APPENDIX E

TRAFFIC IMPACT ANALYSIS

HEXAGON TRANSPORTATION CONSULTANTS, INC.

Solar4America Ice Expansion

Traffic Impact Analysis

Prepared for:

Starbird Consulting LLC

November 12, 2019

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Executive Summary

This report presents the results of the traffic impact analysis conducted for the proposed Solar4America Ice Expansion located at 1500 S. Tenth Street in San Jose, California. The project site is generally located on the southeast corner of the Tenth Street and Alma Street intersection and is currently occupied by an ice hockey facility consisting of four practice ice rinks. The project would add approximately 200,800 square feet to the existing 180,000 square foot facility. Approximately 3,000 square feet of existing facility space would be demolished, resulting in an approximately 377,300 gross square foot facility. The additional space will provide for the addition of one practice ice rink, one competition ice rink with a maximum capacity of 4,213 seats, and 20,000 s.f. of medical office space. The proposed uses will replace a portion of the existing on-site surface parking lot.

Parking will be provided by an existing surface lot on-site and planned new San Jose State University parking structure to be located at the northeast corner of the S. 10th Street and E. Alma Avenue intersection. Access to the site would continue to be provided along S. 10th Street via one existing outbound-only driveway and one new full-access driveway. Site access along E. Alma Avenue would be provided via one driveway providing shared access to the San Jose Giants Stadium and a second driveway to be relocated approximately 140 feet west with the proposed project.

Scope of Study

This study was conducted for the purpose of identifying the potential traffic impacts related to the proposed development. The potential impacts were evaluated following the standards and methodologies set forth in the City of San Jose's Transportation Analysis Policy (Council Policy 5-3), City of San Jose *Traffic Impact Guidelines*, November 2009, the Santa Clara Valley Transportation Authority (VTA) Congestion Management Program's *Transportation Impact Guidelines* (October 2014), and by the California Environmental Quality Act (CEQA). The VTA administers the County Congestion Management Program (CMP). Since the project is expected to add more than 100 net peak hour vehicle trips, a CMP analysis is necessary, which includes a freeway level of service analysis.

In 2013, the State of California passed Senate Bill (SB) 743, which requires jurisdictions to stop using congestion and delay metrics, such as Level of Service (LOS), as the measurement for CEQA transportation analysis. With the adoption of SB 743 legislation, public agencies will be required to base the determination of transportation impacts on Vehicle Miles Traveled (VMT) rather than level of service by July 2020.

In adherence to Senate Bill (SB) 743, the City of San Jose adopted a new Transportation Policy in March 2018, Council Policy 5-1. The policy replaces its predecessor (Council Policy 5-3) and establishes the thresholds for transportation impacts under the CEQA based on VMT instead of LOS.

However, the new transportation policy provides "pipeline provisions" that allow for the use of the prior Council Policy 5-3 provided that a final development application for a project is submitted prior to the effective date, 30 days after adoption, of the new Council Policy 5-1. Given that the proposed project filed its development application in March 2018, before the effective date of the new policy, the evaluation of the project is not required to adhere to the Council Policy 5-1.

The traffic study includes an analysis of AM and PM peak-hour traffic conditions for 19 intersections and 6 freeway segments (12 directional segments) in the vicinity of the project site. The study intersections were selected based upon the estimated number of project trips through the intersection (10 or more trips per lane per hour). The study also includes an evaluation of the project's effects on transit, bicycle, and pedestrian access.

Project Trip Generation

Two project scenarios were analyzed. The first scenario represents a regular weekday PM peak-hour where only the practice rink and medical office building are in use. The second scenario represents a scenario where an event is to be held at the 4,213-seat capacity arena after the PM peak-hour. Under this scenario, it is assumed that the event will start at around 7PM, or at least one hour after the end of the PM peak-hour and that approximately 20% of the total inbound vehicles will enter the project site during the PM peak-hour before 6PM.

Driveway counts at the existing site (consisting of four practice rinks) were used to derive a PM peak-hour trip rate for the proposed additional practice rink. Project trip estimates for the proposed medical office space are based on trip generation rates obtained from the Institute of Transportation Engineers' (ITE's) *Trip Generation*, Tenth Edition, 2017. Trip generation for the arena rink was estimated based on assumptions regarding the proposed operations of the arena rink during non-event days (Scenario 1) and sporting event days (Scenario 2).

Overall, the proposed project under Scenario 1 is estimated to generate 1,087 new daily vehicle trips, with 144 trips (53 inbound and 91 outbound) occurring during the PM peak-hour. Under Scenario 2, the project is estimated to generate 3,783 new daily vehicle trips, with 413 trips (322 inbound and 91 outbound) occurring during the PM peak-hour.

Intersection Level of Service Analysis

Table ES-1 summarizes the results of the intersection level of service analysis under background plus project conditions. The results show that, measured against the City of San Jose level of service standards, the intersection of Monterey Road and Curtner Avenue is projected to operate at unacceptable LOS E during the PM peak-hour under background plus project conditions. The remaining signalized study intersections would operate at an acceptable level of service (LOS D or better) during the PM peak-hour.

Freeway Segment Capacity Analysis

According to CMP Traffic Impact Analysis Guidelines, a freeway level of service analysis is required if the number of project trips added to any freeway segment equals or exceeds one percent of the capacity of the segment. The key freeway segments in the study area were evaluated to determine if the project traffic on each segment would exceed this threshold. The CMP specifies that a mixed-flow lane capacity of 2,300 vehicles per hour per lane (vphpl) be used for segments six lanes or wider in both directions and a capacity of 2,200 vphpl be used for segments with less than six lanes. Using the

CMP's one-percent threshold, the proposed project would not add enough traffic to the freeway segments near the site to warrant a freeway analysis.

Unsignalized Intersection Analysis (Traffic Signal Warrants)

The unsignalized study intersection of Lelong Street and SR-87 Ramps was analyzed for operational purposes, based on the Peak-Hour Volume Signal Warrant, (Warrant #3 – Part B) described in the California *Manual on Uniform Traffic Control Devices* (MUTCD), 2014 Edition. This method makes no evaluation of intersection level of service, but simply provides an indication whether peak-hour traffic volumes are, or would be, sufficient to justify installation of a traffic signal.

The results of the peak-hour traffic signal warrant checks indicate that the unsignalized study intersection is projected to continue to have traffic volumes that meet the thresholds that warrant signalization under background plus project conditions.

Other Transportation Issues

Site Access Evaluation

Vehicular access to the project site would be provided via two driveways along 10th Street (Driveways A and B) and two driveways along Alma Avenue (Driveways C and D). Driveways A and D will provide full-access to the site. Driveway B will provide outbound-only access from the site. Driveway C will provide right-turn only inbound and outbound access to the site.

All project driveways are connected on-site via the surface parking lot surrounding the site. Driveways A and C are both proposed to be approximately 26 feet wide. The existing driveway cut of Driveways B and D will be maintained at approximately 20 feet and 26 feet, respectively.

According to the City of San Jose code, two-way driveways serving commercial uses must have a minimum width of at least 32 feet. Approaches to one-lane driveways must be at least 16 feet wide. Based on these requirements, only Driveway B will meet the City code. The site plan should be revised to provide at least 32-foot wide curb cuts at Driveways A and C. Driveway D also will not meet the City code, however it is not located on the project property. Given that Driveway D already serves the existing baseball stadium and ice hockey facility, the 26-foot width could be deemed acceptable by the City. Ultimately, the City will decide whether Driveway D will need to be widened to 32 feet.

Driveway Operations

Under both Scenario 1 and Scenario 2 project conditions, minimal queuing (approximately one or two vehicles) can be expected at the southbound left-turn movement into Driveway A and the westbound left-turn movement into Driveway D due to low conflicting volumes in the opposing traffic stream of these movements. Queueing for these inbound movements will occur within travel lanes, as there are no turn pockets or striped medians on 10th Street or Alma Avenue along the project frontages. However, the projected minimal queueing into the driveways would result in minimal disruption to through traffic along these roadways.

Sight Distance at the Driveways

A clear line of sight should be provided between the drivers at the project driveways and the approaching traffic. The Caltrans Highway Design Manual (HDM), dated November 2017, identifies the minimum stopping sight distances required for roadways with different design speeds. Stopping sight distance is the minimum distance for a given design speed that a driver needs in order to be able to see something on the road and stop before colliding.

The posted speed limit along 10th Street and Alma Avenue is 35 miles per hour (mph). According to the HDM, a minimum stopping sight distance of 250 feet must be provided on roadways with a design speed of 35 mph.

Both 10th Street and Alma Avenue are long and straight roadways and a clear line of sight from all project site driveways is provided. Based on aerial images, a minimum of 400 feet of sight distance is provided at all project site driveways on 10th Street and Alma Avenue.

Based on the posted speed limits and Caltrans design standards, adequate stopping sight distance is and would continue to be provided at all project site driveways.

On-Site Circulation

The on-site circulation was reviewed in accordance with the City of San Jose code and generally accepted traffic engineering standards. The project would provide 90-degree parking throughout the surface parking areas. All surface drive aisles are shown to provide two-way access and will therefore need to be a minimum 26 feet wide. The proposed drive aisle widths, in combination with the parking dimensions, would provide sufficient room for vehicles to back out of the 90-degree parking stalls.

Based on the proposed layout of the project site, connectivity between all parking areas, adequate drive aisle widths and turn radii, on-site vehicular circulation would be adequate.

Gated Parking Area

A gated parking area (marked “secured area” on the site plan) is proposed along the east side of the hockey facility. Only staff members and players would be allowed into the gated area. Access would be provided via a gate facing the drive aisle parallel to the north project frontage and a second gate facing the general public parking area located at the southeast corner of the site. The gated parking area will be used primarily by staff members who would be familiar with the layout of the parking facility.

East Public Parking Area

During major events, it is recommended that parking be restricted at spaces located along the north-south drive aisle near Driveway D. Limiting parking along the drive aisle will allow traffic to enter and exit the site without being blocked by vehicles backing out onto the drive aisle.

On-Site Passenger Loading Zones

A passenger loading zone is proposed along the drive aisle running along the west project frontage. The loading zone consists of an approximately 67-foot long duc-out and is designated as an accessible loading zone. The duc-out design of the loading zone would not inhibit northbound traffic on the adjacent drive aisle.

Truck and Emergency Vehicles On-Site Circulation

The site plan shows a designated loading area for delivery trucks located at the southeast corner of the on-site building. The loading dock is shown facing an approximately 26-foot wide drive aisle. Additional turn-around space is provided by a drive aisle which heads east from the drive aisle. Therefore, delivery trucks should have adequate space to maneuver into and out of the loading dock. It is recommended that access to the truck loading spaces be prohibited during a major sporting event.

Pedestrian Access

The project will be required to widen the existing 7-foot wide sidewalks along its entire frontages on 10th Street and Alma Avenue to 10-feet per the City’s Complete Streets Standards and Design Guidelines. A north-south crosswalk along the east leg of the 10th Street and Alma Avenue intersection would provide direct access between the site and a proposed parking structure (owned by San Jose

State University) to be constructed at the northeast corner of the intersection. The parking structure would provide additional parking for the proposed ice hockey facility and is discussed further below. With the widened sidewalks and existing crosswalks along roadways and intersections in the vicinity of the project site, adequate pedestrian access to and from the project site to nearby pedestrian destinations would be provided.

Recommended Site Access and Circulation Improvements

The following recommendations are made to promote adequate site access and on-site circulation:

Provide Clear Sight Triangles at Driveways. The project must ensure that any landscaping and signage located adjacent to the project driveways do not obstruct the view for drivers exiting the site.

Design of Project Site. The design of the project site, including but not limited to driveways, sidewalks, drive aisles, turn radii, parking stalls, and signage should adhere to City of San Jose design standards.

Parking

Based on the City of San Jose Municipal Code (Section 20.90.060), the project would be required to provide a total of 850 on-site parking spaces for the existing four rinks and an additional 1,335 spaces for the new proposed uses, for a total of 2,185 required on-site parking spaces. It should be noted however that providing 2,185 parking spaces may be excessive given the following:

- Rink 5, which would be a designated practice rink, will likely not generate traffic requiring 213 parking spaces at any given time. Practice rinks are intended for use by small groups of players and will not attract many spectators.
- The medical office facility will likely be closed after 5PM or 6PM. Parking spaces desginated for the medical office use during the daytime would be avialable for use by the general public during the evening.

The site plan indicates that a total of 599 parking spaces are proposed on-site and will include 48 spaces within a gated parking area (reserved for players and staff members) and 171 parking spaces allocated for events at San Jose Municipal Stadium, adjacent to the east surface parking lot of the project and accessible from Driveway D. However, the on-site parking would be 1,586 spaces fewer than per the City parking requirements.

A new parking structure is currently under construction, with completion estimated in December 2020, at the northeast corner of the 10th Street and Alma Avenue intersection. The parking structure is intended to serve existing traffic associated with sporting events at San Jose State CEFCU Stadium during the weekends. The parking structure also would be accessible to San Jose State students, and staff during weekdays. The parking structure will have approximately 1,500 parking spaces available to Solar4Amercia Ice on event days. Sharks Ice and SJSU will enter into a long-term parking agreement which will be assignable to the City of San Jose. Should there be a delay in the provision of parking in the SJSU garage, other off-site parking locations will be identified in accordance with Chapter 20.90.200 of the San José Municipal Zoning Code for off-site, alternating use and alternative parking arrangements.

The applicant will need to work with the City of San Jose staff to determine if the proposed 599 parking spaces on-site and along with the use of 1,500 spaces in the new SJSU parking garage are appropriate for the project. A parking management plan should be prepared for arena rink events. The plan should identify an event schedule to ensure that arena events do not coincide with San Jose Giants baseball and SJSU sporting events to ensure parking availability in adjacent parking facilities. The plan may also require a limited-use schedule for the practice rinks to make available the majority of on-site parking for use by the arena.

Americans With Disabilities Act Compliance

Based on the above ADA requirements, the proposed project must provide a total of 9 accessible parking spaces, with a minimum of 2 of the 9 spaces designated as van accessible spaces. The site plan lists a total of 22 accessible parking spaces (with 14 of them designated for the medical office use) being proposed within the project site. Therefore, the proposed number of accessible parking spaces satisfies ADA parking requirements.

Bicycle Parking

Based on the City of San Jose Municipal Code (Section 20.90.060), the proposed arena consisting of 4,213 seats will require 71 bicycle parking spaces to meet the City code. Medical facilities are required to provide one parking space per 4,000 s.f. of floor area. Therefore, the proposed 20,000 s.f. medical office use will require 5 bicycle parking spaces to meet the City code. Overall, the project would be required to provide an additional 101 bicycle parking spaces to meet the City code. Of the 101 parking spaces, at least 80% or 80 parking spaces must be provided as Class II (short-term) parking facilities. The remaining 21 parking spaces should be provided as Class I (long-term) parking.

The proposed site plan lists 80 on-site bicycle parking spaces (76 short-term and 4 long-term spaces) being proposed to serve the project. The proposed number of on-site short-term bicycle parking spaces would not meet the City code. However, an additional 50 short-term bicycle parking spaces would be provided at the adjacent Giants Stadium and new SJSU Parking Garage. The applicant will need to work with the City of San Jose staff to determine if the proposed 80 bicycle parking spaces on-site and 50 spaces within the Giants Stadium and new SJSU parking garage are appropriate for the project.

Queuing Analysis

The results of the queuing analysis show that there would be inadequate queue storage capacity for six of the twelve left-turn movements analyzed (six intersections). Intersections projected to have left-turn queue storage deficiencies are discussed below.

1. Tenth Street and I-280 NB On-Ramp (N)

4. Tenth Street and Alma Avenue

6. Eleventh Street and I-280 NB Off-Ramp (N)

8. Senter Road and Keyes Street/Story Road

14. First Street and Alma Avenue

15. Lelong Street and Alma Avenue

Potential Impacts on Pedestrians, Bicycles, and Transit

Project's Effect on Pedestrian and Transit Facilities

It can be expected that the majority of new pedestrian traffic would be generated by the proposed project and use of the new San Jose State parking garage north of the project site. Pedestrian traffic could also increase between the project site and bus stops along First Street/Monterey Road.

The project will be required to widen the existing 7-foot wide sidewalks along its entire frontages on 10th Street and Alma Avenue to 10-feet per the City's Complete Streets Standards and Design Guidelines. With the improved sidewalks and existing crosswalks along roadways and intersections in the vicinity of the project site, adequate pedestrian access to and from the project site to nearby pedestrian destinations would be provided.

Project's Effect on Bicycle Facilities

The proposed project could increase the demand on bicycle facilities in the vicinity of the project site. Assuming bicycle trips would comprise no more than one percent of the total project-generated trips, the project could generate 6-7 new bicycle trips during the peak hours. The potential demand could be easily served by the various bicycle facilities available in the immediate vicinity of the project site. Therefore, the potential increase in bicycle trips by the proposed project would not have an adverse effect on the existing bicycle facilities in the study area, and would not require new off-site bicycle facilities.

Recommendations

- The site plan should be revised to provide at least 32-foot wide curb cuts at Driveways A and C. Driveway D also will not meet the City code, however it is not located on the project property. Given that Driveway D already serves the existing baseball stadium and ice hockey facility, the 26-foot width could be deemed acceptable by the City. Ultimately, the City will decide whether Driveway D will need to be widened to 32 feet.
- During major events, it is recommended that parking be restricted at spaces located along the north-south drive aisle near Driveway D. Limiting parking along the drive aisle will allow traffic to enter and exit the site without being blocked by vehicles backing out onto the drive aisle.
- It is recommended that access to the truck loading spaces be prohibited during a major sporting event.
- A parking management plan should be prepared for arena rink events. The plan should identify an event schedule to ensure that arena events do not coincide with San Jose Giants baseball and SJSU sporting events to ensure parking availability in adjacent parking facilities. The plan may also require a limited-use schedule for the practice rinks to make available the majority of on-site parking for use by the arena.

Table ES 1
Intersection Level of Service Summary

Int. #	Intersection	LOS Standard	Peak Hour	Count Date	Existing		Existing Plus Project (Scenario 1)				Existing Plus Project (Scenario 2)				Background		Background Plus Project (Scenario 1)				Background Plus Project (Scenario 2)			
					Avg. Delay	LOS	Avg. Delay	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C	Avg. Delay	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C	Avg. Delay	LOS	Avg. Delay	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C	Avg. Delay	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C
1	Tenth Street and I-280 NB On-Ramp (N) *	D	PM	12/13/18	16.5	B	16.6	B	0.1	0.006	17.3	B	0.7	0.029	18.2	B	18.4	B	0.2	0.006	19.4	B	1.1	0.029
2	Tenth Street and I-280 SB Off-Ramp (S) *	D	PM	12/13/18	15.3	B	15.4	B	0.1	0.006	16.6	B	1.5	0.063	16.6	B	16.8	B	0.2	0.006	18.3	B	2.0	0.063
3	Tenth Street and Keyes Street	D	PM	03/12/19	24.5	C	24.6	C	0.0	0.003	24.5	C	-0.4	0.029	28.4	C	28.5	C	0.0	0.003	28.7	C	0.0	0.029
4	Tenth Street and Alma Avenue	D	PM	03/12/19	24.8	C	25.2	C	0.6	0.020	26.0	C	1.5	0.071	26.4	C	27.0	C	0.6	0.023	27.2	C	1.8	0.067
5	Tenth Street and Phelan Avenue	D	PM	04/09/19	20.3	C	20.4	C	0.1	0.005	20.7	C	0.7	0.014	20.4	C	20.4	C	0.1	0.005	20.7	C	0.7	0.014
6	Eleventh Street and I-280 NB Off-Ramp (N) *	D	PM	12/13/18	14.5	B	14.6	B	0.1	0.008	15.2	B	0.9	0.048	14.7	B	14.8	B	0.1	0.008	15.5	B	1.0	0.048
7	Eleventh Street and I-280 SB On-Ramp (S) *	D	PM	12/13/18	12.5	B	12.5	B	0.0	0.006	12.5	B	0.1	0.011	12.8	B	12.8	B	0.0	0.006	12.8	B	0.1	0.011
8	Senter Road and Keyes Street/Story Road	D	PM	04/09/19	26.0	C	26.0	C	0.1	0.003	26.2	C	0.3	0.010	27.4	C	27.5	C	0.1	0.003	27.6	C	0.4	0.010
9	Senter Road and Alma Avenue	D	PM	03/12/19	13.8	B	14.1	B	0.3	0.009	14.0	B	0.4	0.012	14.7	B	15.0	B	0.3	0.009	14.9	B	0.4	0.012
10	Senter Road and Phelan Avenue	D	PM	04/09/19	24.3	C	24.9	C	1.0	0.007	24.6	C	0.6	0.006	24.2	C	24.8	C	1.0	0.007	24.6	C	0.6	0.006
11	Seventh Street and Keyes Street	D	PM	04/09/19	35.0	D	35.0	D	0.0	0.001	35.0	D	0.0	0.002	39.1	D	39.1	D	0.0	0.001	39.1	D	0.1	0.002
12	Seventh Street and Alma Avenue	D	PM	03/12/19	26.0	C	26.1	C	0.0	0.006	26.1	C	-0.3	0.030	26.5	C	26.6	C	0.0	0.006	26.5	C	-0.3	0.030
13	Seventh Street and Phelan Avenue	D	PM	04/09/19	31.5	C	31.7	C	0.3	0.006	31.8	C	0.6	0.013	32.1	C	32.2	C	0.3	0.006	32.4	C	0.7	0.013
14	First Street and Alma Avenue*	D	PM	12/04/18	45.1	D	45.7	D	0.5	0.011	46.5	D	1.0	0.028	52.5	D	53.4	D	1.0	0.011	54.9	D	2.8	0.028
15	Lelong Street and Alma Avenue	D	PM	04/09/19	33.1	C	33.1	C	0.0	0.007	33.3	C	0.3	0.034	33.3	C	33.3	C	0.0	0.007	33.5	C	0.3	0.034
17	First Street and Keyes Street*	D	PM	12/04/18	33.1	C	33.1	C	0.0	0.003	33.0	C	-0.1	0.005	36.3	D	36.3	D	0.1	0.003	36.3	D	0.0	0.005
18	Monterey Road and Curtner Avenue*	D	PM	12/04/18	53.4	D	53.5	D	0.1	0.002	53.6	D	0.1	0.001	**67.0**	**E**	**67.2**	**E**	**0.4**	**0.002**	**67.1**	**E**	**0.2**	**0.001**
19	Senter Road and Tully Road*	D	PM	12/04/18	48.4	D	48.5	D	0.1	0.003	48.5	D	0.1	0.003	49.6	D	49.7	D	0.2	0.003	49.6	D	0.2	0.003

* Denotes CMP Intersection
Bold indicates unacceptable level of service.

1. Introduction

This report presents the results of the Traffic Impact Analysis (TIA) conducted for the proposed Solar4America Ice Expansion located at 1500 S. Tenth Street in San Jose, California. The project site is generally located on the southeast corner of the Tenth Street and Alma Street intersection and is currently occupied by an ice hockey facility consisting of four practice ice rinks. The project would add approximately 200,800 square feet to the existing 180,000 square foot facility. Approximately 3,000 square feet of existing facility space would be demolished, resulting in an approximately 377,300 gross square foot facility. The additional space will provide for the addition of one practice ice rink, one competition ice rink with a maximum capacity of 4,213 seats, and 20,000 s.f. of medical office space. The proposed uses will replace a portion of the existing on-site surface parking lot.

Parking will be provided by an existing surface lot on-site and planned new San Jose State University parking structure to be located at the northeast corner of the S. 10th Street and E. Alma Avenue intersection. Access to the site would continue to be provided along S. 10th Street via one existing outbound-only driveway and one new full-access driveway. Site access along E. Alma Avenue would be provided via one driveway providing shared access to the San Jose Giants Stadium and a second driveway to be relocated approximately 140 feet west with the proposed project.

The project site and the surrounding study area are shown on Figure 1. The proposed site plan is shown on Figure 2.

Scope of Study

This study was conducted for the purpose of identifying the potential traffic impacts related to the proposed development. The potential impacts were evaluated following the standards and methodologies set forth in the City of San Jose's Transportation Analysis Policy (Council Policy 5-3), City of San Jose *Traffic Impact Guidelines*, November 2009, the Santa Clara Valley Transportation Authority (VTA) Congestion Management Program's *Transportation Impact Guidelines* (October 2014), and by the California Environmental Quality Act (CEQA). The VTA administers the County Congestion Management Program (CMP). Since the project is expected to add more than 100 net peak hour vehicle trips, a CMP analysis is necessary, which includes a freeway level of service analysis.

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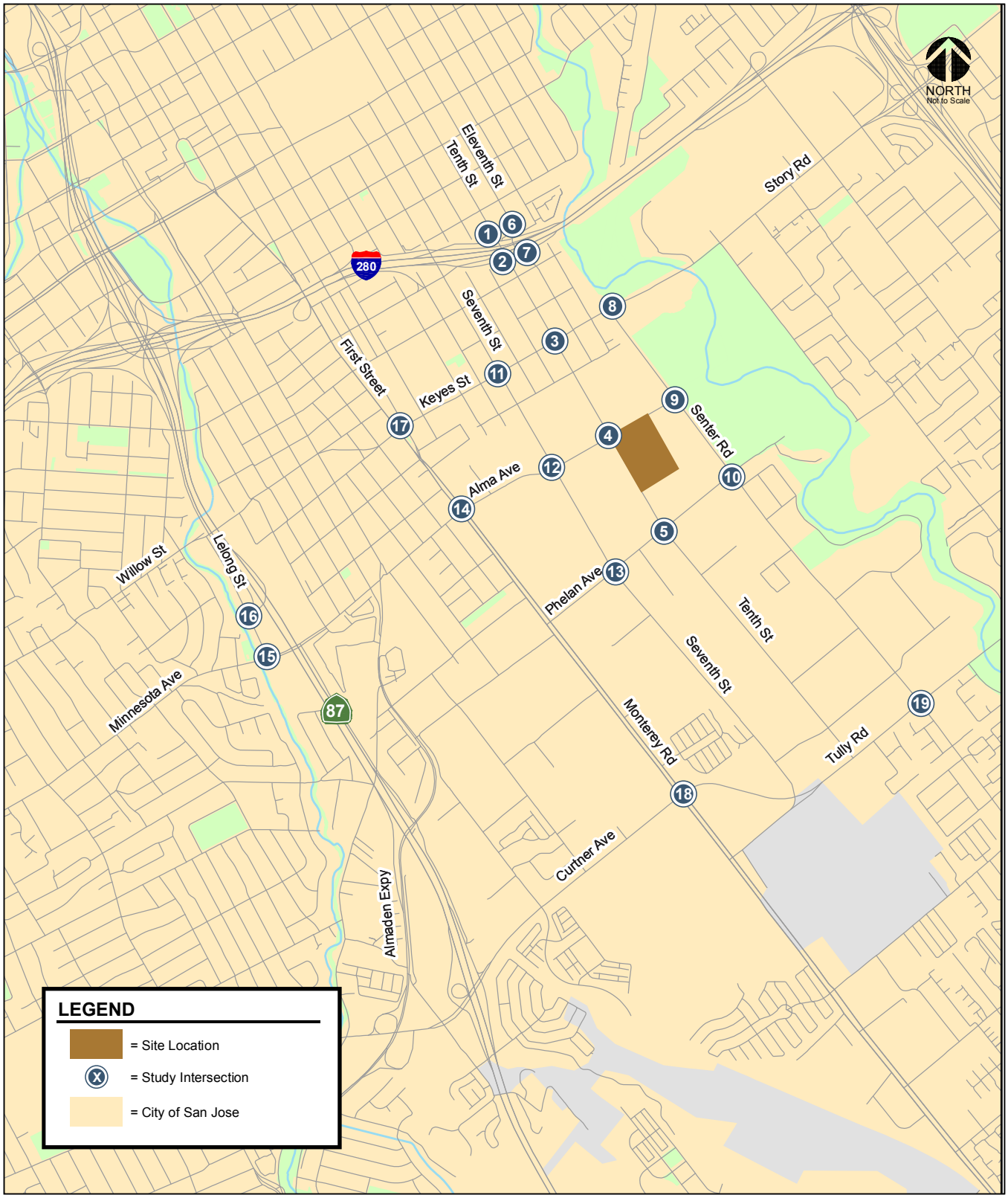

Figure 1
Site Location and Study Intersections

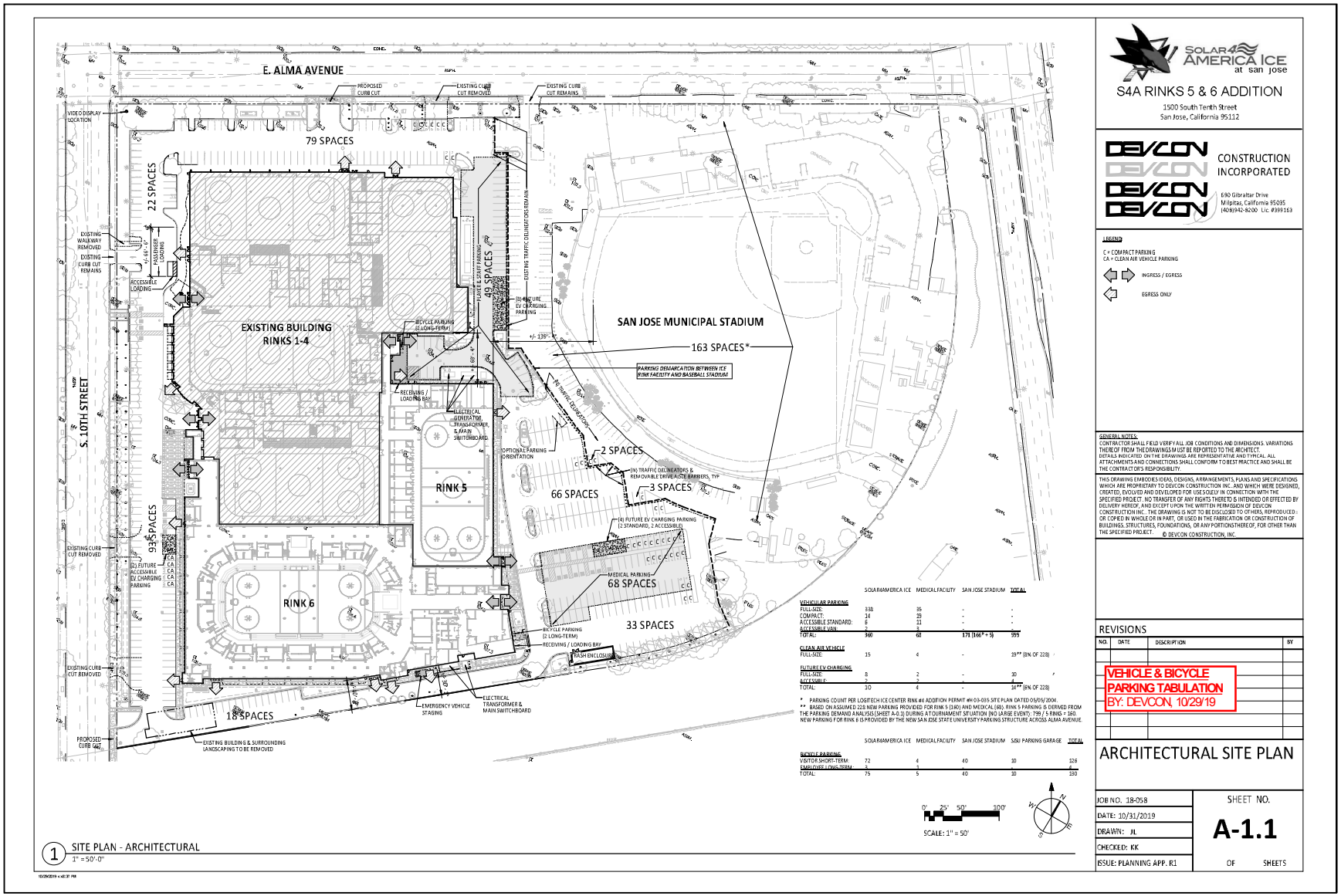

Figure 2
Project Site Plan

In adherence to Senate Bill (SB) 743, the City of San Jose adopted a new Transportation Policy in March 2018, Council Policy 5-1. The policy replaces its predecessor (Council Policy 5-3) and establishes the thresholds for transportation impacts under the CEQA based on VMT instead of LOS.

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The traffic study includes an analysis of AM and PM peak-hour traffic conditions for 19 intersections and 6 freeway segments (12 directional segments) in the vicinity of the project site. The study intersections were selected based upon the estimated number of project trips through the intersection (10 or more trips per lane per hour). The study also includes an evaluation of the project's effects on transit, bicycle, and pedestrian access. The study intersections and freeway segments are listed below and shown on Figure 1.

Study Intersections

In summary, the study includes an analysis of 18 signalized intersections and one unsignalized intersection in the vicinity of the project site. All of the study intersections are located in the City of San Jose. A total of 8 of the study intersections also are CMP designated intersections. All of the study intersections were evaluated against the standards of the City of San Jose, including the 8 CMP signalized study intersections. The operations of the unsignalized study intersection also was evaluated; however, unsignalized intersections are not subject to the City of San Jose level of service policy.

1. Tenth Street and I-280 NB On-Ramp (N) *
2. Tenth Street and I-280 SB Off-Ramp (S) *
3. Tenth Street and Keyes Street
4. Tenth Street and Alma Avenue
5. Tenth Street and Phelan Avenue
6. Eleventh Street and I-280 NB Off-Ramp (N) *
7. Eleventh Street and I-280 SB On-Ramp (S) *
8. Senter Road and Keyes Street/Story Road
9. Senter Road and Alma Avenue
10. Senter Road and Phelan Avenue
11. Seventh Street and Keyes Street
12. Seventh Street and Alma Avenue
13. Seventh Street and Phelan Avenue
14. First Street and Alma Avenue*
15. Lelong Street and Alma Avenue
16. Lelong Street and SR-87 Ramps (unsignalized)
17. First Street and Keyes Street*
18. Monterey Road and Curtner Avenue*
19. Senter Road and Tully Road*

* Denotes CMP intersection

Study Freeway Segments

1. Eastbound I-280, from SR 87 to Tenth Street
2. Eastbound I-280, from Tenth Street to McLaughlin Avenue

3. Northbound SR 87, from Capitol Expressway to Curtner Avenue
4. Northbound SR 87, from Curtner Avenue to Almaden Road
5. Northbound SR 87, from Almaden Road to Alma Avenue
6. Northbound SR 87, from Alma Avenue to I-280
7. Southbound SR 87, from I-280 to Alma Avenue
8. Southbound SR 87, from Alma Avenue to Almaden Avenue
9. Southbound SR 87, from Almaden Avenue to Curtner Avenue
10. Southbound SR 87, from Curtner Avenue to Capitol Expressway
11. Westbound I-280, from McLaughlin Avenue to Tenth Street
12. Westbound I-280, from Tenth Street to SR 87

Study Time Period

Traffic conditions at the study intersections were analyzed for the weekday PM peak-hour of adjacent street traffic. The PM peak hour typically occurs between 4:00 PM and 6:00 PM on an average weekday. These are the peak commute hours during which most traffic congestion occurs on the roadways. The AM and PM peak commute periods are typically evaluated. However, the operation and use of the existing and proposed uses are limited during the AM peak-hour. The proposed project will generate its greatest number of trips and potential impact to the roadway system during the PM peak-hour. Therefore, the standard AM peak commute period was not evaluated.

Study Scenarios

Traffic conditions were evaluated for the following scenarios:

Scenario 1: *Existing Conditions.* Existing conditions were represented by existing peak-hour traffic volumes on the existing roadway network. Existing traffic volumes were obtained from 2018 CMP count data, recently completed traffic studies, and new traffic counts conducted in March and April 2019.

Scenario 2: *Existing plus Project Conditions*. Existing plus project conditions represent existing peak-hour traffic volumes with the addition of traffic generated by the proposed project if the project was open and operating today. Existing plus project conditions were evaluated relative to existing conditions in order to identify potential deficiencies associated solely with the proposed project. Two project conditions were analyzed: the first represents a typical weekday with no large event held at the competition rink and the second represents an event held at the competition rink with up to 4,213 seats occupied.

Scenario 3: *Background Conditions*. Background conditions were represented by future traffic volumes on the future roadway network. Background traffic volumes were estimated by adding to existing peak-hour volumes the projected volumes from approved but not yet constructed developments in the study area. The added traffic from approved but not yet constructed developments was based on San Jose's Approved Trip Inventory (ATI) traffic volumes. Background conditions represent the baseline conditions to which project conditions are compared for the purpose of determining project impacts.

Scenario 4: *Background plus Project Conditions*. Background plus project conditions (also referred to as *Project Conditions*) were estimated by adding to the background traffic volumes the additional traffic estimated to be generated by the proposed project. Background plus project conditions were evaluated relative to background conditions in order to determine potential project impacts. Two project conditions were analyzed: the first represents a typical weekday with no special event held at the competition rink and the

second represents an event held at the competition rink with up to 4,213 seats occupied.

Methodology

This section presents the methods used to determine the traffic conditions for each scenario described above. It includes descriptions of the data requirements, the analysis methodologies, and the applicable level of service standards.

Data Requirements

The data required for the analysis were obtained from new traffic counts, previous traffic studies, the City of San Jose, the CMP, and field observations. The following data were collected from these sources:

- Existing traffic volumes
- Existing lane configurations
- Signal timing and phasing
- Average speed on freeway segments
- A list of approved projects

Analysis Methodologies and Level of Service Standards

Traffic conditions at the study intersections were evaluated using level of service (LOS). *Level of Service* is a qualitative description of operating conditions ranging from LOS A, or free-flow conditions with little or no delay, to LOS F, or jammed conditions with excessive delays. The various analysis methods are described below.

Signalized Intersections

The City of San Jose level of service methodology is TRAFFIX, which is based on the *Highway Capacity Manual (HCM) 2000* method for signalized intersections. TRAFFIX evaluates signalized intersection operations on the basis of average control delay time for all vehicles at the intersection. The City of San Jose level of service methodology employs CMP default values for its analysis parameters.

The City of San Jose's level of service standard is LOS D or better for all signalized intersections, including CMP intersections. The correlation between average delay and level of service is shown in Table 1.

Unsignalized Intersections

The study includes the analysis of one unsignalized intersection. The City of San Jose does not have a level of service standard for unsignalized intersections. The unsignalized study intersection was analyzed for operational purposes only.

Intersection Operations

The analysis of project intersection levels of service was supplemented with an analysis of intersection operations for selected locations. The intersection operations analysis is an important component of the process to evaluate traffic conditions at an intersection. Although calculated levels of service may appear adequate at some locations, traffic operations problems caused by inadequate storage space for vehicle queues could prevent the intersection from ever realizing the calculated level of service.

Table 1
Signalized Intersection Level of Service Definitions Based on Control Delay

Level of Service	Description	Average Control Delay Per Vehicle (Sec.)
A	Operations with very low delay occurring with favorable progression and/or short cycle lengths.	Up to 10.0
B	Operations with low delay occurring with good progression and/or short cycle lengths.	10.1 to 20.0
C	Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.1 to 35.0
D	Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.1 to 55.0
E	Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.1 to 80.0
F	Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths.	Greater than 80.0

Source: Transportation Research Board, 2000 Highway Capacity Manual. (Washington, D.C., 2000)

When inadequate storage space becomes an issue, queues in one turn movement might spill into an adjacent lane and block traffic in that lane from proceeding through the intersection.

The operations analysis is based on vehicle queuing for high-demand movements at intersections. Vehicle queues were estimated using a Poisson probability distribution, which estimates the probability of "n" vehicles in the queue for a vehicle movement using the following formula:

$$P(x=n) = \frac{\lambda^n e^{-(\lambda)}}{n!}$$

Where:

P (x=n) = probability of "n" vehicles in queue per lane
n = number of vehicles in the queue per lane
λ = Average number of vehicles in the queue per lane (vehicles per hour per lane/signal cycles per hour)

The basis of the analysis is as follows: (1) the Poisson probability distribution is used to estimate the 95th percentile maximum number of queued vehicles per signal cycle for a particular movement; (2) the estimated maximum number of vehicles in the queue is translated into a queue length, assuming 25 feet per vehicle; and (3) the estimated maximum queue length is compared to the existing or planned available storage capacity for the movement. This analysis thus provides a basis for identifying locations where potential problems may arise in the future and for estimating future storage requirements at intersections.

Freeway Segment Capacity Evaluation

Per CMP technical guidelines, freeway segment level of service analysis shall be conducted on all segments to which the project is projected to add one percent or more to the segment capacity. Since the project is not projected to add one percent to any freeway segments in the area, freeway analysis for the CMP was not required.

Report Organization

The remainder of this report is divided into seven additional chapters. Chapter 2 describes the existing conditions in terms of the existing roadway network, transit service, and existing bicycle and pedestrian facilities. Chapter 3 describes the method used to estimate project traffic and the resulting traffic conditions expected under existing plus project conditions. Chapter 4 presents the intersection levels of service under background conditions with the addition of traffic from approved development projects. Chapter 5 presents traffic conditions, potential project impacts, and recommended mitigation measures under background plus project conditions. Chapter 6 presents the analysis of other transportation related issues, including impacts to transit, pedestrian and bicycle facilities. Chapter 7 presents the conclusions of the traffic impact analysis.

2. Existing Conditions

This chapter describes the existing conditions for transportation facilities in the vicinity of the site, including the roadway network, transit service, pedestrian and bicycle facilities.

Existing Roadway Network

Regional access to the project site is provided via I-280, State Route (SR) 87, and US 101, as described below.

I-280 is an east-west freeway in the vicinity of the project that extends through the Bay Area, connecting San Francisco to San Jose. I-280 is eight lanes wide with three mixed-flow lanes and one high occupancy vehicle (HOV) lane in each direction in the vicinity of the project site. I-280 provides site access via partial interchanges at 10th Street (ramps to and from west) and 11th Street (ramps to and from east).

SR-87 is primarily a six-lane freeway (four mixed-flow lanes and two HOV lanes) that is aligned in a north-south orientation within the project vicinity. SR 87 begins at its interchange with SR 85 and extends northward, terminating at its junction with US 101. Connections from SR-87 to the project site are provided via a partial interchange at Lelong Street (ramps to and from north) and a full interchange at Curtner Avenue.

US 101 is an eight-lane (three mixed-flow lanes and one high-occupancy vehicle (HOV) lane in each direction) freeway in the vicinity of the site. It extends north through San Francisco and south through Gilroy. Regional access to the project site is provided via its interchanges with Story Road and I-280.

Local roadways in the vicinity of the site include 1st Street/Monterey Road, 7th Street, 10th Street, 11th Street, Senter Road, Keyes Street, Alma Avenue, and Phelan Avenue.

1st Street/Monterey Road is a north-south regional roadway that extends from Downtown San Jose south to Gilroy. A designated Grand Boulevard per the City's General Plan, 1st Street is six lanes wide (three lanes in each direction) in the vicinity of the project and has bike lanes south of its intersection with Keyes Street. Within the vicinity of the project site, the posted speed limit is 35 mph and on-street parking is prohibited on both sides of the street near the project area.

7th Street is a north-south local roadway that extends from East San Salvador Street to Old Tully Road. 7th Street has a posted speed limit of 30 mph and is two lanes wide. 7th Street has sidewalks on both sides and has bike lanes along the street. On-street parking is allowed along the west side of 7th Street south of Alma Avenue within the project vicinity.

10th Street is a north-south local roadway that extends from Old Bayshore Highway to Tully Road. 10th Street has bike lanes and sidewalks on both sides near the project site. 10th Street is a one-way, 2-lane southbound street from East Hedding Street to East Humboldt Street and a two-way, 4-lane (two lanes in each direction) street from East Humboldt Street to Tully Road. Within the vicinity of the project site, the posted speed limit is 35 mph and on-street parking is prohibited on both sides of the street near the project area. 10th Street runs along the west project frontage and would provide direct access to the site via one existing full-access driveway and one existing right-out only driveway.

Senter Road is a north-south local roadway that extends from Keyes Street/Story Road to Coyote Road and then bends east-west from Coyote Road to Monterey Road. Senter Road has a posted speed limit of 40 mph from Keyes Street to Capitol Expressway. Senter Road is six lanes wide (three lanes in each direction) and has bike lanes throughout the entire segment. Within the vicinity of the project site, Senter Road has sidewalks on the eastern side of the street between Keyes Street/Story Road to Alma Avenue.

Keyes Street is an east-west local roadway that extends from 1st Street to Senter Road, where it transitions to Story Road. Keyes Street has a posted speed limit of 35 mph and is four to six lanes wide (two to three lanes in each direction). Keyes Street has sidewalks on both sides of the street and has bike lanes throughout the street. On-street parking is permitted between 2nd Street and 10th Street in the vicinity of the project site.

Alma Avenue is an east-west local roadway that extends from Minnesota Avenue to Senter Road. Alma Avenue has a posted speed limit of 35 mph and is four lanes wide (two lanes in each direction). Within the vicinity of the project site, Alma Avenue has sidewalks on both sides of the street and has on-street parking between 10th Street and Senter Road. Alma Avenue runs along the north project frontage and would provide direct access to the site via one existing full-access driveway and one existing right-in/right-out only driveway. The project proposes to relocate the right-in/right-out only driveway by approximately 140 feet west of its current location.

Phelan Avenue is an east-west local roadway that extends from Monterey Road to Kelley Park. Phelan Avenue has a posted speed limit of 25 mph and is two lanes wide (one lane in each direction) between Monterey Road and 10th Street and a four-lane road between 10th Street and Senter Road. Phelan Avenue has sidewalks on both sides of the street and has bike lanes between Monterey Road and 7th Street, with the exception of a shared-lane bike route segment near a railroad crossing.

Existing Bicycle and Pedestrian Facilities

There are numerous bike lanes and bike paths in the vicinity of the project site. The existing bicycle facilities within the study area are described below and shown on Figure 3.

Class I Trail or Path is an off-street path with exclusive right-of-way for non-motorized transportation used for commuting as well as recreation. There is a Class I bike path that runs through the City of San Jose along the Guadalupe River and is shared between pedestrians and bicyclists and separated from motor vehicle traffic. The Guadalupe River trail is an 11-mile continuous Class I bikeway from Curtner Avenue in the south to Alviso in the north. This trail system can be accessed from the Tamien Caltrain station located along Lick Avenue.

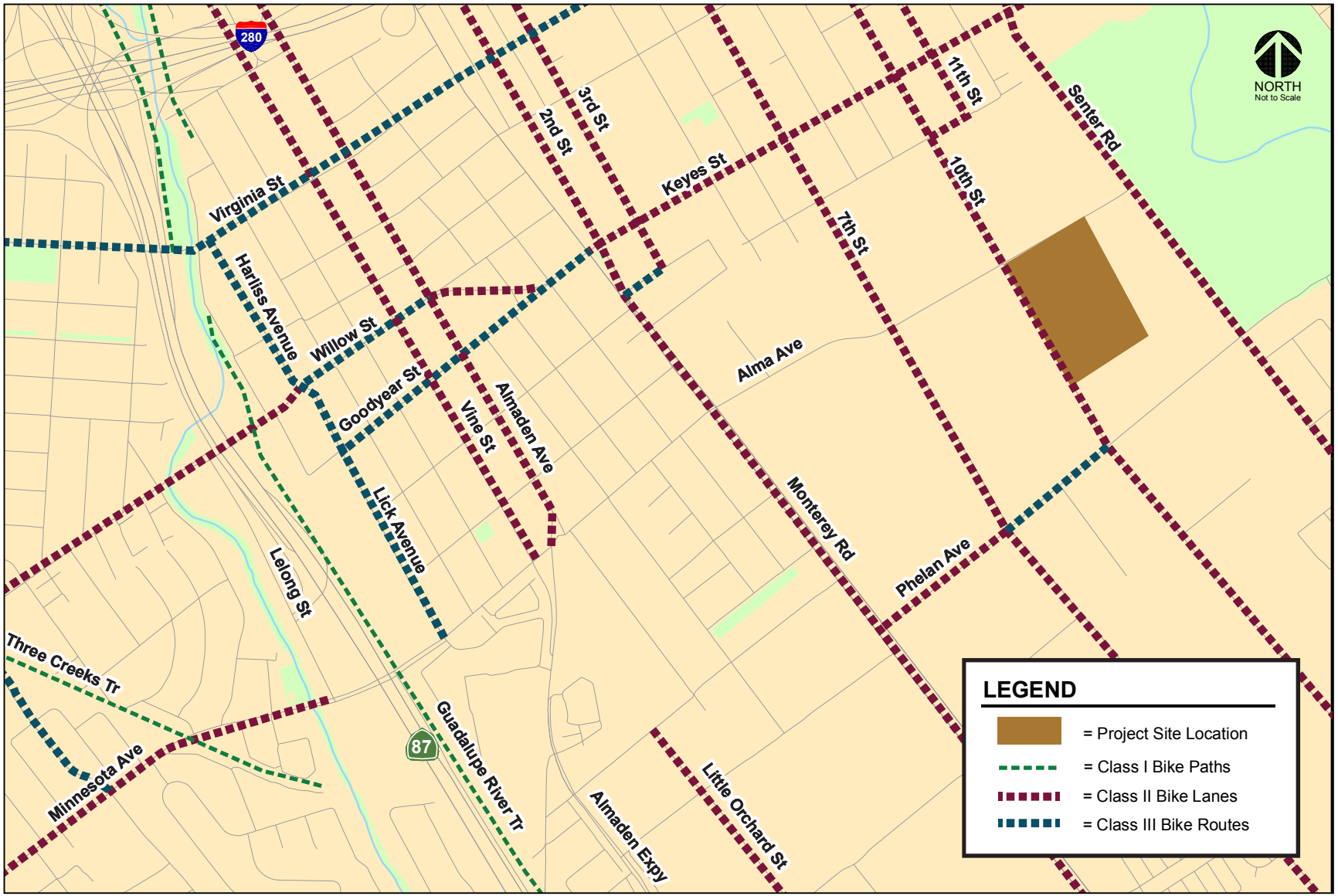


Figure 3
Existing Bicycle Facilities

Class II Bike Lanes are preferential use areas within a roadway designated for bicycles. Within the project vicinity, Class II bikeways are present along the following roadways:

- 1st Street/Monterey Road, south of Humboldt Street
- 2nd Street, north of Humboldt Street (southbound only)
- 3rd Street, north of Humboldt Street (northbound only)
- 7th Street, between San Salvador Street and Tully Road
- 10th Street, along its entire extent
- 11th Street, along its entire extent
- Senter Road, between Story Road and Singleton Road
- Almaden Avenue, north of Alma Avenue
- Vine Street, north of Alma Avenue
- Keyes Street, east of 2nd Street
- Phelan Avenue, between Monterey Road and 7th Street

Class III Bike Routes are signed bike routes that provide a connection through residential, downtown, and rural/hillside areas to Class I and Class II facilities. Bike routes serve as transportation routes within neighborhoods to parks, schools, and other community amenities. Designated bike routes are provided along the following roadways

- Phelan Avenue, between 7th Street and 10th Street
- Goodyear Street, between Lick Avenue and First Street
- Willow Street, between Lick Avenue and Almaden Avenue
- Harliss Avenue between Virginia Street and Willow Street
- Lick Avenue, between Willow Street and Alma Avenue

Pedestrian facilities consist of sidewalks, crosswalks, and pedestrian signals at signalized intersections. In the project vicinity, sidewalks exist along most nearby streets. However, sidewalks do not exist along portions of the following roadways

- South side of Alma Avenue, between 1st Street/Monterey Road and 10th Street
- Both sides of Phelan Avenue, between 1st Street/Monterey Road and 10th Street.
- Both sides of 7th Street, between Alma Avenue and Tully Road
- West side of Senter Road, between Keyes Street/Story Road and Alma Avenue

All of the crosswalks at the signalized study intersections include pedestrian signal heads and push buttons. Crosswalks are provided on all approaches of all signalized study intersections in the vicinity of the project site, with the exception of the following locations:

- Senter Road and Keyes Street/Story Road, west leg of the intersection
- Monterey Road and Phelan Avenue, south leg of the intersection
- 7th Street and Phelan Avenue, north leg of the intersection
- 10th Street and Keyes Street, east leg of the intersection

There is a pedestrian midblock crosswalk across 10th Street about 700 feet north of Alma Avenue. Overall, the existing network of sidewalks and crosswalks in the immediate vicinity of the project site has good connectivity and provide adequate access to nearby transit facilities.

Existing Transit Service

The VTA bus service is described below and shown on Figure 4. The bus lines that operate within the study area are listed in Table 2.

Figure 4
Existing Transit Services

Table 2
Existing Transit Services

Bus Route	Route Description	Nearest Stop	Headway [1]
Local Route 25	De Anza College to Alum Rock Transit Center via Valley Medical Center	Keyes/10th	10-12 min
Local Route 66	Kaiser San Jose Medical Center to Dixon Landing Road (Milpitas)	Monterey/Alma	15 min
Local Route 68	Gilroy Transit Center to San Jose Diridon Station	Monterey/Alma	15 - 20 min
Local Route 73	Snell/Capitol to Downtown San Jose	Keyes/10th	15 min
Local Route 82	Westgate to Downtown San Jose	Monterey/Alma	30 min
Limited Stop Route 304	Santa Teresa LRT Station to Sunnyvale Transit Center	Monterey/Tully	30 - 50 min

Notes:
[1] Approximate headways during peak commute periods.

Existing transit service to the study area is provided by the VTA. The nearest bus stops to the project site are located at the intersections of Senter Road/Alma Avenue, 10th Street/Keyes Street, and 1st Street/Keyes Street. Shuttle service to the study area is provided by San Jose State University (SJSU). This is described below.

San Jose Park & Ride Lot Shuttle Service provides service from the San Jose Park & Ride Lot on 7th Street and Alma Avenue to Duncan Hall at SJSU located on 5th Street and San Salvador Street. The Shuttle Service operates during the college semester, Monday through Thursday with approximately 10-minute headways from 6:30 AM to 9:00 AM, 5-minute headways from 9:00 AM to 4:10 PM, 10-minute headways from 4:10 PM to 8:00 PM, and 20-minute headways from 8:00 PM to 10:30 PM.

Existing Intersection Lane Configurations

The existing lane configurations at the study intersections were determined by observations in the field and are shown on Figure 5.

Existing Traffic Volumes

Existing peak-hour traffic volumes were obtained from previously completed traffic studies, the 2018 CMP Annual Monitoring Report, and new traffic counts conducted in April and May 2019. The existing peak-hour intersection volumes are shown on Figure 6. Intersection turning-movement counts conducted for this analysis are presented in Appendix A and peak-hour intersection turning-movement volumes for all intersections and study scenarios are tabulated in Appendix B.

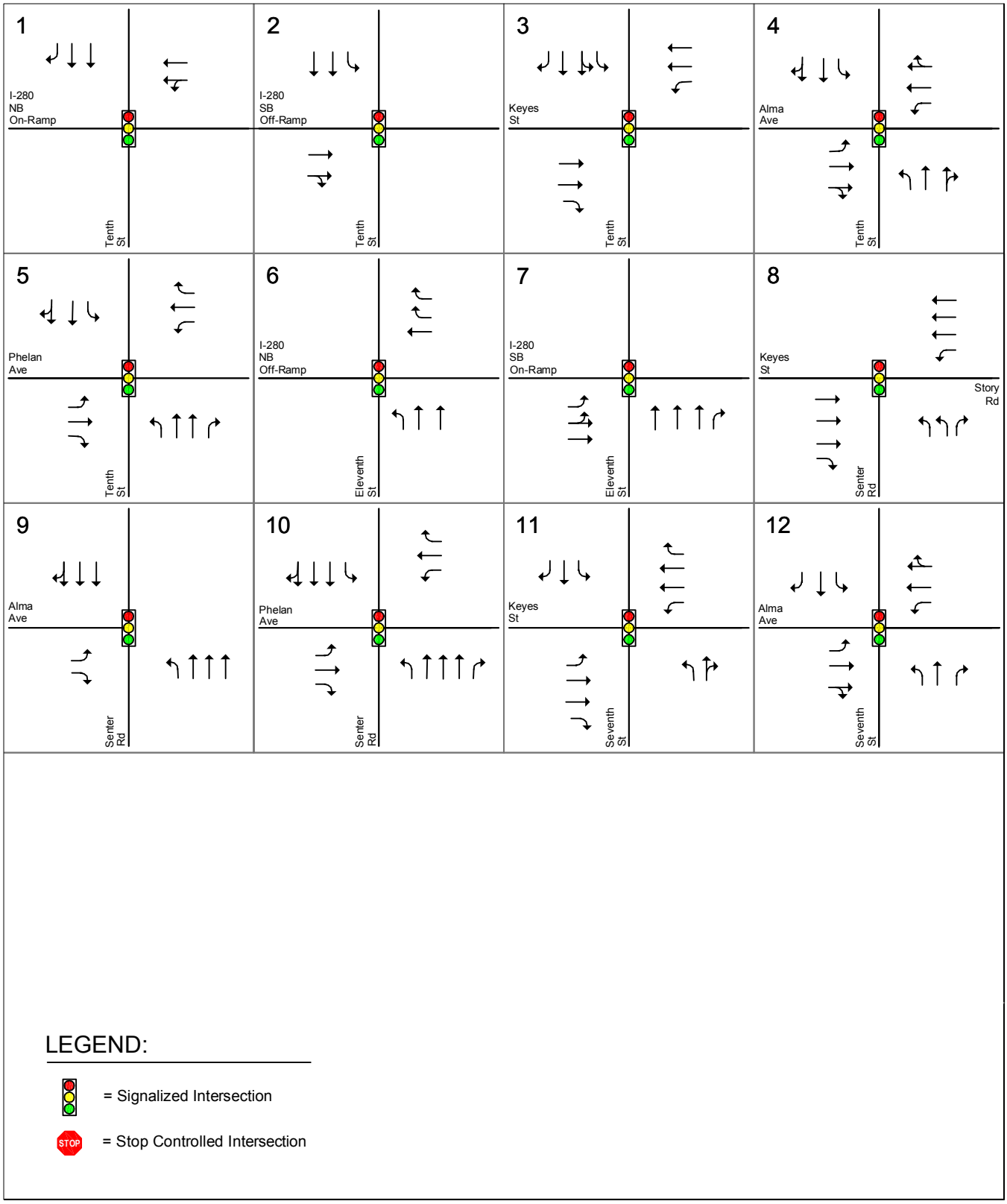


Figure 5
Existing Lane Configurations

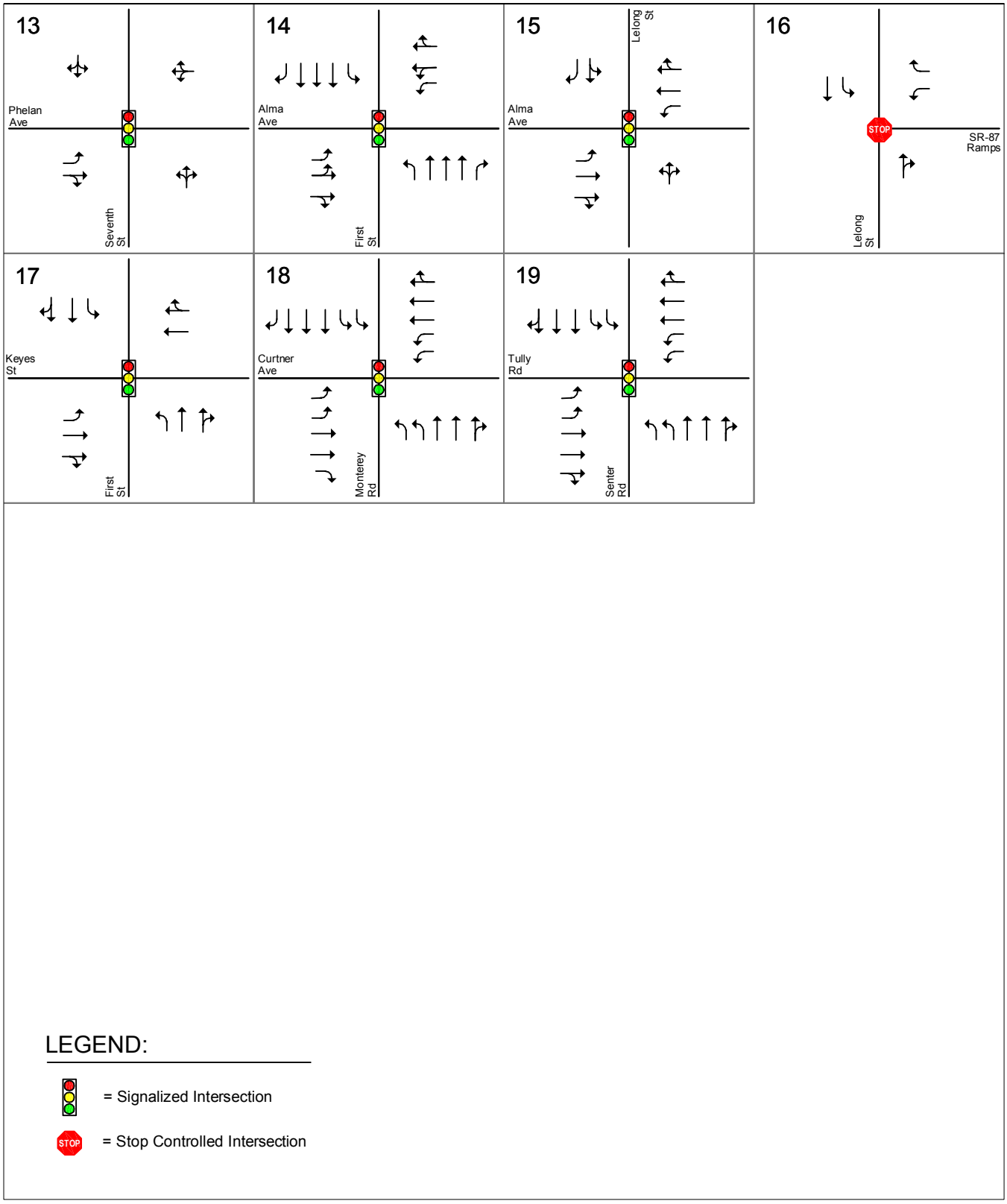


Figure 5 (continued)
Existing Lane Configurations

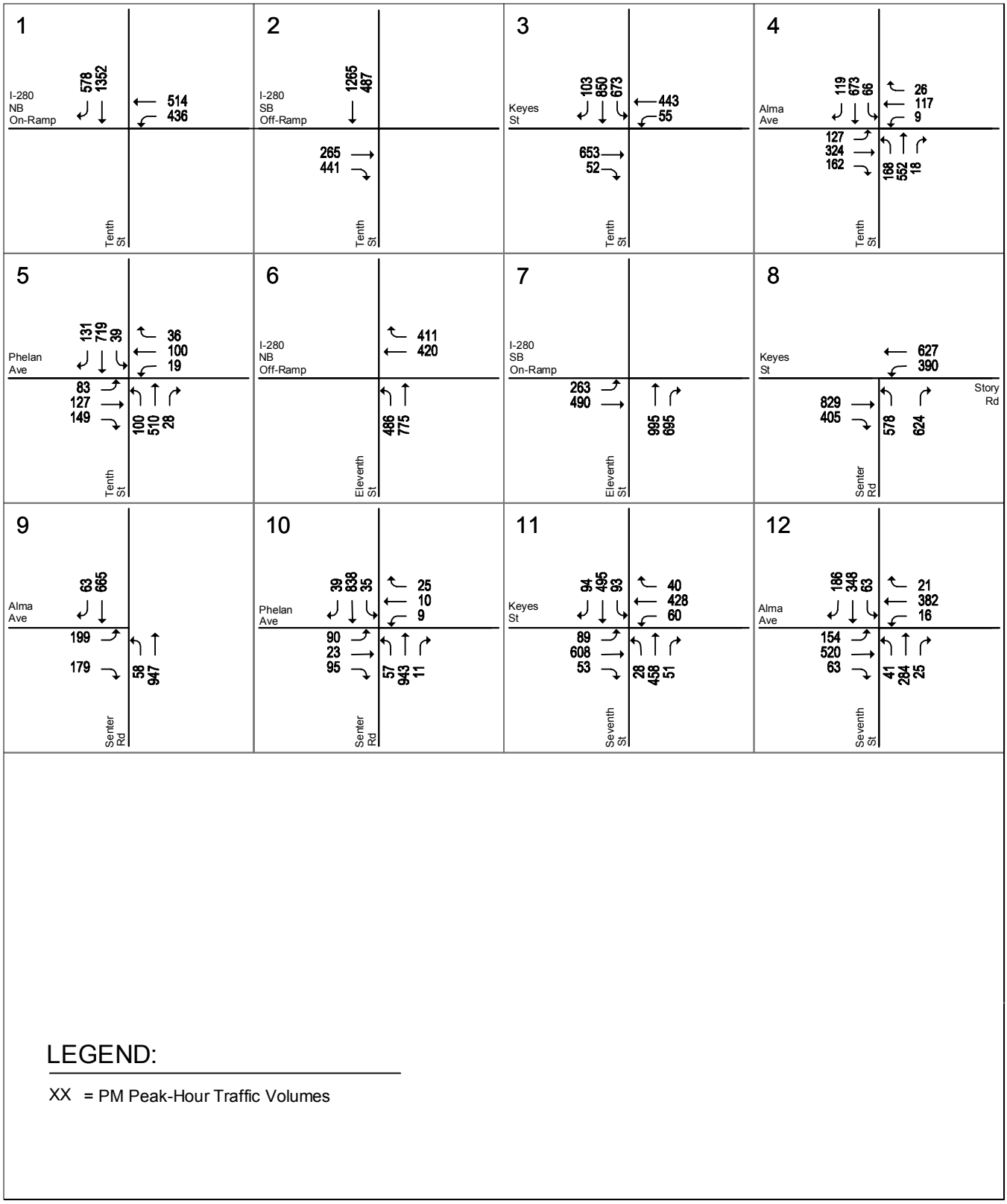


Figure 6
Existing Traffic Volumes

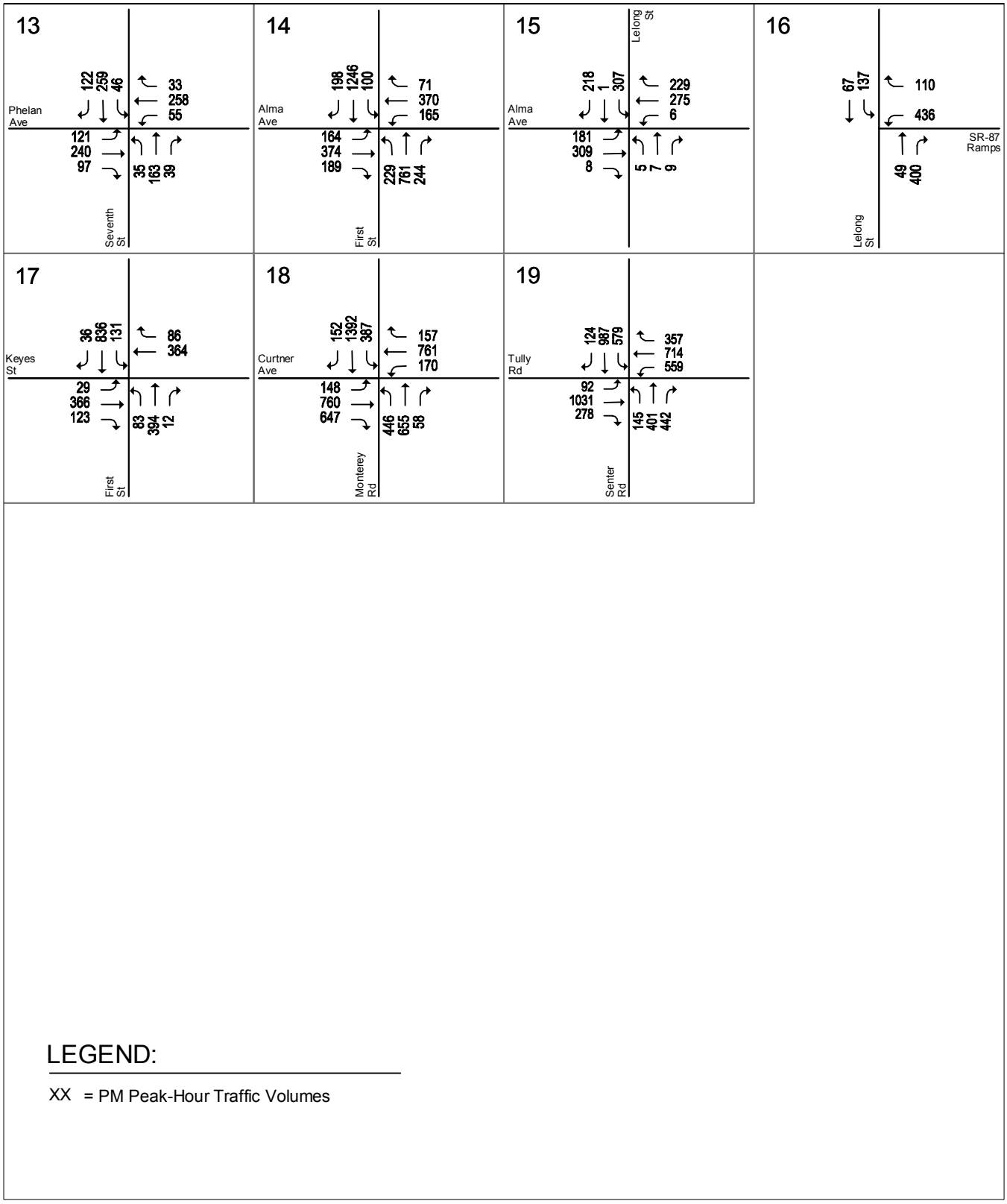


Figure 6 (continued)
Existing Traffic Volumes

Existing Intersection Levels of Service

The results of the intersection level of service analysis under existing conditions are summarized in Table 3. The results of the analysis show that, measured against the City of San Jose level of service standards, all signalized study intersections currently operate at an acceptable level of service (LOS D or better) during the PM peak hour. The level of service calculation sheets are included in Appendix C.

Unsignalized Intersection Analysis (Traffic Signal Warrants)

For unsignalized study intersections, an assessment is made of the need for signalization of the intersection, based on the Peak-Hour Traffic Signal Warrant (Warrant #3 – Part B) described in the *California Manual on Uniform Traffic Control Devices* (MUTCD), 2014 Edition. This method makes no evaluation of intersection level of service, but simply provides an indication of whether peak-hour traffic volumes are, or would be, sufficient to justify installation of a traffic signal. Intersections that meet the peak hour warrant are subject to further analysis before determining that a traffic signal is necessary. The following unsignalized intersection was evaluated:

16. Lelong Street and SR-87 Ramps (unsignalized)

The results of the peak-hour traffic signal warrant checks indicate that the unsignalized study intersection currently has traffic volumes that meet the thresholds that warrant signalization. The peak-hour signal warrant sheets are contained in Appendix D.

Observed Existing Traffic Conditions

Traffic conditions in the field were observed in order to identify existing operational deficiencies and to confirm the accuracy of calculated levels of service. The purpose of this effort was (1) to identify any existing traffic problems that may not be directly related to intersection level of service, and (2) to identify any locations where the level of service calculation does not accurately reflect level of service in the field.

Overall most study intersections operated adequately during both the PM peak-hour of traffic, and the level of service analysis appears to accurately reflect actual existing traffic conditions. However, field observations showed that some operational problems currently occur during the PM peak-hour. These issues are described below.

1. 10th Street and I-280 Northbound On-Ramp

During the PM peak hour, long queues were observed in the southbound lanes on 10th Street. Generally, the southbound through lane traffic can clear through the intersection, but occasionally about 2 to 3 vehicles would fail to clear.

The westbound shared left-turn/through lane heading west onto 10th Street backs up to the 11th Street/I-280 Northbound Off-Ramp intersection (Study Intersection #6) and occasionally spills over onto the northbound left-turn. However, there is usually enough green time to clear to the westbound left-turn lane.

Table 3
Existing Conditions Intersection Levels of Service

Int. #	Intersection	LOS Standard	Peak Hour	Count Date	Avg. Delay	LOS
1	Tenth Street and I-280 NB On-Ramp (N) *	D	PM	12/13/18	16.5	B
2	Tenth Street and I-280 SB Off-Ramp (S) *	D	PM	12/13/18	15.3	B
3	Tenth Street and Keyes Street	D	PM	03/12/19	24.5	C
4	Tenth Street and Alma Avenue	D	PM	03/12/19	24.8	C
5	Tenth Street and Phelan Avenue	D	PM	04/09/19	20.3	C
6	Eleventh Street and I-280 NB Off-Ramp (N) *	D	PM	12/13/18	14.5	B
7	Eleventh Street and I-280 SB On-Ramp (S) *	D	PM	12/13/18	12.5	B
8	Senter Road and Keyes Street/Story Road	D	PM	04/09/19	26.0	C
9	Senter Road and Alma Avenue	D	PM	03/12/19	13.8	B
10	Senter Road and Phelan Avenue	D	PM	04/09/19	24.3	C
11	Seventh Street and Keyes Street	D	PM	04/09/19	35.0	D
12	Seventh Street and Alma Avenue	D	PM	03/12/19	26.0	C
13	Seventh Street and Phelan Avenue	D	PM	04/09/19	31.5	C
14	First Street and Alma Avenue*	D	PM	12/04/18	45.1	D
15	Lelong Street and Alma Avenue	D	PM	04/09/19	33.1	C
17	First Street and Keyes Street*	D	PM	12/04/18	33.1	C
18	Monterey Road and Curtner Avenue*	D	PM	12/04/18	53.4	D
19	Senter Road and Tully Road*	D	PM	12/04/18	48.4	D

* Denotes CMP Intersection
Bold indicates unacceptable level of service.

5. 10th Street and Phelan Avenue

Queueing at the westbound through-lane was occasionally observed blocking access to the left-turn pocket.

6. 11th Street and I-280 Northbound Off-Ramp

As noted above, the westbound queue at the downstream intersection of 10th Street & I-280 Northbound On-Ramp (Intersection #1) frequently spills back on to the northbound left-turn lane at the intersection of 11th Street & I-280 Northbound Off-Ramp. The queue within the northbound left-turn lane frequently exceeds the existing storage capacity, causing spillback onto the upstream intersection of 11th Street & I-280 Southbound On-Ramp (Intersection #7).

7. 11th Street and I-280 Southbound On-Ramp

As noted above, the northbound left-turn queue at the downstream intersection of 11th Street & I-280 Northbound Off-Ramp (Intersection #6) frequently spills back on to the westernmost northbound through-lane at the intersection of 11th Street & I-280 Southbound On-Ramp. The queue occasionally extends 250 feet south to the stop-controlled intersection of 11th Street & Martha Street.

9. Senter Road and Alma Avenue

Long queues were observed on Alma Avenue. Generally, the queues would clear with each green cycle but occasionally 4 to 5 vehicles would fail to clear. However, this occurs infrequently. Senter Road generally provides enough green time for vehicles to pass through the intersection.

11. Seventh Street and Keyes Street

Queueing at the southbound through-lane was occasionally observed blocking access to the left-turn pocket.

14. First Street and Alma Avenue

Queueing at the southbound through-lane was occasionally observed blocking access to the left-turn pocket.

18. Monterey Road and Curtner Avenue

Queueing at the southbound, eastbound, and westbound through-lanes were occasionally observed blocking access to the left-turn pockets.

19. Senter Road and Tully Road

Queueing at the eastbound and westbound through-lanes were occasionally observed blocking access to the left-turn pockets. Additionally, queueing at the southbound left-turn pocket frequently exceeds the storage capacity of the two turn lanes. The queue frequently clears within one cycle, however the queue immediately re-forms with the arrival of traffic from the upstream intersection of Senter Road and Quinn Avenue/Parrott Street. A lane imbalance also was observed upstream of Senter Road and Quinn Avenue/Parrott Street, with more southbound traffic utilizing the #1 lane, in advance of making a left turn at Senter Road and Tully Road.

3. Existing Plus Project Conditions

This chapter describes existing traffic conditions with the addition of the traffic that would be generated by the proposed project if the project was complete and operating today. Existing plus project conditions were evaluated relative to existing conditions in order to determine potential deficiencies on the existing transportation network attributable solely to the project. Existing plus project conditions are presented per CEQA requirements to disclose the project's effect on existing conditions.

Included within this chapter is the description of the procedure of estimating project-generated traffic and the resulting traffic conditions under existing plus project conditions.

Transportation Network under Existing Plus Project Conditions

It is assumed in this analysis that the transportation network under existing plus project conditions would be the same as described under existing conditions.

Project Description

The project would add approximately 200,800 square feet to the existing 180,000 square foot facility. Approximately 3,000 square feet of existing facility space would be demolished, resulting in an approximately 377,300 gross square foot facility. The additional space will provide for the addition of one practice ice rink, one competition ice rink with a maximum capacity of 4,213 seats, and 20,000 s.f. of medical office space. The proposed uses will replace a portion of the existing on-site surface parking lot.

Parking will be provided by an existing surface lot on-site and planned new San Jose State University parking structure to be located at the northeast corner of the S. 10th Street and E. Alma Avenue intersection. Access to the site would continue to be provided via the two existing driveways along S. 10th Street and one driveway along E. Alma Avenue. A second existing driveway on E. Alma Avenue will be relocated approximately 140 feet west with the proposed project.

Project Trip Estimates

The magnitude of traffic produced by a new development and the locations where that traffic would appear are estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. This procedure is explained in more detail in Chapter 5 (Background Plus Project Conditions) of this report.

Trip Generation

Two project scenarios were analyzed. The first scenario represents a regular weekday PM peak-hour where only the practice rink and medical office building are in use. The second scenario represents a scenario where an event is to be held at the 4,213-seat capacity arena after the PM peak-hour. Under this scenario, it is assumed that the event will start at around 7PM, or at least one hour after the end of the PM peak-hour and that approximately 20% of the total inbound vehicles will enter the project site during the PM peak-hour before 6PM.

The proposed project under Scenario 1 is estimated to generate 1,087 new daily vehicle trips, with 144 trips (53 inbound and 91 outbound) occurring during the PM peak-hour. Under Scenario 2, the project is estimated to generate 3,783 new daily vehicle trips, with 413 trips (322 inbound and 91 outbound) occurring during the PM peak-hour.

The project trip generation estimates are presented in Table 8 in Chapter 5.

Trip Assignment and Assignment

The trip distribution pattern for the project was estimated based on existing travel patterns on the surrounding roadway network, the locations of complementary land uses, and previous traffic impact reports in the study area. Trip distribution and assignment are discussed in detail in Chapter 5.

Existing Plus Project Traffic Volumes

Project trips associated with the proposed project, as represented in the above project trip assignment, were added to the existing traffic volumes to obtain existing plus project traffic volumes. Existing plus project conditions traffic volumes are shown on Figure 7. Traffic volumes for all components of traffic are tabulated in Appendix B.

Existing Plus Project Intersection Levels of Service

The results of the intersection level of service analysis under existing plus project conditions are summarized in Table 4. The results show that with the addition of project traffic, both under Scenario 1 and Scenario 2, all of the signalized study intersections would continue to operate at acceptable levels of service (LOS D or better) during the PM peak-hour. The level of service calculation sheets are included in Appendix C.

Unsignalized Intersection Analysis (Traffic Signal Warrants)

The unsignalized study intersections of Lelong Street and SR-87 Ramps was analyzed for operational purposes, based on the Peak-Hour Volume Signal Warrant, (Warrant #3 – Part B) described in the California *Manual on Uniform Traffic Control Devices* (MUTCD), 2014 Edition.

The results of the peak-hour traffic signal warrant checks indicate that the unsignalized study intersection is projected to continue to have traffic volumes that meet the thresholds that warrant signalization under existing plus project conditions. The peak-hour signal warrant sheets are contained in Appendix D.

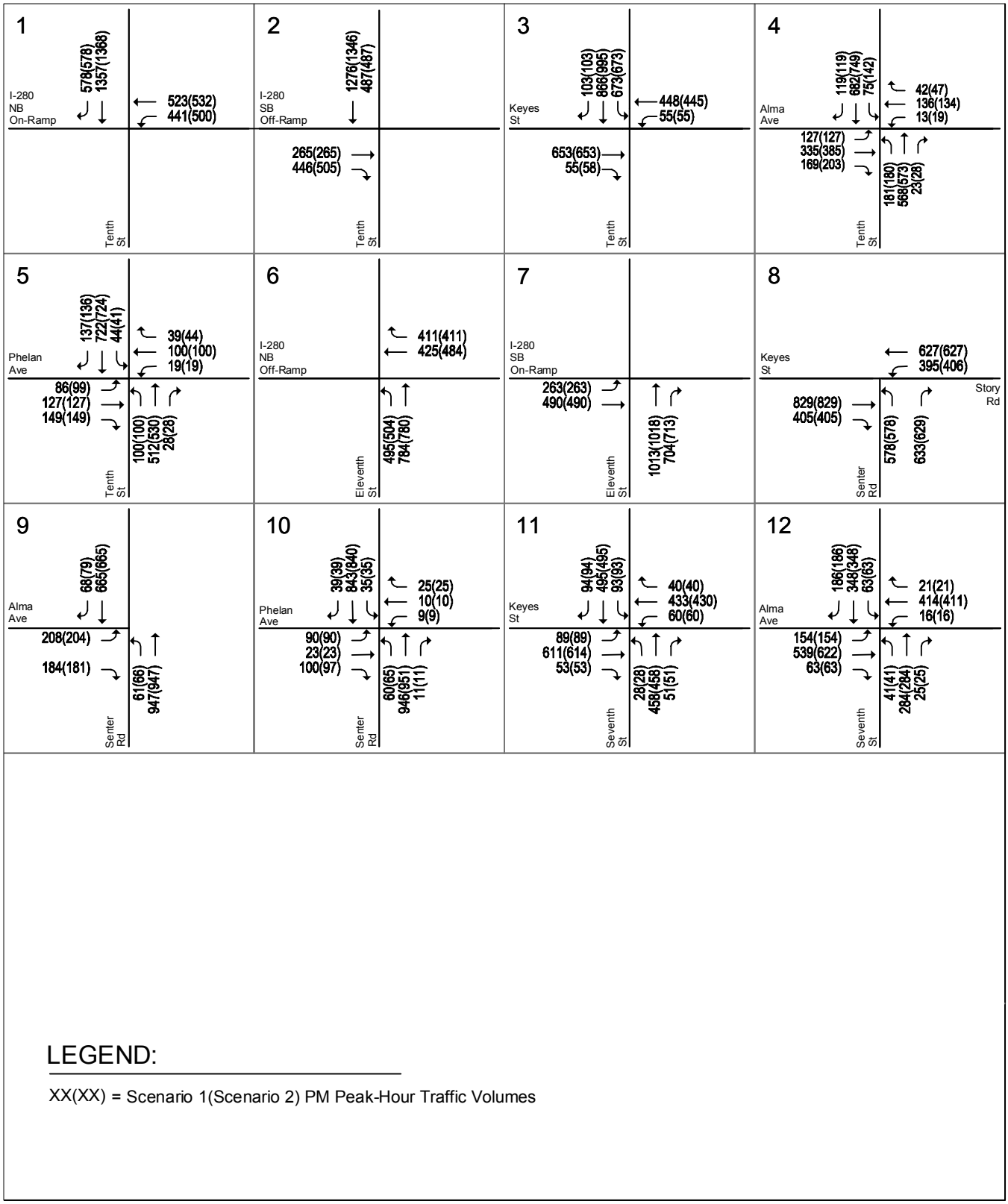
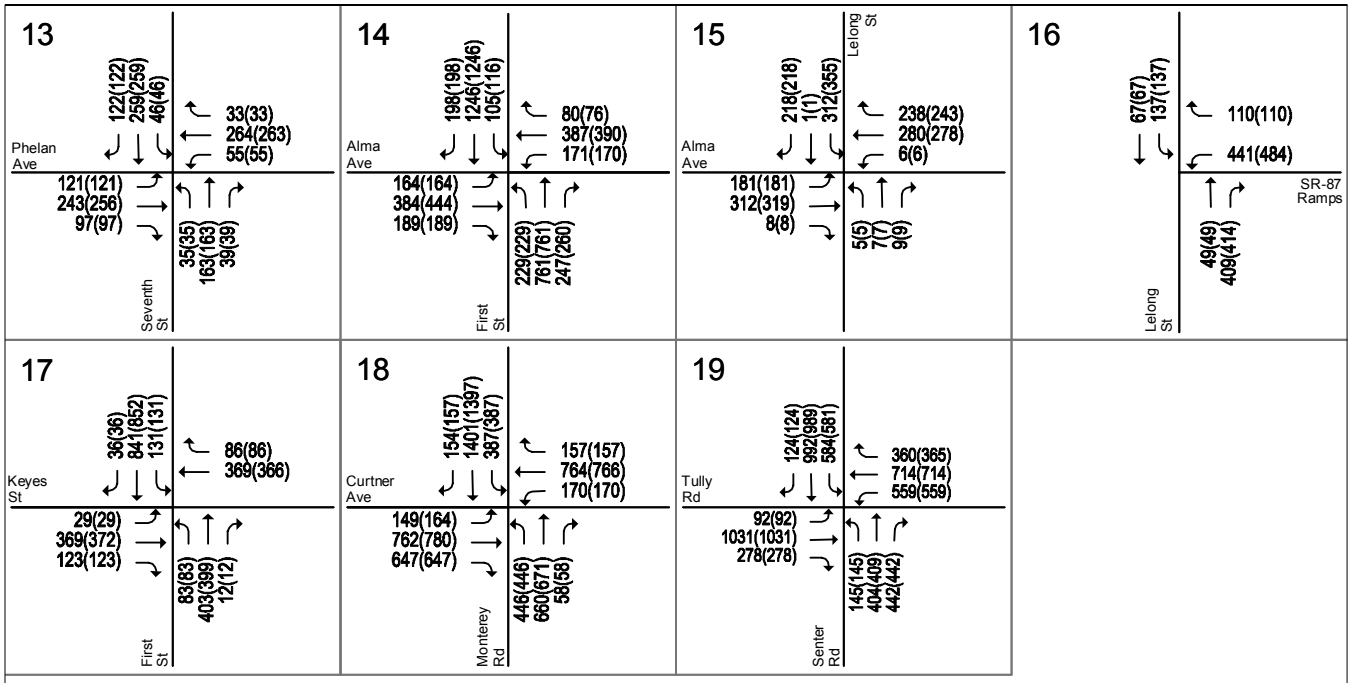


Figure 7
Existing Plus Project Traffic Volumes



LEGEND:

XX(XX) = Scenario 1(Scenario 2) PM Peak-Hour Traffic Volumes

Figure 7 (continued)
Existing Plus Project Traffic Volumes

Table 4
Existing Plus Project Conditions Intersection Levels of Service

Int. #	Intersection	LOS Standard	Peak Hour	Count Date	Existing		Existing Plus Project (Scenario 1)				Existing Plus Project (Scenario 2)			
					Avg. Delay	LOS	Avg. Delay	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C	Avg. Delay	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C
1	Tenth Street and I-280 NB On-Ramp (N) *	D	PM	12/13/18	16.5	B	16.6	B	0.1	0.006	17.3	B	0.7	0.029
2	Tenth Street and I-280 SB Off-Ramp (S) *	D	PM	12/13/18	15.3	B	15.4	B	0.1	0.006	16.6	B	1.5	0.063
3	Tenth Street and Keyes Street	D	PM	03/12/19	24.5	C	24.6	C	0.0	0.003	24.5	C	-0.4	0.029
4	Tenth Street and Alma Avenue	D	PM	03/12/19	24.8	C	25.2	C	0.6	0.020	26.0	C	1.5	0.071
5	Tenth Street and Phelan Avenue	D	PM	04/09/19	20.3	C	20.4	C	0.1	0.005	20.7	C	0.7	0.014
6	Eleventh Street and I-280 NB Off-Ramp (N) *	D	PM	12/13/18	14.5	B	14.6	B	0.1	0.008	15.2	B	0.9	0.048
7	Eleventh Street and I-280 SB On-Ramp (S) *	D	PM	12/13/18	12.5	B	12.5	B	0.0	0.006	12.5	B	0.1	0.011
8	Senter Road and Keyes Street/Story Road	D	PM	04/09/19	26.0	C	26.0	C	0.1	0.003	26.2	C	0.3	0.010
9	Senter Road and Alma Avenue	D	PM	03/12/19	13.8	B	14.1	B	0.3	0.009	14.0	B	0.4	0.012
10	Senter Road and Phelan Avenue	D	PM	04/09/19	24.3	C	24.9	C	1.0	0.007	24.6	C	0.6	0.006
11	Seventh Street and Keyes Street	D	PM	04/09/19	35.0	D	35.0	D	0.0	0.001	35.0	D	0.0	0.002
12	Seventh Street and Alma Avenue	D	PM	03/12/19	26.0	C	26.1	C	0.0	0.006	26.1	C	-0.3	0.030
13	Seventh Street and Phelan Avenue	D	PM	04/09/19	31.5	C	31.7	C	0.3	0.006	31.8	C	0.6	0.013
14	First Street and Alma Avenue*	D	PM	12/04/18	45.1	D	45.7	D	0.5	0.011	46.5	D	1.0	0.028
15	Lelong Street and Alma Avenue	D	PM	04/09/19	33.1	C	33.1	C	0.0	0.007	33.3	C	0.3	0.034
17	First Street and Keyes Street*	D	PM	12/04/18	33.1	C	33.1	C	0.0	0.003	33.0	C	-0.1	0.005
18	Monterey Road and Curtner Avenue*	D	PM	12/04/18	53.4	D	53.5	D	0.1	0.002	53.6	D	0.1	0.001
19	Senter Road and Tully Road*	D	PM	12/04/18	48.4	D	48.5	D	0.1	0.003	48.5	D	0.1	0.003

* Denotes CMP Intersection
Bold indicates unacceptable level of service.

4. Background Conditions

This chapter describes background traffic conditions. Background conditions are defined as conditions just prior to completion of the proposed development. Traffic volumes for background conditions comprise volumes from existing traffic counts plus traffic generated by other approved developments in the vicinity of the project site. This chapter describes the procedure used to determine background traffic volumes and the resulting traffic conditions.

Background Transportation Network

It is assumed in this analysis that the transportation network under background conditions would be the same as the existing transportation network.

Background Traffic Volumes

Background peak-hour traffic volumes were estimated by adding to existing volumes the estimated traffic from approved, but not yet constructed, developments. The added traffic from approved but not yet constructed developments was obtained from the City of San Jose's Approved Trips Inventory (ATI). Background traffic volumes are shown on Figure 8.

Background Intersection Levels of Service

The results of the intersection level of service analysis under background conditions are summarized in Table 5. The results show that, measured against the City of San Jose level of service standards, the intersection of Monterey Road and Curtner Avenue is projected to operate at unacceptable LOS E during the PM peak-hour. The remaining signalized study intersections would operate at an acceptable level of service (LOS D or better) during the PM peak-hour.

The level of service calculation sheets are included in Appendix C.

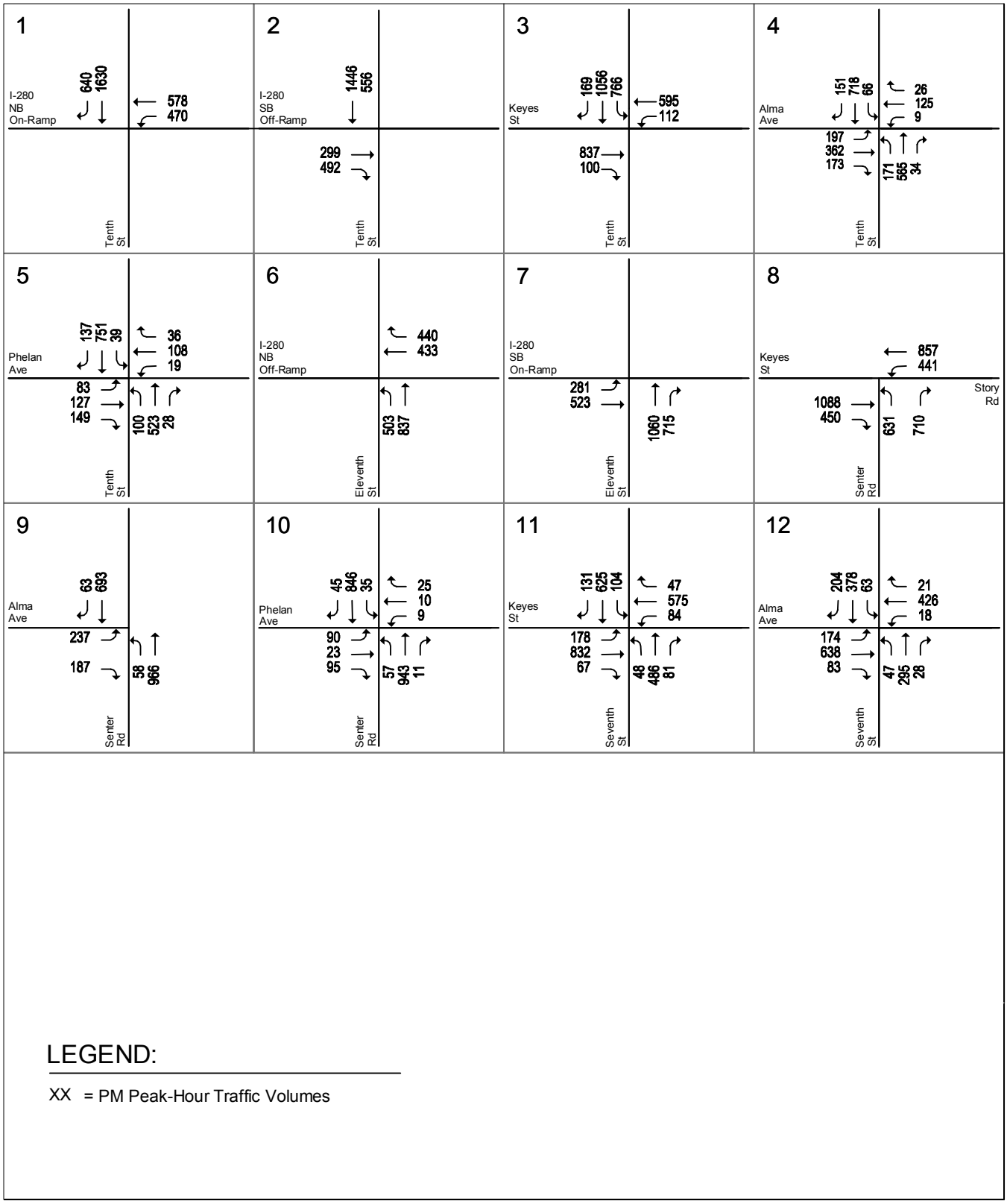


Figure 8
Background Traffic Volumes

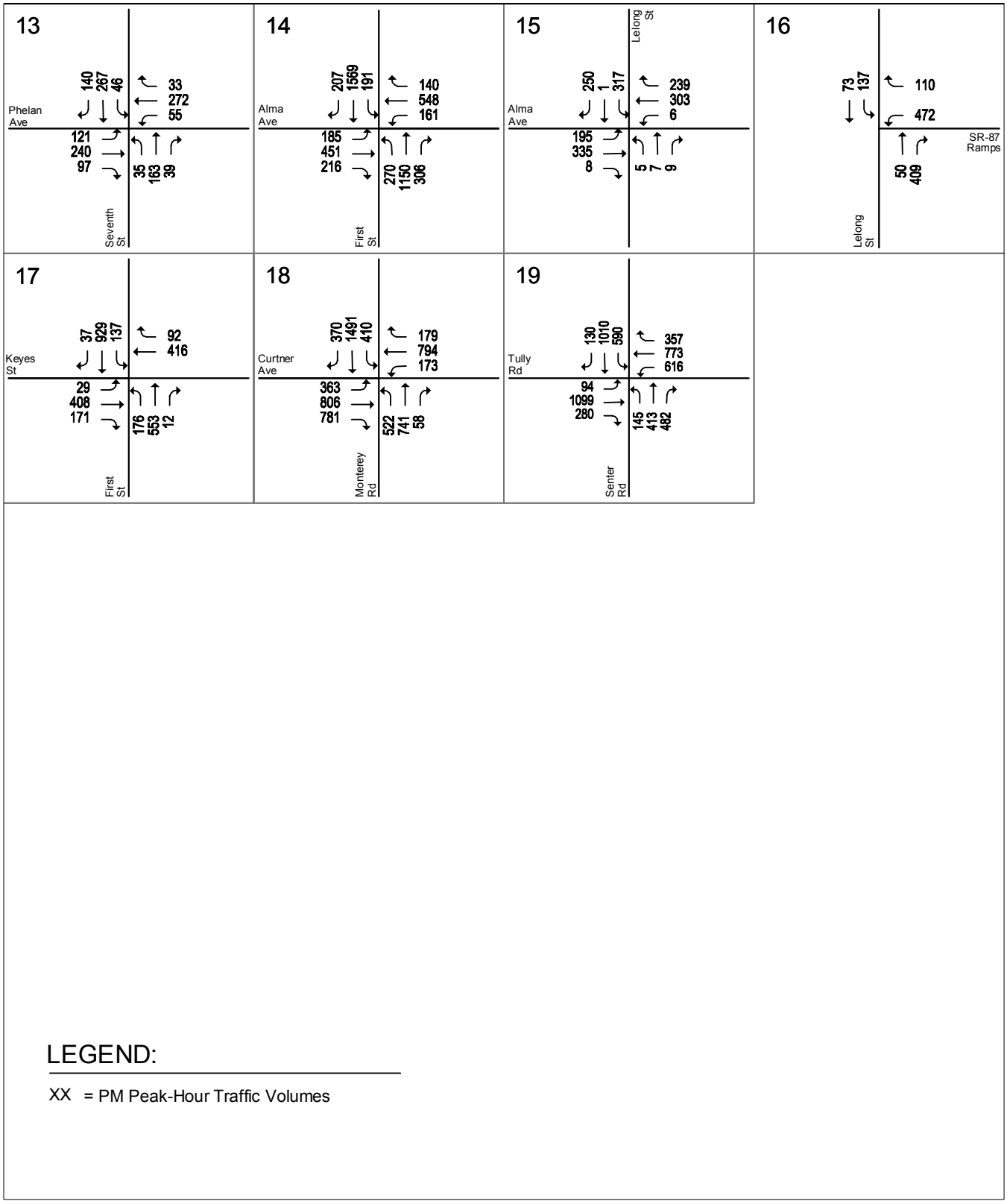


Figure 8 (continued)
Background Traffic Volumes

Table 5
Background Conditions Intersection Levels of Service

Int. #	Intersection	LOS Standard	Peak Hour	Count Date	Existing Avg. Delay	Existing LOS	Background Avg. Delay	Background LOS
1	Tenth Street and I-280 NB On-Ramp (N) *	D	PM	12/13/18	16.5	B	18.2	B
2	Tenth Street and I-280 SB Off-Ramp (S) *	D	PM	12/13/18	15.3	B	16.6	B
3	Tenth Street and Keyes Street	D	PM	03/12/19	24.5	C	28.4	C
4	Tenth Street and Alma Avenue	D	PM	03/12/19	24.8	C	26.4	C
5	Tenth Street and Phelan Avenue	D	PM	04/09/19	20.3	C	20.4	C
6	Eleventh Street and I-280 NB Off-Ramp (N) *	D	PM	12/13/18	14.5	B	14.7	B
7	Eleventh Street and I-280 SB On-Ramp (S) *	D	PM	12/13/18	12.5	B	12.8	B
8	Senter Road and Keyes Street/Story Road	D	PM	04/09/19	26.0	C	27.4	C
9	Senter Road and Alma Avenue	D	PM	03/12/19	13.8	B	14.7	B
10	Senter Road and Phelan Avenue	D	PM	04/09/19	24.3	C	24.2	C
11	Seventh Street and Keyes Street	D	PM	04/09/19	35.0	D	39.1	D
12	Seventh Street and Alma Avenue	D	PM	03/12/19	26.0	C	26.5	C
13	Seventh Street and Phelan Avenue	D	PM	04/09/19	31.5	C	32.1	C
14	First Street and Alma Avenue*	D	PM	12/04/18	45.1	D	52.5	D
15	Lelong Street and Alma Avenue	D	PM	04/09/19	33.1	C	33.3	C
17	First Street and Keyes Street*	D	PM	12/04/18	33.1	C	36.3	D
18	Monterey Road and Curtner Avenue*	D	PM	12/04/18	53.4	D	**67.0**	**E**
19	Senter Road and Tully Road*	D	PM	12/04/18	48.4	D	49.6	D

* Denotes CMP Intersection
Bold indicates unacceptable level of service.

Unsignalized Intersection Analysis (Traffic Signal Warrants)

The unsignalized study intersection of Lelong Street and SR-87 Ramps was analyzed for operational purposes, based on the Peak-Hour Volume Signal Warrant, (Warrant #3 – Part B) described in the California *Manual on Uniform Traffic Control Devices* (MUTCD), 2014 Edition.

The results of the peak-hour traffic signal warrant checks indicate that the unsignalized study intersection is projected to have traffic volumes that meet the thresholds that warrant signalization under background conditions. The peak-hour signal warrant sheets are contained in Appendix D.

5. Background Plus Project Conditions

This chapter describes background plus project traffic conditions, significant project impacts, and measures that are recommended to mitigate project impacts. Included are descriptions of the significance criteria used to establish what constitutes a project impact, the method by which project traffic is estimated, identification of the impacts, and descriptions of the mitigation measures. Background plus project conditions are represented by background traffic conditions (existing plus approved traffic) with the addition of traffic generated by the proposed project. Background plus project conditions were evaluated relative to background conditions in order to determine potential project impacts.

Significant Impact Criteria

Significance criteria are used to establish what constitutes an impact. Impacts on intersections are based on the significance criteria and thresholds of the jurisdiction in which the intersection is located. For this analysis, significance criteria for impacts on intersections are based on the City of San Jose, including for the Santa Clara County Congestion Management Program (CMP) study intersections. Project impacts also were analyzed according to the CMP methodology for the study freeway segments.

Project impacts on other transportation facilities, such as bicycle facilities and transit, were determined on the basis of engineering judgment.

City of San Jose Definition of Significant Intersection LOS Impacts

The project is said to create a significant adverse impact on traffic conditions at a signalized intersection in the City of San Jose if for either peak hour:

1. The level of service at the intersection degrades from an acceptable LOS D or better under background conditions to an unacceptable LOS E or F under background plus project conditions, or
2. The level of service at the intersection is an unacceptable LOS E or F under background conditions and the addition of project trips causes both the critical-movement delay at the intersection to increase by four (4) or more seconds *and* the volume-to-capacity ratio (V/C) to increase by one percent (.01) or more.

An exception to this rule applies when the addition of project traffic reduces the amount of average stopped delay for critical movements (i.e., the change in average stopped delay for critical movements

is negative). In this case, the threshold of significance is an increase in the critical V/C value by 0.01 or more.

A significant impact by City of San Jose standards is said to be satisfactorily mitigated when measures are implemented that would restore intersection level of service to background conditions or better.

Transportation Network under Background Plus Project Conditions

It is assumed in this analysis that the transportation network under background plus project conditions would be the same as the existing transportation network.

Project Description

The project would add approximately 200,800 square feet to the existing 180,000 square foot facility. Approximately 3,000 square feet of existing facility space would be demolished, resulting in an approximately 377,300 gross square foot facility. The additional space will provide for the addition of one practice ice rink, one competition ice rink with a maximum capacity of 4,213 seats, and 20,000 s.f. of medical office space. The proposed uses will replace a portion of the existing on-site surface parking lot.

Parking will be provided by an existing surface lot on-site and planned new San Jose State University parking structure to be located at the northeast corner of the S. 10th Street and E. Alma Avenue intersection. Access to the site would continue to be provided along S. 10th Street via one existing outbound-only driveway and one new full-access driveway. Site access along E. Alma Avenue would be provided via one driveway providing shared access to the San Jose Giants Stadium and a second driveway to be relocated approximately 140 feet west with the proposed project.

Project Trip Estimates

The magnitude of traffic produced by a new development and the locations where that traffic would appear were estimated using a three-step process: (1) trip generation, (2) trip distribution, and (3) trip assignment. In determining project trip generation, the magnitude of traffic entering and exiting the site is estimated for the PM peak hour. As part of the project trip distribution, an estimate is made of the directions to and from which the project trips would travel. In the project trip assignment, the project trips are assigned to specific streets and intersections. These procedures are described below.

Two project scenarios were analyzed. The first scenario represents a regular weekday PM peak-hour where only the practice rink and medical office building are in use. The second scenario represents a scenario where an event is to be held at the 4,213-seat capacity arena after the PM peak-hour. Trip generation estimates for each scenario are provided below in Table 6.

Trip Generation

Arena Rink

Project trips generated by the 4,213-seat capacity arena were estimated with the following assumptions:

- The event is sold-out with 4,213 attendees.
- The occupancy of each arriving vehicle is 2.5 attendees per vehicle.
- The event will start at around 7PM, or at least one hour after the end of the PM peak-hour.
- Approximately 20% of the total inbound vehicles will enter the project site during the PM peak-hour.

Table 6
Project Trip Generation Estimates

Land Use	ITE Land Use Code	Size	Daily		PM Peak Hour					
						Split		Trip		
			Rate	Trip	Rate	In	Out	In	Out	Total
PM Peak-hour Driveway Counts at Existing Site and Estimated Daily Trips										
Existing Site [1] [2]		4 Rinks	391.1	1,565	74.5	45%	55%	134	164	298
Estimates of Project Traffic										
Scenario 1: Peak Program with No Large Event at Competition Rink										
Rink 5 [1] [2]		1 Rink	391.1	391	74.5	45%	55%	34	41	75
Medical Office Building [3]	720	20,000 Square Feet	34.8	696	3.46	28%	72%	19	50	69
Project Trips				**1,087**				**53**	**91**	**144**
Scenario 2: Peak Program with Large Event at Competition Rink (4,213 occupied seats)										
Rink 6 (Arena) [4]	--	4,213 Occupied Seats		3,370				337	0	337
20% Trip Reduction [5]				-674				-67	0	-67
Rink 5 [1] [2]		1 Rink	391.1	391	74.5	45%	55%	34	41	75
Medical Office Building [3]	720	20,000 Square Feet	34.8	696	3.46	28%	72%	19	50	69
Project Trips				**3,783**				**322**	**91**	**413**

Notes:

[1] Peak-hour rate based on driveway counts conducted at the existing ice hockey facility located on-site consisting of four rinks.

[2] Daily trip rate is estimated based on the assumption that there is similar hourly usage of the rinks between 4PM to 9PM. Minimal usage of rinks (approximately 25% of PM peak-hour trips) is assumed between 11AM to 4PM.

[3] Source: ITE *Trip Generation Manual*, 10th Edition 2017

[4] Assumes 2.5 occupants per vehicle and 20% inbound arrival at the arena during PM peak-hour period (before 6PM).

[5] Based on survey data collected in 2019 and provided by the SAP Center/SJ Sharks representatives, approximately 80% of fans/visitors of events at SAP Center arrive by car. Thus, a 20% reduction in estimated trips is applied to account for other mdoes of travel including transit, ride share, and walking/biking.

It also is expected that attendees will utilize transit, ride sharing, and walking/biking to access the site. Based on survey data collected in 2019 and provided by the SAP Center/SJ Sharks representatives, approximately 80% of fans/visitors of events at SAP Center arrive by car. Thus, the remaining visitors, approximately 20%, arrive via transit (approx. 3%), walking/bike (approx. 3%), rideshare (approx. 11%), and other modes (approx. 3%). Rideshare accounts for greatest percentage of guests that do not utilize their own vehicle. The site plan indicates that two passenger loading zones, that may be used for convenient access to rideshare will be located on-site near building entrances. Therefore, a 20% reduction to account for other travel modes was applied to the project trips estimated to be generated by the arena rink.

Based on the above assumptions, the arena rink was estimated to generate approximately 270 inbound trips during the PM peak-hour and approximately 3,370 new daily trips.

Practice Rink

Driveway counts at the existing site (consisting of four practice rinks) were used to derive a PM peak-hour trip rate for the proposed additional practice rink. Daily trips were estimated with the assumption that the PM peak-hour usage of the rinks is similar to the hourly usage between 4PM to 9PM. Additionally, usage of the rinks between 11AM and 4PM was estimated by assuming 25% of PM peak-hour trips.

Based on the above assumptions, the practice rink will generate approximately 75 trips (34 inbound and 41 outbound) during the PM peak-hour and approximately 391 new daily trips.

Medical Office

Project trip estimates for the proposed medical office space are based on trip generation rates obtained from the Institute of Transportation Engineers' (ITE's) *Trip Generation*, Tenth Edition, 2017.

Based on ITE trip generation rates for Medical Office Building (land use #720), it is estimated that the proposed medical office use would generate 696 daily trips with 69 trips (19 inbound and 50 outbound) occurring during the PM peak-hour (see Table 8).

Total Project Trips

Overall, the proposed project under Scenario 1 is estimated to generate 1,087 new daily vehicle trips, with 144 trips (53 inbound and 91 outbound) occurring during the PM peak-hour. Under Scenario 2, the project is estimated to generate 3,783 new daily vehicle trips, with 413 trips (322 inbound and 91 outbound) occurring during the PM peak-hour.

Trip Distribution and Assignment

The trip distribution pattern for the project was estimated based on existing travel patterns on the surrounding roadway network, the locations of complementary land uses, and previous traffic impact reports in the study area. The trip distribution pattern for the project is shown on Figure 9.

The peak-hour trips generated by the project were assigned to the roadway network in accordance with the project trip distribution pattern. Figure 10 shows the assignment of new project trips at each study intersection.

Background Plus Project Traffic Volumes

Project trips associated with the proposed project, as presented in the above project trip assignment, were added to the background traffic volumes to obtain background plus project traffic volumes.

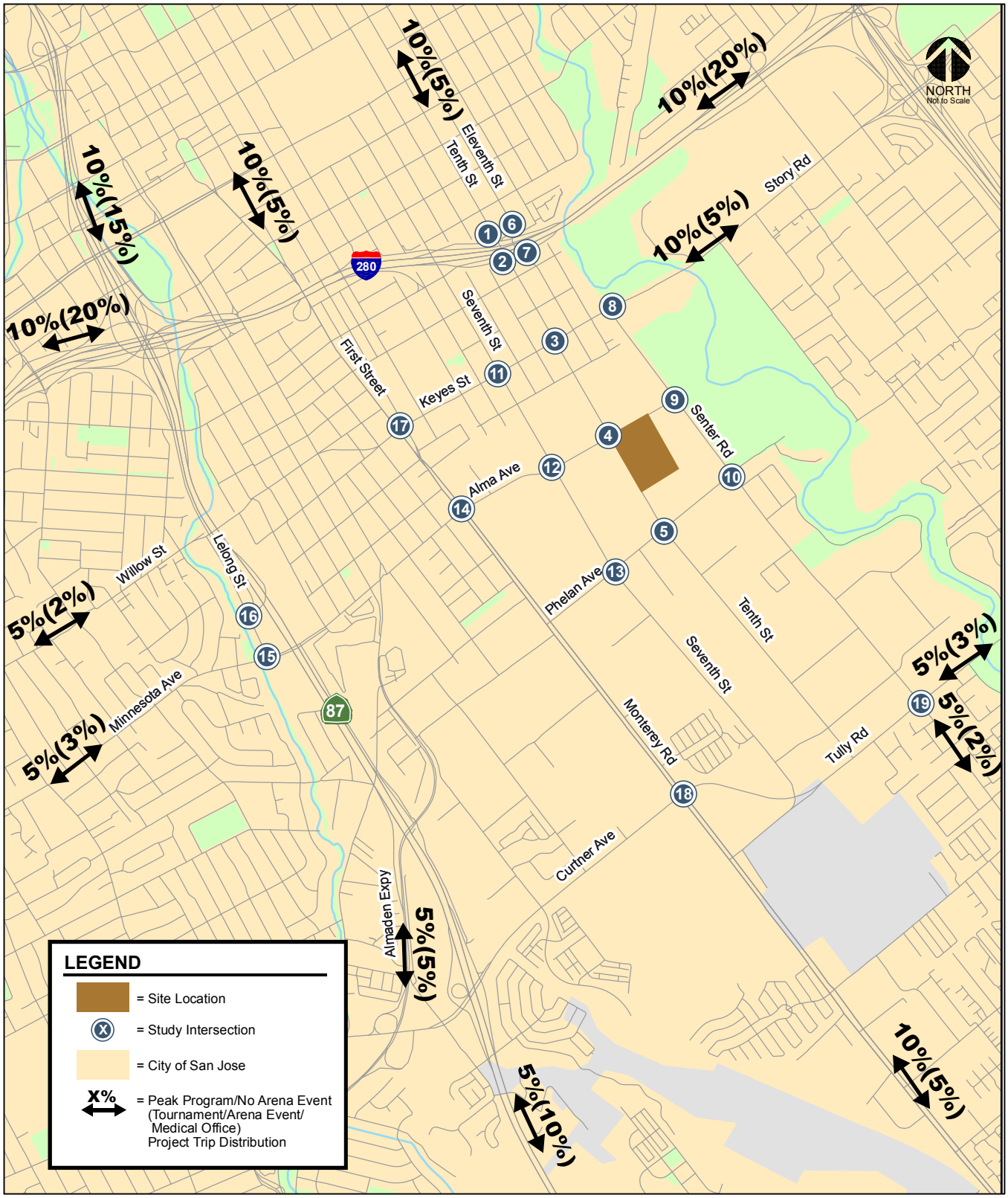
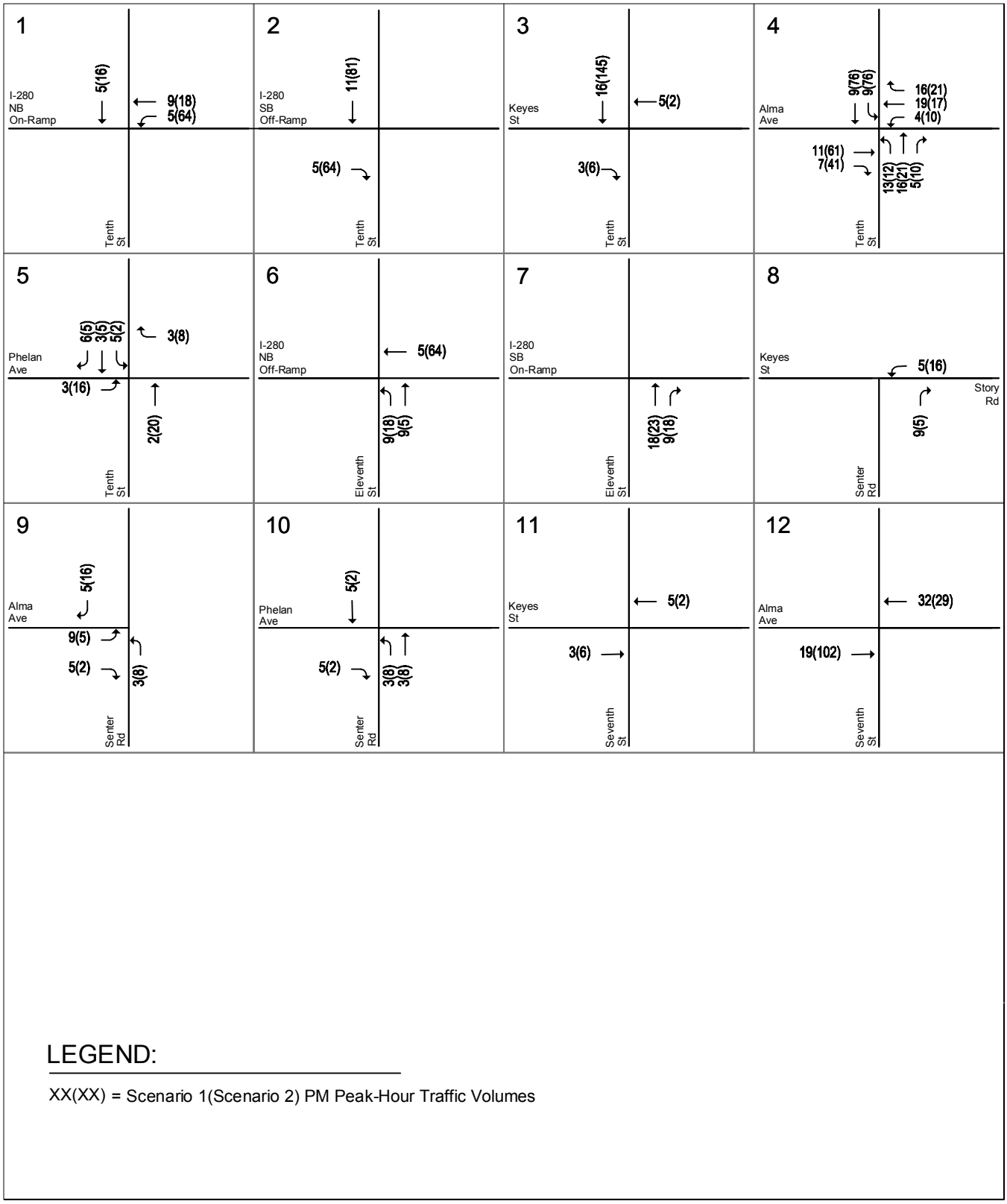


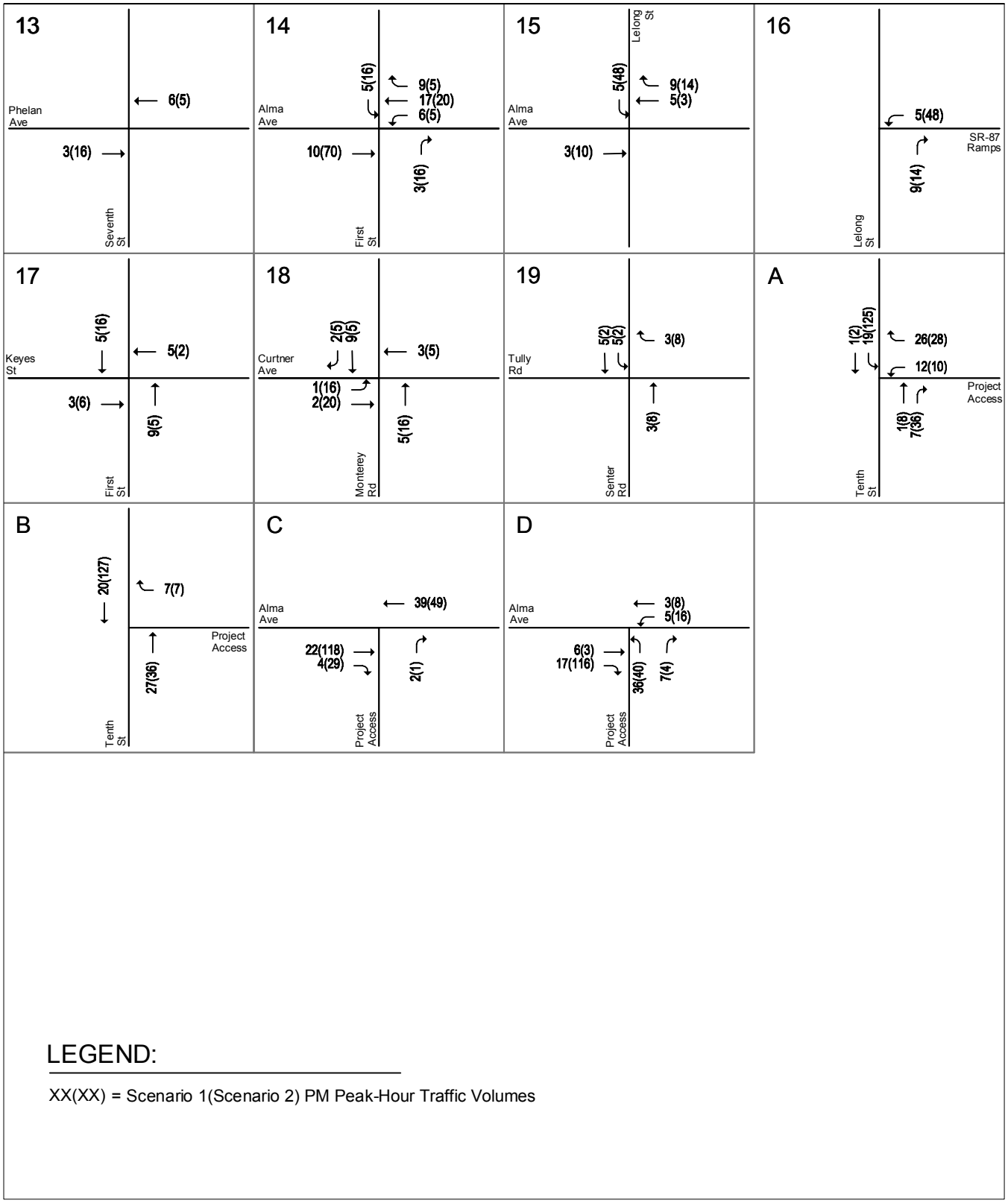
Figure 9
Project Trip Distribution



LEGEND:

XX(XX) = Scenario 1(Scenario 2) PM Peak-Hour Traffic Volumes

Figure 10
Net Project Trip Assignment



LEGEND:

XX(XX) = Scenario 1(Scenario 2) PM Peak-Hour Traffic Volumes

Figure 10 (continued)
Net Project Trip Assignment

Background plus project conditions traffic volumes for the proposed project are shown on Figure 11. Traffic volumes for all components of traffic are tabulated in Appendix B.

Background Plus Project Intersection Levels of Service

The results of the intersection level of service analysis under background plus project conditions are summarized in Table 7. The results show that, measured against the City of San Jose level of service standards, the intersection of Monterey Road and Curtner Avenue is projected to operate at unacceptable LOS E during the PM peak-hour. However, based on the applicable level of service standards and significance criteria, none of the study intersections would be significantly impacted by the proposed project under background plus project conditions.

The remaining signalized study intersections would operate at an acceptable level of service (LOS D or better) during the PM peak-hour under background plus project conditions. The level of service calculation sheets are included in Appendix C.

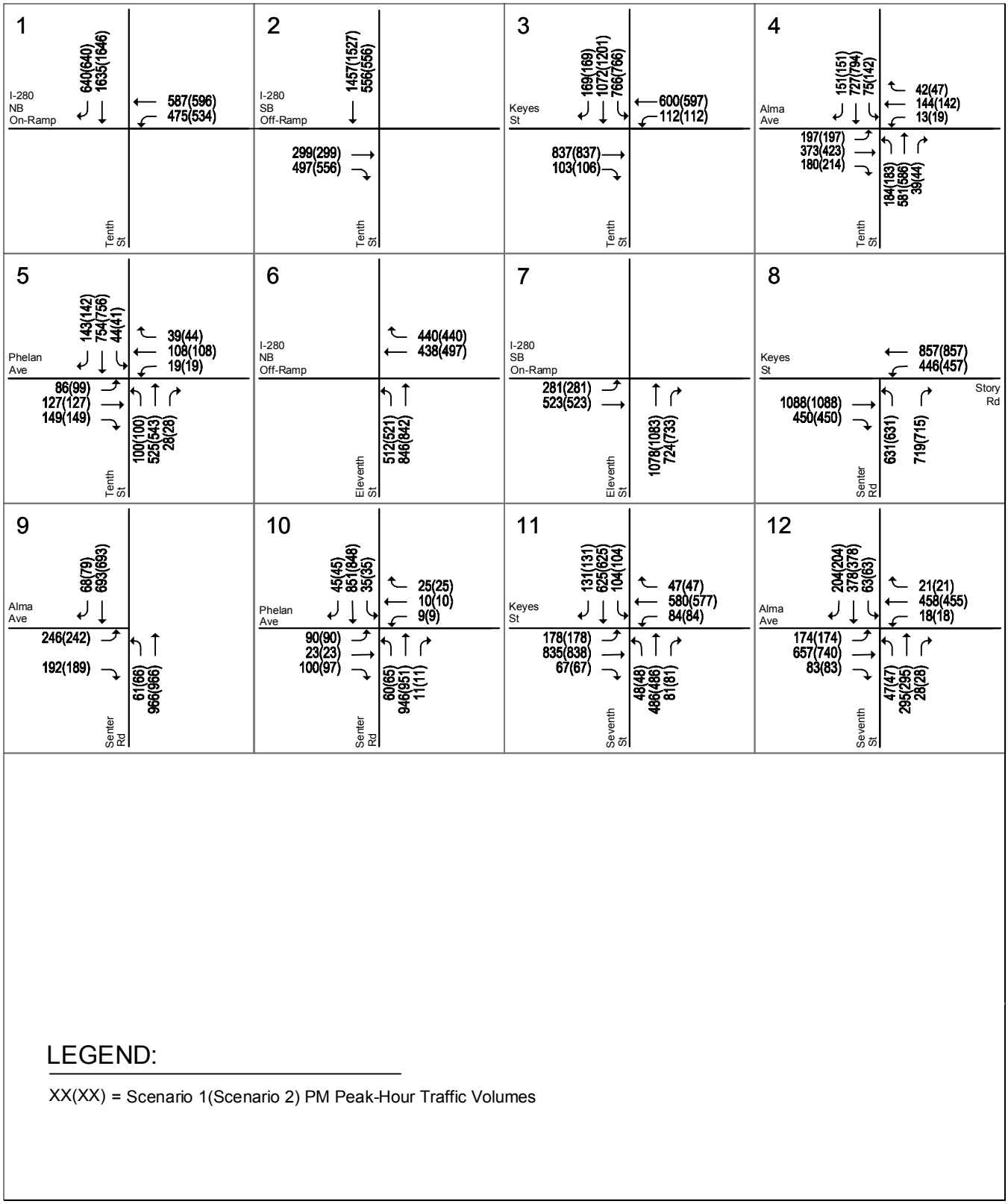
Unsignalized Intersection Analysis (Traffic Signal Warrants)

The unsignalized study intersection of Lelong Street and SR-87 Ramps was analyzed for operational purposes, based on the Peak-Hour Volume Signal Warrant, (Warrant #3 – Part B) described in the California *Manual on Uniform Traffic Control Devices* (MUTCD), 2014 Edition. This method makes no evaluation of intersection level of service, but simply provides an indication whether peak-hour traffic volumes are, or would be, sufficient to justify installation of a traffic signal.

The results of the peak-hour traffic signal warrant checks indicate that the unsignalized study intersection is projected to continue to have traffic volumes that meet the thresholds that warrant signalization under background plus project conditions. The peak-hour signal warrant sheets are contained in Appendix D.

Freeway Segment Analysis

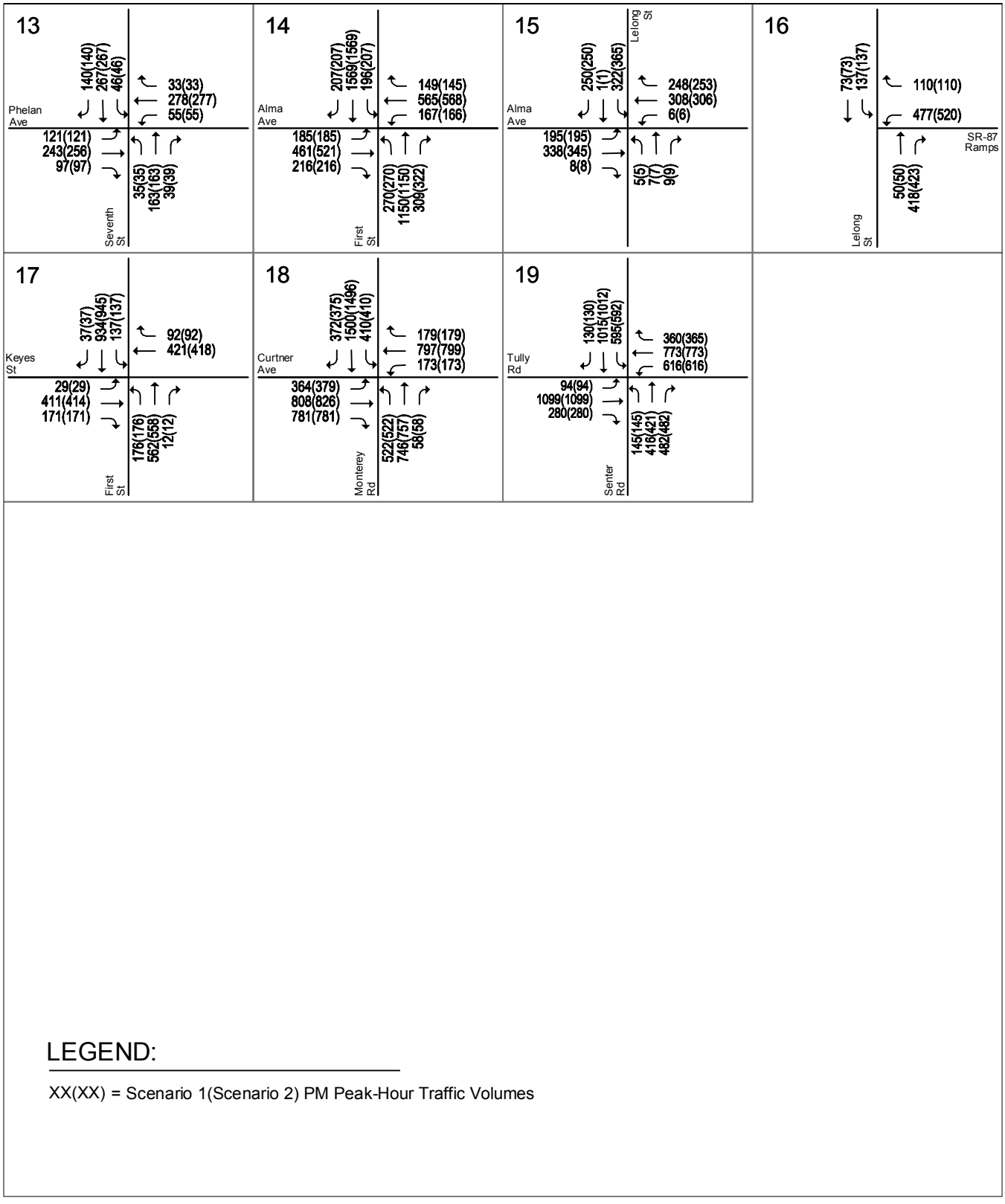
According to CMP Traffic Impact Analysis Guidelines, a freeway level of service analysis is required if the number of project trips added to any freeway segment equals or exceeds one percent of the capacity of the segment. The key freeway segments in the study area were evaluated to determine if the project traffic on each segment would exceed this threshold. The CMP specifies that a mixed-flow lane capacity of 2,300 vehicles per hour per lane (vphpl) be used for segments six lanes or wider in both directions and a capacity of 2,200 vphpl be used for segments with less than six lanes. Using the CMP's one-percent threshold, the proposed project would not add enough traffic to the freeway segments near the site to warrant a freeway analysis. The percentage of traffic projected to be added by the project to freeway segments in the project area is summarized in Table 8.



LEGEND:

XX(XX) = Scenario 1(Scenario 2) PM Peak-Hour Traffic Volumes

Figure 11
Background Plus Project Traffic Volumes



LEGEND:

XX(XX) = Scenario 1(Scenario 2) PM Peak-Hour Traffic Volumes

Figure 11 (continued)
Background Plus Project Traffic Volumes

Table 7
Background Plus Project Intersection Levels of Service

Int. #	Intersection	LOS Standard	Peak Hour	Count Date	Background		Background Plus Project (Scenario 1)				Background Plus Project (Scenario 2)			
					Avg. Delay	LOS	Avg. Delay	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C	Avg. Delay	LOS	Incr. In Crit. Delay	Incr. In Crit. V/C
1	Tenth Street and I-280 NB On-Ramp (N) *	D	PM	12/13/18	18.2	B	18.4	B	0.2	0.006	19.4	B	1.1	0.029
2	Tenth Street and I-280 SB Off-Ramp (S) *	D	PM	12/13/18	16.6	B	16.8	B	0.2	0.006	18.3	B	2.0	0.063
3	Tenth Street and Keyes Street	D	PM	03/12/19	28.4	C	28.5	C	0.0	0.003	28.7	C	0.0	0.029
4	Tenth Street and Alma Avenue	D	PM	03/12/19	26.4	C	27.0	C	0.6	0.023	27.2	C	1.8	0.067
5	Tenth Street and Phelan Avenue	D	PM	04/09/19	20.4	C	20.4	C	0.1	0.005	20.7	C	0.7	0.014
6	Eleventh Street and I-280 NB Off-Ramp (N) *	D	PM	12/13/18	14.7	B	14.8	B	0.1	0.008	15.5	B	1.0	0.048
7	Eleventh Street and I-280 SB On-Ramp (S) *	D	PM	12/13/18	12.8	B	12.8	B	0.0	0.006	12.8	B	0.1	0.011
8	Senter Road and Keyes Street/Story Road	D	PM	04/09/19	27.4	C	27.5	C	0.1	0.003	27.6	C	0.4	0.010
9	Senter Road and Alma Avenue	D	PM	03/12/19	14.7	B	15.0	B	0.3	0.009	14.9	B	0.4	0.012
10	Senter Road and Phelan Avenue	D	PM	04/09/19	24.2	C	24.8	C	1.0	0.007	24.6	C	0.6	0.006
11	Seventh Street and Keyes Street	D	PM	04/09/19	39.1	D	39.1	D	0.0	0.001	39.1	D	0.1	0.002
12	Seventh Street and Alma Avenue	D	PM	03/12/19	26.5	C	26.6	C	0.0	0.006	26.5	C	-0.3	0.030
13	Seventh Street and Phelan Avenue	D	PM	04/09/19	32.1	C	32.2	C	0.3	0.006	32.4	C	0.7	0.013
14	First Street and Alma Avenue*	D	PM	12/04/18	52.5	D	53.4	D	1.0	0.011	54.9	D	2.8	0.028
15	Lelong Street and Alma Avenue	D	PM	04/09/19	33.3	C	33.3	C	0.0	0.007	33.5	C	0.3	0.034
17	First Street and Keyes Street*	D	PM	12/04/18	36.3	D	36.3	D	0.1	0.003	36.3	D	0.0	0.005
18	Monterey Road and Curtner Avenue*	D	PM	12/04/18	**67.0**	**E**	**67.2**	**E**	**0.4**	**0.002**	**67.1**	**E**	**0.2**	**0.001**
19	Senter Road and Tully Road*	D	PM	12/04/18	49.6	D	49.7	D	0.2	0.003	49.6	D	0.2	0.003

* Denotes CMP Intersection
Bold indicates unacceptable level of service.

Table 8
Existing Plus Project Freeway Segment Level of Service Analysis

						Existing Capacity												Project Trips			
						Mixed-Flow Lane						HOV Lane						Mixed-Flow Lane		HOV Lane	
#	Freeway	Segment	Direction	Scenario	Peak Hour	Speed[1] (mi/hr)	# of Lanes[1]	Capacity (veh/ln)	Ex. Volume (pc/hr/ln)	Density (pc/mi/ln)	LOS	Speed[1, 2] (mi/hr)	# of Lanes[1]	Capacity (veh/ln)	Ex. Volume (pc/hr/ln)	Density (pc/mi/ln)	LOS	Volume (pc/hr/ln)	% of Capacity	Volume (pc/hr/ln)	% of Capacity
1	I-280	from SR 87 to Tenth Street	EB	1	PM	14.4	4	2,300	1,094	**76**	**F**	--	--	--	--	--	--	2	0.09	--	--
			EB	2	PM	14.4	4	2,300	1,094	**76**	**F**	--	--	--	--	--	--	16	0.70	--	--
2	I-280	from Tenth Street to McLaughlin Avenue	EB	1	PM	45.4	4	2,300	1,975	44	D	--	--	--	--	--	--	3	0.13	--	--
			EB	2	PM	45.4	4	2,300	1,975	44	D	--	--	--	--	--	--	5	0.22	--	--
3	SR 87	from Capitol Expressway to Curtner Avenu	NB	1	PM	57.8	2	2,200	1,880	33	D	73.1	1	1,650	531	7	A	2	0.09	0	0.00
			NB	2	PM	57.8	2	2,200	1,880	33	D	73.1	1	1,650	531	7	A	13	0.59	3	0.18
4	SR 87	from Curtner Avenue to Almaden Road	NB	1	PM	31.2	2	2,200	1,732	56	E	72.0	1	1,650	728	10	A	0	0.00	0	0.00
			NB	2	PM	31.2	2	2,200	1,732	56	E	72.0	1	1,650	728	10	A	0	0.00	0	0.00
5	SR 87	from Almaden Road to Alma Avenue	NB	1	PM	25.2	2	2,200	1,554	**62**	**F**	68.0	1	1,650	1,158	17	B	0	0.00	0	0.00
			NB	2	PM	25.2	2	2,200	1,554	**62**	**F**	68.0	1	1,650	1,158	17	B	0	0.00	0	0.00
6	SR 87	from Alma Avenue to I-280	NB	1	PM	21.2	2	2,200	1,407	**66**	**F**	63.8	1	1,650	1,393	22	C	3	0.14	2	0.12
			NB	2	PM	21.2	2	2,200	1,407	**66**	**F**	63.8	1	1,650	1,393	22	C	4	0.18	3	0.18
7	SR 87	from I-280 to Alma Avenue	SB	1	PM	21.4	2	2,200	1,415	**66**	**F**	44.5	1	1,650	1,738	39	D	2	0.09	1	0.06
			SB	2	PM	21.4	2	2,200	1,415	**66**	**F**	44.5	1	1,650	1,738	39	D	11	0.50	13	0.79
8	SR 87	from Alma Avenue to Almaden Avenue	SB	1	PM	27.0	2	2,200	1,612	**60**	**F**	45.6	1	1,650	1,732	38	D	0	0.00	0	0.00
			SB	2	PM	27.0	2	2,200	1,612	**60**	**F**	45.6	1	1,650	1,732	38	D	0	0.00	0	0.00
9	SR 87	from Almaden Avenue to Curtner Avenue	SB	1	PM	34.0	2	2,200	1,799	53	E	58.4	1	1,650	1,566	27	D	0	0.00	0	0.00
			SB	2	PM	34.0	2	2,200	1,799	53	E	58.4	1	1,650	1,566	27	D	0	0.00	0	0.00
10	SR 87	from Curtner Avenue to Capitol	SB	1	PM	39.2	2	2,200	1,900	48	E	56.6	1	1,650	1,604	28	D	2	0.09	1	0.06
			SB	2	PM	39.2	2	2,200	1,900	48	E	56.6	1	1,650	1,604	28	D	3	0.14	2	0.12
11	I-280	from McLaughlin Avenue to Tenth Street	WB	1	PM	44.0	4	2,300	1,963	45	D	--	--	--	--	--	--	2	0.09	--	--
			WB	2	PM	44.0	4	2,300	1,963	45	D	--	--	--	--	--	--	16	0.70	--	--
12	I-280	from Tenth Street to SR 87	WB	1	PM	30.6	4	2,300	1,716	56	E	--	--	--	--	--	--	3	0.13	--	--
			WB	2	PM	30.6	4	2,300	1,716	56	E	--	--	--	--	--	--	5	0.22	--	--

[1]Santa Clara Valley Transportation Authority CMP Monitoring & Conformance Report, 2018.
Entries denoted in bold indicate unacceptable LOS F conditions.

6. Other Transportation Issues

This chapter presents other transportation issues associated with the project site, including:

- Site access and circulation
- Parking
- Vehicle queuing analysis
- Freeway ramp operations analysis
- Potential Impacts on Pedestrian, Bicycle, and Transit Facilities

Unlike the level of service impact methodology, which is adopted by the City Council, the analyses in this chapter are based on professional judgment in accordance with the standards and methods employed by the traffic engineering community.

Site Access and Circulation

Site access and on-site circulation were evaluated using commonly accepted transportation planning principles. This review is based on a project site plan prepared by Devcon dated October 31, 2019 (see Figure 12).

The site plan shows the proposed practice rink (Rink 5) and arena rink (Rink 6) will be constructed along the south and east sides of the existing indoor hockey facility. Surface parking areas will surround the entire proposed indoor facility. A portion of the surface parking area located along the east side of the project property is currently shared with the San Jose Giants Baseball Stadium. A shared parking arrangement with the baseball stadium will be maintained with the proposed project.

Site Access Evaluation

Vehicular access to the project site would be provided via two driveways along 10th Street (Driveways A and B) and two driveways along Alma Avenue (Driveways C and D). The project driveways are shown on Figure 12 and described below.

- Driveway A is a proposed two-way driveway located at the southwest corner of the project site on 10th Street that woud provide full-access to/from the project site.
- Driveway B is an existing outbound-only driveway on 10th Street. It is assumed that all movements will make a right-turn out (no outbound left-turns) from the driveway due to its proximity to the intersection of 10th Street and Alma Avenue (approximately 200 feet south of the intersection).

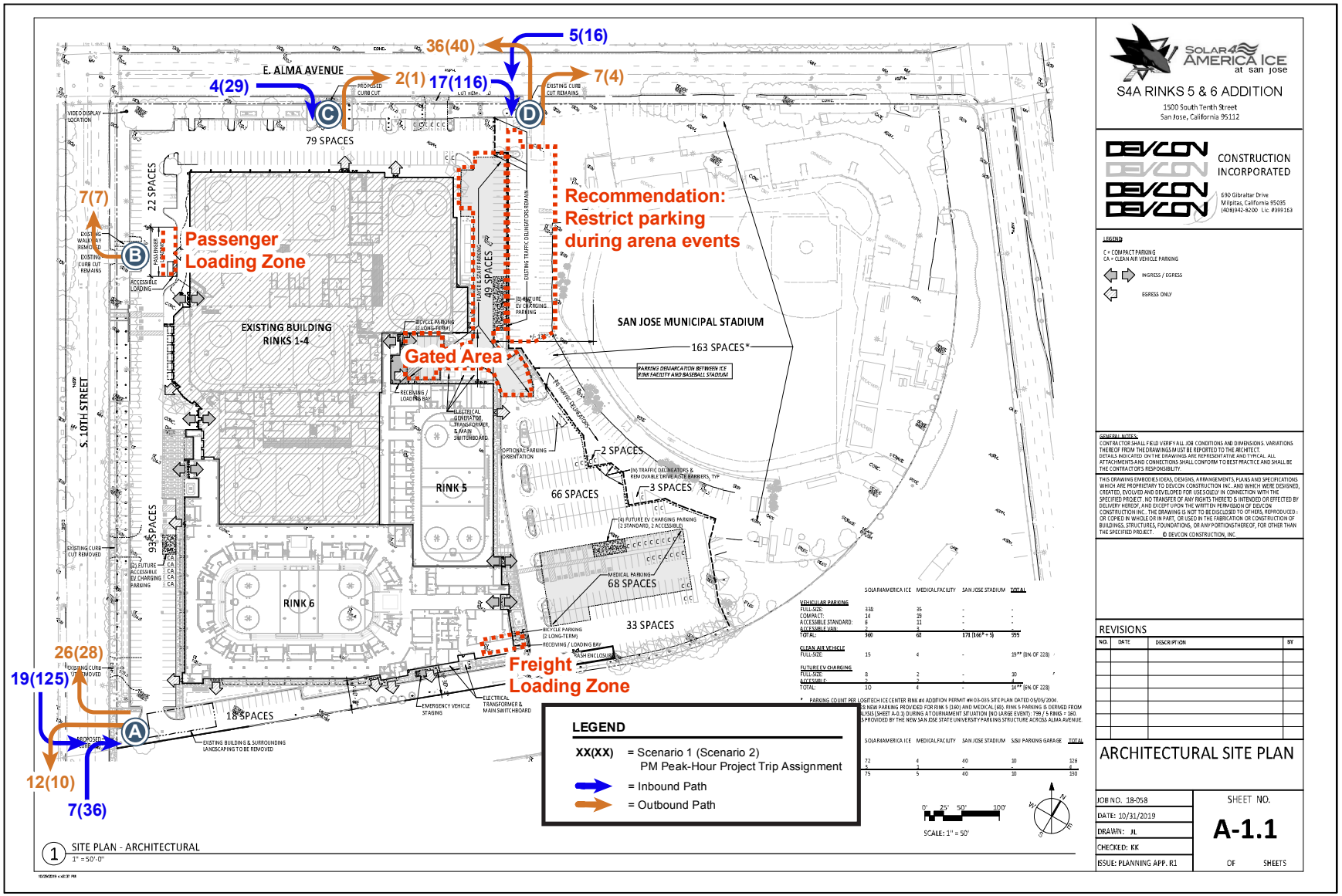


Figure 12
Project Site and PM Peak-Hour Project Trips at Driveways

- Driveway C is a proposed two-way driveway located approixmately 140 feet west of an existing two-way driveway on Alma Avenue proposed to be removed by the project. It is assumed to provide right-in/right-out only access (no inbound left-turns) due to its proximity to the intersection of 10th Street and Alma Avenue (approximately 290 feet east of the intersection).
- Driveway D is an existing two-way driveway on Alma Avenue that provides full-access to/from a surface parking lot that is shared between the existing hockey facility and the San Jose Giants Stadium. Driveway D will continue to provide access to both facilities with the proposed project. It should be noted that unlike the other project driveways, Driveway D is located on the property of the San Jose Giants Staidum.

All project driveways are connected on-site via the surface parking lot surrounding the site. Driveways A and C are both proposed to be approximately 26 feet wide. The existing driveway cut of Driveways B and D will be maintained at approximately 20 feet and 26 feet, respectively.

According to the City of San Jose code, two-way driveways serving commercial uses must have a minimum width of at least 32 feet. Approaches to one-lane driveways must be at least 16 feet wide. Based on these requirements, only Driveway B will meet the City code. The site plan should be revised to provide at least 32-foot wide curb cuts at Driveways A and C. Driveway D also will not meet the City code, however it is not located on the project property. Given that Driveway D already serves the existing baseball stadium and ice hockey facility, the 26-foot width could be deemed acceptable by the City. Ultimately, the City will decide whether Driveway D will need to be widened to 32 feet.

Driveway Operations

The project trip assignment at the site driveways is shown on Figure 12. During the PM peak-hour, a majority of project trips will likely enter the site using Driveways A and D under Scenario 1, with approximately 27 and 22 inbound trips at each driveway, respectively, and approximately 4 trips using Driveway C. Under Scenario 2, approximately 161 trips are projected to enter via Driveway A, 29 trips via Driveways C, and 132 via Driveway C. As shown on Figure 12, there are significantly fewer outbound trips when compared to inbound trips, most of which are generated by the medical office use.

Inbound left-turn queues at Driveways A and D were estimated using the queueing analysis methodology described below for the study intersections. Under both Scenario 1 and Scenario 2 project conditions, minimal queuing (approximately one or two vehicles) can be expected at the southbound left-turn movement into Driveway A and the westbound left-turn movement into Driveway D due to low conflicting volumes in the opposing traffic stream of these movements. Queueing for these inbound movements will occur within travel lanes, as there are no turn pockets or striped medians on 10th Street or Alma Avenue along the project frontages. However, the projected minimal queueing into the driveways would result in minimal disruption to through traffic along these roadways.

As discussed within the Parking section below, a total of 606 parking spaces will be provided on-site and within the adjacent San Jose Giants Stadium property. The 606 parking spaces should be able to accommodate the PM peak-hour traffic demand under Scenario 1 and Scenario 2 (approximately 20% of all inbound project traffic during a sporting event) as estimated in the project trip generation. Therefore, all peak-hour project trips on the project trip assignment are shown entering and exiting the project site driveways under both scenarios. The remaining 80% of inbound trips that would arrive after the PM peak-hour under Scenario 2 would likely exceed the on-site parking capacity. It is presumed that the planned San Jose State parking structure would provide additional parking capacity during events at the proposed arena. However, these inbound trips are not shown utilizing the parking garage's driveways on the project trip assignment as they occur outside of the PM peak-hour.

Sight Distance at the Driveways

A clear line of sight should be provided between the drivers at the project driveways and the approaching traffic. The Caltrans Highway Design Manual (HDM), dated November 2017, identifies the minimum stopping sight distances required for roadways with different design speeds. Stopping sight distance is the minimum distance for a given design speed that a driver needs in order to be able to see something on the road and stop before colliding.

The posted speed limit along 10th Street and Alma Avenue is 35 miles per hour (mph). According to the HDM, a minimum stopping sight distance of 250 feet must be provided on roadways with a design speed of 35 mph.

Both 10th Street and Alma Avenue are long and straight roadways and a clear line of sight from all project site driveways is provided. Based on aerial images, a minimum of 400 feet of sight distance is provided at all project site driveways on 10th Street and Alma Avenue.

Based on the posted speed limits and Caltrans design standards, adequate stopping sight distance is and would continue to be provided at all project site driveways.

On-Site Circulation

The on-site circulation was reviewed in accordance with the City of San Jose code and generally accepted traffic engineering standards. The project would provide 90-degree parking throughout the surface parking areas. All surface drive aisles are shown to provide two-way access and will therefore need to be a minimum 26 feet wide. A majority of parking spaces will be full-size and will therefore need to meet the minimum dimensions of 18 feet in length and 9 feet in width for full-size spaces. Several parking spaces located along the north and east sides of the project are marked compact spaces on the site plan and will need to meet the minimum dimensions of 16 feet in length and 8 feet in width for compact spaces. The proposed drive aisle widths, in combination with the parking dimensions, would provide sufficient room for vehicles to back out of the 90-degree parking stalls.

No dead-end aisles are being proposed (with the exception of a short dead-end aisle within the gated parking area described below), eliminating the need for vehicles to complete U-turns within the site. Additionally, all parking areas would be connected, allowing drivers to circulate the site without having to enter and exit the site while looking for parking.

Based on the proposed layout of the project site, connectivity between all parking areas, adequate drive aisle widths and turn radii, on-site vehicular circulation would be adequate.

Gated Parking Area

A gated parking area (marked “secured area” on the site plan) is proposed along the east side of the hockey facility. Only staff members and players would be allowed into the gated area. Access would be provided via a gate facing the drive aisle parallel to the north project frontage and a second gate facing the general public parking area located at the southeast corner of the site. Between the two gates, the parking area consists of a north-south drive aisle and a short east-west drive aisle with a dead-end. Although dead-end drive aisles are not desirable, the proposed drive-aisle is short (less than 50 feet long) and backing out of the dead-end should not be problematic. Additionally, the gated parking area will be used primarily by staff members who would be familiar with the layout of the parking facility.

East Public Parking Area

The public parking area located at the southeast corner of the site would be accessible via any of the project driveways, however most drivers will likely use Driveways A and D to access this parking area. Access from Driveway A would be provided via an approximately 30-foot wide drive aisle running along the south project frontage. Access to the east parking area from Driveway D involves usage of a north-

south drive aisle located along San Jose Giants Stadium property. During major events, it is recommended that parking be restricted at spaces located along the north-south drive aisle near Driveway D, as shown on Figure 12. Limiting parking along the drive aisle will allow traffic to enter and exit the site without being blocked by vehicles backing out onto the drive aisle.

It should be noted that there is an option to prohibit access to the project site from Driveway D by use of traffic delineators and drive aisle barriers as shown on the site plan. This site access configuration would only be used during days when no major events are scheduled at the proposed arena rink. With this configuration, access to the east public parking area would be restricted to Driveway A. The gated parking area would prevent vehicles from using Driveway C on Alma Avenue to access the east public parking area.

On-Site Passenger Loading Zones

A passenger loading zone is proposed along the drive aisle running along the west project frontage. The loading zone consists of an approximately 67-foot long duc-out and is designated as an accessible loading zone. The duc-out design of the loading zone would not inhibit northbound traffic on the adjacent drive aisle.

Truck and Emergency Vehicles On-Site Circulation

The site plan shows a designated loading area for delivery trucks located at the southeast corner of the on-site building. The loading dock is shown facing an approximately 26-foot wide drive aisle. Additional turn-around space is provided by a drive aisle which heads east from the drive aisle. Therefore, delivery trucks should have adequate space to maneuver into and out of the loading dock. It is recommended that access to the truck loading spaces be prohibited during a major sporting event.

An emergency vehicle staging area is shown along the south drive aisle, west of the truck loading zone. Access between the staging area and Driveway A should be maintained by keeping the south drive aisle free from obstructions such a parked vehicles or trucks.

Pedestrian Access

The proposed project would maintain the existing 7-foot wide sidewalks along its entire frontages on 10th Street and Alma Avenue. A north-south crosswalk along the east leg of the 10th Street and Alma Avenue intersection would provide direct access between the site and a proposed parking structure (owned by San Jose State University) to be constructed at the northeast corner of the intersection. The parking structure would provide additional parking for the proposed ice hockey facility and is discussed further below. With the available sidewalks and crosswalks along roadways and intersections in the vicinity of the project site, adequate pedestrian access to and from the project site to nearby pedestrian destinations would be provided.

As shown on Figure 13, there would be continuous pedestrian access between the project's west entrances and the garage. However, no on-site sidewalks would be located along the east side of the facility (adjacent to the gated parking area), between sidewalks on Alma Avenue and project entrances.

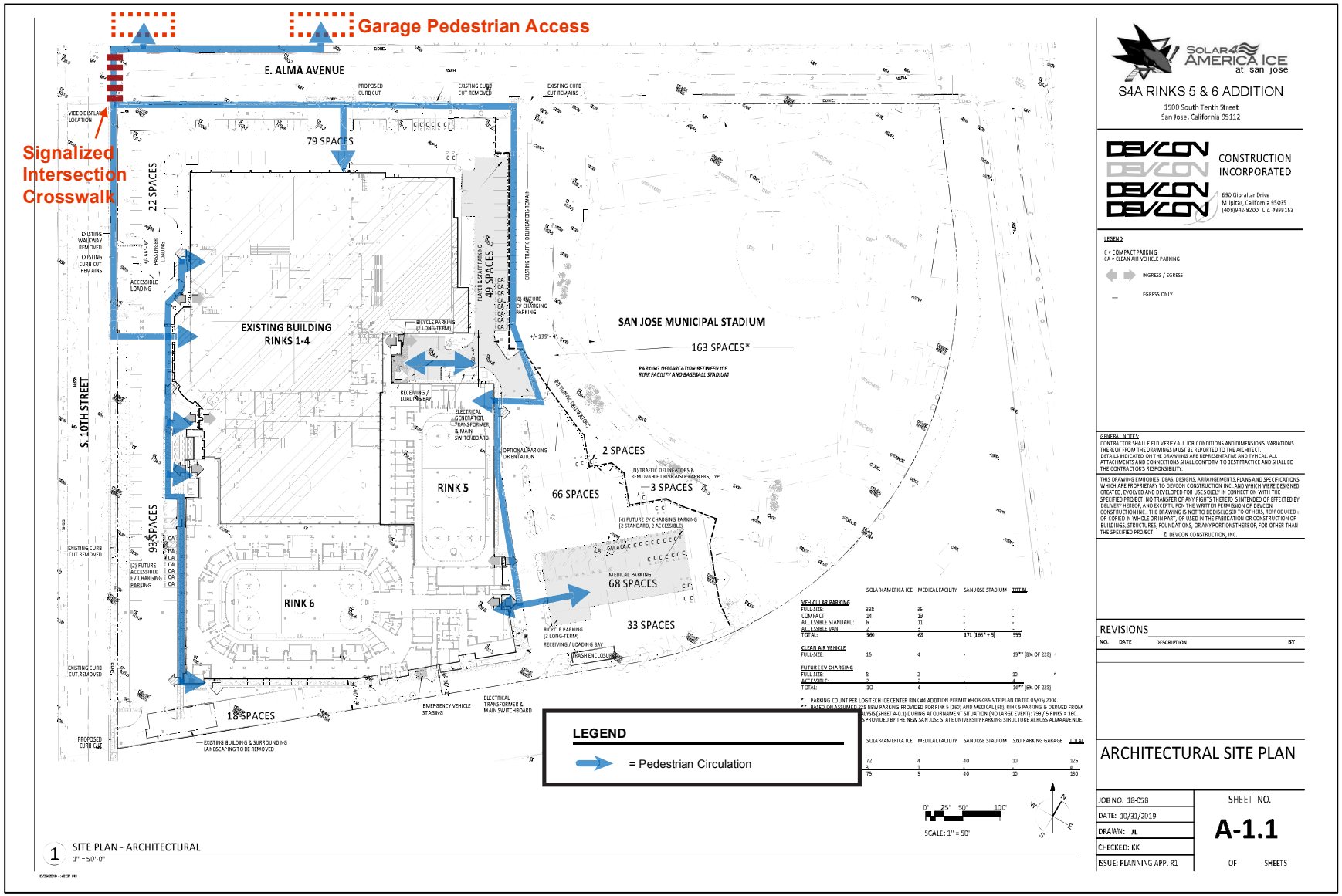


Figure 13
Pedestrian Site Access and Circulation

Recommended Site Access and Circulation Improvements

The following recommendations are made to promote adequate site access and on-site circulation:

Provide Clear Sight Triangles at Driveways. The project must ensure that any landscaping and signage located adjacent to the project driveways do not obstruct the view for drivers exiting the site.

Design of Project Site. The design of the project site, including but not limited to driveways, sidewalks, drive aisles, turn radii, parking stalls, and signage should adhere to City of San Jose design standards.

Parking

The parking analysis for the proposed office development is based on the City of San Jose's zoning code requirements.

Vehicle Parking

The City of San Jose Municipal Code (Section 20.90.060) states that indoor recreational facilities (such as Rink 5) are required to provide one parking space per 80 square feet (s.f.) of recreational area. Based on the site plan, Rink 5 will be 17,000 s.f. of floor space. Therefore, 213 parking spaces will be required for Rink 5. The code also states that sports arenas (such as Rink 6) are required to provide one space per four fixed seats, in addition to one space per 7 linear feet of fixed benches. Based on these standards, the proposed arena consisting of 4,213 seats will require 1,054 parking spaces to meet the City code. Medical facilities are required to provide one parking space per 250 s.f. of leasable floor area. Therefore, the proposed 20,000 s.f. medical office use will require 68 parking spaces to meet the City code (assuming 85% of leasable space = 17,000 s.f.).

Additionally, the four existing practice rinks will remain on-site with the proposed project. The rinks have a total 68,000 s.f. of combined floor space, equating to 850 parking spaces required by the Code.

Overall, the project would be required to provide a total of 850 on-site parking spaces for the existing four 17,000 s.f. rinks and an additional 1,335 spaces for the new proposed uses based on the City parking code, for a total of 2,185 required on-site parking spaces. It should be noted however that providing 2,185 parking spaces may be excessive given the following:

- Rink 5 nor the four existing ice rinks, which are practice rinks, will likely not generate traffic requiring 1,063 parking spaces at any given time. Practice rinks are intended for use by small groups of players and will not attract many spectators.
- The medical office facility will likely be closed after 5PM or 6PM. Parking spaces desginated for the medical office use during the daytime would be available for use by the general public during the evening.

The site plan indicates that a total of 599 parking spaces are proposed on-site including 48 spaces within a gated parking area (reserved for players and staff members), and 171 parking spaces to be allocated for events at the San Jose Municipal Stadium, adjacent to the east surface parking lot of the project and accessible from Driveway D. As noted before, access to parking spaces located on the Stadium site may be restricted by use of traffic delineators and drive aisle barriers as shown on the site plan. Based on information by the applicant, however, events at the arena rink will be scheduled to avoid conflicts with sporting events at the baseball stadium. Therefore, a total of 599 parking spaces would be available on-site and adjacent to the project site during sporting events at the arena rink. However, the on-site parking would be 1,586 spaces fewer than per the City parking requirements.

It should also be noted that a new SJSU parking structure is currently under construction, with completion estimated to be December 2020, at the northeast corner of the 10th Street and Alma

Avenue intersection. The parking structure is intended to serve existing traffic associated with sporting events at San Jose State CEFCU Stadium during the weekends. The parking structure also would be accessible to San Jose State students, and staff during weekdays. The parking structure will have approximately 1,500 parking spaces available to Solar4Amercia Ice on event days. Sharks Ice and SJSU will enter into a long-term parking agreement which will be assignable to the City of San Jose. Should there be a delay in the provision of parking in the SJSU garage, other off-site parking locations will be identified in accordance with Chapter 20.90.200 of the San José Municipal Zoning Code for off-site, alternating use and alternative parking arrangements.

The applicant will need to work with the City of San Jose staff to determine if the proposed 599 parking spaces on-site and 1,500 spaces within the new SJSU parking garage are appropriate for the project. A parking management plan should be prepared for arena rink events. The plan should identify an event schedule to ensure that arena events do not coincide with San Jose Giants baseball and SJSU sporting events to ensure parking availability in the SJSU parking structure. The plan may also require a limited-use schedule for the practice rinks to make available the majority of on-site parking for use by the arena.

Americans With Disabilities Act Compliance

The Americans with Disabilities Act (ADA) requires developments to provide 9 accessible parking space within parking lots with 401 to 500 total parking spaces. Accessible parking spaces shall be at least 96 inches (8 feet) wide and shall be located on the shortest accessible route of travel from adjacent parking to an accessible entrance. In addition, one in every 6 accessible spaces, but no less than one, shall be served by an access aisle at least 96 inches wide and shall be designated as “van accessible”. It should be noted that the accessible parking spaces are not additional parking spaces, but are part of the minimum parking spaces required.

Based on the above ADA requirements, the proposed project must provide a total of 9 accessible parking spaces, with a minimum of 2 of the 9 spaces designated as van accessible spaces. The site plan lists a total of 22 accessible parking spaces (with 14 of them designated for the medical office use) being proposed within the project site. Therefore, the proposed number of accessible parking spaces satisfies ADA parking requirements.

Bicycle Parking

The City of San Jose Municipal Code (Section 20.90.060) states that indoor recreational facilities (such as Rink 5) are required to provide one bicycle parking space per 1,600 square feet (s.f.) of recreational area. Based on the site plan, Rink 5 will be 17,000 s.f. Therefore, 11 bicycle parking spaces will be required for Rink 5. The code also states that sports arenas (such as Rink 6) are required to provide one bicycle space per 60 fixed seats, in addition to one space per 100 linear feet of fixed benches. Based on these standards, the proposed arena consisting of 4,213 seats will require 71 bicycle parking spaces to meet the City code. Medical facilities are required to provide one parking space per 4,000 s.f. of leasable floor area. Therefore, the proposed 20,000 s.f. medical office (assuming 85% of leasable space = 17,000 s.f.) use will require 5 bicycle parking spaces to meet the City code. Overall, the project would be required to provide an additional 87 bicycle parking spaces for the proposed project uses in addition to the 43 spaces required for the four existing ice rinks to meet the City code. Of the total 130 parking spaces, at least 80% or 104 parking spaces must be provided as Class II (short-term) parking facilities. The remaining 26 parking spaces should be provided as Class I (long-term) parking.

The proposed site plan lists 80 on-site bicycle parking spaces (76 short-term and 4 long-term spaces) being proposed to serve the project. The proposed number of on-site short-term bicycle parking spaces would not meet the City code. However, an additional 50 short-term bicycle parking spaces would be provided at the adjacent Giants Stadium and new SJSU Parking Garage. The applicant will need to

work with the City of San Jose staff to determine if the proposed 80 bicycle parking spaces on-site and 50 spaces within the Giants Stadium and new SJSU parking garage are appropriate for the project.

Queuing Analysis

For selected high-demand movements at key intersections, the estimated maximum vehicle queues were compared to the existing or planned storage capacity. The queuing analysis is presented for informational purposes only, since the City of San Jose has not defined any policies related to queuing. Vehicle queues were calculated using a Poisson probability distribution, which estimates the probability of "n" vehicles for a vehicle movement using the following formula:

$$P(x = n) = \frac{\lambda^n e^{-(\lambda)}}{n!}$$

Where:

$P(x = n)$ = probability of "n" vehicles in queue per lane
n = number of vehicles in the queue per lane
λ = Average number of vehicles in the queue per lane (vehicles per hour per lane/signal cycles per hour)

The basis of the analysis is as follows: (1) the Poisson probability distribution is used to estimate the 95th percentile maximum number of queued vehicles per signal cycle for a particular movement; (2) the estimated maximum number of vehicles in the queue is translated into a queue length, assuming 25 feet per vehicle; and (3) the estimated maximum queue length is compared to the existing or planned available storage capacity for the movement. This analysis thus provides a basis for estimating future left-turn storage requirements at intersections. The 95th percentile queue length value indicates that during the peak hour, a queue of this length or less would occur on 95 percent of the signal cycles. Likewise, a queue length larger than the 95th percentile queue would only occur on 5 percent of the signal cycles (about 3 cycles during the peak hour for a signal with a 60-second cycle length). Therefore, left-turn storage pocket designs based on the 95th percentile queue length would ensure that storage space would be exceeded only 5 percent of the time. The 95th percentile queue length is also known as the "design queue length".

A total of 11 left-turn movements at the following nine intersections listed below were evaluated as part of the queuing analysis for this project:

1. Tenth Street and I-280 NB On-Ramp (N) – westbound left/through
4. Tenth Street and Alma Avenue – westbound left, northbound left, southbound left
5. Tenth Street and Phelan Avenue – eastbound left
6. Eleventh Street and I-280 NB Off-Ramp (N) – northbound left
8. Senter Road and Keyes Street/Story Road – westbound left
14. First Street and Alma Avenue – southbound left
15. Lelong Street and Alma Avenue – southbound left
16. Lelong Street and SR-87 Ramps (unsignalized) – westbound left
18. Monterey Road and Curtner Avenue – eastbound left

The results of the queuing analysis show that there would be inadequate queue storage capacity for six of the twelve left-turn movements analyzed (six intersections). The queuing analysis is presented in Table 9. Intersections projected to have left-turn queue storage deficiencies are discussed below.

1. Tenth Street and I-280 NB On-Ramp (N)

The westbound shared left/through-lane and through-only lane queue lengths at the Tenth Street and I-280 NB On-Ramp (N) intersection are projected to exceed the existing storage capacity under existing, background, and background plus project conditions during the PM peak-hour. The 95th percentile queue length for this movement is estimated to be 18 vehicles (or 450 feet) per each of the two westbound lanes during the PM peak-hour under background conditions, exceeding the existing queue storage capacity of approximately 175 feet per lane. With the addition of project trips under Scenario 1, the 95th percentile queue is not projected to increase. However, with the addition of project trips under Scenario 2, the projected queue is projected to increase by one vehicle (to 19 vehicles, or 475 feet) per lane during the PM peak-hour, exceeding the existing capacity by approximately 300 feet per lane.

The westbound turn-lanes already extend the full length of the westbound approach to the upstream intersection of Eleventh Street/I-280 NB Off-Ramp (Study Intersection #6). Providing additional storage space by extending the two lanes or by adding a third lane is not feasible. As described under the existing conditions observations, the westbound queue already spills over onto the northbound left-turn lane of the Eleventh Street/I-280 NB Off-Ramp intersection.

4. Tenth Street and Alma Avenue

The northbound left-turn queue length at the Tenth Street/Alma Avenue intersection is projected to exceed the existing capacity under existing, background, and background plus project conditions during the PM peak-hour. Under background conditions, the 95th percentile queue length for the northbound left-turn movement is estimated to be 7 vehicles (or 175 feet) per lane during the PM peak-hour, exceeding the existing queue storage capacity of approximately 125 feet. With the addition of project trips under both Scenario 1 and Scenario 2, the 95th percentile queue for this movement is projected to increase by one vehicle (to 8 vehicles, or 200 feet) during the PM peak hour, exceeding the existing capacity by approximately 75 feet.

Extending the existing left-turn pocket would be required to accommodate the projected vehicular queue length for this movement. It may be possible to extend the left-turn pocket by an additional 75 feet, however this would require narrowing the existing travel lanes south of the left-turn pocket.

6. Eleventh Street and I-280 NB Off-Ramp (N)

The northbound left-turn queue length at the Eleventh Street/I-280 NB Off-Ramp intersection is projected to exceed the existing storage capacity under existing, background, and background plus project conditions during the PM peak-hour. The 95th percentile queue length for the northbound left-turn movement is estimated to be 17 vehicles (or 425 feet) under background conditions, exceeding the existing queue storage capacity of approximately 275 feet. However, the addition of project trips is not expected to lengthen the projected queues.

As described previously, the westbound queues at the intersection of Tenth Street/I-280 NB On-Ramp (Study Intersection #1) already spill over onto the northbound left-turn lane of the Eleventh Street/I-280 NB Off-Ramp intersection. Observations also indicate that the northbound left-turn queue already backs up to the upstream intersection of Eleventh Street/I-280 SB On-Ramp.

Table 9
Queuing Analysis Summary

Measurement	1. Tenth/ I-280 NB On-Ramp	4. Tenth/Alma			5. Tenth/ Phelan	6. Eleventh/ I-280 NB Off-Ramp	8. Senter/ Story	14. First/ Alma	15. Lelong/ Alma	16. Lelong/ SR-87 Ramps	18. Monterey/ Curtner
	WBL/T PM	WBL PM	NBL PM	SBL PM	EBL PM	NBL PM	WBL PM	SBL PM	SBL PM	WBL PM	EBL PM
Existing Conditions											
Cycle/Delay[1] (sec)	80	80	80	80	72	80	126	150	128	33	156
Lanes	2	1	1	1	1	1	1	1	1	1	2
Volume (vph)	950	9	168	66	83	486	390	100	308	436	148
Volume (vphpl)	475	9	168	66	83	486	390	100	308	436	74
Avg. Queue (veh/ln.)	11	0	4	1	2	11	14	4	11	4	3
Avg. Queue[2] (ft./ln)	264	5	93	37	42	270	341	104	274	100	80
95th %. Queue (veh/ln.)	16	1	7	4	4	16	20	8	17	8	6
95th %. Queue (ft./ln)	400	25	175	100	100	400	500	200	425	200	150
Storage (ft./ ln.)	175	125	125	200	125	275	300	250	225	975	325
Adequate (Y/N)	**NO**	YES	**NO**	YES	YES	**NO**	**NO**	YES	**NO**	YES	YES
Background Conditions											
Cycle/Delay[1] (sec)	80	80	80	80	72	80	126	150	128	43.4	156
Lanes	2	1	1	1	1	1	1	1	1	1	2
Volume (vph)	1048	9	171	66	83	503	441	191	318	472	363
Volume (vphpl)	524	9	171	66	83	503	441	191	318	472	182
Avg. Queue (veh/ln.)	12	0	4	1	2	11	15	8	11	6	8
Avg. Queue[2] (ft./ln)	291	5	95	37	42	279	386	199	283	142	197
95th %. Queue (veh/ln.)	18	1	7	4	4	17	22	13	17	10	13
95th %. Queue (ft./ln)	450	25	175	100	100	425	550	325	425	250	325
Storage (ft./ ln.)	175	125	125	200	125	275	300	250	225	975	325
Adequate (Y/N)	**NO**	YES	**NO**	YES	YES	**NO**	**NO**	**NO**	**NO**	YES	YES
Background Plus Project Conditions (Sc. 1)											
Cycle/Delay[1] (sec)	80	80	80	80	72	80	126	150	128	45.8	156
Lanes	2	1	1	1	1	1	1	1	1	1	2
Volume (vph)	1062	13	184	75	86	512	446	196	323	477	364
Volume (vphpl)	531	13	184	75	86	512	446	196	323	477	182
Avg. Queue (veh/ln.)	12	0	4	2	2	11	16	8	11	6	8
Avg. Queue[2] (ft./ln)	295	7	102	42	43	284	390	204	287	152	197
95th %. Queue (veh/ln.)	18	1	8	4	4	17	22	13	17	10	13
95th %. Queue (ft./ln)	450	25	200	100	100	425	550	325	425	250	325
Storage (ft./ ln.)	175	125	125	200	125	275	300	250	225	975	325
Adequate (Y/N)	**NO**	YES	**NO**	YES	YES	**NO**	**NO**	**NO**	**NO**	YES	YES
Background Plus Project Conditions (Sc. 2)											
Cycle/Delay[1] (sec)	80	80	80	80	72	80	126	150	128	64.9	156
Lanes	2	1	1	1	1	1	1	1	1	1	2
Volume (vph)	1130	19	183	142	99	521	457	207	366	520	379
Volume (vphpl)	565	19	183	142	99	521	457	207	366	520	190
Avg. Queue (veh/ln.)	13	0	4	3	2	12	16	9	13	9	8
Avg. Queue[2] (ft./ln)	314	11	102	79	50	289	400	216	325	234	205
95th %. Queue (veh/ln.)	19	2	8	6	5	17	23	14	19	15	13
95th %. Queue (ft./ln)	475	50	200	150	125	425	575	350	475	375	325
Storage (ft./ ln.)	175	125	125	200	125	275	300	250	225	975	325
Adequate (Y/N)	**NO**	YES	**NO**	YES	YES	**NO**	**NO**	**NO**	**NO**	YES	YES

[1] Vehicle queue calculations based on cycle length for signalized intersections and control delay for unsignalized intersections.
[2] Assumes 25 feet per vehicle in the queue.
NB = Northbound, SB = Southbound, EB = Eastbound, WB = Westbound, R = Right, T = Through, L = Left.

8. Senter Road and Keyes Street/Story Road

The westbound left-turn queue length at the Senter Road and Keyes Street/Story Road intersection is estimated to exceed the existing capacity under existing, background and background plus project conditions during the PM peak-hour. The 95th percentile queue length for this movement is estimated to be 22 vehicles (or 550 feet) per lane during the PM peak-hour under background conditions, exceeding the existing queue storage capacity of approximately 300 feet. With the addition of project trips under Scenario 1, the 95th percentile queue is not projected to increase. However, with the addition of project trips under Scenario 2, the projected queue is projected to increase by one vehicle (to 23 vehicles, or 575 feet) during the PM peak-hour, exceeding the existing capacity by approximately 275 feet.

The westbound left-turn pocket could be extended by the additional 275 feet required to serve the projected queue length for this movement by removing a portion of the existing landscaped center median. However, extension of the left-turn pocket would require the removal of several trees located within the center median.

14. First Street and Alma Avenue

The southbound left-turn queue length at the First Street/Alma Avenue intersection is estimated to exceed the existing capacity under background and background plus project conditions during the PM peak-hour. The 95th percentile queue length for this movement is estimated to be 13 vehicles (or 325 feet) under background conditions, exceeding the existing queue storage capacity of approximately 250 feet. With the addition of project trips under Scenario 1, the 95th percentile queue is not projected to increase. However, with the addition of project trips under Scenario 2, the projected queue is projected to increase by one vehicle (to 14 vehicles, or 350 feet) during the PM peak-hour, exceeding the existing capacity by approximately 100 feet.

The southbound left-turn pocket could be extended by the additional 100 feet required to serve the projected queue length for this movement by removing a portion of the existing landscaped center median. However, extension of the left-turn pocket would require the removal of several trees located within the center median.

15. Lelong Street and Alma Avenue

The southbound shared left-turn and through-lane queue length at the Lelong Street/Alma Avenue intersection is estimated to exceed the existing capacity under existing, background, and background plus project conditions during the PM peak-hour. The 95th percentile queue length for this movement is estimated to be 17 vehicles (or 425 feet) under background conditions, exceeding the existing queue storage capacity of approximately 225 feet. With the addition of project trips under Scenario 1, the 95th percentile queue is not projected to increase. However, with the addition of project trips under Scenario 2, the projected queue is projected to increase by two vehicles (to 19 vehicles, or 475 feet), exceeding the existing capacity by approximately 250 feet.

Extending the existing left-turn pockets and providing a third southbound left-turn lane would be required to accommodate the projected vehicular queue length for this movement. However, the southbound lanes already extend the full length of the southbound approach to the upstream stop-controlled intersection of Lelong Street/Tamien Station entrance. Providing additional storage space by extending the southbound shared left-turn and through-lane or by adding a third lane is not feasible.

Potential Impacts on Pedestrians, Bicycles, and Transit

Pedestrian and Transit Access

As discussed previously, pedestrian facilities consist of sidewalks, crosswalks, and pedestrian signals at signalized intersections. The proposed project would be required to widen the existing 7-foot wide sidewalks along its entire frontages on 10th Street and Alma Avenue to 10-feet per the City's Complete Streets Standards and Design Guidelines. A north-south crosswalk along the east leg of the 10th Street and Alma Avenue intersection would provide direct access between the site and a proposed parking structure (owned by San Jose State University) to be constructed at the northeast corner of the intersection.

Project's Effect on Pedestrian and Transit Facilities

It can be expected that the majority of new pedestrian traffic would be generated by the proposed project and use of the new San Jose State parking garage north of the project site. Pedestrian traffic could also increase between the project site and bus stops along First Street/Monterey Road.

With the widened sidewalks and existing crosswalks along roadways and intersections in the vicinity of the project site, adequate pedestrian access to and from the project site to nearby pedestrian destinations would be provided.

Bicycle Facilities

There are numerous bike lanes and bike paths in the vicinity of the project site, including the Class II bike lanes along 10th Street, which serve the project site directly and prov ide connections to other bicycle facilities in the area.

Project's Effect on Bicycle Facilities

The proposed project could increase the demand on bicycle facilities in the vicinity of the project site. Assuming bicycle trips would comprise no more than one percent of the total project-generated trips, the project could generate 6-7 new bicycle trips during the peak hours. The potential demand could be easily served by the various bicycle facilities available in the immediate vicinity of the project site. Therefore, the potential increase in bicycle trips by the proposed project would not have an adverse effect on the existing bicycle facilities in the study area, and would not require new off-site bicycle facilities.

7. Conclusions

The potential impacts related to the proposed development were evaluated following the standards and methodologies set forth by the City of San Jose and the Santa Clara Valley Transportation Authority (VTA). The VTA administers the County Congestion Management Program (CMP). The traffic study includes an analysis of AM and PM peak-hour traffic conditions for 19 intersections and 6 freeway segments (12 directional segments) in the vicinity of the project site. The study also includes an evaluation of the project's effects on transit, bicycle, and pedestrian access.

Intersection Level of Service Analysis

The results show that, measured against the City of San Jose level of service standards, the intersection of Monterey Road and Curtner Avenue is projected to operate at unacceptable LOS E during the PM peak-hour under background plus project conditions. The remaining signalized study intersections would operate at an acceptable level of service (LOS D or better) during the PM peak-hour.

Unsignalized Intersection Analysis (Traffic Signal Warrants)

The results of the peak-hour traffic signal warrant checks indicate that the unsignalized study intersection of Lelong Street and SR-87 Ramps is projected to have traffic volumes that meet the thresholds that warrant signalization under background plus project conditions.

Other Transportation Issues

Site Access Evaluation

Vehicular access to the project site would be provided via two driveways along 10th Street (Driveways A and B) and two driveways along Alma Avenue (Driveways C and D). Driveways A and D will provide full-access to the site. Driveway B will provide outbound-only access from the site. Driveway C will provide right-turn only inbound and outbound access to the site.

According to the City of San Jose code, two-way driveways serving commercial uses must have a minimum width of at least 32 feet. Approaches to one-lane driveways must be at least 16 feet wide. Based on these requirements, only Driveway B will meet the City code. The site plan should be revised to provide at least 32-foot wide curb cuts at Driveways A and C. Driveway D also will not meet the City code, however it is not located on the project property. Given that Driveway D already serves the

existing baseball stadium and ice hockey facility, the 26-foot width could be deemed acceptable by the City. Ultimately, the City will decide whether Driveway D will need to be widened to 32 feet.

Driveway Operations

Under both Scenario 1 and Scenario 2 project conditions, minimal queuing (approximately one or two vehicles) can be expected at the southbound left-turn movement into Driveway A and the westbound left-turn movement into Driveway D due to low conflicting volumes in the opposing traffic stream of these movements.

Sight Distance at the Driveways

Based on the posted speed limits and Caltrans design standards, adequate stopping sight distance is and would continue to be provided at all project site driveways.

On-Site Circulation

The proposed drive aisle widths, in combination with the parking dimensions, would provide sufficient room for vehicles to back out of the 90-degree parking stalls. Based on the proposed layout of the project site, connectivity between all parking areas, adequate drive aisle widths and turn radii, on-site vehicular circulation would be adequate.

East Public Parking Area

During major events, it is recommended that parking be restricted at spaces located along the north-south drive aisle near Driveway D. Limiting parking along the drive aisle will allow traffic to enter and exit the site without being blocked by vehicles backing out onto the drive aisle.

Truck and Emergency Vehicles On-Site Circulation

Delivery trucks should have adequate space to maneuver into and out of the loading dock. It is recommended that access to the truck loading spaces be prohibited during a major sporting event.

Recommended Site Access and Circulation Improvements

The following recommendations are made to promote adequate site access and on-site circulation:

Provide Clear Sight Triangles at Driveways. The project must ensure that any landscaping and signage located adjacent to the project driveways do not obstruct the view for drivers exiting the site.

Design of Project Site. The design of the project site, including but not limited to driveways, sidewalks, drive aisles, turn radii, parking stalls, and signage should adhere to City of San Jose design standards.

Parking

The site plan indicates that a total of 599 parking spaces are proposed on-site including 48 spaces within a gated parking area (reserved for players and staff members), and 171 parking spaces allocated for events at the San Jose Giants Stadium site, adjacent to the east surface parking lot of the project and accessible from Driveway D. The on-site parking would be 1,586 spaces fewer than per the City parking requirements.

A new parking structure is currently under construction, with completion estimated in December 2020, at the northeast corner of the 10th Street and Alma Avenue intersection. The parking structure will have approximately 1,500 parking spaces available to Solar4Amercia Ice on event days. Sharks Ice and SJSU will enter into a long-term parking agreement which will be assignable to the City of San Jose. Should there be a delay in the provision of parking in the SJSU garage, other off-site parking locations will be identified in accordance with Chapter 20.90.200 of the San José Municipal Zoning Code for off-site, alternating use and alternative parking arrangements.

The applicant will need to work with the City of San Jose staff to determine if the proposed 599 parking spaces on-site and along with the use of 1,500 spaces within the new SJSU parking garage are appropriate for the project. A parking management plan should be prepared for arena rink events. The plan should identify an event schedule to ensure that arena events do not coincide with San Jose Giants baseball and SJSU sporting events to ensure parking availability in adjacent parking facilities. The plan may also require a limited-use schedule for the practice rinks to make available the majority of on-site parking for use by the arena.

Americans With Disabilities Act Compliance

The proposed number of accessible parking spaces satisfies ADA parking requirements.

Bicycle Parking

The proposed site plan lists 80 on-site bicycle parking spaces (76 short-term and 4 long-term spaces) being proposed to serve the project. The proposed number of on-site short-term bicycle parking spaces would not meet the City code. However, an additional 50 short-term bicycle parking spaces would be provided at the adjacent Giants Stadium and new SJSU Parking Garage. The applicant will need to work with the City of San Jose staff to determine if the proposed 80 bicycle parking spaces on-site and 50 spaces within the Giants Stadium and new SJSU parking garage are appropriate for the project.

Queuing Analysis

The results of the queuing analysis show that there would be inadequate queue storage capacity for six of the twelve left-turn movements analyzed (six intersections). Intersections projected to have left-turn queue storage deficiencies are:

1. Tenth Street and I-280 NB On-Ramp (N)

4. Tenth Street and Alma Avenue

6. Eleventh Street and I-280 NB Off-Ramp (N)

8. Senter Road and Keyes Street/Story Road

14. First Street and Alma Avenue

15. Lelong Street and Alma Avenue

Potential Impacts on Pedestrians, Bicycles, and Transit

Project's Effect on Pedestrian and Transit Facilities

The project will be required to widen the existing 7-foot wide sidewalks along its entire frontages on 10th Street and Alma Avenue to 10-feet per the City's Complete Streets Standards and Design Guidelines. With the widened sidewalks and existing crosswalks along roadways and intersections in the vicinity of the project site, adequate pedestrian access to and from the project site to nearby pedestrian destinations would be provided.

Project's Effect on Bicycle Facilities

The potential increase in bicycle trips by the proposed project would not have an adverse effect on the existing bicycle facilities in the study area, and would not require new off-site bicycle facilities.

Recommendations

- The site plan should be revised to provide at least 32-foot wide curb cuts at Driveways A and C. Driveway D also will not meet the City code, however it is not located on the project property.

Given that Driveway D already serves the existing baseball stadium and ice hockey facility, the 26-foot width could be deemed acceptable by the City. Ultimately, the City will decide whether Driveway D will need to be widened to 32 feet.

- During major events, it is recommended that parking be restricted at spaces located along the north-south drive aisle near Driveway D. Limiting parking along the drive aisle will allow traffic to enter and exit the site without being blocked by vehicles backing out onto the drive aisle.
- It is recommended that access to the truck loading spaces be prohibited during a major sporting event.
- A parking management plan should be prepared for arena rink events. The plan should identify an event schedule to ensure that arena events do not coincide with San Jose Giants baseball and SJSU sporting events to ensure parking availability in adjacent parking facilities. The plan may also require a limited-use schedule for the practice rinks to make available the majority of on-site parking for use by the arena.

Solar4America Ice Expansion TIA
Technical Appendices

November 12, 2019

Appendix A
Traffic Counts

Appendix B
Volume Summary Tables

Appendix C
Level of Service Calculations

Appendix D
Signal Warrants