Trafficware. This software utilizes the 2010 capacity analysis methodology in the Transportation Research Board's Highway Capacity Manual. The analysis was performed for the following traffic scenarios:

- Existing (2019)
- Existing+Project (2019)
- Opening Year
- Opening Year+Project
- Future - Cumulative (2035)
- Future - Cumulative+Project (2035)

Level of service (LOS) criteria for unsignalized and signalized intersections, as described in HCM 2010, are presented in the tables below. Level of service analysis results for the study intersections are presented in Table 3. The intersection peak hour level of service goal for the City of Bakersfield is LOS C or better.

LEVEL OF SERVICE CRITERIA UNSIGNALIZED INTERSECTION

Average Control Delay (sec/veh)	Level of Service	Expected Delay to Minor Street Traffic
≤ 10	A	Little or no delay
> 10 and ≤ 15	B	Short traffic delays
> 15 and ≤ 25	C	Average traffic delays
> 25 and ≤ 35	D	Long traffic delays
> 35 and ≤ 50	E	Very long traffic delays
> 50	F	Extreme delays

LEVEL OF SERVICE CRITERIA SIGNALIZED INTERSECTIONS

Volume/Capacity	Control Delay (sec/veh)	Level of Service
< 0.60	≤ 10	A
0.61 - 0.70	> 10 and ≤ 20	B
0.71 - 0.80	> 20 and ≤ 35	C
0.81 - 0.90	> 35 and ≤ 55	D
0.91 - 1.00	> 55 and ≤ 80	E
> 1.0	> 80	F

Table 3a
AM Intersection Level of Service

#	Intersection	Control Type	2019	2019+ Project	2021 Cum ¹	2021 Cum ¹ + Project	2035 Cum ¹	2035 Cum ¹ + Project	2035 Cum ¹ + Project w/Mitigation ²
1	Wible Rd & Taft Hwy (SR 119)	Signal	C	C	C	C	C	C	C ³
2	SR 99 SB Off Ramp/Compagnoni St & Taft Hwy (SR 119)	Signal	C	C	C	C	C	C	-
3	H St & Taft Hwy (SR 119)	Signal	B	B	B	B	B	B	-
4	Project Entrance & Taft Hwy (SR 119)/ Panama Rd	Signal	A	A	A	B	A	B	-
5	Union Ave & Taft Hwy (SR 119)/ Panama Rd	Signal	C	C	C	C	C	C	-
6	S H St & SR 99 NB Off Ramp	EB	A	B	A	B	B	B	-

¹Cum=Other Project traffic added to future background volumes.

²See Table 7 for Mitigation Measures.

³Mitigation due to PM level of service.

Table 3b
PM Intersection Level of Service

#	Intersection	Control Type	2019	2019+ Project	2021 Cum ¹	2021 Cum ¹ + Project	2035 Cum ¹	2035 Cum ¹ + Project	2035 Cum ¹ + Project w/Mitigation ²
1	Wible Rd & Taft Hwy (SR 119)	Signal	C	C	C	C	D (41.5)	D (43.7)	C
2	SR 99 SB Off Ramp/Compagnoni St & Taft Hwy (SR 119)	Signal	C	C	C	C	C	C	-
3	H St & Taft Hwy (SR 119)	Signal	B	B	B	B	B	B	-
4	Project Entrance & Taft Hwy (SR 119)/ Panama Rd	Signal	A	A	A	B	A	B	-
5	Union Ave & Taft Hwy (SR 119)/ Panama Rd	Signal	C	C	C	C	C	C	-
6	S H St & SR 99 NB Off Ramp	EB	B	B	B	B	B	B	-

¹Cum=Other Project traffic added to future background volumes.

²See Table 7 for Mitigation Measures.

TRAFFIC SIGNAL WARRANT ANALYSIS

A peak hour signal warrant evaluation was conducted for the study intersections based on the California Manual on Uniform Traffic Control Devices (MUTCD). Peak hour signal warrants assess delay to traffic on the minor street approaches when entering or crossing a major street. Signal warrant analysis results for the AM and PM peak hour are shown in Tables 4a through 4d.

It is important to note that a signal warrant defines the minimum condition under which signalization of an intersection might be warranted. Meeting this threshold does not suggest traffic signals are required, but rather, that other traffic factors and conditions be considered in order to determine whether signals are truly justified.

It is also noted that signal warrants do not necessarily correlate with level of service. An intersection may satisfy a signal warrant condition and operate at or above an acceptable level of service, or operate below an acceptable level of service and not meet signal warrant criteria.

Table 4a
AM Traffic Signal Warrants - Existing

#	Intersection	2019			2019+Project		
		Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met
4	Project Entrance at Taft Hwy (SR 119)	755	0	NO	865	110	NO
6	H St at SR 99 NB Off Ramp	159	24	NO	161	53	NO

Table 4b
AM Traffic Signal Warrants - Future

#	Intersection	2021 Cumulative			2021+Project Cumulative			2035 Cumulative			2035+Project Cumulative		
		Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met
4	Project Entrance at Taft Hwy (SR 119)	789	0	NO	899	110	NO	850	0	NO	960	110	NO
6	H St at SR 99 NB Off Ramp	159	37	NO	161	66	NO	163	38	NO	165	67	NO

Table 4c
PM Traffic Signal Warrants - Existing

#	Intersection	2019			2019+Project		
		Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met
4	Project Entrance at Taft Hwy (SR 119)	892	0	NO	1015	123	NO
6	H St at SR 99 NB Off Ramp	167	102	NO	169	134	NO

Table 4d
PM Traffic Signal Warrants - Future

#	Intersection	2021 Cumulative			2021+Project Cumulative			2035 Cumulative			2035+Project Cumulative		
		Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met	Major Street Total Approach Vol	Minor Street High Approach Vol	Warrant Met
4	Project Entrance at Taft Hwy (SR 119)	950	0	NO	1073	123	YES	1022	0	NO	1145	123	YES
6	H St at SR 99 NB Off Ramp	167	121	NO	169	153	NO	171	125	NO	173	157	NO

ROADWAY ANALYSIS

Roadway average daily traffic (ADT) and capacities are shown in Table 5a. The volume-to-capacity ratios shown in Table 5b were calculated using the published roadway ADT information and future projected traffic volumes.

A volume-to-capacity ratio (v/c) equal to or less than 0.80 corresponds to a LOS of C, as defined in the Highway Capacity Manual. The City of Bakersfield operational goal for roadway capacity is LOS “C” or better. Mitigation is required where project traffic reduces the LOS to below an acceptable level, or where the pre-existing condition of the roadway is below an acceptable level of service and degrades below the pre-existing LOS with the addition of the project.

Table 5a
Roadway ADT & Capacity

Street	2019 ¹	CUM ² ADT	Project ADT	2019+Proj ADT	2021 ADT	2021+Proj CUM ² ADT	2035 CUM ² ADT	2035+Proj CUM ² ADT	Existing Capacity	Mitigated Capacity
Taft Hwy (SR 119): Wible Rd to SR 99 SB Off Ramp/Campagnoni St	15821	1095	1131	16952	17140	18271	18797	19928	15000	30000
Taft Hwy: SR 99 SB Off Ramp/ Campagnoni St to S H St	15771	520	2403	18174	16464	18867	17727	20130	15000	30000
Taft Hwy: S H St to Project Entrance	10628	373	3392	14020	11119	14511	11982	15374	15000	30000
Taft Hwy: Project Entrance to Union Ave	10036	373	954	10990	10520	11474	11335	12289	15000	30000

¹Cum = Other Project traffic added to future background volumes.

²See Table 8 for mitigation measures.

Table 5b
Roadway Level of Service

Street	v/c 2019	v/c 2019+Proj	(CUM ¹) 2021	(CUM ¹) 2021+Proj	(CUM ¹) 2035	v/c (CUM ¹) 2035+Proj	v/c(Mit ²) 2035+Proj
Taft Hwy (SR 119): Wible Rd to SR 99 SB Off Ramp/Campagnoni St	1.05	1.13	1.14	1.22	1.25	1.33	0.66
Taft Hwy: SR 99 SB Off Ramp/ Campagnoni St to S H St	1.05	1.21	1.10	1.26	1.18	1.34	0.67
Taft Hwy: S H St to Project Entrance	0.71	0.93	0.74	0.97	0.80	1.02	0.51
Taft Hwy: Project Entrance to Union Ave	0.67	0.73	0.70	0.76	0.76	0.82	0.41

¹Cum = Other Project traffic added to future background volumes.

²See Table 8 for mitigation measures.

QUEUE ANALYSIS

A queue length analysis was conducted at all stop-controlled freeway off ramps within the study area to evaluate the adequacy of the existing storage lengths. Table 9 below, shows the existing storage lengths, as well as the 95th percentile queue length determined for each traffic scenario analyzed.

Table 6
QUEUE ANALYSIS

Facility Studied	Movement	Existing Storage (ft)	2019		2019 +Project		2021 Cum ¹		2021 Cum ¹ +Project		2035 Cum ¹		2035 Cum ¹ +Project	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
State Route 99 SB Off Ramp	SBL	330	258	225	222	245	242	239	246	263	254	253	266	273
	SBR	200	89	91	89	110	110	121	90	128	127	138	88	156
State Route 99 NB Off Ramp	EBRL	1000	49	73	65	73	61	77	66	77	57	73	69	82

NOTE: All queue lengths are shown in feet.

¹Cum=Other Project traffic added to future background volumes.

VEHICLE MILES TRAVELED (VMT) EVALUATION

An evaluation of vehicle miles traveled (VMT) for project traffic was conducted based on applicable California Environmental Quality Act (CEQA) guidelines. The analysis involved comparing an estimate of VMT attributable to the project to a baseline VMT for the metropolitan Bakersfield area and assessing whether project VMT would result in a significant transportation impact.

Several factors were taken into consideration when estimating project VMT, including proposed land use, project trip type and distribution, and location of other similar land developments. As noted previously, given the project's close proximity to the SR 119 interchange at SR 99, it is estimated that 88 percent of traffic generated by the project would be diverted-link trips. These trips would exit SR 99, stop at the project site, and then return to the freeway in the same direction of travel as before the stop. In addition, it is estimated that 10 percent of project traffic would be pass-by trips. These trips are intermediate stops made between trip origin and ultimate destination and, like diverted-link trips, would exit the project in the same direction of travel as before the stop. Primary trips would comprise the remaining two percent of project traffic.

Based on the table below, it is anticipated that the project will result in a weighted average VMT of 1.10 miles per vehicle per day. An average daily VMT of 19.17 miles was obtained from the Kern Council of Governments (KernCOG) for use in this study. This baseline (2017) average VMT was developed based on household and employment populations in the metropolitan Bakersfield area as well as local and regional travel patterns.

Project Vehicle Miles Traveled

		Trip Length (miles)				
Trip Type	Project ADT	State Route 99		Street Network	Miles Traveled	Average VMT
		NB	SB			
Diverted-Link	4,500	1.09	1.37	---	5,535	1.23
Pass-By	511	---	---	---	0	0
Primary	102	---	---	1.00	102	1.00
Total	5,113	Weighted Average				1.10

Assumed 50/50 split of diverted-link trips from NB/SB SR 99

SR 99 NB/SB trip lengths based on distance between ramp exit/merge points and project entrance

Street network trip length based on proximity of similar land developments

Pass-by trips are drawn from adjacent street traffic, and therefore, do not contribute to project VMT

The average project VMT of 1.10 miles per vehicle per day is less than the baseline average VMT of 19.17 miles. Therefore, the project is not expected to result in a significant transportation impact.

MITIGATION

Intersection improvements needed by the year 2035 to maintain or improve the operational level of service of the street system in the vicinity of the project is shown in Tables 7 and 8.

**Table 7
Future Intersection Improvements and Local Mitigation**

#	Intersection	Total Improvements Required by 2035	Local Mitigation (Improvements not covered by RTIF)
1	Wible Rd & Taft Hwy (SR 119)	Add 1 EBT, 1 WBT	-

Notes: NB = Northbound; L = Left-Turn Lane; B = Southbound; T = Through Lane; WB = Westbound;
R = Right-Turn Lane; EB = Eastbound

**Table 8
Future Roadway Improvements and Local Mitigation**

Roadway Segment	Total Improvements Required by 2035	Local Mitigation (Improvements not covered by RTIF)
Taft Hwy (SR 119): Wible Rd to SR 99 SB Off Ramp/ Campagnoni St	Add 2 Lanes	RTIF includes a project to improve the interchange.
Taft Hwy (SR 119): SR 99 SB Off Ramp/ Campagnoni St to S H St	Add 2 Lanes	RTIF includes a project to improve the interchange.
Taft Hwy (SR 119): S H St to Project Entrance	Add 2 Lanes	Taft Highway will be improved on the north side with the construction of the project. The south side is wide enough to be striped for two eastbound lanes.
Taft Hwy (SR 119): Project Entrance to Union Ave	Add 2 Lanes	RTIF includes a project to widen Taft Hwy.

SUMMARY AND CONCLUSIONS

This study evaluated the potential traffic impact of a proposed commercial development located at the northeast corner of South H Street and Taft Highway (State Route 119).

Intersection Level of Service Analysis

All intersections currently operate at an acceptable level of service and are anticipated to continue to do so through the opening year (2021).

By the year 2035, it is anticipated that the intersection of Wible Road & Taft Highway (SR 119) will operate below an acceptable level of service prior to the addition of project traffic. All remaining intersections operating at or above LOS C, are anticipated to continue to do so after the addition of project traffic in the future year (2035).

Roadway Level of Service Analysis

The roadway segments of Taft Highway (SR 119) from Wible Road to the State Route 99 Off Ramp and from the State Route 99 Off Ramp to South H Street operate below an acceptable level of service in the existing year (2019). With the addition of project traffic in the existing year, it is anticipated that the segment of Taft Highway (SR 119) from S H Street to the project entrance will operate below an acceptable level of service. As part of the project, the north side of Taft Highway will be widened and could be striped for four lanes along the project frontage.

By 2035, with the addition of project traffic, it is anticipated that the roadway segment of Taft Highway (SR 119) from the project entrance to Union Avenue will operate below an acceptable level of service with the addition of project traffic.

All mitigation items are covered by improvements built by the project or the RTIF program.

Queue Analysis

Based on the data shown in Table 6, the queue lengths for the movements studied at the State Route 99 southbound and northbound off ramps are not anticipated to exceed the available storage lengths.

Vehicle Miles Traveled (VMT) Evaluation

The average project VMT is less than the baseline average for the metropolitan Bakersfield area. Therefore, the project is not expected to result in a significant transportation impact.

Conclusion

One study intersection and all roadway segments were identified to need improvements by the year 2035 in order to maintain acceptable levels of service (shown in Tables 7 and 8). These improvements are included on the RTIF facilities list. Provided the RTIF improvements are constructed, it is anticipated that the proposed commercial General Plan Amendment (GPA) and Zone Change will have minimal impact on traffic operations in the vicinity of the project.

REFERENCES

1. Annual Traffic Census, Kern COG
2. California Manual on Uniform Traffic Control Devices for Streets and Highways, 2014 Edition, Federal Highway Administration (FHA)
3. Highway Capacity Manual, Special Report 209, Transportation Research Board
4. Metropolitan Bakersfield General Plan, Circulation Element, 2014
5. Trip Generation, 10th Edition, Institute of Transportation Engineers (ITE)

APPENDIX